

# Loop Leader PD6622/4 Loop-Powered Rate/Totalizer Instruction Manual



## Loop-Powered Totalizer

- Loop-Powered Rate/Totalizer
- Loop-Powered Backlight with Red Backlight for Alarm Conditions
- Display Rate & Total Simultaneously
- Total Display Includes Commas for More Intuitive Readings
- 1.5 Volt Drop (4.5 Volt Drop w/ Backlight)
- IP65 Front
- -40 to 167°F (-40 to 75°C) Operating Temperature Range
- Five Digit Top Line
- Alphanumeric Tag Names
- Total, Grand Total, or Non-Resettable Grand Total
- Up to 13-digit Total & Grand Total
- Dual-Line Display
- 1/8 DIN Shallow-Depth Case
- Optional Loop-Powered Solid-State Relays
- Optional 4-20 mA Analog Output

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<b>CAUTION:</b> <i>Read complete instructions prior to installation and operation of the meter.</i>	<b>WARNING:</b> <i>Risk of electric shock or personal injury.</i>

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## Introduction

The Loop Leader PD6622 and PD6624 are loop-powered, 1/8 DIN flow rate/totalizers designed for demanding process control applications. The four front panel buttons make setup and programming of the meter simple and intuitive. A dual-line display featuring five digits on the top line and eight digits on the bottom line, preprogrammed engineering units, and optional bargraph display (PD6624) provide a clear and attractive presentation of the process. The units of measure can be changed as needed (e.g. gallons/second to liters/second) without the need to re-scale the meter.

The dual-line display can be customized by the user to operate in such a way as to satisfy a specific application. Typically, the top line is used for the rate while the bottom line is used for the total, grand total, or engineering units. Three programmable function keys and a digital input come standard and allow the meter to be customized for use in specialized applications.

All models come equipped with two open collector outputs and are available with two solid state relays and a 4-20 mA analog output. These outputs can be programmed for alarm indication, signal retransmission via pulse or analog signal, pump control, and a number of other useful features.

The fact that this meter is loop-powered means that there is no need to run additional, costly power lines; the meter gets all of the power it needs from the 4-20 mA loop. The Loop Leader loop-powered rate/totalizer is built in a shallow-depth case with an IP65 front and features loop-powered backlighting and a wide -40 to 167°F (-40 to 75°C) operating temperature range. It doesn't matter if it's indoors or outdoors, in bright sunlight or a dimly lit plant, or in an area that is wet, dirty, hot, or cold, the Loop Leader can go just about anywhere.

## Ordering Information

### Standard Decimal Display Models

PD6622-LNN	Loop-Powered, No Options
PD6622-L2N	Loop-Powered, Two Solid State Relays
PD6622-L3N	Loop-Powered, 4-20 mA Analog Output
PD6622-L5N	Loop-Powered, Two Solid State Relays and 4-20 mA Analog Output
<b>Note:</b> all models come with two open collector outputs standard.	

### Decimal Display with Bargraph Models

PD6624-LNN	Loop-Powered, No Options
PD6624-L2N	Loop-Powered, Two Solid State Relays
PD6624-L3N	Loop-Powered, 4-20 mA Analog Output
PD6624-L5N	Loop-Powered, Two Solid State Relays and 4-20 mA Analog Output
<b>Note:</b> all models come with two open collector outputs standard.	

### Enclosures

Model	Meters	Description	Mounting
PDA2407	1	Plastic NEMA 4X Enclosure	Inside Cover
PDA2410	3	Plastic NEMA 4X Enclosure	Inside Cover
PDA2411	2	Plastic NEMA 4X Enclosure	Inside Cover
PDA23XX	1-10	Economical Plastic NEMA 4X Enclosure	Through Door
PDA25XX	1-10	Plastic NEMA 4X Enclosure	Through Door
PDA26XX	1-6	Stainless Steel NEMA 4X Enclosure	Through Door
PDA27XX	1-6	Steel NEMA 4 Enclosure	Through Door
PDA2801*	1	Low-Cost Plastic NEMA 4X Enclosure	Through Cover
PDA2812	2	Low-Cost Plastic NEMA 4X Enclosure	Through Cover

**Note:** XX = the last two digits of the model number.

Go to [www.predig.com](http://www.predig.com) to find individual part numbers.

# Specifications

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

## General

<b>Display</b>	Top: 0.7" (17.8 mm), Bottom: 0.4" (10.2 mm); 14-segment alphanumeric Top: 5 digits -9999 to 99999 Bottom: 8 digits -9,999,999 to 99,999,999 Bottom line separated by commas
<b>Display Update Rate</b>	Ambient > -10°C: 1 Update/Second Ambient > -20°C: 1 Update/2 Seconds Ambient -40°C: 1 Update/10 Seconds
<b>Overrange</b>	Top: 99999; Bottom: 99,999,999 (flashing)
<b>Underrange</b>	Top: -9999; Bottom: -9,999,999 (flashing)
<b>Programming Method</b>	Front panel
<b>Noise Filter</b>	1, 2, 4, 8, 16 sec.
<b>Noise Filter Bypass</b>	0.1 to 99.9% FS
<b>Recalibration</b>	Recalibration is recommended at least every 12 months.
<b>Max/Min Display</b>	Max/min readings reached by the process are stored until reset by the user or until power to the meter is turned off.
<b>Password</b>	Programmable password restricts modification of programmed settings.
<b>Non-Volatile Memory</b>	All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.
<b>Normal Mode Rejection</b>	64 dB at 50/60 Hz
<b>Environmental</b>	Operating temperature range: -40 to 75°C Storage temperature range: -40 to 85°C Relative humidity: 0 to 90% non-condensing
<b>Connections</b>	Removable screw terminals accept 12 to 22 AWG wire
<b>DI Digital Input Contacts</b>	2.1 VDC on contact. Connect normally open contacts across DI+ to DI-
<b>DI Digital Input Logic Levels</b>	Logic High: 2.4 to 30 VDC (max) Logic Low: 0 to 0.9 VDC
<b>Enclosure &amp; Materials</b>	1/8 DIN, high impact plastic, NORYL® Polyphenylene Ether & Polystyrene blend (PPE PS) Resin, UL 94V-0, color: gray Gasket: Silicone Rubber Faceplate: LEXAN® Polycarbonate (PC) Film Buttons: Silicone rubber; Color: black
<b>Mounting</b>	1/8 DIN panel cutout required. Two panel mounting bracket assemblies provided
<b>Tightening Torque</b>	Screw terminal connectors: 4.5 lb-in (0.5 Nm) Mounting screws: 8.0 lb-in max. (0.9 Nm)
<b>Overall Dimensions</b>	4.68" x 2.45" x 3.79" (119 mm x 62 mm x 96 mm) (W x H x D)
<b>Weight</b>	8.7 oz (247g) w/ option board
<b>Warranty</b>	3 years parts and labor

## Process Input

<b>Accuracy</b>	±0.02% of span ±1 count, Square root and programmable exponent: 10-100% FS
<b>Function</b>	Linear, square root, or programmable exponent
<b>Low-Flow Cutoff</b>	0.0 to 999,999.9
<b>Temperature Drift</b>	25 PPM/°C from -40 to 75°C ambient
<b>Decimal Point</b>	Up to four decimal places: On top Up to seven decimal places: On bottom
<b>Scaling and Display Range</b>	Input: 4-20 mA Scaling Range: -999,999.9 to 999,999.9 Display Range: Top Line: -9999 to 99999; Bottom Line: -9,999,999 to 99,999,999
<b>Voltage Drop</b>	With backlight off: 1.5 V max With backlight on: 4.5 V max
<b>Equivalent Resistance</b>	75 Ω @ 20 mA with backlight off 225 Ω @ 20 mA with backlight on
<b>Input Overload</b>	Over current protection to 1 A maximum

## Rate/Totalizer

<b>Rate Display Indication</b>	-9999 to 99999, top display -9,999,999 to 99,999,999, bottom display
<b>Total Display &amp; Total Overflow</b>	-9,999,999 to 99,999,999 "T" LCD segment shows while displaying total "G T" LCD segments show for grand total. (non-bargraph display version only) Up to 9,999,999,999,999 with 13-digit feature. Total or grand total flashes and a truncated value is shown. Press function key assigned to display (default: F1) to view full number.
<b>Total Decimal Point</b>	Up to four decimal places: On top Up to seven decimal places: On bottom Total decimal point is independent of rate decimal point.
<b>Totalizer</b>	Calculates total based on rate and rate units to display total in engineering units. A custom factor must be programmed if using custom defined units.
<b>Totalizer Rollover</b>	Totalizer rolls over when display exceeds 99,999,999 (9,999,999,999,999 if 13-digit limit enabled). Relay status reflects display.
<b>Total Reset</b>	Via front panel button or external contact closure on digital input
<b>Total Reset Password</b>	Total and grand total passwords may be entered to prevent resetting the total or grand total from the front panel.
<b>Non-Resettable Total</b>	Total and grand total reset may be disabled through the meter interface. Grand total reset may be permanently disabled by selecting YES at the PERM LOCK menu. Once the grand total reset has been permanently disabled, it cannot be enabled.

### Open Collector Output

<b>Rating</b>	Two NPN, Isolated open collector, 30 VDC @ 90 mA maximum
<b>Output Assignment</b>	Pulse, Alarm, Timer, Total Reset, or Disable
<b>Pulse Output Source</b>	Rate, Total, Grand Total, or Test Frequency
<b>Pulse Output Factor</b>	0.000001 to 999,999.9
<b>Pulse Width</b>	Min: 2 ms @ 250 Hz; 50% duty cycle Max: 250 ms @ < 2 Hz
<b>Pulse Output Frequency</b>	250 Hz maximum
<b>Quadrature Pulse Output</b>	Available for Output 2 (90° behind Output 1)
<b>Alarm Output Source</b>	Assign to Rate, Total, Grand Total or Digital Input
<b>High or Low Alarm</b>	User programmable for high or low alarm
<b>Alarm Deadband</b>	0-100% FS, user programmable
<b>On &amp; Off Time Delay</b>	0 to 9,999 seconds
<b>Fail-Safe Operation</b>	Independent for each output
<b>Alarm Operation</b>	Auto, Auto-man, Latch, Latch w/clear
<b>Alarm Indication</b>	Red backlight, Flashing display, Alarm Message, Alarm symbol (!)
<b>Alarm Message</b>	On or Off; User programmable, 8 characters maximum Displayed every 10 sec for 1 sec on bottom
<b>Alarm Acknowledge</b>	Front panel ACK button or external digital input resets output and screen indication
<b>Auto Initialization</b>	When power is applied to the meter, open collectors will reflect the state of the input to the meter
<b>Timer Output</b>	One-shot or Continuous Off Time Delay: 1 sec to 99:59:59 (hrs:min:sec) On Time: 1 sec to 99:59:59 (hrs:min:sec)
<b>Timer Start/Stop</b>	Front panel or digital input, user selectable



### Solid State Relays

<b>Rating</b>	Resistive Load: 250 VAC/DC @ 1 Amp Inductive Load: 1/10 HP @ 125/250 VAC/DC
<b>Noise Suppression</b>	Metal oxide varistors across outputs
<b>Relay Assignment</b>	Alarm, Timer, Batch Control, Sample, or Disable
<b>Alarm Output Source</b>	Assign to Rate, Total, Grand Total, or Digital Input
<b>High or Low Alarm</b>	User programmable for high or low alarm
<b>Alarm Deadband</b>	0-100% FS, user programmable
<b>On &amp; Off Time Delay</b>	0 to 9,999 seconds
<b>Fail-Safe Operation</b>	Independent for each relay
<b>Alarm Operation</b>	Auto, Auto-man, Latch, Latch w/clear
<b>Alarm Indication</b>	Red backlight, Flashing display, Alarm Message, Alarm symbol (!)
<b>Alarm Message</b>	On or Off; User programmable, 8 characters maximum. Displayed every 10 sec for 1 sec on bottom
<b>Alarm Acknowledge</b>	Front panel ACK button or external digital input resets output and screen indication
<b>Auto Initialization</b>	When power is applied to the meter, relays will reflect the state of the input to the meter
<b>Timer Output</b>	One-shot or Continuous Off Time Delay: 1 sec to 99:59:59 (hrs:min:sec) On Time: 1 sec to 99:59:59 (hrs:min:sec)
<b>Timer Start/Stop</b>	Front panel or digital input, user selectable

### 4-20 mA Transmitter Output

<b>Output Source</b>	Rate, total, re-transmit; reverse scaling allowed
<b>Scaling Range</b>	1.00 to 23.0 mA
<b>Disable</b>	High impedance state, less than 1 mA
<b>Calibration</b>	Factory calibrated 4.00 to 20.00 mA
<b>Underrange</b>	1.0 mA, 3.5 mA, or 3.8 mA (If input < 3.5 mA); or Disable; user selectable
<b>Overrange</b>	20.5 mA, 20.8 mA, or 23.0 mA (If input > 20.5 mA); or Disable; user selectable
<b>Isolation</b>	500 V
<b>Accuracy</b>	±0.05% FS ±0.001mA
<b>Temperature Drift</b>	0.5 µA/°C max from -40 to 75°C ambient
<b>External Loop Power Supply</b>	7.0 VDC to 30.0 VDC maximum
<b>Output Loop Resistance</b>	10-750 Ω @ 24 VDC; 10-1100 Ω @ 30 VDC

## Safety Information

 <b>CAUTION:</b> Read complete instructions prior to installation and operation of the meter.	 <b>WARNING:</b> Risk of electric shock or personal injury.
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 <b>Warning!</b>	<b>Hazardous voltages exist within enclosure. Installation and service should be performed only by trained service personnel.</b>
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## 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.

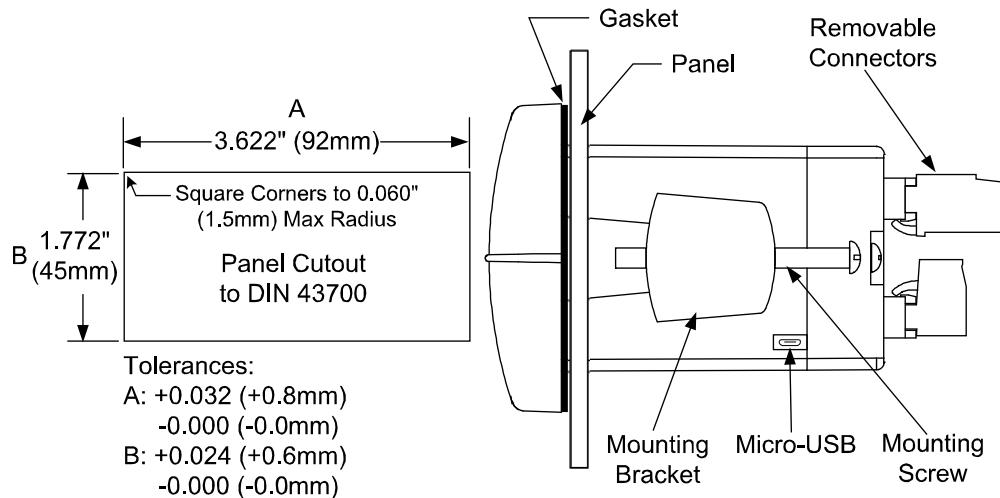
## Unpacking

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 below, for more details.
- Clearance: allow at least 4.0" (102 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 and Panel Mounting Details**

### Mounting Dimensions

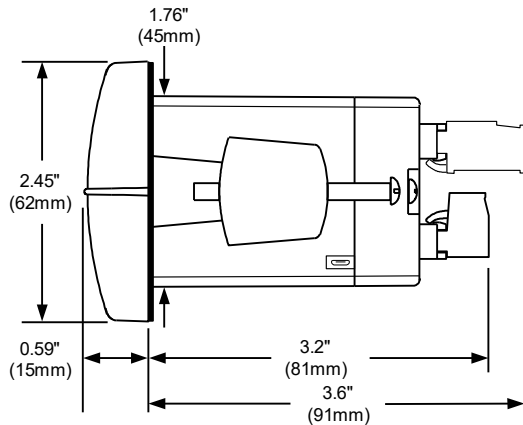


Figure 2. Meter Dimensions - Side View

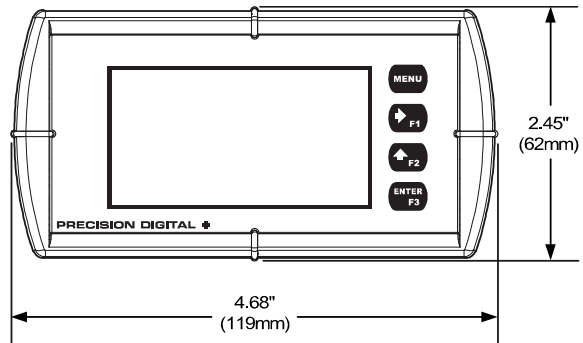



Figure 3. Meter Dimensions - Front View

### Connections

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



*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.

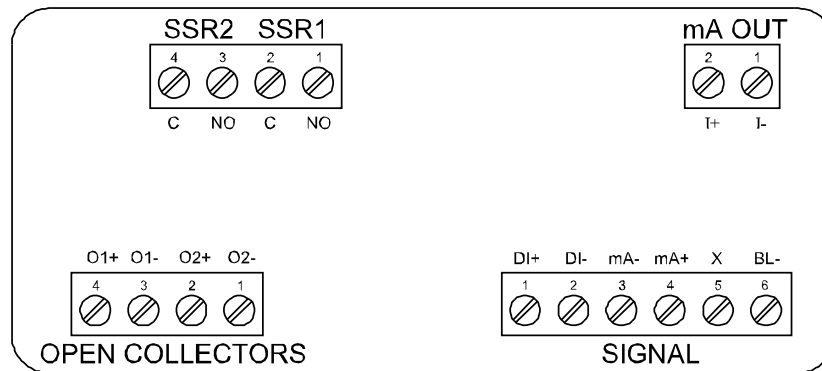
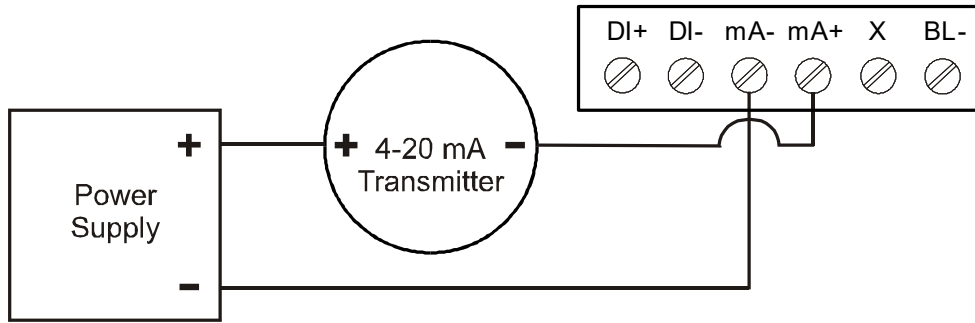


Figure 4. Connector Labeling for Fully Loaded PD6620

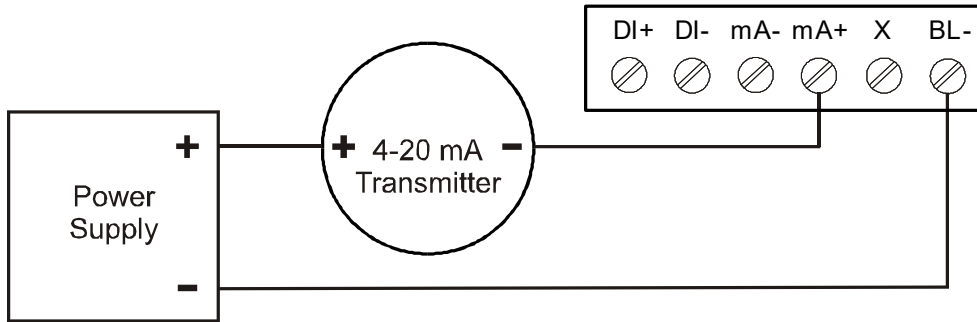


### Current Loop (4-20 mA) Connections

Signal connections are made to a six-terminal connector labeled SIGNAL on Figure 4. The following figures show a 4-20 mA current loop connected to the meter. The first figure shows the connection without the backlight and the second shows the connection with the backlight (the backlight may also be disabled/enabled in the `5.5.5TEM` menu). The meter is powered by the 4-20 mA current loop. There are no switches or jumpers to set up for the input. Setup and programming is performed through the front panel buttons.



**Figure 5. 4-20 mA Input Connection without Backlight**

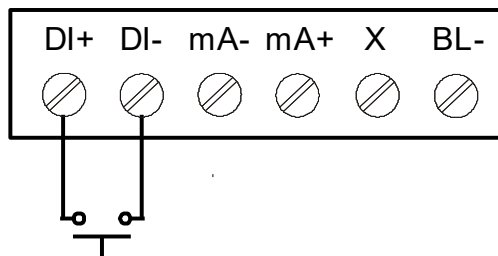


**Figure 6. 4-20 mA Input Connection with Backlight**

The current input is protected against current overload up to 1 amp. The display may or may not show a fault condition depending on the nature of the overload.

### Digital Input Connection

A digital input is standard on the meter. This digital input is connected with a normally open contact across DI+ and DI-, or with an active low signal applied to DI+ and DI-.



**Figure 7. Digital Input Connections**

### 4-20 mA Output Connections

Connections for the 4-20 mA transmitter output are made to the connector terminals labeled MA OUT. The 4-20 mA output must be powered from an external power supply.

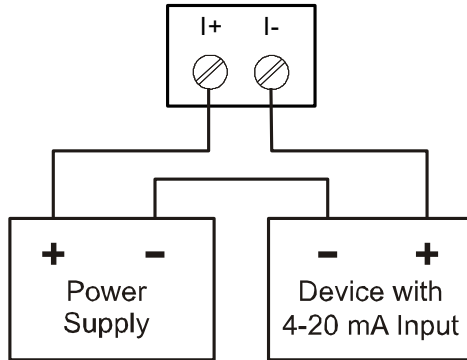


Figure 8. 4-20 mA Output Connections

### Solid State Relay Connections

Relay connections are made to two-terminal connectors labeled SSR1 and SSR2 in Figure 4. Each relay's C terminal is common only to the normally open (NO) contact of the corresponding relay.

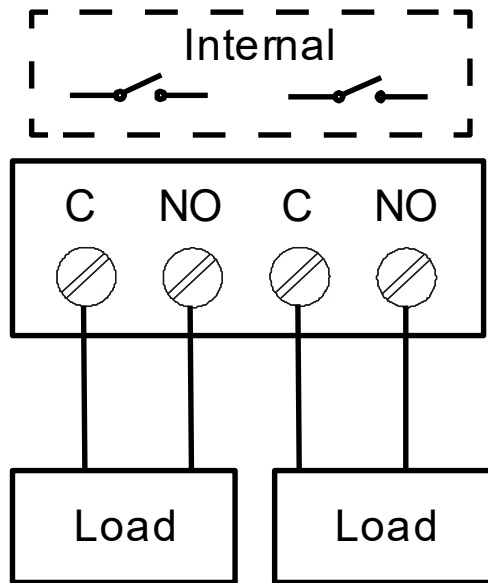


Figure 9. Solid State Relay Connections

### Open Collector Outputs

Open collector output 1 and 2 connections are made to terminals labeled O1+ and O1-, and O2+ and O2-. Connect the alarm or pulse input device as shown below.

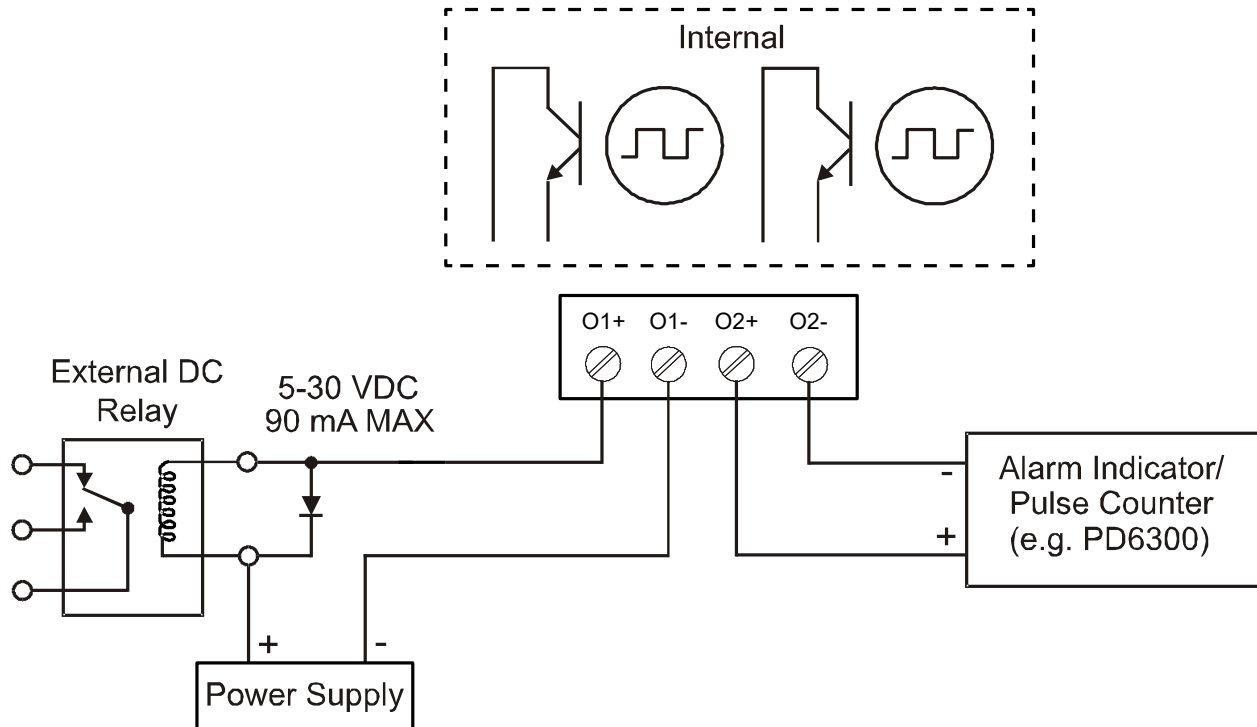


Figure 10. Open Collector Output Connections

## Setup and Programming

The meter is factory calibrated prior to shipment to display 0 to 100, which corresponds to the 4-20 mA input. The calibration equipment is certified to NIST standards.

### Overview

There are no jumpers to set; setup and programming is done through the front panel buttons. The meter may be powered via the micro-USB connection located on the right side of the meter for the purposes of programming only. The backlight will not work while the meter is powered via the USB connection.

### Front Panel Buttons and Status LED Indicators



PD6622

PD6624

Button Symbol	Description
	Menu
	Right-Arrow/F1
	Up-Arrow/F2
	Enter/F3

LCD	Status
	Alarm Indicator (PD6622 Only)
	Password Protection Indicator (PD6622 Only)
	Grand Total Indicator (PD6622 Only)
	Total Indicator (PD6622 Only)

- Press the **Menu** button to enter or exit the *Programming Mode* at any time.
- Press or hold the **Right-Arrow** button to scroll forward through the menus, select digits during numeric programming, select characters during text programming, or decrement the value of a digit or character selected with the **Up-Arrow** button.
- Press and hold the **Right-Arrow** button to zero or clear digits/characters while in data-entry mode.
- Press or hold the **Up-Arrow** button to scroll backwards through the menus or to increment the value of a digit or character.
- Press the **Enter** button to access a menu or to accept a setting or programmed digit/character value.

## 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.

Parameter	Action/Setting Description	Parameter	Action/Setting Description
INPUT	Program the meter 4-20 mA input	TOT RST	Program the open collector for total reset
SCALE RATE	Scale the rate input	RELAY	Program the meter's relay outputs
UNITS	Select the display units	OUTPUT 1	Relay 1 setup
/SECOND	Units per second	OUTPUT2	Relay 2 setup
/MINUTE	Units per minute	DISABLE	Disable the relay
/HOUR	Units per hour	ALARM	Program relay for alarm functionality
/DAY	Units per day	SAMPLE	Program relay for sample functionality
GAL/(T)	Gallons per time unit (T)	TIMER	Program relay as a timer
L/(T)	Liters per time unit (T)	BATCH	Program the relay for batch control functionality
IGAL/(T)	Imperial gallons per time unit (T)	INFO	View relay run time and cycle count
M3/(T)	Cubic meters per time unit (T)	4-20 mA	Program the meter's 4-20 mA output
BBL/(T)	Barrels per time unit (T)	RATE	Transmit a value based on the rate display
BUSH/(T)	Bushels per time unit (T)	TOTAL	Transmit a value based on the total display
CUYD/(T)	Cubic Yards per time unit (T)	RETRANS	Retransmit the 4-20 mA input signal
CUFL/(T)	Cubic Feet per time unit (T)	DISABLE	Disable the 4-20 mA output
CUIN/(T)	Cubic Inches per time unit (T)	CONTROL	Program manual or automatic operation for the outputs
L, BBL/(T)	Liquid barrels per time unit (T)	OC 1	Open collector 1
BBBL/(T)	Beer barrels per time unit (T)	OC2	Open collector 2
HECELL/(T)	Hectoliter per time unit (T)	RELAY 1	Relay 1
AF/(T)	Acre-Foot per time unit (T)	RELAY2	Relay 2
CUSTOM/(T)	Custom unit per time unit (T)	4-20 mA	4-20 mA output
INPUT 1	Program input 1 value	AUTO	Set selected output to automatic operation
INP 1	Enter the input 1 value	MANUAL	Manually control selected output operation
DISP 1	Program display 1 value	ADVANCE D	Program the meter's advanced features
DISP 1	Enter the display 1 value	RATE	Advanced 4-20 mA rate input programming
INPUT 2	Program input 2 value (up to 32 points)	FUNCTION	Select linear, square root, or programmable exponent function
INP 2	Enter the input 2 value	LINEAR	Set meter for linear function and select number of linearization points
DISP 2	Program display 2 value (up to 32 points)	SQROOT	Set meter for square root extraction
DISP 2	Enter the display 2 value	EXPONENT	Set meter for programmable exponent and enter exponent value
SAVE?	Save programmed units, input, and display values	SCALECAL	Scale or calibrate the 4-20 mA input
OUTPUT	Program the meter's available outputs	SCALE RATE	Scale the rate 4-20 mA input
OPEN COLLECTR	Program the meter's open collector outputs	CAL RATE	Calibrate the rate 4-20 mA input
OUTPUT 1	Open collector 1 setup		
OUTPUT2	Open collector 2 setup		
DISABLE	Disable the open collector		
PULSE	Program the open collector for pulse output		
ALARM	Program the open collector for alarm output		
TIMER	Program the open collector as a timer		

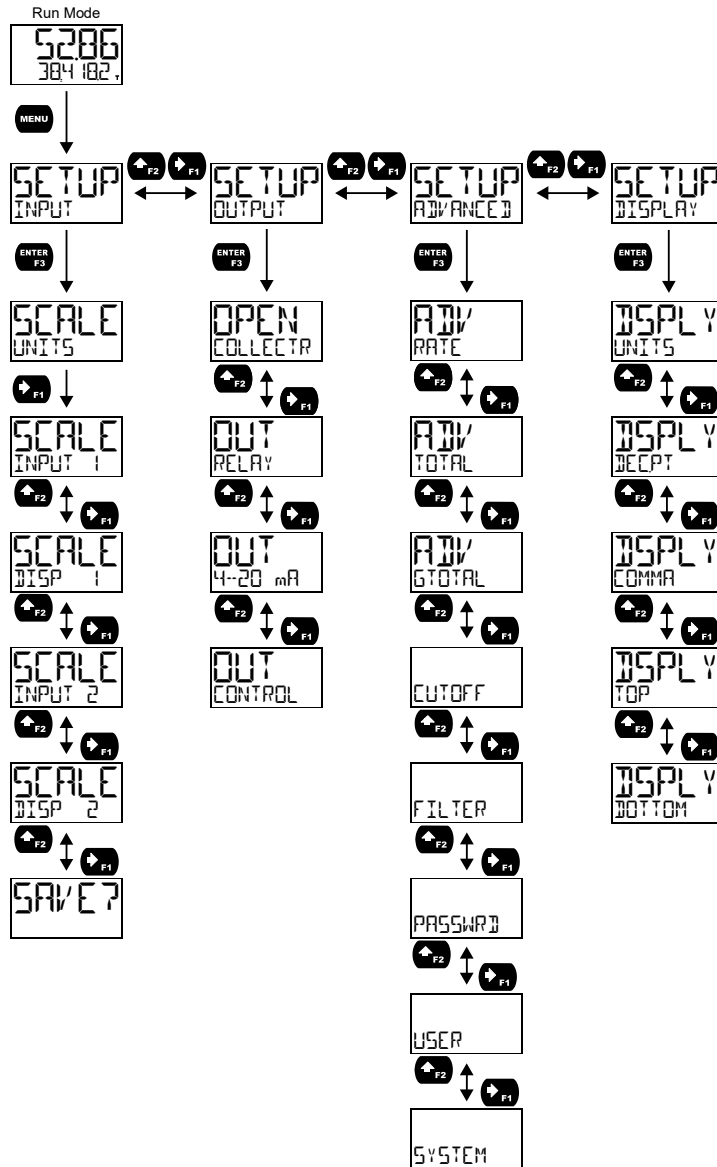
Parameter	Action/Setting Description	Parameter	Action/Setting Description
TOTAL	Advanced total programming	DI	Assign digital input
COUNT	Program the totalizer functionality	DISP FN	Set the function key or digital input to display a value
LIMIT	Set the number of digits used for the total	DISPLAY	Cycle max, min, rate, total, and grand total
8-DIGIT	Eight digits max (99999999)	RATE	Display the rate
13-DIGIT	Thirteen digits max (999999999999) (Requires top line to display entire number, total will flash when number overflows to top line)	TOTAL	Display the total
INITIAL	Set the total to start at a specific number	DISP GT	Display the grand total
RESET	Enable or disable the ability to reset the total	PCTRATE	Display the rate's percentage of max (20 mA)
ENABLE	Enable total reset (default)	R UNITS	Display the rate, total, and grand total units
DISABLE	Disable total reset	R TAG	Display the tags
GTOTAL	Advanced grand total programming	DISPMIN	Display the minimum rate value
COUNT	Program the totalizer functionality	DISPMAX	Display the maximum rate value
LIMIT	Set the number of digits used for the total	MIN MAX	Display the minimum and maximum rate value
8-DIGIT	Eight digits max (99999999)	R mA IN	Display the current mA input value
13-DIGIT	Thirteen digits max (999999999999) (Requires top line to display entire number, total will flash when number overflows to top line)	R mAOUT	Display the current mA output value
INITIAL	Set the total to start at a specific number	MENU FN	Set the function key or digital input to access a menu
RESET	Enable or disable the ability to reset the grand total	RLYINFO	Go to relay information menu (INFO)
ENABLE	Enable grand total reset (default)	MANCTRL	Go to output control menu (CONTROL)
DISABLE	Disable grand total reset	TIMERFN	Set the function key or digital input to start or stop a timer
CUTOFF	Set low-flow cutoff	STARTALL	Start all timers
DISABLE	Disable low-flow cutoff	STOPALL	Stop all timers
ENABLE	Enable low-flow cutoff	SSTPALL	Start or stop all timers
FILTER	Set noise filter value	OC 1	Start/stop open collector 1 timer
20 SEC	2 seconds	OC2	Start/stop open collector 2 timer
40 SEC	4 seconds	RLY 1	Start/stop relay 1 timer
80 SEC	8 seconds	RLY2	Start/stop relay 2 timer
160 SEC	16 seconds	START	Start the selected timer output
OFF	Turn filter off	STOP	Stop the selected timer output
10 SEC	1 second	STR-STP	Start or stop the selected timer output
PASSWORD	Set a password for the meter	BATCHFN	Set the function key or digital input to batch control
MAIN	Program the main meter password	START	Start a batch
TOTAL	Program the total reset password	STOP	Stop a batch
GTOTAL	Program the grand total reset password	STR-STP	Start or stop a batch
USER	Assign function keys and digital input	PRESET	Preset batch amount
F 1	Assign F1 function key	ALARMFN	Set the function key or digital input to acknowledge an alarm
F 2	Assign F2 function key	ACK	Acknowledge all active alarms
F 3	Assign F3 function key	HOLD FN	Set the function key or digital input to hold an output
		HOLDOUT	Hold all outputs
		HL UNHLD	Hold or un-hold all outputs

Parameter	Action/Setting Description	Parameter	Action/Setting Description
OC 1+2	Hold/un-hold open collector outputs	COMMA	Enable or disable the use of a comma to separate the thousands place on the bottom display
RLY 1+2	Hold/un-hold relay outputs	ENABLE	Enable comma (default)
mROUT	Hold/un-hold 4-20 mA output	DISABLE	Disable comma
HOLD	Hold selected output	TOP	Set what to display on the top line
HL UNHLD	Hold or un-hold selected output	RATE	Display the rate
DISABLE	Disable the function key or digital input	RATE+U	Display the rate and its units alternating
RST FN	Set the function key or digital input to reset a value	TOTAL	Display the total
RESET	Reset min, max, or max/min PV value	TOTAL+U	Display the total and its units alternating
R MINMAX	Reset max and min PV value	TAG	Display the tag
RST T	Reset the total	UNITS	Display the units
RST GT	Reset the grand total	PRESET	Display the preset value
RST TGT	Reset the total and grand total	BOTTOM	Set what to display on the bottom line
HINT	Display hint text on first key press and execute action on second key press	TOTAL	Display the total
OFF	Turn the hint function off	TOTAL+U	Display the total and its units alternating
ON	Turn the hint function on	TOT+TAG	Display the total and its tag alternating
SYSTEM	Program system settings	T+U+RU	Display the total, its units, and the rate units alternating
ROUTCAL	Calibrate the analog output	GTOTAL	Display the grand total
DEFAULT	Reset meter to factory defaults	GT+UNITS	Display the grand total and its units alternating
TOTAL	Enable or disable the totalizer	GT+TAG	Display the grand total and its tag alternating
ENABLE	Enable the totalizer (Default)	GT+U+RU	Display the grand total, units, and rate units alternating
DISABLE	Disable the totalizer (see PD6602 manual)	RATE	Display the rate
BACKLITE	Enable or disable the display backlight	RATE+TU	Display the rate and the total's units alternating
ENABLE	Enable the backlight (default)	RATE+U	Display the rate and its units alternating
DISABLE	Disable the backlight	RATE+TAG	Display the rate and its tag alternating
INFO	View meter software, version, and model, and change the meter identifier tag	R UNITS	Display the rate units
SFT	The software ID number	T UNITS	Display the total units
VER	The software version	TAG	Display the tag
MODEL	The meter hardware model number	UNITS	Display the units
IDTAG	The meter identifier tag Press <b>Enter</b> to edit tag	PRESET	Display the preset value
ICAL	Internal calibration used for scaling	TAG+RU	Display the tag and rate units alternating
DISPLAY	Program the meter's display	TAG+TU	Display the tag and total units alternating
UNITS	Change the display units within the selected unit class	OFF	Disable the bottom display
DECPNT	Change the decimal point location	R PCT	Display the rates percentage of max (20 mA)
RATE	Program the rate decimal point	mA IN	Display the current mA input value
TOTAL	Program the total decimal point	mA OUT	Display the current mA output value
GTOTAL	Program the grand total decimal point		

## Main Menu

The main menu consists of all the meter's programmable functions: *Input*, *Output*, *Advanced*, and *Display*.

- Press **Menu** button to enter *Programming Mode* then press the **Right-Arrow** button to move forward through the menu and the **Up-Arrow** button to move back.
- Press **Menu** at any time to exit and return to *Run Mode*. Changes made to settings prior to pressing **Enter** are not saved.
- Changes to the settings are saved to memory only after pressing **Enter/F3** to confirm the setting or pressing **Enter/F3** at the **SAVE ?** screen when available.



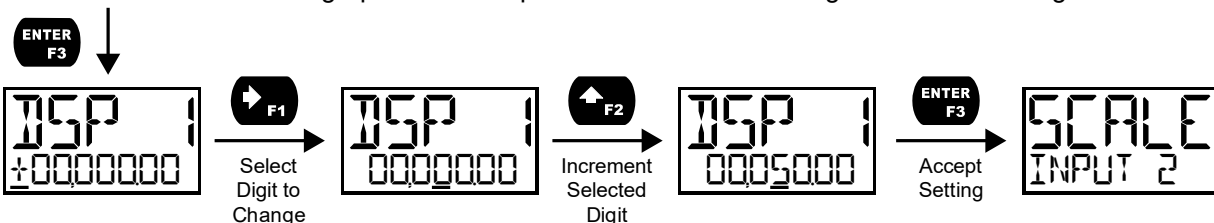
## Setting Numeric Values

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 selected digit will flash.

Press and hold **Up-Arrow** to auto-increment the display value. If you have made a mistake or would like to enter a new value, select the left-most digit and press and hold the **Right-Arrow** button until all digits reset to zero.

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

**Note:** the underscore in the graphic below is provided to show which digit would be flashing.



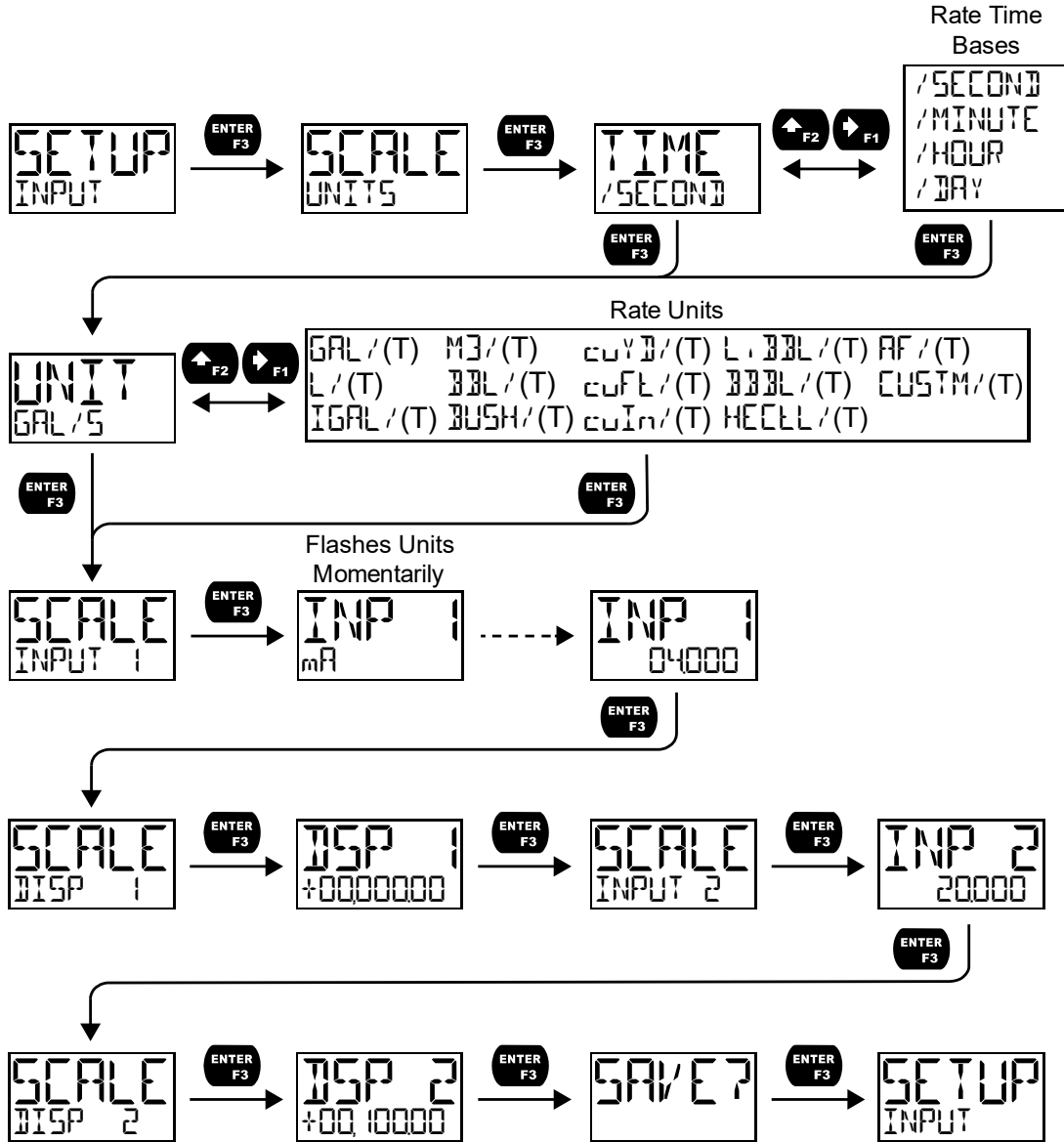


## Setting Up the Input Signal (INPUT)

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

- The meter is factory calibrated prior to shipment to display 0-100 gal/s, which corresponds to the 4-20 mA input. The calibration equipment is certified to NIST standards.
- A calibrated signal source is not needed to scale the meter.

Enter the *Input* menu to scale the meter to display the 4-20 mA input. The input is capable of accepting any signal from 4 to 20 mA.



### Available Unit Classes and Units

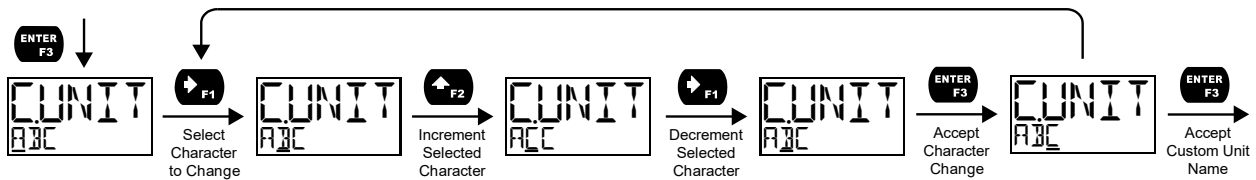
The meter has six available preprogrammed unit classes, *volume*, *height*, *temperature*, *pressure*, *weight*, and *rate*. Each unit class has the following available units to choose from:

Rate Time Bases (TIME)		Rate Units (RATE)	
/SECOND	Units per second	GAL / (T)	Gallons per time unit (T)
/MINUTE	Units per minute	L / (T)	Liters per time unit (T)
/HOUR	Units per hour	IGAL / (T)	Imperial gallons per time unit (T)
/DAY	Units per day	M <sup>3</sup> / (T)	Cubic meters per time unit (T)
		BARREL / (T)	Barrels per time unit (T)
		BUSH / (T)	Bushels per time unit (T)
		CY / (T)	Cubic Yards per time unit (T)
		CU FT / (T)	Cubic Feet per time unit (T)
		CU IN / (T)	Cubic Inches per time unit (T)
		L. BARREL / (T)	Liquid barrels per time unit (T)
		BEER BARREL / (T)	Beer barrels per time unit (T)
		HECTOL / (T)	Hectoliter per time unit (T)
		AF / (T)	Acre-Foot per time unit (T)
		CUSTOM /	Custom unit per time unit (T)

### Setting Custom Units (CUSTOM)

When the desired unit of measure is not available, a custom unit may be programmed. Select the CUSTOM menu in order to enter a custom unit name.

Text values are set using the **Right** and **Up-Arrow** buttons. Press **Right-Arrow** to select next character and **Up-Arrow** to increment character value. The selected character will flash. Press and hold the **Up** or **Right-Arrow** buttons to auto-increment or decrement the character. Press **Enter** to accept the character.



#### Notes:

- Press and hold the **Right Arrow** while no character is being edited to erase all characters to the right of the flashing character
- Press and hold **Up** or **Right Arrow** to auto-increment or decrement a selected character.
- All text values, including tags and alarm messages, are set in a similar fashion.

### Scaling the 4-20 mA Input

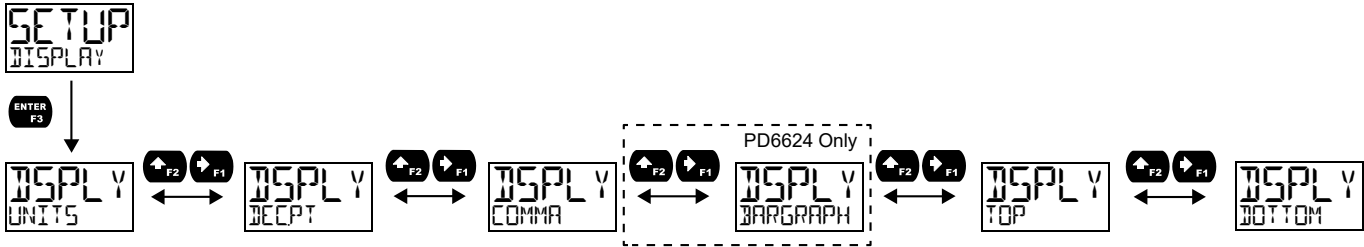
The 4-20 mA input can be scaled to the appropriate values for a given application. The 4-mA input (input 1) should have a corresponding display value (display 1) which represents the low end of the process value range being measured by the transmitter. Likewise, the 20-mA input (input 2) should have a display value (display 2) which represents the high end of the process value range.

**For example:** If the meter is setup to accept a 4-20 mA input and display the flow of a pipe whose rate of flow is between 0 and 100 gal/s, the transmitter would send a 4-mA signal when there is zero flow and a 20-mA signal when there is maximum flow. The meter should be programmed to interpret these inputs on a display range of 0-100, so that at 4-mA the meter will display 0 and at 20-mA the meter will display 100. Processes which require a non-linear scale can be accommodated using the linear (LINEAR), exponent (EXPONENT), and square root (SQROOT) functions available in the Advanced menu. See Signal Input Conditioning Functions (FUNCTION) on page 32.

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

## Setting the Display Features (DISPLAY)

The meter's display functions may be programmed using the *Display* menu. This menu consists of the following submenus: *Units*, *Decimal Point*, *Comma*, *Bargraph* (PD6624 Only), *Top*, and *Bottom*.



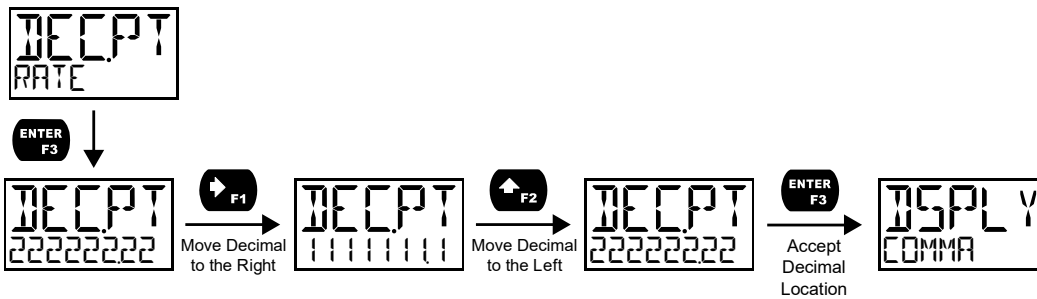
### Changing the Units (UNITS)

It is possible to change the display units without the need to re-scale the meter. When selecting a new unit from within the *DISPLAY* menu (e.g. changing from gallons/sec. (GAL/S) to liters/sec. (L/S)), the meter will automatically convert the display values to display the new unit. Enter the *UNITS* menu, select a new unit of measure from the list of predefined units, and press the **Enter** button. If entering a custom unit (CUSTOM), a custom conversion factor will need to be entered.

### Changing the Decimal Point Location (DECP)

The decimal point may be set with up to seven 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.

The decimal point location is set independently for the rate, total and grand total.



### Enabling or Disabling the Comma on the Bottom Display (COMMA)

The bottom display is set to show a comma separating the thousands and millions place by default if a numeric value is being displayed. This feature can be disabled or enabled using the *Comma* menu.

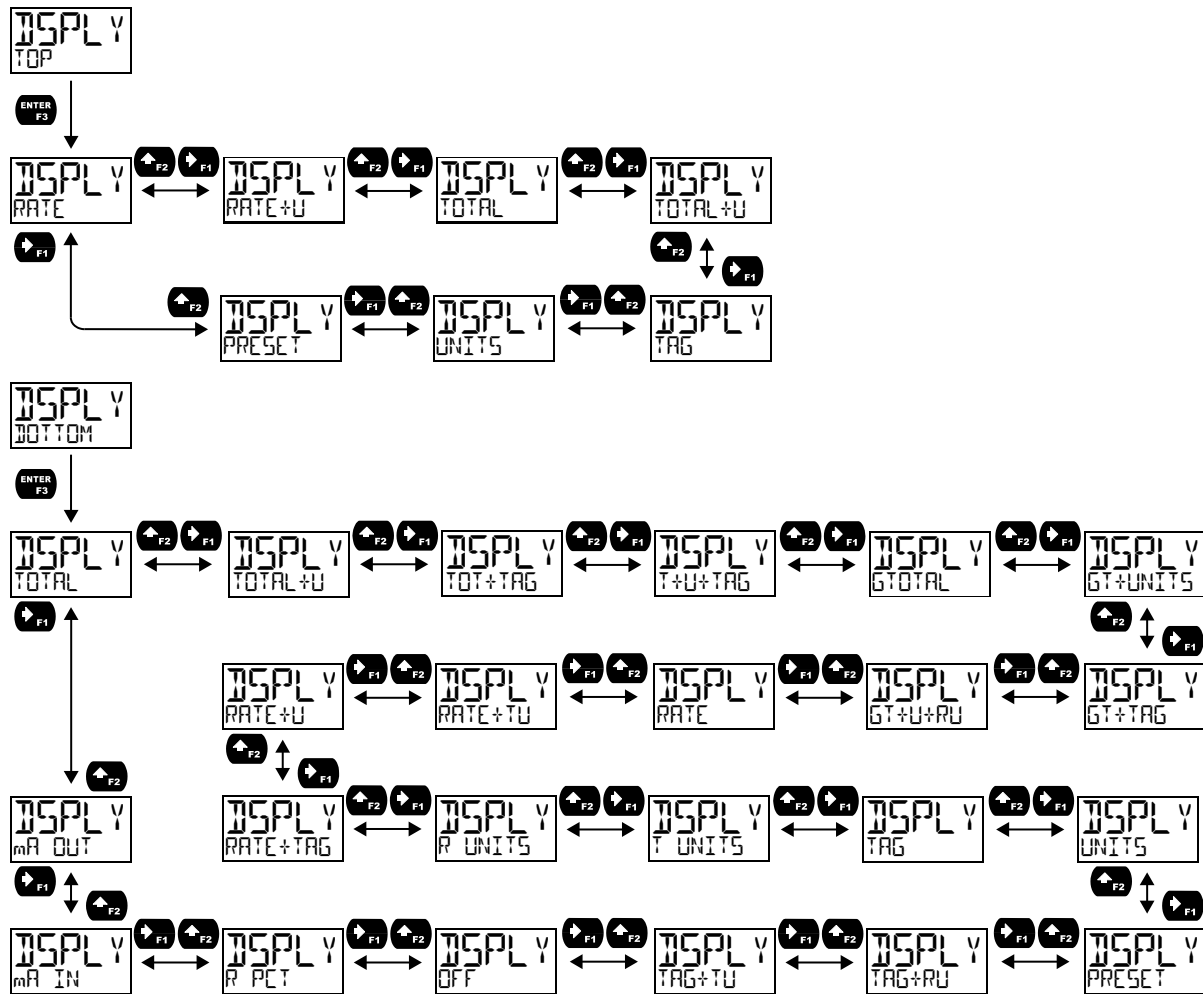
### Programming the Bargraph (PD6624 Only)

The PD6624 comes equipped with a bargraph display for applications where a visual representation of the rate or total's percentage of full scale is desirable. This feature can be changed to represent either rate, a percentage of the rate, or total, or disabled, using the *Bargraph* menu (BARGRAPH). If the bargraph is set to represent total, the total full scale will need to be set.



### Changing What is Displayed (TOP and BOTTOM)

The two display lines (*Top* and *Bottom*) can be programmed to display different values. Use the *Top* and *Bottom* menus to make these changes. If PV2 is enabled, additional options will be available for displaying the second PV on the bottom display.



The top display (TOP) can display:

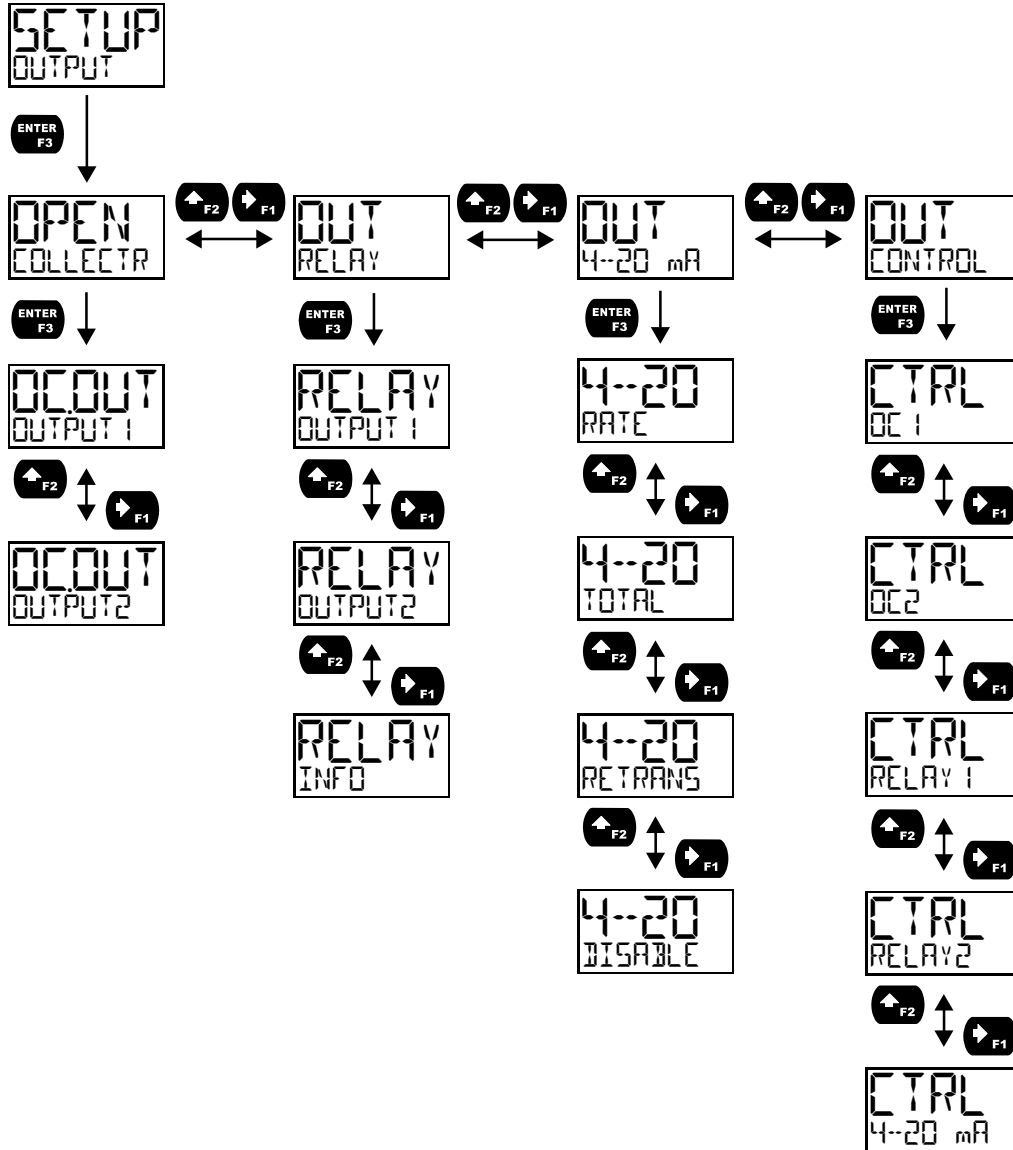
- Rate
- Rate and its units alternating
- Total
- Total and its units alternating
- Tag
- Units
- Preset batch value

The bottom display (BOTTOM) can display:

- Total (with units or tag alternating)
- Total, its units, and the rate units alternating
- Grand total (with units or tag alternating)
- Grand total, units, and rate units alternating
- Rate (with units or tag alternating)
- Rate and the total's units alternating
- Rate or total units
- Tag
- Units
- Preset batch value
- Tag and rate units alternating
- Tag and total units alternating
- Nothing
- Rate's percentage of max scale
- mA input value
- mA output value

## Programming the Outputs (OUTPUT)

Depending on the purchased model, the meter may be available with two open collector outputs, two solid state relays, and one 4-20 mA output. The *Output* menu will only show options for the available outputs. See Ordering Information on page 4 for details.



### Open Collector Outputs (OPEN COLLECTR)

The meter is equipped with two NPN open collector outputs that may be set up for pulse outputs, alarms, timed pulses, total reset, or turned off.

Pulse outputs can be set to transmit the rate, total, or grand total. Output 2 may be used to generate a quadrature output based on the other open collector output. An output test mode is also selectable to generate pulses at a constant programmable frequency.

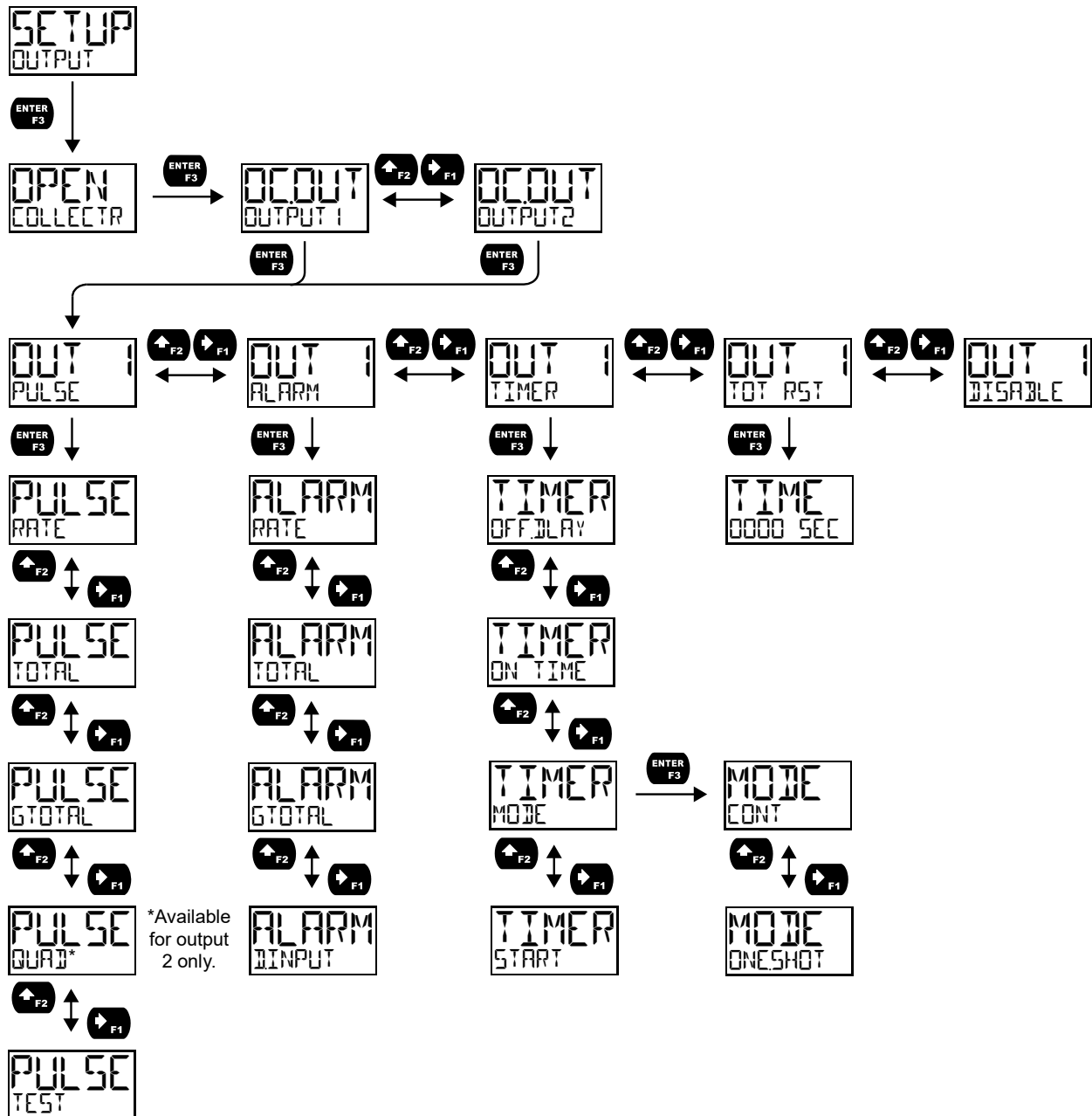
Alarms are available based on the PV value or the digital input. The alarm status will show on the display even if the output is not wired.

A timer output turns the open collector on and off at a specified frequency to act as a timer.

A total reset output generates a pulse whenever the total is reset, regardless of the reset method used.

The On time is programmable between 0 and 9,999 seconds.

The output may be disabled by selecting **DISABLE**.

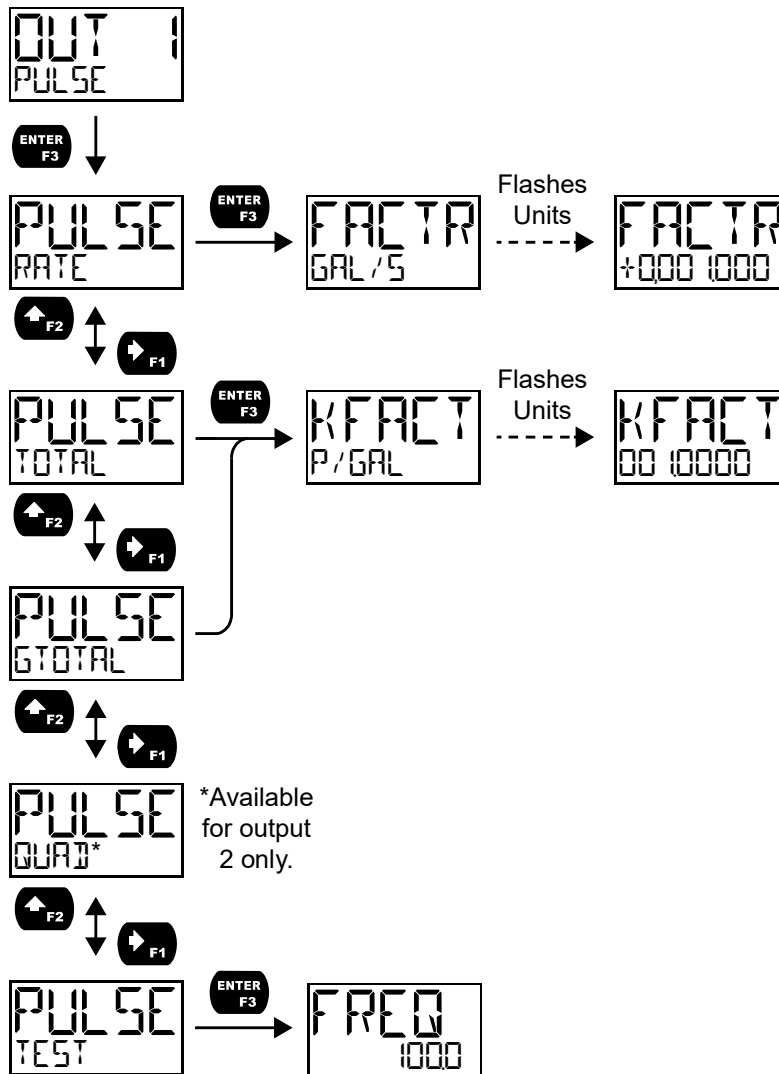


### Pulse (PULSE)

Pulse outputs may be assigned to output the rate, total, or grand total at a programmable factor. The factor determines the number of pulses per second which should be generated per unit of measure. For example, if the meter display shows 100 gallons and the factor is set to 2, the number of pulses generated per second would be 200. The maximum frequency is 250 Hz.

Setting output 2 to quadrature will duplicate the other open collector output, but lag by 90 degrees out of phase. The other output should be programmed as desired for the quadrature output function, and must be a pulse (PULSE) output selection. The quadrature maximum frequency for both outputs is 125 Hz.

The TEST option will output a fixed number of pulses per second based on the FREQ value entered.



### Alarm (ALARM)

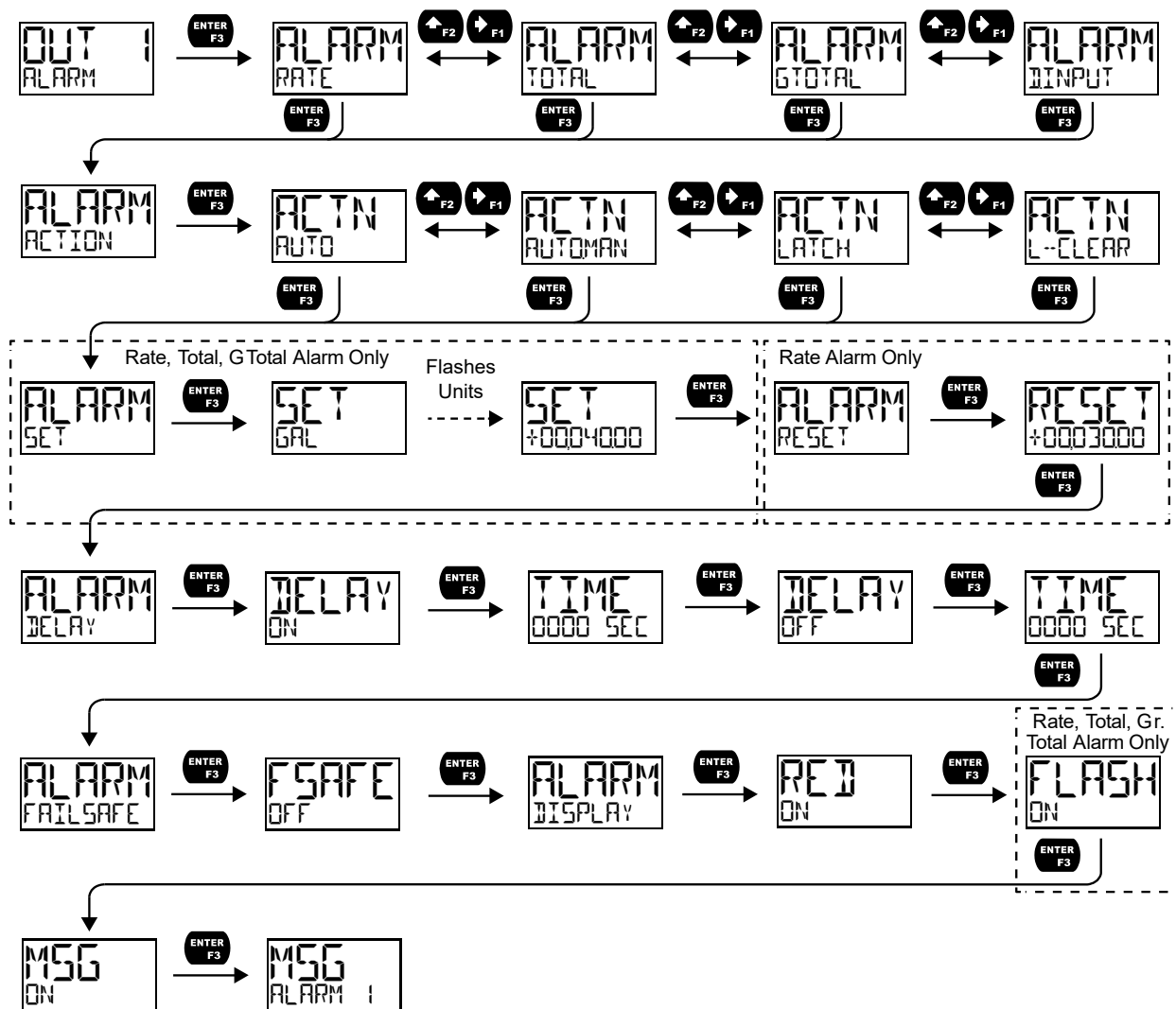
Alarm outputs may be assigned to the rate, total, grand total, or the digital input. When assigned to the rate, the alarm may be set as either a high alarm or a low alarm. Alarm actions (AUTO, AUTOMAN, LATCH, L--CLEAR) determine how and when the alarm should be reset. They operate as follows:

- **Automatic (AUTO):** Alarm will reset automatically once the alarm condition has cleared.
- **Automatic/Manual (AUTOMAN):** Alarm will reset automatically once the alarm condition has cleared but can also be reset using the **Enter** button (or whichever function key is set to acknowledge).
- **Latching (LATCH):** Alarm will **not** reset automatically even if the alarm condition is cleared. Press the **Enter** button at any time to clear the alarm.
- **Latching w/ Clear (L--CLEAR):** Alarm will **not** reset automatically. Press the **Enter** button **once the alarm condition has cleared** to reset the alarm.

If the alarm is set to rate, a set and reset point must be programmed. The set point is the display value at which the alarm will turn on and the reset point is the display value at which the alarm will turn off. If the set point is lower than the reset point, the alarm will be a low alarm; if the set point is higher than the reset point, the alarm will be a high alarm. If the alarm is set to total or grand total, only a set point needs to be programmed. The digital input alarm will engage whenever the digital input is triggered.

For all alarms, a delay before the alarm is turned on or off may be set, as well as a failsafe feature which will inverse the on/off programming.

Alarm states will be displayed on the meter even if no open collector output is physically connected. The alarm indicator (!) will display as well as optional red LED backlight, flashing rate, total, or grand total value (rate, total, or grand total alarms only), and a programmable alarm message.





### Timer (TIMER)

The timer output produces a constant width pulse at a constant frequency. Program the *Off Delay* (OFF\_DELAY) from 1 second to 99 hours 59 minutes and 59 seconds. This is the time it takes from selecting START to turning on the output and for how long the output is off in continuous mode.

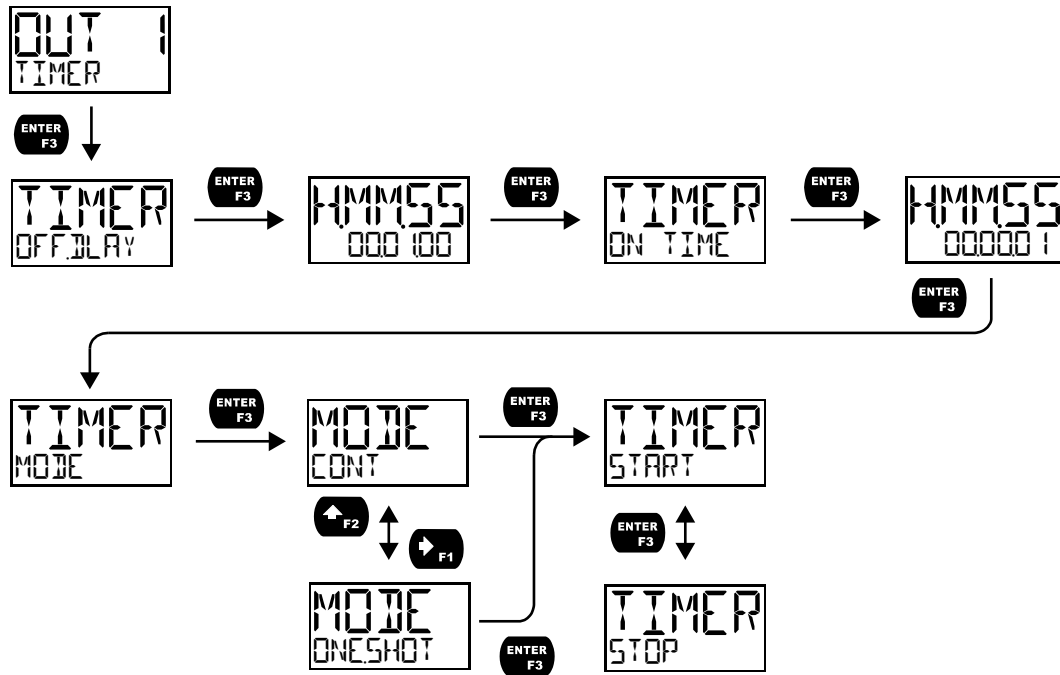
Program the *On Time* (TIME) for the active low pulse from 1 second to 99 hours 59 minutes and 59 seconds (pulse width). This is the period of time for which the output will remain on.

The timer output may be set to generate the timed pulse only once (ONESHOT) or continuously (CONT).

Select *Start* (START) to begin outputting the constant timed pulse.

Select *Stop* (STOP) to end outputting the constant timed pulse.

Function keys or the digital input may be assigned to start and stop timer functions (see the USER menu in *Advanced*).



### Solid State Relay Outputs (RELAY)

The meter is optionally equipped with two solid state relays that may be set up for alarms, sample, timer, or batch control. Alternatively, they may be disabled.

Alarms are available based on the rate, total, or grand total value, or the digital input. The alarm status will show on the display even if the output is not wired.

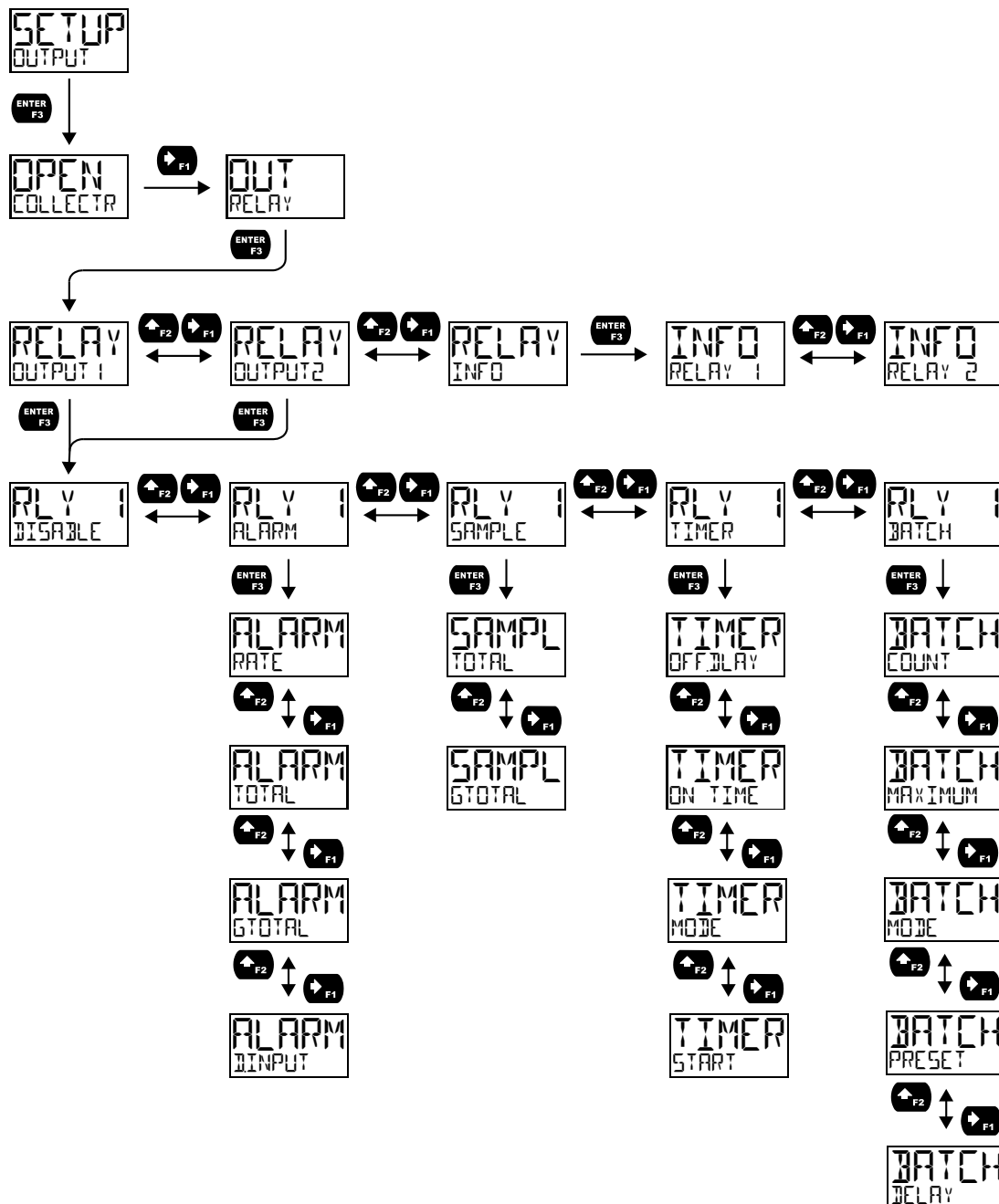
Sample will engage the relay for a programmed period of time when either the total or the grand total have reach a programmed amount.

A timer output turns the relay on and off at a specified frequency to act as a timer.

For use in batch control applications, the meter relays may be set to batch. This will enable the batch control features of the meter.

The output may be disabled by selecting `DISABLE`.

**Caution!** *During setup, the relays do not follow the input and they will remain in the state found prior to entering the Relay menu.*



### Alarm (ALARM)

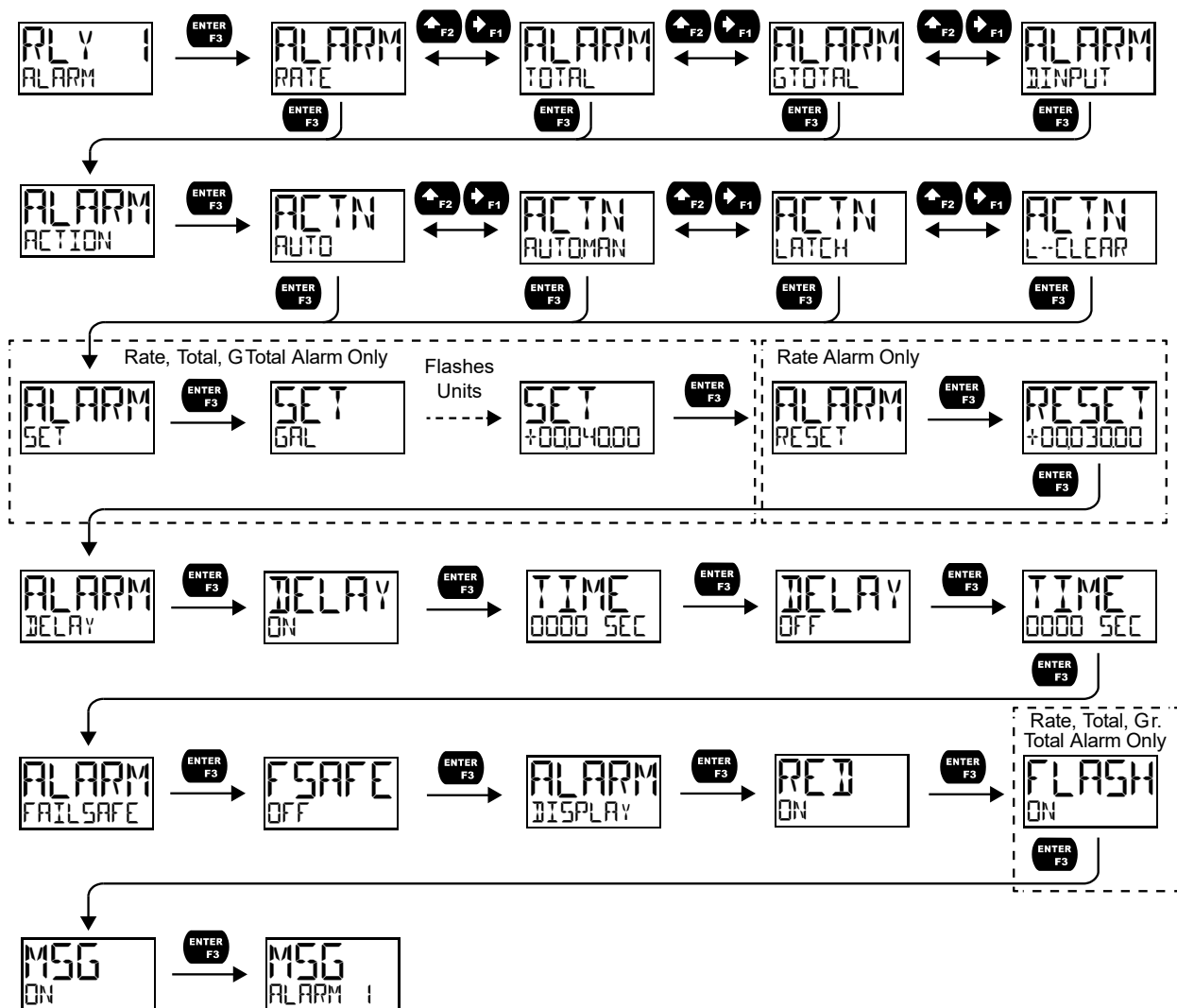
Alarm outputs may be assigned to the rate, total, or grand total values, or the digital input. When assigned to the rate, the alarm may be set as either a high alarm or a low alarm. Alarm actions (AUTO, AUTOMAN, LATCH, L--CLEAR) determine how and when the alarm should be reset. They operate as follows:

- **Automatic (AUTO):** Alarm will reset automatically once the alarm condition has cleared.
- **Automatic/Manual (AUTOMAN):** Alarm will reset automatically once the alarm condition has cleared but can also be reset using the **Enter** button (or whichever function key is set to acknowledge).
- **Latching (LATCH):** Alarm will **not** reset automatically even if the alarm condition is cleared. Press the **Enter** button at any time to clear the alarm.
- **Latching w/ Clear (L--CLEAR):** Alarm will **not** reset automatically. Press the **Enter** button **once the alarm condition has cleared** to reset the alarm.

If the alarm is set to rate, a set and reset point must be programmed. The set point is the display value at which the alarm will turn on and the reset point is the display value at which the alarm will turn off. If the set point is lower than the reset point, the alarm will be a low alarm; if the set point is higher than the reset point, the alarm will be a high alarm. If the alarm is set to total or grand total, only a set point needs to be programmed. The digital input alarm will trigger whenever the digital input is triggered.

For all alarms, a delay before the alarm is turned on or off may be set, as well as a failsafe feature which will inverse the on/off programming.

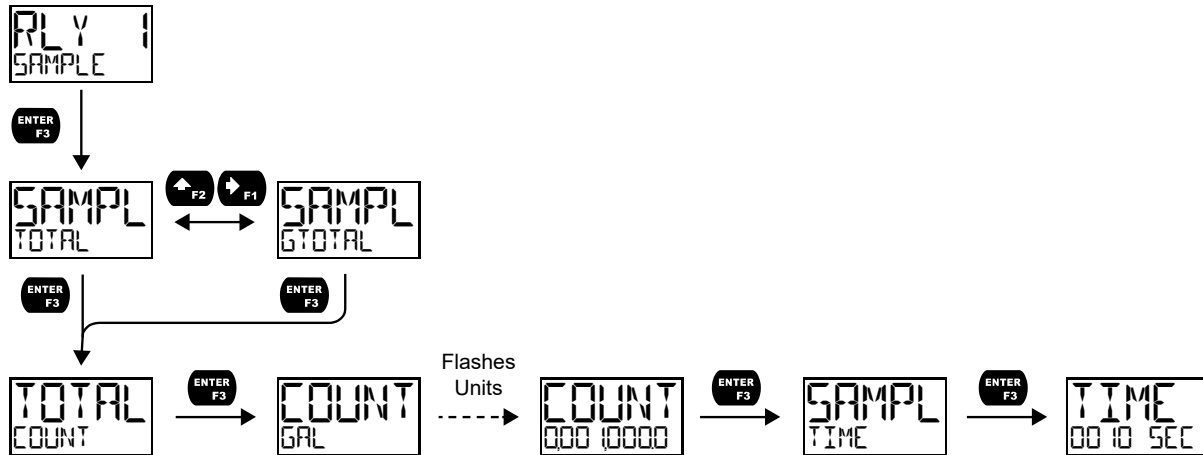
Alarm states will be displayed on the meter even if no relay output is physically connected. The alarm indicator (!) will display as well as optional red LED backlight, flashing rate, total, or grand total value (rate, total, or grand total alarms only), and a programmable alarm message.



### Sample (SAMPLE)

A relay set to sample will trigger when the total or grand total value has incremented by a programmed amount. The relay can be programmed to stay on for a specified amount of time.

**For example:** if a relay is set to sample the total with a `COUNT` of 1,000 and a `TIME` of 10 seconds, the relay will engage for 10 seconds whenever the total has incremented by 1,000 (e.g. 1000, 2000, 3000).



### Timer (TIMER)

The timer output produces a constant width pulse at a constant frequency. Program the *Off Delay* (`OFF_DELAY`) from 1 second to 99 hours 59 minutes and 59 seconds. This is the time it takes from selecting `START` to turning on the output and for how long the output is off in continuous mode.

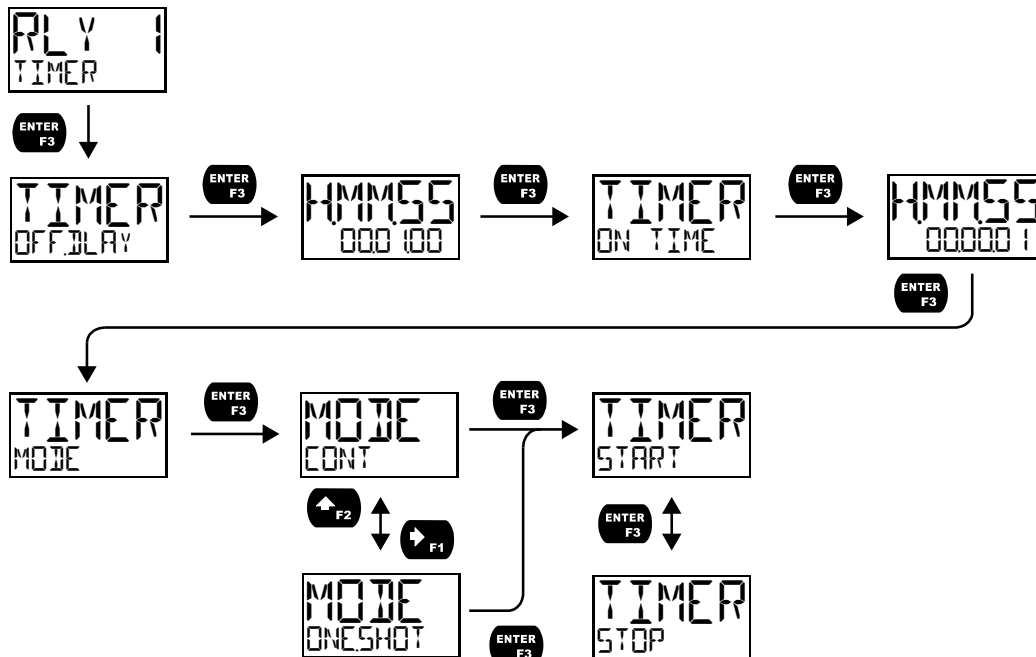
Program the *On Time* (`TIME`) for the active low pulse from 1 second to 99 hours 59 minutes and 59 seconds (pulse width). This is the period of time for which the output will remain on.

The timer output may be set to generate the timed pulse only once (`ONESHOT`) or continuously (`CONT`).

Select *Start* (`START`) to begin outputting the constant timed pulse.

Select *Stop* (`STOP`) to end outputting the constant timed pulse.

Function keys or the digital input may be assigned to start and stop timer functions (see the `USER` menu in *Advanced*).

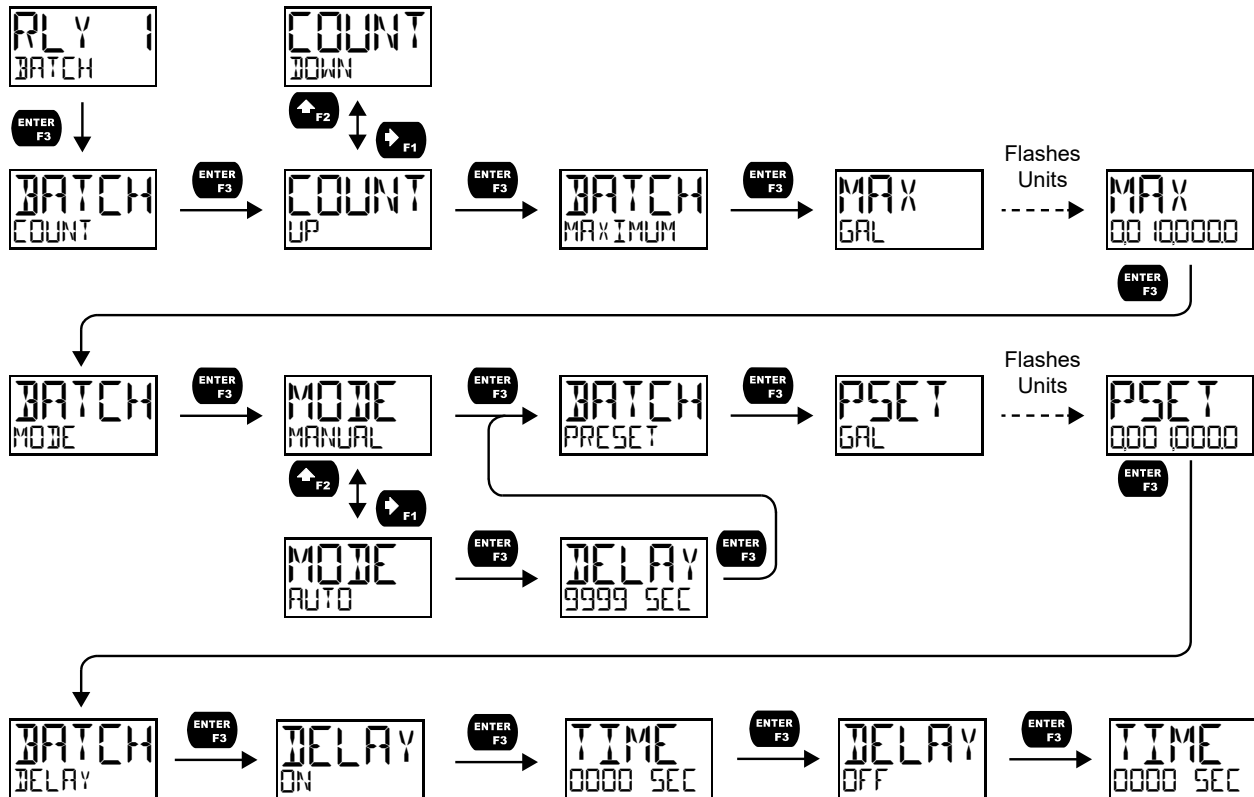


### Batch Control (BATCH)

Selecting batch control for relay 1 will enable batching features on the meter. The top display will be changed to show the total and the bottom display will be changed to display the preset batch amount. The function keys will be changed so that F1 starts a batch, F2 opens the preset menu to allow the preset value to be changed, and F3 stops the currently running batch. Enabling batch control for relay 1 will allow access to the BATCH menu under relay 2 (this menu does not appear by default).

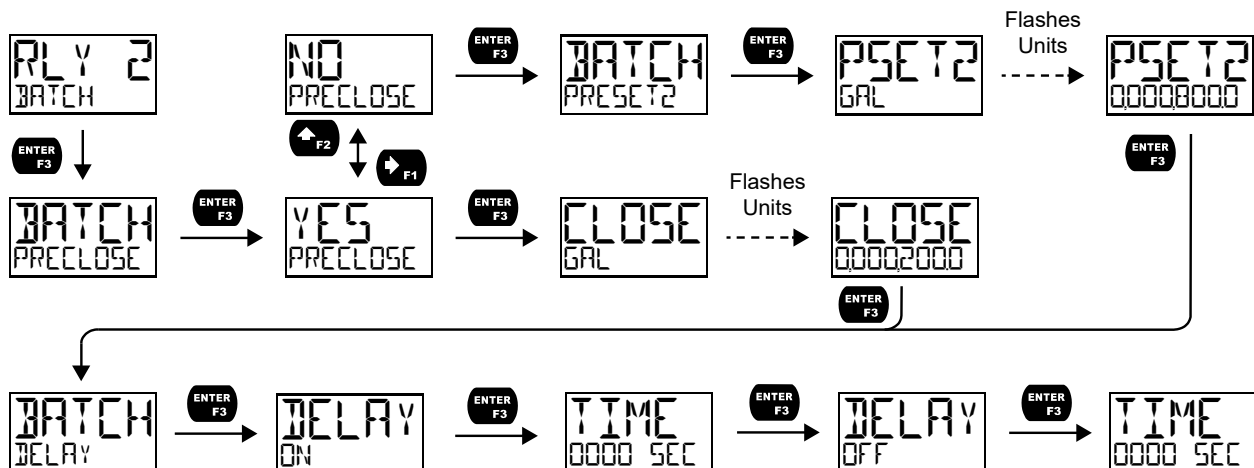
#### Batch Control Relay 1

The batch total can be set to count UP or DOWN. The batch MAXIMUM is the max preset amount that can be batched. Batching can be set to either manual or automatic operation (MANUAL or AUTO). If setting batching to automatic, a delay before the next batch is started must be programmed. The PRESET amount is the value at which the batch will stop and can be programmed up to the value assigned in the MAXIMUM menu. An on and off delay may be set for batching relays.



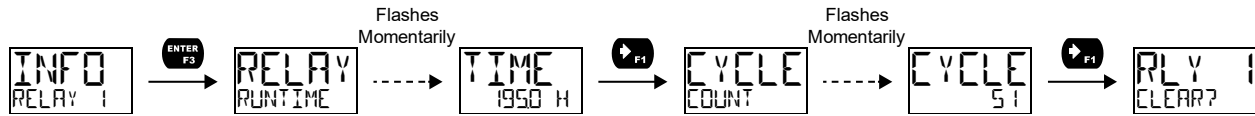
#### Batch Control Relay 2

The BATCH option only appears under relay 2 if relay 1 has also been set to batch control. The second relay may be programmed as a preclose relay or as another batching relay with its own preset amount.



### Relay Information (INFO)

The relay information menu shows run times and cycle counts for each relay. These values may be cleared at any time by selecting the *Clear* option (CLEAR?).



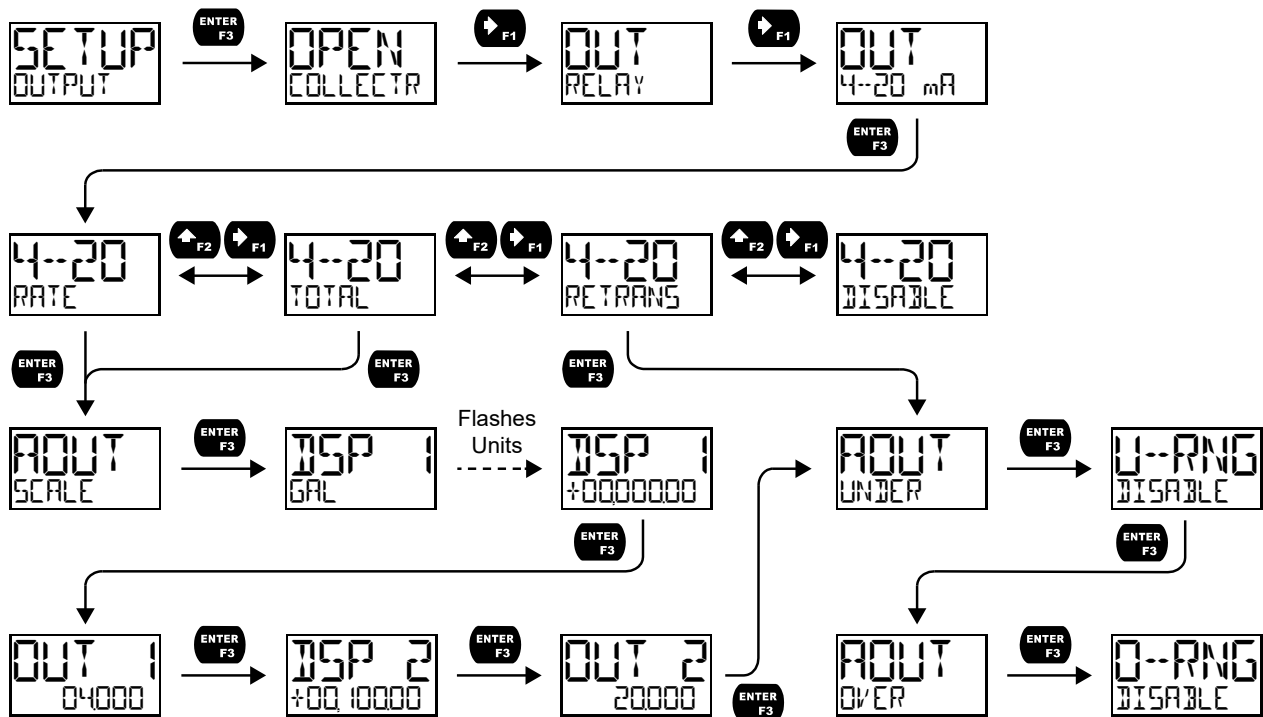
### 4-20 mA Output (4--20 mA)

The 4-20 mA menu is used to scale the 4-20 mA output based on display values. This menu is not present on models without a 4-20 mA output option.

The 4-20 mA analog output (if equipped) can be scaled to provide a 4-20 mA signal for the rate or total display range or to simply retransmit the 4-20 mA input. The output may be disabled (DISABLE), and will only output the minimum signal.

Overrange and underrange values determine what mA signal the meter will output if the mA input is underrange (<3.5 mA) or overrange (>20.5 mA). This value may be set to 1-mA, 3.5-mA, 3.8-mA, 20.5-mA, 20.8-mA, 23-mA, or disabled.

No equipment is needed to scale the analog output; simply program two display values and corresponding mA output signals.



### Rate or Total (RATE or TOTAL)

To scale the analog output, enter display value 1 and a corresponding analog output value for this display, then enter display value 2 and a corresponding analog output value for this display value. This will provide a linearly scaled analog output.

### Retransmit (RETRANS)

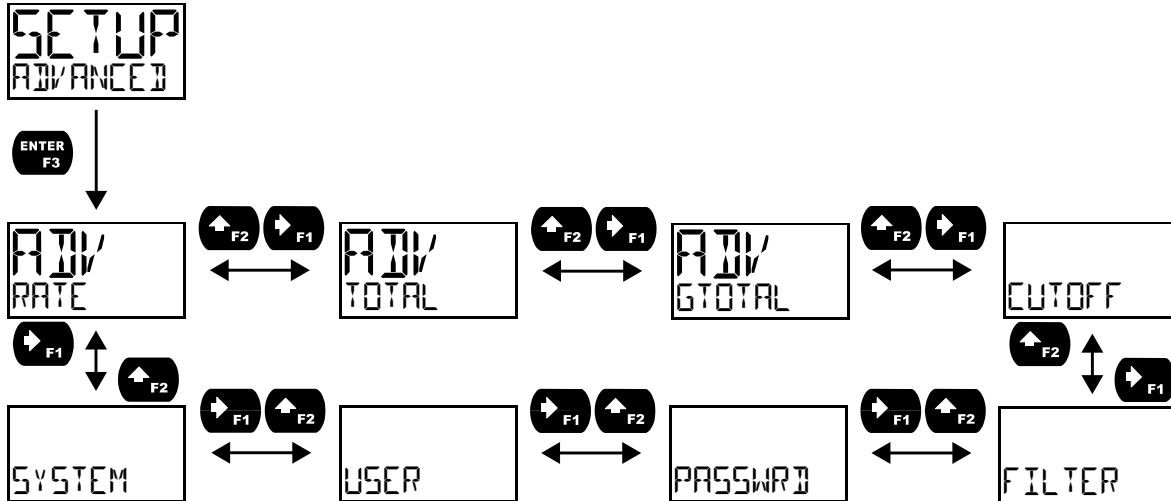
This option will retransmit the 4-20 mA analog input without the need to scale the output.

### Output Control (CONTROL)

The *Control* menu is used to control the open collector outputs, 4-20 mA analog output, or the relays manually, ignoring the input. Each open collector, relay, and analog output can be programmed independently for manual control. Selecting automatic control sets all relays and analog output for automatic operation.

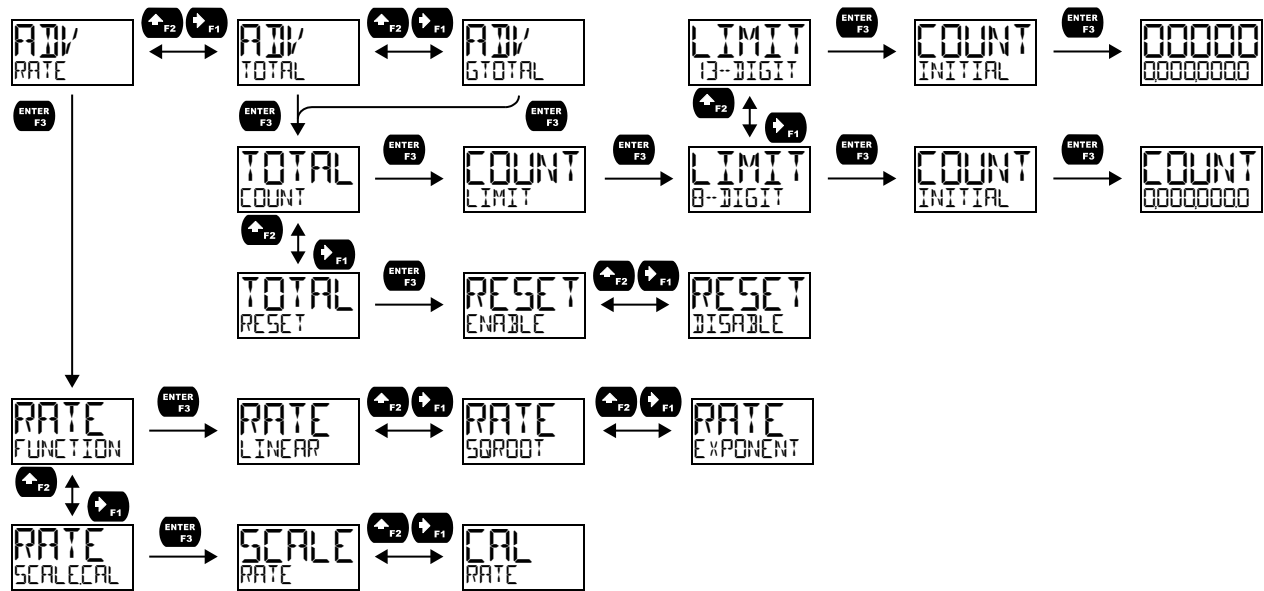
## Advanced Features Menu (ADVANCE)

To simplify the setup process, functions not needed for most applications are located in the *Advanced Features* menu. The options under advanced features include: *advanced rate, total, and grand total setup, cutoff, filter, password, function key programming, and system settings.*



### Advanced Rate, Total, and Grand Total Setup (ADV RATE, TOTAL, GTOTAL)

The *Advanced Rate* menu contains options to apply signal input conditioning functions to the input and scale/calibrate the input signal. The *Advanced Total* and *Advanced Grand Total* menus contain options to change how the value is incremented and if it can be manually reset by the user.



## Signal Input Conditioning Functions (FUNCTION)

The *Function* menu is used to select the signal input conditioner applied to the input: linear, square root, or programmable exponent calculation. Multi-point linearization is part of the linear function selection. Meters are set up at the factory for linear function with 2-point linearization. The linear function provides a display that is linear with respect to the input signal.

### Square Root Linearization (SQROOT)

The square root function can be used to linearize the signal from a differential pressure transmitter and display flow rate in engineering units.

### Programmable Exponent Linearization (EXPONENT)

The programmable exponent can be used to linearize the signal from level transmitters in open-channel flow applications using weirs and flumes.

### 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 the scaled value under the linear function. Multi-point linearization can be used to linearize the display for non-linear signals to convert level to flow using weirs and flumes with complex exponent.

## Advanced Total and Grand Total Programming (ADV TOTAL & ADV GTOTAL)

The advanced total and grand total menu contain the count (COUNT) and reset (RESET) menus. The count menu allows the digit limit to be selected between 8-digit (bottom line only) and 13-digit (uses top and bottom line to display full number) and an initial value at which the total or grand total should begin counting to be set.

When using a 13-digit total or grand total, press the function key assigned to display (default: F1) to view the full amount once the value has exceeded 100,000,000 (decimal places are automatically truncated). If a 13-digit total or grand total is displayed on the bottom line and the value has exceeded nine digits, the truncated value will flash to indicate that it is not the complete value.

The reset menu allows the resetting of total or grand total to zero to be enabled or disabled. Grand total reset may be permanently disabled by selecting YES at the PERMLOCK menu after disabling grand total reset. **Use caution** when selecting the PERMLOCK feature as once grand total reset has been permanently locked it cannot be unlocked.

## Advanced Scaling and Calibration (SCALECAL)

This menu offers options to scale or calibrate the meter.

### Scaling the Input (SCALE)

The scale menu in the *Advanced* menu is the same as the scale menu in the *Input* menu. See Setting Up the Input Signal (INPUT) on page 17 for details about scaling the meter.

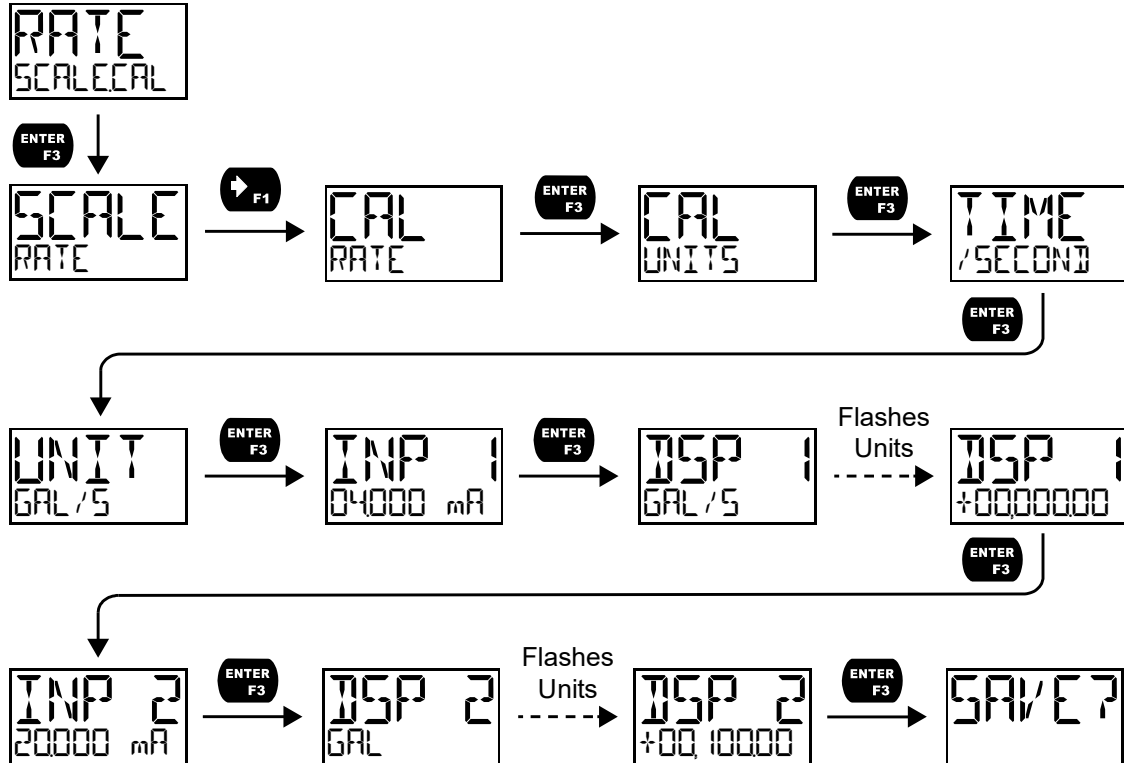


### Calibrating the Input (CAL)

To scale the meter without a signal source, refer to Setting Up the Input Signal (INPUT), page 17.

The meter can be calibrated to display the process in engineering units by applying the appropriate input signal and following the calibration procedure. The CAL menu should be used with a live signal coming from a 4-20 mA transmitter connected to the process being measured.

During calibration, the mA input value will be displayed as INP 1 and INP 2. Adjust the input source until the desired mA value is shown. The use of a calibrated signal source is strongly recommended.



1. After accessing the SCALECAL menu, press the **Right-Arrow** button to scroll to the Calibration menu (CAL RATE) and press **Enter**.
2. Select the appropriate units for the desired process variable, then press **Enter**. For information on units, see Available Unit Classes and Units on page 18.
3. The meter displays INP 1. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
4. After the signal is accepted, the meter displays DISP 1. Enter a corresponding display value for the signal input, and press **Enter** to accept.
5. The meter displays INP 2. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
6. After the signal is accepted, the meter displays DISP 2. Enter a corresponding display value for the signal input and press **Enter** to accept.
7. After completing calibration, the SAVE? display will need to be acknowledged using the **Enter** key before calibration will take effect.

### Low-Flow Cutoff (CUTOFF)

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

The cutoff value may be programmed from 0 to 999999.9. The meter will display zero below the cutoff value. The cutoff may also be disabled.

### Noise Filter (FILTER)

The noise filter is available for unusually noisy signals that cause an unstable process variable display.

The noise filter averages the input signal over a certain period. The filter level determines the length of time over which the signal is averaged. The filter level can be set between 1 and 16 seconds, or turned off. The higher the filter level, the longer the averaging time and so the longer it takes the display to settle to its final value. Setting the filter level to zero disables the filter function.

### Noise Filter Bypass (BYPASS)

The noise filter bypass changes the behavior of the meter so that small variations in the signal are filtered out but large abrupt changes in the input signal are displayed immediately. The bypass value determines the minimum amount of signal change to be displayed immediately. All signal changes smaller than the bypass value are filtered or averaged by the meter. The noise filter bypass may be set between 0.0 and 99.9% of full scale.

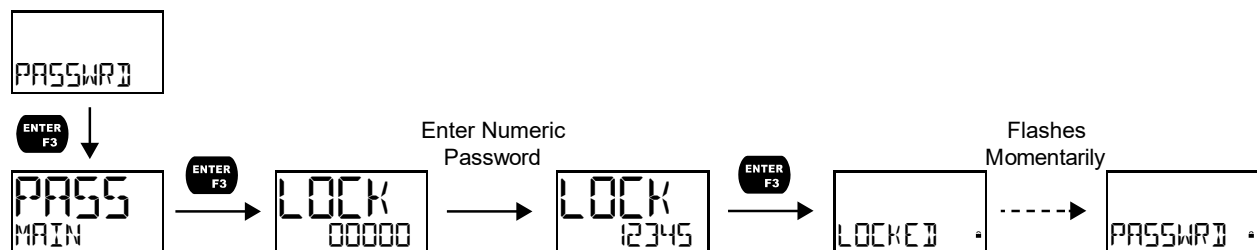
### Enabling Password Protection (PASSWORD)

The *Password* menu is used for programming security to prevent unauthorized changes to the programmed parameter settings. There are three password types available: *Main*, *Total*, and *Grand Total*.

The *Main* password prevents access to the meter *Programming Mode*. *Total* and *Grand Total* passwords prevent resetting of and changes to the total and grand total, respectively.

In order to set a password, enter the *Password* menu and program a five-digit password. When the *Main* password has been enabled, the lock icon will display in the lower right of the display.

For instructions on how to program numeric values see *Setting Numeric Values*, page 16.



### Making Changes to a Password Protected Meter

If the *Main* password is enabled, the meter will display the message `LOCKED` when the *Menu* button is pressed. If the *Total* or *Grand Total* passwords are enabled, the meter will display the message `LOCKED` when trying to reset or change the total or grand total. Press the *Enter* button while the message is being displayed and enter the correct password to gain access to the menu. After exiting *Programming Mode*, the meter returns to its password protected condition.

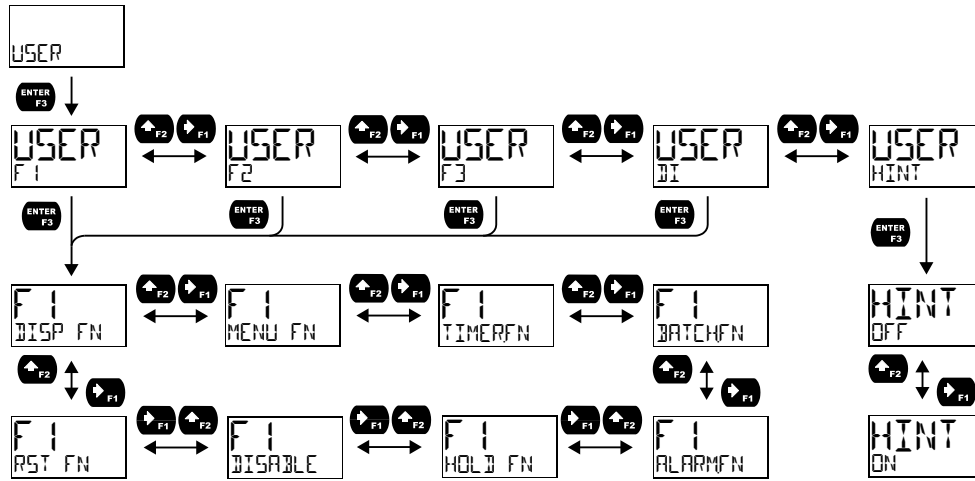
### Disabling Password Protection

To disable the *Main*, *Total*, or *Grand Total* passwords, access the *Password* menu and clear the desired password either by pressing and holding the **Right Arrow** button until all digits reset to zero or manually changing all of the digits to zero. When the **Enter** button is pressed, the meter will display `UNLOCKED` and will no longer require a password to access *Programming Mode*, or a password to reset or change the total or grand total, depending on which password was cleared.

**Note:** If the meter is password protected and the password has been forgotten, the password may be overridden using the master password: **50865**

### Programmable Function Keys User Menu (USER)

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



### Function Keys & Digital Input Available Settings

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

Display	Description	Display	Description
DISP FN	Set the function key or digital input to display a value	RLY2	Start/stop relay 2 timer
DISPLAY	Cycle max, min, rate, total, and grand total	START	Start the selected timer output
DISP RATE	Display the rate	STOP	Stop the selected timer output
DISP TOTAL	Display the total	STR--STP	Start or stop the selected timer output
DISP GT	Display the grand total	BATCHFN	Set the function key or digital input to batch control
PCTRATE	Display the rate's percentage of max (20 mA)	START	Start a batch
DISP UNITS	Display rate, total, and grand total units	STOP	Stop a batch
DISP TAG	Display the tags	STR--STP	Start or stop a batch
DISP MIN	Display the minimum rate value	PRESET	Preset batch amount
DISP MAX	Display the maximum rate value	ALARMFN	Set the function key or digital input to acknowledge an alarm
MIN MAX	Display the minimum and maximum rate value	ACK	Acknowledge all active alarms
DISP mA IN	Display the current mA input value	HOLD FN	Set the function key or digital input to hold an output
DISP mA OUT	Display the current mA output value	HOLD OUT	Hold all outputs
MENU FN	Set the function key or digital input to access a menu	HL UNHLD	Hold or un-hold all outputs
RLY INFO	Go to relay information menu (INFO)	OC 1+2	Hold/un-hold open collector outputs
MAN CTRL	Go to output control menu (CONTROL)	RLY 1+2	Hold/un-hold relay outputs
TIMER FN	Set the function key or digital input to start or stop a timer	mA OUT	Hold/un-hold 4-20 mA output
START ALL	Start all timers	HOLD	Hold selected output
STOP ALL	Stop all timers	HL UNHLD	Hold or un-hold selected output
SSTP ALL	Start or stop all timers	DISABLE	Disable function key or digital input
OC 1	Start/stop open collector 1 timer	RST FN	Set the function key or digital input to reset a value
OC 2	Start/stop open collector 2 timer	RESET	Reset min, max, or max/min PV value
RLY 1	Start/stop relay 1 timer	R MINMAX	Reset max and min PV value
		RST T	Reset the total
		RST GT	Reset the grand total
		RST TGT	Reset the total and grand total

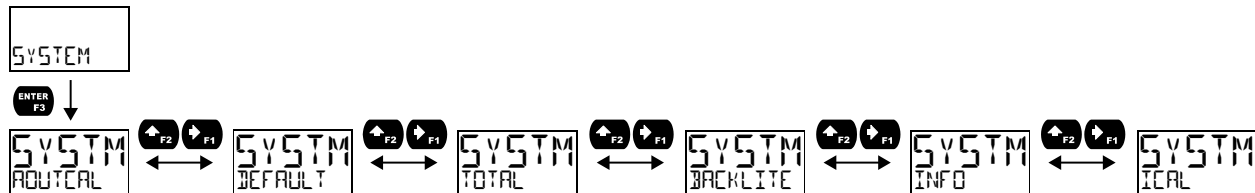
### Enabling the Function Key Hint Feature (HINT)

Enabling the function key hint feature will cause a hint message to be displayed when pressing the F1, F2, or F3 function keys. This text gives a brief description of what the button is programmed to do. Pressing that function key a second time will execute that action.

The hint feature does not affect the digital input (DI) which is intended for immediate execution.

### Changing System Settings (SYSTEM)

The System menu contains the following menus: *Analog Output Calibration, Restore Factory Defaults, Totalizer, Backlight, Information, and Internal Calibration.*

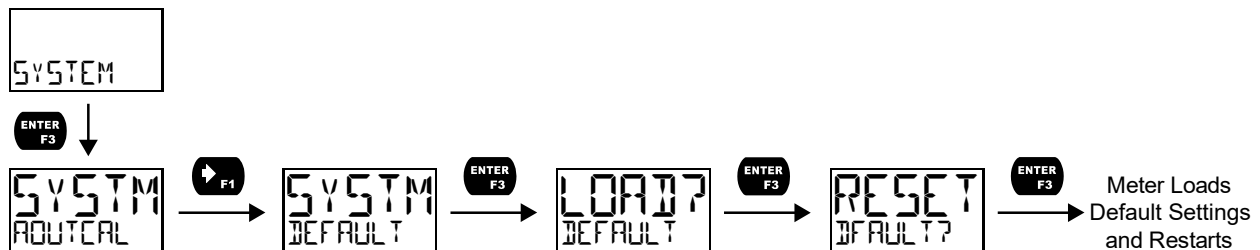


### Analog Output Calibration (ADUTCAL)

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

### Resetting the Meter to Factory Defaults (DEFAULT)

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. To load factory defaults, enter the **DEFAULT** menu under the **SYSTEM** menu and press enter twice in quick succession. The meter will load the default settings and restart.



### Disabling the Totalizer (TOTAL)

The totalizer can be disabled using the TOTAL menu. With the totalizer disabled, the meter will behave as a PD6602 or PD6604 process meter. Refer to the PD6602/4 instruction manual for instructions about programming a PD6602 or PD6604 process meter.

### Enabling or Disabling the Backlight (BACKLITE)

The backlight may be enabled or disabled using the *Backlight* menu. The backlight is enabled by default, but the input must be wired appropriately in order for the backlight to function. See *Current Loop (4-20 mA) Connections* on page 9. The voltage drop is the same if the backlight is not wired or if it is disabled in the menu.

### Viewing System Information (INFO)

System information, such as software number, software version, and model number, may be viewed in the **INFO** menu. Press the *Right Arrow* button to cycle through all available meter information. Press **Enter** to go back to the previous menu.

## Calibrating the Internal mA Reference (ICAL)

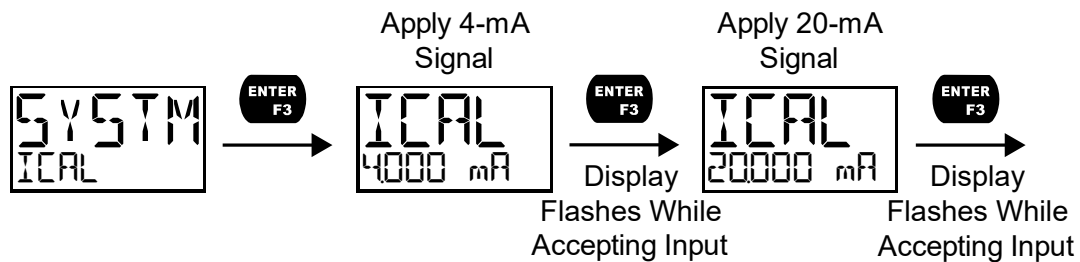
The meter is factory calibrated prior to shipment to display 0 to 100, which corresponds to the 4-20 mA input. The calibration equipment is certified to NIST standards.

The use of calibrated signal sources is necessary to calibrate the internal source of the meter. The meter's internal source is what allows the user to scale the meter without applying a signal. Check calibration of the meter at least every 12 months.

**Note:** Allow the meter to warm up for at least 5 minutes before performing the internal source calibration procedure.

The *Internal Calibration* menu is part of the *Advanced* menu. Internal Calibration is performed as follows:

1. Press the **Menu** button to enter *Programming Mode*.
2. Press the **Right Arrow** button **twice** and press **Enter** to access the **Advanced** menu.
3. Press the **Up-Arrow** button and press **Enter** to access the **System** menu.
4. Press the **Up-Arrow** button and press **Enter** to access the **ICAL** menu.
5. The meter displays *low* input current message (4000 mA). Apply a 4-mA signal and press **Enter**. The display flashes for a moment while the meter is accepting the low input signal.
6. After the display stops flashing, the display moves to the *high* input calibration (20000 mA). Apply the high input signal and press **Enter**. The display will flash again while the meter is accepting the high input signal.







## Meter Operation

The meter is capable of accepting a 4-20 mA current signal and displaying it in engineering units from -99,999 to 999,999 on the top line or from -9,999,999 to 99,999,999 on the bottom line. For example, a 4-20 mA signal could be displayed as -50.000 to 50.000.

The dual-line display can be customized by the user to operate in such a way as to satisfy a specific application. Typically, the top line is used for the rate variable while the bottom line is used for total, grand total, engineering units, or custom tag.

## Front Panel Buttons Operation

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

## Function Keys Operation

During operation, the programmable function keys operate according to the way they have been programmed in the *Advanced Features – User* menu. The table above shows the factory default settings for F1, F2, and F3.

A hint message may be enabled in order to provide a description of what each function key does prior to executing their assigned function. See Enabling the Function Key Hint Feature (HINT) on page 36.

## Digital Input Operation

A digital input 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 between DI+ and DI-, or with an active low signal. During operation, the digital input operates according to the way it has been programmed in the *Advanced Features – User* menu.

## Maximum/Minimum Readings

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

1. Display briefly by pressing the F1 key (default) or assigning to any of the other function keys or to the digital input in the *User* menu.
2. Display continuously by pressing the **Enter** button while the max/min is being displayed to lock the display. Press **Enter** again to unlock.

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

## Changing Engineering Units

It is possible to change the display units without the need to re-scale the meter. The UNITS menu within the DISPLAY menu allows the unit of measure to be changed (e.g. from gallons/second (GAL/S) to liters/second (L/S)) and the meter will automatically convert the display values to the new unit of measure. If entering a custom unit (CUSTOM), a custom conversion factor will need to be entered. See Changing the Units (UNITS) on page 19.

## Troubleshooting

Due to the many features and functions of the meter, it's possible that the setup of the meter does not agree with what an operator expects to see.

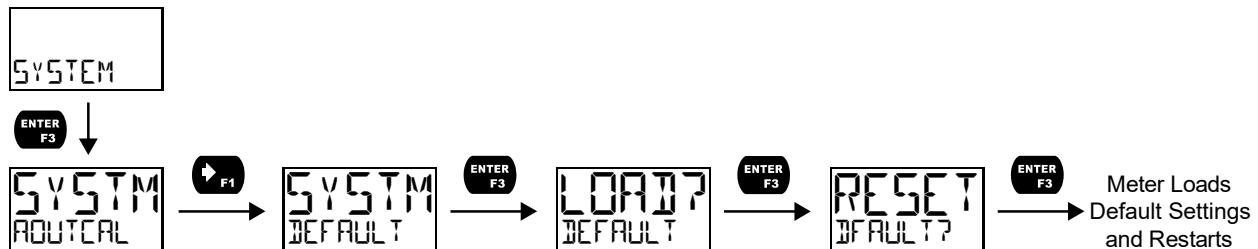
If the meter is not working as expected, refer to the recommendations below.

### 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.

To load factory defaults:

1. Press the **Menu** button to enter *Programming Mode*.
2. Press the **Up-Arrow** button **twice** and press **Enter** to access the **Advanced** menu.
3. Press the **Up-Arrow** button and press **Enter** to access the **System** menu.
4. Press the **Right-Arrow** button and press **Enter** to access the **Default** menu.
5. Press **Enter** twice in quick succession. The meter will load default settings and restart.



### Determining Software Version

To determine the software version of a meter:

1. Press the **Menu** button to enter *Programming Mode*.
2. Press the **Up-Arrow** button **twice** and press **Enter** to access the **Advanced** menu.
3. Press the **Up-Arrow** button and press **Enter** to access the **System** menu.
4. Press the **Up-Arrow** button **twice** and press **Enter** to access the **Info** menu.
5. Press the **Right-Arrow** button to cycle through the meter information. When done, press the **Menu** button to return to the previous menu.

### Factory Default Settings

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

Parameter	Display	Default Setting
<b>Input Menu</b>		
Rate Units	UNITS	Gallons/second
Input 1	INP 1	4.000 mA
Display 1	DSP 1	0.00
Input 2	INP 2	20.000 mA
Display 2	DSP 2	100.00
<b>Output Menu</b>		
Open Collector Output 1	OUTPUT 1	Disabled
Pulse Factor	FACTOR	1.0
Test Frequency	FREQ	100
Alarm	ALARM	PV
Alarm Action	ACTION	AUTO
Set Point	SET	20.00
Reset Point	RESET	10.00
Alarm On Delay	DELAY ON	0 seconds
Alarm Off Delay	DELAY OFF	0 seconds
Alarm Failsafe	FAILSAFE	OFF
Red LED	RED	ON
Flash PV	FLASH	ON
Alarm Message	MSG	ON
Message Text	MSG EDIT	ALARM 1
Timer Off Delay	OFF DELAY	1 minute
Timer On Time	ON TIME	1 second
Timer Mode	MODE	Continuous
Open Collector Output 2	OUTPUT 2	Disabled
Set Point	SET	40.00
Reset Point	RESET	30.00
Message Text	MSG EDIT	ALARM 2
Relay Output 1	RELAY 1	Disabled
Alarm	ALARM	PV
Alarm Action	ACTION	AUTO
Set Point	SET	70.00
Reset Point	RESET	60.00
Alarm On Delay	DELAY ON	0 seconds
Alarm Off Delay	DELAY OFF	0 seconds
Alarm Failsafe	FAILSAFE	OFF
Red LED	RED	ON
Flash PV	FLASH	ON
Alarm Message	MSG	ON
Message Text	MSG EDIT	ALARM 3
Sample Count	TOTAL COUNT	1,000 gallons
Sample Time	TOTAL TIME	10 seconds

Parameter	Display	Default Setting
Batch Count	BATCH COUNT	Up
Batch Max	BATCH MAXIMUM	10,000
Batch Mode	BATCH MODE	Manual
Batch Preset	BATCH PRESET	1,000
Batch On Delay	DELAY ON	0 seconds
Batch Off Delay	DELAY OFF	0 seconds
Timer Off Delay	OFF DELAY	1 minute
Timer On Time	ON TIME	1 second
Timer Mode	MODE	Continuous
Relay Output 2	RELAY 2	Disabled
Set Point	SET	90.00
Reset Point	RESET	80.00
Message Text	MSG EDIT	ALARM 4
4-20 mA Output	4-20 mA	PV
<b>Advanced Menu</b>		
Signal Conditioning Function	FUNCTION	Linear (2 pts)
Count Limit	COUNT LIMIT	8-Digit
Count Initial	COUNT INITIAL	0
Total Reset	TOTAL RESET	Enabled
GTot Reset	GTOT RESET	Disabled
Grand Total Reset Lockout	PERMLOCK	No
Low Cutoff	CUTOFF	Disabled
Filter	FILTER	2.0 seconds
Filter Bypass	BYPAS	00.4 PCT
Main Password	MAIN	00000
Total Password	TOTAL	00000
GTot Password	GTOTAL	00000
Function Key 1	F 1	Display
Function Key 2	F 2	Reset
Function Key 3	F 3	Acknowledge
Digital Input	DI	Reset Total
Function Key Hint Feature	HINT	Disabled
Totalizer	TOTAL	Enabled
Backlight	BACKLIGHT	Enabled
<b>Display Menu</b>		
Unit of Measure	UNITS	Gallons
Decimal Point Location	DECP	2
Comma	COMMA	Enabled
Top Line	TOP	PV
Bottom Line	BOTTOM	Units



## Troubleshooting Tips

Symptom	Check/Action
No display at all	<ol style="list-style-type: none"> <li>1. Check that the 4-20 mA current loop is providing at least 3.5 mA to the meter.</li> <li>2. Check that the voltage drop of all devices connected to the 4-20 mA current loop does not exceed the max rating of the loop power supply.</li> </ol>
Not able to change setup or programming, <b>LOCKED</b> is displayed	Meter is password-protected, enter correct five-digit password to unlock.
Meter display flashes: <ol style="list-style-type: none"> <li>1. 999999</li> <li>2. --99999</li> </ol>	Check that the number of digits required for the scaled value does not exceed the maximum digits for the display line. If it does, try adjusting the decimal point location for less precision or changing the PV display to the bottom line.
Display is unstable	Check: <ol style="list-style-type: none"> <li>1. Input signal stability and value.</li> <li>2. Display scaling vs. input signal.</li> <li>3. Filter and bypass values (increase).</li> </ol>
Display response is too slow	Check filter and bypass values
Display reading is not accurate	Check: <ol style="list-style-type: none"> <li>1. Signal input conditioner selected: Linear, square root, etc.</li> <li>2. Scaling or calibration</li> </ol>
Display does not respond to input changes, reading a fixed number	Check display assignment. It might be displaying max, min, or set point.
Display shows MAX, MIN, RATE, TOTAL, or GTOT and a number	Max or min display has been locked. Press <b>Enter</b> to unlock max/min display readings.
Relay operation is reversed	Check fail-safe settings in <i>Output</i> menu
Relays do not respond to signal	Check: <ol style="list-style-type: none"> <li>1. Relay action in <i>Output</i> menu</li> <li>2. Set and reset points</li> </ol>
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 map changes ahead of time, rather than at random. See Reset Meter to Factory Defaults on page 39 for details on resetting the meter.*

## How to Contact Precision Digital

- For Technical Support please  
Call: (800) 610-5239 or (508) 655-7300  
Fax: (508) 655-8990  
Email: [support@predig.com](mailto:support@predig.com)
- For Sales Support or to place an order please  
contact your local distributor or  
Call: (800) 343-1001 or (508) 655-7300  
Fax: (508) 655-8990  
Email: [sales@predig.com](mailto:sales@predig.com)
- For the latest version of this manual please visit  
[www.predig.com](http://www.predig.com)

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