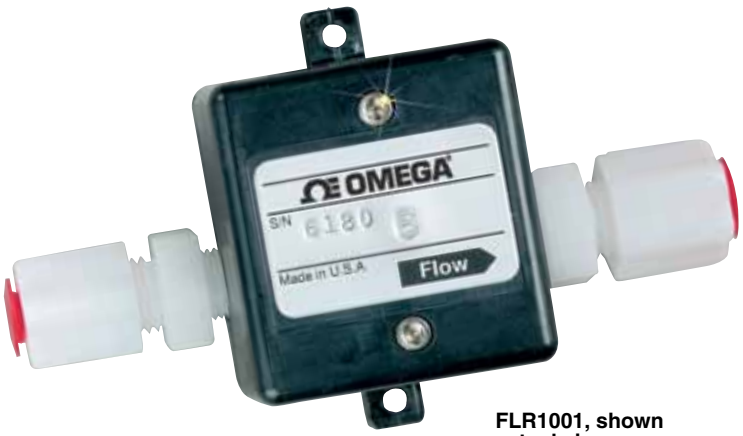
LOW FLOW TURBINE METERS
For Liquid and Gas Applications

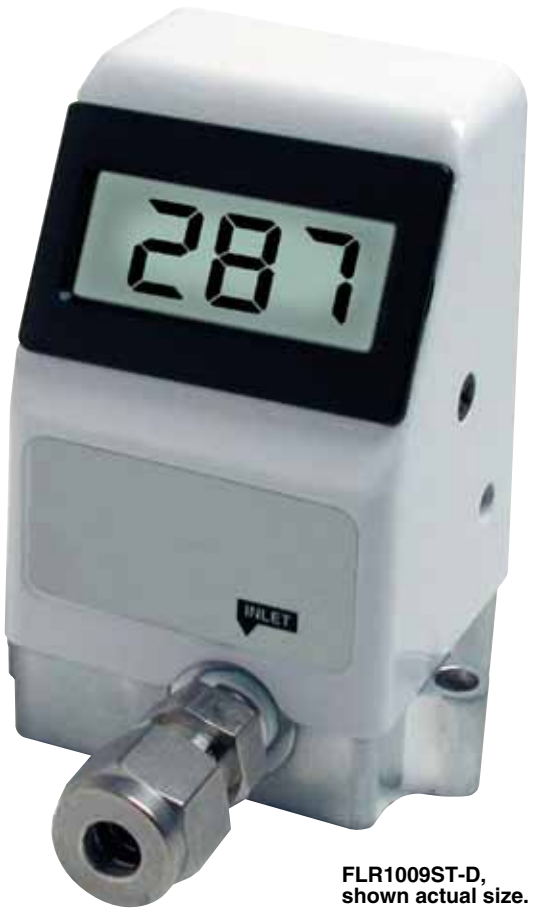
FLR1000 Series

Optional



FLR1001, shown actual size.

- **PPS or Brass Construction**
- **1% Accuracy for Liquids**
- **Up to 0.2% Repeatability**
- **0 to 5V Analog Output**
- **Available With or Without Display**



FLR1009ST-D, shown actual size.

FLR1000 Series flow sensors can measure extremely low flow rates from 20 mL/min to 5 L/min. These sensors are suitable for a wide variety of industrial, commercial, and laboratory flow applications. FLR1000 Series flow sensors operate on 12 Vdc power and are designed for incorporation into data acquisition systems that supply 12.5 Vdc to sensors and receive 0 to 5 Vdc linear signals in return. Because of their cost effectiveness, FLR1000 Series units may replace conventional glass tube and ball flowmeters in applications in which an electrical signal proportional to flow rate is desired.

The FLR1000 Series uses a Pelton-type turbine wheel to determine the flow rate of the gas. The rotation rate of the turbine wheel is linear over a wide dynamic range. The electro-optical system consists of a diode emitting energy in the infrared spectrum. Light energy is alternatively reflected and absorbed from "spokes" deposited on the small turbine wheel. This reflected light energy is detected by a photodiode. Thus, as the turbine wheel rotates in response to gas flow rate, electrical pulses are generated. Processing circuitry provides a DC voltage output proportional to the flow rate. For example, output signal is 1.0 Vdc at 20% of rated flow, 2.5 Vdc at 50% of rated flow, 4.0 Vdc at 80% of rated flow, and 5.0 Vdc at 100% of rated flow. Sensors can handle 20% above their rated flow without being damaged.

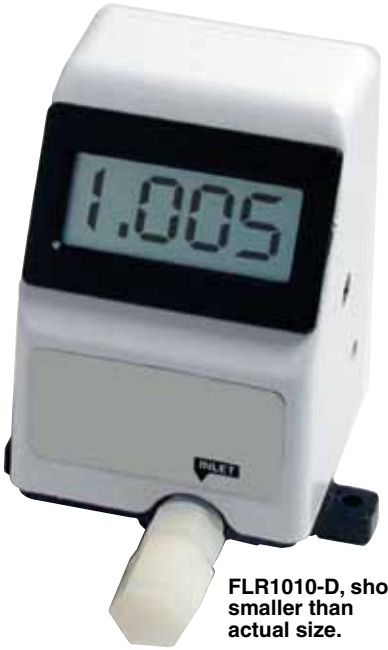
For liquid flow metering with integrated rate display, the FLR1000ST-D Series has been setting the pace. Their advanced Pelton-turbine design provides high turndown ratios, fast response, and repeatable accuracy. A 0 to 5 Vdc analog output is standard. Featuring a 3½-digit display of flow rate in engineering units, these flowmeters are perfect for any laboratory or test facility. For higher-pressure applications or where metal may be required, the FLR1000ST Series is the solution, see page F-89 for complete details.

Specifications (FLR1000 Series)

Accuracy: ±1% FS (liquids), ±3% (gases)
Display: 3½-digit LCD, 22 mm (⅞") H
Output Signal: 0 to 5 Vdc, adjustable ±20% (typical)
Power Requirement: 11.5 to 15 Vdc regulated, 30 mA (typical)
Standard Sensor Material: 40% glass filled polyphenelene sulfide, glass window, stainless steel bearing support; sapphire shaft and bearing; FKM rubber O-rings standard

Pressure Rating: 40 psi at 20°C (68°F) for gas, 100 psi for liquid, 500 psi for brass units using liquid services
Temperature Rating: 0 to 50°C (32 to 122°F)
Temperature Sensitivity: ±0.2%/°C
Linearity: ±3% FS
Repeatability: ±0.5% FS from 50 to 100% of rated maximum flow for gas; ±0.2% FS for liquid
Cable Assembly: 0.9 m (3') cable length

Dimensions:
Display: 76 x 44 x 89 mm (3 x 1.75 x 3.5")
Non-Display: 60 x 42 x 37 mm (2.35 x 1.65 x 1.25")
Pressure Sensitivity: ±0.07%/mm Hg (using air at 1 to 3 atm)
Mounting: Holes for #4 screw provided



FLR1010-D, shown smaller than actual size.

Options

Order Suffix	Description	Compatible Units
-BR	Brass body	Liquid: FLR1007-1013
-P	Pulse output	Liquid: FLR1007-1013
-BR-D	Brass body and display	Gas: FLR1001-1006, FLR1201 Liquid: FLR1007-1013
-BR-P	Brass body and pulse output	Liquid: FLR1007-1013

To Order

Model No. (No Display)	Model No. (Display)	Gas Flow Range	Maximum Pressure Drop (inches water)	Acetal Tube Fitting (inch)
FLR1001	**FLR1001-D**	20 to 100 mL/min	20	1/8
FLR1002	**FLR1002-D**	40 to 200 mL/min	8	1/8
FLR1003	**FLR1003-D**	100 to 500 mL/min	2	1/8
FLR1004	**FLR1004-D**	200 to 1000 mL/min	2	1/8
FLR1005	**FLR1005-D**	0.4 to 2.0 L/min	2	1/4
FLR1006	**FLR1006-D**	1.0 to 5.0 L/min	2	1/4
FLR1201	**FLR1201-D**	2.0 to 10.0 L/min	3	1/4
FLR1202	**FLR1202-D**	4.0 to 20.0 L/min	3	3/8
FLR1203	**FLR1203-D**	10 to 50 L/min	3	3/8
FLR1204	**FLR1204-D**	20 to 100 L/min	3	1/2
FLR1205	**FLR1205-D**	40 to 200 L/min	5	1/2
FLR1206	**FLR1206-D**	100 to 500 L/min	20	1/2
Model No. (No Display)	**Model No. (Display)**	**Liquid Flow Range**	**Maximum Pressure Drop (psi)**	**Acetal Tube Fitting (inch)**
FLR1007	**FLR1007-D**	13 to 100 mL/min	10	1/8
FLR1008	**FLR1008-D**	20 to 200 mL/min	10	1/4
FLR1009	**FLR1009-D**	50 to 500 mL/min	10	1/4
FLR1010	**FLR1010-D**	100 to 1000 mL/min	6	1/4
FLR1011	**FLR1011-D**	0.2 to 2.0 L/min	6	1/4
FLR1012	**FLR1012-D**	0.5 to 5.0 L/min	6	3/8
FLR1013	**FLR1013-D**	1 to 10 L/min	10	3/8

Accessories

Model No.	Description
FLR1000-PW	115 Vac power supply
FLR1000-230PW	230 V power supply with European connector
FLR1000-C35	Replacement 0.9 m (3') cable

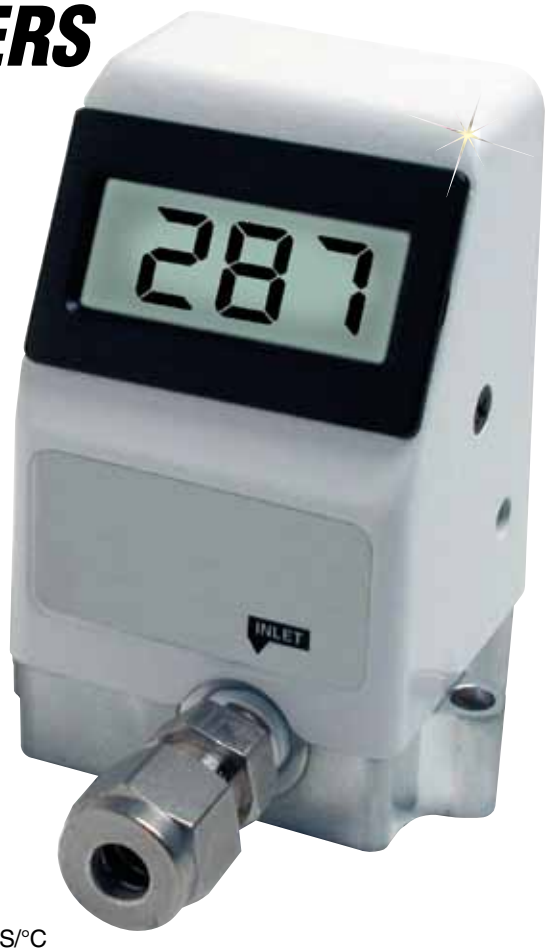
*For a 4-point NIST calibration for air, add suffix **"-NISTAIR"** to model number for additional cost.*
*For a 4-point NIST calibration for water add suffix **"-NISTWATER"** to model number, for additional cost, (FLR1007 calibrations are 3-points).*
Comes complete with 0.9 m (3') cable and operator's manual.
***Ordering Examples: FLR1012,** liquid flow sensor, 0.5 to 5.0 L/min range.*
***FLR1006-D,** gas flow sensor with display, 1.0 to 5.0 L/min range.*

LOW FLOW TURBINE METERS
Stainless Steel Construction

FLR1000ST Series

1 YEAR WARRANTY · CE · NIST · RoHS

Optional†



FLR1009ST-D shown larger than actual size.

- **±1% Accuracy**
- **0.2% Repeatability**
- **Available with 0 to 5V, 4 to 20 mA, or Pulse Output**
- **Available With or Without Display**

Designed for applications where stainless steel may be required, the FLR1000ST Series flowmeters are rated to 500 psig. These units are available to cover flow ranges from 13 mL/min to 10 L/min. A 0 to 5 Vdc or 4 to 20 mA analog output is standard with all units; Voltage output models are also available with an additional pulse output, or with a 3½ digit LCD readout.

SPECIFICATIONS

Accuracy/Linearity: ±1% FS
Repeatability: ±0.2% FS
Pressure Rating:
34 bar (500 psig), maximum
Operating Ambient: 5 to 55°C (41 to 131°F)
Storage Ambient: 0 to 70°C (32 to 158°F)
Temperature Sensitivity: ≤ ±0.2% FS/°C
Wetted Parts: 316 SS, epoxy, Pyrex® glass, PPS, FKM O-rings, sapphire bearings
Filtration (Recommended):
25 microns or less
Analog Output: Linear 0 to 5 Vdc or 4 to 20 mA; non-isolated signal
Pipe Connections: 316 SS compression tube fittings, provided

Electrical Connections: 4-pin male connector for both power and signal; included with 0.9 m (3') cable
Power:
Voltage Output Models:
11.5 to 12.5 Vdc (0.4 W @ 12 Vdc)
Current Output Models:
18 to 24 Vdc (1.2 W @ 24 Vdc), 50 mA

To Order

Model No. (No Display) 0 to 5 V Output and Pulse	Model No. (No Display) 4 to 20 mA Output	Model No. (Display Model) 0 to 5 V Output	Maximum Liquid Flow Range	Pressure Drop (psi)	Tube Connection
FLR1007ST	FLR1007ST-I	FLR1007ST-D	13 to 100 mL/min	10	⅛"
FLR1008ST	FLR1008ST-I	FLR1008ST-D	20 to 200 mL/min	10	¼"
FLR1009ST	FLR1009ST-I	FLR1009ST-D	50 to 500 mL/min	10	¼"
FLR1010ST	FLR1010ST-I	FLR1010ST-D	100 to 1000 mL/min	6	¼"
FLR1011ST	FLR1011ST-I	FLR1011ST-D	0.2 to 2.0 L/min	10	¼"
FLR1012ST	FLR1012ST-I	FLR1012ST-D	0.4 to 5.0 L/min	10	⅜"
FLR1013ST	FLR1013ST-I	FLR1013ST-D	1 to 10 L/min	10	⅜"

Accessories

Model No.	Description
U12Y100	12 Vdc power supply for 0 to 5 Vdc output models
PSU-93	24 Vdc power supply for 4 to 20 mA output models
FLR1000-C	Replacement 0.9 m (3') cable

Comes complete with 0.9 m (3') cable and operator's manual.
*†For optional 4-point NIST calibration certificate add suffix **"-NISTWATER"** to model number, for additional cost (FLR1007ST Series calibrations are 3-points).*
***Ordering Examples: FLR1011ST,** 0 to 5V output and pulse, 0.2 to 2 L/min.*
***FLR1013ST-D,** display model with 0 to 5V output, 1 to 10 L/min.*