PROVU™ PD6363 Dual Pulse Input Rate/Totalizer
Instruction Manual

- 1/8 DIN Digital Panel Flow Rate/Totalizers with NEMA 4X, IP65 Front
- Dual Pulse, Open Collector, NPN, PNP, TTL, Switch Contact, Sine Wave (Coil), Square Wave Inputs
- Rate, Total, and Grand Total for Each Input Channel
- Dual-Line 6-Digit Display, 0.6" (15 mm) & 0.46" (12 mm)
- Isolated 5, 10 or 24 VDC Flowmeter Power Supply
- 2 or 4 Relays + Isolated 4-20 mA Output Options
- Free PC-Based, On-Board, MeterView Pro USB Programming Software
- No Assembly Required
- Gate Function for Display of Slow Pulse Rates
- K-Factor, Internal Scaling, or External Calibration
- Optional SunBright Display Models for Outdoor Applications
- Operating Temperature Range: -40 to 65°C (-40 to 149°F)
- 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
- Programmable Display, Function Keys & Digital Input
- External 4-Relay, Dual Analog Output, & Digital I/O Expansion Modules
- RS-232 & RS-485 Serial Communication Options with Modbus RTU
- Password Protection
- Wide Assortment of NEMA 4X Enclosures for up to Ten Meters
- Light / Horn & Reset Button Accessory
- Control Station Accessory for Remote Operation
- 3-Year Warranty

Disclaimer
The information contained in this document is subject to change without notice. Precision Digital makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose. See Warranty Information and Terms & Conditions on www.predig.com for complete details.

⚠ **CAUTION**

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

⚠ **WARNINGS**

- Risk of electric shock or personal injury.
- This product is not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using this product for such applications does so at his/her own risk. Precision Digital Corporation shall not be held liable for damages resulting from such improper use.

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

Limited Warranty
Precision Digital Corporation warrants this product against defects in material or workmanship for the specified period under "Specifications" from the date of shipment from the factory. Precision Digital's liability under this limited warranty shall not exceed the purchase value, repair, or replacement of the defective unit. See Warranty Information and Terms & Conditions on www.predig.com for complete details.

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FREE MeterView Pro Programming Software

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

The easiest and quickest way to program your PROVU 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 PROVU 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 PROVU PD6363 is a multipurpose, easy to use digital dual pulse input rate/totalizer ideal for flow rate, total, and flow control applications. Its superluminous LED digits make it easily readable in smoke, dust, fog, and, with the optional SunBright display, even direct sunlight.

It accepts two pulse (e.g. 40 mVp-p to 8 Vp-p), square wave (0-5 V, 0-12 V, or 0-24 V), open collector, NPN, PNP, TTL or switch contact signals. Various math functions may be applied to the rate, total, or grand totals of the two channels; including addition, difference, average, minimum, maximum, draw, ratio and more.

The displays, relays, and the analog output may be assigned to the rate, total, or grand total of input channels A or B; or math result channel C. Three of the front panel buttons can be custom-programmed for a specific operation.

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

A fully loaded PD6363 meter has the following: four SPDT relays, 4-20 mA output, and two 24 VDC power supplies. The PD6363 capabilities may be enhanced by adding the following external expansion modules: four SPST relays –creating an eight-relay dual-input process meter, two digital I/O modules with four inputs and four outputs each, serial communication adapters for use with MeterView Pro or Modbus RTU, and a dual isolated 4-20 mA output expansion module.

Ordering Information

Standard Models

85-265 VAC Model	12-24 VDC Model	Options Installed
PD6363-6R0	PD6363-7R0	No options
PD6363-6R2	PD6363-7R2	2 relays
PD6363-6R3	PD6363-7R3	4-20 mA output
PD6363-6R4	PD6363-7R4	4 relays
PD6363-6R5	PD6363-7R5	2 relays & 4-20 mA output
PD6363-6R7	PD6363-7R7	4 relays & 4-20 mA output

SunBright Display Models

85-265 VAC Model	12-24 VDC Model	Options Installed
PD6363-6H0	PD6363-7H0	No options
PD6363-6H2	PD6363-7H2	2 relays
PD6363-6H3	PD6363-7H3	4-20 mA output
PD6363-6H4	PD6363-7H4	4 relays
PD6363-6H5	PD6363-7H5	2 relays & 4-20 mA output
PD6363-6H7	PD6363-7H7	4 relays & 4-20 mA output

Accessories

Model	Description
PDA1002	DIN rail mounting kit for two devices
PDA1004	4 SPST (Form A) relays module
PDA1011	Dual isolated analog output
PDA1044	4 digital inputs & 4 digital outputs module
PDA1232	RS-232 serial adapter
PDA1485	RS-485 serial adapter
PDA7485-I	RS-232 to RS-485 isolated converter
PDA8008	USB Adapter
PDA8232-N	USB to RS-232 non-isolated converter
PDA8485-I	USB to RS-485 isolated converter
PDA-LH	Light / horn accessory
MOD-LH	Light / horn / enclosure modification
PDA2360	Plastic control stations series
PD659	Signal isolators, splitters, & conditioners
PD9501	Multi-function calibrator
PD9502	Low-cost signal generator
PDX6901	Snubber: 0.01 µF/470 Ω, 250 VAC

Enclosures

Series	Meters	Material
PDA2300	1-10	Plastic NEMA 4X
PDA2500	1-6	Plastic NEMA 4X
PDA2600	1-6	Stainless Steel NEMA 4X
PDA2700	1-6	Painted Steel NEMA 4
PDA2800	1-2	Plastic NEMA 4X
PDA3400	1-3	Plastic NEMA 4X

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

Replacement Option Cards

Model	Options Installed
PD1102	2 relays
PD1103	4-20 mA output
PD1104	4 relays
PD1105	2 relays & 4-20 mA output
PD1107	4 relays & 4-20 mA output

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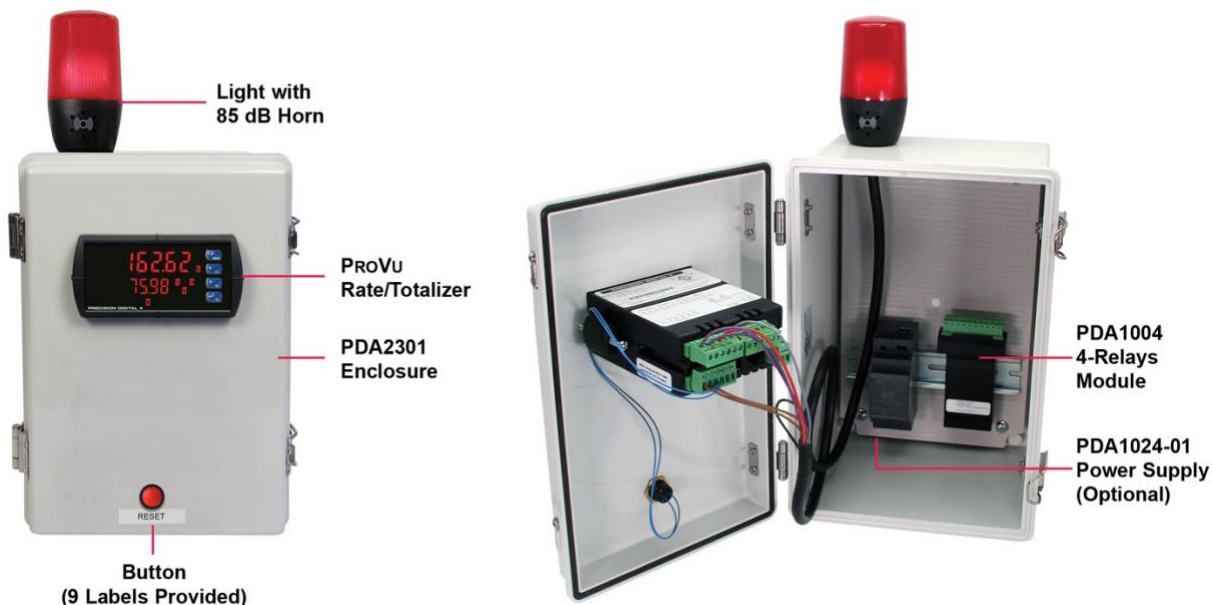
PROVU Meter Shown in a PDA2301 Enclosure with MOD-LHRB1 Red Light / Horn and Button. Meter & Enclosure Sold Separately. Assembly Required.

MOD-LH

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

Note:

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

PDA-LH & PDA-BUTTON

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

PDA2360 Control Stations

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

Note: Control stations with one button may be connected directly to the meter via the F4 terminal. A PDA1044 (4) digital inputs & (4) digital outputs module is required to operate the control stations of more than one button. See *Remote Operation of Meter* on page *21* for details.

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

Helpful Videos

Precision Digital's PROVU Series is a powerful line of 1/8 DIN meters that boasts advanced functionality for various applications. The following videos might be of interest.

PROVU Series Overview
Learn about all the meters in the PROVU Series.

https://www.predig.com/videos/E4gmQrAeT8o

PROVU Multi-Pump Alternation
Learn how to use the PROVU as a pump controller.

https://www.predig.com/videos/PumpControl

PROVU Function Keys Tutorial
Learn how the PROVU's function keys increase the utility of the PROVU.

https://www.predig.com/videos/WMBYKlavW-Q

Connect a PROVU to a PC Using MeterView Pro
Learn how easy it is to use MeterView Pro software.

https://www.predig.com/videos/PC_Connect

Connect a 2-Wire 4-20 mA Transmitter to a PROVU
Learn how to connect your transmitter to a PROVU.

https://www.predig.com/videos/4-20_mA_Connections

MeterView Pro USB Programming Software
Learn how easy it is to program a PROVU PD6000 process meter.

https://www.predig.com/videos/MVPro_SW

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Specifications

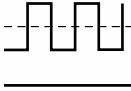*Except where noted all specifications apply to operation at +25°C.*

General

Display	Line 1: 0.60" (15 mm) high, red LEDs Line 2: 0.46" (12 mm) high, red LEDs 6 digits each (-99999 to 999999), with lead zero blanking
Display Intensity	Eight user selectable intensity levels Default value is six.
Display Update Rate	Rate: 10 per second; up to 1 per 100 seconds (and is a function of Low Gate setting); Total: 10 per second (fixed)
LED Status Indicators	See *Front Panel Buttons and Status LED Indicators* on page 22 for details.
Overrange	Display flashes 999999
Display Assignment	Display lines 1 & 2 may be assigned to show: • One or more rate channels: Channel A (Ch-A), B (Ch-B), or C (Ch-C) • Toggle between rate channels: Ch-A & Ch-B, Ch-A & Ch-C, Ch-B & Ch-C, and Ch-A, Ch-B, & Ch-C • Total or grand total: Ch-A or Ch-B • Rate and total or grand total: Ch-A or Ch-B • Relay set points • Max and/or min values: Ch-A, Ch-B, or Ch-C • Toggle between any rate channel & units • Total and units: Ch-A or Ch-B • Toggle between totals: Ch-A & Ch-B; Ch-A, Ch-B, and sum of Ch-A and Ch-B • Modbus input Line 2 may also be set to show engineering units or be off, with no display.
Programming Methods	Four front panel buttons, digital inputs, PC and MeterView Pro software, or Modbus registers.
Recalibration	All ranges are calibrated at the factory. Recalibration is recommended at least every 12 months.
Max/Min Display	Max/min readings reached by the process are stored until reset by the user or until power to the meter is turned off.
Rounding	Select 1, 2, 5, 10, 20, 50, or 100 (e.g. rounding = 10, value = 123.45, display = 123.50).
Password	Three programmable passwords restrict modification of programmed settings and two prevent resetting the totals. Pass 1: Allows use of function keys and digital inputs Pass 2: Allows use of function keys, digital inputs and editing set/reset points Pass 3: Restricts all programming, function keys, and digital inputs. Total: Prevents resetting the total manually Gtotal: Prevents resetting the grand total manually

Non-Volatile Memory	All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.
Power Options	85-265 VAC 50/60 Hz; 90-265 VDC, 20 W max; 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
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

Connections	Removable screw terminal blocks accept 12 to 22 AWG wire, RJ45 for external relays, digital I/O, and serial communication adapters.
Enclosure	1/8 DIN, high impact plastic, UL 94V-0, color: black
Front Panel	NEMA 4X, IP65
Mounting	1/8 DIN panel cutout required: 3.622" x 1.772" (92 mm x 45 mm) Two panel mounting bracket assemblies are provided.
Tightening Torque	Screw terminal connectors: 5 lb-in (0.56 Nm)
Overall Dimensions	4.68" x 2.45" x 5.64" (119 mm x 62 mm x 143 mm) (W x H x D)
Weight	9.5 oz (269 g)
Warranty	3 years parts & labor. See Warranty Information and Terms & Conditions on www.predig.com for complete details.

Dual Pulse Inputs

Two Inputs	Field selectable: Pulse or square wave 0-5 V, 0-12 V, or 0-24 V @ 30 kHz; TTL; open collector 4.7 kΩ pull-up to 5 V @ 30 kHz; NPN or PNP transistor, switch contact 4.7 kΩ pull-up to 5 V @ 40 Hz; Modbus PV (Slave)
Isolated Flowmeter Power Supply	Terminals P+ & P-: 24 VDC ±10%. All models selectable for 24, 10, or 5 VDC supply (internal jumper J4). 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 *Flowmeter Supply Voltage Selection (P+, P-)* on page *17*. When the Light / Horn is powered by the flowmeter power supply, see MOD-LH Light / Horn's flowmeter power supply specification in MOD-LH 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	5un̅
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	n̅ult 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	drAu̅
Weighted avg.	((B-A)*F)+A	u̅ AU5
Ratio	(A/B)*F	rAt io
Ratio 2	((B-A)/A)+P)*F	rAt io2
Concentration	(A/(A+B))*F	ConcEn
Total Addition	(tA+tB+P)*F	5un̅ t
G. Tot. Addition	(GtA+GtB+P)*F	5un̅Gt
Total Difference	(tA-tB+P)*F	d iF Gt
G. Tot. Difference	(GtA-GtB+P)*F	d iF Gt
Total Ratio	(tA/tB)*F	trAt io
Total Ratio 2	((tB-tA)/tA)*F	t-rAt2
Total Percent	(tA/(tA+tB))*100	t PCt

*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.*

Low Voltage Mag Pickup	Sensitivity: 40 mVp-p to 8Vp-p
Minimum Input Frequency	0.001 Hz Minimum frequency is dependent on high gate setting.
Maximum Input Frequency	30,000 Hz (10,000 for low voltage mag pickup)
Input Impedance	Pulse input: Greater than 300 kΩ @ 1 kHz. Open collector/switch input: 4.7 kΩ pull-up to 5 V.

Input Threshold	Low	High	
	1.6 V	3.3 V	3.3 V 1.6 V 0 V

Sequence of Operations for Input Programming	1. Select Input for A and B 2. Set up the rate, total, and grand total engineering units for channels A & B, and units for math channel C 3. Set up rate, total, and grand total decimal points for channels A & B, and decimal point for math channel C 4. Program channel A & B rate parameters 5. Program channel A & B total and reset parameters 6. Set up display lines 1 & 2 and display intensity 7. Select the transfer function for A & B (e.g. Linear) 8. Select Math function for Channel C 9. Program constants for Factor (F) and Adder (P). 10. Program cutoff values for A and B
Accuracy	±0.03% of calibrated span ±1 count
Temperature Drift	Rate display is not affected by changes in temperature.
Multi-Point Linearization	2 to 32 points for channel A and B
Low-Flow Cutoff	0.1 to 999,999 (0 disables cutoff function). Point below at which the display always shows zero.
Decimal Point	Up to five decimal places or none: dddddd, ddddd, dddd, ddd, dd, or dddddd
Calibration	May be calibrated using K-factor, scaling without a signal source, or by applying an external calibration signal.
K-Factor	Field programmable K-factor converts input pulses to rate in engineering units. May be programmed from 0.00001 to 999,999 pulses/unit.
Calibration Range	Input 1 signal may be set anywhere in the range of the meter; input 2 signal may be set anywhere above or below input 1 setting. Minimum input span between any two inputs is 1.0 Hz for calibration and 0.1 Hz for scaling. An error message will appear if the input span is too small.
Filter	Programmable contact de-bounce filter: 40 to 999 Hz maximum input frequency allowed with low speed filter.
Time Base	Second, minute, hour, or day
Gate	Low gate: 0.1-99.9 seconds High gate: 2.0-999.9 seconds

Dual Rate/Totalizer

Rate Display Indication	-99999 to 999999, lead zero blanking.
Total Display & Total Overflow	0 to 999,999; automatic lead zero blanking. Up to 999,999,999 with total-overflow feature. "oⷪ F" is displayed to the left of total overflow and ▲ LED is illuminated.
Total Decimal Points	Up to five decimal places or none: dddddd, ddddd, dddd, ddd, dd, or dddddd Total decimal point is independent of rate decimal point. Channel A and B decimal points programmed independently.
Dual Totalizer	Calculates total for channels A and B based on rate and field programmable multiplier to display total in engineering units. Time base must be selected according to the time units in which the rate is displayed. Channel A and B totalizer parameters programmed independently.
Totalizer Rollover	Totalizer rolls over when display exceeds 999,999,999. Relay status reflects display.
Total Overflow Override	Program total A or B total reset for automatic with 0.1 second delay and set point 1 for 999,999
Totalizer Alarm Presets	Up to eight, user selectable under setup menu. Any set point can be assigned to channel A or B total or grand total (or C) and may be programmed anywhere in the range of the meter for total alarm indication.
Total & Grand Total Reset	Via front panel button, external contact closure on digital inputs, automatically via user selectable preset value and time delay, or through serial communications. Channel A and B total and grand total reset parameters programmed independently.
Total Reset Password	Total and grand total passwords may be entered to prevent resetting the totals or grand totals from the front panel.
Programmable Delay On Release	0.1 and 999.9 seconds; applied to the first relay assigned to total or grand total. If the meter is programmed to reset total to zero automatically when the preset is reached, then a delay will occur before the total is reset.
Non-Resettable Total	The grand totals can be programmed as non-resettable totals by entering the password "050873". Both channels are set to non-resettable when this password is entered.

⚠ **CAUTION**

- Once the Grand Total has been programmed as "non-resettable" the feature **CANNOT** be disabled.

Relays

Rating	2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external; rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP (≈ 50 W) @ 125/250 VAC for inductive loads
Noise Suppression	Noise suppression is recommended for each relay contact switching inductive loads; see *Switching Inductive Loads* on page *19* for details.
Relay Assignment	Relays may be assigned to channel A or B rate, total, or grand total; channel C; or Modbus control.
Deadband	0-100% of span, user programmable
High or Low Alarm	User may program any alarm for high or low trip point. Unused alarm LEDs and relays may be disabled (turn off).
Relay Operation	• Automatic (non-latching) and/or manual reset • Latching (requires manual acknowledge) with or without clear • Pump alternation control (2-8 relays) • Sampling (based on set point and time) • Off (disable unused relays and enable Interlock feature) • Manual on/off control mode
Relay Reset (Acknowledge)	User selectable via front panel button, F4 terminal at back of meter, external contact closure on digital inputs, or through serial communications. 1. Automatic reset only (non-latching), when the input passes the reset point. 2. Automatic + manual reset at any time (non-latching) 3. Manual reset only, at any time (latching) 4. Manual reset only after alarm condition has cleared (L) *Note: Front panel button, F4 terminal at back of meter or digital input may be assigned to acknowledge relays programmed for manual reset.*
Time Delay	0 to 999.9 seconds, on & off relay time delays. Programmable and independent for each relay
Fail-Safe Operation	Programmable and independent for each relay. *Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.*
Auto Initialization	When power is applied to the meter, relays will reflect the state of the input to the meter.
Additional Relays	An external module, model PDA1004, is available to add 4 SPST 3 A relays to the meter.

Isolated 4-20 mA Flowmeter Output

Output Source	Input channels A or B, rate, total, or grand total; channel C; max or min for channel A or B; highest or lowest max or min of A and B; set points 1-8; Modbus input; or manual control mode
Scaling Range	1.000 to 23.000 mA for any display range
Calibration	Factory calibrated: 4.000 to 20.000 = 4-20 mA output
Analog Out Programming	23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break
Accuracy	± 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 Flowmeter 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
Additional 4-20 mA Outputs	An external module, model PDA1011, is available to add two 4-20 mA outputs to the meter.

USB Connection

Function	Programming only
Compatibility	USB 2.0 Standard, Compliant
Connector Type	Micro-B receptacle
Cable	USB A Male to Micro-B Cable
Driver	Microsoft® Windows® 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.*

On-Board Digital Input (F4)

Function	Remote operation of front-panel buttons, acknowledge/reset relays, reset totals, reset max/min values. See *Function Keys & Digital I/O Available* Settings on page *52* for a complete list of capabilities.
Contacts	3.3 VDC on contact. Connect normally open contacts across F4 to COM
Logic Levels	Logic High: 3 to 5 VDC Logic Low: 0 to 1.25 VDC
Additional I/O	Up to 2 external modules, model PDA1044 with 4 digital inputs and 4 digital outputs each can be added.

Modbus® RTU Serial Communications

Slave Id	1 – 247 (Meter address)
Baud Rate	300 – 19,200 bps
Transmit Time Delay	Programmable between 0 and 199 ms
Data	8 bit (1 start bit, 1 or 2 stop bits)
Parity	Even, Odd, or None with 1 or 2 stop bits
Byte-To-Byte Timeout	0.01 – 2.54 second
Turn Around Delay	Less than 2 ms (fixed)

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

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 Micro USB B) RS-232 adapter, RS-485 adapter and RS-485 to USB converter (programming, monitoring, and data logging)
Configuration	Configure meters one at a time
Power	USB port provides power to the meter. ***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
UL File Number	E160849
Front Panel	UL Type 4X, NEMA 4X, IP65; panel gasket provided
Low Voltage Directive	EN 61010-1 Safety requirements for measurement, control, and laboratory use

Electromagnetic Compatibility

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

Note:

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

EU Declaration of Conformity

EU Declaration of Conformity is available in the Documentation CD provided with the product under the EU DoC menu.

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 remove the meter from its case to complete the installation, wiring, and setup of the meter for most applications.

Instructions are provided for changing the flowmeter power supply to output 5 or 10 VDC instead of 24 VDC. See *Figure 5. Flowmeter 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.

Panel Mounting Instructions

- Prepare a standard 1/8 DIN panel cutout - 3.622" x 1.772" (92 mm x 45 mm). Refer to *Figure 1. 1/8 DIN Panel Cutout Dimensions* below for more details.
- Clearance: allow at least 6.0" (152 mm) behind the panel for wiring.
- Panel thickness: 0.04" - 0.25" (1.0 mm - 6.4 mm). Recommended minimum panel thickness to maintain Type 4X rating: 0.06" (1.5 mm) steel panel, 0.16" (4.1 mm) plastic panel.
- Remove the two mounting brackets provided with the meter (back-off the two screws so that there is ¼" (6.4 mm) or less through the bracket. Slide the bracket toward the front of the case and remove).
- Insert meter into the panel cutout.
- Install mounting brackets and tighten the screws against the panel. To achieve a proper seal, tighten the mounting bracket screws evenly until meter is snug to the panel along its short side. DO NOT OVER TIGHTEN, as the rear of the panel may be damaged.
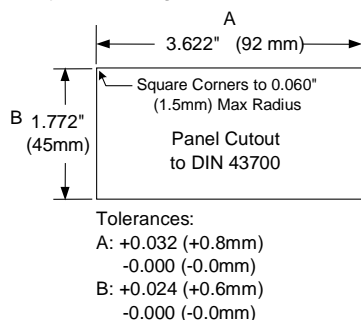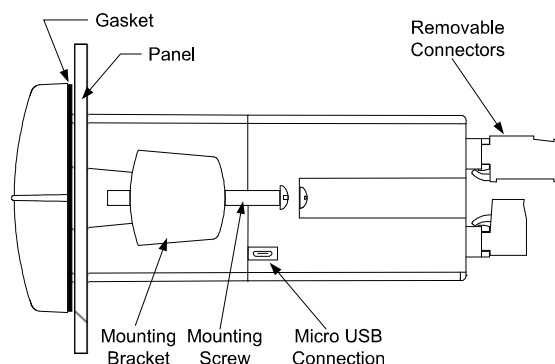

Figure 1. 1/8 DIN Panel Cutout Dimensions

DO NOT apply AC or DC power to the meter when using the USB connection.

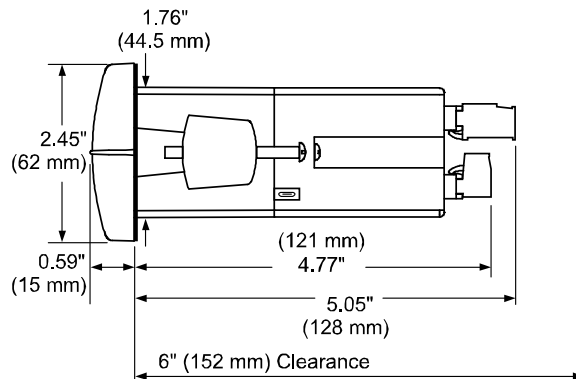**Figure 2. Panel Mounting Details**

Mounting Dimensions

Figure 3. Meter Dimensions - Side View

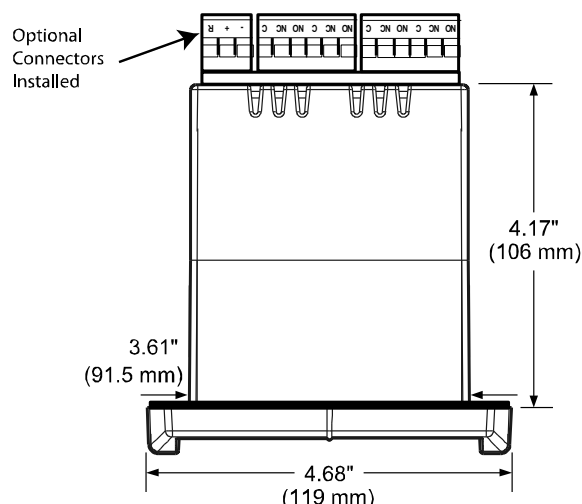**Figure 4. Meter Dimensions - Top View**

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

predig.com/documentation-cad

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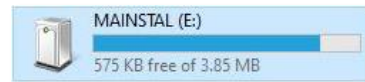
⚠ **WARNINGS**
- Only one meter may be connected at a time. Attaching multiple meters will cause a conflict with the meter software.
- **DO NOT** apply AC or DC power to the meter when using the USB connection.

2. Once the driver is installed, an AutoPlay dialog should appear for the drive "MAINSTAL." Click "Open folder to view files."
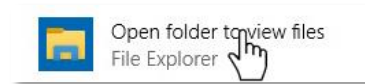
If the computer does not display an AutoPlay dialog for the drive "MAINSTAL," you should open My Computer and double-click on the drive labeled "MAINSTAL."

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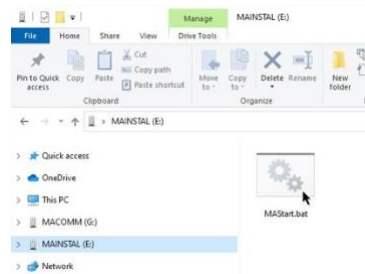
4. If there is an update available, click the "Update" button to install the new version. Otherwise, click "Configure" to begin programming your meter.
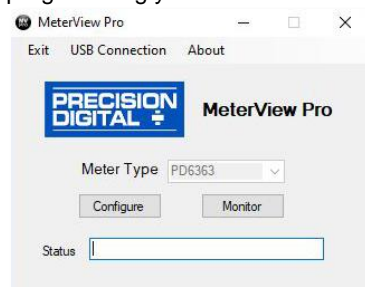
> **Note:** If you decide to update your MeterView Pro software, once the installation has completed, you will be asked if you want to update the setup files located on the meter itself. This way, you will always have the most current version on the meter for future installs.

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

Flowmeter 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 flowmeter or sensor.

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

To access the voltage selection jumper:

1. Remove all the wiring connectors.
2. Unscrew the back cover.
3. Slide out the back cover by about 1 inch.
4. Configure the J4 jumper, located behind the input signal connector, for the desired excitation voltage as shown.
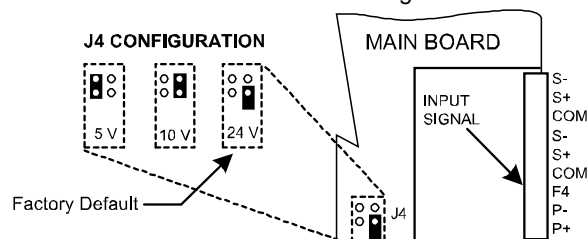
Figure 5. Flowmeter Supply Voltage Selection

Connections

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

⚠ 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 meter, shows the location of all connectors available with requested configuration.

Note: ## on the following figures refers to power and display options. (Example: PD6363-6H5)
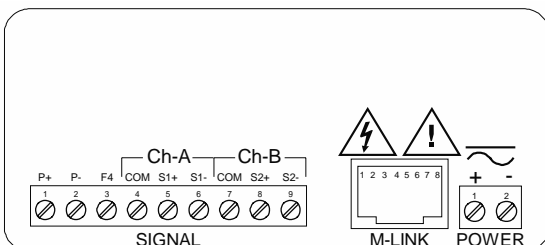
FIGURE 6. PD6363-##0 Connectors Label
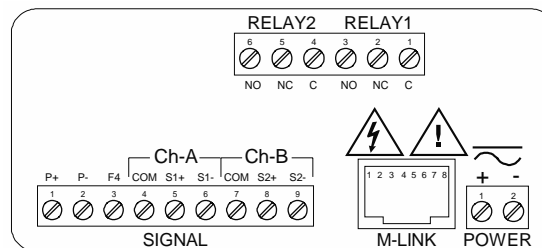
Figure 7. PD6363-##2 Connectors Label
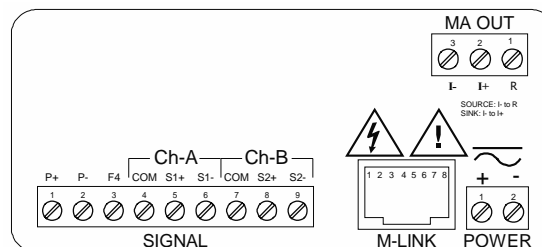
Figure 8. PD6363-##3 Connectors Label
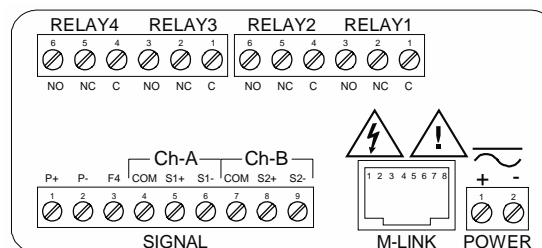
Figure 9. PD6363-##4 Connectors Label
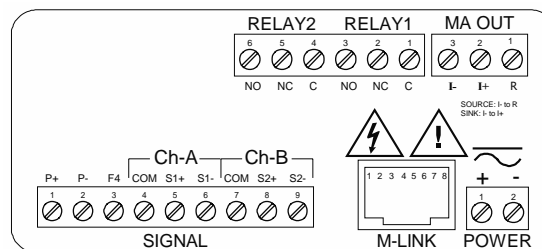
Figure 10. PD6363-##5 Connectors Label
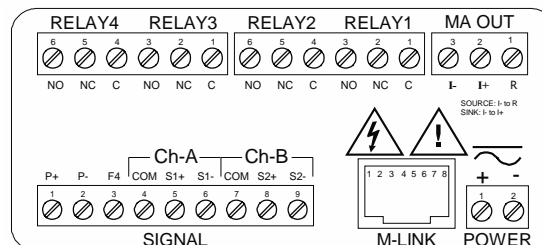
Figure 11. PD6363-##7 Connectors Label

⚠ WARNING

- **DO NOT** connect any equipment other than Precision Digital's expansion modules, cables, or meters to the RJ45 M LINK connector. Otherwise damage will occur to the equipment and the meter.

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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.
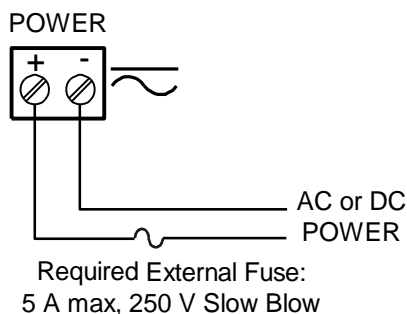
Figure 12. Power Connections

Signal Connections

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

The following figures show examples of signal connections.
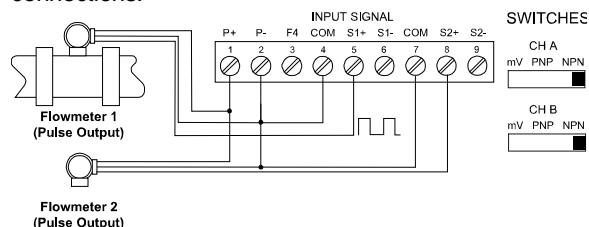
Figure 13. Flowmeters Powered by Internal Power Supply
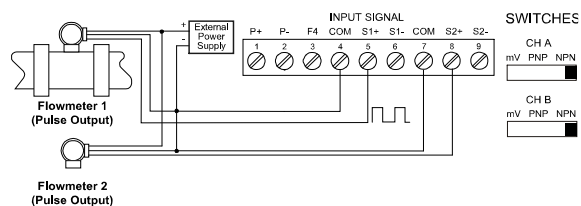
Figure 14. Flowmeters Powered by External Supply
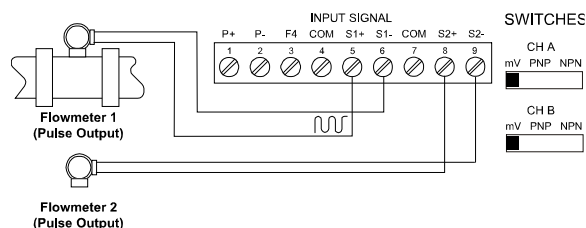
Figure 15. Self-Powered Magnetic Pickup Coil Flowmeter
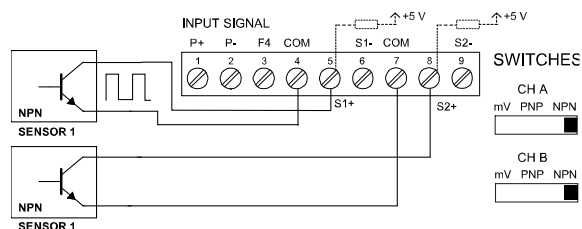
Figure 16. NPN open Collector Input
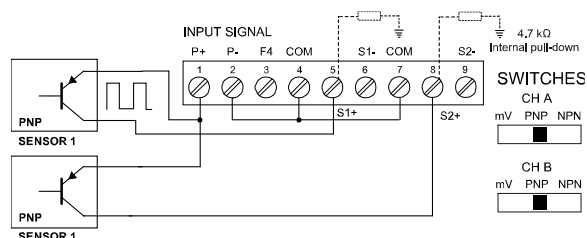
Figure 17. PNP Sensor Powered by Internal Supply
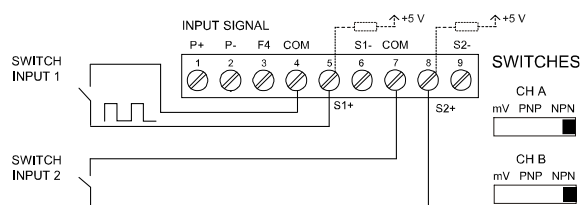
Figure 18. Switch Input Connections

Configure Input Type and Level Switches

Channel A and B each have an internal input type configuration switch. These switches must be set to the correct input type and level. Each switch can be set for mV, PNP, or NPN. For details on what input type to select, see *Signal Connections* starting on page *18*.

Modbus RTU Serial Communications

Serial communications connection is made to an RJ45 connector labeled M-LINK. For interfacing to the PROVU®, use the PDA1232 for RS-232 or the PDA1485 for RS-485. The same port is used for interfacing with all expansion modules (*e.g.* external relays, additional 4-20 mA outputs, digital I/O).

Relay Connections

Relay connections are made to two six-terminal connectors labeled RELAY1 – RELAY4. Each relay's C terminal is common only to the normally open (NO) and normally closed (NC) contacts of the corresponding relay. The relays' C terminals should not be confused with the COM (common) terminal of the INPUT SIGNAL connector.
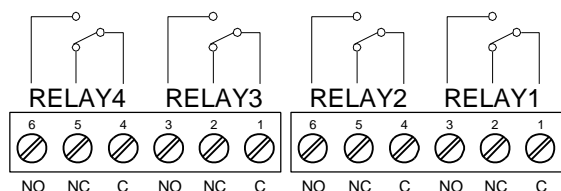
Figure 19. Relay Connections

Switching Inductive Loads

The use of suppressors (snubbers) is strongly recommended when switching inductive loads to prevent disrupting the microprocessor's operation. The suppressors also prolong the life of the relay contacts. Suppression can be obtained with resistor-capacitor (RC) networks assembled by the user or purchased as complete assemblies. Refer to the following circuits for RC network assembly and installation:
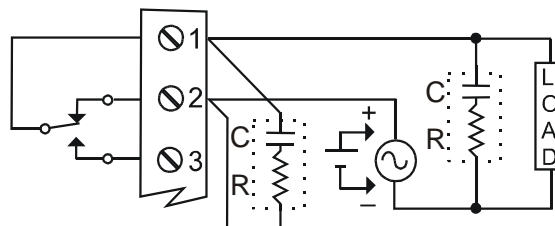
Figure 20. AC and DC Loads Protection

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.*
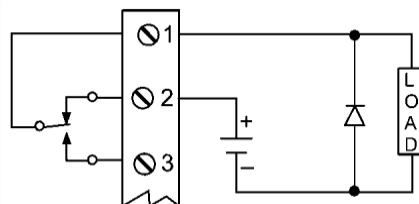
Figure 21. Low Voltage DC Loads Protection

RC Networks Available from Precision Digital

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

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

F4 Digital Input Connections

A digital input, F4, is standard on the meter. This digital input connected with a normally open closure across F4 and COM, or with an active low signal applied to F4. It can be used for remote operation of front-panel buttons, to acknowledge/reset relays, reset totals, or to reset max/min values. See *Function Keys & Digital I/O Available Settings* on page *52* for a complete list of capabilities.
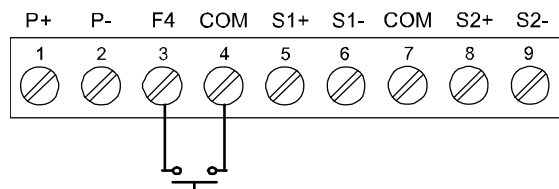
Figure 22. F4 Digital Input Connections

4-20 mA Output Connections

Connections for the 4-20 mA flowmeter 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.
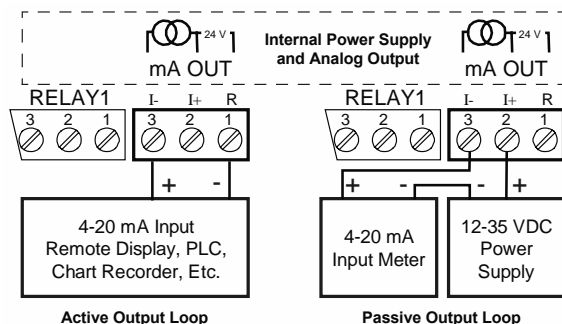
Figure 23. 4-20 mA Output Connections

Analog Output Flowmeter 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.
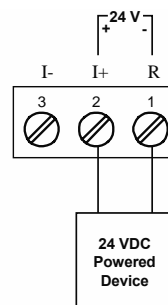
Figure 24. Analog Output Supply Powering Other Devices

External Relay, Analog Output, & Digital I/O Connections

The relay, dual analog output, and digital I/O expansion modules PDA1004, PDA1011, and PDA1044 are connected to the meter using a CAT5 cable provided with each module. The two RJ45 connectors on the expansion modules are identical and interchangeable; they are used to connect additional modules to the system.

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

⚠ WARNING

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

Figure 25. Expansion Module & DIN Rail Mounting Kit
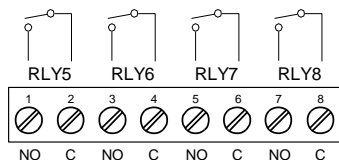
Figure 26. External Relays Module Connections
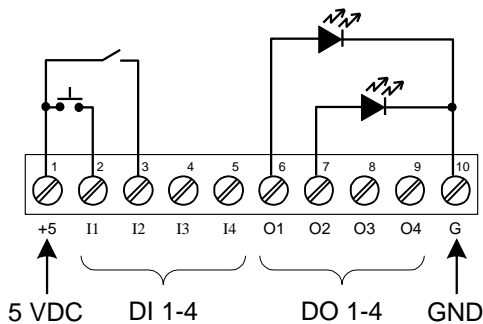
Figure 27. Digital I/O Module Connections
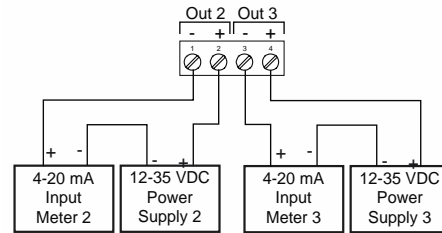
Figure 28. Dual 4-20 mA Output Module Connections

Remote Operation of Meter

The meter can be operated via the front panel push buttons or a remote control station using the PDA1044 Digital I/O module as illustrated in *Figure 29. Meter to Control Station Connection*.

Figure 29. Meter to Control Station Connections

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 *42*.

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.
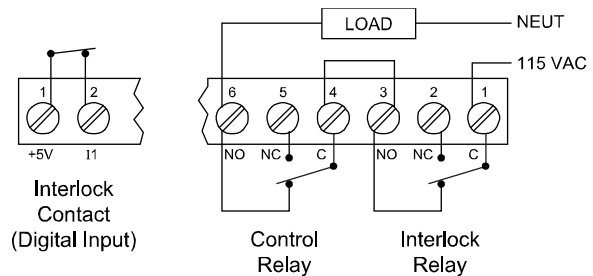
Figure 30. Interlock Connections

Setup and Programming

> The meter may either be scaled (5ᴄᴀʟᴇ) without applying an input, calibrated (ᴄᴀʟ) by applying an input, or you may use the K-Factor menu to match the rate/totalizer with a flowmeter's k-factor (pulse/unit of measure).
>
> The meter comes factory calibrated to NIST standards, so for initial setup, it is recommended to use the K-Factor method or (5ᴄᴀʟᴇ) function.

Overview

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

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

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

Front Panel Buttons and Status LED Indicators

-

Button Symbol	Description
MENU	Menu
▶ F1	Right arrow/F1
▲ F2	Up arrow/F2
↵ F3	Enter/F3

-

LED	State	Indication
1-8	Steady	Alarm condition based on set and reset points, independent of relay status in certain configurations. (Available on all meter configurations, including those without relays installed)
1-8	Flashing	Relay interlock switch open
1-8 & M	Flashing	Relay in manual control mode
R	Steady	Rate
T	Steady	Total
T	Flashing	Meter in Tare mode
G & T	Steady	Grand Total
▲	Steady	Total overflow ("ᴏF" is displayed to the left of total overflow and ▲ LED is illuminated)
M	Flashing	Analog ouput in manual control mode
A	Steady	Channel A displayed
B	Steady	Channel B displayed
C	Steady	Channel C displayed

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

Display Functions & Messages

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

Display Functions & Messages

Display	Parameter	Action/Setting Description
5EtuP	Setup	Enter *Setup* menu
InPut	Input	Enter *Input* selection menu
Ch-A*	Input	Set input operation for channel A (*or B)
totAL	Total	Enable/disable totalizer functions
YES	Yes	Enable totalizer functions
no	No	Disable totalizer functions
modE	Mode	Select dual-input operation mode
duAL	Dual	Set independent dual input mode
ud Ab	Up/Down AB	Set channel A total add/subtract based on the state of channel B
ud A1	Up/Down AI	Set channel A total add/subtract based on the state of a digital input
ud b1	Up/Down BI	Set channel B total add/subtract based on the state of a digital input
ud b1	Up/Down ABI	Set channel A & B total add/subtract based on the state of a digital input for each
9uAd 1	Quadrature 1	Set type 1 quadrature operation
9uAd 2	Quadrature 2	Set type 2 quadrature operation
9uAd 4	Quadrature 4	Set type 4 quadrature operation
un itS	Unit	Select the display units/tags
Ch-A*	Rate unit	Set rate unit or tag for channel A (*or B)
Ch-C	Math unit	Set unit or tag for math channel C
tot-A*	Total unit	Set total unit or tag for channel A (*or B)
Gtot-A*	Grand total unit	Set grand total unit or tag for channel A (*or B)
dEc Pt	Decimal point	Set decimal point
Ch-A*	Decimal point	Set decimal point for channel A (*or B or C)
rAtE*	Rate	Set rate decimal point (*channel A and B only)

Display Functions & Messages

Display	Parameter	Action/Setting Description
totAL*	Total	Set total decimal point (*channel A and B only)
GtotAL*	Grand total	Set grand total decimal point (*channel A and B only)
ProG	Program	Enter the *Program* menu
InCAL	Input calibration	Enter the *Input Calibration* menu
Ch-A	Channel A	Enter channel A input setup
FAct-A	K-factor A	Enter channel A k-factor
SCAL-A	Scale A	Enter the *Scale* menu for channel A
CAL-A	Calibrate A	Enter the *Calibration* menu for channel A
InP 1	Input 1	Calibrate input 1 signal or program input 1 value
diS 1	Display 1	Program display 1 value
InP 2	Input 2	Calibrate input 2 signal or program input 2 value (up to 32 points)
diS 2	Display 2	Program display 2 value (up to 32 points)
Error	Error	Error, calibration or scaling not successful, check signal or programmed value
Ch-b	Channel B	Enter channel B input setup
FAct-b	K-factor B	Enter channel B k-factor
SCAL-b	Scale B	Enter the *Scale* menu for channel B
CAL-b	Calibrate B	Enter the *Calibration* menu for channel B
tSEtuP	Total setup	Enter the *Total Setup* menu
Ch-A*	Channel A	Setup the total for channel A (*or B)
tbASE	Time base	Program total time base
t CF	Total conversion factor	Program total conversion factor
Gt CF	Grand total conversion factor	Program grand total conversion factor
trESEt	Total reset	Program total reset mode: auto or manual
Ch-A*	Channel A	Set total reset modes for channel A (*or B)
t rSt	Total reset	Program total reset mode: auto or manual
Gt rSt	Grand total reset	Program grand total reset mode: auto or manual

Display Functions & Messages

Display	Parameter	Action/Setting Description
t dLY	*Time delay*	Program automatic reset time delay
d5PLAY	*Display*	Enter the *Display* menu
LinE 1	*Display Line 2*	Assign the upper display parameter
LinE 2	*Display Line 2*	Assign the lower display 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 channels A & B
d AC	*Display AC*	Alternate display of channels A & C
d bC	*Display BC*	Alternate display of channels B & C
d AbC	*Display ABC*	Alternate display of channels A, B, & C
d t-A	*Display total A*	Assign display to channel A total
d t-b	*Display total B*	Assign display to channel B total
d Gt-A	*Display grand total A*	Assign display to channel A grand total
d Gt-b	*Display grand total B*	Assign display to channel B grand total
d rt-A	*Display rate and total A*	Alternate display of channel A rate and total
d rt-b	*Display rate and total B*	Alternate display of channel B rate and total
drGt-A	*Display rate and grand total A*	Alternate display of channel A rate and grand total
drGt-b	*Display rate and grand total B*	Alternate display of channel B rate and grand total
d5Et 1*	*Display Set 1**	Displays relay 1 (*through 8) set point.
d Hi-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 high/low A*	Alternate between high/low value of channel A
d Hi-b	*Display high B*	Display high value of channel B

Display Functions & Messages

Display	Parameter	Action/Setting Description
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 Hi-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 C and units/tags*	Alternate display of channel C and the unit/tag
d tA-u	*Display total A and total A units*	Alternate display of channel A total and total units
d tb-u	*Display total B and total B units*	Alternate display of channel B total and total units
d tAb	*Display total A and B*	Alternate display of channel A total and channel B total
d tAbC	*Display total A, B, and sum of A and B*	Alternate display of channel A total, channel B total, and sum of totals as channel C
n7 bu5	*Display Modbus*	Display Modbus input register
d oFF	*Display off*	Display blank line 2
d unit	*Display unit*	Display line 1 channel units
d-intY	*Display intensity*	Set display intensity level from 1 to 8
rELAY	*Relay*	Enter the *Relay* menu
A55iGn	*Assignment*	Assign relays to channels or Modbus
A5iGn 1*	*Assign 1*	Relay 1 (*through 8) assignment
Ch-A*	*Channel A**	Assign relay to channel A (*or B or C)
rAtE*	*Rate*	Assign relay to rate (*channel A and B only)
totAL*	*Total*	Assign relay to total (*channel A and B only)
GtotAL*	*Grand total*	Assign relay to grand total (*channel A and B only)

Display Functions & Messages

Display	Parameter	Action/Setting Description
n˘ buS	*Modbus*	Assign relay to Modbus register
rLY 1*	*Relay 1*	Relay 1 (*through 8) setup
Act 1	*Action 1*	Set relay 1 action
Auto	*Automatic*	Set relay for automatic reset
SEt 1	*Set 1*	Enter relay 1 set point
rSt 1	*Reset 1*	Enter relay 1 reset point
A-n˘An	*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
SAn˘PL	*Sample*	Set relay for sample time trigger control
OFF	*Off*	Turn relay off
FA˘LSF	*Fail-safe*	Enter *Fail-safe* menu
FLS 1*	*Fail-safe 1*	Set relay 1 (*through 8) 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 (*through 8) time delay setup
On 1	*On 1*	Set relay 1 On time delay
OFF 1	*Off 1*	Set relay 1 Off time delay
Aout	*Analog output*	Enter the *Analog output* scaling menu
Aout 1*	*Aout Channel*	Analog Output source channel (*1-3)
d˘S 1	*Display 1*	Program display 1 value
Out 1	*Output 1*	Program output 1 value (e.g. 4.000 mA)
d˘S 2	*Display 2*	Program display 2 value
Out 2	*Output 2*	Program output 2 value (e.g. 20.000 mA)
rESEt	*Reset*	Press Enter to access the *Reset* menu
rSt H˘	*Reset high*	Press Enter to reset max display
rSt Lo	*Reset low*	Press Enter to reset min display
rSt HL	*Reset high & low*	Press Enter to reset max & min displays

Display Functions & Messages

Display	Parameter	Action/Setting Description
tot A	*Reset total A*	Press Enter to reset channel A total
tot b	*Reset total B*	Press Enter to reset channel B total
Gtot A	*Reset grand total A*	Press Enter to reset channel A grand total
Gtot b	*Reset grand total B*	Press Enter to reset channel B grand total
tot Ab	*Reset totals A and B*	Press Enter to reset channels A and B totals
Gt Ab	*Reset grand totals A and B*	Press Enter to reset channels A and B grand totals
Contrl	*Control*	Enter *Manual Control* menu
Auto	*Automatic*	Press Enter to set meter for automatic operation
n˘An	*Manual*	Press Enter to manually control relays or analog output operation
PASS	*Password*	Enter the *Password* menu
PASS 1	*Password 1*	Set or enter Password 1
unLoc	*Unlocked*	Program password to lock meter
Locd	*Locked*	Enter password to unlock meter
PASS 2	*Password 2*	Set or enter Password 2
PASS 3	*Password 3*	Set or enter Password 3
totAL	*Total reset password*	Set or enter a total reset password
GtotAL	*Grand total password*	Set or enter a grand total reset password
999999	*Flashing*	Overrange condition

Main Menu

The main menu consists of the most commonly used functions: *Reset, Manual 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.
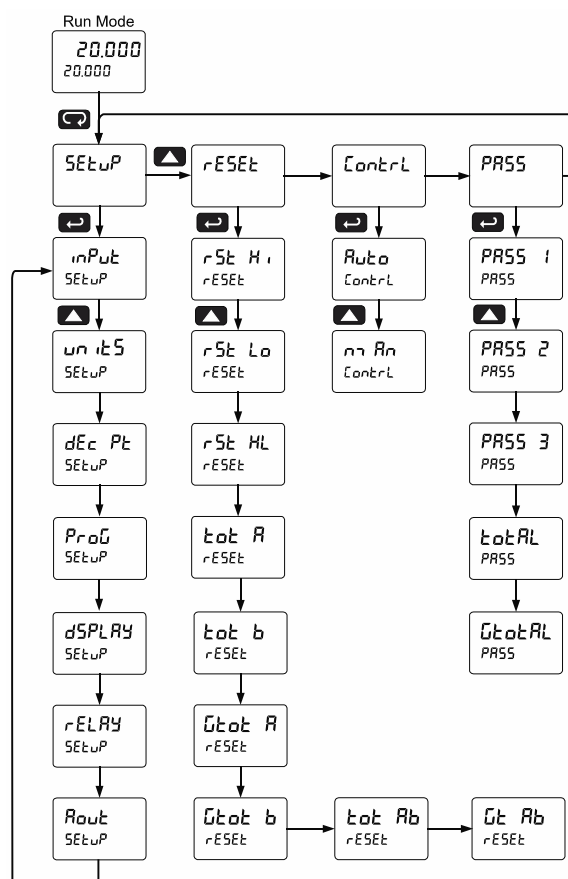
Setting Numeric Values

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.
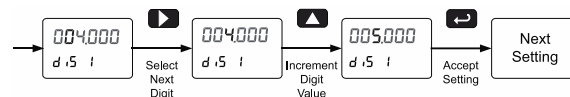
Setting Up the Meter (SEtuP)

The *Setup* menu is used to select:
1. Total enable/disable and channel A and B input modes
2. Units for A & B rate, total & grand total, and C
3. Decimal positions for A & B rate, total, and grand total, and C
4. Program the K-factor (or scale or calibrate) & total functions
5. Display parameters and intensity
6. Relay assignments and operation
7. 4-20 mA analog output scaling

Press the Menu button to exit at any time.

Press **Enter** to Accept
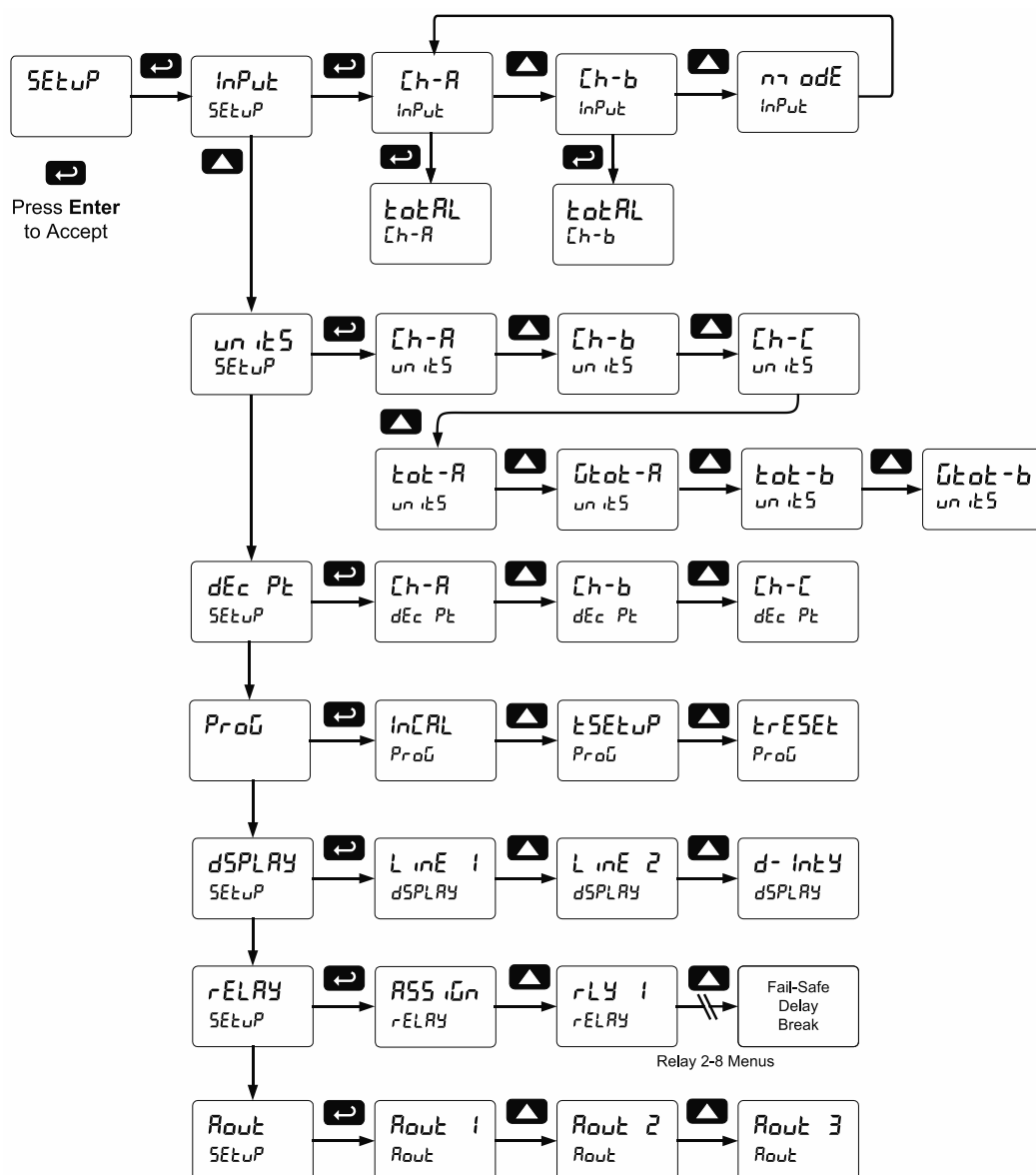
Setting the Input Signal (InPut)

There are two internal slide switches, located inside the rear meter housing to the left of the input connector, which must be configured according to the input levels and types. See *Configure Input Type and Level Switches* on page *19* for details.

Enter the Input menu to enable or disable the totalizer features.
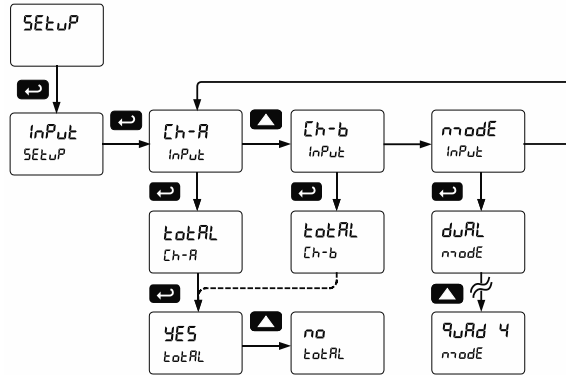
Setting the Totalizer Features (totAL)

To simply not display the total, select alternative display parameters in the display (dSPLAY) menu.

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

Note: The totalizer continues working in the background.

Setting the Dual-Input Mode (modE)

The *Mode* menu is used to set the functions of the dual input and total. The inputs may be configured for independent one-directional total operation, bi-directional total count with the use of another input or a digital input, or for quadrature input modes.

Independent Dual Totalizers (dUAL)

Total A and B are one-directional and independent, only counting up *or* down depending on *Count* settings.

Ch-A Totalizer Add/Subtract by Ch-B Input (ud Ab)
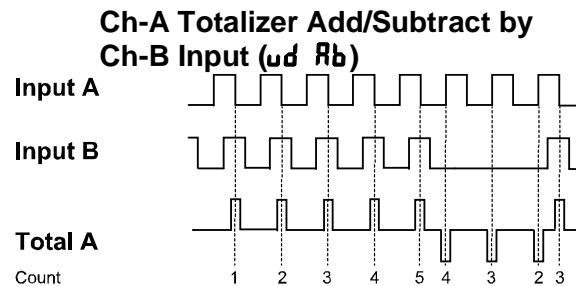
Figure 31. Dual Input Mode (ud Ab)

Total of channel A will add or subtract as determined by the state of input channel B. Channel A total will add at each falling edge if input B is high, and subtract at each rising edge if input B is low.

Ch-A Totalizer Add/Subtract by Digital Input (ud A1)
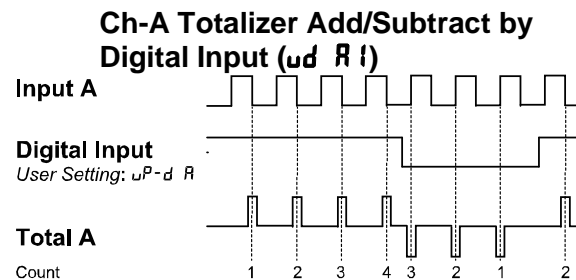
Figure 32. Dual Input Mode (ud A1)

Total of channel A will add or subtract as determined by the state of a digital input. Channel A total will add at each falling edge if an assigned digital input is high, and subtract at each rising edge if an assigned digital input is low.

Ch-B Totalizer Add/Subtract by Digital Input (ud b1)

Total of channel B will add or subtract as determined by the state of a digital input. Channel B total will add at each falling edge if an assigned digital input is high, and subtract at each rising edge if an assigned digital input is low.

Ch-A & Ch-B Totalizer Add/Subtract by Digital Input (ud Ab)

Totals of channel A and B will add or subtract as determined by the state of a digital input assigned to each channel. This mode combines the features of ud A1 and ud b1.

This setting requires the use of a PDA1044 digital I/O expansion module (see *Ordering Information* on page *6*). The F4 digital input will only support one channel.

Quadrature Input Type 1 (QuAd 1)
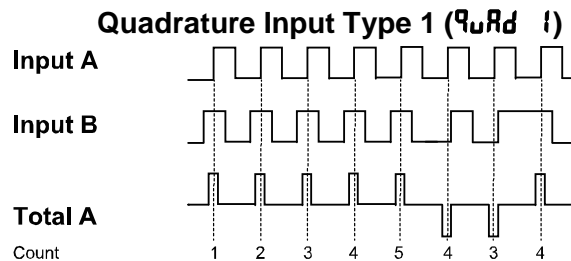
Figure 34. Dual Input Mode (QuAd 1)

Quadrature modes are used to accept inputs that are ±90 degrees out of phase, from quadrature output devices. Total of channel A will add or subtract as determined by the state of input channel B. Channel A total will add at each rising edge if channel B is high, and subtract at each rising edge if channel B is low.

Quadrature Input Type 2 (QuAd 2)
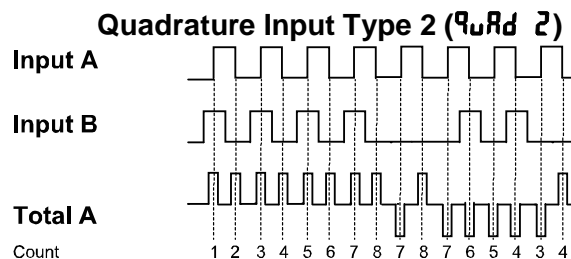
Figure 35. Dual Input Mode (QuAd 2)

Quadrature modes are used to accept inputs that are ±90 degrees out of phase, from quadrature output devices. Total of channel A will add or subtract as determined by the state of input channel B. Channel A total will add at each rising edge if channel B is high, and at each falling edge if channel B is low. Channel A total will subtract at each rising edge if channel B is low, and at each falling edge if channel B is high.

Quadrature Input Type 4 (QuAd 4)
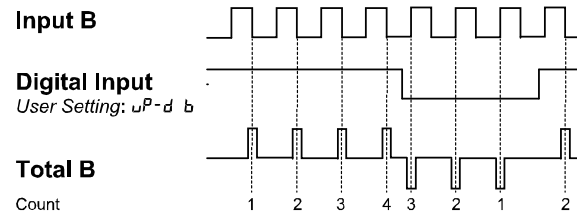
Figure 33. Dual Input Mode (ud b1)
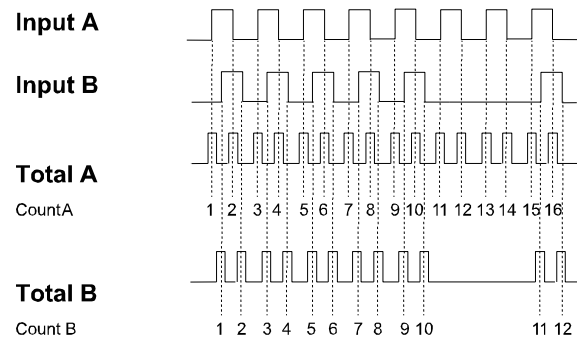
Figure 36. Dual Input Mode (QuAd 4)

Quadrature modes are used to accept inputs that are ±90 degrees out of phase, from quadrature output devices. Totals of channel A and B will add at each rising and falling edge of that channel.

Setting the Rate, Total, & Grand Total Units/Tags (un itS)

Enter the channel A and B rate, total, grand total, and math channel C units (or custom tags) that will be displayed if alternating units is selected in the un itS menu, or d un it is selected as the lower display parameter.

See the *Setting the Display Parameters & Intensity* (dSPLAY) flow chart on page *34* for details on accessing the *Units* menu and parameters. Ch-A and Ch-b set the rate units, tot-A and tot-b the total units, and Gtot-A and Gtot-b the grand total units. Ch-C sets the units for the math channel C.

See the *Setting the Display Parameters & Intensity* (dSPLAY) flow chart on page *34* to access the display menu to show the unit or tag on the lower display.

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	V	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 for any channel, rate, total, or grand total, may be set with up to five decimal places or with no decimal point at all.

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

There are seven decimal points to set up for three channels: Ch-A rate, total, and grand total; Ch-B rate, total, and grand total; and Ch-C.

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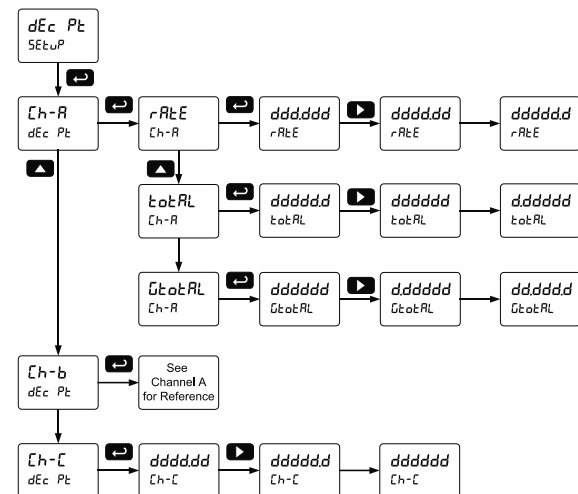
Programming the Rate/Totalizer (ProG)

The meter may either be scaled (SCALE) without applying an input, calibrated (CAL) by applying an input, or you may use the K-Factor menu to match the rate/totalizer with a flowmeter's k-factor (pulse/unit of measure). 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 following menus for each channel A and B:

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

The pulse inputs may be calibrated or scaled to any display value within the range of the meter.
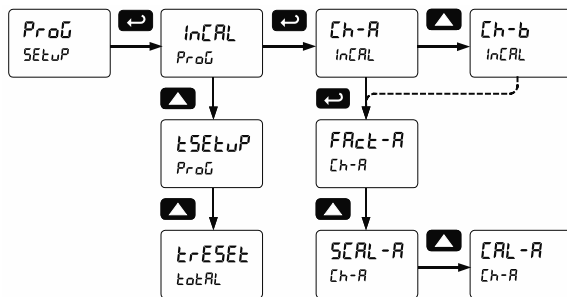
Additional parameters, not needed for most applications, are found in the *Advanced Features* menu; see *Advanced Features Menu*, page 44.

Input Calibration Method (InCAL)

There are three methods of calibrating (or scaling) the display for each input channel to show the correct engineering units.

- Use the *Factor* menu to enter the k-factor of a flowmeter in units/pulse
- Use the *Scale* menu to enter the scaling without a signal source.
- Use the *Calibrate* menu to apply a signal from a signal source.

⚠️ **IMPORTANT**

- The Scale, Calibrate, and K-Factor functions are exclusive of each other. The meter uses the last function programmed. Only one of these methods can be employed at a time.

Multi-Point Calibration & Scaling

The Scale and Calibrate functions can use up to 32 points (default is 2). The number of points should be set in the Advanced menu under the *Multi-Point Linearization* (LinEAr) menu selection prior to scaling and calibration of the meter, see page *47* for details.

K-Factor Calibration (FAct-A, FAct-b)

The meter may be calibrated using the *K-Factor* function. Most flowmeter manufacturers provide this information with the device. Enter the *K-Factor* (FAct-A, FAct-b) menu and select the decimal point with highest resolution possible and program the k-factor value (*i.e.* pulses/gal). The meter will automatically calculate the flow rate using the k-factor and the time base selected.
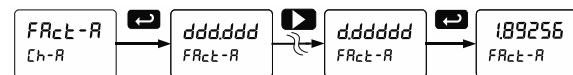
Scaling the Meter without a Signal Source (SCAL-A, SCAL-b)

The inputs 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.

From the InCAL menu, select channel A or B, followed by SCAL-A or SCAL-b, and then set the input signal value and display value for each of the scaling points (default is two). Enter the input signal values in pulses/second (Hz), and the corresponding display values in appropriate engineering units.

Channel B is scaled similarly to Channel A, shown below.

Scaling the Meter for Channel A (SCAL-A)
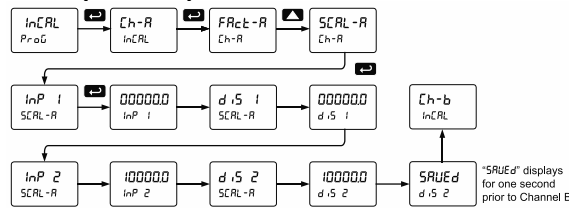
> For instructions on how to program numeric values see *Setting Numeric Values*, page *26*.

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

For example: If the rate at 1000 Hz is 13.2 gal/min, this must be converted to gal/sec. In this scenario, the numbers input into the SCALE menu would be as follows:
InP 1: 0.0
d iS 1: 0.000
InP 2: 1000.0
d iS 2: 0.220

Set the time base set to minutes (see *Total & Grand Total Setup* (tSEtuP) on page *33*) and the meter will display 13.2 gal/min at 1000 Hz

Error Message (Error)

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

After the error message is displayed, the meter reverts to input 2 during calibration or scaling 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. Minimum input span requirements not maintained.
3. Input 1 signal inadvertently applied to calibrate input 2.

Minimum Input Span

The minimum allowed input span is 1.0 Hz, which is the minimum difference between input 1 and input 2 signals required to complete the calibration using an external signal source, or 0.1 Hz for scaling the meter without a signal source.

Calibrating the Meter with External Source (CAL-A, CAL-b)

> To scale the meter without a signal source, refer to Scaling the Meter without a Signal Source (SCAL-A, SCAL-b), *page 31*.

The meter can be calibrated to display the process variables 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.

> There is no need to warm up the meter before performing calibration of the inputs.

Channel B is calibrated similarly to Channel A, shown below.

Calibrating the Meter for Channel A (CAL-A)
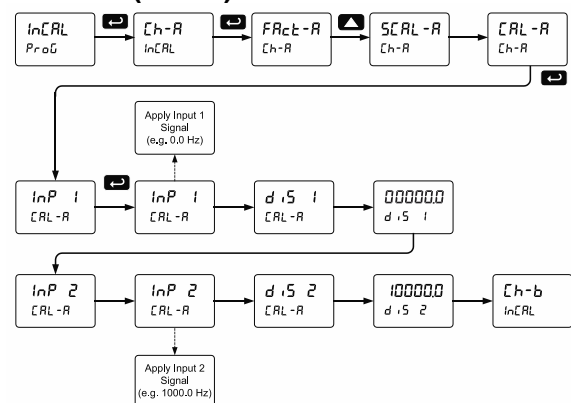
Note: The display values (d iS 1 and d iS 2) need to be in units of measure per second.

Note: Inputs for the above example are:
Input 1: 0.0 Hz; Display 1: 0.0 gallons/min
Input 2: 1000.0 Hz; Display 2: 6000.0 gallons/min

Total & Grand Total Setup (tSEtuP)

The time base and total and grand total conversion factors for input channels A and B are located in the *Totalizer Setup* menu.

The time base is determined by the rate programming. Enter the time unit of the programmed rate scale. *For example: A rate display scaled in engineering units of gallons per minute would use a time base of minutes.*

Total & grand total conversion factors for channel A and B are programmed independently. This means that one total or grand total can be displaying the value in gallons while another displays in million gallons, liters, m^3, etc.
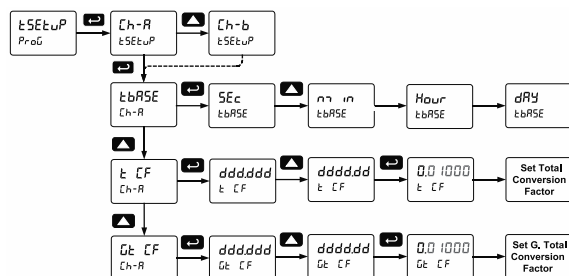
Total & Grand Total Reset (trESEt)

Total reset menus are located in the *Program* menu. The totals can be programmed for manual or automatic reset. In the automatic reset mode, a programmable time delay (t dLY) in seconds is available to reset the total or grand total after the assigned preset is reached.

33
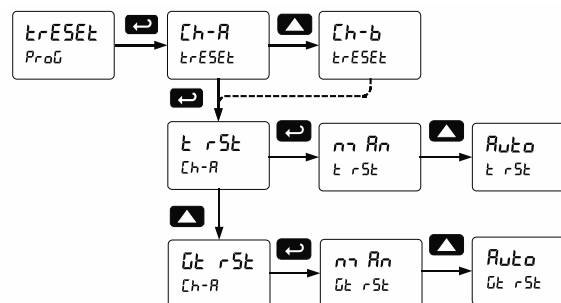
Setting the Display Parameters & Intensity (dSPLAY)

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

1. Ch-A rate (d Ch-A)
2. Ch-B rate (d Ch-b)
3. Ch-C math channel (d Ch-C)
4. Toggle Ch-A & Ch-B rate (d Ab)
5. Toggle Ch-A rate and Ch-C (d AC)
6. Toggle Ch-B rate and Ch-C (d bC)
7. Toggle Ch-A & Ch-B rate, and Ch-C (d AbC)
8. Ch-A total (d t-A)
9. Ch-B total (d t-b)
10. Ch-A grand total (d Gt-A)
11. Ch-B grand total (d Gt-b)
12. Toggle Ch-A rate and total (d rt-A)
13. Toggle Ch-B rate and total (d rt-b)
14. Toggle Ch-A rate and grand total (drGt-A)
15. Toggle Ch-B rate and grand total (drGt-b)
16. Relay set points (1-8) (dSEt 1 to dSEt 8)
17. Max, min, and max & min values for Ch-A, Ch-B, or Ch-C (d Hi-A to d HL-C)
18. Toggle Ch-A rate & units (d A-u)
19. Toggle Ch-B rate & units (d b-u)
20. Toggle Ch-C & units (d C-u)
21. Toggle Ch-A total & units (d tA-u)
22. Toggle Ch-B total & units (d tb-u)
23. Toggle Ch-A total and Ch-B total (d tAb)
24. Toggle Ch-A total, Ch-B total, and the sum of total A + total B (d tAbC)*
25. Modbus input (ni buS)

Note: The (C = sum of total A + total B) displayed with the selection (d tAbC) is different than the math channel C calculated under the Math menu functions. Example: (C = Rate Ch-A + Rate Ch-B).

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

1. All options for display line 1
2. Off, with no display (d oFF)
3. Engineering units for any single channel, total, or grand total

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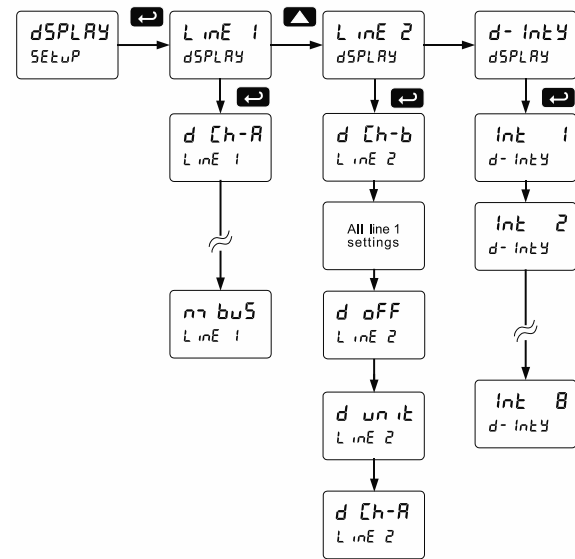
After setting up the input and display, press the Menu button to exit programming and skip the rest of the setup menu.

Customizable Displays

The displays can be set up to read input channels (A or B), rate, total, or grand total, math function channel 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, or the Modbus input. This allows the display to be setup to display whatever variables are most valuable to the application. Here are just a few examples.

Line 1 displays Math Function (C)
Line 2 toggles between Totals A & B

Math Function & Tag

Input Channels A & B Total
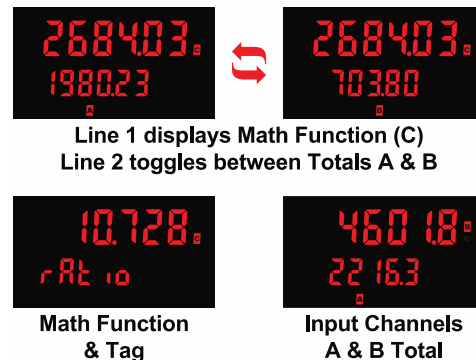
Display Intensity (d- IntY)

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 rate, total, or grand total
   b. Channel B rate, total, or grand total
   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)

Note: The setup of relays 2-4 follows the same pattern shown here for relay 1.

Setting the Relay Assignment (ASSIGn)

Relays may be assigned to Channel A (rate, total, or grand total), Channel B (rate, total, or grand total), Channel C (Math channel), or Modbus input.
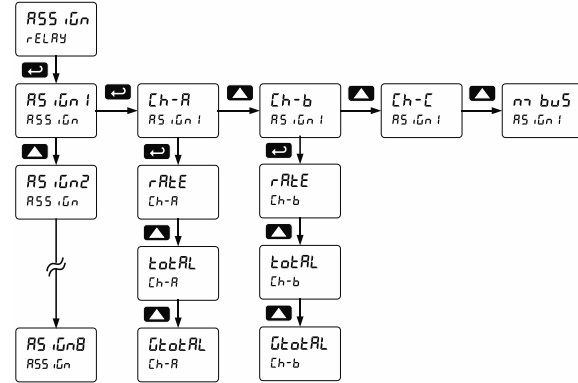
Setting the Relay Action (Act)

Operation of the relays is programmed in the *Action* menu. The relays may be set up for any of the following modes of operation:

1. Automatic reset (non-latching)
2. Automatic + manual reset at any time (non-latching)
3. Latching (manual reset only, at any time)
4. Latching with Clear (manual reset only after alarm condition has cleared)
5. Pump alternation control (automatic reset only)
6. Sampling (the relay is activated for a user-specified time)
7. Off (relay state controlled by Interlock feature)

The following graphic shows relay 1 action setup; relay 2-8 are set up in a similar fashion.
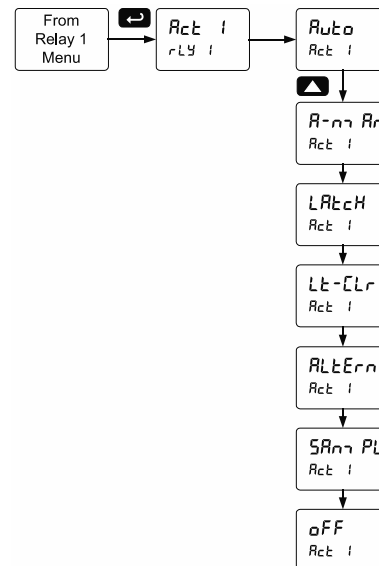
Programming Set and Reset Points

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

Note: Changes are not saved until the reset point has been accepted.
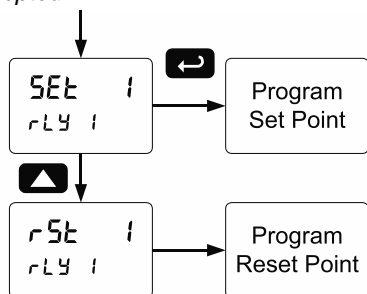
Setting Fail-Safe Operation

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

Programming Time Delay

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

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

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

Relay and Alarm Operation Diagrams

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

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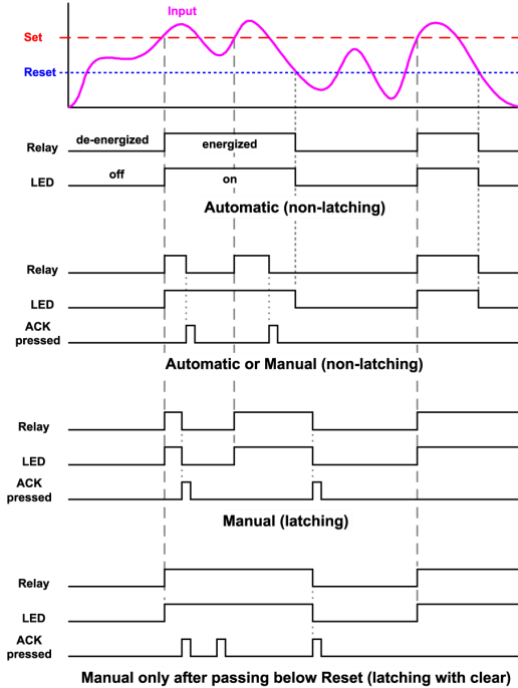
For Manual reset mode, ACK can be pressed anytime to turn "off" relay. To detect a new alarm condition, the signal must go below the set point, and then go above it.

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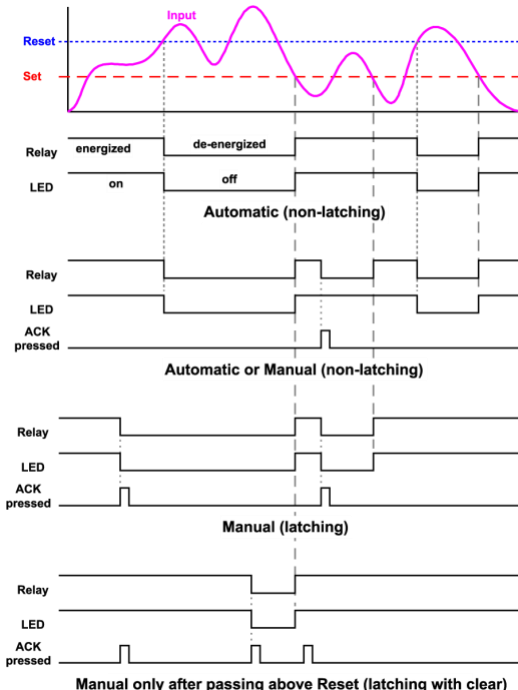
For Manual reset mode, ACK can be pressed anytime to turn "off" relay. To detect a new alarm condition, the signal must go below the set point, and then go above it.

High Alarm with Fail-Safe Operation (Set > Reset)
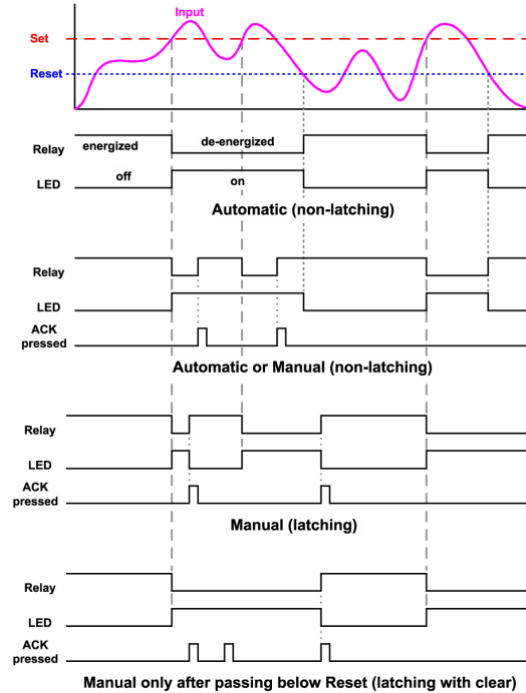
Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.

Low Alarm with Fail-Safe Operation (Set < Reset)
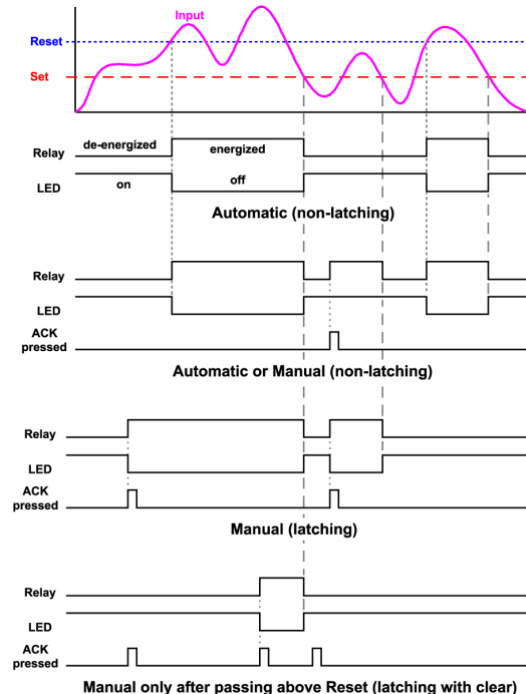
Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.

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Time Delay Operation

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

On Time Delay
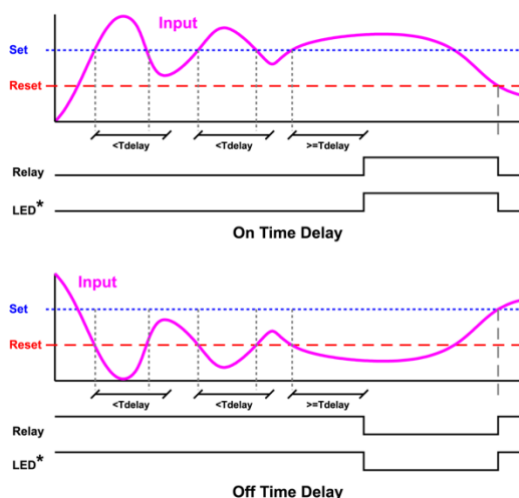
Off Time Delay

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

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

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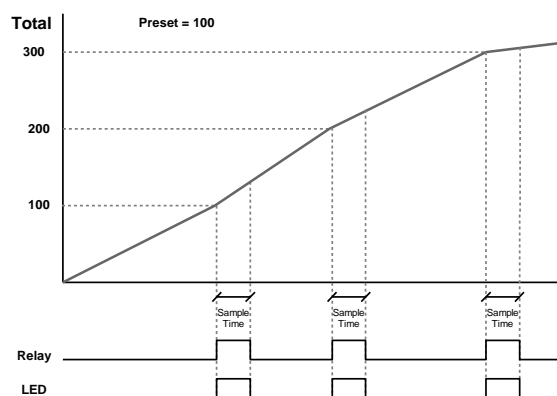
When the total reaches the preset, the relay trips and the sample time starts. After the sample time has elapsed, the relay resets. The cycle repeats every time the preset value is added to the total.

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Pump Alternation Control Operation

LEDs indicate the relay status
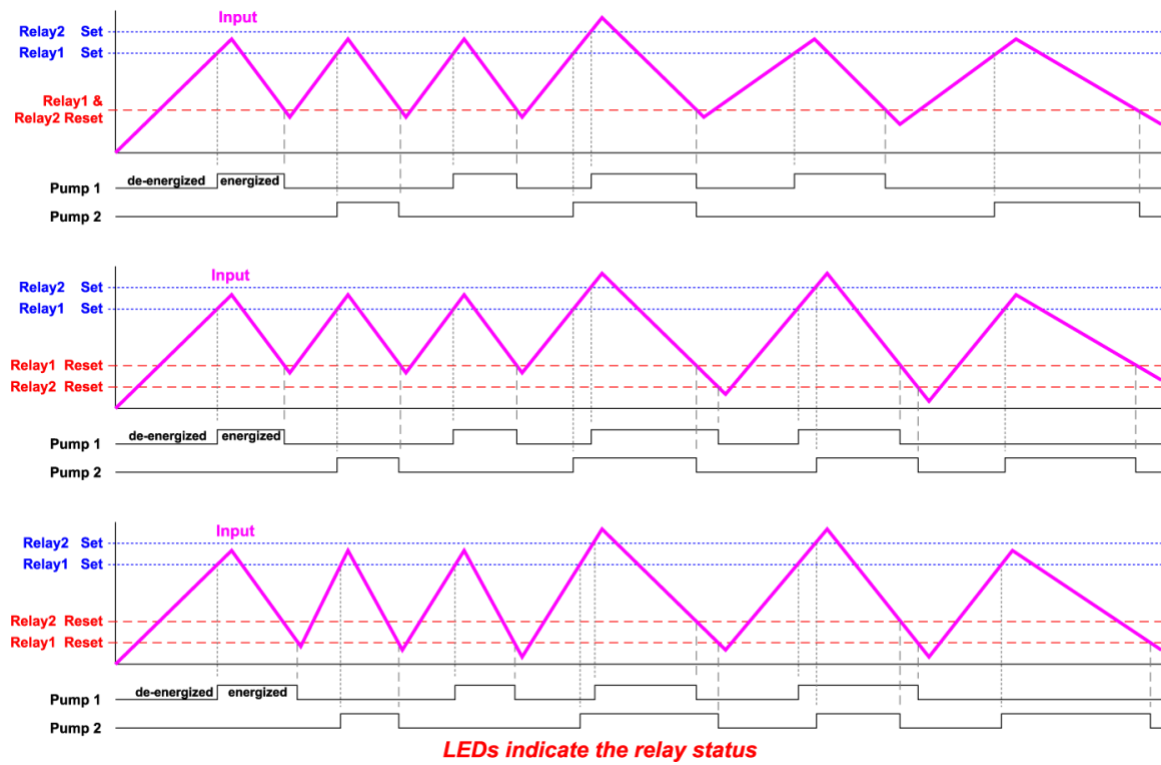
Relay Operation Details
Overview

The relay capabilities of the meter expand its usefulness beyond simple indication to provide users with alarm and control functions. These capabilities include front panel alarm status LEDs as well as either 2 or 4 optional internal relays and/or 4 external relays expansion module. Typical applications include high and low temperature, level, pressure or flow alarms, control applications such as simple on/off pump control, and pump alternation control for up to 8 pumps. There are four basic ways the relays can be used:

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

Relays Auto Initialization

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

Alarm #	HI or LO Alarm	Set Point	Reset Point	Power-Up Reading	Relay & LED
1	HI	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	LED	Status
1	Alarm 1	5	Alarm 5
2	Alarm 2	6	Alarm 6
3	Alarm 3	7	Alarm 7
4	Alarm 4	8	Alarm 8

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

The meter is supplied with four alarm points that include front panel LEDs to indicate alarm conditions. This standard feature is particularly useful for alarm applications that require visual-only indication. The LEDs are controlled by the set and reset points programmed by the user. When the display reaches a set point for a high or low alarm, the corresponding alarm LED will turn on. When the display returns to the reset point the LED will go off. The front panel LEDs 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-nᴙn)

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 (LᴙtᴄH)

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-ᴄLr)

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

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

Acknowledging Relays

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

1. Via the programmable front panel function keys F1-F3 (Example: F3 assigned to ACK).
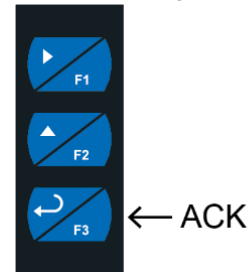
2. Remotely via a normally open push button wired to the F4 terminal at the rear of the instrument.
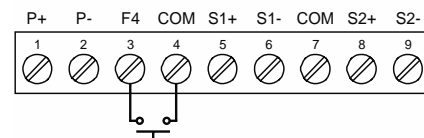
3. One of the digital inputs and the +5 V terminals on the digital I/O expansion module.
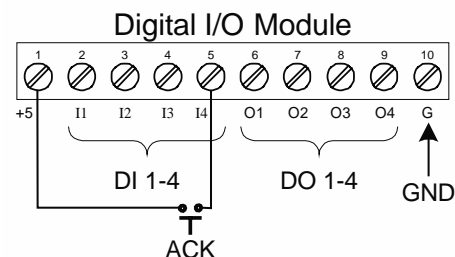
When the ACK button or the assigned digital input is closed, all relays programmed for manual reset are acknowledged.

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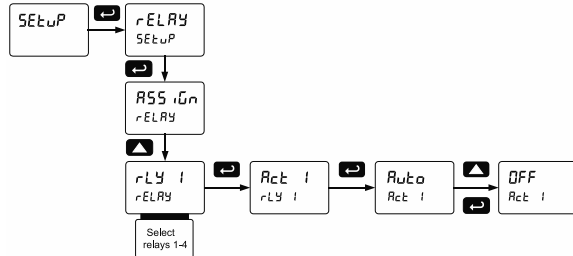
2. In the Advanced features – *User* menu program any of the digital inputs to *Force On* any of the internal relays (1-4).
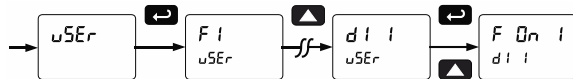
3. Connect a switch or dry contact between the +5V terminal and the corresponding digital input (dI-1 to dI-4) terminal.

SW2
SW1

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

+5　I1　I2　I3　I4　O1　O2　O3　O4　G

5 VDC　　　DI 1-4　　　　DO 1-4　　GND
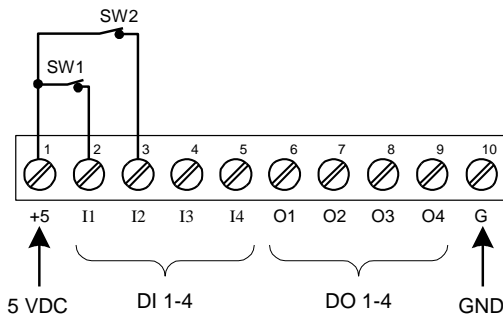
Interlock Relay Operation Example

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

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

Scaling the 4-20 mA Analog Output (Rout)

The 4-20 mA analog outputs can be scaled to provide a 4-20 mA signal for any display range selected. To select the channel and source assignments the analog outputs are assigned to, see *Analog Output Source* on page *50*.

No equipment is needed to scale the analog outputs; 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.

* If Installed
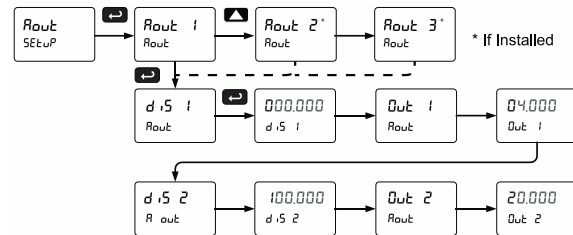
Reset Menu (rESEt)

The *Reset* menu is used to reset the maximum (peak) value of Ch-A and Ch-B rate (rSt Hi), minimum (valley) reading of Ch-A and Ch-B rate (rSt Lo), both high and low value of Ch-A and Ch-B rate (rSt HL), Ch-A total (tot A) or Ch-B total (tot b), Ch-A grand total (Gtot A) or Ch-B grand total (Gtot b), both Ch-A and Ch-B totals (tot Ab), or both Ch-A and Ch-B grand totals (Gt Ab).

Manual Control Menu (Contrl)

The *Manual Control* menu is used to control the 4-20 mA analog output (Aout 1 only) 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.
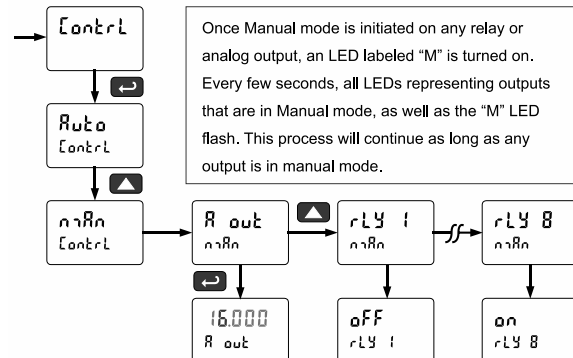
Setting Up the Password (PASS)

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

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

Protecting or Locking the Meter Functions

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

For instructions on how to program numeric values see *Setting Numeric Values* on page *26*.
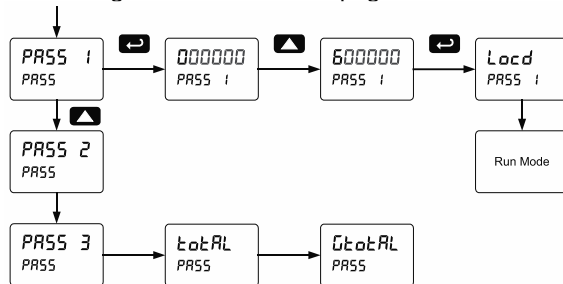
Total Reset Password & Non-Resettable Total

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

The grand total can be programmed as a non-resettable total by entering the password "050873".

⚠ **CAUTION**

- Once the Grand Total has been programmed as "non-resettable" the feature **CANNOT** be disabled.

Making Changes to a Password Protected Meter

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

Disabling Password Protection

To disable the password protection, access the *Password* menu and enter the correct password twice, as shown below. The meter is now unprotected until a new password is entered.
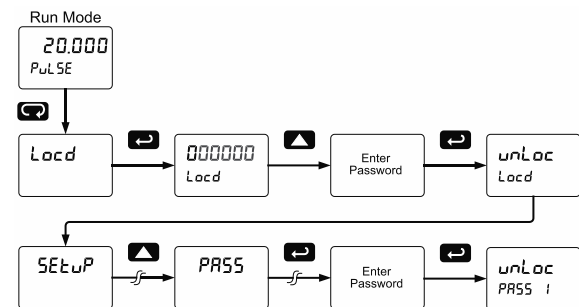
If the correct six-digit password is entered, the meter displays the message unLoc (unlocked) and the protection is disabled until a new password is programmed.

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

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

Advanced Features Menu

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

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

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**
ᏀᎪᎢᎬ	*Gate*	Enter Gate function menu
Lo Ꮐ	*Low gate*	Program Low gate value
Ꮋᵢ Ꮐ	*High gate*	Program High gate value
FᵢᏞᎢᎬr	*Filter*	Enter the Filter menu
ᏟᏂ-Ꭺ	*Channel A*	Set filter speed for channel A
ᏟᏂ-b	*Channel B*	Set filter speed for channel B
Lo SᏢd	*Low speed*	Set the contact de-bounce filter value
Ꮋᵢ SᏢd	*High speed*	Select high speed filter
round	*Round*	Set the rounding value for the display
SᎬrᵢᎪᏞ	*Serial*	Set serial communication parameters
SᏞᎪᏙ Id	*Slave ID*	Set slave ID or meter address
bᎪᵤd	*Baud rate*	Select baud rate
tr dᏞᎽ	*Transmit delay*	Set serial communication transmit delay
PᎪrᵢtᎽ	*Parity*	Select parity Even, Odd, or None with 1 or 2 stop bits
t-bᎽt	*Time byte*	Set byte-to-byte timeout
SᎬᏞᎬct	*Select*	Enter the Select menu (function, math, constant, cutoff, count, Aout programming)
Functn	*Input signal conditioning*	Select linear function parameters
ᏟᏂ-Ꭺ	*Channel A*	Select menu for channel A
ᏟᏂ-b	*Channel B*	Select menu for channel B
LᵢnᎬᎪr	*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)

Advanced Features Menu & Display Messages		
Display	**Parameter**	**Action/Setting**
ᴎᴪᎪth	*Math*	Select the channel C math function
Sᴜᴪ	*Sum*	C = (A+B+P)*F
dᵢF	*Difference*	C = (A-B+P)*F
dᵢFᎪbS	*Abs difference*	C = ((Absolute value of (A-B))+P)*F
ᎪᴠᏀ	*Average*	C = (((A+B)/2)+P)*F
ᴎᴜᏞtᵢ	*Multiplication*	C = ((A*B)+P)*F
dᵢᴠᵢdᎬ	*Divide*	C = ((A/B)+P)*F
Ꮋᵢ-Ꭺb	*Max of A or B*	C = ((High value of channel A or B)+P)*F
Lo-Ꭺb	*Min of A or B*	C = ((Low value of channel A or B)+P)*F
drᎪᴠ	*Draw*	C = ((A/B)-1)*F
ᴠᴠ ᎪᴠᏀ	*Weighted avg.*	C = ((B-A)*F)+A
rᎪtᵢo	*Ratio*	C = (A/B)*F
rᎪtᵢo2	*Ratio 2*	C = ((B-A)/A)+P)*F
ᏟoncᎬn	*Concentration*	C = (A/(A+B))*F
Sᴜᴪ t	*Sum total*	C = (tA+tB+P)*F
SᴜᴪᏀt	*Sum grand total*	C = (GtA+GtB+P)*F
dᵢF t	*Diff. of total*	C = (tA-tB+P)*F
dᵢF Ꮐt	*Difference of grand total*	C = (GtA-GtB+P)*F
trᎪtᵢo	*Total ratio*	C = (tA/tB)*F
t-rᎪt2	*Total ratio 2*	C = ((tB-tA)/tA)*F
t Pct	*Total percent*	C = (tA/(tA+tB))*100
ᏟonSt	*Constant*	Enter math equation constants
ᎪddᎬr	*Adder*	Addition constant used in channel C math calculations (P)
FᎪctoᵣ	*Factor*	Multiplication constant used in channel C math calculations (F)
ᏟᴜtoFF	*Cutoff*	Set low-flow cutoff
ᏟᏂ-Ꭺ	*Channel A*	Set low-flow cutoff for Channel A
ᏟᏂ-b	*Channel B*	Set low-flow cutoff for Channel B
Ꮯoᴜnt	*Count*	Set total count direction
ᏟᏂ-Ꭺ	*Channel A*	Set total count direction for Channel A
ᏟᏂ-b	*Channel B*	Set total count direction for Channel B
tot Ꮯ	*Total count*	Set direction of total count
Ꮐtot Ꮯ	*G. total count*	Set direction of grand total count
ᴜP	*Count up*	Count up
doᴜn	*Count down*	Count down
Ꮯ Stᵣt	*Count start*	Enter count down start value
ᎪoᴜtPr	*Analog output programming*	Program analog output parameters
Ꭺoᴜt 1*	*Analog output 1*	Program analog output 1 (*1-3) parameters
SoᴜrcᎬ	*Source*	Select source for the 4-20 mA output

—

Advanced Features Menu & Display Messages		
Display	**Parameter**	**Action/Setting**
CAL ib	*Calibrate*	Calibrate 4-20 mA output
4 mA	*4 mA output*	Enter mA output value read by milliamp meter with at least 0.001 mA resolution
20 mA	*20 mA output*	Enter mA output value read by milliamp meter with at least 0.001 mA resolution
O-rAnG	*Overrange*	Program mA output for display overrange
u-rAnG	*Underrange*	Program mA output for display underrange
mAX	*Maximum*	Program maximum mA output allowed
mIn	*Minimum*	Program minimum mA output allowed
USEr	*User I/O*	Assign function keys and digital I/O
F1*	*F1* function key*	Assign F1 function key (*F1/F2/F3)
F4	*F4 digital input*	Assign F4 function (digital input)
di 1	*Digital input 1*	Assign digital input 1 – 8, if expansion modules are connected
dO 1	*Digital output 1*	Assign digital output 1 – 8, if expansion modules are connected
diAG	*Diagnostics*	Display parameter settings
LEd t	*LED test*	Test all LEDs
InFo	*Information*	Display software number and version
ErASE	*Erase*	Erase MeterView Pro software stored in meter's memory

Gate Function (GAtE)

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

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

Low Gate (Lo G)

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

High Gate (Hi G)

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

Gate Settings

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

Contact De-Bounce Filter (FıLtEr)

The filter function (FıLtEr) is the second option in the Advanced Features menu. The filter function (FıLtEr) can be used for applications where the meter is set up to count pulses generated by switch contacts. The filter value can be set anywhere between 2 and 50, the higher the value, the greater the filtering. Channel A and B have independent settings.

There are two settings, HıSPd (high speed) and Lo SPd (low speed). After pressing **ENTER** to select Lo SPd, enter the desired filter setting based on the table below so that there are no extra counts when a contact closure is completed. Selecting HıSPd does not require a programmable filter value.

Filter Settings

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

Rounding Feature (round)

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

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

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 (SErıAL)

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, an RS-232, or RS-485 option is required; see *Ordering Information* on page *6* for details.

⚠ **CAUTION**

- **DO NOT** connect any equipment other than Precision Digital's expansion modules, cables, or meters to the RJ45 M LINK connector. Otherwise damage will occur to the equipment and the meter.

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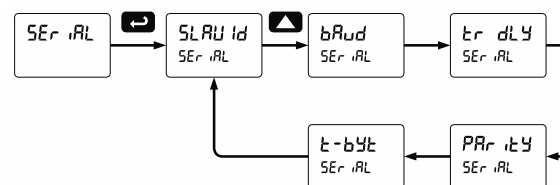
When using more than one meter in a multi-drop mode, each meter must be provided with its own unique address. The meter address (Slave ID) may be programmed between 1 and 247. The transmit delay may be set between 0 and 199 ms. The parity can be set to even, odd, or none with 1 or 2 stop bits.

Select Menu (SELEct)

The *Select* menu is used to select the input signal conditioner applied to the inputs, math function for A & B, constants, low-flow cutoff, total count direction (up or down from a preset amount), and analog output programming. Multi-point linearization is part of the linear function selection.
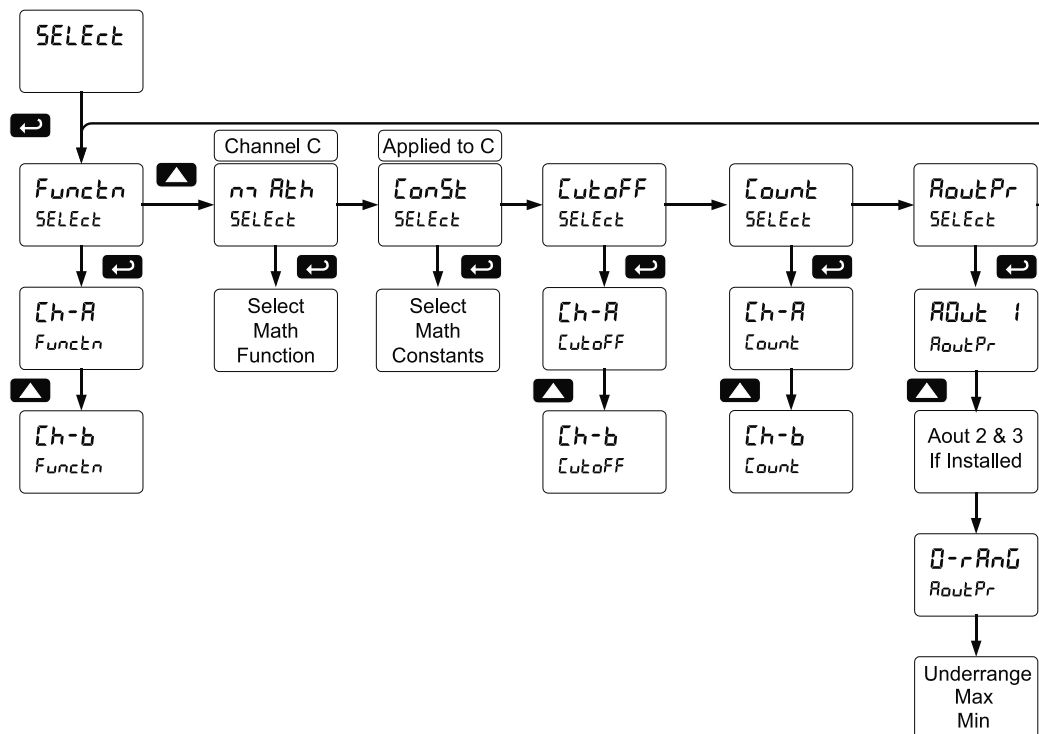
Input Signal Conditioning (Functn)

The *Function* menu is used to condition the linear input signal. Multi-point linearization is part of the linear function selection. Each input channel input signal conditioner is programmed independently.
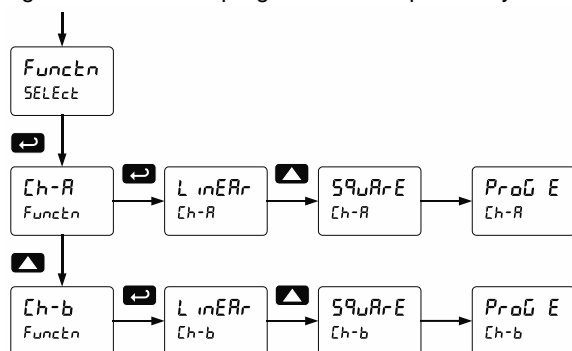
Multi-Point Linearization (LinEAr)

Meters are set up at the factory for linear function with 2-point linearization. Up to 32 linearization points can be selected for 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 flowmeters used to measure volume in odd-shaped tanks or to convert level to flow using weirs and flumes with complex exponent.
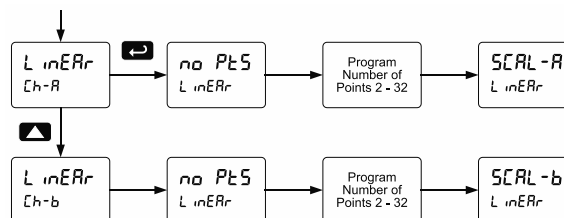
Note: After Scale is displayed continue pressing the Enter button until the meter completes the scaling of the input and display values.

Math Function (𝓃𝓇𝓇𝓉𝓱)

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.

A and B refer to the rate of channel A and B. tA and tB refer to the totals of channel A and B. GtA and GtB refer to the grand totals of channel A and B. The following math functions are available.

Function	Display	Description
Sunn	Sum	C = (A+B+P)*F
diF	Difference	C = (A-B+P)*F
diFAbS	Absolute difference	C = ((Absolute value of (A-B))+P)*F
AUG	Average	C = (((A+B)/2)+P)*F
nnuLti	Multiplication	C = ((A*B)+P)*F
diUidE	Divide	C = ((A/B)+P)*F
Hi-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	C = ((A/B)-1)*F
ui AuG	Weighted avg.	C = ((B-A)*F)+A
rAtio	Ratio	C = (A/B)*F
rAtio2	Ratio 2	C = ((B-A)/A)+P*F
ConcEn	Concentration	C = (A/(A+B))*F
Sunn t	Sum total	C = (tA+tB+P)*F
SunnGt	Sum grand total	C = (GtA+GtB+P)*F
diF t	Difference of total	C = (tA-tB+P)*F
diF Gt	Diff. of grand total	C = (GtA-GtB+P)*F
trAtio	Total ratio	C = (tA/tB)*F
t-rAt2	Total ratio 2	C = ((tB-tA)/tA)*F
t Pct	Total percent	C = (tA/(tA+tB))*100

Math Constants (ConSt)

The *Math Constants* menu is used to set the constants used in channel C math. The math functions include 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 chart on page 48 details the math functions that may be selected in the *Math Function* menu.
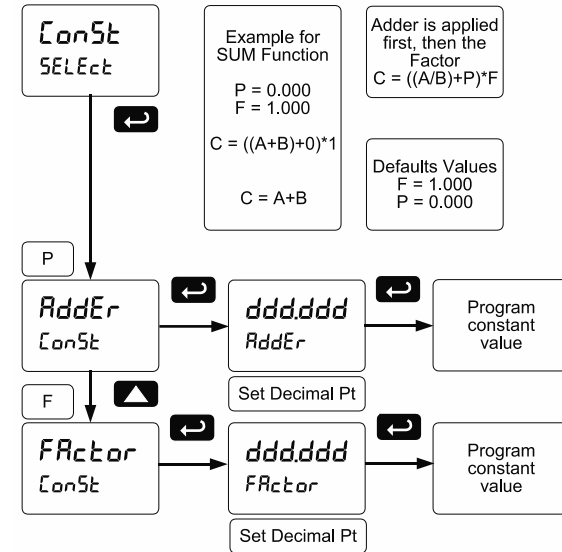
Low-Flow Cutoff (CutoFF)

The low-flow cutoff feature allows the meter to be programmed so that the often-unsteady output from a differential pressure flowmeter, at low flow rates, always displays zero on the meter. The low-flow cutoff for each channel is programmed independently. The cutoff can be disabled to display negative values.

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. The cutoff can be disabled to display negative values.

Totalizer Count Up/Down (Count)

The totalizer count up/down menu may be used to program the total and grand total to either count up from 0 when reset or count down from a programmed value when reset. Total and grand total may have their countdown numbers programmed individually from 0 to 999999.
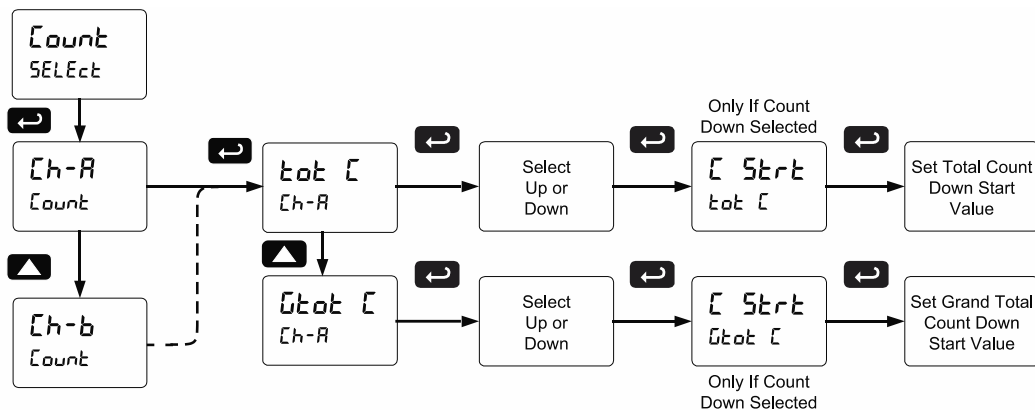
Analog Output Programming (RoutPr)

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

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. Max: Maximum analog output value allowed regardless of input
5. Min: Minimum analog output value allowed regardless of input

Analog Output Source

The analog output source can be based on either of the input channel rate, total, or grand totals (Ch-A, Ch-B), the math channel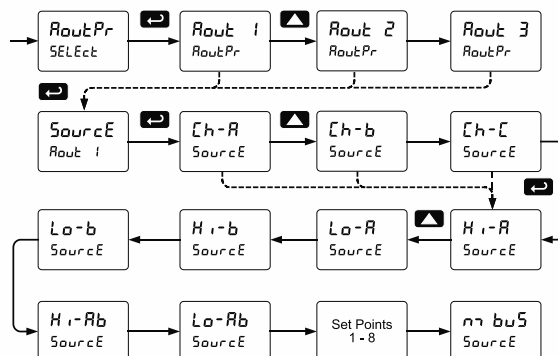 (Ch-C), maximum stored value of either input channel (Hi-A, Hi-B), minimum stored value of either input channel (Lo-A, Lo-B), maximum or minimum of A and B (Hi-AB, Lo-AB), relay set points, or the Modbus input.

To base an analog output on the rate, total, or grand total of channels A or B, select the channel in the *Analog Output Source* menu. Then select the rate, total, or grand total as the source reference for the output, and program the output scale.
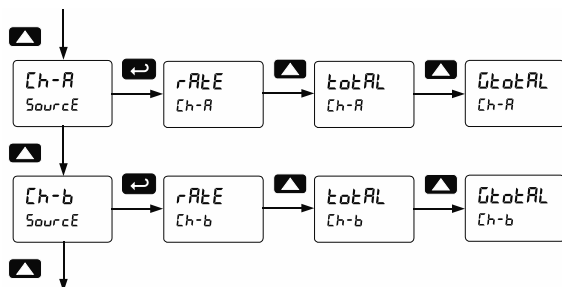
Analog Output Calibration

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

Analog Output Calibration Procedure

1. Wire the PD6363 4-20 mA output to a current loop that includes a power supply (internal or external 12 to 24 VDC), and the mA input on the digital meter. *See Figure 23. 4-20 mA Output Connections* on page *20* for details.
2. Turn on all devices. Allow for a 15 to 30 minute warm-up.
3. Go to the Advanced Features menu, and navigate to the Analog Output Programming (RoutPr) → Calibration (CRL ib) menu and press **Enter**.
4. The display will show 4 m̄R. The PD6363 mA output should now be close to 4 mA. Press Enter and the display will show 04.000. Enter the actual value read by the digital mA meter and press **Enter**.
5. The display will show 20 m̄R. The PD6363 mA output should now be close to 20 mA. Press **Enter** and the display will show 20.000. Enter the actual value read by the digital mA meter and press **Enter**.
6. The meter will now calculate the calibration factors and store them.
7. Press **Menu** to exit and return to Run mode.

Programmable Function Keys
User Menu (uSEr)

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

Up to eight digital outputs can be assigned to a number of actions and functions executed by the meter (i.e. alarms, relay acknowledgement, reset totals, 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.
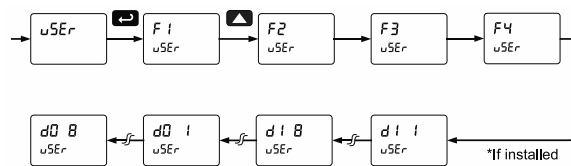
Function Keys & Digital I/O Available Settings

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

Function Keys & Digital I/O Available Settings	
Display	**Description**
r5t Hi	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
rELRY	Directly access the relay menu
SEt 1	Directly access the set point menu for relay 1 (*through 8)
rLY d	Disable all relays until a button assigned to *enable relays* (rLY E) is pressed
rLY E	Enable all relays to function as they have been programmed
O HoLd	Hold current relay states and analog output as they are until a button assigned to *enable relays* (rLY E) is pressed
d HoLd	Hold the current display value, relay states, and analog output momentarily while the function key or digital input is active. The process value will continue to be calculated in the background.
d RbC	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.
d tot	Scrolls through totals for channels A, B, and C (which is the sum of A and B). Values are displayed on display line 1.
d Gtot	Scrolls through grand totals for channels A, B, and C (which is the sum of A and B). Values are displayed on display line 1.
Ln1 Hi	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 Hi	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

Function Keys & Digital I/O Available Settings	
Display	**Description**
Ln2 HC	Display minimum channel C display value on line 2
Ln2 HC	Display maximum & minimum channel C display values on line 2
L itHLC	Display maximum channel C display value on line 2
F On 1	Force relay 1 (*through 4) into the on state. This function is used in conjunction with a digital input expansion module to achieve interlock functionality. See *Setting Up the Interlock Relay (Force On) Feature* on page *42* for details about interlock relays.
ControL	Directly access the manual control menu
d iSRbL	Disable the selected function key or digital I/O
uP-d R	Total count mode direction control for channel A
uP-d b	Total count mode direction control for channel B
RcH	Acknowledge all active relays that are in a manual operation mode such as auto-manual or latching
rESEt	Directly access the reset menu
r5t t	Reset totals for all channels
r5t Gt	Reset grand totals for all channels
r5t tR	Reset total for channel A
r5t GR	Reset grand total for channel A
r5t tb	Reset total for channel B
r5t Gb	Reset grand total for channel B
nEnu	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)
RLn 1	Provide indication when alarm 1 (*through 8) has been triggered (digital outputs only)

Meter Operation

The meter accepts two input channels (A and B) of either pulses (e.g. ±40 mV to ± 8V), square wave (0-5 V, 0-12 V, or 0-24 V), open collector NPN, PNP, TTL, or switch contact signals and displays these signals in engineering units from -99999 to 999999. (*e.g.* a 0-1000 Hz signal could be displayed as -50.000 to 50.000).

Digital inputs and quadrature inputs can be accepted for bi-directional flow on channel A and B. Quadrature inputs can also be accepted, using channels A and B to calculate a single bi-directional flow.

A totalizer can be programmed to count the scaled engineering units, interpreting it as count per second, minute, hour, or day. The scaled rate and total for each channel can be displayed on the top or bottom displays.

A math function channel (C) is available to perform operations on channel A and B rates or totals, 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, display line 1 is used to display the math channel C, while line 2 is used to alternate between displaying input channels A and B rate or total.

Additionally, the meter can be set up to display any input or math channel on display line 1 and a unit or tag on line 2. The relays and analog output can be programmed to operate based on any input rate or total, or the math function channel.

Front Panel Buttons Operation

Button Symbol	Description
MENU	Press to enter or exit Programming Mode, view settings, or exit max/min readings
F1	Press to reset max/min readings or other parameter/function assigned through the *User* menu
F2	Press to display max/min readings or other parameter/function assigned through the *User* menu
F3	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* (uSEr) on page *51* for details.

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

F4 Operation

A digital input, F4, is standard on the meter. This digital input is programmed identically to function keys F1, F2, and F3. The input is triggered with a contact closure to COM, or with an active low signal. During operation, F4 operates according to the way it has been programmed in the *Advanced Features – User* menu. See *Programmable Function Keys User Menu* (uSEr) on page *51* 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/min reading by pressing the Up arrow/F2 button and to use the Right arrow/F1 button to reset the max/min.

To display max and min channel A reading using function key with factory defaults:

1. Press Up arrow/F2 button to display the maximum and minimum reading of channel A since the last reset/power-up.
2. To reset max/min press Right arrow/F1 button. The max & min displays are reset to actual values.
3. 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 iAG)

The *Diagnostics* menu is located in the *Advanced Features* menu. To access the *Diagnostics* menu see *Advanced Features Menu*, page *44*.

For a description of the diagnostic messages, *see Advanced Features Menu &* Display Messages, page *44.*

Testing the Display LEDs

To test all LEDs on the display:
1. Go to the *Diagnostics* menu (d iAG) 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 (inFo) 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 iAG) and press Enter button.
2. Press Up arrow button and scroll to Information menu (inFo).
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 44.
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.
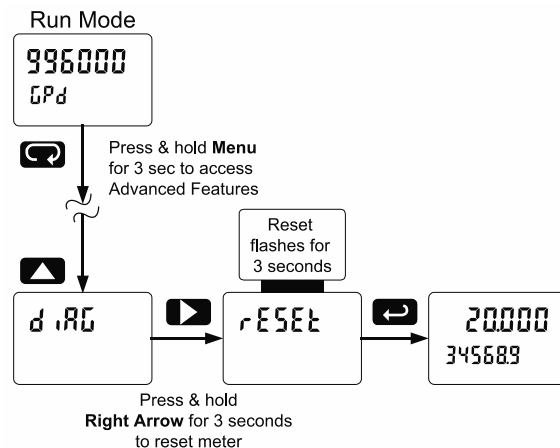
Factory Defaults & User Settings

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	
Total, channel A	Ch-A	Yes
Total, channel B	Ch-b	Yes
Units	unitS	
Rate unit, channel A	Ch-A	HZ-A
Rate unit, channel B	Ch-b	HZ-b
Unit, channel C	Ch-C	HZ-C
Total unit, channel A	tot-A	tot-A
Grand total unit, ch-A	Gtot-A	Gtot-A
Total unit, channel B	tot-b	tot-b
Grand total unit, ch-B	Gtot-b	Gtot-B
Decimal Point	dEc Pt	
Rate, channel A	rAtE	1
Total, channel A	totAL	1
Grand total, channel A	GtotAL	0
Rate, channel B	rAtE	1
Total, channel B	totAL	1
Grand total, channel B	GtotAL	0
Channel C	Ch-C	1
Input Calibration	InCAL	
Number of points	no PtS	
Number of points, ch-A	Ch-A	2
Number of points, ch-B	Ch-b	2
K-Factor, channel A	FAct-A	1.000
K-Factor, channel B	FAct-b	1.000
Total setup	tSEtuP	
Time base, channel A	tbASE	Sec
Total conversion factor, Ch-A	t CF	1.000
Grand total conversion factor, Ch-A	Gt CF	1.000
Time base, channel B	tbASE	Sec
Total conversion factor, Ch-B	t CF	1.000
Grand total conversion factor, Ch-B	Gt CF	1.000
Total reset	trESEt	
Total reset, channel A	t rSt	Manual
Grand total reset, Ch-A	Gt rSt	Manual
Total reset, channel B	t rSt	Manual
Grand total reset, Ch-B	Gt rSt	Manual
Display assignment	dSPLAY	

Factory Defaults & User Settings		
Parameter	**Display**	**Default Setting**
Display line 1	d Ch-A	Channel A
Display line 2	d Ch-b	Channel B
Display intensity	d-IntY	6
Relay	rELAY	
Relay 1 assignment	Ch-A	Channel A total
Relay 1 action	Act 1	Automatic
Relay 1 set point	SEt 1	100.0
Relay 2 assignment	Ch-A	Channel A total
Relay 2 action	Act 2	Automatic
Relay 2 set point	SEt 2	200.0
Relay 3 assignment	Ch-A	Channel A rate
Relay 3 action	Act 3	Automatic
Relay 3 set point	SEt 3	300.0
Relay 3 reset point	rSt 3	250.0
Relay 4 assignment	Ch-A	Channel A rate
Relay 4 action	Act 4	Automatic
Relay 4 set point	SEt 4	400.0
Relay 4 reset point	rSt 4	350.0
Fail-safe relay 1 to 4	FLS 1	Off
On delay relay 1 to 4	On 1	0.0 sec
Off delay relay 1 to 4	OFF 1	0.0 sec
Analog output	Aout	
Display 1 analog out	diS 1	0.0
Output 1 value	Out 1	4.000 mA
Display 2 analog out	diS 2	1000.0
Output 2 value	Out 2	20.000 mA
Source analog output	SourcE	Channel A
Overrange output	O-rAnG	21.000 mA
Underrange output	u-rAnG	3.000 mA
Maximum output	mAX	23.000 mA
Minimum output	min	3.000 mA
Filter	FiLtEr	
Filter, channel A	Ch-A	High speed
Filter, channel B	Ch-b	High speed
Round	round	1
Cutoff	CutoFF	
Cutoff value, channel A	Ch-A	0.0 (disabled)
Cutoff value, channel B	Ch-b	0.0 (disabled)
Serial	SEriAL	
Slave ID (Address)	SLAu id	247
Baud rate	bAud	9600
Transmit delay	tr dLY	50 ms
Parity	PArity	Even
Byte-to-byte timeout	t-bYt	010 (0.1 sec)

Factory Defaults & User Settings

Parameter	Display	Default Setting
Math	ɳɔＲㄷh	
Math, channel C	5uɳɔ	Sum
Adder (constant P)	ＲddEr	0.000
Factor (constant F)	FＲctor	1
User	u5Er	
F1 function key	F1	Reset max & min
F2 function key	F2	Line 1 Max & Min
F3 function key	F3	Acknowledge relays
F4 function (digital input)	F4	Acknowledge relays
Digital input 1	di1	Menu
Digital input 2	di2	Right arrow
Digital input 3	di3	Up arrow
Digital input 4	di4	Enter
Digital output 1	d01	Alarm 1
Digital output 2	d02	Alarm 2
Digital output 3	d03	Alarm 3
Digital output 4	d04	Alarm 4
Password	PＲ55	
Password 1	PＲ55 1	000000 (unlocked)
Password 2	PＲ55 2	000000 (unlocked)
Password 3	PＲ55 3	000000 (unlocked)
Total	totＲL	000000 (unlocked)
Grand total	GtotＲL	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
Controller does not respond to input change	Check: 1. The input signal type and make sure it corresponds with the position of the input switch. 2. The input signal voltage level 3. If a *Low-Flow Cutoff* has been programmed, the controller will display zero below that point, regardless of the input.
Controller displays error message during calibration (Error)	Check: 1. Signal connections 2. Input switch position 3. Minimum input span requirements
Controller displays 999999 -99999	Check: 1. The input signal frequency 2. K-Factor value or scaling, time base, and decimal point
Display is unstable	Check: 1. Input signal stability and value 2. Display scaling vs. input signal 3. Increase the gate settings to average more pulses
Display reading is not accurate	Check: 1. K-Factor value provided by the flowmeter manufacturer 2. Time base selected 3. Scaling or calibration
Display response is too slow	Check: Filter and gate values
Display does not respond to input changes, reading a fixed number	Check: Display assignment, it might be displaying max, min, or set point.
Display alternates between 4. Hi and a number 5. 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 54. 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

For the latest version of this manual please visit

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