

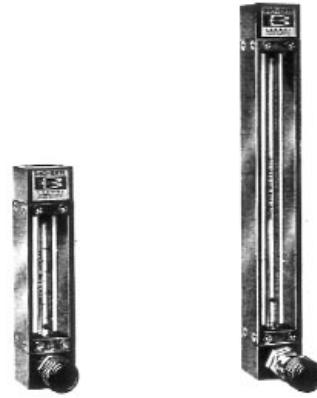
**omega.com**<sup>®</sup>

Ω OMEGA<sup>®</sup>

# FL-1700 and FL-1800 SERIES ROTAMETERS

INSTRUCTION  
SHEET

M0367/0201



## CAUTION

It is recommended that this publication be read in its entirety before performing any operation. Failure to understand and follow these instructions could result in serious personal injury and/or damage to the equipment.

## GENERAL DESCRIPTION

The OMEGA8 FL-1700 and FL-1800 series of variable area flow indicators provides an economical means of flow rate indication for difficult-to-handle, corrosive fluids encountered in chemical plants, research laboratories, semiconductor, and film processing industries.

These rotameters consist of a tapered glass metering tube with ball float, aluminum or stainless steel side plates, and Kynar end fittings. The tube and float assembly is easily removable while the meter remains in the process piping.

These units are also available with an optional integral needle control valve. This valve provides positive shut-off and may be installed at either the inlet or outlet end of the flowmeter. (Note: The valve has 316SS wetted parts.)

## RECEIPT OF EQUIPMENT

When the equipment is received, the outside packing case should be checked for any damage incurred during shipment. If the packing case is damaged, the local carrier should be notified at once regarding his liability. Carefully remove the equipment from the packing case and inspect for damaged or missing parts.

The flowmeters; are shipped completely assembled and tested. It should not be necessary to tighten or adjust any parts when received.

## RETURN SHIPMENT

Do not return any merchandise without an Authorized Return (AR) number. Call OMEGA Customer Service Department at (203) 359-1660.

## RECOMMENDED INSTALLATION PRACTICES

Water hammer and surges can be damaging to any flowmeter and must always be avoided.

Water hammer occurs when a liquid flow is suddenly stopped as with quick closing and solenoid operated valves. Surges occur when flow is suddenly begun, as when a pump is turned on at full power or a valve is quickly opened.

Liquid surges are particularly damaging to flowmeters if the pipe is originally empty. To avoid damaging surges, fluid lines should remain full (if possible) and pumps should be brought up to power slowly and valves opened slowly. In addition, to avoid both water hammer and surges, a surge chamber should be installed.

## INSTALLATION

The flowmeter should be mounted within 6° of true vertical. The inlet connection to the flowmeter is in the bottom end fitting. The connections are normally horizontal, female NPT. Be sure that the piping is adequately supported to prevent undue strain on the meter.

Both end fittings of the flowmeter may be rotated in 90° increments. To rotate the end fittings simply remove the side plates and tube and rotate the end fitting to the desired location. When the meter is reassembled, the side plates and end fittings are self-aligning.

## CAUTION

When installing or reassembling the flowmeter, the following torque specifications must be strictly adhered to or permanent damage to the meter will result.

**Inlet and Outlet Connections: 2 ft. lbs.**

**Side Plate & Window Screws: 2-3 in. lbs.**

Both end fittings are drilled to accept 1/2 inch long No. 6 self-tapping screws to facilitate front-of-panel mounting. When front-of-panel mounting is specified at time of initial order, the panel mounting screws (4) are provided. When installing self-tapping screws, do not overtighten.

## SPECIFICATIONS

**CAUTION** Do not operate this instrument in excess of specifications listed below.

### SCALES

#### LENGTH:

**FL-1700:** 65 mm

**FL-1800:** 150 mm

#### GRADUATIONS:

**FL-1700:** 0-65 mm, Direct reading for air and water

**FL-1800:** 0-150 mm with correlation charts for air and water

#### RATINGS

**PRESSURE:** 150 psig at temperatures up to 1000°F

#### ACCURACY:

**FL-1700:** ±10% full scale

**FL-1800:** ±5% full scale

#### REPEATABILITY:

**FL-1700:** ±1/2% full scale

**FL-1800:** ±1/2% full scale

**CONNECTIONS:** 1/4" NPT, female horizontal

#### CAPACITIES

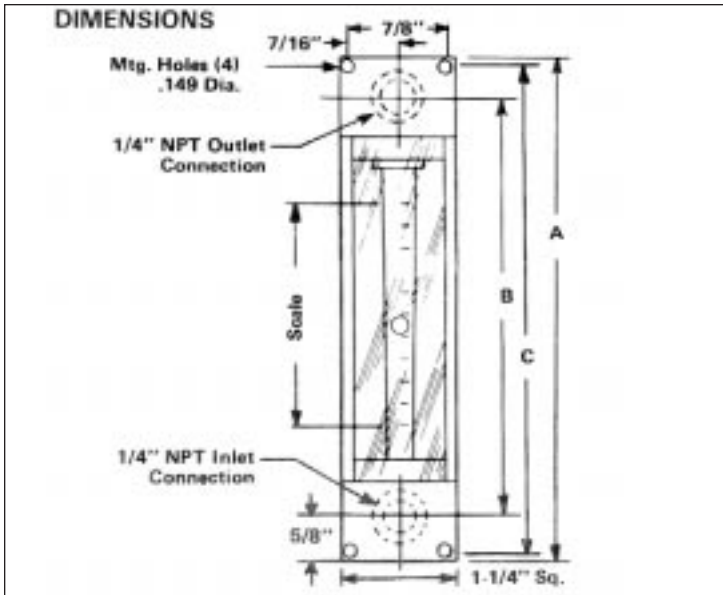
##### MODEL FL-1700

Model No. Air	Air Range	Model No. Water	Water Range
FL-1701	.01 - .13 SCFH	FL-1711	.001 - .011 GPH
FL-1702	.02 - .15 SCFH	FL-1712	.001 - .013 GPH
FL-1703	.09 - .95 SCFH	FL-1713	.011 - .11 GPH
FL-1704	.38 - 3.8 SCFH	FL-1714	.065 - .65 GPH
FL-1705	1.3 - 13 SCFH	FL-1715	.24 - 2.4 GPH
FL-1706	4.4 - 44 SCFH	FIL 1716	.8 - 8 GPH
FL-1706C	13 - 130 SC FH I	F1 1716C	2.8 - 28GPH

## MODEL FL-1800

Meter Size	Tube No.	Float Mtl-	Max. Flow Rate	
			Water (cc/min.)	Air
2	FL-1801	Glass	.537	49 cc/min.
	FL-1802	Glass	1.11	96 cc/min.
	FL-1803	Glass	5.75	370 cc/min.
	FL-1804	Glass	16.6	.82 LPM
	FL-1805	Glass	52.8	2.35 LPM
	FL-1806	Glass	84.6	3.8 LPM
6	FL-1807	Glass	200	8.6 LPM
	FL-1808	Glass	573	23.5 LPM
	FL-1808C	Carboloy	1950	60LPM

NOTE: All air flows given are at 14.7 psia and 70°F.



Meter	Scale	Dimensions		
		A	B	C
FL-1700	65 mm	5 23/32	4 1/2	5 3/8
FL-1800	150 mm	10 1/32	8 13/16	9 11/16

## OPERATION

### CAUTION

During operation, do not exceed pressure and temperature specifications.

After the flowmeter has been installed in the flow system, it is ready for operation. Gradually introduce flow into the system to prevent a flow surge or thermal shock to the flowmeter.

### DISASSEMBLY AND CLEANING

It is recommended the user periodically inspect the tube and float, and clean if necessary. Dirt or foreign materials adhering to the tube and float may cause inaccuracy and sticking of the float. To disassemble, use the following procedure:

1. Remove the plastic safety shield.
2. Loosen the seal spindle by turning it counterclockwise. The tube may now be canted out of the meter housing. If it is desired to clean the metering tube, float, and float stops as an assembly, (using a solvent or ultrasonic cleaner) only the above two steps are required. However, if complete disassembly is required, use the remaining steps.
3. Using a small hook, remove either Teflon float stop from the metering tube, and remove the float. Be careful not to chip tube ends.
4. Packing seats and packing inserts now may be removed.
5. With the metering tube, the seal spindle may be rotated clockwise for removal. It should not be necessary to remove the seal spindle unless the o-ring which seals the spindle requires

replacement. The o-ring may be used as long as it is not torn or distorted,

6. The metering tube, made of borosilicate glass, may be cleaned with any solvent that does not attack glass. Kynar parts may be cleaned with a warm soap and water solution. Air dry thoroughly.

### CAUTION

Do not attempt to clean Kynar parts with any type of solvent or permanent damage to the meter may result.

7. If the flowmeter is equipped with a control valve, the valve may be removed by turning the valve body counterclockwise.

**Note** The standard valve may be disassembled for cleaning. Do not attempt to disassemble the NRS valve. Should the valve require cleaning, consult OMEGA Engineering Customer Service Department at 1-800-622-2378.

### REASSEMBLY PROCEDURE (Refer to applicable parts diagram.)

1. Use the reverse of steps 1 through 5 of the disassembly procedure to reassemble the meter.

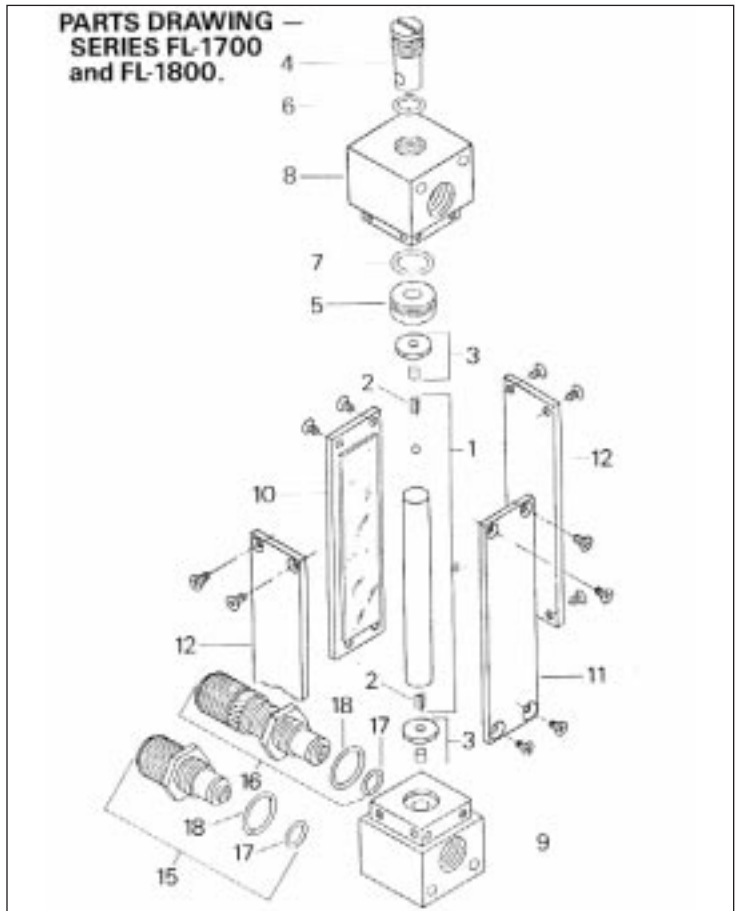
### CAUTION

When reassembling the flowmeter, the following torque specifications must be strictly adhered to or permanent damage to the meter will result.

**Inlet and Outlet Connections: 2 ft. lbs.**

**Side Plate & Window Screws: 2-3 in. lbs.**

2. When replacing the packing seats in the flowmeter body, be sure the packing inserts are approximately 1/16", above the top of the packing seat. Also be certain the tube seats firmly on the packing seats and does not overlap onto the end block.
3. The seal spindle serves to radially compress the tube seat gasket and exert a uniform pressure on the metering tube to prevent any possibility of leakage. Do not overtighten the seal spindle.
4. If the flowmeter is equipped with a control valve, the valve should be installed and hand tightened only. Do not overtighten valve or permanent damage to the meter may result.



5. After the flowmeter has been re-assembled, it is important that it be hydrostatically tested at a liquid pressure rating of 250 psi at room temperature.

**CAUTION Hydrostatic testing should be performed only by trained and qualified personnel or serious damage could result.**

### REPLACEMENT PARTS

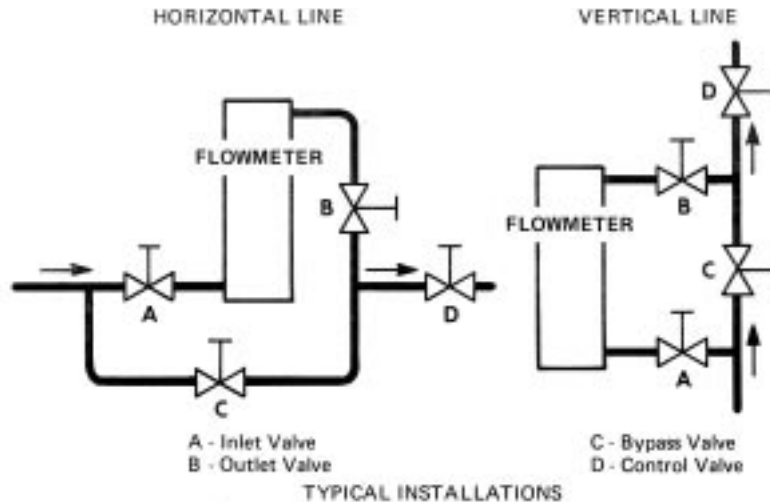
When ordering replacement parts, please specify complete Model Number, Serial Number, part description, part number, material of construction and quantity.

### WARNING

Glass metering tubes are designed for operation up to the maximum operating pressures and temperatures as specified herein. Due to the inherent brittle characteristics of glass and conditions beyond our control, tube breakage could result below specified operating conditions. Possible glass tube breakage represents a potential hazard to operating personnel; therefore, operator protection should be supplied where operating pressures may exceed 50 psig. A safety shield constructed of 1/2" acrylic plastic may be used or the glass tube meter may be replaced with an all metal (armored) meter.

## WARNING FLOWMETER OPERATION

If the inlet and outlet valves adjacent to the flowmeter are to be closed for any reason, the flowmeter must be completely drained. Failure to do so may result in thermal expansion of the liquid which can cause rupture of the meter and possible personal injury.



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Laval (Quebec) H7L 5A1  
Tel: (514) 856-6928 FAX: (514) 856-6886  
e-mail: info@omega.ca

#### For immediate technical or application assistance:

**USA and Canada:** Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®  
Customer Service: 1-800-622-2378 / 1-800-622-BEST®  
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®  
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### WARRANTY / DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

**CONDITIONS:** Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

### RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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Parts List – FL-1700, FL-1800

Ref.	Description	Part Number	Material
1.	Tube and Float Assembly (including float stops)	Per S/N	Tube – Borosilicate glass; Floats – Glass, Carboloy
2.	Float Stops	Per S/N	Teflon
3.	Inlet and Outlet Packing with insert	Per S/N	Viton
4.	Seal Spindle (upper)	A-817-A-058-MP-Q	Kynar
5.	Seal Spindle (lower)	A-817-A-057-MP-Q	Kynar
6.	Seal Spindle O-Ring (upper)	F-375-B-011	Viton A
7.	Seal Spindle O-Ring (lower)	F-375-B-111	Viton A
8.	End Fitting (outlet)	C-325-A-059-MP-Q	Kynar
9.	End Fitting (inlet, use w/o valve)	A-325-C-056-MP-Q	Kynar
9a.	End Fitting (inlet, use w/valve)	S-325-B-065-AA-A	Kynar w/Stn. Stl. insert
9b.	End Fitting (inlet, use w/valve)	S-325-B-066-AA-A	Kynar w/Titanium insert
10.	Front Window Shield w/screws (FL-1700)	A-794-A-007-NQ-A	Clear Plexiglas
10a.	Front Window Shield w/screws (FL-1800)	B-794-B-005-NQ-A	Clear Plexiglas
11.	Back Plate w/screws (FL-1700)	A-615-A-009-NR-A	White Plexiglas
11a.	Back Plate w/screws (FL-1800)	A-615-B-027-NR-A	White Plexiglas
12.	(2) Side Plates w/screws (FL-1700)	A-614-A-007	Aluminum
12a.	(2) Side Plates w/screws (FL-1800)	A-614-B-037	Aluminum
13.	Detachable Scale (Dup. Only) w/screws and nuts (not shown)	Per S/N	Aluminum
14.	Side Plate for use w/det. scale, FL1700 (not shown)	A-614-A-002	Aluminum
14a.	Side Plate for use w/det. scale FL-1800 (not shown)	A-614-B-042	Aluminum
15	Standard Valve Assembly (Aval. on FL-1700, FL-1800)		
	Low Flow, Max. Cap.: Air 5.0 l/min; Water 0.526 l/min	S-947-M-004-BM-A	Stn. Stl./Viton
		S-947-M-007-BM-A	Stn. Stl./Kel-F
		S-947-M-010-JS-A	Titanium/Viton
	Med. Flow, Max. Cap.: Air 14.0 l/min.; Water 1.090 l/min.	S-947-M-005-BM-A	Stn. Stl./Viton
		S-947-M-008-BM-A	Stn. Stl./Kel-F
		S-947-M-011-JS-A	Titanium/Viton
	High Flow, Max. Cap.: Air 28.0 l/min.; Water 2.200 l/min	S-947-M-006-BM-A	Stn. Stl./Viton
		S-947-M-009-BM-A	Stn. Stl./Kel-F
		S-947-M-012-JS-A	Titanium/Viton
16	NRS Valve Assembly (Optional only on FL-1800)		
	Size 1, Max Cap.: Air 150 cc/min; Water 4 cc/min	S-947-L-007-BM-A	Stn. Stl./Viton
		S-947-L-013-BM-A	Stn. Stl./Kel-F
	Size 2, Max. Cap.: Air 350 cc/min; Water 10 cc/min	S-947-L-008-BM-A	Stn. Stl./Viton
		S-947-L-014-BM-A	Stn. Stl./Kel-F
	Size 3, Max. Cap.: Air 600 cc/min; Water 20 cc/min	S-947-L-009-BM-A	Stn. Stl./Viton
		S-947-L-015-BM-A	Stn. Stl./Kel-F
	Size 4, Max. Cap.: Air 2400 cc/min; Water 80 cc/min	S-947-L-010-BM-A	Stn. Stl./Viton
		S-947-L-016-BM-A	Stn. Stl./Kel-F
	Size 5, Max. Cap.: Air 6800 cc/min.; Water 200 cc/min	S-947-L-011-BM-A	Stn. Stl./Viton
		S-947-L-017-BM-A	Stn. Stl./Kel-F
	Size 6, Max. Cap.: Air 27,000 cc/min; Water 650 cc/min	S-947-L-012-BM-A	Stn. Stl./Viton
		S-947-L-018-BM-A	Stn. Stl./Kel-F
17	Orifice O-Ring (NRS)	F-375-B-006-QT-A	Viton
		F-375-B-006-SU-A	Buna
		F-375-B-006-MN-A	Kel-F
17a.	Orifice O-Ring (standard)	F-375-B-006-QT-A	Viton
		F-375-G-031-SU-A	Buna
		F-375-G-031-MN-A	Kel-F
18.	Bonnet O-Ring	F-375-B-015-QT-A	Viton
		F-375-B-015-SU-A	Buna
		F-375-B-015-MN-A	Kel-F