

Technical Publication PH011

Hardy 4050

with WEVERSAVER+

*Parameters and Setup
Procedure*



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Hardy 4050 Description & Part Numbers

This document describes the necessary steps to setup the **Hardy Instruments HI-4050** weight controller used in Heat and Control's loadcell based seasoning, weighing, and blending systems. It applies to the following HI-4050 models:

Hardy Part #	H&C Part #	Description	Voltage(s)
HI-4050-DR-DC-EIP-N2-N3	20558014	DIN rail mounting, DC power, Ethernet IP communication	24 VDC power only
Note: Although the calibration procedure for the unit below (analog) shares many of the same steps as the unit listed above (Ethernet IP), this document does not cover the entirety of the setup procedure for the analog unit at this time.			
HI-4050-DR-DC-N1-N2-4ANB	20558015	DIN rail mounting, DC power, 4-20mA output	24 VDC power only

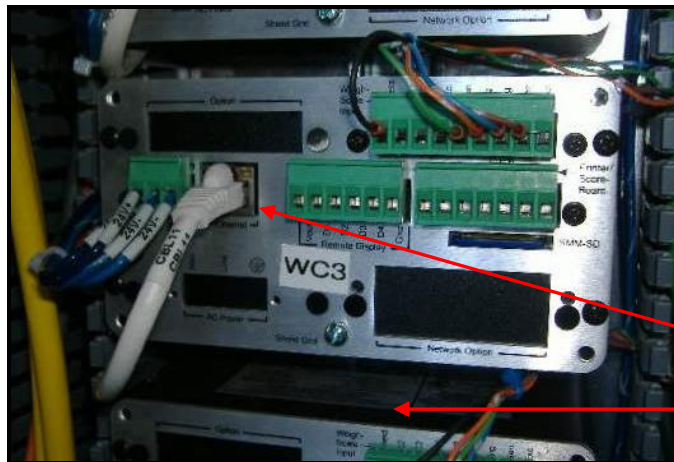
Note: This document does not cover **loadcell** calibration. Those steps are included in **TechPub PH017 – Loadcell Calibration / Drop Test.**

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Setup Procedure for Hardy Instruments 4050 Controller

Because the Hardy 4050 controllers mount on a DIN rail inside a control cabinet or in an accessory panel on a FastBack® conveyor as shown in the photos below, they do not have a display, which means that calibration, tare functions and PLC mapping instructions must be performed using another interface. These controllers are set up by connecting to them using their IP address and the RJ-45 connector on the back of each device (see Photo PH011-1).

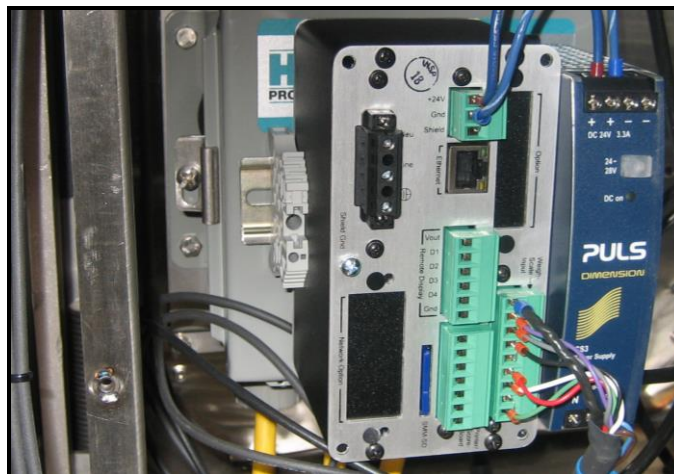


1a: The HI-4050 mounted in a control cabinet. Visible on the left side are the 24VDC power wires and the EtherNet/IP communication cable. In the upper right is the terminal connector for the load cell signal wires.

RJ-45 data port

Serial number sticker on top

Hardy HI-4050 Weight Controller Mounted in Control Cabinet



1b: The HI-4050 mounted in a 260E Gen2 FastBack accessory enclosure. Visible to the right of the controller is a typical dedicated 24VDC power supply (PULS unit). In an On-Machine Seasoning (OMS) application, the controller and power supply are mounted to the lid of the summing junction box where all load cell inputs are summed.

Hardy HI-4050 Weight Controller in 260E Enclosure

Photo PH011-1 – Typical Mounting Arrangements for the Hardy Weight Controller

Power Considerations

Heat and Control, Inc. follows Hardy Instruments' recommendation to have an isolated and dedicated power supply. AC and DC options are available, but Heat and Control has standardized on 24VDC power, because it provides the most stable weight signal. Figure PH011-1 is an excerpt from the HI-4050 manual that addresses the power requirements.

DC Power Input (-DC)

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

CAUTION:

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

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

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

Step 2. Connect the 24 VDC voltage wire, ground wire and shield wire to the connector that plugs into the DC voltage header at the rear panel.

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

Step 4. Apply VDC power to the unit.

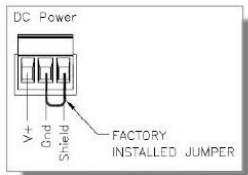


Figure PH011-1 – Hardy Instruments' 24VDC Power Supply Requirements

Weight Controller Setup Procedures (EtherNet/IP model):

The two main steps involved with properly setting up a weight controller whether it is a single weight controller or one of several controllers networked together through an Ethernet hub are listed below. The key to performing the setup is knowing what the IP address is for each device. In case that critical piece of information is not known, you will find instructions for acquiring it in Step #1.

- Step #1 – Initialize the parameters within the Hardy Instruments HI 4050 controller and map certain basic functions to the PLC, page PH011.6.
- Step #2 – Perform a zero and span calibration, page PH011.13.

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Step #1 – Initialize the Parameters within the HI-4050 Weight Controller

You will need the following items:

- **Laptop computer** with an RJ-45 data port.
- **Data cable** with RJ-45 plugs (**straight Ethernet**).
- **IPSetup.exe** (This application is available from the Hardy website free of charge or from the CD that comes with each HI-4050 weight controller. It is used to identify devices on the network by their IP address and allows the user you to re-assigning a unique, fixed IP address to any controller.)
- **Hardy 4050 Mapping.xls** (This file contains a detailed list of all the mapping instructions for various functions in the HI-4050 and I/O between the HI-4050 weight controller and a PLC).
- **Span Weights** totaling **1kg** (It is important that these weights are calibrated. The span weights used to calibrate Ishida scales are acceptable.) In the procedure, the amount of weight used is referred to as High Calibration.

Establishing Communication and Assigning a New IP Address

Using a laptop, a data cable and the Hardy software (IPSetup.exe), connect to any HI-4050 controller. If you do this through a hub or router, and there is more than one weight controller connected to that router, you will be able to see each device. However, since a calibration is one of the steps you will be performing, it is recommended that you connect to only one controller at a time by plugging directly into it or, if plugging into a router, disconnecting all but one controller, and working with it. Figure 11-2 below shows what a typical window would look like running IPSetup.exe. The application has found a controller with an IP address of 192.168.100.34 and Network Mask of 255.255.255.0. In the explanation that follows, the IP address of the controller was changed to 192.168.100.40

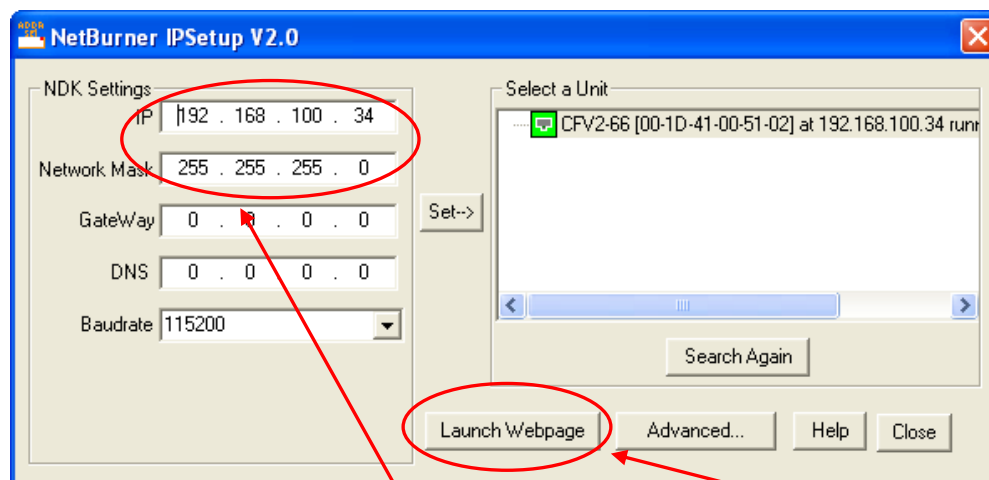


Figure PH00 11-2 – A typical window running IPSetup.exe

Change the IP address as needed (192.168.100.40) and press [Set→]. **DO NOT USE** "Launch Webpage", it is unreliable and will hang occasionally, forcing you to reboot your laptop. A typical IP Address for a single weight controller is **192.168.100.40**. Once an acceptable IP Address has been set in the controller or is known, the setup screens and parameter lists may be accessed in the HI-4050 via an HTML Webpage. (Open up your web browser and type the IP address in the browser window.)

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Once a fixed IP Address has been assigned for the weight controller, you must assign another IP Address in the LAN settings on the laptop. In this example 192.168.100.10 was used. The screen shot in Figure 11-3 below shows how this setting is made in a Windows 7 operating system. The laptop is configured with IP Address: 192.168.100.10, Subnet Mask: 255.255.255.0.

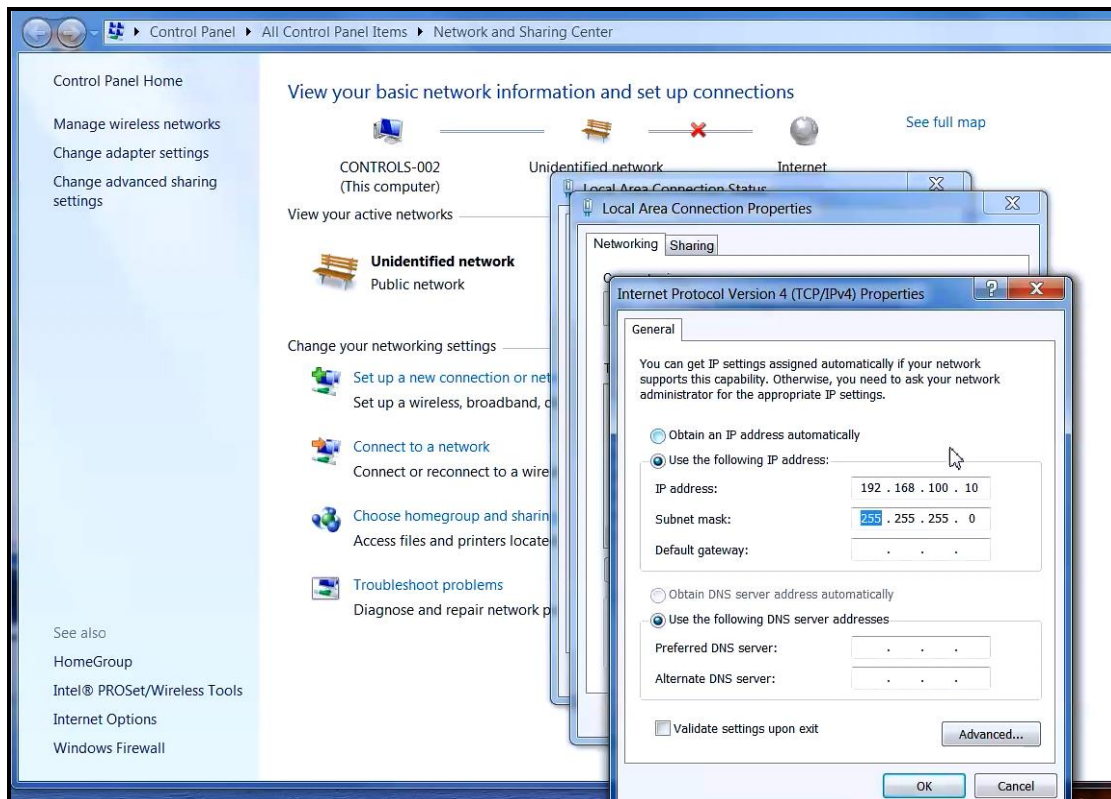


Figure PH011-3 – Configuring Laptop TCP/IPv4 Properties

When you enter the device's IP address in your Web Browser "http://192.168.100.40/", you should see the HI-4050 home page. See Figure 11-4 below. You are now online with the device and viewing the home page of the built in browser in the unit.

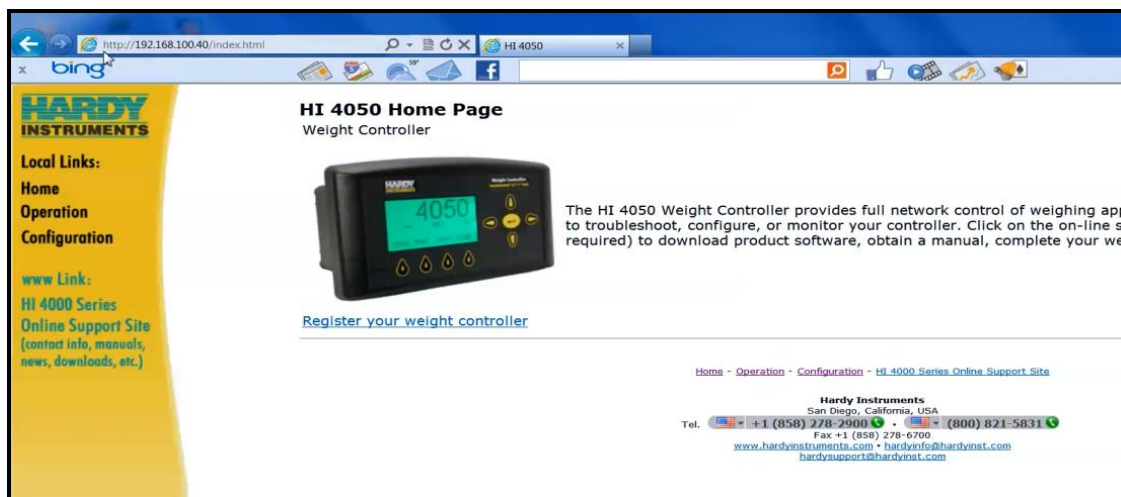


Figure PH011-4 – HI-4040 Home Page

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Configuring the HI-4050 Weight Controller

Step 1A in configuring the controller is to verify the Ethernet/IP data. From the home page, navigate to the Ethernet/IP screen by selecting Configuration, then Options and then Ethernet/IP. A valid Ethernet/IP Key should already be loaded. Next, verify that the input and output bytes are both set to 100. If you make a change, press the **[Save Parameters]** button and cycle power to ensure the new settings are active. The screen will look like the one in Figure 11-5.

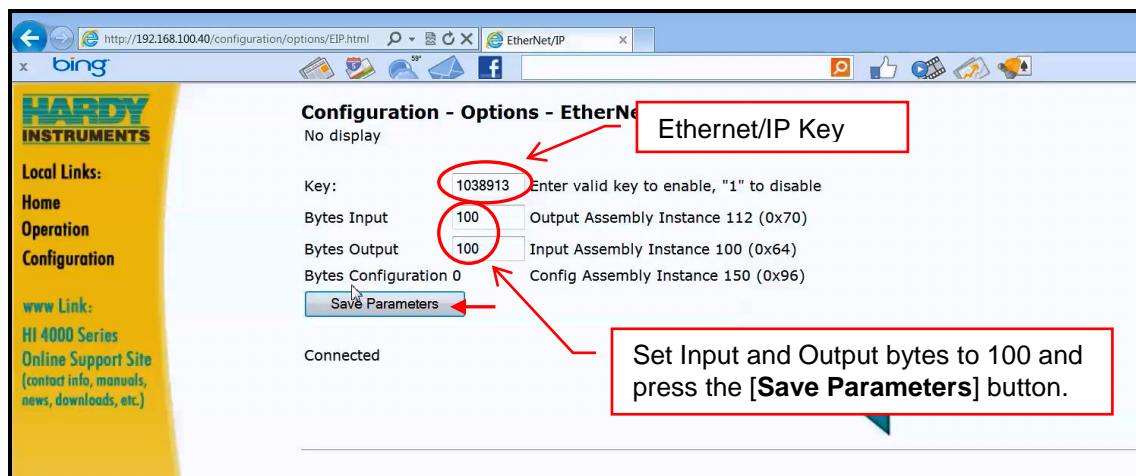


Figure PH011-5 – Checking Ethernet/IP Key and Input/Output Bytes

Step 1B in configuring the controller is to check and confirm the Mode and Type of Control, which should be set to “Gross” and “Loss in Weight” respectively. The values for Target, Preact and Deadband are not relevant for this application and should be set to 0.000. Figure 11-6 below shows what that screen looks like. To navigate to this screen from the Home Page, select Configuration and then Adjust Setpoints. Press the **[Save Parameters]** button before doing anything else.

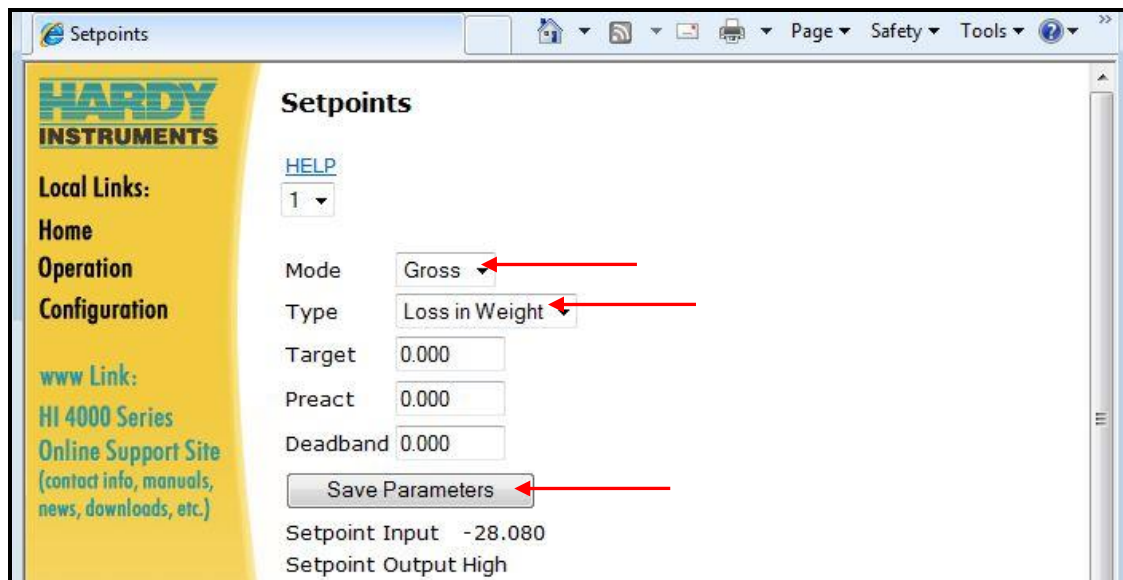


Figure PH011-6 – HI-4050 Instrument Setpoints Screen

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HARDY
PROCESS SOLUTIONS

Local Links:
HOME
OPERATION
CONFIGURATION

www Link:
HI 4000 Series
Online Support Site
(Contact Info, Manuals, News, downloads, etc.)

See descriptions below

Configuration - Instrument Setup

No display
[HELP](#)

Unit: kg

Instrument ID: HI 4050

Operator ID: Scl

Decimal Point: 3

Grads: 1

A/D conversion rate: 250

Number of Averages: 3

WAVERSAVER® variation_thd: 0.25 Hz

motion_thd: 0.000

Motion Tolerance: 0.060

Zero Tolerance: 10.000

AutoZero: OFF

AutoZero Tolerance: 0.180

Tare Weight: 0.000

Scale Capacity: 20.00

Certification: None

Hardy Port: 1024

LCD Contrast:

Unique name per Hardy unit

Increase for more filtering

Decrease for more filtering

2 load cells at 10 Kg each, but can be set to the maximum kg that the scale could handle without over flowing (i.e. 40 kg).

Figure PH011-7 – HI-4050+ Instrument Setup screen, typical Blending System settings

Decimal point: Sets the number of decimal places the controller will resolve (3 = 0.001kg resolution)

Grads: Sets the rounding for the weight reported (1 means the weight reading will change in 0.001kg [1 gram] steps)

Number of Averages: Range: 1-255 (Large numbers provide more smoothing, but lengthen the load cell's settle time.)

WAVERSAVER®:

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Step 1C in configuring the controller is to set the units (kg), the display resolution, and the amount of averaging inside the controller.

From the Home Page, select Configuration and then Instrument Setup. The screen will look similar to that in Figure PH011-7 above.

Press the [**Save Parameters**] button before doing anything else.

Table PH011-1 has parameter values for several applications.

HI-4050 Parameter:	OMS or WeighBack		Blending	
	(2) 20kg load cells	(3) 20kg load cells	(2) 10kg load cells	(3) 10kg load cells
Unit	kg	kg	kg	kg
Instrument ID ¹	HI 4050 (user option)	HI 4050 (user option)	HI 4050 (user option)	HI 4050 (user option)
Operator ID ²	Scale (user option)	Scale (user option)	Scale (user option)	Scale (user option)
Decimal Point	3	3	3	3
Grads	1	1	1	1
A/D Conversion Rate³	250	250	250	250
Number of Averages	75	75	3	3
WAVERSAVER®	0.50 Hz	0.50 Hz	0.25 Hz	0.25 Hz
Variation_thd³	0.000	0.000	0.000	0.000
Motion_thd³	0.000	0.000	0.000	0.000
Motion Tolerance	0.180	0.180	0.060	0.060
Zero Tolerance	10.000	10.000	10.00	10.00
AutoZero	OFF	OFF	OFF	OFF
AutoZero Tolerance	0.180	0.180	0.180	0.180
Tare Weight	0.000	0.000	0.000	0.000
Scale Capacity	40.00	60.00	20.00	30.00
Certification	None	None	None	None

1. – Users may assign names to each controller. This may be very useful when troubleshooting.

2. – Users may also label each controller by function or some other descriptor.

3. – The Hardy model “4050 with WAVERSAVER+” includes this variable. The previous generation model, does not.

Table PH011-1 – Parameter Values for Various Applications

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Step 1D is to map certain inputs and outputs between the HI-4050 weight controller and the PLC. Navigate to this screen from the Home Page by selecting Configuration and then Mapping. This is where you will define what data will be transferred over the communications link. Until you define equations for data to be transferred, you will not receive any data in the PLC. You will notice that the top selections are designated as Destinations and below them are possible sources. First you will choose the destination, then you will choose the source of the data you are transferring. In this case, we have compiled a mapping equation for this application which you may use.

1. Copy and paste the following equation into the mapping field shown in Figure PH011-8 below:

**EFO0=+HFI0, EFO2=+HFI1, ESO4=+HSO1, ESO5=+HSO2, ESO6=+HSI1,
HFO13=+EFI0, HFO12=+EFI2, HSO2=+ESI4**

2. Click on “Map” to write the equation to Hardy controller.
3. Verify the mapping instructions were saved.

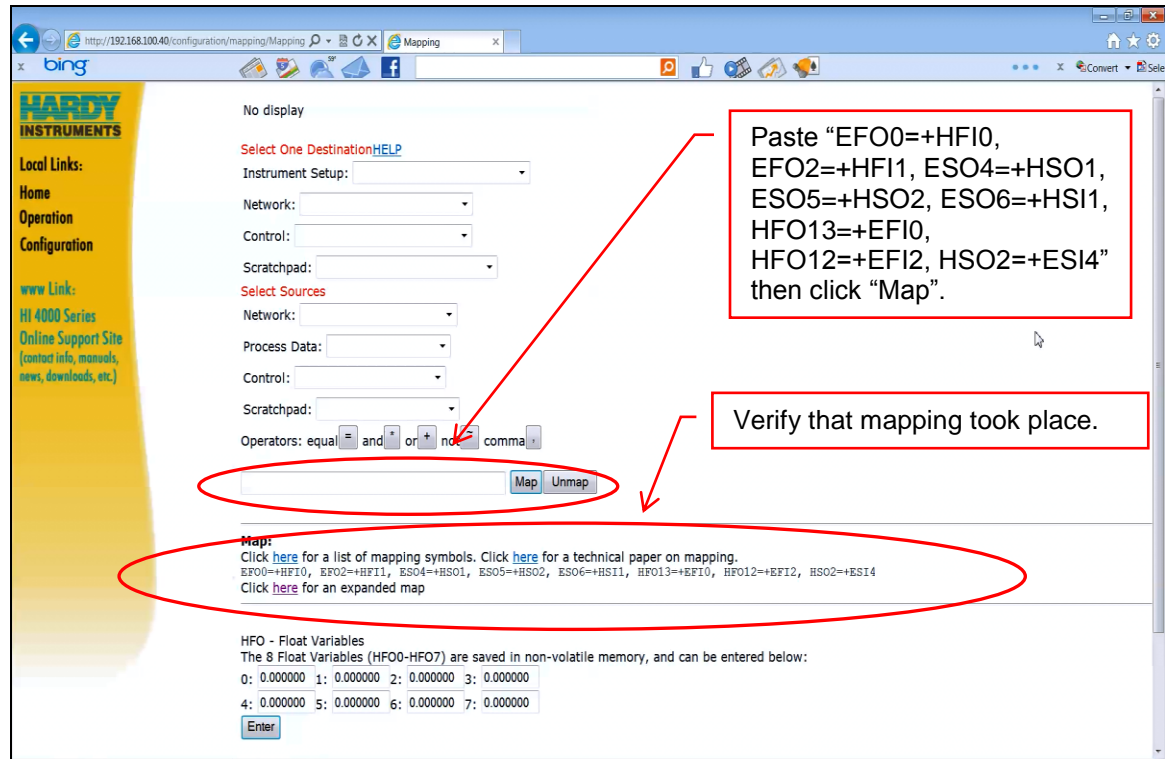


Figure PH011-8 – Mapping Screen

Explanation of equations:

EFO0=+HFI0 – Hardy controller Gross Weight floating point word (HFI0) is being written to PLC Input.Data[0]~[1] (EFO0).

EFO2=+HFI1 – Hardy controller Net Weight floating point word (HFI1) is being written to PLC Input.Data[2]~[3] (EFO2).

ESO4=+HSO1 – Hardy controller Command Status integer word (HSO1) is being written to PLC Input.Data[4] (ESO4). A non-zero status means the command has failed.

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ESO5=+HSO2 – Hardy controller Command Echo integer word (HSO2) is being written to PLC Input.Data[5] (ESO5). This register is used to receive confirmation from the Hardy that a command has been received and executed. When the PLC receives this signal, it looks at the Command Status word for any errors. The following is a list of all the commands currently being used by the PLC.

- Tare completed
- Zero completed
- Cal. Low completed
- Cal. High completed
- Save to SD card completed

ESO6=+HSI1 – Hardy controller Instrument Status integer word (HSI1) is being written to PLC Input.Data[6] (ESO6). The following is a list of the Hardy Instruments Status.

- A/D Conversion Error
- A/D Failure
- Center of Zero (not used)
- Weight Overrange
- Real Time Clock Failure (not used)
- Motion (not used)
- SD Memory Card Read Failure
- Display Error (not used)
- SD Memory Card Write Failure

HFO13=+EFI0 – PLC Low Cal. Setpoint Output.Data[0]]~[1] (EFI0) is being written to Hardy controller Low Cal. Setpoint floating point word (HFO13).

HFO12=+EFI2 – PLC High Cal. Setpoint Output.Data[2]~[3] (EFI2) is being written to Hardy controller High Cal. Setpoint floating point word (HFO12).

HSO2=+ESI4 – PLC Command Word Output.Data[4] (ESI4) is being written to Hardy controller Command Word integer word (HSO2). The following is a list of all the commands currently being used by the PLC.

- Tare command
- Zero command
- Cal. Low command
- Cal. High command
- Save to SD card command

Further detail about mapping may be obtained from the reference file: **Hardy 4050 Mapping.xls** or the hyperlink on the mapping webpage of the technical paper on the subject.

Step #2 – Perform Loadcell Zero and Span Calibration. (Fastback® Stopped)

To read accurate weights on the load cells, they must be correctly zeroed and spanned (low and high) in a calibration process. During normal service it should only be necessary to calibrate the load cells system during the initially set up, however, it may be necessary to routinely re-zero the load cell (perhaps as frequently as once per shift.) Figure 11-9 below shows a monitor screen accessible from the Hardy web browser. The calibration functions should be password protected, so that only qualified personnel have access to them, but the zero function should be accessible to operators, who may find it necessary to zero the scale from time to time. Because Heat and Control we will not be responsible for the OIT screens, this write-up will cover how to calibrate the load cells using the web browser.

Navigate to the monitor screen from the Home page by selecting Operation and then Monitor. Press “Zero” on the pop-up window. Note if the load cell is reading a negative number, there may be something rubbing on the load cell. Each of these functions are pre-defined tasks within the Hardy controller. Once the controller and PLC are “mapped”, these functions are triggered via the OIT screen buttons and inputs.

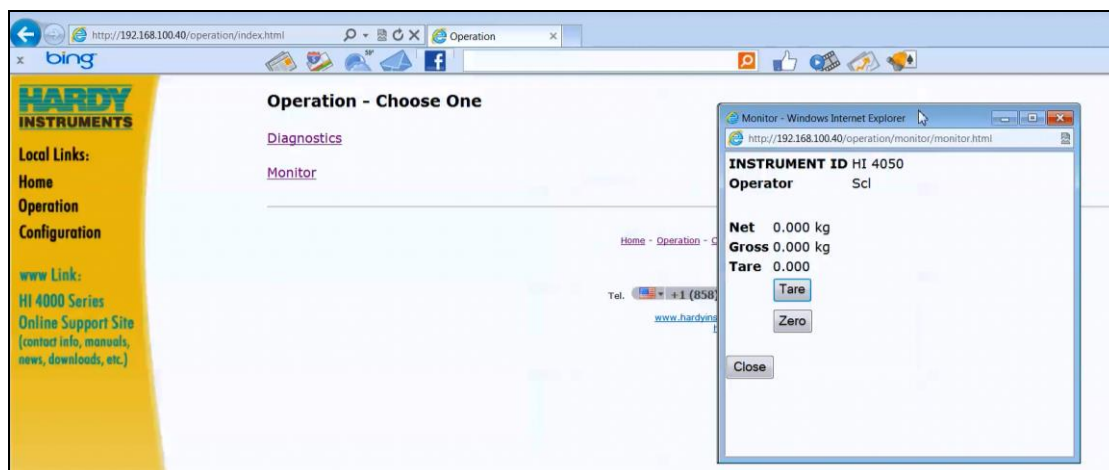


Figure PH011-9 – HI-4050 Monitor Screen

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Once the weight reading has been zeroed, navigate to the Calibration screen by selecting by selecting Configuration and then Calibration from the Home page. See Figure 11-10 below.

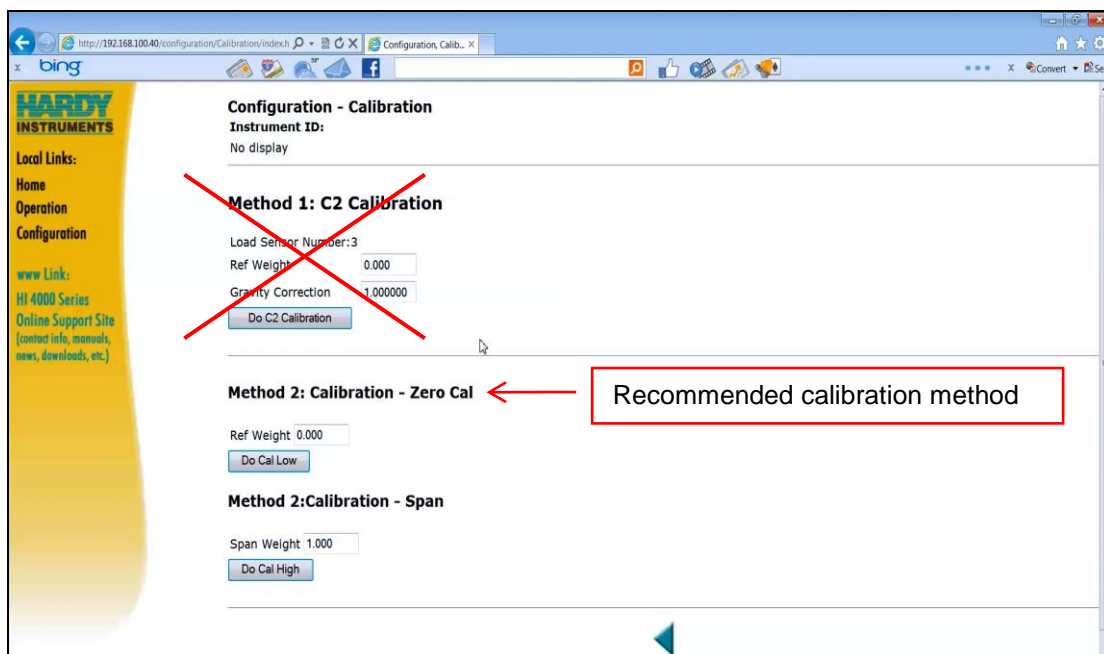


Figure PH011-10 – HI-4050 Calibration Screen

The Zero and Span calibration method is Method 2. This is recommended, because the WeighBack® uses a relatively small part of the load cell range.

With nothing on the load cell tray and ensuring that the weight is reading zero when you monitor the load cell, Press the [**Do Cal Low**] button and wait 30 seconds to a minute before doing anything else. The reference weight for the “Low Cal” is always 0.000kg.

Place your span weight in the center of the load cell and enter in how much you have placed on the load cell. (1.000kg is suitable for a snack food or cereal product in this size pan.) Press the [**Do Cal High**] button and wait 30 seconds to a minute before doing anything else.

Check by removing and adding back the weight. It should settle to zero and come back to the weight amount.

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Revision Record

Revision Level	Date	By	Description
Revision 00	11/26/12	Tom Knodell	Initial, limited Publication
Revision 01	12/12/12	Ken Petri, Tom Knodell	Added cover page, TOC, HC part #'s, and Revision record page
Revision 2	11/16/16	Ken Petri, Tom Knodell, Arlene Mason	Updated parameter sets and screens for model 4050 with WAVERSAVER+ based on latest learnings.