PD8-6000

ProtEX-MAX™ Explosion-Proof Process Meter

ProtEX™ MAX

SUPER-BRIGHT LEDs
Our Brightest Display Ever

MeterView Pro
USB Install

SAFE TOUCH®

IECEx

FM APPROVED

PROCESS

- 0-20 mA, 4-20 mA, 0-5 V, 1-5 V, and ±10 V Inputs
- Input Power Options Include 85-265 VAC or 12-24 VDC
- Modern, Sleek and Practical Enclosure
- Display Mountable at 0°, 90°, 180°, & 270° Degrees
- Explosion-Proof, IP68, NEMA 4X Enclosure
- SunBright Display Standard
- Dual-Scale for Level Applications – Single Input
- Signal Input Conditioning for Flow & Round Horizontal Tanks
- 32-Point, Square Root, or Exponential Linearization
- Multi-Pump Alternation Control
- SafeTouch® Through-Glass Button Programming
- Modbus RS-485 Serial Communications
- Flanges for Wall or Pipe Mounting
- Isolated 24 VDC @ 25 mA Transmitter Power Supply
- Onboard USB and MeterView® Pro Programming Software

PD8-6000 ProtEX-MAX™ Explosion-Proof Process Meter

Through-Glass Button Programming | 90° Rotatable Display | FM APPROVED | IECEx | Sunlight Readable Display | MeterView Pro USB Install

INTRODUCTION

The ProtEX-MAX PD8-6000 has been designed to offer the functions and features of the ProVu PD6000 in a great looking fully FM, CSA, ATEX, and IECEx approved explosion-proof product. The PD8 series is not just a 1/8 DIN meter mounted in an explosion-proof housing; a special bezel and electronics were designed exclusively for the ProtEX-MAX. The bezel and faceplate give the front panel a very finished appearance and house the additional electronics for the PD8.

KEY FEATURES

Precise, Accurate, and More Informative

ProtEX-MAX's large 0.6" upper display provides a highly accurate and precise 6-digit view of the process measurement. Its 24-bit A/D is accurate to ±0.03% of calibrated span ±1 count.

Flow in CFH

Gallons & Setpoint

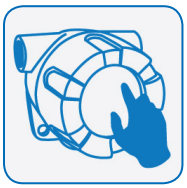
Level in Feet

Pressure Indication

Configurable

The upper display can be programmed to indicate PV, maximum (peak), minimum (valley), alternating maximum/minimum, one of eight alarm set points, or Modbus input. The lower display can also be configured to display engineering units, set points, user defined legends, or simply turned off.

SafeTouch® Button Programming



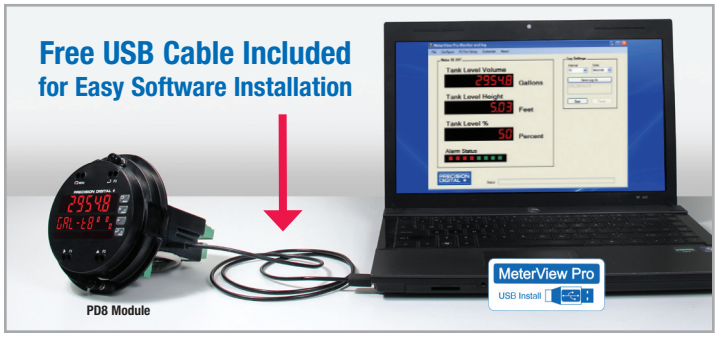
The ProtEX-MAX is equipped with four sensors that operate as through-glass buttons so that it can be programmed and operated without removing the cover (and exposing the electronics) in a hazardous area. The SafeTouch buttons are configured by default to duplicate the function of the front panel mechanical pushbuttons associated with the integrated meter.

Standard SunBright LED Display

The ProtEX-MAX's SunBright display features extraordinarily bright LEDs. They are perfect for indoor and outdoor applications where visibility may be impaired by smoke, fog, dust, or distance or even in direct sunlight.

Free USB Programming Software & Cable

The ProtEX-MAX™ comes preloaded with free **MeterView® Pro** programming software that connects and installs directly to your PC with a standard USB cable, also provided free with each instrument. This eliminates the need to insert CDs, install drivers, or download software from the internet. The software will allow you to configure, monitor, and datalog a ProtEX-MAX™ PD8-6000 using your PC. Just simply connect the meter to your PC with the USB cable and within minutes you will be programming it.



Dual-Scale Display Feature

The ProtEX-MAX PD8-6000 has a rather unique, and very flexible dual-scale capability; a second scaled display can represent the measured input in a different form (i.e. gallons & height). This is of particular value in level applications. Please see the examples shown below. Both displays are independently scaled and are based on the 4-20 mA input signal. Beyond level, this function has been used for pressure & force, current & power, feet & meters, GPM & CFM, and more.

Gallons & mA

Gallons & Height

Gallons & Percent

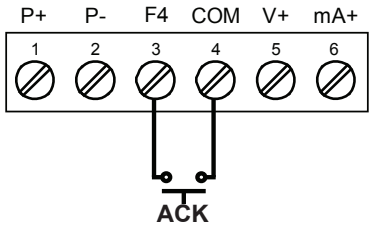
Gallons & Head PSI

Advanced Linearization Capability

The ProtEX-MAX includes a 32-point linearizer. In non-linear level applications (i.e. some pumping or lift stations), it can easily compensate for submerged equipment or plumbing that displace usable volume. A second independent 8-point linearizer is available for a second scaled display (PV2) when "Level" function is enabled. Precision Digital's free MeterView Pro PC-based software greatly simplifies the construction of the linearization tables. The software can save this data to the meter and/or PC.

On-Board Digital Input

The PD8-6000 includes a digital input as standard. This digital input can operate with the tare, reset tare, or interlock relays feature, force relays on from a signal from a PLC or relay on other equipment, and much more. This is ideal for installations where the meter is inaccessible behind a cover, or where an additional function key is needed for customized operation.



Rounding

The rounding feature is used to give the user a steadier display with fluctuating signals. It causes the display to round to the nearest value according to the rounding value selected (1, 2, 5, 10, 20, 50, or 100). For example, with a rounding value of 10, and a input of 12346, the display would indicate 12350.

Max/Min Display

Max/Min (or Peak/Valley) is standard on the ProtEX-MAX PD8-6000. Either display can be configured to show either maximum or minimum excursion since last reset. The displays can also be configured to toggle between Max and Min values. Both values can be simply reset from the front panel.

Easy to Program

The user friendly dual-line display makes the ProtEX-MAX easy to set up & program. No jumpers to set for input selection. All setup & programming can be done using the SafeTouch buttons on the front of the meter face. Three levels of password protection help maintain the reliability of the programming.

Input Setup

Display Setup

DIGITAL COMMUNICATIONS

Modbus® RTU Serial Communications

With the purchase of a serial communication adapter, ProtEX-MAX meters can communicate with any Modbus Master device using the ever-popular Modbus communications protocol that is included in every ProtEX-MAX. This greatly increases the flexibility of the meter. Modbus provides much more capability than read PV and write set points. Below are some examples of other things that can be done with ProtEX-MAX's Modbus communications.

- Send a 6-character message to the lower display upon an event
- Convert a digital value to a 4-20 mA signal
- Remote user control (i.e. change set points, acknowledge alarms)
- Input a Modbus digital PV (in place of analog input)
- Remote override of any, or all, relays and analog outputs

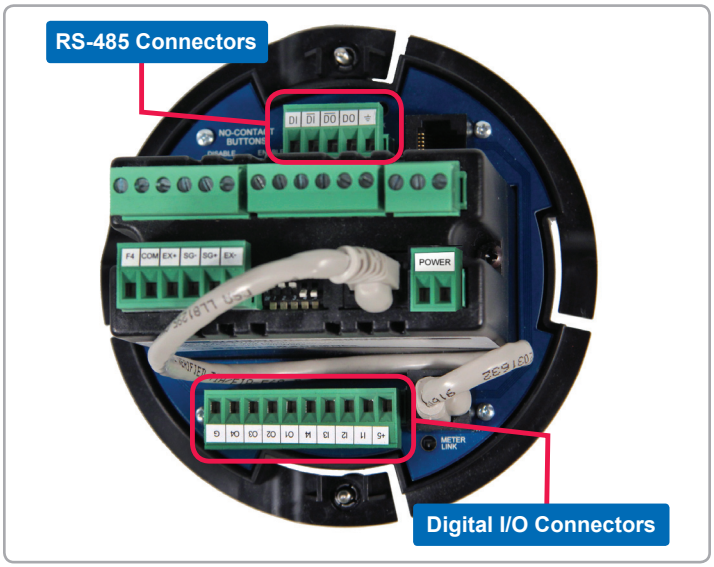
Modbus PV Input

Remote Message

ProtEX VIDEOS

Visit our archive at www.predig.com/videos to watch a video on the ProtEX-MAX Family of Explosion-Proof Meters. Here, you will also find other videos on the ProtEX Series including videos on loop powered process meters, feet and inches level meters, and flow rate/totalizers. Also, see the SafeTouch through-glass button programming in action.

INTEGRATED DIGITAL I/O AND SERIAL COMMUNICATIONS

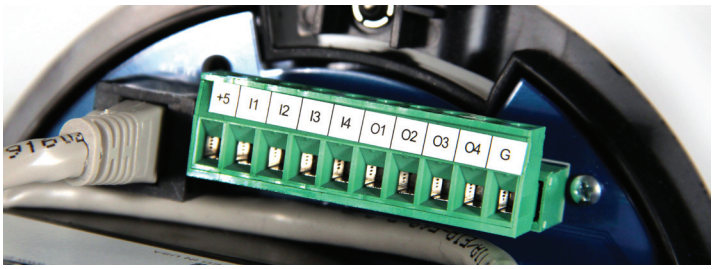


Digital I/O Connections

Four digital inputs and four digital outputs come standard with the ProtEX-MAX. External digital inputs can function similarly to the front panel function keys or digital input F4. They can be configured to trigger certain events (i.e. acknowledge/reset alarms, reset max and/or min values, disable/enable all output relays, and hold current relay states), or provide a direct menu access point. The inputs can be used to configure the meter remotely using panel mount push buttons on a control station, giving the user remote control of the four front panel push buttons.

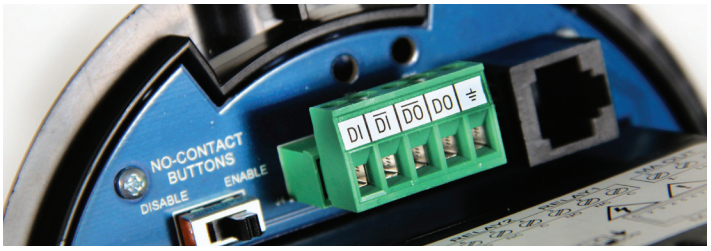
Digital outputs can be used to remotely monitor the ProtEX-MAX's alarm relay output states, or the states of a variety of actions and functions executed by the meter.

Note: The onboard digital inputs (1-4) are configured at the factory to function identically to the front panel pushbuttons (Menu, F1, F2, & F3) in order to work with the SafeTouch buttons. Changing the programming of the digital inputs will affect the function of the SafeTouch buttons.



Serial Communications Connections

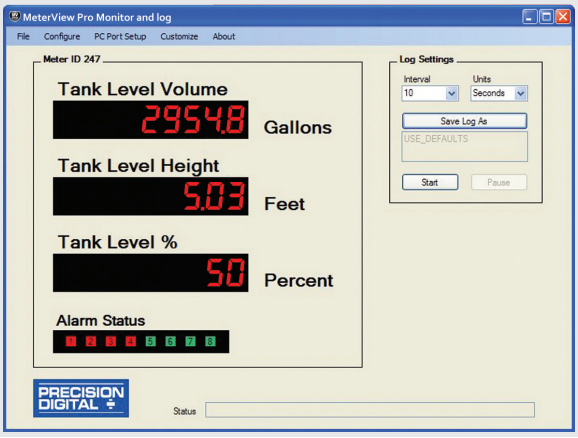
ProtEX-MAX meters come with an RS-485 connection for serial communications with other digital devices. The industry standard Modbus® RTU protocol is included with every meter.



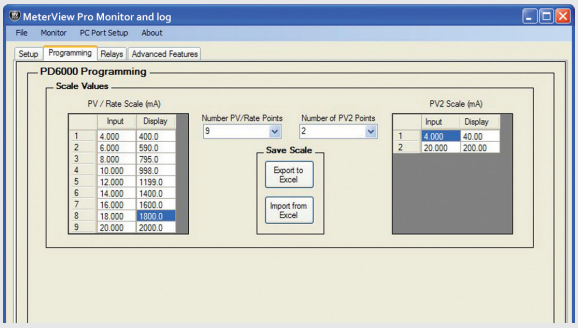
METERVIEW® PRO SOFTWARE

Configure, monitor, and datalog a ProtEX-MAX PD8-6000 from a PC using MeterView Pro Software (available via USB or for download at www.predig.com). See samples below of monitor and data logging, linearization utility, setup, and relays.

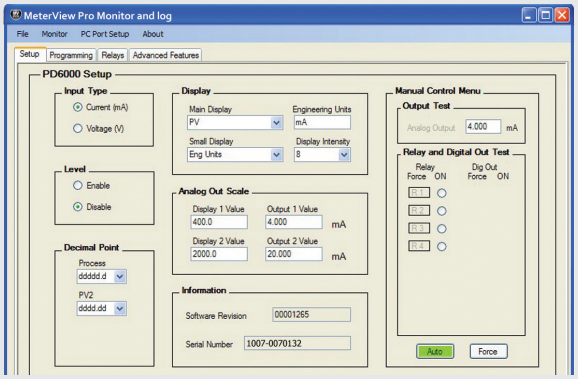
Monitor & Datalog



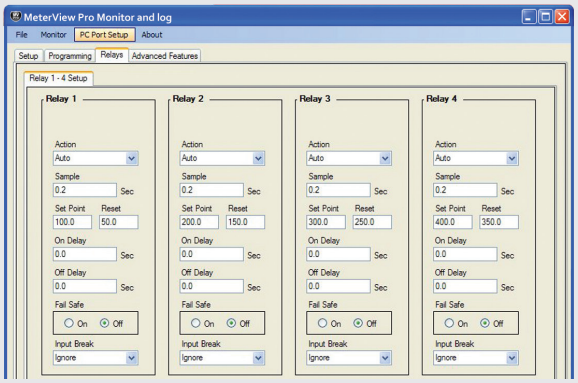
Linearization Utility



Setup

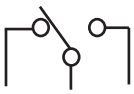


Relays



OUTPUTS

Relay Outputs



The ProtEX-MAX has up to four 3 A Form C relays (SPDT) with multiple power loss fail-safe options. Relays can be configured for proper protective action upon input loop break. Relay ON and OFF delay times are user adjustable. Up to four front panel indicators show alarm and/or relay state. All relays can be configured for 0-100% deadband.

Relay Operation/Configuration

There are powerful relay functions that can be configured in the ProtEX-MAX meter, including:

- Automatic reset only (non-latching)
- Automatic + manual reset at any time (non-latching)
- Latching (manual reset only)
- Latching with clear (manual reset only after alarm condition has cleared)
- Pump alternation control (automatic reset only)
- Sampling (activated for a user-specified time)
- User selectable fail-safe operation
- Relay action for loss (break) of 4-20 mA input signal
- Time delay (on and off), independent for each relay
- Manual control mode
- Interlock relay mode

Analog Output

The isolated analog retransmission signal can be configured to represent the process variable (PV), maximum (peak) value, minimum (valley) value, the value for any of the eight relay set points, or Modbus input. While the output is nominally 4-20 mA, the signal will accurately accommodate under- and over-ranges from 1 to 23 mA.

Manual Output Control

Take control of any output with this feature. All relays can be forced ON or OFF, and the 4-20 mA output signal can be set to any value within its range. When the relays and 4-20 mA output are controlled manually, an LED labeled “M” is turned on and the associated Alarm LEDs (1-8) flash every 10 seconds indicating that the meter is in manual control mode.

Isolated Transmitter Power Supplies

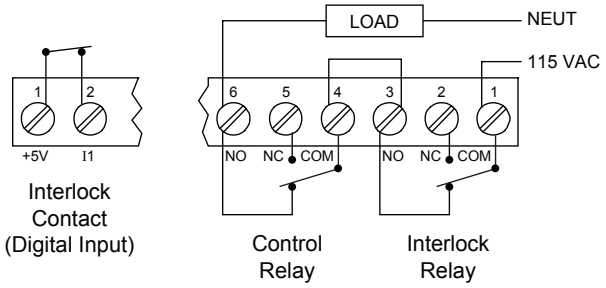
A powerful 24 V @ 25 mA power supply is a standard feature on the ProtEX-MAX meter. It can be configured for 5, 10, or 24 V (default) by means of a simple internal jumper (see manual). An additional power supply (24 V @ 25 mA) is standard with the 4-20 mA output option.

Sampling Function (PV Triggered Timed Relay)

The sampling function allows the operator to set a set point for a “sampling” relay. When the PV reaches that set point, it will close that relay’s contacts for a preset period of time (0.1 to 5999.9 seconds). An example of its use may be for beer/ale fermentation. When the batch reaches a certain pH, the relay contacts would close and by some means (light, horn, etc.) alert someone to take a sample, or provide the trigger to automatically take a sample of the batch. The utility of this function can, of course, be expanded beyond sampling and be used whenever a timed relay output closure is required when the PV reaches a certain set point.

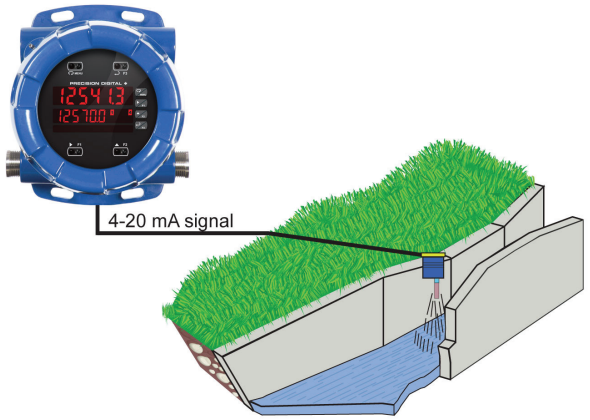
Interlock Relay(s)

This function allows a process to use one or more very low voltage input signals or simple switch contacts to control the state of one or more internal “interlock” relays. A violation (i.e. loss of input, open switch, or open circuit) forces one or more N/O interlock relay contacts to open. One input can be used in series with a number of interlock switches, or up to eight inputs can be required to force-on one (or more) internal interlock relays. Please see *Safety Interlock on the ProVu Series* whitepaper on our website for more information.

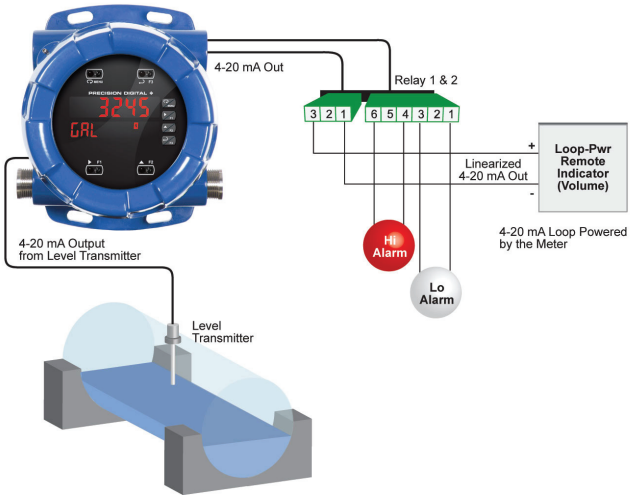


SIGNAL INPUT CONDITIONING

Non-linear input signals (i.e. weirs & flumes, differential pressure, etc.) can be linearized with the ProtEX-MAX’s simple to use built-in signal input conditioners, such as: square-root extractor, exponential linearizer, horizontal round tank linearizer, or the ProtEX-MAX’s powerful general purpose 32-point linearizer.



Weir Flow Calculated Using Exponential Signal Input Conditioner

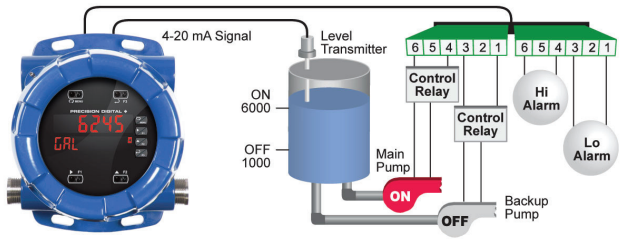


Round Horizontal Tank Signal Input Conditioner

Multi-Pump Alternation

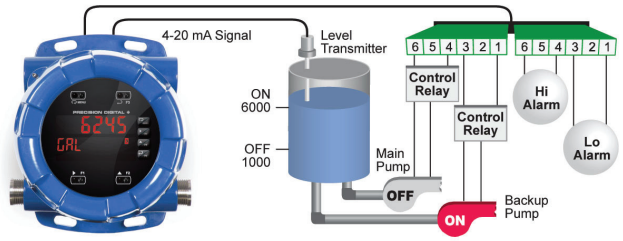
Up to 8 pumps can be alternated/sequenced.

1



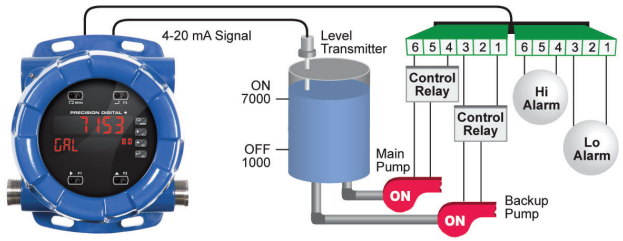
Relay #4 turns the main pump on at 6000 gallons and turns it off at 1000 gallons.

2



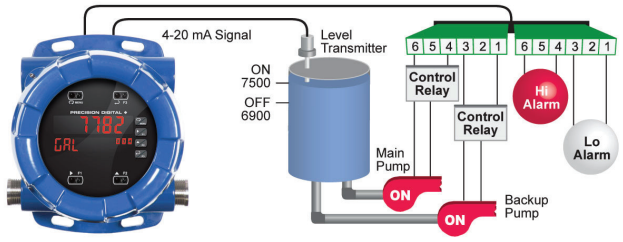
With the Pump Alternation feature activated, the next time the level reaches 6000 gallons, relay #3 transfers and starts the backup pump.

3



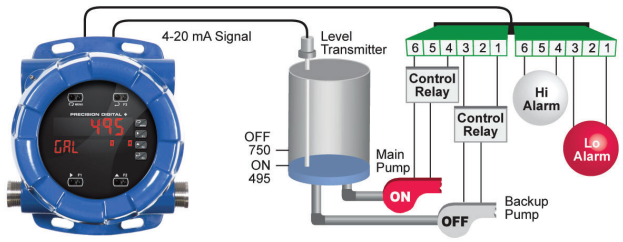
If the backup pump is not able to keep up, and the level reaches 7000 gallons, relay #4 transfers and starts the main pump as well.

4



Relay #2 trips the High Level Alarm at 7500 gallons and resets at 6900 gallons.

5



Relay #1 trips the Low Level Alarm at 495 gallons and resets at 750 gallons.

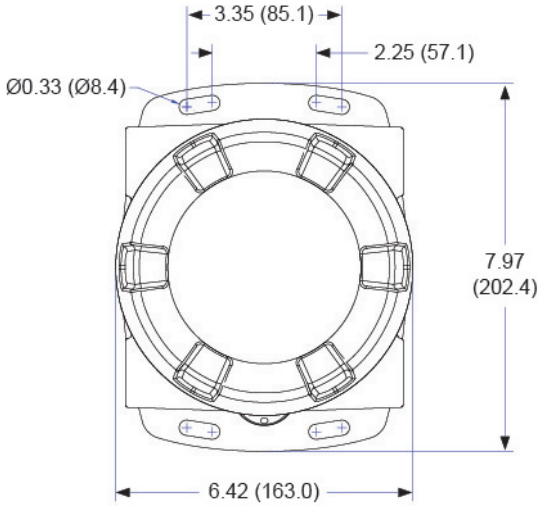
PROTEX-MAX EXPLOSION-PROOF

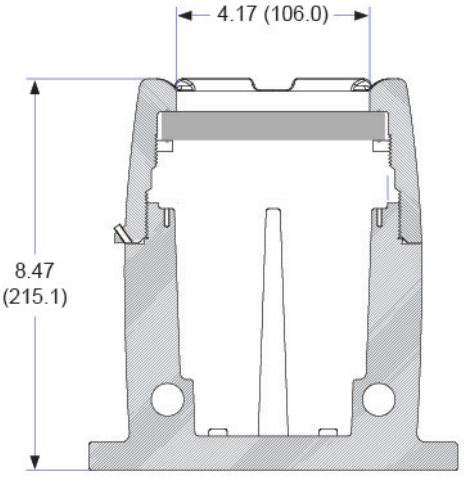
All the proven features of the PROVU brought into your hazardous areas! Go to www.predig.com/pd8

PD8-6000
ProtEX-MAX Explosion-Proof

DIMENSIONS

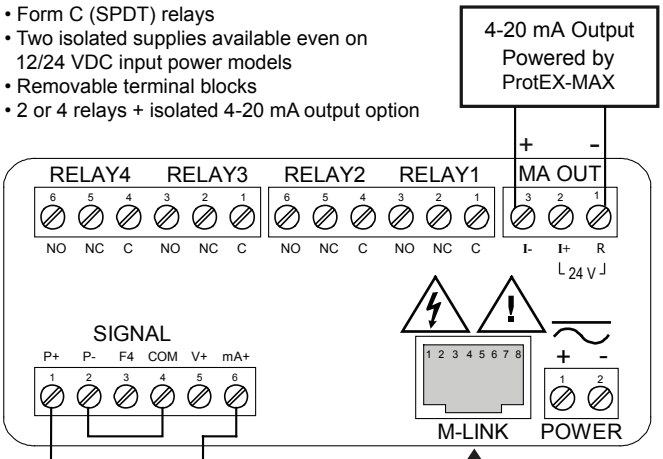
Units: Inches (mm)





CONNECTIONS

- Form C (SPDT) relays
- Two isolated supplies available even on 12/24 VDC input power models
- Removable terminal blocks
- 2 or 4 relays + isolated 4-20 mA output option



ProtEX-MAX provides 25 mA to power the transmitter

- Universal 85-265 VAC or 12/24 VDC input power
- Voltage or current inputs
- No jumpers needed for V/mA input selection
- M-Link for adding expansion modules
- Digital input (F4)

SPECIFICATIONS

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

General

Display: Upper display: 0.60" (15 mm) high. Lower display: 0.46" (12 mm) high. Both are 6 digits (-99999 to 999999), red LEDs.
Display Intensity: Eight intensity levels
Display Update Rate: 5/second (200 ms)
Overrange: Display flashes 999999
Underrange: Display flashes -99999
Display Assignment: The upper and lower displays may be assigned to PV1, PV2, PCT (percent), max/min, alternate max & min, set points, units (lower display only), or Modbus input.
Programming Methods: Four SafeTouch through-glass buttons when cover is installed. Four internal pushbuttons when cover is removed.
F4 Digital Input Contacts: 3.3 VDC on contact. Connect normally open contacts across F4 to COM.
F4 Digital Input Logic Levels: Logic High: 3 to 5 VDC;
Logic Low: 0 to 1.25 VDC
Noise Filter: Programmable from 2 to 199 (0 will disable filter)
Filter Bypass: Programmable from 0.1 to 99.9% of calibrated span
Recalibration: Calibrated at the factory. Recalibration is recommended at least every 12 months.
Max/Min Display: Max / min readings reached by the process are stored until reset by the user or until power to the meter is turned off.
Password: Three programmable passwords restrict modification of programmed settings.
Non-Volatile Memory: All programmed settings are stored in nonvolatile memory for a minimum of ten years if power is lost.
Input Power Options: 85-265 VAC 50/60 Hz, 90-265 VDC, 20 W max, or optional model with 12-24 VDC ±10%, 15 W max.
Fuse: Required external fuse: UL Recognized, 5 A max, slow blow; up to 6 meters may share one 5 A fuse.
Isolated Transmitter Power Supply: Terminals P+ & P-: 24 VDC ± 10%. Isolated from the input at >500 V. Jumper selectable for 24, 10, or 5 VDC supply (internal jumper J4). All models transmitter supply rated @ 25mA max.
Normal Mode Rejection: Greater than 60 dB at 50/60 Hz
Isolation: 4 kV input/output-to-power line. 500 V input-to-output or output-to-P+ supply.
Overvoltage Category: Installation Overvoltage Category II: Local level with smaller transient overvoltages than Installation Overvoltage Category III.
Environmental: T6 Class operating temperature range Ta = -40 to 60°C
T5 Class operating temperature range Ta = -40 to 65°C
Max Power Dissipation: Maximum power dissipation limited to 15.1 W.
Connections: Removable screw terminal blocks accept 12 to 22 AWG wire, RJ45 for external relays, digital I/O, and serial communication adapters.
Enclosure: Explosion-proof die cast aluminum with glass window, corrosion resistant epoxy coating, color: blue. NEMA 4X, 7, & 9, IP68. Default conduit connections: Four ¾" NPT threaded conduit openings and two ¾" NPT metal conduit plugs with 12 mm hex key fitting installed. Additional conduit opening configurations may be available; verify quantity and sizes on specific device labeling during installation.
Mounting: Four slotted flanges for wall mounting or NPS 1½" to 2½" or DN 40 to 65 mm pipe mounting.
Dimensions: 6.42" x 7.97" x 8.47" (W x H x D)
(163 mm x 202 mm x 215 mm)
Weight: 16.0 lbs (7.26 kg)
Warranty: 3 years parts & labor
USB Connection: Compatibility: USB 2.0 Standard, Compliant
Connector Type: Micro-B receptacle
Cable: USB A Male to Micro-B Cable
Driver: Windows 98/SE, ME, 2000, Server 2003/2008, XP 32/64-Bit, Vista 32/64-Bit, Windows 7 32/64-Bit, Windows 10 32/64-Bit
Power: USB Port

Process Input

Inputs: Field selectable: 0-20, 4-20 mA, ±10 VDC (0-5, 1-5, 0-10 V), Modbus PV (Slave)
Accuracy: ±0.03% of calibrated span ±1 count, square root & programmable exponent accuracy range: 10-100% of calibrated span
Temperature Drift: 0.005% of calibrated span/°C max from 0 to 65°C ambient, 0.01% of calibrated span/°C max from -40 to 0°C ambient
Signal Input Conditioning: Linear, square root, programmable exponent, or round horizontal tank volume calculation.
Multi-Point Linearization: 2 to 32 points for PV or PV1. 2 to 8 points for PV2 (Dual-Scale Level feature)
Programmable Exponent: 1.0001 to 2.9999
Low-Flow Cutoff: 0-999999 (0 disables cutoff function)
Decimal Point: Up to five decimal places or none: *d.ddddd*, *dd.dddd*, *ddd.ddd*, *dddd.dd*, *ddddd.d*, or *dddddd*.
Calibration Range: 4-20 mA: minimum span input 1 & input 2: 0.15 mA. ±10 V: minimum span input 1 & 2: 0.10 V. An Error message will appear if input 1 and input 2 signals are too close together.
Input Impedance: Voltage ranges: greater than 1 MΩ. Current ranges: 50 - 100 Ω (depending on resettable fuse impedance).
Input Overload: Current input protected by resettable fuse, 30 VDC max. Fuse resets automatically after fault is removed.

Relays

Rating: 2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external; rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP (≈ 50 watts) @ 125/250 VAC for inductive loads such as contactors, solenoids, etc.
Noise Suppression: Noise suppression is recommended for each relay contact switching inductive loads.
Deadband: 0-100% of span, user programmable
High or Low Alarm: User may program any alarm for high or low trip point. Unused alarm LEDs and relays may be disabled (turned off).
Relay Operation: automatic (non-latching), latching (requires manual acknowledge), sampling (based on time), pump alternation control (2 to 8 relays), Off (disable unused relays and enable interlock feature, manual on/off control mode).
Relay Reset: User selectable via front panel buttons or digital inputs.
1. Automatic reset only (non-latching), when input passes the reset point.
2. Automatic + manual reset at any time (non-latching).
3. Manual reset only, at any time (latching).
4. Manual reset only after alarm condition has cleared (latching).

Note: Front panel button or digital input may be assigned to acknowledge relays programmed for manual reset.
Time Delay: 0 to 999.9 seconds, on & off relay time delays. Programmable and independent for each relay.
Fail-Safe Operation: Programmable and independent for each relay.
Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.
Auto Initialization: When power is applied to the meter, relays will reflect the state of the input to the meter.

Serial Communications

Protocol: Modbus® RTU
Meter Address/Slave ID: 1 - 247
Baud Rate: 300 - 19,200 bps
Transmit Time Delay: Programmable between 0 and 199 ms or transmitter always on for RS-422 communication
Data: 8 bit (1 start bit, 1 or 2 stop bits)
Parity: Even, odd, or none with 1 or 2 stop bits
Byte-to-Byte Timeout: 0.01 - 2.54 seconds
Turn Around Delay: Less than 2 ms (fixed)
Note: Refer to the PROVU® Register Tables located at www.predig.com for details.

PD8-6000 ProtEX-MAX™ Explosion-Proof Process Meter

Isolated 4-20 mA Transmitter Output

Output Source: Process variable (PV), max, min, set points 1-8, manual control setting, or Modbus input
Scaling Range: 1.000 to 23.000 mA for any display range
Calibration: Factory calibrated: 4.000 to 20.000 = 4-20 mA output
Analog Output Programming: 23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break
Accuracy: ± 0.1% of span ± 0.004 mA
Temperature Drift: 0.4 µA/°C max from 0 to 65°C ambient, 0.8 µA/°C max from -40 to 0°C ambient
Note: Analog output drift is separate from input drift.
Isolated Transmitter Power Supply: Terminals I+ & R: 24 VDC ± 10%. Isolated from the input at >500 V. May be used to power the 4-20 mA output or other devices. All models @ 25 mA max.
External Loop Power Supply: 35 VDC maximum
Output Loop Resistance:

Power supply	Minimum	Maximum
24 VDC	10 Ω	700 Ω
35 VDC (external)	100 Ω	1200 Ω

Product Ratings and Approvals

FM: Type 4X; IP66
Class I, Division 1, Groups B, C, D
Class II, Division 1, Groups E, F, G
Class III, Division 1, T5/T6
Class I, Zone 1, AEx d, IIC Gb T5/T6
Zone 21, AEx tb IIIC T90°C; Ta -40°C to +65°C
T6 Ta = -40°C to +60°C; T5 Ta = -40°C to +65°C
Certificate Number: 3047283
CSA: Class I, Division 1, Groups B, C, D
Class II, Division 1, Groups E, F, G
Class III, Division 1
Class I Zone 1 Ex d IIC
Zone 21 Ex tb IIIC T90°C
-40°C < Tamb. < +60° C; Temperature Code T6
-40°C < Tamb. < +65° C; Temperature Code T5
Enclosure Type 4X & IP66
Certificate Number: 2531731
ATEX: II 2 G D
Ex d IIC T* Gb
Ex tb IIIC T90°C Db IP68
Ta = -40°C to +*°C
*T6 = -40°C to +60°C
*T5 = -40°C to +65°C
Certificate number: Sira 12ATEX1182
IECEx: Ex d IIC T* Gb
Ex tb IIIC T90°C Db IP68
Ta = -40°C to +*°C
*T6 = -40°C to +60°C
*T5 = -40°C to +65°C
Certificate Number: IECEx SIR 12.0073

ORDERING INFORMATION

ProtEX-MAX™ PD8-6000 Models		
85-265 VAC Model	**12-24 VDC Model**	**Options Installed**
PD8-6000-6H0	PD8-6000-7H0	None
PD8-6000-6H2	PD8-6000-7H2	2 Relays
PD8-6000-6H3	PD8-6000-7H3	4-20 mA Output
PD8-6000-6H4	PD8-6000-7H4	4 Relays
PD8-6000-6H5	PD8-6000-7H5	2 Relays & 4-20 mA Output
PD8-6000-6H7	PD8-6000-7H7	4 Relays & 4-20 mA Output
Note: 24 V Transmitter power supply standard on all models.		

Accessories	
Model	**Description**
PDAPLUG75	3/4" NPT 316 Stainless Steel Stopping Plug with Approvals
PDA7485-I	RS-232 to RS-422/485 Isolated Converter
PDA7485-N	RS-232 to RS-422/485 Non-Isolated Converter
PDA8485-I	USB to RS-422/485 Isolated Converter
PDA8485-N	USB to RS-422/485 Non-Isolated Converter
PDA6846	Pipe Mounting Kit Zinc Plated (Requires 2)
PDA6846-SS	Pipe Mounting Kit Stainless Steel (Requires 2)

Your Local Distributor is:

Disclaimer

LDS8-6000_A 05/16

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