

# BAT RAT MILLENNIUM

## Battery Powered Ratemeter & Totalizer with Alarm Output

### Features

- UL/C-UL Intrinsically Safe Listed
- Magnetic Pickup Input, Contact Closure Input, DC Pulse Input (Optically Isolated)
- Displays Rate & Total Simultaneously
- 5 Digit Rate Display, 8 Digit Totalizer Display
- 4-20mA Analog Output (optional)
- Powered From Internal Battery, External DC Supply or 4-20 mA Output Loop
- 20 Point Linearization (optional); 10 Point Linearization with Data Logger option
- Isolated High/Low Flow Rate Alarm Output
- Nonvolatile Flash Memory of Setup Data
- RS485 Modbus Communications and Data Logger (optional)
- Setup Software Available for Easy Programming and Monitoring Using a PC and Special Serial Cable (optional)

### Description

Featuring 5 digits of rate and 8 digits of total, the BAT RAT-M is a battery powered indicator with flow rate alarm output. It is 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. When this option is used, it uses the 4-20mA loop to provide power when this output is used. The BATRAT-M is available with an optional setup program (S1 Option). Alternately it is available with a RS485 Modbus RTU communications and a datalogger.

### 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. (Slow input pulse rates, large delay setting and internal math operations may delay the update rate.)

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

#### Alarm Output:

Combination High-Low flow rate alarm output activates when flow rate is less than low set point or greater than high set point.

Type: Opto-isolated photomos relay

Max. voltage (off state): 30 VDC

Current (on state): 100 mA



Mounting Style 1



Mounting Style 2



Mounting Style 3



Mounting Style 3NE



Mounting Style 3SS



Mounting Style 5



Mounting Style 6

**Power:**

**BATTERY POWERED**

Supplied with 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 for standby operation

Protection: Reverse Polarity Protection on DC Power Input

**LOOP POWERED**

Voltage: 8.5 to 30 VDC

Supplied with 1 C size lithium battery for standby operation

Protection: Reverse Polarity Protection on Current Loop

Loop Burden: 8.5V maximum

**BATTERY LIFE EXPECTANCY:**

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

MODEL	RUN TIME			
	Idle	2hrs/day	8hrs/day	24hrs/day
BAT RAT-M-A	10 yrs	10 yrs	10 yrs	9.1 yrs
BAT RAT-M-A-4	10 yrs	10 yrs	10 yrs	8.4 yrs
BAT RAT-M-B/C	10 yrs	10 yrs	10 yrs	10 yrs

standby-operation  
 BAT RAT-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 alarm output shortens battery life.

**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

**Environmental:**

**OPERATING TEMPERATURE**

-4°F (-20°C) to + 158°F (70°C)

Extended Temp: -22°F (-30°C) to + 158°F (70°C)

**HUMIDITY**

0 - 90% Noncondensing

**ACCURACY:**

0.01% Reading, ±1 count

Temperature Drift: 50 ppm/°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

**INPUTS:**

**MAGNETIC PICKUP INPUT**

Frequency Range: 0 to 3500 Hz

Trigger Sensitivity: 10 mV p-p

Over Voltage Protected: ± 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 KΩ 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 KΩ 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 S2 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° C

Temperature Drift:

50 ppm/°C Typical

Reverse Polarity Protected

Update Rate: 8 times/second

**NOTE:** The BAT RAT-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.

**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 RAT-M Serial Adapter Cable (BSAC1) you will be able to setup the BAT RAT-M through your PC.

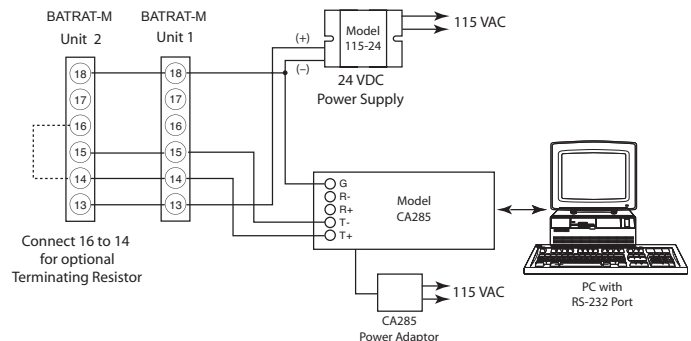
**RS-485 MODBUS and DATA LOGGER OPTION (S2):**

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 26 days of totals, on the 27th day the oldest total in the logger is dropped. Requires external DC power: 6-28VDC (input is reverse polarity protected)

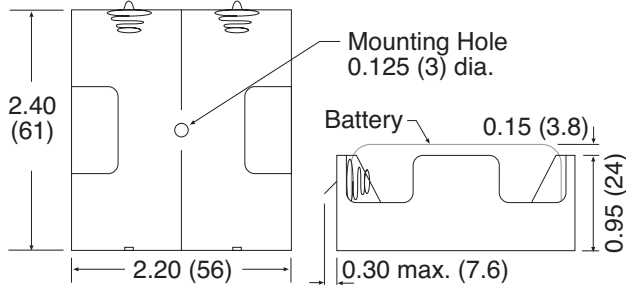
Current Draw:

Receiving: 2 mA

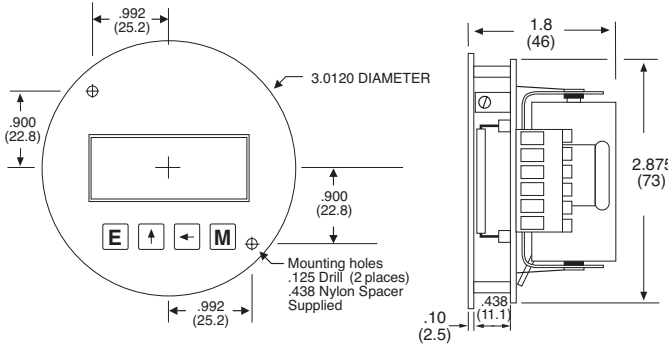
Transmitting: 125 mA (instantaneous peak)



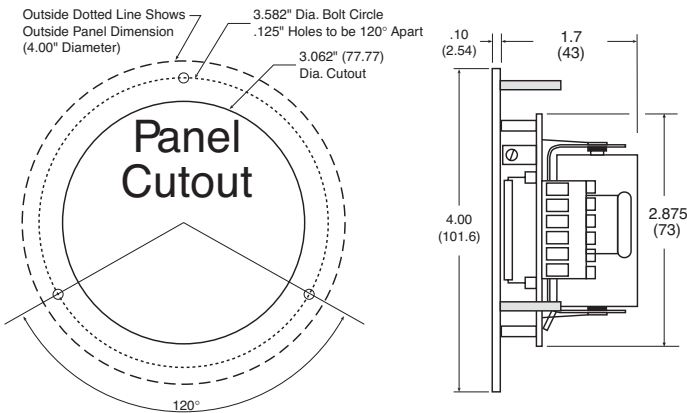
### BATPACK



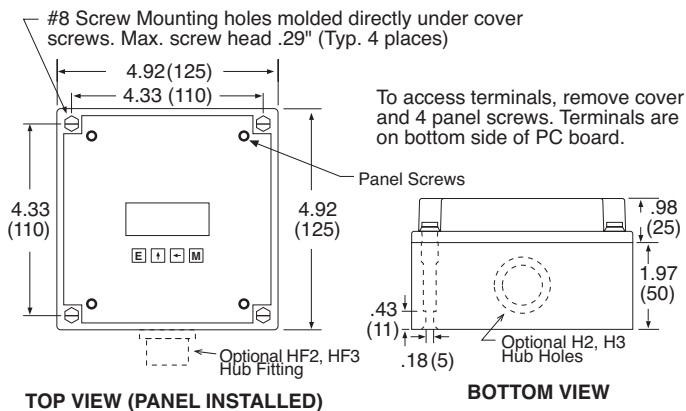
### BATRAT-M-0



### BATRAT-M-1

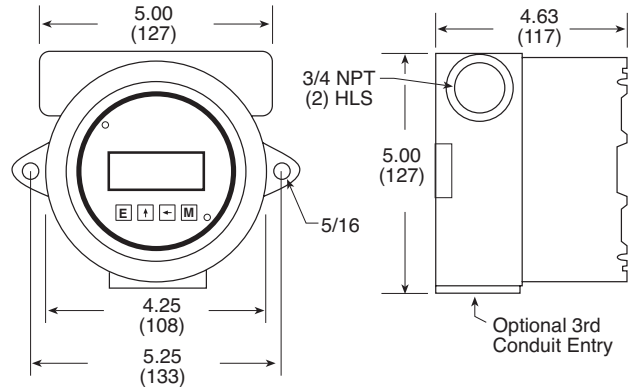


### BATRAT-M-2

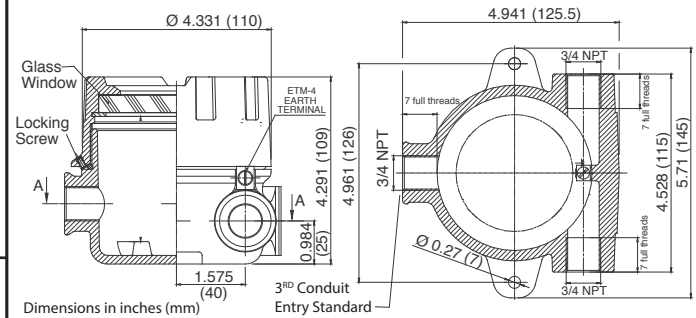


### BATRAT-M-3

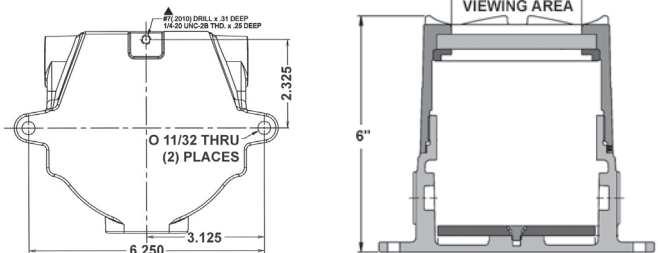
To access terminals, unscrew cover and loosen 2 panel screws.  
Terminals are on bottom side of PC board.



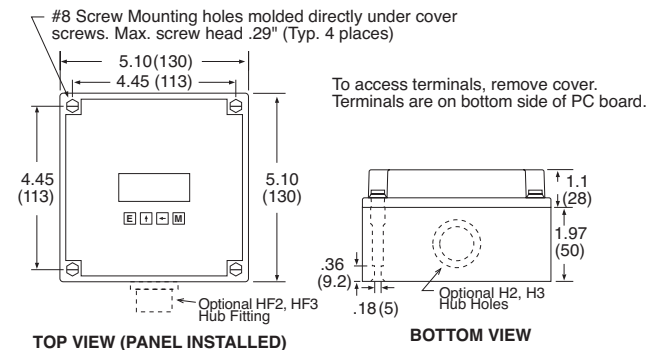
### BATRAT-M-3NE



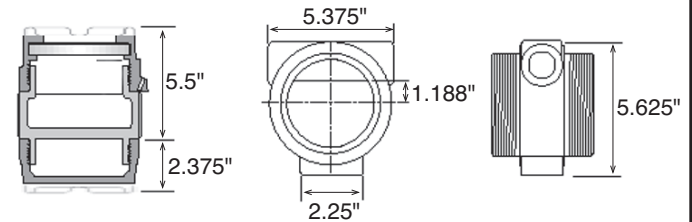
### BATRAT-M-3SS



### BATRAT-M-5

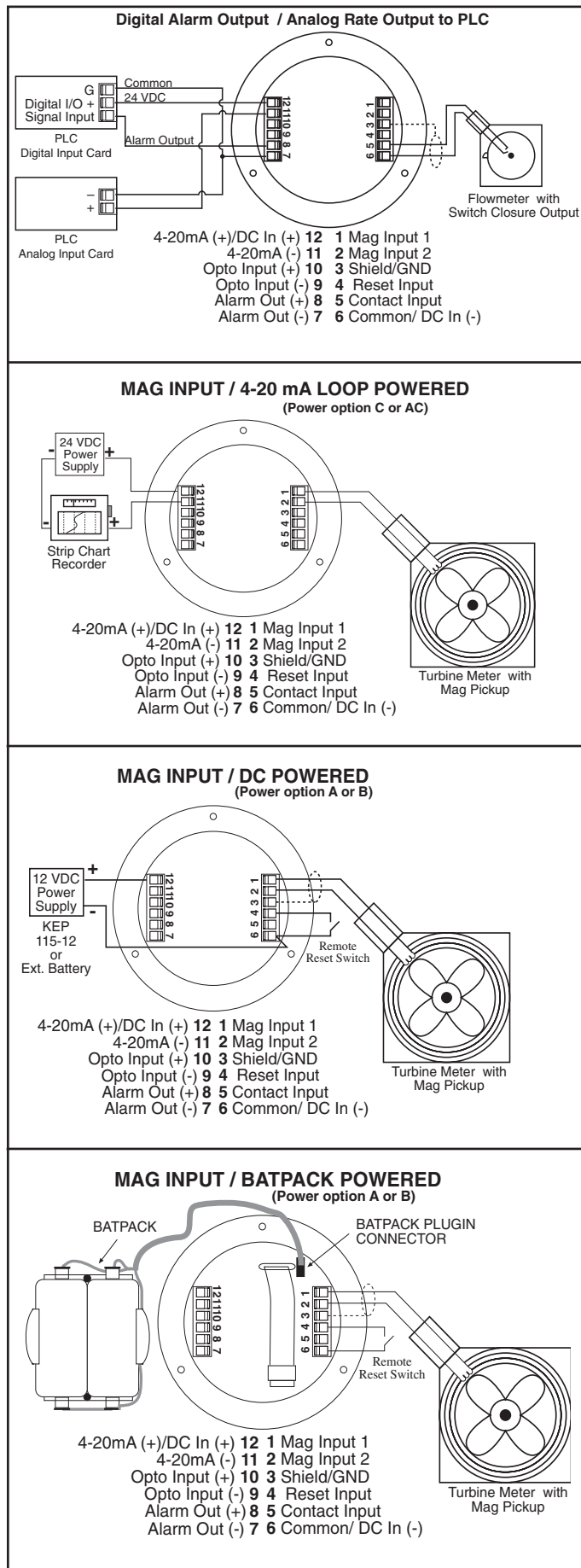


### BATRAT-M-6



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

## Typical Wiring:



## Ordering Information

**EXAMPLE: BATRATM 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

BATRATM0A & BATRATM1A

\*\* Contact factory for latest information

**RoHS Compliant planned**