Helios PD2-6060 Dual Analog Input Process Meter
Instruction Manual

HELIOS

MeterView Pro
USB Install

- Large Display NEMA 4X, IP65 Wall Mounted Meter
- Dual 0-20 mA, 4-20 mA, 0-5 V, 1-5 V, and ±10 V Inputs with Math Functions
- Addition, Difference, Average, Multiplication, Div, Min, Max, Ratio, & More
- Large Dual-Line 6-Digit Display, 1.8" (46 mm) Readable from 100 Feet (30 Meters) Away
- Isolated 24 VDC @ 200 mA Transmitter Power Supply
- Easy Field Scaling in Engineering Units without Applying an Input
- 4 Relays with Interlocking Capability + Isolated 4-20 mA Output Option
- Free PC-Based, On-Board, MeterView Pro USB Programming Software
- SunBright Display Standard Feature; Great for Outdoor Applications
- Operating Temperature Range: -40 to 65°C (-40 to 149°F)
- Conformal Coated PCBs for Dust and Humidity Protection
- UL & C-UL Listed. E160849; 508 Industrial Control Equipment
- Input Power Options: 85-265 VAC / 90-265 VDC or 12-24 VDC / 12-24 VAC
- 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, Square Root Extraction and Programmable Exponent Function
- Programmable Display, Function Keys & Digital Inputs
- External 4-Relay, Dual 4-20 mA Outputs & Digital I/O Expansion Modules
- On-Board RS-485 Serial Communications Standard
- 5 Digital Inputs & 4 Digital Outputs Standard
- Password Protection
- Modbus RTU Communication Protocol Standard
- Light / Horn & Button Accessory
- Control Station Accessory for Remote Operation
- 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.

Registered Trademarks

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FREE MeterView Pro Programming Software

*The meter can be powered from the USB connection. When using the USB connection, **DO NOT** apply AC or DC power to the meter.*

The easiest and quickest way to program your Helios meter is to use the FREE MeterView Pro programming software. This software is loaded into the meter and connects and installs directly to your PC with a USB cable. We recommend that the first thing you do after taking the meter out of the box is connect the Helios to your PC with the provided USB cable – do not use a different cable. **DO NOT** apply AC or DC power to the meter while your PC is connected to the meter as it will disrupt the USB connection. You don't even have to apply an input signal.

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

> **Watch MeterView Pro Software Video at**
> **www.predig.com/meterviewpro**

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.

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Introduction

The Helios PD2-6060 is a multi-purpose, easy to use, large-display dual-input process meter ideal for level, flow rate, temperature, or pressure transmitter applications. It features large 1.8 inch superluminous LED digits, which can be read in direct sunlight from up to 100 feet (30 meters) away. It is housed in a water-resistant, field mountable NEMA 4X/IP65 rated enclosure for convenient indoor or outdoor installation.

The programming buttons are located behind the lower panel door and are not generally accessible during operation. For that reason, we recommend the use of the PDA2364-MRUE remote control station which has four buttons to mimic the buttons behind the panel.

The meter accepts current and voltage signals (e.g. 4-20 mA, 0-10 V). Various math functions may be applied to the inputs including addition, difference, absolute difference, average, weighted average, multiplication, division, minimum, maximum, draw, ratio, and concentration. This is in addition to the input signal conditioning functions (linear, square root, programmable exponent, or round horizontal tank calculations).

The displays, relays, and the analog output may be assigned to input channels A or B, or math result channel C. Three of the programming buttons can be set for custom operation. The analog input can be scaled to display the process in two different scales; for example, the main display could indicate level in feet and the second display could indicate the volume in gallons.

A fully loaded Helios PD2-6060 meter comes with four SPDT relays, a 4 20 mA output, two 24 VDC power supplies, five digital inputs and four digital outputs, and RS-485 serial communications. The four 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 features make the Helios an excellent addition to any system.

Ordering Information

85-265 VAC Models

Model	Standard Features	Options Installed
PD2-6060-6H0	5 Digital Inputs, 4 Digital Outputs, RS-485 Communications	No options
PD2-6060-6H7		4 relays 4-20 mA output

12-24 VDC Models

Model	Standard Features	Options Installed
PD2-6060-7H0	5 Digital Inputs, 4 Digital Outputs, RS-485 Communications	No options
PD2-6060-7H7		4 relays 4-20 mA output

Accessories

Model	Description
PDA0004	Cable Gland
PDA7485-I	RS-232 to RS-485 isolated converter
PDA8485-I	USB to RS-485 isolated converter
PDAPLUG2	Plastic Conduit Plug
PDX6901	Snubber: 0.01 µF/470 Ω, 250 VAC

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 can be connected directly to the Helios meter's on-board digital inputs. See *Remote Operation of Meter* on page *22* for details.

Light / Horn Accessories

Helios Meter Shown with MOD-PD2LHRB1 Red Light / Horn and Button. Meter Sold Separately.

Model	Description
MOD-PD2LHRB1	Red Light / Horn and Button Mounted and Wired to Helios[1]
MOD-PD2LHGB1	Green Light / Horn and Button Mounted and Wired to Helios[1]
MOD-PD2LHYB1	Yellow Light / Horn and Button Mounted and Wired to Helios[1]
MOD-PD2LHBB1	Blue Light / Horn and Button Mounted and Wired to Helios[1]
MOD-PD2LHWB1	White Light / Horn and Button Mounted and Wired to Helios[1]
MOD-PD2LH5CB1	Light / Horn with User Choice of Red, Green, Yellow, Blue or White Light, Button, Mounted and Wired to Helios[1]
MOD-PD2LH3CB1-RYG	Light / Horn with Red, Yellow, Green Light Layers, Button, Mounted and Wired to Helios[1]

Note:

1. Specify MOD-PD2LH model as a separate item on the order for the Helios to order the Light / Horn & Button accessory installed and wired. Meter is sold separately.

9 labels are provided for the button.

Pipe Mounting Kit

Helios Meter Shown mounted to pipe using PDA6260 pipe mounting kit. See *Pipe Mounting Instructions* on page *15* for details.

Model	Description
PDA6260	2" Pipe Mounting Kit for PD2

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

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.

Specifications

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

General

Display	Dual-line: 1.8" (46 mm) high, red LEDs
	6 digits per line (-99999 to 999999), with lead zero blanking
Display Intensity	Eight user selectable intensity levels. Default value is six.
Display Update Rate	5/second (200 ms)
LED Status Indicators	See *LED Status Indicators* on page *23* for details.
Overrange	Display flashes 999999
Underrange	Display flashes -99999
Display Assignment	Display Line 1: Channels A (Ch-A), B (Ch-B), or C (Ch-C), toggle between (Ch-A & Ch-B, Ch-A & Ch-C, Ch-B & Ch-C, and Ch-A, Ch-B, & Ch-C), toggle between channel & units, channel gross weight, toggle net and gross weights, set points, max & min values, or Modbus input. Display Line 2: Same as Display Line 1; plus units, tag or turned off.
Programming Methods	Four programming 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 cycled.
Rounding	Select 1, 2, 5, 10, 20, 50, or 100 (e.g. rounding = 10, value = 123.45, display = 123.50).
Tare	Tare function zeros out the meter to remove the weight of a container. Tare function can be assigned to a function key, F4 terminal, or a digital input. There are two tare functions: Capture Tare for channel A and B, and Reset Tare. See *Tare* (tArE A tArE b) on page *48* for details.
Reset Tare	Clears the tare function and returns the display to the value without tare (gross). Accessed via the Reset menu, function key, or digital input.
Non-Volatile Memory	All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

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.
Power Options	85-265 VAC 50/60 Hz; 90-265 VDC, 20 W max; 12-24 VDC, 12-24 VAC, 15 W max. Powered over USB for configuration only.
Fuse	Required external fuse: UL Recognized, 5 A max, slow blow; up to 6 meters may share one 5 A fuse
Normal Mode Rejection	Greater than 60 dB at 50/60 Hz
Isolation	4 kV input/output-to-power line 500 V input-to-output or output-to-P+ supply
Overvoltage Category	Installation Overvoltage Category II: Local level with smaller transient overvoltages than Installation Overvoltage Category III.

Environmental	Operating temperature range:
	  -40 to 65°C (-40 to 149°F)
	Storage temperature range:
	  -40 to 85°C (-40 to 185°F)
	Relative humidity:
	  0 to 90% non-condensing
	Note: Printed circuit boards are conformally coated.

Connections	Power, signal, relays, mA out: Removable screw terminal blocks accept 12 to 22 AWG wire. RS-485: Removable screw terminal block accepts 16 to 30 AWG wire. Digital I/O: Non-removable screw terminal blocks accept 16 to 30 AWG wire.
Enclosure	UL Type 4X, IP65 rated. Polycarbonate & glass blended plastic case, color: gray. Includes four PG11 through-hole conduit openings, with two factory installed PG11, IP68, black nylon threaded hole plugs with backing nuts.
Mounting	Wall Mounting: Four (4) mounting holes provided for mounting meter to wall. See *Wall Mounting Instructions* on page 14 for additional details. Pipe Mounting: Optional pipe mounting kit (PDA6260) allows for pipe mounting. Sold separately. See *Pipe Mounting Instructions* on page *15* for additional details.
Tightening Torque	Power, signal, relays, mA out terminals: 5 lb-in (0.56 Nm) Digital I/O and RS-485: 2.2 lb-in (0.25 Nm)
Overall Dimensions	10.63" x 12.59" x 4.77" (270 mm x 319.7 mm x 121.2 mm) (W x H x D)
Weight	6.10 lbs (2.76 kg)
Warranty	3 years parts & labor. See Warranty Information and Terms & Conditions on www.predig.com for complete details.

Dual Process Input

Two Inputs	Two non-isolated inputs, independent, field selectable: 0-20 mA, 4-20 mA, ±10 V (0-5 V, 1-5 V, 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 (Switch labeled P+/P-). 85-265 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 *Transmitter Supply Voltage Selection (P+, P-)* on page *17*. When the Light / Horn is powered by the transmitter power supply, see MOD-PD2LH Light / Horn's transmitter power supply specification in MOD-PD2LH manual for additional details. Light / Horn power not available for 5 or 10 VDC supplies.
Channels	Channel A, Channel B, Channel C (Math channel)

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

Math Functions	Name	Function	Setting
	Addition	(A+B+P)*F	5un¬
	Difference	(A-B+P)*F	d iF
	Absolute diff.	((Abs(A-B))+P)*F	d iFAb5
	Average	(((A+B)/2)+P)*F	AuG
	Multiplication	((A*B)+P)*F	n¬ult i
	Division	((A/B)+P)*F	d iU idE
	Max of A or B	((AB-Hi)+P)*F	H i-Ab
	Min of A or B	((AB-Lo)+P)*F	Lo-Ab
	Draw	((A/B)-1)*F	drAu¬
	Weighted avg.	((B-A)*F)+A	u¬ AuG
	Ratio	(A/B)*F	rAt io
	Ratio 2	((B-A)/A)+P)*F	rAt io2
	Concentration	(A/(A+B))*F	ConcEn

*Note: The F constant can be any value from 0.001 to 999.999. If the value is less than 1, it will have the same effect as a divider. For example, the average could also be derived by using (A+B)*F, where F = 0.500.*

Sequence of Operations for Input Programming	1. Select Input for A and B 2. Set up the engineering units for A, B, and C 3. Set up decimal point for A, B, and C 4. Program A & B 5. Set up the displays for A, B, or C 6. Select the transfer function for A & B (e.g. Linear) 7. Select Math function for Channel C 8. Program constants for Factor (F) and Adder (P). 9. Program cutoff values for A and B
Accuracy	±0.03% of calibrated span ±1 count, square root & programmable exponent accuracy range: 10-100% of calibrated span
Temperature Drift	0.005% of calibrated span/°C max from 0 to 65°C ambient, 0.01% of calibrated span/°C max from -40 to 0°C ambient

Input Signal Conditioning	Linear, square root, programmable exponent, or round horizontal tank volume calculation
Multi-Point Linearization	2 to 32 points for channel A and B
Programmable Exponent	User selectable from 1.0001 to 2.9999 for open channel flow
Low-Flow Cutoff	0.1 to 999,999 (0 disables cutoff function). Point below at which display always shows zero.
Decimal Point	Up to five decimal places or none: *dddddd*, *ddddd*, *dddd*, *ddd*, *dd*, or *dddddd*

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 Incompatible	The meter can support ONLY one HART loop on either of the inputs. A signal isolator, such as the PD659 is required if two HART loops are being connected. Under the described conditions, 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	4 SPDT (Form C) internal and rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP (≈ 50 W) @ 125/250 VAC for inductive loads
Noise Suppression	Noise suppression is recommended for each relay contact switching inductive loads. See *Switching Inductive* Loads on page *19* for details.
Relay Assignment	Relays may be assigned to Ch-A, Ch-B, Ch-C, or Modbus input
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 (2-4 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 digital input, 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. *Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.*
Auto Initialization	When power is applied to the meter, relays will reflect the state of the input to the meter.

USB Connection

Function	Programming only
Compatibility	USB 2.0 Standard, Compliant
Connector Type	Type B receptacle
Cable	USB Type A-B cable
Driver	Microsoft® Windows® XP/Vista/7/8/10
Power	USB port provides power to the meter. ***DO NOT*** apply AC or DC power to the meter while the USB port is in use.

Isolated 4-20 mA Transmitter Output

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

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

0-10 VDC Output	The PD659-1MA-1V can convert the optional 4-20 mA output to a 0-10 VDC output

RS-485 Serial Communications

Compatibility	EIA-485
Connectors	Removable screw terminal connector
Max Distance	3,937' (1,200 m) max
Status Indication	Separate LEDs for Power (P), Transmit (TX), and Receive (RX)

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)

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

Digital Input (F4)

Function	Remote operation of front-panel buttons, acknowledge/reset relays, reset max/min values. See *Function Keys & Digital I/O Available Settings* on page *47* for a complete list of capabilities.
Contacts	3.3 VDC on contact. Connect normally open contacts across F4 to COM
Logic Levels	Logic High: 3 to 5 VDC Logic Low: 0 to 1.25 VDC

Digital Inputs & Outputs

Function	Terminals provided for remote operation of all four programming / operation buttons (use PDA2364-MRUE control station). Other uses include acknowledge/reset relays and reset max/min values. See *Function Keys & Digital I/O Available Settings* on page *47* for a complete list of capabilities.
Channels	4 digital inputs & 4 digital outputs
Digital Input Logic High	3 to 5 VDC
Digital Input Logic Low	0 to 1.25 VDC
Digital Output Logic High	3.1 to 3.3 VDC
Digital Output Logic Low	0 to 0.4 VDC
Source Current	10 mA maximum output current
Sink Current	1.5 mA minimum input current
+5 V Terminal	To be used as pull-up for digital inputs only. Connect normally open push buttons across +5 V & DI 1-4.

⚠ WARNING

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

MeterView Pro Software

Availability	Download directly from meter or from www.predig.com/download_software
System Requirements	Microsoft® Windows® XP/Vista/7/8/10
Communications	USB 2.0 (for programming only) (Standard USB A to USB Type B) 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. ***DO NOT*** apply AC or DC power to the meter while the USB port is in use.

Compliance Information

Safety

UL & C-UL Listed	USA & Canada UL 508 Industrial Control Equipment (USA) C22.2 No. 142 (Canadian National Standard)
UL File Number	E160849
Enclosure	UL Type 4X, NEMA 4X, IP65
Low Voltage Directive	EN 61010-1 Safety requirements for measurement, control, and laboratory use

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.

Installation

There is no need to open the clear plastic front cover in order to complete the installation, wiring, and setup of the meter. All programming is done using MeterView Pro software or through the buttons and switches located under the lower door panel and are accessible by removing the single securing screw. Wires should be run through the knockout holes located on the bottom of the meter, see *Figure 5. Conduit Holes Location – Bottom View* on page *14* for details.

There are a total of four pre-drilled conduit entry holes located at the bottom of the meter. If the need to drill additional holes arises, make sure you will have the clearance necessary for conduit mounting hardware.

Do not disconnect the RJ45 connector found on the right side of the meter wiring board. Doing so will disable the on-board digital I/O, RS-485 serial communications, and M-Link functionality.

Instructions are provided for changing the transmitter power supply to output 5 or 10 VDC instead of 24 VDC, see *Figure 8. Transmitter Supply Voltage Selection* on page *17*.

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.

Wall Mounting Instructions

The meter can be mounted to any wall using the four provided mounting holes. Note that the bottom mounting holes are located underneath the lower door panel. To mount the meter to a wall, follow these instructions

- Prepare a section of wall approximately 11" x 13" (280 mm x 330 mm) for meter mounting by marking with a pencil the mounting holes (shown in *Figure 1*) on the wall.

- Select the appropriate mounting screws for the mounting surface to be used. The mounting holes diameter is shown on *Figure 2*.
  Note: Mounting screws are not included.

- Using a drill bit slightly smaller than the girth of the mounting screws, pre-drill holes at the mounting locations previously marked.

- Insert mounting screws into the four mounting holes and screw them into the pre-drilled holes. **DO NOT** overtighten the mounting screws as it is possible that the enclosure could crack and become damaged.
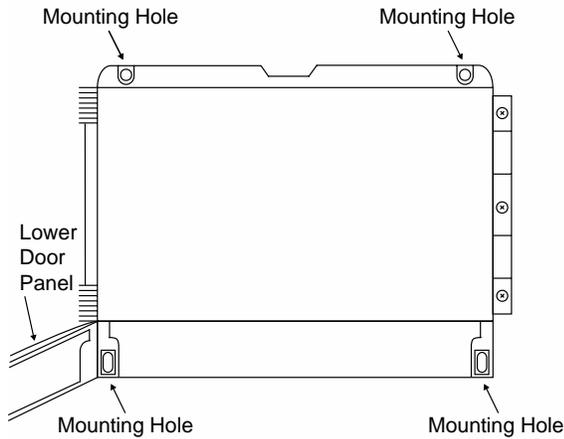

Figure 1. Meter Mounting Holes Location
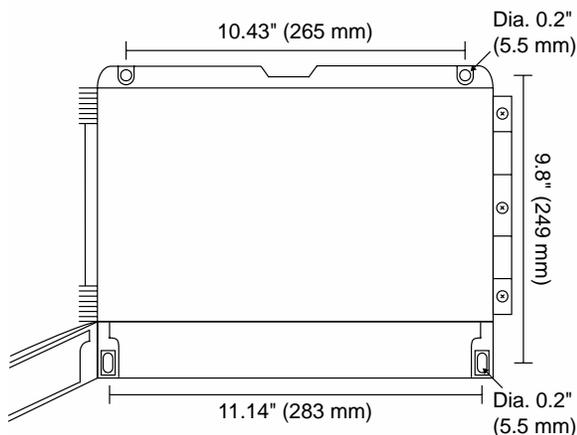
**Figure 2. Meter Mounting Holes Dimensions**

Mounting Dimensions
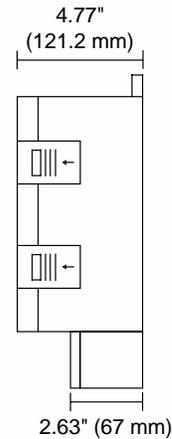
Figure 3. Meter Dimensions – Side View
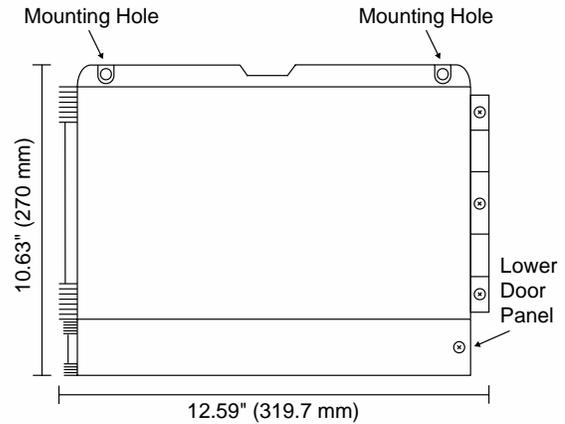
Figure 4. Meter Dimensions - Front View

Conduit Holes Location

Figure 5. Conduit Holes Location – Bottom View

14
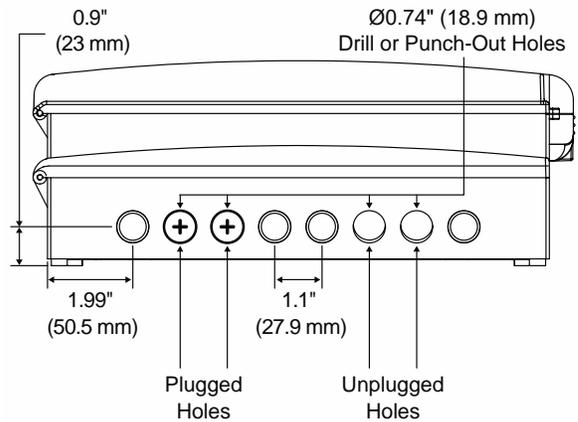
Pipe Mounting Instructions

The meter can also be mounted to a pipe using the optional pipe mounting kit (PDA6260). This kit includes two mounting plates, two U-bolts, and the necessary nuts and bolts. To mount the meter to a pipe using the pipe mounting kit accessory, follow these instructions.

- Secure the mounting plates to the top and bottom (for vertical pipes) or left and right (for horizontal pipes) of the reverse side of the meter enclosure using the provided fasteners.
  DO NOT overtighten the fasteners as it could cause damage to the enclosure.
- Using the provided nuts and U-bolts, secure the mounting plates to the pipe applying enough torque such that the meter cannot be moved up or down (or side to side).
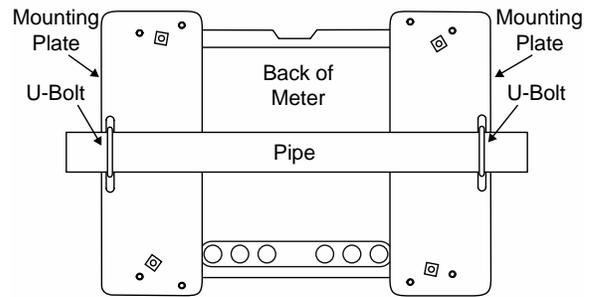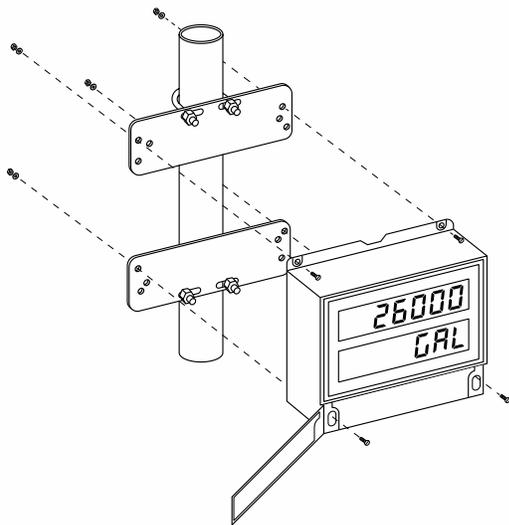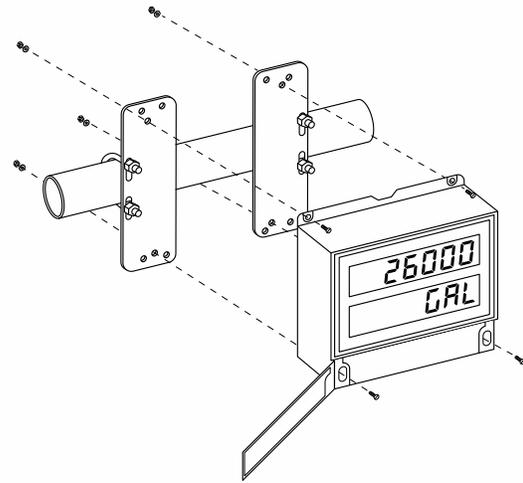
Figure 7. Horizontal Pipe Mount Assembly
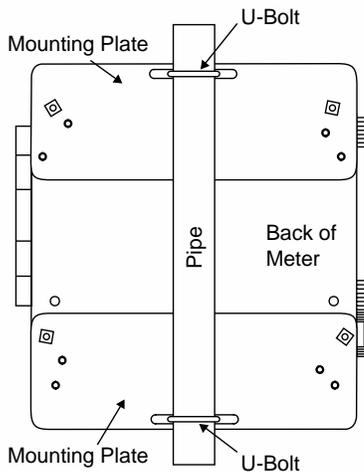
Figure 6. Vertical Pipe Mount Assembly

Installation Overview

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

1. **DO NOT** apply AC or DC power to the meter.
2. Connect the meter to the PC with the USB cable provided. **DO NOT** use a different USB cable.
3. If MeterView Pro (MVPro) is already installed in your computer, then the program will launch automatically in most systems. If the program does not start automatically, double-click on the MVPro icon.
4. If MVPro is not installed, follow the instructions provided below.
5. Use MVPro to configure the meter for your application.
6. Disconnect the USB cable from the meter.
7. Apply power and signal and check operation of the meter.
8. Install the meter and put into service.
9. Make any programming adjustments using the front panel buttons.

MeterView Pro Software

The easiest and quickest way to program your Helios meter is to use the FREE MeterView Pro programming software. This software is loaded into the meter and connects and installs directly to your PC with the USB cable provided. **DO NOT** use a different USB cable. We recommend that the first thing you do after taking the meter out of the box is connect the Helios to your PC with the provided USB cable. **DO NOT** apply AC or DC power to the meter while your PC is connected to the meter as it will disrupt the USB connection. It is not necessary to apply an input signal.

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

> **Watch Meterview Pro Software Video at**
> **www.predig.com/meterviewpro**

MeterView Pro Installation

1. Connect one end of the provided USB cable to the meter and the other end to the computer. The computer will automatically install the driver software it needs to talk to the meter. Follow the on-screen instructions and allow sufficient time for the process to complete. This can take a few minutes. If the process is interrupted, then it could leave the system in an unstable condition.

⚠ WARNINGS

- Only one meter may be connected at a time. Attaching multiple meters will cause a conflict with the meter software.
- **DO NOT** apply AC or DC power to the meter when using the USB connection.

2. Once the driver is installed, an AutoPlay dialog should appear for the drive "MAINSTAL." Click "Open folder to view files."

If the computer does not display an AutoPlay dialog for the drive "MAINSTAL," you should open My Computer and double-click on the drive labeled "MAINSTAL."
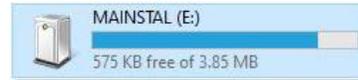
3. Double-click on the file named "MAStart." The program will open a few windows and install two programs on your computer. Simply follow the on-screen instructions until you see one of the dialogs below. If you receive a "User Account Control" warning, click "Yes."
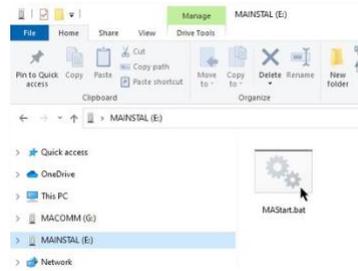
4. If there is an update available, click the "Update" button to install the new version. Otherwise, click "Configure" to begin programming your meter.
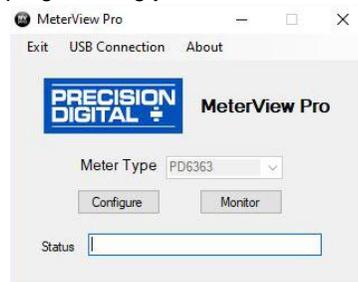
> **Note:** If you decide to update your MeterView Pro software, once the installation has completed, you will be asked if you want to update the setup files located on the meter itself. This way, you will always have the most current version on the meter for future installs.

⚠ WARNING

- **DO NOT** unplug the meter while the new installation files are being written to it. The meter will display ʋʊɼ ɩʈ٤ during the process and you will receive an on-screen notification once the process is complete.

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 switch labeled P+/P- must be configured accordingly.

To access the voltage selection switch:

1. Turn off the power to the meter.
2. Unscrew and open the lower door panel.
3. Locate the P+/P- switch located in the center of the connections board (see diagram below).
4. Flip this switch into the appropriate position for the required transmitter excitation.
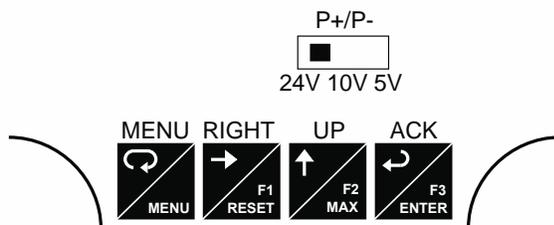
Figure 8. Transmitter Supply Voltage Selection

Connections

All connections are made to screw terminal connectors located under the lower door panel. Remove the single securing screw in order to access the wiring terminals.

> ⚠ **CAUTION**

- Use copper wire with 60°C or 60/75°C insulation 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 inside of the lower door panel, shows the location of all connectors available with the ordered configuration.

> ⚠ **WARNINGS**

- **DO NOT** connect any equipment to the RJ45 M-LINK connector. Otherwise damage will occur to the equipment and the meter.
- **DO NOT** disconnect the RJ45 connector located to the left of the power terminal block. Doing so will disable the on-board digital I/O, and the RS-485 serial communications.
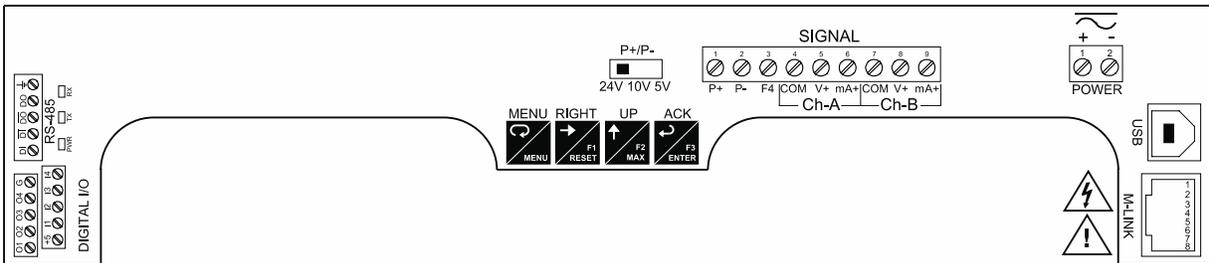
Figure 9. PD2-6060-6H0 / 7H0 Connectors Label
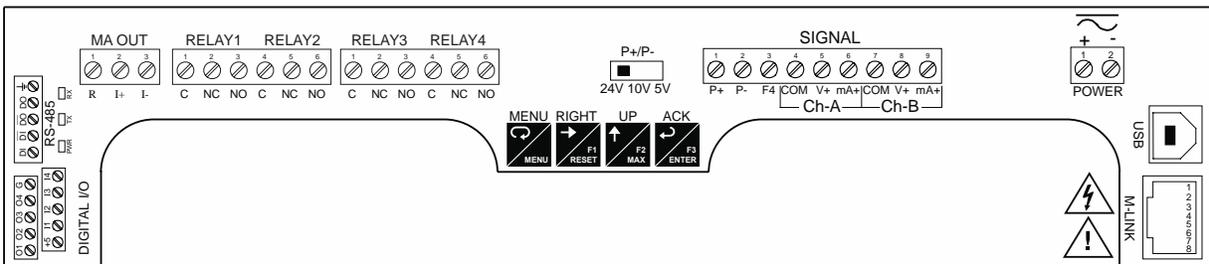
Figure 10. PD2-6060-6H7 / 7H7 Connectors Label

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 *6* for details.

POWER

AC or DC POWER
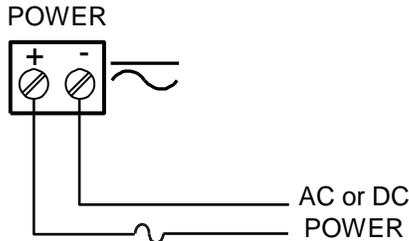
Required External Fuse:
5 A max, 250 V Slow Blow

Figure 11. Power Connections

Signal Connections

Signal connections are made to a nine-terminal connector labeled SIGNAL. The COM (common) terminals are the return for the 4-20 mA and the ±10 V input signals. The two COM terminals connect to the same common return, and are not isolated.

Current and Voltage Connections

The following figures show examples of current and voltage connections.

There are no switches or jumpers to set up for current and voltage inputs. Setup and programming is performed through the front panel buttons or MeterView Pro software.
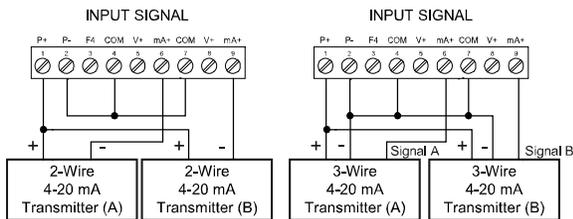
Figure 12. Transmitters Powered by Internal Supply
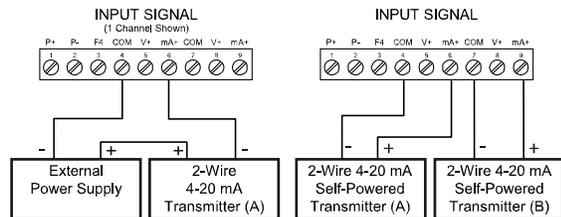
Figure 13. Transmitter Powered by Ext. Supply or Self-Powered

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.
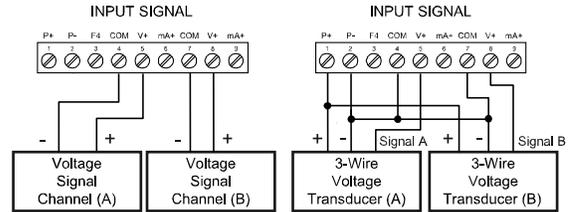
Figure 14. Voltage Input Connections

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

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.
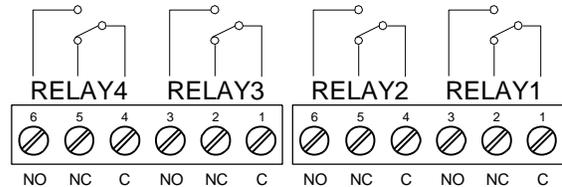
Figure 15. Relay Connections

Switching Inductive Loads

The use of snubbers to suppress electrical noise is strongly recommended when switching inductive loads to prevent disrupting the microprocessor's operation. The snubbers also prolong the life of the relay contacts. Suppression can be obtained with resistor-capacitor (RC) networks assembled by the user or purchased as complete assemblies. Refer to the following circuits for RC network assembly and installation:
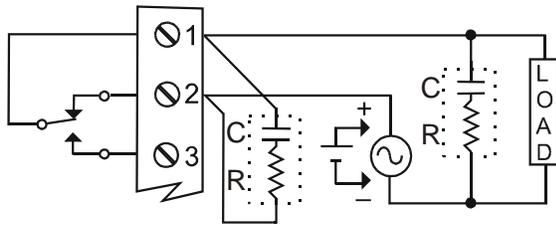
Figure 16. AC and DC Loads Protection

Choose R and C as follows:

R: 0.5 to 1 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.*
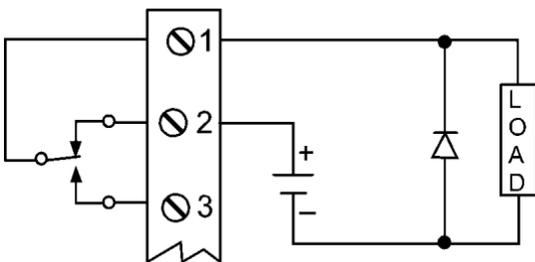
Use a diode with a reverse breakdown voltage two to three times the circuit voltage and forward current at least as large as the load current.

Figure 17. Low Voltage DC Loads Protection

RC Networks (Snubbers) 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.

RS-485 Connections

The RS-485 connections are made to a five terminal connector used for Modbus® RTU serial communications. The RS-485 terminals include Transmit Data (DO) and (/DO), Receive Data (DI) and (/DI), and Signal Ground. See *Modbus RTU Serial Communications* (𝖲𝖾𝗋 𝗂𝖠𝖫) on page *44* for more information.

There are three diagnostic LEDs: Power (PWR) Transmit Data (TX), and Receive Data (RX) to show when the meter is transmitting and receiving data from other devices.
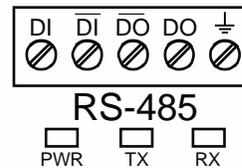
Figure 18. RS-485 Connection

RS-485 Multi-Drop Connection

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) can be programmed between 1 and 247. The transmit delay can be set between 0 and 199 ms. The parity can be set to even, odd, or none with 1 or 2 stop bits.

To change the meter address:
1. Press and hold the Menu button for three seconds to access Advanced Features menu of the meter.
2. Press Up arrow until Serial (𝖲𝖾𝗋 𝗂𝖠𝖫) menu is displayed and press Enter, 𝖠𝖽𝖽𝗋𝖤𝖲 is displayed.
3. Press Enter to change meter address using Right and Up arrow buttons. Press Enter to accept.
4. Press Menu button to exit and return to Run Mode.

RS-485 Serial Converters

To convert the RS-485 to RS-232, use the PDA7485-I converter. To convert the RS-485 to USB, use the PDA8485-I converter. See *Ordering Information* on page *6* for additional information.

RS-485 Connection Examples
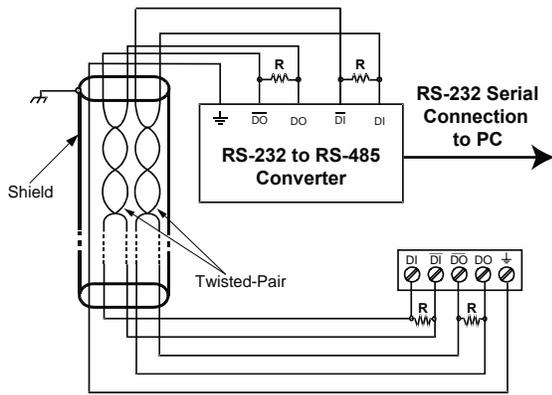
Figure 19. Five-Wire RS-485 Connections
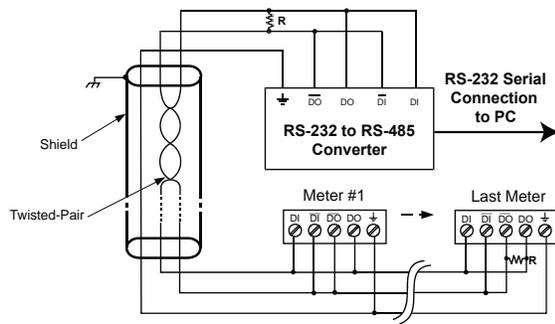
Figure 20. Three-Wire RS-485 Multi-Drop Connections

Notes:

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

RS-485 Converter Connections

Figure 21 below details the wiring connections from the RS-485 connector to an RS-485 serial converter (such as the PDA7485-I or PDA8485-I) for a five-wire network.

RS-485 Connector to RS-485 Serial Converter Connections	
RS-485 Connector	RS-485 to USB or RS-232 Converter
⏚	⏚
$\overline{DO}$	$\overline{DI}$
DO	DI
$\overline{DI}$	$\overline{DO}$
DI	DO

Figure 21. Connections for RS-485 Connector to Serial Converter

Three-Wire Connection

In order to wire the five pins for use as a three-wire half-duplex RS-485 connection, it is necessary to create a jumper connection between DI to DO and /DI to /DO- as shown below.
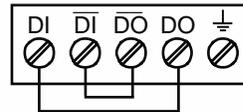
Figure 22. Three-Wire RS-485 Connection

Digital I/O Connections

Digital inputs and outputs are provided in order to expand the functionality of the meter. Digital input connections are made via a push button or switch to the appropriate digital input terminal and the +5 VDC terminal. Digital output connections are made by wiring from the appropriate digital output terminal to the ground terminal.
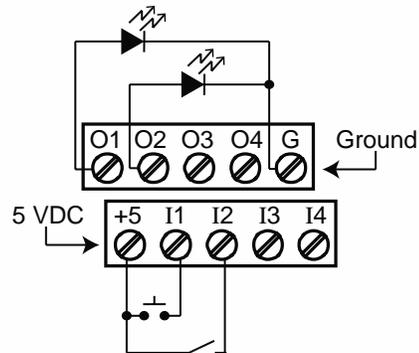
Figure 23. Digital Input and Output Connections

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 *47* for a complete list of capabilities.
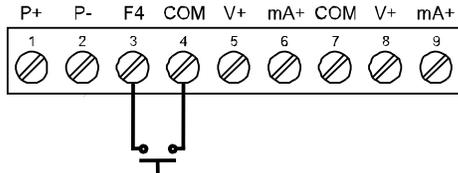
Figure 24. F4 Digital Input Connections

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.
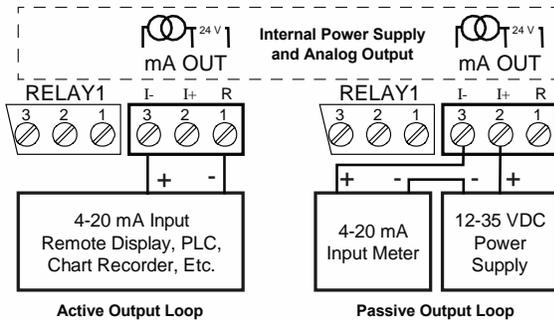
Figure 25. 4-20 mA Output Connections

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.
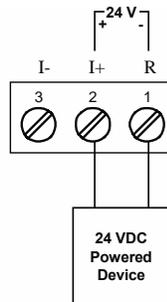
Figure 26. Analog Output Supply Powering Other Devices

Remote Operation of Meter

The meter can be operated via the programming buttons or a PDA2364-MRUE remote control station using the digital inputs and outputs connections as illustrated in *Figure 27. Meter to PDA2364-MRUE Control Station Connection.*
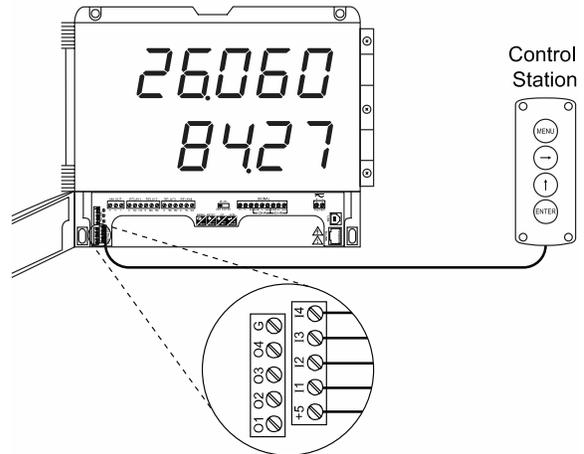
Figure 27. Meter to PDA2364-MRUE Control Station Connection

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 *39*.

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.
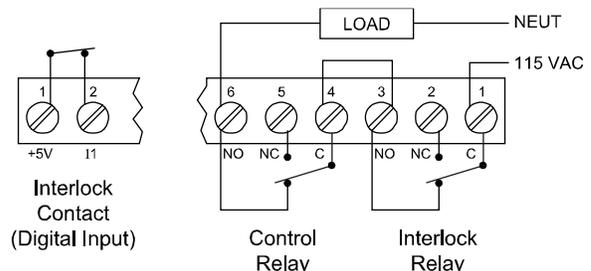
Figure 28. Interlock Connections

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 programming buttons.

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

LED Status Indicators

LED	State	Indication
1-4	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)
1-4	Flashing	Relay interlock switch open
1-4 & M	Flashing	Relay in manual control mode
T	Flashing	Meter in Tare mode
M	Flashing	Analog output in manual control mode
A	Steady	Channel A displayed
B	Steady	Channel B displayed
C	Steady	Channel C displayed

Programming Buttons

Lower Door Panel
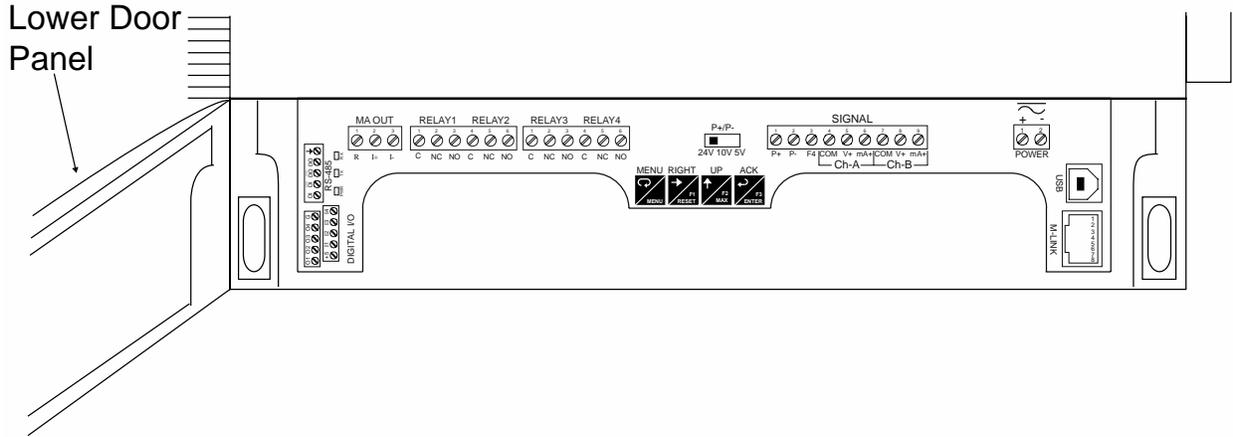
Button	Description
MENU / MENU	**Menu**
RIGHT / F1 RESET	**Right Arrow/F1**

Button	Description
UP / F2 MAX	**Up Arrow/F2**
ACK / F3 ENTER	**Acknowledge (Enter)/F3**

- 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.

Remote Buttons

The meter can be operated via a remote control station (PDA2364-MRUE) using the digital input connections. The PDA2364-MRUE mimics the Helios's four programming buttons: Menu, Right Arrow, Up Arrow, and Enter.

See *Remote Operation of Meter* on page *22* for details.

Display Functions & Messages

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 *Setup* menu
InPut	*Input*	Enter *Input* selection menu
Ch-A	*Input*	Set input type for channel A (*or B)
n˥A	*4-20 mA*	Set meter for 4-20 mA input
UoLt	*0-10 VDC*	Set meter for ±10 VDC input
un˥t5	*Unit*	Select the display units/tags
Ch-A	*Unit*	Set unit or tag for channel A (*or B or C)
dEc Pt	*Decimal point*	Set decimal point
Ch-A	*Decimal point*	Set decimal point for channel A (*or B or C)
ProG	*Program*	Enter the *Program* menu
InCAL	*Input calibration*	Enter the *Input Calibration* menu
Ch-A	*Input A*	Set input type for channel A (*or B)
5CAL A	*Scale A*	Enter the *Scale* menu for channel A
5CAL b	*Scale B*	Enter the *Scale* menu for channel B
CAL A	*Calibrate A*	Enter the *Calibration* menu for channel A
CAL b	*Calibrate B*	Enter the *Calibration* menu for channel B
InP 1	*Input 1*	Calibrate input 1 signal or program input 1 value
d˥5 1	*Display 1*	Program display 1 value
InP 2	*Input 2*	Calibrate input 2 signal or program input 2 value (up to 32 points)
d˥5 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 *Display* menu
L˥nE 1	*Line 1*	Assign line 1 parameter
L˥nE 2	*Line 2*	Assign line 2 parameter
d Ch-A	*Display Ch-A*	Assign display to channel A
d Ch-b	*Display Ch-B*	Assign display to channel B
d Ch-C	*Display Ch-C*	Assign display to channel C (math)
d Ab	*Display AB*	Alternate display of channel A & B
d AC	*Display AC*	Alternate display of channel A & C
d bC	*Display BC*	Alternate display of channel B & C

Display Functions & Messages		
Display	**Parameter**	**Action/Setting Description**
d AbC	*Display ABC*	Alternate display of channel A, B, & C
d SEt 1	*Display set 1**	Displays relay 1(*through 4) set point.
d H˥-A	*Display high A*	Display high value of channel A
d Lo-A	*Display low A*	Display low value of channel A
d HL-A	*Display hi/low A*	Alternate between high/low value of channel A
d H˥-b	*Display high B*	Display high value of channel B
d Lo-b	*Display low B*	Display low value of channel B
d HL-b	*Display high/low B*	Alternate between high/low value of channel B
d H˥-C	*Display high C*	Display high value of channel C
d Lo-C	*Display low C*	Display low value of channel C
d HL-C	*Display high/low C*	Alternate between high/low value of channel C
d A-u	*Display A and units/tags*	Alternate display of channel A and the unit/tag
d b-u	*Display B and units/tags*	Alternate display of channel B and the unit/tag
d C-u	*Display B and units/tags*	Alternate display of channel C and the unit/tag
A GroS	*Display A gross*	Display input channel A gross (no tare)
A nt-G	*Display A net and gross*	Alternate display of channel A net (tare) and gross (no tare)
b GroS	*Display B gross*	Display input channel B gross (no tare)
b nt-G	*Display B net and gross*	Alternate display of channel B net (tare) and gross (no tare)
n˥ buS	*Display Modbus*	Display Modbus input register
d oFF	*Display off*	Display blank (line 2)
d un˥t	*Display unit*	Display line 1 channel units
d-˥ntY	*Display intensity*	Set display intensity level from 1 to 8
rELAY	*Relay*	Enter the *Relay* menu
A55˥Gn	*Assignment*	Assign relays to channels or Modbus
A5˥Gn 1	*Assign 1*	Relay 1 assignment
Ch-A	*Channel A**	Assign relay to channel A (*or B or C)
n˥ buS	*Modbus*	Assign relay to Modbus register
rLY 1	*Relay 1*	Relay 1 setup
Act 1	*Action 1*	Set relay 1 action

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\multicolumn{3}{c}{**Display Functions & Messages**}		
Display	**Parameter**	**Action/Setting Description**
Auto	*Automatic*	Set relay for automatic reset
A-nָAn	*Auto-manual*	Set relay for auto or 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
SAnָPL	*Sample*	Set relay for sample time trigger control
OFF	*Off*	Turn relay off
FAiLSF	*Fail-safe*	Enter *Fail-safe* menu
FLS 1	*Fail-safe 1*	Set relay 1 (*through 4) fail-safe operation
on	*On*	Enable fail-safe operation
oFF	*Off*	Disable fail-safe operation
dELAY	*Delay*	Enter relay *Time Delay* menu
dLY 1	*Delay 1*	Enter relay 1 time delay setup
On 1	*On 1*	Set relay 1 On time delay
OFF 1	*Off 1*	Set relay 1 Off time delay
dLY 2	*Delay 2*	Enter relays 2-4 time delay setup
brEAH	*Loop break*	Set relay condition if loop break detected
iGnorE	*Ignore*	Ignore loop break condition (Processed as a low signal condition)
On	*On*	Relay goes to alarm condition when loop break detected
OFF	*Off*	Relay goes to non-alarm condition when loop break detected
Aout	*Analog output*	Enter the *Analog output* scaling menu
AOut 1	*Aout channel*	Analog Output source channel
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 *Reset* menu
rSt Hi	*Reset high*	Press Enter to reset max display
rSt Lo	*Reset low*	Press Enter to reset min display

**Display Functions & Messages**		
Display	**Parameter**	**Action/Setting Description**
rSt HL	*Reset high & low*	Press Enter to reset max & min displays
rSt tr	*Reset tare*	Press Enter to reset (cancel) tare
Contrl	*Control*	Enter *Control* menu
Auto	*Automatic*	Press Enter to set meter for automatic operation
nָAn	*Manual*	Press Enter to manually control relays or analog output operation
PASS	*Password*	Enter the *Password* menu
PASS 1	*Password 1**	Set or enter Password 1 (*through 3)
unLoc	*Unlocked*	Program password to lock meter
Locd	*Locked*	Enter password to unlock meter
999999 -99999	*Flashing*	Over/under range condition

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Main Menu

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

- Press Menu button to enter Programming Mode then press the Up arrow button to scroll main menu.
- Press Menu, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing Enter are not saved.
- Changes to the settings are saved to memory only after pressing Enter.
- The display moves to the next menu every time a setting is accepted by pressing Enter.
-
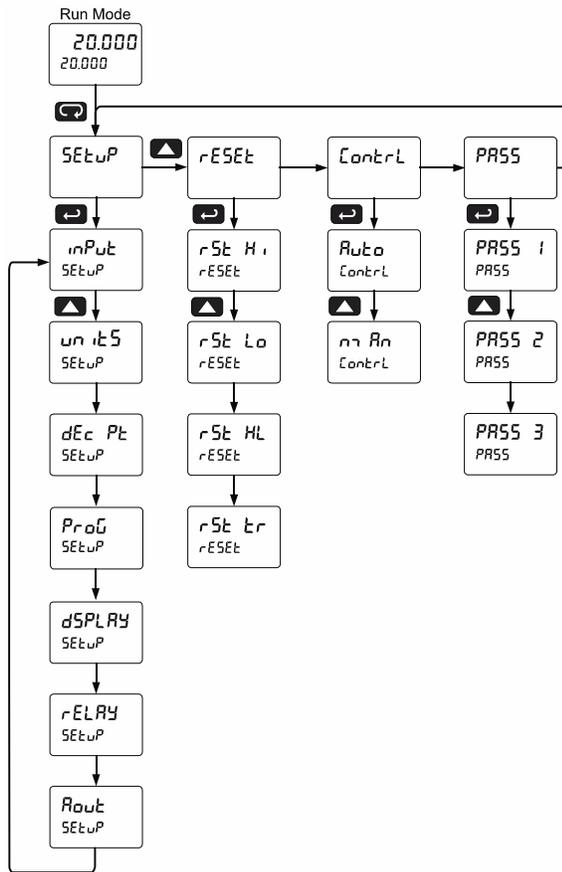
Setting Numeric Values

The numeric values are set using the Right and Up arrow buttons. Press Right arrow to select next digit and Up arrow to increment digit value. The digit being changed is displayed brighter than the rest.

Press and hold Up to auto-increment the display value. If negative numbers are allowed, the first digit position will include a negative symbol (-) after the 9.

Press the Enter button, at any time, to accept a setting or Menu button to exit without saving changes.
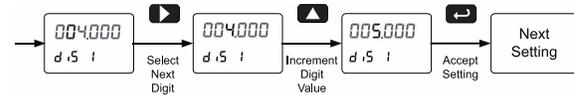
Setting Up the Meter (SEtuP)

The *Setup* menu is used to select:

1. Input signal the meter will accept for channel A and channel B
2. Units for A, B, and C
3. Decimal point position for A, B, and C
4. Program the meter using the Scale or Calibrate functions
5. Display parameter and intensity
6. Relay assignment and operation
7. 4-20 mA analog output scaling

Press the Menu button to exit at any time.
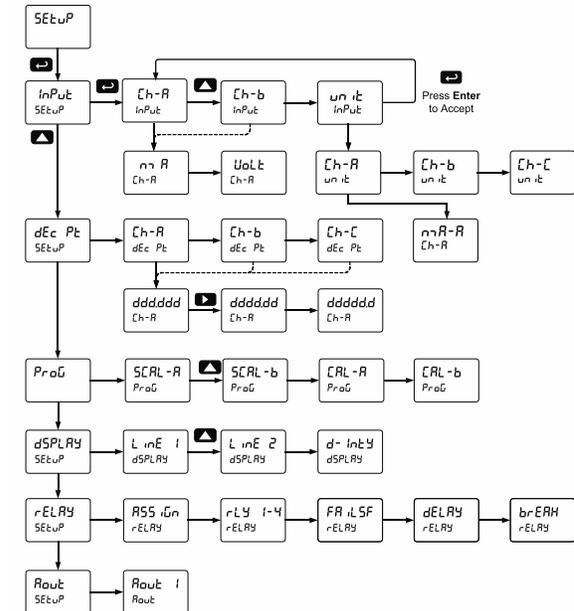
Setting the Input Signal (InPut)

Enter the *Input* menu to set up the meter to display current (nⁱA) or voltage (UoLt) inputs for channel A and channel B.

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.

Channel C is the Math Function calculation, which is set up in the Advanced Features menu.
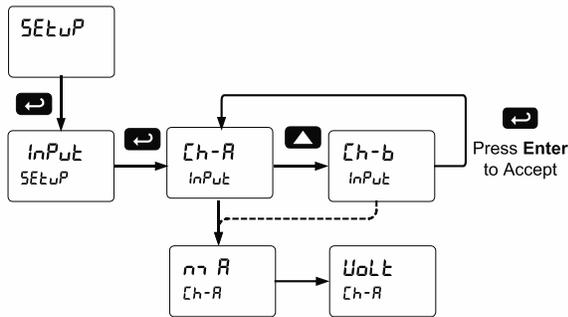
Setting the Display Units or Custom Tags (unitS)

Enter the display unit or custom tag that will be displayed if alternating process input and units is selected in the unitS menu, or d unit is selected as the lower display parameter. See the *Setting the Display Parameter & Intensity* (dSPLAY) flow chart on page 31 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 7-segment character set:

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

Notes:

1. *Degree symbol represented by (<) if programming with MeterView Pro.*
2. *The letters "m" and "w" use two 7-segment LEDs each; when selected the characters to the right are shifted one position.*
3. *Press and hold up arrow to auto-scroll the characters in the display.*

Setting the Decimal Point (dEc Pt)

The decimal point may be set with up to five decimal places or with no decimal point at all.

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.

There are three decimal points to set up for three channels: Ch-A, Ch-B, and Ch-C.

After the decimal points are set up, the meter moves to the *Program* menu.
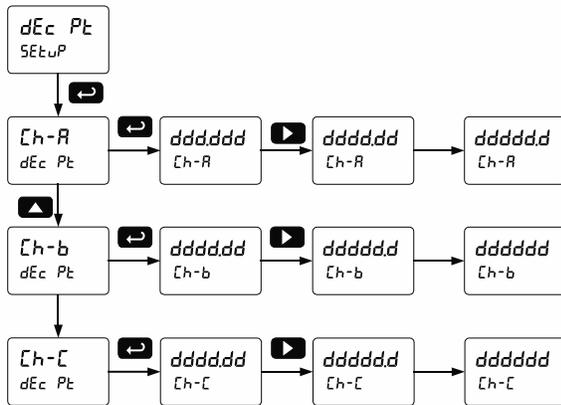
Programming the Meter (ProG)

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.

*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) on page 45 for details.*
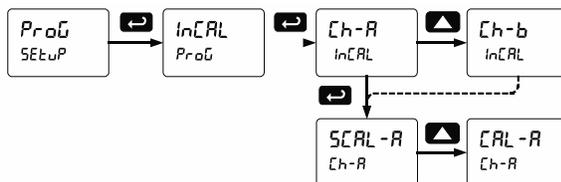
Multi-Point Linearization (LinEAr)

The process inputs may be calibrated or scaled to any display value within the range of the meter. The meter is set up at the factory for 2-point linear calibration.

Up to 32 linearization points may be selected. *See Multi-Point Linearization (LinEAr) on page 45 for details.*

Scaling the Meter (SCALE)

The process inputs (4-20 mA, ±10 VDC) can be scaled to display the process variables in engineering units.

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

Scaling the Meter for Channel A (SCAL-A)
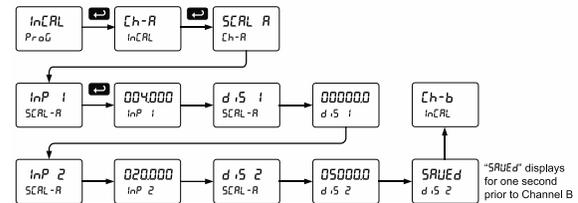
"SAUEd" displays for one second prior to Channel B

Scaling the Meter for Channel B (SCAL-b)

"SAUEd" displays for one second prior to completion.
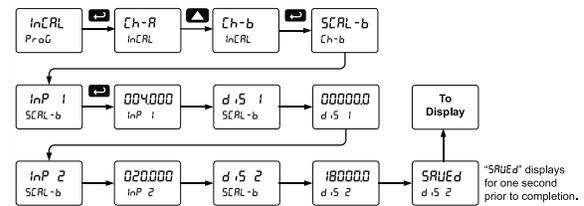
> For instructions on how to program numeric values see *Setting Numeric* Values, page *27*.

Error Message (Error)

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

After the error message is displayed, the meter reverts to input 2 during calibration or scaling 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

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.

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

Calibrating the Meter with External Source (`CAL`)

> *Note: To scale the meter without a signal source, refer to Scaling the Meter (`SCALE`) on page 29.*

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

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

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

Calibrating the Meter for Channel A (`CAL-A`)
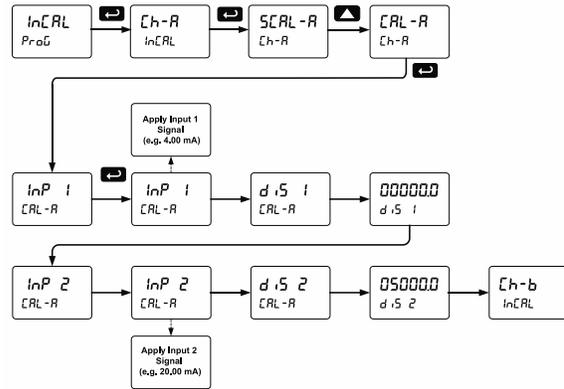
Note: Inputs for the above example are:
Input 1: 4.00 mA; Display 1: 0.0 Gallons
Input 2: 20.00 mA; Display 2: 5000.0 Gallons

Calibrating the Meter for Channel B (`CAL-b`)
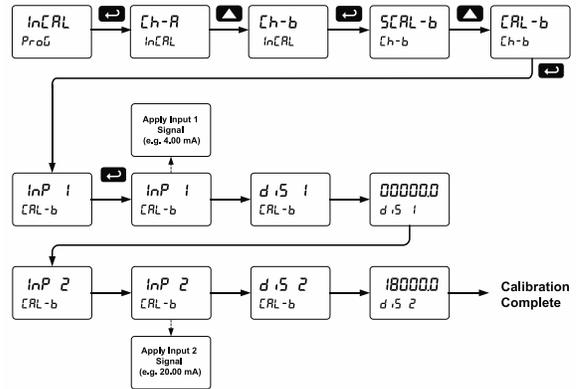
Note: Inputs for the above example are:
Input 1: 4.00 mA; Display 1: 0.0 Gallons
Input 2: 20.00 mA; Display 2: 18000.0 Gallons

Setting the Display Parameter & Intensity (dSPLAY)

Display line 1 can be programmed to display:

1. Process value Ch-A
2. Process value Ch-B
3. Process value Ch-C
4. Toggle between Ch-A & Ch-B, Ch-A & Ch-C, Ch-B & Ch-C, and Ch-A, Ch-B, & Ch-C
5. Relay set points
6. Max & min values for each channel
7. Toggle between Channel & units
8. Channel gross value (no tare) or toggle net (tare) and gross values
9. Modbus input

Display line 2 can be programmed to display:

1. Process value Ch-A
2. Process value Ch-B
3. Process value Ch-C
4. Toggle between Ch-A & Ch-B, Ch-A & Ch-C, Ch-B & Ch-C, and Ch-A, Ch-B, & Ch-C
5. Relay set points
6. Max & min values for each channel
7. Toggle between Channel & units
8. Channel gross value (no tare) or toggle net (tare) and gross values
9. Modbus input
10. Off (no display)
11. Engineering units or custom legends

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

The displays can be set up to read channels A, B, or C, toggle between A & B, B & C, A & C, A & B & C, toggle between channels A, B, or C & units, the max/min of any of the channels, including the math channel (C), set points, gross (without tare) or net (with tare) & gross values of channel A or B, or the Modbus input. In addition to the parameters available on the Upper display, the Lower display can display Engineering units or it could be turned off.

Display Intensity (d-IntY)

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.
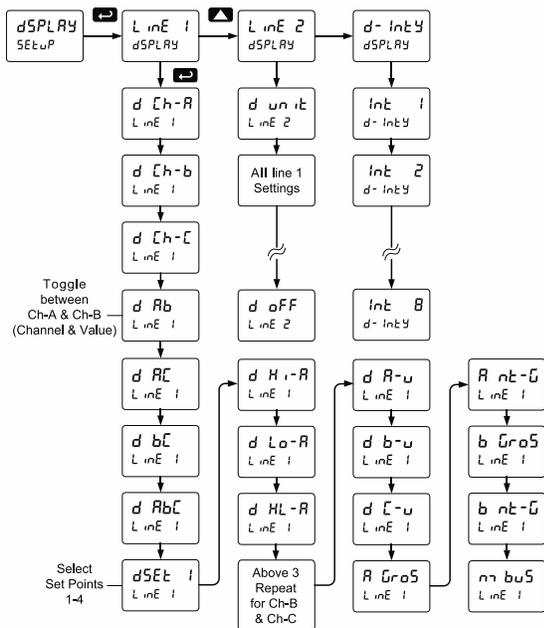
Setting the Relay Operation (rELAY)

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

> ⚠️ **CAUTION**
>
> • During setup, the relays do not follow the input and they will remain in the state found prior to entering the Relay menu.

1. Relay assignment
   a. Channel A
   b. Channel B
   c. Channel C (Math channel)
   d. Modbus
2. Relay action
   a. Automatic reset only (non-latching)
   b. Automatic + manual reset at any time (non-latching)
   c. Latching (manual reset only)
   d. Latching with Clear (manual reset only after alarm condition has cleared)
   e. 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)
3. Set point
4. Reset point
5. Fail-safe operation
   a. On (enabled)
   b. Off (disabled)
6. Time delay
   a. On delay (0-999.9 seconds)
   b. Off delay (0-999.9 seconds)
7. Relay action for loss (break) of 4-20 mA input (ignore, on, off)

Note: The setup for relays 2-4 follows the same pattern shown here for relay 1.
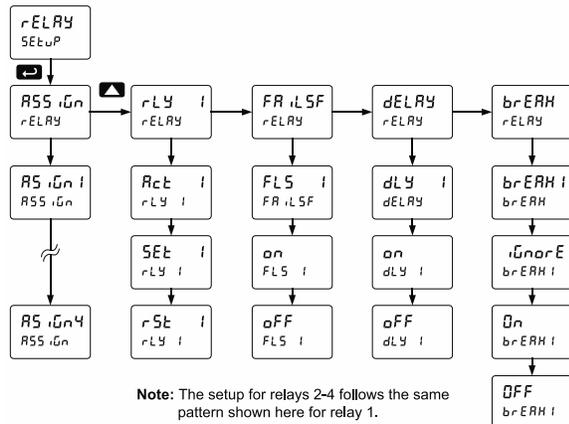
Setting the Relay Assignment (ASSiGn)
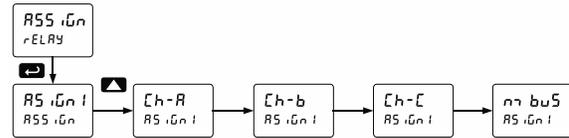
Setting the Relay Action

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 2-4 are set up in a similar fashion.
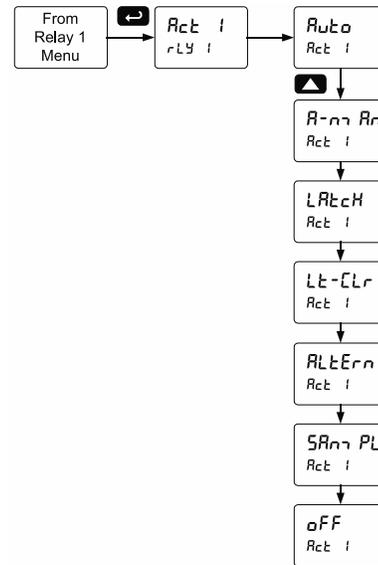
Programming Set and Reset Points

High alarm indication: program set point above reset point.
Low alarm indication: program set point below reset point.
The deadband is determined by the difference between set and reset points. Minimum deadband is one display count. If the set and reset points are programmed with the same value, the relay will reset one count below the set point.
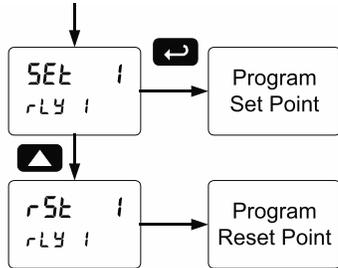
Note: Changes are not saved until the reset point has been accepted.

Setting Fail-Safe Operation

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

Programming Time Delay

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

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

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

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

The loop break feature is associated with the 4-20 mA input. 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)

Note: This is not a true loop break condition; if the signal drops below 0.005 mA, it is interpreted as a "loop break" condition.

The following graph shows the loop break relay operation for a high alarm relay.
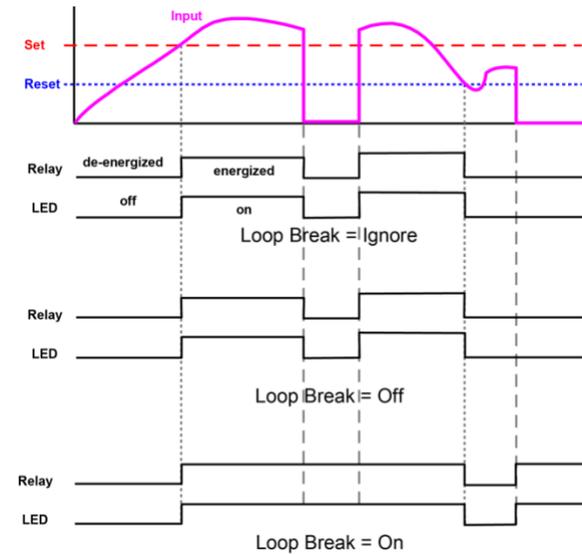
Relay and Alarm Operation Diagrams

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

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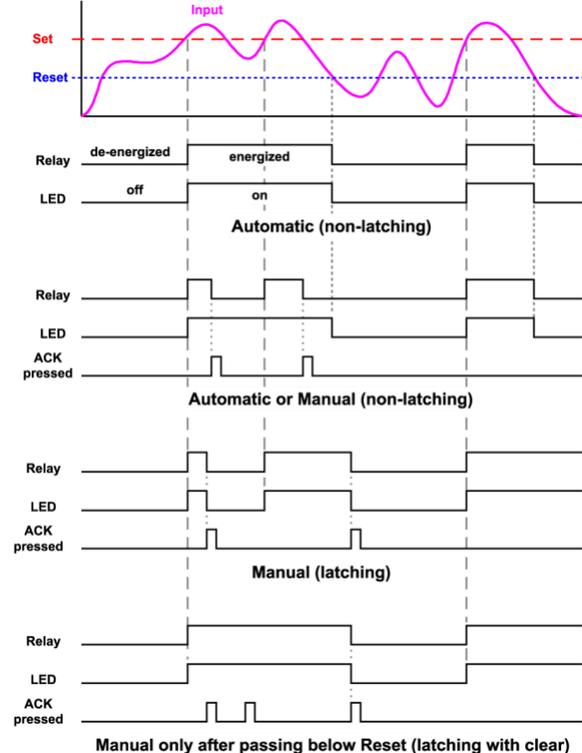
For Manual reset mode, ACK can be pressed anytime to turn "off" relay. To detect a new alarm condition, the signal must go below the set point, and then go above it.

Low Alarm Operation (Set < Reset)
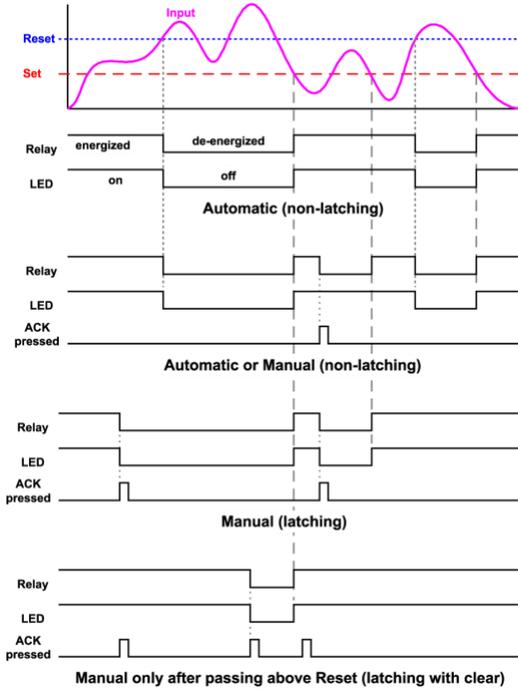
For Manual reset mode, ACK can be pressed anytime to turn "off" relay. For relay to turn back "on", signal must go above set point and then go below it.
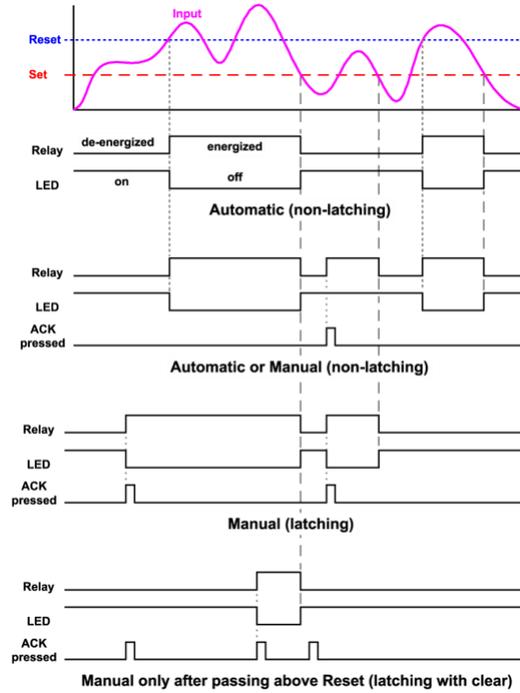
High Alarm with Fail-Safe Operation (Set > Reset)

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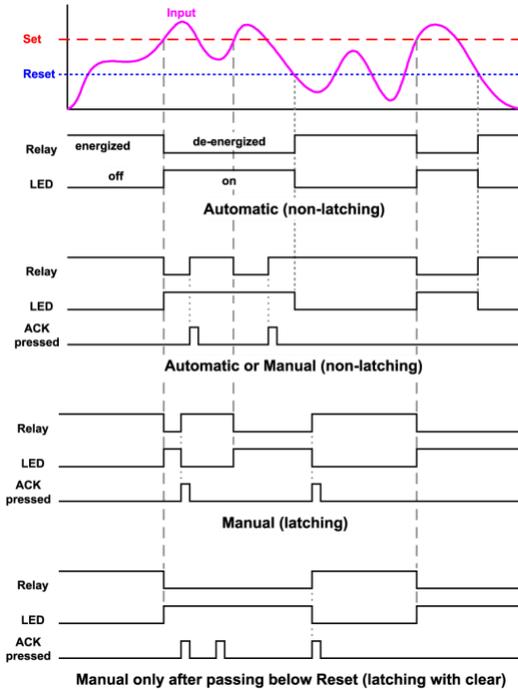
Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.

Time Delay Operation

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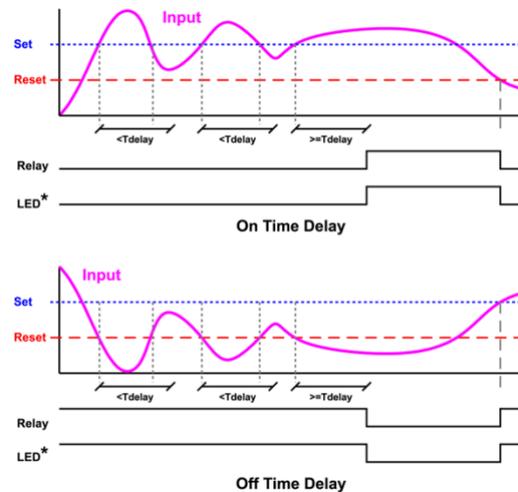
When the signal crosses the set point, the *On* time delay timer starts and the relay trips when the time delay has elapsed. If the signal drops below the set point (high alarm) before the time delay has elapsed, the *On* time delay timer resets and the relay does not change state. The same principle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

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

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Pump Alternation Control Operation

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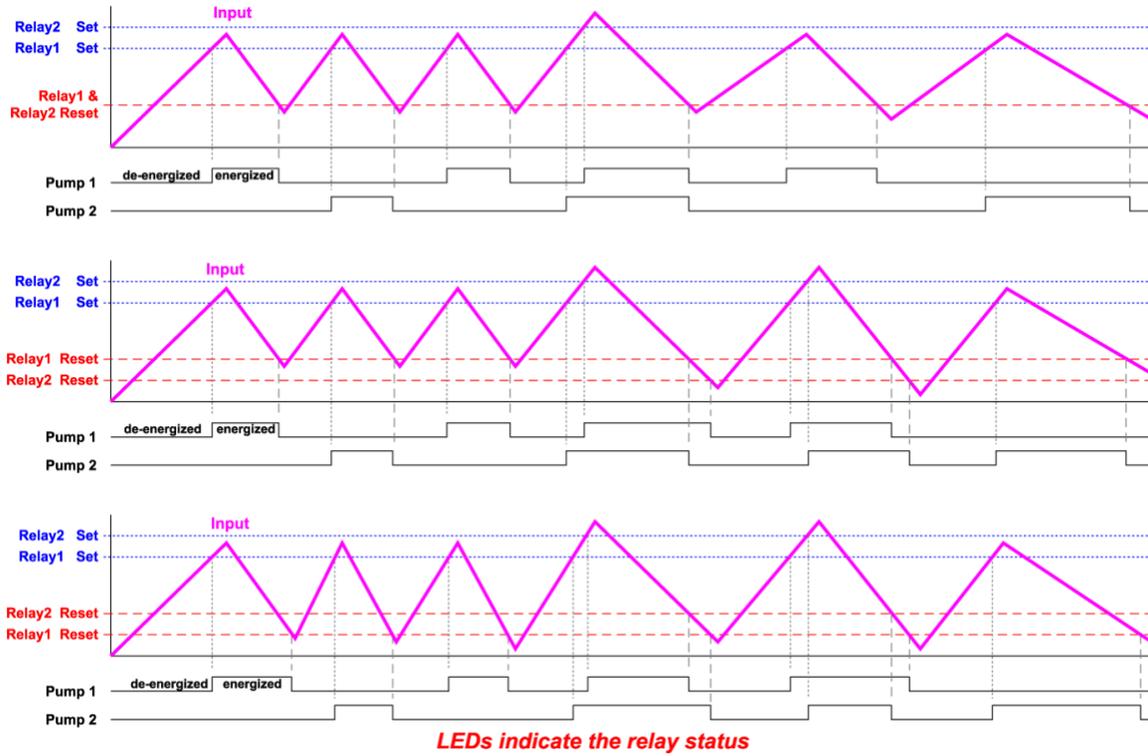
Relay Sampling Operation
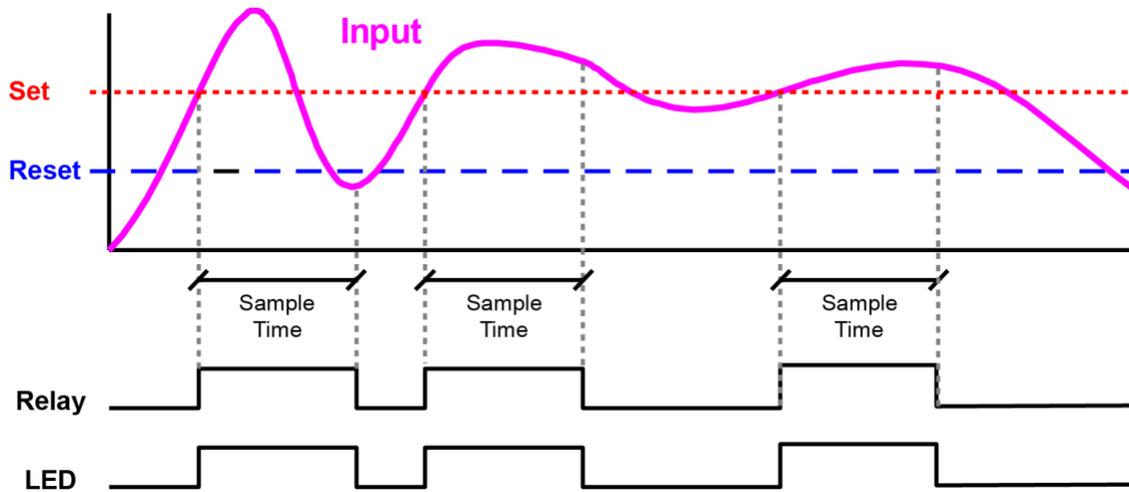
When the signal crosses the set point, the relay trips and the sample time starts. After the sample time has elapsed, the relay resets. The cycle repeats every time the set point is crossed, going up for high alarms and going down for low alarms.

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

Relay Operation Details

Overview

The four-relays option for the meters expands its usefulness beyond simple indication to provide users with alarm and control functions. Typical applications include high and low temperature, level, pressure or flow alarms, control applications such as simple on/off pump control, and pump alternation control for up to 4 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 4 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	1000	500	499	Off
2	LO	700	900	499	On
3	LO	250	400	499	Off
4	HI	450	200	499	On

Fail-Safe Operation

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

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
1	Alarm 1
2	Alarm 2
3	Alarm 3
4	Alarm 4

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 responds differently for latching and non-latching relays.

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

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

Latching and Non-Latching Relay Operation

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

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 (𝐴𝑢𝑡𝑜)

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

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

Non-Latching Relay with Manual Reset (𝐴-𝑛𝑟𝐴𝑛)

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.

In addition, the relay can be manually reset while the alarm condition still exists, but the LED will stay on until the meter returns to the normal condition.

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

Latching Relay (𝐿𝐴𝑡𝑐𝐻)

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

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

Latching Relay with Clear (𝐿𝑡-𝐶𝐿𝑟)

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

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

Light / Horn / Button Accessories


Add visible and audible ways to indicate alarm conditions on any Helios meter with the MOD-PD2LH Light / Horn / Button accessories. The light with built-in 85 dB horn, and button come mounted and wired to the Helios. Meter and accessories are ordered as separate items. See *Ordering Information* on page *6*.

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).
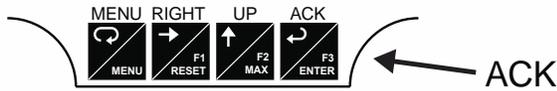
2. Remotely via a normally open push button wired to the F4 terminal.
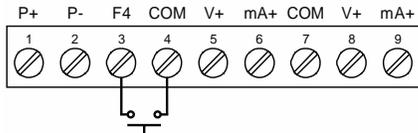
3. Remotely via a normally open push button wired to one of the digital inputs and the +5 V terminal on the digital I/O connections.
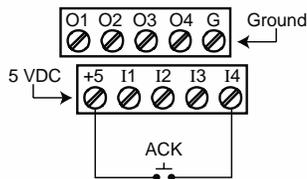
When the ACK button or the assigned digital input is closed, all relays programmed for manual reset are acknowledged.

Acknowledging Relays with Remote Control Station

Relays may be remotely acknowledged by connecting the PDA2361-A to either the F4 terminal or a digital input as described above.

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 4 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	30.000	10.000	Controls pump #1
2	35.000	5.000	Controls pump #2
3	4.000	9.000	Controls low alarm
4	40.000	29.000	Controls high alarm

Pump Alternation Operation

1. Pump #1 turns on when level reaches 30.000, when level drops below 10.000 pump #1 turns off.
2. The next time level reaches 30.000, pump #2 turns on, when level drops below 10.000, pump #2 turns off.
3. If the level doesn't reach 35.000 pump #1 and pump #2 will be operating alternately.
4. If pump #1 cannot keep the level below 35.000 pump #2 will turn on at 35.000, then as the level drops to 10.000 pump #1 turns off, pump #2 is still running and shuts off below 5.000.
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 4 alternating pumps, if setup accordingly.
6. Relay #3 will go into alarm if the level drops below 4.000 and relay #4 will go into alarm if the level exceeds 40.000.

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.

Select relays 1-4
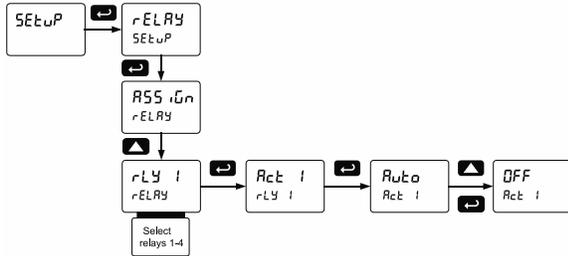
2. In the Advanced features – *User* menu program any of the digital inputs to *Force On* any of the internal relays (1-4).
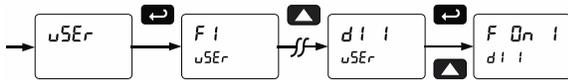
3. Connect a switch or dry contact between the +5V terminal and the corresponding digital input (dI-1 to dI-4) terminal.
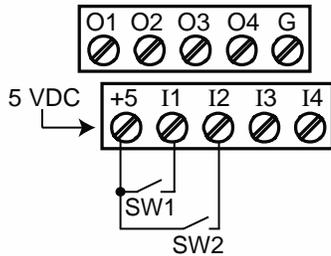
Interlock Relay Operation Example

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.

⚠ **IMPORTANT**

- If the digital inputs are assigned to the *Interlock Function*, then they cannot be used to program the meter remotely.

Scaling the 4-20 mA Analog Output (Rout)

The 4-20 mA analog output can be scaled to provide a 4-20 mA signal for any display range selected. To select the channel and source assignments the analog output is assigned to, see *Analog Output Source* on page *46*.

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 outputs based on display values.

For further details, see *Setting Numeric Values* on page *27, Analog Output Value for Loss of 4-20 mA Input (Loop Break)* on page *46*.
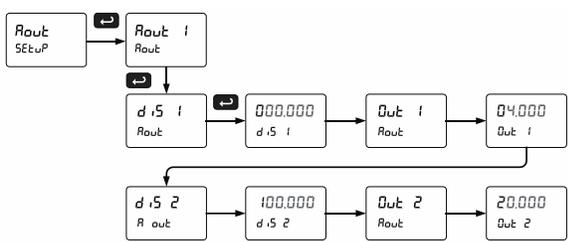
Reset Menu (rESEt)

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" (rSt HL). The tare value used to zero the display may be reset by selecting "reset tare" (rSt tr).

Manual Control Menu (Contrl)

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.

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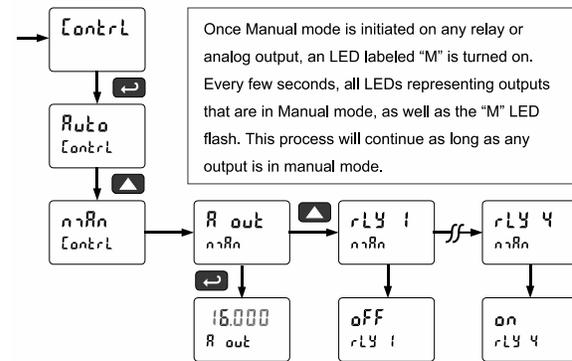
Setting Up the Password (PASS)

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

> 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 *27*.
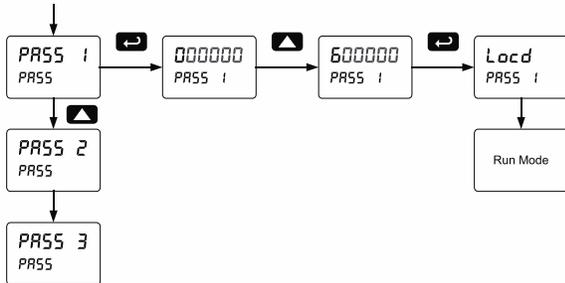
Making Changes to a Password Protected Meter

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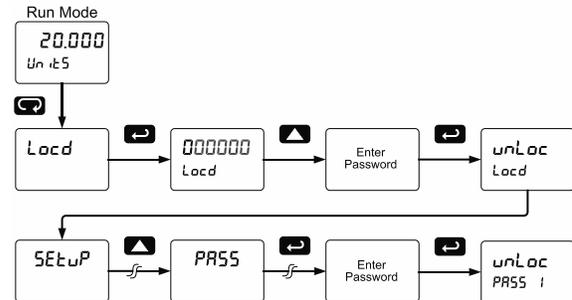
If the correct six-digit password is entered, the meter displays the message unLoc (*Unlocked*) and the protection is disabled until a new password is programmed.

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
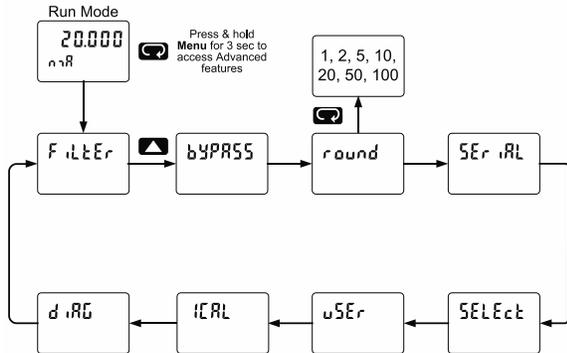
Advanced Features Menu & Display Messages

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
F ilEr	Filter	Set noise filter value
Ch-A	Channel A	Set filter value for channel A
Ch-b	Channel B	Set filter value for channel B
bYPASS	Bypass	Set filter bypass value
Ch-A	Channel A	Set filter bypass value for channel A
Ch-b	Channel B	Set filter bypass value for channel B
round	Round	Set the rounding value for display variables
SEr iAL	Serial	Set serial communication parameters
SLAvE Id	Slave ID	Set slave ID or meter address
bAud	Baud rate	Select baud rate
tr dLY	Transmit delay	Set transmit delay for serial communication
PAr ity	Parity	Select parity Even, Odd, or None with 1 or 2 stop bits
t-bYt	Time byte	Set byte-to-byte timeout
SELEct	Select	Enter the Select menu (function, cutoff, out)
Functn	Input signal conditioning	Select linear, square root, programmable exponent, or round horizontal tank
Ch-A	Channel A	Select menu for channel A

Advanced Features Menu & Display Messages

| Display	Parameter	Action/Setting
Ch-b	Channel B	Select menu for channel B
L inEAr	Linear	Set meter for linear function and select number of linearization points
no PtS	Number of points	Set the number of linearization points (default: 2)
SquArE	Square root	Set meter for square root extraction
ProG E	Programmable exponent	Set meter for programmable exponent and enter exponent value
rht	Round horizontal tank	Set meter for round horizontal tank volume calculation
LEnGth	Length	Enter the tank's length in inches
d iAnr	Diameter	Enter the tank's diameter in inches
nAth	Math	Enter the setup menu for channel C math functions
Sun	Sum	Channel C = (A+B+P)*F
d iF	Difference	Channel C = (A-B+P)*F
d iFAbS	Absolute difference	Channel C = ((Absolute value of (A-B))+P)*F
AvG	Average	Channel C = (((A+B)/2)+P)*F
nuLt i	Multiplication	Channel C = ((A*B)+P)*F
d iv idE	Divide	Channel C = ((A/B)+P)*F
H i-Ab	Max of A or B	C = ((High value of channel A or B)+P)*F
Lo-Ab	Min of A or B	C = ((Low value of channel A or B)+P)*F
drAu	Draw	Channel C = ((A/B)-1)*F
uJAuG	Weighted avg.	Channel C = ((B-A)*F)+A
rAt io	Ratio	Channel C = (A/B)*F
rAt io2	Ratio 2	C = ((B-A)/A)+P)*F
ConcEn	Concentration	Channel C = (A/(A+B))*F
ConSt	Constant	Constant used in channel C math
AddEr	Adder	Addition constant used in channel C math calculations (P)
FRctor	Factor	Multiplication constant used in channel C math calculations (F)
CutoFF	Cutoff	Set low-flow cutoff
Ch-A	Channel A	Set low-flow cutoff for Channel A
Ch-b	Channel B	Set low-flow cutoff for Channel B

Advanced Features Menu & Display Messages

Display	Parameter	Action/Setting
RoutPr	Analog output programming	Program analog output parameters
ROut 1	Analog output	Program analog output 1 parameters
SourcE	Source	Select source for the 4-20 mA output
brEAK	Loop break	Set analog output value if input loop break is detected
O-rAnG	Overrange	Program mA output for display overrange
u-rAnG	Underrange	Program mA output for display underrange
n∃AX	Maximum	Program maximum mA output allowed
n∃ in	Minimum	Program minimum mA output allowed
CAL ib	Calibrate	Calibrate 4-20 mA output (internal reference source used for scaling the output)
4 n∃A	4 mA output	Enter mA output value read by milliamp meter with at least 0.001 mA resolution
20 n∃A	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 function key (*F1/F2/F3)
F4	F4 function	Assign F4 function (digital input)
di 1	Digital input 1	Assign digital input 1 – 4
dO 1	Digital output 1	Assign digital output 1 – 4
ICAL	Internal calibration	Enter internal calibration (used for recalibrating the meter with a calibrated signal source)
Ch-A	Channel A	Perform calibration on channel A
Ch-b	Channel B	Perform calibration on channel B
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)
U CAL	Voltage calibration	Calibrate voltage input
U Lo	Voltage low	Calibrate low voltage input (e.g. 0 V)

Advanced Features Menu & Display Messages

Display	Parameter	Action/Setting
U Hi	Voltage high	Calibrate high voltage input (e.g. 10 V)
d iAG	Diagnostics	Display parameter settings
LEd t	LED test	Test all LEDs
InFo	Information	Display software number and version

Noise Filter (F iLtEr)
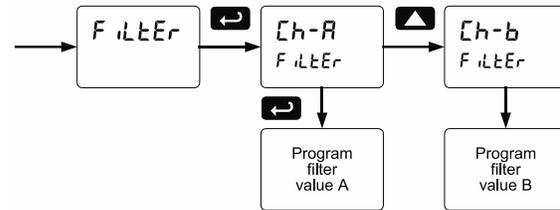
The noise filter is available for unusually noisy signals that cause an unstable process variable display. The noise filter averages the input signal over a certain period. The filter level determines the length of time over which the signal is averaged. The filter level can be set between 2 and 199. 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)
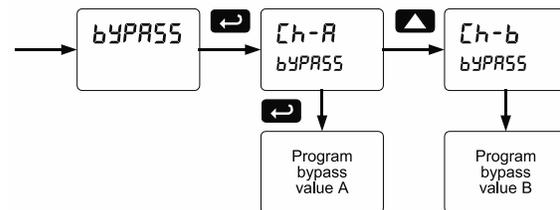
The noise filter bypass changes the behavior of the meter so that small variations in the signal are filtered out but large abrupt changes in the input signal are displayed immediately. The bypass value determines the minimum amount of signal change to be displayed immediately. All signal changes smaller 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.

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Rounding Feature (round)

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

Rounding causes the display to round to the nearest value according to the rounding selected. See examples below:

Rounding Selection	Actual Value	Display Value	Actual Value	Display Value
1	12.022	12.022	12.023	12.023
5	12.022	12.020	12.023	12.025
10	12.024	12.020	12.025	12.030

Modbus RTU Serial Communications (SEr iAL)

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 connection. For ongoing digital communications with a computer or other data terminal equipment, use the RS-485 connection with the appropriate serial converter; see *Ordering Information* on page *6* for details.

> ⚠️ **CAUTION**
>
> - **DO NOT** connect any equipment to the RJ45 M-LINK connector. Otherwise damage will occur to the equipment and the meter.
> - **DO NOT** disconnect the RJ45 connector located to the left of the power terminal block. Doing so will disable the on-board digital I/O, and the RS-485 serial communications.

Notes:
1. *More detailed instructions are provided with each optional serial communications adapter.*
2. *Refer to the Helios Modbus Register Tables located at www.predig.com for details.*
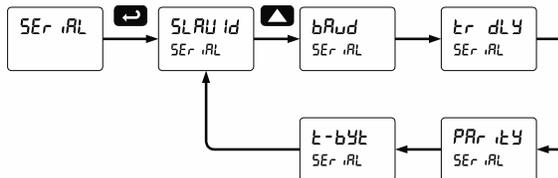
When using more than one meter in a multi-drop mode, each meter must be provided with its own unique address. The meter address (Slave ID) may be programmed between 1 and 247. The transmit delay may be set between 0 and 199 ms. The parity can be set to even, odd, or none with 1 or 2 stop bits.

Select Menu (SELEct)

The *Select* menu is used to select the input signal conditioning function applied to the inputs (linear, square root, programmable exponent, or round horizontal tank), math function for A & B, constants, low-flow cutoff, and analog output programming. Multi-point linearization is part of the linear function selection.
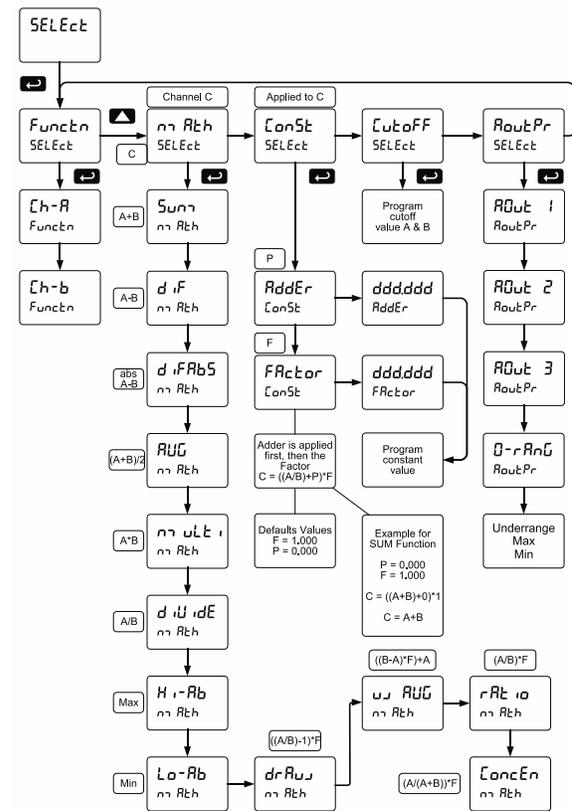
Input Signal Conditioning (Functn)

The *Function* menu is used to select the input-to-output transfer function applied to the input signal: linear, square root, programmable exponent, 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.

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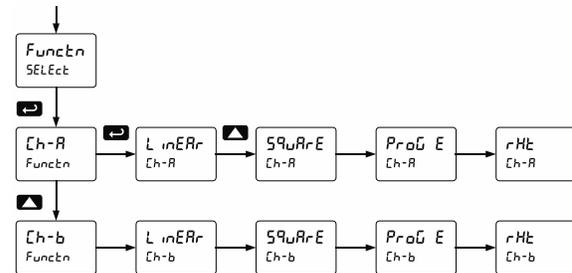
Square Root Linearization (SquArE)

The square root function is used to calculate flow measured with a differential pressure transmitter. The flow rate is proportional to the square root of the differential pressure. Scale the meter so that the low input signal (e.g. 4 mA) is equal to zero flow and the high input signal (e.g. 20 mA) is equal to the maximum flow.
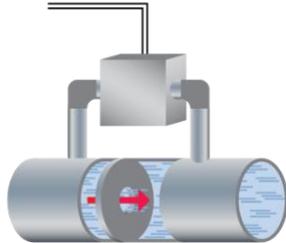
Programmable Exponent Linearization (ProG E)

The programmable exponent function is used to calculate open-channel flow measured with a level transmitter in weirs and flumes. The flow rate is proportional to the head height. Scale the meter so that the low input signal (e.g. 4 mA) is equal to zero flow and the high input signal (e.g. 20 mA) is equal to the maximum flow. This method works well for all weirs and flumes that have a simple exponent in the flow calculation formula. For weirs and flumes with complex exponents it is necessary to use a strapping table and the 32-point linearization of the meter. For more information on how the Programmable Exponent Linearization feature works, see the PD2-6200 manual.

Multi-Point Linearization (L inEAr)

Meters are set up at the factory for linear function with 2-point linearization. Up to 32 linearization points can be selected for each channel 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 or to convert level to flow using weirs and flumes with complex exponent.
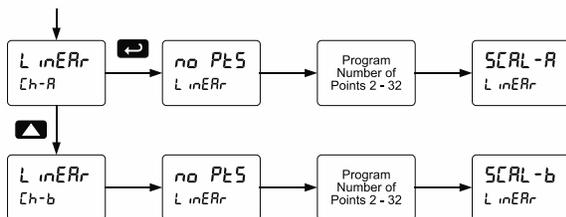
Round Horizontal Tank Linearization (rHt)

This function is used to calculate volume in a round horizontal tank with flat ends.
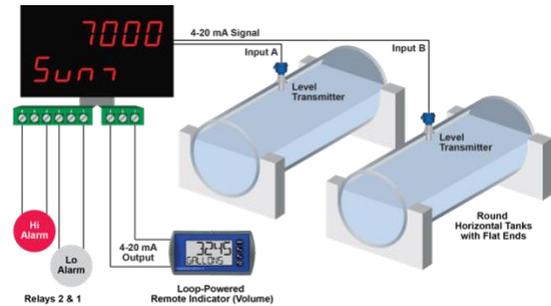
The volume is calculated based on the diameter and length of the tank. The tank's dimensions can be entered in inches or centimeters; the meter automatically calculates the volume in gallons or liters. After entering the dimensions, complete the scaling process with the display values calculated by the meter. The meter can be re-scaled to display the volume in any engineering unit without the need to re-enter the dimensions again.
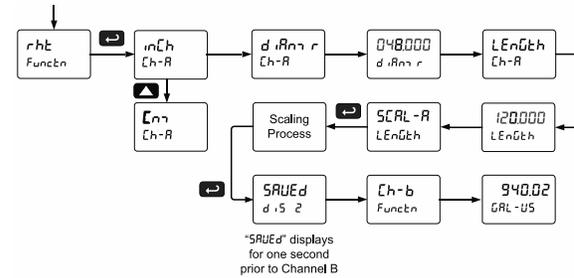
Note: After Scale is displayed continue pressing the Enter button until the meter completes the scaling of the input and display values.

Changing the Volume from Gallons to Liters

In the above graphic, entering 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 d iS 2 is shown on the Upper 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.

Math Function (ɲɾ-Rɛʜ)

The *Math* menu is used to select the math function that will determine the channel C value. These math functions are a combination of input channels A and B, and will display when channel C is selected in the *Display* menu.

The following math functions are available.

Name	Function	Setting
Addition	(A+B+P)*F	Suɲɲ
Difference	(A-B+P)*F	dıF
Absolute diff.	((Abs(A-B))+P)*F	dıFRbS
Average	(((A+B)/2)+P)*F	RuG
Multiplication	((A*B)+P)*F	ɲɾuLtı
Division	((A/B)+P)*F	dıʋıdE
Max of A or B	((AB-Hi)+P)*F	Hı-Rb
Min of A or B	((AB-Lo)+P)*F	Lo-Rb
Draw	((A/B)-1)*F	drRuɹ
Weighted avg.	((B-A)*F)+A	uɹ RuG
Ratio	(A/B)*F	rRtıo
Ratio 2	((B-A)/A)+P)*F	rRtıo2
Concentration	(A/(A+B))*F	ConcEn

Math Constants (ConSt)

The *Math Constants* menu is used to set the constants used in channel C math. The math functions include input channel A and B, as well as the adder constant P, and factor constant F.

The *Adder* constant (P) may be set from -99.999 to 999.999.

The *Factor* constant (F) may be set from 0.001 to 999.999.

The *Math Function* (ɲɾ-Rɛʜ) chart above details the math functions that may be selected in the *Math Function* menu.

Low-Flow Cutoff (CutoFF)

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

The cutoff value may be programmed from 0.1 to 999999. The meter will display zero below the cutoff value. Programming the cutoff value to zero disables the cutoff feature.

Analog Output Programming (RoutPr)

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

1. Source: Source for generating the 4-20 mA output
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 analog output source can be based on either of the input channels (Ch-A, Ch-B), the math channel (Ch-C), maximum stored value of either input channel (Hi-A, Hi-B), minimum stored value of either input channel (Lo-A, Lo-B), relay set points, or the Modbus input.
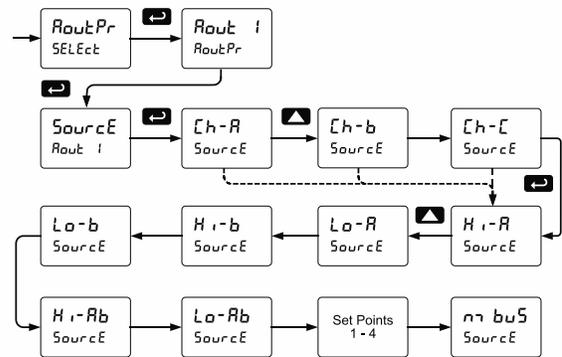
Analog Output Value for Loss of 4-20 mA Input (Loop Break)

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 µA to measure the output current. The values saved internally during this procedure are used for scaling the 4-20 mA output in the *Setup* menu.

Programmable Function Keys
User Menu (u5Er)

The *User* menu allows the user to assign the programming buttons function keys F1, F2, and F3, the digital input F4 (located on the input signal connector), and four digital inputs (located on the digital I/O connector) 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.

The four 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.
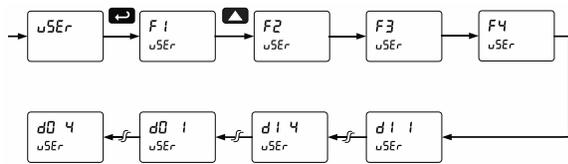

Function Keys & Digital I/O
Available Settings

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

Display	Description
r5t H,	Reset the stored maximum display values for all channels
r5t Lo	Reset the stored minimum display values for all channels
r5t HL	Reset the stored maximum & minimum display values for all channels
tArE A	Capture tare and zero the display for channel A (A LED flashes – same rate as M)**
tArE b	Capture tare and zero the display for channel B (B LED flashes – same rate as M)**
r5t tr	Reset captured tare and resume normal operation for both channels A & B
rELAY	Directly access the relay menu
5Et 1*	Directly access the set point menu for relay 1 (*through 4)
rLY d	Disable all relays until a button assigned to *enable relays* (rLY E) is pressed
rLY E	Enable all relays to function as they have been programmed
O Hold	Hold current relay states and analog output as they are until a button assigned to *enable relays* (rLY E) is pressed

Display	Description
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.
d AbC	Scrolls values for A, B & C when activated. Keeps the last value for 10 seconds and then it returns to its assignment. Values are displayed on display line 1 and the corresponding channel and units on display line 2.
Ln1 H,	Display maximum channel A display value on line 1
Ln1 Lo	Display minimum channel A display value on line 1
Ln1 HL	Display maximum & minimum channel A display values on line 1
Ln2 H,	Display maximum channel B display value on line 2
Ln2 Lo	Display minimum Channel B display value on line 2
Ln2 HL	Display maximum & minimum channel B display values on line 2
L itHLC	Display maximum channel C display value on line 2
Ln2 HC	Display minimum channel C display value on line 2
Ln2 HC	Display maximum & minimum channel C 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 to achieve interlock functionality. See *Setting Up the Interlock Relay (Force On) Feature* on page 39 for details.
Contrl	Directly access the control menu
d i5AbL	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
rE5Et	Directly access the reset menu
n1Enu	Mimic the menu button functionality (digital inputs only)
r iGHt	Mimic the right arrow/F1 button functionality (digital inputs only)
uP	Mimic the up arrow/F2 button functionality (digital inputs only)
EntEr	Mimic the enter/F3 button functionality (digital inputs only)
ALn1 1*	Provide indication when alarm 1 (*through 4) has been triggered (digital outputs only)

** If math functions are displayed, the math function indicator LED "C" will flash when either A or B channel is using a tare value (net value).

Tare (⊥Arᴇ A, ⊥Arᴇ b)

The tare function zero's out the display. In the case of scale weight, tare is used to eliminate container weight and provide net weight readings. There are two tare functions; Capture Tare for channel A and B, and Reset Tare. Display channel indicator letter flashes when a tare is used. It will flash until the tare is reset. The tare can be reset via the Reset menu, a function key, or a digital input.

| Before tare | After capture tare | After reset tare |
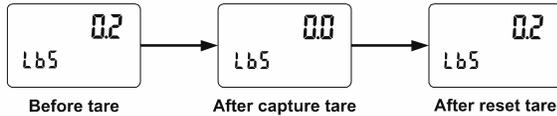
Gross (without tare) and net (with tare) values can be viewed simultaneously. See *Setting the Display Parameter & Intensity* (dSPLAY) on page *31*.

Internal Calibration (iCAL)

> 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 perform the internal calibration of the meter.

Check calibration of the meter at least every 12 months. Each input and input type 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 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 (iCAL) and press Enter.

3. Select channel A (Ch-A) or channel B (Ch-b) and press enter.

4. The meter displays either current calibration (C CAL) or voltage calibration (U CAL), according to the input setup. Press Enter to start the calibration process.

   Example of *Internal Calibration* for current input:

5. The meter displays *low* input current message (C Lo). Apply the low input signal and press Enter. The display flashes for a moment while the meter is accepting the low input signal.

6. 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.

7. Set the display value to correspond to the input signal being calibrated, typically 4.000 mA.

8. The display moves to the *high* input calibration (C Hi). Apply the high input signal and press Enter.

9. 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.
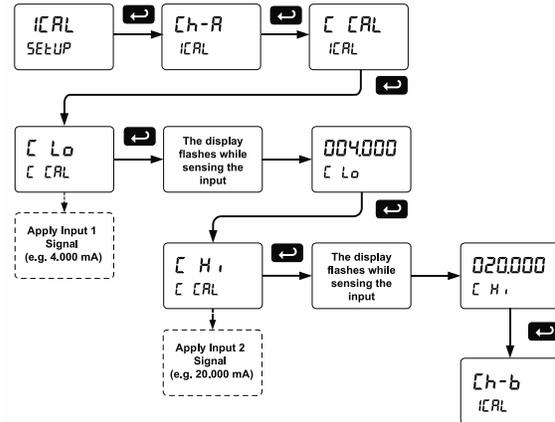
The graphic shows the calibration of the current input. The voltage input is calibrated in a similar way.

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.

After the error message is displayed, the meter reverts to input 2 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:

5. Input signal is not connected to the proper terminals or it is connected backwards.

6. Wrong signal selection in *Setup* menu.

7. Minimum input span requirements not maintained.

8. Input 1 signal inadvertently applied to calibrate input 2.

Minimum Input Span

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.

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

Meter Operation

The meter is capable of accepting two input channels (A and B) of either current (0-20 mA, 4-20 mA) or voltage signals (0-5 V, 1-5 V, 0-10 V, ± 10 V) and displaying these signals in engineering units from -99999 to 999999 (*e.g.* a 4-20 mA signal could be displayed as -50.000 to 50.000).

A math function channel (C) is available to perform operations on channel A and B, with adder and factor constants, and display the results. Engineering units or tags may be displayed with these three channels.

The dual-line display can be customized by the user. Typically, the upper display is used to display the math channel C, while the lower display is used to alternate between displaying input channels A and B.

Additionally, the meter can be set up to display any input or math channel on the upper display and a unit or tag on the lower display. The relays and analog output can be programmed to operate based on any input or math channel.

Button Operation

Button Symbol	Description
MENU	Press to enter or exit Programming Mode, view settings, or exit max/min readings
RIGHT F1 RESET	Press to reset max/min readings or other parameter/function assigned through the *User* menu
UP F2 MAX	Press to display max/min readings or other parameter/function assigned through the *User* menu
ACK F3 ENTER	Press to acknowledge relays or other parameters/function assigned through the *User* 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* (u5Er) on page *47* for details.

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

Digital Inputs Operation

Five (5) digital inputs, F4, DI-1 to DI-4, come standard on the meter. These digital inputs are programmed identically to function keys F1, F2, and F3. The inputs are triggered with a contact closure to +5 in the case of digital inputs 1-4 or with an active high signal, see *Digital I/O Connections* on page *21* for details. The F4 is triggered with a contact closure to COM or with an active low signal. During operation, digital inputs operate according to the way they are programmed in the Advanced Features – User menu. See *Programmable Function Keys User Menu* (u5Er) on page *47* for details.

Maximum/Minimum Readings

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

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 and min channel A reading using function key with factory defaults:
1. Press Up arrow/F2 button to display minimum reading of channel A since the last reset/power-up. The display will then display the maximum reading of channel A since the last reset/power-up.
2. Press the Up arrow/F2 button again to display the minimum reading of channel A since the last reset/power up.
3. To reset max/min press Right arrow/F1 button to access the Reset menu. The max & min displays are reset to actual values.
4. Press Menu to exit max/min display reading.

Troubleshooting

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

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

Diagnostics Menu (d ı.AG)

The *Diagnostics* menu is located in the *Advanced Features* menu, to access *Diagnostics* menu see *Advanced Features Menu*, page *42*.

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

For a description of the diagnostic messages, *see Advanced Features Menu* & Display Messages, page 42.

Testing the Display LEDs

To test all LEDs on the display:

1. Go to the *Diagnostics* menu (d ı.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 (ınFo) 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 ı.AG) and press Enter button.
2. Press Up arrow button and scroll to Information menu (ınFo).
3. Press Enter to access the software number (SFt) and version (UEr) information. Write down the information as it is displayed. Continue pressing Enter until all the information is displayed.
4. The meter returns to Run Mode after displaying all the settings.

Reset Meter to Factory Defaults

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

Instructions to load factory defaults:

1. Enter the *Advanced Features* menu. See *Advanced Features Menu*, page *42*.
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 Run Mode.*
4. The meter goes through an initialization sequence (similar as on power-up), and loads the factory default settings.
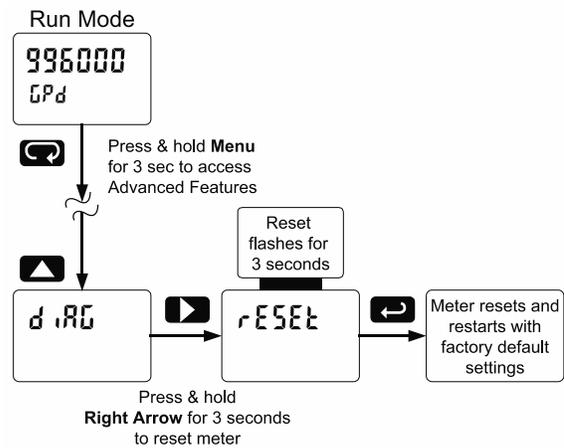
Factory Defaults & User Settings

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

Factory Defaults & User Settings		
Parameter	**Display**	**Default Setting**
Input type	InPut	
Input type, channel A	Ch-A	4-20 mA
Input type, channel B	Ch-b	4-20 mA
Unit	un ıt	
Unit, channel A	Ch-A	mA-A
Unit, channel B	Ch-b	mA-b
Unit, channel C	Ch-C	mA-C
Number of points	no PtS	
Number of points, ch A	Ch-A	2
Number of points, ch B	Ch-b	2
Scaling, (channel A)	ScAL A	
Input 1, channel A	InP 1	4.000 mA
Display 1, channel A	dıS 1	4.000
Input 2, channel A	InP 2	20.000 mA
Display 2, channel A	dıS 2	20.000
Scaling (channel B)	ScAL b	

Factory Defaults & User Settings

Parameter	Display	Default Setting
Input 1, channel B	InP 1	4.000 mA
Display 1, channel B	d iS 1	4.000
Input 2, channel B	InP 2	20.000 mA
Display 2, channel B	d iS 2	20.000
Math, channel C	Sum	Sum
Adder (constant P)	RddEr	0.000
Factor (constant F)	FRctor	1
Filter	F iLtEr	
Filter, channel A	Ch-R	70
Filter, channel B	Ch-b	70
Bypass, channel A	bYPR55	0.2
Bypass, channel B	bYPR55	0.2
Round	round	1
Cutoff	CutoFF	
Cutoff value, channel A	Ch-R	0.0 (disabled)
Cutoff value, channel B	Ch-b	0.0 (disabled)
Display assignment	dSPLRY	
Display line 1	d Ch-R	Channel A
Display line 2	d Ch-b	Channel B
Display intensity	d- intY	6
Relay 1 assignment	Ch-R	Channel A
Relay 1 action	Rct 1	Automatic
Relay 1 set point	SEt 1	1.000
Relay 1 reset point	rSt 1	0.500
Relay 2 assignment	Ch-R	Channel A
Relay 2 action	Rct 2	Automatic
Relay 2 set point	SEt 2	2.000
Relay 2 reset point	rSt 2	1.500
Relay 3 assignment	Ch-R	Channel A
Relay 3 action	Rct 3	Automatic
Relay 3 set point	SEt 3	3.000
Relay 3 reset point	rSt 3	2.500
Relay 4 assignment	Ch-R	Channel A
Relay 4 action	Rct 4	Automatic
Relay 4 set point	SEt 4	4.000
Relay 4 reset point	rSt 4	3.500
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

Factory Defaults & User Settings

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	d iS 1	4.000
Output 1 value	Out 1	4.000 mA
Display 2 analog out	d iS 2	20.000
Output 2 value	Out 2	20.000 mA
Source analog output	SourcE	Channel A
Overrange output	O-rRnG	21.000 mA
Underrange output	u-rRnG	3.000 mA
Loop break output	brERX	3.000 mA
Maximum output	mRX	23.000 mA
Minimum output	m in	3.000 mA
Slave ID (Address)	SLRu id	247
Baud rate	bRud	9600
Transmit delay	tr dLY	50 ms
Parity	PRr itY	Even
Byte-to-byte timeout	t-bYt	010 (0.1 sec)
F1 function key	F1	Reset max & min
F2 function key	F2	Upper Max & Min
F3 function key	F3	Acknowledge relays
F4 function (digital input)	F4	Acknowledge relays
Digital input 1	d i 1	Menu
Digital input 2	d i 2	Right arrow
Digital input 3	d i 3	Up arrow
Digital input 4	d i 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	PRSS 1	000000 (unlocked)
Password 2	PRSS 2	000000 (unlocked)
Password 3	PRSS 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 cable is provided with the meter 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, Locd 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 *Low-Flow Cutoff* 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-flow 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 *Setup* menu 3. Minimum input span requirements
Meter displays 1. 999999 2. -99999	Check: 1. Input selected in *Setup* 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, square root, etc. 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. Hi and a number 2. Lo and a number	Press Menu to exit max/min display readings.
Relay operation is reversed	Check: 1. Fail-safe in *Setup* menu 2. Wiring of relay contacts
Relay and status LED do not respond to signal	Check: 1. Relay action in *Setup* 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 50. 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

Fax: (508) 655-8990

Email: support@predig.com

Sales Support

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

Fax: (508) 655-8990

Email: sales@predig.com

Place Orders

Email: orders@predig.com

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www.predig.com

PRECISION DIGITAL CORPORATION

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