

PD6830 EXPLOSION-PROOF PULSE INPUT RATE/TOTALIZER



- Pulse, Open Collector, NPN, PNP, TTL, Switch Contact, Sine Wave (Coil), Square Wave, Opto-Isolated Inputs
- Modern, Sleek and Practical Enclosure
- Isolated 4-20 mA Output for Either Rate or Total
- 5-Digit Rate, 0.7" (17.8 mm)
- 7 Alphanumeric Character Total/Tag, 0.4" (10.2 mm)
- 7-Digit Totalizer
- SafeTouch® Through-Glass Button Programming
- Battery, DC, or Output Loop-Powered Models
- Gate Function for Rate Display of Slow Pulse Rates
- K-Factor, Scaling, or Live Input Calibration
- 32-Point Linearization
- Password Protection
- Backlight Standard on All Models
- Explosion-Proof, IP68, NEMA 4X Enclosure
- Operates from -40 to 75°C (-20 to 75°C on Battery Models)



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



WARNING: Risk of electric shock or personal injury.



WARNINGS

- 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.
- Failure to follow installation guidelines could result in death or serious injury. Make sure only qualified personnel perform the installation.
- Never remove the meter cover in explosive environments when the circuit is live.
- Cover must be fully engaged to meet flameproof/explosion-proof requirements.

Limited Warranty

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

Registered Trademarks

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INTRODUCTION

The ProtEX-RTP PD6830 is a rugged, explosion-proof pulse input rate/totalizer fully featured for demanding applications in hazardous areas or in the harshest environmental conditions. It is programmed using the four SafeTouch[®] through-glass buttons, without removing the cover. The numeric rate display will read up to 99999 and the alphanumeric total/tag display will read up to 9999999. The alphanumeric display can also be programmed to show any combination of numbers and letters up to seven characters long for use as engineering units and/or the process identification tag. The backlight makes the display more visible under any lighting condition. The enclosure is provided with threaded conduit holes and integrated pipe or wall mounting slotted flanges.

ORDERING INFORMATION

Model	Description
PD6830-AP0	9-30 VDC Powered, Backlight
PD6830-APA	9-30 VDC Powered, Backlight, Isolated 4-20 Output
PD6830-BM0	Battery (or DC)-Powered*, Momentary Backlight**
PD6830-BTA	Battery (or DC)-Powered*, Loop-Powered Backlight, Isolated 4-20 Output
PD6830-CTB	4-20 mA Output-Powered, Loop-Powered Backlight, Non-Isolated 4-20 mA Output
* When DC-powered, battery will provide backup power when DC power is lost.	
** Backlight is constant while supplied with DC power and momentary when operating from battery backup.	

Accessories

Model	Description
PDAPLUG75	¾" Metal Conduit/Stopping Plug
PDABAT36D	3.6 V D Cell Lithium Battery
PDA0001	¾" M-NPT to F-M20 Reducer
PDA0002	¾" M-NPT to 1/2" F-NPT Reducer

Table of Contents

INTRODUCTION -----	3
ORDERING INFORMATION -----	3
SPECIFICATIONS -----	6
General-----	6
Rate Input-----	7
Rate/Totalizer-----	8
4-20 mA Transmitter Output-----	9
Product Ratings and Approvals-----	10
Electromagnetic Compatibility-----	11
SAFETY INFORMATION -----	11
INSTALLATION -----	12
Unpacking-----	12
Pre-Installed Conduit/Stopping Plug-----	Error! Bookmark not defined.
Mounting-----	13
Cover Jam Screw-----	13
Connections-----	13
Input Signal Connections.....	15
DC Power Connection.....	17
External Reset Connection.....	17
4-20 mA Transmitter Output Connections.....	18
Battery Replacement.....	19
SETUP AND PROGRAMMING -----	20
SafeTouch® Buttons-----	21
Buttons and Display-----	22
Main Menu Display Functions & Messages-----	23
Main Menu-----	25
Setting Numeric Values-----	26
Setting Up the Meter (SETUP)-----	27
Setting the Decimal Point (DEC.Pt).....	28
Programming the Meter (PRG).....	29
K-Factor (FRCtr)-----	30
Scaling the Meter (SCALE)-----	31
Calibrating the Meter (LR)-----	32
Setting the Time Base (TBSE)-----	34
Setting the Total Conversion Factor (tctCF)-----	34
Manual or Automatic Total Reset Function (trSE)-----	35
Setting the Tag Display (TAG).....	36
Scaling the 4-20 mA Analog Output (ROUT).....	37
Setting Up the Password (PASSWORD).....	38
Locking the Meter.....	38

Making Changes to a Password Protected Meter	38
Disabling Password Protection	39
Advanced Features Menu	40
Advanced Features Menu & Display Messages	41
Indication (INDICAT)	42
Gate Function (GATE)	43
Multi-Point Linearization (LINEAR)	44
Contact Debounce Filter (FILTER)	46
Low-Flow Cutoff (CUTOFF)	46
Output Internal Calibration (CAL)	46
Backlight (BACKLITE)	46
Information (INFO)	46
Servicing the Meter (SERVICE)	47
OPERATION	48
Front Panel Buttons Operation	48
Resetting the Total	48
Maximum & Minimum Readings (MAXIMUM & MINIMUM)	49
Reset Meter to Factory Defaults	49
Factory Defaults & User Settings	50
TROUBLESHOOTING	51
Troubleshooting Tips	51
MOUNTING DIMENSIONS	52
QUICK USER INTERFACE REFERENCE	54
EC DECLARATION OF CONFORMITY	56

Table of Figures

Figure 1. PD6830 Connector Board	14
Figure 2. Flowmeter Powered by External Supply	15
Figure 3. Opto-Isolated Flowmeter Powered by External Supply	15
Figure 4. Self-Powered Magnetic Pickup Coil Flowmeter	15
Figure 5. NPN Open Collector Input	16
Figure 6. PNP Sensor with External Power	16
Figure 7. Switch Contact Input	16
Figure 8. DC Power Connections	17
Figure 9. PD6830 Reset Connections	17
Figure 10. 4-20 mA Output Connections	18
Figure 11. Battery Orientation	19
Figure 12. Scale Menu	31
Figure 13. Multi-Point Linearization Menu	45
Figure 13. Enclosure Dimensions – Front View	52
Figure 14. Enclosure Dimensions – Side Cross Section View	53

SPECIFICATIONS

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

General

DISPLAY	Five digits rate (-9999 to 99999)	0.7" (17.8 mm) high, 7-segment, automatic lead zero blanking.
	Seven characters Total and/or Tag	0.4" (10.2 mm) high, 14 segment, automatic lead zero blanking.
	Symbols	High, Low, & Set Alarm, Password Lock
DISPLAY UPDATE RATE	Ambient > -25°C: 1 Updates/Second Ambient < -25°C: 1 Update/5 Seconds <i>Note: Update is dependent on gate settings.</i>	
OVERRANGE	Display flashes 99999	
BACKLIGHT	White LED, 10 sec auto-off for battery powered models.	
PROGRAMMING METHODS	Four SafeTouch® through-glass buttons when cover is installed. Four internal pushbuttons when cover is removed.	
RECALIBRATION	All ranges are calibrated at the factory to read frequency in Hz. No recalibration required.	
MAX/MIN DISPLAY	Max/Min readings reached by the process are stored until reset by the user or until power to the meter is cycled.	
PASSWORD	Programmable password restricts modification of programmed settings and manual total reset via button interface.	
NON-VOLATILE MEMORY	All programmed settings and total reading are stored in non-volatile memory for a minimum of ten years if power is lost.	
POWER OPTIONS	9-30 VDC, 2.2 W max	
	4-20 mA Transmitter Output Power, 30 VDC max	
	Battery Power	
	DC Power with battery backup	
BATTERY	3.6 V Primary Lithium (Li-SOCl ₂), non-rechargeable	
	Expected Service Life:	5 Years
	Recommended Replacement Interval:	3 Years when exclusive source 10 Years in backup configuration
	Model PDABAT36D	
ISOLATION	All Models:	500 V opto-isolated input-to-power/output
	PD6830-BTA:	500 V input-to-output
	PD6830-APA:	500 V input/power-to-output <i>Note: Requires separate output supply</i>

ENVIRONMENTAL	Operating temperature range: -40 to 75°C (-20° to 75°C on battery powered models) Storage temperature range: -40 to 75°C Relative humidity: 0 to 90% non-condensing
CONNECTIONS	Screw terminals accept 12 to 22 AWG wire
ENCLOSURE	Explosion-proof die cast aluminum with glass window, corrosion resistant epoxy coating, color: blue. NEMA 4X, 7, & 9, IP68. Three ¾" NPT threaded conduit openings. One ¾" NPT metal conduit/stopping plug with 12 mm hex key fitting installed.
MOUNTING	May be mounted directly to conduit. Two slotted flanges for wall mounting or NPS 1½" to 2½" or DN 40 to 65 mm pipe mounting. See Mounting Dimensions on page 52.
OVERALL DIMENSIONS	5.65" x 5.25" x 4.86" (W x H x D) (144 mm x 133 mm x 124 mm)
WEIGHT	5.00 lbs (80 oz, 2.27 kg)
WARRANTY	3 years parts and labor

Rate Input

PULSE/ TRANSISTOR/ CONTACT CLOSURE INPUT	Field selectable; Sourcing or sinking pulse or square wave 0-5 V, 0-12 V, or 0-24 V; TTL; NPN or PNP transistor; Open collector 100 kΩ pull-up to 3 V; Switch contact 100 kΩ pull-up to 3 V; PNP transistor 100 kΩ pull-down to ground (COM) Maximum Frequency: 30 kHz Minimum Pulse Width: 16 μs
OPTO-ISOLATED INPUT	Sourcing pulse or square wave 0-5 V, 0-12 V, or 0-24 V; Logic High: 4-30 V, Logic Low: < 1 V Maximum Frequency: 10 kHz Minimum Pulse Width: 50 μs Input Current: 1 mA @ 5 V, 2.5 mA @ 12 V, 5 mA @ 24 V
LOW VOLTAGE MAG PICKUP INPUT	Sensitivity: 40 mVp-p to 24 Vp-p Maximum Frequency: 30 kHz
MINIMUM INPUT FREQUENCY	0.001 Hz Minimum frequency is dependent on high gate setting.
INPUT IMPEDANCE	Pulse input: Greater than 300 kΩ @ 1 kHz. Open collector/switch input: 100 kΩ pull-up to 3 V.
ACCURACY	±0.03% of calibrated span ±1 count
TEMPERATURE DRIFT	Rate display is not affected by changes in temperature.

LOW-FLOW CUTOFF	0-99999 (0 disables cutoff function)
DECIMAL POINT	Up to five decimal places or none: <i>d.ddddd, d.dddd, d.ddd, d.d, or d</i>
CALIBRATION	May be calibrated using K-Factor, scale without signal source, internal calibration, or by applying an external calibration signal.
K-FACTOR	Field programmable K-Factor converts input pulses to rate in engineering units. May be programmed from 0.000001 to 9999999 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 input 1 setting. Minimum input span is 1 Hz. An Error message will appear if the input 1 and input 2 signals are too close together.
CONTACT DEBOUNCE FILTER	Programmable contact debounce filter: 40 to 999 Hz maximum input frequency allowed with low speed filter.
TIME BASE	Second, minute, hour, or day
GATE	Low gate: 1-99 seconds; High gate: 2-999 seconds

Rate/Totalizer

DISPLAY ASSIGNMENT	The top display is assigned to rate. The bottom display is programmable to alternate between total for 10 seconds, then the tag for 2 seconds or to show only the total or to show only the tag.
TOTAL DECIMAL POINT	Up to six decimal places or none: <i>d.dddddd, d.dddddd, d.ddddd, d.dddd, d.dd, d.d or d</i> Total decimal point is independent of rate decimal point.
TOTALIZER	Calculates total based on rate and field programmable multiplier to display total in engineering units. Time base must be selected according to the time units in which the rate is displayed.
TOTAL RESET	Via SafeTouch® RESET button, mechanical button (cover off), external contact closure, automatically via user selectable preset value and time delay. Manual reset may be disabled or protected by password.
TOTALIZER ROLLOVER	Totalizer rolls over when display exceeds 9,999,999.

4-20 mA Transmitter Output

OUTPUT SOURCE	Rate or total		
SCALING RANGE	4.000 to 20.000 mA for any display range.		
CALIBRATION	Factory Calibrated: 0.0 to 1000.0 = 4-20 mA output		
UNDERRANGE	Output Underrange: 3.8 mA		
OVERRANGE	Display Overage: 22.0 mA		
	Output Overage: 20.5 mA		
ACCURACY	$\pm 0.1\%$ span ± 0.004 mA		
TEMPERATURE DRIFT	0.4 $\mu\text{A}/^\circ\text{C}$ max from 0 to 65°C ambient,		
	0.8 $\mu\text{A}/^\circ\text{C}$ max from -40 to 0°C ambient <i>Note: Analog output drift is separate from input drift.</i>		
EXTERNAL LOOP POWER SUPPLY	30 VDC maximum		
OUTPUT LOOP RESISTANCE	Power supply	Minimum	Maximum
	24 VDC	10 Ω	700 Ω
	30 VDC	100 Ω	1200 Ω
<i>Note: loop-powered backlight subtracts 150 Ω from maximum resistance figures above.</i>			

Product Ratings and Approvals

FM	Class I, Division 1, Groups B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1; T6 Class I, Zone 1, AEx d IIC T6 Gb Zone 21, AEx tb IIIC T85°C Ta = -40°C to +75°C Enclosure: Type 4X & IP66 Certificate number: 3040391
ATEX	 II 2 G D Ex d IIC T6 Gb Ex tb IIIC T85°C Db IP68 Ta = -40°C to +75°C ATEX Certificate: Sira 10ATEX1116X
CSA	Class I, Division 1, Groups B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1; T6 Class I, Zone 1, Ex d IIC T6 Ta = -40°C to +75°C Enclosure: Type 4X & IP66 Certificate number: 11 2325749
IECEX	IECEX SIR 10.0056X Ex d IIC T6 Gb Ex tb IIIC T85°C Db IP68 Ta = -40°C to +75°C

Special Conditions for Safe Use:

Use suitably certified and dimensioned cable entry device and/or plug. The equipment shall be installed such that the supply cable is protected from mechanical damage. The cable shall not be subjected to tension or torque. If the cable is to be terminated within an explosive atmosphere, then appropriate protection of the free end of the cable shall be provided.

Year of Construction

This information is contained within the serial number with the first four digits representing the year and month in the YYMM format.

For European Community: The PD6830 must be installed in accordance with the ATEX directive 94/9/EC, and the product certificate Sira 10ATEX1116X.

Electromagnetic Compatibility

EMISSIONS	EN 61326:2006 Safety requirements for measurement, control, and laboratory use – Industrial Group 1 Class A ISM emissions requirements
Radiated Emissions	Class A
IMMUNITY	EN 61326:2006 Safety requirements for measurement, control, and laboratory use
ESD	±4 kV contact, ±8 kV air
RFI – Amplitude Modulated	80-1000 MHz @ 10 V/m, 1.4-2.0 GHz @ 3 V/m, 2.0-2.7 GHz @ 1 V/m, 80% AM (1 kHz)
EFT	±2 kV DC mains, ±1 kV other
Telco Surge	±1 kV
CRFI	3 V, 0.15-80 MHz, 1 kHz 80% AM

SAFETY INFORMATION



WARNINGS

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

INSTALLATION

For Installation in USA: The PD6830 must be installed in accordance with the National Electrical Code (NEC) NFPA 70.

For Installation in Canada: The PD6830 must be installed in accordance with the Canadian Electrical Code CSA 22.1.

For European Community: The PD6830 must be installed in accordance with the ATEX directive 94/9/EC and the product certificate Sira 10ATEX116X.



Disconnect from supply before opening enclosure. Keep cover tight while circuits are alive. Conduit seals must be installed within 18" (450mm) of the enclosure.

Wiring connectors are accessed by opening the enclosure. Cover jam screw may need to be loosened on the cover. To access electrical connectors, remove the 2 captive screws, then disconnect the ribbon cable from the display module and set the display module aside.

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.

Pre-Installed Conduit/Stopping Plug

The PD6830 is supplied with one pre-installed conduit/stopping plug for installations that do not require the use of all three conduit entries. The conduit/stopping plug includes an internal hexagonal socket recess for removal. The pre-installed plug and its installation are included in the hazardous area approvals for the PD6830. The conduit/stopping plug has an internal 12 mm hexagonal socket recess for removal. For additional conduit/stopping plugs, see ORDERING INFORMATION on page 3.



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

Mounting

The PD6830 has two slotted mounting flanges that may be used for pipe mounting or wall mounting. Alternatively, the unit may be supported by the conduit using the conduit holes provided.

Refer to *Mounting Dimensions*, page 52 for details.



WARNING

Do not attempt to loosen or remove flange bolts while the meter is in service.

Cover Jam Screw

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

Connections



WARNINGS

- Static electricity can damage sensitive components.
- Observe safe handling precautions for static-sensitive components.
- Use proper grounding procedures/codes.
- If the meter is installed in a high voltage environment and a fault or installation error occurs, high voltage may be present on any lead or terminal.

To access the connectors, loosen the cover jam screw (if tightened) with an M2 hex wrench, remove the enclosure cover and unscrew the two captive screws that fasten the display module into the enclosure. Disconnect the ribbon cable and remove the display module. Power and signal connections are made to a barrier terminal connector in the base of the enclosure. Grounding connections are made to the two ground screws provided on the base – one internal and one external. Use proper grounding techniques for explosion-proof areas and observe all local and national electric codes.

Connections (continued)

- ISO+** Isolated signal input positive terminal connection.
- ISO-** Isolated signal return/negative terminal connection.
- S+** Signal input positive terminal connection.
- S-** Magnetic pickup (coil) signal return/negative terminal connection.
- COM** Signal return/negative, DC power return/negative, Contact closure reset return/negative terminal connection.
- RST+** Contact closure reset pull-up to 3 VDC.
- P+** DC Power positive terminal connection.
- LP+** 4-20 mA transmitter DC power positive terminal connection.
- LP-** 4-20 mA transmitter regulated current output terminal connection.

Refer to Figure 1 for terminal positions.

	<p>Observe all safety regulations. Electrical wiring should be performed in accordance with all agency requirements and applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.</p>
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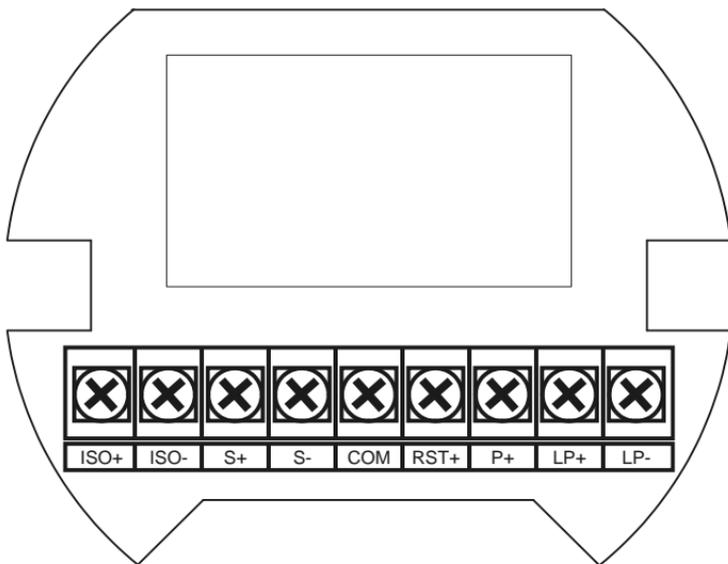
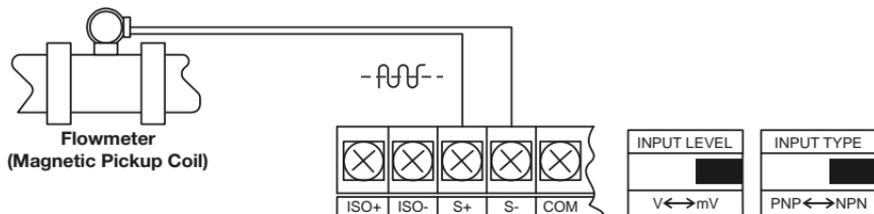
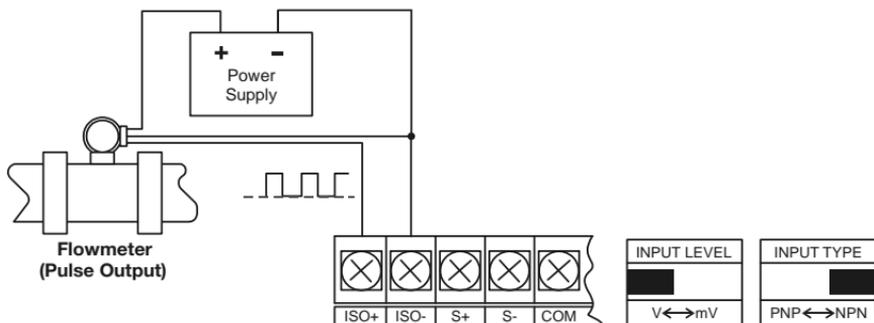
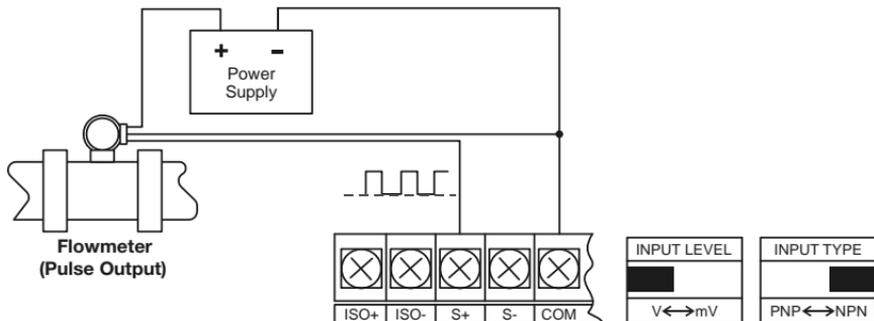
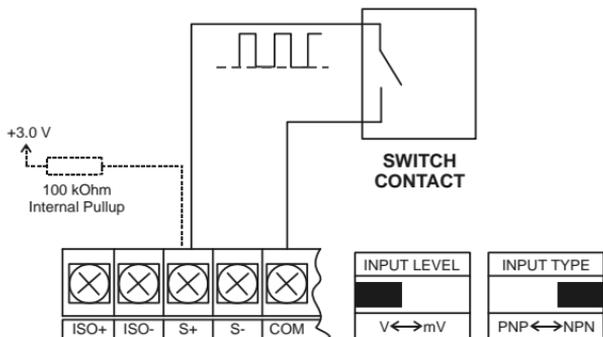
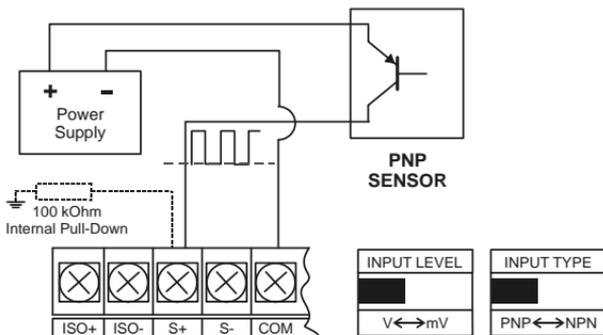
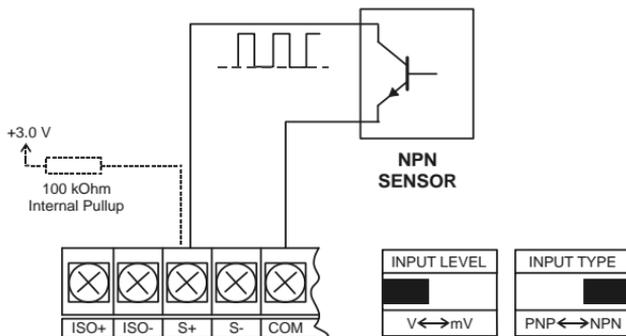


Figure 1. PD6830 Connector Board

Input Signal Connections

Signal connections are made to a barrier terminal mounted in the base of the enclosure. Input level and type are configured using two slide switches on the bottom of the display module as shown in the lower right of the following figures.





DC Power Connection

Models configured for DC power (PD6830-A) are provided with a terminal labeled P+ and are wired as shown in Figure 9. Models configured for battery power (PD6830-B) may optionally be connected to DC power and the battery will function as backup power when DC is lost. The same power supply may be used to power other circuits including a PNP-type sensor, however to maintain input isolation, a separate power supply must be used to power the isolated 4-20 mA transmitter as shown in Figure 10 and/or to power the Opto-Isolated Flowmeter as shown in Figure 3.

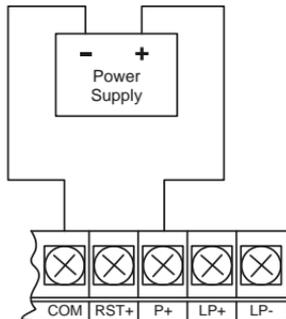


Figure 8. DC Power Connections

External Reset Connection

External reset connections are made between RST+ and COM. Connect to a contact closure source such as a relay or a pushbutton as shown in Figure 9. Avoid extended contact closure to preserve battery life. The total is reset when the button is pressed. The meter will start to totalize immediately. Holding down the button has no effect on the total.

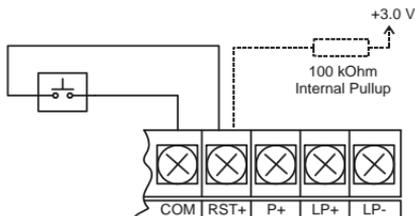


Figure 9. PD6830 Reset Connections

4-20 mA Transmitter Output Connections

Output connections are made to two terminals labeled LP+ and LP-. Connect to an input device such as a remote display or chart recorder as shown in Figure 10.

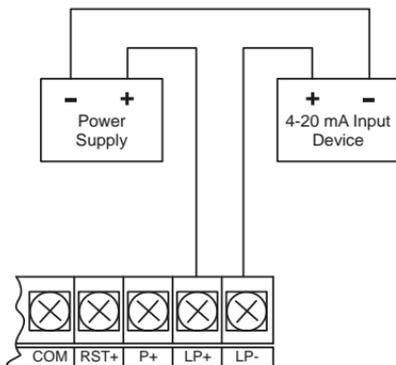


Figure 10. 4-20 mA Output Connections

Battery Replacement

Battery-equipped models have a battery charge monitor. When the battery is nearing the end of its capacity the screen will periodically flash the message **LO BATTERY**. The recommended replacement interval for models using the battery as a primary power source (without DC power at P+ terminal) is three years or within 30 days of the first low battery indication on the screen. Replacement interval on models that use battery as backup during short and infrequent DC power loss is ten years. The total is backed up in non-volatile memory when the low battery monitor trips. It is recommended that an updated reading be manually backed up prior to changing out the battery. Refer to information on preparing the meter for battery change in *Servicing the Meter (SERVICE)* on page 47 before changing battery.



WARNING



Fire, explosion and burns may result if not handled properly. Do not recharge, short circuit, crush, disassemble, heat above 100°C (212°F), incinerate, or expose contents to water.

Battery disposal should be in accordance with applicable regulations, which vary by location. In many locations trashing of used batteries is forbidden and disposal is done through local battery disposal facilities. Spent batteries should be packaged in such a way as to prevent short circuits during handling and transport.

NOTICE: Battery may only be replaced with an original Model PDABAT36D supplied by Precision Digital. Do not recharge battery. Do not replace with used battery.

- Remove cover and display module and disconnect display module ribbon cable.
- Carefully clip and remove the cable ties that were supplied for shipping (if present).
- Remove the spent battery and prepare it for disposal.
- Install new PDABAT36D into battery clip with polarity as shown in Figure 11.
- Reconnect and fasten display module. Install enclosure cover.
- Resume operation.

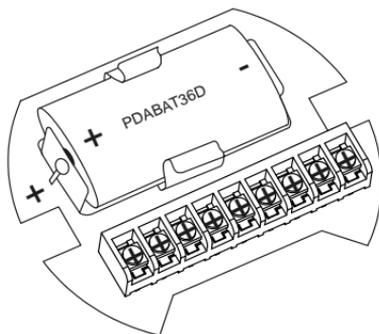


Figure 11. Battery Orientation

SETUP AND PROGRAMMING

There is **no need to recalibrate** the meter for frequency in Hz when first received from the factory.

The meter is **factory calibrated** for Hz prior to shipment.

The calibration equipment is certified to NIST standards.

Overview

Setup and programming is done through the infrared through-glass SafeTouch[®] buttons, or using the mechanical buttons when uncovered. There are three slide switches located on the display module. Two are used to configure the input and the other is to lock or unlock the SafeTouch[®] Buttons.

SafeTouch[®] Buttons

The PD6830 is equipped with four sensors that operate as through-glass buttons so that it can be programmed and operated without removing the cover (and exposing the electronics) in a hazardous area. These buttons can be disabled for security by selecting the LOCK setting on the switch located on the connector board in the base of the enclosure. To actuate a button, press and remove one finger to the glass directly over the marked button area. When the cover is removed, the four mechanical buttons located next to the sensors are used. The sensors are disabled when a mechanical button is pressed and will automatically be re-enabled after 60 seconds of inactivity.

The SafeTouch[®] Buttons are designed to filter normal levels of ambient interference and to protect against false triggering, however, it is recommended that the SafeTouch[®] Buttons be disabled (slide switch to LOCK) if there is an infrared interference source in line-of-sight to the display or if the buttons are not needed.

SafeTouch[®] Button Tips:

- To remove cover with power applied (safe area only), or to clean the window, select **CLERn** from the **SERV ICE** menu before opening the cover or cleaning the glass. This will temporarily disable the SafeTouch[®] buttons for 60 seconds to prevent inadvertent use. Use the mechanical buttons while the meter is open.
- To the extent possible, install the display facing away from sunlight, windows, reflective objects and any sources of infrared interference.
- Keep the glass window clean.
- Tighten the cover securely.
- Use a password to prevent tampering.

After all connections have been completed and verified, connect the ribbon cable to the display module, fasten the display module to the base, install enclosure cover, and then apply power.

Buttons and Display



Button Symbol	Description	Symbol	Status
 MENU	Menu	HI	High Alarm Set
 RESET	Right arrow/Reset	LO	Low Alarm Set
 MAX	Up arrow/Max	SET	Total Alarm Set
 ACK	Enter/Ack		Password Enabled

- 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 or decimal position during programming.
- Press the **Up** arrow button to scroll through the menus, decimal point, or to increment the value of a digit.
- Press the **Enter/Ack** button to access a menu or to accept a setting.
- Press and hold the **Menu** button for five seconds to access the *Advanced* features of the meter.

Main Menu 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.

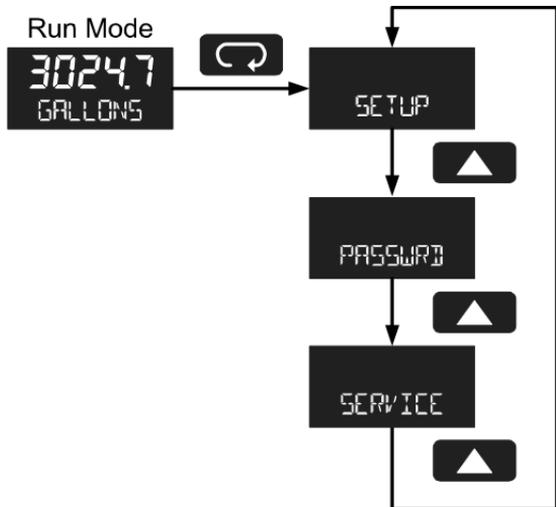
Display	Parameter	Action/Setting
SETUP	Setup	Enter Setup menu
DECPT	Decimal point	Enter Decimal Point menu
RATE	Rate decimal	Set rate display decimal point
TOTAL	Total decimal	Set total display decimal point
PRG	Program	Enter the Program menu
FRCTR	K-Factor	Enter the K-Factor menu
SCALE	Scale	Enter the Scale menu
CAL	Calibrate	Enter the Calibrate menu
INPT 1	Input 1	Calibrate input 1 signal or program input 1 value
DISP 1	Display 1	Program display 1 value
INPT 2	Input 2	Calibrate input 2 signal or program input 2 value
DISP 2	Display 2	Program display 2 value
SPAN Error	Span Error	Error, calibration not successful, check signal
BASE	Time Base	Enter the Time Base menu
SEC	Second	Units per second
MIN	Minute	Units per minute
hour	Hour	Units per hour
DAY	Day	Units per day
CONF	Conversion Factor	Enter the Conversion Factor menu
TRST	Total Reset	Enter the Total Reset menu
AUTO	Automatic	Automatic Total Reset
TDLY	Time Delay	Automatic Reset Time Delay
MAN	Manual	Manual Total Reset
ENABL	Enable	Enable Manual reset

Display	Parameter	Action/Setting
dSRbL	Disable	Disable Manual reset
tRG	Tag/Units	Enter the Tag/Units Menu
On	Tag On	Enable Tag/Units
OFF	Tag Off	Disable Tag/Units
tGGLE	Tag Toggle	Toggle Tag and Total
R out	Transmitter Output	Enter Transmitter Output menu
rRATE	Rate output	Set rate as output variable
totRL	Total output	Set total as output variable
d5PL1	Display 1	Output display 1 value
Out 1	Output 1	Output 1 value
d5PL2	Display 2	Output display 2 value
Out 2	Output 2	Output 2 value
PASSWd	Password	Enter the Password menu
UNLOCKd	Unlocked	Program password to lock meter
LOCKED	Locked	Enter password to unlock meter
99999	Flashing display	Overrange condition
SERVICE	Service	Enter the Service menu
bREt	Change Battery	Backup data and change battery
SLEEP	Sleep Mode	Low power sleep mode
CLERn	Clean Mode	Select before removing/installing cover for service or to clean the glass window

Main Menu

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

Press **MENU** button to enter Programming Mode then press the **Up Arrow** button to scroll through the main menu.



- Press **MENU**, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing **Enter/ACK** are not saved.
- Changes to the settings are saved to memory only after pressing **Enter/ACK**.
- The display moves to the next menu every time a setting is accepted by pressing **Enter/ACK**.

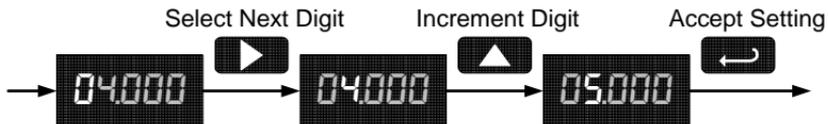
Setting Numeric Values

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.

The digit being changed blinks.

Press the **Enter/ACK** button, at any time, to accept a setting or **MENU** button to exit without saving changes.

The decimal point is set using the **Right** or **Up** arrow button in the *Setup-decimal point* menu.

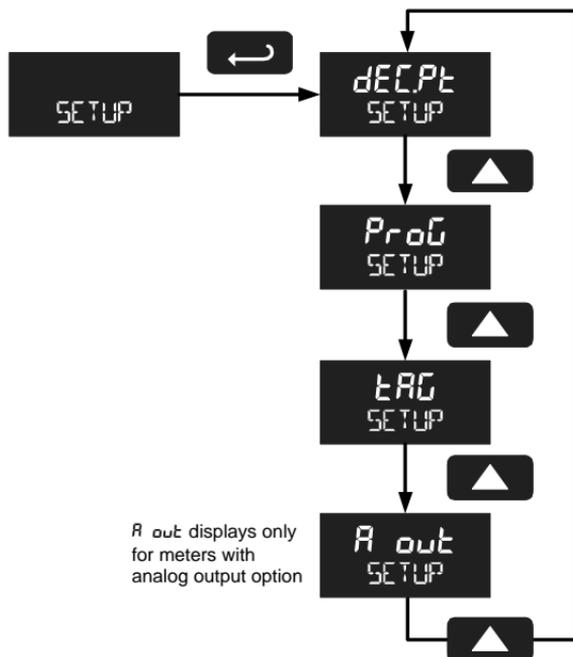


Setting Up the Meter (SETUP)

The *Setup* menu is used to select:

1. Rate and total decimal point position
2. Program menu
3. Rate and total tag display
4. 4-20 mA transmitter output scaling

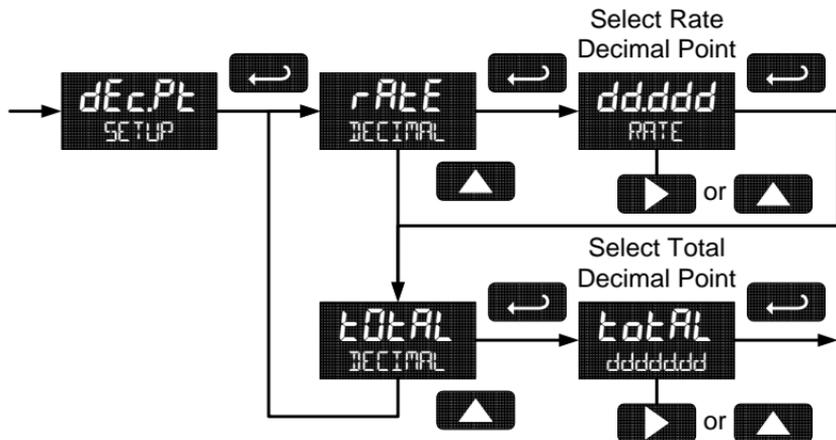
Press the **Enter/Ack** button to access any menu or press **Up** arrow button to scroll through choices. Press the **Menu** button to exit at any time.



Setting the Decimal Point (*dEc.Pt*)

Rate decimal point may be set with up to four decimal places or with no decimal point at all. Total decimal point may be set with up to six decimal places or with no decimal point at all. Rate decimal and total decimal are programmed individually.

Pressing the **Right** arrow moves the decimal point one place to the right until no decimal point is displayed. Pressing the **Up** arrow moves the decimal point one place to the left.



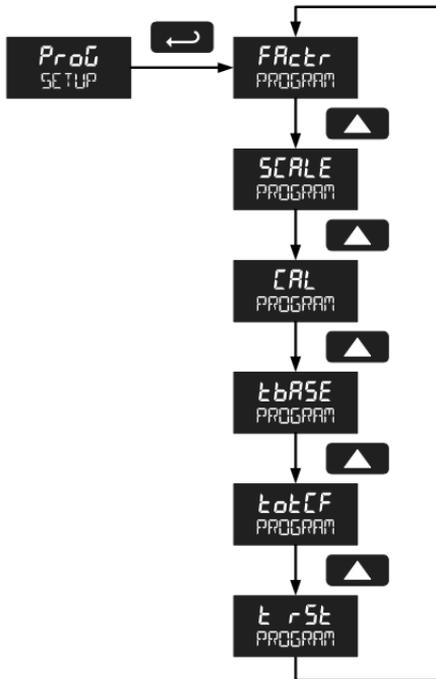
Programming the Meter (Prog)

It is **very important** to read the following information, before proceeding to program the meter:

- There is **no need to recalibrate** the meter for frequency in Hz when first received from the factory.
- The meter is **factory calibrated** for Hz prior to shipment. The calibration equipment is certified to NIST standards.
- Use the *Factor* menu to enter a K-Factor - or
- Use the *Scale* menu to enter the default 2-point scaling without a signal source - or
- Use the *Calibrate* menu to apply a signal from a calibrator or a flowmeter for the default 2-point scaling.

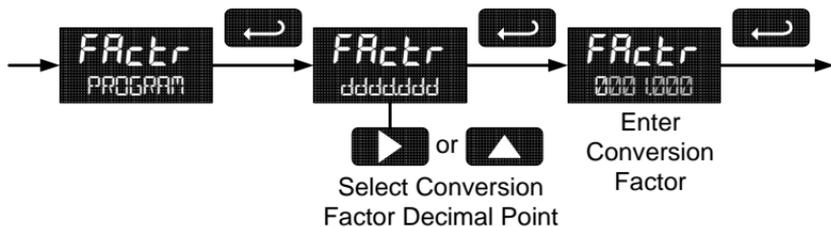
Note: *The K-Factor, Scale, and Calibrate functions are exclusive of each other. The meter uses the last function programmed. Only one of these methods can be employed at a time. The Scale and Calibrate functions can use up to 32 points (default is 2). The number of points should be set in the Advanced menu under the Multi-Point Linearization (LINEAR) menu selection prior to scaling and calibration of the meter, see page 44 for details.*

Additional parameters, not needed for most applications, are viewed and programmed in the *Advanced* menu. See Advanced Features Menu page 40.



K-Factor (FActr)

The meter may be scaled using the *K-Factor* function. Most flowmeter manufacturers provide this information with the device. Enter the *K-Factor* (FActr) 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 and the following scaling selection will be skipped.



Scaling the Meter (SCALE)

The pulse input can be scaled to display the process variable in engineering units. A signal source is not needed to scale the meter; simply program the inputs and corresponding display values.

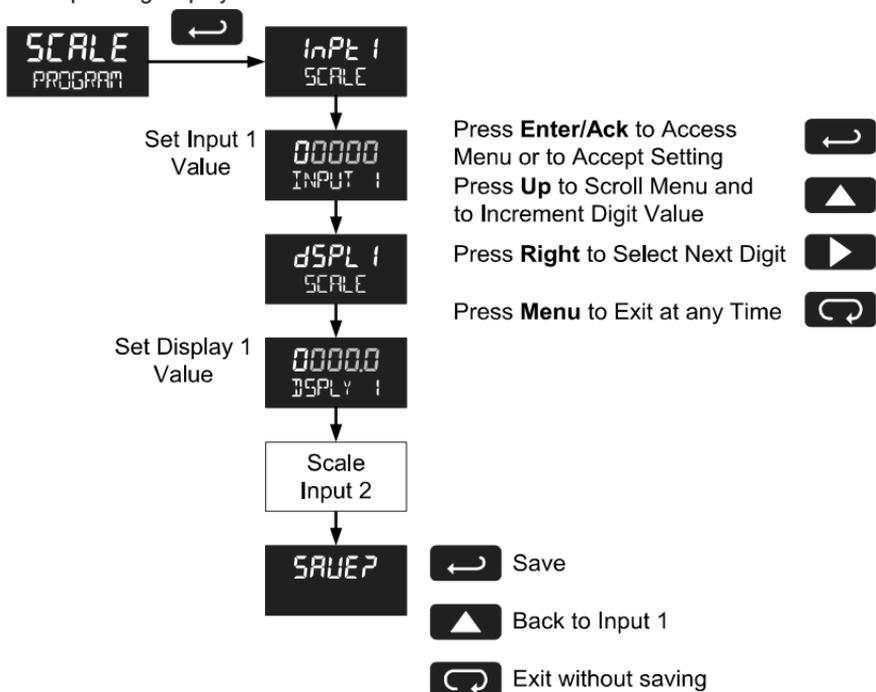


Figure 12. Scale Menu

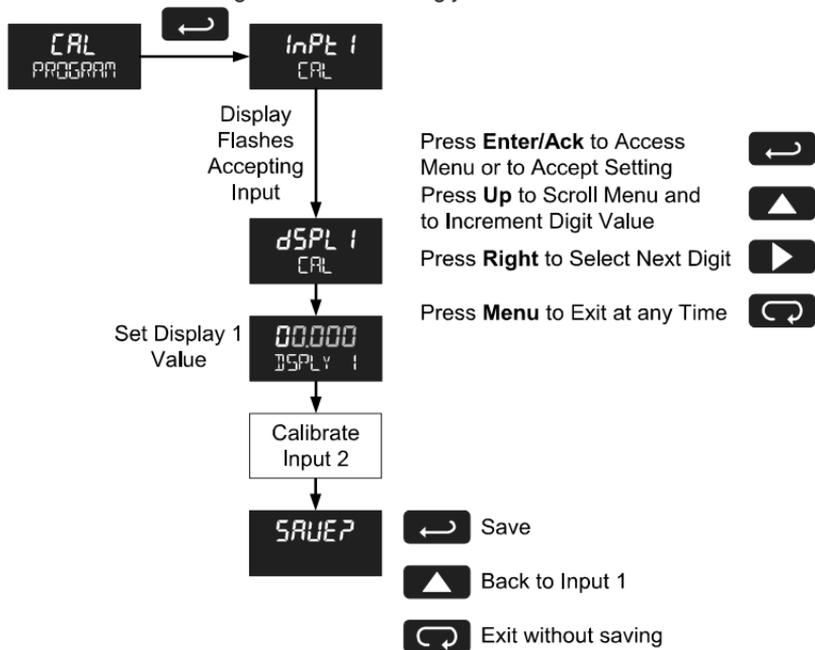
For instructions on how to program numeric values see *Setting Numeric Values*, page 26.

Calibrating the Meter (CAL)

To scale the meter without a signal source refer to K-Factor (FACTOR) or Scaling the Meter (SCALE) on page 30.

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

The use of a calibrated signal source is strongly recommended.



1. Press the **Up** arrow button to scroll to the *Calibration* menu (cAL) and press **Enter**.
2. The meter displays *inPt 1*. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
3. After the signal is accepted, the meter displays *dSPLe 1*. Press **Enter**. Enter a corresponding display value for the signal input, and press **Enter** to accept.
4. The meter displays *inPt 2*. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
5. After the signal is accepted, the meter displays *dSPLe 2*. Press **Enter**. Enter a corresponding display value for the signal input and press **Enter** to accept.
6. After completing calibration the *SAVE?* display will need to be acknowledged using the **Enter** key before calibration will take effect.

Error Message (*Error*)

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

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

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

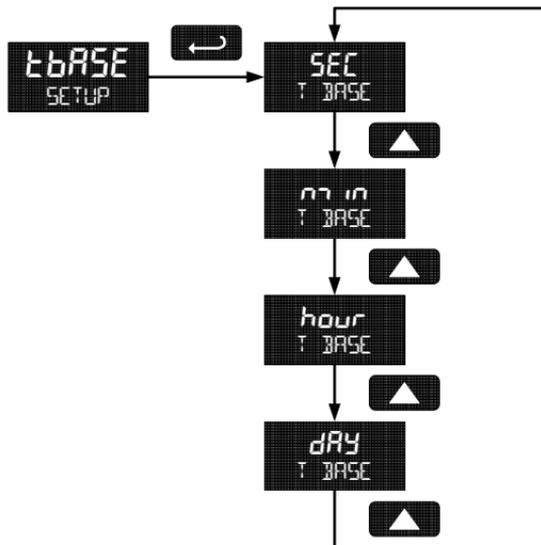
Minimum Input Span

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

Setting the Time Base (tBASE)

The meter calculates rate based on K-Factor and a time base of units per second, minute, hour, or day.

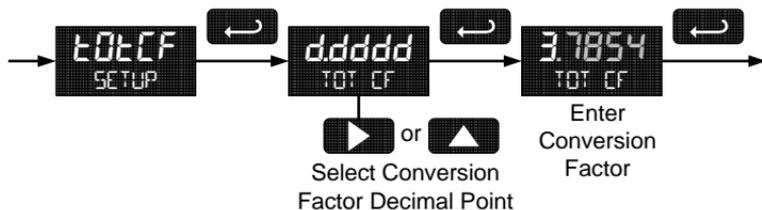
Press the **Enter/Ack** button, at any time, to accept a setting or **Menu** button to exit without saving changes.



Setting the Total Conversion Factor (tCF)

Total Conversion Factor is used to convert to a different unit of total display. For example, to display rate in gallons and total in liters, enter a conversion factor of 3.7854. When rate and total units are the same, the Conversion Factor should be 1.0000.

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



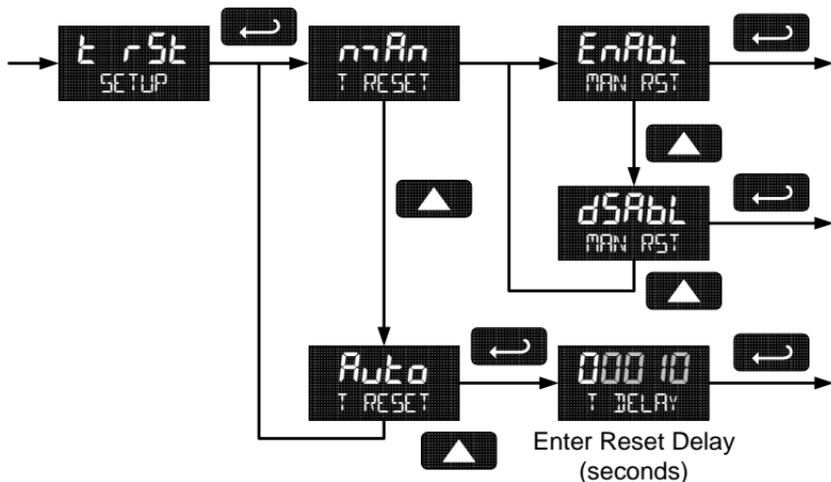
Manual or Automatic Total Reset Function (t rSt)

For manual reset, select PROGRAM → t rSt → n n An and then next select whether manual reset will be enabled (EnAbL) or disabled (dSAbL) using the up arrow key and by then pressing the **Enter/Ack** button to accept. Disabling reset will avoid inadvertent resets of the total via the front reset button or external reset contact.

For automatic reset, select PROGRAM → t rSt → Auto → T DELAY and enter reset delay time in seconds. Once the set point is reached, the meter waits for a programmed amount of time (T DELAY) and then resets the total to zero.

The meter may be automatically reset based on the value programmed in the *Advanced* menu: INDICAT → RLrnr → t otAL → SET.

Press the **Enter/Ack** button, at any time, to accept a setting; otherwise press the **Menu** button to exit without saving changes.

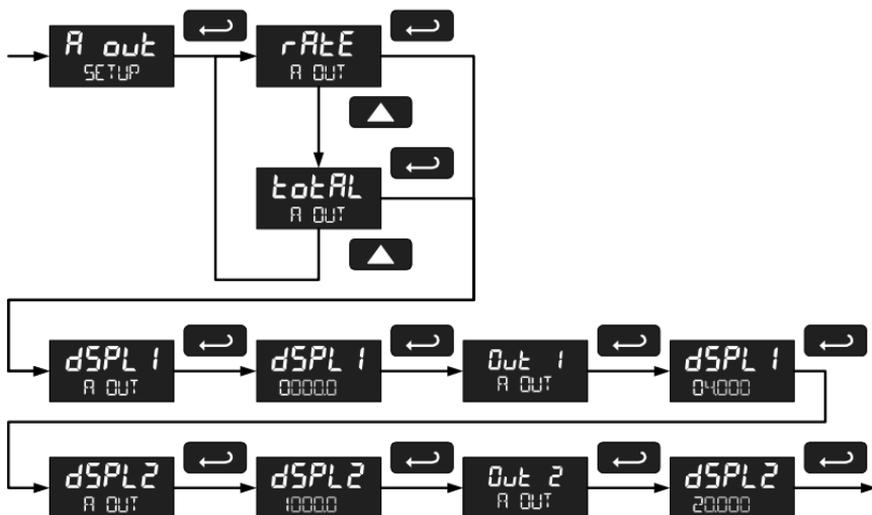


Scaling the 4-20 mA Analog Output (A_{out})

The 4-20 mA analog output (if equipped) can be scaled to provide a 4-20 mA signal for any display range selected for either the rate or the total.

No equipment is needed to scale the analog output; simply program the display values to the corresponding mA output signal. The meter is factory calibrated for milliamps.

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



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



CAUTION

Please note that when power is removed from the meter, the analog output will remain at the last value transmitted at the time of power loss. Take this effect into consideration when designing any system using the 4-20 mA output.

Setting Up the Password (PASSWORD)

The *Password* menu is used to program a five-digit password to prevent unauthorized changes to the programmed parameter settings. The lock symbol is displayed to indicate that settings are protected.

Locking the Meter

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

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



Record the password for future reference. If appropriate, it may be recorded in the space provided.

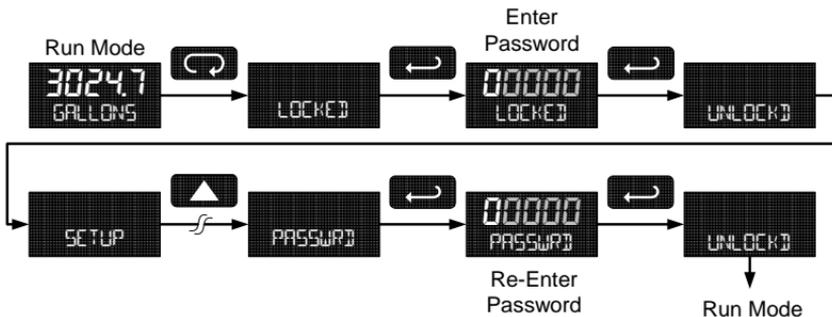
Model:	
Serial Number:	
Password:	_ _ _ _ _

Making Changes to a Password Protected Meter

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

Disabling Password Protection

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



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

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

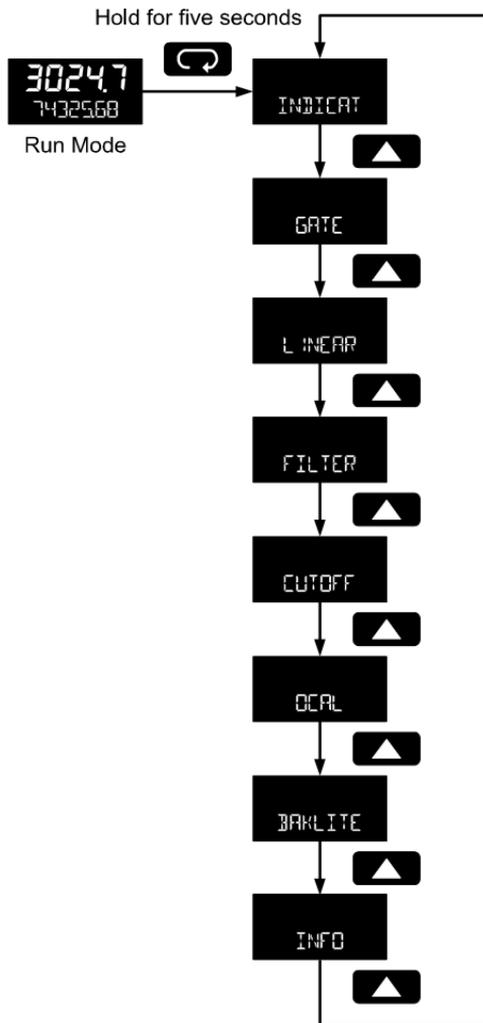
Did you forget the password?

The password may be disabled by entering a master password. If you are authorized to make changes, enter the master password 50865 to unlock the meter permanently. Unlike password disabling, the master password is entered only once to unprotect 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 five seconds to access the *Advanced* features menu.

Press the **Enter/Ack** button to access any menu or press **Up** arrow button to scroll through choices. Press the **Menu** button to exit at any time.



Advanced Features Menu & Display Messages

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

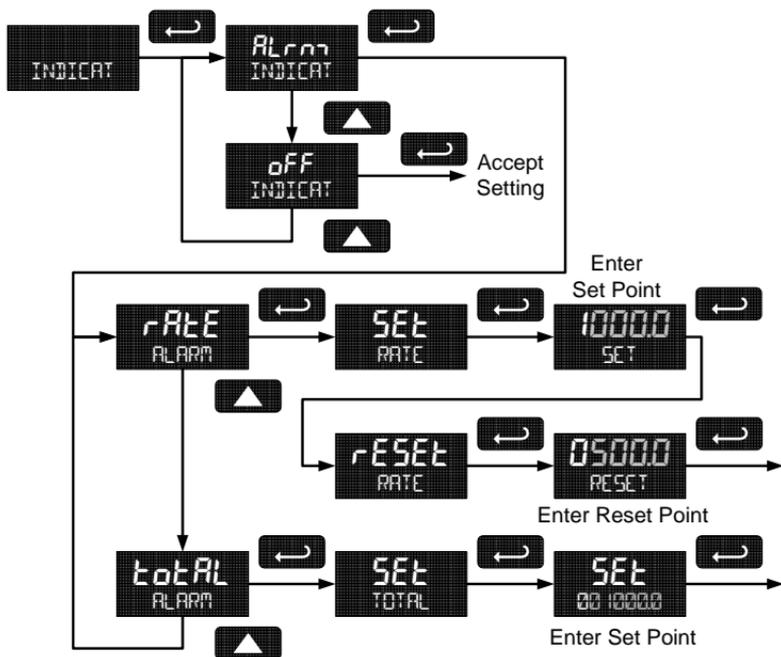
Display	Parameter	Action/Setting
INDICAT	<i>Indication</i>	Enter <i>Indication</i> menu
OFF	<i>Off</i>	Alarm indication <i>Off</i>
ALARM	<i>Alarm Indication</i>	Enter <i>Alarm</i> menu
RATE	<i>Rate Alarm</i>	Assign alarm to <i>rate</i>
TOTAL	<i>Total</i>	Assign alarm to <i>total</i>
SET	<i>Set Point</i>	Program <i>set point</i>
RESET	<i>Reset Point</i>	Program <i>reset point</i> (rate only)
GATE	<i>Gate</i>	Enter <i>Gate</i> menu
LO	<i>Low Gate</i>	Set <i>Low Gate</i>
HI	<i>High Gate</i>	Set <i>High Gate</i>
LINEAR	<i>Linearization</i>	Enter <i>Linearization</i> menu
NOPTS	<i>Number of Points</i>	Enter number of points
FILTER	<i>Filter</i>	Enter <i>filter</i> menu
HI	<i>High Speed Filter</i>	Set <i>high speed</i> filter
LO	<i>Low Speed Filter</i>	Set <i>low speed</i> (contact debounce) filter
CUTOFF	<i>Low-Flow Cutoff</i>	Set <i>low-flow cutoff</i>
OCAL	<i>Output Calibration</i>	Analog output calibration (Factory use only)
BACKLITE	<i>Backlight</i>	Enable or disable backlight
INFO	<i>Meter Information</i>	Show software number and version, or reset to factory defaults
SFE	<i>Software</i>	Software number
VER	<i>Software Version</i>	Software version
RESET DEFAULTS	<i>Reset Defaults</i>	Restore factory default parameter settings

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

Indication (INDICAT)

The *Indication* menu is used to enable and set up a high or low rate alarm or total set point alarm indication on the screen. When in alarm condition, a HI, LO, or SET symbol is displayed accompanied by a flashing display until the ACK is pressed or the condition is cleared (reset).

- **Rate high alarm trip point:** program set point above reset point.
- **Rate low alarm trip point:** program set point below reset point.
- Rate alarm deadband is determined by the difference between set and reset points. Minimum deadband is one display count. If set and reset points are programmed the same, output will reset one count below set point.
- **Total alarm trip point:** program total set point. Alarm reset is triggered by total reset (There is no reset parameter entered for total). If automatic total reset is enabled, this setting will be the trigger point for the timer.



To acknowledge alarm, press the **ENTER/ACK** button once for acknowledge prompt and a second time to confirm.

Gate Function (GATE)

The gate function is used for displaying slow pulse rates. Using the programmable gate, the meter is able to display pulse rates as slow as 1 pulse every 999 seconds (0.001 Hz). The gate function can also be used to obtain a steady display reading with a fluctuating input signal.

There are two settings for the GATE, low gate (**Lo GATE**) and high gate (**Hi GATE**).

Low Gate (Lo GATE)

For most applications, low gate setting should be left at 1 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, the display will update every 10 seconds; changes in rate between updates will not be reflected until next display update.

High Gate (Hi GATE)

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 seconds. When the signal is removed from the meter, the display will show the last reading for 11 seconds; then it will read zero.

Multi-Point Linearization (LINEAR)

Up to 32 linearization points can be selected under the Linear function. The multi-point linearization can be used to linearize the display for non-linear signals such as those from level transmitters used to measure volume in odd-shaped tanks or to convert level to flow using weirs and flumes that require a complex exponent. These points are established via direct entry (SCALE) or with an external calibration signal (CAL).

Number of Points (NOPTS)

Enter number of linearization points. The default value is 2 points. After entering the number of points, the next selection is Scaling (page 31) or Live Input Calibration (page 32).

Manual Entry (SCALE)

Manual entry of the linearization data is done once the number of points has been selected (NOPTS). Input signal levels (INP 1-32) for up to 32 points, along with the desired/corresponding meter reading (DSP 1-32) should be entered for each linearization point. See Figure 13 on page 45.

External Calibration (CAL)

Linearization data can be entered using a known accurate signal source (INP 1-32) and then entering the desired/corresponding meter reading (DSP 1-32) for that input signal level. See Figure 13 on page 45.

Important Navigation Note:

After entering the last display value, the linearization entries must be saved (SAVE) before they will be put into effect. *However*, you may move past this selection using the Up arrow key if you need to go back and correct an earlier entry. Once confident in the entries however, the user must navigate back to the Save menu screen (SAVE) and press the Enter/Ack key to save the changes.

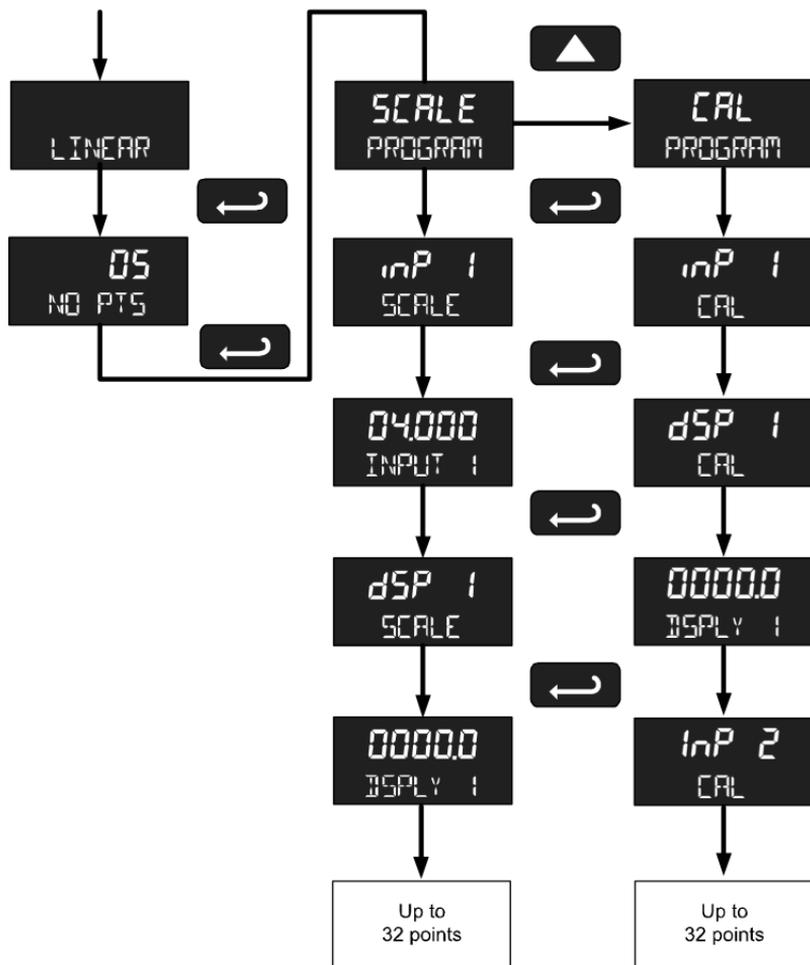


Figure 13. Multi-Point Linearization Menu

Contact Debounce Filter (F ILLEr)

The filter function (F ILLEr) can be used for applications where the meter is set up to count pulses generated by switch contacts. There are two settings, H I (high speed) and L I (low speed). High speed disables the contact debounce filter and allows any pulse of the minimum specified width for the input wired. Press ENTER when L I is displayed to enable the filter function. Program the filter value for the maximum frequency of the true pulse signal in Hz that is expected plus a small margin. In most applications, a setting of 40 will be sufficient to debounce a contact closure, yet allow a pulse train up to 40 Hz.

Low-Flow Cutoff (CUTOFF)

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

The cutoff value may be programmed from -99999 to 99999. Below the cutoff value, the meter will display zero. Programming the cutoff value to zero disables the cutoff feature.

Output Internal Calibration (CAL)

This feature is only used at the factory and for diagnostic purposes. It is not recommended to access this menu without instruction from technical support.

Backlight (BKFLITE)

The *Backlight* menu is used to enable or disable the backlight. This feature is particularly important for the battery-powered models with momentary backlight.

Information (INFO)

The *Information* menu is part of the *Advanced* features menu. It shows software identification number and version number. To determine the software version of a meter:

Go to the *Information* menu (INFO) and press **ENTER** button.

Continue pressing **ENTER** to scroll through the software release number and software version.

Following the information display, the meter will exit the *Advanced* features menu and return to run mode.

Servicing the Meter (SERVICE)

The *Service* menu is used to access features used for maintenance. It is

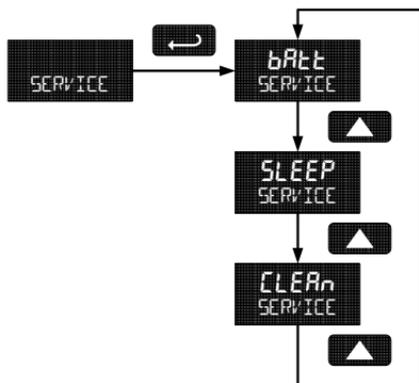
- Select **bATT** to backup the current total into nonvolatile memory and prepare for a battery swap. Once this is selected, the display will flash **CHANGE BATTERY** allowing up to 5 minutes for battery removal before it will automatically exit the menu and return to run mode.
- Select **SLEEP** to enter low power sleep mode. In sleep mode, the display electronics power down to prolong battery life. Incoming pulses are ignored in this mode. The display and output returns to normal operation with the press of a mechanical button, SafeTouch® button, or external reset contact.



CAUTION

The 4-20 mA transmitter output continues at the level it was last updated before sleep mode was entered.

- Select **CLERn** from the service menu to temporarily disable the SafeTouch® buttons to prevent inadvertent use. Buttons will automatically resume operation after 60 seconds. The display blinks the message **CLERn SERVICE**. This should be used when cleaning the window and when installing or removing the cover while power is applied (in a safe area only). The clean feature is not shown in the menu when the SafeTouch® buttons are disabled using the slide switch located on the connector board.



OPERATION

Front Panel Buttons Operation

Button Symbol	Description
	Press to enter or exit Programming Mode or exit Max/Min readings
	Press to reset total (if enabled) Press to reset Max/Min readings
	Press to display Max/Min readings alternately
	Press to acknowledge alarm (if enabled) Press to display Max or Min reading indefinitely while displaying Max or Min

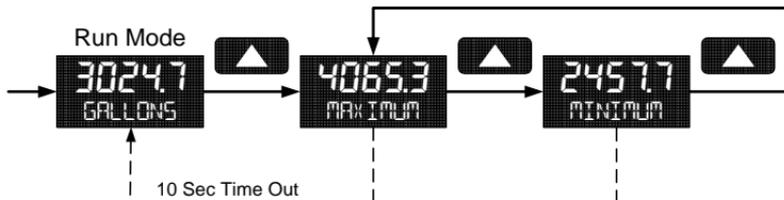
Resetting the Total

If manual total reset is enabled in the Program Menu, the total may be reset by pressing the RESET button and then ACK button. Additionally, the total may be reset using a normally open pushbutton connected across the terminals RST+ and COM.

Note: *The total is cleared immediately when ACK button is pressed. Totalization will then continue, even if the ACK button or external reset button continues to be pressed.*

Maximum & Minimum Readings (MAXIMUM & MINIMUM)

The maximum and minimum (peak & valley) readings reached by the rate are stored in the meter since the last reset or power-up. The meter shows MAXIMUM or MINIMUM to differentiate between run mode and max/min display. Press **ENTER** to remain in Max/Min display mode. If **ENTER** is not pressed, the Max/Min display reading will time out after ten seconds. The meter will return to display the actual reading.



- Press **Up** to Display and to Toggle Between Max & Min 
- Press **Enter** to hold Max/Min 
- Press **Right** to Reset Max/Min 
- Press **Menu** to Exit Max/Min 

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.

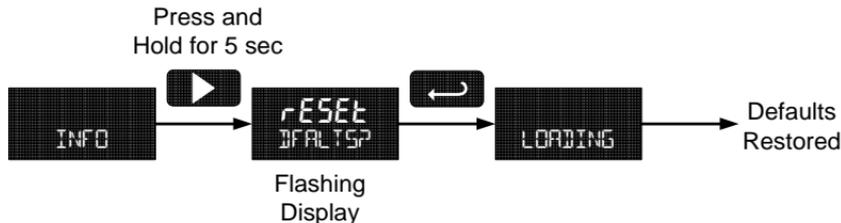
Instructions to load factory defaults:

Enter the *Advanced* features menu.

Press and hold **RESET** button when **INFO** is shown.

Press **ENTER** when **rESEt DfALtSP** prompt is shown

Note: If **ENTER** is not pressed within three seconds, the prompt will stop flashing return to showing **INFO**.



Factory Defaults & User Settings

The following table shows the factory setting for most of the programmable parameters on the meter. Next to the factory setting, the user may record the new setting for the particular application.

Model: _____ S/N: _____ Date: _____

Parameter	Display	Default Setting	User Setting
Decimal point rate	ddddd	1 place	
Decimal point total	ddddddd.d	1 place	
Tag	TAG	Off	
Output variable	R out	Rate	
Output Display 1	dSPL 1	0000.0	
Output 1	Out 1	4.000	
Output Display 2	dSPL 2	1000.0	
Output 2	Out 2	20.000	
Scale/Cal Input 1	InPt 1	00000	
Scale/Cal Display 1	dSPL 1	0000.0	
Scale/Cal Input 2	InPt 2	1000	
Scale/Cal Display 1	dSPL 2	1000.0	
K-Factor	FRctR	1.000	
Time Base	tBASE	second	
Conversion Factor	totCF	1.000000	
Total Reset Function	t rSt	Manual - Enabled	
Password	PASSWRD	00000 (unlocked)	
Advanced Features			
Indication	INDICAT	Off	
Low Gate	LO GATE	1	
High Gate	HI GATE	2	
Filter	FILTER	High Speed	
Cutoff	CUTOFF	0 (disabled)	

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. If the meter is not working as expected, refer to the recommendations below.

Troubleshooting Tips

Symptom	Check/Action
No display or faint display	Check power connection.
Rate display unsteady	Increase low gate setting in <i>Advanced</i> menu.
Meter displays error message during calibration (SPRN ERROR)	Verify minimum input span requirements
Meter flashes 99999	Check input signal is within scaled range of 99999.
Display stuck displaying MAXIMUM or MINIMUM	Press Menu to exit Max/Min display readings.
Display response is too slow	Check gate settings to see if they can be lowered.
If the display locks up or the meter does not respond at all	Perform hard reset by removing and reconnecting the display module or by removing external loop or DC power.
Backlight does not appear.	Backlight is intended for viewing assistance in dim lighting conditions. It may not be noticeable under good lighting conditions. Battery powered models turn off the backlight after ten seconds of button inactivity.
Other symptoms not described above	Call Technical Support for assistance.
SafeTouch® Buttons do not respond	Service menu was selected or mechanical button was pushed. The SafeTouch® Buttons will be re-enabled automatically after a 5 minute delay from the last button push. If slide switch on display module is in Lock position, switch to Unlock. Sunlight can interfere with the sensors. It is recommended to shield the window from sunlight while operating the buttons by standing so as to block direct sunlight.

MOUNTING DIMENSIONS

All units: inches [mm]

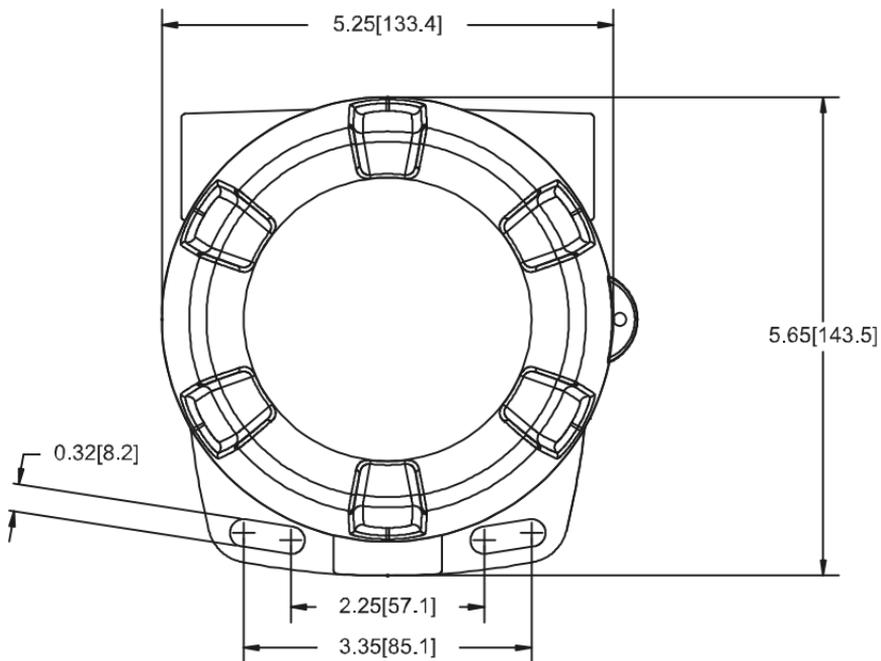


Figure 14. Enclosure Dimensions – Front View

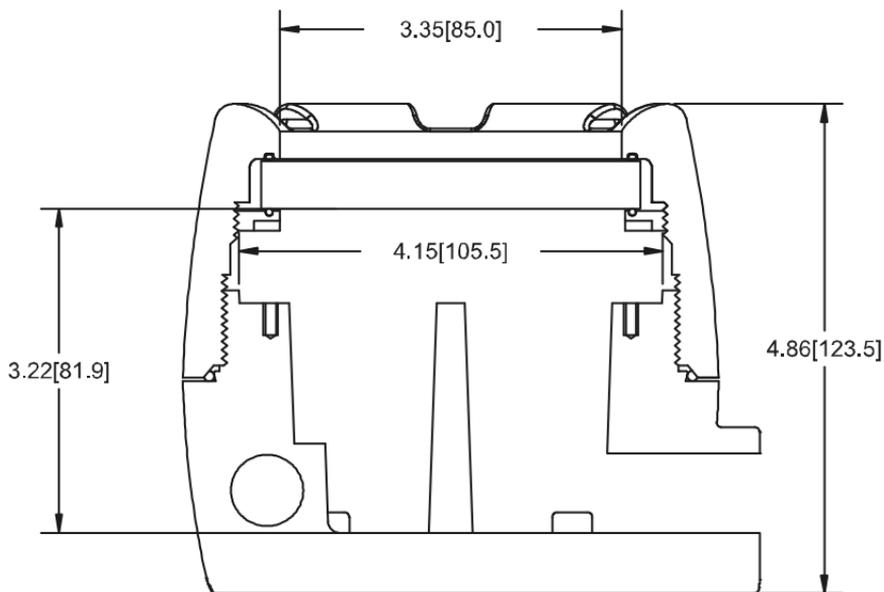


Figure 15. Enclosure Dimensions – Side Cross Section View

QUICK USER INTERFACE REFERENCE

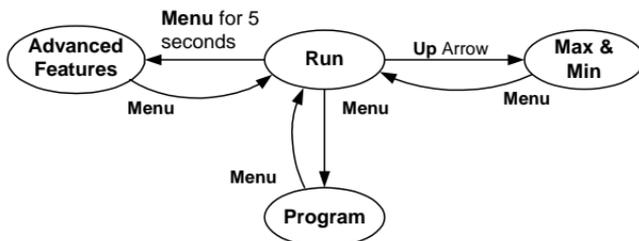
Pushbutton	Function
Menu	Go to Programming Mode or leave Programming, Advanced Features, and Max/Min Modes.
Right Arrow	Move to next digit or decimal point position. Reset Total.
Up Arrow	Move to next selection or increment digit. Go to Max/Min Mode.
Enter/Ack	Accept selection/value and move to next selection. Acknowledge Alarm.

Menu held for 5 seconds enters Advanced Features Menu

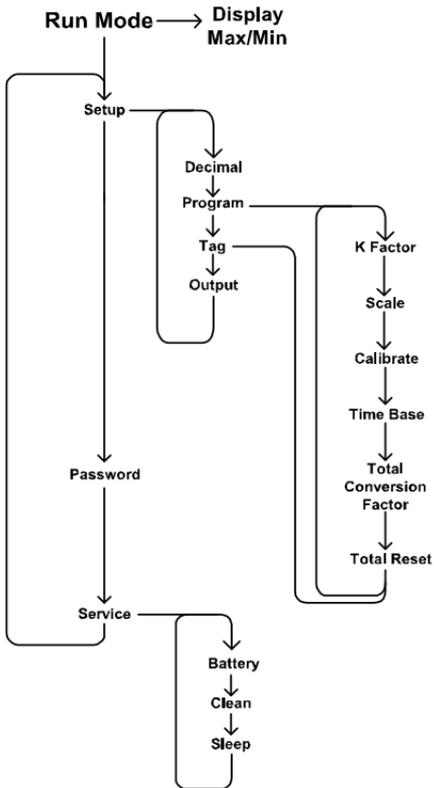
Max/Min Mode

While in Run Mode, pressing **Up Arrow** will initiate Max/Min Mode. **Up Arrow** toggles between Max & Min displays, and **Right Arrow** resets the Max/Min to the current value. Press **Menu** or wait 10 seconds to return to Run Mode. Pressing **Enter/Ack** will disable the 10 second timeout and continuously display Max or Min.

Operational Modes

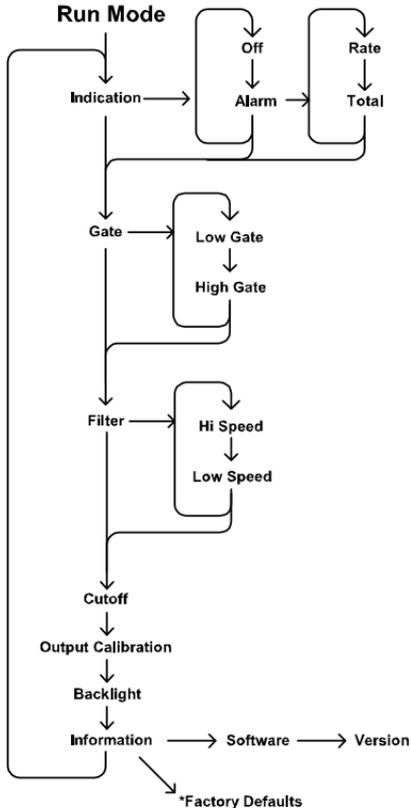


Main Menu



Advanced Menu

Press & hold **Menu** for 5 seconds



*Access by holding **Right/Reset** for 3 seconds

**PRECISION
DIGITAL** **EC DECLARATION OF CONFORMITY**

Issued in accordance with ATEX Directive 94/9/EC

Manufacturer: Precision Digital Corporation

89 October Hill Rd Ste 5

Holliston, MA 01746 USA

Device: PD6830 Series Pulse Input Rate/Totalizer

Notified Body: Sira Certification Service, notified body no. 0518

Rake Lane, Eccleston, Chester, CH4 9JN, England

EC Type Examination Certificate: Sira 10ATEX1116X

Quality Assurance Notification No.: SIRA 10 ATEX M462

Compliance with Standards:

EN 60079-0:2009

EN 60079-1:2007

EN 60079-31:2008

EN 61326:2006

IEC 61010-1:2001 & EN 61010-1:2001, including Group and National Differences as they apply for AU, CA, US and KR

Product Markings:



II 2 G D

Ex d IIC T6 Gb

Ex tb IIIC T85°C Db IP68

Tamb -40°C to +75°C

Community Directives:

94/9/EC ATEX Directive

2004/108/EC EMC Directive

Name: Jeffrey Peters

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Date: 1/1/2011

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