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Chapter 1 General Information

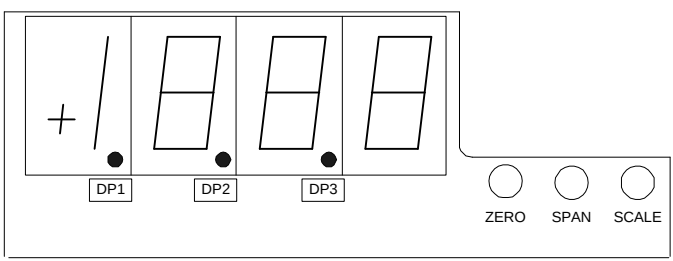
1000 Series Digital Panel Meters: Low Cost Measurement & Display

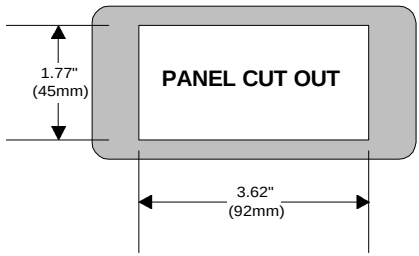
The 1000 Series digital panel meters are suitable for a wide range of display applications. Designed as a low cost solution, they offer ruggedness and reliability with 3 1/2-digit (±1999) display for many current, voltage, frequency, and process applications. The 1000 Series are available in 7 separate models.

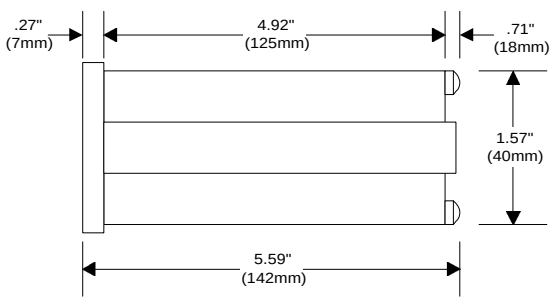
Model No.	**Description**
1000-DCV	Dc Volt Meter
1000-ACV	Ac Volt Meter
1000-DCA	Dc Current Meter
1000-PROC	Process Meter
1000-XCTV	High Ac Current Meter
1000-XDCA	High Dc Current Meter
1000-FREQ	Frequency Meter

Alarm and Power Options	**Description**
-XPS	10Vdc Excitation Power supply
-ALM	Dual Alarm Output with 10Vdc Excitation Power supply
-20	220 Vac Input Power

The unit is housed in a standard 1/8 DIN size case. For models measuring Dc Volts, Ac Volts, Dc current and frequency, range is selectable by connecting the input to the proper screw terminal located on the rear of the unit (see Chapter 2 page 6). For process, high AC and high DC current meters, the range and proper display scaling are selected by jumper settings on the main board. Bright, red .56 inch high LED characters are easy to read. Instrument power is derived from 115 Vac. Power input options include 24 or 220Vac. Engineering unit labels are supplied to indicate measured units. The decimal point placement is configured by jumper selection located behind the snap-off front lens.




PANEL CUT OUT
1.77"
(45mm)
3.62"
(92mm)


.27"
(7mm)
4.92"
(125mm)
.71"
(18mm)
1.57"
(40mm)
5.59"
(142mm)


3.78"
(96mm)
3.54"
(90mm)

Chapter 2 Setup

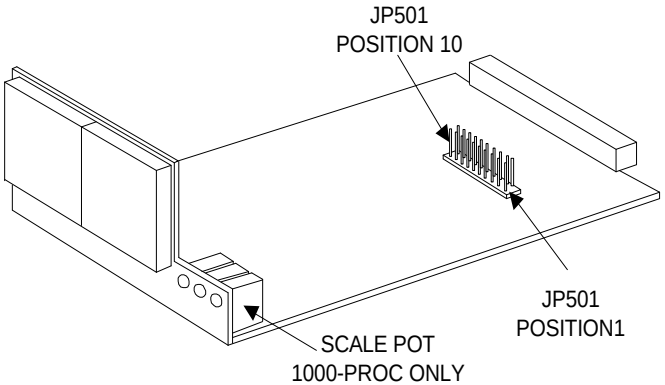
WARNING!

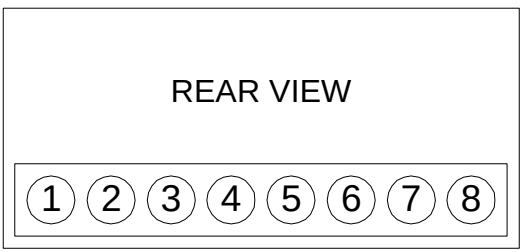
Dangerous voltages are present at the screw terminals. Always remove power before working in this area for wiring, disassembly, and all other activities that involve proximity to electrical circuitry.

NOTE: The 1000-XCTV, 1000-XDCA and 1000-PROC must be configured to display the desired range. To access the main board and its configuration jumpers, remove the front panel lens, lift the display above and over the latch located at the bottom front of the housing, and slide the assembly out of the case.

To begin making measurements, wire up the voltage, current, or frequency-input wires plus AC line power to the instrument. Because dangerous line voltage is present at the rear terminals when power is applied, hook up the input signal wires first, then the power. Plug in line power only after all connections are secure to the rear screw terminals of the meter. Viewing the meter from the rear, the screw terminals are numbered 1 through 8 from left to right according to the drawing on page 6.

PROCESS DC SHUNT	AC CURRENT TRANS-FORMER	DC Current	AC Volts DC Volts Frequency	REAR TERMINAL BLOCK
0-20mA		2mA	600V	1
PROCESS COMMON		20mA	200V	2
0-5VDC		200mA	20V	3
SHUNT HIGH		2A	2V	4
SHUNT COMMON	CT HIGH	5A	200mV	5
	CT COMMON	COMMON		6
AC POWER NEUTRAL				7
AC POWER HOT				8


JP501
POSITION 10
JP501
POSITION1
SCALE POT
1000-PROC ONLY


REAR VIEW
1
2
3
4
5
6
7
8

1000-DCV and 1000-ACV

AC or DC Voltmeters accept and display voltage ranges from +/-199.9mV to +/-600Volts. The range is selected by connecting the input to the proper screw terminal located at the rear of the unit. See chart on page 5.

Range Table

RangeVDC	Accuracy	Resolution
0 to 199.9mV	0.5%	0.1mV
0 to 1.999V	0.5%	1mV
0 to 19.99V	0.5%	10.0mV
0 to 199.9V	0.5%	0.1V
0 to 600V	0.5%	1V

1000-DCA DC Current

DC Ammeters accept and display current ranges from +/-1.999mA to +/-5.00A. The range is selected by connecting the input to the proper screw terminal located at the rear of the unit. See chart on page 5 .

Range Table

Range ADC	Accuracy	Resolution
0 to ±1.999mA	0.5%	1uA
0 to ± 19.99mA	0.5%	10uA
0 to ± 199.9mA	0.5%	100uA
0 to ± 1.999A	0.5%	1mA
0 to ± 5.00 A	0.5%	10mA

1000-FREQ

The Ac frequency meter is capable of measuring the frequency of an Ac voltage of up to 1kHz throughout an input voltage range of 199.9mV to 600Vac. The voltage range of the frequency being measured is selected by connecting the input to the proper screw terminal located at the rear of the unit. See page 5.

Input Voltage	Accuracy	Resolution
199.9mV to 600VAC		
0 to 1kHz	0.5%	1Hz

1000-XCTV High AC Current

The 1000-XCTV high Ac current meter accepts an input of either 1 amp or 5 amp external current transformers and scales the reading to the desired full scale reading of between 50.0 and 2000 amps. Ranges are selected by a combination of jumpers located on the main board (see page 6). No other adjustments are necessary.

The following ranges can be selected as full scale:

50 amps	**1000 amps**
100 amps	**1500 amps**
200 amps	**2000 amps**
500 amps	

Use the table on the following page to configure the meter.

Example 1. Configure the meter to display 1500 amps Ac full scale with a 5 amp input. Install jumpers provided on positions 5,7, and 8.

Example 2. Configure the meter to display 1000 amps Ac full scale with a 1 amp input. Install jumpers provided on positions 3 and 10.

AC CURRENT TRANSFORMER

INPUT	DISPLAY	JUMPER CONNECTIONS									
		1	2	3	4	5	6	7	8	9	10
1 AMP	50.0/500		●	●							●
1 AMP	100.0/1000			●							●
1 AMP	150.0/1500					●					●
1 AMP	199.9/1999										●
5 AMP	50.0/500		●	●				●	●		
5 AMP	100.0/1000			●				●	●		
5 AMP	150.0/1500					●		●	●		
5 AMP	199.9/1999							●	●		

1000-XDCA High Dc Current

The 1000-XDCA high Dc shunt meter accepts an input from 60,100 and 150 Vdc current shunts and scales the reading to the desired full scale reading of between 50.0 and 2000 amps. Ranges are selected by a combination of jumpers located on the main board (see page 6). No other adjustments are necessary. Use the table on the following page to configure the meter.

The following ranges can be selected as full scale:

50 amps	**1000 amps**
100 amps	**1500 amps**
200 amps	**2000 amps**
500 amps	

Example 1. Configure the meter to display 500 amps Dc full scale with a 100mVDc input. Install jumpers provided on position 3.

Example 2. Configure the meter to display 1999 amps Dc full scale with 60mVDc input. Install jumpers provided on positions 6,7,8 and 9.

DC HIGH CURRENT

INPUT	DISPLAY	JUMPER CONNECTIONS									
		1	2	3	4	5	6	7	8	9	10
60mV	50.0/500	●									
60mV	100.0/1000								●		
60mV	150.0/1500							●		●	
60mV	199.9/1999						●	●	●	●	
100mV	50.0/500			●							
100mV	100.0/1000										
100mV	150.0/1500									●	
100mV	199.9/1999							●			
150mV	50.0/500		●								
150mV	100.0/1000				●						
150mV	150.0/1500										
150mV	199.9/1999										●

1000-PROC Process

The 1000-PROC Process meter accepts either voltage or current inputs (0 to 5, 1 to 5 or 0 to 10 Vdc) or (0 to 20mA, 4 to 20mA).

Note: The unit is shipped from the factory calibrated to display 0 to 1000 counts with a 4 to 20mA input signal.

If the unit is to be used for 0 to 20mA, 0 or 1 to 5Vdc or 0 to 10Vdc it must be recalibrated according to the instructions in Chapter 5. Voltage or current inputs are selected simply by wiring the inputs to the proper rear terminals by installing removable jumpers located on the main board and adjusting the scaling potentiometer located behind the front panel lens (see figure page 2). To place the decimal point in the desired location, place the jumper provided below the main display. Use the table on the following page to scale the meter.

Note: The table on the following page is based on 0 display counts with 0 input. Offsets above zero (maximum 500 counts) will be added to the full-scale range. It may be necessary to change jumper settings to achieve the desired display range.

Range Table

Sensor Input	Accuracy	Resolution
0 to 20/4 to 20mA	0.5%	1count of 1999 counts
0 to 5/1 to 5Vdc	0.5%	
0 to 10 Vdc	0.5%	

Example: Scale the meter to display 200 counts with 4mA input and 1500 counts with 20mA input.

1. Install a single jumper jack on position 6. Input 20.0 mA and adjust the SCALE pot to 1500 counts.

2. Input 4.0 mA and adjust the ZERO pot to 200.

3. Repeat steps 1 and 2 until no further adjustment is required.

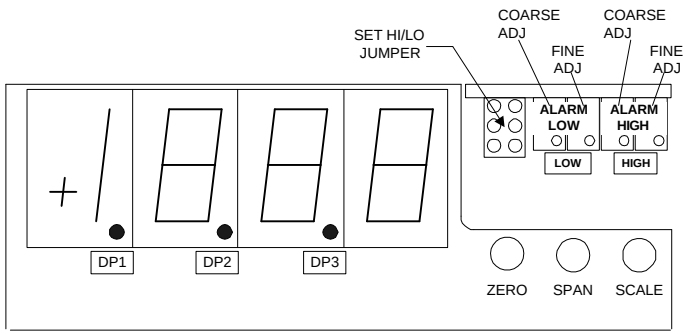
PROCESS

INPUT	FULL SCALE	JUMPER CONNECTIONS									
		1	2	3	4	5	6	7	8	9	10
Volts/Current*	0-100.0%										
Volts/Current*	1070-1999						●				
Volts/Current*	450-950	●					●				
Volts/Current*	200-500			●			●				
0-10 VDC	0-100.0%	●									
0-10 VDC	1000-1999	●					●				
0-10 VDC	525-1000	●	●				●				
0-10 VDC	450-600	●	●	●			●				

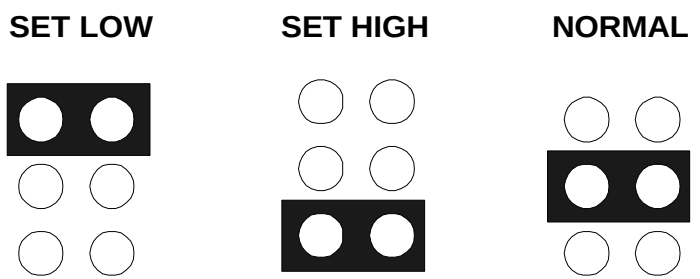
*0 to 20 mA / 0 to 5 or 10 Vdc

Chapter 3 Alarm and Excitation Option

The alarm option enables the user to set a high and a low alarm limit. When an alarm occurs, a red alarm LED indicator will turn on and a normally open relay contact will close. The LED will turn off and the relay will automatically reset when the alarm limit is no longer exceeded. Two alarms are provided and are designated **LOW** and **HIGH** on the front panel. Alarm limits are set by potentiometers located behind the front panel lens.



SET HI/LO JUMPER



Setting the Alarm Limits

Note: Low alarm limits are set by the two coarse and fine potentiometers on the left. High alarm limits are set by the two coarse and fine potentiometers on the right.

STEP 1. Remove power from the instrument and disconnect the signal input wires. Snap off the front panel lens. Apply power and allow approximately 5 minutes of warm-up time.

STEP 2. Set the HI/LO jumper (located between the display digits and the adjustment potentiometers) from the normal position to either the SET HI or the SET LO position. See drawing on page 15.

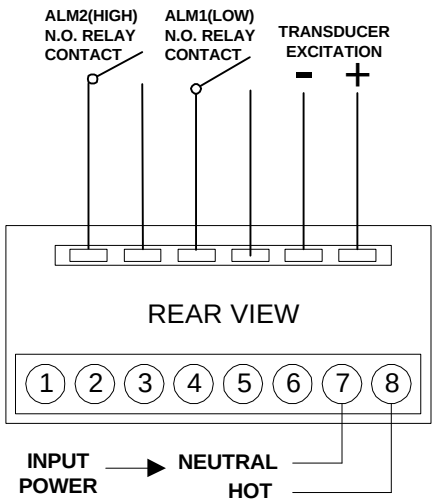
STEP 3. Adjust the coarse potentiometer until the display reads the value of the alarm limit. Make any final adjustments with the fine adjust pot.

STEP 4. Return the HI/LO jumper to its normal position.

STEP 5. Install the front panel lens. Ensure that power is disconnected before reconnecting signal wires.

Alarm and Excitation Option Wiring

Blade terminals accessible at the back of the instrument provide connections to the alarm option. Female connectors are supplied to wire the alarm option into your system. Excitation power supply is standard with the dual alarm.



Chapter 4 General Specifications

Stability with Temperature:
±100ppm/°C maximum

Noise Rejection:
NMRR: <40dB, 50/60 Hz
CMRR: <130dB w/ 250Ω unbalance typical

Display:
3 1/2 digit, 7-segment red/orange LED, 0.56" (14.2mm) height

Environmental:
0°C to 50°, <85% RH, non-condensing

Case Construction:
One-piece black ABS plastic

Size:
Case: 1/8 DIN 1.57" X 3.54"X 4.56"(4.0cm X 9.0cm X 10.9cm)
Bezel: 1.89” X 3.78” (4.8cm X 9.6cm)
Panel Cutout: 1.77" X 3.62" (4.5cm X 9.2cm)

Weight:
1lb. (454g)

Power:
115Vac +/- 10%, 50 or 60 Hz
220Vac +/- 10%, 50 or 60 Hz
24Vac +/- 10%, 50 or 60 Hz

Excitation Power Supply
+10 Vdc @ 30mA

Chapter 5 Calibration

1000-DCV DC Volts

Equipment Required:

1. Precision DC voltage source with a resolution to 0.1mV and an accuracy of ±0.1%

2. Interconnecting copper wire from the DC source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power from the unit and use copper connecting leads, connect the output of the DC voltage source to terminals 5 (+) and 6 (-) of the indicator according to the chart on page 5.

STEP 2. Remove the front panel lens, reconnect power and allow for a 5-minute warm-up.

STEP 3. Input 0.0 mV from the DC voltage source and adjust the ZERO pot for a display of 0.0±1 count. (Refer to the figure on page 15 for the location of the zero and span pots).

STEP 4. Input 190.0 mV from the DC voltage source and adjust the SPAN pot for a reading of 190.0±1 count.

STEP 5. Repeat steps 3 and 4 until no further adjustment is needed.

1000-ACV AC Volts

Equipment Required:

1. Precision AC voltage source with a resolution to 0.1mV and an accuracy of ±0.1%

2. Interconnecting copper wire from the AC source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power from the unit and using copper connecting leads, connect the output of the AC Voltage source to terminals 5 and 6 of the indicator according to the chart on page 5.

STEP 2. Remove the front panel lens and reconnect power and allow for a 5-minute warm-up.

STEP 3. Input 0.0 mV from the AC voltage source and adjust the ZERO pot for a display of 0.0±1 count. (Refer to the figure on page 15 for the location of the zero and span pots).

STEP 4. Input 190.0 mV at the measured frequency from the AC source and adjust the SPAN pot for a reading of 190.0±1 count.

STEP 5. Repeat steps 3 and 4 until no further adjustment is needed.

1000-FREQ Frequency

Equipment Required:

1. Precision AC voltage source with a resolution to 0.1mV and an accuracy of ±0.1%

2. Interconnecting copper wire from the AC source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power from the unit and using copper connecting leads, connect the output of the AC Voltage source to terminals 5 and 6 of the indicator according to the chart on page 5.

STEP 2. Remove the front panel lens and reconnect power and allow for a 5-minute warm-up.

STEP 3. Input 100.0 mV at 60 Hz from the AC voltage source and adjust the ZERO pot for a display reading of 60±1count.

STEP 4. Input 100.0 mV @400 Hz from the AC voltage source and adjust the SPAN pot for a display reading of 400±1count.

STEP 5. Repeat steps 2 and 3 until no further adjustment is needed.

1000-DCA DC Current

Equipment Required:

1. Precision DC current source with a resolution to 0.1mA and an accuracy of ±0.1%

2. Interconnecting copper wire from the DC current source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power from the unit and use copper connecting leads, connect the output of the DC current source to terminals 3 (+) and 6 (-) of the indicator according to the chart on page 5.

STEP 2. Remove the front panel lens, reconnect power and allow for a 5-minute warm-up.

STEP 3. Input 0.0 mA from the DC current source and adjust the ZERO pot for a display of 0.0±1 count. (Refer to the figure on page 15 for the location of the zero and span pots).

STEP 4. Input 190.0 mA from the DC current source and adjust the SPAN pot for a reading of 190.0±1 count.

STEP 5. Repeat steps 3 and 4 until no further adjustment is needed.

1000-PROC Process Meter

The 1000-PROC can be custom scaled to display a full-scale reading from 200 to 1999 counts by installing removable jumpers located on the main board and adjusting the scaling potentiometer located behind the front panel lens.

4-20mA

Equipment Required:

1. Precision DC current source with a resolution of 0.1ma DC and an accuracy of 0.1%.

2. Interconnecting copper wire from the DC current source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power from the unit and remove the front panel lens.

STEP 2. Connect the DC current source to terminal 1 (+) and terminal 2 (-) located on the rear of the unit. Reconnect power and turn the unit on. Allow for a 5-minute warm-up.

STEP 3. Input 4.0mA from the DC current source and adjust the ZERO pot for a display reading of 0.0 ± 1 count.

STEP 4. Input 20.0 mA from the DC current voltage source and adjust the SPAN pot for a reading of 100.0±1 count.

STEP 5. Repeat steps 3 and 4 until no further adjustment is needed.

0 to 20mA
Equipment Required:

1. Precision DC current source with a resolution of 0.1ma DC and an accuracy of 0.1%.

2. Interconnecting copper wire from the DC current source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power from the unit and remove the front panel lens.

STEP 2. Connect the DC current source to terminal 1 (+) and terminal 2 (-) located on the rear of the unit. Reconnect power and turn the unit on. Allow for a 5-minute warm-up.

STEP 3. Input 0.0mA from the DC current source and adjust the ZERO pot for a display reading of 0.0 ± 1 count.

STEP 4. Input 20.0 mA from the DC current source and adjust the SPAN pot for a reading of 100.0±1 count.

STEP 5. Repeat steps 3 and 4 until no further adjustment is needed.

1 to 5VDC
Equipment Required:

1. Precision DC voltage source with a resolution of 0.1mV DC and an accuracy of 0.1%.

2. Interconnecting copper wire from the DC voltage source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power from the unit and remove the front panel lens.

STEP 2. Connect the DC voltage source to terminal 3 (+) and terminal 2 (-) located on the rear of the unit. Reconnect power and turn the unit on. Allow for a 5-minute warm-up.

STEP 3. Input 1.0VDC from the DC voltage source and adjust the ZERO pot for a display reading of 0.0 ± 1 count.

STEP 4. Input 5.0VDC from the DC voltage source and adjust the SPAN pot for a reading of 100.0±1 count.

STEP 5. Repeat steps 3 and 4 until no further adjustment is needed.

0 to 5VDC and 0 to 10VDC

Equipment Required:

1. Precision DC voltage source with a resolution of 0.1mV DC and an accuracy of 0.1%.

2. Interconnecting copper wire from the DC voltage source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power from the unit and remove the front panel lens.

STEP 2. Connect the DC voltage source to terminal 3 (+) and terminal 2 (-) located on the rear of the unit. Reconnect power and turn the unit on. Allow for a 5-minute warm-up.

STEP 3. Input 0.0VDC from the DC voltage source and adjust the Zero pot for a display reading of 0.0 ± 1 count.

STEP 4. Input 5.0VDC from the DC voltage source and adjust the Span pot for a reading of 100.0±1 count.

STEP 5. Repeat steps 3 and 4 until no further adjustment is needed.

1000-XCTV **High AC Current**

Equipment Required:

1. Precision AC current source with a resolution of 0.1ma AC and an accuracy of 0.1%.

2. Interconnecting copper wire from the AC voltage source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power from the unit and remove the front panel lens. Carefully remove the electronics from the housing by lifting the display above and over the latch located at the bottom front of the housing and slide the assembly out of the case.

STEP 2. Make note of the jumper settings on JP501. Carefully remove them and replace jumpers on position 3 and position 10.

STEP 3. Connect the AC current source to terminals 5 and 6 located on the rear of the unit. Reconnect power and turn the unit on. Allow for a 5-minute warm-up.

STEP 4. Input 0.0 amp from the AC current source and adjust the ZERO pot for a display reading of 0 counts ±1 count.

STEP 5. Input 1 amp @ 60 Hz from the AC current source and adjust the SPAN pot for a display reading of 1000 counts ±1 count.

STEP 6. Remove the jumper on positions 3 and 10 and replace all of the jumpers to their original settings.

1000-XDCA **High DC Current**

Equipment Required:

1. Precision DC current source with a resolution of 0.1mV DC and an accuracy of 0.1%.

2. Interconnecting copper wire from the DC current source to the indicator.

3. Trimmer adjusting tool.

STEP 1. Disconnect power and current from the unit and remove the front panel lens. Remove the electronics from the housing by lifting the display above and over the latch located at the bottom front of the housing and slide the assembly out of the case.

STEP 2. Make note of the jumper settings on JP501. Carefully remove them and replace one jumper on position 7.

STEP 3. Connect the DC voltage source to terminals 4 (+) and 5(-) located on the rear of the unit. Reconnect power and turn the unit on. Allow for a 5-minute warm-up.

STEP 4. Input 0.0mV from the DC voltage source and adjust the ZERO pot for a display reading of 0-counts±1 count.

STEP 5. Input 90.0mV from the DC voltage source and adjust the SPAN pot for a display reading of 1800 counts±1 count.

STEP 6. Remove the jumper on position 7 and replace all of the jumpers to their original settings. Calibration is complete.