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## SCOPE OF THIS MANUAL

This manual is intended to help you get the B2800 flow monitor up and running quickly.

### IMPORTANT

*Read this manual carefully before attempting any installation or operation. Keep the manual accessible for future reference.*

## UNPACKING AND INSPECTION

Upon opening the shipping container, visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

**NOTE:** If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

## SAFETY

### Terminology and Symbols



Indicates a hazardous situation, which, if not avoided, is estimated to be capable of causing death or serious personal injury.



Indicates a hazardous situation, which, if not avoided, could result in severe personal injury or death.



Indicates a hazardous situation, which, if not avoided, is estimated to be capable of causing minor or moderate personal injury or damage to property.

### Considerations

The installation of the B2800 monitor must comply with all applicable federal, state, and local rules, regulations, and codes.



**EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.**



**RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CEMATÉRIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.**



**DO NOT CONNECT OR DISCONNECT EITHER POWER OR OUTPUTS UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS.**



**RISQUE D'EXPLOSION. NE PAS DÉBRANCHER TANT QUE LE CIRCUIT EST SOUSTENSION, À MOINS QU'LL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.**

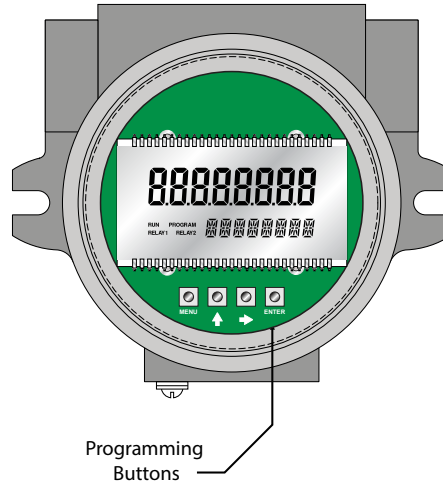
### IMPORTANT

*Not following instructions properly may impair safety of equipment and/or personnel.*

## INTRODUCTION

The B2800XP flow monitor is a state-of-the-art digital signal processing flow monitor designed to provide the user with exceptional flexibility at a very affordable price. Though designed for use with Blancett flow meters, this display can be used with almost any flow meter producing a low amplitude AC output or contact closure signals.

The B2800XP flow monitor is capable of accepting a low level frequency input for calculating flow rate and total. These calculations can then be displayed in the desired units of measurement. The monitor's large eight digit by 0.50 inch (12.7 mm) numeric liquid crystal display makes extended range viewing practical. The second eight digit by 0.25 inch (6.35 mm) alphanumeric display provides for selectable units viewing in run mode and prompts for variables in program mode. The display can show rate, total or alternate between both rate and total.



## EXPLOSION PROOF ENCLOSURE

The EIH Instrument enclosure is designed to house instrumentation and control equipment as well as act as a conduit outlet body in hazardous, abusive and wet locations.

The EIH enclosure is approved by Underwriters Laboratories Inc., Canadian Standards Association, Factory Mutual and CENELEC for use in Class I, Groups B\*, C\*\* and D; Class II, Groups E, F and G; and Class II hazardous (classified) locations as defined by the National Electrical Code and Canadian Electrical Code. It is also NEMA/UL/CSA Type 4 and IP66 rated for watertight applications.

\*With conduit seals installed within 18 inches of enclosure.

\*\*Unsealed conduit lengths must not exceed five feet (152 cm).

## INSTALLATION

### **⚠ WARNING**

#### **ELECTRICAL POWER MUST BE TURNED OFF BEFORE AND DURING INSTALLATION AND MAINTENANCE.**

1. EIH Instrument enclosures are furnished with 3/4 inch NPT offset through feed cast hubs for conduit entries. (Use Cooper Crouse-Hinds RE21-SA to reduce to 1/2 inch hubs.)
2. Secure the enclosure to the conduit system. If the enclosure has mounting feet, select a mounting location that will provide sufficient strength and rigidity to support the enclosure as well as the enclosed device and wiring.

### **⚠ CAUTION**

#### **SELECT A MOUNTING LOCATION SO THAT THE ENCLOSURE WILL NOT BE SUBJECTED TO IMPACT BY HEAVY OBJECTS. IMPACTS CAN DAMAGE ENCLOSED DEVICES OR GLASS LENS.**

3. Install Cooper Crouse-Hinds EYS sealing fittings required by Section 501-5 and/or 502-5 of the National Electrical Code and Section 18 of the Canadian Electrical Code or any other applicable local codes and when enclosure is installed in Class I Group B hazardous locations. (For CSA Group C applications, unsealed conduit lengths must not exceed five feet or 152 cm.)

### **⚠ WARNING**

#### **THE HAZARDOUS LOCATION INFORMATION SPECIFYING CLASS AND GROUP LISTING OF EACH INSTRUMENT ENCLOSURE IS MARKED ON THE NAMEPLATE OF EACH ENCLOSURE.**

### **⚠ CAUTION**

#### **ALL UNUSED CONDUIT OPENINGS MUST BE PLUGGED. PLUG UNUSED CONDUIT OPENINGS WITH COOPER CROUSE-HINDS PLG2. PLUGS MUST BE A MINIMUM OF 1/8 INCH THICK AND ENGAGE A MINIMUM OF FIVE FULL THREADS.**

4. Unthread instrument (and power side) covers and carefully set aside to prevent damage to the cover threads and glass lens (when glass lens cover is used).
5. Pull wires into enclosure making certain they are long enough to make the required connections and to remove the instrument or power supply if servicing is required. Install instrument and power supply, if applicable, and make all electrical connections.

**NOTE:** When installing device, be sure to check instrument dimensions to avoid interference with clamping ring on glass lens and the cover on standard units.

6. Test wiring for correctness by checking continuity and also check for unwanted grounds with insulator resistance tester. Make sure test equipment being used will not damage instrument to be housed in the EIH Instrument enclosure.
7. Carefully re-thread cover to enclosure housing. Tighten cover until cover flange contacts body face.

### **⚠ CAUTION**

#### **USE CARE TO PREVENT DIRT, GRIT OR OTHER FOREIGN MATERIAL FROM LODGING ON THREADS. IF SUCH MATERIAL SETTLES ON THREADS, CLEAN WITH KEROSENE OR STODDARD SOLVENT\*, THEN RE-LUBRICATE WITH COOPER CROUSE-HINDS TYPE STL THREAD LUBRICANT.**

8. Tighten cover set screws to prevent cover from loosening under vibration.

**\* TO AVOID THE POSSIBILITY OF AN EXPLOSION, OXIDATION AND CORROSION, DO NOT USE GASOLINE OR SIMILAR SOLVENT.**

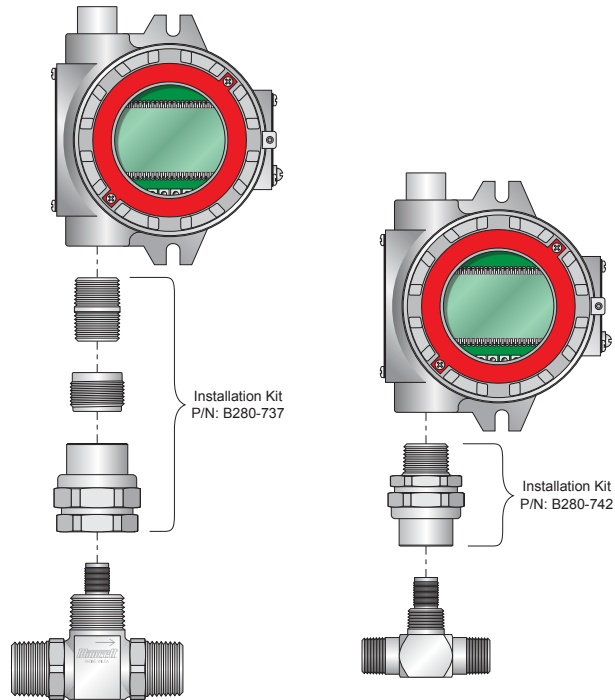
### **⚠ WARNING**

#### **TO MAINTAIN THE EXPLOSION PROOF INTEGRITY OF THE ENCLOSURE WITH A SCREW IN A TAPPED MOUNTING PAD HOLE, THERE MUST BE A MINIMUM OF 1/16 INCH OF MATERIAL BETWEEN THE DRILL POINT AND THE BACK WALL. IF FOR ANY REASON A SCREW WILL NOT BE THREADED INTO THE DRILLED HOLE, A MINIMUM OF 1/8 INCH OF MATERIAL MUST REMAIN BETWEEN THE DRILL POINT AND THE BACK WALL.**

# INSTALLATION KITS

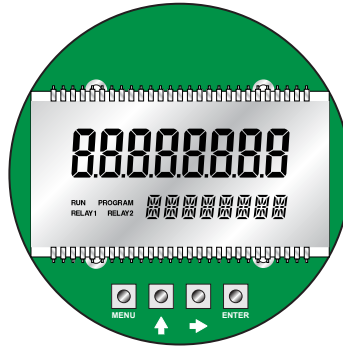
To facilitate installation of the explosion proof B2800XP monitor, two sizes of installation kits are available.

Hub Size	Kit Number	Meter Sizes
1/2 in. NPT Hub	B280-742	3/8 in., 1/2 in., 3/4 in. with 1/2 in. NPT End Fittings
1 in. NPT Hub	B280-737	All Sizes with 1 in. NPT End Fittings and Larger



## OPERATING THE MONITOR

The monitor has two modes of operation referred to as the *RUN* mode and the *PROGRAM* mode. Both the *RUN* mode and the *PROGRAM* mode display screen enunciators confirm the state of the monitor. A quick glance at the lower left corner of the LCD screen will confirm operating status. Normal operation will be in the *RUN* mode. To access the *PROGRAM* mode, press **MENU** until the first programming screen is displayed. After programming the display with the necessary information, turn on the lock out feature to prevent unauthorized access or changing the meter's setup parameters.



### Buttons

<b>MENU</b>	Switches to <i>PROGRAM</i> mode
<b>UP</b>	Scrolls forward through the parameter options and increments numeric variables
<b>RIGHT</b>	Scrolls backward through the parameter options and moves the active digit to the right
<b>ENTER</b>	Saves programming information, advances to the next programming parameter, and used in the reset process

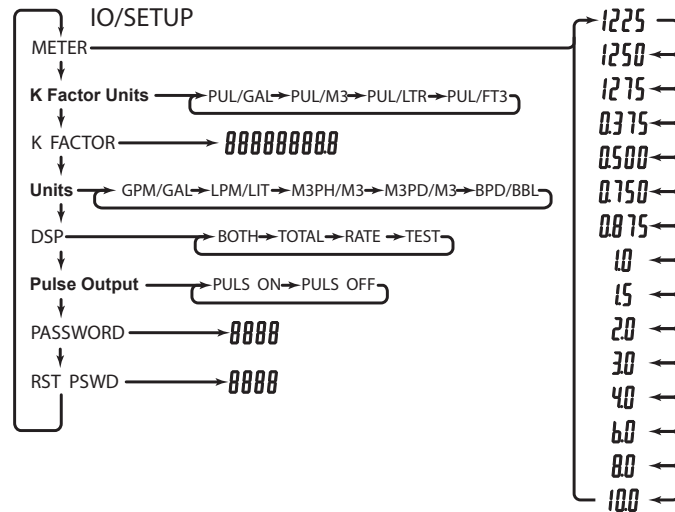
### Modes

<b>RUN</b>	Normal operating mode
<b>PROGRAM</b>	Used to program parameters in the display

# PROGRAMMING

Each turbine flow meter is shipped with either a K-factor value or frequency data. If frequency data is provided, the data must be converted to a K-factor before programming the monitor. K-factor information, when supplied, can usually be found on the neck of the flow meter or stamped on the flow meter body. The K-factor represents the number of pulses per unit of volume. The K-factor is needed to program the monitor readout.

## Programming Mode



### Enter Program Mode

Press **MENU** to enter the programming mode. The mode indicator changes from *RUN* to *PROGRAM*.

### Select Meter Size

At the *METER* prompt, press **UP** or **RIGHT** to scroll to the bore size of your meter. Press **ENTER** to save and advance to the *K-factor Units* parameter.

**NOTE:** The meter connection size and the bore size are different. For example, many of the one inch NPT turbines have bore sizes that range from 3/8...1 in. Be sure to use the correct bore size or the meter will report incorrect flows and totals.

### Enter The K-Factor Unit

Press **UP** or **RIGHT** to scroll to the K-factor unit of the meter. Enter the unit that the meter was calibrated in.

#### Example

If the meter was calibrated in US gallons, use *PUL/GAL*.

Press **ENTER** to save the K-factor unit and advance to the *K FACTOR* parameter.

**NOTE:** Unless otherwise specified, Blancett turbine flow meters are supplied with K-factors measured in pulses per gallon (*PUL/GAL*) which will automatically convert to your desired units of measure.

### Enter The Meter's K-Factor

**NOTE:** The K-factor supplied with the meter or calculated from calibration data is needed to set this parameter.

To change the K-factor value, press **RIGHT** to select the digit that you wish to change. Press **UP** to increment the digit until it matches the meter's K-factor. Repeat this process until all K-factor digits have been entered. Press **ENTER** to save the K-factor and advance to *RATE/TOTAL*.



## Select the Units of Measure

The monitor is programmed with five common rate/total unit options. The monitor shows the rate/total unit that the display is currently set for. If the current selection is correct, press **ENTER** once to advance to the *DISPLAY FUNCTION* parameter. To change the unit, press **UP** or **RIGHT** to scroll to the correct rate unit. Press **ENTER** to save and advance to the *DISPLAY FUNCTION* parameter.

Selection	Rate	Total
GPM/GAL	Gallons per minute	Gallons
LPM/LIT	Liters per minute	Liters
M3PH/M3	Cubic meters per hour	Cubic meters
M3PD/M3	Cubic meters per day	Cubic meters
BPD/BBL	Oil barrels per day	Oil barrels

## Select the Display Function

The monitor displays *RATE*, *TOTAL*, alternates between *BOTH* rate and total or *TEST*. If the current selection is correct, press **ENTER** to advance to the next parameter. To change to an alternate display mode, press **UP** or **RIGHT** to scroll to the correct display mode and press **ENTER** to save and advance to the *TOTALIZER PULSE OUTPUT* parameter.

The *TEST* function acts like a frequency counter and displays the raw input frequency being supplied to the frequency input terminals. This is very useful when troubleshooting flow problems.

## Totalizer Pulse Output

The pulse output parameter can be enabled or disabled. When enabled this output generates 20 mS duration pulse for every time the least significant digit of the totalizer increments. The amplitude of the pulse is dependent on the voltage level of the supply connected to the pulse output and is limited to a maximum 30V DC. Press **UP** or **RIGHT** to scroll to *ON* or *OFF*. Press **ENTER** to save and advance to the *PASSWORD* parameter.

## Password

The *PASSWORD* setting restricts access to *PROGRAM* mode. Initially, the password is set to all zeros and any user can modify the parameter settings in *PROGRAM* mode. To change the password, enter any four digit code. Press **UP** to increment the digit, and **RIGHT** to advance to the next digit. Press **ENTER** to store the password and advance to *RST PSWD*. The new password is now required to enter *PROGRAM* mode. With this password set, any user is able to reset the stored totals on the monitor.

## Reset Password

The *RST PSWD* restricts resetting the totals on the monitor. The *PASSWORD* must also be set to restrict the total reset. Initially, the password is set to all zeros and any user can reset the stored totals on the monitor. To change the password, enter any four digit code. Press **UP** to increment the digit, and **RIGHT** to advance to the next digit. After entering all digits, press **ENTER** to store the password and return to *RUN* mode. The reset password is now required to reset the totals on the monitor.

## Run Mode

### Reset Total

To reset the monitor total display, in *RUN* mode press **MENU** and **ENTER** simultaneously. If the *RST PSWD* has been set to something other than the default, you must enter the new password before the monitor will reset. The monitor flashes *TOTAL RST* and returns to *RUN* mode at the conclusion of the reset procedure.

### Store Total

The current total can be manually stored in the monitor's flash memory. Use this feature prior to replacing the battery. Press and hold **ENTER** for 2 seconds. The display responds with a flashing *TOTALSVD* and then returns to *RUN* mode.

### Automatic Store Total

The monitor is equipped with a store total feature that works automatically, saving the current total to flash memory. The frequency of saves depends on the power supply option chosen.

- Battery Powered: Once per hour and just before a low battery condition turns the unit off.
- Loop Powered: Once every ten minutes.

## ADDITIONAL SCALING PARAMETERS

**NOTE:** The programming instructions below are only available for loop powered units. Battery powered units do not include these programming parameters.

### Flow 4 mA Setting

Zero is the default flow rate at the 4 mA setting. If the current selection is correct, press **ENTER** to advance to the *Flow 20 mA* parameter. To change the setting, press **UP** to increment the flashing digit and press **RIGHT** to move to the next digit. Press **ENTER** to save and advance to the *Flow 20 mA* parameter.

### Flow 20 mA Setting

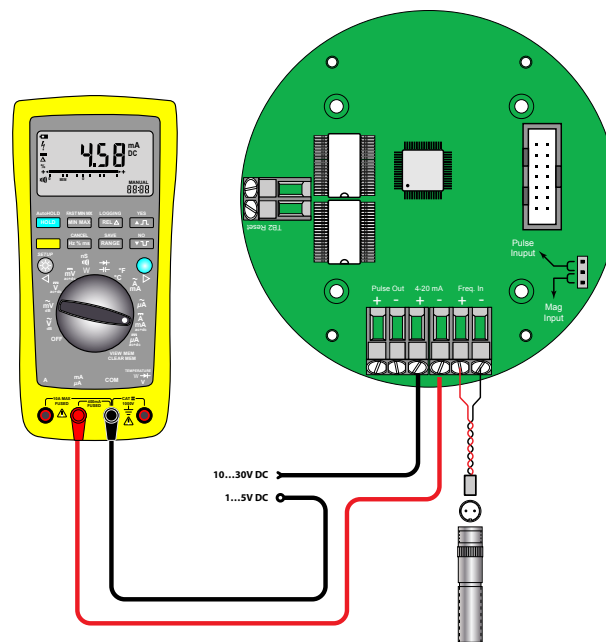
The turbine meter's maximum flow rate is the default value for the 20 mA setting. If the current selection is correct, press **ENTER** to advance to the *4...20 mA Calibration* parameter. To change the setting, press **UP** to increment the flashing digit and press **RIGHT** to move to the next digit. Press **ENTER** to save and advance to the *4...20 mA Calibration* parameter.

### 4...20 mA Calibration

The *4...20 mA Calibration* parameter is the fine adjustment of the 4...20 mA output. The 4 mA setting is typically between 35...50. To set the 4 mA value, connect an ammeter in series with the loop power supply. At the *4MA OUT* prompt, press **UP** to increment and **RIGHT** to decrement the 4 mA value to until a steady 4 mA reading is reached on the ammeter. Press **ENTER** to lock in this value and advance to *20MA OUT*. The 20 mA adjustment is performed using the same procedure as the 4 mA adjustment.

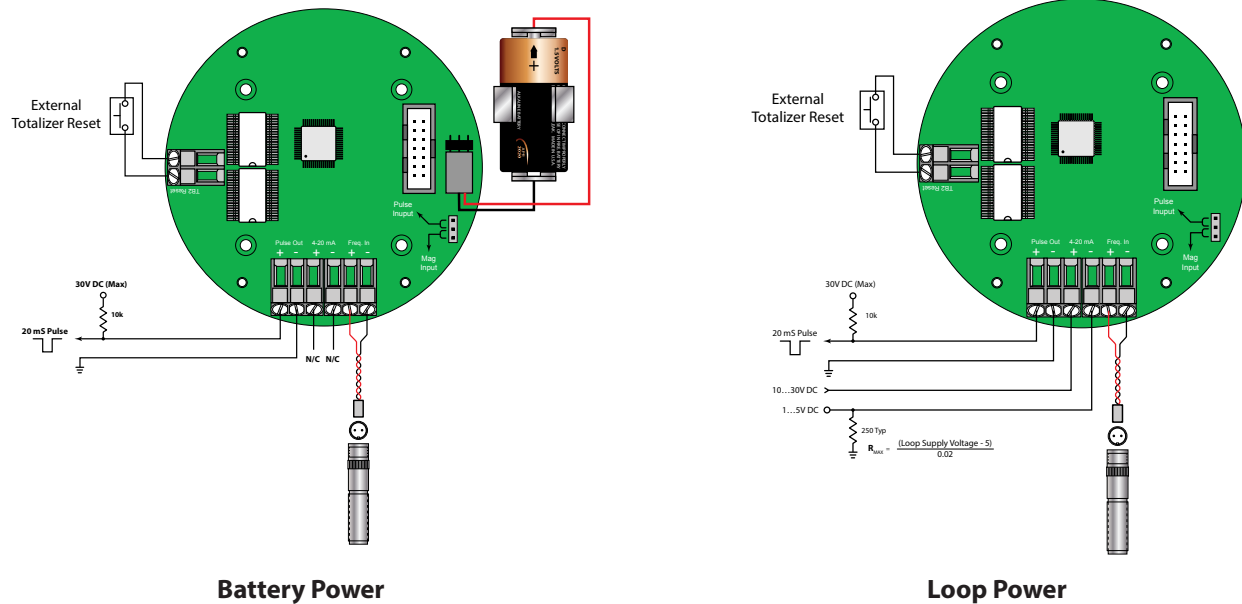
### 4...20 mA Test

The monitor contains a diagnostic routine that allows the simulation of mA values between 4...20 to check output tracking. At the *4-20TEST* prompt press **UP** to increment the simulated mA output or **RIGHT** to decrement the value in increments of 1 mA. The ammeter should track the simulated mA output. If a 4...20 mA test is not necessary, press **ENTER** once to escape the testing at any time.



## ADDITIONAL INPUT OPTIONS

The Blancett flow monitor is capable of receiving magnetic pickup input or a contact closure input. Since most Blancett flow meters use a magnetic pickup, the monitor is shipped configured for magnetic pickup input. To change to a contact closure input, remove JP2 from the bottom two pins and jumper them to the top two pins. See image below.



## BATTERY REPLACEMENT

Battery powered monitors use a single 1.5V, D size alkaline battery. When replacement is necessary, use a clean fresh battery for continued trouble-free operation. Save the total to memory before removing the battery.

### **⚠ WARNING**

**DO NOT OPEN EXPLOSION PROOF ENCLOSURE UNLESS THE AREA IS KNOWN TO BE FREE OF HAZARDS. FAILURE TO MAKE THE AREA SAFE BEFORE OPENING THE ENCLOSURE CAN RESULT IN A HAZARDOUS SITUATION WITH A POTENTIAL FOR INJURY.**

1. Carefully unscrew the enclosure cover to access the circuit board.
2. Remove the four screws securing the circuit board to the enclosure.
3. Lay the circuit board to the side being careful not to pull any wires from their connections.
4. Clip the battery retaining wire/strap and remove the battery.
5. Replace the battery, being sure to observe the proper polarity and install a new retaining strap or wire.
6. Reassemble the monitor, reversing the disassembly process.

## MAINTENANCE

### **WARNING**

***ALWAYS DISCONNECT PRIMARY POWER SOURCE BEFORE OPENING ENCLOSURE FOR INSPECTION OR SERVICE.***

1. Create a schedule for maintenance determined by the environment and frequency of use. Inspect the monitor at least once a year.
2. Perform visual, electrical and mechanical checks on all components on a regular basis.
  - a. Visually check for undue heating evidenced by discoloration of wires or other components, damaged or worn parts, or leakage evidenced by water or corrosion in the interior.
  - b. Electrically check to make sure that all connections are clean and tight, and that the device is operating correctly.

## TROUBLESHOOTING GUIDE

Issue	Remedy
No LCD display	<ul style="list-style-type: none"> <li>Battery Powered Version: Check battery voltage. Should be 1.5V DC. Replace if low or bad.</li> <li>Loop Powered Version: Check for current flow in the loop. Check polarity of the current loop connections for proper orientation.</li> </ul>
No rate or total displayed	<ul style="list-style-type: none"> <li>Check connection from meter pickup to display input terminals.</li> <li>Check turbine meter rotor for debris. Rotor should spin freely.</li> <li>Check programming of flow monitor.</li> <li>Check to see that the minimum flow rate is being met for the current meter in use. Otherwise, the flow meter will not accurately send pulses to the flow monitor.</li> </ul>
Flow rate display interprets reading constantly	<ul style="list-style-type: none"> <li>This is usually an indication of external noise. Keep all AC wires separate from DC wires.</li> <li>Check for large motors close to the meter pickup.</li> <li>Check for radio antenna in close proximity.</li> <li>Try disconnecting the pickup from the monitor pig tail. This should stop the noise. If not, then try reorientating the meter to a new location.</li> </ul>
Flow rate indicator bounces	<ul style="list-style-type: none"> <li>This usually indicates a weak signal. Replace pickup and/or check all connections.</li> <li>Check K-factor.</li> </ul>

Default K-Factor Values			
Meter Size	Default K-Factor	Lower Limit	Upper Limit
3/8 in. (9.53 mm)	20,000	16,000	24,000
1/2 in. (12.7 mm)	13,000	10,400	15,600
3/4 in. (19.05 mm)	2750	2200	3300
7/8 in. (22.23 mm)	2686	2148	3223
1 in. (25.4 mm)	870.0	686.0	1044
1-1/2 in. (38.1 mm)	330.0	264.0	396.0
2 in. (50.8 mm)	52.0	41.6	62.0
3 in. (76.2 mm)	57.0	45.6	68.0
4 in. (101.6 mm)	29.0	23.2	35.0
6 in. (152.4 mm)	7.0	5.6	8.0
8 in. (203.2 mm)	3.0	2.4	4.0
10 in. (254 mm)	1.6	1.3	2.0

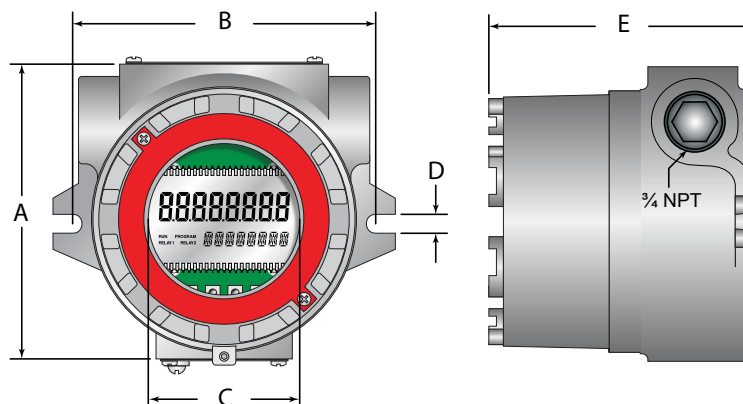
### Replacement Parts

Component	Part Number
Enclosure	B280635
Battery	B280601
Battery Holder	B280634
Battery Tie Wrap	B228036
Cap Plug 3/8 inch	B118236
Desiccant Pouch	B220141
Pickup Cable	B222-121
Battery Mount Plate	B280618
Adapter Bridge Plate	B280677
Hex Standoffs	B280667
Meter Mount Kit - For 1 inch Hub	B280-737
Meter Mount Kit - For 1/2 inch Hub	B280-742

## SPECIFICATIONS

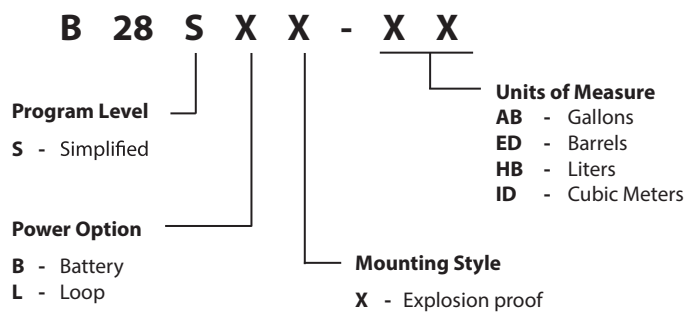
<b>Power Supply Options</b>	Battery Powered	One D size, 1.5V alkaline battery
	Loop Powered	4...20 mA loop power
<b>Power Consumption</b>	Battery Powered	Less than 1 mA @ 1.5V DC
	Loop Powered	25 mA (maximum)
<b>Alphanumeric Rate and Total Display</b>	Eight digit, 0.5 inch high numeric display	
	Eight character, 0.25 inch high alphanumeric display	
<b>Pulsed Output Signal</b>	Type	Outputs one pulse for each increment of the least significant totalizer digit
	Max Voltage	30V DC
	Pulse Type	Opto-Isolated open collector transistor
	Pulse Width ON State	20 mS / maximum pulse rate 20 Hz
	Current (ON State)	0.9V drop @ 5.0 mA or 0.7V drop @ 0.1 A
<b>Magnetic Pickup Inputs</b>	Frequency Range	0...3500 Hz
	Trigger Sensitivity	30 mV p-p
	Over Voltage Protected	±30V DC
	Frequency Measurement Accuracy	±0.1%
<b>Temperature Drift</b>	50 ppm / °C maximum	
<b>Optional Analog Output (Loop Powered Version)</b>	Type	4...20 mA current loop
	Resolution	1:4000
	Transient Over Voltages	Category 3, in accordance with IEC664
	Pollution Degree	2, in accordance with IEC664
	Mounting Classification	NEMA/UL/CSA Type 4 (IP66)
<b>Environmental</b>	Operating Temperature	-22...158° F (-30...70° C)
	Humidity	0...90% non-condensing
<b>Certification</b>	CSA Ordinary Locations	C22.2 No. 1010-1 for Canada; ANSI/ISA S82.02 for US
	CSA Hazardous Locations	Class I, Div 1 Groups B,C, D; Class II, Div 1 Groups E, F, G; Class III; Type 4X; T6 @ 70° F; C22.2 No. 30; C22.2 No. 25
		UL 698, UL 1203

## DIMENSIONS



A	B	C	D	E
5.1 in. (19.31 mm)	5.25 in. (19.87 mm)	2.6 in. (9.84 mm)	5/16 in. (1.19 mm)	4.51 in. (17.07 mm)

## PART NUMBER INFORMATION



## Control. Manage. Optimize.

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