



FLOW INDICATORS

Used in fluid: Oil or Water.

Installation pipe sizes: 80mm (3"), 100mm(4"), 150mm (6") & 200mm (8")

Viewing dial size: 100mm (4")

ISO 9001:2015 CERTIFIED

FUNCTION & APPLICATION:

Flow indicators, as used in power transformer with forced circulation of liquid, are safety devices that protect against the failure or degradation of pumps circulating the cooling fluid.

The product performs the following functions

- 1) It indicates if the flow in the pipe is in the correct direction.
- 2) It acts as an verification during transformer installation that the design flow rate of liquid has been achieved.
- 3) It provides change of electrical contacts if the flow rate falls below predetermined limits.

WORKING FLUID:

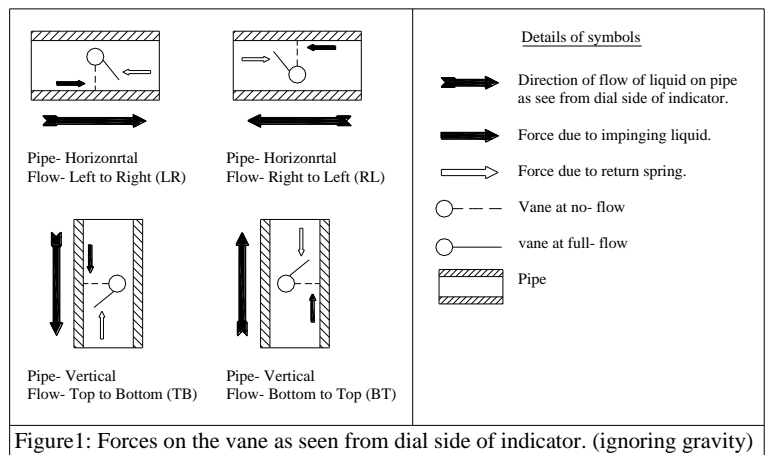
The product can be designed for used with water or transformer oil. The working fluids needs to be specified during ordering. The product can be designed for use with other fluids if the specified gravity is provided during enquiry.

CONSTRUCTION & WORKING:

A suspended vane is exposed to the flow of liquid in the pipe, with its surface at right angles to the direction of flow. When liquid starts flowing in the pipe, the vane is deflected, turning the vane shaft around. This turning is used to indicate flow inside the pipe and to operate limit switches as needed.

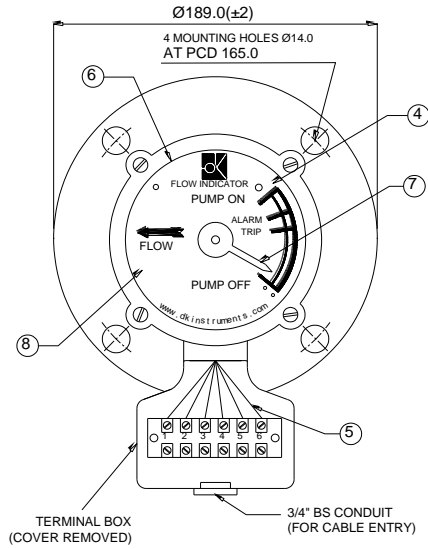
The vane shaft is connected to a neodymium magnet that drives another identical magnet on the other side of a nonmagnetic wall. This follower magnet is on the dial side of the flow indicator, and is connected to the pointer and a mechanism that triggers the limit switches.

The rotation of the vane shaft is opposed by a torsion spring. Steady pointer reading is caused by equilibrium of torque generated by the action of the impinging liquid on the vane and the opposing torque of the torsion spring. When the flow in the pipe falls, the force on the vane reduces, and the torque of the spring on the vane shaft overcomes that exerted by the liquid flow, resulting in the pointer displaying a fall in flow. Figure 1 illustrates the operation of the vane.

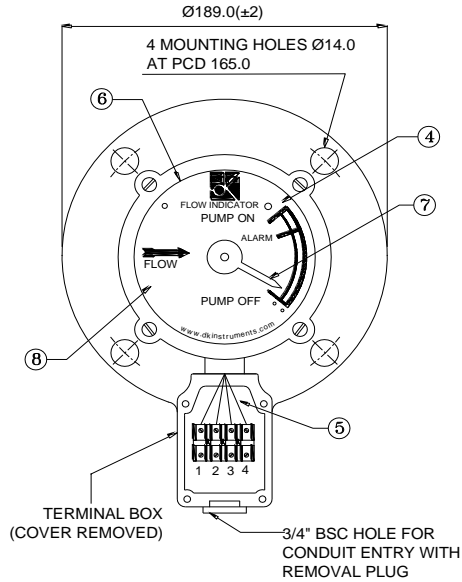


The pointer does not remain steady for unsteady flows

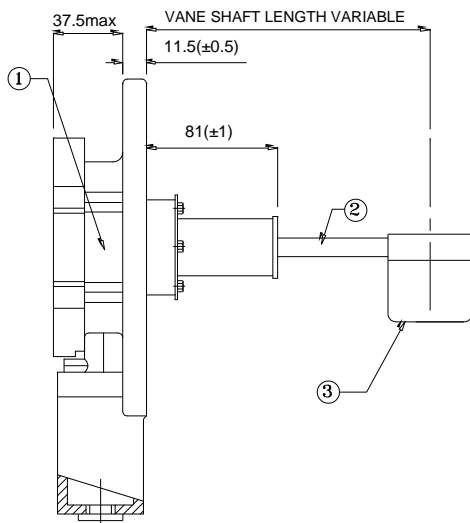
GENERAL DESCRIPTION



Double Micro Switch



Single Micro Switch



PARTS LIST

| SL. | DESCRIPTION | MATERIAL |
|-----|-------------------|--------------------|
| 1 | MAIN BODY & COVER | AL. ALLOY |
| 2 | VANE SHAFT | BRASS |
| 3 | VANE | BRASS |
| 4 | MICRO SWITCH | HONEYWELL / CHERRY |
| 5 | CONNECTING WIRE | 1 Q. MM (FINOLEX) |
| 6 | DIAL | AL. |
| 7 | POINTER | AL. |
| 8 | LENS | GLASS TOUGHENED |

TECHNICAL SPECIFICATIONS / CONDITION:

| | |
|--------------------------------------|---|
| Liquid | Water or Oil |
| Pipe size | 3" to 8" (75mm to 200mm) |
| Switches: | One, tow or none. |
| Switch rating | 5A, 240 V AC and 0.5A, 240 V DC |
| Environmental protection | IP 55 as per EN 60529:1992 |
| Working temperature in liquid | 0 to 100°C |
| Working pressure | 0 to 4 Kg/cm ² |
| Static pressure | At 5 Kg/cm ² under oil for 1 minute |
| Full flow rate and switches | The device is mounted on pipe so that fluid flows in specified direction. The flow rate through the pipe is measured when the pointer reads full flows. The flows rate is then gradually reduced and the flow rate at which each switch operates is measured. For mediums other than the measuring liquid, converted proportional rate of flow is used. |
| Dielectric test | 2KV AC for 1 minute between body and live terminals 1KV AC for 1 minute between contacts |
| Insulation resistance | The insulation resistance should be > 10 MΩ when tested at 500V for 1 minute. |

FUNCTINAL TEST & ELECTRICAL CONNECTION

Testing the Flow Indicator Function with the Vane:

A test system is provided in the Flow Indicator that allows the functional test of switching system. To test the Flow Indicator function positioned the Flow Indicator exactly as vertical and rotates the Vane by hand as the direction of flow. Both the alarm (upper switching system) and Trip (lower switching system) will show continuity by NO to NC or NC to NO as per made according to customer’s requirement. Repeat the functional test each time a Flow Indicator is removed from the transformer for any reason.

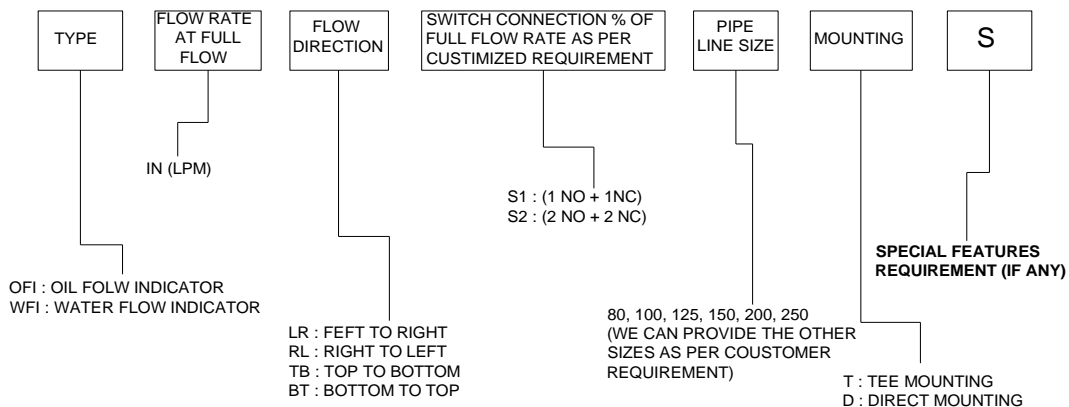
Electrical Connection:

To allow installation of the ‘single wire’ open the terminal box cover comprising of the name plate and the instruction embossed on the backside. Then pass the wire through the conduit screwing into the terminal box. Identification for alarm and trip contacts is given in the wiring diagram on the reverse side of the name plate cover.

CONFIGURATION AND ORDERING

The flow indicator is available in a variety of configurations and ordering can be done by specifying the model numbers and quantities.

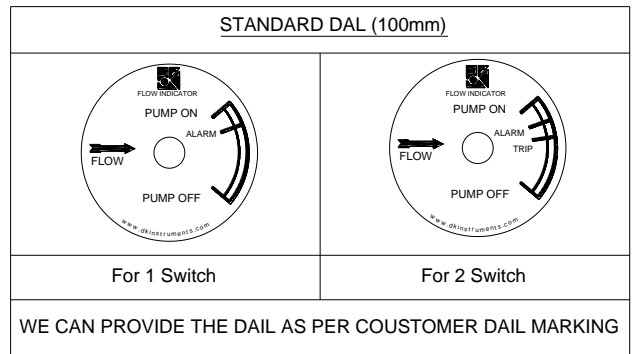
ORDERING CODING



NB: OFI-600-LR-S1-80-T

Alternatively, orders can be placed by specifying all of the following

1. Pipe size
2. Full flow rate in LPM
3. Liquid in pipe
4. Specific gravity of liquid (If than mineral transformer oil or water)
5. Flow direction (Specify only one direction)
6. Dial markings
7. Number of switches and switch setting
8. Quantity against each configuration

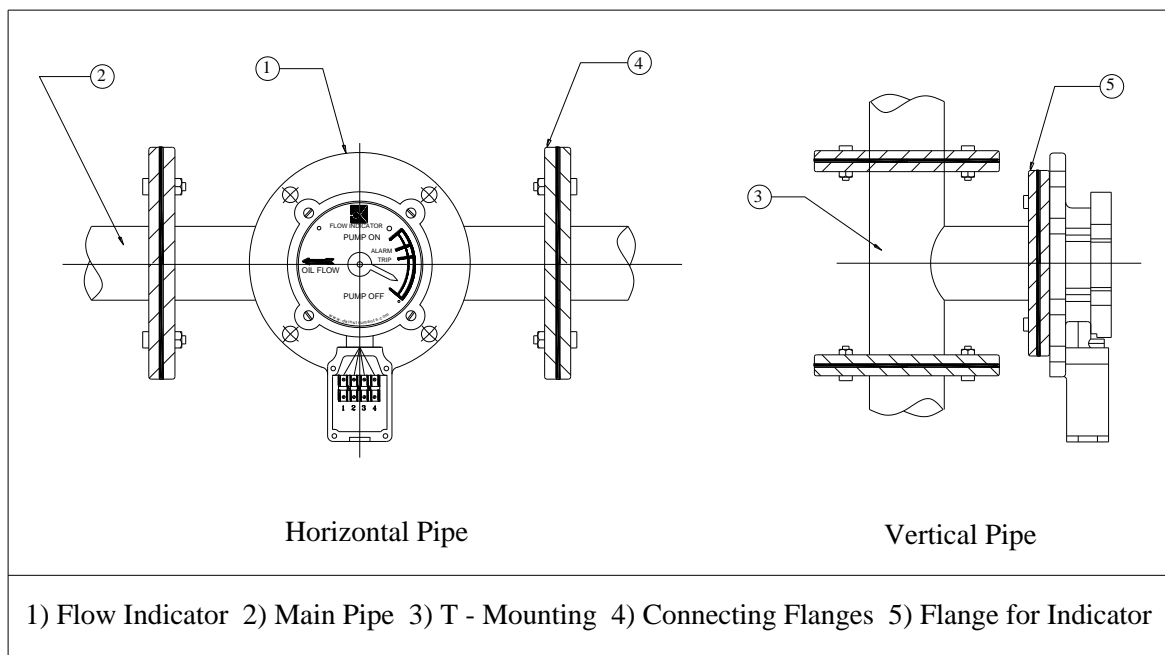


DETAILS OF 'T' - MOUNTING

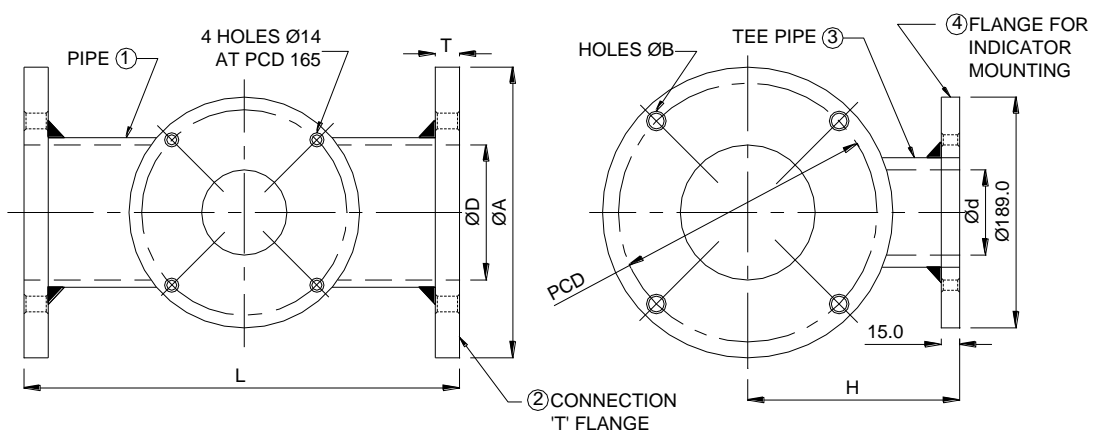
INSTALLATION

A) T-Mounting

The product is installed on a section of the pipeline between the transformer and radiators using a T – Mounting. Flow indicators can be made for both horizontal and vertical mounting with any flow direction. as shown in below figure



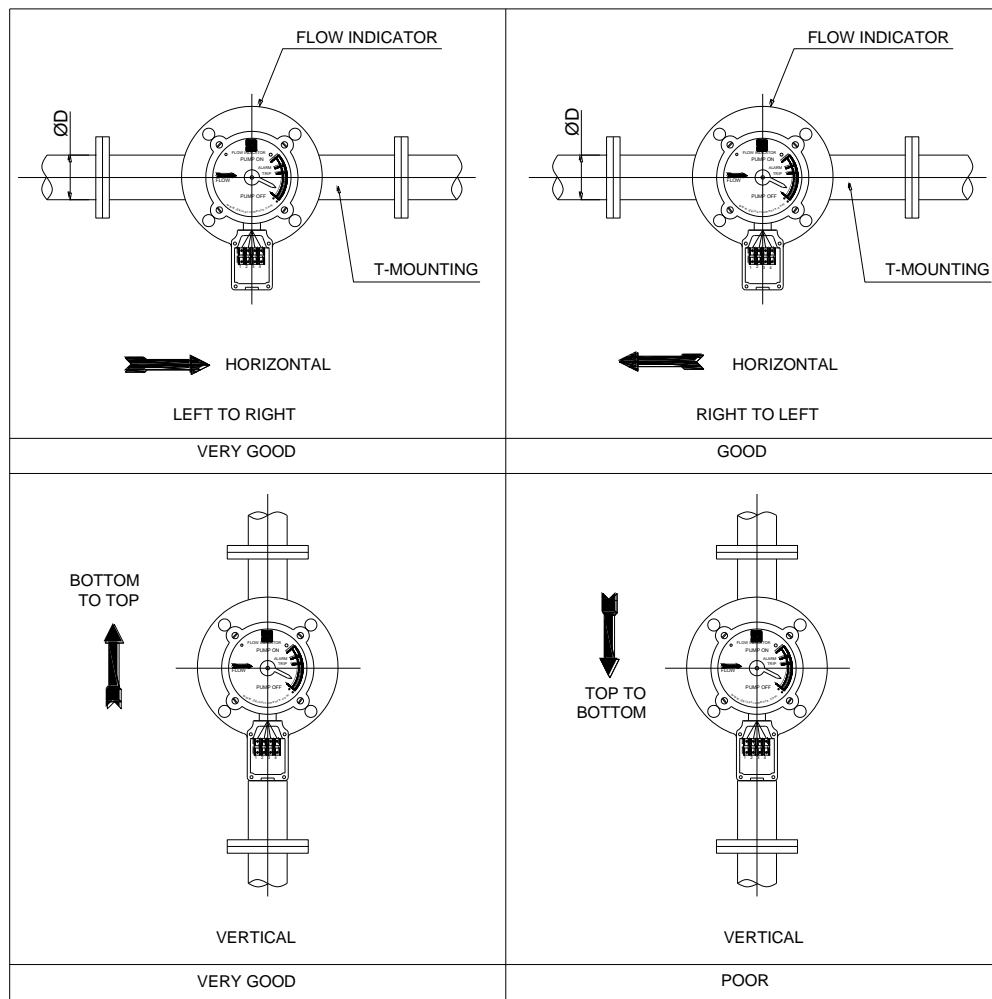
It is necessary to use a T – Mounting to install a Flow Indicators in a pipe line. Below are the dimensions of T – Mounting required for each configuration of dial size and main pipe size. If rate of full flow is less than minimum required, D. K will supply a special T – Mounting with reduced flow area near vane.



| DIMENSION | | | | | | | | | |
|--------------|------|----------|------------|---------------|------------|----------|-------------|-----------|----------|
| LINE SIZE(D) | | TEE PIPE | TOTAL | FLANGE | PROJECTION | FLANGE | BOLT CIRCLE | BOLT HOLE | 'B' HOLE |
| MM | INCH | DIA. (d) | LENGTH (L) | THICKNESS (T) | H | DIA. (A) | PCD | B | N |
| 80 | 3 | 75 | 285 | 15 | 120 | 184 | 146.0 | 17.5 | 4 |
| 100 | 4 | 75 | 300 | 18 | 145 | 216 | 177.8 | 17.5 | 4 |
| 125 | 5 | 100 | 300 | 18 | 145 | 254 | 209.5 | 17.5 | 4 |
| 150 | 6 | 100 | 300 | 22 | 165 | 279 | 235.0 | 17.5 | 8 |
| 200 | 8 | 100 | 300 | 22 | 185 | 336 | 292.1 | 17.5 | 8 |

B) Installation Best Practices

Below diagrams illustrates best practices for designing and installing flow indicator applications. In many cases sub optimal re-taps & settings can also work. Hence the below should be used as a guide, not a rule book.



MAINTENANCE:

The Flow Indicators are not sensitive to external influences. No servicing is needed during operation.

On routine inspections of the protection equipment, test the function of the Flow Indicators as described earlier and check the alarm and trip devices connected to them.

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