

# PD8-6210/PD8-6310 Dual-Line 6-Digit Batch Controllers

## Data Sheet



MeterView Pro

USB Install

- Fully Approved Explosion-Proof Batch Controllers
- Dual-Line 6-Digit Display, 0.6" (15 mm) & 0.46" (12 mm)
- CapTouch Through-Glass Button Programming
- Display Mountable at 0°, 90°, 180°, & 270°
- Isolated 24 VDC @ 25 mA Transmitter Power Supply
- Easy Field Scaling in Engineering Units without Applying an Input
- 4 Relays with Interlocking Capability + Isolated 4-20 mA Output
- Free PC-Based, On-Board, MeterView Pro USB Programming Software
- SunBright Display Standard Feature; Great for Outdoor Applications
- Start / Pause / Stop, Change Batch with Front Panel Buttons
- Display Batch Total, Rate, Grand Total, Count or Preset
- Single or Multi-Stage Batch Control (Up to 4 Relays)
- Front Panel or Remote Total Reset
- Automatic Overrun Correction
- Automatic or Manual Batch Control
- Low or High Flow Alarms while Batching
- 32-Point Linearization, Square Root Extraction and Programmable Exponent Function
- Operating Temperature Range: -55 to 65°C (-67 to 149°F)
- CSA Certified as Explosion-Proof / Dust-Ignition-Proof / Flame-Proof
- ATEX and IECEx Certified as Dust-Ignition-Proof / Flame-Proof
- Input Power Options: 85-265 VAC / 90-265 VDC or 12-24 VDC / 12-24 VAC
- Programmable Display, Function Keys & Digital Inputs
- Flanges for Wall or Pipe Mounting
- Explosion-Proof Aluminum or Stainless Steel NEMA 4X / IP68 Enclosures
- On-Board RS-485 Serial Communications
- Modbus RTU Communication Protocol Standard
- Password Protection
- Four 3/4" NPT Threaded Conduit Openings
- 3-Year Warranty

### ANALOG INPUTS

- 0-20 mA, 4-20 mA, 0-5 V, 1-5 V, and  $\pm 10$  V Inputs

### PULSE INPUTS

- Pulse, Open Collector, NPN, PNP, TTL, Switch Contact, Sine Wave (Coil), Square Wave Inputs

# The Complete **ProtEX™** Series MAX



PD8-154  
**4-Point Alarm  
Annunciator**



PD8-6100  
**Strain Gauge Meter**



PD8-158  
**8-Point Alarm  
Annunciator**



PD8-6200  
**Analog Input  
Flow Rate/Totalizer**



PD8-765  
**Process &  
Temperature Meter**



PD8-6210  
**Analog Input Batch  
Controller**



PD8-6000  
**Process Meter**



PD8-6262  
**Analog Dual-Input  
Flow Rate/Totalizer**



PD8-6001  
**Feet & Inches  
Level Meter**



PD8-6300  
**Pulse Input  
Flow Rate/Totalizer**



PD8-6060  
**Dual-Input  
Process Meter**



PD8-6310  
**Pulse Input  
Batch Controller**



PD8-6080  
**Modbus® Scanner  
with Dual Analog Input**



PD8-6363  
**Pulse Dual-Input  
Flow Rate/Totalizer**



PD8-6081  
**Feet & Inches  
Modbus® Scanner**



PD8-7000  
**Temperature Meter**



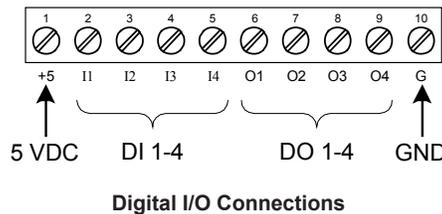
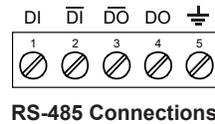
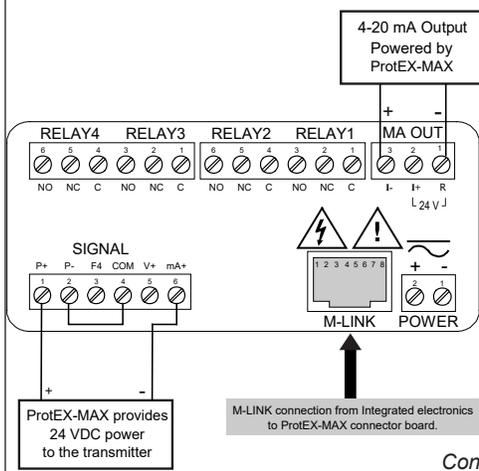
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OVERVIEW



Connections



Connections for PD8-6210-6H7 & PD8-6210-7H7

- Form C (SPDT) relays
- Two isolated supplies available even on 12/24 VDC input power models
- Removable terminal blocks
- 4 relays + isolated 4-20 mA output option
- Universal 85-265 VAC or 12/24 VDC input power
- Voltage or current inputs
- No jumpers needed for
- V/mA input selection
- Digital input (F4)

The Only Explosion-Proof Batch Controller You Will Ever Need

The ProtEX-MAX PD8-6210/6310 explosion-proof batch controllers are specifically designed for displaying flow rate and total from flowmeters with analog or pulse outputs.

The first thing you notice about the ProtEX-MAX is its modern looking, rugged, explosion-proof housing with convenient mounting flanges, available in aluminum or stainless steel. Housed inside this enclosure is a dual-line, 6-digit display that is usually setup to show the current batch quantity and the batch preset on the two lines. START, BATCH, and STOP buttons (which can be operated remotely or without removing the cover) come setup by default for batch control operation. The START button starts the batch. The BATCH button shows the preset value. The STOP button pauses or stops the batch.

The PD8-6210/6310 is certified by CSA as Explosion-Proof / Dust-Ignition-Proof / Flame-Proof and is ATEX and IECEx Certified as Dust-Ignition-Proof / Flame-Proof.

One of the more convenient features of the ProtEX-MAX is its through-glass CapTouch buttons which allow the controller to be operated without removing its cover. Just put your finger on the glass over the button to actuate it. The PD8-6210/6310 can also provide 5, 10, or 24 VDC to power the flowmeter.

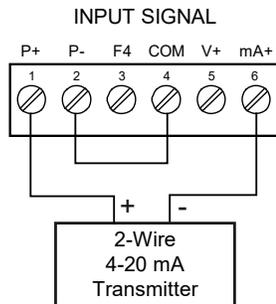
A ProtEX-MAX batch controller can be programmed for a wide variety of applications. Setup is easy for single or multi-stage batching. Automatic overrun correction keeps the batch size accurate, even over time. The PD8-6210/6310 can display the number of batches that have been run and the total amount of product that has been batched. These features and capabilities can easily be programmed without removing the cover using CapTouch buttons in a hazardous area or with free MeterView Pro PC-based software in a safe area.

## TRANSMITTER POWER SUPPLIES

### Meter Powers Transmitter

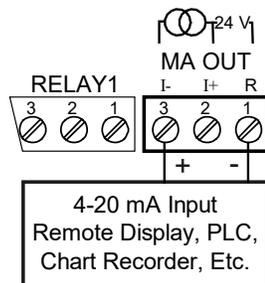
One of the most useful standard features of the PD8-6210/6310 is its built-in isolated 24 V @ 25 mA power supply to power the transmitter. This feature saves money by eliminating an external power supply and also simplifies wiring by reducing the number of devices in the loop. It can be configured for 5, 10, or 24 V (default) by means of a simple internal jumper. This power supply is even available on meters that are powered from DC power (24 V @ 25 mA). To use an external power supply instead of the internal power supply, simply make connections to different terminals on the ProtEX-MAX.

The following diagram illustrates how to wire the ProtEX-MAX so it will power the transmitter:



### Meter Powers 4-20 mA Output

Not only can the ProtEX-MAX power the 4-20 mA input signal, but an additional power supply of 24 V @ 25 mA is provided with the 4-20 mA output option to power the 4-20 mA output.



### Fuse Prevents Current Overload

Another very useful aspect of the ProtEX-MAX is that the current input is protected against current overload by a resettable fuse. The fuse limits the current to a safe level when it detects a fault condition, and automatically resets itself when the fault condition is removed.



## ADVANCED DISPLAY FEATURES

### Easy to Use

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 is done via the front panel.



Input Setup

Display Setup

### Rounding for Even Steadier Display

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 an input of 12346, the display would indicate 12350.

### Quick Preset Changes

The front panel BATCH key is configured by default to access the preset menu. The preset may be changed quickly and easily between batches without the need to enter setup menus.

### Non-Resettable Grand Total

The user can set up the grand total to be non-resettable by entering a specific password. Once this is done, the grand total can never be reset.

### Total Conversion Factor

The user can enter a conversion factor that allows the controller to display total in different units than the rate. For instance, an operator could measure flow rate in gallons per minute and grand total in hundredths of acre-feet.

### On-Board Digital Input

The PD8-6210 and PD8-6310 include 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.

### Clearly Labeled Displays

The main display alternates the display to show the controller state when in pause or stop mode. When displaying rate, grand total, batch count, or preset, the lower display alternates between the display value and the function or unit of measure.



Batch Total & Preset

Alternating Display

## BATCH CONTROLLER FEATURES

A ProtEX-MAX batch controller can be programmed for a wide variety of applications. Setup is easy for single or multi-stage batching. Automatic overrun correction keeps the batch size accurate, even over time and with system wear. It can record grand total, or non-resettable grand total with a time base of seconds, minutes, hours or days. The user can program a conversion factor, and configure a non-resettable grand total, and password protection.

### Manual or Automatic Batch Control

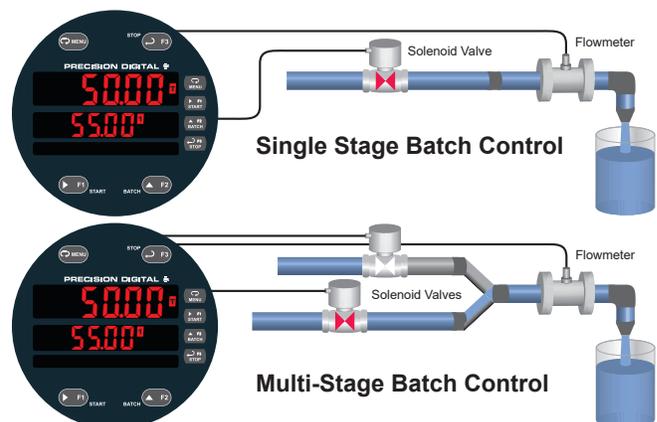
Batches may be started manually with the START front panel button, or with a remote digital input trigger. Batches may also be programmed to start automatically after a 0 to 999.9 second delay after the end of the last completed batch. A manually stopped batch will not automatically restart. The START button or digital input must be used.

### Automatic Overrun Correction

The ProtEX-MAX batch controller will correct for batch overrun or shortages automatically. By tracking the amount the batch was off by, the controller will automatically adjust the batch by modifying the batch relay deactivation time.

### Single and Multi-Stage Batching

The ProtEX-MAX can be used as a single or multi-stage batch controller. Relays assigned to the total act as batch control relays, with additional relays beyond the first including a preclose value. The preclose deactivates the relay before the batch is finished, to allow slower fill rates and a more accurate batch finish. With expansion module relays, up to eight-stage batching is possible. Each additional stage batching relay has an individually programmable preclose amount.



Single Stage Batch Control

Multi-Stage Batch Control

## Easily Choose Your Display Information



**Batch Total & Preset**  
The preset on the second display provides even quicker access to the preset menu just by using the arrow keys to change the value.



**Batch Total & Rate**  
The rate on the second display may be alternated with units for variable flow batching systems. Rate alarms may also be used during the batch process.



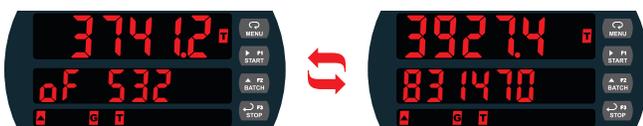
**Batch Total & Batch Count**  
The batch count on the second display, tracks completed batches. The count may be set back to 0 with the reset menu.



**Batch Total & Grand Total**  
A grand total with overflow digits for up to a 9 digit total may be displayed in the second display, with password protection and non-resettable programmable features.

## Grand Total Displays Up to 9 Digits

These batch controllers can display up to nine digits of total flow with the grand total feature. In the diagrams below, the batch controller is displaying 532,831,470 by toggling between a display of “oF 532” and “831470”. Notice the **▲ G T** symbols are lit up indicating the display is in grand total overflow mode.



## Grand Total & Rate Alarms

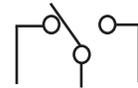
The ProtEX-MAX’s four internal and four external relays can be set up to alarm when the grand total reaches a user-defined set point or when the rate is above or below a certain value. Rate alarms are only activated when the batching process is running. A variety of reset modes are available and the user can also program time delays and fail-safe operation.

## Four Types of Password Protection

The ProtEX-MAX offers 4 types of password protection. Level 1 protection allows the operator use of only the 3 pre-configured function keys on the front panel without a password. Level 2 protection allows the operator use of only the function keys and the ability to change set points without a password. Level 3 protection restricts the function keys and all configuration menus without a password. Grand total reset protection prevents the total from being reset manually.

## OUTPUTS

### Relay Outputs



The ProtEX-MAX includes four 3 A Form C relays (SPDT) with multiple programmable functions. One (relay 1) should always be used for batch control. Other relays may be configured as additional batch relays, with or without preclose for multi-stage batching or as alarms for the rate or grand total. Each alarm has multiple power loss fail-safe options. Alarm relays can be configured for proper protective action upon input loop break. Alarm relay ON and OFF delay times are user adjustable. Up to eight front panel indicators show alarm and/or relay state. All alarm relays can be configured for 0-100% deadband. Rate alarms are only active while a batch is running.

### Relay Operation/Configuration

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

- Single and multiple stage batch control with preclose
- Manual and automatic batch control modes
- Rate alarms during batch process
- Grand total alarms
- Sampling function
- User selectable fail-safe operation
- Relay action for loss (break) of 4-20 mA input signal (PD8-6210)
- Time delay (on and off), independent for each alarm relay

### Analog Output

The isolated analog retransmission signal can be configured to represent the batch total, grand total, maximum (peak) value, minimum (valley) value, the value for any of the eight relay set points, manual setting control, 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.

### Isolated Transmitter Power Supplies

A powerful 24 V @ 25 mA power supply is a standard feature on the ProtEX-MAX controller. 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 @ 40 mA) is standard with the 4-20 mA output option.

## CAPTOUCH THROUGH-GLASS BUTTONS

The ProtEX-MAX is equipped with four capacitive sensors that operate as through-glass buttons so that they can be operated without removing the cover (and exposing the electronics) in a hazardous area or harsh environment. CapTouch buttons are designed to protect against false triggering and can be disabled for security by selecting DISABLE on the switch labeled NO-CONTACT BUTTONS located on the connector board.

### CapTouch Buttons

To actuate a button, press one finger to the window directly over the marked button area. When the cover is removed or replaced, the CapTouch buttons can be used after the meter completes a self-calibrating routine. The sensors are disabled when more than one button is pressed, and they will automatically re-enable after a few seconds. When the cover is removed, the four mechanical buttons located on the right of the faceplate are used.

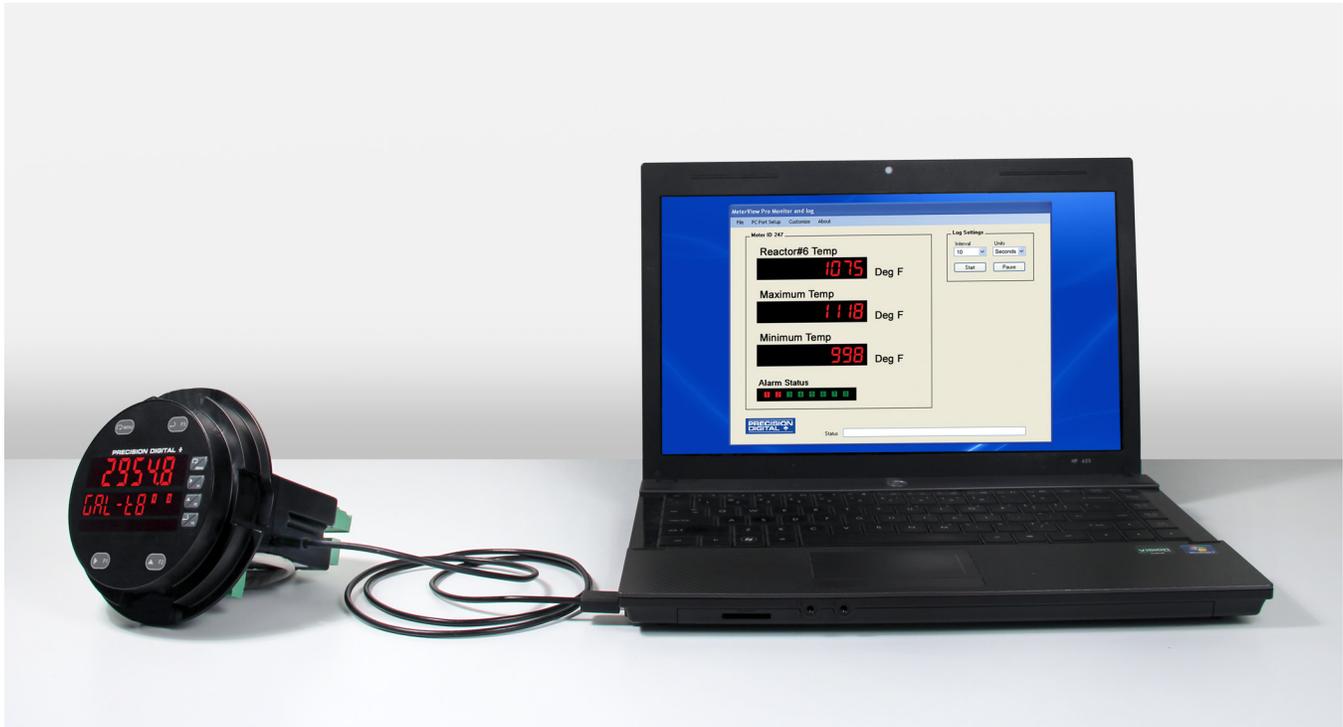
The CapTouch Buttons are configured by default to duplicate the function of the front panel mechanical pushbuttons associated with the integrated meter.



## QUICK & EASY SCALE & PROGRAMMING METHODS

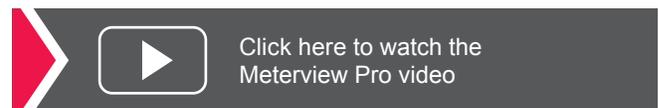
The ProtEX-MAX can be programmed either via the front panel push buttons or free, PC-based MeterView Pro software. MeterView Pro is resident on the ProtEX-MAX and is accessed by a provided USB cable, so it is by far the easiest way to program the ProtEX-MAX. The ProtEX-MAX can be calibrated either by applying a known signal or scaled by entering a desired value with the front panel buttons or MeterView Pro software. Most customers will use the scaling method because it is simpler and does not require a calibrated signal source. Selecting the input to be current or voltage is done with the front panel buttons or MeterView Pro software. Once programming is completed it can be locked with a password.

### Free PC-Based MeterView Pro 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. When you connect your ProtEX-MAX to your PC, MeterView Pro is downloaded to your PC, the software automatically selects the model you are programming, and you're ready to start programming immediately.

Further simplifying the programming process, the ProtEX-MAX can be powered from the USB port, so no need to apply external power while programming your meter. In addition to programming, the software will also allow you to monitor, and datalog a ProtEX-MAX using your PC. You can also generate and save programming files for later use.



**DIGITAL COMMUNICATIONS**

**Modbus RTU Serial Communications**

With onboard RS-485 serial communication, the ProtEX-MAX can communicate with any Modbus *master* device using the popular Modbus communications protocol that is included in every ProtEX-MAX. In addition to the typical Modbus capabilities of reading PVs and writing set points, below are some examples of other things that can be done with the meter's Modbus communications:

- Start, pause, stop, or change preset values
- Send a 6-character message to the second display upon an event
- Remote user control (i.e. change set points, acknowledge alarms)
- Read rate, total, grand total, batch count, etc.



Modbus PV Input



Remote Message

 [Click here for more information on the PROVu's Modbus capabilities](#)

**Serial Adapters & Converters\***



**PDA7485-I**  
RS-232 to RS-422/485  
Isolated Converter



**PDA8485-I**  
USB to  
RS-422/485  
Isolated Converter

 For more info on serial converters click here.

\*All adapters and connectors supplied with appropriate cables.

**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 connected to a multi-button control station to provide the user with 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 CapTouch buttons. Changing the programming of the digital inputs will affect the function of the CapTouch 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.

## PHYSICAL FEATURES

The ProtEX-MAX is designed for ease-of-use in safe and hazardous area applications, and is housed in a rugged NEMA 4X explosion-proof enclosure, available in either aluminum or stainless steel. The ProtEX-MAX can operate over a wide temperature range (-55 to 65°C / -67 to 149°F), includes removable screw terminal connectors, can have up to four relays and a 4-20 mA output, and features through-glass buttons for easy meter operation without the need to remove the cover. All of these features are backed by a 3-year warranty.

### Super-Bright LED Display

The ProtEX-MAX features a dual-line 6-digit display with super-bright LEDs, our brightest ever. These allow the display to be read in any lighting condition, even in direct sunlight.



### CapTouch Through-Glass Buttons

The ProtEX-MAX is equipped with four capacitive 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 DISABLE setting on the NO-CONTACT BUTTONS switch located on the back of the electronics module, inside the enclosure.

### Rugged Explosion-Proof Enclosure

The ProtEX-MAX is housed in a rugged NEMA 4X, 7, & 9, IP68 aluminum or stainless steel enclosure, designed to withstand harsh environments in safe and hazardous areas.



### 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  $\pm 40^\circ$ ; nearly twice that of the competition.



### Built-In Mounting Flanges

The ProtEX-MAX is equipped with two slotted flanges for wall mounting or NPS 1½" to 2½" or DN 40 to 65 mm pipe mounting.



### Flexible Mounting & Wiring

The ProtEX-MAX features four ¾" NPT threaded conduit openings so that wiring can be routed to the most convenient conduit connection(s).



## Rotatable Display

The ProtEX-MAX rotatable display, along with four available conduit connections, provide for numerous installation options. The display can be rotated in 90° increments. Rotate it 90° for horizontal mounting.



Vertical Mounting



Horizontal Mounting

## Perfect & Secure Fit Every Time

The internal cast rails ensure the ProtEX-MAX 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. The display module snaps into the built-in rails on the enclosure making assembly a snap, while pressing the display as close to the glass as possible to improve wide angle viewing. No tools are needed to install or remove it.

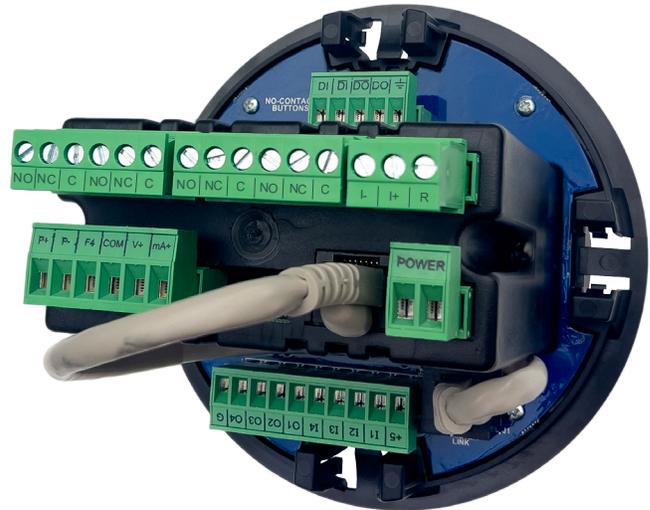
## PDA-SSTAG Stainless Steel Tags

PDA-SSTAG is a laser etched stainless steel tag accessory for any Precision Digital meter. The tag features custom text for equipment identification, instruction, or whatever else is needed in your facility. Each tag comes with a stainless steel wire and lead seal for easy mounting wherever you need it.



## Removable Screw Terminal Connectors

Industrial applications require screw terminal connections for easy field wiring and the ProtEX-MAX goes one step further in convenience by also making them removable.



Connections for PD8-6210-6H7 & PD8-6210-7H7 shown. The above photograph is representative of the back of the PD8-6310 in every regard except for the signal input connector. See page 14 for actual input signal connections.

## USB Port MeterView Pro



## Hazardous Area Certification

The ProtEX-MAX is certified by CSA as Explosion-Proof / Dust-Ignition-Proof / Flame-Proof and is approved by ATEX and IECEx as Dust-Ignition-Proof / Flame-Proof.

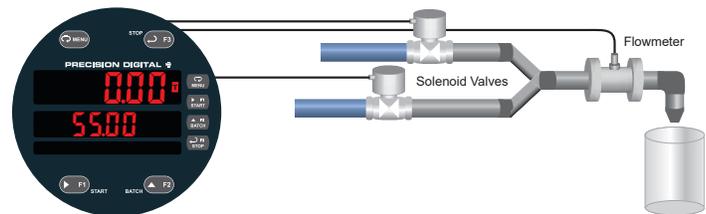
## Wide Operating Temperature Range

The ProtEX-MAX can operate from -55 to 65°C (-67 to 149°F) meaning it can be installed in a wide variety of indoor and outdoor industrial applications.

## MANUAL MULTI-STAGE BATCH CONTROL OPERATION

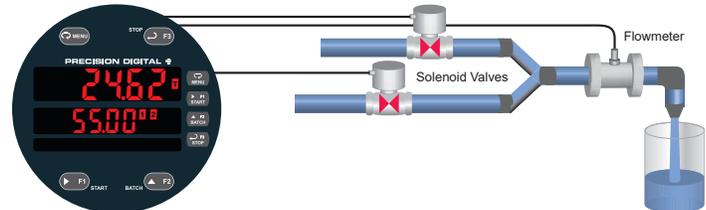
### System Setup

Both valves are closed with an empty barrel in place. The batched total is displayed in the upper display, the preset is selected for the lower display.



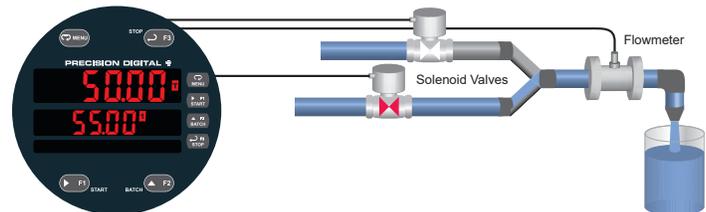
### Batch Start

The START button is pressed. Both valves open. The barrel begins to fill.



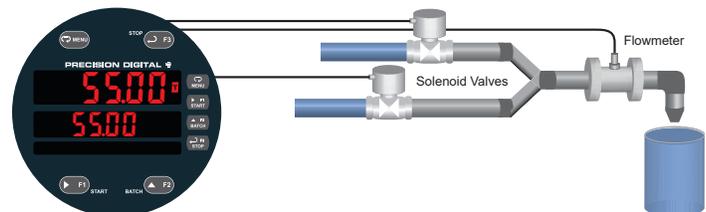
### Preclose Valve

When the batch total reaches a value of 50.00 (Preset [55.00] – Preclose [5.00]) the full-flow valve closes. The fill rate of the tank slows as a result.



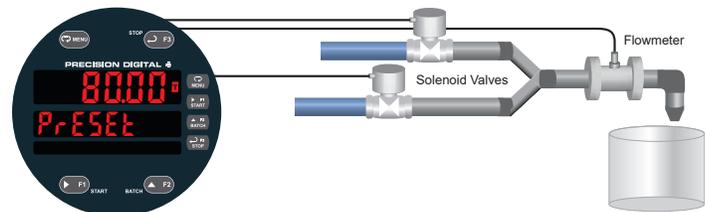
### Completed Batch

When the batch total equals the preset amount, the restricted-flow valve closes. The barrel is now full. If some overrun occurs, the next batch will adjust for this offset amount to maintain accuracy.



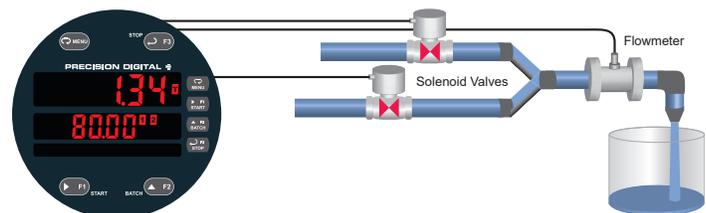
### Change Preset

After placing a new, empty barrel, a new preset fill amount may be selected with the Batch key, while the process is stopped.



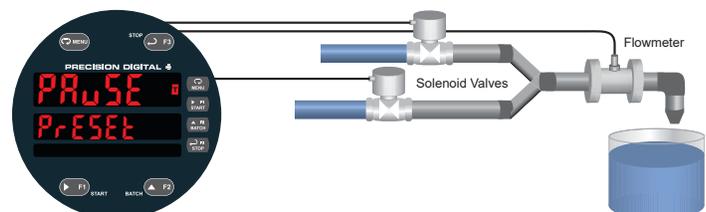
### Begin New Batch

Press the START key and a new batch will begin. With both valves open, the process continues.



### Pause/Stop

At any time, the STOP button may be pressed, once to Pause the process, or twice to cancel the batch, which stops the process.



**ACCESSORIES**

**PD9501 Multi-Function Calibrator**



This PD9501 Multi-Function Calibrator has a variety of signal measurement and output functions, including voltage, current, thermocouple, and RTD.

Model	Description
<a href="#">PD9501</a>	Multi-Function Calibrator

**PD9502 Low-Cost Signal Generator**



The PD9502 is a low-cost, compact, simple to use 4-20 mA or 0-10 VDC signal generator. It can easily be set for 0-20 mA, 4-20 mA, 0-10 V or 2-10 V ranges. Signal adjustment is made with a one-turn knob. A 15-27 VDC wall plug is provided with the instrument. Optional USB power bank is available.

Model	Description
<a href="#">PD9502</a>	Low-Cost Signal Generator

**⚠ WARNING**

- These accessories do not carry hazardous area approvals and are thus not suitable for location in hazardous areas. The use of additional protective devices may allow them to be installed in a safe area and connected to a device in a hazardous area. User should consult a professional engineer to determine suitability of these products for their specific application.

# Complete Product Line of Displays and Controllers IN ALL SHAPES, SIZES & LOCATIONS



Big, Bright Displays  
For Indoor or Outdoor  
in Bright Sunlight



Large Dual-Line  
6-Digit Display



24 VDC  
Transmitter  
Power Supply



MeterView® Pro USB  
Programming Software



Universal 85-265  
VAC or 12-24 VDC  
Input Power  
Options



4-20 mA, 0-10 V,  
Thermocouple, RTD,  
Strain Gauge, High  
Voltage, & Modbus Inputs



Up To Four  
3 A Form C  
Relays (SPDT)



SP Ex IECEx CE

## EXPLOSION-PROOF ProtEX-MAX Series

- NEMA 4X, IP68 Rated Enclosure
- CapTouch Through-Glass Buttons
- Operating Temperature of -55 to 65°C
- Worldwide Approvals

## LARGE DISPLAYS Helios Series

- 1.8" Digits Readable From 100 Feet
- NEMA 4X, IP65 Rated Enclosure
- Operating Temperature of -40 to 65°C
- Now UL and C-UL Approved!

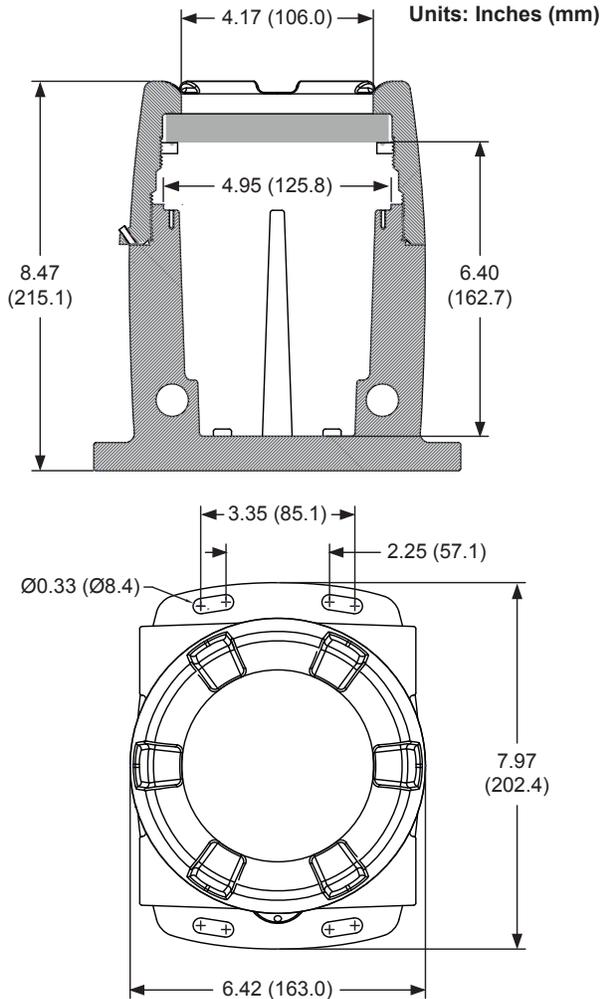
UL CE

## PANEL METERS ProVu Series

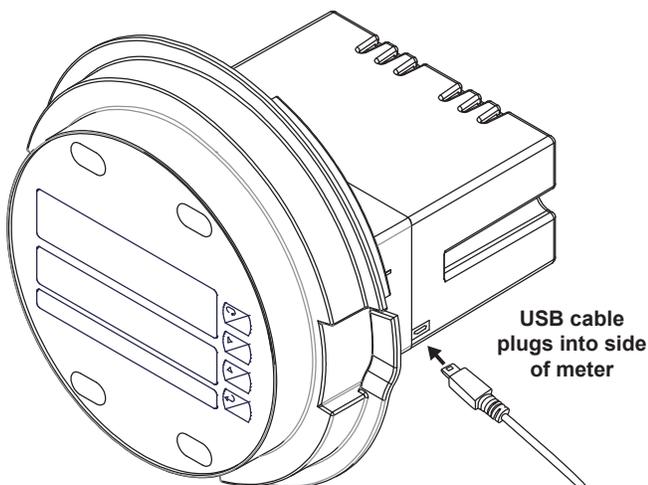
- NEMA 4X, IP65 Rated Front
- Programmable Function Keys
- UL, C-UL, and CE Approvals
- 1/8 DIN Size

Go to [PREDIG.COM](http://PREDIG.COM) for details on ProVu, ProtEX-MAX and Helios Series Meters

## DIMENSIONS



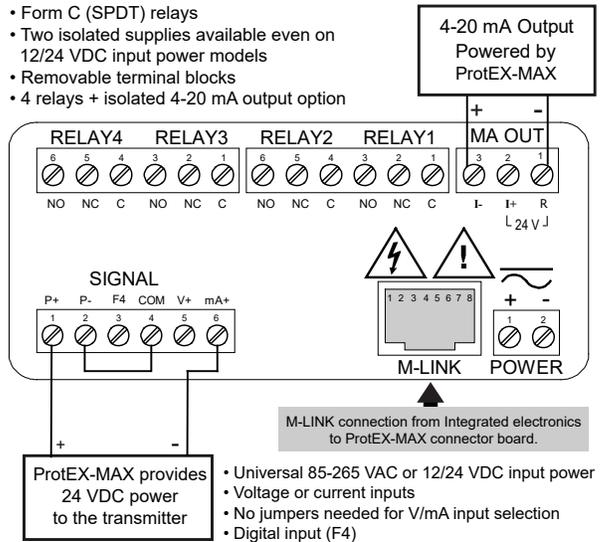
Download free 3-D CAD files of these instruments to simplify your drawings!  
[predig.com/documentation-cad](http://predig.com/documentation-cad)



## CONNECTIONS

### PD8-6210

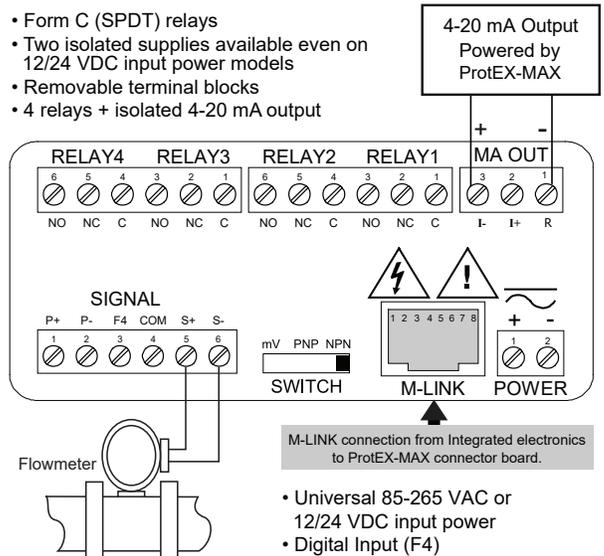
- Form C (SPDT) relays
- Two isolated supplies available even on 12/24 VDC input power models
- Removable terminal blocks
- 4 relays + isolated 4-20 mA output option



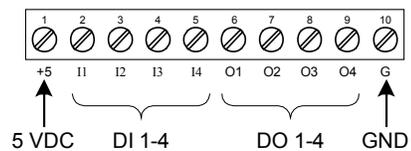
Connections for PD8-6210-6H7 & PD8-6210-7H7

### PD8-6310

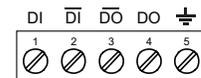
- Form C (SPDT) relays
- Two isolated supplies available even on 12/24 VDC input power models
- Removable terminal blocks
- 4 relays + isolated 4-20 mA output



Connections for PD8-6310-6H7 & PD8-6310-7H7



Digital I/O Connections



RS-485 Connections

## SPECIFICATIONS

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

### General

**Display:** Main display: 0.60" (15 mm) high. Second display: 0.46" (12 mm) high. Both are 6 digits (-99999 to 999999), red LEDs.

**Default Display Assignment:** The upper display shows batch total. The lower display shows rate with alternating units, and can be switched to show grand total, batch count, or preset with the STOP key.

**Custom Display Assignment:** The upper and lower displays may be assigned to rate, total, grand total, batch count, preset, set points, units (lower display only), alternating R & T, R & GT, preset & rate, max & min, or a Modbus display register. Any rate/total/grand total display may be programmed to alternate with a custom unit or tag.

**Alternating Display:** Displays alternate every 10 seconds when display is selected or the batch is paused.

**Display Intensity:** Eight user selectable intensity levels

**Display Update Rate:** 5/second (200 ms)

**Overrange:** Display flashes 999999

**Underrange:** Display flashes -999999

**Programming Methods:** Four CapTouch 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:** Recommended at least every 12 months.

**Max/Min Display:** Max (Peak) / min (Valley) readings reached by the process are stored until reset by the user or until power is cycled.

**Password:** Three programmable passwords restrict modification of programmed settings and two prevent resetting the totals.

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

**Power Options:** 85-265 VAC 50/60 Hz, 90-265 VDC, 20 W max, or optional model with 12-24 VDC  $\pm 10\%$ , 15 W max.

**Fuse:** Required external fuse: UL Recognized, 5 A max, slow blow; up to 6 controllers may share one 5 A fuse.

**Isolated Transmitter Power Supply:** Terminals P+ & P-: 24 VDC  $\pm 10\%$ . internally selectable jumper for 24, 10, or 5 VDC supply. All models transmitter supply rated @ 25 mA max.

**Normal Rejection Mode:** Greater than 60 dB at 50/60 Hz (PD8-6210)

**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  $T_a = -55$  to  $60^\circ\text{C}$   
T5 Class operating temperature range  $T_a = -55$  to  $65^\circ\text{C}$ .  
Storage temperature range:  $-55$  to  $85^\circ\text{C}$  ( $-67$  to  $185^\circ\text{F}$ ).  
Relative humidity: 0 to 90% non-condensing.

**Max Power Dissipation:** Maximum power dissipation limited to 13.73 W. See instruction manual for additional details.

**Connections:** Removable screw terminal blocks accept 12 to 22 AWG wire, RJ45 for external relays, digital I/O, and serial communication adapters.

**Mounting:** Two slotted flanges for wall mounting or NPS 1½" to 2½" or DN 40 to 65 mm pipe mounting

**Weight:** Aluminum: 14.7 lbs (6.67 kg); Stainless Steel: 23.5 lbs (10.66 kg)

**Dimensions:** 6.42" x 7.97" x 8.47" (W x H x D) (163 mm x 202 mm x 215 mm)

**Warranty:** 3 years parts & labor

### PD8-6210 Analog Input

**Inputs:** Field selectable: 0-20, 4-20 mA,  $\pm 10$  VDC (0-5, 1-5, 0-10 V), Modbus PV (Slave)

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

**Temperature Drift:** 0.005% of calibrated span/ $^\circ\text{C}$  max from 0 to  $65^\circ\text{C}$  ambient, 0.01% of calibrated span/ $^\circ\text{C}$  max from  $-40$  to  $0^\circ\text{C}$  ambient

**Signal Input Conditioning:** Linear, square root, programmable exponent, or round horizontal tank volume calculation.

**Multi-Point Linearization:** 2 to 32 points

**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: dddddd, dddddd, dddddd, dddddd, or dddddd.

**Calibration Range:**

Input Range	Minimum Span Input 1 & 2
4-20 mA	0.15 mA
$\pm 10$ V	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 M $\Omega$ .  
Current ranges: 50 - 100  $\Omega$  (depending on resettable fuse impedance).

**Input Overload:** Current input protected by resettable fuse, 30 VDC max. Fuse resets automatically after fault is removed.

## PD8-6310 Pulse Input

**Inputs:** Field selectable: Pulse or square wave 0-5 V, 0-12 V, or 0-24 V @ 30 kHz; TTL; open collector 4.7 k $\Omega$  pull-up to 5 V @ 30 kHz; NPN or PNP transistor, switch contact 4.7 k $\Omega$  pull-up to 5 V @ 40 Hz; coil (sine wave) 40 mVp-p min @ 10 kHz; Modbus PV (Slave)

**Low Voltage Mag Pickup (Isolated):** Sensitivity: 40 mVp-p to 8 Vp-p  
**Minimum Input Frequency:** 0.001 Hz - Minimum frequency is dependent on high gate setting.

**Maximum Input Frequency:** 30,000 Hz (10,000 for Low Voltage Mag Pickup)

**Input Impedance:** Pulse input: Greater than 300 k $\Omega$  @ 1 kHz. Open collector/switch input: 4.7 k $\Omega$  pull-up to 5 V.

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

**Display Update Rate:** Total: 10/sec, Rate: 10/sec to 1/1000 sec

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

**Multi-Point Linearization:** 2 to 32 points

**Low-Flow Cutoff:** 0-999999 (0 disables cutoff function)

**Decimal Point:** Up to five decimal places or none: *dddddd*, *dddddd*, *dddddd*, *dddddd*, *dddddd*, or *dddddd*.

**Calibration:** May be calibrated using K-factor, scale using internal calibration, or calibrate by applying an external calibration signal.

**K-Factor:** Field programmable K-factor converts input pulses to rate in engineering units. May be programmed from 0.00001 to 999,999 pulses/unit.

**Calibration Range:** Input 1 signal may be set anywhere in the range of the controller; input 2 signal may be set anywhere above setting.

**Filter:** Programmable contact de-bounce filter, 40 to 999 Hz maximum input frequency allowed with low speed filter.

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

**Low Gate:** 0.1-99.9 seconds; this function determines how often the incoming pulses are calculated and the rate display is updated.

**High Gate:** 2.0-999.9 seconds; this function determines how long to wait for pulses before the display goes to zero. This function is used to display slow pulse rates.

Note: The combination of the low and high gate functions makes it possible to have a fast display update for fast pulse rates while displaying slow pulse rates, if needed. For example: If the low gate is set to 1.0 second and the high gate to 999.9 second, with a fast pulse rate the display is updated every second; with a slow pulse rate the controller is capable of waiting up to 999.9 seconds before calculating the rate, making it possible to display a very slow rate down to 1 pulse/999.9 second (0.001 pulse/second).

## Batch Controller

**Rate Display Indication:** 0 to 999999, lead zero blanking. "R" LED illuminates while displaying rate.

**Total Displays & Grand Total Overflow:** 0 to 999,999; automatic lead zero blanking. "T" LED is illuminated while displaying batch total and "GT" for grand total. Up to 999,999,999 with total-overflow feature. "oF" is displayed to the left of grand total overflow and  $\blacktriangle$  LED is illuminated.

**Batch Total Decimal Point:** Up to five decimal places or none: *dddddd*, *dddddd*, *dddddd*, *dddddd*, *dddddd*, or *dddddd*. Total decimal point is independent of rate decimal point.

**Totalizer:** Calculates 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.

**Total Conversion Factor:** 0.00001 to 999,999

**Batch Preset:** 0.00001 to 999,999 based on batch total decimal point.

**Automatic Batch Restart Delay:** 00000.1 to 999.9 seconds. The batch will automatically restart after completion of the last batch.

**Grand Total Rollover:** Totalizer rolls over when display exceeds 999,999,999. Relay status reflects the display value.

**Grand Total Alarms:** Up to seven, user selectable under Setup menu. Any set point can be assigned to grand total and may be programmed anywhere in the range of the controller for grand total alarm indication. Note that Relay 1 should always be assigned to batch control (E o L R L).

**Grand Total Reset:** Via front panel button, external contact closure on digital inputs, automatically via user selectable preset value and time delay, or through serial communications.

**Grand Total Reset Password:** A grand total password may be entered to prevent resetting the grand total from the front panel.

**Non-Resettable Grand Total:** The grand total can be programmed as a non-resettable total by entering the password "050873". Caution: Once the Grand Total has been programmed as "non-resettable" the feature cannot be disabled

## Relays

**Rating:** 4 SPDT (Form C) internal and rated 3 A @ 30 VDC and 125/250 VAC resistive load. Total current: 4 A max (total of all relays). 1/14 HP (≈ 50 W) @ 125/250 VAC for inductive loads.

**Noise Suppression:** Noise suppression is recommended for each relay contact switching inductive loads.

**Relay Assignment:** Relays may be assigned to batch control, sampling, rate, or grand total alarms.

**Preclose:** 0-100% of batch size, individually user programmable for each additional batch control relay beyond the first.

**Alarm 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).

**Batching Relay Operation:** Single or (2 to 8) multi-relay batching with optional preclose for multi-stage operation. Each additional relay may be programmed with an individual preclose value.

**Alarm Relay Operation:** Automatic (non-latching), latching (requires manual acknowledge), sampling (based on rate or grand total), pump alternation control (2 to 8 relays), off (disable unused relays), and manual on/off control mode. Alarms are active only when the batch is running.

**Alarm Relay Reset:** User selectable via front buttons, digital inputs, or PC

1. Automatic reset only (non-latching), when input passes the reset point or total is reset to zero.
2. Manual reset only, when batch is stopped (latching).
3. 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. This replaces one of the standard batch control function keys. Only the PAUSE/STOP key function is possible during a batch process, so manual reset may only be done when the controller is in STOP mode.

**Deadband:** 0-100% of span, user programmable

**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, relays will reflect the state of the input. Alarms are active only when the batch is running.

## USB Connection

**Function:** Programming only

**Compatibility:** USB 2.0 Standard, Compliant

**Connector Type:** Micro-B receptacle

**Cable:** USB A Male to Micro-B Cable

**Driver:** Microsoft® Windows® 10/11

**Power:** USB port provides power to the controller for configuration only. **DO NOT** apply AC or DC power to the controller while the USB port is in use.

## Isolated 4-20 mA Transmitter Output

**Output Source:** Rate/process, total, grand total, 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% FS ± 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. Used to power the 4-20 mA output. 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

**Deadband:** 0-100% of span, user programmable

**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, relays will reflect the

## RS-485 Serial Communications

**Compatibility:** EIA-485

**Connectors:** Removable screw terminal connector

**Max Distance:** 3,937' (1,200 m) max

**Status Indication:** Separate LEDs for Power (P), Transmit (TX), and Receive (RX) state of the input. Alarms are active only when the batch is running.

## Modbus® RTU Serial Communications

**Protocol:** Modbus RTU

**Controller 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 ProtEX-MAX Modbus Register Tables located at [www.predig.com](http://www.predig.com) for details.

## Digital Input (F4)

**Function:** Start/Stop batch, remote operation of front-panel buttons, acknowledge/reset relays, reset max/min values. See Function Keys & Digital I/O Available Settings on page 64 for a complete list of capabilities.

**Contacts:** 3.3 VDC on contact. Connect normally open contacts across F4 to COM.

**Logic Levels:** Logic High: 3 to 5 VDC Logic Low: 0 to 1.25 VDC

## Digital Inputs & Outputs

**Function:** Terminals provided for remote operation of all four programming / operation buttons. Other uses include acknowledge/reset relays and reset max/min values.

**Channels:** 5 digital inputs & 4 digital outputs

**Digital Input Logic High:** 3 to 5 VDC

**Digital Input Logic Low:** 0 to 1.25 VDC

**Digital Output Logic High:** 3.1 to 3.3 VDC

**Digital Output Logic Low:** 0 to 0.4 VDC

**Source Current:** 10 mA maximum output current

**Sink Current:** 1.5 mA minimum input current

**+5 V Terminal:** To be used as pull-up for digital inputs only. Connect normally open push buttons across +5 V & DI 1-4.

### WARNING

- **DO NOT** use +5 V terminal to power external devices.

## MeterView Pro Software

**Availability:** Download directly from controller or from [www.predig.com/download\\_software](http://www.predig.com/download_software)

**System Requirements:** Microsoft® Windows® 10/11

**Communications:** USB 2.0 (for programming only) (USB A Male to Micro-B Cable); RS-485 to USB converter (programming, monitoring, batch control, and data logging)

**Configuration:** Configure controllers one at a time

**Power:** USB port provides power to the controller for configuration only. **DO NOT** apply AC or DC power to the controller while the USB port is in use.

**Batch Control:** Use MeterView Pro to control the batch, change the preset, reset totals, and test the relays.

**Data Logging:** Use MeterView Pro for data logging of the batch process.

## Enclosure

**Material:** AL Models: ASTM A413 LM6 die-cast aluminum, copper-free, enamel coated. SS Models: ASTM A743 CF8M investment-cast 316 stainless steel

**Gasket:** Fluoroelastomer

**Rating:** NEMA 4X, IP68 Explosion-proof

**Color:** AL: Blue. SS: Silver.

**Window:** Borosilicate glass

**Conduits:** Four 3/4" NPT threaded conduit openings

**Conduit Stopping Plugs:** Sold separately

**Flanges:** Two built-in flanges for wall and pipe mounting.

**Tamper-Proof Seal:** Cover may be secured with tamper-proof seal.

**Overall Dimensions:** 6.42" x 7.97" x 8.47" (W x H x D) (163 mm x 202 mm x 215 mm)

**Weight:** AL: 14.7 lbs (6.67 kg). SS: 23.5 lbs (10.66 kg).

**ATEX:** Flameproof protection

II 2 G D

Ex db IIC Gb

Ex tb IIIC Db

IP66/IP68

Tamb: -55°C to +85°C

Certificate Number: Sira 19ATEX1252U

**IECEX:** Flameproof and dust protection

Ex db IIC Gb

Ex tb IIIC Db

IP66/IP68

Tamb: -55°C to +85°C

Certificate Number: IECEX SIR 19.0075U

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

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

Class III

Ex db IIC Gb

Ex tb IIIC Db

Class I, Zone 1, AEx db IIC Gb

Zone 21, AEx tb IIIC Db

IP66/IP68/TYP E 4X

Tamb: -55°C to +85°C

Certificate Number: CSA19.80011200U

**UL:** Class I, Division 1, Groups A, B, C, D

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

Class III

Class I, Zone 1, AEx db IIC Gb

Zone 21, AEx tb IIIC Db

Ex db IIC Gb

Ex tb IIIC Db

IP66/IP68/TYP E 4X

Tamb: -55°C to +85°C

Certificate Number: E518920

**Note:** The above approvals are for the enclosure only. See next page for approvals on the entire instrument.

## General Compliance Information

### Electromagnetic Compatibility

#### Emissions

EN 55022

Class A ITE emissions requirements

**Radiated Emissions:** Class A

**AC Mains Conducted Emissions:** Class A

#### Immunity

EN 61326-1

Measurement, control, and laboratory equipment

EN 61000-6-2

EMC heavy industrial generic immunity standard

**RFI - Amplitude Modulated:** 80 -1000 MHz 10 V/m 80% AM (1 kHz)

1.4 - 2.0 GHz 3 V/m 80% AM (1 kHz)

2.0 - 2.7 GHz 1 V/m 80% AM (1 kHz)

**Electrical Fast Transients:** ±2kV AC mains, ±1kV other

**Electrostatic Discharge:** ±4kV contact, ±8kV air

**RFI - Conducted:** 10V, 0.15-80 MHz, 1kHz 80% AM

**AC Surge:** ±2kV Common, ±1kV Differential

**Surge:** 1KV (CM)

**Power-Frequency Magnetic Field:** 30 A/m 70%V for 0.5 period

**Voltage Dips:** 40%V for 5 & 50 periods

70%V for 25 periods

Voltage Interruptions: <5%V for 250 periods

**Note:** Testing was conducted on meters with cable shields grounded at the point of entry representing installations designed to optimize EMC performance.

## Product Ratings and Approvals

**CSA:** Class I, Division 1, Groups B, C, D  
 Class II, Division 1, Groups E, F, G  
 Class III, Division 1, T5  
 Class III, Division 1, T6 (Ta max = 60°C)  
 Ex db IIC T5  
 Ex db IIC T6 (Ta max = 60°C)  
 Ex tb IIIC T90°C  
 Ta = -55°C to +65°C  
 Enclosure: Type 4X & IP66 / IP68  
 CSA Certificate: CSA 12 2531731

**ATEX:** II 2 G D  
 Ex db IIC T\* Gb  
 Ex tb IIIC T90°C Db IP68  
 Ta = -55°C to +65°C  
 \*T6 = -55°C to +60°C  
 \*T5 = -55°C to +65°C  
 Certificate Number: Sira 12ATEX1182X

**IECEX:** Ex db IIC T\* Gb  
 Ex tb IIIC T90°C Db IP68  
 Ta = -55°C to +65°C  
 \*T6 = -55°C to +60°C  
 \*T5 = -55°C to +65°C  
 Certificate Number: IECEX SIR 12.0073X

### ATEX/IECEX Specific Conditions of Use:

- The equipment label and epoxy coating may generate an ignition-capable level of electrostatic charges under certain extreme conditions. The user should ensure that the equipment is not installed in a location where it may be subjected to external conditions (such as high-pressure steam) which might cause a build-up of electrostatic charges on non-conducting surfaces. Additionally, cleaning of the equipment should be done only with a damp cloth.
- Flameproof joints are not intended to be repaired.
- All entry closure devices shall be suitably certified as "Ex d", "Ex t" and "IP66/68" as applicable. Suitable thread sealing compound (non-setting, non-insulating, non-corrosive, not solvent based, suitable for the ambient rating) must be used at the NPT conduit entries to achieve the IPx8 rating while maintaining the Ex protection concept.

### Year of Construction

This information is contained within the serial number with the first four digits representing the year and month in the YYMM format.

### For European Community

The ProtEX-MAX must be installed in accordance with the ATEX directive 2014/34/EU, the product manual, and the product certificate Sira 12ATEX1182X.

## ORDERING INFORMATION

PD8-6210 Analog Input • Aluminum Enclosure		
85-265 VAC Model	12-24 VDC Model	Options Installed
PD8-6210-6H7	PD8-6210-7H7	4 Relays & 4-20 mA Output

PD8-6210 Analog Input • Stainless Steel Enclosure		
85-265 VAC Model	12-24 VDC Model	Options Installed
PD8-6210-6H7-SS	PD8-6210-7H7-SS	4 Relays & 4-20 mA Output

PD8-6310 Pulse Input • Aluminum Enclosure		
85-265 VAC Model	12-24 VDC Model	Options Installed
PD8-6310-6H7	PD8-6310-7H7	4 Relays & 4-20 mA Output

PD8-6310 Pulse Input • Stainless Steel Enclosure		
85-265 VAC Model	12-24 VDC Model	Options Installed
PD8-6310-6H7-SS	PD8-6310-7H7-SS	4 Relays & 4-20 mA Output

Note: 24 V flowmeter power supply standard on all models.

Accessories	
Model	Description
PDAPLUG75	3/4" NPT 316 Stainless Steel Stopping Plug with Approvals
PDA-SSTAG	Stainless Steel Tag
PDA6848-SS	Pipe Mounting Kit Stainless Steel
PDA7485-I	RS-232 to RS-422/485 Isolated Converter
PDA8485-I	USB to RS-422/485 Isolated Converter

## Your Local Distributor is:



**WARNING**  
 Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

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LDS8-6210\_G 02/25