



FLO-CORP.com

# SURGEPRO™ TFT1

## Turbine Flow Transmitter

### OPERATING INSTRUCTIONS



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## SPECIFICATIONS

**LCD Display:** Rate & total, fixed or toggle modes of operation; 8 digit, 3/4" numeric (top line); 8 character, 3/8" alphanumeric (bottom line)

**LCD Display:** (Panel Mount & Explosion-Proof Models Only) Rate & Total, fixed or toggle modes of operation; 8 digit, 1/2" numeric (top line) 8 character, 1/4" alphanumeric (bottom line)

**Power:** Battery: 1 "D" size 1.5 VDC alkaline battery  
Loop-Powered: 4-20 mA, two-wire current loop

**Power Consumption:**  
Battery: Less than 1 milliwatt (~3.5 years on 1 "D" battery)  
Loop-Powered: 23 mA maximum

**Pulse Output Signal:** One pulse for each increment of the least significant digit of totalizer

Pulse Type: Opto-isolated open collector transistor  
Max Voltage: 30 VDC  
Pulse Width (ON State) 20 ms/max pulse rate 25 Hz  
Current: (ON State) 0.9 V drop @ 5.0 mA or 0.7 drop @ 0.1 mA

**Inputs:** Magnetic pickup  
Frequency Range: 1 to 3500 Hz  
Trigger Sensitivity: 30 mV p-p  
Over Voltage Protected +/- 30 VDC

**Frequency Measurement Accuracy:** +/- 0.1%

**Analog Output:** 4-20 mA (Loop-Powered Version)

**Operating Temperature:** -22° F (-30°C) to 158 °F (70°C)

**Humidity:** 0-90% non-condensing

**Enclosure Rating:** NEMA/UL/CSA Type 4X (IP66)

## OPERATING THE SURGEPRO TRANSMITTER

The SurgePro TFT1 Turbine Flow Transmitter monitor utilizes two modes of operation. These are referred to as the **Run** mode and the **Program** mode. Both the Run mode and the Program mode display screen enunciators confirming the state of the monitor. A quick glance at the lower left hand corner of the LCD screen will confirm operating status. Normal operation will be in the **RUN** mode. To access the programming level, press the **MENU** key once. The programming indicator will appear signaling that the display is ready to accept programming inputs. After programming the display with the necessary information, a lock out feature can be turned on to prevent unauthorized access or changing the meter's setup parameters.

# BASIC PROGRAMMING MODE

Keys:

**MENU**- Switches to Programming mode.

**UP Arrow** - Scrolls forward through the parameter choices and increments numeric variables.

**RIGHT Arrow**- Scrolls backward through the parameter choices and moves the active digit to the right.

**ENTER** - Used to save programming information, advance to the next programming parameter, and in the reset process.

Modes:

**RUN** - Normal operating mode.

**PROGRAM**- Used to program variables into the display.

If your monitor was ordered with a flow meter, the two components ship from the factory, calibrated as a set. If the monitor is a replacement, the turbine's K-Factor has changed, or the monitor is being used with some other pulse-generating device, programming will be necessary.

## Programming Using Pulse Output Turbine Flow Meters

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 body. The K-Factor represents the number of pulses per unit of volume. The K-Factor will be needed to program the monitor readout.

**Enter Programming Mode**- Change to programming mode by pressing the MENU key once. The mode indicator will change from RUN to PROGRAM.

**Select The Meter Size** - At the METER prompt, press the ↑ or → arrow keys to select the bore size of your meter. Press ENTER once to save the meter size choice and advance to the K-Factor units selection.

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

**Enter the Meter's K-Factor Unit** - Directly after the METER size is selected the display's K-Factor unit must be chosen. Use the ↑ arrow key, increment the display digit until it matches the meter's K-Factor digit. Repeat this process until all K-Factor digits have been entered. Press ENTER once to save the K-Factor and advance to the RATE/TOTAL Units selection.

**Select The Rate/ Total Units of Measure** - The monitor allows the choice of four common rate/ total units.

SELECTION	RATE	TOTAL
GPM/GAL	Gallons per Minute	Gallons
LPM/LIT	Liters per Minute	Liters
M3PD/M	Cubic Meters per Day	Cubic Meters
BPD/BBL	Barrels per Day	Barrels

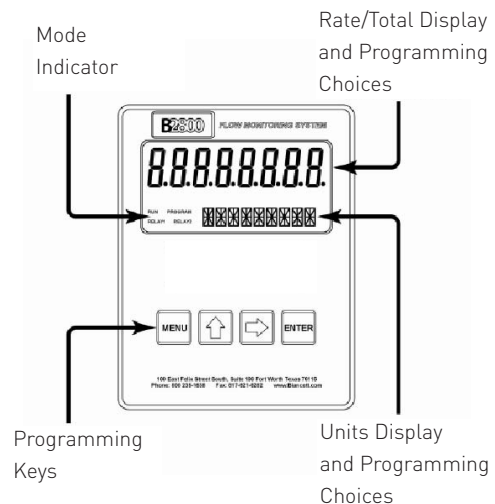


FIGURE 1- FRONT PANEL



The monitor now shows the rate/total unit that the display is currently set for. If the current selection is current, press the ENTER key once to advance to the next parameter. To change to an alternate unit, use the arrow keys to scroll to the desired rate unit and press ENTER to save the choice.

**Note:** The total unit's output multiplier cannot be modified in the Simplified program level. This option is reserved in the Advance program level.

**Select The Display Function** - The monitor can display RATE or TOTAL or alternate between BOTH rate and total. If the current selection is correct, press the ENTER key to advance to the next parameter. To change to an alternate display mode, use the arrow keys to scroll to the desired mode and press ENTER to save the choice.

A TEST function is also available in the Display Function sub-menu. With the test function selected the display 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.

## ADDITIONAL SCALING PARAMETERS

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**Note:** Some of the following scaling parameters are model dependent and may not be displayed.

**Totalizer Pulse Output**- The pulse output parameter can be either enabled or disabled. When enabled this output generates a 20mS 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 30VDC.

**Password**- Password protection prevents un authorized users from changing programming information. Initially, the password is set to all zeros. To change the password press ENTER once at the password prompt. The first digit of the password value will begin to flash. Using the arrow keys as previously described, enter the password value. Pressing ENTER will store the password and exit to run mode.

**Reset Total** - To reset the monitor total display, in run mode press MENU and ENTER simultaneously until TOTAL RST starts to flash. The TOTAL RST will stop flashing and the display will return 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. This procedure may be desirable prior to replacing the battery. Press and hold the ENTER key for 2 seconds. The display will respond with a flashing TOTAL SVD and then return to the run mode.

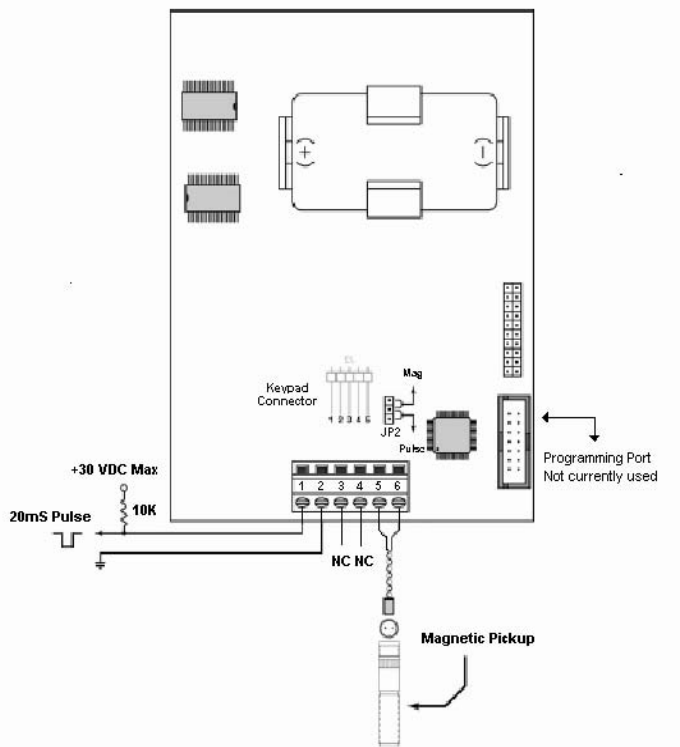
**Automatic Store Total** - The monitor is equipped with a store total feature that works automatically, saving the current total to flash memory. The frequency of saves depends on the power supply option chosen.

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

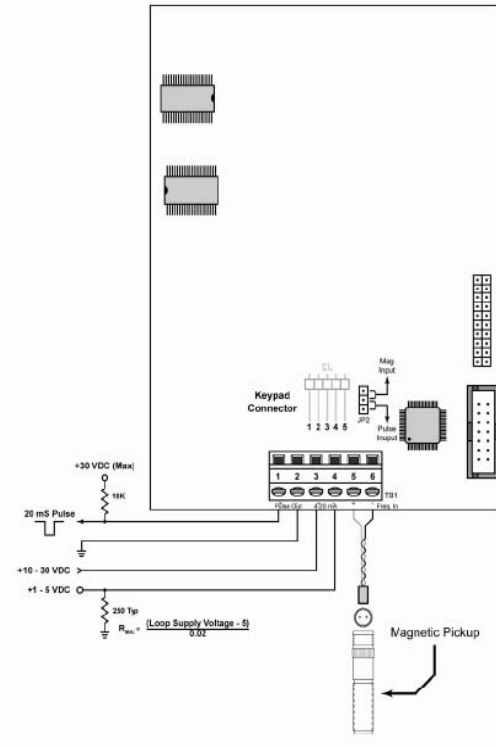
## ADDITIONAL SCALING PARAMETERS

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The SurgePro flow monitor is capable of receiving Magnetic Pickup input (small signal sine wave) or a Contact Closure input (pulse). Since most Flow Line Option's Turbine flow meters utilize a magnetic pickup, the SurgePro flow monitor is shipped configured for magnetic pickup input. To change a Contact Closure input, remove JP2 from the **top** two pins and jumper them to the **bottom** two pins. **See Figure 2**

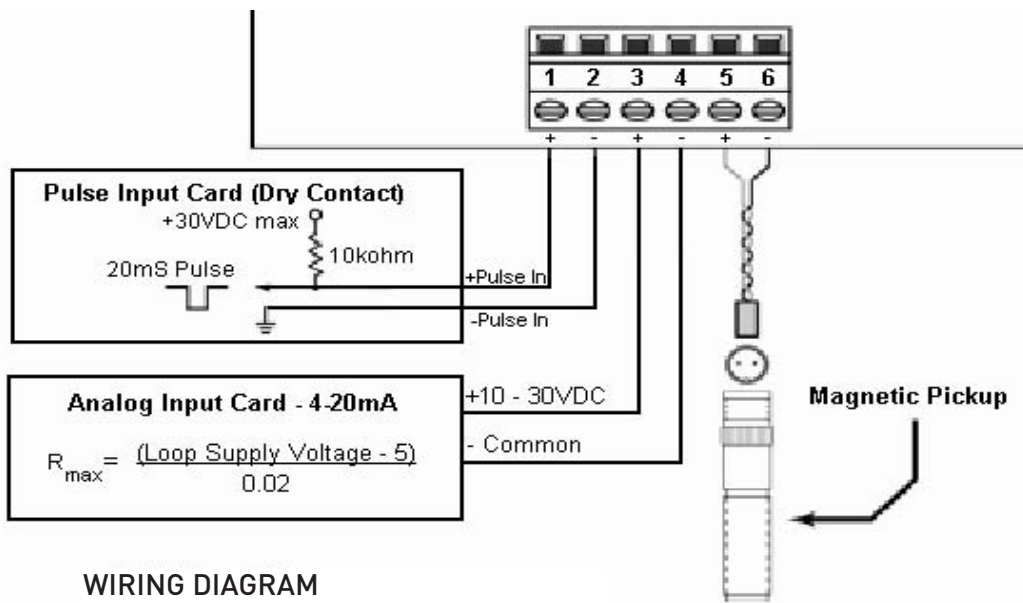


BATTERY POWERED



LOOP POWERED

FIGURE 2 - CIRCUIT BOARD LAYOUT



WIRING DIAGRAM



## TROUBLESHOOTING

### 1.) No LCD Display

- Check Battery Voltage. Should be 1.5 VDC. Replace if low or bad.

### 2.) No rate or total displayed

- Check connection from meter pickup to display input terminals.
- Check turbine meter rotor for debris. Rotor should spin freely.
- Check programming of monitor.

### 3.) Flow rate display reads a constant reading all the time

- This is usually an indication of external noise. Keep all AC wires separate from DC wires.
- Check for large motors close to meter pickup.
- Check radio antenna in close proximity.
- Try disconnecting the pickup from the monitor pig tail. This should stop the noise. If so, then try reorientating the meter to a new location.

### 4.) Flow rate indicator bounces

- This usually indicates a weak signal. Replace pickup and/or check all connections.
- Examine K-Factor.

DEFAULT K-FACTOR VALUES			
Meter Size	Default K-Factor	Lower Limit	Upper Limit
0.375	20,000	16,000	24,000
0.500	13,000	10,400	15,600
0.750	2,750	2,200	3,300
0.875	2,686	2,148	3,223
1.000	870.0	696.0	1,044
1.500	330.0	264.0	396.0
2.000	52.0	41.6	62.0
3.000	57.0	45.6	68.0
4.000	29.0	23.2	35.0
6.000	7.0	5.6	8.0
8.000	3.0	2.4	4.0
10.000	1.6	1.3	2.0

## BATTERY REPLACEMENT

Battery powered monitors use a single 1.5V, D size, alkaline battery. When replacement is necessary, use a clean fresh battery to insure continued trouble free operation. It is recommended that the total be saved to memory before the battery is removed (See Store Total in the programming section of this manual).

Unscrew the two captive screws on the front panel to gain access to the battery. Replace the battery being sure to observe the proper polarity and then re-fasten the front panel.

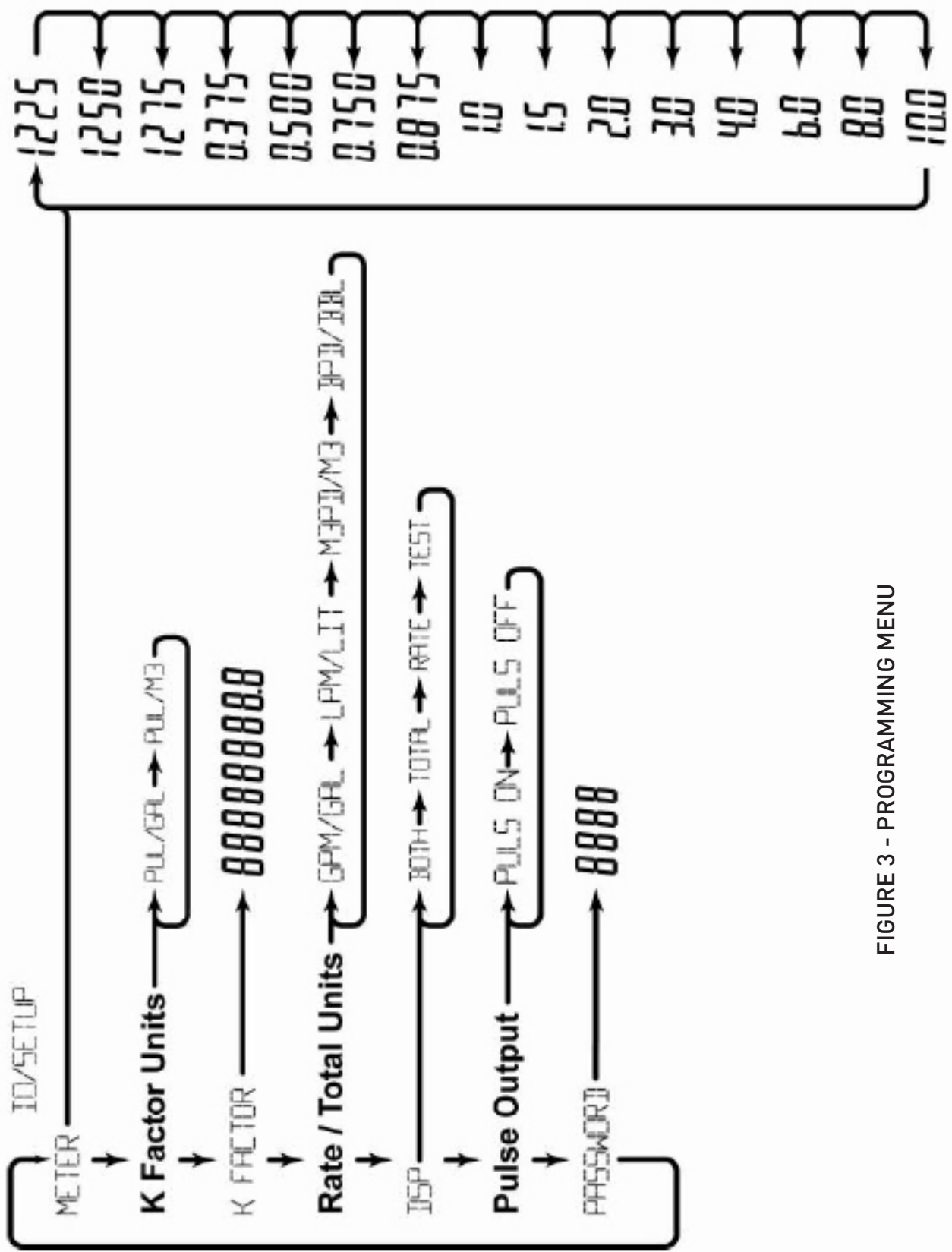
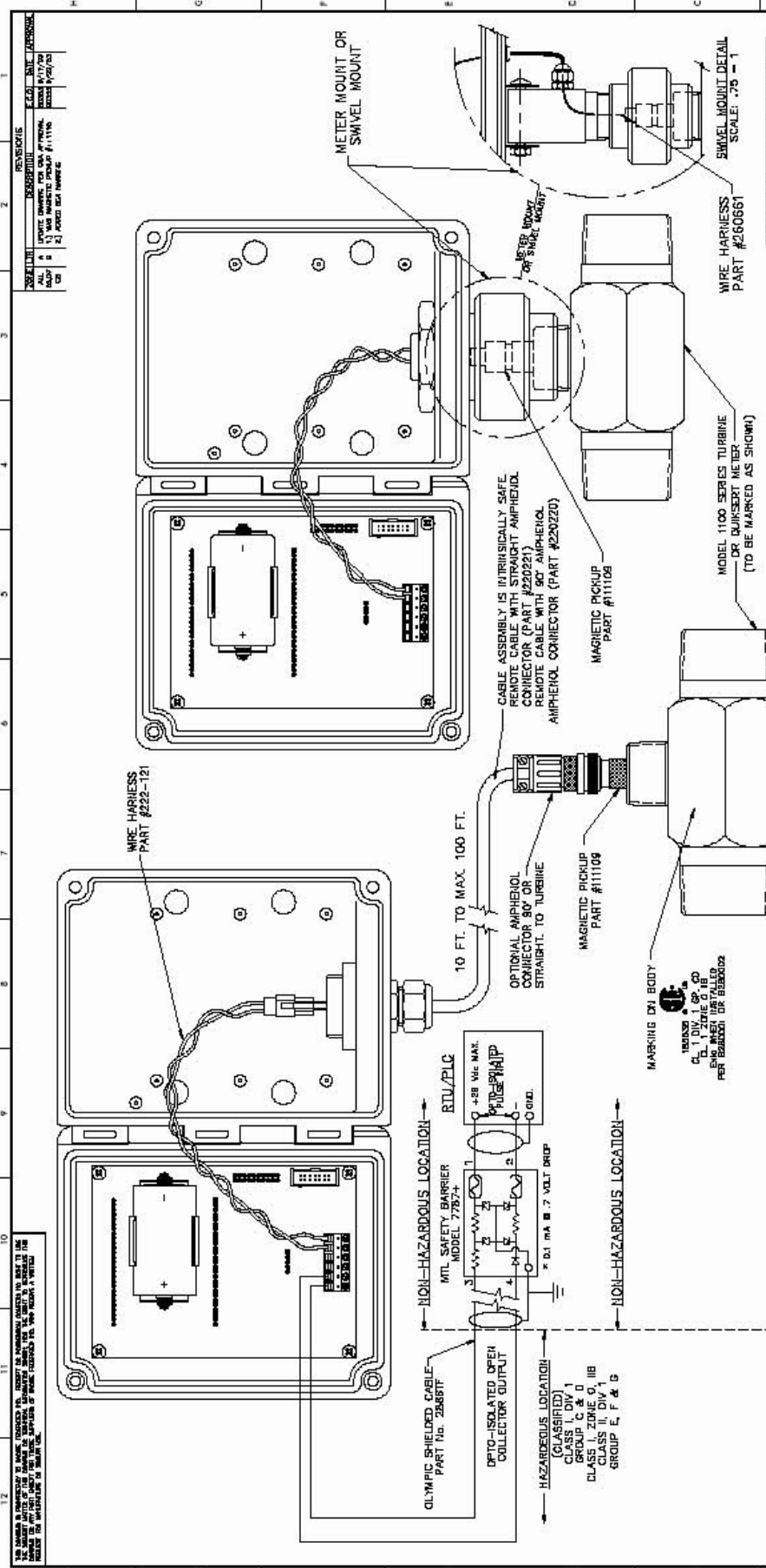


FIGURE 3 - PROGRAMMING MENU





REV	DATE	DESCRIPTION
1	11/19/00	ISSUED FOR CONSTRUCTION
2	02/20/01	REVISED TO ADD WIRE HARNESSES
3	03/20/01	REVISED TO ADD WIRE HARNESSES
4	03/20/01	REVISED TO ADD WIRE HARNESSES
5	03/20/01	REVISED TO ADD WIRE HARNESSES
6	03/20/01	REVISED TO ADD WIRE HARNESSES
7	03/20/01	REVISED TO ADD WIRE HARNESSES
8	03/20/01	REVISED TO ADD WIRE HARNESSES
9	03/20/01	REVISED TO ADD WIRE HARNESSES
10	03/20/01	REVISED TO ADD WIRE HARNESSES
11	03/20/01	REVISED TO ADD WIRE HARNESSES
12	03/20/01	REVISED TO ADD WIRE HARNESSES

SIZE	QUANTITY	DESCRIPTION
1/2"	1	WIRE HARNESSES
3/4"	1	WIRE HARNESSES
1"	1	WIRE HARNESSES
1 1/2"	1	WIRE HARNESSES
2"	1	WIRE HARNESSES
3"	1	WIRE HARNESSES
4"	1	WIRE HARNESSES
6"	1	WIRE HARNESSES
8"	1	WIRE HARNESSES
10"	1	WIRE HARNESSES
12"	1	WIRE HARNESSES

IS EQUIPMENT	TYPE	DESCRIPTION
1	Voc	Barrier
2	Ibc	Barrier
3	Lc	Barrier
4	Lc + Lc	Barrier

**TABLE 1:**

1. CABLE ENTRY DOME CONNECTOR PART NUMBER B260044, DIAMETER OF CABLE NOT TO EXCEED .144 (2.6) TO .250 (6.3)

2. REFERENCE INSTALLATION MANUAL FOR DOME CONNECTOR HOLE PLACEMENT

3. ALL CABLE ENTRIES INTO THE ENCLOSURE MUST BE BROUGHT THROUGH SUITABLY SIZED UL & CSA CERTIFIED HEVCO LIQUID TIGHT STRAIGHT THRU FITTINGS

**NOTES ON CONTROL EQUIPMENT:**

1. CONTROL EQUIPMENT MUST NOT BE USED OR GENERATE MORE THAN 250 V, WITH RESPECT TO EARTH.

# Ordering Information

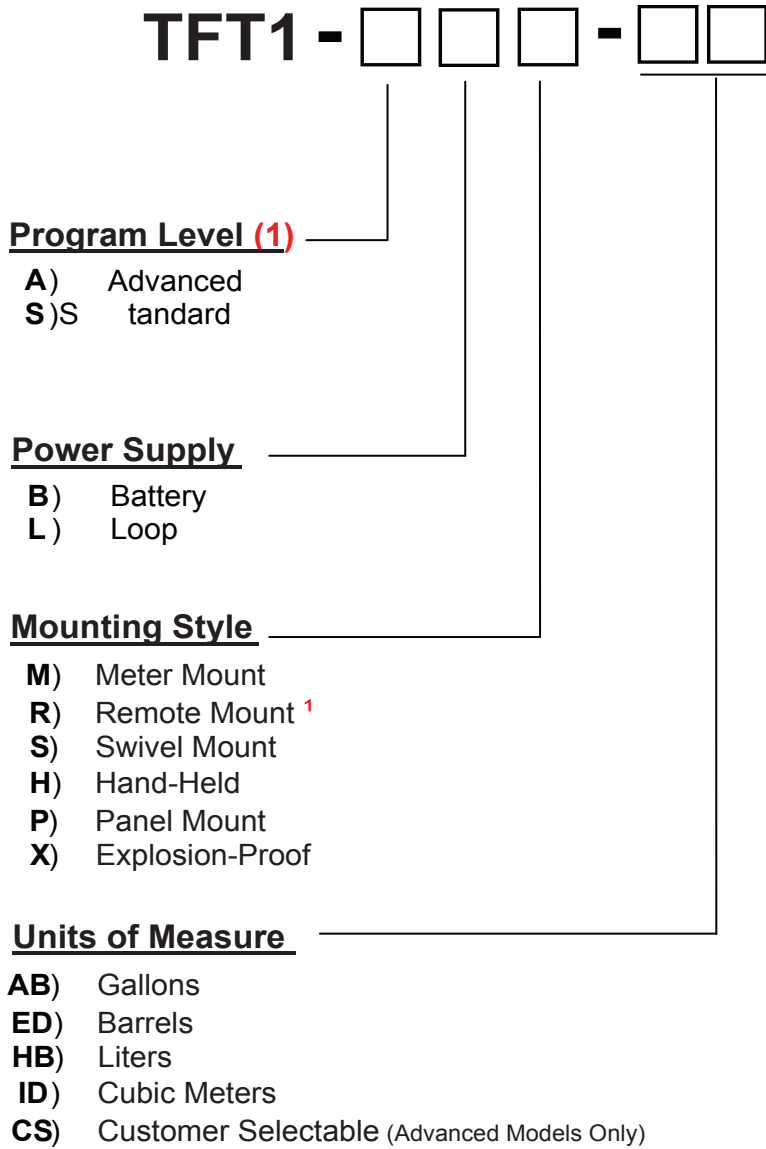
## FLO-CORP MODEL NUMBER BUILDER

For Assistance Call (877) 356-5463

Use the diagram below, working from left to right to construct your Flo-Corp Model Number.  
Simply match the category number to the corresponding box number.

**Example: TFT1-ABM-AB**

*SurgePro Turbine Flow Transmitter, Advanced Programing, Battery Power Supply, Meter Mounting Style, Units in Gallons*



<sup>1</sup> Remote Mount option requires TFA-220-221 cable.

**Ordering Notes**

1) Select the best configuration based on your requirements.

