

# PD662

## LOOP-POWERED METER



- 4-20 mA Input Loop-Powered
- -1999 to 2999 Display
- Easy Four-Button Programming
- NEMA 4X Enclosure
- Programmable Noise Filter
- Loop-Powered Backlight Option
- 1.7 Volt Drop without Backlight
- HART Protocol Transparent
- Operates from -40 to 85°C (-55 to 85°C with Heater Option)

**PRECISION DIGITAL CORPORATION**  
89 October Hill Road • Holliston MA 01746 USA  
Tel (800) 343-1001 • Fax (508) 655-8990

**PRECISION  
DIGITAL** 

[www.predig.com](http://www.predig.com)

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**CAUTION:** Read complete instructions prior to installation and operation of the meter.



**WARNING:** Risk of electric shock or personal injury.



## Warning

This product is not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using this product for such applications does so at his/her own risk. Precision Digital Corporation shall not be held liable for damages resulting from such improper use.

## Limited Warranty

Precision Digital Corporation warrants this product against defects in material or workmanship for the specified period under "Specifications" from the date of shipment from the factory. Precision Digital's liability under this limited warranty shall not exceed the purchase value, repair, or replacement of the defective unit.

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## INTRODUCTION

The PD662 NEMA 4X loop-powered meter is perfect for applications where a simple, inexpensive display is required and AC power is not available. The PD662 derives all its power from the 4-20 mA loop. The PD662 is scaled using four push buttons and can be done without applying an actual calibration signal. The PD662's display will read up to 2999; we call this 3½+ digits! The loop-powered backlighting option lets you see the display under any lighting condition and is powered completely from the 4-20 mA loop. This means there is no need for additional wiring and never any batteries to change.

The PD662 is housed in a rugged NEMA 4X enclosure and is provided with one ½" NPT pipe conduit hole. The PD662 is also available with an optional DC-powered heater that allows the PD662 to operate in temperatures as low as -55°C.

## ORDERING INFORMATION

Model	Description
PD662-0L0-00*	NEMA 4X Loop-Powered Meter
PD662-0K0-00	NEMA 4X Loop-Powered Meter with Backlight
PD662-0L0-A0	NEMA 4X Loop-Powered Meter with Heater
PD662-0K0-A0	NEMA 4X Loop-Powered Meter with Backlight & Heater

\* Quick Shipment Program product, typically shipped within 2 working days

## Accessories

Model	Description
PDA6624	Panel Mounting Kit
PDA6845	2" Pipe Mounting Kit

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## SPECIFICATIONS

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

### General

<b>DISPLAY</b>	0.6" (15.24 mm) LCD, 3½+ digits; -1999 to 2999
<b>DISPLAY UPDATE RATE</b>	2 Updates/Second
<b>OVERRANGE</b>	Display flashes <b>2999</b>
<b>UNDERRANGE</b>	Display flashes <b>-1999</b>
<b>PROGRAMMING METHOD</b>	Four internal pushbuttons
<b>NOISE FILTER</b>	Programmable <b>H I, LO,</b> or <b>OFF</b>
<b>RECALIBRATION</b>	Recalibration is recommended at least every 12 months.
<b>MAX/MIN DISPLAY</b>	Max/Min readings reached by the process are stored until reset by the user or until power to the meter is turned off.
<b>NON-VOLATILE MEMORY</b>	All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.
<b>NORMAL MODE REJECTION</b>	64 dB at 50/60 Hz
<b>ENVIRONMENTAL</b>	Operating temperature range: -40 to 85°C Storage temperature range: -40 to 85°C Relative humidity: 0 to 90% non-condensing
<b>CONNECTIONS</b>	Removable screw terminals accept 12 to 22 AWG wire
<b>ENCLOSURE</b>	Impact resistant polyester plastic, body gray, cover clear with blue faceplate; NEMA 4X, IP66; ½" conduit hole provided at base.
<b>MOUNTING</b>	½" NPT pipe (0.865 in, 12.7 mm) conduit hole on bottom of enclosure. 0.166 in (4.2 mm) wall mounting holes located behind front cover screws.
<b>TIGHTENING TORQUE</b>	Screw terminal connectors: 4.5 lb-in (0.5 Nm)
<b>OVERALL DIMENSIONS</b>	4.33" x 3.15" x 2.76" (110 mm x 80 mm x 70 mm) (W x H x D)
<b>WEIGHT</b>	10.4 oz (295 g)
<b>WARRANTY</b>	3 years parts and labor
<b>EXTENDED WARRANTY</b>	1 or 2 years, refer to Price List for details

## Input

<b>ACCURACY</b>	±1 count	
<b>TEMPERATURE DRIFT</b>	50 PPM/°C from -40 to 85°C ambient	
<b>DECIMAL POINT</b>	User selectable decimal point	
<b>MINIMUM SPAN</b>	Input 1 & Input 2: 0.40 mA	
<b>CALIBRATION RANGE</b>	An <i>Error</i> message will appear if input 1 and input 2 signals are too close together.	
	<b>Input Range</b>	<b>Minimum Span Input 1 &amp; Input 2</b>
	4-20 mA	0.40 mA
<b>MAXIMUM VOLTAGE DROP</b>	<b>Without Backlight</b>	<b>With Backlight</b>
	1.7 VDC @ 20 mA	3.7 VDC @ 20 mA
<b>EQUIVALENT RESISTANCE</b>	85 Ω @ 20 mA	245 Ω @ 20 mA
<b>INPUT OVERLOAD</b>	Over current protection to 2 A max.	

## Heater

<b>POWER</b>	24 VDC, 11 W max.
<b>RECOMMENDED FUSE</b>	UL recognized , 1 A slow blow fuse
<b>OPERATION METHOD</b>	On/Off control with an internal temperature sensor. Heater is on only when necessary due to external temperatures.
<b>TEMPERATURE CUTOFF</b>	Internal 104°C thermal cutoff for over temperature protection.
<b>ENVIRONMENTAL (with Heater)</b>	Operating temperature range: -55 to 85°C Storage temperature range: -40 to 85°C Relative humidity: 0 to 90% non-condensing

## SAFETY INFORMATION



**CAUTION:** Read complete instructions prior to installation and operation of the meter.

Installation and service should be performed only by trained service personnel.

## INSTALLATION

All pushbuttons and wiring connectors are accessed by opening the NEMA 4X enclosure by removing the 4 captive screws that secure the cover.

### 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.

### Mounting

The PD662 can be wall mounted using the mounting holes beneath the cover screws. A ½" NPT pipe conduit hole is provided. It can be panel mounted with the addition of the PDA6624 panel mount kit. It can also be pipe mounted by using the PDA6845 pipe mount kit.

Refer to *Mounting Dimensions*, page 27 for details on wall or panel space requirements.

## PD662 Connections

To access the connectors, remove the enclosure cover and unscrew the two captive stainless steel screws on the rear mounting board. Remove the meter assembly from the enclosure. Signal connections are made to a three-terminal removable connector. The signal wiring terminal block is on the rear of the meter assembly.

- S+** 4-20 mA signal input positive terminal connection
- S-** 4-20 mA signal return/negative terminal connection
- X** Not connected (no backlight option)
- B-** 4-20 mA signal return/negative terminal when using the installed loop powered backlight option

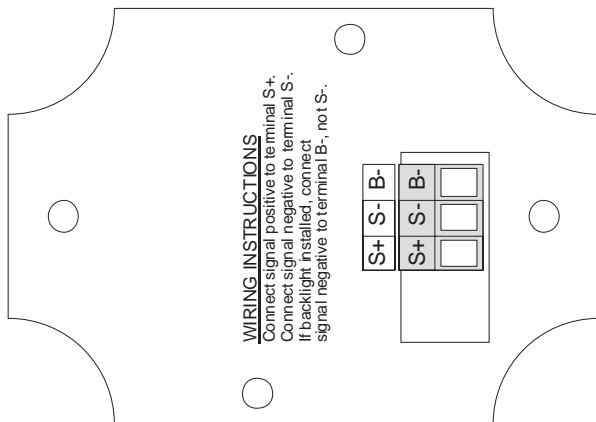
Refer to Figure 1 for terminal positions on the rear of the mounting board inside the meter enclosure.

Meters with the heater option will also have a two terminal removable connector on the rear of the assembly. See Figure 4 for wiring details.

- P+** 24 VDC power positive terminal connection
- P-** 24 VDC power negative terminal connection



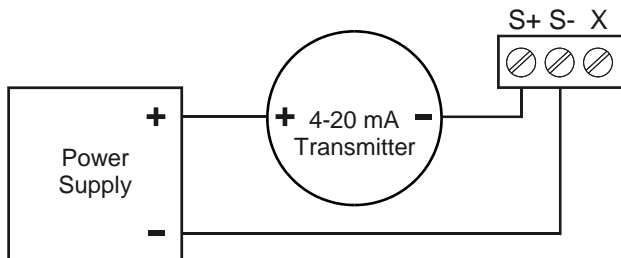
Observe all safety regulations. Electrical wiring should be performed in accordance with all agency requirements and applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.



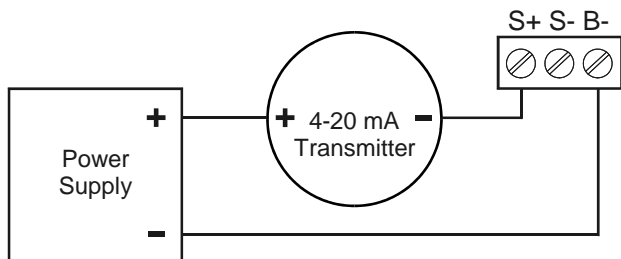
**Figure 1. PD662 Mounting Board Rear View**

## Connection & Wiring Diagrams

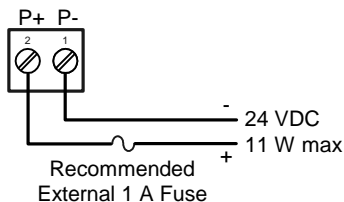
Signal input connections are made to a three-terminal connector labeled S+|S-|X for models without a backlight and S+|S-|B- for models with a backlight. The 4-20 mA input with no backlight has a maximum voltage drop of 1.7 V and is wired as shown in Figure 2. The loop-powered backlight configuration requires a total maximum voltage drop of 3.7 V. The backlight is recommended for dim lighting conditions and is enabled when wired as shown in Figure 3.



**Figure 2. PD662 Input Connections without Backlight**



**Figure 3. PD662 Input Connections with Backlight**



**Figure 4. PD662 Heater Power Connections**

## SETUP AND PROGRAMMING

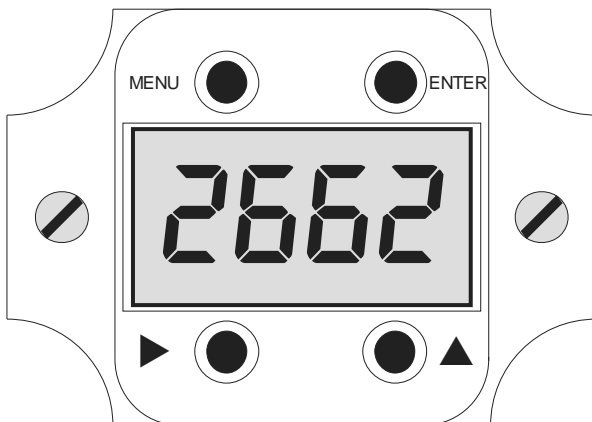
- There is **no need to recalibrate** the meter for milliamps when first received from the factory.
- The meter is **factory calibrated** for milliamps prior to shipment. The calibration equipment is certified to NIST standards.

### Overview

There are no jumpers involved in the setup process of the meter. Setup and programming is done through the front panel buttons. After all connections have been completed and verified, apply power to the loop.

For  
**Quick User Interface Reference Guide**  
go to page 30

## Front Panel Buttons



Button/ Symbol	Description
<b>MENU</b>	Menu button to enter programming mode. Press and hold for 5 seconds to access the <i>Advanced</i> features of the meter.
<b>ENTER</b>	Enter button to access a menu or accept a setting.
▶	Right arrow to scroll through the menus or move to the next digit or decimal position during programming. Displays the Max then Min display values when pressed during normal run mode.
▲	Up arrow to scroll through the menus, decimal point, or to increment the value of a digit. Resets the Max and Min display value when pressed during normal run mode.

## Main Menu Display Functions & Messages

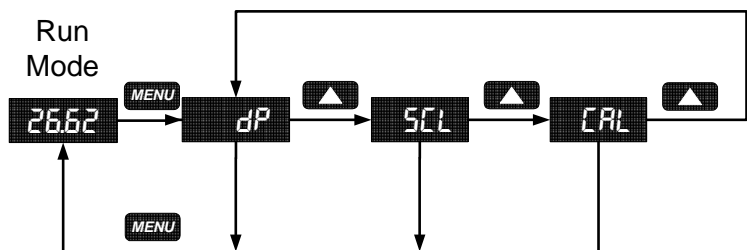
The meter displays various functions and messages during setup, programming, and operation. The following table shows the main menu functions and messages in the order they appear in the menu.

Display	Parameter	Action/Setting
dP	<i>Decimal point</i>	Set decimal point
5[L	<i>Scale</i>	Enter the <i>Scale</i> menu
n 1	<i>Scale Input 1</i>	Input signal 1 value (mA)
d 1	<i>Scale Display 1</i>	Scaled value for input 1
n 2	<i>Scale Input 2</i>	Input signal 2 value (mA)
d 2	<i>Scale Display 2</i>	Scaled value for input 2
[RL	<i>Calibrate</i>	Enter the <i>Calibrate</i> menu
n 1	<i>Calibrate Input 1</i>	Read input signal 1
d 1	<i>Calibrate Display 1</i>	Enter value for input 1
n 2	<i>Calibrate Input 2</i>	Read input signal 2
d 2	<i>Calibrate Display 2</i>	Enter value for input 2

## Main Menu

The main menu consists of the most commonly used functions: *Decimal Point Location*, *Scale*, and *Calibration*.

- Press **Menu** button to enter Programming Mode then press the **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** are not saved.
- Changes to the settings are saved to memory only after pressing **Enter**.
- The display moves to the next menu every time a setting is accepted by pressing **Enter**.

## 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. The two left-most digits on the display are set as a single digit, able to display -19 to 29.

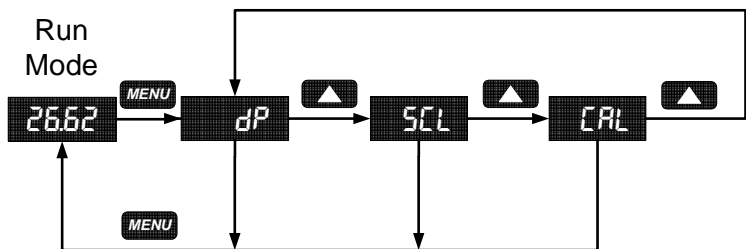
The digit being changed blinks.

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

The decimal point is set using the **Right** or **Up** arrow button in the *Setup-decimal point* menu.

## Setting Up the Meter

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



## Programming the Meter

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

- There is **no need to recalibrate** the meter for milliamps when first received from the factory.
- The meter is **factory calibrated** for milliamps prior to shipment. The calibration equipment is certified to NIST standards.
- Use the *Scale (SCL)* menu to enter scale parameters without applying a live signal.
- Alternatively, use the *Calibrate (CAL)* menu to apply a signal from a calibrator or a 4-20 mA transmitter to calibrate the meter.

Inputs may be calibrated or scaled to any display within the range of the meter.

Additional parameters, not needed for most applications, are viewed and programmed with the *Advanced* features menu, see *Advanced Features Menu*, page 20.

### Minimum Input Span

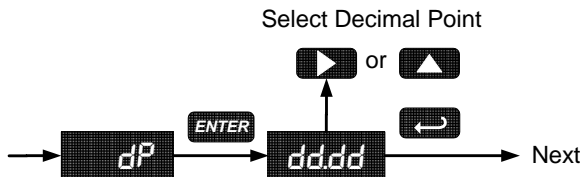
The minimum input span is the minimum difference between input 1 and input 2 signals required to complete the calibration or scaling of the meter. The minimum span is 0.40 mA.

If the minimum span is not maintained, the meter reverts to input 2, allowing the appropriate input signals to be applied.

## Setting the Decimal Point (dP)

Decimal point may be set with up to three decimal places or with no decimal point at all.

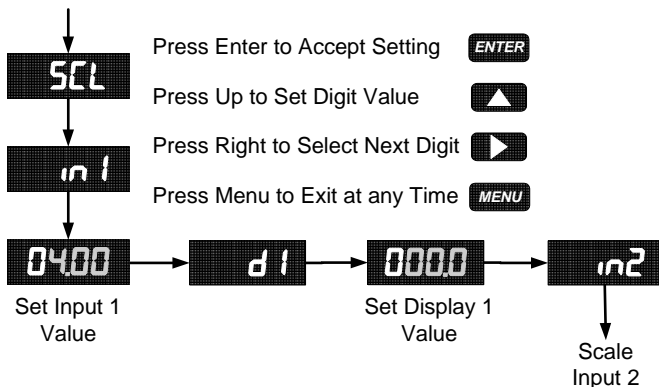
Pressing the **Right** or **Up** arrow moves the decimal point one place to the right until no decimal point is displayed, then it moves to the left most position.



## Scaling the Meter (SCL)

The 4-20 mA input can be scaled to display the process in engineering units.

A signal source is not needed to scale the meter; simply program the inputs and corresponding display values.



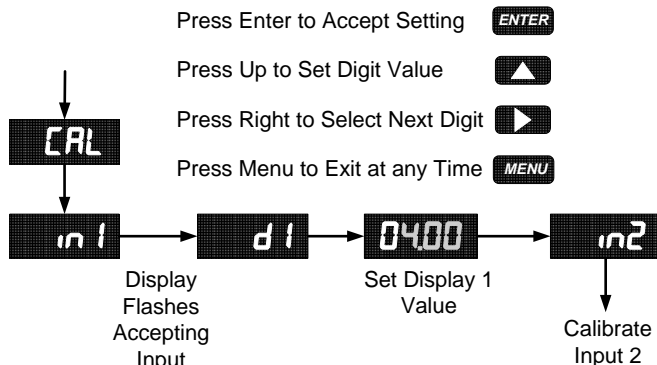
For instructions on how to program numeric values see *Setting Numeric Values*, page 15.

## Calibrating the Meter (CAL)

To scale the meter without a signal source refer to *Scaling the Meter (5CL)*, page 17.

The meter can be calibrated to display the process in engineering units by applying the appropriate input signal and following the calibration procedure.

The use of a calibrated signal source is strongly recommended.



1. Press the **Up** arrow button to scroll to the *Calibration* menu (**CAL**) and press **Enter**.
2. The meter displays **in 1**. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
3. After the signal is accepted, the meter displays **d 1**. Press **Enter**. Enter a corresponding display value for the signal input, and press **Enter** to accept.
4. The meter displays **in 2**. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
5. After the signal is accepted, the meter displays **d 2**. Press **Enter**. Enter a corresponding display value for the signal input, and press **Enter** to accept.

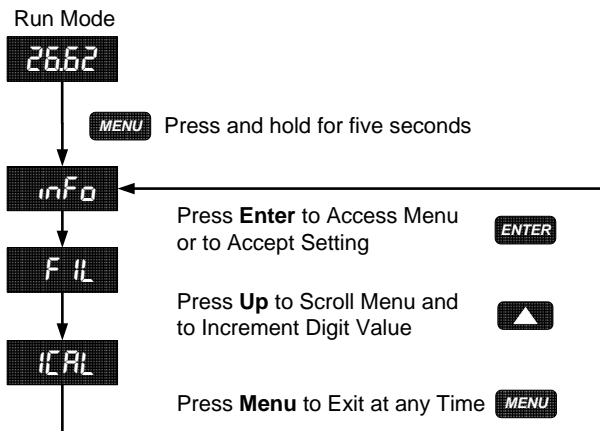
## Recalibrating the Internal Calibration Reference (ICAL)

The *Internal Calibration* (**ICAL**) menu, located in the *Advanced* features menu, is used to recalibrate the internal calibration reference.

Recalibration is recommended at least every twelve months. Refer to *Internal Calibration* (**ICAL**), page 22 for instructions.

## Advanced Features Menu

To simplify the setup process, functions not needed for most applications are located in the *Advanced* features menu. Press and hold the **MENU** button for five seconds to access the *Advanced* features menu



## Advanced Features Menu & Display Messages

The following table shows the *Advanced* features menu functions and messages in the order they appear in the menu.

Display	Parameter	Action/Setting
INFD	Information	Enter the <i>Information</i> menu
SFt	Software Information	Software release number
WEr	Version	Meter firmware version
°C	Calibration Temp (°C)	Temperature at time of I-calibration (°C)
°F	Calibration Temp (°F)	Temperature at time of I-calibration (°F)
F IL	Filter	Set filter function level
I CAL	I-Calibration	Internal master factory calibration
rSt	Reset Defaults	Restore factory default parameter settings

For instructions on how to program numeric values see *Setting Numeric Values*, page 15.

## Information Menu ( *INF* )

The *Information* menu is located in the *Advanced* features menu, to access *Information* menu see *Advanced Features Menu*, page 19.

It shows software identification number, version number, and calibration temperatures. To determine the software version of a meter:

1. Go to the *Information* menu ( *INF* ) and press **Enter** button.
2. The meter will automatically scroll through the software release number and software version. The meter temperatures at the time of last internal calibration in °C and °F are displayed for calibration troubleshooting. Pressing the **ENTER**, **RIGHT**, or **UP** buttons will progress the information display.
3. Following the information display, the meter will exit the *Advanced* features menu and return to run mode.

## Input Signal Filter ( *F IL* )

The noise filter is available for unusually noisy signals that cause an unstable process variable display. The noise filter averages the input signal over a certain period. The filter level can be set to low ( *L* ), high ( *H* ), or off ( *OFF* ). The higher the filter setting, the longer the averaging time and so the longer the display may take to find its final value.

The filter contains a noise filter bypass feature so that while small variations in the signal will be filtered out, large, abrupt changes to the input signal are displayed immediately.

## Internal Calibration ( *iCAL* )

- There is **no need to recalibrate** the meter for milliamps when first received from the factory.
- The meter is **factory calibrated** for milliamps prior to shipment. The calibration equipment is certified to NIST standards.

The internal calibration allows the user to scale the meter without applying a signal. The use of a calibrated signal source is necessary to perform the internal calibration of the meter. Check calibration of the meter at least every 12 months.

### Notes:

- The signal source must have a full-scale accuracy of 0.01% or better between 4 and 20 mA in order to maintain the specified accuracy of the meter.
- Allow the meter to warm up for at least 15 minutes before performing the internal calibration procedure.

The *Internal calibration* menu is part of the *Advanced* features menu.



1. Press and hold the **MENU** button for 5 seconds to enter the *Advanced* features menu.
2. Press the **Up** arrow button to scroll to the *Internal Calibration* menu ( *iCAL* ) and press **Enter**.
3. The meter displays 4.00 mA. Apply a 4.00 mA signal and press **Enter**. The display flashes for a moment while the meter is accepting the signal.
4. After the signal is accepted, the meter displays 20.00 mA. Apply a 20.00 mA signal and press **Enter**. The display flashes for a moment while the meter is accepting the signal.

## Error Message (Err)

An error message indicates that the calibration process was not successful. After the error message is displayed, the meter will revert to input 2 calibration settings. The error message might be caused by inadvertently leaving the signal at the previous level or not maintaining a 0.40 mA minimum span. Press the Menu button to cancel the current calibration process if necessary.

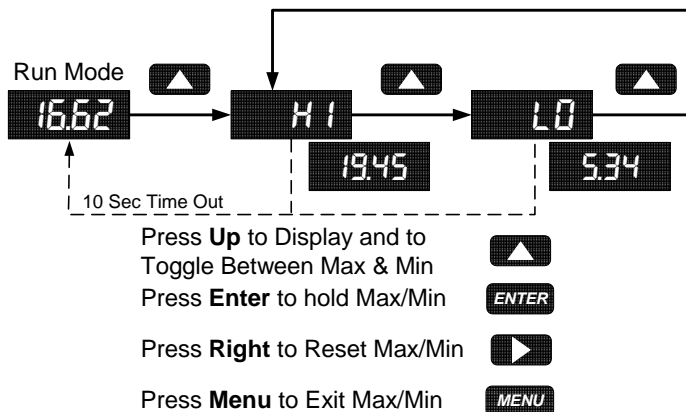
## OPERATION

### Front Panel Buttons Operation

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

## Maximum & Minimum Readings (HI & LO)

The maximum and minimum (peak & valley) readings reached by the process are stored in the meter since the last reset or power-up. The meter flashes **HI** or **LO** to differentiate between run mode and max/min display.



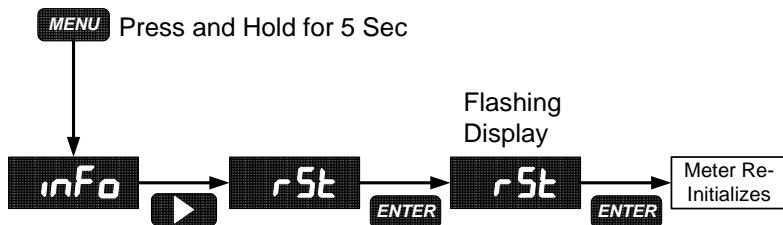
1. Press **Up** arrow button to display maximum reading since the last reset/power-up.
2. Press **Up** arrow again to display the minimum reading since the last reset/power-up.
3. Press **Enter** to continue to display the Max or Min display reading by disabling the Max/Min timeout. The meter will continue to track new Max/Min readings. Press **MENU** to exit the Max/Min reading.
4. If **Enter** is not pressed, the Max/Min display reading will continue to flash and time out after ten seconds. The meter will return to display the actual reading.
5. Press **Right** arrow button while in Max/Min Mode to reset both Max and Min. Max/Min display readings are reset to the current reading.

## Reset Meter to Factory Defaults

When the parameters have been changed in a way that is difficult to determine what's happening, it might be better to start the setup process from the factory defaults.

### Instructions to load factory defaults:

1. Enter the *Advanced* features menu. See Advanced Features Menu, page 19.
2. Press **RIGHT** arrow button when *info* is shown.
3. Press **ENTER** button when *rSt* is shown.  
Press **Enter** again when display flashes *rSt*.  
Note: If **Enter** is not pressed a second time within three seconds, *rSt* will stop flashing and the last **ENTER** press cancelled.
4. The meter goes through an initialization sequence (same as on power-up), and loads the factory default settings.



## Heater Operation

Models with the integrated heater option require no additional setup. All heater operations are controlled automatically by the unit. An internal temperature sensor controls the operation of the heater. The heater is only on when required due to external temperatures.

## Factory Defaults & User Settings

The following table shows the factory setting for most of the programmable parameters on the meter. Next to the factory setting, the user may record the new setting for the particular application.

Model: \_\_\_\_\_ S/N: \_\_\_\_\_ Date: \_\_\_\_\_

<b>Parameter</b>	<b>Display</b>	<b>Default Setting</b>	<b>User Setting</b>
<i>Decimal point</i>	<i>ddd.d</i>	2 places	
<i>Scale</i>	<i>5[L</i>		
<i>Input 1</i>	<i>i n 1</i>	4.00 mA	
<i>Display 1</i>	<i>d 1</i>	4.00	
<i>Input 2</i>	<i>i n 2</i>	20.00 mA	
<i>Display 2</i>	<i>d 2</i>	20.00	
<i>Advanced Features</i>			
<i>Filter</i>	<i>F iL</i>	Off	

## 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.

If the meter is not working as expected, refer to the recommendations below.

### Troubleshooting Tips

Symptom	Check/Action
No display or faint display	<ol style="list-style-type: none"> <li>1. Check connections.</li> <li>2. Perform hard reset by temporarily shorting S+ and S- terminals for a few seconds.</li> </ol>
Rate display unsteady	Increase filter setting in <i>Advanced</i> menu.
Meter displays error message during calibration ( <i>Err</i> )	Check: <ol style="list-style-type: none"> <li>1. Signal connections</li> <li>2. Minimum input span requirements</li> </ol>
Meter flashes <ul style="list-style-type: none"> <li>• 2999</li> <li>• -1999</li> </ul>	Check: <ol style="list-style-type: none"> <li>1. Input signal within scaled range of 2999 and -1999.</li> </ol>
Display stuck flashing a number and <i>H I</i> or <i>L O</i>	Press <b>Menu</b> to exit Max/Min display readings.
Display response is too slow	Check filter setting to see if it can be lowered to <i>L O</i> or <i>OFF</i> .
If the display locks up or the meter does not respond at all	Perform hard reset by temporarily shorting S+ and S- terminals for a few seconds and then removing short.
Backlight does not appear.	Check: <ol style="list-style-type: none"> <li>1. Meter has a backlight installed.</li> <li>2. Signal connections are as shown in Figure 3 on page 11.</li> </ol>
Other symptoms not described above	Call Technical Support for assistance.

## MOUNTING DIMENSIONS

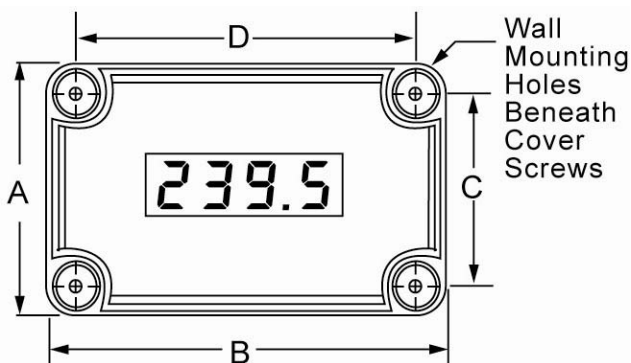


Figure 5. Case Dimensions – Front View

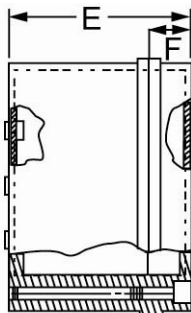


Figure 6. Case Dimensions – Side View

A: 3.15 in (80 mm)

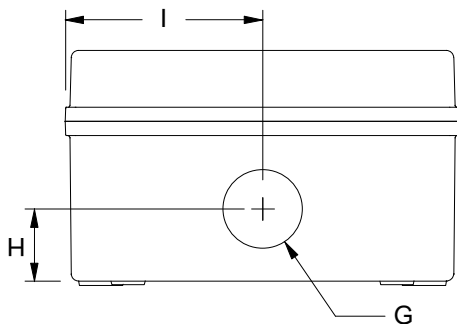
C: 2.44 in (62 mm)

E: 2.76 in (70 mm)

B: 4.33 in (110 mm)

D: 3.62 in (92 mm)

F: 0.79 in (20 mm)

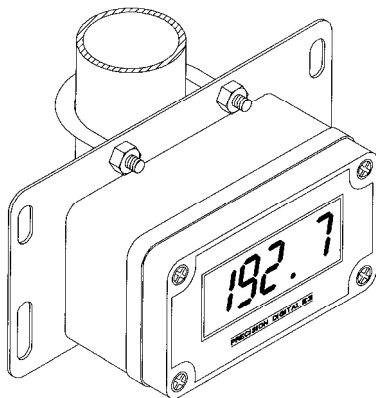


**Figure 7. Case Dimensions – Bottom View**

G: 0.87 in (22 mm)

H: 0.80 in (20 mm)

I: 2.17 in (55 mm)



**Figure 8. PDA6845 Pipe Mounting Kit**

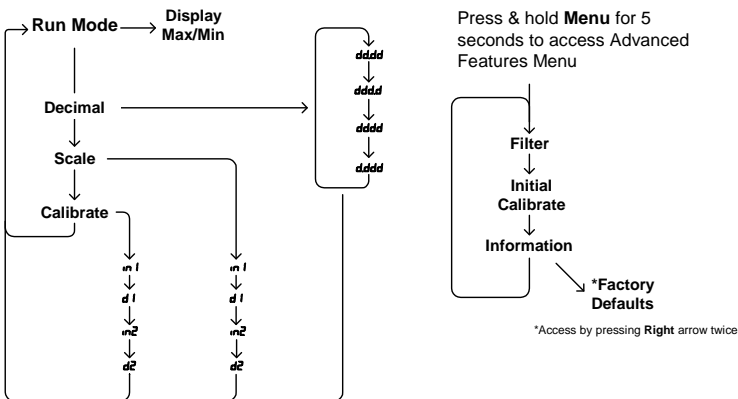
The PDA6845 pipe mounting kit may be used to mount a PD662 to a 2" pipe. The kit includes an 8.20 in (208 mm) x 4.10 in (104 mm) mounting panel with a 2" U-bolt and all necessary mounting hardware.

## QUICK USER INTERFACE REFERENCE GUIDE

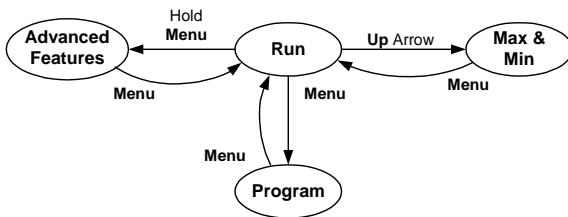
<b>Pushbutton</b>	<b>Function</b>
<b>Menu</b>	Go to Programming Mode, leave Programming Mode, and Max/Min Mode. Hold for 5 seconds to access <i>Advanced Features</i> .
<b>Right Arrow</b>	Move to next digit or decimal point position. Reset Min/Max.
<b>Up Arrow</b>	Move to next selection or increment digit. Go to Max/Min Mode.
<b>Enter</b>	Accept selection/value and move to next selection.

### Max/Min Mode

While in Run Mode, pressing **Up Arrow** will initiate Max/Min Mode. **Up Arrow** toggles between Max & Min displays, and **Right Arrow** resets the Max/Min to the current value. Press **Menu** or wait 10 seconds to return to Run Mode. Pressing **Enter** will disable the 10 second timeout and continuously flash Max or Min.



### Operational Modes





## How to Contact Precision Digital

- For Technical Support:  
Call: (800) 610-5239 or (508) 655-7300  
Fax: (508) 655-8990  
Email: support@predig.com
- For Sales Support:  
Call: (800) 343-1001 or (508) 655-7300  
Fax: (508) 655-8990  
Email: sales@predig.com
- For the latest version of this manual please visit:  
**[www.predig.com](http://www.predig.com)**

