Helm Instrument Company, Inc.
361 West Dussel Drive
Maumee, Ohio 43537 USA
419/ 893-4356
Fax: 419/ 893-1371
www.helminstrument.com

1769 Weigh Scale Module

Model HM1525
Revision 1.0
04/30/2015

Instruction Manual

April, 2015

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. "Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls" (Allen-Bradley Publication SGI-1.1) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will the Allen-Bradley Company or Helm Instrument Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company or Helm Instrument Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Allen-Bradley Company or Helm Instrument Company with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of the Allen-Bradley Company and Helm Instrument Company is prohibited.

Throughout this manual we use note to make you aware of safety considerations.

ATTENTION: Identifies information about practices or circumstances that can lead to property damage. Identifies information that is especially important for successful application and understanding of the product.

Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

ATTENTION: Please check power supply ratings before proceeding! Each tonnage module consumes (+24, 50mA +5, 66mA). Be sure to not overload the power supply.

Preface

Read this preface to familiarize yourself with the rest of this manual. This preface covers the following topics:

- who should use this manual
- the purpose of this manual
- terms and abbreviations
- conventions used in this manual
- Allen-Bradley support

Who Should Use this Manual

Use this manual if you are responsible for the design, installation, programming, or maintenance of an automation control system that used Allen-Bradley small logic controllers.

You should understand electronic process control and be able to interpret the ladder logic instructions required to generate the electronic signals that control your application. If you do not, contact your local Allen-Bradley representative for the proper training before using this product.

Purpose of This Manual

This manual is a learning and reference guide for the Helm Weigh Scale Module. It contains the information you need to install, wire, and use the module.

Related Documentation

The following documents contain information that may be helpful to you as you use Allen-Bradley SLC products. To obtain a copy of any of the Allen-Bradley documents listed, contact your local Allen-Bradley office or distributor.

For	Read this Document	Document Number
CompactLogix 5370 L1 Programmable Automation Controllers	CompactLogix 5370 L1 Programmable Automation Controllers	1769-PP012
An overview for the MicroLogix™ Programmable Controllers	MicroLogix 1500 Programmable Controllers	1764-UM001A-US-P
A description on how to install and use your MicroLogix Programmable Controller	MicroLogix 1500 Programmable Controller Base Units Installation Instructions and Wiring Diagrams	1764-IN001A-ML-P
A description on how to install the processor into the MicroLogix 1500 Base unit.	MicroLogix 1500 Processor Installation Instructions	1764-IN002A-ML-P
Selecting Discrete Input/Output Modules	Compact Discrete Input/Output Modules Technical Data	1769-2.1
View power usage of expansion modules to determine power supply requirements	Expansion Modules System Qualifier	RA Website Download
End Cap Installation	Compact I/O End Caps/Terminators Installation Instructions	1769-5.16
A complete listing of current Automation Group documentation, including ordering instructions. Also indicates whether the documents are available on CD-ROM or in multi-languages	Automation Group Publication Index	SD499
A glossary of industrial automation terms and abbreviations	Allen-Bradley Industrial Automation Glossary	ICCG-7.1
An article on wire sizes and types for grounding electrical equipment	National Electrical Code	Published by the National Fire Protection Association of Boston, MA.

Terms and Abbreviations

The following terms and abbreviations are used throughout this manual. For definitions of terms not listed here refer to *Allen-Bradley's Industrial Automation Glossary*, Publication ICCG-7.1.

Calibration - Procedure, performed by trained personnel, where machine or press is dynamically loaded to impact on load cells. A process of linearity measuring to determine the loading capacity of the machine.

Calibration Number - Amplification values established during machine calibration or pre-assigned on force load cells.

Channel - Refers to one of two, strain gage inputs available on the modules terminal block.

Chassis - A hardware assembly that houses devices such as I/O modules, adapter modules, processor modules, and power supplies.

Configuration Word - Contains the channel configuration information needed by the module to configure and operate each channel. Information is written to the configuration word through the logic supplied in your ladder program.

Data Word - A 16-bit integer that represent the value of the analog input channel. The channel data word is valid only when the channel is enabled.

Gain - Amplification of an input signal.

Load/Force - Measurement of impact during a machine cycle. Sensors provide the input for this measurement.

LSB - (Least Significant Bit) Refers to a data increment defined as the full scale range divided by the resolution. The bit that represents the smallest value within a string of bits.

Remote Configuration - A control system where the chassis can be located several thousand feet from the processor chassis.

Resolution - The smallest detectable change in a measurement, typically expressed in engineering units (e.g. 0.15C) or as a number of bits. For example a 12-bit system has 4,096 possible output states. It can therefore measure 1 part in 4096.

Sample - Load/force values established from a series of machine cycles. Also defined as benchmark.

Sampling time - The time required by the A/D converter to sample an input channel.

Scale - Value used to describe the press/machine overall tonnage. Set for maximum value of one channel. For example, settings for a 150 ton press = 75.

Status Word - Contains status information about the channel's current configuration and operational state. You can use this information in your ladder program to determine whether the channel data word is valid.

Update Time - The time required for the module to sample and convert the input signals of all enables input channels and make the resulting data values available to the SLC processor.

Common Techniques Used in this Manual

The following conventions are used throughout this manual:

- Bulleted lists such as this one provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.

Product Support

Contact your Helm representative or call Helm direct at 419-893-4356:

- sales and order support
- product technical training
- warranty support
- support service agreements

Your Questions or Comments on this Manual

If you have any suggestions for how this manual could be made more useful to you, please send us your ideas.

HM1525 Weigh Scale Module
Revision 1

Overview

You have just purchased the most advanced load monitoring solution available. HELM INSTRUMENT COMPANY, INC. manufactures a complete line of load monitoring control solutions for use on metal stamping, forging, compaction and assembly presses; cold forming, cold heating, injection molding and die cast machines.

Standard or custom transducers and load cells are available for in-die monitoring of transfer or progressive tooling.

At HELM, quality is inherent not only in the design of our products but in the attitudes of our employees as well. We're working together to give you the best. After all, that's what our business is all about - providing innovative instrumentation to help make your manufacturing process more productive and your operation more effective.

The Helm Weigh Scale combines machine and tooling monitoring with programmable limit switch function. User programmable high and low limits protect the machine and tooling to ensure part quality.

Critical setup information can be stored and uploaded as part of a die recipe program. An optional resolver input module is used to compare machine/press tonnage to crank angle for real time signature analysis.

Components

The Helm Weigh Scale module is attached to the controller or to an adjacent I/O module on the din rail. The system is comprised of two parts; the input module and strain gage based sensors and load cells.

Hardware Overview

The Weigh Scale module can be attached to the controller or to an adjacent I/O module before or after din rail mounting. It is a Class 1 module (uses eight input words and eight output words). It interfaces to strain gage based transducers (350ohm or 700ohm).

The module can accept input from two sensors. The module has no output channels. Module configuration requires manual and user programmable setup.

The Weigh Scale module receives and stores digitally converted analog data into its image table for retrieval by processor. The module supports connections from any combination of up to two strain gage sensors.

Any combination of Helm Strain Gage sensors can be used. Contact Helm for additional information on the type and application of different sensor options.

Getting Started

This chapter can help you to get started using the Helm Weigh Scale module. The procedures included here assume that you have a basic understanding of PLC products. You should understand electronic process control and be able to interpret the ladder logic instructions required to generate the electronic signals that control your application.

Because it is a start-up guide, this chapter does not contain detailed explanations about the procedures listed. It does, however, reference other chapters in this book where you can get more information about applying the procedures described in each step.

If you have any questions or are unfamiliar with the terms used or concepts presented in the procedural steps, always read the referenced chapters and other recommended documentation before trying to apply the information.

This chapter will:

- Tell you what equipment you need
- Explain how to install and wire the module
- Show you how to set channels for the sensor input

Required Tools and Equipment

Have the following tools and equipment ready:

- Small blade screwdriver
- Appropriate strain gage cable
- Programming equipment

HM1525 Weigh Scale Module
Revision 1

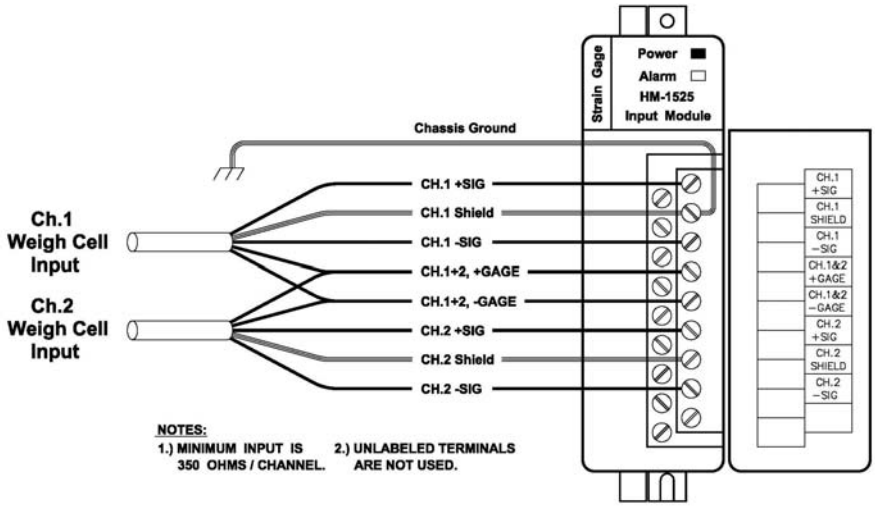
System Operation

The Weigh Scale module communicates to the processor through the parallel backplane interface and receives +5Vdc and +24Vdc power from the power supply through the backplane. No external power supply is required. The MicroLogix and CompactLogix platforms can support up to 8 I/O modules. You may install up to 3 Weigh Scale modules using the base power supply. An additional power supply can be added to support more than 3 modules.

Each individual channel on the module can receive input signals from strain gage based sensors. The module converts the analog values directly into digital values.

Sensor Wiring

The sensors are wired to the modules using the rightmost bank of inputs.
The pin-out is shown below.



To ensure proper operation and high immunity to electrical noise, always use Helm strain gage cable.

To limit noise, keep strain gage cable as far away as possible from power and load lines.

The module can support up to two sensor inputs.

DO NOT attempt to parallel additional gages as you will cause damage to the module and void product warranty.

Channel Configuration Data and Status

This chapter explains how the Weigh Scale module and the processor communicate through the module's input and output image.

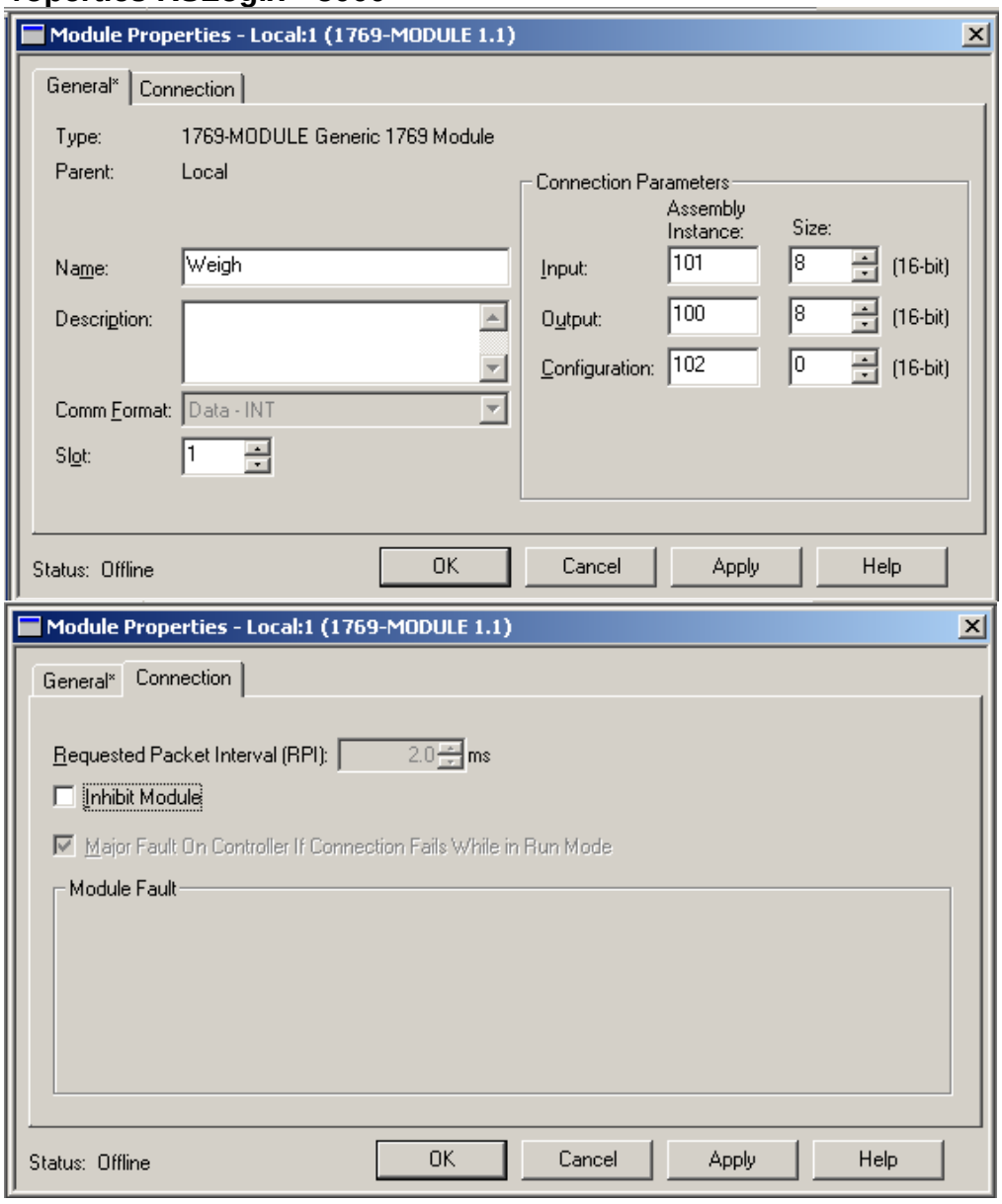
For RS Logix500 software, verify the module ID code.

Weigh Scale Module ID Code = 1

Expansion General Configuration
Vendor ID = 3
Product Type = 9
Product Code = 1
Series/Major Rev/Minor Rev = D

No special I/O configuration (SPIO CONFIG) information is required. The module ID code automatically assigns the correct number of input and output words. The following memory map shows how the output and input image tables are defined.

Module Properties RSLogix™5000



Output Image

Closed_Loop_PID_System - Controller Tag Listing **Page 1**
Closed_Loop_PID_System (Controller) 4/24/2015 11:33:41 AM
C:\RSLogix 5000\Projects\Helm_L31_hm1525_hires.ACD

Show: All Tags
Sort by: Name

Name	Data Type	Description
ch1_ch2_scale	DINT	
ch1_weigh	DINT	
ch2_weigh	DINT	
Local:1:C	AB:1769_MODULE:C:0	
Local:1:I	AB:1769_MODULE_INT_20Bytes:I:0	
Local:1:O	AB:1769_MODULE_INT_16Bytes:O:0	
Local:1:O.Data	INT[8]	
Local:1:O.Data[0]	INT	
Local:1:O.Data[0].0	BOOL	cal mode
Local:1:O.Data[0].1	BOOL	run mode
Local:1:O.Data[0].2	BOOL	clear tare ch1
Local:1:O.Data[0].3	BOOL	set tare ch1
Local:1:O.Data[0].4	BOOL	clear tare ch2
Local:1:O.Data[0].5	BOOL	set tare ch2
Local:1:O.Data[0].6	BOOL	read mv/v sets
Local:1:O.Data[0].7	BOOL	read cal factor
Local:1:O.Data[0].8	BOOL	save to eeprom
Local:1:O.Data[0].9	BOOL	read adtrim
Local:1:O.Data[0].10	BOOL	auto cal mode
Local:1:O.Data[0].11	BOOL	set ch1 scale
Local:1:O.Data[0].12	BOOL	set ch2 scale
Local:1:O.Data[0].13	BOOL	ch1 auto tune
Local:1:O.Data[0].14	BOOL	ch2 auto tune
Local:1:O.Data[0].15	BOOL	read scale sets
Local:1:O.Data[1]	INT	set scale low
Local:1:O.Data[2]	INT	scale set high
Local:1:O.Data[3]	INT	ch1 mv/v set
Local:1:O.Data[4]	INT	ch2 mv/v set
Local:1:O.Data[5]	INT	samples
Local:1:O.Data[6]	INT	parameters
Local:1:O.Data[6].0	BOOL	msf range -0.002% to +001% of full scale
Local:1:O.Data[6].1	BOOL	msf range -0.004% to +002% of full scale
Local:1:O.Data[6].2	BOOL	msf range -0.008% to +004% of full scale

RSLogix 5000

Output Image

Clear Tare Bit
Resets or removes tare value from module. (Used to initially setup module)

Tare Bit
Sets weigh value to zero.

Channel 1 Scale Value
Value of scale from capacity of load cell for Channel 1.

Channel 1 mV/V Setting
4 digit mV/V setting from load cell mV/V specification.

Channel 2 mV/V Setting
4 digit mV/V setting from load cell mV/V specification.

Input Image

Channel 1 Weigh Value
Weigh value for Channel 1

Channel 2 Weigh Value
Weigh value for Channel 2.

Setup Procedure

A complete listing of a sample ladder logic program is included at the back of this manual. Examples shown here are for reference.

All values are 0 (default) on initial start-up. This means that all alarms are disabled. You must make the following adjustments for proper operation:

- **Balance sensor input(s)**
- **Set Calibration numbers**

Step 1. Balance Sensor Input.

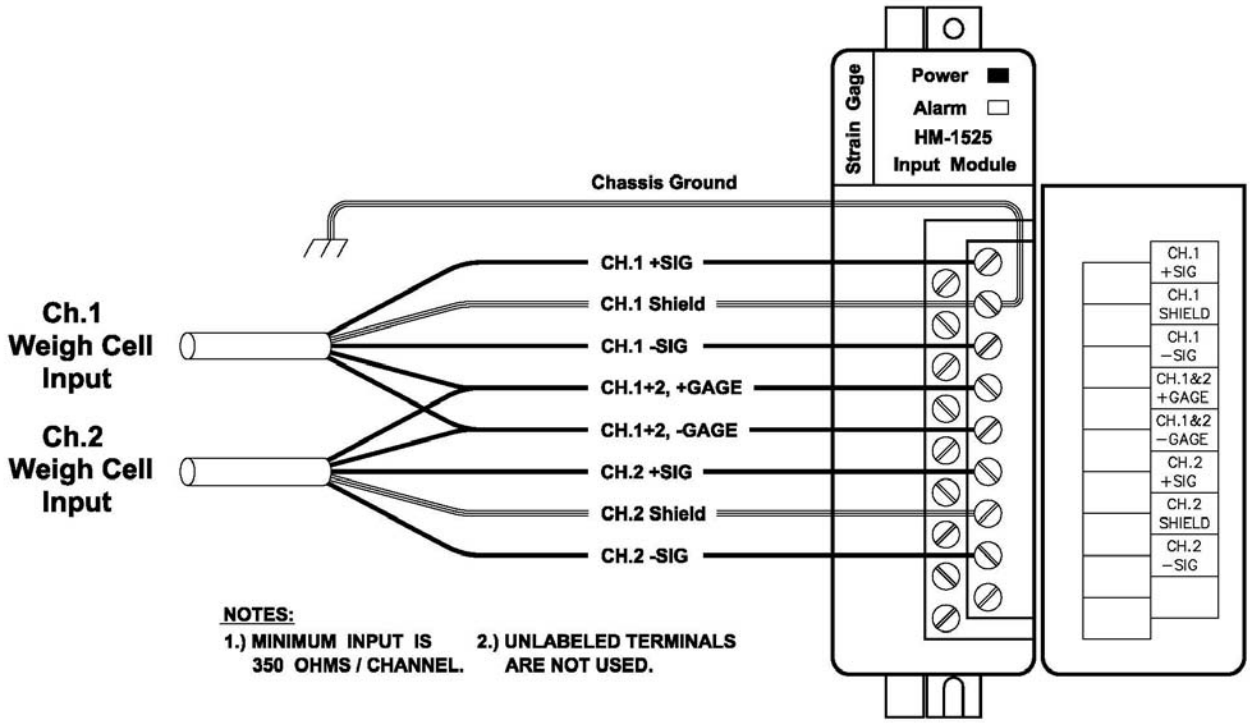
1. Set to Cal Mode
2. Press Clear Tare for each channel
3. Check balance value, should be 131,000 counts

Step 2. Set Calibration Numbers

1. Set Scale to capacity of load cell
2. Set mV/V to load cell specification
3. Example:
   100 ton load cell, 2.025 mV/V
   For scale set, enter 100
   For mV/V set, enter 2025
4. Push Set CH1, Set CH2 Scale
   Push Save to eeprom
5. Set to Run Mode

HT-400 Sensor Ohm Readings:

Green-Black	**350 ohms**
Red-White	**350 ohms**
All other color combinations	**266 ohms**
All colors to Ground	**open**
Shield to Ground	**open**


Strain Gage
Power
Alarm
HM-1525
Input Module
Chassis Ground
Ch.1
Weigh Cell
Input
Ch.2
Weigh Cell
Input
CH.1 +SIG
CH.1 Shield
CH.1 -SIG
CH.1+2, +GAGE
CH.1+2, -GAGE
CH.2 +SIG
CH.2 Shield
CH.2 -SIG
CH.1 +SIG
CH.1 SHIELD
CH.1 −SIG
CH.1&2 +GAGE
CH.1&2 −GAGE
CH.2 +SIG
CH.2 SHIELD
CH.2 −SIG
NOTES:
1.) MINIMUM INPUT IS 350 OHMS / CHANNEL.
2.) UNLABELED TERMINALS ARE NOT USED.

HM1525-HR 2CH MODULE SUPPORT LADDER FOR CONTROLNET

Make 32bit data from two 16bit data tags for ch1 and for ch2

0

BTD
Bit Field Distribute
Source Local:1:I.Data[0]
2
Source Bit 0
Dest ch1_weigh
1
Dest Bit 0
Length 16

BTD
Bit Field Distribute
Source Local:1:I.Data[1]
0
Source Bit 0
Dest ch1_weigh
1
Dest Bit 16
Length 16

BTD
Bit Field Distribute
Source Local:1:I.Data[2]
3
Source Bit 0
Dest ch2_weigh
2
Dest Bit 0
Length 16

BTD
Bit Field Distribute
Source Local:1:I.Data[3]
0
Source Bit 0
Dest ch2_weigh
2
Dest Bit 16
Length 16

HM1734WM-HR 2CH MODULE SUPPORT LADDER FOR CONTROLNET

seperate 32bit data tag and set high and low 16bit output image

1

set scale low

BTD
Bit Field Distribute
Source ch1_ch2_scale
0
Source Bit 0
Dest Local:1:O.Data[1]
0
Dest Bit 0
Length 16

scale set high

BTD
Bit Field Distribute
Source ch1_ch2_scale
0
Source Bit 16
Dest Local:1:O.Data[2]
0
Dest Bit 0
Length 16

(End)