



**Hydro-Flow™ Model 2300A**  
Insertion Vortex Flowmeter  
Installation and Operation Manual



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## MODEL AND SUFFIX CODES

Category	Description	Suffix Codes					
Type	Fixed Insertion - PVDF	2300-A	...	...	...	...	...
Line Size	0.5" (15mm)	...	05	...	...	...	...
	0.75" (20mm)	...	07	...	...	...	...
	1" (25mm)	...	10	...	...	...	...
	1.25" (30mm)	...	12	...	...	...	...
	1.5" (40mm)	...	15	...	...	...	...
	2" (50mm)	...	20	...	...	...	...
	2.5" (65mm)	...	25	...	...	...	...
	3" (80mm)	...	30	...	...	...	...
	4" (100mm)	...	40	...	...	...	...
	5" (125mm)	...	50	...	...	...	...
6" (150mm)	...	60	...	...	...	...	
8" (200mm)	...	80	...	...	...	...	
Mounting Supplied by Fluidyne  OR	Fluidyne CPVC	...	...	02	...	...	...
	Fluidyne PVC	...	...	03	...	...	...
	Fluidyne PVDF	...	...	04	...	...	...
	Fluidyne Polypropylene	...	...	05	...	...	...
Retrofit to +GF+Signet Fitting and No Fluidyne Mounting is Required	Retrofit to +GF+Signet CPVC fitting <sup>3</sup>	...	...	2R	...	...	...
	Retrofit to +GF+Signet PVC fitting <sup>3</sup>	...	...	3R	...	...	...
	Retrofit to +GF+Signet PVDF fitting <sup>3</sup>	...	...	4R	...	...	...
	Retrofit to +GF+Signet Polypropylene fitting <sup>3</sup>	...	...	5R	...	...	...
Output/Display	Pulse/No Display	...	...	...	1	...	...
	4-20 mA/Rate and Total Display	...	...	...	2	...	...
	Pulse/Rate and Total Display	...	...	...	3	...	...
	4-20 mA/No Display	...	...	...	4	...	...
	For Use With Fluidyne Solar Power Supply (includes display) (Low power consumption - 2 mA)	...	...	...	5	...	...
Measuring Units	English	...	...	...	...	...	1
	Metric	...	...	...	...	...	2

**Example:**  
**Retrofit Example:**

**Hydro-Flow 2300-A-12-04-2-1**  
**Hydro-Flow 2300-A-40-4R-2-1**

### EXAMPLE:

A 1.25" PVDF insertion flowmeter with a PVDF union tee fitting, 4-20 mA analog output with a rate/total display with English measuring units.

### RETROFIT EXAMPLE:

A 4" PVDF fixed insertion vortex flowmeter to be retrofit to customer's PVDF fitting (Signet p/n SFMT040 wafer) with current, 4-20 mA output with a rate/total display, English measuring units.

### Notes:

1. Standard English measuring units for flow rate and totalized flow are gallons per minute (gpm) and gallons, respectively. Standard metric measuring units for flow rate and totalized flow are cubic meters per hour (m<sup>3</sup>/hr) and cubic meters (m<sup>3</sup>), respectively. Please specify other desired measuring units for which the flowmeter should be configured. Other units, such as acre-feet, cubic feet, barrels and liters are available and can be set by the factory.
2. Please specify pipe size, material and schedule OR outside and inside diameter of pipe.
3. For Signet retrofit, specify existing signet fitting part number. Model 2300 retrofit is not compatible with Signet 0.5", 0.75" and 1.0" PVC and CPVC tee fittings. In this case, order Fluidyne fittings.



### What is a Vortex Flowmeter?

Vortex shedding flowmeters measure flow by detecting the frequency at which vortices are alternately shed from a bluff body. The vortices create low and high pressure zones behind the bluff body which are detected as a force acting on the sensor wing. This force is transmitted through the sensor wing to the Hydro-Flow™ piezo-resistive sensor mounted inside the flow line. Hydro-Flow's™ unique and proprietary microprocessor based piezo-resistive sensor can accurately and reliably process vortex signals 25 times smaller than permitted by other technologies.

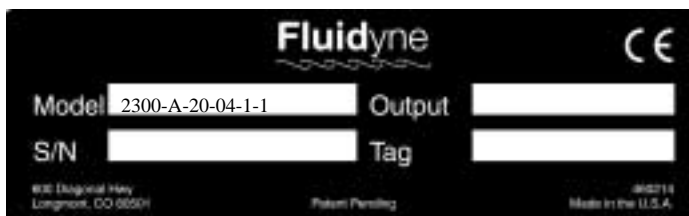
According to well proven physical laws, the shedding frequency is directly proportional to the average flow velocity. This effect can be observed in the fluttering of a flag.

Vortex flowmeters are preferred for many applications requiring wide flow range, accuracy, and reliability (no moving parts).

### When You Receive the Flowmeter

Upon receiving your Fluidyne equipment, verify that all materials on the packing list are present. Check for possible shipping damage and notify the freight carrier or your Fluidyne representative if there is any damage.

A permanent identification plate (ID) is attached to your flowmeter; verify the model is consistent with your requirements. (See Model & Suffix Code Table, p. 3.)



For example, if you ordered a 2" Hydro-Flow™ 2300-A flowmeter with a PVDF wafer fitting, pulse output, no display, and English measuring units. The model number should read 2300-A-20-04-1-1, as in the above ID.

### Common Sense / Meter Handling Issues

You are in receipt of a precision, world-class instrument. Even though the flowmeter is one of the most rugged in the industry, exercise reasonable care with the flowmeter.

1. When not installed, store the flowmeter with the installation manual in its shipping container.
2. Do not ram or poke objects into the meter bore or onto the sensor wing/shedder. Hydro-Flow™ is a no moving parts flowmeter. If you push hard enough to see a part move, the flowmeter is probably damaged.
3. Pay particular attention to the direction of flow. The flow must impact the surface of the stainless steel shedder. The direction of the flow is clearly indicated on the flowmeter electronics. The flowmeter will not work if you install it backwards.
4. The flowmeter's installation location is important for optimum performance accuracy; a quick review of Installation Guidelines, p. 5, will be helpful.

## Installation Guidelines

### Selecting the Best Flowmeter Location

Not all plumbing is laid out with flowmetering in mind. For optimum performance, you must consider straight run requirements and the flowmeter's installation location relative to flow direction. Figures 1 and 2 illustrate useful examples of both proper and improper flowmeter installations. If you have special requirements, PLEASE consult the factory.

### Flowmeter Location

Figure 1 illustrates possible flowmeter locations. The good flowmeter locations are recommended to ensure that the pipe and the flowmeter will always be filled with fluid.

### Straight Run Requirements

Figure 2 illustrates the minimum requirements for straight run piping. *Note: The straight run of the pipe must have the same nominal diameter (D) as the flow-meter body.*

Figure 1. Flowmeter Location

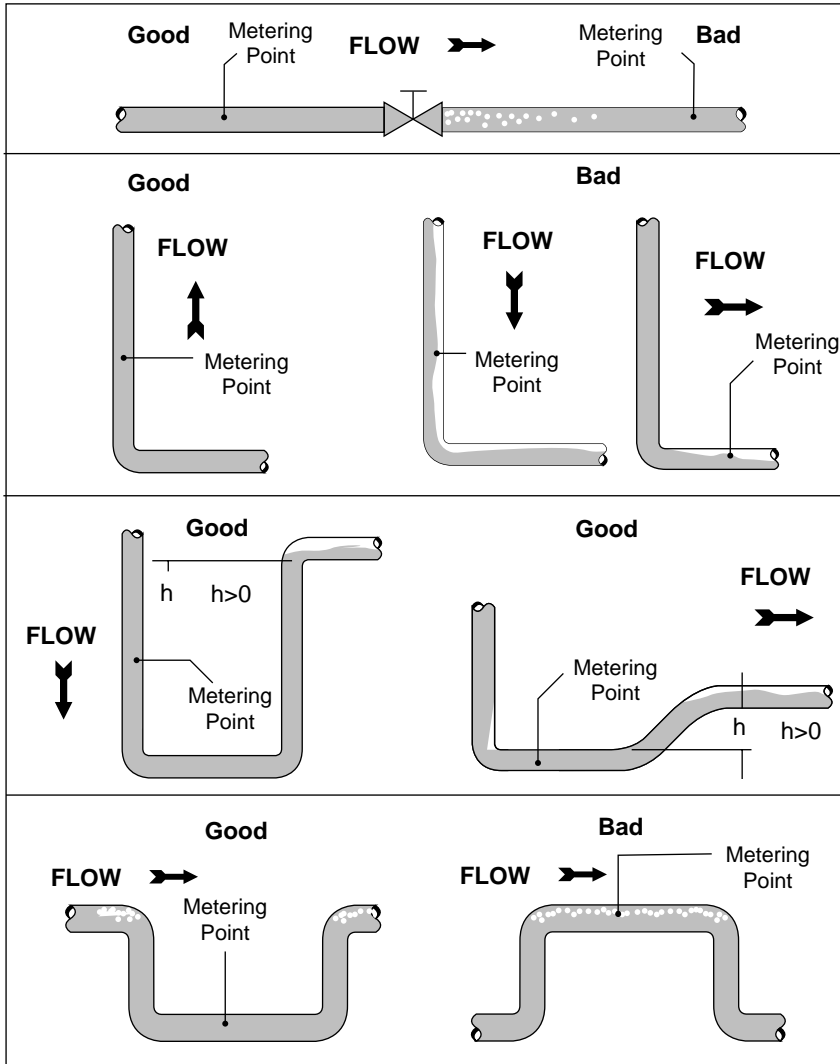
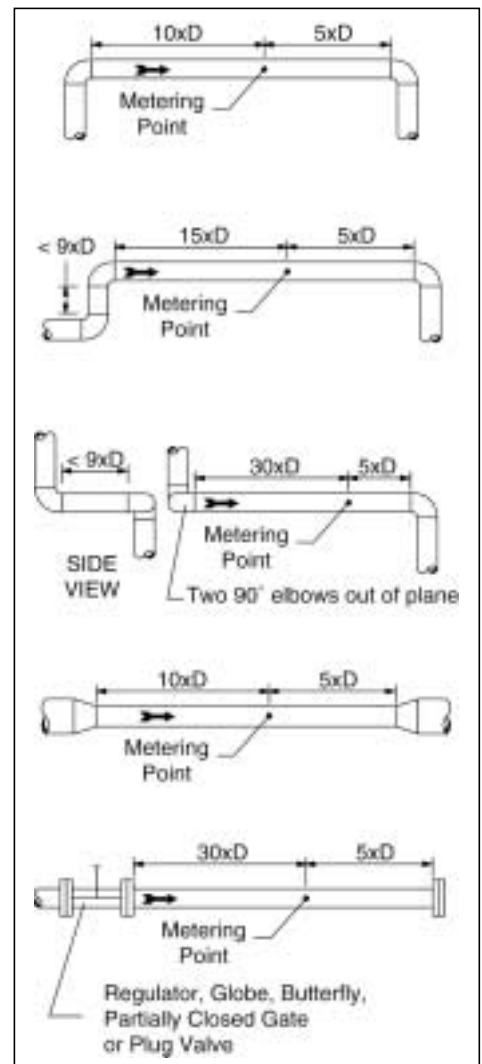
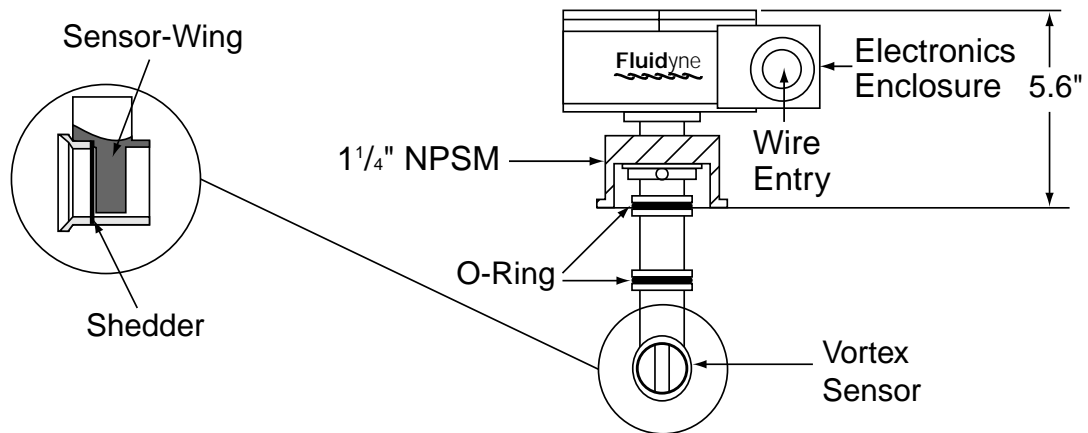


Figure 2. Straight Run Requirements



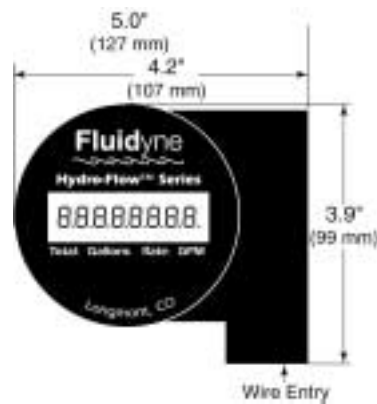
## Mechanical Drawing: Model 2300-A

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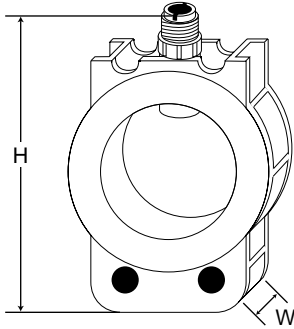


## Dimensional Drawing: Condulet (shown with display)

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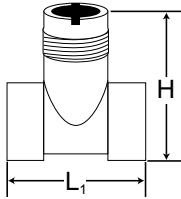


## Dimensional Drawings: Mounting Connections



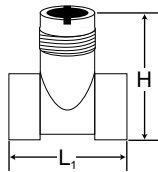
### WAFER FITTING (PVDF, POLYPROPYLENE, PVC, CPVC)

Meter Size in. (mm)	2 (50)	2.5 (62)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)
<b>H</b>	1.3 (40)	2.7 (80)	5.3 (160)	7.0 (210)	11.7 (350)	14.11 (358)	16.20 (412)
<b>W</b>	2.45 (62)	1.82 (46)	1.94 (50)	2.20 (56)	2.50 (64)	2.75 (70)	2.8 (72)



### UNION TEE FITTING (PVDF, POLYPROPYLENE, PVC, CPVC)

Meter Size in. (mm)	0.5 (15)	0.75 (20)	1 (25)	1.25 (30)	1.5 (40)
<b>L</b>	5.05 (128)	5.59 (142)	6.14 (156)	6.33 (161)	6.93 (156)
<b>H</b>	3.43 (87)	3.57 (91)	4.17 (106)	4.35 (111)	6.26 (159)

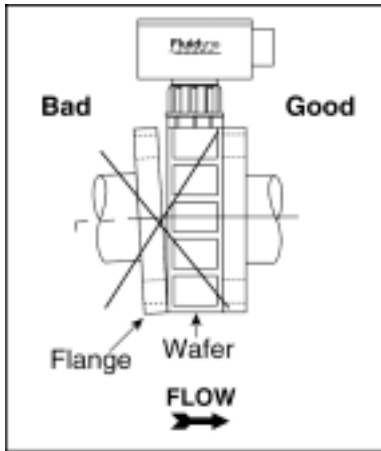


### TEE FITTING (PVC, CPVC)

Meter Size in. (mm)	0.5 (15)	0.75 (20)	1 (25)	1.25 (30)	1.5 (40)
<b>H</b>	3.73 (95)	3.93 (100)	4.30 (109)	4.35 (111)	4.90 (124)
<b>W</b>	3.81 (97)	4.06 (103)	4.17 (106)	4.38 (111)	4.60 (117)

## Mechanical Installation

**Figure 3. Flange Alignment**



### Wafer Mount Installation

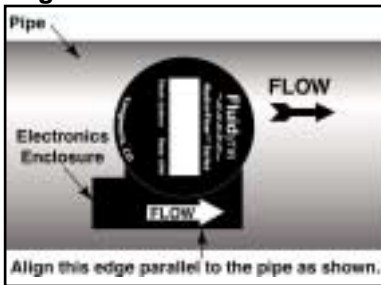
Wafer Mountings are available in sizes 2.0" to 8.0" in either PVDF, polypropylene, PVC or CPVC construction. For a wafer mount installation, flanges with self-centering gaskets are recommended for optimum performance. Gaskets should not protrude into the flow stream.

Pipe supports are recommended if mechanical vibration is present. Pipe supports should follow industry standard piping practices.

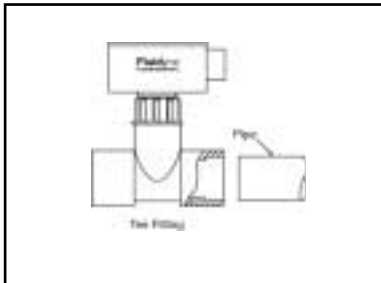
Align the bolt holes of each set of mating flanges. The bolt holes should be directly opposite each other in order to minimize any stress on the flowmeter body. Snug all bolts prior to final tightening. Tighten bolts in a staggered fashion to avoid tilt. (See Figure 3.)

Install the flowmeter with the flow arrow indicator on the electronics enclosure pointing in the direction of flow. (See Figure 4.) Hand tighten the red NPSM clockwise.

**Figure 4. Flow Direction and Alignment**



**Figure 5. Tee Fitting Installation**



### Tee Fitting Installation (PVC and CPVC, sizes 0.5" to 1.5")

#### Equipment

You need an appropriate cement; primer; and cutting and deburring tool daubers with a minimum surface of one-half the pipe diameter, as well as natural fiber rags and gloves resistant to the cement and primer.

#### Installation

1. Inspect pipe for a square, deburred cut and a 10° - 15° beveled end. With a dry, clean rag, remove all foreign matter from the pipe and tee surface. Check the dry fit for 1/4" to 3/4" of the socket.
2. Thoroughly coat the inside socket of the fitting with an appropriate primer by repeated strokes with a well-wetted applicator.
3. Coat the outer surface area of the pipe in a similar manner.
4. Apply a second application of primer to the inside socket of tee fitting; then, immediately apply a generous amount of cement to the out side of pipe.
5. Carefully apply cement to the inside of the tee fitting. *Note: Avoid excess cement in the fitting which could puddle and partially block flow. Cement applications to both pipe and fitting should be made while the primer is still wet.*
6. Immediately apply a second application of cement to the out side of pipe. Bottom the pipe into the flowmeter while the cement on both the pipe and fitting are still liquid. Rotate the pipe 90°, if possible. Hold for approximately 30 seconds.
7. Wipe any excess cement from the pipe and observe "set time" specified by the cement manufacturer.
8. Install the flowmeter with the flow arrow indicator on the electronics enclosure pointing in the direction of flow. (See Figure 4.) Hand tighten the red NPSM clockwise.

### Union Tee Fitting Installation (PVDF and Polypropylene, sizes 0.5" to 1.5")

For PVDF and polypropylene fittings, heat fusing may be the preferred method over cement for installation. Install PVDF and polypropylene fittings according to your instrumentation guidelines.

When the union tee fitting is installed, install the flowmeter with the flow arrow indicator on the electronics enclosure pointing in the direction of flow. (See Figure 4.) Hand tighten the red NPSM clockwise.



## Mechanical Installation (continued)

### Retrofit Installation

Hydro-Flow™ Model 2300 can be retrofit into most existing +GF+ Signet fitting sizes 0.5" and larger. The Model 2300 cannot be retrofit into +GF+ Signet fittings sizes 0.5", 0.75" and 1" PVC and CPVC tee fittings. In this case, use Fluidyne's own PVC and CPVC fittings.

Install the flowmeter with the flow arrow indicator on the electronics enclosure pointing in the direction of flow. (See Figure 4.) Hand tighten the red NPSM clockwise.

### HYDRO-FLOW™MODEL 2300A RETROFIT COMPATABILITY TO SIGNET FITTINGS

Size (inches)	Material*			
	CPVC	PVC	PVDF	Polypropylene
0.5	N/A	N/A	SFMT005 Union Tee	PPMT005 Union Tee
0.75	N/A	N/A	SFMT007 Union Tee	PPMT007 Union Tee
1	N/A	N/A	SFMT010 Union Tee	PPMT010 Union Tee
1.25	CPV8T1012F Tee CPV8T012 Saddle	PV8T015F Tee PV8T012 Saddle	SFMT012 Union Tee	PPMT012 Union Tee
1.5	CPV8T015F Tee CPV8T015 Saddle	PV8T015F Tee PV8T015 Saddle	SFMT015 Union Tee	PPMT015 Union Tee
2	N/A	PV8T020 Pipe Tee PV8S020 Saddle	SFMT020 Union Tee	PPMT020 Union Tee
2.5	N/A	PV8T020 Pipe Tee PV8S020 Saddle	SFMT025 Wafer	PPMT025 Wafer
3	N/A	PV8T030 Pipe Tee PV8S030 Saddle	SFMT030 Wafer	PPMT030 Wafer
4	N/A	PV8T040 Pipe Tee PV8S030 Saddle	SFMT040 Wafer	PPMT040 Wafer
5	N/A	N/A	SFMT050 Wafer	PPMT050 Wafer
6	N/A	PV8S060 Saddle	SFMT060 Wafer	PPMT060 Wafer
8	N/A	PV8S080 Saddle	SFMT080 Wafer	PPMT080 Wafer

For Signet retrofit, specify existing signet fitting part number. **Model 2300 retrofit is not compatible with Signet 0.5", 0.75" and 1.0" PVC and CPVC tee fittings. In this case, order Fluidyne fittings.**

\* Consult factory for stainless steel tee fitting retrofits.

## Electrical Installation

**TABLE 1. CURRENT LIMITING RESISTOR FOR PULSE OUTPUT**

Supply Voltage (DC)	Current Limiting Resistor Values (ohms)	
	Min	Max
10	400	400
12	480	800
14	560	1200
16	640	1600
18	720	2000
20	800	2400
22	880	2800
24	960	3200
26	1040	3600
28	1120	4000
30	1200	4400
32	1280	4800

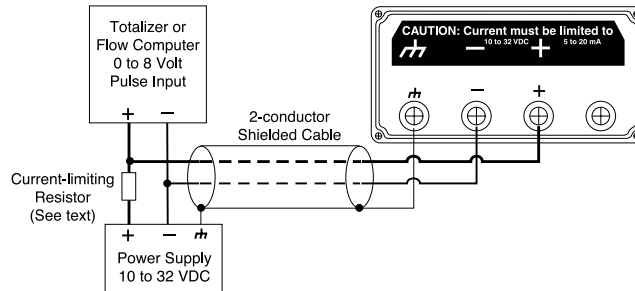
### CAUTION

The pulse output of the Hydro-Flow™ flowmeter functions by momentarily shorting the + terminal to the – terminal. If the flowmeter is connected directly to a DC power source without the series resistor, both the flowmeter and the power source may be damaged. The wiring polarity must be observed for proper operation of the flowmeter. If the flowmeter is wired backwards to the current-limited power source, the flowmeter will not be damaged but it will not function properly.

### Pulse Output Electrical Installation

The Hydro-Flow™ pulse output flowmeter may be used with a 10 to 32 volt DC power supply and series current limiting resistor. The voltage at the flowmeter terminals is internally limited to  $8.0 \pm 1.0$  volts DC under no-flow conditions, dropping to less than 1.0 volt for the 2.5 to 5 millisecond duration of the output pulse. Figure 4 below illustrates a typical installation. *Note: The totalizer or flow computer input must be rated for an 8-volt pulse input.*

**Figure 6. Wiring Diagram - Pulse Output**



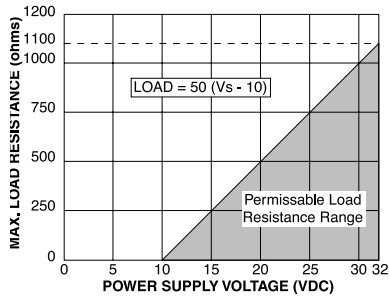
The cable may be up to 2000 feet of #20 AWG or larger shielded two-conductor cable. The shield lead from the meter may be connected to an earth ground, such as a copper cold water pipe. The shield improves noise immunity and provides a return path for electrical surges. Its use is optional in installations in which electrical transients and noise are not a problem.

The current limiting resistor is required to limit the normal operating current in the flowmeter to a value between 5 and 20 mA with a meter voltage of 8 volts, and less than 25 mA with the meter terminals short-circuited. The value of the resistor is determined from the power supply voltage, the operating meter current and the cable resistance. Table 1 lists standard 1/2 watt 5% resistor values which will work in most installations. For power supply voltages between those in the table, use the lower value of resistor.

### 4-20 mA Current Output or No Output (Display Only) Electrical Installation

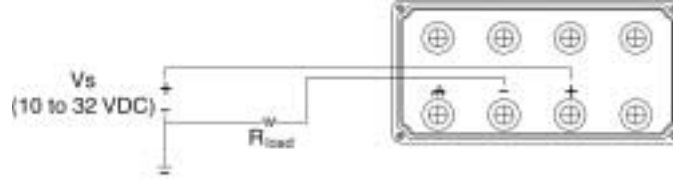
## Electrical Installation (continued)

**Graph 1. Maximum Load Resistance for 4-20 mA Output**



The flowmeter may be connected with up to 2000 feet of #22 AWG or larger cable. Shielded cable may be necessary in some environments to reduce electrical noise; if used, the shield should be connected at one end only to an earth ground point, such as a copper cold water pipe.

**Figure 7. Wiring Diagram - 4-20 mA Current Loop**



# Technical Data

## Mechanical Specifications

### Type

Insertion

### Measurable Fluids

Ultrapure water; deionized water; acids; solvents; water

### Pipe Sizes

0.5" to 8" (15 to 200 mm)

### Ambient Temperature

-20° to 140° F (-29° to 60° C)

### Process Pressure/Temperature

See Graph 2 below.

### Flow Range

0.5 feet, or 0.15 meters, per second minimum  
15 feet, or 4.5 meters, per second maximum

### Measuring Units

English.....Gallons

Metric.....Cubic Meters

Other measuring units available upon request or measuring units can be reconfigured using Fluidyne's Field-Pro™, PC compatible configuration software.

### Accuracy (Combined Linearity and Repeatability)

±1.0% of full scale

### Wetted Parts

Sensor/Bar/Stem .....PVDF

O-rings .....Viton®

### Mounting Options

Retrofit .....Fits existing +GF+ Signet tee fitting. See Signet Retrofit Compatibility, p. 9

Union Tee Fitting...PVDF or PP for 0.5" to 1.5"

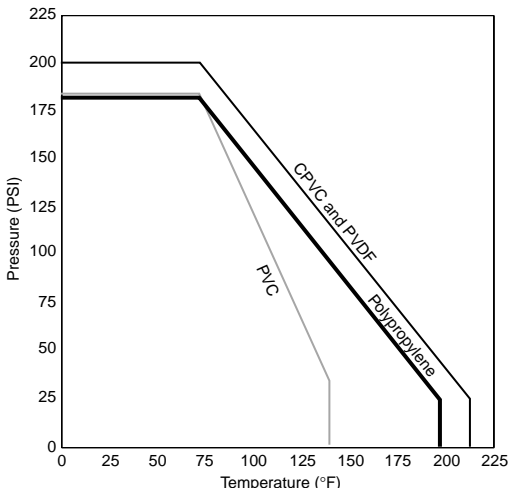
Tee Fitting.....CPVC or PVC for 0.5" to 1.5"

Wafer.....CPVC, PVC, PVDF or PP for 2" to 8"

### Straight Run Piping

Typical 10 diameters upstream, 5 diameters downstream. (See Figure 2, p.5)

**Graph 2. Process Pressure/Temperature**



## Electrical Specifications

### Enclosure

Reinforced Polycarbonate, NEMA 6

### European CE Mark

Approved

### Output Signal Options

**Pulse Output** .....Frequency proportional to flow rate. Power

Supply: 10-32 VDC power supply with current limited by series resistance to between 5 and 20 mA. Maximum pulse width is 5 ms. See Table 2 for standard output scaling.

Other pulse output setting can be configured by the factory or reconfigured in the field using Fluidyne's Field-Pro™.

**Analog Output** .....4-20 mA analog current loop, current pro-

portional to flow rate. Power Supply: 10-32 VDC compliance. 4 mA = zero flow; 20 mA = maximum flow listed in Table 2. Other 20 mA setting can be configured by the

factory or reconfigured in the field using Fluidyne's Field-Pro™.

### Display Option

LCD display alternately shows 4-digit rate and 8-digit total flow.

**TABLE 2. MINIMUM AND MAXIMUM FLOW RANGES**

Line Size in. (mm)	0.5 (15)	0.75 (20)	1 (25)	1.25 (30)	1.5 (40)
Min. Flow	0.5	0.8	1.3	2.0	3.5
Max. Flow (gpm)	13.7	23	40	60	103
Min. Flow	0.12	0.18	0.30	0.45	0.80
Max. Flow (m³/h)	3.1	5.2	9.1	13.8	23.5
Pulses/gal <sup>1)</sup>	550	330	200	125	75
Pulses/m³ <sup>1)</sup>	150,000	85,000	55,000	35,000	20,000

Line Size in. (mm)	2 (50)	2.5 (65)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)
Min. Flow	5.7	7.7	11.7	18.3	28.3	40.8	73.3
Max. Flow (gpm)	168	228	348	558	855	1226	2204
Min. Flow	1.3	1.8	2.7	4.2	6.5	9.3	16.7
Max. Flow (m³/h)	38.1	51.9	78.1	126.7	194.4	278.5	500.6
Pulses/gal <sup>1)</sup>	45	35	20	15	10	5	3
Pulses/m³ <sup>1)</sup>	12,000	9,000	6,000	3,500	2,500	1,500	1,000

1. When flowmeter is configured for pulse output.