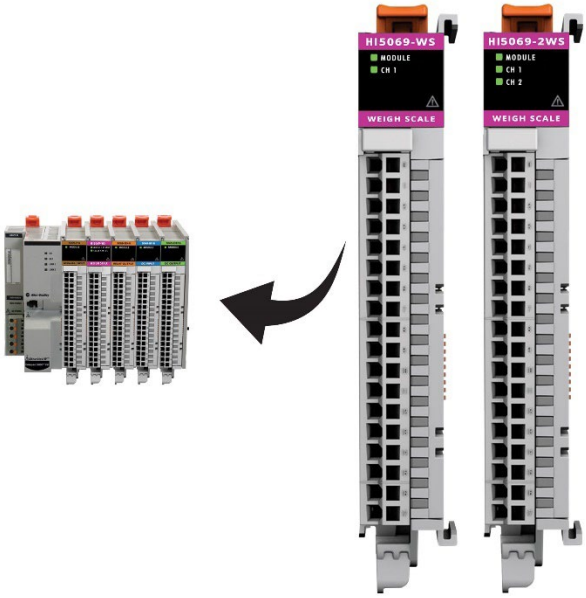
HI5069-WS & HI5069-2WS

Weigh Scale Modules for Compact5000 I/O Systems



Installation & Operations Manual

SECOND GENERATION CALIBRATION

FM APPROVED

Technology Partner
A ROCKWELL AUTOMATION PARTNER

10075 Mesa Rim Road
San Diego, CA 92121
Phone: (858) 278-2900
Website: http://www.hardysolutions.com

Hardy Process Solutions Document Number: 0596-0372-01 Rev. A

Local Field Service

Hardy Process Solutions provides local field service for all scales and weighing equipment. Hardy's factory trained technicians can perform service on all Hardy equipment as well as most other manufacturers' systems. Enabled by the Hardy Process Toolbox, our technicians spend less time onsite, saving you money and reducing your downtime.

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- Scale Installed-Base Evaluation
- PLC Integration Support
- Engineering Design Support & Specification Development
- Quality Documentation Creation

Contact Us
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Contents

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WHEN UNPACKING, DO NOT DISCARD THE PACKING CASE OR ANY PACKING MATERIAL UNTIL THE CONTENTS OF THE PACKING CASE ARE INSPECTED AND CAREFULLY COMPARED WITH THE SHIPPING DOCUMENTS.

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Customer Support Department
HARDY PROCESS SOLUTIONS
10075 Mesa Rim Road, San Diego, California 92121 USA

Phone: (800) 821-5831
(858) 278-2900

E-mail: hardysupport@hardysolutions.com Web Address: www.hardysolutions.com

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UN NUMÉRO UNIQUE (RMA ou RETURN MATERIAL AUTHORIZATION) EST NÉCESSAIRE AFIN DE RENVOYER LE PRODUIT ENDOMMAGÉ. CONTACTEZ LE SERVICE-CLIENTELE AFIN D'EN OBTENIR UN. VEUILLEZ VOUS PRÉMUNIR DES INFORMATIONS SUIVANTES AVANT L'APPEL : NON DE L'ENTERPRISE, ADRESSE, NUMÉRO DE TELEPHONE, NUMÉRO DE SÉRIE DU PRODUIT, AINSI QU'UNE COURTE DESCRIPTION DU PROBLEME.

Chapter 1 - Overview

This manual is designed for use by installers, operators, and service personnel. It provides specifications and procedures for installing, wiring, linking, configuring, operating, maintaining, and troubleshooting the Hardy Process Solutions HI5069-WS Weigh Scale Modules. The system is used for front end signal processing of strain-gauge based load cells and load points for all types of industrial manufacturing weighing applications

Modules feature WAVERSAVER®, C2® Calibration, INTEGRATED TECHNICIAN (IT®) diagnostics, and ladder logic configurability (see note).

Before using the product, be sure you understand all cautions, warnings, and safety procedures stated or referenced in this manual. And, to get the best service from this product, follow the practices recommended in this manual.

Hardy Process Solutions appreciates your business. We welcome all corrections or suggestions for improvement of this manual. Should you not understand any information in this manual or experience any problems with the product, please contact our Customer Support Department at:

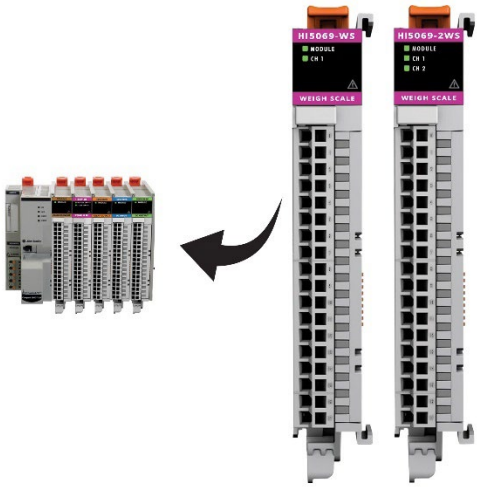
Phone: (858) 278-2900

e-mail: hardysupport@hardysolutions.com

Website: www.hardysolutions.com

NOTE: The Allen-Bradley Compact5000 I/O System manual contains useful information about the Logix platform that is not provided in this manual. This manual assumes that users have a basic understanding of process control and can interpret ladder logic instructions as needed to generate the electronic signals that control their application(s).

Product Description



Hardy HI5069 Plug-In-Modules are high performance single or dual channel weigh scale modules that feature a powerful 24-bit sigma-delta (∑-Δ) analog-to-digital converter (ADC), that when combined with Hardy's WAVERSAVER® filtering technology ensure accurate, fast, and stable weight data in even the most adverse conditions where noise and mechanical vibrations can plague process control.

HI5069-WS Weigh Scale Modules are self-contained, microprocessor-based I/O modules that produce weight data when connected to strain gauge load sensors (load cells, load points, platform scales); and are plugged directly into the backplane of Allen-Bradley Compact5000 I/O Systems.

The HI5069-WS and HI5069-2WS Weigh Scale Modules can be used for a wide variety of process weighing applications such as batching, blending, filling/dispensing, check weighing, force measurement, level by weight and weight rate monitoring.

WAVERSAVER®

During the measurement of small weight changes, the effects of mechanical vibration and noise from the operating environment can introduce substantial interference. The combination of the ADC circuit, micro-processor and WAVERSAVER firmware filters out vibration, noise, and other interference-related signals from the load cell signals to product Accurate, Stable and Fast weight data.

WAVERSAVER® can be configured to ignore noise with frequencies as low as 0.25 Hz. One of five higher additional cut off frequencies may be selected to provide a faster instrument response time. The default factory configuration is 1.0 Hz vibration frequency immunity. The five cutoff frequencies are: 0.25Hz, 0.5Hz, 1Hz, 3.5Hz and 7.5Hz.

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 C2 load sensors, a junction box, interconnect cable, and an instrument with C2 capabilities. Each Hardy C2-certified load sensor outputs digital information used for the calibration. Upon power up, plug-in weigh scale modules read the sensor outputs and detect the number of active sensors. It then 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).

IT

INTEGRATED TECHNICIAN™ (IT) is a system diagnostics utility which, in conjunction with an HI6020IT series junction box, monitors the excitation circuit for possible malfunctions. IT reads individual load sensor voltages and weights, then isolates individual system components for quick and easy troubleshooting.

If the scale system does not have a HI 6020IT Junction Box connected to the module, the mV/V readings and weight are displayed as the total for all the load cells on the system.

Return to Zero Test – Optional

Requires the HI 6020IT Series Junction Box to monitor individual load sensors. This test compares the original voltage reading (saved at calibration) against the current voltage reading of an empty vessel. The test checks for damaged load sensors due to electrical zero shift or abnormal mechanical forces that cause binding on one or all of the load sensors in the system.

NOTE: The HI5069 series Is compatible with Hardy HI6020IT and HI6020JB summing cards and junction boxes. An HI6020IT must be used to run an RTZ test. The HI5069-WS modules are not compatible with Hardy Legacy HI215IT Junction Box.

Weighing System Test – Optional

Requires the HI6020IT Series Junction Box for full utilization. This test is used to diagnose drifting or unstable weight reading problems. The Weighing System Test does the following:

1. Disconnects the controller and engages an internal reference signal to see if the problem is within the instrument.
2. Disconnects the load sensors and engages an internal (in the junction box) reference signal to see if the cable between the instrument and the Junction Box is causing the problem.
3. Reads the weight of each load sensor to see if the load sensor might be causing the problem.

The ability to read the weight seen by each individual load sensor allows use of this test to make cornering, leveling and load sharing adjustments to the weighing system.

Auto Zero Tracking

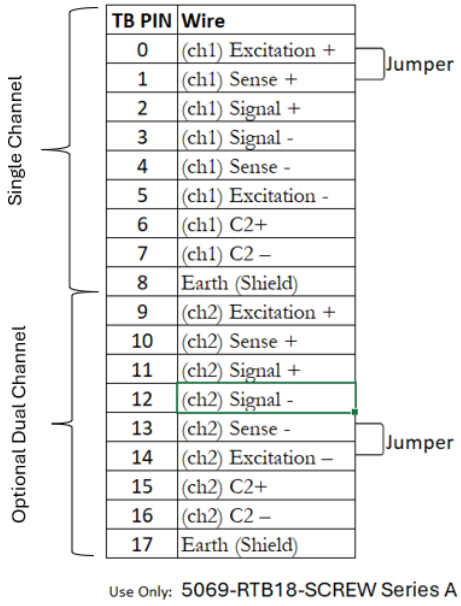
Auto Zero Tracking automatically adjusts for zero weight. This capability allows the module to ignore material build-up in the weighing system within a pre- set auto zero tolerance. For auto zero to work, the current gross weight must be within the auto zero tolerance. The current gross, plus any previously zeroed weight must be within the Zero Tolerance level value and the scale must not be in motion. This is not used on all applications and should be reviewed before use.

NOTE: The amount of weight zeroed off is cumulative. The Auto Zero command will not run if the current gross weight plus any previously zeroed amount exceeds the zero tolerance value.

Chapter 2 - Specifications

Chapter 2 lists the specifications for the HI5069-WS Weigh Scale Modules. Specifications are listed for the standard instrument and for optional equipment. The specifications listed are designed to assist in the installation, operation and troubleshooting of the instrument.

Performance	Recommended:	1:10,000
	Internal resolution	1:8,388,608
	Update Rate to backplane:	250 times per second
	ADC conversion rate:	Up to 4800 times per second
	Number of Load Cells:	Up to 8 350 Ω /scale channel
	Channels	One (HI 5069-WS) or two (HI5069-2WS)
	Non-Linearity:	< 0.001% of Full Scale
Scale Modes:	Gross, Net	
Units of Measure:	Ounce, Pound, Ton, Gram, Kg, Metric Ton	
Weight Processing	WAVERSAVER®: 1.0 Hz to 7.5 Hz	
	Averaging: 1 to 255 User-selectable	
Calibration Methods	C2® calibration without test weights	
	Traditional calibration with test weights	
Output:	Excitation 5VDC	
Inputs:	Signal, -0.3 mV to +15 mV	
	Sense, +5 Vdc	
	C2®, Electronic Calibration	
Cable lengths:	250 feet maximum of C2 authorized cable (max of 8 load sensors/ch)	
Mounting:	Directly to backplane	
	Recommended Terminal Base	
	Cat# 5069-RTB18-SCREW	
Backplane ratings		
MOD Power:	18-32 VDC, 75 mA	
SA Passthrough Max:	10-32 VDC 9.95	
Environmental Conditions		
Operational Temp	0 °C -+ 60 °C (32 °F - +140 °F)	
Storage Temp	-40 °C - +85 °C (-40 °F - +185 °F)	
Relative Humidity	5% - 95% (non-condensing)	
Certifications		
Safety:	UL & CUL, CE	
Environment	RoHS3 and REACH Compliant	
Hazardous:	Class I, II, III/Div2	



TB PIN	Wire
0	(ch1) Excitation +
1	(ch1) Sense +
2	(ch1) Signal +
3	(ch1) Signal -
4	(ch1) Sense -
5	(ch1) Excitation -
6	(ch1) C2+
7	(ch1) C2 –
8	Earth (Shield)
9	(ch2) Excitation +
10	(ch2) Sense +
11	(ch2) Signal +
12	(ch2) Signal -
13	(ch2) Sense -
14	(ch2) Excitation –
15	(ch2) C2+
16	(ch2) C2 –
17	Earth (Shield)

Use Only: 5069-RTB18-SCREW Series A

Configuration Table	Data Type	Defaults	Range	
Gravity Correction	FLOAT	1.0	.9-1.2	
Motion Tolerance	FLOAT	10.0	.0001-999999.99	
Zero Tolerance	FLOAT	10.0	.0001-999999.99	
Tare Weight	FLOAT	0.0	.0001-999999.99	
Reference Weight	FLOAT	0.0	.0001-999999.99	
Span Weight	FLOAT	1000.0	.0001-999999.99	
AutoZero Tolerance	FLOAT	10.0	.0001-999999.99	
Enable AutoZero Tracking	BYTE	0	0-1	0 – Off 1 - On
Metric	BYTE	1	0-5	0 – oz 1 – lb 2 – ton 3 – g 4 – kg 5 - t
Load Cell Sensitivity	BYTE	4	0-8	0 – 1.0 mV/V 1 – 1.5 mV/V 2 – 2.0 mV/V 3 – 2.5 mV/V 4 – 3.0 mV/V 5 – 3.5 mV/V 6 – 4.0 mV/V 7 – 4.5 mV/V 8 – 5.0 mV/V
WAVERSAVER	BYTE	3	0-5	0 – Off 1 – 7Hz 2 – 3.5 Hz 3 – 1Hz 4 – 0.5Hz 5 – 0.25Hz
Num Averages	INT	10	1-255	

NOTE: *The HI5069 is **not** compatible with Legacy HI215 Junction Boxes.*
Please ensure that the HI5069 is installed with the HI6020IT or HI 6020JB Junction Boxes.

Chapter 3 - Installation

Chapter 3 provides the recommended procedures for unpacking, cabling, interconnecting, configuring and installing the Weigh Scale Module. Users and service personnel should be familiar with this information before installing or operating the Weigh Scale module. If you experience any problems installing this equipment, contact Hardy Instruments Inc., Customer Support for assistance.

Installation Overview

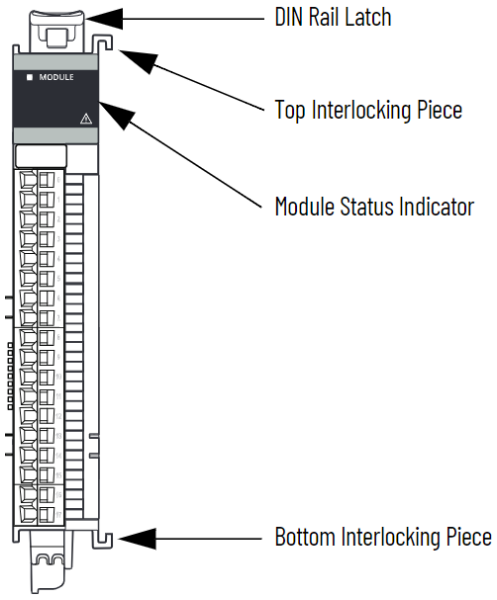
WARNING - ELECTROSTATIC DISCHARGE MAY DAMAGE SEMICONDUCTOR COMPONENTS IN THE MODULE. DO NOT TOUCH THE CONNECTOR PINS.

ATTENTION – UNE DÉCHARGE ÉLECTROSTATIQUE PEUT ENDOMMAGER DES COMPOSANTS SEMI-CONDUCTEURS DANS LE MODULE. NE PAS TOUCHEZ LE CONNECTEUR.

Observe the following handling precautions:

- Wear an approved wrist-strap grounding device when handling the module
- Touch a grounded object or surface to rid yourself of any electrostatic discharged prior to handling the module
- Handle the module from the bezel in front away from the connector. Never touch the connector pins.
- Do not install the module right next to an AC or high voltage DC module
- Route all the load voltage cables away from high voltage cables

Installation Procedure



Modules can be configured as either Local or Remote I/O modules, with some restrictions that are based on the module and controller types. See Rockwell documentation for additional details:
Rockwell Automation Publication 5069-UM004G-EN-P - June 2024

When configured as Local I/O, modules will reside in the same system as the controller and installed to the right of the controller. Data is exchanged with the controller over the system backplane.

When configured as Remote I/O, modules reside in a separate location from the Logix5000 controllers and are accessible over EtherNet/IP via a Compact5000 EtherNet/IP adaptor.

1. Review **Rockwell Automation Publication 5069-UM004G-EN-P - June 2024**
2. Install the module by sliding onto with the controller or the adaptor.
3. Engage the DIN rail latch.
4. Slide an end cap over the last module of the system.
5. Wire **24 VDC** SA Power (Field side).
6. Power up system.

Note: Hardy scale modules require SA power to produce excitation voltage for the sensor.

Load Sensor and Junction Box Connections

Following the wiring diagram to the left, HI 5069-WS weigh scale module will need to be connected to external sensors, whether it's a single load cell connected directly to the module, a group of load cells connected through a Junction Box or a platform scale such as a bench or floor scale.
Each has its own wiring configuration.

Note: **To avoid damage to the HI5069 weigh scale module, removal of the terminal block from the module is recommended when connecting external sensors.**

Single Channel

	Description	RTB#
Jumper	(ch1) Excitation +	0
	(ch1) Sense +	1
	(ch1) Signal +	2
	(ch1) Signal -	3
Jumper	(ch1) Sense -	4
	Ch 1 Excitation -	5
	(ch1) C2+	6
	(ch1) C2 -	7
	(ch1) Gnd	8

Dual Channel

	Description	RTB#
Jumper	(ch1) Excitation +	0
	(ch1) Sense +	1
	(ch1) Signal +	2
	(ch1) Signal -	3
Jumper	(ch1) Sense -	4
	(ch1) Excitation -	5
	(ch1) C2+	6
	(ch1) C2 -	7
	(ch1) Gnd	8
Jumper	(ch2) Excitation +	9
	(ch2) Sense +	10
	(ch2) Signal +	11
	(ch2) Signal -	12
Jumper	(ch2) Sense -	13
	(ch2) Excitation -	14
	(ch2) C2+	15
	(ch2) C2 -	16
	(ch2) Gnd	17

For single channel modules – use pins 0 through 8.
For dual channel modules – use pins 0 through 17.

Use Only: 5069-RTB18-SCREW Series A
Spring-cage terminal blocks NOT recommended

a) Use Screw-Down terminal blocks only*.
Recommended: Rockwell Automation Part# 5069-RTB18-SCREW Series A
- Maximum wire diameter 0.5…1.5mm^2 (22…16 AWG).
- Maximum diameter including insulation is 3.5mm (.14 in.)
- Insulation stripping length is 12mm (0.47in.)
- Torque 0.4 N-m (3.5 lb-in).

See Rockwell Automation Publication 5069-TD001L-EN-P-Octorber 2020 for additional details.

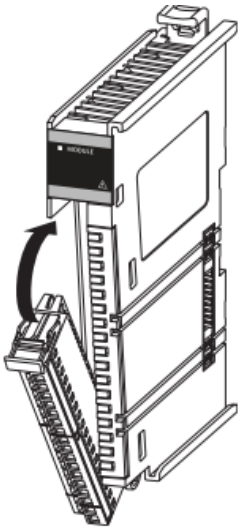
* 5069-RTB18-SPRING terminal blocks are NOT recommended

b) Non-C2 load cells or scale systems – leave C2 terminals empty.

c) When four-wire load sensors with C2, and four wire load sensors without C2, are directly connected to the terminal base, wire jumpers must be installed in the terminal base where indicated.

d) Connect either frame ground (pins 8 & 17) to the cable shield to reduce the effects of EMI (electromagnetic interference) on the scale system.

e) Insert terminal block by first hooking the bottom onto the module, then push the RTB against the module until the RTB clicks into place. Finally push in the RTB handle located at that top of the terminal block until another click is heard.



Notes:

1. If using conduit, do not run load cell cable parallel to, or in the same conduit with power wiring, relay cable or other high energy cables.
2. C2 cable is required for electronic calibration system and INTEGRATED TECHNICIAN: Hardy Process Solutions part number 6020-0001-0.

Chapter 4 – Setup and Operation

Chapter 4 covers the firmware and software settings used to prepare the module controller for calibration and operation. The Setup procedures require Allen Bradley's RS Logix 5000, Allen-Bradley RSLinx™ or RSLinx™ Lite.

General

Use Studio5000 software (v 28 and higher) to configure the HI5069-WS and HI5069-2WS modules. The software provides a module-specific Add-On Profile (AOP) to operate the module. Compact5000 I/O digital modules use the Producer/Consumer network communication model. This communication is an intelligent data exchange between modules and other system devices in which each module produces data without first being polled.
All data exchanged between a controller and the modules is through the backplane bus that these modules may share with other modules. The bus is created when the controller, its modules, and/or a communications adapter are assembled.

See Rockwell documentation for additional details:

Rockwell Automation Publication 5069-UM004G-EN-P - June 2024

Power Check

To make or change settings, there must be power to both the PLC and the module. Verify that the LED's are lit for normal operation. (See Figure Below)

Module Status

LED Light	Status
Solid Green	Normal (Running)
Flashing Green	Device is standby (needs commissioning)
Solid Red	Unrecoverable Fault
Flashing Red	Minor Fault
Flashing Red/Green	Device Self testing
Dark - Off	No power to the module

Scale Status

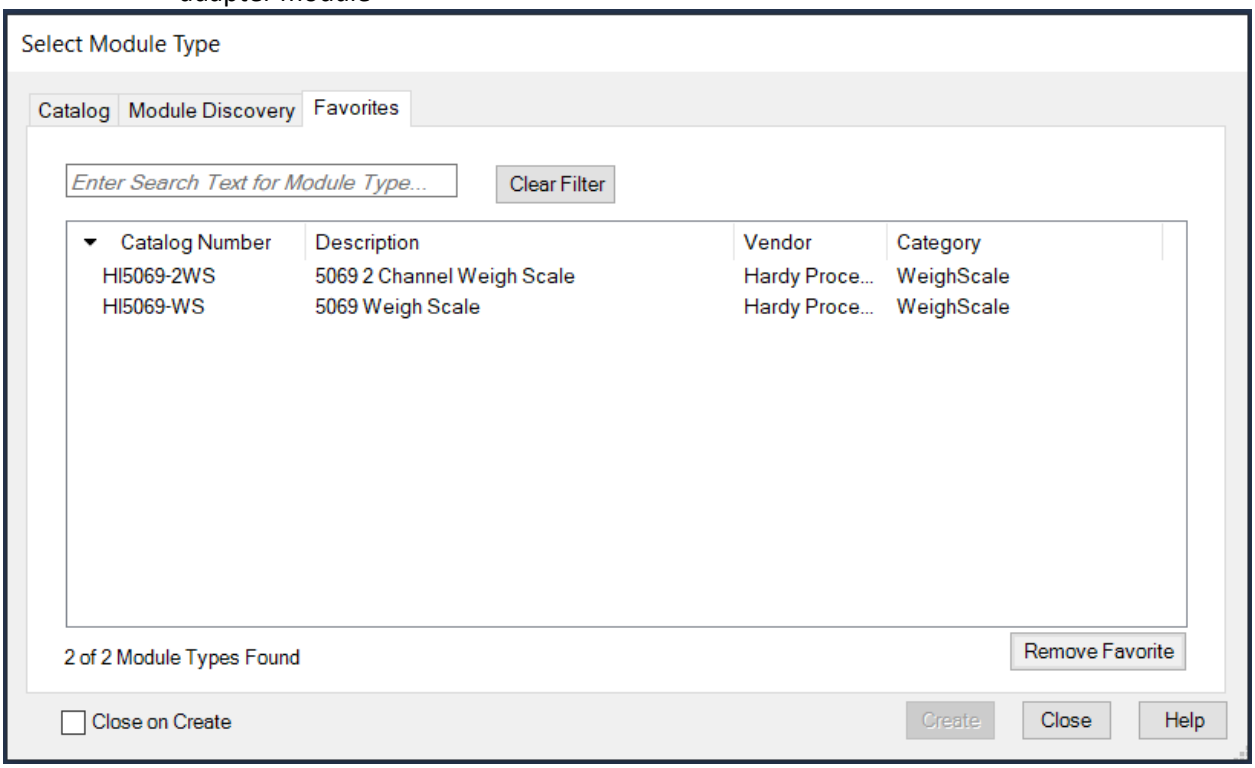
LED Light	Status
Steady Green	Running (Normal)
Flashing Green	Error No Calibration
Steady Red	Error Read Failure or Error Eeprom Write
Flashing Red	Read Convert Error

Setting Up Communications between the PLC and HI 5069-WS

Follow these steps to set up communication between the ControlLogix PLC and the Weigh Scale Module. The steps require that you have a new or open RS Logix® 5000 project. For instructions, see your RS LOGIX 5000 manual.

When not installed directly on the side of a of certain compatible controllers as Local I/O, the HI 5069 WS modules will require a communications adapter module. For this setup example/instructions, an **A-B 5069-AENTR EtherNet/IP Adaptor** was used.

- In the program Controller Organizer, find the I/O Configuration Section.
- Right click on the Ethernet Module you will be installing the Remote I/O under.
- Select 'New Module' to display a list of modules.
- From the Catalog list, select the 5069-AENTR module. Configure the module by:
    - Enter a unique name
    - Enter an IP address (Set up the addressing for the 5069-AENTR module according to the instructions in the Rockwell manual.)
    - In the module definition, set the chassis size to the correct size for the number of modules you have, ***including*** the adapter module.
        - Click OK to accept.
        - Right click on the 5069-AENT module and select 'New Module'.
        - Select the HI 5069-WS (1-Channel Weigh Scale). This will add the new module under the AENT adapter module



The module now shows in the controller Organizer in the I/O configuration under the Remote I/O section Repeat the above steps for any additional modules.

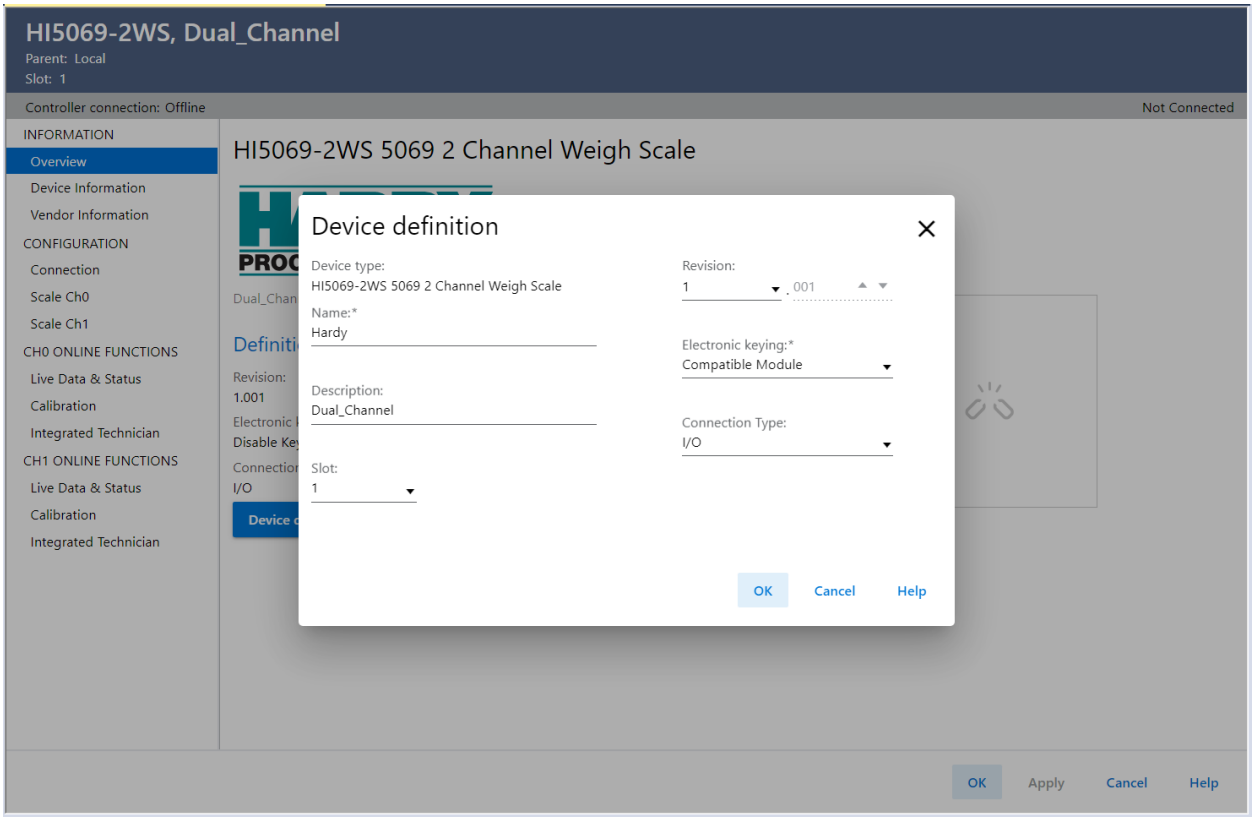
Configuration Parameters

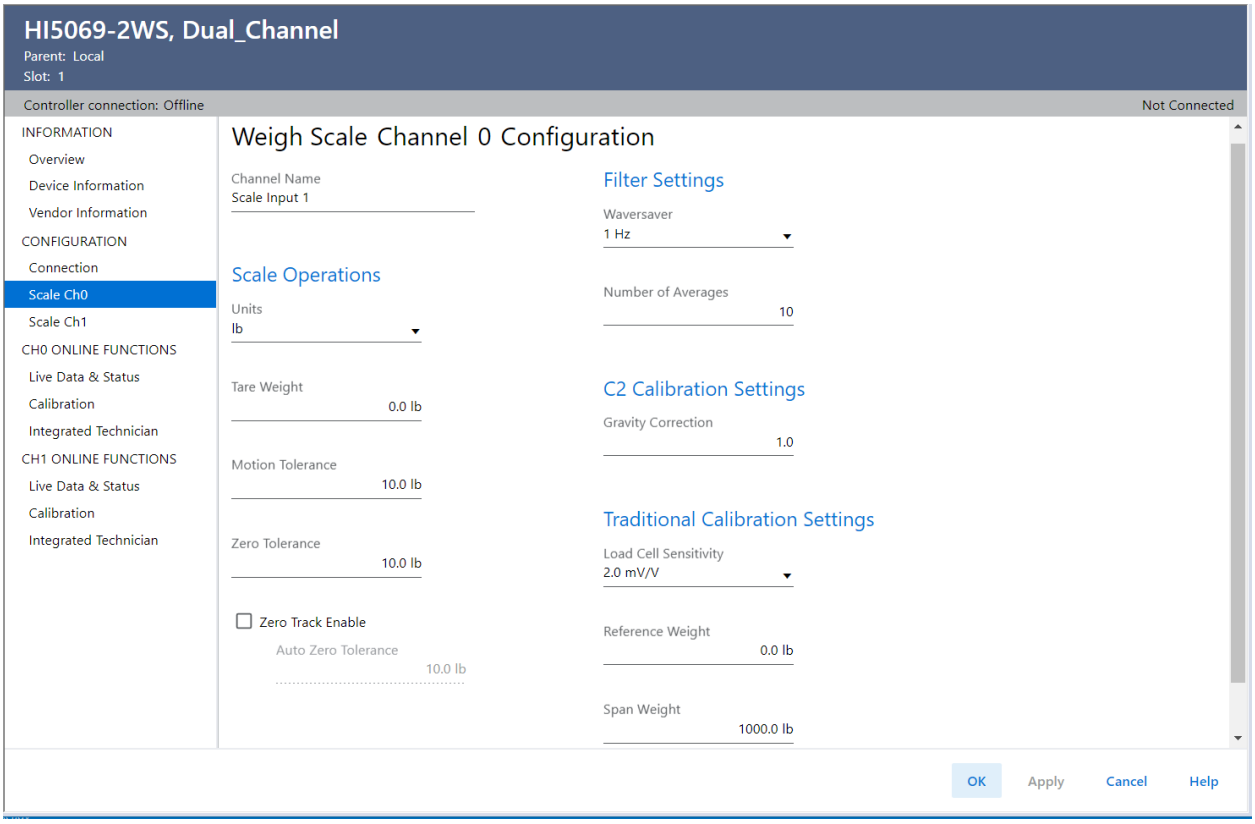
The following parameters are parameters used in the Configuration of the IO:

Configuration Parameters	Data Type
Gravity Correction	FLOAT
Motion Tolerance	FLOAT
Zero Tolerance	FLOAT
Tare Weight	FLOAT
Reference Weight	FLOAT
Span Weight	FLOAT
AutoZeroTolerance	FLOAT
Enable AutoZero Tracking	INT
Unit	INT
Load Cell Sensitivity	INT
WAVERSAVER	INT
Num Averages	INT

Configuration with AOP

Using the AOP to configure the HI 5069-WS module makes it fast and easy. First, open the AOP and navigate to Configuration. Make any required changes. Next, click on Apply. This will download the complete configuration table to the module. Once the table has been downloaded the module is automatically configured.


HI5069-2WS, Dual_Channel
Parent: Local
Slot: 1
Controller connection: Offline
Not Connected
INFORMATION
Overview
Device Information
Vendor Information
CONFIGURATION
Connection
Scale Ch0
Scale Ch1
CH0 ONLINE FUNCTIONS
Live Data & Status
Calibration
Integrated Technician
CH1 ONLINE FUNCTIONS
Live Data & Status
Calibration
Integrated Technician
HI5069-2WS 5069 2 Channel Weigh Scale
Device definition
Device type:
HI5069-2WS 5069 2 Channel Weigh Scale
Name:*
Hardy
Description:
Dual_Channel
Slot:
1
Revision:
1 . 001
Electronic keying:*
Compatible Module
Connection Type:
I/O
OK
Cancel
Help
OK
Apply
Cancel
Help


HI5069-2WS, Dual_Channel
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Slot: 1
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Not Connected
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Vendor Information
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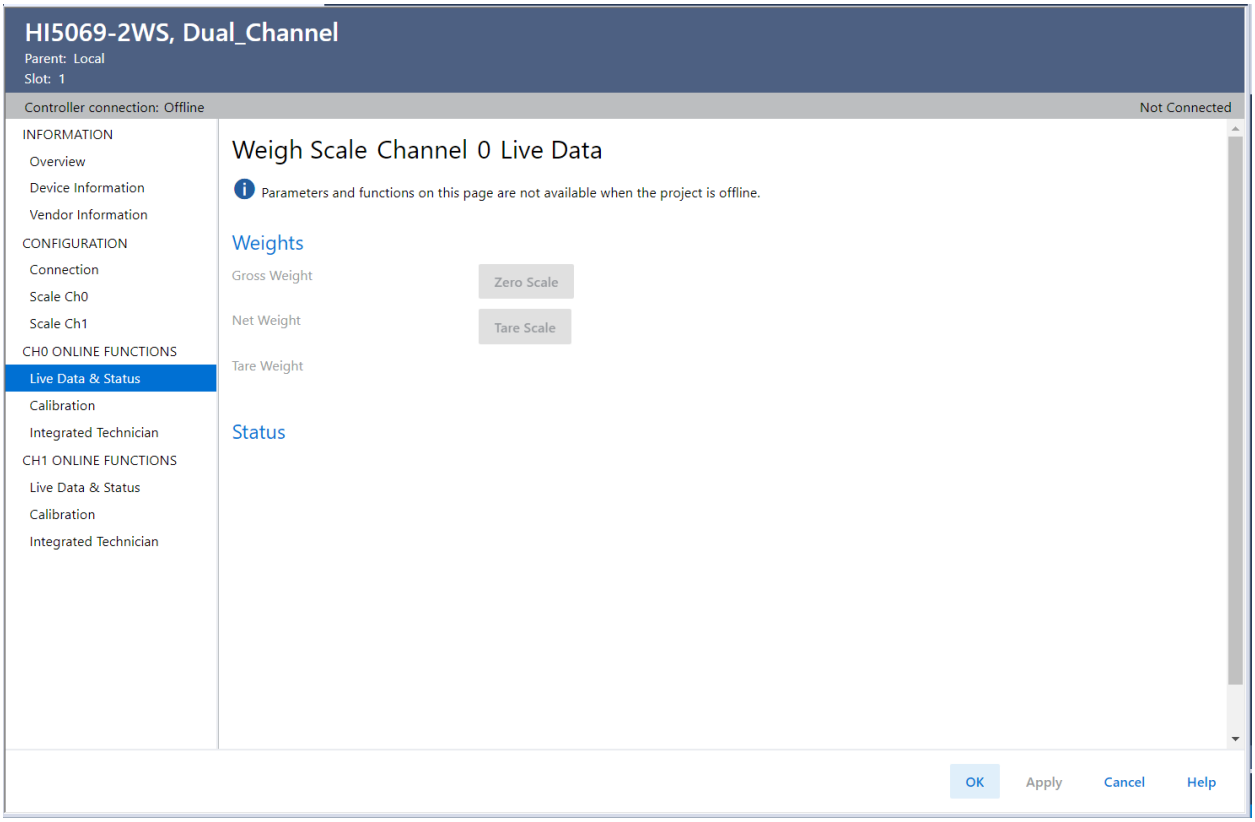
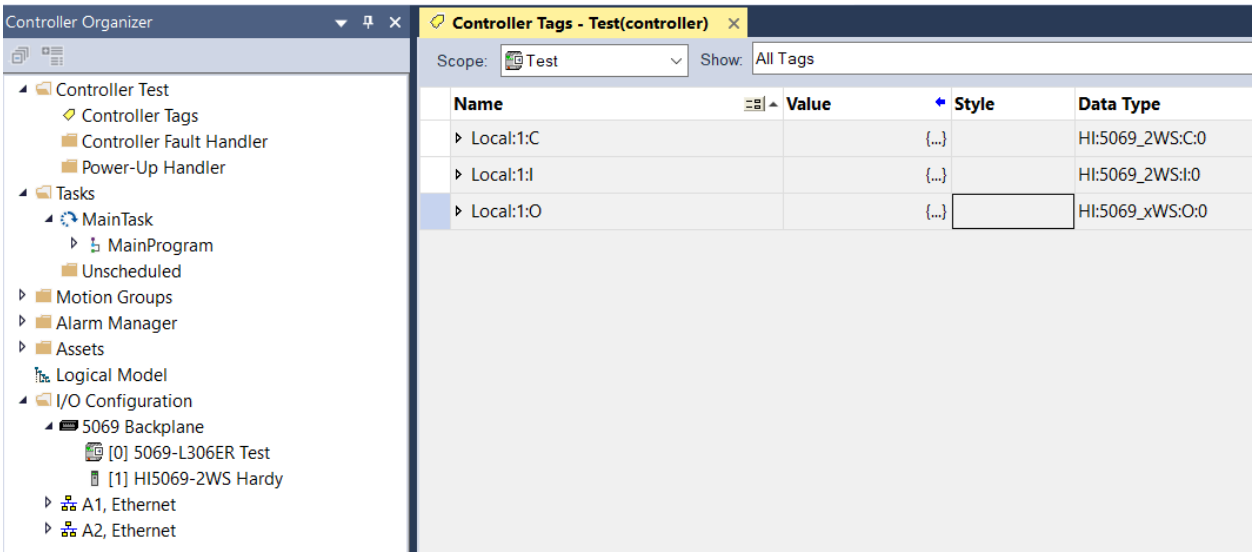
Scale Ch0
Scale Ch1
CH0 ONLINE FUNCTIONS
Live Data & Status
Calibration
Integrated Technician
CH1 ONLINE FUNCTIONS
Live Data & Status
Calibration
Integrated Technician
Weigh Scale Channel 0 Configuration
Channel Name
Scale Input 1
Scale Operations
Units
lb
Tare Weight
0.0 lb
Motion Tolerance
10.0 lb
Zero Tolerance
10.0 lb
Zero Track Enable
Auto Zero Tolerance
10.0 lb
Filter Settings
Waversaver
1 Hz
Number of Averages
10
C2 Calibration Settings
Gravity Correction
1.0
Traditional Calibration Settings
Load Cell Sensitivity
2.0 mV/V
Reference Weight
0.0 lb
Span Weight
1000.0 lb
OK
Apply
Cancel
Help





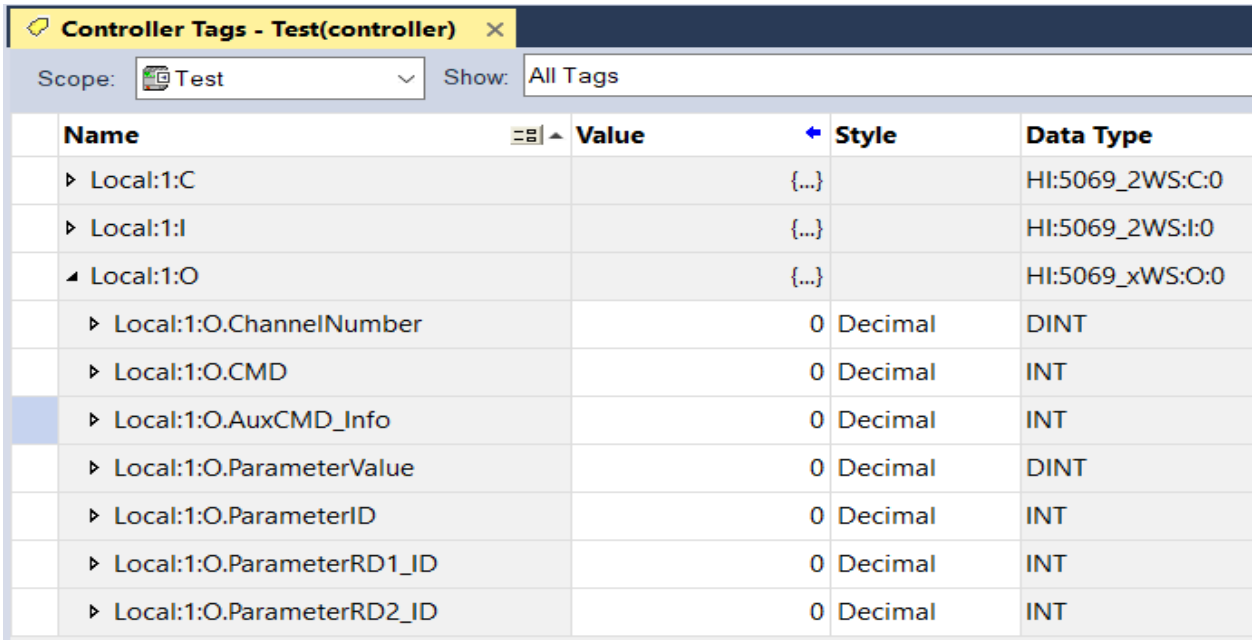
Commands

List of Hardy command Numbers

Command Number	Command
0	Read Parameter
1	Zero Cmd
2	Tare Cmd

(0x64) 100 dec	Cal Low Cmd
(0x65) 101 dec	Cal High Cmd
(0x66) 102 dec	C2 Cal Cmd
(0x80) 128 dec	IT Test
(0x94) 148	Set Default Parameters
(0x0100) 256 dec	IT Test Reduce
(0x0200) 512 dec	Stability Test
(0x1000) 4096 dec	Write Cmd
(0x10F0) 4336 dec	C2 Search

CONFIGURATION TABLE



COMMAND TABLE

Controller Tags - Test(controller)

Scope: Test Show: All Tags

Name	Value	Style	Data Type
Local:1:C	{...}		HI:5069_2WS:C:0
Local:1:C.MaintainDeviceConfig	0	Decimal	BOOL
Local:1:C.Ch0	{...}		HI:5069_WS_Channel:C:0
Local:1:C.Ch0.GravityCorrection	1.0	Float	REAL
Local:1:C.Ch0.MotionTolerance	10.0	Float	REAL
Local:1:C.Ch0.ZeroTolerance	10.0	Float	REAL
Local:1:C.Ch0.TareWeight	0.0	Float	REAL
Local:1:C.Ch0.RefWeight	0.0	Float	REAL
Local:1:C.Ch0.SpanWeight	1000.0	Float	REAL
Local:1:C.Ch0.AutoZeroTolerance	10.0	Float	REAL
Local:1:C.Ch0.AutoZeroTrackEnabl...	0	Decimal	SINT
Local:1:C.Ch0.Units	1	Decimal	SINT
Local:1:C.Ch0.LoadCellSensitivity	2	Decimal	SINT
Local:1:C.Ch0.Waversaver	3	Decimal	SINT
Local:1:C.Ch0.NumAverages	10	Decimal	INT
Local:1:C.Ch1	{...}		HI:5069_WS_Channel:C:0
Local:1:I	{...}		HI:5069_2WS:I:0
Local:1:O	{...}		HI:5069_xWS:O:0

Controller Tags - Test(controller)

Scope: Test Show: All Tags

Name	Value	Style	Data Type
Local:1:I	{...}		HI:5069_2WS:I:0
Local:1:I.RunMode	0	Decimal	BOOL
Local:1:I.ConnectionFaulted	0	Decimal	BOOL
Local:1:I.FieldSidePwrFault	0	Decimal	BOOL
Local:1:I.DiagnosticActive	0	Decimal	BOOL
Local:1:I.DiagnosticSequenceCount	0	Decimal	SINT
Local:1:I.Cmd	{...}		HI:5069_WS_CmdResponse:I:0
Local:1:I.Cmd.ChannelNumber	0	Decimal	DINT
Local:1:I.Cmd.CMD_Echo	0	Decimal	INT
Local:1:I.Cmd.CMD_Status	0	Decimal	INT
Local:1:I.Cmd.ParameterValue	0	Decimal	DINT
Local:1:I.Cmd.ParameterID	0	Decimal	INT
Local:1:I.Cmd.ParameterRD1	0	Decimal	DINT
Local:1:I.Cmd.ParameterRD2	0	Decimal	DINT
Local:1:I.Ch0	{...}		HI:5069_WS_Channel:I:0
Local:1:I.Ch0.ADConvertError	0	Decimal	BOOL
Local:1:I.Ch0.ADFailure	0	Decimal	BOOL
Local:1:I.Ch0.InMotion	0	Decimal	BOOL
Local:1:I.Ch0.NVMWriteError	0	Decimal	BOOL
Local:1:I.Ch0.CenterOfZero	0	Decimal	BOOL
Local:1:I.Ch0.SavingToNVM	0	Decimal	BOOL
Local:1:I.Ch0.CalibrationInProgress	0	Decimal	BOOL
Local:1:I.Ch0.ParamIDNotFound	0	Decimal	BOOL
Local:1:I.Ch0.ScanCounter	0	Decimal	SINT
Local:1:I.Ch0.NetWeight	0.0	Float	REAL
Local:1:I.Ch0.GrossWeight	0.0	Float	REAL

- **0: READ PARAM CMD**. To read a parameter, write a #0 to the CMD register (register #0), and write the parameter number in the ParameterID register of the output table. The parameter value may then be read from ParameterValue register in the input table. This value may be in integer or floating point format, depending on the parameter. The status register in the reply will contain the lower 16 bits of the system status word.
    - Status word bit 0: A/D error
    - Status word bit 6 (0x40): Motion status.
    - Status word bit 7 (0x80): Not Found - the requested parameter number does not exist

- **1: ZERO CMD**. Write a 1 to the command register to ZERO the gross weight. The status register will read 0 if this command succeeds.
    - Status Error code 1 (Fail)
    - Status Error code 2 (ADC Failure)
    - Status Error code 3 (out of tolerance)
    - Status Error code 4 (motion)
    - Status code FF (cmd in progress)
- **2: TARE CMD**. Write a 2 to the command register to ZERO the net weight. The status register will read 0 if this command succeeds:
    - Status Error code 1 (Fail)
    - Status Error code 2 (ADC Failure)
    - Status Error code 4 (motion)
    - Status code FF (cmd in progress)

- **0x64 (100 decimal): CAL LOW CMD**. Write a 0x64 hex to the command register to perform the low step of a traditional calibration. The status register will read 0 if this command succeeds:
    - Status Error code 1 (Fail)
    - Status Error code 2 (ADC Failure)
    - Status Error code 4 (motion)
    - Status code FF (cmd in progress)
- **0x65 (101decimal): CAL HIGH CMD**. Write a 0x65 hex to the command register to perform the high step of a traditional calibration.
    - Status Error code 1 (Fail)
    - Status Error code 2 (ADC Failure)
    - Status Error code 4 (motion)
    - HardcalFailCounts 8: not enough counts between hard cal hi and hard cal lo
    - Status code FF (cmd in progress)
- **0x66 (102 decimal): C2 CAL CMD**. Write a 0x66 hex to the command register to perform a C2 calibration.
    - Status Error code 1 (Fail)
    - Status Error code 2 (ADC Failure)
    - Status Error code 4 (motion)
    - Status Error code 5 (no C2 cells)
    - Status Error code 6 (C2 capacities not equal)
    - Status Error code 7 (Non Hardy C2 load cells)
    - Status code FF (cmd in progress)

- **0x80 (128 decimal): IT test.** Write a 0x80 hex to the command register to perform an Integrated Technician test. (Requires an IT summing card.)
    - Status Error code 1 (Fail)
    - Status code FF (cmd in progress)
- **0x94 (148 decimal): Set Default Parameters.** Write a 0x94 to the command register to set all parameters and calibration back to default settings.
    - Status Error code 1 (Fail)
- **0x100 (256 decimal): IT Test Reduced.** Write a 0x100 hex to the command register to perform an Integrated Technician test with reduced voltage. (Requires an IT summing card.)
    - Status Error code 1 (Fail)
    - Status code FF (cmd in progress)
- **0x200 (512 decimal): Stability Test.** Write a 0x200 hex to the command register to perform

the stability test.
    - Status Error code 1 (Fail)
    - Status code FF (cmd in progress)
- **0x1000 (4096 decimal): WRITE CMD**. Set the value of a parameter. Write 0x1000 in the command register 0, the parameter ID number in ParameterID register and the desired value in ParameterValue register of the output table.
    - Status Error code 1 (Fail)
    - Status Error code 0x0B (Value out of range too high)
    - Status Error code 0x0C (Value out of range too low)
    - Status Error code 0x0D (Not allowed)
    - Status Error code 0x80 (Invalid parameter ID)
- **0x10F0 (4336 decimal): C2 Search**. Write 0x10F0 hex to the command register to force the module to search for and read/update C2 data.
    - Status Error code 1 (Fail)
    - Status code FF (cmd in progress)

Status Word Bits

- Bit 0 = A/D converter error - bad input from the load cells.
- Bit 1 = A/D converter failure - no output from the converter to the processor.
- Bit 2 = Motion - indicates weight is in motion (changing).
- Bit 3 = EEPROM Write error - problem writing to the non-volatile memory in the unit.
- Bit 4 = Center of Zero
- Bit 5 = Saving to Non Volatile Memory.
- Bit 6 = Calibration in Progress
- Bit 7 = Error parameter ID Not Found
- Bit 8-15 = counter - The upper 8 bits are constantly incrementing. This constantly changing value is used as confirmation of communications (heartbeat).

Command Status Return Value

- 0 = Success
- 1 = Fail
- 2 = Fail - ADC error
- 3 = Fail - out of tolerance
- 4 = Fail - motion
- 5 = Fail - no C2 load cells found
- 6 = Fail - C2 capacities not equal
- 7 = Fail - non-Hardy C2 load cells
- 8 = Fail - not enough counts between cal low and cal high weights
- 11 = Fail - value too high
- 12 = Fail – Value too low
- 13 = Fail – not allowed
- 128 = Fail – Parameter ID not found

Output Table

Output Table for the AOP:

OUTPUT table	Type
Command	INT
Aux Command Information	INT

Parameter Value	DINT
Parameter ID	INT
Reserved word 1	INT
Reserved word 2	DINT
Reserved word 3	DINT
Parameter RD1 ID	INT
Reserved word 5	INT
Parameter RD2 ID	INT
Reserved word 6	INT
Total	**14**

Command, Aux Command Information, Parameter ID, and Parameter Value, are used to send commands to the instrument, write new parameter values, read existing parameter values, or read data values. The Command is a 16-bit value used for the command string as shown above in the command section.

The 16-bit Aux Command Information is used for specific information required for special commands. To select which parameter is being read or written, set the predefined number into the Parameter ID. If the value is being read, then the Parameter Value is ignored, or set to the required value if the value is being written.

The following values, Reserved 1, Reserved 2, Reserved 3, Reserved 4, Reserved 5, Reserved 6, and Reserved 7, are reserved, and also provide padding so the user selectable read only parameters are aligned between the output and input tables. The other two values Parameter RD1 ID and Parameter RD2 ID are user selectable parameter ID values which are used to read values from the instrument. These read values can be anything from an instrument specific measurement such as Num Averages to a parameter value such as WAVERSAVER.

Input Table

Input Table for the AOP:

INPUT table	**Type**
Command Echo	INT
Command Status	INT
Parameter Value	DINT
Parameter ID	INT
Instrument Status	INT
Net Weight	REAL
Gross Weight	REAL
Parameter RD1	DINT
Parameter RD2	DINT
Total	**14**

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

The Parameter ID; is an echo of the value sent in the output table, while the Parameter Value is the value for the specified Parameter ID. A 16-bit value, Instrument Status, provides the current state of all the major

functions within the instrument. The top 8 bits are a cyclic “measurement update count”, which will increment by a count of one every time a new measurement value is taken, following a 0 to 255 then repeat cycle. If this value remains the same in two consecutive reads from the module then the communication or the measurement function has failed and the appropriate action needs to be taken. The bottom 8-bits reflect the status of all the major functions and should be used in conjunction with the “measurement update count” to determine the health of the instrument.

The Net and Gross Weight values are always provided. The final two read only command values Parameter RD1 Value and Parameter RD2 Value are the read only values for the different user selectable parameter ID values set in the output table. If a 0x0000 is placed in the Parameter RDx ID value, or the requested parameter does not exist a 0x0000 value will be returned.

Chapter 5 - Calibration

Chapter 5 provides the recommended calibration procedure for the HI5069-WS Weigh Scale Module. For the module to work properly, it must be calibrated prior to operation, and it should be recalibrated periodically or when not in use for extended periods of time. Be sure to follow all the procedures completely to insure that the weights read by the module are accurate. Users and service personnel should be familiar with the procedures in this chapter before installing or operating the Weigh Module.

Pre-Calibration Procedures

Verify that the load cells have been properly installed.

Step 1. Determine if the load cells have been properly installed. See your load cell I&M manual for proper installation instructions.

Step 2. An arrow on some sensors and cells indicates the correct direction of the applied load. If the arrow points in the wrong direction, reposition the load cell.

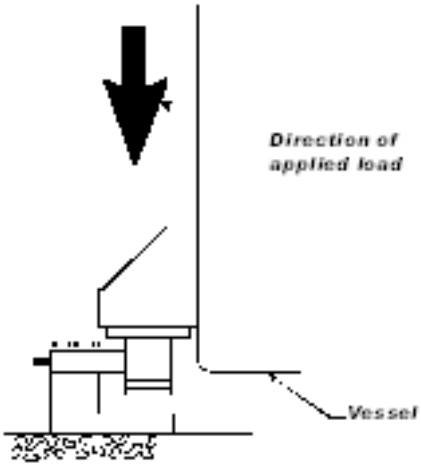
Step 3. Check for Binding on the Load Cell or other parts of the weighing system.

WARNING - BINDING ON A SCALE/VESSEL OR LOAD CELL DOES NOT ALLOW THE LOAD CELL FREE VERTICAL MOVEMENT AND MAY PREVENT THE INSTRUMENT FROM RETURNING TO THE ORIGINAL ZERO REFERENCE POINT.

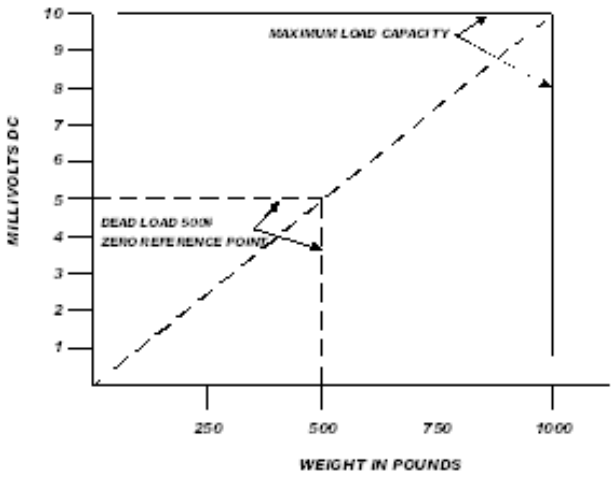
ATTENTION – LIER SUR UNE ÉCHELLE / RÉCIPIENT OU CELLULE DE CHARGE NE PERMET PAS LA CELLULE DE CHARGE LIBRE CIRCULATION VERTICALE ET PEUT EMPÊCHER L'APPAREIL DE REVENIR AU POINT DE RÉFÉRENCE ZÉRO D'ORIGINE.

Load cells must be mounted so that 100% of the load (Vessel w/Contents) passes vertically through the sensors for all of the load cells comprising the system.

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



Electrical Check Procedures



Load Cell/Point Input/Output Measurements
The HI5069 series modules are designed to supply 5 VDC excitation to as many as eight 350-Ohm load cells/points per channel. The expected output from each load cell/point will depend on the mV/V rating of the load cell/point and the weight.

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

A zero reference point will vary from system to system depending on the "Dead Load" of the vessel. "Dead Load" is the weight of the vessel and appurtenances only, with no product loaded. In our example we will assume the dead load to be 500 pounds.

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

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

Load Check
Place a load (weight) on the scale or vessel and check to see if the weight reading on the input table changes in the proper direction and in the case where multiple load cells are used, that all load cells are loaded evenly.

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

If the display reads improperly or shows no change, something is wrong with the setup or wiring. If the display changes weight in the proper direction, remove the weight and proceed to calibrate the instrument. Refer to Chapter 7 on troubleshooting for additional help to determine the cause of the poor weight reading.

Calibration Setup Procedures

Unit of Measure

The Unit of measure can be set to ounces, pounds, tons, grams, kilograms, or metric tons. Any weight value input to the module (e.g. CAL LOW WEIGHT, SPAN WEIGHT) is in the currently selected units. The unit of measure can be set at any time, not just at calibration. Setting the unit of measure before calibrating reminds the user what unit of measure is being displayed.

It is important to note that the weigh scale module does not need to be calibrated again after changing the unit of measure.

Motion Tolerance

The motion tolerance defines the amount the weight reading needs to change in a 1 sec period of time to make the scale go into MOTION status. If the change over the last 1 sec is less than the Motion Tolerance then the scale will not indicate in motion. "Motion Indicate" means the weight on the scale is currently changing. The scale cannot be calibrated, tared, or zeroed while in motion.

Zero Tolerance

The Zero Tolerance sets the range of weights so that the Zero Command works as an offset of the calibrated Zero. The amount of weight zeroed off is cumulative. The zero command will fail if the current gross weight plus any previously zeroed amount exceeds the zero tolerance.

Auto Zero Tolerance

When the Auto Zero Tolerance is entered and Auto Zero Tracking is enabled, any weight within the entered tolerance of zero and not in motion will cause the display to automatically read zero.

The amount of weight zeroed off is cumulative. The auto zero command will not run if the current gross weight plus any previously zeroed amount exceeds the zero tolerance or if the scale is in motion.

Zero Track Enable

Enables the Auto Zero tracking if on or disables the auto zero when off.

Number of Averages

The Number of Averages sets the number of weight readings that is used to compute the displayed weight. The average is a sliding average so that a new average reading is available for display at every reading.

Span Weight

The Span Weight is a Calibration high reference point derived from an actual measured weight. This should not be confused with the Scale Capacity. If you have a 100-pound weight and you place it on the scale, the Span Weight would be 100 pounds.

Ref Weight

The Ref Weight is a Calibration LOW or C2 Cal reference point derived from an actual measured weight, normally zero.

Load Cell Sensitivity

Load cell sensitivity is a measure of how a load cell responds to changes in applied force, it is expressed in millivolts per volt (mV/V). Adjusting the sensitivity parameter is not required when using C2 load cells. When using non-C2 load cells, check the sensitivity rating on the load cell data sheet and adjust the setting accordingly.

Gravity Correction

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

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

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

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

Gravity Correction compensates for an object weighing less at the equator than at the North or South Pole. This allows the user to enter the correction factor for their location and apply it for their C2 calibration. This is not used for hard calibration.

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

Tare Weight

The Tare weight is the amount of weight tared off with the last tare command or the amount entered by the user. The tare weight equals the difference between the net and gross weight readings.

WAVERSAVER®

There are 6 selectable levels. 0 provides NO vibration immunity with the fastest response time. 5 provides the most vibration immunity with the slowest response time. Default setting is 3.

Immunity	Setting
Off	0
7.5 Hz	1
3.5 Hz	2
1.0 Hz	3
0.50 Hz	4
0.25 Hz	5

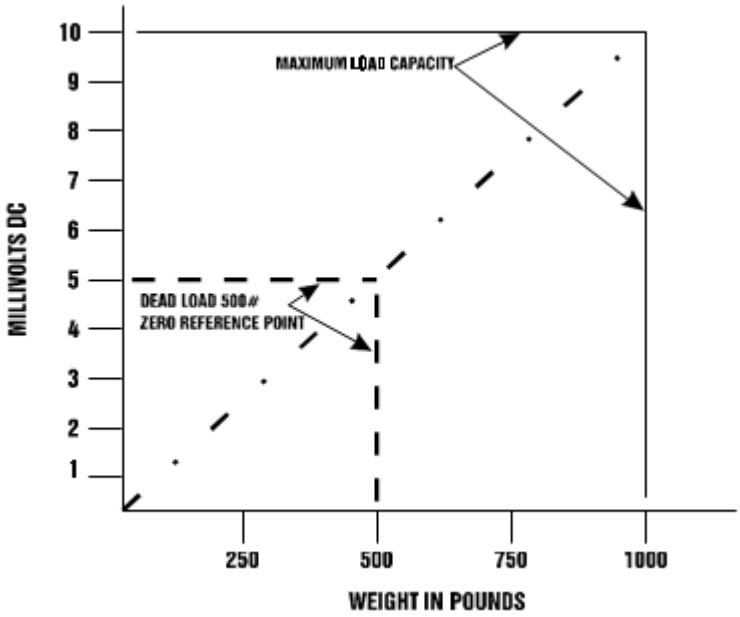
WARNING: BINDING ON A SCALE/VESSEL OR LOAD CELL CAN DENY THE LOAD CELL FREE VERTICAL MOVEMENT AND PREVENT THE INSTRUMENT FROM RETURNING TO THE ORIGINAL ZERO REFERENCE POINT.

AVERTISSEMENT : LA FIXATION D'UNE BALANCE, D'UN RÉCIPIENT OU D'UN CAPTEUR DE PESAGE PEUT EMPÊCHER LE CAPTEUR DE PESAGE DE SE DÉPLACER LIBREMENT DANS LE SENS VERTICAL ET EMPÊCHER L'INSTRUMENT DE REVENIR AU POINT DE RÉFÉRENCE ZÉRO INITIAL.

Electrical Check Procedures

The HI5069 Series Weight Module is designed to supply 5 VDC excitation to as many as eight 350 Ohm load cells/points and two HI6020 Summing Boxes.

The expected output from each load cell/point depends on the mV/V rating of the load cell/point and the weight. For example, a 2mV/V load cell/point will respond with a maximum of 10 mV at full system 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 will be 10 mV at 1000 pounds, 7.5 mV at 750 pounds, and 5 mV at 500 pounds.



A zero reference point will vary from system to system depending on the “Dead Load” of the vessel. “Dead Load” is the weight of the vessel and appurtenances only, with no product loaded. In our example we will assume the dead load to be 500 pounds.

Based on the example, the operating range for this scale is 5-10 mV with a 500-pound weight range. Understand that after zeroing the instrument, the 0 reading refers to the zero reference point and not absolute 0 mV or absolute 0 weight.

NOTE: Load cell/point measurements are checked with a digital volt meter at the connector on the front of the module or by using INTEGRATED TECHNICIAN with the HI6020IT Junction Box.

C2 Calibration

C2 calibration requires C2 load sensors. If you do not have C2 load sensors you must perform a traditional calibration with test weights which we call a Hard Calibration. The Weigh Module reads the performance characteristics of each individual load cell and detects the quantity of load cell(s) in the system. C2 Calibration can be performed by via Allen Bradley RS LOGIX 5000.

C2 Calibration Procedure:

Step 1. Place the ref weight on the scale (if not zero). If the scale cannot be emptied and a known amount of product is present, use the known weight for the reference weight.

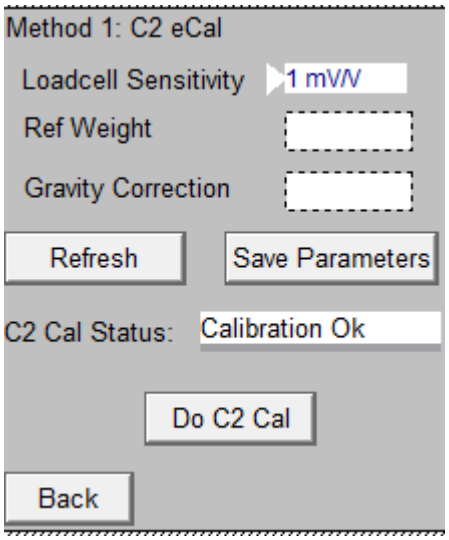
Step 2. Send the C2 calibration command (0x66) by placing the command number into the command register in the output table.

C2 Calibration Using Ladder Logic

1. Check to be sure that the parameters have been setup for your weighting process. (See Chapter 4, Setup & Operations)
2. We have provided a Ladder Logix example explaining how to perform the C2 calibration. The Ladder Logix example is available on the Hardy Process solutions Web Site: **http://www.hardysolutions.com**
3. Under HI 5069-WS Docs and Programs

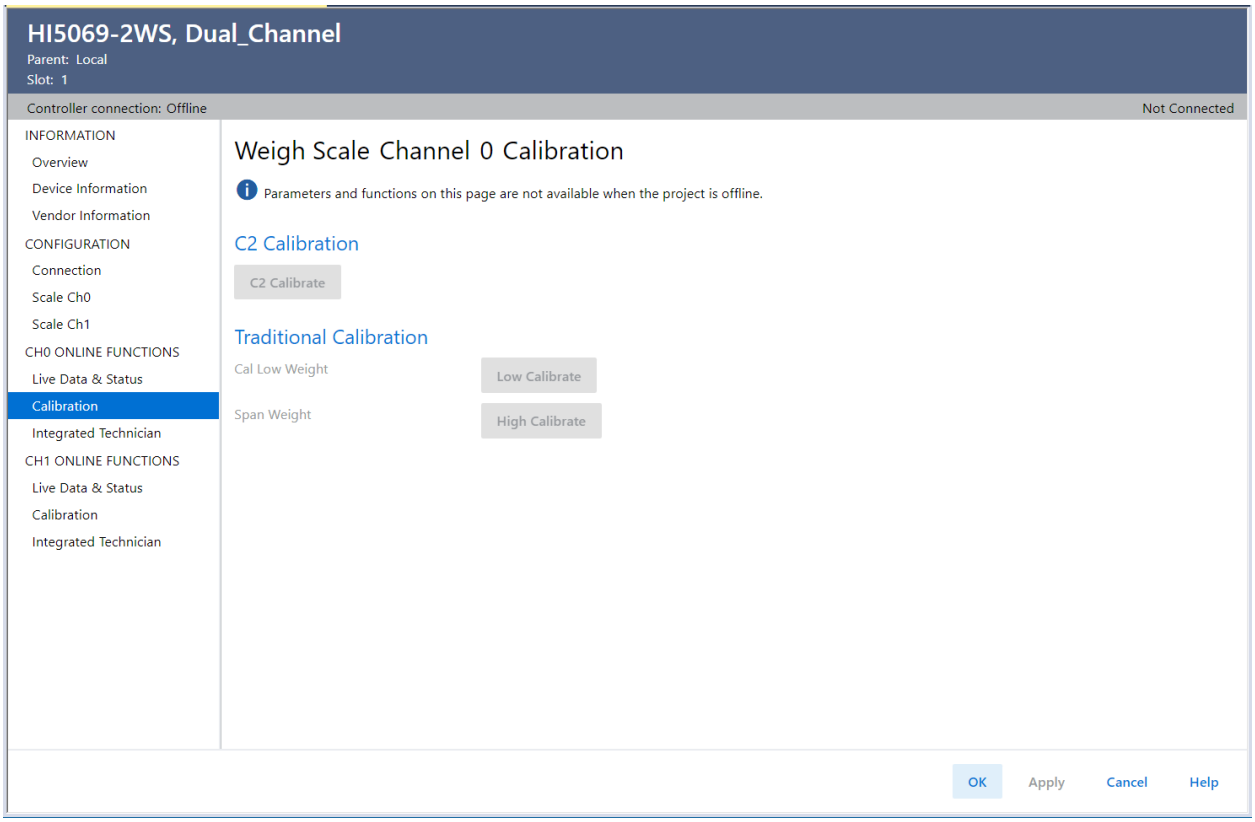
C2 Calibration Using the Faceplate

Once the Faceplate is up and running (for faceplate set up refer to Faceplate quick start), navigate to the calibration menu of the faceplate. Be sure to set your reference weight to the weight that is on the scale (if there is weight on the scale, otherwise leave it at zero). Once the parameters are set make sure to save them, by clicking on the **Save Parameters** button. Now that the parameters are set you are able to perform a C2 Calibration by clicking on **Do C2 Cal**. The Calibration status will display once "Calibration Ok" once the calibration is finished.

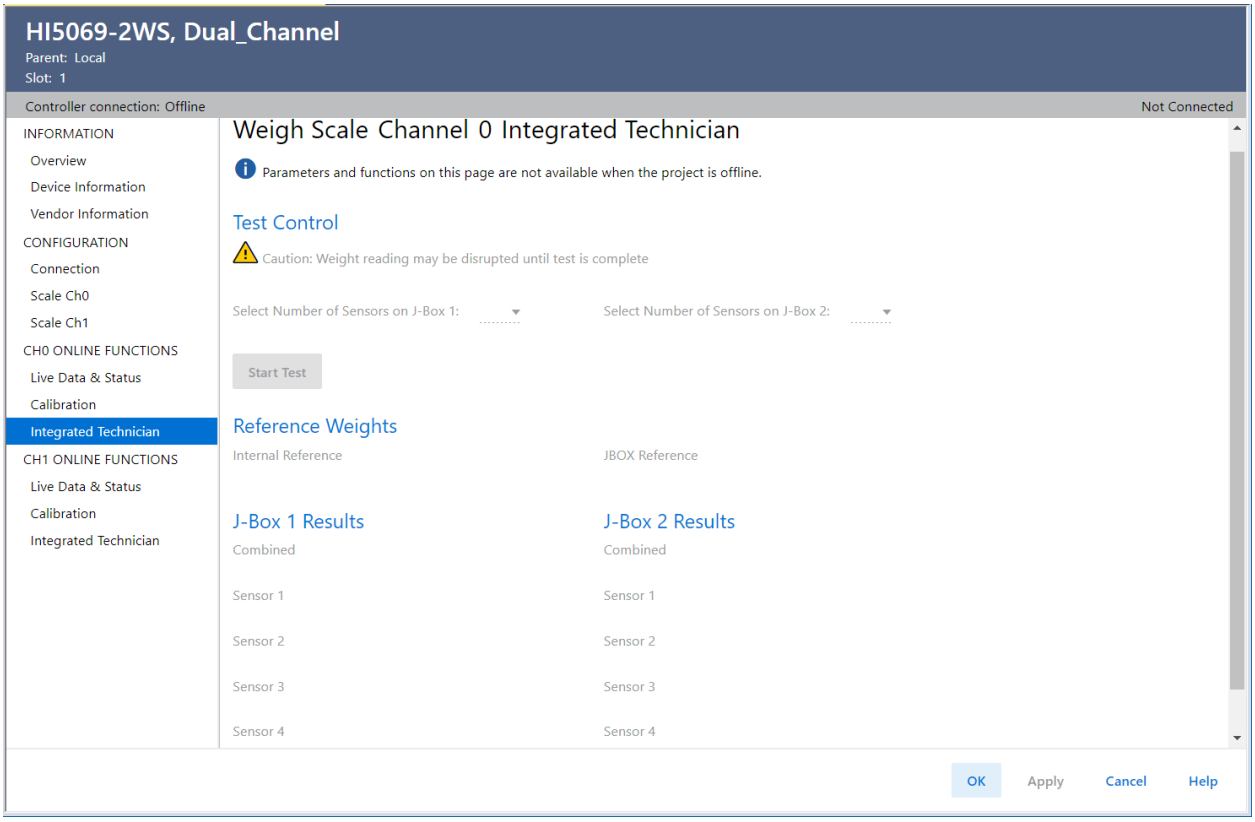


C2 Calibration Using the AOP

Once the AOP is installed and configured, the AOP can be used to perform a C2 Calibration.
Double click on the HI5069 that is located in the IO tree. The AOP window will pop up, next click on the Calibration – Live Data. From this window you can read the Reference Weight value that is used by the module to do the C2 calibration. When ready to perform C2 calibration just click on C2 Cal. At the bottom of the page, use the Command Status view the feedback on the execution of the command.



Integrated Technician Using the AOP



Hard Calibration

Hard Calibration is the traditional method of calibration that uses test weights. Hardy recommends that the test weights total 80 to 100% of the scale capacity.

Step 1	Place the low calibration ref weight (the weight can be zero) on the scale. If scale cannot be emptied, use the known amount of product on the scale as the reference weight.
Step 2	Send a Cal Low Command (CALLOW- CMD) • The Cal Low Command - sets the "calLowCount" parameter to the current A/D average counts when doing a hard calibration.
Step 3	If low calibration ref weight was used, remove it from the scale
Step 4	Place the high (Span) calibration weight on the scale
Step 5	Send a Cal High Command (CAL- HIGHCMD) • The Cal High Command - Sets the Span Weight parameter to the current A/D average counts when doing Hard CAL
Step 6	Remove the weight from the scale

Hard Calibration Using Ladder Logic

Step 1	Check to be sure that the parameters have been setup for your weighing process. (See Chapter 4, Setup)
Step 2	We have provided a Ladder Logic example explaining how to set the weigh process

parameters. The Ladder Logic example is meant to provide a ladder logic model only. Your application may vary and the example may or may not meet your requirements.

Step 3 The Ladder Logix example is available on the Hardy Process solutions Web Site: **http://www.hardysolutions.com** Navigate to Products> PLC Weighing Modules > Weight Modules> HI 5069 Weigh Scale Module and click the button Docs & Programs.

Chapter 6 – Troubleshooting

Return Codes

Name/Code #	Definition	Action
Command Success **command Status 0**	Command passed	None
Command fail **Command Status 1**	Command Failed. Applies to pass/fail commands like C2 Search	Command specific. Reevaluate the command and conditions.
ADC Convert error **Command status error 2** **Statusword bit 0**	Load Cell input out of range (i.e., voltage not 0-15 mV and flashing red LED will display). Can result from overloaded or mismounted load cell. In this state weight readings do not respond to changes.	Check the voltage levels to the module from each load cell. +5 V for excitation and sense lines and 0-15 mV on signal lines. If voltage is bad, to find a problem load cell, disconnect each one at the summing box.
Statusword, bit 1 AC Convert Failure	Output from the A/D converter to processor is bad. The module shows a solid red LED.	Contact Customer Support to return module for repair.
Statusword bit 2 Status Motion **Command status error 4**	The rate of scale weight change over 1 second exceeds the motion tolerance setting. If the setting is too low, motion may be indicated when no changes are occurring.	If the weight is actually changing, stabilize it. If not, increase the motion tolerance setting until the motion bit goes off with static weight.
Statusword bit 3 EEPROM write error	Module cannot write (save settings) to non-volatile memory. EEPROM is probably bad.	Contact Customer support to return module for repair.
Statusword bit 4 Status Center Zero	Indicates the gross weight is reading at the calibration zero point.	None
Statusword bit 6 In Progress **Command Status 0xFF**	Command is in progress.	None
Statusword bit 7 not found **Command Status 0x80**	The parameter ID is invalid	Correct the parameter ID
Command Status 5 No C2	When trying to do a C2 calibration, the module cannot read the data from the load cells.	Check the wiring to ensure proper connections and orientation. Find the problem load cell by disconnecting them at the summing box.
Command Status 6 C2 Capacities not equal	C2 load cells have unequal capacities due to either the use of mismatched load cells or faulty C2 programming.	Verify each load cell is correct per the spec sheet delivered with the cell.

Command Status 7 C2 clones	C2 load cell has a non-Hardy C2 load cell.	Verify the use of Hardy load cells.
Command Status 8 Hard Cal Fail Counts	Too few A/D counts between zero and span points during hard calibration. Input must change by a minimum amount between the cal low and cal high points.	Add weight to the scale and see if readings increase. Check voltages as in ADC Convert Error.
Command Status 0x0B (11 dec)	Value being set is too high	Verify the value is within the tolerance for the parameter being written to. Verify the parameter ID is the correct ID for the parameter you wish to write to.
Command Status 0x0C (12 dec)	Value being set is too low	Verify the value is within the tolerance for the parameter being written to. Verify the parameter ID is the correct ID for the parameter you wish to write to.
Command Status 0x0D (13dec)	**Value not allowed**	

Chapter 7 - Hardy Installation and Commissioning

Hardy delivers on its reputation as a quality manufacturer of weighing equipment. Hardy solutions are EASY to install, integrate, commission, diagnose and maintain. Our customers find that this simplicity delivers the lowest total cost of ownership.

To ensure the best performance of Hardy products, we recommend that you add Hardy Installation to your product purchase. Great products without a quality installation risk long-term performance and availability, and Hardy has a broad network of trained service agents to perform, inspect, and commission new installations.

Hardy offers preferred rates for new installations and we guarantee that the installation will be done right the first time. Plus, with the use of the Hardy Toolbox features like C2 Electronic calibration, Hardy Technicians spend less time onsite than the competition, saving you cost and downtime.

For a fast and easy installation quote, please contact one of our service specialists at:

858-278-2900 Option 4 or 800-821-5831 option 4, or email us at:
hardysupport@hardysolutions.com

Emergency Service and Support

Even with the best quality equipment, failures can happen without warning. The question isn't "if" this will happen, but how prepared you are to rectify the situation "when" the unexpected happens.

Hardy Field Service Technicians are located nationwide to ensure the fastest response to your unplanned downtime, and our emergency after-hours mailbox is checked constantly to prevent customers experiencing a downtime event from having to wait until morning.

For rapid turnaround service, please contact one our service specialists at: **858-278-2900 Option 4 or 800-821-5831 option 4.**

Appendix A

List of the Parameter IDs

Read/Write Parameters

Configuration Parameters:

Units	0x2881
WAVERSAVER	0x2081
NumAverages	0x2082
ZeroTolerance	0x2886
AutoZeroTolerance	0x6302
AutoZeroState	0x6301
MotionTolerance	0x2887
SpanWeight	0x4182
RefWeight	0x4101
Gravity Correction	0x4102
Tare Weight	0x6183
Cal Year	0x4202
Cal Month	0x4203
Cal Day	0x4204

Diagnostic Write Parameters:

IT_NUMSENSORS JBOX 1	0x498D
IT_NUMSENSORS JBOX 2	0x498E

Read Only Parameters

IT Test Diagnostic Parameters:

IT WEIGHT CHANNEL 0	0x4990
IT WEIGHT CHANNEL 1	0x4991
IT WEIGHT CHANNEL 2	0x4992
IT WEIGHT CHANNEL 3	0x4993
IT WEIGHT CHANNEL 4	0x4994
IT WEIGHT CHANNEL 5	0x4995
IT WEIGHT CHANNEL 6	0x4996
IT WEIGHT CHANNEL 7	0x4997
IT MV/V CHANNEL 0	0x49A0
IT MV/V CHANNEL 1	0x49A1
IT MV/V CHANNEL 2	0x49A2
IT MV/V CHANNEL 3	0x49A3
IT MV/V REF 1	0x49A8
IT MV/V CHANNEL 4	0x49A4
IT MV/V CHANNEL 5	0x49A5
IT MV/V CHANNEL 6	0x49A6

IT MV/V CHANNEL 7	0x49A7
IT MV/V REF 2	0x49A9
IT RAW VARIATION CHANNEL 0	0x49B0
IT RAW VARIATION CHANNEL 1	0x49B1
IT RAW VARIATION CHANNEL 2	0x49B2
IT RAW VARIATION CHANNEL 3	0x49B3
IT RAW VARIATION REF 1	0x49B8
IT RAW VARIATION CHANNEL 4	0x49B4
IT RAW VARIATION CHANNEL 5	0x49B5
IT RAW VARIATION CHANNEL 6	0x49B6
IT RAW VARIATION CHANNEL 7	0x49B7
IT RAW VARIATION REF 2	0x49B9
IT WAVERSAVER VARIATION CHANNEL 0	0x49C0
IT WAVERSAVER VARIATION CHANNEL 1	0x49C1
IT WAVERSAVER VARIATION CHANNEL 2	0x49C2
IT WAVERSAVER VARIATION CHANNEL 3	0x49C3
IT WAVERSAVER VARIATION REF 1	0x49C8
IT WAVERSAVER VARIATION CHANNEL 4	0x49C4
IT WAVERSAVER VARIATION CHANNEL 5	0x49C5
IT WAVERSAVER VARIATION CHANNEL 6	0x49C6
IT WAVERSAVER VARIATION CHANNEL 7	0x49C7
IT WAVERSAVER VARIATION REF 2	0x49C9
IT RAW VARIATION RESULT CHANNEL 0	0x49D0
IT RAW VARIATION RESULT CHANNEL 1	0x49D1
IT RAW VARIATION RESULT CHANNEL 2	0x49D2
IT RAW VARIATION RESULT CHANNEL 3	0x49D3
IT RAW VARIATION RESULT REF 1	0x49D8
IT RAW VARIATION RESULT CHANNEL 4	0x49D4
IT RAW VARIATION RESULT CHANNEL 5	0x49D5
IT RAW VARIATION RESULT CHANNEL 6	0x49D6
IT RAW VARIATION RESULT CHANNEL 7	0x49D7
IT RAW VARIATION RESULT REF 2	0x49D9
IT WAVERSAVER VARIATION RESULT CHANNEL 0	0x49E0
IT WAVERSAVER VARIATION RESULT CHANNEL 1	0x49E1
IT WAVERSAVER VARIATION RESULT CHANNEL 2	0x49E2
IT WAVERSAVER VARIATION RESULT CHANNEL 3	0x49E3
IT WAVERSAVER VARIATION RESULT REF 1	0x49E8
IT WAVERSAVER VARIATION RESULT CHANNEL 4	0x49E4
IT WAVERSAVER VARIATION RESULT CHANNEL 5	0x49E5
IT WAVERSAVER VARIATION RESULT CHANNEL 6	0x49E6
IT WAVERSAVER VARIATION RESULT CHANNEL 7	0x49E7
IT WAVERSAVER VARIATION RESULT REF 2	0x49E9

IT RTZ CHANNEL 0	0x49F0
IT RTZ CHANNEL 1	0x49F1
IT RTZ CHANNEL 2	0x49F2
IT RTZ CHANNEL 3	0x49F3
IT RTZ CHANNEL 4	0x49F4
IT RTZ CHANNEL 5	0x49F5
IT RTZ CHANNEL 6	0x49F6
IT RTZ CHANNEL 7	0x49F7
IT RTZ COMBINED	0x498C

Stability Test Parameters:

STABILITY RAW MEAN	0x4901
STABILITY WAVERSAVER MEAN	0x4903
STABILITY RAW VARIATION	0x4902
STABILITY WAVERSAVER VARIATION	0x4904
STABILITY RAW VARIATION RESULT	0x4905
STABILITY WAVERSAVER VAR IATION RESULT	0x4906

Read Only Parameters:

GrossWeight	0x6081
NetWeight	0x6082
ADC_Counts	0x4907
ADC_CountsRaw	0x4908
CalLowCounts	0x4085
CalHighCounts	0x4087
CalCALIBK	0x4083
ZeroCounts	0x2889
CalZeroCounts	0x4084
Cal Type	0x4001
NUMBER C2 SENSORS	0x4103
NUMBER IT J-BOXES	0x4881
FirmwareRevision	0x7985