



TEK-L CD 7800C

Panel Mount Loop-Powered Process Indicator

Instruction Manual

Document Number: IM-7800C



Decimal Display with Bargraph

www.tek-trol.com

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

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1 Safety Instructions

1.1 Intended Use

Tek-LCD 7800C Panel Mount Loop Powered Process Indicator is used to display the process variable on the 5-digit alphanumeric top line along with the units or a tag on the 8-digit alphanumeric bottom line.

1.2 Certifications

CE Approvals.

1.3 Safety Instructions from the Manufacturer

1.3.1 Disclaimer

The manufacturer will not be held accountable for any damage that happens by using its product, including, but not limited to direct, indirect, or incidental and consequential damages.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer has the right to modify the content of this document, including the disclaimer, at any time for any reason without prior notice, and will not be answerable in any way for the possible consequence of such changes.

1.3.2 Product Liability and Warranty

The operator shall bear authority for the suitability of the device for the specific application. The manufacturer accepts no liability for the consequences of misuse by the operator. Wrong installation or operation of the devices (systems) will cause the warranty to be void. The respective Terms and Conditions of Sale, which forms the basis for the sales contract shall also apply.

1.3.3 Information Concerning the Documentation

To prevent any injury to the operator or damage to the device it is essential to read the information in this document and the applicable national standard safety instructions. This operating manual contain all the information that is required in various stages, such as product identification, incoming acceptance and storage, mounting, connection, operation and commissioning, troubleshooting, maintenance, and disposal.

1.4 Safety Precautions

You must read these instructions carefully prior to installing and commissioning the device. These instructions are an important part of the product and must be kept for future reference. Only by observing these instructions, optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device can be ensured.

For additional information that are not discussed in this manual, contact the manufacturer.

Warnings and Symbols Used

The following safety symbol marks are used in this operation manual and on the instrument.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or severe injury



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



NOTE

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

1.5 Packaging, Transportation and Storage

1.5.1 Packaging

The original package consists of

- Tek-LCD 7800C Panel Mount Loop Powered Process Indicator
- Documentation



NOTE

Unpack and Check the contents for damages or sign of rough handling. Report damage to the manufacturer immediately. Check the contents against the packing list provided.

1.5.2 Transportation

- Avoid impact shocks to the device and prevent it from getting wet during transportation.
- Verify local safety regulations, directives, and company procedures with respect to hoisting, rigging, and transportation of heavy equipment.
- Transport the product to the installation site using the original manufacturer's packing whenever possible.

1.5.3 Storage

If this product is to be stored for a long period of time before installation, take the following precautions:

- Store your product in the manufacturer's original packing used for shipping.
- Storage location should conform to the following requirements:
 1. Free from rain and water
 2. Free from vibration and impact shock
 3. At room temperature with minimal temperature and humidity variation
- Properties of the instrument can change when stored outdoors.

1.5.4 Nameplate

The nameplate lists the important information, such as design details and technical data.



NOTE

Check the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

2 Product Description

2.1 Introduction

Tek-LCD 7800C Loop-Powered 1/8 DIN digital panel meters can be installed virtually anywhere. It provides a convenient and informative display of any 4-20 mA signal. One of the most important features for Tek-LCD 7800C is the dual-line display. This dual-line display is mostly used to display the process variable on the 5-digit alphanumeric top line along with the units or a tag on the 8-digit alphanumeric bottom line. Tek-LCD 7800C Panel Meter can easily set up to display the input in one scale on the top and bottom line (such as feet and Gallon, respectively). Both these top and bottom lines use 14- alphanumeric segment characters, which clearly indicate tags, units, and alarm messages.

The Tek-LCD 7800C Panel Mount Loop-Powered Indicator displays the 20-segment bar graph. This bar graph represents a numeric percent value. Tek-LCD 7800C Panel Meters do not require an external power source, as if virtually installed. This Loop-Powered Panel Meter consists of NEMA 4X, IP65 front panel, conformal coated PCBs, and a backlit LCD. Output can be easily read in bright sunlight or dimly lit areas due to backlit LCD. For programming and set up the meter, PC based software easily connects to the meter via USB cable. Also, the meter can be programmed, set up, and operated through the four front panel buttons.

Additionally, the digital input is used for the remote reset to trigger an alarm. All models are well equipped with two open collector outputs, which include two solid-state relays along with 4-20 mA analog output options. Hence, it is useful for alarm indication or pulse output.

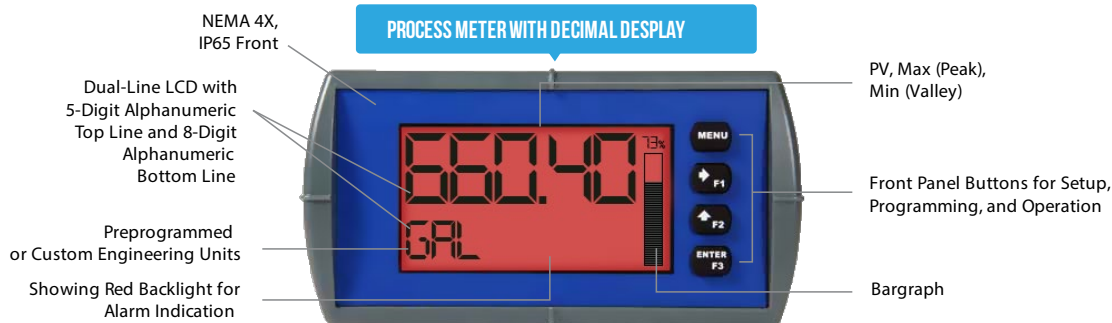


Fig 1: Tek-LCD 7800C Panel Mount Loop-Powered Process Indicator

2.2 Display with Bar Graph



Fig 2: Decimal Display with Bar Graph

2.3 Specifications

Note: All specifications apply to operation at + 77°F (+25°C).		
Display	Five Digits Top Display (-9999 to 99999)	¾" (17.8 mm) high 14-segment alphanumeric Automatic lead zero blanking
	Seven Characters (Engineering Units)	½" (10.2 mm) high 14-segment alphanumeric
	Symbols	High & Low Alarm, Password Lock
	Backlight	Backlight
Display Update Rate	Ambient > -13°F: 2 Updates/Second Ambient < -13°F: 1 Update/5 Seconds	
Overrange	Display flashes 99999	
Underrange	Display flashes -9999	
Programming Method	Four through-window buttons when cover is installed Four internal push-buttons when cover is removed	
Recalibration	Recalibration is recommended at least every 12 months	
Max/Min Display	Max/Min readings reached by the process are stored until reset by the user or until power to the meter is turned off	
Password	Programmable password restricts modification of programmed settings	

Non-Volatile Memory	All programmed settings are stored in non-volatile memory for a minimum of ten years
Normal Mode Rejection	64 dB at 50/60 Hz
Accuracy	±0.05% FS ±0.001mA
Temperature Range	Operating Temperature: -40°F to 167°F (-40°C to 75°C) for safe area products -40°F to 158°F (-40 to 70°C) for hazardous area products Storage Temperature: -40°F to 185°F (-40 to 85°C)
Relative Humidity	0 to 90% non-condensing Printed circuit boards are conformally coated

2.4 Dimensional Drawings

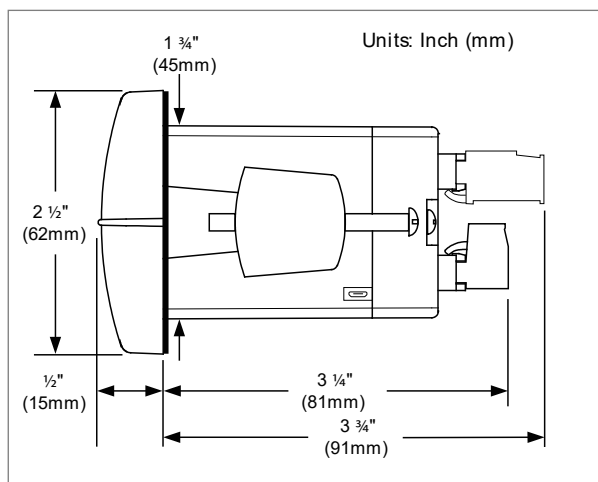


Fig 3: Side View

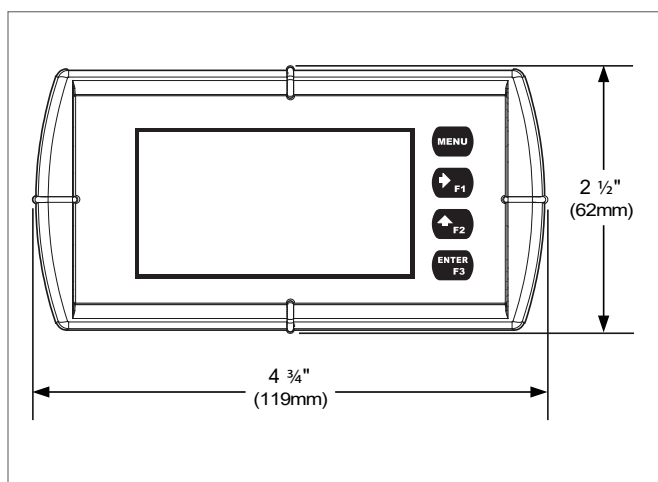


Fig 4: Front View

2.5 Popular Models

Base Model	
Model	Description
7800C-LNN*	Loop-Powered, General Purpose, No Options

Advanced Model	
Model	Description
7800C-L2N	Loop-Powered, General Purpose, Two Solid State Relays
7800C-L3N	Loop-Powered, General Purpose, 4-20 mA Analog Output
7800C-L5N	Loop-Powered, General Purpose, Two Solid State Relays and 4-20 mA Analog Output

3 Installation

This section covers instructions on installation and commissioning. Installation of the device must be carried out by qualified trained, specialists authorized to perform such works.



CAUTION

- When removing the instrument from hazardous processes, avoid direct contact with the fluid and the meter.
- All installation must comply with local installation requirements and local electrical code.



NOTE

There is no need to remove the meter from its case to complete the installation, wiring, and setup of the meter for most applications.

3.1 Panel Mounting Instructions

- Please use a standard 1/8 DIN panel cut-out – 3 3/4" x 1 3/4" (92mm x 45mm), as shown in figure 7.
- Clearance: allow at least 4" (102mm) behind the panel for wiring.
- Panel Thickness: 1/16" to 1/4" (1.0mm to 6.4mm).
- Please use the recommended minimum panel thickness to maintain Type 4X rating: 1/16" (1.5mm) steel panel, 1/4" (4.1mm) plastic panel.
- Please remove the two mounting brackets provided with the meter (back-off two screws so that there is 1/4" (6.4mm) or < through the bracket. Slide the bracket toward the front of the case and remove).
- Insert meter into the panel cut-out.
- Install mounting brackets and tighten the screws against the panel. To achieve a proper seal, tighten the mounting bracket screws evenly until the meter is snug to the panel along its short side. Do not overtighten, as the rear of the panel may be damaged.

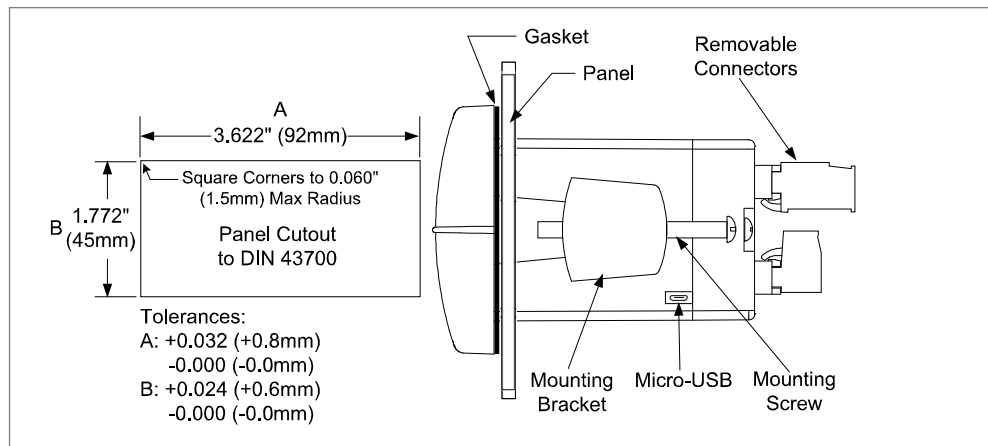


Fig 5: 1/8 DIN Panel Cutout Dimensions and Panel Mounting Details

4 Wiring Connection



CAUTION

- Use copper wire with 60°C or 60/75°C insulation for all line voltage connections. Observe all safety regulations.
- Electrical wiring should be performed in accordance with all applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.

4.1 Power Connections

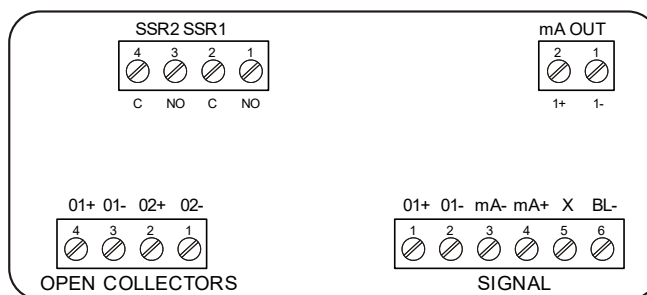


Fig 6: Wiring Diagram

Table 1: Power Connections

SIGNAL +	4-20mA input signal positive terminal connection
SIGNAL -	4-20 mA signal return/negative terminal connection, when not using loop-powered backlight
BACKLIGHT +	+9-36 VDC when powering backlight from external supply
BACKLIGHT -	4-20 mA signal return/negative terminal, when using the installed loop-powered backlight or ground/negative when powering backlight from external supply



WARNING

- 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.

4.2 Current Loop (4-20 mA) Connections

- The following figures 8 and 9 shows 4-20 mA loop connected to the meter.
- Figure 8 shows the connection without the backlight and figure 9 shows the connection with the backlight.
- The meter is powered by the 4-20mA current loop.
- There are no switches or jumpers to set up for the input.
- Setup and programming is performed through the front panel buttons or PC-based software.

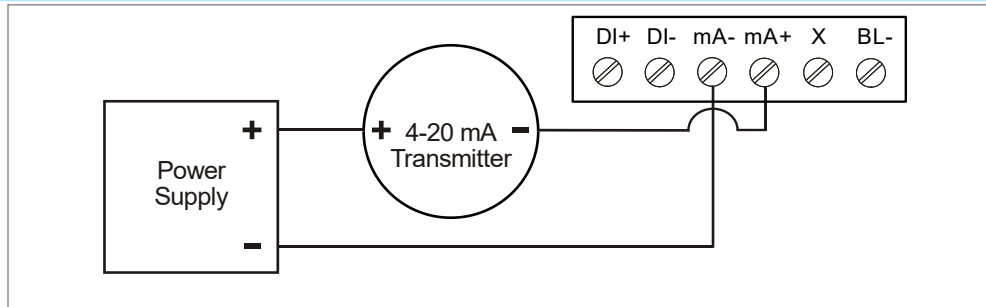


Fig 7: 4-20mA Input Connection without Backlight

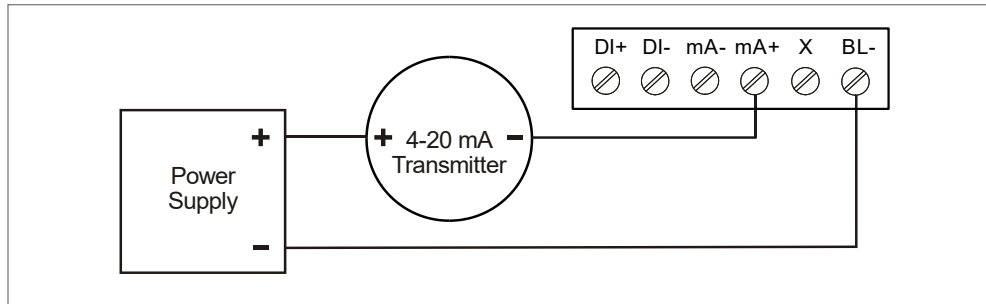


Fig 8: 4-20mA Input Connection with Backlight

4.3 Digital Input Connection

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

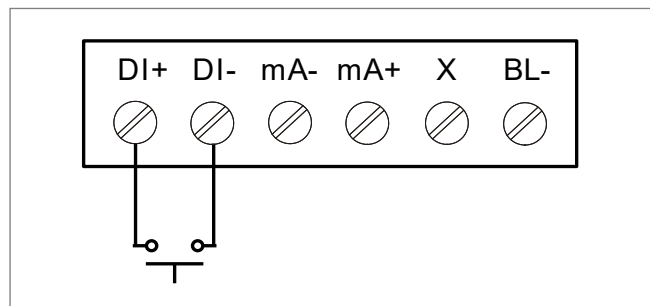


Fig 9: Digital Input Connection

4.4 4-20 mA Output Connections

- Connections for the 4-20 mA transmitter output terminals are labelled as mA OUT.
- The 4-20mA output must be powered from an external power supply.

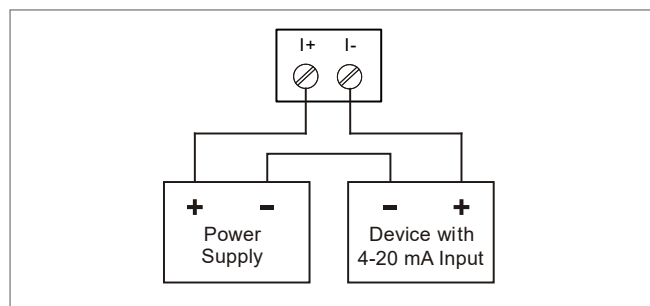


Fig 10: 4-20 mA Output Connections

4.5 Solid State Relay Connections

- Relay connections are made to a four-terminal connector.
- For each relay's, C terminal is common for the normally open (NO) contact of the corresponding relay.

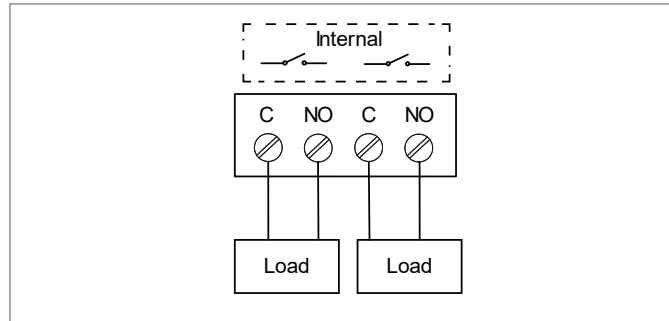


Fig 11: Solid State Relay Connections

4.6 Open Collector Outputs

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

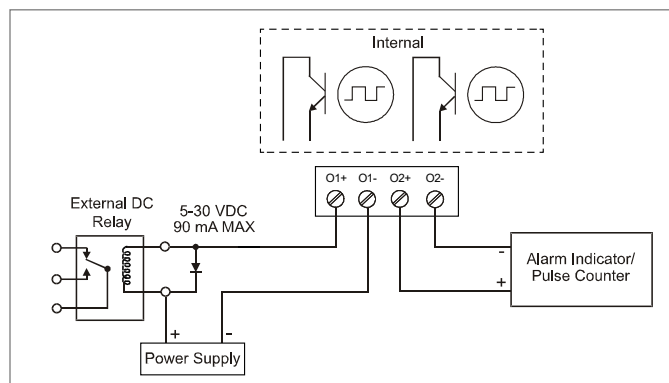


Fig 12: Open Collector Outputs

5 Setup and Programming



NOTE

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

5.1 Basic Instructions

- There are no jumpers to set.
- Setup and programming is done through the front panel buttons or PC-based software.
- The meter may be powered through 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 through the USB connection.

5.2 Front Panel Buttons and LED Indicators



Fig 13: Front Panel Buttons and LED Indicators

Table 2: Front Buttons and its Description








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

Table 3: LED Indicator and its Status

LED	Status
	Alarm Indicator
	Password Protection Indicator
	PV Bar Graph

- Press and hold the **Menu** button from any programming menu to automatically return to Run Mode.
- Press or hold the **Right Arrow** button to scroll forward in the menu section.
- Select digits during numeric programming.

- Select characters during text programming or decrement the value of a digit or character selected by **Up-Arrow** button.
- Press and hold the **Right-Arrow** button to zero or clear digits or characters when in data-entry mode.
- Press or hold the **Up-Arrow** button to scroll backward through the menus or increment a digit or character's value.
- Press the **Enter** button to access a menu or accept a setting or programmed digit/character value.

5.3 Display Functions and Message

The meter displays various functions and messages during setup, programming and operation. The table 4 shows the main menu functions and messages.

Table 4: Display Functions and Message

Parameter	Action/Setting Description
INPUT (PV 1 & PV2)	Program the meter 4-20 mA input (two menus, PV 1 and PV 2, are available if in dual scale mode; see PV 2 under advanced features menu)
SCALE PV (1 or 2)	Scale the selected PV
UNITS	Select the display units
VOLUME	Volume unit class
GAL	Gallons
L	Liters
IGAL	Imperial Gallons
M3	Cubic Meters
BBL	Barrels
BUSH	Bushels
cuYD	Cubic Yards
cuFE	Cubic Feet
cuIn	Cubic Inches
L.BBL	Liquid barrels
BBBL	Beer barrels
HECLL	Hectoliter
AF	Acre-Foot
CUSTM	Custom Unit
HEIGHT	Height unit class
INCH	Inches
FEET	Feet
FT-IN	Feet & Inches
YARD	Yards
CM	Centimeters
M	Meters
CUSTM	Custom unit
TEMP	Temperature unit class
°F	Degrees Fahrenheit
°C	Degrees Celsius

K	Kelvin
°RA	Degrees Rankine
PRESSURE	Pressure unit class
PSI	Pounds per square inch
InHG	Inches of mercury
InH2O	Inches of water
mmHG	Millimeters of mercury
KG/CM2	Kilograms per square centimeter
KG/M2	Kilograms per square meter
mBAR	Millibar
BAR	Bar
PA	Pascal
HPA	Hectopascal
KPA	Kilopascal
MPA	Megapascal
CUSTOM	Custom unit
WEIGHT	Weight unit class
Gm	Grams
KG	Kilograms
Tonne	Tonnes (metric)
oz	Ounces
lb	Pounds
Ton	Tons
CUSTOM	Custom unit
RATE	Rate unit class
/SECOND	Units per second
/MINUTE	Units per minute
/HOUR	Units per hour
/DAY	Units per day
GAL/(T)	Gallons per time unit (T)
L/(T)	Liters per time unit (T)
IGAL/(T)	Imperial gallons per time unit (T)
M3/(T)	Cubic meters per time unit (T)
BBL/(T)	Barrels per time unit (T)
BUSH/(T)	Bushels per time unit (T)
cuYD/(T)	Cubic Yards per time unit (T)
cuFE/(T)	Cubic Feet per time unit (T)
cuIn/(T)	Cubic Inches per time unit (T)
L. BBL/(T)	Liquid barrels per time unit (T)
BBBL/(T)	Beer barrels per time unit (T)
HECLL/(T)	Hectoliter per time unit (T)
AF/(T)	Acre-Foot per time unit (T)
CUSTOM/	Custom unit per time unit (T)
CUSTOM	Custom unit class

CUNIT	Custom unit
INPUT 1	Program input 1 value
INP 1	Enter the input 1 value
DISP 1	Program display 1 value
DISP 1	Enter the display 1 value
INPUT 2	Program input 2 value (up to 32 points)
INP 2	Enter the input 2 value
DISP 2	Program display 2 value (up to 32 points)
DISP 2	Enter the display 2 value
SAVE?	Save programmed units, input, and display values
OUTPUT	Program the meter's available out-puts
OPEN COLLECTR	Program the meter's open collector outputs
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
STWATCH	Program the open collector to turn on while the stopwatch is running
RELAY	Program the meters relay outputs
OUTPUT 1	Relay 1 setup
OUTPUT2	Relay 2 setup
DISABLE	Disable the relay
ALARM	Program relay for alarm functionality
PUMPCTRL	Program relay for pump control application
TIMER	Program relay as a timer
STWATCH	Program relay to turn on while the stopwatch is running
RELAY INFO	View relay run time and cycle count
4-20 MA	Program the meter's 4-20 mA out-put
PV	Program a range to transmit based on the display value
RETRANS	Retransmit the mA input signal
DISABLE	Disable the 4-20 mA output
CONTROL	Program manual or automatic operation for the outputs
OC 1	Open collector 1
OC2	Open collector 2
RELAY 1	Relay 1
RELAY2	Relay 2
4-20 mA	4-20 mA output
AUTO	Set selected output to automatic operation
MANUAL	Manually control selected output operation
ADVANCE D	Program the meter's advanced features

PV SETUP (PV 1 & PV 2)	Advanced input programming (two menus, PV 1 and PV 2, are available if in dual scale mode; see PV 2 under advanced features menu)
SOURCE	Select PV 2 source (dual-scale only; see PV 2 under advanced features menu)
4-20 mA	Source PV 2 from the mA input
PV 1	Source PV 2 from PV 1
FUNCTION	Select linear, square root, or programmable exponent function
LINEAR	Set meter for linear function and select number of linearization points
SQROOT	Set meter for square root extraction
EXPONENT	Set meter for programmable exponent and enter exponent value
RH TANK	Round horizontal tank (dual-scale only; see PV 2 under advanced features menu)
SCALECAL	Scale or calibrate the mA input
SCALE PV	Scale the input
CAL PV	Calibrate the input
CUTOFF	Set low-flow cut-off
DISABLE	Disable low-flow cut-off
ENABLE	Enable low-flow cut-off
FILTER	Set noise filter value
10 SEC	1 second
20 SEC	2 seconds
40 SEC	4 seconds
80 SEC	8 seconds
160 SEC	16 seconds
OFF	Turn filter off
BYPASS	Set filter bypass (0.0 to 99.9% FS)
PASSWD	Set a password for the meter
PASS MAIN	Program the main meter password
USER	Assign function keys / digital input
F 1	Assign F1 function key
F2	Assign F2 function key
F3	Assign F3 function key
DI	Assign digital input
DISP FN	Set the function key or digital input to display a value
DISPLAY	Cycle max, min, and PV(s)
DISP PV	Display the PV
PCT PV	Display the PV's percentage of max (20 mA)
UNITS	Display the PV's units
TAG	Display the PV's tag
DISPMIN	Display the PV's minimum value

DISPMAX	Display the PV's maximum value
MIN MAX	Display the PV's minimum and maximum value
mA IN	Display the current mA input value
mA OUT	Display the current mA output value
MENU FN	Set the function key or digital input to access a menu
RLY INFO	Go to relay information menu (INFO)
MANCTRL	Go to output control menu (CONTROL)
TMR DC 1	Open collector 1 timer
TMR DC 2	Open collector 2 timer
TMR R 1	Relay 1 timer
TMR R 2	Relay 2 timer
TMR FN	Set the function key or digital input to start or stop a timer
START ALL	Start all timers
STOP ALL	Stop all timers
SSTP ALL	Start or stop all timers
DC 1	Start/stop open collector 1 timer
DC 2	Start/stop open collector 2 timer
RLY 1	Start/stop relay 1 timer
RLY 2	Start/stop relay 2 timer
START	Start the selected timer output
STOP	Stop the selected timer output
STR-STOP	Start or stop the selected timer output
ALARM FN	Set the function key or digital input to acknowledge an alarm or access set points
ACK	Acknowledge all active alarms
SETPoint	Access all output set points
SETPDC 1	Access open collector 1 set point
SETPDC 2	Access open collector 2 set point
SETPR 1	Access relay 1 set point
SETPR 2	Access relay 2 set point
SWATCH FN	Set the function key or digital input to activate stopwatch
START	Start the stopwatch
STOP	Pause/Stop the stopwatch
STR-STOP	Start or stop the stopwatch
TARE FN	Set the function key or digital input to tare the display
TARE	Tare the display value
RST TARE	Reset the display value
HOLD FN	Set the function key or digital input to hold an output
HOLD OUT	Hold all outputs
HOLD/UNHOLD	Hold or un-hold all outputs
DC 1+2	Hold/un-hold open collector out-puts
RLY 1+2	Hold/un-hold relay outputs
mA OUT	Hold/un-hold 4-20 mA output
HOLD	Hold selected output

HLDUNHLD	Hold or un-hold selected output
DISABLE	Disable function key or digital input
RST FN	Set the function key or digital input to reset a value
RESET	Reset min, max, or max/min PV
R MINMAX	Reset max and min PV value
HINT	Display hint text on key press and execute action on next key press
OFF	Turn the hint function off
ON	Turn the hint function on
SYSTEM	Program system settings
ADUTCAL	Calibrate the analog output
DEFAULT	Reset meter to factory defaults
PV 2	Enable the meter to scale a second PV based on the mA input
DISABLE	Disable dual-scale feature (default)
ENABLE	Enable dual-scale feature
BACKLITE	Enable/disable display backlight
ENABLE	Enable the backlight (default)
DISABLE	Disable the backlight
INFO	View meter software, version, and model; change the identifier tag
SFT	The software ID number
VER	The software version
MODEL	The meter model number
IDTAG	The meter identifier tag Press Enter to edit tag
ICAL	Internal calibration used for scaling
DISPLAY	Program the meter's display
UNITS	Change the display units within the selected unit class
DECP	Change the decimal point location
COMMA	Enable or disable the use of a comma on the bottom display
ENABLE	Enable comma (default)
DISABLE	Disable comma
BARGRAPH	Enable or change the bar graph
PV (1 or 2)	Set the bar graph to display the PV percentage of full scale
OFF	Turn the bar graph feature off
TOP	Set what to display on the top line
PV (1 or 2)	Display the process variable
PV+UNIT (1 or 2)	Display the process variable and units alternating
PV+TAG (1 or 2)	Display the process variable and tag alternating
TAG+UNIT	Display tag and units alternating
PV+U+TAG (1 or 2)	Display the process variable, unit, and tag alternating
PV 1+PV 2	Display both process variables (dual-scale only; see PV 2 under advanced features menu)
TAG	Display the tag
STOPWATCH	Display the stopwatch

TIMR OC 1	Display open collector 1 timer
TIMR OC2	Display open collector 2 timer
TIMER R 1	Display relay 1 timer
TIMER R2	Display relay 2 timer
MIN	Display minimum value
MAX	Display maximum value
MIN MAX	Display alternating min and max
OFF	Turn top line off
UNITS	Display the units
BOTTOM	Set what to display on the bottom line
UNITS	Display the units
PV (1 or 2)	Display the process variable
PV+UNIT (1 or 2)	Display the process variable and unit alternating
PV+TAG (1 or 2)	Display the process variable and tag alternating
TAG+UNIT	Display the tag and unit alternating
PV+U+TAG (1 or 2)	Display the process variable, unit, and tag alternating
PV 1+PV2	Display both process variables (dual-scale only; see PV 2 under advanced features menu)
TAG	Display the tag
STPWATCH	Display the stopwatch
TIMR OC 1	Display open collector 1 timer
TIMR OC2	Display open collector 2 timer
TIMER R 1	Display relay 1 timer
TIMER R2	Display relay 2 timer
OFF	Turn bottom line off
PV PCT (1 or 2)	Display the process variable percentage of full scale
mA IN	Display the current mA input value
mA OUT	Display the current mA output value

5.4 Main Menu

- The main menu consists of all the meter programmable functions, including Input, Output, Advanced, and Display.
- Press the Menu button to enter Programming Mode.
- Press the Right-Arrow button to move forward in the menu and the Up-Arrow button to move back.
- Press Menu at any time to go back one level or press and hold to exit and return to Run Mode.
- Changes made are saved by the Enter button.
- 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.

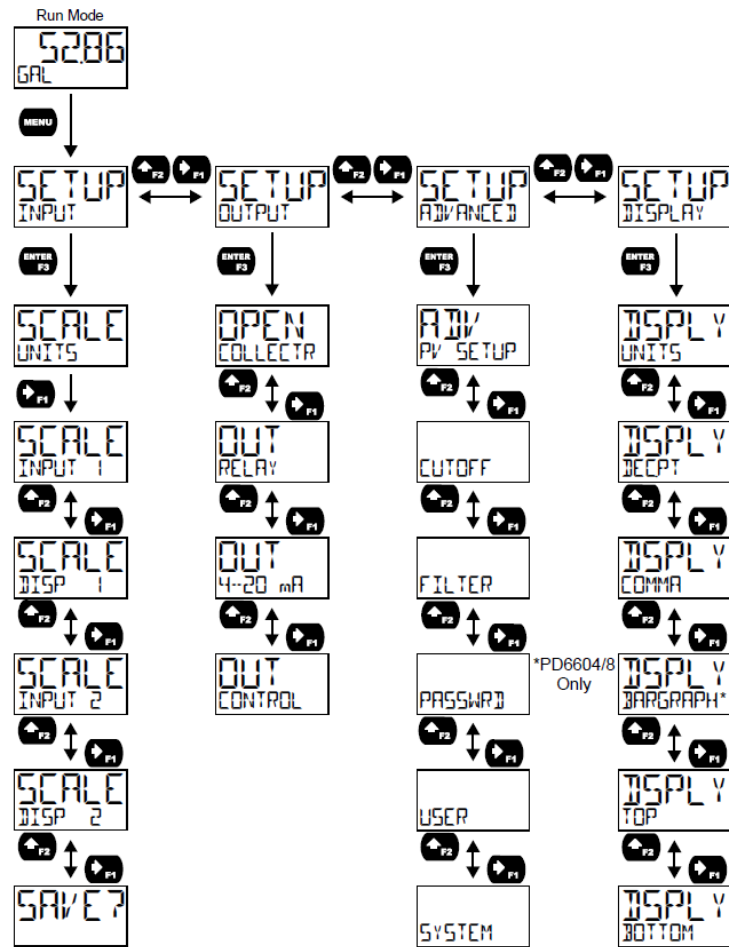


Fig 15: Main Menu

5.4.1 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.

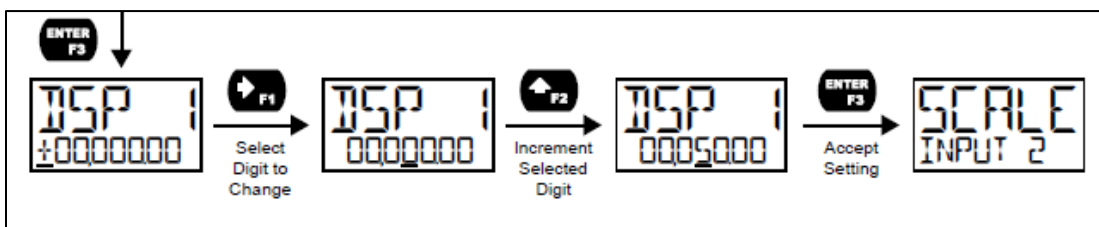


Fig 15: Display Particular Digit by Underscore Sign

5.4.2 Setup of Input Signal (INPUT)



NOTE

- The meter is factory calibrated prior to shipment to display 0 to 100, which corresponds to the 4-20mA input.
 - The calibration equipment is traceable to NIST standards.
 - The calibrated source is not required for scaling the meter.
 - Tek-LCD 7800C is single input meters with dual-scale capability.
-
- Enter the Input menu to scale the meter to display the 4-20mA input.
 - The input is capable of accepting any signal from 4 to 20mA.

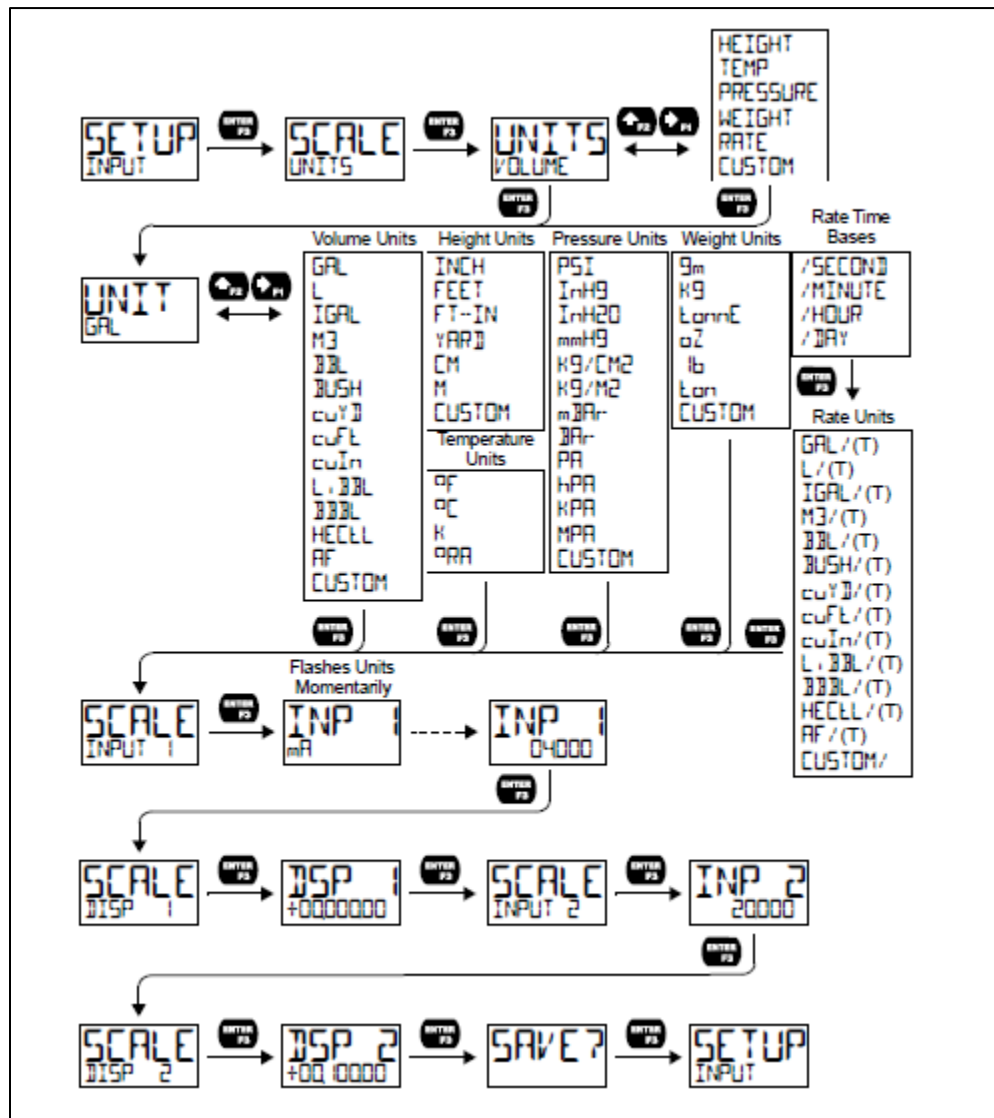


Fig 16: Input Signal Setup

5.4.3 Setup of Custom Units (CUSTOM)

- A custom unit may be programmed, when the desired unit class or unit of measure within a class is not available.
- Select the CUSTOM menu (or CUSTOM unit within a unit class) 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.

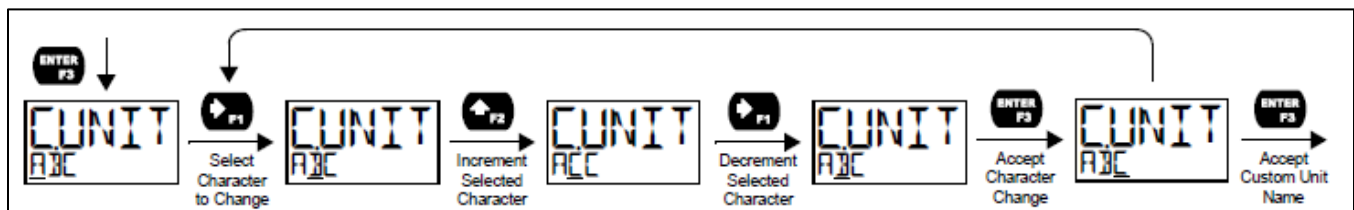


Fig 17: Custom Units Setup



NOTE

- 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.

5.4.3.1 Scaling the 4 to 20mA Input

- The 4-20 mA input can be scaled to the appropriate values for a given application.
- The 4mA 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.
- Similarly, 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 used to display the level of a 100 ft. tall tank, the transmitter should send a 4mA signal when the tank is empty and a 20mA signal when the tank is full.
- The meter should be programmed to interpret these inputs on a display range of 0-100, so that at 4mA the meter will display 0 and at 20mA the meter will display 100.
- Processes which require a non-linear scale can be accommodated using the linear, (LINEAR) exponent (EXPONENT), square root (SQROOT) and round horizontal tank (RH TANK) functions available in the Advanced menu. See Signal Input Conditioning Functions. (FUNCTION)
- A signal source is not needed to scale the meter.
- Simply program the inputs and corresponding display values.

5.4.4 Setup of Display Feature (DISPLAY)

The Tek-LCD 7800C display functions may be programmed using the Display menu. This menu consists of Units, Decimal Point, Comma, Bar graph, Top, and Bottom submenus.

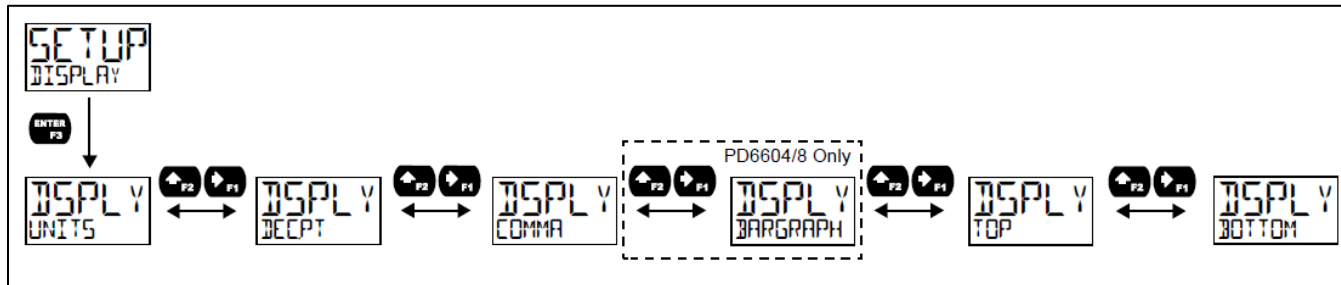


Fig 18: Display Feature Setup

5.4.4.1 Changing the Units (UNITS)

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

5.4.4.2 Changing the Decimal Place Location (DECEPT)

- The decimal point may be set with up to seven decimal places or with no decimal point at all.
- Please press right arrow to move the decimal point one place to the right until no decimal point is displayed, and then it moves to the leftmost position.
- Please press the Up arrow to move the decimal point one place to the left.

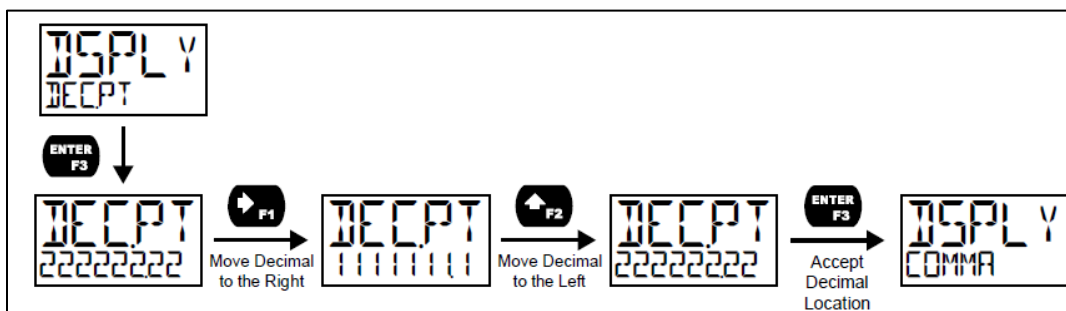


Fig 19: Changing Decimal Place Location

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

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

5.4.4.4 Top and Bottom Display Setup (TOP and BOTTOM)

- The two display lines, i.e., Top and Bottom, can be programmed to display different values using Top and Bottom Menus.
- Additional menus are available if the meter is in dual-scale mode to allow the second PV to be displayed on either the top or bottom line.

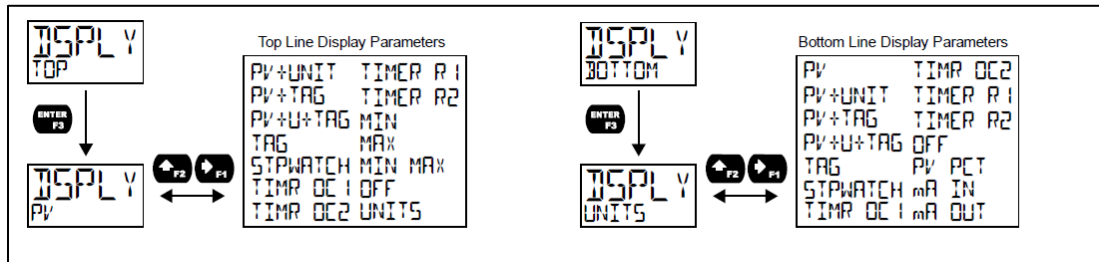


Fig 20: Top and bottom Display Setup

The top line (TOP) can display:

- Process Value (PV)
- Process Value 2 (dual-scale only; see PV 2 under advanced features menu)
- Alternating PV and Units
- Alternating PV and Tag
- Alternating PV, Units, and Tag
- Tag
- Stopwatch
- Open Collector 1 or 2 Timer
- Relay 1 or 2 Timer
- Minimum Value, Maximum Value, or Both
- Off (Blank)
- Units

The bottom line (BOTTOM) can display:

- Units
- Process Value (PV)
- Process Value 2 (dual-scale only; see PV 2 under advanced features menu)
- Alternating PV and Units
- Alternating PV and Tag
- Alternating Tag and Units
- Alternating PV, Units, and Tag
- Tag
- Stopwatch
- Open Collector 1 or 2 Timer
- Relay 1 or 2 Timer
- Off (Blank)
- PV's Percentage of Full Scale
- The mA Input
- The mA Output

5.4.4.5 Programming of Bar Graph

- The Tek-LCD 7800C is equipped with a bar graph display for applications where a visual representation of the process variables with a percentage of full scale is desirable.
- This feature can be enabled or disabled using the Bar graph menu (BAR GRAPH).
- The value displayed on the bar graph can be the percentage of full scale (PV PCT) or the percentage of a user-programmable range (PV).

- If the meter is in dual-scale mode, the bar graph can be assigned to display either PV1 or PV2 using this menu.

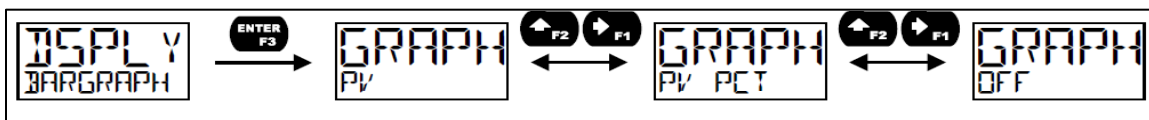


Fig 21: Programming of Bar Graph

5.4.5 Output Setup (OUTPUT)

The Tek-LCD 7800C is available with two open collector outputs, two solid state relays, and one 4-20mA output. The Output menu will show the options for the available outputs.

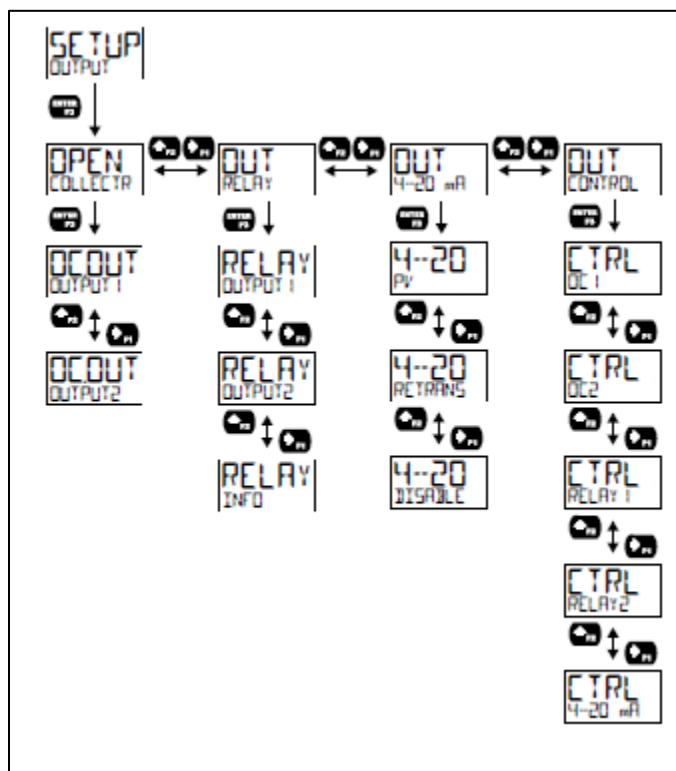


Fig 22: Output Setup

5.4.5.1 Open Collector Outputs (OPEN COLLECTR)

- The meter is equipped with two NPN open collector outputs that set up the pulse outputs, alarms, timed pulses, or disabled.
- Pulse outputs can be set to transmit the PV value (PV1 or PV2 if meter is in dual-scale mode).
- Output 2 is 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 (^(TIMER)) turns the open collector on and off at the specified time intervals. The timer can be set as single-shot or continuous timer.
- The stopwatch output (^(STOPWATCH)) allows the open collector to be manually activated by starting the stopwatch.

- The stopwatch count can be displayed on the top or bottom line.
- The output may be disabled by selecting `DISABLE`.

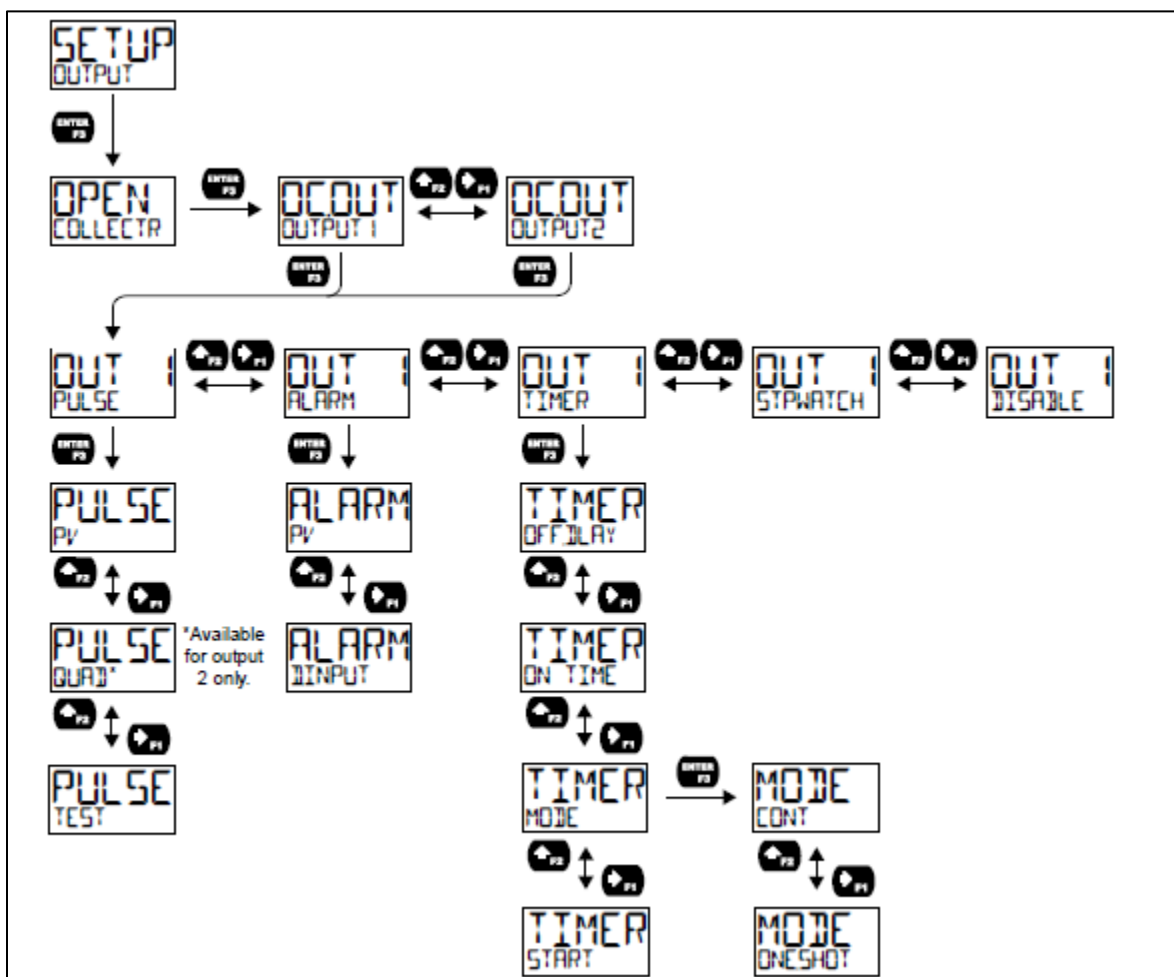


Fig 23: Open Collector Output Setup

5.4.5.2 Pulse Output (PULSE)

- The pulse output is assigned to output the PV 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 100gallons, and the factor is set to 2, the number of pulses generated per second would be 200 at a maximum frequency 1,000Hz.
- 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 500Hz.
- The `TEST` option will output a fixed number of pulses per second based on the `FREQ` value entered.

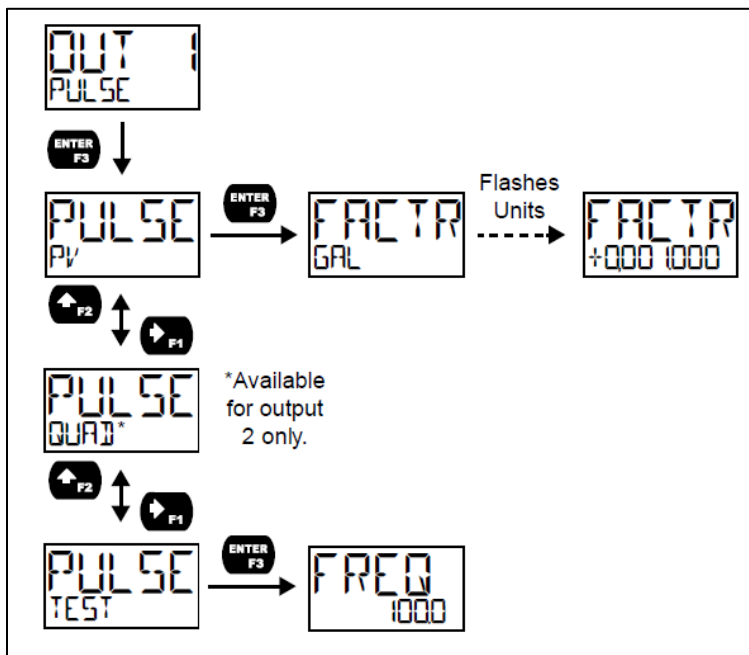


Fig 24: Pulse Output Setup

5.4.5.3 Alarm (ALARM)

- The alarm output is assigned to the PV or digital input.
- 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 or Manual (AUTOMAN): Alarm will reset automatically when the alarm condition has cleared. It can also be reset using the Enter (ACK) button (or function key is set to acknowledge) at any time.
 - Latching (LATCH): Alarm must be reset manually at any time. Press the Enter (ACK) button at any time to clear the alarm.
 - Latching with Reset after Clear (L-CLEAR): Alarm must be reset manually and can only be done after the alarm condition has cleared. Press the Enter (ACK) button after the alarm condition has cleared to reset the alarm.
- If the alarm is set to PV, a set and reset point must be programmed.
- The setpoint 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 setpoint is lower than the reset point, the alarm will be a low alarm; if the setpoint is higher than the reset point, the alarm will be high.
- The digital input alarm will trigger whenever the digital input is triggered.
- For both the PV and digital input alarms, a delay before the alarm is turned on or off may be set and a failsafe feature that will inverse the on/off programming.
- Alarm states will be displayed on the meter even if open collector output is not physically connected.
- The alarm indicator (!) will display optional red LED backlight, flashing PV value (PV alarm only), and a programmable alarm message.

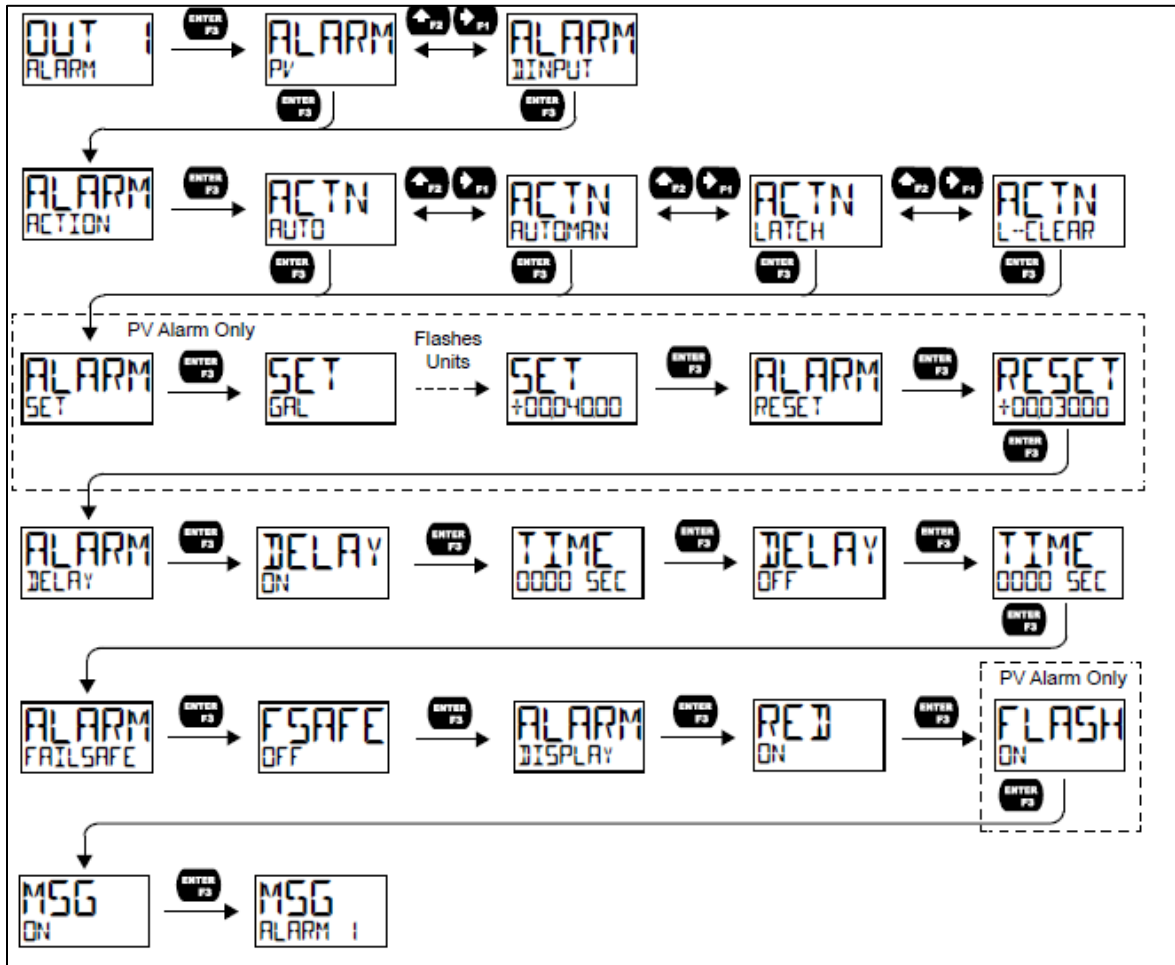


Fig 25: Alarm Output Setup

5.4.5.4 Timer (TIMER)

- The timer output may be set to generate the timed pulse one-shot (ONESHOT) or continuously (CONT).
- The timer output produces a constant width pulse at a constant frequency if set as a continuous timer. Program the Off Delay (OFF DELAY) from 1 second to 99 hours, 59 minutes, and 59 seconds. This is the period when selecting START turns on the output and for how long the output is off in continuous mode.
- Program the On Time (ON TIME) for the active low pulse from 1 second to 99 hours 59 minutes and 59 seconds (pulse width). This is the period for which the output will remain ON.
- Select Start (START) to start outputting the constant timed pulse.
- Select Stop (STOP) to end outputting the constant timed pulse.
- Function keys or digital input may be assigned to start and stop timer functions.

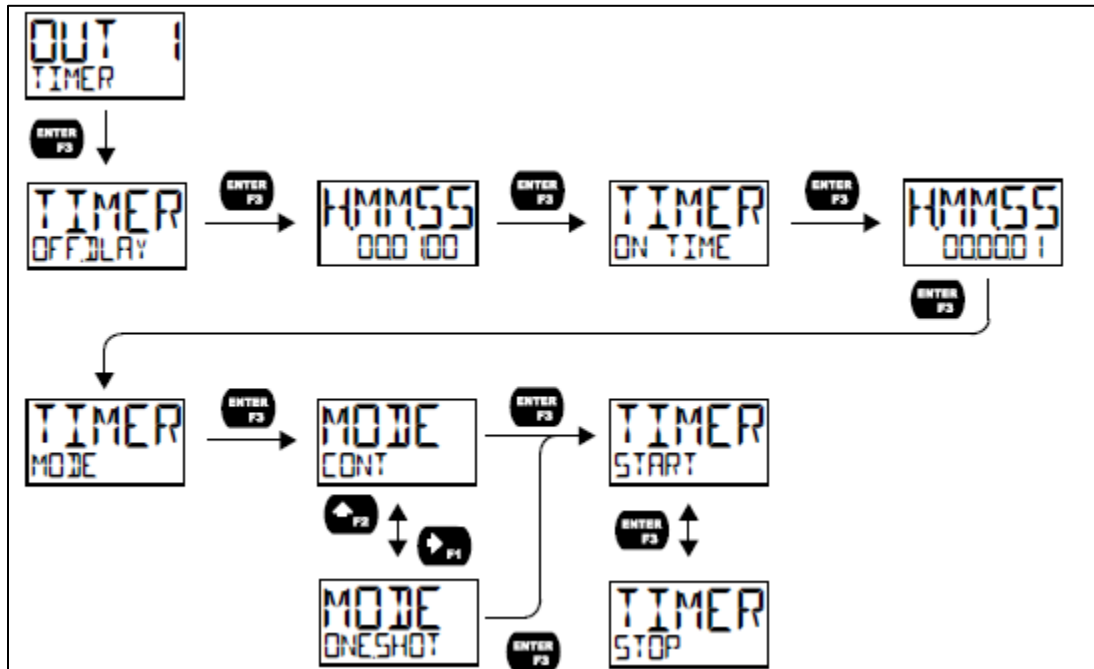


Fig 26: Timer Output Setup

5.4.5.5 Stopwatch (STPWATCH)

- The stopwatch function may be used to manually run and control a process for a specific time interval up to 99 hrs, 59 min, and 59 seconds.
- The stopwatch function may be assigned to any open collector.
- There are three settings needed to use the function effectively as follows:
 - Assign stopwatch to either top or bottom display line.
 - Assign the open collector or relay to control the process (on/off).
 - Assign a function key or digital input to start/stop the stopwatch.

5.4.5.6 Solid State Relay Output (RELAY)

- The meter is optionally equipped with two solid-state relays that may be set up for alarms, timer, or pump control.
- Alternatively, they may be disabled.
- Alarms are available based on the PV value or digital input. The alarm status will show on the display even if the output is not wired.
- Pump control allows the relay to turn on and off a pump at specified on and off points. This can be done using only one of the relays to control one pump (ON-OFF) or using both relays in tandem to alternate between two different pumps (ALTERN).
- A timer output (TIMER) turns the relay on and off at the specified time intervals. The timer can be set as a single-shot or continuous timer.
- The stopwatch output (STPWATCH) allows the relay to be manually activated by starting the stopwatch.
- The stopwatch count can be displayed on the top or bottom line.
- 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.

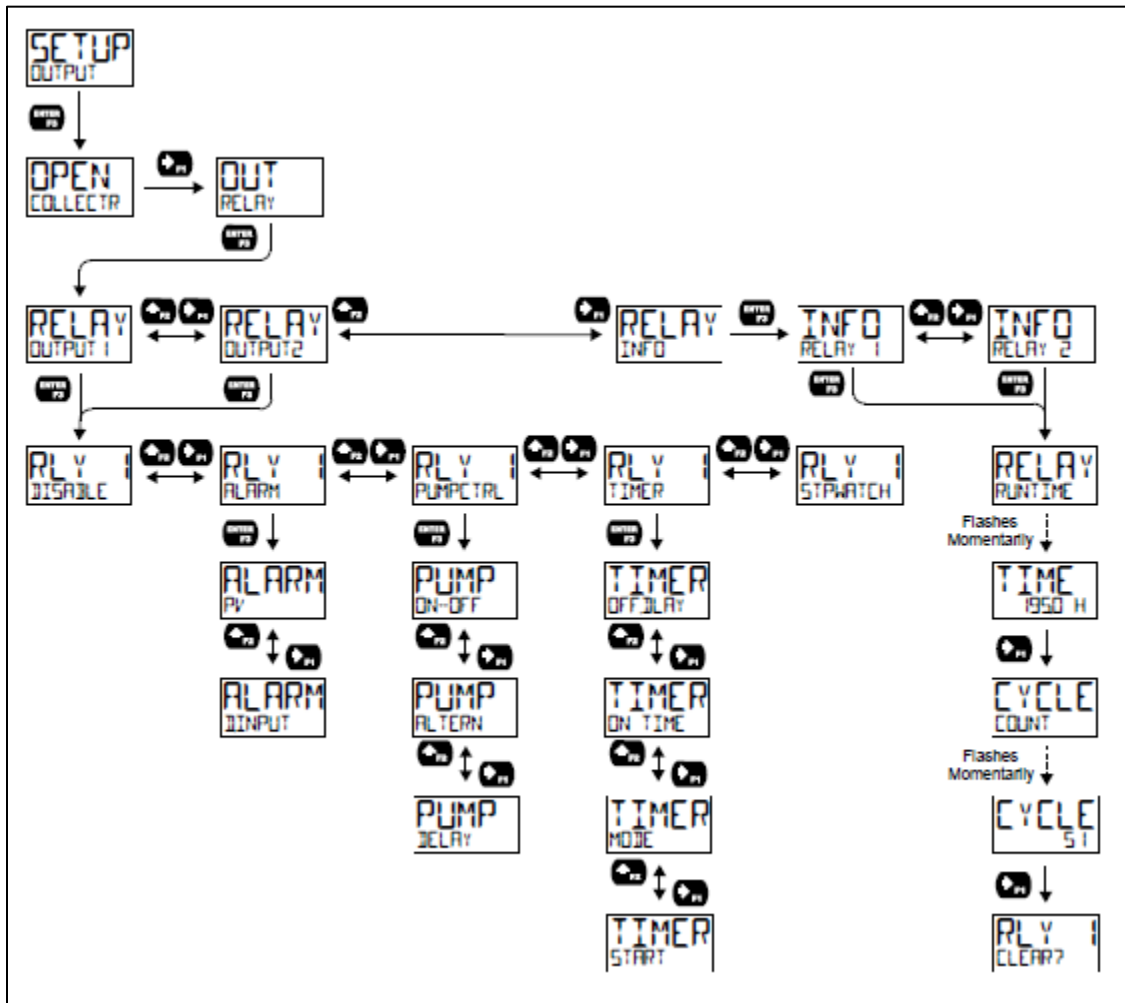


Fig 27: Solid State Relay Output Setup

5.4.6 Pump Control (PUMPCTRL)

- The pump control output is used, where the relays are used to control pumps.
- There are two options for controlling pumps, i.e., on-off (ON-OFF) and pump (ALTERN) alternation.
- ON-OFF will turn the relay on at a programmed-on point and off at a programmed off point.
- Setting the on-point higher than the off point will make the output activate on a high PV value.
- Setting the on-point lower than the off point will make the output active on a low PV value.
- The relay will reset automatically.
- For pump control applications where two similar pumps are used to control a tank's level or a well, it is desirable to have the pumps operate alternately. This prevents excessive wear and overheating of one pump over the lack of use of the other pump.

- Pump alternation uses both relays in tandem to alternate between two similar pumps.
- The ALTERN menu is only available under Output 1 and will automatically set Output 2 to pump alternation.
- Use the pump Alternation Time setting (ALTTIME) to control the alternation based on runtime in addition to level cycles.

5.4.6.1 ON/OFF Pump Control (ON-OFF)

- The on and off points must be programmed to turn on and off the single.
- The relay will activate at the on-point and deactivate at the off point.
- ON and OFF delays may optionally be programmed to delay the relay's activation or deactivation by a certain number of seconds after reaching either the ON point or OFF point.

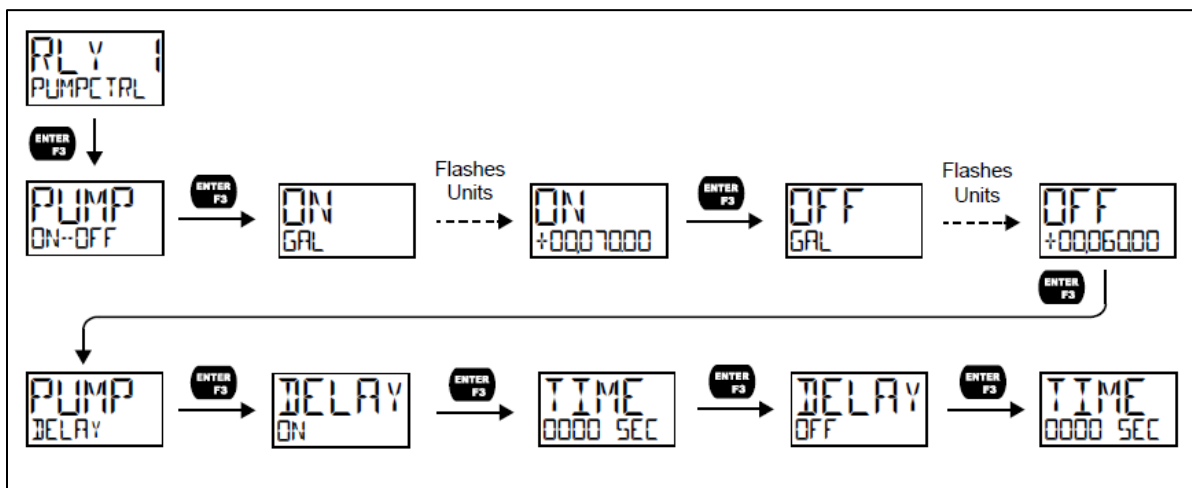


Fig 28: ON-OFF Pump Control

5.4.6.2 Pump Alteration (ALTERN)

- Pump alternation sets the two relays to alternate every time the first on point (ON 1) is reached.
- The active relay will turn off once the first off point (OFF 1) is reached.
- If the PV reaches the second on point (ON 2), the other relay will also turn ON.
- The second relay will turn off once the second off point (OFF 2) is reached, and the first relay will remain active until the first off point (OFF 1) is reached.
- ON and OFF delays are optionally programmed for each ON and OFF point to delay the relays' activation or deactivation by a certain number of seconds after reaching either the on-point or off-point.
- The alternation time (ALTTIME) parameter is set a period of relay on-time for pumps that typically remain ON. For example, if the alternation time is set to 1 hour, the active relay will deactivate after 1 hour of runtime, and the inactive relay will activate.

- If the backup pump is not able to keep Up

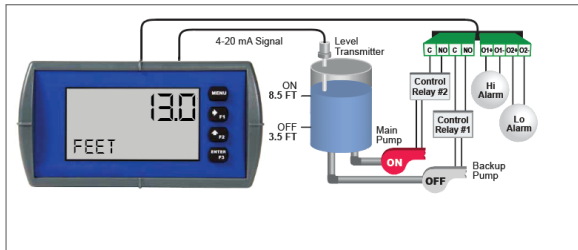


Fig 34: Relay #2 transfers and starts the main pump at level of 13 Feet

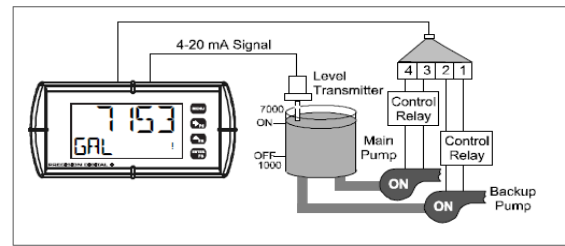


Fig 35: Relay #2 transfers and starts the main pump at level of 7000 Gallons

- Once the level has dropped below the reset points, both relays will turn off.

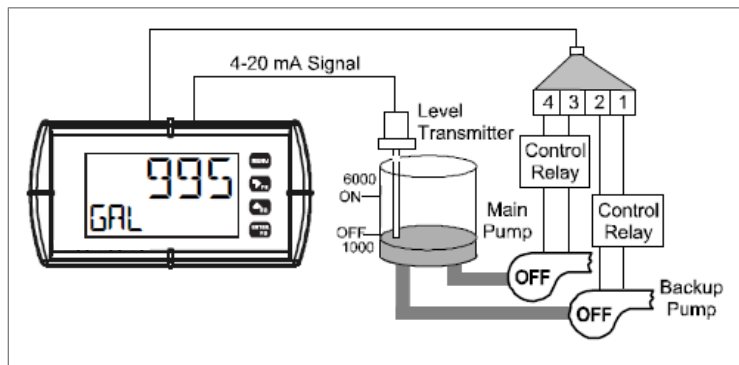


Fig 36: Relay OFF Position

5.4.6.3 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?).

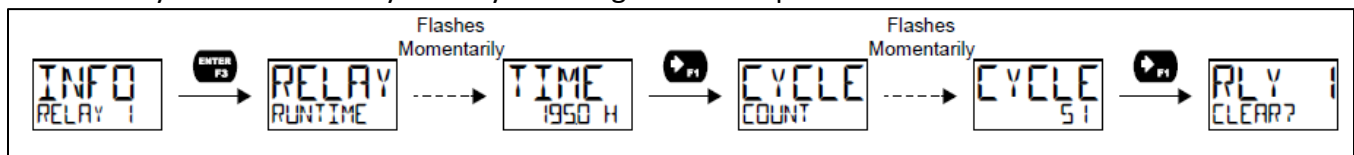


Fig 37: Relay Information

5.4.6.4 4 to 20mA

- The 4 to 20 mA menu is used to scale the 4 to 20mA output based on display values. This menu is not present on models without a 4 to 20mA output option.
- The 4 to 20 mA analog output (if equipped) can be scaled to provide a 4 to 20 mA signal for the PV display range or retransmit the 4 to 20 mA input.
- The output may be disabled (DISABLE), and will only output the minimum signal.
- Overage and Underrange values determine what mA signal the meter will output if the mA input is Underrange (<3.5 mA) or Overage (>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 required to scale the analog output.
- Program two display values and corresponding mA output signals.

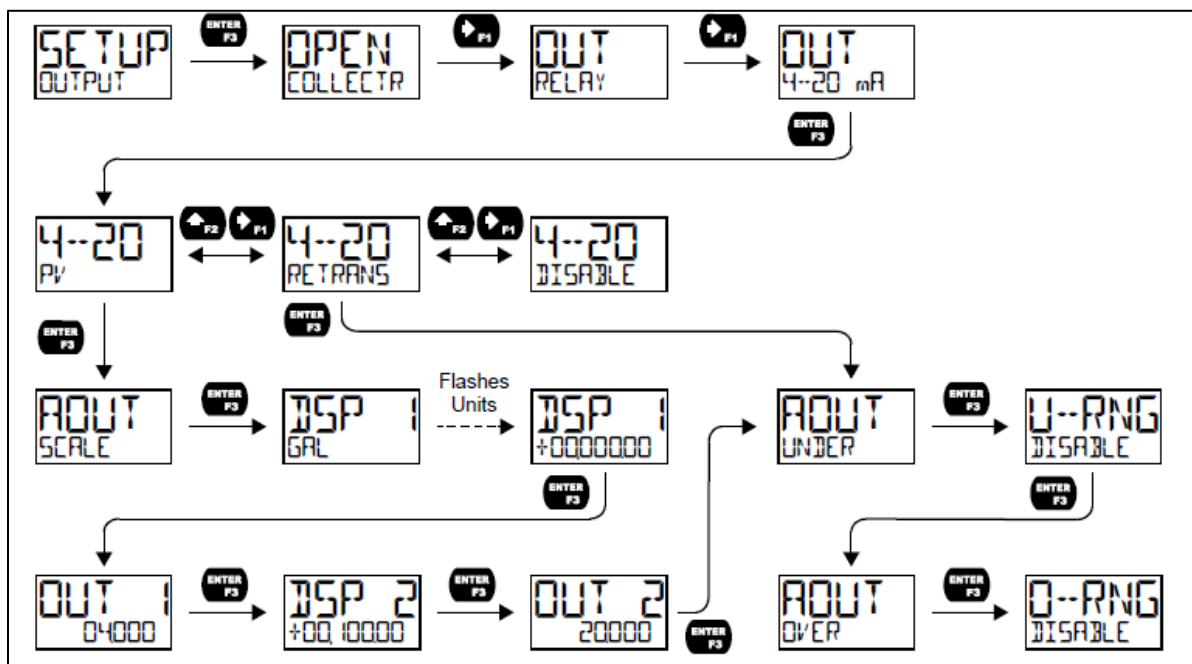


Fig 38: 4 to 20mA Output Setup

- **Process Variable** (PV)
Please enter display value 1 and a corresponding analog output value for this display to scale the analog output. Enter display value 2 and a corresponding analog output value for this displayed value. This will provide a linearly scaled analog output.
- **Retransmit** (RETRANS)
This option will retransmit the 4 to 20 mA analog input without the need to scale the output.
- **Output Control** (CONTROL)
The Control menu controls the open collector outputs, 4 to 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.

5.5 Advanced Features Menu

To simplify the setup process, functions not needed for most applications are located in the Advanced Features menu. The options under advanced features including advanced PV setup, cut-off, filter, function key programming, and system settings.

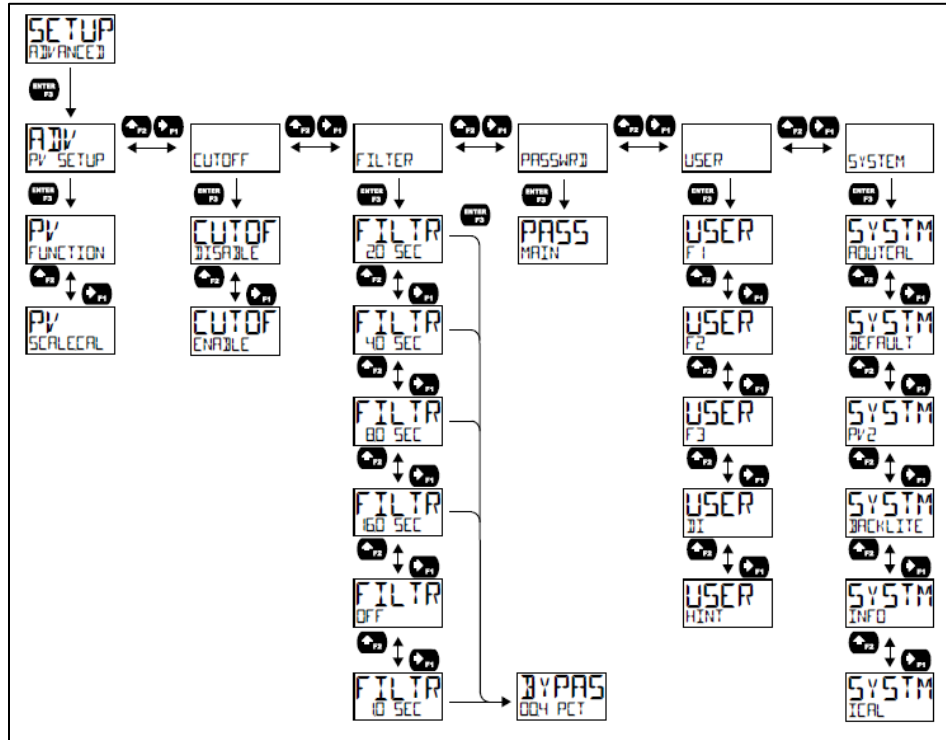


Fig 39: Advance Features Menu

5.5.1 Advanced Process Variable Setup (ADV PV SETUP)

The Advanced PV Setup menu contains options to apply signal input conditioning functions to scale or calibrate the input signal.

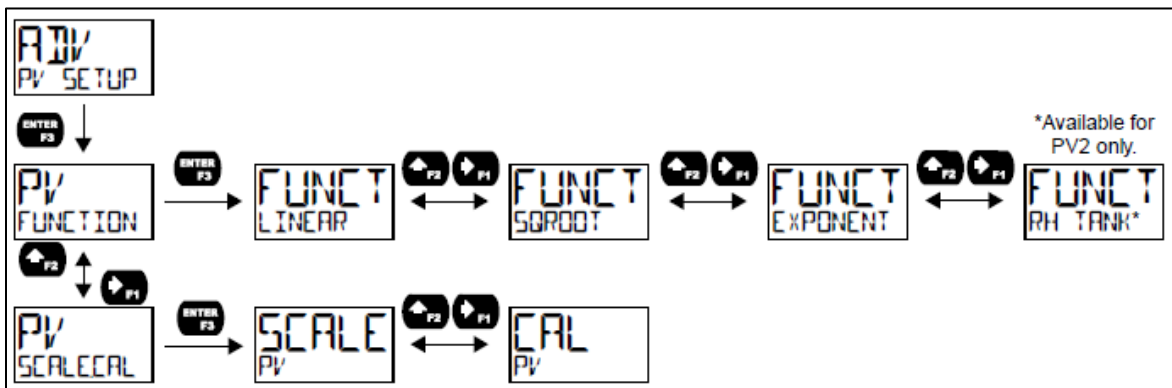


Fig 40: Advanced Process Variable Setup

5.5.1.1 Signal Input Conditioning Functions (FUNCTION)

- The Function menu selects the signal input conditioner applied to the input, such as linear, square root, programmable exponent, or round horizontal tank volume calculation.
- Multi-point linearization is part of the linear function selection.
- Meters are set up at the factory for linear function with 2-point linearization.
- The linear function provides a display that is linear with respect to the input signal.

5.5.1.2 Square Root Linearization (SGROOT)

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

5.5.1.3 Programmable Exponent Linearization (EXPONENT)

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

5.5.1.4 Multi-Point Linearization (LINEAR)

- Meters are set up at the factory for linear function with 2-point linearization.
- Up to 32 linearization points can be selected for PV1 and PV2 under the linear function.
- Multi-point linearization can linearize the display for non-linear signals such as level transmitters used to measure volume in odd-shaped tanks or convert the level to flow using exponent function.
- If the dual-scale level feature has been selected, the menus for PV1 and PV2 are enabled.

5.5.1.5 Round Horizontal Tank Linearization (RH TANK)

- This function automatically calculates the volume in a circular horizontal tank with flat ends.
- It is only available for PV2 while the meter is in dual-scale mode.
- Set the display for the desired decimal point and engineering units before entering the circular horizontal tank function.
- Select units (inches or cm) for the tank dimensions.
- Enter the diameter and length value in inches or cm.
- Results will be calculated automatically in US gallons or liters.
- The unit of measure for the volume can be changed using the display menu.

5.5.2 Advanced Scaling and Calibration (SCALECAL)

This menu offers options to scale or calibrate the meter.

5.5.2.1 Scaling the Input (SCALE)

The scale menu in the Advanced menu is same as the scale menu in the Input menu.

5.5.2.2 Input Calibration (CAL)

- The meter is calibrated to display the process in engineering units by applying the appropriate input signal.
- The ^{CAL} menu should be used with a live signal coming from a 4 to 20mA 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.

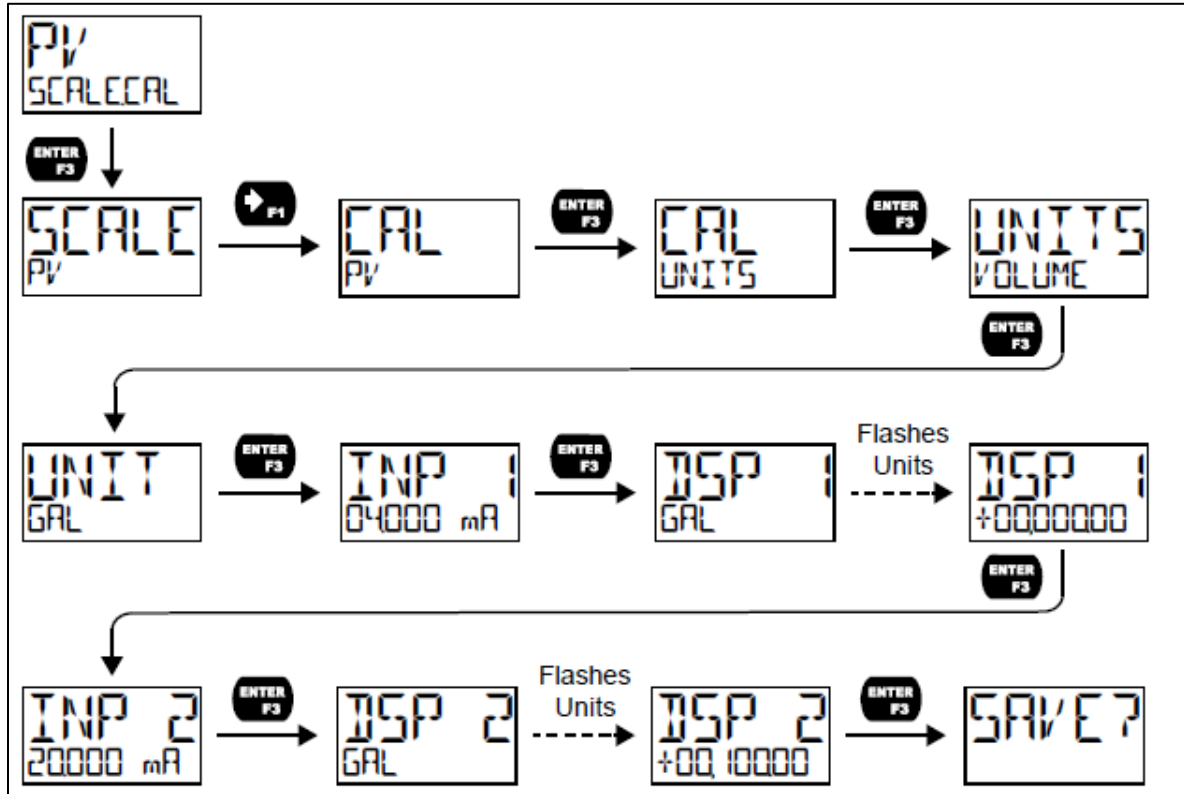


Fig 41: Input Calibration

- After accessing the SCALECAL menu, press the Right-Arrow button to scroll to the Calibration menu (CAL PV), and press Enter.
- Select the appropriate units for the desired process variable, then press Enter.
- The meter displays INP 1. Apply a known signal and press Enter. The display will flash while accepting the signal.
- After the signal is accepted, the meter displays DSP 1. Enter a corresponding display value for the signal input, and press Enter to accept.
- The meter displays INP 2. Apply a known signal and press Enter. The display will flash while accepting the signal.
- After the signal is accepted, the meter displays DSP 2. Enter a corresponding display value for the signal input and press Enter to accept.
- After completing calibration, SAVE? the display will need to be acknowledged using the Enter key before calibration will take effect.

5.5.3 Low-Flow Cut-off (CUTOFF)

- The low-flow cut-off feature allows the meter to be programmed for the often-unsteady output from a differential pressure transmitter always displays zero on the meter at low flow rates.
- The cut-off value is programmed from 0 to 999999.9. The meter will display zero below the cut-off value. The cut-off may also be disabled to display negative values.

5.5.4 Noise Filter (FILTER)

- The noise filter is available for 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 16seconds or turned off.
- The higher the filter level, the longer the averaging time, and therefore, the display takes time to settle the final value.
- Setting the filter level to off disables the filter function.

5.5.4.1 Noise Filter Bypass (BYPASS)

- The noise filter bypass changes the meter's behavior so that small variations in the signal are filtered out. However, 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 the set between 0.1 and 99.9% of full scale.

5.5.5 Enabling Password Protection (PASSWORD)

- The Password menu is used for programming security to prevent unauthorized changes to the programmed parameter settings.
- To set a password, enter the Password menu and program a five-digit password.
- When a password has been enabled, the lock icon will display in the display's lower right.
- Please refer Setting Numeric Values section for instructions on how to program numeric values.

5.5.5.1 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 Programming Mode, the meter returns to its password-protected condition.
- Disabling Password Protection.
- To disable password protection, access the Password menu and clear the entered 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.



NOTE

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

5.6 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 to access some of the menus or activate specific functions immediately (e.g., reset max and min, hold relay states).
- This allows the meter to be significantly customized for use in specialized applications.

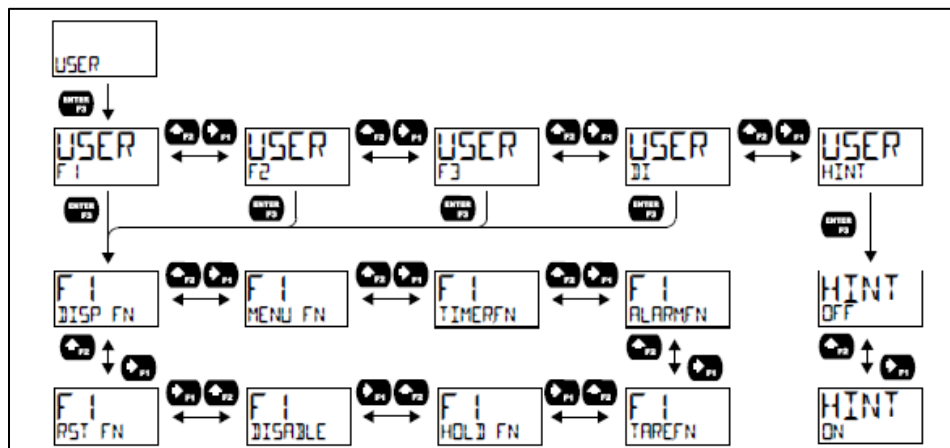


Fig 42: Programmable Function Keys User Menu

Table 5: Function Keys and Digital Input Available Settings

Display	Description
DISP FN	Set the function key or digital input to display a value
DISPLAY	Cycle max, min, and PV(s)
DISP PV	Display the PV
PCT PV	Display the PV's percentage of max (20 mA)
UNITS	Display the PV's units
TAG	Display the PV's tag
DISPMIN	Display the PV's minimum
DISPMAX	Display the PV's maximum
MIN MAX	Display the PV's minimum and maximum value
mA IN	Display the mA input value
mAOUT	Display the mA output value
MENU FN	Set the function key or digital input to access a menu
RLYINFO	Go to relay information menu (INFO)
MANCTRL	Go to output control menu (CONTROL)
TIMR DC1	Open collector 1 timer
TIMR DC2	Open collector 2 timer
TIMER R1	Relay 1 timer
TIMER R2	Relay 2 timer
TIMERFN	Set the function key or digital input to start or stop a timer
STARTALL	Start all timers
STOPALL	Stop all timers
SSTPALL	Start or stop all timers
DC1	Start/stop open collector 1 timer
DC2	Start/stop open collector 2 timer

RLY 1	Start/stop relay 1 timer
RLY2	Start/stop relay 2 timer
START	Start the selected timer output
STOP	Stop the selected
STR--STP	Start or stop the selected timer output
ALARMFN	Set the function key or digital input to acknowledge an alarm
ACK	Acknowledge all active alarms
SETPDINT	View all output set points
SETPDCE1	View open collector 1 set points
SETPDCE2	View open collector 2 set points
SETPTR1	View relay 1 set points
SETPTR2	View relay 2 set points
SWATCHFN	Set the function key or digital input to activate stopwatch
START	Start the stopwatch
STOP	Pause/Stop the stopwatch
STR--STP	Start or stop the stopwatch
TAREFN	Set the function key or digital input to tare the display value
TARE	Tare the display value
RST TARE	Reset the display value
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
OC 1+2	Hold/un-hold open collector outputs
RLY 1+2	Hold/un-hold relay outputs
mAOUT	Hold/un-hold 4-20 mA output
HOLD	Hold selected output
HL UNHLD	Hold or un-hold selected output
DISABLE	Disable the function key or digital input
RST FN	Set the function key or digital input to reset a value
RESET	Reset min, max, or max/min PV value
R MINMAX	Reset max and min PV Val

5.6.1 Enabling the Function Key Hint Feature (HINT)

- Enabling the function key Hint feature will cause a hint message to display 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) intended for immediate execution.

5.6.2 System Settings (SYSTEM)

The System menu contains Analog Output Calibration, Restore Factory Defaults, Dual-Scale (PV2), Backlight, Information, and Internal Calibration menus.

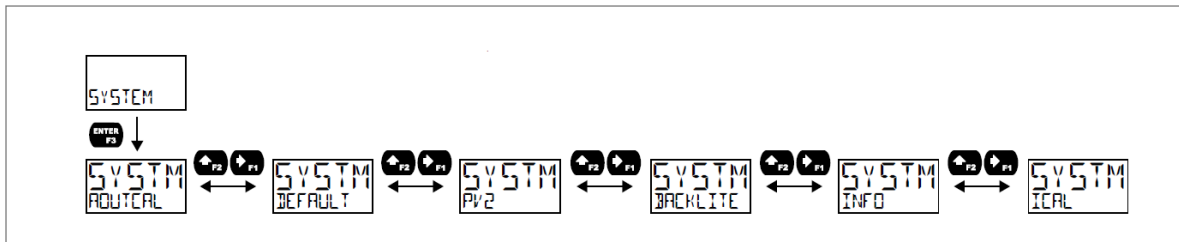


Fig 43: System Settings

5.6.3 Analog Output Calibration (ADUTCAL)

- It is recommended to use a mA meter with a resolution of at least 0.1µA to measure the output current to perform the analog output calibration.
- During this procedure, the values saved internally are used for scaling the 4-20 mA output in the Setup menu.

5.6.4 Resetting the Meter to Factory Defaults (DEFAULT)

- When the parameters have been changed in a difficult way 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.

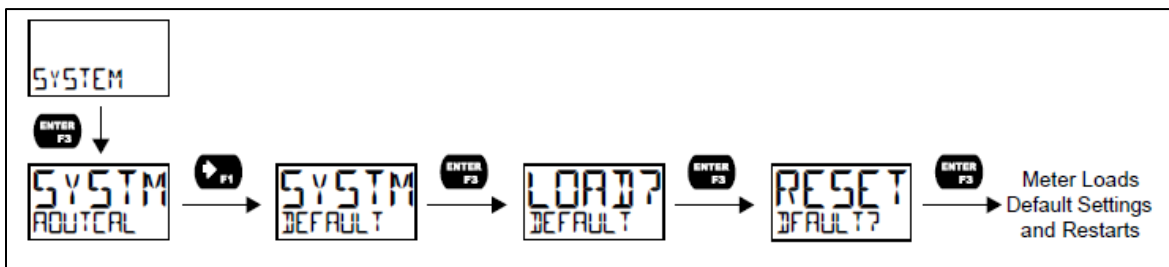


Fig 44: Resetting the Meter to Factory Defaults

5.6.5 Enabling the Dual-Scale Feature (PV2)

- For some level applications, such as displaying the height and volume of a tank, it is possible to enable a second PV, scaled to display a different value based on the same 4-20 mA input. This is accomplished by enabling the dual-scale feature (PV2).
- When the dual-scale feature is enabled, additional menus will be displayed to allow for the second PV programming. The input menu will display PV1 and PV2 for scaling, and the display menu will allow both PVs to be displayed on either line, for example. See table 4 for additional information on where additional dual-scale specific menus will appear.
- PV2 must be enabled to use the Circular Horizontal Tank feature. Please refer to Circular Horizontal Tank Linearization.





- 5.6.6 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 for the backlight to function.
 - Please refer to Current Loop (4-20 mA) Connections. The voltage drop is the same if the backlight is disabled in the software.
- 5.6.7 Viewing System Information (INFO)
- System information, such as software number, software version, model number, and system tag, may be viewed in the INFO menu.
 - Press the Right Arrow button to cycle through all available meter information.
 - Press Menu to go back to the previous menu.

6 Operations

- The meter is capable of accepting a 4-20 mA current signal and displaying it in engineering units from -9,999 to 99,999 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 -50.00 to 50.00.
- The dual-line display can be customized by the user to operate in such a way to satisfy a specific application. Typically, the top line is used for the process variable while the bottom line is used for engineering units, custom tag, or process variable percentage of full scale.
- The 4-20 mA input can be scaled to display the process in two different scales; for example: with PV2 en-abled, the main display could indicate level in feet and the second display could indicate the volume in gallons.

6.1 Front Panel Buttons Operation

Table 6: Front Panel Buttons Operation

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

6.2 Function Keys Operation

- During operation, the programmable function keys operate according to how they have been programmed in the Advanced Features – User menu.
- A hint message may be enabled to describe what each function key does before executing their assigned function.

6.3 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 how it has been programmed in the Advanced Features – User menu.

6.4 Maximum/Minimum Readings

- The max and min readings (peak and valley) reached by the process can be displayed either continuously or momentary:
 - Display briefly by pressing the F1 key (default) or assigning it to any other function keys or the digital input in the User menu.
 - Display continuously by pressing the Enter button while the max/min is displayed to lock the display. Press Enter again to unlock.
- Any of the F1 to F3 function keys (buttons) and the digital input can be programmed to reset the max and 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.

7 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.

7.1 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 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 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.

7.2 Determining Software Version

To determine the software version of a meter as follows:

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.

7.3 Troubleshooting Tips

Table 7: Troubleshooting Tips

Symptom	Check/Action
No display or faint display	Check input signal connections. Perform hard reset by shorting S+ and S- terminals.
Rates display unsteady	Increase filter setting in Advanced menu.
Meter displays error message during calibration (Span error)	Check signal connections. Verify minimum input span requirements.
Meter flashes 99999 or -9999	Check input signal is within the scaled range (99999 and -9999).
Display stuck displaying MAXIMUM or MINIMUM	Press Menu to exit Max/Min display readings.
Display response is too slow	Check filter setting to see if it can be lowered to LO or OFF.
If the display locks up or the meter does not respond at all	Perform hard reset by shorting S+ and S- terminals.
Backlight does not appear	Backlight is intended for viewing assistance in dim lighting conditions. It may not be noticeable under good lighting conditions.
Other symptoms not described above	Call Technical Support for assistance.
Through-window buttons do not respond	Service menu was selected, or mechanical button was pushed. The through-window buttons will be re-enabled automatically 60 seconds after the last button push. If slide switch on connector board is in Lock position, switch to Unlock. Sunlight can interfere with the sensors. It is recommended to shield the window from sunlight as it can interfere with the sensors while operating the buttons.



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