FLOW & CONTROL SYSTEM PRIVATE LTD

Catalogue:
Glass Tube Rotameters: FCSGTR Series

Flow & Control System Private Limited, India

Website: www.flowcontrol.co.in

Flow & Control System Private Ltd
Works: 16/5, Main Mathura Road Plot No: 11,
Lane No: 2 Karkhana Bagh,
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Read this Manual Before Installation

This manual contains essential information about Magnetic liquid level indicators Please read all instructions carefully and follow the steps given in order.

Manual Conventions

This manual uses specific styles and symbols to share technical details, supporting information, and safety guidance. General explanations are written in plain text, while special notices are highlighted as Notes, Cautions, and Warnings.

- Notes: Provide additional information or clarification about an operating step. Notes are meant to assist understanding and do not normally include actions.
- ⚠ Caution: Indicate conditions that could cause minor injury, equipment damage, or reduce system integrity. Cautions also highlight unsafe practices or the need for special tools, materials, or protective gear.
- Warnings: Identify serious hazards that could lead to major injury or death. A warning signals an immediate danger if proper precautions are not taken.

Safety Instructions

- Always follow standard safety practices when working with electrical equipment, especially high-voltage systems. Disconnect power before touching or servicing any components.

⚠ Warning: Explosion risk — do not connect or disconnect any device unless power is turned off or the area is verified to be non-hazardous.

Low Voltage Directive:

This product is intended for Installation Category II, Pollution Degree 2. Any use beyond manufacturer instructions may reduce the equipment's safety and protection.

Warranty

All Flow & Control System mechanical level controls carry a three-year warranty, and electronic level controls carry an eighteen-month warranty from the date of factory shipment. If a unit fails within the warranty period and inspection confirms a manufacturing defect, Flow & Control System will repair or replace it free of charge, excluding transportation costs.

The company is not responsible for misapplication, labour costs, or any direct or indirect damages arising from installation or use. No other warranties apply unless specified in writing for certain products.

Quality Assurance

Flow & Control System maintains a rigorous quality management system to ensure consistent product and service excellence. The company's corporate quality assurance program is ISO 9001 certified, demonstrating compliance with recognized international standards and a commitment to total customer satisfaction.

Copyright Notice

Product specifications are valid as of the publication date and may change without prior notice. Flow & Control System reserves the right to modify product designs or manuals at any time and does not guarantee complete accuracy of the information provided herein.

Table of Contents:

Glass Tube Rotameter: FCSGTR Series

Introduction:

Suitable for inline installation with flanged or threaded connections. Available in various material options for wetted parts.

Working Principle:

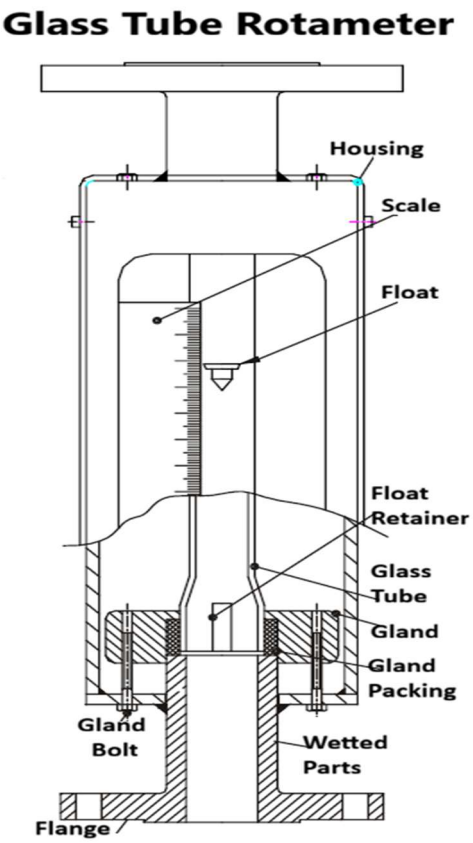
As liquid flows through the rotameter, the float rises to a level proportional to the flow rate and is read against the scale. Opening or throttling the control valve changes the flow rate, which is indicated by a corresponding change in float position.

Available Sizes: 15 NB to 100 NB **Flow Ranges:** **Water:** 2.5 to 40,000 LPH of water at ambient temperature p & **Air:** 0.1 to 750 Nm^3/hr at NTP

Accuracy: ±2% of Full-Scale Deflection (FSD)

Accessories: Steam Jacket & High and low flow alarms

Glass Tube Rotameter FCSGTR Series:



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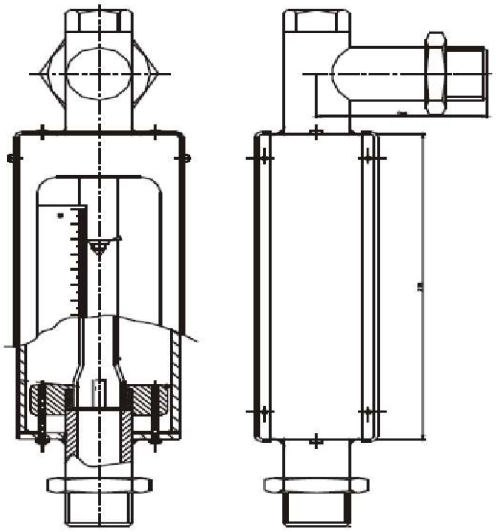
Specifications:

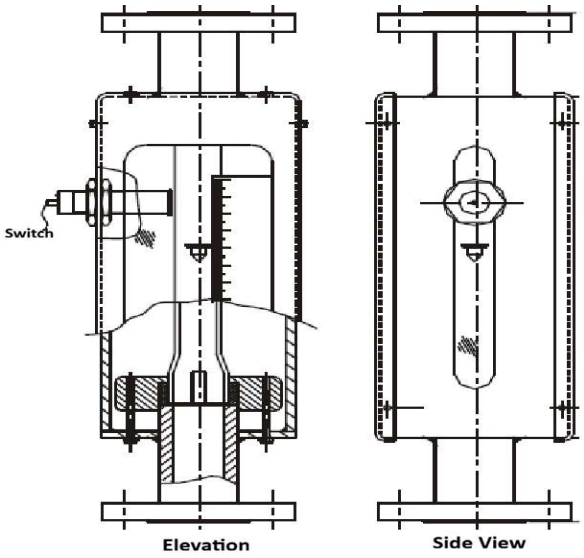
Components	MOC
Housing	M.S. / M.S. PVC Laminated / SS
Scale	Anodized Aluminum / Acrylic / SS
Float	SS 316 / SS 316L / PTFE / Aluminum / Hastelloy C
Float Retainer	SS 316 / PTFE / Aluminum / Hastelloy C
Glass Tube	Borosilicate
Connection	Flanged / Screwed
Gland Packing	Neoprene / PTFE / Silicon
Gland Bolt	MSZP / SS
Direction of Flow	Vertical / Side / Rear
Wetted Parts	MS / SS 304 / SS 316 / SS 316L / PTFE Lined / MS Pinned

Standard Ranges:

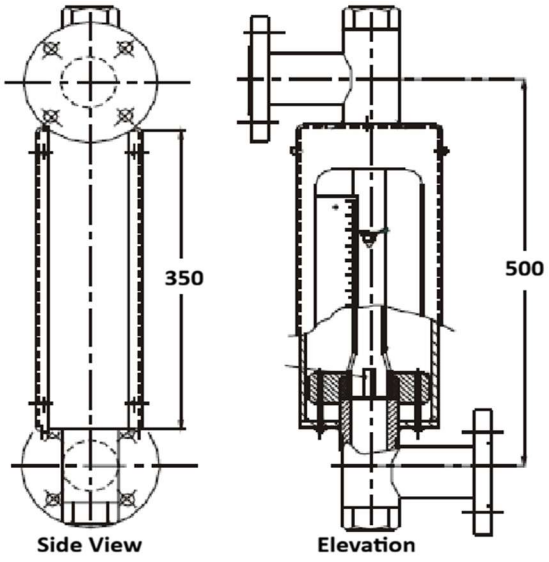
NW	Model No: FCSGTR	Water Flow in LPH & Air Flow in Nm3/hr						Pressure Drop with following floats in MMWC		
		With SS316 Float		With PTFE Float		With PVC Float				
		Water	Air	Water	Air	Water	Air	SS316	PTFE	PVC
15	10	4-40	0.014-1.4	2.25	0.05-0.5	1.75-17.5	0.025-0.25	140	80	60
	20	6-60	0.2-2	3.3-33	0.07-0.7	2.5-25	0.03-0.3	140	80	60
	30	10-100	0.3-3	5.6-56	0.12-1.2	4-40	0.06-0.6	140	80	60
20	40	16-160	0.5-5	9-90	0.2-2	4.5-45	0.1-1	140	80	60
	50	25-250	0.8-8	14-140	0.3-3	7-70	0.16-1.6	360	190	165
	60	40-400	1.2-12	22-220	0.5-5	10.5-105	0.25-2.5	360	190	165
	70	60-600	-	34-340	0.75-7.5	17-170	0.4-4	360	190	165
25	80	60-600	2-20	-	-	26-260	-	360	190	165
	90	100-1000	3-30	56-560	1.25-12.5	-	0.7-7	650	340	305
	100	160-1600	-	90-900	2-20	45-450	1-10	650	340	305
	110	250-2500	8-80	140-1400	3-30	70-700	1.6-16	650	340	305
40	120	160-1600	5-50	-	-	105-1050	-	650	340	305
	130	300-3000	8.5-85	170-1700	3.75-37.5	-	2-20	950	480	420
	140	400-4000	-	225-2250	5-50	130-1300	2.6-26	950	480	420
50	150	400-4000	12-120	-	-	170-1700	-	550	270	240
	160	600-6000	18-180	340-3400	7.5-75	260-2600	4-40	950	480	420
	170	1000-10000	-	650-5600	12.5-125	450-4500	6.75-67.5	950	480	420
80	180	1000-10000	30-300	-	-	-	-	950	480	420
	190	1600-16000	50-500	900-9000	20-200	700-7000	10.5-105	450	240	205
	200	2500-25000	80-800	1400-14000	30-300	1000-10000	15-150	900	450	403



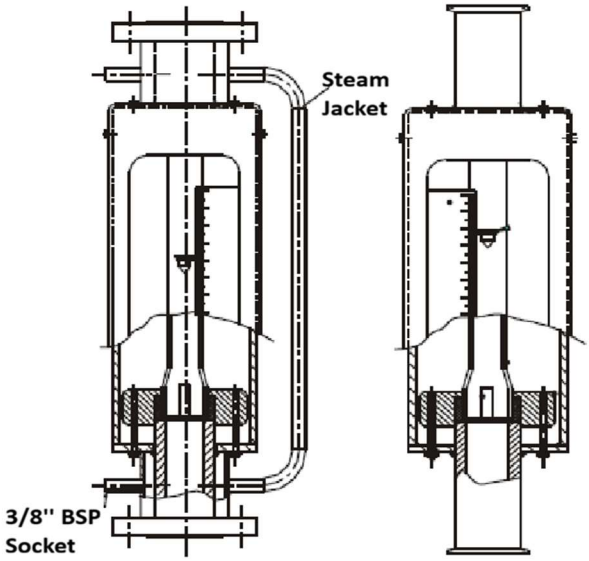
Bottom Back Entry



Rotameter with Proximity Switch



Rotameter with Inlet- RHS & Outlet- LHS



Rotameter with Steam Jacket

Rotameter with Tricolver Fitting

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Glass Tube Rotameter FCSGTR Series:

Application:

To maintain the accuracy of the instrument, it should be used only for the fluid and operating conditions for which it is calibrated. The calibration operating conditions of the Rotameter are mentioned in the test report.
For correct operation of the Rotameter, the available operating pressure should be:

- **At least three times the pressure drop** for liquids
- **At least five times the pressure drop** for gases

Pressure drop values for different models are given in the standard range table.

Accuracy: ±2% of full-scale deflection (FSD) from 100% to 10% of flow.

Repeatability: Within ±0.5% of full scale.

Installation:

Unlike orifice-type flowmeters, no straight pipe length is required upstream or downstream. However, if a valve or any fitting is installed near the meter, a straight pipe length of **2 to 3D** is recommended.
The Rotameter must be installed **vertically** in the pipeline, with the **inlet at the bottom** and the **outlet at the top**. Vertical alignment should be checked using a plumb bob. If the Rotameter is not perfectly vertical, its accuracy and performance may be affected. A deviation of **±2° from vertical** is allowed.
The pipeline must be clean before installing the Rotameter. The line should be flushed using a dummy section in place of the Rotameter. The Rotameter should be installed only after flushing, as shown in **Fig. 1.**
It is recommended to provide **bypass piping** around the Rotameter so that flow through the pipeline can continue during maintenance.
If the nominal bore size of the Rotameter is different from the pipeline size, suitable **reducers or expanders** must be used. It is recommended that the pipeline size should not be more than **one size larger or smaller** than the standard Rotameter size.

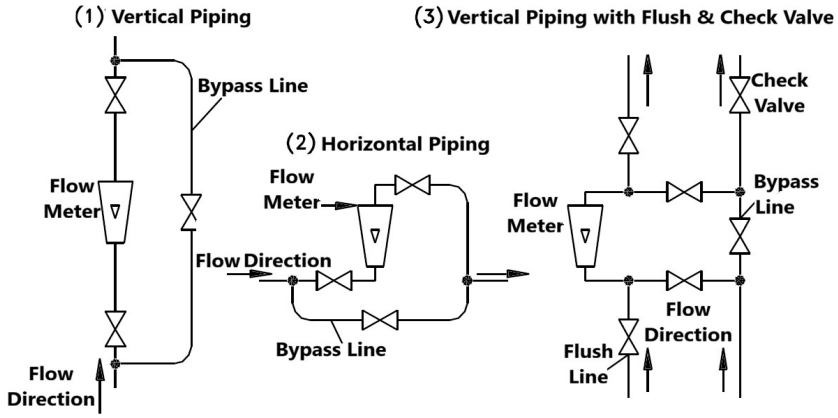


Figure 1

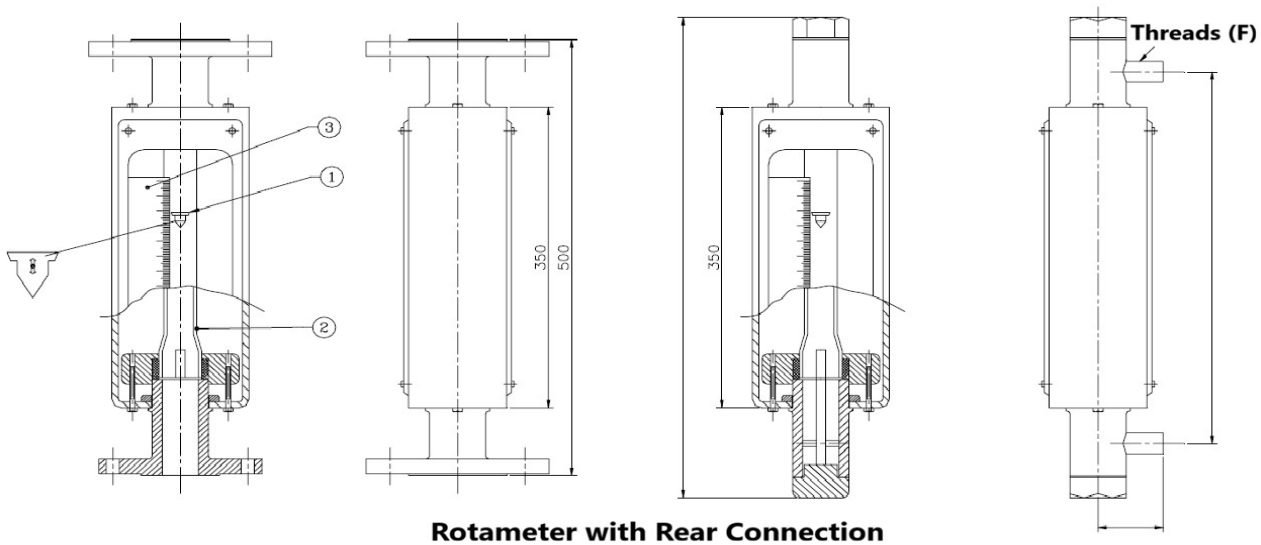
Installation & Maintenance Manual: Glass Tube Rotameter
FCSGTR Series

Caution:

Please read this instruction manual carefully before installing the rotameter. Failure to follow the instructions may result in serious personal injury and/or damage to the rotameter.The manufacturer shall not be held responsible for any damage or injury arising from improper installation or use.

Description:

Operates on the variable area principle. The general construction of the Rotameter is shown in Figure below. The float (1) moves freely up and down inside a tapered **borosilicate glass measuring tube** (2). When fluid flows in the direction of the arrow, the float rises to a position where the **buoyant force** and the **weight of the float (G)** are balanced. The vertical position of the float, as indicated on the **scale (3)**, represents the **instantaneous flow rate**.



Rotameter with Rear Connection

Unpacking:

On receipt of the equipment, inspect the outer packing case for any damage that may have occurred during transit. If damage is observed, it should be immediately reported to the **insurance agency**.
Carefully unpack the Rotameter. Remove the end plugs and take out the plastic rod provided for holding the float in position during transportation.

Application:

To maintain measurement accuracy, the instrument should be used **only for the fluid and operating conditions for which it is calibrated**. The calibration conditions are specified in the test report.
For proper operation of the Rotameter, the operating pressure in **liquid service** should be at least **twice the pressure drop**, and in **gas service**, at least **five times the pressure drop**.
The pressure drop values for different models are provided at the end of this leaflet.

Accuracy: ±2% of full-scale flow (from 100% to 10%)

Repeatability: Within ±0.5% of full scale (F.S.)

Installation: Glass Tube Rotameter

Caution:

Avoid installing **solenoid valves** both upstream and downstream of the Rotameter.

Select an installation location with **minimum vibration**.

When installing a Rotameter with a **glass tapered tube**, ensure that **piping stresses are not transmitted to the glass tube**. All connected pipelines should be **properly supported** to prevent deflection, especially when installing heavier Rotameters.

If **reverse flow** or **water hammer** is expected, install a **check valve downstream** of the Rotameter.

Where required, a **strainer should be installed upstream** of the Rotameter.

Unlike orifice-type flowmeters, no specific upstream or downstream straight pipe lengths are required. However, if valves or fittings are installed near the meter, a **straight pipe length of 2 to 3 pipe diameters (2D–3D)** is recommended.

The Rotameter must always be installed **vertically** in the pipeline, with the **inlet at the bottom** and the **outlet at the top**. Use a plumb bob or level to verify vertical alignment. If the Rotameter is not perfectly vertical, measurement accuracy, sensitivity, and performance may be affected. The permissible inclination is **±2° from the vertical axis**.

The pipeline in which the Rotameter is installed must be **clean**. Flush the pipeline thoroughly using a **dummy section** in place of the Rotameter before installation. Install the Rotameter only after flushing is completed, as shown below in **Figure 1**.

It is recommended to install **bypass piping** around the Rotameter to allow continuous process flow during maintenance or servicing.

If the nominal bore size of the Rotameter differs from the pipeline size, **reducers or expanders must be used**. The pipeline size should not be **more than one size larger or smaller** than the Rotameter's standard size.

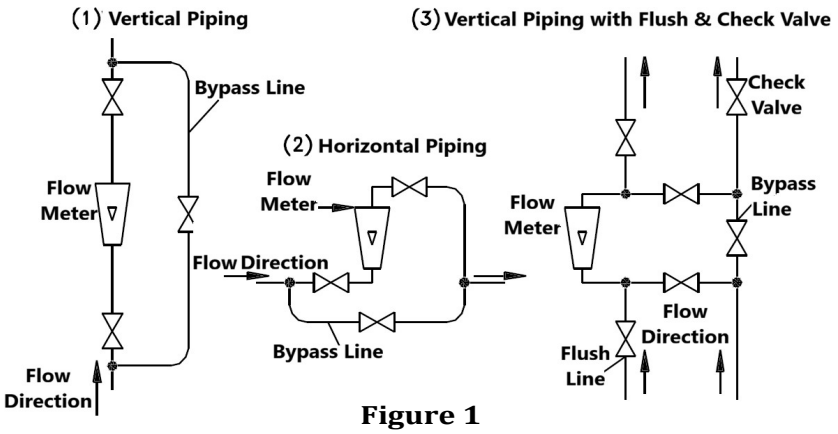


Figure 1

Operation: Valves should be opened **slowly and carefully** to set the required flow rate. **Sudden movement of the float** must be avoided, as it may damage the measuring tube.

The **upper edge of the float**, as shown in **Figure 2**, indicates the flow rate.

The Rotameter is provided with a **detachable scale** calibrated to show flow rate in the required units of quantity per unit time.

For correct alignment, a line marked **"R.P."** on the scale must **coincide with the red line** provided on the measuring tube at the bottom.

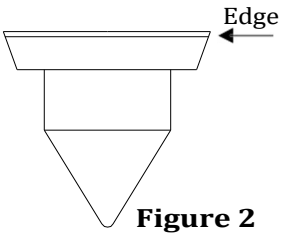


Figure 2

Maintenance:

Under normal operating conditions, the instrument does not require routine maintenance. However, if the measuring tube or float becomes dirty, they should be cleaned. The instrument may remain installed in the pipeline while cleaning or replacing the measuring tube.

If required, remove the tube and float and clean them using a **soft brush**, **trichloroethylene**, or **compressed air**.

Dismantling of the Measuring Tube:

1. Shut off the flow completely.
2. Refer to **Figure 3**, showing the cross-section of the Rotameter assembly.
3. Remove the front covers.
4. Loosen the gland adjusting screws.
5. Unscrew the top gland upward and the bottom gland downward.
6. Carefully remove the glass tube by gently rotating it.

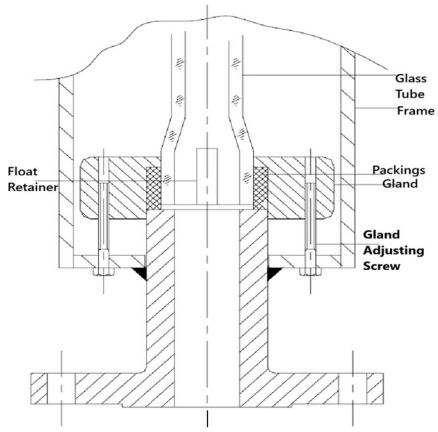


Figure 3

Fitting of the Measuring Tube:

1. Position the glands correctly and place the packings on the tube.
2. Insert the tube into its position.
3. Push the glands downward and upward respectively, and secure them using the gland adjusting screws.
4. Tighten the gland adjusting screws evenly until the gap between the gland & the bottom plate is approx. 3 mm.
- If leakage persists after commissioning, further tighten the screws until the leakage stops.
5. Fix the additional scale, following the remarks given in the test report.
6. Refit the front and rear covers.

Recommended Safe Working Pressure:

Nominal Tube Inlet Bore	Maximum Working Pressure (PSIG) up to 200°F	Pressure Reduction above 200°F (PSIG/°F)	Maximum Temperature °F
1/16" or 1/8"	550	0.75	400
1/4"	450	0.75	400
3/8"	350	0.75	400
1/2"	300	0.75	400
3/4"	240	0.60	400
1"	200	0.45	400
$1^{1/2}$"	130	0.33	400
2"	100	0.25	400
3"	700	0.15	300
4"	50	0.10	300

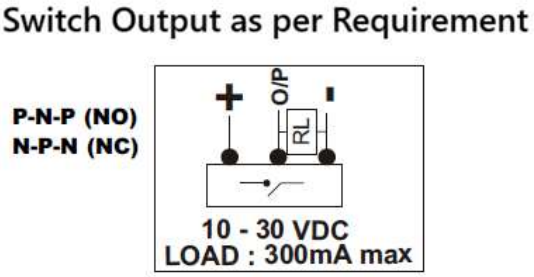
Note:

1. Maximum working pressure ratings are applicable under non-shock conditions (no water hammer).
2. Up to the maximum temperatures listed above, borosilicate glass tubes are resistant to thermal shock.

Setting of Flow Switch: (Optional – as per requirement)

If the glass tube Rotameter is supplied with one or two flow control proximity switches, refer to Figures **A & B** and proceed as follows:

1. Loosen the chuck nut of the proximity switch.
2. Slide the switch to the required flow setting and retighten the chuck nut.
3. Connect the switch as per the provided wiring diagram.
4. Before switching ON the power, ensure all terminals are properly tightened.



Circuit Diagram

Fixing of Steam Line to the Jacket:

(Optional – as per requirement)

1. If the glass tube Rotameter is supplied with a steam jacket, verify the fitting size and use a **high-temperature-resistant thread sealant** to ensure proper steam leak-tightness. Slide the switch to the required flow setting and retighten the chuck nut.
2. Do not use temporary piping for the steam line. The steam piping must be **rigid and permanently installed**.
3. For steam connection details and center-to-center dimensions, refer to **Figure** C.

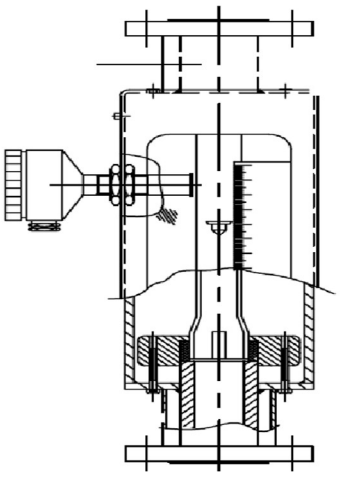


Figure A

FCSGTR-FS1

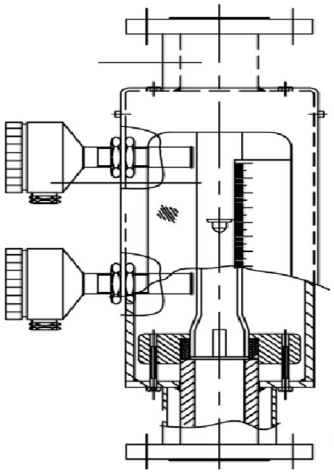


Figure B

FCSGTR-FS2

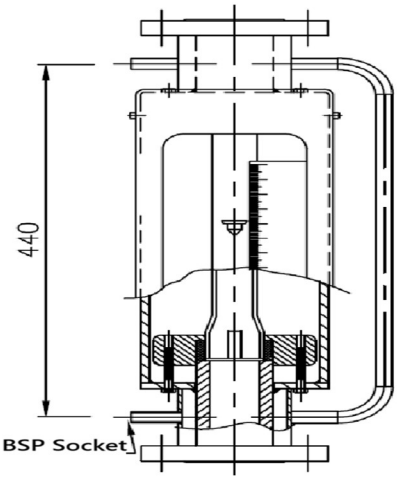
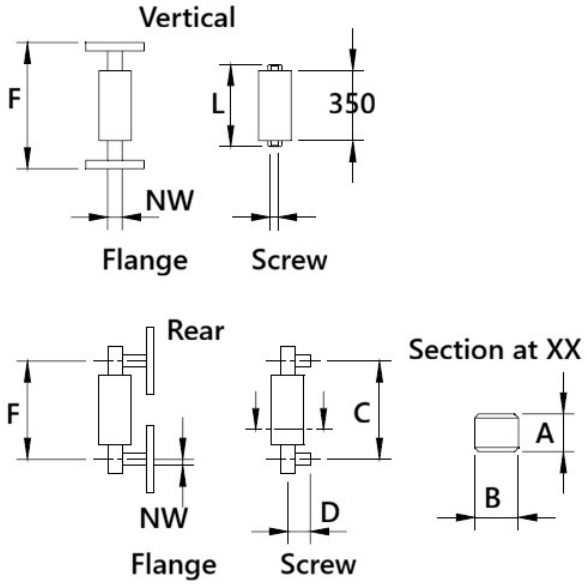


Figure C

FCSGTR-SJ



Overall Dimensions:

NW	F	L	C	D	A	B
15	500	400	440	55	95	90
20	500	400	440	60	95	90
25	500	400	440	65	120	115
40	500	400	500	70	140	140
50	500	450	500	70	155	160
80	500	N/A	500	N/A	190	190

NW	F	L	D
15	350	285	80
20	350	285	85
25	350	285	90
40	350	285	100
50	350	315	100
80	350	315	100

Standard Ranges:

Flow rate with SS316 Float				Pressure Drop Rating	
NW	Glass Size: FCSGTR	Water at ambient Temp LPH	Air 20° C – 760 NM3/hr	KG/Cm2	MMWG
15	10	4-40	0.014-1.4	20	140
	20	6-60	0.2-2		
	30	10-100	0.3-3		
20	40	16-160	0.5-5	20	360
	50	25-250	0.8-8		
	60	40-400	1.2-12		
	70	60-600	-		
25	80	60-600	2-20	12	650
	90	100-1000	3-30		
	100	160-1600	-		
	110	250-2500	-		
40	120	160-1600	5-50	9	950
	130	300-3000	8.5-85		
	140	400-4000	-		
50	150	400-4000	12-120	7	550 950
	160	600-6000	18-180		
	170	1000-10000	-		
80	180	1000-10000	30-300	5	450 900
	190	1600-16000	-		1100
	200	2500-25000	-		
	210	4000-40000	-		

Trouble Shooting:

	Symptom	Cause	Action
1	Leakage at glands	Gland packing failure	Replace gland packings
2	Rotameter showing higher or lower flowrate than expected	Incorrect operating conditions	Consult manufacturer
3	Rotameter initially shows correct reading but shows lower reading after some months	Float damaged or corroded	(a) Replace float (b) In case of gases, also check for leakage
4	Rotameter initially shows correct reading but starts showing higher reading after a few days	Scaling or deposition of foreign particles on inner glass surface or on the float	Clean the rotameter using a suitable solvent or soft brush
5	Fluctuation of float	Incorrect operating pressure	Maintain operating pressure as mentioned in the test report
6	Frequent breakage of glass tube	(a) Flowrate too high due to wrong rotameter selection (b) Operating pressure too high (c) Heavy turbulence (d) Water hammer	Use correct rotameter for application Maintain operating pressure below tube pressure rating Check piping layout

Data required to submit the Quotation:

- Product Code
- Name of the Liquid
- Operating Temperature
- Operating Pressure
- Operating Density
- Center to Center Distance
- Operating Specific Gravity
- Connection Details
- Material Of Construction
- Accessories
- Nozzle Size

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Quality Assurance Plan: Glass Tube Rotameter

No.	Component	Check Characteristic	Type of Check	Quantum of Check	Reference Standard Documents/Acceptance Norms	Format of Records	Scope				Remarks(if any)
							M	C	V	W	
					A Materials						
1	Pipe, Rod, Plate, Flange	Surface finish & Dimensions	Visual	100%	As per requirement given in P.O, approved Drawings, & given Std. Specification	Goods Receipt Note & Mfr.'s/Lab T.C	✓	✓	C		
2	Pipe, Rod, Flange	Chemical Properties	Dimensional & Chemical	Random							
3	Angle, Cover	Surface finish & Dimensions		100%							
					B. BOUGHT OUT / JOB WORK						
1	Glass Tube & Glass Cover	Surface finish & Dimensions.	Visual & Dimensional	Random	From Approved Vendor.	Goods Receipt Note	✓	✓	C		
2	Fasteners, gasket etc.										
					C. IN PROCESS						
1	Machining	Dimension	Measurement	100%	As per Approved Drawing Of Mfr.	Internal Inspection Report	✓	✓	C		
2	Welding	Welding Quality	Visual								
3	Assembly	Dimensions & conformity orientation	Visual & Dimensional				✓	✓	C		
4	Testing	Leak Tightness	Hydro Test		No leak at rated pressure for 20 min.		✓	✓	C		
5	Calibration	w.r.t. Master Calibrator	Calibration		Calibration as per ISA RP-16.6		✓	✓	C		
6	Painting & Cleaning	Surface finish	Visual		As per P.O. & approved Drawing Of Mfg.		✓	✓	C		
7	Final Inspection	• Final finish & Appearance	Visual		• Good Finish		✓	✓	C		
		• Completeness of supply with spares & accessories			• As per P.O. & App. Drawing		✓	✓	C		

◦Legends:

◦C: Customer, ◦M: Manufacturer, ◦P: Perform, ◦V: Verify, ◦W: Witness

◦Performance Test Procedure: ◦Performance Test: M-100%, C-10%

◦Testing 100% by M/s Flow & Control (P) Ltd. and Client may witness randomly as agreed upon.

Prepared By: (QC Engineer) .....

Approved By: (Technical Head) .....

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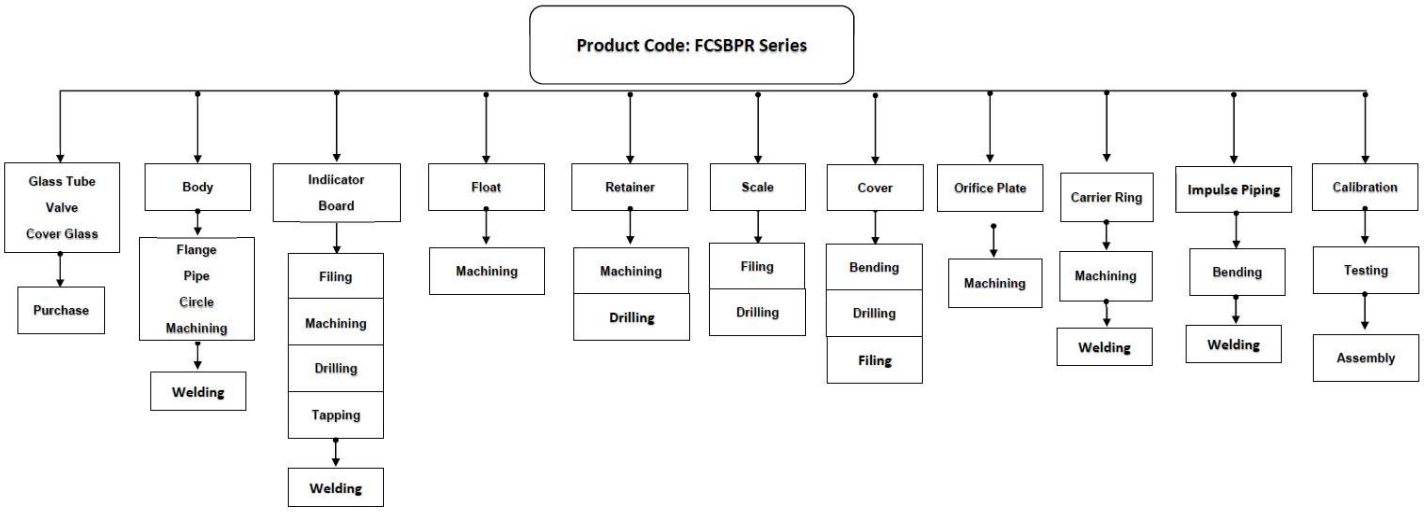
Flow & Control System Private Ltd
Works: 16/5, Main Mathura Road Plot No: 11, Lane No: 2 Karkhana Bagh, Opposite: DPS School, Faridabad - 121001



Reviewed & Approved By: Technical Head

Remarks:

Assured Quality & Less Service Cost

Service Policy

Owners may return any Flow & Control System instrument or component for rebuilding or replacement. Returns must be shipped prepaid. The company will repair or replace the gauge free of charge, excluding transportation costs, provided that, if:

- **Returned within the warranty period; and**
- **The factory inspection finds the cause of the claim to be covered under the warranty.**

If the issue arises from conditions beyond our control or is not covered under warranty, charges for labour and replacement parts will apply. In certain cases, it may be necessary to ship replacement parts or a new instrument before the original is returned.

To arrange this, please provide the model and serial numbers of the instrument to be replaced. Credit for returned materials will be determined based on warranty applicability. Claims for misapplication, labour, or consequential damages will not be accepted.

Return Material Procedure

To ensure efficient processing of returned materials, a Return Material Authorization (RMA) number must be obtained from the factory before shipment. This can be arranged through your local Flow & Control System representative or by contacting the factory directly. Please provide the following information:

1. Company Name **2. Description of Material** **3. Serial Number**

4. Reason for Return **5. Application**

Units previously used in a process must be thoroughly cleaned in accordance with Occupational Safety and Health Administration (OSHA) standards before return. A Material Safety Data Sheet (MSDS) must accompany any unit exposed to process media. All returns must be shipped prepaid, and all replacements will be dispatched F.O.B. factory.

Flow & Control System Private Limited

ISO 9001-2015 Certified Company

CIN NO: U74140DL2015PTC277814

Our Footprints in India and Across the Globe,
"Trusted by leading organizations in Energy, Oil & Gas, Power & Process Industries".

Manufacturing Units:

MIDDLE EAST

Flow & Control System Private Ltd.
INTERNATIONAL SOLUTIONS 4 INDUSTRIAL SERVICES

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E-mail: Sales@IS4IS.COM

ASIA: INDIA

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Global Presence: Australia, Bangladesh, Canada, Dubai, India, KSA, Nepal, UAE

Worldwide: http://www.is4is.com