



*Pyrom*ATION,[®] INC.

INSTRUCTION MANUAL

Series 423 Digital Indicator

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2-1 GENERAL INFORMATION

The 423 Series Instruments are a Microprocessor-Based Digital Process Indicator for thermocouples and RTD's. The instrument has no potentiometers for calibration. All calibration is done from the front panel and stored in non-volatile memory. The program menu has been secured at the factory by the use of a password which prevents unauthorized users from entering the calibration mode.

Thermocouple and RTD inputs can be changed through the pushbuttons as well. Calibration for these are also prompted through pushbutton commands. Again, there are no potentiometers for calibration. Fahrenheit and Celsius and decimal point conversions are made through menu commands.

Menu program lockout is available through pushbutton commands. This lockout is a specified codeword which prevents personnel from entering the menu if desired. There is a universal codeword which will over-ride any user specified codeword. This is maintained in case the user loses or forgets the specified codeword.

2-2 LIMITED WARRANTY

THE MODEL 423 SERIES DIGITAL INDICATOR SOLD BY OR PURCHASED FROM PYROMATION, INC. OR FROM AN AUTHORIZED PYROMATION DISTRIBUTOR, OR AGENT IS SUBJECT TO THE FOLLOWING LIMITED WARRANTY.

This product is warranted to be free from functional defects in materials and workmanship at the time the product leaves the Pyromation, Inc. factory, and to conform at that same time to the specifications set forth in the relevant Pyromation, Inc. installation, wiring, operation manual for this product for a period of one year after shipment from the Pyromation, Inc. factory.

Pyromation's exclusive and sole obligation, and Buyer's exclusive and sole remedy under the above Limited Warranty is limited to either repair or replacement of such product, at Pyromation's option, free of charge to Buyer. Pyromation shall have no obligation to repair or replace unless the claimed defect in material or workmanship is reported in writing to Pyromation at 5211 Industrial Road, Fort Wayne, Indiana 46825 within ten (10) days after delivery to the Buyer from Pyromation or an authorized Pyromation distributor, representative or reseller. If so requested by Pyromation, the product shall be returned to a designated facility during normal business hours, transportation prepaid.

Any action for breach of this warranty or other action arising out of this contract must be commenced within one year after delivery.

Pyromation shall not be liable for any warranty, express or implied, other than the warranty stated above, and in the event of a breach of the above stated warranty, Pyromation shall not be liable for any incidental, consequential, special, or other damages, costs, or expenses other than repair or replacement as described above. Pyromation excludes any and all warranties of merchantability or fitness for a particular purpose. The above stated warranty extends only to the original Buyer from Pyromation, Inc. or from an authorized Pyromation distributor or agent, and may not be transferred or assigned.

3-1 SPECIFICATIONS
- STANDARD -

Power Supply: 120 or 240V_{AC} +10%/-15%
50/60HZ
External Fuse Required - .5A

DC Isolation: @ 500 V_P

Ambient Temperature: 32 to 122°F (0 - 50°C)

Overall Accuracy: RTD or Thermocouple: ± 1°F
4 - 20 mA: ± .1%

Input Impedance: 47M Ohm (Millivolt inputs only)

RTD Excitation Current: .25mA

Error Due to Lead Resistance: 0.1uV per Ohm (T/C Inputs Only)

Conversion Rate: 2.5 per Second

Filtering: Digital: Average of 16 conversions per update
Analog: 2.2K in parallel with 0.1uf

Resolution: .1 or 1 Degree
(Automatic 1 Deg., Resolution above 999.9)

Display: .54" High LED, High Intensity Alpha Numeric

Display Readouts: UNDR - Underrange
OVER - Overage
OPEN - Open Input

Physical Dimensions: 48 x 96 x 148mm (overall dimensions)
(1.89" x 3.78" x 5.83")

- OPTIONS -

Power Supply: 12 or 24 V_{DC} +20/-10%
External Fuse Required - .5A

Auxillary Power Supply: 24 V_{DC} (30 mA Maximum)

Relays: 250 V_{AC} (8A Maximum)
30 V_{DC} (8A maximum)

4-1 ORDER CODE

Example Order Number:

423 - 1 1 - 42 R1 - 04 - S (0-5000)

Table 1

METER STYLE	
ORDER CODE	DESCRIPTION
1	Input Selectable for T/C or RTD's with Fixed Range or 4 - 20 mADC with Scaleable Display

Table 2

POWER SUPPLY	
ORDER CODE	DESCRIPTION
1	120 VAC (Field Selectable)
2	240 VAC (Field Selectable)
3	24 VDC (Factory Installed)
4	12 VDC (Factory Installed)

Table 3

INPUT SELECTION	
ORDER CODE	DESCRIPTION
00	Customer Configured *
85	100 Ohm Plat. RTD, .00385 T.C.
42	4 - 20 mADC
4J	Type J Thermocouple
4K	Type K Thermocouple
4T	Type T Thermocouple
4E	Type E Thermocouple
4N	Type N Thermocouple

* Meters are shipped calibrated for Type K thermocouples, degrees F, and 1° resolution

Table 6

DISPLAY SCALING	
ORDER CODE	DESCRIPTION
S	Factory Scaled 4-20 mA Inputs Only *

* Insert actual scaling desired as per examples below
0 - 5000, 50 - 150, -100 to 100, 500-0

Table 5

OPTIONS		
ORDER CODE	DESCRIPTION	AVAIL. LIMITS
00	No Options	
01	Splash Proof Panel Gasket Seal	Not w/Opt. 02
02	Meter Mounted 12 Pt. Sel. Switch	
03	One SPDT Process Alarm	
04	Two SPDT Process Alarms	
05	24 VDC Power Supply Output	

Table 4

DISPLAY RESOLUTION	
T/C or RTD INPUTS	
ORDER CODE	DESCRIPTION
00	Customer Configured
F1	1° F
F2	.1° F
C1	1° C
C2	.1° C
4 to 20 mA INPUTS	
00	Customer Configured
F1	1° F
F2	.1° F
C1	1° C
C2	.1° C
00	Customer Configured
R1	1 Unit Resolution (9999)
R2	.1 Unit Resolution (999.9)
R3	.01 Unit Resolution (99.99)
R4	.001 Unit Resolution (9.999)

5-1 UNPACKING

Unpack the instrument immediately upon receipt, and visually inspect for shipping damages. If the instrument was damaged in transit, note any damage and file a claim with the carrier.

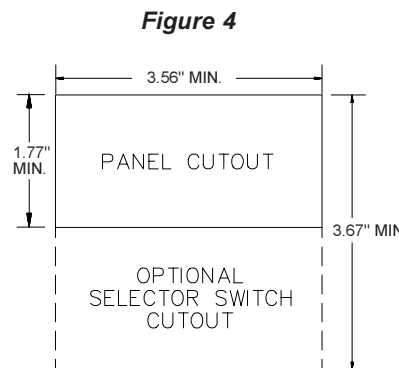
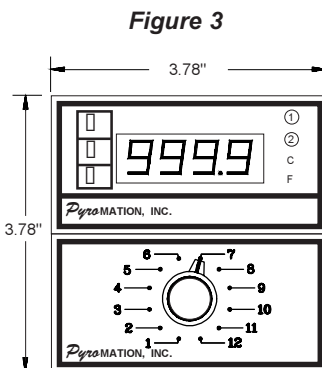
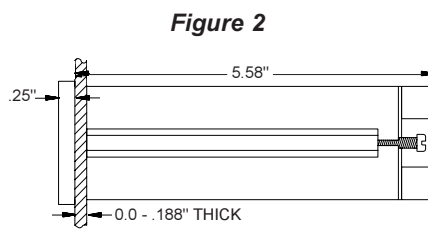
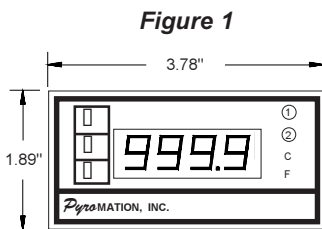
5-2 LOCATION

Install the instrument in an area where it will not be subjected to excessive shock, vibration, dirt, oil, and where the temperature will not exceed 0-50°C (32-122°F). The instrument should not be installed in an area where rapid temperature changes may occur (e.g. near heating or cooling ducts).

5-3 MOUNTING

Figure 1 thru figure 4 below shows panel cutout dimensions and case dimensions. (For units with 12 position selector, cutout dimensions are 3.67" high by 3.56" wide). Remove slide retaining screws and slides. Insert the instrument through the cutout from the front side of the panel and re-insert slides and screws. Do not over-tighten screws.

5-4 MOUNTING ILLUSTRATIONS



6-1 LINE SUPPLY WIRING

Figure 5
120 or 240 VAC Line Supply

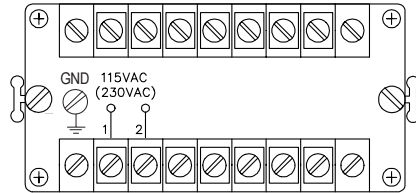
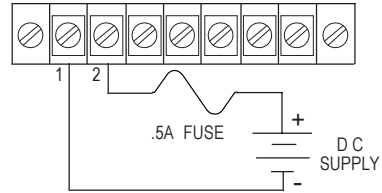
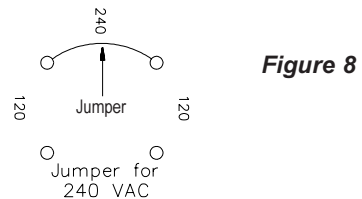
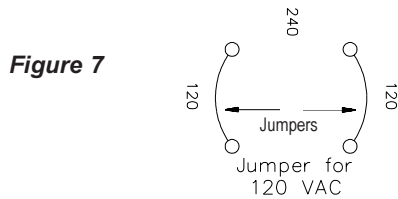


Figure 6
12 or 24 VDC Line Supply



6-2 AC LINE SUPPLY CONVERSION

The 423 Series meter can be field changed from 120 to 240 VAC or back. This is accomplished by changing the jumper on the PC board. The jumpers are located in the rear next to the transformer. See figures below. (This change will not void the limited warranty).



6-3 RTD INPUT WIRING

Figure 9
3 Wire RTD Hookup

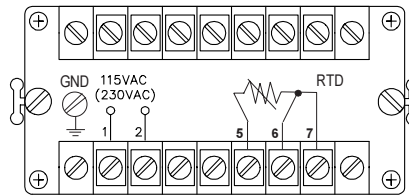


Figure 10
2 Wire RTD Hookup

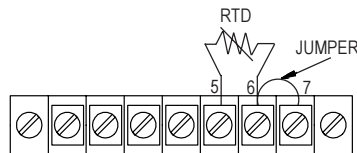
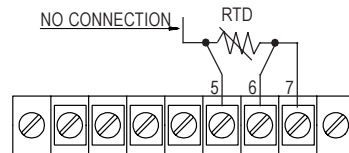


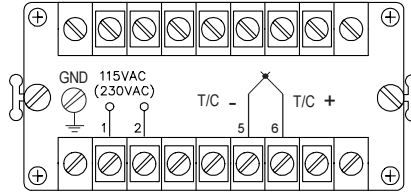
Figure 11
4 Wire RTD Hookup



NOTE: RTD input extension wire should **not** be run in the same conduit as line voltage, nor should they be exposed to excessive electrical noise.

7-1 THERMOCOUPLE INPUT WIRING

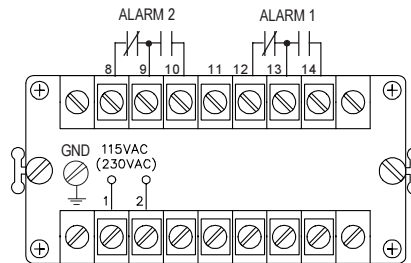
Figure 12



Note: Thermocouple input extension wire should **not** be run in the same conduit as line voltage, nor should they be exposed to excessive electrical noise. Always use compensated leadwire when wiring for thermocouple inputs.

7-2 RELAY WIRING

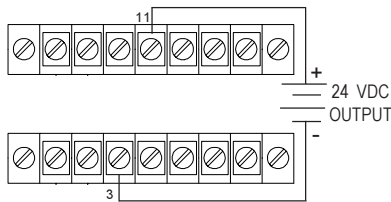
Figure 13



* See note on Page 11

7-3 AUXILIARY POWER SUPPLY WIRING

Figure 14



7-4 4 - 20mA INPUT with and without INTERNAL LOOP POWER

Figure 15 - with Loop Power

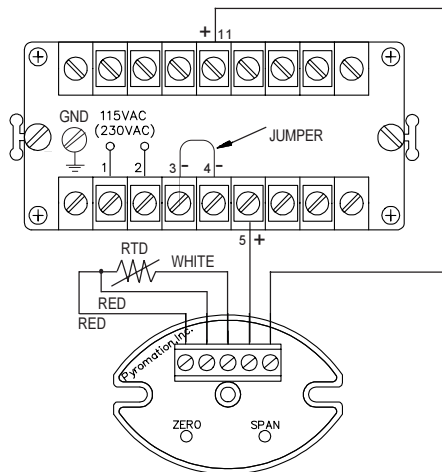
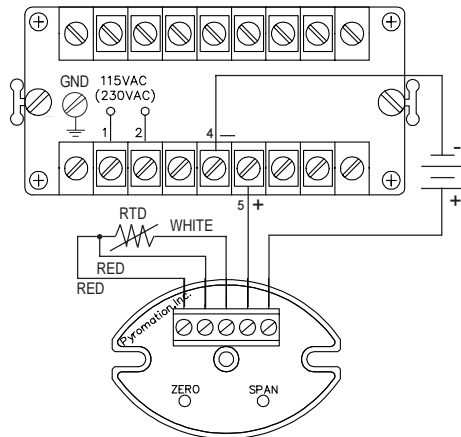


Figure 16 - without Loop Power



8-1 12-POSITION SELECTOR SWITCH WIRING ILLUSTRATIONS

Figure 17

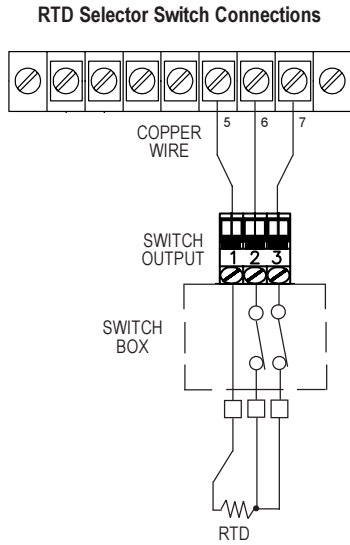
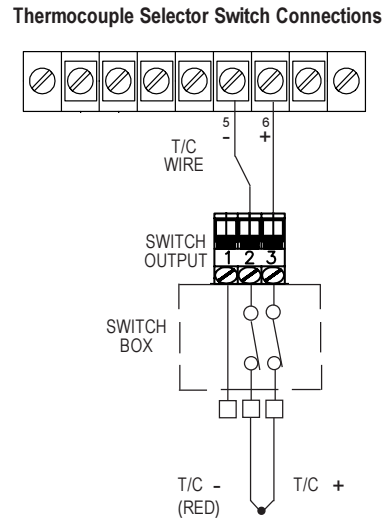
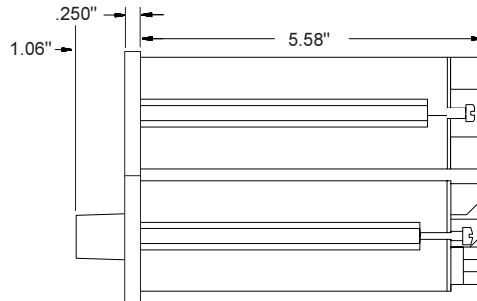


Figure 18



8-2

Figure 19



*Note: Always use **compensated** leadwire when wiring for thermocouple inputs.*

8-3 UNIT REPAIRS

If returning instrument, contact the factory or local representative for a Return Authorization Number. Include the reason for the return with your shipment.

9-1 TROUBLE SHOOTING

PROBLEM

POSSIBLE CAUSES

' OPEN '

- ▣ Sensor not connected
- ▣ Damaged sensor

' OVER '

- ▣ Sensor is over temperature range
- ▣ Incorrect sensor

' UNDR '

- ▣ Sensor is under temperature range
- ▣ Incorrect sensor
- ▣ Wrong polarity on connection

Erratic Readings

- ▣ Loose connection on sensor input
- ▣ Damaged sensor
- ▣ AC noise on sensor connections

POSSIBLE WIRING ERRORS

Destructive Errors

- ▣ Do not connect power to the sensor input. This could destroy the panel meter.
- ▣ Do not connect power to the sensor itself.
- ▣ Incorrect line power on the unit; check options.

Non-Destructive Errors

- ▣ Reversing the polarity on line power input.
- ▣ Reversing the polarity on sensor input.

10-1 MAIN MENU

Below is a block diagram showing the basic menu program. Specific menu breakdowns are described on the following pages. The middle button is used as the enter key. This will move you through the program. The buttons allow you to view and change variables to the program. Please note, to eliminate changes made, simply disconnect power before you come to the PWRD YES/NO prompt.

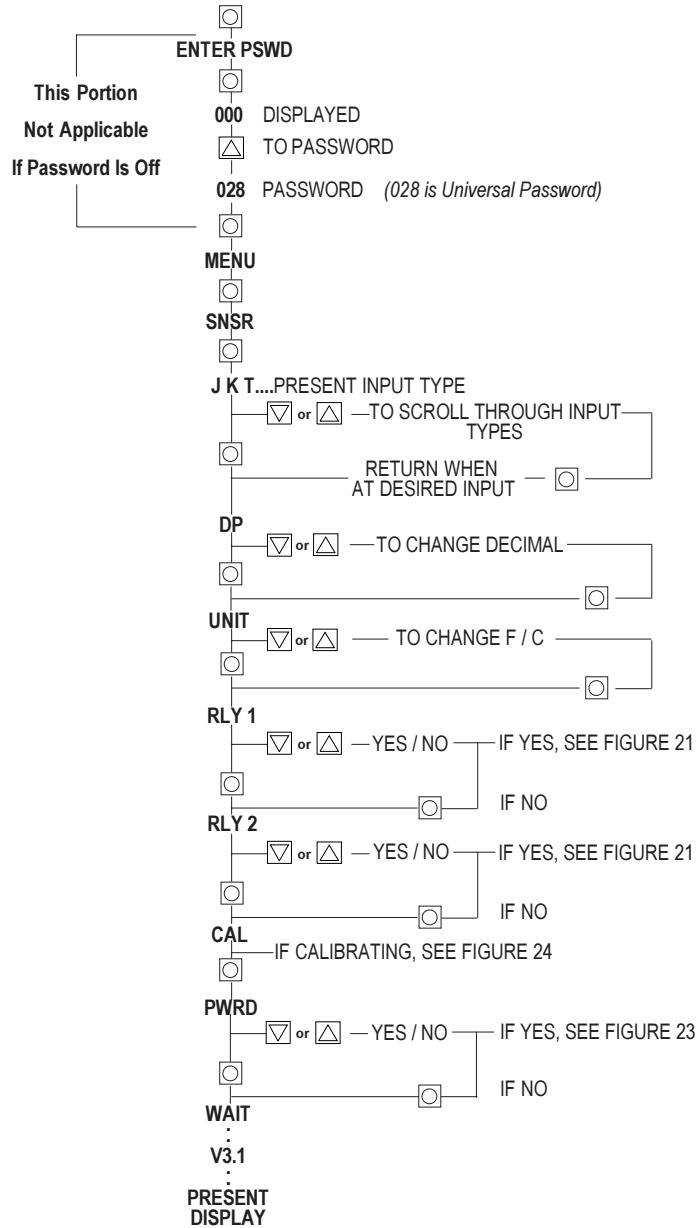
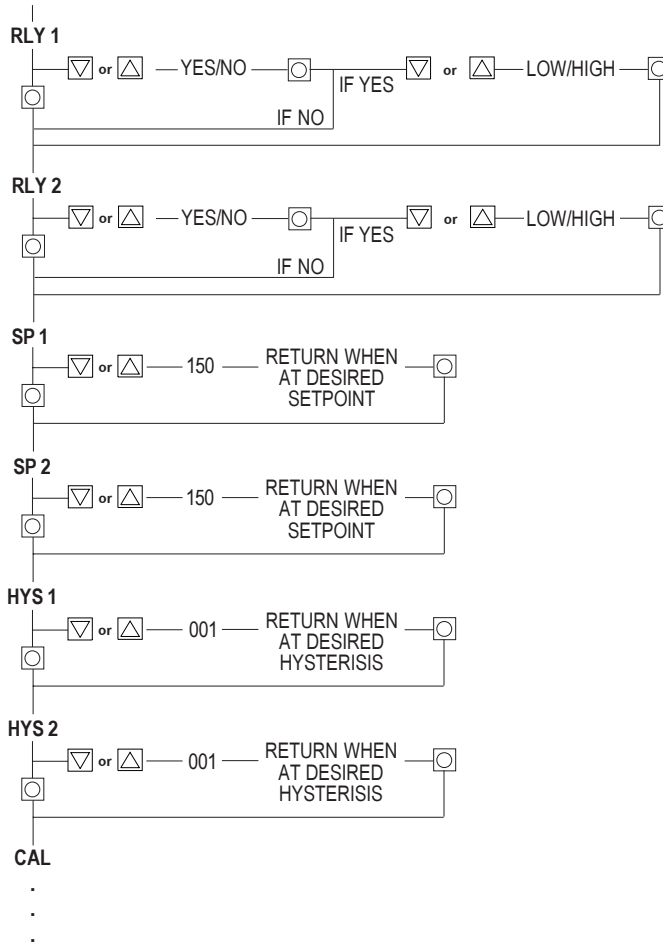


Figure 20

11-1 RELAY MENU

Figure 21

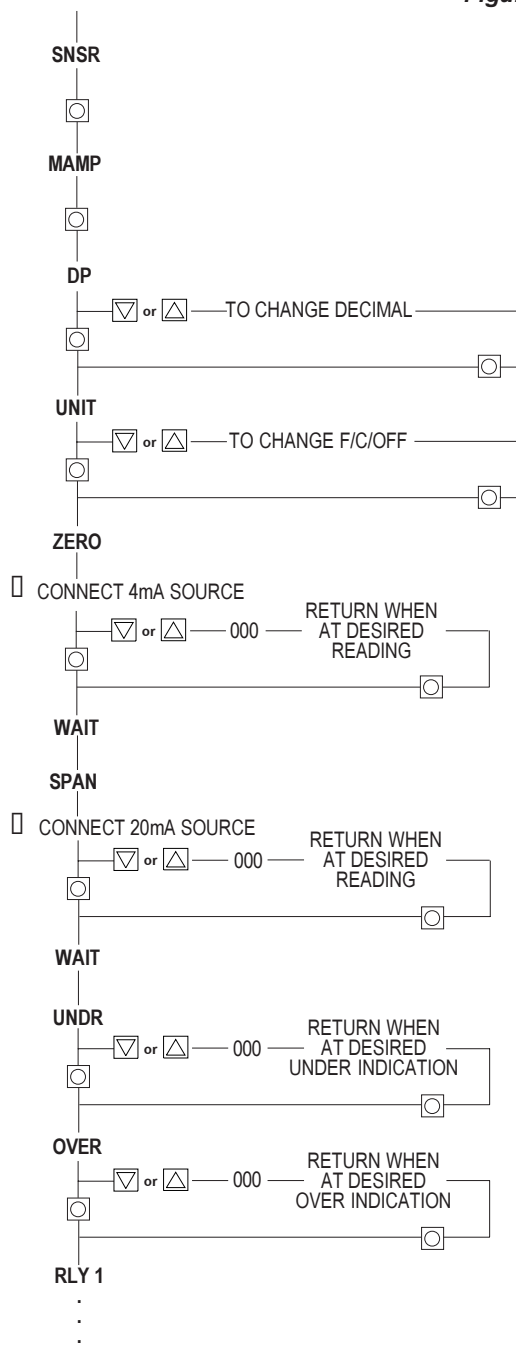


Note 1: Recommend using MOVs on Relay Terminals. Metal-oxide varistors (MOVs) are variable resistors for protecting electronic circuits against AC (alternating-current) voltage transients.

Note 2: They must be operated within their ratings or they will be destroyed.

12-1 4 - 20 mA MENU

Figure 22



13-1 4 - 20mA CALIBRATION PROCEDURES (All steps must be completed)

 = UP  = ENTER  = DOWN

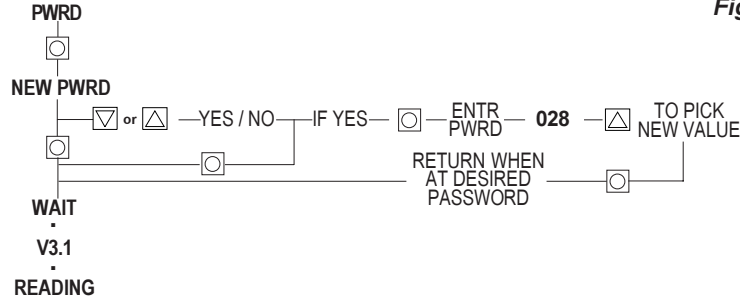
- {Step 1}** Power panel meter for at least 30 minutes.
- {Step 2}** Enter menu program, go to the **SNSR** menu. Press the **ENTER** button. **MAMP** should appear on the display. If not, press the **down** button until **MAMP** is displayed. Press the **ENTER** button.
- {Step 3}** Select proper resolution for the decimal point by pressing the **down** button. When proper resolution has been selected press the **ENTER** button.
- {Step 4}** Select proper scale indication by pressing the **down** button. If **°F** or **°C** is not desired, select **OFF**. Press the **ENTER** button. (Note: If **OFF** was selected, scale indication stickers have been supplied for the front display)
- {Step 5}** Now that **ZERO** appears, press the **down** or **up** button, then select the desired display reading.
- {Step 6}** Once the display reading has been established, connect a 4mA source to the input of the meter. Refer to Figure 16 for proper connections. Press the **ENTER** button. Wait until **SPAN** appears.
- {Step 7}** Now that **SPAN** appears, press the **down** or **up** button, then select the desired display reading.
- {Step 8}** Once the display reading has been established, connect a 20mA source to the input of the meter. Refer to Figure 16 for proper connection. Press the **ENTER** button, **WAIT** until **UNDR** appears.
- {Step 9}** Now that **UNDR** appears, press the **down** or **up** button, then select the desired display reading for the under indication. Press the **ENTER** button.
- {Step 10}** Now that **OVER** appears, press the **down** or **up** button, then select the desired display reading for the over indication. Press the **ENTER** button. Calibration is now complete.

Refer to 4 - 20mA menu on page 12 for the above steps (fig. 22)

14-1 PASSWORD MENU

Described below is the menu for selecting menu passwords.

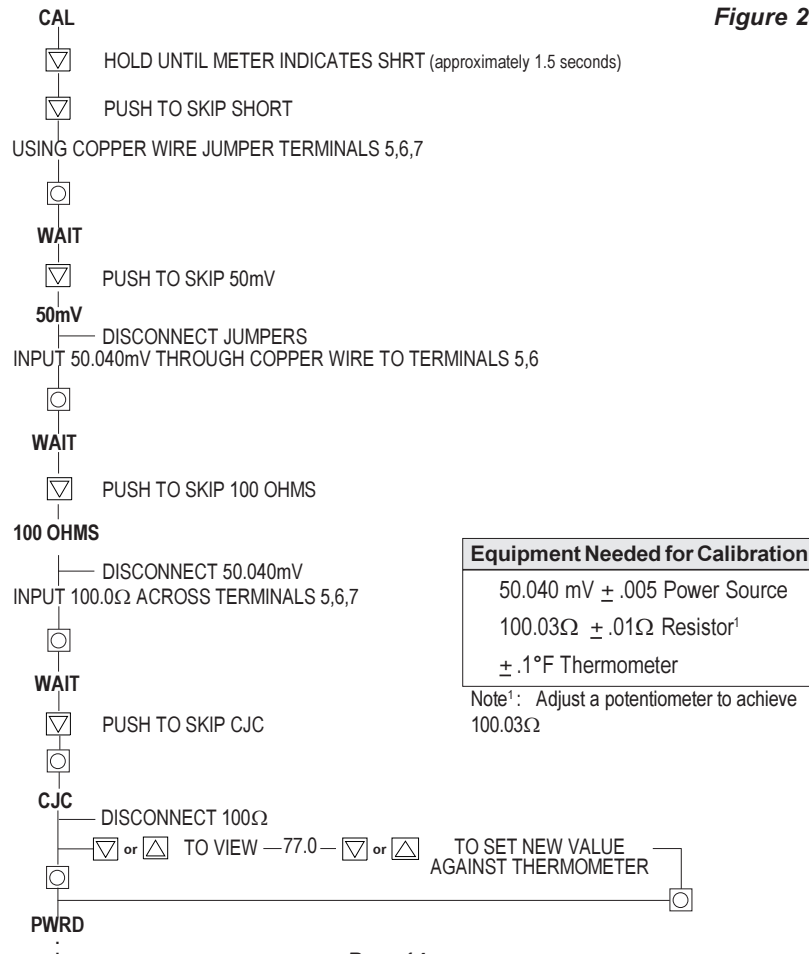
Figure 23



14-2 CALIBRATION MENU

The calibration routine is for thermocouples and RTD's only. Described below is the menu program for calibration. Each calibration can be independently done using the **down arrow** ∇ to scroll to the next routine. Push the **up arrow** \triangle anywhere to exit the calibration routine.

Figure 24



Equipment Needed for Calibration
50.040 mV \pm .005 Power Source
100.03 Ω \pm .01 Ω Resistor ¹
\pm .1 $^{\circ}$ F Thermometer

Note¹: Adjust a potentiometer to achieve 100.03 Ω

15-1 THERMOCOUPLE CALIBRATION PROCEDURE

 = UP  = ENTER  = DOWN

{Step 1} Power panel meter for at least 30 minutes.

{Step 2} Enter menu program, go to the **CAL** mode. Press the **down** button and hold for approximately 1.5 seconds until the meter reads **SHRT**, then release the button. Failure to hold the button for 1.5 seconds will terminate the calibration process.

{Step 3} Install jumpers between terminals 5, 6, and 7 using copper wire. Press and release the **enter** button. Wait until **50mV** appears. Disconnect jumpers.

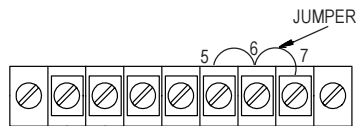


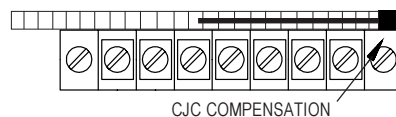
Figure 25

{Step 4} Now that 50mV appears, connect the leads from the 50mV source to the meter using terminals 5 and 6, remembering that terminal 5 is negative. Set the voltage supply for 50.040mV, then press and release the **enter** button. This simulates a thermocouple input. Wait until **100 ohm** appears. Disconnect supply.

{Step 5} Press the **down** button to skip 100 ohm input.

{Step 6} Now that **CJC** appears, place the thermometer across the terminal strip and do not remove until the temperature stabilizes. The reading from the thermometer is going to be the new **CJC** temperature. Press and release the **enter** button. Use the **up** or **down** button to set the value, then press the **enter** button three times until V3.1 appears. Calibration is now complete.

Figure 26



Note: If calibration is off due to the **CJC**, refer to **CJC Calibration** on page 17

16-1 RTD CALIBRATION PROCEDURES

 = UP  = ENTER  = DOWN

{Step 1} Power panel meter for at least 30 minutes.

{Step 2} Enter menu program, go to the **CAL** mode. Press the **down** button and hold for approximately 1.5 seconds until the meter reads **SHRT**, then release the button. Failure to hold the button for 1.5 seconds will terminate the calibration process.

{Step 3} Install jumpers between terminals 5, 6, and 7 using copper wire. Press and release the **enter** button. Wait until **50mV** appears. Disconnect jumpers.

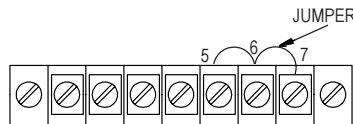


Figure 27

{Step 4} Press the **down** button to skip 50mV input.

{Step 5} Now that 100 ohm appears, install jumper between terminals 6 and 7, and insert the 100Ω resistor into terminals 5 and 6. Then press and release the **enter** button. This simulates a 3 wire RTD. Wait until **CJC** appears. Disconnect jumper and resistor.

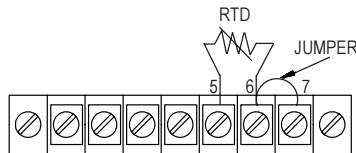


Figure 28

{Step 6} Press the **up** button to save and exit calibration, then press the **enter** button three times until **V3.1** appears. Calibration is now complete.

17-1 CJC CALIBRATION PROCEDURES

 = UP  = ENTER  = DOWN

{Step 1} Power panel meter for at least 30 minutes.

{Step 2} Enter menu program, go to the **CAL** mode. Press the **down** button and hold for approximately 1.5 seconds until the meter reads **SHRT**, then release the button. Failure to hold the button for 1.5 seconds will terminate the calibration process.

{Step 3} Press the **down** button until **CJC** appears.

{Step 4} Now that **CJC** appears, place the thermometer across the terminal strip and do not remove until the temperature stabilizes. The reading from the thermometer is going to be the new **CJC** temperature. Press and release the **enter** button. Use the **up** or **down** button to set the value, then press the **enter** button three times until V3.1 appears. Calibration is now complete.

Figure 29

