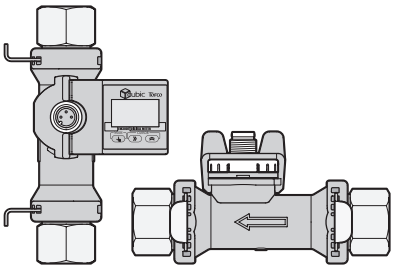

PV6000 Series

Vortex Flow Meters

This document describes the basic steps necessary 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/pv6000**.

Flow Ranges, Frequency Ranges, and Connection Sizes

Base Model Number	PV6004	PV6006	PV6008	PV6012
Flow Range* (LPM)	0.90–15	1.8–32	3.5–50	5.0–85
Flow Range* (GPM)	0.24–4.0	0.48–8.5	0.92–13	1.3–22
Frequency Range (Hz)	~31–399	~24–383	~20–270	~14–227
Connections	3/8" FNPT		1/2" FNPT	3/4" FNPT
Inner Diameter	11.5 mm / 0.45 in		16 mm / 0.63 in	20 mm / 0.79 in

*For models with a digital display, refer to the Digital Display Specifications table below.

Flow Meter Specifications

Output Type	Pulse	Current	Voltage
Output	Square wave[1]	4–20 mA	0–10 VDC
Fluid Temperatures	-40–100 °C / -40–212 °F		
Ambient Temperature	-15–85 °C / 5.0–185 °F		
Operating Pressure Limit[2]	1200 kPa at 40 °C / 174 psi at 104 °F 600 kPa at 100 °C / 87 psi at 212 °F		
Input Voltage	4.75–33 VDC	8–33 VDC	11.5–33 VDC

[1] The amplitude of the pulse frequency output is equal to the input voltage ± 5%.
[2] Unrated. Please see CAUTION statement in Plumbing Connections section.

Temperature Sensor Specifications

Output Type	Pulse	Current	Voltage
Measurement Range	-40–100 °C / -40–212 °F		-25–100 °C /-13–212 °F
Output	Resistance (DIN EN 60751 Class B)		0–8.3 VDC

Digital Display Specifications

Base Model Number	PV6004	PV6006	PV6008	PV6012
Flow Range (LPM)	0.90–15	1.8–32	3.5–50	5.0–85
Flow Range (GPM)	0.24–4.0	0.48–8.5	0.92–13	1.3–22
Output – Flow	N/A			
Output – Temperature	Resistance (DIN EN 60751 Class B)			
Ambient Temperature	0–55 °C / 32–131 °F			
Input Voltage	24 VDC ± 10%			

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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 the direction of the liquid flow. In vertical installations, an upward flow direction is recommended.

NOTE

The instrument should be installed so that the arrows on the sides of the body are facing in the direction of the liquid flow.

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

NOTE

The inner diameter (ID) of the inlet piping or the through-hole of a tube connector, hose barb, or other connecting element must be greater than or equal to the ID of the flow meter.

Refer to the table below to identify the minimum ID of the connecting elements for your instrument.

BASE MODEL NUMBER	MINIMUM ID OF INLET CONNECTION	MINIMUM STRAIGHT RUN OF PIPE	
		INLET	OUTLET
PV6004	11.5 mm / 0.45 in	57.5 mm / 2.26 in	11.5 mm / 0.45 in
PV6006	11.5 mm / 0.45 in	57.5 mm / 2.26 in	11.5 mm / 0.45 in
PV6008	16 mm / 0.63 in	80 mm / 3.15 in	16 mm / 0.63 in
PV6012	20 mm / 0.79 in	100 mm / 3.94 in	20 mm / 0.79 in

PV6000 Series instruments can be used with right-angle elbows with a through-hole ID greater than or equal to the ID of the flow meter.

NOTE

For assistance with applications involving elbows, please contact Proteus Technical Support at tech@proteusind.com or (650) 964-4163.

To ensure optimum performance, straight runs of pipe should be present both upstream and downstream from the instrument. Refer to the table above to identify the minimum straight-pipe lengths required for your instrument.

a. Identify the plumbing connection size and ID of your PV6000 Series instrument.

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 any leaks.

CAUTION!

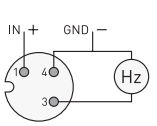
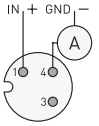
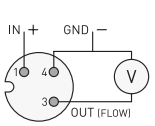
- DO NOT exceed the maximum flow, temperature or pressure limits of your instrument.
- Fast-closing valves can create high-pressure spikes (water hammer), which can damage the vortex sensor.
- Damage may occur if liquid freezes inside the flow meter body.

2. Electrical Connections

a. Locate the DC power source and turn it OFF.

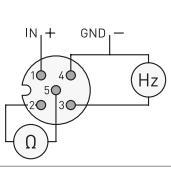
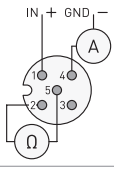
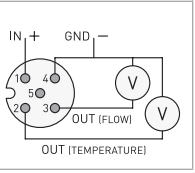
b. Make all wiring connections for your PV6000 Series instrument as shown in the tables below.

Flow Measurement Only

PIN	WIRE	PULSE OUTPUT	CURRENT OUTPUT	VOLTAGE OUTPUT
1	Brown	Power supply	Power supply	Power supply
2	White	No connection	No connection	No connection
3	Blue	Pulse output (flow)	No connection	Voltage output (flow)
4	Black	Supply return	Current output* (flow)	Supply return
5	Gray	No connection	No connection	No connection
				

*The current return should be connected to the negative terminal of the power supply.

Flow and Temperature Measurement

PIN	WIRE	PULSE OUTPUT	CURRENT OUTPUT	VOLTAGE OUTPUT
1	Brown	Power supply	Power supply	Power supply
2	White	Resist. output 1 (temp.)	Resist. output 1 (temp.)	Voltage output (temp.)
3	Blue	Pulse output (flow)	No connection	Voltage output (flow)
4	Black	Supply return	Current output* (flow)	Supply return
5	Gray	Resist. output 2 (temp.)	Resist. output 2 (temp.)	No connection
				

*The current return should be connected to the negative terminal of the power supply.

Digital Display

» Power Cable (3-pin connector)

The power cable connects the flow meter to the display.

For models with temperature measurement, it includes two additional wires for RTD output:

WIRE	FUNCTION
White	Resist. output 1 (temp.)
Gray	Resist. output 2 (temp.)

» Display Cable (5-pin connector)

The display cable connects the display to the power source.

WIRE	FUNCTION
Red	Power supply
Black	Supply return
Yellow	No connection
Green	No connection
White	No connection

c. Confirm that all wire connections are secure.

d. Turn the DC power source ON.

3. Flow Measurement

Pulse / Current / Voltage Output

Typical characteristic lines for standard PV6000 Series products with water calibration are shown in the table below. Refer to the calibration sheet provided with your device for unit-specific flow response information.

NOTE	
Q = Volumetric flow rate (LPM)	I_{OUT} = Current output (mA)
f_{OUT} = Frequency output (Hz)	V_{OUT} = Voltage output (VDC)

BASE MODEL	PULSE OUTPUT	CURRENT OUTPUT	VOLTAGE OUTPUT
PV6004	$Q = (0.0383 \times f_{OUT}) - 0.3$	$Q = 0.938 \times (I_{OUT} - 4\ mA)$	$Q = 1.5 \times V_{OUT}$
PV6006	$Q = (0.0841 \times f_{OUT}) - 0.2$	$Q = 2.000 \times (I_{OUT} - 4\ mA)$	$Q = 3.2 \times V_{OUT}$
PV6008	$Q = (0.1861 \times f_{OUT}) - 0.2$	$Q = 3.125 \times (I_{OUT} - 4\ mA)$	$Q = 5.0 \times V_{OUT}$
PV6012	$Q = (0.3751 \times f_{OUT}) - 0.3$	$Q = 5.313 \times (I_{OUT} - 4\ mA)$	$Q = 8.5 \times V_{OUT}$

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

Resistance Output

PV6000 Series products with temperature measurement capability are equipped with a Pt1000 resistance temperature detector (RTD) that conforms to the DIN EN 60751 Class B specification.

Resistance-output models have measurement range of -40–100 °C / -40–212 °F and a nominal resistance of 1000 Ω at 0 °C / 32 °F.

Voltage Output

For voltage-output models, the measured liquid temperature (**T**) can be calculated from the temperature sensor output using the equations below.

°C	$T = (V_{OUT} \times 15) - 25$

°F	$T = (V_{OUT} \times 27) - 13$

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

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