

# **BAT R/T Millennium**

**Ratemeter / Totalizer**

Installation and Operating Instructions





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# SPECIFICATIONS

## Description

Featuring 5 digits of rate and 8 digits of total, the BAT R/T Millennium edition (BATRT-M) is a battery or loop powered indicator capable of accepting magnetic pickup, DC pulse and switch closure inputs from pulse producing flowmeters. The unit can be ordered with an optional 4-20mA output. The BATRT-M uses the 4-20mA loop to provide power when this output is used.

## Specifications

### DISPLAY:

Rate Display: (selectable decimal)

5 Digits (99999), 0.35" High, Display updates once per second with battery power, 8X per second with DC or Loop power

Rate Descriptors: /SEC, /MIN, /HR  
/MIN, /HR, /DAY with "D" option

Min. Input Frequency: 0.01 Hz to 10 Hz (selectable delay of 0.1 to 99.9 seconds) Selectable Rate Display Damping

Totalizer Display: (selectable decimal)

8 Digits (99999999), 0.2" High

Totalizer Descriptors: GAL, LIT, FT3, M3, "blank"  
GAL, BBL, MCF, M3, "blank" with "D" option

Warning Displays: Low battery warning

### PULSE OUTPUT:

The pulse output advances with the least significant digit of the totalizer or decimal multiples thereof (see Pulse scale divider).

Type: Isolated photomos relay

Max. voltage (off state): 30 VDC

Current (on state): 100mA

Pulse Duration: Selectable 0.5, 0.25, 0.125, 0.0625 seconds

Pulse Scale divider (Pulscale): User selectable,  $\div 1$ ,  $\div 10$ ,  $\div 100$  or OFF

NOTE: Select OFF for max. battery life.

### ACCURACY:

0.01% Reading,  $\pm 1$  count

Temperature Drift: 50 ppm/ $^{\circ}$ C Worst Case

### SAFETY LISTINGS (Mounting Styles 3, 3NE, 3SS):

CSA File 091109 (cert. 1120094)

UL/C-UL File E225832

CLASS 1, DIV 1, GROUPS B, C, D

Additional "enclosure only" approvals available for ATEX and IEC

**CAUTION;** KEEP COVER TIGHT WHILE CIRCUITS ARE ALIVE, A SEAL SHALL BE INSTALLED WITHIN 450mm (18 in) OF THE ENCLOSURE WHEN USED IN GROUP B ATMOSPHERES AND WITHIN 1.5m (5 ft) WHEN USED IN GROUP C ATMOSPHERE

**CAUTION;** PLUG ANY UNUSED CONDUIT ENTRIES WITH A CERTIFIED CONDUIT PLUG

**AVERTIR;** GARDER LA COUVERTURE TENDUE PENDANT QUE CIRCUITS SONT VIVANTS, UN CACHET SERA INSTALLE DANS 450 mm (18 dans) DE LA CLOTURE QUAND UTILISE DANS LES ATMOSPHERES DE B DE GROUPE ET DANS 1.5m (5 ft) QUAND UTILISE DANS L'ATMOSPHERE DE C DE GROUPE

**AVERTIR;** BOUCHER LES ENTREES INUTILISEES DE CONDUIT AVEC UN BOUCHON DE CONDUIT CERTIFIE

## ENVIRONMENTAL:

OPERATING TEMPERATURE

-4 $^{\circ}$ F (-20 $^{\circ}$ C) to + 158 $^{\circ}$ F (70 $^{\circ}$ C)

Extended Temp: -22 $^{\circ}$ F (-30 $^{\circ}$ C) to + 158 $^{\circ}$ F (70 $^{\circ}$ C)

HUMIDITY

0 - 90% Noncondensing

## MOUNTING STYLES:

- 0- Circuit Board- OEM option (consult factory)
- 1- Panel Mount - NEMA 4X Front
- 2- Wall Mount - NEMA 4X Enclosure  
(keypad mounted behind clear cover)
- 3- Explosion Proof - Class I, Division I, Groups B, C & D  
Class II, Division I, Groups E, F & G
- 3NE- Explosion Proof - White, Includes Third Conduit Entry  
Class I, Division I, Groups B, C & D  
Class II, Division I, Groups E, F & G
- 3SS- Explosion Proof - Stainless Steel  
Class I, Division I, Groups B, C & D  
Class II, Division I, Groups E, F & G
- 5- Wall Mount - NEMA 4X Enclosure  
(keypad mounted on cover)
- 6- Double Ended Explosion Proof -  
Class I, Division I, Groups B, C & D  
Class II, Division I, Groups E, F & G  
(contact factory for details)

**NOTE:** Meter mounting kits available for styles 2, 3, 5 and 6  
Consult Factory

## NPPTS:

MAGNETIC PICKUP INPUT

Frequency Range: 0 to 3500 Hz

Trigger Sensitivity: 10 mV p-p

Over Voltage Protected:  $\pm 30$  VDC

OPTO-ISOLATED DC PULSE INPUT

High (logic 1): 4-30 VDC

Low (logic 0): Less Than 1 VDC

Minimum Current: .5 mA

Hysteresis: 0.4 VDC

Frequency Range: 0 to 5 kHz

Min. Pulse Width: 0.1 msec

CONTACT CLOSURE INPUT (contact closure to common)

Internal Pullup Resistor: 100 K $\Omega$  to +3.6 VDC

High (logic 1): Open or 4-30 VDC

Low (logic 0): Less Than .5 VDC

Internal Switch Debounce Filter: 0 to 40 Hz

**NOTE:** Sustained contact closure will shorten battery life.

RESET INPUT (contact closure to common)

Internal Pullup Resistor: 100 K $\Omega$  to +3.6 VDC

High (logic 1): Open or 4-30 VDC

Low (logic 0): Less Than .5 VDC

Minimum On : 25 msec

**NOTE:** Sustained contact closure will shorten battery life.

K-FACTOR

Range: 0.001 to 99999999

Decimal Point Locations: XXXX.XXXX to XXXXXXXX

20 Point Linearization Option (10 Point with Data Logger option)

This feature allows the user to enter 20 different frequencies with 20 different corresponding K-Factors to linearize non linear signals.

## ANALOG OUTPUT OPTION:

Type: 4-20 mA follows rate display, Two wire hookup

Accuracy: 0.025% Full Scale at 20 $^{\circ}$  C

Temperature Drift:

50 ppm/ $^{\circ}$ C Typical

Reverse Polarity Protected

Update Rate: 8 times/second

**NOTE:** The BATRT-M uses the 4-20 mA loop power as its primary power source when this option is used. The battery is still required for standby battery operation.

\* Slow input pulse rates, large delay setting and internal math operations may delay the update rate of information.

# SPECIFICATIONS

(continued)

**Power:**

**BATTERY POWERED**

Supplied with 1 or 2 C size Lithium battery pack.

**EXTERNAL POWER INPUT**

Voltage: 8.5 to 30 VDC

Current: Less than 5 mA

Supplied with 1 C size lithium battery

Protection: Reverse Polarity Protection on DC Power Input

**LOOP POWERED**

Voltage: 8.5 to 30 VDC

Supplied with 1 or 2 C size lithium battery(ies)

Protection: Reverse Polarity Protection on Current Loop

Loop Burden: 8.5V maximum

**BATTERY LIFE EXPECTANCY:**

Expected Years of Operation for BATRT-M of various powering options at equipment duty cycles

MODEL	RUN TIME			
	Idle	2hrs/day	8hrs/day	24hrs/day
BATRT-M-A	10 yrs	10 yrs	10 yrs	9.1 yrs
BATRT-M-A-4	10 yrs	10 yrs	10 yrs	8.4 yrs
BATRT-M -B/C	Indefinite operation when externally powered External or loop power			

**NOTE:** Battery shelf life is rated at 10 years by manufacturer  
Life expectancy based on rated battery capacity at 20°C

The above table is shown with pulse output inactive.  
Use of pulse output shortens battery life.

Example: A pulse output of 0.06 sec. duration, once per second, would derate the battery life by 20%.

**DATA STORAGE:**

Setup Information: Stored in flash memory

Totalizer: Stored in battery backed RAM but can be saved to flash memory by operator for recall after battery change out.

**COMMUNICATIONS OPTION (S1):**

**RS232 SERIAL SETUP SOFTWARE OPTION:**

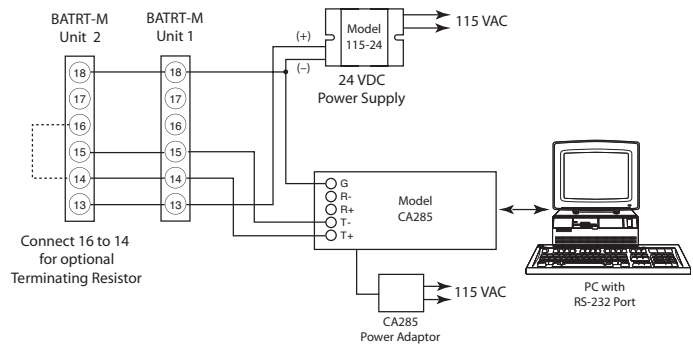
This option enables you to access a variety of process parameters through serial communications. PC compatible communications software is included with this option. With this software and a BAT R/T-M Serial Adapter Cable (BSAC1) you will be able to setup the BAT R/T-M through your PC.

**RS-485 MODBUS and DATA LOGGER OPTION (S2):**

The optional RS-485 card utilizes Modbus RTU protocol to access a variety of process parameters. The Data Logger stores the totalizer to flash memory once every 24 hours at the time you set. The data logger can hold 27 days of totals, on the 28th day the oldest total in the logger is dropped. Requires external DC power: 6-28VDC (input is reverse polarity protected)  
Current Draw:

Receiving: 2 mA

Transmitting: 125 mA (instantaneous peak)



## BATTERY INSTALLATION and REPLACEMENT

### Battery Installation:

All BATRTM models are shipped without the battery(ies) installed. This preserves battery life when the unit is not in service. When using external BATPACK, mount within 12" and plug connector into 3 position square posts (see Fig 1). Polarity is not a concern because center is common.

To install the battery, begin by locating the battery holder. The BATRTM-2, 3, 3NE, 3SS, 5 and 6 require opening the enclosure cover and removing the BATRTM to expose the battery holder.

The plus terminal of the battery is marked with a (+) symbol stamped into the battery holder. Be sure to install the battery(ies) correctly.

Install battery(ies) to begin setup procedure. See Programming Flowchart to setup desired operating parameters.

### Battery Replacement:

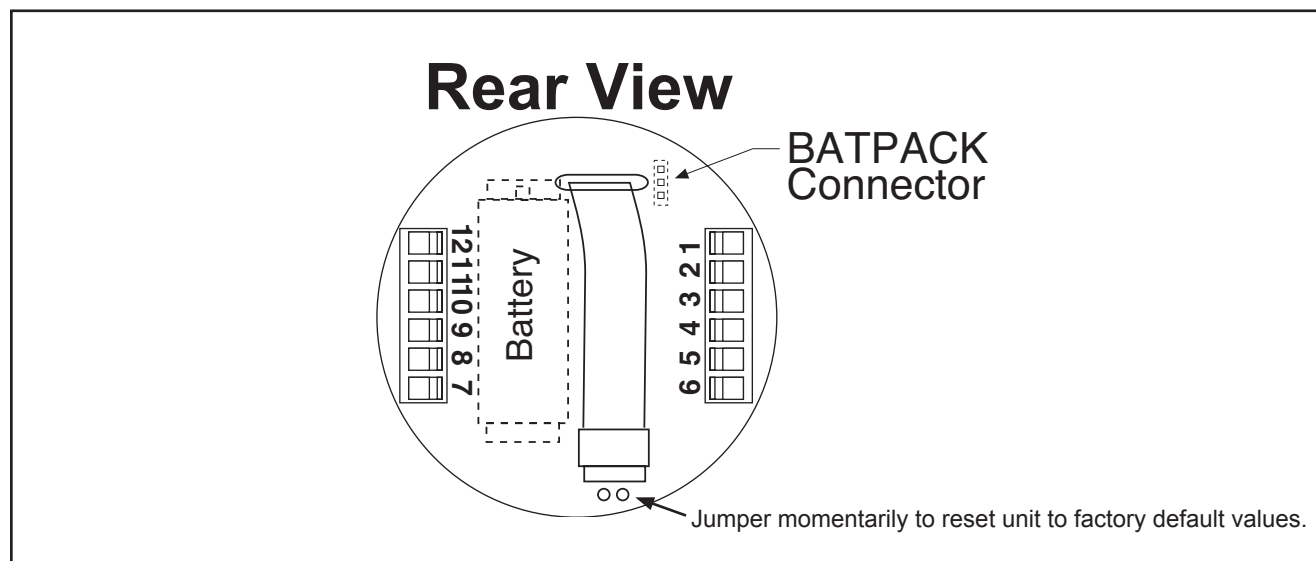
The BAT R/T-M has a battery monitor feature which illuminates when the lithium battery voltage approaches its end of life. A descriptor, "BAT", illuminates when the battery voltage falls below this predetermined value. The low battery detector operates correctly with all power options.

The battery, or batteries, should be replaced within several weeks of the first occurrence of low battery warning, "BAT". Left unattended, the unit may become inaccurate, cease to operate or malfunction.

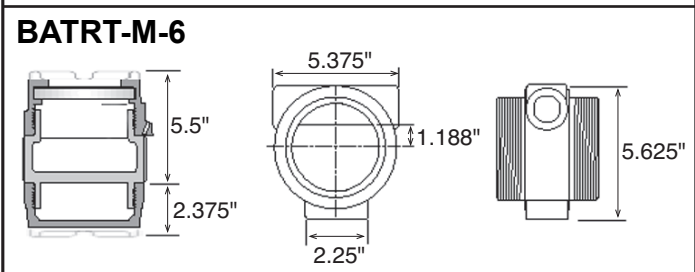
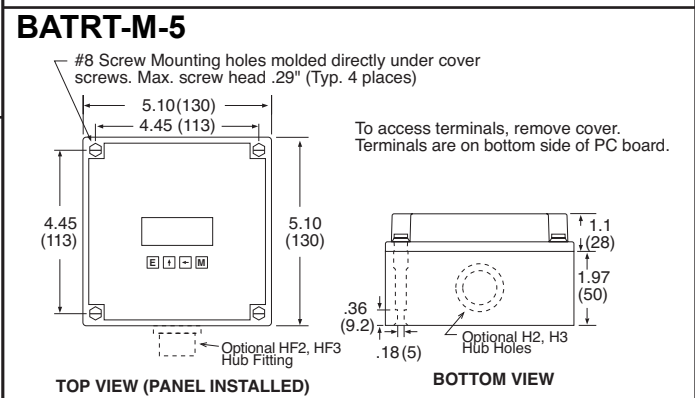
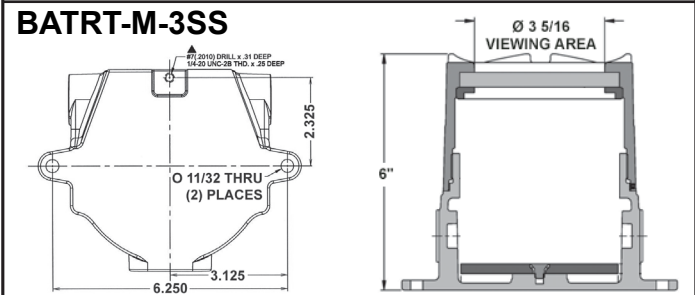
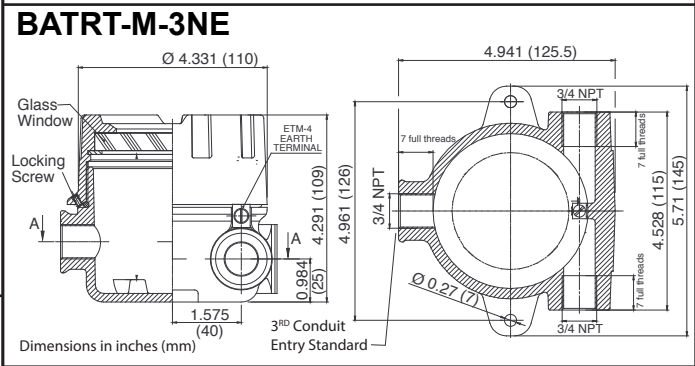
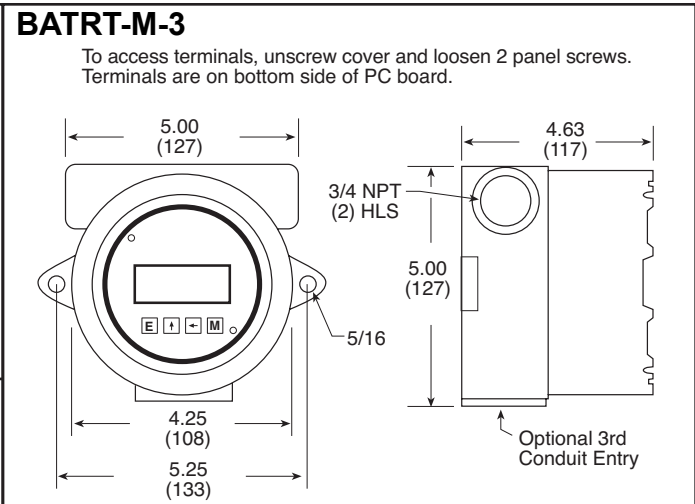
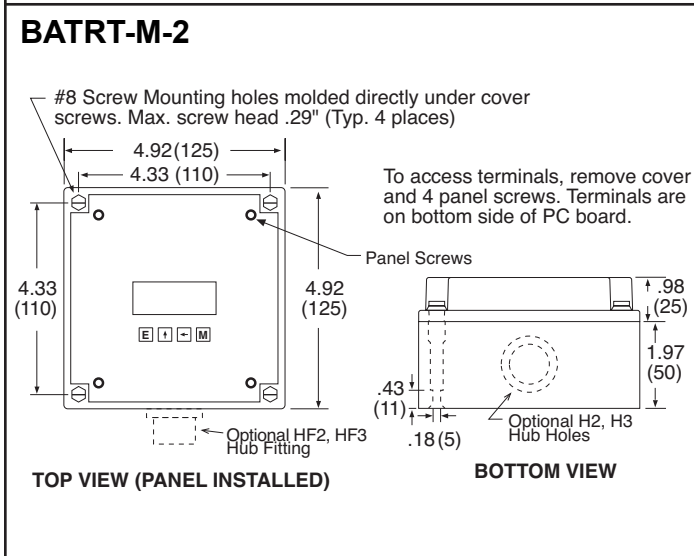
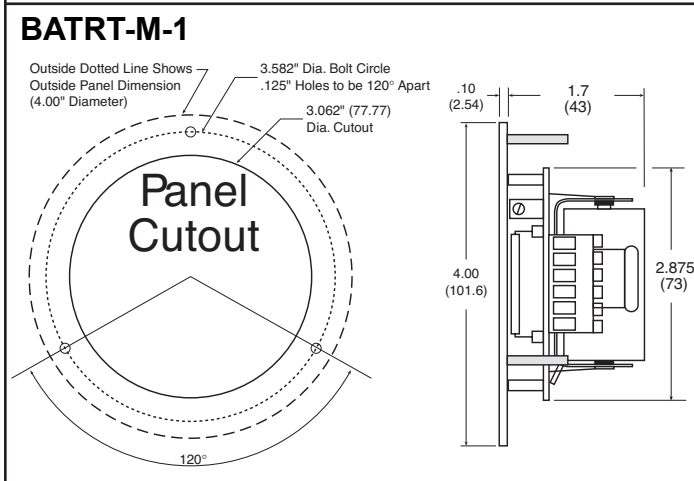
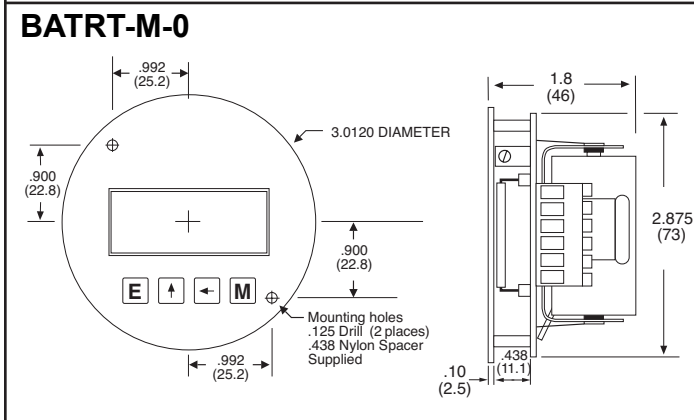
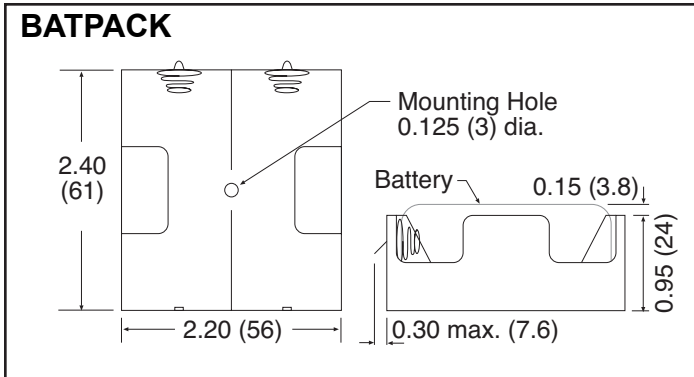
Before replacing the battery(ies), Press the ← (left arrow) key to save the totalizer. The display will show "SAVE TOTAL". This will save the current total value and the total will resume from this value when the new battery(ies) is(are) installed. **NOTE:** If the display starts to flash after the "SAVE TOTAL" message times out, press the "E" (enter) key. If the message "E FLASH" is displayed, then there was not enough power left to save the setup and totalizer to flash memory. At this point you must record the totalizer and setup information and re-enter the setup data after the new battery(ies) is(are) installed.

Install new battery(ies) as described above.

Fig 1



# DIMENSIONS



NOTE: Additional entry holes may be provided on styles 2 and 5.



## THEORY OF OPERATION

### Flow rate equation:

$$\text{Flow Rate Indication} = \frac{\text{Input Frequency}}{\text{FAC}} \times \text{Time Scaler}$$

Where Time Scaler is equal to: 1 for rate per second read out  
 60 for rate per minute read out  
 3600 for rate per hour read out  
 86400 for rate per day read out  
 "D" option Only

### Flow total equation:

$$\text{Flow Total} = \frac{\text{Sum of Input Pulses}}{\text{FAC}}$$

### 20 Point Linearization Option:

A 20 point linearization table is used to construct a curve describing the relationship of K-Factor and input frequency. The measured input frequency is used to access the table. A linear interpolation of adjacent point pairs is used to arrive at the K-Factor at that input frequency. The flow rate and total are then computed based upon the K-Factor for that measurement sample.

**NOTE:** For best performance and resolution choose as many decimal places as possible in the K-Factor.

Example: Enter a K-Factor of 1 as 1.000.

## WIRING

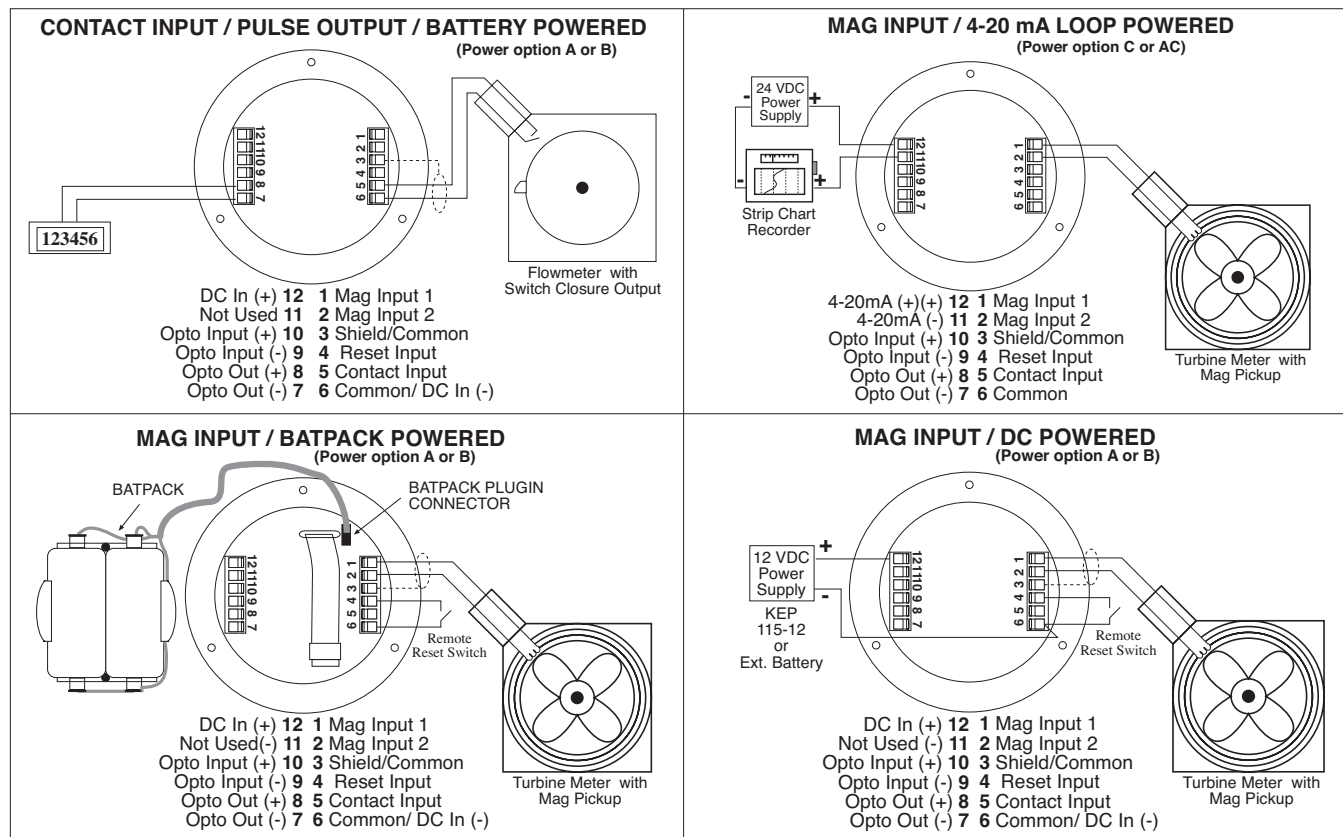
Several typical applications of the BAT R/T-M are shown below. Please observe that the various pulse inputs and power options may be intermixed in many ways to solve common applications. The isolated pulse output may be freely used so long as proper polarity is observed.

**Caution:** When 4-20 mA loop option is provided, the power wiring to the loop power option should always be to terminals (+) 12 and (-) 11. Accidental wiring to (+) 12 and (-) 6 should be avoided since excessive current flow may result with power option "C".

**Caution:** The magnetic pickup input and contact closure input require isolated sensors for proper operation. Accidental connections to earth may result in erroneous operation of the analog output and/or excessive current flow with power option "C".

**Caution:** Accidental connections from circuit common (3 or 6) to earth or terminal (11) may result in erroneous operation of the analog output and/or excessive current flow with power option "C".

## TYPICAL APPLICATIONS



## DEFINITIONS

**SRUE TOTRL:** (Save Total) Press the **E** key while the unit is running to save the total value. The display will show "SRUE TOTRL" for a few seconds. This is a very useful "scratch pad" to save and restore total when replacing the battery(ies)

**Ent CODE:** (enter code) This prompt will only appear if the panel lock is ON. Press the  $\uparrow$  key to increment each digit. Press the  $\leftarrow$  key to step to the next digit to the left. Press the **E** key to enter the 5 digit code. If the entered code is correct, the display will advance to the next menu prompt (CLR tot). If incorrect, the display will return to the run mode.

**CLR tot:** (clear total) Clears (resets) the totalizer. Press the **E** key to clear the total and return to the run mode. Press the **M** key to skip and advance to the next menu selection.

**FdEC:** (factor decimal) Sets the decimal location for the factor. This location is restricted to 3 places (99.999). The use of this decimal automatically limits the number of decimal locations allowable in the rate and total to acceptable ranges. Press the  $\leftarrow$  key to move the decimal. Press the **E** key to select the displayed decimal location.

**NOTE:** For best performance and resolution choose as many decimal places as possible in the K-Factor.  
Example: Enter a K-Factor of 1 as 1.000.

**FAC LINEAR/20POINT:** (factor type) This prompt will only appear if the unit is ordered with the 20 point linearization option. The 20 POINT linearization selection is recommended for flow meters whose K-factors change with different flow rates. This selection allows users to enter up to 20 different frequencies with 20 corresponding K-factors for different flow rates. The LINEAR setting is used for flow meters whose output is linear over its' entire operating flow range. Press the  $\uparrow$  key to step to the desired choice. Press the **E** key to enter the displayed factor type.

**NO / YES SET POINTS:** (set 20 point?) This prompt allows the user to skip the 20 point setup routine. Select YES for initial setup or to change the present 20 point values. Select NO to skip and keep the existing values.

**FAC :** (factor) This prompt appears on all units with linear inputs. The Factor is the number of pulses per unit volume for the flow sensor. The pulses/unit volume is implied by the totalizer descriptor when a descriptor is used. The implied units for the Factor are then as follows:

Standard"D" Option

GAL	pulses/gallon	GAL	pulses/gallon
LIT	pulses/liter	BBL	pulses/BBL
FT3	pulses/ft3	MCF	pulses/MCF
M3	pulses/M3	M3	pulses/M3

Factors from 0.0001 to 99999999 may be used. A "0" value for the factor is not allowed and the unit will default to "1" in LSD if a "0" entry is attempted. The factor is displayed on the subsidiary (lower) display. Press the  $\uparrow$  key to increment each digit. Press the  $\leftarrow$  key to step to the next digit to the left. Press the **E** key to enter the displayed factor.

**Fr# :** (frequency for point #) This prompt will only appear when 20 point selected. It sets the frequency for each of the 20 points (#). Press the  $\uparrow$  key to increment each digit. Press the  $\leftarrow$  key to step to the next digit to the left. Press the **E** key to enter the desired frequency for point #.

**FAC# :** (factor for point #) This prompt will only appear when 20 point selected. It sets the factor for each of the 20 points (#). Press the  $\uparrow$  key to increment each digit. Press the  $\leftarrow$  key to step to the next digit to the left. Press the **E** key to enter the desired factor for point #.

**NOTE:** The display will advance to the next point (Fr#) after each entry of the Fr & Fac until all 20 points are complete. entering a 0 in the Fr or fac setting will advance the display to the next menu prompt (tdec).

## DEFINITIONS (continued)

**tDEC:** (totalizer decimal) Sets the decimal location for the totalizer. The totalizer decimal is not a dummy decimal and will scale the totalizer display accordingly. (i.e. if the tdec is set in the tenths position (1234567.8), 100 will be displayed as 100.0). The location of the decimal point allows for greater resolution of both the totalizer display and the pulse output. The pulse output advances at a rate dependent on the least significant digit of the totalizer. The totalizer decimal location is restricted to a maximum of 4 places (1234.5678). However, the number of totalizer decimal locations allowable is reduced with each decimal place added to the factor decimal. Press the ← key to move the decimal. Press the **E** key to enter the displayed decimal location.

**Note:** The selection of the factor decimal point limits the available selections for the number of decimal points available for the totalizer. This is automatic. Enter your selection of the Factor's decimal point before entering the totalizer decimal point to assure the proper selection of the totalizer decimal point has been made.

**tDESC:** (totalizer descriptor) This allows you to illuminate one of the available descriptors on the display (STD: GAL, LIT, FT3, M3 or "blank"; "D" option: GAL, BBL, MCF, M3, "blank"). Press the ↑ key to select the descriptor. Press the **E** key to enter the selected descriptor.

**rSCALE:** (ratemeter scaling) Sets the timebase for the rate readout. Choose rate per hour (HR5), minutes (MIN) or seconds (SEC). (Days will appear on units ordered with the "D" (rate per day) option.) The scale setting is shown on the main (upper) display. Press the ↑ key to step to the desired choice. Press the **E** key to enter the displayed scale setting.

**Note:** A rate descriptor corresponding to the above choice will be illuminated on the display.

**rDECLOC:** (ratemeter decimal location) Sets the decimal location for the ratemeter information. The ratemeter decimal is not a dummy decimal and will scale the rate display accordingly. (i.e. if the r decloc is set in the tenths position (123.4), 100 will be displayed as 100.0). The ratemeter decimal location is restricted to a maximum of 4 places (.1234). However, the number of ratemeter decimal locations allowable is reduced with each decimal place added to the factor decimal. Press the ← key to move the decimal. Press the **E** key to enter the displayed decimal location.

**Note:** The flow rate indicator will flash "99999" if the computed flow rate exceeds the 99999 display capability of the indicator. Choose a new decimal point location to avoid this.

**NOR #** NORMALIZING FACTOR - Normalizes (averages or dampens) the flow rate data being received. Enter a value from 0 to 9. Higher settings provide more normalizing (averaging) for a more stable display. Derived from the equation:

$$\frac{(\text{Old Data} \times \text{"NOR"} + \text{New Data})}{(\text{"NOR"} + 1)}$$

**DELAY:** (delay) Sets the amount of time (0.1 to 99.9 seconds) that the unit will "look" for valid input data. If pulses are not detected within this "window", the rate will display 0. The display will update once every second as long as the unit receives valid data within a second. Some internal mathematics may delay this update. Press the ↑ key to increment each digit. Press the ← key to step to the next digit to the left. Press the **E** key to enter the displayed delay value.

**out Lo:** (out low) Sets the low setting for the 4-20 mA analog output. Key in the low rate value at which the unit will output 4mA. Press the ↑ key to increment each digit. Press the ← key to step to the next digit to the left. Press the **E** key to enter the displayed out lo value.

**out Hi:** (out high) Sets the high setting for the 4-20 mA analog output. Key in the high rate value at which the unit will output 20 mA. Press the ↑ key to increment each digit. Press the ← key to step to the next digit to the left. Press the **E** key to enter the displayed out hi value.

## DEFINITIONS

(continued)

**PULSE:** (pulse out scaling) This allows the unit to output a pulse for each least significant total count divided by the selected divider. The pulse out can be divided by 1 (1), 10 (10), 100 (100), or turned off (OFF). With the divider set at 1, the unit will give a pulse out for every increment of the LSD displayed.

**Note:** For maximum battery life, turn the pulse output off when pulse output is not used.

Selecting the proper pulse output divider may be needed so that the pulse output does not exceed the maximum rate of the pulse output. If the pulse output pulses too quickly a flashing display will result. Pressing the "M" key will result in a display of an error message "E PULSE". Press the "E" key to return to the run mode.

**PULSE:** (pulse width) Sets the pulse width of the pulse output. Selections are: 0.5 (1Hz), 0.25 (2Hz), 0.125 (4Hz) or 0.0625 (8Hz). This menu item is skipped if PULSE is turned off.

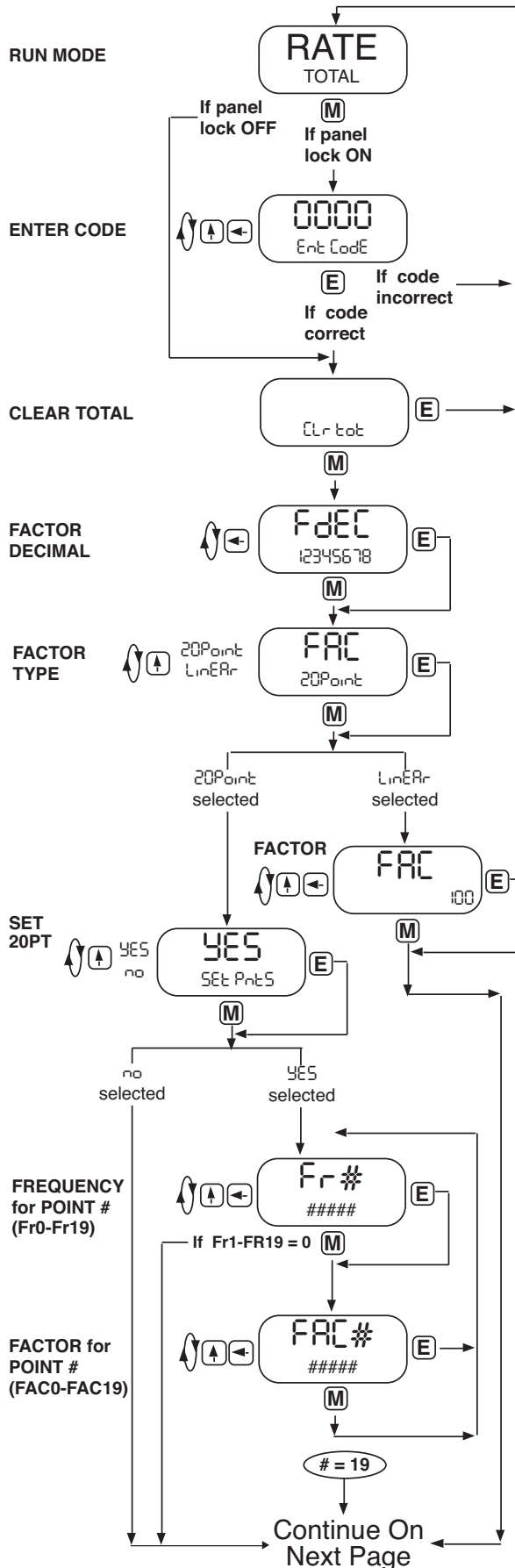
**LOCK:** (lock code) Sets the 5 digit lock code to be entered when the unit prompts Enter Code. This allows the user to gain access to the menu when the unit is locked. Press the ↑ key to increment each digit. Press the ← key to step to the next digit to the left. Press the E key to enter the displayed code.

**Record this number for later use!**

**LOCK CODE:** \_\_\_\_\_

**LOCK:** (lock unit) Sets the panel lock ON or OFF. Press the ↑ key to select On or OFF. Press the E key to enter the displayed selection.

# PROGRAMMING FLOWCHART



Press the **M** key to enter the programming menu.

If the panel lock is on, you must enter the 4 digit lock code to gain access to the menu.

Press the **↑** key to increment each individual digit of the code.

Press the **←** key to advance to the next digit.

Press the **E** key to enter the displayed code.

If the code is correct, display advances to "Clr Tot", if not, display returns to run mode

Press the **E** key to clear the totalizer and return to the programming menu.

Press the **M** key to skip and go to next menu item.

Press the **←** key to step the factor decimal to the desired location.

Press the **E** key to enter the displayed decimal location.

Press the **M** key to skip and keep the existing location

**NOTE:** For best performance and resolution choose as many decimal places as possible in the K-Factor. Example: Enter a K-Factor of 1 as 1.000.

Press the **↑** key to choose factor type (20Point or LINEAR).

Press the **E** key to enter the displayed factor type.

Press the **M** key to skip and keep the existing factor type.

The FAC prompt will only appear if LINEAR is selected or if the unit was ordered without the 20 point linearization option.

Press the **↑** key to increment each individual digit of the factor.

Press the **←** key to advance to the next digit.

Press the **E** key to enter the displayed factor.

Press the **M** key to skip and keep the existing factor.

The SET PntS prompt will only appear if 20Point is selected. This allows users to bypass the 20 point set up and keep the existing values.

Press the **↑** key to choose YES or NO.

Press the **E** key to enter the displayed selection.

Press the **M** key to skip (same as selecting NO).

Press the **↑** key to increment each individual digit of the frequency for point #.

Press the **←** key to advance to the next digit.

Press the **E** key to enter the displayed frequency.

Press the **M** key to skip and keep the existing frequency.

If 0 is entered, the display will advance to the next prompt (tdec).

**NOTE:** Frequency/factor point pairs must be entered in ascending order of frequency

Press the **↑** key to increment each individual digit of the factor for point #.

Press the **←** key to advance to the next digit.

Press the **E** key to enter the displayed factor.

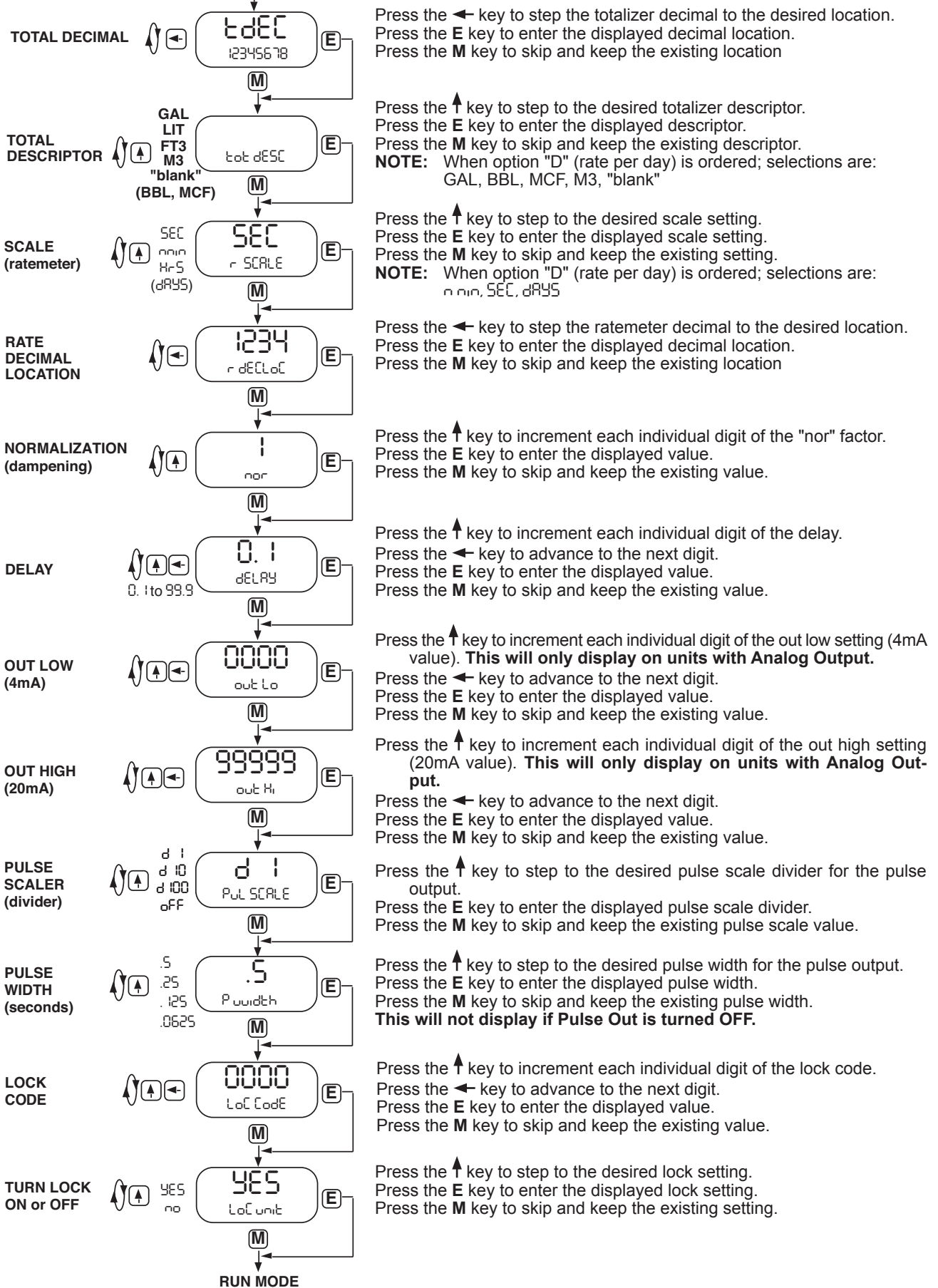
Press the **M** key to skip and keep the existing factor.

If 0 is entered, the display will advance to the next prompt (tdec).

# PROGRAMMING FLOWCHART

(continued)

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## OPERATION

A suitable pulse producing device or flow meter is wired to one of the three pulse inputs provided on the BAT R/T-M. Only one of these inputs is used in a given application. There are no connections to the two unused pulse inputs.

Isolated magnetic pickups may be connected to terminals 1 and 2. Isolated contact closures may be connected to terminals 5 and 6. Any high level, DC pulse type may be connected to terminals 9(-) and 10(+).

Power to the unit may be provided by internal batteries, external DC, or the current loop. In all cases, the internal battery will provide for continued operation in the event primary power is lost.

Once properly wired, the operation of the BAT R/T-M is automatic.

The flow totalizer is updated once per second\* with battery power, 8 times per second with DC or loop power. If no input counts are received the unit remains in a low power state to conserve power.

The flow total may be cleared by the front panel switch sequence or by a contact closure on the remote reset terminal to circuit common.

To reset the unit from the front panel, the following key sequence is required:

- Press **M** "CLr tot" will be displayed (if the panel lock is on, the display will prompt "Ent Code".  
Enter the proper code to advance to the CLr tot prompt)
- Press **E** To clear the total. Unit will return to operation

The flow rate indicator will measure the flow rate once every second\* with battery power, 8 times per second with DC or loop power and display the flow rate.

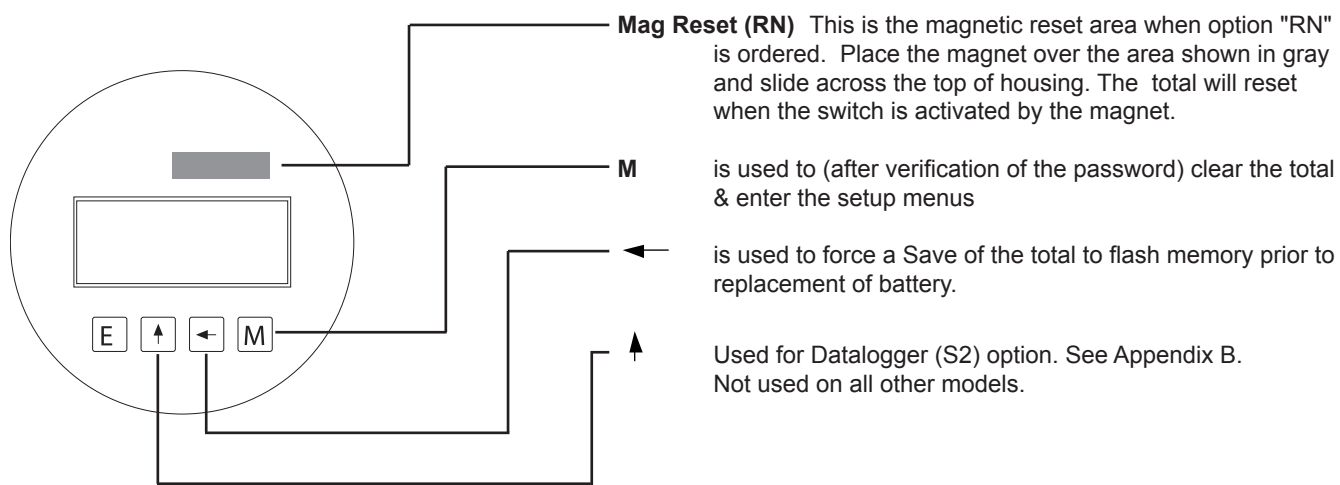
If the input pulses are not detected within the delay setting (0.1 to 99.9 seconds), a flow rate of 0 will be indicated.

The analog output will be scaled based on the user selected zero and full scale and the measured flow rate. The analog output is updated at the same time as the rate display.

The pulse output updates at the same rate as the total display in accordance with the instrument setup of pulse scaling.

\* Slow input pulse rates, large delay setting and internal math operations may delay the update rate of information.. A faster update rate occurs when the unit is loop powered or externally powered.

### KEYPAD OPERATION:



Note:

1. See also setup mode for description of its operation
2. See also Calibration Section for description of its Operation

## ERROR MESSAGES

The BATRT-M is provided with extensive self checking which assists the user in the location of setup entry errors and in reporting malfunctions or unusual operating conditions. When an error occurs, the display will flash. Press any key to see the error message corresponding to the error that has occurred. Press any key again to acknowledge the error. (If the error can be eliminated by a change of setup values, the unit will automatically advance to the MENU so that the appropriate setup changes can be made).

Table - 2 illustrates the warning message, problem, and recommended corrective actions.

Diagnostic Error Messages Table-2

WARNING MESSAGE	CAUSE	CORRECTIVE ACTION
rRtE Er	Rate Low set higher than Rate Hi	Set Rate Hi greater than Rate Lo
FAC Err	Factor = 0	Set in correct Factor
"BAT" Descriptor	Low Battery	Replace battery(ies)
E tOtAL	Total rollover	None required
E rAtE	Rate exceeds 99999	Use lower rate dec point
E PULSE	Pulse out Overflow	Use different pulse scaler or totalizer decimal point
E FLASH	Save to flash memory failed	Write down displayed total and setup values if you are changing the battery. If total wasn't saved, it will display an arbitrary total when new battery is installed. In this case, reset the total to 0 and check the setup information.

## ANALOG OUTPUT CALIBRATION

**CAUTION: Performing the analog output calibration will erase all programming values. Please record all programmed values before beginning the analog output calibration**

If the unit is equipped with the analog output option, the 4-20 mA has been accurately set to 4.000 and 20.000 mA by the factory. No calibration should be required.

The 4-20 mA output may be verified periodically by installing a digital milliamp meter(DMM) in series with the analog output and simulating a full scale or over range flow rate.

If the output is out of calibration, perform the following:

Remove power and/or disconnect battery(ies). Hold down the scroll (↑) key and replace the battery. This will initialize the unit and advance to the analog output calibration mode. Connect a DMM set to read current in series with a power supply (8.5 to 30 volts DC) to TB12 (+) and TB11 (-). The output should read 4.000 ma (± 0.005). If it does not, Adjust the numbers on the display up or down until the output reads 4.000 ma (± 0.005). Press the "E" key. The DMM should now read 20.000 ma (± 0.005). If it does not, Adjust the numbers on the display up or down until the output reads 20.000 ma (± 0.005). Press "E" and the unit will return to the "RUN" mode.



## Decoding Part Number

**EXAMPLE:**    **BATR** **M** **3**        **A**        **4** **ET**

**Series:** \_\_\_\_\_

**Mounting:** \_\_\_\_\_

† 0 = OEM

† 1 = Panel Mount

2 = NEMA 4X Box (Keypad behind clear cover)

3 = Explosion Proof Housing

3NE = Explosion Proof Housing, White  
Includes Third Conduit Entry

3SS = Stainless Steel Ex-Proof Housing (consult factory)

5 = NEMA 4X Box (Keypad outside opaque cover)

6 = Double Ended Explosion Proof Housing

**Power Supply:** \_\_\_\_\_

† A = Battery (2 supplied)

B = External Power Supply (8.5 to 30 VDC)

C = Loop Powered with 4-20 mA Output

AC = Loop Powered with 4-20 mA Output and 2 Batteries

**Options** (Multiple Options Available) \_\_\_\_\_

S1 = Serial Setup Software for use with BSAC1

S2 = RS485/Modbus/Data Logger - Isolated (power options B, C only)

4 = 20 Point Linearization (10 point with S2 option)

D = Rate per Day, Hour or Minute

ET = Extended Temp.: -22°F to 158°F (-30°C to 70°C)

CE = CE Approved Version (LVD & EMC only)

CSA = CSA Approved Version (explosion proof)

IS\*\* = UL Listed IS (consult factory)

ATEXCASE\*\* = European Flame Proof  
ATEX Case (consult factory)

TRX = NEMA7 Explosion Proof Reset Switch on Third Conduit Entry (mounting style 3 only)

RN = External Magnetic Reset

T = Third Conduit Entry in Ex-Proof Housing (mounting style 3 only, Third Conduit Entry is Standard on 3NE & 3SS model and does not need to be specified)

H2 = 0.875" Hole for mounting styles 2 and 5

HF2 = 0.5" Female NPT Hub fitting (mount styles 2 & 5)

H3 = 1.125" Hole for mounting styles 2 and 5

HF3 = 0.75" Female NPT Hub fitting (mount styles 2 & 5)

**Special Battery Options**

NB = No Battery

AB = Supplied with A size batteries

**Accessories:**

BATPACK= External Batt. Pack with 2 C Size Batteries & 12" leads

BATC = Single Battery: Tadiran P/N TL2200/S 3.6V 7200mAh or equal

115-24 = 115 VAC to 24 VDC power supply

BSAC1 = RS232 Serial Adapter Cable with setup software

TFMMK-1 = Turbine Flowmeter Mounting Kit for flow meters with a 1" Male NPT riser

TFMMK-3/4 = Turbine Flowmeter Mounting Kit for flow meters with a 3/4" Male NPT riser

CA-TFM-2-18FL = 18" Long Turbine Flowmeter Cable Assembly

† External battery pack supplied with models BATRTM0A & BATRTM1A

\*\* Contact factory for latest information

**RoHS Compliant planned**

### WARRANTY

This product (excluding batteries) is warranted against defects in materials and workmanship for a period of two (2) years from the date of shipment to Buyer.

The Warranty is limited to repair or replacement of the defective unit at the option of the manufacturer. This warranty is void if the product has been altered, misused, dismantled, or otherwise abused.

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE EXCLUDED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

### Revision History

08/01/07	Original release
11/10/15	Added Specifications and Dimensions for 3NE and 3SS mounting options