

# WIRING AND PROGRAMMING

Digital Display Option RW3  
Digital Display Accessory DR-1

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### 1.1 General

This manual covers the wiring and programming of the digital display which is installed in the flow meter housing (Option RW3) and accessory digital display remote mounting (Option DR-1). See page 5 "Output to Flow Chart" for transmitter output (Options W2, W3 and RW3) and M2 Manual for transmitter (Option W).

The display provides up to 4 1/2 digits for rate and 8 digits for totalization. The display incorporates a microprocessor for scaling and selectable square root extraction. An isolated, scaled open collector output is included for operating a remote contact closure for remote totalization. See figure 3 to convert this output to a voltage output.

The remote digital display (DR-1) requires a 4-20mA signal which is provided by transmitter Options W2, W3 or W. The W2, W3 and RW3 are a 2 wire loop powered (square root function) and the W option is a 4 wire transmitter (linear output signal). An external 24Vdc power supply is required (Option PS-24).

# 1.

## Installation & Wiring

# 1.

## Installation & Wiring

(Continued)

### 1.2 Wiring built-in digital readout

WARNING - ADJUSTING SPAN POT  
WILL CHANGE METER CALIBRATION

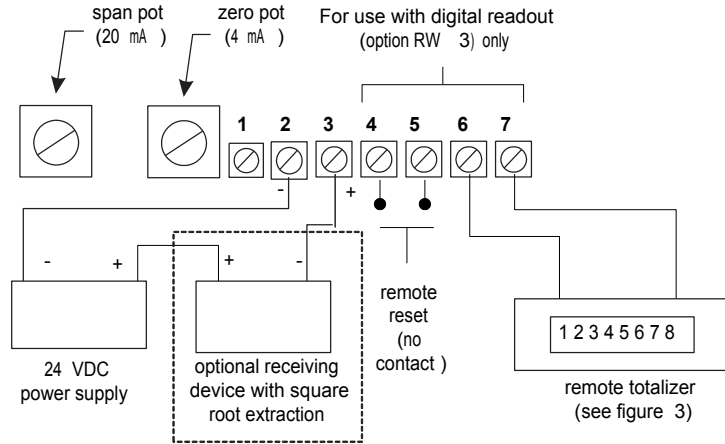


Figure 1

### 1.3 Wiring remote digital readout

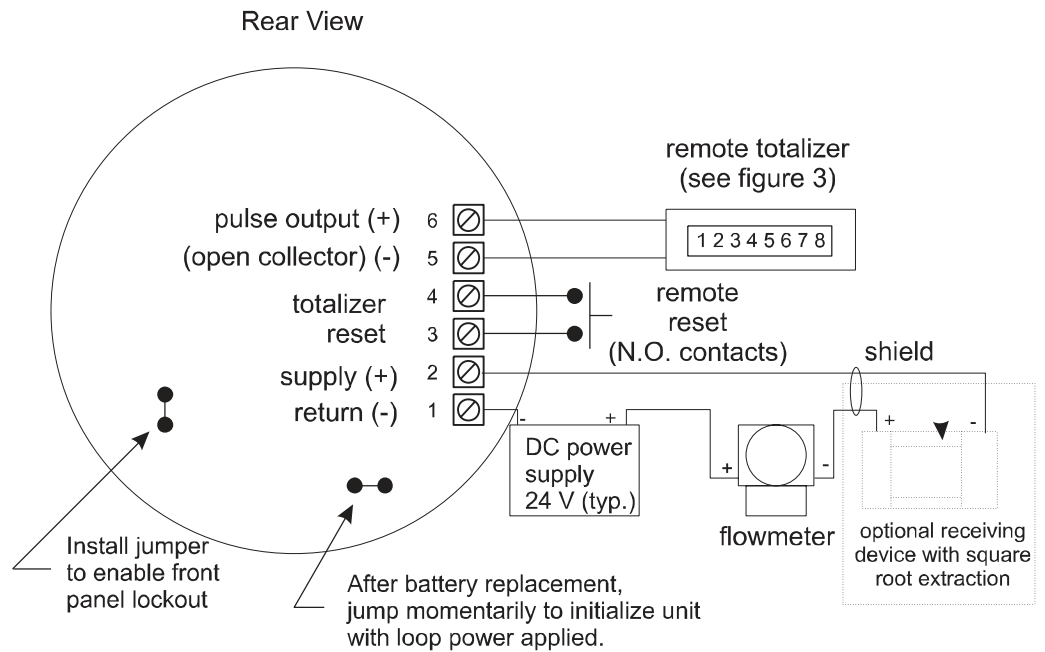


Figure 2

# 1.

## Installation & Wiring (Continued)

### 1.4 Wiring the pulse output

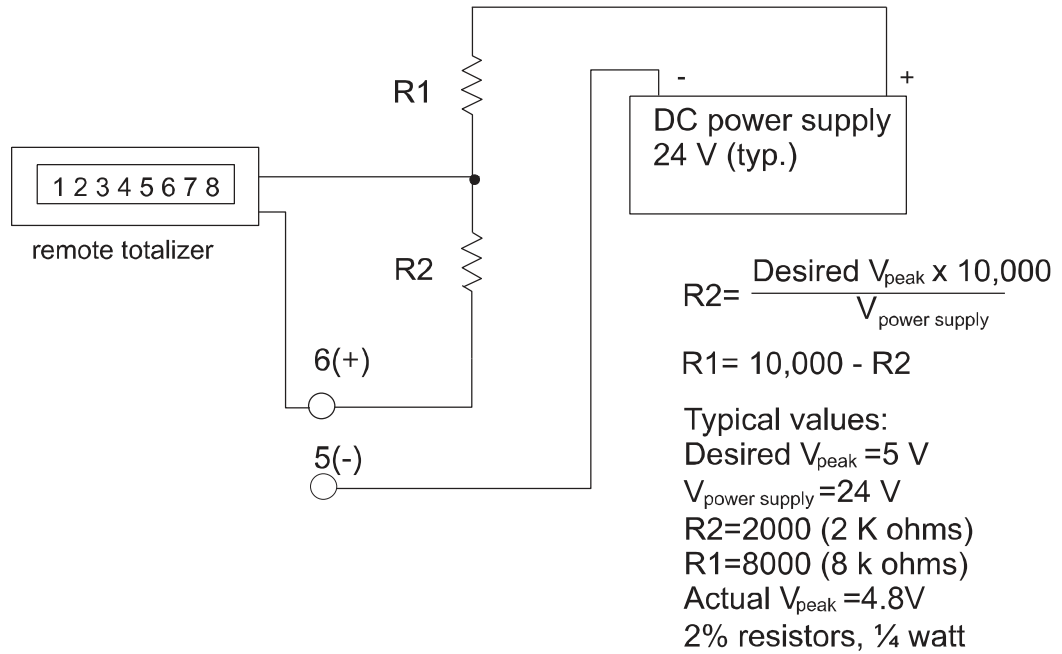


Figure 3  
Obtaining a Voltage Pulse Output

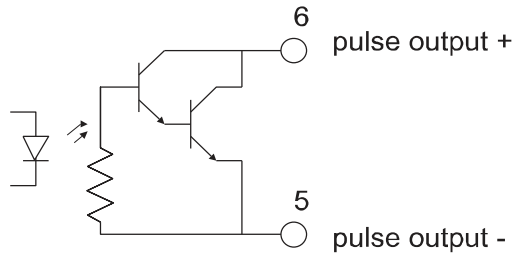


Figure 4  
Pulse Output Schematic

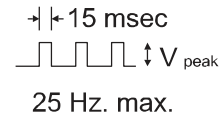


Figure 5  
Pulse Shape

**Caution:** Observe proper polarity when connecting the pulse output. The pulse output circuitry can be damaged by reverse polarity or by voltages exceeding 30 volts.

# 2.

## Definitions

**Ent CodE:** (enter code) This prompt will only appear if the panel lock is ON. Enter the password code to enter the program menu. Press the **▲** key to increment each digit code. Press the **◀** key to step to the next digit to the left. Press the **E** key to enter the 4 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. To override the lock code or if you forgot your password enter 2910 to access the menu or change password.

**Clr tot:** (clear total) Clears (resets) 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.

**3 or 4:** (3.5 or 4.5 digits) Choose between 3.5 or 4.5 digit rate display. Press the **▲** key to step to the desired choice. Press the **E** key to enter the displayed choice (factory set at 4.5).

**dEC Loc:** (decimal location for ratemeter) Sets the decimal location for the ratemeter and the rAtE Lo & rAtE Hi settings. Press the **◀** key to move the decimal. Press the **E** key to enter the displayed decimal location.

**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).

**tot dESC:** (totalizer descriptor) This allows you to illuminate one of the available descriptors on the display (GAL, LIT, FT3, M3 or "blank"). Press the **▲** key to select the descriptor. Press the **E** key to enter the selected descriptor (Based on flow meter model number).

**rAt dESC:** (ratemeter descriptor / scaling) Sets the rate readout. Choose rate per hour, minutes, seconds or "blank" (when no descriptor is selected the unit assumes that the rate lo and rate hi are entered in units per second). Press the **◀** key to step to the desired choice. Press the **E** key to enter the illuminated descriptor (Based on flow meter model number).

**inPut:** (input type) Choose linear (Lin) for transmitter (Option "W") or square root extraction (59.u) for transmitter Options W2, W3 or RW3). Press the **▲** key to step to the desired input type. Press the **E** key to enter the displayed choice (Based on flow meter model number).

**rAtE Lo:** (rate low) Sets the low setting for the 4-20mA analog input. Key in the low rate value which corresponds to the 4mA input (factory setting is 0000). 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 rate lo value.

**rAtE Hi:** (rate high) Sets the high setting for the 4-20mA analog input. Key in the high rate value which corresponds to 20mA input (Based on flow meter model number full scale flow rate). 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 rate hi value.

**Lo Cut:** (low cutoff) Percent of input (0.1 to 9.9) below which all inputs will assume the rate lo value. (i.e. With Lo Cut set 9.9 and rAtE Lo set at 0, all inputs below 5.6mA will read 0). Factory set at 2.2 to reflect lowest reading possible approximately 15% of full scale.

**PuLSEout:** (pulse out divider) 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 (d1), 10 (d 10), 100 (d 100) or off (oFF). With the divider set at 1, the unit will give a pulse out for every increment of the LCD displayed.

# 2.

## Definitions (Continued)

CAL: (calibrate; yes or no) Select Yes to calibrate the unit, select NO to skip the calibration procedure. Press the ▲ key to select YES or NO. Press the E key to enter the displayed selection.

**IMPORTANT:** The factory calibrates all flow meters based on the flow meter model number calibration can only be performed with a known flow standard that corresponds to the full scale flow rate of the flow meter.

CAL Lo: (calibrate low) Apply an accurate 4mA signal at (no flow) to the input and Press the E key. If the calibration is successful the unit will display "donE CAL Lo". If the calibration is not successful the display will read "donE CAL Err" see error codes page 8. Press the M key to continue.

CAL Hi: (calibrate high) apply an accurate 20mA signal (full scale flow rate) to input and Press the E key. If the calibration is successful the unit will display "donE CAL Hi". If the calibration is not successful the display will read "donE CAL Err" see error codes page 8. Press the M key to continue.

LoC CodE: (lock code) Sets the 4 digit lock code to be entered when the unit prompts Ent 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 here for later use! LOCK CODE\_\_\_\_\_ (Override Code: 2910)**

LoC unit: (lock unit) Sets the panel lock ON or OFF. Press the ▲ key to select YES (ON) or NO (OFF). Press the E key to enter the displayed selection.

**NOTE:** A hardware jumper menu lockout is also available (see figure 2). The hardware jumper does not inhibit contact closure reset at terminals 3 and 4.

## Output to Flow Chart

Connect multimeter in series with the current loop. With pipeline pressurized, adjust zero pot until current output reads 4.00 mA ± 0.02 mA at no flow. Establish a known flow rate through the flow meter as close to 95% of full scale as practical. Set span using the formula below.

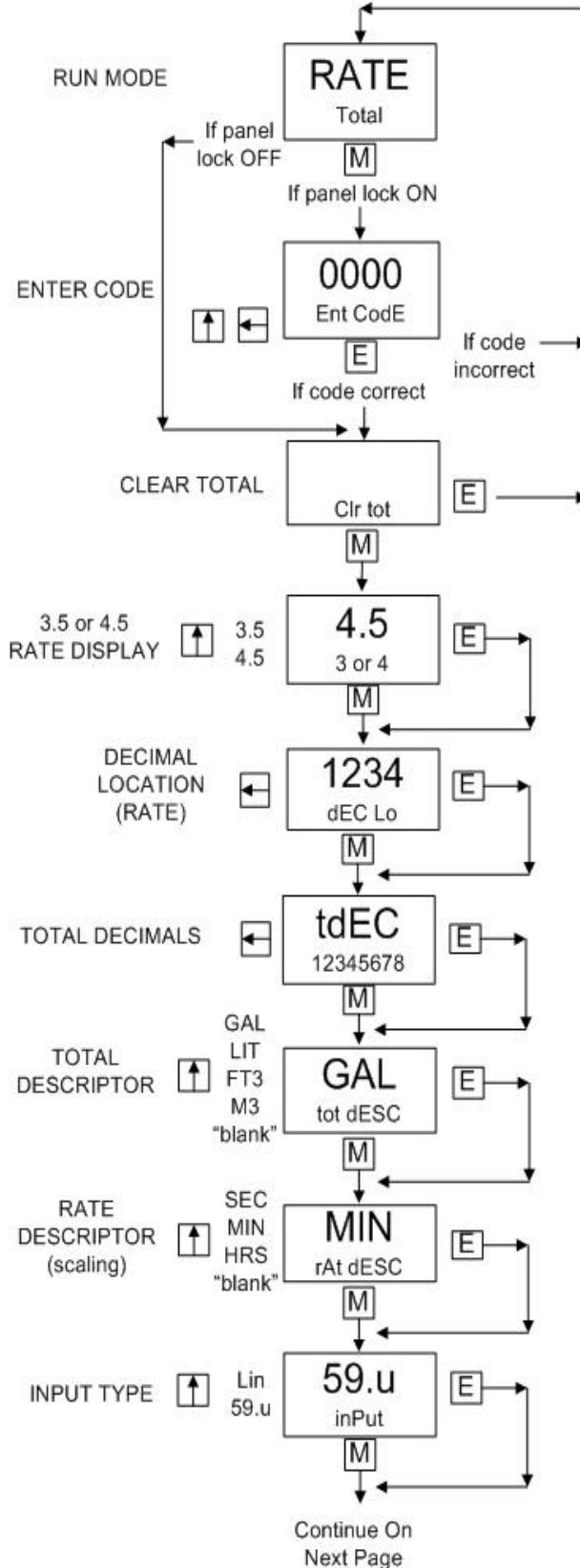
Set span, span is set using the following formula:  $I = 16 Q^2 + 4.00$ ; where I = current output in mA, Q = decimal % of full scale. Click [here](#) to access calculator.

<u>% FS</u>	<u>Current Output</u>	<u>% FS</u>	<u>Current Output</u>
20	4.64	70	11.84
30	5.44	80	14.24
40	6.56	90	16.96
50	8.00	95	18.44
60	9.76	100	20.00

# 3.

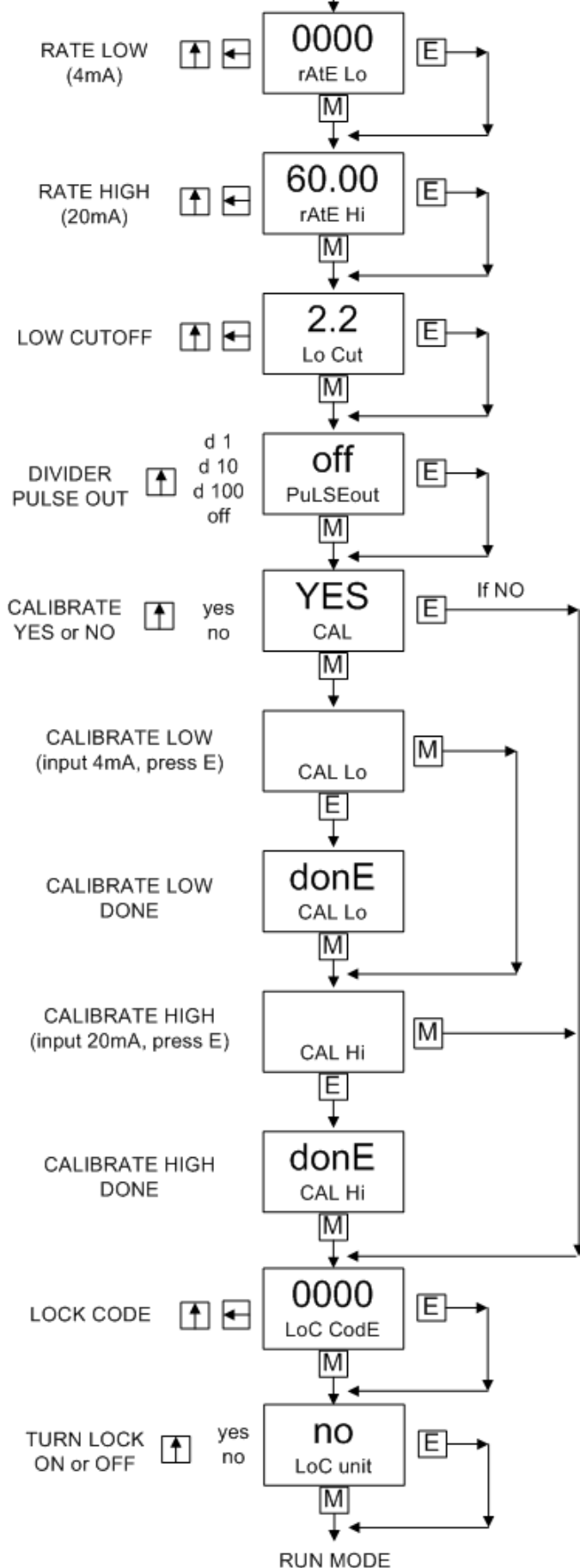
## Programming Flowchart

**NOTE:** All menu selections are saved upon exiting the program menu and returning to the run mode. When making menu changes, do not remove loop power until returning to the run mode.  
**Example: 1 1/2- 71- VUR- 60- ARW3** (Option RW3 - 2 wire loop powered transmitter 4-20mA.)



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 Run Mode.  
 Press the **M** key to skip and go to next menu item.  
 Press the **▲** key to step to the desired number of digits for the rate display. Press the **E** key to enter the displayed choice.  
 Press the **M** key to skip and keep the existing choice.  
 Press the **◀** key to step the decimal to the next digit.  
 Press the **E** key to enter the displayed decimal location.  
 Press the **M** key to skip and keep the existing choice.  
 Press the **◀** key to step the decimal to the next location.  
 Press the **E** key to enter the displayed decimal location.  
 Press the **M** key to skip and keep the existing decimal location.  
 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.  
 Press the **▲** key to step to the desired rate descriptor.  
 Press the **E** key to enter the displayed descriptor.  
 Press the **M** key to skip and keep the existing descriptor.  
 Press the **▲** key to step to the desired input type.  
 Press the **E** key to enter the displayed choice.  
 Press the **M** key to skip and keep the existing input type.

Continue From Previous Page



Press the ▲ key to increment each individual digit of the rate.  
 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 go to next menu item.

Press the ▲ key to increment each individual digit of the rate high setting.  
 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 increment each individual digit of the low cutoff setting.  
 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 divider for the pulse output.  
 Press the E key to enter the displayed divider.  
 Press the M key to skip and keep the existing divider.

Press the ▲ key to step to cal YES or cal NO.  
 Press the E key to enter the displayed choice.  
 Press the M key to skip and proceed to loc code.

Press the E key when 4mA is supplied to the input.  
 Press the M key to skip and proceed to cal hi.

"Done" will appear to signal that the cal lo was successful.  
 Press the M key to advance to cal hi.

Press the E key when 20mA is supplied to the input.  
 Press the M key to skip and proceed to loc code.

"Done" will appear to signal that the cal hi was successful.  
 Press the M key to advance to loc code.

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 code.  
 Press the M key to skip and keep the existing code.

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.

## ERROR CODE

# 4.

## Error Codes

**0000**  
rAtE Err

This error message is displayed when the "RATE LO" value is set equal to or higher than the "RATE HI" value. Press the **M** to re-enter the "RATE LO" and "RATE HIGH" values.

**donE**  
CAL Err

This error message is displayed when the "CAL LO" or "CAL HI" input is set at a value which is out of range (see "CAL LO" and "CAL HI" in programming section for calibrating input range). Press **M** to re-enter the "CAL LO" and/or "CAL HI" procedure.

E bAttrY

If a low battery / invalid memory condition is detected, the display will flash and the "BAT" descriptor will come on. Press **M** to acknowledge the condition. E BATTERY will be displayed. Replace the battery with loop power connected, the unit must be recalibrated if loop power was not maintained.

E PuLSE

This error message is displayed when the total is advancing at a speed greater than the pulse output capability. Choose a greater pulse divider or select "OFF".

# 5.

## Battery Replacement

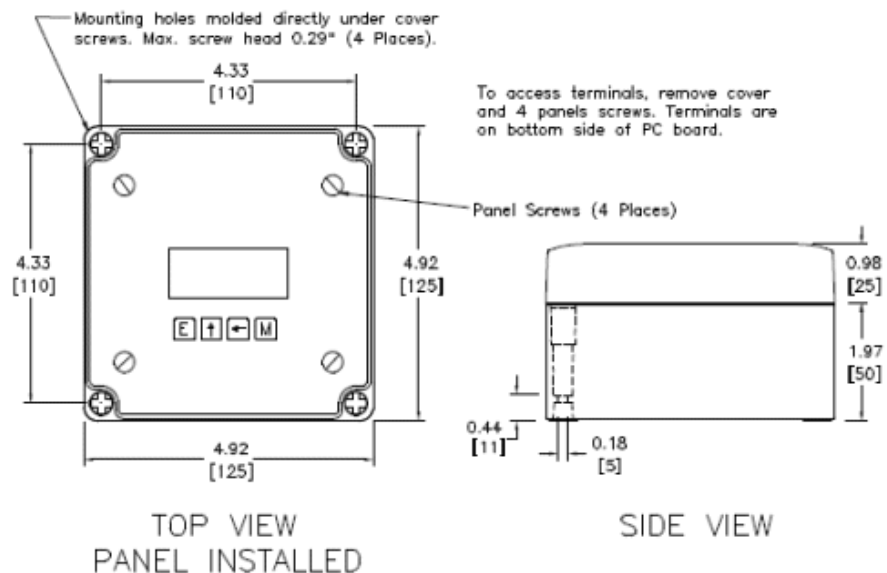
Recommended battery: Panasonic BR2330 3V 250mA-H Lithium (2 yr, standby life)

The polarity of the battery must be correct. Plus (+) must be on top as indicated on the conductor arm.

**Note:** Power the unit from the 4-20mA loop while the battery is being replaced to avoid the need to recalibrate the unit. If the loop power was not maintained the unit will return to the default settings, all menu items must be re-entered. Return to section 3 and follow the programming example to re-enter all menu items based on your model number (see nameplate label for model number details).

# 6.

## Dimensions



**Figure 6**  
Dimensions - Remote Readout DR-1

Keypad: 4 tactile feedback keys



## Specifications

### Description:

Featuring up to 4 1/2 digits of rate and 8 digits of total, the digital indicator is a loop powered indicator capable of accepting either a linear or square root 4-20mA inputs. An isolated scaled pulse output is available for hook up to a remote totalizer. Numeric password protection prevents unauthorized access to menu.

### Specifications:

#### Power Input:

100mA, 24Vdc power supply (Not Included)  
Internal Battery (Setup & totalizer memory storage only)  
3 V 250mA -H Lithium (2 yr. Standby life)

#### Display:

Rate Display: (selectable decimal)  
3.5 or 4.5 Digits (selectable), 0.35" High,  
Display updates once every two seconds.  
Rate Descriptor: /SEC, /MIN, /HR, or Blank  
Totalizer Display: (selectable decimal)  
8 Digit (99999999), 0.2" High  
Totalizer Descriptors: GAL, LIT, FT3, M3  
or "blank"  
Low Battery Error Detection: "BAT"  
descriptor  
Under / Over range Indication: Flashing  
display

#### Environmental:

Operating Temperature  
-4°F (-20°C) to +158°F (70°C)  
Humidity  
0-90% Noncondensing

#### Accuracy:

0.1% Full Scale Resolution,  $\pm 1$  Count  
Temperature Drift:  
50 ppm/°C Typical  
200 ppm/°C Worst Case

**Listing:** CE Compliant

#### Lockout:

Password: Unauthorized menu changes can be prevented by entering a user selectable password (5 digit number). If you forgot the password you can access the menu by using the override password 2910.

Jumper: An internal jumper shunt is provided for applications requiring a sealed menu and totalizer lockout. Install the jumper to enable the lock. (see Typical Wiring, Pg. 2)

#### Inputs:

##### Signal Inputs:

Full Scale Range: 4 to 20 mA DC  
Loop Voltage Drop: 6 Volts Maximum  
Reverse Polarity Protection  
Over Current Protection to 60 mA  
16 Bit resolution; 1 sample every 2  
seconds

Low cutoff supplied to inhibit indications  
at low

flow rates

##### Reset Inputs:

Internal Pullup Resistor: 100 k $\Omega$  to  $\pm 3$   
VDC  
High (logic 1): Open or 3-30 VDC  
Low (logic 0): Less than .5 VDC  
Minimum On: 25 msec

#### Pulse Output:

The pulse output advances with the least  
significant digit of the totalizer

Type: Opto-isolated open collector  
transistor

Max. voltage (off state): 30 VDC

Current (on state): 5 mA @ .9 V drop, .1  
mA @

0.7 drop

Pulse Duration: 15 msec

Pulse Output Rate: 25 CPS max.

Pulse output divider: User selectable.  $\div$

1,  $\div 10$ ,

$\div 100$  or off

#### Calibration & Operation:

Input Scaling: Via front keypad

Decimal Point: Via front keypad

Reset Input: Via front keypad or remote  
dry contact closure