

INTRODUCTION

The ProSense FG1 series flow meter is a rugged, low-cost direct reading industrial class flow meter that is simple to install. It can be mounted in any position without costly flow straighteners or other special plumbing. Constructed of high impact polysulfone plastic, the ProSense FG1 series offers excellent structural integrity and chemical compatibility with a wide range of industrial chemicals.

ProSense FG1 flow meters provide instantaneous, direct-reading flow rate measurement of liquids in closed piping systems. The transparent polysulfone plastic body allows visual inspection of the fluid condition as well as viewing of the internal flow indicator relative to a calibrated flow scale. See **Figure 1**.

ProSense FG1 meters do not require electrical connections for operation, and provide measurement by creating a predictable differential pressure across a sharp-edged orifice that is located in the piston assembly.

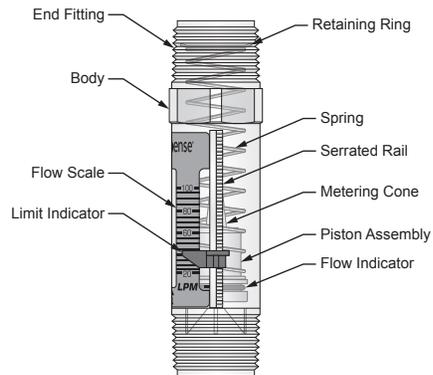


Figure 1: Parts location

OPERATING PRINCIPLE

The ProSense FG1 series flow meter is a piston-type variable area flow meter that uses a sharp-edged annular orifice, formed between an open-centered piston and a tapered metering cone. The piston is held in the no-flow position at the base of the cone by a precision retention spring. As flow in the pipe increases, the differential pressure correspondingly increases across the piston orifice, and moves the piston/flow indicator against the spring. The greater the flow rate, the further the piston moves along the tapered metering cone.

The flow rate is measured by viewing the red indicator ring, mounted on the piston, relative to a graduated flow scale located on the transparent flow meter body. See **Figure 2**.

The unique design allows the meter to be mounted in any orientation, horizontal, vertical or upside down, without sacrificing measurement performance. Flow straighteners, located in the inlet and outlet, allow the flow meter to be less sensitive to turbulent flow conditions. Liquid measurements are provided in gpm and lpm.

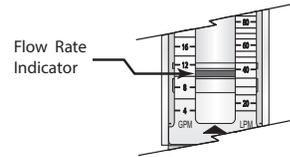


Figure 2: Flow rate indicator

INSTALLATION

CAUTION

THIS UNIT SHOULD BE INSTALLED AND SERVICED BY TECHNICALLY QUALIFIED PERSONNEL TRAINED IN MAINTAINING INDUSTRIAL CLASS FLOW INSTRUMENTATION AND PROCESSING EQUIPMENT.

CAUTION

READ INSTRUCTIONS THOROUGHLY BEFORE INSTALLING THE UNIT. IF YOU HAVE ANY QUESTIONS REGARDING PRODUCT INSTALLATION OR MAINTENANCE, VISIT WWW.AUTOMATIONDIRECT.COM OR CALL TECHNICAL SUPPORT FOR MORE INFORMATION (1-800-633-0405).

CAUTION

LIQUID PIPE SEALANTS, PVC/CPVC PRIMERS AND PVC/CPVC CEMENTS CONTAIN SOLVENTS THAT ARE NOT COMPATIBLE WITH POLYSULFONE PLASTIC. ALLOWING LIQUID PIPE SEALANTS TO CONTACT THE PLASTIC FLOW METER WILL RESULT IN WEAKENING OF THE FLOW METER BODY AND POTENTIALLY CAUSE FRACTURING UNDER PRESSURE.

Precautions

- Do not allow liquid pipe sealant, PVC/CPVC primer or PVC/CPVC cements to come into contact with the plastic flow meter. These contain solvents that are not compatible with polysulfone plastic and result in the flow meter body weakening and potentially fracturing under pressure. If a pipe sealant is required, use Teflon[®] tape.
- Do not install the flow meter in piping systems that are not aligned or properly supported.
- Do not connect the flow meter male plastic NPT fittings to female metal NPT couplings. Differences in coefficients of expansion between metals and plastics can cause the plastic flow meter body to crack. Use a female-to-female plastic pipe coupling to connect metal pipe to the plastic flow meter.

- Do not use pipe wrenches on the flow meter body. Use an open-end wrench on the integral hex flats during installation to avoid scarring or otherwise damaging the external surface.
- Do not subject the flow meter to back pressure or back flow. The flow meter can be damaged if subjected to either condition.
- Do not install the flow meter on systems with large degrees of particulate contamination. Install a minimum filtration of 200 mesh (74 micron) for trouble-free operation.
- Do not install O-ring seals that have not been lubricated.

CAUTION

TO AVOID UNNECESSARY PIPE FLEXING THAT COULD CAUSE STRUCTURAL STRESS ON THE FLOW METER BODY, INDEPENDENT SUPPORT LOCATED AS NEAR AS POSSIBLE TO THE INLET AND OUTLET OF THE METER SHOULD BE USED TO ISOLATE THE METER FROM THE PIPING SYSTEM. FAILURE TO PROVIDE THIS SUPPORT COULD REDUCE THE LIFE OF THE METER.

Properly align the piping with the meter inlet and outlet to minimize structural stress on the plastic meter body. Special attention should be given to this effort if higher operational pressures and/or temperatures are anticipated. Firmly support the piping by using external mounting brackets, both upstream and downstream from the meter to avoid any pipe flexing that could reduce the life of the meter.

- If the flow meter inlet or outlet is being rigidly mounted, and the opposing port must be connected to a flexible hose, then the end connected to the flexible hose must be rigidly mounted.
- Flow meters can be installed immediately adjacent to 90° elbows or other components, providing system design flexibility.

Flow Direction

These meters accept flow in one direction. Align the Flow Arrow, located on the bottom of the meter's flow scale, in the same direction as the anticipated line flow. See **Figure 3**.

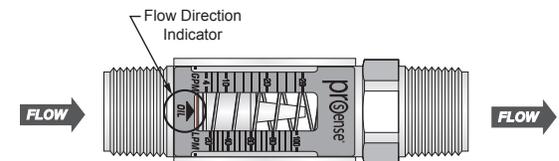


Figure 3: Flow direction indicator

Mounting Orientation

The meter can be installed to operate in any position.

Models with 1 in. Male Plastic NPT Threads

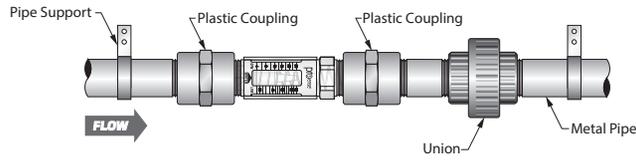


Figure 4: 1 in. (25 mm) NPT models installation

1. Apply a single layer of Teflon® tape to the male NPT threads of the flow meter.
2. Thread the flow meter inlet into a 1 in. plastic, female pipe coupling.
3. Thread the flow meter and coupling onto the inlet pipe and hand tighten. Make sure the flow direction arrow on the flow meter corresponds with the system flow direction. See **Figure 3**.
4. Place an open-end wrench on the flow meter body hex and place a pipe wrench on the metal mating pipe. Tighten until snug. Do not overtighten. Make sure the flow meter scale is oriented for convenient viewing. Do not back-off or unscrew fittings to rotate scale for better viewing.
5. Thread a 1 in. plastic pipe coupling to the outlet connection of the flow meter. Stack a pipe nipple and half of a pipe union onto the pipe coupling. Tighten the assembly as required.
6. Install the other half of the pipe union to the outlet pipe and connect the union halves together.
7. Piping should be supported and aligned properly to avoid placing stress on the flow meter body.
8. Slide the limit indicators to point to appropriate positions on the flow meter scale. To remove the limit indicators, slide them fully towards the flow meter outlet.

Models with 1/2 in. Female, Metal NPT End Fittings

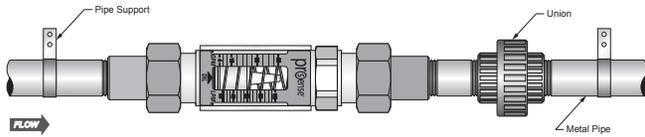


Figure 5: Female, metal threaded end fittings installation

1. Apply Teflon® tape to the male pipe thread connections.
2. Thread the inlet of the flow meter onto the appropriate pipe connection. Make sure the flow direction arrow on the flow meter corresponds with the system flow direction. See **Figure 3**.
3. Tighten flow meter connection by placing an open-end wrench on the flow meter metal connection adjacent to the pipe that is being attached. Tighten until snug. Make sure flow meter scale is oriented for convenient viewing. Do not overtighten. Do not back off or unscrew to rotate scale for better viewing.
4. Install a union fitting at the outlet end of the flow meter.

CAUTION

DO NOT TIGHTEN THE FLOW METER BY WRENCHING FROM THE OPPOSITE FITTING, AS THE METER BODY COULD CRACK.

5. Piping should be supported and aligned properly to avoid placing stress on the flow meter body.
6. Slide the limit indicators to point to appropriate positions on the flow meter scale. To remove the limit indicators, slide them fully towards the flow meter outlet.

Models with 3/4 in. Male, Metal NPT Threaded End Fittings



Figure 6: Male, metal NPT threaded end fittings installation

1. Remove both fittings from the flow meter inlet and outlet. Remove the O-rings from the fittings.
2. Apply Teflon® tape to the male pipe thread connections.
3. Place the brass or stainless steel hex coupler onto the pipe with the threads facing the flow meter.
4. Thread the flow meter fittings onto the mating pipe.
5. Tighten fittings by placing an open-end wrench onto the fitting and a pipe wrench onto the mating pipe.
6. Repeat steps 3...5 for the other flow meter fitting.
7. Lubricate the two O-rings that were removed in step 1. Place the O-rings onto the threaded fittings.
8. Place flow meter between the two installed fittings. Make sure the flow direction arrow on the flow meter corresponds with the system flow direction. See **Figure 3**. Thread the two hex couplers onto the flow meter body.
9. Rotate the flow meter body so the scale can be conveniently viewed. Tighten hex couplers. Typically, only hand tightening is required.
10. Piping should be supported and aligned properly to avoid placing stress on the flow meter body.
11. Slide the limit indicators to point to appropriate positions on the flow meter scale. To remove the limit indicators, slide them fully toward the flow meter outlet.

MAINTENANCE

ProSense FG1 series flow meters are designed to provide many years of service with little or no maintenance requirements. The inside and outside of the meter can be cleaned with denatured alcohol or mild detergent and warm water.

FLUID CORRECTION STANDARD FLOW SCALES

Standard liquid flow scales are calibrated in GPM (Gallons per Minute) and LPM (Liters per Minute) at 0.876 specific gravity for petroleum-based fluids, and 1.0 specific gravity for water and water-based fluids.

For field conversion of the standard scale to other fluids, see "Density Effect".

DENSITY EFFECT

Any fluid density change from stated standards has a proportional effect on meter accuracy. Corrections for more or less dense fluids can be made to standard scales using the following correction factor:

$$\sqrt{\frac{1.0}{\text{Specific Gravity}}}$$

Figure 7: Correction for water-based meters

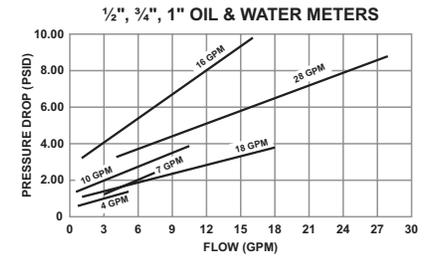
$$\sqrt{\frac{0.876}{\text{Specific Gravity}}}$$

Figure 8: Correction for petroleum-based meters

PRESSURE DROP

The pressure drop curve is valid for fluids with density and viscosity similar to factory test fluids. Fluids with higher viscosity than these test fluids yield a higher pressure drop through the flow meter and piping system per a given flow volume.

A system must have adequate fluidic horsepower available to move the system fluid at a prescribed rate at a pressure adequate to overcome all pressure reducing devices, including the flow meter.



SPECIFICATIONS

FG1 Series Specifications			
Accuracy	±5% of full scale		
Repeatability	±1%		
Pressure Rating	325 psi (22.4 bar) Maximum		
Temperature Range	32...250° F (0...121° C)		
Fittings/Threads	NPT ANSI/ASME B1.20.3		
Materials	Wetted	Body	Polysulfone
		Piston	Polysulfone
		Cone	Polysulfone
		Spring	T300 Stainless Steel
		Retaining Rings	PH15-7MO Stainless Steel
		Seals	Buna-N
		Indicator Ring	Buna-N
		Fittings (1/2 and 3/4 NPT models)	C360 Brass
	Non-wetted	Limit Indicator	Polypropylene
		Scale	Polyester
Calibration Fluid	Oil	0.876 specific gravity, 32 cSt viscosity	
	Water	1.0 specific gravity, 1.0 cSt viscosity	