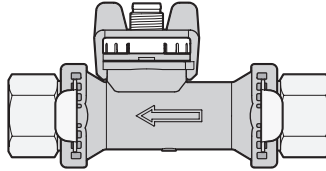


PV6000 Series

Vortex Flow Meters



This document describes the basic steps to install and make operational your PV6000 Series vortex flow meter. Additional product information is available on the Proteus Industries website at www.proteusind.com/vortex.

Model Numbers and Flow Ranges » Models with Pulse / Current / Voltage Output

Base Model Number	PV6004	PV6006	PV6008	PV6012
Flow Range (GPM)	0.24 to 4.0	0.48 to 8.5	0.92 to 13	1.3 to 22
Flow Range (LPM)	0.90 to 15	1.8 to 32	3.5 to 50	5.0 to 85

Model Numbers and Flow Ranges » Models with a Digital Display

Base Model Number	PV6004	PV6006	PV6008	PV6012
Flow Range (GPM)	0.24 to 2.6	0.48 to 6.6	0.92 to 13	1.3 to 22
Flow Range (LPM)	0.90 to 10	1.8 to 25	3.5 to 50	5.0 to 85

Frequency Ranges and Connections

Base Model Number	PV6004	PV6006	PV6008	PV6012
Frequency Range (Hz)	~34 to ~437	~24 to ~382	~19 to ~269	~14 to ~229
Connection Size	1/4"	3/8"	1/2"	3/4"
Inner Diameter	0.47 in / 12 mm	0.47 in / 12 mm	0.63 in / 16 mm	0.79 in / 20 mm

Temperature and Pressure Limits

Output Type or Display	Pulse / Current / Voltage Output	Digital Display
Fluid Temperatures*	-40 to 212 °F / -40 to 100 °C	
Ambient Temperature	50 to 185 °F / -15 to 85 °C	32 to 131 °F / 0 to 55 °C
Pressure Limit	175 psi at 104 °F / 1200 kPa at 40 °C 90 psi at 212 °F / 600 kPa at 100 °C	

*Voltage-output models have a temperature measurement range of -13 to 212 °F / -25 to 100 °C.

Electrical Requirements

Output Type or Display	Pulse Output	Current Output	Voltage Output	Digital Display
Output – Flow	Square wave	4–20 mA	0–10 VDC	N/A
Output – Temperature	Resistance*		0–10 VDC	Resistance*
Input Voltage	4.75–33 VDC	8–33 VDC	11.5–33 VDC	24 VDC ± 10%

*DIN EN 60751 Class B

1. Plumbing Connections

PV6000 Series flow meters can be installed into either horizontal or vertical piping, as long as the instrument is properly oriented in accordance with the direction of the liquid flow. In vertical installations, an upward flow direction is recommended.

NOTE



The instrument should be installed so that the arrow on the side of the body is facing the same direction as the direction of the liquid flow.

To ensure optimum performance, straight runs of pipe should be present both upstream and downstream from the instrument.

- > On the inlet side, a minimum straight pipe length of $0.5 \times ID$ (inner diameter) is required if using a 90° elbow with a radius of $1.8 \times ID$ or larger. If using an elbow with a smaller radius, a minimum length of $5 \times ID$ is required.
- > On the outlet side, a minimum length of $1 \times ID$ is required.

The flow response of a PV6000 Series flow meter, and thus its calibration, may be affected by the inner diameter of the incoming pipe or any devices attached to inlet connection as well as any nearby upstream devices.

- > Piping reducers may be installed upstream of the instrument, but should **not** be connected directly to the unit. A minimum straight run of $5 \times ID$ is required.
- > Piping expanders should **not** be installed upstream of the instrument.

NOTE



The inner diameter of the inlet and outlet piping, as well as of any fittings used, must be identical to that of the flow meter.

- a. Identify the plumbing connection size and inner diameter of your PV6000 Series instrument from the table on the first page of this document.
- b. Make connections to pipe or other fittings as required. With threaded fittings, it is recommended that you use a non-hardening pipe sealant, such as Teflon® (PTFE) tape or paste, to create leak-tight and lubricated junctions.
- c. Turn on the liquid flow slowly and check for leaks at the connections. Tighten connections as required to eliminate leaks.

CAUTION!



Do NOT exceed the maximum flow, temperature or pressure limits of your instrument.

2. Electrical Connections

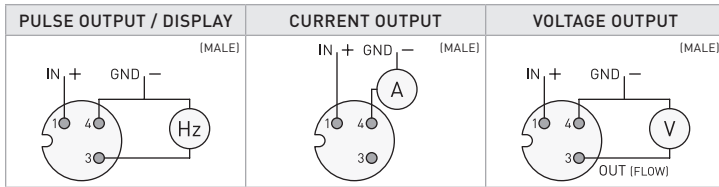
- a. Locate the DC power source and turn it OFF.
- b. Make all wiring connections for your PV6000 Series instrument as shown below and on the following page.

Power Cable Wiring Assignments

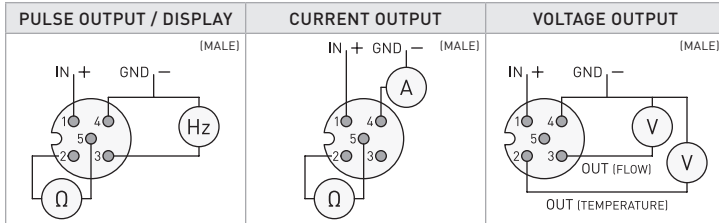
Wire Color	BROWN	WHITE	BLUE	BLACK	GREY
Pin Number	1	2	3	4	5

2. Electrical Connections (Continued)

Connector Pin Assignments » Flow Measurement Only



Connector Pin Assignments » Flow and Temperature Measurement



Display Cable Wiring Assignments

Wire Color	RED	BLACK	YELLOW	GREEN	WHITE
Function	V_{IN}	GND	NC	NC	NC

The display cable for units with temperature measurement capability includes two additional wires for resistance output:

Wire Color	GREY	WHITE
Function	T1	T2

- c. Confirm that all wire connections are secure.
- d. Make cable connections to the instrument as described below.

Pulse / Current / Voltage Output

Connect the M12x1 connector on the end of the power cable to the mating connector on the top of the flow meter and turn the lock nut clockwise to tighten (FIGURE 1).

Digital Display

- i. Connect the M12x1 connector on the end of the power cable to the mating connector on the top of the flow meter and turn the lock nut clockwise to tighten (FIGURE 1).

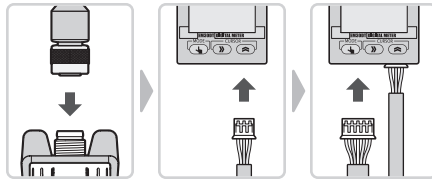



FIGURE 1

FIGURE 2

FIGURE 3

- ii. Insert the 3-pin connector on the other end of the power cable into the right-hand receptacle on the underside of the display unit (FIGURE 2).
 - iii. Insert the 5-pin connector on the end of the display cable into the left-hand receptacle on the underside of the display unit (FIGURE 3).
- e. Turn the DC power source ON.

3. Flow Measurement

NOTE		
	Q = Volumetric flow rate (LPM)	I _{OUT} = Current output (mA)
	f _{OUT} = Frequency output (Hz)	V _{OUT} = Voltage output (VDC)


Pulse / Current / Voltage Output

Characteristic lines for standard PV6000 Series instruments are shown below.


BASE MODEL	PULSE OUTPUT	CURRENT OUTPUT	VOLTAGE OUTPUT
PV6004	$Q = [0.0350 \times f_{OUT}] - 0.3$	$Q = 0.938 \times (I_{OUT} - 4 \text{ mA})$	$Q = 1.5 \times V_{OUT}$
PV6006	$Q = [0.0845 \times f_{OUT}] - 0.2$	$Q = 2.000 \times (I_{OUT} - 4 \text{ mA})$	$Q = 3.2 \times V_{OUT}$
PV6008	$Q = [0.1870 \times f_{OUT}] - 0.2$	$Q = 3.125 \times (I_{OUT} - 4 \text{ mA})$	$Q = 5.0 \times V_{OUT}$
PV6012	$Q = [0.3730 \times f_{OUT}] - 0.3$	$Q = 5.313 \times (I_{OUT} - 4 \text{ mA})$	$Q = 8.5 \times V_{OUT}$

Digital Display

PV6000 Series digital displays are factory-programmed for convenient out-of-the-box operation. When liquid flow is present, the instantaneous flow rate will be displayed in either gallons per minute (GPM) or liters per minute (LPM).

NOTE	
	Digital displays indicate flow rate information only. For models with temperature measurement capability, temperature information is transmitted as a resistance output signal. Refer to the Electrical Connections section for wiring assignments.

4. Temperature Measurement

NOTE		
	T = Liquid temperature (°C)	V _{OUT} = Voltage output (VDC)
	R _{OUT} = Resistance output (Ω)	

Resistance Output

PV6000 Series instruments with optional temperature measurement capability are equipped with a Pt1000 resistance temperature detector (RTD) that conforms to the DIN EN 60751 Class B specification. Models with resistance output have a nominal resistance of 1000 Ω at 0 °C.

Voltage Output

For voltage-output models, the measured liquid temperature can be calculated based on the temperature sensor output using the following equation:

$$T = (V_{OUT} \times 15) - 25$$

Voltage-output models have a measurement range of -13 to 212 °F / -25 to 100 °C.



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