FLOW & CONTROL SYSTEM PRIVATE LTD

Catalogue:
Metal Tube Rotameters

"A joint venture Company Flow & Control System Private Limited, India

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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

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:

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Haryana, India.

Metal Tube Rotameter: FCSMT Series

Introduction:

The Digital Metal Tube Rotameter is suitable for measuring the flow of translucent or opaque fluids under high operating pressure and temperature conditions.

Working Principle:

A float is placed inside a vertically mounted tapered metering tube. As the fluid flows upward through the tube, it lifts the float. Due to the tapered shape of the tube, the float stabilizes at a position where the upward force of the fluid equals the weight of the float.

The float contains an encapsulated magnet, which magnetically couples with an external follower magnet located outside the metering tube. The movement of the follower magnet is mechanically transmitted to an indicating mechanism, allowing the flow rate to be read on a calibrated scale. The scale can be calibrated either in actual flow units or as a percentage of flow.

Adjusting the control valve changes the flow rate in the pipeline, which is directly reflected as a corresponding change on the rotameter scale.

Flow & Control Systems Digital Metal Tube Rotameters are all-metal, variable-area flowmeters designed for measuring liquids and gases under critical operating conditions. They consist of a tapered metal tube, float assembly, and a digital indicating unit. The magnet encapsulated within the float couples with static sensors in the electronic indicating circuit, ensuring accurate and reliable measurement of float movement.

Available Sizes: 20 NB to 100 NB **Flow Ranges:** **Water:** 100 to 40,000 LPH at ambient temp & **Air:** 2.5 to 1,250 Nm^3/hr at NTP

Accuracy: ±2% of Full-Scale Deflection (FSD) & ±1.5% of FSD (on request)

Accessories:

- High and Low Flow Alarm
- Heating Jacket for Metering Section
- Electrical Transmitter with 4–20 mA Output
- Digital Indicator, Totalizer, and Recorder

Specifications:

Components	MOC
Indicator Box	Aluminum/ SS
Scale	Anodized Aluminum / Acrylic / SS
Float	SS316 / SS316L / PTFE / Aluminum / PVC / Hastelloy C
Float Retainer	Vertical Panel Mounting with Rear Connection
Metering Tube	SS304 / SS316 / SS316L / PTFE-Lined SS / PP-Lined SS
Pointer	Aluminum / SS
Connection	Flanged / Screwed
Cover	Transparent Acrylic
Wetted Parts	MS / SS304 / SS316 / SS316L / PTFE-Lined MS / PP-Lined MS
Direction of Flow	Vertical / Rear / Side

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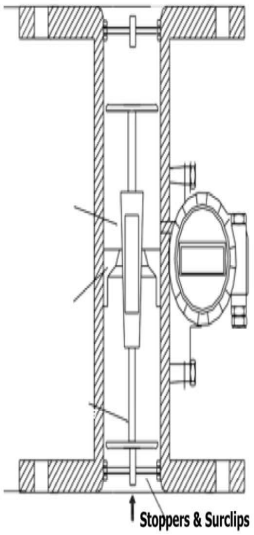
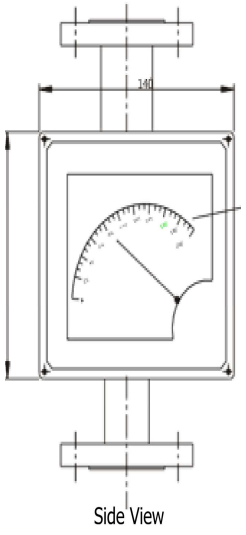
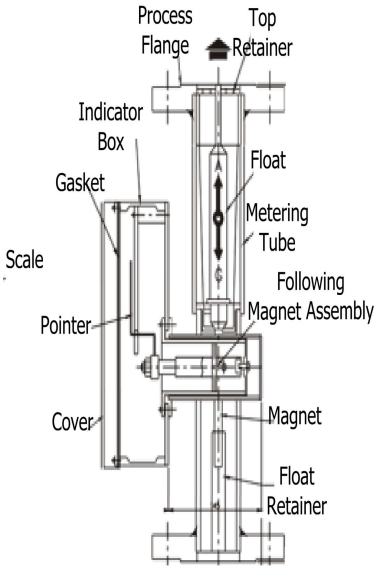
Metal Tube Rotameter: (Low Flow) FCSMT Series

NB	Model No		Water Flow (LPH) & Air Flow (NM^3/hr)				Pressure Drop with following Floats (In MMWC)	
			With SS 316 Float		With PTFE Float			
			Water	Air	Water	Air	SS316	PTFE
15	FCSMT10	FCSMTD10	15-150	0.42-4.2	6.5-65	0.14-14	1160	678
	FCSMT20	FCSMTD20	25-250	0.75-7.5	11-110	0.25-2.5	1160	678
	FCSMT30	FCSMTD30	40-400	1.2-12	17.5-175	0.4-4	1160	678
20	FCSMT40	FCSMTD40	60-600	1.5-15	25-250	0.55-5.5	1160	678
	FCSMT50	FCSMTD50	100-1000	3-30	43-430	0.95-9.5	1015	510
	FCSMT60	FCSMTD60	120-1200	3.5-35	52-520	1-10	1015	510
25	FCSMT70	FCSMTD70	150-1500	4.2-42	65-650	1.4-14	1015	510
	FCSMT80	FCSMTD80	250-2500	7.5-75	110-1100	2.4-24	1015	510
	FCSMT90	FCSMTD90	400-4000	12-120	175-1750	3.8-38	1015	510
40	FCSMT100	FCSMTD100	500-5000	14-140	220-2200	4.8-48	1015	510
	FCSMT110	FCSMTD110	750-7500	20-200	325-3250	7-70	1015	510
	FCSMT120	FCSMTD120	1000-10000	30-300	435-4350	9.5-95	1015	510
50	FCSMT130	FCSMTD130	1250-12500	36-360	545-5450	12-120	1015	510
	FCSMT140	FCSMTD140	1400-14000	40-400	610-6100	13-130	1015	510
	FCSMT150	FCSMTD150	1500-15000	42-420	655-6550	14-140	1015	510
	FCSMT160	FCSMTD160	2000-20000	57.5-575	870-8700	19-190	1015	510
80	FCSMT170	FCSMTD170	2000-20000	57.5-575	870-8700	19-190	1015	510
	FCSMT180	FCSMTD180	2500-25000	70-700	1100-11000	24-240	1015	510
	FCSMT190	FCSMTD190	3000-30000	86-860	1300-13000	28.5-285	1015	510
100	FCSMT200	FCSMTD200	4000-40000	115-1150	1700-17000	37-370	1015	510







**All above model variations are available as per client's requirement.

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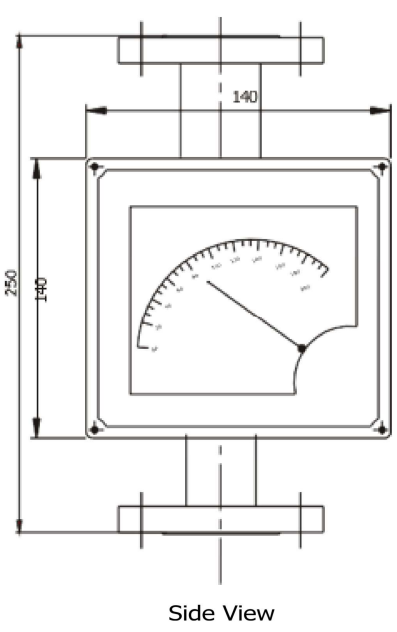
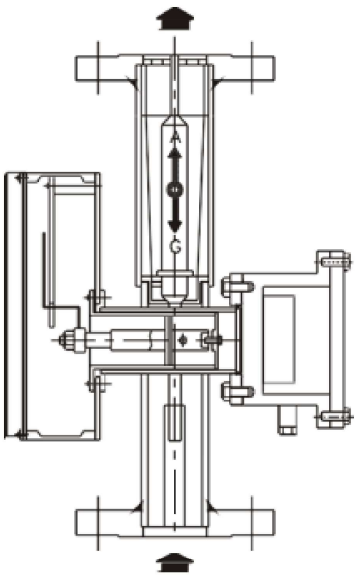
Metal Tube Rotameter: FCSMT Series

Mounting Options:

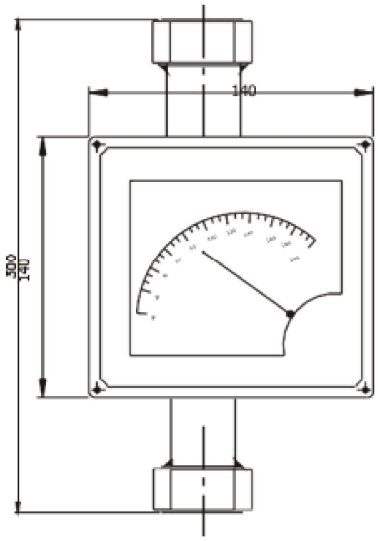


Side View

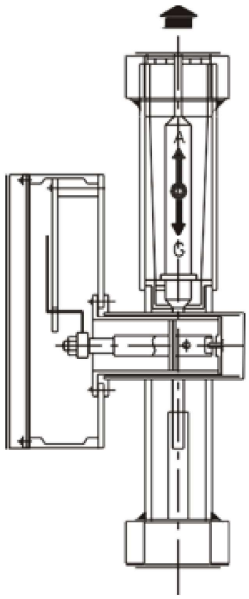


Elevation

Product Code: FCSMTFCS
Rotameter with Flow Control Switch

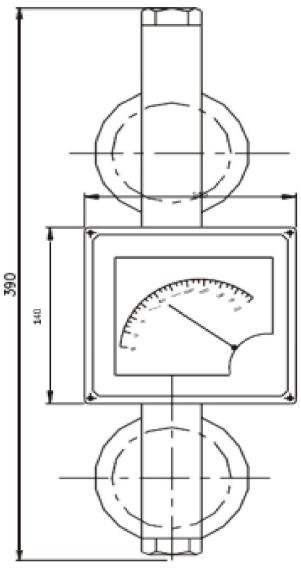


Side View

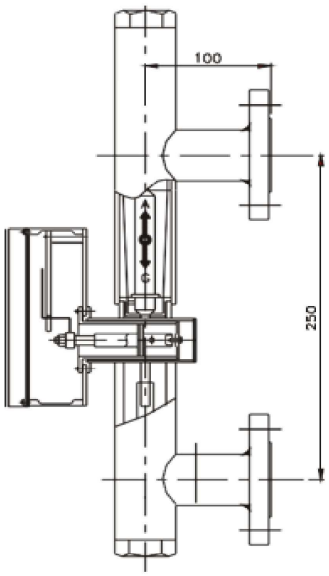


Elevation

Product Code: FCSMTFCS
Rotameter with Screwed Connection

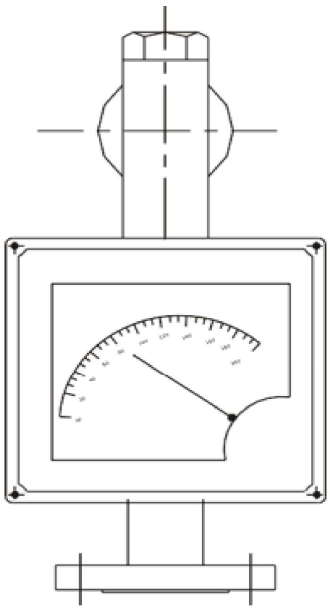


Side View

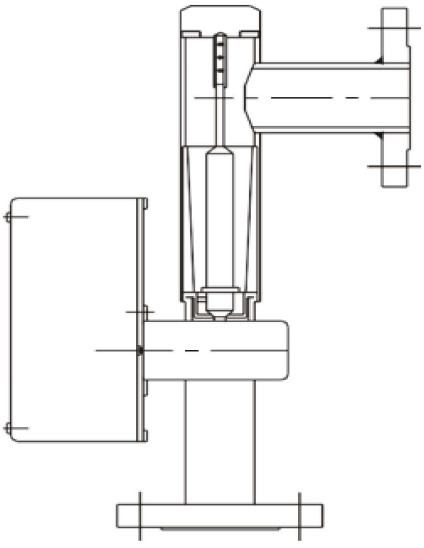


Elevation

Product Code: FCSMTFCSRC
Rotameter with Rear Connection



Side View



Elevation

Product Code: FCSMTFCSRERO
Rotameter with Bottom Entry and backwards outlet

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Installation & Maintenance Manual: Metallic Tube Rotameter FCSMT 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.

Unpacking:

Unpack the rotameter carefully.
The float inside the metal tube is secured in one position during transit to prevent damage. Before installing the instrument in the pipeline, ensure that the float is released and free to move.
Also, check the float retainer at the top of the tube. If it has become loose during transportation, it must be properly tightened before installation.

Application:

To ensure accurate performance, the rotameter must be used only with the fluid and under the operating conditions for which it has been calibrated. These operating conditions are specified in the Test Report supplied with each instrument.

Installation Details:

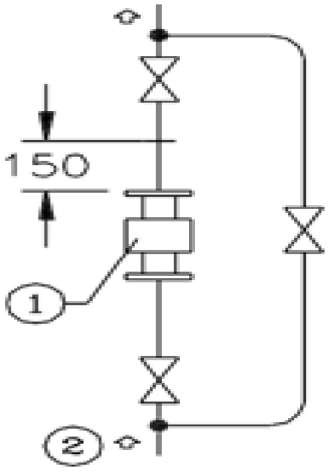
The rotameter must always be installed vertically in the pipeline, with the inlet at the bottom and the outlet at the top.
Vertical alignment should be checked using a plumb bob. A maximum deviation of ±2° is permissible.
If the rotameter is not installed in a true vertical position, its accuracy, sensitivity, and overall performance may be adversely affected.
The pipeline must be clean and free from debris before installation. It is recommended to flush the pipeline using a dummy section in place of the rotameter prior to final installation.
For correct installation practices, refer to Figure 'A'.
Ensure that a minimum downstream straight length of 150 mm is maintained.

Installation Details:

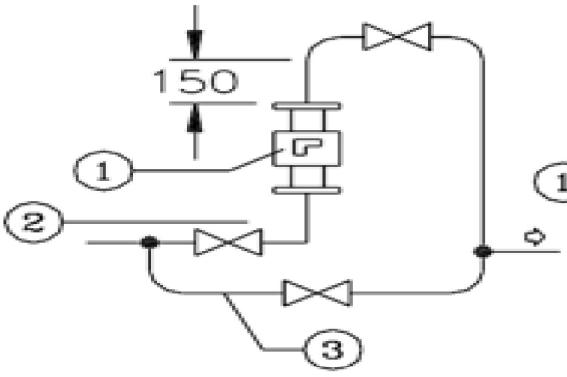
Sl No	Vertical Piping:	Horizontal Piping:	Vertical Piping with Flush Line & Check Valve:
1	MT Rotameter	MT Rotameter	MT Rotameter
2	Direction of Flow	Direction of Flow	Direction of Flow
3	By-Pass Line	By-Pass Line	By-Pass Line
4			Check Valve
5			Flush Line

Figure A

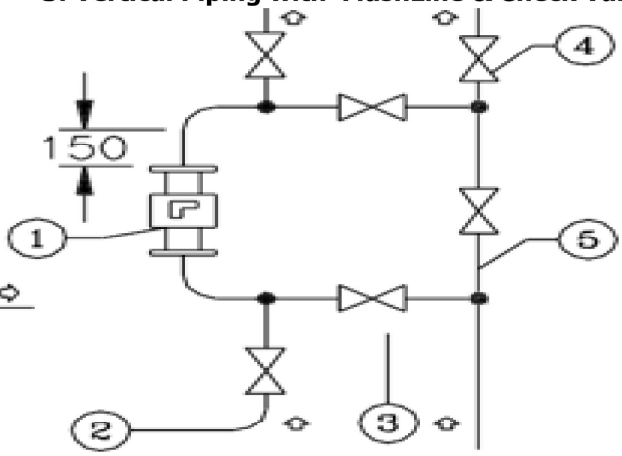
1: Vertical Piping



2: Horizontal Piping



3: Vertical Piping with FlushLine & Check Valve



Operation:

The Metal Tube Rotameter is a precision instrument designed to measure flow rate accurately. As shown in Fig. (B), the float moves freely up and down inside a tapered measuring tube. When fluid flows in the direction indicated by the arrow, the float rises to a position where the buoyant force balances the weight of the float. The vertical position of the float represents the instantaneous flow rate. The scale can be calibrated in either mass flow or volumetric flow units.
A magnet embedded in the float transmits its position to a follower magnet mounted in the indicator assembly. This magnetic coupling ensures that the pointer movement accurately follows the float position, providing a reliable flow indication.

Maintenance:

Under normal operating conditions, the instrument does not require routine maintenance. However, it is essential to ensure that the indicator box remains dust-proof to prevent dust ingress, which may damage the indicating mechanism.
For applications involving fluids such as wash liquids, lubricating oils, particle-laden liquids, LPG, chlorine, etc., periodic cleaning of the rotameter is recommended.

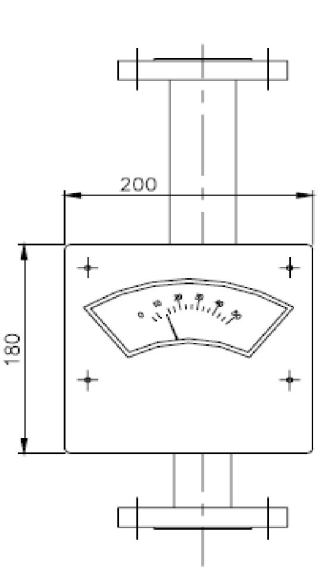
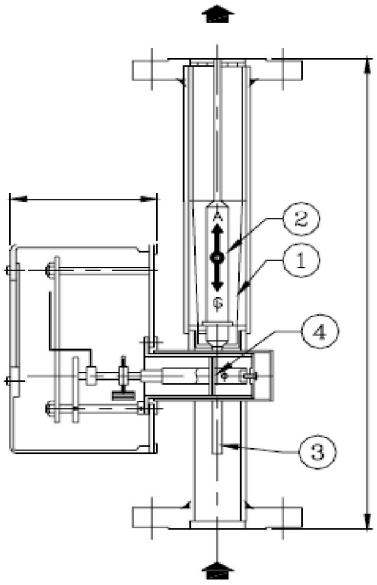
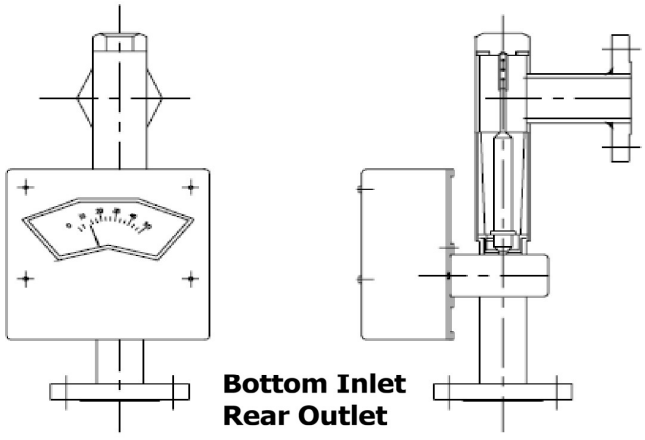
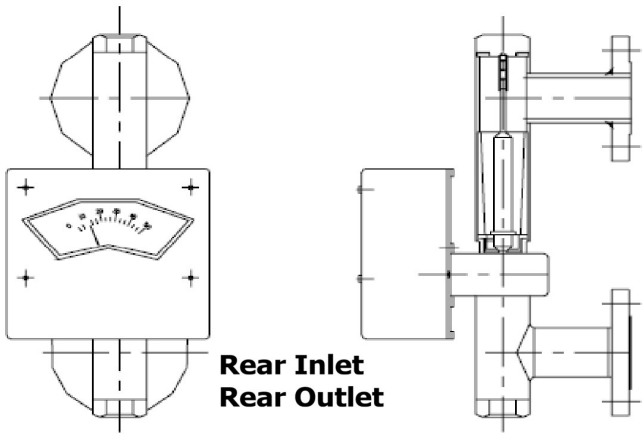


Figure B





Bottom Inlet
Rear Outlet



Rear Inlet
Rear Outlet

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Dismantling:

1) Shut off the flow completely.
2) For inlet/outlet whether up or down in vertical flanged connections: loosen and remove all upper and lower bolts and carefully remove the rotameter assembly. For rear inlet/outlet whether up or down screwed connections: use two spanners—one to hold the rotameter fitting and one for the pipeline fitting—to prevent external force from being applied to the metal tube.
3) Gently remove the end fittings or flange body.
4) Carefully take out the float and its retainer from the block.

Cleaning & Assembly:

5) Clean the float and the tapered bore using a soft brush, then rinse the entire unit with clean water. Do not use solvents, as they will react with Metal Tube Rotameter and damage the indicator components.
6) Use new O-rings and refit the components in their correct positions. Handle the body, float, and float retainers carefully to avoid drops or damage, especially to the float's indicating edge.
7) Reassemble all fittings with care and ensure all threaded joints are leak-tight.
8) The rotameter is now ready for use again.

Troubleshooting:

Symptom:	Probable Cause:	Action to be taken:
1. Pointer stuck at one position.	Float jammed due to particles in the fluid	Clean the rotameter
2. Pointer remains at zero	a) Flow rate below 10% of range b) Operating pressure below required	Select appropriate rotameter Check process conditions
3. Meter shows higher flow than expected	a) Material deposition on taper tube b) Fluid viscosity higher than calibration value	Clean the rotameter Contact factory for recalibratio
4. Meter shows lower flow than expected	Float or taper tube damaged due to corrosion or erosion	Contact factory
5. Erratic flow indication (fluctuating readings)	Magnetic particles accumulated around float.	Install magnetic filter at inlet

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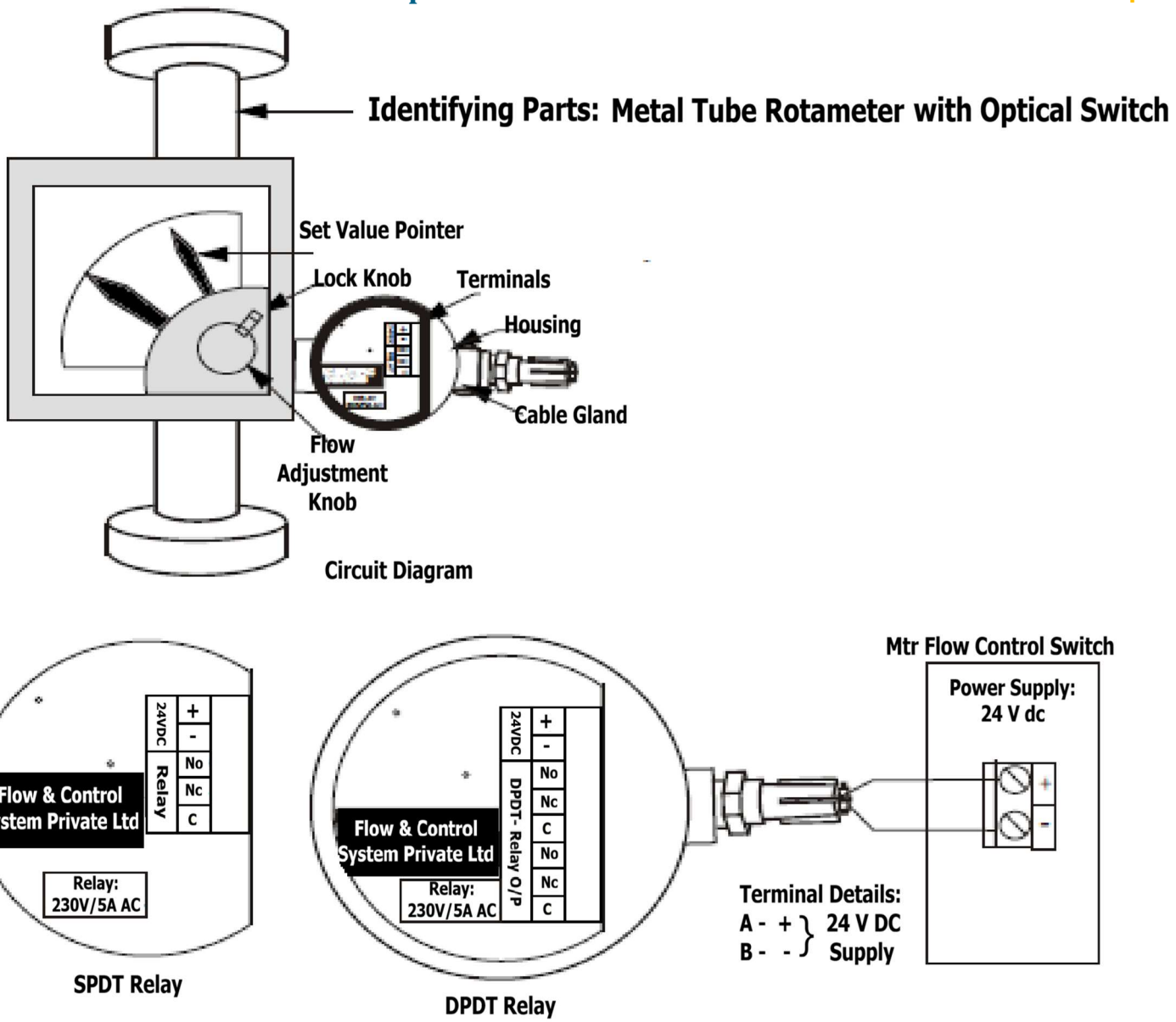
Metal Tube Rotameter with Optical Switch:



Operation: Flow Setting Procedure:

1. Complete the wiring as per the circuit diagram.
2. Connect the standard 24 VDC power supply to the + and – terminals.
3. As per application requirement, connect the relay output (SPDT or DPDT, as per purchase order) to the desired equipment.
4. Switch ON the power supply.
5. Release the knob lock and rotate the flow adjustment knob to the required flow rate, then tighten the lock to fix the switching position.
6. Start the flow in the pipeline.
7. When the indicator pointer crosses the set point, the relay will be triggered and changeover contacts will operate.
8. Any further adjustment can be done by repeating Step 5.

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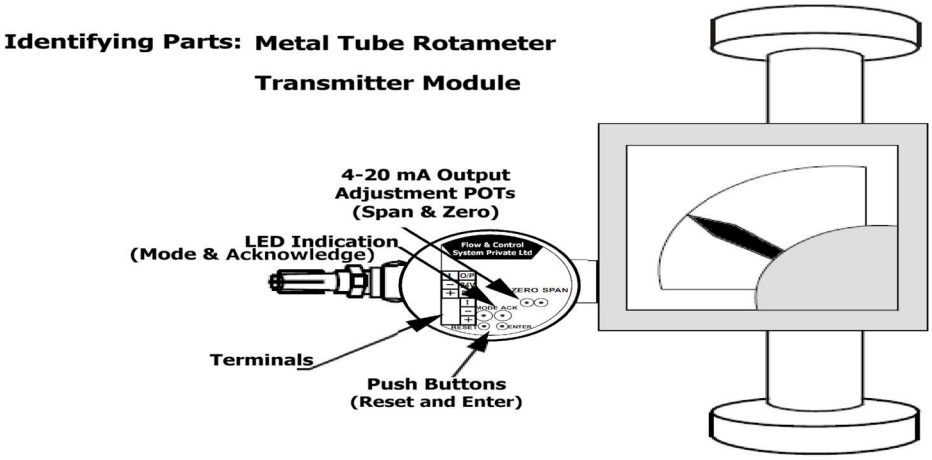
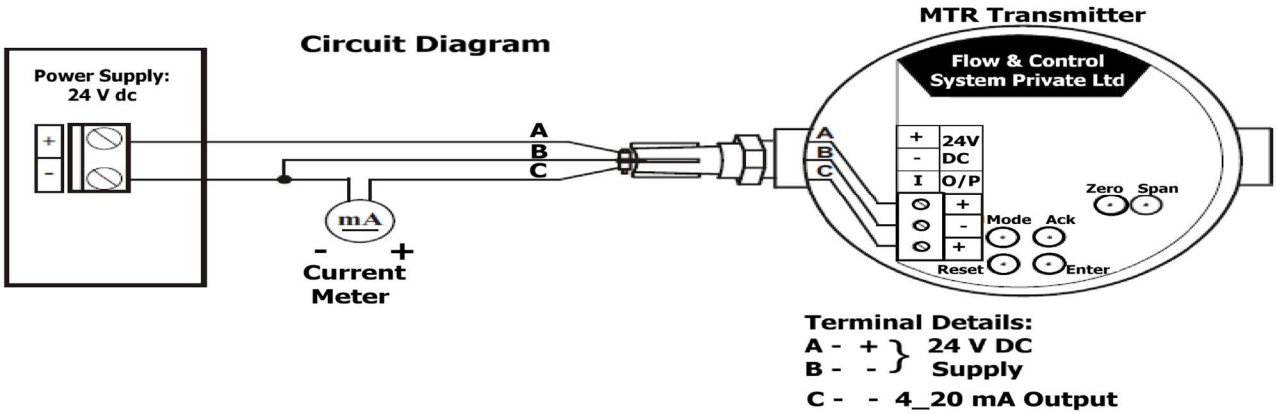
Metal Tube Rotameter Transmitter Module:





Calibration Procedure:

1. Connect the MTR transmitter as per the circuit diagram (3-wire connection).
2. Power ON the instrument while pressing and holding both RESET and ENTER keys.
3. The MODE and ACK LEDs will blink once and remain ON, indicating Calibration Mode.
4. Press the RESET button to clear any previous calibration data.
5. Ensure the pointer of the Metal Tube Rotameter is at zero position.
6. Press the ENTER key once to register the current data.
7. The ACK LED will blink once, confirming successful zero calibration.
8. Increment the pointer to the next position in equal step lengths.
9. Press the ENTER key at each position to register calibration points.
10. Ensure equal step lengths; otherwise, calibration must be restarted.
11. After each adjustment, allow 5 seconds for ADC stabilization.
12. Continue this process until the full-scale position of the pointer is registered.
13. Switch OFF the instrument.
14. Re-apply power while pressing RESET and ENTER, then verify the calibration.
15. If required, repeat the calibration process.

Settings for ZERO and SPAN:

16. Set the pointer to Zero indication.
17. Adjust the ZERO POT until the milli-ammeter shows 4 mA.
18. Move the pointer to Maximum (Full Scale) position.
19. Adjust the SPAN POT until the milli-ammeter shows 20 mA.

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: Metal Tube Rotameter

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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, Flange, Rod, Circle	Surface finish & Dimensions	Visual Dimensional & Chemical	100%	As per requirement given in P.O, approved Drawings, & given Std. Specification	Goods Receipt Note & Mfr.'s/Lab T.C	√	√	C		
2	Pipe, Flange, Rod	Chemical Properties		Random							
3	Aluminium, SS, ABS Housing	Surface finish & Dimensions		100%							
B. BOUGHT OUT / JOB WORK											
1	Magnet & 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) .....

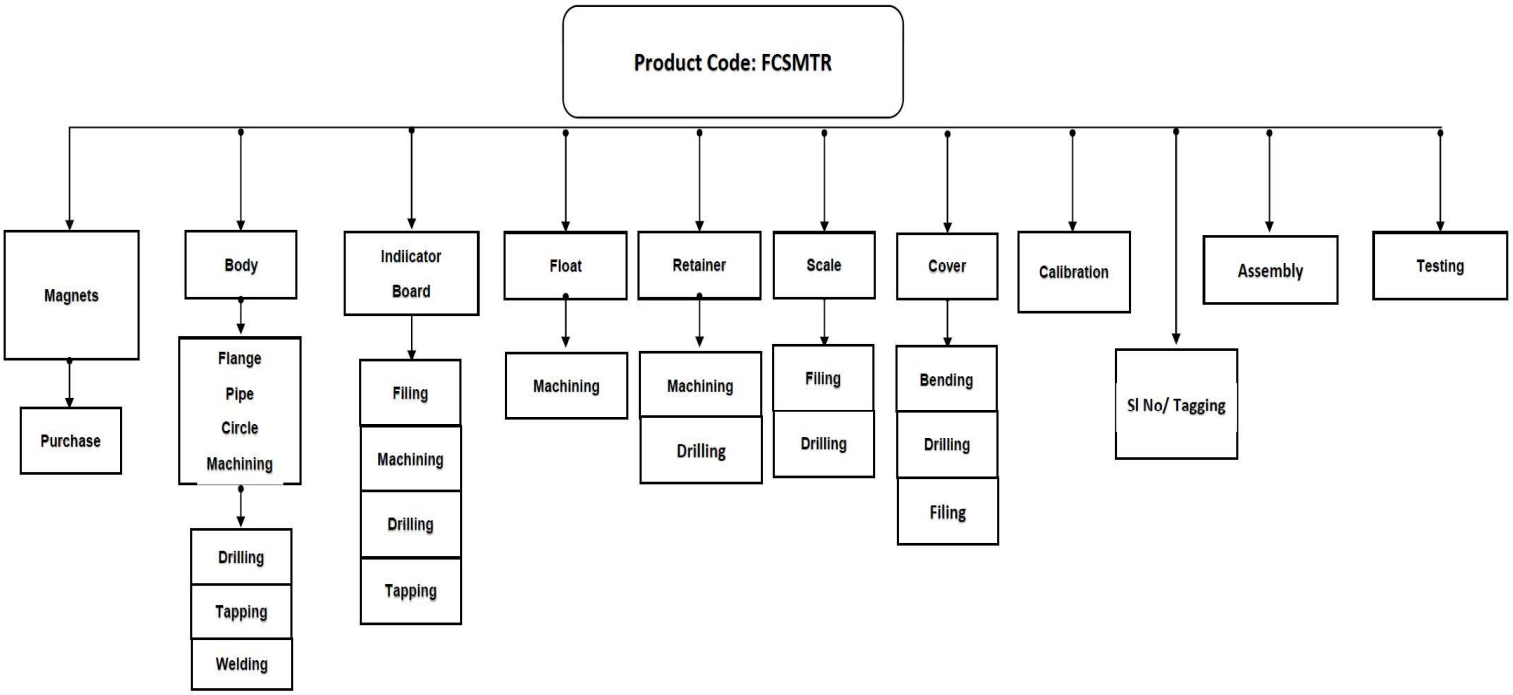
Approved By: (Technical Head) .....

Remarks:

Mobile (+91): 9810452741/9643947660
Email id: quality.rflevel@gmail.com
info@flowcontrol.co.in

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

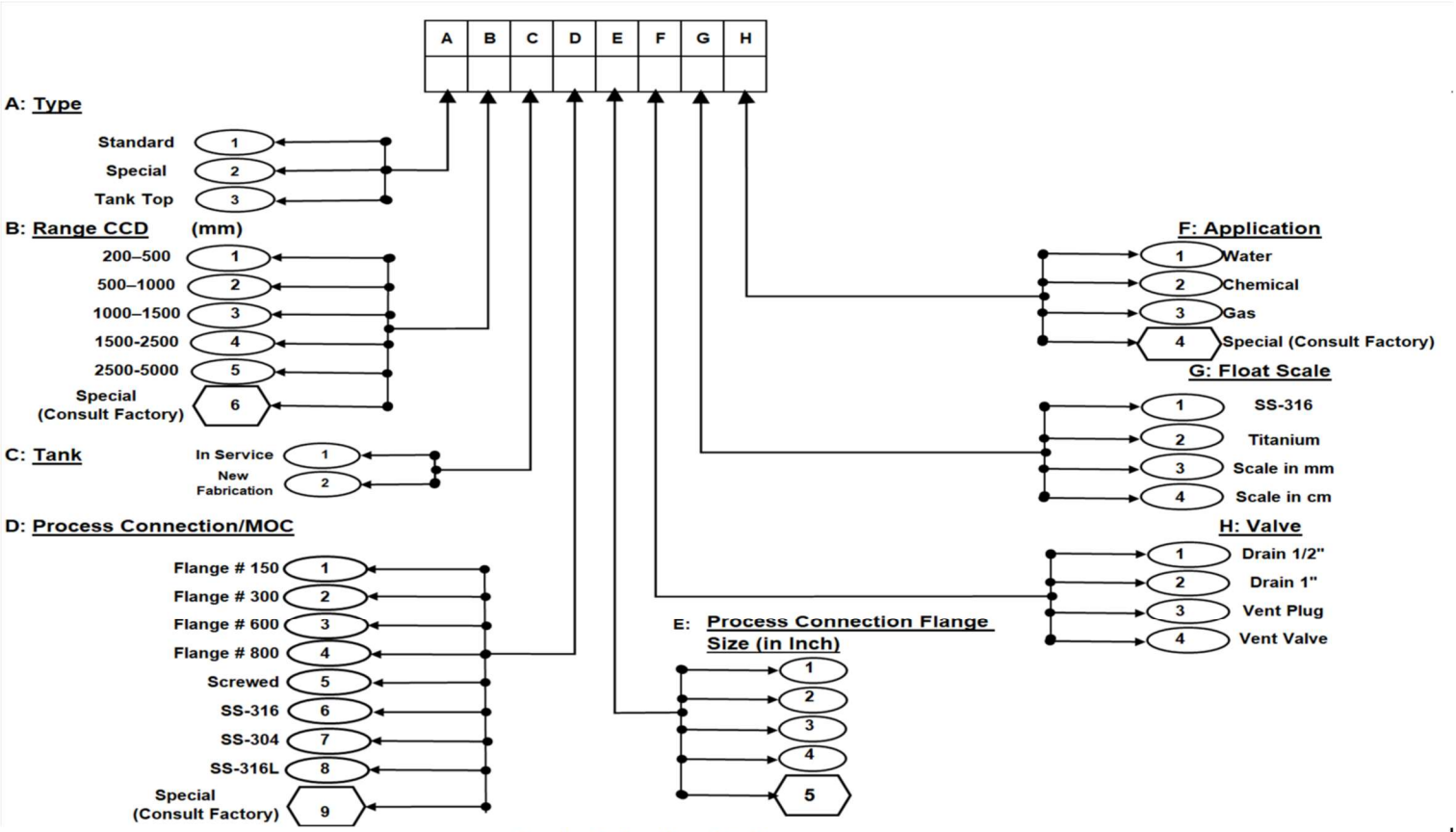
Process Flow Chart: Metal Tube Rotameter



Reviewed & Approved By: Technical Head

Remarks:

DE codification: Acrylic Body Rotameter



Code Selection Reference:

Type	A	1	2	3	-	-	-	-	-	-
Range	B	1	2	3	4	5	6	-	-	-
Tank	C	1	2	-	-	-	-	-	-	-
Process Connection/MOC	D	1	2	3	4	5	6	7	8	9
Process Connection Flange Size (inch)	E	1	2	3	4	5	-	-	-	-
Application	F	1	2	3	4	-	-	-	-	-
Float Scale	G	1	2	3	4	-	-	-	-	-
Valve	H	1	2	3	4	-	-	-	-	-

*Note: For any Specific Requirement Please Consult Factory at above mentioned Email/Numbers

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.

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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

Dammam 1st Industrial City,
P.O. Box 682, Dammam 31421, KSA
Phone: (+966): 33445540/6940/6938/5738 X 193
Fax: +966 3 344 5543
E-mail: Sales@IS4IS.COM

ASIA: INDIA
Flow & Control Systems Private Ltd.
16/5, Main Mathura Road,
Plot No: 11 2nd Lane, Karkhananagh,
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Phone: + 91 124-4366000-09 (10 Lines)
E-mail: info@flowcontrol.co.in,
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