CHAPTER 1 - OVERVIEW

A BRIEF DESCRIPTION OF CHAPTER 1

This manual provides the user and service personnel with a description of the specifications, installation, setup, configuration, operation, communication, maintenance, and troubleshooting procedures for the Hardy Process Solutions HI 1746-WS Weigh Scale Module, designed for use in Allen-Bradley's SLC 5/02, 5/03, 5/04, 5/05 programmable controllers. The HI 1746-WS is equipped with WAVERSAVER®, C2® Calibration, The Button, and INTEGRATED TECHNICIAN (***IT***) diagnostics. The module is configurable via Windows® 95/98/NT HI WS 100 Configuration Software or RS Logix 500© Industrial Programming Software. To get the maximum service life from this product, users should operate this module in accordance with recommended practices either implied or expressed in this manual. Before using the Weigh Scale Module, all users and maintenance personnel should read and understand all cautions, warnings, and safety procedures, referenced or explicitly stated in this manual, to ensure the safe operation of the module. Hardy Process Solutions appreciates your business. 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
FAX: (858) 278-6700
e-mail: hardysupport@hardysolutions.com
Web Address: http://www.hardysolutions.com

NOTE: *WAVERSAVER®, C2®, INTEGRATED TECHNICIAN® are registered trademarks of Hardy Process Solutions Inc. Windows® is a registered trademark of the Microsoft Corporation. RS Logix 500© is a Copyright of Rockwell Software Inc.*

NOTE: *Hardy bases all procedures with the assumption that the user has an adequate understanding of all Allen-Bradley SLC 500 products. In addition the user*

should understand process control and be able to interpret ladder logic instructions necessary to generate the electronic signals that control your application(s).

About Hardy Manuals

Every Hardy Installation and Operation manual is organized into easily referenced chapters, that are almost always the same:

- **Chapter 1** - Provides an introduction to the instrument and an **Overview** of the equipment and its capabilities.
- **Chapter 2** - Provides a complete list of **Specifications**.
- **Chapter 3** - Contains information needed to install the HI 1746-WS (both standard and optional equipment) and the HI 215IT series Junction Box.
- **Chapter 4** - Provides complete hardware **Configuration** instructions for setting dip switches and jumpers.
- **Chapter 5** - Pertains to the firmware/software **Setup** and preparation procedures to calibrate and operate the instrument.
- **Chapter 6** - Provides all **Calibration** instructions.
- **Chapter 7** - Pertains to the **Operating Procedures** of the HI 1746-WS.
- **Chapter 8** - Pertains to the **Troubleshooting** procedures for repair of the instrument.

Hardy Process Solutions hopes that this manual meets your needs for information and operation. All corrections or suggestions for improvements of this manual are welcome and can be sent to the Technical Publications Department or Customer Support Department at Hardy Process Solutions Inc.

Description

The HI 1746-WS Weigh Scale Module is a self contained microprocessor based I/O module with control inputs and outputs, that is designed to be easily plugged into the back plane of an Allen-Bradley SLC 5/02, 5/03, 5/04 or 5/05 programmable controller and/or Remote Rack. The HI 1746-WS Weigh Scale Module can be configured to operate as either a local or

remote module. The HI 1746-WS module 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 module can control two (2) relays via two (2) TTL level outputs and transmits data via the back plane to the SLC. The 20 bit analog to digital converter in the weigh module controller updates twenty (20) times per second and is capable of 985,000 counts of display resolution. This gives the instrument the ability to tolerate large "dead" loads, over sizing of load cells/sensors and still have sufficient resolution to provide accurate weight measurement and control. The HI 1746-WS module is set up by using the SLC 500 AI Series, RS Logix500© Industrial Programming Software for Windows® 95/98/NT or the optional Hardy Windows® 95/98/NT HI WS100 Configuration Software. The software configuration applications must be installed in a PC with either Ethernet, DH+, DH-485, or RS-232-C that can initiate communications with the SLC 5/02, 5/03, 5/04 or 5/05. To calibrate the module you can simply push "The Button" to effect a C2 calibration. C2, Hard (Traditional calibration with weights), and Soft calibration can be implemented from the SLC 500 AI Series DOS software, RS Logix500© Industrial Programming Software for Windows® 95/98/NT or from the optional Hardy WS 100 Configuration Software for Windows. The HI 1746-WS is IT (Integrated Technician) enabled which means the module has a built in IT excitation monitor to detect some load cell problems and with the addition of the optional HI 215IT Junction Box and the HI WS100 software, the operator can use the other IT functions for fault isolation troubleshooting of the weighing system.

WAVERSAVER®

Typically, mechanical noise (from other machinery in a plant environment) is present in forces larger than the weight forces trying to be detected by the module. The HI 1746-WS is fitted with WAVERSAVER® technology which eliminates the effects of vibratory forces present in all industrial weight control and

measurement applications. By eliminating the factor of vibratory forces the module is capable of identifying the actual weight data. WAVERSAVER® can be configured from the Configuration Software 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

C2 Second Generation Calibration enables a scale system to be calibrated electronically without using certified test weights which equals the systems load capacity. A C2 weighing system consists of up to eight (8) C2 load sensors, a junction box, interconnect cable and an instrument with C2 capabilities such as the HI 1746-WS Weight Scale Module. All Hardy C2 certified load sensors contain digital information detailing its unique performance characteristics. The HI 1746-WS reads the performance characteristics of each individual load sensor and detects the quantity of load sensors in the system. C2 Calibration can be performed by pressing "The Button" located in the front of the module, or via Hardy's Configuration Software or Allen-Bradley's RS Logix 500 software.

***IT*®**

INTEGRATED TECHNICIAN™ is a system diagnostics utility which continuously monitors the weighing system (with up to 4 load sensors) for possible malfunctions. For full functionality the HI 215IT junction box and Hardy's Configuration Software for Windows should be used. Full ***IT*** functionality allows the operator to rapidly troubleshoot a weighing system from the Configuration Software, INTEGRATED TECHNICIAN Display.

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 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 Junction Box and Hardy Configuration Software to monitor both mV and mV/V readings 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 balanced 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 in the Configuration Software, Test display is the total for all the load cells on the system.*

Return to Zero Test - Optional

Requires the HI 215IT Junction Box to monitor individual load sensors. The Hardy configuration Software is required when using this option. This test compares the original voltage reading (saved at calibration) against the current voltage reading of an empty vessel. The test displays a “Passed Return to Zero Test” or a “Failed Return to Zero Test” statement when running the System Test from the Configuration Software, Test Display, depending on the outcome of the test. 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 Junction Box. 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.
1. 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.
2. 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. The Hardy Configuration Software is highly recommended for use with this option.

Auto Zero

Auto Zero Tracking will indicate zero weight, as long as any "live weight" on the scale is below the set Auto Zero Tolerance and the scale is not motion. This capability allows the module to ignore material build-up in the weighing system within a pre-set auto zero tolerance.

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.

Set Point TTL Outputs

The HI 1746-WS is equipped with two (2) standard Digital TTL (Transistor - Transistor Logic) Level Outputs which can be connected to external solid state relays. Both outputs have individual set point, preact and deadband parameters. Both outputs are rated at 10 milliamps per line. Each can be programmed to respond to the standard Net, Gross, Rate of Change (ROC), Excitation Monitor, Force On or Force Off mode of operation.

CHAPTER 2 - SPECIFICATIONS

A Brief Description of Chapter 2

Chapter 2 lists the specifications for the HI 1746-WS Weigh Scale Module. 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 1746-WS Weigh Scale Module

Modes of Operation	Local and Remote
Conversion Rate	20 updates per second
Averages	1-255 User Selectable in single increments
Resolution	Displayed: 1:985,000 (@ 3 mV/V) 1:656,000 (@ 2 mV/V) Internal: 1:1,048,576
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
Maximum Zero Tolerance	32766
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 maximum (with respect to earth ground)
Backplane Current Load	0.250 Amps at 5 VDC
Power	+5 VDC +/- 5%
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
Set Point (1 & 2) Out	Discrete outputs (TTL) step function of 0 or +5 VDC to drive an SSR

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	-20^{o} C to 85^{o} C (-4^{o} F to 185^{o} F)
Humidity Range	0-90% (non-condensing)

Approvals

UL Certification
cUL Certification
CE Approval

Digital Voltmeter

Accuracy +/- 2% of full scale
Resolution

- mV/V 4 digits to the right of the decimal
- mV 1 digit to the right of the decimal

Optional Equipment HI 215IT Junction Box

IT Junction Box HI 215IT-SS or PS Series

Case Dimensions

6.25”H x 6.25”W x 4.50D (158.75mmH x 158.75mmW x 114.3mmD)

Weight

5 pounds (2.27 Kilograms)

Enclosure Ratings

-SS	Stainless Steel	NEMA 4 & 4X
-PS	Painted Carbon Steel	NEMA 4

IT Junction Box HI 215IT-FG Series

Case Dimensions

6.50”H x 8.0”W x 4.46”D (165.1mmH x 203.2mmW x 113.28mmD)

Weight

5 pounds (2.27 Kilograms)

Enclosure Rating

-FG	Fiberglass	NEMA 4 & $X

Configuration Software for Windows

Hardy’s Configuration Software for Windows allows the user to configure, monitor, and troubleshoot an HI 1746-WS module and load points from any PC with an installed Windows® 95/98 or NT operating system.

Default Parameters

Table 2-1:

Parameter	Default	Setting
Tare Weight	0.0 lbs	
WAVERSAVER®	1 Hz	2
Weight Units	lbs	0
Span Weight	10,000.0 lbs	
Averages	10	
Auto Zero Tracking Enabled	False	0
Tare Enabled	True	1
Zero Enabled	True	1
Calibration Type	No Calibration	-1
Setpoint Mode 1&2	Force Low, Gross	0x12
Setpoint Value 1&2	10000.0 lbs	
Setpoint Deadband 1&2	0.1 lbs	
Setpoint Preact 1&2	0.0 lbs	
Auto-zero Tolerance	10.0 lbs	
Motion Tolerance	5.0 lbs	
Zero Tolerance	10	
Rate of Change Time Base	10	
Cal Year	0	
Cal Month	0	
Cal Day	0	
Cal ID	0	