



# Series TTMP PVC Electronic Totalizing Meter

Specifications - Installation and Operating Instructions

## Series TTMP PVC Electronic Totalizing Meter

### Electronic Version Options 3, 4, 5 & 6

### Owner's Manual



TTMP-6N5



TTMP-7F4

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#### FLOWMETER

#### IMPORTANT NOTICE

Use Series TTMP meter with water and other chemicals compatible with wetted components (See Specifications Section). Do not use with fuel or incompatible chemicals. Series TTMP meters are available with one of the following electronic options: 4-20 mA Output Only (Option 3), Local Display with Pulse-Out (Option 4), Local Display with 4-20 mA Output (Option 5) or Scaled Pulse (Option 6). Refer to each section for details.

These meters are not legal for trade applications.

Series TTMP meter is very sensitive to electric noise if operated within 1 to 2 inches of some electric motors or other sources of electronic noise.

#### INSTALLATION

##### Connections

Install your meter in-line either horizontally or vertically or at the end of the hose adjacent to the nozzle. Installation to metal connections is not recommended. Install as follows:

1. Plan to install turbine with a minimum straight pipe length as follows:
  - Upstream from the turbine, allow a minimum straight pipe length of 10 times the internal diameter of the turbine.
  - Downstream from the turbine, allow a minimum straight pipe length of 5 times the internal diameter of the turbine.
2. For Spigot (Pipe) End - Use only primer and solvents approved for PVC gluing.

Cut to Length - The meter housing can be shortened by the customer. Each meter has a "dotted" line feature molded on the top surface of the housing tube. The housing can be cut up to this line without harming any internals.

Most glue on fittings will fit without interfering with the computer display area. However, the customer should check all parts before attempting cut.

**DWYER INSTRUMENTS, INC.**  
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361, U.S.A.

Phone: 219/879-8000  
Fax: 219/872-9057

www.dwyer-inst.com  
e-mail: info@dwyer-inst.com

For NPT Fittings - Wrap all connections with 3 to 4 wraps of thread tape. Make sure the tape does not intrude into the flow path.

3. Attach meter with arrow in the direction of fluid flow.
4. For NPT Fittings - Hand tighten the meter at the housing ends. Do not use a wrench or similar tool to tighten. This can damage the housing.
5. For ANSI Flange Fittings - Customer to provide:
  - Ring Gaskets or Full-Face Gaskets approved for use with type flange installed (ANSI) and the fluid being monitored (2 required).
  - 5/8" bolts and nuts for ANSI flanges. Four per side for 3-inch meters; eight per side for 4-inch meters.
  - Torque bolts using a star pattern to 25 ft-lbs. Supplied flanges are two-piece Van Stone style and allow the meter to be oriented regardless of the mating flanges position.

For best results, always verify accuracy before use.

### ⚠ WARNING

Compatibility of this product's material and the process fluid and/or environment should be considered prior to putting into service.

### ⚠ WARNING

Product should never be operated outside its published specifications for temperature or pressure. See specifications for your model.

### ⚠ WARNING

Make sure flow and pressure have been eliminated from process pipe prior to installing or removing product.

### ⚠ WARNING

Always use appropriate flange gaskets when connecting product to process piping.

### ⚠ CAUTION

To protect against leakage, seal all pipe threads with an appropriate sealing compound. Make sure the sealing compound does not intrude into the flow path.

NOTE: Do not over tighten the flange bolts. This may cause the gasket to be compressed into the flow stream and may decrease the accuracy of the meter.

### ⚠ CAUTION

Installation near high electromagnetic fields and high current fields is not recommended and may result in inaccurate readings.

## MAINTENANCE

Proper handling and care will extend the life and service of the meter.

### Turbine Rotor

The meter is virtually maintenance-free. However, it is important the rotor moves freely. Keep the meter clean and free of contaminants.

The rotor can be removed for cleaning and inspection. Begin by unscrewing the nose cone from the outlet end of the meter. A 1/4" square socket extension can be used. Remove the lock and flat thrust washers. Rotor can then be removed from shaft. Note orientation because rotor is not bi-directional. Remove debris or deposits using soft brush or small probe. Reassemble in reverse order.

### ⚠ CAUTION

Blowing compressed air through the turbine assembly could damage the rotor.

### ⚠ CAUTION

Do not allow liquids to dry inside the turbine.

### ⚠ CAUTION

Handle the rotor carefully. Small scratches or nicks can affect accuracy.

NOTE: Make sure the arrow on the turbine outlet is pointed in the direction of fluid flow.

## SPECIFICATIONS

### Inlet and Outlet:

#### Spigot (Pipe) End Models:

TTMP-6S	3 inch Schd. 80, Spigot (Pipe)
TTMP-7S	4 inch Schd. 80, Spigot (Pipe)

#### NPT Models:

TTMP-6N	3 inch NPT
TTMP-7N	4 inch NPT

#### ANSI Flange Models:

TTMP-6F	3 inch 150 # ANSI Flange
TTMP-7F	4 inch 150 # ANSI Flange

Design Type: Turbine

### Wetted Components:

Housing: PVC  
Journal Bearings: PEEK®\* based proprietary formulation  
Shaft: Stainless Steel  
Rotor and Nose Cone: Acetal  
Washers: Stainless Steel

### Max. Working Pressure:

TTMP-6 (all models): 225 PSIG @ 73° F  
TTMP-7 (all models): 225 PSIG @ 73° F (Non CE),  
135 PSIG @ 73° F (CE applications)

## U.S. Measurement

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**Unit of Measure:** Gallon

**Flow Range:**

- 3 inch: 40-400 GPM (Linearity:  $\pm 3.0\%$  of Reading)  
30-600 GPM (Accuracy:  $\pm 2.0\%$  Full Scale)
- 4 inch: 60-600 GPM (Linearity:  $\pm 3.0$  of Reading)  
40-800 GPM (Accuracy  $\pm 2.0\%$  Full Scale)

**Operating Temperature:** +32° F to +140° F  
(Do not allow fluid to freeze inside meter.)

**Storage Temperature:** -40° F to +158° F

**Product Weight - lbs.:**

	Spigot (Pipe)	NPT	ANSI Flange
3 inch:	2.4	3.9	5.8
4 inch:	3.7	6.1	9.2

**Dimensions - Inches (L x H x W):**

Spigot (Pipe):

- 3 inch: 11.5 x 5.34 x 3.5  
4 inch: 13.5 x 6.34 x 4.5

NPT:

- 3 inch: 14.7 x 5.78 x 4.37  
4 inch: 17.0 x 6.7 x 5.87

ANSI Flange:

- 3 inch: 12.0 x 7.5 x 7.5  
4 inch: 14.0 x 9.0 x 9.0

## Metric Measurement

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**Unit of Measure:** Liter

**Flow Range:**

- 3 inch: 151-1514 LPM (Linearity:  $\pm 3.0\%$  of Reading)  
113-2271 LPM (Accuracy:  $\pm 2.0\%$  Full Scale)
- 4 inch: 227-2271 LPM (Linearity:  $\pm 3.0$  of Reading)  
151-3028 LPM (Accuracy  $\pm 2.0\%$  Full Scale)

**Operating Temperature:** 0° to +60° C  
(Do not allow fluid to freeze inside meter.)

**Storage Temperature:** -40° to +70° C

**Product Weight - kgs:**

	Spigot (Pipe)	NPT	ANSI Flange
3 inch:	1.09	1.77	2.63
4 inch:	1.68	2.77	4.17

**Dimensions - cm (L x H x W):**

Spigot (Pipe):

- 3 inch: 29.2 x 13.6 x 8.9  
4 inch: 34.3 x 16.1 x 11.4

NPT:

- 3 inch: 37.3 x 14.7 x 11.1  
4 inch: 43.2 x 17.0 x 14.9

ANSI Flange:

- 3 inch: 30.5 x 20.3 x 20.3  
4 inch: 35.6 x 22.9 x 22.9

## PARTS

Contact Dwyer Instruments for replacement parts and accessories.

## ELECTRONIC OPTION 3 MODEL

### 4-20 mA Output Transmitter

All information needed for Option 3 Model can be found in the Option 5 Model sections. Consult one or all of the following:

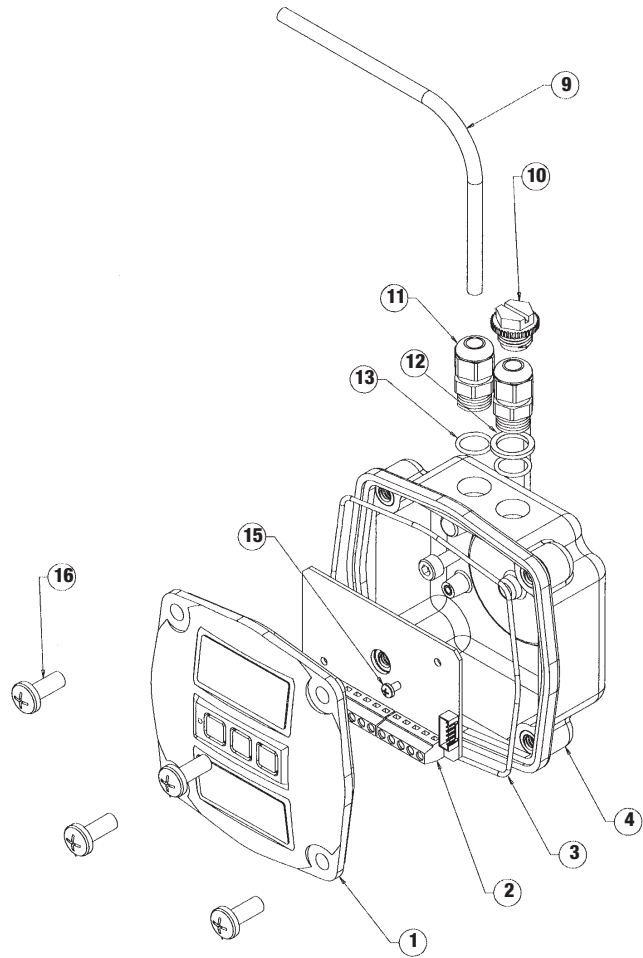
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Check cable-entry seals periodically. Tighten and/or apply sealant if needed. This is especially important in environments containing heavy concentrations of dust, oil mist, or other residue.

Check all wiring connections occasionally for oxidation or corrosion. Clean and re-seat if such conditions are noted.

If necessary, check and re-seat any connections that may have been subjected to strain (during rework or construction, for example).

## PARTS DRAWING – OPTION 3 MODEL



Item No.	Description	No. Req'd.
1	Switch Keypad Kit.....	1
2	Main Circuit Assembly .....	1
3	O-Ring .....	1
4	Adapter Kit	
9	Cable, 100 ft. (Remote Model) .....	1
	Cable, 20 ft. (Remote Model) .....	1
10	Threaded Plug.....	1
11	Strain Relief .....	1
12	Seal .....	1
13	O-Ring .....	1
15	Screw, 4-40 x 3/16 in.....	2
16	Sealing Screw, 1/4-20 x 5/8 in.....	4

For replacement parts, contact Dwyer Instruments, Inc.

## ELECTRONIC OPTION 4 MODEL

### Local Display with Pulse Output

#### IMPORTANT NOTICE

This manual will assist you in operating and maintaining the Dwyer electronics supplied with your meter. The electronics can be used in indoor or outdoor applications where occasional exposure to moisture is common.

The Option 4 Model Pulse Out with Display can be battery powered (9-volt supplied) or externally powered.

#### SAFETY INSTRUCTIONS

- This product is not approved for use in hazardous locations.
- Be sure O-rings and seals are kept in good repair.
- When applying power, use DC power only!
- Disconnect external power before attaching or detaching input or output wires.

#### INSTALLATION

##### ⚠ CAUTION

Installation should be performed only by qualified personnel, and in accordance with local governing regulations.

Avoid plumbing meter where the Display is:

- Subject to constant exposure to water or other liquids (occasional low-pressure splashing will not harm unit).
- Subject to >5g shock loading.
- Facing the sun directly for long periods of time.

The Option 4 Model is shipped without cable or strain relief. See Illustrated Parts List for these components. When wiring long lengths of cable, be sure to connect the shield to LOCAL-COM only! (Multiple shield connections may cause ground-loop problems.

Try to keep cable lengths short. Individual installation sites vary widely, contact Dwyer Instruments, Inc. with questions regarding your specific needs.

#### OPERATION

### Computer Display – Batch and Cumulative Totals

The computer maintains two totals. The Cumulative Total provides continuous measurement and cannot be manually reset. The Batch Total can be reset to measure flow during a single use. The Cumulative Total is labeled with TOTAL 1, Batch Total is labeled TOTAL 2 BATCH.

When the Cumulative Total reaches a display reading of 999,999 the computer will highlight an X10 icon. This indicates to the operator that a zero must be added to the 6 digits shown. When the next rollover occurs, the computer will highlight an X100 icon. This indicates to the operator that two zeroes must be added to the 6 digits shown.

Press the DISPLAY button briefly to switch between the TOTAL 1, TOTAL 2 BATCH and FLOWRATE. Press DISPLAY briefly to display the TOTAL 2 BATCH. Hold the DISPLAY button for 3 seconds to reset the Batch Total to zero.

When fluid is flowing through the meter, a small propeller icon is highlighted.

NOTE: Totalization counts total units without differentiating between gallons, liters or field calibrated units.

### Flowrate Feature

To use this feature, press and release DISPLAY until FLOWRATE icon appears. The factory set time base will be highlighted to the right of FLOWRATE (M = minutes, H = hours, D = days). When FLOWRATE is invoked, the display will be indicating rate of flow.

### Activate the Meter

Computer is on continuously and always ready to perform. The computer is powered by a field replaceable battery. When display becomes dim, faded or the low battery message appears (see below), the battery needs to be replaced. Reference the Maintenance Section for details.

# LobAtt

### Factory and Field Calibration

All calibration information is visible to the user as icons on the top line of the display, above the numeric digits.

All units are configured with a “factory” calibration. Both gallons and liters are available (“GL” or “LT” will be displayed). While holding the CALIBRATE button, briefly press DISPLAY to toggle between gallons and liters. This factory calibration (indicated with FAC) is permanently programmed into the computer and is not user adjustable.

NOTE: Your computer may have other units of measure programmed into it. If so, holding the CALIBRATE button and momentarily pressing the DISPLAY button will toggle through all factory set units. Other possible units are: IGL (imperial gallon), QT (quart), CF (cubic feet), CM (cubic meter), BL (42 gal. barrel), CC (cubic centimeter) or OZ (ounce).

Switching between different units will not corrupt the Total's contents. For example, in GL mode, the computer totalizes 10.00 gallons, if the user switches to LT mode, the display will read 37.85 liters (the same volume, different unit).

The “field” calibration may be set by the user, and can be changed or modified at any time using the calibration procedure described below in the Calibration Section. Totals or flowrate derived from the field calibration are invoked when the FAC icon is no longer visible on the top line of the display.

## CALIBRATION

### Verify Accuracy Before Beginning Field Calibration

For the most accurate results, dispense at a flowrate which best simulates your actual operating conditions. Avoid “dribbling” more fluid or repeatedly starting and stopping the flow. This can result in less accurate calibrations.

Make sure you meet the meter’s minimum flowrate requirements:

#### Series TTMP Meter

3 inch meter	30 GPM (113.6 LPM)
4 inch meter	40 GPM (151.4 LPM)

The use of a uniformly dependable, accurate calibration container is recommended for the most accurate results. Due to high flowrate, it is strongly recommended that calibration be completed with a combination of volume and weight using fine resolution scales.

For best results, the meter should be installed and purged of air before field calibration.

### Field Calibration with Computer Display

Field Calibration and Factory Calibration are defined in the Operation Section. Factory calibration settings are programmed into each computer during manufacturing, using water at 70° F (21° C). Readings using the Factory Calibration (FAC) may not be accurate in some situations, for example, under extreme temperature conditions, non-standard plumbing configurations or with fluids other than water.

### Field Calibration Procedures (Correction Factor Method)

1. To calibrate, press and hold the CALIBRATE and DISPLAY buttons for about 3 seconds until you see FLdCAL. Release both buttons and you will see CF - 00.0. You are now in the field calibration mode and values from -99.9% to +99.9% can be entered.
2. The +/- position appears either as an “underscore” character for plus, or as a “hyphen” character for minus. The DISPLAY button selects the position and the CALIBRATE button toggles this character.
3. The DISPLAY button can then be pushed to select the numeric positions. Press the CALIBRATE button to scroll from 0 to 9. Enter the percentage of change you want the display to correct. When satisfied with the value, press both CALIBRATE and DISPLAY buttons simultaneously. CALEnd will be displayed and unit will go back to normal operation, less the FAC (factory calibration) icon.
4. All enabled units-of-measure remain visible and selectable – the entered correction will be applied to all enabled units.

5. To return to factory calibration (FAC), press and hold both CALIBRATE and DISPLAY buttons for about 3 seconds until FAcCAL is displayed. Then release buttons. Unit should return to normal operation and FAC icon is visible.

## WIRING

### Connecting the Equipment

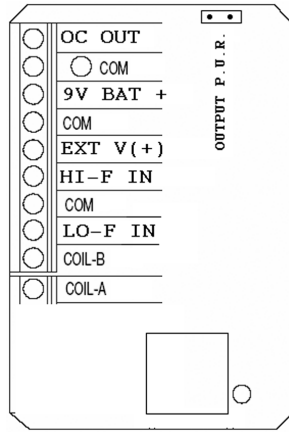
1. Remove the faceplate by removing the four corner screws.
2. Attach wiring from your equipment according to the following terminal connections and wiring instructions, depending on your circumstances. (See Terminal Locations)

The display may be powered by a 9-volt lithium battery, externally powered or both. When both are used (external power terminal as primary with the battery terminal as back up) the batteries should last up to 5 years. Connection and disconnection of either power input while the other is active will not interrupt operation of the display.

#### CAUTION

Determine maximum power supply voltage after determining maximum allowable voltage of all electronic devices in the system.

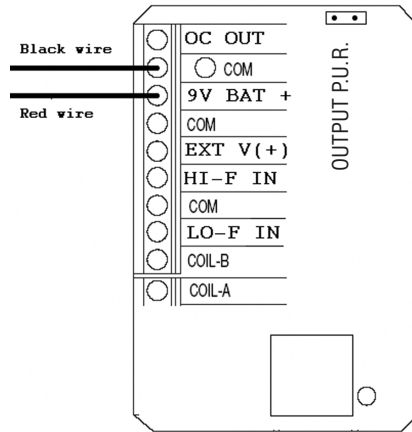
## TERMINAL LOCATIONS



- 9V\_BAT+** Battery, 6.5V to 20V
- EXT\_V(+)** External Power, 7V to 30V
- COIL\_B / COIL\_A** To Flowmeter Sensor
- OC\_OUT**
- This is an open-collector or current-sinking output when NO JUMPER is attached at OUTPUT P.U.R. location. It can sustain closed-circuit current of up to 200 mA and open-circuit voltage of up to 60V.
  - This is an active-drive output when the JUMPER (supplied) is attached at location OUTPUT P.U.R. The JUMPER applies an internal 10K Ohm resistor as a “pull-up” to the regulated power supply of 5.5V.
  - The output ground circuit may be connected to any **COM** terminal.
  - Do not use JUMPER if operating from a battery; it will cause significantly increased system current consumption.
  - CAUTION:** Only use JUMPER when the receiving equipment has a active-drive input with 5V or less.
- COM** All COM terminals are internally connected and may be used either as NEGATIVE power supply terminals or return terminals for any inputs or outputs.

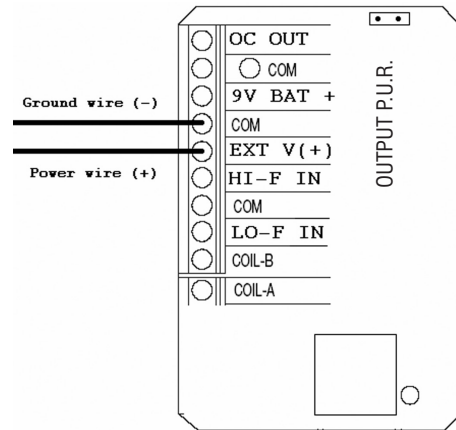
## POWER

### 9V Battery (included)



Connect battery (included) red wire (+) to **9V\_BAT+** terminal.  
Connect battery (included) black wire (-) to any **COM** terminal.

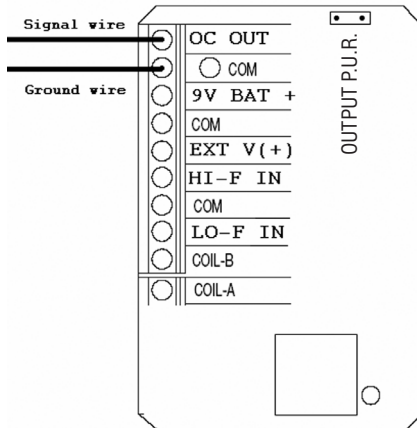
### External Power



Connect power wire (7-30 VDC) to **EXT\_V(+)** terminal.  
Connect ground wire to any **COM** terminal.

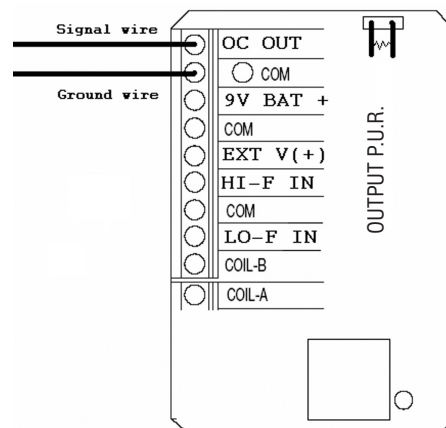
## SIGNAL OUTPUT

### Open Collector



Connect signal wire to **OC\_OUT** terminal.  
Connect ground wire to any **COM** terminal.  
NOTE: Jumper should **not** connect pins marked Output P.U.R.

### Active-Drive Output



Connect signal wire to **OC\_OUT** terminal.  
Connect ground wire to **COM** terminal.  
Place JUMPER (supplied) over both pins marked OUTPUT P.U.R.

NOTE: Multiple COM terminals are provided for convenience in making connections.

## MAINTENANCE

### Replacing the Battery

Replace the battery when the readout becomes dim or blank. Replace the battery with a 9-volt lithium battery.

To replace the battery:

1. Remove the two large screws and two small screws from the battery coverplate.
2. Remove the battery coverplate and gasket.
3. Remove the battery and clean any corrosion from the terminals.

NOTE: Coat the terminals with petroleum jelly to protect against corrosion.

4. Install the new battery.
5. Check the gasket for damage and replace as needed. Position gasket and coverplate to align, insert screws and tighten.

NOTE: Batch and Cumulative Total return to zero when the battery fails or is disconnected. The factory calibration is retained in the computer permanently and will display when the battery is replaced.

Store at temperatures between 14° F to 140° F (–10° C to +60° C).

### WARNING

**(Battery) – Avoid mechanical or electrical abuse. Batteries may explode or cause burns, if disassembled, crushed or exposed to fire or temperatures in excess of 212° F (100° C). Do not short circuit or install with incorrect polarity. DO NOT INCINERATE.**

**Open battery cells should be disposed of in accordance with local regulations. Lithium batteries are best disposed of as a non-hazardous waste when fully or mostly discharged. EPA does not list or exempt Lithium as a hazardous waste. If waste lithium batteries are still fully charged or only partially discharged, they can be considered a reactive hazardous waste because of unconsumed lithium remaining in the battery. Such batteries may qualify as “Universal Waste” in many jurisdictions within the U.S. and thus can be shipped for disposal or recycling in accordance with Universal Waste requirements.**

## SPECIFICATIONS – OPTION 4 MODEL

### Materials:

Acetal, Amorphous Nylon, PET Polyester, Polyester (decals), FKM (gasket & seals), Stainless Steel (fasteners)

### Power Source:

Battery (9V): 6.5V to 20V acceptable range.

Quiescent current (over and above current drawn by display module) at the battery input is typically less than 15uA.

External Power: 7V to 30V acceptable range. Quiescent current (over and above current drawn by display module) at the external power input is typically less than 90uA.

**Battery Life:** 4 years

### Configuration:

2-Totals (1 cumulative and 1 batch), Rate, 2 Cals (Factory calibration; 1 field calibration)

**Time Base:** Minutes

**Unit of Measure:** U.S. gallons, liters or cubic feet

### Accuracy:

No additional error over coupled flow meter's accuracy

### Batch Total:

Up to 999,999 x 100 (99,999,900)

### Cumulative Total:

Up to 999,999 x 100 (99,999,900)

### Temperature:

+14° F to +140° F (–10° C to +60° C) - electronics only

**Cable:** N/A

### Mechanical Connections:

Display is mounted directly to flow meter body

**Electrical Connections:** Two threaded plugs (1/2 x 20)

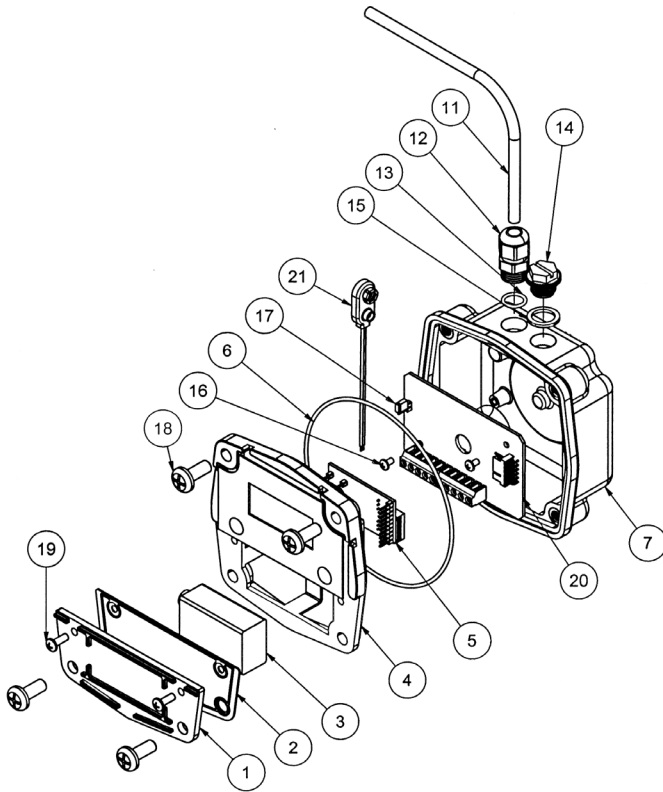
**Weight:** Additional 1 lb. (.45 kg)

## TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
A. LCD REGISTER NOT WORKING	<ol style="list-style-type: none"> <li>1. Battery not connected properly.</li> <li>2. Battery flat.</li> <li>3. Faulty wiring connections.</li> <li>4. Faulty LCD.</li> <li>5. Faulty connection from computer to Pulse PCB.</li> </ol>	<p>Check battery connections.</p> <p>Replace battery.</p> <p>Check wiring for loose or faulty connections.</p> <p>Replace computer assembly.</p> <p>Check wiring connections.</p>



## PARTS DRAWING – OPTION 4 MODEL



Item No.	Description	No. Req'd.
1	Battery Cover.....	1
2	Battery Gasket.....	1
3	Battery, 9-volt Lithium.....	1
4	Computer Kit.....	1
5	Circuit Assembly (Pigtail).....	1
6	O-Ring.....	1
7	Adapter Kit.....	1
11	Cable, 20 ft.....	1
	Cable, 100 ft.....	1
12	Strain Relief.....	1
13	O-Ring.....	1
14	Threaded Plug.....	1
15	Seal.....	1
16	Screw, 4-40 x 3/16 in.....	2
17	Jumper (2-Circuit).....	1
18	Sealing Screw, 1/4-20 x 5/8 in.....	4
19	Sems Screw, 6-32 x 3/8 in.....	2
20	Circuit Assembly (Core).....	1
21	Battery Terminal.....	1
	Battery Conversion Kit (not shown) - Kit includes Items 3, 14, 15 and 21.....	1

For replacement parts, contact Dwyer Instruments, Inc.

## ELECTRONIC OPTION 5 MODEL

### Local Display with 4-20 mA Output

### IMPORTANT NOTICE

This manual will assist you in operating and maintaining the electronics supplied with your meter. The electronics can be used in indoor or outdoor applications where occasional exposure to moisture is common.

The 4-20 mA Out with Display is a flow totalizer and rate meter with industry standard current loop output. The unit is loop powered, and provides a 4-20 mA analog output proportional to the frequency signal for communication with PLCs and other customer equipment. The 4-20 mA (or 0-20 mA) output is calibrated under actual flow conditions with simple push-button calibration. Auxiliary output includes 0-5 VDC.

The microprocessor-based electronics have extremely low power requirements and are completely powered by the 4-20 loop. The electronics provides the options of local (on the meter) and/or remote (up to 5,000 feet) display. Flow total and rate are displayed on a large 6-digit LCD readout with two-point floating decimal for totals from .01 to 999,999. All operations are easily accessed with the push buttons on the display front panel.

### ⚠ CAUTION

This unit is not FM Approved.

NOTE: This unit is loop powered, requiring an input power supply of 8.5 to 35 volts (24 VDC is recommended).

NOTE: Setpoint calibration of the unit is required for the 4-20 mA, 0-20 mA, and 0-5 V output options.

### SAFETY INSTRUCTIONS

- This product is not approved for use in hazardous locations.
- When applying external power to the transmitter, use DC power only.
- Disconnect external power to the transmitter before detaching or attaching input or output wires.
- Ground loops between sensor and user equipment can damage the transmitter and can be dangerous.
- If you cannot galvanically isolate the sensor from earth ground, you may need to use the transmitter's optically isolated inputs.
- Be sure O-rings and seals are kept in good repair.

## INSTALLATION

### ⚠ CAUTION

Installation should be performed only by qualified personnel, and in accordance with local governing regulations.

### Environmental

Avoid plumbing meter where the 4-20 mA Out with Display is:

- Subject to constant exposure to water or other liquids (occasional low-pressure splashing will not harm unit if cable entry points are well-sealed).
- Subject to > 5g shock loading.
- Facing the sun directly for long periods of time.
- Close to high voltage/current runs, DC motors, internal combustion engines or frequency inverters.

### Cable Guidelines

#### 4-20 mA Current Loop:

- The current loop itself is very resistant to electrical noise pickup and shielded cable is seldom needed except in very “noisy” (electrical) locations and/or when very long runs (thousands of feet) are used.

### Sensor Cabling:

- Option 5 Models come with 20 ft. of shielded cable.
- If you require a longer cable, contact Dwyer Instruments, Inc., or use Belden 9363 cable. When wiring longer lengths of cable, be sure to connect the shield to LOCAL-COM only! (Multiple shield connections may cause ground-loop problems).
- Some trial and error may be needed because of the wide variety of user conditions. Try to keep cable lengths short!

## WIRING

Use the diagrams found in the Wiring Diagrams Section to correctly wire the system.

The display is externally powered by the loop.

### ⚠ CAUTION

Determine maximum power supply voltage after determining maximum allowable voltage of all electronic devices in the system.

### Connecting the Equipment:

- Remove the faceplate by removing the four (4) corner screws.
- Attach wiring from your equipment according to the following terminal connections and wiring diagrams, depending on your circumstances.

### Terminal Connections Remote Transmitter INPUTS / OUTPUTS

ISO-IN COM: N/A

ISO-LF IN: N/A

ISO-HF IN: N/A

HL-LF IN: N/A

COIL-A IN: To flowmeter

COIL-B IN: To flowmeter

HL-HF IN: N/A

**EDM PWR:** Local Vcc. Regulated 5-VDC internal power. This terminal can supply up to approximately 2.5 mA, continuously, to external circuitry. Typical load/line regulation under ordinary conditions is about  $\pm 10\%$

**LOCAL COM:** Local Common (2 places)

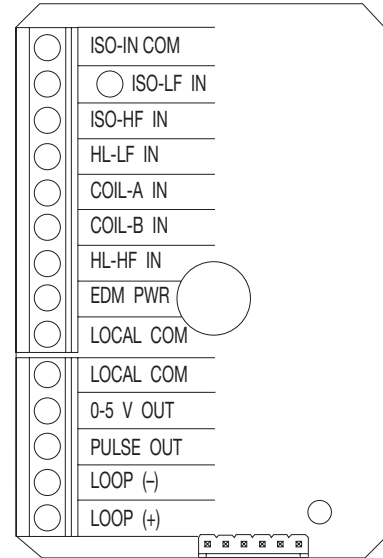
**0-5 V OUT:** 0 to 5 V Voltage Output. Frequency to Analog Output.

**PULSE OUT:** Pulse-Out

Frequency Output Signal. It is an “open-collector” output (also known as “n-p-n” or “current-sinking”), referenced to transmitter Local-Common

**LOOP (-):** 4 to 20 mA Current Loop – current into transmitter

**LOOP (+):** 4 to 20 mA Current Loop – current out of transmitter

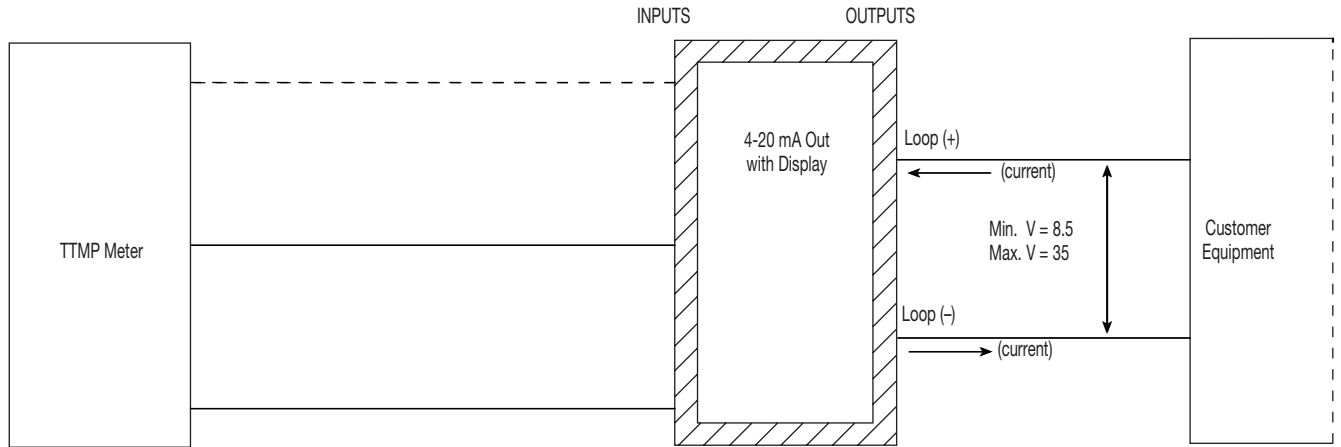


**WIRING DIAGRAM 1**

– 4-20 mA or 0-20 mA Output –

**Customer Equipment With Built-in Power Supply**

Output: Customer Equipment, 0-20 mA Sensing, Built-in Loop Power Supply



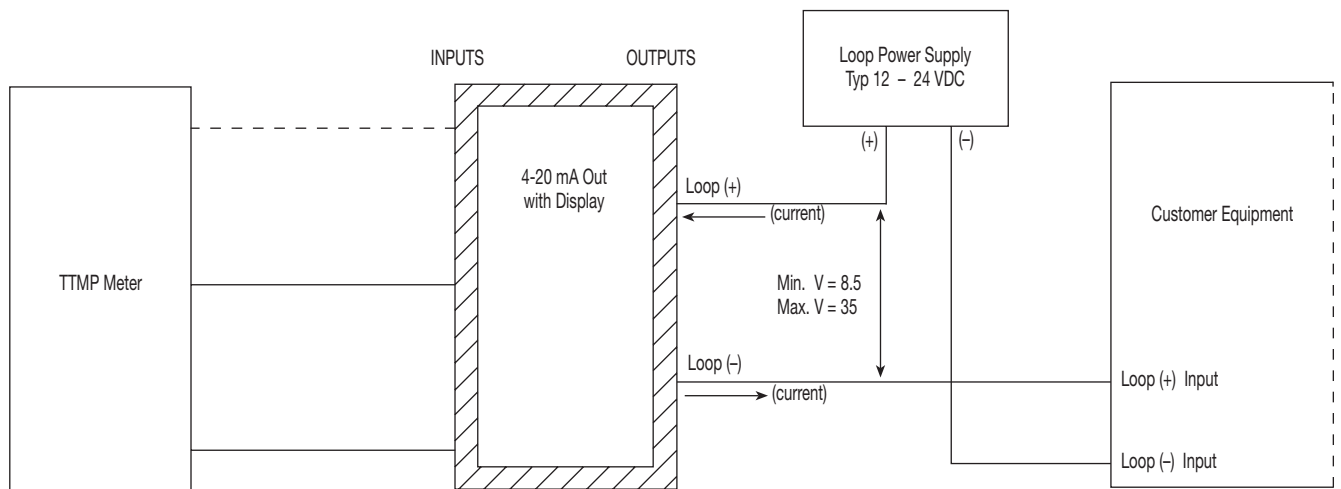
**CAUTION:** When reassembling the faceplate, make sure that the enclosure seal is not crimped or twisted. Do not over-tighten corner screws (hand tighten only). Faceplate can be rotated 90°.

**WIRING DIAGRAM 2**

– 4-20 mA or 0-20 mA Output –

**Customer Equipment Without Built-in Power Supply**

Output: Customer Equipment, 0-20 mA Sensing, Separate Power Supply



**NOTE:** Minimum loop power supply voltage required:  
 $8.5V + (\text{Max} - \text{Customer} - \text{Equipment} - \text{Drop}) + (\text{Wiring} - \text{IR} - \text{Drop})$

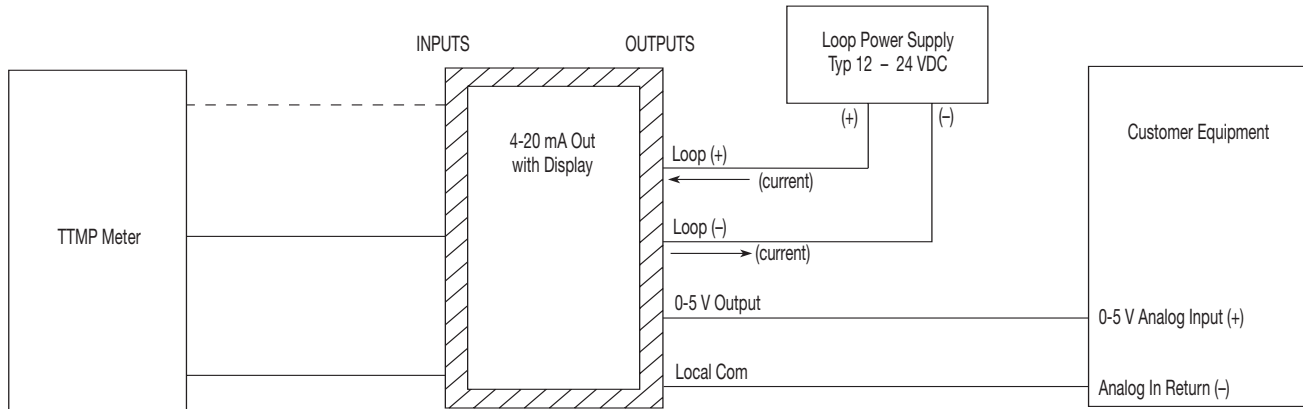
**CAUTION:** When reassembling the faceplate, make sure that the enclosure seal is not crimped or twisted. Do not over-tighten corner screws (hand tighten only). Faceplate can be rotated 90°.

**WIRING DIAGRAM 3**

**– 0-5 V Output –**

**Customer Equipment Without Built-in Power Supply**

Output: Customer Equipment, 0-5 V Sensing, Separate Loop Power Supply



- NOTE 1: Loop power supply electrically isolated from customer equipment  
 NOTE 2: Actual value of loop current (mA) is disregarded

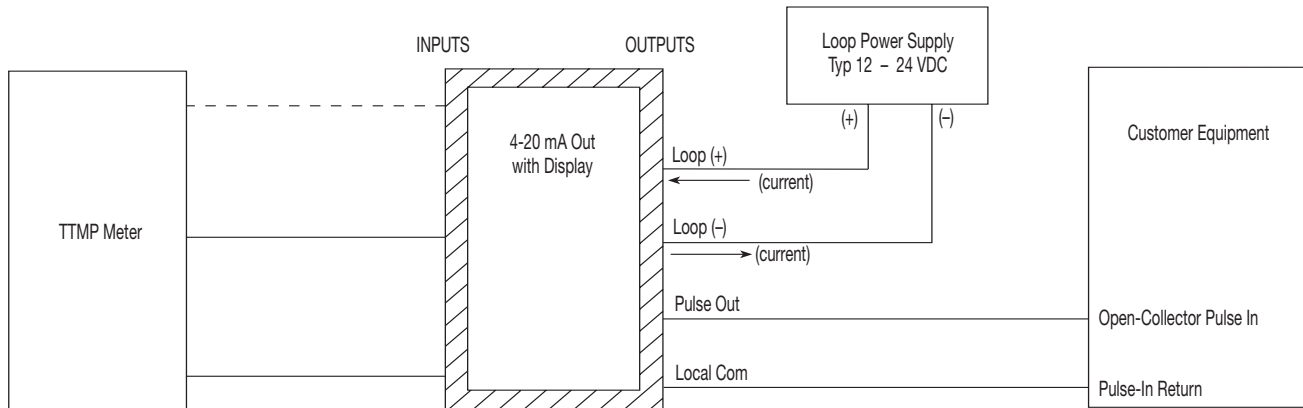
**CAUTION:** When reassembling the faceplate, make sure that the enclosure seal is not crimped or twisted. Do not over-tighten corner screws (hand tighten only). Faceplate can be rotated 90°.

**WIRING DIAGRAM 4**

**– Pulse Output –**

**Customer Equipment Without Built-in Power Supply**

Output: Customer Equipment, Frequency Sensing, Separate Loop Power Supply



- NOTE 1: Loop power supply electrically isolated from customer equipment  
 NOTE 2: Actual value of loop current (mA) is disregarded

**CAUTION:** When reassembling the faceplate, make sure that the enclosure seal is not crimped or twisted. Do not over-tighten corner screws (hand tighten only). Faceplate can be rotated 90°.

## OPERATION

### Computer Display – Batch and Cumulative Totals

The computer maintains two totals. The Cumulative Total provides continuous measurement and cannot be manually reset. The Batch Total can be reset to measure flow during a single use. The Cumulative Total is labeled with TOTAL 1, Batch Total is labeled TOTAL 2 BATCH.

When the Cumulative Total reaches a display reading of 999,999 the computer will highlight an X10 icon. This indicates to the operator that a zero must be added to the 6 digits shown. When the next rollover occurs, the computer will highlight an X100 icon. This indicates to the operator that two zeroes must be added to the 6 digits shown.

Press the DISPLAY button briefly to switch between the TOTAL 1, TOTAL 2 BATCH and FLOWRATE. Press DISPLAY briefly to display the TOTAL 2 BATCH. Hold the DISPLAY button for 3 seconds to reset the Batch Total to zero.

When fluid is flowing through the meter, a small propeller icon is highlighted.

NOTE: Totalization counts total units without differentiating between gallons, liters or field calibrated units.

### Flowrate Feature

To use this feature, press and release DISPLAY until FLOWRATE icon appears. The factory set time base will be highlighted to the right of FLOWRATE (M = minutes, H = hours, D = days). When FLOWRATE is invoked, the display will be indicating rate of flow.

### Activate the Meter

Computer is on continuously while externally powered. When display becomes dim, faded or the low battery message appears (see below), the DC power source needs to be investigated.



### Factory and Field Calibration

All calibration information is visible to the user as icons on the top line of the display, above the numeric digits.

All units are configured with a “factory” calibration. Both gallons and liters are available (“GL” or “LT” will be displayed). While holding the CALIBRATE button, briefly press DISPLAY to toggle between gallons and liters. This factory calibration (indicated with FAC) is permanently programmed into the computer and is not user adjustable.

NOTE: Your computer may have other units of measure programmed into it. If so, holding the CALIBRATE button and momentarily pressing the DISPLAY button will toggle through all factory set units. Other possible units are: IGL (imperial gallon), QT (quart), CF (cubic feet), CM (cubic meter), BL (42 gal. barrel), CC (cubic centimeter) or OZ (ounce).

Switching between different units will not corrupt the Total’s contents. For example, in GL mode, the computer totalizes 10.00 gallons, if the user switches to LT mode, the display will read 37.85 liters (the same volume, different unit).

The “field” calibration may be set by the user, and can be changed or modified at any time using the calibration

procedure described below in the Calibration Section. Totals or flowrate derived from the field calibration are invoked when the FAC icon is no longer visible on the top line of the display.

## CALIBRATION

### Verify Accuracy Before Beginning Field Calibration

For the most accurate results, dispense at a flowrate which best simulates your actual operating conditions. Avoid “dribbling” more fluid or repeatedly starting and stopping the flow. This can result in less accurate calibrations.

Make sure you meet the meter’s minimum flowrate requirements:

#### Series TTMP Meter

3 inch meter	30 GPM (113.6 LPM)
4 inch meter	40 GPM (151.4 LPM)

The use of a uniformly dependable, accurate calibration container is recommended for the most accurate results. Due to high flowrate, it is strongly recommended that calibration be completed with a combination of volume and weight using fine resolution scales.

For best results, the meter should be installed and purged of air before field calibration.

### Field Calibration with Computer Display

Field Calibration and Factory Calibration are defined in the Operation Section. Factory calibration settings are programmed into each computer during manufacturing, using water at 70° F (21° C). Readings using the Factory Calibration (FAC) may not be accurate in some situations, for example, under extreme temperature conditions, non-standard plumbing configurations or with fluids other than water.

### Field Calibration Procedures (Correction Factor Method)

1. To calibrate, press and hold the CALIBRATE and DISPLAY buttons for about 3 seconds until you see FLd-CAL. Release both buttons and you will see CF - 00.0. You are now in the field calibration mode and values from -99.9% to +99.9% can be entered.
2. The +/- position appears either as an “underscore” character for plus, or as a “hyphen” character for minus. The DISPLAY button selects the position and the CALIBRATE button toggles this character.
3. The DISPLAY button can then be pushed to select the numeric positions. Press the CALIBRATE button to scroll from 0 to 9. Enter the percentage of change you want the display to correct. When satisfied with the value, press both CALIBRATE and DISPLAY buttons simultaneously. CAEnd will be displayed and unit will go back to normal operation, less the FAC (factory calibration) icon.
4. All enabled units-of-measure remain visible and selectable – the entered correction will be applied to all enabled units.

- To return to factory calibration (FAC), press and hold both CALIBRATE and DISPLAY buttons for about 3 seconds until FAcCAL is displayed. Then release buttons. Unit should return to normal operation and FAC icon is visible.

## OPERATION – 4-20 mA

### Setting 4-20 mA Endpoints

The 4-20 mA endpoint settings are independent from the display calibration. If you reset the response time you MUST reset the 4-20 mA endpoints.

All units are shipped with the preset at: Response time = 0.7 seconds

Any new values you set for these items are automatically saved when the transmitter is powered down, and automatically restored the next time power is applied.

### Procedure

Before you start, the fluid pumping system should be ready to make two simple calibrating runs, first at the lowest anticipated flowrate, and then the second at the highest anticipated flowrate. Position yourself so you can easily operate the transmitter's pushbuttons. You should be able to see the indicator light (the small window beside the "4" button).

### Setting the Low (4 mA) Endpoint:

To set 4 mA at zero flow, go to step 3. Otherwise follow steps 1, 2 and 3:

- Start the fluid pumping system. Set it for steady flow at the lowest anticipated rate (or the rate at which you want a "minimum" indication).
- Wait while the fluid flow is uninterrupted for at least 10 seconds.
- While watching the transmitter's indicating light, press and hold both its "SET" and "4" buttons. Release them when the light blinks.

NOTE: The length of time between "button press" and "light blink" depends on the transmitter response time. The maximum is 5.2 seconds. If you can't see the indicator light (if you're outdoors in bright light), you can safely just count to 10 while holding the pushbuttons.

NOTE: After setting the minimum, the loop current should be registering at or near 4 mA. Don't worry if it's not exact, it will be correct after setting the high (20 mA) endpoint.

### Setting the High (20 mA) Endpoint

- Start the fluid pumping system. Set it for steady flow at the highest anticipated rate (or the rate at which you want a "maximum" indication).
- Wait while the fluid flow is uninterrupted for at least 10 seconds.

NOTE: If you observe the current loop after completing the procedure, it should be registering at or very near 20 mA (within the resolution specifications for the present conditions).

- While watching the transmitter's indicating light, press and hold both its "SET" and "20" buttons. Release them when the light blinks.

NOTE: During the high and low setpoint procedure, if the new settings are very different from the previous settings, it is possible to reverse the 4 mA and 20 mA setpoints so that the 4 mA frequency is higher than the 20 mA frequency. The situation corrects itself after you complete both setpoints. If the new settings are close to the previous settings, you may safely set either the low and high settings independently.

### Lockout Feature

This transmitter includes a user selectable lockout feature. Select the feature after setting the 4 and 20 mA endpoints during initial use. The lockout feature prevents tampering with the 4 and 20 mA settings on the transmitter.

Before activating the lockout feature make sure there is no signal being received by the transmitter. If signal is being received, deactivate it by one of the following methods:

- Stop the flow through the line that is being recorded.
- Disconnect the output device on the flowmeter.

### Locking / Unlocking the Transmitter

Position yourself so you can easily operate the pushbuttons on the transmitter. You should be able to see the indicator light.

To **lock** the transmitter, use the pushbuttons to enter the following sequence with a brief pause between each button press: 20 – 20 – 20 – SET. The indicator light will blink twice to indicate the unit is locked.

To **unlock** the transmitter, use the pushbuttons to enter the following sequence with a brief pause between each button press: 4 – 4 – 4 – SET. The indicator light will blink once to indicate the unit is unlocked.

### Checking the Status of the Lockout Feature

To check the status of the transmitter, use the pushbuttons to enter the following sequence with a brief pause between each button press: SET – 4 – 20 – SET. The indicator light will blink once if unlocked or twice if locked.

### Optional 0-20 mA Mode

A few current loop systems use 0-20 mA output. The input signal frequency of "0" produces an output analog signal of "0" with direct proportionality and no offset.

NOTE: A true loop current of "0" in a loop powered device is not obtainable. That's because the current loop powers the transmitter, and its operating current is non-zero even at zero frequency input. In 0-20 mode, the loop current will drop to as near zero as possible at zero input, in most units between 1 and 2 mA.

## Procedure

1. To enter 0-20 mode, simply press and hold all three pushbuttons simultaneously (4, SET, and 20) at any flowrate. Continue holding until the indicator light blinks (light will blink in up to 5 seconds) and release all buttons. This sets the LOW END calibration point to zero/zero.
2. Set the 20 mA endpoint as described above under 4-20 mA calibration.
3. The special 0-20 mode will remain in effect until a new 4 mA endpoint is established in the usual way.

## Auxiliary 0-5 VDC

The 4-20 mA Out with Display is equipped with an auxiliary voltage output with a range of 0-5 VDC. This signal is capable of dropping to within a few millivolts of zero, and thus may be more suitable for use in the 0-20 mode.

No special equipment is required to use the 0-5V output, but wiring to customer equipment is different (see Wiring Diagram 3).

## Changing Response Time

The 4-20 mA with Display comes from the factory with a default 0.7 seconds response time.

### WARNING

**If you reset the response time (procedure detailed below) you MUST then reset the 4-20 mA endpoints.**

To give good performance with a variety of sensor types, many frequency-to-analog converters, including the 4-20 mA Out with Display, offer two or more settings for “response time” (sometimes referred to as “settling time” or “averaging time”).

- Longer (slower) response times are needed for sensor types that generate very low frequency outputs.
- Operating a meter at high flowrates may require a shorter (faster) response time to achieve the best transmitter performance.
- Shorter (faster) response times are preferable for sensors that generate higher frequency outputs (Dwyer Series TTMP Meter, for example).
- Longer (slower) response times are also appropriate in situations where sensor-output frequency fluctuates or wobbles substantially.

The 4-20 mA Out with Display offers a choice of five response-time settings, selectable by the unit’s pushbuttons.

## Procedure

1. Start with the unit unpowered. If the unit is presently operating, temporarily disable its external power supply. Be sure to allow at least 30 seconds to elapse with unit unpowered.
2. Press and hold the “4” button. While holding, watch the indicator light and power up the 4-20 mA Out with Display.

3. Shortly after power is applied, the light will blink one or more times. Count the number of blinks (from 1 to 5 blinks) and release the button after the blinking has finished.

NOTE: If necessary, repeat steps 1 through 3 to get the number of blinks corresponding to the response time you want.

Blinks	Response Time
1 blink	0.3 second
2 blinks	0.7 second
3 blinks	1.3 second
4 blinks	2.6 second
5 blinks	5.2 second

In normal operation, the 4-20 mA Out with Display always averages two sequential input readings. The time delay from an abrupt change in input frequency to a final, stabilized output reading is always twice that shown in the above table.

## MAINTENANCE

Check cable-entry seals periodically. Tighten and/or apply sealant if needed. This is especially important in environments containing heavy concentrations of dust, oil mist or other residue.

Check all wiring connections occasionally for oxidation or corrosion. Clean and re-seat if such conditions are noted.

If necessary, check and re-seat any connections that may have been subjected to strain (during rework or construction, for example).

## TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
A. METER IS NOT ACCURATE	<ol style="list-style-type: none"> <li>1. Field Calibration not performed properly.</li> <li>2. Factory Calibration not suitable for liquid being measured.</li> <li>3. Improper installation of flowmeter.</li> <li>4. Flowrates too high or too low.</li> </ol>	<p>Field Calibrate again or select Factory Calibration.</p> <p>Perform a Field Calibration according to Calibration Section or select the proper Factory Calibration selection (i.e., gallon or liter).</p> <p>Check for electrical noise, pulsation or swirl in the flow.</p> <p>See section on display calibration for flowrates.</p>
B. READOUT FADED OR BLANK	<ol style="list-style-type: none"> <li>1. Power not connected.</li> <li>2. Wiring incorrect.</li> <li>3. Computer defective.</li> <li>4. Temperature limits exceeded.</li> </ol>	<p>Check power supply.</p> <p>Verify connections.</p> <p>Contact the factory.</p> <p>Check temperature specifications.</p>
C. NORMAL FLOW-RATE BUT METER DOES NOT COUNT (Meter comes on when DISPLAY button pushed)	<ol style="list-style-type: none"> <li>1. Field Calibration not performed correctly.</li> <li>2. Computer defective.</li> <li>3. Loose wire or mis-wired.</li> <li>4. Sensor not attached to turbine.</li> <li>5. Faulty sensor.</li> </ol>	<p>Field Calibrate again or select Factory Calibration.</p> <p>Contact the factory.</p> <p>Check wiring diagram or cable installation.</p> <p>Check continuity of sensor.</p> <p>Contact the factory.</p>
D. LOOP OUTPUT WITHIN NORMAL RANGE, BUT INCORRECT	<ol style="list-style-type: none"> <li>1. 4 mA / 20 mA setpoints bad or not set.</li> </ol>	<p>Perform new setpoint procedure for both 4 mA and 20 mA points.</p>
E. LOOP OUTPUT "BOUNCES" ERRATICALLY (is unstable)	<ol style="list-style-type: none"> <li>1. Output response-time setting too short, especially for slow input signal.</li> <li>2. Input connections bad.</li> </ol>	<p>Select a longer response-time setting.</p> <p>Check all signal-input connections for intermittent open- or short-circuits.</p>
F. LOOP-OUTPUT STABLE BUT RESPONSE TIME TOO SLOW	<ol style="list-style-type: none"> <li>1. Output response-time setting too long, especially for fast input signal.</li> </ol>	<p>Select a shorter response-time setting.</p>
G. LOOP-OUTPUT OK, BUT 0-5 V OUTPUT DOESN'T WORK	<ol style="list-style-type: none"> <li>1. 0-5 V output loaded too heavily.</li> <li>2. Wiring incorrect.</li> </ol>	<p>Be sure 0-5 V load impedance is at least 1000 ohms (1K<math>\Omega</math>).</p> <p>Verify connections.</p>
H. LOOP OUTPUT "STUCK" AT ZERO (No reading at all, regardless of input signal.)	<ol style="list-style-type: none"> <li>1. Loop not supplying power.</li> <li>2. Loop connections bad.</li> <li>3. Transmitter is faulty.</li> </ol>	<p>Be sure loop power supply is present and working, and has correct polarity.</p> <p>Check all loop connections for open- or short-circuits.</p> <p>Replace transmitter.</p>
I. LOOP OUTPUT "STUCK" AT LOW VALUE (Between 1 and 4 mA) REGARDLESS OF INPUT SIGNAL	<ol style="list-style-type: none"> <li>1. 4 mA / 20 mA setpoints bad or not set.</li> <li>2. No input signal.</li> <li>3. Input connections bad.</li> <li>4. Unit is faulty.</li> </ol>	<p>Perform new setpoint procedure for both 4 mA and 20 mA points.</p> <p>Verify presence of input signal at terminal block.</p> <p>Check all signal input connections for open- or short-circuits.</p> <p>Replace unit.</p>
J. LOOP OUTPUT "STUCK" AT FULL-SCALE (above 20 mA) REGARDLESS OF INPUT SIGNAL	<ol style="list-style-type: none"> <li>1. 4 mA / 20 mA setpoints bad or not set.</li> <li>2. Short-circuit between Loop (-) and LOCAL-COM circuits.</li> <li>3. Incorrect connection of Hall Effect device.</li> </ol>	<p>Perform new setpoint procedure for both 4 mA and 20 mA points.</p> <p>Check all Loop and LOCAL-COM circuitry for shorts.</p> <p>Hall Effect requires dedicated power supply.</p>



## SPECIFICATIONS – OPTION 5 MODEL

### Applications:

Use for indoor or outdoor applications where occasional moisture is common.

### Materials:

Acetal, Amorphous Nylon, Silicone Rubber, Polyester (decals), FKM (gasket & seals), Stainless Steel (fasteners).

### Power Source:

2-wire, loop powered. 8.5 VDC to 35 VDC loop voltage required for correct operation.

### Outputs\*:

Analog Primary: 4-20 mA current loop. With loop voltage maintained within specified limits, will maintain advertised linearity over 4 mA to 20 mA range, with good linearity in over-range conditions to about 1.5 mA and 25 mA.

Analog Auxiliary: 0 to 5 VDC. Relationship to primary current output:  $V \text{ (volts)} = I \text{ (mA)} \div 5$ . Will maintain advertised linearity over 0.8 V to 4.0 V range, with good linearity in over-range conditions to about 0.1 V and 4.9 V.

Recommended minimum driven impedance = 10K Ohms.

Digital (Pulse-Out): Open Collector, square wave. Will switch up to 60 V and up to 200 mA. Closed circuit voltage drop typically 0.1 V; guaranteed less than 0.5 V at any current up to 200 mA.

### Configuration:

2-Totals (1 cumulative and 1 batch), Rate, 2 Cals (Factory calibration, field calibration).

### Time Base:

Minutes

### Unit of Measure:

U.S. gallons, liters or cubic feet.

### Accuracy / Performance:

Possible conversion error, in addition to any inaccuracy of coupled flowmeter, as follows:

Max. Conversion Error: (Nonlinearity plus span, any input, loop current output, 0° C to +70° C, loop voltage supply 12 VDC to 24 VDC) 0.5% of span plus possible resolution uncertainty.

Max. Conversion Resolution Uncertainty: (Loop current output, when properly calibrated) Larger of 0.1 mA or  $[20 \text{ mA} / (10 \times (f_{20} - f_4))]$ . Where  $f_{20}$  = frequency at 20 mA,  $f_4$  = frequency at 4 mA.

Speed of Response: After step change in input frequency, loop output guaranteed stable within 3 x accumulating time (Accumulating time user selectable from 0.3 sec, 0.7 sec, 1.3 sec, 2.6 sec, 5.2 sec).

### Frequency Range:

0.25 to 1,000 hertz

### Batch Total:

Up to 999,999 x 100 (99,999,999)

### Cumulative Total:

Up to 999,999 x 100 (99,999,999)

### Temperature:

Ambient Temperature: +32° F to +140° F (0° C to +60° C)

### Cable:

20 ft., 3 conductor, shielded (Belden 9363).

### Mechanical Connections:

Display is mounted directly to flowmeter body via 1-inch NPT.

### Electrical Connections:

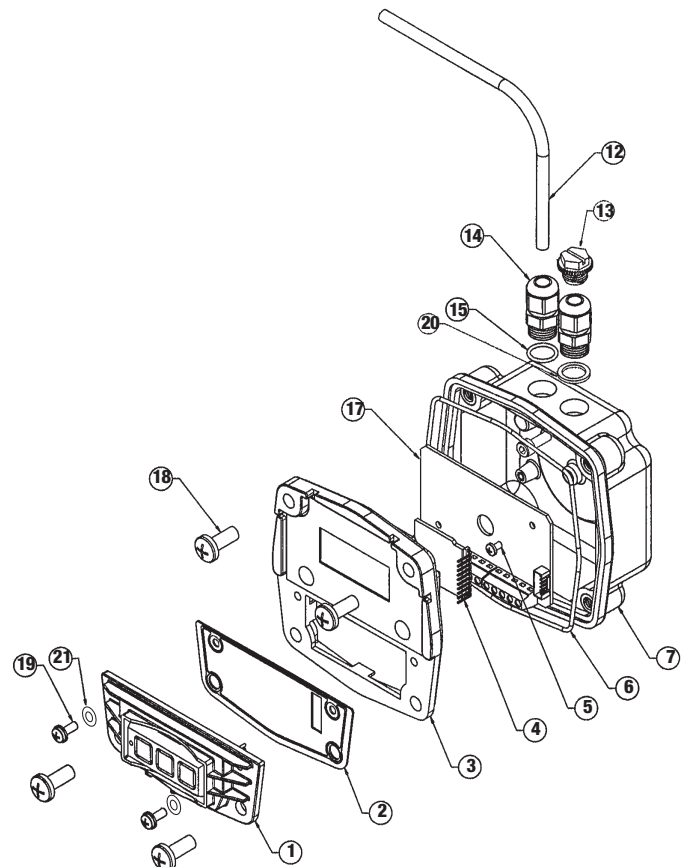
One strain relief port: one threaded plug (1/2 x 20).

### Weight:

1.1 lb. (.5 kg) (Additional)

\* If you want to use the 4-20 mA output **and** one or both of the other outputs at the same time, you must provide electrical isolation between the current loop and all other circuit elements. Failure to do so will result in incorrect 4-20 mA signal conversion, and possible damage to the unit.

## PARTS DRAWING – OPTION 5 MODEL



Item No.	Description	No. Req'd.
1	Switch Keypad Kit.....	1
2	Gasket .....	1
3	Computer Kit.....	1
4	PCB Assembly.....	1
5	Screw, 4-40 x 3/16 in.....	2
6	O-Ring .....	1
7	Adapter Kit.....	1
12	Cable, 20 ft.....	1
	Cable, 100 ft.....	1
13	Threaded Plug.....	1
14	Strain Relief.....	1
15	O-Ring.....	1
17	Main Circuit Assembly.....	1
18	Sealing Screw, 1/4-20 x 5/8 in.....	4
19	Screw, Fillister HD, #6-32 x 3/8", CR.....	2
20	Seal for Threaded (Item #13) Plug.....	1
21	Washer, Flat, #6 (Type B), Narrow, SS.....	2

For replacement parts, contact Dwyer Instruments, Inc.

## ELECTRONIC OPTION 6 MODEL

### Scaled Pulse Output

#### IMPORTANT NOTICE

Dwyer flowmeters have a “K-factor” which is the pulse output per unit volume measured stated as “Pulses Per Gallon” (PPG). In a flowrate-measuring system, it’s desirable to have an output signal that has been converted to a standard unit of measure such as gallons. Such an output can then be used to drive “off-the-shelf” display units and/or relays.

An electronic circuit performs this conversion by counting and accumulating input pulses until the count reaches the known K-factor. It then generates an output pulse. At that time the counter/accumulator “starts over” with a new count, and this process repeats continuously as long as input pulses are present.

The Scaled Pulse Module presents a series of 10-position switches by which the user can set the desired K-factor.

All user connections to the Scaled Pulse Module are made through rugged, convenient screw-terminal blocks, so that in typical setups no soldering, “wire nuts” or electrical tape is required.

#### ⚠ CAUTION

This unit is not FM Approved.

NOTE: This unit is DC powered, requiring an input power supply of 5 to 30 volts.

#### SAFETY INSTRUCTIONS

- This product is not approved for use in hazardous locations.
- When applying external power to the transmitter, use DC power only.
- Disconnect external power to the transmitter before detaching or attaching input or output wires.
- Ground loops between sensor and user equipment can damage the module and can be dangerous.
- Be sure O-rings and seals are kept in good repair.

#### INSTALLATION

#### ⚠ CAUTION

Installation should be performed only by qualified personnel, and in accordance with local governing regulations.

#### Environmental

Avoid plumbing meter where the Scaled Pulse Module is:

- Subject to constant exposure to water or other liquids (occasional low-pressure splashing will not harm unit if cable entry points are well-sealed).
- Close to high voltage/current runs, DC motors, internal combustion engines or frequency inverters.
- Excessive vibration.

#### Cable Guidelines

The open collector signal itself is very resistant to electrical noise pickup and shielded cable is seldom needed except in very “noisy” (electrical) locations and/or when very long runs (thousands of feet) are used.

#### Sensor Cabling

- Some products come with 20 ft. of shielded cable.
- If you require a longer cable, contact Dwyer Instruments, or use Belden 9363 cable. When wiring longer lengths of cable, be sure to connect the shield to Module COM ONLY! (Multiple shield connections may cause ground-loop problems).
- Some trial and error may be needed because of the wide variety of user conditions. Try to keep cable lengths short!

#### WIRING

This manual refers to various models of flowmeters. Determine what type of input the electronics will receive and what type of output, if any, you require. Use the diagrams found in the Wiring Diagrams section, if the unit is not already wired, to correctly wire the system.

#### ⚠ CAUTION

Determine maximum power supply voltage after determining maximum allowable voltage of all electronic devices in the system.

The Scaled Pulse Module comes with 20 ft. of cable to connect to power and output wiring.

#### Connecting the Equipment:

- Remove the faceplate by removing the four (4) corner screws.
- Attach wiring from your equipment according to the following terminal connections and wiring diagrams, depending on your circumstances.

## TERMINAL CONNECTIONS

**COIL-A:** To flowmeter sensor.

**COIL-B:** To flowmeter sensor.

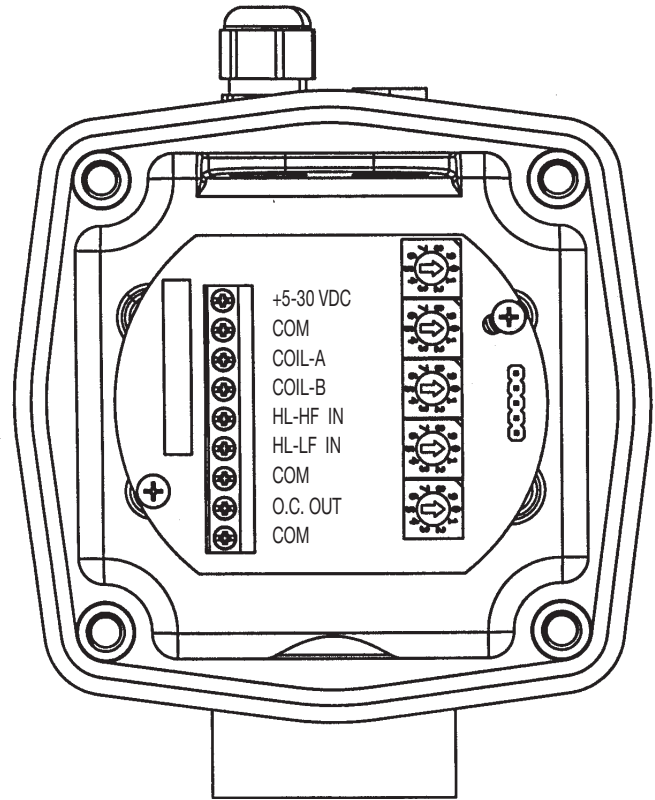
**HL-HF IN:** N/A

**HL-LF IN:** N/A

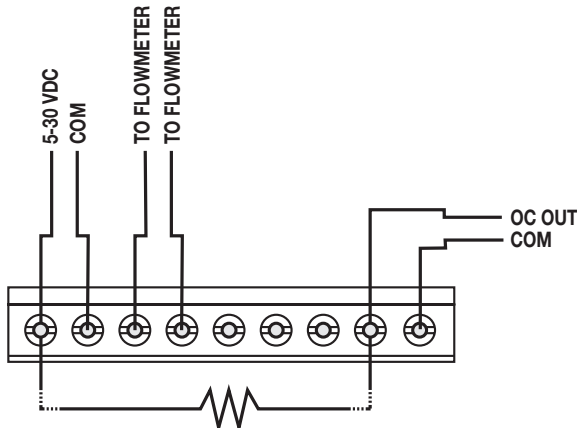
**COM:** Local Common (3 terminals are equivalent)

**O.C. OUT:** Pulse-Out Frequency Output Signal. It is an “open-collector” output (also known as “n-p-n” or “current-sinking”), referenced to transmitter Local-Common.

**+5-30 VDC:** Power supply of 5 to 30 VDC, 25 mA maximum current.



## WIRING DIAGRAM 1



Note: Pull-up resistor only required if not supplied by receiving equipment.

## Circuit Output

The Scaled-Pulse circuit has a single output. It is a true open-collector type, referenced to any of the COM terminals. This output is rated for a maximum sink current of 200 mA, and a maximum open circuit voltage of 60 V. Be sure that you never exceed these limits.

**NOTE:** Do not apply any AC voltage to this output, as the internal device may be damaged.

The output produces a single fixed-duration pulse (pulls “low” briefly) once per “n” input pulses, where “n” is the number set by the K-factor switches (see operational description). A relay is not supplied; however, the user may drive a relay by connecting the coil from the positive DC voltage supply to the open collector output. If so, a DC coil relay should be chosen, with its coil voltage equal to the supply voltage and resistance chosen to limit current to less than 200 mA.

The duration of the output pulse is fixed at 25 milliseconds. This duration is long enough to operate a typical relay or mechanical counter. However, a very low K-factor may result in an output that appears to be “ON” all the time. Shorter (or longer) output pulse durations can be supplied, and may be available on special order from the factory.

## Power Supply

The Scaled Pulse circuit is designed to operate correctly when supplied with any DC voltage between about 5-30 volts, referenced to any of the COM terminals. The supply voltage need not be regulated, as long as it falls within these limits. Reverse polarity protection is included.

Normal operating current is about 10-15 mA, and will never exceed 25 mA.

### ⚠ WARNING

**Do not apply AC voltage to the unit. Low voltage AC will not damage the unit, but may cause erratic operation.**

## Environmental

All electronic components in the Scaled Pulse circuit are rated for an operating temperature range of -40° F to +185° F (-40° C to +85° C).

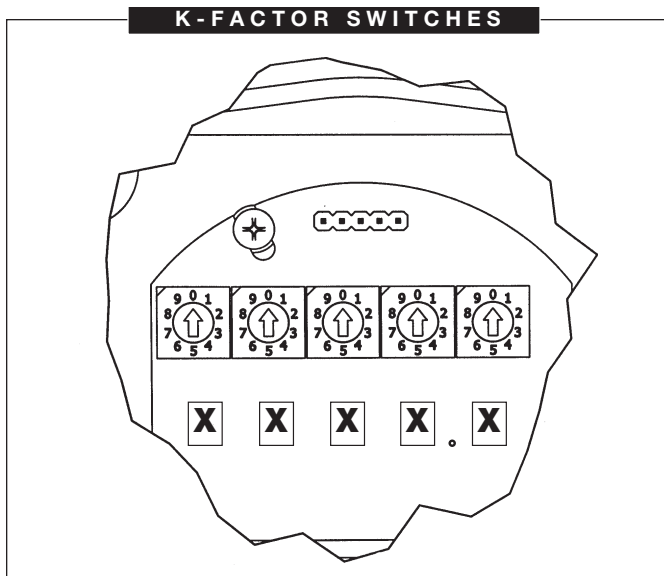
The circuit will operate correctly in humidity conditions up to about 95% non-condensing. As with most electronic circuits, exposed circuitry should not be subjected to liquid moisture.

No components of the Scaled Pulse circuit are especially sensitive to shock or vibration. Ordinary back-of-truck vibration will not damage the unit.

## OPERATION

When installing the Scaled Pulse Module, make sure that all electrical connections are tight and secure.

The only user-adjustable settings are to the K-factor switches. On a typical flowmeter, the K-factor is usually available, either stamped on the unit itself or printed in the accompanying documentation (if you cannot find it, please contact the meter's manufacturer). Using a small straight blade screwdriver or similar tool, simply set the module's K-factor switches to this number.



The "X" markers represent the digits of the K-factor. This allows a K-factor range of 0000.1 to 9999.9. The switches are arranged and labeled as follows:

X X X X . X

Each switch may be set to any of 10 positions (0-9). Set each so that the whole string of switches represents the meter's K-factor. The switches do not have any mechanical stops and may be turned all the way around.

If the meter's K-factor does not contain a decimal point, set the right-most switch to "0".

Example: Meter K-factor is 3555 PPG

3 5 5 5 . 0

If the meter's K-factor has more than one decimal position, you must round the number so that you can set the switches with only one decimal position.

Example: Meter K-factor is 5252.38 PPG

5 2 5 2 . 4

If the meter's K-factor is less than 1000.0 PPG, you must set the left-most switches to "0".

Example: Meter K-factor is 75 PPG

0 0 7 5 . 0

645 PPG x 1.0 = Gallon 645  
645 PPG x 0.1 = 1/10th Gallon 64.5  
645 PPG x 10.0 = 10 Gallons 6450

If you need one output pulse for every 1/10th unit instead of every whole unit, multiply the meter's K-factor by 0.1 and then enter the result on the switches.

If you need one output pulse for every 10 units, multiply the meter's K-factor by 10.

Example: Meter K-factor is 645 PPG

645 PPG x 1.0 = Gallon, set 645

0 6 4 5 . 0

(1 Pulse Out = 1 Gallon)

645 PPG x 0.1 = 1/10th Gallon, set 64.5

0 0 6 4 . 5

(10 Pulses Out = 1 Gallon)

645 PPG x 10.0 = 10 Gallons, set 6450

6 4 5 0 . 0

(1 Pulse Out = 10 Gallons)

If you need to set a very large K-factor (larger than 9999.9), with a standard unit, you will have to follow the instructions for getting an output pulse every 1/10th unit. That is, multiply the meter's K-factor by 0.1, and then enter the result on the switches. Remember that you will get an output pulse every 1/10th unit instead of every whole unit.

If you need to set a very large K-factor (greater than 9999.9), and still need an output pulse for every whole unit, please contact the factory. It is possible to supply, on special order, units with a K-factor range of 00000 to 9999-9 (i.e., no decimal place).

## MAINTENANCE

Check cable-entry seals periodically. Tighten and/or apply sealant if needed. This is especially important in environments containing heavy concentrations of dust, oil mist or other residue.

Check all wiring connections occasionally for oxidation or corrosion. Clean and re-seat if such conditions are noted.

If necessary, check and re-seat any connections that may have been subjected to strain (during rework or construction, for example).

## TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
A. NO OUTPUT ACTIVITY WHEN USING "COIL" OR "HL-HF-INPUT"	<ol style="list-style-type: none"> <li>1. Signal too weak.</li> <li>2. Frequency above 1500 Hz.</li> <li>3. Electronic failure.</li> </ol>	<p>Supply stronger signal.</p> <p>Supply lower frequency.</p> <p>Contact factory.</p>
B. NO OUTPUT ACTIVITY WHEN USING "HL-LF-INPUT"	<ol style="list-style-type: none"> <li>1. Signal too weak.</li> <li>2. Frequency above 150 Hz.</li> <li>3. Electronic failure.</li> </ol>	<p>Supply stronger signal.</p> <p>Supply lower frequency.</p> <p>Contact factory.</p>
C. EXTRA OR ERRATIC OUTPUT PULSES WHEN USING ANY INPUT	<ol style="list-style-type: none"> <li>1. Signal picking up electronic "noise."</li> <li>2. Electronic failure.</li> </ol>	<p>Use shielded (or shorter sensor) cable.</p> <p>Contact factory.</p>
D. EXTRA OR ERRATIC OUTPUT PULSES WHEN USING REED SWITCH	<ol style="list-style-type: none"> <li>1. Using incorrect input.</li> </ol>	<p>Use HL-LF input for Reed Switch.</p>
E. OUTPUT "FLUTTERING" RAPIDLY OR "ON" CONTINUOUSLY	<ol style="list-style-type: none"> <li>1. Very low K-factor plus very high frequency.</li> </ol>	<p>Use "10x" K-factor, output will be one pulse per 10 units (see above).</p>
F. OUTPUT PULSE PRESENT, BUT WILL NOT OPERATE RELAY OR COUNTER	<ol style="list-style-type: none"> <li>1. Relay or counter needs longer-duration pulse.</li> </ol>	<p>Contact factory.</p>

## SPECIFICATIONS – OPTION 6 MODEL

### Applications:

Use for indoor or outdoor applications where occasional moisture is common.

### Materials:

Acetal, Polyester (decals), FKM (gasket & seals), Stainless Steel (fasteners)

### Power Source:

5 to 30 VDC loop voltage required for correct operation.  
Maximum current (exclusive of output current) = 25 mA

### Accuracy/Performance:

Accurate to  $\pm 1$  count

### Frequency Range:

0-1500 Hz

### Operating Temperature:

-40° F to +185° F (-40° C to +85° C) (Electronics only)

### Cable:

20 ft., 3 conductor, shielded (Belden 9363)

### Mechanical Connections:

Unit is mounted directly to flow meter body.

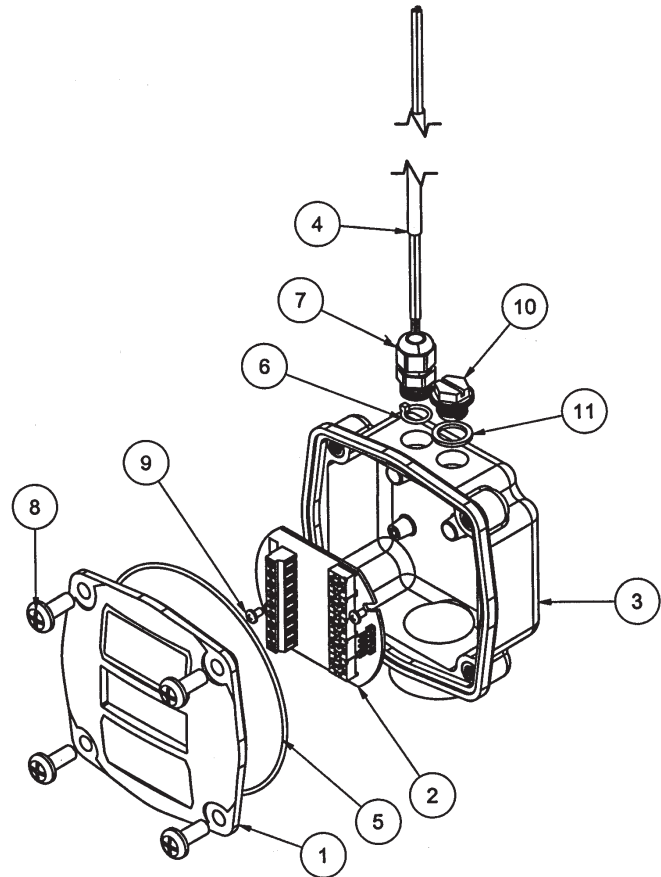
### Electrical Connections:

One strain relief port: one threaded plug (1/2 x 20).

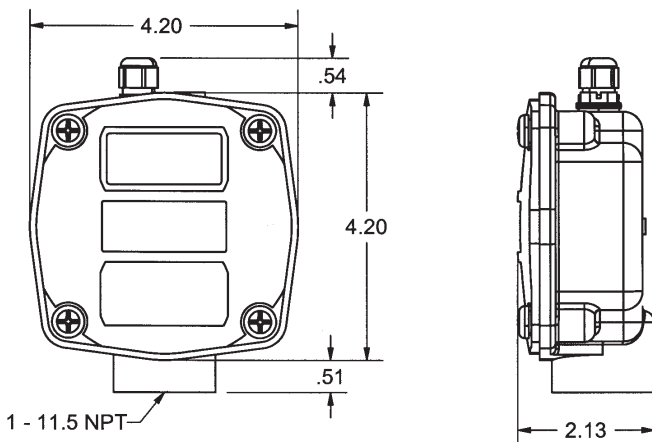
### Weight:

1.1 lb. (.5 kg) (Additional)

## PARTS DRAWING – OPTION 6 MODEL



## DIMENSION DRAWING - TYPICAL



Item No.	Description	No. Req'd.
1	Blank Coverplate Kit.....	1
2	Circuit Assembly Kit.....	1
3	Adapter Kit.....	1
4	Cable, 20 ft. ....	1
5	O-Ring .....	1
6	Seal .....	2
7	Strain Relief .....	2
8	Sealing Screw, 1/4 - 20 x 5/8" .....	4
9	Screw, 4-40 x 3/16" .....	2
10	Threaded Plug.....	1
11	Seal .....	1

For replacement parts, contact Dwyer Instruments, Inc.

## SERVICE

For warranty consideration, contact Dwyer Instruments, Inc.

You will need to:

- Provide information from the decal on your meter.
- Receive a Return Authorization number.
- Flush any fluid from the meter before shipping to the factory.

If possible, leave customer installed fittings or ample length of bare pipe for reinstallation.

## WEEE DIRECTIVE

### ⚠ CAUTION

Do not return the meter without specific authority from the Dwyer Instruments, Inc. Due to strict regulations governing transportation, handling and disposal of hazardous or flammable liquids, Dwyer Instruments, Inc. will not accept meters for rework unless they are completely free of liquid residue.



The Waste Electrical and Electronic Equipment (WEEE) directive (2002/96/EC) was approved by the European Parliament and the Council of the European Union in 2003. This symbol indicates that this product contains electrical and electronic equipment that may include batteries, printed circuit boards, liquid crystal displays or other components that may be subject to local disposal regulations at your location. Please understand those regulations and dispose of this product in a responsible manner.

## RoHS Compliant (2011/65/EU)

This product is in compliance with the RoHS Directive of the European Parliament and of the Council on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

**Environmental Rating: IP65**

## **Maintenance / Repair**

Upon final installation of the Series TTMP Electronic Totalizing Meter, no routine maintenance is required. The Series TTMP is not field serviceable and it is not possible to repair the unit. Field repair should not be attempted and may void the warranty

## **Warranty / Return**

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

**DWYER INSTRUMENTS, INC.**  
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361, U.S.A.

Phone: 219/879-8000  
Fax: 219/872-9057

[www.dwyer-inst.com](http://www.dwyer-inst.com)  
e-mail: [info@dwyer-inst.com](mailto:info@dwyer-inst.com)