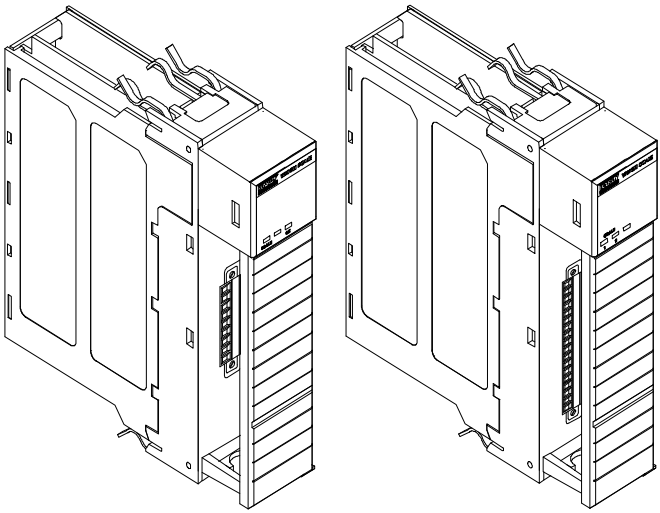
HI 1756-WS & HI 1756-2WS
WEIGH SCALE MODULE
Series A

OPERATION AND INSTALLATION MANUAL



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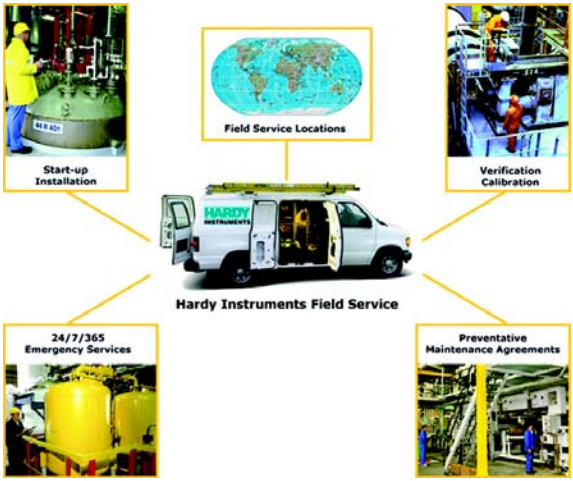

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CHAPTER 1 - OVERVIEW

A BRIEF DESCRIPTION OF CHAPTER 1

This manual is designed for use by installers, operators, and service personnel. It provides specifications and procedures for linking, configuring, operating, maintaining, and troubleshooting the Hardy Instruments HI 1756-WS and HI 1756-2WS ControlLogix® I/O Weigh Scale Modules.

NOTE: *Control/Logix® is a registered trademark of the Rockwell Corporation.*

Both modules come with WAVERSAVER®, C2® button-triggered calibration, INTEGRATED TECHNICIAN (***IT***®) diagnostics, and ladder logic configurability.

NOTE: *WAVERSAVER®, C2®, INTEGRATED TECHNICIAN® are registered trademarks of Hardy Instruments Inc.*

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 Instruments 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:

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About This Manual

Chapter 1 - Introduces the instruments and provides an overview of the their capabilities

Chapter 2 - Provides a list of specifications

Chapter 3 - Contains instructions needed to install the HI 1756-WS and HI 1756-2WS (both standard and optional equipment) and the Remote Termination Assembly (-RTA)

Chapter 4 - Provides hardware configuration instructions, including dip switch and jumper settings.

Chapter 5 - Provides firmware/software setup procedures needed to operate and calibrate the instrument.

Chapter 6 - Provides calibration instructions.

Chapter 7 - Provides operating procedures.

Chapter 8 - Provides troubleshooting procedures.

Description

Both the HI 1756-WS and HI 1756-2WS Weigh Scale Modules are self-contained, microprocessor-based ControlLogix I/O modules with control inputs and outputs that plug into the backplane of an Allen-Bradley ControLogix® programmable controller and/or Remote Rack. The remote rack module connects to the local chassis via a ControlNet link.

NOTE: *The Allen-Bradley Control/Logix®manuals contain useful information about their products 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).*

The HI 1756-WS Weigh Scale Module Series A is configured for single-channel operation while the HI 1756-2WS Weigh Scale Module Series A is configured for dual-channel operation. Both 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.

The analog-to-digital converter in the weigh module controller updates fifty times per second and is capable of 8,388,608 counts of display resolution. This is enough to provide accurate weight measurement and control and to tolerate large “dead” loads or over sizing of load cells/sensors. To calibrate the module you can simply push “The Button” to effect a C2 electronic calibration. C2, Hard (Traditional calibration with weights) is also available for those not using Hardy Instruments C2 certified load sensors.

WAVERSAVER®

During the measurement of small weight changes, the affects of mechanical vibration and noise from the operating environment can introduce substantial interference. WAVERSAVER factors out vibration, noise, and other interference-related signals from the load cell so the rate controller can better decipher the actual 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 1.00 Hz vibration frequency immunity.

C2® Calibration

Traditional calibration uses certified test weights. C2® Electronic Calibration allows a scale to be calibrated without the need for test weights. It can be initiated by pressing "THE BUTTON®" located in the front of the module, or via ladder logic.

A C2 weighing system consists of up to eight C2 load sensors, a junction box, interconnect cable, and an instrument with C2 capabilities (e.g., the HI 1756). Each Hardy Instruments C2-certified load sensor outputs digital information used for the calibration. The modules reads the sensor outputs and detects 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™ is a system diagnostics utility which, in conjunction with an HI 215IT series IT junction box, continuously monitors the excitation circuit (with up to 4 load sensors) for possible malfunctions. IT reads individual load sensor voltages and weights and isolates individual system components for quick and easy troubleshooting.

Excitation Monitor

Continuously monitors a system's excitation current to check for open or shorted load sensors or damaged or broken excitation wire(s), including the wires

between the module, Remote Terminal Assembly (RTA) and the ***IT***® Junction box. If the measured current deviates more than a ± 10% tolerance, an "Excitation Error" bit (Module Status Word bit 9) is set to 1.

Digital Volt Meter (DVM) - Optional

Requires the HI 215IT Series Junction Box to monitor both mV and mV/V readings for the system and per individual load sensor. Once a problem is detected by the operator the DVM readings help the operator to isolate the faulty component. Further, the DVM readings can be used to level a system and to make corner adjustments to platform scales. Accuracy is +/- 2% or better of full scale.

NOTE: *If you do not have the HI 215IT Junction Box connected to the module, the mV/V reading as displayed is the total for all the load cells on the system.*

Return to Zero Test - Optional

Requires the HI 215IT 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.

Weighing System Tests - Optional

Requires the HI 215IT 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 preset auto zero tolerance. For auto zeroing to work correctly, any "live weight" plus any weight previously zeroed on the scale must be below the set Auto Zero Tolerance 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 Autozero command will fail if the current gross weight plus any previously zeroed amount exceeds the zero tolerance value.*

CHAPTER 2 - SPECIFICATIONS

A Brief Description of Chapter 2

Chapter 2 lists the specifications for the HI 1756-WS and HI 1756-2WS 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. All service personnel should be familiar with this section before attempting an installation or repair of this instrument.

Specifications for a Standard HI 1756-WS (-2WS) Weigh Scale Module

Channels

2 Channels

- Single Channel HI 1756-WS
- Dual Channel HI 1756-2WS

Conversion Rate

50 updates per second

Averages

1-255 User Selectable in single increments

Resolution

Internal: 1:8,388,608

Input

Up to eight (8) 350 ohm Full Wheatstone Bridge, Strain Gauge Load Sensors/Cells (5 volt excitation) on one vessel.

Non-Linearity

0.0015% of Full Scale

WAVERSAVER®

User Selectable

- 7.50 Hz
- 3.50 Hz
- 1.00 Hz (Default)
- 0.50 Hz
- 0.25 Hz

Excitation Monitor

Current less than +/- 10% expected

Common-Mode Rejection

110dB at or below 60 Hz

Common-Mode Voltage Range	2.5VDC maximum (with respect to earth ground)
Backplane Input Voltage	5 VDC and 24 VDC
Backplane Current Load	<1 Amp at 5 VDC 0.0125 Amps at 24 VDC (with 4-350 Ohm Load Cells
Backplane Power Load	< 5W at 5 VDC < .3W at 24 VDC with 4-350 Ohm Load Cells
C2 Calibration Input	Isolation from digital section 1000 VDC minimum.
Cable lengths	1000 feet maximum of C2 authorized cable 250 feet maximum of C2 authorized cable (Maximum of 4 load sensors) with IT Junction box.
Load Cell Excitation	5 VDC +/- 1.15 W maximum. Isolation from digital section 1000 VDC minimum
C2 Calibration Output	Isolation from digital section 1000 VDC minimum

Environmental Requirements

Temperature Coefficient	Less than 0.005% of full scale per degree C for Cal-LO and Cal-HI reference points
Operating Temperature Range	0^{o} C to 60^{o} C (32^{o} F to 140^{o} F)
Storage Temperature Range	-40^{o} C to 85^{o} C (-40^{o} F to 185^{o} F)
Humidity Range	0-90% (non-condensing)
Approvals	CE Approval UL, CUL (pending)
Digital Voltmeter	Accuracy +/- 2% of full scale Resolution

- mV/V 4 digits to the right of the decimal

Optional Equipment

1756 RTA (Remote Termination Assembly

Hardy Part # -RTA (HI-1756-XX-RTA if ordered separately) Remote Termination supports two (2) separate HI 1756-WS weigh scale modules or one (1) HI 1756-2WS weigh scale module. Unit includes DIN rail mounting for 35mm x 15mm DIN rail.

RTA Cable Assemblies

Hardy Part # -C6 (HI 1756-XX-C6)

- Cable Length: 6 ft. (1.525 meters) from the single channel module to the RTA.

Hardy Part # -C6 (HI 1756-XX-DC6)

- Cable Length: 6 ft. (1.525 meters) from the dual channel module to the RTA.

HI 215IT Series Junction Box

NEMA rated waterproof enclosure which sums from one to four load sensors load sensors.

- -PS1 NEMA 4 Painted Steel
- -SS1 NEMA 4X Stainless Steel
- -FG1 NEMA 4X Fiberglass

Default Parameters

Parameter	Default	Setting
ChanActive	1	On
calyear*		
calmonth*		
calday*		
calid[2]*		
Calib Type		
tareweight	0.0 lbs	

Table 2-1: Default Parameters

Parameter	Default	Setting
Metric	lbs	0
WAVERSAVER®	1 Hz	3
SpanWeight	10,000.00	
CalLowWeight	lbs	0
Num Averages	10	
ZeroTrackEnable	False	0
ROCTimeBase	10	
ZeroTolerance	10	
AutoZeroTolerance	10.0 lbs	
MotionTolerance	5.0 lbs	

Table 2-1: Default Parameters

NOTE: ** The HI 1756 modules do not have a real time clock, so the year; month; day and calid must be set by the operator.*

CHAPTER 3 - INSTALLATION

A Brief Description of Chapter 3

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.

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. Check to see that everything in the package matches the bill of lading. You should normally have:

- HI 1756-WS or HI 1756-2WS Weigh Scale Module
- Operation and Installation Manual

Step 3. Write down the Model and Serial number of the module. You may need this information when contacting The Customer Support Department for parts or service.

Installing the HI 1756-WS (-2WS) into an Allen-Bradley ControlLogix Processor or Allen-Bradley Remote Rack

WARNING

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

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.

Installing the HI 1756-WS (-2WS) into the ControlLogix Chassis

Step 1. Make sure that the module is oriented correctly for installation. (See Fig. 3-1)

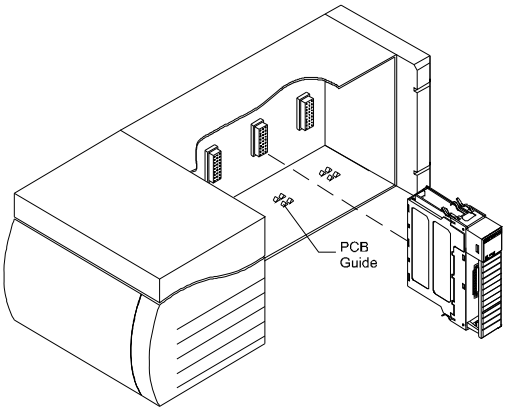


FIG. 3-1 POSITIONING THE MODULE FOR INSTALLATION

Step 2. Gently slide the module into the Chassis.

Step 3. Slide the digital board between the PCB Guides on the top plate and bottom plate of the chassis to line up the module connector with the backplane connector.

Step 4. When the module connector is touching the backplane connector, firmly but carefully push toward the chassis until the pins are plugged in and the Processor Releases (both top and bottom) are snapped into place. (See Fig. 3-2 & 3-3)

Step 5. The installation is complete.

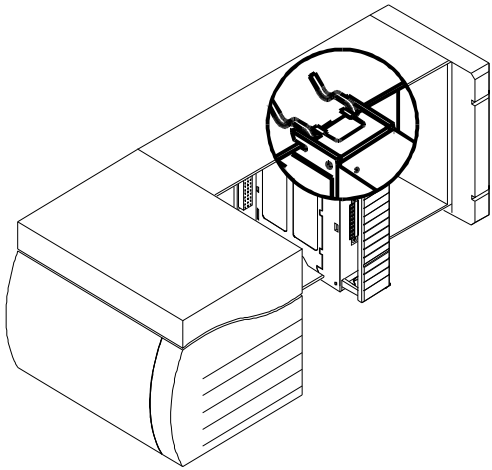


FIG. 3-2 MODULE RELEASE(S)

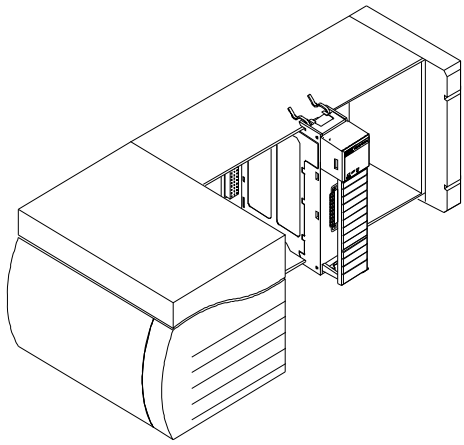


FIG. 3-3 MODULE INSTALLED IN CHASSIS

Removing the Module from the Chassis

Step 1. Press down on the top and bottom processor releases simultaneously and pull the module out of the chassis. (See Fig. 3-3)

Step 2. Store the module in a safe, secure location in an anti-static bag or its original package.

Installing the Module I/O Connector

About the Module I/O Connector

The I/O Connector at the front of the module connects the module to the Remote Terminal Assembly (-RTA), a load sensor, or the HI 215IT Series Junction Box, depending on how many load sensors are installed in the weighing system. See below for the pin-out diagram, which is also located on the inside of the module door. (See Fig. 3-4 & 3-5)

Single Channel		Dual Channel	
Pin 1	Exc+	Pin 1	Exc+
Pin 2	Sense+	Pin 2	Sense+
Pin 3	Sig+	Pin 3	Sig+
Pin 4	Sig-	Pin 4	Sig-
Pin 5	Sense-	Pin 5	Sense-
Pin 6	Exc-	Pin 6	Exc-
Pin 7	C2+	Pin 7	C2+
Pin 8	C2-	Pin 8	C2-
Pin 9	Shield	Pin 9	Shield
		Pin 10	Exc+
		Pin 11	Sense+
		Pin 12	Sig+
		Pin 13	Sig-
		Pin 14	Sense-
		Pin 15	Exc-
		Pin 16	C2+
		Pin 17	C2-
		Pin 18	Shield

Step 1. Open the Module door to gain access to the I/O connector. (See Fig. 3-4 & 3-5)

Step 2. Install the cable and connector so it allows the module door to be shut.

Step 3. With the plug oriented correctly (See the pin-out diagram above), plug the I/O male connector into the I/O connector at the front of the module.

Step 4. Verify that the connector is completely plugged in before operating the module.

NOTE: *Most problems are due to loose connections. Be sure to check the I/O connection first if you have a problem*

receiving information from the load cells or if the relays do not operate correctly.

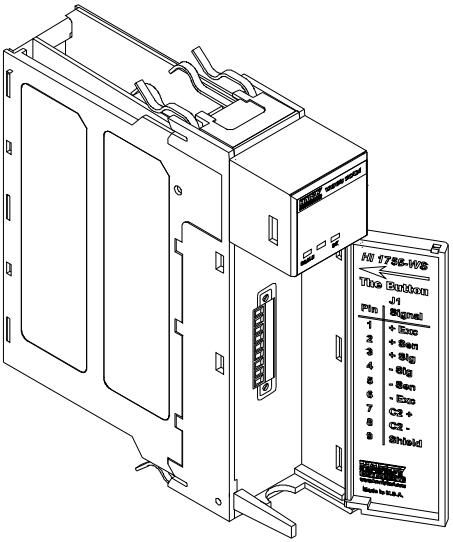


FIG. 3-4 HI 1756-WS WITH DOOR OPEN

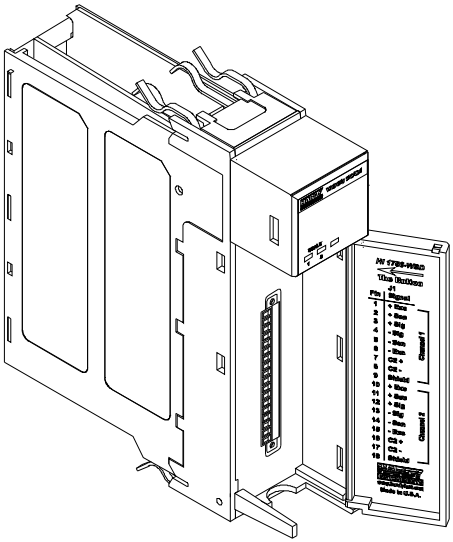


FIG. 3-5 HI 1756-2WS WITH DOOR OPEN

Load Cell Wiring Diagrams

Industry Standard Load Cells

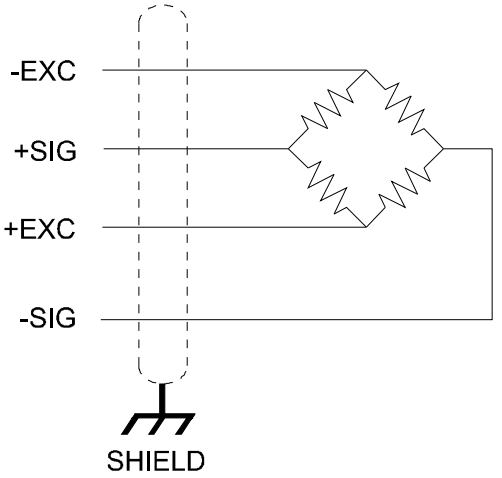


FIG. 3-6 INDUSTRY STANDARD LOAD CELLS WIRING DIAGRAM

Hardy Load Sensor with C2

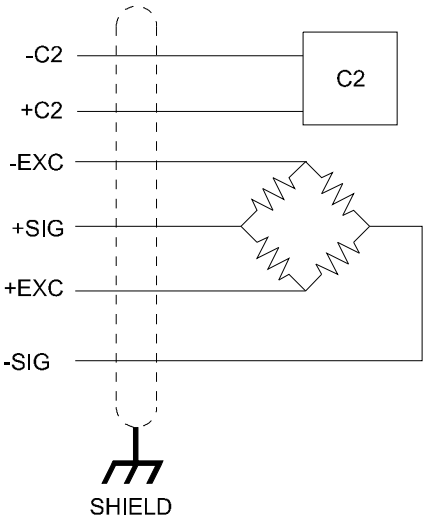


FIG. 3-7 HARDY LOAD SENSOR/C2 WIRING DIAGRAM

HI 1756 Remote Terminal Assembly (HI 1756-XX-RT)

The RTA provides connection points between the HI module's cable assembly and the wires from the junction box(es) or load sensor(s). It comes with a standard 35 mm Din Rail Mounting and requires at least a 5" inch DIN rail for mounting.

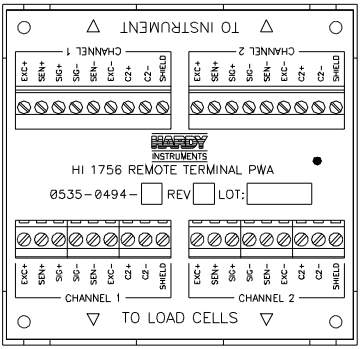


FIG. 3-8 REMOTE TERMINAL ASSEMBLY

NOTE:

*When using load cells that **do not** have sense lines you will need to jumper the Sense (-) to the Excitation (-) and the Sense (+) to the Excitation (+) for one or both channels. (See Fig. 3-9)*

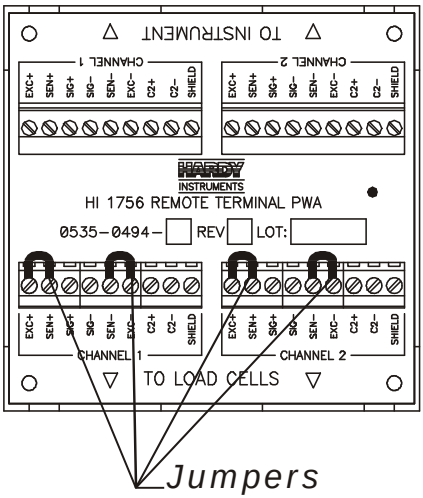


FIG. 3-9 RTA WITH JUMPERS FOR LOAD CELLS WITHOUT SENSE LINES

RTA Cable Assembly

- Six (6) foot cable that connects to the HI 1756-WS module.

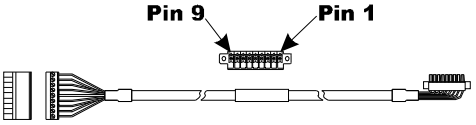


FIG. 3-10 RTA CABLE ASSEMBLY - HI 1756WS SINGLE CHANNEL

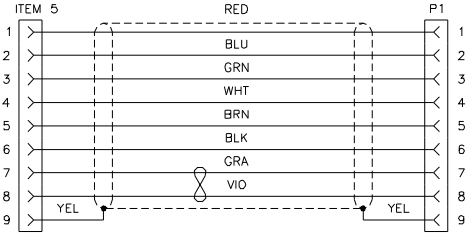


FIG. 3-11 RTA CABLE SCHEMATIC - HI 1756WS SINGLE CHANNEL

- Six (6) foot cable that connects to the HI 1756-2WS module

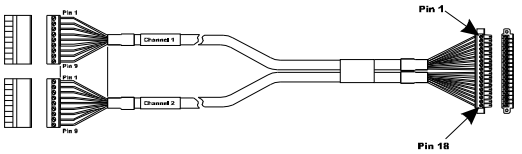


FIG. 3-12 RTA CABLE ASSEMBLY - HI 17562WS DUAL CHANNEL

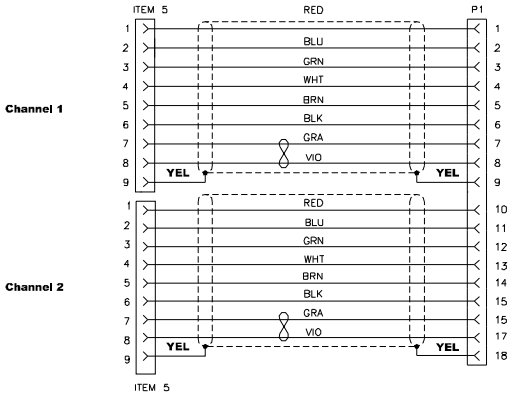


FIG. 3-13 RTA CABLE SCHEMATIC - HI 1756-2WS DUAL CHANNEL

Hardy HI 215IT Junction Box

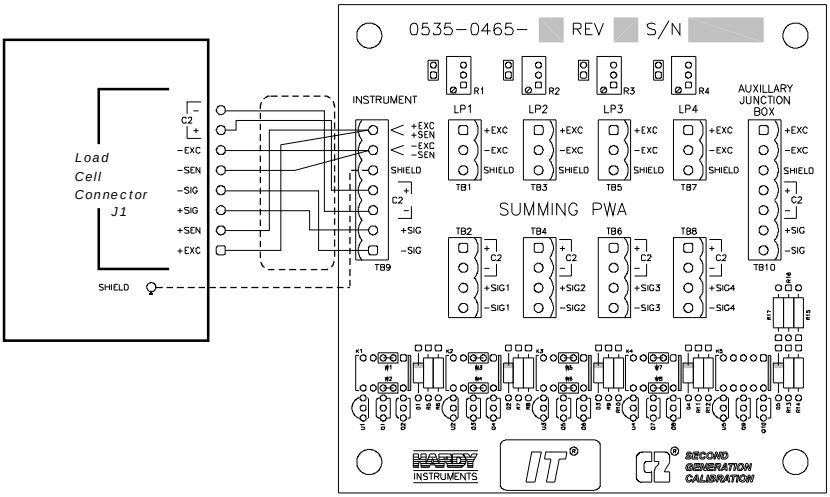


FIG. 3-14 HARDY HI 215IT JUNCTION BOX WIRING DIAGRAM

NOTE: *When connecting the Hardy HI 215IT Junction Box you must remove the two factory installed jumpers 1&2 and 5&6 on the module install sense lines.*

CHAPTER 4 - SETUP

A Brief Description of Chapter 4

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.

Power Check

Step 1. 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 Figs. 4-1 and 4-2)

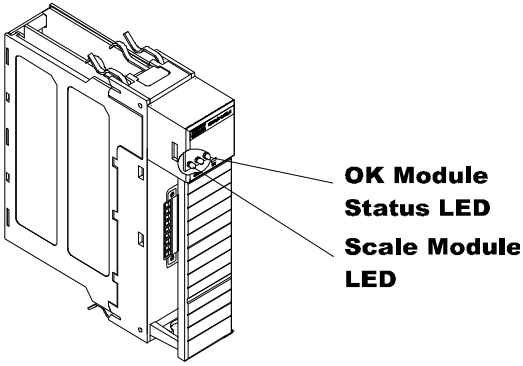


FIG. 4-1 MODULE LEDS SINGLE CHANNEL

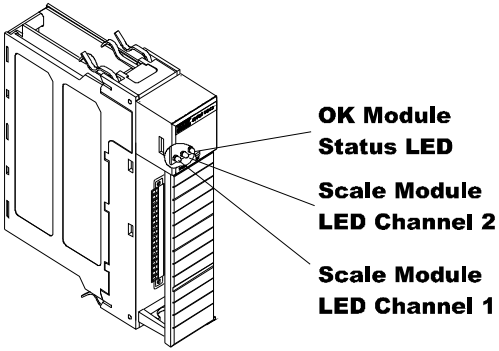


FIG. 4-2 MODULE LEDS DUAL CHANNEL'

LEDS

Scale Data LEDs	Flashing Green	Error No Calibration
	Steady Green	Running (Normal)
	Steady Red	Error Read Failure or Error eeprom write. Contact HI Customer Support
	Flashing Red	Read Convert Error.
	LED is Off	Channel is Inactive
OK Module Status LED	Brief Steady	During power up the LED lights Red for about one second.
	Flashing Green	In Program mode. (Normal)
	Steady Green	In Run Mode. (Normal)
	Steady Red (Backplane Available)	Config. Fault The eeprom checksum failed - bad serial eeprom data or blank serial eeprom. Contact HI Customer Support.
	Steady Red	Internal Hardware watchdog timer fault (e.g. bad Hardware or Firmware). ASIC is non-operational.
	Flashing Red	Communication Error.

Reset Module Message

Modules with communication errors (indicated by a flashing red Module Status LED) can be reset by a reset message.

- Message Type: CIP Generic
- Service Code 5 (Hex)
- Class Name: 1
- Instance Name: 1

Setting Up Communications Between the PLC and the HI 1756-WS (-2WS) Weigh Scale Module

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.

Step 1. Look for a list of folders on the left side of the screen. Scroll to and select the I/O Config folder, which will open a menu.

Step 2. Select New Module to display a list of modules.

Step 3. Scroll to and select the Generic 1756 module to open the Module Properties form.

Step 4. Enter the following connection parameters in the appropriate fields:

- Name of Module
- Description of Module (Optional)
- Slot ID
- Input Assembly Instance:101 Size = 11
- Output Assembly Instance: 146 Size = 1
- Configuration Assembly Instance:241

NOTE: *Size = 0 configuration table not used) or (with version 2.3 software):*
Size = 64 (8-bit) for a 1-channel unit
Size = 128 (8-bit) for a 2-channel unit

Step 5. Select DATA REAL from the Comm Format pull-down list.

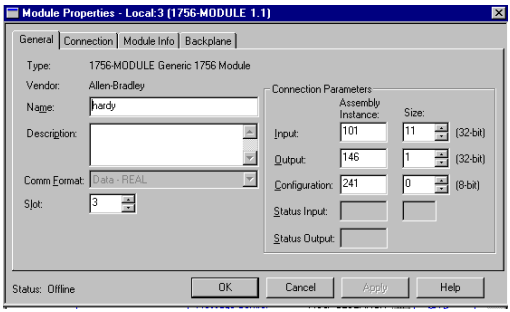


FIG. 4-3 COMMUNICATION CONFIGURATION DIALOG BOX

Step 6. Open the Connection Tab.

Step 7. Set the RPI to 20 milliseconds or greater. **Do not set this parameter lower than 20 milliseconds.**

Step 8. Click on Finish.

Configuration Parameters for the HI 1765-WS Module

With version 2.3 software, the HI 1765-WS module can recieve 32 words of the configuration data from a PLC upon power-up. These data are used only if the value for Config_rev_num is set to 1 and the parameters are sent in the correct format and range.

NOTE: *DINT Parameters can be interpreted as floating point based on the value of a bit within the DecimalPoints parameter of the channel.*

Parameter	Offset (In Words)
Single Channel	
Config_rev_num0 *	0
ChanEnabled0	1
DecimalPoints0 **	2
Metric0	3
NumAverages0	4
Waversaver0	5
SpanWeight0	6
CalLowWeight0	7
ZeroTrackEnables0	8
AutoZeroTolerance0	9
MotionTolerance0	10
TareWeight0	11
EnableButton0	12
RocTimeBased0	13
ZeroTolerance0	14
Spare1_0	15

Parameter	Offset (In Words)
Dual Channel	
Config_rev_num1 *	16
ChanEnabled1	17
DecimalPoints1 **	18
Metric1	19
NumAverages1	20
Waversaver1	21
SpanWeight1	22
CalLowWeight1	23
ZeroTrackEnables1	24
AutoZeroTolerance1	25
MotionTolerance0	26
TareWeight0	27
EnableButton0	28
RocTimeBased0	29
ZeroTolerance0	30
Spare1_0	31

* Must be set to 1 for the other values to apply
** Converts integers to floating-point

When the parameters are displayed, they do not appear in the form above. They may look more like this:

Local:1:C.Data[0]
Local:1:C.Data[1]
...and so on

Input Data

This is discrete input data which is a module-defined data type, LOCAL:X:I (where X is the slot number).

	#0*	Bits 15-0: STATUSWORD Bits 31-16: STATUSWORD of 2nd Channel
CHANNEL #1	#1	Gross Weight:
	#2	Net Weight:
	#3	Rate of Change:
	#4	loadcellcurrent (milliamps):
CHANNEL #2	#5 #6 #7 #8	• 5 - Gross • 6 - Net • 7 - ROC • 8 - Current
	#9, #10	TimeStamp

NOTE: *The TimeStamp is a 64-bit integer giving the system time in microseconds.*

STATUSWORD

The module returns a binary statusword where each bit indicates a state or condition within the module. To interpret these states, note which bits are ON and use the chart below to match each bit location to the state it represents.

For Example: If the satausword is 69 with a binary value of 0000 0000 0100 0101, bits 0, 2 an 6 are on. Bit 0 indicates an A/D conversion error, bit 2 indicates the unit is calibrated in lbs. and bit 6 indicates the scale is in motion.

NOTE: *The screen in Fig. 4-4 shows input data in floating-point format. To read the data bits, the Word0 statusword must be copied to a double integer tag. The first, least significant 16 bits apply to channel 0. In a two-channel module, the 16 most significant bits apply to channel 1; otherwise the upper 16 bits are not used.*

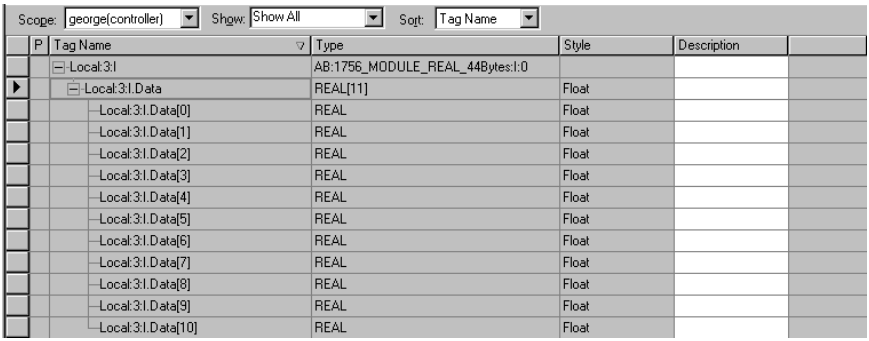


FIG. 4-4 DISCRETE DATA

STATUSWORD bit positions refer to these variables:

Word	Number	Definition
ERRORADCONVERT	0x0001	Millivolt return from the load cell system is out of range for the unit.
ERRORADFAILURE	0x0002	A/D converter in the unit is no longer responding.
STATUSENGLISH	0x0004	Unit calibrated in lbs. If the bit is off, calibrated in kgs.
STATUSZTRACK	0x0008	Auto Zero Tracking is turned on.
STATUSBUTTONENABLED	0x0010	Enabled/Disabled calibrate button.
STATUSINMOTION	0x0040	Weight is changing on the scale.
ERRORNOCAL	0x0080	The unit is at factory default settings.
ERROREEPROMWRITE	0x0100	EEPROM Hardware Error
ERROREXCITEMON	0x0200	Excitation monitor error.
ERRORMAX144	0x0400	Hardware Error in Excitation Monitor
STATUSCMDRCVD	0x2000	Output Table Command Complete

Word	Number	Definition
STATUSCMDERROR	0x4000	Output Table Command Failed
STATUSCHANENABLED	0x8000	Set if channel is enabled

Parameters for the HI 1756-WS (-2WS) Module

NOTE: *The Glossary at the end of this manual provides additional information about the parameters and other common weigh process definitions.*

All parameters in Table 4-1 are either type DINT (4-byte integer) or REAL (4-byte floating point).

#	Type	Parameter	Description
1	DINT	ChanActive	Flag, determines if a channel is alive. Legal values are: 0 (Channel Off) or 1 (Channel On)
2	DINT	calyear	Year of last Calibration*
3	DINT	calmonth	Month of last Calibration*
4	DINT	calday	Day of last Calibration*
5	DINT[2]	calid[2]	ID of calibrator using initials. e.g. JB*
6	DINT	CalibType	Read Only Button = 3 C2 = 1 Hard Cal = 0 Never Calibrated = FFFF
7	REAL	tareweight	Tare weight in lbs or kgs as determined by Metric.
8	DINT	Metric	Report weight in lbs or kgs. Legal Values lbs = 0 kgs = 1

TABLE 4-1: PARAMETERS

#	Type	Parameter	Description
9	DINT	Waversaver	Legal Values are 0-4 0 = 7.5 Hz 1 = 3.5 Hz 2 = 1 Hz 3 = .5 Hz 4 = 0.25 Hz
10	REAL	SpanWeight	Calibration weight, high, in lbs or kgs
11	REAL	CalLowWeight	Calibration weight, low, in lbs or kgs
12	DINT	NumAverages	Legal Values: 1-255
13	DINT	ZeroTrackEnable	Enable for Zero Tracking Legal Values: 0 = Not Enabled 1 = Enabled
14	DINT	ROCTimeBase	Legal Values: 1-1800 seconds
15	REAL	ZeroTolerance	In lbs or kgs.
16	REAL	AutoZeroTolerance	In lbs or kgs
17	REAL	MotionTolerance	In lbs or kgs

TABLE 4-1: PARAMETERS

NOTE: **Since the 1756 module has no real-time clock, the operator must set the year, month, day, and calid.*

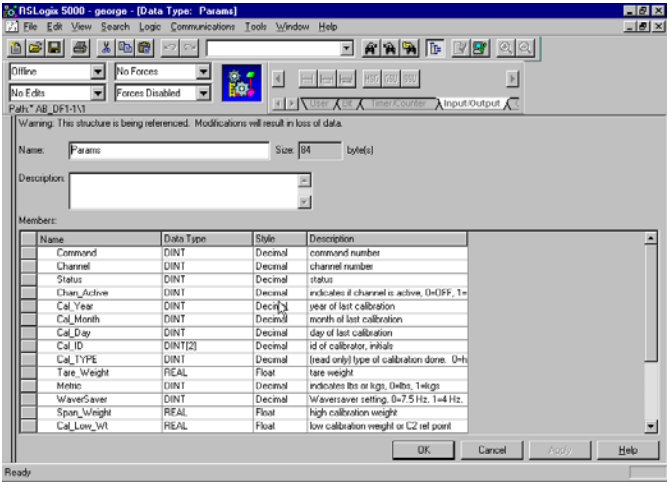


FIG. 4-5 PARAMETERS DIALOG BOX

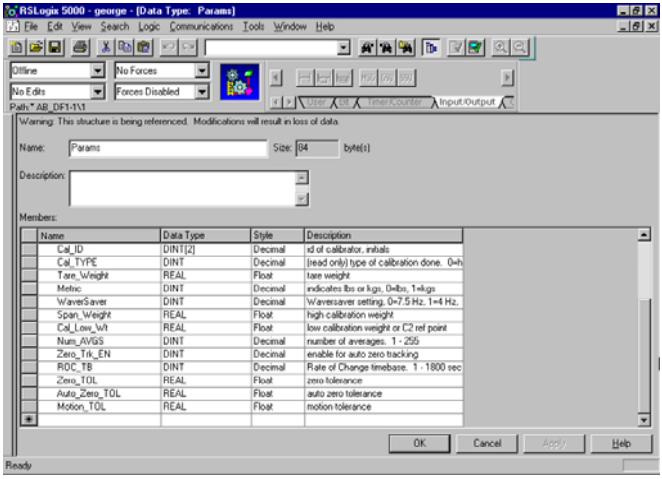


FIG. 4-6 PARAMETERS DIALOG BOX (CONT'D)

Commands

Commands are configured in the RSLOGIX 5000 as follows:

- Message Type: CIP Generic
- Service Code 4c (Hex)
- Class Name: 4
- Instance Name: 254
- Object Attribute: None, leave this field blank
- Message source: a tag defining the data sent to the HI 1756-WS (-2WS).
- Number of elements: defined by the command used.
- Message destination: a tag where the reply data will be written.

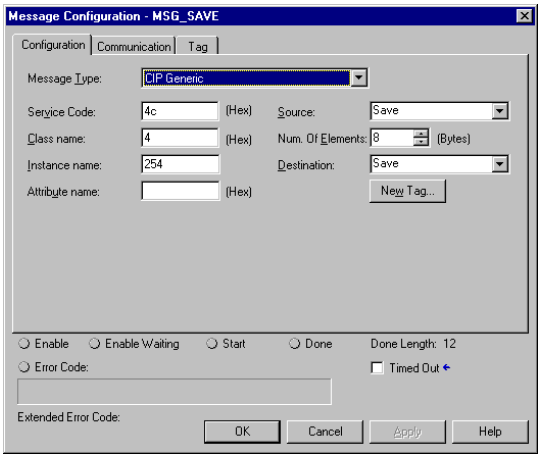


FIG. 4-7 MESSAGE CONFIGURATION EXAMPLE

All commands begin with the following fields:

- Command (DINT): The command number
- Channel (DINT): The channel number (must be 0)

NOTE: *Some commands require additional fields, as specified in the command.*

Reply data contains 3 fields

- Command (DINT): The command number
- Channel (DINT): The channel number
- Status (DINT): Status information

NOTE: *Some commands will produce longer replies.*

Zero Command (ZEROCMD)

The Zero Command requests that the current gross weight be set to zero.

Command Number: 1 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8
Error Return Values:

- OUTOFTOLERANCE - the current weight value is beyond the limits set by the zero tolerance parameter.

NOTE: *The amount of weight zeroed off is cumulative. The Autozero command will fail if the current gross weight plus any previously zeroed amount exceeds the zero tolerance value.*

- "STATUSWORD" - the command failed because either the weight was not stable (in motion) or there was some kind of A/D error.

Tare Command (TARECMD)

The Tare Command requests the current net weight be set to zero.

Command Number: 2 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Error Return Values:

- "STATUSWORD" - the command failed because either the weight was not stable (in motion) or there was some kind of A/D error.

Write Non-Volatile Command (WRITENONVOLATILE)

The Write Non-Volatile Command causes all parameters (including calibration constants) to be saved to the non-volatile memory.

Command Number: 4 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Error Return Values: None

Reload Non-Volatile (RELOADNONVOLATILE)

The Reload Non-Volatile Command causes the weigh module to re-read the values stored in its non-volatile memory. Any parameters changed since the last write non-volatile command are overwritten. this command can be used to abort a calibration or parameter entry session.

Command Number: 0x10 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Error Return Values: None

Enable Calibration Button Command (ENABLEBUTTONCMD)

The Enable Calibration Button Command activates the calibration button.

Command Number: 20 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Error Return Values: None

Disable Calibration Button Command (DISABLEBUTTONCMD)

The Disable Calibration Button Command deactivates the calibration button.

Command Number: 40 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Error Return Values: None

Set Default Parameters (SETDEFAULTPARAMS)

Load the default settings into RAM, and non-volatile RAM.

Command Number: 0x94 (Hexadecimal)

Channel Number: 0 or 1
Number of Elements: 8

Error Return Values: None

Cal Low Command (CALLOWCMD)

The Cal Low Command sets the "calLowCount" parameter to the current A/D average counts when doing a hard calibration. An Integrated Technician function gets called during low calibration.

Command Number: 0x64 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Error Return Values:

- STATUSWORD - there was a conversion error, weight in motion or an A/D error or all three.
- HARDCALFAILCOUNTS - less than 100 counts between the zero and the span weights.

Cal High Command (CALHIGHCMD)

The Cal High Command - Sets the Span Weight parameter to the current A/D average counts when doing Hard CAL.

Command Number: 0x65 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Error Return Values:

- STATUSWORD - there was a conversion error, weight in motion or an A/D error or all three.
- HARDCALFAILCOUNTS - there are less than 100 counts between the zero and the span weights.

C2 Cal Command (C2CALCMD)

The C2 Cal Command - Performs a C2 Calibration. Uses CalLowWeight as the reference point.

Command Number: 0x66 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Error Return Values:

- STATUSWORD - there was a conversion error, weight in motion or an A/D error or all three.
- C2FAILNODEVS - detected no C2 load cells.
- C2FAILCAPEQ - detected two load cells with different capacities.

Read Weight Cal Command (READWEIGHTCAL)

Weight data at calibration points are saved. The Read Weight Cal Command reads in the values, letting you compare raw counts at current input and counts at calibration points to ensure the the scale is returning correct input from each calibration point before running new calibration command.

Command Number: 0x63 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Return Values:

Command (DINT)
Channel (DINT)
Status (DINT)
Zero counts (DINT)
Cal zero counts (DINT)
Cal low counts (DINT)
Cal high counts (DINT)
CalibK (weight per count) (REAL)
ADC (as of the time the command is given) (DINT)

Perform Integrated Technician Tests (WEIGHSYSTEST)

Performs the Integrated Technician tests.

Command Number: 0x6D (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 16
Status
nSensors: Number of Sensors.

Structure (ITECHTEST)

Structure	Item	Description
DINT	command*	0x66
DINT	channel*	0 or 1
DINT	status*	N/A
DINT	nSensors*	Number of load sensors.
REAL	BaseR	Load cell impedance measured during Calibration
REAL	ReadR	Impedance measured at test time
DINT	TestR	Test Result: Good = True, Bad = False
REAL	Vsense	Sense Voltage from the load cells
REAL	loadcell current	Load Cell Current
DINT	RTZ_R_combined	Test result, return to zero, all load cells
DINT	RTZ_R_1**	Test result, return to zero, load cell 1
DINT	RTZ_R_2**	Test result, return to zero, load cell 2
DINT	RTZ_R_3**	Test result, return to zero, load cell 3
DINT	RTZ_R_4**	Test result, return to zero, load cell 4
REAL	DVM_combined	Millivolts/Volt, all load cells
REAL	DVM_1**	Millivolts/Volt, load cell 1
REAL	DVM_2**	Millivolts/Volt, load cell 2
REAL	DVM_3**	Millivolts/Volt, load cell 3
REAL	DVM_4**	Millivolts/Volt, load cell 4
REAL	IREF_weight	Internal reference counts, converted into a weight
REAL	JBOXREF_weight	JBOX reference counts, converted into a weight
REAL	grossweight	Combined Gross Weight, all load cells
REAL	weight_1**	Gross Weight, load cell 1
REAL	weight_2**	Gross Weight, load cell 2
REAL	weight_3**	Gross Weight, load cell 3

Structure	Item	Description
REAL	weight_4**	Gross Weight, load cell 4

NOTE:

** Required Command Data*
** * Available only with the HI 215IT Junction Box.*

Search for C2 Load Sensors (C2SEARCH)

Searches for C2 Load Sensors

Command Number: 0x6E (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Return Values:

- COMMAND
- CHANNEL
- STATUS
- C2ROM - The number of C2 sensors detected.
- C2SWITCH - The number of JBOX switches detected.
- CAPACITY - Combined sensitivity of C2 load cells.
- SENSITIVITY - Combined sensitivity of C2 load cells.

Read C2 Sensor Serial Number (READC2SERIALNUM)

Reads the serial number of a specified C2 load sensor. Must be preceded by the C2SEARCH command.
Command Number: 0x70 (Hexadecimal)
Required Command Data:

- COMMAND
- CHANNEL
- SENSOR # (0-7 Number of specific Load Cell Requested)
- Number of Elements: 12

Return Data:

- COMMAND
- CHANNEL
- STATUS
- 9 DINT SERIAL NUMBER

Error Return Values:

- OUTOFTOLERANCE - No C2 Sensor found.

Read Status of Module (GETSTATUS)

Reads the condition of the module.

Command Number: 0x80 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

NOTE: *See the Timed Out Command section.*

Return Data:

- COMMAND
- CHANNEL
- STATUS - Returns status of the last timed out command.

Write Parameters (WRITEPARAM)

Writes all the parameters.

Command Number: 0x68 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 84

Return Data:

- COMMAND
- CHANNEL
- STATUS - The status is 0 if the command succeeded. If there was a range error detected in one of the parameters, a non-zero value is returned indicating which parameter failed its range. (See Table 4-1)

Read Parameters (READPARAM)

Reads all the parameters.

Command Number: 0x69 (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Return Data:

- COMMAND
- CHANNEL
- STATUS
- PARAMETERS (See Table 4-1)

Read Live Weight (READLIVEWEIGHT)

Reads gross weight in units set by the Metric Parameter, either lbs or kgs.

Command Number: 0x6B (Hexadecimal)
Channel Number: 0 or 1
Number of Elements: 8

Return Data:

- COMMAND
- CHANNEL
- STATUS = STATUSWORD
- Gross weight in units determined by the Metric Parameters
- Net Weight
- Rate of Change
- ADC value (A REAL number between 1.0 and 2.0)

Command Table

Command	Number (Hex)
ZERO*	1

Command	Number (Hex)
TARECMD*	2
WRITENONVOLATILE*	4
RELOADNONVOLATILE*	0x10
GETSTATUS	0x80
ENABLEBUTTONCMD**	0x20
DISABLEBUTTONCMD**	0x40
SETDEFAULTPARAMS	0x94
CALLOWCMD*	0x64
CALHIGHCMD*	0x65
C2CALCMD*	0x66
WRITEPARAM	0x68
READPARAM	0x69
WEIGHSYSTEST	0x6D
C2SEARCH	0x6E
READC2SERIALNUM	0x70
READLIVEWEIGHT	0x6B

NOTE:

* *These commands can be sent through the output table. (See Below)*

** *Newly added*

Output Table

Output (Commandword)	
16 bits	16 bits
Channel 1	Channel 0

The least significant 16 bits are a command for Channel 0, the next 16 bits are a command for Channel 1.

Commands are “1 shot”, occurring upon a 0-1 transition.

Bit 0x2000 in the STATUSWORD will be set upon completion of the output table comand. Bit 0x4000 will also be set if the command failed. Setting the command word to zero will clear these status bits.

Error Code List

SUCCESS	0	
OUTOFTOLERANCE	-3	
NOSUCHCMD	-5	
C2FAILNODEVS	-6	
C2FAILCAPEQ	-7	(failure, capacities not equal)
HARCALFAILCOUNTS	-8	(failure, not enough ADC counts between high, low)

Timed Out Commands

The ASIC on the HI 1756-WS module requires that a command receive a reply within 65 milliseconds. This is not enough time to complete some of the commands. The commands subject to time-out are:

- CALLOWCMD
- C2CALCMD
- WEIGHSYSTEST
- C2SEARCH

The reply to these commands is sent before the commands are actually performed.
To see if a calibration has succeeded, the command “GETSTATUS” can be sent

The data returned by the WEIGHSYSTEST and C2SEARCH commands is actually the data determined by an earlier command. In practice, these commands need to be sent twice.

Return Codes

See Chapter 7, Troubleshooting.

Calibration Setup Procedures

Setting the Unit of Measure

The Unit of measure can be set to either kilograms or pounds. Any weight value input to the module (e.g. CALLOWWEIGHT, SPANWEIGHT) are 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.

Setting the Motion Tolerance Value

The motion tolerance is the tolerance value used to determine if the scale is in motion.

Setting the Zero Tolerance Value

Sets the range of weights so that the Zero Command works as an offset of the calibrated Zero.

NOTE: *The amount of weight zeroed off is cumulative. The zero command will fail if the current gross weight plus any previously zeroed amount exceeds the zero tolerance.*

Setting the Auto Zero Tolerance Value

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.

NOTE: *The amount of weight zeroed off is cumulative. The auto zero command will fail if the current gross weight plus any previously zeroed amount exceeds the zero tolerance.*

NOTE: *There is a short time delay (at least 1 second) before the Auto Zero Triggers.*

Setting the Number of Readings Averages

The Number of Averages sets the number of weight readings which will be 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.

Setting the Span Weight Value

The Span Weight is a 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.

Setting the WAVERSAVER® Value

There are 5 selectable levels. 0 provides the least vibration immunity with the fastest response time. 4 provides the most vibration immunity with the slowest response time. Default setting is 2.

Immunity	Setting
7.5 Hz	0
3.5 Hz	1
1.0 Hz	2
0.5 Hz	3
0.25 Hz	4

CHAPTER 5 - CALIBRATION

A Brief Description of Chapter 5

Chapter 5 provides the recommended calibration procedures for the HI 1756 (WS or 2WS) Weigh Scale Module. For the module to work properly, it must be calibrated prior to operation, and it should be re-calibrated 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.

NOTE: *Do not perform a calibration while the application is in operation.*

Pre-Calibration Procedures

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 arrown 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.

CAUTION: **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.**

- Mount load cells so that 100% of the load (Vessel w/Contents) passes vertically through a cell. (See Fig. 5-1)
- Verify that nothing is binding the load cell. No, hose, electrical cord, tube, or other object should be draped across the scale/vessel or the load cell.
- Ensure that nothing contacts the scale/vessel other than service wires and piping that have been properly mounted with flexible connectors.

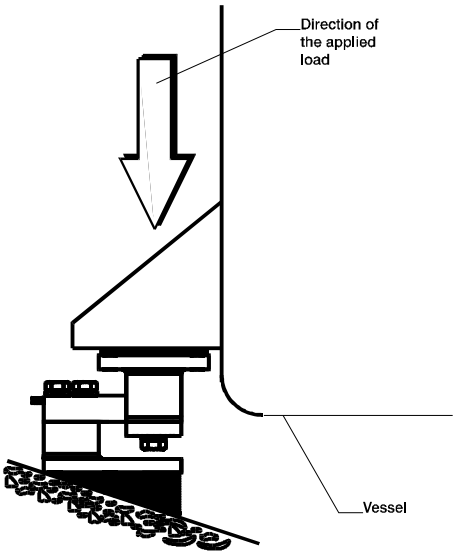


FIG. 5-1 PROPERLY INSTALLED LOAD CELL W/NO BINDING

Electrical Check Procedures

Load Cell/Point Input/Output Measurements

Step 4. Typical Load Cell/Point Input/Output Measurements (EXC & SIG Outputs)

a. The Weigh Module is designed to supply 5 VDC excitation to as many as eight 350 Ohm load cells/points.

b. 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 mVDC 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 mVDC at 1000 pounds, 7.5 mVDC at 750 pounds, 5 mVDC at 500 pounds.

c. 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. (See Fig. 5-2)

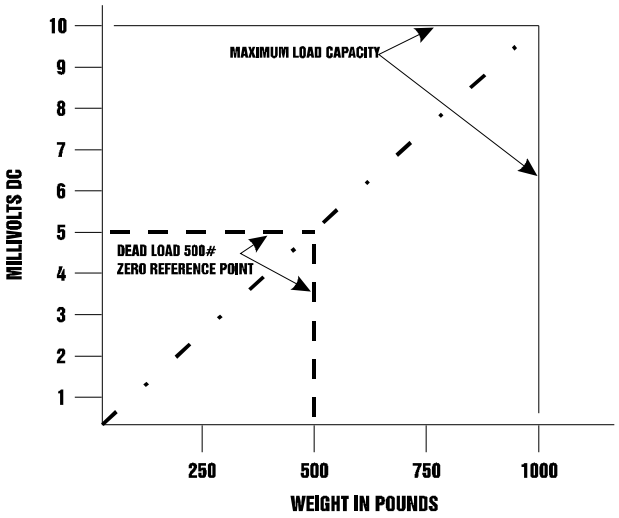


FIG. 5-2 MILLIVOLTS/WEIGHT SCALE

Based on the example, the operating range for this scale is 5-10 mVDC 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 mVDC or absolute 0 weight.

NOTE: *Load cell/point measurements are checked with a digital volt meter at the J2 connector on the front of the module or by using INTEGRATED TECHNICIAN with the HI 215IT Junction Box.*

Load Check

Step 1. Place a load (weight) on the scale or vessel and check to see if the weight reading changes on the ladder logic display in the proper direction.

- For example: If the ladder logic display reads 100 pounds and a 20 pound weight is placed on the vessel or scale, the ladder logic display should read 120 or some value over 100.
- If the ladder logic display reads 100 pounds and 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 ladder logic display is reading improperly or shows no change there is something wrong with the setup.

Step 2. If the ladder logic display changed weight in the proper direction, remove the weight and proceed to calibrate the module.

C2 Calibration

About 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 pressing “The Button” located in the front of the module, or via Allen Bradley RS LOGIX 5000.

“THE BUTTON” C2 Calibration

Step 1. Be sure that the parameters have been setup for your weighing process. (See Chapter 4, Setup)

Step 2. Open the front door of the module.

Step 3. Press and hold “The Button” until the desired Scale LED turns green, and release it when the Scale LED flashes green. (See Fig. 5-3 & 5-4)

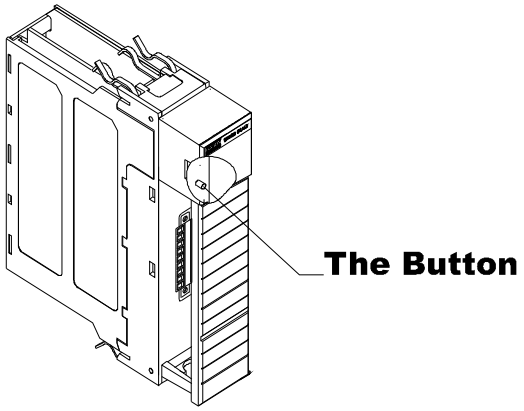


FIG. 5-3 "THE BUTTON" C2 CALIBRATION - HI 1756-WS

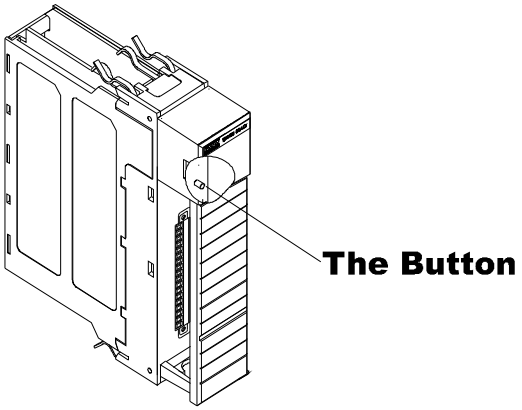


FIG. 5-4 "THE BUTTON" C2 CALIBRATION - HI 1756-2WS

NOTE: *If the module is being calibrated for the first time and you are not sure what parameters to set, use the default parameters which are set by the module at power up. Once the calibration is successful, feel free to change the parameters to meet the requirements of your weighing process. (See Chapter 4 - Setup) Use the Button for calibration at any time after the weighing process parameters have been set.*

Step 4. Press “The Button” again to perform the C2 Calibration. Once the calibration is completed the Scale LED returns to a steady green.

NOTE: *If you do not press the Button again within 20 seconds, the calibration process times out.*

C2 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 perform the C2 Calibration. The Ladder Logic example is available on the Hardy Instruments Inc. Web Site:

http://www.hardyinst.com

Step 3. Click on “Support”.

Step 4. Click on “Sample Programs”.

Step 5. You will find the sample programs under the HI 1756-WS Heading.

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.

Hard Calibration Procedures

Step 1. Place the low calibration weight (the weight can be zero) on the scale.

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. An Integrated Technician function gets called during low calibration.

- Command Number: 0x64 (Hexadecimal)
- Channel Number: 0 or 1
- Number of Elements: 8

- For more information on the Cal Low Command go to Chapter 4, Setup, page 4-11.

Step 3. If you used a weight 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.

- Command Number: 0x65 (Hexadecimal)
- Channel Number: 0 or 1
- Number of Elements: 8
- For more information on the Cal High Command go to Chapter 4, Setup, page 4-12.

Step 6. Remove the weight from the scale.

Step 7. Send a Write Non-Volatile Command **(WRITENONVOLATILE).**

- The Write Non-Volatile Command - causes all parameters (including calibration constants) to be saved to the non-volatile memory.

- Command Number: 4 (Hexadecimal)
- Channel Number: 0 or 1
- Number of Elements: 8

Hard Calibration Ladder Logic Example

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 Hard Calibration Ladder Logic Example is located at the Hardy Instruments Inc. Web Site. If you have access to the Internet:

a. Type the following URL:

http://www.hardyinst.com

b. Click on the Support button.
c. Click on Sample Programs.
d. Click on the pull down menu for the product you are calibrating.
e. Click on the Ladder Logic Example for the HI 1756-WS Weigh Module, Hard Calibration.

Step 4. If you do not have access to the Internet, call your local Hardy representative or Hardy Instruments, Customer Support and we will forward you a hard copy of the calibration ladder logic explanation and ladder logic example.

CHAPTER 6 - OPERATING PROCEDURES

A Brief Description of Chapter 6

Chapter 6 covers the operation of the HI 1756 (-WS and -2WS) Weigh Scale Modules. The Operating Procedures include Reading data transferred to the PLC from the weigh scale module. (See Fig. 6-1)

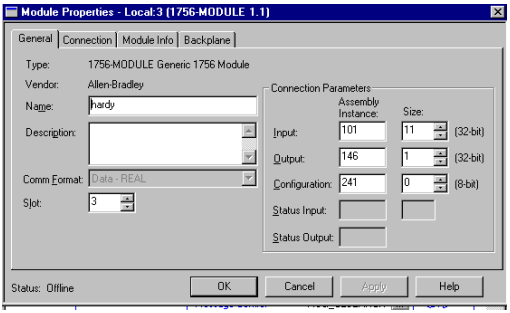


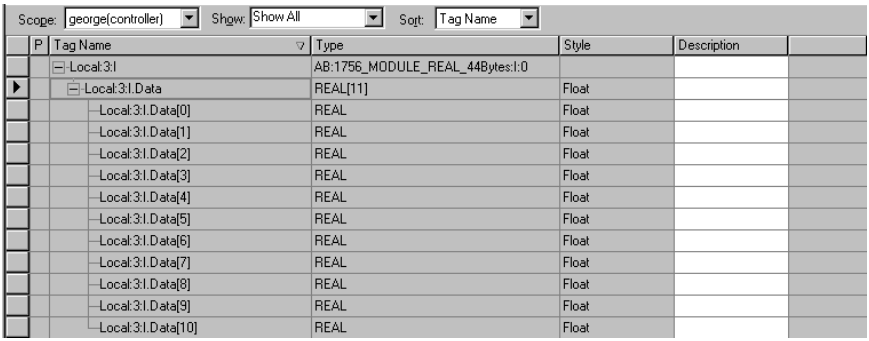
FIG. 6-1 COMMUNICATION CONFIGURATION DIALOG BOX

Input Data

This is the discrete input data which is in module defined data type, LOCAL:X:I (where X is the slot number). (See Fig. 6-2)

#0*	Bits 15-0: STATUSWORD for Channel 0 Bits 31-16: STATUSWORD for Channel 1	
#1	Gross Weight:	5
#2	Net Weight:	6
#3	Rate of Change:	7
#4	loadcellcurrent (milliamps):	8
#9, #10	TimeStamp	

NOTE: *The TimeStamp is a 64 bit integer, giving the system time in microseconds*



Scope: george(controller) Show: Show All Sort: Tag Name

P	Tag Name	Type	Style	Description
	Local:3:I	AB:1756_MODULE_REAL_44Bytes:I:0		
▶	Local:3:I.Data	REAL[11]	Float	
	Local:3:I.Data[0]	REAL	Float	
	Local:3:I.Data[1]	REAL	Float	
	Local:3:I.Data[2]	REAL	Float	
	Local:3:I.Data[3]	REAL	Float	
	Local:3:I.Data[4]	REAL	Float	
	Local:3:I.Data[5]	REAL	Float	
	Local:3:I.Data[6]	REAL	Float	
	Local:3:I.Data[7]	REAL	Float	
	Local:3:I.Data[8]	REAL	Float	
	Local:3:I.Data[9]	REAL	Float	
	Local:3:I.Data[10]	REAL	Float	

FIG. 6-2 DISCRETE DATA

CHAPTER 7 - TROUBLESHOOTING

A Brief Description of Chapter 7

Chapter 7 covers troubleshooting and problem resolution. Maintenance personnel and users should be familiar with Chapter 7 before attempting to repair the HI 1756-WS or HI 1756-2WS.

Scale LED stays off when Performing a C2 Calibration with The Button

If the scale LED does relight when running C2 Calibration (pressing the button), there is probably a hardware problem. Contact Hardy Customer Support for assistance.

Scale LED is Flashing Red

Solution: Check all the connections to be sure they are securely fastened. Securely fasten any loose connections.

Return Codes

When any command is sent to the HI 1756 WS module using an MSG instruction, a returned status indicates whether the module passed or failed. It also provides a reason code if it failed.

Fig 7-1 shows the over-all process. There are three possible status returns for most commands: 0 (pass or success), a positive value (status or condition code), or a negative value (error code). Fig 7-1 separates out the Write Parameters command for which a return value, if not 0, is the index value of the first parameter that is out of tolerance. Values for the Write Parameters command are displayed on the figure.

Fig 7-2 expands on the positive and negative values shown as A1 and A2 in Fig 7-1. It shows sequence numbers for a definition (B#) and the action to take (C#) for each code. For example B1 is listed as a definition and C1 as an action. Table 1 uses the same sequence numbers to provides the detailed information for each definition and action listed in Fig 7-2.

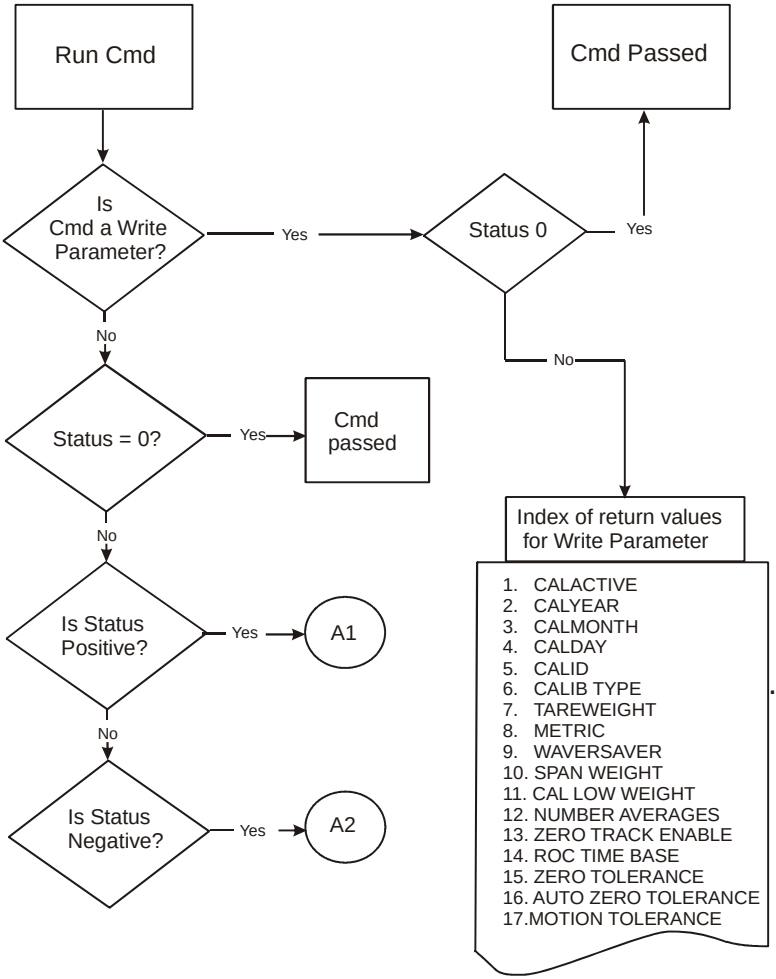


FIG. 7-1 COMMAND RETURN PROCESS

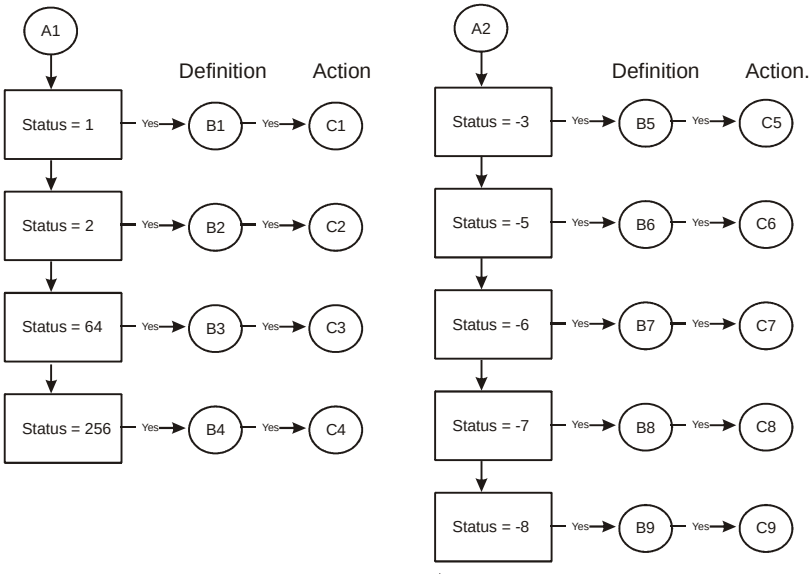


FIG. 7-2 COMMAND DEFINITIONS AND ACTIONS

Name / Code #	Definition	Action
erroradconvert 1	**B1:** 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 repond to changes.	**C1:** 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.
erroradfailure 2	**B2:** Output from the A/D converter to processor is bad. The module shows a solid red LED.	**C2:** Contact Customer Support to return module for repair.
statusinmotion 64	**B3:** 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.	**C3:** If the weight is actually changing, stabilize it. If not, increase the motion tolerance setting until the motion bit goes off with static weight.

Name / Code #	Definition	Action
erroreepromwrite 256	**B4:** Module cannot write (save settings) to non-volatile memory. EEPROM is probably bad.	**C4:** Contact Customer Support to return module for repair.
success - 0	Command passed. No errors	None
outoftolerance -3	**B5:** 1. Occurs with the Zero cmd when zeroing the current weight exceeds the tolerance limit. 2. Occurs with the Read C2 sensor serial number cmd if the sensor number is out of range.	**C5:** 1. Recalibrate the scale, remove weight causing the deviation from the calibration zero point, or increase the zero tolerance limit, but do not set the limit so high that the batch could be out of tolerance. 2. Check the C2 sensor numbers entered to ensure that they match the actual C2 censors.
nosuchcmd - 5	**B6:** The command number is invalid	**C6:** Check the comand code to see if the sent command number exists.
c2failnodevs - 6	**B7:** When trying to do a C2 calibration, the module cannot read the data from the load cells.	**C7:** Check the wiring to ensure proper connections and orientation. Find the problem load cell by disconnecting them at the summing box.
c2failcapeq - 7	**B8:** C2 load cells have unequal cap-acities due to either the use of mismatched load cells or faulty C2 programming.	**C8:** Run the Read C2 Sensor cmd for each load cell and check for difference. Find a problem load cell by disconnecting each one at the summing box.
harcalfailcounts -8	**B9:** Too few A/D counts between zero and span points during hard calibration. Scale input may be higher at the low cal point than previous high cal point. (Cell in-put must change by a minimum amount between the low and high cal points.)	**C9:** Add weight to scale and see if readings increase. Check voltages as in erroradconvert. If error is on Cal Low cmd, try placing weight on the scale and running Cal High before running Cal Low.

Mechanical Inspection See Fig. 7-1

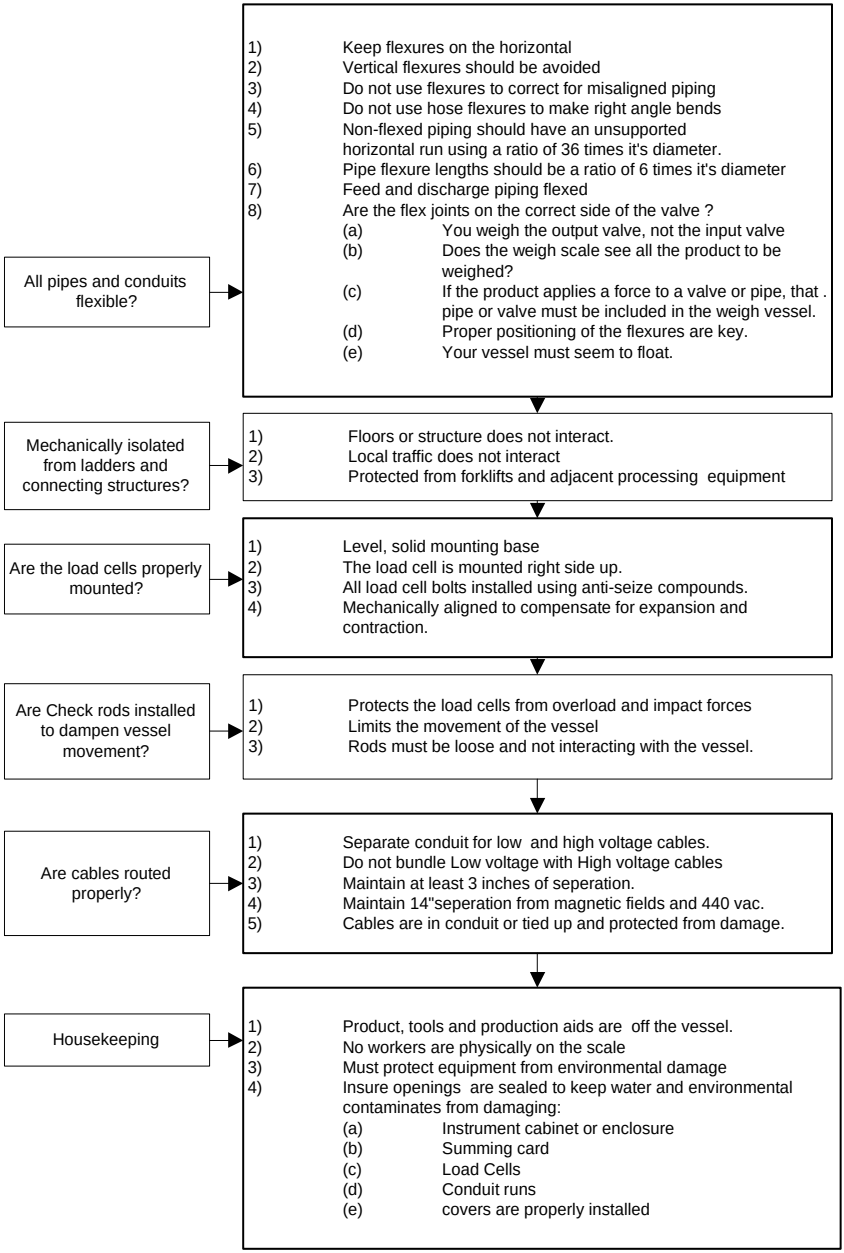


FIG. 7-3 MECHANICAL INSPECTION

Load Sharing and Load Sensor Checkout

See Figure 7-4

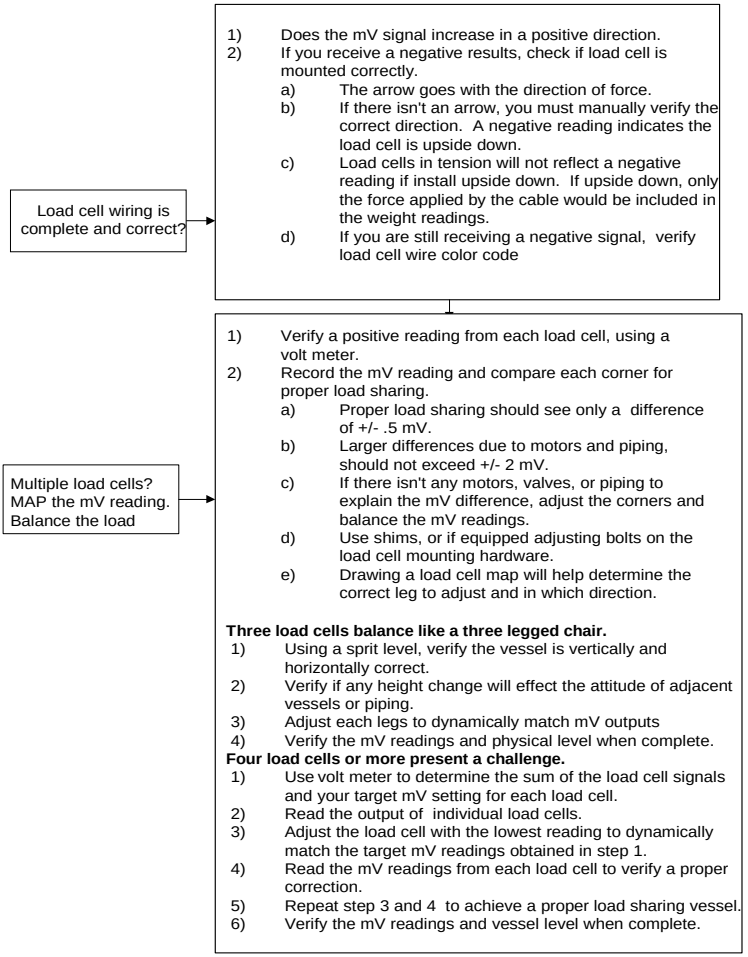


FIG. 7-4 LOAD SHARING AND LOAD SENSOR CHECKOUT

Guidelines for Instabilities on Formerly Operating Systems

See Figure 7-5

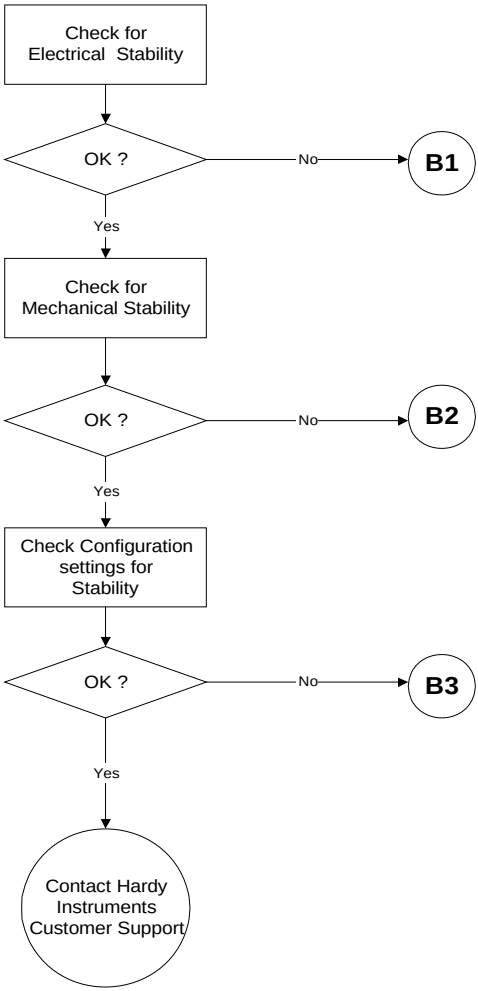


FIG. 7-5 GUIDELINES FOR INSTABILITIES ON FORMERLY OPERATING SYSTEMS

Electrical See Figure 7-6

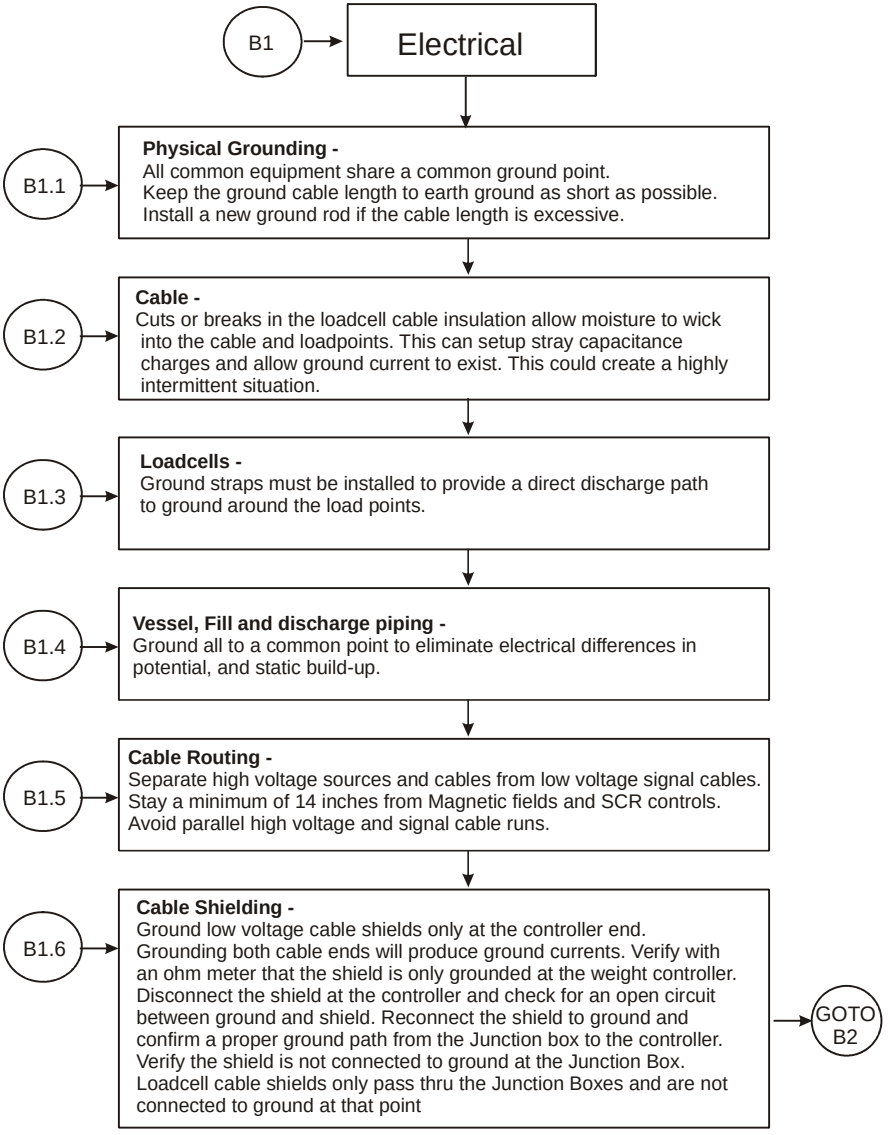


FIG. 7-6 GUIDELINES FOR INSTABILITIES ON FORMERLY OPERATING SYSTEMS - ELECTRICAL

Mechanical Stability and Configuration Settings

See Figure 7-7

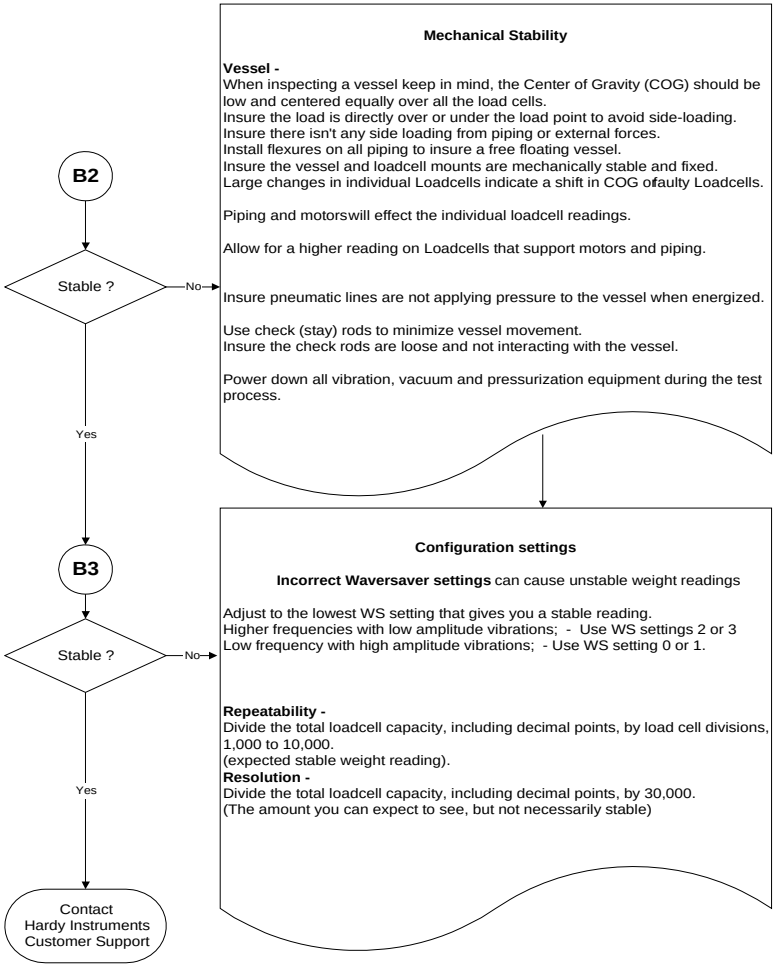


FIG. 7-7 MECHANICAL STABILITY AND CONFIGURATION SETTINGS

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GLOSSARY OF TERMS

ACCURACY — Closeness of a reading to the actual value of the quantity being measured.

ALARM — Indication of a tolerance deviation.

APPURTENANCE — Any added equipment other than the weigh vessel, platform scale or feeder. Pipes, Valves etc.

AUTO ZERO TOLERANCES — Automatic version of Zero Tolerance which is the limit for enabling the module to zero off the weight automatically. This is not used unless you have the Zero Track Enable bit set to on. If used, Gross weight will zero whever gross weight is within the auto zero tolerance and the scale is not in motion.

BAUD RATE — Baud rates are used as a measure of how fast serial data is transmitted. (BIT/SEC). The higher the number the faster the data is sent between 2 devices.

BI-DIRECTIONAL — A capability used to transmit data in either direction at the same time, for example: to or from the instrument.

CAL DAY — Day of the last calibration (if entered).

CAL ID — Operator ID or initials of the person doing the calibration (if entered).

CAL LO WEIGHT — Amount of test weight used (normally zero) for the low point during hard calibration or reference point during C2 calibration.

CAL MONTH — Month of the last calibration (if entered).

CAL TYPE — Type of calibration last performed.

CAL YEAR — Year of the last calibration (if entered).

CHANNEL — Designates the channel the command is being run on. Single channel modules channel is always 0. Dual channel modules, the first channel is always 0 and the second channel is always 1.

CHANNEL ACTIVE	A parameter that turns the channel off/on. If channel is set to 0 it is off or inactive. If channel is set to 1 it is on or active.
COMMAND	A request made by the host computer (PLC) to perform an Action. This consists of either number or letter command designators.
CAPACITY	The maximum weight that can be placed on a scale or balance.
CHECK WEIGHING	Comparing a weight against limits to determine if the weight is within preset limits.
CLEAR KEY	A key used to clear data or formats entered into a menu.
DEAD BAND	A value used to prevent relay chatter once the setpoint is reached.
DEAD LOAD	Weight of hopper assembly or platform assembly sitting on top of load cells.
DECIMAL POINT POSITION	Menu item used to set the decimal point position for all display readouts.
DISPENSER	Dispensing is a Loss-in-Weight process. The Dispenser measures the weight loss out of a vessel until a pre-configured weight set point has been reached
DISPLAY	A device used to show information from the instrument.
ENGINEERING UNITS	Pounds (lbs), Kilograms (kg), ounces (oz, grams (g)
ELECTROSTATIC DISCHARGE	Electrostatic Discharge is an electric charge (static electricity) which occurs when an electrically charged object such as a person, touches an HI 3000 Series Instrument. to avoid damage to personnel and to the unit, a grounded static control wrist strap should always be worn when opening and/or servicing an instrument.

E-MAIL	Short for electronic mail, the transmission of messages over communications networks.
ENTER KEY	This key is used to accept user input into the memory.
EPROM	Electrically Programmable Read-only Memory.
ERROR	A message that indicates an unacceptable input has been entered.
EVEN	A parity configuration.
EXCITATION	DC voltage supplied to the load cell for power.
FILLER	Filling is a Gain-in-Weight process. The Filler measures the weight gain into a vessel until a pre-configured weight set point has been reached.
FULL-SCALE	Full scale input as defined by instrument and load cell parameters. Example: 3mV/V load cell @ 10 volts = 30mV full scale.
GRADUATION SIZE	Minimum increment displayed by the instrument
GROSS WEIGHT	An overall weight exclusive of tare deductions. Weight of material plus container.
IBC	Intermediate Bulk Container
INTERNET	The Internet is a system of linked networks that are worldwide in scope and facilitate data communication services such as remote login, file transfer, electronic mail, the World Wide Web and newsgroups.
INTRANET	An intranet is a private network utilizing Internet-type tools, but available only within that organization.
KILOGRAMS	A unit of mass in the metric system. Equal to 1000 grams or 2.2046 pounds. “kg” represents kilograms on the display.
LEVELLING	The procedure that sets the scale so that a scale platform is exactly horizontal (level).

LED	Light Emitting Diode. these are used as status indicators.
LOAD CELL	A device which produces output signal proportional to the applied weight or force. Also called a strain gauge.
MENU	A set of prompts used to configure the instruments.
MENU DRIVEN	Operational prompts suppled in common language via the system display to guide an operator through a procedure.
METRIC	Unit of measure selection for weight readings, either lbs or kgs. Set 0 for lbs, 1 for kgs.
MICROPROCESSOR	A semiconductor device that performs control, input/output, arithmetic and logical operations by executing instructions obtained from memory sources.
MIDPOINT LINEARITY CORRECTION	Allows operator to "BEND" the response of an instrument to match a non-linear input.
MOTION	The amount of allowable deviation between consecutive readings before a weighment is accepted as being complete.
MOTION TOLERANCE	Weight parameter setting required to indicate the weight is changing on the scale and the scale is in motion. The module takes the current reading and compares this reading with the reading taken a second earlier. If the difference is greater thatn the Motion Tolerance setting, the module indicates that the scale is in motion. The motion tolerance setting should be set so that it is greater than any fluctuation seen on the scale with no weight changing but low enough to indicate motion with the slowest actual increase or decrease of product weight on the scale. Use to get an indication when product is still flowing to prevent redings before a process is done.
NEMA 4	An enclosure that is water tight, dust tight and usable bother indoors and outdoors. Will protect the enclosed

	equipment against spalshing water, seepage of water, falling or hose-directed water and severe external condensation.
NEMA 4X	An enclosure that is water tight, dust tight and usable both in doors and outdoors. Will protect the enclosed equipment against splashing water, seepage of water, falling or hose directed water and severe external condensation. Corrosion Resistant.
NODE	A node is an active device connected to the network, such as an HI 3000 Instrument, computer or a printer. A node can also be a piece of networking equipment such as a hub, switch or a router.
NET WEIGHT	Gross Weight minus the Tare Value.
NON-LINEARITY	A deviation of an instrument response from a straight line.
NUMBER OF READINGS PER AVERAGE	The number of weight readings used to compute the displayed weight.
ODD	A parity configuration.
OPTION	A device not supplied with a standard instrument.
OPTION SLOT	A location used to install an option card.
PARITY	A binary digit error correction appended to an array of bits to make the sum of all the bits always odd or always even. The quality of being either odd or even. The fact that all numbers have a parity is commonly used in data communications to ensure the validity of data.
POUNDS	A unit of mass in the Avoirdupois System. Equal to 16 ounces or 0.4536 kilograms.
POP	Short for **P**ost **O**ffice **P**rotocol, a protocol used to retrieve e-mail from a mail server.

PREACT	The number of units above or below the set point value of which the relay will trip. Use as an “in flight” compensation value.
PREVIOUS KEY	A key used to step back through menus.
PROMPTS	Instructions or options presented in a menu by the instrument.
PROTOCOL	Network protocols are standards that allow computers to communicate. A protocol defines how computers identify one another on a network, the form that the data should take in transit, and how this information is processed once it reaches its final destination.
RAM	Random-Access-Memory. Read/write memory out of which the microprocessor can both write and read data.
RATE OF CHANGE (ROC)	A measure of the rate at which weight is changing. For example: If 100 pounds were dispensed in 1 minute, the rate of change (ROC) would be 100 lb/minute.
REPEATABILITY	The maximum difference between readings for repeated readings under identical conditions. (Also called reproducibility)
RESOLUTION	Resolution is the value of the finest division of the scale.
ROM	Read-Only-Memory. This permanent, non-volatile memory gives the processor instructions and cannot be altered.
RTS	Request to send an RS-232C level, signaling a readiness to send.
RXD	Received data at a serial port. Accepts RS-232C data signals.
SCALE CAPACITY	The maximum amount of weight the scale is capable of supporting. (Live load plus dead load).

SECURE MEMORY MODULE (SMM) The Secure Memory Module stores and protects vital information from corruption. The SMM also allows the transference of data from one instrument to another with no re-calibration ore re-configuration necessary.

SET POINT Ordered weight of a particular ingredient. Weight reading at which a relay will be actuated.

SPAN WEIGHT the total amount of test weights used (placed on the scale) for the high point when performing a “Traditional Calibration”.

STATUS The return staus when running a command.

TAG Another name for the Secure Memory Module

TARE Artificial zeroing of the weight hopper so that a net weight can be displayed. The action of adjusting out the known weight of the container from the total indicated weight, so that the indicator reads net weight directly. For example if you put a pallet on a scale and “tare” out the weight of the pallet you are weighing at zero. The tare weight is the weight of the pallet. Scale will not tare if scale is in motion.

TEMPERATURE COEFFICIENT the change in indication due solely to a change in temperature from a reference temperature. Expressed as a percentage of span value for a specified temperature change.

TIME BASE Time in seconds between values subtracted to determine rate-of-change.

TOKEN In programming languages, a single element of a programming language. For example, a token could be a keyword, an operator, or a punctuation mark. Used to format E-mails or to enter parameters into an Custom E-mail.

TRANSMITTER SPAN Value the transmitter puts out with the maximum weight on the load cell.

TRANSMITTER ZERO	Value the transmitter puts out with the minimum weight on the load cell.
TTL	Transistor-Transistor Logic
TXD	Transmit Data
UPDATE RATE	Number of times per second a new weight reading is taken.
WAVERSAVER®	Setting to remove the effects of ambient vibration from interfering with a weight reading. The range of settings is to eliminate vibration at various frequencies.
ZERO	Weight reading once the dead load has been offset.
ZERO CALIBRATION	Offset of the value of the dead load of the weight hopper.
ZERO TOLERANCE	The number of graduations from zero that will be accepted as zero by the instrument.
ZERO TRACK ENABLE	A bit that is set to allow the module to zero out any accumulated product on the scale up to the Auto Zero Tolerance setting without operator intervention.