

PD6870 EXPLOSION-PROOF LOOP-POWERED PROCESS METER



ProtEX™
One

- 4-20 mA input
- 1 V drop (4 V with backlight)
- 3½ digits LCD, 1" high
- Loop-powered backlight option
- Explosion-proof, IP68, NEMA 4X enclosure
- Flanges for wall or pipe mounting
- Easy calibration and installation
- Operates from -40 to 75°C

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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 ProtEX-One PD6870 is a rugged, loop-powered meter with 1" display digits in an explosion-proof enclosure for demanding applications in hazardous areas or in the harshest environmental conditions. The meter derives all of its power from the 4-20 mA loop with a small 1 volt drop for easy installation in almost any system.

It is programmed using four easy to access front-mounted control dials with no complex or difficult to read programming menus necessary for setup. The numeric display will read from -1999 to 1999 over a 2000 count user adjustable scaling span. The backlight option lets you see the display under any lighting condition and is powered from the 4-20 mA loop with no additional power supply required.

The enclosure is provided with two threaded conduit holes and integrated pipe or wall mounting slotted flanges.

ORDERING INFORMATION

Model	Description
PD6870-0L0	Explosion-Proof Loop-Powered Process Meter
PD6870-0K0	Explosion-Proof Loop-Powered Process Meter with Backlight in

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SPECIFICATIONS

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

General

DISPLAY	3 ½ digit LCD 1" (25.4 mm); -1999 to 1999
DISPLAY UPDATE RATE	2.5 Updates/Second
OVERRANGE	Display reads <i>f</i> on the left most digit
PROGRAMMING METHOD	Four front mounted rotary control dials accessed when the cover is removed.
RECALIBRATION	Recalibration is recommended at least every 12 months.
NORMAL MODE REJECTION	60 dB rejection ratio
ENVIRONMENTAL	Operating temperature range: -40 to 75°C Storage temperature range: -40 to 75°C Relative humidity: 0 to 90% non-condensing
CONNECTIONS	Screw terminals accept 12 to 22 AWG wire
ENCLOSURE	Explosion-proof die cast aluminum with glass window, 0.30% max copper content, corrosion resistant epoxy coating, color: blue. NEMA 4X, IP68. Two ¾" NPT threaded conduit openings. One ¾" NPT nickel plated brass conduit plug with 10 mm hex key fitting installed.
MOUNTING	May be mounted directly to conduit. Two slotted flanges for wall mounting or NPS 1½" to 2½" or DN 40 to 65 mm pipe mounting. See Mounting Dimensions on page 17.
OVERALL DIMENSIONS	5.65" x 5.25" x 4.86" (144 mm x 133 mm x 124 mm) (W x H x D)
WEIGHT	5.00 lbs (80 oz, 2.27 kg)
WARRANTY	3 years parts and labor

Input

ACCURACY	±0.1% of full span ±1 count	
TEMPERATURE DRIFT	150 PPM/°C from -40 to 75°C ambient	
DECIMAL POINT	User selectable decimal point	
CALIBRATION RANGE	4 mA input: -1000 to +1000; 20 mA between 20 and 2000 counts greater than 4 mA display. Two point linear display span.	
MAXIMUM VOLTAGE DROP	Without Backlight	With Loop-Powered Backlight
	1 VDC @ 20 mA	4 VDC @ 20 mA
EQUIVALENT RESISTANCE	50 Ω @ 20 mA	200 Ω @ 20 mA
INPUT OVERLOAD	Over current protection to 2 A max.	

Enclosure Ratings and Approvals

FM & CSA

FM Approved & CSA Certified:

Explosion-proof for use in Class I, Division 1, Groups B, C, and D; Dust-Ignition-proof for Class II, Division 1, Groups E, F, and G, Class III; hazardous (classified) locations, indoor and outdoor (Type 4X and IP66)

USA: Indoor and outdoor (Type 4X and IP66)

Ta = -40°F to +185°F

FM Certificate: 3032880

Canada: Indoor and outdoor (Type 4X);

Ta = -40°C to +85°C

CSA Certificate: 2210414

ATEX & IECEx

ATEX Certified: Group 2, Category 1 (Zone 1), Gases, Vapors, Mists, or Dusts:



II 2 G D

Ex d IIC Gb

Ex tb Db IIIC IP68

Ta = -40°C to +85°C

ATEX Certificate: Sira 08ATEX1325U

IECEx Certified: Flameproof, Gas Group IIC

Ex d IIC Gb

Ex tb IIIC IP68

Ta = -40°C to +85°C

IECEx Certificate: IECEx SIR 08.0126U

Year of Construction

This information is printed on the enclosure label.

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. Service requiring replacement of internal components must be performed at the factory.

INSTALLATION

For Installation in USA: The PD6870 must be installed in accordance with the National Electrical Code (NEC) NFPA 70.

For Installation in Canada: The PD6870 must be installed in accordance with the Canadian Electrical Code CSA 22.1.

For European Community: The PD6870 must be installed in accordance with the ATEX directive 94/9/EC and the enclosure certificates ATEX Certificate: Sira 08ATEX1325U, IECEx Certificate: IECEx SIR 08.0126U.

All controls and wiring connectors are accessed by opening the enclosure. To access electrical connectors, remove the 2 captive screws and remove the display module from the enclosure.



CAUTION: Disconnect from supply before opening enclosure. Keep cover tight while circuits are alive. Conduit seals must be installed within 18" of the enclosure.

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.

Pre-Installed Conduit Plug

The PD6870 is supplied with one pre-installed optional conduit plug for installations that do not require the use of both conduit entries. The conduit plug includes an internal hexagonal socket recess for removal. The pre-installed plug and installation is included in all hazardous area approvals of the PD6870.



CAUTION: Installations of the supplied conduit plug require the application of non-setting (solvent free) thread sealant. If the pre-installed conduit plug is removed or replaced all relevant hazardous area guidelines must be followed for its installation or replacement conduit.

Mounting

The PD6870 has two slotted mounting flanges that may be used for pipe mounting or wall mounting. Alternatively, the unit may be supported by the conduit using the conduit holes provided.

Refer to *Mounting Dimensions*, page 17 for details.

PD6870 Connections

To access the connectors, remove the enclosure cover and unscrew the two captive screws that fasten the display module. Remove the display module. Signal connections are made to a three-terminal connector on the rear of the display module. Grounding connections are made to the two ground screws provided on the base – one internal and one external.

S+ 4-20 mA signal input positive terminal connection

S- 4-20 mA signal return/negative terminal connection

B- 4-20 mA signal return/negative terminal when using the installed loop powered backlight option.

Refer to Figure 1 for terminal positions.



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.

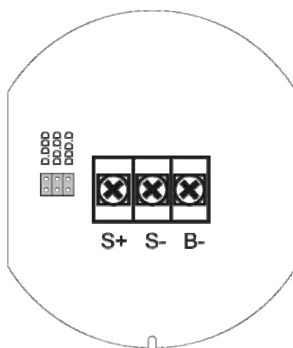


Figure 1. PD6870 Connectors

Connections & Wiring Diagrams

Signal connections are made to a three-terminal connector mounted on the rear of the display module. The enclosure also provides one internal and one external earth grounding screw. The 4-20 mA input with no backlight has a maximum voltage drop of 1 V and is wired as shown in Figure 2. The loop-powered backlight configuration requires a total maximum voltage drop of 4 V. The backlight option is recommended for dim lighting conditions and is enabled when wired as shown in Figure 3.

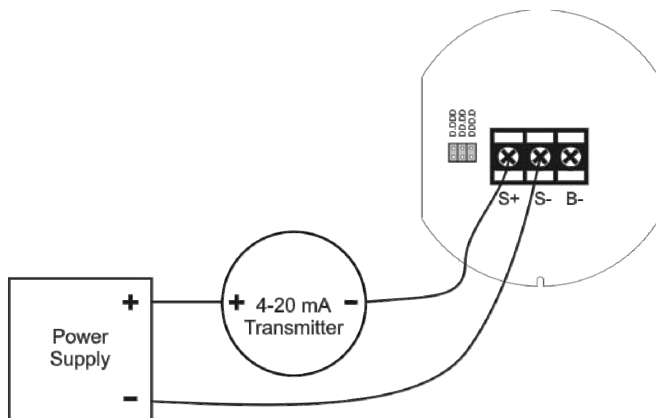


Figure 2. PD6870 Input Connections without Backlight

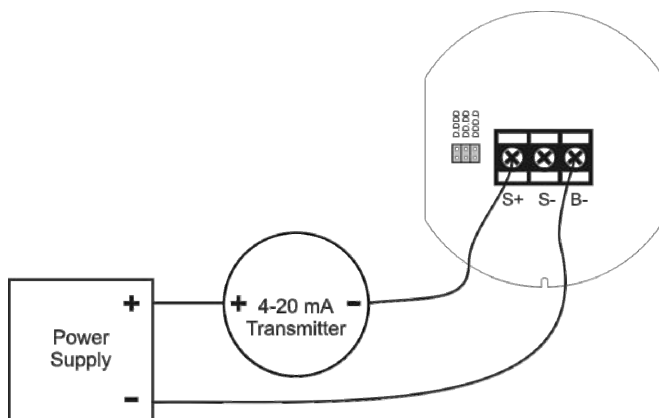


Figure 3. PD6870 Input Connections with Loop-Powered Backlight

SETUP

Overview

Setup is done using four rotary control dials located on the front of the display module that are accessed when the meter cover is removed. Setup is performed using a 4-20 mA signal source and scaling the 4 and 20 mA readings using the control dials.

Scaling Controls and Display



Control	Description
LO	4 mA display adjust.
LO FINE	4 mA precision display adjust.
HI	20 mA display adjust.
HI FINE	20 mA precision display adjust.

Setting Up the Meter

Calibrating the Meter

The meter is provided factory calibrated to display -50.0 at 4 mA and 150.0 at 20 mA. HI and LO coarse and fine controls are labeled on the front of the display. Use the HI and LO controls for large range changes during calibration and the HI FINE and LO FINE controls for precision changes.

Apply a 4 mA signal and adjust the LO controls to display the desired reading. Apply a signal between 16 and 20 mA and adjust the HI controls to display the desired reading. Complete the calibration procedure by making minor adjustments to the LO and HI controls as necessary.

Minimum & Maximum Input Span

A minimum input span of 20 counts is required between a 4 mA and 20 mA input. A maximum input span of 2000 counts may be setup between a 4 mA and 20 mA input. The meter will not properly calibrate or display if these minimum and maximum span ranges are not maintained during scaling.

Setting the Decimal Point

Decimal point may be set using a three position jumper on the rear of the display module. To access the connectors, unscrew the two captive screws that fasten the display module. Remove the display module and place the jumper on the desired pins as indicated on the board for decimal point locations of D.DDD, DD.DD, DDD.D, or remove it if no decimal point is desired.

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: _____

Parameter	Default Setting	User Setting
<i>Decimal point</i>	<i>1 place</i>	
<i>Calibration Settings</i>		
<i>Input 1</i>	<i>4.00 mA</i>	
<i>Display 1</i>	<i>-50.0</i>	
<i>Input 2</i>	<i>20.00 mA</i>	
<i>Display 2</i>	<i>150.0</i>	

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	Check input signal connections.
Rate display unsteady during calibration	Adjust LO FINE or HI FINE controls to fine-tune the display.
Meter displays <i>f</i> on the left most digit location	Check signal level is not over range. Dial down the HI control and re-calibrate at 20 mA.
Display is faded	Check input signal is not under 1 mA.
If the display locks up or the meter does not respond at all	Perform hard reset by shorting S+ and S- terminals.
Backlight does not appear	Verify backlight is installed. Check signal connections are as shown in Figure 3 on page 12.
Other symptoms not described above	Call Technical Support for assistance.

MOUNTING DIMENSIONS

All units: inches [mm]

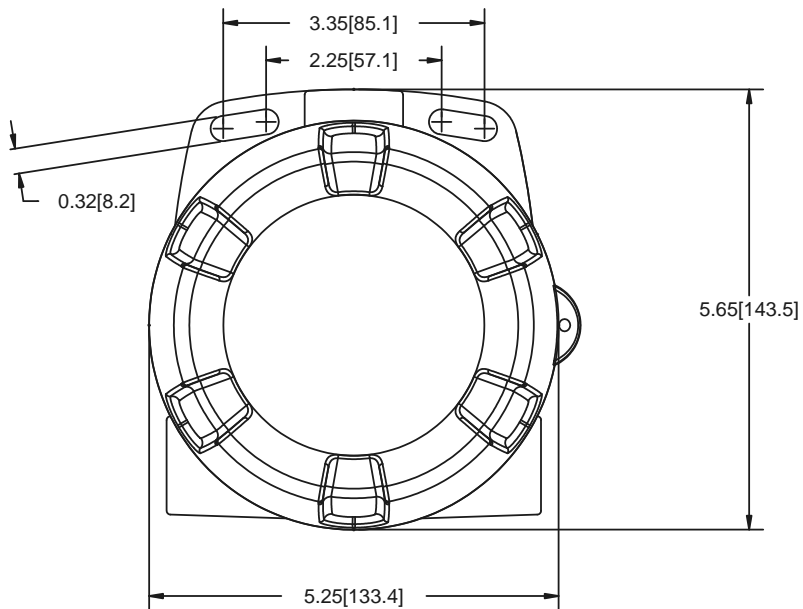


Figure 4. Enclosure Dimensions – Front View

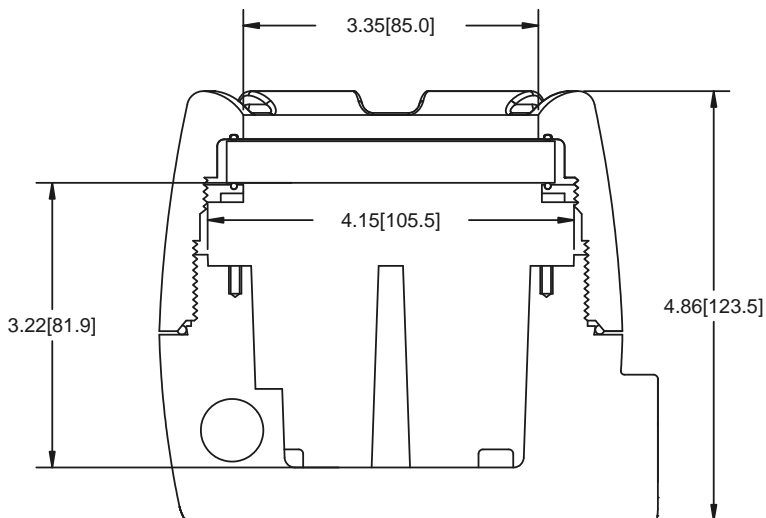


Figure 5. Enclosure Dimensions – Side Cross Section View

Note: The supplied conduit plug may extend up to 0.6 in [15 mm] from the conduit opening when installed.

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
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