# ProtEX-MAX PD8-6300 Explosion-Proof Pulse Input Rate/Totalizer Instruction Manual

**ProtEX™ MAX**

**MeterView Pro**
USB Install

FM APPROVED · CSA · Ex · CE

**Rate/Totalizer**

- Pulse, Open Collector, NPN, PNP, TTL, Switch Contact, Sine Wave (Coil), Square Wave Inputs
- 5, 10, or 24 V Flowmeter Power Supply
- Displays Rate and Total Simultaneously
- Count Up or Down, Total & Grand Total
- Gate Function for Rate Display of Slow Pulse Rates
- K-Factor, Internal Scaling, or External Calibration
- Non-Resettable Grand Total
- Modern, Sleek and Practical Enclosure
- Display Mountable at 0°, 90°, 180°, & 270° Degrees
- Explosion-Proof, IP68, NEMA 4X Enclosure
- SafeTouch® Through-Glass Button Programming
- Flanges for Wall or Pipe Mounting
- Superluminous Sunlight Readable Display
- Free USB Programming Software & Cable
- 4 Relays + Isolated 4-20 mA Output Option
- USB, RS-232, & RS-485 Serial Communication Options
- Input Power Options Include 85-265 VAC or 12-24 VDC

## PRECISION DIGITAL CORPORATION

233 South Street • Hopkinton MA 01748 USA
Tel (800) 343-1001 • Fax (508) 655-8990

**PRECISION DIGITAL**

**www.predig.com**

**Disclaimer**

The information contained in this document is subject to change without notice. Precision Digital makes no representations or warranties with respect to the contents hereof; and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose.

| ⚠ **CAUTION**: *Read complete instructions prior to installation and operation of the meter.* | ⚡ **WARNING**: *Risk of electric shock or personal injury.* |
|---|---|

| ⚡ **Warning!** | • *This product is not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using this product for such applications does so at his/her own risk. Precision Digital Corporation shall not be held liable for damages resulting from such improper use.*<br>• *Failure to follow installation guidelines could result in death or serious injury. Make sure only qualified personnel perform the installation.*<br>• *Never remove the instrument cover in explosive environments when the circuit is live.*<br>• *Cover must be fully engaged to meet flameproof/explosion-proof requirements.*<br>• *Information in this manual supersedes all enclosure, compliance, and agency approval information included in additional product manuals included with this product.* |
|---|---|

**Limited Warranty**

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

**Registered Trademarks**

MeterView® Pro is a registered trademark of Precision Digital Corporation. Modbus® is a Registered Trademark of Schneider Automation Inc. All other trademarks mentioned in this document are the property of their respective owners.

# www.predig.com

# Table of Contents

## Table of Figures

## Introduction

The ProtEX-MAX PD8-6300 offers all the functionality of the ProVu PD6300 as a fully FM, CSA, ATEX, and IECEx approved explosion-proof product. It is specifically designed to display flow rate and total from a pulse output (NPN, PNP, TTL, switch contact, sine wave, etc.) flowmeter. It displays that signal on a dual-line, 6-digit SunBright® sunlight readable display. Flow rate is typically displayed on the upper line and the cumulative total is displayed on the lower line. The total overflow feature allows up to a 9-digit total and grand total to be displayed. The PD8-6300 includes a 24 VDC power supply to drive the flowmeter and can be equipped with up to four internal relays and a 4-20 mA analog output. It can be programmed and operated without opening the housing by using the built-in SafeTouch® through-glass buttons or the RS485 serial communication port with free Modbus® protocol.

# Ordering Information

**SunBright Display Models**

| 85-265 VAC Model | 12-24 VDC Model | Options Installed |
|---|---|---|
| PD8-6300-6H0 | PD8-6300-7H0 | No options |
| PD8-6300-6H7 | PD8-6300-7H7 | 4 relays & 4-20 mA output |

⚠ **WARNING - Cancer and Reproductive Harm - www.P65Warnings.ca.gov**

**Accessories**

| Model | Description |
|---|---|
| PDA1232 | RS-232 serial adapter |
| PDA1485 | RS-485 serial adapter |
| PDA7485-I | RS-232 to RS-422/485 isolated converter |
| PDA8232-N | USB to RS-232 non-isolated converter |
| PDA8485-I | USB to RS-422/485 isolated converter |
| PDA2811 | 1 Meter Plastic NEMA 4X Enclosure |
| PDA2812 | 2 Meter Plastic NEMA 4X Enclosure |
| PDX6901 | Suppressor (snubber): 0.01 µF/470 $\Omega$, 250 VAC |

# Specifications

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

## General

| | |
|---|---|
| **Display** | Line 1: 0.6" (15 mm) high, red LEDs<br>Line 2: 0.46" (12 mm) high, red LEDs<br>6 digits: each (-99999 to 999999), with lead zero blanking. |
| **Display Intensity** | Eight user selectable intensity levels |
| **Display Update Rate** | Rate: 10 per second; up to 1 per 100 seconds (and is a function of Low Gate setting)<br>Total: 10 per second (fixed) |
| **Overrange** | Display flashes 999999 |
| **Display Assignment** | Display lines 1 & 2 may be assigned to rate, total, grand total, alternate rate & total, max/min, units (line 2 only), set points, Modbus input, & more. |
| **Programming Methods** | Four front panel buttons, digital inputs, PC and MeterView Pro software, or Modbus registers. |
| **Recalibration** | All ranges are 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** | Three programmable passwords restrict modification of programmed settings and two prevent resetting the totals.<br>Pass 1: Allows use of function keys and digital inputs<br>Pass 2: Allows use of function keys, digital inputs and editing set/reset points<br>Pass 3: Restricts all programming, function keys, and digital inputs.<br>Total: Prevents resetting the total manually<br>Gtotal: Prevents resetting the grand total manually |
| **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 12-24 VDC ± 10%, 15 W max<br>Powered over USB for configuration only |
| **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%. Selectable for 24, 10, or 5 VDC supply (internal jumper J4). All models transmitter supply rated @ 25mA max. |
| **Isolation** | 4 kV input/output-to-power line<br>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<br>T5 Class operating temperature range Ta = -40 to 65°C |

| | |
|---|---|
| **Max Power Dissipation** | Maximum power dissipation limited to 15.1 W. |
| **Connections** | Screw terminals accept 12 to 22 AWG wire |
| **Enclosure** | Explosion-proof die cast aluminum with glass window, corrosion resistant epoxy coating, color: blue.<br>NEMA 4X, 7, & 9, IP68.<br>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. See Mounting Dimensions on page **57**. |
| **Tightening Torque** | Screw terminal connectors: 5 lb-in (0.56 Nm) |
| **Overall Dimensions** | 6.42" x 7.97" x 8.47" (W x H x D)<br>(163 mm x 202 mm x 215 mm) |
| **Weight** | 16.0 lbs (7.26 kg) |
| **Warranty** | 3 years parts & labor |

## Rate 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; Modbus PV (Slave) |
| **Low Voltage Mag Pickup (Isolated)** | Sensitivity: 40 mVp-p to 8Vp-p |
| **Minimum Input Frequency** | 0.001 Hz<br>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** | ±0.03% of calibrated span ±1 count |
| **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:<br>*d.ddddd*, *d.dddd*, *d.ddd*, *d.dd*, *d.d*, or *dddddd* |
| **Calibration** | May be calibrated using K-factor, internal calibration, 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 0.00001 to 999,999 pulses/unit. |

6

| | |
|---|---|
| **Calibration Range** | Input 1 signal may be set anywhere in the range of the meter; input 2 signal may be set anywhere above or below input 1 setting.<br>Minimum input span between any two inputs is 10 Hz.<br>An error message will appear if the input 1 and input 2 signals are too close together. |
| **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 |
| **Gate** | Low gate: 0.1-99.9 seconds<br>High gate: 2.0-999.9 seconds |
| **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<br>Logic Low: 0 to 1.25 VDC |

## Rate/Totalizer

| | |
|---|---|
| **Display Assignment** | Display lines 1 & 2 may be assigned to rate, total, grand total, alternate rate/total, alternate rate/grand total, set points, alternate rate/units, alternate total/units, alternate grand total/units, display Hi, display Lo, display Hi/Lo, display Modbus, display units (line 2) and display off (line 2). |
| **Rate Display Indication** | -99999 to 999999, lead zero blanking. "R" LED illuminates while displaying rate or frequency. |
| **Total Display & Total Overflow** | 0 to 999,999; automatic lead zero blanking. "T" LED is illuminated while displaying total or grand total.<br>Up to 999,999,999 with total-overflow feature. "$oF$" is displayed to the left of total overflow and ▲ LED is illuminated. |
| **Alternating Display** | Either display may be programmed to alternate between rate and total or rate and grand total every 10 seconds. |
| **Total Decimal Point** | Up to five decimal places or none: $d.ddddd$, $d.dddd$, $d.ddd$, $d.dd$, $d.d$, or $dddddd$<br>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. |
| **Totalizer Rollover** | Totalizer rolls over when display exceeds 999,999,999. Relay status reflects display. |
| **Total Overflow Override** | Program total reset for automatic with 0.1 second delay and set point 1 for 999,999 |
| **Totalizer Presets** | Up to eight, user selectable under setup menu. Any set point can be assigned to total and may be programmed anywhere in the range of the meter for total alarm indication. |
| **Programm-able Delay On Release** | 0.1 and 999.9 seconds; applied to the first relay assigned to total or grand total.<br>If the meter is programmed to reset total to zero automatically when the preset is reached, then a delay will occur before the total is reset. |

| | |
|---|---|
| **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. |
| **Total Reset Password** | Total and grand total passwords may be entered to prevent resetting the total or grand total from the front panel. |
| **Non-Resettable Total** | The grand total can be programmed as a non-resettable total by entering the password "050873".<br><br>⚠️ **Caution!** *Once the Grand Total has been programmed as "non-resettable" the feature **cannot** be disabled.* |

## Relays

| | |
|---|---|
| **Rating** | 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 W) @ 125/250 VAC for inductive loads |
| **Noise Suppression** | Noise suppression is recommended for each relay contact switching inductive loads; see page 18 for details. |
| **Relay Assignment** | Relays may be assigned to rate, total, or grand total. |
| **Deadband** | 0-100% of span, user programmable |
| **High or Low Alarm** | User may program any alarm for high or low trip point.<br>Unused alarm LEDs and relays may be disabled (turn off). |
| **Relay Operation** | Automatic (non-latching)<br>Latching (requires manual acknowledge)<br>Sampling (based on time)<br>Alternation control (2 to 4 relays)<br>Off (disable unused relays and enable Interlock feature)<br>Manual on/off control mode |
| **Relay Reset** | User selectable via front panel buttons, digital inputs, or PC<br><br>1. Automatic reset only (non-latching), when the input passes the reset point or total is reset to zero.<br>2. Automatic + manual reset at any time (non-latching)<br>3. Manual reset only, at any time (latching)<br>4. Manual reset only after alarm condition has cleared (Latching with clear)<br><br>*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<br>Programmable and independent for each relay. |
| **Fail-Safe Operation** | Programmable and independent for each relay.<br><br>*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. |

## Isolated 4-20 mA Transmitter Output

| | |
|---|---|
| **Output Source** | Rate/process, total, grand total, max, min, set points 1-4, Modbus input or manual control mode |
| **Scaling Range** | 1.000 to 23.000 mA for any display range. |
| **Calibration** | Factory calibrated: 0.0 to 1000.0 = 4-20 mA output |
| **Analog Out 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%. May be used to power the 4-20 mA output or other devices.  Refer to Figure 3 on page 14 and Figure 15 on page 19. All models @ 25mA 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 |

## 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) |
| **Slave Id** | 1 – 247 (Meter address) |
| **Baud Rate** | 300 - 19,200 bps |
| **Transmit Time Delay** | Programmable between 0 and 199 ms |

| | |
|---|---|
| **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 second |
| **Turn Around Delay** | Less than 2 ms (fixed) |

*Note: Refer to the PROVU® Modbus Register Tables located at www.predig.com for details.*

## Digital Inputs & Outputs

| | |
|---|---|
| **Channels** | 4 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 pushbuttons across +5 V & DI 1-4. ⚠ **WARNING** *DO NOT use +5 V terminal (pin 1) to power external devices.* |
| **Function Assignment** | The on-board digital inputs (1-4) are designed to mimic the behavior of the front panel buttons (Menu, F1, F2, & F3). If you wish to change their behavior, re-assign F1-F3 to the desired function, then change the corresponding digital input to match. |

## MeterView Pro

| | |
|---|---|
| **System Requirements** | Microsoft® Windows® XP/Vista/7/8/10 |
| **Communications** | USB 2.0 (Standard USB A to Micro USB B) |
| **Configuration** | Configure device settings one at a time |

## Product Ratings and Approvals;

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

***Special Conditions for Safe Use:***
Use suitably certified and dimensioned cable entry device and/or plug. The equipment shall be installed such that the supply cable is protected from mechanical damage. The cable shall not be subjected to tension or torque. If the cable is to be terminated within an explosive atmosphere, then appropriate protection of the free end of the cable shall be provided. Cable must be suitable for 90°C.

***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 94/9/EC, and the product certificate Sira 12ATEX1182.

# Compliance Information

## Safety

| | |
|---|---|
| **UL & c-UL Listed** | USA & Canada<br>UL 508 Industrial Control Equipment |
| **UL File Number** | E160849 |
| **Front Panel** | UL Type 4X, NEMA 4X, IP65; panel gasket provided |
| **Low Voltage Directive** | EN 61010-1:2010<br>Safety requirements for measurement, control, and laboratory use |

## Electromagnetic Compatibility

| | |
|---|---|
| **Emissions** | EN 55022:2010<br>Class A ITE emissions requirements |
| Radiated Emissions | Class A |
| AC Mains Conducted Emissions | Class A |
| **Immunity** | EN 61326-1:2013<br>Measurement, control, and laboratory equipment<br>EN 61000-6-2:2005<br>EMC heavy industrial generic immunity standard |
| RFI - Amplitude Modulated | 80 -1000 MHz 10 V/m 80% AM (1 kHz)<br>1.4 - 2.0 GHz 3 V/m 80% AM (1 kHz)<br>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<br>70%V for 25 periods |
| Voltage Interruptions | <5%V for 250 periods |

*Note:*

*Testing was conducted on PD6300 meters installed through the covers of grounded metal enclosures with cable shields grounded at the point of entry representing installations designed to optimize EMC performance.*

*Declaration of Conformity available at www.predig.com*

# Safety Information

⚠️
**WARNINGS**

- Read complete instructions prior to installation and operation of the instrument.
- Installation and service should be performed only by trained service personnel. Service requiring replacement of internal sub-components must be performed at the factory.
- Disconnect from supply before opening enclosure. Keep cover tight while circuits are alive. Conduit seals must be installed within 18" (450mm) of the enclosure or within 2" (50mm) for Zone installations.
- Verify that the operating atmosphere of the instrument is consistent with the appropriate hazardous locations certifications.
- If the instrument is installed in a high voltage environment and a fault or installation error occurs, high voltage may be present on any lead
- Read all product labels completely and follow all instructions and requirements listed on the labels for installation or service.

# Installation

*Install in accordance with applicable local and national regulations (e.g. NEC).*

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

**For Installation in Canada:** The ProtEX-MAX must be installed in accordance with the Canadian Electrical Code CSA 22.1. All power supplies below 36 V and input circuits must be derived from a CSA Approved Class 2 source.

**For European Community:** The ProtEX-MAX must be installed in accordance with the ATEX directive 94/9/EC and the product certificate Sira 12ATEX1182.

⚠️ **WARNING** Disconnect from supply before opening enclosure. Keep cover tight while circuits are alive. Conduit seals must be installed within 18" (450mm) of the enclosure or within 2" (50mm) for Zone installations.

Wiring connectors are accessed by opening the enclosure. To access electrical connectors, remove the 2 captive screws and then remove the electronics module. Connectors are on the rear of the electronics module.

## Unpacking

Remove the instrument from packing box. Inspect the packaging and contents for damage. Report damages, if any, to the carrier.

If any part is missing or the instrument malfunctions, please contact your supplier or the factory for assistance.

## Pre-Installed Conduit/Stopping Plug

The PD8-6000 is supplied with two pre-installed conduit plugs for installations that do not require the use of all conduit entries. The conduit/stopping plugs include an internal 12mm hexagonal socket recess for removal. The pre-installed plugs and their installation are included in the hazardous area approvals for the PD8 Series enclosure.

| ⚠ **WARNING** | In hazardous areas, conduit and conduit/stopping plugs require the application of non-setting (solvent free) thread sealant. It is critical that all relevant hazardous area guidelines be followed for the installation or replacement of conduit or plugs. |
|---|---|
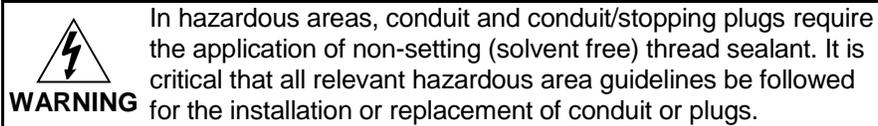
## Mounting

The ProtEX-MAX has four slotted mounting flanges that should be used for pipe mounting or wall mounting. Refer to *Mounting Dimensions*, page 57 for details.

| ⚠ **WARNING** | Do not attempt to loosen or remove flange bolts while the instrument is in service. |
|---|---|
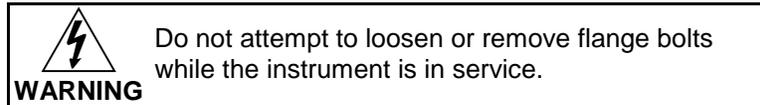
## Cover Jam Screw

The cover jam screw should be properly installed once the instrument has been wired and tested in a safe environment. The cover jam screw is intended to prevent the removal of the instrument cover in a flameproof environment without the use of tools. Using a M2 hex wrench, turn the screw clockwise until the screw contacts the aluminum enclosure. Turn the screw an additional 1/4 to 1/2 turn to secure the cover. Caution: Excess torque may damage the threads and/or wrench.

## Transmitter Supply Voltage Selection (P+, P-)

All meters, including models equipped with the 12-24 VDC power option, are shipped from the factory configured to provide 24 VDC power for the transmitter or sensor.

If the transmitter requires 5 or 10 VDC excitation, the internal jumper J4 must be configured accordingly.

To access the voltage selection jumper:

1. Remove all the connectors.
2. Unscrew the back cover.
3. Slide the back cover about 1 inch.
4. Configure the J4 jumper, located behind the input signal connector, for the desired excitation voltage as shown.
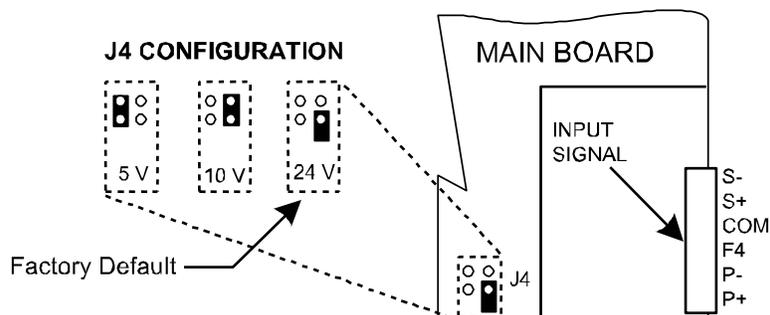


**Figure 1: Transmitter Supply Voltage Selection**

# Connections

| | • **Static electricity can damage sensitive components.** |
|---|---|
| ⚡ **WARNINGS** | • **Observe safe handling precautions for static-sensitive components.** |
| | • **Use proper grounding procedures/codes.** |
| | • **If the instrument is installed in a high voltage environment and a fault or installation error occurs, high voltage may be present on any lead or terminal.** |
| | • **Follow all fusing and wiring precautions requirements for the instrument integrated to the PD8 Series model number being connected.** |

To access the connectors, remove the enclosure cover and unscrew the two captive screws that fasten the electronics module. Signal connections are made to de-pluggable connectors on the back of the electronics module.

Some connectors may be provided already connected. These connections are required for proper operation of the ProtEX-MAX, and should not be removed unless instructed to by this manual.

Wires marked as being used for testing purposes should be removed.

Grounding connections are made to the two ground screws provided on the base – one internal and one external.

After all connections have been completed and verified, apply power to the unit.

## Required & Factory Wired Connection

The ProtEX-MAX comes with a pre-wired connection. This connection is detailed below, and must be maintained in order for the instrument to function properly.

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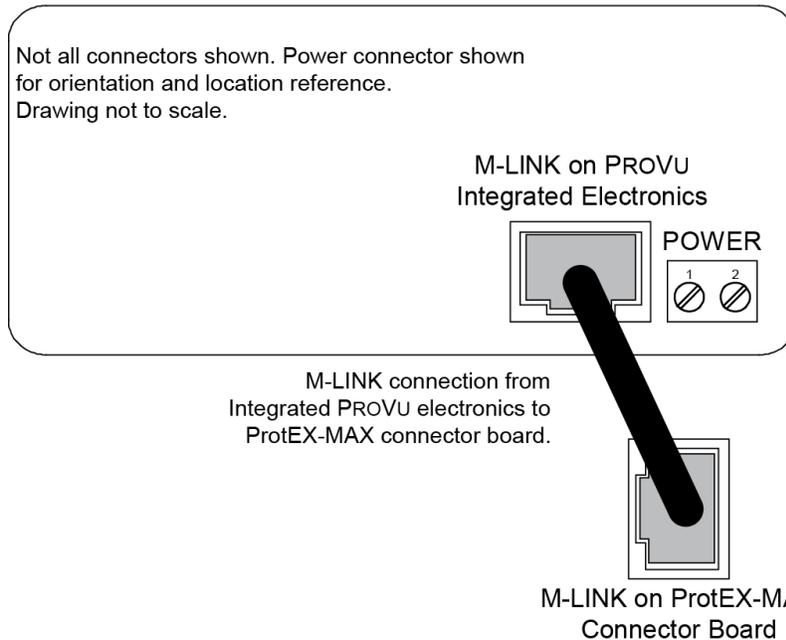


**Figure 2: Integrated ProVu Required Connections**

## Connectors Labeling

The connectors' label, affixed to the meter, shows the location of all connectors available with requested configuration.

| ⚡ Warning! | *Do not connect any equipment other than Precision Digital's expansion modules, cables, or meters to the RJ45 M-LINK connector. Otherwise damage will occur to the equipment and the meter.* |
|---|---|
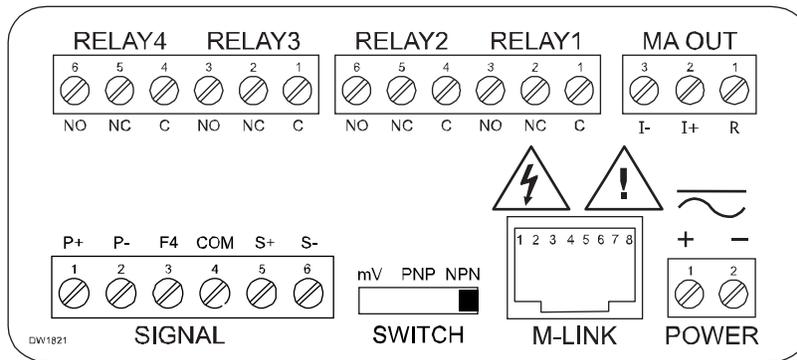


**Figure 3: Connector Labeling for Fully Loaded PD6300**

## Power Connections

Power connections are made to a two-terminal connector labeled POWER on Figure 3. The meter will operate regardless of DC polarity connection. The + and - symbols are only a suggested wiring convention.
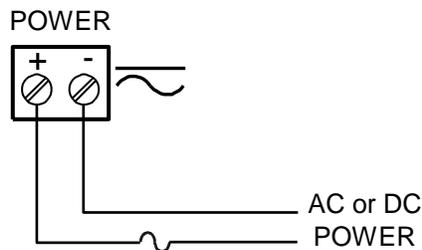


**Figure 4: Power Connections**

## Signal Connections

Signal connections are made to a six-terminal connector labeled SIGNAL on Figure 3. The COM (common) terminal is the return for the input signals.

The following figures show examples of signal connections.

Setup and programming is performed through the front panel buttons.
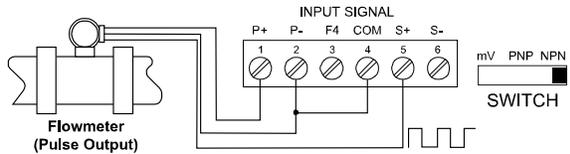
**Figure 5: Flowmeter Powered by Internal Power Supply**
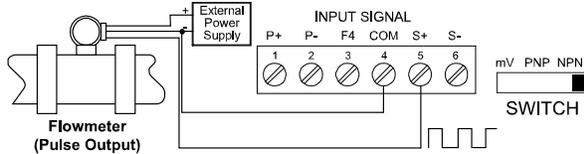
**Figure 6: Flowmeter Powered by External Supply**
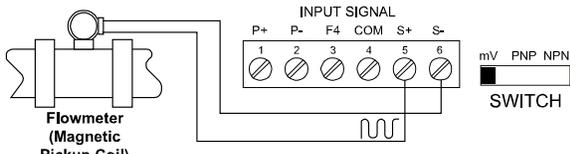
**Figure 7: Self-Powered Magnetic Pickup Coil Flowmeter**
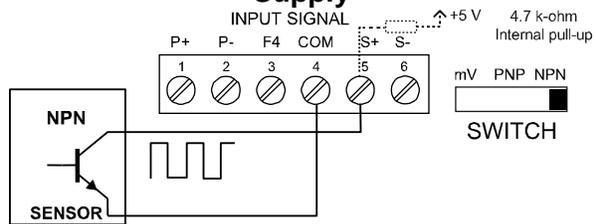
**Figure 8: NPN open Collector Input**
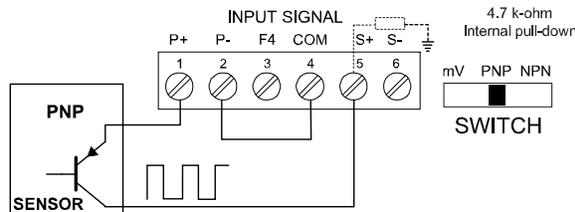
**Figure 9: PNP Sensor Powered by Internal Supply**
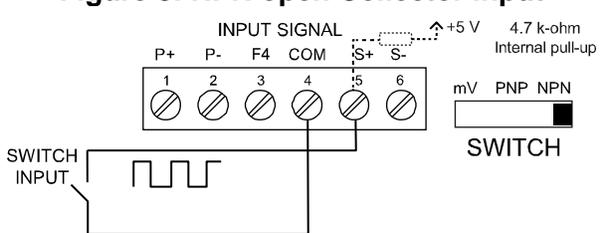
**Figure 10: Switch Input Connections**

## Serial Communications Connections

The ProtEX-MAX has a 5 position terminal block for connecting RS-485 serial devices.

Figure 11 details the wiring connections from the ProtEX-MAX to an RS-485 serial converter (such as the PDA7485 or PDA8485) for a four-wire network.

| ProtEX-MAX to RS-485 Serial Converter Connections | |
|---|---|
| RS-485 Serial Converter | ProtEX-MAX RS-485 Connections |
| ⏚ | ⏚ |
| $\overline{DO}$ | $\overline{DI}$ |
| DO | DI |
| $\overline{DI}$ | $\overline{DO}$ |
| DI | DO |

**Figure 11: ProtEX-MAX Connections to a Serial Converter**

The ProtEX-MAX has three diagnostic LEDs: a Power (P) LED to show when the module is powered properly, a Transmit Data (TX) LED to show when the module is being transmitted to by the PC side, and a Receive Data (RX) LED to show when the module is sending data to a receiving device.

The following diagrams detail how to connect the RS-485 serial communications from the ProtEX-MAX to a RS-485/RS-232 serial converter (PDA7485) in four wire and two wire configurations.

15

### Three Wire Connections

In order to wire the 5 pins for use as a 3-wire half-duplex RS-485 connection, it is necessary to create a jumper connection between DI – DO and DI- – DO- as shown below.
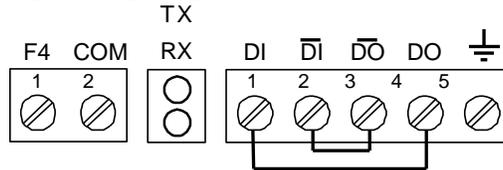


**Figure 12. Three-Wire RS485 Connection**
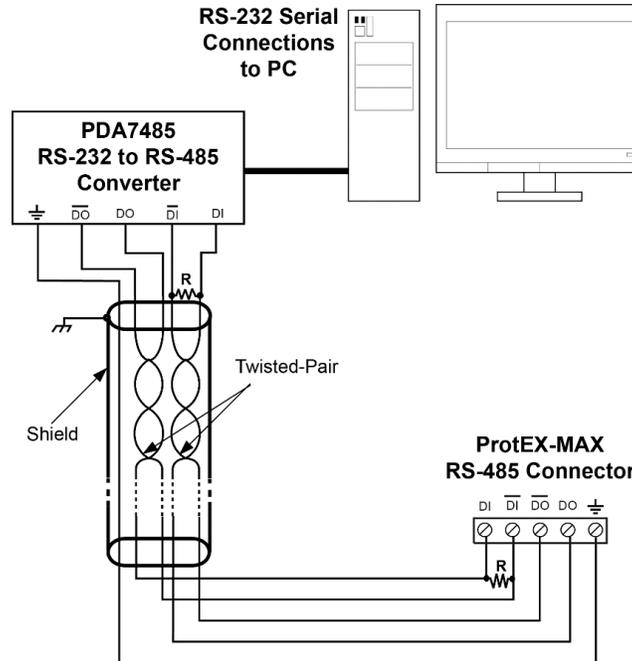


**Figure 13: RS-485 Wiring**

**Notes:**
1. Termination resistors are optional and values depend on the cable length and characteristic impedance. Consult the cable manufacturer for recommendations.
2. Refer to RS-232 to RS-485 Converter documentation for further details.
3. Use shielded cable, twisted-pairs plus ground. Connect ground shield only at one location.

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

**Figure 14: RS-485 Two-Wire Multi-Drop Wiring**

**Notes:**
1. Termination resistors are optional and values depend on the cable length and characteristic impedance. Consult the cable manufacturer for recommendations.
2. Refer to RS-232 to RS-485 Converter documentation for further details.
3. Use shielded cable, twisted-pair plus ground. Connect ground shield only at one location.

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

When using more than one instrument in a multi-drop or multi-point mode, each meter must be provided with its own unique address.

## Using PROVU Serial Adapters

| ⚠ **NOTICE** | PROVU expansion modules and serial adapters are not included in the hazardous area approvals of the ProtEX-MAX. The PDA1232 may be used only while the ProtEX-MAX is in a safe area, and will disable some features while installed. |
|---|---|

PROVU expansion modules and serial adapters are not recommended for use with the ProtEX-MAX. It is recommended that any serial protocol conversion required on the RS-485 communications connection be performed using a PDA7485 RS-232 to RS-485 or PDA8485 USB to RS-485 serial converter located in a safe area.

## Relay Connections

Relay connections are made to two six-terminal connectors labeled RELAY1 – RELAY4 on Figure 3. Each relay's C terminal is common only to the normally open (NO) and normally closed (NC) contacts of the corresponding relay. The relays' C terminals should not be confused with the COM (common) terminal of the INPUT SIGNAL connector.
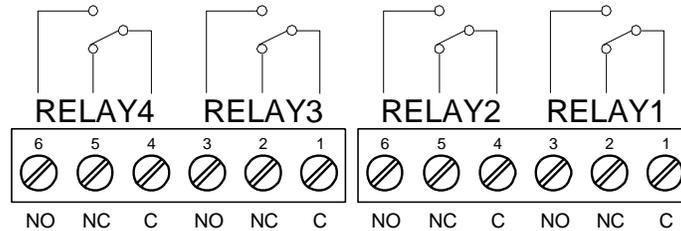


**Figure 15: Relay Connections**

## Switching Inductive Loads

The use of suppressors (snubbers) is strongly recommended when switching inductive loads to prevent disrupting the microprocessor's operation. The suppressors also prolong the life of the relay contacts. Suppression can be obtained with resistor-capacitor (RC) networks assembled by the user or purchased as complete assemblies. Refer to the following circuits for RC network assembly and installation:
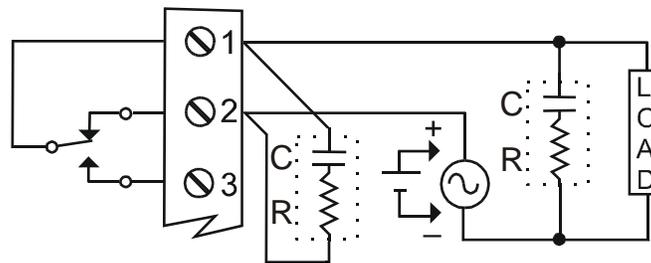


**Figure 16: AC and DC Loads Protection**

Choose R and C as follows:

R: 0.5 to 1 $\Omega$ for each volt across the contacts
C: 0.5 to 1 µF for each amp through closed contacts
*Notes:*

1. *Use capacitors rated for 250 VAC.*
2. *RC networks may affect load release time of solenoid loads. Check to confirm proper operation.*
3. *Install the RC network at the meter's relay screw terminals. An RC network may also be installed across the load. Experiment for best results.*
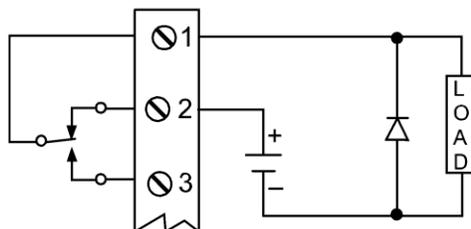


Use a diode with a reverse breakdown voltage two to three times the circuit voltage and forward current at least as large as the load current.

**Figure 17: Low Voltage DC Loads Protection**

### RC Networks Available from Precision Digital

RC networks are available from Precision Digital and should be applied to each relay contact switching an inductive load. Part number: PDX6901.

*Note: Relays are de-rated to 1/14th HP (50 watts) with an inductive load.*

### F4 Digital Input Connections

A digital input, F4, is standard on the meter. This digital input connected with a normally open closure across F4 and COM, or with an active low signal applied to F4.
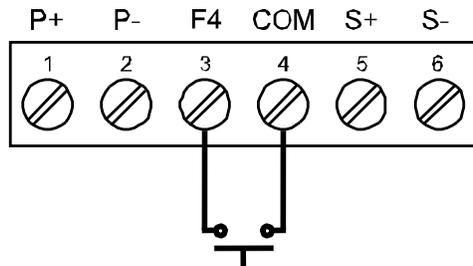


**Figure 18. F4 Digital Input Connections**

### 4-20 mA Output Connections

Connections for the 4-20 mA transmitter output are made to the connector terminals labeled MA OUT. The 4-20 mA output may be powered internally or from an external power supply.
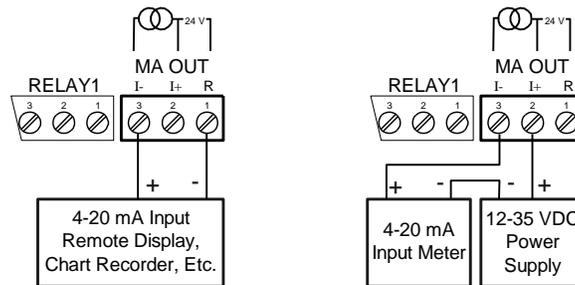


**Figure 19: 4-20 mA Output Connections**

### Analog Output Transmitter Power Supply

The internal 24 VDC power supply powering the analog output may be used to power other devices, if the analog output is not used. The I+ terminal is the +24 V and the R terminal is the return.

### Interlock Relay Feature

As the name implies, the interlock relay feature reassigns one, or more, alarm/control relays for use as interlock relay(s). Interlock contact(s) are wired to digital input(s) and trigger the interlock relay. This feature is enabled by configuring the relay, and relative digital input(s) (see page 41). In one example, dry interlock contacts are connected in series to one digital input which will be used to force on (energize) the assigned interlock power relay when all interlock contacts are closed (safe). The interlock relay front panel LED flashes when locked out. The interlock relay would be wired in-series with the load (N/O contact). See below.
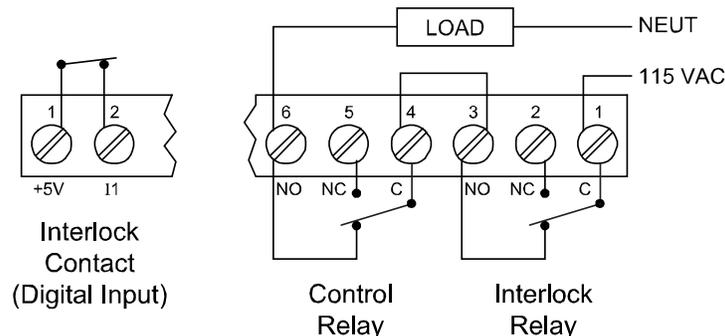


**Figure 20: Interlock Connections**

### Digital I/O Connections

The ProtEX-MAX has a 10 position terminal block for connecting digital inputs and outputs.
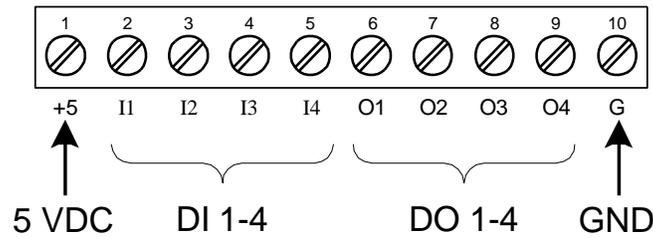


**Figure 21: Digital I/O Connections**

| ⚠ NOTICE | 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.<br>If you wish to change the behavior of the digital inputs, re-assign F1-F3 to the desired function, then change the corresponding digital input to match. |
|---|---|
| ⚡ WARNING | Observe all safety regulations. Electrical wiring should be performed in accordance with all agency requirements and applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety. |

### External Switch Contacts

The ProtEX-MAX includes 4 digital inputs. These digital inputs are preconfigured at the factory to function as external contacts to duplicate the front button functions of the instrument. The factory configuration uses the following corresponding digital input terminals for external switch contacts.

| Digital Input Connection | Factory Default Function |
|---|---|
| I1 | MENU |
| I2 | RIGHT arrow |
| I3 | UP arrow |
| I4 | ENTER arrow |

See Digital Inputs & Outputs in the Specification on page 8 for details on the digital inputs.

| ⚠ NOTICE | The digital inputs are configured at the factory to function identically to the front panel pushbuttons in order to work with the SafeTouch buttons. Changing the programming of the digital inputs will affect the function of the SafeTouch buttons. |
|---|---|

# Setup and Programming

- The meter has been factory calibrated to read input frequency in Hz (pulses/sec). The calibration equipment is traceable to NIST standards.
- Use the *K-Factor* menu to match the rate/totalizer with a flowmeter's k-factor (pulse/unit of measure).
- Or use the *Scale* menu to scale the pulse input (pulse/sec) without a signal source.
- Or use *Cal* menu to calibrate the rate/totalizer using a signal source.

## Overview

There are two switches, located to the right of the input connector, which must be configured according to the input level and type. Jumper J4 located inside the meter, behind the input signal connector, is used to select the excitation voltage (24 V*, 10 V or 5 V) which is supplied to the P+ and P- wiring terminals.

Setup and programming is done through the front panel buttons.

After power and input signal connections have been completed and verified, apply power to the meter.

*Default setting*

# SafeTouch® Buttons

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.

These buttons can be disabled for security by selecting DISABLE on the switch labeled NO-CONTACT BUTTONS located on the connector board.

To actuate a button, press one finger to the glass directly over the marked button area. Then retract finger more than three inches from the glass before pressing the next button. When the cover is removed, the four mechanical buttons located next to the sensors are used. The sensors are disabled when a mechanical button is pressed and will automatically be re-enabled after 60 seconds of inactivity.

The SafeTouch Buttons are designed to filter normal levels of ambient interference and to protect against false triggering, however, it is recommended that the SafeTouch Buttons be disabled (slide switch to LOCK) if there is an infrared interference source in line-of-sight to the display.

The SafeTouch Buttons are configured by default to duplicate the function of the front panel mechanical pushbuttons associated with the integrated meter. The symbols by each SafeTouch button correspond to a mechanical button as shown in the table on the next page.

SafeTouch Button Tips:
- To the extent possible, install the display facing away from sunlight, windows, reflective objects and any sources of infrared interference.
- Keep the glass window clean.
- Tighten the cover securely.
- Use a password to prevent tampering.

| ⚠ WARNING | Take caution when cleaning the window glass as it may result in unintentional SafeTouch button events. Only clean the ProtEX-MAX when the system is safely shut down, and inspect the ProtEX-MAX for proper configuration prior to system restart. |

## Front Buttons and Status LED Indicators



| Button Symbol | Description | | LED | Status |
|---|---|---|---|---|
| MENU or MENU | **Menu** | | 1-8 | Alarm 1 – 8 indicator |
| F1 or F1 | **Right arrow/F1** | | R | Rate indicator |
| F2 or F2 | **Up arrow/F2** | | T | Total indicator |
| F3 or F3 | **Enter/F3** | | G T | Grand Total indicator |
| *Note:* *F4 is a digital input.* | | | ▲ | Total overflow indicator |
| | | | M | Manual control relays &/or analog output |

- Press the Menu button to enter or exit the Programming Mode at any time.
- Press the Right arrow button to move to the next digit during digit or decimal point programming.
- Press or hold the Up arrow button to scroll through the menus, decimal point, or press or hold to increment the value of a digit.
- Press the Enter button to access a menu or to accept a setting.
- Press and hold the Menu button for three seconds to access the advanced features of the meter.

# MeterView® Pro Software

The meter can also be programmed using the PC-based MeterView Pro software included with the meter. This software can be installed on any Microsoft® Windows® (XP/Vista/7/8/10) computer by connecting the meter's onboard USB. The meter is powered by the USB connection, so there is no need to wire anything prior to programming the meter, though USB is intended only for meter configuration.

## MeterView Pro Installation

1. Connect one end of the provided USB cable to the internal electronics module and the other end to the computer. The computer will automatically install the driver software it needs to talk to the meter. **Only one meter may be connected at a time. Attaching multiple meters will cause a conflict with the meter software.**
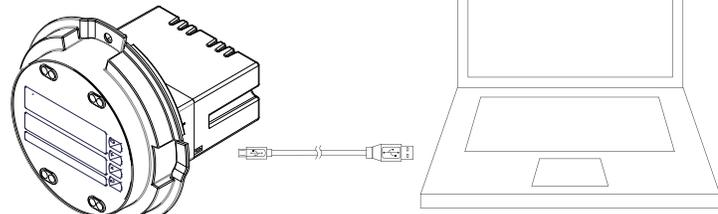
2. Once the driver is installed, an AutoPlay dialog should appear for the drive "MAINSTAL." Click "Open folder to view files." If the computer does not display an AutoPlay dialog for the drive "MAINSTAL," you should open My Computer and double-click on the drive labeled "MAINSTAL."

3. Double-click on the file named "MAStart." The program will open a few windows and install two programs on your computer. Simply follow the onscreen instructions until you see one of the dialogs below. If you receive a "User Account Control" warning, click "Yes."

4. If there is an update available, click the "Update" button to install the new version. Otherwise, click "Configure" to begin programming your meter.
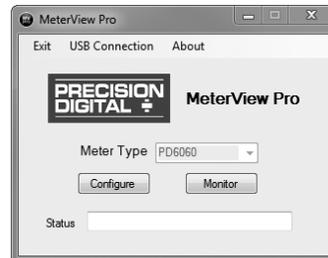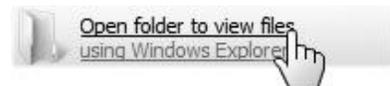
**Note:** If you decide to update your MeterView Pro software, once the installation has completed, you will be asked if you want to update the setup files located on the meter itself. This way, you will always have the most current version on the meter for future installs.

| ⚠ **Warning!** | ***Do not unplug the meter while the new installation files are being written to it. The meter will display ⊔⌐⊏ ⊔⊏⊏ during the process and you will receive an onscreen notification once the process is complete.*** |
|---|---|

Data logging for one meter at a time is available with MeterView Pro software. More advanced data acquisition may be accomplished by using any Modbus RTU compliant software. Additional information regarding configuration and monitoring of the meter using MeterView Pro software is available online. Go to **www.predig.com/meterview-pro**.

## Display Functions and Messages

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

| Display | Parameter | Action/Setting Description |
|---|---|---|
| SEtuP | Setup | Enter *Setup* menu |
| InPut | Input | Enter *Input* selection menu |
| totAL | Total | Enable or disable totalizer features |
| un itS | Units | Select the display units/tags |
| rAtE | Rate | Select the display units for rate |
| totAL | Total | Select the display units for total |
| GtotAL | Grand Total | Select the display units for grand total |
| dEc Pt | Decimal point | Set decimal point for rate, total, grand total |
| ProG | Program | Enter the *Program* menu |
| InCAL | Input Calibration | Enter the *Input Calibration* menu |
| FActor | K-factor Scaling | Programs unit to convert input pulse to rate in engineering units |
| SCALE | Scale | Enter the *Scale* menu |
| CAL | Calibrate | Enter the *Calibrate* menu |
| InP 1 | Input 1 | Calibrate input 1 signal or program input 1 value |
| d iS 1 | Display 1 | Program display 1 value |
| InP 2 | Input 2 | Calibrate input 2 signal or program input 2 value (up to 32 points) |
| d iS 2 | Display 2 | Program display 2 value (up to 32 points) |
| Error | Error | Error, calibration not successful, check signal or programmed value |
| t tb | Total time base | Program total time base |

| Display | Parameter | Action/Setting Description |
|---|---|---|
| t CF | Total conversion factor | Program total conversion factor |
| t rSt | Total reset | Program total reset mode: auto or manual |
| Gt tb | Grand total time base | Program grand total time base |
| Gt CF | Grand total conversion factor | Program grand total conversion factor |
| Gt rSt | Grand total reset | Program grand total reset mode: auto or manual |
| Auto | Automatic | Press Enter to set automatic total reset |
| t dLY | Time delay | Program time delay for total auto reset |
| m An | Manual | Press Enter to reset total manually |
| dSPLAY | Display | Enter the *Display* menu |
| L inE 1 | Line 1 | Press Enter to assign the Upper display parameter (default: PV or rate) |
| L inE 2 | Line 2 | Press Enter to assign the lower display parameter (default: total) |
| d- intY | Display intensity | Set display intensity level from 1 to 8 |
| rELAY | Relay | Enter the *Relay* menu |
| ASS iGn | Assignment | Assign relays to rate, total, grand total, or Modbus |
| AS iGn 1 | Assign 1 | Relay 1 assignment |
| rAtE | Rate | Assign relay to rate |
| totAL | Total | Assign relay to total |
| G totAL | Grand total | Assign relay to grand total |
| rLY 1 | Relay 1 | Relay 1 setup |
| Act 1 | Action 1 | Set relay 1 action |
| Auto | Automatic | Set relay for automatic reset |

| Display | Parameter | Action/Setting Description |
|---|---|---|
| A-nnn An | *Auto-manual* | Set relay for automatic & manual reset any time |
| LAtcH | *Latching* | Set relay for latching operation (relays assigned to rate) |
| Lt-CLr | *Latching-cleared* | Set relay for latching operation with manual reset only after alarm condition has cleared (relays assigned to rate) |
| ALtErn | *Alternate* | Set relay for alternation control (relays assigned to rate) |
| SAnnn PL | *Sampling* | Set relay for sampling operation |
| OFF | *Off* | Disable relay and front panel status LED (Select Off to enable Interlock feature) |
| SEt 1 | *Set 1* | Program set point 1 |
| rSt 1 | *Reset 1* | Program reset point 1 |
| rLY 2 | *Relay 2* | Relays 2-4 setup |
| FA iLSF | *Fail-safe* | Enter *Fail-safe* menu |
| FLS 1 | *Fail-safe 1* | Set relay 1 fail-safe operation |
| on | *On* | Enable fail-safe operation |
| oFF | *Fail-safe off* | Disable fail-safe operation |
| dELAY | *Delay* | Enter relay *Time Delay* menu |
| dLY 1 | *Delay 1* | Enter relay 1 time delay setup |
| On 1 | *On* | Set relay 1 On time delay |
| OFF 1 | *Off* | Set relay 1 Off time delay |
| Aout | *Analog output* | Enter the *Analog output* scaling menu |
| d iS 1 | *Display 1* | Program display 1 value |
| Out 1 | *Output 1* | Program output 1 value (e.g. 4.000 mA) |

| Display | Parameter | Action/Setting Description |
|---|---|---|
| d iS 2 | *Display 2* | Program display 2 value |
| Out 2 | *Output 2* | Program output 2 value (e.g. 20.000 mA) |
| rESEt | *Reset* | Press Enter to access the *Reset* menu |
| rSt H i | *Reset high* | Press Enter to reset max display |
| rSt Lo | *Reset low* | Press Enter to reset min display |
| rSt HL | *Reset high & low* | Press Enter to reset max & min displays |
| rSt t | *Reset total* | Press Enter to reset total |
| rSt Gt | *Reset grand total* | Press Enter to reset grand total |
| ContrL | *Control* | Enter *Control* menu |
| Auto | *Automatic* | Press Enter to set meter for automatic operation |
| nn An | *Manual* | Press Enter to manually control relays or analog output operation |
| PASS | *Password* | Enter the *Password* menu |
| PASS 1* | *Password 1** | Set or enter Password 1* (*1, 2, or 3) |
| totAL | *Total password* | Set or enter password for manual reset |
| GtotAL | *Grand total password* | Set or enter password for manual reset |
| nonrSt | *Non-resettable* | Non-resettable grand total set after entering "050873" for Gtotal password |
| unLoc | *Unlocked* | Program password to lock meter |
| Locd | *Locked* | Enter password to unlock meter |
| 999999 | *Flashing display* | Overrange condition |

25

## Main Menu

The main menu consists of the most commonly used functions: *Reset, Control, Setup*, and *Password*.

- Press Menu button to enter Programming Mode then press the Up arrow button to scroll through the main menu.

- Press Menu, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing Enter are not saved.

- Changes to the settings are saved to memory only after pressing Enter.

- The display moves to the next menu every time a setting is accepted by pressing Enter.
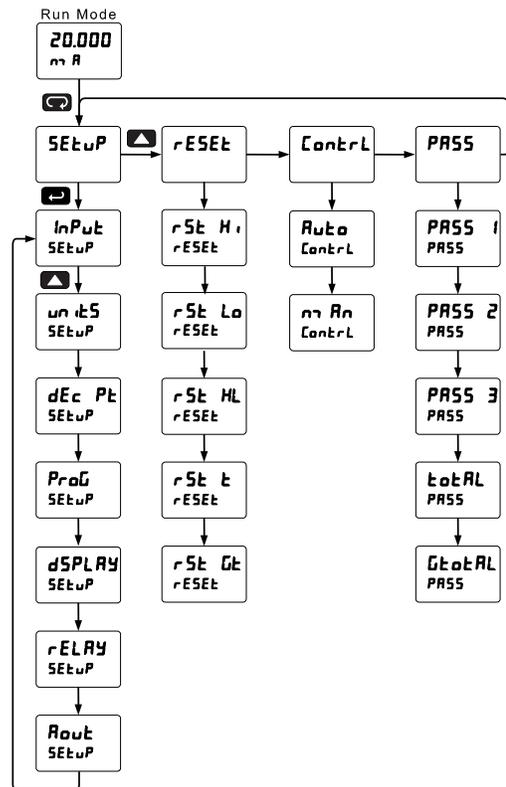
## Setting Numeric Values

The numeric values are set using the Right and Up arrow buttons. Press Right arrow to select next digit and Up arrow to increment digit value. The digit being changed is displayed brighter than the rest. Press and hold Up to auto-increment the display value. If negative numbers are allowed, the first digit position will include a negative symbol (-) after the 9.

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

26
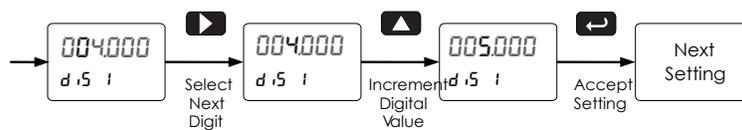
## Setting Up the Rate/Totalizer Meter (SEtuP)

The *Setup* menu is used to select:

1. Enable or disable totalizer features
2. Units for Rate, Total, and Grand Total
3. Decimal point position
4. Input Calibration
5. Display parameter and intensity
6. Relay operation
7. 4-20 mA analog output scaling

Press the Enter button to access any menu or press Up arrow button to scroll through choices. Press the Menu button to exit at any time.
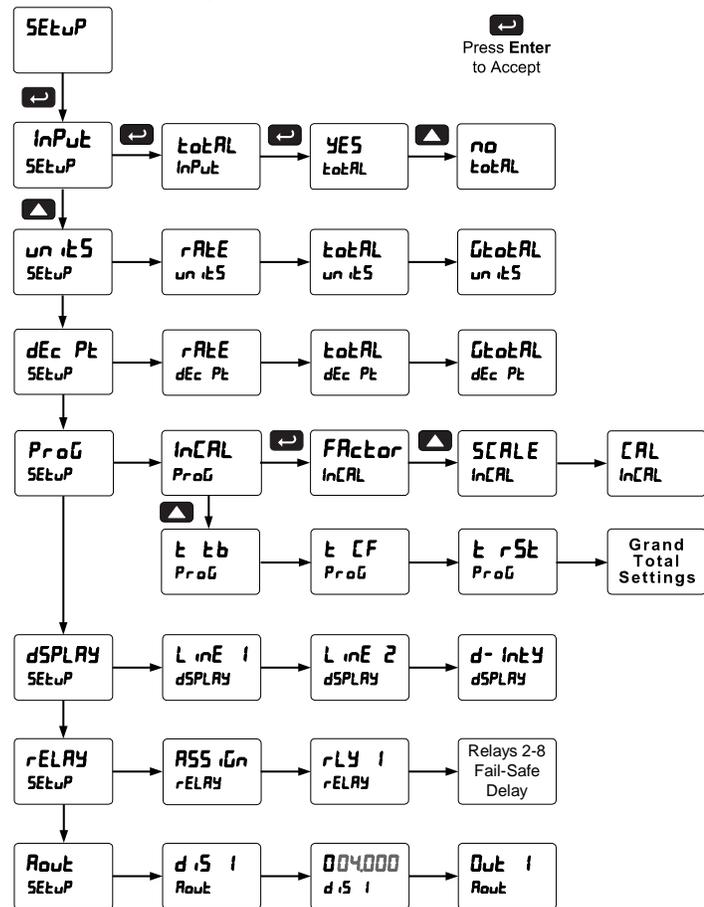
### Setting the Input Signal ( InPut)

There is a switch, located to the right of the input connector, which must be configured according to the input level and type. Jumper J4 located inside the meter, behind the input signal connector, is used to select the excitation voltage (24 V [*Default setting*], 10 V or 5 V) which is supplied to the P+ and P- wiring terminals.

Enter the Input menu to enable or disable the totalizer features.

### Setting the Totalizer Features (totRL)

Enable or disable the totalizer features by selecting "YES" or "no" after the input type has been set up. If the totalizer features are disabled, most totalizer features and functions are hidden from the menus.

*Note: The totalizer continues working in the background.*

## Setting the Input Units or Custom Tags (un it5)

Enter the input unit or custom tag that will be displayed if alternating rate, total, or grand total and units is selected in the un it5 menu, or d un it is selected as the line 2 parameter. See the flow chart on page 33 to access the display menu to show the unit or tag on line 2. The engineering units or custom legends can be set using the following 7-segment character set:

| Display | Character | Display | Character | Display | Character | Display | Character |
|---------|-----------|---------|-----------|---------|-----------|---------|-----------|
| 0 | 0 | C | C | K | K | u | V |
| 1 | 1 | c | c | L | L | u ┘ | w |
| 2 | 2 | d | d | ∩ ˥ | m | H | X |
| 3 | 3 | E | E | n | n | Y | Y |
| 4 | 4 | F | F | 0 | O | Z | Z |
| 5 | 5 | G | G | o | o | - | - |
| 6 | 6 | g | g | P | P | ┘ | / |
| 7 | 7 | H | H | q | q | C | ] |
| 8 | 8 | h | h | r | r | ] | [ |
| 9 | 9 | I | I | S | S | = | = |
| A | A | i | i | t | t | o | Degree(<) |
| b | b | J | J | u | u | | Space |

*Notes:*

*Degree symbol represented by (<) if programming with MeterView® Pro.*

*The letters "m" and "w" use two 7-segment LEDs each; when selected the characters to the right are shifted one position.*

*Press and hold up arrow to auto-scroll the characters in the display.*

## Setting the Decimal Point (dEc Pt)

The decimal point may be set with up to five decimal places or with no decimal point at all. The rate, total, and grand total decimal points are independent.

Pressing the right arrow moves the decimal point one place to the right until no decimal point is displayed, then it moves to the leftmost position.

Pressing the up arrow moves the decimal point to the left.

## Programming the Rate/Totalizer (ProG)

It is **very important** that one reads the following information before programming the meter:

- The meter has been factory calibrated to read input frequency in Hz (pulses/sec). The calibration equipment is traceable to NIST standards.
- Use the *K-Factor* menu to match the rate/totalizer with a flowmeter's k-factor (pulse/unit of measure).
- Or use the *Scale* menu to scale the pulse input (pulse/sec) without a signal source.
- Or use *Cal* menu to calibrate the rate/totalizer using a signal source.

The *Program* menu contains the following menus:

1. K-Factor calibration
2. Scale without a signal source
3. Calibrate with a calibrated signal source
4. Total time base & conversion factor
5. Grand total time base & conversion factor
6. Total reset mode for total & grand total

*Note: The Scale, Calibrate, and K-Factor functions are exclusive of each other. The meter uses the last function programmed. Only one of these methods can be employed at a time. The Scale and Calibrate functions can use up to 32 points (default is 2). The number of points should be set in the Advanced menu under the Multi-Point Linearization* (Linear) *menu selection prior to scaling and calibration of the meter, see page 48 for details.*

The pulse inputs may be calibrated or scaled to any display value within the range of the meter.
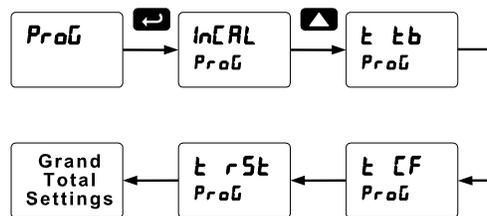


Additional parameters, not needed for most applications, are programmed in the *Advanced Features* menu; see *Advanced Features Menu*, page 45.

### K-Factor Calibration (FActor)

The meter may be calibrated using the *K-Factor* function. Most flowmeter manufacturers provide this information with the device. Enter the *K-Factor* (Factor) menu and select the decimal point with highest resolution possible and program the k-factor value (*i.e.* pulses/gal). The meter will automatically calculate the flow rate using the k-factor and the time base selected.



### Multi-Point Calibration & Scaling

The meter is set up at the factory for 2-point linear calibration. The number of points for multi-point calibration/scaling is set up in the *Advanced Features* menu. Up to 32 linearization points may be selected. See page 48 for details.

### Scaling the Meter (𝖲𝖢𝖠𝖫𝖤)

The pulse inputs can be scaled to display the process variable in engineering units.

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



| For instructions on how to program numeric values see *Setting Numeric Values*, page 26. |
| --- |
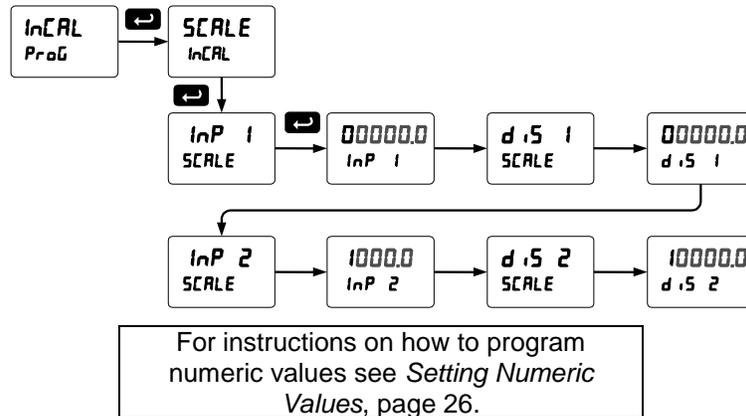
**Note:** The display values (d ᵢ𝖲 𝟣 and d ᵢ𝖲 𝟤) need to be in units of measure per second.

**For example:** If the rate at 1000 Hz is 13.2 gal/min, this must be converted to gal/sec. In this scenario, the numbers input into the 𝖲𝖢𝖠𝖫𝖤 menu would be as follows:

<div align="center">

𝖨𝗇𝖯 𝟣: 0.0
d ᵢ𝖲 𝟣: 0.000
𝖨𝗇𝖯 𝟤: 1000.0
d ᵢ𝖲 𝟤: 0.220

</div>

Set the time base set to minutes (see page 32) and the meter will display 13.2 gal/min at 1000 Hz

### Error Message (𝖤𝗋𝗋𝗈𝗋)

An error message indicates that the calibration or scaling process was not successful. After the error message is displayed, the meter reverts to input 2 during calibration or scaling, allowing the appropriate input signal to be applied or programmed.

The error message might be caused by any of the following conditions:

1. Input signal is not connected to the proper terminals or it is connected backwards.
2. Minimum input span requirements not maintained.
3. Input 1 signal inadvertently applied to calibrate input 2.

### Minimum Input Span

The minimum allowed input span is 1.0 Hz, which is the minimum difference between input 1 and input 2 signals required to complete the calibration or scaling of the meter.

### Gate Function (*GAtE*)

The gate function is used for displaying slow pulse rates. Using the programmable gate, the meter is able to display pulse rates as slow as 1 pulse every 999.9 seconds (0.001 Hz). The gate function can also be used to obtain a steady display reading with a fluctuating input signal.

The gate function (*GAtE*) is the first option in the Advanced Features menu. There are two settings for the *GAtE*, low gate (*Lo G*) and high gate (*Hi G*).

**Low Gate (*Lo G*)**

For most applications, low gate setting should be left at 1.0 second. Increase low gate setting to obtain a steadier rate display. The rate display will update in accordance with the low gate setting, for example if low gate is set at 10.0, the display will update every 10 seconds; changes in rate between updates will not be reflected until next display update.

**High Gate (*Hi G*)**

Set the high gate value to correspond to the highest expected pulse period (lowest pulse rate). For instance, if the meter must display a rate when there is 1 pulse coming into the meter every 10 seconds, set the high gate to 11.0 seconds. When the signal is removed from the meter, the display will show the last reading for 11 seconds; then it will read zero.

### Gate Settings

| Slow Pulse Rate | | |
|---|---|---|
| Low Gate* (sec) | High Gate (sec) | Min Freq** (Hz) |
| 1.0 | 2.0 | 0.5000 |
| 1.0 | 10.0 | 0.1000 |
| 1.0 | 20.0 | 0.0500 |
| 1.0 | 100.0 | 0.0100 |
| 1.0 | 200.0 | 0.0050 |
| 1.0 | 400.0 | 0.0025 |
| 1.0 | 800.0 | 0.0012 |
| 1.0 | 999.9 | 0.0010 |
| *The low gate setting corresponds to the display update rate and is used to stabilize the display reading with a fluctuating signal. **The minimum frequency is dependent on high gate setting. | | |

### Contact De-Bounce Filter (*FiLtEr*)

The filter function (*FiLtEr*) can be used for applications where the meter is set up to count pulses generated by switch contacts. The filter value can be set anywhere between 2 and 50, the higher the value, the greater the filtering.

The filter function (*FiLtEr*) is the second option in the Advanced Features menu. There are two settings, *Hi SPd* (high speed) and *Lo SPd* (low speed), press **ENTER** when *Lo SPd* is displayed to enable the filter function. Program the filter value, so that there are no extra counts when a contact closure is completed.

### Filter Settings

| Contact De-Bounce Filter | | |
|---|---|---|
| Filter Setting | Speed Setting | Max Freq (Hz) |
| 2 | Lo SPd | 999 |
| 4 | Lo SPd | 499 |
| 8 | Lo SPd | 249 |
| 16 | Lo SPd | 124 |
| 32 | Lo SPd | 62 |
| 40 | Lo SPd | 50 |
| 50 | Lo SPd | 40 |
| N/A | Hi SPd | 30,000 |

### Time Base, Total Conversion Factor & Total Reset

The time base, total conversion factor, and total reset menus are located in the *Program* menu.

The total and grand total have their own independent settings. This means that one can be displaying the value in gallons while the other displays in million gallons, liters, m³, etc.
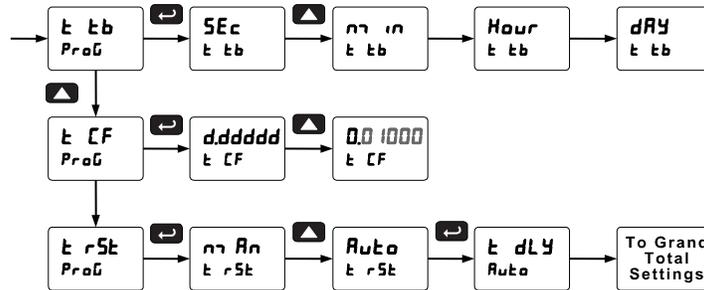


### Time Base

The time base is the amount of time over which the rate parameter should accrue. For example, if the rate was ten and the time base was in minutes, then the total would increase by ten every one minute.

### Total & Grand Total Conversion Factor

The total & grand total conversion factor is the amount by which the rate is multiplied before it is added to the total or grand total. For Example, if the rate was ten per second and the total conversion factor was 100, the total would increase by 1000 every second. This is useful, for instance, if you want to show rate in gallons and total in thousands of gallons.

### Total & Grand Total Reset

The totals can be programmed for manual or automatic reset. In the automatic reset mode, a programmable time delay is available to reset the total or grand total after the assigned preset is reached.

### Non-Resettable Totalizer

The total and grand total can be password-protected to prevent unauthorized resets. The grand total can be programmed as a non-resettable total, see page 43 for details.

### Calibrating the Meter with External Source (CAL)

To scale the meter without a signal source, refer to K-Factor Calibration on page 29 or Scaling the Meter on page 30

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

The use of a calibrated signal source is strongly recommended to calibrate the meter.
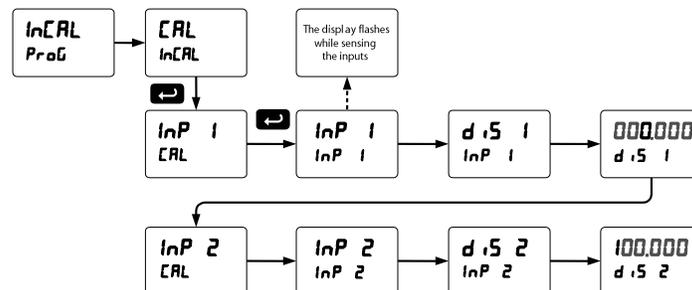


**Note:** The display values (dis 1 and dis 2) need to be in units of measure per second.

*There is no need to warm up the meter before performing the calibration procedure.*

32

## Setting the Display Parameter & Intensity (dSPLAY)

Display line 1 (L inE 1) can be programmed to display:

1. Rate value
2. Total or grand total
3. Relay set points
4. Max & min values
5. Modbus input
6. Display rate and units
7. Rate and total
8. Rate and grand total
9. Total and units
10. Grand total and units

Display line 2 (L inE 2) can be programmed to display:

1. Rate value
2. Total or grand total
3. Relay set points
4. Max & min values
5. Engineering units or custom legends
6. Modbus input
7. Off (no display)
8. Display rate and units
9. Rate and total
10. Rate and grand total
11. Total and units
12. Grand total and units
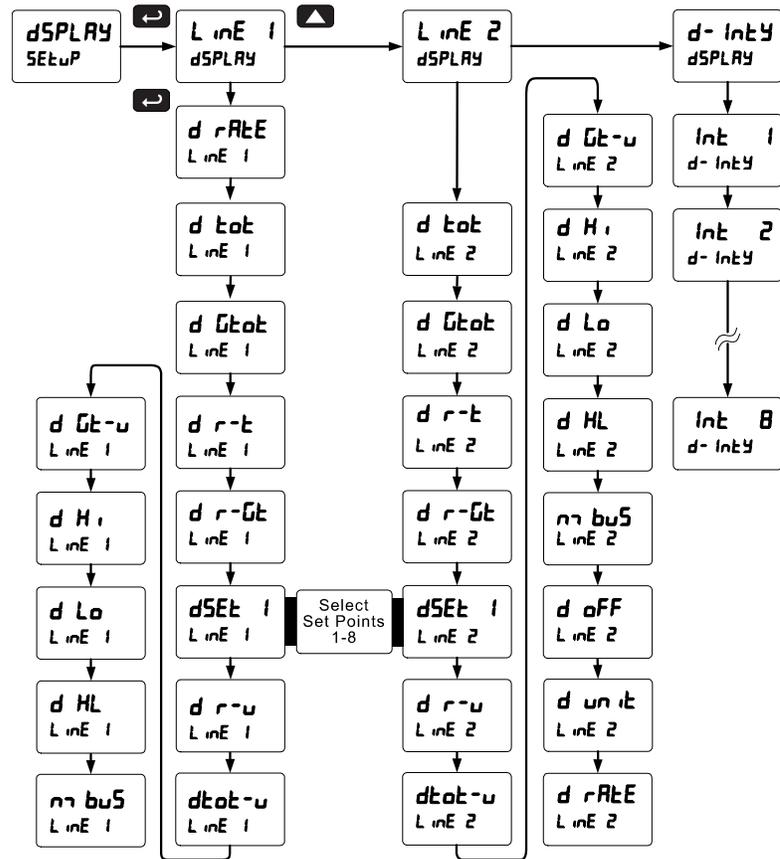


Display Intensity: The meter has eight display intensity levels to give the best performance under various lighting conditions. Select intensity 8 for outdoor applications.  The default display intensity setting is 8.

After setting up the input and the display, press the Menu button to exit programming and skip the rest of the setup menu. Press the Menu button again and the Up arrow to reach the *Program* menu and complete the scaling or calibration of the meter.

33

## Setting the Relay Operation (rELAY)

This menu is used to set up the operation of the relays.

| ⚠ Caution! | *During setup, the relays do not follow the input and they will remain in the state found prior to entering the Relay menu.* |
|---|---|

1. Relay assignment
   a. Rate for low and high alarm
   b. Total
   c. Grand total
   d. Modbus input
2. Relay action
   a. Automatic reset only (non-latching)
   b. Automatic + manual reset at any time (non-latching)
   c. Latching (manual reset only)
   d. Latching with Clear (manual reset only after alarm condition has cleared)
   e. Alternation control (automatic reset only)
   f. Sampling (the relay is activated for a user-specified time)
   g. Off (relay state controlled by Interlock feature)
3. Set and reset points
4. Fail-safe operation
   a. On (enabled)
   b. Off (disabled)
5. Time delay
   a. On delay (0-999.9 seconds)
   b. Off delay (0-999.9 seconds)
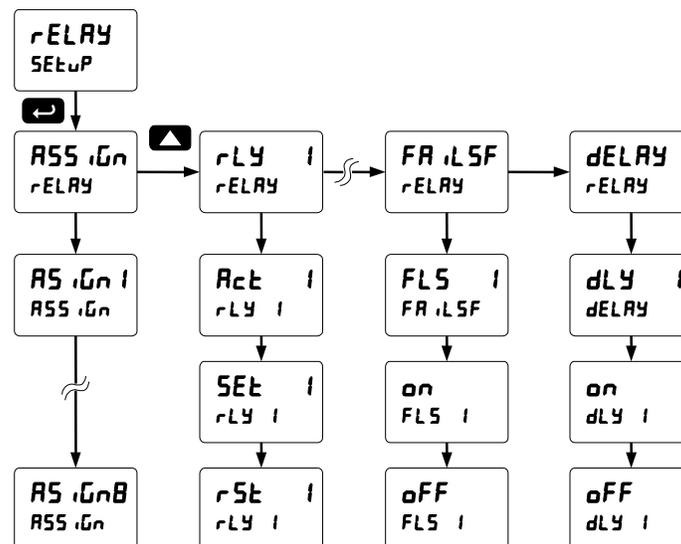


Note: The setup of relays 2-8 follows the same pattern shown here for relay 1.

## Relay Assignment (ASSiGn)

The relays can be assigned to any of the following parameters:
1. Rate for low or high alarm indication
2. Total for alarm indication
3. Grand total for alarm indication
4. Modbus input
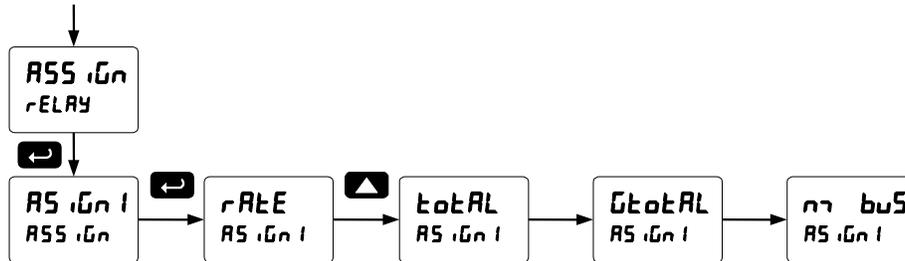


## Setting the Relay Action

Operation of the relays is programmed in the *Action* menu. The relays may be set up for any of the following modes of operation:
1. Automatic reset (non-latching)
2. Automatic + manual reset at any time (non-latching)
3. Latching (manual reset only, at any time)
4. Latching with Clear (manual reset only after alarm condition has cleared)
5. Alternation control (automatic reset only)
6. Sampling (the relay is activated for a user-specified time)
7. Off (relay state controlled by Interlock feature)

The following graphic shows relay 1 action setup; relay 2-4 are set up in a similar fashion.
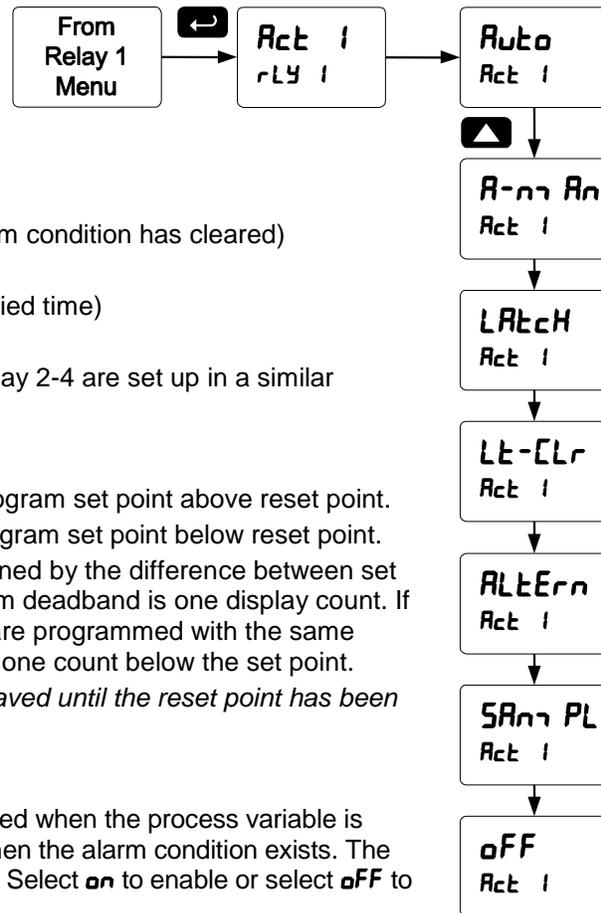


## Programming Set and Reset Points
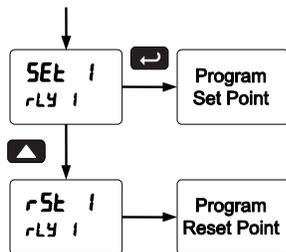


High alarm indication: program set point above reset point.

Low alarm indication: program set point below reset point.

The deadband is determined by the difference between set and reset points. Minimum deadband is one display count. If the set and reset points are programmed with the same value, the relay will reset one count below the set point.

*Note: Changes are not saved until the reset point has been accepted.*

## Setting Fail-Safe Operation

In fail-safe mode of operation, the relay coil is energized when the process variable is within safe limits and the relay coil is de-energized when the alarm condition exists. The fail-safe operation is set independently for each relay. Select **on** to enable or select **oFF** to disable fail-safe operation.

## Programming Time Delay

The *On* and *Off* time delays may be programmed for each relay between 0 and 999.9 seconds. The relays will transfer only after the condition has been maintained for the corresponding time delay.

The *On* time delay is associated with the set point.

The *Off* time delay is associated with the reset point.

35

## Relay and Alarm Operation Diagrams

The following graphs illustrate the operation of the relays, status LEDs, and ACK button.

### High Alarm Operation (Set > Reset)
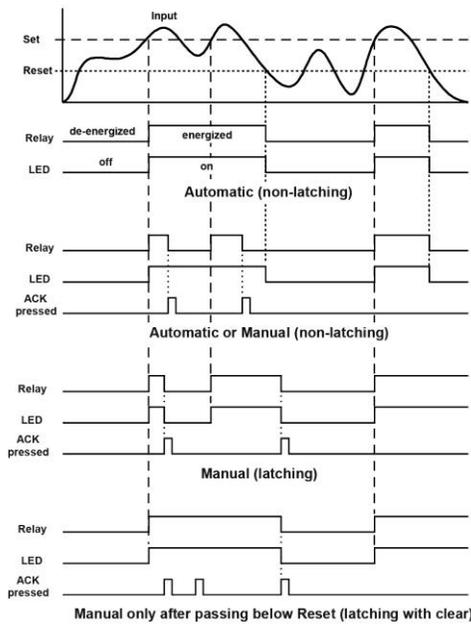


### Low Alarm Operation (Set < Reset)
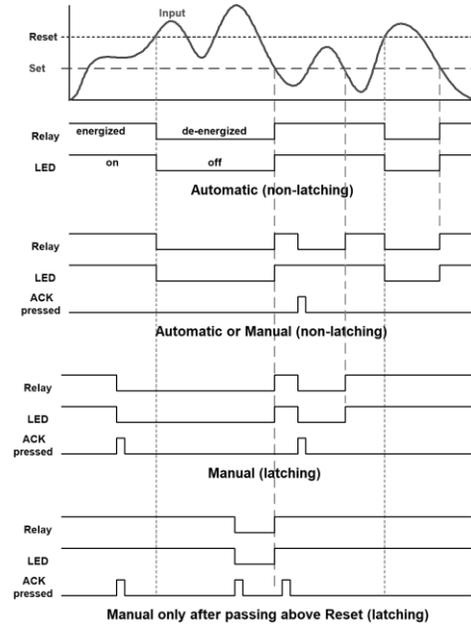


For Manual reset mode, ACK can be pressed anytime to turn "off" relay. To detect a new alarm condition, the signal must go below the set point, and then go above it.

### High Alarm with Fail-Safe Operation (Set > Reset)
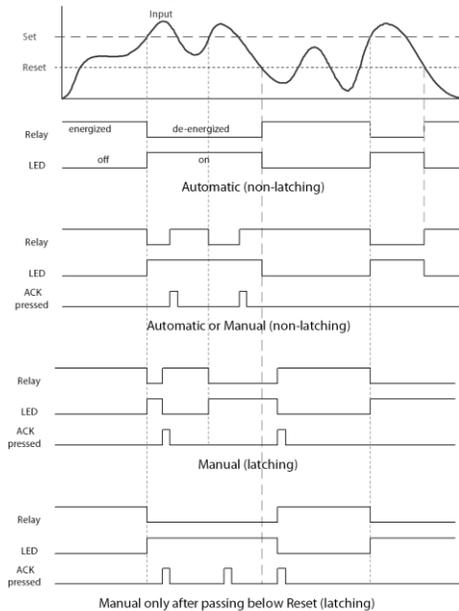


### Low Alarm with Fail-Safe Operation (Set < Reset)
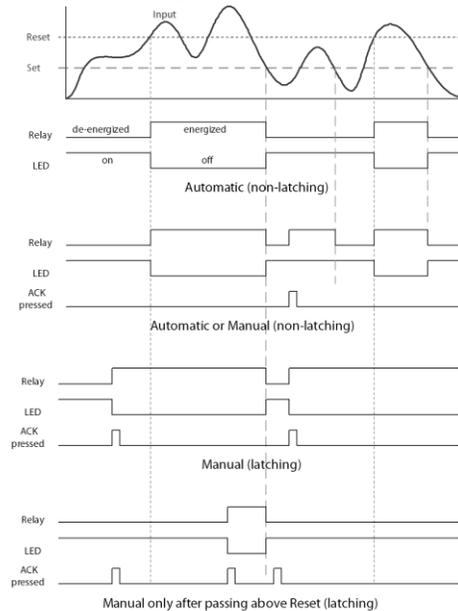


*Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.*

## Pump Alternation Control Operation



LEDs indicate the relay status
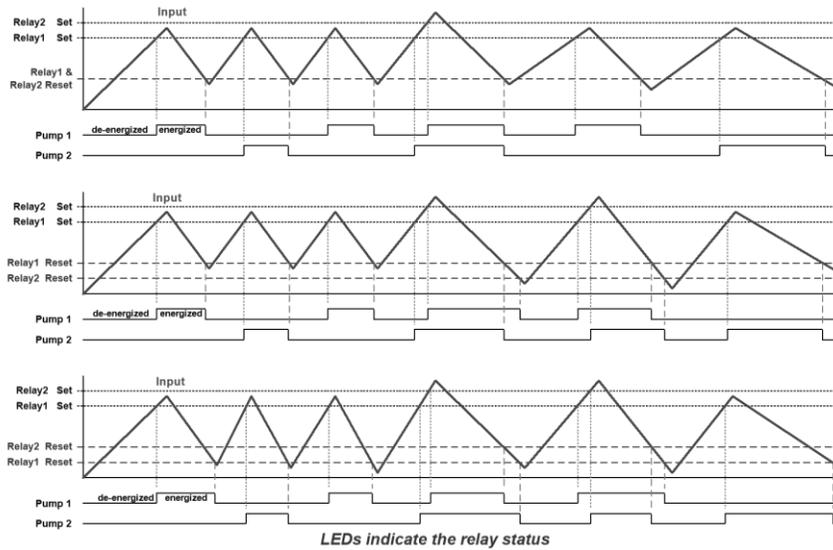
## Rate Relay Sampling Operation
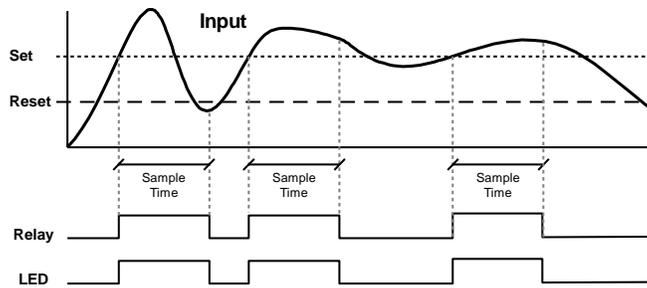


When the signal crosses the set point, the relay trips and the sample time starts. After the sample time has elapsed, the relay resets. The cycle repeats every time the set point is crossed, going up for high alarms and going down for low alarms.

The sample time can be programmed between 0.1 and 5999.9 seconds.

## Total Relay Sampling Operation
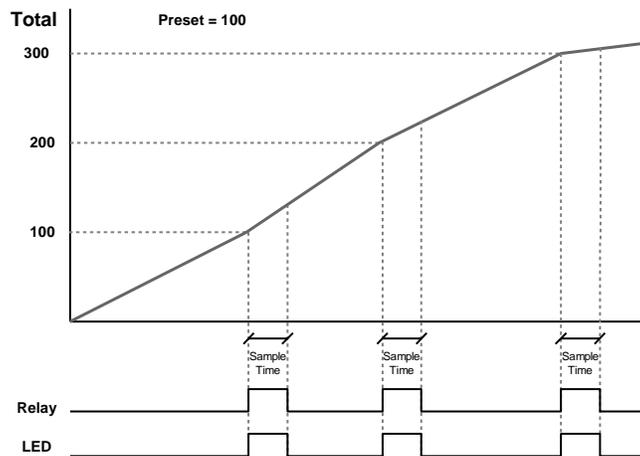


When the total reaches the preset, the relay trips and the sample time starts. After the sample time has elapsed, the relay resets. The cycle repeats every time the preset value is added to the total.

### Time Delay Operation

The following graphs show the operation of the time delay function.



On Time Delay
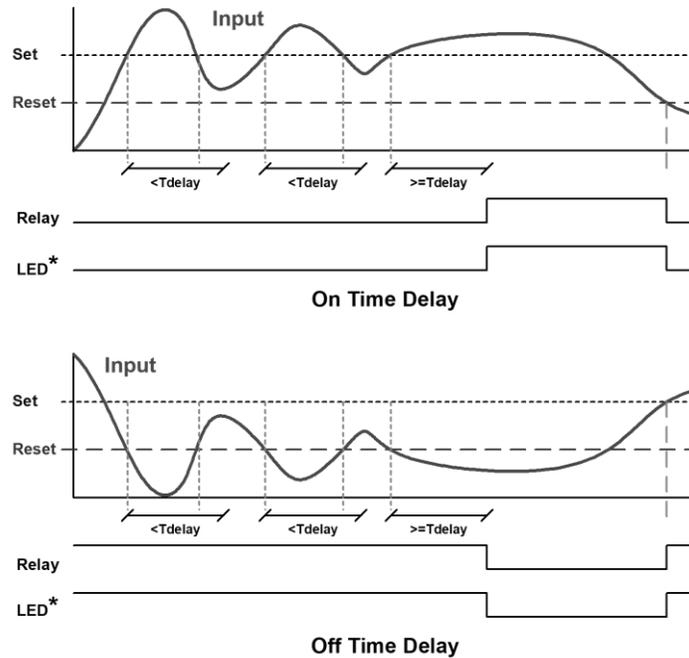


Off Time Delay

When the signal crosses the set point, the *On* time delay timer starts and the relay trips when the time delay has elapsed. If the signal drops below the set point (high alarm) before the time delay has elapsed, the *On* time delay timer resets and the relay does not change state. The same principle applies to the *Off* time delay.

*Note: If "Automatic or Manual" (A-nmAn) reset mode is selected, the LED follows the reset point and not the relay state when the relay is acknowledged.*

## Relay Operation Details

### Overview

The relay capabilities of the meter expand its usefulness beyond simple indication to provide users with alarm and control functions. These capabilities include front panel alarm status LEDs as well as either 2 or 4 optional internal relays. Typical applications include high or low flow alarms and basic batch control. There are four basic ways the relays can be used:

1. High or Low Alarms with Latching or Non-Latching Relays
2. Simple On/Off Control with 100% Adjustable Deadband
3. Sampling (Based on Time)
4. Alternation Control for up to 4 Relays

### Relays Auto Initialization

When power is applied to the meter, the front panel LEDs and alarm relays will reflect the state of the input to the meter. The following table indicates how the alarm LEDs and relays will react on power-up based on the set and reset points:

| Alarm # | HI or LO Alarm | Set Point | Reset Point | Power-Up Reading | Relay & LED |
|---------|----------------|-----------|-------------|------------------|-------------|
| 1 | HI | 1000 | 500 | 499 | Off |
| 2 | LO | 700 | 900 | 499 | On |
| 3 | LO | 250 | 400 | 499 | Off |
| 4 | HI | 450 | 200 | 499 | On |

### Fail-Safe Operation

The following table indicates how the relays behave based on the fail-safe selection for each relay:

*Note: NO = Normally Open, NC = Normally Closed. This refers to the condition of the relay contacts when the power to the meter is off.*

| Fail-Safe Selection | Non-Alarm State | | Alarm State | | Power Failure |
|---------------------|------|------|------|------|---------------|
| | NO | NC | NO | NC | |
| Off | Open | Closed | Closed | Open | Relays go to non-alarm state |
| On | Closed | Open | Open | Closed | Relays go to alarm state |

### Front Panel LEDs

The LEDs on the front panel provide status indication for the following:

The meter is supplied with four alarm points that include front panel LEDs to indicate alarm conditions. This standard feature is particularly useful for alarm applications that require visual-only indication. The LEDs are controlled by the set and reset points programmed by the user. When the display reaches a

| LED | Status | | LED | Status |
|-----|--------|---|-----|--------|
| 1 | Alarm 1 | | 5 | Alarm 5 |
| 2 | Alarm 2 | | 6 | Alarm 6 |
| 3 | Alarm 3 | | 7 | Alarm 7 |
| 4 | Alarm 4 | | 8 | Alarm 8 |

set point for a high or low alarm, the corresponding alarm LED will turn on. When the display returns to the reset point the LED will go off. The front panel LEDs respond differently for latching and non-latching relays.

For non-latching relays, the LED is always off during normal condition and always on during alarm condition, regardless of the state of the relay (e.g. Relay acknowledged after alarm condition).

For latching relays, the alarm LEDs reflects the status of the relays, regardless of the alarm condition. The following tables illustrate how the alarm LEDs function in relation to the relays and the acknowledge button (Default: F3 key assigned to ACK):

### Latching and Non-Latching Relay Operation

The relays can be set up for latching (manual reset) or non-latching (automatic reset) operation.

The On and Off terminology does not refer to the status of the relay's coil, which depends on the fail-safe mode selected.

| Relay terminology for following tables | |
|---|---|
| **Terminology** | **Relay Condition** |
| On | Alarm (Tripped) |
| Off | Normal (Reset) |
| Ack | Acknowledged |

| ⚡ **Warning!** | *In latching relay mode, latched relays will reset (unlatch) when power is cycled.* |
|---|---|

### Non-Latching Relay (Auto)

In this application, the meter is set up for automatic reset (non-latching relay). Acknowledging the alarm while it is still present has no effect on either the LED or the relay. When the alarm finally goes away, the relay automatically resets and the LED also goes off.

| Automatic reset only | | |
|---|---|---|
| **Condition** | **LED** | **Relay** |
| Normal | Off | Off |
| Alarm | On | On |
| Ack (No effect) | On | On |
| Normal | Off | Off |

### Non-Latching Relay (A-nman)

In this application, the meter is set up for automatic and manual reset at any time (non-latching relay). The LED and the relay automatically reset when the meter returns to the normal condition.

The next time an alarm occurs, the operator acknowledges the alarm manually while the alarm condition still exists. This causes the relay to reset, but the LED stays on until the meter returns to the normal condition.

| Automatic + manual reset at any time | | |
|---|---|---|
| **Condition** | **LED** | **Relay** |
| Normal | Off | Off |
| Alarm | On | On |
| Normal | Off | Off |
| Next Alarm | On | On |
| Ack | On | Off |
| Normal | Off | Off |

### Latching Relay (LAtcH)

In this application, the meter is set up for manual reset at any time. Acknowledging the alarm even if the alarm condition is still present resets the relay and turns off the LED.

| Manual reset any time | | |
|---|---|---|
| **Condition** | **LED** | **Relay** |
| Normal | Off | Off |
| Alarm | On | On |
| Ack | Off | Off |

### Latching Relay (Lt-CLr)

In this application, the meter is set up for manual reset only after the signal passes the reset point (alarm condition has cleared). Acknowledging the alarm while it is still present has no effect on either the LED or the relay. When the alarm is acknowledged after it returns to the normal state, the LED and the relay go off. Notice that the LED remains on, even after the meter returns to the normal condition. This is because, for latching relays, the alarm LED reflects the status of the relay, regardless of the alarm condition.

| Manual reset only after alarm condition has cleared | | |
|---|---|---|
| **Condition** | **LED** | **Relay** |
| Normal | Off | Off |
| Alarm | On | On |
| Ack (No effect) | On | On |
| Normal | On | On |
| Ack | Off | Off |

### Acknowledging Relays

There are two ways to acknowledge relays programmed for manual reset:

1. Via the programmable front panel function keys F1-F3 (Default: F3 assigned to ACK).
2. Remotely via a normally open pushbutton wired across one of the digital inputs and the +5 V terminals on the digital I/O modules, or using the F4 digital input, which is triggered with a contact closure to COM, or with an active low signal (see page 19).

When the ACK button or the assigned digital input is closed, all relays programmed for manual reset are acknowledged.
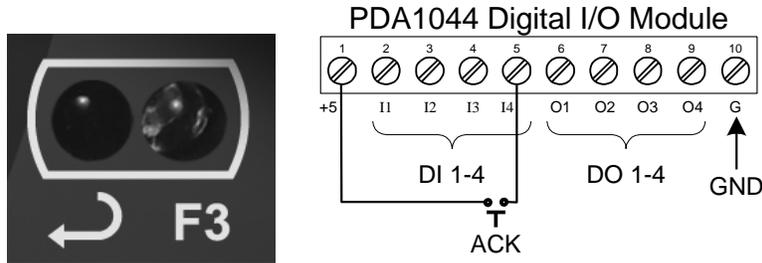


**Figure 22: Acknowledge Relays w/Function Key or Digital Input**

### Setting Up the Interlock Relay (Force On) Feature

Relays 1-4 can be set up as interlock relays. To set up the relays for the interlock feature:

1. Access the *Setup – Relay – Action* menu and set the action to off.
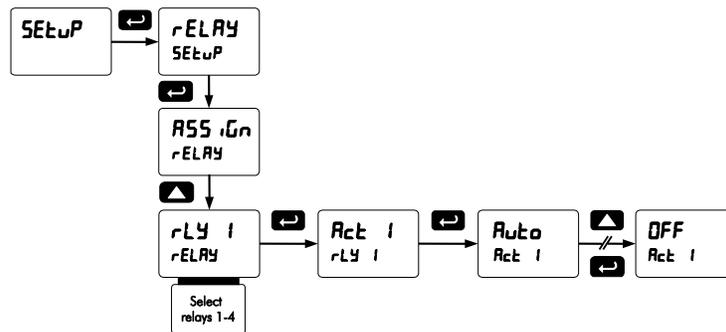


2. In the Advanced features – *User* menu program any of the digital inputs to *Force On* any of the internal relays (1-4).
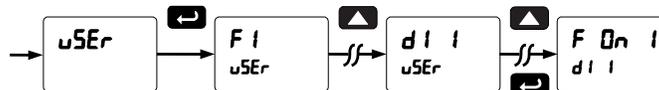


3. Connect a switch or dry contact between the +5V terminal and the corresponding digital input (dI-1 to dI-4) terminal.



41
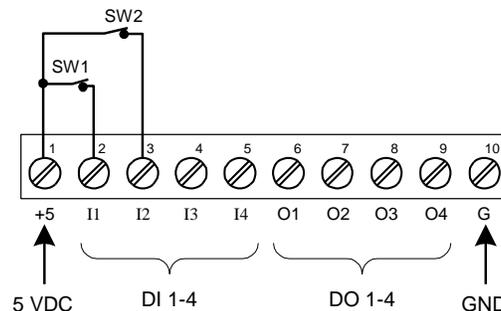
### Interlock Relay Operation Example

Relays 1 & 2 are configured to energize (their front panel LEDs are off) when SW1 & SW2 switches (above) are closed. If the contacts to these digital inputs are opened, the corresponding front panel LEDs flash indicating this condition. The processes being controlled by the interlock relay will stop, and will re-start only after the interlock relay is re-activated by the digital inputs (switches).

*Note: If multiple digital inputs are assigned to the same relay, then the corresponding logic is (AND) – i.e. both switches must be closed to trip the relay.*

## Scaling the 4-20 mA Analog Output (Rout)

The 4-20 mA analog output can be scaled to provide a 4-20 mA signal for any display range selected.

No equipment is needed to scale the analog output; simply program the display values to the corresponding mA output signal.

The *Analog Output* menu is used to program the 4-20 mA output based on display values.



For instructions on how to program numeric values see *Setting Numeric Values*, page 26.
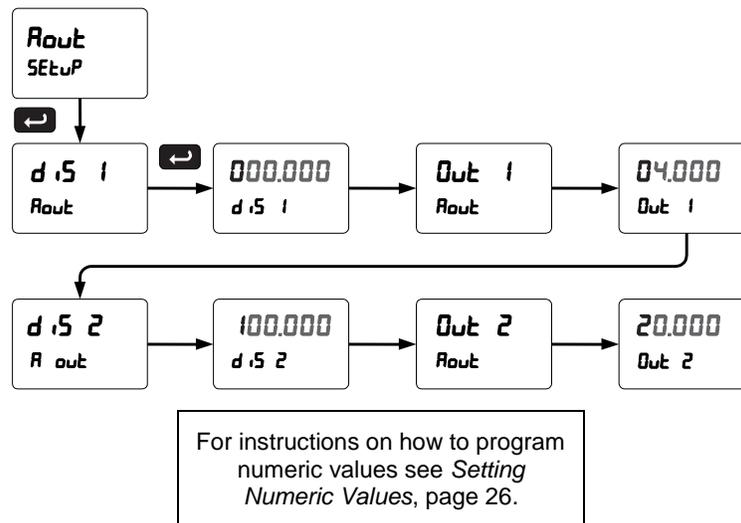
## Reset Menu (rESEt)

The *Reset* menu is used to reset the totals, maximum or minimum reading (peak or valley) reached by the process; both may be reset at the same time by selecting "reset high & low" (rSt HL).

## Control Menu (Contrl)

The *Control* menu is used to control the 4-20 mA analog output and the relays manually, ignoring the input. Each relay and analog output can be programmed independently for manual control. Selecting automatic control sets all relays and the analog output for automatic operation.



Once Manual mode is initiated on any relay or analog output, an LED labeled "M" is turned on. Every few seconds, all LEDs representing outputs that are in Manual mode, as well as the "M" LED flash. This process will continue as long as any output is in manual mode.
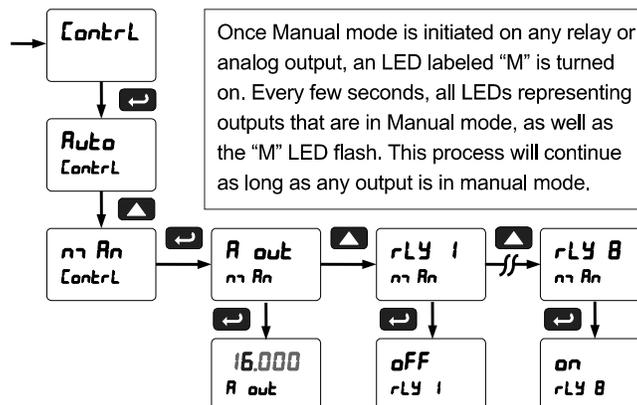
# Setting Up the Password (PASS)

The *Password* menu is used for programming three levels of security to prevent unauthorized changes to the programmed parameter settings and to program the non-resettable totalizer.

> Pass 1: Allows use of function keys and digital inputs
> Pass 2: Allows use of function keys, digital inputs and editing set/reset points
> Pass 3: Restricts all programming, function keys, and digital inputs.
> Total: Prevents resetting the total manually
> Gtotal: Prevents resetting the grand total manually

## Protecting or Locking the Meter

Enter the *Password* menu and program a six-digit password.

For instructions on how to program numeric values see *Setting Numeric Values*, page 26.
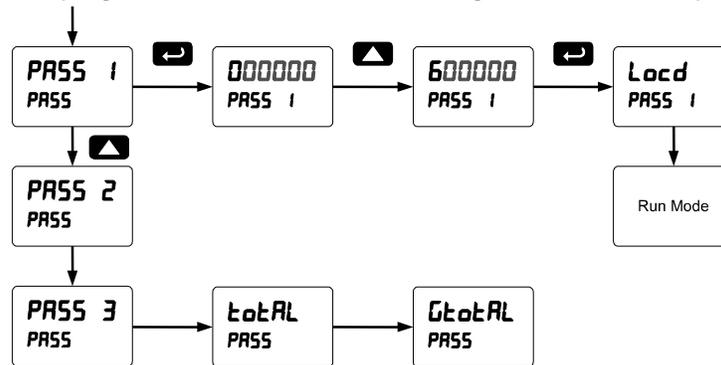


## Total Reset Password & Non-Resettable Total

The total and the grand total can be password-protected to prevent unauthorized total resets.

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.*

## Making Changes to a Password Protected Meter

If the meter is password protected, the meter will display the message *Locd* (*Locked*) when the Menu button is pressed. Press the Enter button while the message is being displayed and enter the correct password to gain access the menu. After exiting the programming mode, the meter returns to its password protected condition.

## Disabling Password Protection

To disable the password protection, access the *Password* menu and enter the correct password twice, as shown below. The meter is now unprotected until a new password is entered.
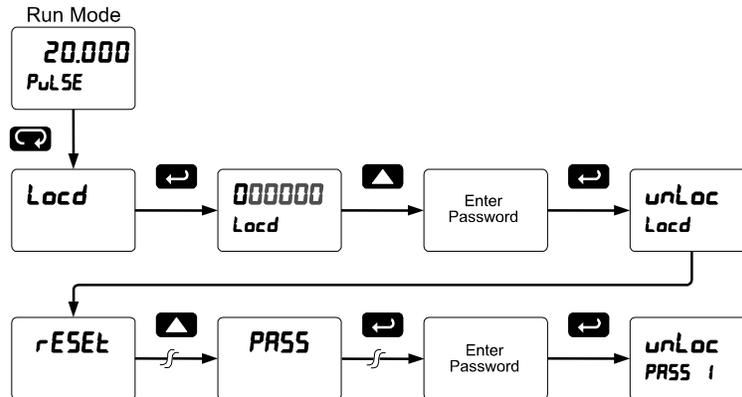


If the correct six-digit password is entered, the meter displays the message *unLoc* (unlocked) and the protection is disabled until a new password is programmed.

If the password entered is incorrect, the meter displays the message *Locd* (Locked) for about two seconds, and then it returns to Run Mode. To try again, press Enter while the *Locked* message is displayed.

> **Did you forget the password?**
> The password may be disabled by entering a master password once. If you are authorized to make changes, enter the master password 508655 to unlock the meter.

# Advanced Features Menu

To simplify the setup process, functions not needed for most applications are located in the *Advanced Features* menu.

Press and hold the Menu button for three seconds to access the advanced features of the meter.

Run Mode

20.000
PuLSE

Press & hold
**Menu** for 3 sec to
access Advanced
features

GAtE → FiLtEr → round

SEriAL

diAG ← uSEr ← SELEct

## Advanced Features Menu & Display Messages

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

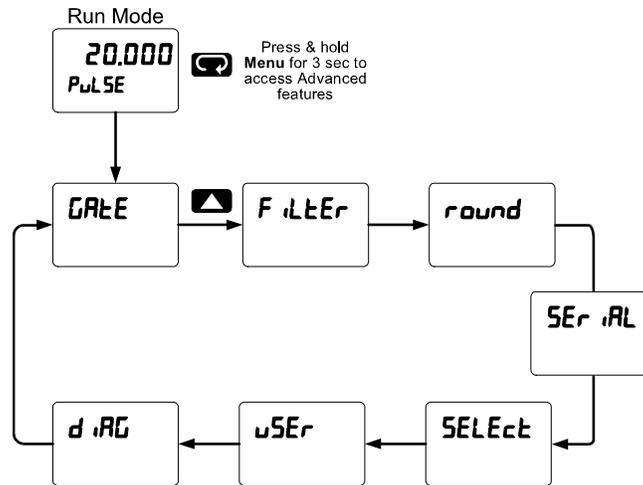| Display | Parameter | Action/Setting |
|---|---|---|
| GAtE | Gate | Enter Gate function menu |
| Lo G | Low gate | Program Low gate value |
| Hi G | High gate | Program High gate value |
| FiLtEr | Filter | Enter the Filter menu |
| Lo SPd | Low speed | Set the contact de-bounce filter value |
| Hi SPd | High speed | Select high speed filter |
| round | Round | Set the rounding value for display variables |
| SEriAL | Serial | Set serial communication parameters |
| SLAUE id | Slave ID | Set slave ID or meter address |
| bAud | Baud rate | Select baud rate |
| tr dLY | Transmit delay | Set transmit delay for serial communication |
| PAritY | Parity | Select parity: Even, Odd, or None with 1 or 2 stop bits |
| t-bYt | Time byte | Set byte-to-byte timeout |
| SELEct | Select | Enter the Select menu (function, cutoff, out) |
| Functn | Signal input conditioning | Select linear only, other functions are not applicable to pulse input |
| LinEAr | Linear | Set meter for linear function and select number of linearization points |

| Display | Parameter | Action/Setting |
|---|---|---|
| no PtS | Number of points | Set meter for 2 to 32-point linearization |
| CutoFF | Cutoff | Set low-flow cutoff |
| Count | Count | Set the totals to count up or down from a set value |
| tot C | Total count | Set the total to count up to or down from the programmed total value |
| Gtot C | Grand total count | Set the grand total to count up or down from from the programmed grand total value |
| AoutPr | Analog output programming | Program analog output parameters |
| SourcE | Source | Select source for the 4-20 mA output |
| O-rAnG | Overrange | Program mA output for display overrange |
| u-rAnG | Underrange | Program mA output for display underrange |
| ny AH | Maximum | Program maximum mA output allowed |
| ny in | Minimum | Program minimum mA output allowed |
| CAL ib | Calibrate | Calibrate 4-20 mA output (internal reference source used for scaling the output) |

45

| Display | Parameter | Action/Setting |
|---|---|---|
| Ч ოҭ Я | *4 mA output* | Enter mA output value read by milliamp meter with at least 0.001 mA resolution |
| 2Ū ოҭ Я | *20 mA output* | Enter mA output value read by milliamp meter with at least 0.001 mA resolution |
| u5Er | *User I/O* | Assign function keys and digital I/O |
| F1 | *F1 function key* | Assign F1 function key |
| F2 | *F2 function key* | Assign F2 function key |
| F3 | *F3 function key* | Assign F3 function key |

| Display | Parameter | Action/Setting |
|---|---|---|
| F4 | *F4 function* | Assign F4 function (digital input) |
| d1 1 | *Digital input 1* | Assign digital input 1 – 4 |
| dŪ 1 | *Digital output 1* | Assign digital output 1 – 4 |
| d ıᎡᏟ | *Diagnostics* | Display parameter settings |
| LEd t | *LED test* | Test all LEDs |
| ınFo | *Information* | Display software and S/N information |
| ErᎡᏚE | *Erase* | Erase MeterView Pro software stored in meter's memory |

## Rounding Feature (round)

The rounding feature is used to give the user a steadier display with fluctuating signals. Rounding is used in addition to the filter function.

Rounding causes the display to round to the nearest value according to the rounding selected. This setting affects the last two digits, regardless of decimal point position.

## Modbus RTU Serial Communications (SEr ıᎡL)

The meter is equipped with serial communications capability as a standard feature using Modbus RTU Serial Communication Protocol.

The meter may be connected to a PC for initial configuration via the onboard micro USB connection. For ongoing digital communications with a computer or other data terminal equipment, an RS-232, or RS-485 option is required; see *Ordering Information* on page 5 for details.

| ⚡ **Warning!** | ***Do not connect any equipment other than Precision Digital's expansion modules, cables, or meters to the RJ45 M-LINK connector. Otherwise damage will occur to the equipment and the meter.*** |
|---|---|

*Note: More detailed instructions are provided with each optional serial communications adapter. Note: Refer to* the *ProVu® Modbus Register Tables located at www.predig.com for details.*
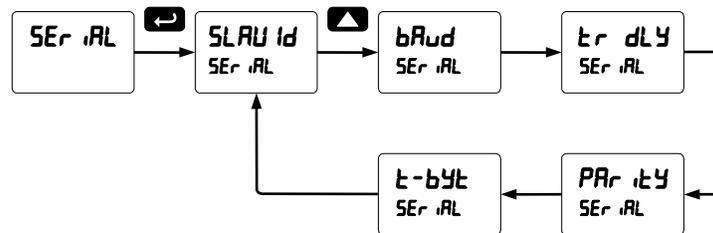


When using more than one meter in a multi-drop mode, each meter must be provided with its own unique address. The meter address (Slave ID) may be programmed between 1 and 247. The transmit delay may be set between 0 and 199 ms. The parity can be set to even, odd, or none with 1 or 2 stop bits.

### Serial Communications Overview

RS-232 and RS-485 are standard interfaces approved by the Electronic Industries Alliance (EIA) for connecting serial devices. In EIA terms, the device (e.g. meter) that connects to the interface is called a Data Communications Equipment (DCE) and the device to which it connects (e.g. the computer) is called a Data Terminal Equipment (DTE).

RS-485 can support multi-point connections per line because it uses lower-impedance drivers and receivers.

Line drivers and receivers are used to exchange data between two or more points (nodes) on a serial communications network. Reliable data communications can be difficult in the presence of induced noise, ground level differences, and other hazards associated with installation of a network. When communicating at high data rates, or over long distances in real world environments, RS-232 is often inadequate. The differential data transmission of RS-485 offers superior performance in most applications. Differential signals can help nullify the effects of ground shifts and induced noise signals that can appear as common mode voltages on a network.

A multi-point network consists of multiple drivers and receivers connected on a single bus, where any point (node) can transmit and/or receive data. RS-485 allows multiple drivers and receivers on the same two-wire or four-wire system. The RS-485 standard specifies up to 32 drivers and 32 receivers on a single bus, but with the introduction of "automatic" repeaters and high-impedance drivers/receivers, this number can be extended to hundreds of points (nodes) on a network.

The cabling used for an RS-485 serial communications network should always be a high quality cable such as Belden 8162 or Alpha 6203C. A two-wire system requires two twisted pairs, and a four-wire system requires three twisted pairs (the extra twisted pair is needed for the signal ground).

Figure 23 illustrates how to connect a general four-wire network (a four-wire network actually contains 5 wires).
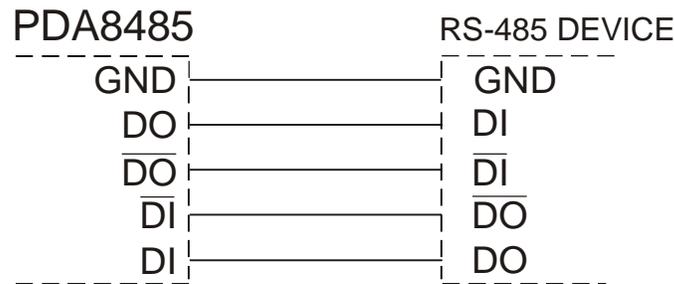


**Figure 23: General Four-Wire Network Connection**

Figure 24 illustrates how to connect a general two-wire network (a two-wire network actually contains 3 wires). Note that the PDA7485 and PDA8485 have DIP switches that allow for two-wire connections without the need to externally wire the DO to the DI and the /DO to the /DI (see the converter section for complete details).
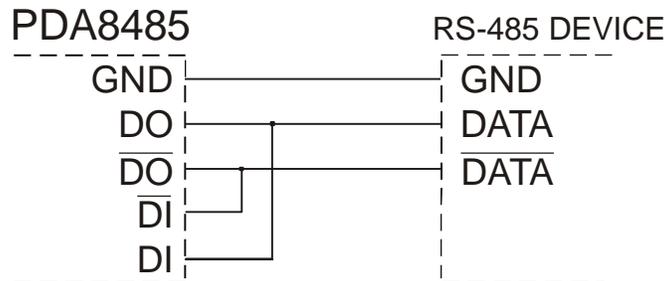


**Figure 24: General Two-Wire Network Connection**

47

## Select Menu (SELEct)

The *Select* menu is used to select the signal input conditioner applied to the input (linear), low-flow cutoff, and analog output programming. The multi-point linearization is part of the linear function selection.
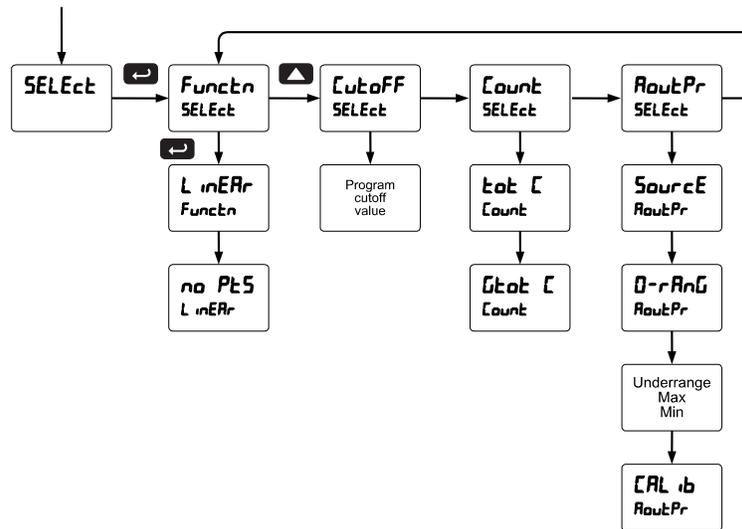


## Signal Input Conditioning (Functn)

The *Function* menu is used to select the signal input conditioner applied to the input: linear, where the multi-point linearization is part of the linear function selection.

Meters are set up at the factory for linear function with 2-point linearization. The linear function provides a display that is linear with respect to the input signal.

## Multi-Point Linearization (Linear)

Meters are set up at the factory for linear function with 2-point linearization. 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.
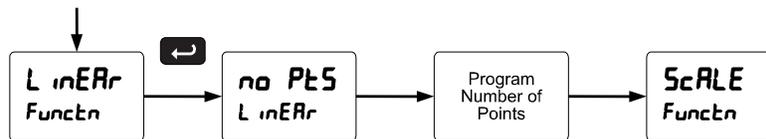


## Low-Flow Cutoff (CutoFF)

The low-flow cutoff feature allows the meter to be programmed so that the often-unsteady output from a differential pressure transmitter, at low flow rates, always displays zero on the meter.

The cutoff value may be programmed from 0 to 999999. The meter will display zero below the cutoff value. Programming the cutoff value to zero disables the cutoff feature.

## Analog Output Programming (RoutPr)

The *Analog Output Programming* menu is used to program the behavior of the 4-20 mA output. The following parameters and functions are programmed in this menu:

1. Source: Source for generating the 4-20 mA output (e.g. PV)
2. Overrange: Analog output value with display in overrange condition
3. Underrange: Analog output value with display in underrange condition
4. Max: Maximum analog output value allowed regardless of input
5. Min: Minimum analog output value allowed regardless of input
6. Calibrate: Calibrate the internal 4-20 mA source reference used to scale the 4-20 mA output

### Analog Output Source

The source for generating the 4-20 mA output may be assigned to the rate/process variable, total, grand total, maximum or minimum value reached by the rate/process, one of the set points, or the Modbus PV input.
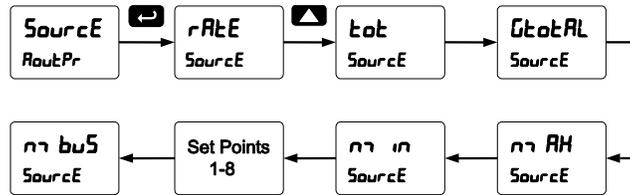


### Analog Output Calibration

To perform the analog output calibration, it's recommended to use a milliamp meter with a resolution of at least 0.1 µA to measure the output current. The values saved internally during this procedure are used for scaling the 4-20 mA output in the *Setup* menu.

## Programmable Function Keys User Menu (uSEr)

The *User* menu allows the user to assign the front panel function keys F1, F2, and F3, the digital input F4 (a digital input located on the signal input connector), and up to eight additional digital inputs to access most of the menus or to activate certain functions immediately (e.g. reset max & min, hold relay states, etc.). This allows the meter to be greatly customized for use in specialized applications.

Up to eight digital outputs can be assigned to a number of actions and functions executed by the meter (i.e. alarms, relay acknowledgement, reset max, min, or max & min, tare, and reset tare). The digital outputs can be used to trigger external alarms or lights to indicate these specific events.



*If installed
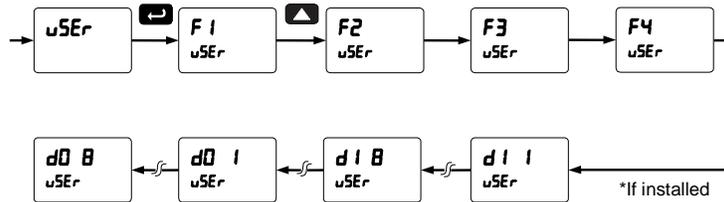
### Function Keys & Digital I/O Available Settings

Refer to the following table for descriptions of each available function key or digital I/O setting.

| Display | Description |
|---------|-------------|
| rELAY | Directly access the relay menu |
| SEt 1* | Directly access the set point menu for relay 1 (*through 8) |
| rLY d | Disable all relays until a button assigned to *enable relays* (rLY E) is pressed |
| rLY E | Enable all relays to function as they have been programmed |
| O HoLd | Hold current relay states and analog output as they are until a button assigned to *enable relays* (rLY E) is pressed |
| d HoLd | Hold the current display value, relay states, and analog output momentarily while the function key or digital input is active. The process value will continue to be calculated in the background. |
| Ln1 Hi | Display maximum display value on line 1 |
| Ln1 Lo | Display minimum display value on line 1 |
| Ln1 HL | Display maximum & minimum display values on line 1 |
| Ln2 Hi | Display maximum display value on line 2 |
| Ln2 Lo | Display minimum display value on line 2 |
| Ln2 HL | Display maximum & minimum display values on line 2 |
| Ln2 Gt | Display the grand total on line 2 |
| F On 1* | Force relay 1 (*through 4) into the on state. This function is used in conjunction with a digital input to achieve interlock functionality. See page 41 for details about interlock relays. |

| Display | Description |
|---------|-------------|
| Contrl | Directly access the control menu |
| d iSAbL | Disable the selected function key or digital I/O |
| AcH | Acknowledge all active relays that are in a manual operation mode such as auto-manual or latching |
| rESEt | Directly access the reset menu |
| rSt t | Reset the total |
| rSt Gt | Reset the grand total |
| rSt Hi | Reset the stored maximum display value |
| rSt Lo | Reset the stored minimum display value |
| rSt HL | Reset the stored maximum & minimum display values |
| dSPLAY | Directly access the display menu |
| L inE 1 | Directly access the display line 1 menu |
| L inE 2 | Directly access the display line 2 menu |
| mEnu | Mimic the menu button functionality (digital inputs only) |
| r iGHt | Mimic the right arrow/F1 button functionality (digital inputs only) |
| uP | Mimic the up arrow/F2 button functionality (digital inputs only) |
| EntEr | Mimic the enter/F3 button functionality (digital inputs only) |
| ALm 1* | Provide indication when alarm 1 (*through 8) has been triggered (digital outputs only) |

# Meter Operation

The meter accepts pulses (e.g. ±40mV to ± 8V), square wave (0-5, 0-12V, or 0-24V), open collector NPN, PNP, TTL, or switch contact signals and displays these signals in engineering units from -99999 to 999999.

The dual-line display can be customized by the user to operate in such a way as to satisfy a specific application. Typically, line 1 is used for the process variable; while line 2 is used for engineering units, custom legend, total, grand total, or set point indication.

The meter can be set up to display the pulse input on line 1 and the Modbus input on line 2. The relays and analog output can be programmed to operate from the Modbus PV input.

## Front Buttons Operation

| Button Symbol | Description |
|---|---|
| MENU or MENU | Press to enter or exit Programming Mode, view settings, or exit max/min readings |
| F1 or F1 | Press to reset max/min readings or other parameter/function assigned through the *User* menu |
| F2 or F2 | Press to display max/min readings or other parameter/function assigned through the *User* menu |
| F3 or F3 | Press to acknowledge relays or other parameters/function assigned through the *User* menu |

## SafeTouch® Buttons

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.

These buttons can be disabled for security by selecting DISABLE on the switch labeled NO-CONTACT BUTTONS located on the connector board.

To actuate a button, press one finger to the glass directly over the marked button area. Then retract finger more than three inches from the glass before pressing the next button. When the cover is removed, the four mechanical buttons located next to the sensors are used. The sensors are disabled when a mechanical button is pressed and will automatically be re-enabled after 60 seconds of inactivity.

The SafeTouch Buttons are designed to filter normal levels of ambient interference and to protect against false triggering, however, it is recommended that the SafeTouch Buttons be disabled (slide switch to LOCK) if there is an infrared interference source in line-of-sight to the display.

The SafeTouch Buttons are configured by default to duplicate the function of the front panel mechanical pushbuttons associated with the integrated meter. The symbols by each SafeTouch button correspond to a mechanical button as shown in the above table.

SafeTouch Button Tips:

- To the extent possible, install the display facing away from sunlight, windows, reflective objects and any sources of infrared interference.
- Keep the glass window clean.
- Tighten the cover securely.
- Use a password to prevent tampering.

| ⚡ **WARNING** | Take caution when cleaning the window glass as it may result in unintentional SafeTouch button events. Only clean the ProtEX-MAX when the system is safely shut down, and inspect the ProtEX-MAX for proper configuration prior to system restart. |
|---|---|

## F4 Operation

A digital input, F4, is standard on the meter. This digital input is programmed identically to function keys F1, F2, and F3. The input is triggered with a contact closure to COM, or with an active low signal. During operation, F4 operates according to the way is has been programmed in the *Advanced Features – User* menu.

## Maximum/Minimum Readings

The max & min readings (peak & valley) reached by the process can be displayed either continuously or momentarily:

1.  Display briefly by assigning to the F1-F3 function keys, F4 (digital input) or to the digital inputs in the *User* menu.
2.  Display continuously by assigning either display to max/min through the *Display* menu.

Any of the F1-F3 function keys (buttons), F4 (digital input), and the digital inputs can be programmed to reset the max & min readings. The meters are set at the factory to display the max reading by pressing the Up arrow/F2 button and to use the Right arrow/F1 button to access the *Reset* menu.

**To display max reading using function key with factory defaults:**

1.  Press Up arrow/F2 button to display maximum reading since the last reset/power-up.
2.  To reset max/min press Right arrow/F1 button to access the Reset menu. The max & min displays are reset to actual values.
3.  Press Menu to exit max/min display reading.

**To display max/min readings continuously:**

Assign either display to Max (d H ı), Min (d Lo), or toggle between Max and Min (d HL) every 10 seconds.
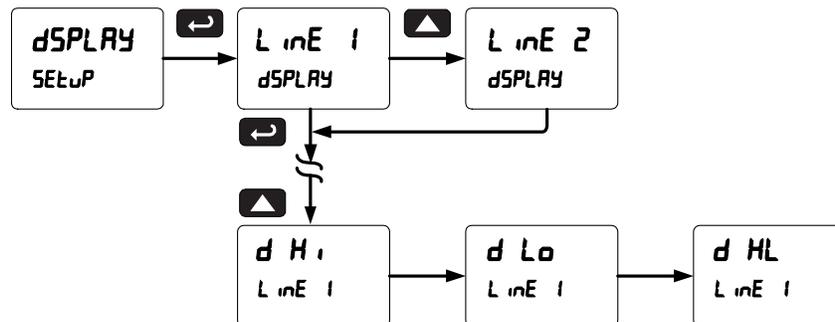
# Troubleshooting

The rugged design and the user-friendly interface of the meter should make it unusual for the installer or operator to refer to this section of the manual. However, due to the many features and functions of the meter, it's possible that the setup of the meter does not agree with what an operator expects to see.

If the meter is not working as expected, refer to the *Diagnostics* menu and recommendations below.

## Diagnostics Menu (d iRG)

The *Diagnostics* menu is located in the *Advanced Features* menu, to access *Diagnostics* menu see *Advanced Features Menu*, page 45.

This menu allows the user to test the functionality of all the meter LEDs, check the meter's software and version information, and erase the MeterView Pro software installation files from the meter. Press the Enter button to view the settings and the Menu button to exit at any time.

For a description of the diagnostic messages, *see Advanced Features Menu &* Display Messages, page 45.

### Determining Software Version

To determine the software version of a meter:
1. Go to the *Diagnostics* menu (d iRG) and press Enter button.
2. Press Up arrow button and scroll to Information menu ( InFo).
3. Press Enter to access the software number (5Ft) and version (UEr) information. Write down the information as it is displayed. Continue pressing Enter until all the information is displayed.
4. The meter returns to Run Mode after displaying all the settings.

## Reset Meter to Factory Defaults

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

**Instructions to load factory defaults:**
1. Enter the *Advanced Features* menu. See *Advanced Features Menu*, page 45.
2. Press Up arrow to go to *Diagnostics* menu
3. Press and hold Right arrow for three seconds, press
Enter when display flashes rESEt.
Note: If Enter is not pressed within three seconds, the display returns to the *Diagnostics* menu.
4. The meter goes through an initialization sequence (similar as on power-up), and loads the factory default settings.
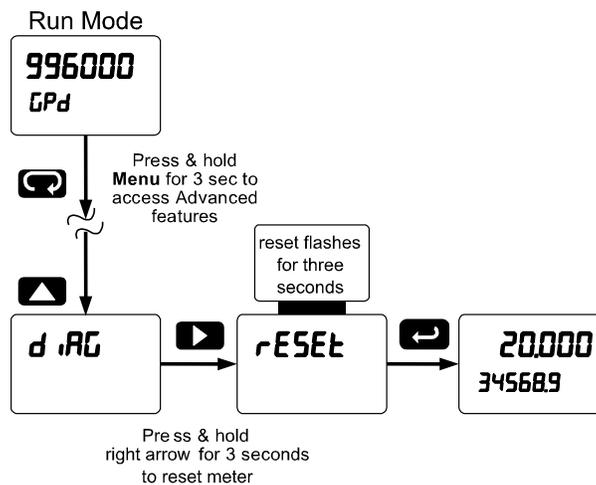
### Factory Defaults & User Settings

The following table shows the factory setting for most of the programmable parameters on the meter.

| Parameter | Display | Default Setting | Parameter | Display | Default Setting |
|---|---|---|---|---|---|
| Input type | InPut | Pulse | Relay 4 assignment | AS iGn4 | Rate |
| Total | YES | Total enabled | Relay 1 action | Act 1 | Automatic |
| Units | un itS | Rate / total / gr. total pulse / pulse / pulse | Relay 1 set point | SEt 1 | 100.0 |
| Filter | F iLtEr | Hi Spd | Relay 1 reset point | rSt 1 | 000.0 |
| K-factor | FActor | 1.000 | Relay 2 action | Act 2 | Automatic |
| Function | Functn | Linear | Relay 2 set point | SEt 2 | 200.0 |
| Number of points | no PtS | 2 | Relay 2 reset point | rSt 2 | 000.0 |
| Input 1 | InP 1 | 00000.0 | Relay 3 action | Act 3 | Automatic |
| Display 1 | d iS 1 | 00000.0 | Relay 3 set point | SEt 3 | 300.0 |
| Input 2 | InP 2 | 10000.0 | Relay 3 reset point | rSt 3 | 250.0 |
| Display 2 | d iS 2 | 10000.0 | Relay 4 action | Act 4 | Automatic |
| Decimal point | dddddd | 1 place | Relay 4 set point | SEt 4 | 400.0 |
| Cutoff value | CutoFF | 0.000 (disabled) | Relay 4 reset point | rSt 4 | 350.0 |
| Display assignment | dSPLAY | | Fail-safe relay 1 | FLS 1 | Off |
| Display line 1 | L inE 1 | Rate/Process | Fail-safe relay 2 | FLS 2 | Off |
| Display line 2 | L inE 2 | Total value | Fail-safe relay 3 | FLS 3 | Off |
| Display intensity | d- IntY | 8 | Fail-safe relay 4 | FLS 4 | Off |
| Total time base | t tb | Second | On delay relay 1 | On 1 | 0.0 sec |
| Total conversion factor | t CF | 1.000 | Off delay relay 1 | OFF 1 | 0.0 sec |
| Total reset | t rSt | Manual | On delay relay 2 | On 2 | 0.0 sec |
| Grand total time base | Gt tb | Second | Off delay relay 2 | OFF 2 | 0.0 sec |
| Grand total conversion factor | Gt CF | 1.000 | On delay relay 3 | On 3 | 0.0 sec |
| Grand total reset | Gt rSt | Manual | Off delay relay 3 | OFF 3 | 0.0 sec |
| Relay 1 assignment | AS iGn 1 | Total | | | |
| Relay 2 assignment | AS iGn2 | Total | | | |
| Relay 3 assignment | AS iGn3 | Rate | | | |

| Parameter | Display | Default Setting |
|---|---|---|
| On delay relay 4 | On 4 | 0.0 sec |
| Off delay relay 4 | OFF 4 | 0.0 sec |
| Display 1 analog out | di5 1 | 0.0 |
| Output 1 value | Out 1 | 4.000 mA |
| Display 2 analog out | di5 2 | 1000.0 |
| Output 2 value | Out 2 | 20.000 mA |
| Source analog output | SourcE | Rate/process |
| Overrange output | O-rAnG | 21.000 mA |
| Underrange output | u-rAnG | 3.000 mA |
| Maximum output | m AX | 23.000 mA |
| Minimum output | m in | 1.000 mA |
| Slave ID (Address) | SLAUE Id | 247 |
| Baud rate | bAud | 9600 |
| Transmit delay | tr dLY | 50 ms |
| Parity | PAr itY | Even |
| Byte-to-byte timeout | t-bYt | 010 (0.1 sec) |

| Parameter | Display | Default Setting |
|---|---|---|
| F1 function key | F 1 | Reset max & min |
| F2 function key | F2 | Line 1: Max (Hi) |
| F3 function key | F3 | Acknowledge relays |
| F4 function | F4 | Acknowledge relays |
| Digital input 1 | di 1 | Menu |
| Digital input 2 | di 2 | Right arrow |
| Digital input 3 | di 3 | Up arrow |
| Digital input 4 | di 4 | Enter |
| Digital output 1 | dO 1 | Alarm 1 |
| Digital output 2 | dO 2 | Alarm 2 |
| Digital output 3 | dO 3 | Alarm 3 |
| Digital output 4 | dO 4 | Alarm 4 |
| Password 1 | PASS 1 | 000000 (unlocked) |
| Password 2 | PASS 2 | 000000 (unlocked) |
| Password 3 | PASS 3 | 000000 (unlocked) |
| Total password | totAL | 000000 (unlocked) |
| Grand total password | GtotAL | 000000 (unlocked) |

## Troubleshooting Tips

| Symptom | Check/Action |
|---|---|
| SafeTouch buttons do not respond | If mechanical button was pushed. The SafeTouch buttons will be re-enabled automatically **60 seconds** after the last button push.<br>If slide switch on connector board is in DISABLE position, switch to ENABLE.<br>Strong direct sunlight may interfere with SafeTouch button operation. It is recommended to operate the buttons by standing so as to block direct sunlight. |
| Serial Communications Power LED Indicator is off | 1. Check modular cable connection<br>Check power to the device |
| If only the TX (or DATA IN) data status LED is flashing when serial communications attempted | 1. Check serial cable<br>2. Check protocol selected on device<br>3. Check instrument address & baud rate<br>Check program address & baud rate |

| Symptom | Check/Action |
|---|---|
| If both data status LEDs (TX and RX) are off when trying to communicate | Remove all unnecessary cables and instruments from the bus. Try getting the system to work with only one device (to ease troubleshooting) and then expand the system one device at a time. |
| Communications slow | Increase the baud rate |
| Random communication errors | 1. Increase the TX delay time<br>Decrease the baud rate |
| Power LED is off | 1. Check modular cable connection<br>Check power to instrument |
| No display at all | Check power at power connector |
| Not able to change setup or programming, *Locd* is displayed | Meter is password-protected, enter correct six-digit password to unlock |
| Meter displays error message during calibration (*Error*) | Check:<br>1. Signal connections<br>2. Minimum input span requirements |
| Meter displays<br>   *999999*<br>  *-99999* | Check:<br>1. Input selected in *Setup* menu<br>2. Corresponding signal at Signal connector |
| Display is unstable | Check:<br>1. Input signal stability and value<br>2. Display scaling vs. input signal<br>3. Filter and gate values |
| Display response is too slow | Check filter and gate values |
| Display reading is not accurate | Check:<br>   Scaling or calibration |
| Display does not respond to input changes, reading a fixed number | Check:<br>   Display assignment, it might be displaying max, min, or set point. |
| Display alternates between<br>1. *Hi* and a number<br>2. *Lo* and a number | Press Menu to exit max/min display readings. |
| Relay operation is reversed | Check:<br>1. Fail-safe in *Setup* menu<br>2. Wiring of relay contacts |
| Relay and status LED do not respond to signal | Check:<br>1. Relay action in *Setup* menu<br>2. Set and reset points |
| Flashing relay status LEDs | Relays in manual control mode or relay interlock switches opened. |
| Meter not communicating with application programs | Check:<br>1. Serial adapter and cable<br>2. Serial settings<br>3. Meter Slave ID and baud rate |
| If the display locks up or the meter does not respond at all | Cycle the power to reboot the microprocessor. |
| Other symptoms not described above | Call Technical Support for assistance. |

*Note: Certain sequences of events can cause unexpected results. To solve these issues, it is best to start fresh from factory defaults and map changes ahead of time, rather than at random.*

# Service

⚠
**WARNINGS**

- Installation and service should be performed only by trained service personnel. Service requiring replacement of internal sub-components must be performed at the factory.
- Disconnect from supply before opening enclosure. Keep cover tight while circuits are alive. Conduit seals must be installed within 18" (450mm) of the enclosure.
- Verify that the operating atmosphere of the instrument is consistent with the appropriate hazardous locations certifications.
- If the instrument is installed in a high voltage environment and a fault or installation error occurs, high voltage may be present on any lead
- Read all product labels completely and follow all instructions and requirements listed on the labels for installation or service.
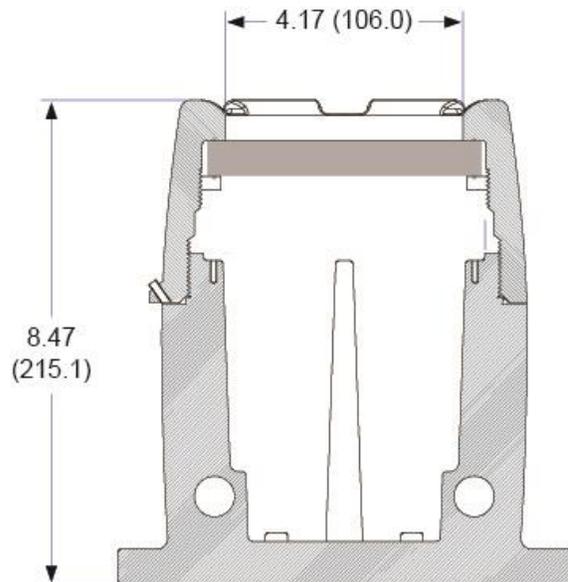
If the enclosure is sound and undamaged, then only the internal electronics housing will need to be returned to the factory for service. Contact the factory for RMA number and return instructions.

# Mounting Dimensions

All units: inches (mm)
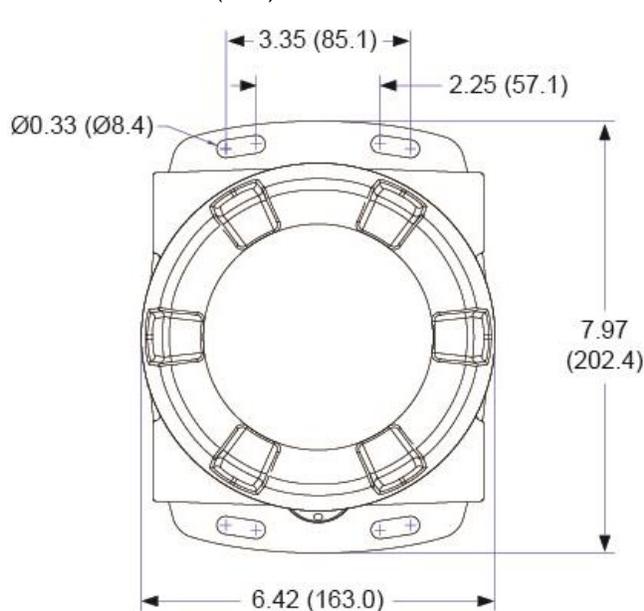


**Figure 25: Enclosure Dimensions – Front View**

**Figure 26: Enclosure Dimensions – Side Cross Section View**

*This Page Intentionally Left Blank*

# EU Declaration of Conformity

Issued in accordance with ISO/IEC 17050-1:2004 and ATEX Directive 2014/34/EU.

We,

**Precision Digital Corporation**
**233 South Street**
**Hopkinton, MA 01748 USA**

as the manufacturer, declare under our sole responsibility that the product(s),

**Model PD8 ProtEX-MAX Series**

to which this declaration relates, is in conformity with the European Union Directives shown below:

| | |
|---|---|
| **2014/35/EU** | **Low Voltage Directive** |
| **2014/34/EU** | **ATEX Directive** |
| **2014/30/EU** | **EMC Directive** |
| **2011/65/EU** | **RoHS Directive** |

This conformity is based on compliance with the application of harmonized or applicable technical standards and, when applicable or required, a European Union notified body certification.

**Standards:**

| | | | |
|---|---|---|---|
| EN 55022:2007 | EN 61000-6-2:2005 | EN 60079-0:2009 | EN 61000-6-4:2007 |
| EN 60079-1:2007 | EN 61010-1:2001 | EN 60079-31:2008 | EN 61326:2006 |

The standards EN 55022:2007, EN 60079-0:2009, EN 60079-1:2007, EN 60079-31:2008, EN 61000-6-4:2007, EN 61010-1:2001, and EN 61326:2006 are no longer harmonized. The requirements of these standards have been checked against the harmonized standard EN 55022:2010, EN 60079-0:2012+A11:2013, EN 60079-1:2014, EN 60079-31:2014, EN 61000-6-4:2007+A1:2011, EN 61010-1:2010, and EN 61326:2013 and there were no major technical changes affecting the latest technical knowledge for the products listed above.

**EC Type Examination Certificate:**    Sira 12ATEX1182

**Product Markings:**        ⟨Ex⟩ II 2 G D
Ex d IIC T* Gb
Ex tb IIIC T90°C Db IP68
Tamb = -40°C to +*°C (*T5 = 65°C, *T6 = 60°C)

**ATEX Notified Body for EC Type Examination Certificate:**    Sira Certification Service, NB 0518
Unit 6, Hawarden Industrial Park
Hawarden, Deeside, CH5 3US, UK

**ATEX Quality Assurance Notification No.:**    SIRA 10 ATEX M462

**ATEX Notified Body for Quality Assurance:**    Sira Certification Service, NB 0518
Unit 6, Hawarden Industrial Park
Hawarden, Deeside, CH5 3US, UK

Signed for and on behalf of Precision Digital Corporation:

| | |
|---|---|
| Name: | Jeffrey Peters |
| Company: | Precision Digital Corporation |
| Title: | President |
| Date: | 02/12/2018 |

**PRECISION DIGITAL ÷**

Document No: DoC PD8 {021218}

# How to Contact Precision Digital

- For Technical Support, please

  Call: (800) 610-5239 or (508) 655-7300

  Fax: (508) 655-8990

  Email: support@predig.com

- For Sales Support or to place an order, please

  Call: (800) 343-1001 or (508) 655-7300

  Fax: (508) 655-8990

  Email: sales@predig.com

- For the latest version of this manual, please visit

  **www.predig.com**