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Installation Instructions
HM2085-WM
Weigh Scale Module

October, 2016

Process Control Systems, Instruments and Transducers

Visit our Web Site at http://www.helminstrument.com or email us at sales@helminstrument.com

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.

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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 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.

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.

HM2085 Weigh Scale Module

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

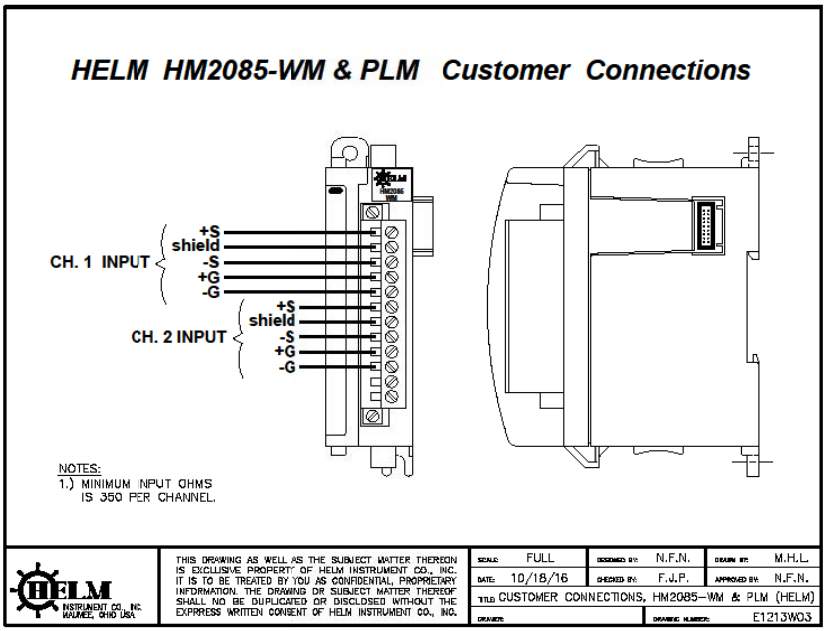
System Operation

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.

Install Software

Copy folder HM2085WM-Rev1_2 from ManualCD to selected folder on user computer.

Open CCW (Connected Components Workbench) and select Open.
Locate folder on hard drive and open HM2085WM-Rev1_2.ccwsln.

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.

Name	Data Type	Dimension	String Size	Initial Value	Direction	Attribute	Comment	Alias	Project Value
weigh1	DINT				Var	ReadWrite			0
weigh2	DINT				Var	ReadWrite			0
scale_set	DINT				Var	ReadWrite			0
output_bit0	BOOL				Var	ReadWrite	cal mode	cal mode	FALSE
output_bit1	BOOL				Var	ReadWrite	run mode	run mode	FALSE
set_ch1trim	BOOL				Var	ReadWrite			FALSE
set_ch2trim	BOOL				Var	ReadWrite			FALSE
weighdata	DINT	[0..1000]			Var	ReadWrite			
output_bit2	BOOL				Var	ReadWrite	clear tare ch1	clear tare ch1	FALSE
output_bit3	BOOL				Var	ReadWrite	set tare ch1	set tare ch1	FALSE
output_bit4	BOOL				Var	ReadWrite	clear tare ch2	clear tare ch2	FALSE
output_bit5	BOOL				Var	ReadWrite	set tare ch2	set tare ch2	FALSE
output_bit6	BOOL				Var	ReadWrite	read mv/v sets	read mv/v sets	FALSE
output_bit7	BOOL				Var	ReadWrite	read cal factor	read cal factor	FALSE
output_bit8	BOOL				Var	ReadWrite	save to eeprom	save to eeprom	FALSE
output_bit9	BOOL				Var	ReadWrite	read adtrim	read adtrim	FALSE
output_bit10	BOOL			0	Var	ReadWrite	autocal mode	autocal mode	FALSE
output_bit11	BOOL				Var	ReadWrite	set ch1 scale	set ch1 scale	FALSE
output_bit12	BOOL				Var	ReadWrite	set ch2 scale	set ch2 scale	FALSE
output_bit13	BOOL			0	Var	ReadWrite	ch1 auto tune	ch1 auto tune	FALSE
output_bit14	BOOL			0	Var	ReadWrite	ch2 auto tune	ch2 auto tune	FALSE
output_bit15	BOOL				Var	ReadWrite	read scale sets	read scale sets	FALSE
msf_valaue	INT				Var	ReadWrite			0
MOT_VAR	INT				Var	ReadWrite			0
ENABLE_BIT	BOOL				Var	ReadWrite			FALSE
ch1mv_vset	INT				Var	ReadWrite			0
ch2mv_set	INT				Var	ReadWrite			0
samples	INT				Var	ReadWrite			0
filtertime	INT			0	Var	ReadWrite			0

mode	BOOL				Var	ReadWrite			FALSE
msf1	BOOL			0	Var	ReadWrite			FALSE
ANGLE	INT				Var	ReadWrite			300
Time0	INT	[0..4]			Var	ReadWrite			
Time0[0]	INT				Var	ReadWrite			
Time0[1]	INT				Var	ReadWrite			
Time0[2]	INT				Var	ReadWrite			
Time0[3]	INT				Var	ReadWrite			
Time0[4]	INT				Var	ReadWrite			
ELAPSED_TIME	TIME				Var	ReadWrite			
msf2	BOOL			0	Var	ReadWrite			FALSE
msf3	BOOL			0	Var	ReadWrite			FALSE
msf4	BOOL			0	Var	ReadWrite			FALSE
msf5	BOOL			0	Var	ReadWrite			FALSE
msf6	BOOL			0	Var	ReadWrite			FALSE
msf7	BOOL			0	Var	ReadWrite			FALSE
extrapar	BOOL			0	Var	ReadWrite			FALSE
zeroband1	BOOL			0	Var	ReadWrite			FALSE
zeroband2	BOOL			0	Var	ReadWrite			FALSE
zeroband3	BOOL			0	Var	ReadWrite			FALSE
extpar2	BOOL			0	Var	ReadWrite			FALSE
ch1_vib_on	BOOL			0	Var	ReadWrite			FALSE
ch2_vib_on	BOOL			0	Var	ReadWrite			FALSE
TIME1	TIME				Var	ReadWrite			
TIME2	INT				Var	ReadWrite			
PART_WEIGHT	DINT				Var	ReadWrite			
PART_COUNT	DINT				Var	ReadWrite			
WEIGH_PARTS	BOOL				Var	ReadWrite			
PIECES	DINT				Var	ReadWrite			
zero_band	INT				Var	ReadWrite			

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

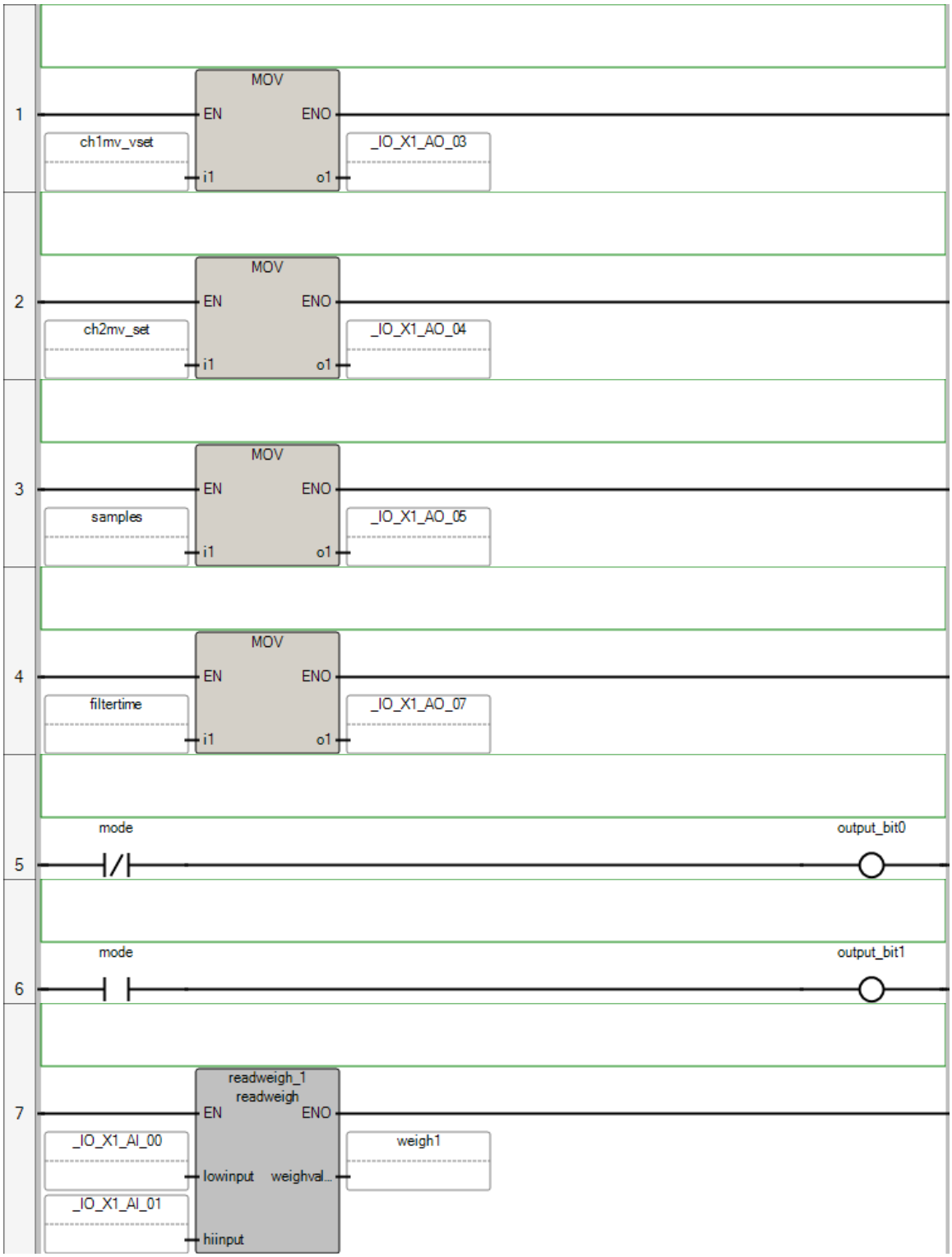
Step 2. Set Calibration Numbers

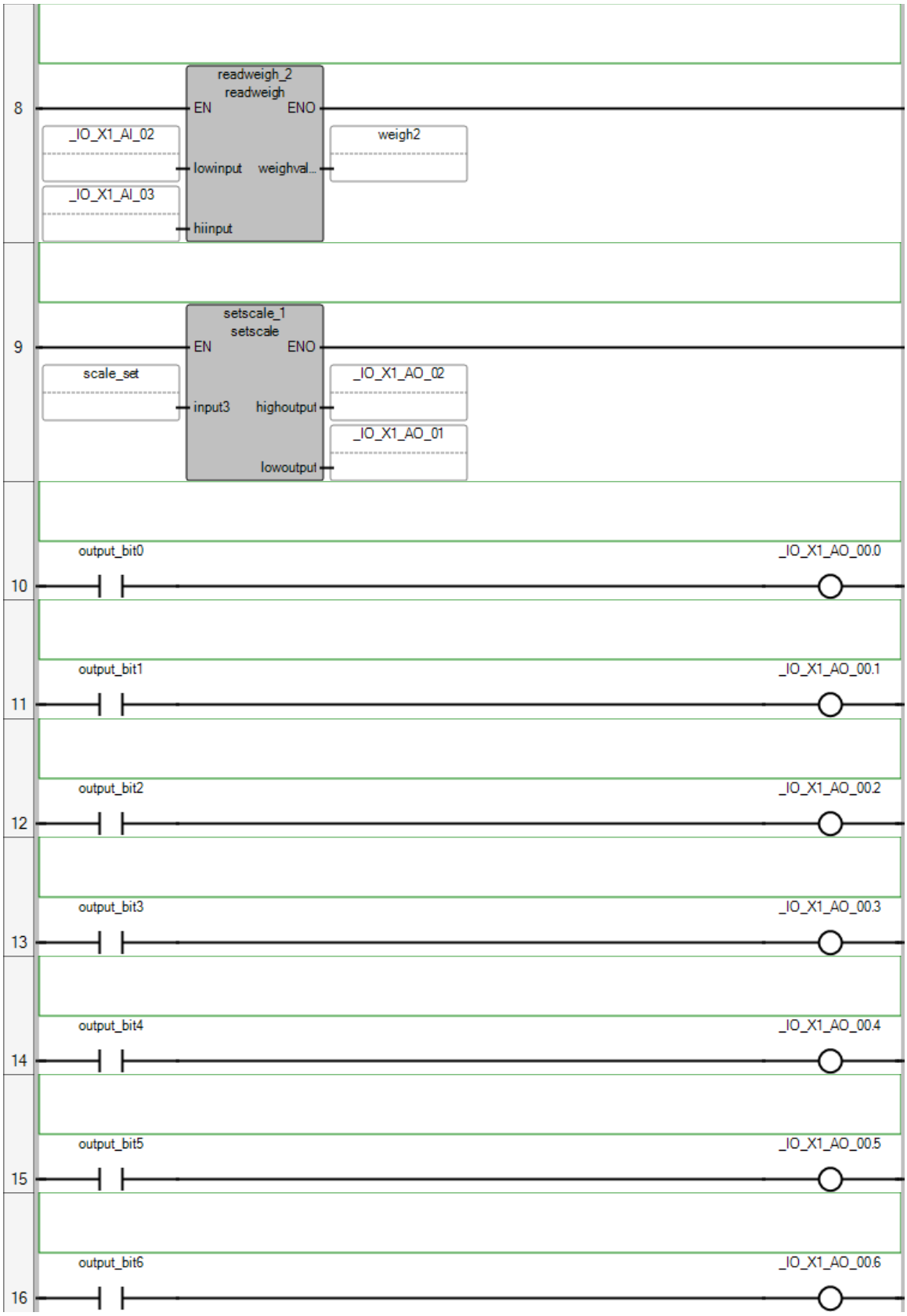
1. Set Scale to capacity of load cell
2. Set mV/V to load cell specification
3. Example:
   100 ton load cell, 2.025 mV/V
   For scale set, enter 100
   For mV/V set, enter 2025
4. Push Set CH1, Set CH2 Scale
   Push Save to eeprom
5. Set to Run Mode

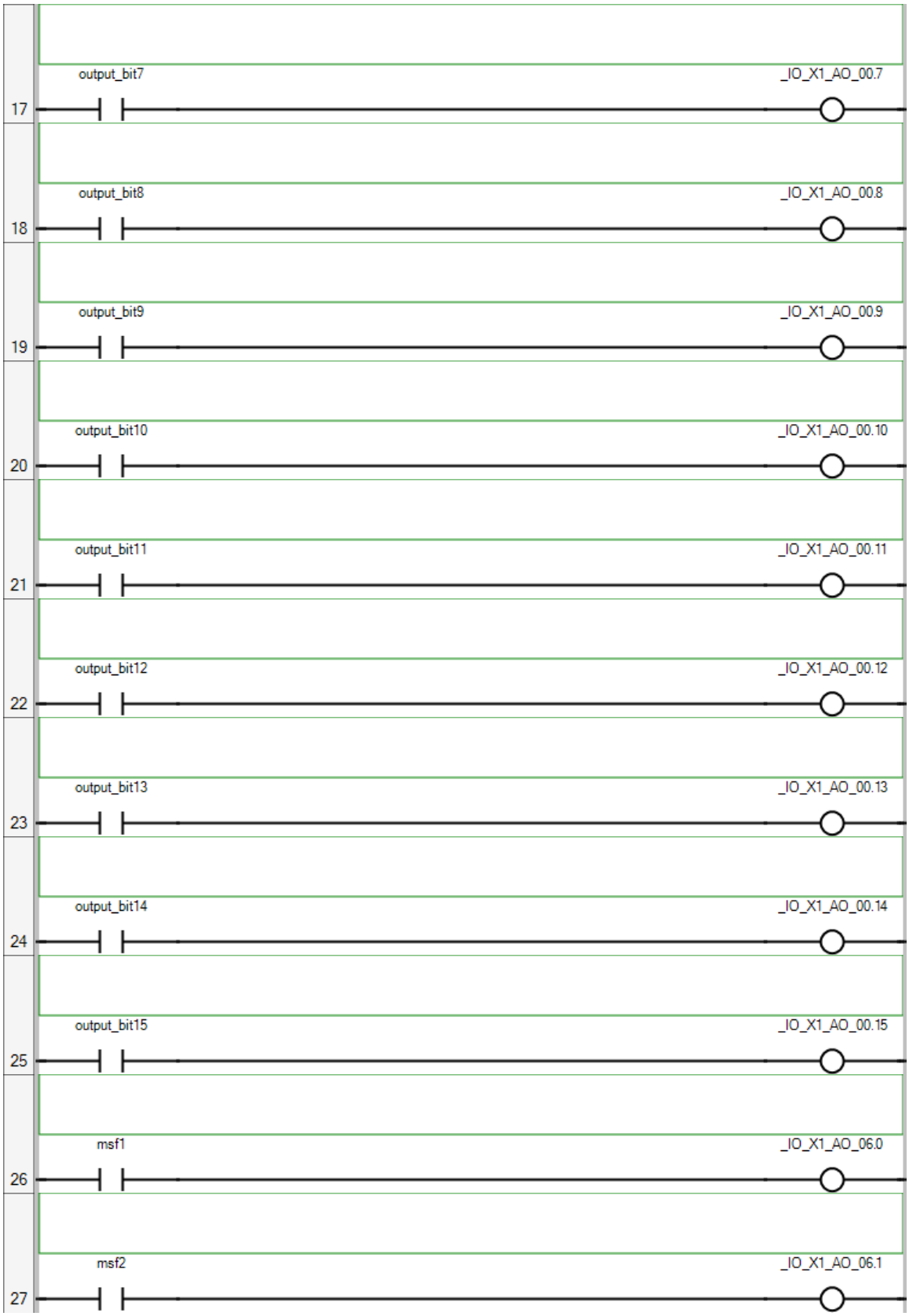
HT-400 Sensor Ohm Readings:

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

Controller.Micro850.Micro850.Prog1




8
readweigh_2
readweigh
EN
ENO
_IO_X1_AI_02
lowinput
weighval...
weigh2
_IO_X1_AI_03
hiinput
9
setscale_1
setscale
EN
ENO
scale_set
input3
highoutput
_IO_X1_AO_02
_IO_X1_AO_01
lowoutput
output_bit0
_IO_X1_AO_00.0
10
output_bit1
_IO_X1_AO_00.1
11
output_bit2
_IO_X1_AO_00.2
12
output_bit3
_IO_X1_AO_00.3
13
output_bit4
_IO_X1_AO_00.4
14
output_bit5
_IO_X1_AO_00.5
15
output_bit6
_IO_X1_AO_00.6
16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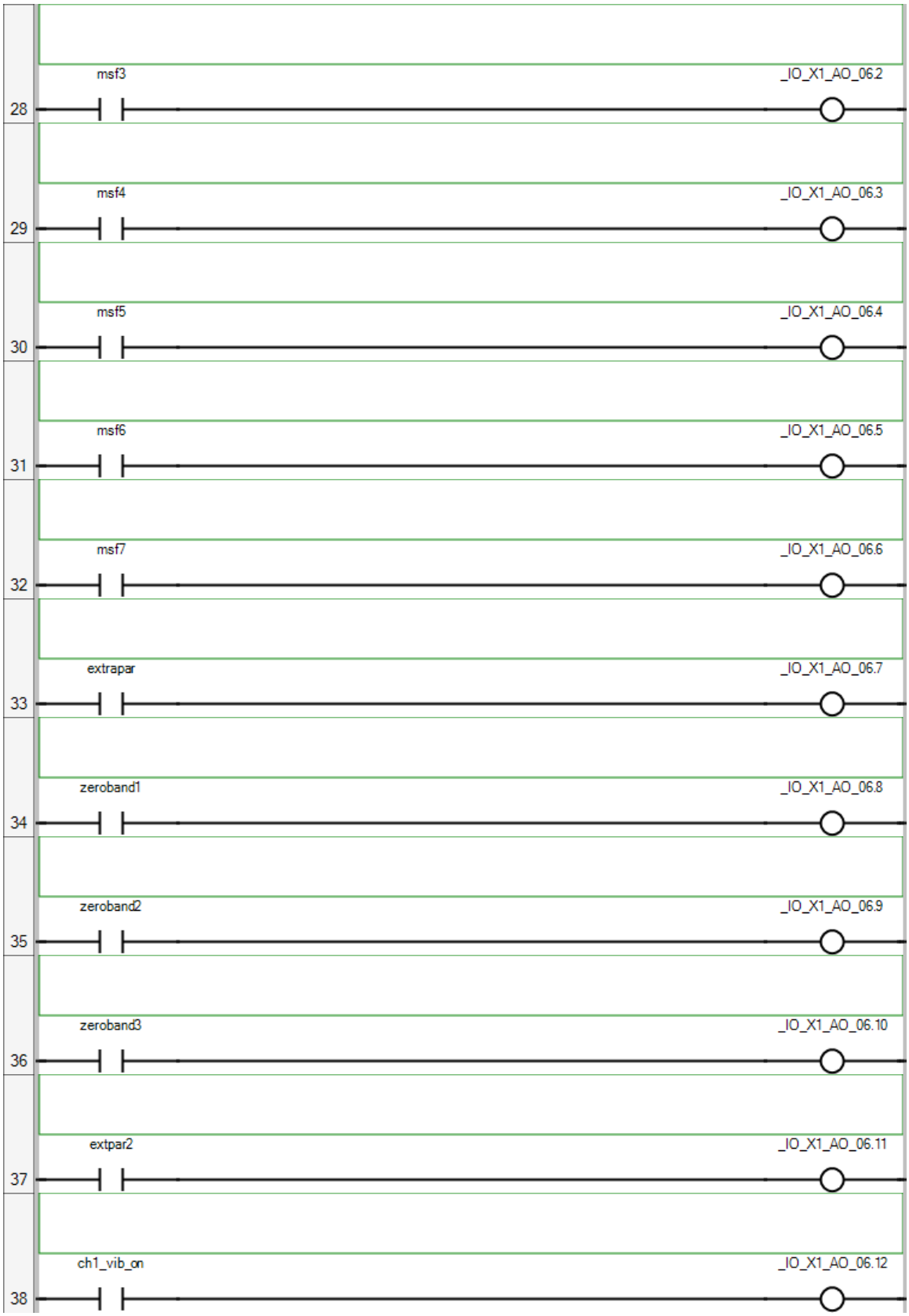
output_bit7
_IO_X1_AO_00.7
18
output_bit8
_IO_X1_AO_00.8
19
output_bit9
_IO_X1_AO_00.9
20
output_bit10
_IO_X1_AO_00.10
21
output_bit11
_IO_X1_AO_00.11
22
output_bit12
_IO_X1_AO_00.12
23
output_bit13
_IO_X1_AO_00.13
24
output_bit14
_IO_X1_AO_00.14
25
output_bit15
_IO_X1_AO_00.15
26
msf1
_IO_X1_AO_06.0
27
msf2
_IO_X1_AO_06.1


28
msf3
_IO_X1_AO_06.2
29
msf4
_IO_X1_AO_06.3
30
msf5
_IO_X1_AO_06.4
31
msf6
_IO_X1_AO_06.5
32
msf7
_IO_X1_AO_06.6
33
extrapar
_IO_X1_AO_06.7
34
zeroband1
_IO_X1_AO_06.8
35
zeroband2
_IO_X1_AO_06.9
36
zeroband3
_IO_X1_AO_06.10
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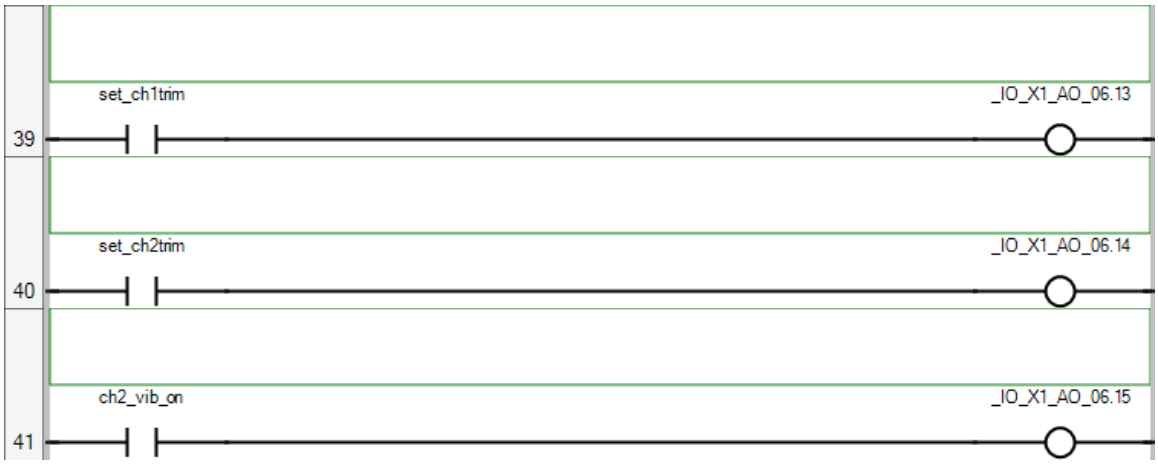
extpar2
_IO_X1_AO_06.11
38
ch1_vib_on
_IO_X1_AO_06.12


39
set_ch1trim
_IO_X1_AO_06.13
40
set_ch2trim
_IO_X1_AO_06.14
41
ch2_vib_on
_IO_X1_AO_06.15

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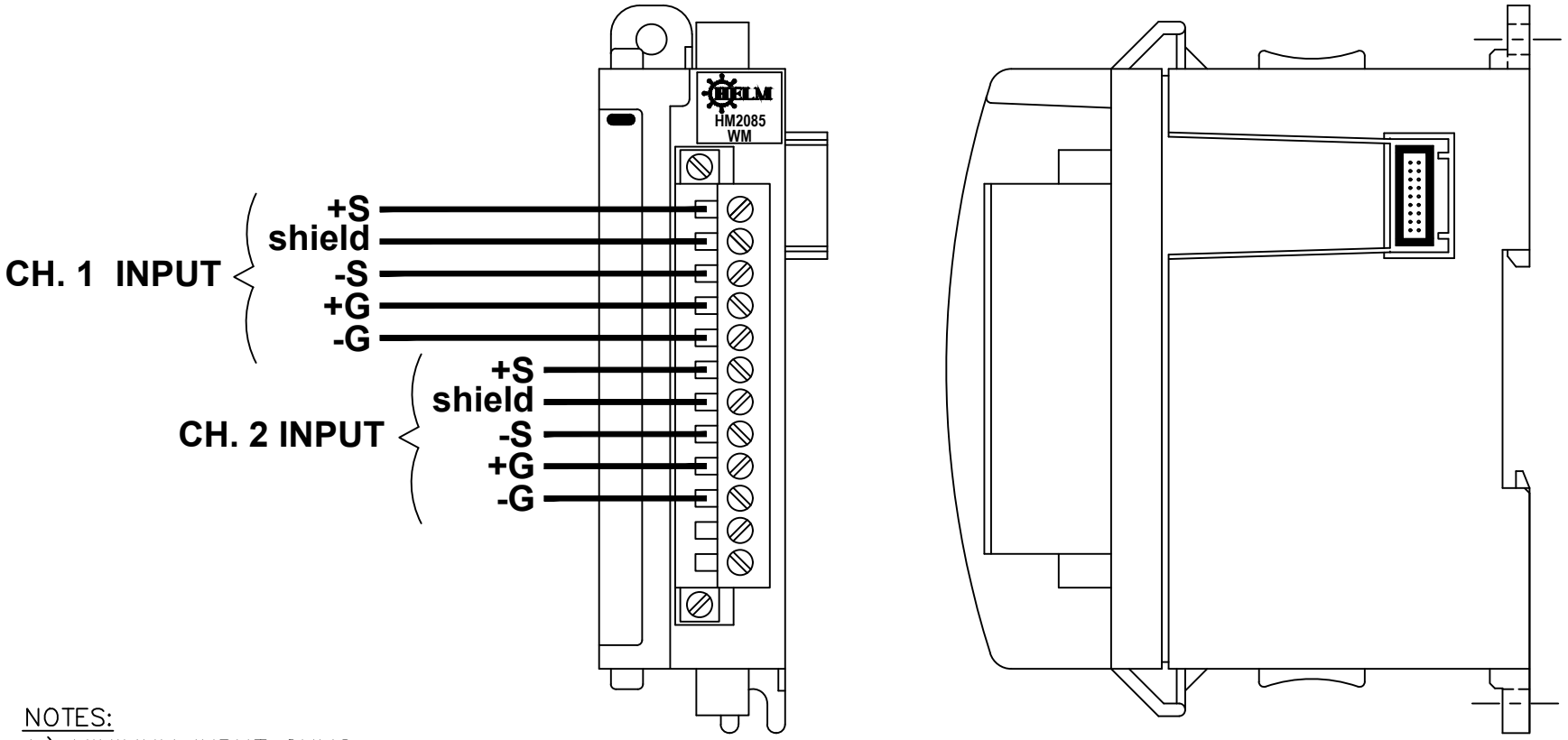
HM2085-WM SPECIFICATIONS

Backplane Power Consumption	**24V @ 70mA 5V @ 132mA**
Type of input	**Strain Gage (350 ohm, 700 ohm)**
Input Impedance	**10k**
Display Resolution	**Up to .001% of full scale**
Overall Module Accuracy	**.01% of full scale**
Module Update Time	**2 milliseconds**
Number of Channels	**2 (isolated)**
A/D Conversion Method	**Successive Approximation - 18 bit**
Normal Mode Rejection: (between +/- input)	**116DB CMRR**
Amplifier Bandwidth	**200 kHz**
Calibration	**Software Selectable**
Isolation:	**500 VDC continuous between inputs and chassis ground, and between input and backplane**
LED indicators	**2 LED's for Power and Alarm**
Recommended Cable	**Strain Gage Cable (Helm part number 6117)**
Operating Temperatures	**0°C to 60°C (32°F to 140°F)**
Hazardous Environment Classification	**Class 1 Division 2 Hazardous Environment**

HELM HM2085-WM & PLM Customer Connections



NOTES:
1.) MINIMUM INPUT OHMS IS 350 PER CHANNEL.

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MAUMEE, OHIO USA

SCALE:	FULL	DESIGNED BY:	N.F.N.	DRAWN BY:	M.H.L.
DATE:	10/18/16	CHECKED BY:	F.J.P.	APPROVED BY:	N.F.N.
TITLE:	CUSTOMER CONNECTIONS, HM2085–WM & PLM (HELM)				
DRAWER:		DRAWING NUMBER:	E1213W03		