HARDY

PROCESS SOLUTIONS

Measurement ▪ Automation ▪ Productivity
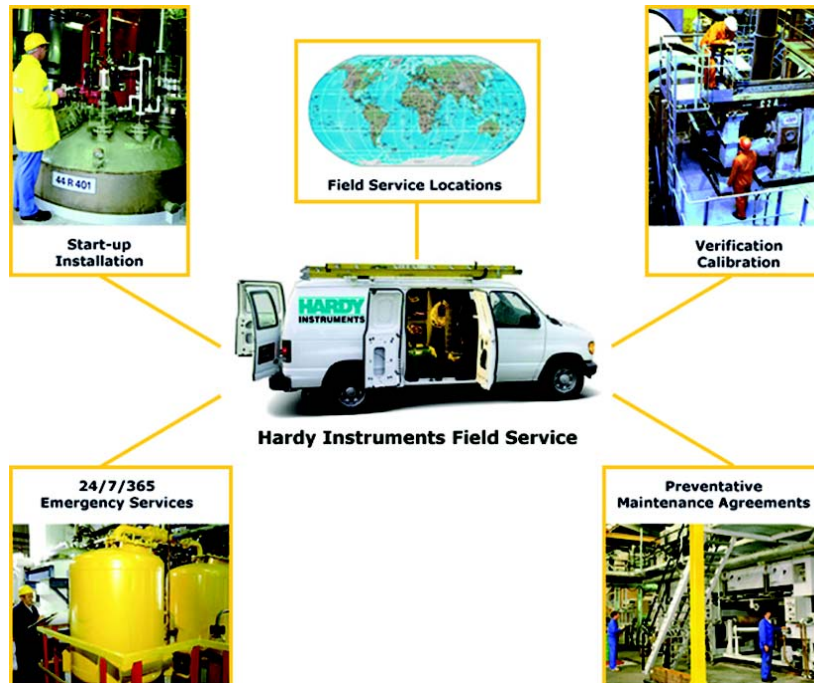
Weight Controller

HI 4050

User's Guide

Hardy Process Solutions Document Number: 0596-0303-01 REV W

Local Field Service

Hardy has over 200 field technicians in the U.S., and more positioned throughout the world to assist you in your support needs. We also have factory engineers who will travel to your facility anywhere in the world to help you solve challenging applications. We're ready to support you with:

- **Installation and start-up**
- **Routine maintenance and certification**
- **Plant audits and performance measurement**
- **Emergency troubleshooting and repair**

To request Emergency Service and Troubleshooting, Start-up, Installation, Calibration, Verification or to discuss a Maintenance Agreement please call **800-821-5831 Ext. 9550** or Emergency Service after hours (Standard Hours 6:30 AM to 5:30 PM Pacific Standard Time) and weekends **Ext**. **9550.**

Outside the U.S

Hardy Process Solutions has built a network of support throughout the globe. For specific field service options available in your area please contact your local sales agent or our U.S. factory at +**1 858-292-2710, Ext. 9550**.

Contents

• • • • • •

• • • • •

Chapter 1
Overview
• • • • • • •

General Introduction to the HI 4050 Weight Controller

This Manual describes installation, setup and troubleshooting procedures for the HI 4050 Weight Controller. 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
hardyinfo@hardysolutions.com

Or visit our web site at:

http://www.hardysolutions.com

Our web site provides information about our products, process weighing, web tension and vibration analysis applications. You can also update the HI 4050 User Guide. The latest revised manuals are available FREE in the product Documents & Software tab on the HI 4050 page on our Web Site. Other pages on the site provide answers to questions about load points, process weighing, vibration analysis, tension control 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.

Description

The Hardy HI 4050 is a single-channel, stand alone Weight Controller that comes with a backlit LCD display and key pad or DIN Rail mountable blind remote. The Weight Controller is designed to accommodate any number of configurations which include the following:

•
•
•
•
•
•

Mounting Options

- Din Rail Mount
- Panel Mount
- Stainless Steel Wall Mount (Optional)

Power Supply

- AC
- DC

Standard Communication

- RS 232 - Printer or scoreboard display (user selectable; two-way communications are not supported). This port can transmit weight data to a serial printer or scoreboard. Baud rates are user selectable at 600, 1200, 2400, 4800, 9600 or 19,200. (Default 9,600)

Communication Options

- EtherNet/IP™ - Key Code Activation Required
- DeviceNet™ - Slave
- Modbus TCP/IP
- RIO (Remote I/))
- ControlNet
- PROFIBUS®

I/O Options

- DIO - four digital outputs
- Three isolated digital inputs

Standard features include a selectable 10/100 Base T Ethernet port and embedded web server to link performance diagnostics and configuration data to and from your local Intranet, Extranet, VPN or via the Internet (World Wide Web). An available DeviceNet interface allows multiple applications to be viewed and controlled from one display and enables 3rd party I/O to be easily added to the system. Mapped I/O saves you wiring costs by distributing the I/O where you need it, at the process or in the control room. The available communication protocols allow you to integrate the controller into your corporate network, enabling data to be transferred to and from a PLC® (Programmable Logic Controller), DCS (Distributed Control System) or computer network.

NOTE *The HI 4050 was recently updated to the HI 4050+. To support all users of the HI 4050, regardless of hardware configuration, this manual uses the term HI 4050 interchangeably with the HI 4050+, except in those matters specifically referring to the HI 4050+.*

A 4050+ unit has new hardware that enable it to operate at 110 or 250 samples per second, offers a resolution of 1:30,000 and has a new patent-pending adaptive filtering mechanism called WAVERSAVER+ that increases the stability of weight readings by a factor of three.

You can identify the new HI 4050+ on the startup menu, which displays the name 4050+. 4050+ indicates that this is a unit with the new high speed weigh scale card in it and with the new firmware that supports these features.

```
                              0.00
HI4050+              GROSS      IB
>

ZERO     TARE     PRNT     MODE
```
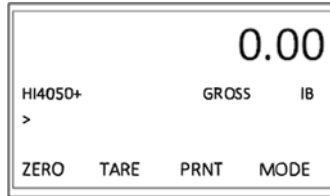
NOTE   *PROFIBUS® is a registered trademark of PROFIBUS International.*

DeviceNet™ and EtherNet/IP™ are trademarks of ODVA™
PLC® is a registered trademark of the Rockwell Corporation.
EtherNet/IP™ is a trademark of the Rockwell Corporation.

The HI 4050 INTEGRATED TECHNICIAN, in conjunction with an IT Junction Box, provides built-in diagnostics enabling you to troubleshoot and diagnose your weighing system from the front panel, web browser, or over a network. You can read individual load sensor voltages and weights, make comparisons, and isolate individual system components for quick and easy troubleshooting.

Enclosure Options

- N4 used when no junction cards are specified
- IT1 Integrated Technician Summing with AUX connector
- IT2 Integrated Technician Summing with trim pots
- JB1 Standard summing card with AUX connector
- JB2 Standard summing card with trim pots

Typical Applications

- Filling a Vessel Using a Feeder - Adding (by gain-in-weight) of a material into a container on a scale.
- Sequential Batch Control - Adding (by gain-in-weight) of multiple ingredients one at a time into a single weight hopper.
- Level Monitoring - Maintaining material levels in various vessels.
- Dispensing to a Vessel - Adding of a material (by loss-in-weight) from a vessel on a scale to a container which is off the scale.

Connectivity

The HI 4050 enables operators to use the selectable10/100 Base T Ethernet port and its embedded web server to link performance, diagnostics and setup data to and from your Intranet, Extranet, VPN or the Internet. The available communication interface lets you view and control multiple applications from a display and add third-party I/O to the system. A single RS-232 serial port is configured as a printer port.

Digital I/O

Digital inputs are used to either signal a change in state or send the commands to tare, zero, or calibrate the instrument. Two setup options provide alternatives for application-specific requirements. The standard option uses only the HI 4050's three built-in external digital inputs, which are sufficient for many applications.

Mapped I/O

Mapped I/O saves wiring costs by distributing the I/O where you need it, at the process or in the control room. Available interfaces provide communications to PLC, DCS or computer controlled systems.

WAVERSAVER®

Mechanical noise (from other machinery in a plant environment) can be present in forces larger than the weight forces being measured. The HI 4050 is fitted with WAVERSAVER technology that eliminates the effects of vibratory forces present in all industrial weight control and measurement applications. By factoring out almost all of the ambient vibratory forces, the controller can separate out the actual weight data.

WAVERSAVER can be configured from the front panel to ignore noise with frequencies as low as 0.25 Hz or as high as 7.0 Hz. One of five higher additional cut off frequencies can be selected to provide a faster instrument response time. The default factory setting is 1.00 Hz vibration frequency immunity.

WAVERSAVER+

WAVERSAVER+ is a superset of WAVERSAVER for the HI 4050+ that uses two additional parameters, **variation_thd** and motion_thd, to configure an adaptive filtering algorithm, which significantly improves the stability and accuracy of the weight reading.

C2® Calibration

C2 Electronic Calibration enables a scale system to be calibrated electronically without using certified test weights. A C2 weighing system consists of up to eight load sensors, a junction box, interconnect cable and an instrument with C2 capabilities, such as the HI 4050 Weight Controller. Digital information within every Hardy Process Solutions C2-certified load sensor details its unique performance characteristics. The HI 4050 Weight Controller reads the performance characteristics of each load sensor and detects the

quantity of load sensors in the system. The calibration process uses a reference point from the front panel or the Web Server. The reference is normally zero (no weight on the scale) but can be a known weight on the scale.

NOTE   *WAVERSAVER® and C2® are registered trademarks of Hardy Process Solutions Inc.*

Integrated Technician™

In conjunction with an IT junction box, the HI 4050 INTEGRATED TECHNICIAN™ (IT®) system diagnostics program makes it possible to diagnose weighing system problems from the 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. The New HI 6020 IT summing junction cards can support up to 8 load cells for diagnostics.

Secure Memory Module (SMM - SD)

The Secure Memory Module is a non-volatile secure digital card that stores critical HI 4050 configuration, calibration and setup data, thereby protecting this information from loss and/or corruption. The SD card dramatically increases the HI 4050's non-volatile storage capacity and flexibility. Furthermore the SD card can be read by a PC with an SD card reader. Each controller is equipped with one SD Card, for additional SD cards and SD card readers, writers and adapters, contact your local Hardy Representative or the Hardy Process Solutions Service Center for price and availability.

NOTE   *Hardy supports Hardy branded SD cards as well as most FAT and FAT32 formatted SD cards to a maximum size of 2GB capacity.*

Model Numbers

An example of a possible number: **HI 4050-DR-AC-EIP-N2-N3**

The abbreviations shown below indicate that the unit is an HI 4050 with a blind Din Rail mount that is AC powered with an EtherNet/IP communication port.

Model Number Option Symbols

Mounts

- DR: Din Rail
- PM: Panel Mount with Local or Remote Display
- PMWS: panel mount NEMA4 enclosure for wall mounting with local display

- DRWS: panel mount NEMA4 enclosure for wall mounting without local display

Power Supply

- AC: AC Voltage
- DC: DC Voltage

Internal Options

- N1: No Internal Option
- EIP: EtherNet/IP
- MD: Modbus/TCP/IP
- ROC: Rate of Change Mode

Network Options

- N2: No External Network
- CN: ControlNet
- RIO: Remote I/O
- DN: DeviceNet
- 4ANA: Analog Output Option - Network Slot
- PB: Profibus
-**MR:** Modbus-RTU

Auxiliary Options

- N3: No Auxiliary Options
- 4ANB: Analog Output Option - Option Slot
- DIO: Digital I/O Option - Option Slot**Options**

Rate of Change Option

The ROC option measures and displays the rate at which a material enters or is dispensed from the scale over a period of time. ROC data uses a 110-entry register. New weight values are written to the register at the rate of 1/110th of the time base. The first register is subtracted from the 111th Register, which is one time base older than the first register. The time frame can be set to units per second, minute, or hour. A time base of discrete values is selectable from 1 to 1800.

Analog Output Option

Each of four independent analog outputs per option card is configured from the front panel or the embedded web server. Two outputs are voltage and two are current. This option allows the transmission of gross, net, available Rate-of-Change (ROC) or "mapped" weight. Mapped weights can be 0-5V or 0-10V on the voltage outputs and 0-20 mA or 4-20 mA on the current outputs. It also is possible to span these ranges over a portion of the weight data with a resolution of 16,000 counts for each channel. All parameters can be mapped to these Analog Outputs.

NOTE   *The analog output is not isolated. An external 4-20 ma isolator may be required for stable readings.*

Digital I/O Option

While the standard HI 4050 includes three built-in external digital inputs, the digital I/O card option adds three more digital inputs (isolated) and four digital outputs (non-isolated).

RIO Option

Under license from The Rockwell Corporation, Hardy Process Solutions Inc. has developed a Remote I/O Interface for the HI 4000 Series. This interface is fast, field proven, requires minimal wiring, requires no special software drivers, and is standard on many Rockwell programmable controllers.

ControlNet Option

ControlNet is an open network protocol used in industrial automation applications for linking an HI 4050 to any ControlNet-capable device (such as PLCs)

Profibus Option

The PROFIBUS-DP (Decentralized Peripherals) communication profile is designed for efficient field-level data exchange. The central automation devices, such as PLC/PC or process control systems, communicate through a fast serial (RS485) connection with distributed field devices, e.g. PLCs. To begin communicating weighing parameters between an HI 4000 Series controller and a PLC, PC or DCS system controller, you need only to load the *.GSD file and set the node address.

DeviceNet Option

The DeviceNet Network is an open, industry-standard communication network protocol designed to provide an interface through a single cable from a programmable controller or PC directly to all HI 4000 series instruments as well as smart devices such as sensors, push buttons, motor starters, simple operator interfaces, drives and other weigh modules.

Communication Options

Chapter Four provides information concerning the purpose and setup procedures for the following network options:

- DeviceNet®
- EtherNet/IP®
- Modbus/TCP/IP®
- PROFIBUS-DP®
- ControlNet®
- RIO (Remote I/O)

Chapter 2
Specifications
• • • • • •

Chapter 2 lists the specifications for the HI 4050 Weight Controller. Specifications are listed for the standard instrument and for instruments fitted with optional equipment. The specifications listed are designed to assist in the installation, operation and troubleshooting of the instrument. Service personnel should be familiar with this section before attempting an installation or repair of the instrument.

General

Channels and Display

Number of Channels

- 1 Channel

Update Rate

- 110 or 250 Updates per Second (HI 4050+)
- 110 Updates per Second (HI 4050)

Resolution

- 1:10.000e (HI 4050)
- 1:30:000e (HI 4050+
- Displayed: 1:985,000 (@3 mV/V)
                 1:656,000 (@2 mV/V)
- Internal: 1:1,048,576

Display

- 128 x 64 Backlit LCD Tricolor Graphic Display with Blue and Green display options and error states represented in Red.

Display Increments (Graduations)

- 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 user-selectable via the front panel key pad and/or Web Page

Limits and Ranges

Excitation Voltage

- 5 VDC

Averages

• 1 to 250 User Selectable in Single Increments

Input

• Up to 8 350-ohm Full Wheatstone Bridge, Strain Gauge Load Sensor/Cells per vessel
• Signal Voltage Range: -.5 to16.5mV @ 5V

Key Pad

• 9 tactile keys, 4 Soft Keys (Mappable)

Non-Linearity

• 0.0015% of Full Scale

Digital Voltmeter

• Accuracy ± 2% of full scale

C2® Maximum Cable Length

• 1000' for C2, Non-C2 load cells, or JB Summing Card
• 250' for IT Summing Card

WAVERSAVER®

• 7.5 Hz
• 3.5 Hz
• 1.0 Hz - Default
• 0.5 Hz
• 0.25 Hz
• OFF

Power and Utility Ranges and Limits

Voltage

• 12-27 VDC (Class 2)
• AC: 120/240 VAC Universal (Optional)

Frequency

• 50/60 Hz

Power

• 10 Watts maximum with options

Battery

• Used to maintain time and date only.

Replaceable Lithium batteries
- Panasonic model BR1220 3V, 35mAh or BR1225 3V, 48mAh
- Rayovac model BR1225 3v, 50mAh

Common Mode Rejection

- 100dB @ 50-60Hz

Environmental Ranges and Limits

Operating Temperature Range

Ordinary Locations

- -10 to 40º C (14º to 104º F) using AC current
- -10 to 60º C (14º to 140º F) using DC current

Hazardous Locations

- -10 to 50º C (14º to 122º F) using AC/DC current

Storage Temperature Range

- DR Type: -40 to 85º C (-40 to 185º F)
- PM Type: -30 to 70º C (-22 to158º F)

Temperature Coefficient

- Less than 0.005% of full scale per degree C for zero and span

Humidity Range

- 0-90% (non-condensing)

Maximum Altitude for Installation

- 2000 Meters (6,562 Feet)

Approvals

- UL, CUL
- Hazardous Class I, Division 2, Groups A,B,C,D, T4A and Class II, Division 2, Groups F, G, T4A
- NTEP
- Canadian Weights and Measures
- CE
- CB
- DeviceNet (ODVA)
- EtherNet/IP (ODVA)

Physical Characteristics

Panel Mount

- Display: Width: 7.07" (179.7)
  - Height: 4.05" (102.8)
  - Depth from panel: 0.73" (18.4)

- Case Dimensions:2.99" H x 5.65" W x 3.125" D (75.9 mm H x 143.51 mm W x 79.37 mm D)

- Case Material: Aluminum Alloy (6063-T5)

- Weight:1.85 pounds (.84 Kilograms)

- Enclosure Rating: Front Panel NEMA 4, 4X Seal

Din Rail Mount

- Depth: 4.0" (101.6mm) Measured from bottom of the Din Rail Mounting Feet to top of the enclosure)

- Case: 2.99" H x 5.65" W x 3.125"D (75.9 mm H x 143.51 mm W x 79.37 mm D)

Wall Mount

- Stainless steel NEMA4 wall mount, with or without display

- Dimensions: 11.50" h x 8.28" w x 5.54" d (292.1 h x 210.3 w x 140.6 d mm)

Option Cards

Analog Option Card

Current Outputs

- 0-20 mA
- 0- 500Ω load at 20mA

Voltage Output

- 0-10 V, max current 10mA

Resolution

- 16,000 counts over 0 to 20mA and 0 to 10V range

Accuracy

- ≤ 0.25% error typical, ≤0.5% max error over time/temperature

Digital I/O Card

The Inputs and Outputs must be mapped. (See Chapter 6, Mapping)

Outputs

- Four non-isolated outputs
- Pulled to ground and current-limited to 250mA.
- Weak 5V pull-up (min 3V at 5mA out)
- Protected against input over voltage above 30V (short term)

Inputs

- Three optically insulated inputs
- 24 VDC input (30 VDC Maximum)
- 3V min input (high), 1V max input (low)
- Input load about 350Ω

Network Option Cards

Profibus Card

Connector: 9-pin serial connector, female

RIO Card

Connector: 5-pin connector

DeviceNet Card

Connector: 5-pin connector

ControlNet

Connector: BNC channels A&B

Ethernet RJ45

Connector: RJ45 EtherNet/IP connector on motherboard

Analog Out

Connector: 8-pin connector

Chapter 3
Installation

• • • • • • •

Chapter 3 covers unpacking, cabling, interconnecting and installing the HI 4050. Users and service personnel should be familiar with the procedures in this chapter before installing or operating the HI 4050.

NOTICE:

This equipment is suitable for use in Class I, Division 2, Groups A,B,C,D, T4A & Class II, Division 2, Groups F, G, T4A or Non-Hazardous Locations Only.

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

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

Step 4.   Record the model number and serial number of the HI 4050. Store them in a convenient, secure location for reference when contacting Hardy Process Solutions Customer Service Department or to buy parts or firmware upgrades.

Mechanical Installation

Installing the HI 4050 Weight Controller in a Panel

WARNING -   YOU MUST INSTALL THE HI 4050 IN A NEMA 4X ENCLOSURE WHEN USING THIS INSTRUMENT IN A CLASS I DIV 2 ENVIRONMENT.

AVERTISSEMENT – Vous devez installer le HI 4050 dans un boîtier NEMA 4X lors de l'utilisation de cet instrument dans un environnement de catégorie I Division 2

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

Step 2.   A paper template comes with the product (0578-0071-01). Make the hole pattern in the panel door or cover using the dimensions provided on the diagrams below.
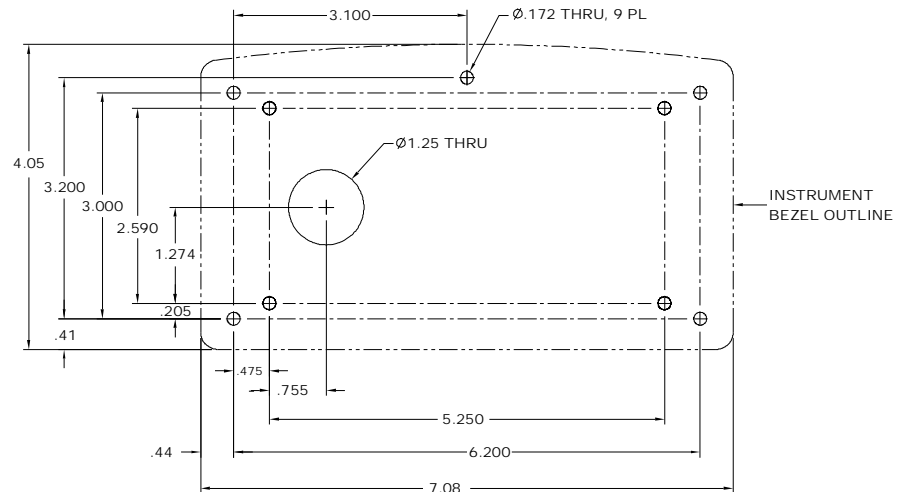
Panel Hole Dimensions (drawn from the back and not displayed to scale)

Printers and copy machines can distort or reduce the template measurements. Verify the dimensional accuracy of any paper template before use.

PANEL HOLE DIMENSIONS (RETROFIT)

NOTE *If you are mounting the panel in a wash down or hazardous area, you must drill the top center hole and install with the 6-32 x 1/2 inch screw.*
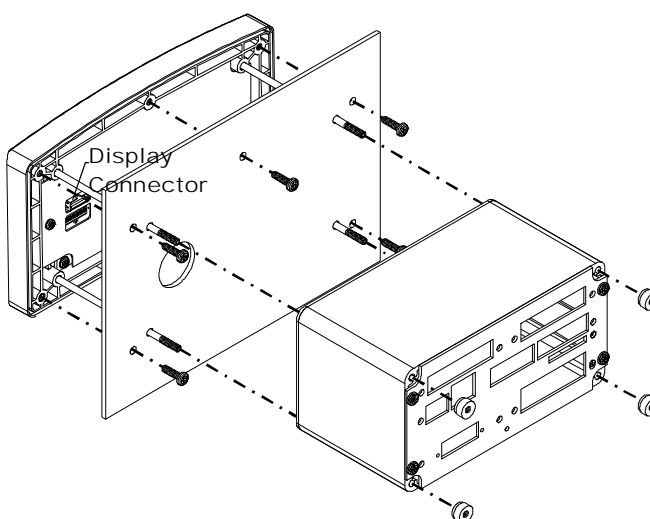
Step 3. Using a Phillips-head screwdriver, install the five 6-32 x 1/2 inch screws that fasten the bezel to the panel. Use a torque screw driver and torque each screw to 10 inch/pounds. DO NOT OVERTIGHTEN!

Step 4. Thread the four-threaded rods through the appropriate holes in the panel and into the bezel.

Step 5. Hand tighten each rod until you can no longer turn the rod. Do not force the rods or use pliers of any kind.

Step 6. Put the display cable and connector through the hole in the panel door or cover and plug the display connector into the display header in the bezel. Smooth any sharp or rough edges.

Step 7. Gently slide the electronic enclosure onto the threaded rods while making sure the display cable glides easily and does not kink.

Step 8. Move the electronic enclosure toward the panel until it stops. Thread the four 6-32 thumb screws onto the threaded rods until tight. Do not use pliers on the thumb screws.
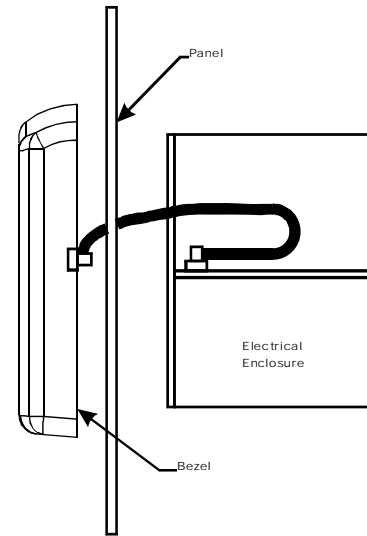
NOTE   *The cable orientation is important to insure you do not pinch the ribbon cable when assembled.*
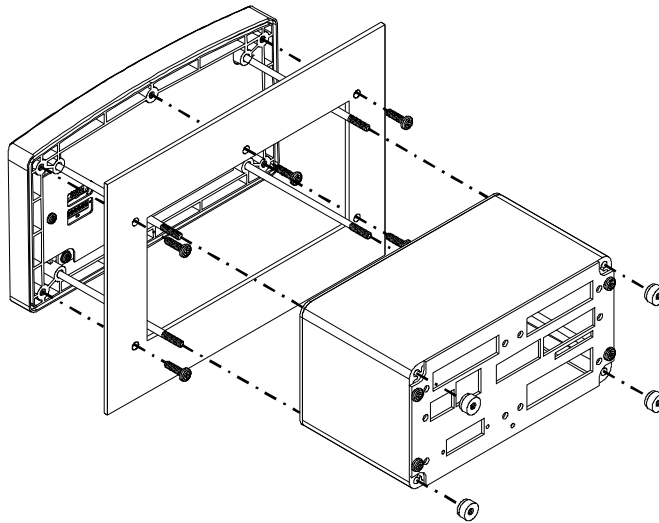
Installing the Wall Mount HI 4050xxWS Weight Controller

Wall mounting to dry wall backing: The enclosure's four mounting holes are located two top and two lower sides. With these top and bottom holes spaced 6" horizontally, a support back plate will need to be installed. This backing plate material choice is subject to environmental conditions. indoor, outdoor, hazardous areas or sever wash down conditions.

For this example we are recommending a 3/4" thick 24"x24" piece of MDX plywood, mounted flat and level to create a strong flat mounting surface for the HI4050PMWS and HI4050DRWS enclosure.

It is very important to install the enclosure on a flat surface. When the four enclosure mounting screws are tightened on a warped surface the enclosures NEMA 4/4X seal will be jeopardized.

Mount the plywood to the level surface, insuring you are screwing into two adjacent wall studs. Insure the four screws are flush and positioned to not interfere with the enclosure's four lag screws 3/8"x2". Drill 5/32" pilot holes to avoid splitting the wall studs.With the plywood secured to the wall, use a spirit level and install the enclosure to the plywood, using four 14-1 wood screws.

Verify the door closes and seals properly. You may need to use shims to insure the surface is level.

Blind Units (no display)

The front display is not necessary for the HI-4050 to operate as a scale controller. Blind units can be fully configured using the Web browser communication and the IP setup program provided on the system CD.

DIN Rail Installation HI 4050 Weight Controller

Step 1. Snap the two DIN rail mounting feet (shown on right) into the two holes on the front panel of the electronic enclosure appropriate for the desired mounting orientation.
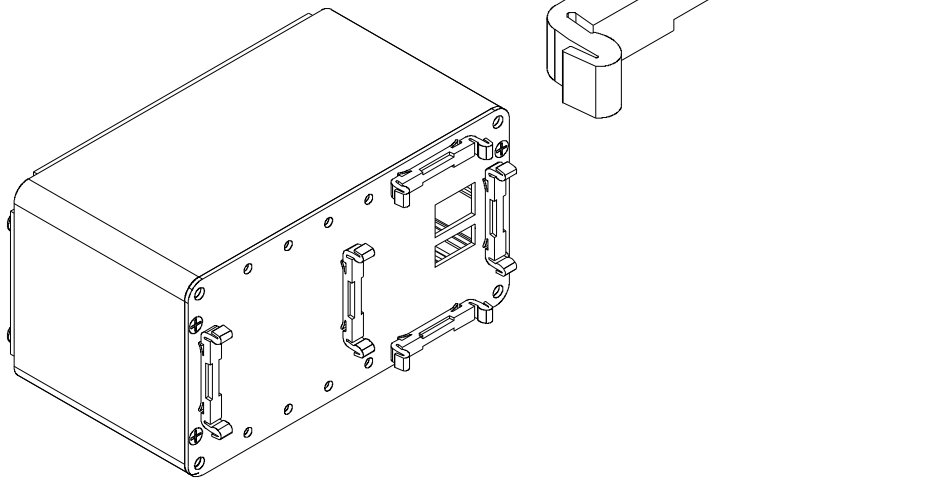
Step 2. When installing, push the mounting feet until you hear a snapping sound. The snap means they are mounted correctly.

Step 3. After installation, check each mounting foot to ensure it is seated correctly.

CAUTION: **If you do not hear a snapping sound, the mounting feet are not mounted correctly and the instrument may be loose, which may interfere with other electrical equipment or wiring.**

ATTENTION **Si vous n'entendez pas un claquement, cela signifie que les pieds de l'appareil ne sont pas installés correctement et l'instrument n'est pas stable, ce qui peut provoquer des interférences avec les autres équipements électriques ou câblage.**

There are several horizontal and vertical mounting options. It is required that at least two mounting feet be used per enclosure.

Step 4. To mount the enclosure onto a DIN rail, place the mounting feet on the DIN Rail and firmly press down until the mounting feet snap onto the rail.

Remote Display Installation

Step 1. Install the Electronic Enclosure on a DIN Rail or in a panel within 100 feet (30.5 meters) of the remote display.

Step 2. Use any 6 wire, shielded cable (Minimum 22 AWG).

Step 3.   A Template is shipped with the instrument. Use a ruler to verify that the holes
           displayed on the template match the measurements displayed on the template.

           Use the template to cut the five holes required for mounting the display on a wall
           or on the door of an enclosure.

Remote Display   **Electronic
                           Enclosure**

**Maximum
Cable Length
100 Ft.**
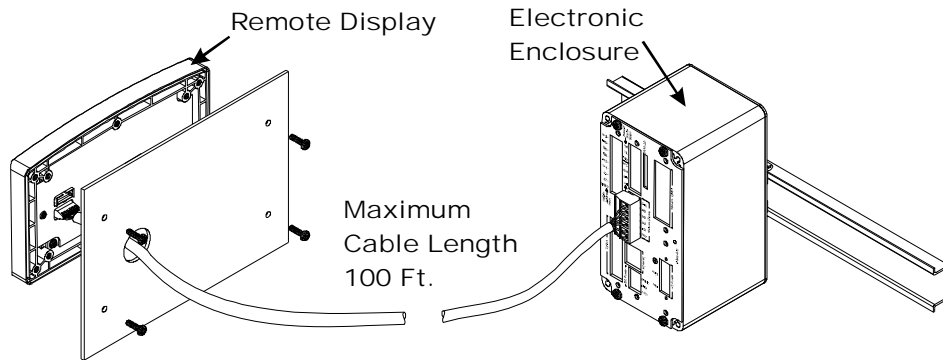
Step 4.   Connect the cable wires to the display and the Electronic Enclosure.
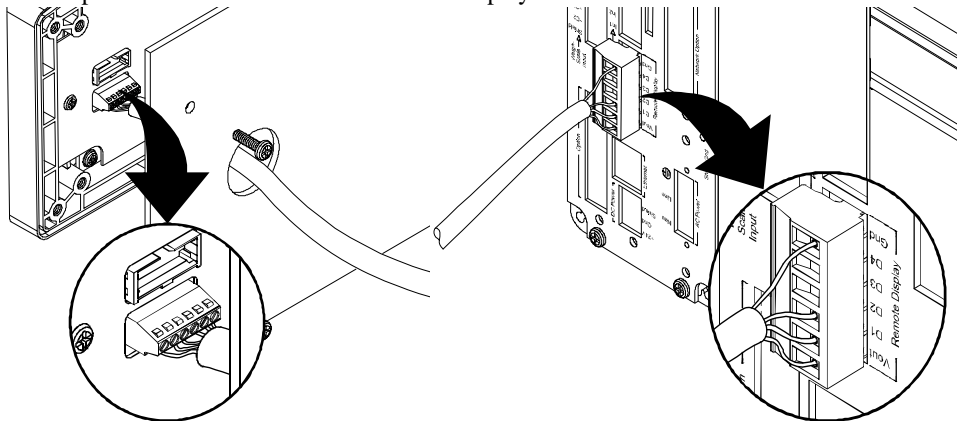
Step 5.   Strip enough insulation off the cable wires so that you can connect the wires to
           The Electronic Enclosure and Remote Display connector.

**WARNING -   Always turn the instrument off before disconnecting the display connector.
Do not hot-swap the display connector. Doing so will cause property damage or personnel
injury.**

**AVERTISSEMENT – Toujours éteindre l'appareil avant de débrancher le
connecteur d'écran. Ne pas changer le connecteur d'écran sans veiller à
éteindre le courant au préalable. Cela pourrait causer des dégâts matériels ou
des risques de blessures.**

Step 6.   Plug the Cable connector into the Remote Display header at the front panel of the Electronic Enclosure. Put the cable through the large hole you cut in the surface where you are going to mount the display. Smooth the large hole to prevent cable damage.

Step 7.   Strip enough insulation off the cable wires so you can connect the wires to the Display connector mounted at the back of the display. Wire the cable connectors as shown in the table below:

DISPLAY	ELECTRONIC ENCLOSURE
Voltage In (Vin)	Voltage Out (Vout)
D1	D1
D2	D2
D3	D3
D4	D4
Ground (Gnd)	Ground (Gnd)

Step 8.   Use a Phillips-head screwdriver and install the four 6-32 x 1/2 inch screws that fasten the bezel to the panel or wall. Use a torque screw driver and torque each screw to 10 inch/pounds. DO NOT OVERTIGHTEN!

Installing a Remote Slave Display

If you only want a remote display and do not want the functionality from the front panel keyboard, you can install a remote display by doing the following:

Step 1.   Use any 4 wire (Shielded) cable (Max 20 AWG / Min 22 AWG - Maximum cable length: 100 feet [30.48 meters]. Do not connect terminals D3 & D4 on either end of the Remote Display cable.

Step 2.   Connect the cable to the display connector.

Step 3.   Plug the connector into the Electronic Enclosure Rear panel header.
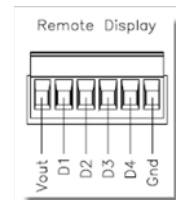
DISPLAY	ELECTRONIC ENCLOSURE
Voltage In (Vin)	Voltage Out (Vout)
D1	D1
D2	D2

DISPLAY	ELECTRONIC ENCLOSURE
D3 Not Used do not Connect	D3 Not Used do not Connect
D4 Not Used do not Connect	D4 Not Used do not Connect
Ground (Gnd)	Ground (Gnd)

NOTE   *You can still configure and operate the HI 4050 from the Web Browser.*

Connecting Two Displays

You can connect up to two displays by connecting one at the front panel and one at the rear panel. However, the display connected to the rear panel will have no keyboard

functionality. Connecting the display at the front panel (panel mount) requires the use of the short cable that comes with the unit.

Step 1.   Install the display to the front panel per Panel Mount instructions above.

Step 2.   Use any 4 wire (Shielded) cable and wire the rear panel connector per Remote Display instructions above.

Installing the SMM-SD Memory Card

Step 1.   Slide the SMM-SD card into the SMM-SD slot on the rear panel label side up.

Step 2.   Push in the SMM-SD card until a snap indicates that the card is seated.
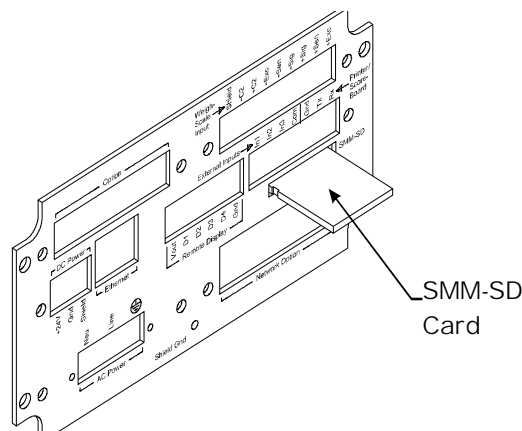
SMM-SD Card

NOTE   *The rear panel may have plugs mounted above the SMM-SD slot. When removing these plugs, avoid accidently disconnecting the SMM-SD card.*

Step 3.   To remove the SMM-SD card, gently push the card in towards the instrument and release the card. The card will pop out a little allowing you to completely remove it from the housing.

Step 4.   Always store the SMM-SD card in a static-free enclosure and in a secure environment so as not to lose the information stored on the card.

Load Point Installation

NOTE   *Use a torque screw driver to insure the smaller 4-40 screws are tightened to 7 inch/lbs (8.06 kg/cm) and the larger #6 and #8 screw to 10 inch/lbs (11.42 kg/cm)*

Rear Panel
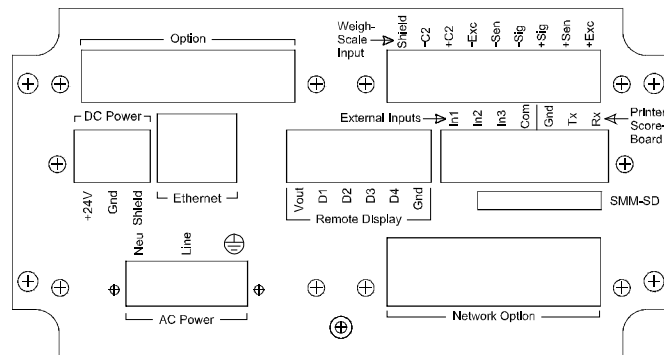
C2® Load Point Connection

We recommend the use of C2 cable from the instrument to the junction box. Note the color codes for C2 load points (left to right facing the rear panel). Match the load sensor's color coding to ease trouble shooting.

Load cell connector Rear panel 9 pin	C2 cable TB9 7 pin Junction Box Connector	Load cell color codes 3 pin connector
• Shield Ground Wire • C2- Violet • C2+ Grey • EXC- Black • SEN- Brown • SIG- White • SIG+ Green • SEN + BLUE • EXC+ RED	• EXC- Black • SEN- Brown • EXC+ RED • SEN+ BLUE • Shield Ground Wire • C2+ Grey • C2- Violet • SIG+ Green • SIG- White	• EXC+ RED • EXC- Black • Shield Ground Wire **4 pin connector** • C2+ Grey • C2- Violet • SIG+ Green • SIG- White

Step 1.   Remove the factory-installed jumpers from the terminal block if you are connecting an 8-wire cable from the junction box.

Step 2.   Connect the cable (Recommended load cell cable: Hardy Solutions Part. # 6020-0001) wires to the channel terminal block according to the cable color code.

Step 3.   Plug the terminal block into the Weigh Scale Input connector on the rear panel.

Non-C2 Load Point Connection

NOTE   *Cable color codes vary between vendors, check with your supplier for the color code for your non-C2 load point. If you are using the Integrated Technician summing card, C2 wires are required to communicate commands to the IT junction card and receive load sensor data in return.*

Step 1.   Remove the factory-installed jumper from the terminal block if you have 6 wire cable that includes sense wires from the load cell or junction box.

Step 2.   Connect the cable (recommended load cell cable: Hardy Solutions Part. # 6020-0001) wires to the Weigh Scale Input terminal block according to the cable color chart, or per manufacturers specification.

Step 3.   Plug the terminal block into the channel connector on the rear panel.

Input Power Wiring

NOTE   *When you use external over-current protection devices, mount the switch and/or circuit breaker near the instrument. Do not connect AC and DC power at the same time.*

WARNING -   Do not plug the power connector into the header with live power. To do so will result in property damage and/or personal injury.

AVERTISSEMENT – Ne pas brancher le connecteur d'alimentation dans le bâti lorsque le courant est déjà présent. Le faire peut entrainer des dégâts matériels et/ou des risques de blessures.

WARNING -   Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

AVERTISSEMENT – Danger d'explosion si la batterie est malremplacer. Remplacer uniquement avec le meme type ou équivalent recommandé par le fabricant. Recyclage des batteries usagees selon les instructions du fabricant.

AC Input Power Wiring (-AC)

WARNING -   Make sure that the power source does not exceed 240 VAC. Operating with incorrect line voltage can result in property damage and/or personal injury.

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

WARNING -   If an automatic disconnect device is used on the AC input wires, the disconnect must act on both the line and neutral wires in a double pole, double throw arrangement i.e. DPDT Relay. Using other automatic disconnect arrangements may cause personal injury and/or property damage.

AVERTISSEMENT – Si un dispositif de déconnexion automatique est utilisé sur les câbles d'entrées du courant, la déconnexion doit agir sur les lignes et câbles électriques neutres de type bipolaire, arrangement de type inverseur i.e Relais DPDT. L'utilisation de d'autres types de configurations de dispositifs peut causer des blessures sur personnel et/ou des dégâts matériels.

- Use a clean primary AC power line, directly from the power panel. This line should not supply any other equipment, including the feeding unit, and should be supplied with a maximum 20 amp breaker.

- AC Power Input

  Neu (Low neutral)

  Line (HI)

- Earth Ground
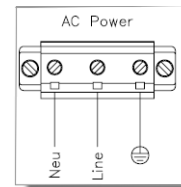
The HI 4050 is configured with a universal power supply rated from120 to 240 VAC.

- Make sure the VAC power is shut off before installing the wires to the connector.

- Install a 3-wire, minimum 14 AWG power line to the 3-pin terminal block connector. Using copper wiring is recommended. Consult your local rules and electrical codes.

DC Power Input (-DC)

CAUTION: **Be careful not to reverse the ground and hot wires, which can result in damage to the equipment.**

You must use a power-limited DC 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.

ATTENTION **Faites attention de ne pas inverser les fils sous tension et les fils allant à la masse, ce qui peut entrainer des dégâts sur le matériel.**

Vous devez utiliser un transformateur de type courant directionnel ou DC (de classe 2) avec une entrée de type DC. Le courant DC doit être fourni par une ligne conforme provenant de la source d'alimentation DC directement.

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

Step 2. Connect the 12-27 VDC voltage wire, ground wire and shield wire to the connector that plugs into the DC voltage header at the rear panel.

Step 3. Plug the connector into the header at the rear panel.

Step 4. Apply VDC power to the unit.
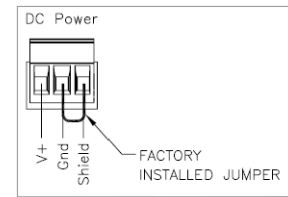
Printer/Scoreboard Wiring

Serial Gnd to Scoreboard Gnd

Serial Tx to Scoreboard RX

Serial Rx (No Connection)

Printer/score-board transmit data [tx] uses rs-232 serial interface communication protocol. External inputs can be configured via mapping. They are non-isolated, active low and referenced to common [com].

Wire size: 12 awg maximum / 22 awg minimum.
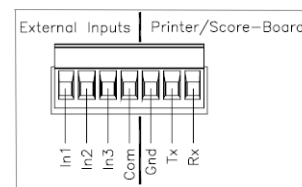
External Inputs 1-3

The first four pins on the input port are used for general-purpose digital inputs. These inputs can be mapped to switches or buttons to control such functions as tare, or zero scale. Inputs one through three can be used only with devices using 5 volts or less. They are activated by shorting the pins 1, 2, or 3 to the J2 pin External input connector pin 4/COM terminal with a dry contact switch or relay.
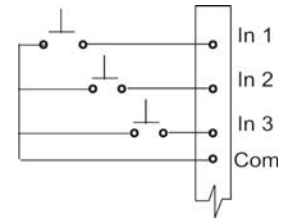
These standard inputs cannot interface with 24v logic directly. To activate the input contacts sent from a PLC, it is necessary to install a relay device as the dry contact or install the optional digital I/O card.

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 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.

Installing Printed Circuit Boards

Step 1. Line up the Printed Circuit board with the grooves in the electrical enclosure
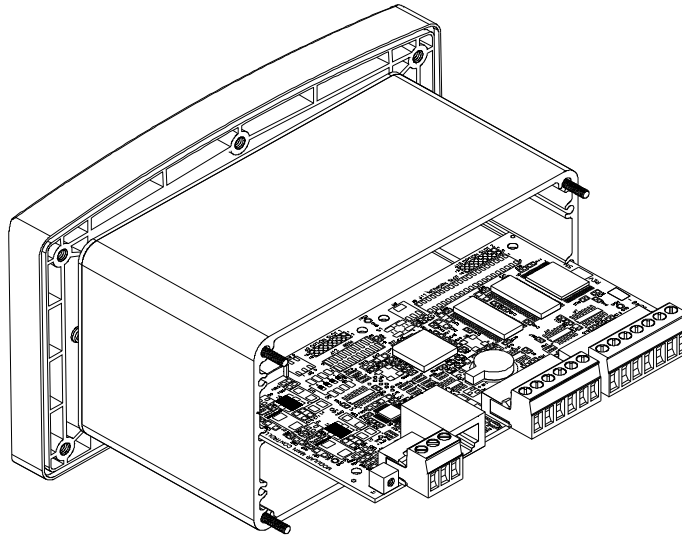
NOTE   *The Main Board and options are installed assembled. We are showing the Main Board installation only for illustration purposes.*

Step 2. The rear panel is normally installed before the printed board assembly is installed.
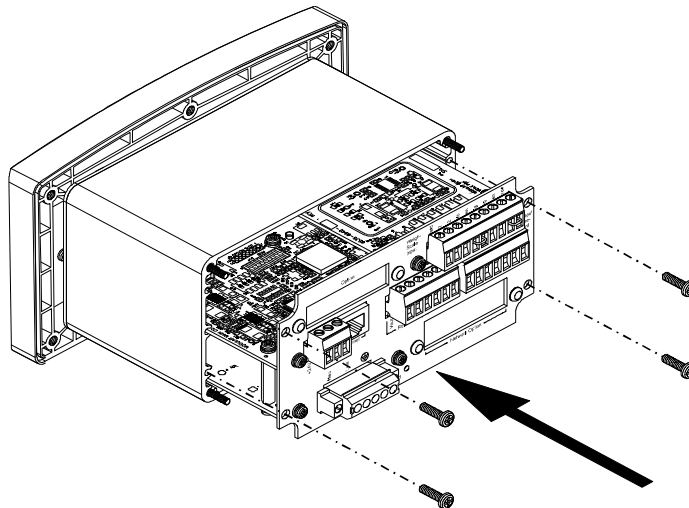
Step 3. Gently slide the circuit boards into the electrical enclosure until the rear panel is against the enclosure.

Step 4. Use the four 6-32 x .1875 Phillips pan-head screws to fasten the rear panel to the electrical enclosure.

Step 5. Use a torque screw driver and torque each screw to 10 inch/pounds. DO NOT OVERTIGHTEN!

Step 6. To disassemble the printed circuit board assembly, reverse Steps 1-5.

Installing Option Cards

The option cards connect to the Main control board either from the network header or option slot header. Each card is installed the same way in either the Network slot or the Options slot, except as noted. This applies to the following cards:

- DIO (options slot)
- Analog Output (option slot - 4ANB) or (network slot - 4ANA)
- Profibus (network slot)
- DeviceNet (network slot)
- ControlNet (network slot)
- RIO (network slot)

CAUTION: *Always protect printed circuit boards from electrostatic discharge (ESD). Always use approved ESD wrist straps and anti-static pads.*

ATTENTION   *Toujours protéger les circuits imprimés provenant de décharges électrostatiques (ESD). Toujours utiliser les straps ESD approuvés et tampons anti-statiques.*

Installing a Card in the Option Slot (applies to -4ANB and -DIO)

Installing the Cards

Step 1. Plug the Board Stacker into the Option Slot Header (J9) on the Main Controller board, as shown below.

NOTE   *Be careful not to bend the pins when plugging the Analog Board into the board stacker.*

Step 2.   Through holes in the bottom of the option card allow you to plug the board stacker into the option slot header (J2) on top of the card. Align the card through holes with 20mm stacker pins.

Option Slot
header (J2)

2mm Board
Stacker

Option Slot
header (J2)
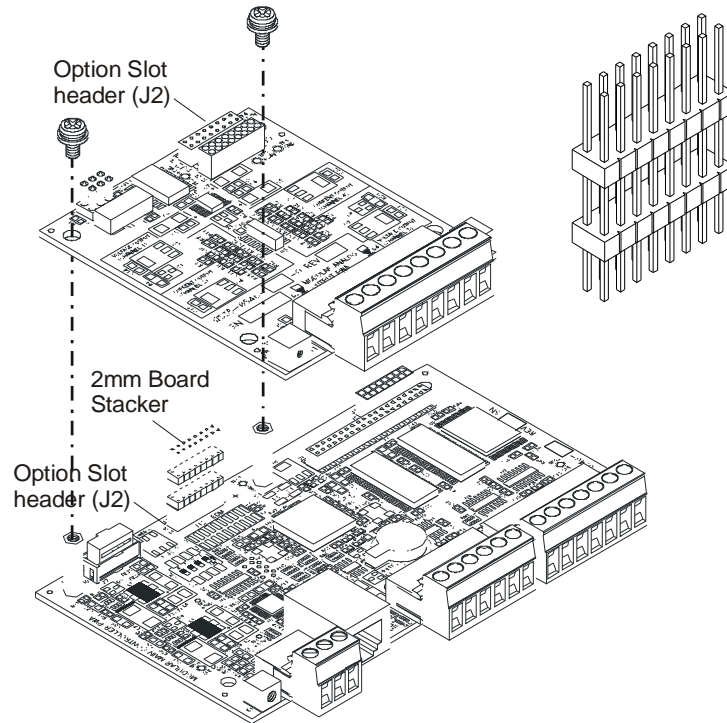
Step 3.   Gently push the card onto the 20mm board stacker pins (making sure you align them through holes on the analog board with the two standoffs on the Main Controller board) until the pins are seated.
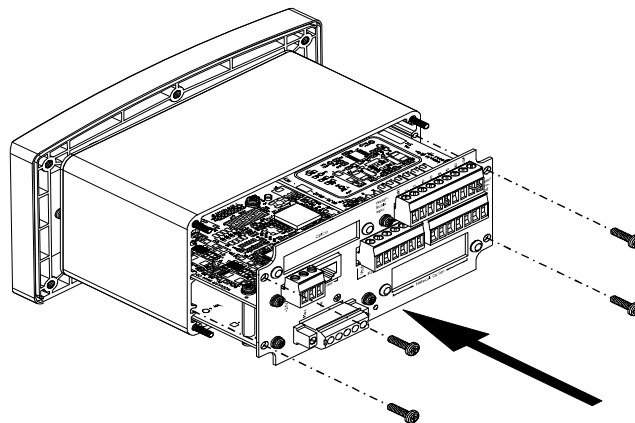
Step 4. Slide the board assembly into the chassis until it stops.

Step 5. Use the four pan-head screws (6-32 x .1875") to fasten the rear plate to the chassis.
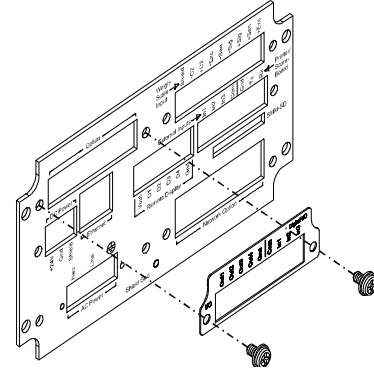
Installing Labels

Step 1. After removing the protective cover off the label, align the label with the through holes on each side of the Option port.

Step 2. Press the label onto the rear panel making sure that it sticks evenly.

Step 3. Use the two pan-head screws (4-40 x .25") flat and split washers to fasten the rear panel to the card assembly, as shown.
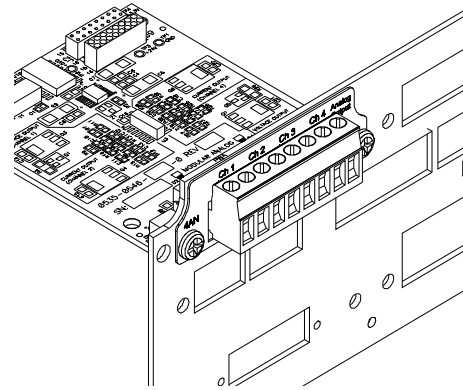
Wiring the Analog Output Card

The Analog Output card is a plug-in option (using a 16-pin board stacker) that you install in the controller board either using the option slot header, as described above, or network header slot, as described in the section Installing Network Cards. Four independent analog outputs can be configured to any of the instruments parameters over an adjustable 16,000 counts of resolution: two current (0-20 mA) and two voltage (0-10 VDC)

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

WARNING -   The Voltage and Current outputs are not interchangeable. To interchange voltage and current will cause personal injury and/or property damage.

AVERTISSEMENT – La carte analogue de Hardy est de source analogique. Ne pas connecter la carte analogique avec une autre source analogique interne ou externe. Le faire peut endommager le matériel et/ou provoquer des blessures sur personnel.

WARNING -   The Hardy Analog Card is the Analog Source. Do not connect the Analog card to another internal or external Analog Source. To do so may result in property damage and/or personal injury.

AVERTISSEMENT – Les sorties de tension et de courant ne sont pas interchangeables. Inter changer le courant et la tension peut provoquer des blessures sur personnel et/ou des dégâts matériels.

Analog Output Wiring

- Channel 1 -Voltage
- Channel 2 - Current
- Channel 3 - Voltage
- Channel 4 - Current
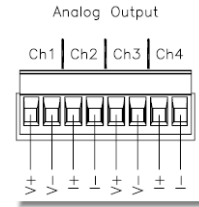
NOTE   *Use a torque connector screw driver to properly tighten the screw terminals to 7inch/lbs (8 kg/cm).*

Wiring the Digital I/O Option Card (-DIO)

The digital I/O card plugs into either the Options or Network slot. (Do no use the External output slot.)

The card can process up to three discrete input signals from a connected PLC or other source without using a relay. Its four outputs enable you to connect to external relays for switching on a valve, switch, etc.
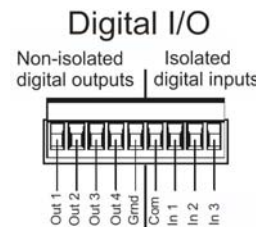
Pin Setup and Wiring

Suggested Option Card Input Wiring

To activate the DIO card's inputs, apply 3-30 VDC between the input terminal (pin 7, 8 or 9) and the COM terminal, pin 6 on the DIO card's 9-pin connector.

6 - Common (Isolated)
7 - Input 1
8 - Input 2
9 - Input 3
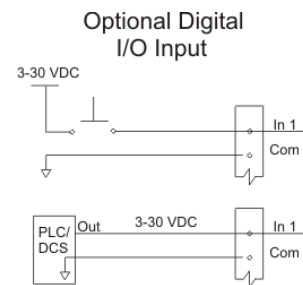
Suggested Option Card Output Wiring

You can use the four DIO card outputs to send a TTL weak 5vdc output signal (worst case minimum 3 V at 5mA out) to a relay driver circuit to actuate mechanical relays. The outputs can also implement pull-to-ground applications requiring 250mA or less. When the output activates, it pulls the return side to ground and activates the relay coil.

For connections to the digital outputs, 1-4 are output 1to output 4, and 5 is the GND (Same as power GND).

Steps to hook up an external relay

Step 1.   Attach a 3-30 VDC power supply common to the GND terminal, pin 5.
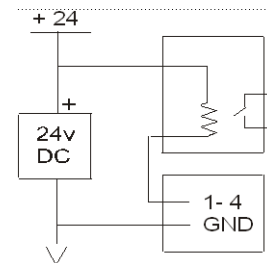
Step 2.   Connect the power supply plus side to the relay coil.

Step 3.   Connect the return side of the relay to a DIO output terminal.

Resettable Fuses

A current exceeding the limit trips a thermal fuse. The fuses will trip if any of the outputs are shorted to a power supply, causing the output voltage to rise to a high logic voltage level. The output will remain in the high state until the user resets the fuse.

To reset the fuse, either remove the power source from the output until the circuit cools (about 30 seconds) or toggle the digital output in question to a high voltage state for 30 seconds.

Installing a Card in the Network Slot

While some cards use a 16-pin board stacker and others use a or 40-pin board stacker, the process for installing an optional card in the network slot is basically the same:

Step 1.   Plug the 16-pin or 40-pin 28mm board stacker into the header on the network option card.
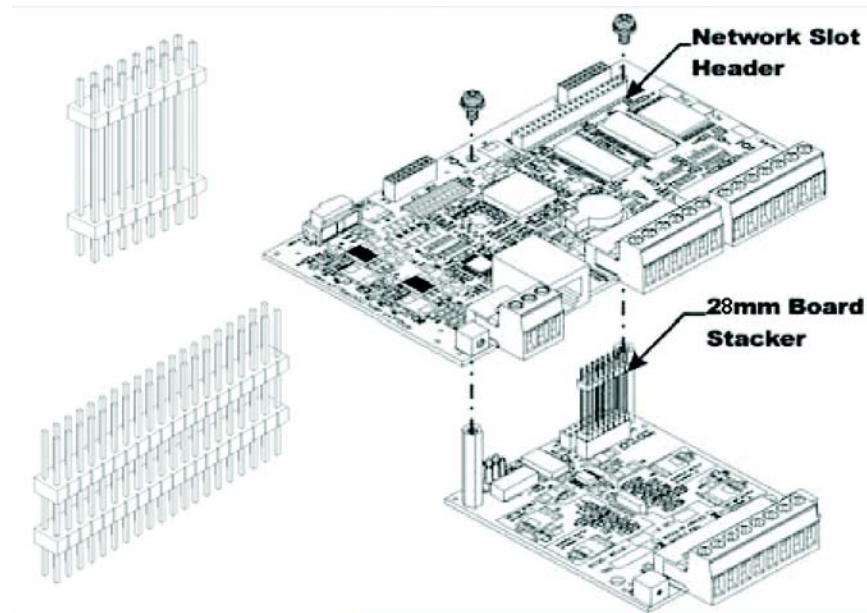
Step 2.   Align the board stacker pins with the16 right-side pin holes for the network slot Header (J41) located on the bottom of the Main Controller board.

Step 3.   Using two fingers gently push the board stacker pins into the network slot header until the standoffs touch the bottom of the main controller board.

Step 4.   Use the two pan-head screws (4-40 x.25") to fasten the option card to the
          standoffs attached to the main controller board.

Installing a Network Card Label

Step 1.   Peel the protective cover off the label.

Step 2.   Align the label with the through holes
          on each side of the Network port.

Step 3.   Press the label onto the rear panel
          making sure that it evenly sticks to the
          rear panel surface.
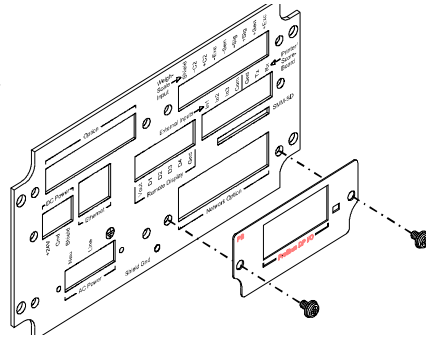
Step 4.   Use the two pan-head screws (4-40 x .25") split and flat washers to fasten the rear
          plate to the board assembly.
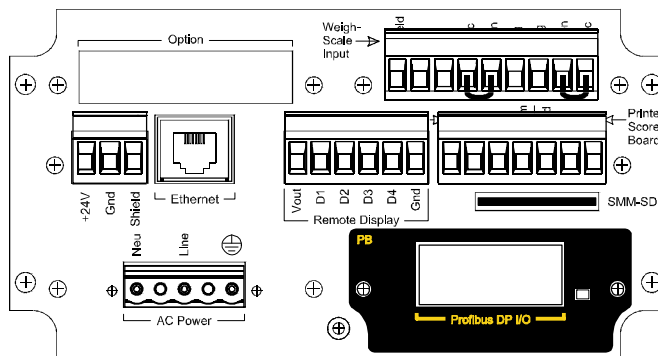
Step 5.   Slide the board assembly into the chassis until it stops.

Step 6.   Use the four pan-head screws (6-32 x .1875") to fasten the rear plate to the
          chassis.

Wiring the PROFIBUS Card

Profibus uses the 40-pin board stacker. Follow the procedure above under Installing
Network Cards.

Connector Terminations:

1	NO CONNECT
2	NO CONNECT
3	RXD/TXD +
4	RTS
5	GND BUS STATUS
6	+5V BUS
7	NO CONNECT
8	RXD/TXD -
9	NO CONNECT
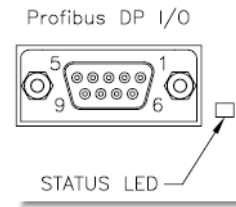
Wiring the DeviceNet Card

DeviceNet uses the 40-pin board stacker. Follow the procedure above under Installing Network Cards.

Left to Right facing the HI 4050 rear panel:

V-	Black
CAN-	Blue
Shield	Uninsulated
CAN+	White
V+	Red
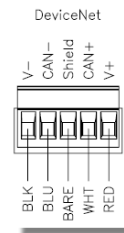
Wiring the Remote I/O Card

See the separate Remote I/O User's Guide for the HI 4000 Series (PN 0596-0306-01) for setup procedures.

Wiring the ControlNet Card

ControlNet Connectors

The ControlNet option requires standard BNC-type conectors. Both connectors should be used. if redundancy is required.
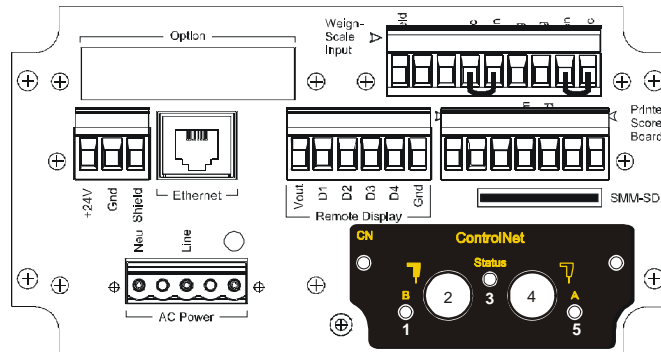
#	Item	#	Item
1	Network Status LED B	4	ControlNet Connector A
2	ControlNet Connector B	5	Network Status LED A
3	Configuration Status LED		

Network Status LEDs

LED	State	Indication
Led A and B	Off	Not online / No power
	Flashing Red (1 Hz)	Incorrect node configuration, duplicate MAC ID etc.
	Alternating Red/Green	Self test of bus controller
	Red	Fatal event or faulty unit
Led A or B	Off	Channel is disabled
	Alternating Red/Green	Invalid link configuration
	Flashing Green (1 Hz)	Temporary errors (node will self correct) or node is not configured to go on-line
	Green	Normal operation
	Flashing Red (1 Hz)	Media fault or no other nodes on the network

Module Configuration LED

State	Indication
Off	No power
Green	Operating in normal condition, controlled by a scanner in Run state
Flashing Green (1 Hz)	The 4050 has not been configured or the scanner is in Idle state
Red	Unrecoverable fault(s), EXCEPTION, fatal event
Flashing Red (1 Hz)	Recoverable fault(s), MAC ID has been changed after initialization, etc.

Wiring the Modbus TCP/IP Option

To connect the HI4050 to a Modbus TCP/IP network, plug a standard RJ-45 network cable into the Ethernet port as you would with any standard Ethernet connection.

Modbus TCP/IP is a software option that comes pre-installed in the HI4050 upon customer request. A key is required to enable the software. You can purchase the option with the Key by contacting your local Hardy Process Solutions Representative or Hardy Service Center. Chapter 4 describes the activation procedure.
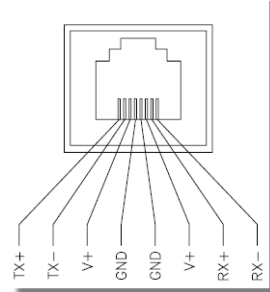
Chapter 4
Configuration

• • • • • • •

Chapter Four contains step-by-step instructions for configuring the Hardy HI 4050 Weight Controller and related communication networks. We recommend reading these procedures because having a correct configuration is necessary to ensure trouble-free operation.

This chapter explains how to configure the HI-4050 from either its own front panel or with a PC-based Web interface connected to the HI-4050 over a standard Ethernet network. HI-4050 features 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 4050 Weight Controller, make sure that:

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

See chapter 3 for details on installing load point cables and Ethernet wiring.

4050 Front Panel and Set Point Configuration

See Chapter 7 for a complete description of the front panel and how it works.

See Chapter 6 for a complete description of what set points are and how they are used.

See Chapter 7 for a description of how an operator can change a setpoint weight.

Ethernet Network Configuration

NOTE *Do not confuse the onboard Ethernet TCP/IP communication with EtherNet/IP®. EtherNet/IP is an industrial protocol that does not transmit Web traffic and is a purchased option.*

An embedded Web server in the HI-4050 allows you the 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-4050 and your desktop / laptop computer.

The HI-4050 Weight Controller 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, or configure the HI-4050 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.

IP Setup

If you have a blind unit, you must use the IP Setup utility to set the IP address instead of the front panel. Follow the steps below for a LAN or Direct Connection, but use the

IP address from these steps in the IP Setup utility to configure the 4050. Refer to the section on IP Setup Program at the end of this chapter for more information.

There are two primary ways to connect the HI-4050 to your computer:

LAN Connection: Connect the HI-4050 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-4050 and your desktop or laptop computer using any standard Ethernet cable. See the *Direct Connection* section below.

LAN Connection

To connect the HI-4050 to a LAN, you simply connect a standard Ethernet cable between the instrument and the common network hub. You will then need to determine the scheme 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. 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. To enable DHCP on the HI-4050, you must first set the current IP address to '0.0.0.0' on the IP configuration screen.

Step 1. Press Enter from the Summary display to activate the Configuration menu. Use the down arrow to select Instrument Setup and press Enter.

Step 2. Use the down arrow to select Ethernet; then select IP to display the IP screen.

Step 3. If the display is not already showing 0.0.0.0, press the CLR button to erase the current IP value.

Step 4. Starting with the right-most digit, enter the value '0.0.0.0' using the up/down arrows to select each character, and press the left arrow to move to the next digit.

Step 5. Press Enter to save the entry.

Step 6. Press the Exit key four times to exit the IP, Ethernet, Configuration and Setup menus.

Step 7. Power-cycle the instrument to force it to enable the DHCP method for setting the IP address. (Step not required for HI 4050 software after version 1.7.0.0.)

Step 8. Recall the Configuration / Instrument Setup / Ethernet / IP menu. If the DHCP configuration was successful, the DHCP: line will include an IP address provided by the network server. This is the IP address to use in your web browser to access the Web Interface. From here you can jump to the section *Network Options Configuration*.

Displaying the Complete DHCP IP 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. On the Ethernet menu, select DHCP. In our example the DHCP address shows 192.168.100.12. The actual address is 192.168.100.128. The "8" is not displayed.
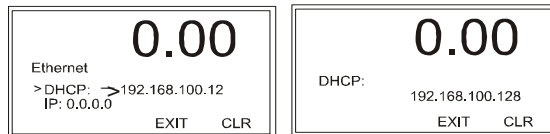
Step 2. Press Enter and the DHCP edit form will show the complete IP address.

NOTES   *You cannot change the values of the DHCP IP address. Exit returns to the Ethernet Menu.*

If the 'DHCP:' line remains 0.0.0.0, allow the instrument another minute to acquire an address from the server and re-enter the IP menu. If this doesn't work, the DHCP server is not visible to the HI-4050 and you should use a Fixed IP configuration.

Fixed IP Configuration Using the Front Panel

The HI-4050 can be configured to use any fixed IP address. 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.

Step 1. From the Summary display, press Enter to activate the Configuration menu. Use the down arrow to select Instrument Setup and press Enter.

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

Step 3. If the display is not showing the correct IP value, press the CLR button to erase the current value.

Step 4.	Starting at the right-most digit, enter the IP number using the standard format. Use the up/down arrows to select each character, and press the left arrow to move to the next digit.

192.168.110.99

Network Identifier

Node Identifier
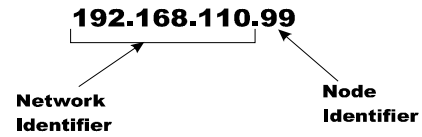
Step 5.   Press Enter to save the entry.

Step 6.   Press the Exit key four times to exit the IP, Ethernet, Configuration, and Setup menus.

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.

Direct Connection

This method of interconnect between an HI-4050 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.

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-4050 and PC with compatible IP addresses.

Direct Connect Hardware

Any standard Ethernet cable with RJ-45 connectors at each end can be used to connect the HI-4050 to your PC. A 'crossover' cable is not required. Simply plug the cable into each instrument.

Connecting a HI 4050 unit to a Laptop Computer

Step 1.   Find the weight controller's IP Address

Instrument Setup> Ethernet>

IP: xxx.xxx.xxx.xx (example 192.168.200.123)

Step 2.   On the Laptop

Open "*Control Panel*"

Select "*Network Connections*"

Right mouse click on "*Local Area Connection*"

Left mouse click on "*Properties*"

Highlight "*Internet Protocol (TCP/IP)*"

Left mouse click on "*Properties*"

Click the Radio Button for "*Use the following IP address:*"

Type in the same first 3 octets from the instrument, but change the node (.xxx) by 1 number (example 192.168.200.124)

Type 255.255.255.0 for the Subnet mask

Back out by clicking "*OK*" all the way back and your new IP address is set

Step 3.   On the laptop, open an Internet Explorer web page

Type in the weight controller's original IP Address

(example 192.168.200.123) and press "*Enter*"

The weight controller web page should now be displayed on the laptop

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; then click Sharing Center.

Step 5.   Click on Change Adaptor 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-4050* 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 = 192.168.100.100

Subnet Mask = 255.255.255.000

Step 11.   Select OK in the TCP/IP Properties dialog box. The computer is now fully configured.

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

Direct Connect Configuration - HI-4050

The HI-4050 must now be assigned a unique IP address that will connect to the Windows PC. There are two simple rules for the IP Address:

- It must have the same network identifier as the computer

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

192.168.110.99

Network Identifier
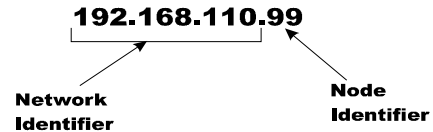
Node Identifier

If your Windows PC already had an IP address assigned, simply increment by one the Node Identifier field of the IP Address you wrote down in the Windows PC configuration steps above. If your Windows PC was originally set to automatically obtain an IP address (DHCP), use 192.168.100.50 for the HI-4050 IP address in step 3 below.

Setting an IP from the Front Panel

Step 1.   From the Summary screen, press Enter to activate the Configuration menu. Use the down arrow to select Instrument Setup and press Enter. Use the down arrow again to select Ethernet. Finally, select IP to display the IP screen.

```
        0.00              0.00              0.00
Setup                Ethernet
> Ethernet  ->         > IP: 192.168.100.1 ->   IP
  CONTRAST              DHCP: 192.168.100.1           192.168.100.1
         EXIT    CLR             EXIT    CLR              EXIT    CLR
```
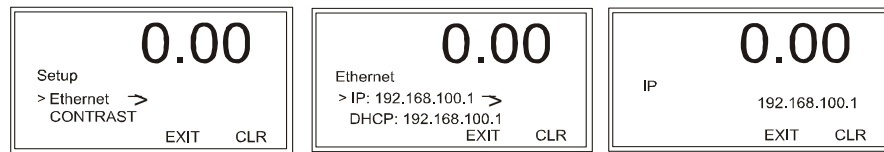
Step 2.   Press the CLR button to erase the current IP value.

Step 3.   Starting with the right most digit of the new HI-4050 IP address, enter each digit using the up/down arrows including the decimal-points. Press the left arrow to move to the next digit.

Step 4.   Press Enter to save the entry.

Step 5.   Press the Exit key four times to exit the IP, Ethernet, Configuration and Setup menus.

The HI-4050 is now configured to communicate with the PC. Enter the HI-4050 IP address from step 3 in the Windows PC Web browser to access the embedded web browser. For example: http://192.168.100.101.

Network Options Configuration

The HI 4000 Series Network configurations include:
- DeviceNet
- RIO
- Profibus DP
- Ethernet TCP/IP

- Modbus TCP/IP
- ControlNet
- Analog Out
- EtherNet/IP

This enables the HI 4000 Series to communicate with many devices on the network, including PCs and PLCs. This means that you can map, configure and monitor all the HI 4000 series products from the front panel or your LAN, Internet, DeviceNet, ControlNet and Wireless Servers that are connected to the Network.

Options Setup from the Web Page

From the Home Page click Configuration to open the Configuration page, and select Options to open the options menu.

What appears on this menu depends on the cards installed in your system. The second Options menus shown here lists DeviceNet, which we will configure as our first example.
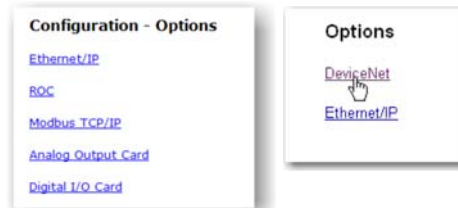
DeviceNet

DeviceNet is an open network protocol for connecting the 4050 to PCs, PLCs or embedded controllers through a single cable interface. Signals from the 4050 can be used for external diagnostics and troubleshooting. Smart devices, such as sensors, push buttons, motor starters, simple operator interfaces, drives and other weight modules can also be linked with DeviceNet, and third-party I/O can be easily added to any system. You can monitor multiple plant-floor devices from one display and reconfigure them as your needs change or service them as required.

Configuring DeviceNet from the Web Interface

Step 1.   From the Options Page select DeviceNet to display the DeviceNet Setup page.

Step 2.   Select the Baud Rate from the pull-down list. See your Network Administrator if you don't know the correct Baud Rate.

Step 3.   In the Node text field, type the Node address of the instrument. Our example shows a Node Address 3.

Step 4.   In the Bytes Input text field, type the bytes input value you need for your application. Our example shows 32 Bytes.

Step 5.   In the Bytes Output text field, type the bytes output value you need for your application. Our example shows 32 Bytes.

Step 6.   Click Save Parameters to save the configuration. The status of the DeviceNet Connection appears at the bottom of the display. If the instrument is connected to the DeviceNet Network, the message reads: "Yes DNET Connection. LED On." If not, it reads: "No DNET Connection. LED Off."

Configuring DeviceNet from the Front Panel

You can adjust the number of Bytes In and Bytes Out if your process requires a different configuration than the default 32 Bytes In and/or Out.

Step 1.   From the Configuration Menu, use the down arrow to select Options and press Enter to open the Options Menu. Use the down arrow to select DeviceNet, then press Enter to display the DeviceNet Menu.

0.00	0.00	0.00
Configuration	Options	DeviceNet
>Options >	>DeviceNet ➜	> DNET Baud 500k
Calibration	Ethernet/IP	DNET Node 3
EXIT CLR	EXIT CLR	EXIT CLR

Step 2.   Select DNET Baud, which is showing the present baud setting. Use the right or left arrow buttons to select the Baud Rate, and press Enter to save. Check with your Network Administrator for the Baud Rate if you don't know the correct Baud Rate.

RANGE: 125K, 250K, 500K (DEFAULT 125K)

Step 3.   Use the Down arrow to select DNET Node; then press Enter to display the DNET Mode edit screen.

0.00	0.00
DeviceNet	DNET Node
> DNET Node ➜ 3	
DNET Bytes In 32	3
EXIT CLR	EXIT CLR
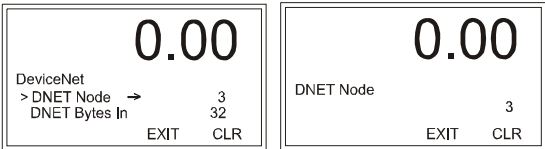
RANGE: 0-63
(DEFAULT 63)

Step 4.   Use the left or right arrow to position the cursor and the up or down arrow to select the node address assigned to this instrument, then press Enter to save the entry.

Step 5.   Use the Down arrow to select DNET Bytes In, and press Enter to display the Bytes in edit screen.

RANGE: 0-32 (DEFAULT 32)
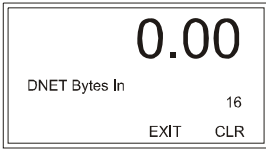
0.00
DNET Bytes In
16
EXIT   CLR

Step 6.   Use the left or right arrow to position the cursor and the up or down arrows to select the values.

Step 7.   When you have entered the new bytes in value, press Enter.

0.00
DNET Bytes Out
16
EXIT   CLR
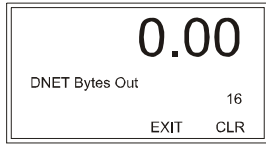
Step 8.   Use the same procedure used to enter the DNET Bytes In value to enter the DNET Bytes Out value.

RANGE: 0-32 (DEFAULT 32)

Step 9. The read-only Poll Connection entry should indicate that the 4050 is connected and polling. If the connection to the DeviceNet Network fails, a "No Connection message appears. Reconnect the DeviceNet cable. The "No Connection" goes away and the Poll Connection reappears.


```
            0.00
DeviceNet
> DNET Bytes Out ➜        32
  No Connection
                    EXIT      CLR
```
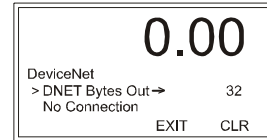
Remote I/O

NOTE   *For complete information about the remote I/O interface, see the HI 4000 RIO Manual.*

Step 1. To configure the Remote I/O from the Web Browser, from the HI 4050 Home page click Configuration; then click Options to display the Options Menu.
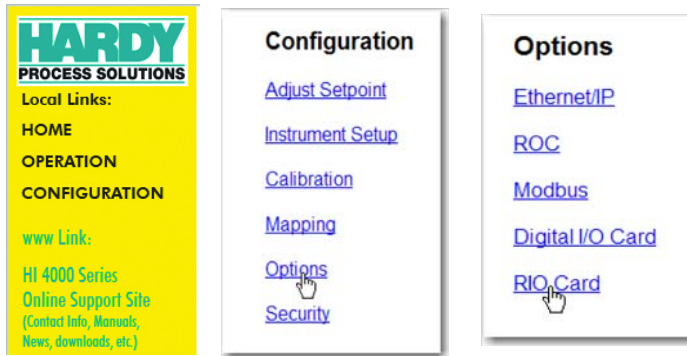
Step 2. Click RIO Card to display the RIO Option Card page.

Step 3. From the Baud pull-down list, select the Baud rate for this application.

Step 4. In the Address text field, enter the address for the HI 4050.
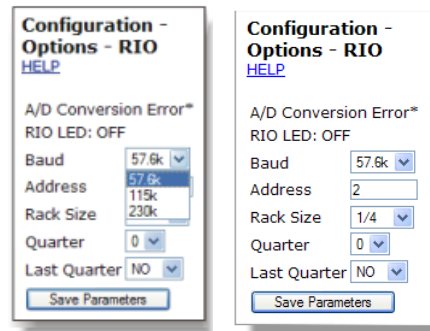
Step 5.   From the Rack Size pull down list, select 1/4 or as required. See HI RIO manual for definition.
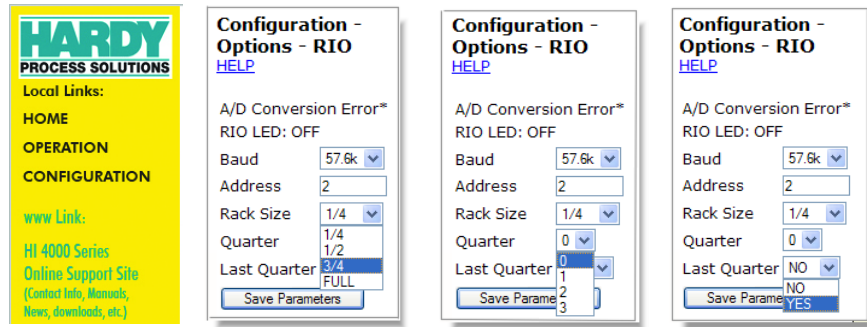
Step 6.   From the Quarter (Starting Quarter) pull-down list, select the Starting Quarter you configured in the PLC to use for this location.

Step 7.   The Last Quarter pull-down list is selectable as YES or NO.

Step 8.   Click Save Parameters when you finish. Note that you do not have to wait until you have configured the all the parameters to save them.

Blind Unit Operation Setup

An HI 4050-DR Rate Controller cannot be configured from the front panel as a blind unit. In a blind unit, the Remote I/O parameters are configured from the Web browser.

Viewing the I/O Card Display

The I/O Card Menu is not configurable but is read only from the front panel. The menu indicates whether the I/O Card is connected, A/D Count, Number of Inputs and the Number of Outputs currently activated. The values are hexidecimal values. A table is provided below to determine the values listed. The Input and Output values consist of a byte with the least significant bit equal to the first Input or Output.

Viewing the Controller I/O Card Option from the Web Page

Select Configuration from the HI 4050 Home Page and select Options to display the Options menu.
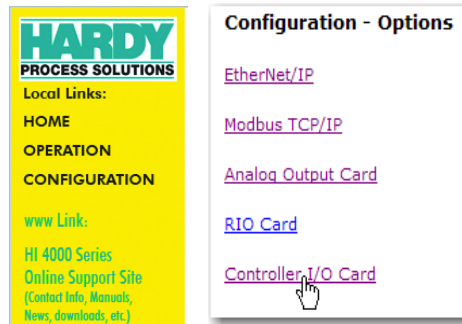
Select Controller I/O Card on the Options menu to open the read-only I/O Card page. This page shows the Inputs and Outputs that are currently activated. You may need to refresh your web screen to view any changes to the inputs.

Configuration - Options

EtherNet/IP

Modbus TCP/IP

Analog Output Card

RIO Card

Controller I/O Card

Configuration - Options - I/O Card

Status: OK
Inputs
               Input 1 (HI5.0)= 0
               Input 2 (HI5.1)= 0
               Input 3 (HI5.2)= 0
               Input 4 (HI5.3)= 0
               Input 5 (HI5.4)= 0
Outputs
               Output 1 (HO4.0)= 0
               Output 2 (HO4.1)= 0
               Output 3 (HO4.2)= 0
               Output 4 (HO4.3)= 0
               Output 5 (HO4.4)= 0
Analog Input Counts 1048 = 0.0 % of full scale
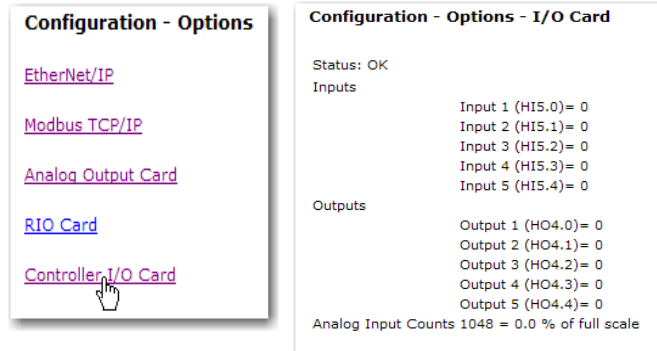
To test the inputs, continuously activate the input and refresh the web page while the input is activated. Confirm and move on to the next input. Be careful not to cause any false actions on the system while testing. When an input is activated you will also see the output percentage of full scale displayed at the bottom of the display.

Viewing the Controller I/O Card Option from the Front Panel

Step 1.   From the Options menu, use the down arrow to select I/O Card; then press Enter to display the I/O Card menu.

0.000
Options
> I/O Card ➔
   Analog Card
          EXIT   CLR

0.000
I/O Card
> I/O Card OK
   A/D Counts 1057
          EXIT   CLR
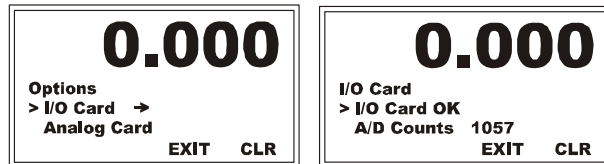
NOTE   *If the I/O Card Option is not installed the I/O Card Menu does not appear.*

Step 2.   Select Inputs and press Enter to open the Inputs edit form.

0.000
I/O Card
> Inputs ➔ 00000
   Outputs 00000
          EXIT   CLR

0.000
Inputs
          0 0 0 0 0
          EXIT   CLR
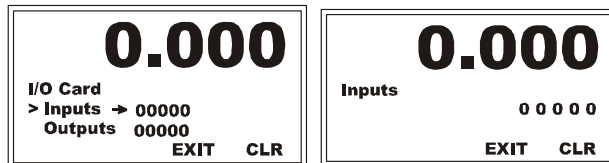
Step 3.   The Inputs are displayed as a 5-bit value. (0 0 0 0 0). Note that the least significant (right-most) digit is input 1 and the most significant (left-most) digit is input 5. For example, with Input 1 and Input 3 active, the display reads.

0.000
Inputs
          0 0 1 0 1
          EXIT   CLR
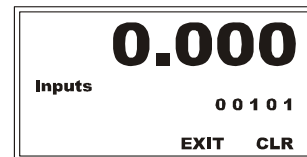
0   0   0   0   0

Input 5   Input 4   Input 3   Input 2   Input 1

Step 4. The Outputs are displayed as a five-bit value.

O   O   O   O   O

Relay 5   **Relay 4**   **Relay 3**   **Relay 2**   **Relay 1**

Relay 1 is on the right of the bit value and Relay 5 is on the left. For example, if Relay 4 and Relay 5 are active, the binary value is (1 1 0 0 0). If the relay output defaults are selected, the alarm and refill relays are activated.
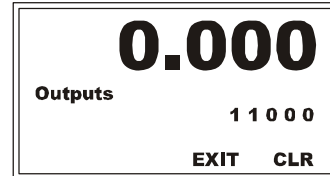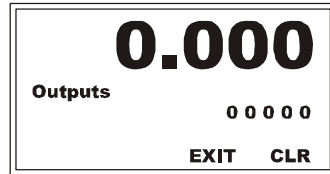
EtherNet/IP™

EtherNet/IP, short for **E**thernet **I**ndustrial **P**rotocol, is an open industrial networking standard that takes advantage of commercial, off-the-shelf Ethernet communication chips and media. Ethernet technology, enables the user to access device-level data from the Internet. The EtherNet/IP networking standard supports both implicit messaging (real-time I/O messaging) and explicit messaging (message exchange). EtherNet/IP is an open network that takes advantage of commercial technology that already exists.

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

You will need a key number to enable EtherNet/IP. You can purchase a key number by contacting the Hardy Service Center or your local Hardy Representative.

NOTE   *EtherNet/IP™ is a trademark of ODVA.*

Configuring EtherNet/IP from the Web page

Step 1. On the Options menu Click EtherNet/IP to open Configuration - Options-Ethernet/IP.

Step 2. A key is required to activate EtherNet/IP. If you have no key, contact the Hardy Process Solutions Service Center to purchase the key, which you enter in the Key field.
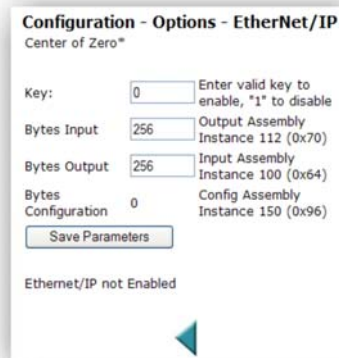
Step 3.   Click Save Parameters.

Configuring EtherNet/IP from the Front Panel

Step 1.   From the Configuration Menu, use the down arrow to select EtherNet/IP and press Enter to display the EtherNet/IP menu. Use the down arrow to select EIP Key, then press Enter to display the EIP edit page.
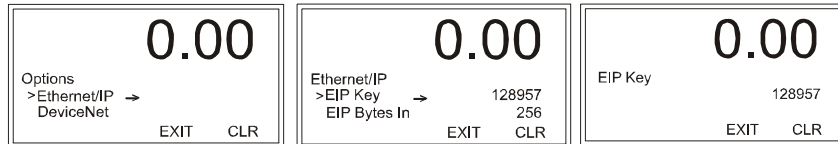
Step 2.   Use the left or right arrow to position the cursor and the up or down arrow to select the values. Enter key number you received from the HI Service Center and press Enter to save it. Note that the number displayed above is only for illustration purposes and is based on the serial number.

Step 3.   You will have to set the following parameters on your PLC in order to communicate with the HI 4050:

* COMM FORMAT: SINT, INT, DINT, OR FLOAT. Recommended as DATA-INT
* INPUT INSTANCE 100, LENGTH 0-256
* OUTPUT INSTANCE 112 - LENGTH 0-256
* CONFIGURATION INSTANCE 150 - LENGTH 0

Step 4.   From the Ethernet IP menu, select EIP Bytes Input to open the edit form.

Step 5.   Use the left or right arrow to position the cursor and the up or down arrow to select the values.
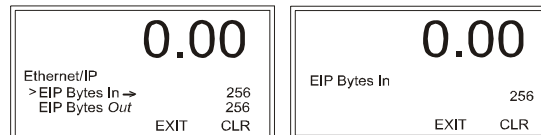
Step 6.   Use the left arrow to move to the next digit and enter the number of bytes you require for your application. Our example shows 256 bytes.

Step 7.   Use the same procedure used to enter the EIP Bytes In value to enter the EIP Bytes Out value.

Step 8.   The read-only Connected entry confirms that the 4050 is connected to the network. If the instrument is not connected to the network, a message appears saying "Not Connected." Check the EtherNet/IP connection at the rear of the instrument to make sure it is securely fastened to the EtherNet/IP port.

Rate of Change (-ROC) Option Configuration

Enabling Rate of Change requires a Key number. You can purchase a key number from the Hardy Service Center or contact your local Hardy representative.

Rate of Change is enabled as an option of print mode.

ROC Time Base

The Time Base is the length of time in seconds between two weight readings that are subtracted to determine the initial flow rate. By increasing the time base, you increase the time between weight readings. This allows more material to be dispensed during the time base period. A proper ROC cannot be determined if the time base is to short. The time base needs to be sufficient to insure a weight changed is determined at the end of each period.

Low flow rates require a longer time base than high flow rates. The HI 4050 measures weight to better than 1 part in 10,000. The formula below provides a general starting range.

TIME BASE > (SCALE CAPACITY/10000)/LOW RATE (units per second)

SCALE CAPACITY/10,000 = determines a consistent and stable weight increment.

Example: (440/10,000) = 0.044lb increments

The lowest setpoint in units per second @ 1lb per minute is: 1lb/60 seconds = 0.0166lb/seconds

Thus:

TIME BASE = 0.044/0.0166= 2.65 (rounded to 3)

MINIMUM TIME BASE = 3 second

This Time base is divided into 100 segments read over the 3 second time base. This will add a new weight reading every 30ms and recalculate the ROC in a rolling average scheme.

Configuring Rate of Change From the Browser

On the Home Page click Configuration to open the Configuration page, then select Options to open the options menu.
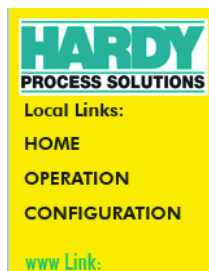
The Option reflects all internal options plus any options installed in your controller.

Step 1. Click ROC to open the Rate of Change page.

Enable Rate of Change

Serial Number: 2251

ROC Key: [0]   Enter valid key to enable, "1" to disable

Set Parameter

To enable this feature, please contact Customer Support to purchase a key.

Step 2. In the ROC Key field, enter the Key number provided by Hardy.

Step 3. Click Set Parameter. Wait a few seconds for the parameter to be saved in the instrument.

Step 4. Click the left arrow to reopen the Rate of Change page.

Step 5. Select the appropriate Time Measure from the Time Measure pull-down.

Rate of Change

Time Measure: sec ▼
Timebase: sec / min / hr   sec
Set Parameter

Disable Rate-of-Change

Step 6. To set the Timebase to use when running a Rate of Change evaluation, type a value in the Timebase text field.

Step 7. Click on the Set Parameter button to set the entry.

Step 8. Click the back arrow to return to the HI 4050 Home Page.

Rate of Change

Time Measure: sec ▼
Timebase: 20   sec
Set Parameter

Disable Rate-of-Change
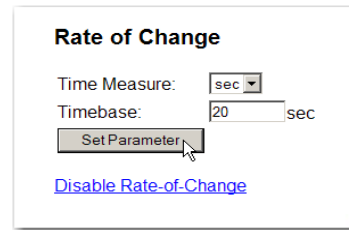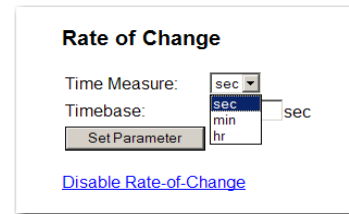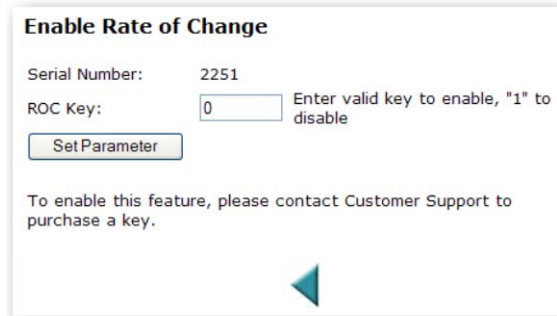
ROC Configuration from the Front Panel

See note above about the key requirement.

Step 1. Once you have a key number, select ROC from the Options menu to display the ROC menu; then press the down arrow to select ROC Key, and press Enter to display the ROC Key screen.
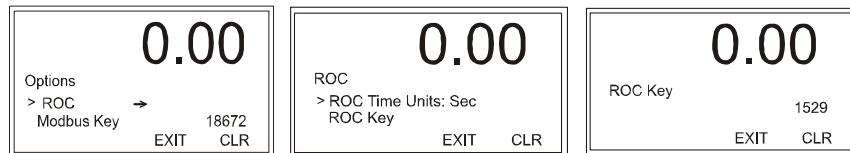
```
        0.00              0.00              0.00

Options            ROC               ROC Key
> ROC              > ROC Time Units: Sec
  Modbus Key    →    ROC Key                        1529
             18672
        EXIT   CLR          EXIT   CLR          EXIT   CLR
```

Step 2. Use the left or right arrow to position the cursor and the up or down arrows to select the values; then press Enter to save the entry. (Note: The displayed number is not valid.)

Step 3.   The Rate of Change is now enabled.

Step 4.   Press Exit to return to the Rate of Change Menu.

Configuring Rate of Change

Step 1.   Select time Base to
          display the Time Base
          edit screen. The Time
          base value can be 1-
          1800 seconds (default
          1).

```
              0.00                      0.00
ROC                         Time Base
> Time Base      →     60                        20
  ROC Time Units      Min
              EXIT    CLR              EXIT    CLR
```
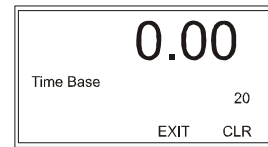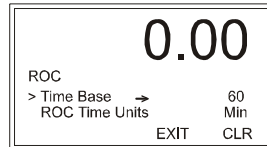
Step 2.   To set the Time Base, use the left or right arrow to position the cursor and the up
          or down arrow to select the values. Our example uses 20.

Step 3.   Press Enter to save the entry and return to the ROC screen.

Step 4.   With the cursor is in front of ROC Time Units, press
          the left or right arrows to select the Timebase value
          and use Enter to set the entry. In our example we
          selected seconds.

```
              0.00
ROC
> ROC Time Units: Sec
  ROC Key
              EXIT    CLR
```
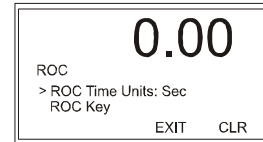
Modbus TCP/IP

Enabling Modbus TCP/IP from the Front Panel

You will need a key number to enable Modbus TCP/IP. You can purchase a key number by contacting the Hardy Service Center or your local Hardy Representative.

Step 1. Once you have a key number, from the Configuration menu, select Options to display the Options menu.

0.00

Configuration
> Options
  Calibration   →

EXIT   CLR

0.00

Options
> Modbus Key   →
  Ethernet/IP

EXIT   CLR
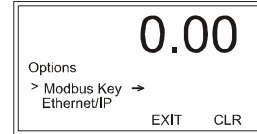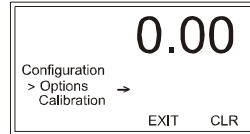
Step 2. Select Modbus Key to open the Modbus Key edit screen.

Step 3. Use the left or right arrow to position the cursor and the up or down arrow to select the Modbus TCP/IP Key number; then press Enter to save. (Note: *The key number shown is for illustration only. Your ROC key number will differ.*)

0.00

Modbus Key   18672

EXIT   CLR
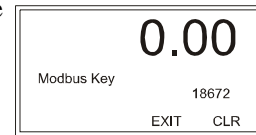
Installing MODBUS from the Web Page (10 socket max.)

NOTE   *MODBUS requires a Key to enable. You can purchase the option with the Key by contacting your local Hardy Process Solutions Representative or Hardy Service Center. If you have not received a key, contact the Hardy Service Center to get the key.*

Step 1. Click ModBus TCP/IP on the Options Page to display the ModBus Options page.

Configuration - Options

Ethernet/IP

ROC

Modbus TCP/IP

Analog Output Card

Digital I/O Card

Step 2. On the ModBus Options page, enter the key number in the Key field, and click Set Parameter to activate the Modbus option.

.

Modbus - Options

Modbus Key: 1544393   Enter Modbus key to enable turning Modbus ON or OFF

Set Parameter
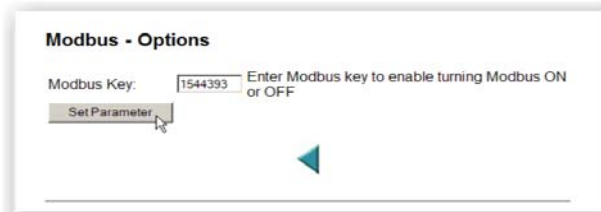
Step 3. You can now map from your client (PLC) to the HI 4050 module via Modbus.

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 4050 module. This client package only communicates with the PLC and is not a full communications package. If you have problems with this test, contact HI Technical Support.

Find a copy of the Hardy Modbus-Link Software on the Documentation CD you received with your HI 4050 Instrument. If you do not have the CD that came with your instrument, download it from the HI 4050 Resources Web page. 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 is an application layer messaging protocol used to support client / server communications between devices connected on different types of buses or networks.

Its services are specified by function codes that are elements of MODBUS request / reply PDUs. MODBUS is implemented for the HI 4050 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.
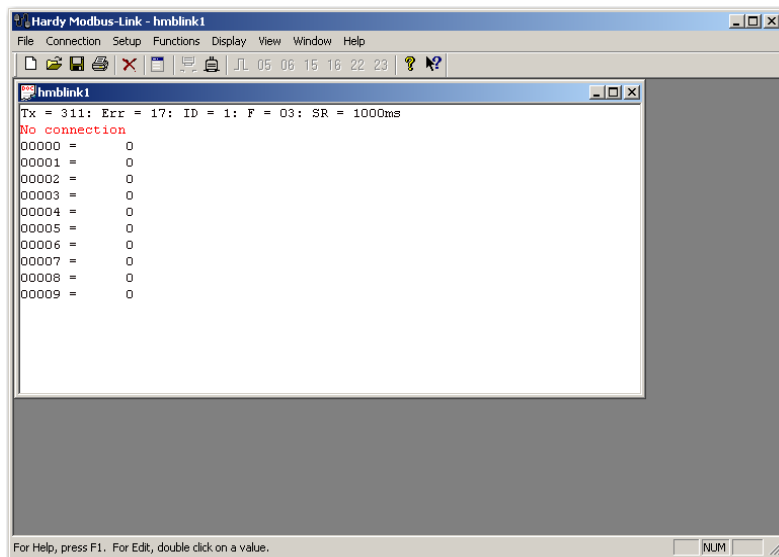
Step 2.   Click Connect n the Connection pull-down menu, to display the TCP/IP
         Connection form.
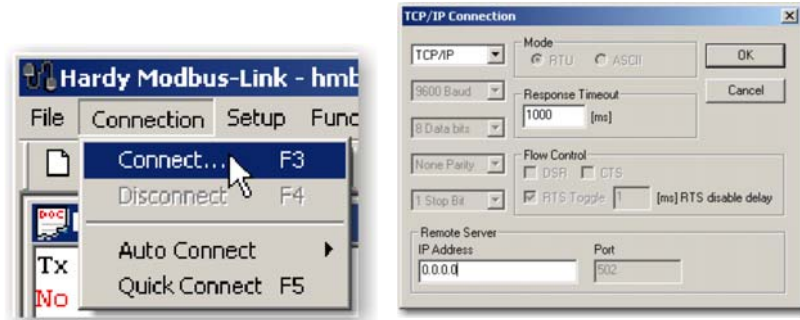
Step 3.   If TCP/IP is not selected, select it from the pull-down list.

Step 4.   Type the address of the HI 4050 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 4050
module.

Step 5.   To verify that you have two-
         way communication, from
         the Mapping web page of the
         HI 4050 instrument you want
         to communicate with, open
         the Destination Network pull-
         down menu and select
         Modbus Float Out (MFO).

Step 6.   Using the default word 0,
         click Select.

         MFO0=" appears in the Map:
         text field
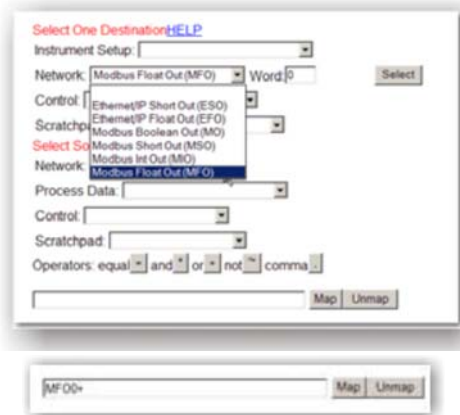
Step 7. Select Float Variable O (HFO) from the Select Source Scratchpad pull-down list.
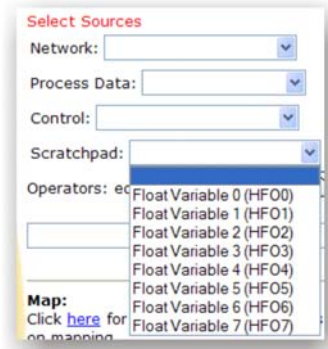
Step 8. Click Select. The Destination and Source appear in the Map: text field. (HFO0).
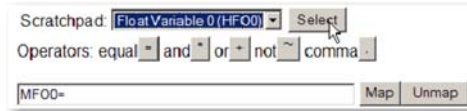
Step 9. Click Map to complete the mapping (Float Variable O, word 0 to Modbus Float Out, Word 0).

Step 10. Type a value in the Hardy Float Out (HFO) text field 0. Our example used 555.0000.
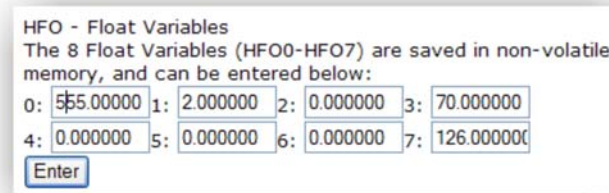
Step 11. On the Hardy Modbus-Link page Display pull-down menu, select Float Inverse. The value we entered from the Mapping page appears to the right of the "00000 =" which is 555.0000
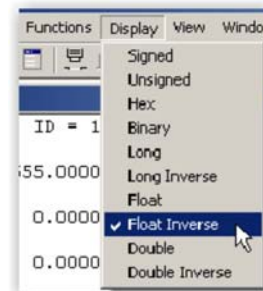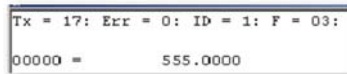
Step 12. Click button 23 to open the Write multiple registers display.

Step 13. Double click the current value. The Enter Value display appears with the value 555 which was sent from the HI 4050 module.

Step 14. Enter a new number and click OK. When we replaced 555 with 999,
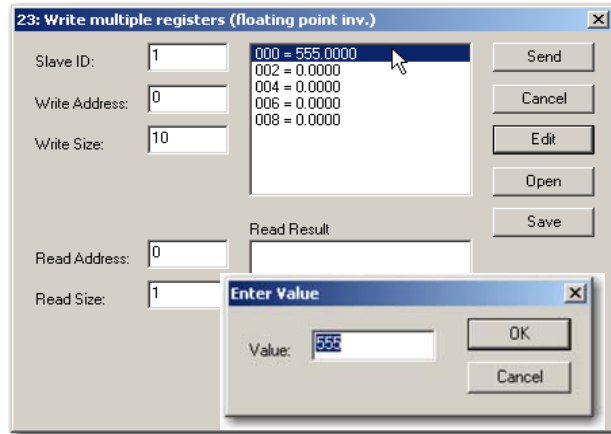
Multiple Registers displayed 999.0000.

Step 15. Click Send. A pop-up shows that the Response from the HI 4050 was received.

Step 16. Click OK.

Configuring MODBUS - TCP/IP Over Ethernet (10 socket max.)

Error Messages:

- Function Not Supported - Does not allow you to use the selected function. Use a different function.

- Address Error - Wrong IP address of the register you want to send the data. Get and enter the correct IP address, which you can get from your Network Administrator.

- Byte Count Error - The Byte count is incorrect. Enter the correct byte count.

- Value Error - The Value entered does not match the variable type. Enter the correct a value that is equal to or less than the variable type.

- Request Error - Your want to Read and you select Write. Make sure you select the correct Request Error.

Analog Card Option Configuration

The analog output card has four channels. Channels 1 and 3 produce a 0-10 volt (V) output. Channels 2 and 4 produce a 0-20 milliamp (I) output. The Voltage Low and High and Current Low and High are set to the default values 0-10 Volts output and 4-20 mA output. While there is normally no reason to change these values, they can be set to accommodate other ranges required for a PLC or operating environment.

With the required add processing time for an analog out signal. With the optional analog out card the SPS setting is forced to 110sps.

The configuration objective is normally to set high and low weight values to match the high and low weight specifications in the PLC. The analog card uses these high and low weight values to calculate its weight-related outputs. You can set these values from either the front panel or the Web interface.
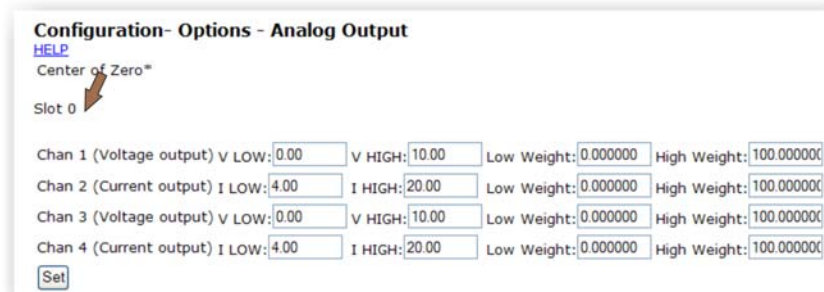
NOTE   *Each analog out channel used needs to be connected to a weighing element. (Gross, NET, ROC) using mapping. This mapping can be accomplished from the web browser or front display.*

Analog Card Configuration from the Web Interface

Step 1.   From the Home Page click Configuration to open the Configuration page, and select Options to open the options menu.

Step 2.   Click Analog Output Card to open the Analog Output form.

Note that Slot 0 indicates where the Analog Card is installed.

Configuration - Options

Ethernet/IP

ROC

Modbus TCP/IP

Analog Output Card

Digital I/O Card
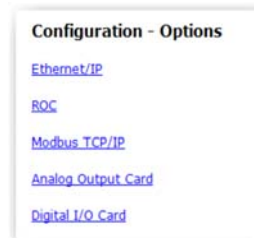
Configuration- Options - Analog Output
HELP
Center of Zero*

Slot 0

	V LOW	V HIGH	Low Weight	High Weight
Chan 1 (Voltage output)	0.00	10.00	0.000000	100.000000
Chan 2 (Current output)	4.00	20.00	0.000000	100.000000
Chan 3 (Voltage output)	0.00	10.00	0.000000	100.000000
Chan 4 (Current output)	4.00	20.00	0.000000	100.000000

Set

NOTE   *If you don't want to change the Voltage Low and High and Current Low and High default values, start with the Low and High Weight values for your application.*

*For assistance in configuring the Analog Output Card, click **HELP** at the top of the page.*

Step 3.   To Configure Channel1 (Voltage Output), rapidly click in the Chan 1 V LOW field until the entire value is highlighted (which may take a few clicks), then type in the value for your low voltage output.

Step 4.   Follow the same procedure to enter appropriate values for the high voltage output (V HIGH), Low Weight, and High Weight.

Step 5.   Click Set to save the parameters at any time. However if you are configuring more than one channel, you can wait until all the channels are configured.

Step 6.   To Configure Channels 2, 3 and 4, repeat the procedures above. Remember that Channels 2 and 4 are current (I) outputs.

NOTE   *To refine a reading of say 10.02 where you want an output reading of 10, adjust the 0-10 values to get the correct output. The formula to do this is as follows:*

- (Expected Output/Actual Output) x Expected Output = New Number
- For example: (10/10.02) x 10 = .998 x 10 = 9.98
- Reset your input numbers to 0-9.98.
- This formula applies to all four channels.

Step 7.   To assign the input data to the analog output channels being used, go to the Mapping page and follow the Instructions for Mapping in Chapter 6.

Configuring the Analog Card from the Web Browser

The lower half of the Analog Output configuration form on the Web interface shows read-only outputs. The analog input weight values for the four channels are labeled: HFO28, HFO29, HFO30, and HFO31. The card scales these values for a linear output within the range defined by the high or low weight values you set.

HFI2, HFI3, HFI4, and HFI5 are mapping symbols for the output scaling results.

The Loopback Debug Values are estimates only and may not match the actual outputs.

```
Analog Channel 1
              Input(HFO28,read only)  7.140000
              Output(HFI2,read only)  7.14
              loopback debug value   9.48 volts
Analog Channel 2
              Input(HFO29,read only)  7.140000
              Output(HFI3,read only)  15.42
              loopback debug value   20.48 milliamps
Analog Channel 3
              Input(HFO30,read only)  0.000000
              Output(HFI4,read only)  0.00
              loopback debug value   0.00 volts
Analog Channel 4
              Input(HFO31,read only)  0.000000
              Output(HFI5,read only)  0.00
              loopback debug value   0.00 milliamps
```

HI 4050 Analog Output Adjustment

If the output from the analog output card does not match the output levels required for your system, there is now a method of recalibrating the output levels based on your system.

Starting in firmware Version 1.7.1.0, there is a page on the web browser as well as a menu on the front panel for adjusting the analog outputs. These pages require the high security code to access.

On the web browser.

Navigate to Configuration> Options> Analog Output Card.
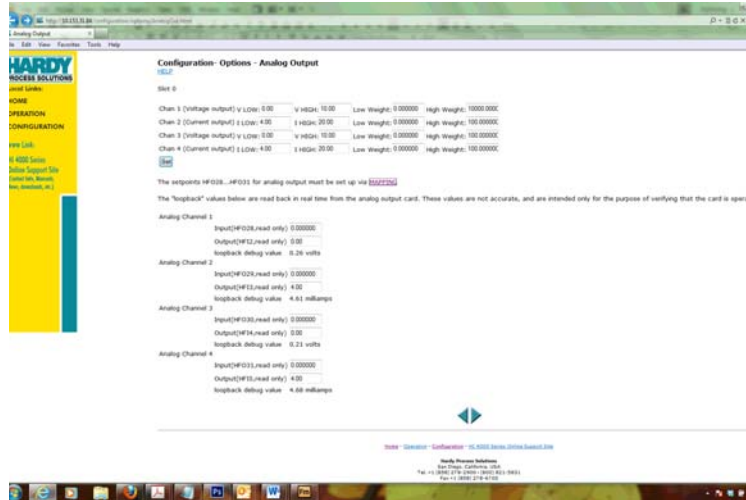
Click the blue RIGHT arrow at the bottom of the screen.

NOTE: *If you are asked for a security code, enter the High security code. If you don't know the password and cannot access this screen, see your system administrator.*

Normally, you will not need to manually adjust the gain or offset values.**

**If these are changed, they will affect the output of the associated analog channel.

NOTE   *In the following procedure you will use two known inputs and measure the actual output levels received. On the Analog Output Calibration page, shown above, enter the higher input as high and the lower as low.*

Procedure to correct the output levels.

Step 1.   Verify that the range for input and outputs is set correctly on the Analog Output setup page. The known inputs would normally be equal to the Low and High range limits for the inputs, but they do not need to be. If they are not the Low and High range limits, then the Desired output levels would be the outputs expected based on that input.

Step 2.   Select the channel you are testing.

Step 3.   Enter the desired output for the first known input (high) for Desired Output High.

Step 4.   Enter the actual output for this input for Actual Output High.

Step 5.   Enter the desired output for the known low input for Desired Output Low.

Step 6.   Enter the actual output for this input for Actual Output Low.

Step 7.   Click "Recalibrate." The unit will recalibrate the outputs from the analog card to match the values expected for the input range setup.

Configuring the Analog Card from the Front Panel

Step 1.   From the Configuration Menu, use the down arrow to select Options, and press Enter to display the Options Menu; select Analog Card to display the Analog Card menu; then select Chan Number.

0.00	0.00	0.00
Configuration > Options → Calibration EXIT CLR	Options > Analog Card → Ethernet / IP EXIT CLR	Analog Card > Chan Number 1 V/I Out Low 10.00 EXIT CLR
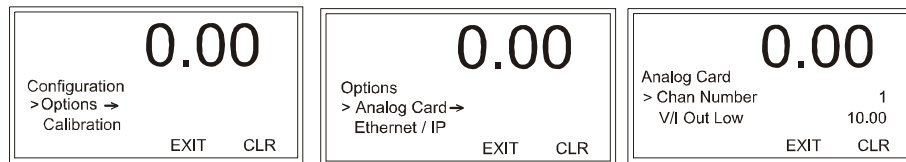
Step 2.   Use the right arrow to select the channel (options:1 or 3 for voltage and 2 or 4 for current), pressing Enter when you finish to save the Chan Number.

NOTE   *If you don't want to change the Voltage Low and High and Current Low and High default values, start with the Low and High Weight values for your application.*

Step 3. For V/I Out Low and V/I Out High, whether the value being configured is voltage or current depends the channel selected in step 4. Select V/I Out Low and use Enter to open the V/I Out Low edit form.
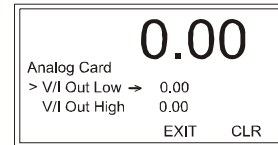
```
                    0.00
Analog Card
> V/I Out Low  →   0.00
  V/I Out High     0.00
                   EXIT    CLR
```

Step 4. Use the left or right arrow to position the cursor and the up or down arrow to select the value. When you finish, press Enter to save and return to the Analog Card menu.
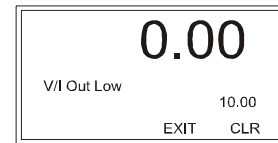
The steps for selecting the low and high values for each channel are the same as described above.

```
                    0.00
V/I Out Low
                           10.00
                   EXIT    CLR
```

Step 5. Use the down arrow to select Low Weight, and press Enter to display the Low Weight edit page.
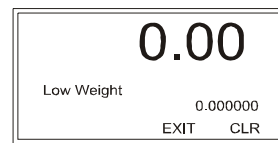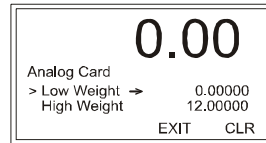
```
                 0.00                              0.00
Analog Card                          Low Weight
> Low Weight  →      0.00000
  High Weight       12.00000                              0.000000
              EXIT      CLR                        EXIT      CLR
```

Step 6. Use the left or right arrow to position the cursor and the up or down arrow to select the value. When you finish, press Enter.

Step 7. Repeat the steps above to set the High Weight value.

Analog Out Mapping

Step 1. From the Options Menu, select Map.

Step 2. Use the right arrow to scroll the Map options, which are: NONE, Gross, Net, or ADV.

```
                    0.00
Options
  Low Weight       12.00000
> Map                NONE
                   EXIT    CLR
```
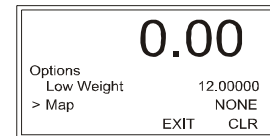
ADV is the default selection and could indicate mapping exists on the regular WEB page. Using the left and right arrows will alter WEB page mapping. If unsure that you are not overwriting earlier efforts, verify the existing mapping using your laptop and web browser software.

Step 3. Use Enter to save your mapping choice.

Digital I/O Option Card

Configuration of the Digital I/O option card is done mainly as a mapping function that is explained in Section 6. However, you can open the screen to the right from the Configuration menu.

Configuration/Options/Digital Input/Output
Center of Zero™

I/O Board Inputs
Input 1 (J1-7) HI0.0 0
Input 2 (J1-8) HI0.1 0
Input 3 (J1-9) HI0.2 0

Main Board Inputs, inverted
Input 1 (J2-1) HI0.4   0
Input 2 (J2-2) HI0.5   0
Input 3 (J2-3) HI0.6   0

Outputs
Output 1 (J1-1) HO0.0 [0 ▾]
Output 2 (J1-2) HO0.1 [0 ▾]
Output 3 (J1-3) HO0.2 [0 ▾]
Output 4 (J1-4) HO0.3 [1 ▾]

Step 1.   From the Configuration menu; select Options to open the options menu; then select Digital I/O Card to open the Digital Input/Output page.

Step 2.   Read-only I/O Board Inputs and Main Board Inputs display at the top of the page. If the input is sending a voltage signal, the status is 1. If there is no voltage signal for the input, the status is 0.

Step 3.   Each of the Outputs refers to a relay associated with a process.

The pull-down options allow you to place a relay in service or take it out of service for setup testing. However, if a relay has been mapped, the mapped activity will override a manual Start or Stop activity set on this page.

Outputs
Output 1 (J1-1) HO0.0   [1 ▾]
Output 2 (J1-2) HO0.1   [0 / 1 ▾]
Output 3 (J1-3) HO0.2   [1 ▾]
Output 4 (J1-4) HO0.3   [1 ▾]
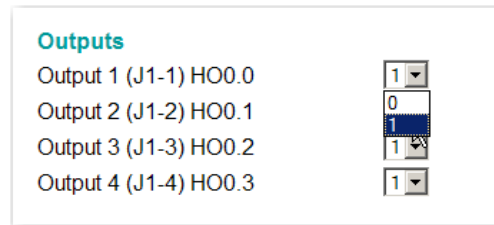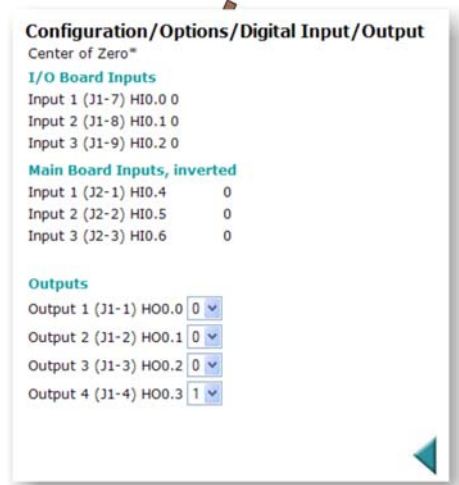
NOTE

Warning: Turning relays ON or OFF during an active process can disrupt the process and result in serious problems.

Avertissement: Mettre les relais en état « Allumé » ou en état « Eteint » durant le processus de fonctionnement peut perturber le processus et provoquer des problèmes graves.

Step 4.   To toggle the output ON, click 1, or to toggle the output Off click 0.

Step 5.   You need to map controls to the Digital Card Outputs. For example you might need to map a Setpoint (Setpoint 1Output HSI2) to Digital Card Output 1 (HO0.0) you need to create this map: HO0.0 = HSI2. Refer to Chapter 6 - Mapping for more instructions.

PROFIBUS® Configuration

ProfiBus DP operates using a cyclic transfer of data between master(s) and slave(s) on an RS485 network. An assigned master periodically requests (polls) each node (slave) on the network. The HI 4050 is a slave device. All data communication exchanges between a master and the HI 4050 originate from the master device. Each HI 4050 is assigned to one master and only that master may write output data to that HI 4050. 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.

Configuring PROFIBUS From the Web Interface

Step 1.   From the Configuration menu select Options to open the Options menu; then Click on Profibus Card. to open the Click on Profibus Card form.
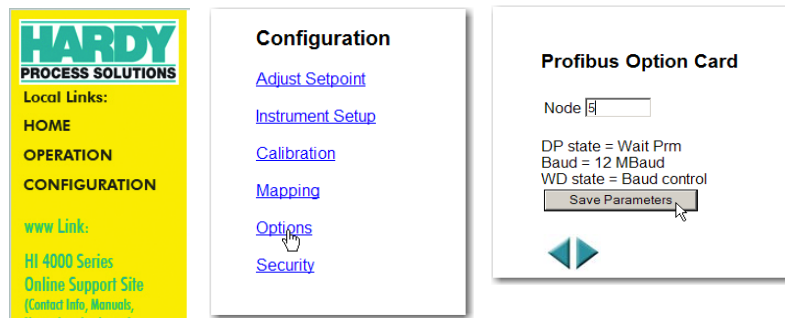
Double click in the Node text field to highlight the current entry.Type in the HI 4050 Node address. **Range:** 1-125 (default 5) Our example uses the default address #5.

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

Step 2.   Click Save Parameters to save the entry.

Step 3.   You can also read the communication status of the instrument.

Step 4.   Click Home to return to the Home Page.

Initialization Process

To be able to add an HI 4050 to a Profibus-DP network, you need a PC and software such as Siemens Step 7™, Simatic Manager or equal, that allows the Profibus-DP PLC and the HI 4050 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 4050 is connected to the network.

A copy of the *.gsd file can be found on the CD that comes with the instrument or at the Hardy Website or at http://www.profibus.com/libraries.html.

Whichever Simatic Manager you select, you must go through these three steps:

Step 1.   Connect the HI 4000 Series Instrument to the Profibus DP network and verify the address. (See the Installation Section for Installation and Cabling Instructions.)

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.   Install the *.gsd file, and map I/O data table properties to the instrument.

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 4050. (See below) 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 module 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.**

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.

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.

Initialization Procedures

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.   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 "HI4000" or drag and drop the "HI4000" folder to the Profibus-DP Network.

Step 6.   This opens the HI 4000 PDP Parameters dialog box where you can set the address of the instrument, if necessary.
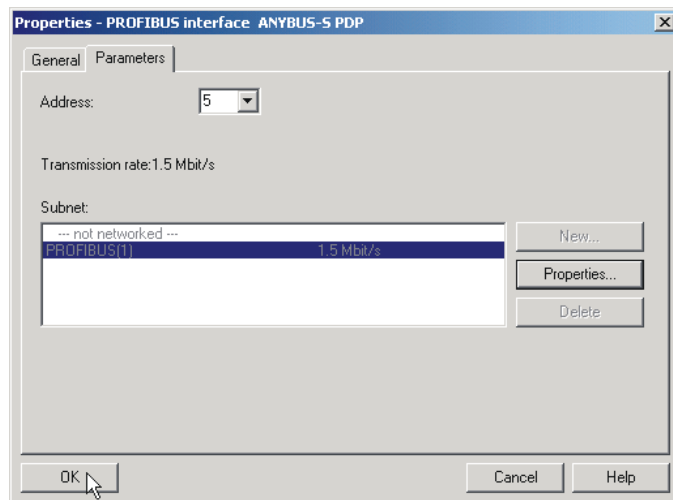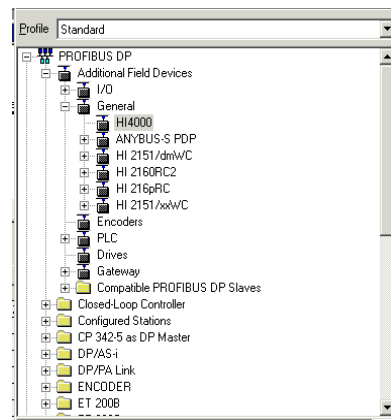
NOTE   *The HI 4050 Series Input and Output Sizes are expressed in words. 16 words input and 16 words output.*

Step 7.   Click OK to set the Node Address.

Step 8.   The HI 4000 Series module appears in the Profibus Network.

Step 9.   Click the Download Icon to download the configuration to the PLC and open the Select Destination Module dialog box.
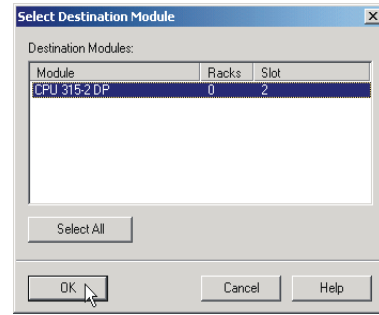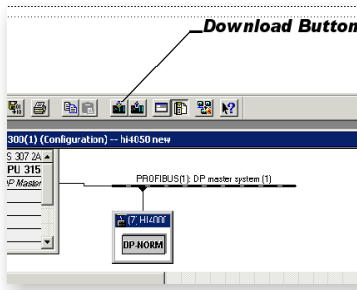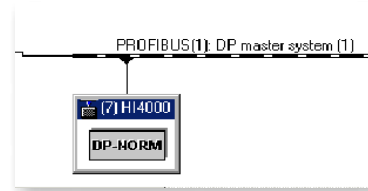
Step 10. Click OK to open the Select Station Address Dialog box; then click OK again. A status box will show the progress of configuration download to the PLC.
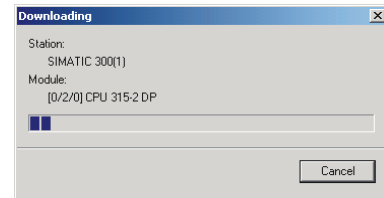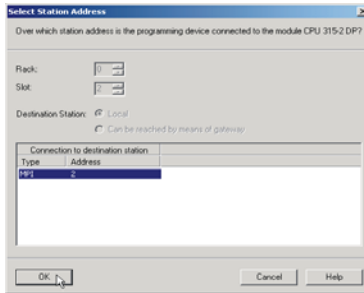
Step 11. When the download is complete the HW Config dialog box should look something like this.

Step 12. Initialization is complete.
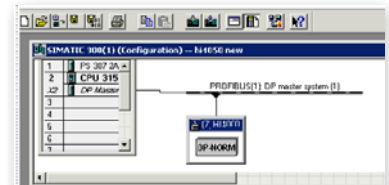
Configuring Profibus from the Front Panel

Step 1. Select Options from the Configuration menu, then Profibus from the Options menu.

0.000

Options
> Profibus ➜
  Ethernet/IP
            EXIT   CLR

0.000

Profibus
> Profibus Node ➜
  DP State
            EXIT   CLR
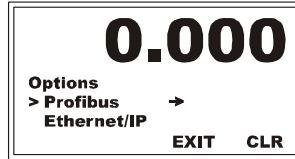
Step 2. Select Profibus Node to open the Profibus Node edit screen.
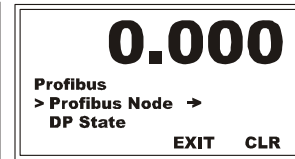
Step 3. Press CLR to clear the current entry and position the cursor, then use the up or down arrow to select the number for the right-most digit.

0.000

Profibus Node
                   5
            EXIT   CLR
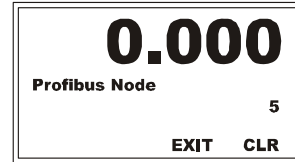
Step 4. Press the left arrow to move the cursor to the next digit, and use the up or down arrow to select the number for the left digit.Our example sets the Node Address at #7.

Step 5. Press Enter to save the entry.

0.000

Profibus Node
                   7
            EXIT   CLR
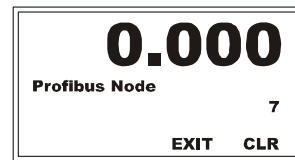
Step 6. The other parameters are status indicators and are read only. The status indicators indicate the state of communications between the Master and the HI 4050.

DP State (Read Only)

- 00 = Status "Wait_ Prm" (HI 4050 waiting for communications from the Master Device.)
- 01 = Status "Wait_Cfg" (HI 4050 configuring for Data Exchange)
- 10 = Status "DATA_EX" (HI 4050 Exchanging Data with Master)

0.000

Profibus
> Profibus Node ➜
  DP State   Wait PRM
            EXIT   CLR
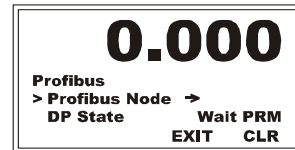
WD State (Read Only)

- 00 = Status "Baud_Search". (HI 4050 searching for baud rate.)
- 01 = Status "Baud_Control". (HI 4050 found the baud rate.)
- 10 = Status "DP_Control". (HI 4050 communicating at the current baud rate.)

0.000

Profibus
> Baud   Error
  WD State   Baud Search
            EXIT   CLR
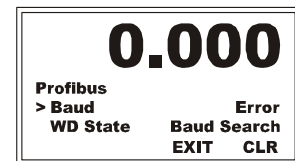
Baud Rate

Reads the baud rate at which the HI 4050 communicates with the Master Device. If "Error" appears it means that no data is being exchanged between the HI 4050 and a Master device.

Press the Exit button until you return to the Summary display

ControlNet Option Card

To set the ControlNet Parameters:

Step 1.   For Node, enter the
          Control-Net address of the
          HI 4050 (1 to 99). (If the
          node # you use does not
          work, try a different #.)

Step 2.   For Words Out, enter the
          number of 16-bit words
          (INT) to send the PLC
          (max 127). This must match the input table size in the PLC.

Step 3.   For Words In, enter the number of 16-bit words (max 127) from the PLC. This
          must match the output table size in the PLC, which may be either INT or DINT.

Step 4.   On the PLC, use the following parameters:

          • Comm Format = Data In
          • PLC Input Assembly Instance = 100
          • PLC Output Assembly Instance = 150
          • PLC Config Instance = 0
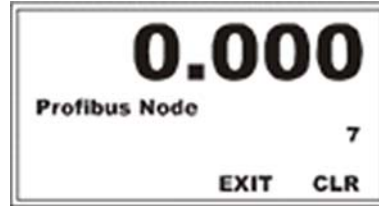
See the ControlNet example in Section 6, *Mapping*.

Parameters Configured

Unit (of Measure) Parameter

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

- Pounds (lb) - Default
- Ounces (oz)
- Pounds/Ounces (lb/oz)
- Ton (Ton) Short ton
- Kilograms (Kg)
- Grams (G)
- Metric Ton (t) Long ton

NOTE *UNITS can be changed over communications using the JS02 Units parameter and command interface.*

On the Web form, from the Units pull-down list, select the weight units to use, then click Change Unit to set the units value. Our example shows pounds (lb)
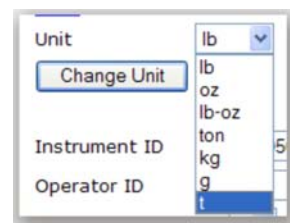
On the 4050 display:

Step 1. If the cursor is not already in front of Units, press the down or up arrow to select Units.
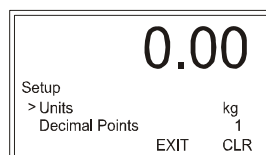
Step 2. Use the Left or Right arrow to select the Unit of measure.
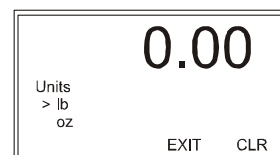
Step 3. Press Enter to save the selection.

Instrument ID Parameter

The Instrument ID parameter provides unique identification for the Weight Controller.

RANGE: 19 Characters (default MODULAR)

On the Web page, enter a name to identify the instrument in the Instrument ID text field. We used "HI 4050."

Instrument ID   HI 4050

On the 4050 display, use the Down arrow to select Instrument ID, then press Enter to display the Instrument ID edit page.

```
         0.00                  0.00
Setup                  Instrument ID
> Instrument ID →    Modular          Detergent
  Operator ID
         EXIT   CLR            EXIT   CLR
```
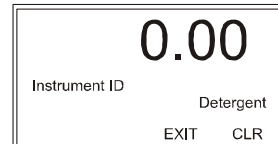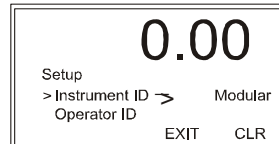
Use the left or right arrow to position the cursor and the up or down arrows change the value Enter saves the entry.

Operator ID Parameter

The Operator ID is the ID of the user who is going to operate the Weight Controller 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   Jon

On the 4050 display:

Step 1.   Press the Down arrow to select Operator ID.

```
         0.00                  0.00
Setup                  Operator ID
> Operator ID →    Joe                  Joe
  Printer Setup
         EXIT   CLR            EXIT   CLR
```

Step 2.   Press Enter to open the Operator ID edit screen.
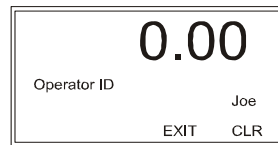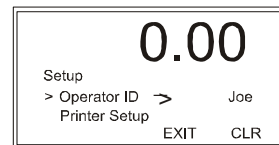
Step 3.   Use the left or right arrow to position the cursor and the up or down arrows change the value

Step 4.   When you have selected all the values, press Enter to save.

Decimal Point Parameter

Step 5.   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. Adding decimal points will not improve a system accuracy beyond the specified ability of the load cell.

RANGE: 0-5 (default 2)

On the Web page, from the Decimal Point pull-down list, select the decimal position for this instrument.
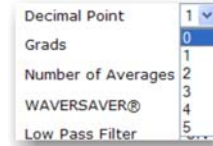
On the 4050 display:

Step 1.   Use the Down arrow to select Decimal Point displaying the current number of digits setting.

Step 2.   Press the Right or Left Arrow buttons to select the Decimal point position, then press Enter to save the selection.
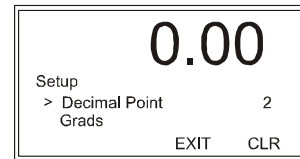
Graduation Size Parameter

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, the graduation size 10 will display increments of .10 engineering units and the graduation size 50 will display increments of .50 engineering units. For a scale with 10,000 capacity, graduation size = 1

RANGE: 1, 2, 5,10, 20, 50, 10, 200, 500, 1000 (default 1)

NOTE   *Graduation is only for display resolution, as full decimal point resolution is transmitted across communications and used to make internal calculations.*

On the Web page, from the Grads pull-down menu, select the Graduation Size Parameter for this instrument.
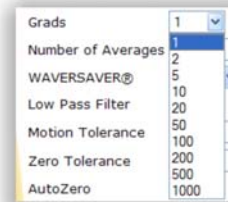
On the 4050 display:

Step 1.   Use the Down arrow to select Grads.

Step 2.   Use the Right or Left arrows to select the Graduation Size for the instrument, then press Enter to save the selection.
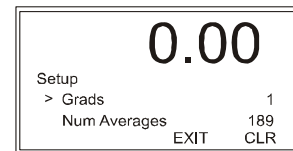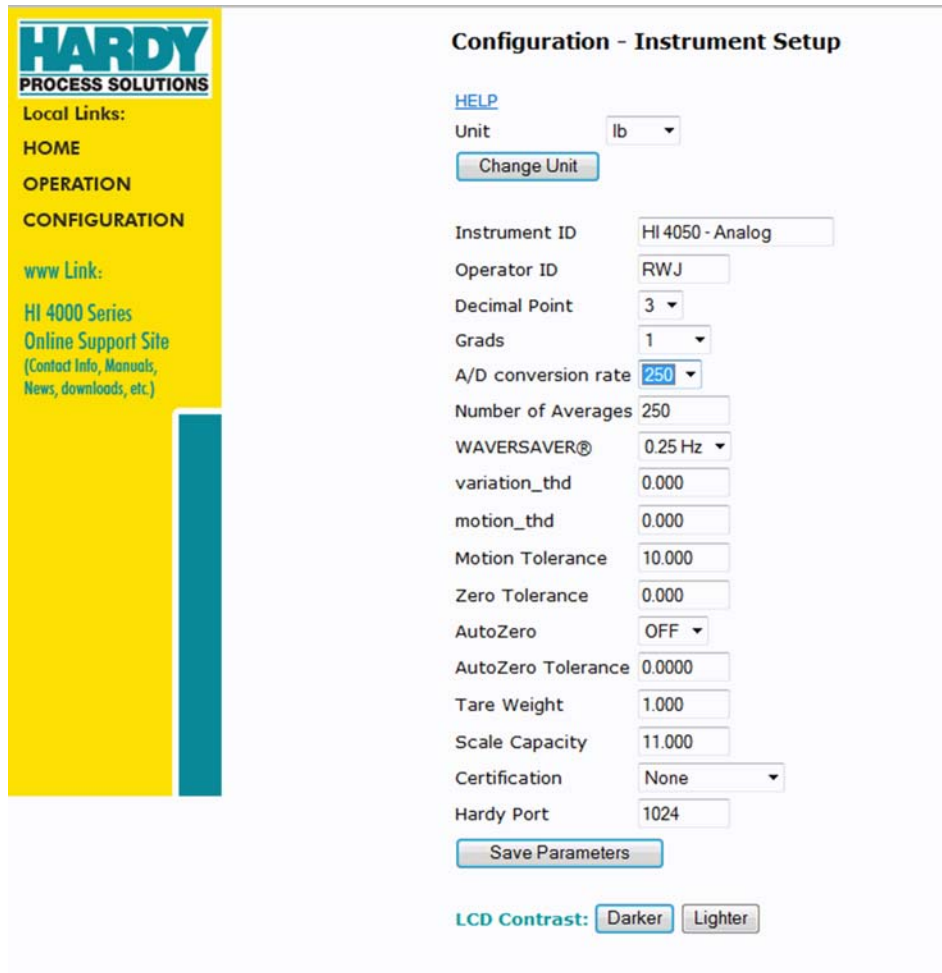
A/D Conversion Rate Parameter

The HI 4050+ sample rate is selectable at 110 sps or 250 sps (samples per second). That is the number of weight samples that are available for communications and weight processing, whether the weight has changed or not. Note that this function is only available in the HI 4050+
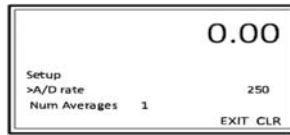
On the 4050+ Display: From the Setup Menu, arrow down to select A/D rate. Toggle between 110 or 250 to make your selection and hit Arrow down to Enter to select the desired rate.

On the Web Page: From the Setup Menu, arrow down to select A/D rate. Toggle between 110 or 250 to make your selection and hit Arrow down to Enter to select the desired rate.

NumAverages Parameter

The value you enter for Number of Averages (NumAverages) sets the number of weight readings used to compute a sliding average of displayed weight. This setting is to aid in ignoring 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.

You should not set the number of NumAverages to exceed the WAVERSAVER timing. With a WAVERSAVER=7.5hz (60ms) and SPS speed selection of 250sps, this instance would suggest a limit of 60 ms or 15 averages (4ms each). A SPS setting of 110sps provides a 10ms sample rate.

Vigorous vibration and impacting would require a lower frequency WAVERSAVER setting or increased NumAverages. So when you decrease the WAVERSAVER setting, reduce the NumAverages accordingly.

The default factory setting is 10.

RANGE: 1-250 (default 10)

On the Web page, 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.

Number of Averages 10

On the 4050 display:

Step 1.   Use the Down arrow to select Num Averages, and press Enter to display the Num Averages Edit screen.
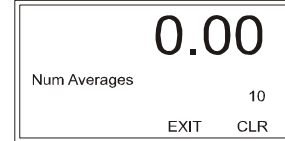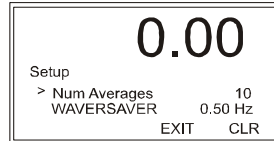
0.00
Setup
> Num Averages   10
   WAVERSAVER   0.50 Hz
                    EXIT   CLR

0.00
Num Averages
                              10
                    EXIT   CLR

Step 2.   Use the left or right arrow to position the cursor and the up or down arrows change the value

Step 3.   When you have selected all the values, press Enter to save.

The WAVERSAVER® Parameter

Mechanical noise (from other machinery in a plant environment) can be present in forces larger than the weight forces being measured. The HI 4050 is fitted with WAVERSAVER technology that eliminates the effects of vibratory forces present in all dynamic and static industrial weight control and measurement applications. By factoring out almost all of the ambient vibratory forces, the HI 4050 can separate out the actual weight data from background noise caused by vibration.

WAVERSAVER can be configured from the front panel or via the web browser to ignore noise with frequencies as low as 0.25 Hz. One of five higher additional cut off frequencies can be selected to provide a faster instrument response time.

The default factory setting is 1Hz vibration frequency immunity.

To determine which WAVERSAVER® setting is right for your application the rough guideline is that the less vibration your scale is exposed to, the faster the weighing time.

To reduce the effects of low amplitude high frequency vibrations, use WAVERSAVER® settings OFF, 7.5Hz, 3.5Hz or 1.0Hz.

To reduce the effects of high amplitude low frequency vibrations, use WAVERSAVER® settings 0.5Hz or 0.25Hz.

The WAVERSAVER® calculation speed is independent of the sample rate.

The HI 4050 sample rate is selectable at 110 sps or 250 sps (samples per second). That is the number of weight samples that are available for communications and weight processing, whether the weight has changed or not. With the optional analog out card the SPS setting is forced to 110sps.

The approximate timing for WAVERSAVER calculations are as follows:

- 7.5hz = 60 ms
- 3.5hz = 120 ms
- 1hz = 500 ms
- 0.5hz = 1 seconds
- 0.25hz = 2 seconds,
- WAVERSAVER OFF = 0 seconds.

After a change on the scale the total time to finalize a new weight reading is the WAVERSAVER plus the NumAverages. Calculate the amount of time your product will be fully on the scale. Then adjust the WAVERSAVER and NumAverages setting to add up to less than that time period.

Section 1 describes the benefits of using the WAVERSAVER feature.

On the Web page, from the pull-down list, select the value for WAVERSAVER.
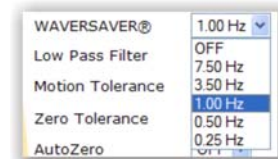
On the 4050 display:

Step 1. Use the Down arrow to select WAVERSAVER.

Step 2. Press the Right or Left Arrow buttons to select the WAVERSAVER setting for your instrument, and press Enter to save the selection.
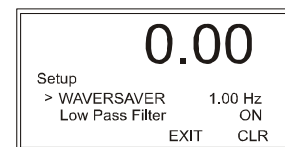
WAVERSAVER+ Options: Variation_thd and Motion_thd

WAVERSAVER+ is a superset of WAVERSAVER that uses two entirely new parameters, **Variation_thd** (Variation Threshold) and **Motion_thd** (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.

To configure WAVERSAVER+, set the WAVERSAVER and Numaverages parameters to establish the speed and required accuracy for dynamic weighing. Set the variation_thd to 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_thd should be set to 9 (1.5X) and the motion_thd parameter set to 2 (1/3X). Note the weight changes will settle to a 2 increment level

Weight changes smaller than 1:40,000 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

On the 4050 display:

Step 1.   Use the Down arrow to select the Setup Menu.

Press the Right or Left Arrow buttons to select the variation_thd or Motion_thd. Enter the setting for your instrument, and press Enter to save the selection.
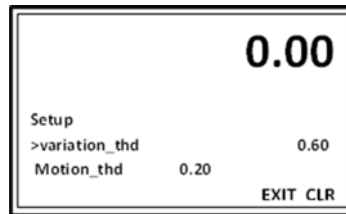
On the Web page: Select the options from the Configuration>Setup menu.

Low Pass Filter Parameter

NOTE   *Low Pass Filter has been replaced in Firmware Version 1.14.0.0 or greater with WAVERSAVER+ using two new parameters: Variation Threshold and Motion Threshold. The section below is provided for those users whose instruments are operating with older firmware.*

The Low Pass filter can be toggled on or off. When it is on it provides a more stable weight reading but at the expense of the reaction time. Some applications require the additional stability. If reaction time is not critical, leave the Low Pass Filter On, otherwise turn it off.

RANGE: ON/OFF (default ON)

On the Web page, from the Low Pass Filter pull-down list, select ON to turn the filter on or OFF to turn it off. For most applications the Low Pass Filter should remain ON.

On the 4050 display:

Step 1.   Press the down arrow to select Low Pass Filter.

Step 2.   Press the right arrow to toggle between ON or OFF.

Step 3.   Press Enter to save your choice.

> 0.00
>
> Setup
> \> Low Pass Filter   ON
>   Motion Tolerance
>   EXIT   CLR

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 graduation sizes

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

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

Motion Tolerance must be greater than or equal to the Graduation Sizes. We recommend three graduation sizes.

RANGE: .000001 - 999999 (default 10)

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

Motion Tolerance   10.0

On the 4050 display:

Step 1.   After selecting Motion Tolerance with the down arrow on the Setup menu, press Enter to display the Motion Tolerance edit form.

> 0.00
>
> Motion Tolerance
>   .05
>   EXIT   CLR

Step 2.   Use the left or right arrow to position the cursor and the up or down arrows change the value

Step 3.   When you have selected all the values, press Enter to save.

Step 4.   Use the left or right arrow to position the cursor and the up or down arrows change the value. Our example uses .05, which is for illustration only. Yours will vary depending on your application.

Step 5.   When you have selected all the values, press Enter to save.
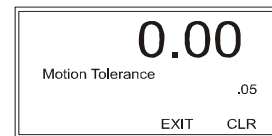
Zero Tolerance Parameter (Gross Weight)

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).

RANGE: .000001 - 999999 . (default 10.0)

On the Web page, enter the value in the text box provided. Our example, for illustration only, sets Zero Tolerance to 10.

Zero Tolerance   10.0

On the 4050 display:

Step 1.	Use the Down arrow to select Zero Tolerance, then press Enter to display the edit form.
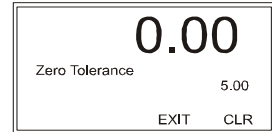
Step 2.   Use the left or right arrow to position the cursor and the up or down arrows change the value. When you have selected all the values, press Enter to save.

AutoZero and AutoZero Tolerance Parameters (Gross Weight)

Setting the AutoZero Parameter to ON automates the zeroing function. When AutoZero is ON, if the motion is within tolerance and the value is within the AutoZero tolerance value, the instrument is automatically zeroed every few seconds until you turn off AutoZero. This does not override the Zero button. You can still press the Zero button to zero the HI 4050 at any time, but AutoZero is useful in applications where you are zeroing a scale quite often and don't want to push the Zero button each time.

RANGE: .000001 - 999999 . (default 10.0)

The AutoZero Tolerance parameter is used by the auto zero tracking feature and any zero command sent over communication or mapping path. AutoZero sets the gross weight units to zero, using the current gross zero as reference.

Set the AutoZero Tolerance parameter smaller than the ZERO Tolerance parameter. If the AutoZero Tolerance is exceeded for some reason you may press the ZERO button on the instrument and utilize its tolerance level. This resets the AutoZero tolerance and again allows AutoZero to resume.

RANGE: .000001 - 999999 . (default 10.0)

On the Web page, the AutoZero Parameter defaults to OFF. Turning it ON automates the zeroing function. You must then set the value for AutoZero Tolerance.

On the 4050 display:

Step 1.   Use the Down arrow to select AutoZero.

Step 2.   Use the Left or Right arrows to toggle between On and Off, and press Enter to save the entry.

Step 3.   Use the down arrow to select AutoZero Tolerance, and press Enter to display the AutoZero Tolerance edit screen.
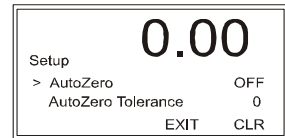
Step 4.   Use the left or right arrow to position the cursor and the up or down arrows change the value.

Step 5.   When you have selected all the values, press Enter to save. Our example (for illustration only) shows 4.85 for our AutoZero Tolerance. Yours will vary depending on your application.

Tare Weight Parameter (Net Weight)

The value you enter for Tare Weight allows the user to avoid pushing the Tare button each time he/she weighs something.

RANGE: .000001 - 999999 . (default 0.0)

On the Web page, enter the weight in the text box provided

On the 4050 display:

Step 1.   Use the Down arrow to select Tare Weight, then press Enter to display the Tare Weight edit screen.
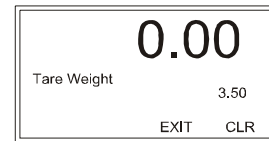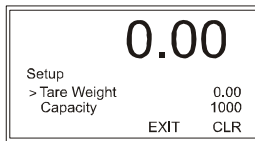
Step 2.   Use the left or right arrow to position the cursor and the up or down arrows change the value.

Step 3.   When you have selected all the values, press Enter to save. Our example shows 3.50, which is for illustration only.

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 eight graduations, when configured using one of the certified modes, DASHES will appear on the front display. This signifies that you have exceeded the certified scale limit. When a certified mode is selected as NONE, this is more of a scratch pad noting the total load cell capacity. With NONE selected, exceeding the amount in the Scale Capacity does not have any screen affect, unless the 16 Millivolt range is exceeded. Then a row of ASTERISKS will appear. Communications to and from optional devices are not effected.

RANGE: .000001 - 999999 . (Default 999999)

On the Web page, enter the capacity in the text box provided
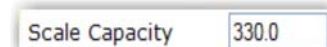
On the 4050 display:

Step 1.   Use the down arrow to select capacity, then press Enter to display the Capacity edit screen.
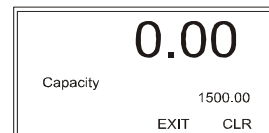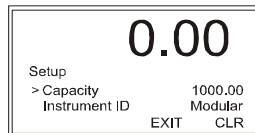
Step 2.   Use the left or right arrow to position the cursor and the up or down arrows change the value.

Step 3.   When you have selected all the values, press Enter to save. Our example, for illustration only, uses1500.00.

Certification Parameter

The Certification parameter allows you to select the Certification to apply. If you select US NTEP or Canada, you can no longer tare with a negative gross weight.

NOTE   *Selecting either of these parameters sets the instrument to meet the certification standard, but it does not generate a certification. To obtain NTEP or Canada certification, you must have the appropriate agency come and certify the instrument.*

RANGE: NTEP, MC, None. (Default None)

On the Web page, for Certification, select the certification type from the pull-down list.
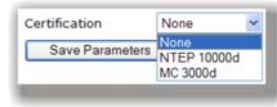
Click Save Parameters when you have finished this screen.

On the 4050 display:

Step 1.   Use the Down arrow to select Certification and click Enter to open the Certification edit page.
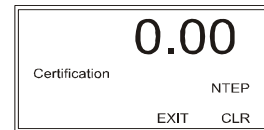
Step 2.   Use the Left or Right arrows to scroll the options, and press Enter to save.

LCD Contrast Parameter

Note that the Instrument Configuration Setup page allows you to change the contrast on the HI 4050 display by clicking the Darker or Lighter buttons.

To set the LCD Contrast Parameter from the 4050 display:

Step 1.   From the Setup menu press the down arrow to select CONTRAST.

Step 2.   Press the ENTER button to allow editing.
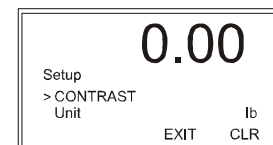
Step 3.   Press the left or right arrow button to increase ordecrease the contrast and press Enter to save.

Printer and Time Setup Parameters

Printer / Scoreboard Setup

The Print parameters can output values, e.g., the Gross, Net and Tare with a Rate of Change Option and weight units (lb, kg etc.), to either a Printer or a Scoreboard display.

Print Mode: For all modes, the information sent to the printer includes terminal etc., the current time/current date, and the mode.

The mode choices are:

- Gross, Net or Tare
- All (Gross, Net, Tare)
- ROC (Rate of Change)
- Scoreboard: Outputs to a device that displays weight data in large print.

NOTE   *See your Network Administrator if you don't know the correct values for Baud Rate, Parity, and Data Bits.*

Baud Rate: RANGE: 300, 1200, 2400, 4800, 9600 (default), 19200

Parity: RANGE: NONE (default), ODD, EVEN

Data Bits: RANGE: 7 OR 8 (default)

Setup From the Web Interface

Step 1.   Click the right green arrow at the base of the Instrument Setup form to open the Configuration - Printer form.

Step 2.   Select the print mode, baud rate, parity, and data bits from the pull-down lists.

Step 3.   Click Save Parameters when you finish.

Setup From the 4050 Interface

Step 4.   Use the down arrow to select Printer Setup, and press Enter to display the Printer Setup menu.

0.00

Setup
> Printer Setup ⇗
   Time
                          EXIT   CLR
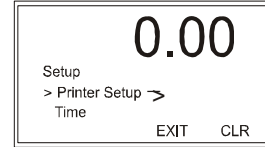
Step 5.   Select Printer Mode.

Step 6.   To set the Printer Mode (If the option is enabled), use the Left or Right arrows.

0.00

Printer Setup
>Printer Mode ⇗   Gross
   Baud Rate   1920
                    EXIT   CLR

0.00

Printer Setup
> Printer Mode ⇗ Scoreboard
   Baud Rate   9500
                    EXIT   CLR
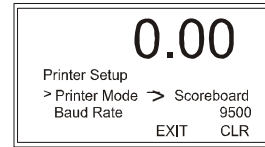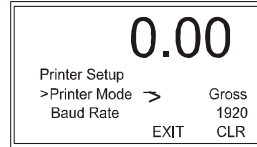
NOTE   *If the Scoreboard is configured, the Print button does not function.*

Step 7.   Select Baud Rate.

Step 8.   Press the left or right arrows to set the Baud Rate, then press Enter to save the entry.

0.00

Printer Setup
> Baud Rate ⇗   1920
   Parity   NONE
                    EXIT   CLR
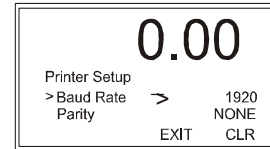
Step 9.   Select Parity.

Step 10.   Press the left or right arrows to set the Parity, then press Enter to save the entry.

0.00

Printer Setup
> Parity ⇗   NONE
   Data Bits   8
                    EXIT   CLR

Step 11.   Select Data Bits.

Step 12.   To change the Data Bits value, press the left or right arrow to toggle between 8 and 7, then press Enter to save your selection.

0.00

Printer Setup
> Data Bits ⇗   8
   Printer Mode   Gross
                    EXIT   CLR
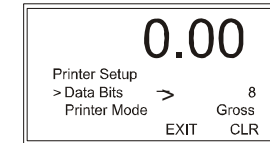
Step 13.   Press Exit to return to the Setup Menu.

Configuring Date and Clock

You can set Hour, Minute, Month, Day and Year parameters here. These settings are the times stamps for the alarms. You can also select Greenwich Mean Time.

NOTE   *To set up Greenwich Mean Time, see Appendix A*

Setup From the Web Interface

Step 1.   Click the right green arrow at the base of the Printer Setup form to open the Configuration - Date and Time form.

Step 2.   Enter the current hour, minute, day, month, year, and time zone in the appropriate text fields.

Step 3.   Click Save Parameters to save the Date and Clock parameters.

Setup From the 4050 Interface

Step 1.   Press the Down arrow to select Time.

Step 1.   Press Enter to display the Time Setup Menu with the cursor in front of Time Zone.

Step 2.   Press the Left or Right arrows to select the time zone in your location.

RANGE: 24 zones (Default PST -8H)

Step 3.   Press Enter to save the zone and display the time screen with the cursor in front of Time-Year showing the currently set value.

Step 4.   Press Enter to display the Time - Year edit screen.

Step 5.   Use the left or right arrow to position the cursor and the up or down arrows change the value. When you have selected all the values, press Enter to save.

RANGE: YYYY (four digits no default)

Step 6.   Press the Down arrow to select Time - Month, and press Enter to display the Time - Month edit screen.

Step 7.   Use the left or right arrow to position the cursor and the up or down arrows change the value. When you have selected all the values, press Enter to save and display the next screen.

RANGE: (1 - 12 with no default)

Step 8.   Press the Down arrow to select Time - Day, and press Enter to view the Time - Day edit form.

```
              0.00                              0.00
Time
> Time - Day        >        0      Time - Day
  Time - Hours               7                          13
          EXIT     CLR                      EXIT     CLR
```
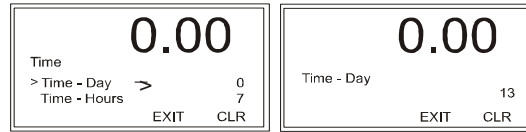
Step 9.   Use the same procedure described for setting the month to set the day.

RANGE: DD (1-31 with no default)

Step 10. Press the Down arrow to select Time - Hours, and press Enter to display the Time - Hours edit form.

```
              0.00                              0.00
Time
> Time - Hours      >        7      Time - Hours
  Time - Minutes            31                          13
          EXIT     CLR                      EXIT     CLR
```
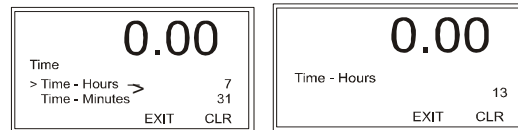
Step 11. Use the same procedure described for setting the month to set the hour using the 1-24 hour format.

RANGE: HH (1-24 with no default)

Step 12. Press the Down Arrow button to select Time - Minutes, and press Enter to display the Time - Minutes edit form.

```
              0.00                              0.00
Time
> Time - Minutes    >       32      Time - Minutes
  Timezone     PST (BMT - 8h)                           31
          EXIT     CLR                      EXIT     CLR
```
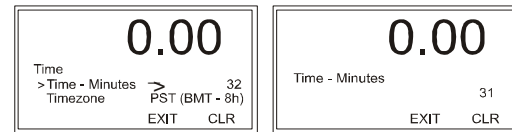
Step 13. Use the same procedure described for setting the month to set the current minutes.

RANGE: MM (1-60 with no default)

Set Points

A set point value is a threshold weight or level based on the Unit (of Measure) you select during system configuration. It may be set in either Net, Gross or available ROC weight units. Up to four setpoints are available for optional use. This subsection describes the attributes you can assign to a setpoint during setup configuration.

However, setpoints are used mainly for mapping digital I/O communications between the HI 4050 and network devices (e.g., PLCs). You define the use of a setpoint value based on how you apply that value within a mapping equation. See Section 6 for mapping information. Also, some setpoint target values may be changed while the system is operating to accommodate changes in the operation. See Section 7 for information on resetting setpoints during system operation.

Parameters

Deadband Limit, Preact Limit, and Type

The Deadband limit is the difference between the set point and the reset. It is used to prevent rapidly fluctuating setpoint states once the set point is reached. For example, with a set point value of 1000 pounds and a deadband set to 5 pounds, the relay would close at 1000 pounds but not open until the weight dropped to 995 pounds.

The preact value is the difference between the set point and the trip point. It is used as a compensation value when filling a vessel. If set to zero, there is no compensation.

You need to select the Type. Gain in Weight is used if a setpoint is a high trip limit. Loss in Weight and deadband is used for a low trip limit, as shown in the pictures below.

Gain in Weight

HIGH TRIP LIMIT

Loss in Weight

LOW TRIP LIMIT
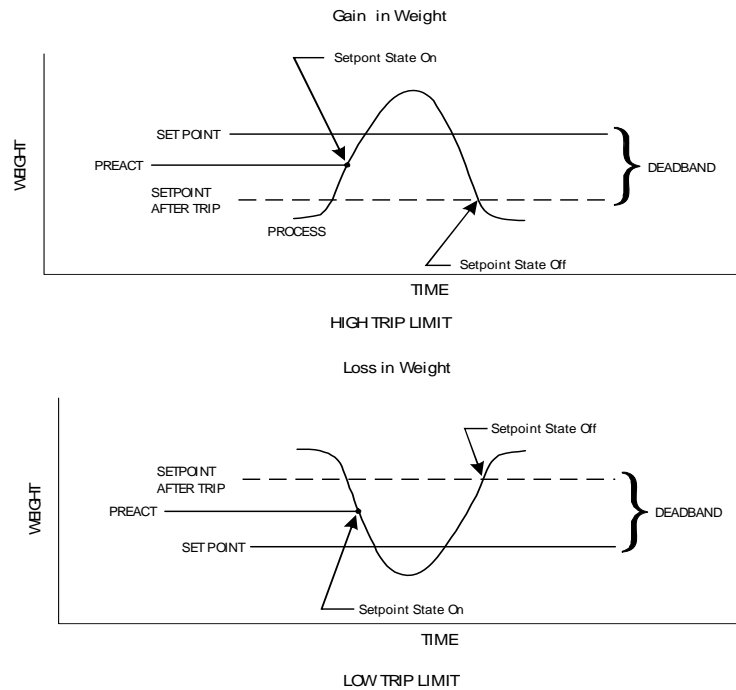
Mode

Specifies which weight source to use as the setpoint input (GROSS, NET, or ROC).

Target Weight

Setpoint target weight. A setpoint ON/OFF status change is based on this value combined with the effect of implementing Deadband and Preact limits.

Type

The options determine which formula to apply:

Gain in Weight: The setpoint turns on when the weight is greater than the setpoint target minus the preact and off when the weight is less than the target minus the deadband

or

Loss in Weight: The setpoint turns on when the weight is less than the setpoint target plus the preact and off when the weight is greater than the setpoint plus the preact

EXAMPLE of reverse logic relay usage.

These are two settings to fill a vessel to 350 and reset the output when near empty.

With a setpoint setting normal relay logic:

Setting NET,GIW, Target=350, Pre=0, Deadband=345. When the output reaches 250, the output goes high and stays until LIW is below 5.

With a setpoint setting using reverse relay logic:

Settings NET, LIW, Target=5, Pre=0, Deadband=345. The Output is set high until 350, then the output goes low and stays low until LIW is below 5.

HI 4050 Security

The security system can be used to:

- Protect the entire Web interface and front panel from unauthorized access
- (front panel only) Limit access to selected functions by those who have basic access

To gain access to protected interfaces and functions, the user must enter a security code. Note that Web page security can be assigned to use require either the medium or high level code for access, but not both, while security for the front panel can be set to one level and access to specific functions via the front panel can be set do a different level.

Configuring HI 4050 Security from the Web Page

Step 1.   From the Configuration Page select Security to open the Security page.

The text field allows only short integers. Enter only numbers (in any combination).

Be sure to write down the codes you use and store them in a secure location in case you need to refer to them again.

Step 2. Type in the High Security and Medium Security codes in the appropriate text boxes. To NOT set High and/or Medium Security Codes, enter 0.

Step 3. For the field Front Panel TARE/ZERO Security, use the pull-down list to select the level of security for taring and zeroing the instrument from the front panel.

Step 4. Use the pull-down lists in the same way to set the levels of security for Front Panel Calibration Security and Web Page Security.

Step 5. When you finish, click Save Code to save the security settings.

Setting Parameter Security

Now that you have created a High and Medium Security Code you can now use a dollar sign notation to set security on any of the parameters you want. If you want to require a password for changing units you can enter one dollar sign $ for Medium Security Code or two dollar signs $$ for High Security Code. This can be done by editing the Parameter Dump.

For example: If you want a high security code for Units, enter the following:

00000001 $$Unit=0 (lb)

Step 1. From the Home page click Operation to display the Operation page, and click Diagnostics to display the Diagnostics page

Step 2. Click the Parameters hypertext link to list the parameter configurations.

Step 3.   Click next to the Parameter text for which you want to set a security code.
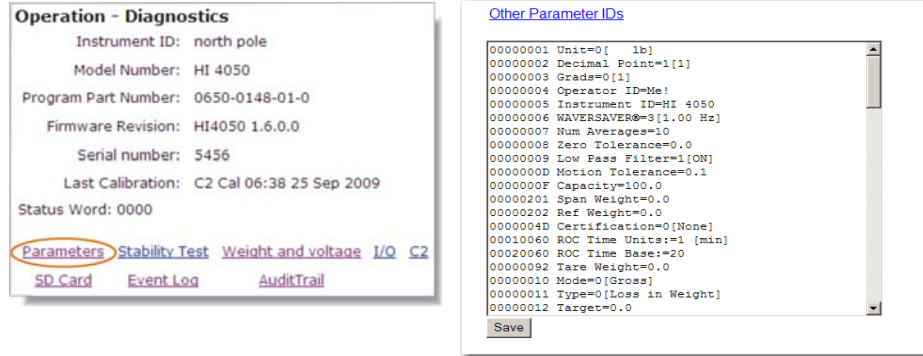
Step 4.   Add two dollar signs for High security or one (1) dollar sign for Medium security. Our example shows two (High security).
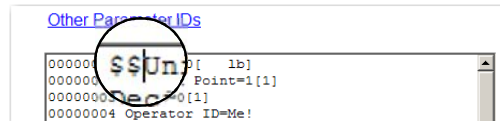
Step 5.   Click the Save button to save the security changes.

Step 6.   Click the back arrow to get back to the Home Page.

Step 7.   A user wanting to change the Unit parameter must know the High Security Code password.
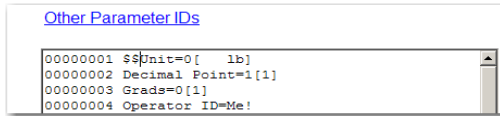
NOTE   *If you have not set a Medium or High Security Code and enter dollar signs for a parameter(s) the instrument disregards the security code. You must enter a High or Medium security code before entering the dollar signs.*

Configuring Security from the Front Panel

Step 1.   From the Configuration Menu press the down arrow to select Security. Verify Password 0 appears if you have set a High or Medium password for Configuration.
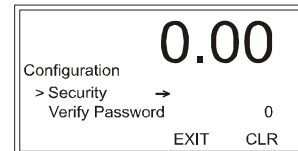
Step 2.   Press Enter to open the Security Menu; then select High Password to display the High Password editing form.
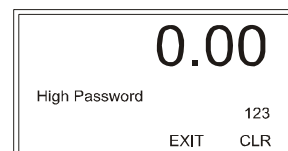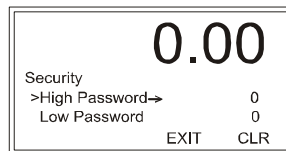
Step 3. Use the left or right arrow to position the cursor and the up or down arrow to select the value. When you finish, press Enter to save the password and return to the Security Menu. Our example shows 123 (*for illustration only*).

Step 4. Use the Down arrow to select Medium Password, and press Enter to display the Medium Password edit form.

```
        0.00              0.00
Security
 >Medium Password    0      Medium Password
   Tare/Zero sec  NONE                    456
          EXIT   CLR                EXIT   CLR
```
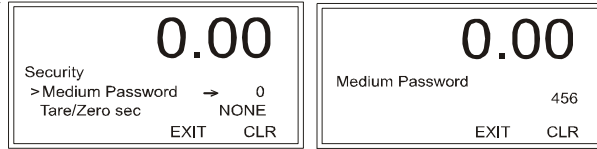
Step 5. Use the left or right arrows to select a digit and the Up or Down arrows to scroll to the value, and press Enter to save and return to the Security Menu. To delete an entry, use the left arrow. Our example (*for illustration only*) shows 456.

Step 6. To set security for the Tare/Zero functions, press the down arrow to select "Tare/Zero Sec.

Step 7. Press the Right or Left arrow buttons to select NONE/MEDIUM/HIGH. Our example uses MEDIUM.

```
        0.00
Security
 >Tare/Zero sec  MEDIUM
   Calib Sec      NONE
          EXIT   CLR
```
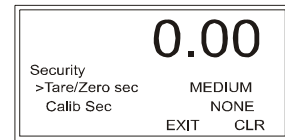
To Tare or Zero the instrument you need a password. When you Tare or Zero the instrument, Verify Password appears.

```
        0.00              0.00
Zero
 > Verify Password         Verify Password
                                         456
          EXIT   CLR                EXIT   CLR
```

Step 8. Press Enter to display the Verify Password edit screen. Use the up or down arrows to enter the assigned password (for either High or Medium Passwords) and press Enter. The Zero process can then proceed and you are returned to the Security Menu. Since we assigned a Medium Password of 456, we would enter 456.

Step 9. Use the password procedure described above for all Sections that are assigned a password. For example, you can assign a password to the Calibration Section and to the Web Page.

```
        0.00
Security
 >Calib Sec       HIGH
   Web Sec       MEDIUM
          EXIT   CLR
```
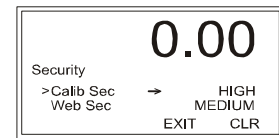
IP Setup Program (necessary for Blind HI-4050 Units)

The IP Setup program comes on the installation disk or it can be downloaded or run from the Hardy Process Solutions Web site (*Software updates and programs can be downloaded from www.hardysolutions.com. Select PRODUCTS>Weighing Instruments>Weight Controllers>HI 4050 Single Scale Weight Controller>. Then click on the Tab "Docs & Programs" . Then download the IP Setup Program*). To run the program, you must be on the same network as the HI 4050 and your firewall must be set to allow the process.

When you run the the IP Setup program from a network computer, it will find the HI-4050 and allow you to set its IP address.
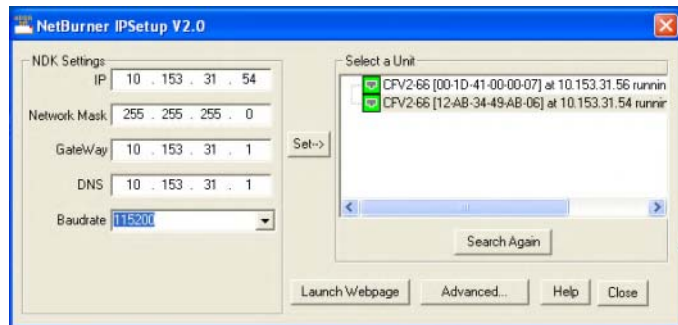
Chapter 5
Calibration

• • • • • • •

Chapter 5 describes calibration procedures. For the Weight Controller to give precise readings, it must be routinely calibrated both during operation and 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 4050 Weight Controller.

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

Pre-Calibration Procedures

Mechanical Check Procedures

Check to determine if the load cells have been installed properly. Refer to your load cell I&M manual for proper installation instructions. On some load cells an arrow indicates the direction of applied load. If the arrow points 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 system.

CAUTION - 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.

ATTENTION – La reliure sur une Scale/Vessel ou Load Cell ne permet pas à la Load Cell de faire des mouvements verticaux et peut éviter à l'appareil de revenir au point original de référence zéro.

A load cell must be mounted so that 100% of the load (Vessel + Contents) are vertically passing through a load cell.

• Visually check to see that nothing is binding the load cell or other parts of the weighing system.
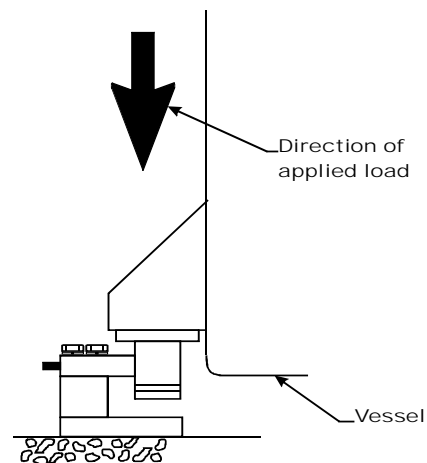
- Make sure that nothing is draped over the scale/vessel or the load cell, such as a hose, electrical cord, tubes, or other objects.
- Check to see that nothing comes in contact with the scale/vessel other than service wires and piping that have been properly mounted with flexible connectors.

Electrical Check Procedures

Check to see that there is power to the Weight Controller.

- If there is power to the controller the front panel display should be lit.
- If the display appears with a value the unit is ready for calibration.

The 4050 supplies 5 VDC excitation to as many as eight 350 ohm load cells/points, and the expected output from each load cell/point depends on the mV/V rating of the load cell/point and weight.

Typical Load Cell/Point Input/Output Measurements (EXC & SIG outputs)

- A 2 mV/V load cell/point will respond with a maximum of 10 mVDC at full weight capacity where the system includes the weight of the vessel and the weight of the product as measured by the load cell/point.
- If the load cell/point weight capacity is rated at 1000 pounds, the load cell/point output will be10 mVDC at 1000 pounds, 7.5 mVDC at 750 pounds, 5 mVDC at 500 pounds and so on.
- A zero reference point will vary from system to system depending on the "Dead Load" (weight of the vessel and appurtenances only, with no product loaded) of the vessel. The example below uses a dead load of 500 lbs.
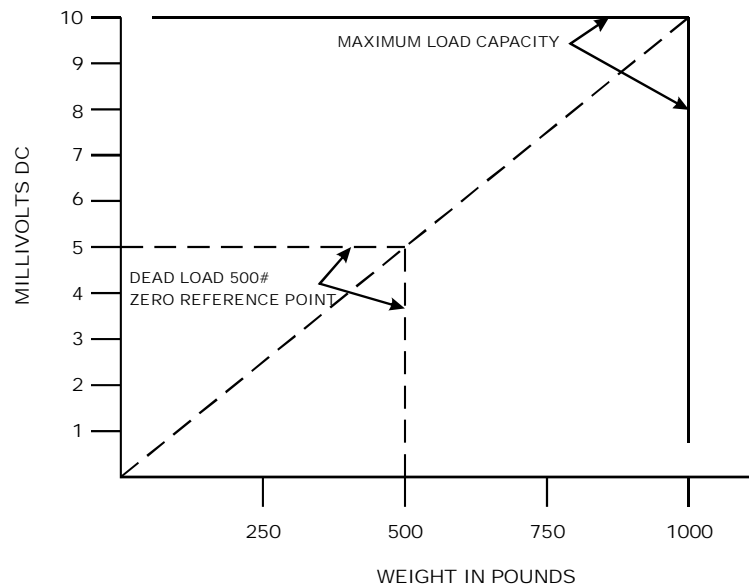
Based on this example, the operating range for this scale is 5-10 mVDC with a 500 pound weight. Understand that after zeroing the instrument the 0 reading on the instrument refers to the zero reference point and not absolute 0 mVDC or absolute 0 weight.

NOTE   *Load cell/point measurements can be checked with a digital voltmeter at the J1 connector on the rear panel or at the summing box of the HI 4050 or use Integrated Technician if you are using the IT Junction Box.*

Allow the instrument to warm up for about 15 minutes before doing the calibration procedures. Mechanically exercise the scale using maximum load several times before final calibration.

Calibration Procedures

C2 Calibration

C2 Electronic Calibration calibrates a scale system electronically without using certified test weights. It uses up to eight load sensors, a junction box, interconnect cable and an instrument with C2 capabilities, such as the HI 4050 Weight Controller. Digital information within an HI C2-certified load sensor details its unique performance characteristics. The HI 4050 Weight Controller reads the performance characteristics of each load sensor and detects the number of load sensors in the system.

Before running C2 calibration, run all of the pre-calibration procedures. Make sure you have configured the HI 4050. This includes setting the units, decimal point, scale capacity, averages etc. For instructions please see Chapter 4, Configuration.

Reference Weight

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.

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 various cities around the world.

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%.

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.

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

C2 Calibration From the Web Page

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

Configuration

Adjust Setpoint

Instrument Setup

Calibration

Mapping

Options

Security

Configuration - Calibration
Instrument ID: APP Pharm #5 Batch

Method 1: C2 Calibration

Load Sensor Number: 1
Ref Weight   12.0
Gravity Correction 1.000000
[Do C2 Calibration]

Method 2: Calibration - Zero Cal

Ref Weight 12.0
[Do Cal Low]

Method 2: Calibration - Span

Span Weight 100.1
[Do Cal High]
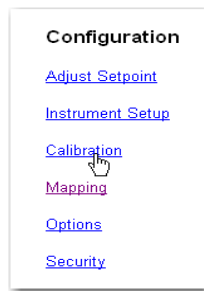
Step 1. In the "Ref Weight" text field, enter the reference weight for your application.

Step 2. (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 .

Method 1: C2 Calibration

Load Sensor Number: 1
Ref Weight   0.00
Gravity Correction 1.000000
[Do C2 Calibration]

Step 3. Click the "Do C2 Calibration" button.

Step 4. Wait a few seconds and the results will appear. If the Calibration was successful a Cal completed OK appears and the Load Sensor Number will read 0.

Cal completed OK
Back

Step 5. This message appears if no, incorrectly wired, or over ranged load points are connected to the 4050. Check the cable and connectors of the load point(s) and re-calibrate.

Cal failed: A to D converter error
Back

Step 6. This message appears if no C2 load points are connected to the 4050. Either do a traditional calibration or connect C2 load sensors to the instrument.

> **C2 Cal failed: no C2 sensors found**
>
> Back

Step 7. Click <u>Back</u> to return to the Calibration page.

C2 Calibration from the Front Panel

The example settings are for illustrations only. Your setting requirements will vary.

Step 1. From the Configuration menu, use the down arrow to select Calibration, and press Enter to display the Calibration menu. Select C2 Cal, and press Enter to display the C2 Calibration Menu with the cursor in front of Num C2.
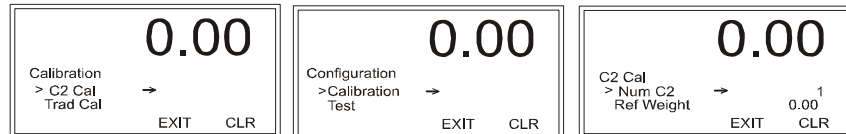
Step 2. The read-only Num C2 lists the number of C2 load cells on the system detected by the HI 4050. Verify that the displayed number matches the actual number installed. If not, check to ensure that each load cell/point cable connection is securely fastened and that each load cell/point cable is not broken.

On the HI 4050 web page, select Operations > Diagnostics >C2 and Weight and Voltage to determine which load cell/point is malfunctioning.

Step 3. Press the down arrow to select Ref Weight (Reference Weight) and press Enter to display the Ref Weight edit form.
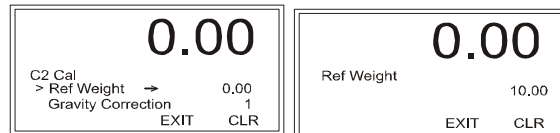
Step 4. Use the left or right arrow to position the cursor and the up or down arrow to select the value.

Step 5. When you finish press Enter to save the Reference Weight and return to the C2 Cal menu.
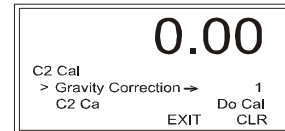
Step 6. Select Gravity Correction to open the edit page if you want to enter a gravity correction.

Step 7. Use the left or right arrow to position the cursor and the up or down arrow to select the value, and press Enter to save. Our example shows 1.006.
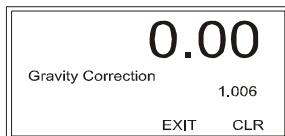
Step 8. Use the Down arrow to select C2 Cal, and press Enter to set the C2 Calibration.

Step 9. A "Cal Completed OK" briefly appears on the screen indicating the C2 calibration was successful.

```
                          0.00
C2 Cal
 > C2 Ca              →    Do Cal
    Num C2                      4
                      EXIT    CLR
```

A "Security Violation" message briefly appears if you lack the security level required to do a calibration.

A "Cal Failed" message briefly appears with the error number if the C2 Calibration was not successful. Chapter 8, Troubleshooting lists corrective actions.

Traditional Calibration

Traditional 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.

Load Check

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 reads100 pounds and a 20 pound load is placed on the vessel or scale, the display should read 120 or some value over100.

If the display reads 80 pounds and a 20 pound load is placed on the vessel or scaled, the reading is going in the wrong direction and indicates some problem with the system. (See Chapter 8, 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 Controller.

Traditional Calibration from the Web page

Step 1. Traditional 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 weight is on the scale when setting this value, the weight must be equal to the amount of load on the scale.

Step 2. Wait 12 seconds or more.

Step 3. Click in the Ref Weight text field and enter the reference weight you want. In our example we entered 0 lbs. If you want the reference weight to be 5.0 lbs., enter 5.0.

Step 4.   Click the Do Cal Low button to do the Trad Cal Zero. 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 Chapter 8 for help in correcting the error.

Method 2: Calibration - Zero Cal

Ref Weight 0
Do Cal Low

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

Method 2:Calibration - Span
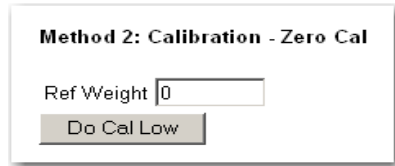
Span Weight 5
Do Cal High

Step 6.   In the Span Weight text field, enter the amount of live load weight placed on the scale.
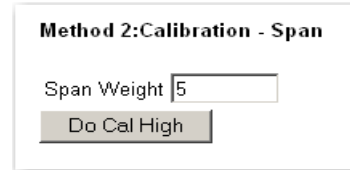
Step 7.   Click the Do Cal High button. A "Cal Completed OK" message appears briefly if the calibration was successful.

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

Cal failed: not enough ADC counts between high and low
Back
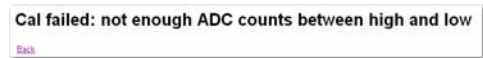
Step 9.   The scale is now calibrated.

Traditional Calibration from the Front Panel

Step 1.   From the Configuration menu, use the down arrow to select Calibration, then press Enter to display the Calibration menu. Select Trad Cal and press Enter to open the Trad Cal menu; then press Enter to open the Reference Weight edit form.

0.00
Calibration
> Trad Cal   ➞
C2 Cal
                        EXIT   CLR

0.00
Trad Cal
> Ref Weight   ➞   0.00
Low Cal   Do Cal
                        EXIT   CLR

0.00
Ref Weight
                          0.00

                        EXIT   CLR

Step 2.   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.

Step 3. Use the Down arrow to select "Cal Low Do Cal, and press Enter to save. A "Cal Completed OK" message appears briefly if the calibration was successful.

```
                    0.00
  Trad Cal
  > Cal Low              Do Cal
    Span Weight
                     EXIT    CLR
```
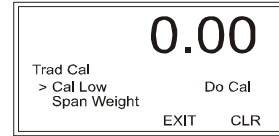
Step 4. An Error number appears if the calibration was not successful. See Chapter 8, Troubleshooting, for help with errors.

Step 5. Press the down arrow to select Span Weight, and press Enter to open the Span Weight edit page showing the last Span Weight.

Step 6. To set the Span Weight, place a certified test weight on the scale.

Step 7. Use the left or right arrow to position the cursor and the up or down arrow to select the value. If a 10 lb. weight is used, enter10.00. Press Enter to save.

```
                    0.00                            0.00
  Trad Cal                           Span Weight
  > Span Weight  →         10                             10
    Cal High            Do Cal
                EXIT    CLR                        EXIT    CLR
```
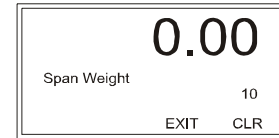
Step 8. Use the Down Arrow button to select Cal High, then press Enter to do the Cal High. A "Cal Completed OK" message appears briefly if the calibration is successful. An Error number appears if the calibration fails. See the Error list in Chapter 8, Troubleshooting for help with error correction.

```
                    0.00
  Trad Cal
  > Cal High            Do Cal
    Ref Weight             0.00
                     EXIT    CLR
```
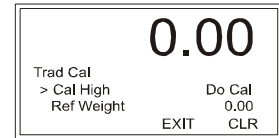
Chapter 6
Mapping
• • • • • • •

About Mapping

Mapping allows you to set up certain monitoring and control activities to meet your process requirements without programming. HI 4050 mapping is more flexible than the typical I/O addressing used in a PLC. Since the HI 4050 does not use predefined I/O addressing, you can tailor custom mappings to meet the unique requirements of your application. Whether the input is digital data to be routed to a display (requiring the DIO card option) or a setpoint signal used to trigger a command to a PLC, mapping is often the easiest way to achieve the desired result.

Glossary of Mapping Terms

Assignment Statement - The assignment statement tells the computer to change the value stored in the memory address named as a variable on the left side of an = sign. (The = sign is called an assignment operator). For example: $i = a + b$, means get the values stored in memory locations a and b, add them together, then store the sum in location i.

Destination - This is the destination memory address to which data will be moved. left side of the equation. See also Source.

I/O Interface - The section of the instrument that communicates with the external input.

Input Contact - Inputs interface selector and limit switches, push buttons, and sensors to the HI 4050. An address assigned to each input identifies the location of the input device.

Input table - Defined in the section *Input and Output Tables*.

Local Mapping - See the section *Local Input*.

Network Mapping - This is mapping to and from network communication devices.

Node Number - This is the physical address of a device in a network.

Output table - Defined in the section *Input and Output Tables*.

Setpoints - Setpoints are for optional use in mapping digital I/O or other communication values. A set point value is a threshold weight or level. It may be set in either net or gross weight units. Up to four setpoints are available. Section 4 describes how you assign a set of attributes to a setpoint, but you define the purpose of a setpoint based on how you apply that setpoint within a mapping equation.

Source - This is the memory address of the data (right side of the equation) you want to assign to the destination.

Word - When mapping the value selected for Network on the Mapping page, you can specify a value for Word. Data passed to a table must be formatted to match the allocated space. Words are groups of bit locations that can be identified by a sequence number. The default word 0 indicates that data sent to that memory location will occupy the allocated space starting from the first available bit. Entering a different value in the Word field allows you to specify a different starting point for storing the data input. This may be done to avoid overriding data that already exists in certain locations. For example, with ControlNet and RIO some tables have assigned word 0 (or both 0 and 1) to other uses, so they should not be used for a new mapping. You may need to track where information is stored. For example, if both weight and Setpoint 1 are assigned to Word zero in the same table, the overlapping input values would override one another. Note too that Int and Float consume two words, so both the word selected and the word to follow must be available for mapping.

How Mapping Works

Mapping (Addressing I/O) creates assignment statements. The destination is on the left side of the = sign and is a memory address (variable). The Source is the data on the right side of the = sign at a memory address. The = sign assigns the data on the right side of the assignment statement to the memory address on the left side of the assignment statement. Any reference to the right side of the assignment statement refers to the data only and not the address, even though the address is listed.

Memory Address (Variable) = Data (Values, states)

NOTE   *Additional variables are identified in the mapping pull downs and list of mapping symbols.*

Input and Output Tables

To transfer values from node to node (e.g. the HI 4050 and PLCs) during an I/O scan, each node has an **Input Table**, where incoming values from other nodes are received, and an **Output Table** that contains the values to be read by other nodes. The HI 4050 inputs can be weight data, current states, etc., and the output can be commands or data to be used or displayed by other nodes. The input and output tables are data arrays where data are stored (i.e. a set of memory locations of tailored sizes based on the type assigned to the variable and having an address). Mapping specifies what to do with HI 4050 input.
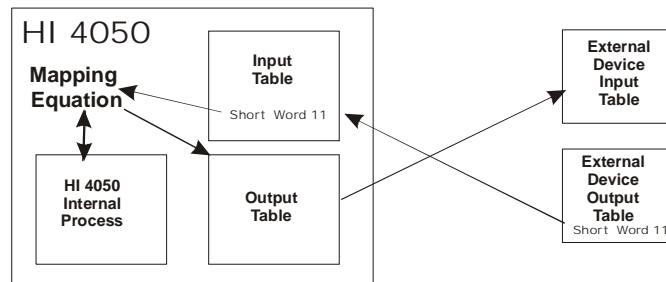
Often, more than two devices are involved, so separate input and output tables having different addresses may be set up for data exchanges with each device.

In an HI 4050 mapping equation, the right side is for data from its input table and the left side is for output.

A single equations uses at least two terms. There are limits to the number of terms allowed with the two Samples per second selections or 110sps or 250sps. If 110sps the term limit is 250. If the 250sps selection is used the term limit is reduced to 64. The number of currently entered and allowed terms are noted on the browser mapping page. Complicated equations are be more than two terms and that number will be noted (as an example 13/250). Example: CMD0=DSI0*DSO0 consists of three terms.

The HI 4050 scans through the I/O tables at either 110 times a second or 250 times per second and reads any values they contain. If state or other values are stored in the tables, the firmware processes the data and outputs it to an output device or the screen. If nothing is stored to output, no output is sent. When an I/O scan occurs, the state of each input is transferred from the input point to the input table for the receiving device, as shown in the graphic below.

Inputs interface with selector switches, push buttons, limit switches and other sensors connected to the HI 4050 for an ON/OFF connection. When the firmware is initiated, it assigns the physical input contact to a memory address. (Remember Inputs = User Switches.)

Mapping an input to a destination assigns the value of the input in the input table to an output table address. For example: **Tare = Input #3** means assign the state (Open (0) or Closed (1)) of Contact #3, contained in the Contact Closure input #3 memory address, in the input table and move it to the Tare address in the output table.

Output variables are also further identified by the first two letters of the variable:

- HO - Hardy output table
- DO - DeviceNet output table
- EO - EtherNet/IP output table

The digital inputs on the Weight Controller are found in an input table, as are the items in the DeviceNet input table. Some of the input table tables include:

- HI - Hardy input table
- DI - DeviceNet input table
- EI - Ethernet input table

Local Input

This is mapping where the input side of the equation is a digital signal entering the HI 4050 via a connector (other than a network connection feeding into an input table).
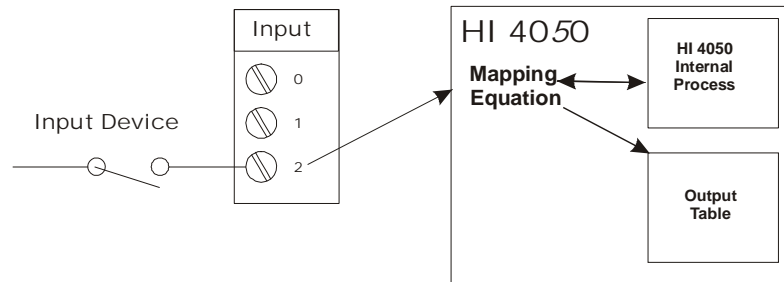
The source of such inputs would be an interface with a limit or selector switch, push button, or some other sensor feeding voltage signals into the HI 4050.

The output may be mapped to an HI 4050 internal process or one of its output tables.

Remember: Local Inputs = User Switches.

Volatile and Non-Volatile Memory

The HI 4050 output tables and input tables use volatile memory. This means, when you power off the HI 4050, you lose the data. The Addressing I/O (Mapping) is saved in non-volatile memory and is not lost when you power off.

Mapping to an Output

In English we might say: Connect Gross Weight to EtherNet/IP Float Out.

- EtherNet/IP Float Out is the Destination.
- Gross Weight is the Source.

In Assignment Statement form this mapping would look like this:

- Destination = Source or
- EtherNet/IP Float Out (EFO) = Gross Weight (HF10)

From the Web Browser let's go through the process:

Step 1.   From the HI 4050 Home Page, click Configuration to view the Configuration menu.

HARDY
PROCESS SOLUTIONS
Local Links:
HOME
OPERATION
CONFIGURATION
www Link:

Configuration
Adjust Setpoint
Instrument Setup
Calibration
Mapping
Options
Security
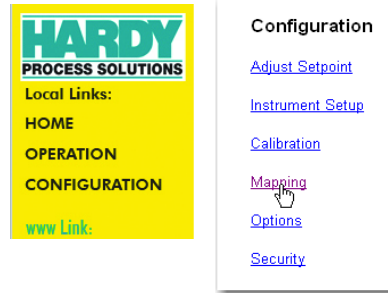
Step 2.   Select Mapping to view the Configuration Mapping Setup form. The pull-down menus list both Destination and Source setup options.

Select One Destination HELP
Instrument Setup:
Network:
Control:
Scratchpad:
Select Sources
Network:
Process Data:
Control:
Scratchpad:
Operators: equal = and * or + not ~ comma ,

Map   Unmap

Example #1 Mapping to a Network Output

Step 1.   For our destination, from the Network pull-down list we select an option based on three factors:

Network:
Control:
Scratchpa
Select Sou
Network:
Process D

Ethernet/IP Boolean Out (EO)
Ethernet/IP Short Out (ESO)
Ethernet/IP Int Out (EIO)
Ethernet/IP Float Out (EFO)
Modbus Boolean Out (MO)
Modbus Short Out (MSO)
Modbus Int Out (MIO)
Modbus Float Out (MFO)

- Type of network, e.g., CNET (Control Net), "EtherNet/IP, Modbus, etc.

- Message data type based on the number of bits to be sent or received, e.g., Int, Float, short Int, or Boolean (see Data Types below).

- Whether the value is an input or an output. Note that the listed options for destination show mainly output options.
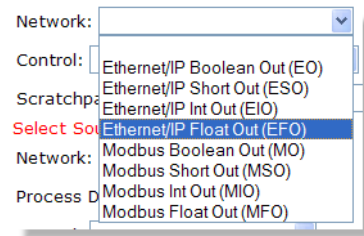
Step 2. A Word box and Select button appears to the right of the Network box. Select the word (location within the register to begin the value) and click Select. Avoid using a word that is already in use for that table.
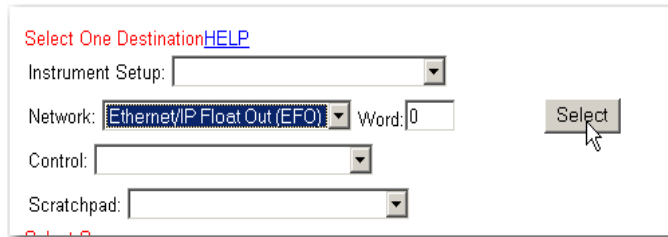
Step 3. An address appears in the text box below. You must scroll down to see it. Since we selected EtherNet/IP Float Out, the destination address is EFO0 followed by =.
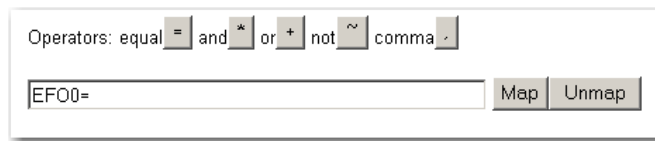
Step 4. As our source, we select Gross Weight from the Process Data pull-down list.
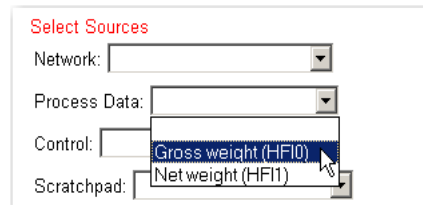
Step 5. A Select button then appears to the right. Click Select to use Gross Weight as the Source.
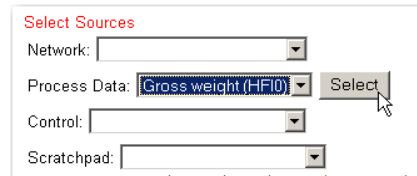
Step 6. This completes the assignment statement in the Mapping text box: "EFO0=HFI0"
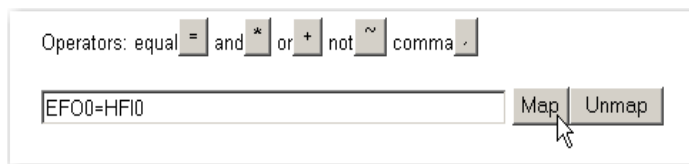
Step 7. Click Map to complete the Gross Weight to EtherNet/IP Float Out equation. The Gross Weight that is stored in the input table is now assigned to the EtherNet/IP Float Out output table and to the EtherNet/IP Network. The Map list, shown below, shows the new mapping.

Map:
Click here for a list of mapping symbols. Click here for a technical paper on mapping.
HFO27=+HFO0, HFO1=+HSI2, HFO4=+WS\0, EFO0=+HFI0
Click here for an expanded map
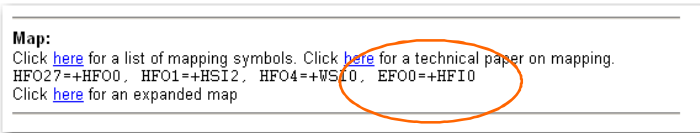
Data Types

This description should help you choose the correct data type for mapping, e.g., Int, Float, short Int, or Boolean.

All registers being transferred are integer. The mapping selection type specifies only the data format within the selected word location. It does not indicate the type of register being used. All HI-4050 data locations (registers) are configured in 16-bit words.

- When you map a Boolean value, you use only one bit within the specified word, but you must specify the bit within the word that communicates the on/off or yes/no value.
- If you map as a Short Int, you will use one word.
- If you map as an Int or float, you will use two word locations. The selection of Int or Float will specify the format of the data within the two words.

HI-4050

The setup size of the communications registers in the HI-4050 differ by network type. Packet size determines how much data can be transferred in each send or receive activity.

- **DeviceNet:** setup length in Bytes
- **EIP:** setup length in Bytes
- **RIO:** does not specify, but is in 16 bit Words
- **Modbus TCP/IP:** does not specify, but is in 16 bit Words
- **Profibus:** is 16 bit words

Receiving Device (PLC, computer, etc.)

Depending on the its capabilities of your receiving device, you may have other choices than those shown. Some communication options are not available with some PLC platforms.

RS Networx for DeviceNet:

  Defaults to DINT (32-bit word) in RS Networx, but can be setup differently.

Control Logix & Compact Logix PLC setup:

  EIP: setup length is SINT (8 bits)

  DeviceNet: DINT (32-bit word)

  RIO: defaults to INT (16 bit word.)

SLC & PLC5 setup:

EIP: INT (16 bit word.). (This needs special logic programming to communicate. See WebTech question #1387 for more information.)

DeviceNet: defaults to INT (16 bit word.)

RIO: defaults to INT (16 bit word.)

Siemens 315 PLC:

Profibus defaults to bytes

Example #2 Mapping an Input

We next connect a remote switch for use in Tare operations, so we must map User Switch 1 (1 of 3 inputs to the HI 4050) to Tare. The assignment statement is:

- Destination = Source
- Tare (HO2.0) = User Switch 1 (HI0.4)

Step 1. Select Tare on the Control pull-down menu. A Select button appears.
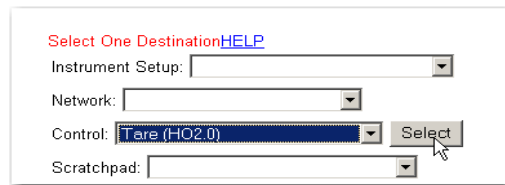
Step 2. When you click Select, the Control text box displays the destination address.

Step 3. From the Control pull-down list in the Source Section, select User Switch 1. A Select button will appear.
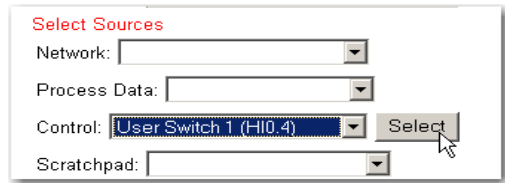
Step 4. Click Select to display the Source address in the Map text field.
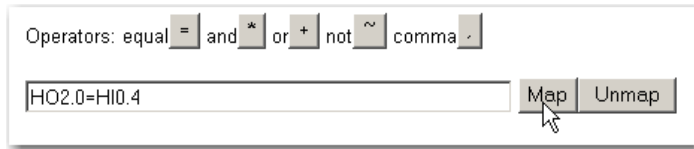
Step 5. The Mapping Assignment Statement is complete. Tare (HO2.0) = User Switch 1.

Step 6.   Click Map to map the Input Contact #1 to Tare.

Map:
Click here for a list of mapping symbols. Click here for a technical paper on mapping.
HFO27=+HFO0, HFO1=+HSI2, HFO4=+WSI0, EFO0=+HFI0, HO2.0=+HI0.4
Click here for an expanded map

Simple Mapping Example from the Front Panel

This method is only used for mapping options as that used for DIO and Analog out cards. Mapping more complex ocmmunications and boolean type equations requires the use of the Web Browser and a Ethernet TCP/IP connection.

Example: Mapping Relay 1 and 2 to set points 1 and 2 using the front display and keypad.

Destination=Source, Destination=Source

HO0.0=HSI2, HO0.1=HSI3

- HO0.0= Relay1
- HSI2= Set point 1
- HO0.1= Relay2
- HSI3= Set point2

Press the enter button on the front display to enter Configuration.

Arrow to MAP and press enter.

Starting says no equations defined if the mapping is empty.

Arrow to Map Dest, press enter

Using the arrows change the existing or create the mapping HO0.0 and press enter

Down arrow to Map Src press enter

Using the arrows, change the existing or create the mapping HSI2 and press enter

Arrow down to Add Map?

Pressing enter adds the two equations to mapping.

Repeat for additional equations.

Advanced Mapping

Boolean Mapping

In a Boolean equation, the destination (left side of the equation) is a Boolean term. It can have the value 0 (FALSE) or 1 (TRUE). The HI 4050 supports three Boolean operations:

- AND - The symbol for "AND" in a Boolean Assignment Statement is "*".
- OR - The symbol for "OR" in a Boolean Assignment Statement is "+".

- NOT - the symbol for "NOT" in a Boolean Assignment Statement is "~".

The Boolean tables are arrays of short (2-byte) integers. An individual Boolean variable in the table is located by its word offset and its bit offset. Boolean tables are given 2 letter names as follows:

- DI - is the DeviceNet input table.
- DO - is the DeviceNet output table.
- HI - is the Hardy input table.
- HO - is the Hardy output table.

DeviceNet input tables and output tables are mapped to physical external devices using a DeviceNet configuration software like Rockwell Software's RS NetWorx.[®]

NOTE   *RS NetWorx® is a registered trademark of the Rockwell Corporation.*

A Boolean variable is addressed with the syntax below:

[tablename][word offset].[bit offset]

Example: DI0.3 is bit #3 in the DeviceNet input table, word #0.

Example #3 Mapping an Network Input to a Local Output

If you have the Digital I/O card and you want a PLC to send yes/no instructions to an HI 4050, you will have to map the local output to a network input. Here is the process:

Step 1.   From the Mapping page, under Destination click on the Control pull-down menu and select Digital Card Output (HO0.0).

Step 2.   Click on the Select button to set the Destination. The DIO1(HO0.0)" address appears on the left side of the Assignment Statement.
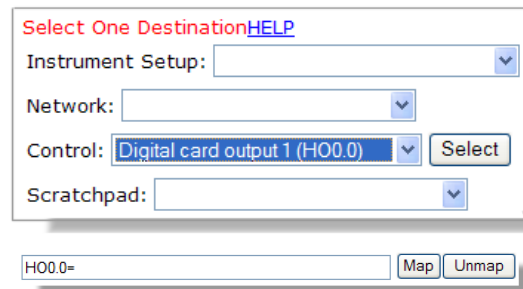
Step 3. From the Networks pull- down, select a boolean (yes/no) option as the Source for the Assignment Statement.
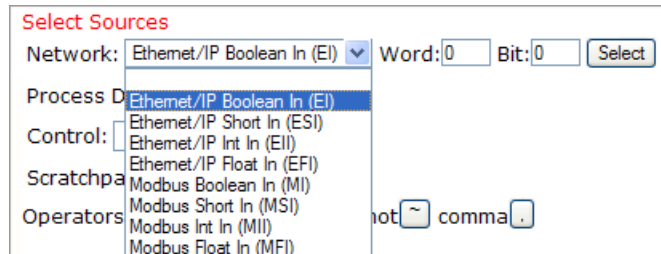
Step 4. In the Word text box, if the default location is not already in use, accept it.

Step 5. Click on the Select button to assign the source to the right side of the assignment statement. Click the Map button. The new mapping will appears below the Map text field. This sets the digital output #1 to high/low from the input selected.

NOTE: *HI 4050 network input is the source for the data from PLC output. The PLC can send instructions to the network (input(source) on the HI 4050 and in turn to the HI 4050 output (destination).*

Example #4 Mapping a Switch

Step 1. To Map the control source (Digital Input 1) to a Control Source (Tare), return to the Configuration menu and select Mapping.

Step 2. From the Control pull-down menu, select Tare (HO2.0).

Select One Destination HELP
Instrument Setup:
Network:
Control:
Scratchpad
Select S
Network
Process
Control:
Scratchp
Operator

Command Word (HSO2)
Tare (HO2.0)
Zero (HO2.1)
Hard Cal Low (HO2.2)
Hard Cal High (HO2.3)
C2 Cal (HO2.4)
Save Param File (HO2.5)
Print (HO2.6)
Clear Tare (HO2.7)
Parameter value MSW(JSO14)
Parameter ID MSW(JSO15)
Digital card output (HSO0)
Digital card output 1 (HO0.0)
Digital card output 2 (HO0.1)
Digital card output 3 (HO0.2)
Digital card output 4 (HO0.3)
Analog card output 1 (HFO28)
Analog card output 2 (HFO29)
Analog card output 3 (HFO30)
Analog card output 4 (HFO31)

comma .

Map Unmap

Map:
Click her   . Click here for a technical
mapping
HO2.0=HI0.0
Click here for an expanded map

Step 3. Click Select. Tare (HO2.0) appears in the mapping field.

You will need to send a transition signal from low to high each time you want to Tare, Zero, or any other function.

Select One Destination HELP
Instrument Setup:
Network:
Control: Tare (HO2.0)   Select
Scratchpad:

Operators: equal = and * or + not ~ comma .
HO2.0=   Map Unmap
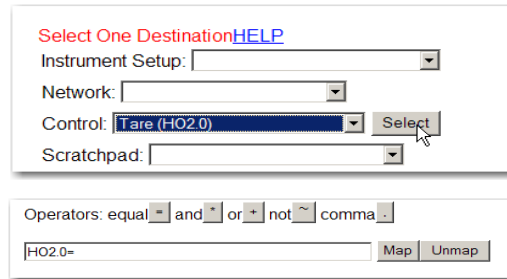
Step 4. To Map the inputs on the Main Board, select User Switch 1, 2 or 3 as the Source. A Select button will appear next to the Control field.

Step 5. Click Select to display the full mapping in the Map field.

Step 6. Click Map.

HO2.1=HI0.4   Map

Select Sources
Network:
Process Data:
Control:
Scratchp
Operator

Status Word (HSI1)
Command Status (HSO1)
Digital card input (HSI0)
Digital card input 1 (HI0.0)
Digital card input 2 (HI0.1)
Digital card input 3 (HI0.2)
User Switch 1 (HI0.4)
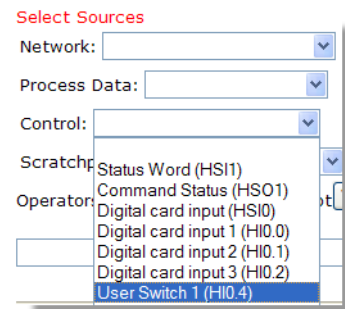
Command Word (HSO2) and Status Word (HSI1)

When you are trying to send a command to the unit through mapping, you will be using HSO2 for most of these commands. HSI1 is a status word that indicates the state of the unit at that time. Do not confuse this with HSO1 which is the status of the command sent in HSO2.If you are monitoring HSI1, this would indicate the condition of the unit at all times. Any conditions in the list will have its bit turned on, so the value would be a combination of any bits turned on at that time. Bits 0 & 1 are for A/D error/fault conditions. If you have a problem with the input from the load cells or have a problem with the A/D converter in the unit, you will get one or both of these bits on. If the bit is 0, then it is not an active condition, 1 would indicate a true condition.

HSI1 - Status Word:

- HSI1 bit 0 (HI1.0) - A/D Conversion Error
- HIS1 bit 1 (HI1.1) - A/D Failure
- HIS1 bit 2 (HI1.2) - Center of Zero
- HIS1 bit 3 (HI1.3) - Weight Overrange
- HIS1 bit 5 (HI1.5) - Real Time Clock failure
- HIS1 bit 6 (HI1.6) - Motion
- HIS1 bit 8 (HI1.8) - SD memory card read failure
- HIS1 bit 9 (HI1.9) - Display error
- HIS1 bit 11 (HI1.11) - SD memory card write failure

When you send a command by setting a bit in HSO2, the command word, the HI 4050 will run that command and send a copy of the command bit sent back to the user in HSO2 being read. At that time, the unit will also send a command status in HSO1 to give an indication of a pass or fail of the command. If it fails, the value returned will be an indication of the cause of the failure. HSO1 - Command Status - value returned after a command (see HSO2) is done.

Non-zero status means the command failed:

- Status 1 (0x0001) = Calibration, Zero, or Tare failed due to ADC error
- Status 2 (0x0002) = Calibration, Zero, or Tare failed due to ADC failure
- Status 64 (0x0040) = Calibration, Zero, or Tare failed due to Motion
- Status -8 (0xFFF8) = Hard Calibration failed, not enough ADC counts between high and low steps
- Status -6 (0xFFFA) = C2 Calibration failed, no C2 sensors detected
- Status 7 (0x0007) = Bad command number of no command being sent

HSO2 - Command Word:

Commands are performed on a 1-shot basis when this word changes from 0 to 1. An error code is returned in the "command status" word HSO1.

- HSO2 bit 0 (HO2.0) - Tare

- HSO2 bit 1 (HO2.1) - Zero
- HSO2 bit 2 (HO2.2) - Hard Cal Low
- HSO2 bit 3 (HO2.3) - Hard Cal High
- HSO2 bit 4 (HO2.4) - C2 Cal
- HSO2 bit 5 (HO2.5) - Write Parameters to SD card
- HSO2 bit 6 (HO2.6) - Print
- HSO2 bit 7 (HO2.7) - Clear Tare

Analog Mapping

In an analog equation the Destination value is an analog term. The equation can have different values in different formats, e.g. 16-bit integer, 32-bit integer, and 32-bit float. The HI 4050 supports three analog operations. The symbols are the same as the Boolean operations, but with different meaning.

- Multiply. The symbol for "multiply" is '*'
- Add. The symbol for "Add" is '+'
- Negate. The symbol for "Negate" is '~'

Analog tables are given three-letter names as follows:

DFI,DFO,DSI,DSO,DII,DIO all refer to DeviceNet tables, where the item is a float, a short integer, or a 32-bit integer, depending on the second letter in the table name.

- S - 16-bit signed integer
- F - float
- I - 32-bit signed integer

An analog variable is addressed with the syntax below:

> [tablename][offset]

The offset is an offset in words in the case of the network tables. The offsets in Hardy tables have various predefined meanings.

When an analog equation is evaluated, all terms are converted to float. The final result is then converted to the type of the destination.

Mixed Mapping

In an analog equation, the term on the left side of the = sign is an analog variable. In a Boolean equation, the term on the left side is a Boolean variable. It is permissible to use analog variables in Boolean equations and vice versa. A mixed equation is Boolean if its left side is a Boolean term and Analog if its left side is an analog term.

A Boolean variable in an analog equation is converted to 1.0 or 0.0.

An analog variable in a Boolean equation is TRUE if it is greater than zero and FALSE if it is less than or equal to zero.

You may also reference additional examples using the WebTech Knowledge base found on the http://www.hardysolutions.com website by selecting Support Center> WebTech Knowledge Base> Click in the acceptance box to enter the database. and Search on "command interface" or search ID "1480".

Special (Command) Mapping

A command interface can be used to read or write a parameter value. The table CMD appears only on the left side of a "command" equation. The right side has 1 or 2 terms. The first one defines (in words) where the command data comes from the table and offset, and the second term defines the table and offset where the response to a command is written.

Setting up the Command Interface Mapping

Use an equation of the form CMD0 = (in_table)*(out_table)

In_table is an input table defining where the command is written.

Out_table defines where the replay data is written.

Example: CMD0=DSI0*DSO0

This equation says the command will be written to the DeviceNet input table at word offset 0 and the reply data is written to the DeviceNet output table at word offset zero.

The upper two bytes of PARAMETER ID (JSO15) and the upper two bytes of the parameter value (JSO14) can also be mapped, which removes the need to do steps 1 and 2 above. Instead, you would write the 0000 and 0001 into JSO15and JSO1, respectively.

Example: JSO15 = DSI2 and JSO14 = DSI3

By doing this you can set four-byte parameter values using a single command rather than the three commands required above.

The Command Interface The HI 4050 may receive commands over any of its network interfaces. A command consists of four-bytes, which it receives through its network input data. The instrument responds with a four-byte response.

To read the value of any parameter, send the four-byte PARAMETER ID. The byte order is LITTLE ENDIAN (i.e., least significant byte first). Verify that the upper two bytes are set correctly. To verify what they should be, either see the parameter list at the end of this section or look on the OPERATION/DIAGNOSTICS/PARAMETERS web page to find the parameter IDs. Use the special parameter ID (0x4001 or 0xC001 with the upper bit set) to set the upper bytes. The value the instrument returns for the parameter will be either integer or float.

When writing the value of a parameter, the PARAMETER ID is four bytes long, and the parameter value is also four bytes long if it is a floating-point number. However, each command is only four bytes long, while most integer valued parameters are only two bytes long. Also the most significant two bytes of a PARAMETER ID is usually zero.

To set the value of a two byte parameter with a four byte PARAMTER ID, send these four bytes:

- byte 0: The least significant byte of the PARAMTER ID
- byte 1: The next byte of the PARAMTER ID but with the highest order bit set.
- bytes 2,3: The value you want to set the parameter to.

For example, to set the value of NumAverages to 3, if the first two-bytes are set to 0, send this hex command <0x8007><0x0003>.

Here the <0x0007> is the lowest 2 bytes of the PARAMETER ID or NumAverages which becomes 0x8007 after you set the most significant bit and <0x0003> is the value you want to set the parameter to.

If the parameter is 4 bytes long, as all floating-point values are, you must first set the upper 2 bytes. A special PARAMETER VALUE (0x4000 or 0xC000 with the upper bit set) does this. Also if the upper two bytes of the PARAMTER ID are not zero, use the special parameter ID (0x4001 or 0xC001 with the upper bit set) to set the upper bytes.

All write commands are 1-shots

The first two bytes of the response to a write command are an echo of the first two bytes of the command. The next two bytes are either the TWO MOST SIGNIFICANT bytes of the parameter or, if the parameter was in fact a command like ZERO or TARE, a status code indicating whether the command succeeded or failed.

If the PARAMETER ID is not valid, the instrument will return four zero bytes.

A parameter writing example: Setting Setpoint 2 Target to 1.0

Setpoint 2 Target has a PARAMTER ID of 0x00010012 (hexadecimal). The number 1.0 in float format is 0x3F800000.

Step 1.   Set the upper two bytes of the parameter value with the command <0xC000><0x3F80>

Step 2.   Set the upper two bytes of the PARAMETER ID with the command <0xC001><0x0001>

Step 3.   Write the Setpoint 2 Target with the command <0x8012><0x0000>

Performing a Parameter List (Dump)

Step 1.   Select Operation on the Home Page to open the Operation menu.

Step 2.   Select Diagnostics to open the Diagnostics Page.
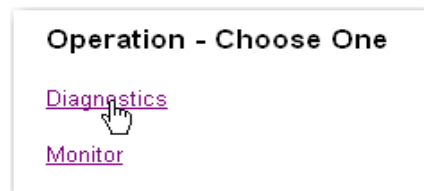
Step 3. Click Parameters to display a list of the parameters and their settings.

Operation – Diagnostics

Instrument ID: Modular
Model Number: HI 4050
Program Part Number: 650-0149-01-0
Firmware Revision: Modular Beta 1.0.0.53
Serial number: E006
Last Calibration: C2 Cal 3 Oct 2006
Status Word: 0000

Parameters Stability Test Weight and voltage I/O C2 SD Card

00000001 $Unit=4[kg]*	0001002A Data bits:=1[8]
00000002 $$Decimal Point=0[0]*	0002002A Parity:=0[NONE]
00000003 $$Grads=0[1]*	0003002A Printer Mode=2[TARE]
00000004 Operator ID=Me!	000002F2 scratchpad=3.000000
00000005 Instrument ID=Modular	000102F2 scratchpad=1.000000
00000006 WAVERSAVER®=3[1.00 Hz]	000202F2 scratchpad=1.000000
00000007 Num Averages=15	000302F2 scratchpad=3.000000
00000008 $Zero Tolerance=5	000402F2 scratchpad=3107.000000
00000009 Low Pass Filter=1[ON]	000502F2 scratchpad=3110.000000
0000000D Motion Tolerance=1	000602F2 scratchpad=0.000000
0000000F Capacity=125	000702F2 scratchpad=0.000000
00000201 Span Weight=1	00000036 DNET Baud=2[500k]
00000202 Ref Weight=0	00010036 DNET Node=3
0000004D Certification=0[None]	00020036 DNET Bytes In=32
00000092 Tare Weight=1	00030036 DNET Bytes Out=32
00000010 Mode=0[Gross]	00020037 EIP key=1288042
00000011 Type=0[Loss in Weight]	00000037 EIP Bytes In=256
00000012 Target=3	00010037 EIP Bytes Out=256
00000013 Preact=0	00000208 Calibration Date=C2 Cal 3 Oct 2006
00000014 Deadband=0	00000203 Cal Low Counts=768413
00010010 Mode=1[Net]	00000204 Cal High Counts=795421
00010011 Type=0[Loss in Weight]	00000205 Cal Span Factor=3.623863085522E-05
00010012 Target=0	00000206 Zero Counts=768413
00010013 Preact=0	00000209 Cal Zero Counts=768413
00010014 Deadband=0	0000020A ITECH=768291 770281 770549 770941
00020010 Mode=0[Gross]	772737 5 1
00020011 Type=0[Loss in Weight]	0000001D zone=3[PST(GMT-8h)]
00020012 Target=0	000002F0 MAP:=HFO27=+HFO0, HFO1=+HSI2,
00020013 Preact=1	HFO4=+WSI0, EFO0=+HFI0, HO2.0=+HI0.4,
00020014 Deadband=1	DFO2=+HFI1, HO2.1=+DFI2
00030010 Mode=0[Gross]	00000300 Display Mode=0
00030011 Type=0[Loss in Weight]	00000301 Display Line=1
00030012 Target=0	0000002D High Security Code=1
00030013 Preact=0	0001002D Medium Security Code=2
00030014 Deadband=0	0000002E FPSecurity=2[HIGH]
0000001A AutoZero=0[OFF]	0000002F Calibration Security=0[NONE]
0000000E AutoZero Tolerance=0	00000030 Web Page Security=1[M]
0000002A Baud Rate:=4[9600]	

Using a Parameter Dump to Save Settings

The Parameter dump can be used as a backup of the SD card and for duplicating setups in other 4050 controllers.

Step 1.   Click inside the parameter dump box.

Step 2.   Select ALL

Step 3.   Copy and paste the contents into a TEXT file or Notepad. **Do not use** a word processing document file type.

Step 4.   Reverse the order to restore data to the parameter dump.

Step 5.   Click SAVE when you have copied over the existing text with the new text. to save the parameters to the new HI 4050 instrument.

NOTE   *In some instances, the calibration data cannot be transferred between 4050 controllers using the SD card or the parameter dump method. The problem occurs when a controller containing the old analog weigh scale card's data tries to copy to a controller with the new version of the Analog weigh scale card used in the HI 4050+. The differences in the cards prohibit a direct data transfer. That non-transferral of calibration data happens for new to old **and** old to new.*

You can tell if the controller has the latest analog weigh scale card if on the front display HI 4050+ is displayed on the main display line.

Chapter 7
Operation

• • • • • • •

Chapter 7 contains step-by-step instructions for operating the Hardy Process Solutions HI 4050 Weight Controller. The procedures include complete instructions for operating the Weight Controller from the front panel and from the Web page. Operating procedures primarily include Taring and/or zeroing the instrument and creating setpoints. We highly recommend reading the procedures before operating the Weight Controller. Being familiar with the operating procedures insures that the Controller will provide trouble free service.

Getting Started

Before operating the Hardy HI 4050 Weight Controller, check to make sure the following procedures have been performed:

- Power and Load Point cables properly installed.
- Communication cables properly installed.
- Calibration Performed.

The 4050 Front Panel

Overview

The Front Panel Display is a five-line Graphic LCD. The Summary screen displays the current weight in the selected mode (Gross, Net or available Rate of Change) and the selected engineering units (lb, oz, lb/oz, kg, g, Ton, t (Metric Ton). The screen displays the menus for Configuration, Calibration, Test and Operation.
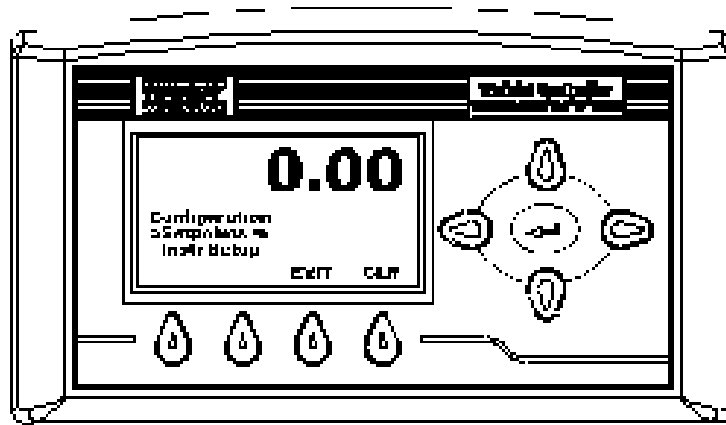
Button Functions

Four buttons below the screen activate the functions named on the screen above each button. These functions vary depending on the screen selected.

For example to Zero the instrument, press the button directly below the ZERO function.

Up/Down - Left/Right Buttons

The Up or Down arrow s move the cursor vertically allowing the user to scroll through a list or menu. Use them to move from one sub-menu to another or to increase / decrease displayed values. The Left / Right arrow buttons move the cursor horizontally left or right.

Enter Button

Press Enter to display the Menus and Sub-Menus or to enter the configured values or selected items form a pick list into non-volatile memory.
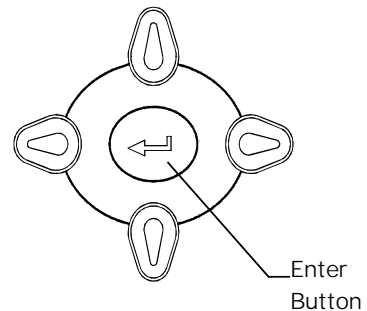
Enter Button

Exit Button

Exit returns to the previous menu. The Exit button only appears when you enter a menu, it does not appear on the Summary Display.

Clear Button

Clear (CLR) clears the total Alphanumeric Entry and repositions the cursor for the first entry. It is a good idea to clear an existing parameter value before entering a new value to avoid making mistakes. CLR only appears when you enter a menu. It does not appear on summary or operation displays.
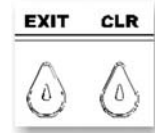
Zero Button

Use the Zero button in Gross mode to zero the selected scale to within the tolerance level. Use of this function should not exceed the value entered for zero tolerance.

Tare Button

Tares the selected scale. The Tare button sets the Net Weight equal to 0. In Net Mode (i.e. a channel displays Net in the Summary display) the weight changes to 0.00. In Gross mode the Gross Weight does not change; however, the Net weight is changed to 0.00.

Print Button

The Print button prints the Gross, Net and Tare weights to an attached printer. If the Rate of Change option is activated, the print button prints the ROC as well. If the Scoreboard is activated, the Print button does not function.

Entering Alphanumeric Values

To enter a number, letter, or punctuation mark, use the Up or Down arrows. Move the cursor to where you want to enter the value. Press the Up or Down arrows until the letter or number you want appears. Press the Right or Left buttons to move the cursor to the next position. The two punctuation marks are the period (.) and the minus (-) sign.

Starting Up for the First Time

When the HI 4050 Weight Controller first powers, a Summary display shows the weight in Gross or Net mode. To change from Gross, Net or ROC (Rate of Change) mode, use the Mode button.
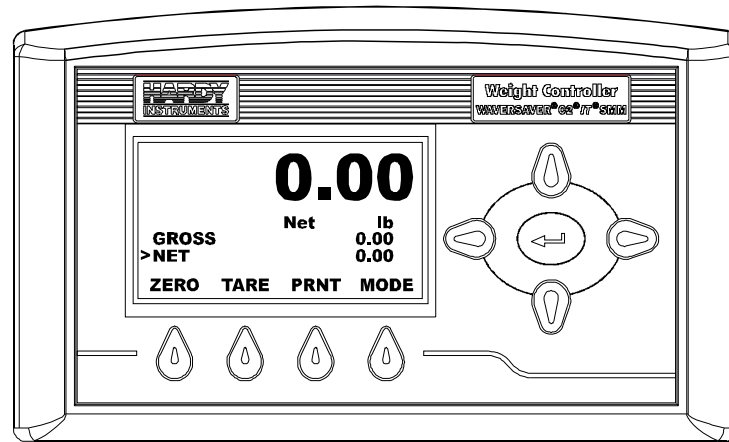
WARNING After configuring your system and turning the instrument off, make sure that the SMM-SD is installed correctly before powering up. If the SMM-SD is not installed, the instrument returns to a default condition which probably does not meet your process requirements and could result in product/property damage or personal injury.

AVERTISSEMENT – Après avoir configuré votre système et mis l'appareil sous hors-tension, assurez-vous que le SMM-SD est installé correctement avant de le remettre sous tension. Si le SMM-SD n'est pas installé, l'appareil retournera dans les conditions à défaut, ce qui probablement ne correspondra pas à vos exigences de fonctionnement et pourra endommager le produit ou provoquer des blessures personnelles.

Step 1.   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.

Step 2.   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 and AutoZero Tolerances parameters. Instructions for Zero Tolerance and AutoZero Tolerance Parameter Setup is in Chapter 4.

Step 3.   To Print Gross, Net, Tare, or All, depending what you configured when setting the Print parameters, press the Print button.

Using the Onboard Display Menus

After Startup, the display shows that this is a HI 4050+ with the new high speed weigh scale card in it with the new firmware.

```
                           0.00
HI4050+            GROSS       IB
>

ZERO    TARE    PRNT    MODE
```
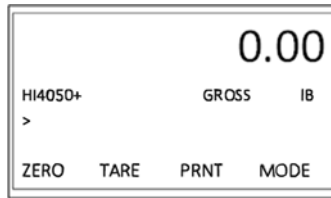
You can use the up and down arrow to scroll through the line options.

These are in order:

1 BLANK
2 BLANK
3 GROSS
4 NET
5 CUSTOM
6 ROC (Rate of Change -- if enabled in the controller)

As you press the up or down arrow, you can scroll through and stop at any two consecutive lines showing from list.

This shows the selection of Net and CUSTOM. CUSTOM display is a mapped value.

```
                           0.00
HI4050+            GROSS       IB
>Net                         2.22
 CUSTOM
ZERO    TARE    PRNT    MODE
```
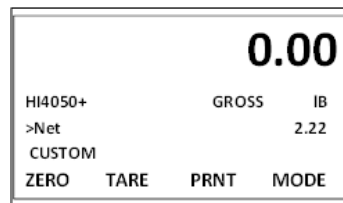
Below, the display of the unit indicates that the Scale connected to the HI 4050 is in motion.
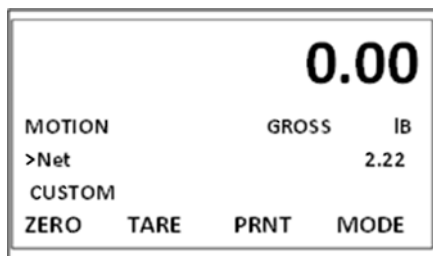
This display with the "><" is an indication that the scale reading as at 0.00 +/- .5 grad.
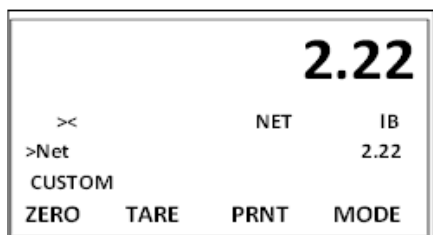
Pressing the MODE button will change the large number display between GROSS, NET, And ROC (if enabled) as show here with NET Selected.

Set Points Configuration

About Set Points

Operators may need to reset a set point target weight. For example, if a packaging operation switches from 10 pound bags to five pound bags, you would change a set point target weight from ten to five. Target weight is one of several values on the set point web page, but in most cases, operators will not be asked to change the other values. Instructions for Configuring the instrument can be found in Chapter 4.

Target

This is the target weight for your application. You may be asked to reset this value if a production activity changes.

Entering Set Points from the Web Page

Click Configuration on the Home Page to open the Configuration menu, and select Adjust Setpoint to open the Adjust Setpoint page.
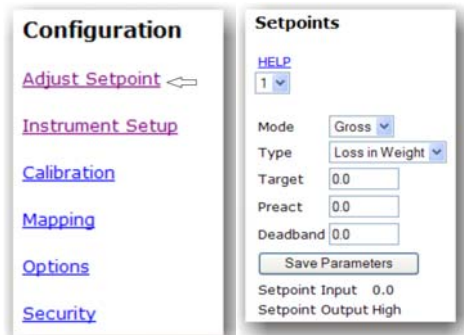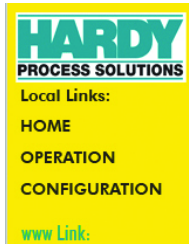
Step 1. If your system uses more than one setpoint (up to four may be used), you will need to know which one you should change. To select the Setpoint to configure, use the pull-down list below Help. In our example we selected Setpoint 1, which appears in the text field.

Step 2. Select the Mode from the pull-down list. In our example we selected Gross.

Step 3. From the Type pull down list, select the Type of control you want for your application. In our example we selected "Loss in Weight."

Step 4. Enter the Target weight for your application in the Target field. Our example shows 180.0 lbs.
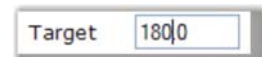
Step 5. In the Preact text field, enter the Preact value for your application. Our example uses 5.00 lbs.
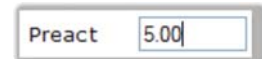
Step 6. In the Deadband field, enter the value for your application. Set points deactivate at the set point plus the deadband. Set the deadband larger than the preact to prevent rapidly fluctuating setpoint states. In our example we entered 8.00 lbs.
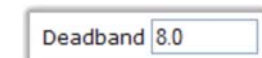
Step 7. Click Save Parameters to save the Setpoint parameters.
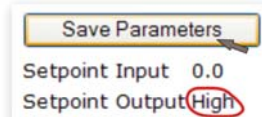
Note the Setpoint Information is displayed below the Save Parameters button. This is read only and indicates the Setpoint you currently are configuring. The high or low is relative to the Target weight. Current weight and output condition is also high or low.

Entering Set Points from the Front Panel

All four set points are configured the same way. The procedures is:

Step 1. To select the setpoint to configure, starting from the default Summary Display, press Enter to open the Configuration Menu, and use the down arrow to select Setpoints. (Note: *The arrow on the right of Setpoints indicates that it is also a menu.*) With Setpoints selected, press Enter to open the Setpoint menu, then use the left or right arrow to select the Setpoint. Our example shows Setpoint 2.
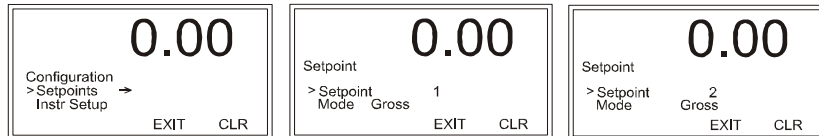
Step 2. Mode; then use the Right or Left arrow to toggle between Gross, Net or available Rate of Change modes. Our example shows Gross.

Step 3. Use the Down arrow to select Target; then press Enter to display the Target edit form.
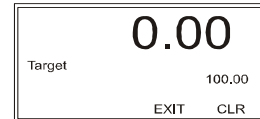
Step 4. Use CLR to clear the existing value and position the cursor for entering the first digit. Use the Up or Down arrows to scroll the number or decimal point.
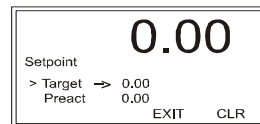
Step 5. Use the Left arrow to move to the next digit and the Up or Down arrows to scroll the number or decimal point. The weight is in the units you selected for "Units" when you configure the instrument. Our example shows 100.00 for target weight.
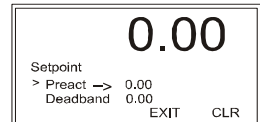
Step 6. Press Enter to save the target weight.

Step 7. "Entry Accepted" appears briefly and then the Setpoint Menu returns.

Chapter 8
Troubleshooting

• • • • • • •

Chapter 8 provides procedures for troubleshooting the electrical, mechanical and firmware elements of the HI 4050 and for using Hardy's Integrated Technician (IT®) software utility to isolate problems. Flow charts provide troubleshooting steps for the weight controller, load cells, and cabling. Chapter Eight also provides

Disassembly and Reassembly Notes, Warnings and 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.

- Ensure that any disassembly is done in a clean, well ventilated, properly controlled static environment.
- Ensure that the assemblies and sub-assemblies are well supported and insulated when doing any repairs on the HI 4050 Weight Controller.
- Place small fasteners, connectors and electrical parts in closed containers so as not to lose parts during reassembly.
- Read the disassembly instructions before any disassembly begins. If any of the instructions for disassembly are unclear, contact 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.

- Always install complete hardware groups (Screws, Washers, Lock Washers, Spacers, Etc.) back to the original point of removal.

- 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.

- Always perform a final inspection after completing any reassembly to be sure that all fasteners are tight, all connectors are secure and there are no loose parts on any of the printed circuit boards in the Weight Controller.

- Always follow proper safety procedures when working on or around the Weight Controller.

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 vibration isolators, cables draped over pipes etc.) can make a load cell seem to be the problem.

If you are in doubt as to how to resolve a problem or if you need assistance, look for 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 several 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.

Customer Service is 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, Ext.9550.

2 Technical Support outside the US and Canada:1-858-278-2900 Ext.9550.

Error Messages

- A/D Failure Error! - Internal Electronics Error, Retry.

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

- Motion Error! - Check Motion Tolerance Settings and Retry

- Trad Cal Error! - Error occurred during calibration, re-calibrate.

- C2 Cal Error! - Error occurred during calibration, re-calibrate.

- Too Lo Error! - Verify that the load cell signal level is 0-15 mV. Verify that there is enough weight on the scale. Perform Span than go back and Zero.

- Too Hi Error! - Verify that the load cell signal level is 0-15mV.   Verify that there is enough weight on the scale. Perform Span than go back and Zero.

- 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 even be removing the uneven load cell and replacing it with a load cell that is equal to the others 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.

- Function Error! - Pressed a function button and the Function did not work. Try again. Cycle power.

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

- Security Violation! - User signed in with a password that does not allow performance of a certain function or entry to certain menus. Security level of the user identified in the User ID, too low for the menu or function.

- Over-range - Weight over the setpoint target.

- 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®)
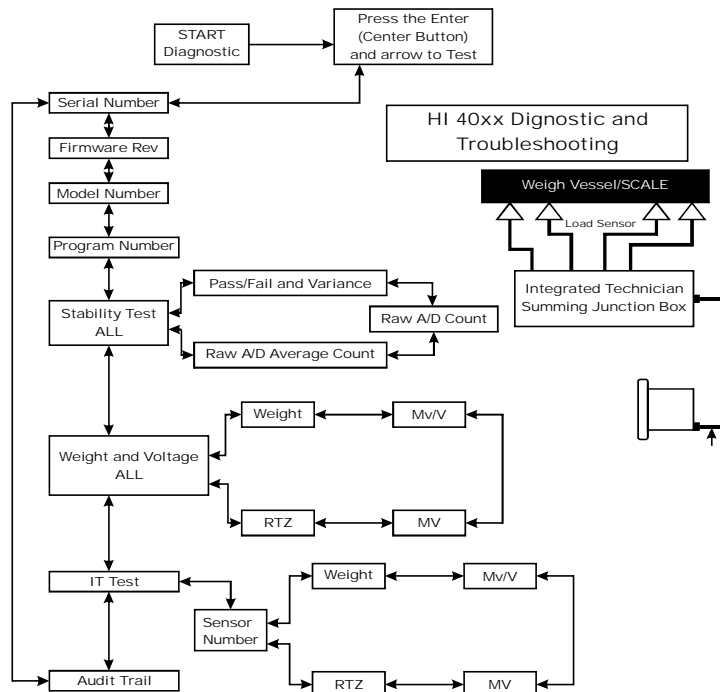
A more detailed explanation of each section of the test follows below:

Stability Test ALL
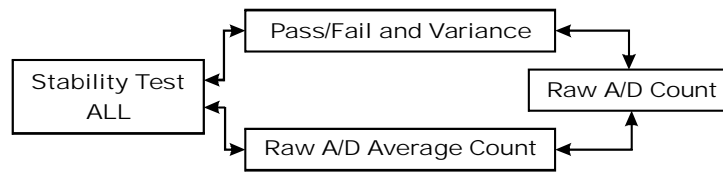
See Stability Test under the System and Load Cell Tests >Integrated Technician section of Chapter 8 for details.

PASS/FAIL and Variance 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.

Raw A/D Count

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

Raw A/D Average Counts

These numbers also reflect weight change at the smallest measurement, the internal analog-to-digital converter computer register - except that this reading is averaged using the AVERAGES setting parameter from the controller's configuration. Using the maximum number of internal averages and the 10ms update 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 all varieties of load cell connection systems.

Further investigation to isolate system problems requires the use of hand tools and multi-meters or the Integrated Technician Summing Junction Box and using the IT© Test section.
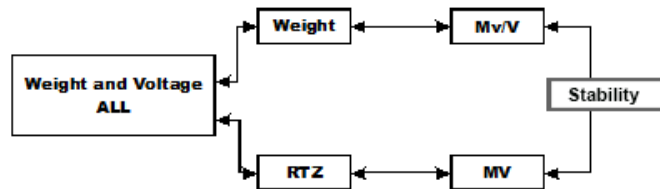
NOTE   *IT ®is a registered trademark of Hardy Process Solutions.*

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.

mV/V are DC voltage signals between 0-3.0000 mv/v   This is the mv signal divided by the sense volts to derive the mv/v level. This reading will be to 4 decimal place resolution.

mV DC voltage signals are between 0-15 millivolts. Overloads and negative millivolt readings are not shown as actual readings but 15.3 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. Millivolt/Volt equals the output from a load cell per each volt of excitation. The HI 4050 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.

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 **WAIT** 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

```
┌──────────┐        ┌──────────┐      ┌──────────┐
│ IT Test  │◄───┐   │  Weight  │◄────►│   Mv/V   │◄──┐
└──────────┘    │   └──────────┘      └──────────┘   │
                ▼        ▲                            │
           ┌──────────┐  │                            │
           │  Sensor  │◄─┘                            │
           │  Number  │◄─┐                            │
           └──────────┘  │                            │
                ▼        ▼                            │
           ┌──────────┐      ┌──────────┐             │
           │   RTZ    │◄────►│    MV    │◄────────────┘
           └──────────┘      └──────────┘
```
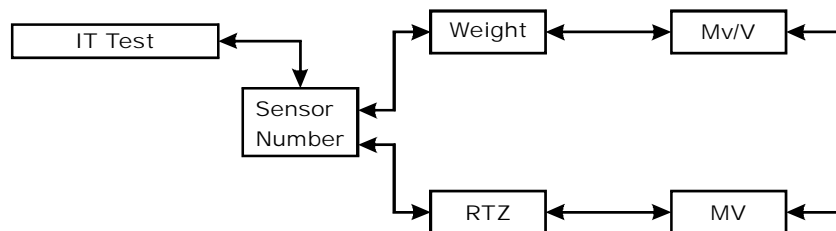
If your system has an Integrated Technician Summing Junction box, the IT test can help identify individual load cell problems up to a maximum of four load cell selections.

Sensor Number Indicates which sensor is under test. Using the up or down arrow selects the target sensor to be tested.

NOTE

Warning: Do not install your HI 215IT summing board in areas susceptible to high vibrations. The relays on the board can chatter and affect your weight readings.

Audit Trail

A list of parameters and successful calibration events is logged into the audit trail section. Event listings are formatted with a time and date stamp. Log entries cannot be erased and are stored in the Secure Memory Module.

Audit Trail

General Troubleshooting Flow Chart Index

Drifting or unstable weight readings	**A**
Electrical, Mechanical and Configuration reviews	**B**
Drifting or unstable weight readings	**C**
Weight indication will not return to zero	**E**
Verify individual load sensor operation	**F**
Trad. Cal - A/D Failure Error	**G**
Mechanical Inspection	**H**
Electrical Inspection	**J**
Load Sensor Installation	**K**
Exceeds the Millivolt range. Out of range condition.	**M**
Blank Display	**N**
SD Card Diagnostics and losing memory at power cycles	**P**

A - Guidelines for Instabilities on Formerly Operating Systems

A → Press the ENTER Button and arrow to the TEST prompt and press ENTER.

Select the Stability Test and press ENTER

This is a Pass or Fail test with the Variance displayed. The variance is the difference between the low and high counts over 100 readings. → Monitor the Test results

PASS? — No → **A1**

Yes

EXIT to the Summary Display

Monitor the display for stability

STABLE? — No → Verify wiring and connectors are solid and clean

Yes → **Cont. C**

Verify wiring and connectors are solid and clean

STABLE? — Yes → **Cont. C**

No

Replace IT summing card

STABLE? — Yes → **Cont. C**

No → **B1**

A1 - Guidelines for Instabilities on Formerly Operating System (Cont'd)

A1

UNSTABLE WEIGHT CONTROLLER

Disconnect external signal cables and shields, except AC Power

Monitor the Display for stability

STABLE?

Yes

No

Reconnect signal cables one at a time

Problem could be in the instrument. Contact Hardy Customer Support PH: 800-821-5831

Monitor the display for stability

If installing any cable causes unstable readings REVIEW TROUBLESHOOTING SECTION B: B1.1-B1.7

Go to B

B - Guidelines for Instabilities on Formerly Operating Systems (Cont'd)

B → Check for
Electrical Stability

OK? — No → **B1**

Yes

Check for
Mechanical Stability

OK? — No → **B2**

Yes

Check Configuration
settings for
stability

OK? — No → **B3**

Yes

Go To
A
Stability

B1 - Guidelines for Instabilities on Formerly Operating Systems (Cont'd)

B1 → **Electrical**

B1.1
Physical Grounding -
All common equipment share a common ground point.
Keep the ground cable length to earth ground as short as possible.
Install a new ground rod if the cable length is excessive.

B1.2
Cable -
Cuts or breaks in the load cell insulation allow moisture to wick into the
cable and load points. This can setup stray capacitance charges and allow
ground currents to exist. This could create a highly intermittent situation.

B1.3
Vessel, Fill and discharge piping -
Ground all to a common point to eliminate electrical differences in potential
and static build-up.

B1.4
Load Cells -
Ground straps must be installed to provide a direct discharge path to ground
around the load points.

B1.5
Cable Routing -
Separate high voltage sources and cables form low voltage signal cables.
Stay a minimum of 14 inches from magnetic fields and SCR controls.
Avoid parallel high voltage and signal cable runs.

B1.6
Cable Shielding -
Ground low voltage cable shields only at the controller end.
Grounding both cable ends produce ground currents.
Verify, with and ohm meter, the shield is only grounded at the weight controller.
Disconnect eh shield at the controller and check for an open circuit between ground
and shield. Reconnect the shield to ground and confirm a proper ground path from
the IT Junction box to the controller.
Verify the shield is not connected to ground at the IT Junction Box.
Load cell shields only pass thru the IT Junction boxes and are not connected
ground at that pont.

B1.7
Weight Controller - Common AC ground and Chassis grounds.

Go to B

B1 - Guidelines for Instabilities on Formerly Operating Systems (Cont'd)

B1

B2

OK? — No →

Vessel -
When inspecting a vessel, keep in mind the Center of Gravity (COG) should be low and centered equally over all the load cells.
Insure the load is directly over or under the load point to avoid side-loading.
Make sure there isn't any side loading from piping or external forces.
Install flexures on all piping to insure a free floating vessel.
Make sure the vessel and load cell mounts are mechanically stable and fixed.
Large changes in individual load cells indicate a shift in the COG or faulty load cells.

Piping and motors can effect the individual load cell readings.

Allow for a higher reading on load cells that support motors and piping.

Insure pneumatic lines are not applying pressure to the vessel when energized.

Use check (stay) rods to minimize vessel movement.
Make sure the check rods are loose and not interacting with the vessel.

Power down all vibration, vacuum and pressurization equipment during the test process.

Yes ↓

B3

OK? — No →

Configuration Settings

Incorrect WAVERSAVER settings can cause unstable weight readings.

Adjust to the lowest WS setting that gives you a stable reading.
Higher frequencies with low amplitude vibrations - Use WS settings 1 or 2
Lower frequencies with high amplitude vibrations - Use WS setting 3 or higher

Incorrect number of decimal places. Reading weight increments beyond the equipment applications level. (Sed Guideline Calculations below)

Repeatability -
Divide the total load cell capacity, including decimal points by 10,000.
(Expected stable weight reading)

Resolution -
Divide the total load cell capacity, including decimals points by 30,000.
(The amount you can expect to see but not necessarily stable

Yes ↓

**Return to
A
STABILITY**

C

C - Guidelines for Instabilities on Formerly Operating Systems

C

Weight and Voltage ALL

Weight ← **Mv/V**

RTZ ← **MV**

IT Test

Weight ← **Mv/V**

Sensor Number

RTZ ← **MV**

STABLE?

No

Yes

**At the IT Junction Box
Remove and Replace
the load sensor(s) determined to be faulty.**

STABLE?

Yes   No

**Replace summing card
Re-install all load
sensors**

TEST COMPLETE

Yes

STABLE?

No

**If you are unable to isolate the instability:
Compare your results by testing the vessel when empty
and then re-testing under load.**

**Go to B for additional system checks
Or
Contact Hardy Instruments
Customer Support
PH: 800-821-5831**

E - Non-Return to Zero (Must be connected to an IT® Summing Box

```
    ┌───┐        ┌──────────────┐                    ┌────────────────────────┐
    │ E │───────▶│  When empty  │        Yes         │ Check for product      │
    └───┘        │ Gross weight │───────────────────▶│ buildup or             │
                 │ not equal to │                    │ mechanical problems.   │
                 │    zero.     │                    │ Using the ZERO command │
                 └──────────────┘                    │ if within the ZEROTOL  │
                        │ No                          │ limits can zero the    │
                        ▼                             │ vessel                 │
                                                      └────────────────────────┘
```

Enter TEST mode and start the RTZ return to zero tests:

This program level checks, records and compares the millivolt output of each individual load point only when connected to an IT Summing Box

Next, review the individual sensor values for out of range or non-performance

This program level reads and compares the millivolt output of each individual load point to the values recorded at calibration. Out of tolerance readings flag an error

LS1? — Yes → **ERROR? Check load sensor 1**
No ↓

LS2? — Yes → **ERROR? Check load sensor 2**
No ↓

LS3? — Yes → **ERROR? Check load sensor 3**
No ↓

LS4? — Yes → **ERROR? Check load sensor 4**
No ↓

TEST COMPLETE

F

E1 →
Additional Testing Suggestions
Verify cable connections and cable integrity.
REVIEW TROUBLESHOOTING SECTION
F Individual load cell Millivolt readings
A Verify Sensor readings are stable
B Electrical and Mechanical Guidelines

F - Verify Individual Load Cell Millivolt Readings

- Testing an individual load cell signal output requires an IT Summing Junction box or millivolt meter.
- Use the load cell certificate to verify the millivolt per volt (mV/V) rating:

  Example: 3mV/V load cells produce approximately 15mV at full load. That is 5 volts excitation x 3 mV/V. A scale capacity of 1,000 lbs. with 100 lbs. of deadload when empty, the load point mV reading should measure 1.5mV.

```
        ( F )
          │
          ▼
┌─────────────────────┐
│ Press ENTER and arrow to │
│   TEST menu and run      │
│   ITECH TEST Program     │
└─────────────────────┘
          │
          ▼
┌──────────┐      ┌─────────────────┐
│ Select   │◀─────│ IT TEST Checks  │
│   IT     │      │ individual load │
│ TEST MV  │      │ sensor output   │
└──────────┘      │ mV readings     │
          │        └─────────────────┘
          ▼
┌──────────┐
│ Press ENTER │
│ to check load│
│   sensor    │
└──────────┘
          │
          ▼
┌──────────┐
│ Record load │
│ sensor mV output│
│ level for   │
│ comparison  │
└──────────┘
          │
          ▼
┌──────────┐
│ Repeat for all load │
│   sensors   │
└──────────┘
```

Zero mV reading
1) No dead load
   Apply load and re-test.
2) Wiring error
   Verify color code using the load cell certificate
3) Open bridge circuit
   Disconnect power and verify load point bridge resistance reading with an Ohmmeter

High mV reading
1) Stressed load cell, remove all load and re-test.
2) Excessive loading
   For additional testing go to: (H)

High mV reading → (K)

Unstable reading → (A)

mV readings acceptable?
- No
- Yes → **TEST COMPLETE**

Defective load Cell Replace and repeat TEST F

G - Calibration Failed: Not Enough Counts Between ZERO and SPAN

- This error only occurs at the SPAN parameter.

G

The difference between zero and span is less than 1000 counts

Using the IT Test or a millivolt meter:

- Verify the Signal Millivolt reading is positive and within the acceptable range of 0 to 15mV.

- Verify when weight is applied there is a positive increase in the signal millivolt readings.

- Compression load cells can be installed upside down refer to the load cell installation guide for proper installation.

- Check mechanical binding that restricts the vessel movement under load.

- Verify the load cell wiring is correct.

- Check that each load cell signal changes under load. A single load cell installed upside down or wired backwards can algebraically reduce the total signal.

SPAN WEIGHT to Small

- 1000 counts out of 985,000 is very small.
- (100,000 lb. Scale would require a minimum of 101 lbs.

ERROR?

yes

no

Contact
Hardy Instruments
Customer Service
800-321-5831
Ext. 1757

PROCEED
WITH
CALIBRATION

H - Mechanical Inspection

H

H1 → All pipes and conduits flexible →

1) Keep flexures on the horizontal
2) Vertical flexures should be avoided
3) Do not use flexures to correct for misaligned piping
4) Do not use hose flexures to make right angle bends
5) Non-flexed piping should have an unsupported horizontal run using a ratio of 36 times it's diameter
6) Pipe flexure lengths should be a ratio of 6 times it's diameter
7) Feed and discharge piping flexed
8) Are the flex joints on the correct side of the valve?
   (a) You weigh the output valve, not the input valve
   (b) Does the weight scale see all the product to be weighed?
   (c) If the product applies a force to a valve or pipe, that pipe or valve must be included in the weight vessel.
   (d) Proper position of the flexures are key
   (e) Your vessel must seem to float.

H2 → Mechanically isolated from ladders and connecting structures? →

1) Floors or structure does not interact
2) Local traffic does not interact
3) Protected from forklifts and adjacent processing equipment.

H3 → Are the load cells properly mounted? →

1) Level, solid mounting base
2) The load cell is mounted right side up
3) All load cell bolts installed using anti-seize compounds
4) Mechanically aligned to compensate for expansion and contraction

H4 → Are check rods installed to dampen vessel movement? →

1) Protects the load cells from overload and impact forces
2) Limits the movement of the vessel
3) Rods must be loose and not interact with the vessel

H5 → Are cables routed properly? →

1) Separate conduit for low and high voltage cables
2) Do not bundle low voltage with high voltage cables
3) Maintain at least 3 inches of separation
4) Maintain 14" separation from magnetic fields and 440 VAC
5) Cables are in conduit or tied up and protected from damage

H6 → Housekeeping →

1) Product, tools and production aids are off the vessel.
2) No workers are physically on the scale
3) Must protect equipment from environmental damage
4) Insure openings are sealed to keep water and environmental contaminates from damaging
   (a) Instrument cabinet or enclosure
   (b) Summing card
   (c) Load Cells
   (d) Conduit runs
   (e) Covers properly installed

To
Verify Electrical
go to

J

J - Electrical Inspection

J

J1 → Verify the proper voltage level has been supplied →

DO NOT POWER UP THE CONTROLLER UNTIL INPUT VOLTAGES CAN BE VERIFIED

1) Verify the proper input power, AC or DC, is properly installed
2) Use a meter to verify neutral, ground and hot are correct
3) Computer grade power
4) Use Active filters for motor noises and spikes
5) Use isolation transformers to combat surges and sags
6) Isolated from SCR and motor control circuits
7) Use a Common earth ground.

   (a) Keep ground cable runs as short as possible
   (b) Excessive ground cable runs can act as an antenna for AC noise
   (c) Install grounding straps around load cells to direct static away from the load cell and directly to ground
   (d) Install ground straps on the input and discharge piping and the vessel to a common earth ground

J2 → Apply power to the controller only if supply voltage is correct →

1) Verify the front display illuminates
2) Completes the initialization process
3) Displays a weight reading. This weight value will not be correct if a calibration procedure was not performed

J3 → Does the scale reflect a weight change? →

1) Press the MODE button to display NET weight
2) Press the TARE button to ZERO the NET weight
3) Apply weight to the vessel

   (a) Does the weight increase and decrease in the correct direction with the weight?
   (b) Does the weight return to ZERO NET?
   (c) The weight value will not be correct until a proper calibration is complete

J4 → Cabling →

1) Use the load cell certificate, manuals or drawings to verify the load cell color code. Input = Excitation, Output = Signal
2) Shielding
   (a) Grounded only at the weight controller
   (b) Continuous shield connection from the load cell cable to the controller. Single point EMI/RFI drain
   (c) Terminated but not grounded at the summing box
3) Sense lines installed?
   (A) Jumpers or sense lines in the J1 connector?
   (B) Sense lines must be installed for C2 or Softcal calibration
4) Use IT TEST to verify readings

To Verify Proper Load Cell Operations Go to

K

K - Load Sharing and Load Sensor Checkout

K

K1 → Load Cell wiring is complete and correct? →

1) Does the mV signal increase in a positive direction
2) If you receive a negative result, check if load cell is mounted correctly.

   (a) The arrow goes with the direction of force
   (b) If there isn't an arrow, you must manually verify the correct direction. A negative reading indicates the load cell is upside down
   (c) Load cells in tension will not reflect a negative reading if installed upside down. If upside down, only the force applied by the cable will be included in the weight reading
   (d) If you are still receiving a negative signal, verify load cell wire color code

K2 → Multiple load cells MAP the mV reading. Balance the load →

1) Verify a positive mV reading from each load sensor using IT TEST, mV
2) Record the mV reading and compare each corner for proper load sharing
   (a) For proper load sharing you should see only a difference of +/- .5mV
   (b) Larger differences due to motors and piping should not exceed +/- 2mV
   (c) If there aren't any motors, valves or piping to explain the mV difference, adjust the corners and balance the mV readings
   (d) Use shims or if equipped adjusting bolts on the load cell mounting hardware
   (e) Drawing a load cell map helps determine the correct leg to adjust and in which direction

Three load cells balance like a three legged chair

1) Using a spirit level, verify the vessel is vertically and horizontally correct
2) Verify if any height change effects the attitude of adjacent vessels or piping
3) Adjust each leg to dynamically match mV outputs
4) Verify the mV readings and physical level when complete

Four or more load cells present a challenge

1) Use the Weight and Voltage test to determine the sum of the load cell signals to set your target mV reading for each load cell
2) Read the output of individual load cells
3) Adjust the load cell with the lowest reading to dynamically match the target mV readings obtained in Step 1
4) Read the mV readings from each load cell to verify a proper correction
5) Repeat steps 3 and 4 to achieve a proper load sharing vessel
6) Verify the mV readings and vessel level when complete

Monitor system for proper operation
Check out completely

M - (******) or (- - - - - - -) ERROR

(M)

- - - - - - or * * * * * *
The load sensor output signal has exceeded the millivolt limits set in Configuration and/or the internal factory setting.

1) **Verify the signal wires are properly connected**
   (a) **Verify load cell cable color code**
      (1) **Load Cell Certificate**
      (2) **Installation Manual**
      (3) **Cable marking strips**
   (b) **Broken signal wires act as antenna for EMI/RFI**
   (c) **Load cell cable shields must be grounded only at the Weight controller to dampen EMI/RFI signals**
2) **The load cell output signal voltage has exceeded 15mVDC or is negative**
   (a) **Use IT Test to verify mV levels**
      (1) **Verify total millivolt signal level**
      (2) **Verify individual load cell millivolt signals**
         a) **An individual load cell may be over-ranged and and exhibit high millivolt readings**
         b) **Possible physical damage to the load cell**
         c) **Internal strain gauge bond broken**
         d) **Moisture in the load cell cable or body**
3) **Weight in the hopper exceeds the configured Scale Capacity setting**
   (a) **Under configuration verify the Scale Capacity setting**
   (b) **9 divisions with division size based on the certification mode selected**
      NTEP MODE: 1 DIV Scale Capacity/10,000
      Canadian MODE: 1 DIV Scale Capacity/3,000
   (c) **This is used only as a warning and does not effect calibration**
   (d) **Optional communication signals are unaffected by this indication**
4) **Weight in the hopper exceeds the load cell capacity**
   (a) **Mechanical forces or product acting on the scale overloads the load cells**
   (b) **Use IT TEST to verify Millivolt levels**
5) **Review Mechanical and Electrical Flow charts for additional tips. B1**
6) **Sense connection missing**

Yes ← **ERROR?** → No

**Contact
Hardy Instruments
Customer Service
800-321-5831**

**PROCEED WITH
WEIGHING
PROCESS**

N - Weight Controller's Front Display is Blank

```
                        ( N )
                          │
                          ▼
                   ╱─────────────╲                    ┌──────────────────────────┐
                  ╱  Measure AC or ╲      No           │ 1) Check for proper power│
                 ╱   DC Power, OK?   ╲────────────────▶│    and the source        │
                  ╲                 ╱                  │    connection            │
                   ╲─────────────╱                     │ 2) Check the circuit     │
                          │                            │    breaker at the source │
                         Yes                           └──────────────────────────┘
                          │
                          ▼
                   ╱─────────────╲
                  ╱    Measure     ╲      No
                 ╱    excitation    ╲────────────────────────────┐
                 ╲    voltage,      ╱                             │
                  ╲    5 VDC?      ╱                              │
                   ╲─────────────╱                               ▼
                          │                            ┌──────────────────────┐
                         Yes                           │ Disconnect all the   │
                          │                            │ connectors from the  │
                          ▼                            │ back panel except    │
                 ┌──────────────────┐                  │ power                │
                 │    Contact       │                  └──────────────────────┘
                 │ Hardy Instruments│                             │
                 │ Customer Service │                             ▼
                 │   800-821-5831   │                    ╱─────────────╲
                 └──────────────────┘                   ╱    Measure     ╲
                                          Yes          ╱    excitation    ╲      No
                                      ┌───────────────╱    voltage,       ╲──────────┐
                                      │               ╲    5 VDC?         ╱           │
                                      │                ╲─────────────────╱            │
                                      ▼                                               ▼
                      ┌────────────────────────────┐              ┌──────────────────────┐
                      │ 1) Reconnect the jacks one │              │    Contact           │
                      │    at a time checking the  │      No      │ Hardy Instruments    │
                      │    5VDC excitation.        │─────────────▶│ Customer Service     │
                      │ 2) If reconnecting any jack│              │   800-821-5831       │
                      │    effects the 5VDC, check │              └──────────────────────┘
                      │    for wiring errors.      │
                      └────────────────────────────┘
                                      │
                                  Display OK
                                      │
                                      ▼
                          ╭──────────────────────╮
                          │ Monitor system for   │
                          │ proper operation     │
                          │ Check out completely │
                          ╰──────────────────────╯
```

P - SD Card Diagnostics and Losing Memory at Power Cycles

P

Power Down then Power Up

Able to Change Screen? → **Yes**

No

Remove all Connectors Other than Power Connector

Able to Change Screen? → **Yes**

No

Remove the SD card, cycle power. Without the SD card, the instrument should *boot* with factory default configuration

Able to Change Screen? → **Yes**

No

With SD Card installed Use the EtherNet I/P port and a computer, to enter the Operations Diagnostics, SD CARD read Params selection → **Yes**

Parameters intact? → **Yes** → Select: SAVE and EXIT, then cycle power

No

Contact Hardy Instruments Customer Service for additional instructions and possible return for repair

PROBLEM SOLVED

Tests and Diagnostics

The Test and Diagnostics menus provide an expanded view of how the weight controller 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 Web page

Step 1.   From the Home Page click on Operation. The Operation Choose One page appears.

Step 2.   Click Diagnostics to view the Operation-Diagnostics Page.

The page lists the Instrument ID, Model Number, Program Part Number, Firmware Revision, Serial Number, Last Calibration and Status Word at a glance.
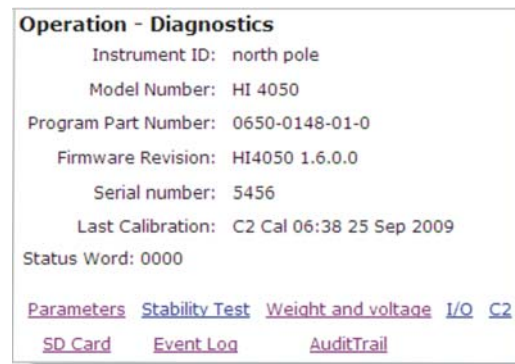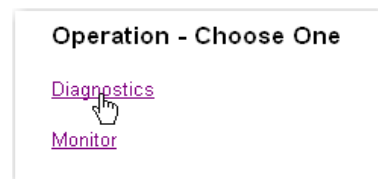
Diagnostic testing from the front panel

From the Configuration menu, use the down arrow to select Test and press Enter to open the Test Menu. This menu lists the tests you can run.
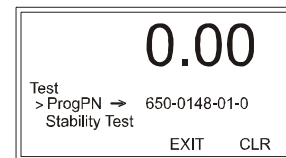
It also lists the same read-only options as the Web-interface Operation-Diagnostics page, including serial, model, and firmware revision numbers, etc.

Use the down arrow to select the option. If an arrow follows the options, press Enter to see the display.

ProgPn# = Program Part Number. This is the part number of the firmware. To see the entire part number, select ProgPN and press Enter.
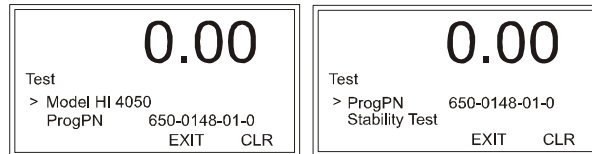
NOTES   *The values entered in the Test Menu are for illustration purposes only. Your values will vary.*

To download the latest firmware version, visit the Hardy Solutions web page select Products> Weighing Instruments> Weight Controllers> HI 4050 Single Scale Weight Controller and then select the Docs & Programs tab. The current firmware with loading programs and instructions are listed along with other drawings and the latest manual..

For more extensive information about the Weight Controller and scale operation see Operation/Diagnostics in the System Integrity Check and Fault Determination from the Web Page section below.

Parameters

Parameters is the first listed hyper-link at the base of the Operation-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 4050 to use in configuring another HI 4050 or for sending a copy of your parameters to 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.
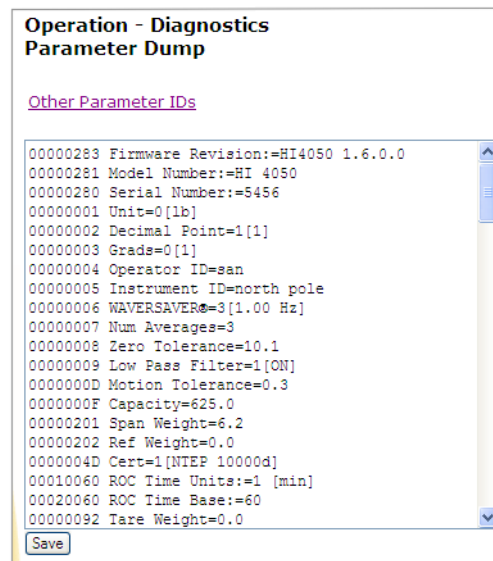
To paste the parameter configuration into the instrument you want to configure:

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.

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 4 - Configuration for more instructions.

Note the Other Parameter IDs for use in UDP communication using Ethernet TCP/IP to a PC. Use hyperlink or similar serial program.To view all the other parameter settings, click that link.

Other Parameter IDs

- 0x0090 Gross Weight
- 0x0091 Net Weight
- 0x0092 Tare Weight
- 0x0800 Command Word
- 0x0093 Average A/D counts
- 0x0094 Raw A/D counts
- 0x0095 loadcell millivolt output
- 0x0096 loadcell millivolt per volt output

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 4050 Weight Controller.

Load cell sensor point - Used to measure pressure, weight, or torque, the sensor point 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 cells/points. When the HI 4050 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 cells/points).

Weight Controller - This is part of the HI 4050 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.

USE SYMMETRIC BEAM LOADED
THROUGH SHEAR CENTER TO
AVOID TWIST WITH LOAD

UNIVERSAL JOINT
OR
HOSE

JUNCTION
BOX

HI 4050
Weight Controller

INTERMEDIATE SUPPORT FRAME
FULLY CONSTRAINED
LATERALLY WITH STAY RODS

BIN ACTIVATOR

NON METALLIC EXPANSION
ASSEMBLY OR HOSE
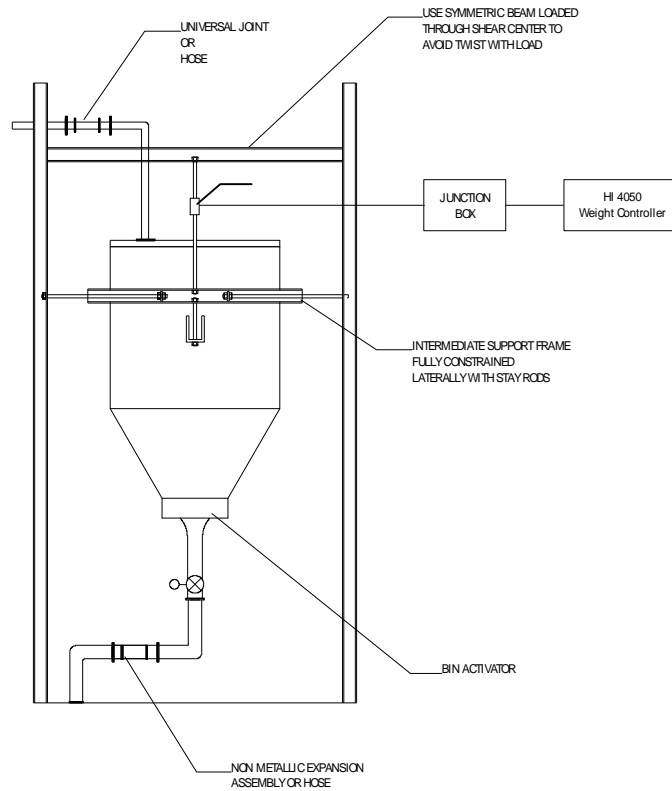
INTEGRATED TECHNICIAN

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

Without the HI 215IT Summing junction box, there is no way 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.

With the HI 215IT Summing junction box and IT firmware, the HI 4050 can provide both
average numerical values and values specific to each load cell, including PASS/FAIL
values for each load cell, as shown below.

Operation - Diagnostic
Integrated Technician

Sensor No.	weight	mV/V	mV	RTZ	variation	stability test
Sensor 1	1.449430	0.1201	0.6	PASS	3.59	PASS
Sensor 2	-0.993904	0.0336	0.2	PASS	3.88	PASS
Sensor 3	-6.785617	0.0661	0.3	FAIL	2.82	PASS
Sensor 4	8.293720	0.0586	0.3	FAIL	3.33	PASS
Reference		1.9867	9.9		31.51	FAIL

To view this screen on your system, see *Weight and Voltage Tests.* The number for a load sensor 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 average. With the IT option, it tests and reports for each load cell. The test sends the load cell data to the analog-to-digital convertor 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 instrument is considered unstable. In that case, see the Troubleshooting Flow Charts Section.

CAUTION | **Do not perform the Stability Test during production. The test activities can cause incorrect readings.**

ATTENTION | **Ne pas effectuer le test de stabilité lors de la production. Ces tests peuvent résulter à des lectures incorrectes.**

Running the Stability Test from the Web Interface

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

Stability test is also listed as an option on the Operation - Diagnostics display. Select the Stability Test hyperlink and wait a few seconds.
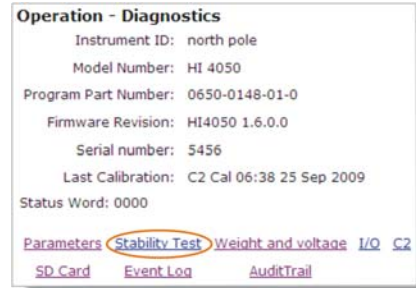
The results will not be specific to each load sensor, as in the IT test. They will display an average reading and PASS/FAIL for the system as a whole.
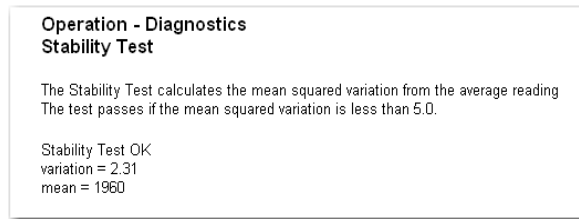
Running the Stability Test from the front panel

Step 1. From the Test menu, select Stability Test with use the down arrow and press Enter. The HI 4050 runs the test and shows the results.
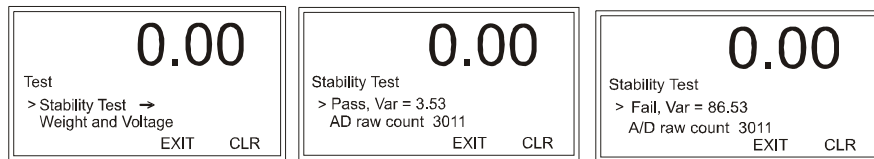
Step 2. To see the AD/Raw Count and the A/D Average select them from the menu.

Step 3. Press Exit to return to the Test Menu.
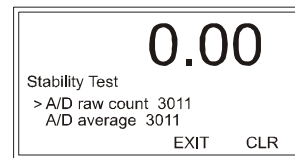
Weight and Voltage Tests

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 Weight and Voltage to open the Operation/Diagnostics - Weight & Voltage page.

00 *OFF*Batch complete*

Weight and voltage   I/O   C2   SD
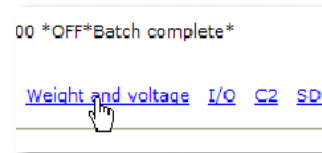
Operation - Diagnostic
Weight and voltage

Gross Weight	millivolts/volt	millivolts	A/D Counts	RTZ
0.948012 oz	0.0694	0.3	861263	PASS

Do IT test. WARNING: Do not do with active product

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

Operation - Diagnostic
Integrated Technician

Sensor No.	weight	mV/V	mV	RTZ	variation	stability test
Sensor 1	1.449430	0.1201	0.6	PASS	3.59	PASS
Sensor 2	-0.993904	0.0336	0.2	PASS	3.88	PASS
Sensor 3	-6.785617	0.0661	0.3	FAIL	2.82	PASS
Sensor 4	8.293720	0.0586	0.3	FAIL	3.33	PASS
Reference		1.9867	9.9		31.51	FAIL

These readings allow you to determine if the problem is in the instrument (internal) or in a load sensor(s) (external). The mV reading is a coarser reading than the mV/V or Weight readings. The mV reading is sufficient to balance the corners of your scale or vessel.

The specification range for the Weight Controller is 0-15 mV, so a reading between 0-15 mV is within the normal range. A reading outside this range (15.5 mV, 3.1 mV/V Maximum or any negative values) would normally indicate that the problem is external to the Instrument (most likely improper wiring).

If all the load sensor readings are 0.00, something is wrong between the HI 4050 and the HI 215IT junction box or with the junction box itself. Either the cable is disconnected, or something is causing the junction box to not transmit the readings to the HI 4050.

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 Weight and Voltage test from the front panel

The same information can be obtained from the front panel. From the Test menu, select Weight and Voltage and press Enter to show the menu.

```
                    0.00
Test
 >Weight and Voltage ➔
  Audit trail
                      EXIT      CLR
```

```
                    0.00
Weight and Voltage
 >  IT Test      ➔
    MV/V
                      EXIT      CLR
```
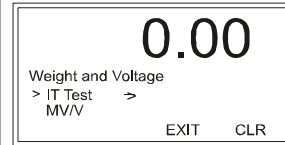
Then select IT Test to run the test. To read the rest of the results, press the down arrow. The weight and voltage/reading raw counts and average are shown below.

```
                    0.00
Weight and Voltage
 > A/D Raw Count    3104
   A/D average      3110
                    EXIT      CLR
```

```
                    0.00
Weight and Voltage
 > mV/V           0.0566
   mV             0.2832
                    EXIT      CLR
```

```
                    0.00
Weight and Voltage
 > Wt             1.0136
   Return to Zero    Pass
                    EXIT      CLR
```
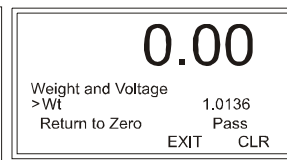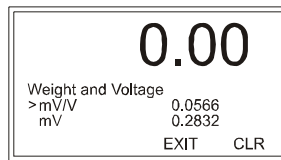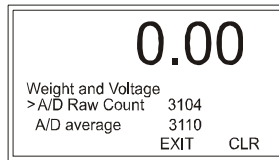
Step 1.   To select a Sensor, use the up or down arrows to move through the list, and press Enter to display the sensor IT Test results for the selected sensor. Our example looks at Sensor number 1.
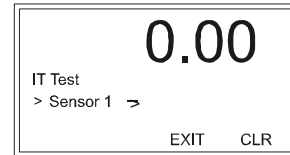
Step 2.   The output values will appear on the Sensor 1 menu. If an arrow appears on a listing, you can select that listing and press Enter to obtain more information.
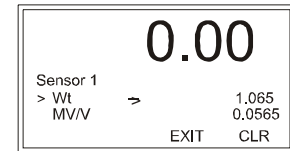
Step 3.   Press the Exit button to return to the Sensor Menu. If you want to test other load sensors select the sensor and repeat steps 1 through 5 above.
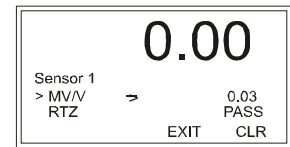
Step 4.   Press Exit to return to the It Test Menu; then press Exit again to return to the Test Menu.

Return to Zero test

The RTZ column on the Web interface Operation/ Diagnostics - Weight & Voltage IT page means Return to Zero. This test determines whether the instrument returns to a starting zero point. PASS indicates that you are within the sum of the preset Motion and Zero Tolerance settings.
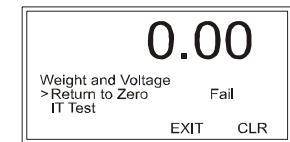
FAIL indicates that you are outside the sum of the preset Motion and Zero Tolerance settings. If this results from too much build up on the scale, you need to clean the scale or you have scale problems. Run this test whenever you cannot zero the scale. If the Return to Zero test fails, see the E Flow Char - Non Return to Zero for troubleshooting help.

Checking Inputs and Optional Outputs

You can check to see which inputs or outputs are operating from the Web interface by clicking on I/O at the bottom of the Operation - Diagnostics page to display the Input and Output page. If an Input or Output is in use the
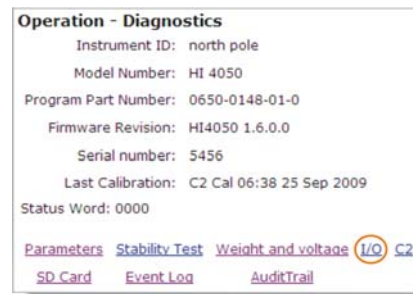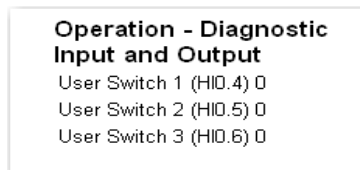
I/O reads 1. If an Input or Output is not in use, the I/O reads 0. In our example none of the inputs (User Switches) are being used so they all read 0.

This information is available from the front panel only by Selecting Digital I/O from the Options menu. See also Configuring the Digital I/O Option Card. For testing the I/O card outputs , you can toggle the outputs on or off from the Configuration - Options - I/O Card page. See *I/O Card Configuration.*

To return to the Diagnostics page click on the back arrow.

Viewing System C2 Load Sensors

The Sensor 1 and Sensor 2, etc. data on the Web interface Operation/ Diagnostics - Weight & Voltage IT page may be C2 sensors or non-C2 sensors. To check only the C2-type load cells, see the Operations - Diagnostic C2 Data page, which tells you how many C2 load cells are in use and provides the C2 version, Serial Number, Output Resistance, Output Voltage and Capacity for a selected cell. The Read Sensor button allows you to read this information for all C2 load sensors in the system. When you press the Read Sensor button, it receives the information from the first load sensor. The serial number is important if you need to contact Hardy Process Solutions Technical Support. You do not need an IT summing box.

Step 1.   Click on "C2" at the bottom of the page to display the C2 Data page listing the number of C2 load sensors that are found in the weighing system.
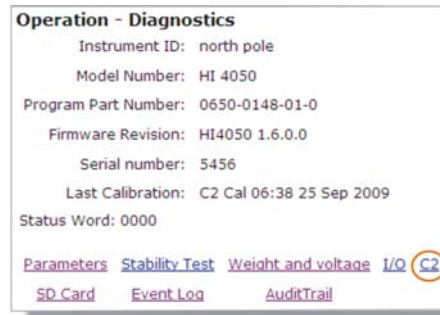
Step 2.   From the Read Data from: pull-down list, select the C2 load sensor you want to view.

Our example shows only one C2 load sensor found. If no C2 load sensors are installed the "C2 Sensors Found" reads 0.

The information on this page is C2 load sensor data only. It does not refer to any position on the IT Junction box, nor does it tell you the operating condition of the load sensor. To determine the condition of a load cell and its position, use Weight and Voltage/IT Test.
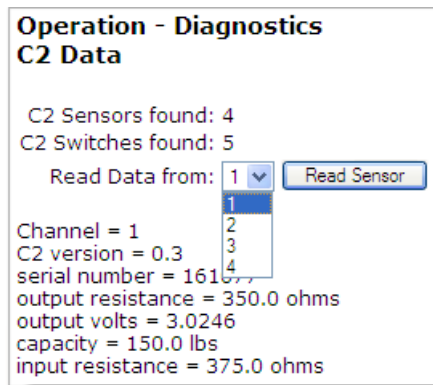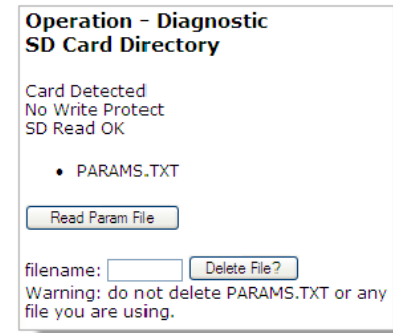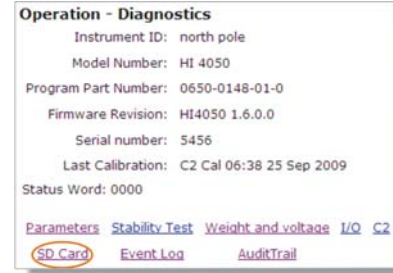
Step 3.   Click on the back arrow to return to the Diagnostics page.

SMM-SD Card Directory

If your computer is equipped with an SD card reader, you can click on SD Card to display the SD Card page indicating the Write Protect status and listing the base directory with the files where the non-volatile memory is located for the HI 4050.

The Read Param File button invokes a reading of the parameters file, which updates the system based on the current content of that file.

If you type in a filename, including the suffix, and click the Delete File? button, the file will be deleted.

Operation - Diagnostics
Instrument ID: north pole
Model Number: HI 4050
Program Part Number: 0650-0148-01-0
Firmware Revision: HI4050 1.6.0.0
Serial number: 5456
Last Calibration: C2 Cal 06:38 25 Sep 2009
Status Word: 0000

Parameters Stability Test Weight and voltage I/O C2
SD Card Event Log AuditTrail

Operation - Diagnostic
SD Card Directory

Card Detected
No Write Protect
SD Read OK

- PARAMS.TXT

Read Param File

filename: [____] Delete File?
Warning: do not delete PARAMS.TXT or any file you are using.

WARNING - RANDOM FILE DELETION FROM THE SD CARD DIRECTORY CAN RESULT IN LOST AUDIT LOGS OR DAMAGE TO YOUR SYSTEM CONFIGURATION. DO NOT USE THE DELETE FUNCTION UNLESS YOU KNOW THAT THE FILE YOU WANT TO DELETE CURRENTLY HAS NO VITAL SYSTEM FUNCTION (E.G. PARAMETERS OR WORKING INGREDIENT FILES).

AVERTISSEMENT – LA SUPPRESSION ALEATOIRE DE FICHIERS DEPUIS LE REPERTOIRE DE LA CARTE SD PEUT CAUSER LA PERTE DES JOURNAUX D'AUDIT OU ENDOMMAGER LA CONFIGURATION DE VOTRE SYSTEME. NE PAS UTILISER LA FONCTION « SUPPRIMER » A MOINS QUE LE FICHIER QUE VOUS VOULEZ SUPPRIMER N'EST PAS VITALE POUR LE FONCTIONNEMENT DU SYSTEME (E.G FICHIERS PARAMETRES OU DE FONCTIONNEMENT SYSTEME.)

Audit Trail and Event Log

The Audit Trail is a log of changes made to select parameters and calibrations that are monitored for NTEP rated instruments. It lists the date and time and whatever transaction performed. The Event Log shows startup dates and times.

On the Web interface, click the Event Log or Audit Trail link at the bottom of the Operations - Diagnostics page.

```
Operation - Diagnostics
Audit Trail
HELP

13:44 7 Oct 2009
Unit=0[lb]
Decimal Point=1[1]
Motion Tolerance=0.3
Zero Tolerance=10.1
Cert=1[NTEP 10000d]
Calibration Date=C2 Cal 13:44 7 Oct 2009
Cal Span Factor=3.849951826851E-05
Cal Zero Counts=730735
Zero Counts=730735
Span Weight=6.2
AutoZero Tolerance=0.1
Capacity=625.0
13:40 3 Oct 2009
Low Pass Filter=1[ON]
```

```
Operation - Diagnostics
        Instrument ID:   north pole
        Model Number:   HI 4050
Program Part Number:   0650-0148-01-0
   Firmware Revision:   HI4050 1.6.0.0
        Serial number:   5456
     Last Calibration:   C2 Cal 06:38 25 Sep 2009
Status Word: 0000

Parameters  Stability Test  Weight and voltage  I/O  C2
SD Card      Event Log              AuditTrail
```

```
Operation - Diagnostics
Event Log
HELP
 Center of Zero*SDCard Read fail*

13:01 3 Oct 2009 Power Up*
```

Step 4.   From the front panel Test menu, you can select Audit Trail (but not Event Log) . Press Enter to see the Audit Trail display showing the event time and date.

```
            0.00
Test
 > Audit Trail  >
    SN            E006
                EXIT     CLR
```
```
            0.00
Audit Trail
 > 12:49 31 August 2009
                EXIT     CLR
```
```
            0.00
Audit Trail
 > Num Averages = 15
                EXIT     CLR
```
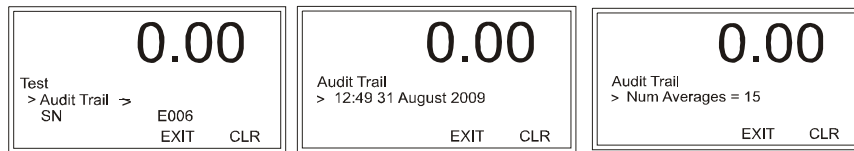
Step 5.   To view the rest of the Audit Trail log, press the up or down button.

Step 6.   To return to the summary display, press Exit until the summary display appears.

Checking Network Connections and Configuration with the "Ping" Tool

The Ping Tool is used from the computer's start/run utility. Click Start and then Run.

Selecting the module by IP Address for Testing

NOTE   *You can only ping from the PC. You cannot ping from an instrument.*

Step 1.   Type PING <space>IP address of the instrument you want to test. For Example:

PING 192.168.110.99

Our example uses the default address for all HI4050 Series Instruments. The IP address you are testing will be different.

Step 2. Press the Enter key on the PC. The PING utility starts sending out a packet to a specified address and gets a reply if the unit is functioning correctly.

If the instrument or network is configured incorrectly and cables are loose or not connected correctly, nothing prints out after the first line. Do the following:

- Check the Network cables and connectors to be sure they are tightly fastened and the correct cables for this application.
- Check the configuration to be sure that the instrument is configured correctly. (See Configuration IP Address in Chapter 4)

Step 3. If the unit is configured correctly and Ethernet functioning correctly and the cables are the correct ones for this application and are securely fastened, 64 signals should be returned and the print out will reflect this fact.

General Policies and Information

With over 70 years of industrial weighing experience and products in the field, Hardy Process Solutions continues to design, manufacture, install and support Hardy products worldwide. The following paragraphs describe Hardy's customer support services and equipment warranty.

NOTE   *For all non-warranty repairs a purchase order or credit card information is required. You can also go to the Hardy web site and request a Return Authorization number. An RA# will be e-mailed to you. http://www.hardysolutions.com/service/repair.php*

Ordering Replacement Parts

Contact the Hardy Process Solutions Sales Department to order replacement parts and option boards. Have your equipment model number and serial number ready.

Software Downloads for Your HI 4050

To access the software that Hardy Process Solutions has made available for downloads:

Step 1.   In a web browser, go to www.hardysolutions.com/4000_support/index.html to open the HI 4000 Series On-line Support Site, and click HI 4000 Download Section.

Step 2.   This will display the screen shown below which can be used to download software for HI-4000 Series instruments.

Downloading and Installing Firmware Updates (S-19 Files)

In the procedure below, you will download both the Hardy Auto Update program and the latest HI-4050 rate controller firmware to a common directory on the same network as the rate controller.

Step 1.   On the Hardy Auto Update line of the HI 4000 Series Downloads page (shown above), right click on the Update link and use the Save Target As menu option to save the Hardy Auto Update program to a known location on your computer.

Step 2.   Under HI-4050 Rate Controller Firmware, right click on the Latest Firmware link and use the Save Target As menu option to save this file to the same folder. You can rename the firmware, but the name must always include _APP.s19 for the AutoUpdate program to recognize it.

Step 3.   Find and start the Auto Update.exe program.

Step 4.   Click Find to search for and list the units that are online on this network.

Step 5.   Select the IP address of the unit you want to upgrade.

Step 6.   Click Browse to find and select the firmware file you downloaded.

Step 7.   Once you have the IP address and the file selected, click on the Update button.

Step 8.   You should now be asked for a User Name and Password. Username is hardy and password is updatepass (all one word in lowercase letters). If Update does not give you the Password screen, the path to your program file may be too long. Try moving your files up to your root directory and run again.
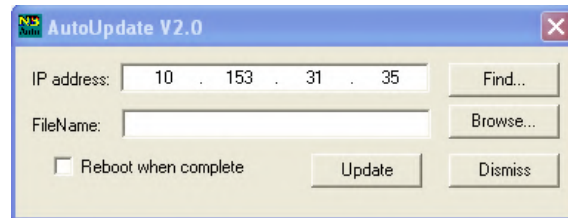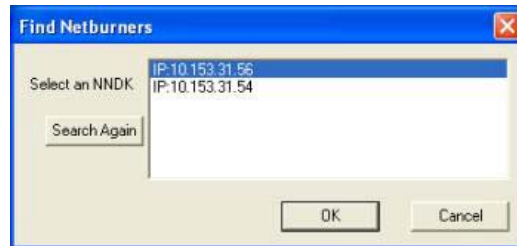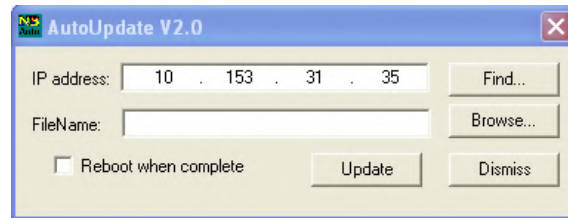
Step 9. After you log on, a percent complete bar will show the progress of the upgrade. Once it completes the download, it should show the screen indicating the programming is complete without error.

Step 10. Cycle power on the HI 4050 unit.

Warranty

A warranty problem may be handled by returning the product to the factory for repair or replacement under warranty. In the event you experience a problem with this instrument contact your local Hardy Representative or the Hardy Process Solutions Service Center to determine if the problem is covered under warranty.

Web Address: http:/?www.hardsolutionscom/Service/term.php.

System Support (Requires Purchase Order or Credit Card)

Technical Service is provided as follows:

- New system start-up: Ensure that the installation is checked and correct; instruments are calibrated, and operators trained.

  1 Service: Engineers are trained and qualified to provide on-site installation, calibration, and maintenance.

  2 On-site training: A Hardy Support Representative can be scheduled to train your operations and maintenance personnel. This can be as simple as basic load cell theory or as complete as troubleshooting techniques that allow you to service your equipment.

Technical Service

Technical Service Manager
Hardy Process Solutions
9440 Carroll Park Drive, San Diego, CA 92121
Telephone: (858) 278-2900
FAX: (858) 278-6700
Web Site: http://www.hardsolutions.com
E-Mail: hardysupport@hardysolutions.com

Appendix A
About Timezones

• • • • • •

Greenwich Mean Time

There are 25 integer World Time Zones from -12 through 0 (GMT) to +12. Each one is 15° of longitude as measured East and West from the Prime Meridian of the World which is at Greenwich, England. Some countries have adopted non-standard time zones, usually a 30 minute offset.

Each Time Zone is measured relative to Greenwich, England. Civilian designations are typically three letter abbreviations (e.g. EST) for most time zones. Below is a list of the abbreviated time zones with the GMT time adjustment.

GMT	Civilian Time Zones	Cities
GMT	GMT: Greenwich Mean UT: Universal UTC: Universal Co-ordinated WET: Western Europe	London, England Dublin, Ireland Edinburgh, Scotland Reykjavik, Iceland Casablanca, Morocco
EAST OF GREENWICH		
+1	CET: Central Europe	Paris, France Berlin, Germany Amsterdam, Holland Brussels, Belgium Vienna, Austria Madrid, Spain Rome, Italy Bern, Switzerland Oslo, Norway
+2	EET: Eastern Europe	Athens, Greece Helsinki, Finland Istanbul, Turkey Jerusalem, Israel Harare, Zimbabwe
+3	BT: Baghdad	Kuwait Nairobi, Kenya Riyadh, Saudi Arabia Moscow, Russia
+3:30		Tehran, Iran

GREENWICH TIME ZONES (GMT)

GMT	Civilian Time Zones	Cities
+4		Abu Dhabi, UAE Muscat Tblisi Volgograd Kabul
+4:30		Afghanistan
+5		
+5:30		India
+6		
+6:30		Cocos Islands
+7		
+8	CCT: China Coast	Shanghai, China Hong Kong, China Beijing, China
+9	JST: Japan Standard	Tokyo, Japan Osaka, Japan Taipei, Taiwan
+9:30	Australian Central Standard	Darwin, Australia Adelaide, Australia
+10	GST: Guam Standard	
+10:30		Lord Howe Island
+11		
+11:30		Norfolk Island
+12	IDLE: International Date Line East NZST: New Zealand Standard	Wellington, NZ Fiji Marshall Islands
+13		Rawaki Islands
+14		Line Islands
WEST OF GREENWICH		
-1	WAT: West Africa	Azores Cape Verde Islands
-2	AT: Azores	

GREENWICH TIME ZONES (GMT)

GMT	Civilian Time Zones	Cities
-3		Brasilia, Brazil Buenos Aires, Argentina Georgetown, Guyana
-3:30		Newfoundland
-4	AST: Atlantic Standard	Caracas, Venezuela La Paz
-5	EST: Eastern Standard	Bogota, Colombia Lima, Peru New York, NY, USA
-6	CST: Central Standard	Chicago, Illinois, USA Mexico City, Mexico Saskatchewan, Canada
-7	MST: Mountain Standard	Phoenix, Arizona Denver, Colorado
-8	PST: Pacific Standard	Seattle, Washington Portland, Oregon San Francisco, CA
-9	AHST: Alaska-Hawaii Standard CAT: Central Alaska HST: Hawaii Standard	Anchorage, Alaska Honolulu, Hawaii
-11	NT: Nome	Nome, Alaska
-12	IDLW: International Date Line West	

GREENWICH TIME ZONES (GMT)

Step 1.   Check the Greenwich Time Zones Table for the time zone you are in.

Step 2.   Press the right or left arrow until the correct time zone appears. For example Pacific Standard Time is -8.

Step 3.   Press the Enter button to save the entry.

Step 4.   Press the Down arrow to select Time-Year. (See Fig. 73)

4 Appendix A

INDEX

9440 Carroll Park Drive, San Diego, CA 92121
Telephone:1-800-821-5831   FAX: (858) 278-6700
Web Address: http://www.hardysolutions.com

Hardy Process Solutions Document Number: 0596-0303-01 REV W