

# PD6800

ProtEX-Pro Explosion-Proof Process & Level Meter

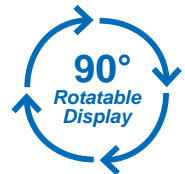
**ProtEX**<sup>TM</sup>  
Pro



**PROCESS & LEVEL**

- 4-20 mA Input Loop-Powered
- Modern, Sleek and Practical Enclosure for Hazardous Locations
- 5-Digit, 0.7" (17.8 mm) Upper Display (0.6" for -0L1 Models)
- Optional Level Indicator Bar Graph
- 7 Alphanumeric Character, 0.4" (10.2 mm) Lower Display
- SafeTouch<sup>®</sup> Through-Glass Button Programming
- Password Protection
- 32-Point , Square Root, or Exponential Linearization
- Loop or External DC-Powered Backlight Standard
- 3.0 V Drop (6.0 V with Backlight)
- Explosion-Proof, IP68, NEMA 4X Enclosure
- Flanges for Wall or Pipe Mounting
- HART<sup>®</sup> Protocol Transparent
- Operates from -40 to 75°C

**SAFE TOUCH**<sup>®</sup>  
Through-Glass  
Button Programming



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**PD6800 Process & Level Meter**

*Displays clear alphanumeric tag names*



**Process Displays**



Level in Liters



Level in Feet



Pressure Indication

**Easy to Setup**



Programming



**OVERVIEW**

The new ProtEX-Pro PD6800 explosion-proof process meter brings modern design, easy readability, and enhanced functionality to hazardous areas around the world in a way never seen before. Competitors have lost sight of the fact that the primary thing customers do with meters is look at them. They want a reliable meter with a display that provides the important information about their process, can be seen under varied lighting conditions, from wide angles, and from a distance. The PD6800 delivers all these and more, plus it boasts an optional segmented bar graph level display. Spend a few minutes reviewing the features described in the graphic above and you will see how!

**KEY FEATURES**

**Informative & Easy to Read Display**

The high contrast, backlight LCD display is easy to read from far away and under various lighting conditions. The upper display is 0.7" high and shows 5 digits of flow rate. The PD6800-0L1 models have a segmented bar graph level indicator included with 5 digits 0.6" in height. The lower display is 0.4" high and shows either flow total or a tag with 7 alphanumeric characters. And best of all, the display is mounted right up against the glass so it can be seen from a wide viewing angle.

**Through-Glass SafeTouch® Buttons**

The PD6800 is equipped with four sensors that operate as through-glass buttons so that it can be programmed and operated without removing the cover (and exposing the electronics) in a hazardous area. These buttons can be disabled for security by selecting the LOCK setting on the switch located on the connector board in the base of the enclosure. To actuate a button, press one finger to the glass directly over the marked button area. When the cover is removed, four mechanical buttons located next to the sensors are used.

**Modern, Sleek and Practical Enclosure**

The first thing customers notice about a product is its enclosure and the ProtEX-Pro really shines here. The copper-free (0.30%), smooth, die-cast aluminum NEMA 4X (IP68) enclosure is finished with a corrosion resistant epoxy coating that literally does make the ProtEX-Pro shine. The built-in mounting flanges make for convenient wall or pipe mounting and there is even a slot on the back of the enclosure for centering on the pipe. There are two ¾" NPT conduit holes for wiring.

**Wide Viewing Angle**

Customers can't always look at the display from straight on, so the window and display module have been optimized to provide a wide viewing angle of approximately +/- 40°; nearly twice that of the competition! Remember, the PD6800 is designed to be looked at.



**Environmentally Tough**

ProtEX™ Series meters not only look great with their modern, smooth die cast aluminum enclosures, but they can be installed virtually anywhere. The NEMA 4X / IP68 enclosure provides serious protection from the elements, high impact, corrosion and electrical interference and the extensive, worldwide agency approvals means they can be installed virtually anywhere.

**Perfect & Secure Fit Every Time**

The internal cast rails ensure the ProtEX assembles together perfectly, quickly and securely; and everything lines up for optimal viewing every time. There are no standoffs to worry about breaking or getting out of alignment. Two spring-loaded, self-retaining, thumbscrews make the assembly a snap, while pressing the LCD as close to the glass as possible to improve wide angle viewing.

**INPUT SIGNAL CONDITIONING**

**Live Input Calibration**

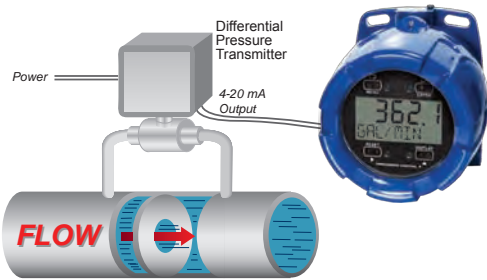
In lieu of meter scaling, the meter can be calibrated with a precision signal source. While applying a precision signal, the relative scale value is entered via the front panel. This is done at any two points along the scale. Using this method, the operator can set a “best fit straight line” for non-linear input spans.

**Multi-Point Linearizer**

Up to 32 linearization points can be selected under the Linear function. The multi-point linearization can be used to linearize the display for non-linear signals such as those from level transmitters used to measure volume in odd-shaped tanks or to convert level to flow using weirs and flumes that require a complex exponent. These points are established via direct entry (SCALE) or with an external calibration signal (CAL).

**Square Root Extraction**

The square root extraction function displays flow rate by extracting the square root from a differential pressure transmitter signal. The user selectable low-flow cutoff feature gives a reading of zero when the flow rate drops below a user selectable value.



**Programmable Exponent**

The programmable exponent function is used to linearize the level signal in open channel flow applications using weirs and flumes and display flow rate and units of measure.

**ADDITIONAL FEATURES**

**Password Protection**

A 5-digit password prevents unauthorized changes to the programmed parameter settings. The lock symbol is displayed to show that settings are protected. If the meter is password protected, the meter will display the message LOCKED when the Menu button is pressed.

**Alarm Indication**

The PD6800 has high or low alarm indication. When in alarm, the display will flash, and a HI or LO symbol is displayed. The alarm has an adjustable deadband (the difference between the set and reset points). The alarm is acknowledged by pressing the ENTER button.

**Isolated Open Collector Output (-0L1 Models Only)**

The isolated open collector output on the PD6800-0L1 may be assigned for use with the alarm (pulse output). The rating of the output is 30 VDC @ 150 mA max.

**INSTALLATION**

**Installation Flexibility**

The PD6800’s rotatable display/meter module along with two available conduit connections provide for numerous installation options. The display can be rotated in 90° increments. Rotate it 90° for horizontal mounting. Wiring can then be routed to either the top conduit connection, or from below to the opposite conduit connection (metal conduit plug supplied). Use both conduit connections for through-wiring in any plane.

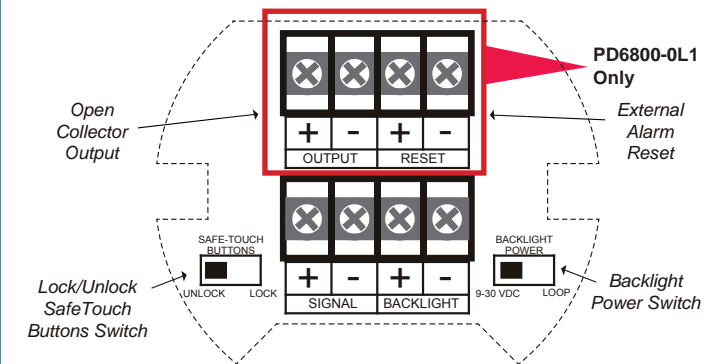


**Easy Wiring & Service**

Unscrew the two captured thumb screws and unplug a connecting cable and the display/meter module is simply and completely removed. A heavy duty terminal block is then easily accessed and wired. It is clearly marked to prevent wiring errors. The display/meter module can be removed *without breaking the loop*. As such, it can be serviced without the need to uninstall the entire product.



**CONNECTIONS**



See LIM6800 manual for wiring instructions

## SPECIFICATIONS

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

### General

**Display:** Five digits (-9999 to 99999) 0.70" (17.8 mm) high, 7-segment, automatic lead zero blanking; **-0L1:** 0.6" high with level bar graph. Lower: Seven characters 0.4" (10.2 mm) high, 14 segment alphanumeric. Symbols: for high & low alarm, Password Lock. Backlight: White

**Decimal Point:** Upper process display has up to four decimal places or none: d.dddd d.ddd, d.dd, d.d, or ddddd

**Display Update Rate:** Ambient > -25°C: 2 Updates/Second.

Ambient < -25°C: 1 Update/5 Seconds

**Externally Powered Backlight:**

Voltage Range: 9-36 VDC

<b>Supply Voltage</b>	9 VDC	12 VDC	24 VDC	30 VDC
<b>Maximum Power</b>	0.2 W	0.25 W	0.5 W	0.75 W

**Display Orientation:** Display may be mounted at 90° increments up to 270° from default orientation.

**Overrange:** Display flashes 99999

**Underrange:** Display flashes -9999

**Programming Method:** Four SafeTouch® through-glass buttons when cover is installed. Four internal pushbuttons when cover is removed.

**Noise Filter:** Programmable - Lo, Med, Hi, or Off

**Recalibration:** 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.

**Advanced Functions:** Live input calibration, linearization, square root, or programmable exponent

**Alarm Indication:** Flashing display plus HI/LO indicators

**Non-Volatile Memory:** All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

**Normal Mode Rejection:** 64 dB at 50/60 Hz

**Operating Temperature Range:** -40 to 75°C.

**Storage Temperature Range:** -40 to 85°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, corrosion resistant epoxy coating, color: blue. NEMA 4X, 7, & 9, IP68. Copper-free (0.3%). Two 3/4" NPT threaded conduit openings.

One 3/4" NPT metal conduit plug with 12 mm hex key fitting installed.

**Mounting:** May be mounted directly to conduit. Two slotted flanges for wall mounting or NPS 1 1/2" to 2 1/2" or DN 40 to 65 mm pipe mounting.

**Overall Dimensions:** 5.65" x 5.25" x 4.86" (W x H x D)

(144 mm x 133 mm x 124 mm)

**Weight:** 5.00 lbs (80 oz, 2.27 kg)

**Warranty:** 3 years parts and labor

### Input

**Input range:** 4-20 mA

**Accuracy:** ±0.03% of calibrated span ±1 count, square root & programmable exponent accuracy range: 10-100% of calibrated span.

**Temperature Drift:** 50 PPM/°C

**Decimal Point:** User selectable decimal point

**Calibration Range:** An error message will appear if input 1 and input 2 signals are too close together. Input Range: 4-20 mA. Minimum Span Input 1 & Input 2: 0.10 mA

**Maximum Voltage Drop:** 3.0 VDC @ 20 mA without loop-powered backlight. 6.0 VDC @ 20 mA with loop-powered backlight

**Equivalent Resistance:** 150 Ω @ 20 mA without loop-powered backlight. 300 Ω @ 20 mA with loop-powered backlight

**Input Overload:** Over current protection to 2 A max.

### Open Collector Output (-0L1 Models Only)

**Rating:** Isolated open collector, 30 VDC @ 150 mA max.

**Alarm Output:** Assign to level or volume for high or low alarm trip point.

**Deadband:** 0-100% FS, user selectable

**Acknowledge:** Front panel ENTER button and external RESET terminals resets output and screen indication.

### Product Ratings & Approvals

**FM:** Explosion-proof for use in Class I, Division 1, Groups B, C, D.

Class II, Division 1, Groups E, F, G. Class III, Division 1; T6.

Class I, Zone 1, AEx d IIC T6 Gb. Zone 21, AEx tb IIIC T85°C.

Ta = -40 to 75°C. Enclosure: Type 4X & IP66.

Certificate number: 3040391

**ATEX:** II 2 G D. Ex d IIC T6 Gb. Ex tb IIIC T85°C Db IP68.

Ta = -40 to 75°C.

Certificate number: Sira 10ATEX1116X

**CSA:** Class I, Division 1, Groups B, C, D. Class II, Division 1, Groups E, F, G. Class III, Division 1; T6. Class I, Zone 1, Ex d IIC T6. Ta = -40 to 75°C.

Enclosure: Type 4X & IP66.

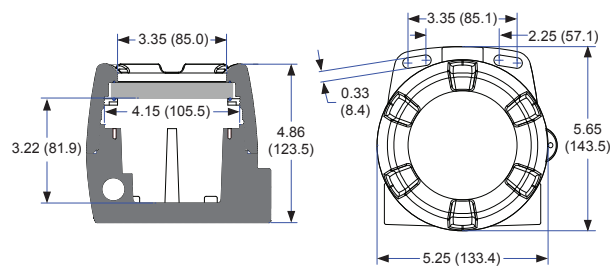
Certificate number: 11 2325749

**IECEX:** Ex d IIC T6 Gb. Ex tb IIIC T85°C Db IP68. Ta = -40 to 75°C

Certificate number: IECEX SIR 10.0056X.

### DIMENSIONS

Units: Inch (mm)



### ORDERING INFORMATION

ProtEX-Pro PD6800 • Process Meter	
Model	Description
PD6800-0K0	ProtEX-Pro Process Meter with Backlight
PD6800-0L1	ProtEX-Pro Process Meter with Level Bar Graph & Backlight

Accessories	
Model	Description
PDA0001	3/4" M-NPT to F-M20 Reducer
PDA0002	3/4" M-NPT to 1/2" F-NPT Reducer
PDA6846	Pipe mounting kit; includes zinc-plated u-bolt for 2" pipe, (2) washers, and (2) nuts.
PDA6846-SS	Pipe mounting kit; includes stainless steel u-bolt for 2" pipe, (2) washers, and (2) nuts.

**Your Local Distributor is:**

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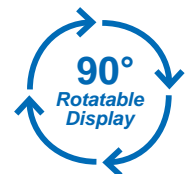
# PD6801

ProtEX-F&I Level Meter



FEET & INCHES

- Display Level in Feet & Inches
- 4-20 mA Input Loop-Powered
- Programmable 1/8 or 1/16 Inch Display
- 20-Segment Tank Level Indicator
- Lower Display for Tag, Volume, or Percent
- SafeTouch® Through-Glass Button Programming
- Open Collector Alarm Output
- Loop-Powered or External DC-Powered Backlight Standard
- Explosion-Proof, IP68, NEMA 4X Enclosure
- Operates from -40 to 75°C



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# PD6801 ProtEX-F&I Loop-Powered Level Meter

## PD6801 Level Meter

Displays clear alphanumeric tag names

- Ground Screw
- Mounting Flanges (Up to 2½" Pipe)
- Locking Screw
- SafeTouch® Menu Button
- Backlight Standard
- 0.6" (15.24 mm) Feet & Inches
- 0.4" (10.2 mm) 7-Character (Alphanumeric)
- Two ¾" NPT Conduit Holes
- SafeTouch® Right Arrow



Explosion-Proof Die-Cast Aluminum NEMA 4X Enclosure

SafeTouch® Enter or Alarm Acknowledge Button

Tank Level Bar Graph

Alphanumeric Engineering Units

Alarm Indicators

SafeTouch® Display or Up Arrow

Mechanical Buttons (4 Places)

### Lower Displays



Custom Tag

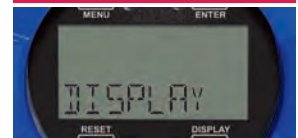


Volume



Percent

### Simple to Setup



Easy to Follow Programming



Through-Glass Button Programming

## OVERVIEW

The new ProtEX-F&I PD6801 explosion-proof level meter brings modern design, easy readability, and enhanced functionality to hazardous areas around the world in a way never seen before. The PD6801 features a clearly labeled feet and inches display. The feet and inches display is easily read and understood, providing quick and easy to comprehend information to operators. The meter can display in eighths or sixteenths of an inch. It includes a volume scale display feature and can be seen under varied lighting conditions, from wide angles, and from a distance. Spend a few minutes reviewing the features described in the graphic above and see how the PD6801 is the ideal level meter for your operation!

## KEY FEATURES

### Easy to Understand Feet & Inches Display

The upper display is 0.6" high and shows clearly labeled feet and inches up to 399 feet, 11 and 15/16 inches. The high contrast, backlight LCD display is easy to read from far away and under various lighting conditions. Feet and inches are clearly labeled. Fractions of an inch may be displayed as eighths, sixteenths, or turned off, displaying only full feet and inches.

### 20-Segment Tank Level Indicator

A 20-segment tank level indicator gives a clear indicator of height at a glance. When a high level alarm is triggered, the tank level indicator will flash the segment indicating the alarm level. High and low level alarm indicators located with the tank level indicator will flash to alert an operator to the alarm condition. The tank level indicator may be scaled independently of the analog input scale, so the tank indicator may display as full at less than 20 mA. This is ideal for level transmitters that output less than 20 mA at the maximum height of the tank or pit depth.

### Lower Display for Tag, Volume, or Percent

The lower display is 0.4" high and shows either a custom tag, volume, or percent full with seven alphanumeric characters. A custom tag is programmable for any seven alphanumeric digits. The 14-segment display makes the tag easy to read, and it can include lower and upper-case letters. This is ideal for identification or material labels. Volume may be displayed from 0 to 9999999, with or without an alternating tag. Percent full may also be displayed, with or without an alternating tag. The percent is clearly labeled with PCT.

### Through-Glass SafeTouch Buttons

The PD6801 is equipped with four sensors that operate as through-glass buttons so that it can be programmed and operated without removing the cover (and exposing the electronics) in a hazardous area. These buttons can be disabled for security by selecting the LOCK setting on the switch located on the connector board in the base of the enclosure. To actuate a button, press one finger to the glass directly over the marked button area. When the cover is removed, four mechanical buttons located next to the sensors are used.

### Modern, Sleek and Practical Enclosure

The first thing customers notice about a product is its enclosure and the ProtEX-F&I really shines here. The copper-free (0.3%), smooth, die-cast aluminum NEMA 4X (IP68) enclosure is finished with a corrosion resistant epoxy coating that literally does make the ProtEX-F&I shine. The built-in mounting flanges make for convenient wall or pipe mounting and there is even a slot on the back of the enclosure for centering on the pipe. There are two ¾" NPT conduit holes for wiring.

# PD6801 ProtEX-F&I Loop-Powered Level Meter

## Wide Viewing Angle

The window and display module have been optimized to provide a wide viewing arc of approximately 80°, nearly twice that of the competition! The PD6801 is designed to be looked at.



## Environmentally Tough

ProtEX™ Series meters not only look great with their modern, smooth die-cast aluminum enclosures, but they can be installed virtually anywhere. The NEMA 4X / IP68 enclosure provides serious protection from the elements, as well as high impact, corrosion and electrical interference. The extensive, worldwide agency approvals means they can be installed in virtually any environment.

## Perfect & Secure Fit Every Time

The internal cast rails ensure the ProtEX assemblies together perfectly, quickly and securely; components line up for optimal viewing every time. There are no standoffs to worry about breaking or getting out of alignment. Two spring-loaded, self-retaining, thumbscrews make the assembly a snap, while pressing the LCD as close to the glass as possible to improve wide angle viewing.

## INPUT SIGNAL CONDITIONING

### Volume Scale

An independent second display scale of the 4-20 mA input allows volume to be shown on the lower display. The volume scaling is fully independent of the level scale.

### Multi-Point Linearizer

Up to 32 linearization points can be selected for the level indicator under the Multipoint menu. The volume scale has an independent 32-point linearizer. Multi-point linearization can be used to linearize the display for non-linear signals, such as when measuring volume using level transmitters on odd-shaped tanks. The level scale and volume scale may use different numbers of linearization points.

### Live Input Calibration

In lieu of meter scaling, the meter can be calibrated with a precision signal source. This is done at any two points along the scale. Using this method, the operator can set a “best fit straight line” for non-linear input spans.

## ADDITIONAL FEATURES

### Open Collector Output Alarm & Indication

The PD6801 has an open collector output that may function as a high or low alarm. When in an alarm condition, the display will flash, and a HI or LO symbol is displayed. The alarm has an adjustable deadband (the difference between the set and reset points). The alarm is acknowledged by pressing the ENTER button.

### Password Protection

A 5-digit password prevents unauthorized changes to the programmed parameter settings. If the meter is password protected, the meter will display the message `LOCKED` when the Menu button is pressed.

## INSTALLATION

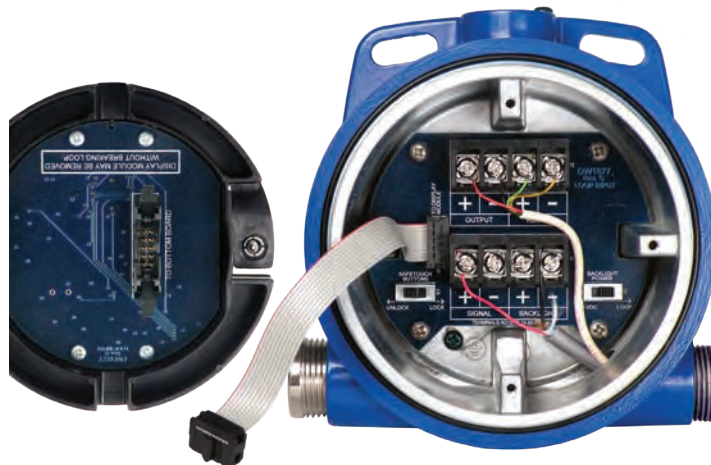
### Installation Flexibility

The PD6801's rotatable display/meter module, along with two available conduit connections, provides for numerous installation options. The display can be rotated in 90° increments. Rotate it 90° for horizontal mounting. Wiring can then be routed to either the top conduit connection, or from below to the opposite conduit connection (metal conduit plug supplied). Use both conduit connections for through-wiring in any plane.

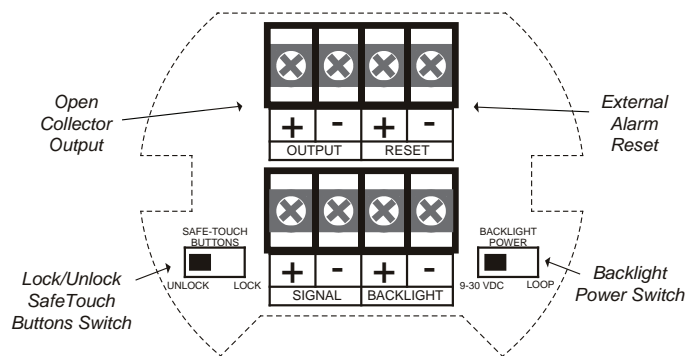


### Easy Wiring & Service

Unscrew the two captured thumb screws and unplug a connecting cable and the display/meter module is simply and completely removed. A heavy duty terminal block is then easily accessed and wired. It is clearly marked to prevent wiring errors. The display/meter module can be removed *without breaking the loop*. As such, it can be serviced without the need to uninstall the entire product. All relevant hazardous area guidelines must be followed during service.



## CONNECTIONS



See LIM6801 manual for wiring instructions

# PD6801 ProtEX-F&I Loop-Powered Level Meter

## SPECIFICATIONS

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

### General

**Display:** Feet & Inches display: 0.60" (15.2 mm) high, 0 to 399 FT - 11 15/16 IN with 1/16 or 1/8 fraction display.  
 Lower 7-digit display: 0.4" (10.2 mm) high, 14-segment alphanumeric characters, display tag, volume 0 to 9999999, and/or 0-100 percent.  
**Tank Level Indicator:** 20 segments, F (Full) and E (Empty)  
**Alarm Indication:** HI and LO; **Backlight:** White, loop or DC powered  
**Display Assignment:** Lower display may be assigned to custom unit or tag, volume, volume and tag, percent height, percent height and tag, or off.  
**Display Update Rate:** Ambient > -25°C: 2 Updates/Second  
 Ambient < -25°C: 1 Update/5 Seconds  
**Externally Powered Backlight:**  
**Voltage Range:** 9-36 VDC

<b>Supply Voltage</b>	9 VDC	12 VDC	24 VDC	30 VDC
<b>Maximum Power</b>	0.2 W	0.25 W	0.5 W	0.75 W

**Overrange and Underrange:** Level display flashes to 399 FT 11 15/16 IN  
 Volume display flashes 9999999 if overrange, -999999 if underrange.

**Programming Method:** Four SafeTouch® through-glass buttons when cover is installed. Four internal pushbuttons when cover is removed.

**Noise Filter:** Programmable low (L), medium (M), high (H), or off (OFF)

**Recalibration:** Recalibration is recommended at least every 12 months.

**Password:** Programmable password restricts modification of settings.

**Nonvolatile Memory:** All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

**Normal Mode Rejection:** 64 dB at 50/60 Hz

**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, corrosion resistant epoxy coating, color: blue. NEMA 4X, 7, & 9, IP68.

Two 3/4" NPT threaded conduit openings. One 3/4" NPT metal conduit plug with 12 mm hex key fitting installed.

**Mounting:** May be mounted directly to conduit. Two slotted flanges for wall mounting or NPS 1 1/2" to 2 1/2" or DN 40 to 65 mm pipe mounting. See Mounting Dimensions.

**Overall Dimensions:** 5.65" x 5.25" x 4.86" (W x H x D)  
 (144 mm x 133 mm x 124 mm)

**Weight:** 5.00 lbs (80 oz, 2.27 kg)

**Warranty:** 3 years parts and labor

### Input

**Accuracy:** ±0.03% of calibrated span ±1 count

**Input Range:** 3 to 24 mA

**Multi-Point Linearization:** 2 to 32 points each for level and volume

**Temperature Drift:** 50 PPM/°C from -40 to 75 °C ambient

**Calibration Range:**

Input Range: 4-20 mA, Input 1 & 2 Minimum Span: 0.10 mA

**Maximum Voltage Drop:** Without Backlight or with Externally-Powered

(DC Powered) Backlight: 3.0 VDC @ 20 mA

With Loop-Powered Backlight: 6.0 VDC @ 20 mA

**Equivalent Resistance:** 150 Ω @ 20 mA without loop-powered backlight.

300 Ω @ 20 mA with loop-powered backlight.

**Input Overload:** Over current protection to 2 A max.

### Open Collector Output

**Rating:** Isolated open collector, 30 VDC @ 150 mA max.

**Alarm Output:** Assign to level or volume for high or low alarm trip point.

**Deadband:** 0-100% FS, user selectable

**Acknowledge:** Front panel ENTER button and external RESET terminals resets output and screen indication.

### Disclaimer

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**PRECISION DIGITAL CORPORATION**

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## Product Ratings & Approvals

**FM:** Explosion-proof for use in Class I, Division 1, Groups B, C, D

Class II, Division 1, Groups E, F, G

Class III, Division 1; T6

Class I, Zone 1, AEx d IIC T6 Gb

Zone 21, AEx tb IIIC T85°C

Ta = -40 to 75°C

Enclosure: Type 4X & IP66

Certificate number: 3040391

**ATEX:** II 2 G D

Ex d IIC T6 Gb

Ex tb IIIC T85°C Db IP68

Ta = -40 to 75°C

Certificate number: Sira 10ATEX1116X

**CSA:** Class I, Division 1, Groups B, C, D

Class II, Division 1, Groups E, F, G

Class III, Division 1; T6

Class I, Zone 1, Ex d IIC T6

Ta = -40 to 75°C. Enclosure: Type 4X & IP66

Certificate number: 11 2325749

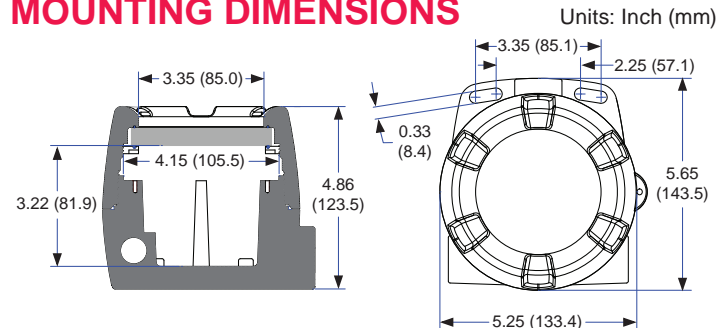
**IECEX:** Ex d IIC T6 Gb

Ex tb IIIC T85°C Db IP68

Ta = -40 to 75°C

Certificate number: IECEX SIR 10.0056X

## MOUNTING DIMENSIONS



## ORDERING INFORMATION

ProtEX-F&I PD6801 • Level Meter	
Model	Description
PD6801-0K1-0	ProtEX-F&I Meter with Backlight & Open Collector Output

Accessories	
Model	Description
PDA0001	3/4" M-NPT to F-M20 Reducer
PDA0002	3/4" M-NPT to 1/2" F-NPT Reducer
PDA6846	Pipe mounting kit; includes zinc-plated u-bolt for 2" pipe, (2) washers, and (2) nuts.
PDA6846-SS	Pipe mounting kit; includes stainless steel u-bolt for 2" pipe, (2) washers, and (2) nuts.

**Your Local Distributor is:**

Order from:

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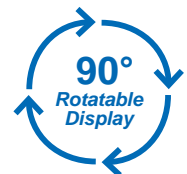
# PD6820

ProtEX-RTA Explosion-Proof Rate/Totalizer



FLOW RATE/TOTAL

- 4-20 mA Input Loop-Powered
- Modern, Sleek and Practical Enclosure
- 5-Digit, 0.7" (17.8 mm) Upper Display
- 7 Alphanumeric Character, 0.4" (10.2 mm) Lower Display
- 7-Digit Totalizer
- SafeTouch® Through-Glass Button Programming
- Password Protection
- 32-Point , Square Root, or Exponential Linearization
- Rate in Units per Second, Minute, Hour, or Day
- Open Collector Pulse or Alarm Output
- Loop or External DC-Powered Backlight Standard
- 3.0 V Drop (6.0 V with Backlight)
- Explosion-Proof, IP68, NEMA 4X Enclosure
- Flanges for Wall or Pipe Mounting
- HART® Protocol Transparent
- Operates from -40 to 75°C



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## PD6820 Analog Input Rate/Totalizer

Displays rate & total simultaneously



### Rate/Totalizer Displays



Flow Rate Indicator



Flow Totalizer



Rate & Total

### Easy to Setup



Programming



## OVERVIEW

The new ProtEX-RTA PD6820 explosion-proof rate/totalizer brings modern design, easy readability, and enhanced functionality to hazardous areas around the world in a way never seen before. Competitors have lost sight of the fact that the primary thing customers want to do with meters such as these is to look at them. Customers want a meter that looks nice so they can be proud to install it in their facility. They want a meter with a display that provides the important information about their process, can be seen under varied lighting conditions, from wide angles, and from a distance. The PD6820 delivers all these and more. Spend a few minutes reviewing the features described in the graphic above and you will see how!

## KEY FEATURES

### Informative & Easy to Read Display

The high contrast, backlight LCD display is easy to read from far away and under various lighting conditions. The upper display is 0.7" high and shows 5 digits of flow rate. The lower display is 0.4" high and shows either flow total or a tag with 7 alphanumeric characters. And best of all, the display is mounted right up against the glass so it can be seen from a wide viewing angle.

### Through-Glass SafeTouch® Buttons

The PD6820 is equipped with four sensors that operate as through-glass buttons so that it can be programmed and operated without removing the cover (and exposing the electronics) in a hazardous area. These buttons can be disabled for security by selecting the LOCK setting on the switch located on the connector board in the base of the enclosure. To actuate a button, press one finger to the glass directly over the marked button area. When the cover is removed, four mechanical buttons located next to the sensors are used.

## Modern, Sleek and Practical Enclosure

The first thing customers notice about a product is its enclosure and the ProtEX-RTA really shines here. The copper-free (0.30%), smooth, die-cast aluminum NEMA 4X (IP68) enclosure is finished with a corrosion resistant epoxy coating that literally does make the ProtEX-RTA shine. The built-in mounting flanges make for convenient wall or pipe mounting and there is even a slot on the back of the enclosure for centering on the pipe. There are two ¾" NPT conduit holes for wiring.



Wide Viewing Angle

## Isolated Open Collector Output

The isolated open collector output on the PD6820 may be assigned for use with the alarm or totalizer (pulse output). The rating of the output is 30 VDC @ 150 mA max.

## Perfect & Secure Fit Every Time

The internal cast rails ensure the ProtEX assemblies together perfectly, quickly and securely; and everything lines up for optimal viewing every time. There are no standoffs to worry about breaking or getting out of alignment. Two spring-loaded, self-retaining, thumbscrews make the assembly a snap, while pressing the LCD as close to the glass as possible to improve wide angle viewing.

## TOTALIZER CAPABILITIES

### Totalizer Pulse Output

The totalizer pulse output function requires use of the open collector output. It will output a pulse at a user adjustable pulse rate, and can be scaled with a K-factor of between 0.0001 and 99999. Example: For 1 pulse every 500 gallons, set the K-factor to 500. This output can be sent to a PLC or counter.

### Totalizer Conversion Factor

Total Conversion Factor is used to convert to a different unit of measure for the total display. For example, to display rate in gallons and total in liters, enter a conversion factor of 3.7854. When rate and total units are the same, the Conversion Factor should be 1.0000.

### Total Reset

The total can be reset either manually via the front panel RESET button or external contact; or automatically using a programmed setpoint and delay time. Total reset can also be disabled.

## INPUT SIGNAL CONDITIONING

### Live Input Calibration

In lieu of meter scaling, the meter can be calibrated with a precision signal source. While applying a precision signal, the relative scale value is entered via the front panel. This is done at any two points along the scale. Using this method, the operator can set a "best fit straight line" for non-linear input spans.

### Multi-Point Linearizer

Up to 32 linearization points can be selected under the Linear function. The multi-point linearization can be used to linearize the display for non-linear signals such as those from level transmitters used to measure volume in odd-shaped tanks or to convert level to flow using weirs and flumes that require a complex exponent. These points are established via direct entry (SCALE) or with an external calibration signal (CAL).

### Square Root Extraction

The square root extraction function displays flow rate by extracting the square root from a differential pressure transmitter signal. The user selectable low-flow cutoff feature gives a reading of zero when the flow rate drops below a user selectable value.

### Programmable Exponent

The programmable exponent function is used to linearize the level signal in open channel flow applications using weirs and flumes and display flow rate & total, units of measure, or toggle between total and units of measure.

## ADDITIONAL FEATURES

### Password Protection

A 5-digit password prevents unauthorized changes to the programmed parameter settings. The lock symbol is displayed to show that settings are protected. If the meter is password protected, the meter will display the message LOCKED when the Menu button is pressed.

### Alarm Indication

The PD6820 can be configured to have a high or low rate alarm indicator, or a total alarm trip point indicator. The OC output is available for use as an alarm output. When in alarm mode, the display will flash, and a HI or LO symbol is displayed. The alarm has an adjustable deadband and is acknowledged by pressing the ENTER button.

## INSTALLATION

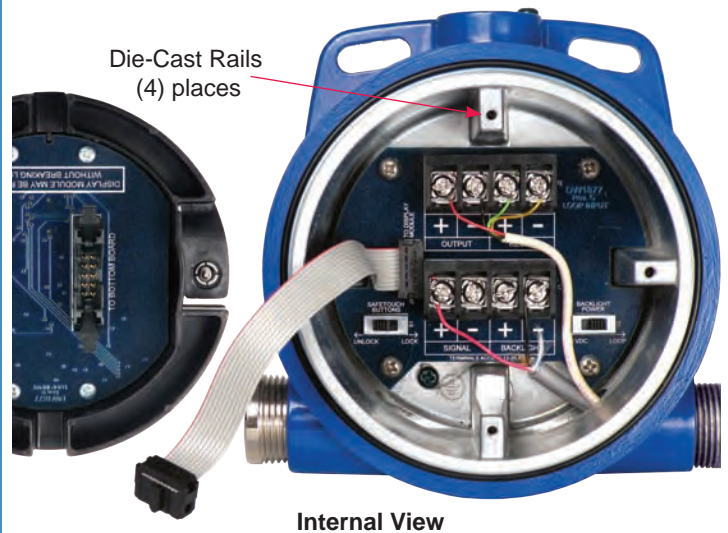
### Installation Flexibility

The PD6820's rotatable display/meter module along with two available conduit connections provide for numerous installation options. The display can be rotated in 90° increments. Rotate it 90° for horizontal mounting. Wiring can then be routed to either the top conduit connection, or from below to the opposite conduit connection (metal conduit plug supplied). Use both conduit connections for through-wiring in any plane.

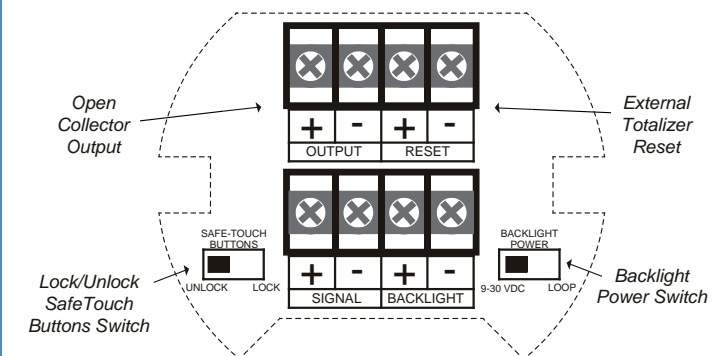


### Easy Wiring & Service

Unscrew the two captured thumb screws and unplug a connecting cable and the display/meter module is simply and completely removed. A heavy duty terminal block is then easily accessed and wired. It is clearly marked to prevent wiring errors. The display/meter module can be removed *without breaking the loop*. As such, it can be serviced without the need to uninstall the entire product.



## CONNECTIONS



See LIM6820 manual for wiring instructions

## SPECIFICATIONS

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

### General

**Display:** Upper: Five digits (-9,999 to 99,999) 0.70" (17.8 mm) high, 7-segment, automatic lead zero blanking. Lower: Seven characters 0.4" (10.2 mm) high, 14 segment alphanumeric. Symbols: for high & low alarm, password lock. Backlight: white

**Display Update Rate:** Ambient > -25°C: 2 Updates/Second.

Ambient < -25°C: 1 Update/5 Seconds

### Externally Powered Backlight:

**Voltage Range:** 9-36 VDC

<b>Supply Voltage</b>	9 VDC	12 VDC	24 VDC	30 VDC
<b>Maximum Power</b>	0.2 W	0.25 W	0.5 W	0.75 W

**Display Orientation:** Display may be mounted at 90° increments up to 270° from default orientation.

**Overrange:** Display flashes 99,999

**Underrange:** Display flashes -9,999

**Programming Method:** Four SafeTouch® through-glass buttons when cover is installed. Four internal pushbuttons when cover is removed.

**Noise Filter:** Programmable Lo, Med, Hi, or Off

**Recalibration:** 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.

**Advanced Functions:** Live input calibration, linearization, square root, or programmable exponent

**Non-Volatile Memory:** All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

**Normal Mode Rejection:** 64 dB at 50/60 Hz

**Operating Temperature Range:** -40 to 75°C.

**Storage Temperature Range:** -40 to 85°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, corrosion resistant epoxy coating, color: blue. NEMA 4X, 7, & 9, IP68.

Copper-free (0.3%). Two ¾" NPT threaded conduit openings.

One ¾" NPT metal conduit plug with 12 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.

**Overall Dimensions:** 5.65" x 5.25" x 4.86" (W x H x D)

(144 mm x 133 mm x 124 mm)

**Weight:** 5.00 lbs (80 oz, 2.27 kg)

**Warranty:** 3 years parts and labor

### Input

**Input range:** 4-20 mA

**Accuracy:** ±0.03% of calibrated span ±1 count, square root & programmable exponent accuracy range: 10-100% of calibrated span.

**Temperature Drift:** 50 PPM/°C

**Decimal Point:** User selectable decimal point

**Calibration Range:** An error message will appear if input 1 and input 2 signals are too close together. Input Range: 4-20 mA. Minimum Span Input 1 & Input 2: 0.10 mA

**Maximum Voltage Drop:** 3.0 VDC @ 20 mA without loop-powered backlight. 6.0 VDC @ 20 mA with loop-powered backlight

**Equivalent Resistance:** 150 Ω @ 20 mA without loop-powered backlight. 300 Ω @ 20 mA with loop-powered backlight

**Input Overload:** Over current protection to 2 A max.

### Open Collector Output

**Rating:** Isolated open collector, 30 VDC @ 150 mA max.

**Alarm Output:** Assign as rate alarm or total alarm trip point.

**Deadband:** 0-100% FS, user selectable

**Acknowledge:** Front panel ENTER button resets output and screen indication.

**Pulse Output K-Factor:** K-factor programmable from 0.0001 to 99999.

**Pulse Output Frequency:** 2, 4, 8, 16, 32, 64, 128 Hz. Minimum pulse width: 3.9 ms @ 128 Hz. Maximum pulse width: 250 ms @ 2 Hz. Factory default pulse width: 31 ms @ 16 Hz

### Rate/Totalizer

**Rate Display:** 0 to 99,999 leading zero blanking

**Total Display:** 0 to 9,999,999 leading zero blanking

**Total Decimal Point:** Up to six decimal places or none: d.dddddd, d.ddddd, d.dddd d.dd, d.dd, d.d, or ddddddd

**Lower Display Configuration:** Can be programmed to display total, tag name/engineering units, or to alternate between them.

**Totalizer:** Calculates total based on rate, time base of second, minute, hour, or day, and field programmable multiplier; stored in non-volatile memory upon power loss.

**Totalizer Reset:** Via front panel SafeTouch® button, time delay, external contact closure, or protected

**Total Conversion Factor:** 0.000001 to 9,999,999

**Totalizer Rollover:** Display rolls over when display exceeds 9,999,999. Relay status reflects the displayed value.

**Total Reset Delay:** Programmable from 0 to 99,999 seconds

### Product Ratings & Approvals

**FM:** Explosion-proof for use in Class I, Division 1, Groups B, C, D.

Class II, Division 1, Groups E, F, G. Class III, Division 1; T6.

Class I, Zone 1, AEx d IIC T6 Gb. Zone 21, AEx tb IIIC T85°C.

Ta = -40 to 75°C. Enclosure: Type 4X & IP66.

Certificate number: 3040391

**ATEX:** II 2 G D. Ex d IIC T6 Gb.

Ex tb IIIC T85°C Db IP68.

Ta = -40 to 75°C.

Certificate number: Sira 10ATEX1116X

**CSA:** Class I, Division 1, Groups B, C, D.

Class II, Division 1, Groups E, F, G. Class III, Division 1; T6.

Class I, Zone 1, Ex d IIC T6.

Ta = -40 to 75°C. Enclosure: Type 4X & IP66.

Certificate number: 11 2325749

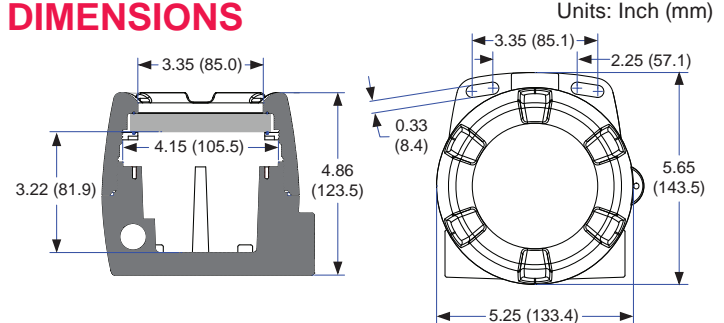
**IECEX:** Ex d IIC T6 Gb.

Ex tb IIIC T85°C Db IP68.

Ta = -40 to 75°C

Certificate number: IECEX SIR 10.0056X.

### DIMENSIONS



### ORDERING INFORMATION

ProtEX-RTA PD6820 • Analog Input Rate/Totalizer	
Model	Description
PD6820-0K1	PD6820 Analog Input Rate/Totalizer with Backlight

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# ProtEX-RTP PD6830

Dual-Line 5-Digit Explosion-Proof Pulse Input Rate/Totalizers

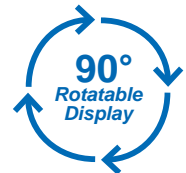
**ProtEX™**  
RTP



**SAFE TOUCH®**  
Through-Glass  
Button Programming

**FLOW RATE/TOTAL**

- Pulse, Open Collector, NPN, PNP, TTL, Switch Contact, Sine Wave (Coil), Square Wave, Opto-Isolated Inputs
- Explosion-Proof, IP68, NEMA 4X Enclosure
- 5-Digit 0.7" (17.8 mm) Top Display for Rate or Total
- 7 Alphanumeric Character 0.4" (10.2 mm) Lower Display for Rate, Total, Grand Total, Units, and Tag
- 13-Digit Totalizer with Total Overflow Feature
- SafeTouch® Through-Glass Button Programming
- Isolated 4-20 mA Output for Rate, Total, or Grand Total
- Two Isolated Open Collector Pulse Outputs, Up to 5 kHz
- Battery, DC, or Output Loop-Powered Models
- Gate Function for Rate Display of Slow Pulse Rates
- K-Factor, Scaling, or Live Input Calibration with 32-Point Linearization
- Automatic Rate, Total, and Grand Total Unit Conversions
- Password Protection
- Backlight Standard on All Models
- On-Board Data Logging
- Modbus® Communications RS-485 Option
- Flanges for Wall or Pipe Mounting
- Operates from -40 to 75°C



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# PD6830 ProtEX-RTP Explosion-Proof Pulse Input Rate/Totalizers

## PD6830 Pulse Input Rate/Totalizer

Mounts directly to flowmeter

Explosion-Proof  
Die-Cast Aluminum  
NEMA 4X Enclosure

Three 3/4" NPT  
Conduit Holes

SafeTouch®  
Menu Button

0.7" (17.8 mm)  
5-Digit

0.4" (10.2 mm)  
7-Character  
(Alphanumeric)

Engineering Units,  
Total, Rate, & More

SafeTouch®  
Reset or Right Arrow

Mounting Flanges  
(Up to 2 1/2" Pipe)



SafeTouch®  
Enter or  
Acknowledge Button

Rate/Total/Process  
Variable

Backlight Standard

Total/Grand Total,  
Battery, and Sleep  
Mode Icons

Alarm Indicator

Password Protection

SafeTouch®  
Max/Min or Up Arrow

Mechanical Buttons  
(4 Places)

3/4" NPT Flowmeter  
Connection

### Rate/Totalizer Displays



Flow Rate Indicator



Total Indicator



Rate & Total

### Easy to Setup



Input Programming Example



Through-Glass Button Programming

## OVERVIEW

The new ProtEX-RTP PD6830 Explosion-Proof Rate/Totalizer brings modern design, easy readability, and enhanced functionality to hazardous areas around the world in a way never seen before. Other meter designs have lost sight of the fact that the primary thing operators do with meters such as these is look at them. Operators want a meter with a display that provides the important information about their process, can be seen under various lighting conditions, from wide angles, and from a distance. The PD6830 delivers all these and more, with high performance and a sleek, modern look that managers can be proud to install in their facility. Spend a few minutes reviewing the features described in the graphic above and you will see how!

## KEY FEATURES

### Informative & Easy to Read Display

The high contrast, backlit LCD is easy to read from far away and under various lighting conditions. The upper display is 0.7" high and shows 5 digits of flow rate or total. The lower display is 0.4" high and shows either flow rate, total, grand total or a tag with 7 alphanumeric characters. Best of all, the display is mounted right up against the glass so it can be seen from a wide viewing angle.

### SafeTouch® Through-Glass Buttons

The PD6830 is equipped with four sensors that operate as through-glass buttons so that it can be programmed and operated without removing the cover (and exposing the electronics) in a hazardous area. These buttons can be disabled for security by selecting the OFF setting on the THRU-GLASS BUTTONS switch located on the back of the electronics module, inside the enclosure.

To actuate a button, press one finger to the glass directly over the marked button area. When the cover is removed, four mechanical buttons located next to the sensors are used.

To save power, and prevent unintended triggers, SafeTouch buttons enter a power saving mode after three minutes of inactivity. This mode is indicated by a pause symbol (⏸). To enable the SafeTouch buttons, press the MENU button for up to five seconds. The display will read AWAKE, and the SafeTouch buttons will be fully enabled.

### Modern, Sleek and Practical Enclosure

The first thing customers notice about a product is its enclosure and the PD6830 really shines here. The copper-free (0.30%), smooth, die-cast aluminum NEMA 4X (IP68) enclosure is finished with a corrosion resistant epoxy coating that literally does make the PD6830 shine. The built-in mounting flanges make for convenient wall or pipe mounting and there is even a slot on the back of the enclosure for centering on the pipe. There are two 3/4" NPT conduit holes for wiring and one 3/4" NPT hole for a flowmeter connection.

### Perfect & Secure Fit Every Time

The internal cast rails ensure the PD6830 assembles together perfectly, quickly and securely; and everything lines up for optimal viewing every time. There are no standoffs to worry about breaking or getting out of alignment. Two spring-loaded, self-retaining thumbscrews make the assembly a snap, while pressing the LCD as close to the glass as possible to improve wide angle viewing.

# PD6830 ProtEX-RTP Explosion-Proof Pulse Input Rate/Totalizers

## Wide Viewing Angle

Customers can't always look at the display from straight on, so the window and display module have been optimized to provide a wide viewing angle of approximately +/- 40°; nearly twice that of the competition! Remember, the PD6830 is designed to be looked at.



## TOTALIZER CAPABILITIES

### Display Total or Grand Total

The upper display shows the flow rate or 5-digit total. The bottom display can display 5-digit rate, 13-digit total or grand total, or a 7-character alphanumeric unit or tag. It is easy to switch between displaying the rate, total, or grand total. Press DISPLAY to change the lower display. The LCD will display a T when showing total, and a GT when showing the grand total.

### 13-Digit Total/Grand Total Overflow

The total and grand total may each display up to 13 digits on the lower, 7-digit display. To do this, the display enters overflow mode. The total and grand total will toggle between two displays as shown below.



6 Most Significant Digits

7 Least Significant Digits

### Displaying Grand Total of 2,015,497,892,002

The T or GT indicator on the display will flash to indicate overflow, and the 6 most significant digits (first 6 numbers of the total) are indicated with the overflow symbol as shown above.

### Total & Grand Total Reset

The total and grand total may be reset via the SafeTouch RESET button, mechanical button (cover off), an external contact closure (total only), or automatically via user-selectable preset value and time delay (1-99,999 sec). Manual reset may be disabled or protected by a password. Total and grand total are reset independently.

### Non-Resetable Grand Total Mode

The grand total may be configured to be a non-resetable grand total. *This is a permanent setting.* Configuring the grand total as a non-resetable grand total locks out all setup parameters that could be used to reset or change the setup of the grand total; including input selection, rate scaling, and conversion factors.

## Alternating Rate, Total, Unit, & Tag Displays

The meter can be configured so that the lower display automatically toggles between several displays, such as the total or grand total value, total or grand total units, and a custom assigned tag name. Rate and rate units, total units, or a custom tag may also be selected to toggle. The toggled values will display every 10 seconds for 1-5 seconds; as programmed.



Total on Bottom

Total Units on Bottom

### Bottom Display Alternating Total and Total Units

### Total On Top Line Display

A 5-digit total may be displayed on the top display, with various bottom displays including rate, grand total, units and tags.



Total on Top Display, Total Units on Bottom

For example, the top 5-digit display may display total, and the bottom display used for the full 7-digit or 13-digit grand total.

## METER CONFIGURATION

### Automatic K-Factor Unit Conversions

Most flowmeter manufacturers provide k-factor and k-factor units for the device. Enter the defined k-factor and units (i.e. pulses/gal), and the meter can automatically convert the rate, total, and grand total displays to any of 12 predefined units with four different rate time base selections and four different total multipliers. This allows you to display the units you want without the need to do math or enter additional conversion factors! Custom units can be entered which require a user defined conversion factor. The available predefined units are shown below.

Unit	Description	Unit	Description
GAL	Gallons	CYD	Cubic yards
L	Liters	CUF	Cubic feet
IGAL	Imperial gallons	CUIN	Cubic Inches
M3	Meters cubed	LBB	Liquid Barrels
BL	Barrels	BB	Beer barrels
BUSH	Bushels	HECL	Hectoliter

The rate time base is selectable in seconds, minutes, hours, or days.

The total and grand total may have a x1, x100 (h), x1000 (k), or x1,000,000 (M) multiplier to prevent rollover. For example, a total unit of gallons, and a multiple of x1,000,000 (1x10^6) will display total in mega-gallons (MGAL). Totals are automatically recalculated when changing between predefined units.

## Custom Display Conversion Factors

Displaying rate and total in desired units is fast, requiring no math or conversion factors, regardless of the k-factor defined by the flowmeter manufacturer. The PD6830 automatically performs all unit conversions.

Configuration Steps	Example 1	Example 2
1. Enter flowmeter k-factor and k-factor units. This is defined by the flowmeter manufacturer	45 Pulses/Gal	12 Pulses/Liter
2. Select display rate unit and time base from available preset options.	Liters/Sec	Barrels/Min
3. Select total units and optional multiplier.	Megaliters	Barrels

Programming the meter in *Example 1* above accepts a flowmeter signal defined in pulses/gallon and displays rate in Liters/second and total in Megaliters. No calculations were required, just a few settings with clearly labeled menu selections!

*Example 1 Meter Displays:*



Rate & Total

Flow Rate Units

Total Units

## Custom Scaling and Live Input Calibration

In lieu of K-Factor setup, the meter can be scaled to any span relative to the input pulse rate span (i.e. if you knew the pulse input span for gallons but wanted to display the rate and total in liters). No external signal is required. Live input calibration can also be performed. This is done at any two points along the scale. Using this method, an operator can set a “best fit straight line” for non-linear input spans.

## Multi-Point Linearization

Up to 32 linearization points can be selected under the Scale function. The multi-point linearization can be used to linearize the display for non-linear signals such as non-linear flows, and for end-point correction on flow meters. These points are established via direct entry (SCALE) or with an external calibration signal (CAL).

## Customizable Menu Structure

The top-level programming menus are fully customizable. The menus available by default when pressing the MENU button are Setup and Advanced. These menus may be removed, or additional parameters added, to customize the programming menu for easier operation and enhanced programming security.

## ADDITIONAL FEATURES

### Pulse to 4-20 mA Retransmission

Use the analog output to retransmit the pulse input signal in the commonly used 4-20 mA form. This feature is available on the PD6830's -APA, -BMA, -BTA, -CTB, and -DTB models. The 4-20 mA output can be scaled to represent all, or part, of the actual input span.

## Open Collector Outputs

The PD6830 has two open collector outputs standard. Open collector pulse outputs Out 1 and Out 2 are individually programmable for rate, total, or grand total alarms; rate, total, or grand total pulse outputs; retransmitting of pulse inputs; quadrature paired output; or constant timed pulse output.

## Wide Input Signal Selection

The PD6830 is designed to handle a wide variety of inputs, including: pulse, open collector, NPN, PNP, TTL, or switch contact up to a 64 kHz rate. It can readily discern inputs with pulse widths as small as 5 μs. Inputs are conveniently set up on the display module by simply moving a switch to the desired option. The voltage input offers up to 500 V of isolation.

## Gate Function for Slow or Unsteady Pulses

The gate function allows for a rate display of slow or unsteady pulse rates. Using the programmable gate, the meter is able to display pulse rates as slow as 1 pulse every 9,999 seconds (0.0001 Hz). The gate function can also be used to obtain a steady display reading with a fluctuating input signal. There are two settings for the Gate, low gate and high gate.

## Settings Password Protection

A 5-digit password prevents unauthorized changes to the programmed parameter settings. The lock symbol is displayed to show that settings are protected. If the meter is password protected, the meter will display the message PASS LOCKED when the MENU button is pressed.



## Alarm Indication

The PD6830 has LCD indicators to alert the operator when an alarm condition is in effect.



## Save Backup & Backup Restore

The backup restore feature is used to save and restore programmed settings. This is useful to restore meters whose programming has been altered in unknown ways, or to quickly restore known good settings if mistakes are made during reprogramming. The load feature will not affect the current password settings, or allow the editing of permanently locked parameters due to the enabling of the non-resettable grand total feature.



## FLEXI-POWERED

There are PD6830 models that can be powered by battery, DC with battery backup, DC only, the output-loop, or the output loop with battery backup. Under nominal battery operating conditions, the battery life is approximately 5 years. As an unused backup, the life is the shelf-life of the battery (up to 20 years). When powering the PD6830-CTB or -DTB by the output loop, the output load impedance must not exceed 30 VDC excitation (See Specifications for details).

## Battery Backup

Any ProtEX-RTP model with a battery may use the battery as a battery backup. As a battery backup, the primary power source is supplied by either DC power or the output loop; depending on the model. The battery is installed during battery backup operation. If there is a power failure of the primary power source, the battery will instantly take over powering the meter. There will be no interruption in the display, and no information will be lost.

## Battery Status Indication

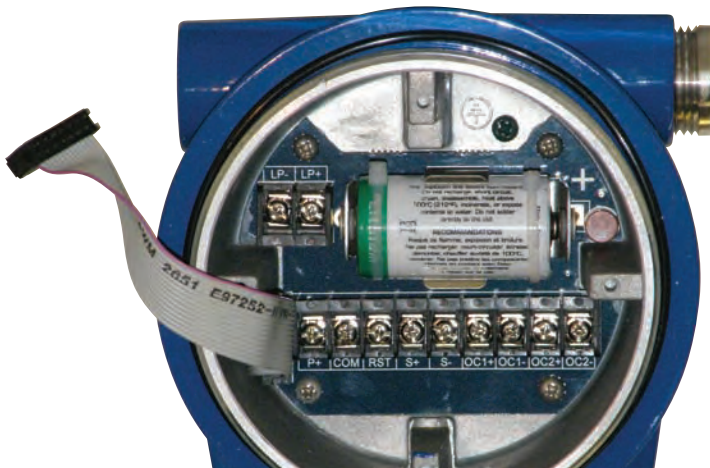
A battery indicator on the LCD alerts the user to the power status of the PD6830. If powered on with a battery, the battery indicator appears and will flash when a battery replacement is necessary. When the battery is being used as a battery backup, the battery symbol will appear if the primary power source fails, and the meter is being powered by the battery.

## Power Smart Backlight

The meter backlight saves power and extends battery life by automatically detecting the power source and entering a power-save mode when battery powered. When the backlight is enabled and powered by a DC source or the output loop, the backlight remains on. When battery power is detected, the backlight automatically adjusts to be on momentarily, activating whenever a button activation is detected, and turning off after a short time when no button activation is detected.

## Designed for Long Battery Life

The PD6830 is designed with power savings in mind to help extend battery life. Power saving features include a low power "sleep" mode for the SafeTouch buttons and momentary battery-powered backlight. These power saving features extend battery life to up to 7.5 years. Low power drain from the battery when being used as a battery backup extends the recommended replacement interval to 10 years. See Specifications for additional battery life details.



## INSTALLATION

### Direct Mounting

The PD6830 is designed to easily mount directly to a flowmeter. The example below shows it mounted to a turbine flowmeter. This particular ProtEX-RTP model (BM0) is battery-powered. Even though battery-powered, it does have a backlight; but to conserve battery power, it only turns on while SafeTouch® buttons are in use.



### Installation Flexibility

The PD6830's rotatable display, along with three available conduit connections, provide for numerous installation options. The display can be rotated in 90° increments. Rotate it 90° for horizontal mounting. Wiring can be routed to the most convenient conduit connection(s). One metal conduit plug is supplied per unit. Additional plugs are available (PDAPLUG75) if needed.



### Easy Wiring & Service

Field wiring is made to easily accessible screw terminal blocks at the base of the enclosure and there is plenty of room inside the enclosure to do the wiring. The terminal blocks are clearly marked to ensure proper wiring. The meter module connects to a detachable ribbon cable so that it can be easily removed for service, while keeping all the field wiring intact.

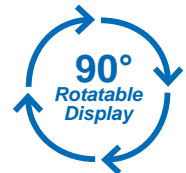
# ProtEX-RTP PD6830

Dual-Line 5-Digit Explosion-Proof Pulse Input Rate/Totalizers



FLOW RATE/TOTAL

- Pulse, Open Collector, NPN, PNP, TTL, Switch Contact, Sine Wave (Coil), Square Wave, Opto-Isolated Inputs
- Explosion-Proof, IP68, NEMA 4X Enclosure
- 5-Digit 0.7" (17.8 mm) Top Display for Rate or Total
- 7 Alphanumeric Character 0.4" (10.2 mm) Lower Display for Rate, Total, Grand Total, Units, and Tag
- 13-Digit Totalizer with Total Overflow Feature
- SafeTouch® Through-Glass Button Programming
- Isolated 4-20 mA Output for Rate, Total, or Grand Total
- Two Isolated Open Collector Pulse Outputs, Up to 5 kHz
- Battery, DC, or Output Loop-Powered Models
- Gate Function for Rate Display of Slow Pulse Rates
- K-Factor, Scaling, or Live Input Calibration with 32-Point Linearization
- Automatic Rate, Total, and Grand Total Unit Conversions
- Password Protection
- Backlight Standard on All Models
- On-Board Data Logging
- Modbus® Communications RS-485 Option
- Flanges for Wall or Pipe Mounting
- Operates from -40 to 75°C



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# PD6830 ProtEX-RTP Explosion-Proof Pulse Input Rate/Totalizers

## SPECIFICATIONS

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

### General

**Display:** Top: Five digits (0 to 99,999), 0.7" (17.8 mm) high, 7-segment, automatic lead zero blanking. Bottom: Seven characters, 0.4" (10.2 mm) high, 14-segment automatic lead zero blanking. Symbols: Total, grand total, battery power/low battery, high & low alarm, password lock, and SafeTouch button sleep mode/disable.

**Display Assignment:** Top Display: Rate or total; Bottom Display: Combinations of rate, total, grand total, units, and custom tag.

**Backlight:** White LED, 10 sec auto-off when battery powered.

Backlight deactivated below temperatures  $\approx -20^{\circ}\text{C}$

**Display Update Rate:** Ambient  $> -20^{\circ}\text{C}$ : 1 Update/Second.

Ambient  $< -20^{\circ}\text{C}$ : 1 Update/10 Seconds.

*Note: Update is dependent on gate settings.*

**Display Orientation:** Display may be mounted at  $90^{\circ}$  increments up to  $270^{\circ}$  from default orientation

**Overrange:** Display flashes 99,999

**Programming Method:** Four SafeTouch® through-glass buttons when cover is installed. Four internal pushbuttons when cover is removed.

**Recalibration:** Calibrated at the factory to read frequency in Hz. No recalibration required.

**Max/Min Display:** Max/Min readings reached by the process are stored until reset by the user or until power to the meter is cycled.

**Password Menu Options:** Three programmable password selections can be used for the following: restrict modification of settings, prevent resetting the total or grand total without the password, or permanently lock out the ability to change or reset the grand total or any grand total related settings (making a non-resettable grand total).

**Pass:** Restricts modifications of programmed settings to require re-entering the password to make changes.

**Pass T:** Restricts the reset of total to require re-entering the password.

Disables the manual mode reset contact.

**Pass GT:** Restricts the reset of grand total to require re-entering the password. May enable a non-resettable grand total and permanent lockout of grand total-related settings with a specific password.

**Alarm Indication:** Flashing display plus HI/LO indicators for rate alarms, SET for total alarms

**Non-Volatile Memory:** All programmed settings and total are stored in non-volatile memory for a minimum of ten years if power is lost.

**Power Options:** 9-30 VDC, 2.2 W max; 4-20 mA Output Powered, 30 VDC max; battery power; 9-30 VDC power with battery backup; 4-20 mA Output Powered with Battery Backup.

**Battery:** 3.6 V Primary Lithium (Li-SOCl<sub>2</sub>), non-rechargeable Model PDABAT36C. Expected service life & recommended replacement interval is dependant on the operating conditions.

#### Operating Condition

*No open collector outputs, SafeTouch buttons off, minimal backlight*

Service Life: 7.5 years Recommended Replacement: 5.5 years

*<100 Hz open collector outputs, minimal SafeTouch button and backlight*

Service Life: 5.5 years Recommended Replacement: 4 years

*<2 kHz open collector outputs, minimal SafeTouch button and backlight*

Service Life: 2.5 years Recommended Replacement: 2 years

*5 kHz open collector outputs, minimal SafeTouch button and backlight*

Service Life: 1.3 years Recommended Replacement: 1 year

*Backup power only*

Service Life: N/A Recommended Replacement: 10 years

**Isolation:** All models: 500 V opto-isolated input-to-power/output with isolated input enabled.

PD6830-APA: 500 V input/power-to-output

PD6830-BMA: 500 V input/power-to-output

PD6830-BTA: 500 V input-to-output.

*Note: Requires separate output supply*

**Data Logging:** Up to 1024 records, recorded 4/day at specific times or at defined time intervals. Record contains date, time, rate, total, grand total, and log number.

**Operating Temperature Range:** -40 to  $75^{\circ}\text{C}$

**Storage Temperature Range:** -40 to  $75^{\circ}\text{C}$ .

**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, corrosion resistant epoxy coating, color: blue. NEMA 4X, 7, & 9, IP68. Copper-free (0.3%). Three  $\frac{3}{4}$ " NPT threaded conduit openings. One  $\frac{3}{4}$ " NPT metal plug with 12 mm hex key fitting installed.

**Mounting:** May be mounted directly to conduit. Two slotted flanges for wall mounting or NPS  $1\frac{1}{2}$ " to  $2\frac{1}{2}$ " or DN 40 to 65 mm pipe mounting.

**Overall Dimensions:** 5.67" x 5.24" x 4.88" (W x H x D)  
(144 mm x 133 mm x 124 mm)

**Weight:** 5.00 lbs (80 oz, 2.27 kg)

**Warranty:** 3 years parts and labor

### Rate Input

**Pulse Input:** Field selectable; Sourcing or sinking pulse or square wave 0-5 V, 0-12 V, or 0-24 V; TTL; NPN or PNP transistor; Open collector 100 k $\Omega$  pull-up to 3 V; Switch contact 100 k $\Omega$  pull-up to 3 V; PNP transistor 100 k $\Omega$  pull-down to ground (COM); Active input 100 k $\Omega$  to battery level, 10 k $\Omega$  to power. Maximum Frequency: 64 kHz. Minimum Pulse Width: 5  $\mu\text{s}$ . Thresholds selectable as normal or hi.

Threshold Setting	Low (V)	High (V)
Normal	1.2	2.0
Low	0.2	1.2

**Opto-Isolated Input:** Sourcing or sinking pulse or square wave 0-5 V, 0-12 V, or 0-24 V; Logic High: 2-24 V, Logic Low:  $< 1\text{ V}$ .

Maximum Frequency: 20 kHz

Minimum Pulse Width: 20  $\mu\text{s}$ .

Input Current: 1 mA @ 5 V, 2.5 mA @ 12 V, 5 mA @ 24 V

**Low Voltage Mag Pickup Input:** Sensitivity: 20 mVp-p to 24 Vp-p.

Maximum Frequency: 6 kHz

**Minimum Input Frequency:** 0.0001 Hz. Minimum frequency is dependent on high gate setting (rate display).

**Input Impedance:** Pulse input: Greater than 75 k $\Omega$  @ 1 kHz.

Open collector/switch input: 100 k $\Omega$  pull-up to 3 V.

**Input K-Factor Units:** Gallons, liters, imperial gallons, cubic meters, barrels, bushels, cubic yards, cubic feet, cubic inches, liquid barrels, beer barrels, hectoliters, or custom.

**K-Factor:** Field programmable K-Factor used to define custom input units. May be programmed from 0.000001 to 9,999,999 pulses/unit.

**Accuracy:**  $\pm 0.03\%$  of calibrated span  $\pm 1$  count

**Temperature Drift:** Rate display is not affected by changes in temperature.

**Low-Flow Cutoff:** 0-99,999 (0 disables cutoff function)

**Decimal Point:** Up to four decimal places or none: 4.4444, 33.333, 222.22, 1111.1, or 00000

**Calibration:** May be calibrated using K-Factor, scale without signal source, or by applying an external calibration signal.

**Calibration Range:** Input 1 signal must be  $\geq 1\text{ Hz}$ ; input 2 signal may be set anywhere above input 1 setting.

Minimum input span is 1 Hz.

An Error message will appear if the input 1 and input 2 signals are too close together.

**Input Contact Debounce Filter:** Programmable. Input signal frequency speed selections of Hi (no filter), Med (250 Hz max input, 31 ms pulse width), and Low. (100 Hz max input, 12 ms minimum pulse width).

**Time Base:** Second, minute, hour, or day

**Gate:** Low gate: 1-99 seconds; High gate: 2-9,999 seconds

### Rate/Totalizer

**Display Assignment:** The Top display is assigned to rate or total. The Bottom display is programmable to display total; total and units; total and tag; total, total units, and rate units; grand total; grand total and grand total units; grand total and tag; grand total, grand total units, and rate units; rate units; rate; rate and total units; rate and rate units; rate and tag; rate units; total units; a custom tag; or be off (blank).

**Rate Display Units:** Gallons, liters, imperial gallons, cubic meters, barrels, bushels, cubic yards, cubic feet, cubic inches, liquid barrels, beer barrels, hectoliters, or custom.

**Rate Display Time Base:** Display rate may be calculated in terms of units per second, minute, hour, or day

**Total/Grand Total Display Units:** Gallons, liters, imperial gallons, cubic meters, barrels, bushels, cubic yards, cubic feet, cubic inches, liquid barrels, beer barrels, hectoliters, or custom. Setting is independent for each.

# PD6830 ProtEX-RTP Explosion-Proof Pulse Input Rate/Totalizers

**Total/Grand Total Display Unit Multiplier:** x1, x100 (h), x1000 (k), or x1,000,000 (M) multiplier (and prefix) applied to total or grand total display units. Setting is independent for each.

**Total/Grand Total Decimal Points:** Up to six decimal places or none: 6.666666, 55.55555, 444.4444, 3333.333, 22222.22, 111111.1 or 0000000. Total and grand total decimal points are independently programmed, and are independent of rate decimal point.

**Totalizers:** Calculates total and grand total based on rate and field programmable multiplier to display total in engineering units. Time base must be selected according to the time units in which the rate is displayed. The total and grand total utilize the same time base, with different conversion factors and resets.

**Totalizer Reset:** Via SafeTouch® RESET button, mechanical button (cover off), external contact closure (total only), automatically via user selectable preset value and time delay (1 – 99,999 sec). Manual reset may be disabled or protected by password for the total and grand total. Total and grand total reset independently.

**Total Overflow & Rollover:** The total can display up to 9,999,999,999,999. Up to 9,999,999 can be displayed on the lower display normally. An overflow display will toggle between the first six digits and last seven digits (999999 <-> 9999999) for a 13-digit total. The total will rollover beyond thirteen digits. The T indicator on the display will flash to indicate total overflow, and the six most significant digits (first six numbers of the total) are indicated with the flashing overflow symbol.

**Grand Total Overflow & Rollover:** The grand total can display up to 9,999,999,999,999. Up to 9,999,999 can be displayed on the lower display normally. An overflow display will toggle between the first six digits and last seven digits (999999 <-> 9999999) for a 13-digit total. The grand total will rollover beyond thirteen digits. The GT indicator on the display will flash to indicate grand total overflow, and the six most significant digits (first six numbers of the grand total) are indicated with the flashing overflow symbol.

**External Reset Contact:** External total reset connections are made between RST and COM. Logic High: 1.4 V, 3.3V max; Logic Low: < 0.8 V. 32 ms debounce.

## 4-20 mA Transmitter Output

**Output Source:** Rate/process, total, grand total, or disabled.

**Scaling Range:** 4.000 to 20.000 mA for any display range.

**Calibration:** Factory calibrated: 0.0 to 1000.0 = 4-20 mA output

**Underrange:** 3.8 mA

**Overrange:** Display Overrange: 20.5 mA, Output Overrange: 20.5 mA

**Accuracy:** ± 0.05% span ± 0.004 mA

**Temperature Drift:** 0.8 µA/°C max from -40 to 75°C ambient

**External Loop Power Supply:** 30 VDC maximum

**Output Loop Resistance:** 24 VDC, 10-750 Ω; 30 VDC 100-1100 Ω

Note: loop-powered backlight subtracts 150 Ω from maximum resistance figures above.

## Open Collector Outputs

**Output Assignment:** Two open collector pulse outputs Out 1 and Out 2. Individually programmable for rate, total, or grand total alarms; rate, total, or grand total pulse outputs; or retransmitting of pulse inputs; constant timed pulse output; quadrature outputs (requires Out 1 and Out 2); or off.

**Rating:** Isolated open collector, off: 24 VDC max; on: <1V @ 150 mA max.

**Alarm Outputs:** Assign to rate for high or low alarm trip point.

Assign to total or grand total for total or grand total summation alarms.

**Alarm Deadband:** 0-100% FS, user selectable

**Alarm Acknowledge:** ACK button resets output and LCD indication.

**Pulse Output K-Factor (Count):** K-factor (count) programmable from 0.000001 to 9999999. Rate pulses are generated as a scaled output of the rate input with one output pulse per K-factor (count) number of input pulses. Total and grand total pulses are generated for every total or grand total increment selected. (e.g. K factor value of 100 will generate one pulse every time the total is incremented by 100 units)

Rate retransmission pulses one to one for input pulses, up to maximum output speed. K-factor is not used for retransmitting outputs.

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**Pulse Output Maximum Frequency:** 5 kHz; 50% duty cycle.

If the maximum would be exceeded, the meter will display *PULSE OVERRANGE*.

**Pulse Rate Retransmit Output:** The output will generate 100 to 130 us pulses at the falling edge of every input pulse.

**Maximum retransmit frequency:** 5 kHz.

**Quadrature Output:** Output set to quadrature will lag the other pulse output by 90° (1/4 duty cycle) at output frequency. Minimum 1 Hz

**Timer Output:** Programmable on and off time, repeating cycle. Minimum period 0.1 second, maximum 100,000 seconds. Minimum pulse time 0.01 second, maximum 10,000 seconds.

## Serial Communications

**Protocol:** 2-Wire RS-485 with Modbus® RTU. Isolation optional.

**Master Address/Slave ID:** 1 - 247

**Baud Rate:** 1,200; 2,400; 4,800; 9,600; 19,200; 38,400; 57,600; or 115,200 bps

**Transmit Time Delay:** Programmable between 0 and 199 ms

**Parity/Stop Bit:** Even, odd, none with 1 stop bit, or none with 2 stop bits

**Byte-to-Byte Timeout:** Max of 1.5 character times or 750 µs

Note: Refer to Modbus Register Tables at [www.predig.com](http://www.predig.com) for details.

## Product Ratings & Approvals

**FM:** Explosion-proof for use in Class I, Division 1, Groups B, C, D. Class II, Division 1, Groups E, F, G. Class III, Division 1; T6. Class I, Zone 1, AEx d IIC T6 Gb. Zone 21, AEx tb IIIC T85°C. Ta = -40 to 75°C.

Enclosure: Type 4X & IP66.

**ATEX:** II 2 G D. Ex d IIC T6 Gb. Ex tb IIIC T85°C Db IP68.

Ta = -40 to 75°C.

**IECEx:** Ex d IIC T6 Gb. Ex tb IIIC T85°C Db IP68.

Ta = -40 to 75°C

**CSA:** Class I, Division 1, Groups B, C, D. Class II, Division 1, Groups E, F, G. Class III, Division 1; T6. Class I, Zone 1, Ex d IIC T6.

Ta = -40 to 75°C. Enclosure: Type 4X & IP66.

## ORDERING INFORMATION

ProtEX-RTP PD6830 • Pulse Input Rate/Totalizer	
Model	Description
PD6830-AP0-0	DC powered
PD6830-APA-0	DC powered with isolated loop output
PD6830-BM0-0	Battery powered (or DC with battery backup*)
PD6830-BMA-0	Battery powered (or DC with battery backup*) with isolated loop output
PD6830-BTA-0	Battery powered (or DC with battery backup*) with output loop-powered backlight and isolated loop output
PD6830-CTB-0	Output loop powered with loop output
PD6830-DTB-0	Output loop with battery backup* (or battery powered) with loop output
-M Option	2-wire RS-485 connection with Modbus protocol.** Replace ending -0 in part number with -M. Not available on -CTB or -DTB model. (Example: PD6830-APA-M)
-I Option	Isolated signal 2-wire RS-485 with Modbus protocol.** Replace ending -0 in part number with -I. Not available on -CTB or -DTB model. (Example: PD6830-APA-I)

\* Battery will provide backup power when other power supply is lost.

\*\*RS-485 communication functions only when powered by DC.

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# PD6830X ProtEX Super Snooper

Dual-Line 5-Digit Explosion-Proof Modbus® Scanners

ProtEX-MS2



ProtEX-MFI

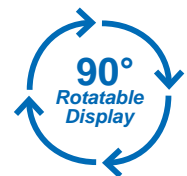


APPROVED



MODBUS SCANNER

- Modbus® Master, Slave, or Snooper Mode
- Scan up to 16 Modbus Process Variables
- 5-Digit Decimal or Feet & Inches Level Display
- 7 Alphanumeric Character 0.4" (10.2 mm) Lower Display for Process Variables, Custom Units, and Tags
- Independent Scaling, Tag, and Unit for Each PV
- On-Board Three-Wire RS-485 with Modbus
- Explosion-Proof, IP68, NEMA 4X Enclosure
- SafeTouch® Through-Glass Button Programming
- Two Isolated Pulse Outputs Standard, Up to 5 kHz
- Isolated 4-20 mA Output Option
- Pulse Input for Rate, Total, and Grand Total
- 13-Digit Totalizer with Total Overflow Feature
- Automatic Rate, Total, and Grand Total Unit Conversions
- Password Protection
- Backlight Standard on All Models
- Operates from -40 to 75°C
- Data Logging Functions and Modbus Accessible Data



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PRECISION DIGITAL CORPORATION

# PD6830X ProtEX Explosion-Proof Modbus Scanner

## PD6830X Modbus Scanner

Easily Connects to Existing Modbus Networks

Explosion-Proof Die-Cast Aluminum NEMA 4X Enclosure

Three 3/4" NPT Conduit Holes

SafeTouch Menu Button

0.7" (17.8 mm) 5-Digit

0.4" (10.2 mm) 7-Character (Alphanumeric)

Engineering Units, Total, Rate, & More

SafeTouch Prev or Right Arrow

Mounting Flanges (Up to 2 1/2" Pipe)

 Through-Glass Button Programming



**ProtEX**<sup>TM</sup>



SafeTouch® Enter, Scan or Acknowledge Button

Rate/Total/Process Variable

Backlight Standard

Total/Grand Total, Battery, and Sleep Mode Icons

Alarm Indicator

Password Protection

SafeTouch Next or Up Arrow

Mechanical Buttons (4 Places)

3/4" NPT Flowmeter Connection

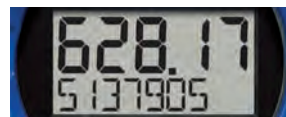
### Scanner Displays



Modbus Variable with Tag



Modbus Variable with Unit



Dual Modbus Variables

### Level Display Model (-L)



Feet & Inches LCD

## OVERVIEW

The explosion-proof ProtEX-MS2 and ProtEX-MFI Super Snoopers are serial input RS-485 Modbus® RTU scanners. These Modbus devices are ideal for hazardous areas or safe areas in need of a rugged solution. The ProtEX-MS2 has a two-line decimal display. The ProtEX-MFI top line displays level in feet and inches up to 399 ft, 11 and 15/16 inches. It includes a 20-segment tank level indicator.

Each can accept up to 16 Modbus process variables (PVs), from up to 16 devices. The scanners automatically cycle through the PVs, with the ability to manually cycle PVs or pause scanning.

A flow meter pulse input for rate, total, and grand total is standard. The total and grand total can display up to 13 digits with the total overflow feature.

Up to four math channels (CV1-CV4) may be used to perform math functions on any of the input variables. Math functions include sum, difference, weighted average, ratio and more. Nested math functions may be used in these math equations, allowing for complex math formulas.

The display is programmable to show any input, math channel, units, or tags, on a variety of display combinations between the top and bottom displays.

Standard features include SafeTouch® through-glass buttons for operating the scanner without removing the cover, a backlight that makes the display mode visible in any lighting condition, 512 points of input data logging, and two open collector pulse or alarm outputs. A 4-20 mA output is available as an option.

The enclosure is provided with three threaded conduit holes and integrated pipe or wall mounting flanges. One conduit plug is installed, and included in the explosion-proof approvals.

## KEY FEATURES

The ProtEX Super Snoopers can be programmed as a Modbus RTU Master, Slave, or Snoopers. Its Modbus communications capabilities and math functions make it unique, while still maintaining the great quality and worldwide hazardous area approvals of the ProtEX family.

The PD6830X has isolated half-duplex RS-485 serial communications with a three position header for 3-wire (communications and ground) communication.

### Informative & Easy to Read Display

The high contrast, backlit LCD is easy to read from far away and under various lighting conditions. The upper display is 0.7" high and shows up to 5 digits. The lower display is 0.4" high and shows 7 alphanumeric characters ideal for dual PV display or as units and tags for the top display.

### Modbus RTU Serial Communications

As a Master, the scanner reads up to 16 slave devices, scales the data from each, and indicates each on an alternating display. The scanner in Master Mode is capable of polling up to 16 process variables (PVs). It shows each PV (PV1-PV16) alternately on the top and/or bottom display.

In Snoopers Mode, the scanner is able to read up to 16 variables being polled by the master by listening to the bus traffic. It picks up specific registers being polled by a master device from a specific slave device and processes the data being read. No other device on the Modbus network needs to be reprogrammed for the Snoopers Mode scanner to display data polled by the Modbus master.

As a Slave, the scanner is controlled by a master device. The data sent to it by the master is scaled, displayed, and used to operate the open collector and 4-20 mA outputs.

# PD6830X ProtEX Explosion-Proof Modbus Scanner

## Modbus Application Capabilities

The PD6830X scanners can communicate with any Modbus device using the ever-popular Modbus communications protocol. Take advantage of the Modbus capabilities in the level and flow transmitters you already have by using Master Mode to read more data, more accurately. Possible applications include:

- Use Master Mode to scan the top level, interface level, and temperature from Modbus multivariable level transmitters.
- Use Master Mode to display the flow rate, tag, and units, for multiple Modbus-enabled flow meters.
- Use Snooper Mode to add a tank side indicator at eye-level for a Modbus level transmitter being polled by a master in the control room.
- Use Snooper Mode to add additional remote displays to a network with a Modbus scanner acting as the master, and display the data at all operator locations.
- Use Slave Mode to display data sent to the scanner by a Modbus master in the control room.

These are just a few capabilities of using the PD6830X Modbus Scanners in a Modbus process network.

## Powerful Math Functions

The PD6830X includes a variety of math functions. Each of the four Math Channels (C1-C4) may be assigned a math function. The Math Channels may then be displayed, used to control outputs, or included in the data log, just as the Modbus PVs.

Math Function	Calculation	Setting
Addition	PAR1 + PAR2	SUM
Difference	PAR1 - PAR2	DIF
Multiplication	PAR1 * PAR2	MULTI
Division	PAR1 / PAR2	DIVIDE
Absolute diff.	Abs(PAR1 - PAR2)	DIFABS
Weighted avg.	((PAR1 - PAR2)*PAR3) + PAR2	WAVG
Draw	((PAR1 / PAR2) - 1) * PAR3	DRAW
Ratio	(PAR1 / PAR2) * PAR3	RATIO
Concentration	PAR1 / (PAR1 + PAR2) * PAR3	CONCEN
Constant	Constant value of 0.0001 to 99999	CONST
None	Disable	NONE
Absolute Value	Abs(PAR1)	ABS
Square Root	$\sqrt{\text{PAR1}}$	SQRT

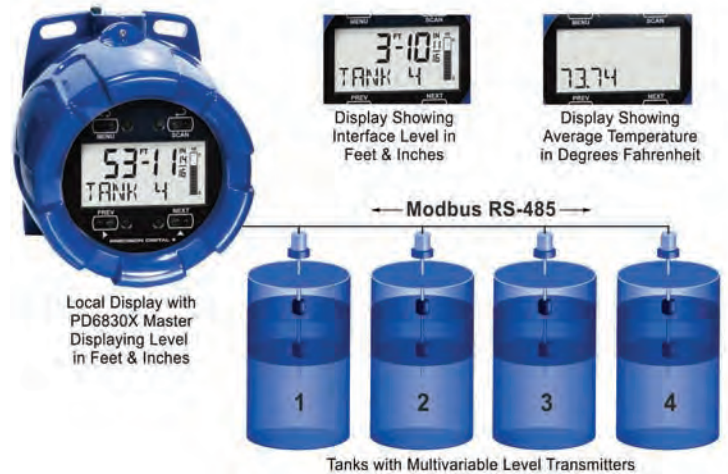
The Math Channels are configured by selecting a parameter (PAR) for each math function. For complex math needs, a nested math function may be selected for the parameter.

Parameter Name	Definition	Setting
Modbus PV1	The scaled PV1 value; PV2 to PV16 also selectable	PV 1
Math Channel CV1	The math channel CV1 value; CV2 to CV4 also selectable	CV 1
Rate	The pulse rate display rate value	RATE
Total	The total display value	TOTAL
Grand Total	The grand total display value	Gr TOTAL
Nested Math/Value	Any above math function or value	

## Modbus Scanner Example 1: Master Tank Level Indicator

The following example shows just one possible use for the PD6830X. The PD6830X is setup for Master mode, and is polling the Modbus transmitters.

In this application we have a system consisting of (4) MTS M-Series multivariable tank level gauges connected to a PD6830-AX0-I-L displaying product level and interface level in feet and inches, and average temperature in °F. The tank level indicator displays the level and interface for each tank as the PVs are scanned.

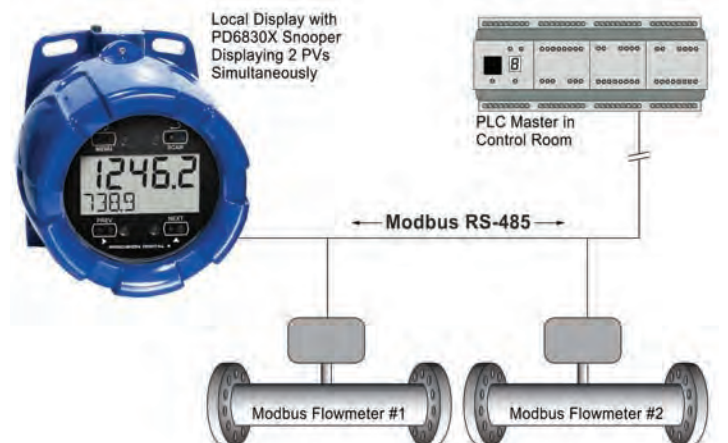


For a two line decimal display showing units of inches, feet, or meters, a PD6830-AX0-I-2 could be considered for this application.

## Modbus Scanner Example 2: Snooper Flowmeter Display

In this application, a system consisting of (2) Modbus enabled flowmeters are connected to a SCADA system operated out of a control room. A Modbus PLC polls the data out of the flowmeters. A PD6830-AX0-I-2 has been added to the system as a Modbus Snooper, to provide the operators an easy to read field display near the flow lines.

The scanner displays one flow rate on the top display, and one on the bottom display. Each has an alternating tag and unit for clear identification.



# PD6830X ProtEX Explosion-Proof Modbus Scanner

## SafeTouch® Through-Glass Buttons

The PD6830X is equipped with four sensors that operate as through-glass buttons so that it can be programmed and operated without removing the cover (and exposing the electronics) in a hazardous area. These buttons can be disabled for security by selecting the OFF setting on the THRU-GLASS BUTTONS switch located on the back of the electronics module, inside the enclosure.

To actuate a button, press one finger to the glass directly over the marked button area. When the cover is removed, four mechanical buttons located next to the sensors are used.

To save power, and prevent unintended triggers, SafeTouch buttons enter a power saving mode after three minutes of inactivity. This mode is indicated by a pause symbol (⏸). To enable the SafeTouch buttons, press the MENU button for up to five seconds. The display will read AWAKE, and the SafeTouch buttons will be fully enabled.

## Wide Viewing Angle

Operators can't always look at the display from straight on, so the window and display module have been optimized to provide a wide viewing angle of approximately +/- 40°; nearly twice that of the competition! Remember, the PD6830X is designed to be seen.



## Modern, Sleek and Practical Enclosure

The first thing operators notice about a product is its enclosure and the PD6830X really shines here. The copper-free (0.30%), smooth, die-cast aluminum NEMA 4X (IP68) enclosure is finished with a corrosion resistant epoxy coating that literally does make the PD6830X shine. The built-in mounting flanges make for convenient wall or pipe mounting and there is even a slot on the back of the enclosure for centering on the pipe. There are two 3/4" NPT conduit holes for wiring and one 3/4" NPT hole for a flowmeter connection.

## Customizable Menu Structure

The top-level programming menus are fully customizable. The menus available by default when pressing the MENU button are Setup and Advanced. These menus may be removed, or additional parameters added, to customize the programming menu for easier operation and enhanced programming security.

## PULSE INPUT RATE/TOTALIZER

The ProtEX PD6830X Super Snoopers include a pulse input for use with pulse output flowmeters. This allows a pulse flowmeter to be seamlessly added to the same display that shows Modbus transmitter information. Rate, total, and grand total may be displayed for the pulse input flowmeter in addition to the 16 Modbus process variables.

## Wide Input Signal Selection

The PD6830X is designed to handle a wide variety of inputs, including: pulse, open collector, NPN, PNP, TTL, or switch contact up to a 64 kHz rate. It can readily discern inputs with pulse widths as small as 5 µs. Inputs are conveniently set up on the display module by simply moving a switch to the desired option. The voltage input offers up to 500 V of isolation.

## Display Rate, Total, or Grand Total

The upper display shows the flow rate or 5-digit total or grand total. The bottom display can display 5-digit rate, 13-digit total or grand total, or a 7-character alphanumeric unit or tag. The scanner can display the pulse input rate, total, and grand total in addition to Modbus PVs and math channels. The overflow feature allows for 13 digits of total or grand total on the lower display by toggling between the 6 most significant digits, and the 7 least significant digits.

## Total & Grand Total Reset

The total and grand total may be reset via an external contact closure (total only), or automatically via user-selectable preset value and time delay (1–99,999 sec). Manual reset may be disabled or protected by a password. Total and grand total are reset independently.

## Non-Resettable Grand Total Mode

The grand total may be configured to be a non-resettable grand total. *This is a permanent setting.* Configuring the grand total as a non-resettable grand total locks out all setup parameters that could be used to reset or change the setup of the grand total; including input selection, rate scaling, and conversion factors.

## Automatic K-Factor Unit Conversions

Most flowmeter manufacturers provide k-factor and k-factor units for the device. Enter the defined k-factor and units (i.e. pulses/gal), and the meter can automatically convert the rate, total, and grand total displays to any of 12 predefined units shown below (with four different rate time base selections and four different total multipliers). This allows you to display the units you want without the need to do math or enter additional conversion factors! Custom units can be entered which require a user defined conversion factor.

Unit	Description	Unit	Description
GA	Gallons	CY	Cubic yards
L	Liters	CF	Cubic feet
IGA	Imperial gallons	CUIN	Cubic Inches
M3	Meters cubed	LBB	Liquid Barrels
BB	Barrels	BBB	Beer barrels
BUSH	Bushels	HECTL	Hectoliter

The rate time base is selectable in seconds, minutes, hours, or days.

The total and grand total may have a x1, x100 (h), x1000 (k), or x1,000,000 (m) multiplier to prevent rollover. For example, a total unit of gallons, and a multiple of x1,000,000 (1x10^6) will display total in mega-gallons (MGA). Totals are automatically recalculated when changing between predefined units.



## Gate Function for Slow or Unsteady Pulses

The gate function allows for a rate display of slow or unsteady pulse rates. Using the programmable gate, the meter is able to display pulse rates as slow as 1 pulse every 9,999 seconds (0.0001 Hz). The gate function can also be used to obtain a steady display reading with a fluctuating input signal. There are two settings for the Gate, low gate and high gate.

## Multi-Point Linearization

Up to 32 linearization points can be selected under the Scale function. The multi-point linearization can be used to linearize the display for non-linear signals such as non-linear flows, and for end-point correction on flow meters. These points are established via direct entry (SCALE) or with an external calibration signal (EPL).

## ADDITIONAL FEATURES

### 4-20 mA Retransmission

Use the analog output to retransmit a Modbus PV, math channel value, or the pulse input signal in the commonly used 4-20 mA form. This feature is available on the PD6830-AXA-I-2 and PD6830-AXA-I-L models.

The 4-20 mA output can be scaled to represent all, or part, of the actual display span.

### Open Collector Outputs

The PD6830X comes standard with two open collector outputs. Open collector pulse outputs (Out 1 and Out 2) are individually programmable for a Modbus PV, math channel, pulse input rate, total, or grand total alarms; rate, total, or grand total pulse outputs; retransmitting of pulse inputs; quadrature paired output; or constant timed pulse output.

### Save Backup & Backup Restore

The backup restore feature is used to save and restore programmed settings. This is useful to restore scanners whose programming has been altered in unknown ways, or to quickly restore known good settings if mistakes are made during reprogramming. The load feature will not affect the current password settings, or allow the editing of permanently locked parameters due to the enabling of the non-resettable grand total feature.

### Settings Password Protection

A 5-digit password prevents unauthorized changes to the programmed parameter settings. The lock symbol is displayed on decimal display models to show that settings are protected. If the scanner is password protected, the scanner will display the message LOCKED (LOCKED) when the MENU button is pressed.

## INSTALLATION

### Easy Wiring & Service

Field wiring is made to easily accessible screw terminal blocks at the base of the enclosure and there is plenty of room inside the enclosure to do the wiring. The terminal blocks are clearly marked to ensure proper wiring. The scanner module connects to a detachable ribbon cable so that it can be easily removed for service, while keeping all the field wiring intact.

## Installation Flexibility

The PD6830X's rotatable display, along with three available conduit connections, provide for numerous installation options. The display can be rotated in 90° increments. Rotate it 90° for horizontal mounting. Wiring can be routed to the most convenient conduit connection(s). One metal conduit plug is supplied per unit. Additional plugs are available (PDAPLUG75) if needed.



## DATA LOGGING

The PD6830X is capable of data logging up to 512 records, each containing date, time, and log number as well as rate, total, grand total or all enabled Modbus PVs and Math Channel CVs. This allows a total of 256 records of all enabled PVs and CVs and 256 records of rate, total, and grand total; or 512 records of only the enabled Modbus PVs and CVs if the pulse inputs are disabled.

### Real Time Logging

A real time clock records the date and time for each data log entry. The data may be recorded using the Log Time feature up to 4 times per day at a specific times entered by the user. When the log is full, it will roll over and continue to log, deleting the oldest data. The data may also be recorded using the Log Interval feature, recording the data every programmed time interval, from 1 minute to 24 hours. When the Interval log is full, recording will stop, keeping all data until logging is started again.

### On-Screen Access

The data log entries are viewable on the scanner LCD. Data points may be navigated by viewing the log number, date and time. A known log may be jumped to immediately, avoiding a lengthy search for data. With through-glass buttons and a customizable menu, the data log can be accessed quickly and without the need for external control stations or serial communications, for easy viewing in the field.

# PD6830X ProtEX Explosion-Proof Modbus Scanner

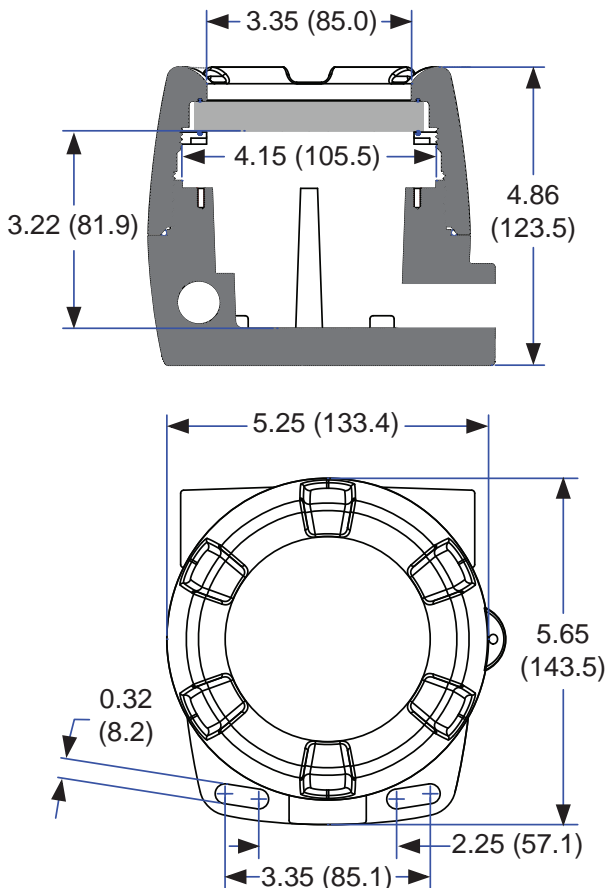
## CONNECTIONS

To access the wiring connections, remove the enclosure cover and unscrew the two captive screws that fasten the display module. Disconnect the ribbon cable and remove the display module. Power and signal connections are made to terminal blocks at the base of the enclosure. Grounding connections are made to the two ground screws provided on the base – one internal and one external.

Code	Description
D+	RS-485 data B (non-inverting)
D-	RS-485 data A (inverting)
G	RS-485 shield ground
P+	DC power positive terminal
COM	DC power return/negative, reset contact closure common
RST	Contact closure reset pull-up to 1.8 VDC
S+	Pulse input signal input positive terminal
S-	Pulse input signal input negative terminal
OC1+	Open collector output 1 positive terminal
OC1-	Open collector output 1 negative terminal
OC2+	Open collector output 2 positive terminal
OC2-	Open collector output 2 negative terminal
LP+	4-20 mA transmitter DC power positive terminal
LP-	4-20 mA transmitter regulated current output terminal

## DIMENSIONS

Units: Inch (mm)



## SPECIFICATIONS

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

### General

**Decimal Display:** Top Display: Five Digits (0 to 99999), 0.7" (17.8 mm) high, 7-segment, automatic lead zero blanking. Bottom Display: Seven Characters, 0.4" (10.2 mm) high, 14-segment, automatic lead zero blanking. Symbols: Total, grand total, high alarm, low alarm, SafeTouch button sleep mode/disable, password lock.

**Feet & Inches Display:** Top Display: 0.60" (15.2 mm) high, 0 to 399FT, 11<sup>15</sup>/<sub>16</sub> IN, 7-segment, programmable 1/16 or 1/8 fraction display. Bottom Display: Seven Characters, 0.4" (10.2 mm) high, 14-segment, 7-digits. Tank Level Indicator: 20-segments, F (Full) and E (Empty). Alarm Indication: High and low alarm. Backlight: White

**Display Assignment:** Top and Bottom Display\*: Process Variables (PV); Alternating PV and Units, Tag and PV, or Tag, PV, and Units; Pulse Input Rate, Total, or Grand Total with Alternating Tag. Bottom Display: All Top Display Options or Off. Units and tag independent for each PV, pulse input rate, total, and grand total. \*Note: On feet and inches display models, top display used only for level Modbus process variables or math channels.

**Backlight:** Backlight deactivated below temperatures ≈ -20°C

**Alarm Indication:** Flashing display plus HI/LO (alarm) or SET indicators

**Scan and Update Rate:** Ambient > -20°C: Modbus PV scan rate programmable from 2 to 99 seconds per PV. Tag and units programmable for 1 to 5 second alternation. Pulse input variables update 1/second. Rate update is dependent on gate settings. Ambient < -20°C: All Modbus scan, alternating units and tags, and pulse input variables update/10 seconds minimum.

**Underrange:** Upper Display: Decimal display flashes --9999. Level display flashes to 399FT 11 15/16 IN. Lower Display: Flashes --999999

**Overrange:** Upper Display: Decimal display flashes 99999. Level display flashes to 399FT 11 15/16 IN. Lower Display: Flashes 9999999

**Programming Methods:** Four SafeTouch® through-glass buttons when cover is installed. Four internal pushbuttons when cover is removed.

**Password Menu Options:** Three programmable password selections can be used for the following: restrict modification of settings, prevent resetting the total or grand total without the password, or permanently lock out the ability to change or reset the grand total or any grand total related settings (making a non-resettable grand total).

**Pass:** Restricts modifications of programmed settings to require re-entering the password to make changes.

**Pass T:** Restricts the reset of total to require re-entering the password. Disables the manual mode reset contact.

**Pass GT:** Restricts the reset of grand total to Require re-entering the password. May enable a non-resettable grand total and permanent lockout of grand total-related settings with a specific password.

**Input Power:** 9-30 VDC, 38 mA max. 2.2 W

**Data Logging:** Up to 512 records, recorded 4/day at specific times or at defined time intervals. Record contains first eight enabled Modbus PVs; C1-4 if enabled; date; time; pulse rate, total, and grand total with units; and log number.

**Isolation: All Models:** 500 V opto-isolated pulse input-to-power/OC output with isolated input enabled, 500 V input/power-to-RS-485 serial communications. **AXA Models:** 500 V input/power-to-analog output.

**Environmental:** Operating temperature range: -40 to 75°C; Storage temperature range: -40 to 75°C; Backlight deactivated below temperatures ≈ -20°C; Relative humidity: 0 to 90% non-condensing.

**Non-Volatile Memory:** All programmed settings and total reading are stored in non-volatile memory for a minimum of ten years if power is lost.

**Connections:** Screw terminals accept 12 to 22 AWG wire

**Enclosure:** Explosion-proof die-cast aluminum with glass window, corrosion resistant epoxy coating, color: blue. NEMA 4X, 7, & 9, IP68. Copper-free (0.3%).

**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.

**Display Orientation:** Display may be mounted at 90° increments up to 270° from default orientation.

**Overall Dimensions:** 5.67" x 5.24" x 4.88" (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

## Modbus Operating Modes

**Master:** Processes and displays data read from Modbus RTU slave devices. Up to 16 process variables (PVs) from up to 16 slave devices. Each PV programmed individually.

**Slave:** Processes data sent to it from a Modbus RTU master device.

*Note: Refer to Modbus Register Tables at [www.predig.com](http://www.predig.com) for details.*

**Snooper:** Listens to the Modbus traffic and picks up a specific register or registers being polled by a Master device from a specific slave device and processes the data being read. Up to 16 process variables (PVs) from up to 16 devices. If multiple registers are polled by the master with one command, only the first returned value will be read.

**Master Poll Time:** 0.1 to 99.9 sec. Time between read-commands.

**Master Timeout:** 0.1 to 99.9 seconds. Time elapsed after a poll request is made before the scanner considers that request to have failed.

**Number of Retries:** 1-99. The number of retries the scanner will make when requesting data before reporting an error condition on the PV.

**Snooper Response Time:** 0.1 to 99.9 seconds. Time since the last PV update the before being considered an error.

**Slave Timeout:** 0.0 to 99.9 seconds. Time elapsed after the last data received from a master before the scanner considers the data to be out of date. Programming 0 disables the timeout, and PV data will be displayed indefinitely despite not being updated regularly.

## Modbus Scanner Process Variables

**PV Inputs:** Up to 16 independently programmed Modbus process variables (PVs) may be scanned (Master mode) or detected (Snooper mode). Each of the 16 Modbus PVs may be enabled or disabled.

**Slave ID:** Specifies which device on the bus to monitor. Valid for Master and Snooper modes only.

Assign the slave ID or address (1-247) of each of the devices containing the process variables to be displayed (Slave ID for PV1-16).

**Register Number:** Specifies which register(s) to read in the devices on the bus.

5 Digit Function 03: 40001–49999; 04: 30001–39999; or 65: 1–9999.

6 Digit Function 03: 400001–465535 or 04: 300001–365535;

or 65: 1–65535.

Range is dependent on Function Code selection (03, 04, or 65)

Will read 2 registers for Long integer and Floating point data types; the register entered and the next consecutive register number.

Valid for Master and Snooper modes only.

**Function Code:** 03, 04, and 65 (used to read 32 bit registers). Master & Snooper modes only.

**Data Type:** Select the data format of the PVs. Select between short integer (2 byte), long integer (4 byte), or floating point (4 byte). Slave mode uses floating point only.

**Byte Order:** Integer data programmable as binary or BCD, and signed or unsigned. Byte order selectable as big-endian (1234), little-endian (4321), byte swap big-endian (2143), or byte swap little-endian (3412). Byte swap unavailable for short.

## Math Channels

**Math Result Channels:** Four math channels CV1-CV4. Each math channel may be programmed for a math function.

**Math Functions:** Parameter 1 (PAR1), parameter 2 (PAR2), and parameter 3 (PAR3) independently programmable for each math channel C1-C4.

Math Function	Function	Setting
Addition	PAR1 + PAR2	SUM
Difference	PAR1 - PAR2	DIFF
Multiplication	PAR1 * PAR2	MULTI
Division	PAR1 / PAR2	DIVIDE
Absolute diff.	Abs(PAR1 - PAR2)	DIFFABS
Weighted avg.	((PAR1 - PAR2)*PAR3) + PAR2	WAVG
Draw	((PAR1 / PAR2) - 1) * PAR3	DRAW
Ratio	(PAR1 / PAR2) * PAR3	RATIO
Concentration	PAR1 / (PAR1 + PAR2) * PAR3	CONCEN
Constant	Constant	CONST
Long Integer	Constant	LONG
Floating Pt.	Constant	FLOAT
None	Disable	NONE
Absolute Value	Abs(PAR1)	ABS
Square Root	√(PAR1)	SQRT

## Serial Communications

**Protocol:** 3-Wire RS-485 Modbus® RTU

**Scanner ID:** 1 – 247. Specifies the address of the PD6830X.

**Baud Rate:** 1,200; 4,800; 9,600; 19,200; 38,400; 57,600; or 115,200 bps

**Transmit Time Delay:** Programmable between 0 and 199 ms

**Parity/Stop Bit:** Even, odd, none with 1 stop bit, or none with 2 stop bits

**Byte-to-Byte Timeout:** Max of 1.5 character times or 750 μs

## Pulse Input

**Pulse/Transistor/Contact Closure Input:** Field selectable; Sourcing or sinking pulse or square wave; 0-5 V, 0-12 V, or 0-24 V; TTL; NPN or PNP transistor; Open collector 100 kΩ pull-up to 3 V; Switch contact 100 kΩ pull-up to 3 V; PNP transistor 100 kΩ pull-down to ground (COM); Active input 100 kΩ to battery level, 10 kΩ to power.

Maximum Frequency: 64 kHz; Minimum Pulse Width: 5 μs;

Threshold Setting Low (V) High (V)

Normal	1.2	2.0
Low	0.2	1.2

**Opto-Isolated Input:** Sourcing pulse or square wave 0-5 V, 0-12 V, or 0-24 V; Logic High: 2-24 V, Logic Low: < 1 V; Maximum Frequency: 20 kHz; Minimum Pulse Width: 20 μs; Input Current: 1 mA @ 5 V, 2.5 mA @ 12 V, 5 mA @ 24 V.

**Low Voltage Mag Pickup Input:** Sensitivity: 20 mVp-p to 24 Vp-p; Maximum Frequency: 6 kHz

**Minimum Input Frequency:** 0.0001 Hz. Minimum frequency is dependent on high gate setting (rate display).

**Input Impedance:** Pulse input: Greater than 75 kΩ @ 1 kHz.

Open collector/switch input: 100 kΩ pull-up to 3 V.

**Accuracy:** ±0.03% of calibrated span ±1 count

**Pulse Input Recalibration:** All ranges are calibrated at the factory to read frequency in Hz. No recalibration required.

**Temperature Drift:** Rate display is not affected by changes in temperature.

**Low-Flow Cutoff:** 0-99,999 (0 disables cutoff function)

**Decimal Point:** Up to four decimal places or none:

4444 3333 2222 1111 or 0000

**Calibration:** May be calibrated using K-Factor, scale without signal source, or by applying an external calibration signal.

**K-Factor:** Field programmable K-Factor converts input pulses to rate in engineering units. May be programmed from 0.000001 to 9,999,999 pulses/unit.

**Calibration Range:** Input 1 signal must be ≥ 1 Hz; input 2 signal may be set anywhere above input 1 setting. Minimum input span is 1 Hz. An Error message will appear if the input 1 and input 2 signals are too close together.

**Input Contact Debounce Filter:** Programmable contact debounce filter. Input signal frequency speed selections of Hi (no filter), Med (250 Hz max input, 2 ms pulse width), and Low (100 Hz max input, 5 ms minimum pulse width).

**Time Base:** Second, minute, hour, or day

**Gate:** Low gate: 1-99 seconds; High gate: 2-9,999 seconds

## Pulse Rate/Totalizer

**Display Assignment:** The top display may be assigned to rate, total, or grand total, in addition to Modbus process variables.

**Rate Display Units:** Gallons, liters, imperial gallons, cubic meters, barrels, bushels, cubic yards, cubic feet, cubic inches, liquid barrels, beer barrels, hectoliters, or custom.

**Rate Display Time Base:** Rate display may be calculated in terms of units per second, minute, hour, or day.

**Total/Grand Total Display Units:** Gallons, liters, imperial gallons, cubic meters, barrels, bushels, cubic yards, cubic feet, cubic inches, liquid barrels, beer barrels, hectoliters, or custom. Setting is independent for each.

**Total/Grand Total Display Unit Multiplier:** x1, x100 (h), x1000 (k), or x1,000,000 (M) multiplier (and prefix) applied to total or grand total display units. Setting is independent for each.

**Total/Grand Total Decimal Points:** Up to six decimal places or none: 6.666666, 55.55555, 444.4444, 3333.333, 22222.22, 111111.1 or 0000000  
Total and grand total decimal points are independently programmed, and are independent of rate decimal point.

**Totalizers:** Calculates total and grand total based on rate and field programmable multiplier to display total in engineering units. Time base must be selected according to the time units in which the rate is displayed. The total and grand total utilize the same time base, with different conversion factors and resets.

# PD6830X ProtEX Explosion-Proof Modbus Scanner

**Totalizer Reset:** Via SafeTouch® RESET button, mechanical button (cover off), external contact closure (total only), automatically via user selectable preset value and time delay (1 – 99,999 sec). Manual reset may be disabled or protected by password for the total and grand total. Total and grand total reset independently.

**Total Overflow & Rollover:** The total can display up to 9,999,999,999,999. Up to 9,999,999 can be displayed on the lower display normally. An overflow display will toggle between the first six digits and last seven digits (999999 <> 9999999) for a 13-digit total. The total will rollover beyond thirteen digits. The T indicator on the display will flash to indicate total overflow, and the six most significant digits (first six numbers of the total) are indicated with the flashing overflow symbol -f.

**Grand Total Overflow & Rollover:** The grand total can display up to 9,999,999,999,999. Up to 9,999,999 can be displayed on the lower display normally. An overflow display will toggle between the first six digits and last seven digits (999999 <> 9999999) for a 13-digit total. The grand total will rollover beyond thirteen digits. The GT indicator on the display will flash to indicate grand total overflow, and the six most significant digits (first six numbers of the grand total) are indicated with the flashing overflow symbol -f.

**External Total Reset:** External total reset connections are made between RST and COM. Logic High: 1.4 V, 3.3V max; Logic Low: < 0.8 V. 90 ms minimum pulse width.

## 4-20 mA Transmitter Output

**Output Source:** Modbus PV 1-16, math channel 1-4, rate/process, total, grand total, or disabled.

**Scaling Range:** 4.000 to 20.000 mA for any display range.

**Disable:** If disabled, the output will output 3.2 mA.

**Calibration:** Factory Calibrated: 0.0 to 1000.0 = 4-20 mA output

**Underrange:** Output Underrange: 3.8 mA

**Overrange:** Display Overrange: 20.5 mA. Output Overrange: 20.5 mA

**Accuracy:** ± 0.05% span ± 0.004 mA

**Temperature Drift:** 0.08 µA/°C max from -40 to 75°C ambient

**External Loop Power Supply:** 30 VDC maximum

**Output Loop Resistance:**

Power supply	Minimum	Maximum
24 VDC	10 Ω	750 Ω
30 VDC	100 Ω	1100 Ω

Note: loop-powered backlight subtracts 150 Ω from maximum resistance figures above.

## Open Collector Outputs

**Output Assignment:** Two open collector pulse outputs Out 1 and Out 2. Individually programmable for Modbus PV, math channel, pulse rate, total, or grand total alarms; Modbus PV, math channel, pulse rate, total, or grand total pulse outputs; or retransmitting of pulse inputs; constant timed pulse output; quadrature outputs (requires Out 1 and Out 2); or off.

**Rating:** Isolated open collector, off: 24 VDC max, on: <1 V @ 150 mA max

**Alarm Output:** Assign to Modbus PV 1-16, math channel 1-4, or rate for high or low alarm trip point. Assign to total or grand total for total or grand total alarms.

**Alarm Deadband:** 0-100% FS, user selectable

**Alarm Acknowledge:** Front panel SCAN/ENTER button resets output and screen indication.

**Pulse Output Count:** The pulse output count (COUNT) is programmable from 0.000001 to 9999999. PV and math channels generate a frequency equal to the PV or math value divided by the Count value. Rate pulses are generated at a rate of one output pulse per Count value. Total and grand total pulses are generated for every total or grand total increment selected (e.g. Count value of 100 will generate one pulse every time the total is incremented by 100 units).

Pulse rate retransmission outputs one to one for input pulses, up to maximum output speed. Count is not used for retransmitting outputs.

**Pulse Output Pulse Width:** Unless otherwise stated, pulses are 50% duty cycle for required frequency.

A pulse rate retransmit output will generate 100 to 130 µs pulses at the falling edge of every input pulse.

## Disclaimer

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**Pulse Output Maximum Frequency:** 5 kHz, pulse width at 50% duty cycle. If the outputs exceed 5 kHz, the scanner will display PLUS SE OPERATING

**Quadrature Output:** Output set to quadrature will lag the other pulse output by 90° (1/4 duty cycle) at output frequency. Minimum 1 Hz

**Timer Output:** Programmable on and off time, repeating cycle. Minimum period 0.1 second, maximum 100,000 seconds. Minimum pulse time 0.01 second, maximum 10,000 seconds.

## Product Ratings & Approvals

**FM:** Class I, Division 1, Groups B, C, D

Class II, Division 1, Groups E, F, G

Class III, Division 1; T6

Class I, Zone 1, AEx d IIC T6 Gb

Zone 21, AEx tb IIIC T85°C

Ta = -40°C to +75°C

Enclosure: Type 4X & IP66

Certificate number: 3040391

**ATEX:** II 2 GD

Ex d IIC T6 Gb

Ex tb IIIC T85°C Db IP68

Tamb -40°C to +75°C

ATEX Certificate: Sira 10ATEX1116X

**IECEX:** Ex d IIC T6 Gb

Ex tb IIIC T85°C Db IP68

Ta = -40°C to +85°C

IECEX Certificate: IECEX SIR 10.0056X

**CSA:** Class I, Division 1, Groups B, C, D

Class II, Division 1, Groups E, F, G

Class III, Division 1;

Ex d IIC T6

Enclosure Type 4X, IP66/68:

Ta = -40°C to +75°C

Certificate number: 2325749

## ORDERING INFORMATION

ProtEX PD6830X • Explosion-Proof Modbus Scanner	
Model	Description
PD6830-AX0-I-2	Isolated 2-wire RS-485 with Modbus protocol.
PD6830-AXA-I-2	Isolated 4-20 output, and isolated 2-wire RS-485 with Modbus protocol.
PD6830-AX0-I-L	Feet and inches display and isolated 2-wire RS-485 with Modbus protocol.
PD6830-AXA-I-L	Feet and inches display, isolated 4-20 output, and isolated 2-wire RS-485 with Modbus protocol.
ProtEX PD6830X Accessories	
Model	Description
PDAPLUG75	¾" NPT Metal Conduit Plug
PDA6846	Pipe Mounting Kit for. Includes zinc-plated u-bolt for 2" pipe, (2) washers, and (2) nuts.
PDA6846-SS	Pipe Mounting Kit. Includes stainless steel u-bolt for 2" pipe, (2) washers, and (2) nuts.
PDA8068	USB Serial Adapter for PD6730/PD6830 Programming
PDA8485-I	USB to RS-422/485 Isolated Converter
PDA8485-N	USB to RS-422/485 Non-Isolated Converter

### Your Local Distributor is:

Order from:

**C A Briggs Company**

622 Mary Street; Suite 101

Warminster, PA 18974

Phone: 267-673-8117 - 800-352-6265

Fax: 267-673-8118

[Sales@cabriggs.com](mailto:Sales@cabriggs.com) - [www.cabriggs.com](http://www.cabriggs.com)

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