SCM4-PLM

STRAIN GAGE INPUT MODULE
with ProfiNet/Profibus Setup

INSTRUCTION MANUAL

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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" 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.

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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 tonnage module consumes (+24, 173 mA +5, 220mA). Be sure to not overload the power supply.

TABLE OF CONTENTS

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

Who Should Use this Manual

Use this manual if you are responsible for the design, installation, programming, or maintenance of an automation control system.

You should have a basic understanding of a PLC network. 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.

Purpose of This Manual

This manual is a learning and reference guide for the Helm HM-2-SSI Module. It contains the information you need to install, wire, and use the module.

Contents of this Manual

Chapter	Title	Content
	Preface	Describes the purpose, background, and scope of this manual. Also specifies the audience for whom this manual is intended and defines key terms and abbreviations used throughout this book.
1	Overview	Provides a hardware and system overview. Explains and illustrates the components of the system.
2	Installation and Wiring	Provides installation information and wiring guidelines.
3	Channel Configuration, Data and Status	Examines the channel configuration and the channel status word, and explains how the module uses configuration data and generates status during operation.
4	Initial Setup Procedures	Gives setup instructions for initial setup. This includes the hardware setup, as well as installing the GSD file, and Siemen's ladder logic.
5	Troubleshooting	Explains how to interpret and correct problems that occur while using the load module.
A	Specifications	Provides physical, electrical, Environmental, and functional Specifications for the module.
B	Module Diagrams	Included diagrams are the load module layout, Profibus wiring, strain gage wiring module I/O wiring, master/slave config. Wiring, and encoder wiring.
C	GSD File	GSD files are used by Profibus configuration tools to enable a master Profibus scanner module - either in a PLC or PC - to know what slave devices are to be communicated to, their node address, what parameters can be read and written to and more.
D	Address Values	Provides Image Blocks
E	Siemen's Ladder Logic	Provides Siemen's Ladder Logic program

Terms and Abbreviations

The following terms and abbreviations are used throughout this manual.

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

Calibration Number - An 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.

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.

SCM4-PLM - Helm monitoring module; provides processor input from up to four sensors.

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 LSB 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.

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.

Resolver - Sometimes called encoder. Device attached on a machine to determine stroke position. Sine/cosine based resolver required for Helm systems.

Reverse Load - Measurement of negative load/force being exerted on machine following the break-through of material, also referred to as snap through.

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

Sample Count - User input value used to specify how many machine cycles to base the sample on.

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.

Setup Mode - Status condition of monitor typically enables during die setup. Machine capacity alarms are enabled. On resolver based systems, press curve alarm can be enabled. This mode is also used during machine and resolver calibrations.

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.

Target Load - A reference load established by the user. Used primarily during setup to improve setup time.

Tolerance /Trend Alarm - User defined upper and lower control limits established during the sample and compare process. These limits are established on the peak load and will activate the machine stop relay when exceeded.

Tracking Alarm - Requires resolver input. The sample and compare process is applied to the entire forming force based on user selected upper and lower control limits.

Trend Deviation - Percent of change, high and low, from sample value to current value.

TSM - Acronym for Through-the-Stroke load monitoring. Resolver input is required for monitoring the load being developed during machine cycle.

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.

Chapter 1

Overview

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

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 HM-2-SSI 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.

Strain Gain Transducer Operation

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 HM-2-SSI module for processing. The Helm Strain Gage is capable of measuring either a tension or compression signal.

CHAPTER 1

SCM4-PLM Features

- Four channel Strain Gage input with Auto Zero (350-700 ohm)
- RS422 Serial Communication port
- DIN rail mount
- Peak model
- Applications include Stamping, Forging, Die Cast, Injection Molding, Assembly

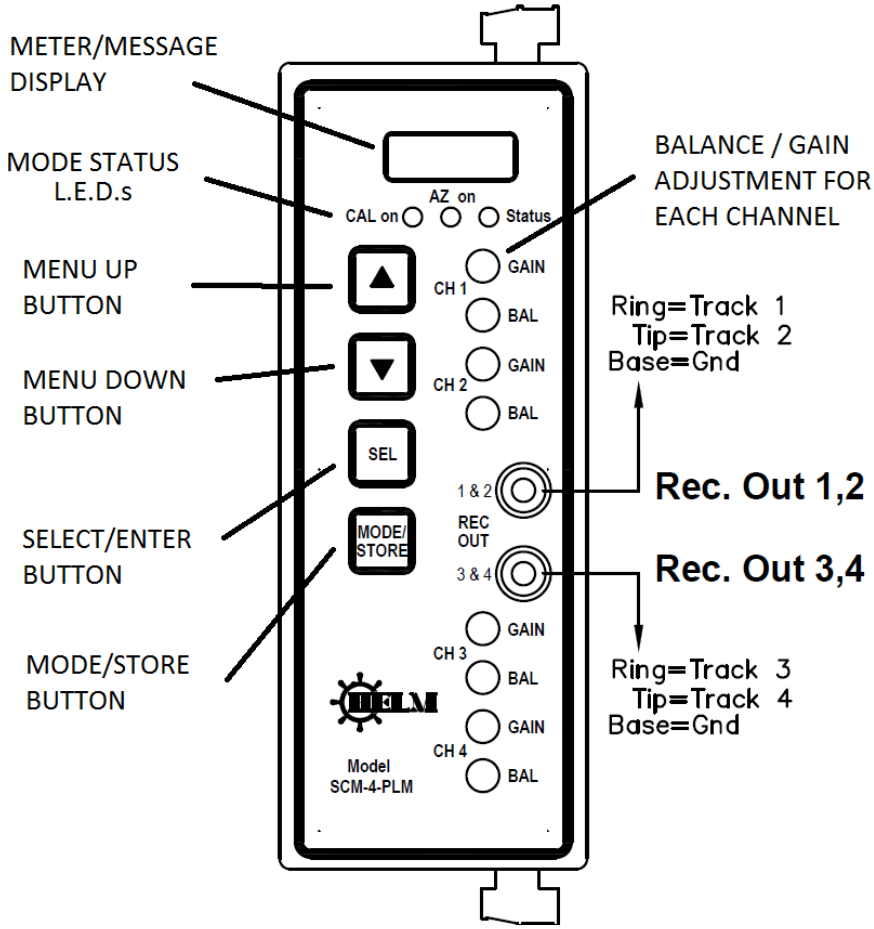
CHAPTER 1

Hardware Overview

Conjunction with Anybus, it interfaces with most industrial network protocol such as Profibus, Profinet, Ethernet/IP, CC Link IE, and etc.

The SCM4-PLM module receives and stores digitally converted analog data into its image table for retrieval on a Serial or a PLC network. The module supports connections from four strain gage sensors.

Hardware Features



METER/MESSAGE DISPLAY:

- The message display shows menu settings, and calibration values.

BALANCE ADJUSTMENT:

- Used to set selected channel's sensor input balance to 0.

GAIN ADJUSTMENT:

- Used to adjust selected channel's calibration number (input gain value).

RECORDER OUTPUT JACK:

- The recorder output jack outputs the analog signals of each channel.

MODE STATUS LED'S:

- **Calibration LED**
    - This LED is lit if the module's calibration resistor is on.
- **AZ**
    - This LED is lit when Auto-Zero (AZ) is turned on.
- **Status**
    - Solid Green → Online Communications
    - Flashing Green → No Serial Communications
    - Solid Red → ERROR: Communication Fault

UP/DOWN BUTTONS:

- The up/down buttons are used to change settings and values.

SELECT/ENTER BUTTON:

- This button allows the user to navigate through the menu.

MODE/STORE BUTTON:

- When in other settings, this button is used to save the current values to the module's EEPROM.
- Make sure to use STORE button on each screen to save any changes you made before move to next screen.

Chapter 2

Getting Started

This chapter can help you to get started using the Helm SCM4-PLM module. The procedures included here assume that you have a basic understanding of PLC Network communications. 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
- potentiometer trimmer (tweaker)
- appropriate strain gage cable

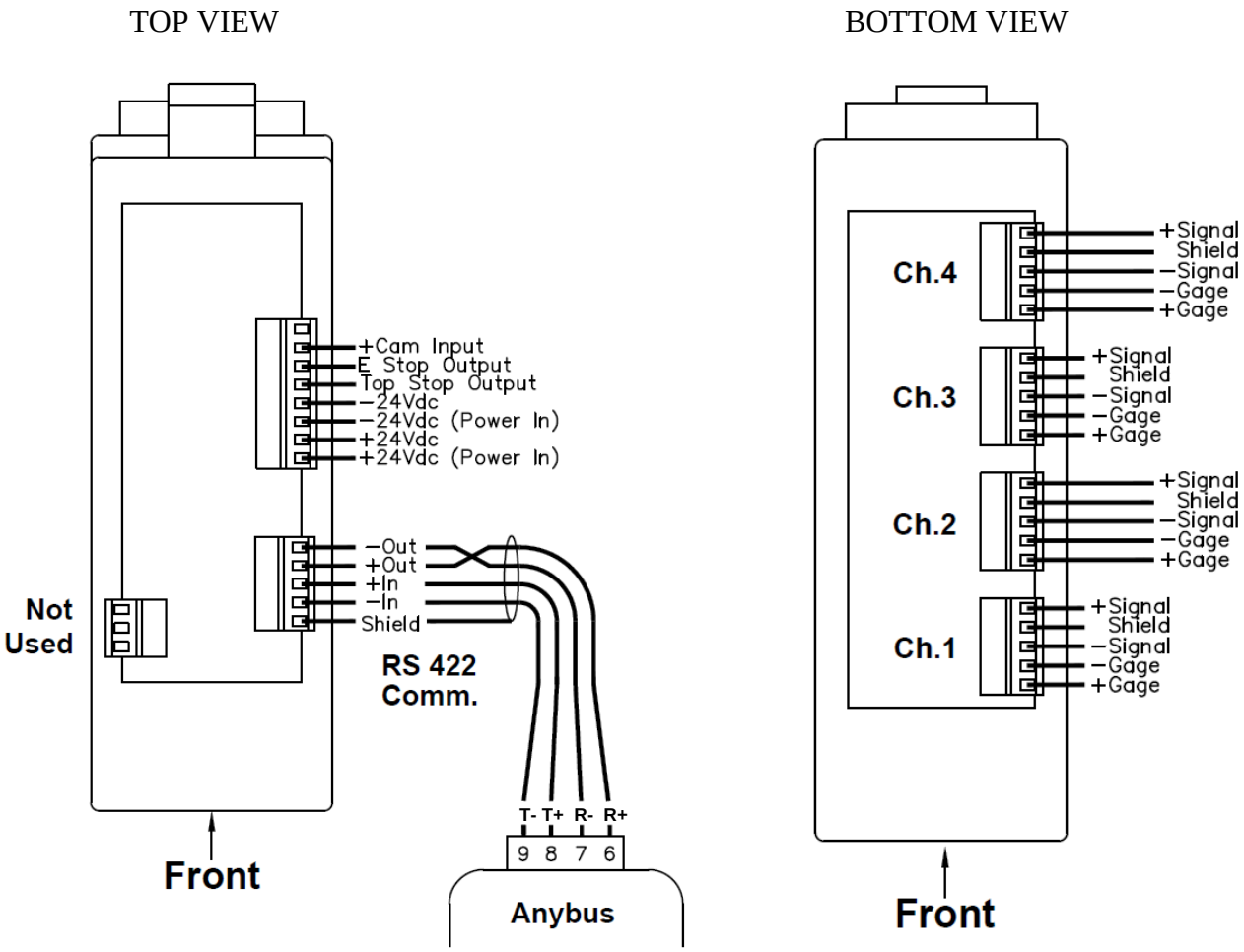
System Operation

The SCM4-PLM module receives+24Vdc power from an external power supply to operate.

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.

Connection Wiring

The module contains an 8-pin orange connector for wiring to the strain gages or load cells. The pin-out is shown below for both types used.



Chapter 3

Channel Configuration Data and Status

This chapter explains how the SCM4-PLM module communicates though the module's input and output image using Anybus. It lists the preliminary setup and operation required before the module can function.

Output Image Block

SCM4-PLM OUTPUT BLOCK

This data block is the image of the output of the module. You can control the behavior of the module from this area such as setting the tonnage alarm limit values, changing the module's mode of operation, and etc.

OUTPUT DATA TABLE (2 Byte per field)

Data Tags DB	Data Type	Bit	Description
.Data[0]	INT	-	Seq Number (This must match with the SCM4 module's Seq set)
.Data[1]	Bit Bit Bit	0 1 2	Alarm Reset
	Bit Bit Bit Bit	8 9 10 11	Set to Calibrate Mode Set to Peak mode Set to Monitor Mode Save Settings to EEPROM (any changes of values below this address requires to save to EEPROM for permanent change. This bit needs to stay on until Save confirmed bit turns on (Input.Data[19].6)
.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 Ch3 High Capacity Alarm Value (in Calibrate mode)
.Data[5]	INT	-	Set Ch4 High Capacity Alarm Value (in Calibrate mode)
.Data[6]	INT	-	Set Sample Count
.Data[7]	INT	-	Set Low Alarm Inhibit Count
.Data[8]	L Byte H Byte	- -	Set Ch1 Low Tolerance value Set Ch1 High Tolerance value
.Data[9]	L Byte H Byte	- -	Set Ch2 Low Tolerance value Set Ch2 High Tolerance value
.Data[10]	L Byte H Byte	- -	Set Ch3 Low Tolerance value Set Ch3 High Tolerance value
.Data[11]	L Byte H Byte	- -	Set Ch4 Low Tolerance value Set Ch4 High Tolerance value
.Data[12]	INT	-	Not used
.Data[13]	INT		Not used

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
When set On (1), the module is in calibration mode. No alarms are active.
Note: all other mode bits must be off.

Set Peak Mode Bit
When set On (1), the module is in setup mode. Capacity alarms are active.
Note: all other mode bits must be off.

Set Monitor Parts Mode Bit
When set On (1), the module is in monitor parts (trend monitoring) mode. Capacity alarms and trend alarms are active.
Note: all other mode bits must be off.

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 of change off the sample value. Range = 0 to 99%. A value of 0 disables alarm.

Input Data Block (Anybus)

SCM4-PLM Receive Data

This data block is an image of the Input of the module though Anybus. You can monitor the status of the module's operation from this area such as current tonnage readings, tonnage alarm conditions, reverse load readings, etc.

INPUT DATA TABLE (2Byte per field)

Data Tags DB	Data Type	Bit	Description
.Data[0]	INT	-	Seq. No of the module
.Data[1]	INT	-	Communication Update Counter The value should increment every second in Peak& Monitor mode. Every 1/3 second in Cal mode.
.Data[2]	INT	-	Ch1 Peak value in Ton (Peak/Monitor mode) Ch1 Cal/Bal value (CAL mode)
.Data[3]	INT	-	Ch2 Peak value in Ton (Peak/Monitor mode) Ch2 Cal/Bal value (CAL mode)
.Data[4]	INT	-	Ch3 Peak value in Ton (Peak/Monitor mode) Ch3 Cal/Bal value (CAL mode)
.Data[5]	INT		Ch4 Peak value in Ton (Peak/Monitor mode) Ch4 Cal/Bal value (CAL mode)
.Data[6]	INT		Ch1 Trend value in Percent
.Data[7]	INT		Ch2 Trend value in Percent
.Data[8]	INT		CH3 Trend value in Percent
.Data[9]	INT		CH4 Trend value in Percent
.Data[10]	INT		Ch1 Sample value in Ton
.Data[11]	INT		Ch2 Sample value in Ton
.Data[12]	INT		Ch3 Sample value in Ton
.Data[13]	INT	-	Ch4 Sample value in Ton
.Data[14]	INT	-	Ch1 Reverse Load in Ton
.Data[15]	INT	-	Ch2 Reverse Load in Ton++
.Data[16]	INT	-	Ch3 Reverse Load in Ton
.Data[17]	INT	-	Ch4 Reverse Load in Ton
.Data[18]	Bit	0 1 2 3 4 5 6 7 8 9 10 11 12 13	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 - - Ch3 High Trend Alarm Indication Bit Ch3 Low Trend Alarm Indication Bit Ch4 High Trend Alarm Indication Bit Ch4 Low Trend Alarm Indication Bit Ch3 Capacity Alarm Indication Bit Ch4 Capacity Alarm Indication Bit
.Data[19]	Bit	0 1 2 3 4 5 6 7 8	Module In Calibrate Mode Indication Bit Module In Bypass (Peak) Mode Indication Bit Module In Monitor Mode Indication Bit Sampling in progress Indication Bit Sample Ready Indication Bit (This bit stays On until the mode changes back to Peak or Calibrate) Alarm Rest in progress bit Save to EEPROM Confirmed - CAM Trigger Toggle bit
.Data[20]	INT	-	Cycle Counter
.Data[21]	INT	-	Current Scale Set
.Data[22]	INT		0 = normal, 0x55 = Receive Data Check sum error

Update Counter
This counter increments when the data block has been refreshed (updated).

Seq. No
Current Sequence no set to identify the module from the Serial network.

Ch1(2) Peak value in Ton / Calibrate number
This integer word represents the peak load on channel 1(2) in Peak and Monitor Mode.
In Calibrate mode, this displays the sensor's balance reading or calibration(gain) readings.

Ch1(2)Trend Deviation in Percent
This 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
This 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 peak tonnage of the channel has met or exceeded the Capacity alarm set limit.

High Trend Indication Alarm Bit
When on (1), the current peak tonnage 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 tonnage 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 it is actually in Calibration mode when On(1).

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

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

Sampling in progress Indication Bit
This bit is reported by the module that it 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 it completed the learning cycle and established new sample tonnage when On(1).

Alarm Reset in Progress Bit
This bit is reported by the module that it 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's state.

CYCLE Counter
This Counter value increment by each cycle of the machine.

Scale Set
Reports current scale setting of the module .

Chapter 4

Initial Hardware Setup Procedures

A complete listing of a sample Siemen's 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:

- set station number
- set hi/low
- set scale value
- set auto zero (az) control
- set channel 1 calibration
- set channel 2 calibration

Menu Sequence:

1. Ch1 cal (default on power-up) – Shows Cal No./ Autozero test mode/ Balance adjust
2. Ch2 cal – Shows Cal No./ Autozero test mode/ Balance adjust (change by Mode button)
3. Ch3 cal – Shows Cal No./ Autozero test mode/ Balance adjust (change by Mode button)
4. Ch4 cal – Shows Cal No./ Autozero test mode/ Balance adjust (change by Mode button)
5. hi / lo
6. az -Autozero On/Off
7. trk/pk – Track(Cal) mode / Peak mode (TSM model Only)
8. angle - reports the current resolver angle (TSM model only)
9. scale
10. station
11. comms test

*Note that Menu button only works when the SCM4-PLM module is in CAL mode. If the module in SETUP or Monitor mode, change to CAL mode using the HMI screen that is already communicate with the module.

Step 1. Set the Station Number

From the SCM4-PLM module, press SELECT until "station" scrolls across the display. From this menu you can change the station number by pressing the up/down buttons to coordinate

with the communications nod address for multi drop serial connection. (Typically set to 1 for Anybus connection.)
* Make sure to push MOD/STORE button to save after make changes

Step 2. Set the Hi/Low Gain Range

Press SELECT until "hi/low" scrolls across the display. Change the module's hi/low alarm settings from here
LOW = 140k CAL resistor range.
HI = 1M CAL resistor range.
* Make sure to push MOD/STORE button to save after make changes

Step 3. Set the Scale Value

⇒ Press SELECT until "scale" scrolls across the display. Use the up/down buttons to set the scale value to coordinate with the tonnage of the press the module is communicating with. Scale value is the capacity of the machine divided by number of sensors installed.
Example) for 1000 ton press with four sensors, 1000 / 4 = 250
* Make sure to push MOD/STORE button to save after make changes

Step 4. Auto-Zero (AZ) Control

⇒ Press SELECT until "az" scrolls across the display. The auto-zero value should normally set to 'on'. Set to 'off' only on special circumstances.

Step 5. Calibrating Channels

⇒ Press SELECT until "ch1 cal" scrolls across the display. Under this menu, users can change between three modes: Cal no value adjust mode Autozero test mode, and balance adjust mode.

Calibration Adjust Mode → using the gain potentiometer, a user can manually adjust the setting to their desired calibration number.

Autozero Test Mode → In this mode, the module tries to zero the current balance value automatically. If the value does not become zero, then there might be some sensor/wire issues or sensor mounting issue which can prevent the autozero.

Balance Adjust Mode → using the balance potentiometer, you can manually adjust the balance to zero.

Step 6. Calibrate Channel 2, 3, and 4

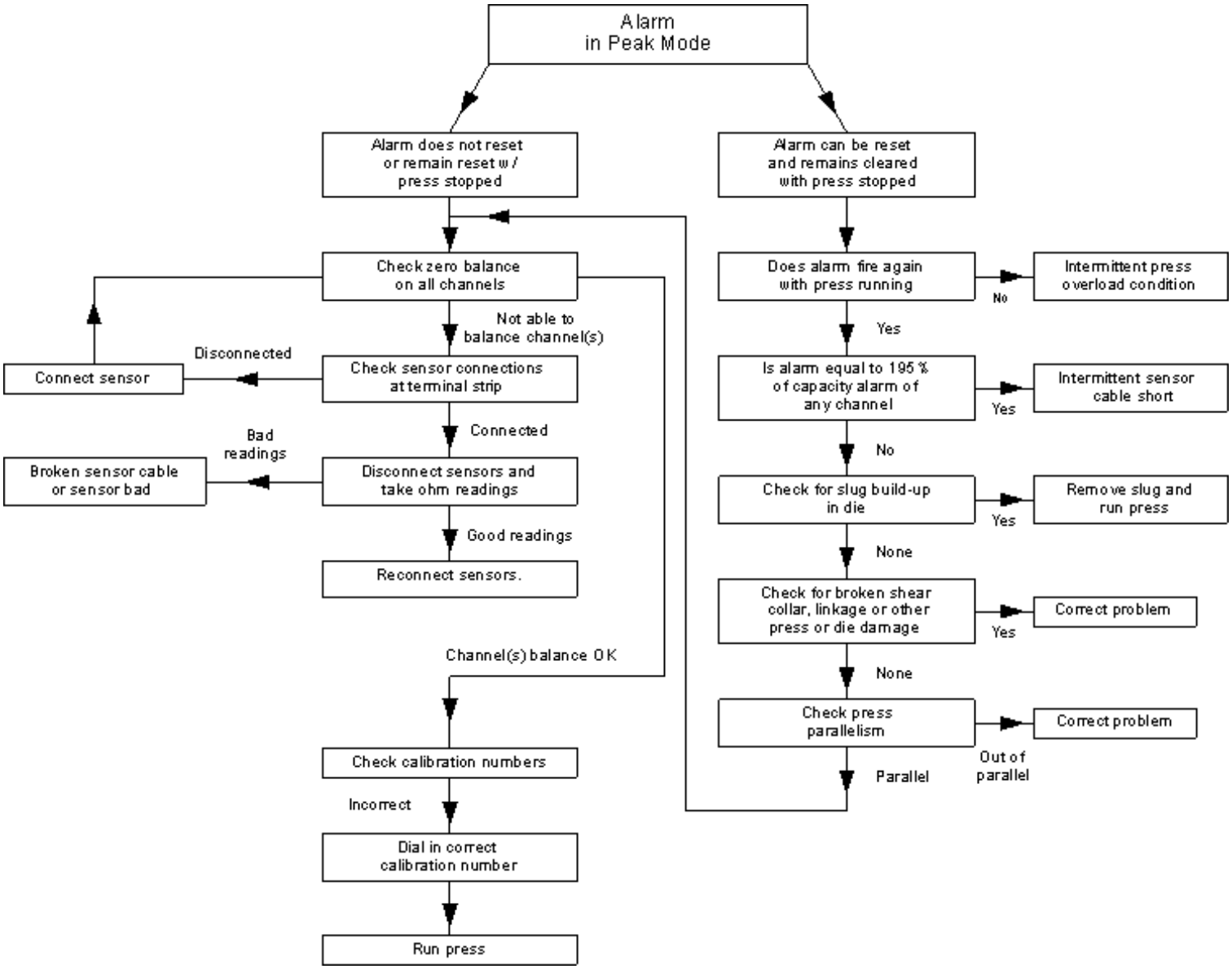
⇒ Repeat Step 5 for to calibrate the rest of channels.

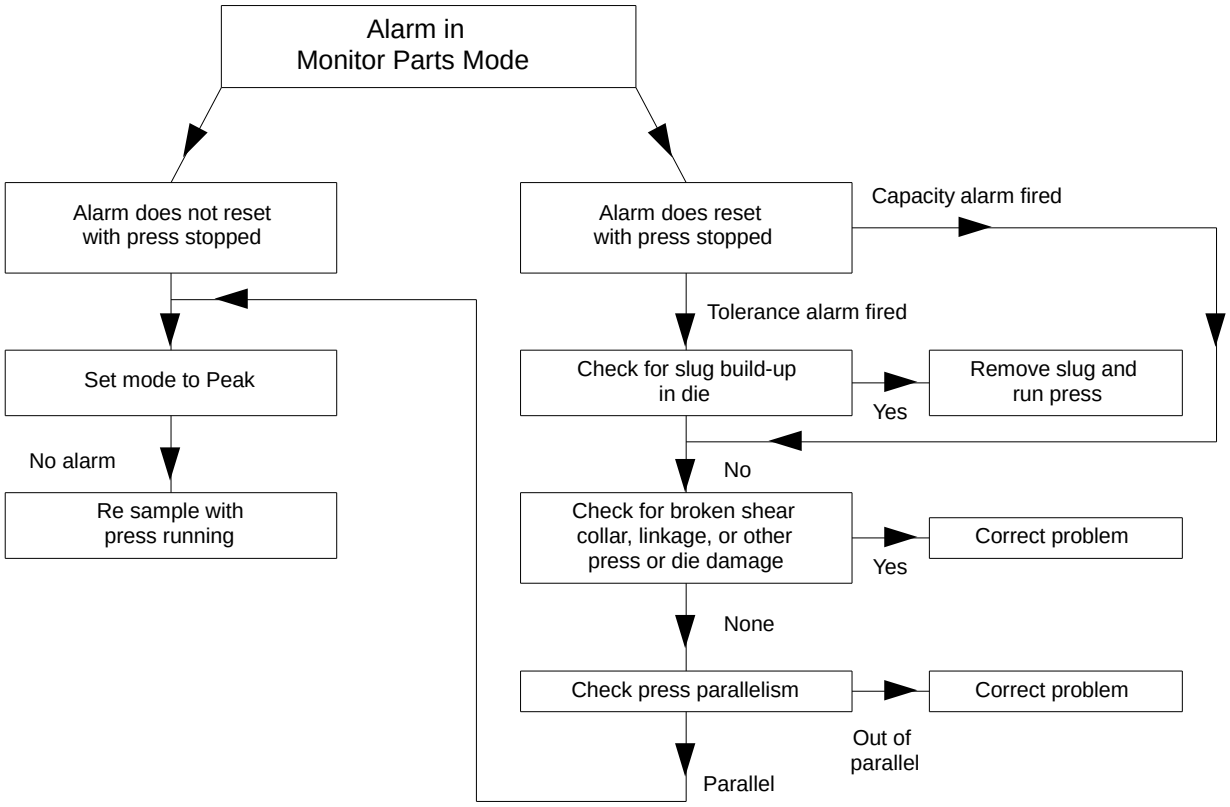
Chapter 5

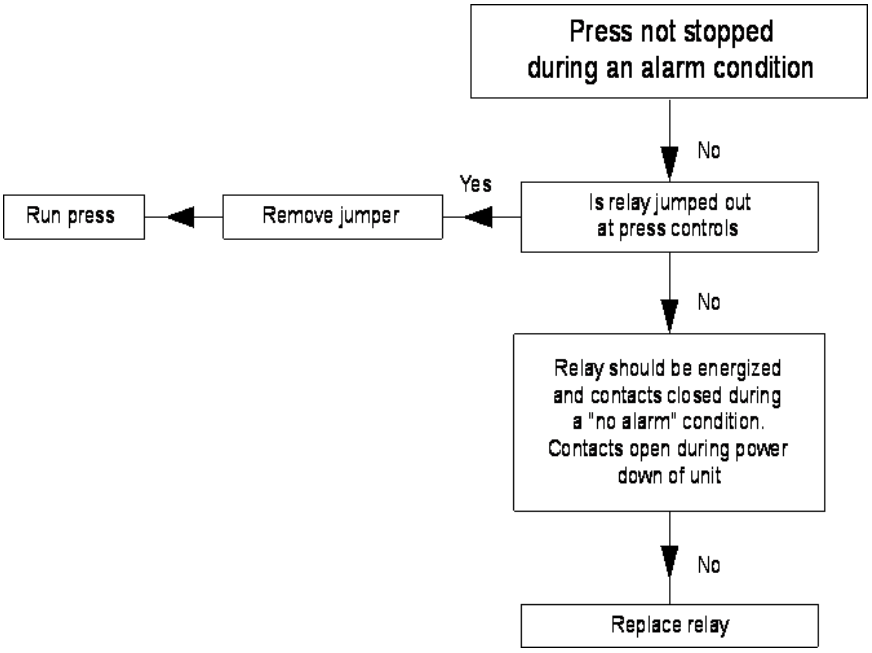
System Troubleshooting Guide

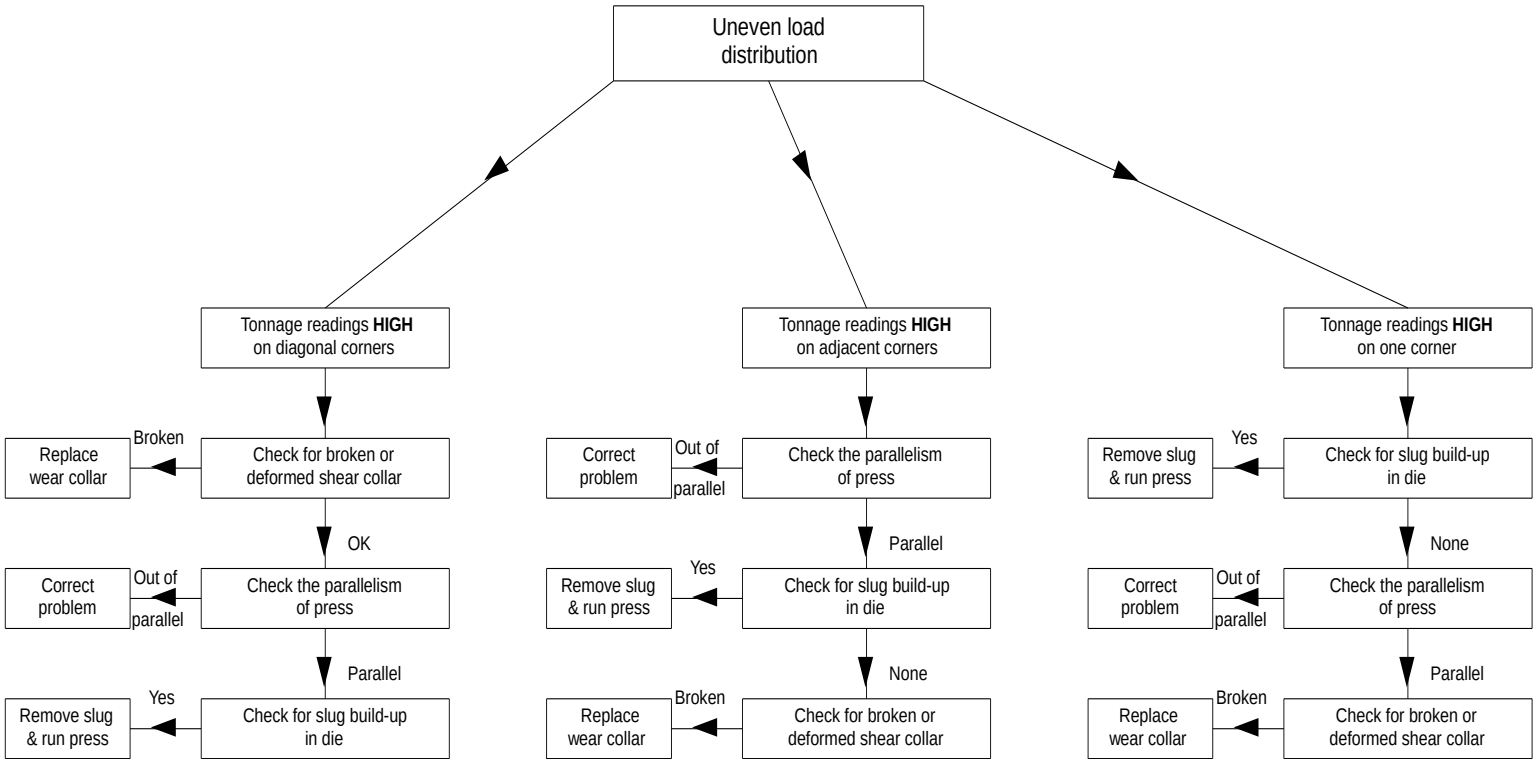
HT-400 Sensor Ohm Readings

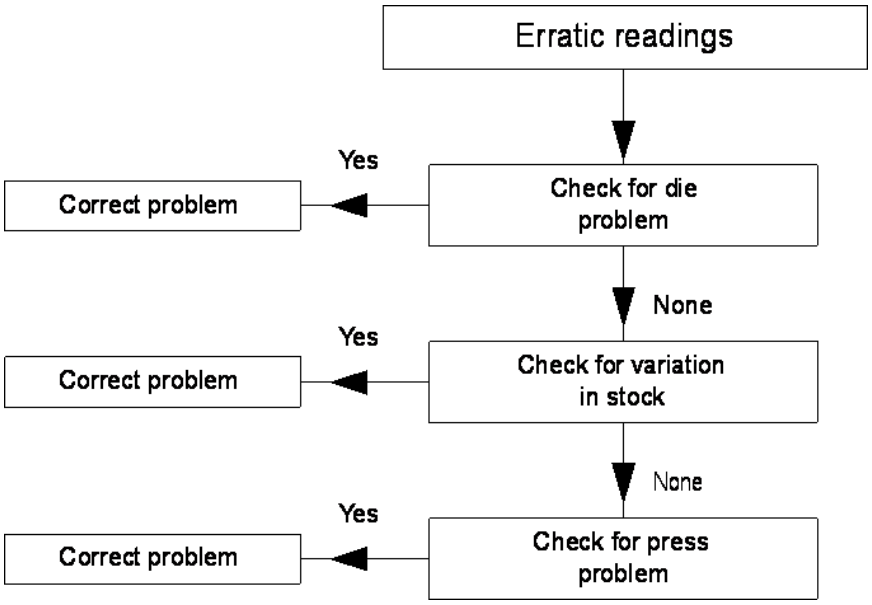
Green-Black…… 350 ohms
Red-White……... 350 ohms
All other color combinations…..…… 266 ohms
All colors to Ground...…… open
Shield to Ground.…… open











Appendix A: *Specifications:*

Electrical Specifications:

Power Consumption	146 MA at 24 vdc
Number of Channels	2 (isolated)
A/D Conversion Method	12 bit
Normal Mode Rejection (between + input and - input)	50 db at 2000 gain
AMP roll-off frequency	650 Hz at 3000 Gain
Calibration	Software Selectable

Physical Specifications:

Press Buttons	4 buttons for menu navigation and selection
LED Indicators	3 LEDs for Calibration, Auto-Zero, and Status
Recommended Cable	Strain Gage Cable (Helm part number 6117)
Terminal Strip	5-pin removable

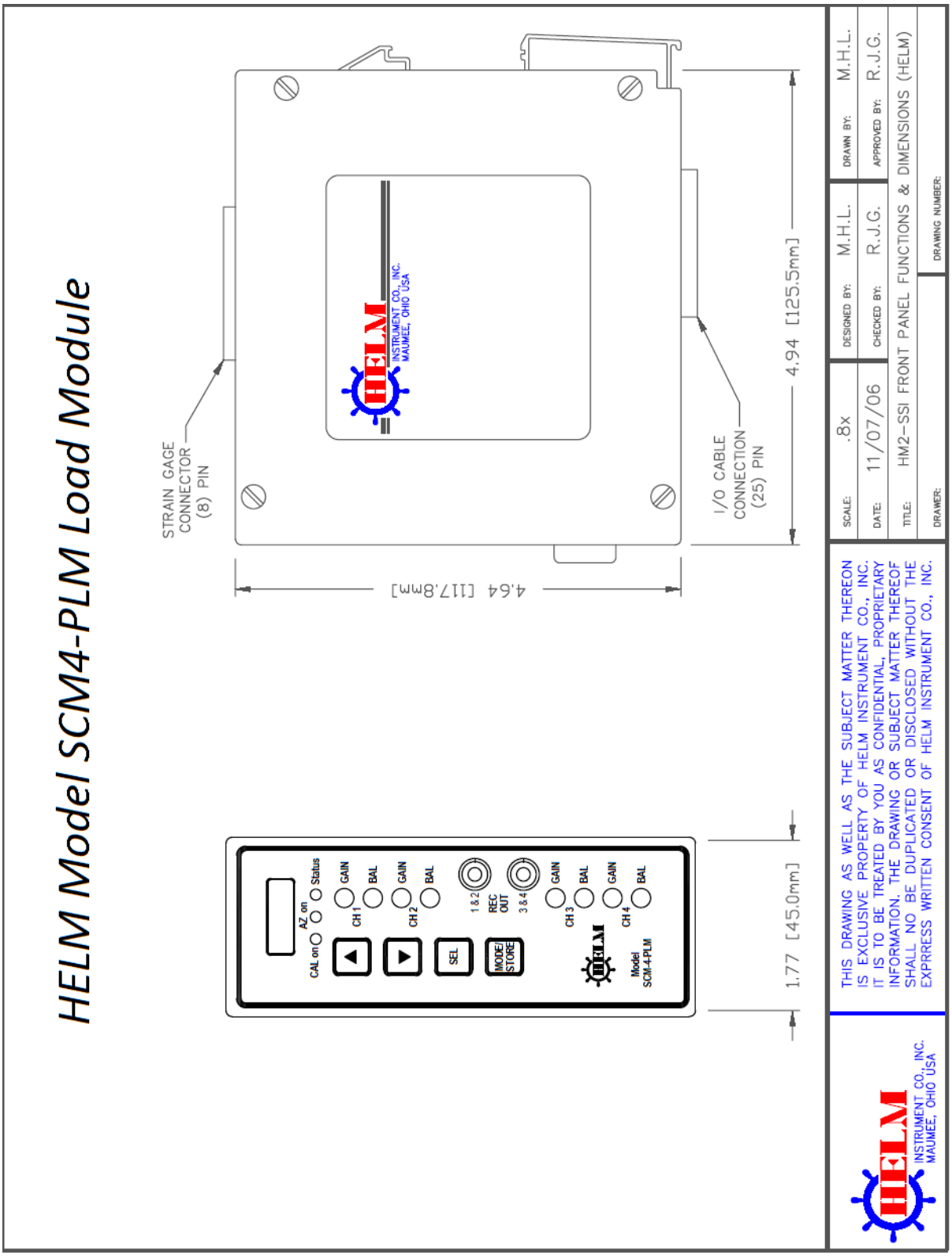
Environmental Specifications:

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

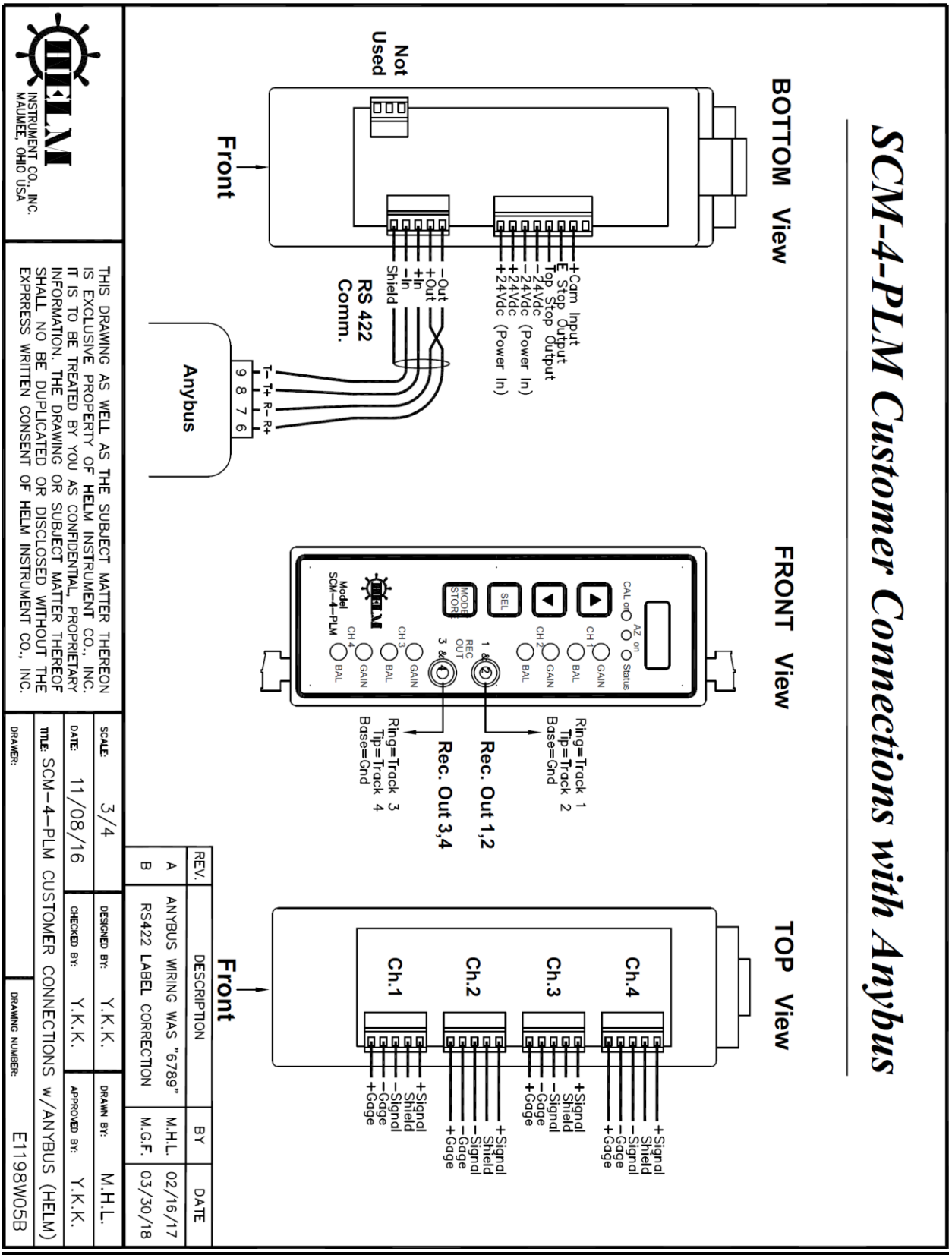
Input Specifications:

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
Module Update Time	100 µsec

Appendix B: *Module Diagrams:*



train Gage & I/O Connector Wiring



REV.	DESCRIPTION	BY	DATE
A	ANYBUS WIRING WAS "6789"	M.H.L.	02/16/17
B	RS422 LABEL CORRECTION	M.G.F.	03/30/18

HELM INSTRUMENT CO., INC.
MAUMEE, OHIO USA

SCALE: 3/4	DESIGNED BY: Y.K.K.	DRAWN BY: M.H.L.	
DATE: 11/08/16	CHECKED BY: Y.K.K.	APPROVED BY: Y.K.K.	
TITLE: SCM–4–PLM CUSTOMER CONNECTIONS w/ANYBUS (HELM)			
DRAWER:		DRAWING NUMBER: E1198W05B	

Appendix D: *Anybus I/O address Values:*

Anybus Input Image:

Data Tags DB	Data Type	Bit	Description
.Data[0]	INT	-	Seq. No of the module
.Data[1]	INT	-	Communication Update Counter The value should increment every second in Peak& Monitor mode. Every 1/3 second in Cal mode.
.Data[2]	INT	-	Ch1 Peak value in Ton (Peak/Monitor mode) Ch1 Cal/Bal value (CAL mode)
.Data[3]	INT	-	Ch2 Peak value in Ton (Peak/Monitor mode) Ch2 Cal/Bal value (CAL mode)
.Data[4]	INT	-	Ch3 Peak value in Ton (Peak/Monitor mode) Ch3 Cal/Bal value (CAL mode)
.Data[5]	INT		Ch4 Peak value in Ton (Peak/Monitor mode) Ch4 Cal/Bal value (CAL mode)
.Data[6]	INT		Ch1 Trend value in Percent
.Data[7]	INT		Ch2 Trend value in Percent
.Data[8]	INT		CH3 Trend value in Percent
.Data[9]	INT		CH4 Trend value in Percent
.Data[10]	INT		Ch1 Sample value in Ton
.Data[11]	INT		Ch2 Sample value in Ton
.Data[12]	INT		Ch3 Sample value in Ton
.Data[13]	INT	-	Ch4 Sample value in Ton
.Data[14]	INT	-	Ch1 Reverse Load in Ton
.Data[15]	INT	-	Ch2 Reverse Load in Ton++
.Data[16]	INT	-	Ch3 Reverse Load in Ton
.Data[17]	INT	-	Ch4 Reverse Load in Ton
.Data[18]	Bit	0 1 2 3 4 5 6 7 8 9 10 11 12	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 - Ch3 High Trend Alarm Indication Bit Ch3 Low Trend Alarm Indication Bit Ch4 High Trend Alarm Indication Bit Ch4 Low Trend Alarm Indication Bit Ch3 Capacity Alarm Indication Bit Ch4 Capacity Alarm Indication Bit
.Data[19]	Bit	0 1 2 3 4 5 6 7 8	Module In Calibrate Mode Indication Bit Module In Bypass (Peak) Mode Indication Bit Module In Monitor Mode Indication Bit Sampling in progress Indication Bit Sample Ready Indication Bit (This bit stays On until the mode changes back to Peak or Calibrate) Alarm Rest in progress bit Save to EEPROM Confirmed - CAM Trigger Toggle bit
.Data[20]	INT	-	Cycle Counter
.Data[21]	INT	-	Current Scale Set
.Data[22]	INT		0 = normal, 0x55 = Receive Data Check sum error

Anybus Output Image:

Data Tags DB	Data Type	Bit	Description
.Data[0]	INT	-	Seq Number (This must match with the SCM4 module's Seq set)
.Data[1]	Bit Bit Bit	0 1 2	Alarm Reset
	Bit Bit Bit Bit	8 9 10 11	Set to Calibrate Mode Set to Peak mode Set to Monitor Mode Save Settings to EEPROM (any changes of values below this address requires to save to EEPROM for permanent change. This bit needs to stay on until Save confirmed bit turns on (Input.Data[19].6)
.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 Ch3 High Capacity Alarm Value (in Calibrate mode)
.Data[5]	INT	-	Set Ch4 High Capacity Alarm Value (in Calibrate mode)
.Data[6]	INT	-	Set Sample Count
.Data[7]	INT	-	Set Low Alarm Inhibit Count
.Data[8]	L Byte H Byte	- -	Set Ch1 Low Tolerance value Set Ch1 High Tolerance value
.Data[9]	L Byte H Byte	- -	Set Ch2 Low Tolerance value Set Ch2 High Tolerance value
.Data[10]	L Byte H Byte	- -	Set Ch3 Low Tolerance value Set Ch3 High Tolerance value
.Data[11]	L Byte H Byte	- -	Set Ch4 Low Tolerance value Set Ch4 High Tolerance value
.Data[12]	INT	-	Not used
.Data[13]	INT		Not used

Appendix D

Raw Serial Communication I/O data:

Baud Rate: 38400
Parity: None
Stop Bit: 1
Data Bit: 8

Receive Data Table (Size: 24Words or 48Byte)

Byte Index	Data Type	Bit	Description
[0]	 H Byte L Byte	-	Validation Header Values 0x55h 0x54h
[1]	INT	-	Seq. No
[2]	INT	-	Update Counter
[3]	INT	-	Ch1 Peak value in Ton
[4]	INT	-	Ch2 Peak value in Ton
[5]	INT	-	Ch3 Peak value in Ton
[6]	INT		Ch4 Peak value in Ton
[7]	INT		Ch1 Trend value in Percent
[8]	INT		Ch2 Trend value in Percent
[9]	INT		CH3 Trend value in Percent
[10]	INT		CH4 Trend value in Percent
[11]	INT		Ch1 Sample value in Ton
[12]	INT		Ch2 Sample value in Ton
[13]	INT		Ch3 Sample value in Ton
[14]	INT	-	Ch4 Sample value in Ton
[15]	INT	-	Ch1 Reverse Load in Ton
[16]	INT	-	Ch2 Reverse Load in Ton++
[17]	INT	-	Ch3 Reverse Load in Ton
[18]	INT	-	Ch4 Reverse Load in Ton
[19]	Bit	0 1 2 3 4 5 6 7 8 9 10 11 12 13	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 - - Ch3 High Trend Alarm Indication Bit Ch3 Low Trend Alarm Indication Bit Ch4 High Trend Alarm Indication Bit Ch4 Low Trend Alarm Indication Bit Ch3 Capacity Alarm Indication Bit Ch4 Capacity Alarm Indication Bit
[20]	Bit	0 1 2 3 4 5 6 7 8	Module In Calibrate Mode Indication Bit Module In Bypass (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 back to Bypass) Alarm Rest in progress bit Save to EEPROM Confirmed - CAM Trigger Toggle bit
[21]	INT	-	Cycle Counter
[22]	INT	-	Current Scale Set
[23]	INT	-	0 = normal, 0x55 = Receive Data check sum error

Download Data Table (Size: 16Words or 32 Byte)

Byte Index	Data Type	Bit	Description
.[0]		-	Validation Header Values
	H Byte		0x55h
	L Byte		0x54h
.[1]	INT	-	Seq Number
.[2]	Bit	0	
	Bit	1	Alarm Reset
	Bit	2	
	Bit	8	Set To Calibrate Mode
	Bit	9	Set (Peak) mode
	Bit	10	Set Monitor Mode
	Bit	11	Save Settings to EEPROM
.[3]	INT	-	Set Ch1 High Capacity Alarm Value (in Calibrate mode)
.[4]	INT	-	Set Ch2 High Capacity Alarm Value (in Calibrate mode)
.[5]	INT	-	Set Ch3 High Capacity Alarm Value (in Calibrate mode)
.[6]	INT	-	Set Ch4 High Capacity Alarm Value (in Calibrate mode)
.[7]	INT	-	Set Sample Count
.[8]	INT	-	Set Low Alarm Inhibit Count
.[9]	L Byte	-	Set Ch1 Low Tolerance value
	H Byte	-	Set Ch1 High Tolerance value
.[10]	L Byte	-	Set Ch2 Low Tolerance value
	H Byte	-	Set Ch2 High Tolerance value
.[11]	L Byte	-	Set Ch3 Low Tolerance value
	H Byte	-	Set Ch3 High Tolerance value
.[12]	L Byte	-	Set Ch4 Low Tolerance value
	H Byte	-	Set Ch4 High Tolerance value
.[13]	INT	-	Not used
.[14]	INT		Not used
.[15]	INT		check sum (from Data[1] to Data[14]) only low Byte will be checked

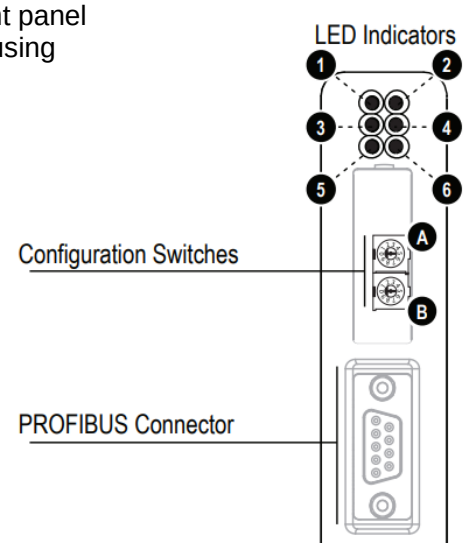
ANYBUS COMMINCATOR INITIAL SETUP

1. How to config IP address of the Anybus Communicator for ProfiNet module(AB7013),.

   Download the IP Config program from below link and install then run IP Config.
   https://www.anybus.com/docs/librariesprovider7/default-document-library/software/hms-ipconfigtool.zip?sfvrsn=ff5b9ad6_44

   Click Scan button to search the Communicator connected to the network and Double click on the module found to configure the network address settings.

2. For ProfiBus module(AB7000), remove fromt panel below LED indictors and set Node number using the Configuration Switches.



SETTING UP PLC I/O Table for SCM4-PLM Module

1. For ProfiNet Module(AB7013), Download load GSDML files for your PLC Project.

   https://www.anybus.com/docs/librariesprovider7/default-document-library/software/hms-ipconfigtool.zip?sfvrsn=ff5b9ad6_44

   Use “GSDML-V2.3-HMS-ABC_PROFINET_IO-20141127.xml” file to setup the Input and Output table for your PLC project.

2. For ProfiBus Module (AB7000) use the link below for GDS file

   https://www.anybus.com/docs/librariesprovider7/default-document-library/firmware-software/hms-gsd-abc-pdp.zip?sfvrsn=416fadd6_4

Input Size: 23 words (46 Bytes)
Output Size: 14 word (28 Bytes)

Once the Anybus Communicator is running on the network without error, you must assign the matching Seq number of the connected SCM4-PLM module into the first word of the Output Data table. To verify or configure the Seq number of the SCM4-PLM module,
Please refer to the SCM4-PLM manual. Seq number is set at '1' as default in the SCM4-PLM

OUTPUT Data[0] = 1

After the matching sequence number is entered into the first word of output data table, you will see the new values updating on the Input data table.