

# Series RTI

RATE/TOTAL DISPLAY  
INSTRUCTIONS



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GENERAL INFORMATION

The Series RTI flow displays are microcontroller-based indicator/transmitters that show flow rate and total and provide output signals. The RTI is powered by external DC voltage and has both pulse and 4 to 20 mA analog outputs. When the RTI is being used in the 4 to 20 mA mode, it is a “two-wire” or “loop-powered” device, meaning that the 4 to 20 mA output signal doubles as its power supply.

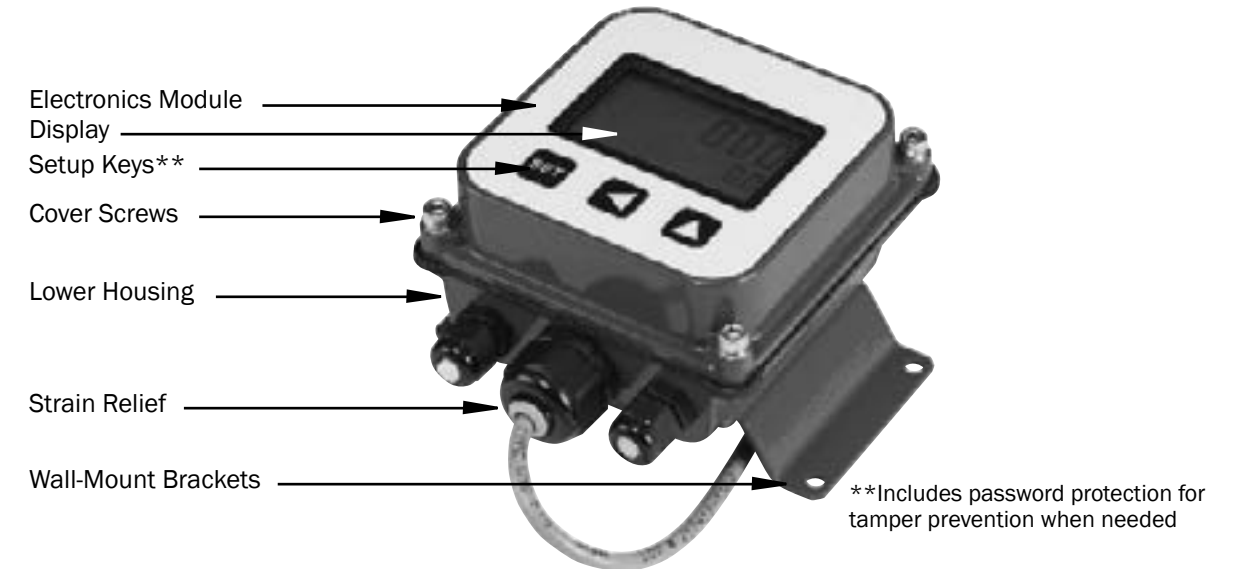
The RTI can be factory-mounted on the meter (-M) or remotely wall mounted with the brackets provided (-W). The RTI is also available as a panel mount (-P) with an open back for easy installation in the user’s own electrical enclosure. Most RTI’s can be converted from wall-to-meter or meter-to-wall mount configurations after installation if needed.

The addition of a dual-relay output board allows for certain applications requiring contact output isolation (e.g., certain metering pumps and water treatment controls). Dual solid state relays provide exactly the same pulse output as the standard unit, and each can signal one external device. A non-resettable total is also available. The RTI can be ordered in a plastic enclosure with a 115 VAC power supply for use with mechanical meters, or with a built-in 115 VAC/12 to 24 VDC dual power supply for magmeters.

Housings for the -W and -M models are rugged cast aluminum, potted and gasketed for maximum environmental protection. A membrane keypad allows settings to be changed without removing the cover. (Password protection, a standard feature, can be used to prevent settings from being changed.)

\*\*Includes password protection for tamper prevention when needed

FEATURES



| SPECIFICATIONS*         |                       | RTI  |
|-------------------------|-----------------------|--|
| Power                   |                       | 12 to 30 VDC, 4mA (4 to 20 mA when loop-powered)   |
| Display                 | Rate                  | 6-digit autorange, 1/2" character height   |
|                         | Total                 | 8-digit, 5/16" character height  |
| Outputs                 | Current Sinking Pulse | Scaled Pulse output (0.1 sec duration 6.1 Hz max), or (High Alarm output or Low Alarm output)<br>Sensor pass-through Pulse output (unscaled) |
|                         | Analog                | 4 to 20 mA loop; 24 to 30 Vdc  |
| Pulse Output Range      |                       | 0.1 - 9999999.9 units/pulse  |
| Input                   |                       | 5V pulse or contact closure  |
| Input Range             |                       | 1.0 - 1,500 pulses/second  |
| K-Factor Range          |                       | .001 - 99999.999   |
| Flow Alarm Output Range |                       | .01 - 999999.99  |
| Operating Temperature   |                       | -30 to 65° C (-22 to 148° F)   |
| Environmental           |                       | NEMA 4X, IP66  |

\*Specifications subject to change

**Wall Mount.** To mount a Series RTI display to the wall, hold the unit in the desired position, mark the holes in the mounting feet, drill and mount with screws. With the RTI-W-VPS option (Built-in 115 VAC power supply), first remove the front cover to gain access to the mounting screw holes.

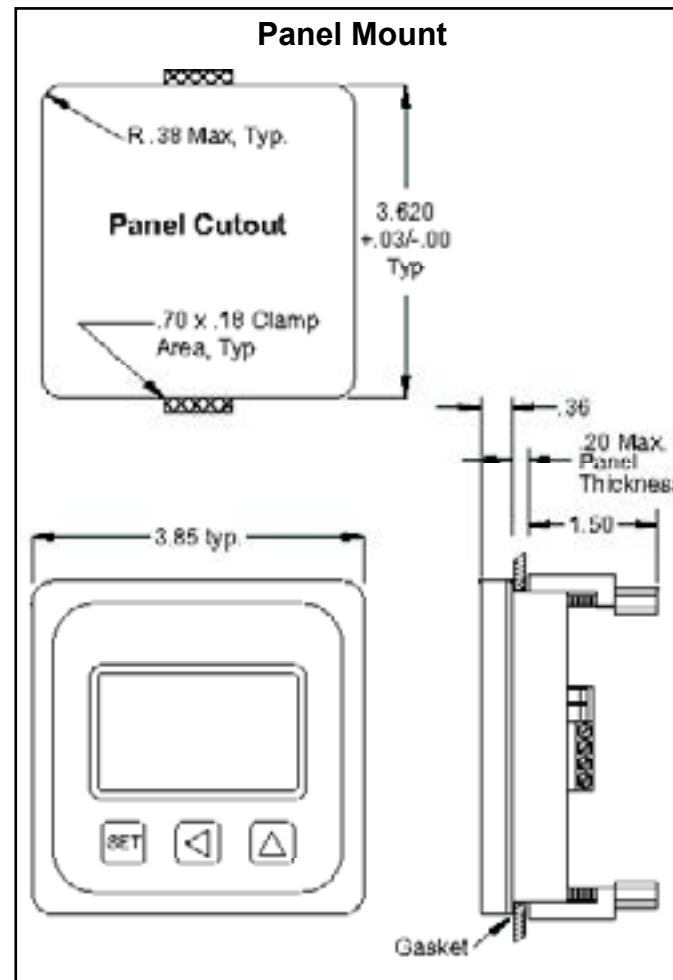
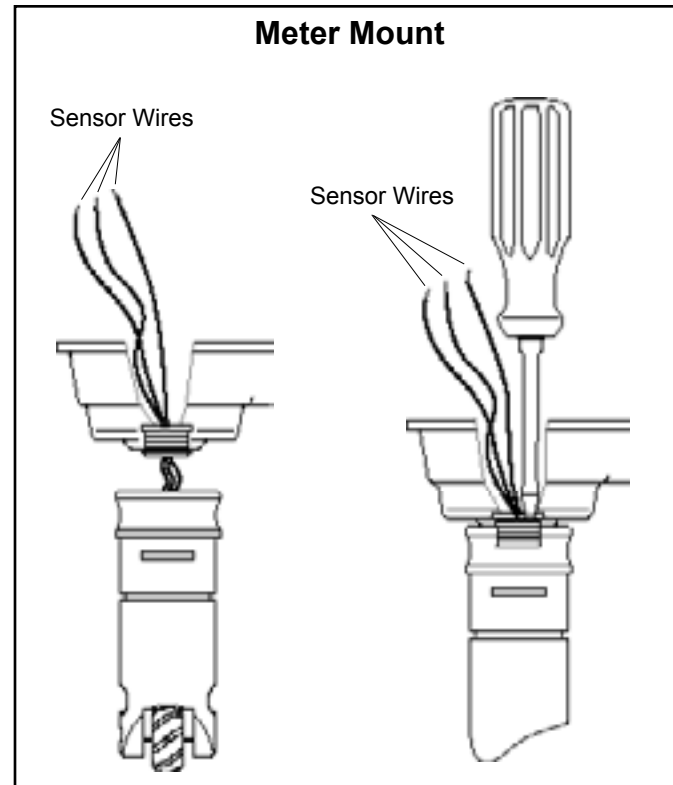
A meter-mounted RTI Series can be converted to a wall mount using an MMK mounting kit offered in our Series FPCA.

**Meter Mount.** If the Series RTI display was ordered as an -M model, the housing is made to be directly mounted to the flow sensor and therefore needs no further installation.

An RTI Series module can be converted from a wall-to a meter-mount using the WMK adapter kit found in Series FPCA that includes a lower housing and associated hardware. This can be accomplished as follows:

- 1) Remove the strain relief through which the flow sensor cable runs.
- 2) Cut the cable to about 6" in length. Carefully strip the cable jacket to expose the three colored wires (red, white, and black) inside.
- 3) Route the wires through the threaded connector pre-installed in the bottom of the housing.
- 4) Start the threaded connector into the female thread on the top of the flow sensor. Be sure to match the oblong shape on the bottom of the housing to the depression on the top of the flow sensor.
- 5) Using an ordinary screwdriver inserted in one side of the slot (see drawing), tighten the screw as much as possible.
- 6) Strip the wire ends, make the connections to the RTI Series display as shown in Connections Diagrams, and then use the cover screws to attach the display to the top of the housing.

**Panel Mount.** Using the "Panel Cut out" drawing as a guide, cut a square hole in the panel. Remove the clamps from the back of the RTI-P and insert the display unit through the cutout, taking care that the panel sealing gasket is in place between the front of the panel and the flange of the display. Hold the display in place while starting the screw of one of the two clamps. Finger tighten the screw, then install the other clamp. When both are in place, firmly tighten the clamps with a small wrench or nut driver.



**Connections.** To connect the Series RTI flow display to a flow sensor or an external device such as a chemical metering pump, follow the Standard Connections diagrams on pages 4 thru 6.

If the RTI's 4 to 20 mA current signal is not required, connect the power terminals to any 12 to 30 VDC voltage source.


**Dual Relay Output (Option -DRO).** If you purchase the RTI with option -DRO, the required component will come preinstalled, and no extra procedures are required.

If you are retrofitting an existing installation of an RTI with the dual relay board, please follow the instructions below:

- 1) Peel the backing off of the double-stick tape and affix it to the bottom of the relay board.
- 2) Carefully attach the board to the RTI as shown in the connection diagram on page 5. Be sure that the red wire faces the "Sensor Input" side of the RTI, and that the white wire faces the "Pulse Output" side.
- 3) Connect the white wire to the "Pulse Scaled" positive terminal, and the red wire to the "Power 4 to 20 mA" positive terminal.
- 4) Connect devices to the relays as desired.

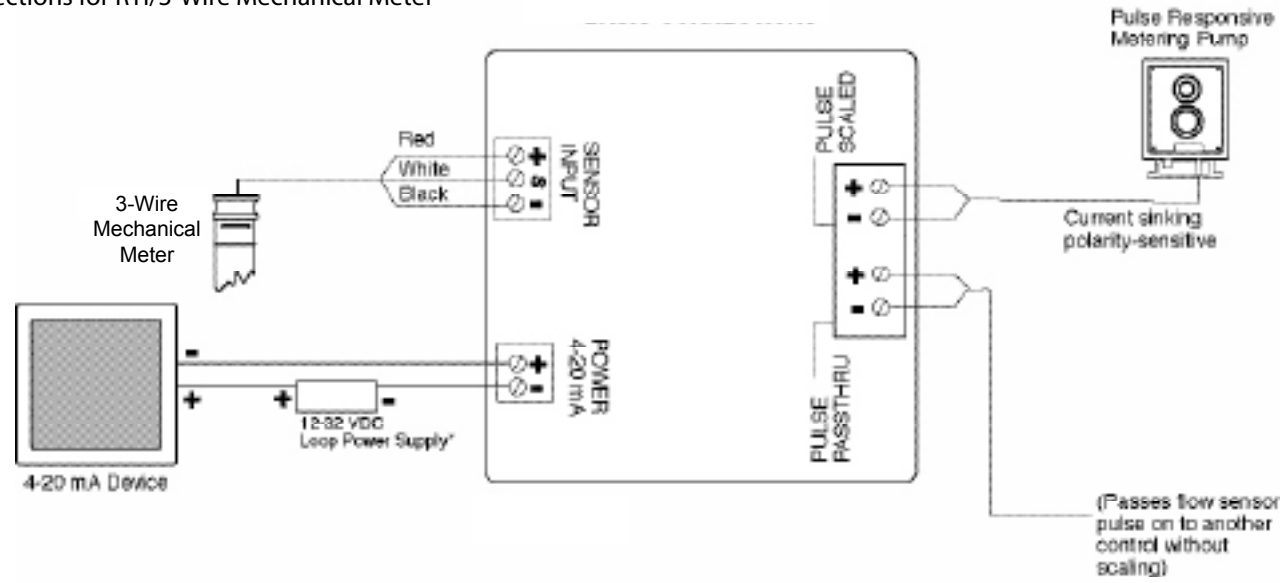
**-DRO Relay Board Specifications**

|                              |                 |       |
|------------------------------|-----------------|-------|
| Output Voltage               | 0 to 130 VAC/DC |       |
| Output Current (each output) |                 |       |
| Temperature                  | 50° C           | 85° C |
| Current Limit                | 100 mA          | 50 mA |
| Max Pulses/Second            | 5               |       |
| Contact Time Per Output      | 100 ms          |       |

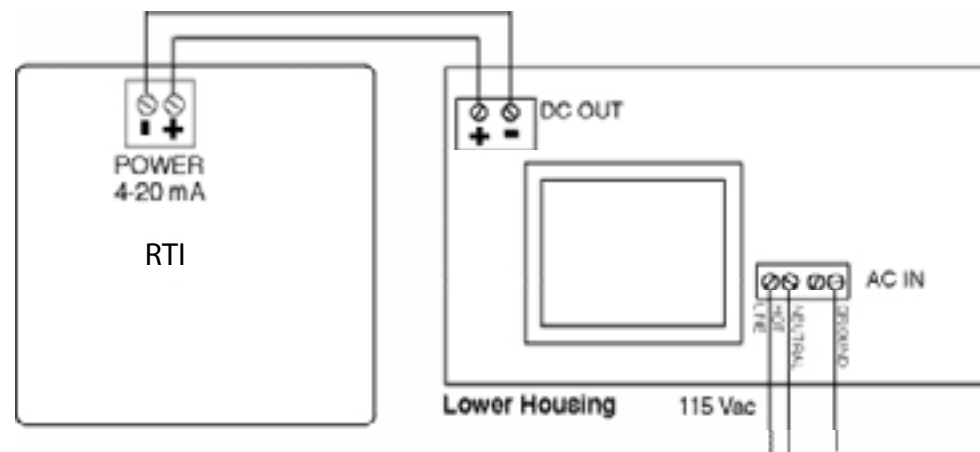


**Caution:** If output is being used to control an external device, such as a metering pump, do not connect the device until programming is completed. If malfunction or incorrect programming of the output could cause personal injury or property damage, separate safeguards must be installed to prevent such injury or damage.

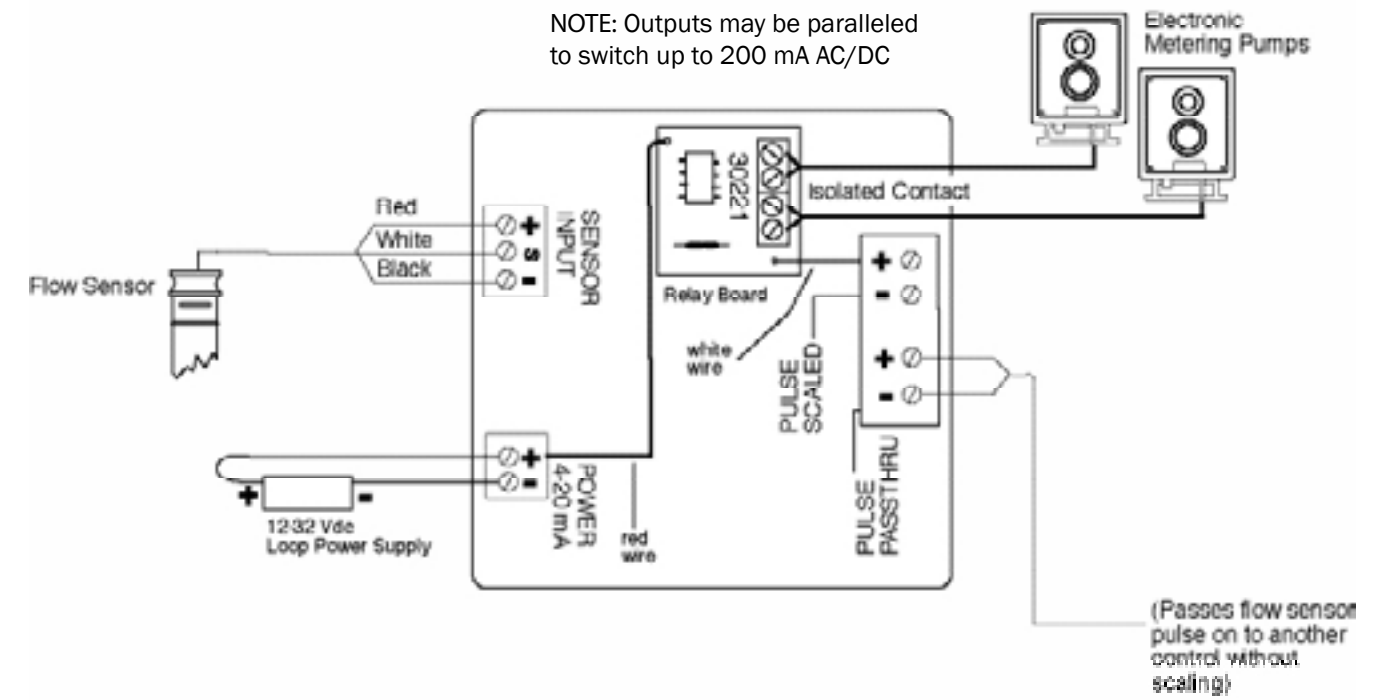
Connections for RTI/3-Wire Mechanical Meter



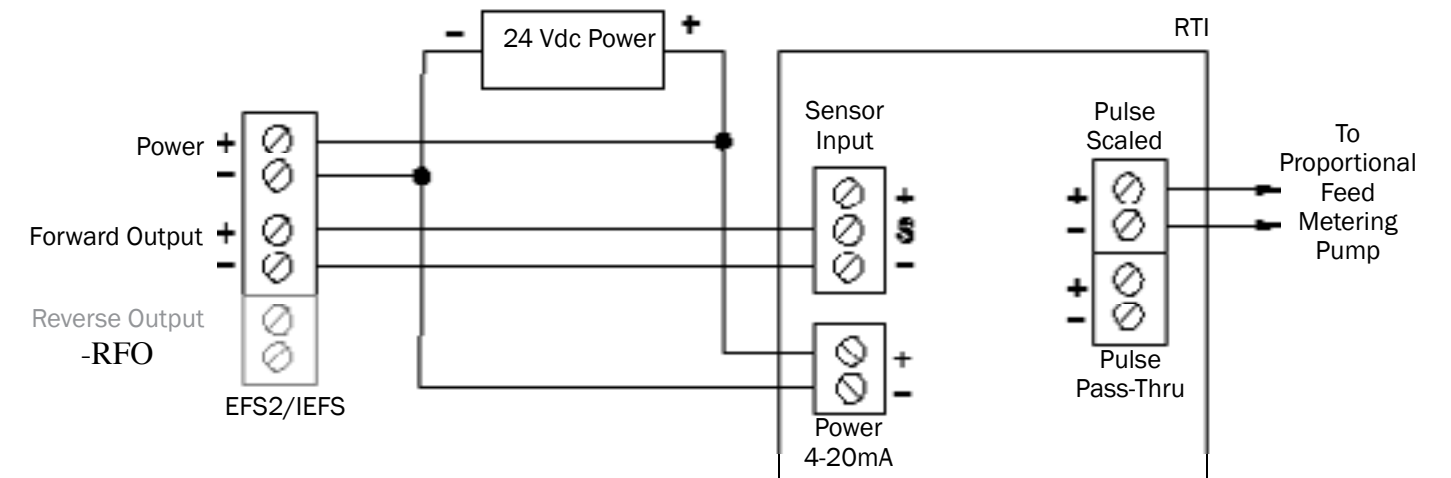
Connections for RTI-W-VPS (115 VAC Option)



Connections for RTI-X-DRO (Dual Relay Output Option)



Connections for Series RTI to Series EFS2 or IEFS Electromagnetic Flow Sensors



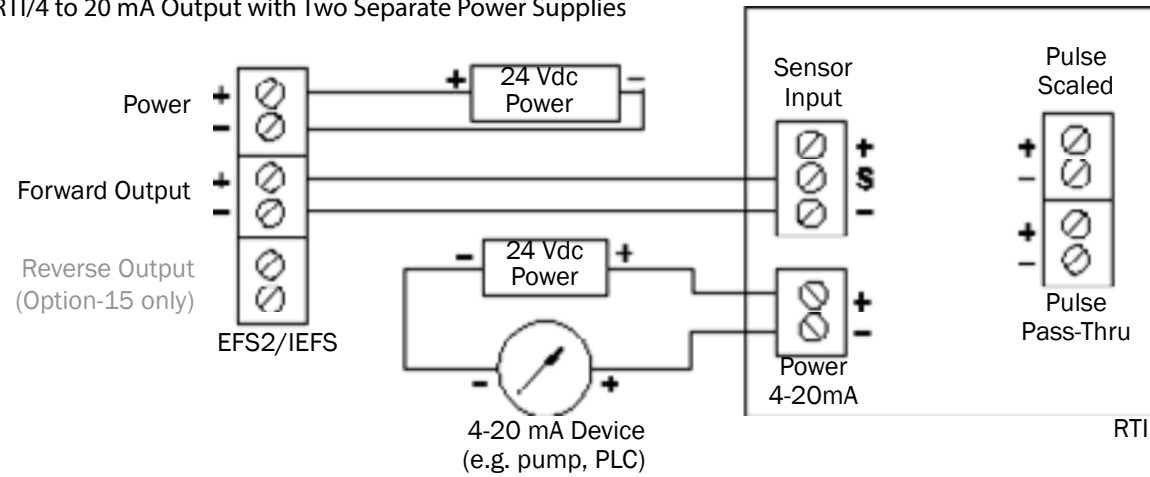
RTI Display with 4 to 20 mA Output

When running the RTI with a magmeter (which requires power), the RTI must be connected to two power supplies, one for the magmeter and one for the 4-20 mA loop. You may either use a dual power supply, or two single power supplies (one of which may be the 4-20 mA loop itself). See diagrams below.



**Caution:** Important! Do not connect power to the power supply until all connections have been made and confirmed correct, and the cover has been put back into place.

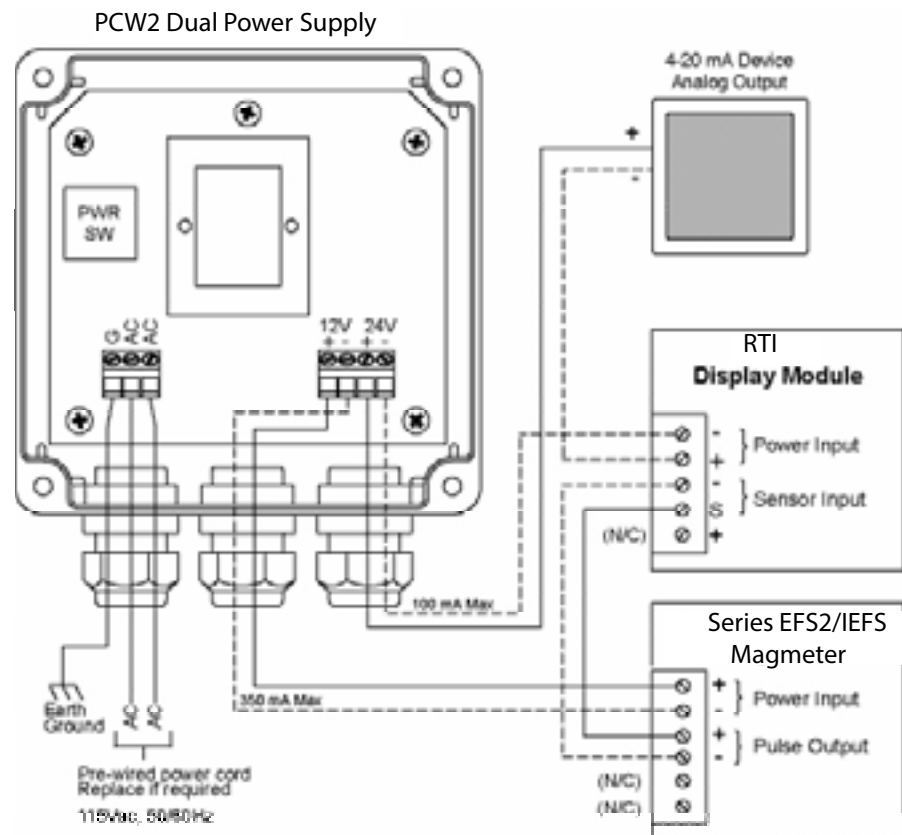
Series RTI/4 to 20 mA Output with Two Separate Power Supplies



Series RTI/4 to 20 mA Output with PWC2 Dual Power Supply (Part of Series FPCA)

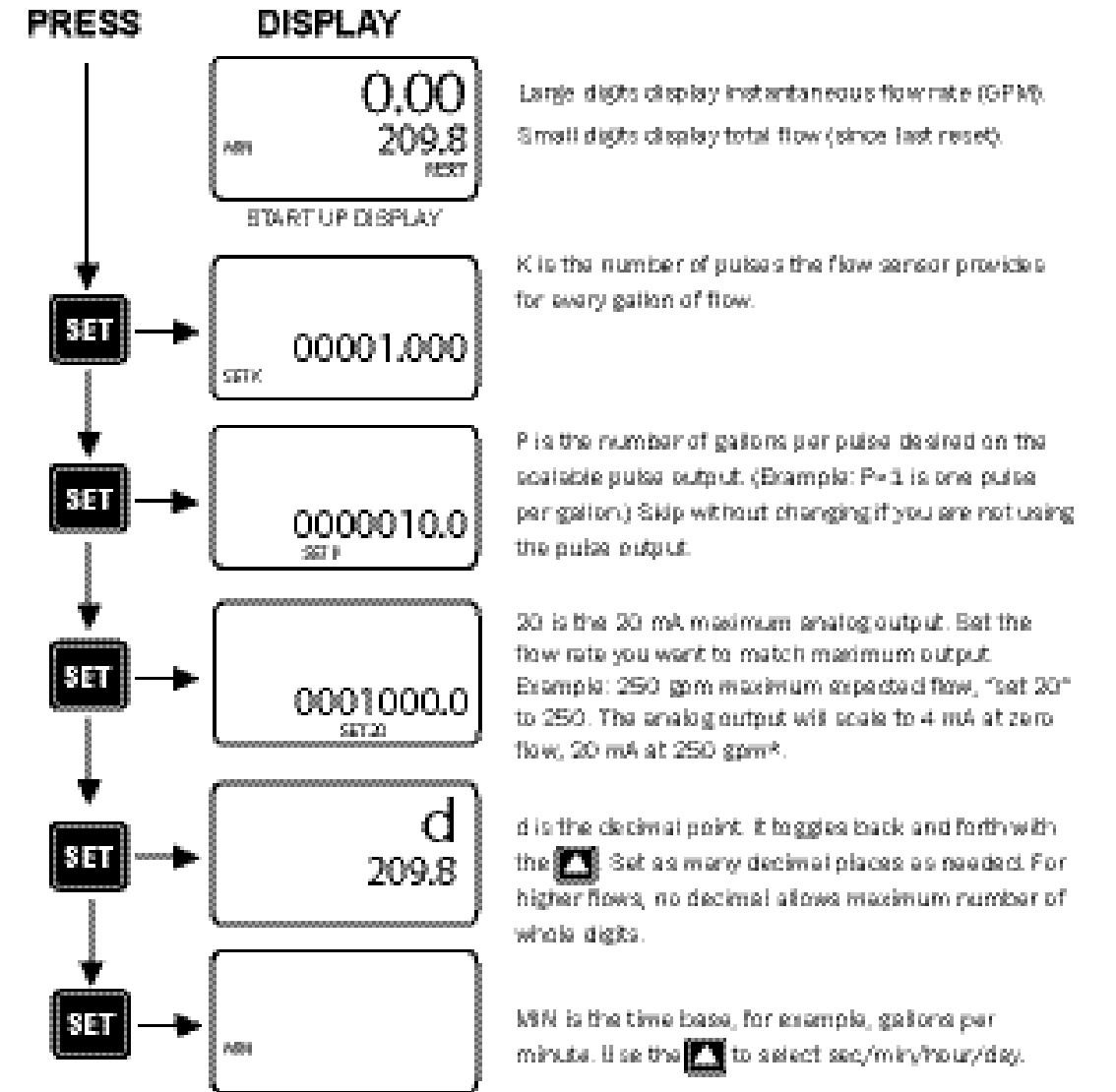


**Caution:** It is essential for safety and proper operation to use a ground connection for the 115 VAC power. Do not use this power supply without proper grounding.



QUICK SETTINGS OVERVIEW

See following page for step-by-step instructions on changing these settings. Pass through all settings and return to original display to save settings.

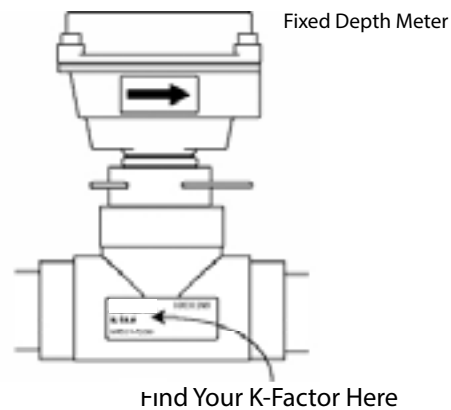


**\*NOTE:** Use the up arrow key to reach your desired digit. Then press the left arrow key to move to the next digit. Repeat the process until the entire number is entered.

**K-FACTOR**

At a minimum, every Series RTI flow display must be programmed with the "K-factor". (This is the number of pulses that the meter produces per gallon of flow.) If you wish the RTI to read in units other than gallons, see below.

The K-factor on any Dwyer Instruments Inc. flow sensor fitting or in-line meter can be found on the model-serial label. The line reading K = xxxx gives the desired number. For depth-adjustable sensors, look in the instruction manual under your pipe size.



**READING IN OTHER UNITS**

**Changing Volume Units.** The default K-factor units are pulses per gallon. To read your total in metric or other units instead, the standard K-factor must be converted to the desired volume units. For example, to read in pulses per liter, the K-factor must be multiplied by the applicable number shown below.

NOTE: Both rate & total will read in whatever units you choose.

| To Convert K to: | Multiply by: |
|------------------|--------------|
| Liters           | .26418       |
| Cubic Meters     | 264.18       |
| Fluid Ounces     | .0078        |
| Cubic Feet       | 7.48         |

**Changing Time Units:** To read your rate in liters per second (for example), convert the K-factor volume units as shown above and change the time units to Seconds, using the Set Time Unit instructions at right.

**Set K.** Begin by pressing the SET key once. The prompt SET K should appear on the display. The digit to the far right will be blinking. Use the up arrow key to reach your desired value. Then press the left arrow key to move to the next digit. Repeat the process until the entire number is entered. (Note that the decimal is fixed at three places. If you only have two decimal places for your K-factor, enter a zero for the third digit.) Press SET to advance. (Note: If unable to set K-factor, the unit is "locked" to prevent tampering. Please contact Dwyer Instruments Inc. for assistance.)

**Set P/Flow Alarm.** At this screen you may select between pulse output (P) or flow alarm (A) functions. If the pulse output and flow alarm features are not being used, this step can be skipped. The P (pulse output) setting does not affect anything if it is not being used.

Set P is the default that appears on a new Series RTI. On an RTI that has been previously set up with flow alarm function, an A will appear on this screen. To move between P and A screens, firmly press all three keys for 5-10 seconds, then use the up arrow to scroll through the three options: P, AL HI (high flow alarm) and AL LO (low flow alarm).

**Set P.** From this screen, follow the same process as for Set K to enter the desired pulse rate. This is the number of gallons (or whatever units are programmed) between pulses. (Note: Using the pulse output function disables the high and low flow alarm functions.) (6.1 Hz max output)

**Set Flow Alarm.** From the A screen, use the up arrow key to choose either AL HI or AL LO and then press the SET key to set the alarm rate. Use the up arrow and left arrow as above to reach the desired digits. (Note: Using the flow alarm function disables the pulse output function.)

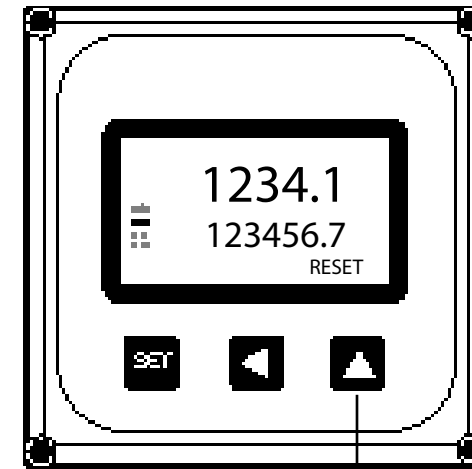
**Set 20 mA.** Press the SET key to advance to SET 20 to set the flow rate in volume units per time unit, at which 20 mA is desired. Use the up arrow key to reach your desired value. Then press the left arrow key to move to the next digit. Repeat the process until the entire number is entered. The processor will automatically scale the 4 to 20 mA loop accordingly, with 4 mA at zero flow.

**Set Decimal Point.** Press the SET key again for the D prompt. Pressing the up arrow key switches among no decimal place, one decimal place, and two decimal places.

**Set Time Unit.** When the SET key is pressed again, a blinking time unit appears. Press the up arrow key to select SEC (seconds), MIN (minutes), HR (hours) or DAY (days) (for example, gal/min, or gal/hr).

To save settings and return to normal operation after entering settings, press SET again. When the unit is connected to an operating flow sensor, the rate (larger digits) and total (smaller digits) indicator numbers should appear in the display.

**Resettable/Non-Resettable Totalizer.** Unless the unit has been ordered with the non-reset option, a RESET prompt is visible in the lower right corner above the up arrow key, when the display is in use. Press the up arrow key at any time to reset the totalizer to zero. (Note: If you need to reset a unit that has been ordered with a non-resettable totalizer, contact Dwyer Instruments Inc.)



This key resets total to zero when in normal run mode.

**CAUTION:** Do not touch up Arrow button unless you intend to RESET Total to Zero. TOTAL IS NOT RECOVERABLE.

**Operation of 4 to 20 mA Output.** If the 4 to 20 mA output is in use and is correctly connected, the signal should vary between 4 mA and 20 mA in proportion to the flow, with the top flow rate set by the user (see Settings, page 8). At no time should the signal drop below 4 mA. A reading between 0 and 4 mA indicates a fault of some type, typically in the loop power supply or the connections (see Troubleshooting, back page). In the rare instance that the 4 to 20 signal fluctuates excessively ("paints"), it may need to be damped by additional averaging. Contact Dwyer Instruments Inc. for information on how to increase filtering.

**Operation of the Pulse Output.** If the pulse output is being used (either standard electronic or relay-type), it should pulse for 0.1 second every time the set number of gallons has been totalized. If a pulse-responsive metering pump is properly connected to this output, it should stroke periodically. If this does not occur, see Troubleshooting, back page.

**WARRANTY/RETURN**

Refer to "Terms and Conditions of Sale" in our catalog or on our website. Contact customer service to receive a Returns Goods Authorization number before shipping your product back for repair. Be sure to include a brief description of the problem plus any relevant application notes.

## TROUBLESHOOTING

| Problem   | Probable Cause   | Try...  |
|---|--|---|
| Display blank   | No power to the unit<br><br>Short in sensor circuit  | Check for minimum 12 VDC at power terminals<br><br>Disconnect sensor, see if display returns (zero flow rate)   |
| Display missing segments  | Damaged display module   | Contact Dwyer Instruments, Inc. for replacement   |
| Display reading meaningless characters                          | Unit's microcontroller crashed   | Disconnect and reconnect power, if problem repeats, contact distributor for return/replacement  |
| Display reads normally, flow rate incorrect                     | Wrong K-factor or time base entered  | Enter correct K-factor from meter, fitting, or manual   |
| Display reads normally, incorrect pulse output                  | Wrong pulse output setting<br><br>Polarity reversed on pulse output terminals  | Use "Set P" to correct pulse output setting<br><br>Reverse leads  |
| Display reads normally, but no (or incorrect) 4 to 20 mA output | Wrong 20 mA setting<br><br>Inadequate loop power supply voltage<br><br>Polarity incorrect in 4 to 20 mA loop circuit | Use "Set 20" to correct target top flow rate<br><br>Check voltage (For 4 to 20 mA applications, 24 VDC recommended)<br><br>Compare to Connections diagram |
| Display reads zero when there is flow                           | Flow sensor failed<br><br>Break in flow sensor circuit   | Consult flow sensor manual for how to test<br><br>Check for continuity with multimeter  |
| Display reads flow rate when there is none                      | Long flow sensor wire, running parallel to power wires<br><br>Flow sensor malfunction                                | Reroute wire or change to shielded wire<br><br>See flow sensor manual to check  |

