SABRE T MODEL PD743
TEMPERATURE METER
Instruction Manual



Sabre Series

- J, K, T, E Thermocouple & 100 Ω Pt RTD
- Pre-Calibrated for All Input Types
- Type 4X, NEMA 4X, IP65 Front
- Shallow Depth Case 3.2" Behind Panel
- 4 Digit Display, 0.56" (14 mm) High, Red LEDs
- Easy Front Panel Programming
- Maximum/Minimum Display
- Universal Power Supply 85-265 VAC
- 12-36 VDC/12-24 VAC Power Option

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INTRODUCTION

The Sabre T model PD743 is an easy-to-use temperature meter. It accepts type J, K, T, E thermocouple and 100 Ω platinum RTD sensors. The four front panel buttons make the setup and programming an easy task.

ORDERING INFORMATION

85-265 VAC* Model	12-36 VDC* Model	Description
PD743-6R0-0	PD743-7R0-0	Temperature Meter
*All models may be powered from AC or DC, see ***Specifications*** for details.		

NEMA 4 & NEMA 4X Enclosures

Model	# of Meters	Description	Mounting
PDA2500	1 - 6	Plastic NEMA 4X Enclosure	Through Door
PDA2600	1 - 6	Stainless Steel NEMA 4X Enclosure	Through Door
PDA2700	1 - 6	Steel NEMA 4 Enclosure	Through Door
PDA2801	1	Plastic NEMA 4X Enclosure	Through Cover

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SPECIFICATIONS

Except where noted all specifications apply to operation at +25°C.

General

DISPLAY	0.56" (14 mm) high, red LED Four digits, automatic lead zero blanking.
DISPLAY UPDATE RATE	RTD: 5/second Thermocouple: 2.5/second
OVERRANGE	Display flashes 9999
UNDERRANGE	Display flashes -1999
PROGRAMMING METHODS	Four front panel buttons
RECALIBRATION	All ranges are calibrated at the factory. Recalibration is recommended at least every 12 months.
MAX/MIN DISPLAY	Max/min readings reached by the process are stored until reset by the user or until power to the meter is turned off.
PASSWORD	Programmable password restricts modification of programmed settings.
NON-VOLATILE MEMORY	All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.
POWER OPTIONS	85-265 VAC, 50/60 Hz; 90-265 VDC, 8 W max or 12-36 VDC, 12-24 VAC, 6 W max
FUSE	Required fuse: UL Recognized, 5 A max, slow blow Up to 6 meters may share one 5 A fuse
NORMAL MODE REJECTION	64 dB at 50/60 Hz
ISOLATION	4 kV input-to-power line
OVERVOLTAGE CATEGORY	Installation Overvoltage Category II: Local level with smaller transient overvoltages than Installation Overvoltage Category III.
ENVIRONMENTAL	Operating temperature range: 0 to 65°C Storage temperature range: -40 to 85°C Relative humidity: 0 to 90% non-condensing
CONNECTIONS	Removable screw terminal blocks accept 12 to 22 AWG wire, RJ11 for factory use only.
ENCLOSURE	1/8 DIN, high impact plastic, UL 94V-0, color: gray
MOUNTING	1/8 DIN panel cutout required. Two panel mounting bracket assemblies provided

TIGHTENING TORQUE	Screw terminal connectors: 5 lb-in (0.56 Nm)
OVERALL DIMENSIONS	2.45" x 4.68" x 3.79" (62 mm x 119 mm x 96 mm) (H x W x D)
WEIGHT	8.5 oz (241 g)
WARRANTY	1 year parts & labor
EXTENDED WARRANTY	1 or 2 years, refer to the Price List for details.

Temperature Inputs

INPUTS	Field selectable: Type J, K, T, or E thermocouples; 100 Ω platinum RTD (0.00385 or 0.00392 curve)
RESOLUTION	1° for all thermocouples and RTD inputs 1° or 0.1° for Type T thermocouple

ACCURACY

Input Type	Range	Accuracy
Type J	-58° to 1382° F -50° to 750°C	±2°F ±1°C
Type K	-58° to 2300° F -50° to 1260°C	±2°F ±1°C
Type T	-292° to 700° F -180° to 371°C	±2°F ±1°C
Type T 0.1° Res	-199.9° to 700.0° F -180.0° to 371.0°C	±1.8°F ±1.0°C
Type E	-58° to 1700° F -50° to 927°C	±2°F ±1°C
100 Ω RTD	-328° to 1382°F -200° to 750°C	±1°F ±1°C

COLD JUNCTION REFERENCE	Automatic, fixed, no user calibration needed
TEMPERATURE DRIFT	±2°C maximum 0 to 65°C ambient temperature
INPUT IMPEDANCE	Greater than 100 kΩ

COMPLIANCE INFORMATION

Safety

UL LISTED	USA and Canada UL 508 Industrial Control Equipment
UL FILE NUMBER	E160849
FRONT PANEL	UL Type 4X, NEMA 4X, IP65; panel gasket provided
LOW VOLTAGE DIRECTIVE	EN 61010-1:2010 Safety requirements for measurement, control, and laboratory use

Electromagnetic Compatibility

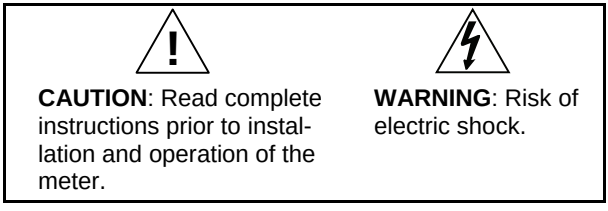
EMISSIONS	EN 55011:2009+A1:2010 Group 1 Class A ISM emissions requirements
Radiated Emissions	Class A
AC Mains Conducted Emissions	Class A
IMMUNITY	EN 61326-1:2013 Measurement, control, and laboratory equipment EN 61000-6-2:2005 EMC heavy industrial generic immunity standard
RFI - Amplitude Modulated	80 -1000 MHz 10 V/m 80% AM (1 kHz) 1.4 - 2.0 GHz 3 V/m 80% AM (1 kHz) 2.0 - 2.7 GHz 1 V/m 80% AM (1 kHz)
Electrical Fast Transients	±2kV AC mains, ±1kV other
Electrostatic Discharge	±4kV contact, ±8kV air
RFI - Conducted	10V, 0.15-80 MHz, 1kHz 80% AM
AC Surge	±2kV Common, ±1kV Differential
Surge	1KV (CM)
Power-Frequency Magnetic Field	30 A/m 70%V for 0.5 period
Voltage Dips	40%V for 5 & 50 periods 70%V for 25 periods
Voltage Interruptions	<5%V for 250 periods

Note:

Testing was conducted on PD743 meters installed through the covers of grounded metal enclosures with cable shields grounded at the point of entry representing installations designed to optimize EMC performance.

Declaration of Conformity available at www.predig.com

SAFETY INFORMATION





WARNING

Hazardous voltages exist within enclosure. Installation and service should be performed only by trained service personnel.

INSTALLATION

There is no need to remove the meter from its case to complete the installation, wiring, and setup of the meter.

Unpacking

Remove the meter from box. Inspect the packaging and contents for damage. Report damages, if any, to the carrier.

If any part is missing or the meter malfunctions, please contact your supplier or the factory for assistance.

Panel Mounting

- Prepare a standard 1/8 DIN panel cutout – 3.622" x 1.772" (92 mm x 45 mm). Refer to *Mounting Dimensions*, page 28 for more details.
- Clearance: allow at least 4" (102 mm) behind the panel for wiring.
- Panel thickness: 0.04" - 0.25" (1.0 mm - 6.4 mm). Recommended minimum panel thickness to maintain Type 4X rating: 0.06" (1.5 mm) steel panel, 0.16" (4.1 mm) plastic panel.
- Remove the two mounting brackets provided with the meter (back-off the two screws so that there is ¼" (6.4 mm) or less through the bracket. Slide the bracket toward the front of the case and remove).
- Insert meter into the panel cutout.
- Install mounting brackets and tighten the screws against the panel. To achieve a proper seal, tighten the mounting bracket screws evenly until meter is snug to the panel along its short side. DO NOT OVER TIGHTEN, as the rear of the panel may be damaged.

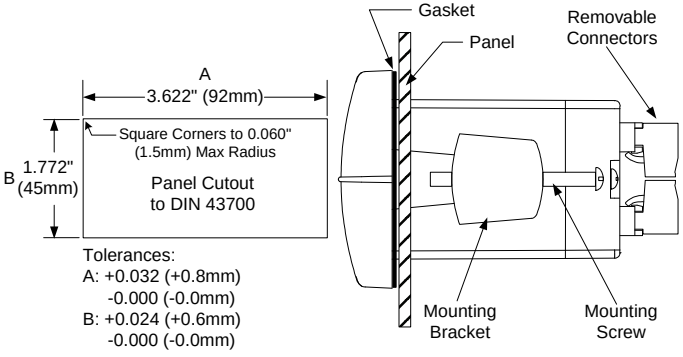


Figure 1. Panel Cutout and Mounting

Connections

All connections are made to removable screw terminal connectors located at the rear of the meter.

> Use copper wire with 60°C or 60/75°C insulation for all line voltage connections. Observe all safety regulations. Electrical wiring should be performed in accordance with all applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.

Connector Labeling

The connectors label, affixed to the meter, shows the location of the connectors. It also identifies the location of the RTD/TC selector switch.

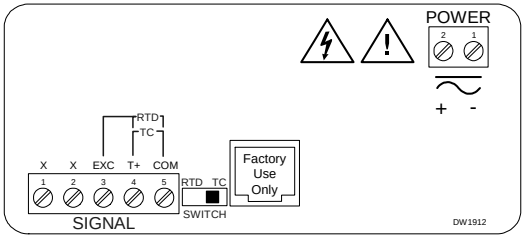


Figure 2. Connector Labeling

Power Connections

Power connections are made to a two-terminal connector labeled POWER on Figure 2. The meter will operate regardless of DC polarity connection. The + and - symbols are only a suggested wiring convention.

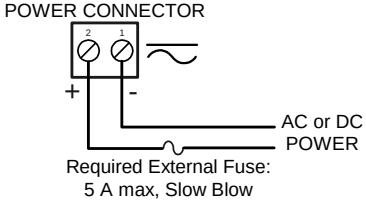


Figure 3. Power Connections

Signal Connections

Signal connections are made to a five-terminal connector labeled SIGNAL on Figure 2. The COM (common) terminal is the return for all types of input signals.

Thermocouple and RTD Connections

The following figures show examples for thermocouple and RTD connections.

The RTD/TC selector switch must be set to the proper position for the meter to accept the selected temperature input.

The input type is selected using the *Setup* menu.

The selected thermocouple input must correspond to thermocouple sensor and wire type used.

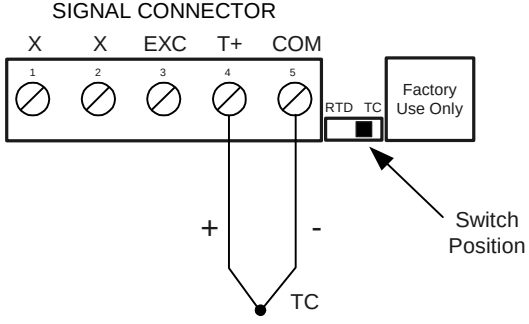


Figure 4. Thermocouple Input Connections

X = No connection

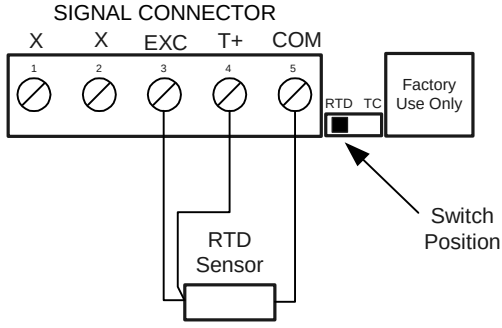


Figure 5. Three-Wire RTD Input Connections

The meter accepts two, three, or four-wire RTDs. The three-wire RTD connection has built-in lead wire compensation.

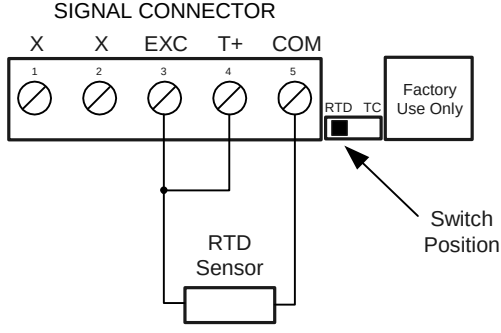


Figure 6. Two-Wire RTD Input Connections

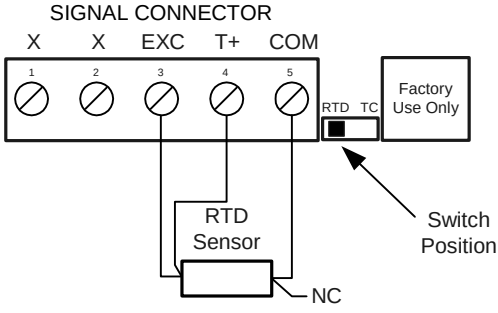


Figure 7. Four-Wire RTD Input Connections

The four-wire RTD connection is similar to the three-wire. One of the leads of a four-wire RTD is not connected, and may be clipped off.

The three-wire connection provides sufficient lead wire compensation to provide accurate readings even with long leads.

SETUP AND PROGRAMMING

- There is **no need to recalibrate** the meter when first received from the factory.
- The meter is ***factory calibrated*** prior to shipment, for all input types, in degrees Fahrenheit. The calibration equipment is certified to NIST standards.

Overview

There are no jumpers involved in the setup process of the meter. The RTD/TC selector switch, located between the SIGNAL and RJ11 connectors, must be set accordingly for the meter to accept RTD or thermocouple inputs, Figure 2.

Setup and programming is done through the front panel buttons.

After power and signal connections have been completed and verified, apply power to the meter.

For
Quick User Interface Reference Guide
go to page 30

Front Panel Buttons and Status LED Indicators



Button Symbol	Description
	**Menu**
	**Right arrow/Reset**
	**Up arrow/Max**
	**Enter/Ack**

- Press the **Menu** button to enter or exit the Programming Mode at any time.
- Press the **Right** arrow button to move to the next digit during digit programming.
- Press the **Up** arrow button to scroll through the menus, decimal point, or to increment the value of a digit.
- Press the **Enter/Ack** button to access a menu or to accept a setting.

Display Functions and Messages

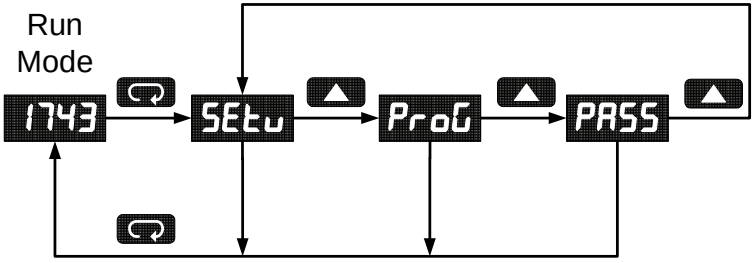
The meter displays various functions and messages during setup/programming and operation. The following table shows the displayed functions and messages with their action/setting description.

Display	Parameter	Action/Setting
SEtu	*Setup*	Enter *Setup* menu
inPt	*Input*	Enter *Input* menu
rtd	*RTD*	Set meter for RTD input
A385	*Alpha 385*	Set α = 0.00385 European curve 100Ω RTD
A392	*Alpha 392*	Set α = 0.00392 American curve 100Ω RTD
tC	*TC*	Set meter for TC input
0 J	*0 J*	Type J
1 K	*1 K*	Type K
2 t	*2 T*	Type T
3 t.0	*3 T.0*	Type T, 0.1° resolution
4 E	*4 E*	Type E
F C	*°F or °C*	Set temperature scale
°F	*°F*	Set meter to Fahrenheit
°C	*°C*	Set meter to Celsius
Prog	*Program*	Enter the *Program* menu
CAL	*Calibrate*	Enter the *Calibrate* menu
inP1	*Input 1*	Calibrate input 1 signal
dis1	*Display 1*	Program display 1 value
inP2	*Input 2*	Calibrate input 2 signal
dis2	*Display 2*	Program display 2 value
Err	*Error*	Error, calibration not successful, check signal
PASS	*Password*	Enter the *Password* menu
unLC	*Unlocked*	Program password to lock meter
LoCd	*Locked*	Enter password to unlock meter
9999 -1999 oPEn	*Flashing display*	Overrange condition Underrange condition Open TC or RTD sensor

Main Menu

The main menu consists of the following functions: *Setup*, *Program*, and *Password*.

- Press **Menu** button to enter Programming Mode then press **Up** arrow button to scroll main menu.



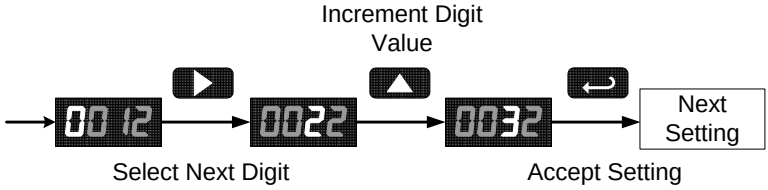
- Press **Menu**, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing **Enter/Ack** are not saved.
- Changes to the settings are saved to memory only after pressing **Enter/Ack**.
- The display moves to the next menu every time a setting is accepted by pressing **Enter/Ack**.

Setting Numeric Values

The numeric values are set using the **Right** and **Up** arrow buttons. Press **Right** arrow to select next digit and **Up** arrow to increment digit value.

The digit being changed is displayed brighter than the rest.

Press the **Enter/Ack** button, at any time, to accept a setting or **Menu** button to exit without saving changes.

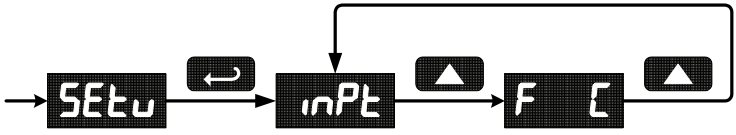


Setting Up the Meter (SEtu)

The *Setup* menu is used to select:

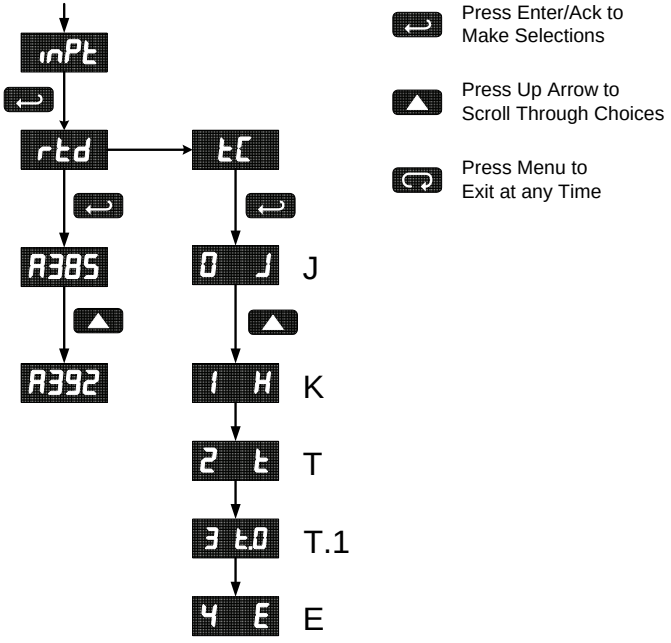
1. Input signal the meter will accept
2. Units (°F or °C) for temperature inputs

Press the **Enter/Ack** button to access any menu or press **Up** arrow button to scroll through choices. Press the **Menu** button to exit at any time.



Setting the Input Signal (inPt)

Enter the *Input* menu to set up the meter to display thermocouple (tC) or RTD (rtd) inputs.



If RTD is selected, the display shows **A385** or **A392**. Select the coefficient to match the RTD sensor, either 0.00385 (European curve) or 0.00392 (American curve).

If TC is selected, scroll through the thermocouple types and select the type matching the TC sensor.

The input signal must be connected to the appropriate input terminals and the RTD/TC selector switch must be set accordingly, see Figure 4 on page 11.

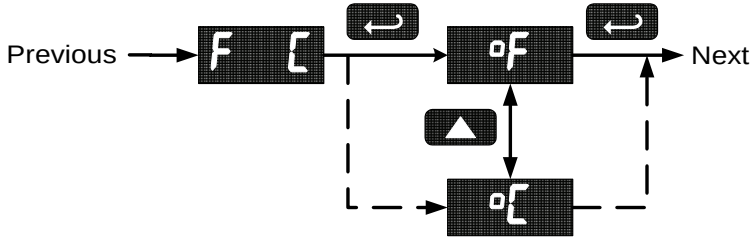
For thermocouple inputs, allow at least 30 minutes warm-up time for meter to reach specified accuracy.

Setting the Temperature Scale (F C)

The meter can be set to display temperature in degrees Fahrenheit or Celsius.

Press **Up** arrow to change selection.

Press **Enter/Ack** to accept.



Programming the Meter (PrOG)

It is **very important** to read the following information, before proceeding to program the meter:

- There is **no need to recalibrate** the meter when first received from the factory.
- The meter is ***factory calibrated*** prior to shipment, for all input types, in degrees Fahrenheit. The calibration equipment is certified to NIST standards.

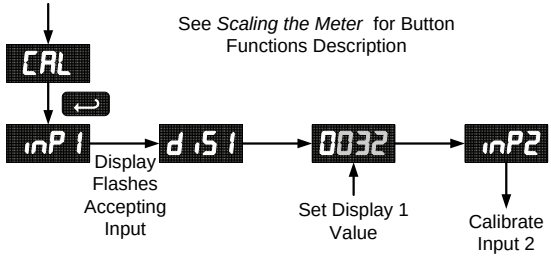
The *Program* menu contains the *Calibrate* menu.



Recalibrating Temperature Inputs (CAL)

Remember, the meter is **calibrated** at the factory prior to shipment. Re-calibration is recommended at least every twelve months.

The *Calibration* (CAL) menu is used to **recalibrate** the thermocouple and RTD inputs.



Allow at least 30 minutes warm-up time before performing recalibration procedure to ensure specified accuracy.

Error Message (Err)

An error message indicates that the calibration process was not successful.

After the error message is displayed, the meter reverts to input 1, allowing the appropriate input signals to be applied.

The error message might be caused by any of the following conditions:

1. Input signal is not connected to the proper terminals or it is connected backwards.
2. Wrong signal selection in *Setup* menu.
3. Minimum input span requirements not maintained.
4. Input 1 signal inadvertently applied to calibrate input 2.

Minimum Input Span

The minimum input span is the minimum difference between input 1 and input 2 signals required to complete the calibration of the meter.

Input range	Input 1 & input 2 span
TC	100°F (56°C)
RTD	50°F (28°C)

Recommended Calibration Points

To recalibrate the meter, it is recommended to use the Fahrenheit scale; this will give a greater degree of accuracy to the calibration. The scale can be changed to the Celsius scale after calibration is completed. The meter will display temperature accurately in any scale. The following table shows the recommended low and high calibration points for all types.

Type of input	Input 1 (Low)	Input 2 (High)	Check (Middle)
Type J T/C	32°F	1182°F	600°F
Type K T/C	32°F	1893°F	960°F
Type T T/C	32°F	693°F	360°F
Type T T/C	32.0°F	693.0°F	360.0°F
Type E T/C	32°F	1652°F	840°F
100 Ω RTD (0.00385)	32°F 100Ω	1148°F 320.12Ω	590°F 215.61Ω
100 Ω RTD (0.00392)	32°F 100Ω	1127°F 320.89Ω	580°F 215.87Ω

Recalibration Procedure for Temperature Inputs

1. Connect signal to the meter using the appropriate wire (e.g. type J thermocouple wire to recalibrate type J input), see page 11.
2. Set up the meter to accept the selected input (e.g. type J T/C), see page 19.
3. Set up the meter to display temperature in degrees Fahrenheit, see page 20.
4. Apply signal corresponding to input 1 (e.g. 32°F) and program display 1 to read 32.
5. Apply signal corresponding to input 2 (e.g. 1182°F for type J) and program display 2 accordingly.
6. After the meter accepts input 2, the display flashes the message CJr, indicating that the meter is sensing the cold junction reference. This completes the recalibration procedure for the selected input.

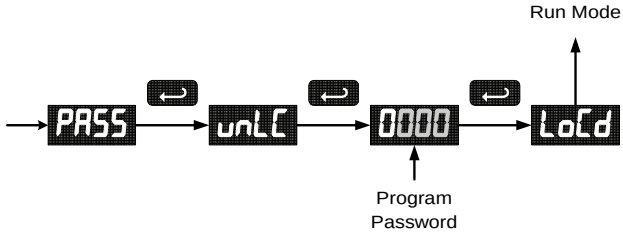
Setting Up the Password (PASS)

The *Password* menu is used to program a four-digit password to prevent unauthorized changes to the programmed parameter settings.

Locking the Meter

Enter the *Password* menu and program a four-digit password.

For instructions on how to program numeric values see *Setting Numeric Values*, page 18.

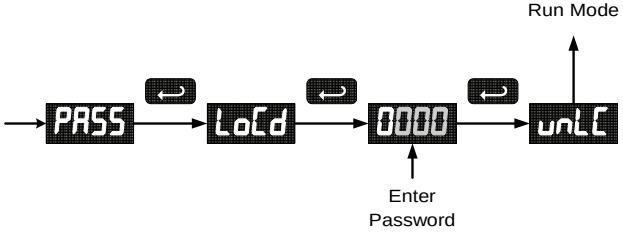


Record the password for future reference. If appropriate, it may be recorded in the space provided.

Model:	
Serial Number:	
Password:	__ __ __ __

Unlocking the Meter

If the meter is password protected, the correct password must be entered in order to make changes to the parameter settings.



Entering the correct four-digit number sets the password to 0000, disabling the protection.

Changes to the programmed parameter settings are allowed only with the password set to 0000.

If the password entered is incorrect, the meter displays LoCd (Locked) for about two seconds, then it returns to Run Mode. To try again, press **Enter/Ack** while the *Locked* message is displayed.

Forgot the Password?

The password may be disabled by the following procedure:

1. Note display reading prior to pressing the Menu button. Ignore decimal point and sign.
2. Access the *Password* menu, add 2 to the noted reading and enter that number as the password (e.g. display reading = -1.23, password = 0125).

OPERATION

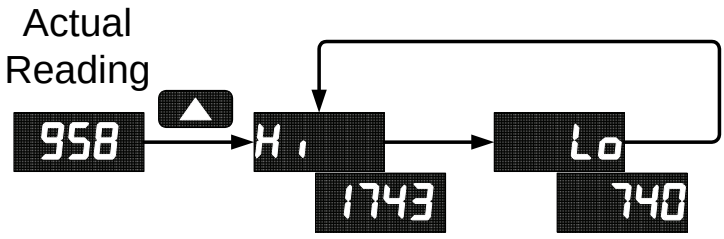
The temperature inputs are displayed according to the input type and temperature units (°F or °C) selected. Type T thermocouples can be displayed with either 1° or 0.1° resolution.

Front Panel Buttons Operation

Button Symbol	Description
	Press to enter or exit Programming Mode, view settings, or exit Max/Min readings
	Press to reset Max/Min readings
	Press to display Max/Min readings alternately
	Press to display Max/Min reading indefinitely while displaying Max/Min

Maximum/Minimum Readings

The main function of the front panel buttons during operation is to display the maximum and minimum readings reached by the process.



Press **Up** to Display and Toggle Max/Min

Press **Enter** to Hold Max/Min

Press **Right** to Reset Max/Min

Press **Menu** to Exit Max/Min

1. Press **Up** arrow/**Max** button to display maximum reading since the last reset/power-up.
2. Press **Up** arrow/**Max** again to display the minimum reading since the last reset/power-up.
3. Press **Enter/Ack** to hold Max/Min display reading, the meter will continue to track new Max/Min readings.
4. If **Enter/Ack** is not pressed, the Max/Min display reading will time out after ten seconds and the meter will return to display the actual reading.
5. Press **Right** arrow/**Reset** button to reset Max/Min while reading is being displayed. Max/Min display readings are reset to actual reading.

MOUNTING DIMENSIONS

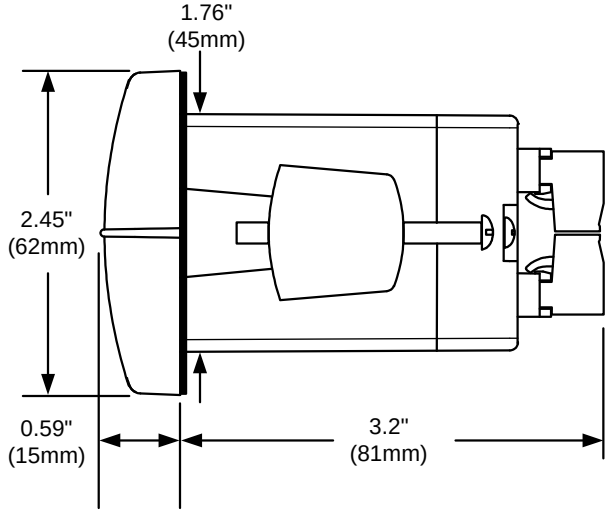


Figure 8. Meter Dimensions - Side View

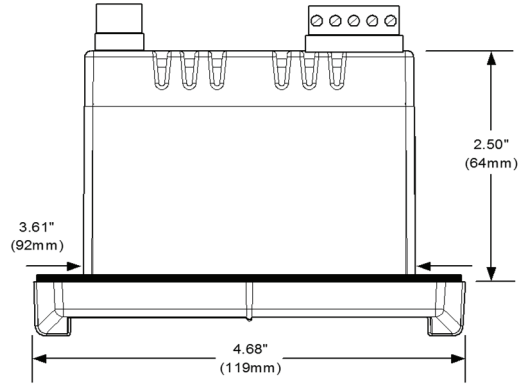


Figure 9. Case Dimensions - Top View

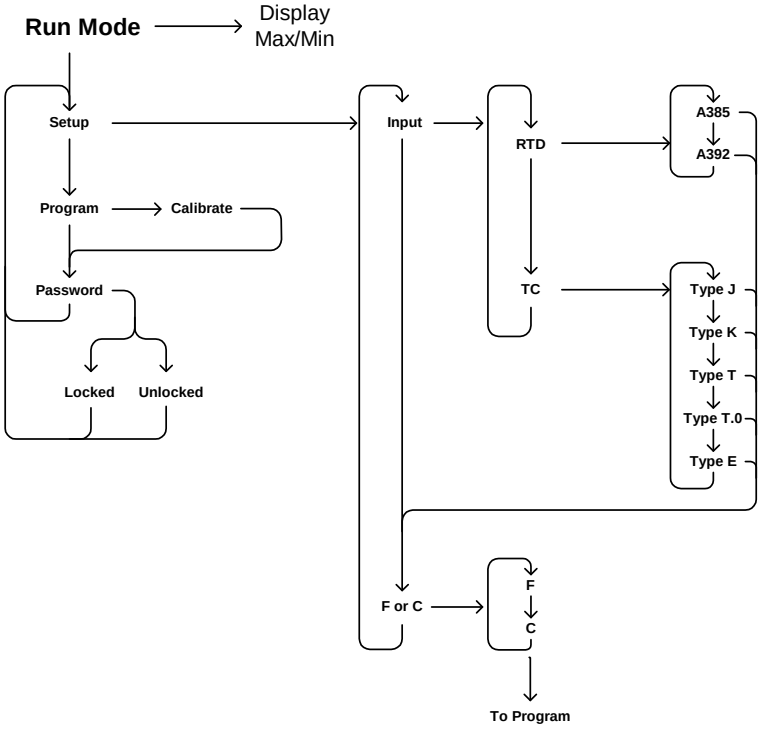
TROUBLESHOOTING

The rugged design and the user-friendly interface of the meter should make it unusual for the installer or operator to refer to this section of the manual.

Troubleshooting Tips

Symptom	Check/Action
No display at all	Check power at power connector
Not able to change setup or programming, LoCd is displayed	Meter is locked, enter correct four-digit password to unlock
Meter displays error message during calibration (Err)	Check: 1. Signal connections 2. Input selected in *Setup* menu 3. Minimum input span requirements
Meter displays • oPEn • 9999 • -1999 • Displays negative number, not responding to RTD.	Check: 1. Input selected in *Setup* menu 2. TC/RTD Switch position 3. Corresponding signal at Signal connector
Display alternates between 1. Hi and a number 2. Lo and a number	Press **Menu** to exit Max/Min display readings.
Inaccurate temperature reading	Check: 1. Temperature units (°F or °C) 2. TC type or RTD curve selected 3. Type of TC wire used 4. Calibration
If the display locks up or the meter does not respond at all	Cycle the power to restart the microprocessor.
Other symptoms not described above	Call Technical Support for assistance.

QUICK USER INTERFACE REFERENCE GUIDE



EU DECLARATION OF CONFORMITY

Issued in accordance with ISO/IEC 17050-1:2004.

We,

Precision Digital Corporation
233 South Street
Hopkinton, MA 01748 USA

as the manufacturer, declare under our sole responsibility that the product(s),

Model PD743 Sabre Temperature Meter

to which this declaration relates, is in conformity with the European Union Directives shown below:

2014/35/EU	**Low Voltage Directive**
2014/30/EU	**EMC Directive**
2011/65/EU	**RoHS Directive**

This conformity is based on compliance with the application of harmonized or applicable technical standards and, when applicable or required, a European Union notified body certification.

Standards:

EN 55011:1998
EN 61000-6-2:2001
EN 61010-1:1995
EN 61326:2006

The standards EN 55011:1998, EN 61000-6-2:2001, EN 61010-1:1995, and EN 61326:2006 are no longer harmonized. The requirements of these standards have been checked against the harmonized standards EN 55011:2009+A1:2010, EN 61000-6-2:2005, EN 61010-1:2010, and EN 61326:2013 and there were no major technical changes affecting the latest technical knowledge for the products listed above.

Product Markings: CE

Signed for and on behalf of Precision Digital Corporation:

Name: Jeffrey Peters
Company: Precision Digital Corporation
Title: President
Date: 04/20/2016

Document No: DoC PD743 {042016}

How to Contact Precision Digital

- For Technical Support please
  Call: (800) 610-5239 or (508) 655-7300
  Fax: (508) 655-8990
  Email: support@predig.com
- For Sales Support or to place an order please
  Call: (800) 343-1001 or (508) 655-7300
  Fax: (508) 655-8990
  Email: sales@predig.com
- For Calibration information visit
  www.predig.com
- For the latest version of this manual please visit
  www.predig.com