WATER FLOWMETER AND CONTROLLER

FLR-1600A Series
FLV-4600A Series

1 YEAR WARRANTY · NIST · RoHS

Standard

- **Response Time Up to 20 ms**
- **Turndown Ratio of 50:1**
- **Pushbutton Tare (with Display)**
- **±2% FS Accuracy**
- **NIST Traceability**

The OMEGA® FLR-1600A and FLV-4600A Series flowmeters and controllers use two of the best studied physical properties of liquids to measure flow: pressure and viscosity. Differential pressure measurement, across a laminar flow element, results in a flowmeter that is inherently linear. OMEGA flow meters measure differential pressure within that laminar region to achieve a turndown of 50:1 typical and the accuracy is ±2.0% of full scale. It uses the same technology as the laminar gas mass flow and volumetric flow meters, FMA-1600A and FLV-1600A. There are no moving parts to wear out.

The FLR-1600A Series is a volumetric water flowmeter. The unique method of flow detection allows the meter to measure extremely low flow rates at an affordable price. The FLR-1600A Series was designed with deionized water in mind. These flowmeters are available in ranges of 500 microliters per minute full scale to 10 liters per minute full scale.

The FLR-1600A water meter provides data on the flow rate and temperature via the standard local display and the RS232 serial output. An optional gauge pressure sensor is available on the secondary output model **"-P"**.

The FLV-4600A Series water flow controller utilizes a proportional valve coupled to a flowmeter body creating a unique in-situ closed-loop flow controller system. Measurements are taken within the laminar region of the flow meter and the integral PID controller positions the valve according to the flow set points. The controllers can accept an RS232 or the 0 to 5V control input signal depending on what is preferred. Independent of the set point voltages, the controllers can be configured for single or dual output of the same or different voltages and/or different parameters such as temperature and flow. This is possible because of our laminar flowmeter design that incorporates solid-state differential and temperature sensors on the standard model to determine flow in an inherently linear system. An optional, absolute gauge pressure sensor is available on the **"-P"** secondary output models. The result is a fast responding linear flow meter with multiple outputs. All these parameters are simultaneously visible with our dynamic display that includes a push button operator interface. water flow controllers are available from 50 milliliters per minute full scale to 500 milliliters per minute full scale.

SPECIFICATIONS

Accuracy: ±2% FS
Repeatability: ±2% FS
Turndown Ratio: 50:1
Response Time:
FLR-1600A: 20 ms
FLV-4600A: 100 ms
Input Control Signal (FLV-4600A Units):
0 to 5 Vdc and RS232
Output Signal: 0 to 5 Vdc, RS232
Optional Input/Outputs:
4 to 20 mA, 0 to 10 Vdc
Operating Temperature:
10 to 50°C (50 to 122°F)
Zero Shift: 0.02%/ATM FS/°C
Span Shift: 0.02%/ATM FS/°C

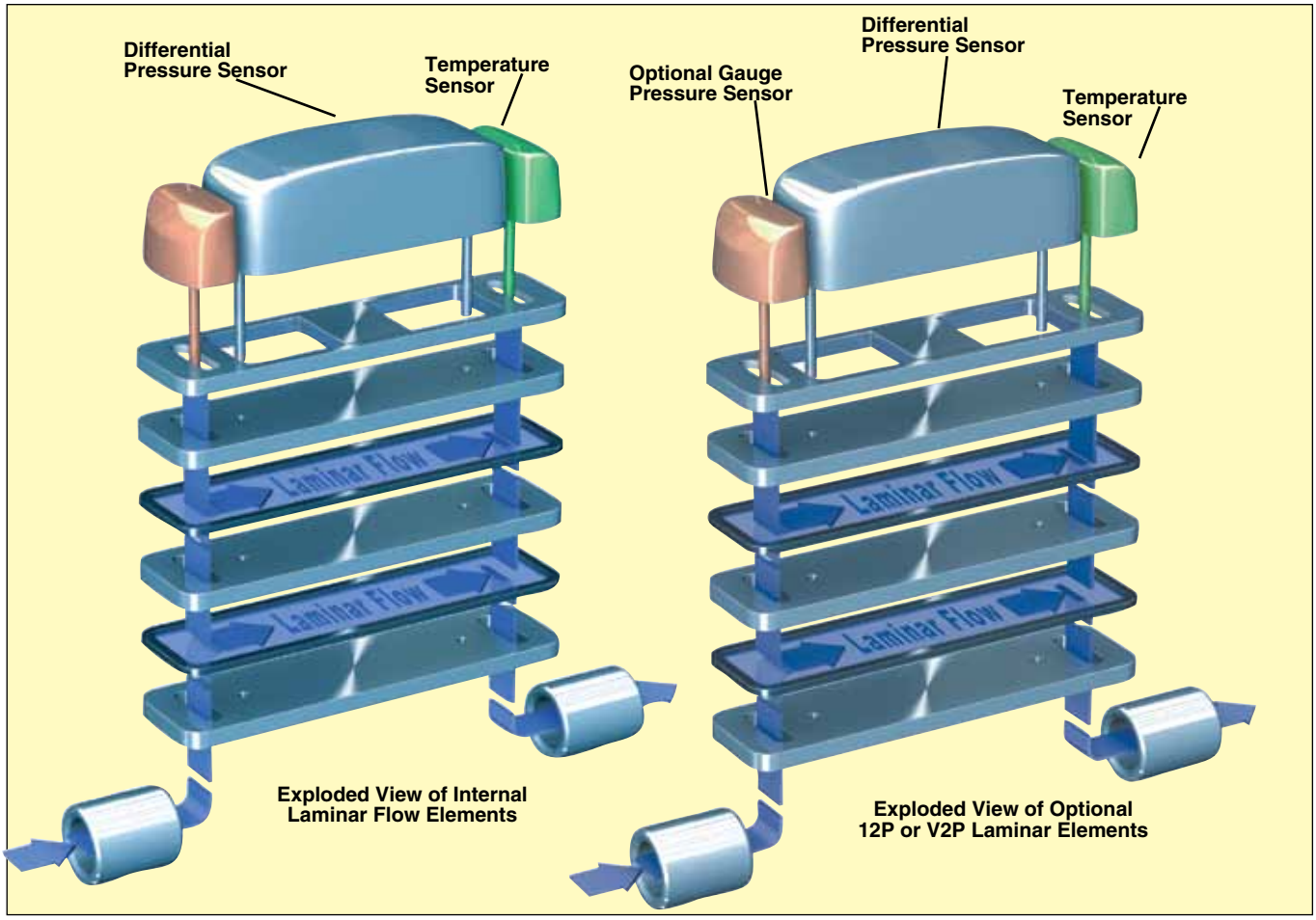
Excess Flow Rate:
Approx 28% overage
Maximum Pressure:
Meters: 200 psig
Controllers: 150 psig
Minimum Pressure Drop: 0.4 psid
Supply Current (Typical):
FLR-1600A: 30 mA
FLV-4600A: 250 mA
Supply Voltage:
FLR-1600A: 7 to 30 Vdc, 0.035 A
FLV-4600A: 12 to 30 Vdc, 0.250 A
Note: *15 Vdc minimum for 4 to 20 mA output option.*
Electrical Connections:
8-pin circular mini DIN
Wetted Materials: 303, 302 and 316 SS, FKM, polythermide, silicone glass, silicone rubber; controllers also

Dimensions: mm (inch)

Flow Range (Full Scale)	Height	Length	Depth
FLR-1600A			
0.5 to 1 SCCM	112 (4.4)	60 (2.4)	27 (1.05)
2 to 500 SCCM	116 (4.6)	60 (2.4)	27 (1.05)
1 SLPM	116 (4.6)	60 (2.4)	27 (1.05)
2 SLPM	119 (4.7)	67 (2.6)	27 (1.05)
5 to 10 SLPM	129 (5.1)	102 (4.0)	41 (1.6)
FLV-4600A			
0 to 1 SCCM	112 (4.4)	85 (3.3)	27 (1.05)
5 to 500 SCCM	116 (4.6)	91 (3.6)	27 (1.05)
1 to 5 SLPM	145 (5.7)	194 (7.7)	57 (2.3)

Please allow approximately 44.5 mm (1.75") on top of unit for electrical cable connection.

FLV-4604A shown smaller than actual size.



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To Order					
Water Flowmeter Model No.	**4 to 20 mA Output Model No.**	**2, 4 to 20 mA Output** Model No.**	**2, 0 to 5V Output** Model No.**	**Connection**	**Maximum Flow**
FLR-1601A	**FLR-1601A-I**	**FLR-1601A-I2**	**FLR-1601A-V2**	10 to 32 thread	0.001 to 0.5 CCM
FLR-1602A	**FLR-1602A-I**	**FLR-1602A-I2**	**FLR-1602A-V2**	10 to 32 thread	0.02 to 1 CCM
FLR-1614A	**FLR-1614A-I**	**FLR-1614A-I2**	**FLR-1614A-V2**	⅛ FNPT	0.04 to 2 CCM
FLR-1615A	**FLR-1615A-I**	**FLR-1615A-I2**	**FLR-1615A-V2**	⅛ FNPT	0.1 to 5 CCM
FLR-1603A	**FLR-1603A-I**	**FLR-1603A-I2**	**FLR-1603A-V2**	⅛ FNPT	0.2 to 10 CCM
FLR-1616A	**FLR-1616A-I**	**FLR-1616A-I2**	**FLR-1616A-V2**	⅛ FNPT	0.4 to 20 CCM
FLR-1604A	**FLR-1604A-I**	**FLR-1604A-I2**	**FLR-1604A-V2**	⅛ FNPT	1 to 50 CCM
FLR-1617A	**FLR-1617A-I**	**FLR-1617A-I2**	**FLR-1617A-V2**	⅛ FNPT	2 to 100 CCM
FLR-1618A	**FLR-1618A-I**	**FLR-1618A-I2**	**FLR-1618A-V2**	⅛ FNPT	4 to 200 CCM
FLR-1619A	**FLR-1619A-I**	**FLR-1619A-I2**	**FLR-1619A-V2**	⅛ FNPT	0 to 500 CCM
FLR-1620A	**FLR-1620A-I**	**FLR-1620A-I2**	**FLR-1620A-V2**	¼ FNPT	0.02 to 1 LPM
FLR-1605A	**FLR-1605A-I**	**FLR-1605A-I2**	**FLR-1605A-V2**	¼ FNPT	0.04 to 2 LPM
FLR-1606A	**FLR-1606A-I**	**FLR-1606A-I2**	**FLR-1606A-V2**	¼ FNPT	0.1 to 5 LPM
FLR-1607A	**FLR-1607A-I**	**FLR-1607A-I2**	**FLR-1607A-V2**	¼ FNPT	0.2 to 10 LPM
Water Flow Controller Min P = 5 Psig					
FLV-4604A	**FLV-4604A-I**	**FLV-4604A-I2**	**FLV-4604A-V2**	⅛ FNPT	1 to 50 CCM
FLV-4617A	**FLV-4617A-I**	**FLV-4617A-I2**	**FLV-4617A-V2**	⅛ FNPT	2 to 100 CCM
FLV-4618A	**FLV-4618A-I**	**FLV-4618A-I2**	**FLV-4618A-V2**	⅛ FNPT	4 to 200 CCM
FLV-4619A	**FLV-4619A-I**	**FLV-4619A-I2**	**FLV-4619A-V2**	⅛ FNPT	0 to 500 CCM
FLV-4620A	**FLV-4620A-I**	**FLV-4620A-I2**	**FLV-4620A-V2**	⅛ FNPT	0.02 to 1 LPM
FLV-4605A	**FLV-4605A-I**	**FLV-4605A-I2**	**FLV-4605A-V2**	¼ FNPT	0.04 to 2 LPM
FLV-4606A	**FLV-4606A-I**	**FLV-4606A-I2**	**FLV-4606A-V2**	¼ FNPT	0.1 to 5 LPM

Comes complete with 24 Vdc universal power supply, 1.8m (6') cable, 8-pin male mini-DIN connector, operator's manual, and NIST certificate.

*For a portable version of the FLR-1600A Series meters add suffix, **"-B"** to the model number, for additional cost. Portable versions have an integral battery compartment and come complete with 24 Vdc universal power supply, 1.8m (6') cable, 8-pin male mini-DIN connector, operator's manual, Nist certificate, and 9V battery installed. Option not available on versions where 4 to 20 mA is the chosen output.*

Units are calibrated to air @ 5 psig for 0 to 1 LPM, 15 psig for 2 to 10 LPM, 30 psig for 20 to 100 LPM, and 50 psig for 200 LPM and greater

Calibrations done at ambient 21°C (70°F) temperature only.

*To replace the standard RS232 communications with RS485, add suffix **"-RS485"** to the model number, for additional cost.*

*** Optional secondary output are scaled the same as the primary output scale. For an alternate temperature output scale, add suffix **"-T"** to the model number, no additional cost. For an alternate Pressure output scale, add suffix **"-P"** to the model number, for additional cost.*

***Note:** Models with secondary output for pressure include optional gauge pressure sensor.*

*For units scaled in CFH, add suffix **"-CFH"** to model number. Specify desired CFH range, no additional cost.*

*For totalizer option, add suffix **"-TOT"** to the model number, for additional cost. Please specify resolution.*

*This is a 6-digit counter. **Examples:** For totalizing in liters with 1/100 liter resolution, the max count would be 9999.99. For totalizing in liters with 1 liter resolution, the max count would be 999999.*

Accessories for FLR-1600A/FLV-4600A Series

Model No.	Description
FMA1600-C1	Replacement 8-pin male mini-DIN connector cable, single ended, 1.83 m (6')
FMA1600-C1-25FT	8-pin male mini DIN connector cable, single ended, 7.62 m (25')
FMA1600-C2	8-pin male mini DIN connector cable, double ended, 1.83 m (6')
FMA1600-C2-25FT	8-pin male mini DIN connector cable, double ended, 7.62 m (25')
FMA1600-C3	8-pin male mini DIN to DB9 female adaptor, 1.83 m (6')
FMA1600-CRA	8-pin male right-angle mini DIN cable, single ended, 7.83 m (6')
FMA1600-MDB	Multi-drop box
FMA1600-PSU	Univeral 100 to 240 Vac to 24 Vdc power supply adaptor
MN1604	Replacement 9V battery for the "-B" portable meters
FMA1600-BP	Battery cradle (not for use with "-B" versions)
FTNY-K210BN	Nylon body, tube ID 1⁄16 BAXB to 10 to 32 UNF connector
FTPP-K23ONP	Polypropylene body, tube ID ⅛ hose barb to 10-32 UNF connector