Rate Controller

HI 4060

USER GUIDE

Field Service Locations

Start-up Installation

Verification Calibration

Hardy Field Service

24/7/365 Emergency Services

Preventative Maintenance Agreements

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:

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- **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** or Emergency Service after hours (Standard Hours 6:00 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.**

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Chapter 1
Overview

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This manual provides users and service personnel with specifications and procedures for installing, configuring, operating, maintaining, and troubleshooting the Hardy Process Solutions **HI 4060 Rate Controller** with WAVERSAVER®.

NOTE *WAVERSAVER is a registered trademark of Hardy Process Solutions.*

To ensure good performance and maximum service life, follow all guidelines described in this manual. Both users and maintenance personnel should understand all cautions, warnings, and safety procedures. If you find that the information in this manual does not provide the help you need, contact the HI Customer Service Department at:

Phone: (858) 278-2900

FAX: (858) 278-6700

Web Site: www.hardysolutions.com

Support e-mail address: support@hardysolutions.com

About Hardy Manuals

An overview of each chapter's contents is listed below:

- **Chapter One** - Provides an overview of HI 4060 capabilities and features

- **Chapter Two** - Provides a overview of HI 4060 specifications

- **Chapter Three** - Describes the steps for installing both the standard and optional HI 4060 equipment and the HI 215IT series junction box

- **Chapter Four** - Explains how to configure the HI 4060 for network operation (EtherNet/IP or DeviceNet) using either the front panel or Web interface

- **Chapter Five** - Provides calibration instructions

- **Chapter Six** - Provides mapping instructions

- **Chapter Seven** - Provides procedures for operating the HI 4060

- **Chapter Eight** - Provides troubleshooting procedures for repair of the HI 4060

HI 4060 Overview

The **HI 4060** is a single-ingredient, loss-in-weight controller that measures the flow rate from a feeding device located on a process weighing scale. The user enters the flow parameters, and an HI 4060 algorithm automatically calculates and adjusts the tuning parameters needed to maintain the desired rate. After comparing the actual flow rate

(measured by calculating the loss of weight over short intervals) to the desired flow rate, it computes the adjustments needed to achieve the desired rate and transmits signals to adjust the speed of the feeding device.

NOTE *While the system rate calibration is designed to automatically fine tune the flow rate parameters, you can also make manual adjustments.*

Typical Applications

The **HI 4060 provides** closed-loop rate control that can be used in a variety of material-flow applications, such as auger, belt, and vibration-based feeders, converting them from volumetric to gravimetric.

The Rate Controller can be operated in batch, automatic or manual mode. It can control rate controllers or can function as a slave device to a master controller, e.g., a PLC, another HI 4060, or a computer.

NOTE *The HI-4060 controls a single ingredient, single feeder, and can transmit control to other feeder controllers using analog out and communications.*

Features and Capabilities

C2® Calibration

Traditional calibration uses certified test weights. C2® Electronic Calibration allows a scale to be calibrated without the need for test weights. A C2® weighing system consists of up to eight load cell sensors, a junction box, interconnect cable, and an instrument with C2® capabilities (e.g., the HI 4060). Each Hardy C2-certified load sensor outputs digital information used for calculating the calibration. When the HI 4060 reads the signals from the load sensors, it calibrates the scale based on the load sensor's output plus a user-supplied reference point value (from 0 to any known weight on the scale).

WAVERSAVER®

During the measurement of small weight changes, the affects of mechanical vibration and noise from the feeders and plant environment can introduce substantial interference. WAVERSAVER factors out vibration, noise, and other interference-related signals from the load cell so that the rate controller can better decipher the actual weight data.

WAVERSAVER can be configured from either the front panel or Web interface.

Older WAVERSAVER Card: While WAVERSAVER can factor out noise with frequencies as low as 0.5 Hz, one of three higher cut-off frequencies can be selected to provide a faster response time. The default factory setting is 1 Hz vibration frequency immunity.

New WAVERSAVER Card: While WAVERSAVER can factor out noise with frequencies as low as 0.25 Hz when using the new Weigh Scale card, one of five higher cut-off frequencies can be selected to provide a faster response time. The default factory setting is 1 Hz vibration frequency immunity.

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

Alarms

Two HI 4060 alarms flag deviations from your specified flow rate.

The **Rate Tolerance Alarm** is used to detect small flow-rate changes. It can be set to trigger either a visual or sound alarm when the flow rate is above or below the tolerance range you select for a time that exceeds a limit you set.

The **Rate Exception Control (REC) Alarm** is triggered by an out-of-tolerance flow rate using a broader guard band tolerance than the Rate Tolerance Alarm. The REC provides a user-selectable option when a set threshold is reached to either shut down the feeder system or just display an "RE+" or "RE-"on the controller screen. During an REC alarm state that has not resulted in shutdown, the controller will continue to maintain the flow rate while monitoring the loss in weight until the rate is within tolerance.

Connectivity and Ports

For details, see the Available Communications section of this chapter.

Mapped I/O

Mapped I/O saves wiring costs by distributing the I/O where you need it, either at the process, using the instrument's front keypad, or in the control room through the mapping page on the instrument's web browser interface.

Integrated Technician™

The HI 4060 INTEGRATED TECHNICIAN™ (IT®) in conjunction with an IT junction box provides built-in system diagnostics that 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.

Secure Memory Module (SMM-SD)

A Secure Memory Module (SMM) in the HI 4060 protects critical data from loss and/or corruption while increasing system flexibility. Using a Secure Digital (SD) card that provides non-volatile storage, SMM - SD stores the configuration for hundreds of

ingredients, as well as HI 4060 calibration and setup data. This allows a stored configuration to be activated in a matter of minutes without the need for rate recalibration.

The SD card can be read by a PC with an SD card reader. It is conveniently located on the rear panel, where it can be quickly replaced, if necessary.

NOTE   *Hardy supports Hardy Branded SD Cards and readers only. Other non Hardy branded products are not supported.*

Automatic or Manual Control Modes

Automatic mode corrects for variations in desired flow rates automatically.

Manual Control Mode uses the side-to-side arrows to manually control the flow rate. With the touch of a button, users can convert to automatic mode when proper flow rate is achieved.

Continuous or Batch Modes

User selectable operating modes for continuous or batch processing.

Automatic or Manual Refill

Automatic refill uses user selectable refill points to start and stop the refill process without interrupting the feed process. HI and LO alarms to detect a refill failure.

The Manual Refill option only allows for manual refill at any time.

True Two and Five-Point Automatic Rate Calibration

The 5-point auto rate calibration creates a high feed accuracy for a wide range of feed rates. It either provides the user with automatically calculated parameters, or it lets the user manually enter his own derived values.

Operational and Mode Displays

Single button selection of predefined operating displays such as, Rate, Current Weight, Totalized Weight, Batch data and Output Percentage. This enables the user to view more functions on the Summary Display, allowing the operator to see at a glance the system performance.

Graphics Display Mode

Graphs actual feed rate vs. rate setpoint or operating percentage output.

Front Panel

5" x 7" Waterproof when mounted in a NEMA 4 enclosure.

Reports

The HI 4060 automatically prepares batch performance reports that provide:

- Total weight at the time of the report and at the end of the last batch

- The dates and times for the start and end of the batch

- The date and time for the report.

Available Communications

Hardy Process Solutions provides support for the following network options. See your installation disk or the Hardy Process Solutions website to download the support interface software that best matches your network requirements.

EtherNet/IP®

Ethernet has become the defacto standard for both corporate enterprise and factory networking systems. It enables the user to access device-level data from the Internet. EtherNet/IP, short for **E**thernet **I**ndustrial **P**rotocol, is an open industrial networking standard. It takes advantage of commercial, off-the-shelf Ethernet communication chips and media and supports both implicit messaging (real-time I/O messaging) and explicit messaging (message exchange). *EtherNet/IP is a registered trademark of ODVA.*

Modbus/TCP/IP

TCP/IP is a commonly used set of layered protocols that provide a versatile, scalable, and reliable data transport mechanism for networked machines with Internet connectivity. By combining Ethernet with a universal networking standard (TCP/IP) and a vendor-neutral instruction set /data representation (MODBUS®), Modbus/TCP/IP gives a truly open, accessible network for exchange of process data that is easy to implement for any device that supports TCP/IP sockets. If you have a MODBUS® driver and you understand Ethernet and TCP/IP sockets, you can quickly have a driver up and running and talking to a PC. No exotic chip sets are required, and you can use standard PC Ethernet cards to talk to your implemented device.

NOTE   *Mod-BUS® is a registered trademark of Schneider Automated Inc.*

DeviceNet

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.

PROFIBUS

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., I/O, drives, valves, and measuring transducers. Data exchange with the distributed devices is based on communication functions defined in the EN 50 170 standard. While these are mostly cyclic functions, DP also offers extended acyclic communication services for the parameterization, operation, monitoring and alarm handling of intelligent field devices. 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.

RIO

Under license from The Allen-Bradley Corporation, Hardy Process Solutions Inc. has developed a Remote I/O Interface for the HI 4000 Series.

Hardy worked with substantial customer input from Allen-Bradley to ensure that the remote I/O communications network best matched the needs of system integrators and end users for industrial and process applications. The interface is fast, field proven, requires minimal wiring, requires no special software drivers, and is standard on many Allen-Bradley programmable controllers. To communicate parameters to and from the controller, you need only to connect three wires, set the address and baud rate in the controller, and write some ladder logic.

RIO Information contained in this manual is subject to change. Always check the latest version of this manual at our web site (http://www.hardysolutions.com) before beginning system design. While this product incorporates technology licensed by Allen-Bradley Company Inc., Hardy Process Solutions supplies this product and provides all warranty and technical support for it.

Interpreting the Model Code Number

Model Code Breakdown

- The model code number can be found on a label that is attached to the top panel of the HI 4060.

- The model code number starts with the base model number (HI 4060). The dash alphanumeric designations indicate the capabilities of the rate controller. For example: A model HI 4060RC-PM-AC-EIP-DN is a Panel Mount, AC powered, with Ethernet I/P Interface, DeviceNet Communications.

Part Number Configuration Chart

Series Model	Instrument Type	Power Supply	Internal Option	Network Option	Auxillary Option	Enclosure Option	
HI4060	XX	XX	XX	XX	XX	XX	

	INSTRUMENT TYPE		
	-DR	DIN Rail (no display) - base model, no additional charge	
	-PM	Panel/Remote Mount (with display)	
	-DRWS	Wall Mount Stainless Steel Enclosure (no display)	
	-PMWS	Wall Mount Stainless Steel Enclosure (with display)	

POWER SUPPLY	
-AC	AC Power 110-240VAC, 47-63Hz
-DC	DC Power 24 Volts nominal

INTERNAL OPTIONS	
-N1	No Internal Option
-EIP	EtherNet/IP Communications
-MD	Modbus TCP/IP Communications

NETWORK OPTION	
-N2	No External Option
-DN	Devicenet Communications
-4ANA*	4 Channel Analog
-PB	Profibus Communications
-RIO	Allen-Bradley Remote I/O

AUXILIARY OPTION	
-N3	No Auxilliary Option
-4ANB*	4 Channel Analog

*   Requires one Analog connection.
     May select either -ANA or -ANB, but not both

**   Trim pots must not be used with C2 load cells

*** For more than 4 load cells, use Summing Cards
      with TB-10 expansion connector

ENCLOSURE OPTION use only with -DRWS or -PMWS Instrument Types	
-N4	No Summing Card Includes Glands and Seal
-IT1	Summing Card with Integrated Technician (IT)
-IT2	Summing Card with IT and Trim Pots**
-JB1	Standard Summing Card
-JB2	Summing Card with Trim Pots**
-JB3	Summing Card with TB-10 expansion connector***
-JB4	Summing Card with Trim Pots** and TB-10 connector***

Chapter 2
Specifications

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Chapter 2 provides specifications for the HI 4060 rate controller and optional equipment that may come with the package. The specifications listed are designed to assist in the installation, operation and troubleshooting of the instrument. All service personnel should be familiar with this section before attempting an installation or repair of the instrument

Basic Specifications

Number of Channels

- 1 Channel

Update Rate

- 110 Updates per Second

NOTE   *Some older HI 4060 models may have a maximum update rate of 15 updates per second.l*

Resolution

- 1 in 30:000

Excitation Voltage

- 0-5 VDC

Averages

- 1 to 255 User Selectable in Single Increments

NOTE   *Older HI 4060 modules use only 1-31 User Selectable Averages*

Input

- Up to eight (8) 350 ohm Full Wheatstone Bridge, Strain Gauge Load Sensor/Cells (5 volt excitation) on one vessel.
- Weight Signal Voltage Range 0-15 mV

Display

- 128 x 64 Backlit LCD Graphic Display

Display Increments (Graduations)

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

- Corresponding weight unit/time unit is dependent on the decimal point location.

Key Pad

- 9 tactile keys
- 4 Soft Keys (Mappable)

Non-Linearity

- 0.0015% of Full Scale

WAVERSAVER®

- 7.5 Hz
- 3.5 Hz
- 1.0 Hz
- 0.50 Hz
- 0.25 HZ

NOTE   *Older models of the HI 4060 may have only three WAVERSAVER options: 15 Hz, 1.0 Hz and 0.5 Hz.*

C2® Maximum Cable Length

- 1000' for C2, Non C2, or JB Card
- 500' for IT

Digital Voltmeter (IT)

- Accuracy ± 2% of full scale

Power and Utility Requirements

Voltage

- 24 VDC (Standard)
- 100/240 VAC Universal (Optional)

Frequency

- 47/63 Hz

Power

- 10 Watts maximum with options

Common Mode Voltage Range

- ± 2.5 VDC

Common Mode Rejection

- 100dB @ 50-60Hz

Environmental Requirements

Operating Temperature Range

- -10 to 40º C (14º to 104º F)

Storage Temperature Range

- DR Type: -40 to 85º C (-40 to 185º F)
- PM Type: -30 to 70º C (-22 to 158º F)

Humidity Range

- 0-90% (non-condensing)

Approvals

- UL/CUL
- DeviceNet (ODVA)
- EtherNet/IP (ODVA)
- Allen Bradley Remote I/0

Physical Characteristics

Panel Mount

- Depth: 5.125" (130.175mm) Back of the Bezel to rear cable clearance
- Case Dimensions: 4.00"H x 5.65"W x 3.125"D (101.6mm H x 143.51mm W x 79.37mm D)
- Case Material: Aluminum Alloy (6063-T5)
- Weight: 2.45 pounds (1.11 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: 4.00"H x 5.65"W x 3.125"D (101.6mm H x 143.51mm W x 79.37mm D)

Analog Card

NOTE *On the 4060, the Analog Output Card is required. It may reside in Slot A or Slot B, but an analog card may not be placed in both slots.*

Current Outputs

- 0-20 mA and 4-20 mA
- 0- 500Ω load at 20mA

Voltage Output

- 0-5 V and 0-10 V, max current 10mA

Resolution

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

Accuracy

- ≤ 1% initial accuracy, ≤ 1% over temp
- Default settings channel 1-4 = motor speed control

Internal Network Options

- EtherNet/IP
- Modbus

Network Option Cards

Profibus Card

Connector: 9-pin Serial Connector, female

RIO Card

Connector: 9-pin Serial Connector

Chapter 3
Installation
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Chapter 3 pertains to unpacking, cabling, interconnecting and installing the HI 4060 Rate Controller. User and service personnel should be familiar with the procedures contained in this chapter before installing or operating the HI 4060 Rate Controller.

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

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

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

Unpacking

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

Step 2.   Verify that everything in the package matches the bill of lading. If any items are missing, damaged, or there are 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 3.   Record the model number and serial number of the HI 4060. Store the serial number in a convenient, secure location for reference when contacting Hardy I Customer Service Department or to buy parts or firmware upgrades.

NOTE   *The HI-4060 front display is optional. Without a front display, a communications IP Setup disk and Web browser are required to setup and operate the Rate Controller.*

Disassembly and Reassembly Notes and Cautions

- Installation of this equipment must be in compliance with any and all International, National and Local Electrical and Mechanical codes.

- Any disassembly must be done in a clean, well ventilated, properly controlled static environment.

- Always make sure that the assemblies and sub-assemblies are well supported and insulated when doing any repairs on the instrument.

- Place small fasteners, connectors and electrical parts in closed containers so as not to lose parts during reassembly.

- Read all the disassembly instructions before any disassembly begins. Be sure that you are familiar with the procedures. 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 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.

Mechanical Installation

Installing the HI 4060 Rate Controller in a Panel

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

CAUTION **You must install the HI 4060 in a NEMA 4, 4X or IP 55 rated enclosure or better.**

WARNING -   YOU MUST INSTALL THE HI 4060 IN A NEMA 4X ENCLOSURE WHEN USING THIS INSTRUMENT IN A CLASS I or CLASS II ENVIRONMENT.

Step 1.   Observe all Electrostatic Discharge (ESD) precautions before and during installation.
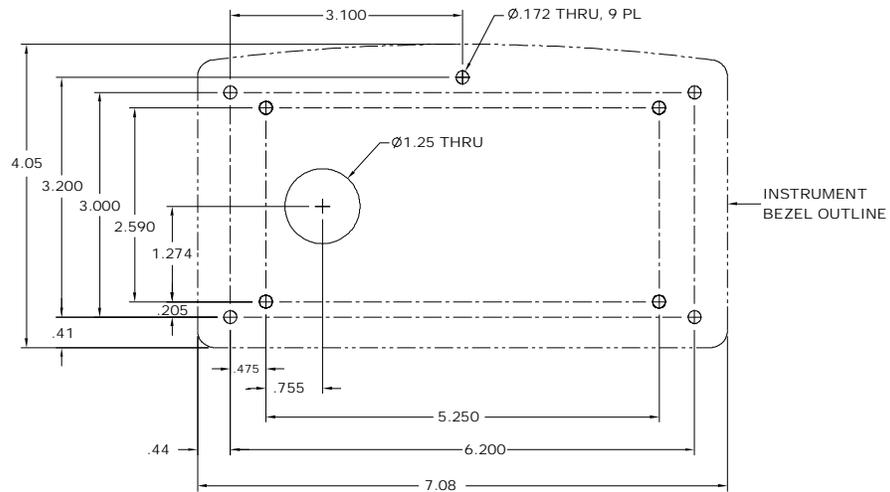
Panel Hole Dimensions (drawn from the back and not displayed to scale)

A paper template comes with the product. Copies of that template can be printed from the Hardy Website. If you print from Hardy Website be sure to note the print instructions. A photocopied version may not be correctly sized.

Step 2. Use a Phillips-head screwdriver and install the five (5) 6-32 x 1/2 inch screws that fasten the bezel to the panel. Use a torque screw driver to torque each screw to 10 inch/pounds. DO NOT OVERTIGHTEN!
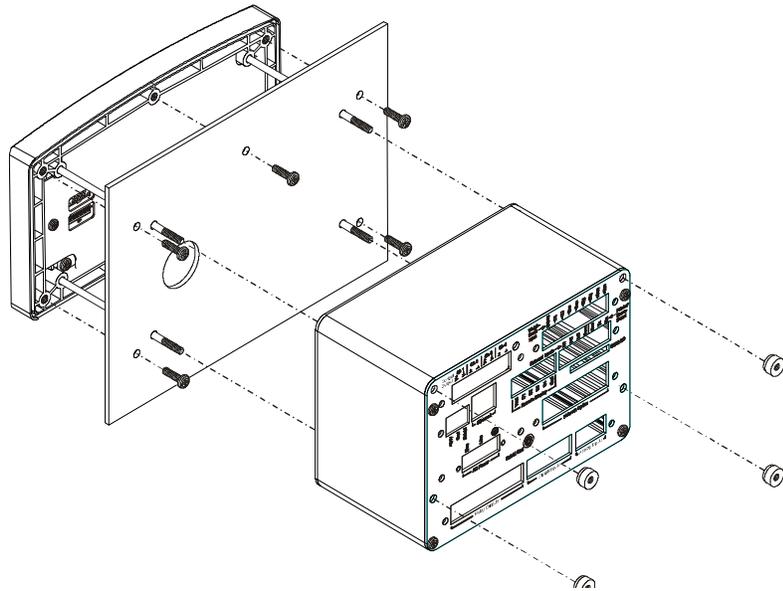
Step 3.   Put the Display cable and connector through the 1.25-inch hole in the panel door or cover and plug the display connector into the display header in the bezel.

Step 4.   Gently slide the electronic enclosure onto the threaded rods while making sure the display cable glides easily and does not kink.

Step 5.   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.
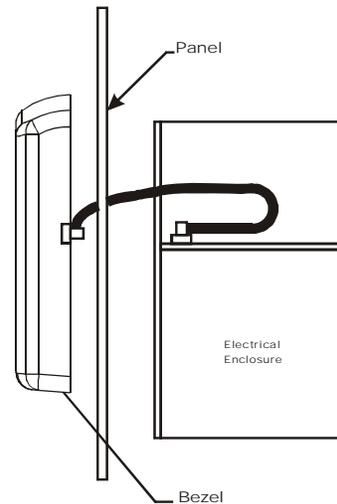
DIN Rail Installation HI 4060 Rate Controller

Step 1.   Snap the DIN rail mounting feet into any two holes on the mounting panel of the electronic enclosure until you hear a snapping sound. The snap means they are mounted correctly. Use two mounting feet per enclosure.
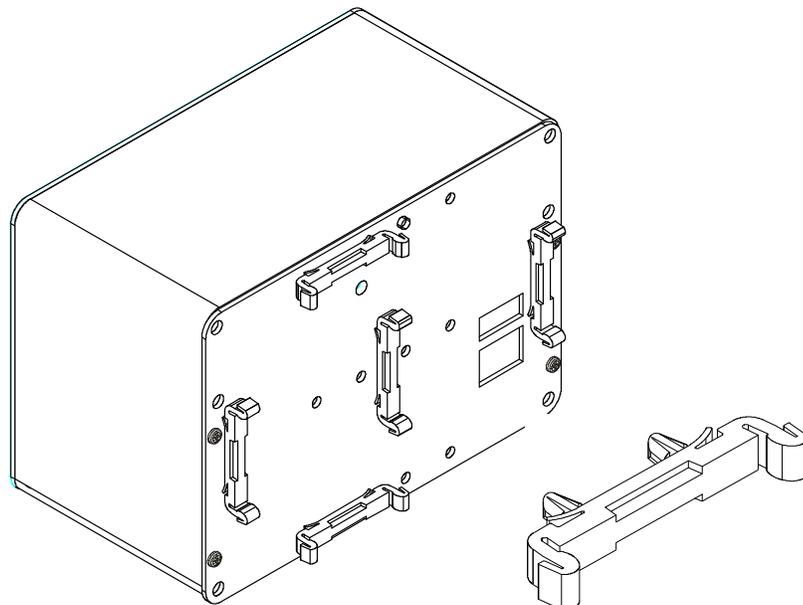
Two clips are provided with the instrument. This picture shows one unmounted sample clip and five clips mounted in vertical and horizontal arrangements.

Step 2.   After installation, tug on each mounting foot to ensure it is seated correctly.

Remote Display Installation

Remote Display   Electronic Enclosure

Maximum Cable Length 100 Ft.
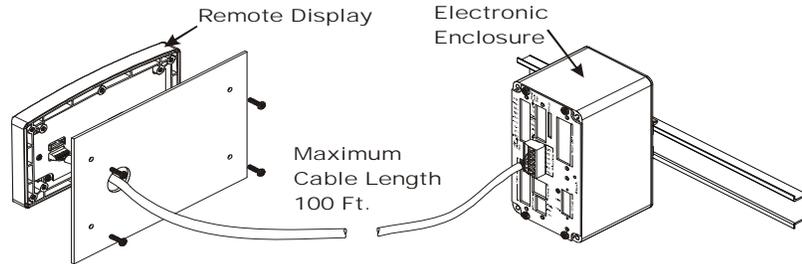
Step 1. Install the Electronic Enclosure on a DIN Rail or in a panel within 100 feet of the Electronic Enclosure.

Step 2. Remember the maximum length of the Display Cable is 100 Ft. (30.48 meters). Use shielded 6 wire cable (Minimum 22 AWG).

Step 3. Use the Template that was shipped with the instrument to cut the five holes required for mounting the display on a wall or on the door of an enclosure.

Step 4. Connect the cable wires to the display and the Electronic Enclosure, as shown.

Step 5. Wire the cable connectors as follows:

DISPLAY	ELECTRONIC ENCLOSURE
Voltage In (Vin)	Voltage Out (Vout)
D1	D1
D2	D2
D3	D3
D4	D4
Ground (Gnd)	Ground (Gnd)
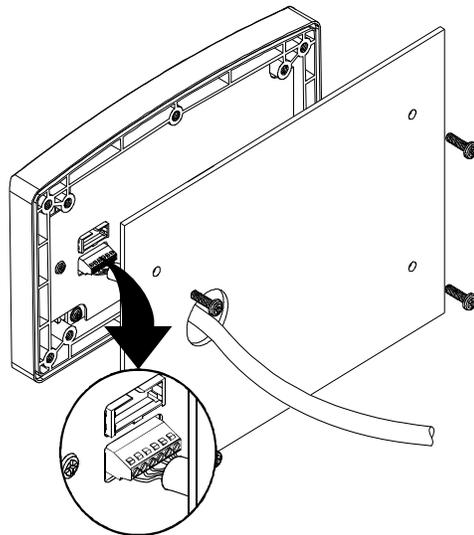
Step 6. Plug the cable connector into the remote display header of the electronic enclosure.

Step 7. Put the cable through the 1.25-inch hole you cut in the surface where you are going to mount the display.
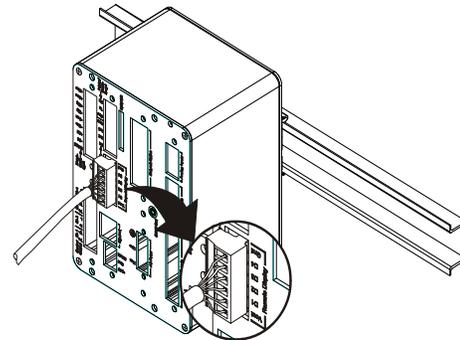
Step 8.   Use a Phillips-head screwdriver to install the four 6-32 x 1/2 inch screws that fasten the bezel to the panel or wall. Use a torque screw driver and torque each screw to 10 inch/pounds. DO NOT OVERTIGHTEN!

NOTE   *If you are mounting the remote panel in a wash-down or hazardous area drill the fifth hole and install with the 6-32 x 1/2 inch screw.*

Installing a remote display or a second display

You can connect up to two displays by connecting one display at the front panel and one at the rear panel. However, the display connected to the rear panel will have no keyboard functionality. When connecting the display at the front panel (Panel Mount) use the short cable that comes with the unit.

**NOTE**   *Only one keypad display can be active. With two displays, the ribbon cabled display has the only active keypad. You can still configure and operate the HI 4060 from the Web Browser.*

Step 1.   Shielded 4-wire cable (Min 22 AWG) is preferred. If you use 6-wire cable, do not connect to terminals D3 & D4 on either or both ends of the remote display cable.

Step 2.   Wire the cable connectors as follows:

DISPLAY	ELECTRONIC ENCLOSURE
Voltage In (Vin)	Voltage Out (Vout)
D1	D1
D2	D2
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)

Step 3.   Connect the cable to the display connector.

Step 4.   Plug the connector into the electronic enclosure rear panel header.

Installing the SMM-SD Memory Card

NOTE   *The HI 4060 supports most brands of SD Cars with a capacity of up to 16 MB and a few brands of up to 32GB capacity. Larger cards may cause loss of data. ar cause the unit to lock up. Hardy suggests using 16MB or less capacity SD cards in this device.*

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

NOTE   *Remove and replace the SMM-SD card only when the power is off.*

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

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

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

SMM-SD Card

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

Rear panel

C2® Load Point Connection

We suggest that you wire a C2 cable from the instrument to the junction box using the color code for C2 load points (left to right when facing the rear panel) and that you match the load sensor color code to ease trouble shooting. There are many color combinations due to the lack of an industry standard:

Shield Ground Wire

- C2-   Violet
- C2+   Grey
- EXC-   Black
- SEN-   Brown
- SIG-   White
- SIG+   Green
- SEN+   Blue
- EXC+   Red

WARNING: Load Cell Cable Length has been calculated into C2® calibration data. Hardy Process Solutions recommends that you do not cut your ADVANTAGE® or ADVANTAGE® Lite load sensor cables, as your C2® accuracy will be affected and the warranty will be voided.

Rear panel with network and AC power options

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 Process Solutions Prt. # 6020-0001) wires to the channel terminal block according to the cable color chart.

Step 3.   Plug the terminal block into the Channel 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.*

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

Step 2.   Connect the cable (Recommended load cell cable: Hardy Process Solutions Prt. # 6020-0001) wires to the channel 1 terminal block according to the cable color chart, or per manufacturer's specification.

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

NOTE   *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 date in return.*

Printer/Scoreboard Wiring

Printer/Scoreboard Wiring Diagram

Serial Gnd to Scoreboard Gnd

Serial Tx to Scoreboard RX

Serial Rx (No Connection)

Digital Inputs 1-3

The first four pins on the input port, located on the main controller board at J2, are used for general-purpose inputs. These inputs can be mapped to read printer outputs (or 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 4 COM terminal with a dry contact switch or relay.
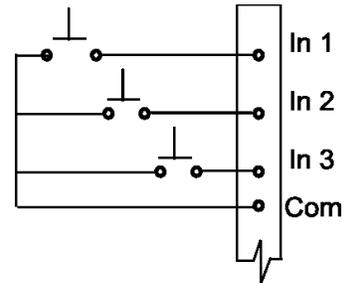
These standard inputs cannot interface with 24v logic directly. To activate the input contacts sent from a PLC, it is necessary to install a relay device as the dry contact or install the digital I/O card

Input Power Wiring

NOTE   *When you use external over-current protection devices, mount the switch and/or circuit-breaker near the instrument.*

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.

> **WARNING -** If a lithium battery is replaced with an incorrect type it may cause an explosion which will cause property damage or personal injury.

AC Input Power Wiring (-AC)

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

The AC power should be supplied by a "clean" primary 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.

> **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.

Step 1.   The HI 4060 is configured with a universal power supply rated from 120 to 240 VAC. Make sure the VAC power is shut off before installing the wires to the connector.

Step 2.   Install a 3-wire, minimum 14 AWG power line to the 3-pin terminal block connector.

Network: Installation

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

This enables the HI 4000 Series to communicate with virtually every device 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.

Simple Ethernet Network

You can manage the HI 4060 from any Ethernet network connected computer. Both devices must be set up for network communication.

All 4000 Series instruments are designed with a selectable 10/100 base T Ethernet connection which links your PC to an embedded server in the instrument. You can connect to an instrument via the Internet, Intranet, Extranet, or VPN (Virtual Private Network). Your computer must have an Ethernet card and cable with an RJ45 connector to connect to the instrument (Either crossover or straight are usable with the 4000 Series). Once connected you can, monitor, map and configure any of the instruments from your web browser from any location in your plant or enterprise. Help Dialogs are also available in the browser to assist when performing setup or troubleshooting of an instrument. In addition the browser connects you to the Hardy Web Site which connects the user to a full range of customer services and support.

Step 1.   Connect one of the RJ45 connectors to the Ethernet connection at the rear panel of the HI 4000 Series products.

Step 2.   Connect the other RJ45 connector to the Ethernet connection on your laptop Ethernet card or your Ethernet adapter.

Step 3.   If the Instrument does not have an IP address, you will need to create one. See Chapter 4 for details.

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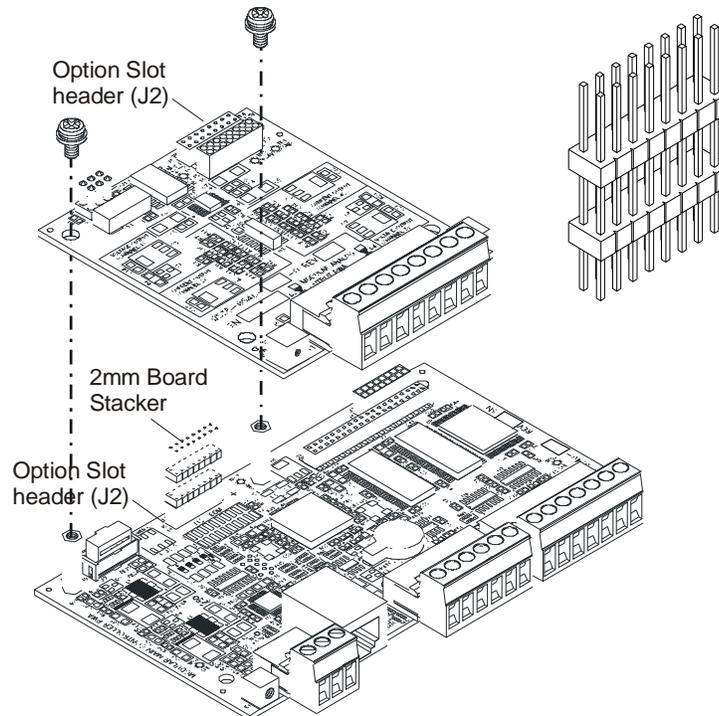
Step 2.   Through holes in the bottom of the option card allow you to plug the board stacker into the option slot header (J2) on top of the card. Align the card through holes with the stacker pins.

Step 3.   Gently push the card onto the board stacker pins (making sure you align the through holes on the analog board with the two standoffs on the Main Controller board) until the pins are seated. Be careful not to bend the pins when plugging the Analog Board into the board stacker.

Step 4.   Slide the board assembly into the chassis until it stops.

Step 5.   Use 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.
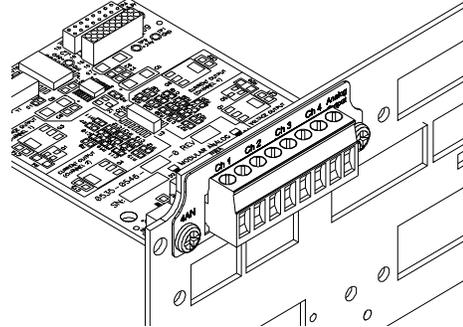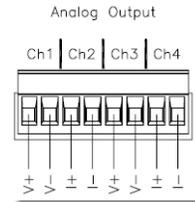
The Analog Output Card

The Analog Output card comes standard on the HI 4060. 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.*

Analog Wiring

- Channel 1 -Voltage
- Channel 2 - Current
- Channel 3 - Voltage
- Channel 4 - Current

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

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.

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 20 mm16-pin or 40-pin board stacker into the network option card header.

Option Slot header (J2)

20 mm Board Stacker

Option Slot header (J2)
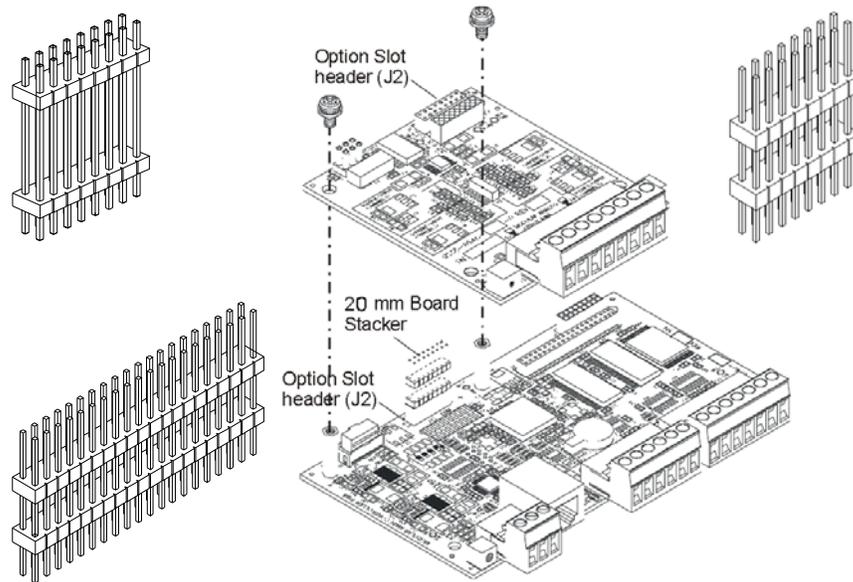
Step 2.   Align the board stacker pins with the16 right-side pin holes for the network slot Header (J41) located on the bottom of the Main Controller board.

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, and 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**
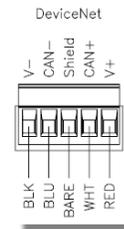**8**   **RXD/TXD -**
9   **NO CONNECT**
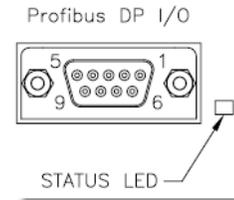
Wiring the DeviceNet Card

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

Left to Right facing the HI 4060 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 Modbus TCP/IP Option

Modbus TCP/IP is a software option that comes pre-installed in the HI4060 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.

To connect the HI4060 to a Modbus TCP/IP network, plug the network cable into the Ethernet port as you would with any standard Ethernet connection. See the Ethernet sections above for details.
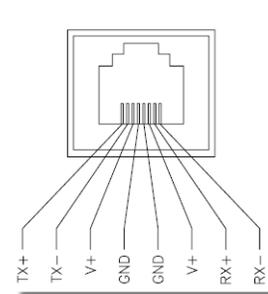
Chapter 4
Configuration

Chapter Four provides stepped instructions for configuring the Hardy Process Solutions HI 4060 Rate Controller and the available network options (e.g., EtherNet/IP, ControlNet, and DeviceNet) from either the front panel or Web interface. Following these procedures will help to ensure trouble-free service.

Front Panel Basics

This section provides an overview of the front panel screen functions used to navigate, make selections, and view and edit the data values displayed.

| Summary | Operational | Changing function keys | Left | Up/Down | Enter | Right |
| Display Area | Display area | labeled above in display | arrow | arrows | Button | arrow |
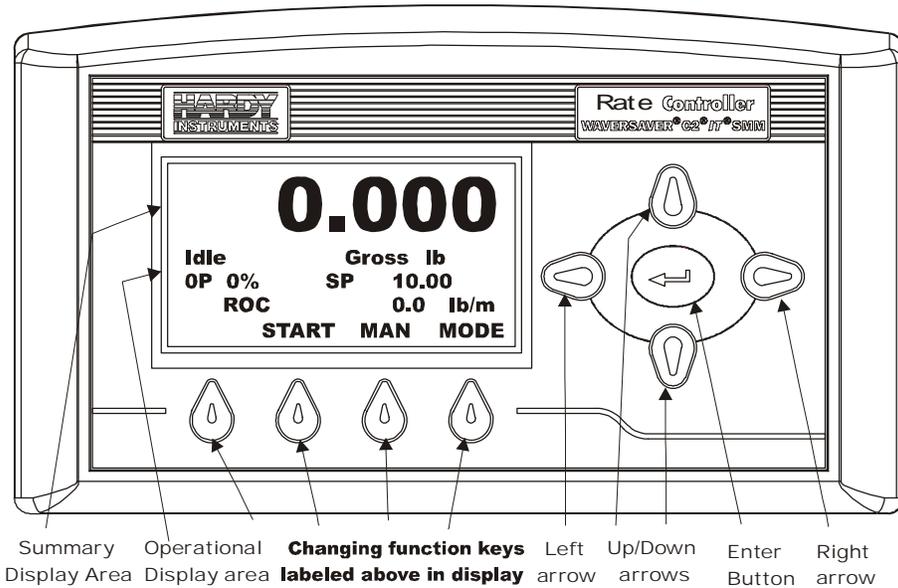
Display Area

The display area has five lines: At the top is a read-only Summary line that shows the current weight in large print. The next three Operational lines can display either read-only information or selectable options. And the bottom line names the function currently assigned to each of the function keys.

Scroll and Select Buttons

Up/Down Arrow Buttons

The Left/Right arrows move the cursor horizontally left or right. They are normally used to select a character to change.

Left/Right Arrow Buttons

The Up/Down arrows scroll the options for a cusror location. For example, with the cursor on the right-most digit of a five-digit number, you can press the Up or Down arrow to select a number for that digit. Normally, after selecting all of the digits, you must press the Enter button to save the selection.

Enter Button

Press Enter to save the current selection on a menu or a pick list into non-volatile memory.

Function Buttons

The functions associated with each of up to four function keys (buttons) are subject to change when you make a different mode selection. The function name appears on the screen above the button. The function buttons named below are frequently listed options:

START

The Start button typically starts a motor speed control that in turn runs a feeder, pump etc.

Manual (MAN)

The Manual button puts the HI 4060 in manual mode, which allows you to adjust the output percentage (OP) and/or set or reset the setpoint when you are developing new process parameters or adjusting existing processes.
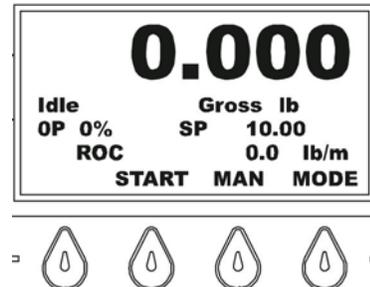
MODE

The Mode button enables you to switch between Gross Weight, Totalized Weight (Total), Amount (Amt) of weight on the scale and Actual Rate (ROC) modes while operating. The display outputs the value for the mode selected. For example: ACT lb/m

HOLD

The Hold Button appears as the left-most button after you press the Start Button. Pressing the Hold Button suspends a process.

STOP

The Stop Button appears as the left-most button after you press the Hold Button. Pressing the Stop Button stops the output to the motor speed control to stop a process or idle state.

EXIT

On a lower level menu, the Exit button allows you to return you to the previous menu.

CLR

CLR appears when you enter a menu. It clears the current value and repositions the cursor for the first entry. To avoid mistakes, you can clear the existing value before entering the new value.

Summary Display

The Summary screen, shown in the example above, displays gross weight, which can be displayed in lb, oz, kg, g, Ton, or t (Metric Ton) per Unit/Unit of time and can be expressed in - m = minutes, hr = hour, s = seconds. It also shows the actual rate of change, total amount, and batch total. The settings can be toggled using the MODE soft key

The large display area displays:

- The current weight display (large display) shows that the gross weight of the ingredient currently in the feeder or scale is: 0.000 lbs

- OP #% - In our example, 0% indicates that the system is idle. If the system were active, it would show the percentage of the available output signal driving the feeder.
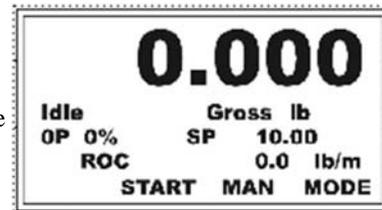
NOTE   *The Actual Rate (ACT) is a heavily averaged Rate of Change that represents the over-all ROC feed rate. ROC is the raw, unaveraged feed rate for visualization of your flow rate.*

The Up/Down arrows allow you to scroll the six top-level options to appear on the front panel display. They do not always match the order in which they appear on the Web displays.

1 Output percentage (OP)

2 Batch Amount (Amt)

3 Totalized Weight

4 Rate of Change (ROC)

5 Ingredients (This chapter begins with this menu)

6 Gross 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-4060 allows you to easily configure the parameters via a Web browser. A standard Ethernet network is required to provide the connectivity between the HI-4060 and your desktop or laptop computer.

The HI-4060 Rate Controller is designed with a standard 10/100 BASE-T Ethernet connection for linking to any Windows PC. Once connected, the PC can be used to monitor, configure, or download Hardy software to the HI-4060. A Help function can assist you in setup or trouble-shooting. The browser also links to the Hardy Web Site where the user can find additional services and support.

There are two primary ways to connect the HI-4060 to your computer:

LAN Connection: Connect the HI-4060 to an existing Ethernet-based Local Area Network (LAN) that has connectivity to your desktop or laptop computer. See *LAN Connection* below.

Direct Connection: Make a direct point-to-point connection between the HI-4060 and your desktop or laptop computer using any standard Ethernet cable. See *Direct Connection* below.

LAN Connection

To connect the HI-4060 to a LAN, you simply connect a standard Ethernet cable between the instrument and the common network hub. 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 HI-4060.

Blind Units: For controllers without a display, the IP address must be setup using the IPSetup program. In Section 8 see *Software Downloads for Your HI 4060*.

The IP address can be set manually (fixed IP), or it can be set automatically by a network service called DHCP. To use fixed IP addresses, refer to the section *Fixed IP Configuration Using the Front Panel*. For automatic IP assignment (DHCP) use the following steps:

DHCP Configuration Using the Front Panel

DHCP works only if a DHCP server installed on your network. To enable DHCP on the HI-4060, set the current IP address to '0.0.0.0' at the IP configuration screen.

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

```
          0.000
Configuration
>Instr Setup -->
  Options
                    EXIT  CLR
```

Step 1. From the Setup menu, select Ethernet; then press Enter to display the Ethernet menu.
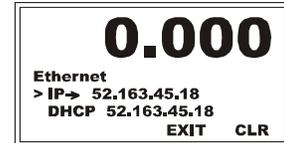
Step 2. If the display is not already showing 0.0.0.0 for IP, select IP and press the CLR button to erase the current IP value.

Step 3. 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 4. Press Enter to save the entry.

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

Step 6. Power-cycle the instrument to force the unit to enable the DHCP method for setting the IP address. (Step not required for HI 4060 software after version 1.7.0.0.)

Step 7. Recall the Configuration / Instrument Setup / Ethernet / IP menu and view the DHCP page. If the DHCP configuration was successful, the page will include an IP address provided by the network server. This is the IP address to use in your web browser to load the Web Interface (See *Displaying the Complete DHCP IP Address*). This completes IP setup.

NOTE   *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-4060 and you should use a Fixed IP configuration..*

Displaying the Complete DHCP IP Address

Read-only screens can display a limited number of characters per line. Follow these steps to see the complete IP address in DHCP:

Step 1. On the Ethernet menu, select DHCP. If, for example, the screen shows 192.168.100.12 for the DHCP address, the actual address could have one more digit, e.g., 192.168.100.128. The "8" is not displayed.

Step 2. Press Enter and the DHCP edit form will show the complete IP address.

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

## Fixed IP Configuration Using the Front Panel

The HI-4060 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.   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. Finally, select IP to display the IP screen.

```
        0.000                    0.000                    0.000
Configuration              Setup                    Ethernet
>Instr Setup -->           > Ethernet      ➜        > IP➜  52.163.45.18
  Options                    CONTRAST ⭠ dark  light ➜    DHCP  52.163.45.18
            EXIT  CLR                     EXIT    CLR                EXIT    CLR
```

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

```
            0.000
IP
             52.163.45.18
               EXIT    CLR
```
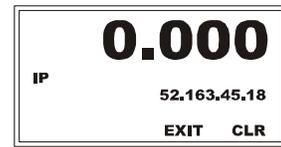
Step 4.   Starting with the right-most digit, enter the desired IP number using the standard format shown to the right. Use the up/down arrows to select each character, and press the left arrow to move to the next digit.

192.168.110.99

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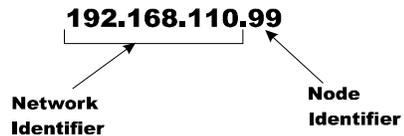
Step 5.   Press Enter to save the entry.

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. This completes IP setup.

Direct Connection

This method of interconnect between an HI-4060 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-4060 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-4060 to your PC. A 'crossover' cable is not required. Simply connect the cable between each instrument.

Windows PC configuration

Windows 2000

Step 1.   After starting your computer, click Start.

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

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

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

Step 5.   Click the IP Address tab. - If the 'Use the Following IP Address' box is already checked, write down the displayed IP Address and jump to the 'Direct Connect Configuration – HI-4060' section below.

Step 6.   Click the 'Specify an IP Address' check box; then enter the following into the TCP/IP Properties dialog.

> IP Address = 192.168.100.100
> Subnet Mask = 255.255.255.000

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

Windows XP

Step 1.   After starting your computer, click Start.

Step 2.   Click on Settings > Network Connections

Step 3.   Right-Click on 'Local Area Connection' and select Properties.

Step 4.   Click on Internet Protocol (TCP/IP) and click on the Properties button to open the Internet Properties (TCP/IP) Properties dialog. - 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-4060' section below.

Step 5.   Click the 'Use the Following IP Address' check box; then enter the following into the TCP/IP Properties dialog.

> IP Address = 192.168.100.100
> Subnet Mask = 255.255.255.000

Step 6.   Select OK on the TCP/IP Properties dialog box. The computer is now fully configured. To return the computer to the original network settings, return to the 'Internet Properties (TCP/IP) dialog and select 'Obtain an IP address automatically' and click OK.
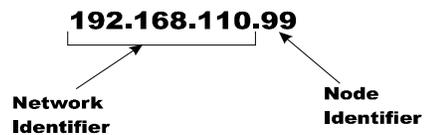
Windows 7

Step 1.   After starting your computer, click Start.

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. - 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-4060' section below.

Step 9.   Step 7. Click on 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 10. Select OK on the TCP/IP Properties dialog box. The computer is now fully configured. To return the computer to the original network settings, return to the 'Internet Properties (TCP/IP) dialog and select 'Obtain an IP address automatically' and click OK.

Direct Connect Configuration - HI-4060

The HI-4060 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), then use 192.168.100.50 for the HI-4060 IP address in step 3 below.

Setting an IP from the Front Panel

Step 1.   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 ⟶
   CONTRAST
              EXIT   CLR
	Ethernet
	> IP: 192.168.100.1 ⟶
	   DHCP: 192.168.100.1
	              EXIT CLR
		IP
		
		     192.168.100.1
		              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-4060 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-4060 in now configured to communicate with the PC. Enter the IP address in any web browser to access the embedded web browser. For example: http://192.168.100.101

Web Interface Basics

Help

To view a description of the various parameters on each of the configuration pages, click "HELP" to display the Help dialog.

Save Parameters

Most Save buttons let you either save entered parameters at any time during the configuration process or wait until you have configured all of the listed parameters.

Network Options Configuration

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

To open the Configuration Options menu from the Web interface, Select Configuration to display the Configuration menu and select Options menu.

What appears on the Options menu depends on the cards installed in your system.

EtherNet/IP

Modbus TCP/IP

Analog Output Card

RIO Card

Controller I/O Card

Configuring DeviceNet

DeviceNet is an open network designed to connect the Rate Controller to higher-level controllers such as PCs, PLCs or embedded controllers.The DeviceNet Network is an open, global industry-standard communication network designed to provide an interface through a single cable from a programmable controller or PC directly to the HI 4060 Rate Controller as well as smart devices such as sensors, push buttons, motor starters, simple operator interfaces, drives and other modules.

The user can adjust the number of Bytes In and Bytes Out should their process require a different configuration than the default 32 Bytes In and/or Out.

Step 1.   From the Home Page, select Configuration; then select Options. The Configuration page appears.

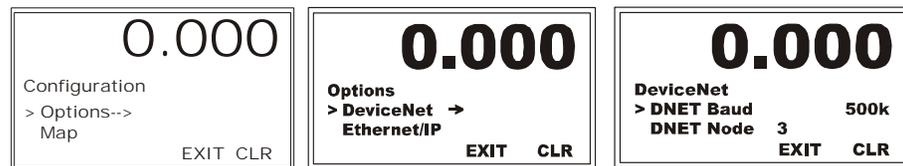NOTE   *The Options Menu varies depending upon what options are installed in the HI 4060.*

Accessing DeviceNet from the Web Interface

Select Configuration to display the Configuration menu and select Options menu, select DeviceNet to open the DeviceNet Setup page. Accessing

DeviceNet

Baud   500k
Node   3
Bytes Input   32
Bytes Output 32
Save Parameters

No DNET Connection
LED Off
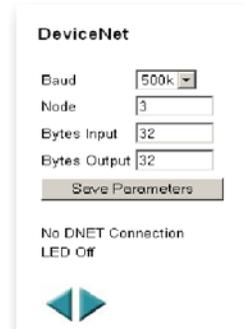
DeviceNet from the Front Panel

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 and press Enter to open the DeviceNet menu.

0.000	0.000	0.000
Configuration	Options	DeviceNet
> Options-->	> DeviceNet ➔	> DNET Baud 500k
Map	Ethernet/IP	DNET Node 3
EXIT CLR	EXIT CLR	EXIT CLR

DeviceNet Baud

See your Network Administrator if you don't know the correct Baud Rate.
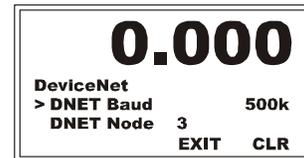
Range: 125k, 250k, 500k (default 125k)

Entering Baud Rate from the Web interface

From the Baud pull-down list, select the Baud rate you need for your DeviceNet network.
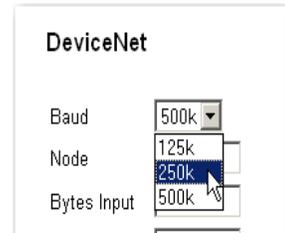
Entering Baud Rate from the front panel

From the DeviceNet menu, select DNET Baud and press Enter. Press the right or left arrows to select the Baud Rate you want. Press Enter to save the entry.
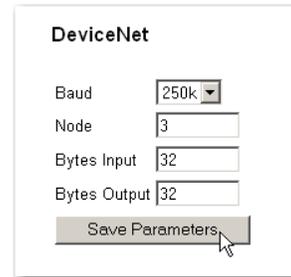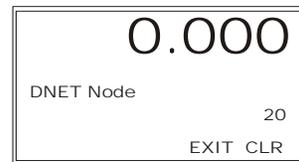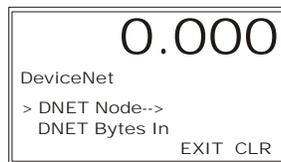
DNET Node

Range: 0-63 (default 63)

Entering Node from the Web interface

In the Node text field, type in the Node address of the instrument.

Entering Node from the front panel

Step 1.   From the DeviceNet menu, select DNET Node; then press Enter to display the DNET Node edit screen.

Step 2.   Use the right or left arrow to position the cursorand use the up or down arrows to select the number of the node address.

Step 3.   Press Enter to save the entry.

DNET Bytes Input and Bytes Output

Range: 0-32 (default 32)

Entering DNET Bytes In from the Web interface

Step 1.   In the Bytes Input text field, enter the Bytes
Input value you need for your application.

Step 2.   In the Bytes Output text field, enter the Bytes
Output value you need for your application.

Step 3.   Click Save Parameters to save the configuration.
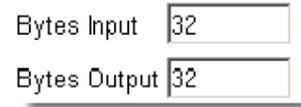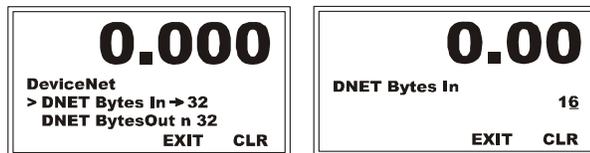
Entering DNET Bytes In from the front panel

Step 1.   Use the Down arrow to select DNET Bytes In and press Enter to open the DNET
Bytes In edit form.

0.000
DeviceNet
> DNET Bytes In ➜ 32
DNET BytesOut n 32
EXIT   CLR

0.00
DNET Bytes In
16
EXIT   CLR

Step 2.   Use CLR to clear the current entry and position the cursor on the first value to
change; then use the up or down arrow to scroll to the value.

Step 3.   Use the left arrow to move the cursor to the next position, and repeat the process
above until you have entered all the digits for your DNET Bytes In. Our example
shows 16 bytes.

Step 4.   Press Enter to save the entry.

Step 5.   Use the Down arrow to select DNET Bytes Out and press Enter to open the DNET
Bytes Out edit form.
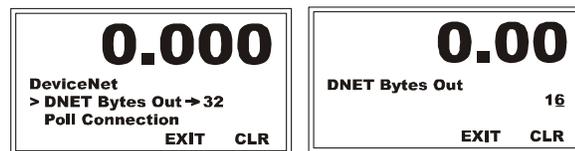
0.000
DeviceNet
> DNET Bytes Out ➜ 32
Poll Connection
EXIT   CLR

0.00
DNET Bytes Out
16
EXIT   CLR

Step 6.   Use CLR to clear the current entry and position the cursor on the first value to
change; then use the up or down arrow to scroll to the value.

Step 7.   Use the left arrow to move the cursor to the next position, and repeat the process
above until you have entered all the digits for your DNET Bytes Out. Our
example shows 16 bytes.

Step 8.   Press Enter to save the entry.

DNET No Connection

The Poll Connection entry is read only, telling you that the instrument is connected and polling. If the HI 4060is not connected to the DeviceNet Network a "No DNET Connection" message appears.

To resolve the problem and remove the warning, you must reconnect the DeviceNet cable.

From the Web page

The picture to the right shows the Setup form displaying the No DNET Connection the message.

When the cable is connected correctly, the "No DNET Connection LED Off" message should then be replaced by "Yes DNET Connection. LED On" message.
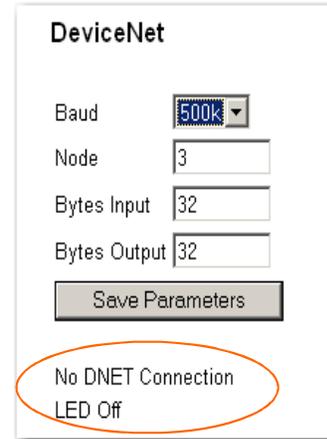
From the Front panel

Step 1.   If the instrument is not connected to the DeviceNet Network a "No Connection" message appears.

Step 2.   Reconnect the DeviceNet cable. The "No Connection" goes away and the Poll Connection reappears.

Step 3.   Press Exit to return to the Setup Menu.
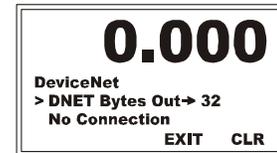
EtherNet/IP™

EtherNet/IP, short for EtherNet Industrial Protocol, is an open industrial networking standard that takes advantage of commercial, off-the-shelf Ethernet communication chips and media. Ethernet technology, enables the user to access device-level data from the network. 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.
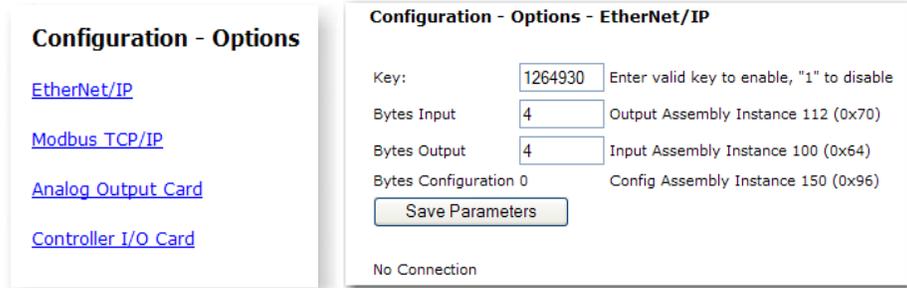
You will need a key number to enable EtherNet/IP for field upgrades. If the controller was ordered with EIP, the key should be in place. You can purchase a key number by contacting the Hardy Service Center or your local Hardy Representative.

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

Configuring EtherNet/IP from the Web page

Step 1.   Select EtherNet/IP from the Options menu to open the Configuration - Options - EtherNet/IP form.

Configuration - Options

EtherNet/IP

Modbus TCP/IP

Analog Output Card

Controller I/O Card

Configuration - Options - EtherNet/IP

Key:	1264930	Enter valid key to enable, "1" to disable
Bytes Input	4	Output Assembly Instance 112 (0x70)
Bytes Output	4	Input Assembly Instance 100 (0x64)
Bytes Configuration 0		Config Assembly Instance 150 (0x96)

Save Parameters

No Connection

Step 2.   Enter the key number you received when you purchased the EtherNet/IP option in the Key text field.

Step 3.   In the Bytes Input field enter the number of bytes you require for your application. Our example shows 4 bytes.

Step 4.   In the Bytes Output field enter the number of bytes you require for your application.

Step 5.   Click on the Save Parameters button to save the settings.

Configuring EtherNet/IP from the front panel

Step 1.   From the Configuration Menu, select Options and press Enter; then select EtherNet/IP and press Enter.

0.000
Configuration
> Options-->
    Map
                    EXIT CLR

0.000
Options
 >Ethernet/IP -->
                    EXIT CLR
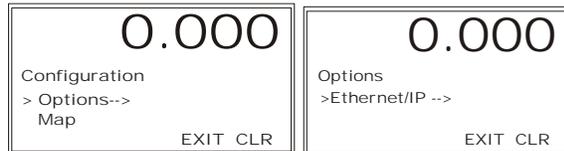
Step 2.   On the EtherNet/IP Menu, select EIP Key and press Enter to open the EIP Key edit form.

0.000
Ethernet/IP
 >EIP Key -->
    EIP Bytes In   256
                    EXIT CLR

0.00
EIP Key
                    EXIT   CLR

0.00
EIP Key
                    128957
                    EXIT   CLR
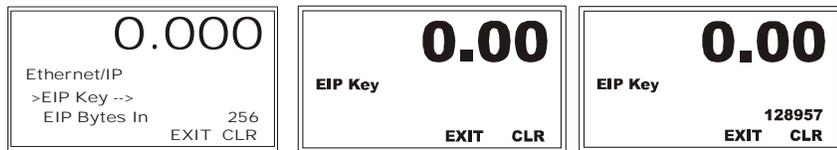
Step 3.   To enter the key number you received from Hardy Process Solutions Service Center, use the left or right arrow to position the cursor and the up or down arrow to enter the value. Repeat the process until you have entered all the digits for your EIP Key.

Note that the number displayed is for illustration only. Keys are based on serial
number and do not transfer to other like controllers.

Step 4.   Press Enter to save the key entry.

Step 5.   You will have to set the following parameters on your PLC in order to
communicate with the HI 4060:

- **COMM FORMAT: DATA - SINT**
- **INPUT INSTANCE 100, LENGTH UP TO 256**
- **OUTPUT INSTANCE 112 - LENGTH UP TO 256**
- **CONFIGURATION INSTANCE 150 - LENGTH 0**

NOTE   *Minimize the string length to match the application. The input and output ranges must
coincide between the host and the HI 4060.*

Step 6.   Use the down arrow to select EIP Bytes In and press Enter to display the EIP
Bytes In edit form.
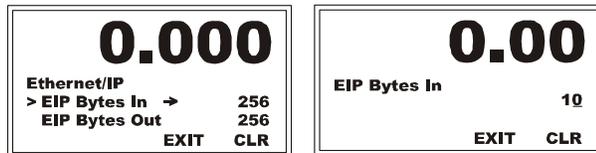
Step 7.   Use the left or right arrow to position the cursor and the up or down arrow to enter
the value. Repeat the process until you have entered all the digits for your EIP
Bytes In. Our example shows 10 bytes.

Step 8.   Press Enter to save the entry.

Step 9.   Use the down arrow to select EIP Bytes Out and press Enter to display the EIP
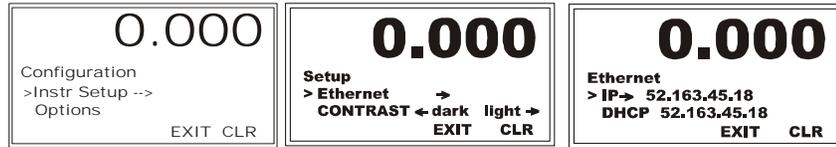Bytes Out edit form.
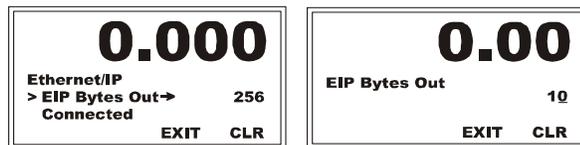
Step 10.   Follow the procedures used in steps 7-10 to set the values for Bytes Out. Our
example uses the default value of 10 bytes.

IP Addresses

An IP address consists of 32 bits (4 Bytes) that indicate the network and host numbers.
Follow the steps below to assign a fixed IP address (without DHCP):

Step 1. From the Setup menu, use the Down arrow to select Ethernet; then press Enter to display the Ethernet menu with the cursor in front of IP.

0.000

Configuration
>Instr Setup -->
   Options
                    EXIT CLR

0.000

Setup
> Ethernet   ➔
   CONTRAST ← dark   light ➔
                    EXIT   CLR

0.000

Ethernet
> IP➔ 52.163.45.18
   DHCP 52.163.45.18
                    EXIT   CLR

Step 2. Press Enter to open the IP edit form. If you are configuring the instrument for the first time, the default IP address appears. You must change this address when starting the instrument for the first time.

0.000

IP
         52.163.45.18

                    EXIT   CLR

Step 3. Use the left or right arrow to position the cursor and the up or down arrow to enter the value. Repeat the process above until you have entered a valid IP address.

Range: 0.0.0.0 to 255.255.255.255.

Step 4. Press Enter to save the entry and return to the Ethernet Menu.

It is recommended that you leave the Mask, Gate and DNS settings alone. They are not listed as options. Contact your Network Administrator if you need to set these parameters.

No Connection

The Connection message is read only, telling you that the instrument is or is not connected. If the HI 4060is not connected to the network a "No Connection" message appears.

To resolve the problem and remove the warning, you must reconnect the Ethernet cable.

The picture to the right shows the Setup form displaying the No Connection the message. The picture below shows the message from the front panel

Configuration - Options - EtherNet/IP

Key: 1264930   Enter valid key to enable, "1" to disable

Bytes Input   4   Output Assembly Instance 112 (0x70)

Bytes Output   4   Input Assembly Instance 100 (0x64)

Bytes Configuration 0   Config Assembly Instance 150 (0x96)

   Save Parameters

No Connection

0.000

Ethernet/IP
>EIP Bytes Out -->   32
  No Connection
                    EXIT CLR
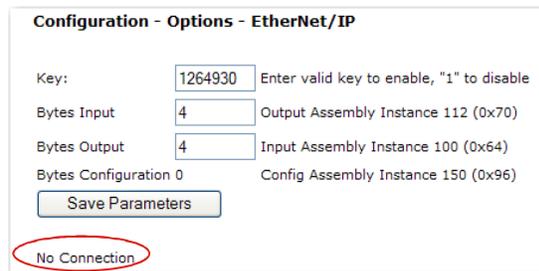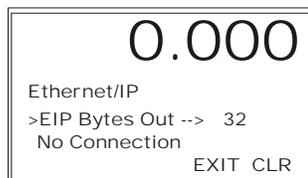
Remote I/O

　　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 4060 Home page click Configuration; then click Options to display the Options Menu.
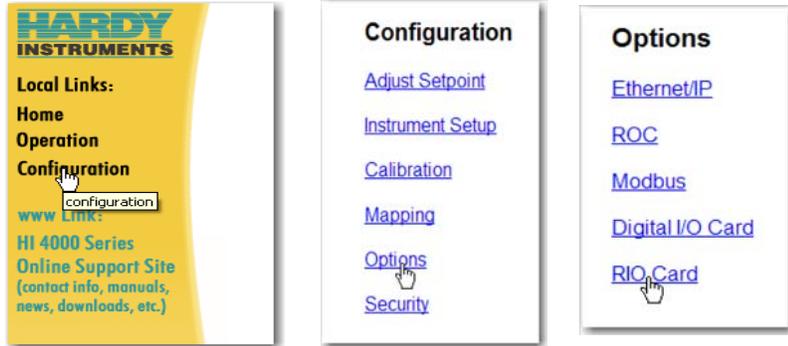
Step 2.　Click RIO Card to display the RIO Option Card page.

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 4060.

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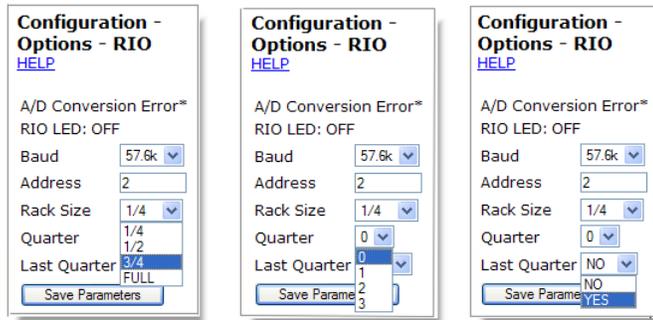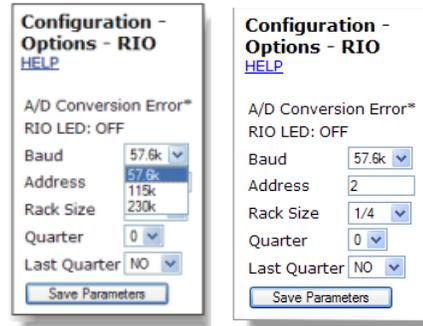
Step 6.　From the Quarter (Starting Quarter) pull-down list, select the Starting Quarter you configured in the PLC to use for this location.

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 4060-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 hexadecimal 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 4060 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.
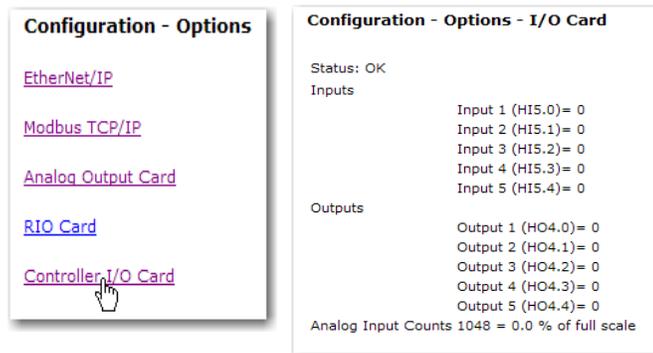
To test the inputs, continuously activate the input and refresh the web page while the input is activated. Confirm and move on to the next input. Be careful not to cause any false actions on the system while testing. When an input is activated you will also see the output percentage of full scale displayed 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                        0.000
Options                      I/O Card
> I/O Card   →               > I/O Card OK
   Analog Card                  A/D Counts  1057
              EXIT   CLR                    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                        0.000
I/O Card                     Inputs
> Inputs  →  00000                          0 0 0 0 0
   Outputs   00000
              EXIT   CLR                    EXIT   CLR
```
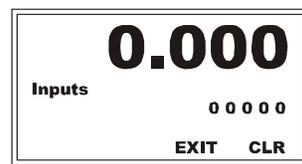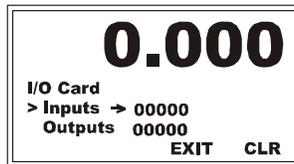
Step 3. The Inputs are displayed as a 5-bit value. (0 0 0 0 0). Note that the least significant (right-most) digit is input 1 and the most significant (left-most) digit is input 5. For example, with Input 1 and Input 3 active, the display reads.

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

O   O   O   O   O
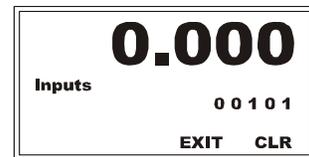
Input 5 Input 4 Input 3 Input 2 Input 1

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
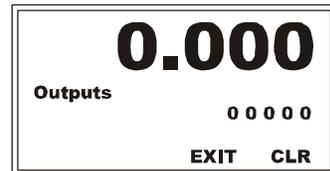
The relay outputs default settings are Relay 1 ON, Relay 2 SHUTOFF, Relay 3 REC, Relay 4 ALARM, and Relay 5 REFILL. Relay 1 is on the right of the bit value and Relay 5 is on the left. For example, if Relay 4 and Relay 5 are active, the binary value is (1 1 0 0 0). If the relay output defaults are selected, the alarm and refill relays are activated.

```
        0.000
Outputs
              0 0 0 0 0
              EXIT   CLR

        0.000
Outputs
              1 1 0 0 0
              EXIT   CLR
```
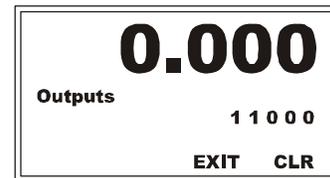
Analog Output Card

The Analog Output Card comes standard on the 4060.

The analog parameters configure the analog output channels. The channels are hard configured as voltage or current outputs. Channels 1 and 3 are voltage output channels (0-10 VDC). Channels 2 and 4 are current outputs (0-20 mA). Although the analog board comes as standard equipment, it is configured via the Options menu.

Configuring the Analog Output Card from the Web Page

Step 1. From the Home Page, click Configuration to open the Configuration menu. Although the Analog Output Card comes standard, it is accessed under Options, so select Options to open the Options menu; then select Analog Output Card.
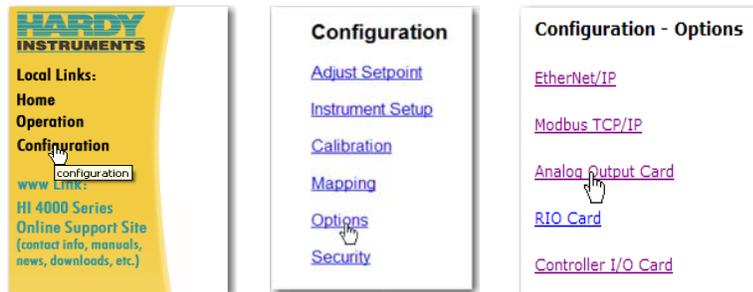
Step 2.   Click Analog Output Card to open the Configuration - Options - Analog Output page.

Configuration- Options - Analog Output
HELP

Slot 0

Chan 1 (Voltage output)	V LOW: 0.00	V HIGH: 5.00	Low Value: 0.000000	High Value: 100.000000
Chan 2 (milliamps)	I LOW: 4.00	I HIGH: 20.00	Low Value: 0.000000	High Value: 130.000000
Chan 3 (Voltage output)	V LOW: 0.00	V HIGH: 10.00	Low Value: 0.000000	High Value: 130.000000
Chan 4 (milliamps)	I LOW: 4.00	I HIGH: 20.00	Low Value: 0.000000	High Value: 130.000000

Set

The setpoints HFO20…HFO23 for analog output must be set up via MAPPING.

NOTES   *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. If you don't want to change the values start with the Low and High Weight values for your application.*

*For assistance in configuring the Analog Output Card you can click on '**HELP**" at the top of the page.*

Analog out channel 1-4 are default mapped as OP% for motor speed control. To change the analog out source, you need only to map it and that will change the default setting.

To change a value, rapidly click in the text field until the entire value is highlighted. It may take a few clicks

You can click on the Set button to save the parameters as you enter values or wait until all the channels are configured.

To Configure Channel 1 (Voltage Output):

Step 1.   Type the value for your low voltage output in the Chan 1 V LOW text box.

Step 2.   Type the value for your high voltage output in the V HIGH text box.

Step 3.   Type the value for your Low Weight Setting.

Type in the value you want for your High Weight Setting.

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 4060 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 1.6.0.1, 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.
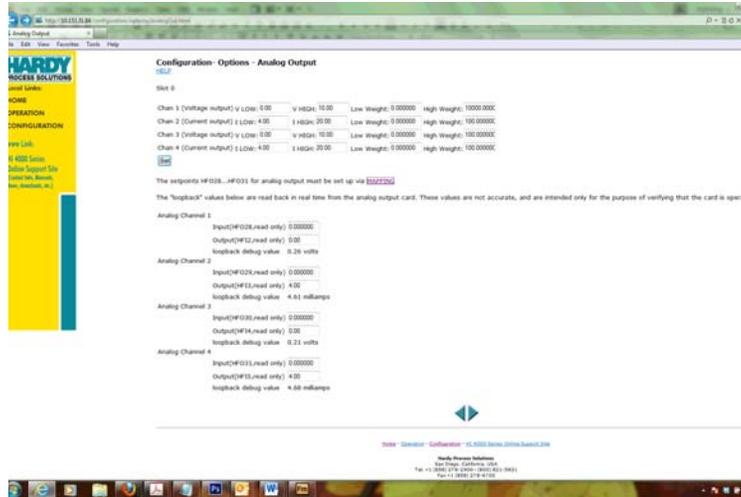
Click the blue RIGHT arrow at the bottom of the screen.

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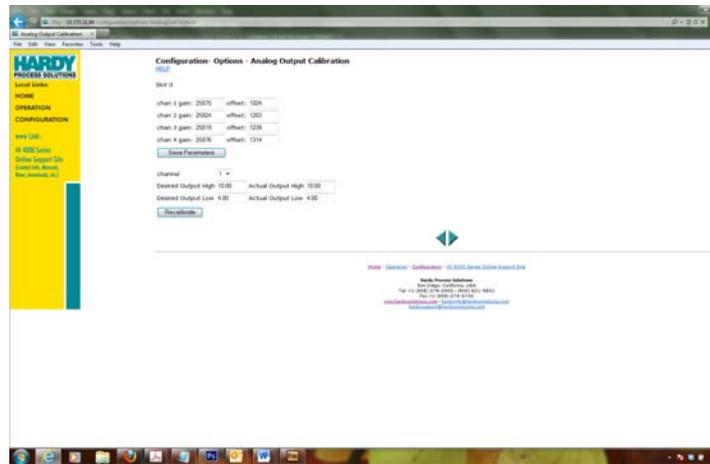
Normally, you will not need to manually adjust the gain or offset values.**

**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 Use the left or right arrow to position the cursor and the up or down arrow to select

Step 8.   The analog output card's Output Settings are configured in MAPPING via the symbols HFO28, HFO29, HFO30, and HFO3. Use these rules to scale the settings:

- If the setting is less than the Low Weight, the analog output is set to V (or I) Low.
- If the setting is greater than the High Weight, the analog output is set to V (or I) High.
- Otherwise, the output is "V (I) Low" + (Setpoint - "Low Weight")*("V(I) High"-"V(I) Low")/("High Weight" - "Low Weight")
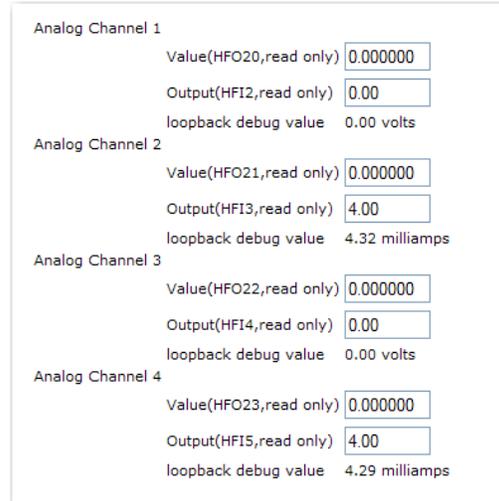
NOTE   *The Loopback Debug Values are estimates only and may not match the actual outputs.*

Configuring the Analog Output Card from the Front Panel

Step 1. From the Options menu, use the down arrow to select Analog Card; then press Enter to display the Analog Card Sub-Menu.

Step 2. Press the right or left arrow to select the channel you want to view and/or configure. **Range:** 1- 4 (default 1)

0.000

Options
 >Analog Card -->
  Ethernet/IP
                    EXIT CLR

Setting Channel 1 & 3 Output Voltage Parameters

Keep in mind that Channel 1 and Channel 3 are 0-10 Voltage Channels.

0.000

 Analog Card
 > Chan Number -->   1
   V/I Out Low   0.00
                    EXIT CLR

Step 1. Use the down arrow to select V/I Out Low and press Enter to open the V/I Out Low edit screen.

 Range: 0- 10V (default 0- 10V)

0.000

V/I Out Low

                         0.00
                  EXIT   CLR
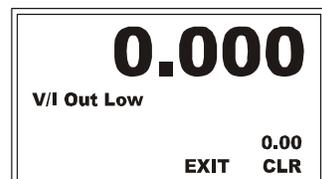
Step 2. Use the left arrow to position the cursor and the up and down arrow to set the value. Our example shiws 0.00 as out Low Output voltage value.

If you want to narrow the total range from 0-10 V to 0-5, change the V/I Out Low value to 5.00. You can adjust the low output voltage to any value to fit your application requirements.

0.000

V/I Out Low

                         5.00
                         Volts
                  EXIT   CLR
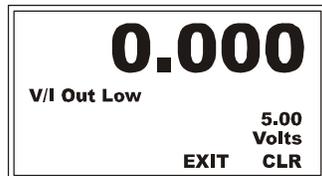
Step 3. Press Enter to save the setting. A brief message "Entry Accepted" appears if the value is between 0-10 Volts. If the value is not between 0-10 Volts, the V/I value reverts to 0.00

Setting Current Channel 2 & 4 Parameters

The process for configuring Channel 4 is the same.

NOTES   *When you finish with the configuration from the front panel, if you selected the defaults and want a signal other than motor control you will need to map that input signal to the Analog Channel, as described in Chapter 6.*

To set the Analog Card Parameters, see Configuring the Analog Output Card from the Web Page.

Analog Card Help Menu

The Help Menu provides a description of all the Analog Card parameters.

Step 1. Press the down arrow until the cursor is in front of Help.

Step 2. Press Enter to view the Help Menu.

Step 3. To read the complete descriptions and see other parameters press the down arrow.

Step 4. Press the Exit button once to return to the Help menu or twice to return to the Options menu.

```
        0.000
Analog Card
> Help ➔
   Chan Number
                  EXIT    CLR
```

```
        0.000
The analog output
card has 4 channels
Channels 1 and 3
                  EXIT
```

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

ModBusModBus is an application layer messaging protocol, positioned at level 7 of the OSI model and enabled to communicate with up to ten different hosts. It provides client/server communication between devices connected on different types of buses or networks. Support for the simple and elegant structure of ModBus continues to grow. The Internet community can access ModBus at a reserved system port 502 on the TCP/IP stack.

ModBus is a request/reply protocol and offers services specified by function codes. ModBus function codes are elements of ModBus request/reply PDUs. The objective of this document is to describe the function codes used within the framework of ModBus transactions.

ModBus is an application layer messaging protocol for client/server communication between devices connected on different types of buses or networks. It is currently implemented for the HI 4060 product line using: TCP/IP over Ethernet.
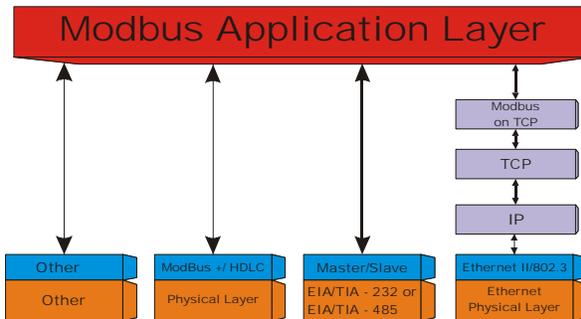
Enabling ModBus in the HI 4060 Module

ModBus is an optional network communication protocol and requires a Key to enable. If it was not ordered with your system, you can purchase the option with the Key by contacting your local Hardy Process Solutions Representative or Hardy Service Center.

Enabling ModBus TCP/IP from the Web page

Step 1.   From the HI 4060 home page, click Configuration to open the Configuration menu, select Options to open the Options menu.

Step 2.   Select ModBus TCP/IP. On the ModBus-Options page, enter the ModBus Key in the ModBus Key text field.
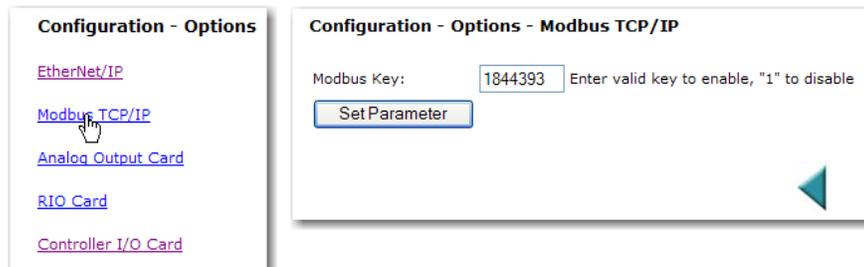
Step 3.   Click Set Parameter.

Step 4.   This procedure activates the ModBus option in the instrument.

Step 5.   The HI 4060 module is ModBus enabled.

Step 6.   You can now map from your client (PLC) to the HI 4060 module via ModBus.

Installing Hardy ModBus-Link

If you do not have a PLC or other client, Hardy has provided the Hardy ModBus-Link Client to communicate with the HI 4060 module. For the sake of clarity the Client/Server definitions are as follows:

- Client - The module asking for data.
- Server - The module providing the data.
- 1-10 host socket connections available on link

This Hardy ModBus software is used to setup and test the link and is not a full protocol packaged software.

Step 1.   On the Documentation CD you received with your HI 4060 Instrument you will find a copy of the Hardy ModBus-Link Software. If you do not have the CD that came with your instrument you can go to the HI 4060 Resources Web page and download the application from there.

Step 2.   Double click on the Hardy ModBus-Link .exe file to install the software on your PC. Once the Installation is complete a Hardy ModBus-Link icon appears on your Desktop.

Step 3.   Double click the Hardy ModBus-Link icon to open the display shown below.
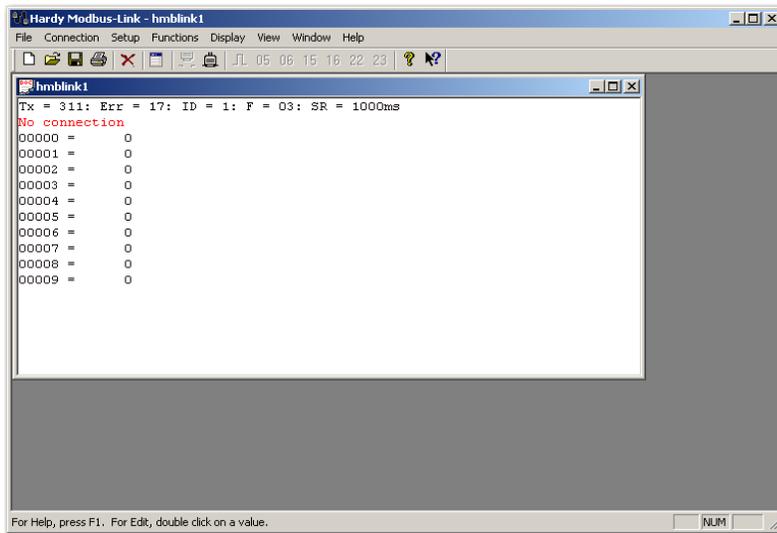
Step 4.   From the Connection pull down menu, click "Connect" to display the TCP/IP Connection page.

Instrument Setup / Entering scale capacity

Step 5. To verify that you have two-way communication, on the Mapping web page of the HI 4060 instrument you want to ping, select "ModBus Float Out" (MFO) on the Destination Network pull down menu.

Step 6. For Float Variable under Scratchpad, use the default word 0. "MFO0=" appears in the Map: text field.

Step 7. From the Select Source Scratchpad pull down list, select the Float Variable 0 (HFO0), as shown below. Keep the default word 0.
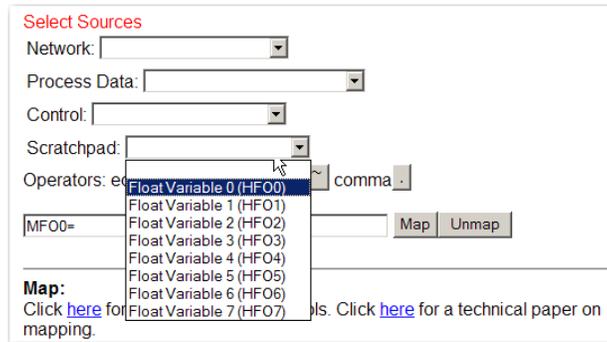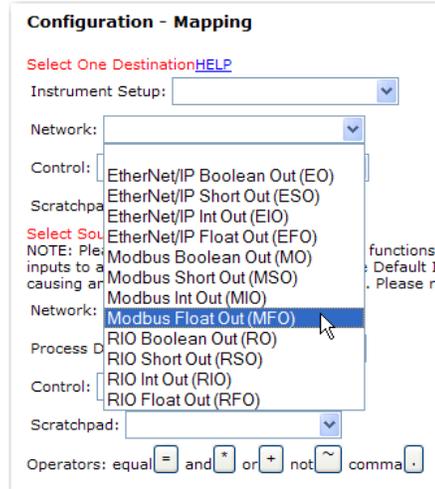
Step 8. A Select button appears. Click this button.

The Destination and Source appear in the Map: text field. (MFO0=HFO0). Click the Map button to open the HFO - Float Variables form, shown below. Thus far we have mapped the Float Variable 0, word 0 to ModBus Float Out, Word 0).

Step 9.	The HFO - Float Variables form, type in a value. For our example we used the value "555.0000." Double click in the HFO (Hardy Float Out) text field 0 and click Enter.

HFO - Float Variables
The 8 Float Variables (HFO0-HFO7) are saved in non-volatile mer

0: 555.000 1: 1.000000 2: 0.000000 3: 0.000000

4: 0.000000 5: 0.000000 6: 0.000000 7: 0.000000
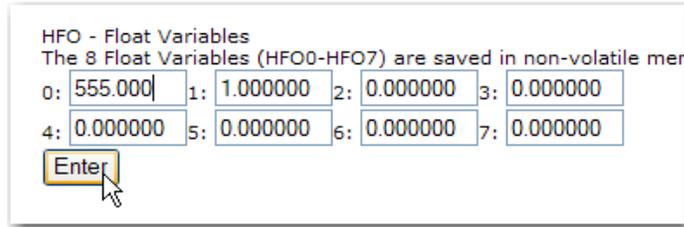
Enter

Step 10.	Go to the Hardy ModBus-Link Display. Minimize the Web Page, but do not close the browser. On the Display pull down, select Float Inverse.

Hardy Modbus-Link - hmblink1

File   Connection   Setup   Functions   Display   View   Window   Help

16 22 23

Signed
Unsigned
Hex
Binary
Long
Long Inverse
Float
✔ Float Inverse
Double
Double Inverse

hmblink1

Tx = 9: Err = 0: ID = 1   1000ms

00000 =   555.0000
00001 =
00002 =   0.0000
00003 =
00004 =   0.0000
00005 =
00006 =   0.0000
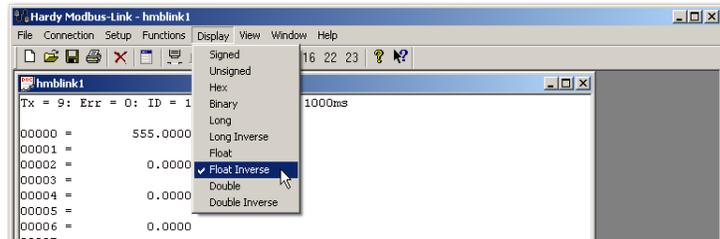
Step 11.	The value we entered from the Mapping page appears to the right of the 00000 = which is 555.0000. Click button 23, as shown below to open the Read/Write Multiple Registers page.

Hardy Modbus-Link - hmblink1

File   Connection   Setup   Functions   Display   View   Window   Help

05 06 15 16 22 23

hmblink1   23: Read/Write multiple registers

Tx = 46: Err = 0: ID = 1: F = 03: SR = 1000ms

Step 12.	Double click on "555.0000."

23: Write multiple registers (floating point inv.)

Slave ID: 1   000 = 555.0000   Send
                            002 = 0.0000
                            004 = 0.0000   Cancel
Write Address: 0   006 = 0.0000
                            008 = 0.0000   Edit
Write Size: 10
                                                   Open
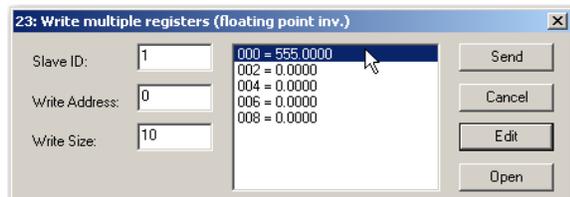
Step 13. The Enter Value display appears with the value 555 which was sent from the HI 4060 module (In our example 555). Enter a new number. We entered 999."
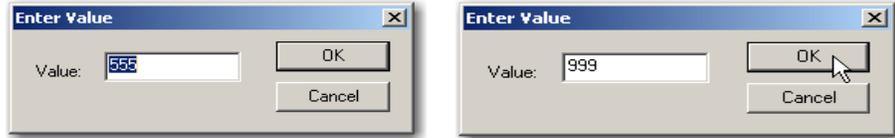
Step 14. Click OK. The Write Multiple Registers display appears with 999.0000 in place of 555.0000. Click the Send button.

Step 15. A Response pop up appears indicating that the Response from the HI 4060 module was received. Click on OK.
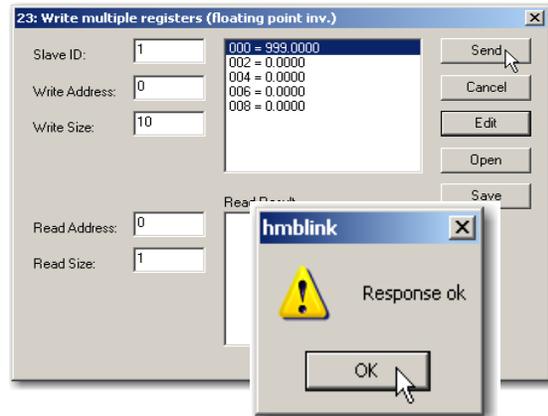
Step 16. Should you get an error message, check the following:

- Function Not Supported - You cannot use the selected function. Use a different function.
- Address Error - Wrong IP address of the register you want to send the data to. Get and enter the correct IP address. See 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.

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 4060 is a slave device. All data communication exchanges between a master and the HI 4060 originate from the master device. Each HI 4060 is assigned to one master and only that master may write output data to that HI 4060. 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.
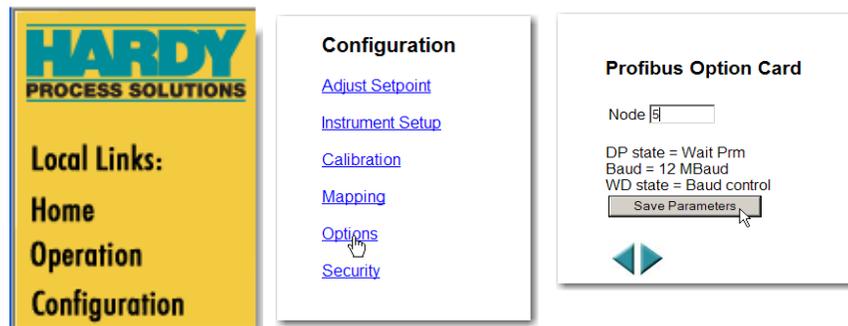
Double click in the Node text field to highlight the current entry. Type in the HI 4060 Node address. **Range:** 1-125 (default 5) Our example uses the default address #5.

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 4060 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 4060 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 4060 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 4060. (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.**

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

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.
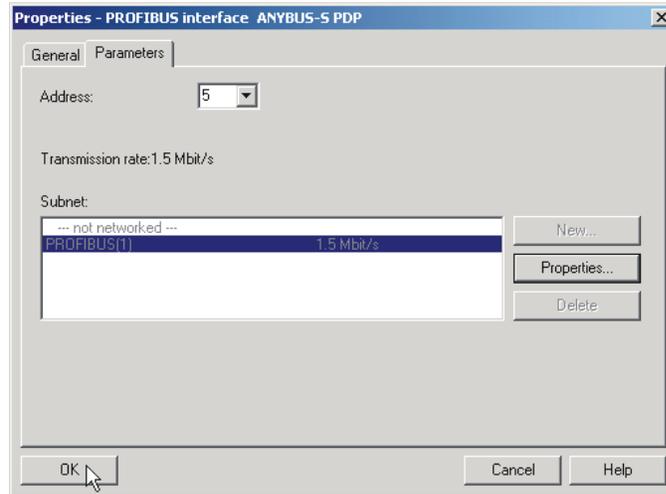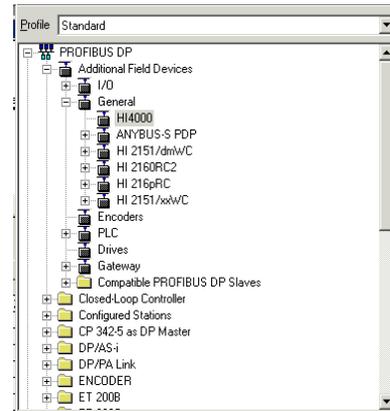
NOTE   *The HI 4060 Series Input and Output Sizes are expressed in words. 16 words input and 16 words output.*

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.
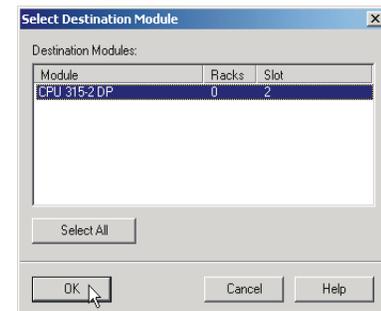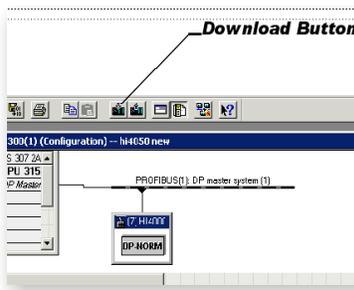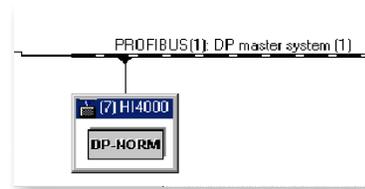
Step 10. Click OK to open the Select Station Address Dialog box; then click OK again. A status box will show the progress of configuration download to the PLC.
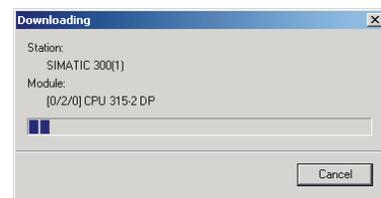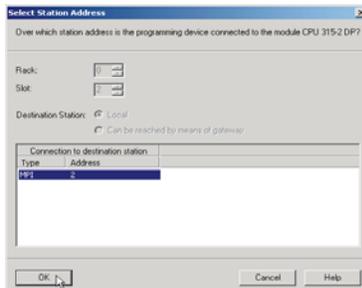
Step 11. When the download is complete the HW Config dialog box should look something like this.
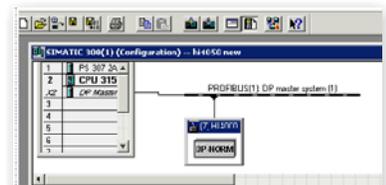
Step 12. Initialization is complete.

Configuring Profibus from the Front Panel

Step 1. Select Options from the Configuration menu, then Profibus from the Options menu.
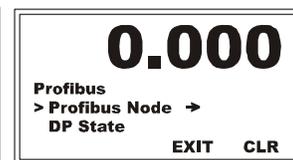
Step 2. Select Profibus Node to open the Profibus Node edit screen.

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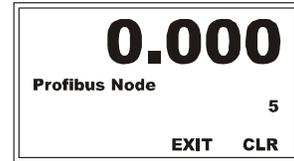
Step 4. Press the left arrow to move the cursor to the next digit, and use the up or down arrow to select the number for the left digit. Our example sets the Node Address at #7.
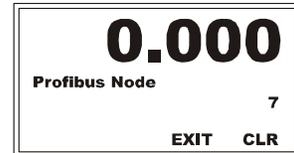
Step 5. Press Enter to save the entry.

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 4060.

DP State (Read Only)

- 00 = Status "Wait_ Prm" (HI 4060 waiting for communications from the Master Device.)
- 01 = Status "Wait_Cfg" (HI 4060 configuring for Data Exchange)
- 10 = Status "DATA_EX" (HI 4060 Exchanging Data with Master)
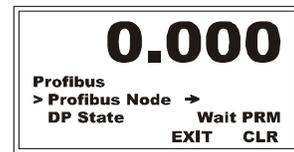
WD State (Read Only)

- 00 = Status "Baud_Search". (HI 4060 searching for baud rate.)
- 01 = Status "Baud_Control". (HI 4060 found the baud rate.)
- 10 = Status "DP_Control". (HI 4060 communicating at the current baud rate.)
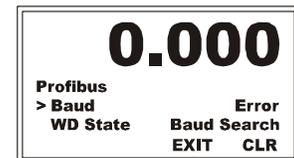
Baud Rate

Reads the baud rate at which the HI 4060 communicates with the Master Device. If "Error" appears it means that no data is being exchanged between the HI 4060 and a Master device.

Press the Exit button until you return to the Summary display

Configuring Rate of Change (ROC)

ROC measures and displays the rate at which a material enters or is dispensed from the scale over a period of time. The 4060 uses a minimum of one second's worth of updates to calculate the change. The register used for ROC data holds 15 entries. New weight values are written to the register at the rate of 1/15th of the time base; then the first register is subtracted from the 16th Register. Thus, the 16th register is one-time base older than the 1st register.

Time Units and Time Base

The HI 4060 calculates and optimizes the flow rate. However, you enter values within an appropriate range to use as a starting point for auto rate calculation.

ROC Time Units

ROC time units are the units of time (seconds, minutes or hours) you want for the Rate of Change. The ROC display on the summary display will read in these units. Auto rate calibration uses a minimum of 10 ROC Time periods to make the rate calculation.

Units: SEC, MIN, HR (default SEC)

Range = 1 - 1800

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. Low flow rates require a longer time base than high flow rates. The HI 4060 measures weight to about 1 part in 10,000. The formula below provides a minimum.

TIME BASE > (SCALE CAPACITY/5000)/LOW SETPOINT (units per sec.)

SCALE CAPACITY/5000 = determines minimum weight increment
Example: (440/5000) = 0.088 lb
lowest setpoint in units per second @ 3 lb per min is: 3 lb/60 sec = 0.05 lb/sec
Thus:
     TIME BASE = 0.088/0.05
     TIME BASE = 1.76 (rounded to 2)
     MINIMUM TIME BASE = 2 seconds

Configuring ROC (Time Units and Time Base) from the Web interface

To display the ROC page, click the right green arrowhead at the bottom or the ROC link at the top of the Configuration - Ingredient or Refill form. Sample screens are displayed below under Configuring the Time Base from the Web interface.

Step 1.   From on the Time Measure pull down, select the Time Measure to use for this ingredient. Our example uses minutes.
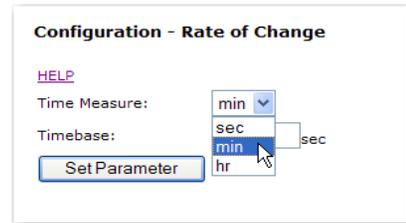
Step 2. In the time base field, enter the Timebase you want for the interval between weight readings.

Step 3. Click Save Parameters to save the parameter settings.

Configuration - Rate of Change

HELP

Time Measure: min

Timebase: 10   sec

Set Parameter
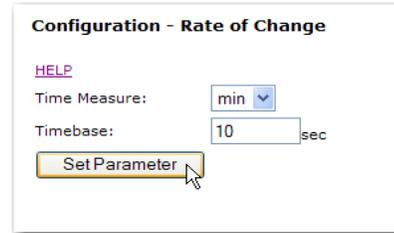
Configuring ROC (Time Units and Time Base) from the Front Panel

Step 1. From the Ingredient menu, select ROC and press Enter to display the ROC sub-menu.

> **0.000**
> Ingredient
> \> ROC ➜
>   RateCal
>   EXIT   CLR

> **0.000**
> ROC
> \> Time Base   ➜
>   ROC Time Units: min
>   EXIT   CLR
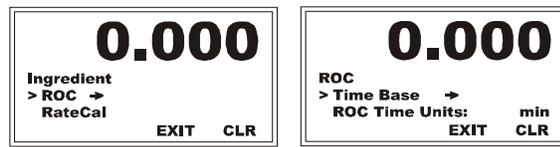
Step 2. Select Time Units; then press Enter to display the Time Unit edit page.

> **0.000**
> ROC
> \> ROC Time Units: sec
>   Time Base   6
>   EXIT   CLR

> **0.000**
> Time Units
>   **Seconds**
>   EXIT   CLR
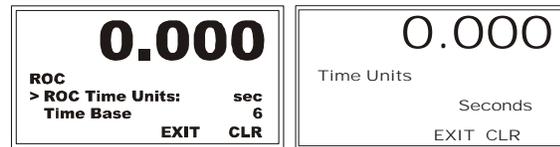
Step 3. Press the left or right arrow to toggle between seconds, minutes, or hours.

Step 4. Press Enter to save the entry and return to the ROC Menu.

Step 1. Use the down arrow to select Time Base; then press Enter to display the Time Base edit form.
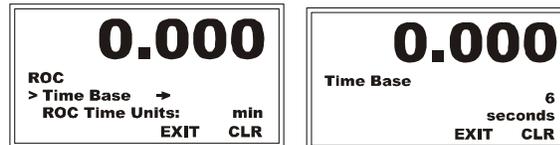
> **0.000**
> ROC
> \> Time Base   ➜
>   ROC Time Units: min
>   EXIT   CLR

> **0.000**
> Time Base
>   6
>   seconds
>   EXIT   CLR

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

Step 3. Press Enter to save the entry

Step 4. Press Exit to return to the Ingredient Sub-Menu.

Graphing ROC (Front Panel)

You can graph the Actual Rate of Change (ACT) compared to the Rate Setpoint or the Control Output Percentage on the front panel display. ACT is a heavily averaged ROC used for over-all performance. During setup, you can make the plot easier to see by adjusting the Max and Min parameters. The default values for the Actual ROC graph include the Max Rate that was set during a rate calibration and zeroing. For the Control Output Percentage, the max is 100 and the min is 0.

Step 1. From the
Configuration
menu, select
Graph and press
Enter to open the
Graph menu.

0.000
Configuration
> Graph →
  Instr Setup
         EXIT   CLR

0.000
Graph
> Graphing?   OFF
  Graph var   ACT
         EXIT   CLR
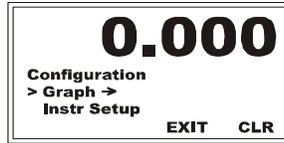
Step 2. Press the up or down arrows to toggle between OFF and ON, and press Enter to save the setting.

Step 3. Select Graph var and use the up or down arrows to toggle between ACT and OP (Control Output Percentage).

0.000
Graph
> Graph var   ACT
  Max   5.02
         EXIT   CLR

0.000
Graph
> Graph var   ACT
  Max   5.02
         EXIT   CLR

0.000
Graph
> Graph var   OP
  Max   5.02
         EXIT   CLR

Step 4. Press Enter to save the selection.

Step 5. Use the down arrow to select Max.

Step 6. If you selected the Actual (ACT) option, the default Max rate is whatever the Max rate

0.000
Graph
> Max   5.02
  Min   0.00
         EXIT   CLR

Configuring 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   *Web page security can be assigned to 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.*

Restricting access to the Web interface and front panel

If security is currently in place and you want to change any security settings, logon using the high security code.

Restricting access to the Web interface and front panel from the Front Panel

Step 1.   If you want to require a high-level password to access the Configuration Menu, use the down arrow to select Security and press Enter to open the Security menu; then select High Password and press Enter to open the High Password edit form.

```
┌─────────────────────────┐  ┌─────────────────────────┐  ┌─────────────────────────┐
│              0.000      │  │              0.000      │  │              0.000      │
│ Configuration           │  │ Security                │  │ High Password           │
│ > Security ➜            │  │ > High Password ➜    0  │  │                      0  │
│   Rate Setpoint    3.00 │  │   Medium Password    0  │  │                         │
│          EXIT    CLR    │  │          EXIT    CLR    │  │         EXIT    CLR     │
└─────────────────────────┘  └─────────────────────────┘  └─────────────────────────┘
```

Step 2.   The field defaults to 0, which indicates that no password protection is required. Use the up or down arrow to change to a value for your High security code (**Allowed Range 0- 65535**). Our example (for illustration only) shows 123.

```
┌─────────────────────────┐
│              0.000      │
│ High Password           │
│                   123   │
│         EXIT    CLR     │
└─────────────────────────┘
```

Step 3.   Press Enter to save the password and return to the Security Menu.

Step 4.   To set up a medium-level password, use the same process described in steps 1-3.

Step 5.   To apply security for the front panel, from the Configuration menu select Security and press Enter to open the Security menu.

```
┌─────────────────────────┐  ┌─────────────────────────┐
│              0.000      │  │              0.000      │
│ Configuration           │  │ Security                │
│ > Security ➜            │  │ > FPSecurity      NONE  │
│   Rate Setpoint    3.00 │  │   Calib Sec       NONE  │
│          EXIT    CLR    │  │          EXIT    CLR    │
└─────────────────────────┘  └─────────────────────────┘
```

Step 6.   Select FPSecurity, and press the Right or Left arrows to select NONE, MEDIUM, or HIGH. Using the same procedures, you can setup a NONE, MEDIUM, or HIGH password requirement for the Calibration Section and to the Web Page.

```
┌─────────────────────────┐  ┌─────────────────────────┐  ┌─────────────────────────┐
│              0.000      │  │              0.000      │  │              0.000      │
│ Security                │  │ Security                │  │ Security                │
│ > FPSecurity     HIGH   │  │ > Calib Sec      HIGH   │  │ >Web Sec -->     NONE   │
│   Calib Sec      NONE   │  │   Web Sec       MEDIUM  │  │   High Password         │
│          EXIT    CLR    │  │          EXIT    CLR    │  │          EXIT  CLR      │
└─────────────────────────┘  └─────────────────────────┘  └─────────────────────────┘
```

Step 7.   Press the Exit button to return to the Summary Display.

Restricting access to the Web interface and front panel from the Web Page

Step 1.   From the Configuration menu, click Security to open the Security page.

NOTE   *The field allows 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.   In the High and/or Medium Security Code text fields, type in the number codes you want (**Allowed Range 0- 65535**).

Step 3.   Our example shows 123 for High and 456 for Medium. To not set a code, enter 0.

Step 4.   On the "Front Panel Security pull-down list, select the level of security you want for the front panel.

If other than NONE, there must be a security code for that level or the security system will not require a code to be entered.

Step 5.   From the "Front Panel Calibration Security pull-down list, select the level of security you want for calibrating the instrument. If other than NONE, there must be a security code for that level or the security system will not require a code to be entered.

Step 6.   From the "Web Page Security" pull down list, select the level of security you want for the Web Pages.If other than NONE, there must be a security code for that level or the security system will not require a code to be entered.

Step 7.   Click Save Code to save the security settings.

Configuration - Security

HELP

High Security Code	123
Medium Security Code	456
Front Panel Security	MEDIUM
Front Panel Calibration Security	HIGH
Web Page Security	HIGH

Save Code

NOTE   *You can save your settings at any time during the Security setup process.*

Verifying a password from the front panel

For front panel access, the user's password is used to derive the user's ID. Users who must enter passwords to operate or configure the instrument from the front panel should follow these steps:

Step 1.   Select Verify Password and press Enter to open the edit page.

0.000
Configuration
> Verify Password   0
    Calib Sec   NONE
                EXIT   CLR

0.000
Verify Password
                    0
                EXIT   CLR

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

Step 3.   Repeat the process until you have entered the whole password; then press Enter to open the window.

0.000
Verify Password
                  123
                EXIT   CLR

Setting Parameter Security

The setup for High and Medium security code can be applied to functions accessed through the front panel. Three security levels apply to parameters: NONE, MEDIUM, and HIGH. The security level for a parameter is indicated by the addition of dollar signs or zero to the parameter name, as described below:

- **None**: A security code of 0 disables all security, whether the $ sign is present on a parameter or not.
- **Medium:** If a parameter has medium security, insert a $ before its name.
- **High:** If a parameter has medium security, insert $$ before its name.

For example, this Decimal Point parameter has a medium security level:

00000002 $Decimal Point=1 [1]

This manual system allows a system administrator to selectively set security restrictions for selected parameters.

Setting Parameter Security from the Web Interface

You can access the parameters by editing the Parameter Dump. Select Operation from the Home page to open the Operation menu; then select Diagnostics to open the Operation- Diagnostics form.

Click the Parameters link to display a list of parameters.

For each function you want to protect, enter the $ (medium security) or $$ (high security) in front of the parameter name.
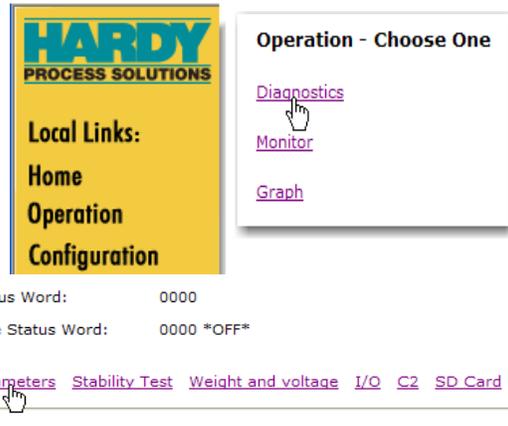
For example, if you want a high security code for Units, enter the following: 00000001 $$Unit=0 (lb)

Our examples show two dollar signs, High Security for the Weight Decimal Pt and one dollar sign for Rate Decimal Pt.

NOTE

You must first enter a High or Medium security password or both in order for the Parameter Security to work.

Click the Save button to save the security changes.


```
Operation - Diagnostics
Parameter Dump

Other Parameter IDs

00000001 Unit=0 [lb]
00000002 $$Weight Decimal Pt=2 [2]
00010002 $Rate Decimal Pt=2 [2]
00020002 Total Decimal Pt=1 [1]
00030002 Batch Decimal Pt=2 [2]
00000003 Grads=0 [1]
00000004 Operator ID=
00000005 Instrument ID=HI 4060
00000006 WAVERSAVER®=1 [7.50 Hz]
00000007 Num Averages=20
00000009 Low Pass Filter=1 [ON]
0000000A Gain In Weight=0 [NO]
0000000F Capacity=330.00
00000201 Span Weight=5.00
00000202 Ref Weight=0.00
0000002A Baud Rate:=5[19200]
0001002A Data bits:=1[8]
0002002A Parity:=0[NONE]
0003002A PrintMode=0[BATCH REP]
000002F2 scratchpad=6.000000

Save
```

NOTES

The Mode and Operational Display on the Summary display work even if a HIGH or MEDIUM password has been assigned.

Pressing Enter makes the Configuration Menu reappear so you can proceed. This is true for all Sections that are assigned a password.

Instrument Setup

This section describes how to setup values such as Instrument ID, Operator ID, Unit of Measure and other values that are basic to HI 4060 operation. The outline will follow the Configuration - Instrument Setup form on the Web interface, but the procedure for using the front panel display will also be explained for each value.

The configuration process sets up the instrument to operate as a scale. This includes configuring WAVERSAVER®, Scale Capacity, Units of Measure, Motion tolerance and

other instrument parameters required for your process. Here is where the global parameters are entered. All of the configured parameters and mappings except the IP Address are stored in the Secure Memory Module (SMM-SD).

Accessing Instrument setup from the Web Interface

Step 1. From the HI 4060 Home Page click on Configuration to open the Configuration Menu.

Step 2. Select Instrument Setup to open the Configuration - Instrument Setup form.

Accessing the Instrument Setup menu from the Front Panel

Step 1. Configuration is a top-level menu which can be accessed from any lower level menu by clicking the Exit button one or more times, or press Enter from the Summary display.

Step 2. Use the down arrow to select Instrument setup, and press Enter to open the setup menu

nit (of Measure)

The Unit parameter sets the scale and related displays to one of the following options:

- Pounds (lb) - Default
- Ounces (oz)
- Ton (Ton) short ton
- Kilograms (Kg)
- Grams (G)

- Metric Tonnes (t) long ton

Range: LB, OZ, LB/OZ, TON, KG, G, T (default LB)

Configuring Unit from the Web interface

Step 1. Select a weight type from the Unit pull-down selection list.

Step 2. Click on the Change Unit button to make the change. You must click Save Parameters to save any value set from this form
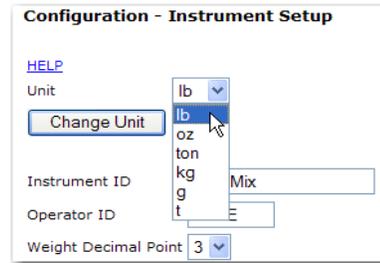
Configuring Unit from the front panel

Step 1. From the Setup menu, use the down arrow to select Unit.

Step 2. Press the left or right arrows to select the Unit of measure you want.

Step 3. Press Enter to save the selection.
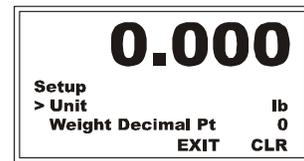
Instrument ID

The Instrument ID parameter provides a specific identification for a Rate Controller. This is important when using several HI 4060's for different applications. A unique Instrument ID allows you to distinguish one HI 4060 from another.

Range: 19 characters (default HI 4060)

Configuring the Instrument ID from the Web interface

Enter an instrument ID from the keyboard. You must click Save Parameters to save any value set from this form.

Configuring the Instrument ID from the Front Panel

Step 1.   From the Setup menu, select Inst. ID; then press Enter to open the Inst. ID edit form.
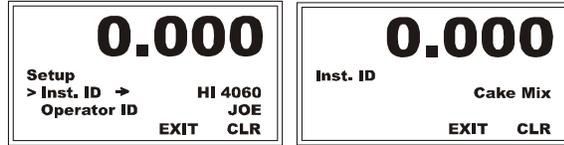
```
┌──────────────────────┐  ┌──────────────────────┐
│      0.000           │  │      0.000           │
│ Setup                │  │ Inst. ID             │
│ > Inst. ID  →        │  │                      │
│             HI 4060  │  │             Cake Mix │
│   Operator ID    JOE │  │                      │
│          EXIT   CLR  │  │          EXIT    CLR │
└──────────────────────┘  └──────────────────────┘
```

Step 2.   Use the right or left arrow to position the cursor and the up or down arrow to change the value for your instrument ID. Our example changes the default value to Cake Mix, which makes this instrument easy to recognize by its application.

Step 3.   Press Enter to save the entry and return to the Setup Menu.

Operator ID

The Operator ID is the ID of the user logged into the system using security. Select three letters or numbers or any combination of the two that adequately identifies the user. We have provided some examples for your assistance.

Range: 3 characters (default none)

Some examples of Operator IDs are Joe, 312, J15, or JD7

Viewing the Operator ID from the Web interface

Enter an operator ID from the keyboard. Use Save Parameters to save any value set from this form.

Operator ID [   ]

Configuring the Operator ID from the Front Panel

Step 1.   To open the Operator ID edit form from the Setup menu, use the down arrow to select Operator ID; then press Enter.
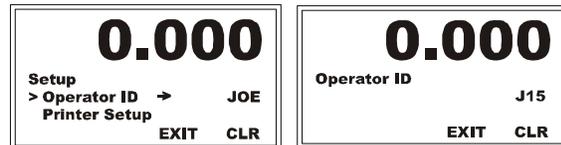
```
┌──────────────────────┐  ┌──────────────────────┐
│      0.000           │  │      0.000           │
│ Setup                │  │ Operator ID          │
│ > Operator ID  →  JOE│  │                      │
│   Printer Setup      │  │                 J15  │
│          EXIT   CLR  │  │          EXIT    CLR │
└──────────────────────┘  └──────────────────────┘
```

Step 2.   Use CLR to clear the current entry and position the cursor on the first value to change. Use the up or down arrow to scroll to the value, first from 1-10 and then from A-Z.

Step 3.   Use the right or left arrow to move the cursor to the next position, and repeat the process until you have entered all of the characters (up to 3) for your operator ID.

Step 4.   Press Enter to save the entry and return to the Setup Menu.

Weight Decimal Point

Set the Weight Decimal Point parameter to indicate the location of the decimal point within the weight values, which are based on the selected unit of measure. The higher the number, the farther to the left the decimal point moves and the more precisely the rate is displayed. However, setting the decimal point far to the left does not ensure that the weight value will be accurate enough to distinguish the requested level of precision from interference factors.

Range: 0-5 (default 2)

Setting the decimal point from the Web interface

Step 1.   From the Decimal Point pull-down list, select the number of digits from the right edge of the displayed number before which the decimal point should appear.

Step 2.   You must click Save Parameters to save any value set from this form.
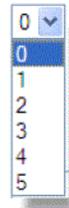
Setting decimal point from the front panel

Step 1.   From the Setup menu, use the down arrow to select Weight Decimal Pt.

Step 2.   Press the Right or Left arrows to select the number of digits from the right side of the displayed number before which you want the decimal point inserted.

Step 3.   Press Enter to save the selection.
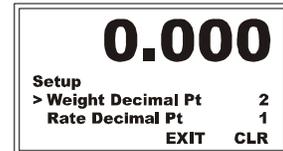
Rate Decimal Point

The Rate Decimal Point Parameter sets the location of the decimal point within the Flow Rate value. If there is a limit on the totalizer, the decimal point can determine its range. The higher the number, the farther to the left the decimal point moves and the more precisely the rate is displayed. However, setting the decimal point far to the left does not ensure that the total weight measurement will be accurate enough to distinguish the requested level of resolution. Adding decimals does not increase the precision. Maximum precision is 1:10,000. Increasing the decimal point beyond that only produces unstable readings.

Range: 0-5

Setting the Rate decimal point from the Web interface

Step 1.   From the Rate Decimal Point pull-down list, select the number of digits from the right edge of the displayed number before which the decimal point should appear.

Step 2.   You must click Save Parameters to save any value set from this form.
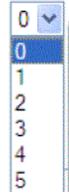
Setting Rate decimal point from the front panel

Step 1.   From the Setup menu, use the Down arrow to select Rate Decimal Pt.

Step 2.   Press the Right or Left arrows to select the number of digits from the right side of the displayed number before which you want the decimal point inserted.

Step 3.   Press Enter to save the selection.
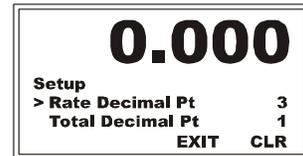
Total Decimal Point

The Total Decimal Point parameter sets the location of the decimal point within the Total weight value, which is based on the selected unit of measure. For example, with a six-digit range (e.g., 999,999), the totalizer would start over at one million, but with three decimal points (e.g., 999.999), it would start over at one thousand. (See note in specification.)

Range: 0-5 (default 1) In most applications a decimal setting of 0 or 1 is recommended.

Setting the Total decimal point from the Web interface

Step 1.   From the Total Decimal Point pull-down list, select the number of digits from the right edge of the displayed number in front of which the decimal point should appear.

Step 2.   You must click Save Parameters to save any value set from this form.
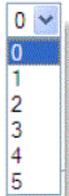
Setting Total decimal point from the front panel

Step 1.   From the Setup menu, use the Down arrow to select Total Decimal Pt.

Step 2.   Press the Right or Left arrows to select the number of digits from the right side of the displayed number before which you want the decimal point inserted.

Step 3.   Press Enter to save the selection.
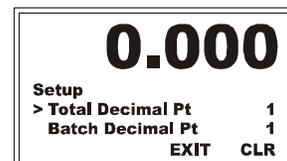
Batch Decimal Point

The Batch Decimal Point parameter sets the location of the decimal point within the batch weight value, which is based on the selected unit of measure. The higher the number, the farther to the left the decimal point moves. However, setting the decimal point far to the left cannot ensure that the scale is accurate enough to distinguish the requested level of precision.

Range: 0-5 (default 1)

Configuring the Batch Decimal Point from the Web interface

Step 1.   From the Batch Decimal Point pull-down list, select the number of digits from the right edge of the displayed number in front of which the decimal point should appear.

Step 2.   You must click Save Parameters to save any value set from this form.
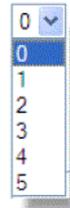
Configuring the Batch decimal point from the front panel

Step 1.   From the Setup menu, use the Down arrow to select Batch Decimal Pt.

Step 2.   Press the Right or Left arrows to select the number of digits from the right side of the displayed number before which you want the decimal point inserted.

Step 3.   Press Enter to save the selection.
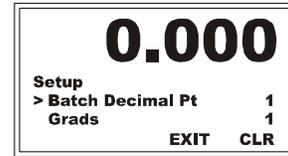
Grads (Graduation Size)

The Graduation Size is the minimum increment or decrement used in the display of HI 4060 weight values. The HI 4060 can repeatedly distinguish changes of up to one ten thousandth of the total load cell capacity, so graduation values set smaller than that would probably reflect noise variations rather than accurate weight readings. The value applies to the right-most digit(s), which may be at the sub-decimal level. For example, with a graduation size

of two applied to the final digit of 10,000.00, the minimum change allowed to the displayed number would be.02, allowing for values of 9999.98, 10,000 or 10,000.02.

Range: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 (default 1)

Configuring Grads from the Web interface

Step 1.   From the Grads pull-down list, select the minimum increment or decrement to use in the display of HI 4060 weight values.

Step 2.   You must click Save Parameters to save any value set from this form.
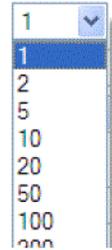
Configuring Grads from the front panel

Step 1.   From the Setup menu, select Grads.

Step 2.   Use the Right or Left arrows to select the minimum increase or decrease to allow in the display of HI 4060 weight values; then press Enter to save.
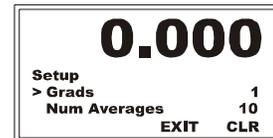
Num Averages

A number of weight readings are averaged to reduce the affect of material impact and/or vibration as material moves on and off the scale. The Rate Controller takes 110 readings per second. If you average enough weight readings, the weight loss or gain remains smooth and the displayed value shows little or no fluctuation, although it is actually recalculated (by sliding average) with each reading. If a weight reading fluctuates too much, increase the number of readings in the average, but for applications that require a very quick weight reading, do not set this value too high. See also WAVERSAVER for information on filtering unstable weight readings.

Range: 1-255 (default 20)

NOTE   *Older models of the HI 4060 have a Num Averages range of 1-31.*

Configuring Number of Averages from the Web interface

Step 1.   In the Number of Averages edit box, enter the number of weight readings to average in the display of HI 4060 weight values.

Step 2.   You must click Save Parameters to save any value set from this form.
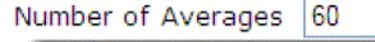
Configuring Number of Averages from the front panel

Step 1.   From the Setup menu, select Num Averages and press Enter to open the Num Averages edit form.

Step 2. To enter the number of weight readings to average in the display of HI 4060 weight values, use CLR to clear the current entry and position the cursor on the first value to change, and use the up or down arrow to scroll to the value.

Step 3. Use the left arrow to move the cursor to the next position, and repeat the process above until you have entered all the digits for your Num Averages value.

Step 4. Press Enter to save.

NOTE   *The number entered in Figure above is for illustration purposes only. Yours will vary depending on your application.*

WAVERSAVER®

Chapter One provides a detailed description of WAVERSAVER's function and purpose. In short, WAVERSAVER helps to mitigate the effects of vibratory forces, allowing the HI 4060 to distinguish between actual weight data and mechanical noise in the signals the load cell sends it. WAVERSAVER can be configured to ignore noise with frequencies as low as 0.5 Hz. Two higher frequencies may be selected to provide a faster instrument response time.

High values allow faster readings, while the lower values raise the degree of filtration. The function is user selectable and can be turned off.

Range: 7.5, 3.5, 1.0, 0.5, 0.25 Hz. (default 1.00 Hz)

NOTE   *Some older models of the HI 4060 may have only three WAVERSAVER options: 15 Hz, 1.0 Hz and 0.5 Hz.*

Configuring WAVERSAVER from the Web interface

Step 1. From the WAVERSAVER pull-down list, select the number of Hz to use for the filter.

Step 2. You must click Save Parameters to save any value set from this form.

WAVERSAVER®	1.00 Hz ✓
Low Pass Filter	15 Hz
	1.00 Hz
Scale Capacity (t)	0.50 Hz

Configuring WAVERSAVER from the front panel

Step 1. Select WAVERSAVER with the Down arrow.

Step 2. Use the Right or Left arrows to select the number of Hz to use for the filter.

Step 3. Press Enter to save the selection.

0.000

Setup
> WAVERSAVER   1.00 Hz
Low Pass Filter   ON
                    EXIT   CLR

Low Pass Filter   Range: ON/OFF (default ON)

NOTE   *The Low Pass Filter is only used with older HI 4060 Models. Newer models do not use Low Pass Filter and instead use WAVERSAVER+ (see below)*

The Low Pass (LP) filter can be toggled on or off. It provides a more stable weight reading, but at the expense of some reaction time. For an application that requires very stable weight readings and the reaction time poses no problem, the Low Pass filter allows for a more precise adjustment. High-speed weight readings will be better with the low-pass filter off.

Configuring Low Pass Filter from the Web interface

From the Low Pass Filter pull-down list, select ON or OFF. You must click Save Parameters to save any value set from this form.

Configuring Low Pass Filter from the front panel

We recommed setting the low-pass filter to ON mode for most applications. Off is used for the control of liquids.

Step 1.   Use the Down arrow to select Low Pass Filter and press Enter.

Step 2.   Press the Right or Left arrows to toggle between ON or OFF.

Press Enter to save the selection.

WAVERSAVER+ 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.

NOTE   *WAVERSAVER+ is only available in newer HI 4060 models. Models with WAVERSAVER+ do not use the Low Pass Filter Described above.*

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 4060 display:

Step 1.   In the Instrument Setup menu, use the Down arrow to select the Variation Threshold and press Enter.

Step 2.   To enter the number in the display of HI 4060, use CLR to clear the current entry and position the cursor on the first value to change, and use the up or down arrow to scroll to the value.

Step 3.   Use the left arrow to move the cursor to the next position, and repeat the process above until you have entered all the digits for your value.

Step 4.   Press Enter to save.

Step 5.   In the Instrument Setup menu, use the Down arrow to select the Motion Threshold and press Enter.

Step 6.   To enter the number in the display of HI 4060, use CLR to clear the current entry and position the cursor on the first value to change, and use the up or down arrow to scroll to the value.

Step 7.   Use the left arrow to move the cursor to the next position, and repeat the process above until you have entered all the digits for your value.

Step 8.   Press Enter to save.

On the HI 4060 Web page:

Enter the value in the text box provided in the Instrument Setup menu.
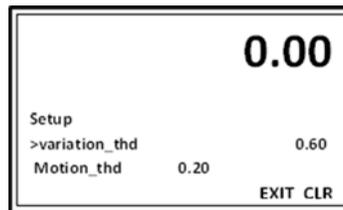
Configuring the Capacity Parameter

For optional use in noting the scale capacity.

Configuring Capacity from the Web interface

Step 1.   In the Capacity edit box, enter the total capacity of the scale system.

Step 2.   You must click Save Parameters to save any value set from this form.

Configuring Capacity from the front panel

Step 1.   Use the Down
          arrow to select
          Capacity; then
          press Enter to open
          the edit form.

Step 2.   Use the right or left arrow to position the cursor on the first value to change and
          the up or down arrow to change to the Capacity value. Our example shows
          1,500.0 lbs. Press Enter to save the entry and return to the Setup Menu.

Use Default I/O?

Use Default I/O refers your choice to use or not use the factory-set defaults of five switch
inputs. Deselecting the defaults requires you to map any control function to the inputs and
analog outputs.

Range: YES/NO (default YES)

NOTE   The Switch Input defaults are:

                         • Input 1 = START
                         • Input 2 = STOP
                         • Input 3 = ESTOP
                         • Input 4 = FORCE REFILL
                         • Input 5 = CLEAR TOTAL

                     The Relay Output defaults are:

                         • Relay 1 = MOTOR ON
                         • Relay 2 = SHUTOFF
                         • Relay 3 = REC
                         • Relay 4 = ALARM
                         • Relay 5 = REFILL

Analog Output channels 1-4 are set by default for motor speed control OP%:
Configuring Use Default I/O? from the Web interface

Step 1.   Select YES or NO from the Use Default
          I/O? pull-down list.
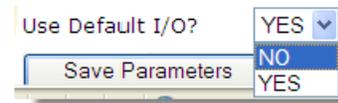
Step 2.   You must click Save Parameters to save
          any value set from this form.

Configuring Use Default I/O? from the front panel

Step 1.   From the Setup menu, use the down arrow to select Use Default I/O? and press Enter.

Step 2.   Press the right or left arrow to toggle between YES and NO.

Step 3.   Press Enter to save the entry.
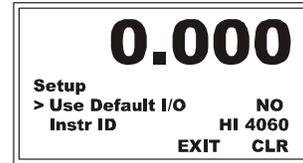
Instrument Usage Help

Help provides descriptions of all the parameters in the Instrument Setup Menu.

Step 1.   Use the down arrow to select Help, and press Enter to display the help screen.
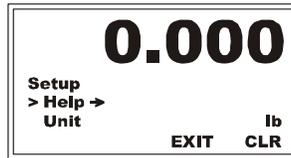
Step 2.   The Help Display appears with a description for *Units* of Measure.

Step 3.   To view a parameter, press the down arrow until the parameter appears with the description. To read the entire Parameter description continue to press the down arrow until the next parameter appears.

Step 4.   Press Exit to return to the Instrument Setup Menu.

Step 5.   Press Exit to return to the Configuration Menu.

LCD Contrast

Use the LCD Contrast or CONTRAST option to increase or decrease the contrast of the display.

Adjusting contrast from the Web interface

Step 1.   To make the display lighter, click Lighter, or to make the display darker, click Darker.
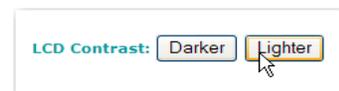
Adjusting the Front Panel LCD Display

Step 1.   Select CONTRAST from the Setup menu.

Step 2.   Press the right arrow to increase the contrast. Press the left arrow to decrease the contrast. This completes the Instrument Configuration.

Configuring a Printer or Scoreboard

The Printer Parameters are set to operate a Printer or Scoreboard which can print out or display on a Scoreboard whatever appears in the front panel display. The Printer parameters also include a Batch Report (Batch Rep) which prints out the following:

- Current Date and Time
- The Date and Time the last batch started.
- The Date and Time the last batch ended.
- The Total Weight.
- The Batch Total Weight

NOTE   *If the Scoreboard is configured, the Print button does not function.*

Opening Configuring - Printer from the Web interface

To display the Configuration - Printer form from the Configuration - Instrument Setup page, click the Printer link at the top of the page or one of the green arrows at the bottom.

If you are using a scoreboard, the scoreboard will display similar screens to those pictured in Chapter 7 under *Mode Displays* (without the function key names). The content of each display depends on the operating mode.
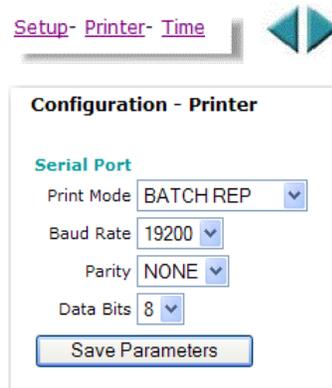
Configuring Printer Setup from the front panel

From the Setup menu, use the down arrow to select Printer Setup and press Enter to open the Printer Setup menu.
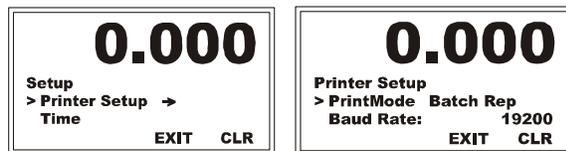
Print Mode

Range: Batch Rep - Scoreboard (default Batch Rep - i.e., Batch Report)

Configuring Mode from the Web interface

Step 1.   From the Print Mode pull-down menu, select the mode you want, either a Batch Report or printing to a Scoreboard.

Configuring Mode from the front panel

Step 1.   From the Printer Setup menu, select Print Mode and press Enter.

Step 2.   To select the Print Mode use the Left or Right arrows to toggle between Batch Report or printing to a Scoreboard.

Step 3.   Press Enter to save the entry.

Baud Rate

See your Network Administrator if you don't know the correct Baud Rate.

Range: 300, 1200, 2400, 4800, 9600, 19200 (default 19200)

Configuring Baud Rate from the Web interface

Step 1.   Click on the Baud Rate pull down list.

Step 2.   Click on the Baud rate for the printer connected to this instrument.
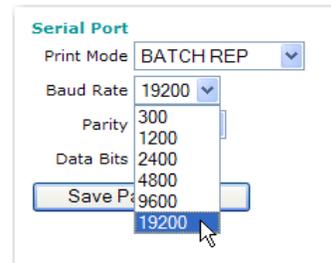
Configuring Baud Rate from the front panel

Step 1.   From the Printer Setup menu, select Baud Rate and press Enter.

Step 2.   To select the Baud Rate, press the left or right arrow until the baud rate you want appears.

Step 3.   Press Enter to save the entry.

Parity

See your Network Administrator if you don't know the correct parity.

Range: NONE, ODD, EVEN (default NONE)

Configuring Parity from the Web interface

From the Parity pull down list, select the Parity required for the printer connected to this instrument.
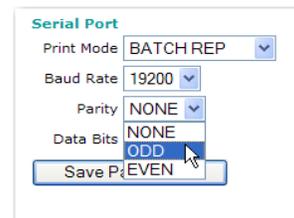
Configuring Parity from the front panel

Step 1.   From the Printer Setup menu, select Parity and press Enter. The current Parity value is displayed.

Step 2.   To select the Parity option you want, press the Left or Right arrows until it appears.

Step 3.   Press Enter to save the entry.

Data Bits

Most printers are set for eight bits. A seven-bit option is also available. See your printer manual if you think your printer could might require a seven-bit setting.

Range: 7 or 8 (default 8)

Resetting the Data Bits default from the Web interface

Step 1.   From the Data Bits pull-down menu, select the Data Bits required for the printer connected to this instrument.

Step 2.   Click on Save Parameters to save the entries.
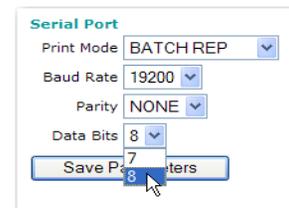
Resetting Data Bits default from the front panel

Step 1.   From the Printer Setup menu, select Data Bits and press Enter. The current Data Bits value is displayed.

Step 2.   To select the Data Bits press the Left or Right Arrow to toggle between 8 and 7.

Step 3.   Press Enter to save the entry.

Step 4.   Press the Exit button to return to the Setup Menu.

Configuring Date and Time

HI 4060s are set with a default time, which you will need to change to the time in your area.

NOTE   *To set up Greenwich Mean Time (GMT), see Appendix A.*

Configuring Date and Time Setup from the Web interface

Step 1.   To display the Configuration - Date and Time page from the Instrument Setup page, click the Time link at the top of the or an arrow at the bottom.

Step 2. In the Minute field, enter the current minute in the format shown (leading 0 not required).

Step 3. In the Hour field, enter the current hour (1-24) in the format shown (leading 0 not required).

Step 4. In the Day field, enter the current Day of the month in the format shown (leading 0 not required).

Step 5. In the Month field, enter the number of the current month (leading 0 not required).

Step 6. In the Year field, enter the current year in the format shown.

Step 7. From the time zone pop-up menu, select the time zone in your area. GMT = Greenwich Mean Time

Step 8. Click Save Parameters to save the Date and Time settings.

Configuring Date and Time Setup from the front panel

Step 1. From the Setup menu, select Time and press Enter to display the Time menu with the cursor in front of Zone. Press Enter to select Zone.
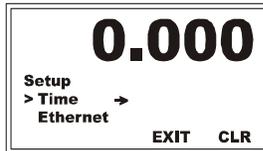
Step 2.   Press the Left or Right arrows to select the time zone in your location. Press Enter to save and return to the Time menu.

Step 3.   Use the down arrow to scroll to Time-year and press Enter to open the Time-Year edit page.

```
      0.000              0.000
Time                Time-year
> Time-year    →  2008                 2008
   Time-month       10
         EXIT   CLR          EXIT   CLR
```
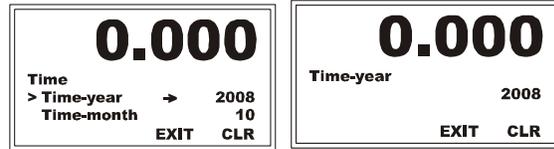
Step 4.   Use the left arrow to position the cursor and the up or down arrow to select the value. Repeat the process above until you have entered all the numbers for Time-year. **Note:** Use only four numbers. Other options cannot be saved.

Step 5.   Press Enter to save the entry and return to the Time Menu.

Step 6.   Use the Down arrow to select Time - Month and press Enter to display the Time - Month edit page.
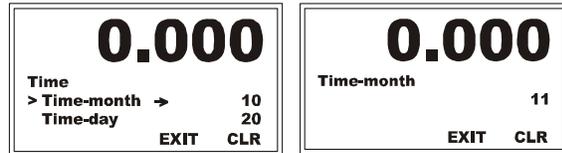
```
      0.000              0.000
Time                Time-month
> Time-month   →    10                  11
   Time-day         20
         EXIT   CLR          EXIT   CLR
```

Step 7.   Use the left arrow to position the cursor and the up or down arrow to select the value. **Note:** Use only up to two numbers. Other options cannot be saved.

Step 8.   Press Enter to save the entry and return to the Time Menu.

Step 9.   Use the Down arrow to select Time - Day and press Enter to open the The Time - Day Menu edit page.

```
      0.000              0.000
Time                Time-day
> Time-day     →    20                  21
   Time-hours       14
         EXIT   CLR          EXIT   CLR
```
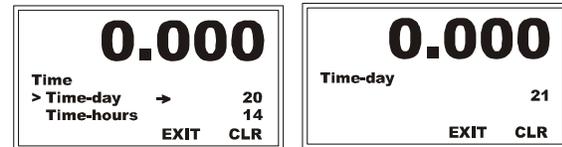
Step 10. Use the left arrow to position the cursor and the up or down arrow to select the value. **Note:** Use only up to two numbers. Other options cannot be saved.

Step 11. Press Enter to save the entry and return to the Setup Menu.

Step 12. Use the Down arrow to select Time - Hours and press Enter to display the Time - Hours Menu.

```
      0.000              0.000
Time                Time-hours
> Time-hours   →    14                  21
   Time-minutes     23
         EXIT   CLR          EXIT   CLR
```
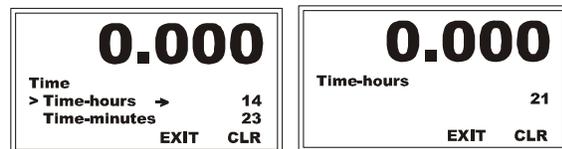
Step 13. Use the left arrow to position the cursor and the up or down arrow to select the value. **Note:** Use only up to two numbers. Other options cannot be saved.

Step 14. Press Enter to save the entry and return to the Setup Menu.

Step 15. Use the Down arrow to select Time - Minutes; then press Enter to display the Time - Minutes edit page.

```
┌──────────────────────┐ ┌──────────────────────┐
│      0.000           │ │      0.000           │
│ Time                 │ │ Time-minutes         │
│ > Time-minutes →  32 │ │                  28  │
│   zone  PST(GMT-8h)  │ │                      │
│         EXIT   CLR   │ │          EXIT  CLR   │
└──────────────────────┘ └──────────────────────┘
```
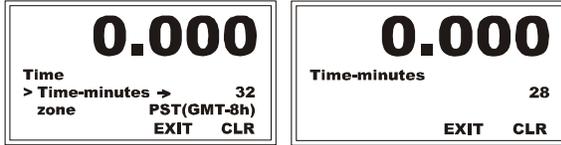
Step 16. Use the left arrow to position the cursor and the up or down arrow to select the value.. **Note:** Use only up to two numbers. Other options cannot be saved.

Step 17. Press Enter to save the entry and return to the Time Menu.

Step 18. Press Exit to return to the Setup Menu.

Rate Calibration Configuration

This section describes how to set the parameters for Rate Calibration. It begins with information that applies to entries made from either the Web interface or front panel. See Chapter 5 for additional instructions on running Rate Calibration.

Use Rate Calibration to calibrate the system starting flow rate, either manually or using Auto Rate Cal calculator. Rate calibration establishes the feeder maximum rate, PI settings, and the starting OP% for a given rate setpoint. From that starting point, the controller adjusts the OP% to maintain an optimized setpoint. Environment and product conditions require monitoring and adjustment to meet the requested setpoint target.

NOTE   *You must calibrate the scale prior to rate calibration.*

The P and I values

The PI controller calculates an output percentage based on the parameters P - Proportional, and I - Integral. The rate calibration process can set the values for P and I automatically. D (Derivatve) is set to 0 and cannot be changed.

The output percent is determined by the formula:

P*((Setpoint - ActualRate)/MaxRate + I * (integral of the proportional term)).

Cal Type

There are three types of calibrations to determine the rate per output percentage:

- Two-point rate calibration (default) for Auto RateCal, where two flow rates are selected (points 2 and 4).
- Five-point rate calibration for Auto RateCal, select starting % point 1 where five flow rates are performed.
- Advanced Cal, used when you cannot do an Auto RateCal and you know the flow rate for 2 output percentage selections (points 2 and 4).

The known flow rates can come from experience with the material, often through trial and error. When these known values have been entered, the HI 4060 RC calculates the rates for seven output points: Minimum %, projected maximum rate at 100%, and five linear percentage points.

If a two-point Auto Rate Calibration is selected, the unit will go to the high rate output percent for a period of feed time plus prime time. When this period is complete, it will save the actual rate as the high cal rate and will then pause for a period of pause time before going to the low rate output percent for a period of feed time When this period is complete, it will save the actual rate as the low cal rate.

After doing the auto rate calibration at the low and high rates, the unit will estimate the zero rate output percent and the Max rate cal rate and will fill values for the first, third, and fifth five-point calibration rate pairs.

Five-point measurement provides tighter flow rate control. Enter the point one output percent, which must be between 10.0 and 30.0 percent. The next four calibration output percents are fixed at cal point 1 + 10.0, cal point 1 + 20.0, cal point 1 + 30.0, and cal point 1 + 60.0. The unit will then run at each of these output percents, starting with the highest one, for a period of feed time or feed time plus prime time on the first run. It saves the actual rates it observes into the cal rates and estimates the MaxRate and zero output rates.

We recommend that you select output percentage points where your control set point falls between pt 2 and pt 4.

If an Advanced calibration is selected, you must enter calibration pairs for the low rate and the high rate. The unit will fill in the other calibration pairs based on linear extrapolation from the two entered points.

Prime Time

The time in seconds it takes to get the system up to full flow for the first calibration point. (The feeder must prime the feeding system and the feeding system must smoothly feed product at an OP % selected rate.) This only occurs on the first test OP% run of the rate calibration.

Range: 1-999 (default 5 sec)

Pause Time

This is the time you want the feeder to wait between Auto Rate Calibration cycles. If necessary, more material may be added to the feeder. Note that this parameter should be set long enough to allow the operator to press the "hold" button in between feed runs..

We recommend that you make the Pause Time equal to or greater than the Timebase value you entered for the ROC.

NOTE   *If a feeder is manually paused before a cycle starts, or during a cycle, when the test is restarted it will run from the beginning.*

Feed Time

Feed Time is the test duration at each rate. Set this to a minimum of 10 X ROC time base.

Range: 1-999 (default 0)

Configuring Rate Calibration from the Web interface

The information in the section above defines and explains the fields on this form.

To open the Rate Calibration form, click the green right arrow at the base of the Configuration - Ingredient form or click on the Rate Calibration link at the top of the form.

Configuring P, I, Values

The Rate Calibration process automatically sets the values for P and I of the PI algorithm, but you can adjust them on this screen.

Selecting Cal Type

On the Cal Type pull-down menu, select the Cal type for this ingredient. Our example uses five-point Cal Type.

Setting Pause Time

Step 1.   Use the down arrow to select Pause time; then press Enter to display the Pause Time edit form.

Step 2. To enter the numeric value you want for the Pause Time: Press the left arrow until the cursor is at the first character entry for the Pause Time, and use the up or down arrow to select the number or punctuation you want.

Step 3. Press the right arrow to move the cursor one place to the right, and repeat the above process until you have entered all the numbers for your Pause Time value. In our example we selected 10 seconds.

Step 4. Press Enter to save the entry and return to the RateCal Menu.

Setting Feed Time

Step 1. Press the down arrow to select Feed Time; then press Enter to display the Feed Time edit form.

0.000
RateCal
> Feed time   ➜   20
Do Auto Rate Cal
EXIT   CLR

0.000
Feed time
30
EXIT   CLR

Step 2. To enter the numeric value you want for the Feed Time: Press the left arrow until the cursor is at the first character entry for the Feed Time, and use the up or down arrow to select the number or punctuation you want.

Step 3. Press the right arrow to move the cursor one place to the right, and repeat the above process until you have entered all the numbers for your Feed Time value. In our example we selected 30 seconds.

Step 4. Press Enter to save the entry and return to the RateCal Menu.

NOTE *Make sure you have enough material to do a Rate Cal at the highest OP%. If, for example, 30 seconds at 90% would empty the hopper, reduce the Rate Cal to a lower rate.*

RateCal Percents

RateCal Percents sets the output percentage for the three cal types.

- For the 2 pt Cal Type (%Lo & % Hi), make sure that the Hi % is higher than the Lo % and that there is a separation of at least 10%. You enter Pt2 and Pt4.
- For the 5 pt Cal Type (Pt1, Pt2, Pt3, Pt4, Pt5), you select only Pt1,the first RateCal percentage, and the HI 4060 will select the remaining percentages, which are read only and cannot be changed except by changing the first output value.
- For the Advanced Cal Type, you need to know the flow rates for two output percentage setpoints. You enter the output percentages and the known flow rates and the instrument does the rest.

Range: 0-100

RateCal Percents from the Web Page

Use the seven rate calibration pairs of output percent and output rate to set the initial output percent when the unit starts. The zero output rate is fixed at 0.0, and the "max output percent" is fixed at 100%. You can edit the other parameters.

	Output percent	Cal Rate (lb/m)
Zero output	0	0
5 Point Calibration point 1	20	200.000
5 Point Calibration Point 2, or 2 point cal Low rate	40	400.000
5 Point Calibration point 3	60	600.000
5 Point Calibration point 4, or 2 point cal High rate	80	800.000
5 Point Calibration point 5	100	1000.000
Max rate	100	1000.000

You can change the values in the highlighted OP% (and/or Cal Rate) fields. With 5 pt Cal Type, the OP% number for Pt 1 is highlighted. With 2 pt Cal Type, the OP% values for pt 2 and pt 4 are highlighted. With Advanced, both the OP% values for pt 2 and pt 4 and Cal Rates are highlighted .

Example: A calibration pair Output percent of 25% and a cal rate 250 means that a rate of 250 weight units per unit time will be obtained when the output percent is 25 %.

NOTE   *Internet Explorer is a registered trademark of the Microsoft Corporation*

RateCal Percents from the Front Panel

Step 1.   Select RateCal Percents and press Enter to display the RateCal Percents edit screen for the Cal Type you selected. For our example we selected 2pt Cal Type. Select the 2PtLo (OP2) and press Enter to open the 2PtLo (OP2) edit page.

```
0.000                    0.000                    0.000
RateCal                  RateCal Percents         2PtLo %(OP2)
> RateCal Percents  →    > 2PtLo %(OP2)  →   40                      40
  Prime Time        0      2PtHi %(OP4)     60                      60
           EXIT   CLR              EXIT   CLR           EXIT   CLR
```

Step 2.   Press the right arrow to position the cursor and the up or down arrow to change the number. Repeat the process until you have entered all the numbers for your 2PtLo %(OP2) value. Our example shows 40 percent.

Step 3.   Press Enter to save the entry and return to the RateCal Menu.

Step 4.   Use the down arrow to select 2PtHi %(OP4) and press Enter to display the 2PtHi %(OP4) edit page.

```
0.000                    0.000
RateCal Percents         2PtHi %(OP4)
> 2PtHi %(OP4)  →   60                      60
  2PtLo %(OP2)     40
           EXIT   CLR           EXIT   CLR
```
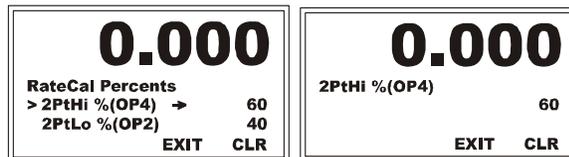
Step 5. To change the 2PtHi %(OP4) value, use the left or right arrow to position the cursor and the up or down arrow to change the number or punctuation. Our example shows 60 percent.

Step 6. Press Enter to save the entry and return to the RateCal Menu.

Running Rate Cal

The Auto Rate Cal will prime the system, then run for the selected feed time based on the calibration type, pause time, and RateCal Percents you selected. In each case, the display will show the flow rates for five output percentage points plus the MIN and MAX OP% rates to give you the calibration performance curve.

- For the 2 pt Cal Type (Pt2 and Pt4) the two flow rates for the percentages you selected are the actual flow rates. The instrument calculates the remaining three flow rates .
- For the 5 pt Cal Type, where you provide Pt1, the first RateCal percentage, the display will show the actual flow rates for 5 output percentage points between the Low and High output percentages.
- For the Advanced Cal Type, where you provide known flow rates for two output percentage setpoints (Pt2 and Pt4) and the output percentages, the HI 4060 calculates the remaining three output percentage points. The feeder does not operate during this process.

Running Rate Cal from the Web interface

Step 1. In the Feed Time field, enter the amount of time you want for each feed run.

Feed time (sec) | 20

Step 2. Click the Do Rate Calibration button.

The result depends on the Cal Type you selected. With five-point, the instrument cycles through each of the OP% listed for the 5 pt calibration. With two-point, it cycles through each of the OP% listed for the 2 pt calibration.

As the calculation runs, the instrument will cycle through the feed time and display the OP% RCAL percent remaining below the STOP button at the base of the form. (e.g. 80%, 50%, 40%, 30%, 20%). 80% represents the point 5 OP %, which is the first stage of the cycle.

State: RCAL OP: 80%

The new values will appear in the display.

	Output percent	Cal Rate (lb/m)
Zero output	0	0
5 Point Calibration point 1	20	200.000
5 Point Calibration Point 2, or 2 point cal Low rate	40	400.000
5 Point Calibration point 3	60	600.000
5 Point Calibration point 4, or 2 point cal High rate	80	800.000
5 Point Calibration point 5	100	1000.000
Max rate	100	1000.000

Running Rate Cal from the Front Panel

Step 1.   From the Rate Cal menu, use the down arrow to select Do Auto Rate Cal, then press Enter to display the Do Auto Rate Cal form.

Step 2.   To start the Auto RateCal press the Start button.

0.000	0.000	0.000
RateCal > Do Auto Rate Cal ➜ RateCal Results EXIT CLR	Do Auto RateCal? Start CLR	**Running RateCal** Exit CLR

Step 3.   After the display says RCAL, you are exited to the main display screen.

Reading RateCal Results

Step 1.   To read the results of the Rate Cal, use the down arrow to select RateCal Results and Press Enter to display the Rate Cal menu listing the OP stages

Step 2.   Select an OP stage number and press Enter to view the Rate and units.

0.000	0.000	0.000
RateCal > RateCal Results ➜ PID P 5 EXIT CLR	RateCal Results > OP1 23 Rate ➜ 0.204 OP2 30 Rate 0.408 EXIT CLR	OP1 23 Rate 0.204 lb/m EXIT CLR
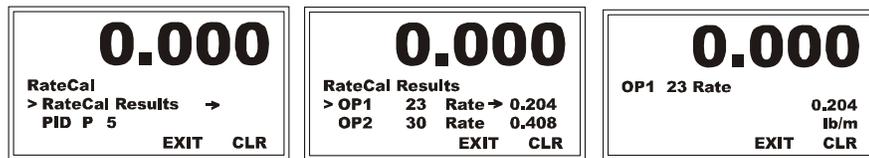
Step 3.   Press Exit to return to the RateCal Results menu.

Step 4.   You can continue to read the results for all 5 points on the curve.

Step 5.   Select OP 100%, and press Enter to see the read-only details.

0.000	0.000
RateCal Results > Op100% (Max Rate)➜ 2.4 Min % 16 EXIT CLR	Op100% (Max Rate) 2.406 lb/m EXIT CLR
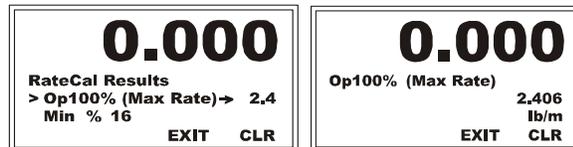
Step 6.   Press Exit until you return to the Ingredients sub-menu.

Refills

Refilling during calibration

If you need to refill the feeder hopper to complete a rate calibration, you can do this during the pause between cycles.

Step 1.   After one cycle the instrument will pause and the OP% goes to 0%.

Step 2.   Click the STOP button.

Step 3.   The RCAL changes to RHOLD.

Step 4.   Complete your refill at this time.

Step 5.   Click on the Do Rate Calibration button and the Calibration process begins again.
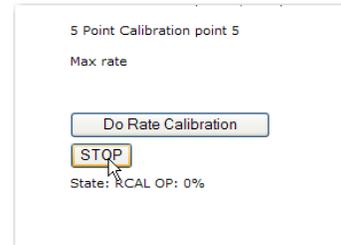
Auto Refills

Automatic refill uses user selectable refill points to start and stop the refill process without interrupting the feed process. HI and LO alarms to detect a refill failure. Manual Refill allows for manual refill at any time.

Configuring Auto Refill from the Web page

Set Auto Refill to YES on the Configuration - Refill page.
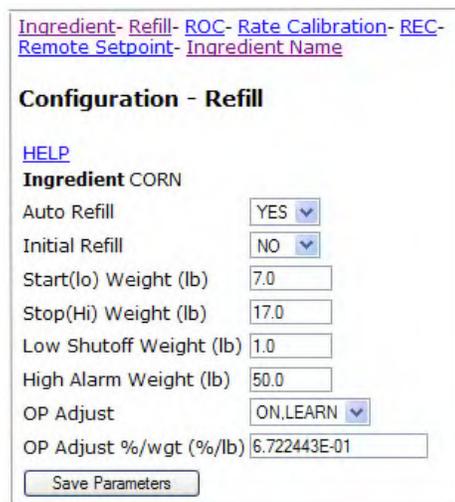
Configuring Auto Refill from the front panel

Step 1.   Use the down arrow to select Auto Refill. The left / right arrows toggle from Yes to No.
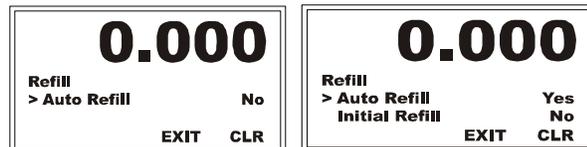
Step 2.   To Select Auto Refill select Yes. The Initial Refill parameter appears.

Initial Refill

Initial Refill ensures that the filler contains enough material to safely begin operation. It can help to decrease the number of refills during a run. Review how the initial refill works before you make this selection.

After selecting Initial Refill, when you press the start button the feeder starts to run, and the instrument checks to see if the material in the hopper is below the HI Setpoint weight. If it is, the instrument fills the hopper until the HI Weight Setpoint is reached..

Range YES or NO (default NO)

NOTE   *If Initial Refill is on with Auto Refill off, Initial Refill still activates the refill relay and fills the hopper to the stop high amount. If you wish to prevent this, turn off Initial Refill when you turn off Auto Refill.*

Configuring Initial Refill from the Web interface

From the Initial Refill pull-down list, select YES or NO. You must click Save Parameters to save any value set from this form.
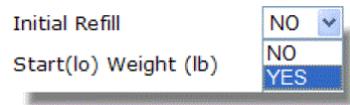
Configuring Initial Refill from the front panel

Step 1.   From the Ingredient menu, use the down arrow to select Refill and press Enter.

Step 2.   Use the down arrow to select Initial Refill.

Step 3.   Use the right or left arrow to use (YES) or not use (NO) this function and Press Enter to save. Initial Refill begins when you press the Start button.

Refill Start (lo) and Stop (hi)

The Start (lo), which is set in mass units (actual weight), triggers a signal to begin the refill process. You need to determine when you want the refill to automatically begin (or an alarm to trigger so an operator can refill the feeder). The Start (lo) value must be higher than the

Lo Shutoff value. Stop(Hi) signals when the weight in a hopper goes above the high setpoint.

Range Lo >0.0 (default 10.0) . . **Range Hi** >0.0 (default 110.0)

Configuring Start (Lo) Stop (Hi) from the Web interface

Enter the low and high values in the named fields. You must click Save Parameters to save any value set from this form.

Start(lo) Weight (lb)	15.00
Stop(Hi) Weight (lb)	32.00

Configuring Start (Lo) and Stop (Hi) from the front panel

To set the weights you want to trigger the start and stop refill signals.

Step 1.   From the Refill menu, use the down arrow to select Start (lo), and press Enter to open the Start (lo) edit page.
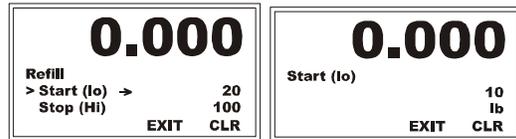
> **0.000**
> Refill
> > Start (lo)   →   20
>   Stop (Hi)   100
>   EXIT   CLR

> **0.000**
> Start (lo)
>   10
>   lb
>   EXIT   CLR

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

Step 3.   When you have selected all the values, press Enter to save the Start Lo value. Our example shows 10 pounds.

Step 4.   Press Enter to save the entry and return to the Refills sub-menu.

Step 5.   Use the same procedure to set the Stop (Hi) weight that, when reached, will signal to stop the refill process.

Low Shutoff and High Alarm Weight

The Low Shutoff setting stops the process when there is insufficient or no material in the hopper. This setting can be 0 weight indicating nothing in the hopper or a weight setting somewhat above the 0 weight and the Start (lo) value. The Low Shutoff value must be below the Start (lo) value. The weight you enter for High Alarm will trigger an alarm should the flow rate go above this value while refilling.

Low Shutoff Range >0 (default 0)

High Alarm Range >0 (default none)

Configuring HI Alarm from the front panel

Step 1.   From the Refill submenu, use the down arrow to select Hi Alarm, and press Enter to display the HI Alarm edit page.

> **0.000**
> Refill
> > Hi Alarm   →   110
>   Op Adjust   OFF
>   EXIT   CLR

> **0.000**
> Hi Alarm
>   120
>   lb
>   EXIT   CLR

Step 2.   To enter the weight you want to trigger an alarm should the flow rate go above this value while refilling, use the right or left arrow to move the cursor and the upor down arrow to change the value.

Step 3.   Repeat the process until you have entered all the numbers or punctuation for your High Alarm value. Our example shows 120 lbs. Press Enter to save.

Step 4.   In the Low Shutoff Weight field, use the same process to enter the weight at which you want to stop the flow should the flow rate go below this value while refilling.

Step 5.   Press Enter to save the entry.

OP Adjust %/wgt

OP (Output Percentage) Adjust % per unit of wgt. The weight of an ingredient in a hopper can affect the rate of feed. For example, a liquid at the base of a full hopper is under greater pressure than a liquid at the base of a near empty hopper. If no adjustment is made, the liquid flows out faster when the hopper is full than when it is low. When the OP Adjust parameter is ON (i.e., not set to OFF), the OP Adjust %/wgt value will adjust the refill rate to compensate for any change in weight of the ingredient in the hopper. OP Adjust On Learn is used to calculate this value.

Range: -100 to +100 up to six decimal places   (Default 0.0)

OP Adjust %/wgtfrom the front panel

Step 1.   OP Adjust %/wgt is described above. Select it with the down arrow.

0.000	**0.000**
Refill	OP Adjust %/wgt
> OP Adjust %/wgt ➔ 9.9	
Auto Refill YES	0.000000E.00
EXIT CLR	EXIT CLR

Step 2.   Press Enter to display the OP Adjust %/wgt edit form.

Step 3.   Use the right or left arrow to move the cursor and the up or down arrow to change the value.

Step 4.   Repeat the process until you have entered all the numbers or punctuation for your OP Adjust %/wgt value. Our example shows a typical calculated value in a machine-readable format.

Step 5.   Press Enter to save and return to the Refill Menu.

Step 6.   Pressing the Exit button returns to the Ingredient Sub-Menu.

OP Adjust and OP Adjust %/wgt during refill

OP = Output Percentage. If you use OP Adjust, it uses the OP Adjust %/wgt value to allocate the refill. There are thee options:

  OFF: (default) Turns off the function.

ON-LEARN: (works only with Auto Refill) The HI 4060 saves the % output and change in weight values from previous refills and continuously calculates the optimal Output % based on these values. This allows the instrument to adjust as conditions and the material or refill characteristics change over time.

ON-FIXED: With Auto Refill, you can use ON-FIXED to either lock in an effective learned value or enter a noted value that has worked well on previous applications.

Configuring OP Adjust and OP Adjust %/wgt from the Web interface

Select one of the three options (explained above) from the OP Adjust pull-down. You must click Save Parameters to save any value set from this form.

Configuring OP Adjust and OP Adjust %/wgt from the front panel

Step 1. From the Refill menu, select OP Adjust. The left and right arrows toggle between ON,LEARN, ON, FIXED and OFF, which are described above.

Remote Setpoint

The standard Remote (Rate) Setpoint can be set up as 0-5 VDC, 0-10 VDC, 0-20 mA or 4-20 mA. We will refer to these as the "signals." A signal can come from a variety of Host Controllers (PLC, computer, a flow meter, etc.). The Remote Setpoint function gets its input from an Analog I/O Card installed in the HI 4060.

Ingredient #1 is the Master ingredient where the actual flow is measured and transmitted. Other ingredients may be Slave ingredients with flow rates that are proportional to the flow rate of Ingredient #1. For example, if ingredient #1's flow rate is 10 gallons/minute and ingredient #2 must be fed at 10% of the flow rate of ingredient #1; ingredient #2 must be fed at a flow rate of 1 gallon/minute (a 10/1 ratio). To maintain a flow rate for ingredient

#2 that is 10% of Ingredient #1, the HI 4060 uses the flow rate signal for ingredient #1 to adjust its output signal to the feeder motor for ingredient #2. Even if ingredient #1's flow rate varies, the rate controller must maintain the 10% proportional feed rate.

SP HI/LO wgt/time

When configuring, the user can scale the input signal by entering flow rates that are represented by the Low and Hi inputs. This allows tight rate scaling for precise control. Noise can be d out by selecting from an averaging range of 1-20.

The SP HI wgt/time setting is the input signal referenced as the maximum rate setpoint, depending on the signal range selected, and the SP LO wgt/time setting is the minimum signal input to be referenced as the minimum rate setpoint depending on the signal range selected (i.e., 0-20 milliamps, 4-20 milliamps, 0-5 volts, 0-10 volts). The SP HI wgt/time setting corresponds to 20 milliamps or 5 or 10 volts input. For example, if you set the SP HI to be 100 lbs/min at the max input of 20 milliamps and 5 or 10 VDC, the controller will

request 100 lbs/min (assuming that the feeder can achieve that rate).

The SP LO wgt/time setting corresponds to 0 milliamps or 0 volts input; so if you want the min rate to be 0.00 lbs/min, the min input needs to be 0 milliamps 0VDC. Your minimum rate may not be zero. You may set the lowest rate for the application by raising the SP LO to reflect the minimum ratio.

Range: 0-99999 (default High 100.0 Low 0.0)

Configuring the Remote Setpoint from the Web interface

Step 1. To open the Configuration- Remote Setpoint form from any form in the Configuration - Ingredient series, click the Remote Setpoint link (top of form) or the green right arrow (base of form).

Step 2. In the SP HI weight/time (lb/m) field, enter the High Setpoint for this ingredient. Our example uses 100 lb/m.

Step 3. In the SP LO weight/time (lb/m) field, enter the Low Setpoint for the ingredient. Our example uses 0.000 lb/m.

Configuring the Remote Setpoint from the front panel

Step 1. To open the Remote Setpoint menu, select Remote Setpoint from the Ingredient menu and press Enter.

Step 2. Select SP HI wgt/ time and press Enter to open the SP HI wgt/ timeedit page.

Step 3. Use the left or right arrow to position the cursor and the up or down arrow to change the number or punctuation. Repeat the process until you have entered all the numbers for your SP HI wgt/time value. Our example shows 80 lbs/min.

Step 4.   Select SP LO wgt/time from the Remote Setpoint menu, then press Enter to open the edit page.

0.000
Remote Setpoint
> SP LO wgt/time   →   0.000
   Input HI%   100
                  EXIT   CLR

0.000
SP LO wgt/time   0.0
                      lbs/min
                  EXIT CLR

Step 5.   Use the left or right arrow to position the cursor and the up or down arrow to change the number or punctuation for your SP HI wgt/time value. Our example shows 80 lbs/min. In our example we selected 0.000 lbs/min. Setting the Setpoint LO to 0.0 provides a ratio of 00% to 80% of the master flow rate.

Input HI% and Input LO%

The HI 4060 Input HI% parameter allows the operator to quickly change the input signal in order to reduce the flow rate, without changing the HI and LO Output Signal parameters. The master flow rate and the slaves can have the same SP HI and SP LO parameter settings. By setting percentage you can control the ratio.

For Example: The master and this slaves HI output signal setting are 10.00 lbs/min. The slave feed rate required is only 9 lbs/min. You can set this slave Input HI Percentage at 90% and the HI 4060 recalculates the feeder rate to 0 to 9 lbs/min. If the process requires a maximum 5.7 lbs/min, set the percentage for 57%, 6.3 lbs/min, set the percentage for 63%, etc. Your rates probably will not be an even percentage as our example, but a percentage of the HI and LO SP rates can be use for the control, rather than differing SP HI and SP LO setting from controller to controller.

The HI 4060 Input LO% parameter allows the operator to quickly change the input signal in order to meet the new flow rate without changing the LO or HI SP Output Signal.

Range: 0-100 (default High 100.0 Low 0.0)

Configuring the Input HI and Input LO from the Web interface

Step 1.   For Input HI %, enter the High Output Percentage to maintain the SP HI setpoint. Our example uses 100%.

Input HI% (5.00 V)   100.000

Input LO% (0.00 V)   0.000

Step 2.   For Input LO%, enter the Low Output Percentage to maintain the SP LO setpoint. Our example uses 0.000 percent.

Configuring the Input HI and Input LO from the front panel

Step 1.   Select Remote Setpoint on the Ingredient menu. Press Enter to open the Remote Setpoint menu. Select Input HI% and press Enter to open the Input HI% edit form.
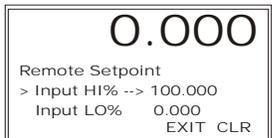
0.000
Ingredient
> Remote Setpoint -->
   Help
                  EXIT CLR

0.000
Remote Setpoint
> Input HI% --> 100.000
   Input LO%   0.000
                  EXIT CLR

0.000
Input HI %
                           90
                  EXIT   CLR

Step 2.   Use the left or right arrow to position the cursor and the up or down arrow to change the number or punctuation for your Input HI% value. Our example shows 90 percent.

Step 3.   Press Enter to return to the Remote Setpoint menu and select Input LO% and press Enter to open the Input LO% edit form.

Step 4.   Use the left or right arrow to position the cursor and the up or down arrow to change the number or punctuation for your Input LO% value.

Our example shows 0.0 percent. Setting the LO rate to zero provides a ratio of 90% of the master flow.

Remote Average

This is the number of samples for the I/O card to average when determining a value. The averaging parameter is most often set when using any device that outputs an erratic signal (e.g. a flow meter). The averaging function takes a number of input (voltage or amperage) readings and averages the input signal to improve stability. However, this improvement comes at the expense of response time. A setting of one average takes 100 milliseconds. A setting of 100 averages takes 1 second. The averaging function is a running average, where the input signals are totaled and the total is divided by the number of set averages (1-200). The Default setting is 20. The instrument reads one new signal plus the last 99 signals and repeats the averaging process again.

For example, with a setting of 20 the instrument reads 20 of the most current input signals (amps or voltages), totals the signals, divides by 20, drops down one, reads one new signal along with 19 of the old readings, totals the signals, divides by 20, drops down one, etc.

Range: 0-200 (default 20)

NOTE   *When setting averaging parameters, set the smallest value that provides stable set point readings.*

Remote SP Window:

If the value of a newly calculated remote setpoint differs from the current setpoint by less than this parameter the setpoint value will be set to a heavily averaged value of the analog input. This parameter may be used to keep the setpoint from fluctuating from noise on the analog input.

On the 4060 display:

Step 1.   In the Ingredient menu, use the Down arrow to select the Remote Setpoint and press Enter. Use the Down arrow to Remote SP Window and press enter.

Step 2.   To enter the number in the display of HI 4060, use CLR to clear the current entry and position the cursor on the first value to change, and use the up or down arrow to scroll to the value.

Step 3.   Use the left arrow to move the cursor to the next position, and repeat the process above until you have entered all the digits for your value.

Step 4.   Press Enter to save.

On the Web Page:

Enter the value in the text box provided in the Ingredient>Remote Setpoint menu.

NOTE   *For further questions, please see Chapter 7, Operations: Setting Remote Set Points Analog Input Range Parameter*

The Range parameter selects the input that matches the analog device connected to the analog card on the HI 4060.

Value Range: 0-5 V, 0-10 V, 0-20 Milliamps, 0-24 Milliamps (default 0-5 V)

Remote Setpoint (SP) Enable

In order to use the Remote Setpoint you have to enable it. This parameter enables you to send signals to the Analog card on the HI 4060.

Range: YES/NO (default NO)

Remote Average, Range, and Remote Setpoint (SP) Enable from the Web interface

Step 1.   In the Remote AVG field, enter the number of samples to average when calculating a value for this ingredient.

Step 2.   On the Analog Input range pull-down menu, select the Input Range that matches the Analog input to the HI 4060 I/O Card.

Step 3.   Our example shows 0-20 Milliamps range.

Step 4.   On the Remote SP Enable pull-down list, click YES to enable or NO to disable Remote SP function.
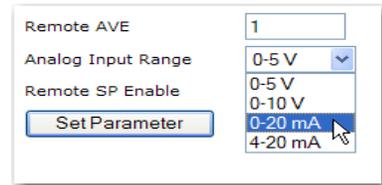
NOTE   *You must select YES if you want to use the Remote SP Function.*

Step 5.   Click on the Set Parameter button to save the settings.

Remote Average, Range, and Remote Setpoint (SP) Enable from the front panel

Step 1.   Select Remote Setpoint on the Ingredient menu to open the Remote Setpoint menu; then select Remote AVG and press Enter to open the Remote AVE edit form.
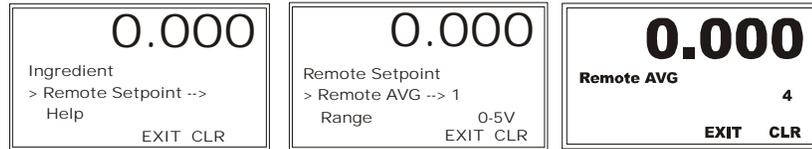
0.000	0.000	0.000

Ingredient
> Remote Setpoint -->
  Help
         EXIT CLR
	Remote Setpoint
	> Remote AVG --> 1
	  Range **0-5V**
	         EXIT CLR
		Remote AVG
		                    4
		
		         EXIT CLR

Step 2.   Use the left or right arrow to position the cursor and the up or down arrow to change the number or punctuation for your Remote AVE value. Our example shows 4.

Configuring REC Parameters

REC Level %

The REC Level % (RECPERCENT or REC LEVEL% parameter) is a percentage of Max Rate. It is the level of error above or below the Setpoint Rate that you can accept before the instrument goes into REC mode. For example: If the rate calibration Max Rate is 5.0

lb/min, and the REC level % is 20%, the allowable deviation is 1.0 lb/min from the Rate Setpoint before a Rate Exception error occurs.

Range: 0-100 (default 20%. However, this allows for a very large error. We recommend a setting between 5% and 10% and allowing a RE+ or RE- indication about every five min.)

REC Time

The time the unit must remain in the REC mode to get an alarm condition or if the Shutdown parameter is selected to shutdown the operation.

Range: 0-999 (default 10)

REC Shutdown Parameter

The REC Shutdown enables you to shutdown your operation if the system operates in REC mode beyond the time limit set in REC Time. If you select YES for REC Shutdown and the RE error goes beyond the REC Time, the HI 4060 shuts the system down. If you select NO, once the deviation goes beyond the REC Time, the system only displays an alarm.

Range: NO/YES (default NO)

Configuring Rate Exception Control (REC) from the Web interface

Step 1. To open the REC page from any form in the Configuration - Ingredient series, click the REC link at the top of the page or the green right arrow at the bottom of the page.

Step 2. In the REC Level % field, set the Max deviation your process can tolerate from the Setpoint Rate for this ingredient. Our example shows 20.0%.

Step 3. In the REC Time (sec) field, enter the amount time you want the deviation to occur before an REC alarm occurs. Our example shows 30 seconds.

Step 4. Select YES or NO for REC Shutdown.

Step 5. Click Save Parameters to save your changes.

Configuring Rate Exception Control (REC) from the Front Panel

Step 1. Select REC on the Ingredient menu and press Enter to open the REC menu; then select REC Level % and press Enter to open the REC Level % edit form.

```
      0.000           0.000              0.000
Ingredient       REC                REC Level%
> REC -->        > REC Level% --> 20.0            10
  Remote Setpoint   REC Time 30
          EXIT  CLR            EXIT  CLR              EXIT    CLR
```

Step 2. Use the left or right arrow to position the cursor and the up or down arrow to change the number or punctuation. Our example shows 10 % for REC Level %.

Step 3. Press Enter to save the entry and return to the REC menu.

Step 4. Select REC Time; then press Enter to display the REC Time edit page.
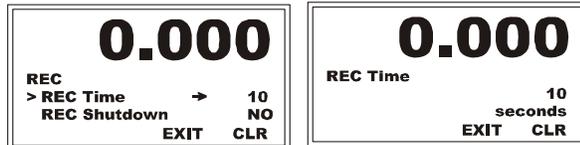
```
      0.000              0.000
REC                  REC Time
> REC Time       ➜   10            10
  REC Shutdown       NO          seconds
          EXIT   CLR          EXIT   CLR
```

Step 5. Use the left or right arrow to position the cursor and the up or down arrow to change the number. Repeat the process until you have entered all the numbers for your REC Time value; then press Enter to save the entry and return to the REC menu. Our example shows10 seconds.

Step 6. From the REC menu, use the down arrow to select REC Shutdown.

```
      0.000              0.000
REC                  REC
> REC Shutdown   ➜   YES        > REC Shutdown   ➜   NO
  REC Level %        40.0          REC Level %        40.0
          EXIT   CLR          EXIT   CLR
```
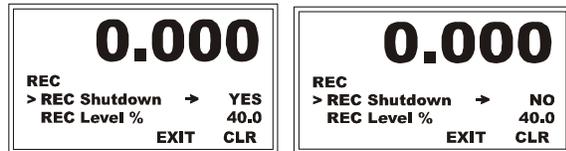
Step 7. Press the right or left arrow to toggle between Yes and No.

Step 8. Press Enter to save the entry, and use Exit to return to the Ingredient menu.

Ingredient Configuration

Each ingredient is configured with a name, rate setpoint, preact and other parameters to deliver the exact amount of material for your process, whether you are working in batch or continuous mode. You can configure and store more than 100 ingredient names from either the front panel or the web interface.

Accessing the ingredients forms from the Web interface

On the HI 4060 Home Page click Configuration to open the Configuration menu and select Ingredient.
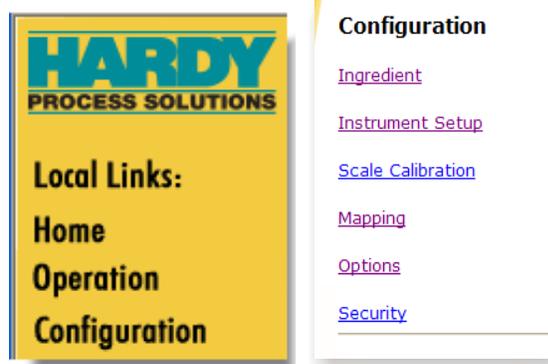
This will display the Configuration - Ingredient form set for the last selected ingredient.

Several parameters, e.g., ingredient name, unit (of measure), and time (set on the ROC page) are set from forms that are accessed via the links listed at the top of the page.

Ingredient Name

Before you can configure an ingredient, it must have a name in the database. However, you cannot select or create ingredient names from the Configure - Ingredient page. Click either the Ingredient Name link at the top of the page or the right arrow at the bottom of the page to open the Ingredient Name form.

Name of Parameter: INGRED
Range: 1-7 alphanumeric characters (default: none)

Before you configure your first ingredient name, the Configuration - Ingredient form and other forms accessed from that form, display a set of default values. After the first name has been configured, these forms will display the values for the last selected ingredient.

Selecting an ingredient to rename

Since the configuration file for that name inherits the existing values of the last selected ingredient, to simplify the task when you create a new ingredient, select an ingredient that is very close to the one you currently want to configure, enter a new name, and modify the inherited values as needed.

NOTE   *The ingredient name is a file name for the ingredient configuration file. You must enter DOS file names and follow what is called the 8.3 file naming convention. Make the name descriptive but brief because you have only seven characters. The characters you cannot use in a file name are: * / + | \ = ? [ ] ; : . < > ,*

Cloning and changing an ingredient from the Web interface

Step 1.   From the Other Ingredients pull-down list, click the name of the ingredient you want to use as a model for your default parameters. That name will appear in the Ingredient Filename box.

Step 2.   Type in the new name you want for this ingredient. Our example uses Cement.

Step 3.   Click Change file to save the new Filename with inherited values from the ingredient you first selected. To distinguish the new ingredient, you must change values, as appropriate on one or more of the other Ingredient configuration forms.
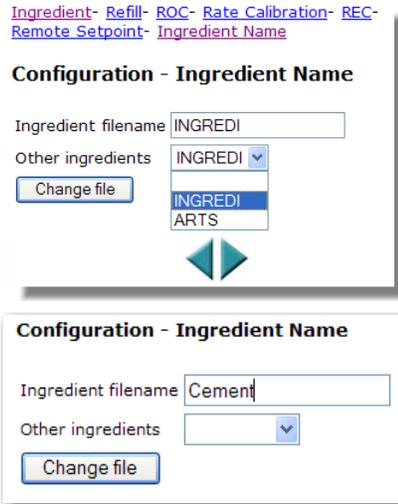
Cloning and changing an ingredient from the front panel

Step 1.   From the Configuration menu (top level), use the down arrow to select Ingredient and press Enter to open the Ingredient menu.

Step 2.   Use the down arrow, if necessary, to choose Select Ingredient and press Enter.

Step 3.   On the edit page, press the right or left arrow until the name of the ingredient you want to use as a model for your parameters appears.
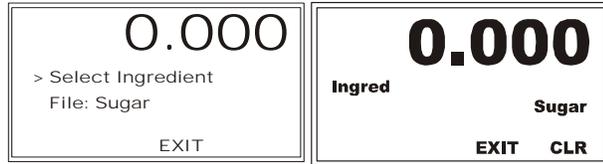
Step 4.   Our example uses Sugar, so our new ingredient name will inherit the values for sugar when the configuration screens are opened.

CAUTION   **When you enter the Ingredient sub-menu, unless you change the name of the ingredient, the new parameters will be written over the current ingredient parameters. To create a new ingredient you must change the current ingredient name.**

Step 5.   Press CLR to clear the current name and position the cursor for entering a new name; then enter the first character of the alphanumeric name for the new ingredient by using the up or down arrows to select the letter or number you want.

Step 6.   Press the right arrow once to move the cursor to the next character entry position, then use the up or down arrows to select the next letter or number. Repeat this process until you have entered all of up to seven total characters.

Step 7.   Press Enter to save the ingredient. The display returns to the Ingredient sub-menu with the new ingredient displayed.

Step 8.   To change the parameters for this ingredient, press the down arrow until the cursor is in front of the parameter(s) you want to change. To change to a higher level menu with this ingredient selected, press Exit.

Step 9.   When you finish changing parameters, press Exit to overwrite the inherited default parameters. The Ingredient name is not saved until you exit to the summary display.

NOTE   *When you save a configured ingredient, the HI 4060 creates an ingredient file that is stored in non-volatile memory on the SMM SD memory card.*

Setting Ingredient Values

After selecting an ingredient, as described above, we will next configure the ingredient. This section will explain how to configure the values from either the Web interface or the front panel.

Rate Setpoint Configuration

The Rate Setpoint is the ingredient target flow rate (Loss in or Gain Weight) you want to maintain for your process. Either medium or high security should be set for this menu so that non-authorized personnel cannot inadvertently change this parameter.

CAUTION	**Changing the Rate Setpoint changes the currently loaded ingredient setup.**

From the Web interface

After you select an ingredient as described above, the Configuration - Ingredient page will display the ingredient name. To change the Rate Setpoint for this ingredient, enter the value in the Rate Setpoint field (default 10). Our example shows 2.00 lb/m. To save changes on this page, click Save Parameters.

Ingredient- Refill- ROC- Rate Calibration- REC- Remote Setpoint- Ingredient Name

Configuration - Ingredient

HELP
See Warnings
Ingredient   TECWEIGH
Rate Setpoint (lb/m) 2.120
Mode   CONTINUOUS
Batch Amount (lb)   4.00
Batch Preact (lb)   0.00
Alarm Delay (secs)   5
Hi Shutoff (lb/m)   5.000
Lo Shutoff (lb/m)   0.500
Shutoff Out%   0.0
Wait Time(secs)   2
Total   383.2 lb   Clear Total
Save Parameters

From the Front Panel

Step 1.   From the Configuration or Ingredient menu, select Rate Setpoint and press Enter.

0.000
Ingredient
> Rate Setpoint → 10.0
  Mode
                EXIT   CLR

0.000
Rate Setpoint
                     10.0
                     lb/m
              EXIT   CLR

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

Step 3.   When you have selected all the values for rate setpoint, press Enter.

Selecting Mode

You can operate either in continuous or batch mode depending on the process.

Range continuous/batch (default continuous)

From the Web interface

Select the mode from the Mode pull-down list. To save changes, click Save Parameters. Our example shows CONTINUOUS.

Configuration - Ingredient

HELP

Rate Setpoint (lb/m) 2.000

Mode CONTINUOUS

CONTINUOUS
BATCH

Batch Amount (lb)

Batch Preact (lb) 0.000

Alarm Delay (secs) 10

From the front panel

Step 1. Select Mode from the Ingredient menu.

Step 2. Press the left or right arrow to toggle the mode, and press Enter to save.

Step 3. If you select Continuous mode, saving the setting takes you directly to the Totals Menu.

0.000

Ingredient
> Mode   Batch
   Batch
                    EXIT   CLR

Batch (Amount and Preact)

If there are values for Batch Amount and Batch Preact in continuous mode, the HI 4060 ignores these parameters. But if you select Batch mode, you must enter these parameters. The Batch Amount sets the amount of ingredient in weight units used per batch for the selected ingredient. The preact value is the difference between the batch amount and when you stop feeding. In some cases the feeders coast to a stop so the preact should be set accordingly so that the batch amount is reached when the feeder comes to a complete stop.

Batch Amount Range >0.0 (default 0.0)

Batch Preact Range >0.0 (default 0.0)

   It is not necessary to enter 0.00 for these parameters)

From the Web interface

In Batch mode, enter the batch amount for this ingredient in the Batch Amount field. (Our example shows 4.54 kg.), and enter the Batch Preact value for this ingredient in the Batch Preact field. To save changes on this page, click Save Parameters.

Mode   BATCH

Batch Amount
(kg)   4.54

Batch Preact (kg) 0.00

From the front panel

Step 1. Select Batch with the down arrow and press Enter to display the Batch menu.

Step 2. Select Batch Amount with the down arrow and press Enter to display the Batch Amount edit form.

```
  0.000                0.000                0.000
Ingredient            Batch                Batch Amount
> Batch  →            > Batch Amount  →     20                       20.0
  Totals                Preact                                         lb
          EXIT   CLR              EXIT   CLR              EXIT   CLR
```

Step 3. Use the left or right arrow to position the cursor and the up or down arrow to change the value.

Step 4. When you have selected all the values for your Batch Amount, press Enter to save the entry and return to the Batch sub-menu.

Step 5. Use the down arrow to select Preact and press Enter to open the Preact edit page.

```
  0.000                0.000
Batch                Preact
> Preact  → 0                             18.0
  Batch Amount  20                          lb
          EXIT   CLR              EXIT   CLR
```

Step 6. Use the left or right arrow to position the cursor and the up or down arrow to change the value.

Step 7. When you have selected all the values for your preact amount, press Enter to save the entry and return to the Batch sub-menu.

Alarm Delay

The Alarm Delay is the amount of time you want the instrument to delay before setting off either a HI shutoff or LO shutoff alarm after detecting a flow rate that is out of tolerance. This avoids nuisance alarms and gives the system time to clear a problem.

If a product is easily liquefied, set a very short delay to prevent large spills. If a product tends to plug or bridge set a longer delay.

Alarm Delay Range >0.0 (default 10.0sec.)

From the front panel

Step 1. From the Configuration menu, use the down arrow and press Enter to select Rate Tolerance. Use the Rate Tolerance menu to set the Alarm parameters: The Alarm Delay and the HI and LO shutoff alarm values notify you of unacceptable rates of flow. When you change the setpoint rate, the alarm tolerance bands follow the new setpoint automatically.

Step 2. Use the down arrow to select Alarm Delay, and press Enter to open the Alarm Delay edit page.

Step 3. Use the left or right arrow to position the cursor and the up or down arrow to change the value.

Step 4. When you have selected all the values for rate setpoint, press Enter to save the entry and return to the Rate Tolerance sub-menu, and use Exit to return to the Ingredient Menu.

Alarm Delay From the Web interface

In the Alarm Delay field, enter the delay in seconds you want before the instrument signals an alarm condition. To save changes on this page, click Save Parameters.

Rate Tolerance / Hi and Lo Shutoff

If the ACT flow rate is above the setpoint beyond the alarm delay time, the Hi and Lo Shutoff alarms can be configured to signal an alarm condition that can either shut the process down or lower the output to a set percentage (See Shutoff % Out below).

NOTE   *The Lo Shutoff alarm value must be ≤ the lowest set point value.*

HI Shutoff Range undefined (default 100)

Lo Shutoff Range undefined (default 0.0)

From the Web interface

In the Hi Shutoff field enter the high shutoff value you want, and in the Lo Shutoff field enter the low shutoff value you want. To save changes, click Save Parameters.
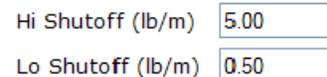
From the front panel

Step 1. From the Ingredient menu, use the down arrow and Enter to select Rate Tolerance; then from the Rate Tolerance submenu, use the down arrow to select Hi Shutoff, and press Enter to open the Hi Shutoff edit form.
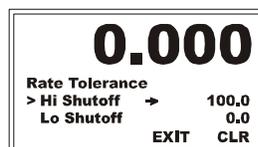
Step 2. Use the left or right arrow to position the cursor and the up or down arrow to change the value.

Step 3. When you have selected all the values for rate setpoint, press Enter to save and return to the Rate Tolerance menu. Our example shows 102.0 lb/m. for a setpoint of 100.00 lb/m.

Step 4. Use the same procedure to set the Lo Shutoff. Our example uses 98.0 lb/m assuming a setpoint of 100.00 lb/m.

Shutoff Out %

If the unit shuts down, the output percentage (OP) will be set to the value of the Shutoff Out % parameter. If your process must continue to operate, you can preset the percentage output so that the process does not completely shut down. If the flow rate goes outside the rate tolerance, the system goes into Rate Exception Control. The REC timer starts and, if the REC times out the system output goes to the preset Shutoff Out % until the system problem is corrected, clear the alarms and press the Start button again.

CAUTION **If you want the system to stop be sure to set the Shutoff Out % to 0.0. Otherwise the controller will go to a preset output and continue operating which may result in a malfunction of the system.**

Shutoff Out % Range 0.0> (default 0.0 You cannot set fractions of a second.)

From the Web interface

In the Shutoff Out % field enter the percentage. To save changes on this page, click Save Parameters.

From the front panel

Step 1. From the Rate Tolerance menu, use the down arrow to select Shutoff Out % and press Enter to open the Shutoff Output % edit form.

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

Step 3. When you have selected all the values for rate setpoint, press Enter to save and return to the Rate Tolerance sub-menu. (Exit returns to the Ingredient Sub-Menu.) Our example shows 10.0 %.
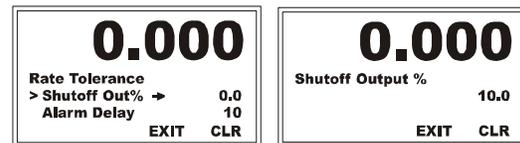
Wait Time

Wait Time is the time the controller waits for the material to settle before it calculates the batch total.

Wait Time Range 0 - >65,500 seconds (default 0.0 Very high values not recommended)

From the Web interface

Enter the wait time n the Wait Time field. To save changes on this page, click Save Parameters.

From the front panel

Step 1.   From the Ingredient menu, select Wait Time, then press Enter to display the Wait Time edit page.
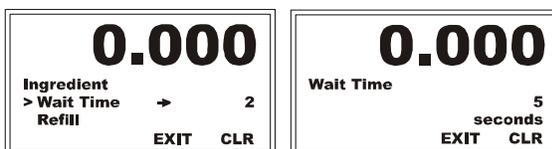
Step 2.   Use the left or right arrow to position the cursor and the up or down arrow to change the value.

Step 3.   When you have selected all the values for rate setpoint, press Enter to save and return to the Ingredient Menu. Our example shows 5 seconds.

Totals

The HI 4060 records the total amount dispensed. The Total number displays the amount of material that has been processed from the start of the process until the process completes or is interrupted. For error correction, the Total parameter can be cleared (in either continuous or batch modes) from the Web interface or changed from the front panel. For example, if a power failure shuts the system down during a process, before you resume operation you can re-enter the lost total from the front panel.

CAUTION   **If you change the total or batch total, stop the system.**

Total Range 0 - >99,999.0 wt units (default 0.0)

Batch Total (Front Panel only)

The Batch Total reads the total amount of material for the selected batch that has been processed from the start of a batch process until the batch process ends (by intent or other reason). When the Batch is complete, the Batch Total resets to 0.0 for the next batch. The Batch Total parameter can be changed from the front panel should there be an error in the batch total amount while processing. We recommend that you stop the system when changing this parameter.

Batch Total Range 0 - >99,999.0 wt units (default 0.0)

From the Web interface

You may view or clear the total for all batches from the Web interface.

Whether the HI 4060 is in Continuous or Batch mode, the Clear Total button will remove the total weight accumulated in a process and return the value to 0.00. To save the new parameters click the Save Parameters button.

Shutoff Out%	0.0
Wait Time(secs)	2
Total	0.0 kg [Clear Total]
[Save Parameters]	

You can clear the Total at anytime during the process even when the system is running.

Changing the total from the front panel

Changing this value is not normally recommended, but if you know the value is wrong and needs changing, start from the Ingredient Menu.

Step 1.   Select Totals and press Enter to display the Totals menu, then select Total and press Enter to display the Total edit screen.

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

Step 3.   When you have selected all the values for Total, press Enter to save and return to the Totals sub-menu. Our example shows 310.00 pounds.

Changing the Batch Total From the front panel

Changing this value is not normally recommended, but if you know the value is wrong and needs changing, start from the Totals Menu.
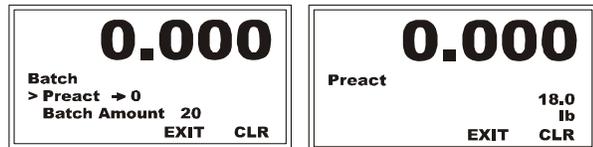
Step 1.   Select Batch with the down arrow and press Enter to display the Batch edit form.
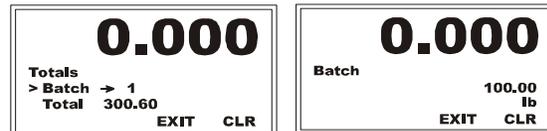
Step 2.   Use the right or left arrow to move position the cursor and the up or down arrow to select the value.

Step 3.   When you have selected all the values for Batch Total, press Enter to save and return to the Totals sub-menu. In our example we entered 100.00 pounds.

IP Setup Program (necessary for Blind HI-4060 Units)

The Netburner IP Setup program comes on the installation disk or it can be downloaded or run from the Hardy Process Solutions Web site (See *Software Downloads for your HI-4060* above). To run the program, you must be on the same network as the HI-4060 and your firewall must be set to allow the process.

When you run the Netburner IP Setup program from a network computer, it will find the HI-4060 and allow you to set its IP address.
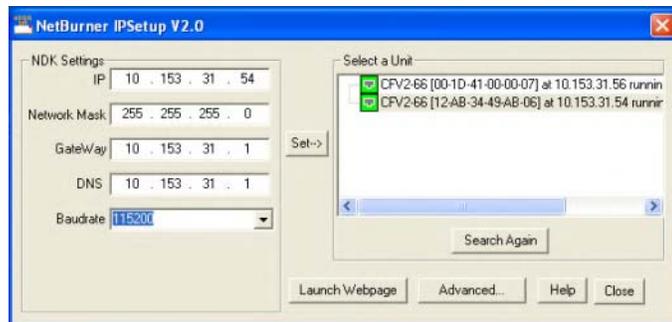
Chapter 5
Calibration

• • • • • •

Chapter 5 pertains to the calibration procedures for the HI 4060 Rate Controller. It is important that both users and service personnel know and follow the procedures contained in this chapter before installing or operating the HI 4060 Rate Controller. To ensure that the rates read by the controller are accurate, we recommend that the Rate Controller be re-calibrated periodically or when it has not been in use for extended periods of time. All calibration is done in the Gross mode.

Pre-Calibration Procedures

NOTE   **FOR NEW INSTALLATIONS**

It is recommended to install 80-100% of the load several times to exercise the scale. This settles the mounts and any piping prior to the final calibration.

Mechanical Check Procedures

Step 1.   Check to determine if the load cells have been installed properly. Refer to your load cell I&M manual for proper installation instructions.

Step 2.   On some load cells an arrow indicates the direction of the 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.

Step 3.   Check for binding on the load cell or other parts of the system. A load cell must be mounted so that 100% of the load (vessel + contents) pass through the load cell vertically.

Step 4.   Verify that nothing is binding the load cell or other parts of the weighing system. nothing should be draped over the scale/vessel or the load cell, such as a hose, electrical cord, tubes, or other objects.

Direction of applied load
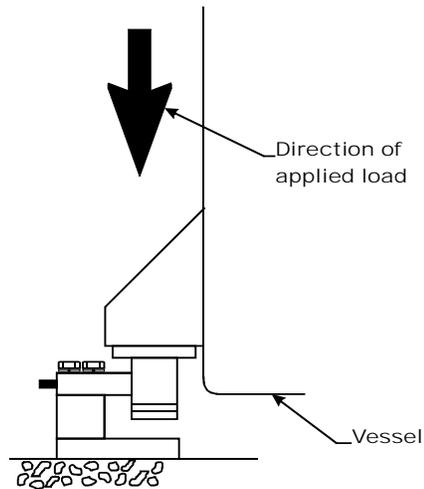
Vessel

Properly installed load cell/no binding

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.**

Step 5.   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

Step 1.   Check to see that there is power to the Rate Controller. If there is power, the front panel display should be lit, and if the display appears with a value, the unit is ready for calibration.

Step 2.   Typical Load Cell/Point Input/Output Measurements (EXC & SIG outputs)

- The HI 4060 Rate Controller is designed to supply 5 VDC excitation to as many as eight 350 ohm load cells/points.
- The expected output from each load cell/point depends on the mV/V rating of the load cell/point and weight. For example, a 2 mV/V load cell/point will respond with a maximum of 10 mVDC at the system's full weight capacity, which 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 be 10 mVDC at 1000 pounds, 7.5 mVDC at 750 pounds, 5 mVDC at 500 pounds and so on..

Millivolts/Weight Scale
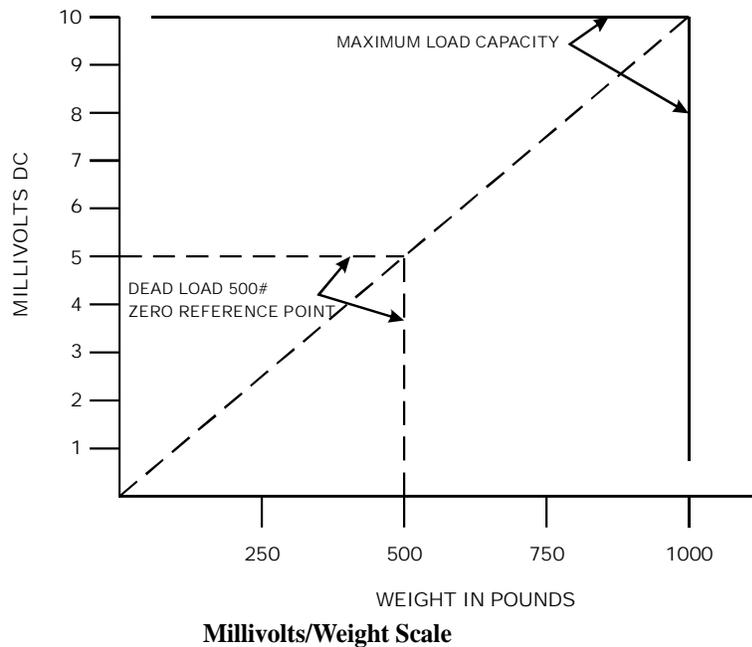
A zero reference point will vary on different systems depending on the "Dead Load" of the vessel. Dead Load is the weight of the vessel and appurtenances, with no product loaded. Our example assumes the dead load to be 500 lbs. In this example, the operating range for this scale is 5-10 mVDC with a 500 pound weight. After zeroing the instrument, the 0 reading refers to the zero reference point and not absolute 0 mVDC or absolute 0 weight.

NOTE   *Load cell/point measurements can be checked with a digital voltmeter at the J1 connector on the rear panel or at the summing box of the HI 4060 or use Integrated Technician if you are using the IT Junction Box.*

Step 3.   Allow the instrument to warm up for about 15 minutes before doing the calibration procedures.

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 reads 100 pounds and a 20 pound load is placed on the vessel or scale, the display should read 120 or some value over 100.
- If the display reads 80 pounds 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 or the load cells.

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

Calibration Procedures

NOTES   *When calibrating the HI 4060 for the first time, go from one sub-menu to the next in sequence.*

Any example settings are for illustration only. Your setting requirements will vary.

Make sure you have configured the instrument for your application. This includes setting the units, decimal point, scale capacity, averages etc. For instructions, please see Chapter 4, Configuration.

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 4060 Rate Controller. The HI 4060 reads the performance characteristics of each load sensor and detects the quantity of load sensors in the system.

Reference Weight is the total live load on the scale. The calibration process uses a reference point that can be entered from either the front panel or the Web page. The reference can be zero (no weight on the scale) or a known weight, such as a container, that will be on the scale. With no weight on the scale, the Reference Weight is 0.00. With 5 lbs on the scale, the Reference Weight is 5.00 lbs.

C2 Calibration Procedures From the Web page

Step 1.   Perform all of the pre-calibration procedures listed above.

Step 2.   Make sure you have configured the instrument for your application. This includes setting the units, decimal point, scale capacity, averages etc. For instructions please see Chapter 4, Configuration.

Step 3.   From the home page select Configuration to display the Configuration menu, then select Scale Calibration to open the Configuration - Scale Calibration page.

Step 4.   This step establishes the gross zero reference. Enter the reference weight for your application in the C2"Ref Weight" text field. Our example shows 0.000 lbs.

Step 5.   You can enter a gravity correction factor. (For Gravity Correction information see the section *About Gravity Correction* and the correction factor selection table later in this chapter.

Step 6.   Click on the "Do C2 Calibration" button.

Step 7.   The results will appear in a few seconds. If the Calibration succeeds, a Cal completed OK appears. If no load points are connected to the instrument, a Cal Failed: A to D Converter Error appears. To correct this error check the cable and connectors of the load point(s) and re-calibrate.
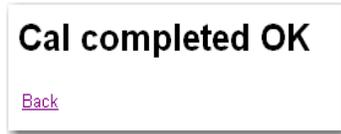
You will also see that the Load Sensor Number reads 0. If no C2 load points are connected to the instrument, a Cal Failed: No C2 sensors found appears. This requires a traditional instrument calibration or connect C2 load sensors to the instrument.
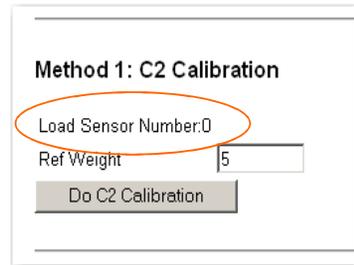
Step 8.   Click on "Back" to return to the Calibration page.

C2 Calibration Procedures From the Front Panel

Step 1.   From the Configuration Menu, select Calibration and press Enter to open the Calibration menu; then select C2 Cal and press Enter to open the C2 Cal menu with the cursor in front of Num C2.

Step 2.   Check the C2 Load Cell count. The read-only Num C2 lists the number of C2 load cells installed on the system that the instrument detected. Verify that the load cells detected match the number of C2 load cells actually installed.

Step 3.   If the load cells detected do not match the load cells installed in the system, verify that each load cell/point cable connection is securely fastened and in good condition. Also, on the HI 4060 web page the information concerning Operations/Diagnostics/C2 and Weight and Voltage can help you to determine which load cell/point is malfunctioning.

Step 4.   Select Ref Weight (Reference Weight) and press Enter to open the Ref Weight Menu edit screen.
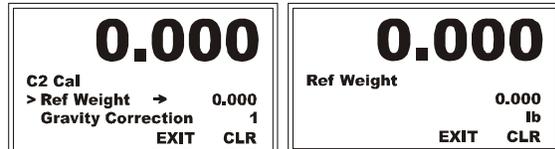
Step 5. This step establishes the gross zero reference. Press the CLR button to clear the current value and position the cursor and use the up or down arrows to scroll the number for the right-most digit.

Step 6. Use the left arrow to select the next position and the up or down arrows to scroll the number or punctuation. Repeat the process to enter the Reference Weight value.

Step 7. Press the Enter button to save the Reference Weight.

About The Gravitation Correction Factor

The table below shows the gravitation correction factor for various cities around the world. Objects weigh about 0.06% 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. For example, Mexico City is 1.002102 and Oslo is 0.998726.

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

In general if your location is between the 45th parallel and the equator, the gravity correction is greater than 1.0. For example, because the gravity is less at these latitudes, you factor the scale by 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%.

If you do not want to enter a Gravitation Correction Factor go to Step 16, C2 Cal.

You must calibrate C2 after setting the Gravity Correction for the correction factor to work.

Step 8. Select Gravity Correction from the C2 Cal Menu to display the Gravity Correction edit screen.

```
        0.000
Gravity Correction
                      1.006

             EXIT    CLR
```

```
        0.000
C2 Cal
> Gravity Correction -->    1
  C2 Cal            Do Cal
             EXIT  CLR
```
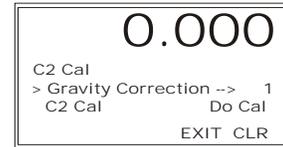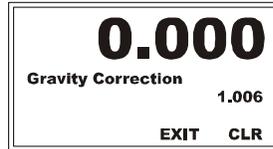
Step 9. Use the left arrow to position the cursor and the up or down arrows to change the value until you have entered all the characters for the Gravity Correction Factor. Our example shows 1.006.

Step 10. Press the Enter button to save the Gravity Correction Factor.

Step 11. Use the Down Arrow to select C2 Cal . . Do Cal and press Enter to perform the C2 Calibration. A "Cal Completed OK" briefly appears on the screen indicating the C2 calibration was successful.

```
        0.000
C2 Cal
> C2 Cal          Do Cal
  A/D Average       65535
             EXIT  CLR
```

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

A "Security Violation" message briefly appears if the user does not have the security level required to do a calibration.

Step 12. Use the down arrow to select A/D Average. This is a read only display of the Average A/D counts.

Step 13. Press the Exit button to return to the Calibration Menu.

```
        0.000
Analog Card
> A/D Average       14380
  Num C2                 1
             EXIT    CLR
```

Traditional Calibration

Traditional Calibration is the method of calibration that uses test weights. We recommend that the test weights total 80 to 100% of the scale live load capacity.

Traditional Calibration normally uses a zero point and the physical placement of test weights on the scale. To set the scale value. The scale is normally empty, but not necessarily. The reference weight must be the amount of live load weight on the scale. With no weight on the scale, the Zero Value would be 0.00. Wait 12 seconds or more.

Traditional Calibration from the Web page

Step 1. In the Ref Weight text field 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 2. Cal low weight is a reference for the weight of any product on the scale that is not removed during calibration (derived from actual measured weight used at cal low or C2 cal). Normally, you would remove all "live load" weight from the scale to obtain a CalLow Weight of 0.0. Click on the Do Cal Low button to do the Trad Cal Zero. A "Cal Completed OK" message appears briefly if the calibration was successful. If not, an Error number appears. See Chapter 8, Troubleshooting. for help with error correction.

Step 3. To set the Span Weight, place a certified test weight on the scale.

Step 4. In the Span Weight text field, enter the weight of the certified weight. Our example shows 5 lbs.

When you click the Do Cal High button, a "Cal Completed OK" message appears briefly if the calibration succeeds, or an error message appears if the calibration fails. See the Error list in Chapter 8 for help with error correction.

Traditional Calibration from the Front Panel

Step 1. From the Configuration menu select Calibration and press Enter button to display the Scale Calibration Menu; select Trad Cal and press Enter to display the Trad Cal menu: then press Enter to open the Reference Weight edit screen.

Step 2. Traditional Calibration requires a zero point and the physical placement of test weights on the scale. The Ref Weight would normally be 0.0 (but not necessarily). Enter a reference weight equal to the weight on the scale.

Step 3. Wait 12 seconds or more.

Step 4. Use the Left and Right Arrow buttons to position the cursor. Use the Up or Down Arrow buttons to enter the Reference Weight for this instrument.

Step 5. Press the Enter button to save the entry.

Step 6. Select Cal Low Do Cal with the Down arrow, and press Enter to show the Cal Low value. A "Cal Completed OK" message appears briefly if the calibration succeeded. If not, you will see an Error number. See the Error list in Chapter 8, Troubleshooting for help in correcting the error.

```
         0.000
Trad Cal
> Cal Lo              Do Cal
  A/D Average          11848
                  EXIT   CLR
```

Step 7. From the Scale Calibration menu, select Trad Cal with the Down arrow to view the A/D Averages. This is used to tell when the scale settles.

Step 8. From the Trad Cal menu, use the Down arrow to select Span Weight and press Enter to open the Span Weight Menu edit screen showing the last Span Weight.

```
         0.000
Trad Cal
> A/D Average        11848
  Span Weight         6.000
              EXIT    CLR
```

```
         0.000
Trad Cal
> Span Weight        10.00
  Do Cal High        Do Cal
              EXIT    CLR
```

```
         0.000
Span Weight
                     10.00
                        lb
              EXIT    CLR
```
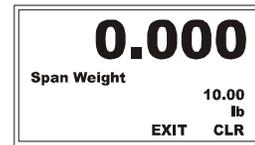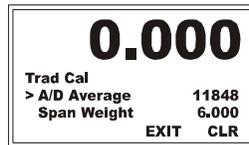
Step 9. To set the Span Weight: Place a certified test weight on the scale and use the Left and Right arrows to position the cursor and the Up or Down arrows to enter the value of the test weight; then press Enter to save. For a 10 lb. weight, enter 10.00.

Step 10. Select Do Cal High, and press Enter to do the Cal High. A "Cal Completed OK" message appears briefly if the calibration succeeded. If not, you will see an Error number. See the Error list in Chapter 8, Troubleshooting for help in correcting the error

```
         0.000
Trad Cal
> Do Cal High →      Do Cal
  A/D Average         11843
              EXIT    CLR
```
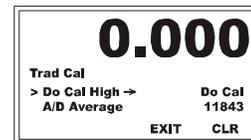
Step 11. The scale is now calibrated.

```
         0.000
Trad Cal
> A/D Average        11848
  Ref Weight         0.000
              EXIT    CLR
```
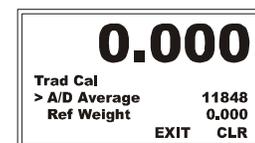
Chapter 6
Mapping
• • • • • • •

Default mapping predefines the I/O and analog signals. (Default functions for the five I/O card inputs HI5.0-HI5.4 are listed under Control.) If you use these defaults, it is necessary to map only commands sent over the communication links.

Mapping allows you to set up certain monitoring and control activities to meet your process requirements without programming. Whether the input is digital data to be routed to a display or a signal used to trigger a command to a PLC, mapping is often the easiest way to achieve the desired result. HI 4060 mapping is more flexible than the typical I/O addressing used in a PLC. You can either use the predefined I/O default mapping or tailor custom mappings to meet the unique requirements of your application. To prevent unintended action with your inputs when you reset the defaults, be sure to set Use Default I/O to NO on the Configuration - Instrument Setup page.

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

I/O Interface - The section of the instrument that communicates with the "outside world".

Input Contact - Inputs interface selector and limit switches, push buttons, and sensors to the HI 4060. 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 devices.

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

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

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)

Input and Output Tables

To transfer values from node to node during the I/O scan, each node has an **Output** table, that contains the values to be read by other nodes, and an **Input** table, where incoming values from other nodes are received. Generally, the transferred values are current states or other variables. The output tables and input 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 4060 input.
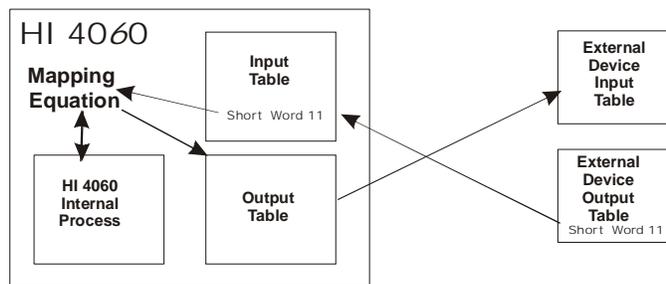
Often, more than two devices are involved, so separate output tables and input tables having different addresses may be set up for data exchanges with each device.

The HI 4060 scans through the I/O tables 110 times a 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.

The left side of an assignment statement is for output table data, and the right side of an assignment statement is for input table data. Memory address (variable) = Data (values, states).

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

If the items in the table are only permitted on the right side of an Assignment Statement, we call it an input table:

- 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 4060 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 4060. The mapping output normally goes to an HI 4060 internal process or one of its output tables.

Remember Local Inputs = User Switches.
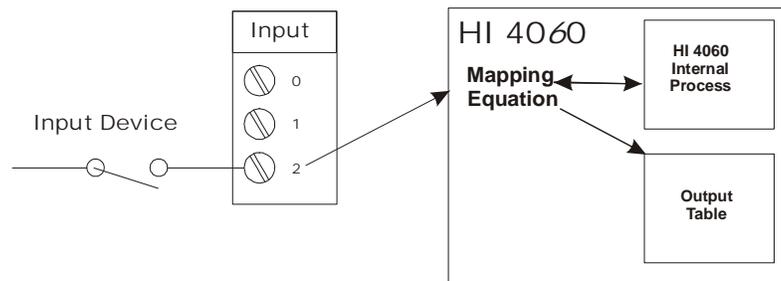
Volatile and Non-Volatile Memory

The data stored in the output tables and input tables are stored in volatile memory. This means, when you power off the HI 4060 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)

Network Input

Like the HI 4060, PLCs have output tables and input tables. The HI 4060 is a network node that you can assign a node address so the Network scanner can identify the instrument.

> **WARNING: YOU CANNOT ASSIGN THE SAME ADDRESS TO TWO DIFFERENT NODES. THE PLC CANNOT DETERMINE WHICH NODE IT IS COMMUNICATIING WITH. THIS CAN RESULT IN PROPERTY DAMAGE OR PERSONAL INJURY.**

The Network scanner, scans each node's output table and reads the values to the PLC's input table which makes the data available to the PLC for processing.

Here again you can assign the data in the node's output table to an address in the PLC input table. For example, to display a Gross Weight on the PLC's output (screen), you assign the Gross Weight value in the HI 4060's input table to its output table where the PLC Scanner can read it and moves it to its input table (where it can then be output to the PLC screen).

Network Output

The Network Scanner writes data in a PLC's output table to the input table of any network node that is setup to receive it. This data then becomes a source that can be mapped to any destination in the HI 4060.

Mapping from the Web Browser

Step 1.   From the HI 4060 Home Page, click Configuration to view the Configuration menu.

Step 2.   Select Mapping to view the Configuration Mapping Setup form. The pull-down menus list both Destination and Source setup options.

Configuration - Mapping

Select One Destination HELP

Instrument Setup:

Network:

Control:

Scratchpad:

Select Sources

NOTE: Please be aware that there are default functions for the 5 I/O card inputs HI5.0-HI5.4 listed under Control. If you map the switch inputs to another function without setting "Use Default I/O" (located in the configuration instrument setup menu) to NO, then you risk causing an unintended action with your inputs. Please read the manual concerning default input values.

Network:

Process Data:

Control:

Scratchpad:

Operators: equal [=] and [^] or [+] not [~] comma [.]

[Map] [Unmap]

Map:
Click here for a list of mapping symbols. Click here for a technical paper on mapping.
ESO0=+HFI0
Click here for an expanded map

Step 3. For our destination, from the Network pull-down list we select an option based on three factors:

Configuration - Mapping

Select One Destination HELP

Instrument Setup:

Network:

Control:
EtherNet/IP Boolean Out (EO)
EtherNet/IP Short Out (ESO)
Scratchpa EtherNet/IP Int Out (EIO)
Select Sou EtherNet/IP Float Out (EFO)

- 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.

In our example, we select "Ethernet/IP Float Out (EFO) as our destination.

Step 4. This causes Ethernet/IP Float Out (EFO) to appear in the text box and a Select button appear to the right of the Network box.

Network: EtherNet/IP Float Out (EFO) Word: 0 [Select]

Step 5. When we click Select, an address appears in the text box below. You will have to scroll down to see it. In our example we selected Ethernet/IP Float Out, which has an address of: EFO0. An equal sign also appears.
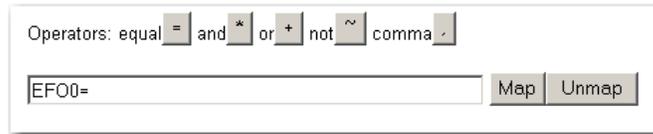
Step 6. You have now selected the Destination. Now we want to select the source Gross Weight, which is Process Data.

Step 7. From the Process Data pull down, select "Gross Weight." A Select button appears to the right of the Process Data box.
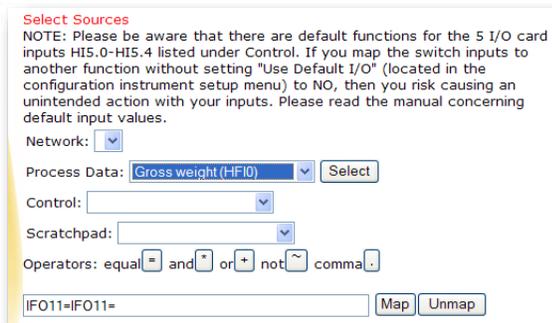
Step 8. Click the Select button to select "Gross Weight as the Source.

Step 9. The Assignment Statement is complete. You now see in the Mapping text box: "EFO0=HFI0"
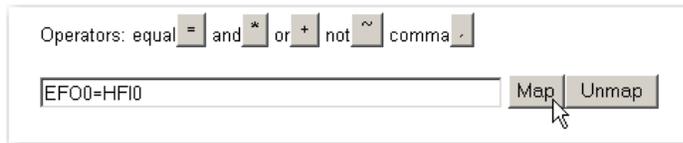
Step 10. Click the Map button. You have now mapped Gross Weight to Ethernet/IP Float Out. The Gross Weight that is stored in the input table is now assigned to the Ethernet/IP Float Out output table and to the Ethernet/IP Network. Notice that the new mapping is included in the Map list.

Example #2 Mapping an Input

To connect a remote switch for starting a process, you can map "User Switch 1" (1 of 3 inputs to the HI 4060) to the Start (HO3.0) option. The Assignment Statement is:

- Destination = Source
- Start (HO3.0) = User Switch 1 (HI0.4)

Step 1. On the Control pull-down menu under Destination, select Start. A Select button appears.
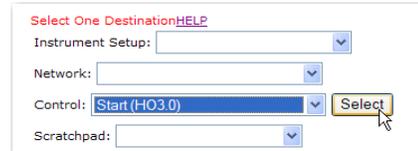
Step 2. Click the Select button.

Step 3. The Destination address appears in the Mapping text field.

Step 4. Under the Source Section click on the Control pull-down menu. Click on User Switch 1. A Select button appears.

Step 5. Click the Select button. The Source address appears in the Map text field.

Step 6. The Mapping Assignment Statement is complete. Start (HO3.0) = User Switch 1 (HI0.4). Click the Map button. The Input Contact is now mapped to Start.

Simple Network Mapping

Mapping to a Network Output

To send data to a PLC from the HI 4060, you need to map the data to a network output. For example, to map the weight to an Ethernet/IP output, the process is:

Step 1. From the Network pull down, select Ethernet/IP Float Out.

Step 2. In the Word text box, enter the number 2. See Glossary of Mapping Terms for an explanation on how the Word text box is used.

Step 3. Click on the Select button to set the Destination. The "Ethernet/IP Float Out" address appears on the left side of the Assignment Statement.

The 2 in Ethernet/IP Float Out address EFO2 refers to Word 2.

Step 4. Click on the Process Data pull-down list.
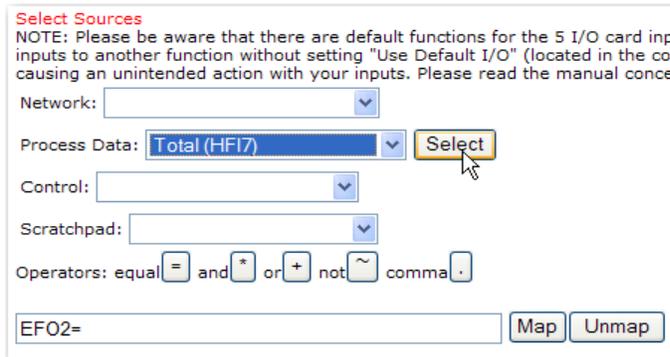
Step 5. Click on Total (HFI7).

Step 6. Click the Select button to enter Total as the source of the Assignment Statement.

Step 7. The total address appears on the right side of the assignment statement.
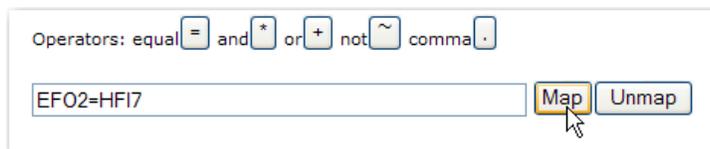
Step 8. The total weight is now available to the PLC via the DeviceNet Scanner.
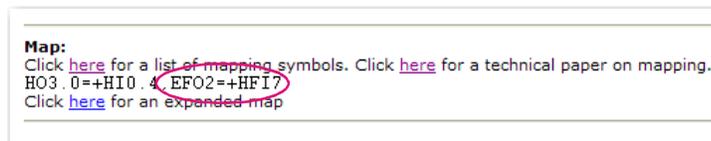
Mapping a Network Input for Control

PLC output that is input to the HI 4060 can be mapped for HI 4060 local control.

When the PLC sends information to the HI 4060, this mapping process clears alarms when word 2 bit 0 is set high.

Step 1. Under Destination on the Mapping page, select Clear Alarm (HO3.6) on the Control pull-down list.

Step 2. When you click Select, the Clear Alarm (HO3.6) address appears on the left side of the Assignment Statement.

Step 3. From the Networks pull down, select a Boolean option as the Source for the Assignment Statement.

Step 4. In the Word text box, type in the number 2. See Glossary of Mapping Terms for an explanation on how the Word text box is used.

Step 5. Click on the Select button to assign the source to the right side of the assignment statement; then click the Map button.

Step 6.   The new mapping, clears alarms when word 2 bit 0 is set high from the PLC.

Map:
Click here for a list of mapping symbols. Click here for a technical paper on mapping.
EFO0=+HFI0, HO3.6=+EI0.0
Click here for an expanded map

More Advanced Mapping

This section is for those who have experience Addressing I/O (mapping) or for those who want more information as to how the mapping works locally and on the network. It includes instructions for Boolean, Analog, Mixed and Special Command mapping procedures.

Unlike the addressing of PLC input and output, you do not map the physical location of an I/O module terminal to a bit location in the processor. HI 4060 mappings are not predefined. Instead, you map values or states in an input table to an output table location. HI 4060 mapping is nothing more than assigning data from an address (Source) to another address (Destination) to be used by the controller in ways that meet your process requirements. The HI 4060 has default mapping for the Addressed I/O.

For each input, e.g., the state of the input device, an associated input table address identifies the physical location for the data. When you map an input to a destination, you assign the input table value to an output table Address. For example: **Clear Alarm = Input #3** means assign the state (Open (0) or Closed (1)) of Contact #3, contained in the Contact Closure input #3 input table address, and move it to the Clear Alarm address in the output table.

Boolean Mapping

In a Boolean equation, the destination (left side of the equation) is a Boolean term. A Boolean variable is a variable that can have the value 0 (FALSE) or 1 (TRUE). In the HI 4060 there are 3 Boolean operations supported:

- 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 two 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®.

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.

Analog Mapping

Analog equation mapping is defined as the destination in an analog term. Analog variables can have different values in different formats:16-bit integer, 32-bit integer, and 32-bit float.

Three analog operations are supported. The symbols are the same as the Boolean operations, but with different meaning.

> 1: Multiply. The symbol for "multiply" is '*'
>
> 2: Add. The symbol for "add" is '+'
>
> 3: Negate (logical NOT). The symbol for "NOT" is '~'

Analog tables are given three letter names as follows:

DFI,DFO,DSI,DSO,DII,DIO all refer to network 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 in DeviceNet tables is measured in words. See Glossary of Mapping Terms for an explanation on how the Word text box is used. The offsets in Hardy tables have various predefined meanings. When an analog equation is evaluated, all terms get converted to float. The final result is then converted to the type of the LHS (destination).

Mixed Mapping

An equation is said to be an analog equation if the term on the left side of the equals sign is an analog variable. The equation is said to be a Boolean equation if the term on the left side is a Boolean variable. It is permissible to have analog variables appear in Boolean equations and Boolean variables in analog equations. (We call a mixed equation "Boolean" if its LHS is a Boolean term and "Analog" if its LHS 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.

Special (Command) Mapping

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

The Command Interface

A command interface can be used to read or write a parameter value. The HI 4060 may receive commands over any of its network interfaces. A command consists of a four-byte command which it receives through its network input data. The instrument responds with a four-byte response. We need to set the upper two bytes of the parameter ID into the location for this, as described below.

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 JSO15 and JSO14, 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.

To read the value of any parameter, send the four-byte PARAMETER ID. The byte order is LITTLE ENDIAN, that is 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 an 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 setup 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, first set the upper 2 bytes. A special PARAMETER value (0x4000 or 0xC000 with the upper bit set) does this.

The first two bytes of the response to a write command echo 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 CLEAR ALARM 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 Rate Setpoint Target to 1.0

Rate Setpoint 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 Rate Setpoint Target with the command <0x8012><0x0000>

Parameter List (Dump)

Step 1.   To display the Operation menu from the Home Page, click Operation.

Step 2.   Select Diagnostics to display the Diagnostics Page, and click on Parameters to display list of the parameters and their settings.

Operation - Choose One

Diagnostics

Monitor

Graph

Operation - Diagnostics

Instrument ID:	HI 4060
Model Number:	HI 4060
Program Part Number:	0650-0158-01-0
Firmware Revision:	HI4060 1.0.0.50 beta
Serial number:	5456
Last Calibration:	C2 Cal 23 Dec 2008
Status Word:	0000
Rate Status Word:	0000 *OFF*

Parameters   Stability Test   Weight and voltage   I/O   C2   SD Card

* The dollar signs indicate that the parameters have a security code. One (1) dollar sign for Medium Security and two (2) dollar signs for High Security. 00000001 $$Unit=0 [lb]

00000002 $Weight Decimal Pt=3 [3]
00010002 Rate Decimal Pt=3 [3]
00020002 Total Decimal Pt=2 [2]
00030002 Batch Decimal Pt=3 [3]
00000003 Grads=0 [1]
00000004 Operator ID=Me!
00000005 Instrument ID=HI 4060
00000006 WAVERSAVER®=3 [1.00 Hz]
00000007 Num Averages=10
00000009 Low Pass Filter=1 [ON]
0000000A Gain In Weight=0 [NO]
0000000F Capacity=130.000
00000201 Span Weight=6.001
00000202 Ref Weight=0.000
0000002A Baud Rate:=5[19200]
0001002A Data bits:=1[8]
0002002A Parity:=0[NONE]
0003002A PrintMode=0[BATCH REP]
000002F2 scratchpad=0.000000
000102F2 scratchpad=30.000000
000202F2 scratchpad=0.000000
000302F2 scratchpad=0.000000
000402F2 scratchpad=0.000000
000502F2 scratchpad=0.000000
000602F2 scratchpad=0.000000
000702F2 scratchpad=0.000000
00000036 DNET Baud=2[500k]
00010036 DNET Node=6
00020036 DNET Bytes In=32
00030036 DNET Bytes Out=32
00000037 EIP Bytes In=4
00010037 EIP Bytes Out=4
00020038 Analog Weight Low=0.000000
00030038 Analog Weight High=100.000000
00040038 Analog Output Low=0.00
00050038 Analog Output High=5.00
10020038 Analog Weight Low=0.000000
10030038 Analog Weight High=130.000000
10040038 Analog Output Low=4.00
10050038 Analog Output High=20.00
20020038 Analog Weight Low=0.000000
20030038 Analog Weight High=130.000000
20040038 Analog Output Low=0.00
20050038 Analog Output High=10.00
30020038 Analog Weight Low=0.000000
30030038 Analog Weight High=130.000000
30040038 Analog Output Low=4.00
30050038 Analog Output High=20.00
00000040 Profibus Node:=5
00000041 RIO Baud Rate=0 [57.6k]
00010041 RIO Address=0
00020041 RIO Rack Size=0 [1/4]
00030041 RIO Quarter=0 [0]
00040041 RIO Last Quarter=0 [NO]
00000208 Calibration Date=C2 Cal 23 Dec 2008
00000203 Cal Low Counts=3033020
00000204 Cal High Counts=3455028
00000205 Cal Span Factor=2.883120214392E-05
00000206 Zero Counts=3033020
0000020A ITECH=0 0 0 0 0 0 0
0000020B Gravity Correction=1.000000
0000001D zone=3[PST(GMT-8h)]

000002F0 MAP:=MFO0=+HFO0
000002F1 Use Default I/O?=1 [YES]
00000300 Display Mode=1
00000301 Display Line=2
0000002D High Security Code=0
0001002D Medium Security Code=0
0000002E FPSecurity=0[NONE]
0000002F Calibration Security=0[NONE]
00000030 Web Page Security=0[NONE]
00000061 Modbus Key=1417817
00020037 EIP key=1264930
00000505 Ingr Filename=INGRED
00010060 ROC Time Units:=1 [min]
00020060 ROC Time Base:=5
00810500 Rate at percent=1.170
00820500 Rate at percent=2.340
00830500 Rate at percent=2.711
00840500 Rate at percent=3.083
00050500 Rate at percent=3.547
00860500 Rate at percent=4.012
80000500 Rate Cal Percent=0
81000500 Rate Cal Percent=10
82000500 Rate Cal Percent=20
83000500 Rate Cal Percent=35
84000500 Rate Cal Percent=50
85000500 Rate Cal Percent=75
41000500 Prime time=0
42000500 Pause time=5
43000500 Feed time=40
44000500 Cal type=0 [2 point]
00000501 Rate Setpoint=3.000
00000502 PID P=50.0
00000503 PID I=16.1
00000506 Alarm Delay=10
00010506 Lo Shutoff=0.000
00020506 Hi Shutoff=100.020
00000508 Batch Amount=6.000
00010508 Preact=0.000
00000509 Mode=0[CONTINUOUS]
00000507 Auto Refill=0 [NO]
00010507 Initial Refill=0 [NO]
00020507 Start(lo)=10.000
00030507 Stop(hi)=99.999
00040507 Hi Alarm=110.000
00050507 Low Shutoff=2.000
00060507 OP Adjust=2 [ON,FIXED]
00070507 OP Adjust %/wgt=0.000000E+00
0000050B Wait Time=2
0000050C REC Level%=20.0
0001050C REC Time=30
0002050C REC Shutdown=0 [NO]
0000050D Shutoff Out%=0.0
0002050E Input LO%=0.000
0003050E Input HI%=100.000
0004050E SP LO wgt/time=0.000
0005050E SP HI wgt/time=100.000
0006050E Remote AVE=1
0007050E Remote SP Enable=0 [NO]
0008050E Range=0 [0-5 V]
00000098 Total=290.31
00000099 Batch=14.500
000002F4 Graph var=0 [ACT]

Map Dictionary

CMD0 - Specifies input and output locations for the command interface

    e.g. CMD0=ESI25*ESO20

Th unit will look for commands starting at EtherNet/IP input word 25 and send acknowledgements to output word 20

  Be careful to distinguish between digit zero "0", and upper-case letter "O".

DFI - DeviceNet Input, regarded as floats

DFO - DeviceNet Output, regarded as floats

DSI - DeviceNet Input, regarded as 16 bit integers

DSO - DeviceNet Output, regarded as 16 bit integers

DII,DIO - DeviceNet Input,Output, regarded as 32 bit integers

DI,DO - DeviceNet Boolean input and output

EFI,EFO,ESI,ESO,EII,EIO,EI,EO - Ethernet I/P, similar to DeviceNet

PFI,PFO,PSI,PSO,PII,PIO,PI,PO - Profibus

RFI,RFO,RSI,RSO,RII,RIO,RI,RO - RIO. Words 0-63 for block transfer, Words 64-71 for discrete transfer

MFI,MFO,MSI,MSO,MII,MIO,MI,MO - Modbus

HSI - Hardy Short Input Table. This table allows the things in HI to be mapped as 16-bit words.

    HSI0 - Digital Input
- HSI0 bit 0 (HI0.0) - Digital Card Input 1
- HSI0 bit 1 (HI0.1) - Digital Card Input 2
- HSI0 bit 2 (HI0.2) - Digital Card Input 3
- HSI0 bit 4 (HI0.4) - User Switch 1
- HSI0 bit 5 (HI0.5) - User Switch 2
- HSI0 bit 6 (HI0.6) - User Switch 3

    HSI1 - Status Word
- HSI1 bit 0 (HI1.0) - A/D Conversion Error
- HIS1 bit 1 (HI1.1) - A/D Failure
- HIS1 bit 3 (HI1.3) - Weight Overrange
- HIS1 bit 7 (HI1.7) - Real Time Clock failure
- 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

    HSI2 - Default Relay Output, as determined by the state machine (can be overridden by mapping HSO4)
- HSI2 bit 0 (HI2.0)ON/OFF relay
- HSI2 bit 1 (HI2.1)Shutoff relay
- HSI2 bit 2 (HI2.2)REC relay
- HSI2 bit 3 (HI2.3)Alarm relay
- HSI2 bit 4 (HI2.4)Refill relay

HSI3 - State machine operating mode
- 0 = IDLE
- 1 = AUTO
- 2 = MANUAL
- 3 = START
- 4 = STOP
- 5 = SHUTOFF
- 6 = PAUSE
- 7 = RATE CAL
- 8 = REFILL
- 9 = REFILL FULL
- 10 = MANUAL HOLD
- 11 = RATE CAL HOLD

HSI4 - Rate Status Word
- HSI4 bit 0 (HI4.0) Low Alarm
- HSI4 bit 1 (HI4.1) High Alarm
- HSI4 bit 2 (HI4.2) Control lost
- HSI4 bit 3 (HI4.3) Refill overflow
- HSI4 bit 4 (HI4.4) Not OK to Feed
- HSI4 bit 5 (HI4.5) ON/OFF
- HSI4 bit 6 (HI4.6) Rate Range Error - Rate is below zero, or above MAX RATE
- HSI4 bit 11 (HI4.11) RE- (rate exception condition, low rate)
- HSI4 bit 12 (HI4.12 Batch Complete
- HSI4 bit 13 (HI4.13)Request Refill
- HSI4 bit 14 (HI4.14)REC (rate exception condition)
- HSI4 bit 15 (HI4.15)Shutoff

HSI5 -Digital input from I/O card. These 5 inputs do not have to be mapped if the parameter Use Default I/O is set to YES. The default functions are listed below.
- HI5.0 Start
- HI5.1 Stop
- HI5.2 Abort
- HI5.3 Force Refill
- HI5.4 Clear Total

HSI10 -Analog input counts from I/O card

HSO - Hardy Short Output table. This table allows the things in HO to be mapped as 16-bit words.

HSO0 - Digital Output
- HSO0 bits 0-3 (HO0.0-HO0.3) - Digital Card Output 1-4

HSO1 - Command Status - value returned after a command (see HSO2) is done. Non-zero status means the command failed.
- Status 1,2 = Calibration failed due to ADC error, or ADC failure
- 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

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) - Clear Total
- 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) - Do 2 point Rate Calibration
- HSO2 bit 8 (HO2.8) - Do 5 point Rate Calibration
- HSO2 bit 10 (HO2.10) - Enter Manual Mode
- HSO2 bit 11 (HO2.11) - Exit Manual Mode

HSO3 - Mapped Switch

- HO3.0 Start
- HO3.1 Stop
- HO3.2 Abort
- HO3.3 Force Refill
- HO3.4 Clear Total
- HO3.5 Print
- HO3.6 Clear Alarm
- HO3.7 Clear Hopper
- HO3.8 Not OK to Feed

HSO4 - Relay Output- defaulted to the values below, unless re-mapped

- HO4.0 Relay1-ON
- HO4.1 Relay2-SHUTOFF
- HO4.2 Relay3-REC
- HO4.3 Relay4-ALARM
- HO4.4 Relay5-REFILL

JSO Hardy Short Integer Parameters

JSO0 - WAVERSAVER®

JSO1 - Num Averages

JSO2 - Unit

JSO3 - Weight Decimal Point

JSO4 - Wait Time

JSO5 - Grad Size

JSO6 - Remote Key

JSO7 - Auto Refill

JSO8 - Initial Refill

JSO9 - Alarm Delay

JSO10 - REC Time

JSO11 - REC Shutdown

JSO13 - Rate Decimal Point

JSO14 - Param Value MSW

JSO15 - Param ID MSW

JSO16 - Remote Setpoint Averages

JSO17 - Remote Setpoint Enabled

JSO18 - Remote Setpoint Analog Input Range

JSO19 - Total Decimal Point

JSO20 - Gain in Weight

JSO21 - PrintMode

JSO22 - Batch Decimal Point

HFO Hardy Float Parameters

HFO0..HFO7 - Scratchpad variables

HFO8 - Max Rate

HFO12 - Span Weight

HFO13 - Cal Low Weight

HFO14 - Scale Capacity

HFO15 - Remote Setpoint in

HFO16-19 - Remote Setpoint configuration: RateLow, RateHigh, InputPercentLow, InputPercentHigh

HFO20-23 - Input to one of 4 channels of analog output card

HFO24-27 - Analog output channel 1 configuration: Low Value, High Value, OutputVoltsLow, OutputVoltsHigh

HFO28-31 - Analog output channel 2 configuration: Low Value, High Value, OutputMilliampsLow, OutputMilliampsHigh

HFO32-35 - Analog output channel 3 configuration: Low Value, High Value, OutputVoltsLow, OutputVoltsHigh

HFO36-39 - Analog output channel 4 configuration: Low Value, High Value, OutputMilliampsLow, OutputMilliampsHigh

HFO41-42 - Initial and Final gross weights of a run

HFO43 - ROC noise

HFI Hardy Float Parameters (read only)

HFI0 - Gross weight

HFI1 - OP Output Percent

HFI2-5 - Analog Output setpoints, calculated from scaling HFO28-31

HFI6 - Rate of Change, not averaged

HFI7 - Total

HFI8 - Batch Total

HFI9 - Remote Setpoint Value

HFI10 - ACT (Rate of Change, heavily averaged)

IFO Rate parameters

    IFO0 - Controlled variable, usually rate of change (ROC)

    IFO1 - Rate Setpoint

    IFO2 - PID P

    IFO3 - PID I

    IFO5 - RefillStartWgt

    IFO6 - RefillStopWgt

    IFO7 - RefillOverloadWgt

    IFO8 - RefillLowShutoff

    IFO9 - LowAlarmShutDownRate

    IFO10 - HighAlarmShutDownRate

    IFO11 - Batch Amount

    IFO12 - Batch Preact

    IFO13 - Manual Mode OP

WSI

    WSI0 - A/D convertor raw counts

    WSI1 - A/D convertor average counts

    WSI2 - A/D running count

Chapter 7
Operation

• • • • • • •

Chapter 7 pertains to the operation of the HI 4060. This section includes instructions for selecting Operational displays, ratio control, setting operating parameters. We recommend that maintenance personnel and operators read and understand this chapter before operating the controller. Make sure that all configuration and setup procedures are completed before operating the controller.

Operational Displays on the Front Panel

There are two types of displays: Summary and Operational. The Summary display is the large weight readout that the user can see from a distance. The Operational Displays appears at the bottom of the front display.

You can select the display to show what is useful during an operation. For example you might want to select the Gross Mode Display and the Rate of Change Operational Display.

Operational Status Display   **Weight/Rate Summary**

8.000

Idle   Gross lb
0P 0%   SP   10.00
ROC   0.0   lb/m
START   MAN   MODE

Operational Display   **Mode Display**
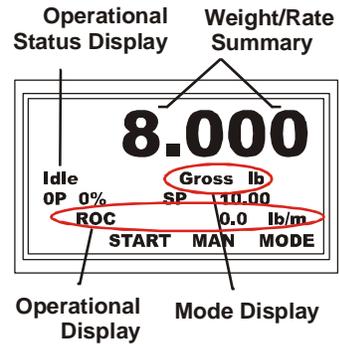
Selecting Mode Displays from the Front Panel

Step 1.   Any mode can be selected at any time. Selecting mode or operational displays will not effect the a currently running process.

Step 2.   From the Summary display press the Mode button to select the mode you want.

Mode Displays

There are five modes that can appear in the mode display area.

• The Gross Weight Mode display shows the gross weight which includes anything put on the permanent scale structure.

8.000

Idle   Gross lb
0P 0%   SP   10.00
ROC   0.0   lb/m
START   MAN   MODE
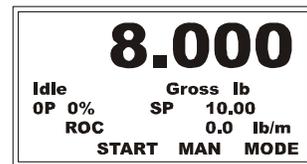
- Amount (AMT) of weight that has been processed since the last start when in Continuous operation mode. When you completely stop the process this value goes to 0.00 and begins again when you press Start.

```
    15.00
Idle          AMT    lb
0P 0%        SP    10.00
      ROC          0.0  lb/m
    START   MAN   MODE
```

- Batch lists the amount of weight that has been processed since the last start when in Batch operation mode. When you completely stop the batch process, this value goes to 0.00 and begins again when you press Start.

```
    8.000
Idle         BATCH  lb
0P 0%        SP    10.00
      ROC          0.0  lb/m
    START   MAN   MODE
```

- Actual (ACT) feed rate in weights units per unit of time (lb/m) whether in Continuous or Batch mode. This is a heavily averaged ROC and is indicative of your current run rate.

```
    2.000
Idle          ACT    lb/m
0P 0%        SP    10.00
      ROC          0.0  lb/m
    START   MAN   MODE
```

- Total weight accumulated during a continuous or batching process.

```
    80.00
Idle          Total    lb
0P 0%        SP    10.00
      ROC          0.0  lb/m
    START   MAN   MODE
```

Operational displays

NOTE *Selecting operational displays will not effect the a currently running process.*

There are six options for what can appear in the operations display area.

- Ingredient display lists the current selected ingredient.

```
    2.000
Idle          ACT    lb/m
0P 0%        SP    10.00
   Ingredient:     Grain
    START   MAN   MODE
```

- Rate of Change (ROC) display shows the change rate in weight units/time units. This is the lightly averaged or Raw rate of change.

```
    2.000
Idle          ACT    lb
0P 0%        SP    10.00
      ROC          0.0  lb/m
    START   MAN   MODE
```

- Total display shows the total amount of an ingredient processed.

```
    2.000
Idle          ACT    lb/m
0P 0%        SP    10.00
      Total        310.00
    START   MAN   MODE
```

- In batching mode, the Batch display shows the actual weight processed on the left and the rate setpoint for the current batch on the right. In continuous mode, the Batch amount shows the total material fed since the last idle mode.

```
       5.000
Idle         ACT      lb/m
OP 20%       SP       10.00
   Batch           125.00/5.00
         START  MAN  MODE
```

- Output display shows the output in percentage with one decimal point for a finer definition of the control activities.

```
       8.000
Idle         ACT      lb/m
OP 20%       SP       10.00
   OP               20.0
         START  MAN  MODE
```

- Gross weight display shows the gross weight which includes anything put on the permanent scale structure.

```
       8.000
Idle         ACT      lb/m
OP 20%       SP       10.00
   GROSS             11.00
         START  MAN  MODE
```

Setting the Rate Setpoint

Setting the Rate Setpoint from the Front Panel

Step 1. Press the down arrow until the cursor is in front of "Rate Setpoint."

Step 2. Press Enter. The Rate Setpoint sub-menu appears.

```
       0.000
Configuration
> Rate Setpoint    ➜     10.00
  Ingredients
                  EXIT    CLR
```

Step 3. Press CLR to clear the current entry and position the cursor on the first digit to change.

Step 4. Use the up or down arrow to select the number you want, then use the left arrow to move to the next character, and repeat the process until you have entered all the characters for your rate setpoint.

Step 5. Press Enter to save the new rate setpoint.

Step 6. Press the Exit button to return to the Configuration Menu.

NOTE   *You can change the active setpoint from the front panel in the active state, but you cannot change the remote setpoint from the Ingredient menu while in the Remote Setpoint state.*

Setting the Rate Setpoint from the Web Page in Idle Mode

Step 1.   To open the Ingredient Configuration page from the HI 4060 Home page, click Configuration to display the Configuration menu; then click Ingredient.

Step 2.   In the Rate Setpoint field, enter the new Rate Setpoint.

Step 3.   Press the Save Parameters button.
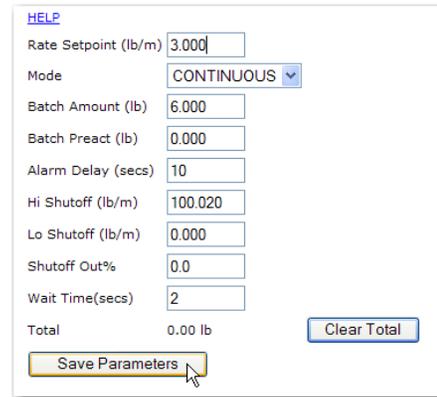
HELP	
Rate Setpoint (lb/m)	3.000
Mode	CONTINUOUS
Batch Amount (lb)	6.000
Batch Preact (lb)	0.000
Alarm Delay (secs)	10
Hi Shutoff (lb/m)	100.020
Lo Shutoff (lb/m)	0.000
Shutoff Out%	0.0
Wait Time(secs)	2
Total	0.00 lb Clear Total
Save Parameters	

Ratio Control (Master/Slave)

Description of a Ratio Controlled System

The Host Controller monitors and/or controls the flow rate of the main ingredient (Ingredient #1). The process requires that ingredient #2, #3, #4 etc. be fed into the main ingredient or vessel at a certain percentage (proportion) of the flow rate of ingredient #1.

For example, if ingredient #1's flow rate is 10 gallons/minute and the process requires that ingredient #2 be fed at 10% of the flow rate of ingredient #1; ingredient #2 must be fed at a flow rate of 1 gallon/minute (a 10/1 ratio). However, ingredient #1's flow rate is not constant. The rate controller for ingredient #2, must maintain the 10% proportional feed rate no matter what the flow rate of ingredient #1 may be.

Ratio Process Control System

The Host Controller is fitted with an Analog Output Option card that generates a 0-5 VDC, 0-10 VDC, 0-20 milliamp or 4 to 20 milliamp output signal that is proportional to the actual flow rate of ingredient #1.

The Slave Controller is fitted with a Remote Set Point Analog Input Option card to receive a 0-5 VDC, 0-10 VDC, or 4 to 20 milliamp signal. The slave controller receives the signal from the host and adjusts the output signal to the feeder motor to maintain a ratio of ingredient #2.

The flow rates of all ingredients can be monitored by Host (PLC or Computer).

New desired flow rates should not be continuously transferred to the Rate Controllers over communications. When new rate information is received, existing rate information in memory is written over and the instrument will not enter closed loop control for a minimum of one Time base periods plus the averages (20 averages per second).

The Timebase default is four seconds.

- The Master Ingredient is where the actual flow is measured and transmitted. A signal can come from a variety of Host Controllers including a flow meter.
- Different Slave ingredients can track the flow of the master ingredient. The remote set points for slave ingredients is proportionally calculated from the rate of the master ingredient.

Remote Set Points for Ratio Control Applications

The Remote Set Point Input enables the user to set a range that is used to receive rate set point values from another unit's analog outputs. The Set Point parameters can be set remotely from the Remote I/O and PROFIBUS Interface Card, but cannot be remotely set via the serial communication.

Setting Remote Set Points for Ingredient B from the Front Panel

Selecting the Ingredient

This is an example. Your setpoint number may be different.

Step 1.   To open the SP HI wgt/time edit from the Configuration menu, use the down arrow to select Ingrd.

Step 2.   Press the right arrow to scroll through the listed ingredient names, and press Enter

Setting the SP HI wgt/time

Step 1.   From the Ingredient menu, select Remote Setpoint, and press Enter to display the Remote Setpoint menu.

Step 2.   Use the down arrow to select SP HI wgt/time, then press Enter.

Step 3.   Press the left or right arrow to position the cursor and the up or down arrow to select the number. Our example shows 25 lb/m you want for the SP HI wgt/time.

Step 4.   Press Enter to save the entry and return to the Remote Setpoint menu.

Setting SP LO wgt/time

Step 1.   To display the SP LO wgt/time edit form for Ingredient B, use the down arrow to select SP LO wgt/time and press Enter; then select SP LO wgt/time and press Enter

0.000
Remote Setpoint
> SP LO wgt/time   ➜   0.000
   Input HI%   100
                    EXIT   CLR

0.000
SP LO wgt/time
                        1.000
                        lbs/min
                    EXIT   CLR
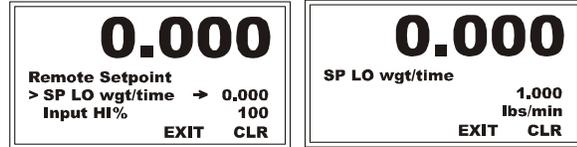
Step 2.   Press CLR to clear the current entry and position the cursor on the first digit.

Step 3.   To enter 1.0 pound for the SP LO wgt/time: use the up or down arrow to select the number; then press the left arrow until the cursor is at the next character and select the number or punctuation you want. Repeat the process above until you have entered all the numbers for your SP LO wgt/time value. In our example we selected 1.000 lbs/min.

Step 4.   Press Enter to save the entry and return to the Remote Setpoint menu.

Setting Input HI%

Step 1.   To display the Input HI % edit form, use the down arrow to select Input HI %, then press Enter.

0.000
Remote Setpoint
> Input HI%   ➜   100
   Input LO%   5
                    EXIT   CLR

0.000
Input HI %
                          100
                    EXIT   CLR
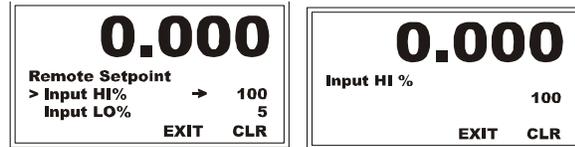
Step 2.   Press CLR to clear the current entry and position the cursor on the first digit to enter, then use the up or down arrow to select the number you want.

Step 3.   Press the left arrow to move the cursor to the next character, and use the up or down arrow to select the number or punctuation you want. Repeat the process above until you have entered all the numbers for your Input HI% value. In our example we selected 100 percent.

Step 4.   Press Enter to save the entry and return to the Remote Setpoint menu.

Setting Input LO%

Step 1.   To display the Input LO % edit form from the Remote Setpoint menu, select Input LO % and press Enter.
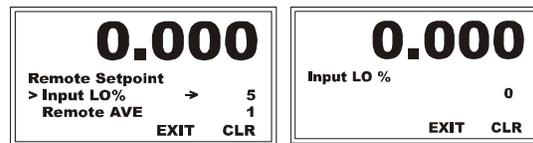
0.000
Remote Setpoint
> Input LO%   ➜   5
   Remote AVE   1
                    EXIT   CLR

0.000
Input LO %
                            0
                    EXIT   CLR

Step 2.   Press CLR to clear the current entry and position the cursor on the first digit to change.

Step 3.   To enter 0 for the Input LO%: Use the up or down arrow to select the number.

Step 4. Use the left arrow to move the cursor one place to the left, and use the up or down arrow to select the number or punctuation you want. Repeat the process until you have entered all the numbers for your Input LO% value.

Step 5. Press Enter to save the entry and return to the Remote Setpoint menu.

Setting Range

Step 1. From the Remote Setpoint menu, use the down arrow to select Range.

Step 2. Press the right or left arrow to toggle between the range selections.

Step 3. The range options are 0-5v, 0-10v, 0-20mA, or 4-20 mA. Our example uses 4-20 mA.

Step 4. Press Enter to save the entry.

Step 5. This completes the configuration process for Ingredient B.

Step 6. Repeat to Set the Remote Setpoint for the Next Ingredient

Setting the Remote Setpoints for Ration Control from the Web Page

Step 1. On the HI 4060 Home Page, click Configuration to display the Configuration page.

Step 2. Click Ingredient to display the Configuration Ingredient page.

Step 3. At the top of the page click on Ingredient Name.
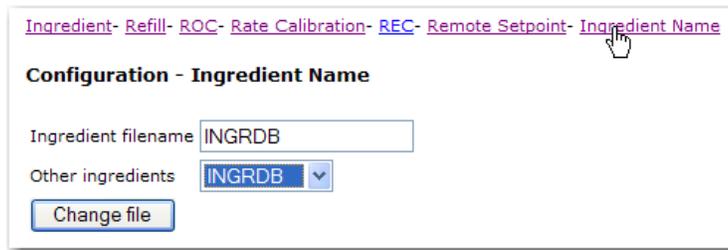
Step 4. If you have not created an ingredient name for Ingredient B, enter the name in the Ingredient Filename field.

Step 5. Click on Change File to save the ingredient name.

Step 6.   If you have selected an ingredient name for Ingredient B, click on the "Other ingredients" pull down list.

Step 7.   Click on the name you gave for Ingredient B. In our example we selected INGRDB.

Step 8.   At the top of the page click on Remote Setpoint to display the Remote Setpoint page

Configuration - Ingredient Name

Ingredient filename FLOUR

Other ingredients FLOUR

Change file

INGREDI
INGRED
FLOUR
INGREDIE
INGRD
INGRDB
INGRDC

Ingredient- Refill- ROC- Rate Calibration- REC- Remote Setpoint- Ingredient Name

Configuration - Ingredient

HELP

Rate Setpoint (lb/m) 3.000

Mode CONTINUOUS

Batch Amount (lb) 6.000

Batch Preact (lb) 0.000

Step 9.   Enter the values we selected for Ingredient B

Step 10. Click on the Set Parameter button to save the Remote Setpoint parameters for Ingredient B.

Configuration - Remote Setpoint

HELP

SP HI weight/time (lb/m) 25.000

SP LO weight/time (lb/m) 1.000

Input HI% 100.000

Input LO% 0.000

Remote AVE 1

Analog Input Range 4-20 mA

Remote SP Enable YES

Set Parameter

Step 11. Click on Ingredient Name to open the displayed screen.

Step 12. On the Ingredient Name pull down list, select the name you gave for Ingredient B. In our example we selected INGRDB.

Step 13. Click on Remote Setpoint to display the Remote Setpoint Page.

Step 14. Enter the Remote Setpoint parameters for Ingredient C.

Step 15. Press the Set Parameter button to save the settings.

Step 16. Your Ratio Control settings are complete.

Setting the Averaging Parameter from the Front Panel

When using any device that output an erratic signal (e.g. a flow meter). The averaging function takes a number of input (voltage or amperage) readings and averages the input signal to improve stability. The improvement in stability however, is at the expense of the response time. A setting of 1 average takes 100 milliseconds. A setting of 100 averages takes 1 second.

Step 1. When in the Remote Setpoint sub-menu press the up or down arrow until the cursor is in front of Remote AVG.

Step 2. Press Enter to display the Remote Setpoint (AVG) sub-menu appears.

Step 3. Press CLR to clear the current entry.

Step 4. Press the left arrow until the cursor is at the first character entry for the Remote Setupoint, and use the up or down arrow to select the number or punctuation you want.

Step 5. Press the right arrow to move the cursor one place to the right, and repeat the process above until you have entered all the numbers for your averaging value. In our example we selected 4 averages.

Step 6. Press Enter. the Remote Setpoint Sub-Menu appears.

Step 7. Press the Exit button to return to the Summary Display.

Setting the Averages from the Web Page

Step 1. From the HI 4060 Home Page, click Configuration to display the Configuration page.

Step 2. Click on Ingredient to display the Ingredient Page.

Step 3. At the top of the page click on Remote Setpoint. The Remote Setpoint appears.

Step 4. Click in the Remote AVE field until the value is highlighted.

Step 5. Enter the Average value you want for the selected ingredient. In our example we selected 1.

Step 6. Press Set Parameter to save the settings

Configuration - Remote Setpoint

HELP

SP HI weight/time (kg/m)	100.000
SP LO weight/time (kg/m)	0.000
Input HI% (5.00 V)	100.000
Input LO% (0.00 V)	0.000
Remote AVG	1
Analog Input Range	0-5 V
Remote SP Enable	NO

Set Parameter

Chapter 8
Troubleshooting
• • • • • • •

Chapter 8 provides procedures for troubleshooting the electrical, mechanical and firmware elements of the HI 4060 and for using Hardy's Integrated Technician (IT®) software utility to isolate problems. Flow charts provide troubleshooting steps for the rate 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.**

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

- 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 4060.

- 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 Rate Controller.
- Always follow proper safety procedures when working on or around the Rate 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.hardyinst.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 AM 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.1757.

Error Messages

Error Messages on the Webpage

- 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.
- Overrange - 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.

Error Messages on the Optional Display

NOTE   *Some error messages are duplicated on the web page and on the display, but others are not.*

- **ADF** - A/D Failure Error! - Internal Electronics Error. This is an indication the analog to digital converter in the unit is no longer sending an output to the processor. This would normally indicate a hardware failure in the unit.
- **ADE** - A/D Convert Error! - Load Cells input out of range. This is an indication the signal from the load sensors to the analog to digital converter is out of range. This can be caused by: a) Broken wire(s); b) miswire of sensor(s); c) improper installation of sensor(s); d) overloaded sensor(s); e) damaged sensor(s).
- **Trad Cal Error!** - Error occurred during calibration, re-calibrate.
- **C2 Cal Error!** - Error occurred during calibration, re-calibrate.
- **No C2 Sensor!** - Instrument did not detect a C2 Load Sensor
- **CAL Failed!** - Too few counts between Zero and Span. Traditional cal and the load cells are bad or no test weights were applied for Span step.
- **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.
- **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.
- **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.
- **LoA** – Low Rate Alarm - Rate is running below the Low Shutoff rate
- temporarily, if it stays low for the set alarm duration the controller will shut down. Adjusted under ingredient menu.
- **HiA** – High Rate Alarm - Rate is running above the High Shutoff rate temporarily, if it stays high for the set alarm duration the controller will shut down. Adjusted under ingredient menu.

- **REC +/-** - Rate Exception Alarm - The rate exception control display indicates whether the controller is running within the requested range. If an out-of-range rate does not correct itself in the REC time allowed, the RE+ is displayed to indicate the direction. Measured against the rate look up table rates set during the rate calibration routine. Helps set limits for automatic compensation for bulk density changes.

- **Los** – Lost Control - Current ROC conditions are not within the defined control parameters. Falling back to the basic rate look up table and attempting to regain control.

- **RFL** – Refill -The defined start refill weight level and with auto refill set to yes has been reached, or a force refill command was delivered. Refill continues until the stop high weight is reached or the force refill command is again activated.

- **Ovr** - Refill overflow – Refill action did not stop or exceeded the maximum refill setting. Alarm only and the feeding will continue. Signifies the auto refill valve did not close. This condition will remain until alarm is cleared or the unit is put back to the Idle mode.

- **NOK** - Not OK to Feed! – Abort signal bit or input is active. Works like an E-STOP.

- **Rate Range Error** - Rate is below zero, or above MAX RATE. Reference the rate look up table and review defined minimum and maximum rates.

- **Shutoff SDw** - Shut off - where a condition is out of tolerance longer than the preset limit. This can be several alarms, low gross weight in hopper, low/high rate, or rate exception (REC).

Trouble Shooting Using Integrated Technician (IT®)

```
┌─────────────┐         ┌──────────────────┐
│   START     │────────▶│  Press the Enter │
│  Diagnostic │         │  (Center Button) │
└─────────────┘         │ and arrow to Test│
                        └──────────────────┘
                                 │
┌─────────────┐                  │        ┌──────────────────────────┐
│Serial Number│◀─────────────────┘        │  HI 40xx Dignostic and   │
└─────────────┘                           │     Troubleshooting      │
        ▲                                 └──────────────────────────┘
        ▼                                   ┌────────────────────────┐
┌─────────────┐                             │   Weigh Vessel/SCALE   │
│Firmware Rev │                             └────────────────────────┘
└─────────────┘                                Load Sensor
        ▲
        ▼
┌─────────────┐
│Model Number │
└─────────────┘
        ▲
        ▼
┌───────────────┐
│Program Number │
└───────────────┘
        ▲          ┌────────────────────────┐
        ▼          │ Pass/Fail and Variance │   ┌────────────────┐
┌─────────────┐    └────────────────────────┘   │   Raw A/D Count│   ┌──────────────────────┐
│Stability Test│◀──                              └────────────────┘   │Integrated Technician │
│    ALL      │◀──┌────────────────────────┐                          │Summing Junction Box  │
└─────────────┘   │ Raw A/D Average Count  │                          └──────────────────────┘
        ▲         └────────────────────────┘
        ▼              ┌────────┐      ┌────────┐
                       │ Weight │◀─────│  Mv/V  │
┌─────────────────┐    └────────┘      └────────┘
│Weight and Voltage│
│      ALL         │
└─────────────────┘    ┌────────┐      ┌────────┐
        ▲              │  RTZ   │◀─────│   MV   │
        ▼              └────────┘      └────────┘
┌─────────────┐        ┌────────┐      ┌────────┐
│   IT Test   │◀──     │ Weight │      │  Mv/V  │
└─────────────┘        └────────┘      └────────┘
        ▲          ┌──────────┐
        ▼          │ Sensor   │
                   │ Number   │
┌─────────────┐    └──────────┘
│ Audit Trail │        ┌────────┐      ┌────────┐
└─────────────┘        │  RTZ   │      │   MV   │
                       └────────┘      └────────┘
```

A more detailed explanation of each section of the test follows below:

Stability Test ALL
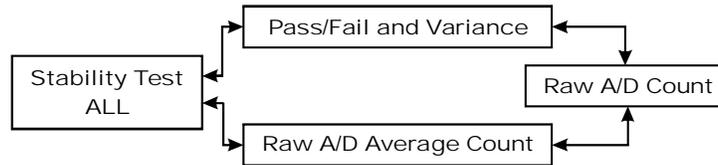
PASS/FAIL and Variance Test

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 noise to 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.
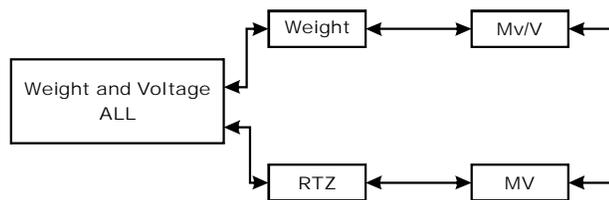
NOTE   *IT $^®$is a registered trademark of Hardy Process Solutions.*

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 and 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 4060 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

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
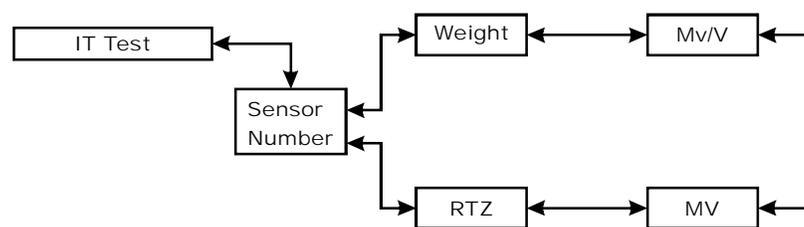
If your system has an Integrated Technician Summing Junction box, the IT test can help identify individual load cell problems up to a maximum of four load cell selections.

Sensor Number Indicates which sensor is under test. Using the up or down arrow selects the target sensor to be tested.

Weight Displays the force seen by a selected load cell. This force can show an imbalance or weight distribution problem. Review your system to insure proper balance. Motors can account for this problem. Piping should not apply any appreciable force on the scale.

Mv/V and MV DC voltage signals are between 0 and 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 need to use a multi-meter with a 200 or 300mV range to view the out of range voltages.

RTZ (Return to Zero) Test

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 this WAIT period the WEIGHT readings are collected for each load point. When this test is run, after a valid calibration has been

completed, there is a comparison of the original weight reading collected and current. If the difference exceeds the combined Motion and the Zero Tolerance parameters the test fails. Use this test to determine which load cell is malfunctioning in a drifting weight problem.

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 )
                            |
                            v
        +-------------------------------------------+
        |         UNSTABLE RATE CONTROLLER          |
        +-------------------------------------------+
                            |
                            v
        +-------------------------------------------+
        |   Disconnect external signal cables and   |
        |          shields, except AC Power         |
        +-------------------------------------------+
                            |
                            v
              +---------------------------+
              |     Monitor the Display   |
              |         for stability     |
              +---------------------------+
                            |
                            v
                         /       \
          Yes          /  STABLE?  \          No
       +--------------<             >--------------+
       |               \         /                |
       |                 \     /                   |
       v                   \ /                     v
+-----------------+                      +-------------------------+
| Reconnect signal|                      |    Problem could be in  |
|  cables one at a|                      | the instrument.  Contact|
|      time       |                      | Hardy Customer Support  |
+-----------------+                      |    PH:  800-821-5831    |
       |                                 +-------------------------+
       v
+-----------------+
|   Monitor the   |
|display for       |
|   stability     |
+-----------------+
       |
       v
+-------------------------+
| If installing any cable |
|   causes unstable       |          ( Go to )
|   readings              |--------->(   B    )
| REVIEW TROUBLESHOOTING  |
| SECTION B: B1.1-B1.7    |
+-------------------------+
```

Troubleshooting 171

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 rate 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 → **Rate 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

Sensor Number → **Weight** ← **Mv/V**

RTZ ← **MV**

At the IT Junction Box
Remove and Replace
the load sensor(s) determined to be faulty.

STABLE? — Yes / No

STABLE? — Yes / No

Replace summing card
Re-install all load sensors

No → **TEST COMPLETE** — Yes → **STABLE?** — Yes / No

Yes

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

NOTE *Return to Zero is run during the Weight and Voltage tests.*

Review the individual sensor values for out of range or non-performance

LS1? — Yes → ERROR? Check load sensor ONE

No

LS2? — Yes → ERROR? Check load sensorTWO

No

LS3? — Yes → ERROR? Check load sensor THREE

No

LS4? — Yes → ERROR? Check load sensor FOUR

No

TEST COMPLETE

F

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
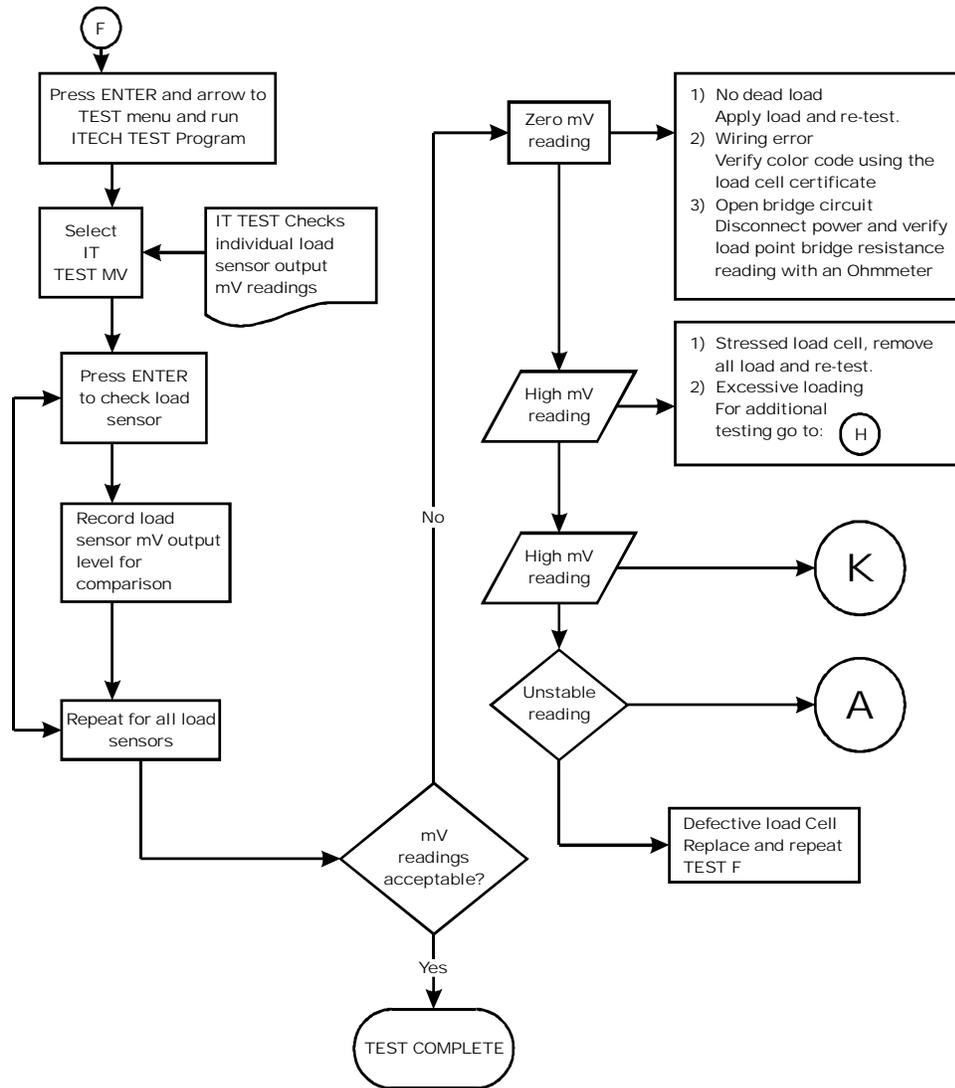
F - Verify Individual Load Cell Millivolt Readings

Testing an individual load cell signal output requires an IT Summing Junction box or millivolt meter.
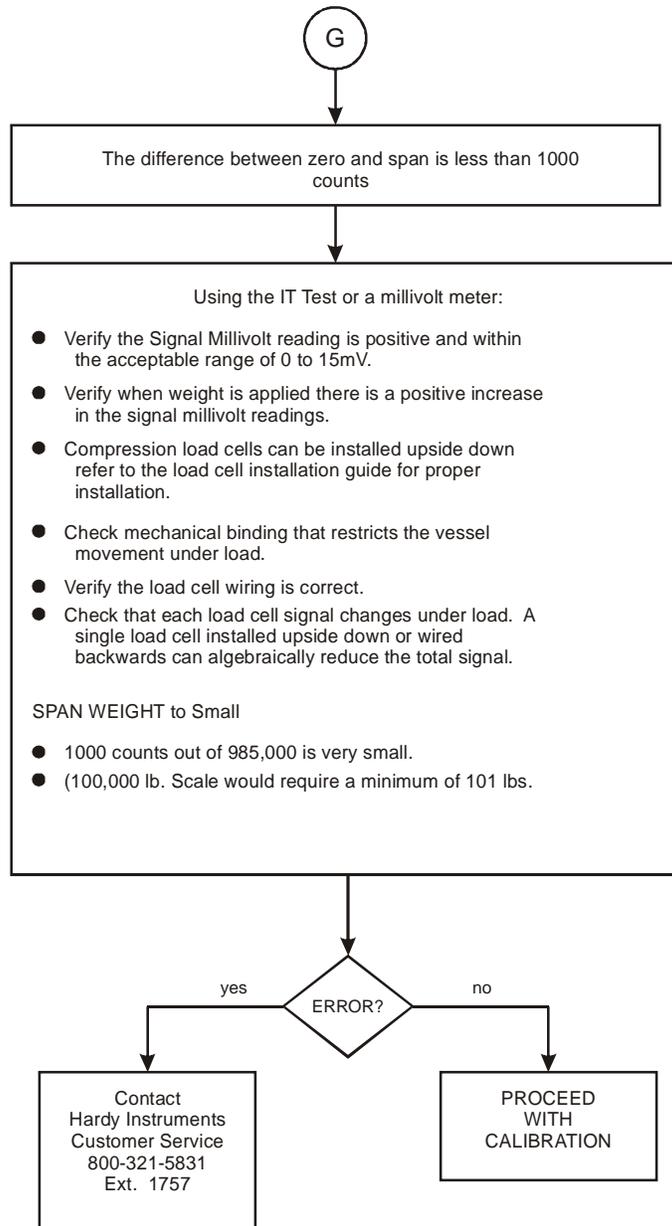
Use the load cell certificate to verify the millivolt per volt (mV/V) rating:

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.
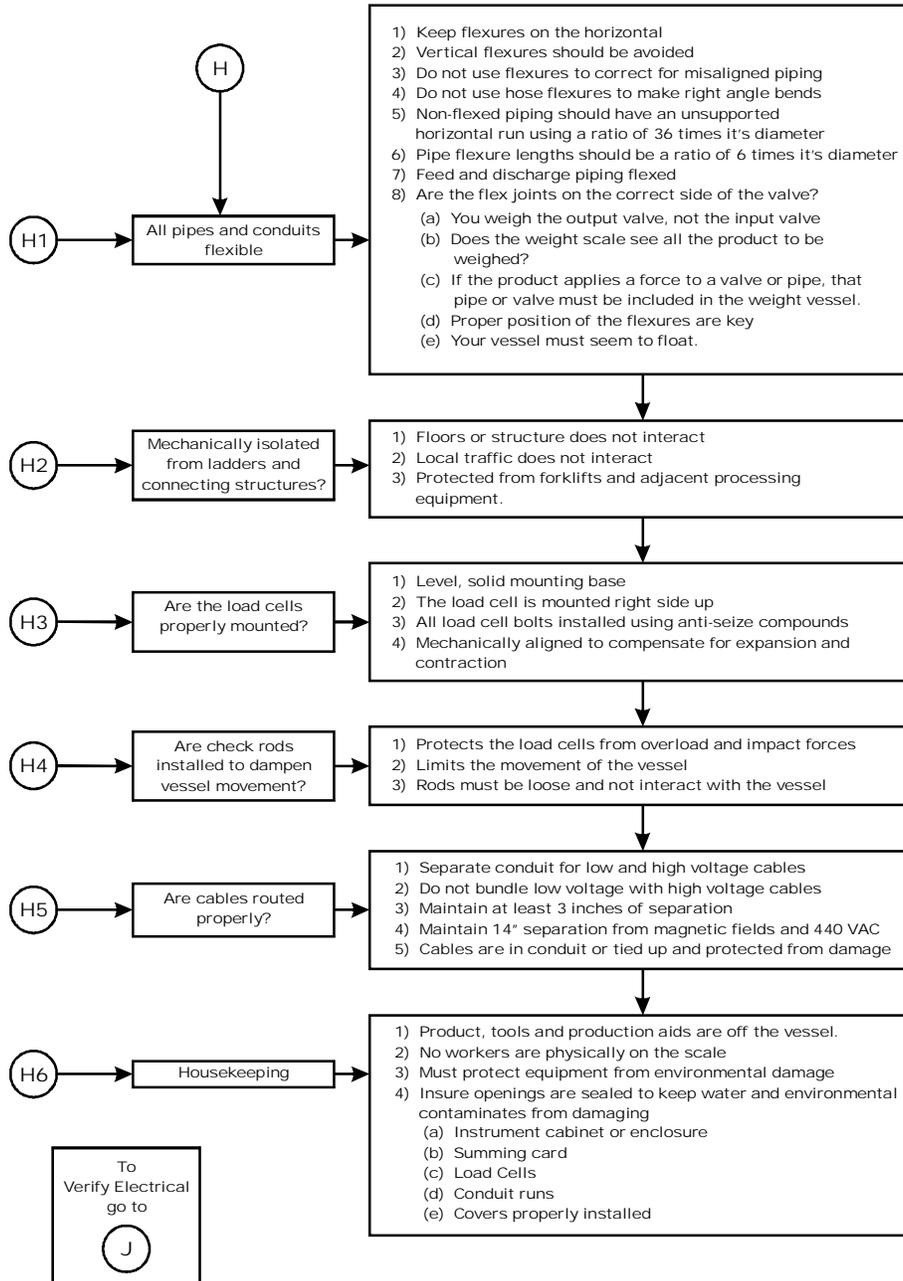
F

Press ENTER and arrow to TEST menu and run ITECH TEST Program

Select IT TEST MV ← **IT TEST Checks individual load sensor output mV readings**

Press ENTER to check load sensor

Record load sensor mV output level for comparison

Repeat for all load sensors

mV readings acceptable?

No

Yes

TEST COMPLETE

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**

Defective load Cell Replace and repeat TEST F

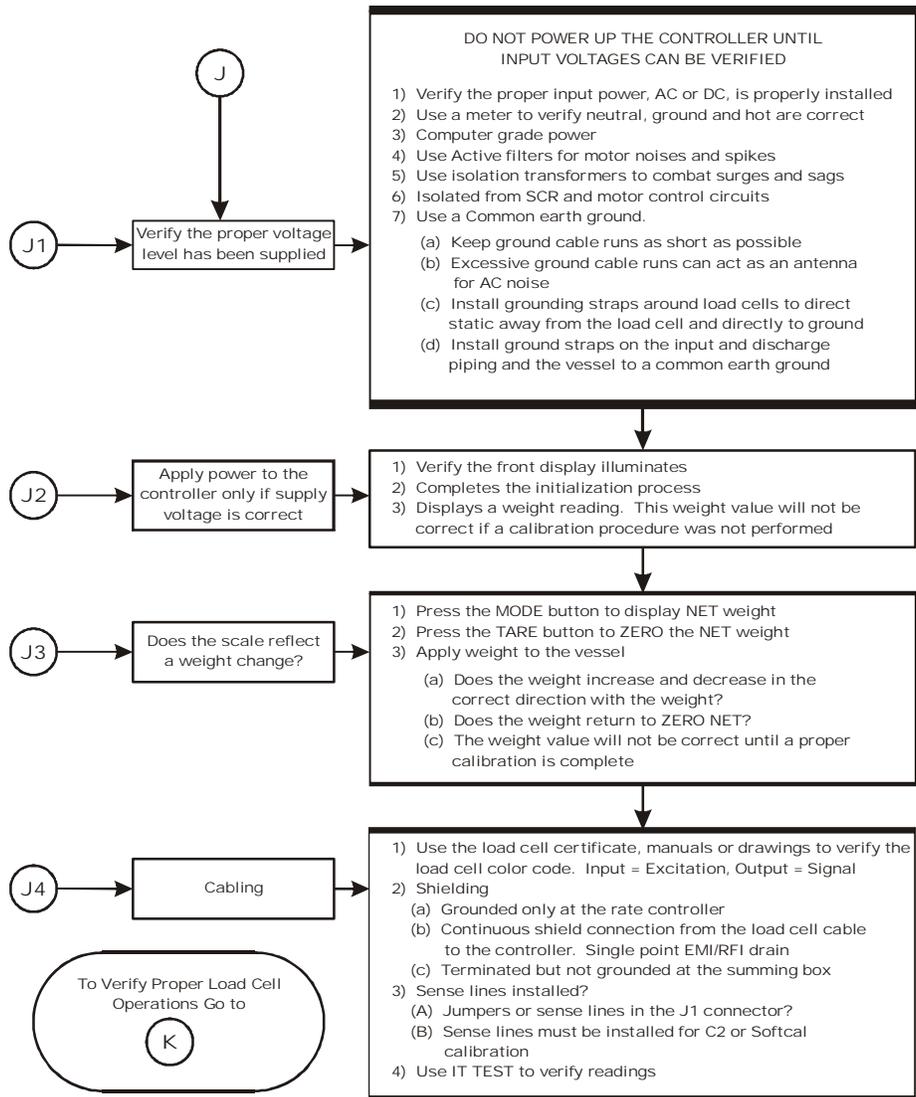# G - Calibration Failed: Not Enough Counts Between ZERO and SPAN

- This error only occurs at the SPAN parameter. You may ZERO out chains and temporary calibration equipment to hold or hoist test weights. Zeroing the temporary weight does not effect the calibration.
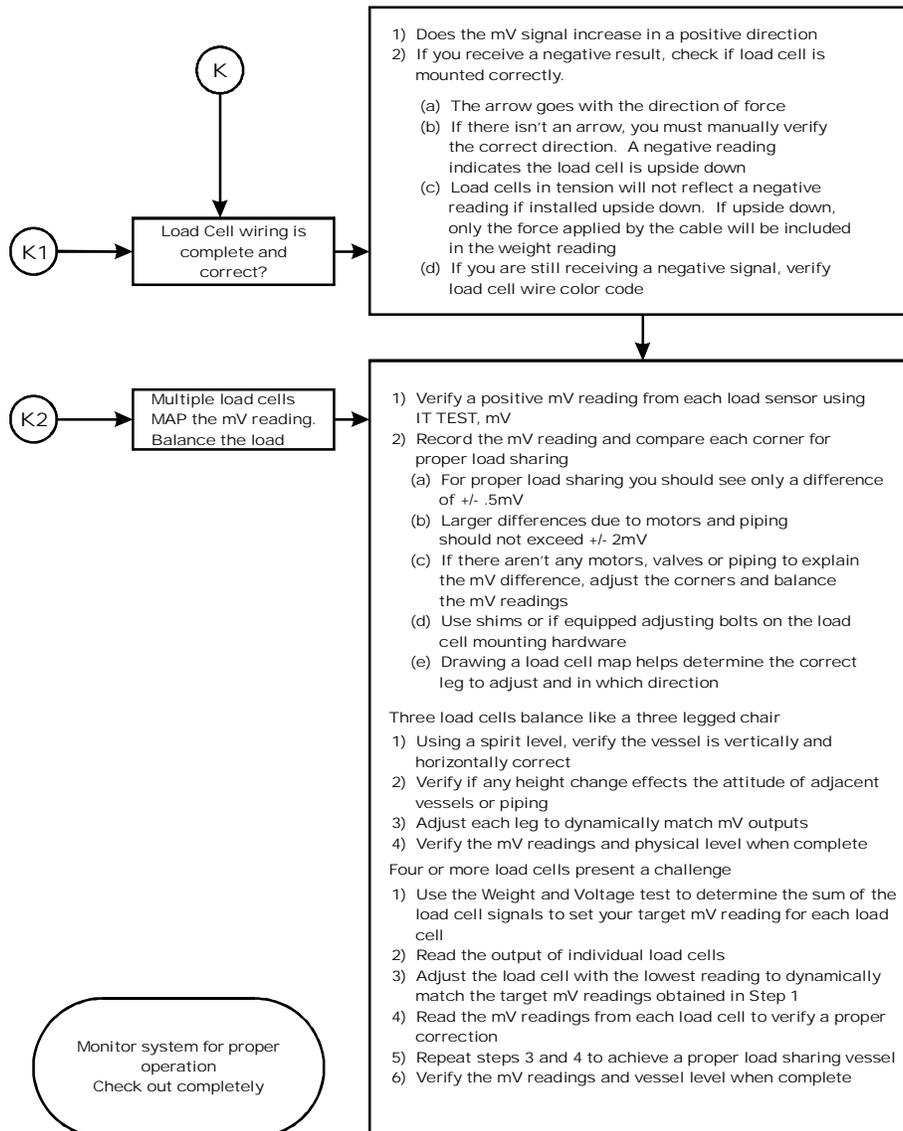
G

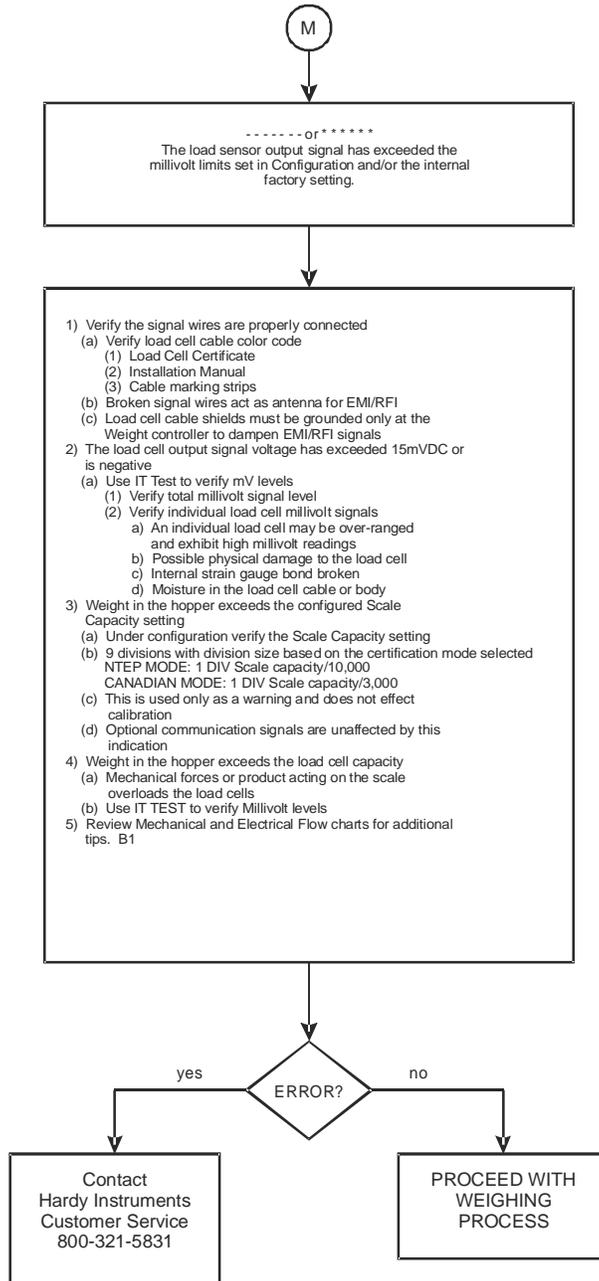The difference between zero and span is less than 1000 counts

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.

yes   ERROR?   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 rate 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 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

yes ◇ ERROR? no

Contact	PROCEED WITH
Hardy Instruments	WEIGHING
Customer Service	PROCESS
800-321-5831	

N - Rate Controller's Front Display is Blank

```
            (N)
             |
             v
      /‾‾‾‾‾‾‾‾‾‾\                          ┌──────────────────────────┐
     / Measure AC \         No              │ 1) Check for proper power │
    <   or DC Power >────────────────────►  │    and the source connection │
     \   OK?      /                         │ 2) Check the circuit breaker at │
      _____/                          │    the source            │
             │ Yes                          └──────────────────────────┘
             v
      /‾‾‾‾‾‾‾‾‾‾\
     / Measure    \          No
    <  excitation  >──────────────────┐
     \ voltage,    /                  │
      \ 5 VDC?    /                   v
       _____/            ┌──────────────────┐
             │ Yes           │ Disconnect all the │
             v               │ connectors from the │
   ┌──────────────────┐      │ back panel except │
   │ Contact          │      │ power            │
   │ Hardy Instruments│      └──────────────────┘
   │ Customer Service │                │
   │ 800-821-5831     │                v
   └──────────────────┘         /‾‾‾‾‾‾‾‾‾‾\
                               / Measure    \      No
                              <  excitation  >──────────┐
                       Yes     \ voltage,    /          │
                        ┌──────  \ 5 VDC?    /           │
                        │         _____/            │
                        v                               v
   ┌──────────────────────────┐              ┌──────────────────┐
   │ 1) Reconnect the jacks one│     No       │ Contact          │
   │    at a time checking the │──────────►   │ Hardy Instruments│
   │    5VDC excitation.       │              │ Customer Service │
   │ 2) If reconnecting any jack│             │ 800-821-5831     │
   │    effects the 5VDC, check │            └──────────────────┘
   │    for wiring errors.     │
   └──────────────────────────┘
                        │ Display OK
                        v
                ╭──────────────────╮
                │ 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

Erratic Weight or Rate Control

This section explains how to resolve problems relating to rate and Rate of Change (ROC) calculation, Rate Exception Control (REC), motor speed control, and weight calibration.

1   **Rate calculations**

   a   Rate calculations are no better than the scale's calibration accuracy. Verify the scale calibration using test weights.

   b   Follow the weight troubleshooting flow charts and correct any equipment binding, rubbing, and piping problems.

   c   After an initial rate calibration on a new system, repeat the calibration several times to ensure consistency, and verify that calibration using the posted weight loss over time.

   d   If the rate displayed does not match your test samples:

      (1)   Re-calibrate the weight and then the rate.

      (2)   Review the troubleshooting tips for mechanical influences relating to the feeder mechanism

      (3)   Look for leaks in the delivery system or refill gate.

   e   If the system is slow to change rate (or weight) readings.

      (1)   Adjust the number of averages setting.

      (2)   Adjust the WAVERSAVER setting.

      (3)   See 4 below.

   f   Look for a systematic and consistent weight loss. Determine what a stable rate should be. If the weight displayed on the monitor continuously falls and rises and you never get a stable rate or symmetrical weight loss pattern:

      (1)   The rate may be too slow for the load call capacity.

      (2)   The material may be bridging or liquefying and basically inconsistent.

      (3)   The feeder motor may be feeding too fast, mechanisms may be damaged, or working conditions may not be right.

2   **ROC calculation**

The ROC reading does not necessarily indicate a smooth weight loss. The amount of ROC control required depends on the material currently being fed.

   a   Since ROC calculations are developed from the weight reading, the weight reading must be correct.

   b   The Loss In Weight (LIW) ratio is calculated from the total scale load cell capacity. If an LIW rate error greatly exceeds the weighing error:

(1) Add decimal points up to 1 part in 50,000 to help determine the ROC.

(2) Balance the WAVERSAVER setting and averages.

3 **Motor speed control output signal**

a If the motor speed control output signal indicates a problem, but the voltage and current levels measured on the terminals is correct:

(1) Adjust the OP% out in manual mode.

(2) In the ON condition, verify that the output signal matches the percentage of full range. For example: 50% of a 0-10V signal should read 5 VDC at the analog out terminal.

(3) Adjust the WAVERSAVER setting and averages.

b If the output is properly wired back to the motor speed controller, verify that the Option parameters for that analog out are set correctly and that the HI 4060 analog signal is reaching the corrected controller terminals.

NOTE   *Hardy Process Solutions Inc. does not provide motor speed control converters. Consult the motor speed controller manufacturer's manual for troubleshooting and settings.*

4 **REC +/- settings**

a The rate exception control display indicates whether the controller is running within the requested range. If an out-of-range rate does not correct itself in the REC time allowed, the RE+ is displayed to indicate the direction. While this may indicate that the rate is too small for the scale's accuracy or resolution, the reading can be used to determine the effect of parameter and mechanical adjustments on improving the material flow control.

b The visual indicator does not activate corrective action, but during auto rate calibration the PI settings are adjusted to optimize the flow rate for your feeder settings and material. The display shows the speed of oscillation and can be used to view the effect of correction or adjustments to the PI settings.

(1) P = 0-100% correction factor. P determines the amount of action or reaction that is made in response to an out-of-range rate indication

(2) I = the speed of that action/reaction. This value normally requires only a small adjustment. (0.2 increments) If the rate is always high, reduce the I. If it is always low, increase I.

5 **The feeder fails to stop in HOLD, STOP or IDLE**

a Determine whether the motor speed control goes to the low setting.

(1) Verify with a multimeter.

(2) Follow the speed control manufacturer's troubleshooting guide(s) to determine the malfunction.

(3) Verify that the Analog out is returning to the low parameter setting as set in the Options menu for that analog out channel.

NOTE   *Send a Stop or Hold signal when a stop condition occurs. Do not rely on the analog signal to stop the feeder.*

Tests and Diagnostics

The Test and Diagnostics menus provide an expanded view of how the rate controller and scale are working. 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.

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 learn the serial number, model number, firmware revision number, and other information you may want to record. A Hardy representative may ask for this information if you make a request to Technical Support.

Diagnostic testing from the Web page

Select Operation on the Home Page to open the Operation - Choose One menu.

Select Diagnostics to open the Operation-Diagnostics page.

While the page provides serial number, model number, firmware revision number, etc. the tests and related options are listed as hypertext links at the bottom of the page.
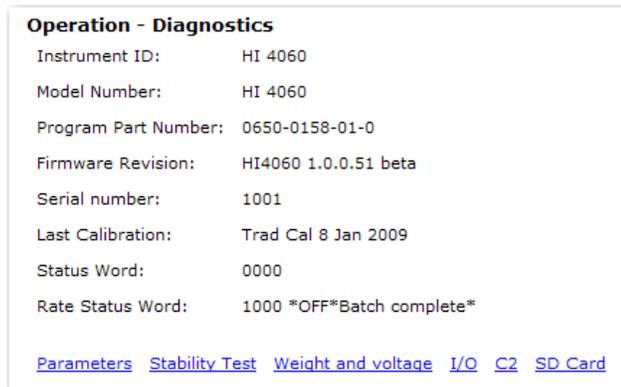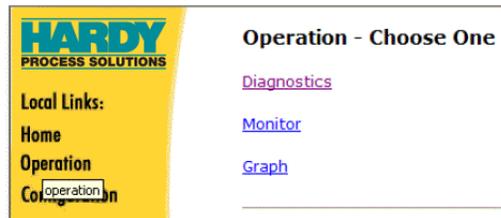
Front panel test menu

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

```
   0.000              0.000
Configuration       Test
> Test   ➜          > ProgPN ➜      0650-158-01
   Security            Stability Test
          EXIT   CLR            EXIT   CLR
```

The test menu not only 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 read the informtion. If an arrow follows the options, press Enter to see the display.

```
   0.000              0.000
Test                Firmware Revision
> Firmware Revision ➜   HI 4060 1.0.0.0
   Model HI 4060
          EXIT   CLR            EXIT   CLR
```
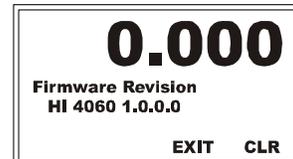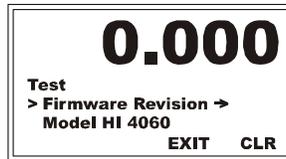
ProgPn# = Program Part Number. This is the part number of the firmware. To see the entire part number, select ProgPN and press Enter.

```
   0.000              0.000
Test                Test
> Model Number ➜ HI 4060   > ProgPN ➜      0650-158-01
   ProgPN   0650-0158-01-     Stability Test
          EXIT   CLR            EXIT   CLR
```
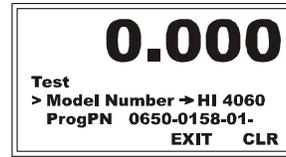
NOTES   *The values entered in the Test Menu are for illustration purposes only. Your values will vary.*

To download the latest firmware version, see the HI 4060/Downloads site at: http://www.hardyinst.com/4000_support/downloads/4000downloads.php.

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 4060 either to use in configuring another HI 4060 or for sending a copy of your parameters to support@hardyinst.com.

To copy the parameters:

Step 1.   Right click in the parameter list.

```
Operation - Diagnostics
Parameter Dump

Other Parameter IDs

00000001 Unit=0 [lb]
00000002 Weight Decimal Pt=2 [2]
00010002 Rate Decimal Pt=2 [2]
00020002 Total Decimal Pt=1 [1]
00030002 Batch Decimal Pt=2 [2]
00000003 Grads=0 [1]
00000004 Operator ID=
00000005 Instrument ID=HI 4060
00000006 WAVERSAVER®=4 [0.50 Hz]
00000007 Num Averages=10
00000009 Low Pass Filter=1 [ON]
0000000A Gain In Weight=0 [NO]
0000000F Capacity=330.00
00000201 Span Weight=5.00
00000202 Ref Weight=0.00
0000002A Baud Rate:=5[19200]
0001002A Data bits:=1[8]
0002002A Parity:=0[NONE]
0003002A PrintMode=0[BATCH REP]
000002F2 scratchpad=6.000000
Save
```

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 hyperlink at the top of the parameters list. To view all the other parameter settings, click that link.
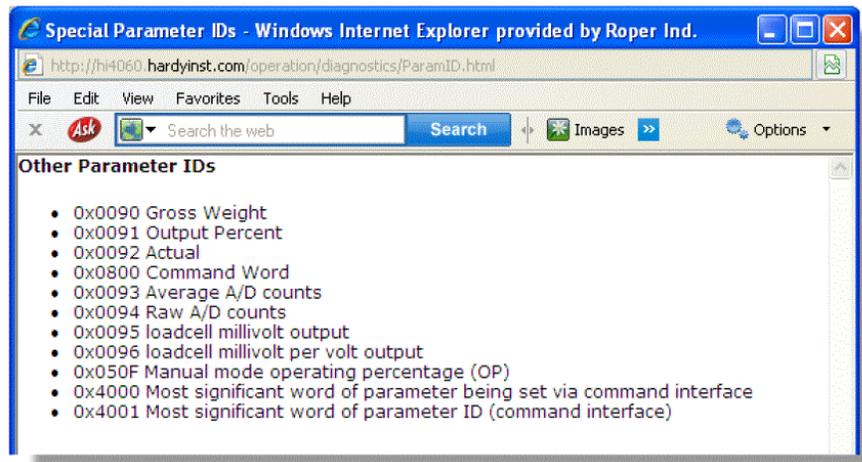
System and Load Cell Tests

Overview of Typical Load Cell System

The typical load cell system consists of one or more load cells/points, a summing junction box, and an HI 4060 Rate Controller.

Load Cell/Sensor/Point - is a strain gauge based force transducer that generates an electrical signal proportional to the load applied to the scale. Tension or compression type load cells/points can be used to measure pressure, load, or torque.
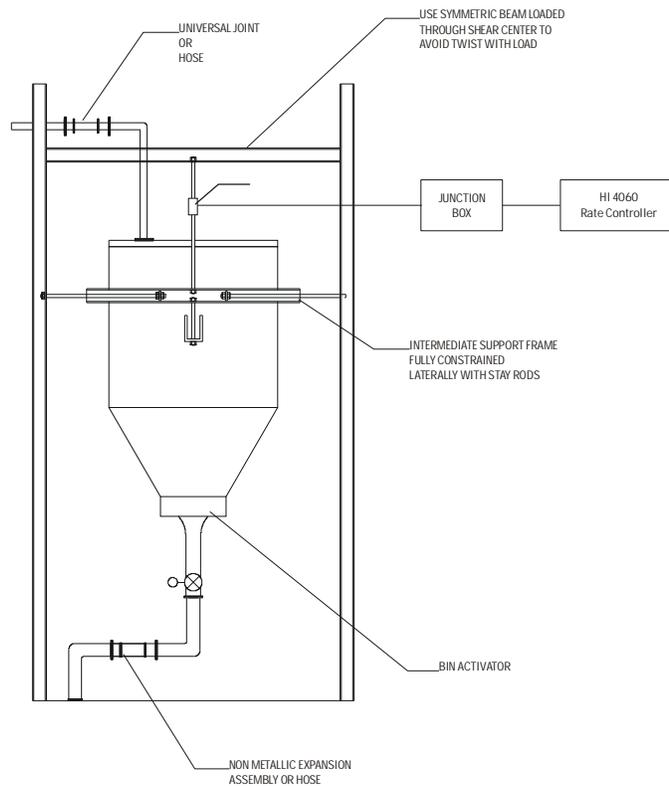
The load cell/point takes as an input the 5 volts DC Excitation Voltage generated by the HI 4060. It generates a millivolt output proportional to the weight on the scale (0-10mv DC for 2mv/V load cells/points or 0-15mv DC for 3mv/V load cells/points).

Rate Controller - is the part of the HI 4060 instrument that, among other functions:

- Powers the load cell(s)/point(s)
- Reads the millivolt signal output from the load cell(s)/point(s)
- Digitizes, interprets, communicates and displays the results in terms of weight

INTEGRATED TECHNICIAN (IT®)

INTEGRATED TECHNICIAN (IT®) is an optional diagnostics utility that enables the operator to rapidly troubleshoot the individual load cells in a weighing system from either the front panel or Web interface. The option requires an HI 215IT Summing junction box, which provides separate inputs for each load cell.

If you have more than one load cell without the HI 215IT Summing junction box, there is no way to isolate the load cell signals. The system can return either an average numerical value or a PASS/ FAIL value for the test. If any load cell fails, the test will fail without identifying the problem load cell

If you have more than one load cell with the HI 215IT Summing junction box, the system can provide both the average numerical values and values specific to each load cell, with PASS/ FAIL values by load cell. The number for a load sensor is based on the connections in the IT junction box.

Operation - Diagnostic Integrated Technician

Sensor No.	weight	mV/V	mV	RTZ	variation
Sensor 1	1.449430	0.1201	0.6	PASS	3.59
Sensor 2	-0.993904	0.0336	0.2	PASS	3.88
Sensor 3	-6.785617	0.0661	0.3	FAIL	2.82
Sensor 4	8.293720	0.0586	0.3	FAIL	3.33
Reference		1.9867	9.9		31.51

Check the installation sequence in the box to determine which load sensor is number 1, 2 and so on.

If you do not have the optional IT junction box, some of the options described below will not appear on either interface.

NOTE

Warning: Do not install your HI 215IT summing board in areas that are susceptible to high vibrations since the relays on the summing board can "chatter" and affect your weight readings.

Running the IT test from the Web interface

The IT Web page shows all the weight and voltage values at once, so it is the preferred way to view the test results. If the IT option is installed on your system, click "Do IT Test on the Operation - Diagnostics page. If more than one load sensor is connected, the display will show them all, as shown above.

Operation - Diagnostic Integrated Technician

Sensor No.	weight	mV/V	mV	RTZ
Sensor 1	0.008226	0.0512	0.3	PASS

Running the IT test from the front panel

Step 1.   From the Test menu, select Weights and Voltages.

Step 2. Select IT Test and press Enter to list the sensors, then select the sensor to test.

```
        0.000
Weight and Voltages
> IT Test    ➔
   mV/Volt        0.2439
              EXIT    CLR
```

```
        0.000
IT Test
> Sensor 1➔

              EXIT    CLR
```
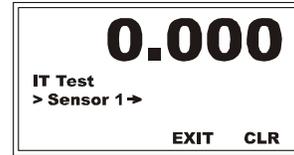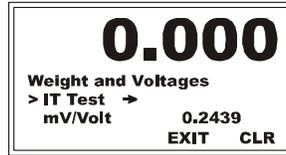
Step 3. Press Enter to display that sensor's test readings.

Step 4. To read the test results press the down arrow.

```
        0.000
Sensor 1
> Wt            1.0685
   mV/V         0.0566
           EXIT    CLR
```

```
        0.000
Sensor 1
> mV               .3
   RTZ            Pass
           EXIT    CLR
```

Step 5. Press Exit to return to the Sensor Menu. If you want to test other load sensors select the sensor and repeat steps 1 through 5 above. Otherwise press Exit again to return to the It Test Menu., and press Exit again to return to the Test Menu.

Understanding the Tests

To determine if an instrument or cabling problem exists, verify the basic operation of the system by performing the following system checks.

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 Stability test switches a fixed signal into 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.**

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 4060 runs the test and shows the results.

```
        0.000
Test
> Stability Test  ➔
   Weight and Voltage
              EXIT    CLR
```

```
        0.000
Stability Test
> Pass, var = 3.70
   A/D Raw Count      7258
              EXIT    CLR
```

```
        0.000
Stability Test
> Fail, var = 86.50
   A/D Raw Count      7258
              EXIT    CLR
```
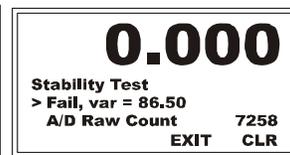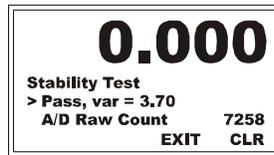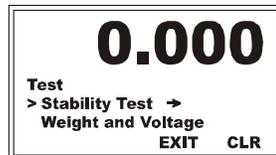
Step 2. To see the AD/Raw Count and the A/D Average select them from the menu.

Step 3. Press Exit to return to the Test Menu.
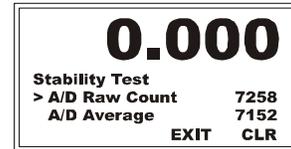
Running the Stability Test from the Web Interface

Select Stability Test at the bottom of the Operation-Diagnostics page. The instrument will run the test and post the results after a few seconds.
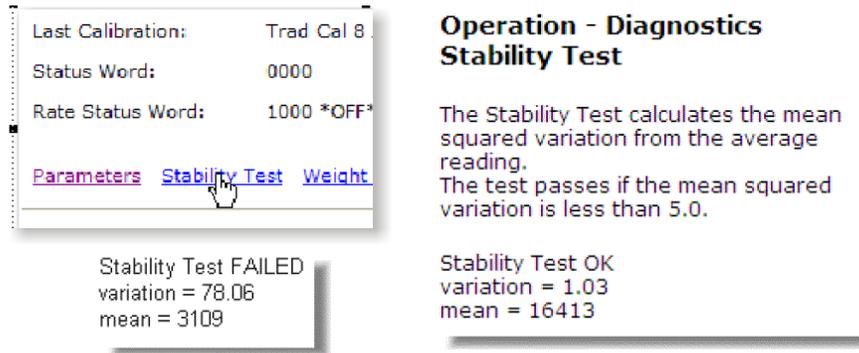
Weight and Voltage Test

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).

Running the IT test will show the weight and voltage results for each load sensor, including the following values:

Weight: Weight value recorded on the sensor

mV and mV/V: mV 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. These readings allow you to determine if the problem is in the instrument (internal) or in a load sensor(s) (external). The normal specification range for the Rate Controller is 0-15 mV. Readings outside this range (15.5 mV, 3.1 mV/V Maximum or any negative values), indicate an external problem. (most likely improper wiring).

When you check the results, if all the load sensors read 0.00, something is probably wrong between the HI 4060 and the HI 215IT junction box, e.g., the cable may be disconnected. Something could also be causing the box to not transmit the readings to the HI 4060.

If you get no reading for one or possibly two or more load sensors (e.g., Sensor 3 reads 0.00 or the reading is larger or smaller than it should be) and you know that the sensors are connected to the junction box, either the load sensor is malfunctioning or its cable to the junction box is loose or miswired.

Running the Weight and Voltage Test from the Web interface

Click on Weight and Voltage to open the
Operation/Diagnostics - Weight & Voltage page, shown
below.
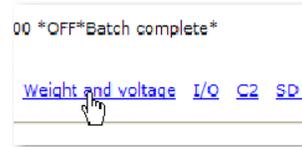
Running the Weight and Voltage Test from the front panel

Step 4. Select Weight
and Voltage and
press Enter to
run the test and
view results.
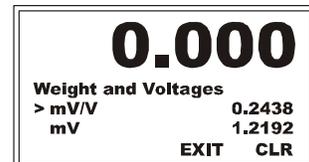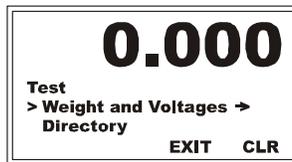
Step 5. To read the rest of the results, press the down
arrow. The weight and voltage/reading raw
counts and average are shown to the right.
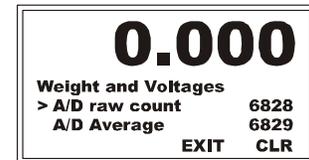
Directory

The Directory contains the list of the ingredient files saved to non-volatile memory. The
filenames of ingredient files have .ing extensions. Files with other extensions may be listed,
but only the .ing files are ingredient files.

Step 1. From the Test
menu, select
Directory and
press Enter to
list the ingre-
dient filenames.

Step 2. Press the right or left arrow to see the entire list.

Step 3. Press Exit to return to the Test Menu.

Checking Inputs and (Optional) Outputs

The I/O test option, listed on the bottom of the Operations - Diagnostics page, allows you to see which inputs (user switches) or outputs are operating by clicking on I/O.

Click I/O 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 are being used so they all read 0. (To return to the Diagnostics page click on the back arrow.)

Viewing System C2 Load Sensors

This test tells you how many C2 load cells are in use. You can also learn the version, serial number, output resistance, output voltage, and capacity for a selected C2 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 C2 at the bottom of the Operation - Diagnostics page

to open the Operation - Diagnostics C2 Data page. This page shows the number of C2 load sensors that are found in the weighing system. The default sensor information is for the first load sensor to respond.

NOTE   *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 load sensor's condition and position, use the Weight and Voltage/IT Test.*

Step 2.   On the Read Data from pull-down list, select the C2 load sensor to view; then click Read Sensor to display for that sensor. Our example shows only one C2 sensor found. If no C2 load sensors are installed, "C2 Sensors Found" will read 0.

Step 3. Click on the back arrow to return to the Diagnostics page.

Viewing the SMM-SD Card

If your computer has an SD card reader you can read and modify the contents of the base (PARAMS.TXT) files on the SD Card page. Click the SD Card link to open the page

It shows the Write Protect status and lists the base directory with the files where the non-volatile memory is located for the HI 4060.

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.
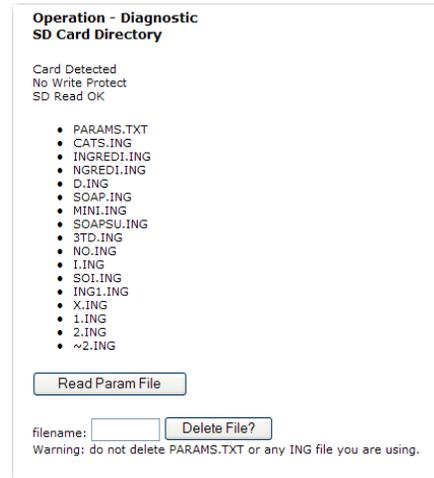
NOTE

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. There is storage for more than 100 ingredient files.

Event Log

The event log lists the time and date of power-up events.

Click the Event Log link at the bottom of the Operation - Diagnostics page to display the read-only log.
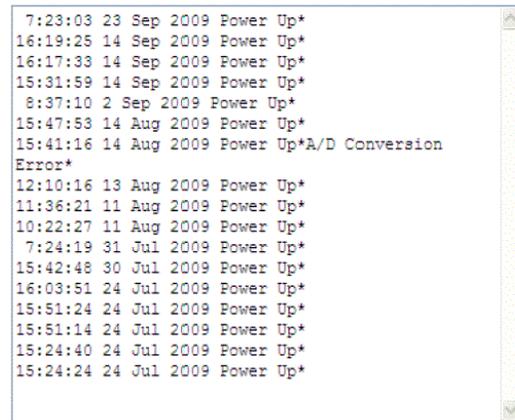
Using the Ping Tool to Test the Network Connections and Configuration

The Ping Tool is used from the Start > Run of the PC.

Selecting the module by number for ping testing

Step 1.   Type PING <space>IP address of the instrument you want to test. For Example:

PING 192.168.110.99

Step 2.   In our example we used the default address for all HI4060 Series Instruments. The IP address you are testing will be different.

Step 3.   Press the Enter key on the PC.

Step 4.   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 are configured incorrectly and cables are loose or not connected correctly, nothing prints out after the first line, check the Network cables and connectors to be sure they are tightly fastened and the correct cables for this application. Also, check the configuration to be sure that the instrument is configured correctly. (See Configuration IP Address in Chapter 4)

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

Hardy Process Solutions provides world-wide support for its products. The following paragraphs describe Hardy's customer support services and equipment warranty. When returning a product, call the Technical Service Department listed below for a Return Authorization Number. You will need to provide your company name, address, telephone number, equipment model number, S/N, and a brief description of the problem.

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.hardyinst.com/service/repair.php*

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.hardyinst.com/Service/term.php

Ordering Replacement Parts

Contact the Hardy Sales Department to order replacement parts and option boards. Have your equipment model number and serial number ready.

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.
- Service: Engineers are trained and qualified to provide on-site installation, calibration, and maintenance.
- 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 which allow you to service your equipment.

Software Downloads for Your HI 4060

To access the software, drawings and documentation that Hardy Process Solutions has made available for downloads:

Step 1.   In a web browser, go to www.hardysolutiions.com Site, and click Products, Weighing Instruments, Rate Controller, HI 4060.

Step 2.   Click the tab Documents & Downloads. Downloads are divided into categories.

Step 3.   This will display the screen shown below which can be used to download software for HI 4060 Rate Controller

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-4060 rate controller firmware to a common directory on the same network as the rate controller.

Step 1. On the Hardy HI 4060 Downloads page (shown above), right click on the Update link and use the Save Target As menu option to save the file.

Step 2. Under HI 4060 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 directory. You would then open the Zip file, which contains several files. You can rename the firmaware, 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.
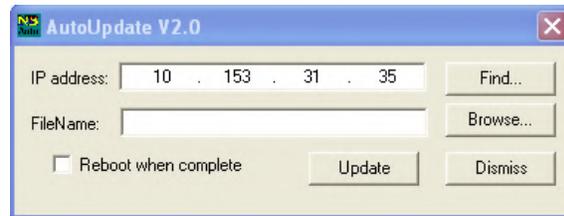
Step 4. Click Find to search for and list the units that are online on this network.

Step 5. Select the IP address of the unit you want to upgrade.
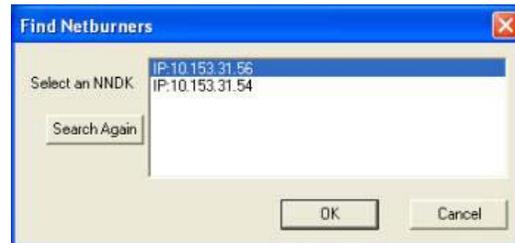
Step 6. Click Browse to find and select the firmware file you downloaded.
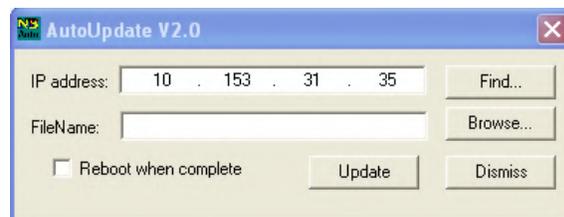
Step 7. Once you have the IP address and the file selected, click on the Update button.

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 4060 unit.

FOR FURTHER INFORMATION CONTACT:

Technical Service Manager
Hardy Process Solutions
9440 Carroll Park Drive, San Diego, CA 92121
Telephone: +1 (858) 278-2900
FAX: +1 (858) 278-6700
Web Site: http://www.hardysolutions.com
E-Mail: hardysupport@hardysolutions.com

Appendix A
About Time Zones

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

GREENWICH TIME ZONES (GMT)

GMT	Civilian Time Zones	Cities
+3:30		Tehran, Iran
+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 11. Check the Greenwich Time Zones Table for the time zone you are in.

Step 12. Press the right or left arrow until the correct time zone appears. For example Pacific Standard Time is -8.

Step 13. Press the Enter button to save the entry.

Step 14. Press the Down arrow until the cursor is in front of Time-Year.

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