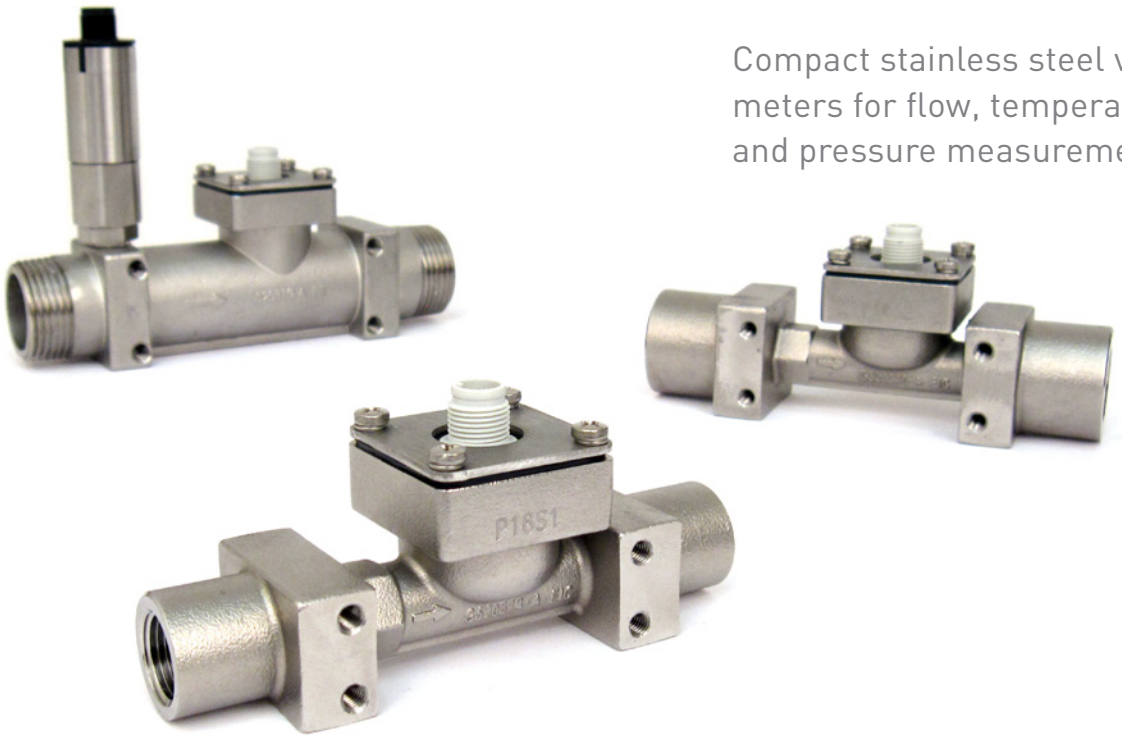
Proteus Industries Inc.

PRODUCT DATA SHEET

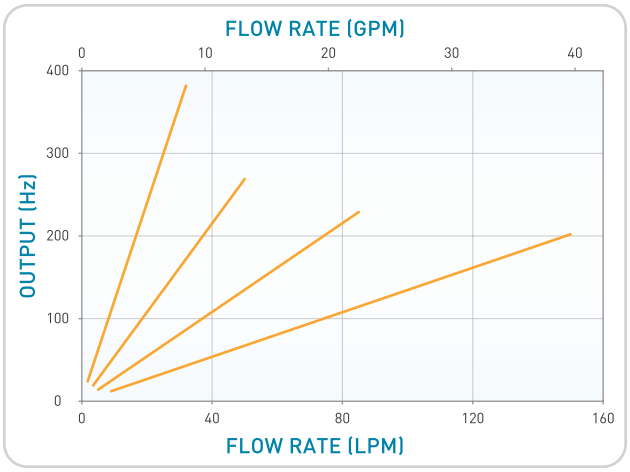
V7000 Series

Compact stainless steel vortex meters for flow, temperature, and pressure measurement



- Flow ranges from 1.8 to 150 LPM / 0.48 to 40 GPM
- Accuracy of better than ± 3% of flow range
- Optional temperature measurement capability from -40 to 125 °C / -40 to 257 °F with integrated Pt1000 RTD sensor
- Optional pressure measurement capability from 0 to 1200 kPa / 0 to 174 psi
- Rugged stainless steel construction
- Pulse, resistance, 0–10 VDC or 4–20 mA outputs
- Flow response can be calibrated for kinematic viscosities from 0.3 to 14 cSt — traceable calibrations also available
- No moving parts — high resistance to suspended solids
- Optional digital display for local indication of liquid flow rate
- Compatible with Galden®, Fluorinert™ and other advanced heat-transfer fluids
- Materials of construction are FDA-approved for contact with food and drinking water

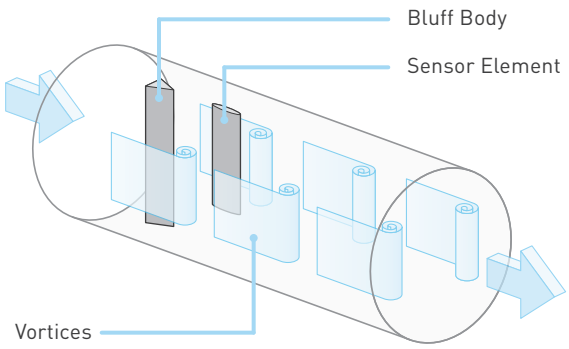
V7000 Series flow meters combine compact stainless steel bodies and sensitive, stable vortex sensors to produce high-value flow management tools. Proteus' world-class calibration capability can transform standard meters into instruments of uncommon accuracy, providing the confidence and certainty that the most critical heat-sensitive processes and equipment require.



Typical response curves of four V7000 Series flow meters

How It Works

As liquid flows around a bluff body inside the flow channel, swirling vortices are formed and carried downstream at the velocity of the flowing liquid. Alternating localized high- and low-pressure zones characteristic of a vortex stream are detected by a piezoelectric crystal that produces a pulse each time a vortex passes the sensor element. The number of vortices formed is directly proportional to the linear velocity of the liquid and, thus, to the volumetric flow rate.



Cost-Effective Measurement of Flow, Temperature, and Pressure

Proteus V7000 Series vortex flow meters offer the capability to measure the flow rate, temperature, and pressure in one instrument, requiring only a single connection point in your line.

» Flow — Three standard output options are available: pulse, 4–20 mA or 0–10 VDC. An optional digital display is available for local indication of the instantaneous liquid flow rate.

» Temperature — A Pt1000 RTD sensor integrated into the bluff body provides direct measurement of the liquid temperature without requiring additional probes or fittings. Temperature information is transmitted as a resistance signal in instruments with pulse or current output or as 0–10 VDC in instruments with voltage output.

» Pressure — A rugged pressure sensor can be attached to any size of instrument with voltage output for accurate measurement of liquid pressures up to 1200 kPa / 174 psi.

Certified Calibrations Help You Control Your Most Critical Processes

Proteus' expert calibration capabilities are based on knowledge, experience, and world-class reference instrumentation for flow, temperature, and pressure. Every V7000 Series instrument is shipped with a calibration certificate that identifies the actual performance capability of each sensor. Response factors are reported in both SI and US units of measure.

» Calibration beyond the ordinary

Our flow, temperature, and pressure measurement tools and expertise can be applied to provide you with specialized calibrations.

	STANDARD	SPECIALIZED
Flow	Flow response is measured and verified at three flow rates with water at 22 °C / 72 °F.	The flow response of your V7000 Series instrument can be determined for liquids with kinematic viscosities from 0.3 to 14 cSt — and you don't need to provide the test liquid!
Temperature	Temperature response is verified at room temperature.	Temperature responses can be determined at one or more temperatures within the meter's operating range of -40 to 125 °C / -40 to 257 °F.
Pressure	Pressure response is verified at 138 and 1034 kPa / 20 and 150 psi.	Customized pressure calibration can be made at multiple test pressures within the 0 to 1200 kPa / 0 to 174 psi operating range.

» Traceable calibration

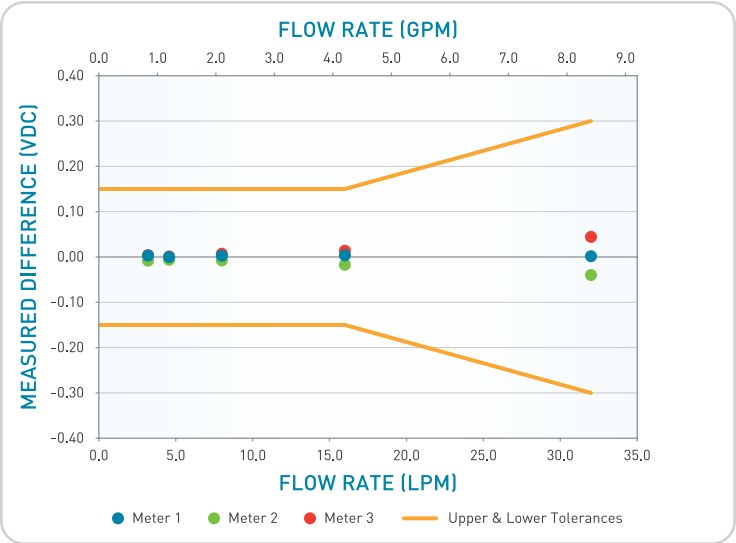
Our world-class reference instruments and measurement assurance programs allow us to offer NIST-traceable, ISO 17025-compliant, and Z540.3-compliant calibrations.

Performance Characteristics

» Flow

The responses of three calibrated V7000 Series vortex flow meters demonstrate excellent repeatability across the instruments' flow range to 30 LPM / 7.9 GPM.
The orange lines illustrate the specified tolerances for uncalibrated meters.

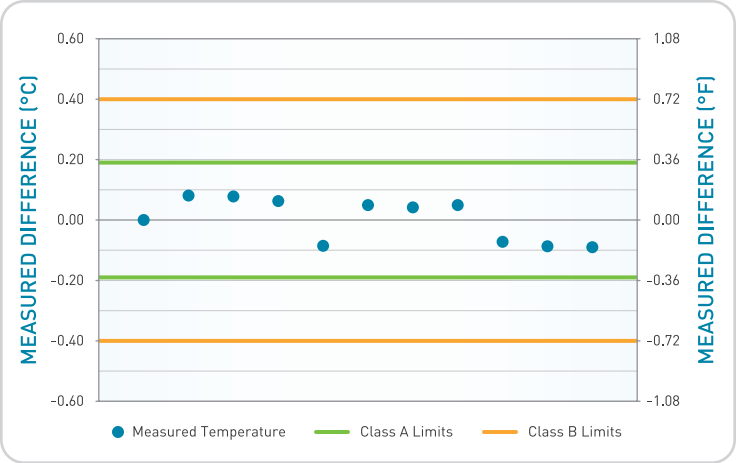
Proteus' world-class calibration equipment and processes provide you with exact response factors for liquids with kinematic viscosities from 0.3 to 14 cSt.



» Temperature

The measurement accuracy of ten temperature sensors with water at 20 °C / 68 °F is within the specified tolerance of a Class A Pt1000 RTD.

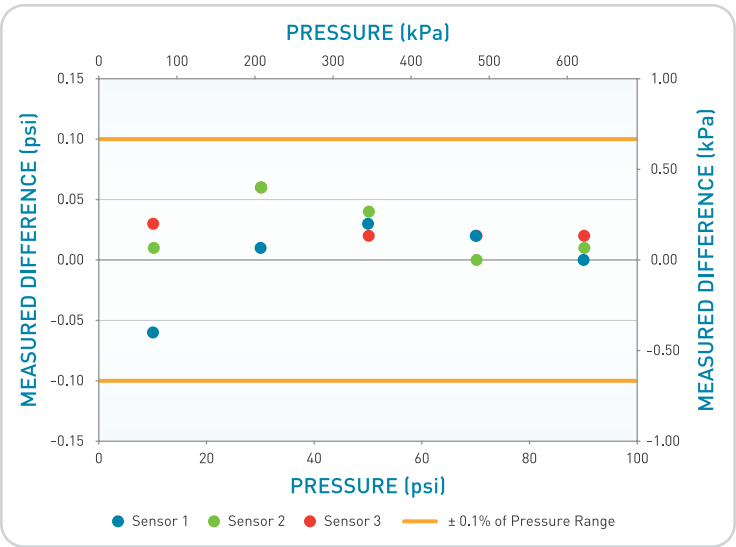
A specialized temperature calibration can provide even greater confidence that your product or process is being cooled—or heated—to the correct temperature.



» Pressure

The outputs of three pressure sensors are within ±0.4 kPa / ±0.06 psi across the 690 kPa / 100 psi range.

A pressure calibration confirms the in-tolerance response of each pressure sensor. The supplied calibration factors provide you with even greater accuracy at your operating pressure.



Flexibility of Connections

V7000 Series flow meters are available in a variety of connection sizes and thread options for each flow range, eliminating the need for intermediate fittings or adapters and reducing cost and the number of connection points.

Flow Ranges and Connections

Flow Range (LPM)	1.8 to 30	3.5 to 50	5.0 to 85	9.0 to 150
Flow Range (GPM)	0.48 to 7.9	0.92 to 13	1.3 to 22	2.4 to 40
Frequency Range (Hz)	~25 to 350	~20 to 270	~15 to 230	~12 to 200
Connection Size Options	3/8" FNPT 1/2" FNPT 3/4-14 SAE 3/4" FNPT 1/2" MNPT 3/4" MNPT	1/2" FNPT 3/4" FNPT 3/4" MNPT 1 1/16-12 SAE 1" MNPT	3/4" FNPT 1" FNPT 1" MNPT	1" FNPT 1" MNPT 1¼" MNPT 1 5/16-12 SAE

Flow Meter Specifications

Output Type	Pulse	Current	Voltage
Fluid Temperatures	-40 to 125 °C / -40 to 257 °F		
Ambient Temperature	-15 to 85 °C / 5.0 to 185 °F		
Kinematic Viscosities	0.3 to 14 cSt		
Operating Pressure Limit[1]	1200 kPa at 40 °C / 174 psi at 104 °F • 600 kPa at 100 °C / 87 psi at 212 °F		
Pressure Drop	< 23 kPa / < 3.3 psi at maximum flow rate		
Liquid Types	Water, water/glycol mixtures, Galden©, Fluorinert™, and other material-compatible liquids		
Flow Sensor	Piezoelectric sensor element		
Output	Square pulse frequency[2]	4–20 mA	0–10 VDC
Accuracy	< ± 1.5% of range at < 50% of flow range • < ± 3% of measured value at > 50% of flow range		
Signal Delay	< 100 ms		< 2 sec
Response Time	< 5 ms		< 500 ms
Input Voltage	4.75–33 VDC	8–33 VDC	11.5–33 VDC
Current Consumption	< 2 mA	–	< 5 mA
Wetted Materials	Flow body: Cast 304 stainless steel Bluff body: PPA (PA6T/6I - 40% glass fiber)		Sensor element: ETFE O-rings: EPDM
Enclosure Protection	IP65		
Standards and Compliance	CE conformity (EN 61326-2-3:2006) • RoHS and REACH compliance Materials of construction: NSF-51 and NSF-61 approval		
Cable Length	2.0 m / 6.6 ft		

[1] Unrated. Note: Fast-closing valves can create high-pressure spikes (water hammer), which can damage the vortex sensor.
[2] The amplitude of the pulse frequency output is equal to the input voltage ± 5%.

Temperature Sensor Specifications

Flow Sensor Output Type	Pulse	Current	Voltage
Temperature Sensor	Pt1000 RTD (DIN EN 60751 Class B)		
Measurement Range	-40 to 125 °C / -40 to 257 °F		-25 to 125 °C / -13 to 257 °F
Output Format	Resistance		0–10 VDC
Output Value	-40 °C = 842.7 Ω • 0 °C = 1000 Ω • 125 °C = 1479.5 Ω		T °C = (V_{OUT} × 15) - 25
Accuracy	± 0.3 K at T = 0 °C • ± 0.3 K ± 0.005 K/°C * T °C at T ≠ 0 °C		± 0.5 K ± 0.005 K/°C * T °C

Pressure Sensor Specifications

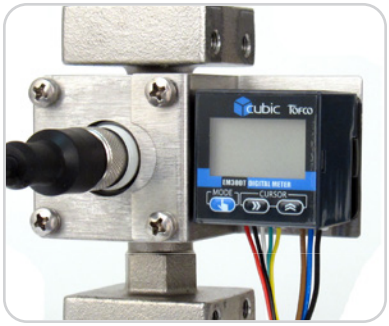
Pressure Sensor	Ceramic piezoelectric sensor element
Pressure Range	0 to 1200 kPa / 0 to 174 psi
Accuracy	± 11 kPa / ± 1.6 psi
Output	0–8.7 VDC
Response Time	< 2 ms
Input Voltage	12–33 VDC
Current Consumption	< 7 mA
Enclosure Protection	IP65
Wetted Materials	Body: 303 stainless steel Sensor element: Alumina (Al_2O_3 - 96%) O-ring: EPDM
Cable Length	2.0 m / 6.6 ft

Customization is Our Way of Life

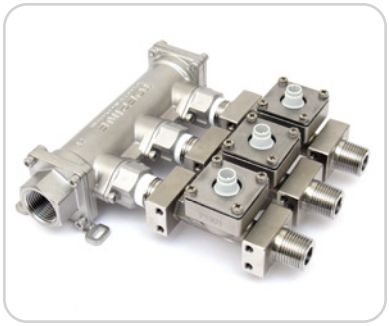
Whether you need a compact manifold, a critical calibration or a coolant monitoring system for your most critical flow-management tasks, our engineers and applications specialists have the experience, expertise, and inspiration to create a solution that will delight you! Instrumentation with specialized plumbing connections, wiring harnesses, precision control valves—even software—can be quickly designed and prototyped.

When your new product goes to production, fittings will be properly positioned, entire units and sub-assemblies will be certified leak-tight, all electrical connections will have been tested end-to-end, and the system's calibration will be certified to the specified accuracy. Our lean manufacturing processes and ISO 9001-certified procedures will ensure that your instruments will arrive at your location ready for use, the first time and every time.

Let us put our knowledge base to work on solving your most demanding flow measurement challenges! Contact Proteus Applications Support at tech@proteusind.com or (650) 964-4163 to discuss your requirements for a customized solution.



Compact digital displays for local indication of the instantaneous liquid flow rate.



Customized manifold assemblies for cost-effective liquid distribution, measurement, and control.

Coolant monitoring instrumentation for precise measurement of cooling or heating capacity, with multi-level alarms and leak-detection capability.

Need More Information?

» Visit our website — Additional V7000 Series product information, including dimensional drawings, prices, and more, is accessible at www.proteusind.com/v7000.

» Contact us — Our flow management experts will be pleased to answer your questions! Email us at tech@proteusind.com or call us at (650) 964-4163.

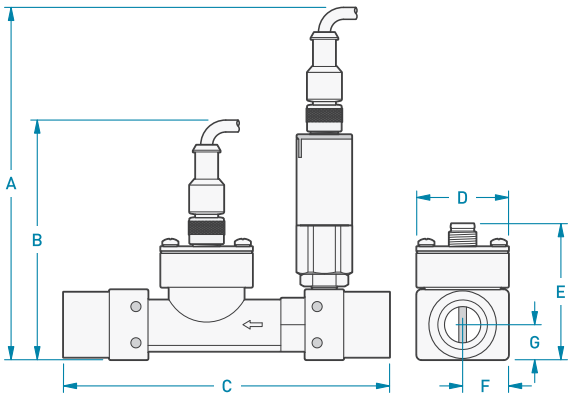
Model Numbers

		0V70	06	F	T	P	A	32

Base Model Number					
Thread Size	» 3/8" NPT				06
	» 1/2" NPT or 3/4-16 SAE				08
	» 3/4" NPT or 1 1/16-12 SAE				12
	» 1" NPT				16
	» 1 1/4" NPT or 1 5/16-12 SAE				20
Thread Form	» NPT – Female				F
	» NPT – Male				M
	» SAE – Female				S
Temperature Option	» RTD sensor installed				T
	» No temperature sensor				[blank]
Pressure Option	» Pressure sensor installed				P
	» No pressure sensor				[blank]
Output Options		FLOW	TEMP.	PRESS.	
	»	0–10 VDC	0–10 VDC	0–8.7 VDC	A
	»	4–20 mA	Resistance	N/A	I
	»	Pulse	Resistance	N/A	[blank]
Flow Range	» 1.8 to 30 LPM / 0.48 to 7.9 GPM				32
	» 3.5 to 50 LPM / 0.92 to 13 GPM				50
	» 5.0 to 85 LPM / 1.3 to 22 GPM				85
	» 9.0 to 150 LPM / 2.4 to 40 GPM				150

For a complete list of standard model numbers, refer to the V7000 Series price list available at www.proteusind.com/v7000.

Product Dimensions



FLOW RANGE	CONN.	MODEL	A	B	C	D	E	F	G
1.8 to 30 LPM 0.48 to 7.9 GPM	3/8" FNPT	0V7006F32	111.9 mm 4.40 in	94.1 mm 3.70 in	121.0 mm 4.76 in	38.0 mm 1.50 in	52.8 mm 2.08 in	19.0 mm 0.75 in	12.5 mm 0.49 in
	1/2" MNPT	0V7008M32							
	1/2" FNPT	0V7008F32	120.9 mm 4.76 in	98.6 mm 3.88 in	131.0 mm 5.16 in	38.0 mm 1.50 in	57.3 mm 2.26 in	19.0 mm 0.75 in	17.0 mm 0.67 in
	3/4-16 SAE	0V7008S32							
	3/4" FNPT	0V7012F32							
	3/4" MNPT	0V7012M32							
3.5 to 50 LPM 0.92 to 13 GPM	1/2" FNPT	0V7008F50	115.9 mm 4.56 in	98.0 mm 3.86 in	135.0 mm 5.31 in	38.0 mm 1.50 in	56.7 mm 2.23 in	19.0 mm 0.75 in	14.5 mm 0.57 in
	3/4" MNPT	0V7012M50							
	3/4" FNPT	0V7012F50	121.9 mm 4.80 in	101.0 mm 3.98 in	135.0 mm 5.31 in	38.0 mm 1.50 in	59.7 mm 2.35 in	19.0 mm 0.75 in	17.5 mm 0.69 in
	1 1/16-12 SAE	0V7012S50							
	1" MNPT	0V7016M50							
5.0 to 85 LPM 1.3 to 22 GPM	3/4" FNPT	0V7012F85	122.4 mm 4.82 in	103.2 mm 4.06 in	157.0 mm 6.18 in	38.0 mm 1.50 in	62.0 mm 2.44 in	19.0 mm 0.75 in	17.8 mm 0.70 in
	1" MNPT	0V7016M85							
	1" FNPT	0V7016F85	126.9 mm 4.99 in	105.5 mm 4.15 in	157.0 mm 6.18 in	40.0 mm 1.57 in	64.2 mm 2.53 in	20.0 mm 0.79 in	20.0 mm 0.79 in
9.0 to 150 LPM 2.4 to 40 GPM	1" MNPT	0V7016M150	124.9 mm 4.92 in	106.9 mm 4.21 in	152.5 mm 6.00 in	38.0 mm 1.50 in	65.7 mm 2.58 in	19.0 mm 0.75 in	19.0 mm 0.75 in
	1" FNPT	0V7016F150	130.9 mm 5.15 in	110.0 mm 4.33 in	163.0 mm 6.42 in	44.0 mm 1.73 in	68.7 mm 2.70 in	22.0 mm 0.87 in	22.0 mm 0.87 in
	1 1/4" MNPT	0V7020M150							
	1 5/16-12 SAE	0V7020S150							

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