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Installation Instructions
HM2085-PLM
Strain Gage Input 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

Helm HM2085-PLM Installation Instructions

HELM INSTRUMENT COMPANY, INC. manufactures a complete line of load monitoring control solutions for use on metal stamping, forging, compaction and assembly presses, thermoforming and tablet presses.

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 HM1085-LM is a 2-channel strain gage input module featuring programmable high and low limits to protect the machine, the tooling and to ensure part quality.

Strain Gage Transducers

The primary part of the load monitoring system centers around the measurement. The basic function of the Helm HT-400 Strain Gain sensor is to detect the amount of deflection imposed on the press or die as parts are being formed. All Strain Gain sensors are matched to within 1% and therefore can be replaced without recalibration of the machine.

The Helm Strain Gain sensors can be mounted to strategic high stress areas of the machine frame or strategically located in tooling or applied to stop blocks. Signals from these sensors are routed to the module for processing. The module is capable of measuring either a tension or compression signal.

Explosion Hazard

Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. Substitution of components may impair suitability for Class I, Division 2.

Preventing Electrostatic Discharge

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment.
Touch a grounded object to discharge potential static.

- Wear an approved grounding wrist strap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation. When not in use, store the equipment in appropriate static-safe packaging.

Grounding

The controller is grounded through DIN rail to chassis ground. Use zinc plated, yellow chromated steel DIN rail to assure proper grounding. Using other DIN rail materials (e.g. aluminum, plastic,etc.) which can corrode, oxidize or are poor conductors can result in improper or intermittent platform grounding.

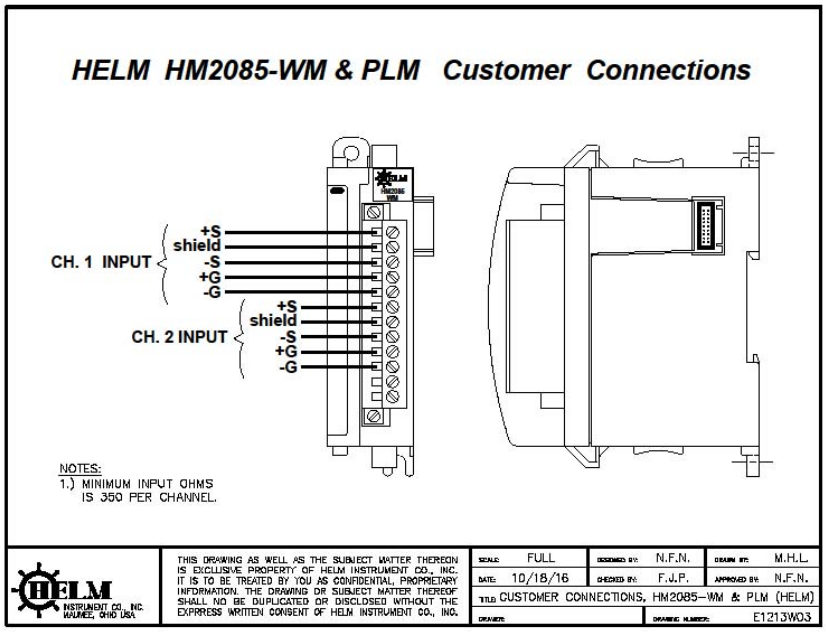
System Operation

The 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.

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 HM2085PLM-Rev1 from ManualCD to selected folder on user computer.

Open CCW (Connected Components Workbench) and select Open.
Locate folder on hard drive and open HM2085PLM-Rev1.ccwsln.

Name	Data Type	Dimension	String Size	Initial Value	Direction	Attribute	Comment	Alias	Project Value
bypass_mode	BOOL			1	Var	ReadWrite			TRUE
bypass_scale	BOOL				Var	ReadWrite	read mv/v sets		FALSE
cam_bit	BOOL				Var	ReadWrite			TRUE
ch1_cleartare	BOOL			0	Var	ReadWrite	read adtrim		FALSE
ch1_dev	REAL				Var	ReadWrite			34.0
ch1_float	REAL				Var	ReadWrite			0.0
ch1_high_cap	BOOL				Var	ReadWrite			FALSE
ch1_highcapset	INT				Var	ReadWrite			1050
ch1_hitrendset	DINT				Var	ReadWrite			0
ch1_lotrendset	DINT				Var	ReadWrite			0
ch1_low_cap	BOOL				Var	ReadWrite			FALSE
ch1_lowcapset	INT				Var	ReadWrite			0
ch1_percent	REAL				Var	ReadWrite			3400.0
ch1_record	BOOL				Var	ReadWrite			FALSE
ch1_revload	INT				Var	ReadWrite			25
ch1_tare	BOOL				Var	ReadWrite	set ch1 scale		FALSE
ch1_trend	DINT				Var	ReadWrite			0
ch1hitrend	BOOL				Var	ReadWrite			TRUE
ch1lotrend	BOOL				Var	ReadWrite			TRUE
ch2_cleartare	BOOL			0	Var	ReadWrite	set ch2 scale		FALSE
ch2_dev	REAL				Var	ReadWrite			
ch2_float	REAL				Var	ReadWrite			
ch2_high_cap	BOOL				Var	ReadWrite			FALSE
ch2_highcapset	INT				Var	ReadWrite			1050
ch2_hitrendset	DINT				Var	ReadWrite			
ch2_lotrendset	DINT				Var	ReadWrite			
ch2_low_cap	BOOL				Var	ReadWrite			FALSE
ch2_lowcapset	INT				Var	ReadWrite			0
ch2_percent	REAL				Var	ReadWrite			
ch2_record	BOOL				Var	ReadWrite			FALSE
ch2_revload	INT				Var	ReadWrite			24
ch2_tare	BOOL				Var	ReadWrite	read scale sets		FALSE
ch2_trend	DINT				Var	ReadWrite			
ch2hitrend	BOOL				Var	ReadWrite			
ch2lotrend	BOOL				Var	ReadWrite			
counterbit	BOOL				Var	ReadWrite			FALSE
cyclecntreset	BOOL				Var	ReadWrite			FALSE

cyclecount	DINT				Var	ReadWrite			98
enable_avg	BOOL				Var	ReadWrite			FALSE
extra7	BOOL				Var	ReadWrite			FALSE
extrainput10	BOOL				Var	ReadWrite			FALSE
extrainput11	BOOL				Var	ReadWrite			FALSE
extrainput12	BOOL				Var	ReadWrite			FALSE
extrainput13	BOOL				Var	ReadWrite			FALSE
extrainput14	BOOL				Var	ReadWrite			FALSE
extrainput15	BOOL				Var	ReadWrite			FALSE
extrainput6	BOOL				Var	ReadWrite			FALSE
extrainput7	BOOL				Var	ReadWrite			FALSE
extrainput8	BOOL				Var	ReadWrite			FALSE
extrainput9	BOOL				Var	ReadWrite			FALSE
forcedata	DINT	[0..1000]			Var	ReadWrite			
learncomplete	BOOL				Var	ReadWrite			FALSE
load_wav	BOOL				Var	ReadWrite			FALSE
low_alarm_inh	BOOL				Var	ReadWrite			
lowalarmcounter	DINT				Var	ReadWrite			
lowinhcount	DINT				Var	ReadWrite			
mode	BOOL				Var	ReadWrite			FALSE
motionbit	BOOL				Var	ReadWrite			
peak_mode	BOOL				Var	ReadWrite	clear tare ch1		FALSE
peak1	DINT				Var	ReadWrite			29
peak2	DINT				Var	ReadWrite			21
playback	BOOL				Var	ReadWrite			FALSE
readcal	BOOL				Var	ReadWrite	save to eeprom		FALSE
relearnbit	BOOL				Var	ReadWrite			
reset	BOOL				Var	ReadWrite	clear tare ch2		FALSE
samplecount	DINT				Var	ReadWrite			0
sampleset	DINT				Var	ReadWrite			0
savetoeeprom	BOOL				Var	ReadWrite			FALSE
set_cal	BOOL				Var	ReadWrite	set tare ch1		FALSE
set_ref_tons	INT				Var	ReadWrite			1000
start_wav	BOOL				Var	ReadWrite			FALSE
startlowinh	BOOL				Var	ReadWrite			
wavedatatest	DINT				Var	ReadWrite			0
xferdata	BOOL				Var	ReadWrite			FALSE

OUTPUT TAG DESCRIPTIONS

TRACK MODE
(Data[0]): Bit 0
Used for initial installation

PEAK MODE
(Data[0]): Bit 1
A/D values scaled with math in ladder logic

CLEAR TARE BIT
(Data[0]): Bit 2
Clears internal tare value for “zero state”.
Useful when troubleshooting load cell wiring or other failures.

TARE
(Data[0]): Bit 3
Sets A/D value to zero.

ALARM RESET
(Data[0]): Bit 4

SET CAL FACTOR (IN PEAK MODE ONLY)
(Data[0]): Bit 5

READ CAL FACTOR (IN PEAK MODE ONLY)
(Data[0]): Bit 6

RECORD MODE
(Data[0]): Bit 7
Used for troubleshooting, check signal strength and waveform storage.
This feature allows the module to update a block of memory at real time data using “Grab Data” ladder logic to create data block. Track, Peak mode bits off.

- Set module to record mode, wait for value = 20, clear record mode.
- Run “Grab Data” routine to get real time data.
- Set Track mode bit.

BYPASS SCALING
(Data[1]): Bit 1

SAVE TO EEPROM
(Data[1]): Bit 2
Use to save all settings to module

REQUIRED CONTROLLER TAGS

SET REFERENCE TONS
Full scale setting for CH1
Value is determined by capacity of load cell and by resolution required.
Actual value is from load cell specification or rated capacity on column or side of press.

LOW CAPACITYALARM SET
Enter desired value to set low alarm limit.

VALUE
Reports measured peak tonnage value in RUN mode.
Reports raw A/D count value in CAL mode.

HIGH CAPACITY SETTING
Enter desired value to set high alarm limit.

HIGH CAPACITY ALARM BIT
Bit is set when high limit is reached

LOW CAPACITY ALARM BIT
Bit is set when low limit is reached.

CHECK REFERENCE TONS
Used to verify that the module has the correct value.

CHECK LOW CAPACITY SET
Used to verify that the module has the correct value.

CHECK HIGH CAPACITY SET
Used to verify that the module has the correct value.

NOTE: After changing any setting, module should be set to Track mode.
Toggle SAVE TOEEPROM bit to save settings.

Troubleshooting with the Indicators

Module Status:

Off	No power applied to device.
Green	Device operating normally.

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**

For each channel used:

Step 1. Balance Sensor Input

1. Set to TRACK mode.
2. Set Clear Tare bit momentarily and set check coarse zero bit.
3. Check Raw A/D value. 32,000

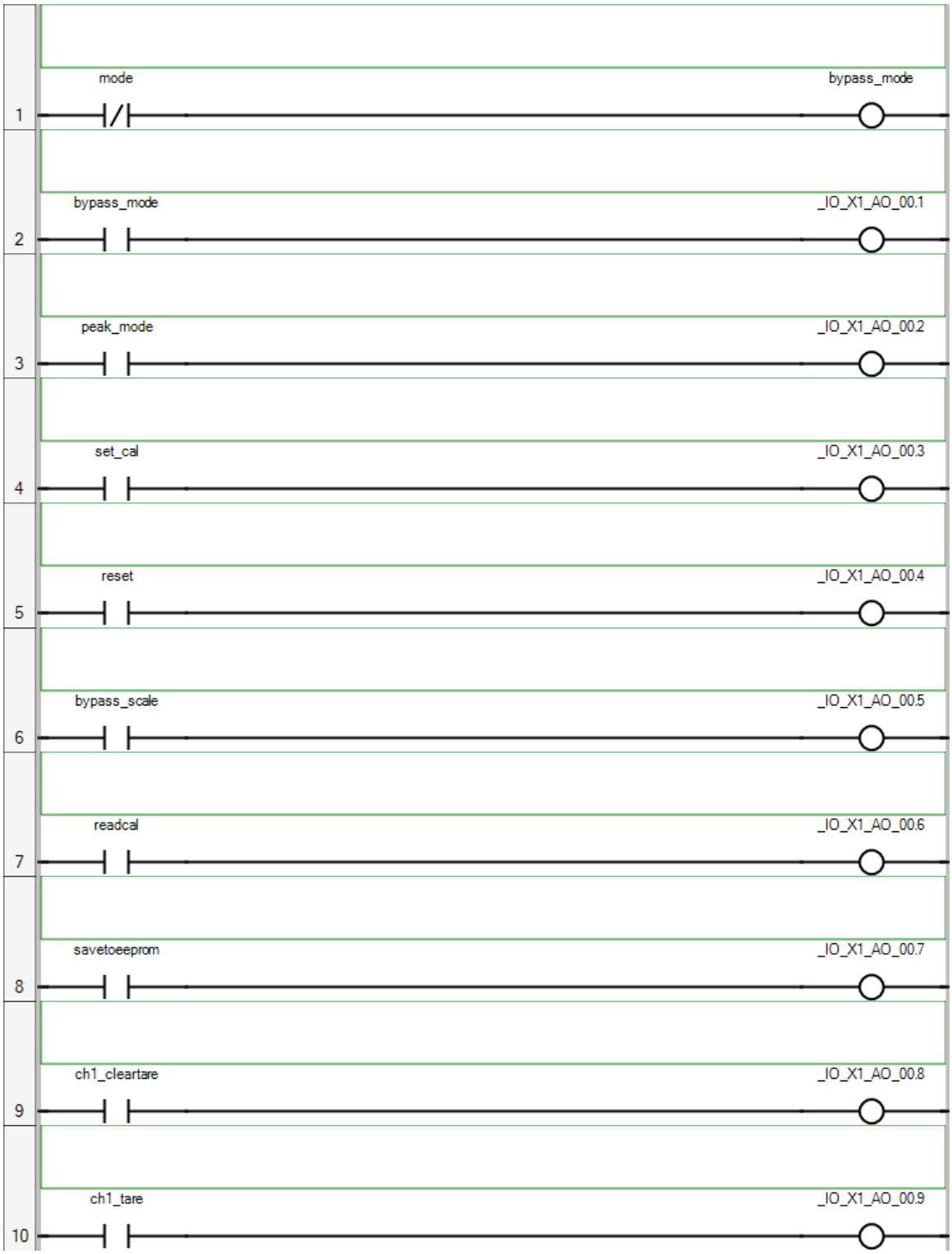
   CH1 = Controller Tag “value”.

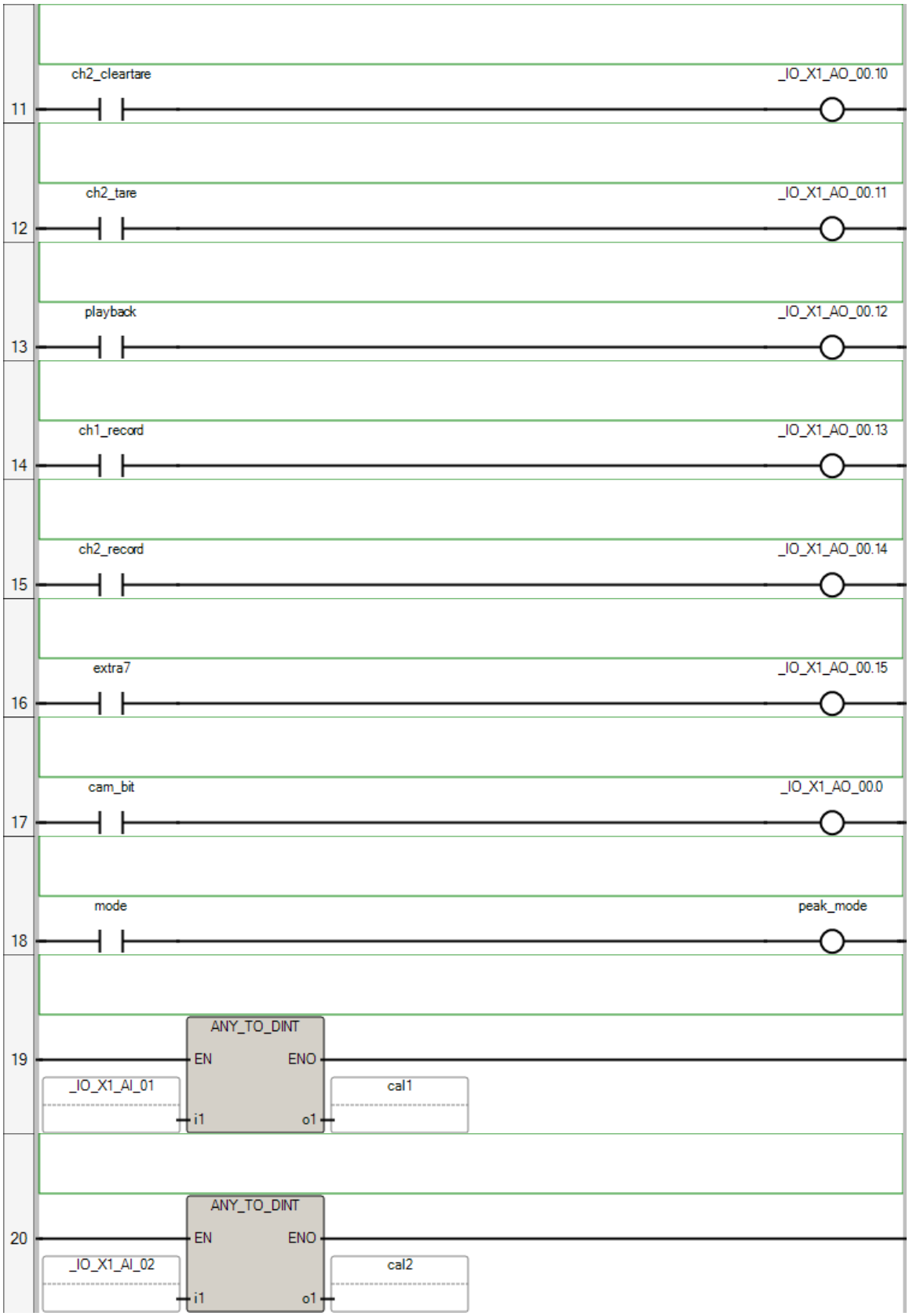
4. Set Zero Tare bit momentarily.

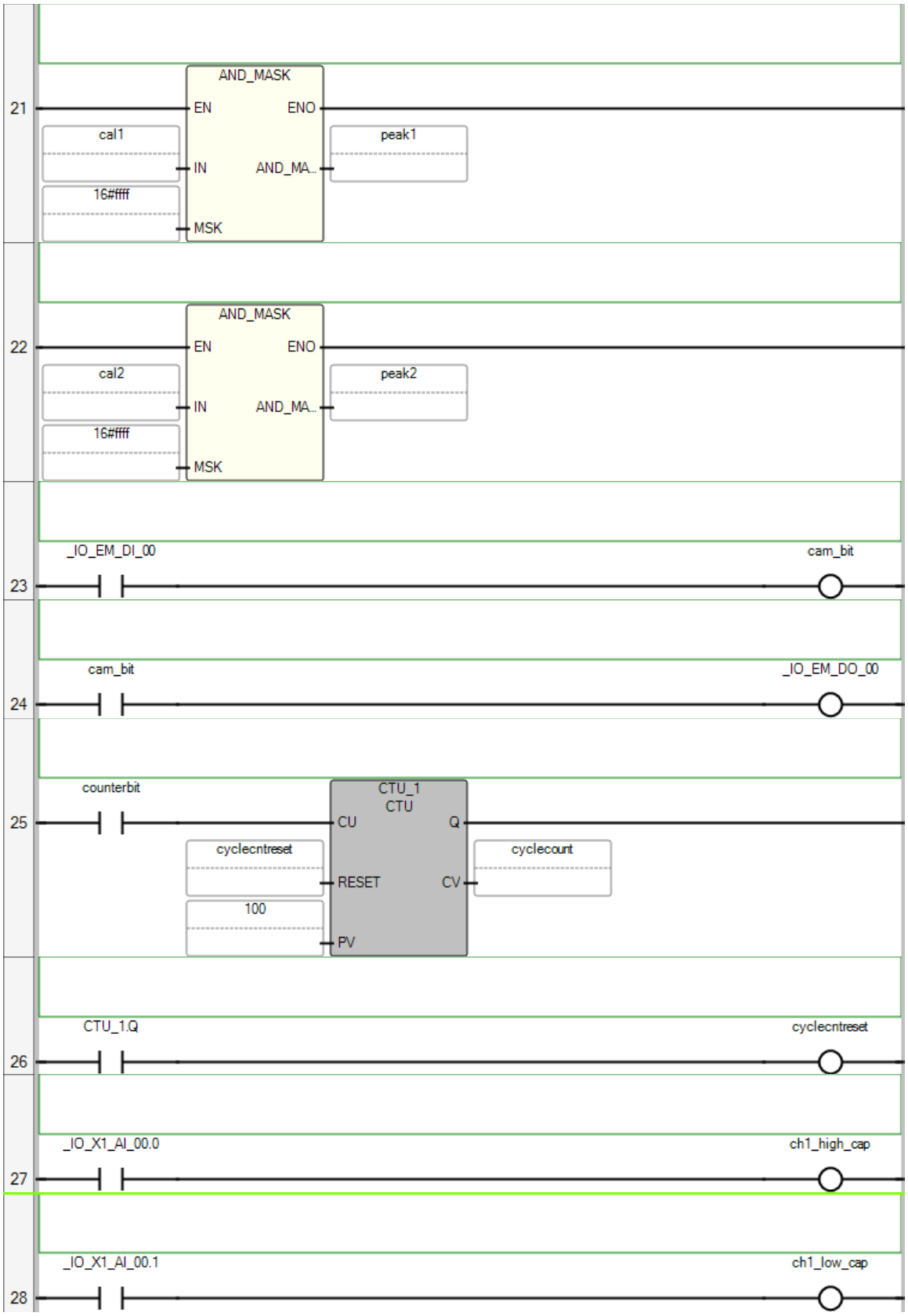
Step 2. Set Calibration Factor

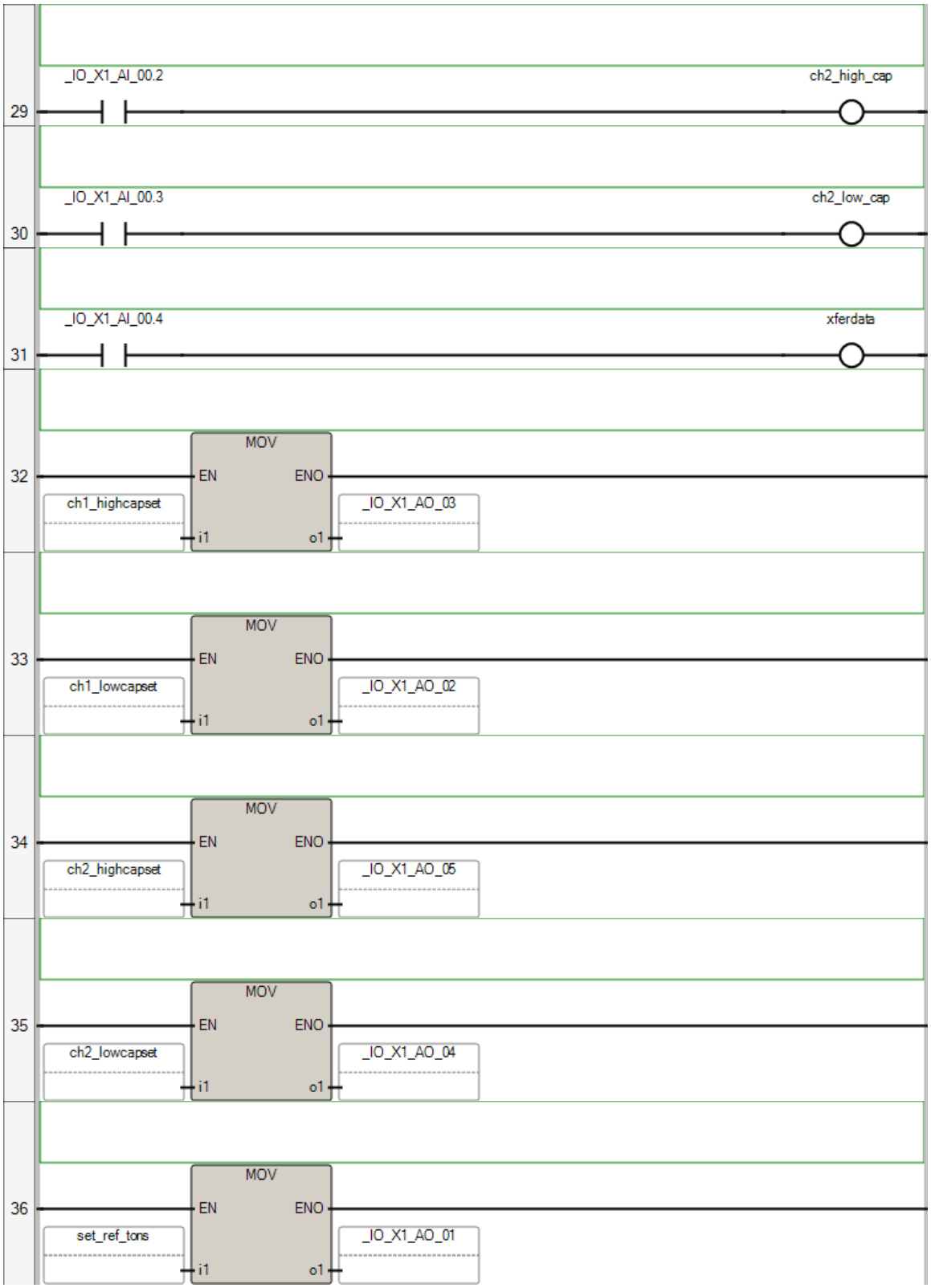
1. Set to PEAK Mode.
2. Set Reference Tons to Actual Load/Tons.
3. Run Machine.
4. Toggle Set Cal Factor Bit.
5. Value should Equal Load/Tons.
6. Set Read Cal Factor Bit to Record Cal Factor on Calibration Sheet.
7. Set to TRACK Mode.
8. Toggle SAVE TO EEPROM bit.

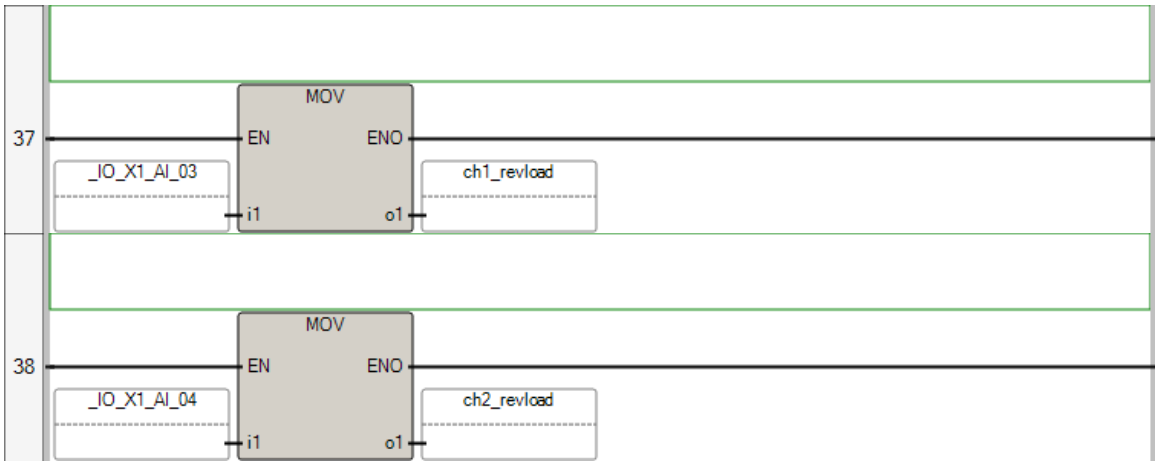
Controller.Micro850.Micro850.Prog1




11
ch2_cleartare
_IO_X1_AO_00.10
12
ch2_tare
_IO_X1_AO_00.11
13
playback
_IO_X1_AO_00.12
14
ch1_record
_IO_X1_AO_00.13
15
ch2_record
_IO_X1_AO_00.14
16
extra7
_IO_X1_AO_00.15
17
cam_bit
_IO_X1_AO_00.0
18
mode
peak_mode
19
ANY_TO_DINT
EN
ENO
_IO_X1_AI_01
i1
o1
cal1
20
ANY_TO_DINT
EN
ENO
_IO_X1_AI_02
i1
o1
cal2


21
AND_MASK
EN
ENO
cal1
IN
AND_MA...
peak1
16#ffff
MSK
22
AND_MASK
EN
ENO
cal2
IN
AND_MA...
peak2
16#ffff
MSK
_IO_EM_DI_00
cam_bit
23
cam_bit
_IO_EM_DO_00
24
counterbit
CTU_1
CTU
25
CU
Q
cyclecntreset
RESET
CV
cyclecount
100
PV
CTU_1.Q
cyclecntreset
26
_IO_X1_AI_00.0
ch1_high_cap
27
_IO_X1_AI_00.1
ch1_low_cap
28


29
_IO_X1_AI_00.2
ch2_high_cap
30
_IO_X1_AI_00.3
ch2_low_cap
31
_IO_X1_AI_00.4
xferdata
32
MOV
EN
ENO
ch1_highcapset
i1
o1
_IO_X1_AO_03
33
MOV
EN
ENO
ch1_lowcapset
i1
o1
_IO_X1_AO_02
34
MOV
EN
ENO
ch2_highcapset
i1
o1
_IO_X1_AO_05
35
MOV
EN
ENO
ch2_lowcapset
i1
o1
_IO_X1_AO_04
36
MOV
EN
ENO
set_ref_tons
i1
o1
_IO_X1_AO_01



POU Prog1

The POU defines 3 variable(s).

Variable cal1

(* *)
Direction: Var
Data type: DINT
Attribute: Read/Write

Variable cal2

(* *)
Direction: Var
Data type: DINT
Attribute: Read/Write

Variable CTU_1

(* *)
Direction: Var
Data type: CTU
Attribute: Read/Write

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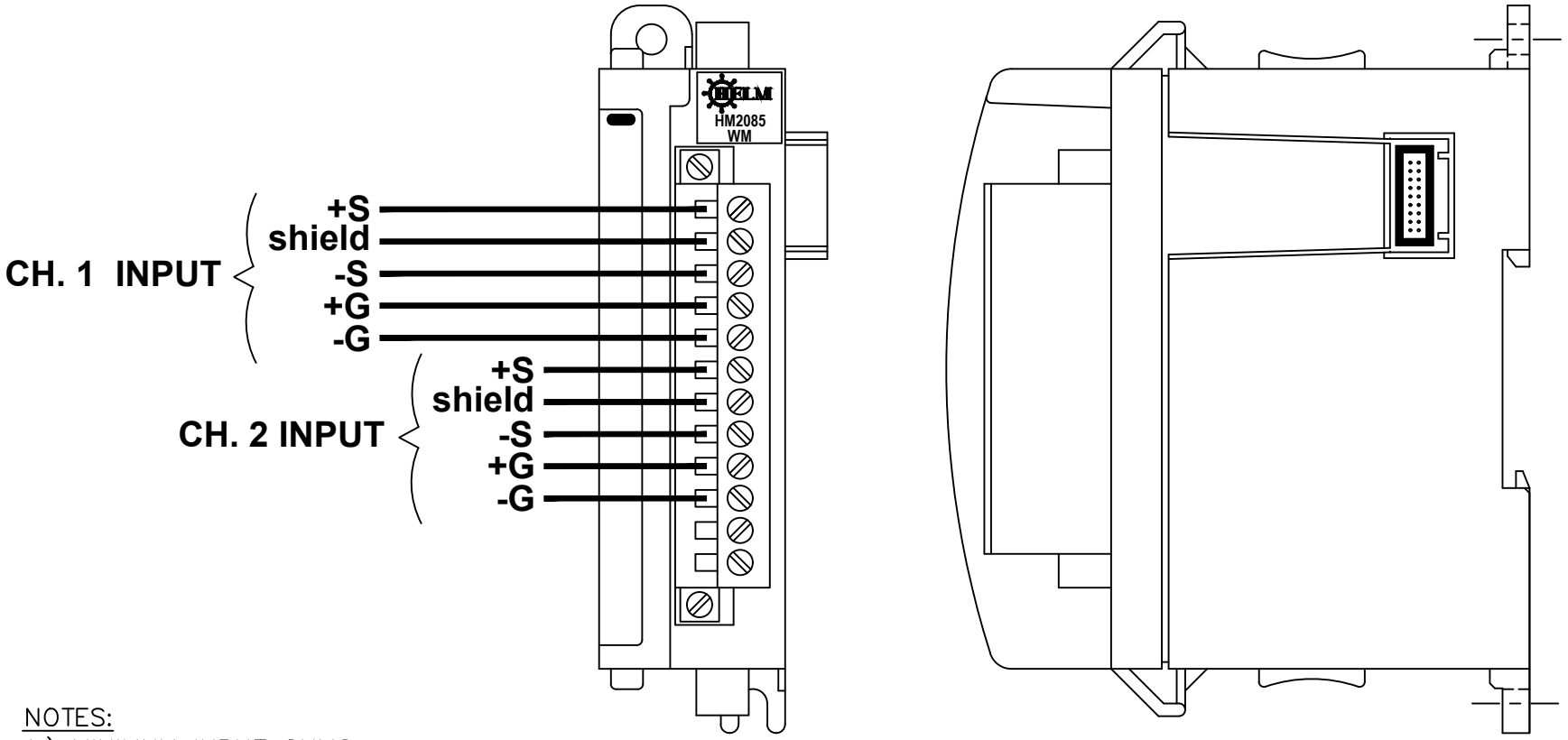
HM2085-PLM Specifications

Backplane Power Consumption	**24V @ 70mA** **5V @ 132mA**
Type of input	**Strain Gage (350 ohm, 700 ohm)**
Input Impedance	**10k**
Display Resolution	**Up to .1% 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 – 16**
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.

HELM INSTRUMENT CO., INC.
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		