

McCROMETER Propeller Flow Meters

RE100 DIGITAL REGISTER/TRANSMITTER

Manual for Installation, Operation & Maintenance

MODELS: RE100-000, RE100-001, RE100-012, RE100-100,
RE100-101, RE100-112
RETROFIT KITS: RE100-000-K, RE100-001-K, RE100-012-K,
RE100-100-K, RE100-101-K, RE100-112-K



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SECTION 1 - Description & Specifications

1.1 DESCRIPTION

The RE100 Digital Register is a battery powered device that accepts pulse inputs from a McCrometer Propeller Flow Meter and simultaneously indicates both Rate and Total on an LCD display. The RE100 has separate scaling factors for Rate and Total allowing the use of different engineering units. The totalizer is updated to non-volatile memory every 60 minutes and will be retained even if the battery is removed. Analog output (4-20mA) and pulse output options are available. The register is mounted in a standard McCrometer canopy housing and can be retrofitted to existing McCrometer Propeller Flow meters (part numbers with a "-K" suffix.) The registers are available either meter mounted or remote mounted, up to 50 feet from the meter body.

1.2 SPECIFICATIONS

Environmental		Display Functions	
Operating Temperature:	32°F to 158°F (0°C to 70°C)	Update Time:	0.5 to 5 seconds
Storage Temperature:	-40°F to 158°F (-40°C to 70°C)	Update Default:	0.5 seconds
Housing Rating:	NEMA 4	Display Timeout:	1 to 9999 seconds
EMI/EMC:		Timeout Default:	60 seconds
Electrostatic Discharge:	8 KV (IEC 1000-4-2 Level 3)	Non-volatile Storage:	EEPROM updated every 60 minutes (when running)
Electrical Fast Transient:	1 KV (IEC 1000-4-4 Level 3)	Totalizer Functions	
RF Susceptibility:	150 KHz to 230 MHz @ 10 V (IEC 1000-4-6 Level 3)	Display:	8 digits, 0.25" high
Input Signal		Decimal Point:	0 to 4 places, programmable
Type:	Voltage pulse	Total Scaling Factor:	0.0001 to 9999
Voltage Range:	1-10 V (with hysteresis)	Reset:	Front Panel (can be disabled permanently)
Maximum Frequency:	3 kHz	Rate Functions	
Minimum Frequency:	0.125 Hz	Display:	5 digits, 0.35" high
Minimum Pulse Width:	2 µs	Decimal Point:	0 to 4 places, selectable
Max Remote Distance:	50 Feet	Rate Scaling Factor:	0.0001 to 9999
Power Requirements		Calculation Method:	1/Tau
Battery Type	3 VDC Lithium, Replaceable	Accuracy:	±0.25% of reading
Operating Life:	4 years*	Smoothing:	0 to 99%, programmable
Low Battery Indication:	6 months before expiration	Smoothing Default:	50%
	*When used with the display timeout feature	Rate Zero Time:	8 seconds

1.3 OPTIONS

Scaled Pulse Output	4-20mA w/Scaled Pulse Output		
Type:	Open Collector transistor	Type:	Std 2-wire loop powered
Maximum Rating:	0.1 A, 32 V	Operating Voltage:	12 to 32 VDC
Pulse Width:	32 milliseconds	Resolution:	16 bits
Max Output Distance:	500 feet	Pulse Type:	Opto-isolated transistor
		Pulse Width:	32 milliseconds
		Power switch:	Automatic battery override
		Max Output Distance:	5000ft + (analog) 500 feet (pulse)

1.4 MODEL NUMBER IDENTIFICATION

MODEL NUMBER	DESCRIPTION
RE100-000	Meter Mounted Register with No Outputs
RE100-001	Meter Mounted Register with Open Collector Pulse Output
RE100-012	Meter Mounted Register with Optically Isolated Pulse and 4-20mA Output
RE100-100	Remote Mounted Register with No Outputs
RE100-101	Remote Mounted Register with Open Collector Pulse Output
RE100-112	Remote Mounted Register with Optically Isolated Pulse and 4-20mA Output

Note: Add the suffix "-K" for Retrofit Kit Part Numbers.

SECTION 2 - Operation & Programming

2.1 OPERATION - The RE100 is shipped pre-programmed and will operate as soon as the meter is installed. Under normal conditions, the display shows current flow rate and total flow. When the display timeout feature has been activated, the display is blank, but the totalizer keeps counting. To reactivate the display, close the canopy lid momentarily (to darken the display) and reopen. The display will remain on for the duration of the programmed timeout. This feature is designed to conserve battery life by turning off the display when not needed. The register face also includes the engineering units and the multiplier value for the totalizer digits.

2.2 FRONT PANEL OPERATION

To enter the Programming Mode, press and hold the PGM key for 5 seconds.

1. Use the ← key to move the currently selected digit. The currently selected digit will blink. If the leftmost digit is selected and the → key is pressed, the rightmost digit becomes selected. Decimal points are moved the same way.
2. Use the ↑ key to increase the value of the currently selected digit.
3. Use the **PGM** key to change to the next menu item.
4. Hold the **PGM** key for 5 seconds to exit the program mode from any menu item. If no key is pressed for 120 seconds while in Programming Mode, normal operation is automatically resumed.
6. While at the "Total Reset" screen in Programming Mode, pressing the ← key will reset the Total to zero. See **Section 5** to disable this feature.



THE FOLLOWING IS A LIST OF MENU ITEMS THAT CAN BE ADJUSTED:

Totalizer

- Scale factor (0001-9999)
- Scale factor decimal place (0 to 4 places)
- Totalizer display decimal point (0 to 4 places)

Rate Meter

- Scale factor (0001 – 9999)
- Scale factor decimal place (0 to 4 places)
- Rate display decimal point (0 to 4 places)
- Update time (0.5 to 9.5 seconds in 0.5 second increments)
- Rate smoothing (0 to 99%, 0 = no smoothing)
- Display timeout (0 to 9999 seconds, 0 = no timeout)

4-20 mA Analog Rate Output Scaling (optional)

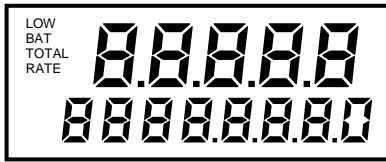
- Zero Value 4mA (0 to 99999 – decimal point same as Rate Meter)
- Full Scale Value 20mA (0 to 99999 – decimal point same as Rate Meter)

Other

- Totalizer Reset

2.3 VISUAL PROGRAMMING GUIDE

Menu



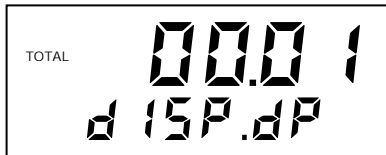
1



2



3



4



5



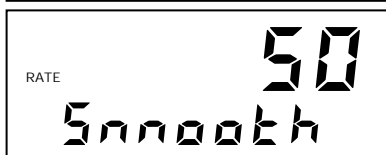
6



7



8



9



All segments displayed (for illustration only)

Hold the PGM key for 5 seconds to activate the programming mode. Then press the PGM key to navigate to the next menu. Use the \leftarrow and \uparrow keys to select and change digits.

Totalizer Scale Factor (0001 to 9999)

Use this menu to set the digits only, use the next menu to set the decimal point for totalizer scale factor.

Totalizer Scale Factor Decimal Point (0-4 places)

This determines the decimal point for the totalizer scale factor (Menu 1). Use the \leftarrow key to move the decimal point.

Totalizer Display Decimal Point (0-4 places)

This determines the location of the decimal point displayed during normal run mode. It has no effect on flow calculations. Use the \leftarrow key to move the decimal point. This can be used for a large totalizer unit like an acre-foot.

Rate Scale Factor (0001 to 9999)

Use this menu to set the digits only, use the next menu to set the decimal point for rate scale factor.

Rate Scale Factor Decimal Point (0-4 places)

This determines the decimal point for the rate scale factor (Menu 4). Use the \leftarrow key to move the decimal point.

Rate Display Decimal Point (0-4 places)

This determines the location of the decimal point displayed during normal run mode. It has no effect on flow calculations. Use the \leftarrow key to move the decimal point. This can be used for a large rate unit like a cubic-foot.

Display Update Time (0.5 to 9.5 seconds)

This menu determines the update speed for the display. "0.5" seconds is the default setting.

Rate Display Smoothing (0-99%)

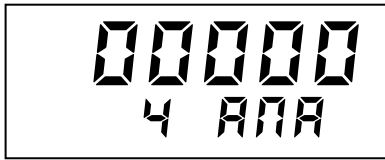
This determines how much the old rate is used for the new rate calculations. A higher number causes the rate display to change more slowly. This also affects the optional 4-20mA output. "50" is the default setting.

Display Timeout (0-9999 seconds)

The display will blank after the specified timeout. A momentary darkness (lid closure) will activate the display again for the specified time duration. This feature conserves battery life. A value of 0000 disables the timeout. "0300" is the default setting.

2.3 VISUAL PROGRAMMING GUIDE (continued)

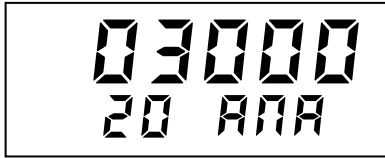
10



Analog Rate 4mA Value (0 to 99999)

Programs the 4mA to correspond to the rate shown in this screen. **NOTE:** This menu item will appear only when power has been applied to the optional 4-20mA output.

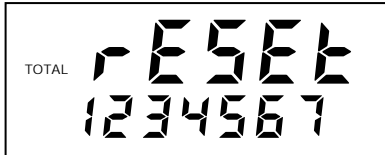
11



Analog Rate 20mA Value (0 to 99999)

Programs the 20mA to correspond to the rate shown in this screen. **NOTE:** This menu item will appear only when power has been applied to the optional 4-20mA output.

12



Reset (clear) the Totalizer to Zero

The current Totalizer count is displayed on the bottom line. Depress and hold the \leftarrow key for 3 seconds to reset the Totalizer. **NOTE:** This function will not be accessible if the Totalizer reset has been disabled permanently (see Section 4).

2.4 FLOW CALCULATIONS

2.4.1 TOTALIZER SCALE FACTOR

$$TSF = \frac{\text{PulsesPerTotalizerUnit}}{\text{TotalizerDisplayDPF}}$$

The Totalizer Scale Factor (TSF) determines how many input pulses correspond to the change of one digit in the totalizer display.

Note: The optional output pulse value will be the same as the totalizer multiplier value.

DisplayDPF table:

Display	DPF
00000	1
0000.0	10
000.00	100
00.000	1000
0.0000	10000

2.4.2 RATE SCALE FACTOR

$$RSF = \frac{\text{PulsesPerRateUnit}}{\text{SecondsInTimeUnit} \cdot \text{RateDisplayDPF}}$$

The Rate Scale Factor (RSF) scales the incoming frequency to display the correct flow rate. Be sure to label the display with the Rate Unit and Time Unit when programming is complete.

TimeUnit table:

TimeUnit	# of Seconds
SEC	1
MIN	60
HRS	3600
DAY	86400

2.5 PROGRAMMING EXAMPLE (for menu items 1 thru 6)

SAMPLE METER INFORMATION: Meter size 6"

Totalizing in GALLONS

Indicating Rate in GALLONS PER MINUTE (GAL/GPM).

Typical Totalizer values: 1000 gal (= 675 propeller revolutions)
100 gal (= 67.5 propeller revolutions)
10 gal (= 6.75 propeller revolutions)

TOTALIZER SCALE FACTOR (TSF) for a Totalizer unit of 1000 gallons

A digital register typically receives 2 pulses per propeller revolution. Multiply the pulses per prop revolution times the number of revolutions needed to equal the Totalizer Unit:

STEP 1) ESTABLISH THE PULSES PER TOTALIZER UNIT:

675 prop revolutions = 1000 gallons, times 2 pulses per revolution =
1350 PULSES PER TOTALIZER UNIT

STEP 2) ESTABLISH THE TOTALIZER SCALE FACTOR (TSF):

1350 divided by 1 (see Totalizer Display Decimal Place Factor Table, previous page) = **1350**

$$TSF = \frac{1350 \text{PulsesPerTotalizerUnit}}{1(\text{TotalizerDisplayDPF})} = 1350$$

STEP 3) PROGRAM THE REGISTER:

MENU 1: Enter "1350"

MENU 2: Since "1350" is a whole number, no decimal point is used.

MENU 3: The *display* requires no decimal place for this volume unit.

RATE SCALE FACTOR (RSF) for a Rate unit of one gallon per minute (GPM)

STEP 1) ESTABLISH THE PULSES PER RATE UNIT:

1350 pulses divided by 1000 gallons =
1.35 Pulses Per Gallon

STEP 2) DIVIDE THE PULSES PER RATE UNIT BY THE SECONDS IN THE TIME UNIT:

1.35 pulses per gallon divided by 60 seconds (see Time Unit Table, previous page) = **.0225**

$$RSF = \frac{1.35(\text{PulsesPerRateUnit})}{60(\text{SecondsInTimeUnit}) \bullet 1(\text{DisplayDPF})} = .0225$$

STEP 3) Program the register:

MENU 4: Enter "0225"

MENU 5: Enter ".0225" (the decimal place four to the left)

MENU 6: The *display* would require no decimal place for this unit.

NOTE: The register can be re-programmed for almost any meter. Provide the meter serial number so the correct pulse values, time units, etc. can be entered into programming.

SECTION 3 - Wiring

3.1 TERMINAL LOCATIONS

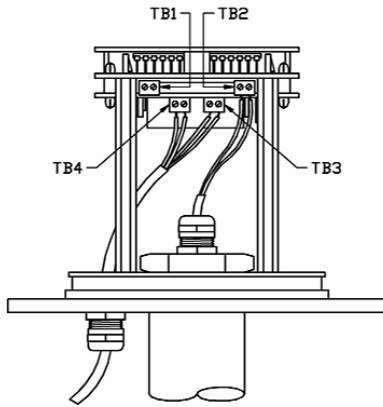


Figure 1
Meter Mounted

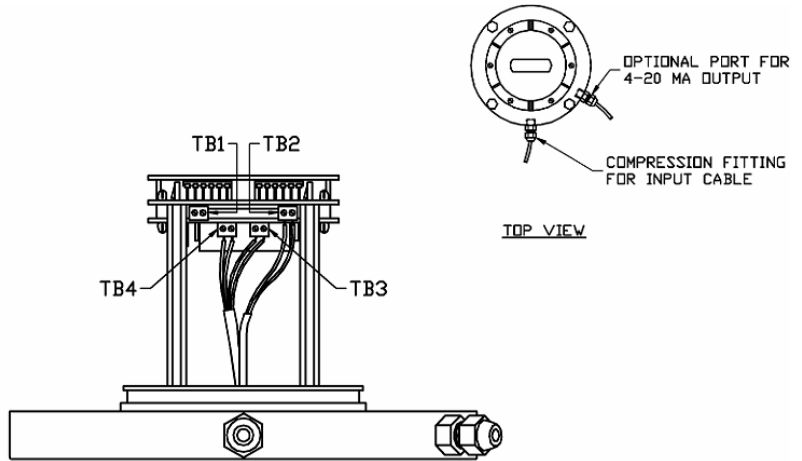
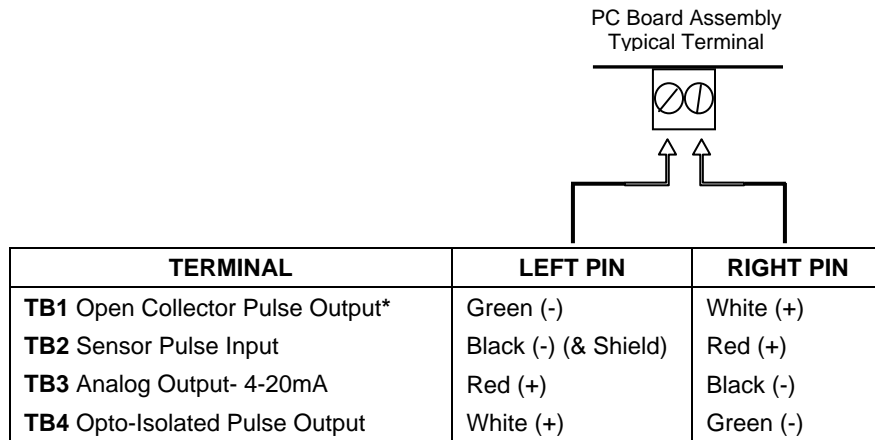


Figure 2
Remote Mounted

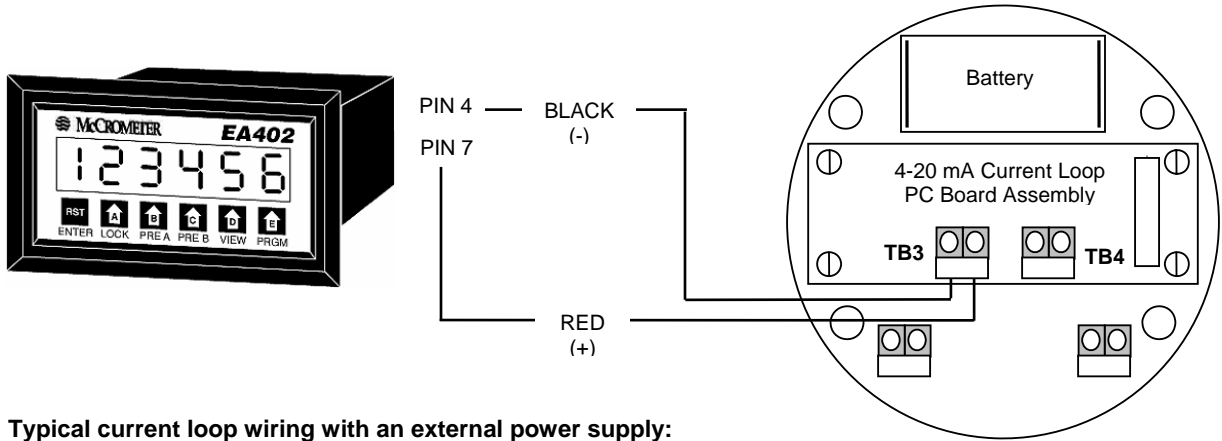
3.2 WIRING COLOR CODES & TERMINAL HOOKUPS



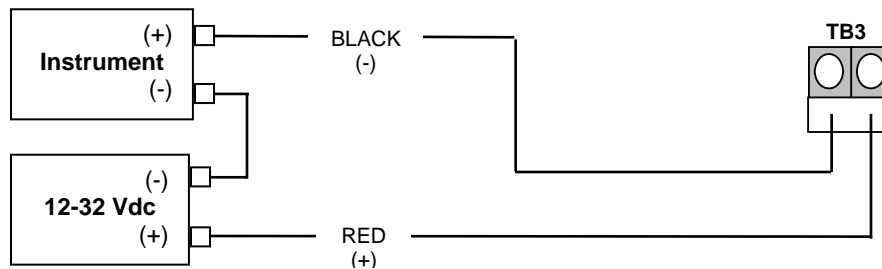
IMPORTANT: *The pulse output wires on TB1 are moved to TB4 when the 4-20mA Analog Output board is installed.

3.3 WIRING - CURRENT LOOP (4-20 mA ANALOG OUTPUT)

Typical wiring to a McCrometer EA402 Flow Computer (the EA402 provides the loop power):



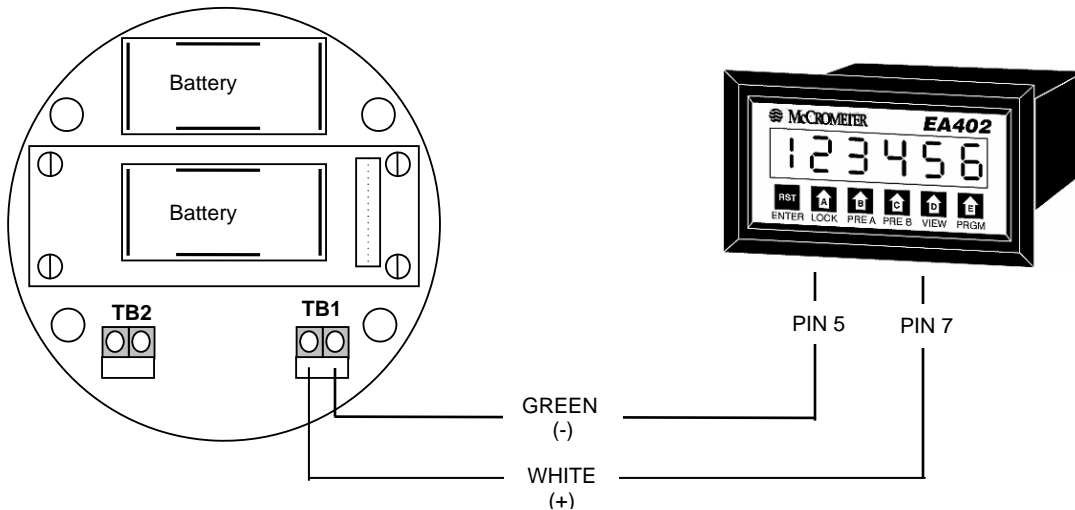
Typical current loop wiring with an external power supply:



3.4 WIRING - PULSE OUTPUT - Open Collector Transistor (no current loop power)

Typical wiring to a McCrometer EA401 Flow Computer (the EA401 powers the pulse loop):

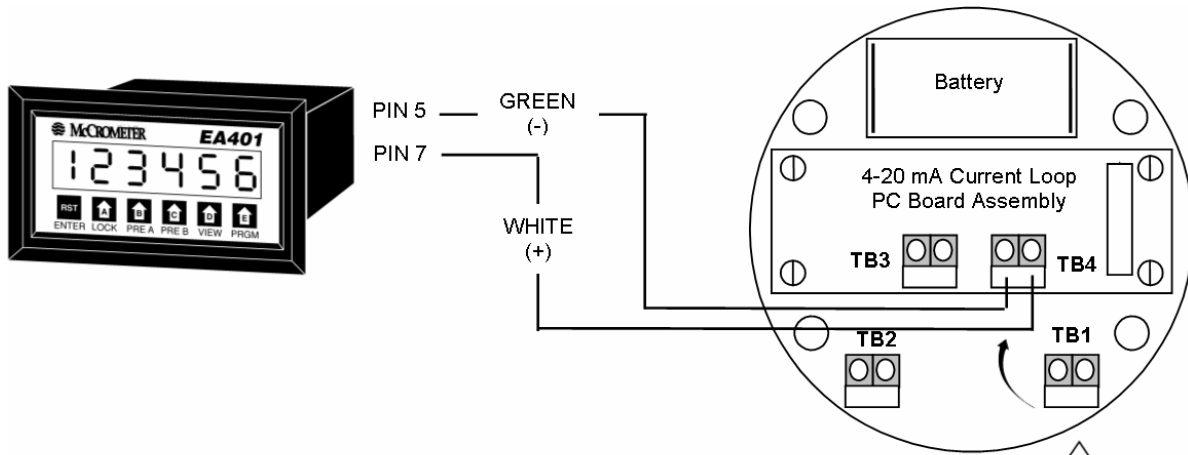
IMPORTANT: Some instruments require the addition of a resistor to activate the pulse function. See SECTION 6.7 for installation of a pull-up resistor.



3.5 WIRING - PULSE OUTPUT - Opto-isolated Transistor (with current loop power)

Typical wiring to a McCrometer EA401 Flow Computer (the EA401 powers the pulse loop):

! IMPORTANT: Some instruments require the addition of a resistor to activate the pulse function. See SECTION 6.7 for installation of a pull-up resistor.



NOTE: When the 4-20 mA Current Loop PC Board Assembly is added to the RE100 Register, the pulse wires must be moved from Terminal TB1 to TB4.

SECTION 4 - RETROFIT KIT INSTALLATION (Converting from mechanical register to digital)

NOTE: It is important to provide the meter serial number so the correct sensor and programming can be provided.

4.1 METER MOUNTED Retrofit Kit Parts List & Drawing - (shown with optional output)

PART No.	DESCRIPTION	Qty
EA520-xx	Sensor (2 PPR)	1
EA528-xx	Sensor (8PPR- As required)	1
EB400-01	4-20mA/pulse card -(Optional)	1
EJ112-00	Compression fitting	2*
ELR100-01	Register & LCD Display	1
EZ150-00	Battery, 3 volt	2**
R0139-10	Hex bushing, brass	1
R0141-60	Base plate, meter mount	1
R0141-65	Base plate, for outputs	1
R0710-50	Canopy w/lens	1
10015-00	Desiccant pack	1
10016-00	Canopy screw, 1/2" long, S.S.	5
10018-00	Canopy screw, 3/4" long, S.S.	1
10023-00	Gasket, base plate	1
10179-10	O-ring, base plate	1
10180-00	O-ring, canopy	1
10262	Gasket, canopy	1
10269	Register standoff, short	4
10303	Register standoff, long	4
10273	O-ring, hex bushing, small	1
10274	O-ring, hex bushing, large	1
15016-00	Seal, tamper resistant	1
10110-10	O-ring, propeller bearing (see FIGURE 7, item 3)	2

*Only 1 fitting is used if no output options.

** Only 1 battery is used if 4-20 mA Output board is installed.

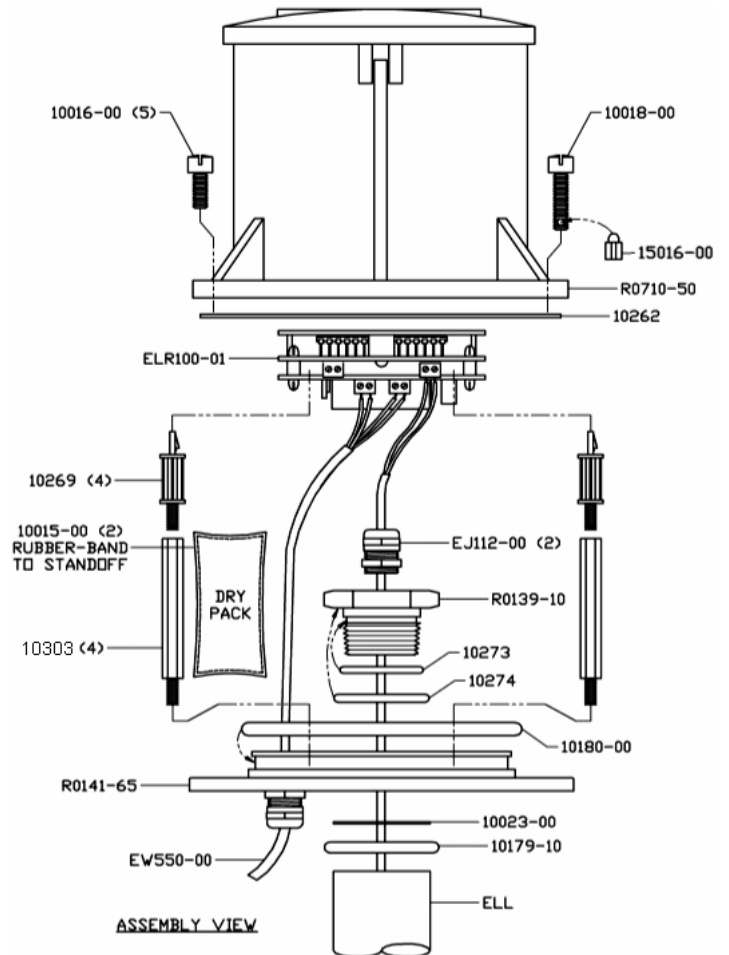


Figure 3

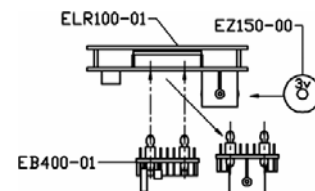


Figure 4
4-20 mA Output Board Detail

4.2 REMOTE MOUNTED Retrofit Kit Parts List & Drawing - (shown with optional output)

Part No.	DESCRIPTION	Qty
EA520-xx	Sensor (2 PPR)	1
EA528-xx	Sensor (8PPR- Optional)	1
EB400-01	4-20mA/pulse card -(Optional)	1
EH219-00	Plug, output fitting**	1
EJ112-00	Compression fitting	3
ELR100-01	Register & LCD Display	1
EZ150-00	Battery, 3 volt	2*
EW550-00	Cable, 4 conductor	50'
R0139-00	Hex bushing, S.S.	1
R0145-00	Wall plate, remote	1
R0710-50	Canopy with lens	1
10015-00	Desiccant pack	1
10016-00	Canopy screw, 1/2" long, S.S.	5
10018-00	Canopy screw, 3/4" long, S.S.	1
10180-00	O-ring, canopy	1
10262	Gasket, canopy	1
10269	Register standoff, short	4
10303	Register standoff, long	4
10273	O-ring, hex bushing, small	1
10274	O-ring, hex bushing, large	1
15016-00	Seal, tamper resistant	1
10110-10	O-ring, propeller bearing (see FIGURE 7, item 3)	2

* Only 1 used if 4-20 mA Output board is used
 ** plugs an unused output port

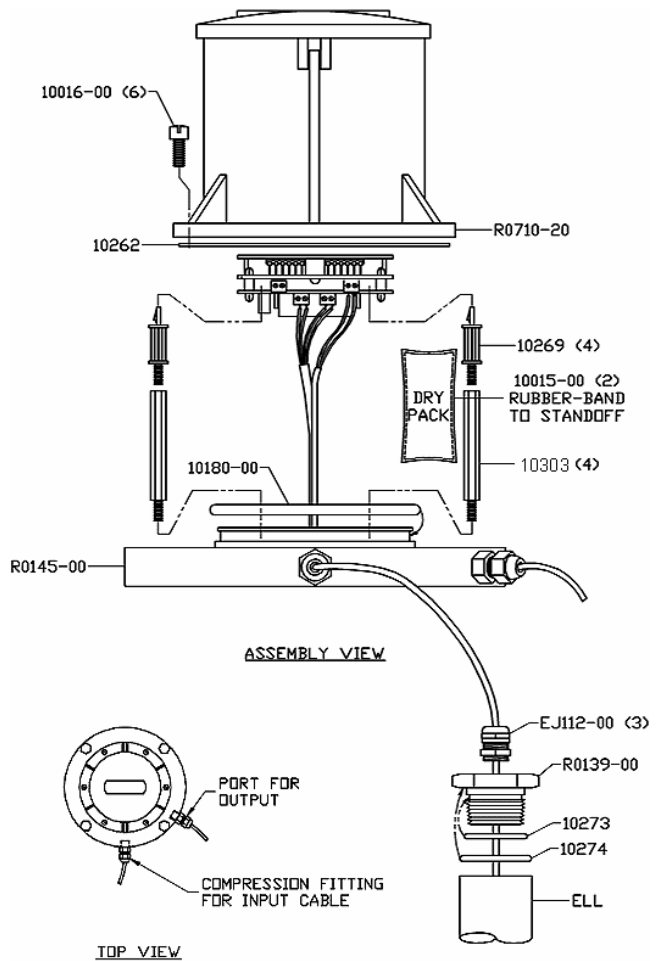


Figure 5

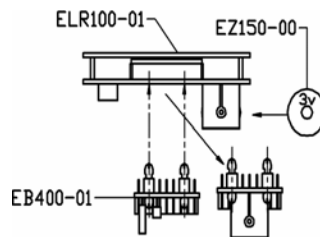


Figure 6

P/N EB400-01 4-20 mA Output Board Detail

4.3 RETROFIT KIT INSTALLATION - Meter Mount

CAUTION: Do not remove the meter under pressure

Step 1) Check the parts received against the parts lists on page 9 and page 10. Contact the factory to report any discrepancies.

Step 2) Remove the complete meter from the pipe, or the meter head assembly from the pipe if so equipped. Remove the propeller (1), bearing assembly (2), bearing o-ring(s)(3), cable (4), liner stop (5), and liner (6) from the ell. (**Figure 7**)

Check the inside of the ell to be sure it is clean and dry. Clean the bearing o-ring grooves and threads on the end of the ell.

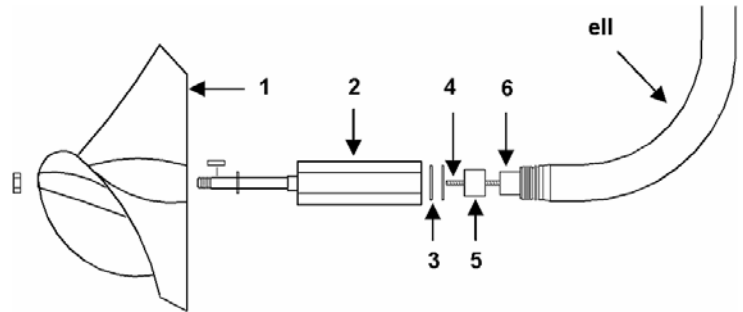


Figure 7

Step 3) Remove the canopy (1), register (2), hex bushing (3), base plate (4), and gaskets (5) from the top end of the ell. (**Figure 8**)

None of these parts will be reused.

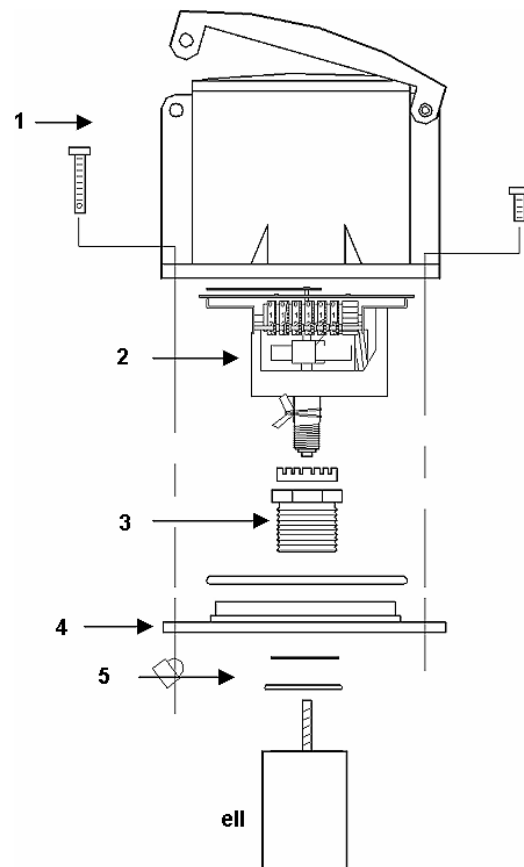


Figure 8

4.3 RETROFIT KIT INSTALLATION - Meter Mount (continued)

Step 4) Pull the Aft Bearing Assembly (1) from the back of the propeller bearing assembly (2) (it is only held in place by magnetic attraction). (Figure 9)

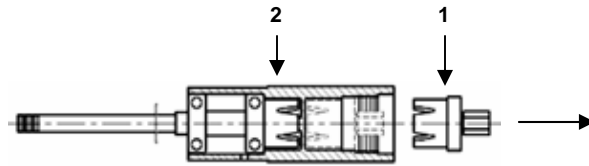


Figure 9

Step 5) Set the sensor (1) into the back of the bearing housing (2). Be sure the sensor is fully seated before re-installing the bearing assembly onto the ell. (Figure 10)

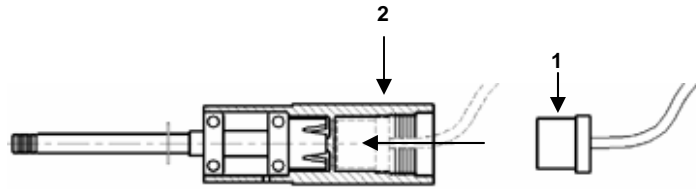


Figure 10

Step 6) Install new o-rings (1) and push the sensor cable (2) up through the ell. Install and tighten the bearing assembly (3). (Figure 11)

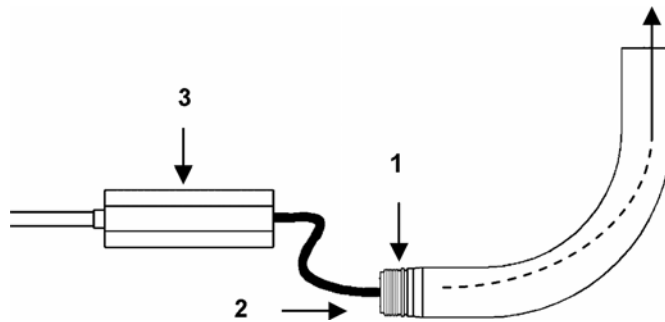


Figure 11

Step 7) Set the new base plate (1) with o-rings (2) onto the ell and secure it with the new hex bushing (3). Install the new canopy o-ring (4). (Figure 12)

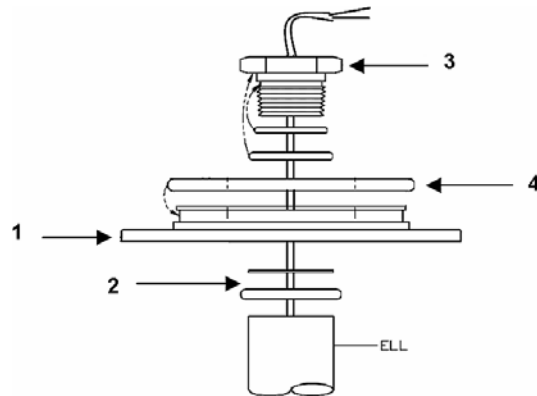


Figure 12

4.3 RETROFIT KIT INSTALLATION - Meter Mount (continued)

Step 8) Push the sensor cable (1) through the compression fitting (2) and install the fitting into the hex bushing (3). Push any optional output cable (4) through the second compression fitting (5) and install it into the bottom of the base plate. (Figure 13)

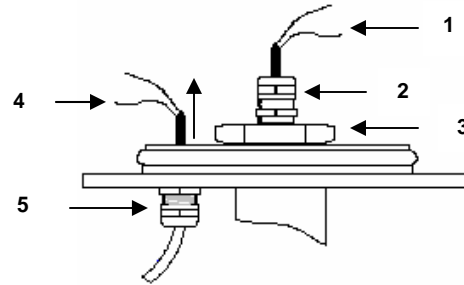


Figure 13

Step 9) Screw the register stand-offs (1) into the base plate and install the register assembly (2) (Figure 14).

NOTE: The register can be rotated 180 degrees if required for better viewing. (Figure 15)

Connect the input wires and any output wires to the appropriate terminals (see **WIRING SECTION 3**, page 6). Tighten the compression fitting(s).

Install and spin the propeller to verify operation of the register.

Secure a new desiccant pack to one of the standoffs and install the canopy.

NOTE: A 4-20 mA output loop should be powered even if not used, to conserve battery life.

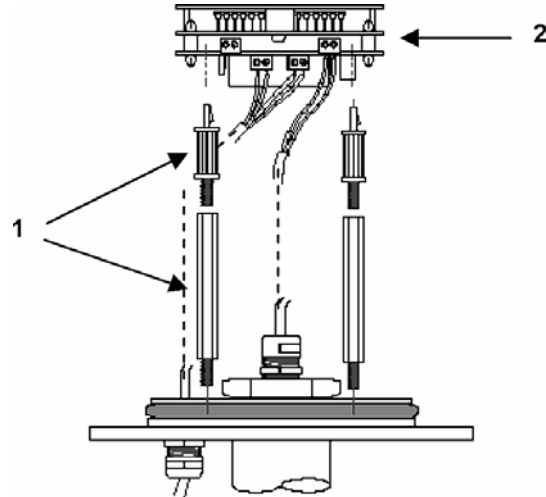


Figure 14

The register can be rotated 180 degrees for best viewing without having top loosen and rotate the base plate: Orient the register as needed before pressing the register down onto the stand-offs. (Figure 15)



Figure 15

4.4 RETROFIT KIT INSTALLATION - REMOTE MOUNT

Step 1)

Follow Steps 1 thru 5 , Section 4.3:

Remove the meter lower end components - propeller, bearing, etc. (Figure 7).

Remove the meter upper components - register, base plate, etc. (Figure 8).

Remove the bearing Aft assembly and insert the sensor (Figures 9 & 10).

Step 2) NO BASE PLATE WILL BE INSTALLED, only the supplied hex bushing (1) and compression fitting (2) (Figure 16). Screw the hex bushing (1) (with o-rings) into the ell and tighten. Slide the compression fitting (2) over the cable and screw into the hex bushing. Tighten the compression fitting onto the cable and run the cable as required to the remote register mounting location.

Note: The register can be mounted up to 100 feet away from the meter head.

Step 3) Install the compression fittings (1). NOTE: A remote register with no optional outputs will have the unused compression fitting plugged.

Prepare the location where the wall plate (2) will be mounted. Four 13/32" diameter holes (3) are provided for mounting the base plate to a vertical surface. Use suitable fasteners to secure the wall plate to the mounting surface.

Step 4) Push the sensor input cable (1) thru one of the compression fittings (2) on the wall plate. Push any optional output cable (3) thru the other compression fitting. Tighten both fittings onto the cables. (Figure 18)

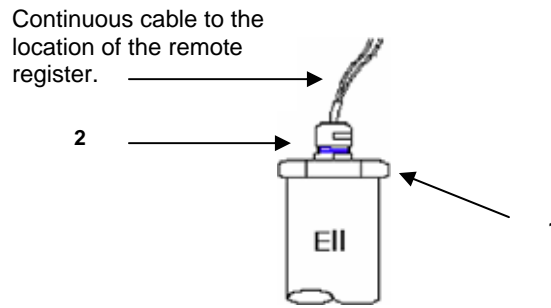


Figure 16

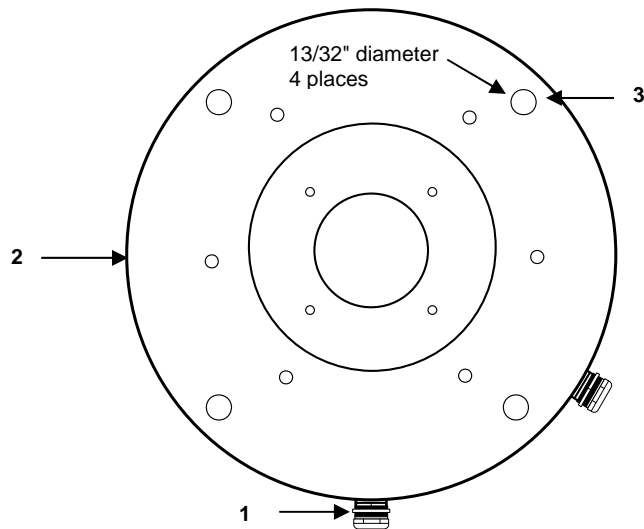


Figure 17

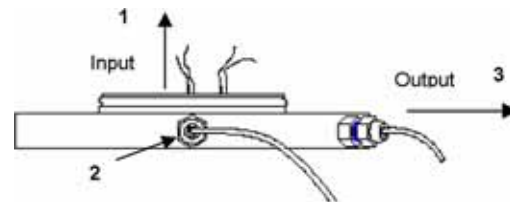


Figure 18

4.4 RETROFIT KIT INSTALLATION - REMOTE MOUNT (continued)

Step 5) Follow Step 8), Section 4.3, and install the register standoffs, the register and the canopy.

SECTION 5 - SERVICE

5.1 REGISTER REPLACEMENT

Step 1) Remove the canopy and disconnect all wires from the register.

Step 2) Squeeze the end of each register standoff (1) and remove the register assembly (2).

Step 3) Press the new register onto the standoffs and connect the input (and output wires as required). Refer to the wiring diagram, page 6.

Step 4) Replace the desiccant pack with a new one and secure the canopy.

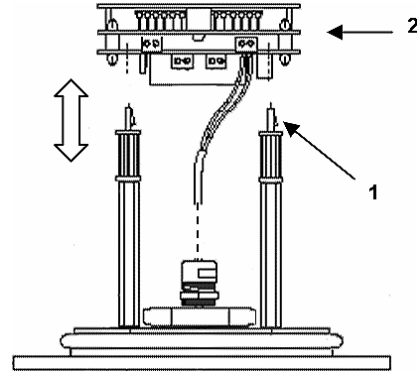


Figure 19

5.2 ANALOG (4-20 mA) OUTPUT BOARD INSTALLATION/REPLACEMENT

Step 1) Follow Steps 1 and 2, SECTION 4.3, and remove the canopy, disconnect the wires and remove the register.

Step 2) Squeeze the standoffs (Figure 20) to remove either the center battery board, or an existing 4-20mA board. (The small battery board is replaced by the 4-20 mA output board when the 4-20 mA option is added.)

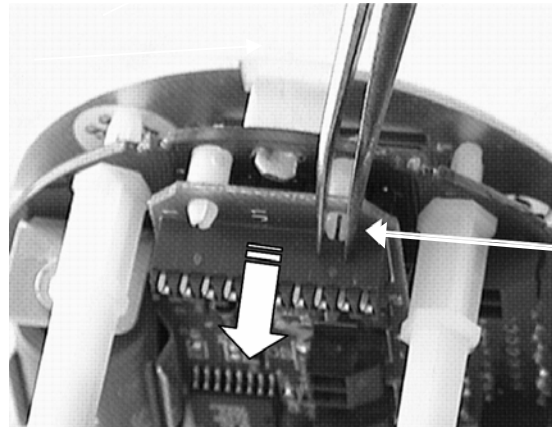


Figure 20

5.2 ANALOG (4-20 mA)OUTPUT BOARD INSTALLATION/REPLACEMENT (continued)

Step 3) Install the new output board: Align the ten pins on the back of the register (1) with the pin connector holes (2) on the end of the new 4-20mA analog output board (3). Push the board down until fully engaged with the pins (1). (Figure 21)

Caution: Do not push on the pin connector (6). The pins (1) are sharp and will protrude through the connector when the board is fully seated.

Step 4) Align the register standoffs (4) standoffs with the holes (5) in the analog output board. Push the analog output board onto the standoffs until fully seated.

Step 5) Secure the register assembly onto the register standoffs (Section 5.1, Figure 19) and connect the wiring as needed. (Wiring, page 6). Replace the desiccant pack and the canopy.

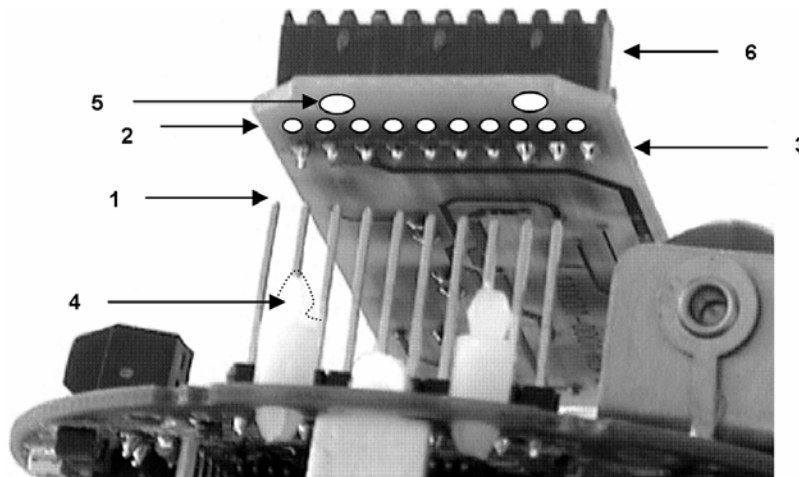


Figure 21

5.3 SENSOR REPLACEMENT - Meter Mounted Register

Step 1) Remove the propeller (1) and bearing assembly (2). (Figure 22)

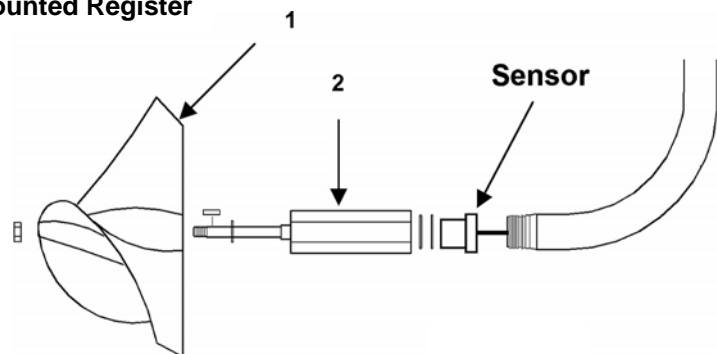


Figure 22

5.3 SENSOR REPLACEMENT - Meter Mounted Register (continued)

Step 2) Remove the register canopy and disconnect the wires from terminal TB2 (1). (Figure 23)

Step 3) Loosen the input cable compression fitting (2) and pull the sensor out of the ell (see Figure 22, previous page). Remove the compression fitting from the base plate (3).

Step 4) (Refer to Step 4, and Step 5, Section 4.3) Install the new sensor into the back of the bearing assembly. Push the wires up into the ell and out the top of the base plate. Install and tighten the bearing assembly onto the ell.

TIP: Push a length of wire down from the top of the base plate, and out the bottom of the ell. Attach the end of the sensor cable to this wire and pull the sensor cable up and through the base plate.

Step 5) Slide the compression fitting (2) onto the sensor cable and install the compression fitting into the base plate. Tighten the compression fitting onto the cable.

Step 6) Trim the sensor wires back as needed and connect to terminal TB2 (1). Refer to the WIRING diagram on page 6.

Step 7) Replace the propeller and spin it to verify register operation. Replace the desiccant pack and install the canopy.

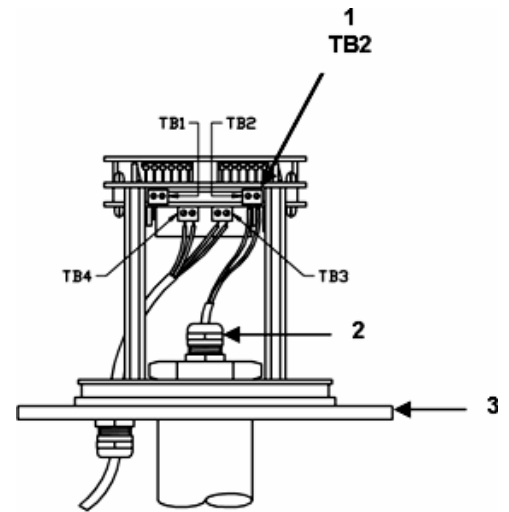


Figure 23

5.4 SENSOR REPLACEMENT - Remote Mounted Register

The procedure is the same as the Meter Mounted Register, except both the compression fitting in the hex bushing on the ell and the input cable compression fitting on the wall plate will need to be removed to run the sensor cable from the bearing assembly through the ell, and over to the remote mounted wall plate. Refer to SECTION 4.4, Step 2, Figure 16, and Step 4, Figure 18 for details.

5.5 BATTERY REPLACEMENT

A low battery ("LO BATT") indicator will show on the display, allowing 6 months before the battery expires. However, the battery should be replaced any time the voltage reads less than 2.7 volts.

Step 1) Remove the canopy and carefully pry the battery or batteries from the holder(s) (1).

Step 2) Install new 3 volt lithium batteries.

IMPORTANT: The battery on the main circuit board has the positive (+) end to the right as shown (Figure 24). The second battery (on the small circuit board) has the positive (+) side to the left.

NOTE: A register with a powered 4-20mA loop does not require the use of a battery for operation. The register will switch from battery power to loop power automatically.

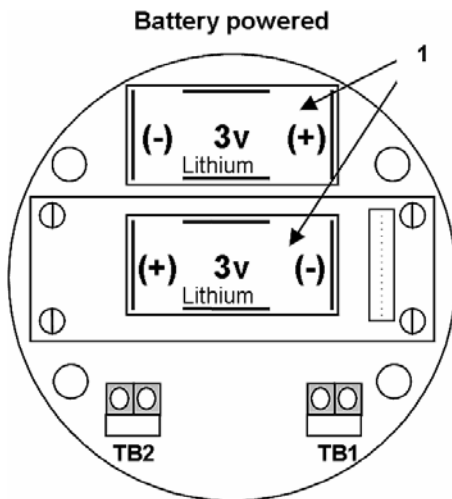


Figure 24

Loop powered with battery backup

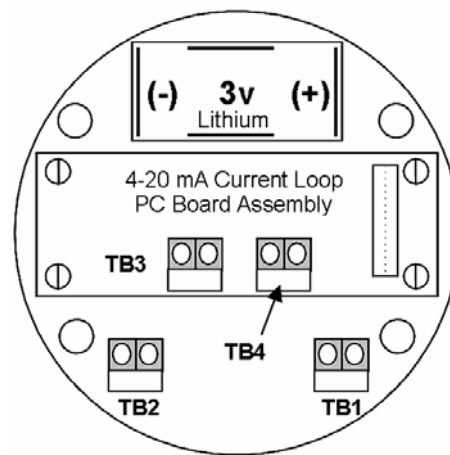


Figure 25

Step 3) Install a new desiccant pack and replace the canopy.

Note: The register should immediately display the old totalizer reading and a rate of flow (zero "0" if the flow was turned off).

5.6 DISABLING THE TOTALIZER RESET FUNCTION

Step 1) Remove the canopy and locate the break-away tab (1) beneath the "PGM" button on the display and next to terminal TB2 on the bottom of the register (Figure 26).

Step 2) Carefully break off the tab with needle-nose pliers.

Step 3) Install a new desiccant pack and replace the canopy.

NOTE: The Total can no longer be reset via the "↔" key on the front panel.

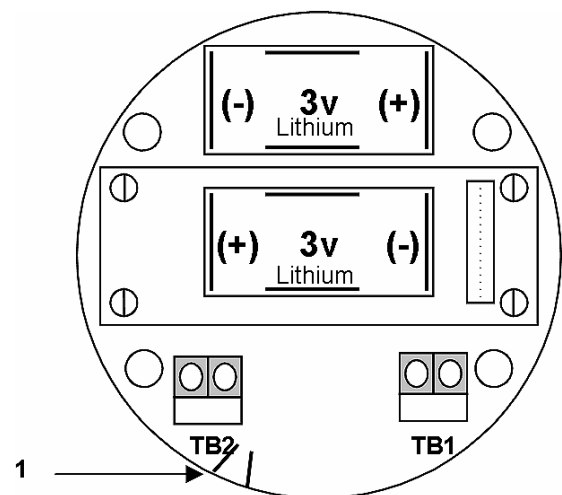


Figure 26
(Bottom View)

SECTION 6 - TROUBLESHOOTING

6.1 DISPLAY IS BLANK (WILL NOT TURN ON FROM SLEEP MODE)

- A) Display timeout feature has turned off the display.
 - Darken the register to reactivate the display (replace the canopy lid if missing).
 - Reprogram the display timeout for a longer duration before blanking the display (SECTION 2.3).
 - Disable the timeout feature (SECTION 2.3, Menu 9)
- B) One or both batteries are dead.
 - Check the battery (or batteries) for at least 2.7 volts. Replace as needed.
 - Be sure the battery polarity is correct (SECTION 5.5).
 - Power the 4-20mA loop (if the option was provided).
- C) The register circuitry is "locked up."
 - Remove the batteries and reinstall. For registers with the 4-20mA Output Option, power down the 4-20mA loop and remove the one remaining battery. Power up the 4-20mA loop. If the register is now functional leave out the battery - the loop power will operate the register.

6.2 DISPLAY DOES NOT CHANGE (STAYS AT "0")

- A) Sensor wire(s) broken, loose or disconnected.
 - Check the condition of the sensor wires and verify that they are properly connected to terminal TB2 (SECTION 3.1).
- B) Sensor is defective.
 - The sensor wires can be connected to a known good register to verify sensor operation. The sensor can be damaged by the effects of lightning and other power surges. Replace as needed (SECTION 5.3).
- C) Incorrect register programming.
 - Refer to the Programming Guide (SECTION 2.3, 2.4) and verify that all menu items were programmed properly.
- D) The register circuitry is "locked up."
 - See SECTION 6.1, Item C), above.

6.3 THE RATE AND/OR TOTAL READ TOO HIGH

- A) Incorrect programming.
 - Refer to the Programming Guide (SECTION 2.3, 2.4) and check the K Factors and decimal places.
 - Verify that the register is programmed for the correct meter size and engineering units.
 - Verify that the register is programmed for the correct sensor (2 or 8 PPR sensor).
- B) Register is reading electrical interference as input pulses.
 - Verify that the sensor wires are properly connected and that the shield is connected with the black wire to terminal TB2 (SECTION 3.1).
 - Shield the register from the source of the electrical noise and/or move the meter to a different location.

6.4 THE RATE AND/OR TOTAL READ TOO LOW

- A) Incorrect programming.
 - Same as SECTION 6.3, Rate/Total Reading Too High, above.
- B) Bad sensor wire connection.
 - Check for a broken wire and/or loose connection at terminal TB2 (SECTION 3.1).

6.5 ANALOG OUTPUT IS AT 4MA AND DOES NOT CHANGE

- A) Incorrect programming
 - Check that the 20mA Rate was set to a value greater than the 4mA Rate (zero) (SECTION 2.3, Menu item 11).
- B) Register circuitry is "locked up."
 - See SECTION 6.1, "DISPLAY IS BLANK", Item C) above.

TROUBLESHOOTING (continued)

6.6 ANALOG OUTPUT VALUE IS AT 0 "ZERO" MA AND DOES NOT CHANGE

- A) Improper wiring, or no loop current or voltage.**
Check the source voltage and current (see SPECIFICATIONS, SECTION 1.2).
Check for loose or broken wires at terminal TB3 and at the voltage source. Verify that the voltage source is wired to the register properly. Note: Reversed polarity to terminal TB3 can damage the register (see WIRING DIAGRAM, SECTION 3.1).
For loop wiring with a separate power supply from the process instrument, verify that the power supply and instrument share a common ground.
- B) The 4-20mA board not installed properly.**
Verify that all 10 pins on the main board protrude through the 10 holes in the 4-20mA board connector and the board is fully seated on the standoffs (see SECTION 5.2, Figure 21).

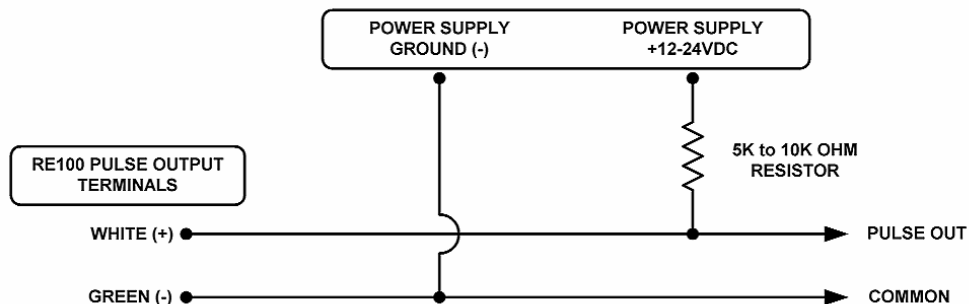
6.7 NO PULSE OUTPUT

- A) No loop current or voltage:**
Check the power source for the correct pulse voltage and current.
Check for loose or broken wires at terminal TB1 (or TB4) and at the voltage source (SECTION 3.1).
- B) The pulse output wires are connected to the wrong terminal(s):**
When adding a 4-20mA board to an existing register, be sure to move the pulse output wires from TB1 to TB4 on the 4-20mA board. Check the wiring and polarity at both the register and the receiving instrument. (SECTION 3.1).
- C) Pulse transistor is not switching:**

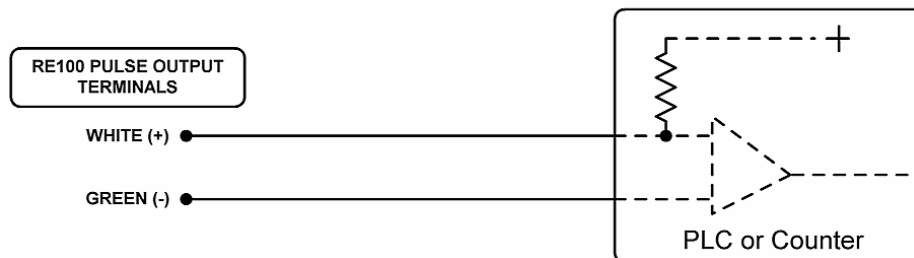
MODELS: RE100-001, RE100-012, RE100-101, RE100-112
RE100-001K, RE100-012-K, RE100-101-K, RE100-112-K

A pull-up resistor may be needed to enable the RE100 Register to produce an output pulse. Most counter and PLC inputs already have adequate internal resistance and only require the connection of the two pulse output wires. Both wiring methods are shown below.

RE100 Pulse output wired to a device that has no internal pull-up resistor:



RE100 Pulse output wired to a device with an internal pull-up resistor:



TROUBLESHOOTING

6.7 NO PULSE OUTPUT (CONTINUED)

- D) Receiving instrument cannot detect the pulse.
Verify that the instrument can detect the type of pulse produced by the RE100 register (see SPECIFICATIONS, SECTION 1.2).
- E) Incorrect programming.
A high Totalizer value will lower the pulse frequency since both are set by the Totalizer Scale Factor. A low flow rate in a small meter will take a long time to send an output pulse if the Totalizer is programmed with a high value (see SECTION 2.3, 2.4).

6.8 DISPLAY IS DIM OR MISSING SEGMENTS

- A) The battery is weak (below 2.7 volts):
Replace the battery. Note: A low battery will indicate "**LO BATT**" to the left of the Rate numbers on the display about six months before it expires.
- B) The display is sun damaged:
Replace the display assembly (P/N ELR100-01)(if a 4-20 mA output board is present it can be reused). Avoid exposing the LCD display to direct sunlight. A missing canopy lens should be replaced as soon as possible.
- C) The register has electronic or physical damage:
The register can be damaged by power surges, incorrect wiring, moisture and physical damage due to rough handling. Remove the canopy and check for burned components, proper wiring, entry point(s) for moisture. Be sure any unused output signal opening is sealed from the weather (See note in SECTION 4.4, STEP 3).

WARRANTY

This Warranty shall apply to and be limited to the original purchaser consumer of any McCrometer product. Meters or instruments defective because of faulty material or workmanship will be repaired or replaced, at the option of McCrometer Inc., free of charge, FOB the factory in Hemet, California, within a period of one (1) year from the date of delivery.

Repairs or modifications by others than McCrometer Inc. or their authorized representatives shall render this Warranty null and void in the event that factory examination reveals that such repair or modification was detrimental to the meter or instrument. Any deviations from the factory calibration require notification in writing to McCrometer Inc. of such recalibrations or this Warranty shall be voided.

In case of a claim under this Warranty, the claimant is instructed to contact McCrometer Inc., 3255 W. Stetson Ave., Hemet, California 92545, and to provide an identification or description of the meter or instrument, the date of delivery, and the nature of the problem.

The Warranty provided above is the only Warranty made by McCrometer Inc. with respect to its products or any parts thereof and is made expressly in lieu of any other warranties, by course of dealing, usages of trade or otherwise, expressed or implied, including but not limited to any implied warranties of fitness for any particular purpose or of merchantability under the uniform commercial code. It is agreed this Warranty is in lieu of and buyer hereby waives all other warranties, guarantees or liabilities arising by law or otherwise. Seller shall not incur any other obligations or liabilities or be liable to buyer, or any customer of buyer for any anticipated or lost profits, incidental or consequential damages, or any other losses or expenses incurred by reason of the purchase, installation, repair, use or misuse by buyer or third parties of its products (including any parts repaired or replaced); and seller does not authorize any person to assume for seller any other liability in connection with the products or parts thereof. This Warranty cannot be extended, altered or varied except by a written instrument signed by seller and buyer.

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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