

PD6001 PROVu Analog Input Feet & Inches Meter

Instruction Manual



PROVu
SERIES



MeterView Pro
USB Configure

- 1/8 DIN Digital Panel Meter with Type 4X, NEMA 4X, IP65 Front
- 0-20 mA, 4-20 mA, 0-5 V, 1-5 V, and ± 10 V Field Selectable Inputs with $\pm 0.03\%$ Accuracy
- Feet & Inches Display Ideal for Level Applications
- Top Display: Six 12-Segment Alphanumeric Characters, 0.6" (15 mm), Ft & In Designations
- Bottom Display: Six 12-Segment Alphanumeric Characters, 0.46" (12 mm)
- Isolated 24 VDC @ 200 mA Transmitter Power Supply
- Easy Field Scaling in Engineering Units without Applying an Input
- 2 or 4 Relays with Interlocking Capability + Isolated 4-20 mA Output Options
- Free PC-Based MeterView Pro USB Programming Software (Available for Download)
- No Assembly Required
- Optional SunBright Display Models for Outdoor Applications
- Operating Temperature Range: -40 to 65°C (-40 to 149°F)
- UL & C-UL Listed. E160849; UL 61010 Programmable Controllers
- Input Power Options: 85-264 VAC (nominal 100-240 VAC), 50/60 Hz, 30 VA max (-6 models) or 12-24 VDC $\pm 10\%$, 15 VA max (-7 models)
- Display Input in Two Different Scales Simultaneously - Great for Level Applications
- Multi-Pump Alternation Control
- Round Horizontal Tank Function; Just Enter Diameter & Length
- 32-Point Linearization
- Programmable Display, Function Keys & Digital Input
- External 4-Relay & Digital I/O Expansion Modules
- RS-232 & RS-485 Serial Communication Options with Modbus RTU
- Password Protection
- Wide Assortment of NEMA 4X Enclosures for up to Ten Meters
- Light / Horn & Reset Button Accessory
- Control Station Accessory for Remote Operation
- Stainless Steel Sun Hood Accessory Available
- 3-Year Warranty

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CAUTION

- Read complete instructions prior to installation and operation of the meter.

WARNINGS

- Risk of electric shock or personal injury.
- 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.

WARNING

Cancer and Reproductive Harm - www.P65Warnings.ca.gov

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. See Warranty Information and Terms & Conditions on www.predig.com for complete details.

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FREE MeterView Pro Programming Software



The meter can be powered from the USB connection.

The easiest and quickest way to program your ProVu meter is to use the FREE MeterView Pro programming software available to download to your PC from www.predig.com. The meter can be connected to your PC with a USB-C cable. It is not necessary to apply an input signal or AC/DC power.

MeterView Pro programming software is intuitive, and most customers can get their meter programmed as they like without even looking in the manual.

In addition to programming, the software may be used for:

- Monitoring
- Datalogging using your PC
- Generating and saving programming files for later use

Once your meter is programmed the way you want it, you can wire it up for your application per the instructions in this manual and install it. If you find that you need to make adjustments to the programming after the meter is installed, you can use the front panel buttons and the instructions in this manual to do so.

12-Segment Alphanumeric Characters Display

The ProVu has six 12-segment alphanumeric characters on both the top and bottom displays. Notice how much better letters like "N" and "K" appear as 12-segment characters vs. 7-segment characters found on other meters.



7-Segment



12-Segment

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Introduction

The ProVu PD6001 is a versatile, easy-to-use digital process meter featuring a bright, highly visible main display with convenient feet and inches designations. Both the top and bottom displays provide six 12-segment alphanumeric characters.

It is ideal for level applications requiring an easy-to-understand display, as it shows feet, inches, and fractions of an inch. Its superluminous LED digits make it easily readable in smoke, dust, fog, and, with the optional SunBright® display, even direct sunlight.

The PD6001 accepts current and voltage signals (e.g. 4-20 mA, 0-10 V). Three of the front panel buttons can be custom-programmed for a specific operation. The analog input can be scaled to display the process in two different scales. The main display can indicate level in feet and inches with printed feet and inches designations, and the second display could be used to indicate some other scale, such as the volume in gallons or liters.

The basic model includes an isolated 24 VDC transmitter power supply that can be used to power the input transmitter or other devices. An additional isolated 24 VDC power supply is included with the 4-20 mA output option. A digital input is standard.

A fully loaded PD6001 meter has the following: four SPDT relays, 4-20 mA output, and two 24 VDC power supplies. The PD6001 capabilities may be enhanced by adding the following external expansion modules: four SPST relays (creating an eight-relay process meter), two digital I/O modules with four inputs and four outputs each, and USB, RS-232 or RS-485 communication adapters.

The eight relays can be used for alarm indication or process control applications such as pump alternation control. The 4-20 mA isolated output, Modbus RTU serial communications, and digital I/O options make the PD6001 an excellent addition to any level monitoring or control system.

Ordering Information

Standard Models

85-265 VAC Model	12-24 VDC Model	Options Installed
PD6001-6R0	PD6001-7R0	No Options
PD6001-6R2	PD6001-7R2	2 Relays
PD6001-6R3	PD6001-7R3	4-20 mA Output
PD6001-6R4	PD6001-7R4	4 Relays
PD6001-6R5	PD6001-7R5	2 Relays & 4-20 mA Output
PD6001-6R7	PD6001-7R7	4 Relays & 4-20 mA Output

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

SunBright Display Models

85-265 VAC Model	12-24 VDC Model	Options Installed
PD6001-6H0	PD6001-7H0	No Options
PD6001-6H2	PD6001-7H2	2 Relays
PD6001-6H3	PD6001-7H3	4-20 mA Output
PD6001-6H4	PD6001-7H4	4 Relays
PD6001-6H5	PD6001-7H5	2 Relays & 4-20 mA Output
PD6001-6H7	PD6001-7H7	4 Relays & 4-20 mA Output

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

Accessories

Model	Description
PDA1004	ProVu 4 Relays Expansion Module
PDA1024-01	24 VDC Power Supply for DIN Rail ¹
PDA1044	ProVu 4 Digital Inputs & 4 Digital Outputs Expansion Module
PDA1232	RS-232 Serial Adapter
PDA1485	RS-485 Serial Adapter
PDA7485-I	RS-232 to RS-485 Isolated Converter
PDA8232-N	USB to RS-232 Non-Isolated Converter
PDA8485-I	USB to RS-485 Isolated Converter
MOD-LH	Light/Horn Enclosure Modification ²
PDA-BUTTON1R	NEMA 4X Red Pushbutton
PDA-LH	Light/Horn ³
PDA2360	Plastic Control Stations Series
PD659	Signal Isolators, Splitters, & Conditioners
PD9501	Multi-Function Calibrator
PD9502	Low-Cost Signal Generator
PDX6901	Snubber: 0.01 μ F/470 Ω , 250 VAC
PDA18DINSH	Stainless Steel Sun Hood for 1/8 DIN Panel Meter

1. The PDA1024-01 power supply requires a clearance of 5 mm on the left and right sides, 40 mm above, and 20 mm below for heat dissipation.
2. The enclosure comes pre-drilled with holes for Light/Horn and Button to be installed by user. Meter / controller and enclosure are sold separately. The Light/Horn hole is located on the top in the back left corner of the enclosure and the button hole is centered on the front of the enclosure about an inch off the bottom of the door. For mounting in different locations, order items separately and drill holes and mount as desired.
3. For light color options see the MOD-LH Series manual (LIMMODLH).

Enclosures

Series	Meters	Material
PDA2300	1-10	Plastic NEMA 4X
PDA2600	1-6	Stainless Steel NEMA 4X
PDA2700	1-6	Painted Steel NEMA 4
PDA2800	1-2	Plastic NEMA 4X
PDA3400	1-3	Plastic NEMA 4X

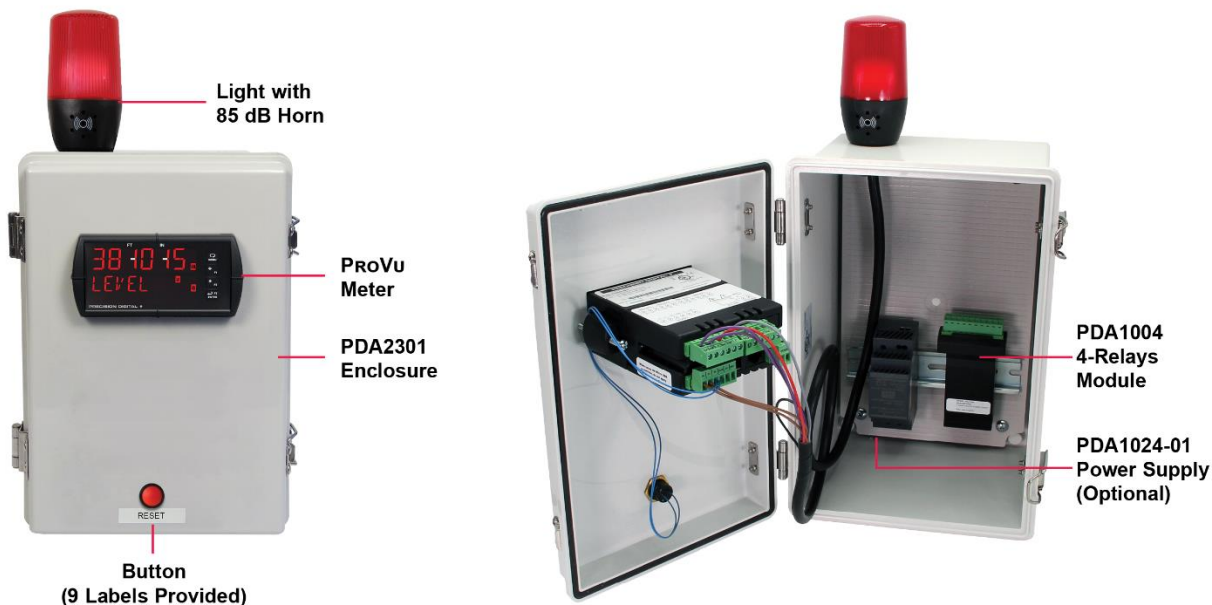
Need help selecting the right enclosure?
Go to www.prediq.com/esu

ProVu Option Cards

Model	Options Installed
PD1102	ProVu 2 Relays Option Card
PD1103	ProVu 4-20 mA Output Option Card ¹
PD1104	ProVu 4 Relays Option Card
PD1105	ProVu 2 Relays + 4-20 mA Output Option Card ¹
PD1107	ProVu 4 Relays + 4-20 mA Output Option Card ¹

1. Output calibration required by user.
2. These upgrade cards are intended for customers who already have a meter and want to upgrade its functionality. Customers with new application should purchase the meter with the option card already installed; see Ordering Information.

Light / Horn Accessories



ProVu Meter Shown in a PDA2301 Enclosure with MOD-LHRB1 Red Light / Horn and Button. Meter & Enclosure Sold Separately. Assembly Required.

MOD-LH



Model	Description
MOD-LHRB1	Red Light / Horn and Button with Holes Drilled in Enclosure ⁽¹⁾
MOD-LHGB1	Green Light / Horn and Button with Holes Drilled in Enclosure ⁽¹⁾
MOD-LHYB1	Yellow Light / Horn and Button with Holes Drilled in Enclosure ⁽¹⁾
MOD-LHBB1	Blue Light / Horn and Button with Holes Drilled in Enclosure ⁽¹⁾
MOD-LHWB1	White Light / Horn and Button with Holes Drilled in Enclosure ⁽¹⁾
MOD-LH5CB1	Light / Horn with User Choice of Red, Green, Yellow, Blue or White Light, Button, and Holes Drilled in Enclosure ⁽¹⁾

PDA-LH & PDA-BUTTON



Model	Description
PDA-LHR	Red Light / Horn
PDA-LHG	Green Light / Horn
PDA-LHY	Yellow Light / Horn
PDA-LHB	Blue Light / Horn
PDA-LHW	White Light / Horn
PDA-LHW	White Light / Horn
PDA-LH5C	Light / Horn with User Choice of Red, Green, Yellow, Blue or White Light
PDA-BUTTON1R	Red Button
PDA-BUTTON1G	Green Button
PDA-BUTTON1B	Blue Button

Note:

1. This MOD supplies the Light / Horn and Button. The enclosure comes pre-drilled with holes for Light / Horn and Button and the user performs the installation and wiring. Meter and enclosure are sold separately. The Light / Horn hole is in the back left corner of the enclosure and the Button is centered on the cover of the enclosure below the meter about an inch off the bottom of the cover except on the PDA3400 series where it is mounted on the side of the enclosure.

PDA2360 Control Stations

Model	Description
PDA2360-E	Emergency button
PDA2361-A	Ack button
PDA2361-B	Blank button
PDA2361-R	Reset button
PDA2361-T	Tare button
PDA2361-S	Stop button
PDA2361-Q	Silence button
PDA2362-AR	Ack and Reset buttons
PDA2362-BB	Two blank buttons
PDA2364-MRUE	Menu, right, up, enter buttons

Note: Control stations with one button may be connected directly to the meter via the F4 terminal. A PDA1044 (4) digital inputs & (4) digital outputs module is required to operate the control stations of more than one button. See *Remote Operation of Meter* on page 22 for details.

PDA18DINSH Sun Hood for 1/8 DIN Panel Meters

Model	Description
PDA18DINSH	Stainless Steel Sun Hood for 1/8 DIN Panel Meter

Signal Splitter & Conditioner Accessories

Model	Description
PD659-1MA-1MA	Signal Isolator with One 4-20 mA Input and One 4-20 mA Output
PD659-1MA-2MA	Signal Splitter with One 4-20 mA Input and Two 4-20 mA Outputs
PD659-1V-1MA	Signal Conditioner with One 0-10 VDC Input and One 4-20 mA Output
PD659-1MA-1V	Signal Conditioner with One 4-20 mA Input and One 0-10 VDC Output

PDA6420 Split Core AC Current Transducer

Model	Description
PDA6420	Input: 30/60/120 AAC; Output: 4-20 mA

Note: The PDA6420 may be useful for customers that want to convert their AC Current reading to a 4-20 mA signal and display it on a meter that accepts a 4-20 mA input.

Useful Tools**PD9501 Multi-Function Calibrator**

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

PD9502 Low-Cost Signal Generator

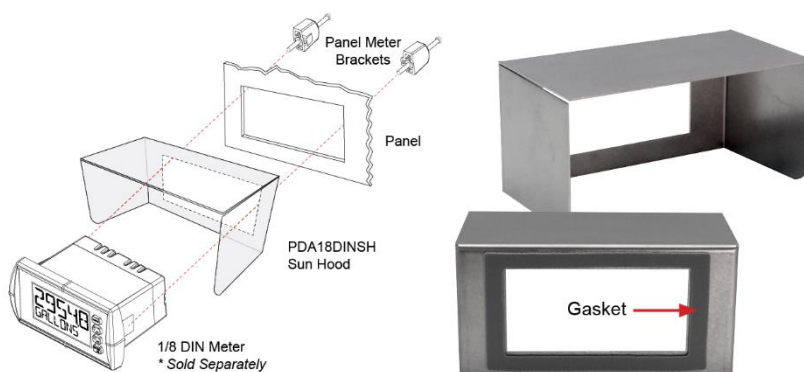
The [PD9502](#) is a low-cost, compact, simple to use 4-20 mA or 0-10 VDC signal generator. It can easily be set for 0-20 mA, 4-20 mA, 0-10 V or 2-10 V ranges. Signal adjustment is made with a one-turn knob. A 15-27 VDC wall plug is provided with the instrument. Optional USB power bank is available.

No More Sun Glare On Your Panel Meter Display!

NEW PDA18DINSH Sun Hood

The PDA18DINSH Sun Hood improves the readability of 1/8 DIN digital panel meters when they are mounted in direct sunlight by shading the instrument from the sun.

The Sun Hood is made from 18 gauge 316 stainless steel and mounts between the 1/8 DIN digital panel meter and the panel. In addition, a gasket is provided that installs between the Sun Hood and the panel to provide a NEMA 4X seal to the panel. The whole assembly is held in place by the panel meter's mounting brackets.



- Provides Shade for 1/8 DIN Digital Panel Meters
- Made from 18 Gauge 316 Stainless Steel
- Easy Mounting Requires no Drilled Holes in the Panel
- Includes Gasket to Maintain NEMA 4X Seal

SPECIFICATIONS

Model	PDA18DINSH
Material	18 gauge 316 stainless steel
Overall Dimensions	2.99" x 5.68" x 2.99" (H x W x D)
Weight	0.9 lb (0.4 kg)
Gasket Material	Silicone Foam
Approvals	UL & C-UL Listed

Specifications

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

General

Display	Dual-line red LED Both lines: 6 digits, 12-segment alphanumeric characters Line 1: 0.6" (15 mm), feet and inches designation Line 2: 0.46" (12 mm) 6 digits each (-99999 to 999999), with lead zero blanking.
Feet & Inches Range	-9 ^{FT} 11 ^{IN} (15/16 or 7/8) to 99 ^{FT} 11 ^{IN} (15/16 or 7/8)
Display Intensity	Eight user selectable intensity levels. Default value is six.
Display Update Rate	5/second (200 ms)
LED Status Indicators	See <i>Front Panel Buttons and Status LED Indicators</i> on page 23 for details.
Overrange	Display flashes 999999
Underrange	Display flashes -999999
Display Assignment	Line 1: PV1, max/min, max & min, set points, or Modbus input. Line 2: Same as Line 1; plus units, tag, PV2, percent of PV1, PV1 level in feet & unit/tag, or turned off.
Programming Methods	Four front panel buttons, digital inputs, PC and MeterView Pro software, or Modbus registers.
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.
Rounding	Select 1, 2, 5, 10, 20, 50, or 100 (e.g. rounding = 10, actual value = 12.093, secondary display = 12.090, main display = 12 ^{FT} 1 ^{IN} 1/16).
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.
Input Power Options	85-264 VAC (nominal 100-240 VAC), 50/60 Hz, 30 VA max (-6 models) or 12-24 VDC +/-10%, 15 VA max (-7 models). Powered over USB for configuration only.

Non-Volatile Memory	All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.
Fuse	Required external UL Listed fuse: 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	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	Maximum Ambient: -40°C to +65°C (-40°F to +149°F) Relative Humidity: Non-condensing 0% to 90% Class: II (Double insulated) Pollution Degree: 2 Overvoltage Cat: II Altitude: up to 2000 meters
Connections	Removable screw terminal blocks accept 12 to 22 AWG wire, RJ45 for external relays, digital I/O, and serial communication adapters.
Enclosure	1/8 DIN, high impact plastic, UL 94V-0, color: black
Front Panel	Type 4X, NEMA 4X, IP65
Mounting	1/8 DIN panel cutout required: 3.622" x 1.772" (92 mm x 45 mm) Two panel mounting bracket assemblies are provided.
Tightening Torque	Screw terminal connectors: 4.3 lb-in (0.49 Nm)
Overall Dimensions	4.68" x 2.45" x 5.64" (119 mm x 62 mm x 143 mm) (W x H x D)
Weight	9.5 oz (269 g)
Warranty	3 years parts & labor. See Warranty Information and Terms & Conditions on www.predig.com for complete details.

Process Input

Inputs	Field selectable: 0-20, 4-20 mA ±10 V (0-5, 1-5, 0-10 V) Modbus PV (Slave)	
Isolated Transmitter Power Supply	Terminals P+ & P-: 24 VDC ±10%. All models selectable for 24, 10, or 5 VDC supply (internal jumper J4). 100-240 VAC models rated @ 200 mA max, 12-24 VDC powered models rated @ 100 mA max. 5 & 10 VDC supply rated @ 50 mA max. Refer to <i>Transmitter Supply Voltage Selection (P+, P-)</i> on page 19. When the Light / Horn is powered by the transmitter power supply, see MOD-LH Light / Horn's transmitter power supply specification in MOD-LH manual for additional details. Light / Horn power not available for 5 or 10 VDC supplies.	
Accuracy	±0.03% of calibrated span ±1 count	
Temperature Drift	0.005% of calibrated span/°C max from 0 to 65°C ambient, 0.01% of calibrated span/°C max from -40 to 0°C ambient	
Input Signal Conditioning	Linear or round horizontal tank volume calculation	
Multi-Point Linearization	2 to 32 points for PV or PV1 2 to 8 points for PV2 (Dual-scale Level feature)	
Round Horizontal Tank	Diameter & Length: 999.999 inch or cm calculates volume in gallons or liters respectively.	
Low-Height Cutoff	0 ^{FT} 1 ^{IN} (0 ^{/16} or 0 ^{/8}) to 99 ^{FT} 11 ^{IN} (15 ^{/16} or 7 ^{/8}) (0 ^{FT} 0 ^{IN} (0 ^{/16} or 0 ^{/8}) disables cutoff function)	
Decimal Point	Up to five decimal places or none (PV2 only): d.dddd, d.dddd, d.dd, d.dd, d.d, or d	
Calibration Range	Input Range	Minimum Span Input 1 & 2
	4-20 mA	0.15 mA
	±10 V	0.10 V
	An error message will appear if the input 1 and input 2 signals are too close together.	
Input Impedance	Voltage ranges: greater than 500 kΩ Current ranges: 50 - 100 Ω (depending on internal resettable fuse impedance)	
Input Overload	Current input protected by an internal resettable fuse, 30 VDC max. Fuse resets automatically after fault is removed.	
HART Transparency	The meter does not interfere with existing HART communications; it displays the 4-20 mA primary variable and it allows the HART communications to pass through without interruption. The meter is not affected if a HART communicator is connected to the loop. The meter does not display secondary HART variables.	

Relays

Rating	(Optional) Two or four SPDT (Form C) outputs rated 30 VDC, 3A, 250 VAC 50/60 Hz, 3A resistive, 120/250 VAC, N.O only 1/14 HP <i>Note: Per UL 61010 - All relay outputs are non-isolated and considered hazards live.</i>
Noise Suppression	Noise suppression is recommended for each relay contact switching inductive loads. See Error! Not a valid result for table. on page 21 for details.
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 or without clear - Pump alternation control (2-8 relays) - Sampling (based on set point and time) - Off (disable unused relays and enable Interlock feature) - Manual on/off control mode
Relay Reset (Acknowledge)	User selectable via front panel button, F4 terminal at back of meter, external contact closure on digital inputs, or through serial communications.
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. <i>Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.</i>
Auto Initialization	When power is applied to the meter, relays will reflect the state of the input to the meter.
Additional Relays	An external module, model PDA1004 , is available to add 4 SPST 3 A relays to the meter.

Isolated 4-20 mA Transmitter Output

Output Source	Process variable (PV), max, min, set points 1-8, 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 Out Programming	23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break		
Accuracy	$\pm 0.1\%$ of span ± 0.004 mA		
Temperature Drift	0.4 $\mu\text{A}/^\circ\text{C}$ max from 0 to 65°C ambient, 0.8 $\mu\text{A}/^\circ\text{C}$ max from -40 to 0°C ambient <i>Note: Analog output drift is separate from input drift.</i>		
Isolated Transmitter Power Supply	Terminals I+ & R: 24 VDC $\pm 10\%$. 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
Additional 4-20 mA Outputs	35 VDC (external)	100 Ω	1200 Ω
	The PD659-1MA-2MA can split the optional 4-20 mA output into two isolated 4-20 mA outputs		
0-10 VDC Output	The PD659-1MA-1V can convert the optional 4-20 mA output to a 0-10 VDC output		

USB Connection

Function	Programming only
Connector Type	USB-C
Power	USB port provides power to the meter. To be used during programming only.

On-Board Digital Input (F4)

Function	Remote operation of front-panel buttons, acknowledge/reset relays, reset max/min values. See <i>Function Keys & Digital I/O Available Settings</i> on page 46 for a complete list of capabilities.
Contacts	3.3 VDC on contact. Connect normally open contacts across F4 to COM
Logic Levels	Logic High: 3 to 5 VDC Logic Low: 0 to 1.25 VDC
Additional I/O	Up to 2 external modules, model PDA1044 with 4 digital inputs and 4 digital outputs each can be added.

Modbus® RTU Serial Communications

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)
<i>Note: Refer to the ProVu Modbus Register Tables located at www.predig.com for details.</i>	

MeterView Pro Software

Availability	Download software to a PC from www.predig.com/software
System Requirements	Microsoft® Windows® 10/11
Communications	USB 2.0 (for programming only) USB-C RS-232 adapter, RS-485 adapter and RS-485 to USB converter (programming, monitoring, and data logging)
Configuration	Configure meters one at a time
Power	USB port provides power to the meter. To be used during programming only.

PDA1044 Digital Input & Output Expansion Module

Power	7.5 VDC, 0.6 W (Limited Energy supplied from the meter) with an expansion module port: 5 VDC, 0.01 A
Channels	Four digital inputs & four digital outputs per module
Mounting Method	35 mm "top hat" DIN rail
Digital Input Logic High	3 to 5 VDC
Digital Input Logic Low	0 to 1.25 VDC
Digital Output Logic High	5 VDC
Digital Output Logic Low	0 to 0.4 VDC
Source Current	15 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.

Approvals	UL & C-UL Listed. E160849; UL 508 Industrial Control Equipment
------------------	--

PDA1004 4 Relays Expansion Module

Power	7.5 VDC, 0.9 W (Limited Energy supplied from the meter) with an expansion module port: 5 VDC, 0.11 A
Relays	Four; Form A (SPST); Rated 3 A @ 30 VDC and 125/250 VAC for resistive loads. 1/14 HP @ 125/250 VAC for inductive loads, CAT II.
Mounting Method	35 mm "top hat" DIN rail
Approvals	UL & C-UL Listed. E160849; UL 508 Industrial Control Equipment

WARNING

- Per UL 61010, all relay outputs are non-isolated and considered hazardous live at all time.

MOD-LH Light/Horn

Light Colors	MOD-LHRB1: Red MOD-LHGB1: Green MOD-LHYB1: Yellow MOD-LHBB1: Blue MOD-LHWB1: White MOD-LH5CB1: User selectable: red, green, yellow, blue, white MOD-LH3CB1-RYG: 1 layer each of red, yellow, green (consult factory for other colors available)
Light Action	Can be wired to flash (not available on MOD-LH5CB1) or stay steady on
Light/Horn & Button Installation	When MOD-LH is ordered with an enclosure, the user performs installation and wiring of Light/Horn and Button in pre-drilled holes.
Horn	85 dB
Rating	IP 65
Light/Horn Independence	Light and horn can be controlled via separate relays
Power Requirement	No additional power required when wired to a ProVu meter. When mounted remote: 24 VDC
Transmitter Power Supply	The ProVu's internal transmitter power supply is capable of supplying 200 mA to power the transmitter and other devices such as the Light/Horn. The following table illustrates how much of this power is required to drive various Light/Horns. If more power is needed, then consider the PDA1024-01.

MOD-LH and MOD-LH5CB1 Models:

Color	Power Required	Color	Power Required
Red	17 mA	Blue	15 mA
Green	15 mA	White	42 mA
Yellow	23 mA	Horn	20 mA

Example: 17 mA (Red Light) + 20 mA (Horn) = 37 mA total current needed from the 200 mA supply. Available current = 163 mA

MOD-LH3LCB1-RYG:

Power Requirement for the horn and each color that is turned on:

Color	Power Required	Color	Power Required
Red	34 mA	Yellow	33 mA
Green	29 mA	Horn	38 mA

Example: 33 mA (Yellow Light) + 38 mA (Horn) = 71 mA total current needed from the 200 mA supply. Available current = 139 mA

Reset / Silence Button	NEMA 4X; may be wired to F4 terminal on ProVu. F3 front panel button can also be used to reset relays.
Button Labels	The Light/Horn accessory comes with 9 pre-printed message labels the user can affix under the red button: RESET, BATCH, ACK, TARE, SILENCE, STOP, START, PAUSE, START/STOP
Light/Horn Mounting Connection	M22
Hole Sizes	Light/Horn: 0.875" (22 mm) Button: 0.630" (16 mm)
Cable Length:	3.28 feet (1 meter)
Operating Temperature Range	-5 to 40°C (23 to 104°F)

Pronto

Assembly Services for Precision Digital Meters and Accessories



The PDEA-PVA Pronto Process Value Alarm Enclosure Assemblies from Precision Digital are pre-configured systems for applications like tank fill areas and gas detection stations, with custom build options also available. They accept multiple process signals, display readings in various units, and provide relay and retransmission outputs, with pre-wired alarm indicators including light and horn towers and annunciator panel meters with a silence function.

- UL 508A Enclosed Industrial Control Panels or UL 698A Enclosed Industrial Control Panels Relating to Hazardous Locations
- Supplied with Electrical & Mechanical Drawings
- Shipped Fully Installed and Pre-Wired
- Supplied with 5 Amp Circuit Breaker on Power Input

PDEA-PVA
SERIES

CUSTOM
ASSEMBLIES

Compliance Information

Safety

UL & C-UL Listed	USA & Canada UL 61010 Programmable Controllers
UL File Number	E160849
Front Panel	UL Type 4X, NEMA 4X, IP65; panel gasket provided
Low Voltage Directive	EN 61010-1 Safety requirements for measurement, control, and laboratory use

Electromagnetic Compatibility

Emissions	EN 55022 Class A ITE emissions requirements
Radiated Emissions	Class A
AC Mains Conducted Emissions	Class A
Immunity	EN 61326-1 Measurement, control, and laboratory equipment EN 61000-6-2 EMC heavy industrial generic immunity standard
RFI - Amplitude Modulated	80 - 1000 MHz 10 V/m 80% AM (1 kHz) 1.4 - 2.0 GHz 3 V/m 80% AM (1 kHz) 2.0 - 2.7 GHz 1 V/m 80% AM (1 kHz)
Electrical Fast Transients	±2kV AC mains, ±1kV other
Electrostatic Discharge	±4kV contact, ±8kV air
RFI - Conducted	10V, 0.15-80 MHz, 1kHz 80% AM
AC Surge	±2kV Common, ±1kV Differential
Surge	1KV (CM)
Power-Frequency Magnetic Field	30 A/m 70%V for 0.5 period
Voltage Dips	40%V for 5 & 50 periods 70%V for 25 periods
Voltage Interruptions	<5%V for 250 periods

Note:

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

EU Declaration of Conformity

For shipments to the EU and UK, a Declaration of Conformity was printed and included with the product. For reference, a Declaration of Conformity is also available on our website www.predig.com/docs.

Safety Information

⚠ CAUTION

- Read complete instructions prior to installation and operation of the meter.

⚠ WARNINGS

- Risk of electric shock or personal injury.
- Hazardous voltages exist within enclosure. Installation and service should be performed only by trained service personnel.
- If the equipment is used in a manner not specified by Precision Digital, the protection provided by the equipment may be impaired.
- 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 their own risk. Precision Digital Corporation shall not be held liable for damages resulting from such improper use.

Installation

There is no need to remove the meter from its case to complete the installation, wiring, and setup of the meter for most applications. Instructions are provided for changing the transmitter power supply to output 5 or 10 VDC instead of 24 VDC. See *Figure 5. Transmitter Supply Voltage Selection* on page 19.

⚠ IMPORTANT

- A UL Listed supplementary 5 A fuse is required for installation.
- User must supply and install with a labeled and suitably located disconnect device (switch, breaker).

Unpacking

Remove the meter from box. Inspect the packaging and contents for damage. Report damages, if any, to the carrier. If any part is missing or the meter malfunctions, please contact your supplier or the factory for assistance.

Panel Mounting Instructions

- Prepare a standard 1/8 DIN panel cutout - 3.622" x 1.772" (92 mm x 45 mm). Refer to *Figure 1. 1/8 DIN Panel Cutout Dimensions* below for more details.
- Clearance: allow at least 6.0" (152 mm) behind the panel for wiring.
- Panel thickness: 0.04" - 0.25" (1.0 mm - 6.4 mm). Recommended minimum panel thickness to maintain Type 4X rating: 0.06" (1.5 mm) steel panel, 0.16" (4.1 mm) plastic panel.
- Remove the two mounting brackets provided with the meter (back-off the two screws so that there is 1/4" (6.4 mm) or less through the bracket. Slide the bracket toward the front of the case and remove).
- Insert meter into the panel cutout.
- Install mounting brackets and tighten the screws against the panel. To achieve a proper seal, tighten the mounting bracket screws evenly until meter is snug to the panel along its short side. **DO NOT OVER TIGHTEN**, as the rear of the panel may be damaged.

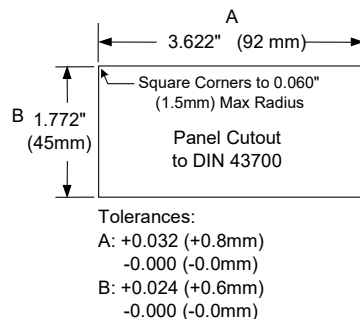


Figure 1. 1/8 DIN Panel Cutout Dimensions

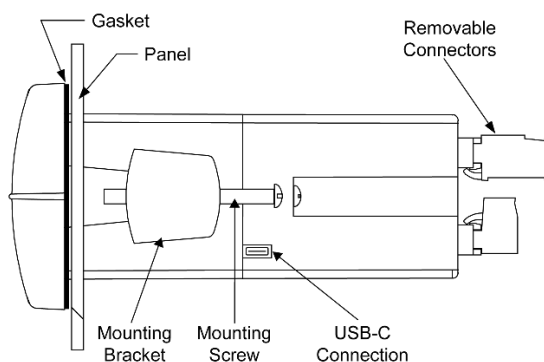


Figure 2. Panel Mounting Details

Mounting Dimensions

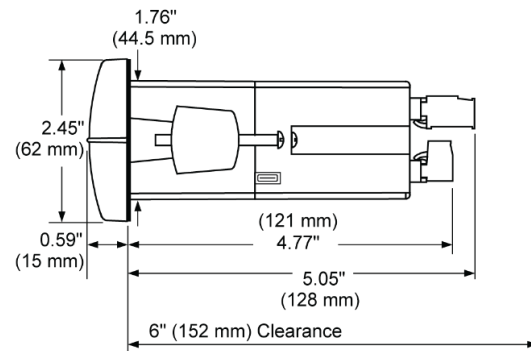


Figure 3. Meter Dimensions - Side View

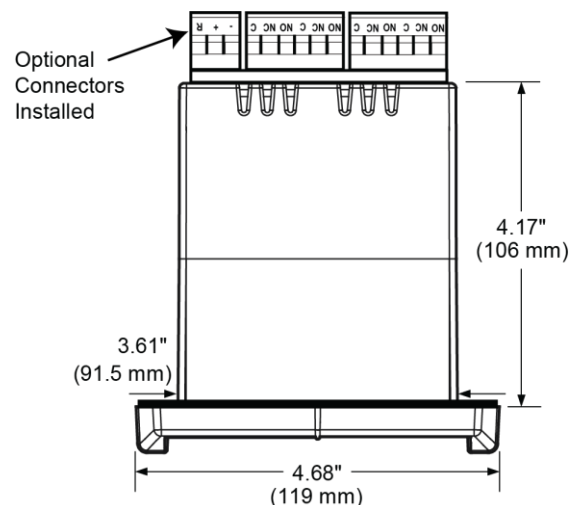


Figure 4. Meter Dimensions - Top View



Download free 3-D CAD files of these instruments to simplify your drawings!

predig.com/documentation

Installation Overview

We recommend the following sequence for getting the meter into service:

1. Connect the meter to the PC with a USB-C cable.
2. If MeterView Pro Software is already installed on your computer, double-click the MeterView Pro Software icon to launch the program.
3. If MeterView Pro Software is not installed, follow the *MeterView Pro Software Installation* instructions.
4. Use MeterView Pro Software to configure the meter for your application.
5. Disconnect the USB-C cable from the meter.
6. Apply power and signal and check operation of the meter.
7. Install the meter and put it into service.
8. Make any programming adjustments using the front panel buttons.

MeterView Pro Software

The easiest and quickest way to program your PROVu meter is to use the FREE MeterView Pro programming software, available to download to your PC from www.predig.com. The meter can be connected to your PC with a USB-C cable.

MeterView Pro programming software is intuitive, and most customers can get their meter programmed as they like without even looking in the manual.

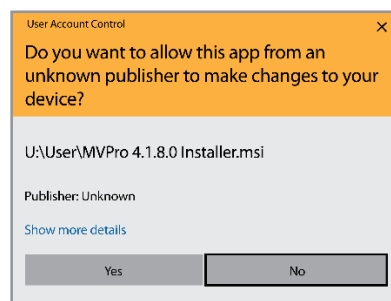
MeterView Pro Software Installation

1. Connect one end of a USB-C cable to the meter and the other end to the computer.

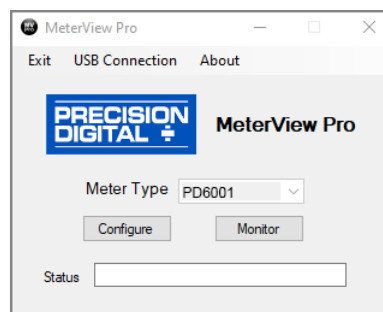
⚠ WARNINGS

- Only one meter may be connected at a time. Attaching multiple meters will cause a conflict with the meter software.

2. Download MeterView Pro Software from www.predig.com. Once the driver is downloaded, right-click to extract all files from the .zip folder.
3. Double-click on the installer to run. The program will open a few windows and install the MeterView Pro Software on your computer.
4. Simply follow the on-screen instructions until you see the "User Account Control" warning window, then click "Yes."



5. Click the "Finish" button to complete the installation.
6. Once MeterView Pro software is installed and launched on your PC, click "Configure" to begin programming your meter.



7. Disconnect the USB-C cable from the meter.
8. Apply power and signal and check operation of the meter.
9. Install the meter and put it into service.
10. Make any programming adjustments using the front panel buttons.

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

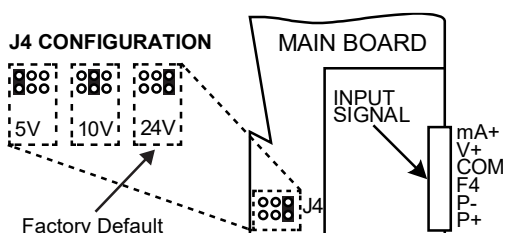


Figure 5. Transmitter Supply Voltage Selection

Connections

All connections are made to removable screw terminal connectors located at the rear of the meter.

CAUTION

- Use copper wire UL rated min. 250V 90°C for all line voltage connections. Observe all safety regulations. Electrical wiring should be performed in accordance with all applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.

Connectors Labeling

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

Note: ## on the following figures refers to power and display options. (Example: PD6001-6H5)

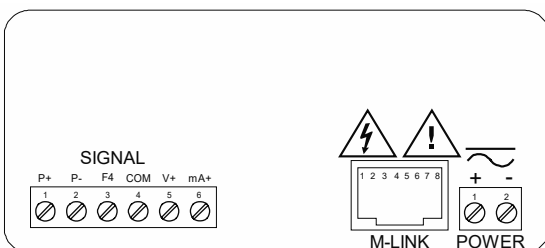


Figure 6. PD6001-##0 Connectors Label

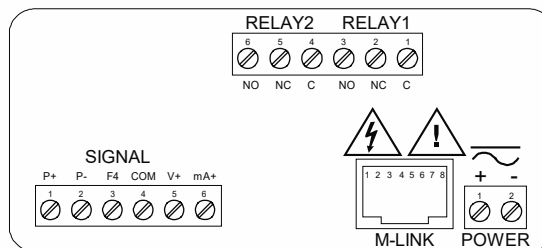


Figure 7. PD6001-##2 Connectors Label

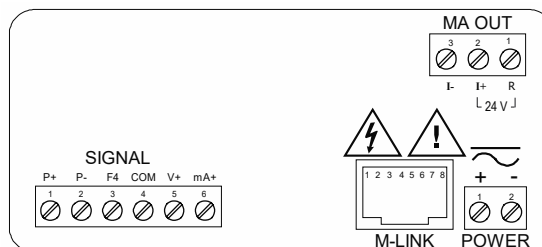


Figure 8. PD6001-##3 Connectors Label

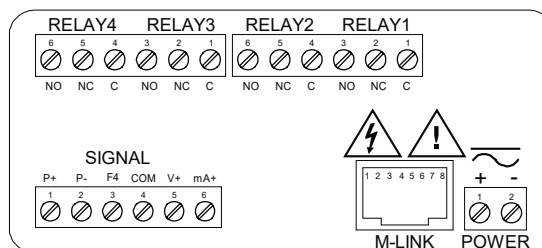


Figure 9. PD6001-##4 Connectors Label

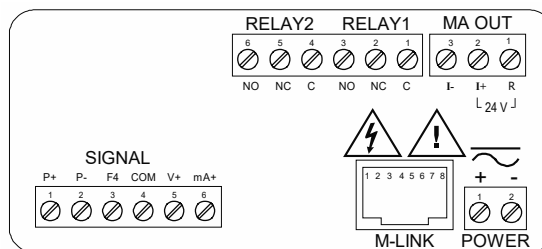


Figure 10. PD6001-##5 Connectors Label

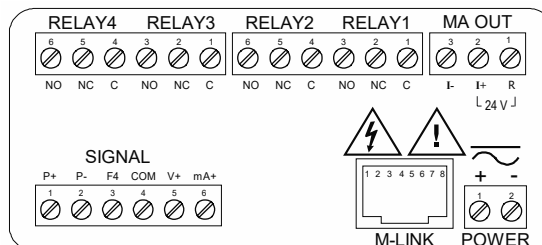


Figure 11. PD6001-##7 Connectors Label

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.

Power Connections

Power connections are made to a two-terminal connector labeled POWER. The meter will operate regardless of DC polarity connection. The + and - symbols are only a suggested wiring convention. There are separate models for low voltage and high voltage power. See *Ordering Information* on page 7 for details.

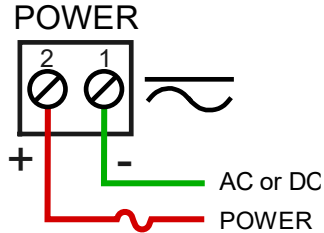


Figure 12. Power Connections

Notes:

1. "AC" Powered meters accept 85-264 VAC (nominal 100-240 VAC) and "DC" powered meters accept 12-24 VDC
2. Required External UL Listed Fuse: 5 A max, Slow Blow.

Signal Connections

Signal connections are made to a six-terminal connector labeled SIGNAL. The COM (common) terminal is the return for the 4-20 mA and the ± 10 V input signals.

Current (mA) Connections

The following figures show examples of current connections. There are no switches or jumpers to set up for current inputs. Setup and programming is performed through the front panel buttons or MeterView Pro software.

IMPORTANT

- Incoming field wiring shall be rated min. 250V, 90°C, copper conductors only.

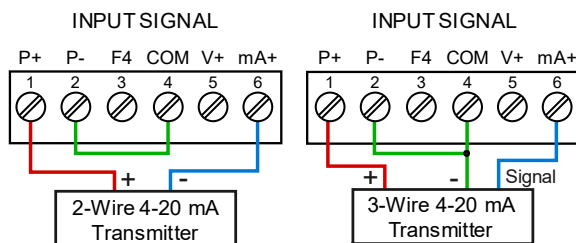


Figure 13. Transmitters Powered by Internal Supply

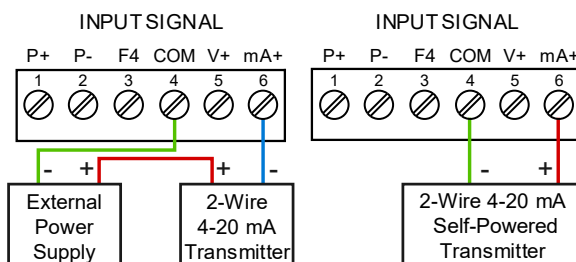


Figure 14. Transmitter Powered by External Supply or Self-Powered

The current input is protected against current overload by an internal resettable fuse. The display may or may not show a fault condition depending on the nature of the overload.

The fuse limits the current to a safe level when it detects a fault condition, and automatically resets itself when the fault condition is removed.

Voltage (V) Connections

The following figures show examples of voltage connections.

There are no switches or jumpers to set up for voltage inputs. Setup and programming is performed through the front panel buttons or MeterView Pro software.

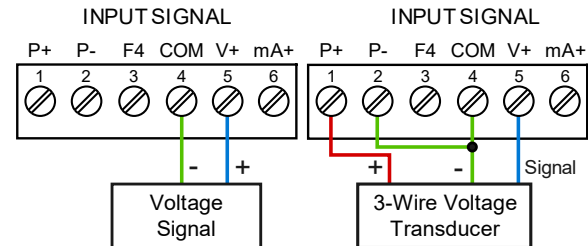


Figure 15. Voltage Input Connections

The meter is capable of accepting any voltage from -10 VDC to +10 VDC.

Modbus RTU Serial Communications

Serial communications connection is made to an RJ45 connector labeled M-LINK. For interfacing to the ProVu, use the PDA1232 for RS-232 or the PDA1485 for RS-485. The same port is used for interfacing with all expansion modules (e.g. external relays, digital I/O).

Relay Connections

Relay connections are made to two six-terminal connectors labeled RELAY1 – RELAY4. 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.

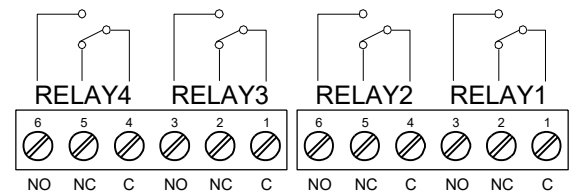


Figure 16. Relay Connections

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:

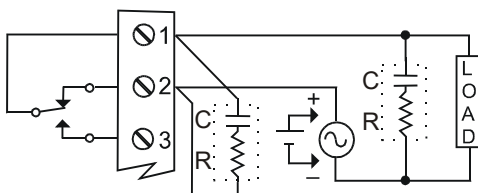


Figure 17. AC and DC Loads Protection

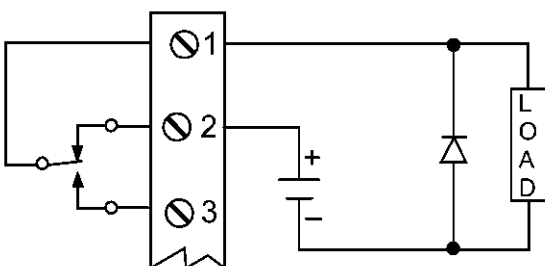
Choose R and C as follows:

R: 0.5 to 1 Ω 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 18. 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 should be connected with a normally open contact across F4 and COM, or with an active low signal applied to F4. It can be used for remote operation of front-panel buttons, to acknowledge/reset relays, or to reset max/min values. See *Function Keys & Digital I/O Available Settings* on page 46 for a complete list of capabilities.

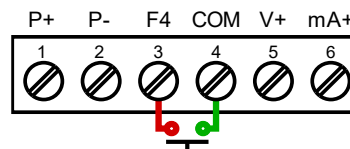


Figure 19. F4 Digital Input Connections

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.

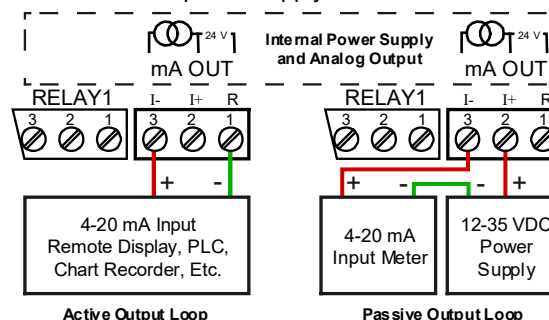


Figure 20. 4-20 mA Output Connections

Analog Output 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.

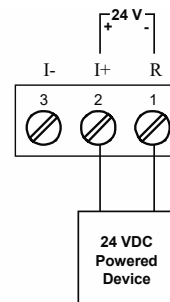


Figure 21. Analog Output Supply Powering Other Devices

External Relays & Digital I/O Connections

The relay and the digital I/O expansion modules [PDA1004](#) & [PDA1044](#) are connected to the meter using a CAT5 cable provided with each module. The two RJ45 connectors on the expansion modules are identical and interchangeable; they are used to connect additional modules to the system.

Note: The jumper located between the RJ45 connectors of the PDA1044 must be removed on the second digital I/O module in order for the system to recognize it as module #2.

WARNING

- **DO NOT** connect or disconnect the expansion modules with the power on! More detailed instructions are provided with each optional expansion module.



Figure 22. PDA1044 Expansion Module

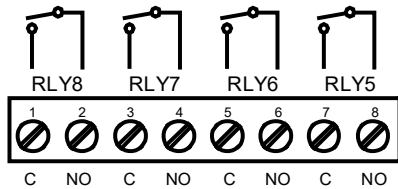


Figure 23. External Relays Module Connections

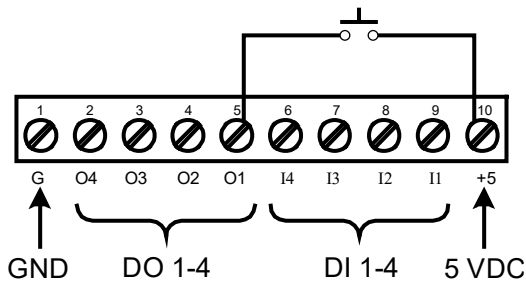


Figure 24. Digital I/O Module Connections

Remote Operation of Meter

The meter can be operated via the front panel push buttons or a remote control station using the PDA1044 Digital I/O module as illustrated in *Figure 25. Meter to Control Station Connection*.



Figure 25. Meter to Control Station Connection

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 activate the interlock relay. This feature is enabled by configuring the relay, and the corresponding digital input(s), see *Setting Up the Interlock Relay (Force On) Feature* on page 38.

In the example below, an Interlock Contact switch is connected to a digital input, which will be used to force on (energize) the Interlock Relay. The Interlock Relay and the Control Relay are connected in series with the load.

- When the Interlock Contact is closed (safe), the Interlock Relay energizes, allowing power to flow to the Control Relay; the corresponding front panel LED is on.
- When the Interlock Contact is open, the corresponding front panel LED flashes (locked out), the Interlock Relay is de-energized, preventing power from flowing to the Control Relay and the load.

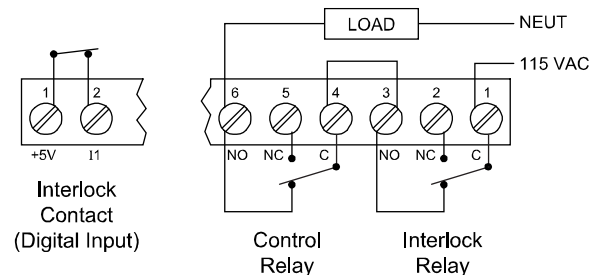


Figure 26. Interlock Connections

Setup and Programming

There is **no need to recalibrate** the meter when first received from the factory.

The meter is **factory calibrated** prior to shipment for milliamps and volts with calibration equipment that is certified to NIST standards.

Overview

There are no jumpers to set for the meter input selection.

Setup and programming is done using MeterView Pro or through the front panel buttons.

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

Front Panel Buttons and Status LED Indicators



Button Symbol	Description
	Menu
	Right arrow/F1
	Up arrow/F2
	Enter/F3

LED	State	Indication
1-8	Steady	Alarm condition based on set and reset points, independent of relay status in certain configurations. (Available on all meter configurations, including those without relays installed)
1-8	Flashing	Relay interlock switch open
1-8 & M	Flashing	Relay in manual control mode
T	Flashing	Meter in Tare mode
M	Flashing	Analog output in manual control mode
$\overline{8}$	Steady	Eighths of an inch
$\overline{16}$	Steady	Sixteenths of an inch

Symbol	Description
FT	Feet value
IN	Inches value
- -	Designation separators

- 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 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.

Display Functions & 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 Functions & Messages		
Display	Parameter	Action/Setting Description
SEtUP	Setup	Enter <i>Setup</i> menu
INPUt	Input	Enter <i>Input</i> selection menu
MA	4-20 mA	Set meter for 4-20 mA input
V oLT	0-10 VDC	Set meter for ± 10 VDC input
d-SCALE	Dual-scale	Press Enter to select dual-scale display for some level applications (Select Yes or No)
UnITS	Units	Select the display units/tags
dEc Pt	Decimal point	Set decimal point
PV 2	PV2	PV2 decimal point (Level)
PRoG	Program	Enter the <i>Program</i> menu
SCALE	Scale	Enter the <i>Scale</i> menu
SCALE 1	Scale 1	Enter the <i>Scale</i> menu for PV1
SCALE 2	Scale 2	Enter the <i>Scale</i> menu for PV2
CAL	Calibrate	Enter the <i>Calibration</i> menu
INP 1	Input 1	Calibrate input 1 signal or program input 1 value
dis 1	Display 1	Program display 1 value
INP 2	Input 2	Calibrate input 2 signal or program input 2 value (up to 32 points)
dis 2	Display 2	Program display 2 value (up to 32 points)
Error	Error	Error, calibration not successful, check signal or programmed value
dSPLAY	Display	Enter the <i>Display</i> menu
Line 1	Display line 1	Press Enter to access Line 1 display format and parameter options (default: PV)
Formt	Format	Format fractional inches to either eighths (1/8) or sixteenths (1/16)
PARAM	Parameter	Press Enter to assign the Main display parameter (default: PV)
dSEt 1*	Display set 1*	Display relay 1 (*through 8) set point
d Hi	Display high	Display high value
d Lo	Display low	Display low value

Display Functions & Messages		
Display	Parameter	Action/Setting Description
d HL	Display hi/low	Alternate between high/low value
M bUS	Display Modbus	Display Modbus input register
d PV	Display PV	Select to display PV
Line 2	Display line 2	Press Enter to assign the Line 2 display parameter (default: engineering units)
d unit	Display unit	Display units on line 2
d PV 2	Display PV2	Select to display PV2 (dual-scale display)
d PCT	Display PCT	Select to display percent of PV1 (dual-scale display)
d L-u	Display Level Units	Select to display PV1 level in decimal units on display line 2
d off	Display off	Turn off display line 2
d-INTY	Display intensity	Set display intensity level from 1 to 8
RELAY	Relay	Enter the <i>Relay</i> menu
RLY 1*	Relay 1*	Relay 1 (*through 8) setup <i>Note: Relays 5-8 are shown only if expansion relay module is installed. Only relays 1-4 are available in the base model.</i>
Act 1	Action 1	Set relay 1 action
Auto	Automatic	Set relay for automatic reset
A-MAN	Auto-manual	Set relay for automatic & manual reset any time
LATCH	Latching	Set relay for latching operation
Lt-CLr	Latching-cleared	Set relay for latching operation with manual reset only after alarm condition has cleared
ALTErn	Alternate	Set relay for pump alternation control
SAMPLE	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
RSr 1	Reset 1	Program reset point 1
FAI LSF	Fail-safe	Enter <i>Fail-safe</i> menu
FLS 1	Fail-safe 1	Set relay 1 fail-safe operation
on	On	Enable fail-safe operation
off	Off	Disable fail-safe operation
FLS 2	Fail-safe 2	Set relays 2-8 fail-safe operation

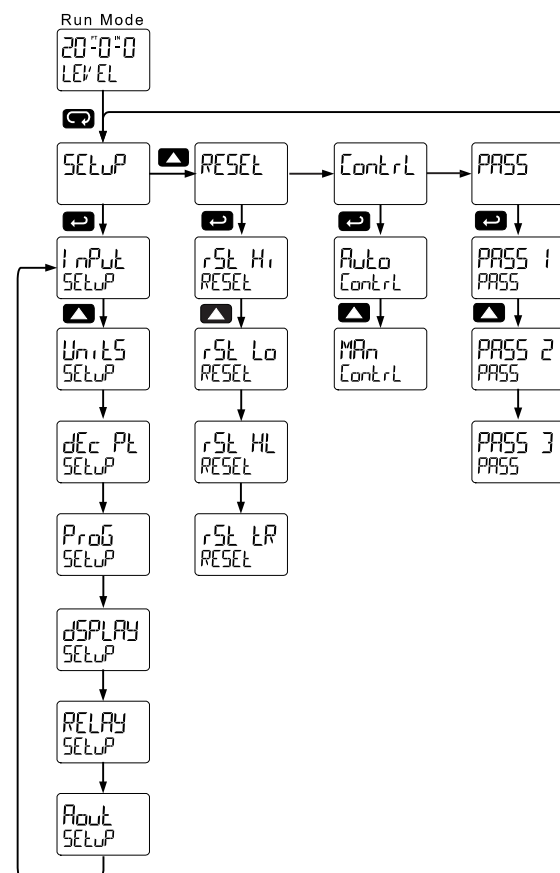
Display Functions & Messages		
Display	Parameter	Action/Setting Description
dELAY	Delay	Enter relay <i>Time Delay</i> menu
dLY 1	Delay 1	Enter relay 1 time delay setup
On 1	On 1	Set relay 1 On time delay
OFF 1	Off 1	Set relay 1 Off time delay
dLY 2	Delay 2	Enter relays 2-8 time delay setup
bREAK	Loop break	Set relay condition if loop break detected
bREAK 1*	Loop break 1*	Set relay 1 (*through 8) condition if loop break detected <i>Note: Relays 5-8 are shown only if expansion relay module is installed. Only relays 1-4 are available in the base model.</i>
Ignore	Ignore	Ignore loop break condition (Processed as a low signal condition)
On	On	Relay goes to alarm condition when loop break is detected
OFF	Off	Relay goes to non-alarm condition when loop break is detected
ROUT	Analog output	Enter the <i>Analog output</i> scaling menu
dis 1	Display 1	Program display 1 value
Out 1	Output 1	Program output 1 value (e.g. 4.000 mA)
dis 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 <i>Reset</i> 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
ContrL	Control	Enter <i>Control</i> menu
Auto	Automatic	Press Enter to set meter for automatic operation
MAN	Manual	Press Enter to manually control relays or analog output operation
PASS	Password	Enter the <i>Password</i> menu
PASS 1	Password 1	Set or enter Password 1
PASS 2	Password 2	Set or enter Password 2
PASS 3	Password 3	Set or enter Password 3

Display Functions & Messages		
Display	Parameter	Action/Setting Description
unLOC	Unlocked	Program password to lock meter
Locd	Locked	Enter password to unlock meter
999999 -999999	Flashing	Over/under range condition

Main Menu

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

- Press Menu button to enter Programming Mode then press the Up arrow button to scroll 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/F3.
- The display moves to the next menu every time a setting is accepted by pressing Enter/F3.



Setting Numeric Values

The numeric values on PV1 (main display) 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. The leading zero in any of the unit designations is omitted. Because of this, if the leading zero of any unit designation is the currently selected unit, none of the digits will be brighter than any other. Pressing the Up arrow will increment the value to 1.

The range of numeric values for each unit designation is from 0-99 for feet, 0-11 for inches and either 0-7 or 0-15 for fractional inches depending on whether the desired display is in eighths ($1/8$) or sixteenths ($1/16$) mode.

Press and hold up arrow to auto-increment the display value.

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

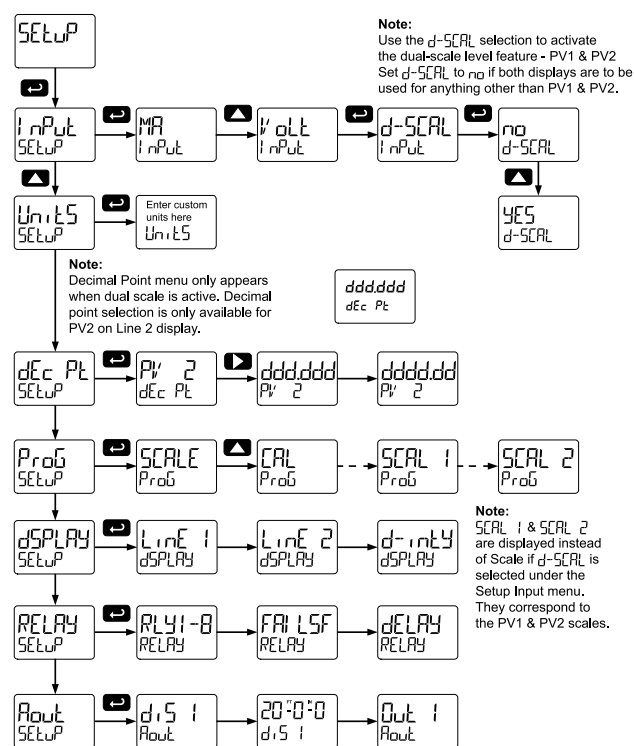


Setting Up the Meter (SETUP)

The Setup menu is used to select:

1. Input signal the meter will accept
2. Dual-scale feature for some level applications
3. Select the display units/tags
4. Decimal point position
5. Programming Menu
6. Display parameter and intensity
7. Relay operation
8. 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.



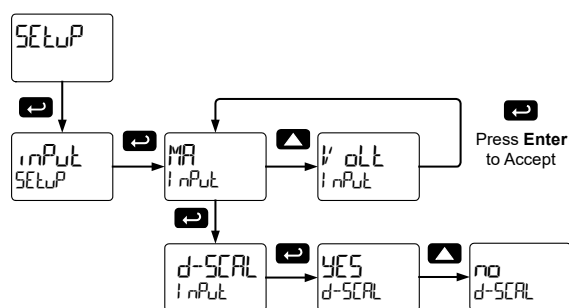
Setting the Input Signal (INPUT)

Enter the *Input* menu to set up the meter to display current (mA) or voltage (VOLT) inputs.

The current input is capable of accepting any signal from 0 to 20 mA. Select current input to accept 0-20 mA or 4-20 mA signals.

The voltage input is capable of accepting any signal from -10 to +10 VDC. Select voltage input to accept 0-5, 1-5, 0-10, or ± 10 VDC signals.

After selecting mA or Volt input, *d-SCAL* is displayed; press Enter to select "Yes" or "No". Selecting "Yes" enables the dual-scale feature, which allows for the Scale (SCALE) and Units (UNITS) menus to be used to scale the same input in two different scales for PV1 & PV2.



Set *d-SCAL* to NO if both displays are to be used for anything other than PV1 & PV2.

Setting the Input Units or Custom Tags (UNITS)

Enter the input unit or custom tag that will be displayed if a unit is selected as the display line 2 parameter. See the *Setting the Display Parameter & Intensity (DISPLAY)* flow chart on page 30 to access the display menu to show the unit or tag on display line 2.

The engineering units or custom legends can be set using the following 12-segment character set:

Display	Character
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	A
b	b
C	C
c	c
d	d
E	E
F	F
G	G
g	g
H	H
h	h
I	I
i	i
J	J
K	K
L	L
l	l
M	M

Display	Character
N	N
n	n
O	O
o	o
P	P
Q	Q
R	R
r	r
S	S
t	t
U	U
u	u
V	V
W	W
w	w
X	X
Y	Y
Z	Z
-	-
/	/
\	\
]	]
[	[
=	=
Degree(<)	Degree(<)
*	*
Space	Space

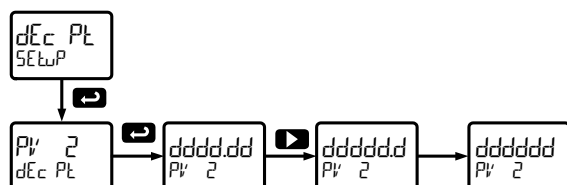
Notes:

1. Degree symbol represented by (<) if programming with MeterView Pro.
2. Press and hold up arrow to auto-scroll the characters in the display.

Setting the Decimal Point (dEC Pt)

The decimal point on PV2 (display line 2) may be set only if the dual-scale level feature is selected. It may be set with up to five decimal places or with no decimal point at all.

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



Programming the Meter (PrOG)

The meter may either be scaled (SCALE) without applying an input or calibrated (CAL) by applying an input. The meter comes factory calibrated to NIST standards, so for initial setup, it is recommended to use the (SCALE) function.

The Program menu contains the Scale (SCALE) and the Calibrate (CAL) menus.

Process inputs may be scaled or calibrated to any display within the range of the meter.

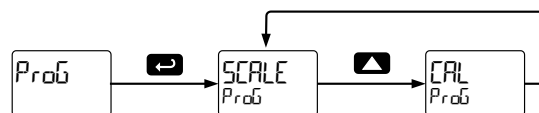
The PD6001 is a single input meter with dual-scale capability.

If the dual-scale level feature is selected in the Setup menu, the Scale 1 and Scale 2 menus are enabled for PV1 & PV2 respectively.

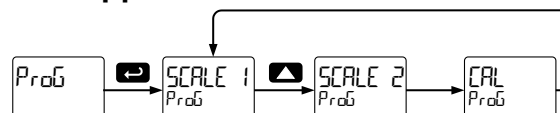
The process input may be calibrated or scaled to any display value within the range of the meter.

Note: The **Scale** and **Calibrate** 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 prior to scaling and calibration of the meter. See *Multi-Point Linearization (LINEAR)* menu on page 43 for details.

Program Menu for Single Scale Process



Program Menu for Dual-Scale Level Applications



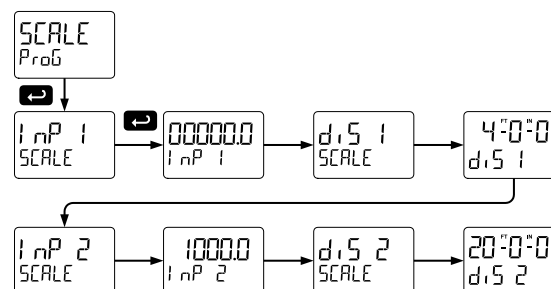
Additional parameters, not needed for most applications, are programmed in the *Advanced Features* menu; see *Advanced Features Menu* on page 41.

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 for PV1 and up to 8 linearization points may be selected for PV2. See *Multi-Point Linearization (LINEAR)* menu on page 43 for details.

Scaling the Meter (SCALE)

The process input (4-20 mA, ± 10 VDC) 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.

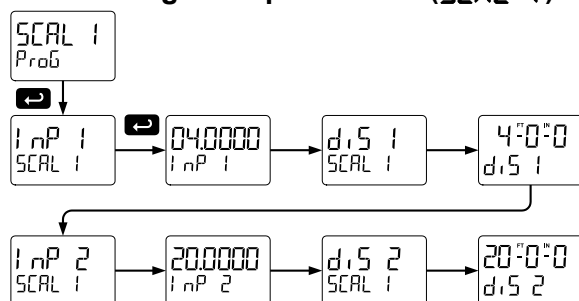


Dual-Scale for Level Application

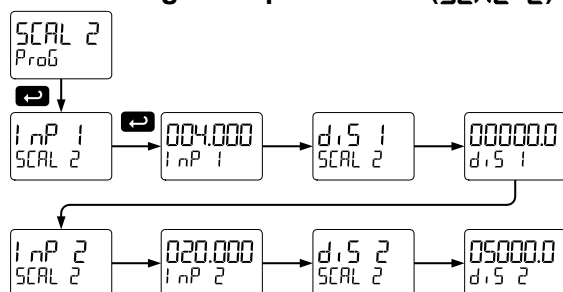
The analog input can be displayed in two different scales, by enabling the dual-scale feature (d-SCALE) in the Setup-Input menu. See *Setting the Input Signal* (INPUT) page 27.

To enable the dual-scale feature for level applications displaying height and volume, you must select d-SCALE in the Input selection menu.

Scaling the Input for PV1 (SCALE 1)



Scaling the Input for PV2 (SCALE 2)



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 the input prior to the failure during calibration or scaling and to input 1 during internal calibration, 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. Wrong signal selection in Setup menu.
3. Minimum input span requirements not maintained.
4. Input 1 signal inadvertently applied to calibrate input 2.

Minimum Input Span

Input Range	Input 1 & Input 2 Span
4-20 mA	0.15 mA
±10 VDC	0.10 VDC

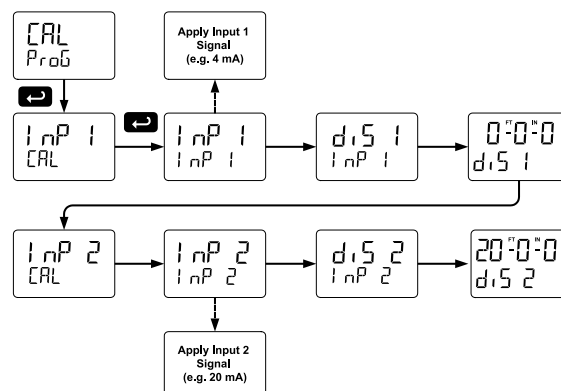
The minimum input span is the minimum difference between input 1 and input 2 signals required to complete the calibration or scaling of the meter.

Calibrating the Meter with External Source (CAL)

*Note: To scale the meter without a signal source refer to *Scaling the Meter (SCALE)*, page 28.*

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 necessary to calibrate the meter.



*Note: Inputs for the above example are:
Input 1: 4 mA; Display 1: 0^{FT}0^{IN}(0^{/16} or 0^{/8})
Input 2: 20 mA; Display 2: 20^{FT}0^{IN}(0^{/16} or 0^{/8})*

Warm up the meter for at least 15 minutes before performing calibration to ensure specified accuracy.

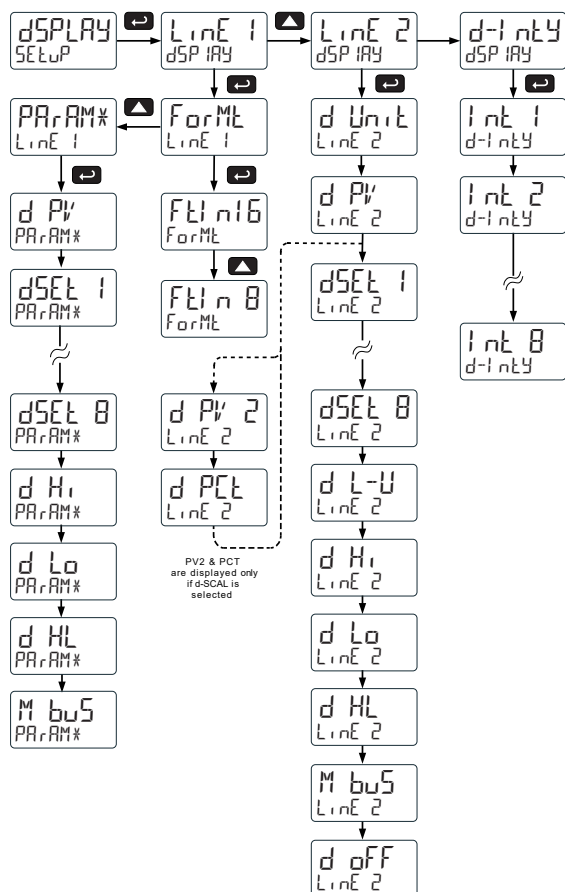
Setting the Display Parameter & Intensity (dSP LAY)

Display line 1 can be programmed to display:

1. Process value
2. Relay set points
3. Max & min values
4. Modbus input

Display line 2 can be programmed to display:

1. Unit or tag
2. Process value 2 (PV2)
3. Percent of PV1 (PCT)
4. Relay set points
5. Level value in feet with unit or tag
6. Max & min values
7. Engineering units or custom legends
8. Modbus input
9. Off (no display)



Display Intensity (d-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 intensity is 6.

Dual-Scale Display

The PD6001 has a rather unique, and very flexible dual-scale capability. A second scaled display that can represent the measured input in a different form (i.e. feet & gallons). This is of particular value in level applications. Both displays are independently scaled and are based on the 4-20 mA input signal. This function can be used for feet & gallons, feet & meters, feet & percent, feet & barrels, and more.



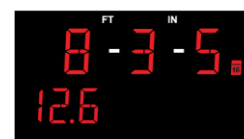
Feet & Gallons



Feet & Meters



Feet & Percent



Feet & Barrels

After setting up the input and display, press the Menu button to exit programming and skip the rest of the setup menu.

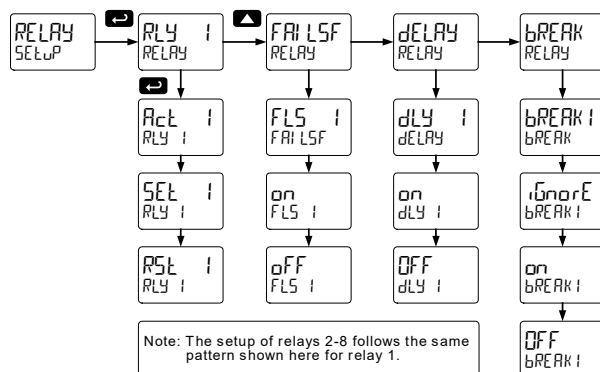
Setting the Relay Operation (RELAY)

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 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. Pump alternation control (automatic reset only)
 - f. Sampling (the relay is activated for a user-specified time)
 - g. Off (relay state controlled by Interlock feature)
2. Set point
3. Reset point
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)
6. Relay action for loss (break) of 4-20 mA input (ignore, on, off)

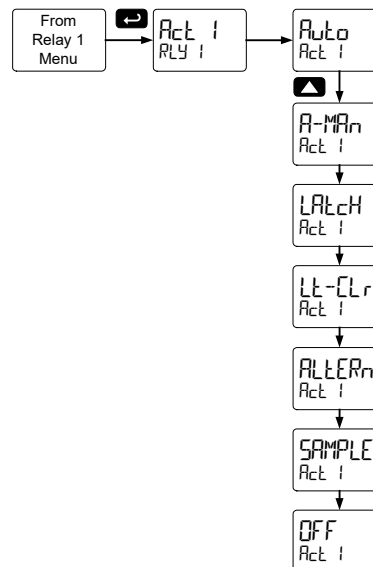


Setting the Relay Action

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. Pump 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 2-8 are set up in a similar fashion.

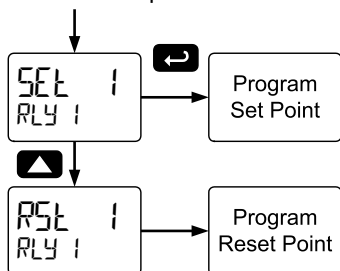


Programming Set and Reset Points

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.

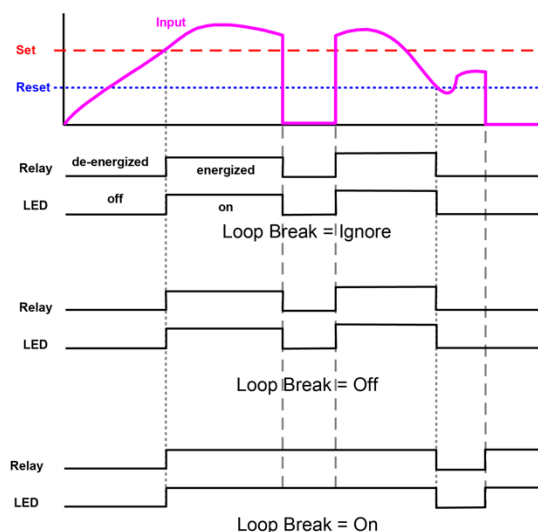
The *Off* time delay is associated with the reset point.

Relay Action for Loss of 4-20 mA Input (Loop Break)

A loop break condition is triggered when the 4-20 mA input signal drops below 0.005 mA. Each relay may be programmed to go to one of the following conditions when the meter detects the loss of the input signal (i.e. < 0.005 mA):

1. Turn *On* (Go to alarm condition)
2. Turn *Off* (Go to non-alarm condition)
3. Ignore (Processed as a low signal condition)

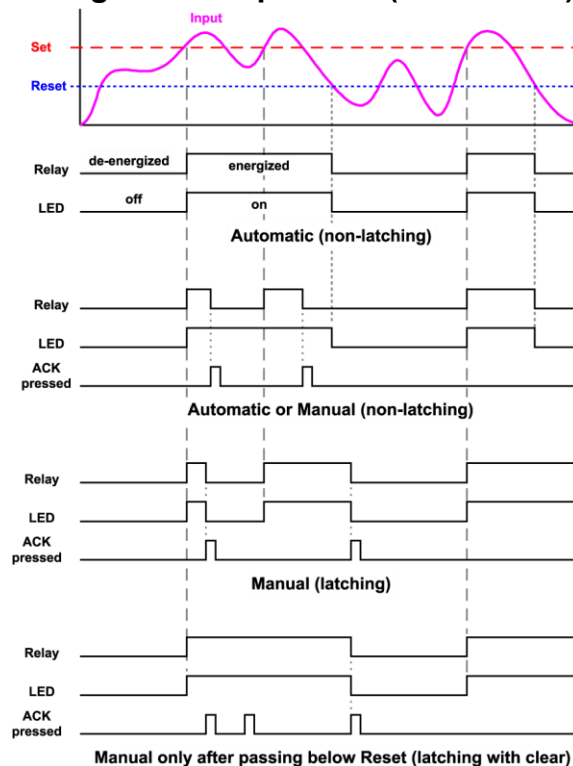
The following graph shows the loop break relay operation for a high alarm relay.



Relay and Alarm Operation Diagrams

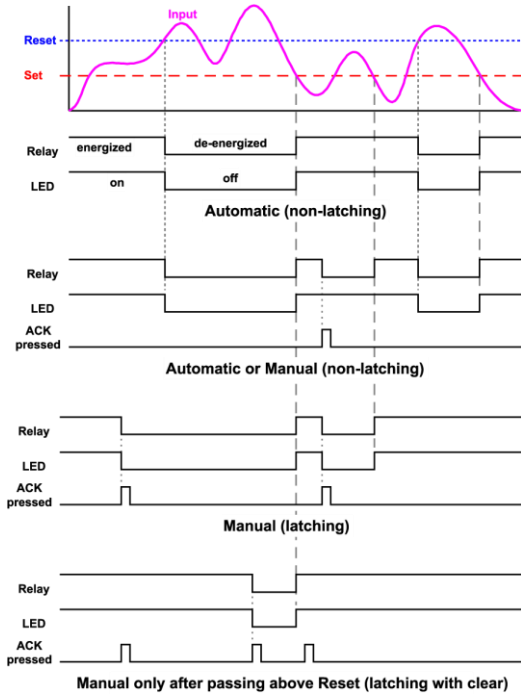
The following graphs illustrate the operation of the relays, status LEDs, and ACK button.

High Alarm Operation (Set > Reset)



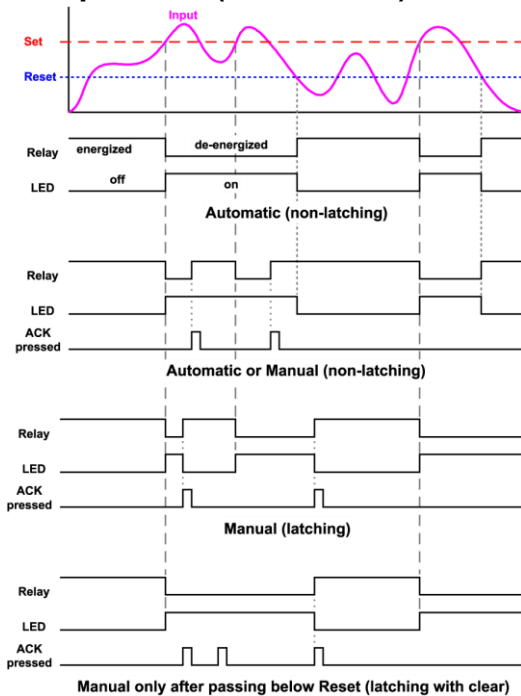
For Manual reset mode, ACK can be pressed anytime to turn "off" relay. To detect a new alarm condition, the signal must go below the set point, and then go above it.

Low Alarm Operation (Set < Reset)



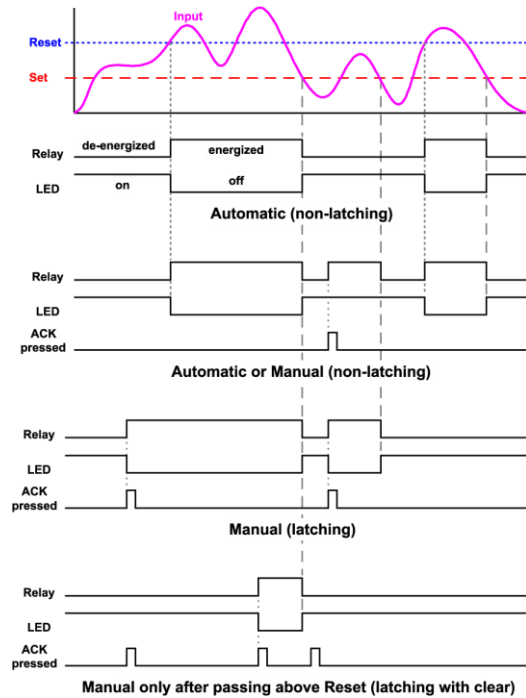
For Manual reset mode, ACK can be pressed anytime to turn "off" relay. For relay to turn back "on", signal must go above set point and then go below it.

High 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.

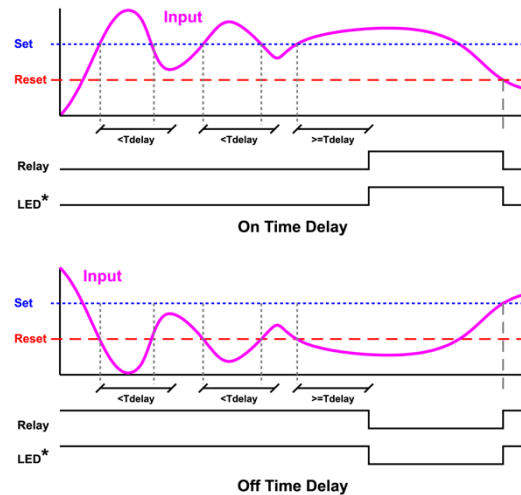
Low Alarm with Fail-Safe Operation (Set < Reset)



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

Time Delay Operation

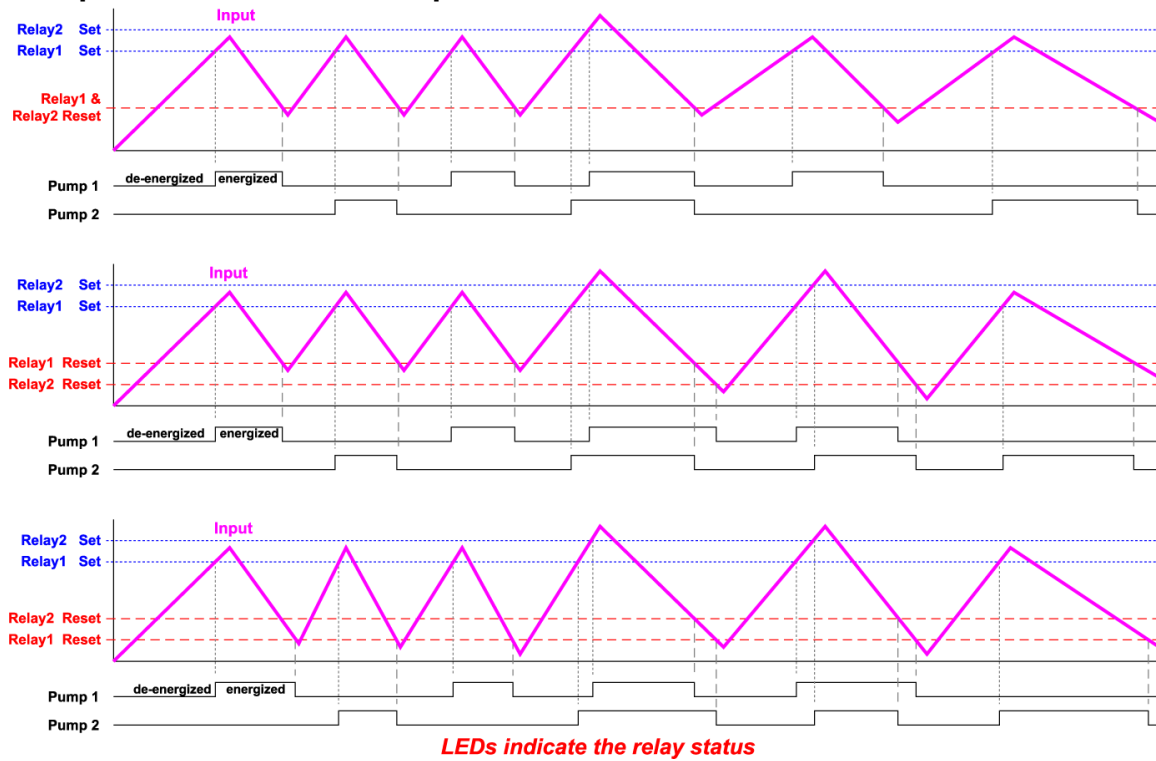
The following graphs show the operation of the time delay function.



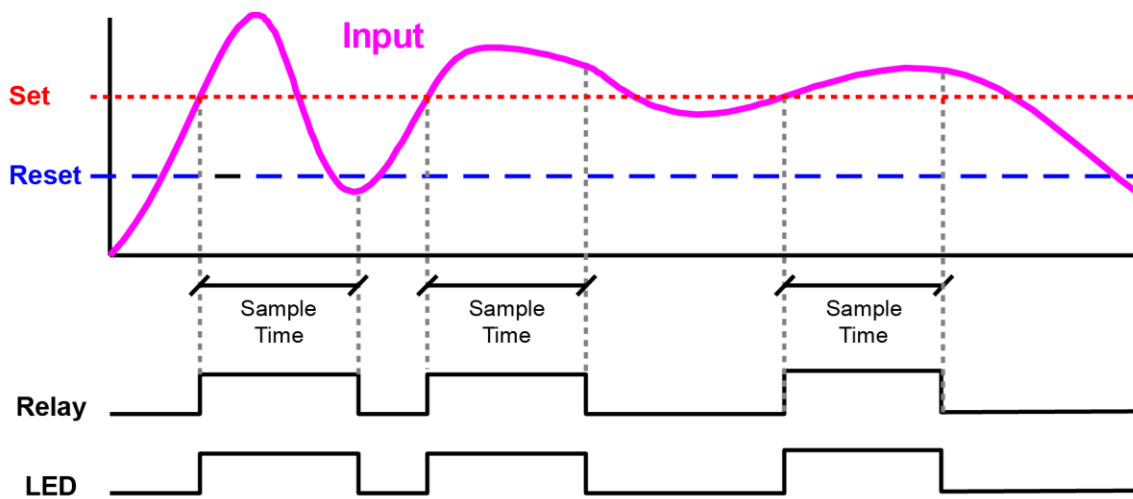
When the signal crosses the set point, the On time delay timer starts and the relay trips when the time delay has elapsed. If the signal drops below the set point (high alarm) before the time delay has elapsed, the On time delay timer resets and the relay does not change state. The same principle applies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

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

Pump Alternation Control Operation



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.

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 and/or 4 external relays expansion module. Typical applications include high and low level alarms, control applications such as simple on/off pump control, and pump alternation control for up to 8 pumps. There are four basic ways the relays can be used:

1. High and Low Alarms with Latching or Non-Latching Relays
2. Simple On/Off Control with 100% Adjustable Deadband
3. Sampling (Based on Time)
4. Pump Alternation Control for up to 8 Pumps

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	10 ^{FT} 0 ^{IN} 0/16	5 ^{FT} 0 ^{IN} 0/16	4 ^{FT} 11 ^{IN} 15/16	Off
2	LO	7 ^{FT} 0 ^{IN} 0/16	9 ^{FT} 0 ^{IN} 0/16	4 ^{FT} 11 ^{IN} 15/16	On
3	LO	2 ^{FT} 6 ^{IN} 0/16	4 ^{FT} 0 ^{IN} 0/16	4 ^{FT} 11 ^{IN} 15/16	Off
4	HI	4 ^{FT} 6 ^{IN} 0/16	2 ^{FT} 0 ^{IN} 0/16	4 ^{FT} 11 ^{IN} 15/16	On

Fail-Safe Operation

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

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

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

Front Panel LEDs

The alarm status LEDs on the front panel are available on all meters, even those without relays installed, and provide status indication for the following:

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

Note: LEDs 5-8 require the external relay module PDA1004 to be connected.

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 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 reflect 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.

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

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

WARNING

- In latching relay mode, if Fail-Safe is off, latched relays will reset (unlatch) when power is cycled.

Non-Latching Relay (A-U-O)

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 with Manual Reset (A-M-A-N)

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 (L-A-L-C-H)

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 with Clear (L-L-C-L-R)

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

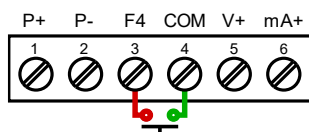
Acknowledging Relays

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

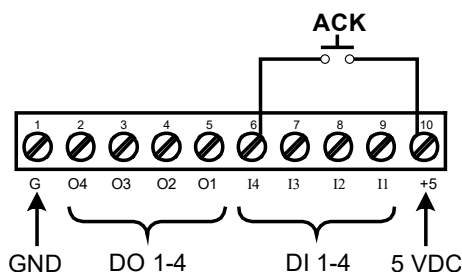
1. Via the programmable front panel function keys F1-F3 (Example: F3 assigned to ACK).



2. Remotely via a normally open push button wired to the F4 terminal at the rear of the instrument.



3. One of the digital inputs and the +5 V terminals on the digital I/O expansion module.



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

Pump Alternation Control Applications (ALTERN)

For pump control applications where two or more similar pumps are used to control the level of a tank or a well, it is desirable to have all the pumps operate alternately. This prevents excessive wear and overheating of one pump over the lack of use of the other pumps.

Up to 8 relays can be set up to alternate every time an on/off pump cycle is completed. The set points and reset points can be programmed, so that the first pump on is the first pump off.

Application #1: Pump Alternation Using Relays 1 & 2

1. Relays 1 and 2 are set up for pump alternation.
2. Relays 3 and 4 are set up for low and high alarm indication.

Set and Reset Point Programming			
Relay	Set Point	Reset Point	Function
1	$30^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	$10^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	Controls pump #1
2	$35^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	$5^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	Controls pump #2
3	$4^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	$9^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	Controls low alarm
4	$40^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	$29^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	Controls high alarm

Pump Alternation Operation

1. Pump #1 turns on when level reaches 30^{FT} , when level drops below 10^{FT} , pump #1 turns off.
2. The next time level reaches 30^{FT} , pump #2 turns on, when level drops below 10^{FT} , pump #2 turns off.
3. If the level doesn't reach 35^{FT} , pump #1 and pump #2 will be operating alternately.
4. If pump #1 cannot keep the level below 35^{FT} , pump #2 will turn on at 35^{FT} , then as the level drops to 10^{FT} , pump #1 turns off, pump #2 is still running and shuts off below 5^{FT} .
5. Notice that with the set and reset points of pump #2 outside the range of pump #1, the first pump on is the first pump to go off. This is true for up to 8 alternating pumps, if setup accordingly.
6. Relay #3 will go into alarm if the level drops below 4^{FT} and relay #4 will go into alarm if the level exceeds 40^{FT} .
7. Adding the 4 external relays, expansion module allows using the 4 SPDT internal relays for pump alternation and the 4 SPST external relays for high, high-high, low, and low-low alarm indication.

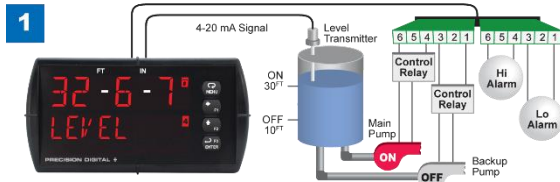
Application #2: Pump Alternation Using Relays 3 & 4

1. Relays 1 and 2 are set up for low and high alarm indication.
2. Relays 3 and 4 are set up for pump alternation.

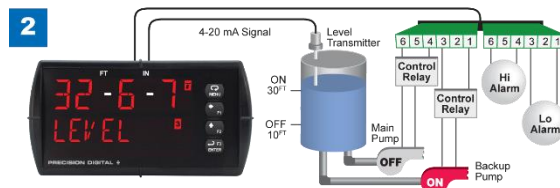
Set and Reset Point Programming			
Relay	Set Point	Reset Point	Function
1	$4^{\text{FT}} 10^{\text{IN}} \frac{0}{16}$	$7^{\text{FT}} 6^{\text{IN}} \frac{0}{16}$	Controls low alarm
2	$45^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	$42^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	Controls high alarm
3	$40^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	$9^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	Controls backup pump
4	$30^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	$10^{\text{FT}} 0^{\text{IN}} \frac{0}{16}$	Controls main pump

Pump Alternation Visual Representation

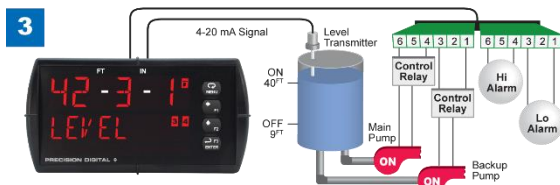
The following graphics provide a visual representation of a typical pump alternation application with high and low alarm monitoring:



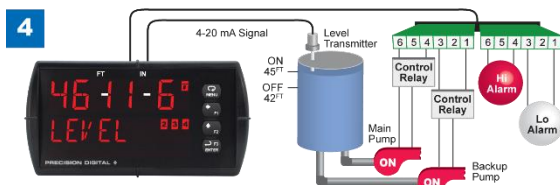
Relay #4 turns the main pump on at 30^{FT} and turns it off at 10^{FT}.



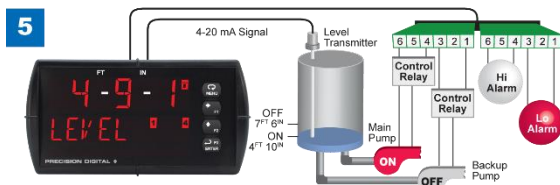
With the Pump Alternation feature activated, the next time the level reaches 30^{FT}, relay #3 transfers and starts the backup pump.



If the backup pump is not able to keep up, and the level reaches 40^{FT}, relay #4 transfers and starts the main pump as well.



Relay #2 trips the High Level Alarm at 45^{FT} and resets at 42^{FT}.

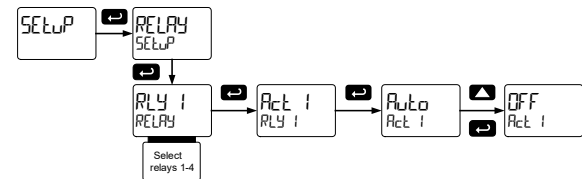


Relay #1 trips the Low Level Alarm at 4^{FT} 10^{IN} and resets at 7^{FT} 6^{IN}.

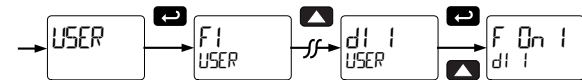
Setting Up the Interlock Relay (Force On) Feature

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

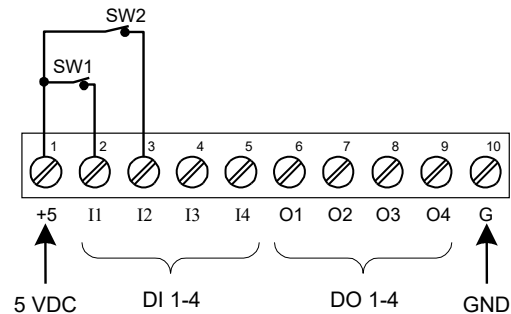
1. Access the *Setup – Relay – Action* menu and set the action to off.



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 (dl-1 to dl-4) terminal.



Interlock Relay Operation Example

Relays 1 & 2 are configured to energize (their front panel LEDs are steady on) 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.

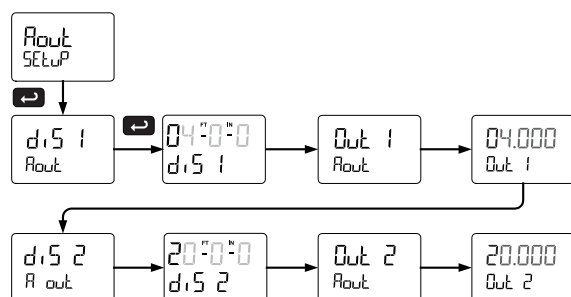
Scaling the 4-20 mA Analog Output (A_{out})

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 further details, see *Setting Numeric Values*, page 26, Analog Output Value for Loss of 4-20 mA Input (Loop Break), page 45.

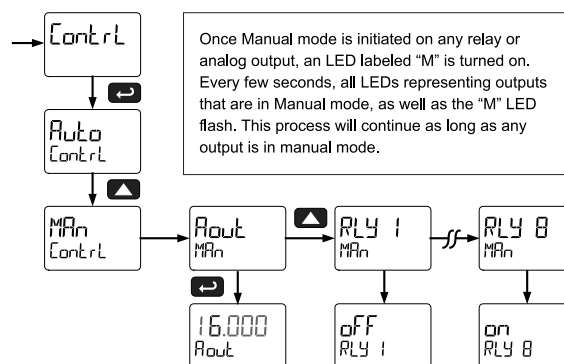


Reset Menu (RESET)

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

Manual Control Menu (Control)

The *Manual 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 analog output for automatic operation.



Setting Up the Password (PASS)

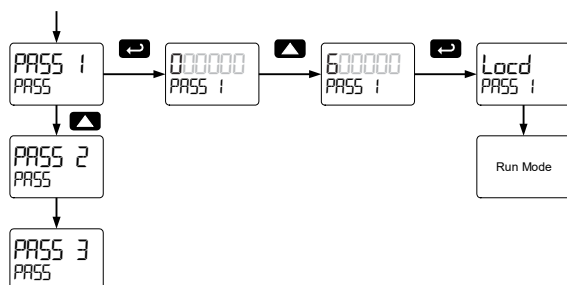
The *Password* menu is used for programming three levels of security to prevent unauthorized changes to the programmed parameter settings.

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.

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.

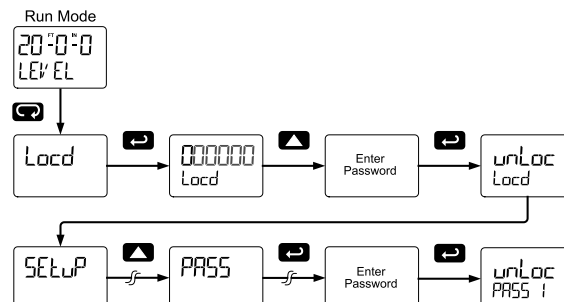


Making Changes to a Password Protected Meter

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 to 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.

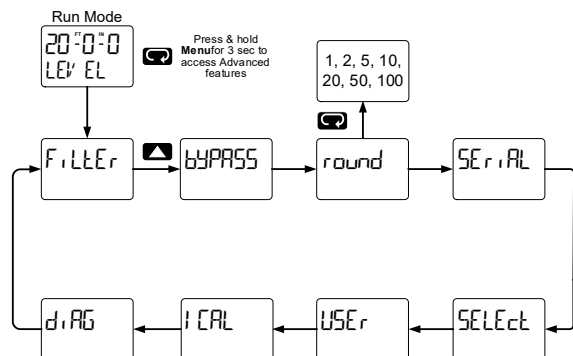
Did you forget the password?

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.



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.

Advanced Features Menu & Display Messages		
Display	Parameter	Action/Setting
FILTEr	Filter	Set noise filter value
bYPASS	Bypass	Set filter bypass value
Round	Round	Set the rounding value for display variables
SErIAL	Serial	Set serial communication parameters
SLAVE ID	Slave ID	Set slave ID or meter address
BAUD	Baud rate	Select baud rate
TX DELAY	Transmit delay	Set transmit delay for serial communication
PARITY	Parity	Select parity Even, Odd, or None with 1 or 2 stop bits
BT-BYTE	Time byte	Set byte-to-byte timeout
SELEct	Select	Enter the Select menu (function, cutoff, out)
Function	Input signal conditioning	Select linear or round horizontal tank function
PV 1	PV1	Select PV1 number of linearization points
LINEAR	Linear	Set meter for linear function and select number of linearization points
NOPTS	Number of points	Set PV1 for 2 to 32-point linearization Set PV2 for 2 to 8-point linearization
PV 2	PV2	Select PV2 number of linearization points

Advanced Features Menu & Display Messages		
Display	Parameter	Action/Setting
rhL	Round horizontal tank	Set meter for round horizontal tank volume calculation
inch	Dimension	Enter dimension in inches to calculate volume in gallons
CM	Dimension	Enter dimension in centimeters to calculate volume in liters
DIAMr	Diameter	Enter the tank's diameter in inches or centimeters
LENGTH	Length	Enter the tank's length in inches or centimeters
CUTOFF	Cutoff	Program Low-Height Cutoff Value for PV 1
ROUTPr	Analog Output Programmable parameters menu	Enter Analog Output Programmable parameters menu
SOURCE	Source	Select source for the 4-20 mA output
ORRANG	Overrange	Program mA output for display overrange
UNRANG	Underrange	Program mA output for display underrange
BREAK	Break	Set analog output value if input loop break is detected
MAX	Maximum	Program maximum mA output allowed
MIN	Minimum	Program minimum mA output allowed
CALIB	Calibrate	Calibrate 4-20 mA output (internal reference source used for scaling the output)
4 MA	4 mA output	Enter mA output value read by milliamp meter with at least 0.001 mA resolution
20 MA	20 mA output	Enter mA output value read by milliamp meter with at least 0.001 mA resolution
USER	User I/O	Assign function keys and digital I/O
F1*	F1 function key	*Assign F1-F4 function key
ACK	Acknowledge	Acknowledge relays
RESET	Reset	Enter Reset menu
RESET Hi	Reset Max	Reset Maximum
RESET Lo	Reset Min	Reset Minimum
RESET HL	Reset Max-Min	Reset Maximum & Minimum
RELAY	Relay	Relay menu
SET 1*	Set Points 1-8	*Set Points 1-8
RLY d	Relay Disable	Relay Disable (all relays)
RLY E	Relay Enable	Relay Enable (all relays)

Advanced Features Menu & Display Messages

Display	Parameter	Action/Setting
HoLd	Output Hold	Hold current relay states and analog output as they are until a button assigned to <i>enable relays</i> (RLY E) is pressed
HoLd	Display 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	Line 1 High	Max on line 1
Ln1 Lo	Line 1 Low	Min on line 1
Ln1 Hi	Line 1 High/Low	Max/min line 1
Ln2 Hi	Line 2 High	Max on line 2
Ln2 Lo	Line 2 Low	Min on line 2
Ln2 Hi	Line 2 High/Low	Max/min line 2
F On 1*	Force On Relay 1	*Force relay 1-8 on
CoNtRl	Control	Control Menu
dISAbL	Disable	Disable the selected function key or digital I/O
dI 1	Digital input 1	Assign digital input 1 – 8, if expansion modules are connected
dO 1	Digital output 1	Assign digital output 1 – 8, if expansion modules are connected
I CAL	Internal source calibration	Enter internal source calibration (used for scaling the meter without a signal source)
C CAL	Current calibration	Calibrate 4-20 mA current input (internal reference source used for scaling the input)
C Lo	Current low	Calibrate low current input (e.g. 4 mA)
C Hi	Current high	Calibrate high current input (e.g. 20 mA)
V CAL	Voltage calibration	Calibrate voltage input
V Lo	Voltage low	Calibrate low voltage input (e.g. 0 V)
V Hi	Voltage high	Calibrate high voltage input (e.g. 10 V)
dIAG	Diagnostics	Display parameter settings
LEd t	LED test	Test all LEDs
I nFo	Information	Display software number and version
ErASE	Erase	Erase MeterView Pro software stored in meter's memory

Noise Filter (F iLTER)

The noise filter is available for unusually noisy signals that cause an unstable process variable display. The noise filter averages the input signal over a certain period. The filter level determines the length of time over which the signal is averaged. The filter level can be set between 2 and 199. The higher the filter level, the longer the averaging time and so the longer it takes the display to settle to its final value. Setting the filter level to zero disables the filter function.

Noise Filter Bypass (bYPASS)

The noise filter bypass changes the behavior of the meter so that small variations in the signal are filtered out but large abrupt changes in the input signal are displayed immediately. The bypass value determines the minimum amount of signal change to be displayed immediately. All signal changes smaller than the bypass value are filtered or averaged by the meter. The noise filter bypass may be set between 0.1 and 99.9% of full scale.

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 is only applicable if line 2 is setup to display level unit tags (L -u). Rounding will round line 2 to the nearest decimal value according the rounding selected. The main display's level reading will be adjusted to match the rounded decimal value. See examples below:

Rounding Selection	Actual Value	Secondary Display Value	Main Display Value
1	12.093	12.093	12 ^{FT} 11 ^{IN} 2/16
	12.953	12.953	12 ^{FT} 11 ^{IN} 7/16
5	12.093	12.095	12 ^{FT} 11 ^{IN} 2/16
	12.953	12.955	12 ^{FT} 11 ^{IN} 7/16
10	12.093	12.090	12 ^{FT} 11 ^{IN} 1/16
	12.953	12.950	12 ^{FT} 11 ^{IN} 6/16
50	12.093	12.100	12 ^{FT} 11 ^{IN} 3/16
	12.953	12.950	12 ^{FT} 11 ^{IN} 6/16

Modbus RTU Serial Communications (SERIAL)

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

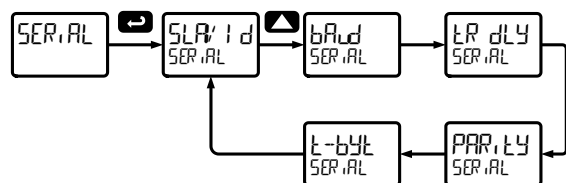
The meter may be connected to a PC for initial configuration via the on board USB-C connection. For ongoing digital communications with a computer or other data terminal equipment, an RS-232, or RS-485 option is required; see *Ordering Information* on page 7 for details.

CAUTION

- 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.

Notes

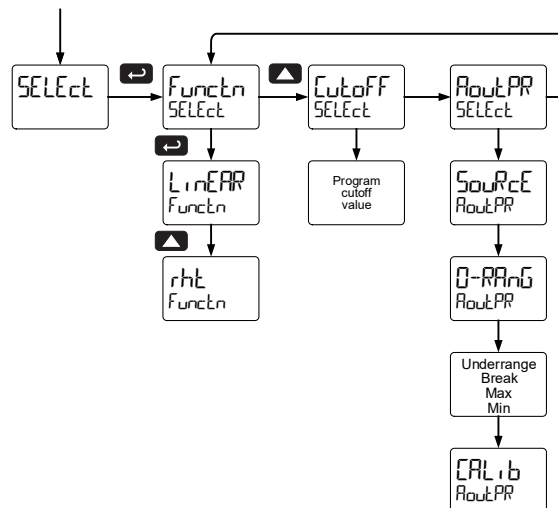
- More detailed instructions are provided with each optional serial communications adapter.
- Refer to the ProVu Modbus Register Tables located at www.predig.com for details.



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.

Select Menu (SELECT)

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



Input Signal Conditioning (Functn)

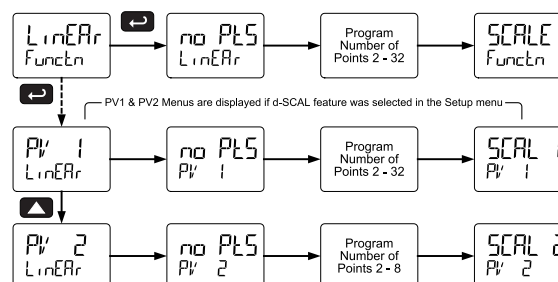
The *Function* menu is used to select the input signal conditioner applied to the input: linear or round horizontal tank volume calculation. Multi-point linearization is part of the linear function selection.

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.

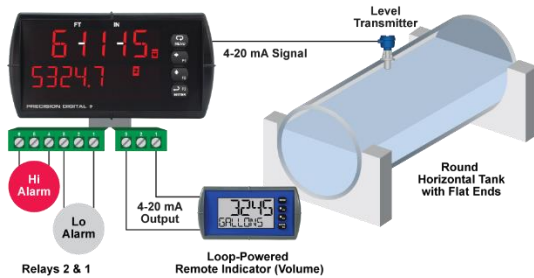
Multi-Point Linearization (LINEAR)

Meters are set up at the factory for linear function with 2-point linearization. Up to 32 linearization points can be selected for PV1 under the linear function. The multi-point linearization can be used to linearize the display for non-linear signals such as those from level transmitters used to measure volume in odd-shaped tanks.

If the dual-scale level feature has been selected, the menus for PV1 & PV2 are enabled. PV2 can be programmed with up to 8 linearization points.



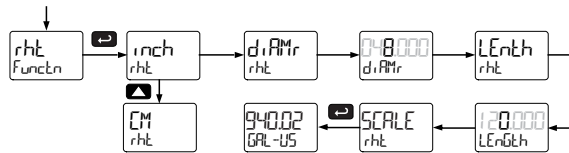
Round Horizontal Tank Linearization (rHt)



This function automatically calculates the volume in a round horizontal tank with flat ends. This option is only available on PV2 since PV1 is the designated level indicator.

Set the display for the desired decimal point and engineering units before entering the round horizontal tank function. Select units, inches or cm for the tank dimensions. Enter the diameter and the results are calculated automatically in US gallons; if centimeters, the results are liters.

The meter can be scaled to display the volume in any engineering unit.



Note: After Scale is displayed continue pressing the Enter button until the meter completes the scaling of the input and display values.

Changing the Volume from Gallons to Liters

In the above graphic, entering the 48" for the diameter and 120" for the length of the round horizontal tank, the meter automatically calculates that the volume of the tank is 940.02 gallons.

1. Convert gallons to liters
1 US gallon = 3.7854 L
940.02 gal = 3558.4 L
2. Go to the *Setup* menu and change the decimal point to 1 decimal.
3. Go to the *Program – Scale* menu and press Enter until $\frac{d}{5} \frac{2}{1}$ is shown on the main display.
4. Press Enter and change the display 2 value to 3558.4.
5. The meter is now displaying the volume in liters.

Note: The display can be scaled to display the volume in any engineering units.

Low-Height Cutoff (Cutoff)

The low-height cutoff feature allows the meter to be programmed so that the often-unsteady outputs from level transmitters, or levels that read close to zero but do not reach zero due to setup constraints, may display zero on the meter. The display will read zero when the display would be below the programmed cutoff level value. The cutoff can be disabled to display negative values.

The cutoff value may be programmed from $0^{FT} 1^{IN} (0/16 \text{ or } 0/8)$ to $99^{FT} 11^{IN} (15/16 \text{ or } 7/8)$. The meter will display zero below the cutoff value. Programming the cutoff value to $0^{FT} 0^{IN} (0/16 \text{ or } 0/8)$ disables the cutoff feature.

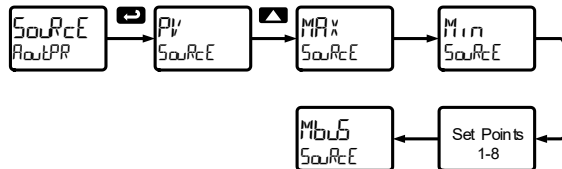
Analog Output Programming (AoutPr)

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. Break: Analog output value when loop break is detected
5. Max: Maximum analog output value allowed regardless of input
6. Min: Minimum analog output value allowed regardless of input
7. 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 process variable, maximum or minimum value reached by the process, one of the set points, or the Modbus PV input.



Analog Output Value for Loss of 4-20 mA Input (Loop Break)

The AoutPr - Break menu is used to force the analog output to go to a user-specified mA value if a break condition is detected in the 4-20 mA input loop. Selecting Ignore causes the mA output to go to the minimum value.

Analog Output Calibration

To perform the analog output calibration, it is recommended to use a milliamp meter with a resolution of at least 0.1 μ A 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.

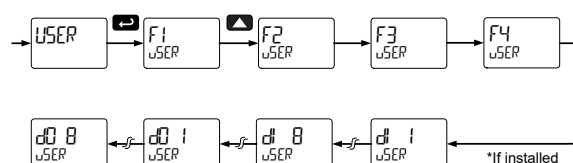
Analog Output Calibration Procedure

1. Wire the PD6001 4-20 mA output to a current loop that includes a power supply (internal or external 12 to 24 VDC), and the mA input on the digital meter. See *Figure 20. 4-20 mA Output Connections* on page 21 for details.
2. Turn on all devices. Allow for a 15 to 30 minute warm-up.
3. Go to the Advanced Features menu, and navigate to the Analog Output Programming (AoutPr) → Calibration (CALIB) menu and press **Enter**.
4. The display will show **4 mA**. The PD6001 mA output should now be close to 4 mA. Press **Enter** and the display will show **04.000**. Enter the actual value read by the digital mA meter and press **Enter**.
5. The display will show **20 mA**. The PD6001 mA output should now be close to 20 mA. Press **Enter** and the display will show **20.000**. Enter the actual value read by the digital mA meter and press **Enter**.
6. The meter will now calculate the calibration factors and store them.
7. Press **Menu** to exit and return to Run mode.

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 input signal 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.



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
RSt H ₁	Reset the stored maximum display value
RSt Lo	Reset the stored minimum display value
RSt HL	Reset the stored maximum & minimum display values
TARe	Capture tare and zero the display
RSt Tr	Reset captured tare and resume normal operation
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 <i>enable relays (RLY E)</i> is pressed
RLY E	Enable all relays to function as they have been programmed
0 HoLd	Hold current relay states and analog output as they are until a button assigned to <i>enable relays (RLY E)</i> 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 H ₁	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 H ₁	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
F On 1*	Force relay 1 (*through 4) into the on state. This function is used in conjunction with a digital input expansion module to achieve interlock functionality. See <i>Setting Up the Interlock Relay (Force On) Feature</i> on page 38 for details.
ContRl	Directly access the control menu
dISAbL	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
MEnu	Mimic the menu button functionality (digital inputs only)
riGHt	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)

Internal Source Calibration (I CAL)

The meter is **factory calibrated** prior to shipment for milliamps and volts with calibration equipment that is certified to NIST standards.

The use of calibrated signal sources is necessary to calibrate the internal source of the meter. The meter's internal source is what allows the user to scale the meter without applying a signal.

Check calibration of the meter at least every 12 months. Each input must be recalibrated separately.

Notes:

1. If meter is in operation and it is intended to accept only one input type (e.g. 4-20 mA), recalibration of other input is not necessary.
2. Allow the meter to warm up for at least 15 minutes before performing the internal source calibration procedure.

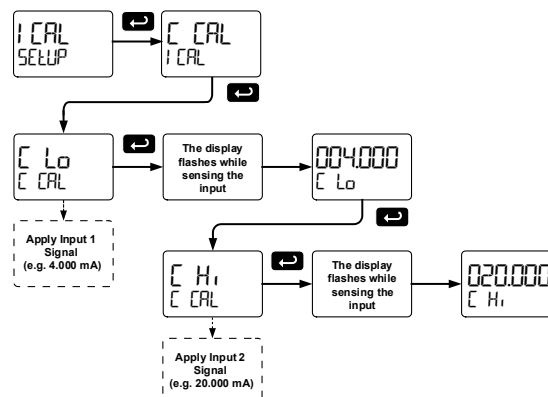
The *Internal calibration* menu is part of the *Advanced Features* menu.

1. Press and hold the Menu button for three seconds to access the advanced features of the meter.
2. Press the Up arrow button to scroll to the *Internal calibration* menu (I CAL) and press Enter.
3. The meter displays either current calibration (I CAL) or voltage calibration (V CAL), according to the input setup. Press Enter to start the calibration process.

Example of Internal Calibration for current input:

4. The meter displays *low* input current message (I Lo). Apply the low input signal and press Enter. The display flashes for a moment while the meter is accepting the low input signal.
5. After the display stops flashing, a number is displayed with the leftmost digit brighter than the rest. The bright digit is the active digit that can be changed by pressing the Up arrow button. Press the Right arrow button to move to the next digit.
6. Set the display value to correspond to the input signal being calibrated, typically 4.000 mA.
7. The display moves to the *high* input calibration (I Hi). Apply the high input signal and press Enter.
8. Set the display for the high input calibration, in the same way as it was set for the low input calibration, typically 20.000 mA.

The graphic below shows the calibration of the current input. The voltage input is calibrated in a similar way.



Tips:

- Low and high input signals can be any valid values within the range of the meter.
- Observe minimum input span requirements between input 1 and input 2.
- Low input should be less than high input signal.

Error Message (Error)

An error message indicates that the calibration or scaling process was not successful.

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. Wrong signal selection in *Setup* menu.
3. Minimum input span requirements not maintained.

Minimum Input Span

Input Range	Input 1 & Input 2 Span
4-20 mA	0.15 mA
±10 VDC	0.10 VDC

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

Meter Operation

The meter is capable of accepting current (0-20 mA, 4-20 mA) and voltage (0-5 V, 1-5 V, 0-10 V, ± 10 V) signals and displaying these signals in engineering units from $-9^{FT}11^{IN}(15/16 \text{ or } 7/8)$ to $99^{FT}11^{IN}(15/16 \text{ or } 7/8)$ on display line 1 and units from -99999 to 999999 on display line 2 (e.g. a 4-20 mA signal could be displayed as $0^{FT}0^{IN} 9/16$ to $25^{FT}0^{IN} 9/16$ on display line 1 and -50.000 to 50.000 on display line 2).

The primary function of this meter is to display level from a 4-20 mA output transmitter in feet and inches format rather than the more common decimal format. The meter can also display the 4-20 mA signal in a different scale on line 2 with $d-HI$ enabled to provide users with a display of both level and volume, for instance. The meter also provides the 24 VDC necessary to power the transmitter, thus simplifying wiring and reducing costs.

The meter can be equipped with up to 4 internal and 4 external relays to provide alarm and control functions. The relays can be set up for pump control alternation to maintain even wear of pumps. The relays can also be used to drive Precision Digital [PDA-LH](#) light/horns. The meter can be operated from the front panel buttons or remotely using a [PDA2360](#) control station connected to the meter using a [PDA1044](#) digital I/O expansion module. Users can acknowledge relays, display and reset the Max/Min values, manually control relays, etc.

Additionally, the meter can be set up to display the analog input in feet and inches on the main display and the Modbus input on the second display. The relays and analog output can be programmed to operate from the Modbus PV input.

Front Panel Buttons Operation

Button Symbol	Description
	Press to enter or exit Programming Mode, view settings, or exit max/min readings
	Press to reset max/min readings or other parameter/function assigned through the <i>User</i> menu
	Press to display max/min readings or other parameter/function assigned through the <i>User</i> menu
	Press to acknowledge relays or other parameters/function assigned through the <i>User</i> menu

Function Keys Operation

During operation, the programmable function keys operate according to the way they have been programmed in the *Advanced Features – User* menu. See *Programmable Function Keys User Menu* ([USE r](#)) on page 46 for details.

The table above shows the factory default settings for F1, F2, and F3.

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 it has been programmed in the *Advanced Features – User* menu. See *Programmable Function Keys User Menu* ([USE r](#)) on page 46 for details.

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 or to the digital inputs in the *User* menu.
2. Display continuously by assigning either display to max/min through the *Display* menu.

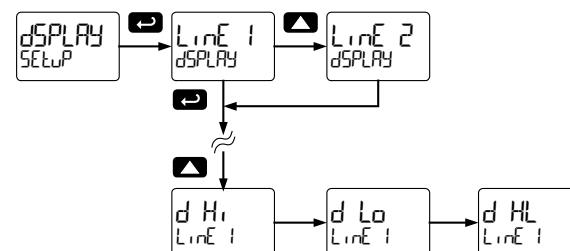
Any of the F1-F3 function keys (buttons) and the digital inputs can be programmed to reset the max & min readings. The meters are set at the factory to display the max reading by pressing the Up arrow/F2 button and to use the Right arrow/F1 button to access the *Reset* menu.

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 ($d-HI$), Min ($d-LO$), or toggle between Max and Min ($d-HL$) every 10 seconds.



Troubleshooting

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 consult the recommendations described below.

Diagnostics Menu (d, AG)

The *Diagnostics* menu is located in the *Advanced Features* menu, to access *Diagnostics* menu see *Advanced Features Menu* on page 41.

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* on page 41.

Testing the Display LEDs

To test all LEDs on the display:

1. Go to the *Diagnostics* menu (d, AG) and press Enter button.
2. Press Up arrow button and scroll to *LED Test* menu (LED T).
3. Press the Enter button to activate the LED Test. The meter will cycle through all digits, decimal points, and relay indicators to enable the operator to check that all LEDs are functioning properly.
4. Press the Enter button again to access the *Information* menu (i, nF d) or press the Menu button to return to Run Mode.

Determining Software Version

To determine the software version of a meter:

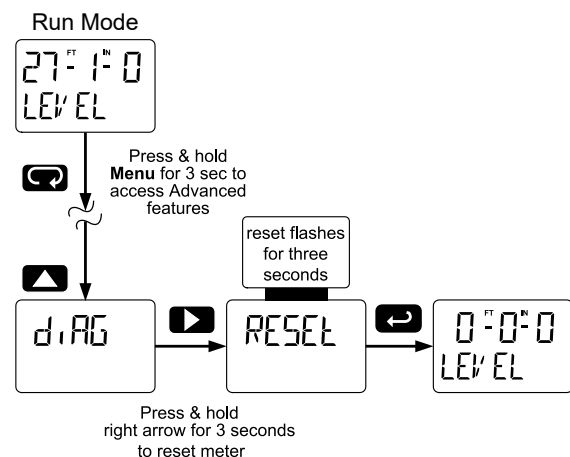
1. Go to the *Diagnostics* menu (d, AG) and press Enter button.
2. Press Up arrow button and scroll to *Information* menu (i, nF d).
3. Press Enter to access the software number (SFL) and version (V ER) information. Write down the information as it is displayed. Continue pressing Enter until all the 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* on page 41.
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
Input type	INPUL	4-20 mA
Dual-scale feature	DSCALE	No (Single scale)
Filter	FILTER	70
Bypass	BYPASS	0.2
Function	FUNCTION	Linear
Number of points	NOPTS	2
Programming	PROG	Scale
Input 1	INP 1	4.000 mA
Display 1	DIS 1	4 ^{FT0IN 0/16}
Input 2	INP 2	20.000 mA
Display 2	DIS 2	20 ^{FT0IN 0/16}
Decimal point	DDDDD	3 places
Cutoff value	CUTOFF	0.0 (disabled)
Display assignment	DISPLAY	
Display line 1 (Main)	LINE 1	PV: Process variable
Display line 2	LINE 2	Eng unit default= level
Display intensity	D-INTY	6
Relay 1 action	ACT 1	Automatic
Relay 1 set point	SET 1	1 ^{FT0IN 0/16}
Relay 1 reset point	RSET 1	0 ^{FT6IN 0/16}
Relay 2 action	ACT 2	Automatic
Relay 2 set point	SET 2	2 ^{FT0IN 0/16}
Relay 2 reset point	RSET 2	1 ^{FT6IN 0/16}
Relay 3 action	ACT 3	Automatic
Relay 3 set point	SET 3	3 ^{FT0IN 0/16}
Relay 3 reset point	RSET 3	2 ^{FT6IN 0/16}
Relay 4 action	ACT 4	Automatic
Relay 4 set point	SET 4	4 ^{FT0IN 0/16}
Relay 4 reset point	RSET 4	3 ^{FT6IN 0/16}
Fail-safe relay 1	FLS 1	Off
Fail-safe relay 2	FLS 2	Off
Fail-safe relay 3	FLS 3	Off
Fail-safe relay 4	FLS 4	Off
On delay relay 1	ON 1	0.0 sec
Off delay relay 1	OFF 1	0.0 sec
On delay relay 2	ON 2	0.0 sec

Parameter	Display	Default Setting
Off delay relay 2	OFF 2	0.0 sec
On delay relay 3	ON 3	0.0 sec
Off delay relay 3	OFF 3	0.0 sec
On delay relay 4	ON 4	0.0 sec
Off delay relay 4	OFF 4	0.0 sec
Loop break relay 1	IGNORE	Ignore
Loop break relay 2	IGNORE	Ignore
Loop break relay 3	IGNORE	Ignore
Loop break relay 4	IGNORE	Ignore
Display 1 analog out	DIS 1	4 ^{FT0IN 0/16}
Output 1 value	OUT 1	4.000 mA
Display 2 analog out	DIS 2	20 ^{FT0IN 0/16}
Output 2 value	OUT 2	20.000 mA
Source analog output	SOURCE	Process Variable
Overrange output	ORANGE	21.000 mA
Underrange output	URANGE	3.000 mA
Loop break output	BREAK	1.000 mA
Maximum output	MAX	23.000 mA
Minimum output	MIN	1.000 mA
Slave ID (Address)	SLAVE ID	247
Baud rate	BAUD	9600
Transmit delay	TR DLY	50 ms
Parity	PARITY	Even
Byte-to-byte timeout	LBYTE	010 (0.1 sec)
F1 function key	F1	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)

Troubleshooting Tips

This meter is a highly sophisticated instrument with an extensive list of features and capabilities. If the front panel buttons are used to program the meter, it may be a difficult task to keep everything straight. That is why we strongly recommend the use of the free [MeterView Pro](#) software for all programming activities. A USB-C cable is required to connect the meter to a PC for programming with MeterView Pro software.

If you have programmed the meter with the front panel buttons and it is not working as intended, try re-programming the meter using MeterView Pro software.

Symptom	Check/Action
No display at all	Check power at power connector
Not able to change setup or programming, LOCK is displayed	Meter is password-protected, enter correct six-digit password to unlock or Master Password of 508655.
Meter does not respond to input change	If a <i>Low-Height Cutoff</i> Value has been programmed, the meter will display zero below that point, regardless of the input – which can appear like the meter is not responding to an input change. Check to make sure the problem is not being caused by an undesired low-height cutoff value. To prevent the display from showing a negative value, set the low-flow cutoff to a value greater than zero.
Meter displays error message during calibration (Error)	Check: 1. Signal connections 2. Input selected in <i>Setup</i> menu 3. Minimum input span requirements
Meter displays 1. 999999 2. -99999	Check: 1. Input selected in <i>Setup</i> menu 2. Corresponding signal at Signal connector
Display is unstable	Check: 1. Input signal stability and value 2. Display scaling vs. input signal 3. Filter and bypass values (increase)
Display response is too slow	Check filter and bypass values
Display reading is not accurate	Check: 1. Input signal conditioner selected: Linear or round horizontal tank. 2. Scaling or calibration
Display does not respond to input changes, reading a fixed number	Check: 1. Display assignment, it might be displaying max, min, or set point.
Display alternates between 1. H₁ and a number 2. L₀ and a number	Press Menu to exit max/min display readings.
Relay operation is reversed	Check: 1. Fail-safe in <i>Setup</i> menu 2. Wiring of relay contacts
Relay and status LED do not respond to signal	Check: 1. Relay action in <i>Setup</i> menu 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: 1. Serial adapter and cable 2. Serial settings 3. Meter address 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 use the manual as a step by step programming guide, rather than a random approach to programming. To reset the meter to factory defaults, see [Reset Meter to Factory Defaults](#) on page 49. In addition, for best results, we recommend using the free [MeterView Pro](#) software for all programming needs.

Contact Precision Digital

Technical Support

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

Email: support@predig.com

Sales Support

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

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Place Orders

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For the latest version of this manual please visit

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