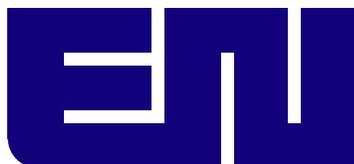


**MICRO-S
MIGHTY-1S
MIGHTY-4S
MIGHTY-5S
DIGITAL WEIGHT METERS**

OWNERS MANUAL



ELECTRO-NUMERICS, INC.

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Micro-S Series Owners Manual

P/N: **500-273** Revision: **D**

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1.

INTRODUCTION

Electro-Numerics' Digital Weight Meters are high accuracy yet cost effective displays for use with scales and in other weighing applications. While these meters are often used with load, torque and pressure transducers, they may also be used to display DC voltage and current as well as process inputs (4/20mA, 0/10V etc.). These meters are different from our other Micro Series displays in that they provide many features used in weighing and scale applications while still providing the ease of setup that has made the Micro Series so popular.

Special features include:

Count by 1, 2, 5, 10, 20, 50 or 100

Control of zero width with an Auto Zero selection from +/-1 to +/-9 counts.

Viewing of either Net or Gross weight by front panel push-button and LED indicator lamp showing which item is being viewed.

Selection of viewing the Peak value of Net or Gross weight.

Setpoint Control with "dribble factor" allowing the setpoints to activate at a specified amount above or below the setpoint. This feature is often used when filling containers by weight to allow for fill material that is added after the alarm point due to overshoot or mechanical reaction time.

TARE control to compensate for the weight of containers holding the items to be weighed. With an external control switch or entered manually from the menu or selected by front panel TARE push-button, the TARE value is subtracted from the Gross value to become the Net value. This TARE function is different from other Micro Series meters in that an Offset value (different from the TARE value) may be entered. This Offset value is subtracted from each meter reading.

The TARE value is stored in nonvolatile memory and is not reset when powering-up the meter.

A selectable dummy zero shifts the five active digits left and allows the meter to display up to 999,990

Other popular features that are still provided on all models in the Micro Series.

Front panel push-button or optional RS-232/RS-485 setup allows the user to customize the unit for a specific application.

Digital scaling of zero and span provides direct readout in engineering units up to 99,999 or 999,990 with dummy zero selected.

Analog-to-digital conversion that provides up to 60 conversions per second for accurate display of peak signal input and quick response in control applications when using optional Analog or Setpoint outputs.

An adaptive auto-filter that automatically supplies a time constant compatible with the signal noise level. This ensures stable displayed readings and outputs while responding rapidly to changes of the input signal that exceed a selected threshold value.

Selective security lockout of the front panel setup protects against accidental changes to the meter.

A lightweight, high-efficiency switching power supply operating from AC or DC voltages. The meter can be powered worldwide without changes to the supply. An optional low voltage supply operates on 9 to 37 Vdc from batteries or 8 to 28 Vac from sources such as 400 Hz aircraft power.

Isolated 5, 10, and 24 Vdc excitation outputs to power transducers.
Enclosures made of high impact plastic with mounting hardware included.
All wiring is by removable plugs conforming to IEC950 safety standards.
All output options are isolated from meter and power ground by 250 Vac minimum.

With an extended version signal conditioner card installed, these meters are capable of linearizing a nonlinear input signal such as gallons of liquid in a irregularly shaped tank. Up to 240 points may be linearized by a computer program that stores the parameters via RS232 into permanent nonvolatile memory. The extended meter is also capable of measuring rate of change. For example, the level of a tank is measured and the difference between readings determines the flow rate in or out of the tank.

A dual setpoint option is offered with two form C (10 A @ 250 Vac) relays or solid state relay outputs for alarm and control capabilities. Either setpoint may be latching or non-latching and separately configured to be energized above or below the setpoint or in a fail-safe mode. Scale Meters provide selectable "dribble factor" allowing operation of the relays to occur at a fixed value above or below the setpoint to compensate for material in a chute or pipe that is added after valve shut off . Additionally, outputs may also be selected to operate from the filtered signal to reduce relay chatter or from the unfiltered signal for fast response. Snubber circuits and programmable relay switching time delay extend relay contact life.

Isolation of the optional 0/20 mA (4/20 mA) and 0/ +10 V analog outputs eliminates ground loop problems. The output may be scaled by front panel push-buttons or RS-232/RS-485. The 4/20 mA output will drive up to an 600 Ohm load with 12 V compliance

These meters offer optional RS232 or RS485 bidirectional communications or parallel, 3-state BCD output to interface with computers, PLC's or other digital devices. IBM PC compatible software is available for meter setup when an RS232 or RS-485 Serial Communications card is installed.

2.

RECEIVING AND UNPACKING

Your meter has been carefully tested and inspected prior to shipment. Should the meter be damaged in shipment, notify the freight carrier immediately. In the event the meter is not configured as ordered or the unit is inoperable, return the unit to the place of purchase for repair or replacement. Please include a detailed description of the problem.

3.

SAFETY CONSIDERATIONS

Visually inspect the meter for signs of damage. If the unit is damaged, do not attempt to operate.

These meters can have two different power supplies installed. These supplies provide operating power to the meter. High range power supply (MPS1) operates from 85 to 264 Vac or 90 to 370 Vdc. Low Range power supply (MPS2) operates from 8 to 28 Vac or 9 to 37 Vdc. Verify that the proper range power supply board is installed for the power to be used.

These meters have no AC or DC (mains) switch; they will begin operating as soon as power is connected.

Do not make signal wiring changes or connections when power is applied to the instrument . Make signal connections before power is applied and, if reconnecting is required, disconnect the AC or DC (mains) power before such wiring is attempted.

To prevent electrical or fire hazard, do not expose these meters to excessive moisture. When models Micro-S or Mighty-1S are properly installed in a panel with the rubber gasket in place, the meter bezel is sealed against dust and moisture however, the rear of the meter and the connectors are not sealed. Model Mighty-4S is supplied in a sealed case, however, it is necessary to use a sealed conduit connector for the power and signal connections to the meter.

Do not operate the instrument in the presence of flammable gases or fumes; such an environment constitutes a definite safety hazard. This meter is designed to be mounted in a metal panel.

Verify the panel cutout dimensions and mount according to instructions.

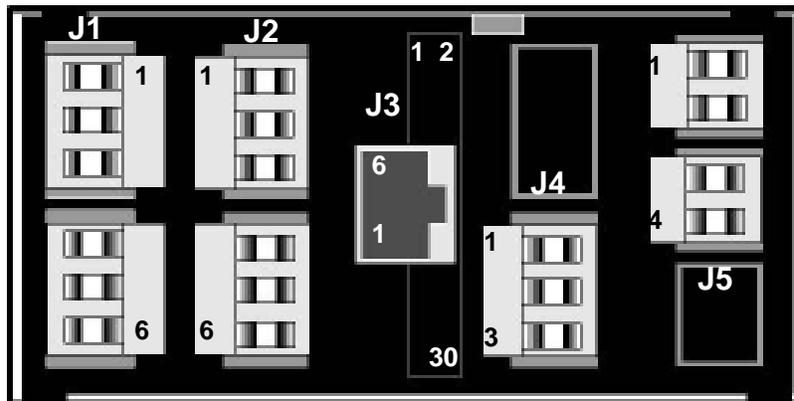
4.

CONNECTOR WIRING INFORMATION

4.1 CONNECTOR LOCATION

The connectors are the screw terminals that plug into the mating jack mounted on the printed circuit board. J3 is either a 6 conductor phone plug for RS-232 and RS-485 or a 30 pin, mass termination, edge connector for parallel BCD.

MICRO-S, MIGHTY-1S and MIGHTY-4S SCREW TERMINAL CONFIGURATION



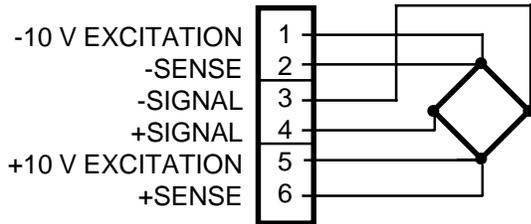
4.2 J1 - POWER AND DIGITAL CONTROLS

AC HI (+DC HI)	1
AC LO (DC RET)	2
EARTH GROUND	3
DIGITAL CONTROL INPUT B (+5V OUT)*	4
DIGITAL CONTROL INPUT A*	5
DIGITAL GROUND	6

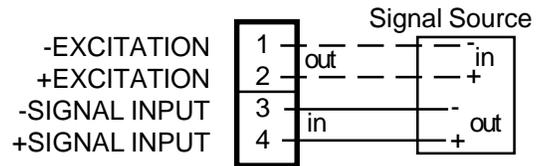
*Note: Non-isolated digital control inputs A and B are menu selectable for Tare, Peak Display, Hold, or Reset Function Reset, TareReset and Blank
 Digital Input B selected - Jumper "h"
 +5V Output selected - Jumper "g"

4.3 J5 - SIGNAL INPUT

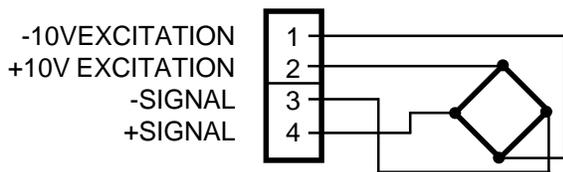
BRIDGE TYPE LOAD (WEIGHT), PRESSURE & TORQUE



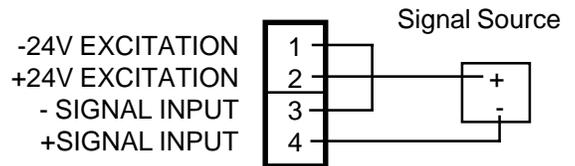
DC VOLTS, AMPS & PROCESS (4/20 MA)



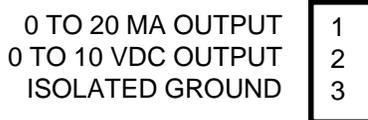
STRAIN GAUGE



2 WIRE PROCESS TRANSMITTER

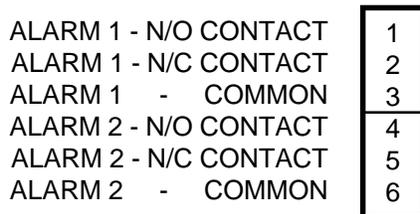


4.4 J4 - ANALOG OUTPUT



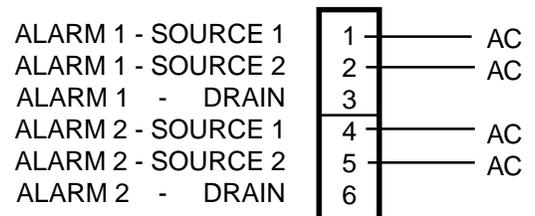
4.5 J2 - DUAL SETPOINT CONTROLLER

RELAY OUTPUTS



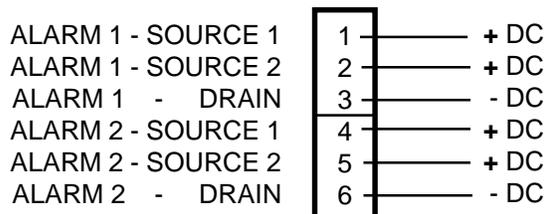
SOLID STATE RELAY OUTPUTS

Switching AC 125Vac @120 ma max.



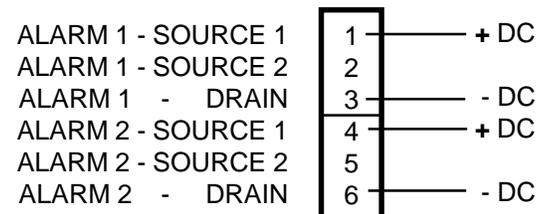
SOLID STATE RELAY OUTPUTS

Switching DC 125Vdc @240 ma max.



* SOLID STATE RELAY OUTPUTS

Switching DC 125Vdc @120 ma max.



* This configuration is directly compatible with the optotransistor (MOC) output board.

4.6 J3 DIGITAL INTERFACE

RS - 232 INTERFACE

NO CONNECTION	6
ISOLATED GROUND	5
RX	4
TX	3
RTS	2
NO CONNECTION	1

RS - 485 INTERFACE

ISOLATED GROUND	6	
BRX	5	TRANSMIT -
ARX	4	TRANSMIT +
ATX	3	RECEIVE +
BTX	2	RECEIVE -
ISOLATED GROUND	1	

BCD OUTPUT

1	1	2	2
4	3	4	8
10	5	6	20
40	7	8	80
100	9	10	200
400	11	12	800
1K	13	14	2K
4K	15	16	8K
10K	17	18	20K
40K	19	20	80K
	21	22	
	23	24	
+ POL	25	26	DATA READY
BCD HOLD	27	28	BCD ENABLE
ISOLATED GND	29	30	ISO 5 / 15VDC

5.0

FRONT PANEL CONFIGURATIONS

FRONT PANEL SETUP KEYS, MICRO-S

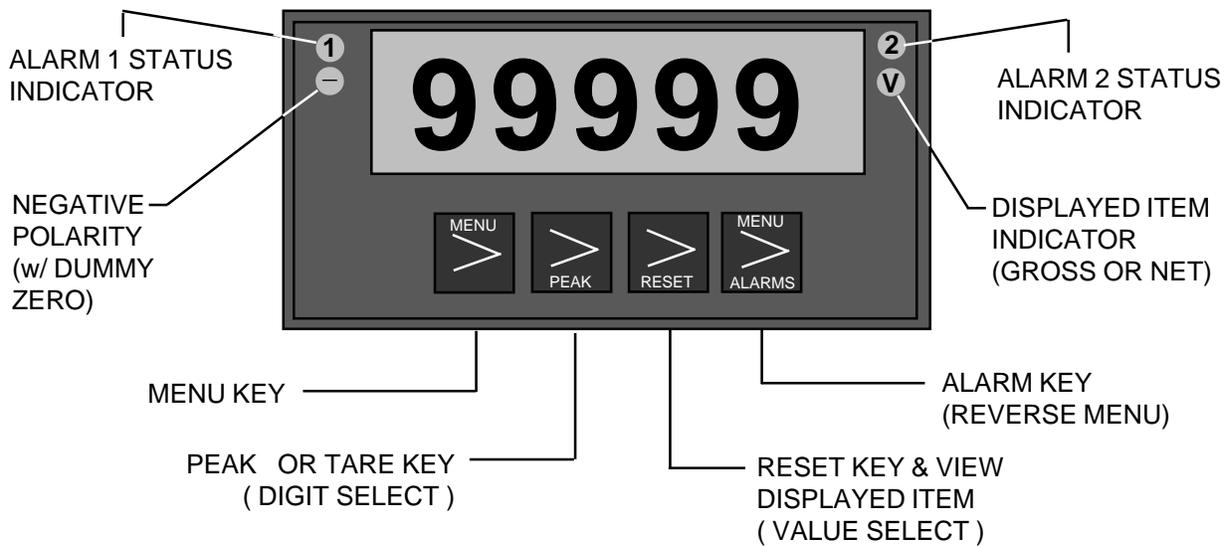


Figure 5.1

FRONT PANEL SETUP KEYS, MIGHTY- 1S

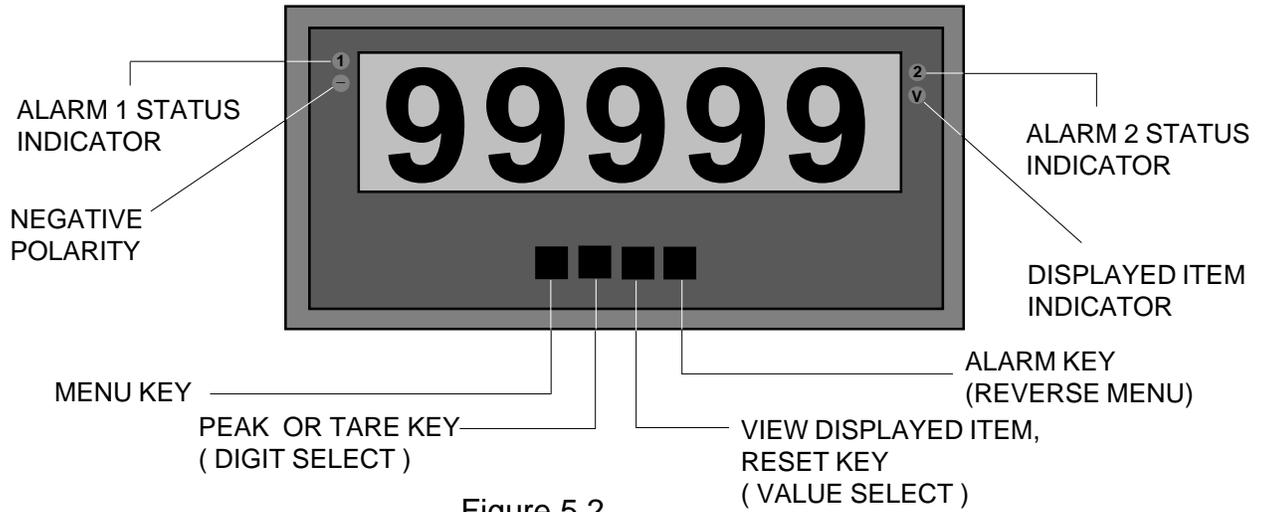


Figure 5.2

FRONT PANEL SETUP KEYS, MIGHTY- 4S

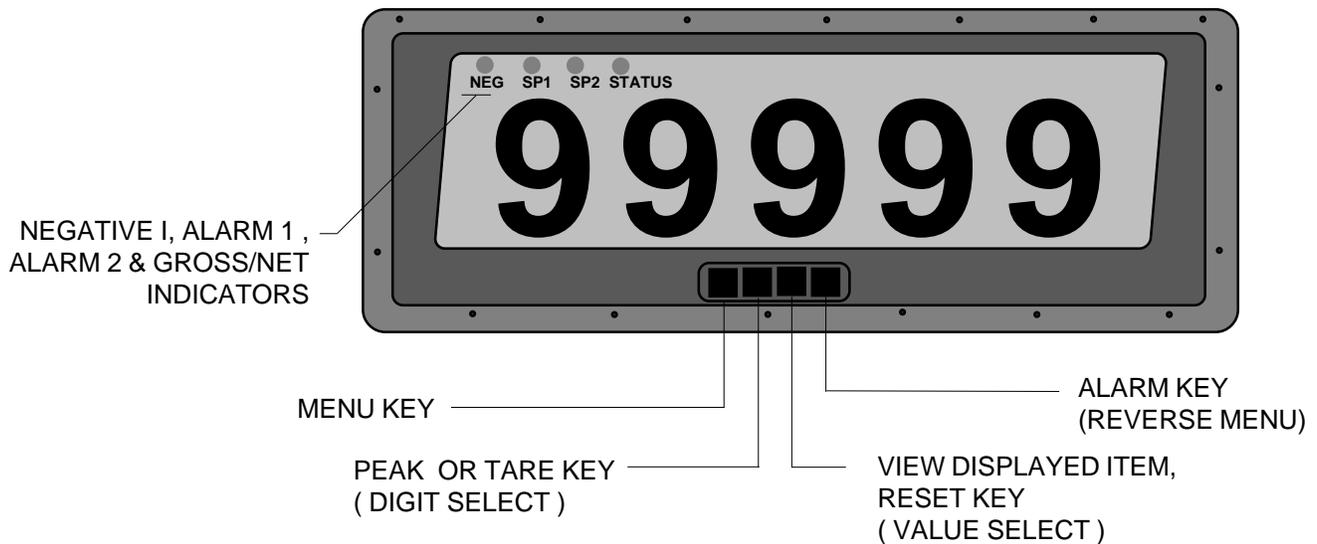


Figure 5.3

6.0

METER KEYPADS



6.1 KEY PAD FUNCTIONS

Shown on the previous pages are the three meter models covered by this manual. The four keypads on the front of each model operate in exactly the same way and perform the same functions. LED status indicators (setpoints, negative sign and viewed item) vary in position depending on the model.

OPERATING MODE (Definition)

The meter is in normal operation and the input signal value is displayed.

MENU MODE (Definition)

The meter display and outputs do not respond to the input signal and alarm relays are deenergized.

MENU KEY FUNCTIONS

Operating Mode

PRESSING RESULTS



1. Causes the meter to change from the OPERATING mode to the MENU mode and steps through the meter setup selections.

Menu Mode

PRESSING RESULTS



2. Each additional press of the menu key will advance to the next menu item until RESET is reached at which time the meter will reset into the OPERATING mode.



3. While in the MENU mode, after performing any change, pressing the menu key will store the changes made to the item values.



4. Resets the meter and shifts to the OPERATING mode without having to go to the end of the menu items.

PEAK KEY FUNCTIONS

Menu Mode

PRESSING RESULTS



1. While the meter is displaying a menu item, pressing the PEAK key will show the values of that menu item. One of the digits displayed will be flashing which indicates its value may be changed. To make any digit active, keep pressing the PEAK key until the digit you wish to change begins to flash.



2. Will increment the flashing digit by one for each press.

Operating Mode



3. Toggles the display between the PEAK, noted by a blinking display, and INPUT values.
4. In the Alarm Mode, pressing the PEAK key causes the most significant digit of the displayed setpoint value to flash. Digits are then selected the same as in the MENU mode.
5. If selected by menu item, the PEAK key becomes a TARE key.

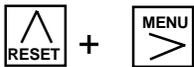
RESET KEY FUNCTIONS

Operating Mode

Pressing the RESET key and any other key causes several different resets to take place as shown below. Pressing and releasing the RESET key without pressing any other key causes the display to toggle from NET to GROSS and a front panel LED indicator lights.

PRESSING

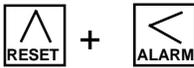
ACTIONS



+



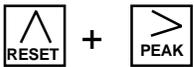
1. Resets all display functions.



+



2. Resets any alarm conditions.



+



3. Resets the peak value to the current peak value.

ALARM KEY FUNCTIONS

Operating Mode

PRESSING

ACTIONS



1. 1st. press displays setpoint #1 value.



2. 2nd. press displays setpoint #2 value.



3. 3rd. press returns to the input signal value.

Menu Mode



4. Steps the display backwards through the menu items.

7.0

SCALING METHODS

There are three selectable methods for scaling the meter. They apply to the two input board types compatible with the Micro-S Series. The three methods are defined below.

1. **Method 1, "Scaling by reading the input signal values":**
When using this method, the meter calculates the proper scaling and offset values, entering them into memory. The meter is connected to your sensor and looks at the values of the input signals.
2. **Method 2, "Scaling using scale and offset":**
This method requires that you calculate the required scale and offset values and enter them into memory when the meter displays SCALE and OFFSET. The meter does not need to be connected to your sensor. This is the "default" method selected when configured by the factory.

3. **Method 3, "Scaling using the coordinates of two points":**

In using this method you enter the low input signal value, the display value for the low signal, the high input signal value and the display value for the high input signal. These values are entered when menu items **Lo In**, **Lo rd**, **HI In** and **HI rd** are displayed. The meter does not need to be connected to your sensor.

7.1 **Accessing scaling method 1**

1. Remove the input board and verify that the jumpers are in the correct positions for the range you intend to use. Re-install the board.
2. Apply power and press the left **MENU** key until **ConFG** appears on the display.
3. Press the **PEAK** key and five digits will appear on the display. Continue pressing the **PEAK** key until the second digit begins to flash **01000**. Make this digit a "1" by pressing the **RESET** key until "1" appears. Note that when this digit is a "0", you have access to scaling methods 2 and 3. Store the change by pressing the left **MENU** key. Go to Section 9 in this manual and perform the procedure "**signal scaling by applying a known pressure or weight**". Perform any other changes in section 9 that are required for your application.

7.2 **Accessing scaling method 2**

1. Remove the input board and verify that the jumpers are in the correct positions for the range you intend to use. Re-install the board.
2. Apply power and press the left **MENU** key until **ConFG** appears on the display.
3. Press the **PEAK** key, and five digits will appear on the display. Continue pressing the **PEAK** key until the underlined (second) digit begins to flash **00000**. Make this digit a "0" by pressing the **RESET** key until "0" appears. Note that when this digit is a "1", you have access to scaling method 1 only. Store the change by pressing the left **MENU** key.
4. Go to Section 9 under **SEtuP** and select "**Scale Factor and Offset**". Press the **PEAK** key, and five numbers will appear on the display. Press the **PEAK** key again until the underlined (fourth) digit begins to flash **00000**. Make this digit a "0" by pressing the **RESET** key until "0" appears. Perform any other changes in Section 9 that are required for your application.

7.3 **Accessing scaling method 3**

1. Remove the input board and verify that the jumpers are in the correct positions for the range you intend to use. Re-install the board.
2. Apply power and press the left **MENU** key until **ConFG** appears on the display.
3. Press the **PEAK** key, and five digits will appear on the display. Continue pressing the **PEAK** key until the second digit begins to flash **00000**. Make this digit a "0" by pressing the **RESET** key until "0" appears. Note that when this digit is a "1", you have access to scaling method 1 only. Store the change by pressing the left **MENU** key.
4. Go to Section 9 under **SEtuP**. Press the **PEAK** key, and five numbers will appear on the display. Press the **PEAK** key again until the underlined digit begins to flash **00010**. Make this digit a "1" by pressing the **RESET** key until "1" appears. Store the change by pressing the **MENU** key. Referring to Section 9, press left **MENU** until **Lo In** appears. Using the **PEAK** and **RESET** keys, enter the low input value. Push the left **MENU** key until **Lo rd** appears. Using the **PEAK** and **RESET** keys, enter the low reading to be displayed. Repeat this procedure for **HI In** and **HI rd**. Perform any other changes in Section 9 that are required for your application.

8.

SETTING MENU LOCKOUTS

For security and ease of operation, any or all program menu items may be disabled. Each function to be disabled is set to "1" in the menu items, "Loc 1", "Loc 2" or "Loc 3". These lockout menu items may in turn be "locked-out" by installing an internal hardware shorting jumper. With the jumper installed, the operator has access only to enabled menu items.

8.1 SETTING HARDWARE LOCKOUT JUMPER



Lockout Jumper

To access the jumper, remove the rear panel per section 23.1, 25.1 or 27. Remove jumper "a" located on the lower portion of the power supply board next to the input connectors (see figure at left) to enable the front panel keypad. Replace the jumper to disable the front panel keypad.

Jumper Removed - Loc 1,2 and 3 are displayed as menu items and allow other menu items to be locked out or enabled.

Jumper Installed - Loc1, 2 and 3 are not displayed on program menu.

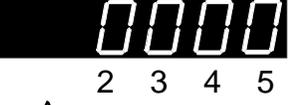
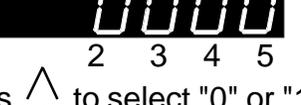
Power Supply Board Figure 8.1

8.2 SETTING SOFTWARE LOCKOUTS

When setting up the meter, it may be necessary to enable some of the menu items. Any digit set to "1" in Loc 1, Loc 2 or Loc 3 indicates that item is locked out. By setting the digit to "0", the item will appear in the menu. Be sure to reset the lockout bit to "1" after selection if you do not want the value changed by the operator.

Note: The hardware lockout jumper must be removed to access Loc 1, 2 and 3 (see section 8.1)

MENU KEY	digit SELECT KEY	VALUE SELECT KEY
<div style="text-align: center; border: 1px solid black; padding: 2px; margin-bottom: 5px;"> Loc 1 </div> <p>Press the key until Loc 1 is displayed.</p>	<div style="text-align: center; border: 1px solid black; padding: 2px; margin-bottom: 5px;"> 11111 </div> <p>Press to display status and select left digit. Press again to select another digit. Selected digit will flash. "1" indicates the menu item is disabled. "0" indicates the item is enabled.</p>	<div style="text-align: center; border: 1px solid black; padding: 2px; margin-bottom: 5px;"> 0000 2 3 4 5 </div> <p>Press to select "0" or "1" for flashing digit</p> <ul style="list-style-type: none"> 1 - Change display item 2 - Input type selection 3 - Enable meter setup, config. & decimal pt. 4 - Change count & autozero

MENU KEY ^{MENU} >	DIGIT SELECT KEY ^{PEAK} >	VALUE SELECT KEY ^{RESET} ^
 <p>Press the ^{MENU} > key until Loc 2 is displayed. Lockout jumper on power supply must be removed.</p>	 <p>Press ^{PEAK} > to display status and select left digit. Press ^{PEAK} > again to select another digit. Selected digit will flash. "1" indicates the menu item is disabled. "0" indicates the item is enabled.</p>	 <p>Press ^{RESET} ^ to select "0" or "1" for flashing digit 2 - Filter 3 - Scale or Lo in, Hi in 4 - Offset or Lo rd, Hi rd 5 - Tare value</p>
 <p>Press the ^{MENU} > key until Loc 3 is displayed. Lockout jumper on power supply must be removed.</p>	 <p>Press ^{PEAK} > to display status and select left digit. Press ^{PEAK} > again to select another digit. Selected digit will flash. "1" indicates the menu item is disabled. "0" indicates the item is enabled.</p>	 <p>Press ^{RESET} ^ to select "0" or "1" for flashing digit 2 - Alarm configuration 3 - Setpoint programming 4 - Analog Output scaling 5 - Ser. Comm. setup</p>
 <p>Press the ^{MENU} > key until Loc 3 is displayed. Lockout jumper on power supply must be removed.</p>	 <p>Press ^{PEAK} > to display status and select left digit. Press ^{PEAK} > again to select another digit. Selected digit will flash. "1" indicates the menu item is disabled. "0" indicates the item is enabled.</p>	 <p>Press ^{RESET} ^ to select "0" or "1" for flashing digit 2 - View peak value 3 - View alarm setpoints 4 - Reset (meter reset) 5 - Reset (peak & alarm)</p>

9.

CALIBRATION

All ranges of the meter have been digitally calibrated at the factory prior to shipment. The calibration equipment is certified to NIST standards. Calibration constants are stored in non-volatile memory in EEPROM on the signal conditioner. This provides superior long term accuracy and stability while eliminating much of the analog circuitry that causes drift .

Since the calibration is stored on the signal conditioner and analog output boards, all boards of the same revision level may be mixed and interchanged without requiring recalibration. If recalibration is required, the meter may be returned to Electro-Numerics or any authorized Electro-Numerics distributor.

10.

METER SETUP & PROGRAMMING

Before beginning Setup of the meter, you should first decide on the method of meter scaling as described on page 7. Method 2 is the default setting shipped from the factory. Starting on page 11, proceed through the Setup menu with **InPut**, **SEtuP** and **ConFG**. Under **ConFG**, if you select **01000** Method 1 (scaling by reading the input signals), and after a meter **ReSet**, you must connect the meter to your sensor or transducer and use the following procedure to scale the meter. If you select **00000** (method 2 or 3) *this procedure does not apply*.

Signal scaling by applying a known pressure or weight

<div style="border: 1px solid black; display: inline-block; padding: 2px;"> MENU KEY ^{MENU} </div>	<div style="border: 1px solid black; display: inline-block; padding: 2px;"> DIGIT SELECT KEY ^{PEAK} </div>	<div style="border: 1px solid black; display: inline-block; padding: 2px;"> VALUE SELECT KEY ^{RESET} </div>
Press the ^{MENU} key. Lo In will appear on the meter display.	Press the ^{PEAK} key. The meter will begin to take readings. Set the input signal from the source to its low input value.	Press the ^{RESET} key to store the Lo In value.
Press the ^{MENU} key. Hi In will appear on the meter display.	Press the ^{PEAK} key. The meter will begin to take readings. Set the input signal from the source to its highest input value.	Press the ^{RESET} key to store the Hi In value.
Press the ^{MENU} key. Lo rd will appear on the meter display.	Press the ^{PEAK} key. Enter the value you want on the display for the low input signal by using the ^{PEAK} and ^{RESET} keys.	Press the ^{MENU} key to store the Lo rd value.
Hi rd will appear on the meter display.	Press the ^{PEAK} key. Enter the value you want on the display for the high input signal by using the ^{PEAK} and ^{RESET} keys.	Press the ^{MENU} key to store the Hi rd value.

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

LOAD CELL SIGNAL CONDITIONER

InPut Input signal type	Strn Load cells	20.0 50.0 100.0 250.0 500.0	20, 50, 100, 250, 500 mV FS
	dC DC millivolts	20.0 50.0 100.0 250.0 500.0	20, 50, 100, 250, 500 mV FS
	DC SIGNAL CONDITIONER		
	dC U DC Volts	0.2U 2.0U 20.0U 200.0U 660.0U	0.2, 2, 20, 200, 660 V FS
dC A DC Amperes	2.0a 20.0a 200.0a 5.0A	2, 20, 200 mA, 5 A FS	
rAtio Strain Gauge	0.2U 2.0U 20.0U	0.2, 2, 20 V FS	

SEtuP Meter Setup	00000 Display selection	0 No dummy zero 1 Dummy zero
	00000 Line frequency	0 60 Hz 1 50 Hz
	00000 Peak key functions as a Peak or TARE pushbutton	0 Peak key active 1 Peak key functions as a TARE pushbutton
	00000 Method of scaling meter	0 Scale factor and offset 1 Coordinates of 2 points
	00000 Rear connector digital control inputs A & B TTL, CMOS, and contact closure compatible Logical 0 = True Logical 1 = False	0 A: Reset, B: Meter Hold 1 A: Function Reset, B: Peak Display 2 A: Meter Hold, B: Peak Display 3 A: Meter Hold, B: Tare 4 A: Peak Display, B: Tare 5 A: Reset, B: Tare 6 A: Function Reset, B: Tare 7 A: Tare Reset, B: Tare

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

<p>SEtuP Meter Setup (continued)</p>	<p>00000 Rear connector digital control inputs inputs A & B</p> <p>TTL, CMOS, and contact closure compatible Logical 0 = True Logical 1 = False</p>	<p>8 A: Display blank B: Tare 9 A: Reset B: Display blank A A: Tare Reset B: Display blank B A: Display item B: Tare C A: Display item B: Display blank D A: Reset B: Display item E A: Function Reset B: Display item F A: Meter Hold B: Display item</p>
<p>ConFG Meter Configuration</p>	<p>00000 Operates as a rate of change meter Extended version only</p>	<p>0 Not rate of change 1 Rate x 0.1 2 Rate x 1 3 Rate x 10 4 Rate x 100 5 Rate x 1000 6 Rate x 10000</p>
	<p>00000 Scaling by reading input signal or by Setup selection</p>	<p>0 Use setup scaling method 1 Scale by reading input</p>
	<p>00000 Allows relays to trip at a fixed offset above or below the setpoint.</p>	<p>0 Programmable offset enabled 1 Programmable offset disabled</p>
	<p>00000 Display the peak of the net value or gross value</p>	<p>0 Peak of net value 1 Peak of gross value</p>
	<p>00000 Scaling for nonlinear input Extended version only</p>	<p>0 Linear input 1 Custom curve</p>

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

<p>Count Count and autozero options</p>	<p>00 Count by Least significant digits can be set to count by values greater than 1 to reduce noise</p> <p>00 Autozero When a reading is within the selected value of zero, the meter is set to zero</p>	<p>0 count by 1 1 count by 2 2 count by 5 3 count by 10 4 count by 20 5 count by 50 6 count by 100</p> <p>0 No auto zero 1 +/- 1 count 2 +/- 2 counts 3 +/- 3 counts 4 +/- 4 counts 5 +/- 5 counts 6 +/- 6 counts 7 +/- 7 counts 8 +/- 8 counts 9 +/- 9 counts</p>
<p>FiLtr Display and Output Filtering</p>	<p>00000 Alarm filtering</p> <p>00000 Peak display filtering</p> <p>00000 Display filtering</p> <p>00000 Adaptive filter response</p> <p>00000 Input signal filtering</p>	<p>0 Output is unfiltered 1 Output is filtered</p> <p>0 Peak of unfiltered signal 1 Peak of filtered signal</p> <p>0 Batch average, 16 rdgs 1 Display filtered signal</p> <p>0 Low threshold level 1 High threshold level</p> <p>0 Autofilter 1 Batch avg, 16 rdgs. 2 Moving avg, .08 sec. 3 Moving avg, .15 sec. 4 Moving avg, .3 sec. 5 Moving avg, .6 sec. 6 Moving avg, 1.2 sec. 7 Moving avg, 2.4 sec. 8 Moving avg, 4.8 sec. 9 Moving avg, 9.6 sec. A Unfiltered(used with Hold)</p>

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

<p>dEc.Pt Decimal point selection</p>	<p>d_ddd</p>	<p>d_ddd dd_ddd ddd_dd ddd.d ddd.d .ddd</p>
<p>(Scale and Offset selected) SCALE Scale factor multiplier</p>	<p>0.0000 0.0000 0.0000 0.0000 0.0000 0.0000</p>	<p>Select 0 through 9 for flashing digit and decimal point location when decimal point is flashing</p>
<p>OFFSt Offset or Zero Value</p>	<p>0.0000 0.0000 0.0000 0.0000 0.0000</p>	<p>Select 0 through 9 for flashing digit. Decimal point location is fixed by dEC.Pt selection</p>
<p>(coordinates of 2 pts method) Lo in Low signal input value</p>	<p>0.0000 0.0000 0.0000 0.0000 0.0000</p>	<p>Select 0 through 9 for flashing digit. Decimal point location is fixed by input range chosen.</p>
<p>Lo rd Low Displayed Reading at Low Signal Input</p>	<p>0.0000 0.0000 0.0000 0.0000 0.0000</p>	<p>Select 0 through 9 for flashing digit. Decimal point location is fixed by dEC.Pt selection</p>
<p>Hi In High Signal Input Value</p>	<p>0.0000 0.0000 0.0000 0.0000 0.0000</p>	<p>Select 0 through 9 for flashing digit. Decimal point location determined by input range chosen.</p>
<p>Hi rd High Displayed Reading at High Signal Input</p>	<p>0.0000 0.0000 0.0000 0.0000 0.0000</p>	<p>Select 0 through 9 for flashing digit. Decimal location is fixed by dEC.Pt selection.</p>
<p>Tare Tare Value Note: Tare values that are manually entered will be overwritten if autotare is used.</p>	<p>0.0000 0.0000 0.0000 0.0000 0.0000</p>	<p>Select 0 through 9 for flashing digit. Decimal location is fixed by dEC.Pt selection.</p>

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

<p>ALSEt Alarm Operation Setup (Only enabled if relay output is installed).</p>	<p>00000 Relay state when alarm is active</p>	<p>0 Relay 1 on, Relay 2 on 1 Relay 1 off Relay 2 on 2 Relay 1 on, Relay 2 off 3 Relay 1 off, Relay 2 off</p>
	<p>00000 Alarm latching or nonlatching</p>	<p>0 Alarm 1 nonlatching, Alarm 2 nonlatching 1 Alarm 1 latching, Alarm 2 nonlatching 2 Alarm 1 nonlatching, Alarm 2 latching 3 Alarm 1 latching, Alarm 2 latching</p>
	<p>00000 Alarm status</p>	<p>0 AL1 active high AL2 active high 1 AL1 active low AL2 active high 2 AL1 disabled AL2 active high 3 AL1 active high AL2 active low 4 AL1 active low AL2 active low 5 AL1 disabled AL2 active low 6 AL1 active high AL2 disabled 7 AL1 active low AL2 disabled 8 AL1 disabled AL2 disabled</p>

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

<p>ALSEt (continued) Alarm Operation Setup</p>	<p>00000 Alarm comparison on net or gross weight</p>	<p>0 AL1 Net AL2 Net 1 AL1 Gross AL2 Net 2 AL1 Net AL2 Gross 3 AL1 Gross AL2 Gross</p>
	<p>00000 Number of readings in the alarm zone to cause an alarm</p>	<p>0 After 1 reading 1 After 2 readings 2 After 4 readings 3 After 8 readings 4 After 16 readings 5 After 32 readings 6 After 64 readings 7 After 128 readings</p>
<p>SP1_d Deviation (or dribble factor) from setpoint value - Alarm 1 (Only enabled if relay output is installed).</p>	<p>00000 00000 00000 00000 00000 A plus or minus value sets how far above or below the setpoint the relays operate</p>	<p>Select 0 through 9 for flashing digit. Decimal location is fixed by dEC.Pt selection.</p>
<p>SP2_d Deviation (or dribble factor) from setpoint value - Alarm 2 (Only enabled if relay output is installed).</p>	<p>00000 00000 00000 00000 00000 A plus or minus value sets how far above or below the setpoint the relays operate</p>	<p>Select 0 through 9 for flashing digit. Decimal location is fixed by dEC.Pt selection.</p>
<p>An Set Setup of analog output. (Only enabled if analog output board is installed).</p>	<p>000 Source</p>	<p>0 Net value 1 Gross value</p>
	<p>000 Calibrated output is current or voltage.</p>	<p>0 Current output 1 Voltage output</p>
	<p>000 Analog output filtering</p>	<p>0 Analog output unfiltered 1 Analog output filtered</p>
<p>An Lo Displayed value for 0 voltage or current output</p>	<p>0.0000 0.0000 0.0000 0.0000 0.0000</p>	<p>Select 0 to 9 for flashing digit. Decimal point location fixed by dEC.Pt selection.</p>
<p>An Hi Displayed value for 10 volts or 20 mA output</p>	<p>0.0000 0.0000 0.0000 0.0000 0.0000</p>	<p>Select 0 to 9 for flashing digit. Decimal fixed by DEC.Pt selection.</p>

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

<p>(if serial interface is installed)</p> <p>Ser 1</p> <p>Serial interface setup</p> <p><u>Fixed Parameters</u></p> <p>No parity</p> <p>8-bit word</p> <p>1 stop bit</p>	<p>000</p> <p>Output filtering</p>	<p>0 Send unfiltered signal</p> <p>1 Send filtered signal</p>																																	
	<p>000</p> <p>Baud rate</p>	<p>0 300 baud</p> <p>1 600 baud</p> <p>2 1200 baud</p> <p>3 2400 baud</p> <p>4 4800 baud</p> <p>5 9600 baud</p> <p>6 19200 baud</p>																																	
	<p>000</p> <p>Digital output rate (in seconds)</p>	<table border="0"> <tr> <td></td> <td style="text-align: center;"><u>60 Hz</u></td> <td style="text-align: center;"><u>50 Hz</u></td> </tr> <tr> <td>0</td> <td>Line frequency</td> <td></td> </tr> <tr> <td>1</td> <td>.28 sec</td> <td>.34 sec</td> </tr> <tr> <td>2</td> <td>.57 sec</td> <td>.68 sec</td> </tr> <tr> <td>3</td> <td>1.1 sec</td> <td>1.4 sec</td> </tr> <tr> <td>4</td> <td>2.3 sec</td> <td>2.7 sec</td> </tr> <tr> <td>5</td> <td>4.5 sec</td> <td>5.4 sec</td> </tr> <tr> <td>6</td> <td>9.1 sec</td> <td>10.9 sec</td> </tr> <tr> <td>7</td> <td>18.1 sec</td> <td>21.8 sec</td> </tr> <tr> <td>8</td> <td>36.3 sec</td> <td>43.5 sec</td> </tr> <tr> <td>9</td> <td>72.5 sec</td> <td>87 sec</td> </tr> </table>		<u>60 Hz</u>	<u>50 Hz</u>	0	Line frequency		1	.28 sec	.34 sec	2	.57 sec	.68 sec	3	1.1 sec	1.4 sec	4	2.3 sec	2.7 sec	5	4.5 sec	5.4 sec	6	9.1 sec	10.9 sec	7	18.1 sec	21.8 sec	8	36.3 sec	43.5 sec	9	72.5 sec	87 sec
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<p>Ser 2</p> <p>Serial interface setup</p>	<p>0000</p> <p>Line Feed</p>	<p>0 None after carriage rtn</p> <p>1 LF after carriage return</p>																																	
	<p>0000</p> <p>Alarm data transmitted with meter readings</p>	<p>0 No alarm data</p> <p>1 Alarm data with reading</p>																																	
	<p>0000</p> <p>Control of digital output</p>	<p>0 Continuous output</p> <p>1 Output on RS-232 / RS-485 command only</p>																																	
	<p>0000</p> <p>Meter address for RS-232/ RS-485 communication (digit display, address num- ber of meter)</p>	<table border="0"> <tr> <td style="text-align: center;">Meter#</td> <td style="text-align: center;">Display</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">thru</td> <td style="text-align: center;">thru</td> </tr> <tr> <td style="text-align: center;">9</td> <td style="text-align: center;">9</td> </tr> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">A</td> </tr> <tr> <td style="text-align: center;">thru</td> <td style="text-align: center;">thru</td> </tr> <tr> <td style="text-align: center;">15</td> <td style="text-align: center;">F</td> </tr> </table>	Meter#	Display	1	1	thru	thru	9	9	10	A	thru	thru	15	F																			
Meter#	Display																																		
1	1																																		
thru	thru																																		
9	9																																		
10	A																																		
thru	thru																																		
15	F																																		

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

<p>Ser 2 (continued) Serial interface setup</p>	<p>0000 Meter address (continued) Note: Addresses 1 through 15 are denoted by 1 through 9 and A through F. Addresses 16 through 31 use the same character followed by a decimal point.</p>	<table border="1"> <thead> <tr> <th>Meter#</th> <th>Display</th> </tr> </thead> <tbody> <tr> <td>16</td> <td>1.</td> </tr> <tr> <td>thru</td> <td>thru</td> </tr> <tr> <td>25</td> <td>9.</td> </tr> <tr> <td>26</td> <td>A.</td> </tr> <tr> <td>thru</td> <td>thru</td> </tr> <tr> <td>31</td> <td>F.</td> </tr> </tbody> </table>	Meter#	Display	16	1.	thru	thru	25	9.	26	A.	thru	thru	31	F.
Meter#	Display															
16	1.															
thru	thru															
25	9.															
26	A.															
thru	thru															
31	F.															
<p>Ser 3 Serial interface setup (only enabled if communications board installed)</p>	<p>00000 RS485 full or half duplex</p>	<p>0 Full duplex 1 Half duplex</p>														
	<p>00000 Not used</p>	<p>0 Spare 1 Spare</p>														
	<p>00000 RS232 RTS type</p>	<p>0 Nonlatching RTS 1 Latching RTS</p>														
	<p>00000 Carriage return (and LF, if selected)</p>	<p>0 Only at end of all items 1 At end of each item (If alarm, only at end)</p>														
	<p>00000 Data sent via communications (if BCD, only 1 item allowed)</p>	<p>0 Net and gross 1 Net only 2 Gross only 3 Peak only (net or gross) 4 Net + gross + peak</p>														
<p>Loc 1 Lockout of Menu Items (Lockout switch must be in off position to access Loc 1, 2, 3. See Figure 9.1)</p>	<p>0000 Change display item #</p>	<p>0 Enabled 1 Disabled</p>														
	<p>0000 Input type selection</p>	<p>0 Enabled 1 Disabled</p>														
	<p>0000 Meter setup, configuration and decimal point selection.</p>	<p>0 Enabled 1 Disabled</p>														
	<p>0000 Count</p>	<p>0 Enabled 1 Disabled</p>														
<p>Loc 2 Lockout of Front Panel Keys</p>	<p>0000 Filter</p>	<p>0 Enabled 1 Disabled</p>														

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

<p>Loc 2 (Continued) Lockout of Front Panel Keys (continued) (Lockout switch must be in off position to access Loc 1, 2, 3. See Figure 9.1)</p>	<p>0000 Scale or Lo in, Hi in</p>	<p>0 Enabled 1 Disabled</p>
	<p>0000 Offset or Lo rd, Hi rd</p>	<p>0 Enabled 1 Disabled</p>
	<p>0000 Tare</p>	<p>0 Enabled 1 Disabled</p>
<p>Loc 3 Lockout of Front Panel Keys (Lockout switch must be in off position to access Loc 1, 2, 3)</p>	<p>0000 Alarm configuration</p>	<p>0 Enabled 1 Disabled</p>
	<p>0000 Alarm setpoint programming (if view setpoints enabled)</p>	<p>0 Enabled 1 Disabled</p>
	<p>0000 Analog output scaling</p>	<p>0 Enabled 1 Disabled</p>
	<p>0000 Serial communications setup</p>	<p>0 Enabled 1 Disabled</p>
<p>Loc 4 Lockout of Front Panel Keys (Lockout switch must be in off position to access Loc 1, 2, 3. See Figure 9.1)</p>	<p>0000 View peak value pushbutton</p>	<p>0 Enabled 1 Disabled</p>
	<p>0000 View alarm setpoints pushbutton</p>	<p>0 Enabled 1 Disabled</p>
	<p>0000 Reset pushbutton (meter reset)</p>	<p>0 Enabled 1 Disabled</p>
	<p>0000 Reset pushbutton (peak and alarm reset)</p>	<p>0 Enabled 1 Disabled</p>

11.

DC VOLTS & AMPS

This section is designed to provide basic meter setup instructions when a direct readout of voltage or current is required. When an external shunt is used to monitor current, the setup for process signals, section 12, should be used. Some menu items, such as leading zero blanking, display filtering, etc., are not discussed in this section and have been set to the most commonly used values. Should these items require change, refer to section 10 for selection information. For configuration of optional boards, see the appropriate section elsewhere in the manual.

11.1 RANGE JUMPER SELECTIONS

Voltage	
Input	Jumpers Required
200mV	E, b
2V	E, a
20V	F, g, b
200V	F, g, a
660V	F, h, a

Current	
Input	Jumpers Required
2mA	D, h, b
20mA	C, h, b
200mA	B, h, b
5A	A, h, b

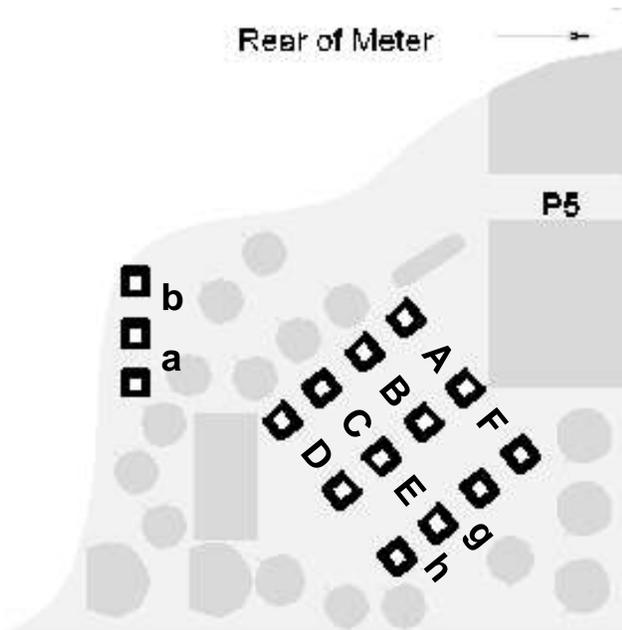


Figure 11.1 DC Signal Conditioner

- Notes**
1. See Section 18 to select 5,10 or 24Vdc excitation.
 2. Jumpers designated by capital letters require 5mm (0.2in) jumpers. Jumpers designated by lower case letters require 2.5mm (0.1 in) jumpers.
 3. Spare jumpers should be stored on single unused jumper posts not associated with capital letter designations

11.2 MENU SELECTION

Whenever the scale factor is 1.0 and offset is zero, the meter displays a direct readout of the signal input in (milli)volts or (milli)amperes. In the following example, the meter is configured for a full scale display of 0 to 20V or 0 to 20mA equals 0 to 20.000. Other ranges follow the same setup format. Note that the decimal point selection does not affect the displayed value. A full scale value of 20000 may be displayed as 20.000 milliamps or 20000 microamps. During setup, it may be necessary to enable some menu items that are locked out. See Section 9 for further information.

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

<p></p> <p>Press the  key to display InPut (Input type selection). Note: Selection of input type & range must match jumper selection in Section 11.1</p>	<p></p> <p>Press  until dC U (dc Volts) is displayed</p> <p></p> <p>or dC A (DC Amps) is displayed.</p>	<p></p> <p>Press  to select 0.2V, 2.0V, 20.0V, 200.0V, 660.0V</p> <p></p> <p>or 2.0a, 20.0a, 200.0a (milliamps) or 5.0A (Amps)</p>
<p></p> <p>Press the  key to display SEtUP. (Basic setup) See Section 9, Page 10 for detailed description of selections for digits 1 through 5.</p>	<p></p> <p>Press  to display status and select left digit. Press  again to select another digit. Selected digit will flash.</p>	<p></p> <p>Press  to select value for flashing digit. Digit 1: "0"= 20,000 cts. full scale "3"=2,000 cts. full scale Digit 4: "0" = scale and offset method</p>
<p></p> <p>Press the  key to display dEcPt (Decimal point).</p>	<p></p> <p>Press  to display location of decimal point.</p>	<p></p> <p>Press  to change decimal point location.</p>
<p></p> <p>Press the  key to display SCALE (Scale factor).</p>	<p></p> <p>Press  to display value and select left digit. Press again to select another digit.</p>	<p></p> <p>Use  to set digit values. Set value and decimal to 1.0 (1.0000, 01.000, etc)</p>
<p></p> <p>Press the  key to display OFFSt (Zero offset).</p>	<p></p> <p>Press  to display value and select left digit. Press again to select another digit.</p>	<p></p> <p>Use  to set digit values. Set value to 00.000. Decimal point is fixed by Dec.Pt.</p>
<p></p> <p></p> <p>Press the  key. Continue to press  (or  and  simultaneously) until rESET is displayed. The meter will now go to the operating mode and display the value of the input signal.</p>		

12.

PROCESS SIGNAL INPUTS

This section provides basic meter setup instructions for a direct readout in engineering units such as psi, rpm, etc. The signal input may come from a transducer or other voltage or current source. Some menu items, such as leading zero blanking, display filtering, etc., are not discussed in this section and have been set to the most commonly used values. Should these items require change, refer to section 10 for selection information. For configuration of optional boards, see the appropriate section elsewhere in the manual.

12.1 RANGE JUMPER SELECTIONS

Voltage	
Input	Jumpers Required
200mV	E, b
2V	E, a
20V	F, g, b
200V	F, g, a
660V	F, h, a

Current	
Input	Jumpers Required
2mA	D, h, b
20mA	C, h, b
200mA	B, h, b
5A	A, h, b

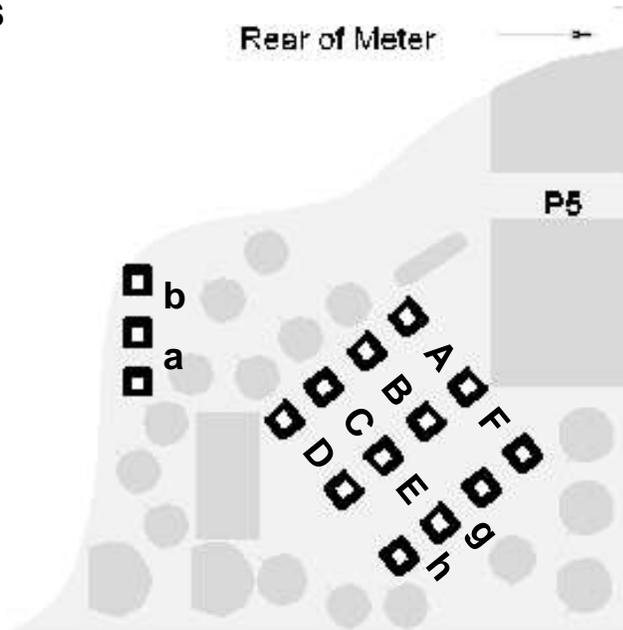


Figure 12.1 DC Signal Conditioner

- Notes**
1. See Section 18 to select 5, 10 or 24Vdc excitation.
 2. Jumpers designated by capital letters require 5mm (0.2in) jumpers. Jumpers designated by lower case letters require 2.5mm (0.1 in) jumpers.
 3. Spare jumpers should be stored on single unused jumper posts not associated with capital letter designations

12.2 MENU SELECTION

Display in engineering units is most easily programmed using the coordinates of 2 points. There are two methods. The first is to enter the 4 values (low signal input, desired reading at the low signal input, high signal input, and desired reading at the high signal input) directly via the front panel pushbuttons or the RS232 interface. The second method is to have the meter read the signal input at a known low value and store that reading as the low in and read a known high signal value and store that value as high in. The low and high known values are entered as the lo rd and hi rd. An example of using the reading the input method of coordinates of 2 points is shown for the load cell meter, Section 14. Selecting the reading method (menu item "config" digit 2 set to 1) overrides either method of scaling selected in "setup". The following example is the 2 coordinate method of directly entering the 4 values.

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

InPut

Press the  key to display InPut (Input type selection).

Note: Selection of input type & range must match jumper selection in Section 12.1.

dC A

Press  until dC A (DC Amperes) is displayed. (dC U if voltage input).

20.03

Press  to select 2.0a, 20.0a, 200.0a (milliamps) or 5.0A (Amps).
(.20U, 2.0U, 20.0U, 200.0U or 660.0U if voltage input)

SEtUP

Press the  key to display SEtUP. (Basic setup) See Page 10 for description of digits 1 through 5.

30000
1 2 3 4 5

Press  to display status and select left digit. Press again to select another digit. Selected digit will flash.

00010
1 2 3 4 5

Press  to select value for flashing digit.
Digit 4: "0"=scale & offset
"1"=2- coordinate

dEcPt

Press the  key to display dEcPt (Decimal point).

d.dddd

Press  to display decimal point location

ddd.dd

Press  to change decimal point location.

Lo in

Press the  key to display Lo in (Low signal input value).

00.000

Press  to display value and select left digit. Press  again to select another digit.. Dec pt. fixed by input range

04.000

Use  to set digit values and set to 04.000 (4 mA). Most significant digit may be set to 0 thru 9 and -0 thru -9.

Lo rd

Press the  key to display Lo rd (Desired meter reading at low signal input).

000.00

Press  to display value and select left digit. Press  again to select another digit.

000.00

Use  to set digit values and set to 000.00 .

Hi in

Press the  key to display Hi in (High signal input value).

00.000

Press  to display value and select left digit. Press  again to select another digit.

20.000

Use  to set digit values and set to 20.000 (20 mA).

Hi rd

Press the  key to display Hi rd (Desired meter reading at high signal input).

000.00

Press  to display value and select left digit. Press  again to select another digit.

100.00

Use  to set digit values and set to 000.00 .

rESEt

100.00

Press the  key. Continue to press  (or  and  simultaneously) until rESEt is displayed. The meter will now go to the operating mode and display the value of the input signal.

13.

STRAIN GAUGES AND POTENTIOMETERS

13.1 RANGE JUMPER SELECTIONS

Voltage

Input	Jumpers Required
200mV	E, b
2V	E, a
20V	F, b, g

Notes

1. See Section 18 to select 10Vdc or to remove jumpers for external excitation.
2. Jumpers designated by lower case letters require 2.5mm (0.1 in) jumpers.
3. Spare jumpers should be stored on single unused jumper posts.

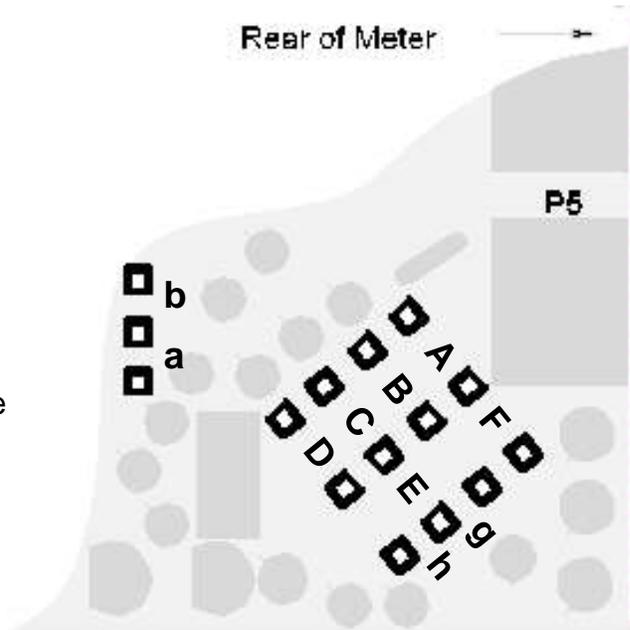


Figure 13. 1 DC Signal Conditioner

13.2 MENU SELECTION

Display in engineering units is most easily programmed using the coordinates of 2 points. There are two methods. The first is to enter the 4 values (low signal input, desired reading at the low signal input, high signal input, and desired reading at the high signal input) directly via the front panel pushbuttons or the RS232 interface. The second method is to have the meter read the signal input at a known low value and store that reading as the low in and read a known high signal value and store that value as high in. The low and high known values are entered as the lo rd and hi rd. An example of using the reading the input method of coordinates of 2 points is shown for the load cell meter, Section 14. Selecting the reading method (menu item "config" digit 2 set to 1) overrides either method of scaling selected in "setup". To set up the range using coordinates of 2 points, values for low signal input, low display, high signal input and high display are entered. The following example uses this scaling method. Signal input is 0 to 20mV and displayed value is 000.00 (at 0mV) to 100.00 (at 20mV). When setting up the meter, it may be necessary to enable some menu items. See Section 9 for further information.



<div style="background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 1.2em; margin-bottom: 5px;">InPut</div> <p>Press the key to display InPut. Note: Range selection must match jumper selection in Section 15. 1 .</p>	<div style="background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 1.2em; margin-bottom: 5px;">rAt 10</div> <p>Press until rAtio (Ratio-metric operation) is displayed.</p>	<div style="background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 1.2em; margin-bottom: 5px;">0.2U</div> <p>Press to select 0.2U, 2.0U or 20.0U (200mV, 2V or 20Vdc).</p>
---	---	--

MENU KEY



DIGIT SELECT KEY



VALUE SELECT KEY



SEtUP

Press the  key to display SEtUP. (Basic setup). See Section 9 for detailed description of selections for digits 1 through 5.

30000

Press  to display status. Press  again to select another digit. Selected digit will flash.

00010

Press  to select value. Digit 1: "0" = 20,000 cts. FS
"2" = LSD fixed zero
"3" = 2,000 cts. FS
Digit 4: "1" for 2 point scaling

dEcPt

Press the  key to display dEcPt (Decimal point).

d.dddd

Press  to display decimal point location.

ddd.dd

Press  to select decimal point location.

Lo in

Press the  key to display Lo in (Low signal input value).

.00000

Press  to display value. Press  again to select another digit. **Note:** Decimal point is fixed by input range selection.

.00000

Use  to set digit values and set to .00000 (0mV). **Note:** Most significant digit may be set to 0 thru 9 and -0 thru -9.

Lo rd

Press the  key to display Lo rd (Desired meter reading at low signal input).

000.00

Press  to display value. **Note:** Decimal point is fixed by dEcPt selection.

000.00

Use  to set digit values and set to 000.00

Hi in

Press the  key to display Hi in (High signal input value).

.00000

Press  to display value. **Note:** Decimal point is fixed by input range selection.

.02000

Use  to set digit values and set to .02000 (20mV)

Hi rd

Press the  key to display Hi rd (Desired meter reading at high signal input).

000.00

Press  to display value. **Note:** Decimal point is fixed by dEcPt selection.

100.00

Use  to set digit values and set to 100.00

rESEt

Press the  key. Continue to press  (or  and  simultaneously) until rESEt is displayed. The meter will now go to the operating mode and display the value of the input signal

100.00

14.

LOAD CELLS AND MICROVOLT INPUTS

This section provides setup instructions for use as a microvoltmeter or with load cells and strain gauges. 10 Volt excitation will power up to 4 350 Ohm load cells. Sense leads may be used to compensate for lead resistance of the excitation supply. For configuration of optional boards, see the appropriate section elsewhere in the manual.

14.1 RANGE JUMPER LOCATIONS

Input	Jumper Locations	Full Scale Display Scale factor = 1
20mV	none	20000
50mV	a	50000
100mV	b	10000
250mV	c	25000
500mV	d	50000

- Notes
1. See Section 22 to select 10V excitation.
 2. Jumpers are 2.5mm (0.1 in).

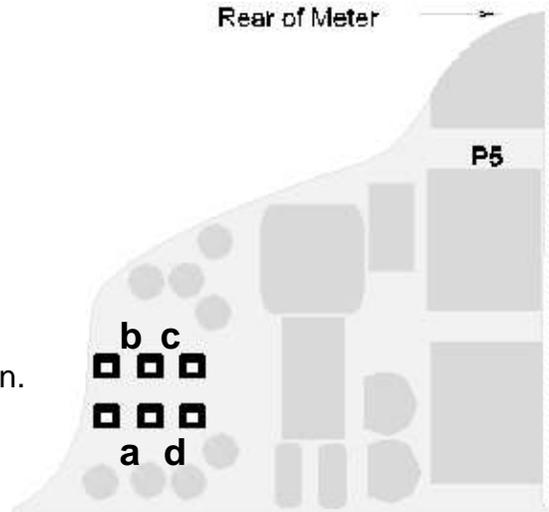


Figure 14.1 Load Cell Signal Conditioner

14.2 MENU SELECTION

To scale the meter using the reading method of coordinates of 2 points, the low signal input and high signal input are read directly by the meter and are stored as Lo in and Hi in. For example, the full scale range of a load cell is 500 pounds and has an output of 2mV/V. With 10V excitation, the full scale range of 20mV selected. The resolution is .01 pounds. With no weight on the scale, the meter should read 0.00 and with a 500 pound weight on the scale the meter should display 500.00 pounds. With no weight on the scale, press the menu key to select Lo in and press the digit select key. The meter will take readings and display the millivolt value of the input signal. Pressing the value select key will store this reading as Lo in. Press the menu key to select Hi in, place the 500 pound weight on the scale and repeat the procedure the same as for Lo in. Press the menu key to select lo rd (Low reading) and enter 000.00, then press the menu key to select Hi rd (High reading) and enter 500.00. Advantages of this method are accuracy, since reading the value corrects for any error in the transducer, and ease of recalibration. To recalibrate the meter, take readings at 0 and 500 pounds, Lo rd and Hi rd do not need to be reentered. If a 500 lb. weight was not available, the same result can be achieved by using any known weight. During setup, it may be necessary to enable some menu items. See Section 9 for further information. See Section 12, Process Meters, for an example scaling by direct entry of the input values.

<div style="border: 1px solid black; padding: 2px; display: inline-block;"> MENU KEY </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> DIGIT SELECT KEY </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> VALUE SELECT KEY </div>
<div style="border: 1px solid black; padding: 2px; display: inline-block; background-color: black; color: white; font-family: monospace; font-size: 1.2em;">InPut</div>	<div style="border: 1px solid black; padding: 2px; display: inline-block; background-color: black; color: white; font-family: monospace; font-size: 1.2em;">Strn</div>	<div style="border: 1px solid black; padding: 2px; display: inline-block; background-color: black; color: white; font-family: monospace; font-size: 1.2em;">20.0</div>
Press the key to display InPut (Input type selection).	Press until Strn (ratio-metric) is displayed.	Press to select 20.0, 50.0, 100.0, 250.0 or 500.0mV

MENU KEY 

DIGIT SELECT KEY 

VALUE SELECT KEY 

 <p>Press the  key to display ConFG(configuration). See Section 10 for detailed description of digits 1 thru 5.</p>	 <p>Press  to display status. Press  again to select digit. Selected digit will flash.</p>	 <p>Press  to select value. Digit 2:"1"= Reading input 2 coordinate method of scaling.</p>
---	---	--

 <p>Press the  key to display dEcPt (Decimal point).</p>	 <p>Press  to display decimal point location.</p>	 <p>Press  to change decimal point location.</p>
--	--	--

 <p>Press the  key. Continue to press  (or  and  simultaneously) until rESEt is displayed. The meter will go to the operating mode and display the value of the input signal.</p>	
---	---

 <p>Press the  key to display Lo in (Low signal input value). Apply an input for a known low value.</p>	 <p>Press  to display input signal. Meter will momentarily blank and then display a reading.</p>	 <p>Use  to store reading as low input</p>
---	---	--

 <p>Press the  key to display Hi in (High signal input value). Apply an input for a known high value.</p>	 <p>Press  to display input signal. Meter will momentarily blank and then display a reading.</p>	 <p>Use  to set digit values and set to 20.000mV.</p>
---	---	---

 <p>Press the  key to display Lo rd (Desired meter reading at low signal input).</p>	 <p>Press  to display value and select left digit. Press  again to select another digit. Decimal point set by dEc.Pt</p>	 <p>Use  to set digit values and set to 0.</p>
--	---	--

 <p>Press the  key to display Hi rd (Desired meter reading at high signal input).</p>	 <p>Press  to display value and select left digit. Press  again to select another digit. Decimal point set by dEc.Pt .</p>	 <p>Use  to set digit values and set to 500.00.</p>
---	---	---

 <p>Press the  key. Continue to press  (or  and  simultaneously) until rESEt is displayed. The meter will go to the operating mode and display the value of the input signal.</p>	
---	---

15.

DUAL ALARM OUTPUTS

15.1 OPERATING MODE MENU SELECTION

When setting up the meter, it may be necessary to enable some of the menu items. See Section 9 for further information.

MENU KEY 	DIGIT SELECT KEY 	VALUE SELECT KEY 
<p></p> <p>Press the  key until ALSEt (Alarm setup) is displayed. See Section 10, ALSEt for detailed selection information for Digits 1 through 5.</p>	<p></p> <p>Press  to display status. Press  again to select digit. Selected digit will flash.</p>	<p></p> <p>Press  to select value for flashing digit</p> <p>Digit 1: Relay state in alarm Digit 2: Latching or non-latching output Digit 3: Alarm high, low, or disabled Digit 4: Alarms on net or gross Digit 5: Time delay</p>
<p></p> <p>Press the  key and SP1_d (Alarm 1 deviation).</p>	<p></p> <p>Press  to display value. Press  again to select digit. Selected digit will flash.</p>	<p></p> <p>Using  to select digit and  to set digit value, enter deviation value for setpoint 1 Relays turn on and off at setpoint value plus deviation.</p>
<p></p> <p>Press the  key and SP2_d (Alarm 1 deviation).</p>	<p></p> <p>Press  to display value. Press  again to select digit. Selected digit will flash.</p>	<p></p> <p>Using  to select digit and  to set digit value, enter deviation value for setpoint 2 Relays turn on and off at setpoint value plus deviation.</p>

15.2 NORMAL OPERATION

When deviation is set to zero, the alarm energizes at and above the setpoint and deenergizes below the setpoint if high alarm is selected. The alarm energizes at and below the setpoint and deenergizes above the setpoint if low alarm is selected. The setpoint value is not displayed if the alarm is disabled.

15.3 DEVIATION

If a positive or negative value is programmed in deviation, that value is added to the setpoint value and this becomes the point where the relays energize or de-energize. For example, a 55 gallon drum is to be filled from a large tank. The setpoint is 55.0 and when this value is reached, the relay de-energizes and shuts off the valve at the tank. However, the pipe between the tank and the drum contains 1.5 gallons of fluid and this continues to run and the drum overflows. Since the amount of fluid in the pipe will remain constant when the valve is shut off, a deviation value of -1.5 is programmed. Now when the drum is filled, the valve is shut off at 53.5 gallons and the additional 1.5 gallons in the pipe fills the drum to 55 gallons. This allows the operator to set the setpoint to correct value for any type of container and the 1.5 gallons in the pipe is always taken into account automatically.

15.4 VIEWING AND CHANGING SETPOINTS

When viewing or changing the setpoint values, it is not necessary to enter the setup menu. This allows the meter to continue conversions and provide outputs when the setpoints are displayed. To view setpoints, Lockout 4, "view alarm setpoints" must be enabled. To change setpoint values, both Lockout 4, "view alarm setpoints" and Lockout 3, "alarm setpoints programming" must be enabled.

<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;"> MENU KEY MENU </div>	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;"> digit SELECT KEY PEAK </div>	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;"> VALUE SELECT KEY RESET </div>
<div style="text-align: center; font-size: 24px; font-weight: bold; background-color: black; color: white; padding: 5px; margin-bottom: 10px;">300.24</div> <p>Press the ALARMS key to display Alarm 1 value.</p>	<div style="text-align: center; font-size: 24px; font-weight: bold; background-color: black; color: white; padding: 5px; margin-bottom: 10px;">200.00</div> <p>Alarm value blinks and Alarm 1 LED indicator lights. Press PEAK to select digit.</p>	<div style="text-align: center; font-size: 24px; font-weight: bold; background-color: black; color: white; padding: 5px; margin-bottom: 10px;">295.00</div> <p>Using PEAK to select digit and RESET to set digit value, enter setpoint 1 value.</p>
<div style="text-align: center; font-size: 24px; font-weight: bold; background-color: black; color: white; padding: 5px; margin-bottom: 10px;">395.00</div> <p>Press ALARMS key again to display Alarm 2 value</p>	<div style="text-align: center; font-size: 24px; font-weight: bold; background-color: black; color: white; padding: 5px; margin-bottom: 10px;">395.00</div> <p>Alarm value blinks and Alarm 2 LED indicator lights. Press PEAK to select digit.</p>	<div style="text-align: center; font-size: 24px; font-weight: bold; background-color: black; color: white; padding: 5px; margin-bottom: 10px;">305.00</div> <p>Using PEAK to select digit and RESET to set digit value, enter setpoint 2 value.</p>
<div style="text-align: center; font-size: 24px; font-weight: bold; background-color: black; color: white; padding: 5px; margin-bottom: 10px;">300.24</div> <p>Press ALARMS key again. The meter resets and then displays the present reading.</p>		

16.

ANALOG OUTPUT

The analog output option provides a 0 to 20mA and a 0 to 10Vdc linear signal derived from the displayed reading. The low signal output and high signal output may be set to equal any displayed value. Although both outputs are available, only one is calibrated to specifications. The other output is accurate to +/-1% of the displayed value typical (2%max).

16.1 4 TO 20MA OUTPUT SCALING

The output is scaled by selecting a displayed value for the low signal output and a displayed value for the high signal output. For a current output, the low value is 0mA and the high output is 20mA. To scale a signal for 4 to 20 mA, the following procedure must be used:

1. Desired display value for 20mA - Desired display value for 4mA = Display span
2. Display span / 4 = Offset value
3. Desired display value for 4mA - Offset value = **An Lo**
4. **An Hi** = Desired display value for 20mA

16.2 ANALOG OUTPUT SETUP SOFTWARE

The following menu items are accessible only with an Analog Output option installed and appropriate lockouts enabled. See Section 10 for further information. Setup Example: 4mA to 20mA out = 5000 counts to 15000 counts (See Section 16.1).

		
<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">  </div> <p>Press the  key until An Set (Setup of analog output) is displayed. See Section 10, An Set for detailed selection information for Digits 1 through 6.</p>	<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">  </div> <p>Press  to display status. Press  again to select digit. Selected digit will flash.</p>	<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">  </div> <p>Press  to select value for flashing digit Digit 3: Source Digit 4: Current or Voltage Digit 5: Filtering</p>
<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">  </div> <p>Press the  key until An Lo (Displayed value at 0mA or 0V) is displayed.</p>	<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">  </div> <p>Press  to display value. Press  again to select digit. Selected digit will flash.</p>	<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">  </div> <p>Press  to select value for flashing digit</p>
<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">  </div> <p>Press the  key until An Hi (Displayed value at 20mA or 10V) is displayed.</p>	<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">  </div> <p>Press  to display value. Press  again to select digit. Selected digit will flash.</p>	<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">  </div> <p>Press  to select value for flashing digit</p>

17.

RS-232 AND RS-485 INTERFACE

17.1 OPERATING MODE MENU SELECTION

The following menu items are accessible only with an RS-232 or RS-485 option installed and appropriate lockouts enabled. See Section 9 for further information.

MENU KEY	DIGIT SELECT KEY	VALUE SELECT KEY
<div style="text-align: center; border: 1px solid black; background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 24px; margin-bottom: 10px;">SEr 1</div> <p>Press the key until SEr 1 (Serial interface setup 1) is displayed.</p>	<div style="text-align: center; border: 1px solid black; background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 24px; margin-bottom: 10px;">000</div> <div style="text-align: center; font-size: 12px; margin-bottom: 5px;">1 2 3 4 5</div> <p>Press to display status. Press again to select digit. Selected digit will flash.</p> <p>Digit 3: Output filtering</p> <p>Digit 4: Baud rate</p> <p>Digit 5: Output update rate</p>	<div style="text-align: center; border: 1px solid black; background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 24px; margin-bottom: 10px;">158</div> <div style="text-align: center; font-size: 12px; margin-bottom: 5px;">1 2 3 4 5</div> <p>Press to select value for flashing digit</p> <p>3: "0"- Send unfiltered signal "1"- Send filtered signal</p> <p>4: "0" - "6" -300 to 19.2K baud</p> <p>5: "0"- "9"-60/sec to 1/15min</p>
<div style="text-align: center; border: 1px solid black; background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 24px; margin-bottom: 10px;">SEr 2</div> <p>Press the key until SEr 2 (Serial interface setup 2) is displayed.</p>	<div style="text-align: center; border: 1px solid black; background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 24px; margin-bottom: 10px;">0000</div> <div style="text-align: center; font-size: 12px; margin-bottom: 5px;">1 2 3 4 5</div> <p>Press to display status. Press again to select digit.</p> <p>Digit 2: Line feed</p> <p>Digit 3: Alarm data sent with meter readings</p> <p>Digit 4: Control of output</p> <p>Digit 5: Meter address</p>	<div style="text-align: center; border: 1px solid black; background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 24px; margin-bottom: 10px;">001E</div> <div style="text-align: center; font-size: 12px; margin-bottom: 5px;">1 2 3 4 5</div> <p>Press to select value for flashing digit</p> <p>2: "0"-no line feed "1"-<LF> after <CR></p> <p>3: "0"-no alarm data "1"-alarm data sent</p> <p>4: "0"-continuous output "1"-output on command</p> <p>5: "1" to "F" & "0." to "F." - Meter #1 to Meter #31</p>
<div style="text-align: center; border: 1px solid black; background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 24px; margin-bottom: 10px;">SEr 3</div> <p>Press the key until SEr 3 (Serial interface setup 3) is displayed.</p>	<div style="text-align: center; border: 1px solid black; background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 24px; margin-bottom: 10px;">00000</div> <div style="text-align: center; font-size: 12px; margin-bottom: 5px;">1 2 3 4 5</div> <p>Press to display status. Press again to select digit.</p> <p>Digit 1: RS485 duplex mode</p> <p>Digit 2: Not used</p> <p>Digit 3: RS232 RTS type</p> <p>Digit 4: Carriage Return (and LF, if selected)</p>	<div style="text-align: center; border: 1px solid black; background-color: black; color: white; padding: 5px; font-family: monospace; font-size: 24px; margin-bottom: 10px;">10102</div> <div style="text-align: center; font-size: 12px; margin-bottom: 5px;">1 2 3 4 5</div> <p>Press to select value for flashing digit</p> <p>1: "0"-Full duplex "1"-Half duplex</p> <p>2: "0"-Spare</p> <p>3: "0"-Nonlatching RTS "1"-Latching RTS</p> <p>4: "0." Only at end of all items "1"-At end of each item (if alarm values sent, only at end)</p>



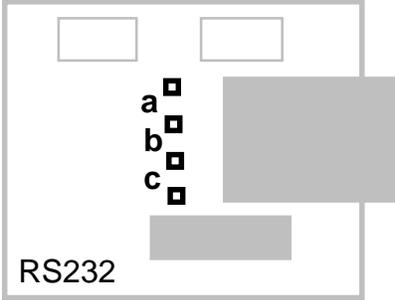
<p>SEr 3(Serial interface setup 3) continued</p>	<p>Press $\begin{matrix} \triangleright \\ \text{PEAK} \end{matrix}$ to display status. Press $\begin{matrix} \triangleright \\ \text{PEAK} \end{matrix}$ again to select digit. Digit 5: Data sent via serial communications</p>	<p>Press $\begin{matrix} \triangle \\ \text{RESET} \end{matrix}$ to select value for flashing digit 1: "0"-Net and gross "1"-Net only "2"-Spare "3"-Nonlatching RTS "4"-Latching RTS</p>

17.2 JUMPER SELECTION

RS232

- Jumper a** - installed for normal operation
- Jumper b** - installed when used as slave display
- Jumper c** - provides pull up resistor on RTS line

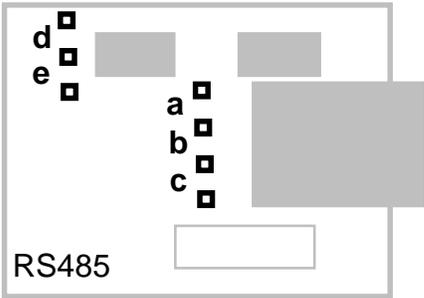
Shipped with jumpers a and c installed



RS485

- Jumper a and c** - add 121 ohm load resistors and are installed with long cables. If multiple meters are on same line, only the last meter in the line should be jumpered.
- Jumper d** - installed for full duplex operation
- Jumper e** - installed for half duplex operation

Shipped with jumper d installed.



18.

PARALLEL BCD OUTPUT

18.1 OPERATING MODE MENU SELECTION

The following menu items are accessible only with a BCD option installed and appropriate lockouts enabled. See Section 9 for further information.

MENU KEY	DIGIT SELECT KEY	VALUE SELECT KEY
Press the key until SEr 1 (Serial interface setup 1) is displayed.	Press to display status. Press again to select digit. Selected digit will flash. Digit 3: Output filtering Digit 5: Output update rate	Press to select value for flashing digit 3: "0"-Send unfiltered signal "1"-Send filtered signal 5: "0"-Line frequency "1" to "9" - Batch display rate (3.5/sec) to Batch display rate / 256 (1 every 15 min.)

18.2 BCD OUTPUT LEVELS

The BCD option provides isolated, buffered, stored, 3-state parallel outputs that are selectable for either 0 to 5Vdc logic levels (LSTTL, CMOS compatible) or 0 to 15Vdc. Selection jumpers are located on the BCD board. BCD outputs are positive true. Polarity bit is positive true for +sign.

LOGIC LEVEL	JUMPER REQUIRED
0 to 5Vdc	b
0 to 15Vdc	a

18.3 BCD CONTROL SIGNALS

Enable Logical 0 - All outputs go to the high impedance state
 Logical 1 - BCD information is available at outputs.

$\overline{\text{BCD Hold}}$ Logical 0 - BCD from last update prior to BCD Hold going low is stored
 Logical 1 - BCD information updates at selected rate.

$\overline{\text{Data Ready}}$ Logical 0 - BCD outputs are valid
 Logical 1 - BCD outputs are not valid

19.

5, 10 AND 24 VDC EXCITATION OUTPUTS

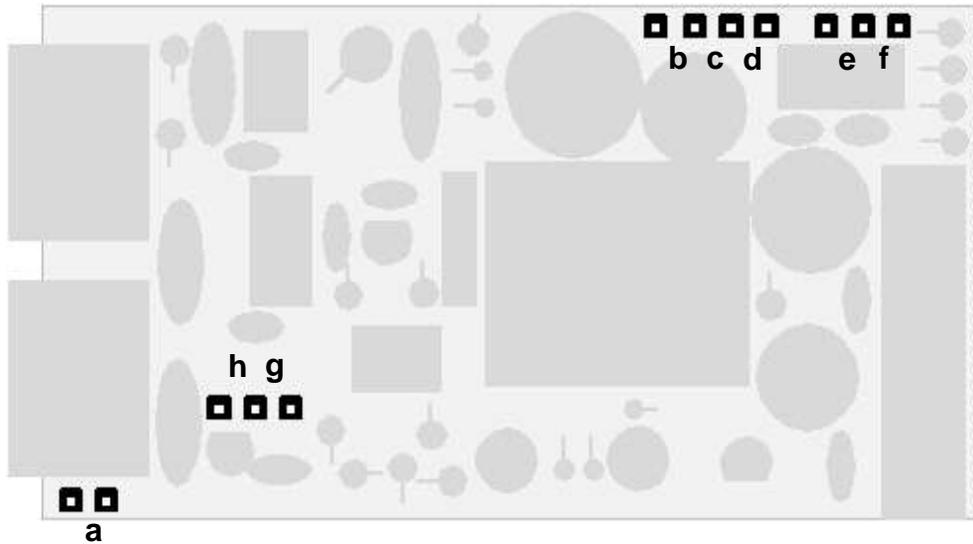
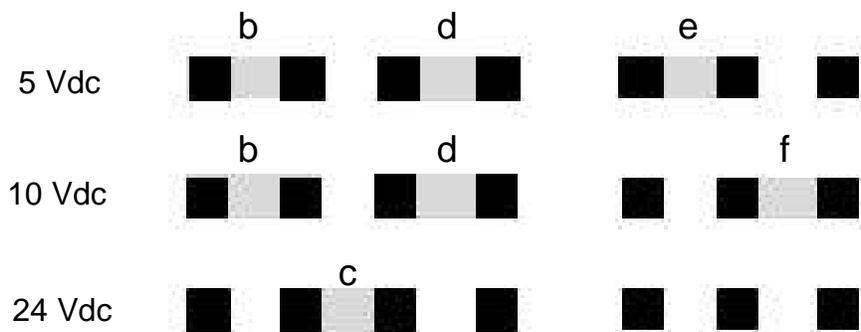


Figure 18.1 - Power Supply

19.1 SELECTION OF 5, 10 OR 24VDC OUTPUT

Voltage Output	Jumper Locations
5 Vdc	b, d and e
10 Vdc	b, d and f
24 Vdc	c



19.2 SELECTION OF OTHER JUMPERS

- Jumper ' a ' - Front panel menu lockout, locked when installed (see Section 9)
- Jumper ' g ' - Provides +5V power output at P1-4 when installed
- Jumper ' h ' - Connects "Digital Input B" to P1-4 when installed

20.

DIGITAL CONTROL INPUTS

20.1 FUNCTION OF DIGITAL CONTROL INPUTS

- Tare Logical 0 - The present display value is set to zero and stored as an offset value.
 Logical 1 - The displayed value is equal to the signal input minus the tare value.
- Peak Display Logical 0 - The peak value of the input signal is displayed.
 Logical 1 - The present value of the input signal is displayed.
- Hold Logical 0 - The meter display and outputs are held at the last reading.
 Logical 1 - The display and outputs are updated normally
- Reset Logical 0 - The microcomputer reads and resets the meter to nonvolatile memory values
 Logical 1 - The meter display and outputs operate normally.
- Function Reset Logical 0 - The microC resets peak to present value and resets alarms.
 Logical 1 - The meter display and outputs operate normally.
- Tare Reset Logical 0 - The Tare value in nonvolatile memory is set to zero.
 Logical 1 - Tare values may be stored in nonvolatile memory
- Display Blank Logical 0 - The display LED lamps and segments are turned off
 Logical 1 - The display operates normally.

20.3 MENU SELECTIONS

MENU KEY	DIGIT SELECT KEY	VALUE SELECT KEY
Press the key until SEtup (Basic meter setup) is displayed.	Press to display status. Press again to select digit. Selected digit will flash. Digit 5: digital inputs A & B at J1, Pins 5 and 4.	Press to select value for flashing digit 0 A: Reset B: Meter Hold 1 A: Function Reset B: Peak display 2 A: Meter Hold B: Peak 3 A: Meter Hold B: Tare 4 A: Peak B: Tare 5 A: Reset B: Tare 6 A: Reset B: Tare 7 A: Tare Reset B: Tare 8 A: Blank B: Tare 9 A: Reset B: Blank A A: Func Reset B: Tare B A: Display Item B: Tare C A: Display Item B: Blank D A: Reset B: Display Item E A: Funct. Rst. B: Disp. Item D A: Hold B: Disp. Item

21.

MOUNTING & MECHANICAL ASSEMBLY, MICRO-S

21.1 REMOVING THE REAR PANEL

To remove the rear panel, first remove any connectors that are installed. Press down on both rear panel retaining tab releases(see Fig.23.1) and pull the top of the rear panel away from the case. The bottom of the rear panel will now lift out.



Figure 21.1

21.2 REMOVING THE METER FROM THE CASE

After removing the rear panel, the meter can be taken out of the case by carefully grasping the power supply board and signal conditioner board at the connectors and sliding the unit out the back of the case. See Figure 23.2.

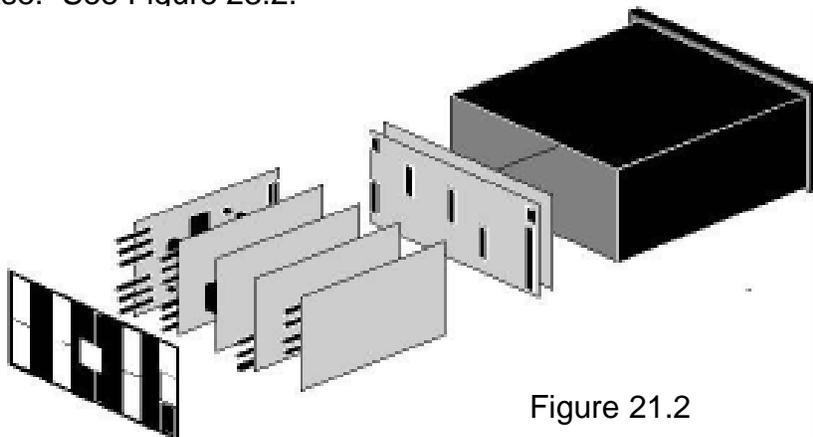


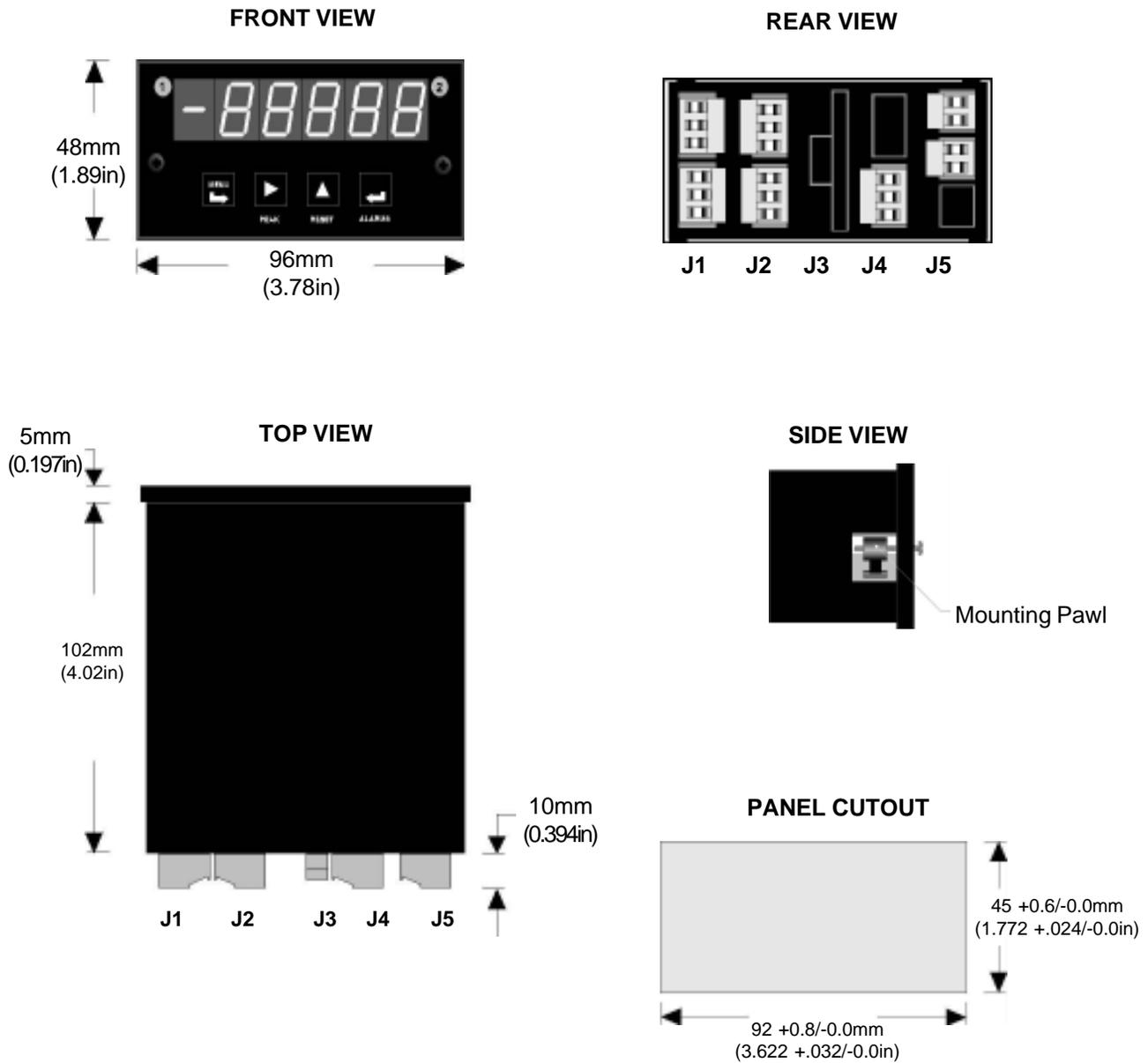
Figure 21.2

21.3 REASSEMBLING THE METER

Reverse the preceding procedures to reinstall the meter in the case. After the meter is in the case, insert the bottom tabs on the rear panel into the case first. Care must be taken to ensure the printed circuit boards are properly aligned by the board retaining pins on the inside of the rear panel.

21.4 PANEL MOUNTING, MICRO-S

Ensure that the gasket is in place. Turn the two mounting screws counterclockwise until the space between the mounting pawl and the bezel is greater than the panel thickness. Insert the meter in the panel cutout. Turn the mounting screws clockwise until the meter is securely mounted in the panel. Do not overtighten the mounting screws.



22.

MOUNTING & MECHANICAL ASSEMBLY, MIGHTY-1S

22.1 REMOVING THE REAR PANEL

To remove the rear panel, first remove any connectors that are installed. Remove the 6 screws holding the back plate in place (see Fig. 25.1) and pull the rear panel away from the case.

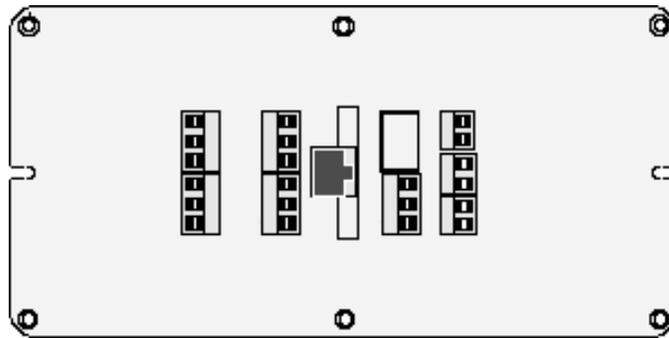


Figure 22.1

22.2 REMOVING THE METER FROM THE CASE

After removing the rear panel, the meter can be taken out of the case by carefully grasping the power supply board and signal conditioner board at the connectors and sliding the unit out the back of the case. See Figure 25.2.

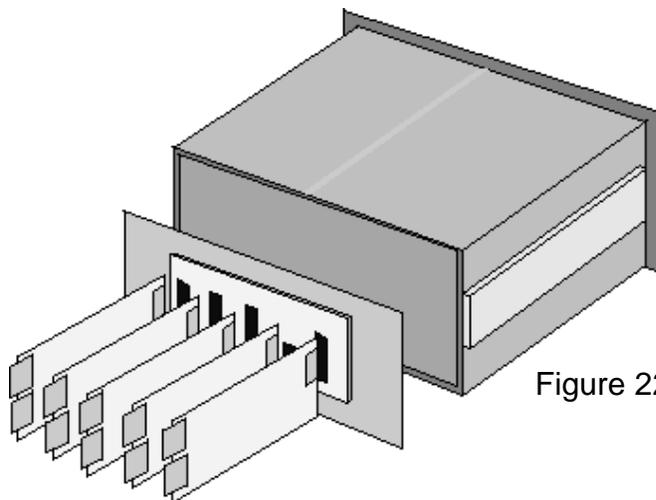


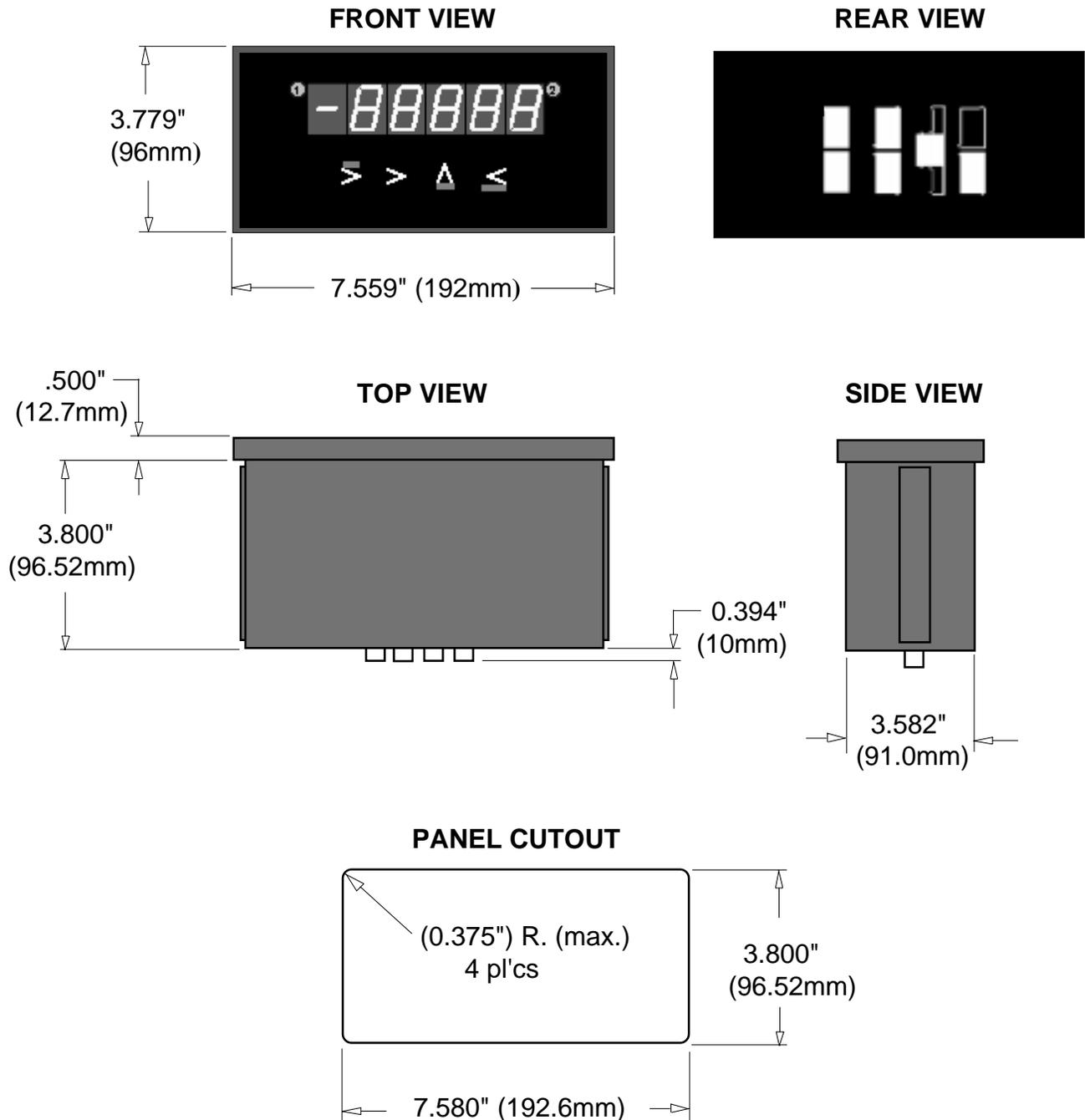
Figure 22.2

22.3 REASSEMBLING THE METER

Reverse the preceding procedures to reinstall the meter in the case. After the meter is in the case, align the board with the back plate holes and install and tighten the six back plate screws.

22.4 PANEL MOUNTING, MIGHTY-1S

The Mighty-1S is mounted to a panel by metal slides located on each side of the case. To mount the meter into a panel, remove the two set-screws from the rear of the panel that hold the slides. Remove the two slides. Ensure that the gasket is in place. Place the Mighty-1S into the panel cutout, replace the two slides and the two set screws. Tighten the set screws until the front edge of the plates are firmly held against the rear of the panel.



23.

MOUNTING & MECHANICAL ASSEMBLY, MIGHTY- 4S

23.1 OPENING THE CASE

To remove the display board assembly from the case, loosen the outside nut on the cable feed-through located on the end of the case so the cable is free to move. Remove the 8 bezel screws from the bezel. Remove the bezel and window. Using a 1/4" nut driver, remove the (8) hex spacers. The display board assembly may now be removed from the main portion of the case.



Figure 23.1

23.2 ACCESSING THE I/O CONNECTORS

After removing the display board assembly, all plug-in boards and their I/O connectors are accessible. Boards may be added or deleted by first removing the plug-in I/O connectors and then the (4) screws securing the module hold-down board. See Figure 27.2.

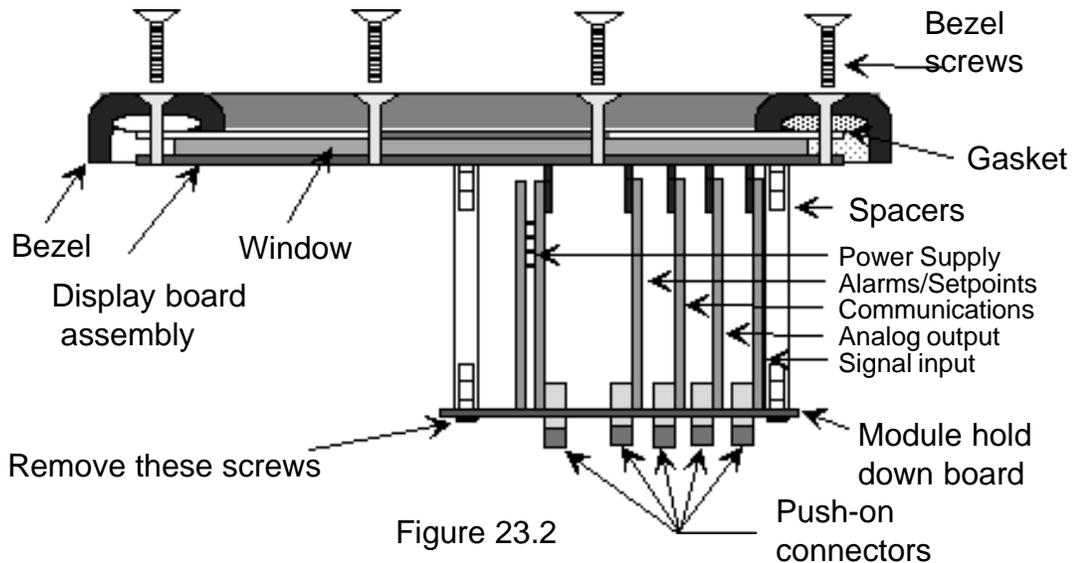


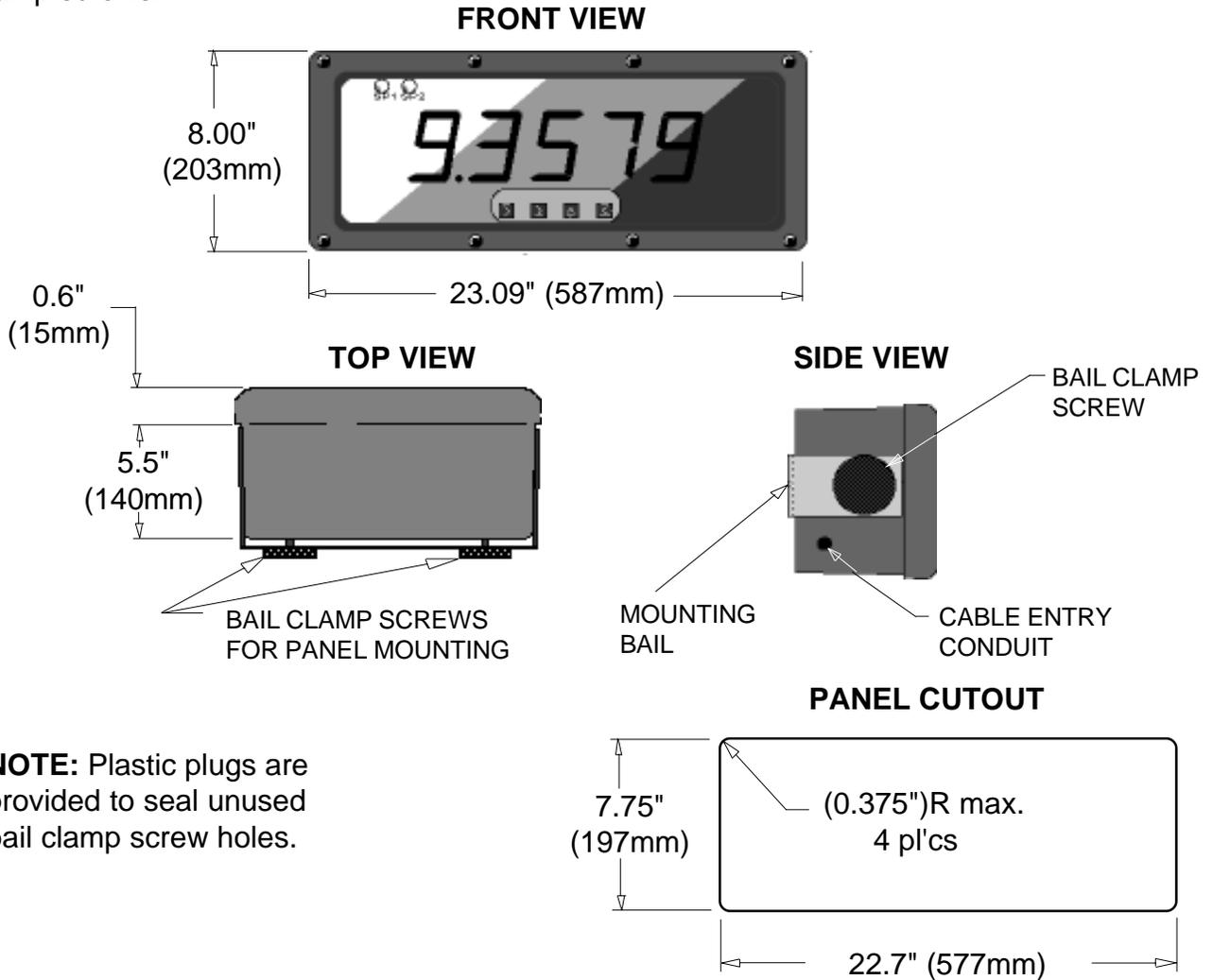
Figure 23.2

23.3 REASSEMBLING THE DISPLAY

Reverse the preceding procedures to reassemble the case. First install the display board assembly and the (8) hex spacers. Next install the window and bezel with the (8) bezel screws. Care must be taken to ensure the printed circuit board, window and gasket are properly aligned with the 8 mounting screws holes in the bezel assembly.

23.4 PANEL MOUNTING, MIGHTY-4S

Remove the panel mount bail and bail clamp screws. Install the display through panel cutout. Using the rear screw insert positions, replace the panel mount bail and bail clamp screws and secure the panel mount bail firmly against the back of the panel. Do not over tighten the bail clamp screws.

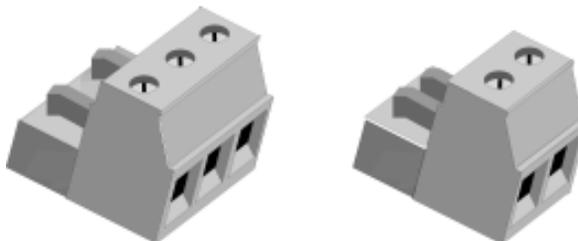


NOTE: Plastic plugs are provided to seal unused bail clamp screw holes.

24.

CONNECTORS, ALL MODELS

The Micro Series meters use UL/VDE rated screw terminal connectors that plug into mating jacks on the plug-in modules.



25.

SPECIFICATIONS

BASIC METER

Display

Type 5 LED, 7-segment, 14.2mm (.56") high digits & 3 LED indicators
 Color Red or green
 Range -99999 to +99999 and -99990 to +99990

A to D Conversion

Rate 60/s for 60 Hz NMR, 50/s for 50 Hz NMR
 Output Update Rate 56/s at 60 Hz, 47/s at 50 Hz
 Display Update Rate 3.5/s at 60 Hz, 3/s at 50 Hz

Noise Rejection

CMV from DC to 60 Hz Safety-rated to 250Vac, 4.2kVp per High Voltage Test
 CMR from DC to 60 Hz 130 dB
 NMR at 50/60 Hz 90 dB with minimum digital filtering

External Inputs/Outputs (CMOS/TTL Levels)

Hold input 0 - holds display and outputs
 Peak input 0 - displays peak value
 Tare input 0 - offsets input value to zero
 Reset input 0 - resets all meter functions
 Function Reset input 0 - resets tare NVM to zero
 Tare Reset input 0 - resets peak values and alarms
 Display Blank input 0 - Turns off the display LED's

ACCURACY

Span Tempco 0.003% of reading/°C
 Load Cell Meter only 0.0015% of reading/°C
 Zero Tempco 0.2 uV/°C
 Reference Junction 0.03 degree/degree

Load Cell Inputs

INPUT RANGE	RESOLUTION	OUTPUT ZERO RANGE	OUTPUT SPAN RANGE	ERROR AT 25°C
20.000 mV	1 uV	-99,999	0	.01% Full Scale
50.000 mV	2.5 uV	to	to	Scale
100.00 mV	5 uV	+99,999	+/-99,999	+/-1 Ct.
250.00 mV	12.5 uV			
500.00 mV	25 uV			

DC Volts

VOLTAGE RANGE	RESOLUTION	INPUT OHMS	ERROR AT 25°C
200.00 mV	10 uV	1 G	.01% Full Scale
2.0000 V	100 uV	1 G	Scale
20.000 V	1 mV	1 M	+/-2 Ct.
200.00 V	10 mV	1 M	
660.0 V	100 mV	1 M	

Ratio

VOLTAGE RANGE	RESOLUTION	INPUT OHMS	ERROR AT 25°C
200.00 mV	10 uV	1 G	.01% Full Scale
2.0000 V	100 uV	1 G	Scale
20.000 V	1 mV	1 M	+/-2 Ct.

DC Amperes

CURRENT RANGE	RESOLUTION	INPUT OHMS	ERROR AT 25°C
2.0000 mA	0.1 uA	100	.01% Full Scale
20.000 mA	1.0 uA	10	Scale
200.00 mA	10 uA	1	+/-2 Ct.
5.000 A	1.0 mA	.01	

POWER SUPPLIES

Input Voltage (std)	85 to 264 Vac, 90 to 370 Vdc
Input Voltage (opt)	8 to 28 Vac, 9 to 37 Vdc
Frequency	DC and 47 to 440 Hz
Consumption	5.3 Watts max.
Excitation Power Supplies	
Outputs	5 Vdc, 5%, 100 mA max 10 Vdc, 5%, 120 mA max. 24 Vdc, 5%, 40 mA max.
Isolation	Safety-rated to 250Vac, 4.2kVp per High Voltage Test

OUTPUT OPTIONS COMMON SPECIFICATIONS

Power	Provided by basic meter
Isolation	Safety-rated to 250Vac, 4.2kVp per High Voltage Test
Update Rate	56/s at 60 Hz, 47/s at 50 Hz

DUAL CONTROLLER OPTION

Setup	setpoint values may be entered by front panel pushbuttons or via RS-232 or RS-485
Output Operation	either output may be set to operate above, below or around the setpoint, latching or non-latching or output disabled
Time Delay	selectable time delay of output status change of 1 to 128 readings

Alarm Status Indicators

Type	2 red LED lamps
------------	-----------------

Relay Output

Contact Rating	10 A @ 240 Vac, 8 A @ 24 Vdc
Pickup	26 ms typ.
Release	22 ms typ.

Solid State Relay Output

Voltage Rating	125Vac, 150 Vdc max.
Current Rating	120 mAac, 240mAdc
Response to input signal	17 ms typ.

ANALOG OUTPUT OPTION

Power	supplied by basic meter
Accuracy	basic meter +/-0.1% Analog Full Scale
Response Time	17 ms for unfiltered input, same as basic meter for filtered input
Compliance 0 to 20 mA	12 V (0 to 600 Ohms)
0 to 10 V	2 mA (5 kOhms min.) load

RS-232 / RS-485 INTERFACE OPTION

Type	full or half duplex (RS-485)
Baud Rates	300, 600, 1200, 2400, 4800, 9600, 19200
Signal Levels	Meet RS-232 and RS-485 standards

BCD OUTPUT OPTION

Type	3-state, stored, parallel
Signal Levels	LSTTL, CMOS compatible
Controls	BCD Enable, Hold, Data Ready

ENVIRONMENTAL

Operating Temperature	0°C to 55°C
Storage Temperature	-40°C to 85°C
Relative Humidity	90% from 0°C to 40°C

There are three methods of scaling the meter. Method 1 reads the values when the meter is connected to a sensor or transducer. Method 2 uses Scale Factor and Offset ($MX + b$), see SCALE and OFFSET below. Method 3 uses Coordinate of Two Points. Methods 2 and 3 do not require that the meter be connected to a sensor or transducer and the scaling information is usually supplied from the sensor's calibration certificate.

Coordinates of Two Points With this method of scaling (Method 3), you enter known values for zero and full scale. For example if the meter is connected to a 4/20mA pressure sensor for a reading of 0 to 100.0 PSI, you would input 4mA = 000.0 and 20 mA = 100.0.

Note: Method 2 (Scale Factor and Offset) is the default method of scaling shipped from the factory.

Scale With this method of scaling (Method 2), you enter calculated values for Scale (scale factor) and Offset (at zero). The scale factor may be set from +/-0.0001 to +/-9.9999. When scale is selected, the most significant digit flashes allowing the value of that digit to change, pushing the digit select key moves the flashing digit to the right. When the right hand digit is flashing, pushing the digit select key again causes the decimal point to be displayed. Pushing the value select key changes the location of the decimal point. When decimal XXXXX. is reached, the next time the digit select key is depressed, the display goes back to the scale factor.

Offset Offset is used in conjunction with Scale above. An offset value from -99,999 to 99,999 may be entered in the offset menu item to be used to offset the zero point.

Deviation Applies to Setpoint Alarms. Either alarm may operate in the deviation mode. In the menu item "dEU1b & dEU2b", a value is entered equivalent to the amount above and below the setpoint at which the alarm operates. For example, if the value entered is 100, and the setpoint value is 1000, the alarm would energize above 1100 and below 900.

Hysteresis Applies to Setpoint Alarms. Either alarm may operate in the hysteresis mode. In the menu item "dEU1H & dEU2H", a value is entered equivalent to the amount above and below the setpoint at which the alarm operates. For example, if the value entered is 10, and the setpoint value is 1000, if the alarm is set to energize above the setpoint, the alarm would energize above 1010 would not deenergize until the displayed value goes below 990. This mode reduces relay chatter and excessive cycling of the load.

Auto filtering This filtering method looks at the input signal for +/- variations. The larger the deviations, the greater the filtering applied. The amount of filtering is automatic and based on the moving average chart following.

Auto Filtering (Cont.)

TIME	READINGS AVERAGED
0.08 sec	2
0.15 sec	4
0.30 sec	8
0.60 sec	16
1.20 sec	32
2.40 sec	64
4.80 sec	128
9.60 sec	256

Batch averaging 16 readings

There are two BATCH AVERAGING listings, one under DISPLAY FILTERING and the other under INPUT SIGNAL FILTERING. They both operate in the same manner however the one for DISPLAY FILTERING pertains only to the display while the other operates on all other functions listed as filtering either on or off, such as the analog output and peak signal. The meter accumulates 16 readings, averages them and displays the results or sends the results to the output board. When finished, the result is cleared and the process begins again with another 16 readings. There is no moving averaging associated with this type of filtering.

Moving average

Assume the INPUT SIGNAL FILTERING is set to 4. This relates to a moving average of 8 readings. The meter will take 1/8 of the new reading and add it to the previous moving average, then average it again which becomes the new moving average. This process continues until the MOVING AVERAGE selection is changed.

Unfiltered input

When unfiltered is selected, the meter will process information at approximately 60 readings per second. If filtering is selected, the processing rate will be slower than 60 readings per second dependent on the amount of filtering used.

Calibration

CALIBRATION should not be confused with the term SCALING. CALIBRATION of the meter is done at the factory where calibration values are entered into memory locations to compensate for factors such as component tolerance, etc. This provides superior long term accuracy and stability while eliminating much of the analog circuitry that causes drift. To perform CALIBRATION requires factory equipment and software. See SCALING.

Scaling

Scaling of the meter can be accomplished by the user with or without sophisticated laboratory standards. Scaling uses the meter's menu that allows setting of all parameters such as zero offset, full scale readings, analog output values, etc. In other words all of the parameters of the meter are accessible to the user to make the meter function in the manner required. These functions are listed under SETUP in the owners manual.

27.

Electro-Numerics Inc. Products

Electro-Numerics family of Digital Panel Meters and Large Digit Indicators are high quality, accurate, solid state instruments designed for years of trouble free operation. Over 27 years of digital instrumentation experience has resulted in a series of displays recognized in the field as reliable, well designed instruments. From our compact sized DPM's with 0.6" LED digits to our Large Digit indicators with 1", 2 1/4", & 4" LED or 4", 6" & 9" tall electromagnetic digits, we cover most applications in process measurement and display.

Warranty (2 Years)

Electro-Numerics, Inc. warrants these products to be free in defects in workmanship and materials for two years from the date of shipment to the original customer. This warranty on workmanship and materials may be considered as unconditional provided that, in the opinion of Electro-Numerics, Inc., the equipment has not been mechanically, environmentally, or electrically abused and has been installed, maintained and operated within the limits of rated or normal usage.

Defective products must be sent, transportation charges prepaid with notice of the defect, to our plant in Temecula, CA.

This warranty is limited, at the option of Electro-Numerics, Inc., to repair, replacement, or an appropriate credit adjustment not to exceed the original equipment sales price. All warranty freight charges are F.O.B. our plant, Temecula, CA.

Electro-Numerics, Inc. assumes no responsibility in connection with the sale of its products beyond that stated above and is not responsible for any incidental or consequential loss or damage which might result from a failure of any Electro-Numerics, Inc. product.

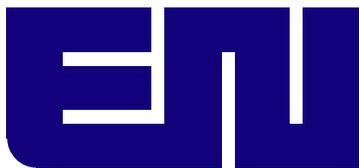
Direct all warranty and out-of-warranty requests/inquiries to Electro-Numerics, Inc., Customer Service Repair Dept., telephone: (951) 699-2437, Fax: (951) 695-7246. Repair work will be handled at the factory or an authorized Electro-Numerics, Inc. repair service center.

All items sent in for service are subject to a minimum evaluation charge of \$60.00 in the event that the product is found to be out-of-warranty or, if under warranty, not in need of additional service. Out-of-warranty service and repair charges will be quoted on a case by case basis. All repaired products will be shipped to you F.O.B., Temecula, CA.

Repair Policy

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