PD2-6400

Helios High Voltage & Current Meter

PRECISION DIGITAL ÷

2600.0

GAL

c(UL)us LISTED

HELIOS

▲ Actual Size Digit

HIGH VOLTAGE & CURRENT

- **Large 1.80" Digits**
- **Dual-Line 6-Digit Display**
- **Readable from up to 100 Feet (30 Meters) Away**
- **Superluminous Sunlight Readable Display**
- **NEMA 4X, IP65 Rated Field Mountable Enclosure**
- **Operating Temperature Range of -40 to 65°C (-40 to 150°F)**
- **One (1) High Voltage and One (1) High Current Input**
- **Multiplication for Apparent Power Calculation**
- **0-300 VAC or VDC Voltage Input**
- **0-5 AAC or ADC Current Input**
- **85-265 VAC, or 12-24 VDC Input Power Models**
- **Programmable Display & Function Keys**
- **2 or 4 Relays + Isolated 4-20 mA Output Options**
- **Onboard USB & RS-485 Serial Communication Options**
- **Modbus® RTU Communication Protocol Standard**
- **Program the Meter from a PC with Onboard USB and MeterView® Pro**

PD2-6400 Helios High Voltage & Current Meter

NEMA 4X, IP65 Rated Enclosure

UV Resistant Sunlight Readable Display

UL LISTED

Dual-Line 6-Character Display with Extra Large 1.8" Digits

User Configurable Upper Display (Showing Voltage)

User Configurable Lower Display (Showing Current)

Alarm Status Indicators

Connections and Function Keys Easily Accessible Behind Front Panel Door.

MeterView Pro USB Install

INTRODUCTION

The Helios PD2-6400 is a multipurpose, easy to use high voltage and current input meter ideal for measuring direct voltage and current or the output from voltage shunts and current transformers. It has one 0-300 VAC or VDC voltage input and one 0-5 AAC or ADC current input. The meter may be used with a single voltage or current input, or to measure both simultaneously. A math channel P calculates apparent power as the product of the voltage and current inputs.

The PD2-6400 can display voltage, current, and apparent power. The dual line display can show any two parameters simultaneously, or alternate between any parameters as well as their programmable units and tags.

A fully loaded PD2-6400 meter has the following: four SPDT relays, 4-20 mA output, and a 24 VDC power supply.

KEY FEATURES

Precise, Accurate, and More Informative

The Helios' large 1.8" display provides a highly accurate and precise dual line, 6-digit view of the voltage/high current measurement and the lower display can also provide a clearly identifiable custom tag. Its 24-bit A/D is accurate to ±0.03% of calibrated span ±1 count. The PD2-6400's display also has lead zero blanking capability.

Configurable

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

Superluminous Sunlight Readable Display

PD2-6400's standard SunBright display features extraordinarily bright LEDs. It is perfect for applications where the meter is in direct sunlight or in applications where visibility may be impaired by smoke, fog, dust, or distance.

Function Keys

There are three function keys available to the user. These keys can be programmed to trigger certain events (i.e. acknowledge alarms, reset max and/or min, disable/enable output relays, or hold current relay states), provide direct menu access points, and more.

Easy to Program

The user friendly dual-line display makes the Helios easy to set up & program with its programming buttons located behind the front door panel. There are three levels of password protection to help maintain the integrity of the programming and there are no jumpers to set for the meter input selection.


Input Setup

Display Setup

Display Single or Dual Input

The Helios PD2-6400 has a rather unique display that can represent the measured input in a different form (i.e. Volts & Amps). Please see the examples shown below. Both displays are independently scaled and are based on the 4-20 mA input signal. This function can be used for Value & Volts, Value & Amps, Voltage Value & Current Value, and Volts & Amps.

Value & Volts   **Value & Amps**

Alternating Input Value and Units
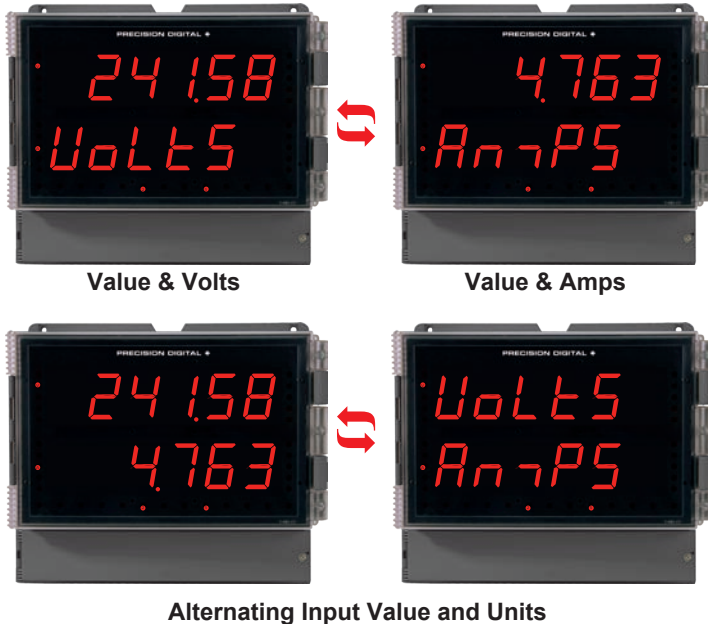
Advanced Linearization Capability

The Helios includes a 32-point linearizer for non-linear Current or Voltage signals. The meter's factory default setting is for 2-point linearization. Up to 32 linearization points can be user-selected for each channel, Voltage or Current, under the Linear Function. Precision Digital's free MeterView® Pro PC-based programming software greatly simplifies the construction of the linearization tables. The software enables the user to save this data to the meter and/or PC.

On-Board Digital Input

The PD2-6400 includes a digital input as a standard feature. This digital input can be assigned functionality such as alarm acknowledgement, as well as enable, disable, or force relays on from a signal from a PLC or relay on other equipment, and much more. This is ideal for installations where the meter is inaccessible behind a cover, or where an additional function key is needed for customized operation.

```
P+    P-    F4   COM   V+   mA+
 1     2     3     4     5     6
```
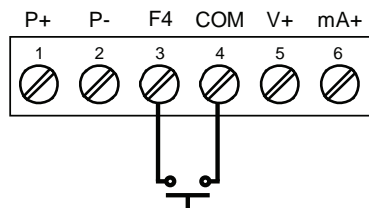
Max/Min Display

Max/Min (or Peak/Valley) is standard on the Helios PD2-6400. Either display can be configured to show either maximum or minimum excursion since last reset. The displays can also be configured to toggle between Max and Min values.

Three Tier Password Protection

The PD2-6400 offers 3 levels of password protection:
- Level 1 protection allows the operator use of only the 3 pre-configured function keys without a password.
- Level 2 protection allows the operator use of only the function keys and the ability to change set points without a password
- Level 3 protection restricts the operator from using the function keys and all meter configuration menus without a password.

Free USB Programming Software

The Helios comes with free **MeterView® Pro** programming software that connects to your PC with a standard USB cable that is provided with each instrument. The software will allow you to configure, monitor, control, and datalog a Helios PD2-6400 using your PC. A new and very useful feature of this software is that it is resident on the Helios meter and installed directly into your PC. This eliminates the need to install drivers or download software from the internet. Just connect the Helios to your PC (the Helios even gets its power from the PC so you don't have to provide external power!) and within minutes you will be programming it with the free software.

DIGITAL COMMUNICATIONS

Modbus® RTU Serial Communications

With the purchase of a serial communication adapter, Helios meters can communicate with any Modbus Master device using the ever-popular Modbus communications protocol that is included in every Helios. This greatly increases the flexibility of the meter. Modbus provides much more capability than reading PV and writing set points. Below are some examples of other things that can be done with Helios's Modbus communications.
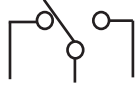
- Send a 6-character message to the lower display upon an event
- Convert a digital value to a 4-20 mA signal
- Remote user control (i.e. change set points, acknowledge alarms)
- Input a Modbus digital PV (in place of analog input)
- Remote override of any, or all, relays and analog outputs

Modbus PV Input   **Remote Message**
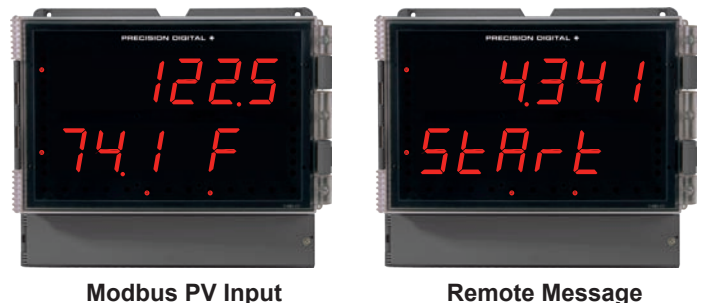
OUTPUTS

Relay Outputs

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

Relay Operation/Configuration

There are powerful relay functions that can be configured in the Helios meter, including:

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

Analog Output

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

Manual Output Control

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

Isolated Transmitter Power Supplies

A powerful 24 V @ 200 mA power supply is a standard feature on the meter. It can be configured for 5, 10, or 24 V (default) by means of a simple internal jumper (see manual). An additional power supply (24 V @ 40 mA) is standard with the 4-20 mA output option.

Interlock Relay(s)

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

Interlock Relay Connections
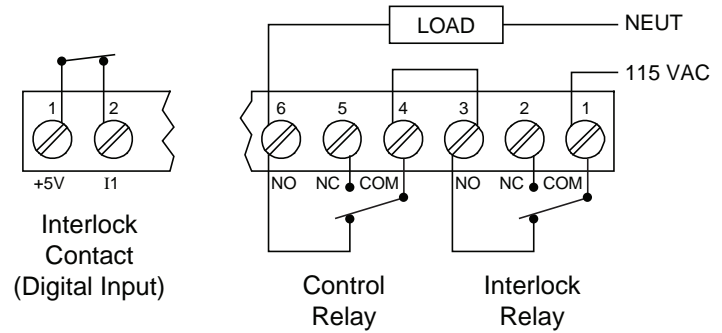
APPLICATION EXAMPLES

The PD2-6400 Helios can be used to display application data for voltage, current, or both. Each Channel, Voltage or Current, can be scaled independently. The following examples show just a few of the PD2-6400's application capabilities using generators and transformers. Each example is followed by a wiring diagram that shows proper switch position for the meter.

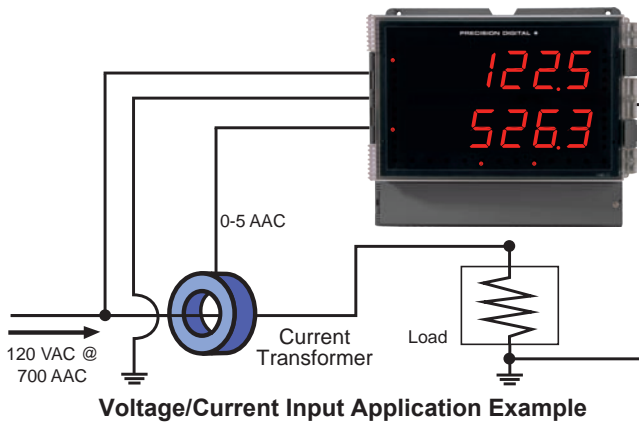### Voltage Measurement for a Generator Driving a Load
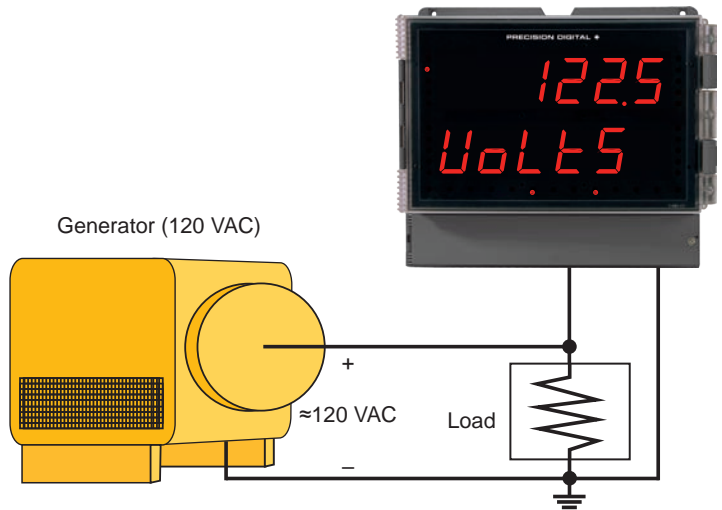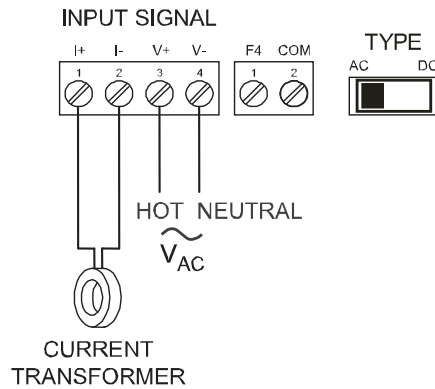

Voltage Input Application Example
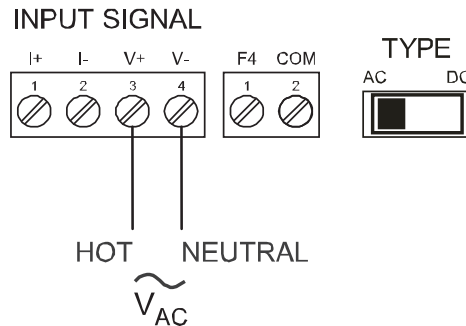
Voltage Input Wiring Example with AC Switch Selected

Voltage & Current Measurement for a Transformer Driving a Load
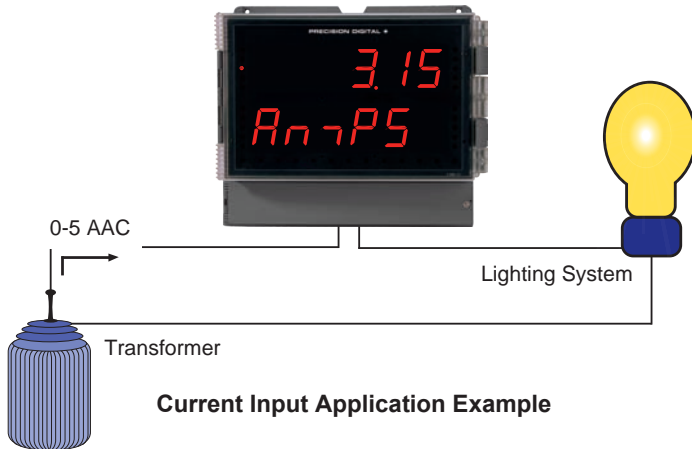

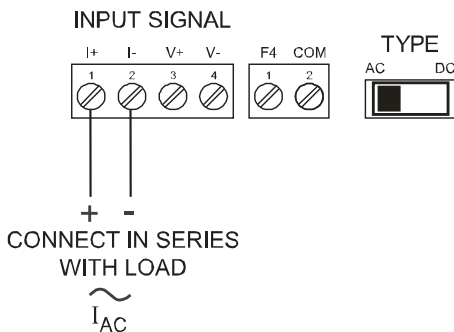**Voltage/Current Input Application Example**

Voltage/Current Input Wiring Example w/AC Switch Selected
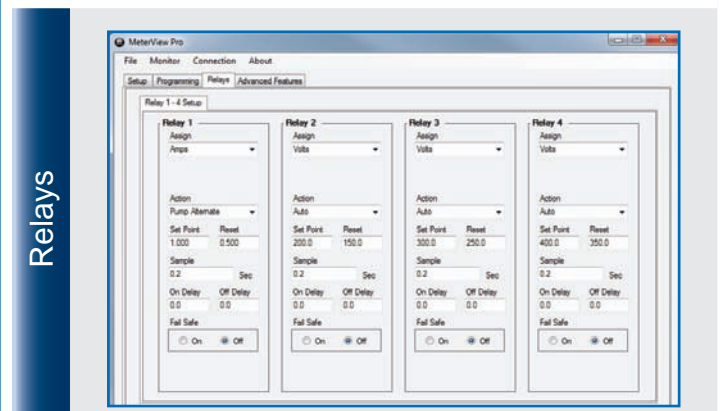
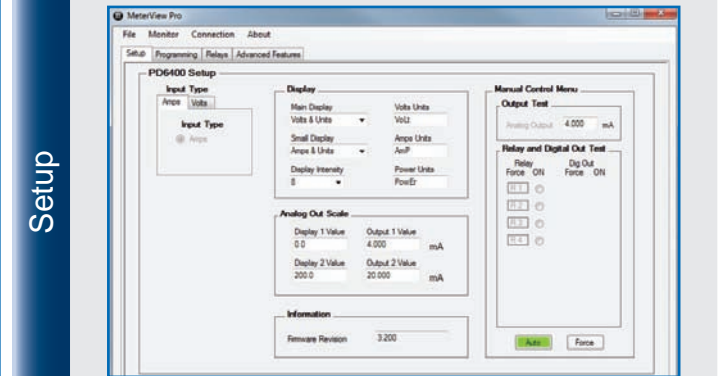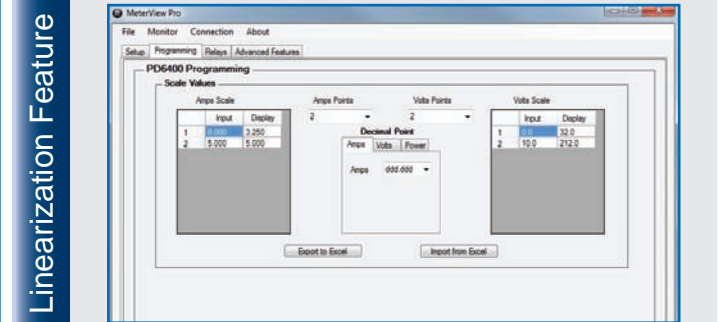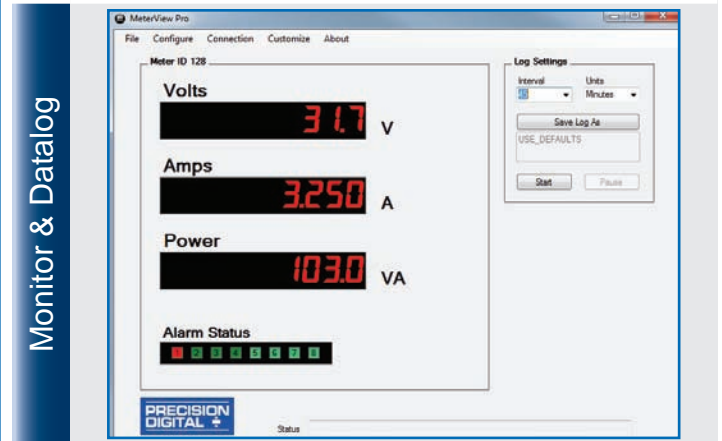## Current Measurement for a Lighting System

Current Input Application Example

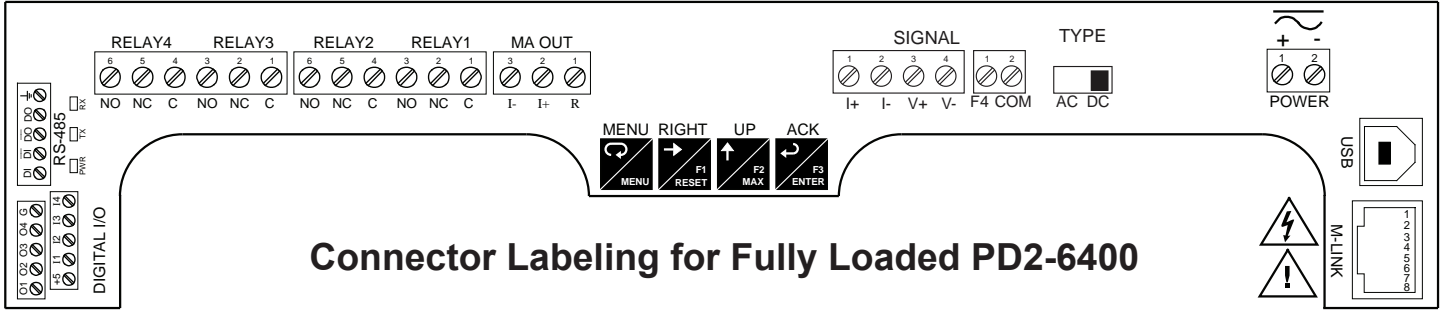**Current Input Wiring Example with AC Switch Selected**

METERVIEW® PRO SOFTWARE

Configure, monitor, and datalog a PD2-6400 from a PC using Meter View Pro Software (available with each Helios meter via USB or for download at www.predig.com).

Monitor & Datalog

Linearization Feature

Setup

Relays

CONNECTIONS

Connector Labeling for Fully Loaded PD2-6400

MOUNTING OPTIONS

Pipe Mounting Kit

The meter can also be mounted to a pipe using the optional pipe mounting kit (PDA6260). This kit includes two mounting plates, two U-bolts, and the necessary nuts and bolts. *See PD2-6400 manual for instructions.*

Vertical Pipe Mounting

Horizontal Pipe Mounting
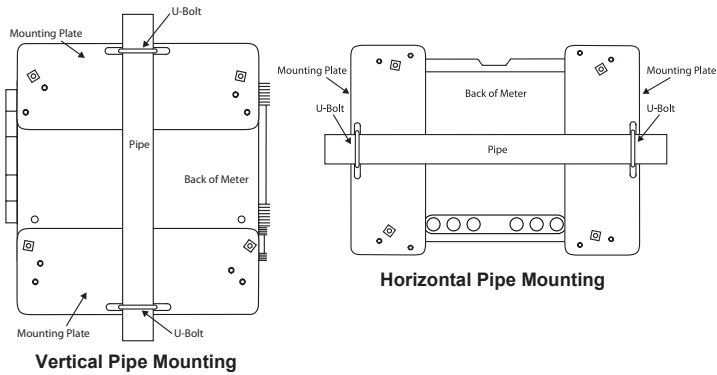
Wall Mounting

The meter can be mounted to any wall using the four provided mounting holes. Note that the bottom mounting holes are located behind the front door panel. *See manual for instructions.*
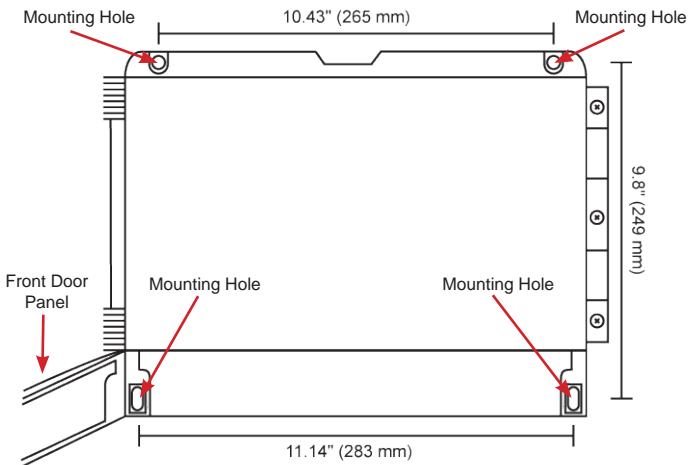
DIMENSIONS

Front View ▲

Side View ▶

SPECIFICATIONS

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

General

Display: Two lines with 1.8" (46 mm) high digits, red LEDs; 6 digits per line (-99999 to 999999), with lead zero blanking

Display Intensity: Eight user-selectable intensity levels

Display Update Rate: 5/second (200 ms)

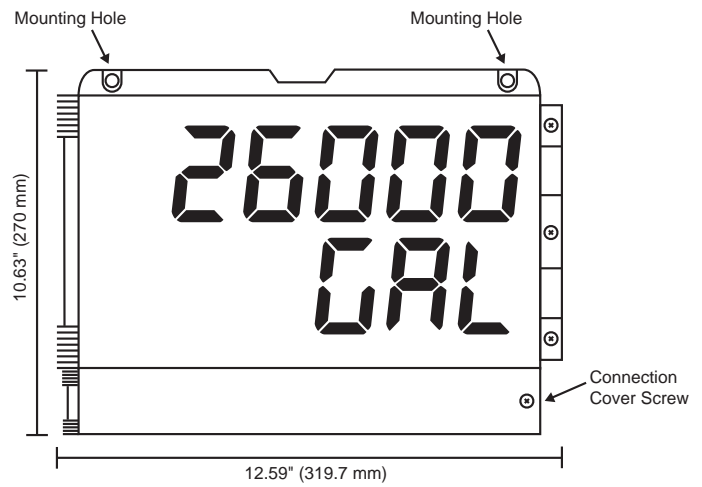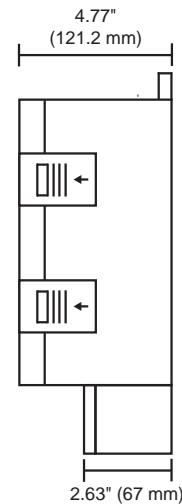**Overrange:** Display flashes 999999

Underrange: Display flashes -99999

Display Assignment: Displays lines 1 & 2 may be assigned to process values for Channels A (Ch-A, current), V (Ch-V, voltage), or P (Ch-P, apparent power); toggle between (Ch-A & Ch-V, Ch-A & Ch-P, Ch-V & Ch-P, and Ch-A, Ch-V, & Ch-P); relay set points; max and/or min values for CH-A, Ch-V, or Ch-P; CH-A and units; Ch-V and units; Ch-P and units; or Modbus input. The lower display may also be set to show engineering units or be off, with no display.

Noise filter: Programmable from 2 to 199 (0 will disable filter)

Filter Bypass: Programmable from 0.1 to 99.9% of calibrated span

Recalibration: All ranges are calibrated at the factory. Recalibration is recommended at least every 12 months.

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

Password: Three programmable passwords restrict modification of programmed settings.

  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

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. 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.

Normal Mode Rejection: Greater than 60 dB at 50/60 Hz

Isolation: 500 V AC/DC potential allowed between voltage and current input channels. Channels isolated by 3 MΩ impedance
4 kV input/output-to-power line 500 V input-to-output or output-to-P+ supply.

Overvoltage Category: Installation Overvoltage Category II: Local level with smaller transient overvoltages than Installation Overvoltage Category III.

Environmental:

Operating temperature range: -40 to 150°F (-40 to 65°C)

Storage temperature range: -40 to 185°F (-40 to 85°C)

Relative humidity: 0 to 90% non-condensing

Connections: Removable and integrated screw terminal blocks accept 12 to 22 AWG wire.

Enclosure: UL Type 4X, IP65 rated. Polycarbonate & glass blended plastic case, color: gray. Includes four PG11 through-hole conduit openings, with two factory installed PG11, IP68, black nylon threaded hole plugs with backing nuts.

Wall Mounting: Four (4) mounting holes provided for mounting meter to wall.

Pipe Mounting: Optional pipe mounting kit (PDA6260) allows for pipe mounting. Sold separately. See manual for mounting instructions.

Tightening Torque: *Removable Screw Terminals:* 5 lb-in (0.56 Nm)
Digital I/O and RS485 Terminals: 2.2 lb-in (0.25 Nm)

Overall Dimensions: 10.63" x 12.59" x 4.77"
(270 mm x 319.7 mm x 121.2 mm) (W x H x D)

Weight: 6.10 lbs (2.76 kg)

UL File Number: UL & C-UL Listed. E160849; 508 Industrial Control Equipment.

Warranty: 3 years parts & labor

USB Connection: Compatibility: USB 2.0 Standard, Compliant
Connector Type: Micro-B receptacle
Cable: USB A Male to Micro-B Cable
Driver: Windows 98/SE, ME, 2000, Server 2003/2008, XP 32/64-Bit, Vista 32/64-Bit, Windows 7 32/64-Bit, Windows 10 32/64-Bit
Power: USB Port

Voltage and Current Inputs

High Voltage Input: One high voltage input (Channel V) 0-300 VDC or VAC; Switch Selectable, Modbus PV (Slave)

High Current Input: One high current input (Channel A) 0-5 AAC or ADC; Switch Selectable, Modbus PV (Slave)

Channels: Channel A, Channel V, Channel P (Math Channel for Apparent Power)

AC/DC Selection: Switch selectable for AC or DC inputs. Channels A and V share AC/DC selection.

Apparent Power Math: Apparent power P calculated as $P = ((A * V) + C) * F$

Programmable Constants: Constant C (Adder): -99.999 to 999.999, default: 0.000. Constant F (Factor): 0.001 to 999.999, default: 1.000.

Accuracy: ADC: 0.03% Full Scale ±1 count,

AAC: 0.1% Full Scale ±1 count,

VDC: 0.05% Full Scale ±1 count,

VAC: 0.15% Full Scale ±1 count, square root & programmable exponent accuracy range: 10-100% of calibrated span

Temperature Drift: 0.005% of calibrated span/°C max from -40 to 65°C ambient

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

Multi-Point Linearization: 2 to 32 points for Channel A and V

Low-Flow Cutoff: 0-999999 (0 disables cutoff function). Independent for Channel A and V.

Decimal Point: Up to five decimal places or none:
d.ddddd, *d.dddd*, *d.ddd*, *d.dd*, *d.d*, or *dddddd*

Calibration Range:

Input Channel	Input Range	Minimum Span Input 1 & Input 2
A	+/- 0-5 ADC 0-5 AAC	+/- 0.005 ADC 0.010 AAC
V	+/- 0-300 ADC 0-300 VAC	+/- 0.1 VDC 0.3 VAC

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

Input Impedance: *Voltage Input:* greater than 3 MΩ.

Current Input: 50 - 100 Ω.

Input Overload: Voltage input protected up to 500 VDC
Current input protected up to 10 A by a 10A/300V fast acting non-resettable fuse. Fuse is NOT resettable after a fault; unit must be factory reconditioned.

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

F4 Digital Input Logic Levels: *Logic High:* 3 to 5 VDC
Logic Low: 0 to 1.25 VDC

Relays

Rating: 2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external; rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP (≈ 50 W) @ 125/250 VAC for inductive loads

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

Deadband: 0-100% of span, user programmable

High or Low Alarm: User may program any alarm for high or low trip point. Unused alarm LEDs and relays may be disabled (turn off).

Relay Operation: Automatic (non-latching) and/or manual reset
Latching (requires manual acknowledge) with/without clear
Pump alternation control (2 to 4 relays)
Sampling (based on time)
Off (disable unused relays and enable Interlock feature)
Manual on/off control mode

Relay Reset: Digital inputs, or PC.

1. Automatic reset only (non-latching), when input passes the reset point.
2. Automatic + manual reset at any time (non-latching).
3. Manual reset only, at any time (latching).

4. Manual reset only after alarm condition has cleared (latching).
Note: Button behind front panel or digital input may be assigned to acknowledge relays programmed for manual reset.

Time Delay: 0 to 999.9 seconds, on & off relay time delays. Programmable and independent for each relay.

Fail-Safe Operation: Programmable and independent for each relay.
Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.

Auto Initialization: When power is applied to the meter, relays will reflect the state of the input to the meter.

Isolated 4-20 mA Transmitter Output

Output Source: Process channel A, V, or P, max or min for channel A, V, or highest or lowest max or min of A and V, 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: 4.000 to 20.000 = 4-20 mA output

Analog Output Programming: 23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break

Accuracy: ± 0.1% of span ± 0.004 mA

Temperature Drift: 0.4 µA/°C max from 0 to 65°C ambient, 0.8 µA/°C max from -40 to 0°C ambient
Note: Analog output drift is separate from input drift.

Isolated Transmitter Power Supply: Terminals I+ & R: 24 VDC ± 10%. Isolated from the input at >500 V. May be used to power the 4-20 mA output or other devices. All models rated @ 40 mA max.

External Loop Power Supply: 35 VDC maximum

Output Loop Resistance:

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

Digital Input & Output Terminal

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 to power external devices.

Dual-Line 1.8 Inch Digits!

▲ Actual Size Digit

RS485 Serial Communications Terminal

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)

Modbus® RTU Serial Communications

Meter Address/Slave ID: 1 - 247
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 seconds
Turn Around Delay: Less than 2 ms (fixed)
Note: Refer to the Helios Register Tables located at www.predig.com for details.

ORDERING INFORMATION

PD2-6400 • Standard Models		
85-265 VAC Model	**12-24 VDC Model**	**Options Installed**
PD2-6400-6H0	PD2-6400-7H0	No Options
PD2-6400-6H7	PD2-6400-7H7	4 Relays & 4-20 mA Output
Note: 24 V Transmitter power supply standard on all models.		

Accessories	
Model	**Description**
PDA6260	Pipe Mounting Kit
PDA7485-I	RS-232 to RS-422/485 Isolated Converter
PDA7485-N	RS-232 to RS-422/485 Non-Isolated Converter
PDA8485-I	USB to RS-422/485 Isolated Converter
PDA8485-N	USB to RS-422/485 Non-Isolated Converter
PDAPLUG2	Plastic Conduit Plug
PDX6901	Suppressor (snubber): 0.01 µF/470 Ω, 250 VAC

Your Local Distributor is:

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

www.predig.com