

FLOW INDICATORS

SERIES: 401X-M & 402X-M

1.0 FUNCTIONS:

Flow Indicators included in this catalogue are mainly designed as a safety device looking to the need of an electrical signal on failure of forced circulation of liquid in pipe line.

They perform following functions:

1. Indicate the rate of full flow in proper direction in specified pipe.
2. Operate one or two switches when rate of flow drops near to 70% of specified full flow. These switches can be used to initiate precautionary system or safety devices.

2.0 APPLICATIONS:

Consider the case of furnace transformer in which one Flow Indicator can be mounted on suitable member of oil circulating pipe and one on water circulating pipe of heat-exchanger.

The pointer of respective Flow Indicator will indicate whether desired rate of flow is maintained or not and switch will operate. If the flow drops near to 70% to initiate precautionary system. For similar purpose it can be used on liquid circulating pipes in chemical processes, heavy duty bearings, compressors, etc.

4.0 CONSTRUCTION & WORKING :

A suspended vane is used as sensor. Its surface is kept at right angle to direction of flow. When liquid starts flowing through pipe, the vane gets deflected along with vane shaft. This deflection is used to indicate flow inside the pipe and to operate the switch or switches as follows:

A pair of permanent magnets is used as glandless coupling. The driving magnet is connected with vane, therefore it rotated with vane and remains in liquid. The follower magnet, separated by a non-magnetic wall, is kept outside in air and acquires position corresponding to driving magnet. The follower magnet carries a pointer and a cam. The pointer is set to read the specified rate of full flow and the cam is set to operate one or two switches when flow drops near to 70%.

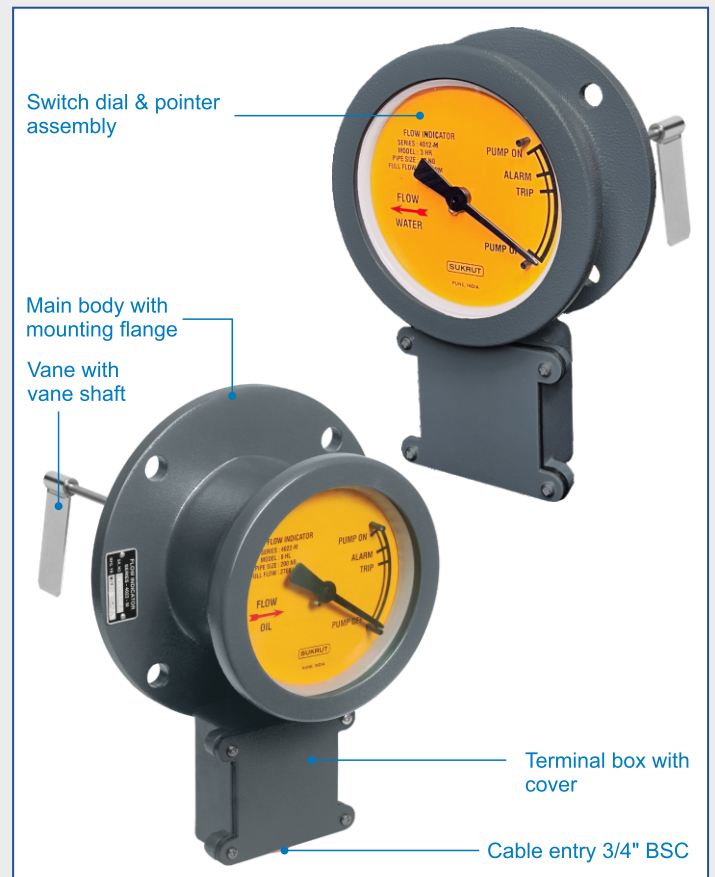
A return spring is used which acts in the opposite direction of flow. Hence any steady position of pointer is the result of equilibrium of force due to impinging liquid on vane, spring tension & weight of vane. The pointer does not remain steady for unsteady flows. The size and shape of vane and tension on return spring is adjusted to suit specified full flow. The vane occupies very small area out of full cross section of pipe at NO-FLOW position. At full flow it becomes almost parallel to flow, Hence there is practically no head-loss across flow Indicator.

5.0 DIAL MARKING:

The spread of flow indicating portion of dial is only about 70°. Hence it is not possible to print more markings. Usually PUMP ON - PUMP OFF or FULL FLOW - NO FLOW type of limit markings are printed. Intermediate markings such as ALARM, TRIP are also printed if required. Besides, specifications such as value of full flow, liquid, pipe size and direction of flow are also printed. The background of dial is yellow. Direction indicating arrow is in red colour and all other markings in black colour.

6.0 SWITCHES:

One or two Micro switches of SPST type are provided. Their contact position can be set to NO or NC at full flow. If required, switch can be changed from NO to NC or vice versa at site. In case of single switch, it is set to operate near 70% when flow is falling. In case of two switches, both are mounted on same plate. Hence both operate at same rate of flow. But in order to satisfy design requirements, one switch can be set to operate near 80% and the other near 70% or one near 70% and the other near 60%. It is not possible to set a switch to operate at lower value than 60. We can modify setting suitably if switching requirements are clearly specified.



7.0 WIRING:

Leads from switch/switches are brought into a terminal box positioned at the bottom of indicator. A two-way or four-way terminal strip is provided. Terminals are accessible for wiring after removing cover. A hole with conduit threads is provided for fixing cable gland to box. Terminals are marked. Wiring should be done as per respective wiring diagrams

8.0 SETTING:

Full Flow- Each indicator is set in water-flowing condition. Pipe size, pipe position, direction of flow is maintained. By adjusting a valve in pipe line, the specified rate of full flow established, and then the pointer is set to read the full flow mark. This method of setting gives very accurate results as it is based on equilibrium of vane at full flow. In case of liquids other than water. Proportional rate of flow of water is maintained for setting.

Switch- After setting of pointer at full flow, switches are set in the sequence ordered by customer. Flow is reduced to check operation of switch & increased to check automatic resetting. The rate of flow at which switching occurs is approximate, the switch positioning is kept adjustable to compensate difference in pipe gradient at site.

9.0 TESTING :

9.1. Static pressure: At 7 Kg/cm²

9.2. Flow: Indicator is mounted on pipe. Water is allowed to flow in specified direction. Rate of flow is checked when pointer reads full flow. For liquids other than water proportional rate of flow of water is checked.

9.3. Switch: Switch operation is checked by reducing and increasing flow in pipe line.

9.4. Contact rating: Switches are tested in laboratory at 5A.240V.AC

9.5. Dielectric strength: Live terminals are checked at 2kV with body. A test certificate is provided with each instrument.



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10.0 DESIGN FEATURES:

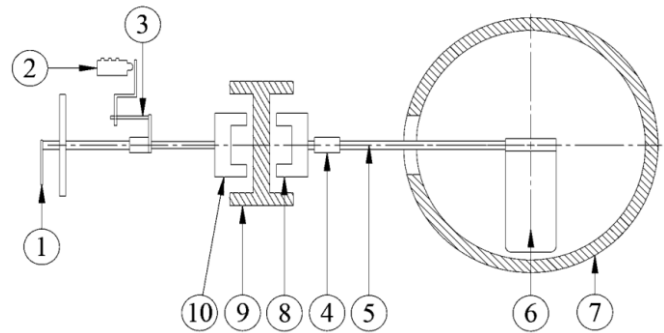
1. Switch contacts are not affected by dust, humidity or corrosive atmosphere.
2. Switches can be serviced without need of stopping flow.
3. Causes negligible head-loss.
4. Low maintenance cost.
5. Robust construction & trouble free service.
6. Does not get damaged due to excess flow or reverse flow.

11.0 HOW TO ORDER:

In order to be able to offer suitable Flow-indicator, we need following information:

1. Liquid in pipe
2. Specific Gravity of liquid
3. Rate of flow in LPM
4. Pipe size
5. Pipe position
6. Direction of flow (Specify only one direction)
7. Switch setting
8. Dial Marking
9. Working Temperature
10. Working Pressure
11. T-Mounting Required or Not Required.
12. Quantity against each specification

FIG 1. SCHEMATIC



ITEM DESCRIPTION

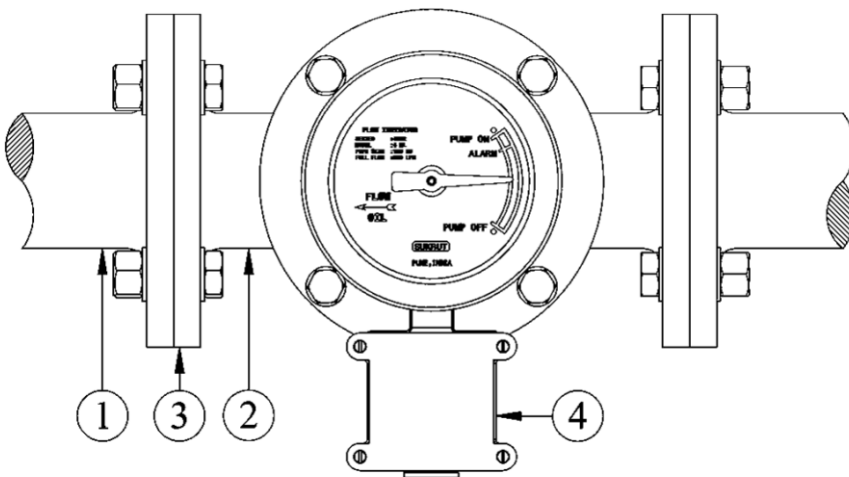
1.	Pointer & Dial	6.	Vane
2.	Micro Switch	7.	Main Pipe
3.	Switch Operating Camp	8.	Driving Magnet
4.	Return Spring	9.	Non-Magnetic Wall
5.	Vane Shaft	10.	Follower Magnet

FIG 2.

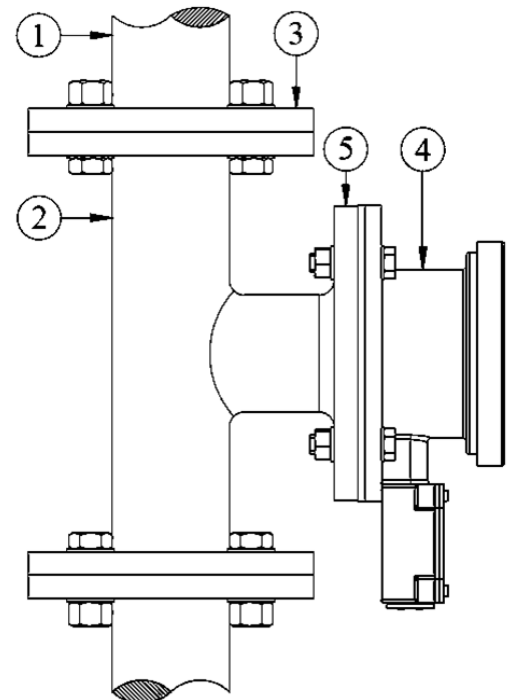
WORKING POSITIONS

ITEM DESCRIPTION:

1. Main pipe
2. T-Mounting
3. Connecting Flanges.
4. Flow indicator.
5. Flange for indicator.



Horizontal Pipe



Vertical Pipe

NOTE: FOR REFERENCE, 402X-M SERIES IS CONSIDERED

GENERAL NOTES :

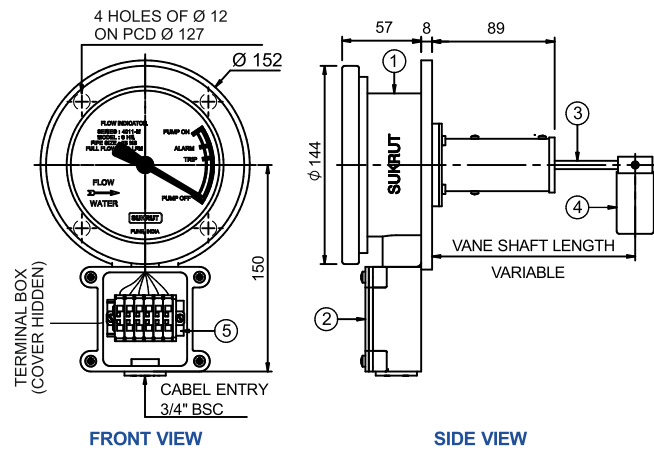
1. Flow indicators are not interchangeable for different liquids, pipe diameter, direction of flow or rate of full flow. Hence they should be ordered separately.
2. The rate of full flow is not adjustable.
3. The switch operation point is not adjustable.



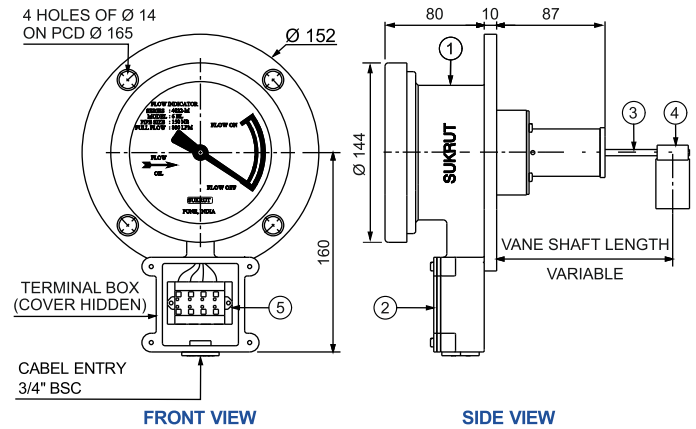
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FIG 3. FLOW INDICATOR: SERIES 401X- M



FLOW INDICATOR: SERIES 402X - M



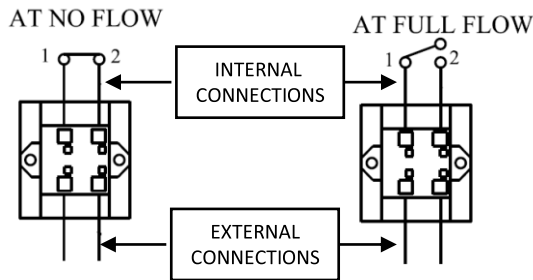
PART LIST FOR FIG.3

1	HOUSING WITH MOUNTING FLANGE	ALUMINUM	QTY -1
2	TERMINAL BOX COVER	ALUMINUM	QTY -1

3	VANE	S.S	QTY -1
4	VANE SHAFT	BRASS	QTY -1
5	WAGO PRESS TERMINAL	-	QTY -1

FIG 4. WIRING DIAGRAMS

SINGLE SWITCH:FI-4021-M



DOUBLE SWITCH: FI-4022-M

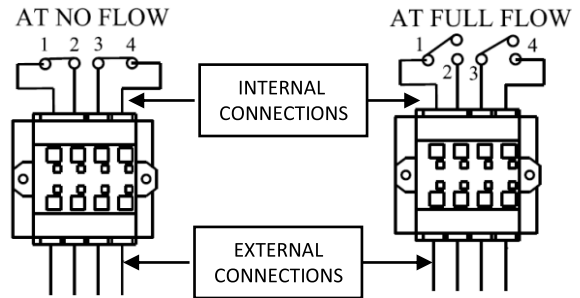
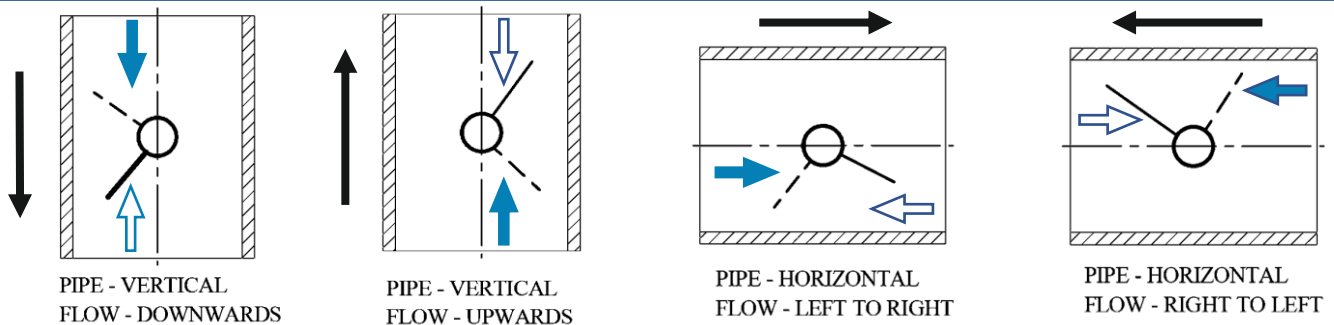


FIG 5. DETAILS OF VANE ORIENTATION



DETAILS OF SYMBOL

	Direction of flow of liquid in pipe as seen from dial side of indicator		Force due to impinging liquid.		Vane at Full-flow
	Force due to return spring		Vane at no - flow		Pipe

GENERAL NOTES :

1. Fig.5 Shows Vane position at NO FLOW and FULL FLOW as seen from dial side of indicator
2. Indicator are set for any one direction out of four illustrated in fig.5
3. The figure also shows direction of forces acting on vane due to impinging liquid and return spring (Gravitational force not shown).

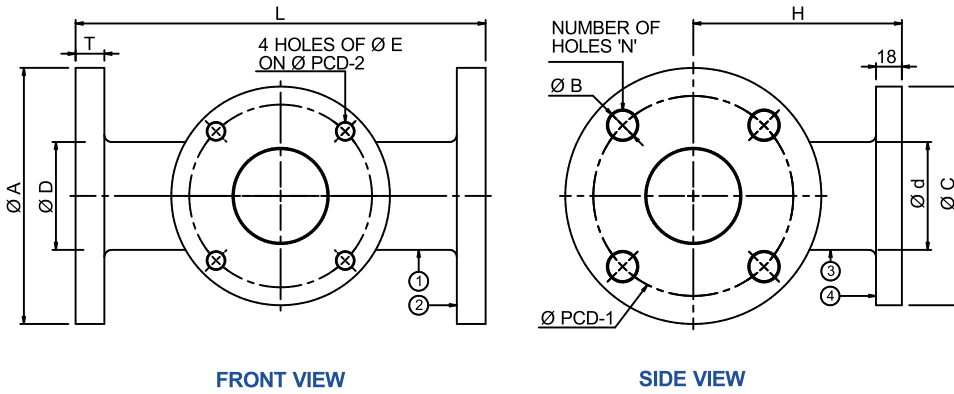


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FIG 6.

T-MOUNTING DETAILS



ITEM	DESCRIPTION
1.	Pipe (Size Equal to Mail Pipe Line)
2.	Connecting Flange
3.	Tee Pipe
4.	Flange For Indicator

MODEL	CODE	D-mm	D-inch	d	L	T	H	A	C	E	PCD-1	PCD-2	B	N
401X-M SERIES	M1-2	50	2	80	285	15	120	152	152	12	114.3	127	17.5	4
	M1-2.5	65	2.5	80	285	15	120	165	152	12	127	127	17.5	4
	M1-3	80	3	80	285	15	120	184	152	12	146	127	17.5	4
	M1-4	100	4	80	300	18	145	216	152	12	177.8	127	17.5	4
	M1-5	125	5	100	300	18	145	254	152	12	209.5	127	17.5	4
	M1-6	150	6	100	300	22	165	279	152	12	235	127	17.5	8
402X-M SERIES	M2-1.5	37	1.5	75	285	12	120	133	189	14	98.4	165	14.5	4
	M2-2	50	2	75	285	15	120	152	189	14	114.3	165	17.5	4
	M2-2.5	65	2.5	75	285	15	120	165	189	14	127.0	165	17.5	4
	M2-3	75	3	75	285	15	120	184	189	14	146.0	165	17.5	4
	M2-4	100	4	75	300	18	145	216	189	14	177.8	165	17.5	4
	M2-5	125	5	100	300	18	145	254	189	14	209.5	165	17.5	4
	M2-6	150	6	100	300	22	165	279	189	14	235.0	165	17.5	8
	M2-8	200	8	100	300	22	185	336	189	14	292.1	165	15.5	8
	M2-10	250	10	100	350	22	205	406	189	14	357.6	165	17.5	12

GENERAL NOTES :

1. We recommend ordering Flow indicator with the 'T-Mounting' for pipe size 50mm or less.
2. If 'T-Mounting' is required, we supply flow indicator duly assembled with 'T-Mounting' for pipe size 50mm and less.
For higher sizes 'T-Mounting' and Flow indicator are packed separately to avoid damage to indicator.
3. T-Mounting is same for horizontal & vertical application.
4. If rate of full flow is less that the minimum required flow, suitable flow area reduction nozzle will be provided.
5. Except indicator mounting, rest all dimensions can be customized to suit customer requirement.
6. All joints are strongly welded & evaluated for 10 Kg/Cm² static pressure.
7. In case of any query or special requirement, kindly share the detailed drawing or contact us.



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