Proteus Industries Inc.

PRODUCT DATA SHEET

8000 Series

Liquid Flow Meters

Advanced microprocessor-based flow measurement technology in a compact, leak-tight package

- Flow ranges from 0.2 to 227 LPM / 0.05 to 60 GPM
- Accuracy of 3% of flow range
- Liquid temperatures from -40 to 90 °C can be monitored at up to 30 °C ambient temperature without remote-mounting the electronics!
- Enhanced accuracy and stability from digital signal processing
- 15 alarm values selectable in 5% steps – plus AutoAlarm™!
- Standard 0–10 VDC or 0–5 VDC, and 4–20 mA outputs
- Specialized calibration available to account for viscosity effects of fluid and operating temperature — traceable calibrations also available
- Bright tricolor LED provides clear visual indication of flow status
- NEMA 4X / IP66 packaging ensures reliable performance in wet environments

Proteus 8000 Series flow meters provide accurate, rugged, reliable and cost-effective measurement of heat transfer fluids and other liquids from -40 to 90 °C. Customized versions can be adapted for use with liquid temperatures to 150 °C and above. A built-in relay can be used to sound an alarm or shut down a system before damage is done to valuable equipment and products.

AT A GLANCE

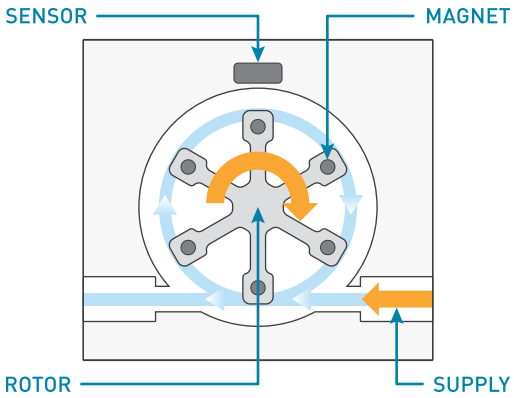
Flow Ranges	0.2 to 227 LPM 0.05 to 60 GPM
Temperature Limit[1]	90 °C / 194 °F
Operating Pressure Limit[2]	621 kPa / 90 psi
Output Formats	0–10 VDC OR 0–5 VDC 4–20 mA
CE Marked	Yes
REACH Compliant	Yes
NEMA 4X / IP66 Enclosure	Standard

[1] 150 °C / 302 °F and above with customized versions.
[2] 1724 kPa / 250 psi with optional metal faceplate.

How It Works

As liquid flows through the flow sensor cavity, it causes the rotor to spin. Magnets embedded in the rotor switch a Hall-Effect sensor mounted in the sensor body. The rotational frequency of the rotor is measured by a microcomputer, and scaling factors entered into flash memory allow the volumetric flow rate to be calculated. Flow rate information is output as 0–5 or 0–10 VDC and 4–20 mA.

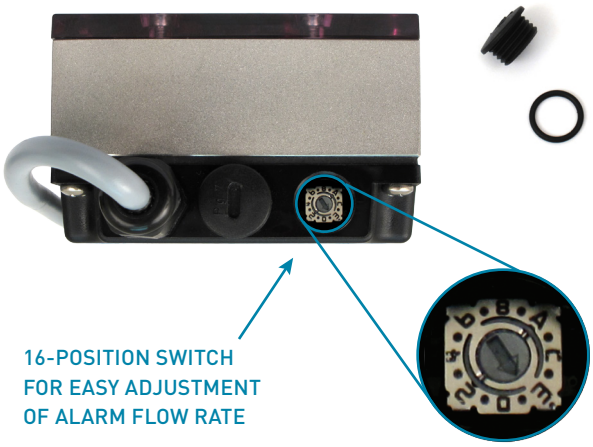
A built-in relay is programmed to change state when the measured flow rate falls below a preset alarm value. A bright LED flow status indicator is GREEN when the flow rate is at normal operating levels, AMBER if it falls below a calculated warning limit, and RED if it falls below the alarm flow rate.



Easy Trip Point Adjustment

A 16-position rotary switch provides simple and accurate selection of the alarm trip point value. The switch is housed under a screw closure with a leak-tight O-ring seal to prevent unintentional adjustment. Selecting switch positions **1** to **F** sets the trip point flow rate in 5% steps from 10% to 80% of the maximum flow rate of the instrument. The **F** position can alternatively be factory-programmed with a custom trip point value.

The unique AutoAlarm™ feature allows the operator to set the alarm trip point value based on a measured reference flow rate. To activate AutoAlarm, simply adjust your liquid flow to the desired flow rate and turn the rotary switch to the **0** (zero) position; the LED status indicator will then blink for five seconds to indicate that the trip point has been successfully programmed!



POSITION	PERCENTAGE OF UPPER LIMIT OF FLOW RANGE
0	AutoAlarm™ » Sets trip point based on reference flow rate
1	10%
2	15%
3	20%
4	25% (Default setting for standard products)
5	30%
6	35%
7	40%
8	45%
9	50%
A	55%
B	60%
C	65%
D	70%
E	75%
F	Programmed custom trip point value -OR- 80%

Wide Temperature Range and Accurate Flow Calibration

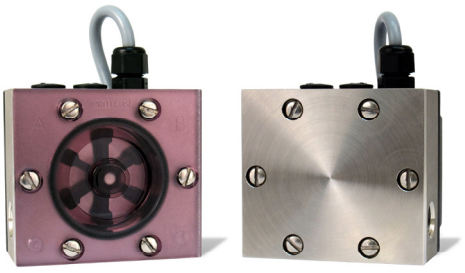
Standard brass and stainless steel models are capable of monitoring fluids at temperatures from -40 to 90 °C. Customization is available to extend the liquid temperature limit to above 150 °C. Proteus' world-class calibration capability allows us to deliver instruments with temperature- and fluid-specific calibrations to help you control your most critical processes.

Contact our flow experts at tech@proteusind.com or (650) 964-4163 for assistance in identifying the optimum solution for your most demanding applications!

Flow Visibility

A clear polysulfone faceplate allows the rotor to be fully visible, telling you at a glance if your cooling fluid is flowing.

Optional metal faceplates enable brass and stainless steel flow meters to be operated at pressures up to 1724 kPa / 250 psi.



Flow Ranges, Connections and Model Numbers

FLOW RANGE*		CONNECTIONS	MODEL NUMBER	
LPM	GPM		BRASS	STAINLESS STEEL
0.2 – 1.1	0.05 – 0.3	1/4" FNPT	08004BN03	08004SN03
0.2 – 2.2	0.06 – 0.6	1/4" FNPT	08004BN06	08004SN06
0.4 – 5.3	0.1 – 1.4	1/4" FNPT	08004BN1	08004SN1
0.95 – 9.5	0.25 – 2.5	1/4" FNPT	08004BN2	08004SN2
0.95 – 9.5	0.25 – 2.5	9/16-18 SAE		08006SA2
1.1 – 17	0.3 – 4.5	1/4" FNPT	08004BN4	08004SN4
1.1 – 17	0.3 – 4.5	9/16-18 SAE		08006SA4
2.2 – 34	0.6 – 9.0	3/8" FNPT	08006BN9	08006SN9
3.0 – 38	0.8 – 10	3/4-16 SAE		08008SA10
5.3 – 53	1.4 – 14	1/2" FNPT	08008BN14	08008SN14
4.5 – 60	1.2 – 16	3/4" FNPT	08012BN16	08012SN16
4.5 – 60	1.2 – 16	1 1/16-12 SAE		08012SA16
11 – 151	3.0 – 40	3/4" FNPT	08012BN40	08012SN40
15 – 151	4.0 – 40	1" FNPT	08016BN40	08016SN40
15 – 151	4.0 – 40	1 5/16-12 SAE		08016SA40
19 – 227	5.0 – 60	1" FNPT	08016BN60	08016SN60

*Listed flow ranges are for water at 25 °C / 77 °F.

MATCHING AN 8000 SERIES FLOW METER TO YOUR APPLICATION

1. Select a flow body material that is chemically compatible with your fluid.
2. Check the operational temperature and pressure limits to identify suitable materials.
3. Select your flow meter with a range so that
    a. your nominal flow rate is around 50–60% of the upper flow limit of the instrument, and
    b. your maximum flow rate is less than the upper flow limit of the instrument.
4. For specialized heat-transfer fluids such as Galden® or Fluorinert™, or if using positionable elbows, select SAE straight-thread connections.

For assistance in selecting the 8000 Series flow meter that is best suited to your flow control task, contact Proteus Applications Support at tech@proteusind.com or (650) 964-4163.

Temperature and Pressure Limits

FLOW BODY MATERIAL	FACEPLATE MATERIAL	TEMPERATURE LIMIT*		OPERATING PRESSURE LIMIT		BURST PRESSURE (5:1)	
		°C	°F	kPa	psi	kPa	psi
Brass	Clear Polysulfone	90	194	621	90	3103	450
	Brass	90	194	1724	250	8618	1250
Stainless Steel	Clear Polysulfone	90	194	621	90	3103	450
	Stainless Steel	90	194	1724	250	8618	1250

*This is the fluid temperature that can be sustained with the flow meter cooled by ambient air up to 30 °C / 86 °F.

Other Wetted Materials

COMPONENT	AVAILABLE MATERIALS	
	STANDARD	OPTIONAL
Rotor	PPS	
O-Ring	Viton®	Buna-N, Silicone Rubber
Rotor Shaft	316 Stainless Steel	Alumina

Performance Characteristics

The flow measurement capability of 8000 Series instruments can be qualified by three characteristics:

ACCURACY

The closeness of an indicated value to the actual value

Accuracy is expressed as a ±% of the highest value at which the calibration adjustment is made.

LINEARITY

The closeness of a calibration to curve to its best-fit straight line

Linearity is expressed as the maximum measured deviation of any calibration point from the ideal response line during a single calibration cycle.

REPEATABILITY

The ability of the instrument to reproduce readings when the same measured value is presented to it consecutively, under the same conditions and in the same direction

Repeatability is expressed as the maximum difference between output readings.

» How They Are Reported

The measurement capability of each 8000 Series product is stated on a Certificate of Conformance delivered with the unit.

A Calibration Certificate stating improved accuracy of ± 1% of reading for a single flow point is available at additional cost. This calibration adjustment is referenced to a flow standard whose response is controlled to ± 0.5% of the selected flow point. Standard calibrations are made with water at room ambient temperature.

» Calibration and Measurement Uncertainty

Accuracy specifications for 8000 Series instruments include the uncertainty of the calibration process. Uncertainty statements for flow calibrations are available upon request.

Accuracy - Standard	± 3% of flow range with standard validation
Accuracy - Validated	± 2% of calibration value
Linearity	± 1.5% of flow range from 0.1 to 1.0 × flow range
Repeatability	± 1% of flow range from 0.1 to 1.0 × flow range
Output Formats	Voltage: 0–10 VDC (default) or 0–5 VDC • Current: 4–20 mA
Hysteresis	5% of flow range
Pressure Drop	Less than 69 kPa / 10 psi at maximum flow rate for all versions except 08004BN06, 08004SN06 and 08004PN06. Contact Proteus Applications Support for more information.

Electrical Requirements

Input Power Voltage	+24 VDC ± 10%
Input Power Consumption	< 1 W
Relay Contacts Maximum Current	1 A at 48 VDC
Voltage Output Maximum Sourcing Current	15 mA at 2 VDC output
Maximum Loop Resistance	900 Ω at 24 VDC
Cable Specifications	Length: 2.0 m / 6.6 ft • Flame Rating: VW-1

Wiring

COLOR	FUNCTION	COLOR	FUNCTION	COLOR	FUNCTION
(BARE)	Shield	BROWN	Voltage Output	BLUE	Relay Normally Open
RED	+24 VDC	ORANGE	Current Output	WHITE	Relay Normally Closed
BLACK	Ground	YELLOW	Relay Common	GREEN	Analog Ground

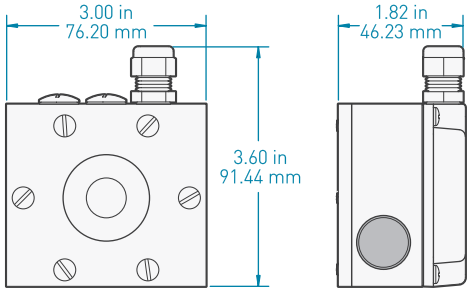
Compliance and Certifications

8000 Series instruments are compliant with the standards and directives listed below. Complete details, including information on suitability and restrictions, are available in the 8000 Series Technical Reference Manual.

- **» CE Compliance** — 2004/108/EC Electromagnetic Compatibility (EMC); 2006/95/EC Low Voltage
- **» Environmental Compliance** — 2011/65/EU RoHS Directive; 1907/2006/EC REACH Regulation.
- **» Electromagnetic Compatibility** — EN 55011:2007 ISM Equipment; EN 61326-1:2006 Electrical Equipment
- **» Safety Compliance** — EN 61010-1:2010 Safety Requirements for Electrical Equipment

Dimensions and Drawings

The size of an 8000 Series instrument is dependent on its flow range, and ranges from (HWD) 69.6×76.2×46.1 mm to 80.3×91.4×68.7 mm (2.7×3.0×1.8 in to 3.2×3.6×2.7 in). Outline and 3D drawings are accessible on the Proteus Industries website at www.proteusind.com/8000. Solid models are available upon request; please contact Proteus Applications Support.



Need More Information?

- **» Download the 8000 Series Technical Reference Manual**

  This comprehensive document, containing technical descriptions, performance specifications, flow response and pressure drop curves, installation and mounting instructions, maintenance guidelines and other valuable information is accessible at www.proteusind.com/8000.

- **» Contact Proteus Applications Support**

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

Proteus: Customization Experts

Bring us your specifications and let us create a flow management solution to meet your exact requirements. Materials can be modified or improved for compatibility with your fluid; flow ranges can be matched to large connections; adaptations can be implemented for high and low temperatures; and multiple devices can be integrated in cost-effective manifold assemblies for liquid distribution, measurement and control.

Fittings will be properly positioned, the entire unit will be certified to be leak tight, and all electrical connections will have been tested end-to-end. Our lean manufacturing processes and ISO 9001 certified procedures ensure that your devices will arrive on time, every time, and ready for use.

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