LAKE MONITORS

BASIC

Data Sheet No. B-699

IN-LINE LIQUID FLOW RATE MONITORS

FOR 1/4 – 2 INCH PIPE SIZES

CHOICE OF THREE MATERIALS OF CONSTRUCTION

Select from aluminum, brass or stainless steel to meet system and liquid requirements.

UNRESTRICTED MOUNTING

Allows the designer to install the monitor in any orientation – horizontal, vertical or inverted.

SUPERIOR EXTERIOR DESIGN

Weather-tight for use outdoors and/or on systems where wash downs are required.

GOOD VISCOSITY STABILITY

A sharp-edged orifice provides excellent measurement stability to a minimum of 500 SSU.

RUGGED AND RELIABLE

Designed as a hydraulic service tool, this monitor will provide years of maintenance-free performance.

HIGH PRESSURE OPERATION

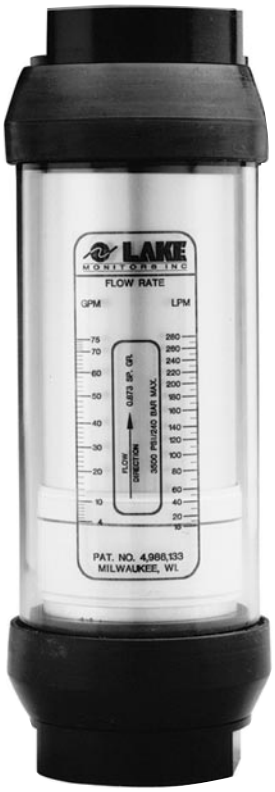
The magnetically coupled follower design allows operation to 6000 PSIG and use with opaque liquids.

TWENTY-THREE DIFFERENT PORTS AVAILABLE

Standard selection of NPT, SAE and BSP ports reduces the amount of adapters required for installation.

LOW COST PRECISION

Mid-scale measuring accuracy within ±2.5%. Full-scale accuracy within ±4%.



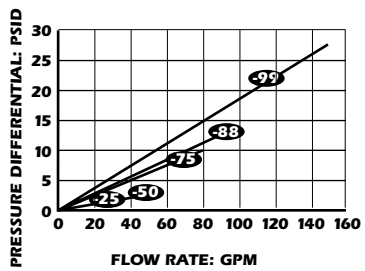
ENGINEERING SPECIFICATION

THE IN-LINE FLOW RATE MONITOR SHALL:

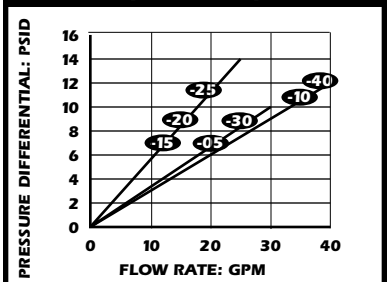
- use the variable annular orifice technique with compression spring recovery.
- not require inlet or outlet straight plumbing, or require vertical pipe mounting.
- have a measuring accuracy of ±2.5% of full scale in the center third of the measuring range, and ±4% of full scale accuracy over the entire flow measuring range.
- have a stainless steel sharp-edged orifice.
- have a weather-tight external construction.
- be Lake Monitors No. B _ _ – _ _ _ – _ _

PRESSURE DIFFERENTIAL VS FLOW RATE

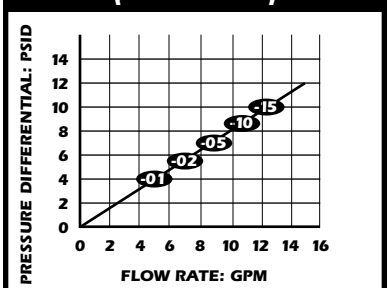
SERIES 5 MONITORS (1-1/4″ - 2″)



SERIES 4 MONITORS (3/4″ - 1″)



SERIES 3 MONITORS (1/4″ - 1/2″)



LAKE MONITORS

3828 West Mitchell St.▪Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com

IN-LINE LIQUID FLOW RATE MONITORS

MATERIALS OF CONSTRUCTION (WETTED COMPONENTS)

	ALUMINUM	BRASS	STAINLESS STEEL
High-pressure casing, end ports and tapered shaft	Aluminum	Brass	#304 Stainless Steel
Seals	Buna-N (STD), EPR, Viton® or Kalrez®	Buna-N (STD), EPR, Viton® or Kalrez®	Viton® with Teflon® backup (STD), Buna-N, EPR or Kalrez®
Transfer Magnet	Teflon coated Alnico	Teflon coated Alnico	Teflon coated Alnico
Floating Orifice Disk	Stainless Steel	Stainless Steel	Stainless Steel
All other internal parts	Stainless Steel	Stainless Steel	Stainless Steel

MATERIALS OF CONSTRUCTION (NON-WETTED COMPONENTS)

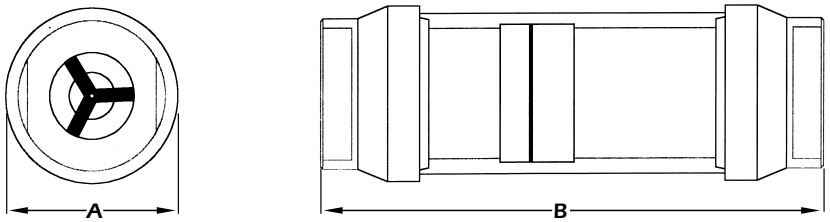
	ALUMINUM	BRASS	STAINLESS STEEL
Window Tube	Polycarbonate (STD), Pyrex	Polycarbonate (STD), Pyrex	Polycarbonate (STD), Pyrex
Window Seals	Buna-N (STD), Teflon	Buna-N (STD), Teflon	Buna-N (STD), Teflon

Teflon is a registered trademark of duPont de Nemours & Co.
Viton and Kalrez are registered trademarks of Dow DuPont Elastomers.

PERFORMANCE

Measuring accuracy:	±2.5% of full-scale in the center third of the measuring range; ±4% of full-scale over the entire scale range.
Repeatability:	±1% of full-scale
Flow measuring range:	0.05-150 GPM (0.2-560 LPM)
Maximum operating pressure:	aluminum and brass monitors: 3500 PSIG (240 Bar) stainless steel monitors: 6000 PSIG (410 Bar)
Maximum operating temperature:	240°F (116°C) Note: for operation to 600°F (316°C), see our High Temperature Data sheet.
Pressure differential:	see graphs
Standard calibration fluids:	Oil monitors: DTE 25 @ 110°F (43°C), 0.873 sg Water monitors: tap water @ 70°F (21°C), 1.0 sg

MECHANICAL



SIZE CODE

DIM	SERIES 3	SERIES 4	SERIES 5	SERIES 5
A	1-7/8″ (48mm)	2-3/8″ (60mm)	3-1/2″ (90mm)	3-1/2″ (90mm)
B	6-9/16″ (167MM)	7-5/32″ (182mm)	10-1/8″ (258mm)	12-5/8″ (322mm)
PORT SIZES	NPTF: 1/4″, 3/8″, 1/2″ SAE: #6, #8, #10 BSP: 3/8″, 1/2″	NPTF: 3/4″, 1″ SAE: #12, #16 BSP: 3/4″, 1″	NPTF: 1-1/4″, 1-1/2″ SAE: #20 BSP: 1-1/4″	NPTF: 2″ SAE: #32 BSP: 2″

Note: Consult factory for SAE brass monitor requirements.

LAKE MONITORS

PNEUMATIC

Data Sheet No. G-699

PNEUMATIC FLOW RATE MONITORS

FOR 1/4 – 2 INCH PIPE SIZES

CHOICE OF THREE MATERIALS OF CONSTRUCTION

Select from aluminum, brass or stainless steel to meet system and media requirements.

UNRESTRICTED MOUNTING

Allows the designer to install the monitor in any orientation – horizontal, vertical or inverted.

SUPERIOR EXTERIOR DESIGN

Weather-tight for use outdoors and/or on systems where wash downs are required.

MULTI-USE

These versatile monitors are used to verify air compressor outputs and to test pneumatic machinery and tools for proper air consumption.

RUGGED AND RELIABLE

These monitors are constructed with all metal pressure vessels, allowing safe, permanent, installation in industrial systems.

HIGH PRESSURE OPERATION

The magnetically coupled follower design allows operation to 1000 PSIG.

TWENTY-THREE DIFFERENT PORTS AVAILABLE

Standard selection of NPT, SAE and BSP ports reduces the amount of adapters required for installation.

LOW COST PRECISION

Mid-scale measuring accuracy: within ±2.5%. Full-scale accuracy: within ±4%.

ENGINEERING SPECIFICATION

THE PNEUMATIC IN-LINE FLOW RATE MONITOR SHALL:

- use the variable annular orifice technique with compression spring recovery.
- not require inlet or outlet straight plumbing, or require vertical pipe mounting.
- have a measuring accuracy of ±2.5% of full scale in the center third of the measuring range, and ±4% of full scale accuracy over the entire flow measuring range.
- have a stainless steel sharp-edged orifice.
- have a weather-tight external construction.
- be Lake Monitors No. G _ _ – _ _ _ – _ _.

PRESSURE DIFFERENTIAL VS FLOW RATE

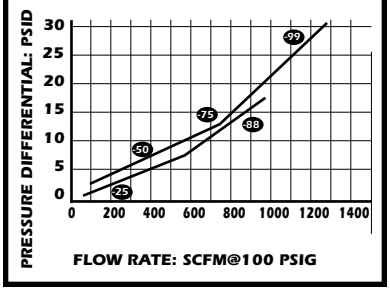
Lake Monitors Order Number:
(see guide to standard monitor numbers)

G3A - 4AB - 05

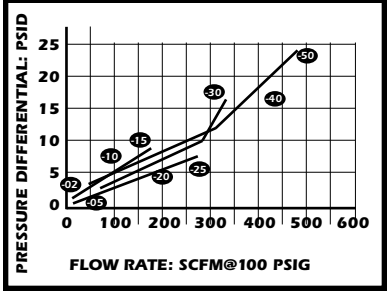
Series 3

Flow rate: 5-50 SCFM

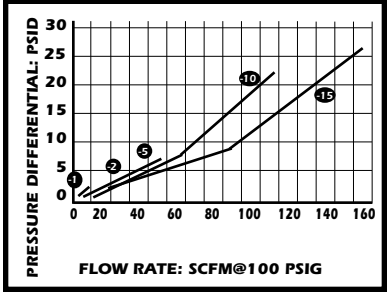
SERIES 5 MONITORS (1-1/4" - 2")



SERIES 4 MONITORS (3/4" - 1")



SERIES 3 MONITORS (1/4" - 1/2")



LAKE MONITORS

3828 West Mitchell St.▪Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com

PNEUMATIC FLOW RATE MONITORS

MATERIALS OF CONSTRUCTION (WETTED COMPONENTS)

	ALUMINUM	BRASS	STAINLESS STEEL
High-pressure casing, end ports and tapered shaft	Aluminum	Brass	#304 Stainless Steel
Seals	Buna-N (STD), EPR, Viton® or Kalrez®	Buna-N (STD), EPR, Viton® or Kalrez®	Viton® with Teflon backup (STD), Buna-N, EPR or Kalrez®
Transfer Magnet	Teflon coated Alnico	Teflon coated Alnico	Teflon coated Alnico
Floating Orifice Disk	Stainless Steel	Stainless Steel	Stainless Steel
All other internal parts	Stainless Steel	Stainless Steel	Stainless Steel

MATERIALS OF CONSTRUCTION (NON-WETTED COMPONENTS)

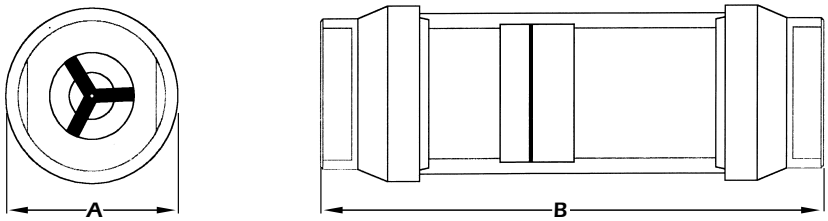
	ALUMINUM	BRASS	STAINLESS STEEL
Window Tube	Polycarbonate (STD), Pyrex	Polycarbonate (STD), Pyrex	Polycarbonate (STD), Pyrex
Window Seals	Buna-N (STD), Teflon	Buna-N (STD), Teflon	Buna-N (STD), Teflon

Teflon is a registered trademark of duPont de Nemours & Co.
Viton and Kalrez are registered trademarks of Dow DuPont Elastomers.

PERFORMANCE

Measuring accuracy:	±2.5% of full-scale in the center third of the measuring range; ±4% of full-scale over the entire scale range
Repeatability:	±1% of full-scale
Flow measuring range:	2.0-1000 SCFM (1.0-470 LPS)
Pressure differential:	see graphs
Maximum operating pressure:	aluminum and brass monitors: 600 PSIG (40 Bar) stainless steel monitors: 1000 PSIG (70 Bar)
Maximum operating temperature:	240ºF (116ºC) Note: for operation to 600ºF (316ºC), see our High Temperature Data sheet.
Standard calibration fluids:	air @ 70ºF (21ºC), 1.0 sg and 100 PSIG (6.8 Bar)

MECHANICAL



SIZE CODE

DIM	SERIES 3	SERIES 4	SERIES 5	SERIES 5
A	1-7/8" (48mm)	2-3/8" (60mm)	3-1/2" (90mm)	3-1/2" (90mm)
B	6-9/16" (167MM)	7-5/32" (182mm)	10-1/8" (258mm)	12-5/8" (322mm)
PORT SIZES	NPTF: 1/4", 3/8", 1/2" SAE: #6, #8, #10 BSP: 3/8", 1/2"	NPTF: 3/4", 1" SAE: #12, #16 BSP: 3/4", 1"	NPTF: 1-1/4", 1-1/2" SAE: #20 BSP: 1-1/4"	NPTF: 2" SAE: #32 BSP: 2"

Note: Consult factory for SAE brass monitor requirements.
For specific pneumatic application information, please see our "Pneumatic Sizing Guide".

LAKE MONITORS

HIGH TEMPERATURE

Data Sheet No. H-699

HIGH TEMPERATURE FLOW RATE MONITORS

FOR 1/4 – 2 INCH PIPE SIZES

MULTI-APPLICATION
Uses include: barrel heating fluids, thermal transfer fluids and non-steam water monitoring.

THREE MATERIALS AVAILABLE
Select from aluminum, brass or stainless steel construction to meet system requirements.

UNRESTRICTED MOUNTING
Allows the designer to install the monitor in any orientation – horizontal, vertical or inverted.

GOOD VISCOSITY STABILITY
A sharp-edged orifice provides excellent measurement stability to a minimum of 500 SSU.

RUGGED AND RELIABLE
Designed as a hydraulic service tool, this monitor will provide years of maintenance-free performance.

HIGH PRESSURE OPERATION
The magnetically coupled follower design allows operation to 6000 PSIG and use with opaque liquids.

TWENTY-THREE DIFFERENT PORTS AVAILABLE
Standard selection of NPT, SAE and BSP ports reduces the amount of adapters required for installation.

LOW COST PRECISION
Mid-scale measuring accuracy within ±2.5%. Full-scale accuracy within ±4%.

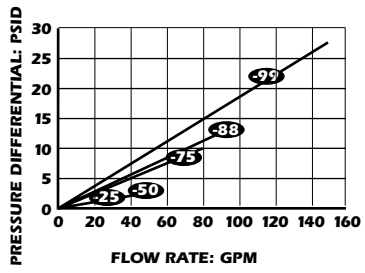
ENGINEERING SPECIFICATION

THE HIGH TEMPERATURE IN-LINE FLOW RATE MONITOR SHALL:

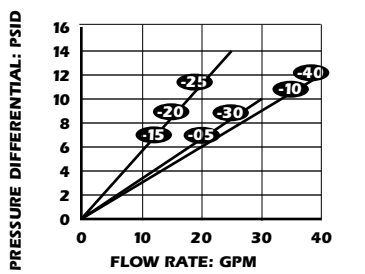
- use the variable annular orifice technique with compression spring recovery.
- not require inlet or outlet straight plumbing, or require vertical pipe mounting.
- have a measuring accuracy of ±2.5% of full scale in the center third of the measuring range, and ±4% of full scale accuracy over the entire flow measuring range.
- have a stainless steel sharp-edged orifice.
- have a minimum temperature rating of: H-series 400ºF (204ºC) or J-series 600ºF (315ºC).
- be Lake Monitors No. H _ _ – _ _ _ – _ _ for 400ºF (204ºC) applications or J _ _ – _ _ _ – _ _ for 600ºF (315ºC) applications.

PRESSURE DIFFERENTIAL VS FLOW RATE

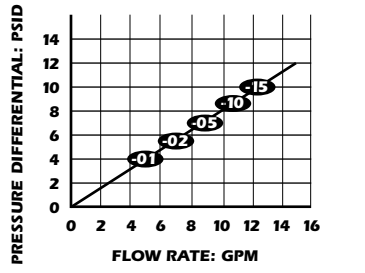
SERIES 5 MONITORS (1-1/4″ - 2″)



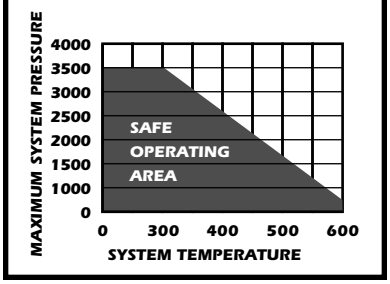
SERIES 4 MONITORS (3/4″ - 1″)



SERIES 3 MONITORS (1/4″ - 1/2″)



TEMPERATURE DERATING FOR ALUMINUM & BRASS MONITORS



LAKE MONITORS

3828 West Mitchell St.▪Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com

HIGH TEMPERATURE FLOW RATE MONITORS

MATERIALS OF CONSTRUCTION (WETTED COMPONENTS)

	ALUMINUM	BRASS	STAINLESS STEEL
High-pressure casing, end ports and tapered shaft	Aluminum	Brass	#304 Stainless Steel
Seals H-series (400°)	Viton® w/Teflon backup	Viton® w/Teflon backup	Viton® w/Teflon backup
J-series (600°)	Kalrez® w/Teflon backup	Kalrez® w/Teflon backup	Kalrez® w/Teflon backup
Transfer Magnet	Teflon coated Alnico	Teflon coated Alnico	Teflon coated Alnico
Floating Orifice Disk	Stainless Steel	Stainless Steel	Stainless Steel
All other internal parts	Stainless Steel	Stainless Steel	Stainless Steel

MATERIALS OF CONSTRUCTION (NON-WETTED COMPONENTS)

	ALUMINUM	BRASS	STAINLESS STEEL
Window Tube	Pyrex	Pyrex	Pyrex
Window Seals	Teflon	Teflon	Teflon

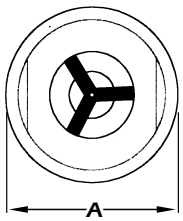
Teflon is a registered trademark of duPont de Nemours & Co.
Viton and Kalrez are registered trademarks of Dow DuPont Elastomers.

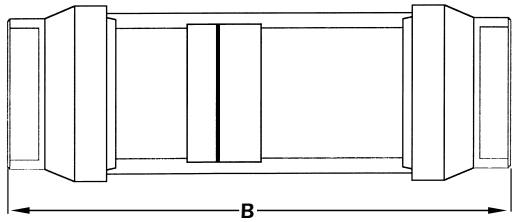
PERFORMANCE

Measuring accuracy:	±2.5% of full-scale in the center third of the measuring range; ±4% of full-scale over the entire scale range.
Repeatability:	±1% of full-scale
Flow measuring range:	0.05-150 GPM (0.2-560 LPM)
Pressure differential:	see graphs
Maximum operating pressure[1]:	aluminum and brass monitors: 3500 PSIG (240 Bar) stainless steel monitors: 6000 PSIG (410 Bar)
Maximum operating temperature:	H-series: 400ºF (204ºC) J-series: 600ºF (315ºC)
Standard calibration fluids:	Oil monitors: DTE 25 @ 110ºF (43ºC), 0.873 sg Water monitors: tap water @ 70ºF (21ºC), 1.0 sg Air monitors: air @ 70ºF (21ºC), 1.0 sg and 100 PSIG (6.8 Bar)

[1]Note: see Temperature/Pressure De-rating chart

MECHANICAL





SIZE CODE

DIM	SERIES 3	SERIES 4	SERIES 5	SERIES 5
A	1-7/8″ (48mm)	2-3/8″ (60mm)	3-1/2″ (90mm)	3-1/2″ (90mm)
B	6-9/16″ (167MM)	7-5/32″ (182mm)	10-1/8″ (258mm)	12-5/8″ (322mm)
PORT SIZES	NPTF: 1/4″, 3/8″, 1/2″ SAE: #6, #8, #10 BSP: 3/8″, 1/2″	NPTF: 3/4″, 1″ SAE: #12, #16 BSP: 3/4″, 1″	NPTF: 1-1/4″, 1-1/2″ SAE: #20 BSP: 1-1/4″	NPTF: 2″ SAE: #32 BSP: 2″

Note: Consult factory for SAE brass monitor requirements.

LAKE MONITORS

FLOW ALARM

Data Sheet No. A-699

FLOW RATE ALARMS

FOR 1/4 – 2 INCH PIPE SIZES

FIELD ADJUSTABLE ALARM SETTING

Only a screwdriver is required to change the flow alarm setting.

WEATHER-TIGHT CONSTRUCTION

The sealed, corrosion-resistant, enclosure allows installation in environments where liquid-tight seals are required.

SIMPLE ON/OFF LOGIC

Positive alarm points using 10 A., dry-contact, SPDT switches, reduce the complexity found in standard rotameter OFF/ON/OFF circuits.

PRE-WIRED WITH CABLE DISCONNECT

The standard Hirschmann inter-connection provides easy installation and maintenance of the FLOW ALARM and the system it is a part of.

UNRESTRICTED MOUNTING

Allows the designer to install the monitor in any orientation – horizontal, vertical or inverted.

ECONOMICAL PROTECTION

This monitor rapidly pays for itself as it "sounds the alarm" on incorrect lubrication or cooling volumes, protecting expensive equipment and reducing downtime.

QUALITY ASSURANCE

Can be an integral part of a quality control system, yielding consistent system operation.

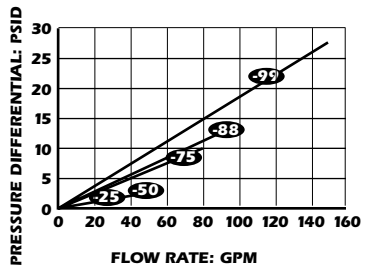
ENGINEERING SPECIFICATION

THE IN-LINE FLOW RATE MONITOR/ALARM SHALL:

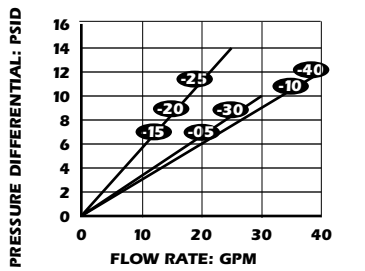
- have field adjustable, dry-contact, alarm setting(s).
- use the variable annular orifice technique with compression spring recovery.
- not require inlet or outlet straight plumbing, or require vertical pipe mounting.
- have a measuring accuracy of ±2.5% of full scale in the center third of the measuring range, and ±4% of full scale accuracy over the entire flow measuring range.
- have a stainless steel sharp-edged orifice.
- have a weather-tight external construction.
- be Lake Monitors No. M _ _ – _ _ _ – _ _ for single alarm applications, or N _ _ – _ _ _ – _ _ for dual alarm applications.

PRESSURE DIFFERENTIAL VS FLOW RATE

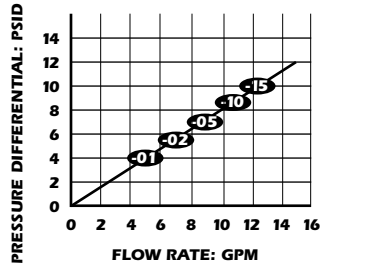
SERIES 5 MONITORS (1-1/4″ - 2″)



SERIES 4 MONITORS (3/4″ - 1″)



SERIES 3 MONITORS (1/4″ - 1/2″)



LAKE MONITORS

3828 West Mitchell St.▪Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com

FLOW RATE ALARMS

MATERIALS OF CONSTRUCTION (WETTED COMPONENTS)

	ALUMINUM	BRASS	STAINLESS STEEL
High-pressure casing, end ports and tapered shaft	Aluminum	Brass	#304 Stainless Steel
Seals	Buna-N (STD), EPR, Viton® or Kalrez®	Buna-N (STD), EPR, Viton® or Kalrez®	Viton® with Teflon backup (STD), Buna-N, EPR or Kalrez®
Transfer Magnet	Teflon coated Alnico	Teflon coated Alnico	Teflon coated Alnico
Floating Orifice Disk	Stainless Steel	Stainless Steel	Stainless Steel
All other internal parts	Stainless Steel	Stainless Steel	Stainless Steel

MATERIALS OF CONSTRUCTION (NON-WETTED COMPONENTS)

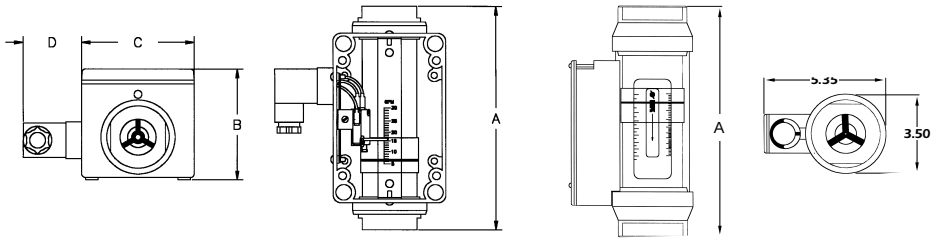
	ALUMINUM	BRASS	STAINLESS STEEL
Enclosure	Series 3: polycarbonate	Series 3: polycarbonate	Series 3: polycarbonate
	Series 4: polyester	Series 4: polyester	Series 4: polyester
	Series 5: polycarbonate and aluminum	Series 5: polycarbonate and aluminum	Series 5: polycarbonate and aluminum
Window Seals	Buna-N	Buna-N	Buna-N

Teflon is a registered trademark of duPont de Nemours & Co.
Viton and Kalrez are registered trademarks of Dow DuPont Elastomers.

PERFORMANCE

Measuring accuracy:	±2.5% of full-scale in the center third of the measuring range; ±4% of full-scale over the entire scale range
Repeatability:	±1% of full-scale
Flow measuring range:	0.05-150 GPM (0.2-560 LPM); 2-1000 SCFM (1-470 LPS)
Maximum operating pressure:	aluminum and brass monitors: 3500 PSIG (240 Bar) stainless steel monitors: 6000 PSIG (410 Bar)
Maximum operating temperature:	media: 240ºF (116ºC) ambient: 180ºF (82ºC)
Pressure differential:	Liquid: see graphs. Gases: see Pneumatic data sheet
Standard calibration media:	Oil monitors: DTE 25 @ 110ºF (43ºC), 0.873 sg Water monitors: tap water @ 70ºF (21ºC), 1.0 sg Air monitors: air @ 70ºF (21ºC), 1.0 sg and 100 PSIG (6.8 Bar)
Alarm switch dead-band:	4% of full scale
Alarm switch contacts:	SPDT (dry contact), UL/CSA rating: 10 amps and 1/4 hp, 125 or 250 vac. 1/2 amp, 125 vdc; 1/4 amp, 250 vdc; 3 amps, 125 vac "L" (lamp load) Double-Break Switch: Consult factory

MECHANICAL



DIM	SERIES 3	SERIES 4	SERIES 5	SERIES 5
A	6-9/16″ (167mm)	7-5/32″ (182mm)	10-1/8″ (258mm)	12-5/8″ (322mm)
B	3-11/32″ (85mm)	3-9/16″ (90mm)	3-1/2″ (90mm)	3-1/2″ (90mm)
C	3-5/32″ (80mm)	3-9/16″ (90mm)		
D	1-7/8″ (47mm)	1-7/8″ (47mm)		
PORT SIZES	NPTF: 1/4″, 3/8″, 1/2″ SAE: #6, #8, #10 BSP: 3/8″, 1/2″	NPTF: 3/4″, 1″ SAE: #12, #16 BSP: 3/4″, 1″	NPTF: 1-1/4, 1-1/2″ SAE: #20 BSP: 1-1/4″	NPTF: 2″ SAE: #32 BSP: 2″

Note: Consult factory for SAE brass monitor requirements.

LAKE MONITORS

PHOSPHATE ESTER

Data Sheet No. P-699

PHOSPHATE ESTER FLOW RATE MONITORS

FOR 1/4 – 2 INCH PIPE SIZES

THREE MATERIALS AVAILABLE
Select from aluminum, brass or stainless steel construction to meet system requirements.

UNRESTRICTED MOUNTING
Allows the designer to install the monitor in any orientation – horizontal, vertical or inverted.

MULTI-USE
Factory calibrated for phosphate ester, these versatile monitors can be used to verify hydraulic power unit outputs and to test machinery and tools for proper fluid flow rates.

RUGGED AND RELIABLE
These monitors are constructed with all metal pressure vessels that allow safe, permanent, installation in industrial systems.

HIGH PRESSURE OPERATION
The magnetically coupled follower design allows operation to 6000 PSIG.

TWENTY-THREE DIFFERENT PORTS AVAILABLE
Standard selection of NPT, SAE and BSP ports reduces the amount of adapters required for installation.

LOW COST PRECISION
Mid-scale measuring accuracy within ±2.5%. Full-scale accuracy within ±4%.

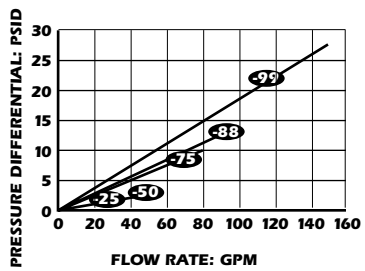
ENGINEERING SPECIFICATION

THE PHOSPHATE ESTER IN-LINE FLOW RATE MONITOR SHALL:

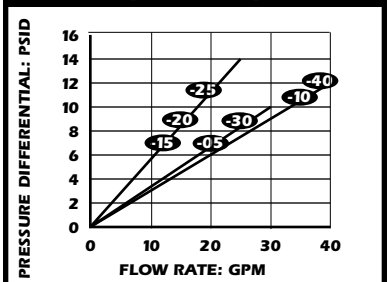
- be factory calibrated for phosphate ester measurements.
- use the variable annular orifice technique with compression spring recovery.
- not require inlet or outlet straight plumbing, or require vertical pipe mounting.
- have a measuring accuracy of ±2.5% of full scale in the center third of the measuring range, and ±4% of full scale accuracy over the entire flow measuring range.
- have a stainless steel sharp-edged orifice.
- be Lake Monitors No. P _ _ – _ _ _ – _ _.

PRESSURE DIFFERENTIAL VS FLOW RATE

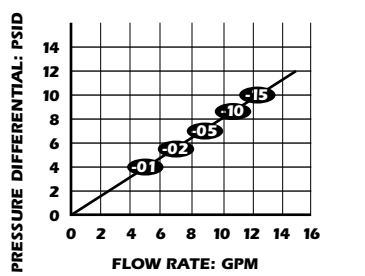
SERIES 5 MONITORS (1-1/4″ - 2″)



SERIES 4 MONITORS (3/4″ - 1″)



SERIES 3 MONITORS (1/4″ - 1/2″)



LAKE MONITORS

3828 West Mitchell St.▪Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com

PHOSPHATE ESTER FLOW RATE MONITORS

MATERIALS OF CONSTRUCTION (WETTED COMPONENTS)

	ALUMINUM	BRASS	STAINLESS STEEL
High-pressure casing, end ports and tapered shaft	Aluminum	Brass	#304 Stainless Steel
Seals	EPR w/Teflon backup (STD), Viton® or Kalrez®	EPR w/Teflon backup (STD), Viton® or Kalrez®	EPR w/Teflon backup (STD), Viton® or Kalrez®
Transfer Magnet	Teflon coated Alnico	Teflon coated Alnico	Teflon coated Alnico
Floating Orifice Disk	Stainless Steel	Stainless Steel	Stainless Steel
All other internal parts	Stainless Steel	Stainless Steel	Stainless Steel

MATERIALS OF CONSTRUCTION (NON-WETTED COMPONENTS)

	ALUMINUM	BRASS	STAINLESS STEEL
Window Tube	Pyrex	Pyrex	Pyrex
Window Seals	Teflon	Teflon	Teflon

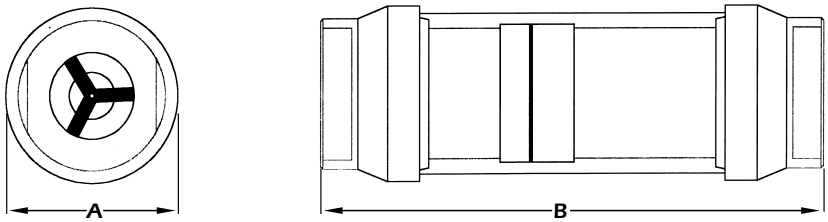
Teflon is a registered trademark of duPont de Nemours & Co.
Viton and Kalrez are registered trademarks of Dow DuPont Elastomers.

PERFORMANCE

Measuring accuracy:	±2.5% of full-scale in the center third of the measuring range; ±4% of full-scale over the entire scale range.
Repeatability:	±1% of full-scale
Flow measuring range[1]:	0.1-130 GPM (0.4-490 LPM)
Pressure differential:	see graphs at left
Maximum operating pressure:	aluminum and brass monitors: 3500 PSIG (240 Bar) stainless steel monitors: 6000 PSIG (410 Bar)
Maximum operating temperature:	240ºF (116ºC) Note: for operation to 600ºF (316ºC) alternate o-ring material will be required.
Standard calibration fluids:	DTE 25 @ 110ºF (43ºC), 0.873 sg. Monitors are density corrected to 1.16 sg.

[1] To determine approximate measuring ranges multiply the range listed in the Liquid Flow Rate section of Lake's **Guide to standard monitor numbers** by 0.93. For example, a P3A6WB10 would have a scale range to 10 GPM *0.93 = 9.3 GPM at full scale.

MECHANICAL



SIZE CODE

DIM	SERIES 3	SERIES 4	SERIES 5	SERIES 5
A	1-7/8″ (48mm)	2-3/8″ (60mm)	3-1/2″ (90mm)	3-1/2″ (90mm)
B	6-9/16″ (167MM)	7-5/32″ (182mm)	10-1/8″ (258mm)	12-5/8″ (322mm)
PORT SIZES	NPTF: 1/4″, 3/8″, 1/2″ SAE: #6, #8, #10 BSP: 3/8″, 1/2″	NPTF: 3/4″, 1″ SAE: #12, #16 BSP: 3/4″, 1″	NPTF: 1-1/4″, 1-1/2″ SAE: #20 BSP: 1-1/4″	NPTF: 2″ SAE: #32 BSP: 2″

Note: Consult factory for SAE brass monitor requirements.

FLOW TRANSMITTER

Data Sheet No. T-699

FLOW RATE TRANSMITTERS

FOR 1/4 – 2 INCH PIPE SIZES

SIMPLE TO INSTALL

All transmitters are factory calibrated and ship fully assembled. Simply install the transmitter into your system and apply power.

INDUSTRY STANDARD OUTPUTS

Transmitters provide proportional analog outputs of 4-20mA, 0-5 Vdc and 1-5 Vdc[1]. These outputs will drive popular data acquisition devices, meters and analog input cards.

DIRECT READING OR OPTIONAL DIGITAL DISPLAY

All transmitters provide a visual indication of flow rate integral to the transmitted output. For improved readability, an integral digital display is available.

WEATHER-TIGHT CONSTRUCTION

The sealed, corrosion-resistant, enclosure allows installation in environments where liquid-tight seals are required.

RUGGED AND RELIABLE

Without delicate internal components to break, abrade or corrode, the Lake flow transmitter will provide many years of low maintenance service.

COMPATIBLE WITH LAKE MONITOR'S R/T100 AND R100

This Lake flow rate transmitter combines with these Lake analyzers to make a powerful flow instrument capable of remote monitoring of rate and total flows.

[1] The 1-5Vdc output requires an external 250 ohm resistor to be wired at the receiving device.

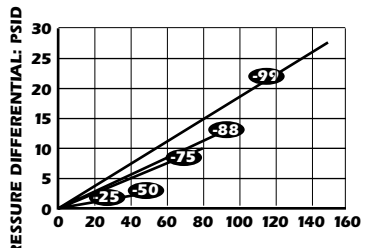
ENGINEERING SPECIFICATION

THE IN-LINE FLOW RATE MONITOR/TRANSMITTER SHALL:

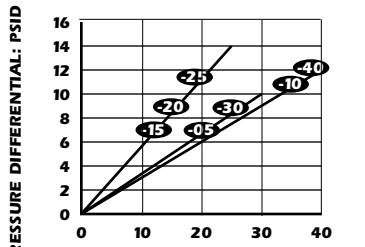
- be factory calibrated for 4-20mA, 0-5Vdc and 1-5Vdc outputs.
- use the variable annular orifice technique with compression spring recovery.
- not require inlet or outlet straight plumbing, or require vertical pipe mounting.
- have a measuring accuracy of ±2.5% of full scale in the center third of the measuring range, and ±4% of full scale accuracy over the entire flow measuring range.
- have a stainless steel sharp-edged orifice.
- have a weather-tight external construction.
- be Lake Monitors No. R _ _ – _ _ _ – _ _.

PRESSURE DIFFERENTIAL VS FLOW RATE

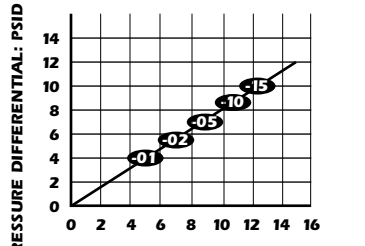
SERIES 5 MONITORS (1-1/4″ - 2″)



SERIES 4 MONITORS (3/4″ - 1″)



SERIES 3 MONITORS (1/4″ - 1/2″)



LAKE MONITORS

3828 West Mitchell St.▪Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com

FLOW RATE TRANSMITTERS

MATERIALS OF CONSTRUCTION (WETTED COMPONENTS)

	ALUMINUM	BRASS	STAINLESS STEEL
High-pressure casing, end ports and tapered shaft	Aluminum	Brass	#304 Stainless Steel
Seals	Buna-N (STD), EPR, Viton® or Kalrez®	Buna-N (STD), EPR, Viton® or Kalrez®	Viton® with Teflon backup (STD), Buna-N, EPR or Kalrez®
Transfer Magnet	Teflon coated Alnico	Teflon coated Alnico	Teflon coated Alnico
Floating Orifice Disk	Stainless Steel	Stainless Steel	Stainless Steel
All other internal parts	Stainless Steel	Stainless Steel	Stainless Steel

MATERIALS OF CONSTRUCTION (NON-WETTED COMPONENTS)

	ALUMINUM	BRASS	STAINLESS STEEL
Enclosure	Series 3: polycarbonate Series 4: polyester Series 5: polycarbonate and aluminum	Series 3: polycarbonate Series 4: polyester Series 5: polycarbonate and aluminum	Series 3: polycarbonate Series 4: polyester Series 5: polycarbonate and aluminum
Window Seals	Buna-N	Buna-N	Buna-N

Teflon is a registered trademark of duPont de Nemours & Co.
Viton and Kalrez are registered trademarks of Dow DuPont Elastomers.

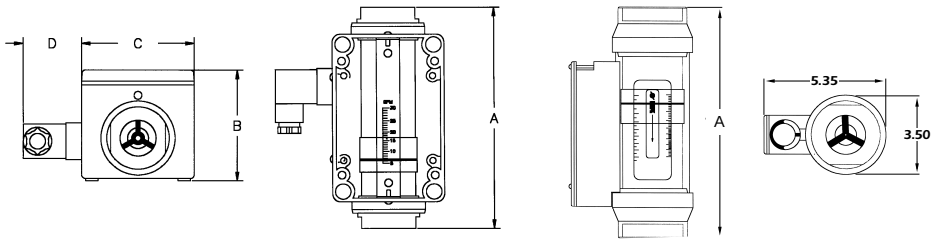
MONITOR PERFORMANCE

Measuring accuracy:	±2.5% of full-scale in the center third of the measuring range; ±4% of full-scale over the entire scale range
Repeatability:	±1% of full-scale
Flow measuring range:	0.05-150 GPM (0.2-560 LPM); 2-1000 SCFM (1-470 LPS)
Maximum operating pressure:	aluminum and brass monitors: 3500 PSIG (240 Bar) stainless steel monitors: 6000 PSIG (410 Bar)
Maximum operating temperature:	media: 240ºF (116ºC) ambient: 180ºF (82ºC)
Pressure differential:	Liquid: see graphs. Gases: see Pneumatic data sheet
Standard calibration media:	Oil monitors: DTE 25 @ 110ºF (43ºC), 0.873 sg Water monitors: tap water @ 70ºF (21ºC), 1.0 sg Air monitors: air @ 70ºF (21ºC), 1.0 sg and 100 PSIG (6.8 Bar)

ELECTRONIC TRANSMITTER PERFORMANCE

Power requirements:	12-35 Vdc, connections via screw terminal
Load driving capacity:	4-20mA: Load resistance is dependent on power supply voltage. Use the following equation to calculate maximum load resistance: Max Loop Load (ohms) = 50(Power supply volts - 12). 0-5Vdc: Minimum load resistance 1000 ohms 0-1mA: Maximum load resistance 100 ohms 1-5Vdc: Minimum load resistance 25K ohms
Transmission distance:	4-20mA, 0-1mA and 1-5Vdc: limited only by wire resistance and power supply voltage. 0-5Vdc: <200 feet recommended
Digital Display:	3.5 digits, 0.5" digit height, LCD
LED Indicator:	provides power indication, intensity increases with flow rate
Over-current protection:	self limiting at 35mA
Resolution:	infinite
Isolation:	Inherently isolated from the process
Response time:	<0.1 seconds

MECHANICAL



DIM	SERIES 3	SERIES 4	SERIES 5	SERIES 5
A	6-9/16" (167mm)	7-5/32" (182mm)	10-1/8" (258mm)	12-5/8" (322mm)
B	3-11/32" (85mm)	3-9/16" (90mm)	3-1/2" (90mm)	3-1/2" (90mm)
C	3-5/32" (80mm)	3-9/16" (90mm)		
D	1-7/8" (47mm)	1-7/8" (47mm)		
PORT SIZES	NPTF: 1/4", 3/8", 1/2" SAE: #6, #8, #10 BSP: 3/8", 1/2"	NPTF: 3/4", 1" SAE: #12, #16 BSP: 3/4", 1"	NPTF: 1-1/4, 1-1/2" SAE: #20 BSP: 1-1/4"	NPTF: 2" SAE: #32 BSP: 2"

Note: Consult factory for SAE brass monitor requirements.

LAKE MONITORS

R100 AND R/T100

Data Sheet No. RT-699

R100 AND R/T100 FLOW ANALYZERS

FLEXIBLE
Integrates with Lake Monitor's flow rate transmitters to form a powerful flow control and measurement system.

SIMPLE TO USE
Every unit ships with easy to use, step by step instructions regarding programming and system setup.

EASY TO READ
Features 6 digits of bright red 7-segment LED displays that are .55 inches high.

TWO PROGRAMMABLE RELAYS
The standard 10 Amp form C relays allow precise flow rate and batch control.

DUAL POWER OPERATION
Units are designed to operate on 110 VAC or 15-24 VDC.

USER SELECTABLE ANALOG INPUT
The R100 and R/T100 permit standard analog inputs of 0-5V, 0-10V, 1-5V, 4-20mA and 0-20mA.

RATE FUNCTION: R100 AND R/T100
Displays 4.5 digits of user scalable flow rate information.

TOTALIZER FUNCTION: R/T100
Accumulates up to 6 digits of information. A totalizer divider allows total division by 1, 10, 100 or 1000.

ENGINEERING SPECIFICATION

THE DIGITAL TOTALIZER/RATE METER SHALL:

- interface directly with Lake Monitor's flow rate transmitters.
- provide 4.5 digits of rate information and 6 digits of totalized information.
- have two programmable 10A relays.
- have user scalable units of measure.
- have a NEMA 4/IP 65 front panel.
- have EEPROM memory backup.
- have a 1/8 DIN panel cutout.
- be Lake Monitors Number R100 for rate only measurements or R/T100 for rate and totalized measurements.

R100 AND R/T100 FLOW ANALYZERS

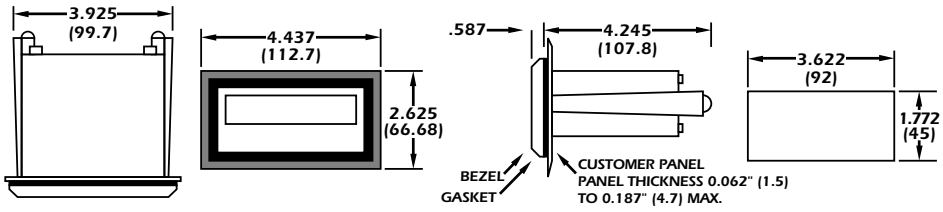
MECHANICAL PERFORMANCE

Enclosure size:		1/8 DIN, 3.63" x 1.78" cutout
Construction:		high impact ABS
Temperatures:	Operating Storage	+41ºF (5ºC) to +130ºF (54ºC) -40ºF (-40ºC) to +200ºF (93ºC)
Humidity:		0-90% non-condensing
Weight:		2 lbs.
Connections:		via terminal blocks

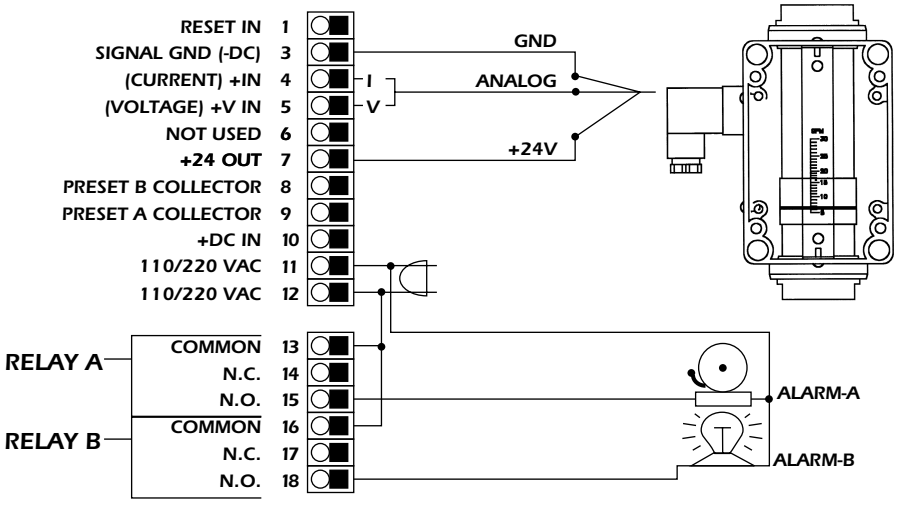
ELECTRONIC PERFORMANCE

Measuring accuracy:	±0.25% maximum measuring error.
Temperature stability:	<20 ppm over operating range
Input power:	110VAC ±15% (8VA) or 15-24VDC (300mA)
Display:	6 digit red LED, 0,.55" high digits
Analog inputs:	4-20mA, 0-20mA, 0-5VDC, 1-5VDC or 0-10VDC Selectable from the front panel.
Input impedence:	current inputs: 100 Ohms voltage inputs: 115K Ohms
Resolution:	14.5 bits
Input protection:	over voltage: 50V over current: 50mA
Relays:	two SPDT, 10A @120/240VAC or 23VDC.

DIMENSIONS



APPLICATION



LAKE MONITORS

3828 West Mitchell St. ▪ Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com

LAKE MONITORS

HYDRAULIC ANALYZER

Data Sheet No. HSA-699

HYDRAULIC SYSTEM ANALYZER

FOR 1/2 – 1-1/2 INCH PIPE SIZES

A COMPLETE TROUBLESHOOTING SYSTEM

The analyzer consists of a flowmeter, silicone filled pressure gauge, bi-metal temperature gauge and a precision needle load valve. A comprehensive operator's manual describes testing of various system components.

PLAN COMPONENT REPAIRS

This system analyzer can be part of a predictive maintenance program, allowing strategized pump, valve, motor and cylinder rebuilding.

COMPACT AND RUGGED

The complete hydraulic system analyzer is small enough to fit in a tool box and built to withstand tough industrial use.

NON-ELECTRICAL

Without batteries to fail or other electrical power connections to make, this system will provide a lifetime of simple and reliable operation.

METRIC AND SAE MEASURING RANGES

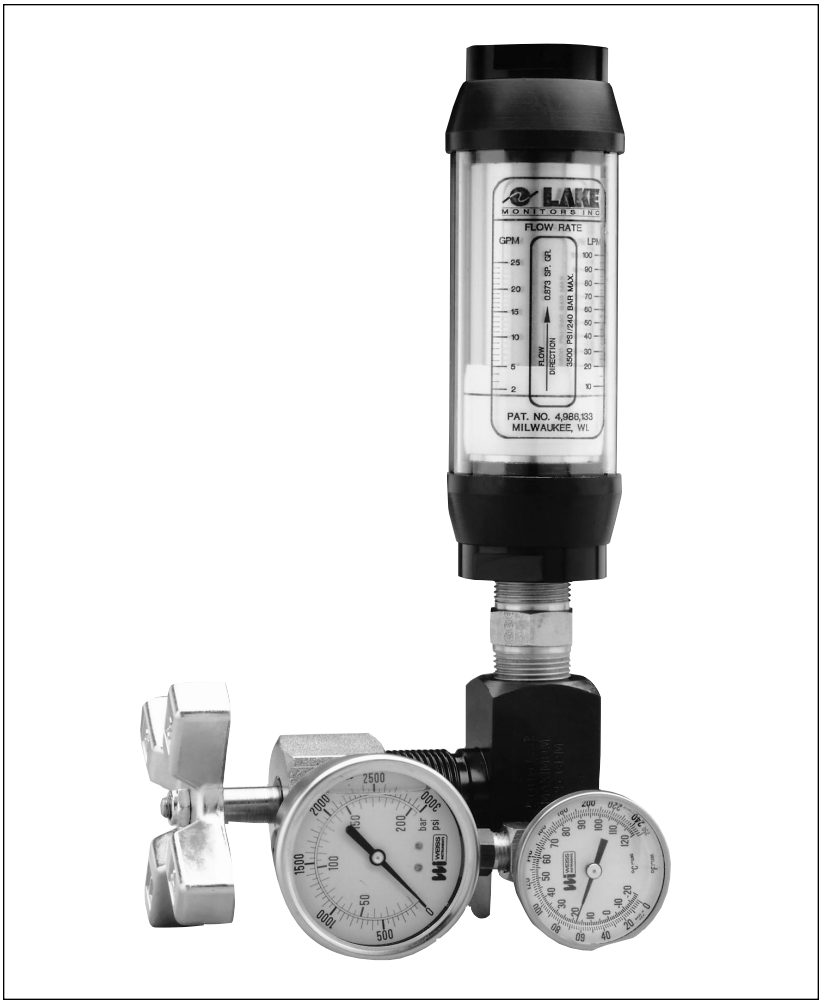
These multi-measurement analyzers simultaneously measure flow in GPM and LPM, pressure in PSIG and Bar, and temperature in degrees F and C.

UNRESTRICTED MOUNTING

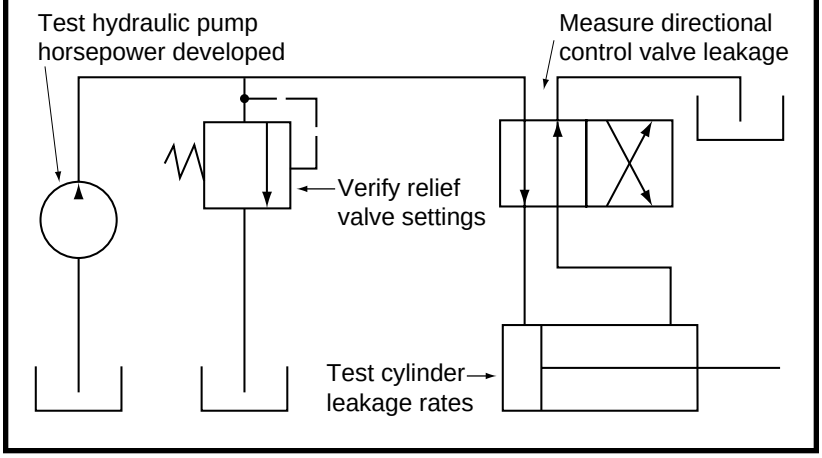
Accurate measurements can be taken in any mounting orientation, without the straight pipe required with other analyzer systems.

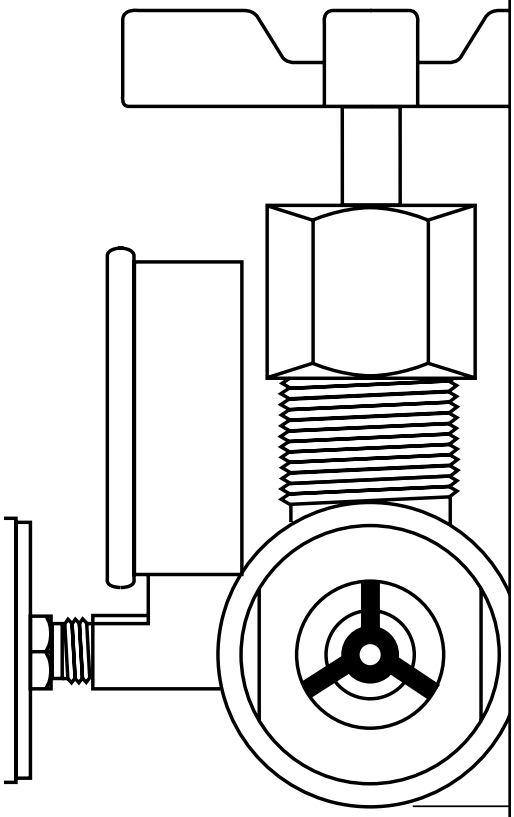
PIN-POINT SYSTEM PROBLEMS

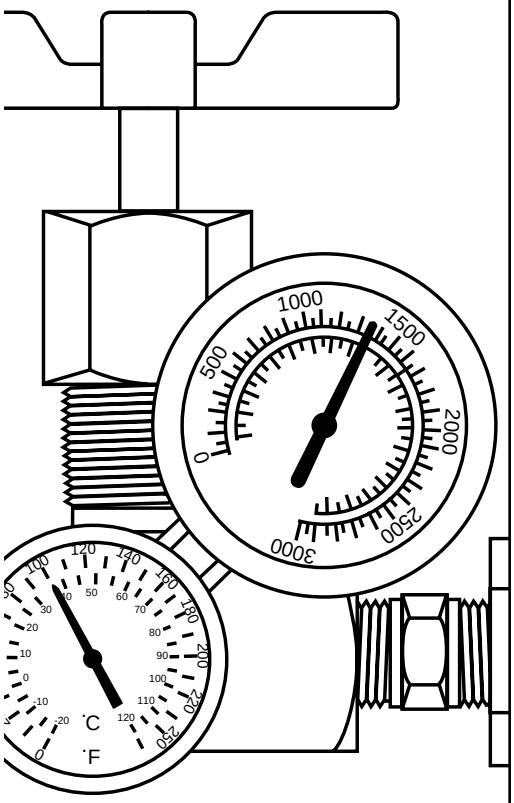
The hydraulic system analyzer and comprehensive troubleshooting manual will save time and money by testing discrete components within the system, eliminating trial and error approaches.



ANALYZER APPLICATIONS







HYDRAULIC SYSTEM ANALYZER

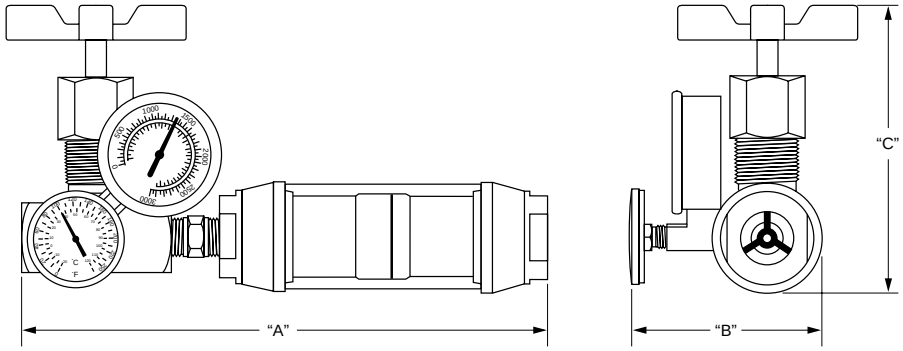
MATERIALS OF CONSTRUCTION

WETTED COMPONENTS		NON-WETTED COMPONENTS	
COMPONENT	**MATERIALS**	**COMPONENT**	**MATERIALS**
High-pressure casing, end ports and tapered shaft	Aluminum and steel	Windows	polycarbonate and glass
Seals	Buna-N (STD)	Window Seals	Buna-N
Transfer Magnet	Teflon coated Alnico		
Floating Orifice Disk	Stainless Steel		
All other internal parts	Stainless Steel		

PERFORMANCE

Measuring Accuracy:	flow; ±4% of full-scale (±2.5% in center third of measuring range) pressure; ±2% of full-scale temperature; ±1% of full-scale
Repeatability:	±1% of full-scale – all measurements
Measuring range:	Flow: 0.05-150 GPM (0.2-560 LPM) see our Guide to Standard Monitors for specific ranges Pressure: 0-3000 PSIG (0-200 Bar) Temperature: 0-250°F (-20-120°C)
Maximum operating pressure:	aluminum monitors: 3000 PSIG (200 Bar)
Maximum operating temperature:	240°F (116°C)
Standard calibration fluids:	Oil monitors: DTE 25 @ 110°F (43°C), 0.873 sg

MECHANICAL



SIZE CODE

DIM	SERIES 3 ½" NPTF	SERIES 4 ¾" NPTF	SERIES 4 1" NPTF	SERIES 5 1¼" NPTF
A	10½" (266mm)	11½" (292mm)	13" (330mm)	16½" (420mm)
B	4" (100mm)	4" (100mm)	4¼" (108mm)	5¼" (133mm)
C	5½" (140mm)	6½" (165mm)	6½" 165mm)	8" (200mm)
PORT SIZES	NPTF: ½"	NPTF: ¾"	NPTF: 1"	NPTF: 1¼"

LAKE MONITORS

3828 West Mitchell St.▪Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com

FLOWSTAT

Data Sheet No. FS4-00

CHOICE OF THREE PORT SIZES

Select from 1/2" , 3/4" or 1" porting to meet system requirements.

EASY MAINTENANCE AND CLEANING

Has only one moving component, the impeller. Cleaning and maintenance may be performed without removing the sensor from the piping.

HERMETICALLY ENCAPSULATED CIRCUITRY

Stands up to the harshest environments.

TRANSMIT SEVERAL THOUSAND FEET

The standard interface is a 2-wire, 4-20mA current loop. Sensor signal may be transmitted on a low cost wire without degradation.

CONNECTS DIRECTLY TO YOUR FLOW MONITORING INSTRUMENTS

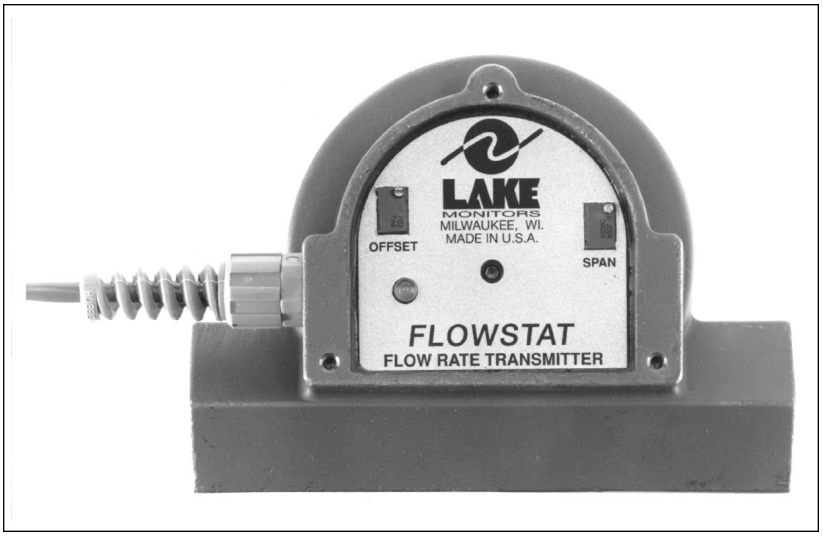
Can be connected directly to analog acquisition cards, chart recorders, or other monitoring instruments, without external signal conditioning.

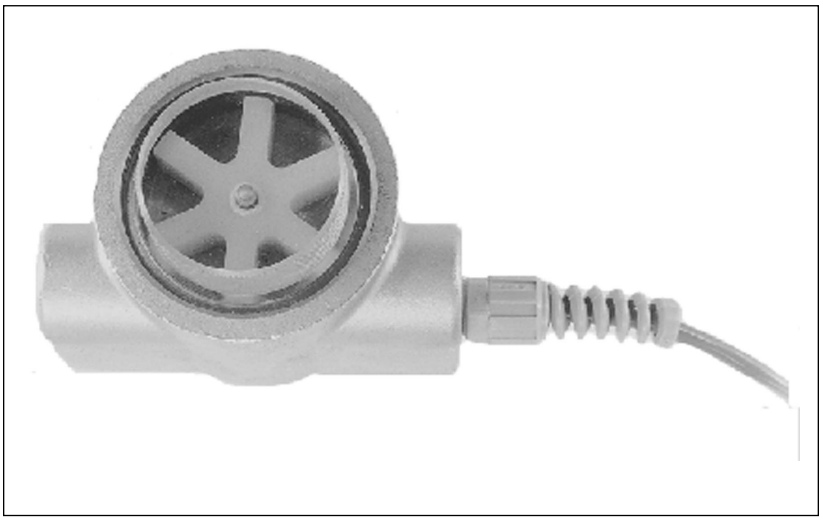
SIMPLY PLUMB AND APPLY POWER

Comes factory calibrated to your flow range specifications.

VALUE PRICING

Combined with low cost operation and maintenance, equals better bottom line savings for your operation





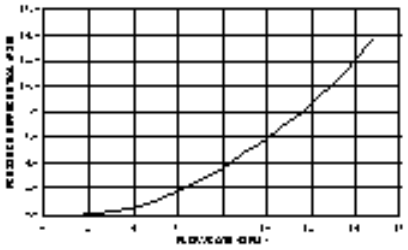
ENGINEERING SPECIFICATION

THE FLOWSTAT SENSOR SHALL:

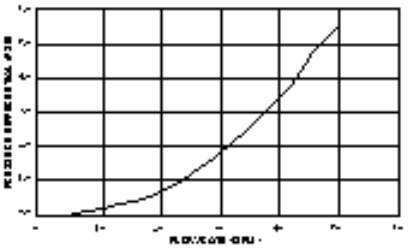
- have only one moving component.
- be calibrated to user specified flow range.
- have a measuring accuracy of 2% of full scale.
- have hermetically encapsulated circuitry.
- be Lake Monitors Number C_ _ - _ _ - _ _ for the Current output, and No. P_ _ - _ _ - _ _ for the pulse Output version

PRESSURE DIFFERENTIAL VS FLOW RATE

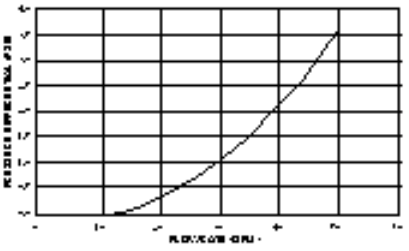
ϕ1/2" NPT Port Size



ϕ3/4" NPT Port Size



ϕ1" NPT Port Size



LAKE MONITORS

3828 West Mitchell St.▪Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com

MATERIALS OF CONSTRUCTION

WETTED COMPONENTS:

Casing	Stainless Steel
Cover	Stainless Steel (optional clear polycarbonate)
Seal	Buna-N (other options available)
Turbine	Acetal copolymer
Bearing	iglide 250®
Shaft	Stainless steel

NON-WETTED COMPONENTS:

Encapsulant	Epoxy
Strain relief	Nylon
Lock Ring	Stainless steel
Wire insulation	High temperature PVC

Note: iglide 250® is a registered trademark of igus®

PERFORMANCE

Measuring accuracy:	±2% of full-scale
Repeatability:	±0.5% of full-scale
Flow Measuring Range:	
1/2" porting	0.5-15 GPM [2-60 LPM]
3/4" - 1" porting	15-50 GPM [60-200 LPM]
Temperature range:	20-225° F [–7 to 107°C]
Pressure Range:	to 500 PSIG [34 bar]
w/optional clear cover	to 200 PSIG [14 bar]
Pressure Differential:	See graphs

ELECTRONIC SPECIFICATIONS

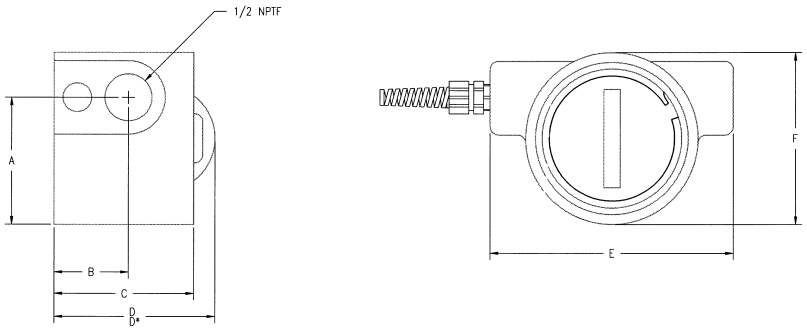
4-20 MA CIRCUIT:

Power Requirements	12-35 Vdc
Load driving capacity:	1150 Ohms max
Maximum transmitting distance:	Limited only by wire resistance & supply voltage
Response time:	2 seconds to 90% (step change in flow rate)
Connections:	Via 10 ft. (3m.) 22 awg pigtail
Controls:	4mA (offset): 20mA (span) factory set
Resolution:	Infinite
Over-current limit:	Self limiting at 30mA
Other protection:	Reverse polarity
Fail-safe indication:	4mA

PULSE OUTPUT VERSION:

Type:	3 wire, hall effect
Voltage:	5V minimum / 24V maximum
Maximum current:	25mADC

MECHANICAL



DIM	1/2" NPTF	3/4" NPTF - 1" NPTF
A	1.94" (49 mm)	3.06" (78 mm)
B	1.13" (29 mm)	1.33" (34 mm)
C	2.00" (51 mm)	2.46" (62 mm)
D	2.45" (62 mm)	2.78" (71 mm)
D*	2.60" (66 mm)	2.88" (73 mm)
E	3.70" (94 mm)	5.25" (133 mm)
F	2.63" (67 mm)	3.80" (97 mm)

* Dimension with optional clear polycarbonate cover installed

VISI RATE

Data Sheet No. VR4-00

CHOICE OF TWO MATERIALS OF CONSTRUCTION

Select from brass or stainless steel to meet system and liquid requirements.

UNRESTRICTED MOUNTING

Allows the designer to install the monitor in any direction – horizontal, vertical or inverted. Two scale positions available for scale reading ease.

COMPACT AND RUGGED DESIGN

Measures less than 5" long and 1 1/2" diameter with a tough polysulphone body of construction.

VISUAL INSPECTION OF FLUID

The transparent body allows for visual inspection of fluid conditions. Diagnose problems at a glance.

PATENTED SENSING METHOD ASSURES ACCURACY

The Helical-Torque sensing method assures accuracy of better than 95% of actual flow rates, even with variable fluid parameters.

SUPERIOR READABILITY

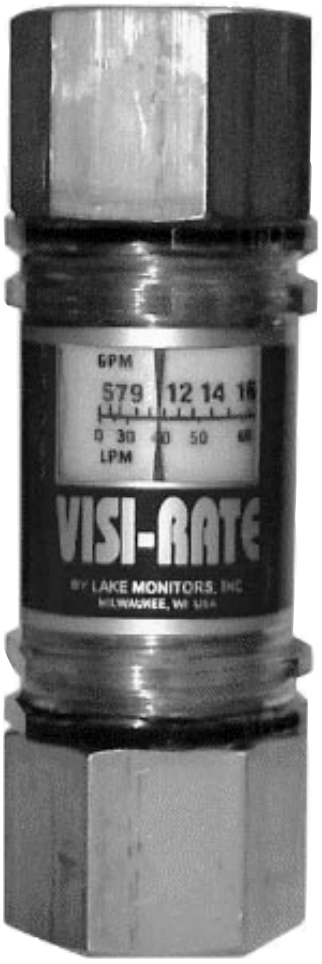
Extra long 3 1/2" scale, provides excellent flow rate measuring resolution along with dual units of GPM and LPM.

FOURTEEN PORT SIZES AVAILABLE

Standard selection of NPT, SAE and BSP ports reduces the amount of adapters required for installation.

LOW COST PRECISION

Measuring accuracy of ±5% and repeatability of ±1%.

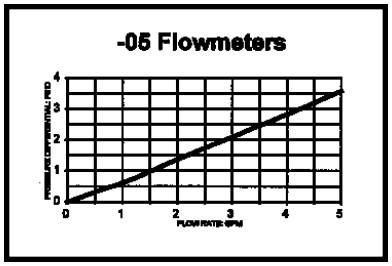


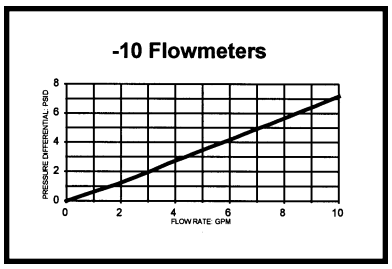
ENGINEERING SPECIFICATION

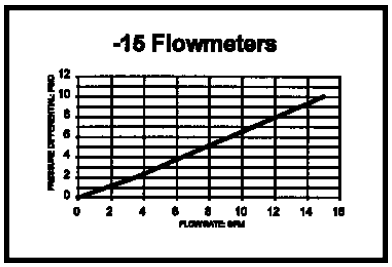
THE VISI-RATE METER SHALL:

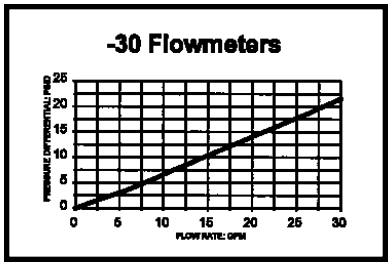
- use the mass axial turbine rotation to measure flow rate.
- not require inlet or outlet straight plumbing, or require vertical pipe mounting.
- have a measuring accuracy of ±5% of full scale with ±1% repeatability.
- use the helical-torque sensing method to measure flow.
- be Lake Monitor No VRB - _ _ - _ _ for flow measuring or for a flow indicator be a VRI - _ _

PRESSURE DIFFERENTIAL VS FLOW RATE









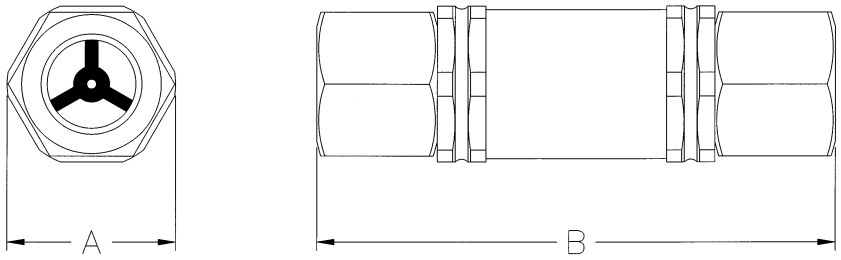
MATERIALS OF CONSTRUCTION (WETTED COMPONENTS)

	BRASS	STAINLESS STEEL
End Ports	Brass	Stainless Steel
Seals	Buna-N	Viton®
Spring (VRB Series)	Stainless Steel	Stainless Steel
Turbine and Casing	Polysulphone	Polysulphone

PERFORMANCE

Measuring Accuracy:	±5% of full-scale
Repeatability:	±1 % of full-scale
Flow Measuring Range: (VRB flow meters)	1-30 GPM [5-110 LPM]
Minimum flow detection: (VRI flow meters)	0.2 GPM [0.8 LPM]
Maximum operating temerpature	250°F [121°C]
Maximum operating pressure:	200 PSIG [14 bar]
Pressure Differential:	See graphs
Filtration requirements:	37 Micron (400 U.S. mesh) minimum

MECHANICAL



DIM	1/4" - 1/2" SIZES	3/4" - 1" SIZES
A	1-3/4" (45 mm)	1-3/4" (45 mm)
B	3/4" (87 mm)	5-3/8" (137 mm)
Port Sizes	NPTF: 1/4", 3/8", 1/2" SAE: #6, #8, #10 BSPP: 3/8", 1/2"	NPTF: 3/4", 1" SAE: #12, #16 BSPP: 3/4", 1"

LAKE MONITORS

3828 West Mitchell St.▪Milwaukee, WI 53215
Phone: 414/671-3577
FAX: 414/671-LAKE (5253)
Toll Free: 800-850-6110 (U.S. & Canada only)
www.lakemonitors.com