TEK-TROL

Technology Solutions

TEK-LCD 7802A

NEMA 4X Loop-Powered Flow Rate/Totalizer Indicator

Instruction Manual

Document Number: IM-7802A

www.tek-trol.com

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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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Disclaimer

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WARNING

- Risk of electric shock or personal injury.
- This product is not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using this product for such applications does so at his/her own risk. Tek-Trol LLC shall not be held liable for damages resulting from such improper use.
- Failure to follow installation guidelines could result in death or serious injury. Make sure only qualified personnel perform the installation.

CAUTION

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

Limited Warranty

Tek-Trol LLC warrants this product against defects in material or workmanship for the specified period under “Specifications” from the date of shipment from the factory.
Tek-Trol’s liability under this limited warranty shall not exceed the purchase value, repair, or replacement of the defective unit.

Registered Trademarks

All trademarks mentioned in this document are the property of their respective owners.

1 Safety Instructions

WARNING

- Installation and service should be performed only by trained service personnel. Service requiring replacement of internal components must be performed at the factory.
- Disconnect from supply before opening enclosure. Keep cover tight while circuits are alive.
- If the meter is installed in a high voltage environment and a fault or installation error occurs, high voltage may be present on any lead.

1.1 Installation

WARNING

Hazardous voltages may exist within enclosure. Installation and service should be performed only by trained service personnel.

Wiring connectors are accessed by opening the enclosure. To access electrical connectors, remove the 2 captive screws, then disconnect the ribbon cable from the display module and set the display module aside.

1.2 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.

1.3 Conduit/Stopping Plug

The Tek-LCD 7802A is provided with three ¾ NPT threaded conduit openings and one IP68 rated ¾ NPT plastic conduit plug.

The conduit/stopping plug included has 1.29 wrenching flats and a screwdriver slot.

2 Product Description

2.1 Introduction

The Tek-LCD 7802A is a plastic field mounted loop-powered rate/totalizer fully featured for demanding applications in the harshest environmental conditions. The meter derives all of its power from the 4-20 mA loop. It is programmed using the four through-window buttons, without removing the cover, and can be scaled with or without a calibration signal. The numeric rate display will read up to 99999 and the alphanumeric total/tag display will read up to 9999999. The alphanumeric display can also be programmed to show any combination of numbers and letters up to seven characters long for use as engineering units and/or the process identification tag. The backlight lets you see the display under any lighting condition and can be powered from either the 4-20 mA loop or from a separate DC power supply.

The enclosure has three threaded conduit holes, integrated pipe or wall mounting flanges, and allows for easy installation of tamper seals.

2.2 Specifications

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

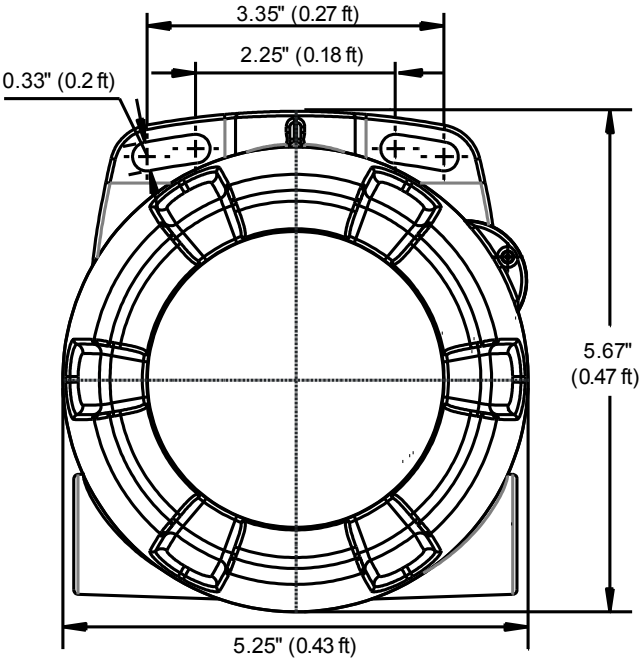
General		
Display	Five digits (-9999 to 99999)	0.70" (0.05ft) high, 7-segment, automatic lead zero blanking.
	Seven characters (Total and/or Tag)	0.4" (0.03ft) high, 14-segment. 7-digit Totalizer 9,999,999
	Symbols	High, Low, & Set Alarm, Password Lock
	Backlight	White
Display Update Rate	Ambient > -25°C: 2 Updates/Second Ambient < -25°C: 1 Update/5 Seconds	
Overrange	Display flashes 99999	
Underrange	Display flashes -9999	
Programming Method	Four through-window buttons when cover is installed. Four internal pushbuttons when cover is removed.	
Noise Filter	Programmable Lo, med, HI, or **OFF**	
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 and total reading are stored in non- volatile memory for a minimum of ten years if power is lost.	
Normal Mode Rejection	64 dB at 50/60 Hz	

Environmental	Operating temperature range: -40°C to 75°C (-40°F to 167°F) Storage temperature range: -40°C to 75°C (-40°F to 167°F)Relative humidity: 0 to 90% non-condensing	
Connections	Screw terminals accept 12 to 22 AWG wire	
Enclosure	NEMA 4X, IP65 plastic field enclosure. Color: grey. Three ¾ NPT threaded conduit openings. One ¾ NPT plastic conduit plug, with 1.29 wrenching flats and a screwdriver slot, is included.	
Mounting	May be mounted directly to conduit. Two slotted flanges for wall mounting or NPS 1½ to 2½ or DN 40 to 0.21ft pipe mounting. See DIMENSIONAL DRAWING on page 7.	
Overall Dimensions	5.67 x 5.25 x 4.18 (W x H x D) (0.47ft x 0.43ft x 0.34ft)	
Weight	1.65 lbs (26.4 oz, 0.75 kg)	
Warranty	3 years parts and labor	
Input		
Accuracy	±0.03% of calibrated span ±1 count, square root & programmable exponent accuracy range: 10-100% of calibrated span.	
Advanced Function	Linear, square root, or programmable exponent	
Multipoint Linearization	2 to 32 points	
Programmable Exponent	1.0001 to 2.9999	
Low Flow Cut- Off	0-99999 (0 disables cutoff function)	
Temperature Drift	50 PPM/°C from -40°C to 75°C (-40°F to 167°F) ambient	
Decimal Point	User selectable decimal point	
Totalizer	Calculates total based on rate, time base of second, minute, hour, or day, and field programmable multiplier; stored in non-volatile memory upon power loss.	
Totalizer Reset	User selectable via through-window buttons, time delay, external contact closure, or protected	
Calibration Range	An *Error* message will appear if input 1 and input 2 signals are too close together.	
	Input Range	**Minimum Span Input 1 & Input 2**
	4-20 mA	0.10 mA

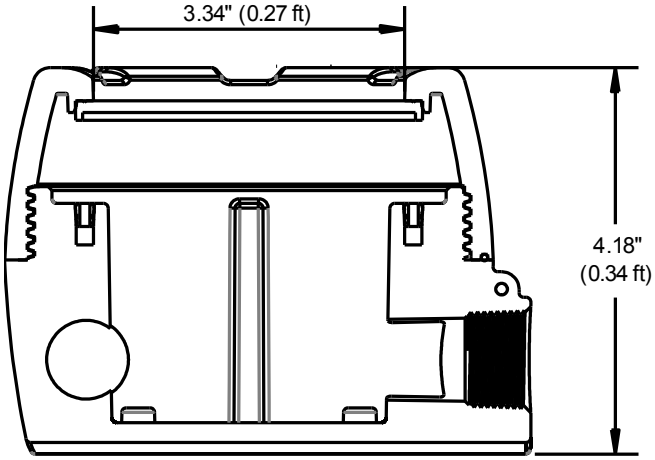
Maximum Voltage Drop	**Without Backlight or with Externally-Powered (DC Powered) Backlight**	**With Loop-Powered Backlight**
	3.0 VDC @ 20 mA	6.0 VDC @ 20 mA
Equivalent Resistance	-150 Ω @ 20 mA	300 Ω @ 20 mA
Externally Powered Backlight	**Voltage Range:**	**Maximum Power**
	9-36 VDC.	**9 VDC 12VDC 24VDC 36VDC**
		0.2 W 0.25 W 0.5 W 0.75 W
Input Overload	Over current protection to 20 mA max.	
Open Collector Output		
Rating	Isolated open collector, 30 VDC @ 150 mA max.	
Alarm Output	Assign to rate for high or low alarm trip point. Assign to total for total alarm trip point.	
Deadband	0-100% FS, user selectable	
Acknowledge	Front panel ACK button resets output and screen indication.	
Pulse Output K-Factor	K-factor programmable from 0.0001 to 99999. One pulse is generated for every total increment selected (e.g. K-factor value of 100 will generate one pulse every time the total is incremented by 100 units). If the pulse output exceeds the programmed output frequency, pulses are accumulated as pending and are not lost. Pulses will continue to output until the buffer is emptied or the total is reset from the front panel.	
Pulse Output Frequency	Programmable frequency: 2, 4, 8, 16, 32, 64, 128 Hz. Minimum pulse width: 3.9 ms @ 128 Hz Maximum pulse width: 250 ms @ 2 Hz Factory default pulse width: 31 ms @ 16 Hz	

2.3 Dimensional Drawing

Enclosure Dimensions – Front View



Enclosure Dimensions – Side Cross Section View



2.4 Ordering Information

Popular Model

Model	Description
Tek-LCD 7802A-0K1	NEMA 4X Loop-Powered Flow Rate/Totalizer

Accessories

Model	Description
Tek-LCD 7800A-PLUG75P	3/4 NPT Plastic Conduit Plug
Tek-LCD 7800A-6846	Steel Pipe Mounting Kit
Tek-LCD 7800A-6846SS	Stainless Steel Pipe Mounting Kit

2.5 Mounting

The Tek-LCD 7802A has two slotted mounting flanges that may be used for pipe mounting or wall mounting. Alternatively, the unit may be supported by the conduit using the conduit holes provided.

Refer to *Dimensional Drawing*, page 8 for details.

WARNING

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

3 Connections

WARNING

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

To access the connectors, remove the enclosure cover and unscrew the two captive screws that fasten the display module. Disconnect the ribbon cable and remove the display module. Signal connections are made to a four-terminal connector in the base of the enclosure.

SIGNAL +	4-20 mA signal input positive terminal connection
SIGNAL -	4-20 mA signal return/negative terminal connection when not using loop powered backlight.
BACKLIGHT +	+9-30 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.
OUTPUT+	NPN open collector output positive.
OUTPUT-	NPN open collector output negative.
RESET +	Contact closure reset pullup to 3 VDC
RESET-	Contact closure reset ground/negative.

Refer to Figure 1 for terminal positions.

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.

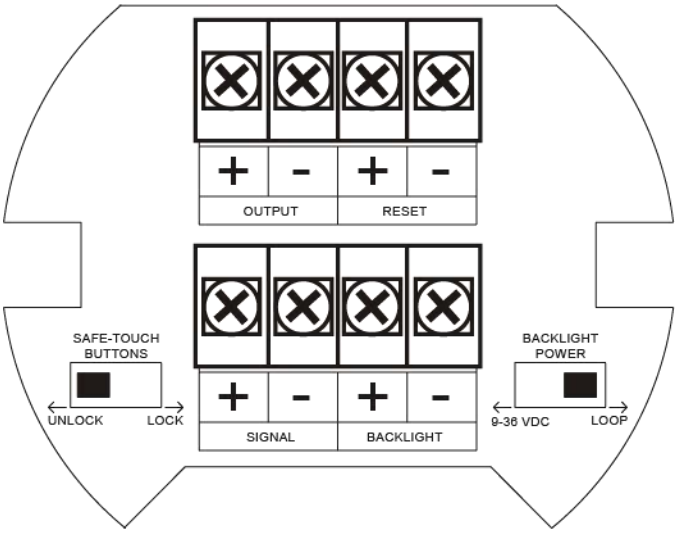


Figure 1. Connector Board

3.1 Input Signal & Backlight Connections

Signal and backlight connections are made to a four-terminal connector mounted in the base of the enclosure. For installations without backlight, only the two signal terminals are connected. The 4-20 mA input with no backlight has a maximum voltage drop of 3 V and is wired as shown in Figure 2. The loop-powered backlight configuration requires a total maximum voltage drop of 6 V. The backlight is recommended for dim lighting conditions and is enabled when wired as shown in Figure 3 or Figure 4.

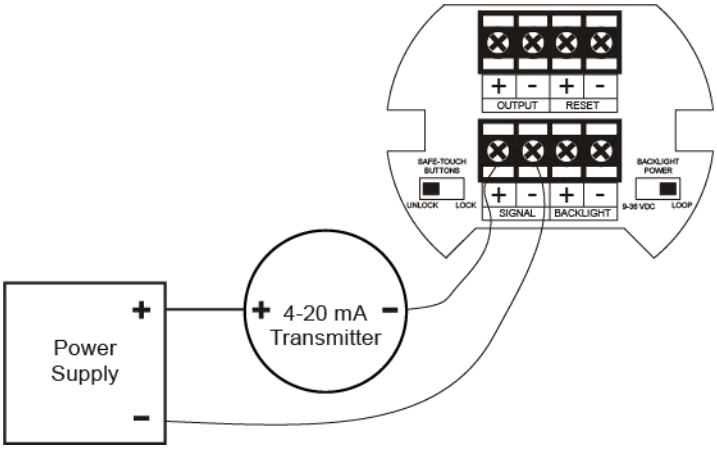


Figure 2. Input Connections without Backlight

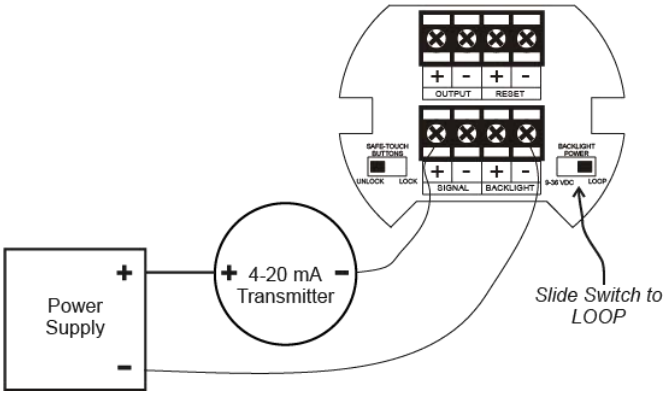


Figure 3. Input Connections with Loop-Powered Backlight

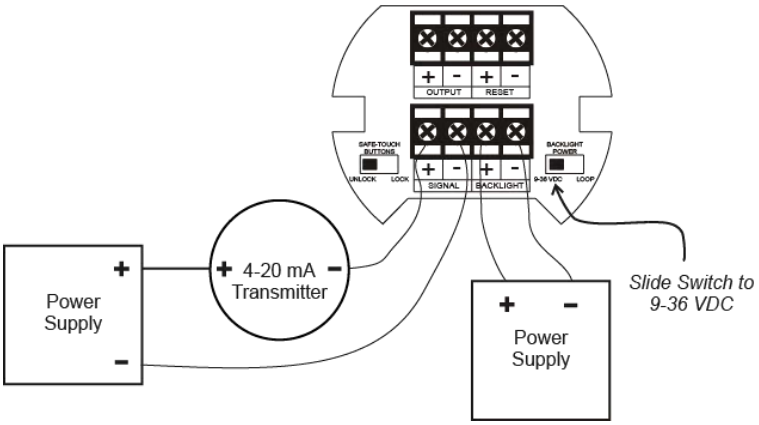


Figure 4. Input Connections with Externally-Powered Backlight

It is possible to use the same transmitter (signal loop) power supply for the externally powered backlight. The backlight circuit will draw 25 mA in addition to the loop circuit.

3.2 External Reset Connection

External reset connections are made to two terminals labelled Reset. Connect to a contact closure source such as a relay or a pushbutton as shown in Figure 5.

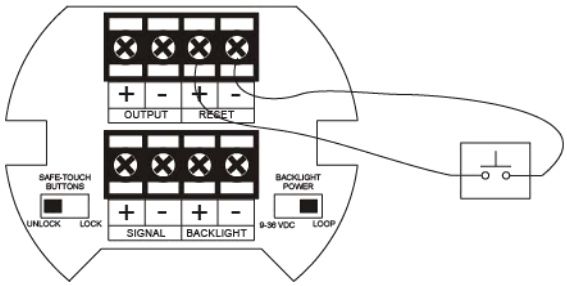


Figure 5. Reset Connections

3.3 Open Collector Output Connections

Output connections are made to two terminals labelled OUTPUT. Connect to an input device such as alarm indicator or pulse counter as shown in Figure 6, or drive a relay as shown in Figure 7.

To avoid damaging the Tek-LCD 7802A's amplifying components, use care not to wire incorrectly or exceed output ratings. A diode, such as 1N4000 series, will provide protection from relay transients.

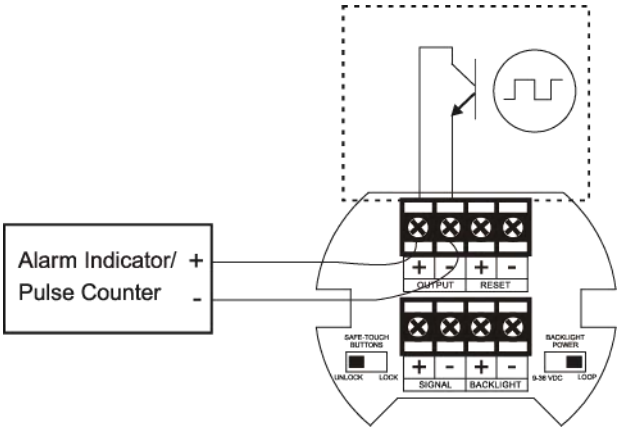


Figure 6. Connection to Device with Internal Pull-Up

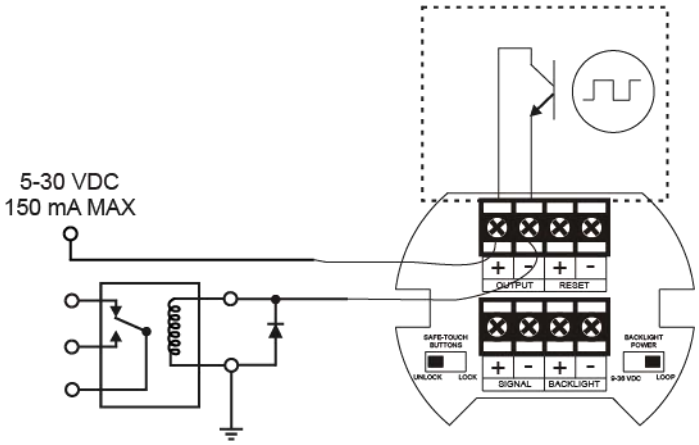


Figure 7. Output Connections

4 Setup and Programming

There is no need to recalibrate the meter for milliamps when first received from the factory.
The meter is factory calibrated for milliamps prior to shipment. The calibration equipment is certified to NIST standards.

4.1 Overview

Setup and programming are done through the infrared through-window buttons or using the mechanical buttons when uncovered. There are two slide switches located on the connector board. One is used to select backlight power (if equipped) and the other is to lock or unlock the through-window buttons.

4.2 Through-Window Buttons

The Tek-LCD 7802A is equipped with four sensors that operate as through-window buttons so that it can be programmed and operated without removing the cover. These buttons can be disabled for security by selecting the LOCK setting on the switch located on the connector board in the base of the enclosure. To actuate a button, press one finger to the window directly over the marked button area. When the cover is removed, the four mechanical buttons located next to the sensors are used. The sensors are disabled when a mechanical button is pressed and will automatically be re-enabled after 60 seconds of inactivity.

The through-window buttons are designed to filter normal levels of ambient interference and to protect against false triggering, however, it is recommended that the through-window buttons be disabled (slide switch to LOCK) if there is an infrared interference source in line-of-sight to the display.

Through-Window Button Tips:

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

After all connections have been completed and verified, apply power to the loop.

4.3 Buttons and Display

Button Symbol	Description
MENU	Menu
RESET	Right arrow/Reset
DISPLAY	Up arrow/Max
ENTER	Enter

Symbol	Status
HI	High Alarm Set
LO	Low Alarm Set
SET	Total Alarm Set
🔒	Password Enabled

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

4.4 Main Menu Display Functions & Messages

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

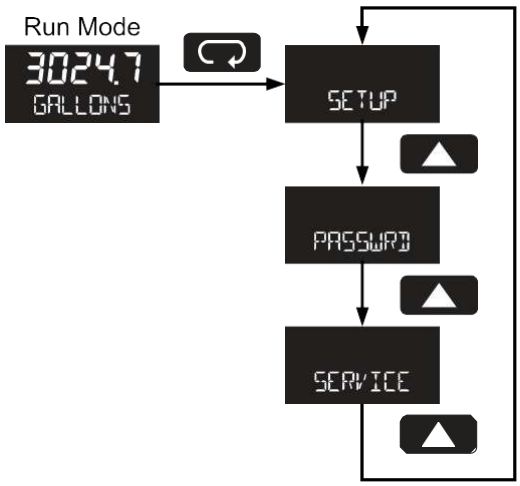
Display	Parameter	Action/Setting
SETUP	*Setup*	Enter Setup menu
DEC.pt	*Decimal point*	Enter Decimal Point menu
Rate	*Rate decimal*	Set rate display decimal point
totAl	*Total decimal*	Set total display decimal point
PRoG	*Program*	Enter the Program menu
sCAlE	*Scale*	Enter the Scale menu
CAl	*Calibrate*	Enter the Calibrate menu
Inpt1	*Input 1*	Calibrate input 1 signal or program input 1 value
DspL1	*Display 1*	Program display 1 value
Inpt2	*Input 2*	Calibrate input 2 signal or program input 2 value
DsPl2	*Display 2*	Program display 2 value
Span Error	*Span Error*	Error, calibration not successful, check signal
TbASE	*Time Base*	Enter the Time Base menu
sEc	*Second*	Units per second
Min	*Minute*	Units per minute
hour	*Hour*	Units per hour
dAy	*Day*	Units per day
TotCF	*Conversion Factor*	Enter the Conversion Factor menu
T rST	*Total Reset*	Enter the Total Reset menu
Auto	*Automatic*	Automatic Total Reset
T DELAY	*Time Delay*	Automatic Reset Time Delay
M An	*Manual*	Manual Total Reset
EnAbl	*Enable*	Enable Manual reset
DisplAy	*Parameter*	Action/Setting
dsAbl	*Disable*	Disable Manual reset
tAG	*Tag/Units*	Enter the Tag/Units Menu
ON	*Tag On*	Enable Tag/Units
OFF	*Tag Off*	Disable Tag/Units

togle	*Tag Toggle*	Toggle Tag and Total
PASSWRD	*Password*	Enter the Password menu
LOCKD	*Unlocked*	Program password to lock meter
UNLOCKED	*Locked*	Enter password to unlock meter
99999 -99999	*Flashing display*	Overrange condition Underrange condition
SERVICE	*Service*	Select before removing/installing cover for service or to clean the window

4.4.1 Main Menu

The main menu consists of the most commonly used functions: Setup, Password, and Service. Press **Menu** button to enter Programming Mode then press the **Up Arrow** button to scroll through the main menu.

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



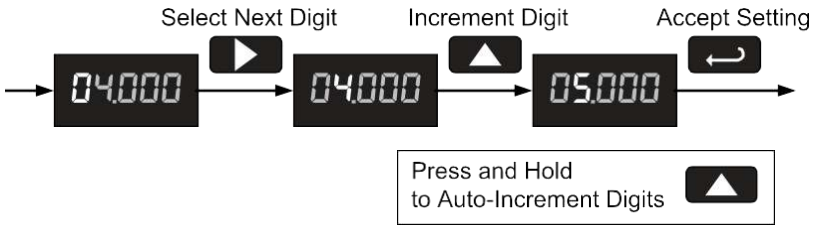
- Press **Menu**, at any time, to exit and return to Run Mode. Changes made to set- tings prior to pressing **Enter** are not saved.
- Changes to the settings are saved to memory only after pressing **Enter**.
- The display moves to the next menu every time a setting is accepted by pressing **Enter**.

4.4.2 Setting Numeric Values

The numeric values are set using the **Right** and **Up** arrow buttons. Press **Right** arrow to select next digit and **Up** arrow to increment digit. The digit being changed blinks.

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

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

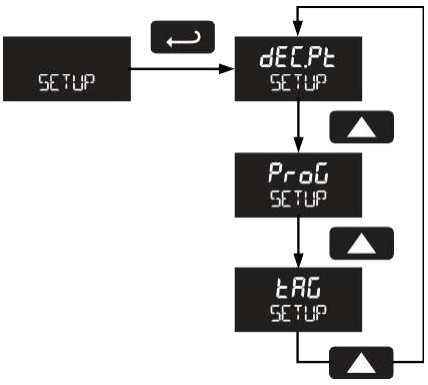


4.4.3 Setting Up the Meter (SETUP)

The *Setup* menu is used to select:

1. Rate and total decimal point position
2. Program menu
3. Rate and total tag display
4. Time base
5. Total conversion factor
6. Manual or automatic total reset function

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

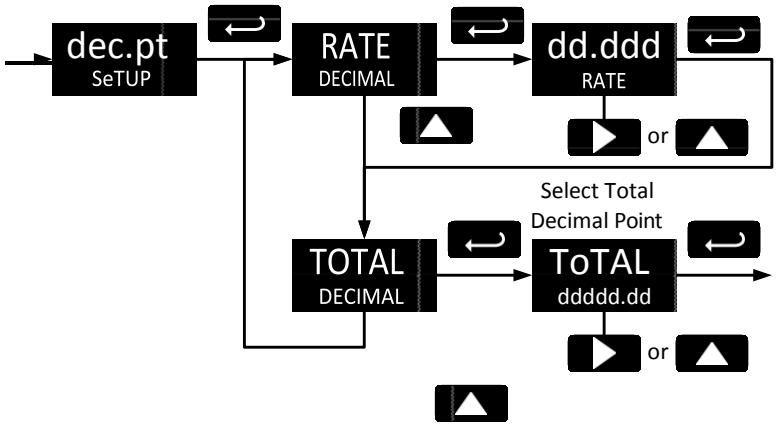


4.4.4 Setting the Decimal Point (dEc_PT)

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

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

Select Rate Decimal Point



4.4.5 Programming the Meter (PRoG)

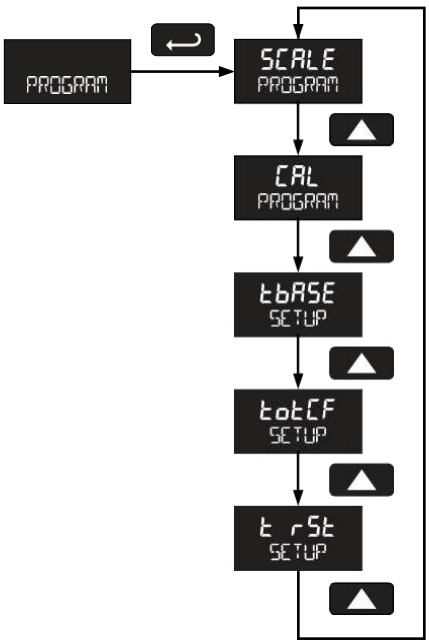
It is **very important** to read the following information, before proceeding to program the meter:

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

NOTE

The Scale and Calibrate functions are exclusive of each other. The meter uses the last function programmed. Only one of these methods can be employed at a time. The Scale and Calibrate functions can use up to 32 points (default is 2). The number of points should be set in the Advanced menu under the Multi-Point Linearization (linear) menu selection prior to scaling and calibration of the meter, see page 37 for details.

Additional parameters, not needed for most applications, are viewed and program- med with the *Advanced* features menu, see Advanced Features Menu page 29.



4.4.6 Scaling the Meter (SCALE)

The 4-20 mA input can be scaled to display the process in engineering units.

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

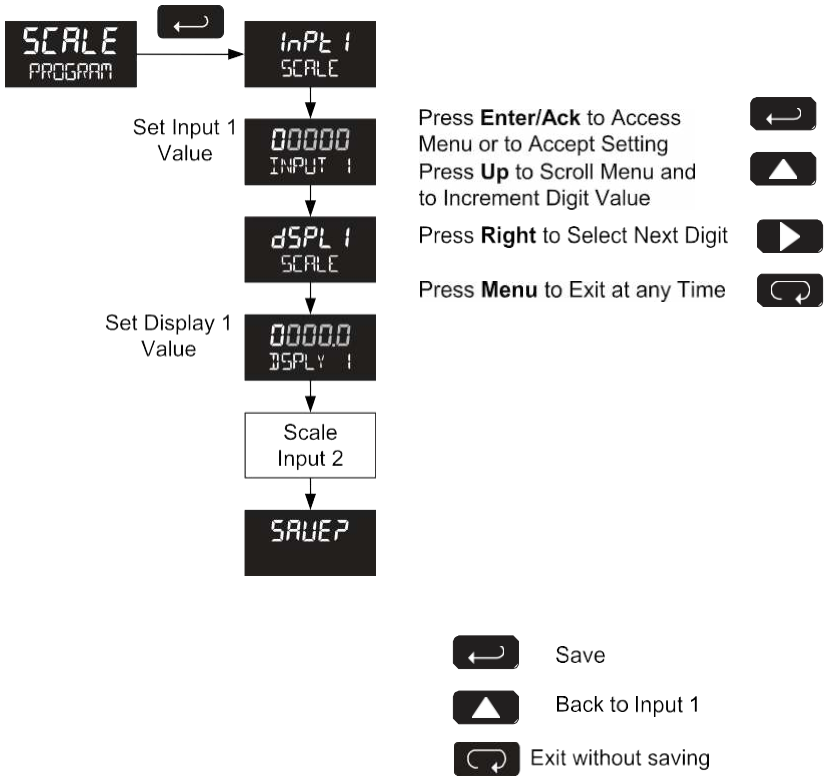


Figure 8. Scale Menu

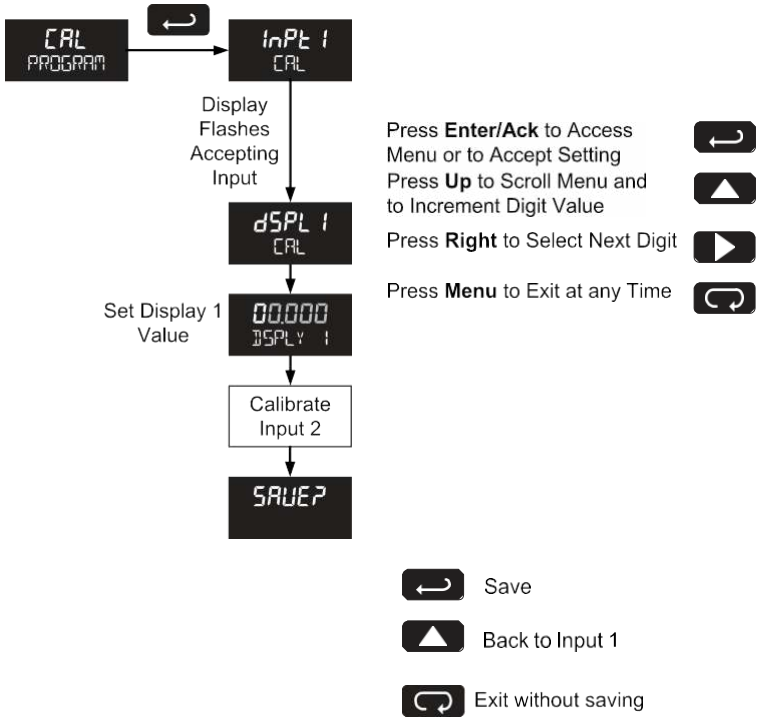
For instructions on how to program numeric values see 4.4.2 *Setting Numeric* Values, page 18.

4.4.7 Calibrating the Meter (CAL)

To scale the meter without a signal source refer to 4.4.6 Scaling the Meter (Scale), page 21.

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

The use of a calibrated signal source is strongly recommended.



1. Press the **Up**-arrow button to scroll to the *Calibration* menu (cAL) and press **Enter**.
2. The meter displays Inpt1. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
3. After the signal is accepted, the meter displays dspl1 Press **Enter**.
   Enter a corresponding display value for the signal input, and press **Enter** to accept.
4. The meter displays Inpt2. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
5. After the signal is accepted, the meter displays dspl2. Press **Enter**. Enter a corresponding display value for the signal input and press **Enter** to accept.
6. After completing calibration, the save? display will need to be acknowledged using the **Enter** key before calibration will take effect.

Minimum Input Span

The minimum input span is the minimum difference between input 1 and input 2 signals required to complete the calibration or scaling of the meter. The minimum span is 0.10 mA.

If the minimum span is not maintained, the meter reverts to input 2, allowing the appropriate input signals to be applied.

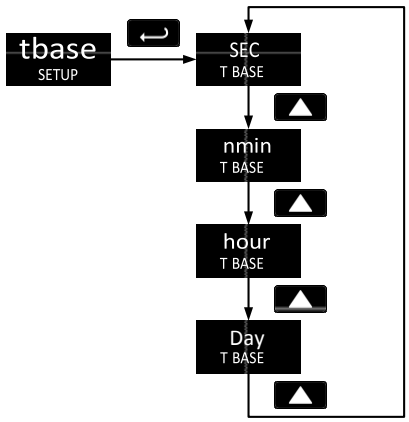
Re-Calibrating the Internal Calibration Reference (ICaL)

The Internal Calibration (ICAL) menu, located in the Advanced features menu, is used to recalibrate the internal calibration reference. Recalibration is recommended at least every twelve months. Refer to Internal Calibration (ICAL), page 33 for instructions.

4.4.8 Setting the Time Base (tbAsE)

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

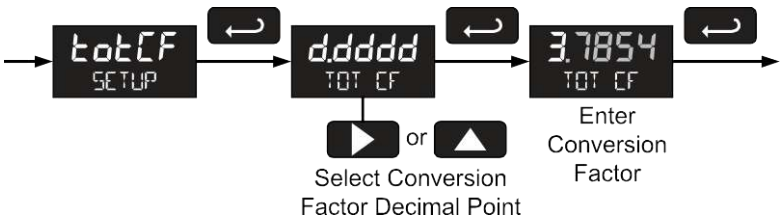
Press the Enter button, at any time, to accept a setting or Menu button to exit without saving changes. X



4.4.9 Setting the Total Conversion Factor (totCF)

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

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



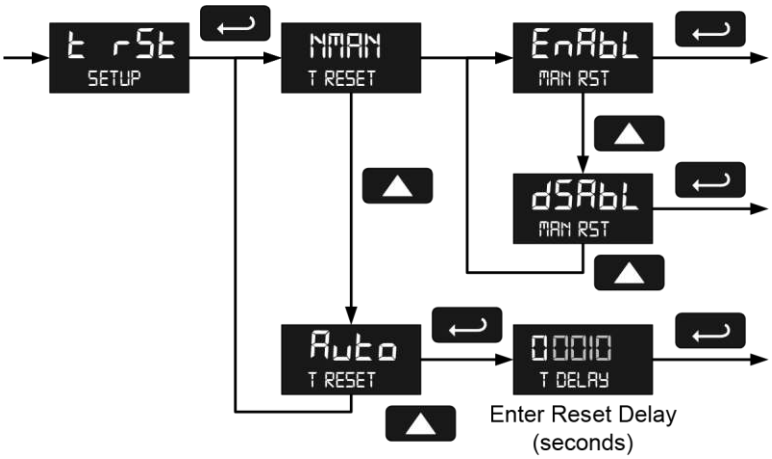
4.4.10 Manual or Automatic Total Reset Function (trST)

The meter may be programmed to reset the total either manually using the Reset button or automatically. Manual reset button may be disabled to avoid inadvertent total reset.
The automatic reset is based on the set point programmed in the Advanced menu:
OUTPUT → AlrM → totAl. Once the set point is reached, the meter waits for a programmed amount of time (t dly) and then resets the total to zero.

- To enable total reset by **Reset** button, choose M An → EnAbl.
- To disable total reset by **Reset** button, choose M An → dsAbl.
- To reset total upon total alarm set point, choose auto, enter a time delay (tdly), and proceed to programming the set point, see page 30.

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

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



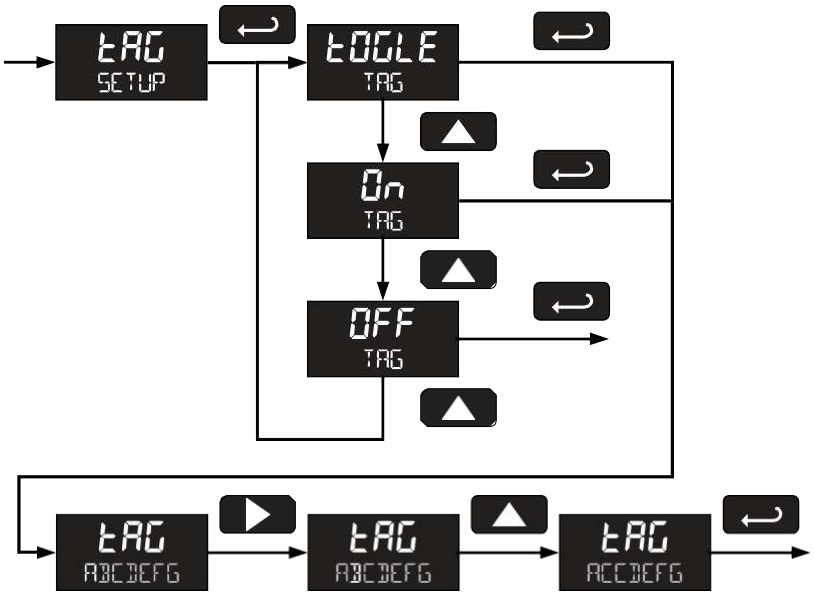
4.4.11 Setting the Tag Display (TAG)

The meter can be set to display a combination of seven alphanumeric characters for engineering units (e.g. GALLONS) or for identification (e.g. TANK 3). Press Right arrow to select next unit and Up arrow to increment unit.

- To automatically cycle the lower display between total reading for ten seconds and tag for two seconds, choose tOGlE.
- To disable the tag display and show only total reading uninterrupted on the lower display, choose Off.
- To show tag only on the lower display choose On. Totalizing continues in the background but is not shown while On is selected.

Selecting On or tOGlE prompts for entry of the tag.

The unit being changed blinks.
Press the **Enter** button, at any time, to accept a setting or **Menu** button to exit without saving changes.



4.4.12 Setting Up the Password (PASSWRD)

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

Locking the Meter

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

For instructions on how to program numeric values see 4.4.2 Setting Numeric Values, page 18.

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

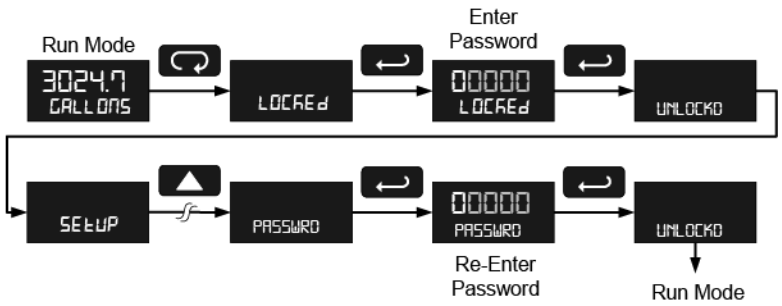
Model:	
Serial Number:	
Password:	- - - - -

Making Changes to a Password Protected Meter

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

4.4.13 Disabling Password Protection

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



If the correct six-digit password is entered, the meter displays the message UNLOCKD (unlocked) and the protection is disabled until a new password is programmed.
If the password entered is incorrect, the meter displays the message LOCKED for about two seconds, and then it returns to Run Mode. To try again, press Enter while the Locked message is displayed.

Did you forget the password?
The password may be disabled by entering a master password. If you are authorized to make changes, enter the master password 50865 to unlock the meter.

4.4.14 Service Feature (SERVICE)

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

4.5 Advanced Features Menu & Display Messages

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

Display	Parameter	Action/Setting
OUTPUT	*Output*	Enter output menu
OFF	*Off*	Disable output
AlrM	*Alarm Output*	Enter alarm output menu
RStE	*Rate Alarm*	Assign alarm output to rate
TotAl	*Total*	Assign alarm output to total
SEt	*Set Point*	Program set point
REsEt	*Reset Point*	Program reset point
PulsE	*Pulse Output*	Program pulse output K-factor
MAX HZ	*Frequency*	Program pulse output maximum frequency
Funct	*Function*	Enter advanced function menu
LnEAr	*Linear*	Set linear scaling
SquAr	*Square Root*	Set square root extraction
ProG-E	*Programmable Exponent*	Set programmable exponent
CUTOFF	*Low-Flow Cutoff*	Set low-flow cutoff
FILTER	*Filter*	Set noise filter
OFF	*Filter Off*	Disable noise filter
LO	*Filter Low*	Set noise filter to low setting
NMED	*Filter Medium*	Set noise filter to medium setting
HI	*Filter High*	Set noise filter to high setting
ICAL	*Internal Calibration*	Enter internal reference calibration
INFO	*Meter Information*	Show software number and version, or reset to factory defaults
SFT	*Software*	Software number
vEr	*Software Version*	Software version
RESET DFALTS?	*Reset Defaults*	Restore factory default parameter settings

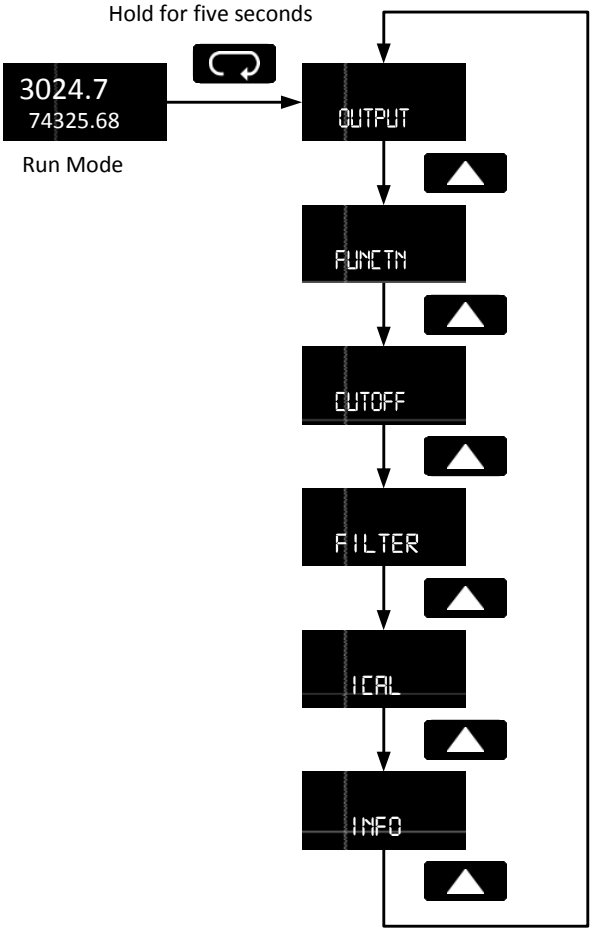
For instructions on how to program numeric values see 4.2.2 Setting Numeric Values, page 18.

4.5.1 Advanced Features Menu

To simplify the setup process, functions not needed for most applications are located in the Advanced features menu. Press and hold the **Menu** button for five seconds to access the Advanced features menu.

Press the **Enter** button to access any menu or press **Up arrow** button to scroll through choices.

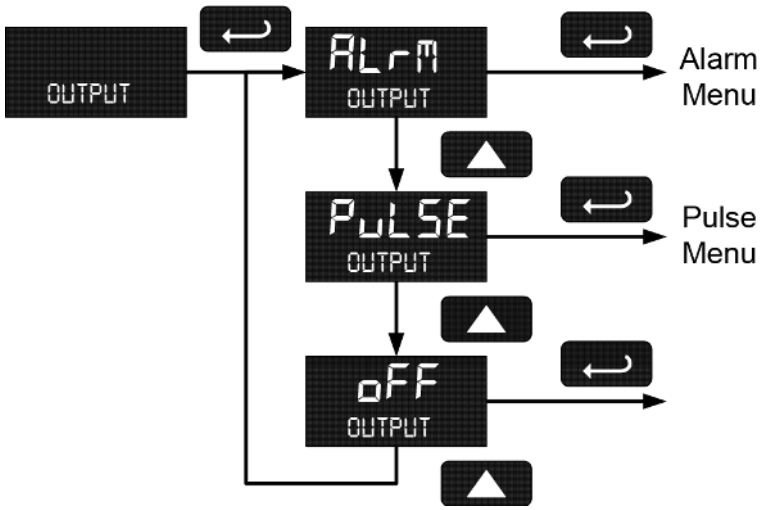
Press the **Menu** button to exit at any time.



4.5.2 Alarm & Pulse Output (OUTPUT)

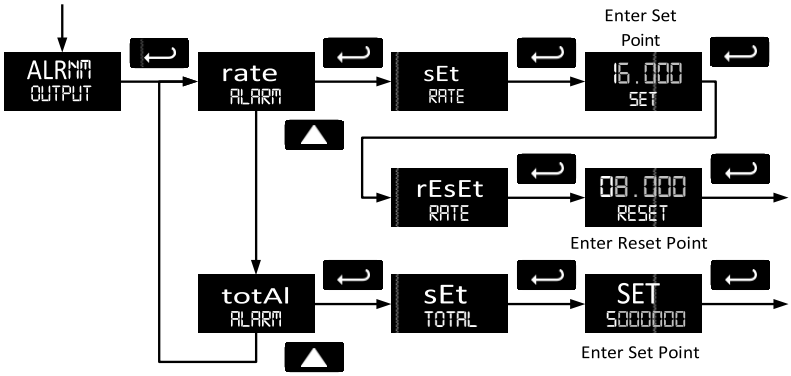
The Tek-LCD 7802A is equipped with an NPN open collector output that may be set up for high or low rate alarm trip point, total alarm trip point, or pulse output based on K-factor. The pulse output frequency may be programmed for 2, 4, 8, 16, 32, 64, or 128 Hz.

The output may be disabled by selecting off. When alarm indication is enabled, the HI and LO symbols are used accompanied by a flashing display. The alarm status will show on the display even if the output is not wired.



4.5.3 Alarm Output (Alrm)

- **Rate high alarm trip point:** program set point above reset point.
- **Rate low alarm trip point:** program set point below reset point.
- Rate alarm deadband is determined by the difference between set and reset points. Minimum deadband is one display count. If set and reset points are programmed the same, output will reset one count below set point.
- **Total alarm trip point:** program total set point. Alarm reset is triggered by total reset (There is no reset parameter entered for total). If automatic total reset is enabled, this setting will be the trigger point for the timer. It is not necessary to have the output wired for automatic reset function to work.

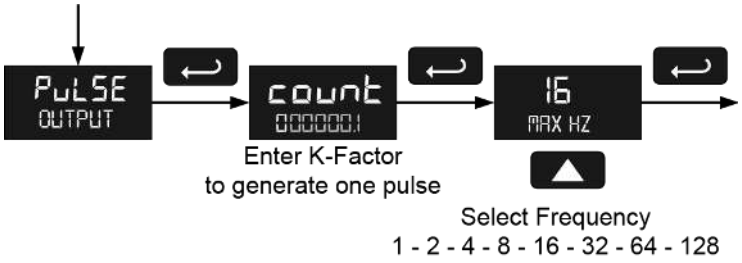


To acknowledge an alarm, press the Enter button once for acknowledge prompt and a second time to confirm.

4.5.4 Pulse Output K-Factor (PulsE)

The pulse output K-factor corresponds to the total units (e.g. gallons) needed to generate one pulse. For example, if the K-factor value is set to 10, one pulse is generated for every 10 counts incremented on the display.

If the pulse output exceeds the programmed output frequency, pulses are accumulated as pending. Pulses will continue to output until the buffer is emptied or the total is reset from the front panel.



4.5.5 Advanced Function Selection (FUNCTN)

The Advanced Function menu is used to select the advanced function to be applied to the input: linear, square root, programmable exponent, or round horizontal tank volume calculation. The 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.

4.5.6 Multi-Point Linearization (InEAr)

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

4.5.7 Manual Entry (SCALE)

Manual entry of the linearization data is done once the number of points has been selected (NO PTS). Input signal levels (InP 1-32) for up to 32 points, along with the desired/corresponding meter reading (dSP 1-32) should be entered for each linearization point. See Figure 9 on page 31.

4.5.8 External Calibration (CAL)

Linearization data can be entered using a known accurate signal source (InP 1-32) and then entering the desired/corresponding meter reading (disp 1-32) for that in-put signal level. See Figure 9 on page 31.

NOTE

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

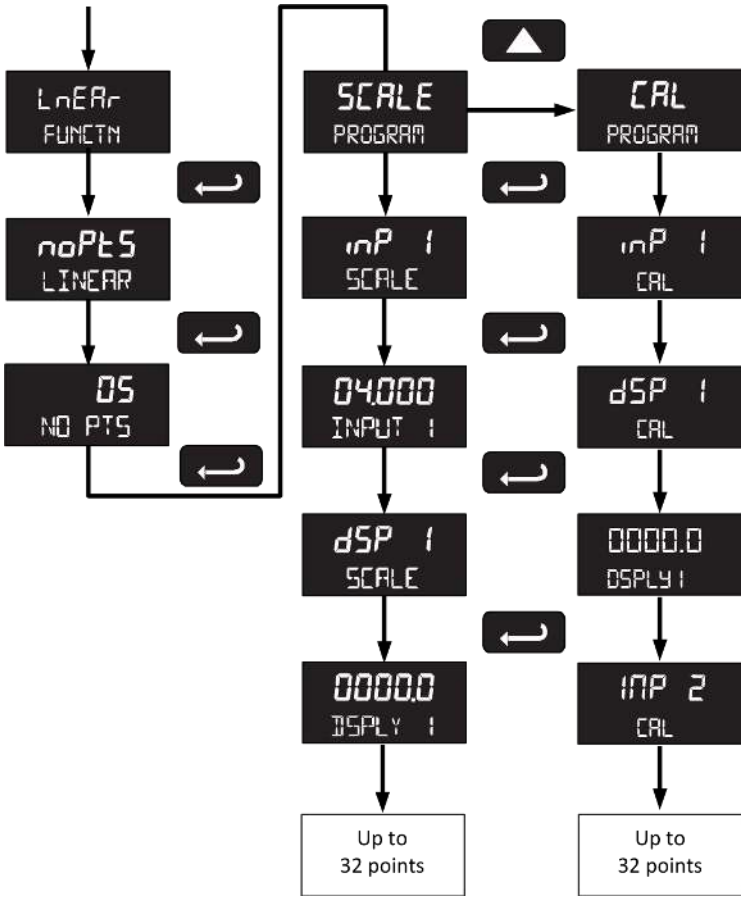


Figure 9. Multi-Point Linearization Menu

4.5.9 Square Root Linearization (SquAr)

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

4.5.10 Programmable Exponent Linearization (ProG.E)

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

4.5.11 Low-Flow Cutoff (CUTOFF)

The low-flow cutoff feature allows the meter to be programmed so that the often unsteady output from a differential pressure transmitter, at low flow rates, always displays zero on the meter. The default cutoff is zero to prevent negative readings, but this may be overridden to allow them.
The cutoff value may be programmed from -0 to 99999. Below the cutoff value, the meter will display zero. Selecting either square root or programmable exponent will set the cutoff value to 0. Program the cutoff value to 0 to disable.

4.5.12 Input Signal 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 can be set to low (LO), medium (MEd), high (HI), or off (OFF). The higher the filter setting, the longer the averaging time and so the longer the display may take to find its final value.
The filter contains a noise filter bypass feature so that while small variations in the signal will be filtered out, large, abrupt changes to the input signal are displayed immediately.

4.5.13 Internal Calibration (ICAL)

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 can be set to low (LO), medium (MEd), high (HI), or off (OFF). The higher the filter setting, the longer the averaging time and so the longer the display may take to find its final value.
The filter contains a noise filter bypass feature so that while small variations in the signal will be filtered out, large, abrupt changes to the input signal are displayed immediately.

> There is **no need to recalibrate** the meter for milliamps when first received from the factory.
> The meter is **factory calibrated** for milliamps prior to shipment. The calibration equipment is certified to NIST standards.

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

NOTE

The signal source must have a full-scale accuracy of 0.002% or better between 4 and 20 mA in order to maintain the specified accuracy of the meter.
Allow the meter to warm up for at least 15 minutes before performing the internal calibration procedure.

The Internal calibration menu is part of the Advanced features menu.
Press and hold the Menu button for 5 seconds to enter the Advanced features menu. Press the Up-arrow button to scroll to the Internal Calibration menu (ICAL) and press Enter.
The meter displays 4.000 mA. Apply a 4.000 mA signal and press Enter. The display flashes for a moment while the meter is accepting the signal.
After the signal is accepted, the meter displays 20.000 mA. Apply a 20.000 mA signal and press Enter. The display flashes for a moment while the meter is accepting the signal.

4.5.14 Error Message (SPAn ERROR)

An error message indicates that the calibration process was not successful. After the error message is displayed, the meter will revert to input 2 calibration settings. The error message might be caused by inadvertently leaving the signal at the previous level or not maintaining the minimum span. Press the Menu button to cancel the current calibration process if necessary.

4.5.15 Information (INFO)

The Internal calibration menu is part of the Advanced features menu. It shows software identification number and version number. To determine the software version of a meter:
Go to the Information menu (INFO) and press **Enter** button.
Continue pressing **Enter** to scroll through the software release number and software version.
Following the information display, the meter will exit the Advanced features menu and return to run mode.

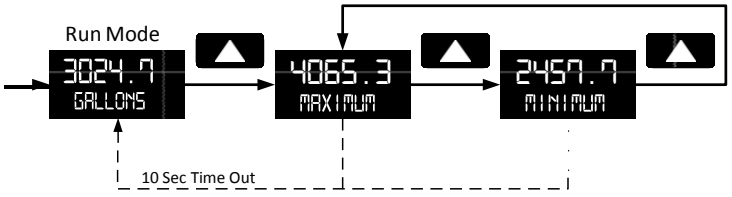
5 Operation

5.1 Front Panel Buttons Operation

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

5.2 Maximum & Minimum Readings (MAXIMUM & MINIMUM)

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



Press **Up** to Display and to Toggle Between Max & Min

Press **Enter** to hold Max/Min

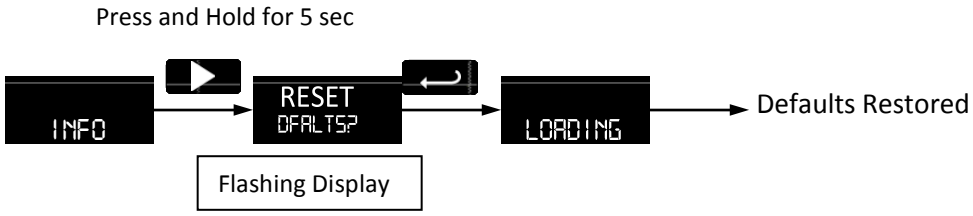
Press **Right** to Reset Max/Min

Press **Menu** to Exit Max/Min

5.3 Reset Meter to Factory Defaults

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

Instructions to load factory defaults:
Enter the Advanced features menu.
Press and hold **Reset** button when INFO is shown.
Press **Enter** when RESET DFRLTS? prompt is shown
Note: If **Enter** is not pressed within three seconds, the prompt will stop flashing return to showing INFO.



5.4 Factory Defaults & User Settings

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

Model: _____ S/N: _____ Date: _____

Parameter	Display	Default Setting	User Setting
Programming	PROGRAM	Scale	
Input 1	**InPt1**	4.000 mA	
Display 1	**Dspl1**	4.000	
Input 2	**InPt2**	20.00 mA	
Display 2	**Dspl2**	20.000	
Decimal point rate	**Dd.ddd**	3 places	
Decimal point total	**Dddddd.dd**	2 places	
Tag	**tAG**	Off	
Time Base	**tbAsE**	Minute	
Conversion Factor	**TotCF**	1.0000	
Total Reset Function	**T rst**	Manual - Enabled	
Password	PASSWRD	00000 (unlocked)	
Advanced Features			
Output	OUTPUT	Off	
Function	FUNCTN	Linear	
Cutoff	CUTOFF	0 (disabled)	
Filter	FILTER	Low	

6 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.

6.1 Troubleshooting Tips

Symptom	**Check/Action**
No display or faint display	Check input signal connections. Perform hard reset by shorting S+ and S- terminals.
Rate 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 scaled range of 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. Check connections are as shown in Figure 3 or Figure 4 on page 12.
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 while operating the buttons by standing so as to block direct sunlight.

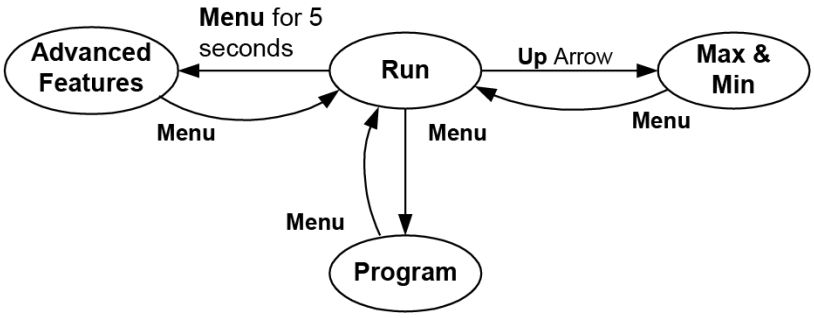
7 Quick User Interface Reference

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

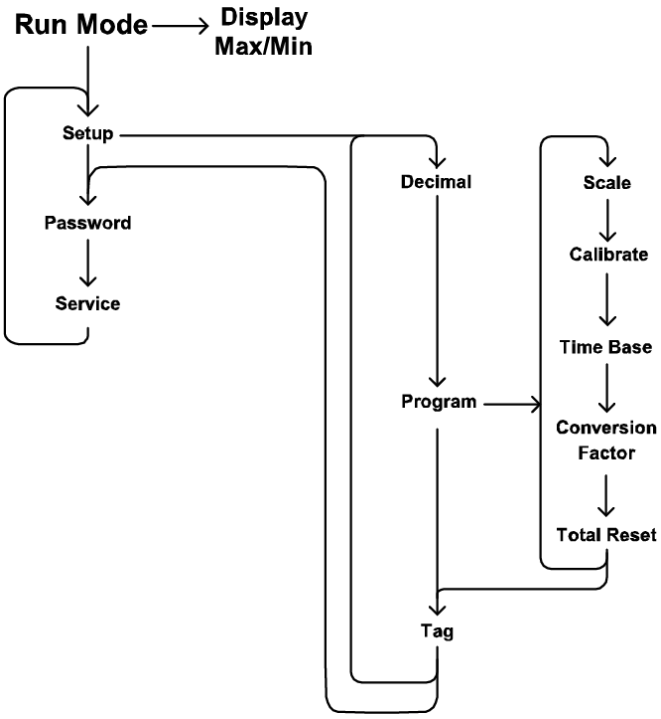
Menu held for 5 seconds enters Advanced Features Menu

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

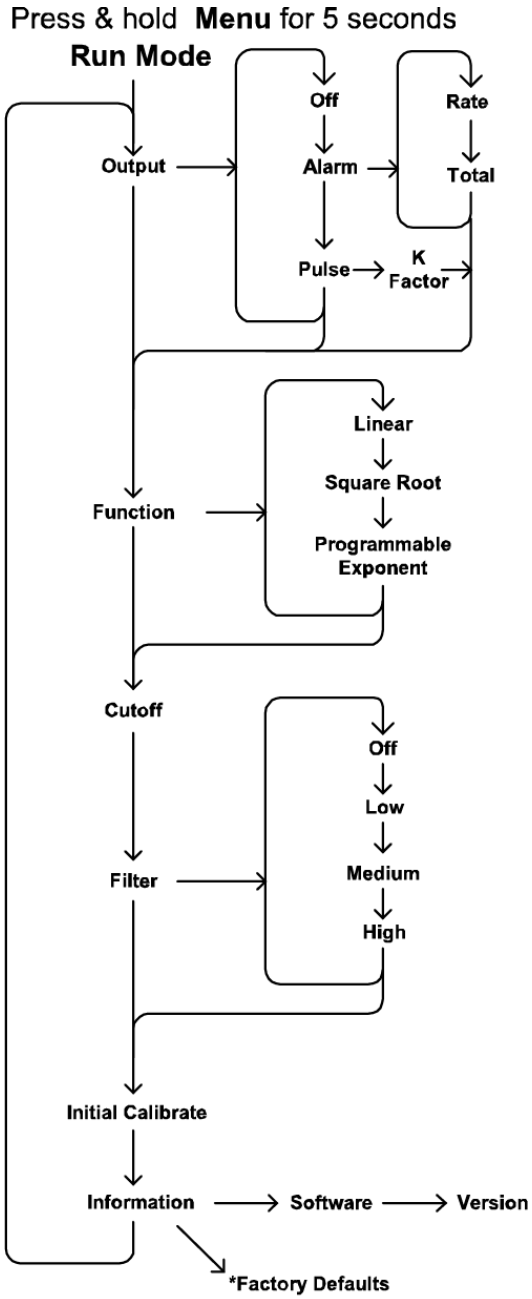
7.1 Operational Modes



Main Menu



Advanced Menu



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

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