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INFINITY® Scale Meter

Handbook 44 Approved

Operator's Manual

MADE IN THE U.S.A.

NEWPORT Electronics, Inc.

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It is the policy of NEWPORT to comply with all worldwide safety and EMC/EMI regulations that apply. NEWPORT is constantly pursuing certification of its products to the European New Approach Directives. NEWPORT will add the CE mark to every appropriate device upon certification.

WARNING: These products are not designed for use in, and should not be used for, patient connected applications.

This device is marked with the international caution symbol. It is important to read the Setup Guide before installing or commissioning this device as it contains important information relating to safety and EMC.

Table of Contents

This Manual is applicable to all meters with serial number 1520525 and larger.

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Notes

1. Introduction

1.1 DESCRIPTION

The scale meter belongs to a complete line of high performance, 6-digit meters.

The scale meter is front panel configurable to accept 4-wire bridge, 0-20 and 4-20 mA dc current inputs, unipolar and bipolar DC voltage inputs and potentiometer inputs. The meter will accept inputs from most of the process sensors in use today such as transmitters, pressure transducers, and potentiometers.

Configuring the scale meter is accomplished through the 5 front panel buttons. If the optional RS-232 or RS-485 communications are installed, the user may remotely set the display parameters.

Options for the scale meter include analog and BCD outputs, relay outputs, and RS-232 or RS-485 communications.

1.2 FEATURES

Standard features include:

- NIST Certified for Handbook 44 operation
- Input ranges from –50 V to +100 V dc, and 4-20 mA dc
- Self Diagnostics
- High Accuracy
- Selectable classes "III", "IIIL" or "IIII"
- Selectable scale divisions
- Selectable minimum and maximum capacity levels
- Fixed, auto or sequential tare functions
- Displays Units of Measurement
- Front panel indication of net or gross values
- 2 or 5-coordinate linearization of input signals
- Sensor excitation of 1.5 to 11 or 24 V dc
- Smart filtering that detects the difference between the signal input and line noise
- Wide choice of outputs such as 4-20 mA, 1-5 V, 0-10 V, RS-232, RS-485, BCD or dual form C, 7-amp relays.

1.3 AVAILABLE MODELS

TABLE 1.1
MAIN ASSEMBLIES

DESCRIPTION
Red LEDs, 115 V ac, 50/60Hz
Red LEDs, 230 V ac, 50/60Hz
Green LED's, 115 V ac, 50/60 Hz
Green LED's, 230 V ac, 50/60Hz

NOTE: The following options are available installed at the time of purchase or as separate items installed by the user after purchase:

Analog Output Board, BCD Output Board, RelayOutput Board, RS-232 Communications Board, and RS-485 Communications Board.

TABLE 1.2
CONTROL/BCD OUTPUT OPTIONS

DESCRIPTION
Standard four open-collector outputs are standard
Isolated BCD Output Board
Dual 7A Form-C Relays
Dual 7A and Dual 1A Form and C-Relays

NOTE: Choose only one Control/BCD output option per meter. A 40-pin mating connector is included with the BCD option.

TABLE 1.3
ANALOG OUTPUT

DESCRIPTION
None
Isolated configurable analog (4-20 mA, 0-1, 0-5, 1-5, 0-10 V dc, 0-20 mA) output

TABLE 1.4
SERIAL COMMUNICATIONS OPTION

DESCRIPTION
Isolated RS-232 Communications
Isolated RS-485 Communications

NOTES: Choose only one option per meter.Both computer communications come with one 6 ft.communications cable with phone plug termination.

* Phone plug adapters are available for communication options.

** Ask your sales person for the current part number.

TABLE 1.5
OPTIONS

DESCRIPTION
Custom Calibration/configuration
50 Hz line frequency
60 Hz line frequency
Blank lens
9-pin Serial Connector for RS-232
9-pin Serial Connector for RS-485
25-pin Serial Connector for RS-232
5-pin Serial Connector for RS-485
19" Rack panel for one (1) meter
19" Rack panel for two (2) meters
19" Rack panel for three (3) meters

Notes:

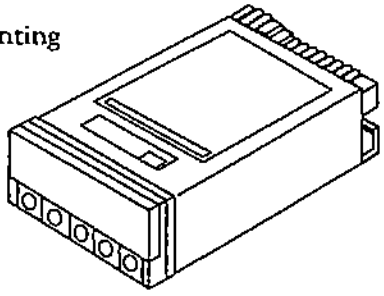
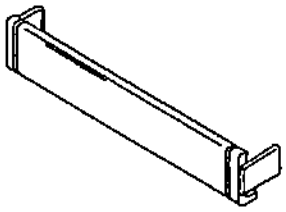
2. Unpacking

Remove the Packing List and verify that all equipment has been received. If there are any questions about the shipment, please call the Customer Service Department at the telephone number on the rear cover of this manual.

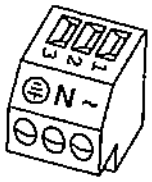
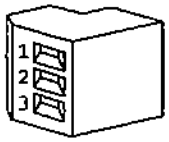
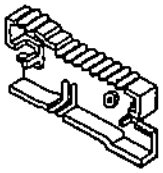
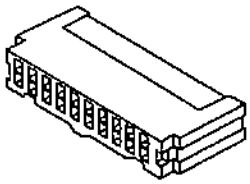
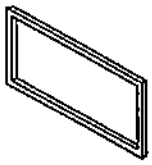
Upon receipt of shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

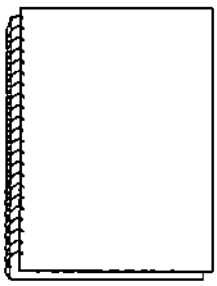
NOTE: The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

When you ordered your scale meter, you will receive the following items in the shipping box:

QTY	DESCRIPTION	ILLUSTRATION
1	Basic Meter in a Mounting Sleeve with Gasket	
1	Optional Front-Panel Button Cover available with return of the postcard included in meter box	

Unpacking

QTY	DESCRIPTION	ILLUSTRATION
1	AC Power Connector (orange - P1)	
2	Input Connectors (gray - P3 and P9)	
1	Rear Protective Cover with Screw	
1	20-Socket Ribbon Connector (P2 Connector)	
2	Panel-Mounting Gaskets (1 Spare)	

QTY	DESCRIPTION	ILLUSTRATION
1	Scale Meter Owner's Guide	

Other items may also be in the box depending on the options ordered. Refer to specific options described previously.

Notes:

3. Safety Considerations

The meter is protected in accordance with Class II of IEC 348 and VDE 0411.

> *WARNING: If your meter is to be wired to sensors or control inputs which could have hazardous potentials, these potentials will be carried through to the 20-pin digital output connector at the rear, and will be present on the meter's circuit boards. Install the rear 20-pin mating connector and insert the electronics into the case* **before** *connecting the meter to any source of possible high voltage.*
>
> *DO NOT contact any exposed metal parts or interconnect any option board(s) or change any jumpers on this meter while it is connected to AC voltage.*

To provide safe operation, follow these guidelines:

3.1 POWER WIRING

The meter has no power-on switch, so it will be in operation as soon as power is applied.

3.2 HUMIDITY

Do not expose your meter to rain or condensing moisture.

3.3 FUMES AND GASES

Do not operate your meter in flammable or explosive atmospheres.

Notes:

4. Parts of the Meter

4.1 FRONT OF THE METER

The following is a brief description of each part of the front of the meter.

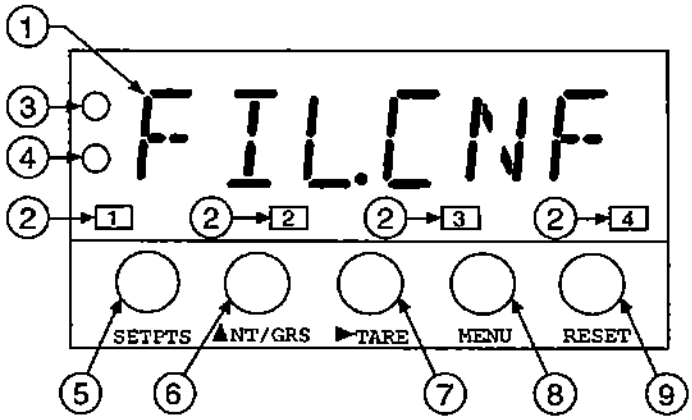


Figure 4-1. Front Panel Part Illustration

TABLE 4.1
FRONT PANEL PART DESCRIPTION

ITEM	DESCRIPTION
1	–9.9.9.9.9. or 9.9.9.9.9.9 6-digit 14 segment, 0.54" high LED display with programmable decimal point.
2	SETPOINT LED The 1, 2, 3 and 4 LEDs correspond to the status of setpoints 1, 2, 3 and 4.
3	NET INDICATION Net indication is displayed via the green LED located at the left side of the front panel and is illuminated when NET value is displayed.

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ITEM	DESCRIPTION
4	CENTER ZERO INDICATION (CZ) Center zero is displayed via an orange LED located at the left side of the front panel and is illuminated any time the gross value is within 0.25 of the selected scale division (SCL.DIV).
5	SETPTS BUTTON Press this button in the run mode to scroll through the 4 setpoints and their values, as well as the fixed tare value and zeroing value. In this mode you may change any of the setpoint values and/or the fixed tare value. After using the '▲/NT/GRS' and '▶/TARE' buttons to alter these settings, press the 'SETPTS' button to store these new values. Unless you press the 'SETPTS' button within approximately 20 seconds to store your input, the meter scrolls to the next setpoint and retains the last value stored.
6	▲/NT/GRS BUTTON When in the run mode, you may do the following: Select peak value display (display flashes to distinguish it from the reading value). You must configure the Tare Configuration bit "TAR.6" to equal "1". Select toggling between gross & net values. You must configure the Tare Configuration bit "TAR.6" to equal "0" (default). Recall the PEAK reading since the last press of the 'RESET' button. To return to the current readings without resetting the PEAK reading, press the '▲/NT/GRS' button. To reset the PEAK reading, press the 'RESET' button. In the configuration mode, use the '▲/NT/GRS' button to change the values of the flashing digit shown on the display and/or toggle between menu choices, such as ALC=0 or ALC=1. When configuring your setpoint values, press the '▲/NT/GRS' button to increment the flashing digit from 0 to 9 by 1's.

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ITEM	DESCRIPTION
7	▶/TARE BUTTON In the run mode, if TAR.5=0 then press the '▶/TARE' button to tare the reading using instaneous tare value (TAR.1=0) or to use fixed tare value (TAR.1=1). For a complete listing of tare configurations, refer to Section 10.2.10. If TAR.5=1 then the '▶/TARE' button will display valley value. When configuring your setpoint values, press the '▶/TARE' button to scroll to the next digit.
8	MENU BUTTON In the run mode, press the 'MENU' button to terminate the current measuring process and enter you into the configuration mode. Note: only if you have installed the lockout jumpers on the main board. In the configuration mode, press the 'MENU' button to store changes in the non-volatile memory and then advance you to the next menu item. In this mode press 'SETPTS' button to reverse the action of the 'MENU' button (advancing or going back one item).
9	RESET BUTTON Press this button in configuration mode to advance or go back one step. A second push will take you off the menu and perform 'RESET2'. NOTE: Meter performs normal duties if you are in setpoint routines, or displaying peak or valley. However, the meter stops all measurements if you are in the menu mode. When you exit this mode, the meter performs a hard reset 'RESET2', which resets your peak & valley and setpoints. When you are in run mode, and you have configured the Tare Configuration(refer to Section 10.2.10) ('TAR.CNF') bit to 'TAR.7=0', press the 'RESET' button once to display 'RESET 1'. 'RESET 1' resets

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ITEM	DESCRIPTION
	alarms, setpoints, and tare. When you press the 'RESET' pushbutton twice, the meter displays 'RESET 2' and returns to the run mode. 'RESET 2' performs a hard system reset which resets the peak and/or valley and tare. It also loads the setup parameters from the EEPROM. If you configure the Tare Configuration ('TAR.CNF') bit to 'TAR.7=1', press 'RESET 1' to reset the tare, but not perform a system hard reset. *WARNING: A hard reset clears the Peak & Valley, Alarm latches and meter reading and immediately begins a new measurement.* **NOTE:** In setpoint or configuration mode, the meter displays all flashing digits on any decimal values that have overflowed. Press '▲/NT/GRS' button to start a new value.

4.2 REAR OF THE METER

The following is a brief description of each part of the rear of the meter. The label on the top of the mounting sleeve (not the case) identifies the location of the connectors found at the rear of the meter. Figure 4-2 shows this label.

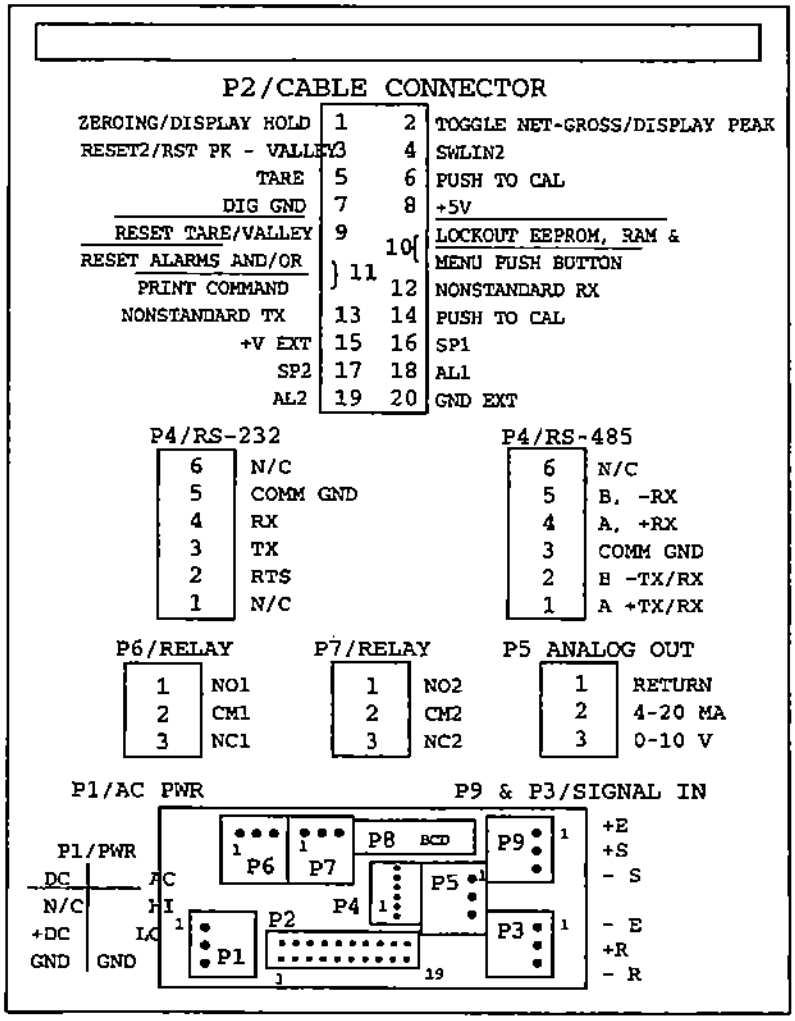


Figure 4-2. Connector Label for Rear Connectors

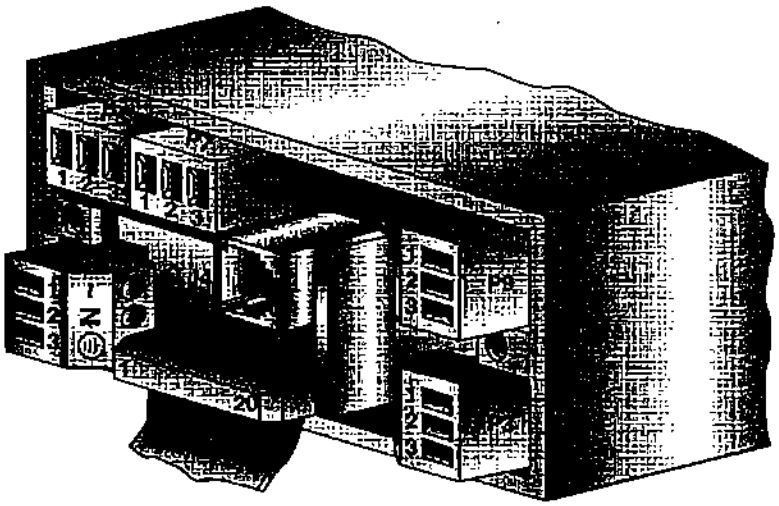


Figure 4-3. Rear View - Optional Relay Output Board and Serial Communications Board Installed

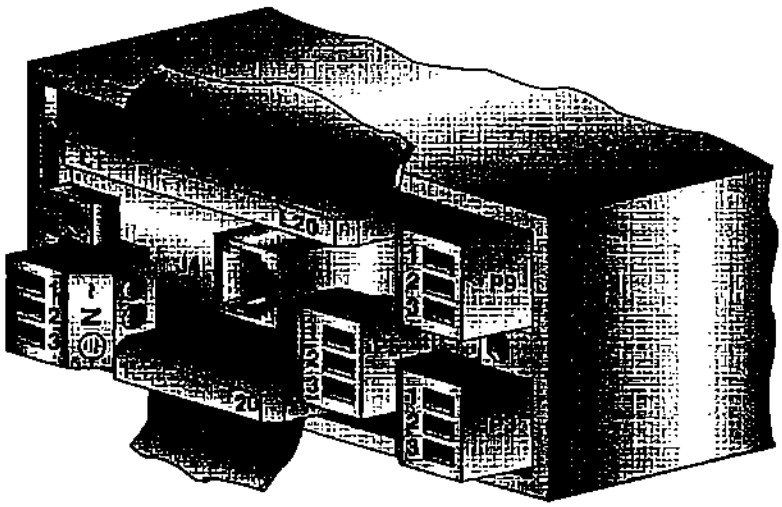


Figure 4-4. Rear View - Optional BCD Output Board and Serial Communications Board Installed

TABLE 4-2
REAR CONNECTOR DESCRIPTIONS

CONNECTOR #	DESCRIPTION
P1	AC Power Connector
P2	External I/O Connector
P3	Input Connector, –E, +R, –R
J4	Optional RS-232 or RS-485 Phone Jack Connector
P5	Optional Analog Out Connector
P6	Optional Form-C Relay #1 Connector
P7	Optional Form-C Relay #2 Connector
P8	Optional BCD Connector
P9	Input Connector, +E, +S, –S

Notes:

5. Setup

5.1 CONDITIONS REQUIRING DISASSEMBLY

You may need to remove the sleeve or open the meter for several reasons:

1. To inspect the rating label on the case (not the same label as on the sleeve) (Section 5.2.1).
2. To check or change the 115 V ac or 230 V ac or main board jumpers (Sections 5.2.2 and 5.2.4).
3. To install optional output board(s) (Section 5.2.3).
4. To mount the meter in a panel (Section 5.2.5).

5.2 DISASSEMBLY

The following procedure describes how to open the meter. Figure 5-1 shows the meter with the standard bezel.

1. Make sure the AC power plug is removed from the meter.
2. Remove the cover mounting screw and set aside.
3. Remove the rear protective cover and set aside.
4. Remove all wiring connectors from the rear of the meter.
5. Remove both thumbnuts and set aside.
6. Remove the sleeve and set aside.
7. Bend the side panel detents on the case (shown in Figure 5-4) outward to release the boards. Pull the board assembly out of the case by the mounting screw stem.

NOTE: From this point forward, these 7 steps are referred to as "Reveal the main board".

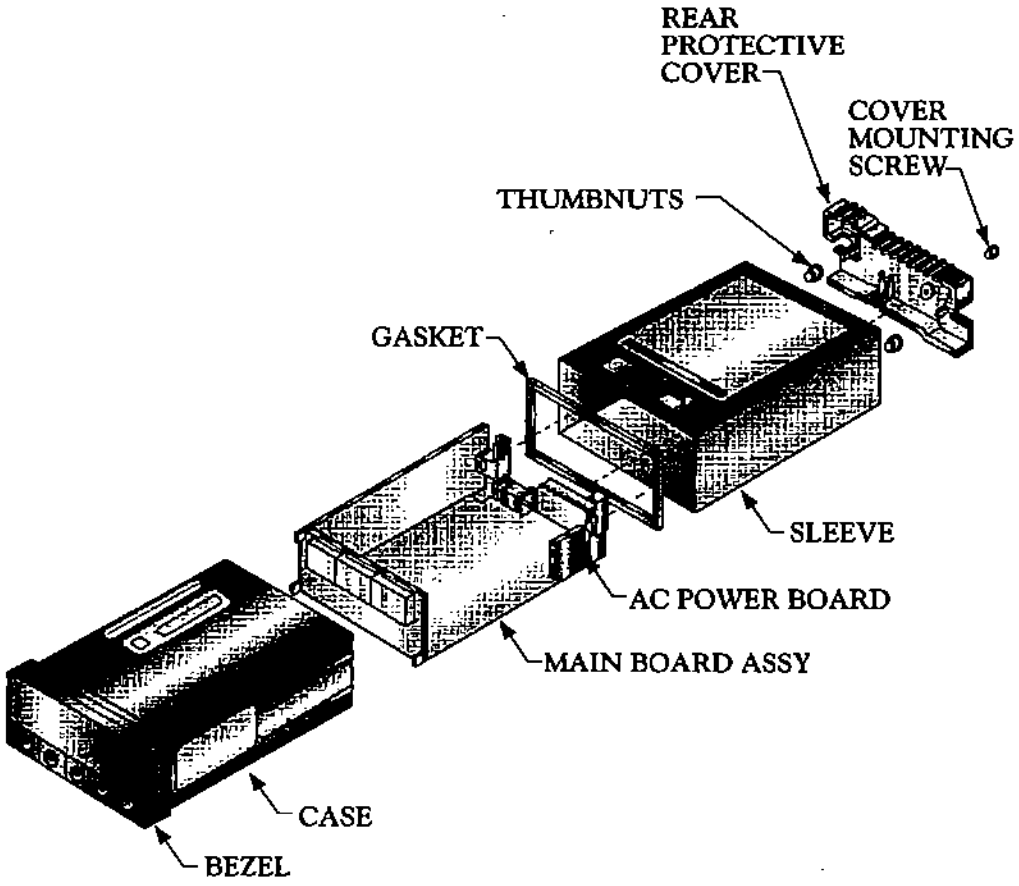


Figure 5-1. Meter Exploded View

5.2.1 RATING/PRODUCT ID LABEL

To look at the Rating/Product ID label on the case, you must follow the first 6 steps as described in Section 5-2. Refer to Figure 5-2 for the location of the Product Identification Label.

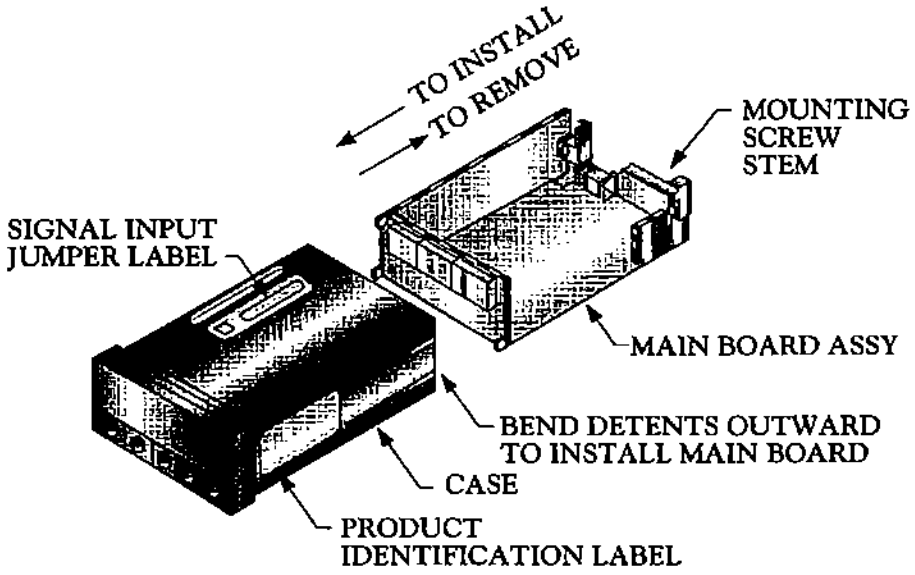


Figure 5-2. Board Assembly Removing/Installing Detail

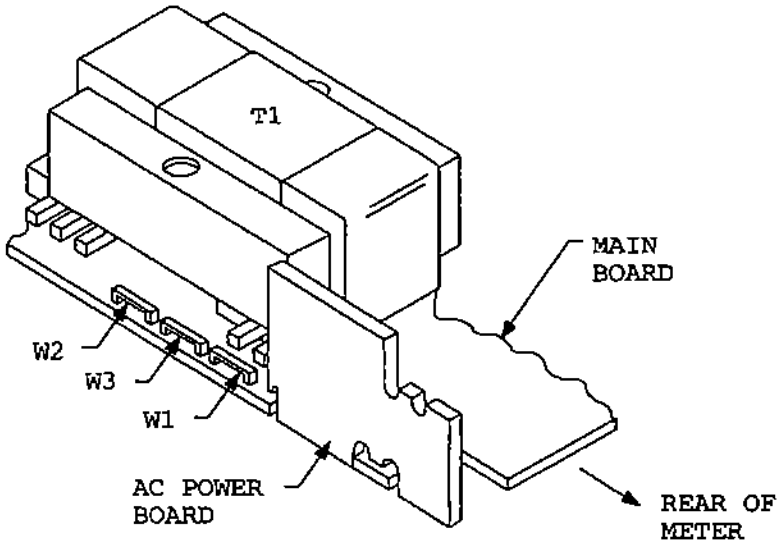


Figure 5-3. Transformer Jumpers

5.2.2 MAIN BOARD POWER JUMPERS

To check voltage jumpers or to change from 115 V ac to 230 V ac:

1. "Reveal the Main Board" (refer to Section 5.2, Disassembly).

2. Locate the main board assembly and position it in front of you the same way as shown in Figure 5-3.

3. On the main board, locate the transformer jumpers W1, W2, and W3 near the transformer T1.

If your power requirement is 115 V ac, jumpers W1 and W2 should be installed.
(DO NOT INSTALL W3)

If your power requirement is 230 V ac, jumper W3 should be installed.
(DO NOT INSTALL W1 OR W2)

5.2.3 PRINTED CIRCUIT BOARD(S) INSTALLATION

To install optional printed circuit board(s):

1. "Reveal the Main Board" (refer to Section 5.2, Disassembly).

2. Using Figure 5-4 as a reference, insert option board(s) into the corresponding slot(s) on the main board. Each circuit board is keyed to fit in it's own position.

3. To re-assemble the meter, follow the steps in Section 5.2 in reverse order.

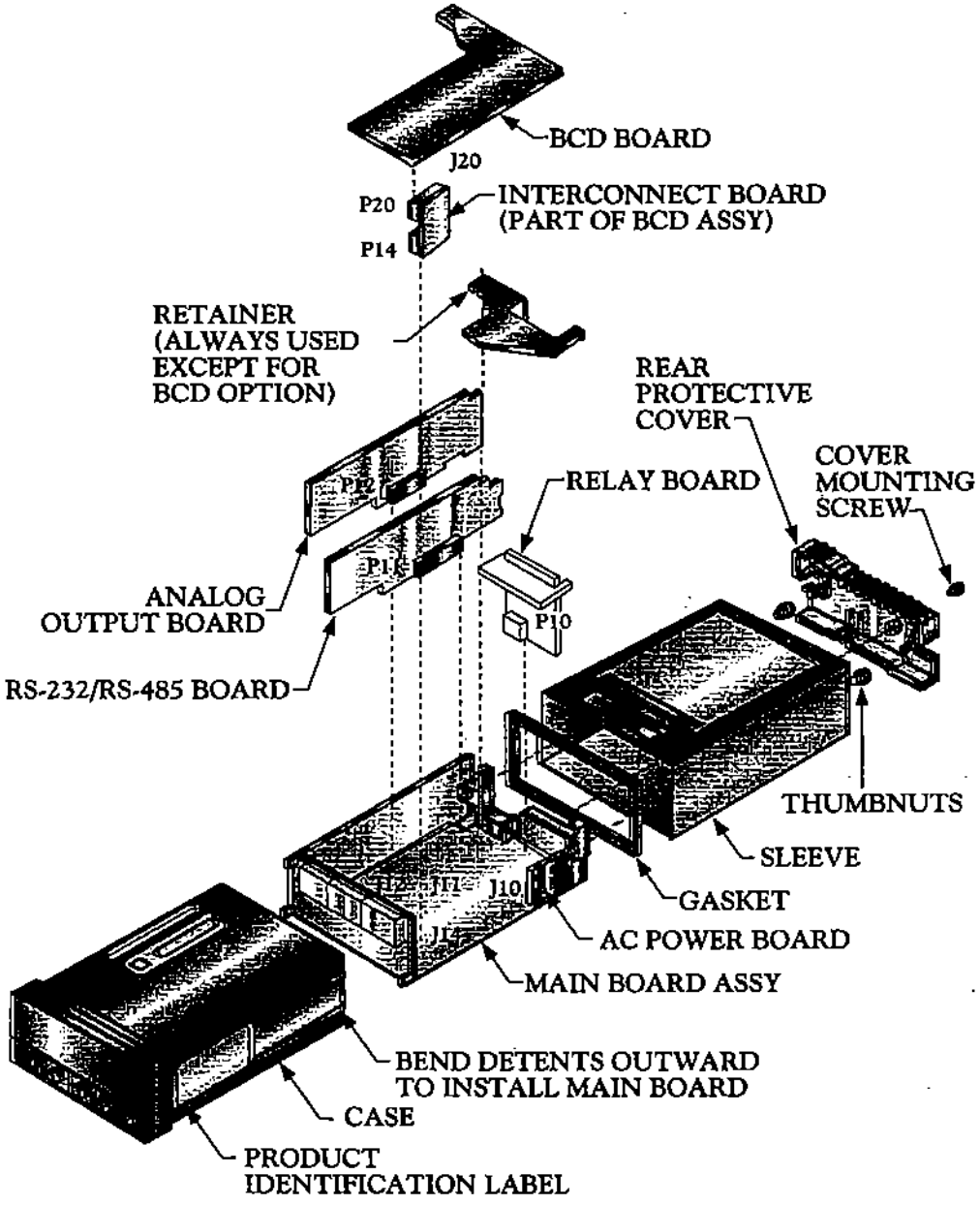


Figure 5-4. Optional Printed Circuit Board Locations

5.2.4 HOW TO ACCESS JUMPERS

To gain access to jumper S1, S2 and S3 used to configure input type, remove the mounting sleeve. The jumpers may be accesed through the slot in the case.

To gain access to jumpers on the main board for power, excitation and lockout selection:

1. "Reveal the main board" (refer to Section 5.2, Disassembly).
   NOTE: To access the S1, S2 and S6 jumpers on the Signal Input Board, you only need to remove the mounting sleeve.

2. To re-assemble the meter, follow the steps in reverse order.

Figures 5-5 through 5-11 show the layout of the seven (7) printed circuit boards with respective jumper blocks, where applicable, used in the meter. Figures 5-7 through 5-11 show the optional boards.

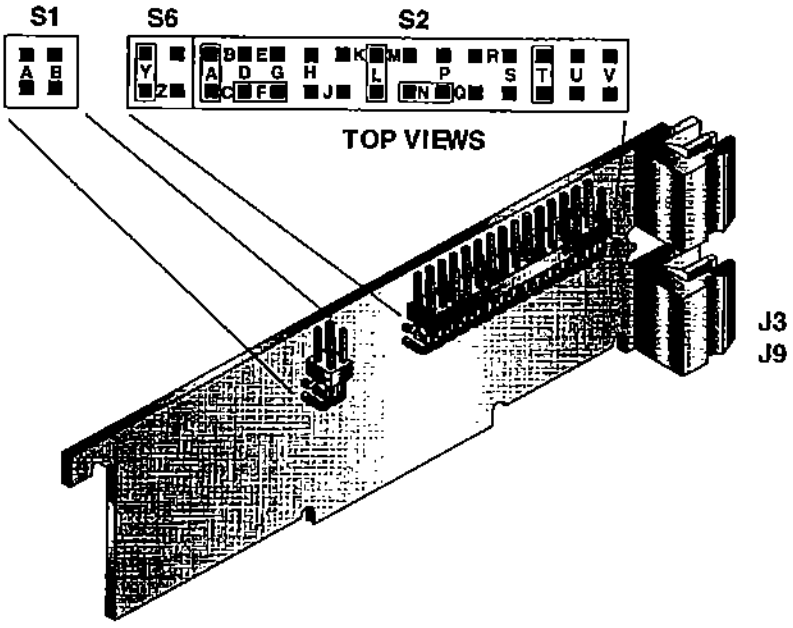


Figure 5-5. Signal Input Board

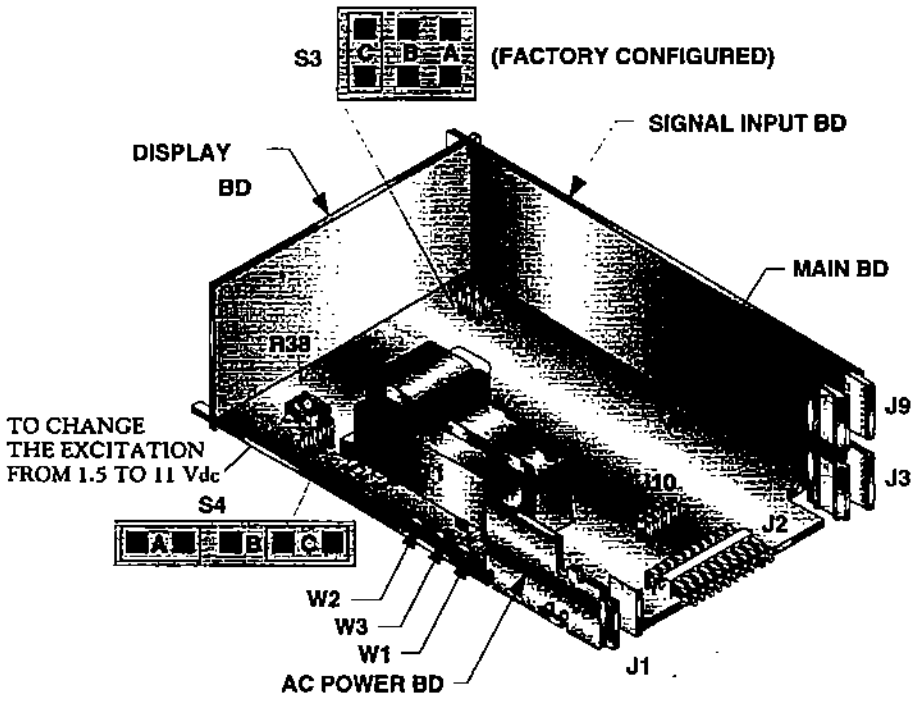


Figure 5-6. Main Board (AC)

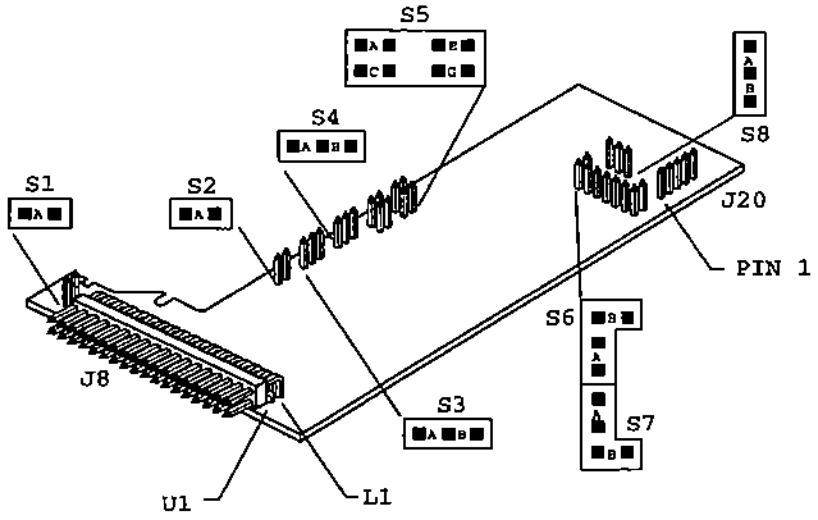


Figure 5-7. BCD Option Board

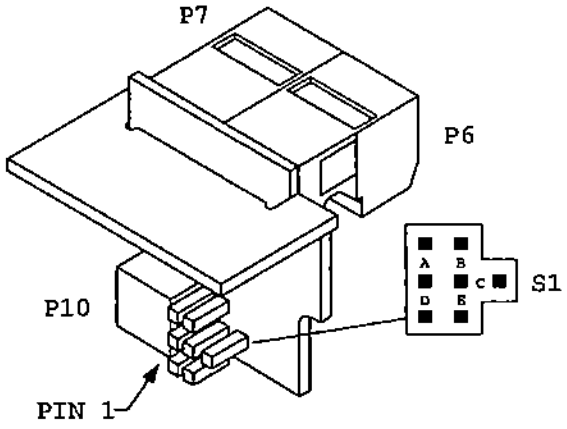


Figure 5-8. Relay Option Board

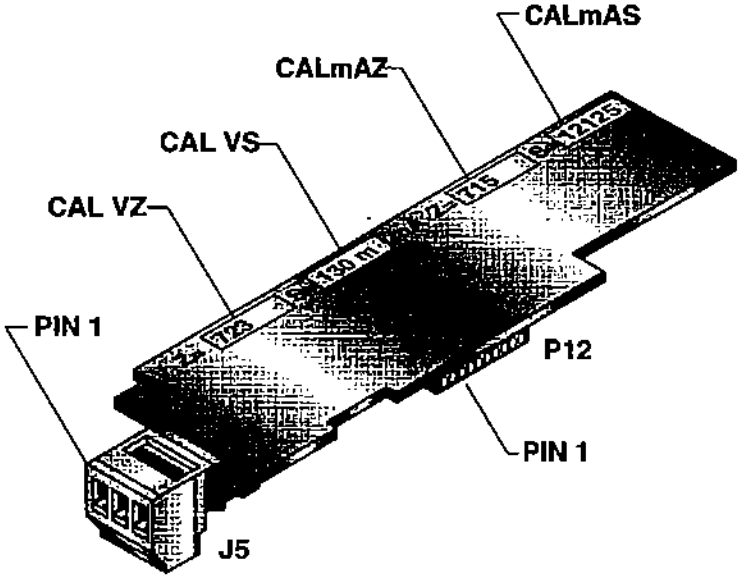


Figure 5-9. Analog Output Option Board

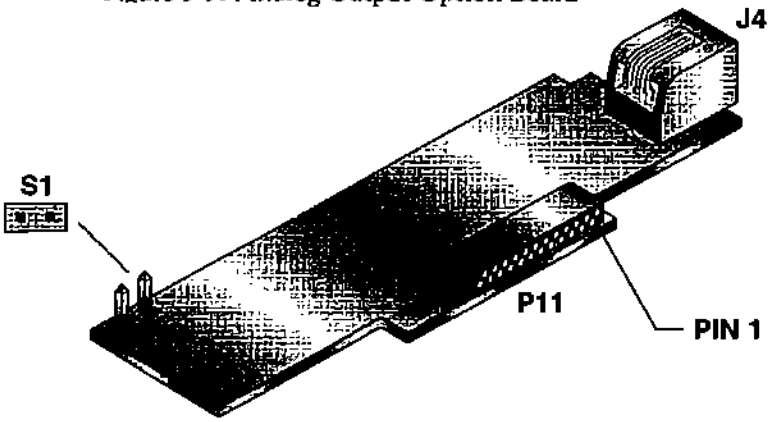


Figure 5-10. RS-232 Option Board

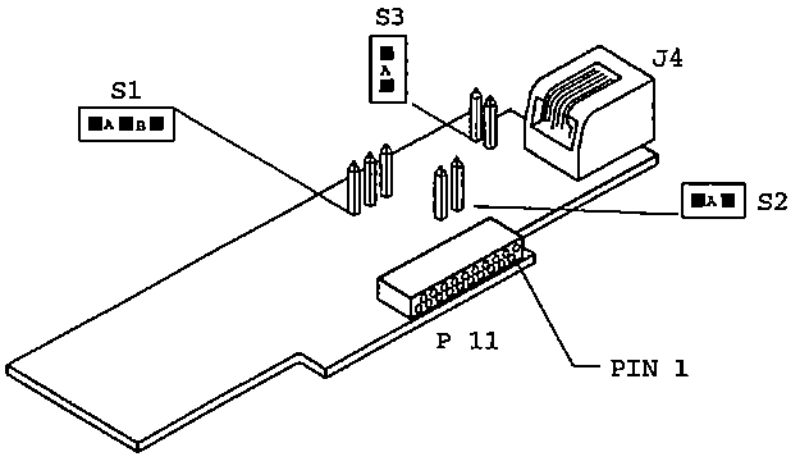


Figure 5-11. RS-485 Option Board

5.2.5 PANEL MOUNTING

To mount the meter in a panel:

1. "Reveal the Main Board" (refer to Section 5.2, Disassembly). You don't need to do step 7.

2. Using the panel cutout diagram shown in Figure 5-12, cut a hole in the panel.

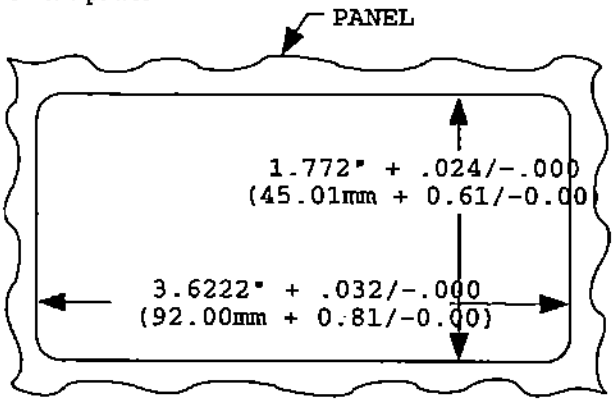


Figure 5-12. Panel Cutout Dimensions

3. Insert the case and meter into the hole from the front of the panel, so that the gasket seals between the bezel and the front of the panel. Refer to Figure 5-13.

4. Slip the sleeve over the rear of the case.

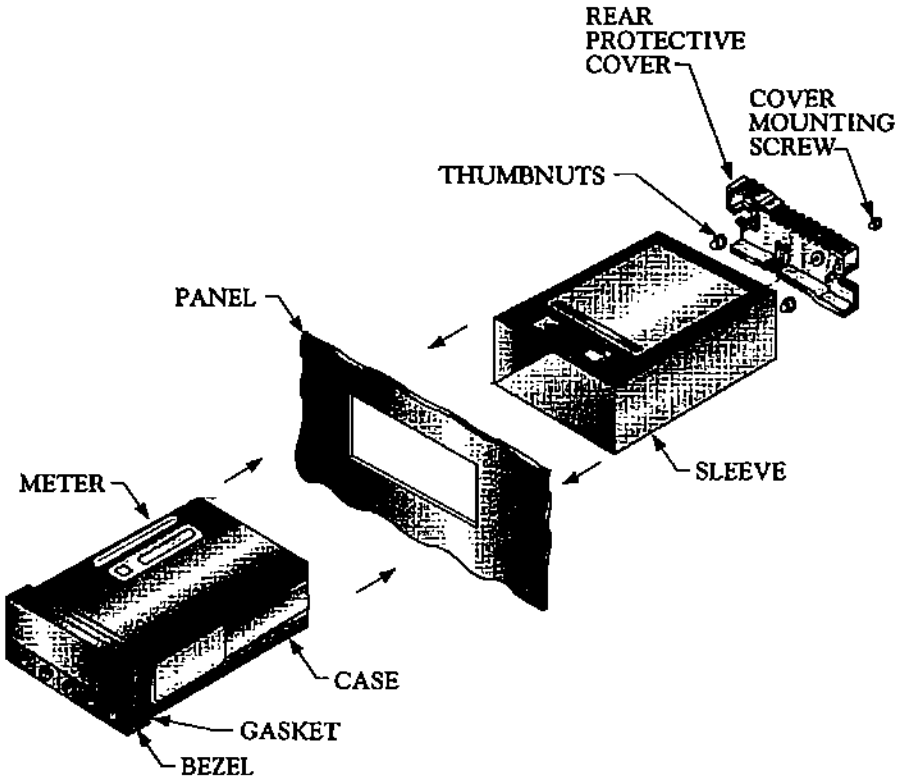


Figure 5-13. Panel Mounting

5. Re-attach and tighten the thumbnuts to hold the meter firmly in the panel.

6. Replace the wire connectors at the rear of the meter.

7. Replace the applicable rear protective cover and secure with the cover mounting screw.

8. Re-apply power. Section 5.3 covers how to wire the power connector, if you haven't already done so.

The meter display should light, and pass through "RESET 2" to run or display mode. If the meter flashes an overscale or overload message, press the 'MENU' button to advance to the configuration mode. Do not be concerned about overloads (the +S input can stand 120 V continuously and current inputs can handle ten times rated current).

5.2.6 BENCH TOP USE

The sleeve has no mounting function in bench-top use, but covers the input-jumper opening and provides additional protection. Attach the appropriate wires to the signal connectors P3, P9 and plug them in to the rear of the assembly. The label on the case sleeve shows the connectors and terminal designators.

Plug in the power connector and attach the rear protective cover with the cover mounting screw. Apply power. The meter should enter self diagnostic routine and display "RESET 2", then return to the run mode. If the meter flashes an overscale or overload message refer to Section 20, Troubleshooting Guide. Do not be concerned about overloads (the +S input can stand 120 Vac continuously and current inputs can handle ten times rated current).

5.3 AC WIRING

The orange (power) connector must be wired according to the following procedure (refer to Figure 5-14):

TABLE 5.1
AC POWER CONNECTIONS

USA WIRING CODE	INTERN'L WIRING CODE	CONNECTION	PIN # ON ORANGE CONNECTOR
Black	Brown	AC High (HI)	1
White	Blue	AC Neutral(LO)	2
Green	Green/Yellow	AC Ground	3

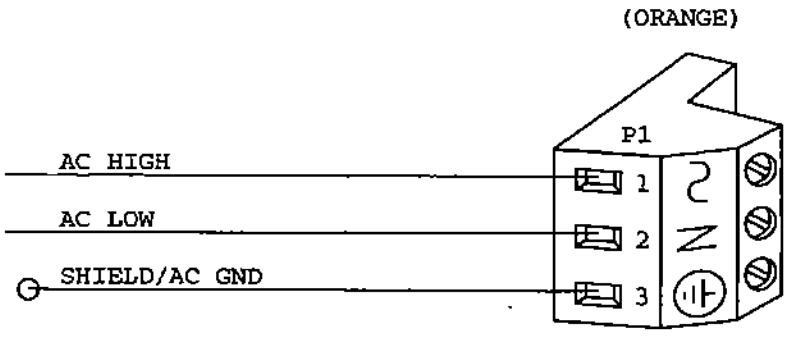


Figure 5-14. AC Connector Wiring

Notes:

6. Jumper Positions

6.1 INTRODUCTION

This section is for the configuration and setup of your jumper positions for readrate, unipolar or bipolar signal input, sensor input signal jumpers, sensor excitation jumpers, pushbutton lockouts and lockout of lockout configuration menus.

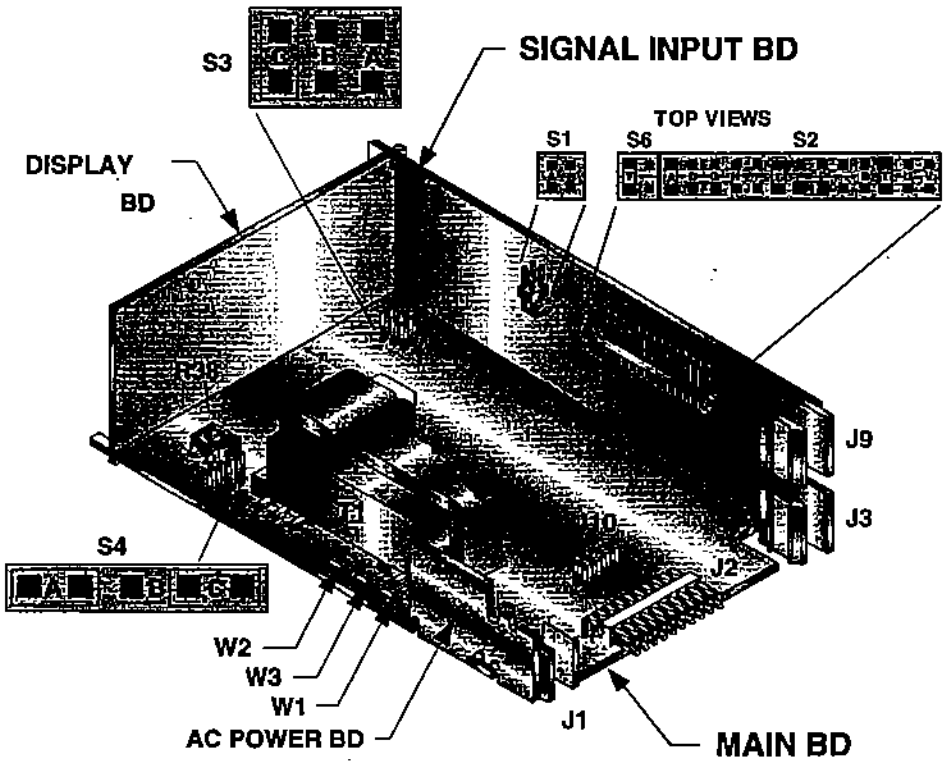


Figure 6-1. Various Jumper Locations.

6.2 S1 JUMPER POSITIONS FOR READRATE AND UNIPOLAR OR BIPOLAR INPUT(S)

Jumper Positions

S1A JUMPER

The typical readrate for your meter is 3/per second. This requires that no jumper has been installed in the S1A position and Input Configuration ("IN CNF") bit "INP.2" has been set to equal "0". Your meter is capable of a fast readrate of 13/per second. This requires that you install a jumper in the S1A position and the Input Configuration ("IN CNF") bit "INP.2" has been set to equal "1".

S1B JUMPER

The typical setting for your meter is unipolar. For unipolar input, no jumper is installed in the S1B position and Input Configuration ("IN CNF") bit "INP.3" must be set to equal "0". For bipolar inputs, install a jumper in S1B and set Input Configuration ("IN CNF") bit "INP.3" to equal "1". Refer to Figure 6-6 for the location of the S1 jumpers.

6.3 S2 JUMPER POSITIONS FOR INPUT RANGES

The following are the input signal jumper positions required to be installed in the "S2" position on your meter for the current or voltage input ranges you require. These jumper positions include those that are required for sensor excitation. Jumpers S2-N & S2-T are for internal excitation (if installed). To select desired excitation see Section 6.6. Refer to Figure 6-1 for the location of the S2 jumpers.

6.3.1 BRIDGE OR STRAIN TRANSDUCER INPUT

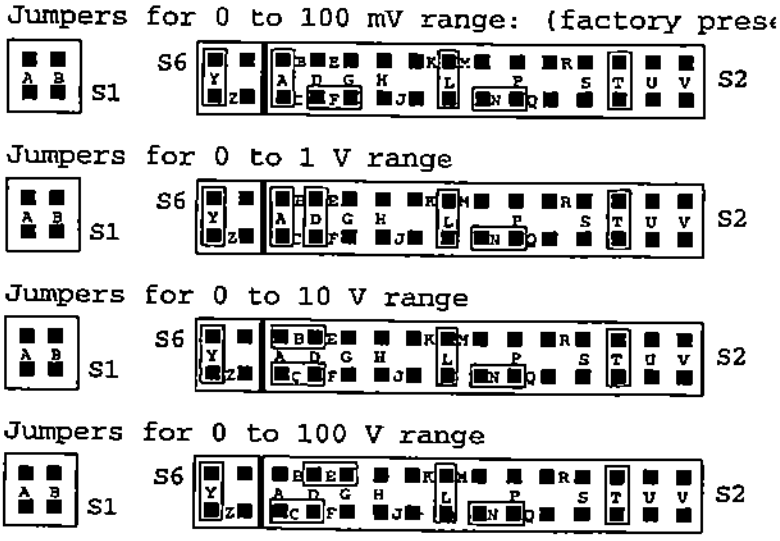
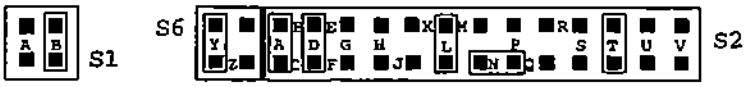


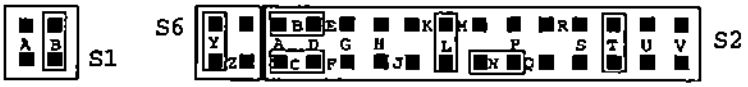
Figure 6-2. Bridge - Unipolar (meter supplied excitation).

Jumpers for -50 to +50 mV range

Jumpers for -500 to +500 mV range



Jumpers for -5 to +5 V range



Jumpers for -50 to +50 V range

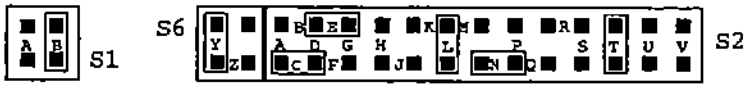


Figure 6-3. Bridge - Bipolar (meter supplied excitation).

Voltage (Non Ratiometric) - Unipolar/Bipolar similar to bridge inputs above except substitute jumper M for L.

6.3.2 0-20 mA (4-20 mA) INPUT:

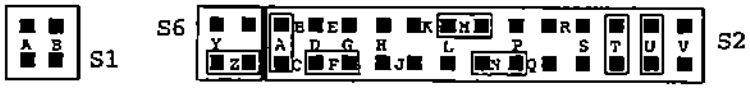


Figure 6-4. Current (24 V meter supplied excitation. Install S4B and remove S4A & S4C on main board).

6.3.3 POTENTIOMETER INPUT:

6.3.3.1 NON-RATIOMETRIC

Jumpers for 0 to 10 V range: (using 10V dc d

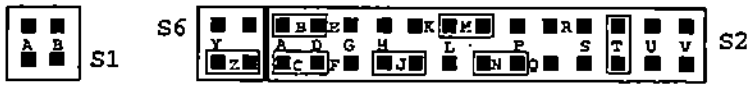


Figure 6-5. Potentiometer (Non-ratiometric reading).

6.3.3.2 RATIOMETRIC

Jumpers for 0 to 10 V range: (using 10V dc d

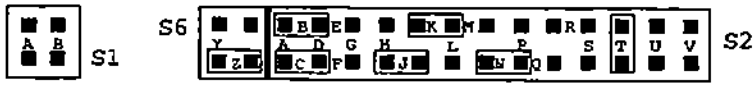


Figure 6-6. Potentiometer (Ratiometric reading).

NOTE: Remove the "S2T" jumper when you use external sensor excitation.

6.4 S6 JUMPER POSITIONS

Install S6-Y if you are using bridge or strain transducer for input.
Install S6-Z if your input is volt or current.

6.5 S3 JUMPER POSITIONS

S3A: This is the Handbook 44 jumper position, if installed. Some setup values cannot be changed (refer to table 6.1)

S3B: This is the calibration values jumper, if installed. You have access to these values via communication.

S3C: This is the lockout item jumper. If removed, lockout items in Menu (L1CNF to L4CNF) cannot be viewed.

TABLE 6.1
S3 JUMPERS

S3A (For "HB44" Seal") If installed	You may not change these functions: CLASS (III or IIIL); SCLDIV (Scale divisions); MAX.CAP (Maximum capacity); MIN.CAP (Minimum capacity); U.O.M. (Unit of measure); RDG.CNF (Reading configuration); RD.SC.OF (Reading Scale & Offset); or RDG SC (Reading Scale) & RDG OF (Reading Offset); IN CNF (Input configuration); IN.SC.OF (2 or 5 point coordinate Input scale and offset); TAR.CNF (Tare Configuration); DEC PT (Decimal Point); CNT BY (Count By); LIN.CAL (5 Point Calibration values); ZRO.VAL (Zeroing Value).
S3B If installed	You may change: Initial calibration values. (Only through serial communications)
S3C If not installed	You may not view or change: Lockout configurations.

S3B (the middle jumper), however, should NOT be installed. This jumper is only used when recalibrating the meter (e.g. an annual, careful performance by the calibration lab). When this jumper is installed, calibration coefficients can be changed via digital communications.

6.6 S4 JUMPER FOR EXCITATION VOLTAGE

S4B: 24 volt excitation will be provided if this jumper only is installed.

S4A & S4C: If these 2 jumpers only are installed the meter can deliver 1.5 to 11 volt excitation by adjusting POT (R38). (Accepted values for ratiometric reading are 4 to 11 volts).

TABLE 6.2
S4 JUMPERS

S4A & S4C	Installed	For 1.5 to 11 V dc excitation (4 to 11 V for ratiometric reading)
S4B	Installed	For 24 V dc excitation

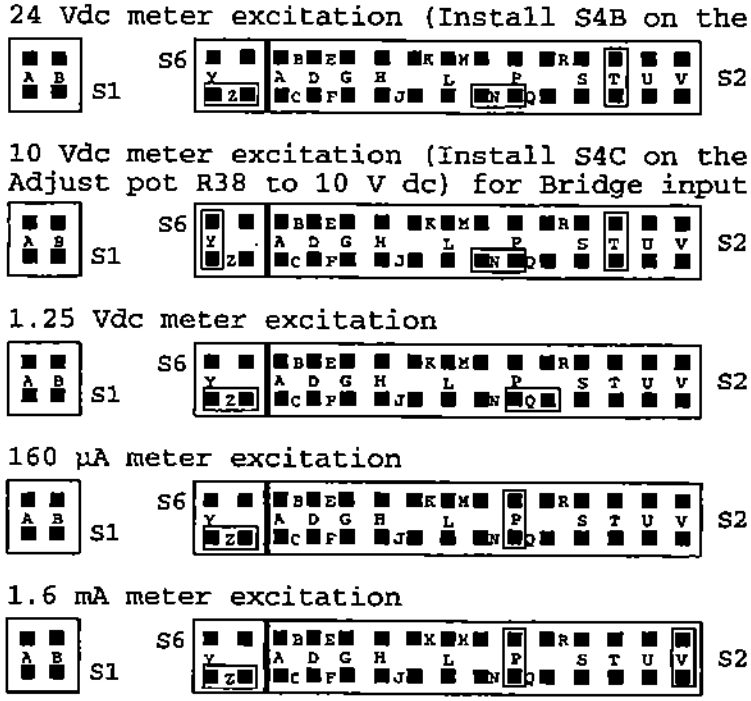


Figure 6-7. Sensor Excitation

NOTES: 1) Minimum/maximum excitation for "Ratiometric" measurement is 4 to 11 V dc.

6.7 W1-W2-W3 JUMPERS FOR MAIN POWER

Jumper Positions

These are wire jumpers and are set by the factory.

6.7.1 FOR 115 V AC:

W1 and W3 are connected.
W2 is open.

6.7.2 FOR 230 V AC:

W1 and W3 are open.
W2 is connected.

7. Signal and Power Input Connections

7.1 INTRODUCTION

The following describes how to connect your sensors to your meter with and without sensor excitation and how to connect the AC power to your meter. Prior to wiring the sensor to the meter, check with a multimeter that a proper excitation exists.

7.2 SIGNAL INPUT CONNECTIONS

The following figures (7-1 through 7-10) show the connections for bridge, voltage, current and potentiometer inputs:

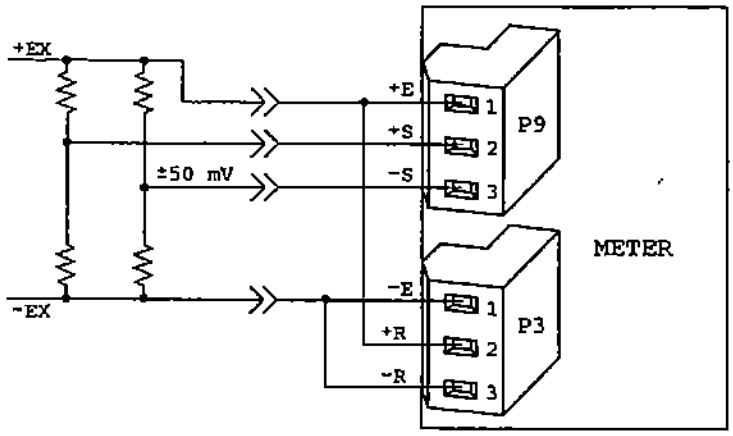


Figure 7-1. 4-Wire Bridge Input With Internal Sensor Excitation (Install Jumpers S6-Y, S2-T & S2-N).

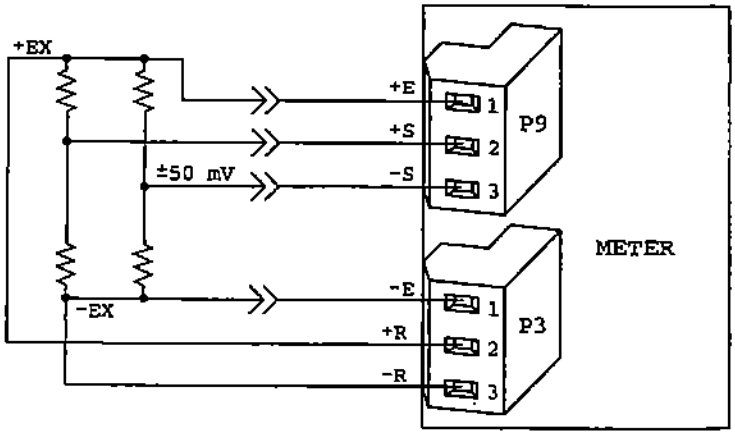


Figure 7-2. 6-Wire Bridge Input With Internal Sensor Excitation (Install Jumpers S6-Y, S2-T & S2-N).

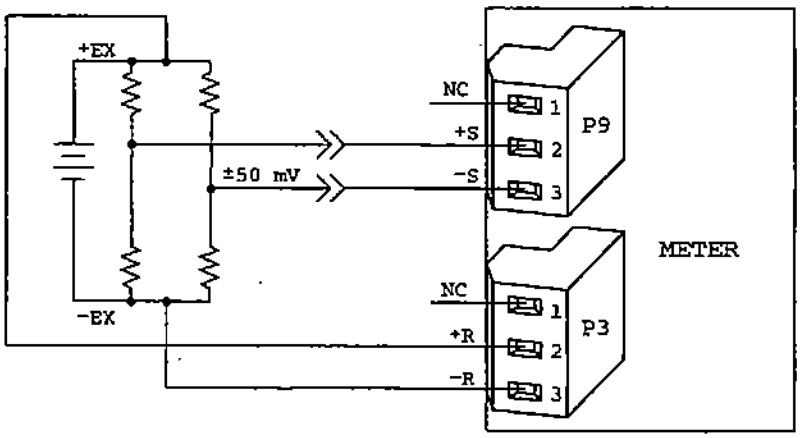


Figure 7-3 4/6-Wire Bridge Input With External Sensor Excitation (Install Jumper S6-Y).

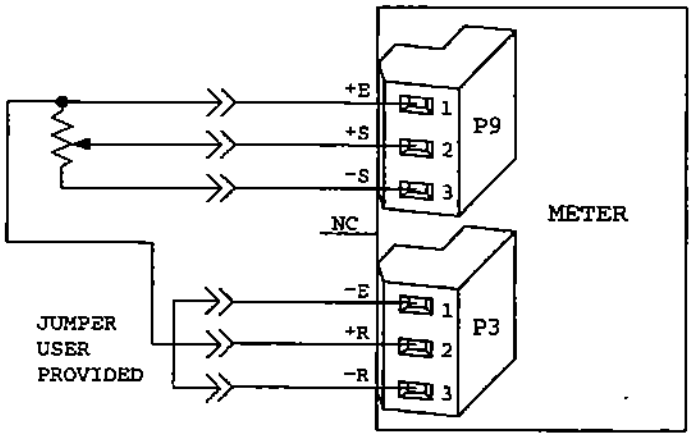


Figure 7-4 Potentiometer Connections With Internal Power Supply and Ratiometric Measurement (Jumper S6-Z Installed)

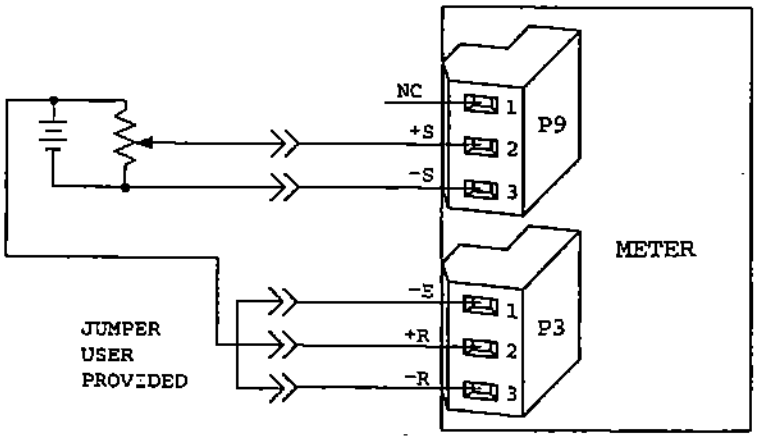


Figure 7-5 Potentiometer Connections With External Power Supply and Ratiometric Measurement (Jumper S6-Z Installed).

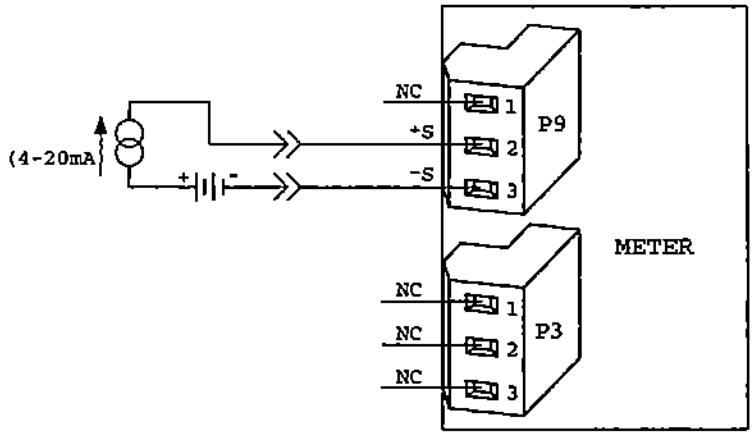


Figure 7-6 0-20 mA Input Without Sensor Excitation.

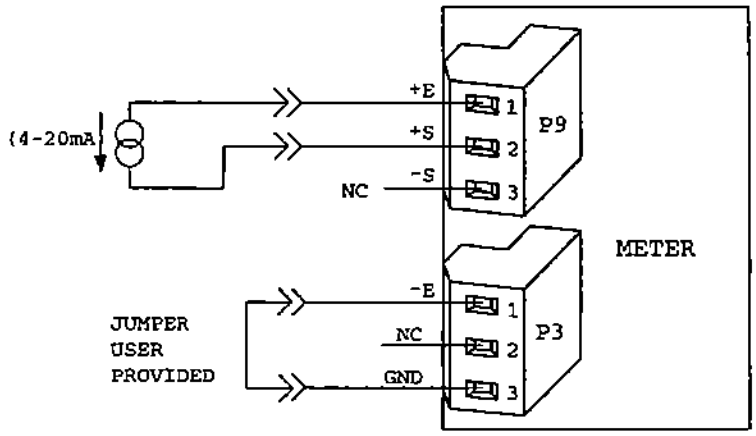


Figure 7-7 0-20 mA Input With 24 V Sensor Excitation (Jumper S6-Z Installed).

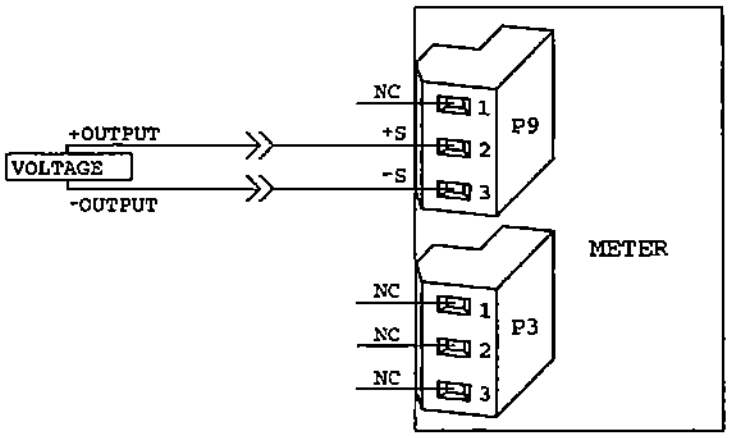


Figure 7-8 Voltage Input Without Sensor Excitation.

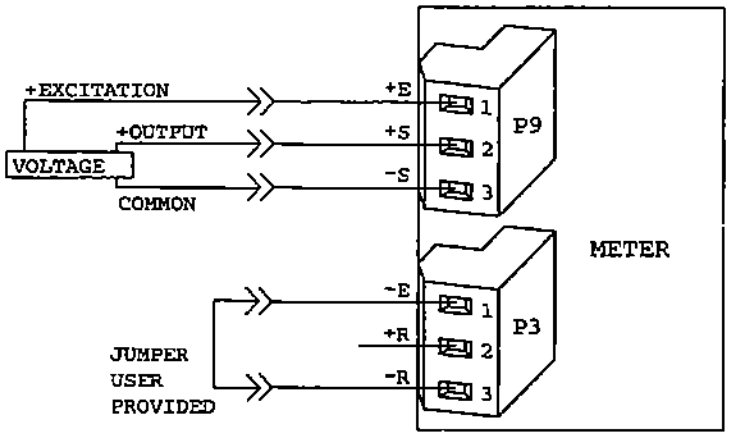


Figure 7-9 3-Wire Voltage Input With Sensor Excitation (Jumper S6-Z Installed).

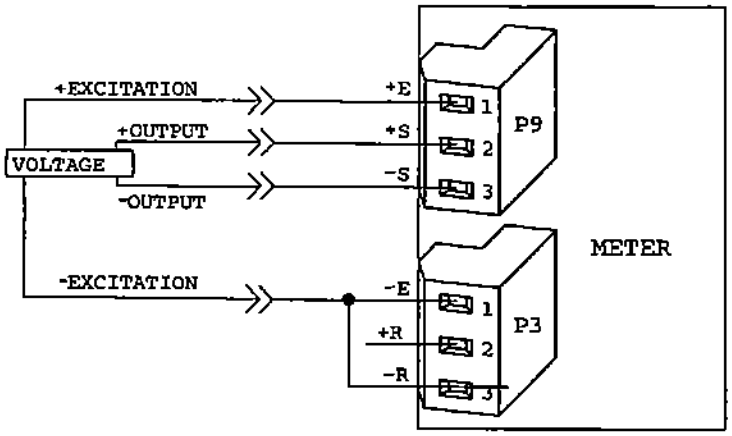


Figure 7-10 4-Wire Voltage Input With Sensor Excitation (Jumper S6-Z Installed).

7.3 AC WIRING CONNECTION

The orange (power) connector must be wired according to table 7.1 (also refer to Figure 7-11).

TABLE 7.1
AC POWER CONNECTIONS

USA WIRING CODE	INTERN'L WIRING CODE	CONNECTION	PIN # ON ORANGE CONNECTOR
Black	Brown	AC High (HI)	1
White	Blue	AC Neutral(LO)	2
Green	Green/Yellow	AC Ground	3

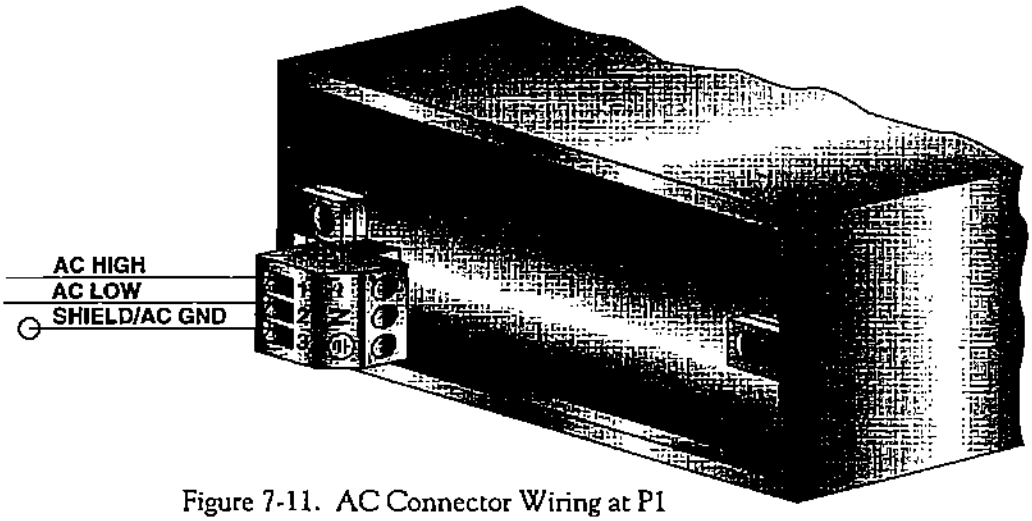


Figure 7-11. AC Connector Wiring at P1

Connect your AC meter power as described above and as shown in Figure 7-11.

WARNING: Do not connect your AC meter power until all input jumpers and sensor input connections are completed. Failure to do so could result in damage to your sensor and/or the meter.

You are now ready to proceed with scaling your meter to display in engineering units as described in Section 9.

Notes:

8. Power On Routine

8.1 SELF DIAGNOSTICS

The meter has a unique feature to test its different parameters when it is powered on, as follows:

> NOTE: You can bypass self-diagnostic routine with setting "L2C.7=1" in lockout configuration 2. Refer to Section 10.1.

8.1.1 TEST THE DISPLAY DIGITS

Meter displays "SEG.TST" for 1-2 seconds, then lights up all segments of all digits for 3-5 seconds, allowing you to check for bad segments.

8.1.2 TEST EEPROM IC

Meter displays "MEM.TST" while it checks its EEPROM for any error on its content. If no error occurs the meter displays "PASSED"; if not the meter then flashes "ERR 03".

8.1.3 HARDWARE TEST

> NOTE: Apply 0 volt at input pins P9.2 (+S) and P9.3 (–S) for this test before applying power to the meter.

Meter displays "HW.TST" to measure the input signal and compare it with ground connection. If ok, the meter displays "PASSED", if not the meter warns you with flashing "ERR 04".

8.2 METER DISPLAY:

8.2.1 "HB44"

If jumper "S3A" (refer to Section 6.5) has been installed on the main board (indicating that the meter has been configured for Handbook 44 Specification).

8.2.2 "RESET 2"

Initializing itself for the run mode.

Notes:

9. Methods for Scaling the Meter to Display in Engineering Units

9.1 SCALING YOUR METER USING 2 OR 5 COORDINATE INPUT SCALE AND OFFSET (IN.SC.OF) WITH SENSOR CONNECTED TO YOUR METER

The most accurate method for scaling your meter to display engineering units is by connecting your sensor to your meter, apply two known loads, record them as INPUT1 through INPUT5 respectively and use these numbers for entry into 2 or 5 coordinate Input Scale and Offset ("IN.SC.OF").

The typical factory calibration and configuration is for the meter to accept a 0-100 mV dc input signal and scaled to display 0 to 100000.

An example would be a 4-wire pressure transducer or load cell that sends an output signal of 0-100 mV dc. With a signal input of "0 mV dc", the display will show "000000"and when a signal input of 100 mVdc is applied, the meter will display "100000".

NOTE: Your display may not show exactly "000000" and may display a negative number such as "–000015" or a positive number such as "000023".

Using Input Scale and Offset ("IN.SC.OF") allows you to accurately scale your input signal to display in any engineering units you require.

NOTE: Although the full span input of your sensor signal is preferred for maximum resolution, you may record any 5 points within the signal span for scaling accurately into engineering units.

9.1.1 SETTING INPUT CONFIGURATION ("IN CNF")

TABLE 9.1
SETTING INPUT CONFIGURATION

BIT NO.	DESCRIPTION
INP.1 = 0	Line power frequency = 60 Hz
INP.1 = 1	Line power frequency = 50 Hz
INP.2 = 0	Slow read rate (3/sec)
INP.2 = 1	Fast read rate (10-13/sec)
INP.3 = 0	Input signal unipolar (from –10 mV to 100 mV)
INP.3 = 1	Input signal bipolar (from –60 mV to + 60mV)
INP.4 = 0	Non-ratiometric reading
INP.4 = 1	Radiometric reading
INP.5 = 0	Disable input scale and offset
INP.5 = 1	Enable input scale and offset
INP.6 = 0	"RESET2" at rear connector Pin P2.3
INP.6 = 1	Peak/valley reset at rear connector Pin P2.3
INP.7 = 0	Enables display hold on pin P2.4
INP.7 = 1	Enables zeroing function via pin P2.4
INP.8 = 0	Enables normal count by
INP.8 = 1	Enables absolute count by

9.1.2 TO SELECT DECIMAL POINT POSITION (DEC PT)

TABLE 9.2
DECIMAL POINT POSITION PROCEDURE.

PRESS	THEN PRESS (TO CHANGE IF REQUIRED)	UNTIL DISPLAY SHOWS	COMMENTS
'MENU'		"DEC PT"	Press the 'MENU' button until the display shows "DEC PT".
'TARE'	'NT/GRS'	"FFFFFF."	Press the 'TARE' button and the display will show "FFFFFF."or the previously selected position. Press the 'NT/GRS' button to select the decimal point position you require, the meter displays the previously selected decimal point location within the "F's"
'MENU'		"CNT BY"	Press the 'MENU' button to store your decimal point selection and the meter will momentarily display "STORED" only if you have made a change and then "CNT BY".
'RESET'	'RESET'	"RESET2" then the Measured Value	Press the 'RESET' button two times. The display will momentarily show "RESET2" and then will display the currently measured values.

Your meter is now calibrated. If you need to offset your zero reading on your meter after calibration, you must proceed with the following steps:

9.1.3 ENTERING ZERO OFFSET NUMBERS

You have two (2) ways to enter a zero offset. The first and easiest is using the TARE function. This is accomplished by connecting a momentary contact to the rear P2 connector at P2-5 and P2-4. Each time this momentary contact is activated, the display will automatically display zero.

The second method for entering a zero offset number is Reading Offset ("RDG OF").

The RDG OF (Reading Offset) menu item should be used if the meter shows a nonzero reading with zero input. The offset value zeroes the display by cancelling out the nonzero reading.

If your meter displays a positive reading at zero input, you must enter a negative offset value. If your meter displays a negative reading at zero input, you must enter a positive offset value.

If you are using an active decimal point (RDG.2=0), your offset value will be the negative of the display reading at zero point.

If you are using the more common independent decimal point (the factory setting, RDG.2=1), follow these instructions to convert the display reading to the appropriate offset value:

1. Note the display reading at zero input, ignoring the decimal point. This reading represents the count value - the number of whole counts that need to be offset.
2. Shift the count value to the left side of the decimal point.
3. If the count value is positive, make it negative by replacing the leading digit (the left-most digit) with a minus sign. If the count value is negative, make it positive by replacing the negative sign with a zero.

Example 1: Your meter displays 000.003 when the input is zero. The count value is 000003. Shift this value to the left side of the decimal point: 003.000. Change the leading zero to a minus sign: -03.000. This is the "converted offset value" you will use for configuring RDG OF.

Example 2: Your meter displays -00.003 when the input is zero. The count value is -00003. Shift this value to the left side of the decimal point: -03.000. Change the leading minus sign to a zero: 003.000. This is the "converted offset value" you will use for configuring RDG OF.

If the nonzero reading is fluctuating between two numbers, convert the smaller count value to the offset value, then add a 5 just right of the decimal point. This adds half a count to the offset. For example, the display if flucuating between 00.0001 and 00.0002. Calculate the offset using the 000001 count value. The converted offset value is −1.0000. Add a 5 to the right of the decimal point: the final offset value is −1.5000.

TABLE 9.3
ZERO READING OFFSET PROCEDURE

PRESS	THEN PRESS (TO CHANGE IF REQUIRED)	UNTIL DISPLAY SHOWS	COMMENTS
'MENU'		"RDG OF"	Press the 'MENU' button until the display shows "RDG OF".
'TARE'		"000000."	Press the 'TARE' button and the display will show the last offset entered.
'TARE'	'NT/GRS'	"XXXXXX"	Use the 'TARE' to move to each digit and the 'TARE' button to change the flashing digits value and enter your zero offset number.
'MENU'		"STORED" then "IN CNF"	Press the 'MENU' button to store your selection. The display will momentarily show "STORED" then "IN CNF".
'RESET'	'RESET'	"RESET2" the Measured Value	Press the 'RESET' button two times. The display will momentarily show "RESET2" and then will display the currently measured values.

NOTE: If after zeroing the display with RDF OF, the reading again drifts from zero, the required offset value is the sum of the current RDG OF value and the current converted offset value. The examples below illustrate the calculation of required offset values when using an independent decimal. If you are using an active decimal point, the current converted offset value is simply the negative value of the display reading.

Example 1: You use a RDG OF value of –1.0000 to zero the meter. The next morning, the meter displays 00.0008 at zero input; you need to rezero. The current count value is 000008; shifting this value to the left of the decimal makes it 08.0000, and making the value negative makes it –8.0000. The required RDG OF value is the sum of the current RDG OF value (–1.0000) and the current converted offset value (–8.0000):

–1.0000 + –8.0000 = –9.0000

Example: You use a RDG OF value of –1.0000 to zero the meter. The next morning, the meter displays –0.0008 at zero input; you need to rezero. The current count value is –00008; shifting this value to the left of the decimal makes it –8.0000, and making the value positive makes it 08.0000. The required RDG OF value is sum of the current RDG OF value (–1.0000) and the current converted offset value (08.0000):

–1.0000 + 08.0000 = 07.0000

If you require further configuration(s) for your specific application, refer to Sections 10 through 23.

NOTE: Should you receive an error code of any kind while configuring your meter, refer to Section 20 - Troubleshooting - Display Messages and Troubleshooting Guide.

10. Explanation of Lockout Configurations and Meter Function Menus

HOW TO USE THE TABLES IN SECTION 10	
TARE, NT/GRS, MENU BUTTONS	These are the buttons on the meter you are to press to access the parameters given in the same column.
MAIN MENU/ SUBMENU:	These are headings for the table columns.
DISPLAYED INFORMATION:	These are parameters seen on the display after pressing either 'TARE', 'NT/GRS', or 'MENU' button(s).

NOTE: If you press the 'RESET' button two times while the meter is in the run mode, all Setpoints, Alarms, Peak & Valley reset and the meter begins new measurements.

If you press the 'RESET' button one time while in the configuration mode, you move one MAIN MENU backwards and any selection are not saved. If you press the 'RESET' button two times while in the configuration mode, you reset the meter and only those menu items previously saved by pressing the 'MENU' button will be saved.

10.1 INDIVIDUAL LOCKOUT INFORMATION

To restrict access to different parameters of the program in the meter, you may want to lockout parts of the meter. When you lock out a parameter, it will no longer appear when you scroll through the menu. To lockout specific parameters of the meter (setpoint, scaling), refer to Tables 10.1 and 10.2.

Two lockout items hide or show "L1C" and "L2C" menu items. These lockout items are at the end of the menu items for easy use. You can lockout these items by removing jumper S3C on the main board (refer to Section 6.5).

The 'TARE' button allows you to sequence through L1C.1, L1C.2, L1C.3, L1C.4, L1C.5, L1C.6, L1C.7 and L1C.8.

The 'NT/GRS' button allows you to select the "0" or "1" state for each "L1C" condition.

The 'MENU' button stores the selected values for all "L1C" condition(s) changed and advances the meter to "L2 CNF". Do not press the 'MENU' button after each change within the submenu or the meter will advance to the next menu item.

Every underlined "0" or "1" state is the factory preset value.

TABLE 10.1
LOCKOUT CONFIGURATION 1

BIT NO.	DESCRIPTION
L1C.1 = 0	Unlock setpoints 1 to 4
L1C.1 = 1	Lockout setpoints 1 to 4
L1C.2 = 0	Unlock fixed tare and zeroing values
L1C.2 = 1	Lockout fixed tare and zeroing values
L1C.3 = 0	Unlock display valley value
L1C.3 = 1	Lockout display valley value
L1C.4 = 0	Unlock display peak value
L1C.4 = 1	Lockout display peak value
L1C.5 = 0	Unlock the following: • "CLASS" (III, IIIL or IIII) • "SCL.DIV" (Scale Divisions) • "MAX.CAP" (Maximum Capacity) • "MIN.CAP" (Minimum Capacity) • "U.O.M." (Unit of Measure)
L1C.5 = 1	Lockout the following: • "CLASS" (III, IIIL or IIII) • "SCL.DIV" (Scale Divisions) • "MAX.CAP" (Maximum Capacity) • "MIN.CAP" (Minimum Capacity) • "U.O.M." (Unit of Measure)

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BIT NO.	DESCRIPTION
L1C.6 = 0	Unlock the following: • "RDG.CNF" (Reading Configuration) • "IN.CNF" (Input Configuration) • "LIN.CAL" (5 point Calibration).
L1C.6 = 1	Lockout the following: • "RDG.CNF" (Reading Configuration) • "IN.CNF" (Input Configuration) • "LIN.CAL" (5 point Calibration).
L1C.7 = 0	Unlock "TAR.CNF" (Tare Configuration)
L1C.7 = 1	Lockout "TAR.CNF" (Tare Configuration)
L1C.8 = 0	Unlock "DEC PT" (Decimal Point)
L1C.8 = 1	Lockout "DEC PT" (Decimal Point)

TABLE 10.2
LOCKOUT CONFIGURATION 2

BIT NO.	DESCRIPTION
L2C.1 = 1	Unlock the following: • "CNT BY" (Count By) • "FIL.CNF" (Filter Configuration) • "FIL TI" (Filter Time Constant)
L2C.1 = 1	Lockout the following: • "CNT BY" (Count By) • "FIL.CNF" (Filter Configuration) • "FIL TI" (Filter Time Constant)
L2C.2 = 0	Unlock the following: • "SP CNF" (Setpoint Configuration) • "AL CNF" (Alarm Configuration) • "AL FNC" (Alarm Function) • "AL RDG" (Alarm Reading) • "SP DB" (Setpoint Deadband) • "AL DB" (Alarm Deadband)
L2C.2 = 1	Lockout the following: • "SP CNF" (Setpoint Configuration) • "AL CNF" (Alarm Configuration) • "AL FNC" (Alarm Function) • "AL RDG" (Alarm Reading) • "SP DB" (Setpoint Deadband) • "AL DB" (Alarm Deadband)

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BIT NO.	DESCRIPTION
L2C.3 = 0	Unlock the following: • "DSP.FLS" (Display Flash) • "BCD.OUT" (BCD Output) • "ANL.OUT" (Analog Output) • "OT.SC.OF" (Output Scale & Offset)
L2C.3 = 1	Lockout the following: • "DSP.FLS" (Display Flash) • "BCD.OUT" (BCD Output) • "ANL.OUT" (Analog Output) • "OT.SC.OF" (Output Scale & Offset)
L2C.4 = 0	Unlock the following: • "BAUD" (Baud Rate) • "SER.CNF" (Serial Configuration) • "ADDRES" (Meter Address) • "DAT FT" (Data Format) • "BUS FT" (Bus Format) • "SER.CNT" (Serial Count)
L2C.4 = 1	Lockout the following: • "BAUD" (Baud Rate) • "SER.CNF" (Serial Configuration) • "ADDRES" (Meter Address) • "DAT FT" (Data Format) • "BUS FT" (Bus Format) • "SER.CNT" (Serial Count)
L2C.5 = 0	Unlock the following: • "CAL VZ" (Voltage Zero Calibration Factor) • "CAL VS" (Voltage Gain Calibration Factor) • "CAL mAZ" (Current Zero Calibration Factor) • "CAL mAS" (Current Gain Calibration Factor)
L2C.5 = 1	Lockout the following: • "CAL VZ" (Voltage Zero Calibration Factor) • "CAL VS" (Voltage Gain Calibration Factor) • "CAL mAZ" (Current Zero Calibration Factor) • "CAL mAS" (Current Gain Calibration Factor)
L2C.6 = 0	Display Auto Zero Tracking item
L2C.6 = 1	Do Not Display Auto Zero Tracking item
L2C.7 = 0	Enable diagnostic routine with power on
L2C.7 = 1	Disable diagnostic routine with power on

10.2 MENU FUNCTIONS

NOTE: In this mode "MENU " button stores new values and then advances to new items. Press "SETPT" button to toggle the action of the menu button by advancing or going back in the menu items.

10.2.1 "CLASS"

Selects the class required for operation in "III", "IIIL", or "IIII".

Defaults to III.

10.2.2 "SCL.DIV": SELECTS SCALE GRADUATION

You specify this value for stabilization purposes. Tare and Print does not work until reading stabilizes within one or three graduations corresponding to the chosen class.

10.2.3 "MAX.CAP": SELECTS MAXIMUM CAPACITY

105% of this value is the upper limit for the working area of the meter. If reading exceeds this value, meter flashes "OVR.CAP" and trips the related active above alarms.

10.2.4 "MIN.CAP": SELECTS MINIMUM CAPACITY

This is the lower limit for the meter. If reading becomes less than this value, it flashes "UND.CAP" and trips all active below alarms.

10.2.5 "U.O.M.": SELECTS UNIT OF MEASURE

Select three letters for unit of measure (lower case dash is blank) for transmission or print out or display.

RDG.CNF (Reading Configuration) determines if and how U.O.M. displays. Refer to Section 10.2.6.

10.2.6 RDG.CNF (READING CONFIGURATION)

Reading configuration selects:

- Reading scale and offset (direct vs 2-point) [RDG.1]
- Active or independent decimal point [RDG.2]
- Display brightness [RDG.3]
- Set up peak tracking [RDG.4]
- Set up U.O.M. display format [RDG.5]
- Enable 2 or 5 point linearization [RDG.6]

Direct scale and Offset: these two values are used in the straight line equation, $y = mx + b$.

Display = m times input plus b or [m (input) + b] (where m is the RDG SC and b is the RDG OF).

The 5-data-point method allows the user to use 5 known points to convert from one scale to another.

TABLE 10.3
READING CONFIGURATION

MENU BUTTON MAIN MENU	MIN/MAX/ MENU * BUTTON SUB MENU	DESCRIPTION
"RDG.CNF":		READING CONFIGURATION
		Reading Scale & Offset:
	"RDG.1=0"	Direct Format
	"RDG.1=1"	2-Coordinate format
		Decimal point effect:
	"RDG.2=0"	Active
	"RDG.2=1"	Independent
		Display Brightness:
	"RDG.3=0"	Normal
	"RDG.3=1"	50% of Normal

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MENU BUTTON MAIN MENU	MIN/MAX/ MENU * BUTTON SUB MENU	DESCRIPTION
		Peak Value:
	"RDG.4=0"	Peak tracks net value
	"RDG.4=1"	Peak tracks gross value
		Unit of Measurement on display:
	"RDG.5=0"	No unit of measurement
**	"RDG.5=1"	Display first letter of U.O.M.
**	"RDG.5=2"	Display first 2 letters of U.O.M.
		Reading Scale & Offset:
	"RDG.6=0"	Enables 2-point linearization
	"RDG.6=1"	Enables 5-point linearization
		Reading Scale & Offset:
	"RDG.7=0"	Disables 2 or 5 point linearization
	"RDG.7=1"	Enables 2 or 5 point linearization

* The 'TARE' button allows you to sequence through RDG.1, RDG.2, RDG.3, RDG.4, RDG.5, RDG.6, and RDG.7.

The 'NT/GRS' button allows you to select the "0" or "1" state for each "RDG" condition.

**When RDG.5=1 or 2 display automatically deletes the U.O.M. (Unit of measure) letters if the reading value to be displayed exceeds 4 or 5 digits.

NOTES:

1. If you set Reading Configuration bit RDG.6 to equal 0, you do not have access to LIN.CAL (5-point Linearization Calibration).
2. If you set Reading Configuration bit RDG.6 to equal 1, you do not have access to RD.SC.OF (Reading Scale and Offset), RD.SC (Reading Scale), RDG.OF (Reading Offset) or IN.SC.OF (Input Scale and Offset).

The 'MENU' button stores the selected values for all "RDG.CNF" condition(s) changed and advances the meter to "RD SC". Do not press the 'MENU' button after each change within the submenu or the meter will advance to the next menu item.

Every underlined "0" or "1" state is the factory preset value.

10.2.7 RDG SC (READING SCALE) AND RDG OF (READING OFFSET)

Typically, the following conditions must exist to use "RDG SC" and "RDG OF":

- You cannot connect a known load to the meter
- You require a display with 3 or more positions to the right of the decimal point
- You have previously scaled your meter using Input Scale and Offset ("IN.SP.OF")
- You want to enter a constant multiplying factor or you have an extremely large offset

If you choose 'RDG.1=0', then you advance automatically into "RDG SC" and "RDG OF":
"RDG SC" is reading scale from –99999 to +499999 if you set the display to "1.00000". "RDG OF" is reading offset from -99999 to 999999 if you set the display to "000000".

When "RDG SC" displays, press the 'MIN' button to see the previously-set value. Process measurement scale is set to "1.00000" using the 'MIN/MAX' buttons. Press the 'MENU' button to store.

When "RDG OF" displays, you may choose to enter a reference temperature offset here (e.g., "–100.00") so that the display reads deviation of the input from the boiling point (or some other temperature).

If you choose "RDG.1 = 1" you advance automatically into "RD.SC.OF".

TABLE 10.4
READING SCALE/READING OFFSET

MENU BUTTON MAIN MENU	MIN/MAX* BUTTON SUB MENU 1	MIN/MAX /MENU** BUTTON SUB MENU 2	DESCRIPTION
"RD.SC.OF":			READING SCALE & OFFSET
	INPUT 1		Item #1 of Coordinate #1.
		000000. ("00000.0")	Enter the first value displayed by the meter.
	READ 1		Item #2 of Coordinate #1.
		000000. ("00000.0")	Enter first desired value.
	INPUT 2		Item #1 of Coordinate #2.
		000000. ("10000.0")	Enter the second value displayed by the meter.
	READ 2		Item #2 of Coordinate #2.
		000000. ("10000.0")	Enter second desired value.

* The 'MIN' button allows you to sequence through "INPUT 1", "READ 1", "INPUT 2", and "READ 2" headings.

The 'MAX' button sends you to the value corresponding to "INPUT 1", "READ 1", "INPUT 2", or "READ 2" so you can change it (go to the SUB MENU 2 item).

** The 'MIN' button allows you to step through the digits of the applicable number being changed.

The 'MAX' button changes the value of the digit to be displayed.

The 'MENU' button stores the selected values for each input required in "RD.SC.OF". After the last value ("READ 2") has been entered and the 'MENU' button is pressed, the meter display will advance to "IN CNF".

Every underlined item is the factory preset value.

10.2.8 IN CNF (INPUT CONFIGURATION)

Input configuration is used to select:

- 50 or 60 Hz line frequency [INP.1]
- Slow or fast read rate [INP.2]
- Unipolar or bipolar inputs [INP.3]
- Ratiometric vs non-ratiometric [INP.4]
- Enable/disable Input Scale and Offset [INP.5]
- Selection of hard reset or peak/valley reset [INP.6]
- Enable/disable zeroing function [INP.7]

In the FAST mode, you need a jumper in the S1A position on the vertical Signal Input Board. If you set the SLOW read rate, this jumper should be removed to avoid overloading the integrator. SLOW read rate produces less noise. If your input is bipolar, set INP.3=1 and install Jumper S1B.

TABLE 10.5
INPUT CONFIGURATION

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"IN CNF":		INPUT CONFIGURATIONS
		Line Frequency:
	"INP.1=0"	60 Hz
	"INP.1=1"	50 Hz
		Read Rate:
	"INP.2=0"	Slow (3/sec)
	"INP.2=1"	Fast (10-13 sec)
		Input Voltage:
	"INP.3=0"	Unipolar (from –10 mV to 100 mV
	"INP.3=1"	Bipolar (from –60 mV to +60 mV
	"INP.4=0"	Non-ratiometric reading
	"INP.4=1"	Ratiometric reading
		Input Scale & Offset:
	"INP.5=0"	Disable
	"INP.5=1"	Enable

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MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
		Rear connector Pin P2.3:
	"INP.6=0"	"RESET2"
	"INP.6=1"	Peak/valley reset
	"INP.7=0"	Enable display hold on P2.4
	"INP.7=1"	Enable zeroing function via P2.4
		Count by:
	"INP.8=0"	Averaging
	"INP.8=1"	Special (refer to Section 14.2)

* The 'TARE' button allows you to sequence through INP.1, INP.2, INP.3, INP.4, INP.5, INP.6, and INP.7.

The 'NT/GRS' button allows you to select the "0" or "1" state for each "INP" condition.

The 'MENU' button stores the selected values for all "IN CNF" condition(s) changed and advances the meter to "IN.SC.OF". Do not press the 'MENU' button after each change within the submenu or the meter will advance to the next menu item.

Every underlined "0" or "1" state is the factory preset value.

10.2.9 IN.SC.OF (INPUT SCALE AND OFFSET)

Refer to Section 9.3 for a detailed discussion of this feature.

NOTE: "IN.SC.OF" is disabled when "AUT.ZRO" (auto zeroing) is enabled.

10.2.10 TARE CONFIGURATION ('TAR.CNF')

TABLE 10.6
TARE CONFIGURATION

BIT NO.	DESCRIPTION
TAR.1 = 0	Use instantaneous tare value
TAR.1 = 1	Use fixed tare value
TAR.2 = 0	Enable stabilization mode
TAR.2 = 1	Disable stabilization mode
TAR.3 = 0	Normal tare
TAR.3 = 1	Sequential tare mode (refer to Section 14.1)
TAR.4 = 0	No limit for tare
TAR.4 = 1	Positive tare
TAR.4 = 2	Positive (3% of MAX. CAP)/tare
TAR.4 = 3	Positive (1% of MAX. CAP)/tare
TAR.5 = 0	'▶TARE' button: tare/and Pin 2.9: reset tare
TAR.5 = 1	'▶TARE' button: valley/and Pin 2.9: valley
TAR.6 = 0	'▲ NT/GRS' button and Pin 2.2: toggle between net/gross
TAR.6 = 1	'▲ NT/GRS' button and Pin 2.2: peak
TAR.7 = 0	'RESET button: RESET1 /RESET2
TAR.7 = 1	'RESET' button: reset tare

IMPORTANT NOTE: If "TAR.2=0" in 'TAR.CNF' then unless the reading value is stabilized (meaning that the value is within ±1 or ±3 scale division(s) (SCL.DIV) for Class III; or IIIL & IIII respectively), tare will not be enabled, and any request for transmission will be responded by "?53". If "TAR.2=1" then above condition will be bypassed. If jumper "S3A" (for Handbook 44) is installed meter will always assume "TAR.2=0".

10.2.11 DEC PT (DECIMAL POINT)

Refer to Section 9 for a detailed discussion of this feature.

Decimal point is used to select the resolution of your meter display such as in one degree, tenths of a degree, hundredths of a degree or more.

If "ERR 01" is displayed, check that "RDG OF" is within the display range.

TABLE 10.7
DECIMAL POINT POSITION

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON CONDITION	DESCRIPTION
"DEC PT":		DECIMAL POINT POSITION
	"FFFFF."	Position 1
	"FFFF.F"	Position 2
	"FFF.FF"	Position 3
	"FF.FFF"	Position 4
	"F.FFFF"	Position 5
	"FFFFFF"	Position 6

* Press the 'TARE' button to show all "F's" on the display.

Press the 'NT/GRS' button to move the decimal point.

Press the 'MENU' button to store the decimal point location and the meter then advances to "CNT BY".

The underlined item is the factory preset value.

NOTE: If you set INP.8=1 (refer to Section 10.2.8) for special Count By, the decimal point will always be at position 1.

10.2.12 CNT BY (COUNT BY)

Count by is used to round off the meter values by 1's, 2's, 5's, 10's, 20's, 50's, or 100's. This feature is normally set to "001" so that the display shows all possible values for the least-significant digit.

If the combination of input-signal noise and selected resolution is high, however, your meter can round off the display to the nearest 2, 5, 10, 20, 50 or even 100 digits. This can eliminate annoying display jitter without introducing any filter time delays.

TABLE 10.8
COUNT BY

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"CNT BY":	"000" "<u>001</u>" "002" "005" "010" "020" "050" "100"	COUNT BY ROUNDING OFF THE VALUE (the decimal point position is ignored)

* Press the 'TARE' button to show "001", "002", "005", "010", "020", "050", or "100".

Press the 'NT/GRS' button to select one of the above.

Press the 'MENU' button to store the Count By number and the meter then advances to "FIL.CNF".

The underlined item is the factory preset value.

10.2.13 FIL.CNF (FILTER CONFIGURATION)

Filter configuration is used to select:

- Adaptive Bandwidth Control (ABC) filtering or normal filter [FIL.1]

"FIL.1=0" for Adaptive Bandwidth Control (ABC filtering, which averages over a larger number of samples when the input is not moving, but drops down to no averaging for systematic input changes). "FIL.1=1" is for averaging over a fixed number of samples. The number of samples to be used is selected in "FIL TI".

TABLE 10.9
FILTER CONFIGURATION

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"FIL.CNF":		FILTER CONFIGURATION
		Filter Type:
	"FIL.1=0"	ABC Filter
	"FIL.1=1"	Normal Filter

Adaptive Bandwidth Control takes the average of the samples except when the input is rapidly changing.

10.2.14 FIL TI (FILTER TIME CONSTANT)

Filter time constant is used to determine the number of readings the meter will average before displaying an input value.

For fixed filtering, the averaged number of samples is fixed; for Automatic Bandwidth Control, the chosen value is the maximum number of samples in the average computed by ABC when the input is not changing significantly (ABC, for slowly-moving signals, filters by averaging the "TI" number of samples, but follows signal changes rapidly by decreasing that averaging number).

Press the 'MENU' button to store your selection and advance to "SP CNF".

TABLE 10.10
FILTER TIME CONSTANT

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"FIL TI":		FILTER TIME CONSTANT
	"001"	
	"002"	
	"004"	
	"008"	Number of readings used in averaging.
	"016"	
	"032"	
	"064"	
	"128"	
	"256"	

* Press the 'TARE' button to show "001", "002", "004", "008", "016", "032", "064", "128" or "256".

Press the 'NT/GRS' button to select one of the above.

The underlined item is the factory preset value.

10.2.15 SP CNF (SETPOINTS 1 & 2 CONFIGURATION)

Refer to Section 11 for an in-depth discussion of these features.

Setpoint configuration is used to select:

- The active zone of each setpoint to above and below the setting [SPC.1 & SPC.4]
- Setpoint 1 & 2 on/off status (if active) [SPC.2 & SPC.5]
- Setpoint net or gross value [SPC.3 & SPC.6]
- Enabled or disabled setpoints [SPC.7]
- One or two-sided setpoint deadband [SPC.8]

TABLE 10.11
SETPOINT CONFIGURATION

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"SP CNF":		SETPOINTS 1 & 2 CONFIGURATIONS
		Setpoint 1 active zone:
	"SPC.1=0"	Above
	"SPC.1=1"	Below
		Setpoint 1 output:
	"SPC.2=0"	On (if active)
	"SPC.2=1"	Off (if active)
		Setpoint 1 assigned to:
	"SPC.3=0"	Net value
	"SPC.3=1"	Gross value
		Setpoint 2 active zone:
	"SPC.4=0"	Above
	"SPC.4=1"	Below
		Setpoint 2 output:
	"SPC.5=0"	On (if active)
	"SPC.5=1"	Off (if active)
		Setpoint 2 assigned to:
	"SPC.6=0"	Net value
	"SPC.6=1"	Gross value
		Setpoints 1 & 2 action:
	"SPC.7=0"	Enabled
	"SPC.7=1"	Disabled
		Setpoint 1 & 2 deadband:
	"SPC.8=0"	Two-sided
	"SPC.8=1"	One-sided

* The 'TARE' button allows you to sequence through SPC.1, SPC.2, SPC.3, SPC.4, SPC.5, SPC.6, SPC.7 and SPC.8.

The 'NT/GRS' button allows you to select the "0" or "1" state for each "SPC" condition.

The 'MENU' button stores the selected values for each "SPC" condition changed and advances the meter to the next configuration ("AL CNF").

Every underlined "0" or "1" is the factory preset value.

10.2.16 AL CNF (ALARM CONFIGURATION)

Refer to Section 11 for an in-depth discussion of these features.

Alarm configuration is used to select:
- The active zone for each alarm point to above or below the setting [ALC.1 & ALC.4]
- Alarm output on/off status (if active) [ALC.2 & ALC.5]
- Setpoint net or gross value [ALC.3 & ALC.6]
- Enabled or disabled alarm points [ALC.7]
- Reset Alarm at P2-11 [ALC.8]

TABLE 10.12
ALARM CONFIGURATION

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"AL CNF":		ALARMS 1 & 2 (SETPOINTS 3 & 4) CONFIGURATIONS
		Alarm 1 Active zone (Setpoint 3):
	"ALC.1=0"	Above
	"ALC.1=1"	Below
		Alarm output 1:
	"ALC.2=0"	On (if active)
	"ALC.2=1"	Off (if active)

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MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
		Setpoint 3 assigned to:
	"ALC.3=0"	Net value (total Net if in sequential tare mode)
	"ALC.3=1"	Gross value
		Alarm 2 active zone (Setpoint 4):
	"ALC.4=0"	Above
	"ALC.4=1"	Below
		Alarm output 2:
	"ALC.5=0"	On (if active)
	"ALC.5=1"	Off (if active)
		Setpoint 4 assigned to:
	"ALC.6=0"	Net value (total Net if in sequential tare mode)
	"ALC.6=1"	Gross value
		Alarms 1 & 2 (Setpoints 3 & 4) action and LEDs:
	"ALC.7=0"	Enabled
	"ALC.7=1"	Disabled
		Alarm reset at P2-11 connector:
	"ALC.8=0"	Disabled
	"ALC.8=1"	Enabled

* The 'TARE' button allows you to sequence through ALC.1, ALC.2, ALC.3, ALC.4, ALC.5, ALC.6, ALC.7 and ALC.8.

The 'NT/GRS' button allows you to select the "0" or "1" state for each "ALC" condition.

The 'MENU' button stores the selected values for each "ALC" condition changed and advances the meter to the next configuration ("AL FNC").

Every underlined "0" or "1" is the factory preset value.

10.2.17 AL FNC (ALARM FUNCTION)

Refer to Section 11 for an in-depth discussion of these features.

Alarm function is used to select:
- Whether the alarms are used in the no-deviation, high-deviation, low-deviation or band deviation modes [ALF.1 & ALF.3]
- Whether or not to latch the alarms [ALF.2 & ALF.4]

TABLE 10.13
ALARM FUNCTION

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"AL FNC":		ALARMS 1 & 2 FUNCTION SETPOINT 3
		Alarm 1 state:
	"ALF.1=0"	No Deviation Mode
	"ALF.1=1"	Low Deviation Mode
	"ALF.1=2"	High Deviation Mode
	"ALF.1=3"	Band Deviation Mode
		Alarm 1 latch action:
	"ALF.2=0"	Unlatched
	"ALF.2=1"	Latched
		Alarm 2 state:
	"ALF.3=0"	No Deviation Mode
	"ALF.3=1"	Low Deviation Mode
	"ALF.3=2"	High Deviation Mode
	"ALF.3=3"	Band Deviation Mode
		Alarm 2 latch action:
	"ALF.4=0"	Unlatched
	"ALF.4=1"	Latched

* The 'TARE' button allows you to sequence through ALF.1, ALF.2, ALF.3 and ALF.4.

The 'NT/GRS' button allows you to select the "0", "1", "2", or "3" state for each "ALF" condition.

The 'MENU' button stores the selected values for each "ALF" condition changed and advances the meter to the next configuration ("AL RDG").

Every underlined item is the factory preset value.

10.2.18 AL RDG (ALARM READINGS)

Refer to Section 11 for an in-depth discussion of these features.

Alarm reading is used to select the number of readings (from 01 to 15) the meter must make prior to activating the alarms.

TABLE 10.14
ALARM READINGS

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"AL RDG":	"00 00" ("03 03")	ALARM NUMBER OF READINGS Number of readings to delay activation of Alarms 1 & 2 (from "01" to "15") (AL1), (AL2)

* Press the 'TARE' button to show the current number of readings on the display (left pair of digits are flashing).

The 'NT/GRS' button is used to change the value of the flashing digits (from 01 to 15).

Pressing the 'TARE' button allows you go to the second set of digits.

The 'NT/GRS' button is used to change the value of the flashing digits.

After changing the last number, if necessary, pressing the 'MENU' button stores everything that was changed and advances the meter to the next configuration ("SP DB").

The underlined item is the factory preset value.

10.2.19 SP DB (SETPOINT DEADBAND)

Refer to Section 11 for an in-depth discussion of these features.

Setpoint deadband is used to select the amount of hysteresis for setpoints 1 and 2 (programmable from "0000" to "9999").

TABLE 10.15
SETPOINT DEADBAND

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"SP DB":		SETPOINTS 1 & 2 DEADBAND
	"0000" ("0020")	Hysteresis for (w/system decimal points) Setpoints 1 and 2 (Programmable from "0000" to "9999")

* Press the 'TARE' button to show the value on the display.

The 'NT/GRS' button also allows you to sequence through the digits of the number being changed.

The 'MAX' button changes the value of the digit to be displayed.

The 'MENU' button stores the selected values for each "SP DB" condition cahnged and advances the meter to the next configuration ("AL DB"):

The underlined item is the factory preset value.

10.2.20 AL DB (ALARM DEADBAND)

Refer to Section 11 for an in-depth discussion of these features.

Alarm deadband is used to select the amount of hysteresis for alarms 1 and 2 (setpoints 3 and 4) (programmable from "0000" to "9999").

TABLE 10.16
ALARM DEADBAND

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
"AL DB":		ALARMS 1 & 2 DEADBAND
	"0000" ("0020")	Hysteresis for (w/System decimal points) Alarms 1 & 2 (Programmable from "0000" to "9999")

* Press the 'TARE' button to show the value on the display.

The 'TARE' button also allows you to sequence through the digits of the number being changed.

The 'NT/GRS' button changes the value of the digit to be displayed.

Press the 'MENU' button to store the changes and advances the meter to the next configuration ("FLS.DSP").

The underlined item is the factory preset value.

10.2.21 FLASHING DISPLAY OPTIONS

TABLE 10.17
FLASHING DISPLAY OPTIONS

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
FLS.DSP	FLS.1 = 0	Disable flash display
	FLS.1 = 1	Flashes display if setpoint 1 active
	FLS.1 = 2	Flashes display if setpoint 2 active
	FLS.1 = 3	Flashes display if setpoint 3 active
	FLS.1 = 4	Flashes display if setpoint 4 active
	FLS.1 = 5	Flashes display if setpoint 1 or 2 are active.
	FLS.1 = 6	Flashes display if setpoint 3 or 4 are active.
	FLS.1 = 7	Flashes display if any setpoint is active

* Press the 'TARE' button to show the value on display.

The 'TARE' button also allows you to select the "0" through "7" state for each 'FLS' condition.

The underlined item is the factory preset value.

The 'MENU' button stores the selected value for each 'FLS' condition changed and advances the meter to the next configuration ("BCD.OUT")

10.2.22 BCD (BINARY-CODED DECIMAL) OUTPUT

TABLE 10.18
BINARY-CODED DECIMAL OUTPUT

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
BCD.OUT	BCD.1 = 0 BCD.1 = 1	Compatible with all desk top printers Compatible with Newport printer
	BCD.2 = 0 BCD.2 = 1 BCD.2 = 2 BCD.2 = 3 BCD.2 = 4 BCD.2 = 5	BCD out disabled Net value on BCD output Gross value on BCD output (Total net value if in sequential tare mode) Tare value on BCD output Peak value on BCD output Valley value on the BCD output (This option is not valid if in sequential tare mode and will output remote value if in remote meter mode).

* Press the 'TARE' button to show the value on display.

The 'TARE' button allows you to select BCD.1 or BCD.2

The 'NT/GRS' button allows you to changew the value of the BCD option.

Defaults are underlined and are the factory preset values.

The 'MENU' button stores the selected value for each 'BCD' condition changed and advances the meter to the next configuration ("ANL.OUT").

10.2.23 ANALOG OUTPUT

TABLE 10.19
ANALOG OUTPUT

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
ANL.OUT	ANL.1 = 0 <u>ANL.1 = 1</u>	Analog out for 0-10 Vdc Analog out for 0-20 mAdc
	<u>ANL.2 = 0</u> ANL.2 = 1 ANL.2 = 2 ANL.2 = 3 ANL.2 = 4 ANL.2 = 5	Analog out disabled Net value on analog out Gross value on analog out (Total net value if in sequential tare mode. Tare value on analog out Peak value on analog out Valley value on the analog output (This option is not valid if in sequential tare mode and will output remote value if in remote meter mode).

* Press the 'TARE' button to show the value on display.

The 'TARE' button also allows you to select ANL.1 or ANL.2

The 'NT/GRS' button allows you to change the value of the Analog Output option.

Defaults are underlined and are the factory preset values.

The 'MENU' button stores the selected value for each 'ANL' condition changed and advances the meter to the next configuration ("OT.SC.OF").

10.2.24 OT.SC.OF (OUTPUT SCALE AND OFFSET)

Output scale and offset is used to calibrate your optional analog output to correspond to the engineering units you desire.

TABLE 10.20
OUTPUT SCALE AND OFFSET

MENU BUTTON MAIN MENU	TARE NT/GRS * BUTTON SUB MENU 1	TARE NT/GRS MENU ** BUTTON SUB MENU 2	DESCRIPTION
"OT.SC.OF":			OUTPUT SCALE AND OFFSET
	READ 1		Item #1 of Coordinate #1.
		000000. ("000000.")	Enter the first value displayed by the meter.
	OUTPT1		Item #2 of Coordinate #1.
		00.0000 ("04.0000")	Enter first desired output value.
	READ 2		Item #1 of Coordinate #2.
		000000. ("100000.")	Enter the second value displayed by the meter.
	OUTPT2		Item #2 of Coordinate #2.
		00.0000 ("20.0000")	Enter second desired output value.

* The 'TARE' button allows you to sequence through "READ 1", "OUTPT1", "READ 2", and "OUTPT2" headings.

The 'NT/GRS' button sends you to the value corresponding to "READ 1", "OUTPT1", "READ 2", and "OUTPT2" so you can change it (go to the SUB MENU 2 item).

** The 'TARE' button allows you to step through the digits of the applicable number being changed.

The 'NT/GRS' button changes the value of the digit to be displayed.

The 'MENU' button stores the selected values for each input required in "OT.SC.OF". After the last value ("READ 2") has been entered and the 'MENU' button is pressed, the meter display will advance to "BAUD".

Every underlined item is the factory preset value.

10.2.25 BAUD (BAUD RATE)

Baud is used to select the baud rate for communication via the optional RS-232 or RS-485 communications boards. The choices are 300, 600, 1200, 2400, 4800, 9600, and 19200.

TABLE 10.21
BAUD RATE

MENU BUTTON MAIN MENU	TARE NT/GRS MENU * BUTTON SUB MENU	DESCRIPTION
"BAUD":	"00300" "00600" "01200" "02400" "04800" "09600" "19200"	BAUD RATE Select baud rate for communications via RS-232 or RS-485

* Press the 'TARE' button to show "00300", "00600", "01200", "02400", "04800", "09600", or "19200".

Press the 'NT/GRS' button to select one of the above.

Press the 'MENU' button to store the changes and the meter advances to the next configuration ("SERCNF").

The underlined item is the factory preset value.

10.2.26 SERCNF (SERIAL COMMUNICATION CONFIGURATION)

Serial communication configuration is used to select:
- No parity, odd parity, or even parity for communications [SER.1]
- 1 stop bit or 2 stop bits [SER.2]

TABLE 10.22
SERIAL COMMUNICATIONS CONFIGURATION

MENU BUTTON MAIN MENU	TARE/ NT/GRS MENU * BUTTON SUB MENU	DESCRIPTION
"SERCNF":		SERIAL COMMUNICATION CONFIGURATION
		Select parity for communications via RS-232 or RS-485:
	"SER.1=0"	No parity
	"SER.1=1"	Odd parity
	"SER.1=2"	Even parity
		Select stop bits for communications via RS-232 or RS-485:
	"SER.2=0"	1 Stop Bit
	"SER.2=1"	2 Stop Bits
	"SER.3=0"	Not used
	"SER.3=1"	Set to zero

* The 'TARE' button allows you to toggle between SER.1 and SER.2.

The 'NT/GRS' button allows you to select the "0", "1", or "2" state for each "SER" condition.

The 'MENU' button stores the selected values for each "SER" condition changed and advances the meter to the next configuration ("ADDRES").

Every underlined "0", "1" or "2" is the factory preset value.

10.2.27 ADDRES (MULTIPOINT COMMUNICATIONS DEVICE ADDRESS)

Address is used to give each meter a unique address while on the network using the optional RS-485 board.

TABLE 10.23
MULTIPOINT COMMUNICATIONS DEVICE ADDRESS

MENU BUTTON MAIN MENU	TARE/ NT/GRS MENU * BUTTON SUB MENU	DESCRIPTION
"ADDRES":	"000" ("001")	MULTIPOINT COMMUNICATIONS DEVICE ADDRESS Enter address as an integer value: "000" to "199"

* Press the 'TARE' button to show the value on the display.

The 'TARE' button also allows you to change the position of the digit being changed.

The 'NT/GRS' button changes the value of the digit to be displayed.

Press the 'MENU' button to store the changes and advances the meter to the next configuration ("DAT FT").

The underlined item is the factory preset value.

10.2.28 DAT FT (DATA FORMAT FOR COMMUNICATIONS)

Data format is used to set all the parameters to be transmitted via the optional RS-232 or RS-485 serial communications board.

Data format allows you to select:
- Whether to transmit Alarm status [DAT.1]
- Whether to transmit HI/LO status [DAT.2]
- Whether to transmit net or gross value [DAT.3 & DAT.4]
- Whether or not ot transmit the peak and valley readings [DAT.6]
- The type of separator [DAT.7]
- Whether or not to transmit the unit of measure [DAT.8]

TABLE 10.24
DATA FORMAT

MENU BUTTON MAIN MENU	TARE/ NT/GRS MENU * BUTTON SUB MENU	DESCRIPTION
"DAT FT":		DATA FORMAT
		Alarms and HI/LO Status Characters:
	† "DAT.1=0"	Do not transmit
	"DAT.1=1"	Transmit
		Display value:
	†† "DAT.2=0"	Do not transmit
	"DAT.2=1"	Transmit
		Net value:
	"DAT.3=0"	Do not transmit
	"DAT.3=1"	Transmit
		Gross value:
	"DAT.4=0"	Do not transmit
	"DAT.4=1"	Transmit
		Tare value:
	"DAT.5=0"	Do not transmit
	"DAT.5=1"	Transmit
		Peak and valley values:
	"DAT.6=0"	Do not transmit
	"DAT.6=1"	Transmit
		Separator for above items:
	"DAT.7=0"	Space
	"DAT.7=1"	<CR>
		Unit of measurement:
	"DAT.8=0"	Do not transmit
	"DAT.8=1"	Transmit

* The 'TARE' button allows you to sequence through DAT.1, DAT.2, DAT.3, DAT.4, DAT.5, DAT.6, DAT.7, and DAT.8.

The 'NT/GRS' button allows you to select the "0" or "1" state for each "DAT" condition.

The 'MENU' button stores the selected values for each "DAT" condition changed and advances the meter to the next configuration ("BUS FT").

Every underlined "0" or "1" is the factory preset value.

† 2 characters will be transmitted left most which is alarm and right most is HI/LO (Peak/Valley) status character.

†† Following is the value of display transmission whether "BUS.7" in "BUS.FT" item (refer to Section 10.2.29) is 0 or 1.

1) "BUS.7=0"
   a) If Net, Gross, Peak, Valley or remote values are on display and are normal value: XXXXXX.
   b) If Net, Gross are + overload, over capacity or + overscale: ?+999999
   c) If Net, Gross are – overload, under capacity or – overscale: ?–999999
   d) If meter is in setpoint or menu routine: ?+000000.

2) "BUS.6=0"and "BUS.7=1"(formatted format)
   N:XXXXXX. for Net on display
   G:XXXXXX. for Gross on display
   P:XXXXXX. for Peak on display
   V:XXXXXX. for Valley on display
   R:XXXXXX. for Remote Value on display
   $:+?000000. for Setpoints or Menu on display
   If any of the above four values are ± overloaded (i.e. Net): N:±?999999.

Note: XXXXXX. means normal 6-digit number, with decimal point from position 1 to 6.

3) "BUS.6=1"and "BUS.7=1"(identification format)
   XXXXXX.N for Net on display
   XXXXXX.G for Gross on display
   XXXXXX.P for Peak on display
   XXXXXX.V for Valley on display
   $:+?000000. for Setpoints or Menu on display
   If any of the above four values are ± overloaded (i.e. Net): ±?999999N.

Note: XXXXXX. means normal 6-digit number, with decimal point from position 1 to 6.

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10.2.29 BUS FT (BUS FORMAT FOR COMMUNICATIONS)

Bus format is to select:

- Whether or not to include check sum with reading [BUS.1]
- Whether or not to include line feeds [BUS.2]
- Whether or not to have the meter respond in echo mode [BUS.3]
- Nultipoint or point-to-point mode [BUS.4]
- (If in point-to-point mode) select whether to communicate continuously or on command [BUS.5]
- Whether a message character is used in handshake or continuous mode [BUS.6]
- Whether or not to transmit formatted values [BUS.7]
- Whether or not to enable the external print command at P2-11 [BUS.8]

TABLE 10.25
BUS FORMAT

MENU BUTTON MAIN MENU	TARE/ NT/GRS MENU * BUTTON SUB MENU	DESCRIPTION
"BUS FT":		BUS FORMAT
		Check sum with reading:
	"BUS.1=0"	Excluded
	"BUS.1=1"	Included
		Line feed following all <CR>'s:
	"BUS.2=0"	Excluded
	"BUS.2=1"	Included
		Response from the meter (echo):
	"BUS.3=0"	No
	"BUS.3=1"	Yes
		Point to Point mode or Multipoint mode:
	"BUS.4=0"	Pt-Pt
	"BUS.4=1"	Multi-Pt
		Point-to-Point mode only:
	"BUS.5=0"	Continuous
	"BUS.5=1"	On Command

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MENU BUTTON MAIN MENU	TARE/ NT/GRS MENU * BUTTON SUB MENU	DESCRIPTION
"BUS FT"	"BUS.6=0"and "BUS.7=0"	Transmit data in regular form
	"BUS.6=1"and "BUS.7=0"	Transmit data in regular form
	"BUS.6=0"and "BUS.7=1"	Transmit data in formatted form
	"BUS.6=1"and "BUS.7=1"	Transmit identification of the data

* The 'TARE' button allows you to sequence through BUS.1, BUS.2, BUS.3, BUS.4, BUS.5, BUS.6, BUS.7 and BUS.8.

The 'NT/GRS' button allows you to select the "0" or "1" state for each "BUS" condition.

The 'MENU' button stores the selected values for each "BUS" condition changed and advances the meter to the next configuration ("SERCNT").

**Example for "BUS.7" and "BUS.6" items: Suppose we want to print Net, Gross, Tare, Peak and Valley values, each on one line with unit of measure. Printout will have the following form.

If BUS.7=0:
0427.45
1427.45
0200.00
1793.86
0542.14 LBS

If "BUS.6=0" and "BUS.7=1":
N: 0427.45 LBS
G: 1427.45 LBS
T: 0200.00 LBS
P: 1793.86 LBS
V: 0542.14 LBS

If "BUS.6=1" and "BUS.7=1"
427.45N
1427.45G
200.00T
1793.9P
542.14 V LBS

IMPORTANT: If "BUS.6=1" and "BUS.7=1" there are only 5 digits for a display value. The meter deletes the right most digit and rounds the value, if there is no room to place the identification letter.

10.2.30 SERCNT (NO. OF READINGS BETWEEN EACH TRANSMISSION OR PRINT)

This item programs the number of readings the meter must take (programmable from "00001" to "59,999") between transmissions of data via the optional RS-232 or RS-485 serial communications board when it is in continuous mode (BUS.4=0, BUS.5=0 refer to Section 10.2.29).

Once you are done with the changes, press the 'MENU' button to display the normal operating display. The meter advances to run mode showing the currently measured values. Pressing the 'RESET' button two times allows you to return to the run mode.

TABLE 10.26
SERIAL COUNT

MENU BUTTON MAIN MENU	TARE/ NT/GRS MENU * BUTTON SUB MENU	DESCRIPTION
"SERCNT":	"00000" ("<u>00001</u>")	SERIAL COUNT This specifies the number of readings between data transmissions: "00001" to "59999"

* Press the 'TARE' button to show the value on the display.

The 'NT/GRS' button also allows you to change the position of the digit being changed.

The 'NT/GRS' button changes the value of the digit to be displayed.

Press the 'MENU' button to store the changes and advance to the next configuration (CAL VZ)

The underlined item is the factory preset value.

10.2.31 ANALOG OUTPUT CALIBRATION VALUES

The analog output calibration values (see Figure 12-1) are printed on the optional analog output board. These four numbers (CAL VZ, CAL VS, CAL mAZ, and CAL mAS) must be entered into the meter to ensure that the analog output board is calibrated with the microprocessor.

TABLE 10.27
ANALOG OUTPUT CALIBRATION NUMBERS

MENU BUTTON MAIN MENU	MIN/MAX/ MENU * BUTTON SUB MENU	DESCRIPTION
"CAL VZ"	0 to 59999	Analog output offset volt.
"CAL VS"	0 to 59999	Analog output scale volt.
"CAL mAZ"	0 to 59999	Analog output offset current.
"CAL mAS"	0 to 59999	Analog output scale current.

Once you complete changes, press the 'MENU' button to display. The meter advances to the next configuration (AUT.ZRO)

10.2.32 (AUT.ZRO) AUTO ZERO TRACKING

TABLE 10.28
AUTO ZERO TRACKING

MENU BUTTON MAIN MENU	TARE/ MENU * BUTTON SUB MENU	DESCRIPTION
AUT.ZRO	<u>OFF</u>	Off
	0.6 DIV	0.6 Scale Division (SCL.DIV)
	1 DIV	1 Scale Division (SCL.DIV)
	3 DIV	3 Scale Division (SCL.DIV)

If "AUT.ZRO" is enabled, and the current reading is within ± of the auto zeroing value you select, then any increment of the value within the selection will not be added to the reading. (CZ led will be on as long as reading is within the auto zero tracking limit).

* Press the 'TARE' button to show the value on display.

The 'TARE' button also allows you to select the 'AUT.ZRO' condition.

The underlined item is the factory preset value.

The 'MENU' button stores the selected value for each 'AUT.ZRO' condition changed and advances the meter to the next configuration ("LI CNF") For more information on Lockout Configuration, refer to Tables 10.1 and 10.2.

Notes:

11. Setpoints/Alarms

Setpoints 1 through 4 can be configured for a very large variety of zone and level signalling.

SP1 and SP2 have balanced or single-sided configurable hysteresis and are non-latching, suitable for control-level signalling. SP3 and SP4 are often used as ALarm 1 and ALarm 2, because they have single-sided hysteresis and can be configured for latching action.

The levels of these setpoints are entered during run mode via the front-panel pushbuttons (refer to Section 11.11). Many performance options are entered during the configuration mode (refer to Sections 11.2 through 11.10).

11.1 FEATURES OVERVIEW

1. Four full-range levels with many menu programmable features.

2. Independent operation or ganged action (including guard-band assignments).

3. Active above or below level, outside or inside band.

4. SP1 and SP2 have configurable hysteresis, 50% on either side or 100% on inactive side of setpoint.

5. SP3 and SP4 have configurable hysteresis, 100% on inactive side.

6. SP3 and SP4 is configurable for latching action.

7. Setpoint levels can be compared to the unfiltered or filtered input signal measurements.

8. Configurable delays in alarm action.

9. Individual front-panel LED indicators.

10. Four (4) open-collector transistor outputs with clamping diodes, are isolated from signal input.

11. Setpoints can be displayed and reset as desired without

interrupting measurements.

Setpoints 1 and 2 have selectable hysteresis, allocated 50% on either side of the setpoint level. A single setpoint can now generate on/off control signals for an operating region defined by the hysteresis. Refer to Figures 11-1 and 11-2 to understand how hysteresis works:

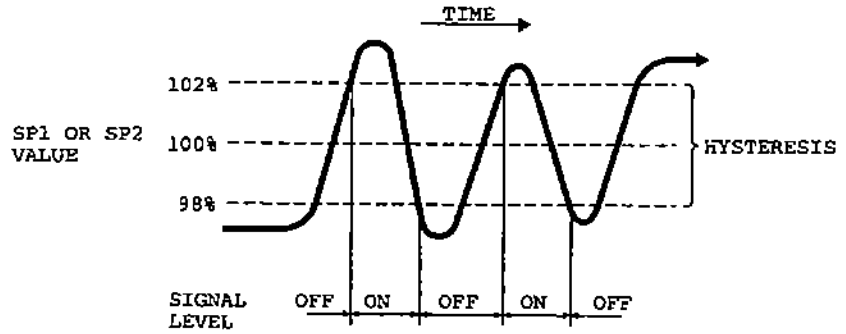


Figure 11-1. Setpoints 1 & 2 Action
(Setpoint at 100 with 4% hysteresis)

These two setpoints have selectable single-sided hysteresis. When used as alarms, the action is immediate (unless a delay is programmed) going into the alarm zone but turning off is deferred (if latching is not programmed) by the hysteresis amount.

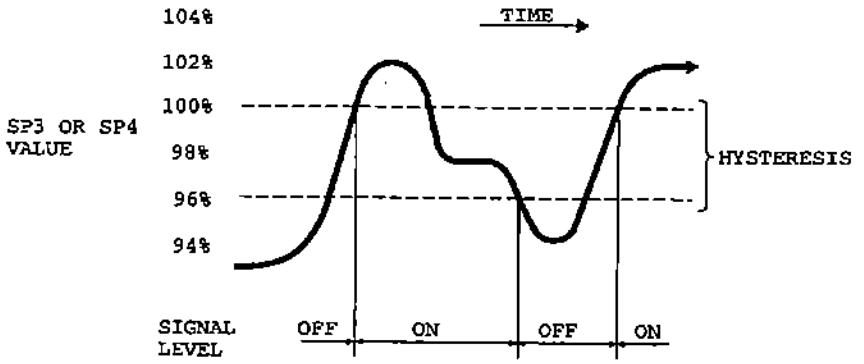


Figure 11-2. Setpoints 3 & 4 Action
(for Low Alarm with Relay on at -100, relay off at -96
with a hysteresis of 4)

You are now able to program the setpoint features (as described in the following sections).

11.2 UNLOCKING THE FEATURES

All setpoint values and features can be set via the front-panel buttons or the optional serial communications boards (RS-232 or RS-422/485).

1. Check that main board jumper S3C is installed (to permit memory storage of program and data along with button controls).

> **NOTE:** Jumper S3B should NOT be installed. This jumper is reserved for factory recalibration!

2. Press the 'MENU' button to see "L1 CNF" and then press the 'MIN' button to view "L1C.1=0" if "SP 1" is unlocked. If "L1C.1=1", change to equal "0" by pressing the 'MAX' button.

3. Press the 'MIN' button again to advance to "L1C.2" and set equal to "0" to unlock "SP 2".

4. Press the 'MENU' button to save changes.

11.3 SELECTING "SP CNF" SETPOINT CONFIGURATION FEATURES

These eight bits select the modes for "SPC.1" and "SP 2" (see Section 11.5 for "SP 3" and "SP 4").

1. Press the 'MENU' button until "SP CNF" is displayed, then press the 'TARE' button to sequence through the selections. Use the 'NT.GRS' button to choose alternate choice.

2. "SPC.1=0" makes "SP 1" active ABOVE its level;
   "SPC.1=1" sets "SP 1" active BELOW.

3. "SPC.2=0" turns "SP 1" transistor ON when "SP 1" is active.
   "SPC.2=1" turns it OFF.

4. "SPC.3=0" for net value
   "SPC.3=1" for gross value.

5. "SPC.4=0" makes "SP 2" active ABOVE setpoint.
   "SPC.4=1" makes "SP 2" active BELOW setpoint.

6. "SPC.5=0" turns "SP 2" transistor ON when "SP 2" is active.
   "SPC.5=1" turns it OFF.

7. "SPC.6=0" for net value.
   "SPC.6=1" for gross value.

8. "SPC.7=0" Enables both setpoints 1 and 2.
   "SPC.7=1" Disables both setpoints 1 and 2.

9. "SPC.8=0" Sets up setpoints 1 & 2 deadbands on two sides.
   "SPC.8=1" Sets up setpoints 1 & 2 deadbands on one side.

11. Press the 'MENU' button to store your selections and advance to "AL CNF" (Alarm Configuration).

11.4 DEVIATION FUNCTION FOR ALARMS

Deviation functions apply to Alarms 1 and 2 (Setpoints 3 and 4) and act as buffer zones to control setpoint action. The Alarm 1 deviation is the sum of the Alarm 1 value plus the Setpoint 1 value; the Alarm 2 deviation is the Alarm 2 value plus the Setpoint 2 value. The four types of deviation functions are Process (no deviation), High, Low, and Deadband. The following illustrate the ways in which the deviation function alters the alarm response.

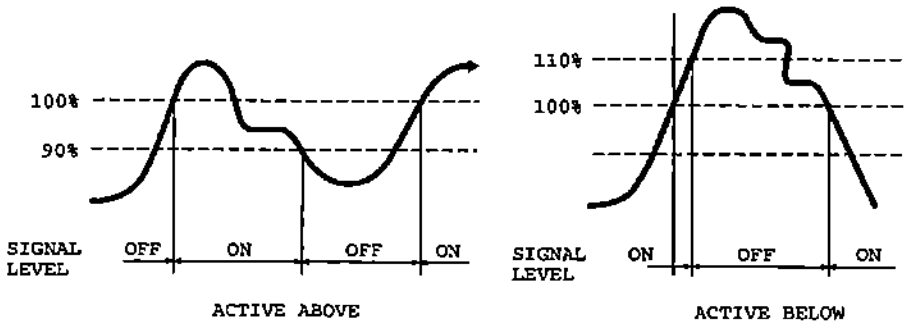


Figure 11-3. Process Deviation

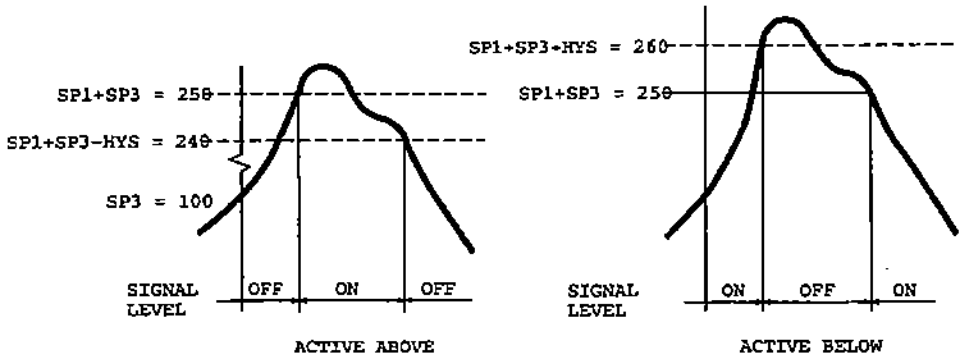


Figure 11-4. High Deviation for both Active Above and Active Below

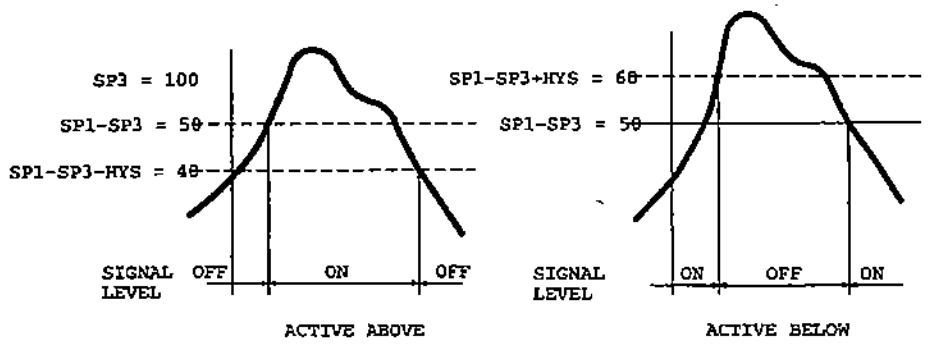


Figure 11-5. Low Deviation for both Active Above and Active Below

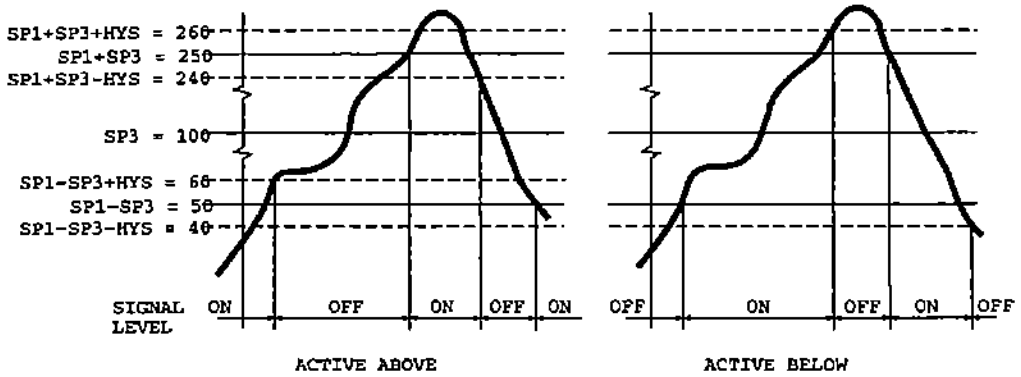


Figure 11-6. Band Deviation for both Active Above and Active Below

11.5 SELECTING "AL CNF" ALARM CONFIGURATION FEATURES

These bits offer the same selections for "SP 3" and "SP 4" as "SP CNF" did for "SP 1" and "SP 2", except for the last bit, which controls "SP 3" and "SP 4" LATCH reset.

1."ALC.1=0" makes Alarm 1 (Setpoint 3) active above the Setpoint value.
"ALC.1=1" makes Alarm 1 (Setpoint 3) active below the Setpoint value.

When Alarm 1 (Setpoint 3) is assigned to place a band about the Setpoint 1 level (by setting "ALF.1=3", described in Section 11.6), "ALC.1=0" makes Alarm 1 (Setpoint 3) active ABOVE and BELOW the band (OUTSIDE the band), with the chosen hysteresis for Alarm 1 (Setpoint 3) now inside the band. If "ALC.1=1", Alarm 1 (Setpoint 3) is active INSIDE the band, with the chosen hysteresis for Alarm 1 (Setpoint 3) now outside the band.

Figure 11-7 Illustrates the Alarm configuration for hysteresis.

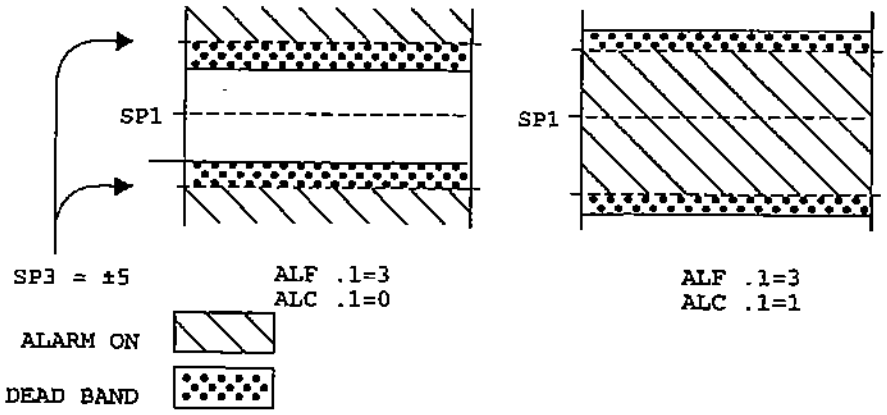


Figure 11-7. AL CNF Hysteresis

2."ALC.2=0" turns the Alarm 1 (Setpoint 3) open-collector output ON when Setpoint 3 is active.
"ALC.2=1" turns it OFF.

3. "ALC.3=0" sets up Alarm 1 for net value.
   "ALC.3=1" sets up Alarm 1 for gross value.

4. "ALC.4=0" makes Alarm 2 (Setpoint 4) active ABOVE the Setpoint value.
   "ALC.4=1" makes Alarm 2 (Setpoint 4) active BELOW the Setpoint value.

When Alarm 2 (Setpoint 4) is assigned to place a band about the Setpoint 4 level (by setting "ALF.1=3", described in Section 11.6), "ALC.4=0" makes Alarm 2 (Setpoint 4) active ABOVE and BELOW the band (OUTSIDE the band), with the chosen hysteresis for Alarm 2 (Setpoint 4) now inside the band. If "ALC.4=1", Alarm 2 (Setpoint 4) is active INSIDE the band, with the chosen hysteresis for Alarm 2 (Setpoint 4) now outside the band.

5. "ALC.5=0" turns the Alarm 2 (Setpoint 4) open-collector output ON when Setpoint 1 is active.
   "ALC.5=1" turns it OFF.

6. "ALC.6=0" sets up Alarm 2 for net value.
   "ALC.6=1" sets up Alarm 2 for gross value.

7. "ALC.7=0" ENABLES both Alarms 1 and 2 (Setpoints 3 and 4) action and LEDs.
   "ALC.7=1" DISABLES both Alarms 1 and 2 (Setpoints 3 and 4) action and LEDs.

8. "ALC.8=0" DISABLES Alarm reset at the P2-11 connector.
   "ALC.8=1" ENABLES Alarm reset at the P2-11 connector.

Press the 'MENU' button to store any changes and advance to "AL FNC" (Alarm Function).

11.6 SELECTING "AL FNC" ALARM FUNCTION FEATURES

This byte allows you to select independent or ganged operation for "SP 3" and "SP 4", and whether or not they should latch once triggered.

1."ALF.1=0" makes Alarm 1 (Setpoint 3) INDEPENDENT, with a level equal to the value inserted for Setpoint 3.
"ALF.1=1" assigns Setpoint 3 ("SP 3") to Setpoint 1 ("SP 1"), placing it ABOVE Setpoint 1 ("SP 1") by the amount entered for Setpoint 3 ("SP 3").
"ALF.1=2" places "SP 3" BELOW "SP 1" by the amount entered for "SP 3".
"ALF.1=3" places "SP 3" ON BOTH SIDES OF "SP 1" by the amount entered for "SP 3".

2."ALF.2=0" makes Alarm 1 (Setpoint 3) a NON-LATCHING Alarm.
"ALF.2=1" makes Alarm 1 (Setpoint 3) LATCHING. This means that once Alarm 1 (Setpoint 3) is triggered it will remain active until it is reset by pressing the 'RESET' button one time or by grounding P2-11 when configuration bit "ALC.8=1" is set. Reset can also be accomplished via the optional RS-232 or RS-485 serial communication board.

3."ALF.3=0" makes "SP 4" INDEPENDENT, with a level equal to the value inserted for "SP 4".
"ALF.3=1" assigns "SP 4" to "SP 2", placing it ABOVE "SP 2" by the amount entered for "SP 4".
"ALF.3=2" places "SP 4" BELOW "SP 2" by the amount entered for"SP 4".
"ALF.3=3" places "SP 4" ON BOTH SIDES OF "SP 2" by the amount entered for "SP 4".

4."ALF.4=0" makes Alarm 2 (Setpoint 4) a NON-LATCHING Alarm.
"ALF.4=1" makes Alarm 2 (Setpoint 4) LATCHING. This means that once Alarm 2 (Setpoint 4) is triggered it will remain active until it is reset by pressing the 'RESET' button one time or by grounding P2-11 when configuration bit "ALC.8=1" is set. Reset can also be accomplished via the optional RS-232 or RS-485 serial communication board.

Press the 'MENU' button to store any changes and advance to "AL RDG" (Alarm Reading).

11.7 "AL RDG": ALARM READINGS-SELECT DELAY IN ALARM ACTION

This byte allows you to select the number of input readings required to trigger Alarm 1 (Setpoint 3) and Alarm 2 (Setpoint 4) action.

When "AL RDG" is displayed, press the 'TARE' button to see two 2-digit numbers, with the first one flashing, indicating that you can reset the delay for SP3 by pressing the 'NT/GRS' button.

After choosing "SP 3" delay, press the 'TARE' button and select the delay for "SP 4" by pressing the 'NT/GRS' button.

Store your selections or changes by pressing the 'MENU' button and advance to "SP DB" (Setpoint Deadband).

11.8 "SP DB": SELECT "SP 1" AND "SP 2" DEADBAND (HYSTERESIS)

The deadband (hysteresis) for Setpoint 1 ("SP 1") and Setpoint 2 ("SP 2") is displayed with the same decimal point location as chosen for run mode.

This selected hysteresis value is EVENLY SPLIT on both sides of the levels chosen for "SP 1" and "SP 2".

View the value by pressing the 'TARE button, reset by pressing the 'NT/GRS' button, and store by pressing the 'MENU' button. Advance to "AL DB" (Alarm Deadband).

11.9 "AL DB": SELECT ALARM 1 ("SP 3") AND ALARM 2 ("SP 4") DEADBAND (HYSTERESIS)

This selected deadband (hysteresis) for Alarm 1 ("SP 3") and Alarm 2 ("SP 4") is placed on the INACTIVE side of the selected levels. This results in immediate action (if zero (0) delay is selected in "AL RDG") when an alarm limit is exceeded, but defers recovery when the input returns to pre-alarm levels.

Press the 'TARE' button to view the values, change the values of each flashing digit by pressing the 'NT/GRS' button, store any changes by pressing the 'MENU' button. Advance to "OUT.CNF" (Output Configuration).

11.10 "FLS.DSP": CONTROL FLASHING OF THE DISPLAY

You may wish to bring abnormal conditions to immediate attention by causing the display to flash.
Press the 'TARE' button to see "FLS.1".
Press the 'NT/GRS' button to select "0", "1", "2", "3", "4", "5", "6" or "7".

"FLS.1=0" disables display flashing.
"FLS.1=1" flashes the display if SP1 is active.
"FLS.1=2" flashes the display if SP2 is active.
"FLS.1=3" flashes the display if SP3 is active.
"FLS.1=4" flashes the display if SP4 is active.
"FLS.1=5" flashes the display if SP1 or SP2 are active.
"FLS.1=6" flashes the display if SP3 or SP4 are active.
"FLS.1=7" flashes the display if any SP is active.

Save your choice or changes by pressing the 'MENU' button and advance to meter "BCD.OUT" (Binary-Coded Decimal)

11.11 ENTERING SETPOINT VALUES

You may view or enter setpoint values as follows:.

1. Press the 'SETPTS' button. The meter now starts its setpoint display cycle; every 15 seconds, the display flashes the SP number, and then displays the value of that setpoint, with a flashing left-hand digit.

2. You can restart the time-out of any of these display intervals by pressing the 'TARE' button (to shift the flashing [alterable] digit position), or by pressing the 'NT/GRS' button (to increment the value of that digit).

3. When you change the value of any setpoint and then decide to revert to the original value instead, just press the 'RESET' button or allow the display to return to "RUN" at the end of its cycle. The meter does not store a new value for the setpoint in either case.

4. To save a newly-entered setpoint value, press the 'SETPTS' button again.

5. You may return to viewing the measurements by pressing the 'RESET' button or repeatedly pressing the 'SETPTS' button (or by letting the meter complete its setpoint display cycle).

12. Peak and Valley Readings

The meter has the capacity to display peak and valley values. Access the "TAR.CNF" function (refer to Section 10.2.10) and set TAR.6=1 for peak or TAR.5=1 for valley values. The '▶/TARE' button displays valley values and '▲/NT/GRS' button displays peak values.

The meter examines every new reading to see if it is greater than the stored PEAK or less than the stored VALLEY readings.

If you have unlocked access to these values with "L1C.5=0" and "L1C.6=0" (part of the first lockout byte "L1 CNF"), you can view the PEAK ("HI RDG") by pressing the 'NT/GRS button, or the VALLEY ("LO RDG") by pressing the 'TARE' button while in the run mode.

Selection of either PEAK or VALLEY causes the display to blink giving the indication that it is NOT the current measurement value. If the meter measures a more extreme value while displaying the PEAK or VALLEY measurement, the new value will immediately replace the old.

Unlike the setpoint display, there is no time out period. Press the same button, 'SETPTS' button or 'MENU' button to return to current-value mode.

The BCD option can be programmed to read the PEAK (but not the VALLEY) instead of the current measurement (refer to Section 16).

Both PEAK and VALLEY readings (and/or a PEAK/VALLEY status summary character) can be transmitted by the RS-232 or RS-422/485 digital communications (refer to Section 18).

The PEAK or VALLEY value can be transmitted via the optional analog output board (refer to Section 15).

Notes:

13. Special Values

You may access these values in setpoint mode. Press 'SETPTS' button to see these values then use '▲/NT/GRS' and '▶/TARE' buttons to change the value.

13.1 "FX.TARE" (FIXED TARE VALUE)

Fixed Tare ('FX.TARE'): This is a predetermined value that can be entered into the meter when required for your application. To select this, you must configure the Tare Configuration ('TAR.CNF') bit "TAR.1" to equal "1" (refer to Section 10.2.10).

You may select instantaneous tare by configuring the Tare Configuration ('TAR.CNF') bit "TAR.1" so that is equals "0" (refer to Section 10.2.10).

13.2 "ZERO.VAL" (ZEROING FUNCTION VALUE)

This is the actual value stored in EEPROM when you use zeroing switch at rear connector P2.4 and configure your INP.7 = 1 (refer to Section 10.2.8). You can change this value manually. This is the value that is subtracted from the gross value before you apply tare to the gross value.

Notes:

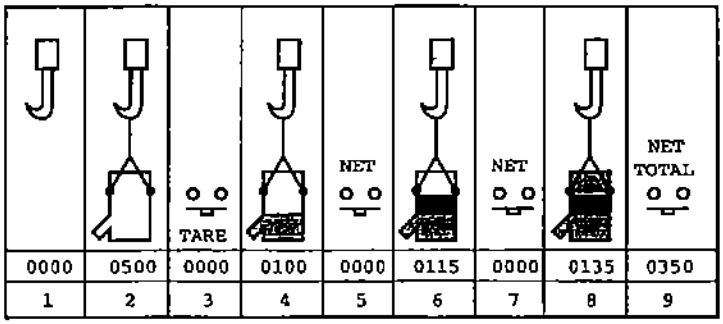
14. Description of Special Modes

14.1 SEQUENTIAL TARE

When configuration bit "TAR.3 = 1", is set, the meter enters sequential tare mode. This allows you to measure several batches of mixed product with different weights and at the end of a process, you can display the total.

In this mode, the following operations occur:

a. Reset Tare function: Press the 'RESET TARE' button after the last tare to perform the standard reset tare function. Additional presses of the 'RESET TARE' button zero out non-required weight from the gross value.
b. Gross value is now Total Net.
c. Net is Instantaneous Net.



0000	0500	0000	0100	0000	0115	0000	0135	0350
1	2	3	4	5	6	7	8	9

NET WEIGHT READOUT

TABLE 14.1
EXAMPLE OF SUCCESSIVE POURING
FROM 3 SHAFTS WITH 1 LADLE

STEP	DESCRIPTION	METER BUTTON'S OPERATION	WEIGHT READING
1	Hook empty	RESET	0000
2	Hook + ladle The ladle is weighed	--	0500
3	TARE operated Ladle weight cancelled	RESET	0000

continued next page

continued from previous page

STEP	DESCRIPTION	METER BUTTON'S OPERATION	WEIGHT READING
4	Metal pouring The metal is weighed (1st pour)	--	0100
5	Tare operated 1st weighing memorized	TARE	0000
6	Metal pouring The metal is weighed (2nd pour)	--	0115
7	Tare operated 2nd weighing is entered in memory	TARE	0000
8	Metal pouring The metal is weighed (3rd pour) 3rd weighing is entered in memory	--	0135
9	Total Net displayed	NT/GRS	0350

14.2 SPECIAL COUNT BY

When configuration bit "INP.8 = 1" (refer to Section 10.2.8), the meter will go into a special count by mode (normal count by, "INP.8 = 0", is an averaging round-off of the display). This mode allows the meter to round-off the display to the nearest value (corresponding to the count by number configured in the meter) larger than the display. An example of Special Count By is as follows:

Meter is configures for Special Count By and the count by number selected is 5. When any weight is applied, such as 1, 2, 3, 4, or 5 pounds, the display will automatically indicate 5.

15. Analog Output Option

If you received your meter with the optional analog board installed, you should not have to enter the trim data as described in Section 15.5.

Your meter converts display readings into an independently-scaled-and-offset isolated voltage and/or current analog output. Isolation is accomplished via opto-isolators on the board. Your meter has the capability of transmitting SIMULTANEOUS voltage and current outputs although when this is done, the current analog output is not as accurate.

15.1 FEATURES OVERVIEW

1. Precise analog levels are generated from digital code using a proprietary ASIC chip.

2. Voltage (to 10 V) is available at the same time as current (to 22 mA), but the total current drawn should not exceed 24 mA.

3. Load resistance for the voltage output can be as low as 500 ohms (20 mA at 10 V out) when current output is not used.

4. Loop resistance for the current output can be as high as 600 ohms (12 volts compliance) with negligible current from the voltage output.

5. Both outputs are galvanically isolated from both power and measurement circuits of the meter: 354 V per IEC spacing, 500 V test.

6. Precision calibration is applied by the meter to either the voltage output or the current output (but not to both simultaneously). When both outputs are used simultaneously, the non-calibrated output is stable but does require external adjustment if fine-trimming is required.

7. Independent, 15-bit resolution OuTput SCale and OFfset (OT.SC.OF) can convert a wide range of meter readings to the desired current or voltage output span.

8. The output resolution permits good accuracy for turndown ratios (offset/span) as high as 100:1.

9. 50° to 104°F (10° to 40°C) accuracy within 0.1% after installation calibration.

10. 10% to 90% step response time is 50 milliseconds (plus filter delay, if any, programmed for the analog output).

11. Configurable so that output will track the PEAK or VALLEY measurement.

15.2 UNLOCKING

1. Press the 'MENU' button until "L2 CNF" is displayed, then press the 'TARE' button until "L2C.3" is displayed.

2. Press the 'NT/GRS' button (if required) to set "L2C.3=0", unlocking the choice of current or voltage as the calibrated output.

3. Press the 'TARE' button (and the 'NT/GRS' button if required) to set "L2C.3=0", unlocking OT.SC.OF.

4. Press the 'MENU' button to store these choices.

5. If your analog board is NEWLY INSTALLED, you will need to enter the four trimming constants (refer to the one-time only procedure in Section 15.4). To unlock this feature, press the 'TARE' button and then the 'NT/GRS' button to set "L2C.5=0" and store by pressing the 'MENU' button.

15.3 "OT.SC.OF": SETTING OUTPUT SCALE AND OFFSET

Any two data points can be used here: a data point is specified by a value of the display ("READ") and the desired output ("OUTPT") for that display.

1. Press the 'TARE' button to see "READ1" and then use the 'TARE' and 'NT/GRS' buttons to enter a small display value, for example, "000.000", where the center decimal point position is used as an example.

2. Store this value by pressing the 'MENU' button and then you see "OUTPT1". Use the 'TARE' and 'NT/GRS' buttons to specify the desired output value, for example, "04.0000" if current calibration had been selected ("OUT.2=1"), or "00.0000" for voltage.

3. Store this value by pressing the 'MENU' button and then advance to "READ2". Use the 'TARE' and 'NT/GRS' buttons to enter a large display value, for example, "123.456", for the display that you want the analog output at full scale.

4. Store this value by pressing the 'MENU' button and then advance to "OUTPT2". Use the 'TARE' and 'NT/GRS' buttons to enter the desired output for the display value in step 3. For example, enter "20.0000" for calibrated current or "10.0000" for calibrated voltage.

5. Press the 'MENU' button to store. Press the 'RESET' button two times to return to run mode and check calibration points, unless your analog output board is newly installed; in this case, follow Section 15.4.

15.4 BOARD INSTALLATION; ENTERING THE TRIM DATA

To precisely calibrate your analog output board with your meter, each analog output board has been supplied with voltage and current zero trim values printed on the board. "CAL VZ" is for the voltage output and "CALmAZ" is for the current output.

Similarly, the fine trim for output gain is "CAL VS" for the voltage output and "CALmAS" for the current output.

These 4 data points are obtained from the factory calibration of each analog output board and are inscribed on the top edge of each board, as shown in Figure 15-1.

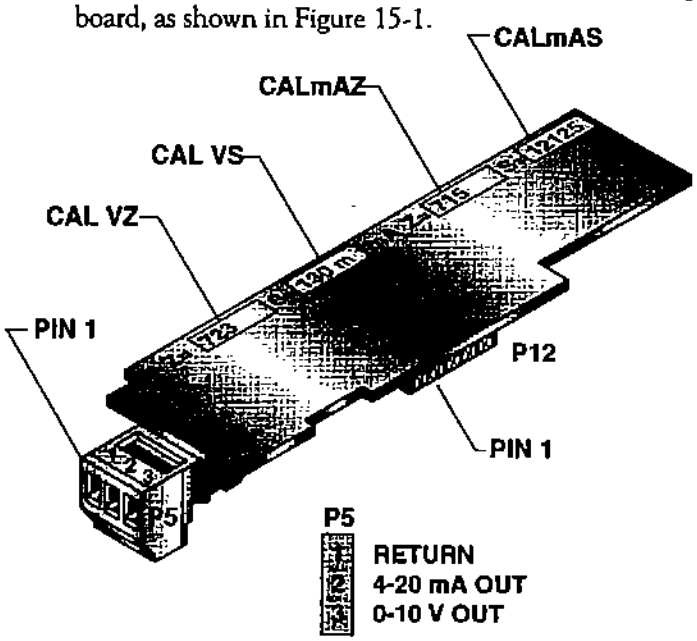


Figure 15-1. Analog Option Board and Connection Diagram at P5.

If you are installing an analog output board, follow this "one time only" procedure:

1. Write down the four (4) numbers inscribed on the top edge of your analog output board below:

CAL VZ = _____

CAL VS = _____

CALmAZ = _____

CALmAS = _____

2. "Reveal the main board" and install the analog output board using the procedures outlined in Section 5.2.

3. Attach connector wires, insert connectors, and apply power to the meter as described in Section 5.3.

4. If not already unlocked, press the 'MENU' button until "L2 CNF" is displayed and press the 'TARE' button to see "L2C.5". Now press the 'NT/GRS' button to set "L2C.5=0".

5. Press the 'MENU' button to store and advance to "CAL VZ". Use the 'TARE' and 'NT/GRS' buttons to enter the value (recorded from the edge of the board).

6. Press the 'MENU' button to store and advance to "CAL VS". Use the 'TARE' and 'NT/GRS' buttons to enter the value.

7. Repeat for "CALmAZ".

8. Repeat for "CALmAS".

9. Press the 'MENU' button to store your entries and then you will see "AUT.ZRO". Press the 'RESET' button two times and you will see "RESET2", followed by "RUN". Verify your calibration points for the analog output.

15.5 SELECTING MODE OF ANALOG OUTPUT AND SOURCE OF DATA, "ANL.OUT" VALUE TO BE TRANSMITTED ON ANALOG OUTPUT

1. Press the 'MENU' button until the display shows "ANL.OUT".

2. Press the 'TARE' button to toggle between ANL.1 and ANL.2.

3. Press the 'NT/GRS button to change digit's value, select according to Table 15.1.

4. Press the 'MENU' button to store.

TABLE 15.1
ANALOG OUTPUT

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
ANL.OUT	ANL.1 = 0	Analog out for 0-10 V dc
	ANL.1 = 1	Analog out for 0-20 mA dc
	ANL.2 = 0	Analog out disabled
	ANL.2 = 1	Net value on analog out
	ANL.2 = 2	Gross value on analog out (Total net value if in sequential tare mode.
	ANL.2 = 3	Tare value on analog out
	ANL.2 = 4	Peak value on analog out
	ANL.2 = 5	Valley value on the analog output (This option is not valid if in sequential tare mode and will output remote value if in remote meter mode).

The 'MENU' button stores the selected value for each 'ANL' condition changed and advances the meter to the next configuration ("OT.SC.OF").

16. BCD Option

16.1 FEATURES OVERVIEW

1. 6 BCD digits (24 lines plus 1 polarity, 3 decimal-point location code, 1 overflow, 1 timing, 1 control, 4 card address, and 3 isolation power lines).

2. Furnished 40-line mass-terminated connector: pin compatibility with 50-pin BCD cable assignments.

3. Can be jumpered for internal, non-isolated drive or external power with isolation (354 V per IEC spacing, 500 V test).

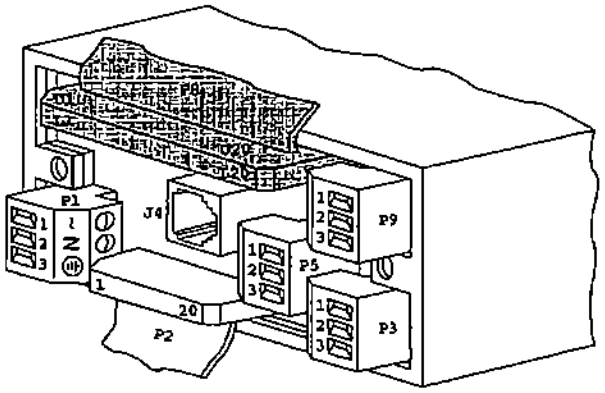
4. Upper 3 BCD digits can be multiplexed onto lower 3 BCD lines for 3 digits at a time readout.

5. All outputs tri-state, TTL/CMOS compatible, 10 LSTTL loads.

6. Data always valid (stored, buffered).

7. Selectable 4-line card address (with internal pull-ups) or single-line activation.

Figure 16-1 shows the rear of the meter case with the 40-line edge connector highlighted and the upper and lower pin assignments.



P8

BCD 400K	L1	U1	BCD 800K
BCD 100K	L2	U2	BCD 200K
ISO GND	L3	U3	SPARE
BCD 40K	L4	U4	BCD 80K
BCD 10K	L5	U5	BCD 20K
BCD 4K	L6	U6	BCD 8K
BCD 1K	L7	U7	BCD 2K
D.P. 2	L8	U8	D.P. 4
BCD 400	L9	U9	BCD 800
BCD 100	L10	U10	BCD 200
BCD 40	L11	U11	BCD 80
BCD 10	L12	U12	BCD 20
BCD 4	L13	U13	BCD 8
BCD 1	L14	U14	BCD 2
ISO GND	L15	U15	D. P. 1
DATA READY	L16	U16	POLARITY
ISO V+	L17	U17	HOLD
SPARE	L18	U18	OVERFLOW
ADDRESS B4	L19	U19	ADDRESS B8
ADDRESS B1	L20	U20	ADDRESS B2

Figure 16-1. BCD 40-Pin Cable Connector (P8)

Figure 16-2 shows the board connections and pin designators. The locations of the jumpers are also shown.

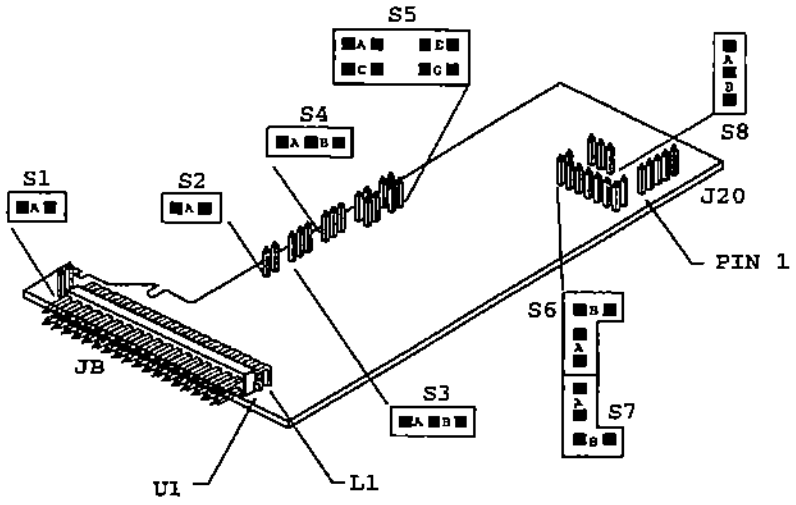


Figure 16-2. BCD Option Board

16.2 BCD CARD JUMPER TABLE

JUMPER	WHEN USED
	S1A Brings OVERFLOW signal to P8-U18
S2A	Insert for 3-digit multiplex Remove for 6-digit readout
S3A	Insert for 3-digit multiplex or one-line card-address enable OR
S3B	4-line card-address enable
S4A	Insert for 3-digit multiplex OR
S4B	Insert for 6-digit readout
S5A	P8-U20 must be low to enable card Remove for high or open enable
S5C	P8-L20 must be low to enable card Remove for high or open enable
S5E	P8-U19 must be low to enable card Remove for high or open enable
S5G	P8-L19 must be low to enable card Remove for high or open enable
S6A, S6B, S7A, S7B	Install for internal power Remove for isolated power
S8A	Output data is negative-true OR
S8B	Output data is positive-true

16.3 INTERCONNECT BOARD

For mechanical support and electrical interconnection, each BCD board is shipped with a small 5-pin INTERCONNECT board. Insert onto the main board pins immediately behind the right-hand side of the display board. The BCD board itself (component side down) is then plugged into the interconnect board at J20, with the PCB connection fingers protruding from the case rear. For assembly detail, refer to Figure 5-5 (in Section 5).

16.4 50-LINE CABLE COMPATIBILITY

The 40 lines of the BCD connector are compatible with lines 9 through 48 of some 50-line busses (left-most 8 and right-most 2 are not used by this BCD option).

16.5 SELECTING THE SOURCE OF DATA, "BCD.OUT" TO BE TRANSMITTED ON BCD OUTPUT

1. Press the 'MENU' button until the display shows "BCD.OUT".
2. Press the 'TARE' button to toggle between BCD.1 and BCD.2.
3. Press the 'NT/GRS button to change option's value, select according to Table 16.1.
4. Press the 'MENU' button to store.

TABLE 16.1
BINARY-CODED DECIMAL OUTPUT

MENU BUTTON MAIN MENU	TARE/ NT/GRS/ MENU * BUTTON SUB MENU	DESCRIPTION
BCD.OUT	BCD.1 = 0	Compatible with all desk top printers
	BCD.1 = 1	Compatible with Newport printer
	BCD.2 = 0	BCD out disabled
	BCD.2 = 1	Net value on BCD output
	BCD.2 = 2	Gross value on BCD output (Total net value if in sequential tare mode)
	BCD.2 = 3	Tare value on BCD output
	BCD.2 = 4	Peak value on BCD output
	BCD.2 = 5	Valley value on the BCD output (This option is not valid if in sequential tare mode and will output remote value if in remote meter mode).

The 'MENU' button stores the selected value for each 'BCD' condition changed and advances the meter to the next configuration ("ANL.OUT").

16.6 HOLD CONTROL

P8-U17 is the $\overline{\text{HOLD}}$ line, referenced to the same ground as the BCD outputs (on P8-L15 and P8-L3). Pulling this line low freezes the BCD outputs (useful for a slow reading device or asymmetric cable delays).

When released, all 6 digits of the BCD data are updated together.

16.7 DATA READY TIMING PULSES

The tri-state BCD outputs are always valid (to within a few nanoseconds; a single update pulse controls all the digits).

To generate a timing marker, P8-L16, $\overline{\text{DATA READY}}$, goes active low for approximately 200 microseconds at the time of each BCD update. The polarity of this line is NOT CHANGED by S8, the data polarity control jumper.

16.8 BRINGING OUT THE BCD OVERFLOW LINE

P8-U18 can be used for BCD OVERFLOW by inserting jumper S1A. If this line is used for another purpose by some other equipment on the BCD bus, remove this jumper.

16.9 3 DIGIT AT A TIME MULTIPLEX

When jumpers S2A, S3A, and S4A are used, P8-L20 and S5C control when the upper 3 digits of the 6-digit BCD value appear on the output line (P8-U9 through P8-L14).

With jumper S5C, a LOW level on P8-L20 activates those upper 3 digit outputs; a high or open level disables those digits.

With jumper S5C removed, a high or open level on P8-L20 enables those upper 3 digits and a low level disables them.

When the upper 3 digits are NOT enabled, the lower 3 digits can be enabled in just the same way by jumper S5A and P8-U20, and they now appear on the same 12 lines.

16.10 6 DIGIT AT A TIME CARD ADDRESS

BCD Option

Jumpers S2A and S4A are removed for full parallel (6-digit output).

If jumper S3A is installed, the outputs are enabled by line P8-L20 ALONE: a low level enables the outputs when jumper S5C is installed, and a high or open level does the job if S5C is removed.

When jumper S3A is removed, the outputs are enabled only when the selected 4-line address is applied to P8-U19, L19, U20 and L20. Each of these four is exclusive-OR'd with its jumper, and the following four outputs are AND'd to create a 1 of 16 enable code.

If jumper S5A is installed, P8-U20 must be LOW to enable the card (BIT 2).
If jumper S5C is installed, P8-L20 must be LOW to enable the card (BIT 1).
If jumper S5E is installed, P8-U19 must be LOW to enable the card (BIT 8).
If jumper S5G is installed, P8-L19 must be LOW to complete enabling the card outputs (BIT 4).

BINARY BIT	1	2	4	8		1	2	4	8
JUMPER S5-	C	A	G	E		C	A	G	E
00	X	X	X	X	08	X	X	X	
01		X	X	X	09		X	X	
02	X		X	X	10	X		X	
03			X	X	11			X	
04	X	X		X	12	X	X		
05		X		X	13		X		
06	X			X	14	X			
07				X	15				

Figure 16-3. Address Programming Chart for 4-line Address

NOTE: "X" in chart indicates jumper that must be installed.

EXAMPLE: For a positive true address of 03, install jumpers S5-G and S5-E.

If any of these jumpers are removed, the corresponding line must go HIGH or OPEN to assist the card enable; if all four jumpers are missing, for example, the card outputs are enabled ONLY when all four lines are HIGH or OPEN, a ground on any of the four input lines causes the outputs to go to the high impedance state.

16.11 SELECT DATA POLARITY: JUMPER S8

Inserting the jumper in S8B (the usual shipping position) makes the output data (including decimal point code) positive-true.

Placing the jumper in S8A converts the data to negative-true.

16.12 DECIMAL POINT ADDRESS CODE

P8-U15, P8-L8 and P8-U8 output a 3-bit positive-true binary code for the location of the decimal point: "001" for the extreme right position and "110" for the extreme left position (just to the right of the left-hand digit).

Panel-mounted printers, however, may require an inverted/shifted decimal point code. You can create this by setting "BCD.1=1" in the "BCD.OUT" rather than the normal "BCD.1=0" (Refer to Section 10.2.22).

16.13 APPLYING NON-ISOLATED/ISOLATED POWER

Non-isolated power from the meter is connected to this board by inserting jumpers S6A, S6B, S7A, and S7B (bridging the isolation separation distance on the board). Current drawn is less than 10 mA.

To isolate these outputs from the other meter circuits, remove the four jumpers described earlier, and connect an external, nominal 5 V supply to P8-L17, with its ground return connected to P8-L15.

16.14 DRIVING A PRINTER

Direct connection of the 24 BCD lines and the 3 decimal point address lines is all that is needed for positive-true printers that accept a binary-coded decimal point address (which do not print the decimal point).

If your printer has more than 6 digits, tie the unused inputs to ground or V+ or leave open (whichever produces blanks in those locations).

For negative-true decimal point addresses, found in some panel-mounted printers, set "BCD.1=1" (part of menu item "BCD.OUT", unlocked by "L2C.3=0").

Notes:

17. Relay Option

17.1 DUAL RELAY - FEATURES OVERVIEW

1. Two isolated (354 V per IEC spacing, 500 V test) 7-ampere Form C electro-mechanical relays are provided on a small vertical board that plugs into J10 on the main board.

2. Each relay has its 3-pin screw-terminal connector protruding from the rear of the case. Each connector is keyed to prevent inadvertent insertion of the power screw terminal connector.

3. Clamp diodes to the V+ supply limit coil turn-off spikes.

4. 200 ohm, 2500pf snubbers are provided for each normally open contact.

5. Relay 1 can be driven by either SP1 or SP3.

6. Relay 2 can be driven by either SP2 or SP4.

Figure 17-1 shows the board connections and jumper locations.

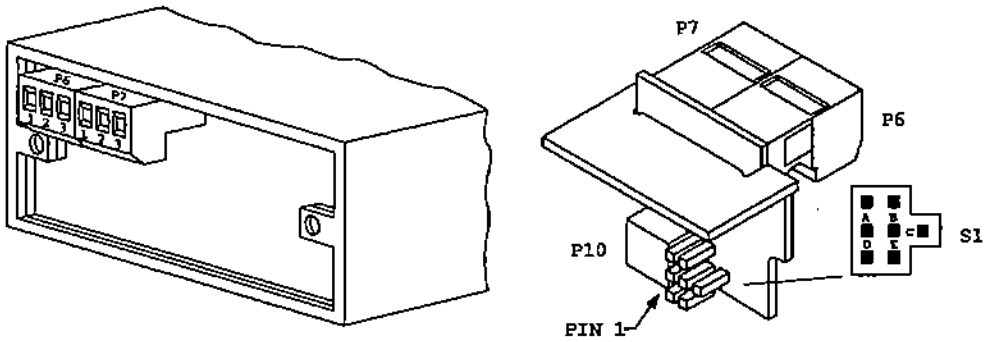


Figure 17-1. Relay Option Board With S1 Jumper Positions and Connection Diagram.

17.2 DUAL RELAY BOARD JUMPER TABLE

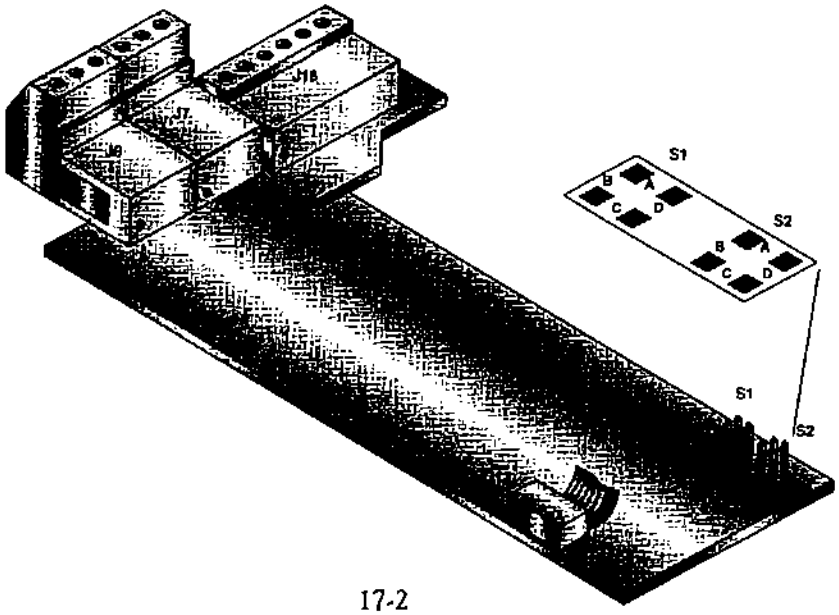
Relay Option

JUMPER	FUNCTION
S1A*	Drives Relay 1 from SP3
S1B	not used
S1C	Drives Relay 2 from SP2
S1D	Drives Relay 1 from SP1
S1E*	Drives Relay 2 from SP4

* Factory preset jumper locations

17.3 FOUR RELAY OUTPUT BOARD

The Four Relay Output Board provides two isolated (354Vper IEC spacing, 500 test), 7-ampere form C and two 0.5-ampere form C electro-mechanical relays that enable alarm-triggerd switching to an external device. Each relay accommodates a single alarm output. Two hundred-Ohm 2500pf snubbers are provided for each normally open contact.



17.4 SPECIFICATIONS

Output type Power Rating	Four Form C Relays
for resistive loads	Two relays at P6 and P7 Normally open contact 7 amp; 30V dc or 230V ac Normally closed contact, 7 amp; 30V dc or 230V ac
for resistive loads	Two relays at P18 Normally open contact 1 amp; 30V dc or 0.5 amp 125V ac Normally closed contact 1 amp; 30V dc or 0.5 amp 125V ac

17.5 JUMPER RELAY ASSIGNMENTS

Table A-1 illustrates jumper relay assignments. Relay 1 corresponds to the P6 plug. Relay 2 corresponds to the P7 plug. Relay 3 responds to the P18 (pins 1-3) and relay 4 responds to P18 (pins 4-6). Defaults are in bold text

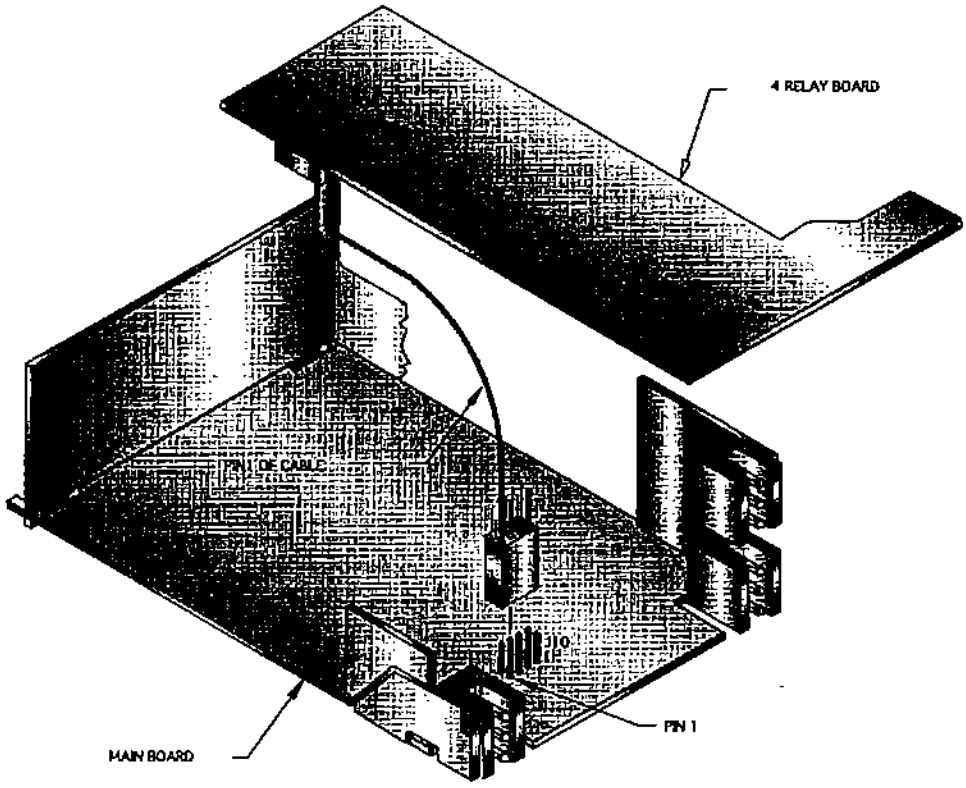
K1 = Relay 1 (7 Amp maximum current capability.)
K2 = Relay 2 (7 Amp maximum current capability.)
K3 = Relay 3 (1 Amp maximum current capability.)
K4 = Relay 4 (1 Amp maximum current capability.)

P6			P7			P18					
1	2	3	1	2	3	1	2	3	4	5	6
NO	CM	NC	NO	CM	NC	NO	CM	NC	NO	CM	NC

NO = Normally Open NC = Normally Closed CM = Common

17

Relay Option



4-RELAY BOARD JUMPERS

S1	S2	AL1	AL2	AL3	AL4
A,C*	A,C*	K1	K2	K3	K4
B,D	A,C	K3	K2	K1	K4
B,D	B,D	K3	K4	K1	K2
A,C	B,D	K1	K4	K3	K2

Factory default jumper positions are marked with *

18. RS-232 or RS-485 Option Board

18.1 FEATURES OVERVIEW

1. When you order either option board, you will also receive 2 software diskettes (one 5-1/4" and one 3-1/2"), a complete configurations setup program, and a six foot communications cable that plugs into J4. Optional female 9-pin and 25-pin "D" computer connector-adapters are offered for either RS-232 or RS-422/485 hookup.

2. The communications board you ordered, plugs into the main board socket (P11 connects into J11 next to the transformer) with the 6-pin telephone socket. J4 is then protruding out of the rear of the case.

3. Install, run, establish communication and meter setup information are described in Section 18.3; screen error messages are described in Section 18.4 and a sample basic program to read the meter information to your screen is described in Section 18.5.

4. There are no jumpers on the RS-232 card (all software controlled with or without button programming).

5. Only 3 RS-422/485 jumpers (half/full duplex and impedance-matching resistors).

6. Choose baud rate from 300 to 19200. Standard factory setting is 9600.

7. Wide choice of commands and message formats available.

Figure 18-1 gives the board connections and pin designators for RS-232.

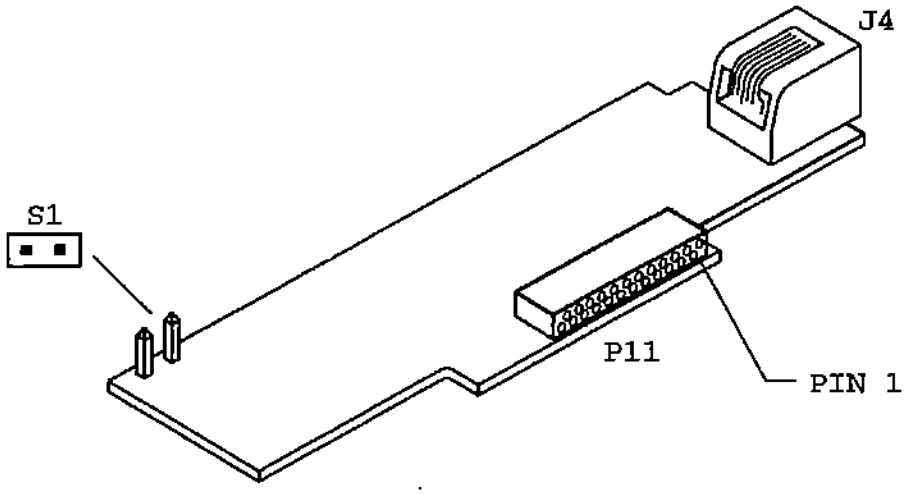


Figure 18-1. RS-232 Option Board and Pin Designations

Figure 18-2 shows board connections and pin designators for RS-485.

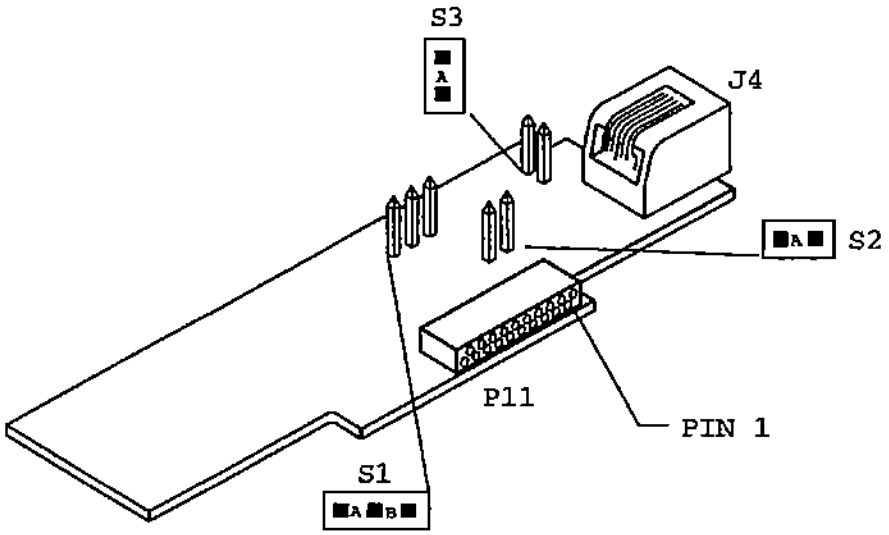


Figure 18-2. RS-485 Option Board and Pin Designations

18.2 FRONT-PANEL PUSHBUTTON CONFIGURATION

RS-232 or RS-485 Option Board

If your meter communications settings are unknown or need changing, you can insert the factory-set values with the front panel buttons (or, after communications has been established, from your keyboard).

1. Unlock the communications bits by setting "L2C.4=0".

2. Press the 'MENU' button until "BAUD" displays, then press the 'NT/GRS' button until the baud rate you require displays. Press the 'MENU' button to store this choice and your meter displays "SERCNF".

3. Press the 'TARE' button until you see the display show "SER.1=0" for no parity, "SER.1=1" for odd parity, or "SER.1=2" for even parity. Press the 'NT/GRS' button to select the parity you require for your system. Once you have selected parity, press the 'TARE' button and advance to "SER.2=0" or "SER.2=1".

4. Press the 'NT/GRS' button to select the "SER.2" value. Setting "SER.2=0" picks the value to one stop bit; "SER.2=1" selects two stop bits. Select "SER.2=0".

5. Press the 'MENU' button to store these choices and then advance to "ADDRES". Use the 'NT/GRS' button to set to "001" (unless your meter is one of several on an RS-485 bus, in which case you must give a different address to each device and use those addresses when communicating from your computer).

6. Press the 'MENU' button again and the meter advances to DAT.FT (refer to Section 10.2.28).

7. Once you select and store the data format, press the 'MENU' button again and the meter advances to BUS.FT (refer to Section 10.2.29) to set the required values.

8. Once you select and store the bus format, press the 'MENU' button again, the meter advances to "SER.CNT". If you are configuring the meter as continuous printout then you need to set this item. (Refer to Section 10.2.30, SER.CNT).

9. Press 'MENU' button to save the above items and 'RESET' button two times to go back to run mode. The remaining communications parameters are set via Serial Communications.

RS-232 or RS-485 Option Board

18.3 SERIAL COMMUNICATIONS SAMPLE PROGRAM

The following sample program will allow you to send a request for information to the meter and receive a response.

> NOTE: The codes in this sample program are found in the serial communications operators guide.

18.3.1 PROGRAM OBJECTIVES

1. Clear screen
2. Print "Enter a Command>"
3. Accept "X01" (requests unfiltered meter reading)
4. Accept "X02" (requests PEAK meter reading)
5. Accept "X03" (requests VALLEY meter reading)
6. Accept "X04" (requests filtered meter reading)
7. Accept any other command code and suffix, ("ccc") from list in the Serial Communications Operator's guide.
8. Screen echoes the chosen command
9. Computer sends request to meter
10. Stall for 0.5 seconds, then look for response
11. Put watchdog message on screen if no response in 10 seconds
12. Print meter response on screen
13. User selects Quit or more commands.

18.3.2 CODE AND [NOTES]

```
1000    CLS [Clear screen command]

1010    COMM$ = "COM1" [Label for communications
        port COM1]

1020    BAUD$ = "9600" [Label for choice of 9600 baud]

1030    PARITY$ = "0" [Label for Odd parity]

1040    STOPBT$ = "1"[Label for one stop bit]

1050    CLOSE #1 [Get ready to reopen #1]

1060    OPEN COMM$ + BAUD$ + "," + PARITY$ + ",7," +
        "CS, DS, RS" AS #1 [OPENS COM1]
```

```
1070    INPUT "ENTER A COMMAND >", CMD$
        [Prompts and Labels Input]

1080    IF CMD$ <>"^AE" THEN CMD$ = "*" + CMD$
        [Add recognition character unless command is that for
        setup data]

1090    PRINT CMD$ [Screen echoes command]

1100    PRINT #1, CMD$ [Send command to meter]

1110    N = 0 [Initialize watchdog]

1120    SOUND 32767, 27:SOUND 32767, 1:
        SOUND 32767, 1 [Delay 0.5 seconds]

1130    N = N + 1 [Increment watchdog]

1140    IF N <> 20 THEN 1180 [Test for timeout]

1150    INPUT "NO RESPONSE YET: TYPE 'C' TO
        CONTINUE, 'Q' TO QUIT", B$ [10 second timeout]

1160    IF B$ = "Q" THEN 1230 [Exit if desired]

1170    N = 0 [Restart watchdog]

1180    IF LOC(1) = 0 THEN 1120 [Stall until buffer
        has contents]

1190    A$ = INPUT$(LOC(1), #1)
        [Read and label contents of COM1]

1200    PRINT A$ [Put data onto screen]

1210    INPUT "TYPE 'M' FOR MORE COMMANDS OR
        'Q' TO QUIT", B$

1220    IF B$ = 'M' THEN 1070

1230    END
```

A: SETUP ITEMS

Single Commands

No.	Command Prefix	Command Suffix(HEX)	#Of Bytes of Data (#of Char)	Description of Item	Abbrev. on Display
1	G/P/R/W	01	1(2)	Class	(CLASS)
2	G/P/R/W	02	2(4)	Scale Division	(SCL.DIV)
3	G/P/R/W	03	3(6)	Maximum Capacity	(MAX.CAP)
4	G/P/R/W	04	3(6)	Minimum Capacity	(MIN.CAP)
5	G/P/R/W	05	3(6)	Unit of Measure	(U.O.M.)
6	G/P/R/W	06	*1(2)	Reading Configuration	(RDG.CNF)
7	G/P/R/W	07	3(6)	Reading Scale	(RDG.SC)
8	G/P/R/W	08	3(6)	Reading Offset	(RDG.OF)
9	G/P/R/W	09	*1(2)	Input Configuration	(IN.CNF)
10	G/P/R/W	0A	3(6)	Input Scale	—
11	G/P/R/W	0B	*1(2)	Tare Configuration	(TAR.CNF)
12	G/P/R/W	0C	**1(2)	Decimal Point/Count by	(DEC PT/CNT BY)
13	—	0D	—	ERROR (?C)	—
14	G/P/R/W	0E	**1(2)	Filter Configuration/Filter Time	(FIL.CNF/FIL.TI)
15	G/P/R/W	0F	—	ERROR(?C)	—
16	G/P/R/W	10	*1(2)	Setpoints 1 & 2 Configuration	(SP.CNF)
17	G/P/R/W	11	*1(2)	Setpoints 3 & 4 Configuration	(AL.CNF)
18	G/P/R/W	12	*1(2)	Setpoints 3 & 4 Functions	(AL.FNC)
19	G/P/R/W	13	1(2)	Setpoints 3&4 Delayed reading	(AL.RDG)
20	R/W	14	2(4)	Setpoints 1 & 2 Deadband	(SP.DB)
21	R/W	15	2(4)	Setpoints 2 & 3 Deadband	(AL.DB)
22	G/P/R/W	16	**1(2)	Flash display/Turnout delay	(FLS DSP/--)
23	G/P/R/W	17	**1(2)	BCD out/Analog out Configuration (	BDC.OUT/ANL.OUT)
24	—	18	—	ERROR(?C)	—
25	G/P/R/W	19	3(6)	Output Scale	—
26	R/W	1A	**1(2)	Communication Configuration/Baud rate	(SER CNF/BAUD)
27	—	1B	—	ERROR (?C)	—
28	G/P/R/W	1C	1(2)	Device Address	(ADDRES)
29	G/P/R/W	1D	*1(2)	Communication Data Format	(DAT FT)
30	G/P/R/W	1E	*1(2)	Communication Bus Format	(BUS FT)
31	R/W	1F	2(4)	Communication Printout Delay	(SER.CNT)
32	G	20	—	Read display mode	—
33	—	21	—	ERROR (?C)	—
34	—	22	—	ERROR (?C)	—
35	—	23	—	ERROR (?C)	—
36	R/W	24	*1(2)	Lockout 1 Configuration	(L1 CNF)
37	R/W	25	*1(2)	Lockout 2 Configuration	(L2 CNF)
38	—	26	—	ERROR (?C)	—
39	G/P/R/W	27	1(2)	Communication Recognition Characte	—
40	G/P/R/W	28	—	ERROR (?C)	—
41	G/P/R/W	29	3(6)	Setpoint 1 Value	(SP1)
42	G/P/R/W	2A	3(6)	Setpoint 2 Value	(SP2)
43	G/P/R/W	2B	3(6)	Setpoint 3 Value	(SP3)
44	G/P/R/W	2C	3(6)	Setpoint 4 Value	(SP4)
45	G/P/R/W	2D	3(6)	Fix Tare Value	(FX.TARE)
46	G/P/R/W	2E	3(6)	Input Offset	—
47	G/P/R/W	2F	3(6)	Output Offset	—
48	***R/W	3E	2(4)	Analog out Volt Calib. Offset	(CAL VZ)
49	***R/W	3F	2(4)	Analog out Volt Scale	(CAL VS)
50	***R/W	40	2(4)	Analog out Current Calib.Offset	(CALMAZ)
51	***R/W	41	2(4)	Analog out Current Calib.Scale	(CALMAS)
52	***R/W	50	3(6)	Zeroing Function Value	(ZRO.VAL)

* These items are one byte each and are bit addressed.
** These items are one byte containing 2 items as:
"High Nibble/Low Nibble"
*** To be able to execute "W" for these items, install jumper "S1B", otherwise meter responds with "?L".

2. Block Commands for Setup Parameters

No.	Command Prefix	Command Suffix(HEX)	Items involved in the Order
1	G/P/R/W	80	47-25-46-10-8-7-4-3-45-44-43-42-41
2	G/P/R/W	81	2-5-39-28-26-22-11-23-22-18-17-16-12-6-1-30-29-14-9
3	R/W	82	38-37-36-31-21-20

Items involved in the Block commands should be in the order specified with the first item to be first received or transmitted.

1. G means : read from RAM
2. P means : write to RAM
3. R means : read from EEPROM
4. W means : write to EEPROM
5. G/P/R/W means : G or P or R or W can be executed
6. G20 (Item No.32) is one byte value and will transmit display mode as shown in the table below.

Return Value(HEX)	Display Shows
00	Net value
01	Gross value
02	Peak value
03	Valley value
04	Remote value
05	+OVLD
06	- OVLD
07	IOVSC (Input scale & offset too large)
08	ROVSC (Reading scale & offset too large)
09	CB OVF (Count by overflow)
0A	OVR.CAP (Over Capacity)
0B	UND.CAP (Under Capacity)
0C	DP.OVF (Decimal point too large)
0D	—
0E	—
0F	None of the above (meter is in setpoint or menu)

7. Executing "P09" and "P0C" will be followed by "RESET1".
8. A"—" on the display abbreviation means this item cannot be accessed by using a push button. You can access item numbers (9, 46 and 25, 7) indirectly from the menu under "IN.SC.OF" and OT.SC.OF", respectively.
9. If you install jumper S1A on main board (Handbook 44), then single command item numbers 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, and block command item numbers 1, 2, 3 can not be changed although they can be read. A request to execute "M" or "H" will be responded by "?C".

B. Measurement Items

1. ***Read measurement values.*** (The meter transmits data upon receiving the following commands)

Command	*Description*
X01	Net Value
X02	Gross value (Total NET of meter is in sequential tare mode: Refer to Section 14 of the manual)
X03	Instant Tare value
X04	Peak value
X05	Valley value (not valid if meter is in sequential Tare mode: Refer to Section 14 of the manual).
X06	Display value
V01	Read block of measurement values (the items involved in this response will be specified by DATA FORMAT ("DAT.FT" refer to Section 10.2.28 of the manual).

2. ***Read Status characters.***(The meter transmits status characters upon receiving the following commands)

Command	*Description*
U01	Alarms
U02	HI/LO (Peak Valley)

The meter transmits "?S" if the reading value is not stabilized, and one or both of the following conditions exist:

* "TAR.2=0"(refer to Section 10.2.10 of the Operator's Manual)
* Jumper S1A is installed (if Handbook 44 mode is selected)

The reading value is not stabilized if reading values are not within +1 or +3 scale divisions (SCL.DIV) for Classes III and IIIL/IIII, respectively.

3. ***Perform Tests***

Command	*Description*
T01	Segment Test
T02	Memory Test
T03	Hardware Test
T04	Hole Test

If an error occurs during "T02" or "T03" commands, the meter transmits "?M" and "?H" respectively.

4. ***Display Command***

Command	*Data*	*Description*
Y01	3 bytes	Puts data on display(remote value)
Y02	—	Put NET value on display
Y03	—	Put Gross value on display
Y04	—	Put Peak value on display
Y05	ERROR	Error

5. ***Reset Commands***

Command	*Description*
Z01	Reset 1
Z02	Reset 2
Z03	Reset latched alarms (setpoints 3 & 4)
Z04	Reset Peak Valley
Z05	Reset Tare
Z06	Perform Zeroing function

When executing "Z06", if the display value is more than 21% of the maximum capacity (MAX.CAP) the meter displays "ERROR" and transmits "?Z".

6. ***Disable Commands***

Command	*Description*
D01	Disable setpoints 3 & 4
D02	Disable setpoints 1 & 2
D03	Disable remote meter (go to normal mode)
D04	Display Hold
D05	Disable all front panel push button

7. ***Enable Commands***

Command	*Description*
E01	Enable setpoints 3 & 4
E02	Enable setpoints 1 & 2
E03	Activate alarm state
E04	Display Run
E05	Do Tare (see note 1)
E06	Enable all front panel push button

When executing "E05", if "TAR.4=1/2/3" of TAR.CNF item, and the reading value to be tared is not within the specified limit, command will not be executed and the meter transmits "?V" (refer to section 10.2.10 for more information).

8. ***Additional Error Codes***

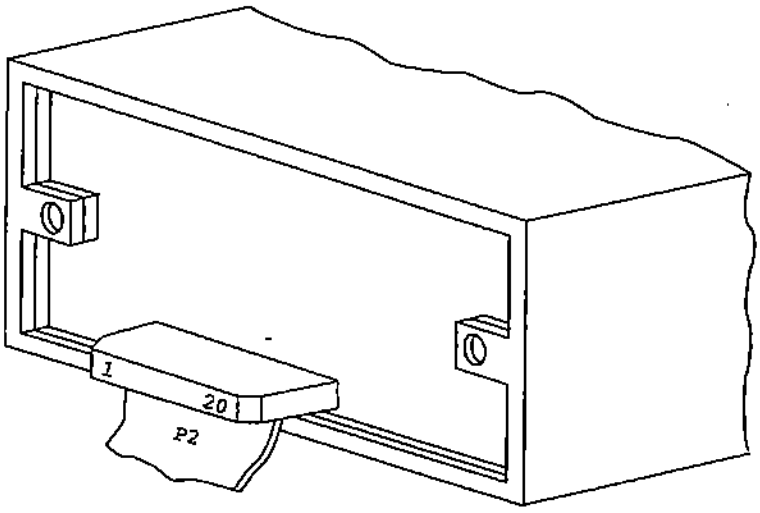
Code	*Description*
?C	Command error
?F	Format error
?P	Parity error
?L	EEPROM lock for H844
?V	Could be one of the following errors: • Decimal point error • Communication recognition error • Communication address error

Notes:

19. External Control Lines

P2, the 20-pin connector at the rear of the main board, connects to the setpoint transistor collectors and permits remote control of significant meter features.

The meter case label gives the names (abbreviated functions) of each of the twenty pins of P2, the center-bottom connector. Refer to Figure 19-1.



P2

ZEROING/DISPLAY HOLD	1	2	TOGGLE NET-GROSS/DISPLAY PEAK
RESET2/RST PK - VALLEY	3	4	SWLIN2
TARE	5	6	PUSH TO CAL
DIG GND	7	8	+5V
RESET TARE/VALLEY	9	10	LOCKOUT EEPROM, RAM & MENU PUSH BUTTON
RESET ALARMS AND/OR PRINT COMMAND	11	12	NONSTANDARD RX
NONSTANDARD TX	13	14	PUSH TO CAL
+V EXT	15	16	SP1
SP2	17	18	AL1
AL2	19	20	GND EXT

Figure 19-1. Connector Label Detail

19.1 ZEROING/DISPLAY HOLD (PIN 1)

This is a dual function pin that performs zeroing or holds the display. Momentarily connecting this pin to pin 4 zeros the display if "INP.7=1 and holds the display if INP.7=0".

19.1.1 ZEROING SWITCH

If you configure INP.7=1 any momentary connection to pin 2.4 zeros the display. If the display reading is less than 21% of the maximum capacity (MAX.CAP, refer to Section 10.2.3) the display shows "RESET1" and you read zero value on the display. Otherwise if the display value is more than 21% of the maximum capacity the display shows "ERR5" and zeroing is not performed.

NOTE: You can also change the value of zeroing manually. (Refer to Section 13.2)

19.2 TOGGLE NET-GROSS/DISPLAY PEAK (PIN 2)

Momentary connection of this pin to pin 4 will either toggle between net & gross values or display peak value, depending on whether "TAR.5=0 or 1" - respectively.

19.3 HARD RESET/RESET2/RESET PEAK-VALLEY (PIN 3)

This is a dual function pin that hard resets the meter and also resets peak & valley. Momentarily connecting this pin to pin 4 performs hard reset on the meter or resets peak & valley if "INP.6=0 or 1" respectively.

19.4 TARE (PIN 5)

Momentarily grounding this pin to pin 7 tares the display.

19.5 RESET TARE/DISPLAY VALLEY (PIN 5)

This is a dual function pin. Momentarily grounding this pin to pin 7 resets the tare or displays valley if "TAR.1=0 or 1" respectively.

19.6 PUSH TO CAL (PIN 6 AND PIN 14)

This feature allows you to connect an external calibration resistor to P2-6 and P2-14 at the rear of the meter. **Note:** Use a one-way switch only.

If your selected calibration resistor is to be mounted externally (in series with your switch), install a SHORT in place or R35. **Note:** This short is already installed at the factory

If your selected calibration resistor is to be mounted internally, solder it in the holes of R35 on the input board.

19.7 DIGITAL GROUND (PIN 7)

This is a non-isolated ground to be used for the digital controls provided on this P2 connector.

> *WARNING: THIS METER GROUND IS NOT ISOLATED FROM THE SIGNAL INPUT AND SHOULD NOT BE CONNECTED TO EXTERNALLY-GROUNDED DEVICES UNLESS ISOLATION IS PROVIDED EITHER AT THE SIGNAL INPUT OR AT THIS EXTERNAL-LOGIC CONNECTION.*

19.8 +5 V (PIN 8)

Up to 20 mA is available for driving external devices, but isolation should be provided if there is a possibility of common mode (ground) currents, since this supply is NOT isolated from the signal input.

19.9 LOCKOUT EEPROM AND 'MENU' BUTTON (PIN 10)

Connecting this pin to P2-7 stops any configuration changes and new storage into the non-volatile memory, and when in run mode does not allow entry into the setup mode when the 'MENU' button is pressed.

19.10 PRINT COMMAND AND/OR RESET OF ALARMS (PIN 11)

This is a dual function pin. Momentarily grounding this pin to P2-7 when "BUS.8=1" has been programmed will initiate a meter printout via serial communications in the format previously selected. If "ALC.8=1" it also resets the latched alarms.

19.11 NONSTANDARD RX (PIN 12) AND NONSTANDARD TX (PIN 13)

These two pins allow digital communications with the meter using 5 V CMOS logic levels and RS-232 protocols and format. This access is normally reserved for specialized equipment communication in a calibration lab or at the factory.

19.12 +V EXT (PIN 15)

This is the pin on which to bring in isolated external 5 to 30 V to power the snubbing diodes of the four setpoint/alarm open-collector transistors.

19.13 SP1 (PIN 16)

The open-collector of the first setpoint transistor (can carry 150 mA).

19.14 SP2 (PIN 17)

The open-collector of the second setpoint transistor (can carry 150 mA).

19.15 AL1 (PIN 18)

The open-collector of the third setpoint (first alarm) transistor (can carry 150 mA).

19.16 AL2 (PIN 19)

The open-collector of the fourth setpoint (second alarm) transistor (can carry 150 mA).

19.17 GND EXT (PIN 20)

This is the return to the external ground (P2-20) of the external power for the setpoint transistors and snubbing diodes brought in on P2-15, 16, 17, 18 and 19. Figure 19-2 shows an example of a circuit using an external relay with SP1 (Setpoint 1).

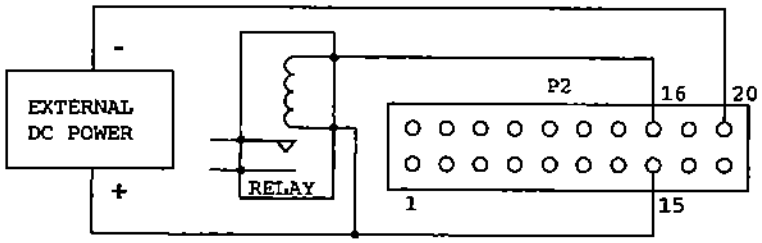


Figure 19-2. Connection of External Relay to Setpoint Transistor

19.18 EXTERNAL SWITCHES AND FUNCTIONS FOR P2 CONNECTOR

TABLE 19.1
P2 CONNECTOR EXTERNAL SWITCHES AND FUNCTIONS

PIN #	TYPE OF SWITCH	CONNECT TO	ACTION
P2.1	MOMENTARY	P2.4	DISPLAY HOLD/ZEROING (SEE NOTE 1)
P2.2	MOMENTARY	P2.4	PEAK/TOGGLE BETWEEN NET OR GROSS VALUES* (SEE NOTE 2)
P2.3	MOMENTARY	P2.4	RESET2/RESET PEAK & VALLEY (SEE NOTE 3)
P2.5	MOMENTARY	GROUND	TARE
P2.9	MOMENTARY	GROUND	RESET TARE/DISPLAY VALLEY (SEE NOTE 4)
P2.10	TOGGLE	GROUND	LOCKOUT RAM, EEPROM, & INHIBIT MENU BUTTON
P2.11	MOMENTARY	GROUND	PRINT VALUES AND/OR RESET ALARMS** (SEE NOTE 5)

* The symbol "/" denotes that only one of the functions can be accomplished.

** The symbol"and/or" denotes that these functions can be accomplished at the same time.

Notes are in Table 19.2.

19.19 CONFIGURATION BITS RELATED TO P2 SWITCH FUNCTIONS

TABLE 19.2
CONFIGURATION BITS - P2 SWITCH FUNCTIONS

NOTE	CONFIGURATION BITS	SWITCH ACTION
1	INP.7 = 0 INP.7 = 1	DISPLAY HOLD ENABLES ZEROING
2	TAR.5 = 0 TAR.5 = 1	TOGGLE BETWEEN NET & GROSS VALUES DISPLAY PEAK
3	INP.6 = 0 INP.6 =1	RESET 2 (HARD RESET) RESET PEAK & VALLEY
4	TAR.4 = 0 TAR.4 = 1	RESET TARE DISPLAY VALLEY
5	ALC.8 = 0 ALC.8 = 1	DISABLES ALARM RESET VIA P2-11 SWITCH CONNECTION ENABLES ALARM RESET VIA P2-11 SWITCH CONNECTION
6	BUS.8 = 0 BUS.8 = 1	DISABLES PRINT COMMAND VIA P2-11 SWITCH CONNECTION ENABLES PRINT COMMAND VIA P2-11 SWITCH CONNECTION

20. Troubleshooting - Display Messages and Troubleshooting Guide

A flashing alpha-numeric message in the display generally indicates an incorrect combination of jumpers and/or configuration values.

20.1 ERROR MODE MESSAGES

20.1.1 FLASHING "999999" (NUMERICAL OVERFLOW)

The maximum number of counts in the display cannot exceed –99999 or 999999. If, by moving the ACTIVE decimal point one or more places to the left, you cause the display to move beyond the maximum number of counts it is capable of showing (for example, 12345.0 to 12345.00), the display will indicate the overflow by flashing "999999".

20.1.2 FLASHING "ERR 01" (OFFSET OVERFLOW)

When an offset value has been entered and then the ACTIVE decimal point has been moved one or more places to the left, causing the offset display reading to move beyond the maximum number of counts it is capable of showing (for example, 1000.00 to 1000.000), the display will go into offset overflow.

NOTE: The meter will only display 6 digits (999999) maximum.

20.1.3 FLASHING "ERR 02" (SETPOINT OVERFLOW)

After a Setpoint (or Alarm) value has been entered and then the ACTIVE decimal point has been moved one or more places to the left, causing the setpoint display reading to move beyond the number of counts it is capable of showing (for example, setpoint at 100.00 and then a decimal point change to 100.0000), the display will indicate the SETPOINT OVERFLOW by momentarily flashing "ERR 02" before returning to the run mode.

NOTE: The meter will only display 6 digits (999999) maximum.

20.1.4 "NOSTOR" & "STORED" (PROGRAMMING ENTRIES IN EEPROM)

If you are in the configuration mode and you make a CHANGE to any setup parameter (for example, changing "RDG.1 = 1" to "RDG.1 = 0") and press the 'MENU' button, the display will MOMENTARILY flash either "STORED" or "NOSTOR" and then go to the next menu item. If you are in a submenu, this will only occur when you press the 'MENU' button to go to the next menu item.

20.1.5 FLASHING "+OVLD" (POSITIVE INPUT OVERLOAD)

If the signal input exceeds 110% of the full range when unipolar or positive range when bipolar, the display will flash a "+OVLD".

20.1.6 FLASHING "–OVLD" (NEGATIVE INPUT OVERLOAD)

If the signal becomes negative more than 10% of full range when unipolar and 110% of the negative range when bipolar, the display will flash "–OVLD".

20.1.7 FLASHING "I OVSC" (INPUT OVERSCALE)

This display occurs when the input scale and/or offset applied to the input signal causes the display to go into a numerical overflow.

20.1.8 FLASHING "R OVSC" (READING OVERSCALE)

This display occurs when the reading scale and/or offset applied to the input signal causes the display to go into a numerical overflow.

20.1.9 FLASHING "CB OVF" (COUNT BY OVERFLOW)

When a display value near the maximum display capability is forced into a numerical overflow by changing the CNT BY menu (for example, the display reads 999997 and the count by is changed from 001 to 005 and rounds the display up to 1000000).

20.1.10 FLASHING "OVR.CAP" (OVER CAPACITY)

This display occurs when the reading is larger than 105% of the maximum capacity.

20.1.11 FLASHING "UND.CAP" (UNDER CAPACITY)

This display occurs when the reading is under the minimum capacity.

20.1.12 FLASHING "DPOVF" (DECIMAL POINT OVERFLOW)

This display occurs when the reading overflows due to a decimal point error.

20.1.13 FLASHING "ERR 03" (EEPROM TEST ERROR)

This display occurs when an EEPROM test error exists.

20.1.14 FLASHING "ERR 04" (HARDWARE TEST ERROR)

This display occurs when a hardware test error exists.

20.1.15 DISPLAY "ERR 05" (ZERO VALUE OVERFLOW)

This display occurs when the zeroing value exceeds more than 21% of the capacity of the meter.

20.1.16 TABLE OF MESSAGES DISPLAYED BY THE METER

MESSAGE	DISPLAY STATE	DESCRIPTION
SCALE	STEADY	Name of meter
SEG.TST	STEADY	Segment test
MEM.TST	STEADY	EEPROM test
HW.TST	STEADY	Hardware test
PASSED	STEADY	Test passed
+OVLD	FLASHING	Input more than 110 mV (60 mV) for Unipolar (Bipolar)
–OVLD	FLASHING	Input less than, –10 mV (60 mV) for Unipolar (Bipolar)
OVR.CAP	FLASHING	Over capacity: Reading larger than 105% of the maximum capacity.
UND.CAP	FLASHING	Under capacity: Reading less than minimum capacity
I OVSC	FLASHING	Reading overflowed due to Input Scale and Offset
R OVSC	FLASHING	Reading overflowed due to Reading Scale and Offset
CB OVF	FLASHING	Count By overflow
DP OVF	FLASHING	Reading overflowed due to decimal point
ERR 01	FLASHING	Setpoints overflowed due to decimal point
ERR 02	FLASHING	2 coordinate scale and offset programming error
ERR 03	FLASHING	EEPROM test error
ERR 04	FLASHING	Hardware test error
ERR 05	FLASHING	Zeroing value is larger than 21% of the capacity of the meter
999999	FLASHING	Overflowed value due to decimal point (only in setpoint and menu routines)

20.2 TROUBLESHOOTING GUIDE

"99999"

POSSIBLE CAUSE: Active decimal point change driving the display into numerical overload.

TO CORRECT: Press the 'MAX' button to reset the entire display to all zeros, then enter a revised number into the submenu item that caused the overflow.

"ERR 01"

POSSIBLE CAUSE: Active decimal ("RDG.2=0") has been selected and/or DEC PT (decimal point) position has been moved one or more places to the left driving the programmed offset value into numerical overflow.

TO CORRECT: Press the 'MENU' button and the meter will show the left most decimal point position possible for the chosen offset: by pressing the 'MENU' button again this revised entry is stored.

Alternately, the amount of RDG.OF may be reduced to get the decimal point further to the left.

"ERR 02"

POSSIBLE CAUSE: Active decimal (RDG.2) has been selected and/or DEC PT (decimal point) position has been moved one or more places to the left driving the programmed Setpoint value into numerical overflow.

TO CORRECT: Display will flash "ERR 02" message for a short period of time, then automatically correct the setpoint's decimal point position and move to the next menu item. Press the 'SETPT' button until the meter displays flashing "999999". Then press the 'MAX' button to reset the display to "000000" and enter a new valid setpoint value.

"+OVLD"

POSSIBLE CAUSE: The positive input CURRENT & VOLTAGE exceeds the input range selected.

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TO CORRECT: Check both the input range and the actual input to find the error condition and either reduce the input or change jumpers to a higher input range for more input attenuation.

"-OVLD"

POSSIBLE CAUSE: The negative input voltage exceeds the input range selected.

"I OVSC"

POSSIBLE CAUSE: The input scale and/or offset values chosen are large enough to drive the display into numerical overflow.

TO CORRECT: Reduce the input and/or the input scaling/offset. Refer to "IN.SC.OF" in Section 9.2.5.

"R OVSC"

POSSIBLE CAUSE: The reading scale and/or offset values chosen are large enough to drive the display into numerical overflow.

TO CORRECT: Reduce the READING scale/offset and/or move the active decimal point to the right. Reducing INPUT scale/offset is not required, because the input overscale message has higher priority than this message and would be displayed if there were an input overscale.

"CB OVF"

POSSIBLE CAUSE: CNT BY (count by value) has been changed causing the display to round up to a numerical overflow.

TO CORRECT: Reduce the "CNT BY" count by value to 001. If you have an active decimal point selected, move the decimal point one or more positions to the right.

"SERIAL"

POSSIBLE CAUSE: A configuring change has been attempted via the front panel buttons while the serial communications port is actively communicating with the meter.

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TO CORRECT: Either lockout the front panel buttons by removing the jumpers S3A & S3C or disconnect the serial communications option.

"DP.OVF"

POSSIBLE CAUSE: Reading overflowed due to decimal point error.

TO CORRECT: Choose a lower value decimal point.

"ERR 03"

POSSIBLE CAUSE: EEPROM test error.

TO CORRECT: Check existing values, verify and store them by pressing RESET twice. Turn off and on the power. If error message contin ues to display, turn off and on the meter two to three times. If error still persists, the EEPROM is faulty. Contact the Customer Service Department.

"ERR 04"

POSSIBLE CAUSE: Hardware test error.

TO CORRECT: Connect Pin P9-2 to Pin P9-3 and turn the meter on and off two to three times. If error persists, you have a hardware defect. Contact the Customer Service Department.

"ERR 05"

POSSIBLE CAUSE: Zeroing value is larger than 21% of the capacity of the meter.

TO CORRECT: Do one of the following:

- Change the MAXCAP capacity (to the higher Value)
- Lower your display reading Your zeroing display value should be less than 1/20th of the MAXCAP.

Notes:

21. Specifications

21.1 CURRENT INPUT

INPUT RANGES(+10%):	0-20 mA and 4-20 mA
RESOLUTION:	1µA
MAXIMUM INPUT:	200 mA
INPUT OHMS:	5
SENSOR EXCITATION:	
AC-POWERED:	10 V to 30 mA; 5 V to 60 mA; 24 V to 25 mA
DC-POWERED:	35 mA at 24 V dc or 120 mA at 10 V dc

21.2 VOLTAGE INPUT

INPUT RANGES:				
UNIPOLAR:	100 mV	1 V	10 V	100 V
BIPOLAR:	±50 mV	±0.5 V	±5 V	±50 V
RESOLUTION:	1 µV	10 µV	100 µV	1 mV
MAX INPUT:	70 Vp	350 Vp	350 Vp	300 Vp
INPUT OHMS:	1G	1M	1M	1M
BIAS AMPS:	50 pA	5 pA	1 pA	1 pA

SENSOR EXCITATION: 10 V to 30 mA, 5 V to 60 mA, 24 V to 25 mA

21.3 POTENTIOMETER INPUT

INPUT RANGES:	1 V or 10 V
RESOLUTION:	10 µV or 100 µV respectively

SENSOR EXCITATION: 1.5 to 11 Vdc to 60 mA Max, 24 V to 25 mA Max

21.4 GENERAL

SCALE:	+0.000001 to +500000 or –0.0001 to –99999.
OFFSET:	Zero to +999999
POLARITY:	Automatic

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NOISE REJECTION

NMR:	60 dB, 50 or 60 Hz, + selected filter
CMR:	120 dB
CMV:	1500 V peak test, 354 V per IEC spacing

ACCURACY at 25 C:	
MAX ERROR:	±0.005% of reading
SPAN TEMPCO:	less than 15 ppm/deg C
STEP RESPONSE:	1 second to 99.9%
WARMUP:	55 minutes to rated accuracy It is recommended that the unit be continuously running to insure its accuracy.

CONVERSION TECHNIQUE:	Dual-slope

READRATE and DISPLAY UPDATE/Programmable

INTEGRATION TIME:	3 samples/sec:	100 msec
	13 samples/sec, 60 Hz:	16.7 msec
	12 samples/sec, 50 Hz:	20 msec

DISPLAY

LEDs:	6, 0.54" (13.8mm)h, red, 14-segment 4, 0.12" x 0.24" (3 x 6mm), red lamp
SYMBOLS:	–.8.8.8.8.8. or 8.8.8.8.8.8.
DECIMAL POINT POSITION:	Programmable

OUTPUTS

(STANDARD):	4, isolated open collector; 150 mA at 1 V sink; 30 V open
BCD OUTPUT:	Tri-state, TTL/CMOS compatible; internal 5 V supply for non-isolated, external 5 V supply for isolated.

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ANALOG OUTPUT: 0-5 V, 1-5 V, 0-10 V, 0-20 mA, 4-20 mA level; compliance, 12 V at 20 mA; 15-bit resolution; 0.1% accuracy; programmable zero and span.

TURNDOWN RATIO

(MAX OFFSET-MIN SPAN): 1000 with 0.1% or 100 with 0.01% resolution

COMMUNICATIONS INFORMATION

RS-232 COMMUNICATIONS: RJ11 4-wire connection; complete program setup and message display capability; programmable to transmit current display, alarm status, MIN/MAX, and status

BAUD RATES: 300, 600, 1200, 2400, 4800, 9600, 19200

RS-485 COMMUNICATIONS: RJ12 6-wire connection; addressable from "000" to "199"; complete program setup and message display capability; programmable to transmit current display, alarm status, MIN/MAX, and status

BAUD RATES: 300, 1200, 2400, 4800, 9600, 19200

FLASHING MESSAGES

DURING PROGRAMMING (configuration mode)

NUMERICAL OVERFLOW:	"999999"
OFFSET OVERFLOW:	"ERR 01"
SETPOINT OVERFLOW:	"ERR 02"
NOT STORED IN EEPROM:	"NOSTOR"
VALUE PUT IN EEPROM:	"STORED"

DURING MEASUREMENT (RUN MODE)

INPUT TOO LARGE, POSITIVE:	"+ OVLD"
INPUT TOO LARGE, NEGATIVE:	"– OVLD"
EXCESS INPUT SCALE/OFFSET:	"I OVSC"
EXCESS DISPLAY SCALE/OFFSET:	"R OVSC"
COUNT-BY DISPLAY OVERFLOW:	"CB.OVF"

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DURING SETPOINT ADJUST (RUN MODE)

OUT OF SELECTED DIGIT RANGE:	"999999"
NOT STORED IN EEPROM:	"NOSTOR"
VALUE PUT IN EEPROM:	"STORED"

POWER

AC VOLTAGES:	115 +10%, 50/60 Hz or 230 V +10% (RMS)
AC FREQUENCY:	49 to 100 Hz (to 440 Hz with 110 or 220 V minimum)
DC VOLTAGES:	10 to 32 V dc
CONSUMPTION:	3 TO 9 Watts MAX

ENVIRONMENTAL

OPERATING TEMP RANGE:	0 to 50 degrees C (32 to 140°F)
STORAGE TEMP RANGE:	–40 to 85 degrees C (–40 to 202°F)
HUMIDITY:	up to 95% non-condensing at 40°C (104°F)
FRONT PANEL:	NEMA-4 rated

MECHANICAL

DIMENSIONS (H x W x D):	1.89 x 3.78 x 5.86 (48mm x 96mm x 145mm) (add 0.27 inch or 15mm depth for Cold Junction Compensation Board). Refer to Figure 18-1 for the dimensions of the standard meter with the bezel.
WEIGHT:	1.316 pounds (600 g)
MATERIAL:	94V-0 UL-rated Polycarbonate

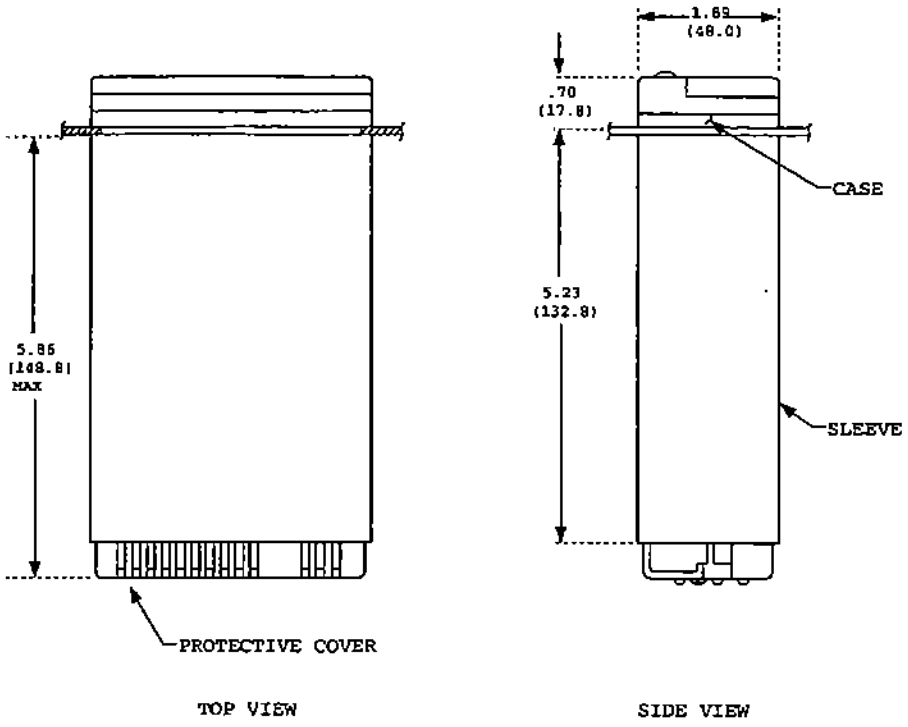

Figure 18-1. Dimensions for Meter Housing.

Notes:

22. Factory Preset Values

JUMPER POSITIONS:

Voltage
S1: NONE S2: A, F, L, N, T
S3: C S4: A, C S6: Y

Class: III
SCL.DIV: 00.1

Input Type: 0-100 mV
MAX CAP: 110000
MIN CAP: –100
U.O.M. LBS

Reading Configuration "RDG.CNF":
RDG.1=0 RDG.2=0 RDG.3=0 RDG.4=0
RDG.5=0 RDG.6=0 RDG.7=0

Reading Scale
("RDG SC"): 1.00000

Reading Offset
(RDG OF"): 000000

Input Configuration "IN CNF":
INP.1=0 INP.2=0 INP.3=0 INP.4=1
INP.5=0 INP.6=0 INP.7=1 INP.8=0

Input Scale and Offset "IN.SC.OF":
INPUT 1: 000000. READ 1: 000000.
INPUT 2: 100000. READ 2: 100000.

TARE Configuration "TAR.CNF":
TAR.1=0 TAR.2=0 TAR.3=0 TAR.4=1
TAR.5=0 TAR.6=0 TAR.7=1

Decimal Point "DEC PT" Position: FFFFFF.

Count By "CNT BY": 001

Factory Preset Values

Filter Configuration "FIL.CNF": FIL.1=0

Filter Time Constant "FIL TI": 16

Setpoint Configuration "SP CNF":

SPC.1=0	SPC.2=0	SPC.3=1	SPC.4=0
SPC.5=0	SPC.6=1	SPC.7=0	SPC.8=0

Alarm Configuration "AL CNF":

ALC.1=0	ALC.2=0	ALC.3=1	ALC.4=0
ALC.5=0	ALC.6=1	ALC.7=0	ALC.8=1

Alarm Function "AL FNC":

ALF.1=0	ALF.2=0	ALF.3=0	ALF.4=0

Alarm Number of Readings "AL RDG":
03 03 for (AL1) (AL2)

Setpoints 1 & 2 Deadband "SP DB": 0020

Alarms 1 & 2 Deadband "AL DB": 0020

Flashing Display "FLS.DSP": 0

BCD out "BCD.OUT":

BCD.1=0	BCD.2=1

Analog output "ANAL.OUT":

ANL.1=1	ANL.2=0

Output Scale and Offset "OT.SC.OF":

READ 1: 000000.	OUTPT 1: 04.0000
READ 2: 100000.	OUTPT 2: 20.0000

Baud Rate "BAUD": 09600

Serial Communication Configuration "SERCNF":

SER.1=1	SER.2=0	SER.3=0

Address "ADDRES" (for RS-485): 001

Data Format "DAT FT":

DAT.1=0	DAT.2=0	DAT.3=1	DAT.4=0
DAT.5=0	DAT.6=0	DAT.7=0	DAT.8=0

Bus Format "BUS FT":

BUS.1=0	BUS.2=0	BUS.3=1	BUS.4=0
BUS.5=1	BUS.6=0	BUS.7=0	BUS.8=1

Serial Count "SERCNT": 00001

ANALOG OUTPUT

CAL VZ:	_____
CAL VS:	_____
CAL mAZ:	_____
CAL mAS:	_____

Auto Zero Tracking "AUT.ZRO": Off

LOCKOUT CONFIGURATION(S)

L1 CNF	L2 CNF
L1C.1=0	L2C.1=0
L1C.2=0	L2C.2=0
L1C.3=0	L2C.3=0
L1C.4=0	L2C.4=0
L1C.5=0	L2C.5=0
L1C.6=0	L2C.6=0
L1C.7=0	
L1C.8=0	

Notes:

23. Record Your Setup Values

JUMPER POSITIONS:

Voltage:
S1:_____ S2: _____
S3:_____ S4: _____

Class: _____
SCL.DIV: _____

Input Type: _____
MAX CAP: _____
MIN CAP: _____
U.O.M. _____

Reading Configuration "RDG.CNF":
RDG.1=___ RDG.2=___ RDG.3=___ RDG.4=___
RDG.5=___ RDG.6=___ RDG.7=___

Reading Scale
("RDG SC"): _____

Reading Offset
(RDG OF"): _____

Input Configuration "IN CNF":
INP.1=___ INP.2=___ INP.3=___ INP.4=___
INP.5=___ INP.6=___ INP.7=___ INP.8=___

Input Scale and Offset "IN.SC.OF":
INPUT 1: _____ READ 1: _____
INPUT 2: _____ READ 2: _____

TARE Configuration "TAR.CNF":
TAR.1=___ TAR.2=___ TAR.3=___ TAR.4=___
TAR.5=___ TAR.6=___ TAR.7=___

Decimal Point "DEC PT" Position: _____

Count By "CNT BY": _____

Record your Setup Values

Filter Configuration "FIL.CNF": _____

Filter Time Constant "FIL TI": ____

Setpoint Configuration "SP CNF":

SPC.1=___ SPC.2=___ SPC.3=___ SPC.4=___
SPC.5=___ SPC.6=___ SPC.7=___ SPC.8=___

Alarm Configuration "AL CNF":

ALC.1=___ ALC.2=___ ALC.3=___ ALC.4=___
ALC.5=___ ALC.6=___ ALC.7=___ ALC.8=___

Alarm Function "AL FNC":

ALF.1=___ ALF.2=___ ALF.3=___ ALF.4=___

Alarm Number of Readings "AL RDG":

_____

Setpoints 1 & 2 Deadband "SP DB": _____

Alarms 1 & 2 Deadband "AL DB": _____

Flashing Display "FLS.DSP": _____

BCD out "BCD.OUT":

BCD.1=___ BCD.2=___

Analog output "ANAL.OUT":

ANL.1=___ ANL.2=___

Output Scale and Offset "OT.SC.OF":

READ 1:_____ OUTPT 1:_____
READ 2:_____ OUTPT 2:_____

Baud Rate "BAUD": _____

Serial Communication Configuration "SERCNF":

SER.1=___ SER.2=___ SER.3=___

Address "ADDRES" (for RS-485): _____

Data Format "DAT FT":

DAT.1=___	DAT.2=___	DAT.3=___	DAT.4=___
DAT.5=___	DAT.6=___	DAT.7=___	DAT.8=___

Bus Format "BUS FT":

BUS.1=___	BUS.2=___	BUS.3=___	BUS.4=___
BUS.5=___	BUS.6=___	BUS.7=___	BUS.8=___

Serial Count "SERCNT": _____

ANALOG OUTPUT

CAL VZ: _____

CAL VS: _____

CAL mAZ: _____

CAL mAS: _____

Auto Zero Tracking "AUT.ZRO": _____

LOCKOUT CONFIGURATION(S)

L1 CNF	L2 CNF
L1C.1=___	L2C.1=___
L1C.2=___	L2C.2=___
L1C.3=___	L2C.3=___
L1C.4=___	L2C.4=___
L1C.5=___	L2C.5=___
L1C.6=___	L2C.6=___
L1C.7=___	
L1C.8=___	

Notes:

Warranty/Disclaimer

NEWPORT Electronics, Inc. warrants this unit to be free of defects in materials and workmanship for a period of one (1) year from the date of purchase. In addition to NEWPORT's standard warranty period, NEWPORT Electronics will extend the warranty period for one (1) additional year if the warranty card enclosed with each instrument is returned to NEWPORT.

If the unit should malfunction, it must be returned to the factory for evaluation. NEWPORT's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by NEWPORT, if the unit is found to be defective it will be repaired or replaced at no charge. NEWPORT's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of NEWPORT's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

NEWPORT is pleased to offer suggestions on the use of its various products. However, NEWPORT neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by NEWPORT, either verbal or written. NEWPORT warrants only that the parts manufactured by it will be as specified and free of defects. NEWPORT MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of NEWPORT with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall NEWPORT be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by NEWPORT is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, or used on humans, or misused in any way, NEWPORT assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and additionally purchaser will indemnify NEWPORT and hold NEWPORT harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to the NEWPORT Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO NEWPORT, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM NEWPORT'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting NEWPORT:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult NEWPORT for current repair charges. Have the following information available BEFORE contacting NEWPORT:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

NEWPORT's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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For immediate technical or application assistance please call:

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