

F-2000

INSTRUCTION MANUAL



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1.0 INTRODUCTION TO THE F-2000

Congratulations on purchasing the F-2000 electronic flow meter. The F-2000 is designed to measure the flow of a fluid in a pipe. The meter is factory calibrated to any engineering units and displays the rate of flow or the total of flow on a 6 digit LCD display. Two AAA batteries power the unit for up to one year.

There are four models are available:

RT = Rate and Totalizer

AO = 4-20mA, 0-10 VDC Analog Output, flow rate and totalizer

PC = Batch processing, flow rate alarm, proportional chemical metering, flow rate and totalizer.

AP = Analog output, batch processing, flow rate alarm, proportional chemical metering, flow rate and totalizer.

2.0 FEATURES

- Battery powered rate and total
- Extended battery life mode (screen blanks after 30 seconds)
- Easy to read, eight digit LCD display
- Installs quickly on existing pipe
- Factory programmed
- Field programmable front panel push buttons
- No pressure drop
- Weather resistant enclosure (NEMA 4X)
- Corrosion resistant PVDF sensor
- Corrosion resistant ABS enclosure
- High accuracy
- Extended flow range
- Front panel security lockout
- Minimal maintenance required

3.0 APPLICATIONS

Model AO

- Measure and display the flow rate
- Measure and display the total flow
- Control external devices with
 - 4-20mA control signal
- Control external devices with
 - 0-10VDC control signal

Model PC

- Measure and display the flow rate
- Measure and display the total flow
- Maintain a flow rate range alarm
- Trigger a high flow rate alarm
- Trigger a low flow rate alarm
- Manually controlled batch processing
- Timed auto-reset batch processing
- Proportional flow chemical pump process control

Model RT

- Measure and display the flow rate
- Measure and display the total flow

4.0 SPECIFICATIONS**4.1 Physical**

Maximum Working Pressure.....	300 psig (20.7 bar)
Maximum fluid temperature.....	200°F (93°C) - saddle and sensor only 200°F (93°C) - polypropylene and PVDF 140°F (60°C) - molded PVC tee units 140°F (60°C) - when mounted on PVC
Ambient temperature range.....	32°F (0°C) to 110° F (43°C)
Enclosure.....	NEMA 4X (acceptable for outdoor use)
NOTE: Protect the LCD display from direct sunlight.	
Sensor Accuracy.....	±1% of full scale reading
Repeatability.....	±1% of full scale reading
Power requirements.....	15 VDC Nominal (15 - 24 VDC Absolute - DO NOT EXCEED 24.0 VDC)
Model RT units only.....	Four standard AA alkaline batteries or 15-24VDC Plug in transformer (Battery life expectancy 1 year minimum)
All units.....	15-24VDC (plug-in transformer supplied)
Model AO analog output board.....	Linear, Non-isolated, powered loop. (250 ohm max for 4-20 ma / 500 ohms minimum for 0-10 VDC)
Model PC Process control board.....	Relay SPDT, NO/NC Maximum switching load 8 amps @ 115 VAC, 220 VAC, 230 VAC 7 amps @ 30 VDC (resistive load)
Maximum fluid debris size.....	0.020" diameter

4.2 Dimensional Drawing

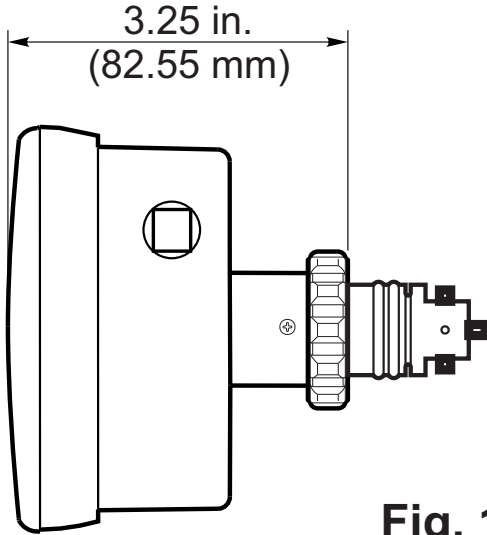
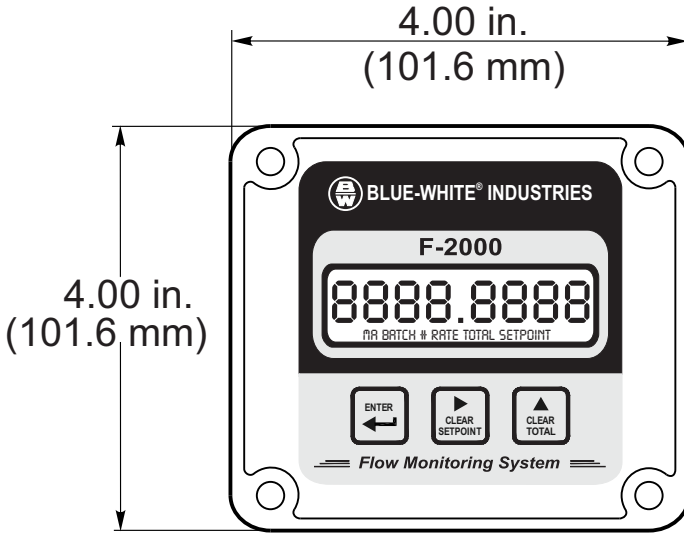
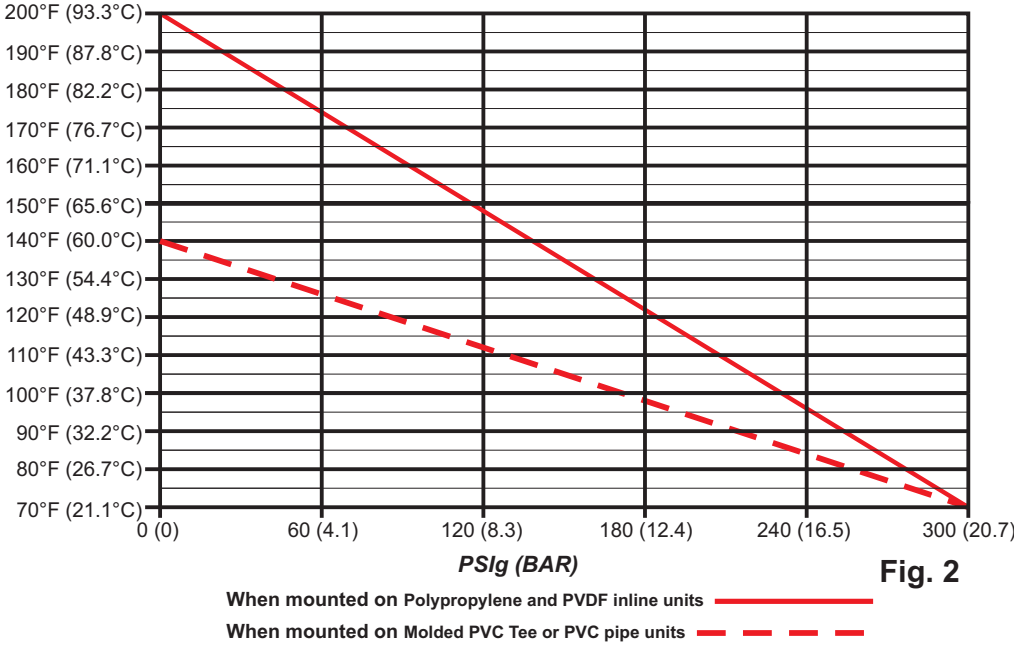


Fig. 1

4.3 Temperature vs. Pressure

Temperature



Note: Pressure and temperature limits are inversely proportional.

5.0 FLOW RANGES

Note: Due to increased wear on the paddle and axle, continuous operation at the upper 25% of the flow range is not recommended

METRIC PIPES

SADDLES - Standard Flow [Min - Max]

Pipe Size	LPM 1	LPH 1	M3H 1
50 MM - PN 10 & 16	70.0 - 700.0	4200 - 42000	4.20 - 42.00
63 MM - PN 10 & 16	110 - 1100	6600 - 66000	6.60 - 66.00
75 MM - PN 10 & 16	150-1500	9000 - 90000	9.00 - 90.00
90 MM - PN 10 & 16	230 - 2300	13800 - 138000	13.8 - 138.0
110 MM - PN 10 & 16	350 - 3500	21000 - 210000	21.0 - 210.0
160 MM - PN 10 & 16	720 - 7200	43000 - 430000	43.0 - 430.0
200 MM - PN 10 & 16	1150 - 11500	70000 - 700000	70.0 - 700.0
160 MM - PN 10	1700 - 17000	100000 - 1000000	100 - 1000
200 MM - PN 10	2700 - 27000	170000 - 1700000	170 - 1700

IPS PIPES (Some molded bodies are no longer sold, but are shown for reference only.)

MOLDED INLINE BODIES [Min - Max]

Pipe Size	RANGE#	GPM	GPH	GPD	LPM	LPH	M3H
3/8"	1	.800 - 8.000	48.0 - 480.0	1100 - 11000	3.00 - 30.00	180 - 1800	0.180 - 1.800
3/8"	2	.400 - 4.000	20.0 - 200.0	550 - 5500	1.00 - 10.00	60.0 - 600.0	0.060 - 0.600
1/2"	1	2.00 - 20.00	120 - 1200	2800 - 28000	7.00 - 70.00	420 - 4200	0.420 - 4.200
1/2"	2	.500 - 5.000	30.00 - 300.0	700 - 7000	2.00 - 20.00	120 - 1200	0.120 - 1.200
3/4"	1	3.00 - 30.00	180 - 1800	4320 - 43200	11.0 - 110.0	660 - 6600	0.660 - 6.600
3/4"	2	.800 - 8.000	48.0 - 480.0	1100 - 11000	3.00 - 30.00	180 - 1800	0.180 - 1.800
1"	1	5.00 - 50.00	300 - 3000	7200 - 72000	20.0 - 200.0	1200 - 12000	1.20 - 12.00
1"	2	2.00 - 20.00	120 - 1200	2800 - 28000	7.00 - 70.00	420 - 4200	0.420 - 4.200
1-1/2"	1	4.00 - 40.00	240 - 2400	5700 - 57000	15.0 - 150.0	900 - 9000	0.900 - 9.000
1-1/2"	2	6.00 - 60.00	360 - 3600	8600 - 86000	25.0 - 250.0	1500 - 15000	1.50 - 15.00
1-1/2"	3	10.0 - 100.0	600 - 6000	14400 - 144000	40.0 - 400.0	2400 - 24000	2.40 - 24.00
2"	1	4.00 - 40.00	240 - 2400	5700 - 57000	15.0 - 150.0	900 - 9000	0.900 - 9.000
2"	2	6.00 - 60.00	360 - 3600	8600 - 86000	25.0 - 250.0	1500 - 15000	1.50 - 15.00
2"	3	10.0 - 100.0	600 - 6000	14400 - 144000	40.0 - 400.0	2400 - 24000	2.40 - 24.00
2"	4	20.0 - 200.0	1200 - 12000	28800 - 288000	70.0 - 700.0	4200 - 42000	4.20 - 42.00

SADDLES - Standard Flow [Min - Max]

Pipe Size	GPM 1	GPH 1	GPD 1	LPM 1	LPH 1	M3H 1
1-1/2" IPS	15.0 - 150.0	900 - 9000	21500 - 215000	60.0 - 600.0	3600 - 36000	3.60 - 36.00
2.0" IPS	30.0 - 300.0	1800 - 18000	43000 - 430000	100 - 1000	6000 - 60000	6.00 - 60.00
2.5" IPS	40.0 - 400.0	2400 - 24000	57600 - 576000	150 - 1500	9000 - 90000	6.00 - 60.00
3.0" IPS	60.0 - 600.0	3600 - 36000	86500 - 865000	250 - 2500	15000 - 150000	15.0 - 150.0
4.0" IPS	100 - 1000	6000 - 60000	144000 - 1440000	400 - 4000	24000 - 240000	24.0 - 240.0
6.0" IPS	250 - 2500	15000 - 150000	360000 - 3600000	900 - 9000	54000 - 540000	54.0 - 540.0
8.0" IPS	400 - 4000	24000 - 240000	575000 - 5750000	1500 - 15000	90000 - 900000	90.0 - 900.0
10.0" IPS	600 - 6000	36000 - 360000	865000 - 8650000	2200 - 22000	132000 - 1320000	132 - 1320
12.0" IPS	800 - 8000	48000 - 480000	1150000 - 11500000	3000 - 30000	180000 - 1800000	180 - 1800

GPM = Gallons Per Minute
 LPM = Liters Per Minute
 OZM = Ounces Per Minute

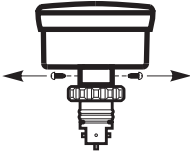
GPH = Gallons Per Hour
 LPH = Liters Per Hour
 M3H = Cubic Meters per

Hour
 GPD = Gallons Per Day
 LPD = Liters Per Day

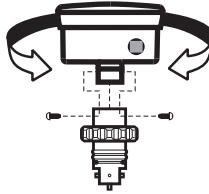
6.0 MOUNTING OPTIONS

Rotating Display

Step 1: Remove Two Screws



Step 2: Rotate 90°



Step 3: Re-attach Screws

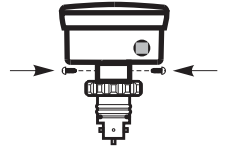


Fig. 6

Angle Mount on Horizontal Pipe

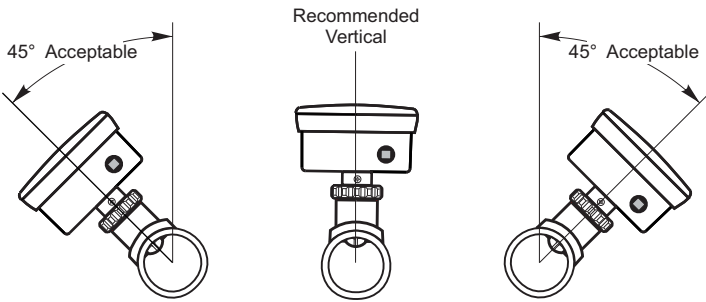


Fig. 7

Panel Mount

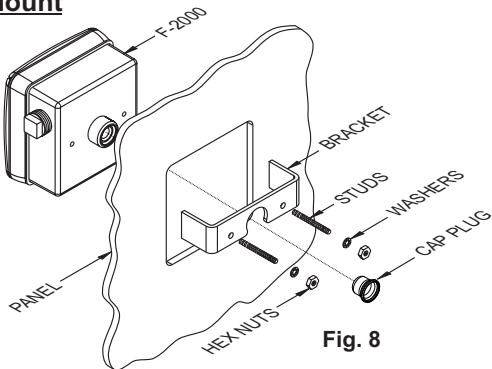


Fig. 8

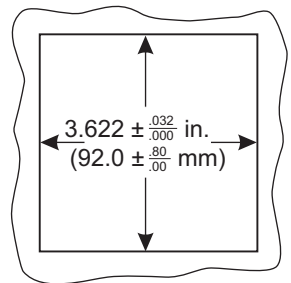


Fig. 9

Optional Pipe and Wall Mount Adapter Kit

Wall Mount

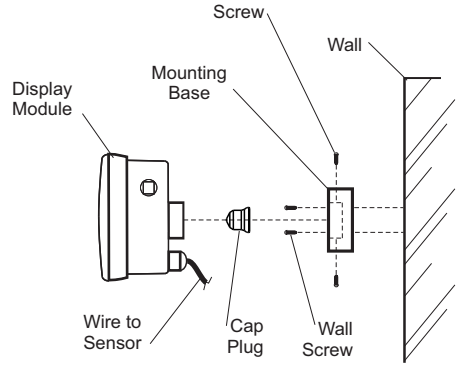
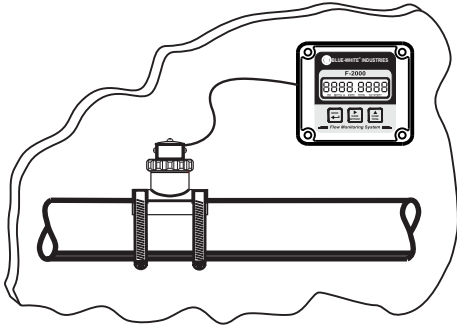


Fig. 10

Pipe Mount

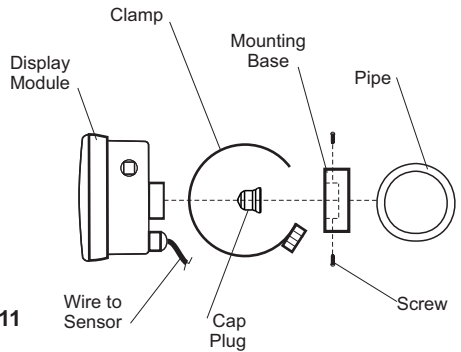
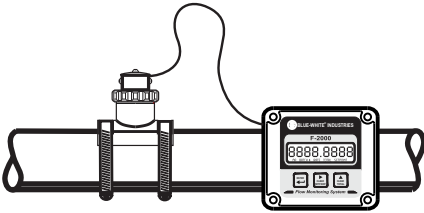


Fig. 11

Ordering Information

Kit Number	Description
71000-301	Wall Mount Kit
71000-302	Pipe Mount Kit for 1-1/2" pipe
71000-303	Pipe Mount Kit for 2" pipe
71000-304	Pipe Mount Kit for 3" pipe
71000-305	Pipe Mount Kit for 4" pipe
71000-306	Pipe Mount Kit for 6" pipe
71000-307	Pipe Mount Kit for 8" pipe
71000-414	Pipe Mount Kit for 10" pipe
71000-415	Pipe Mount Kit for 12" pipe

7.0 F-2000 Electrical Wiring Connections

7.1 Enclosure knock-out Instructions

Option A: Conduit Connection

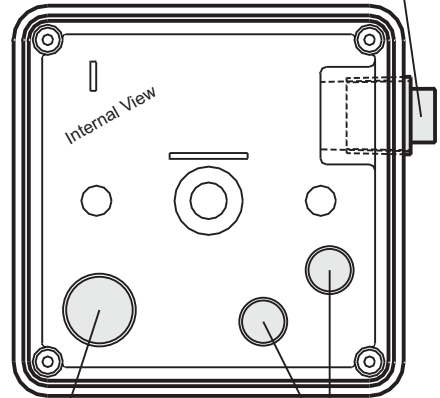
1. Remove the red cap plug.
2. Install your pipe fitting (1/2 - 14 NPT male end).

Option A:

1/2-14 MPT Red Cap Plug (for pipe fitting)

Option B: Liquid-Tight Connections

1. Remove knock-out(s) using a screwdriver.
2. Trim edge(s) with a knife and remove sharp edges.
3. Install the provided liquid-tight connector(s).



Option B:

3/4 DIA. Knock-out (large liquid-tight connector)

Option B:

1/2 DIA. Knock-out (small liquid-tight connector)

Notes:

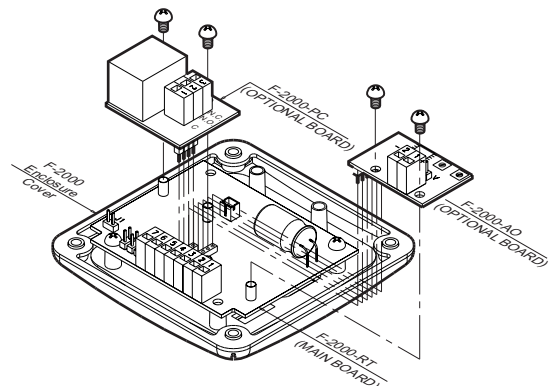
For the large liquid-tight connector (3/4" knock-out), the acceptable cable diameter is between .200 - .394 in (5.1 - 10.0 mm).

For the small liquid-tight connector (1/2" knock-out), the acceptable cable diameter is between .118 - .255 in (3.0 - 6.5 mm).

7.2 Optional Circuit Board Installation

CAUTION: DISCONNECT POWER SOURCE BEFORE SERVICING.

1. Carefully align optional board's Pin Header with the Pin Header socket located on the main circuit board.
2. Press firmly into place.
3. Secure the board with the two screws provided.



7.3 Model RT Circuit Board Wiring

CAUTION: DISCONNECT POWER SOURCE BEFORE SERVICING.

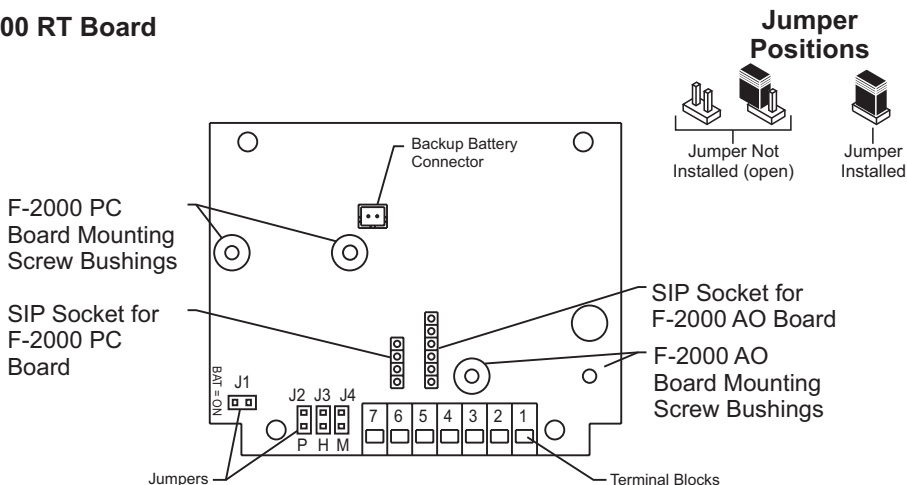
Jumper Configuration

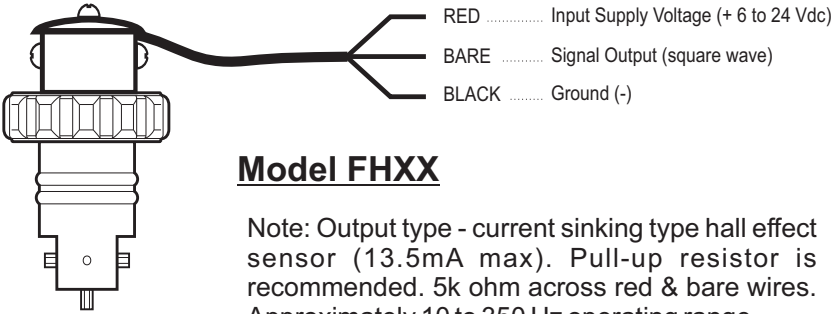
Jumpers	Function
J1 Installed	Battery Input (4 - 1.5 VDC, AA Cells)
J1 Left Open	Plug-In Transformer (115 VAC/15 VDC, 220 VAC/15 VDC, 230 VAC/15 VDC)
J2 Installed	Front Panel Programming is Disabled
J2 Left Open	Front Panel Programming is Enabled (factory default)
J3 Installed and J4 Left Open	Hall Effect Sensor and Micro-Flow Sensor Input
J3 Left Open and J4 Installed	AC Coil Sensor Input

Terminal Configuration

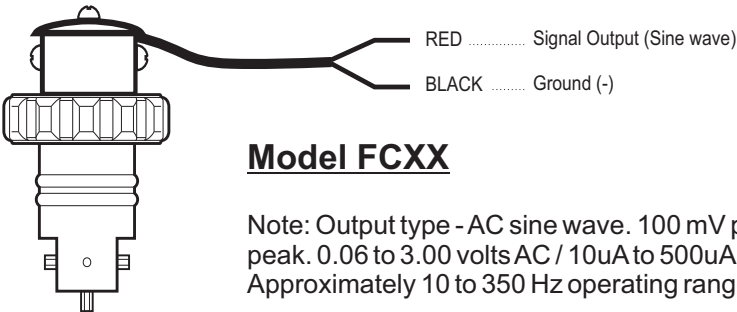
	Terminal	Function
Supply power input	6	Positive (+) power input (red wire from battery pack, or black with stripe wire from 15 VDC plug-in transformer)
	5	Ground (-) power input (black wire from battery pack or 15 VDC plug-in transformer)
AC coil sensor input	2	Ground (-) input (black wire from coil sensor body)
	3	Pulse input (yellow or red wire from coil sensor body)
Hall Effect sensor input	1	Positive (+) input (red wire from hall effect sensor)
	2	Ground (-) input (black wire from hall effect sensor)
	3	Pulse input (bare wire from hall effect sensor)
Micro-Flo sensor input	1	Positive (+) input (red wire from hall effect sensor)
	2	Ground (-) input (black wire from Micro-Flo sensor or negative (-) output from Micro-Flo display circuit board)
	3	Pulse input (bare wire from Micro-Flo sensor or positive (+) output from Micro-Flo display circuit board)
Open connector pulse output (from sensor)	7	NPN positive (+) signal output (Max voltage: 30VDC, Max load: 15mA, 2k ohm pull-up recommended.)
	4	NPN negative (-) signal output

F-2000 RT Board

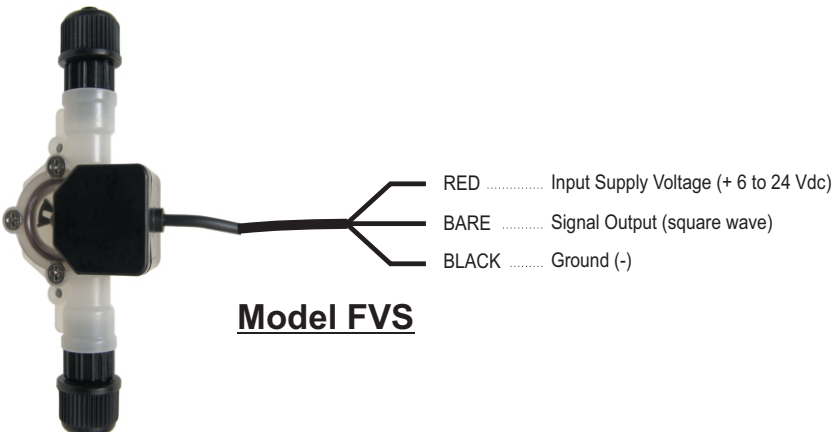


7.4 Model FHXX and FCXX Sensor wiring**Model FHXX**

Note: Output type - current sinking type hall effect sensor (13.5mA max). Pull-up resistor is recommended. 5k ohm across red & bare wires. Approximately 10 to 350 Hz operating range.

**Model FCXX**

Note: Output type - AC sine wave. 100 mV peak to peak. 0.06 to 3.00 volts AC / 10uA to 500uA AC. Approximately 10 to 350 Hz operating range.

**Model FVS**

8.0 HOW TO OPERATE THE F-2000

8.1 *Theory of Operation*

The MODEL RT is the base unit of the F-2000 flow monitoring system. Fluid flowing through the pipe causes the paddlewheel to spin. Pulses generated by the spinning paddlewheel are counted and multiplied by scaling factors. The resulting flow rate amounts and total flow amounts are displayed on the LCD readout. Pressing the enter button located on the front panel toggles the display between flow rate and total flow or allows entry into the programming mode. Pressing the clear total button while the total flow value is displayed will return the total to zero (must be activated in the programming mode - not the factory default setting). A small icon will light at the bottom of the LCD indicating the mode being displayed.

The MODEL PC includes all of the features of the MODEL RT as well as a relay which can be used to switch external electrical equipment when user programmed setpoints are reached. The relay must be assigned to respond to either the rate value for rate alarm applications (rate mode), or to the total value for batching or proportional feed applications (batch mode). Only one may made be used at any one time. When assigned to the batch mode, the display can be toggled to show four different values, the rate of flow, total flow, current batch number or current batch total, by pressing the enter button located on the front panel. A small icon will light at the bottom of the LCD display indicating the mode being displayed. The model PC is described in a separate instruction manual.

The MODEL AO includes all of the features of the MODEL RT as well as a 4-20mA or 0-10VDC output signal which is proportional to the flow rate value. This mode is always active although the output value can not be displayed on the LCD. A small icon will light indicating the mode is active. The model AO is described in a separate instruction manual.







The MODEL AP includes the features of all three F-2000 models, the RT, PC, and AO.

8.2 How To Operate The MODEL RT

8.2.1 What Was The MODEL RT Designed To Do?

- Display the rate of flow up to eight digits.
- Display the total amount of flow up to eight digits.
- Output an open collector signal (NPN) that is proportional to the flow rate. Operates by batteries or plug-in AC transformer.
- Greater than 1 year battery life.
- Front panel user programmable.
- Front panel programming can be disabled for security.
- Front panel total reset can be disabled for security.
- Programmable battery saving mode. (Screen blanks after 30seconds)
- Programmable decimal point locations for both rate and total modes.
- Display can be mounted on the sensor or panel mounted (1/4 DIN). See figure 6 and 8.
- Display can be rotated on sensor. See figure 6.
- Display can be mounted on a pipe or wall with optional mounting bracket kit. See figure 8 - 11.
- Display can be panel mounted up to 250 ft. from sensor when used with AC coil sensor.
- Display can be panel mounted up to 1 mile from sensor when used with Hall Effect sensor.
- Optional circuitry, AO (analog output) and PC (process control) boards, can be field installed at a later time.

8.2.2 What Features Are Available On The MODEL RT?

- Press  to toggle between RATE and TOTAL display modes. The icon will light to indicate the active mode. 
- Press and hold  for at least 1.25 seconds to enter the programming mode. Allow twenty seconds to pass so the display will switch back to the readout mode. See section 7.1. 
- While the TOTAL mode is displayed, press  to reset the total amount to zero. (Must be enabled in the program 

8.2.3 How Do I Determine My Calibration Numbers?

When ordered as a complete system, the F-2000 MODEL RT is factory programmed to the flow range you specified when you placed your order. See section 5.0 for various flow ranges.

Note: The F-2000 model AO and PC functions will *always* require field programming. All F-2000 models will require field programming when components are purchased separately. See section 7.2 and 7.3.

The following screens are used to input the calibration constants and to turn on or off the various features of the MODEL RT. The MODEL RT has six different input screens. They are listed in the table below.

Screen No.	Programming Functions
RATE 1	Input flow Rate Scale Factor - (S_r)
RATE 2	Input flow rate display Decimal Point Factory - (D_r)
RATE 3	Toggle Battery Saving mode - on / off (factory default: off)
TOTAL 1	Input flow Total Scale Factor - (S_t)
TOTAL 2	Input total flow display Decimal Point Factor - (D_t)
TOTAL 3	Toggle front panel Clear Total button on (enabled) /off (disabled) - (factory default: off)

Before programming the unit, the following calibration constants must be determined. Remember, when purchased as a complete system, the model RT is pre-programmed at the factory. No further programming is necessary.

Input flow rate display Decimal Point Factory - (D_r)

Step 1 Where would you like your displayed flow rate decimal point located?Desired Location = D, (Decimal Rate Factor) *Note: Four decimal places max.*

XXXXXX = 1

XXXX.X = 10

XXX.XX = 100

XX.XXX = 1000

X.XXXX = 1000

Enter your D, here.

Step 2 What time factor would you like to use in your measurement?

Example: Per Minute = 60 seconds

Per Hour = 3600 seconds

Per Day = 86400 seconds Enter seconds here.

Step 3 To determine your flow rate K-Factor, the following information is needed.a. What size pipe are you going to install this meter on? inch pipeb. What schedule pipe are you using? Sch 40 or Sch 80 or Inlinec. What is your flow range? Low Flow or Standard Flow (refer to pages 20 & 21)

d. Using the data you specified above, locate your K-Factor from the correct table. Pages 20 & 21.

e. What is your K-Factor?

f. If you are going to be using gallons as your unit of measure, you can go directly to Step 4.

g. To convert K-Factor to other units of measure, use the following formulas:

Ounces = K-factor ÷ 128

Liters = K-factor ÷ 3.785

Cubic Meters = K-factor ÷ 0.003785

Write your new K-Factor number here. **Example:** To convert 2" schedule 80 gallons K-factor to liters, you will use the following formula:*Note: Locate your K-factor off the table on pages 20 & 21.*

$$\frac{58.82 \text{ (K-factor)}}{3.785} = 15.54$$

Your new liters K-factor is 15.54

Step 4 Calculate your Rate Scale Factor (S_r) using the following formula.

D_r from **Step 1**, Seconds from **Step 2**, K-Factor from **Step 3**.

$$S_r = \frac{D_r \times \text{Seconds}}{\text{K-Factor}}$$

Example:

D _r	= 10	S _r = $\frac{10 \times 3600}{63.52}$
Seconds	= 3600	S _r = $\frac{36000}{63.52}$
K-Factor	= 63.52	S _r = 566.751

Write your S_r (Rate Scale Factor) number here.

Step 5 Where would you like your displayed accumulated Total Decimal (D_i) point located?

Desired Location = D_i (Total Decimal Factor) *Note: Four decimal places maximum.*

- XXXXX = 1
- XXXX.X = 10
- XXX.XX = 100
- XX.XXX = 1000
- X.XXXX = 10000

Enter your D_i here

Step 6 Determine your Total K-factor.

Your Total K-factor and Flow Rate K-factor are the same if the same units (i.e., Gallons, liters, etc.) Are displayed for both. However, you can use a different unit of measure for your total display. Follow the instructions in **step 3-g** to convert to a different Total K-factor unit. Write your Total K-factor here.

Step 7 Calculate your Total Scale Factor (S_t) using the following formula.

$$S_t = \frac{D_t}{K}$$

Example:

$$S_t = \frac{D_t}{K}$$

$$S_t = \frac{1}{58.82}$$

$$S_t = 00.0170$$

Note: The Total Scale Factor may be carried out to four decimal places.








Write your Total Scale Factor (S_t) here.

8.2.4 How Do I Program The MODEL RT?

Note: While in the programming mode, if no buttons are pressed within twenty seconds, the programming mode is automatically exited without saving the input of the last screen. See page 22 for programming menu flow chart.



Step 1 Entering the Rate Scale Factor.



- Press and hold down  for at least 1.25 seconds.
- Enter the Rate Scale Factor (Sr from Step 4, page 17).
- Press  to select the digit to be modified or the decimal point.
- Press  to modify the selected digit. Repeat the process until all digits have been modified. Note: The selected digit will blink to notify you it is selected.
- Press  to proceed to the last digit. Press  once more and the digits will stop flashing.
- Press  once to see the decimal point appear. Press repeatedly until the decimal point is located in the desired location.
- When finished, press . This will move you to the RATE 2 screen.



Step 2 The Rate Decimal Point Location screen.



- Press  once to see the decimal point appear. Press repeatedly until the decimal point is located in the desired location. Then press  to move you to RATE 3.
- This value should match Page 16, Step 1, desired decimal location. (Example 0000.0)






Step 3 The Battery Save Mode On / Off screen. Factory default = OFF

- Press  to toggle the ON and OFF settings. Press  once you've selected your setting.



Step 4 The Total Scale Factor screen is selected.



- Enter the Total Scale Factor (S_i from Step 7, page 17).
- Press  to select the digit to be modified or the decimal point. Note: The selected digit will blink to notify you it is selected.
- Press  to modify the selected digit or the decimal point. Repeat until all digits have been Entered. When finished, press . This will move you to the TOTAL 2 screen.



Step 5 The Total Decimal Point screen is selected.




- The Total 2 screen is where you enter your Decimal Point Factor for your totalizer.
- Use the information you calculated on D_i , on Page 17, Step 5. Move the decimal point by pressing the  until the decimal point is in the desired location.
- Then press . (Example 00000)

Step 6 The Front Panel Clear Total Button Enable / Disable screen is selected. Factory default = OFF (disabled)



- The Total 3 screen gives you the option to turn on or off the clear total button function. It was designed to prevent the user from making the mistake of clearing the totalizer screen. By pressing the  you can scroll through the on and off mode.
- Press  once you have made your selection.

Step 7 Exit the programming mode

- Press and hold down  for at least 1.25 seconds to exit the Programming mode.

8.2.5 Calibration Constants

Note: The values in the following tables are based on laboratory testing of nominal pipe dimensions. The F-2000 sensor is factory calibrated to $\pm 1\%$ of full scale linearity. Your actual accuracy will vary based on your pipe I.D. And other installation factors.

METRIC PIPE PN10 & PN16 (Meets DIN 8062)

Saddle Mount Models (Pipe Insertion connection)

Standard Flow Range - LPM (liters per minute)

Pipe Size (MM)	PN Rating	Pipe I.D. (MM)	Flow Range (LPM)	K-Factor (Pulse/L)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr) (LPM/Hz)	Rate Display Decimal Point (Dr)	Rate Scale Factor (Sr) (L/Pulse)	Rate Display Decimal Point (Dr)	Total Scale Factor (St) (L/Pulse)	Total Display Decimal Point (Dt)	Total Scale Factor (St) (L/Pulse)	Total Display Decimal Point (Dt)
50	10	45.2	70.0 - 700.0	16.561	36.2297	0000.0	00.0604	00000				
50	16	42.6	70.0 - 700.0	20.719	28.9588	0000.0	00.0483	00000				
63	10	57.0	110 - 1100	10.522	05.7023	00000	00.0950	00000				
63	16	53.6	110 - 1100	11.830	05.0720	00000	00.0845	00000				
75	10	67.8	150 - 1500	9.2155	06.5108	00000	00.1085	00000				
75	16	63.8	150 - 1500	10.3557	05.939	00000	00.0966	00000				
90	10	81.4	230 - 2300	5.294	11.3335	00000	00.1889	00000				
90	16	76.6	230 - 2300	5.944	10.0944	00000	00.1682	00000				
110	10	99.4	350 - 3500	2.942	20.3969	00000	00.3399	00000				
110	16	93.6	350 - 3500	3.107	19.3133	00000	00.3219	00000				
160	10	144.6	720 - 7200	1.386	43.2782	00000	00.7213	00000				
160	16	136.2	720 - 7200	1.574	38.1081	00000	00.6351	00000				
200	10	180.8	1150 - 11500	0.927	64.7077	00000	01.0785	00000				
200	16	170.2	1150 - 11500	1.008	59.5501	00000	00.9925	00000				
250	10	226.2	1700 - 17000	0.565	106.232	00000	01.7705	00000				
315	10	285.0	2700 - 27000	0.353	170.003	00000	02.8334	00000				

I.P.S. PIPE (Meets ASTM-D-1785)

Molded Inline Bodies (Male NPT connection)

(Some molded bodies are no longer sold, but are shown for reference only.)

3/8" - 1" pipe sizes - Standard Range #1 - GPM (gallons per minute)

Pipe Size (in.)	Pipe Sch.	Body I.D. (In.)	Flow Range (GAL/Min)	K-Factor (Pulse/GAL)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Rate Scale Factor (Sr) (GAL/Pulse)	Rate Display Decimal Point (Dr)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)
3/8	Inline	0.375	.800 - 8.000	1456.31	41.2000	00.000	00.0069	0000.0				
1/2	Inline	0.500	2.00 - 20.00	1034.48	05.8000	000.00	00.0097	0000.0				
3/4	Inline	0.660	3.00 - 30.00	612.25	09.8000	000.00	00.0163	0000.0				
1.0	Inline	0.840	5.00 - 50.00	338.60	17.7200	000.00	00.0295	0000.0				

3/8" - 1" pipe sizes - Low Range #2 - GPM (gallons per minute)

Pipe Size (in.)	Pipe Sch.	Body I.D. (In.)	Flow Range (GAL/Min)	K-Factor (Pulse/GAL)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Rate Scale Factor (Sr) (GAL/Pulse)	Rate Display Decimal Point (Dr)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)
3/8	Inline	0.218	.400 - 4.000	2926.83	20.5000	00.000	00.0034	0000.0				
1/2	Inline	0.250	.500 - 5.000	2419.35	24.8000	00.000	00.0041	0000.0				
3/4	Inline	0.375	.800 - 8.000	1518.99	39.5000	00.000	00.0066	0000.0				
1.0	Inline	0.500	2.00 - 20.00	1034.48	05.8000	000.00	00.0097	0000.0				

Molded Inline Bodies (Male NPT connection) - continued

1-1/2" - 2" pipe sizes - GPM (gallons per minute)

Pipe Size (in.)	Pipe Sch.	Flow Range #	Flow Range (GAL/Min)	K-Factor (Pulse/GAL)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)
1-1/2	Inline	1	4.00 - 40.00	466.20	12.8700	000.00	00.0215	0000.0				
1-1/2	Inline	2	6.00 - 60.00	192.93	31.0994	000.00	00.0518	0000.0				
1-1/2	Inline	3	10.0 - 100.0	156.94	3.8231	0000.0	00.0637	0000.0				
2	Inline	1	4.00 - 40.00	468.75	12.8000	000.00	00.0213	0000.0				
2	Inline	2	6.00 - 60.00	196.40	30.5499	000.00	00.0509	0000.0				
2	Inline	3	10.0 - 100.0	162.16	3.7000	0000.0	00.0617	0000.0				
2	Inline	4	20.0 - 200.0	67.416	8.9000	0000.0	00.1483	0000.0				

Saddle Models (Pipe insertion connection)

Standard Flow Range - GPM (gallons per minute)

Pipe Size (in.)	Pipe Sch.	Pipe I.D. (in.)	Flow Range (GAL/Min)	K-Factor (Pulse/GAL)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point	Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)
1.5	40	1.610	15.0 - 150.0	86.580	06.9300	0000.0	00.0116	00000				
1.5	80	1.500	15.0 - 150.0	102.04	05.8800	0000.0	00.0098	00000				
2.0	40	2.067	30.0 - 300.0	50.850	11.7994	0000.0	00.0197	00000				
2.0	80	1.939	30.0 - 300.0	58.820	10.2006	0000.0	00.0170	00000				
2.5	40	2.469	40.0 - 400.0	34.8635	17.2010	0000.0	00.0287	00000				
2.5	80	2.323	40.0 - 400.0	39.200	15.3061	0000.0	00.0255	00000				
3.0	40	3.068	60.0 - 600.0	21.820	27.4977	0000.0	00.0458	00000				
3.0	80	2.900	60.0 - 600.0	24.000	25.0000	0000.0	00.0417	00000				
4.0	40	4.026	100 - 1000	11.8577	05.0600	00000	00.0843	00000				
4.0	80	3.826	100 - 1000	12.7659	04.7000	00000	00.0783	00000				
6.0	40	6.065	250 - 2500	5.3507	11.2135	00000	00.1869	00000				
6.0	80	5.761	250 - 2500	5.5738	10.7647	00000	00.1794	00000				
8.0	40	7.981	400 - 4000	2.985	20.1000	00000	00.3350	00000				
8.0	80	7.625	400 - 4000	2.940	20.4082	00000	00.3401	00000				
10.0	40	10.020	600 - 6000	1.594	37.6412	00000	00.6274	00000				
10.0	80	9.564	600 - 6000	1.845	32.5203	00000	00.5420	00000				
12.0	40	11.938	800 - 8000	1.116	53.7634	00000	00.8961	00000				
12.0	80	11.376	800 - 8000	1.296	46.2963	00000	00.7716	00000				

PVC Tee (Solvent weld connection)

1" - 3" pipe sizes - GPM (gallons per minute)

Pipe Size (in.)	Pipe Sch.	Pipe Type	Flow Range (GAL/Min)	K-Factor (Pulse/GAL)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)
1"	Inline	PVC	6.00 - 60.00	267.860	22.3998	00.000	00.0373	0000.0				
1-1/2"	Inline	PVC	15.0 - 150.0	94.0400	6.3803	000.00	00.0106	0000.0				
2"	Inline	PVC	30.0 - 300.0	53.1600	11.2867	000.00	00.0188	0000.0				
3"	Inline	PVC	60.0 - 600.0	20.69	29.000	000.00	00.0483	0000.0				

PVC Tee (Solvent weld connection)

1" - 2" pipe sizes - LPM (liters per minute)

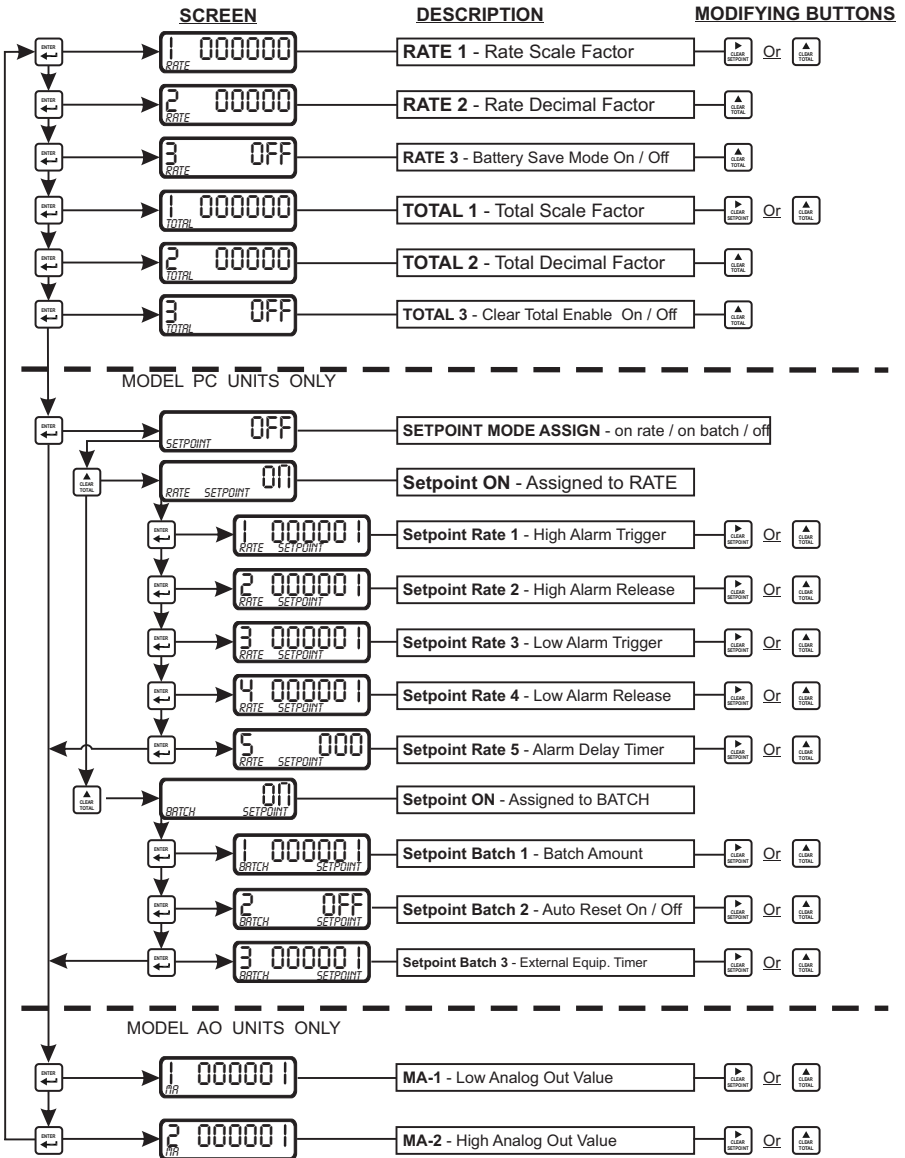
Pipe Size (in.)	Pipe Sch.	Pipe Type	Flow Range (LPM)	K-Factor (Pulse/L)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)
1"	Inline	PVC	25.0 - 250.0	70.7613	8.4792	00.000	00.1413	0000.0				
1-1/2"	Inline	PVC	60.0 - 600.0	24.8428	24.1519	000.00	00.0403	0000.0				
2"	Inline	PVC	100.0 - 1000.0	14.0434	4.2725	000.00	00.0712	0000.0				

PVC Tee (Solvent weld connection)

1" - 2" pipe sizes - M3H (cubic meters per hour)

Pipe Size (in.)	Pipe Sch.	Pipe Type	Flow Range (M3H)	K-Factor (Pulse/M3)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Rate Scale Factor (Sr) (GPM/Hz)	Rate Display Decimal Point (Dr)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)	Total Scale Factor (St) (GAL/Pulse)	Total Display Decimal Point (Dt)
1"	Inline	PVC	1.5 - 15.0	70761.35	5.0875	00.000	00.0014	0000.0				
1-1/2"	Inline	PVC	3.6 - 36.0	24842.82	14.4911	000.00	00.0040	0000.0				
2"	Inline	PVC	6.0 - 60.0	14043.43	25.6348	000.00	00.0071	0000.0				

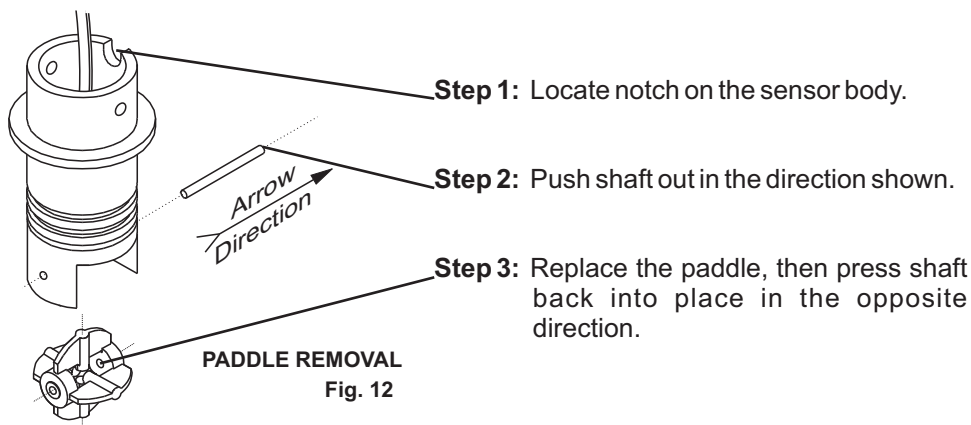
8.3 Programming Menu Flow Chart



9.0 MAINTENANCE

The F-2000 requires very little maintenance, however, some conditions will cause increased wear or possible damage to the unit.

- Periodically remove the sensor assembly from the pipe fitting and inspect the meter for signs of wear and obstructions. Clean the paddle of any foreign objects. Replace the paddle and axle if worn.
- Although the meter is capable of operating at the high end of the flow range, continuous use at very high flow rates (upper 25% of the calibrated flow range), is not recommended. The paddle and axle life is related to the rate of flow and the fluid being measured. Corrosive fluids moving at high flow rates will cause increased wear requiring frequent inspection and maintenance. Ceramic, titanium or nickel axles are available for extreme corrosive environments.
- Although the F-2000 is designed to withstand outdoor conditions, a cool, dry location where the unit can be easily serviced is recommended. **The life of the LCD display will be severely reduced when installed in direct sunlight. Do not install the meter so that the LCD is in direct sunlight.**
- O-rings should be inspected periodically. Immediately replace the o-rings at any sign of wear, swelling, cracking or discoloration.
- Battery operated models. Replace the four AA batteries every 12 months. The program memory will not erase when replacing the batteries. The unit will function normally for approximately 2 minutes while replacing the batteries. To replace the batteries, open the front panel of the enclosure by removing the four Phillips screws. After replacing the batteries, be sure the foam insert is in place before closing the front panel.
- Test the electronics by removing the sensor assembly from the pipe fitting and spinning the paddle by hand. If a reading does not appear in the display window, replace the batteries. If a reading still does not appear, the circuitry must be serviced by an authorized service center.

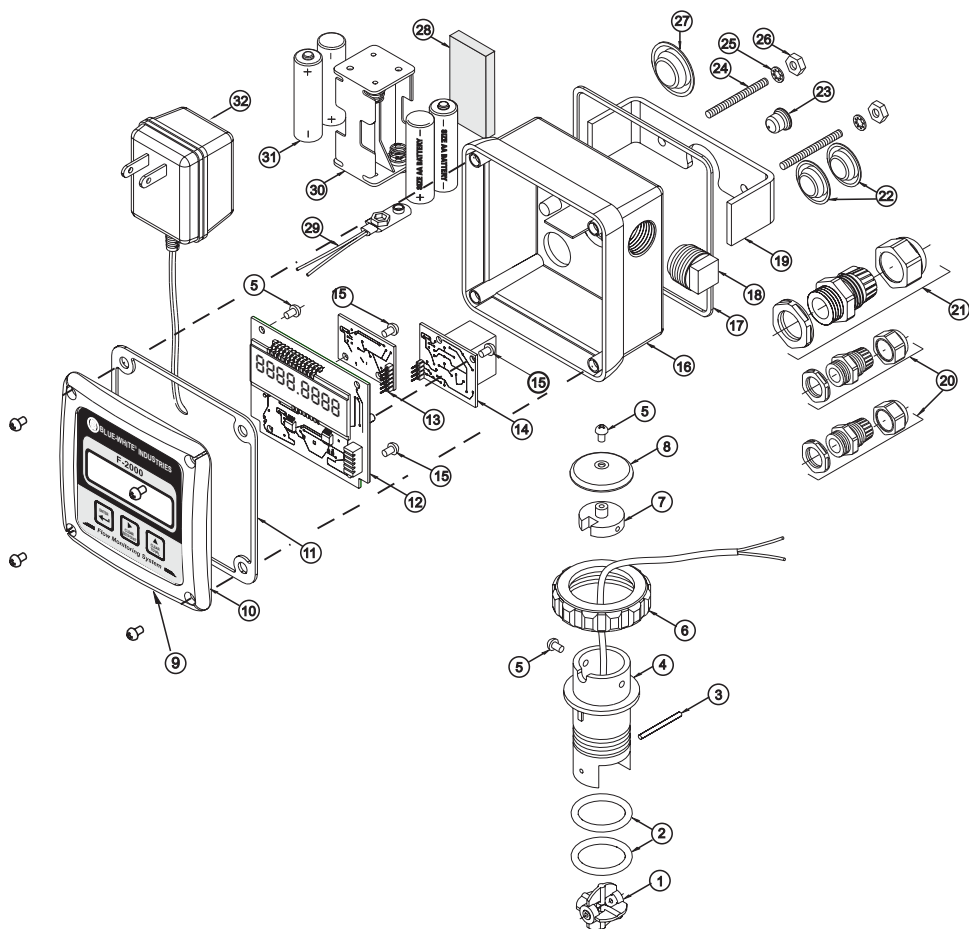


9.1 F-2000 Parts List

Item	Part Number	Description	Quantity
1	70000-783	Paddle assembly Kynar	1
2	90003-021	O-ring 022 Viton E60	2
3	90007-589	Axle PVDF	1
4	71000-238	Sensor body AC coil 1' cable	1
	71000-285	Sensor body AC coil 25' cable	1
	70000-806	Sensor body Hall effect 25' cable	1
5	90011-080	Screw #6-32 x .37 PH pan B 18/8	5
6	91001-280	Union nut	1
7	76002-023	Retainer sensor cap	1
8	90006-550	Cap sensor body SS	1
9	90012-208	Switch overlay F-2000	1
10	71000-356	Cover F-2000 w/ Switch overlay	1
11	90006-592	Gasket F-2000 housing neoprene	1
12	90010-227	Circuit board F-2000 RT	1
13	71000-311	Kit Circuitry model F-2000 AO	1
14	71000-316	Kit Circuitry model F-2000 PC	1
15	90011-155	Screw #6-32 x .31 PH pan SS	4
16	76001-149	Enclosure F-2000 sensor mount	1
	76001-150	Enclosure F-2000 panel mount	1
17	90006-593	Gasket F-2000 1/4 DIN panel mount	1
18	90008-331	Cap plug P-48 1/2 NPT red F-2000	1
19	71000-294	Kit F-2000 1/4 DIN panel mount	1
20	70000-730	Connector liquid-tight 1/2 in.	2
21	70000-589	Connector liquid-tight 3/4 in.	1
22	90008-332	Plug 1/2 in.	2
23	90008-340	Cap plug VTP-25 red	1
24	90011-038	Stud screw #10-32 1.62 long	2
25	90011-092	Star washer #10-32	2
26	90011-026	Hex nut #10-32	2
27	90008-333	Plug 7/8 in.	1
28	90013-222	Foam pad 1/4 in. thick	1

29	90008-254	Battery clip	1
30	90010-233	Battery holder F-2000 4x AA	1
31	90008-330	Battery alkaline AA	4
32	90008-336	Power supply 115VAC/15VDC	1
	90008-337	Power supply 220VAC/15VDC Europe	1
	71000-310	Power supply 230VAC/15VDC	1

9.2 F-2000 Exploded View



9.3 TROUBLESHOOTING

Situation	Cause	Solution
Leaking	Improper installation Worn or damaged o-rings	Pipe Fitting Manual pages 5 - 10 Pipe Fitting Manual pages 7
Flow rate reading is inaccurate	Improper installation Improper velocity profile Flow rate is out of range	Pipe Fitting Manual page 5 - 10 Pipe Fitting Manual page 4 Model RT Manual page 7
No display	Dead batteries Blocked paddle Damaged electronics Battery save mode is ON	Model RT Manual page 23 Pipe Fitting Manual page 6 - 10 Model RT Manual page 23 Model RT Manual page 18
Display shows zero flow	Improper alignment / installation Worn paddle and / or axle Damaged electronics	Pipe Fitting Manual page 7 Model RT Manual page 23 Model RT Manual page 23



Users of electrical and electronic equipment (EEE) with the WEEE marking per Annex IV of the WEEE Directive must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, recovery of WEEE and minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. The WEEE marking applies only to countries within the European Union (EU) and Norway. Appliances are labeled in accordance with European Directive 2002/96/EC.

Contact your local waste recovery agency for a *Designated Collection Facility* in your area.

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BLUE-WHITE LIMITED WARRANTY

Your Blue-White product is a quality product and is warranted for a specific time from date of purchase (proof of purchase is required). The product will be repaired or replaced at our discretion. Failure must have occurred due to defect in material or workmanship and not as a result of operation of the product other than in normal operation as defined in the product manual. Warranty status is determined by the product's serial label and the sales invoice or receipt. The serial label must be on the product and legible. The warranty status of the product will be verified by Blue-White or a factory authorized service center.

Variable Area and Digital Flow meters are warranted for 1 year from date of purchase (proof of purchase is required). The flow meter will be repaired or replaced at our discretion. The S6A ultrasonic flow meter is warranted for 2 years from date of purchase (proof of purchase is required). The flow meter will be repaired or replaced at our discretion.

WHAT IS NOT COVERED

- Freight to the factory, or service center.
- Products that have been tampered with, or in pieces.
- Damage resulting from misuse, carelessness such as chemical spills on the enclosure, abuse, lack of maintenance, or alteration which is out of our control.
- Damage by faulty wiring, power surges or acts of nature.
- Damage that occurs as a result of: meter misalignment, improper installation, over tightening, use of non-recommended chemicals, use of non-recommended adhesives or pipe dopes, excessive heat or pressure, or allowing the meter to support the weight of related piping.

BLUE-WHITE does not assume responsibility for any loss, damage, or expense directly or indirectly related to or arising out of the use of its products. Failure must have occurred due to defect in material or workmanship and not as a result of operation of the product other than in normal operation as defined in the manual.

Warranty status is determined by the product's serial label and the sales invoice or receipt. The serial label must be on the product and legible. The warranty status will be verified by Blue-White or a factory authorized service center.

PROCEDURE FOR IN WARRANTY REPAIR

Warranty service must be performed by the factory or an authorized service center. Contact the factory or local repair center to obtain a RMA (Return Material Authorization) number. It is recommended to include foot strainer and injection/check valve fitting since these devices may be clogged and part of the problem. Decantamine, dry, and carefully pack the product to be repaired. Please enclose a brief description of the problem and proof of purchase. Prepay all shipping and insurance cost. COD shipments will not be accepted. Damage caused by improper packaging is the responsibility of the sender. When In-Warranty repair is completed, the factory pays for return shipping to the dealer or customer.

PRODUCT USE WARNING

Blue-White products are manufactured to meet the highest quality standards in the industry. Each product instruction manual includes a description of the associated product warranty and provides the user with important safety information. Purchasers, installers, and operators of Blue-White products should take the time to inform themselves about the safe operation of these products. In addition, Customers are expected to do their own due diligence regarding which products and materials are best suited for their intended applications. BLUE-WHITE is pleased to assist in this effort but does not guarantee the suitability of any particular product for any specific application as Blue-White does not have the same degree of familiarity with the application that the customer/end user has. While BLUE-WHITE will honor all of its product warranties according to their terms and conditions, Blue-White shall only be obligated to repair or replace its defective parts or products in accordance with the associated product warranties.

BLUE-WHITE SHALL NOT BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE WHETHER DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING OUT OF OR RELATED TO THE FAILURE OF ANY OF ITS PARTS OR PRODUCTS OR OF THEIR UNSUITABILITY FOR A GIVEN PURPOSE OR APPLICATION.

CHEMICAL RESISTANCE WARNING

BLUE-WHITE offers a wide variety of wetted parts. Purchasers, installers, and operators of Blue-White products must be well informed and aware of the precautions to be taken when injecting or measuring various chemicals, especially those considered to be irritants, contaminants or hazardous. Customers are expected to do their own due diligence regarding which products and materials are best suited for their applications, particularly as it may relate to the potential effects of certain chemicals on Blue-White products and the potential for adverse chemical interactions. Blue-White tests its products with water only. The chemical resistance information included in this instruction manual was supplied to BLUE-WHITE by reputable sources, but Blue-White is not able to vouch for the accuracy or completeness thereof. While BLUE-WHITE will honor all of its product warranties according to their terms and conditions, Blue-White shall only be obligated to repair or replace its defective parts or products in accordance with the associated product warranties.

BLUE-WHITE SHALL NOT BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE, WHETHER DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING OUT OF OR RELATED TO THE USE OF CHEMICALS IN CONNECTION WITH ANY BLUE-WHITE PRODUCTS.

Users of electrical and electronic equipment (EEE) with the WEEE marking per Annex IV of the WEEE Directive must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, recovery of WEEE and minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. The WEEE marking applies only to countries within the European Union (EU) and Norway. Appliances are labeled in accordance with European Directive 2002/96/EC. Contact your local waste recovery agency for a Designated Collection Facility in your area.



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F-2000

MODEL PC - MODEL PB - MODEL AO

OUTPUT BOARDS

INSTRUCTION MANUAL



Blue-White[®]

5300 Business Drive
Huntington Beach, CA 92649
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Phone: 714-893-8529 FAX: 714-894-9492
E mail: sales@blue-white.com or techsupport@blue-white.com
Website: www.blue-white.com

1.0 F-2000 Electrical Wiring Connections

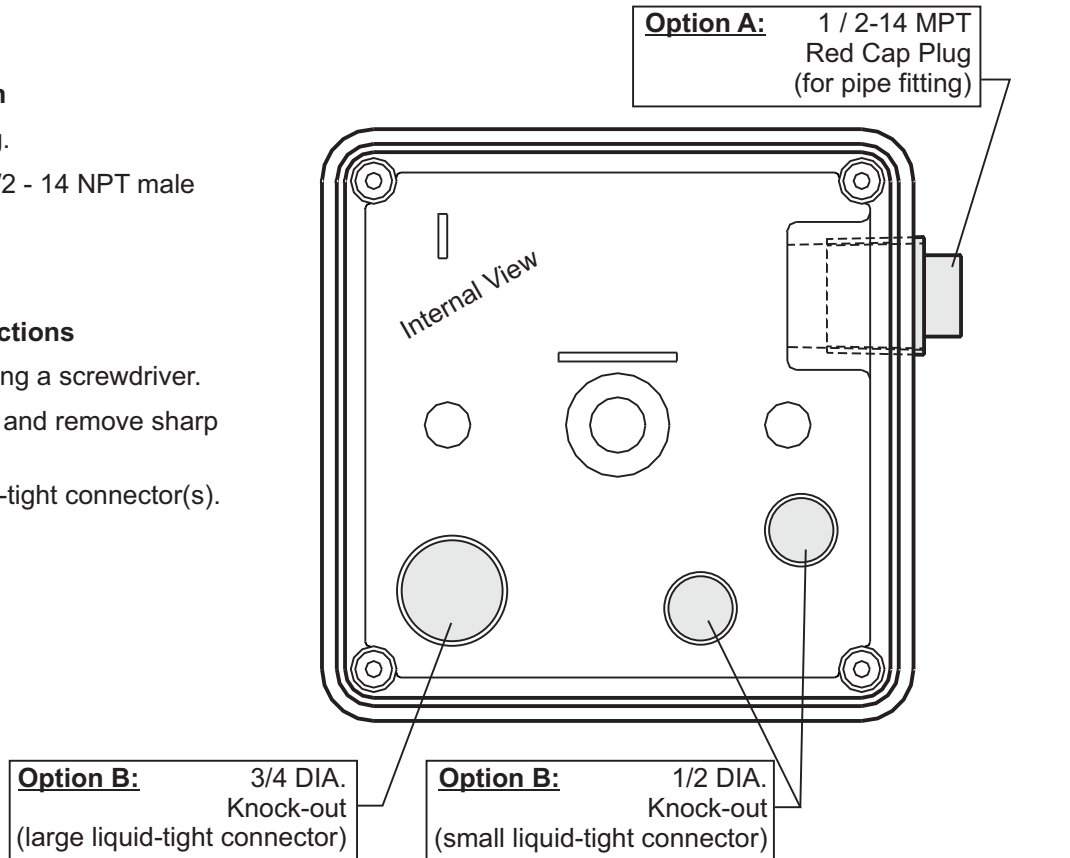
1.1 Enclosure knock-out Instructions

Option A: Conduit Connection

1. Remove the red cap plug.
2. Install your pipe fitting (1/2 - 14 NPT male end).

Option B: Liquid-Tight Connections

1. Remove knock-out(s) using a screwdriver.
2. Trim edge(s) with a knife and remove sharp edges.
3. Install the provided liquid-tight connector(s).



Notes:

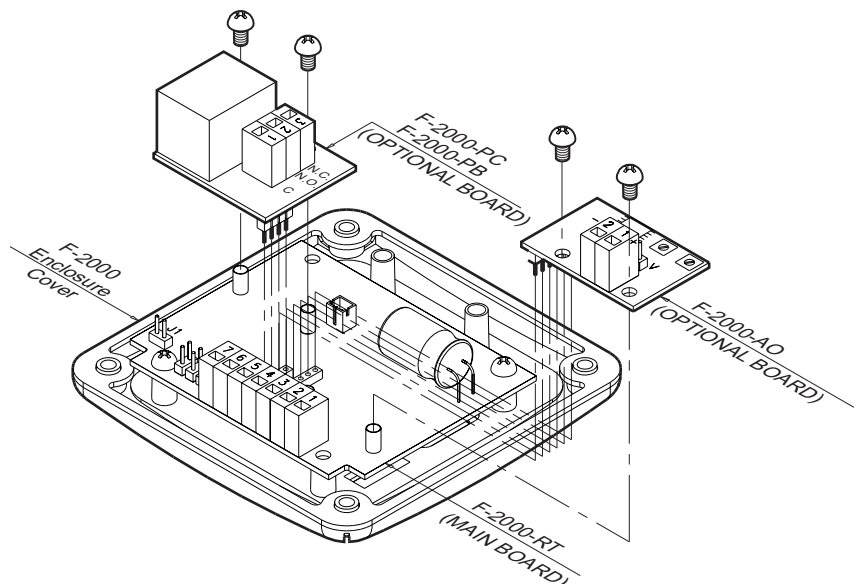
For the large liquid-tight connector (3/4" Knock-out), the acceptable cable diameter is between .200 - .394 in (5.1 - 10.0 mm).

For the small liquid-tight connector (1/2" Knock-out), the acceptable cable diameter is between .118 - .255 in (3.0 - 6.5 mm).

1.2 Optional Circuit Board Installation

CAUTION: DISCONNECT POWER SOURCE BEFORE SERVICING.







1. Carefully align optional board's Pin Header with the Pin Header socket located on the main circuit board.
2. Press firmly into place.
3. Secure the board with the two screws provided.



1.3 Model RT Circuit Board Wiring

CAUTION: DISCONNECT POWER SOURCE BEFORE SERVICING.

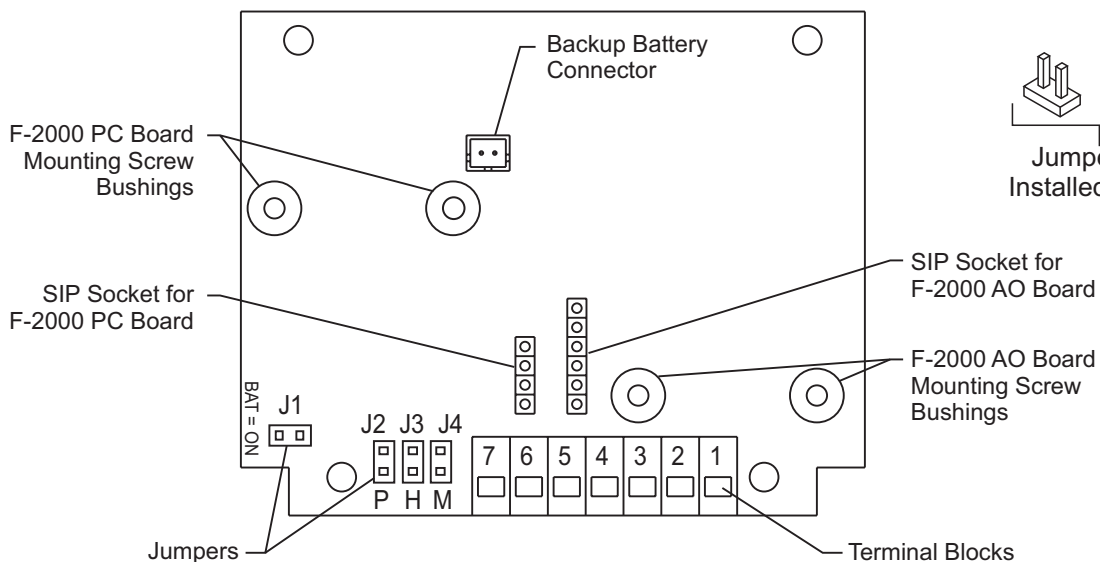
Jumper Configuration

Jumpers	Function
J1 Installed 	Battery Input (4 - 1.5 VDC, AA Cells)
J1 Left Open 	Plug-In Transformer (115 VAC / 15 VDC, 220 VAC / 15 VDC, 230 VAC / 15 VDC)
J2 Installed 	Front Panel Programming is Disabled
J2 Left Open 	Front Panel Programming is Enabled (factory default)
J3 Installed and J4 Left Open 	Hall Effect Sensor Input
J3 Left Open and J4 Installed 	AC Coil Sensor Input

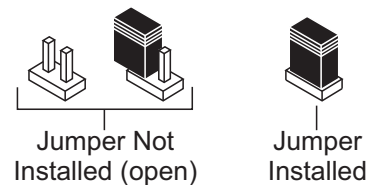
Terminal Configuration

	Terminal	Function
Supply power input	6	Positive (+) power input (red wire from battery pack, or black with stripe wire from 15 VDC plug-in transformer)
	5	Ground (-) power input (black wire from battery pack or 15 VDC plug-in transformer)
AC coil sensor input	2	Ground (-) input (black wire from coil sensor body)
	3	Pulse input (yellow or red wire from coil sensor body)
Hall Effect sensor input	1	Positive (+) input (red wire from hall effect sensor)
	2	Ground (-) input (black wire from hall effect sensor)
	3	Pulse input (bare wire from hall effect sensor)
Open connector pulse output (from sensor)	7	NPN positive (+) signal output (Max voltage: 24VDC, Max load: 15mA, 2k ohm pull-up recommended.)
	4	NPN negative (-) signal output

F-2000 RT Board

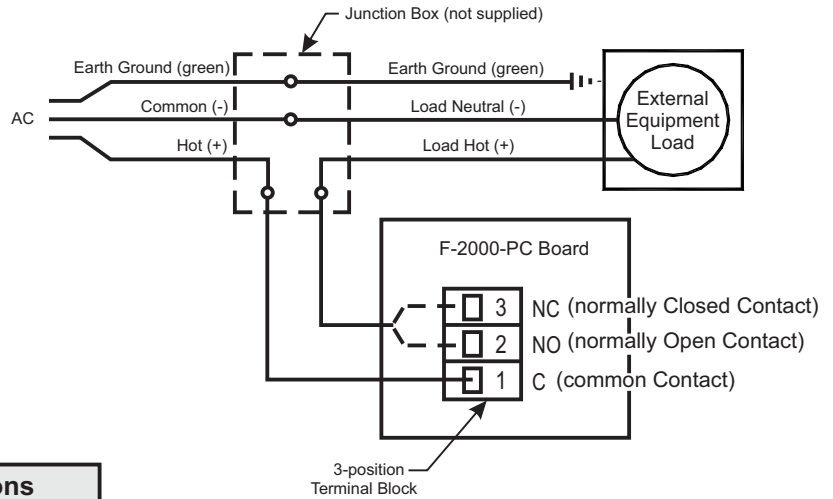
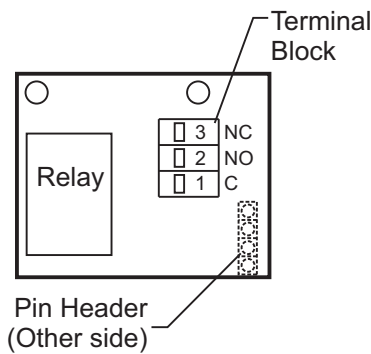


Jumper Positions



1.4 Model PC Circuit Board Wiring

CAUTION: DISCONNECT POWER SOURCE BEFORE SERVICING.



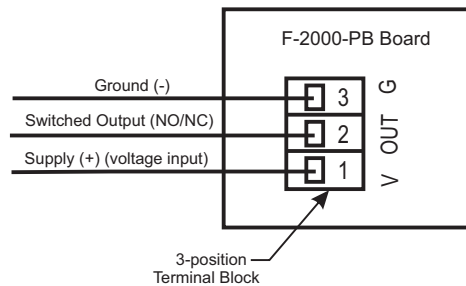
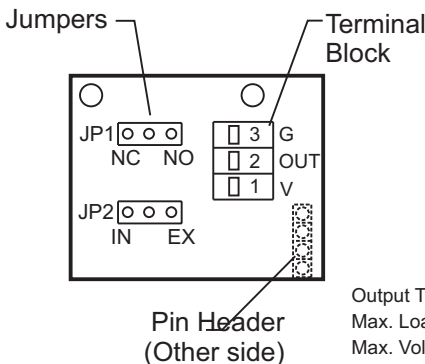
Terminal Configuration

Terminal	Terminal Block Connections
1	Common
2	NO (Normally Open) contact
3	NC (Normally Closed) contact

Output Type: Isolated relay SPDT (single poll double throw), NO / NC
 Max. Load: 8 amps (AC) @ 115 VAC, 220 VAC, 230 VAC
 7 amps (DC) @ 30 VDC (resistive load)
 Max. Voltage: 250 VAC, 125 VDC

1.5 Model PB Circuit Board Wiring

CAUTION: DISCONNECT POWER SOURCE BEFORE SERVICING.



Output Type: Non-Isolated contact closure switch, NO / NC
 Max. Load: 100 milliamps (.10 amp)
 Max. Voltage: 30 VDC if JP2 is set for external power.
 15 VDC if JP2 is set for internal power and F-2000 is powered by plug-in transformer.
 3 VDC if JP2 is set for internal power and F-2000 is powered by Batteries.
 Max. Power: 3 Watts

Terminal Configuration

Terminal	Terminal Block Connections
1	Voltage input (+)
2	Switched output (NO/NC)
3	Ground (-)



Jumper Configuration

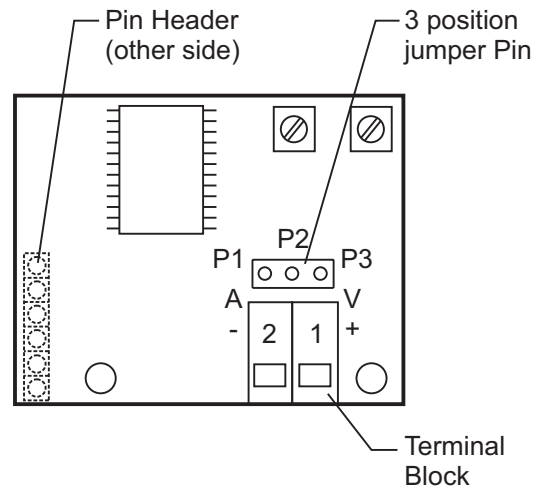
Jumper	Jumper Settings
JP1	NC = Normally closed contacts NO = Normally open contacts (default)
JP2	IN = Internal power EX = External power (default) Note: See above voltage limits

1.6 Model AO Circuit Board Wiring

CAUTION: DISCONNECT POWER SOURCE BEFORE SERVICING.

Jumper Configuration

Output	Jumper Settings
4-20 Milliamp	Connect P1 & P2 (leave P3 open) (factory default), Max Load = 250 Ohms 
0-10 Volts DC	Connect P2 & P3 (leave P1 open), Max Load = 500 Ohms 

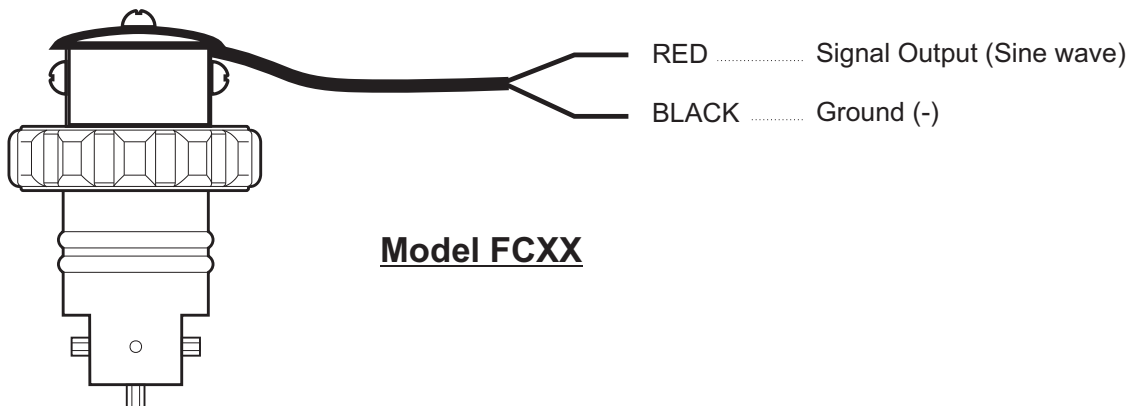
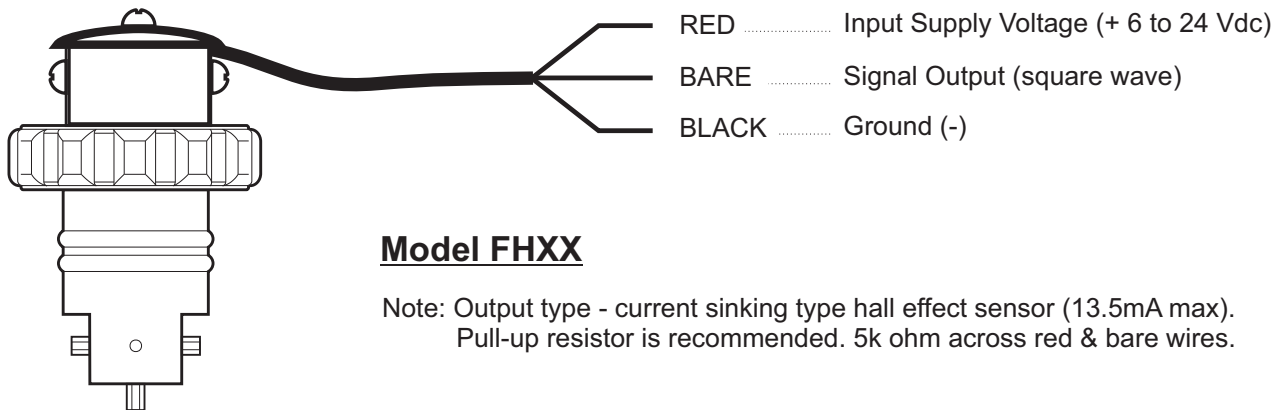


Terminal Configuration

Terminal Number	Terminal Block Connections
1	Positive (+) Analog Output Signal
2	Negative (-) Analog Output Signal

Output Type: Linear, Non-Isolated, powered loop.
 Loop resistance: 250 ohm maximum for 4-20mA output
 500 ohm maximum for 0-10 V DC

1.7 Model FHXX and FCXX Sensor wiring



2.0 HOW TO OPERATE THE MODEL PC and MODEL PB

2.1 What Was The MODEL PC and PB Designed To Do?

In addition to the features of the MODEL RT, the model PC includes a single SPDT relay which can be used to switch an external component such as a pump, valve, alarm buzzer, etc., on and off in order to assist in the control of a process. The relay setpoints must be assigned to either the rate mode, the batch (total) mode, or turned off. **The MODEL PC cannot be battery operated.**

The MODEL PB offers all of the features of the MODEL PC but includes a contact closure switch instead of a relay and may be battery operated.

- High level flow rate alarm.
- Low level flow rate alarm.
- High and low level flow “range” alarm.
- Manual start or automatically timed start batch processing.
- Proportional chemical feed injector pump control.

2.2 What Features Are Available?

- All controls are front panel programmable.
- MODEL PC Max. switching load 8 Amp at - 115 VAC, 230 VAC, 220 VAC; 7 Amp at 30 VDC (resistive load).
- MODEL PB Max. switching load 100 milliamp at 30 VDC.
- NO / NC contact.
- Rate alarms can be latched requiring a manual reset.
- Programmable “alarm release value” provides hysteresis to prevent relay flickering (see page 28).
- High and low range alarms can be independently programmed.
- Alarm delay timer temporarily silences alarms for a programmed time from 0-999 seconds.
- Independent display and resetting of batch count and batch amount.
- Front panel clearing of batch counts and amounts can be disabled.
- Turn on / off external devices, for a programmable time from 0-999 seconds per batch.

2.3 How Do I Program The MODEL PC & PB?

The Model PC & PB setpoints must be assigned to either the rate mode (option 1), the batch (total) mode (option 2), or turned off (option 3).

- Option 1 -** Assign the setpoints to the RATE mode for applications involving the switching of external devices, such as alarms or valves, when the rate of flow is greater than or less than the programmed flow RATE value. The Model PC and PB is used to monitor flow RATE in this mode. **Example:** High or low flow rate alarms.
- Option 2 -** Assign the setpoints to the BATCH mode for applications involving the switching of external devices such as chemical metering pumps, centrifical pumps, solenoid valves, etc., when the amount of flow is greater than or less than the programmed batch amount value. In this mode, the Model PC is used to monitor flow total. **Example:** Manual batch processing or proportional feed rate control.
- Option 3 -** The OFF mode opens the relay contacts regardless of the flow conditions. The setpoints are not assigned.

SETPOINT MODE SELECTION PROGRAMMING SCREEN OPTIONS

OPTION	SELECTION	FUNCTION
Option - 1 (page 27)	Setpoint - RATE	Relay Setpoints are assigned to flow RATE mode.
Option - 2 (page 32)	Setpoint - BATCH	Relay Setpoints are assigned to BATCH (accumulative or “total”) mode.
Option - 3	Setpoint - OFF	Relay Setpoints are not assigned. Relay is not energized.

OPTION 1. RELAY SETPOINTS ARE ASSIGNED TO THE RATE MODE.

When the setpoint mode selection screen is assigned to RATE, the following program screens are available:

PROGRAMMING SCREEN	PROGRAMMING SCREEN FUNCTION
Setpoint - RATE - 1	High alarm flow RATE trigger value. (Factory default value = 000001)
Setpoint - RATE - 2	High alarm flow RATE release value. (Factory default value = 000001)
Setpoint - RATE - 3	Low alarm flow RATE trigger value. (Factory default value = 000001)
Setpoint - RATE - 4	Low alarm flow RATE release value. (Factory default value = 000001)
Setpoint - RATE - 5	Alarm reset delay time from 000 - 999 seconds. (Factory default value = 000)

The *relay setpoints* may be assigned in one of three ways:

Choice 1. High Alarm Only

The **High Alarm Trigger Setpoint** energizes the relay at a high flow rate value (high flow alarm). A single trigger value is assigned to a flow rate value greater than the normal flow rate. The relay will energize when the flow rate increases to the programmed value. In this option, the low trigger and release values are not used and should be programmed to a value of zero.

Choice 2. Low Alarm Only

The **Low Alarm Trigger Setpoint** energizes the relay at a low flow rate value (low flow alarm). A single trigger value is assigned to a flow rate value less than the normal flow rate. The relay will energize when the flow rate decreases to the programmed value. In this option, the high trigger and release values are not used and should be programmed to a value of zero.

Choice 3. High and Low Range Alarm Setpoints

The **Range Alarm Setpoints** energize the relay at both the high and low flow rate values (out-of-range alarm). Both the high and low trigger values must be assigned creating an acceptable range of flow. The relay will energize when the flow rate increases or decreases out of the acceptable range.

The *relay action* may be programmed in three ways:

Choice 1. Manual Unlatching requires the user to press the clear setpoints button to unlatch the relay (turn off the alarm). The relay is energized and latched when the trigger value is reached and remains energized and latched until the clear setpoints button is pressed.

To enable the feature, program the trigger and release values to the same value.

Choice 2. Automatic Unlatching requires the programming of a separate release point. When the setpoint is triggered, the relay will automatically unlatch when this release value is crossed.

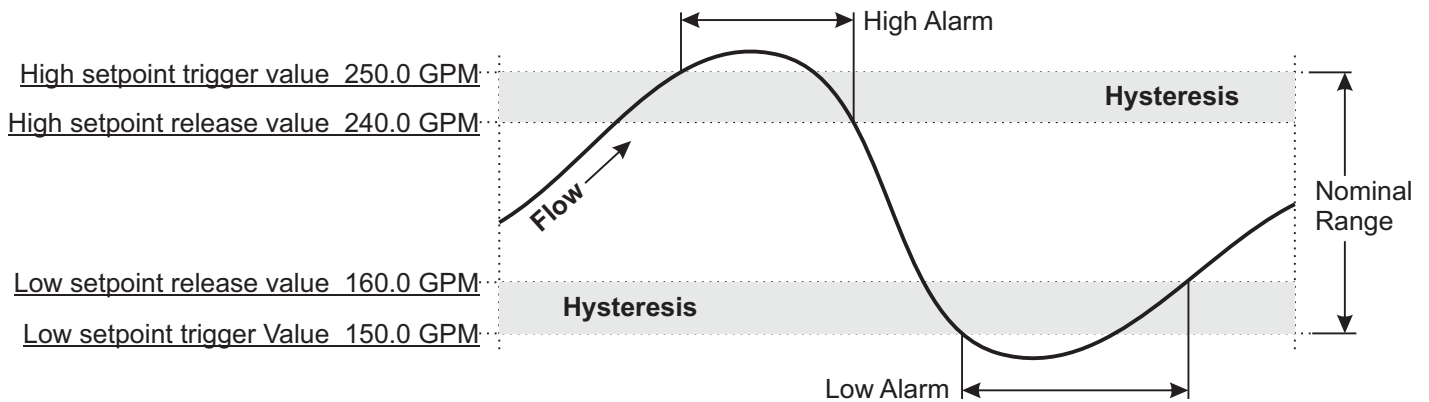
To enable the feature, program a different trigger and release value. The high release value must be less than the high trigger value. The low release value must be greater than the low trigger value.

Choice 3. The Relay is Deactivated

To deactivate the relay, program all trigger and release values to zero.

NOTE: When latched, regardless of how the relay action is programmed, the relay may be unlatched manually by pressing the front panel "clear setpoints" button. However if there is still an alarm condition (high or low trigger value is exceeded), the relay will immediately re-latch. An alarm reset delay time can be programmed which will delay the re-latching of the relay even though the alarm condition still exists. If the relay is being used to switch an audible alarm, this feature allows for temporarily silencing the alarm, allowing time to affect repairs, without actually disabling the alarm feature. The programmable time range is from 0-999 seconds.

FLOW RANGE ALARM EXAMPLE



Note: If the relay flickers on and off due to unstable flow, readjust the release value to increase the amount of hysteresis.

2.4 Programming the MODEL PC & PB when the setpoints are assigned to rate.





Caution: An emergency shut off switch for externally controlled electrical equipment is recommended.

Note: The F-2000 must be powered by the AC Adapter.

Note: While in the programming mode, if no buttons are pressed within twenty seconds, the programming mode is automatically exited without saving the input of the last screen.




Step 1 Enter the programming mode and assign the setpoints to the RATE mode.






- Press  for at least 1.25 seconds.
- Press  to by-pass the first six program screens until you reach the Rate Setpoint Screen (seventh
- Press  to select Rate Setpoint On.
- Press .

Step 2 Enter the High Alarm Trigger Value or 0.






- Press  to select the digit or decimal point to be modified. The selected digit will blink.
- Press  to change the selected digit. Note: Setting the value to zero disables the High Alarm.screen).
- Press  when you have entered your desired High Alarm Trigger Value.




Step 3 **Enter the High Alarm Release Value or 0.**

- Press  to select the digit or decimal point to be changed. The selected digit will blink.
- Press  to change the selected digit. *Note:* This value must not be greater than the High Alarm Trigger Value.
- Press  when you have entered your desired High Alarm Release Value.


Step 4 **Enter the Low Alarm Trigger Value or 0.**

- Press  to select the digit or decimal point to be changed. The selected digit will blink.
- Press  to change the selected digit. *Note:* Setting the value to zero disables the Low Alarm.
- Press  when you have entered your desired Low Alarm Trigger Value.




Step 5 **Enter the Low Alarm Release Value or 0.**

- Press  to select the digit or decimal point to be changed. The selected digit will blink.
- Press  to change the selected digit. *Note:* This value must not be less than the Low Alarm Trigger Value.
- Press  when you have entered your desired Low Alarm Release Value.

Step 6 **Enter the Alarm Reset Delay Timer in seconds or press**

The alarm will be silenced (relay de-energized) for the programmed amount of time when  is pressed.

After the delay time, if the alarm condition still exists, the relay will re-energize. This feature allows the user to temporarily silence the alarm without disabling the alarm feature. The programmed time range is from 0 to 999 seconds.

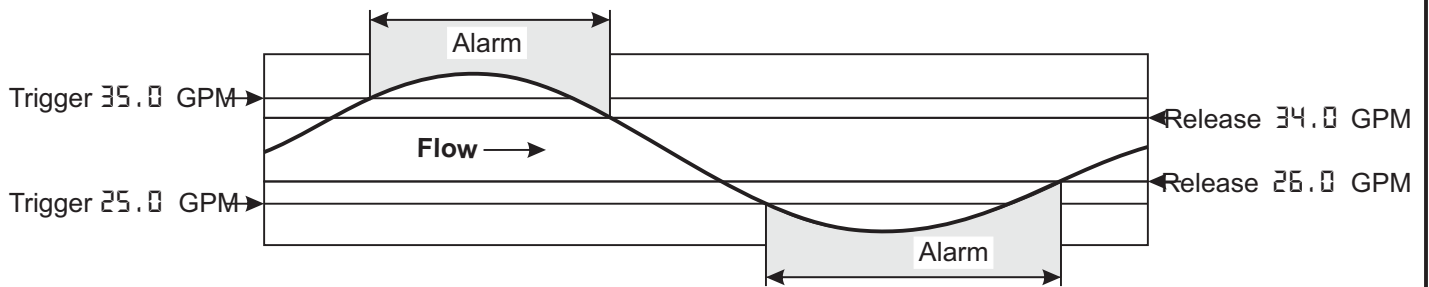
- Press  to select the digit to be changed.
- Press  to change the selected digit. *Note:* Setting the value to zero disables the Alarm Reset Delay Timer.
- Press  to save your Alarm Reset Delay Time.

Step 7 **Press and hold down**

for at least 1.25 seconds to exit.

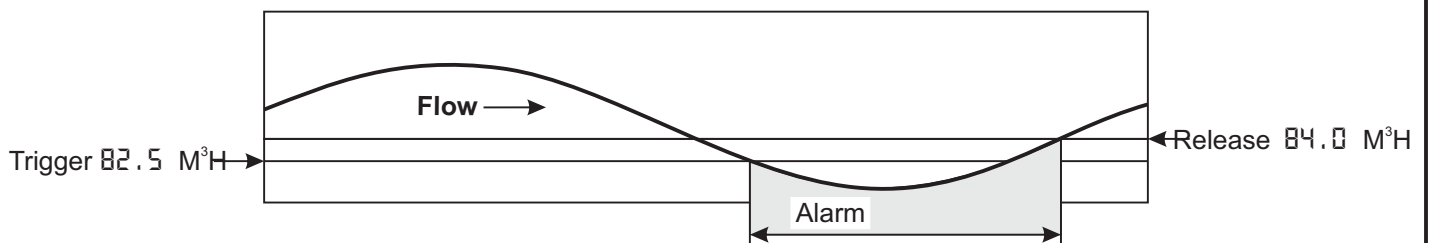
2.5 Examples of Setpoint Assigned to Rate.

Example 1: An audible alarm must sound when the flow rate goes out of the range of 25 to 35 gallons per minute.



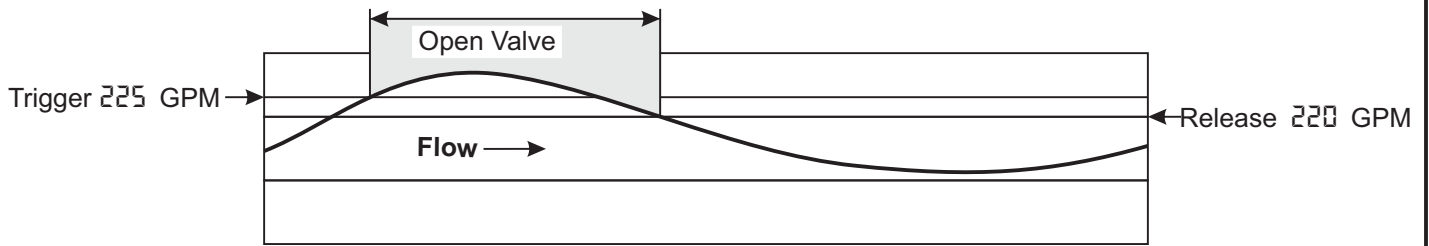
- Step 1** Set the SETPOINT MODE SELECTION screen to SETPOINT - RATE.
- Step 2** Set SETPOINT - RATE - 1, screen for a high range trigger value of 35.0.
- Step 3** Set SETPOINT - RATE - 2, screen for a high range release value of less than 35 and greater than 25. (If latching alarm is required, set the release value to 35).
- Step 4** Set SETPOINT - RATE - 3, screen for a low range trigger value.
- Step 5** Set SETPOINT - RATE - 4, screen for a low range release value of greater than 25 and less than 35. (If latching alarm is required, set the release value to 25).
- Step 6** Set SETPOINT - RATE - 5, to the desired alarm silencing delay time of 0 - 999 seconds(optional).
- Step 7** Wire the alarm to the normally open terminals of the relay terminal block. See page 16.

Example 2: An audible alarm must sound if the flow rate goes below 82.5 cubic meters per hour.



- Step 1** Set the SETPOINT MODE SELECTION SCREEN to SETPOINT - RATE.
- Step 2** Set SETPOINT - RATE - 1, screen for a high trigger value of 0. (High alarm not used, bypass).
- Step 3** Set SETPOINT - RATE - 2, screen for a high release value of 0. (High alarm not used, bypass).
- Step 4** Set SETPOINT - RATE - 3, screen for a low trigger value of 82.5.
- Step 5** Set SETPOINT - RATE - 4, screen for a low release value of greater than 82.5 (example: 84.0).
- Step 6** Set SETPOINT - RATE - 5, to the desired alarm silencing delay time of 0 - 999 seconds (optional).
- Step 7** Wire the alarm to the normally open terminals block. See page 16.

Example 3: A solenoid valve must open if the flow rate goes above 225 gallons per minute.



- Step 1** Set the SETPOINT MODE SELECTION SCREEN] to SETPOINT - RATE.
- Step 2** Set SETPOINT - RATE - 1, screen for a high trigger value of 225.
- Step 3** Set SETPOINT - RATE - 2, screen for a high release value of less than 225. Example: 220
- Step 4** Set SETPOINT - RATE - 3, screen for a low trigger value of 0. (Low alarm not used).
- Step 5** Set SETPOINT - RATE - 4, screen for a low release value of 0. (Low alarm not used).
- Step 6** Set SETPOINT - RATE - 5, to the desired alarm delay silencer time from 0 - 999 seconds (optional).
- Step 7** Wire the value to the normally open terminals of the relay terminal block. See page 16.

OPTION 2. RELAY SETPOINTS ARE ASSIGNED TO THE BATCH MODE.

BATCH AMOUNT - Two types of batch applications are available, manually started batches and automatically started batches. Both types require the programming of a batch amount value.

In a **manually started batch**, the relay is energized manually by the user when the front panel clear setpoint button is pressed and de-energized when the batch amount is reached. In this mode, the relay is switching a valve or other device that is controlling the flow being measured.

In an **automatically started batch**, the relay is energized and the external equipment timer is started when the batch amount is reached. The relay is de-energized at the end of the timer cycle.

AUTO RESET ON/OFF - The auto reset must be turned off for manual start batches and turned on for auto start batches.

EXTERNAL EQUIPMENT TIMER - The external equipment timer is only used with auto start batches.

When the setpoint mode selection screen is assigned to BATCH, the following program screens are available:

PROGRAMMING SCREEN	PROGRAMMING SCREEN FUNCTION
Setpoint - BATCH - 1	Batch amount value.
Setpoint - BATCH - 2	Auto reset on or off (on for auto timed batches and proportional feed control, off for manually reset batches)
Setpoint - BATCH - 3	External equipment timer amount in seconds (0 - 999).

MANUAL BATCH START APPLICATION

Manual batch start requires pressing the clear setpoints button to energize the relay. The relay de-energizes when the Batch Amount is reached. The clear setpoints button must be pressed again to begin the next batch.

CAUTION: A SEPARATE EMERGENCY SHUT-OFF SWITCH FOR EXTERNAL EQUIPMENT IS RECOMMENDED.

Application 1. Manual Batch Operation

In this operation, the relay is used to switch a device such as a valve or pump, *that is controlling* the flow being measured.

Example: a pump is turned on and off to fill containers to a preset amount of fluid. The fluid being pumped is also the fluid being measured by the F-2000.

1. The pump is wired to the normally open relay contacts of the F-2000.
2. Manually pressing the front panel “clear setpoints” button starts the batch by energizing the relay, which switches on power to the pump. The **SETPOINT** display icon illuminates.
3. The displayed Batch Number increments by one.
4. The displayed Batch Amount increases based on the pump flow rate.
5. When the programmed Batch Amount is reached, the relay de-energizes, turning off the pump. The **SETPOINT** display icon disappears.
6. The batch is complete.

Note: The batch may be interrupted and re-started by pressing the “clear setpoints” button. The **SETPOINT** display icon flashes.

AUTOMATIC BATCH START APPLICATION

Automatic Batch Start requires programming the EXTERNAL EQUIPMENT TIMER to a specific time from 000 - 999 seconds. When the batch amount is reached, the relay energizes and the timer starts. The relay de-energizes when the number of seconds programmed is reached.

Application 2. Proportional Chemical Feed Operation

In this operation, the relay is used to switch a device such as a valve or pump, *that is being controlled* by the flow being measured.

Example: A chemical injection pump is turned on for a preset amount of time when the Programmed Batch Amount is reached, thus injecting an amount of chemical per an amount of measured flow.

1. The chemical injection pump is wired to the normally open relay contacts.
2. The flow measurement begins.
3. The displayed Batch amount increases based on the flow rate being measured.
4. When the programmed Batch Amount is reached, the following occurs:
 - a. The external equipment timer begins.
 - b. The relay energizes turning on the chemical injection pump.
 - c. The Batch Amount Resets to zero.
 - d. The next batch flow rate measurement begins and the displayed Batch Amount increases.
 - e. When the External Equipment Timer cycle ends, the relay de-energizes turning off the chemical injection pump.
5. The displayed Batch Number increments by one.
6. The batch is complete.

Note: The chemical pump may be stopped and re-started by pressing the clear setpoints button.

Application 3. Automatically Timed Batching Operation

In this operation, the relay is used to switch a device, such as a valve or pump, *that is controlling* the flow being measured.

Example: A solenoid valve is wired to the normally closed contact of the F-2000 relay. In the de-energized relay state, the valve is energized and open, which permits the flow being measured to flow. When the programmed batch amount is reached, the relay is energized, opening the relay circuit which closes the valve, and a time delay cycle begins. After the time delay cycle, the relay de-energizes which opens the solenoid valve and the next batch begins.

CAUTION: WHEN WIRED TO THE NORMALLY CLOSED CONTACTS OF THE RELAY, EXTERNAL EQUIPMENT WILL BE ENERGIZED IF THE CLEAR SETPOINTS BUTTON IS PRESSED. A SEPARATE EMERGENCY SHUT-OFF SWITCH FOR EXTERNAL EQUIPMENT IS RECOMMENDED.

1. The solenoid valve is wired to the normally closed contacts.
2. The flow measurement begins.
3. The displayed Batch Amount increases based on the flow rate being measured.
4. When the programmed Batch Amount is reached, the following occurs:
 - a. The time delay cycle (External Equipment Timer) begins.
 - b. The relay energizes closing the valve which stops the flow.
 - c. The batch amount resets to zero.
5. When the External Equipment Timer cycle ends, the relay de-energizes, opening the solenoid valve.
6. The displayed Batch Number increments by one.
7. The batch is complete.





2.6 Programming The MODEL PC & PB When Setpoints Are Assigned To Batch

Note: The F-2000 must be powered by the AC adapter.

CAUTION: A SEPARATE EMERGENCY SHUT-OFF SWITCH FOR EXTERNAL EQUIPMENT IS RECOMMENDED.

Step 1 Enter the programming mode and assign the setpoint to the BATCH mode.






- Press  for at least 1.25 seconds.
- Press  to by-pass the first six program screens until you reach the Batch Setpoint Screen (seventh screen).
- Press  to select Batch Setpoint ON.
- Press .

Step 2 The Setpoint Batch-1 screen, Batch Amount Value is selected.



This screen is used to enter the batch amount value. The relay will energize when the accumulated total flow equals the programmed value.



- Press  to select the digit or the decimal to be modified. The selected digit will blink.
- Press  to change the selected digit.
- Press  when you have finished.

Step 3 The Setpoint Batch-2 screen, Auto Batch Start On or Off is enabled.



This screen is used to toggle the auto Batch Start function On and Off.

Note: Select **On** for auto-Start Batches and **Off** for manual Start Batches.




- Press  to select On or Off.
- Press .

Step 4 The Setpoint Batch-3 screen, external equipment Timer amount (in seconds) is displayed.



This screen is used to enter the number of seconds per batch that the relay will be energized.

Note: Set to zero for manual Start Batch operations.


- Press  to select the digit to be modified.
- Press  to change the selected digit.
- Press .

2.7 Examples of Setpoint Assigned To Batch

Example 1: Proportional feed application. A chemical feed pump must run for 3 seconds for every 12.57 liters of flow measured.

- Step 1** Set the SETPOINT MODE SELECTION screen to SETPOINT - BATCH.
- Step 2** Set SETPOINT - BATCH - 1 screen for a batch amount value of 000012.57
- Step 3** Set SETPOINT - BATCH - 2 screen for automatic batch start.
- Step 4** Set SETPOINT - BATCH - 3 screen for external equipment timer on-time of 003 seconds.
- Step 5** Wire the pump to the normally open terminals of the relay terminal block.
- Step 6** The pump will start automatically when the batch amount is reached.

Example 2: Manual batch application. In a truck depot, an attendant must open a solenoid valve allowing 2,000 gallons of water to flow into each truck.

- Step 1** Set the SETPOINT MODE SELECTION screens to SETPOINT - BATCH
- Step 2** Set SETPOINT - BATCH - 1 screen for a batch amount value of 00002000
- Step 3** Set SETPOINT - BATCH - 2 screen for automatic BATCH START OFF.
- Step 4** Set SETPOINT - BATCH - 3 screen for external equipment timer on-time of 000 seconds.
- Step 5** Wire the solenoid valve to the normally open terminals of the relay terminal block.
- Step 6** Press  to begin the first batch.

3.0 HOW TO OPERATE THE MODEL AO

3.1 What Was The MODEL AO Designed To Do?

! Output a 4-20mA or 0-10VDC signal which is proportional to the flow.

3.2 What Features Are Available?

- ! Front panel programmable zero and span.
- ! 20-4mA and 10-0VDC inverted logic capabilities.
- ! Front programming can be disabled for security.
- ! 4-20mA or 10VDC output signal (factory default) selected via jumper pin located on the circuit board.






3.3 How Do I Program The MODEL AO?

Note: The F-2000 must be powered by AC Adapter

Programming Screen	Programming Screen Function
MA 1	Input the desired flow rate which corresponds to an output signal of 4mA or 0VDC. This value may be either the high or the low point in the range.
MA 2	Input the desired flow rate which corresponds to an output signal of 20mA or 10VDC. This is the opposite range point from the MA 1 setting (above).




Step 1 MA 1, Flow Rate at Low Output Signal (4mA or 0VDC).



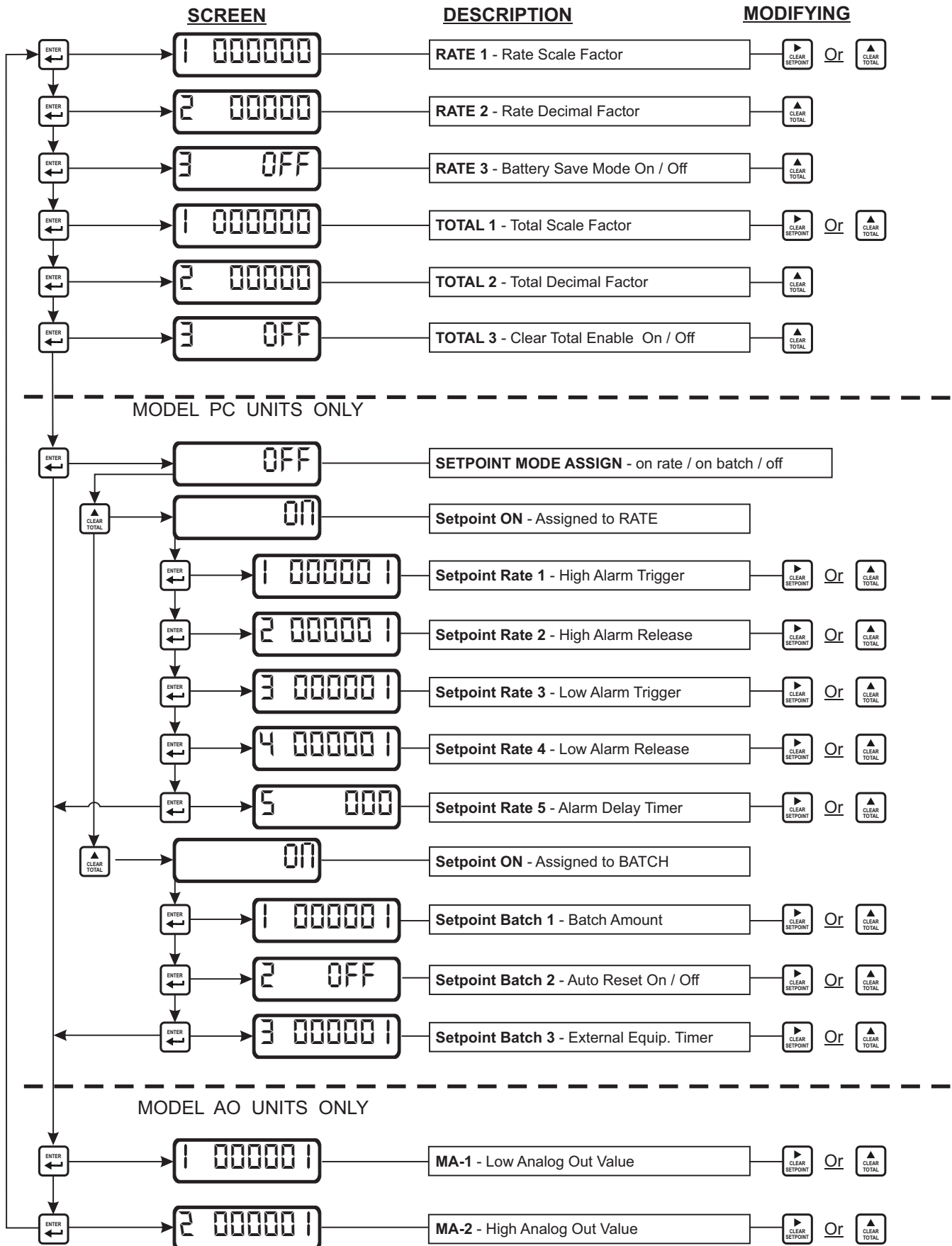
- Press  for at least 1.25 seconds to activate programming mode.
- Press  to toggle through the different display screens until you reach the MA screen.
- Press  to select the digit to be changed. *Note:* The selected digit will blink.
- Press  to change the selected digit.
- Press  .

Step 2 MA 2, Flow Rate at High output Signal (20mA or 10VDC).



- Press  to select the digit to be changed.
- Press  to change the selected digit.
- Press  .

4.0 Programming Menu Flow Chart



BLUE-WHITE LIMITED WARRANTY

Your Blue-White product is a quality product and is warranted for a specific time from date of purchase (proof of purchase is required). The product will be repaired or replaced at our discretion. Failure must have occurred due to defect in material or workmanship and not as a result of operation of the product other than in normal operation as defined in the product manual. Warranty status is determined by the product's serial label and the sales invoice or receipt. The serial label must be on the product and legible. The warranty status of the product will be verified by Blue-White or a factory authorized service center.

Variable Area and Digital Flow meters are warranted for 1 year from date of purchase (proof of purchase is required). The flow meter will be repaired or replaced at our discretion. The S6A ultrasonic flow meter is warranted for 2 years from date of purchase (proof of purchase is required). The flow meter will be repaired or replaced at our discretion.

WHAT IS NOT COVERED

- Freight to the factory, or service center.
- Products that have been tampered with, or in pieces.
- Damage resulting from misuse, carelessness such as chemical spills on the enclosure, abuse, lack of maintenance, or alteration which is out of our control.
- Damage by faulty wiring, power surges or acts of nature.
- Damage that occurs as a result of: meter misalignment, improper installation, over tightening, use of non-recommended chemicals, use of non-recommended adhesives or pipe dopes, excessive heat or pressure, or allowing the meter to support the weight of related piping.

BLUE-WHITE does not assume responsibility for any loss, damage, or expense directly or indirectly related to or arising out of the use of its products. Failure must have occurred due to defect in material or workmanship and not as a result of operation of the product other than in normal operation as defined in the manual.

Warranty status is determined by the product's serial label and the sales invoice or receipt. The serial label must be on the product and legible. The warranty status will be verified by Blue-White or a factory authorized service center.

PROCEDURE FOR IN WARRANTY REPAIR

Warranty service must be performed by the factory or an authorized service center. Contact the factory or local repair center to obtain a RMA (Return Material Authorization) number. It is recommended to include foot strainer and injection/check valve fitting since these devices may be clogged and part of the problem. Decontaminate, dry, and carefully pack the product to be repaired. Please enclose a brief description of the problem and proof of purchase. Prepay all shipping and insurance cost. COD shipments will not be accepted. Damage caused by improper packaging is the responsibility of the sender. When In-Warranty repair is completed, the factory pays for return shipping to the dealer or customer.

PRODUCT USE WARNING

Blue-White products are manufactured to meet the highest quality standards in the industry. Each product instruction manual includes a description of the associated product warranty and provides the user with important safety information. Purchasers, installers, and operators of Blue-White products should take the time to inform themselves about the safe operation of these products. In addition, Customers are expected to do their own due diligence regarding which products and materials are best suited for their intended applications. BLUE-WHITE is pleased to assist in this effort but does not guarantee the suitability of any particular product for any specific application as Blue-White does not have the same degree of familiarity with the application that the customer/end user has. While BLUE-WHITE will honor all of its product warranties according to their terms and conditions, Blue-White shall only be obligated to repair or replace its defective parts or products in accordance with the associated product warranties.

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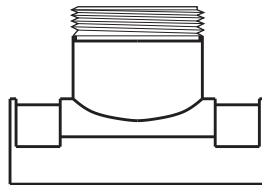
Blue-White[®]

URL: www.Blue-White.com
E-mail: sales@blue-white.com
Customerservice@blue-white.com

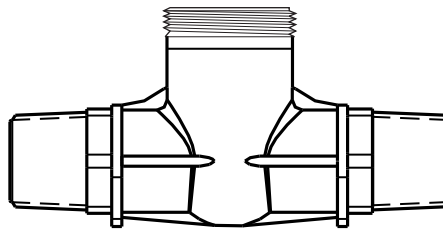
Phone: 714-893-8529
Fax: 714-894-0149

PADDLEWHEEL FLOWMETER

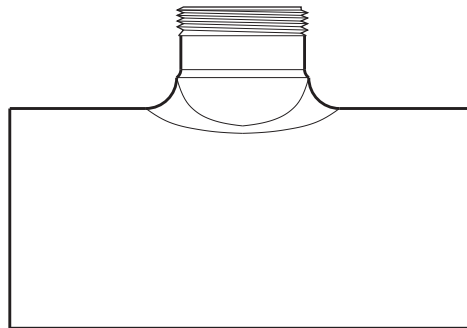
PIPE FITTING INSTALLATION MANUAL



SADDLE



MOLDED IN-LINE BODY



MOLDED TEE

Blue-White[®]

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1.0 Temperature vs. Pressure

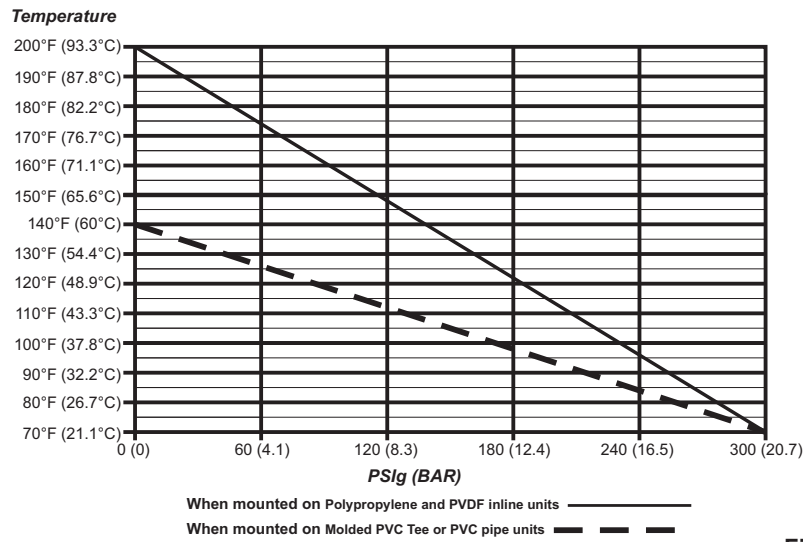


Fig. 1

Note: Pressure and temperature limits are inversely proportional.

2.0 Calibration Constants

Note: The values in the following tables are based on laboratory testing of nominal pipe dimensions. The sensor is factory calibrated to ±1% of full scale linearity. Your actual accuracy will vary based on your pipe I.D. And other installation factors.

METRIC PIPE PN10 & PN16 (Meets DIN 8062)

Saddle Mount Models (Pipe Insertion connection)

Standard Flow Range - LPM (liters per minute)

Pipe Size (MM)	PN Rating	Pipe I.D. (MM)	Flow Range (LPM)	K-Factor (Pulse/L)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr)	Rate Display Decimal Point	Total Scale Factor (St)	Total Display				
50	10	45.2	70.0 - 700.0	16.561	36.2297	0000.0	00.0604	00000				
50	16	42.6	70.0 - 700.0	20.719	28.9588	0000.0	00.0483	00000				
63	10	57.0	110 - 1100	10.522	05.7023	00000	00.0950	00000				
63	16	53.6	110 - 1100	11.830	05.0720	00000	00.0845	00000				
90	10	81.4	230 - 2300	5.294	11.3335	00000	00.1889	00000				
90	16	76.6	230 - 2300	5.944	10.0944	00000	00.1682	00000				
110	10	99.4	350 - 3500	2.942	20.3969	00000	00.3399	00000				
110	16	93.6	350 - 3500	3.107	19.3133	00000	00.3219	00000				
160	10	144.6	720 - 7200	1.386	43.2782	00000	00.7213	00000				
160	16	136.2	720 - 7200	1.574	38.1081	00000	00.6351	00000				
200	10	180.8	1150 - 11500	0.927	64.7077	00000	01.0785	00000				
200	16	170.2	1150 - 11500	1.008	59.5501	00000	00.9925	00000				
250	10	226.2	1700 - 17000	0.565	106.232	00000	01.7705	00000				
315	10	285.0	2700 - 27000	0.353	170.003	00000	02.8334	00000				

I.P.S. PIPE (Meets ASTM-D-1785)

Molded Inline Bodies (Male NPT connection)

3/8" - 1" pipe sizes - Standard Range #1 - GPM (gallons per minute)

Pipe Size (in.)	Pipe Sch.	Body I.D. (In.)	Flow Range (GAL/Min)	K-Factor (Pulse/GAL)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr)	Rate Display Decimal Point	Rate Scale Factor (Sr)	Rate Display Decimal Point	Total Scale Factor (St)	Total Display Decimal Point	Total Scale Factor (St)	Total Display Decimal Point
3/8	Inline	0.375	.800 - 8.000	1456.31	41.2000	00.000	00.000	00.0069	0000.0	00.0069	0000.0	
1/2	Inline	0.500	2.00 - 20.00	1034.48	05.8000	000.00	000.00	00.0097	0000.0	00.0097	0000.0	
3/4	Inline	0.660	3.00 - 30.00	612.25	09.8000	000.00	000.00	00.0163	0000.0	00.0163	0000.0	
1.0	Inline	0.840	5.00 - 50.00	338.60	17.7200	000.00	000.00	00.0295	0000.0	00.0295	0000.0	

3/8" - 1" pipe sizes - Low Range #2 - GPM (gallons per minute)

Pipe Size (in.)	Pipe Sch.	Body I.D. (In.)	Flow Range (GAL/Min)	K-Factor (Pulse/GAL)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr)	Rate Display Decimal Point	Rate Scale Factor (Sr)	Rate Display Decimal Point	Total Scale Factor (St)	Total Display Decimal Point	Total Scale Factor (St)	Total Display Decimal Point
3/8	Inline	0.218	.400 - 4.000	2926.83	20.5000	00.000	00.000	00.0034	0000.0	00.0034	0000.0	
1/2	Inline	0.250	.500 - 5.000	2419.35	24.8000	00.000	00.000	00.0041	0000.0	00.0041	0000.0	
3/4	Inline	0.375	.800 - 8.000	1518.99	39.5000	00.000	00.000	00.0066	0000.0	00.0066	0000.0	
1.0	Inline	0.500	2.00 - 20.00	1034.48	05.8000	000.00	000.00	00.0097	0000.0	00.0097	0000.0	

Molded Inline Bodies (Male NPT connection) - continued

1-1/2" - 2" pipe sizes - GPM (gallons per minute)

Pipe Size (in.)	Pipe Sch.	Flow Range #	Flow Range (GAL/Min)	K-Factor (Pulse/GAL)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr)	Rate Display Decimal Point	Rate Scale Factor (Sr)	Rate Display Decimal Point	Total Scale Factor (St)	Total Display Decimal Point	Total Scale Factor (St)	Total Display Decimal Point
1-1/2	Inline	1	4.00 - 40.00	466.20	12.8700	000.00	000.00	00.0215	0000.0	00.0215	0000.0	
1-1/2	Inline	2	6.00 - 60.00	192.93	31.0994	000.00	000.00	00.0518	0000.0	00.0518	0000.0	
1-1/2	Inline	3	10.0 - 100.0	156.94	3.8231	0000.0	0000.0	00.0637	0000.0	00.0637	0000.0	
2	Inline	1	4.00 - 40.00	468.75	12.8000	000.00	000.00	00.0213	0000.0	00.0213	0000.0	
2	Inline	2	6.00 - 60.00	196.40	30.5499	000.00	000.00	00.0509	0000.0	00.0509	0000.0	
2	Inline	3	10.0 - 100.0	162.16	3.7000	0000.0	0000.0	00.0617	0000.0	00.0617	0000.0	
2	Inline	4	20.0 - 200.0	67.416	8.9000	0000.0	0000.0	00.1483	0000.0	00.1483	0000.0	

Note: Certain Molded Inline bodies are no longer available, but are shown here for reference only.

Saddle Models (Pipe insertion connection)

Standard Flow Range - GPM (gallons per minute)

Pipe Size (in.)	Pipe Sch.	Pipe I.D. (In.)	Flow Range (GAL/Min)	K-Factor (Pulse/GAL)	RATE 1		RATE 2		TOTAL 1		TOTAL 2	
					Rate Scale Factor (Sr)	Rate Display Decimal Point	Rate Scale Factor (Sr)	Rate Display Decimal Point	Total Scale Factor (St)	Total Display Decimal Point	Total Scale Factor (St)	Total Display Decimal Point
1.5	40	1.610	15.0 - 150.0	86.580	06.9300	0000.0	0000.0	00.0116	00000	00.0116	00000	
1.5	80	1.500	15.0 - 150.0	102.04	05.8800	0000.0	0000.0	00.0098	00000	00.0098	00000	
2.0	40	2.067	30.0 - 300.0	50.850	11.7994	0000.0	0000.0	00.0197	00000	00.0197	00000	
2.0	80	1.939	30.0 - 300.0	58.820	10.2006	0000.0	0000.0	00.0170	00000	00.0170	00000	
2.5	40	2.469	40.0 - 400.0	34.8635	17.2010	0000.0	0000.0	00.0287	00000	00.0287	00000	
2.5	80	2.323	40.0 - 400.0	39.200	15.3061	0000.0	0000.0	00.0255	00000	00.0255	00000	
3.0	40	3.068	60.0 - 600.0	21.820	27.4977	0000.0	0000.0	00.0458	00000	00.0458	00000	
3.0	80	2.900	60.0 - 600.0	24.000	25.0000	0000.0	0000.0	00.0417	00000	00.0417	00000	
4.0	40	4.026	100 - 1000	11.8577	05.0600	00000	00000	00.0843	00000	00.0843	00000	
4.0	80	3.826	100 - 1000	12.7659	04.7000	00000	00000	00.0783	00000	00.0783	00000	
6.0	40	6.065	250 - 2500	5.3507	11.2135	00000	00000	00.1869	00000	00.1869	00000	
6.0	80	5.761	250 - 2500	5.5738	10.7647	00000	00000	00.1794	00000	00.1794	00000	
8.0	40	7.981	400 - 4000	2.985	20.1000	00000	00000	00.3350	00000	00.3350	00000	
8.0	80	7.625	400 - 4000	2.940	20.4082	00000	00000	00.3401	00000	00.3401	00000	
10.0	40	10.020	600 - 6000	1.594	37.6412	00000	00000	00.6274	00000	00.6274	00000	
10.0	80	9.564	600 - 6000	1.845	32.5203	00000	00000	00.5420	00000	00.5420	00000	
12.0	40	11.938	800 - 8000	1.116	53.7634	00000	00000	00.8961	00000	00.8961	00000	
12.0	80	11.376	800 - 8000	1.296	46.2963	00000	00000	00.7716	00000	00.7716	00000	

3.0 PIPE INSTALLATION REQUIREMENTS

3.1 Flow Stream Requirements

- The accuracy is based on steady, undisturbed flow with a fully developed **turbulent** flow profile. Pulsating, swirling and other disruptions in the flow stream will effect the meters accuracy.
- There are two basic types of flow profiles; **turbulent** and **laminar** (see figure 2).

Turbulent flow exists when the speed of the fluid flowing in the pipe is nearly constant across the entire width of the pipe. This is typical of low viscosity fluids like water, flowing at high velocity.

Laminar flow exists when the speed of the fluid flowing in the center of the pipe is greater than the speed of the fluid at the outer edge near the pipe wall. This is typical of high viscosity fluids flowing at low velocity. Because the meter is measuring the fluid near the pipe wall only (especially in larger pipe sizes), a constant flow velocity across the flow stream is required.

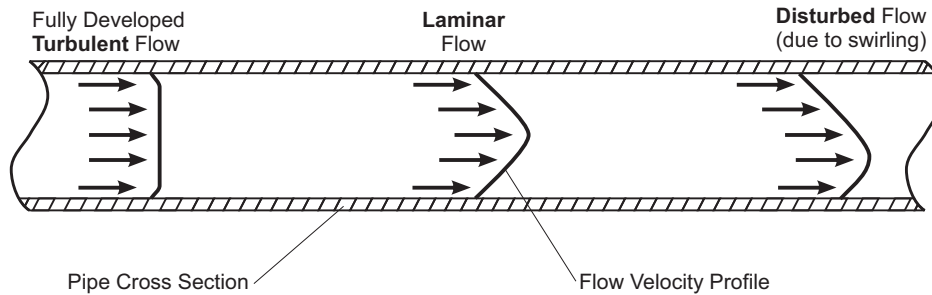


Fig. 2

To determine which type of flow exists in your installation, the following is required:

- Flow rate of the fluid in GPM = Q
- Specific gravity of the fluid = G
- Pipe inside diameter in inches = D
- Fluid viscosity in centepoise = V

Use the following equation to determine the REYNOLDS NUMBER:

$$\text{REYNOLDS NUMBER} = \frac{3160 \times Q \times G}{D \times V}$$

Flow conditions with a Reynolds Number greater than 4000 is fully developed **turbulent** flow.

A Reynolds Number less than 2000 is laminar flow. It requires a Reynolds number greater than 4000 to maintain accuracy.

3.1 Minimum Pipe Length Requirements

The accuracy is affected by disturbances such as pumps, elbows, tees, valves in the flow stream. Install the meter in a straight run of pipe **as far as possible** from any disturbances. The distance required for accuracy will depend on the type of disturbance. (see figure 3 and 4).

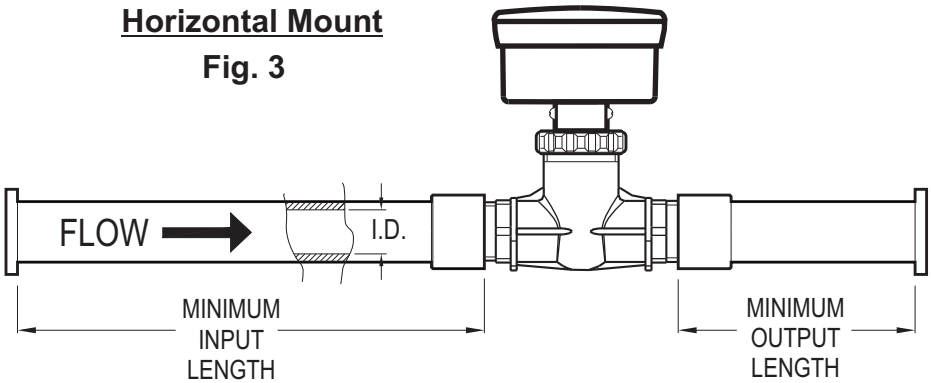
Type Of Disturbance	Minimum Inlet Pipe Length	Minimum Outlet Pipe Length
Flange	10 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Reducer	15 X Pipe Inside Diameter	5 X Pipe Inside Diameter
90° Elbow	20 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Two 90° Elbows -1 Direction	25 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Two 90° Elbows -2 Directions	40 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Pump Or Gate Valves	50 X Pipe Inside Diameter	5 X Pipe Inside Diameter

4.0 HOW TO INSTALL

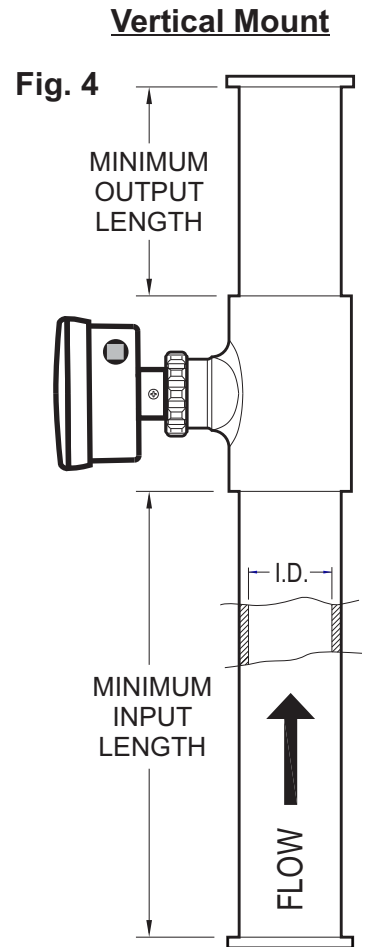
Meter was designed to be installed and operated by qualified personnel only. Do not attempt to install or operate the meter if you are unsure. Seek qualified assistance. Please note that warranty coverage does not include damage due to misuse or improper installation.

4.1 Mounting Location

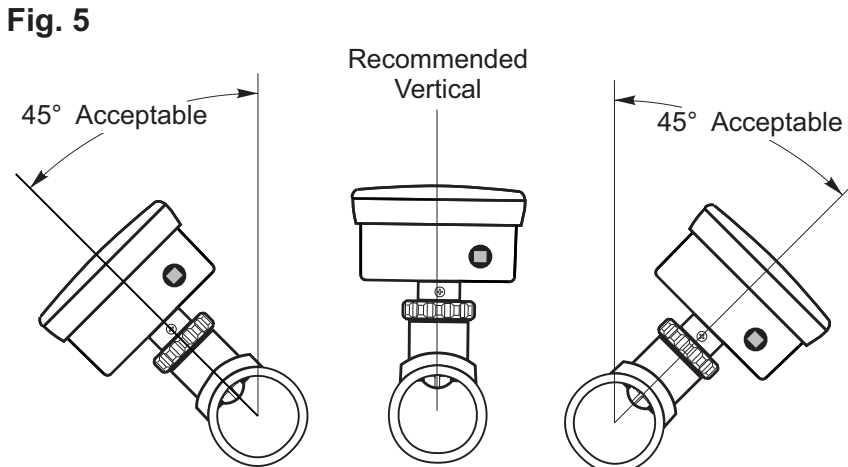
- The meter is designed to withstand outdoor conditions. A cool, dry location, where the unit can be easily serviced is recommended.
- The meter can be mounted on horizontal or vertical runs of pipe (see figure 3 and 4). Mounting at the vertical (twelve o'clock) position on horizontal pipe is recommended (see figure 7). Mounting anywhere around the diameter of vertical pipe is acceptable, however, the pipe must be completely full of water at all times. Back pressure is essential on downward flows.
- The meter can accurately measure flow from either direction provided the minimum inlet and outlet conditions are



*See Minimum Pipe Lengths table on previous page.



Angle Mount on Horizontal Pipe



5.0 How To Install Saddle Fitting

The saddle is designed to mount on smooth schedule 40 IPS pipe, schedule 80 IPS pipe (ASTM-D-1785), PN10 metric pipe or PN16 metric pipe (DIN 8062). The outside of the pipe must be clean, smooth and free of surface imperfections. The outside diameter must be as specified to ensure a leak free installation. The inside diameter must be as specified to ensure meter accuracy.

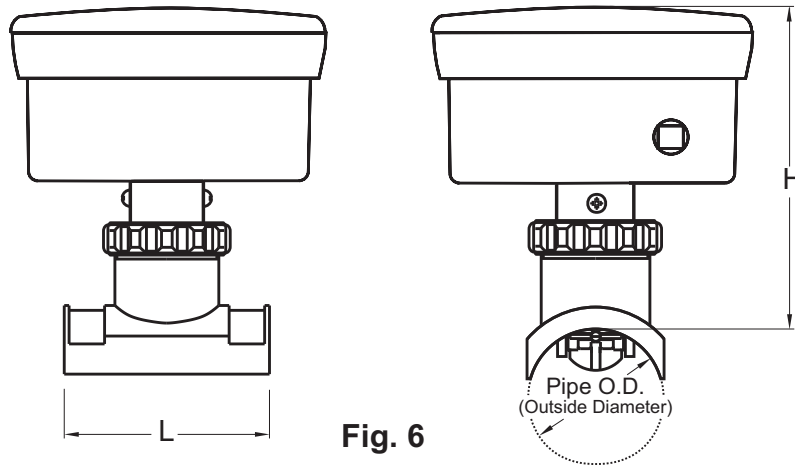


Fig. 6

I.P.S. Pipe Sizes (in inches) (ASTM-D-1785)

Nominal Pipe Size	Length (L)	Height (H)	Schedule 40		Schedule 80	
			Outside Diameter	Inside Diameter	Outside Diameter	Inside Diameter
1-1/2"	3-3/16"	4-1/2"	1.900	1.610	1.900	1.500
2"	3-3/16"	4-1/2"	2.375	2.067	2.375	1.939
3"	3-3/16"	4-1/2"	3.500	3.068	3.500	2.900
4"	3-3/16"	4-1/2"	4.500	4.026	4.500	3.826
6"	3-3/16"	4-3/8"	6.625	6.065	6.625	5.761
8"	3-3/16"	4-3/8"	8.625	7.981	8.625	7.625
10"	4-1/2"	4-1/2"	10.750	10.020	10.750	9.564
12"	4-1/2"	4-1/2"	12.750	11.938	12.750	11.376

Metric Pipe Sizes (in millimeters) (DIN 8062)

Nominal Pipe Size	Length (L)	Height (H)	Pn10		Pn16	
			Outside Diameter	Inside Diameter	Outside Diameter	Inside Diameter
50mm	81	114	50.0	45.2	50.0	42.6
63mm	81	114	63.0	57.0	63.0	53.6
90mm	81	114	90.0	81.4	90.0	76.6
110mm	81	114	110.0	99.4	110.0	93.6
160mm	81	110	160.0	144.6	160.0	136.2
200mm	81	110	200.0	180.8	200.0	170.2
250mm	114	114	250.0	226.2	N/A	N/A
315mm	114	114	315.0	285.0	N/A	N/A

Step 1 Drill The Mounting Hole

- Select an area on the pipe. Be sure the surface area of the pipe is clean and smooth.
- Meter can accurately measure flow either direction provided the minimum inlet and outlet conditions are met.
 - can accurately measure flow either direction provided the minimum inlet and outlet conditions are met.
- Drill a 1-1/8" diameter hole through the center of the pipe wall. On horizontal installations, drill the hole as close to the vertical (12 O'clock) position as possible. Do not exceed 45° from vertical. See figure 5. A hole saw kit is available from the factory, order **part number 20000-062**.
- Clean all burrs from inside and outside the hole. Use fine sandpaper (440 grit) if necessary.

Step 2 Install The Saddle

- Insert the alignment tool through the top of the saddle. Slide the large O-ring over the bottom of the alignment tool and into the groove on the underside of the saddle.
- With the alignment tool and O-ring in place, position the saddle over the drilled hole. Insert the alignment tool into the hole seating the saddle. Be sure the O-ring is properly seated in the O-ring groove.
- Place the pipe clamps around the pipe and into the slots on the saddle. Tighten the clamps in an alternating method.

Step 3 Check The Saddle Alignment

- Pull the alignment tool out of the saddle. If the tool is not easily removed, the alignment is not correct. Slightly loosen the clamps and insert the tool. The saddle must be mounted directly over the hole. Adjust the saddle alignment until the alignment tool slides freely in and out of the saddle.
- Be certain the O-ring is properly seated and visible in the groove around the hole.
- Tighten the clamps.

Step 4 Install The Sensor

- Be sure two O-rings are located on the sensor body (see figure 7). The O-rings have been lubricated at the factory with silicone oil.
- Push the sensor assembly into the saddle with a twisting motion. The notch on the sensor body must fit into the slot on the saddle. Be sure the sensor is fully inserted into the saddle.
- **HAND TIGHTEN** the black union nut. Do not tighten the nut with a tool.

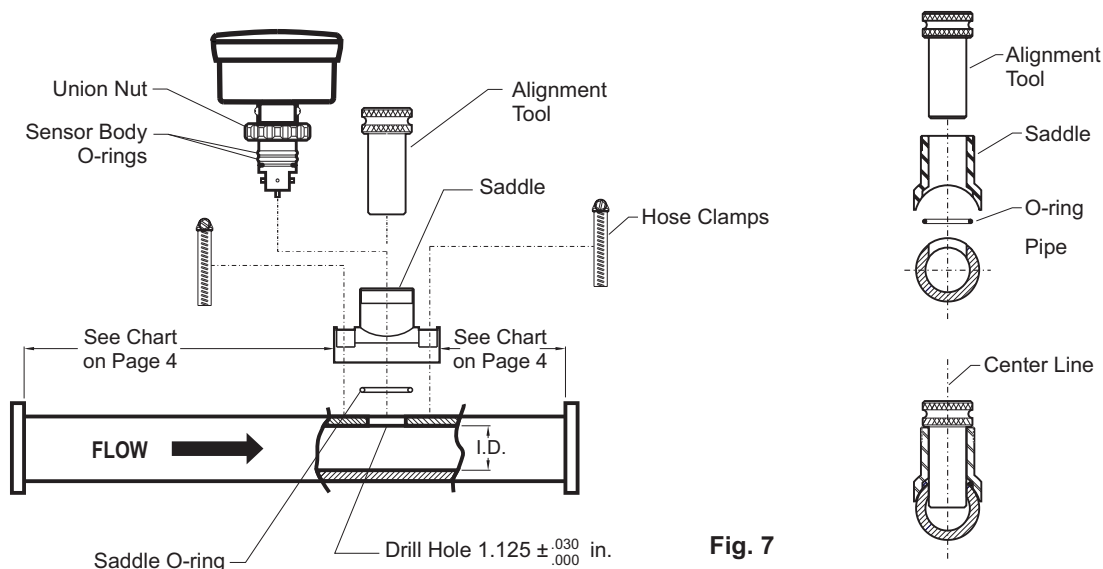


Fig. 7

NOTES:

6.0 Installing The Molded In-Line Fitting (MI)

All molded in-line (MI) fittings have male American National Standard Taper Pipe Threads (MPT).

- Select an area on the pipe as outlined in section 4.1.
- The meter can accurately measure flow from either direction provided the minimum inlet and outlet conditions are met. Section 3.1
- Install the meter as you would any other plastic pipe fitting. Be sure the inlet and outlet fittings are aligned properly. Improper alignment of the fittings will put stress on the adapter connections and may cause leaking or fitting damage. Do not over tighten the fittings. Use PTFE tape sealant only on the adapter threads.
- Meter can be mounted on horizontal or vertical runs of pipe. Mounting at the twelve o'clock position on horizontal pipe is recommended. Mounting anywhere around the diameter of vertical pipe is acceptable, however, the pipe must be completely full of water at all times. See figure 3, 4 and 5.
- Be sure the inlet and outlet plumbing is properly secured. T

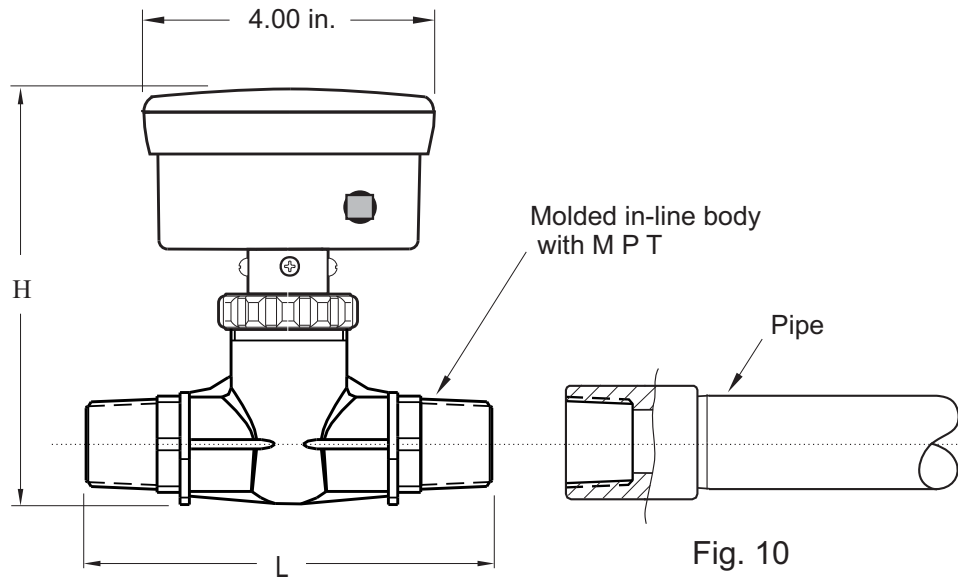


Fig. 10

Nominal Pipe Size	Body Description	Length	Height
3/8"	3/8" MPT-low flow	4.73"	5.70"
3/8"	3/8" MPT-std flow	4.73"	5.79"
1/2"	1/2" MPT-low flow	5.09"	5.70"
1/2"	1/2" MPT-std flow	5.09"	5.79"
3/4"	3/4" MPT-low flow	5.25"	5.79"
3/4"	3/4" MPT-std flow	5.25"	5.97"
1.0"	1.0" MPT-low flow	5.65"	5.97"
1.0"	1.0" MPT-std flow	5.65"	5.97"
1.5"	1.5" MPT-all flow ranges	7.00"	6.50"
2.0"	2.0" MPT-all flow ranges	7.00"	6.75"

7.0 How To Install Molded PVC Fitting (AT)

Note: Tee fittings are I.P.S. Pipe, Slip glue joints.

- Step 1** Select an area on the pipe as outlined in section 4.1.
- Step 2** Remove the sensor from the tee fitting. **Do not glue the Tee while the sensor is installed.**
- Step 3** Install the tee fitting as you would any other plastic pipe solvent weld (glue) fitting. Do not use too much glue. Excessive glue may create a disturbance in the flow stream which will effect the accuracy of the meter.
- Step 4** Meter can be mounted on horizontal or vertical runs of pipe. Mounting at the vertical (twelve o'clock) position on horizontal pipe is recommended (see figure 5). Mounting anywhere around the diameter of vertical pipe is acceptable, however, the pipe must be completely full of water at all times. See figure 3, 4 and 5.
- Step 5** Install the sensor. Be sure two O-rings are located on the sensor body. The O-rings have been lubricated at the factory with silicone oil. Push the sensor assembly into the saddle with a twisting motion. The notch on the sensor body must fit into the slot on the saddle. Be sure the sensor is fully inserted into the saddle. **HAND TIGHTEN** the black union nut.

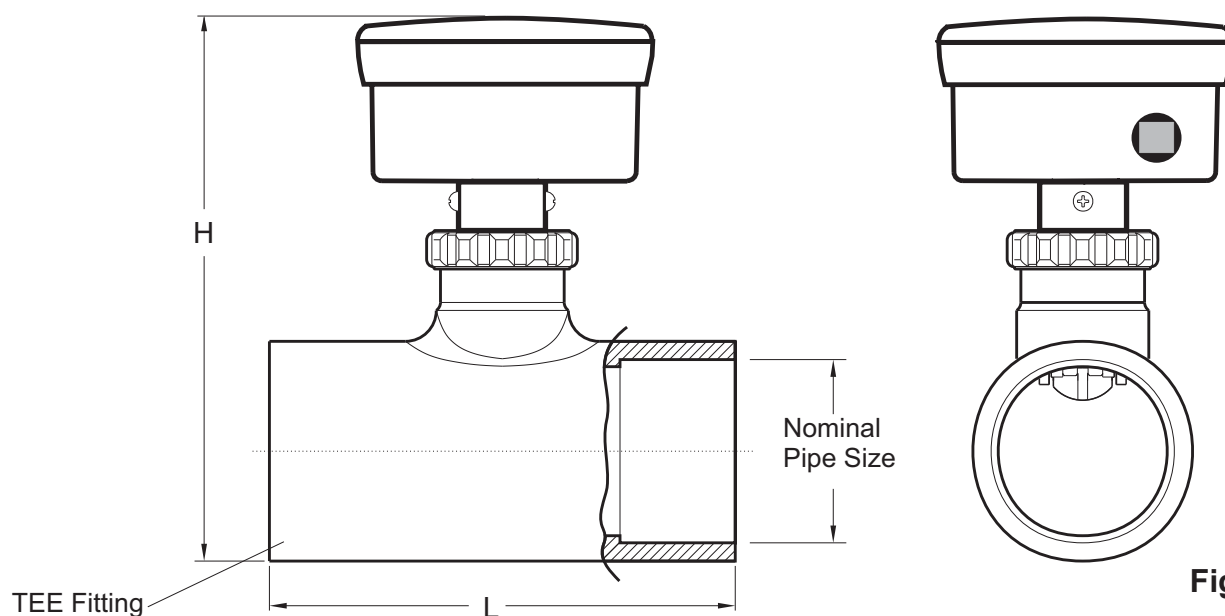
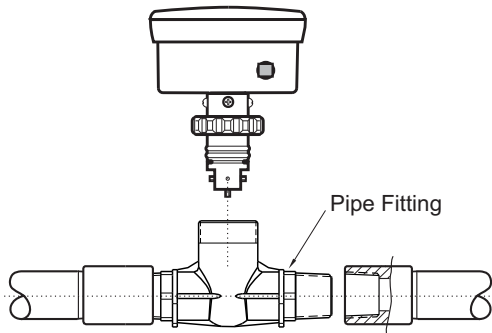


Fig. 11

Nominal Pipe Size	Height (H)	Length (L)	Replacement Tee
1" IPS	6"	4"	76000-978
1-1/2" IPS	6-5/8"	4-1/2"	76000-975
2" IPS	7-1/8"	4-3/4"	76000-976

IPS: International Pipe Standard

Molded In-Line Body Parts List



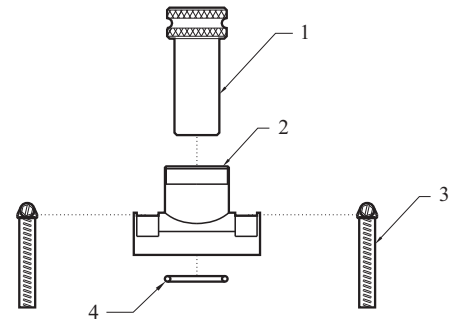
Complete Kit Ordering Numbers

Molded In-Line Pipe Fittings

Pipe Size	GPM Flow Range	LPM Flow Range	M ³ /HR Flow Range	OZ/Min Flow Range	Model Number	
M/NPT	Range	Range	Range	Range	MNPT	MBSPT
3/8"	.8 to 8	30 - 30	0.2 - 1.8	106 - 1058	38M1	38MB1
3/8"	.4 to 4	1 - 10	0.1 - 0.6	35 - 353	38M2	38MB2
1/2"	2 to 20	7 - 70	0.4 - 4.2	247 - 2469	50M1	50MB1
3/4"	3 - 30	11 - 110	0.7 - 6.6	388 - 3880	75M1	75MB1
1"	5 to 50	20 - 200	1.2 - 12	705 - 7054	10M1	10MB1
1-1/2"	6 to 60	25 - 250	1.5 - 15	885 - 8818	15M2	15MB2
2"	10 to 100	40 - 400	2.4 - 24	1411 - 14108	20M3	20MB3
2"	20 to 200	70 - 700	4.2 - 42	2469 - 24689	20M4	20MB4

Complete kits include:
 1) Molded inline body fitting
 1) Instruction manual

Saddle Parts List



Replacement Part Numbers

Item	Part No .	Description
1	76000-830	Alignment tool
2	91001-115	Saddle, 1-1/2" pipe (50mm)
	91001-114	Saddle, 2" pipe (63mm)
	91001-116	Saddle, 3" pipe (90mm)
	76100-087	Saddle, 4" pipe (110mm)
	76100-088	Saddle, 6" pipe (160mm)
	76100-089	Saddle, 8" pipe (200mm)
	76100-139	Saddle, 10" & 12" pipe
3	90008-010	Hose-Clamp #28 for 1-1/2" pipe
	90008-137	Hose-Clamp #40 for 2" pipe
	90008-015	Hose-Clamp #52 for 3" pipe
	90008-018	Hose-Clamp #72 for 4" pipe
	90008-019	Hose-Clamp #116 for 6" pipe
	90008-020	Hose-Clamp #152 for 8" pipe
	90008-348	Hose-Clamp #188 for 10" pipe
	90008-349	Hose-Clamp #224 for 12" pipe
4	90003-108	O-ring / Viton® for 1-1/2", 2", 3"
	90003-114	O-ring / Viton® for 4", 6", 8", 10", 12"

Complete Kit Ordering Numbers

Metric (DIN 8062) Pipe Saddle Fittings	
Kit No	Description
05K0	50mm Metric pipe, Pn10, PVDF
05K6	50mm Metric pipe, Pn16, PVDF
06K0	63mm Metric pipe, Pn10, PVDF
06K6	63mm Metric pipe, Pn16, PVDF
09K0	90mm Metric pipe, Pn10, PVDF
09K6	90mm Metric pipe, Pn16, PVDF
11A0	110mm Metric pipe, Pn10, PVC
11A6	110mm Metric pipe, Pn16, PVC
16A0	160mm Metric pipe, Pn10, PVC
16A6	160mm Metric pipe, Pn16, PVC
20A0	200mm Metric pipe, Pn10, PVC

U.S. (IPS) Pipe Saddle Fittings	
Kit No	Description
15K4	1-1/2" IPS pipe, schedule 40, PVDF
15K8	1-1/2" IPS pipe, schedule 80, PVDF
20K4	2" IPS pipe, schedule 40, PVDF
20K8	2" IPS pipe, schedule 80, PVDF
30K4	3" IPS pipe, schedule 40, PVDF
30K8	3" IPS pipe, schedule 80, PVDF
40A4	4" IPS pipe, schedule 40, PVC
40A8	4" IPS pipe, schedule 80, PVC
60A4	6" IPS pipe, schedule 40, PVC
60A8	6" IPS pipe, schedule 80, PVC
80A4	8" IPS pipe, schedule 40, PVC
80A8	8" IPS pipe, schedule 80, PVC
100A4	10" IPS pipe, schedule 40, PVC
100A8	10" IPS pipe, schedule 80, PVC
120A4	12" IPS pipe, schedule 40, PVC
120A8	12" IPS pipe, schedule 80, PVC

Complete kits include:
 1) Saddle fitting
 2) Pipe clamps
 1) O-ring seal
 1) Installation alignment tool
 1) Instruction manual

BLUE-WHITE LIMITED WARRANTY

Your Blue-White product is a quality product and is warranted for a specific time from date of purchase (proof of purchase is required). The product will be repaired or replaced at our discretion. Failure must have occurred due to defect in material or workmanship and not as a result of operation of the product other than in normal operation as defined in the product manual. Warranty status is determined by the product's serial label and the sales invoice or receipt. The serial label must be on the product and legible. The warranty status of the product will be verified by Blue-White or a factory authorized service center. Variable Area and Digital Flow meters are warranted for 1 year from date of purchase (proof of purchase is required). The flow meter will be repaired or replaced at our discretion. The S6A ultrasonic flow meter is warranted for 2 years from date of purchase (proof of purchase is required). The flow meter will be repaired or replaced at our discretion.

WHAT IS NOT COVERED

- Freight to the factory, or service center.
- Products that have been tampered with, or in pieces.
- Damage resulting from misuse, carelessness such as chemical spills on the enclosure, abuse, lack of maintenance, or alteration which is out of our control.
- Damage by faulty wiring, power surges or acts of nature.
- Damage that occurs as a result of: meter misalignment, improper installation, over tightening, use of non-recommended chemicals, use of non-recommended adhesives or pipe dopes, excessive heat or pressure, or allowing the meter to support the weight of related piping.

BLUE-WHITE does not assume responsibility for any loss, damage, or expense directly or indirectly related to or arising out of the use of its products. Failure must have occurred due to defect in material or workmanship and not as a result of operation of the product other than in normal operation as defined in the manual.

Warranty status is determined by the product's serial label and the sales invoice or receipt. The serial label must be on the product and legible. The warranty status will be verified by Blue-White or a factory authorized service center.

PROCEDURE FOR IN WARRANTY REPAIR

Warranty service must be performed by the factory or an authorized service center. Contact the factory or local repair center to obtain a RMA (Return Material Authorization) number. It is recommended to include foot strainer and injection/check valve fitting since these devices may be clogged and part of the problem. Decontaminate, dry, and carefully pack the product to be repaired. Please enclose a brief description of the problem and proof of purchase. Prepay all shipping and insurance cost. COD shipments will not be accepted. Damage caused by improper packaging is the responsibility of the sender. When In-Warranty repair is completed, the factory pays for return shipping to the dealer or customer.

PRODUCT USE WARNING

Blue-White products are manufactured to meet the highest quality standards in the industry. Each product instruction manual includes a description of the associated product warranty and provides the user with important safety information. Purchasers, installers, and operators of Blue-White products should take the time to inform themselves about the safe operation of these products. In addition, Customers are expected to do their own due diligence regarding which products and materials are best suited for their intended applications. BLUE-WHITE is pleased to assist in this effort but does not guarantee the suitability of any particular product for any specific application as Blue-White does not have the same degree of familiarity with the application that the customer/end user has. While BLUE-WHITE will honor all of its product warranties according to their terms and conditions, Blue-White shall only be obligated to repair or replace its defective parts or products in accordance with the associated product warranties.

BLUE-WHITE SHALL NOT BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE WHETHER DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING OUT OF OR RELATED TO THE FAILURE OF ANY OF ITS PARTS OR PRODUCTS OR OF THEIR NONSUITABILITY FOR A GIVEN PURPOSE OR APPLICATION.

CHEMICAL RESISTANCE WARNING

BLUE-WHITE offers a wide variety of wetted parts. Purchasers, installers, and operators of Blue-White products must be well informed and aware of the precautions to be taken when injecting or measuring various chemicals, especially those considered to be irritants, contaminants or hazardous. Customers are expected to do their own due diligence regarding which products and materials are best suited for their applications, particularly as it may relate to the potential effects of certain chemicals on Blue-White products and the potential for adverse chemical interactions. Blue-White tests its products with water only. The chemical resistance information included in this instruction manual was supplied to BLUE-WHITE by reputable sources, but Blue-White is not able to vouch for the accuracy or completeness thereof. While BLUE-WHITE will honor all of its product warranties according to their terms and conditions, Blue-White shall only be obligated to repair or replace its defective parts or products in accordance with the associated product warranties.

BLUE-WHITE SHALL NOT BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE, WHETHER DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING OUT OF OR RELATED TO THE USE OF CHEMICALS IN CONNECTION WITH ANY BLUE-WHITE PRODUCTS.

Users of electrical and electronic equipment (EEE) with the WEEE marking per Annex IV of the WEEE Directive must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, recovery of WEEE and minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. The WEEE marking applies only to countries within the European Union (EU) and Norway. Appliances are labeled in accordance with European Directive 2002/96/EC. Contact your local waste recovery agency for a Designated Collection Facility in your area.



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