HELM

HM-1756-SGI-PLM
Strain Gage Input Module

User Manual

Force Measurement and Control Solutions

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 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 Helm Instrument Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

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

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

ATTENTION: Please refer to accompanying manuals
Strain Gage Installation and Helm ControlLogix Navigator Software
for additional information on the application of the Helm HM-1756-SGI-PLM module.

PREFACE

Read this preface to become familiar 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
- Helm Instrument support

WHO SHOULD USE

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

You should have a basic understanding of ControlLogix 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. If you do not, contact your local Helm representative for the proper training before using this product.

PURPOSE OF THIS MANUAL

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

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RELATED DOCUMENTATION

Additional documents containing information that may be helpful to you as you use Allen-Bradley ControlLogix products may be found at http://www.ab.com/manuals/cl/ or from your local distributor.

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.

Bypass Mode - Enabled to perform calibration and setup procedures.

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.

Look Window - Resolver or cam activated window, which allows specific degrees in a machine cycle to be processed.

Low Alarm Inhibit - Number of consecutive machine cycles where low alarm is inhibited. Used in a process where machine cycles several times before running speed is established.

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.

Monitor Parts Mode - Status condition used during production run. Sample and compare logic is enabled. On resolver based systems, tracking alarm limits can be enabled.

Multiplexer - A switching system that allows several input signals to share a common A/D converter.

Peak Mode - Normally enabled during job setup.

Terms and Abbreviations (Continued)

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.

Strokes per Minute (SPM) - Value calculated when a machine cycles through a complete rotation (0 to 360 degrees).

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

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.

OVERVIEW

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

The Helm Strain Gage 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 two Helm Strain gage based sensors.

The primary part of the load monitoring system centers around the measurement. The basic function of the Helm 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 Strain Gage module for processing. The Helm Strain Gage is capable of measuring either a tension or compression signal.

- Sample and Compare Logic - processor memorizes the sample or benchmark load and compares each machine cycle against this sample.

- User programmable Sample Count - selectable number of machine cycles on which to base the sample.

- High and Low Capacity Alarm Sets - a discrete load limit for a maximum allowable load and a minimum allowable load.

- High and Low Trend Alarm Sets - set as a percentage of load change on an established sample.

- Low Alarm Inhibit - User programmable option to disable low alarm during process start-up.

HARDWARE OVERVIEW

The HM-1756-SGI-PLM module fits into any single-slot. It is a Class 1 module (uses eight input words and eight output words).

The module can accept 2 channels of strain gage input. Two 700 ohm gages may be paralleled to one channel.

Module configuration requires manual and user programmable setup. The module receives and stores digitally converted analog data into its image table for retrieval.

HM-1756-SGI-PLM SPECIFICATIONS

Backplane Power Consumption	10W
Number of Channels	2 (isolated)
I/O Chassis Location	Any I/O module slot except 0
A/D Conversion Method	Successive Approximation - 12 bit
Normal Mode Rejection (between + input and - input)	50 db at 2000 gain
AMP roll-off frequency	650 Hz at 3000 Gain
Calibration	Manual Calibration
Isolation	500 VDC continuous between inputs and chassis ground, and between inputs and backplane
LED Indicators	STATUS, ALARM, OK
Recommended Cable	Strain Gage Cable (Helm part number 6117)

Operating Temperature	0°C to 60°C (32°F to 140°F)
Hazardous Environment Classification	Class 1 Division 2 Hazardous Environment

Type of Input	Strain Gage (350 ohm, 700 ohm)
Input Impedance	1K
Display Resolution	Up to 0.1% of full scale
Overall Module Accuracy	1% of full scale
Requested Packet Interval (RPI)	60.0ms

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GETTING STARTED

This chapter can help you to get started using the Helm Strain Gage module. The procedures included here assume that you have a basic understanding of ControlLogix 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. It also references other documentation that may be helpful if you are unfamiliar with programming techniques or system installation requirements. 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 calibrate the module

REQUIRED TOOLS AND EQUIPMENT

Have the following tools and equipment ready:
- small blade screwdriver
- programming equipment (All programming examples shown in this manual demonstrate the use of Rockwell RSLogix 5000 Software).
- Helm CAM/ Prox Input Module

SYSTEM OPERATION

The module communicates to the controller through the serial backplane interface and receives +5Vdc and +24Vdc power from the controller power supply through the backplane. No external power supply is required. You may install as many modules in your system as the power supply can support.

FRONT PANEL
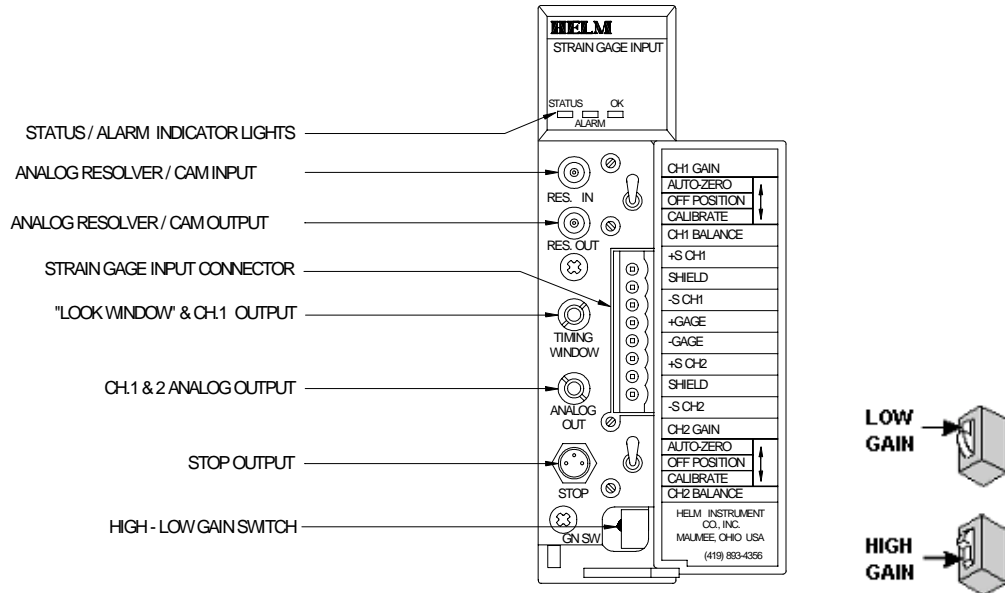
Status / Alarm Indicator Lights
Status light is on (green) when module is in Peak or Monitor Parts Mode.
Status light is off when module is in Calibrate Mode.

Alarm light is off when no tonnage fault is present.
Alarm light is on (red) when tonnage fault is present.

OK light is on (green) when PLC communication is OK.

Module Setup

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:

- set operating mode
- set meter scale
- set capacity (maximum load) alarms
- set sample count
- set trend alarms

MODULE I/O CONFIGURATION

This shows the preliminary setup and operation required before the module can function in a 1756 I/O system using RSLogix5000

Adding Module to I/O Configuration

Select **1756-MODULE Generic Module** from *Select Module Type* window
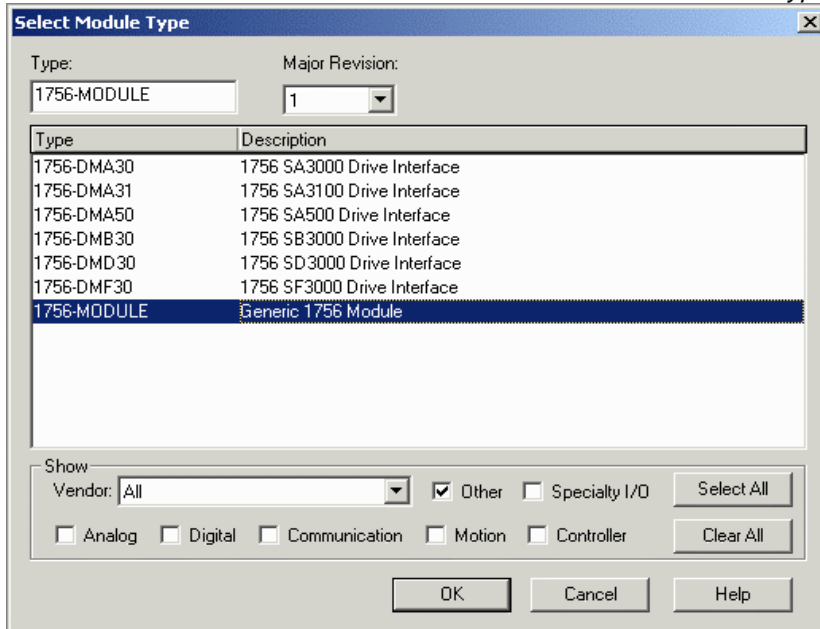
Configuration Module's Properties

From the Controller Organizer, right click on the added module and open up Module Properties windows

Type in a name for the module, select a slot number

General: Connection Parameters

	Assembly Instance	Size
Input	100	14
Output	190	9
Configuration	1	0

Connection: Requested Packet Interval(RPI): 60.0ms
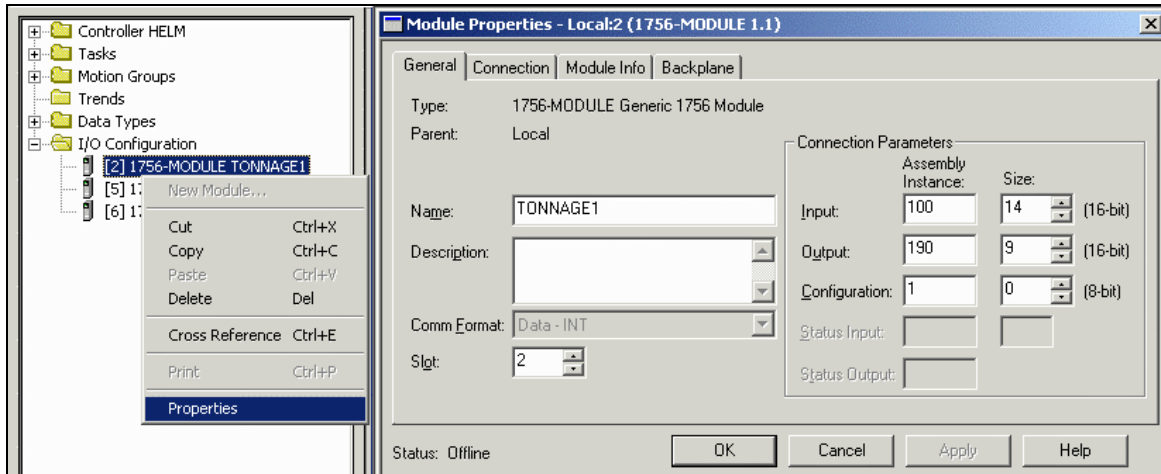
MODULE I/O CONTROLLER DATA TAGS

Output Tags
The 9 word output data (output from the CPU to the module) contains Information that you configure to define the way the module will work.   Example – If you want to access the module located in slot 2 in the ControlLogix chassis, your data tag would be Local:2:O and all 9 words are located as Loca:2:O.Data[0] ..[8]

Data Tags Local:x.O	Data Type	Bit	Description
.Data[0]	Bit Bit Bit	0 1 2	Alarm Reset
	Bit Bit Bit Bit	8 9 10 11	Set Calibrate mode Set Setup mode Set Monitor Mode
.Data[1]	INT	-	Set Scale Value
.Data[2]	INT	-	Set Ch1 High Capacity Alarm Value (in Calibrate mode)
.Data[3]	INT	-	Set Ch2 High Capacity Alarm Value (in Calibrate mode)
.Data[4]	INT	-	Set Sample Count (2, 4, 8, or 16)
.Data[5]	INT	-	Set Low Alarm Inhibit Count
.Data[6]	L Byte H Byte	- -	Set Ch1 Low Tolerance value Set Ch1 High Tolerance value
.Data[7]	L Byte H Byte	- -	Set Ch2 Low Tolerance value Set Ch2 High Tolerance value
.Data[8]	Bit Bit Bit Bit Bit Bit Bit Bit H Byte	0 1 2 3 4 5 6 7 -	Set Trend Alarm On/Off switch bit Set Tolerance value type (1 = Tolerance in Ton, 0 = Tolerance in Percent)

X: slot number

Alarm Reset Bit
Set this bit On(1) for at least 50ms or longer to clear all present alarm condition of the module.

Set Calibrate Mode Bit
Set On (1) to change the operation mode to Calibration mode. No alarms are active.
Note: all other mode bit must be off

Set Peak Mode Bit
Set On (1) to change the operation mode to Setup (peak only monitoring) mode. Capacity alarms are active.
Note: all other mode bit must be off

Set Monitor Parts Mode Bit
Set On (1) to change the operation mode to Monitor parts (trend monitoring) mode. Capacity alarms are active, trend alarms are active.
Note: all other mode bit must be off

Set Scale Value
The maximum load rating of the machine per channel. For example, if the machine is rated at 500ton max and two load sensors are installed for the module, then the scale set should be 250.

Set Ch1(2) High Capacity Alarm Value
Integer value of high capacity alarm setting. Range = 0 to 9999.   A value of 0 disables alarm.
The value entered will not be valid in the module until in Calibrate mode.

Set Sample Count
Enter one of the numbers 2, 4, 8,or 16. This is the number of cycles for the module to take to learn new sample(Target) tonnage for Trend alarm feature.

Set Low Alarm Inhibit Count
Enter a number of cycles for module to inhibit low trend alarm when sampling is done in Monitor mode.
To disable this feature, enter '0'

Set Ch1(2) High/Low Tolerance Value
Integer values of high and low limit for trend alarm settings. Values are set in percent or in ton and represent the maximum and minimum percent/ton of change off the sample value.
Range = 0 to 99%. Or 0 to 255ton. Actual value need to be entered is: High Tol x 256 + Low Tol
A value of 0 disables alarm.

Set Trend Alarm On/Off switch bit
When set on (1), Trend alarm is active in Monitor part. Set off to disable it.

Set Tolerance value type bit
When set on(1), the module takes the High/Low Tolerance value setting as ton.
When set off(0), the module takes the High/Low Tolerance value setting as percent.

Input Tags

The 14-word module input image (input from the module to the processor) represents data words and status words. Data words hold the input data that represents the values of the sensor inputs. Status words contain the various status conditions of the module

Data Tags Local:x.I	Data Type	Bit	Description
.Data[0]	INT	-	Update Counter
.Data[1]	INT	-	ASIC Fault Code
.Data[2]	INT	-	Ch1 Peak value in Ton (in PEAK or MONITOR Mode) Ch1 Calibrate number (in CALIBRATE Mode)
.Data[3]	INT	-	Ch2 Peak value in Ton (in PEAK or MONITOR Mode) Ch2 Calibrate number (in CALIBRATE Mode)
.Data[4]	INT	-	Ch1 Trend deviation in Percent or Ton
.Data[5]	INT	-	Ch2 Trend deviation in Percent or Ton
.Data[6]	INT	-	Ch1 Sample value in Ton
.Data[7]	INT	-	Ch2 Sample value in Ton
.Data[8]	INT	-	Ch1 Reverse Load in Ton
.Data[9]	INT	-	Ch2 Reverse Load in Ton
.Data[10]	Bit	0 1 2 3 4 5 -	Ch1 High Trend Alarm Indication Bit Ch1 Low Trend Alarm Indication Bit Ch2 High Trend Alarm Indication Bit Ch2 Low Trend Alarm Indication Bit Ch1 Capacity Alarm Indication Bit Ch2 Capacity Alarm Indication Bit
.Data[11]	Bit	0 1 2 3 4 5 6	Module In Calibrate Mode Indication Bit Module In Peak Mode Indication Bit Module In Monitor Mode Indication Bit Sampling in progress Indication Bit Sample Ready Indication Bit (stay On until the mode changes) Alarm Rest in progress bit CAM Trigger toggle bit
.Data[12]	INT	-	Cycle Counter
.Data[13]	INT	-	CAM Signal

Update Counter
Update Counter increments by one when every time the Input image tag has been updated with new data from the module.

ASIC Fault Code
Reserved for firmware trouble shoot.

Ch1(2) Peak value in Ton / Calibrate number
Integer word represents peak load on channel 1(2) for current machine cycle in Peak and Monitor Mode.
In Calibrate mode, this displays the sensor input balance when the three-position switch is set to OFF (center) position on the front of panel of the module. When the three-position switch is set to Calibrate (down) position, this displays the sensor's calibration(gain) number.

Ch1(2)Trend Deviation in Percent or Ton
Integer word represents the difference between current peak load and sample peak load.
in percentage or tonnage. This value can be used to control Trend deviation LED type display.
(Only valid in Monitor mode)

Ch1(2) Sample value in Ton
Integer word represents the average of the load values in Tons when learning(sampling) cycle is completed in Monitor mode.

Ch2 Reverse Load in Ton
Integer word represents the peak reverse load value in tons for the current machine cycle.

Capacity Alarm Indication Bit
When on (1), the current load of the channel has met or exceeded the Capacity alarm set limit.

High Trend Indication Alarm Bit
When on (1), the current peak load has met or exceeded the high tolerance percentage or tonnage setting from the sample tonnage.

High Trend Indication Alarm Bit
When on (1), the current peak load has met or become below the low tolerance percentage or tonnage setting from the sample tonnage.

Module In Calibrate Mode Indication Bit
This bit is reported by the module that the module is actually in Calibration mode when On(1)

Module In Peak Mode Indication Bit
This bit is reported by the module that the module is actually in Peak mode when On(1)

Module In Monitor Mode Indication Bit
This bit is reported by the module that the module is actually in Monitor mode when On(1)

Sampling in progress Indication Bit
This bit is reported by the module that the module is currently in learning(sampling) mode when On(1)

Sample Ready Indication Bit (stay On until the mode changes)
This bit is reported by the module that the module completed the learning cycle and established new sample tonnage when On(1)
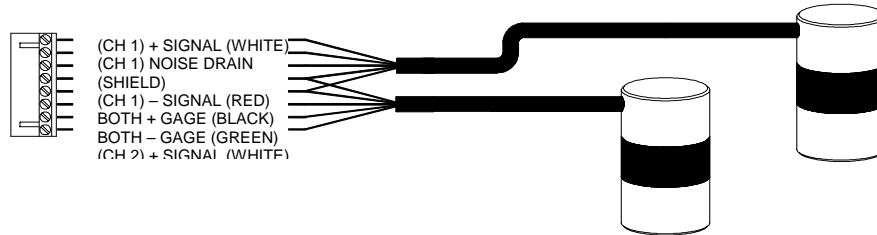
Alarm Rest in progress bit
This bit is reported by the module that the module is currently resetting all alarm conditions when On(1)

CAM Trigger Toggle bit
This bit toggles between 0 and 1 when there is a state change of the CAM input from low to high. If there is no CAM input state change, the bit remains the same as the last bit state.

CALIBRATING MODULE WITH SENSOR
WIRING SENSOR(S)

(CH 1) + SIGNAL (WHITE)
(CH 1) NOISE DRAIN
(SHIELD)
(CH 1) – SIGNAL (RED)
BOTH + GAGE (BLACK)
BOTH – GAGE (GREEN)
(CH 2) + SIGNAL (WHITE)

	Tension Operation	Compression Operation
Green (+ Gage)	Green	Black
Black (- Gage)	Black	Green
White (+ Signal)	White	White
Red (- Signal)	Red	Red
Brown (Shield)	Shield	Shield
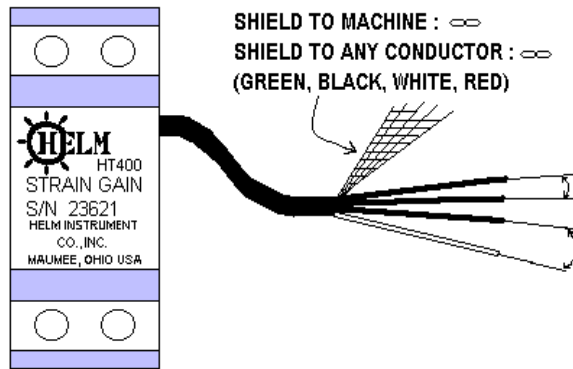
SHIELD TO MACHINE : ∞
SHIELD TO ANY CONDUCTOR : ∞
(GREEN, BLACK, WHITE, RED)

HELM
HT400
STRAIN GAIN
S/N 23621
HELM INSTRUMENT
CO., INC.
MAUMEE, OHIO USA

GREEN - BLACK : 350 OHMS
WHITE - RED   : 350 OHMS
GREEN - RED   : 263 OHMS
GREEN - WHITE : 263 OHMS
WHITE - BLACK : 263 OHMS
BLACK - RED   : 263 OHMS

NOTE:
ABOVE RESISTANCE VALUES
SHOULD MEASURE WITHIN +10
OHMS FOR CABLE LENGTHS UP
TO STANDARD 35 FT.

HT-400 "STRAIN GAIN" SENSOR

Connecting CAM Input for Look Window Timing

Connect Helm CAM/ Prox. Input Module to the HM1756SGI module with provided Coax Cable.
24VDC timing input needs to be connected to CAM Input Module for Peak load window timing. Refer to APPENDIX C for the connection details.

Note: Helm CAM/ Prox Input Module provide clean and reliable timing signal for the HM1756 Module which allows the HM1756SIG module functioning properly over 1000 SPM machine operation.

Set the Run mode bit to Bypass

⇒ From your operator interface, put the tonnage module into bypass mode. (The STATUS light on the tonnage module will turn off).

Balance Sensor Input.

1. Set three-position switch to OFF (center) position.
2. Adjust balance potentiometer until 0's are all displayed from Local:x:I.Data[2] for Ch1, Local:x:I.Data[3] for Ch2
3. If two sensors are wired, follow this procedure for both channels

Calibration Numbers

1. Set three-position switch to calibrate (down) position)
2. Adjust Gain Potentiometer to dial in calibration numbers. These number is displayed at Local:x:I.Data[2] for Ch1, Local:x:I.Data[3] for Ch2
3. If two sensors are wired, follow this procedure for both channels.

Always make sure that the three-position switch is in ON (top) position for Normal operation.

The remaining setup procedures can be accomplished with the Run Mode bit in either Bypass, Peak or Monitor Parts Mode. However, the Bypass Mode should only be used when setting calibration values or zero balancing the sensor input.

Set Machine Capacity Scale

The three position switch should be placed in the ON (top) position.

This setting is based off of one channel. It represents the maximum allowable load or tonnage from one sensor location.

Setting Machine Capacity Scale using (1) two channel module:

If 2 sensors are installed on the left and right sides of a 60 ton press, set the Scale to 30 (maximum capacity of one sensor).

Use the following table as a reference for setting the Machine Capacity Scale for a single force module installation with two sensors. Divide the press/machine capacity by the number of sensors (2) and set Scale to the result.

PRESS CAPACITY	SCALE SETTING	PRESS CAPACITY	SWITCH SETTING	PRESS CAPACITY	SWITCH SETTING
20	10	30	15	40	20
45	22	50	25	60	30
80	40	110	55	150	75
...					
200	100	250	125	300	150

If 2 sensors are installed in the tooling rather than on the press structure, set the Machine Capacity Scale to the highest load/tonnage of one sensor.

Setting Machine Capacity Scale for multiple channel systems.

Divide the Machine capacity by the number of sensors and set Machine Capacity Scale on all modules to the result.

Example: If 2 load modules are used for monitoring a straight side press with 4 sensors mounted on the press columns, set the Machine Capacity Scale on both modules to the highest load/tonnage of one sensor.

Use the following table as a reference for setting the Machine Capacity Scale for a system comprised of (2) force modules and (4) sensors.

PRESS CAPACITY	SWITCH SETTING (same on all modules)	PRESS CAPACITY	SWITCH SETTING (same on all modules)	PRESS CAPACITY	SWITCH SETTING (same on all modules)
100	25	125	31	150	37
175	43	200	50	250	62
275	68	300	75	350	87
400	100	450	112	500	125
...					
800	200	1000	250	1200	300

Set Capacity Alarms
This value is a discrete load/tonnage value, not a percentage.

NOTE: Although the range of values for capacity alarm settings is 0 to 9999, it is recommended that you do not enter values that exceed the capacity rating of the machine/press. A value of 0 disables capacity alarm set.

To determine the maximum rating for each channel, divide the total machine/press capacity by the number of sensor inputs. EXAMPLE: A press or slide rated at 100 tons with a (2) channel force module would have a capacity alarm setting of 50 tons per sensor input.

This setting differs from the Scale setting as it can be adjusted up or down depending on the nature of the process. The recommended maximum value is 195% of Machine Capacity Scale.

Set Sample Count

The sample count is a user programmable parameter that tells the processor how many machine strokes are required to establish sample or benchmark load values. The programmable values are 2, 4, 8,or 16. A value of 0 invalidates the Monitor Parts mode. You should set Sample Count to a minimum of 2 to enable Monitor Parts mode.

Note: Each time you change Monitor Parts mode bit from ON to OFF, the sample value is cleared. During normal operations, Monitor Parts mode is enabled when beginning a process run. If the process varies due to change in material thickness, for example, it may be necessary to take a new sample.

APPENDIX A: CONTROLLER TAGS

OUTPUT TAGS

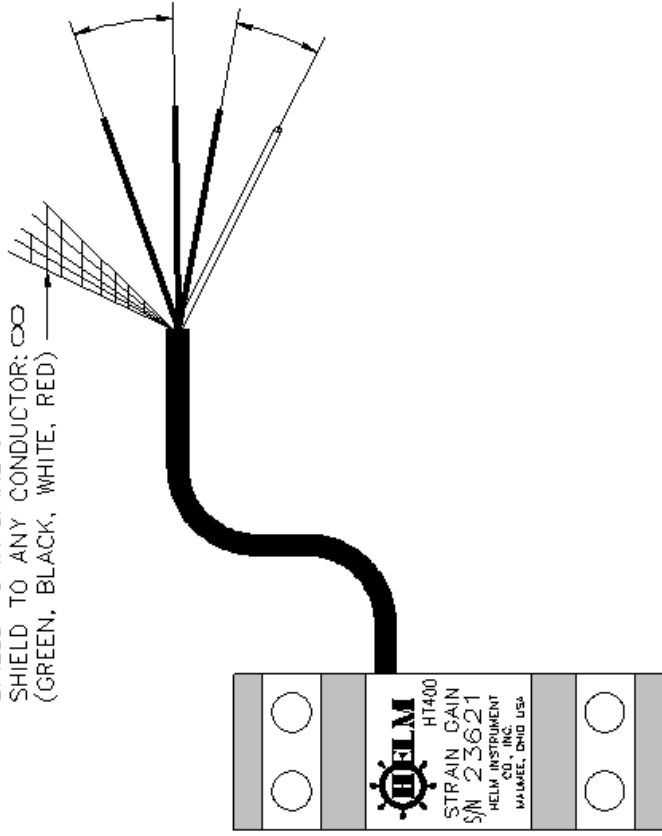| Data Tags Local:x.O	Data Type	Bit	Description
.Data[0]	Bit	0	
	Bit	1	Alarm Reset
	Bit	2	
	Bit	8	Set Calibrate mode
	Bit	9	Set Setup mode
	Bit	10	Set Monitor Mode
	Bit	11	
.Data[1]	INT	-	Set Scale Value
.Data[2]	INT	-	Set Ch1 High Capacity Alarm Value (in Calibrate mode)
.Data[3]	INT	-	Set Ch2 High Capacity Alarm Value (in Calibrate mode)
.Data[4]	INT	-	Set Sample Count (2, 4, 8, or 16)
.Data[5]	INT	-	Set Low Alarm Inhibit Count
.Data[6]	L Byte	-	Set Ch1 Low Tolerance value
	H Byte	-	Set Ch1 High Tolerance value
.Data[7]	L Byte	-	Set Ch2 Low Tolerance value
	H Byte	-	Set Ch2 High Tolerance value
.Data[8]	Bit	0	
	Bit	1	
	Bit	2	Set Trend Alarm On/Off switch bit
	Bit	3	
	Bit	4	Set Tolerance value type (1 = Tolerance in Ton, 0 = Tolerance in Percent)
	Bit	5	
	Bit	6	
	Bit	7	
	H Byte	-	

INPUT TAGS

Data Tags Local:x.I	Data Type	Bit	Description
.Data[0]	INT	-	Update Counter
.Data[1]	INT	-	ASIC Fault Code
.Data[2]	INT	-	Ch1 Peak value in Ton (in PEAK or MONITOR Mode) Ch1 Calibrate number (in CALIBRATE Mode)
.Data[3]	INT	-	Ch2 Peak value in Ton (in PEAK or MONITOR Mode) Ch2 Calibrate number (in CALIBRATE Mode)
.Data[4]	INT	-	Ch1 Trend deviation in Percent or Ton
.Data[5]	INT	-	Ch2 Trend deviation in Percent or Ton
.Data[6]	INT	-	Ch1 Sample value in Ton
.Data[7]	INT	-	Ch2 Sample value in Ton
.Data[8]	INT	-	Ch1 Reverse Load in Ton
.Data[9]	INT	-	Ch2 Reverse Load in Ton
.Data[10]	Bit	0	Ch1 High Trend Alarm Indication Bit
		1	Ch1 Low Trend Alarm Indication Bit
		2	Ch2 High Trend Alarm Indication Bit
		3	Ch2 Low Trend Alarm Indication Bit
		4	Ch1 Capacity Alarm Indication Bit
		5	Ch2 Capacity Alarm Indication Bit
		-	
.Data[11]	Bit	0	Module In Calibrate Mode Indication Bit
		1	Module In Peak Mode Indication Bit
		2	Module In Monitor Mode Indication Bit
		3	Sampling in progress Indication Bit
		4	Sample Ready Indication Bit (stay On until the mode changes)
		5	Alarm Rest in progress bit
		6	CAM Trigger toggle bit
.Data[12]	INT	-	Cycle Counter
.Data[13]	INT	-	CAM Signal

APPENDIX B: SENSOR

APPENDIX C: SYSTEM CONNECTION

HELM Model "HM 1756-SGI" PLM System Connections

NOTES:
Drawing shows HELM model 1756-SGI Strain Gage Modules, necessary related components, and associated interconnecting wiring.

(2) Strain Gage Inputs, Ea. Module

(Same to Ch's 3 & 4)

External I/O Connection

ALLEN BRADLEY 1756-PB75 POWER SUPPLY

LOGIX 5563

POWER
24V DC
75W

Alarm Output/Auxillary Input Cable

STRAIN GAGE INPUT / STRAIN GAGE INPUT
1756-SGI   1756-SGI
STAT ALARM OK   STAT ALARM OK
RES. IN   RES. IN
RES. OUT   RES. OUT

"Cam" Timing Input Options

DRY-CONTACT CAM SWITCH

BLUE
BLACK (PLC Common)
+24V   0V   (RETURN)

24 VDC PLC OUTPUT

BLUE
BLACK (PLC Common)
+24V PLC OUTPUT   0V (RETURN)

2-WIRE PROX PROBE

OUTPUT
+   -
BLUE
BLACK (PLC Common)
+24V   0V   (RETURN)

ALARM OUTPUT / TIMING INPUT

Notes:
1.) This output is Solid State
2.) Output Rating = .25 amps @ 24Vdc

BROWN
BLACK

BROWN   Alarm Output
BLACK   PLC Common
BLUE   "CAM" Timing Input *

Last Rev. 12/07/05

HELM
INSTRUMENT CO., INC.
MAUMEE, OHIO USA

		DRAWN BY:	M.H.L.
		APPROVED BY:	R.J.G.
DESIGNED BY:	Y.K.K.	CHECKED BY:	N.F.N.
SCALE:	NONE		
DATE:	02/11/05		
TITLE:	HM 1756-SG1 PLM SYSTEM CONNECTIONS (HELM)		
DRAWER:		DRAWING NUMBER:	E1094W05A