**SPECIFICATIONS**

**Description**
Featuring 5 digits of rate and 8 digits of total, the 915-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 915-BATRT-M uses the 4-20mA loop to provide power when this output is used.

**Specifications**

**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

**Battery Life Expectancy:**
Expected Years of Operation for 915-BATRT-M of various powering options at equipment duty cycles

<table>
<thead>
<tr>
<th>MODEL</th>
<th>RUN TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>915-BATRT-M-A</td>
<td>10 yrs</td>
</tr>
<tr>
<td>915-BATRT-M-A-A</td>
<td>10 yrs</td>
</tr>
<tr>
<td>915-BATRT-M-B/C</td>
<td>10 yrs</td>
</tr>
</tbody>
</table>

**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%.

**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” 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 of (see Pulse scale divider). Type: Isolated photomos relay
- **Max. voltage (off state):** 30 VDC
- **Current (on state):** 100 mA
- **Pulse Duration:** Selectable 0.5, 0.25, 0.125, 0.0625 seconds
- **Pulse Scale divider (Pulscale):** User selectable, +1, +10, +100 or OFF
- **NOTE:** Select OFF for max. battery life.

**Accuracy:**
- 0.01% Reading, ±1 count
- Temperature Drift: 50 ppm/°C Worst Case

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

**Safety Listings (Mounting Styles 3, 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**

**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

**Mounting Styles:**
1- Panel Mount - NEMA 4X Front
3- Explosion Proof - Class I, Division I, Groups B, C & D
3SS- Explosion Proof - Stainless Steel
5- Wall Mount - NEMA 4X Enclosure (keypad mounted on cover)
6- Double Ended Explosion Proof - Class I, Division I, Groups B, C & D

**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 factory for details)

**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.

**K-Factor**
- **Range:** 0.001 to 99999999
- **Decimal Point Locations:** XXXX.XXXX to XXXXXXX

**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 915-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.
BATTERY INSTALLATION & REPLACEMENT

Battery Installation:
All 915-BATRT-M 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 915-BATRT-M-3, 3SS, 5 and 6 require opening the enclosure cover and removing the 915-BATRT-M 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 915-BATRT-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

Rear View

BATTERY INSTALLATION & REPLACEMENT

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 915-BATRT-M Serial Adapter Cable (BSAC1) you will be able to setup the 915-BATRT-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)

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.

BATTERY INSTALLATION & REPLACEMENT

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Install new battery(ies) as described above.
**DIMENSIONS**

**BATPACK**

- Mounting Hole: 0.125 (3) dia.
- Battery: 0.15 (3.8)
- 0.30 max. (7.6)

**915-BATRT-M-3**

- Optional 3rd Conduit Entry
- To access terminals, unscrew cover and loosen 2 panel screws.
- Terminals are on bottom side of PC board.

**915-BATRT-M-1**

- Panel Cutout
- Outside Dotted Line Shown
- Outside Panel Dimension: 3.982" Dia. Bolt Circle
- 3.982" (101.6) Dia. Cutout

**915-BATRT-M-5**

- #8 Screw Mounting holes molded directly under cover screws. Max. screw head .29" (Typ. 4 places)
- To access terminals, remove cover. Terminals are on bottom side of PC board.

**915-BATRT-M-6**

- Optional HF2, HF3 Hub Fitting
- Optional H2, H3 Hub Holes

**915-BATRT-M-3SS**

- Optional 3rd Conduit Entry

NOTE: Additional entry holes may be provided on style 5.
THEORY OF OPERATION

Flow rate equation:

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

Flow total equation:

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

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

20 Point Linearization Option: (10 Point with S2 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.
Several typical applications of the 915-BATRT-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.

**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.

**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.

### TYPICAL APPLICATIONS

**CONTACT INPUT / PULSE OUTPUT / BATTERY POWERED**

**ACTIVE PICKUP / 4-20mA LOOP POWERED**

**MAG INPUT / 4-20 mA LOOP POWERED**

**MAG INPUT / DC POWERED**

**MAG INPUT / BATPACK POWERED**

(Power option A or B)
DEFINITIONS

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

**ENTER CODE**: (enter code) This prompt will only appear if the panel lock is ON. 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 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.

**FD EC**: (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 ← 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 / 20 Point**: (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 ↑ key to step to the desired choice. Press the E key to enter the displayed factor type.

**NO / YES SET PNTS**: (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:

<table>
<thead>
<tr>
<th>Standard</th>
<th>&quot;D&quot; Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAL</td>
<td>pulses/gallon</td>
</tr>
<tr>
<td>LIT</td>
<td>pulses/liter</td>
</tr>
<tr>
<td>FT3</td>
<td>pulses/ft3</td>
</tr>
<tr>
<td>M3</td>
<td>pulses/M3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gallon</th>
<th>pulses/gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liter</td>
<td>pulses/liter</td>
</tr>
<tr>
<td>Foot-cube</td>
<td>pulses/ft3</td>
</tr>
<tr>
<td>MCF</td>
<td>pulses/MCF</td>
</tr>
<tr>
<td>M3</td>
<td>pulses/M3</td>
</tr>
</tbody>
</table>

Factors from 0.0001 to 999999999 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 ↑ 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 factor.
DEFINITIONS
(continued)

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 ↑ key to increment each digit. Press the ← key to step to the next digit to the left. Press the E key to enter the desired frequency for point #.

FrC# : (factor for point #) This prompt will only appear when 20 point selected. It sets the factor for each of the 20 points (#). 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 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 (tdc).

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 tdc 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.

TDec dES: (totalizer descriptor) This allows you to illuminate one of the available descriptors on the display (STD: GAL, LT, 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.

r Scale : (ratemeter scaling) Sets the rate readout. Choose rate per hour (H-S), minutes (nnIn) 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.

r dECloc : (ratemeter decimal location) Sets the decimal location for the ratemeter. 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.
DEFINITIONS
(continued)

NORMALIZING FACTOR - Normalizes (averages) the 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:
\[
\text{Derived from the equation:} \quad \frac{\text{Old Data} \times \text{"NOR"} + \text{New Data}}{\text{"NOR"} + 1}
\]

(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 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 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.

(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 (d 1), 10 (d 10), 100 (d 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 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 out scaling is turned off.

(lock code) Sets the 5 digit lock code to be entered when the unit prompts for 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 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.

NOTE: Units equipped with RS232 option S1, refer to Appendix A for additional definitions.
NOTE: Units equipped with RS485 Modbus option S2, refer to Appendix B for additional definitions.
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 E key to choose factor type (20P or Lnr). 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 Lnr 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.

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).

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).

NOTE: UNITS EQUIPPED WITH RS232 OPTION S1, REFER TO APPENDIX A.
NOTE: UNITS EQUIPPED WITH RS485 MODBUS OPTION S2, REFER TO APPENDIX B.
Press the \rightarrow key to step the totalizer 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.
Press the \uparrow key to step to the desired totalizer descriptor.
Press the E key to enter the displayed descriptor.
Press the M key to skip and keep the existing descriptor.

NOTE: When option "D" (rate per day) is ordered; selections are:
- GAL
- BBL
- MCF
- M3
- "blank"

Press the \rightarrow key to step the ratemeter 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: When option "D" (rate per day) is ordered; selections are:
- min
- sec
- days

Press the \rightarrow key to step the delay decimal to the desired location.
Press the E key to enter the displayed delay decimal location.
Press the M key to skip and keep the existing delay location.
Press the \uparrow key to increment each individual digit of the "nor" factor.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.

Press the \rightarrow key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.
Press the \uparrow key to increment each individual digit of the delay.
Press the \rightarrow key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.
Press the \uparrow key to increment each individual digit of the out low setting (4mA value). This will only display on units with Analog Output.
Press the \rightarrow key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.
Press the \uparrow key to increment each individual digit of the out high setting (20mA value). This will only display on units with Analog Output.
Press the \rightarrow key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.
Press the \rightarrow key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.
Press the \uparrow key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.
Press the \uparrow key to step to the desired pulse scale divider for the pulse output.
Press the E key to enter the displayed pulse scale divider.
Press the M key to skip and keep the existing pulse scale value.
Press the \uparrow key to step to the desired pulse width for the pulse output.
Press the E key to enter the displayed pulse width.
Press the M key to skip and keep the existing pulse width.

This will not display if Pulse Out is turned OFF.
Press the \rightarrow key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.
Press the \uparrow key to increment each individual digit of the lock code.
Press the \rightarrow key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.
Press the \uparrow key to step to the desired lock setting.
Press the E key to enter the displayed lock setting.
Press the M key to skip and keep the existing setting.
OPERATION

KEYPAD OPERATION:

Mag Reset (RN)  This is the magnetic reset area when option "RN" is ordered. Place the magnet over the area shown in gray and slide across the top of housing. The total will reset when the switch is activated by the magnet.

M is used to (after verification of the password) clear the total & enter the setup menus

is used to force a Save of the total to flash memory prior to replacement of battery.

Used for Datalogger (S2) option. See Appendix B. Not used on all other models.

Note:
1. See also setup mode for description of its operation
2. See also Calibration Section for description of its Operation
ERROR MESSAGES

The 915-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

<table>
<thead>
<tr>
<th>WARNING MESSAGE</th>
<th>CAUSE</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>rAfE Err</td>
<td>Rate Low set higher than Rate Hi</td>
<td>Set Rate Hi greater than Rate Lo</td>
</tr>
<tr>
<td>FAc Err</td>
<td>Factor = 0</td>
<td>Set in correct Factor</td>
</tr>
<tr>
<td>&quot;BAT&quot; Descriptor</td>
<td>Low Battery</td>
<td>Replace battery(ies)</td>
</tr>
<tr>
<td>E t0tRL</td>
<td>Total rollover</td>
<td>None required</td>
</tr>
<tr>
<td>E rAfE</td>
<td>Rate exceeds 99999</td>
<td>Use lower rate dec point</td>
</tr>
<tr>
<td>E Pulse</td>
<td>Pulse out Overflow</td>
<td>Use different pulse scaler or totalizer decimal point</td>
</tr>
<tr>
<td>E FLASH</td>
<td>Save to flash memory failed</td>
<td>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.</td>
</tr>
</tbody>
</table>

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 calibrations 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.
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.

ORDERING INFORMATION

EXAMPLE: 915-BATRT-M 3 A 4 ET

Series:

Mounting:
* 1 = Panel Mount
  3 = Explosion Proof Housing
  5 = NEMA 4X Box (915-BATRT-M outside opaque cover)
  6 = Double Ended Explosion Proof Housing (consult factory)

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 Compliant
CSA** = CSA Listed Explosion Proof
IS** = UL Listed IS (planned)
TRX = NEMA7 Explosion Proof Reset Switch (mounting style 3 and 6)
T = Third Conduit Entry in Ex-Proof Housing (mounting style 3 and 6)
H2 = 0.875" Hole for mounting style 5
HF2 = 0.5" Female NPT Hub fitting for mounting style 5
H3 = 1.125" Hole for mounting style 5
HF3 = 0.75" Female NPT Hub fitting for mounting style 5

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
* External battery pack supplied with model 915-BATRT-M1A
** Contact factory for latest information
DEFINITIONS

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

E nc: (enter code) This prompt will only appear if the panel lock is ON. 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 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: (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.

FdE: (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 ← 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 L Inear setting is used for flow meters whose output is linear over its' entire operating flow range. Press the ↑ key to step to the desired choice. Press the E key to enter the displayed factor type.

no / YES Set PntS: (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:

<table>
<thead>
<tr>
<th>Standard</th>
<th>&quot;D&quot; Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAL pulses/gallon</td>
<td>GAL pulses/gallon</td>
</tr>
<tr>
<td>LIT pulses/liter</td>
<td>BBL pulses/BBL</td>
</tr>
<tr>
<td>FT3 pulses/ft3</td>
<td>MCF pulses/MCF</td>
</tr>
<tr>
<td>M3 pulses/M3</td>
<td>M3 pulses/M3</td>
</tr>
</tbody>
</table>

Factors from 0.0001 to 9999999 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 ↑ 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 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 ↑ key to increment each digit. Press the ← key to step to the next digit to the left. Press the E key to enter the desired frequency for point #.

FRE# : (factor for point #) This prompt will only appear when 20 point selected. It sets the factor for each of the 20 points (#). 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 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).

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 (1234.9678). 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.

DesC: (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.
r SCALE: (ratemeter scaling) Sets the timebase for the rate readout. Choose rate per hour (Hrs), 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.

deCloC: (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:

\[
\frac{(Old\ Data \times \ "NOR" + \ New\ Data)}{("NOR" + 1)}
\]

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.

Pulseout: (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 (d 1), 10 (d 10), 100 (d 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.

P 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 out scaling is turned off.

bRdE: (baud rate) Sets the baud rate for the serial communication.

Parity: (parity) Sets the parity for the serial communication.

Locode: (lock code) Sets the 5 digit lock code to be entered when the unit prompts Locode. 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: ________________________

LocUnit: (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.
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 (20 point 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 FRC 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 20 point 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).
Press the \( \downarrow \) key to step the totalizer decimal to the desired location. Press the \( \uparrow \) key to enter the displayed decimal location. Press the \( \rightarrow \) key to skip and keep the existing location.

Press the \( \downarrow \) key to step to the desired totalizer descriptor. Press the \( \uparrow \) key to enter the displayed descriptor. Press the \( \rightarrow \) key to skip and keep the existing descriptor.

NOTE: When option "D" (rate per day) is ordered; selections are: GAL, BBL, MCF, M3, "blank"

Press the \( \downarrow \) key to step to the desired scale setting. Press the \( \uparrow \) key to enter the displayed scale setting. Press the \( \rightarrow \) key to skip and keep the existing setting.

NOTE: When option "D" (rate per day) is ordered; selections are: min, sec, days

Press the \( \downarrow \) key to step the ratemeter decimal to the desired location. Press the \( \uparrow \) key to enter the displayed decimal location. Press the \( \rightarrow \) key to skip and keep the existing location.

Press the \( \downarrow \) key to step to the desired delay. Press the \( \uparrow \) key to advance to the next digit. Press the \( \rightarrow \) key to enter the displayed delay. Press the \( \rightarrow \) key to skip and keep the existing value.

Press the \( \downarrow \) key to step to the desired pulse scale divider for the pulse output. Press the \( \uparrow \) key to step the pulse scale divider. Press the \( \rightarrow \) key to skip and keep the existing pulse scale value.

Press the \( \downarrow \) key to step the pulse width for the pulse output. Press the \( \uparrow \) key to enter the displayed pulse width. Press the \( \rightarrow \) key to skip and keep the existing pulse width. This will not display if Pulse Out is turned OFF.
Press the key to select the desired baud rate.
Press the E key to enter the displayed choice.
Press the M key to skip and keep the existing choice.

Press the key to select the desired parity.
Press the E key to enter the displayed choice.
Press the M key to skip and keep the existing choice.

Press the key to increment each individual digit of the lock code.
Press the key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.

Press the key to step to the desired lock setting.
Press the E key to enter the displayed lock setting.
Press the M key to skip and keep the existing setting.
RS-485 Terminals

<table>
<thead>
<tr>
<th>Switch</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
</tr>
<tr>
<td>3</td>
<td>OFF</td>
</tr>
<tr>
<td>4</td>
<td>ON</td>
</tr>
<tr>
<td>5</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Typical Hookup

Connect 16 to 14 for optional Terminating Resistor
DEFINITIONS

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

ENT E: (enter code) This prompt will only appear if the panel lock is ON. 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 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 E: (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.

FDE: (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 ← 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.

FACTOR: (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:

<table>
<thead>
<tr>
<th>Standard</th>
<th>&quot;D&quot; Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAL pulses/gallon</td>
<td>GAL pulses/gallon</td>
</tr>
<tr>
<td>LIT pulses/liter</td>
<td>BBL pulses/BBL</td>
</tr>
<tr>
<td>FT3 pulses/ft3</td>
<td>MCF pulses/MCF</td>
</tr>
<tr>
<td>M3 pulses/M3</td>
<td>M3 pulses/M3</td>
</tr>
</tbody>
</table>

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 ↑ 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 factor.

FR#: (frequency for point #) This prompt will only appear when 10 point selected. It sets the frequency for each of the 10 points (#). 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 desired frequency for point #.

FAC#: (factor for point #) This prompt will only appear when 10 point selected. It sets the factor for each of the 10 points (#). 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 desired factor for point #.

NOTE: The display will advance to the next point (FR#) after each entry of the Fr & Fac until all 10 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 places 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.

r scale: (ratemeter scaling) Sets the timebase for the rate readout. Choose rate per hour (Hrs), minutes (mnIn) 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.

r decloc: (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:

\[(\text{Old Data} \times "\text{NOR}" + \text{New Data}) / ("\text{NOR}" + 1)\]

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.
PULSRE: (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 (d 1), 10 (d 10), 100 (d 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.

PWHT: (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 PULSRE is turned off.

ADDR: (address) Sets the address of the device from 1 to 247 for Modbus network.

BAUDR: (baud rate) Sets the baud rate for the serial communication.

PARITY: (parity) Sets the parity for the serial communication.

STOPB: (stop bits) Sets the number of stop bits for the serial communication. This menu item is skipped if Parity is nonE.

TRANSDLY: (transmission delay) A delay can be added between the time the BatRT receives a request and when it responds to it (Note: RS485 option)

date: (date) Sets the date for the real time clock. The format is MMDDYYYY.

time: (time) Sets the time for the real time clock. The format is HHMM.  NOTE: Pressing E key will set the time to the displayed value with 00 seconds. Press M key to keep the existing running time value.

LOG: (log time) Sets the time of day that the data logger will record the total.

VIEWLOG: (view log) Prompts user to view data logger. Select YES to view or NO to skip. When YES is selected for VIEWLOG. The display will show the date of the last log in month and day format MMDD. Use the "E" or "M" keys to view previous logs.

LOGCLR: (log clear) Prompts user to clear the data logger. Select YES if you want to clear else select no.

LOCK: (lock code) Sets the 5 digit lock code to be entered when the unit prompts LOCK. 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 UNIT: (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.
Appendix B - RS485 with Modbus Protocol Option S2

PROGRAMMING FLOWCHART

RUN MODE
- If panel lock OFF
  - Press the M key to enter the programming menu.
- If panel lock ON
  - 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.

CLEAR TOTAL
- 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.

ENTER CODE
- 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 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.

FACTOR DECIMAL
- Press the key to increment each individual digit of the factor.
- Press the E key to enter the displayed factor.
- Press the M key to skip and keep the existing factor.

FACTOR TYPE
- Press the key to choose factor type (10 Point or Linear).
- Press the E key to enter the displayed factor type.
- Press the M key to skip and keep the existing factor type.

SET 10PT
- If yes selected
  - Press the E key to enter the displayed selection.
- If no selected
  - Press the M key to skip (same as selecting NO).

FREQUENCY for POINT # (Fr0-Fr9)
- If Fr1-Fr9 = 0
  - 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.

FACTOR for POINT # (FAC0-FAC9)
- Press the key to increment each individual digit of the factor for point #.
- Press the E key to enter the displayed factor.
- Press the M key to skip and keep the existing factor.

NOTE: Frequency/factor point pairs must be entered in ascending order of frequency.
PROGRAMMING FLOWCHART
(continued)

Continued From Previous Page

TOTAL DECIMAL
- Press the ← key to step the totalizer 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.

TOTAL DESCRIPTOR
- Press the ↑ key to step to the desired totalizer descriptor.
- Press the E key to enter the displayed descriptor.
- Press the M key to skip and keep the existing descriptor.

NOTE: When option "D" (rate per day) is ordered; selections are: GAL, BBL, MCF, M3, "blank"

SCALE (ratemeter)
- Press the ↑ key to step to the desired scale setting.
- Press the E key to enter the displayed scale setting.
- Press the M key to skip and keep the existing setting.

NOTE: When option "D" (rate per day) is ordered; selections are: min, HRS, days

RATE DECIMAL LOCATION
- Press the ← key to step the ratemeter 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.

NORMALIZATION (dampening)
- Press the ↑ key to increment each individual digit of the "nor" factor.
- Press the E key to enter the displayed value.
- Press the M key to skip and keep the existing value.

DELAY
- Press the ↑ key to increment each individual digit of the delay.
- Press the ← key to advance to the next digit.
- Press the E key to enter the displayed value.
- Press the M key to skip and keep the existing value.

OUT LOW (4mA)
- Press the ↑ key to increment each individual digit of the out low setting (4mA value). This will only display on units with Analog Output.
- Press the ← key to advance to the next digit.
- Press the E key to enter the displayed value.
- Press the M key to skip and keep the existing value.

OUT HIGH (20mA)
- Press the ↑ key to increment each individual digit of the out high setting (20mA value). This will only display on units with Analog Output.
- Press the ← key to advance to the next digit.
- Press the E key to enter the displayed value.
- Press the M key to skip and keep the existing value.

PULSE SCALER (divider)
- Press the ↑ key to step to the desired pulse scale divider for the pulse output.
- Press the E key to enter the displayed pulse scale divider.
- Press the M key to skip and keep the existing pulse scale value.

PULSE WIDTH (seconds)
- Press the ↑ key to step to the desired pulse width for the pulse output.
- Press the E key to enter the displayed pulse width.
- Press the M key to skip and keep the existing pulse width.

This will not display if Pulse Out is turned OFF.

TDEC
12345678
ToT DESC
TDECLoC
E
M
E
M
E
M
E
M
1234
R DEC
E
M
E
M
E
M
0.1
dELAY
0.1 to 99.9
E
M
E
M
E
M
E
M
0.0625
P width
0.5
E
M
0.5
P width
0.25
.125
.0625
 Continue On
Next Page

TOTAL DECIMAL
TOTAL DESCRIPTOR
SCALE (ratemeter)
RATE DECIMAL LOCATION
NORMALIZATION (dampening)
DELAY
OUT LOW (4mA)
OUT HIGH (20mA)
PULSE SCALER (divider)
PULSE WIDTH (seconds)
PROGRAMMING FLOWCHART

Continued From Previous Page

ADDRESS

001

Press the ↑ key to increment each individual digit of the address.
Press the → key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.

BAUD RATE

9600 4800 2400 1200 off

Press the ↑ key to select the desired baud rate.
Press the E key to enter the displayed choice.
Press the M key to skip and keep the existing choice.

PARITY

odd

Press the ↑ key to select the desired parity.
Press the E key to enter the displayed choice.
Press the M key to skip and keep the existing choice.

STOP BITS

1

Press the ↑ key to select the desired number of stop bits.
Press the E key to enter the displayed choice.
Press the M key to skip and keep the existing choice.

NOTE: Only appears if parity = none

Transmission Delay

0.0 to 1.0

Press the ↑ key to increment each individual digit of the trans. delay.
Press the → key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.

DATE

01.01.2000 to 12.31.2099

Press the ↑ key to increment each individual digit of the date.
Press the → key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.

TIME

00.00 to 23.59

Press the ↑ key to increment each individual digit of the time.
Press the → key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.

LOG TIME

00.00 to 23.59

Press the ↑ key to increment each individual digit of the log time.
Press the → key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.

VIEW LOG

no

Press the ↑ key and select "yes" to view log. Select "no" to skip.
Press the E key to enter the displayed choice.
Press the M key to skip.

LOG DATE

date of last log

02.22

The date of last log will be shown in the format (MM-DD) if "yes" was selected above.
Press M or E to view previous logs and exit when the end of datalog is reached.

LOG CLEAR

no

Press the ↑ key and select "yes" to clear log. Select "no" to skip.
Press the E key to enter the displayed choice.
Press the M key to skip.

LOCK CODE

0000

Press the ↑ key to increment each individual digit of the lock code.
Press the → key to advance to the next digit.
Press the E key to enter the displayed value.
Press the M key to skip and keep the existing value.

TURN LOCK ON or OFF

YES

Press the ↑ key to step to the desired lock setting.
Press the E key to enter the displayed lock setting.
Press the M key to skip and keep the existing setting.
Modbus RTU Protocol

When the 915-BATRT-M is equipped with the Modbus option, the protocol it uses is the Modbus RTU protocol. This protocol defines a message structure that hosts and clients will recognize and use on the Modbus network over which they communicate. It describes the process a master device (PC compatible) uses to request access to another device (915-BATRT-M), how it will respond to requests from the other devices, and how errors will be detected and reported. It establishes a common format for the layout and contents of message fields. During communications on a Modbus RTU network, the protocol determines how each 915-BATRT-M will know its device address, recognize a message addressed to it, determine the kind of action to be taken, and extract any data or other information contained in the message. If a reply is required, the 915-BATRT-M will construct the reply message and send it using Modbus RTU protocol.

RTU Mode
The 915-BATRT-M with Modbus communications option supports the Modbus RTU (Remote Terminal Unit) mode only. The Modbus ASCII mode is not supported. The main advantage of the RTU mode is that its greater character density allows better data throughput than ASCII for the same baud rate. The Modbus RTU uses a Master-Slave Query-Response Cycle in which the 915-BATRT-M is the slave device.

Control Functions
The 915-BATRT-M with Modbus communications option supports the following function codes:

<table>
<thead>
<tr>
<th>CODE</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Read Coil Status</td>
<td>Reads the status of a coil (ON or OFF)</td>
</tr>
<tr>
<td>03</td>
<td>Read Holding Registers</td>
<td>Reads the value in a holding register</td>
</tr>
<tr>
<td>05</td>
<td>Force Single Coil</td>
<td>Forcs a single coil (0x reference) to either ON or OFF</td>
</tr>
<tr>
<td>06</td>
<td>Preset Single Register</td>
<td>Presets a value into a single holding register (4x reference)</td>
</tr>
<tr>
<td>15</td>
<td>Force Multiple Coil</td>
<td>Forces each coil (0x reference) in a sequence of coils to either ON or OFF</td>
</tr>
<tr>
<td>16</td>
<td>Preset Multiple Registers</td>
<td>Presets values into a sequence of holding registers (4x reference)</td>
</tr>
</tbody>
</table>

915-BATRT-M Communication Setup Menu
The setup menu allows Modbus RTU Protocol communications parameters of: Device ID, Baud Rate, and Parity to be selected to match the parameters of your Modbus network. Each 915-BATRT-M must have it's own Device ID and the same Baud Rate and Parity setting.
## Register & Coil Usage

### Register Usage (each register is 2 bytes)

<table>
<thead>
<tr>
<th>Data</th>
<th>Register</th>
<th>Data Type</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume Flow</td>
<td>Reg 40001 &amp; 40002</td>
<td>Float</td>
<td>Read</td>
</tr>
<tr>
<td>Total</td>
<td>Reg 40003 &amp; 40004</td>
<td>Float</td>
<td>Read</td>
</tr>
<tr>
<td>Linear K-Factor</td>
<td>Reg 40005 &amp; 40006</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#0</td>
<td>Reg 40007 &amp; 40008</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#0</td>
<td>Reg 40009 &amp; 40010</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#1</td>
<td>Reg 40011 &amp; 40012</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#1</td>
<td>Reg 40013 &amp; 40014</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#2</td>
<td>Reg 40015 &amp; 40016</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#2</td>
<td>Reg 40017 &amp; 40018</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#3</td>
<td>Reg 40019 &amp; 40020</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#3</td>
<td>Reg 40021 &amp; 40022</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#4</td>
<td>Reg 40023 &amp; 40024</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#4</td>
<td>Reg 40025 &amp; 40026</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#5</td>
<td>Reg 40027 &amp; 40028</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#5</td>
<td>Reg 40029 &amp; 40030</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#6</td>
<td>Reg 40031 &amp; 40032</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#6</td>
<td>Reg 40033 &amp; 40034</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#7</td>
<td>Reg 40035 &amp; 40036</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#7</td>
<td>Reg 40037 &amp; 40038</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#8</td>
<td>Reg 40039 &amp; 40040</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#8</td>
<td>Reg 40041 &amp; 40042</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Frequency#9</td>
<td>Reg 40043 &amp; 40044</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Factor#9</td>
<td>Reg 40045 &amp; 40046</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Rate Delay</td>
<td>Reg 40047 &amp; 40048</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Analog Out Low</td>
<td>Reg 40049 &amp; 40050</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Analog Out High</td>
<td>Reg 40051 &amp; 40052</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #0</td>
<td>Reg 40053 &amp; 40054</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #1</td>
<td>Reg 40055 &amp; 40056</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #2</td>
<td>Reg 40057 &amp; 40058</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #3</td>
<td>Reg 40059 &amp; 40060</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #4</td>
<td>Reg 40061 &amp; 40062</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #5</td>
<td>Reg 40063 &amp; 40064</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #6</td>
<td>Reg 40065 &amp; 40066</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #7</td>
<td>Reg 40067 &amp; 40068</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #8</td>
<td>Reg 40069 &amp; 40070</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #9</td>
<td>Reg 40071 &amp; 40072</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #10</td>
<td>Reg 40073 &amp; 40074</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #11</td>
<td>Reg 40075 &amp; 40076</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #12</td>
<td>Reg 40077 &amp; 40078</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #13</td>
<td>Reg 40079 &amp; 40080</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #14</td>
<td>Reg 40081 &amp; 40082</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #15</td>
<td>Reg 40083 &amp; 40084</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #16</td>
<td>Reg 40085 &amp; 40086</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #17</td>
<td>Reg 40087 &amp; 40088</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #18</td>
<td>Reg 40089 &amp; 40090</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #19</td>
<td>Reg 40091 &amp; 40092</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #20</td>
<td>Reg 40093 &amp; 40094</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #21</td>
<td>Reg 40095 &amp; 40096</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #22</td>
<td>Reg 40097 &amp; 40098</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Flow Total Log #23</td>
<td>Reg 40099 &amp; 40100</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
</tbody>
</table>
## Register & Coil Usage (continued)

### Data

<table>
<thead>
<tr>
<th>Register</th>
<th>Data Type</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reg 40101 &amp; 40102</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40103 &amp; 40104</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40105 &amp; 40106</td>
<td>Float</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40133</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40134</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40135</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40136</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40137</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40138</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40139</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40140</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40141</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40142</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40143</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40144 &amp; 40145</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40146</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40147</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40148</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40149</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40150</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40151</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40152</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Reg 40153</td>
<td>Integer</td>
<td>Read/Write</td>
</tr>
</tbody>
</table>

**NOTE:** The Float data type follows the IEEE format for a 32 bit float.

### COIL USAGE (each coil is 1 bit)

<table>
<thead>
<tr>
<th>Coil</th>
<th>Data Type</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil 00001</td>
<td>bit</td>
<td>Read</td>
</tr>
<tr>
<td>Coil 00002</td>
<td>bit</td>
<td>Read</td>
</tr>
<tr>
<td>Coil 00003</td>
<td>bit</td>
<td>Read</td>
</tr>
<tr>
<td>Coil 00004</td>
<td>bit</td>
<td>Read</td>
</tr>
<tr>
<td>Coil 00005</td>
<td>bit</td>
<td>Write</td>
</tr>
<tr>
<td>Coil 00006</td>
<td>bit</td>
<td>Write</td>
</tr>
<tr>
<td>Coil 00007</td>
<td>bit</td>
<td>Write</td>
</tr>
<tr>
<td>Date</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>01/06</td>
<td>Original release</td>
<td></td>
</tr>
<tr>
<td>07/09</td>
<td>Added note to RS485 Appendix B: &quot;NOTE: Pressing E key will set the time to the displayed value with 00 seconds. Press M key to keep the existing running time value.&quot; on pages 22 and 25</td>
<td></td>
</tr>
</tbody>
</table>