

INSTRUCTION MANUAL FOR FLOWMETERS

Series RV

1. DESCRIPTION

The flowmeter of the RV series is a cheap measuring instrument of the orifice meter type for high and very high flow rates. Equipped with gage glass, it may be used both with fluids (water) and gases (air), as well as with other types of fluid, on demand.

The flowmeter of the RV series is directly fastened to the orifice meter; hence, the reading shall be carried out close to the piping. The orifice meter can either be positioned horizontally or vertically on the piping.

It may be equipped with a minimum and/or maximum flow alarm.

The instrument is further furnished with by-pass cocks needed to maintain or replace the glass gauge without having to drain the piping or stop the plant.

2. MODEL IDENTIFICATION

The instrument is identified by a model code, which can be found on the rating plate of each unit along with all other relevant process data.

For a detailed knowledge of these codes, please consult the catalog bulletin.

3. OPERATING PRINCIPLE

The flowmeter exploits the principle of the orifice meter-based throttling gears, along with the variable-area one.

The ratio between flow rate and flow resistance is obtained partly in a theoretical way, through the Bernulli's theorem, and partly through experimental steps.

The flow rate is calculated through the flow resistance at the two ends of the orifice meter, made up of a gauged barrage, to which the flowmeter is connected. The latter, composed of a float inside a tapered tube, will take such a value in height as a function of the flow resistance at its two ends.

A gauged scale on the tube will indicate the flow rate value of the piping.

4. INSTALLATION

The flowmeter of the RV series, by exploiting the orifice metering principle, follows the installation rules of the throttling elements (see ISO 5167). More in detail, the piping shall:

- Be circular and straight-lined;
- Have the same diameter as the orifice;
- Not be encrusted or corroded for at least 10D before and 4D after the orifice;
- Respect straight-lined sections ahead of and after the flowmeter to allow for a properly accurate metering.

MOUNTING ON THE SYSTEM

This instrument shall be mounted both on vertical and horizontal piping; installation on vertical piping is preferential, since it solves all problems in connection with dirty fluids or fluids featuring small traces of gas; the preferred flow direction is up-over (rising); whereas as regards gases, it does not make any difference whether the flow direction is rising or descending.

Before performing the installation, check the line connections and the instrument connections for compatibility.

The flowmeter shall be installed perfectly upright.

The orifice meter shall be placed between pipes that are well lined up and with controlled distances to prevent mechanical stresses from affecting the instruments.

The flowmeter body displays an arrow that marks the direction of the flow; comply with such indication throughout the installation stage.

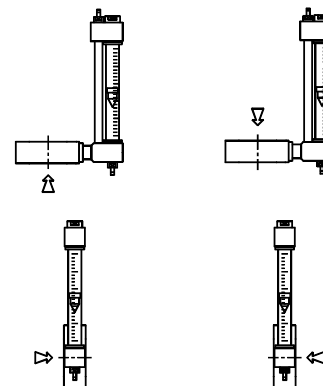
Remove the rod that locks out the float (which was placed as a protective element during shipment) as follows:

1. Unscrew the cap located above the gage glass;
2. Remove the rod;
3. Retighten the cap

ROTATION OF THE ORIFICE METER

The instrument, unless specified otherwise on the order, comes with the orifice meter prearranged for a rising vertical piping up to DN150, for versions exceeding this limit, the orifice meter body and the flowmeter are delivered separately. If you wish to rotate the orifice meter to one of the positions shown in the figure, go through the following steps:

1. Loosen the screws between the orifice meter and the flowmeter;
2. Rotate the orifice meter;
3. Retighten the screws;

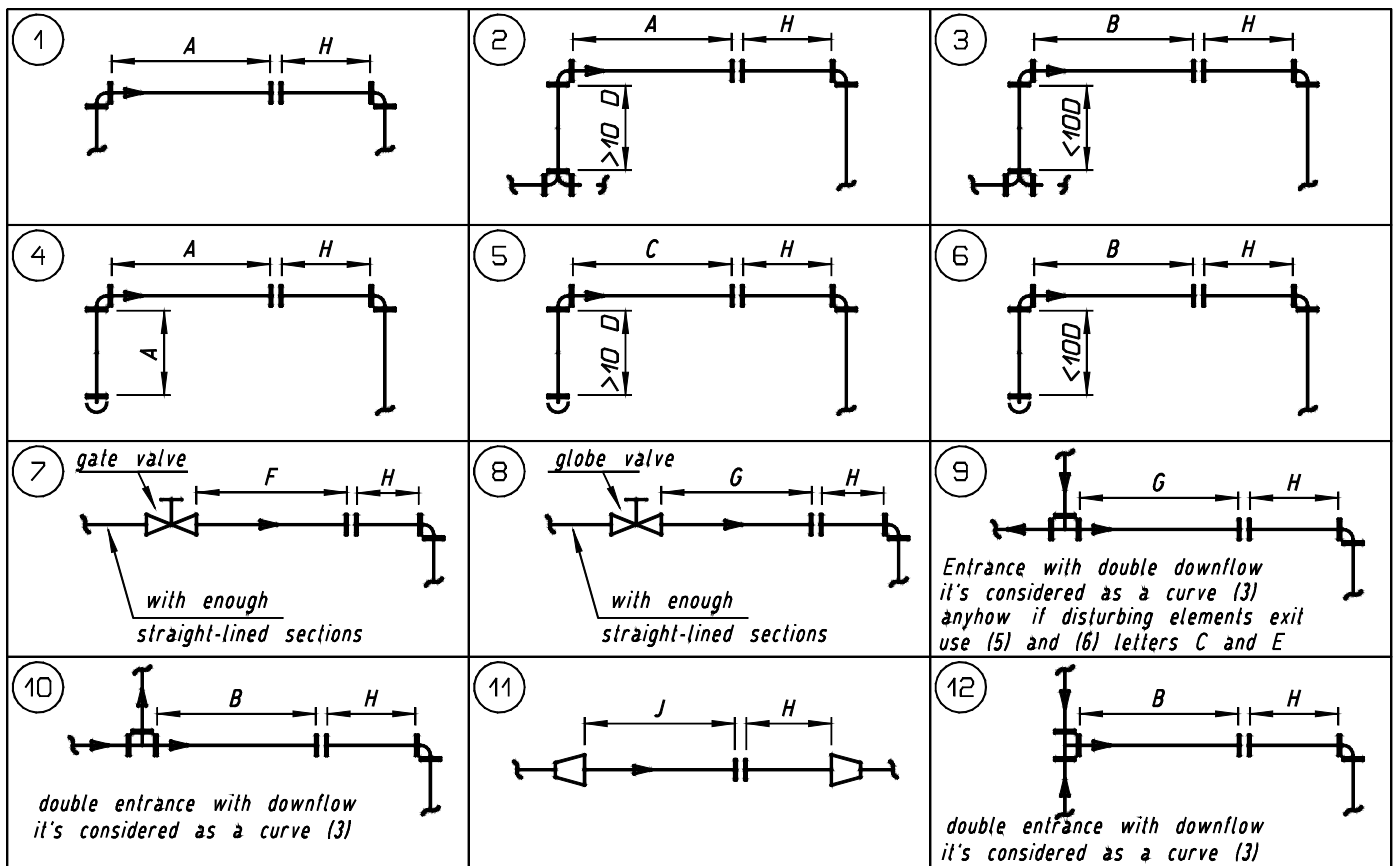


The table and the diagrams below (taken from the API RP 550 standard part.1) provides an indication about the lengths ahead (entrance) and downstream (exit) expressed in multiples of **D** as a function of the installation type and the **β** ($\beta=d/D$) diameters ratio.

It does not make any difference whether the piping is vertical or horizontal, with the fluid flow direction as marked by the arrow.

In cases when not enough straight-lined **D** diameters are available, standardized flow "RECTIFIERS" can be purchased.

Diameter ratio	Straight-lined sections in "D"							
	A	B	C	E	F	G	H	J
0.8	20	25	33	40	14	50	5	15
0.75	17	21	27	35	11	44	5	14
0.7	14	19	23	31	9	39	5	13
0.65	12	15	21	28	8	34	5	11
0.6	10	14	19	25	8	31	5	10
0.55	9	12	18	22	7	28	5	9
0.5	8	10	17	21	7	25	5	8
0.45	7	9	16	20	5	24	5	7
0.4	7	9	15	18	5	22	5	7
0.35	6	9	14	17	5	21	5	6
0.3	6	9	14	16	5	20	5	6
0.25	6	9	14	16	5	19	5	6



5. SETTING AT WORK

In a new system, we suggest you close the flowmeter by-pass valves then wash the piping abundantly. Fully reopen the bypass valves and, in the case of fluids (water), blow off all the air that is found inside the flowmeter through the cap located on top of the gage glass. As far as the plastic version is concerned, the protection of the gage glass shall never be removed if the unit is under pressure.

6. CALIBRATION

The instrument is factory-set and does not need any adjustment or setting to be performed on site. In cases when alarm contacts are adopted, they need to be set for the value required when the instrument will be installed.

7. MAINTENANCE

This type of instrument was designed to be used with clean fluids and which do not bring about corrosion, incrustations or deposits. The presence of these phenomena is likely to cause operating failures or wrong measurements.

REPLACING THE GAGE GLASS

Dismounting:

1. Close the by-pass valves (8) that are found on the instrument;
 2. Remove the screws (14) that close the packing glands (13 – 15);
 3. Remove the cap (9);
 4. Pull out the gage glass (2), with an upward movement, until you are past the lower float retainer, then tilt the glass downwards;
 5. Pull the float (1) out of the gage glass, taking care not to damage it;
- On replacing the gage glass, we suggest you also replace its seals (3).

Reassembling

1. Insert the upper seals and packing glass, then the lower seals and packing gland until halfway along the gage glass, starting from its bottom end;
2. Insert the gage glass into the flowmeter body acting in the same way as when you removed it;
3. Place the gaskets in the related housings and close the packing glands;
4. After cleaning it, insert the float into the gage glass from the cap hole;
5. Screw down the cap;
6. Slowly open the by-pass valves, first of all the lower one, then the upper one;

If the packing glands show leakages, suitably tighten the screws (14).

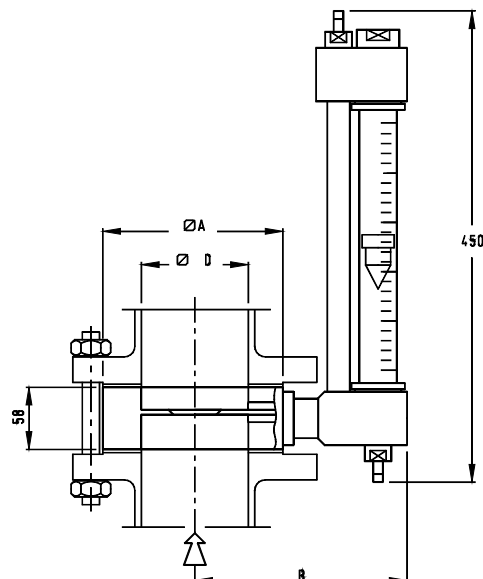
In cases when damaged parts are found, immediately provide for their replacement, contact our customer service to order the related spare parts.

At the end of the cleaning and replacement of parts possibly damaged, you can start reassembling the flowmeter, by going through all of the steps listed above, in reversed order.

If you wish to set the instrument at work, please follow the instructions provided in paragraph (5) SETTING AT WORK.

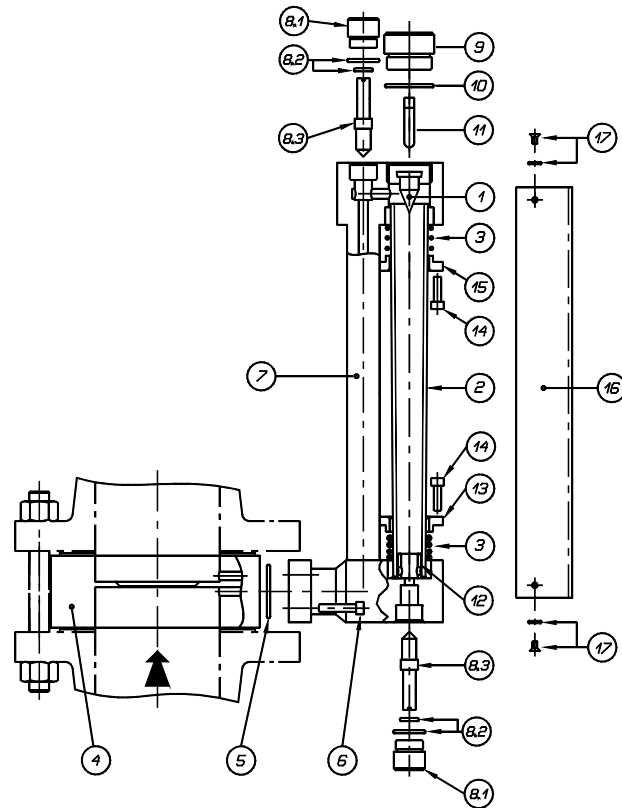
8. DIMENSIONAL DRAWINGS OF THE BODY

Mod	Ø A	Ø B
32	82	149
40	83	150
50	102	161
65	121	171
80	134	178
100	162	193
125	192	209
150	218	222
200	273	250
250	328	278
300	375	302
350	438	334



9. RECOMMENDED SPARE PARTS (*)

Pos.	Name
(*) 1	Float
(*) 2	Gage glass
(*) 3	Gage glass seals
4	Orifice meter body
5	Seal
6	Screw
7	Flowmeter body
8	by-pass cock KIT
8.1	Union
8.2	Seals
8.3	Stem
9	Cap
10	Cap seal
11	Upper float retainer
12	Lower float retainer
13	Lower packing gland
14	Screw
15	Upper packing gland
16	Protection
17	Screw



N.B. On ordering spare parts, always mention the serial number that identified the unit.

Such number is printed on the instrument rating plate that is bolted on its body and is composed of five digits preceded by the letter "F" (e.g.: F.45678).

The gage glass is furnished with its own identification code that can be found on it, the code is a number of four digits preceded by the letters "FP" (e.g.: FP4578).

10. FAULT FINDING

The flowmeters of the RV series are not generally subject to faults.

The flowmeter does not make the correct measurement:

- Ensure that no fluid leaks out of the joints, if leakages are found, screw them tight;
- Ensure that it is properly installed, please refer to paragraph (4) INSTALLATION;
- Ensure that the piping is free from incrustations, otherwise clean them away;
- Ensure that the piping is free from corrosion, if corroded parts are found, immediately replace them;
- Ensure that the gage glass and the float are free from incrustations or dirt, and clean them, if necessary;
- Ensure that the inner passages of the flowmeter are not clogged up; if this is the case, clean them all;
- Ensure that the gage glass and the float are not corroded, and replace whatever corroded part possibly found;
- Ensure (with fluids) that no air bubbles are found in the flowmeter; if they are found, please blow them off;
- Ensure (with gases) that no water deposits can be found in the flowmeter; if they are found, remove them

Fluid leaking out if the packing glands:

- Ensure that the fastening screws are properly tightened;
- Check the seals for integrity;
- Check the gage glass for breakages

All these checks need to be carried out as per the instructions provided in paragraph (7) MAINTENANCE.

In cases when the problem persists, or in the event of other problems showing up, please contact our customer service department.

11. DISPOSAL

Once their operating cycle is over, these instruments need to be scrapped; please comply with the regulations in force dealing with disposal.

During disposal, please pay special attention to the polymers, rubber and resins used to manufacture the instrument.

The metal parts can only be recycled when all seals, special protective coatings demanded by the customer and whatever other components made from plastics, are removed

12. GUARANTEE

All the flowmeters of the RV series are guaranteed to be free from manufacturing defects for 12 months from the date of shipment.

In the event of failures, for which return of the instrument is envisaged, within the above-mentioned term OFFICINE OROBICHE will provide for free replacement (transport fees not included) of all damaged parts, provided that the fault is not attributed to an improper use of the instrument.

OFFICINE OROBICHE are not liable for any improper use of its products in cases when they are used to serve purposes other than those set forth in the specifications approved of on the order.

In these cases, no claim shall be taken into consideration.

All damages and/or expenses, whether direct or indirect, deriving from an improper installation or use shall in no circumstances be attributable or chargeable to OFFICINE OROBICHE.

The instrument cannot be used for more than 10 years from delivery.

Once this period is over, there are two alternative options:

- 1) Replace it with a new one.
- 2) Ask for reconditioning or overhauling to be performed by OFFICINE OROBICHE or, at all events, by a skilled technician who undertakes all responsibilities for any further use beyond such term.

INSTRUMENT RETURN PROCEDURE

The instrument shall be returned for repair along with the following data:

- 1) Buyer's name.
- 2) Description of material.
- 3) Failure highlighted.
- 4) Process data.
- 5) Fluids that have been used with the instrument.

The unit shall be returned perfectly clean and free from dust or deposits, otherwise OFFICINE OROBICHE reserve the right not to carry out the requested maintenance and to send the unit back to the sender.

FINAL NOTES

Each instrument is delivered fully assembled and with all the needed accessories.

In special cases only, some parts are delivered separately.

Accessories such as alarm sensors and amplifiers are supplied along with the instrument, but not assembled.

Therefore, we suggest you carefully examine the supply, in order to report whatever discrepancies possibly found immediately on reception of the goods.

N.B. IN CASES WHEN THE INSTRUMENTS ARE MEANT TO BE USED IN AREAS FEATURING POTENTIALLY EXPLOSIVE ATMOSPHERES, THE USER SHALL COMPLY WITH THE ADDITIONAL SAFETY INSTRUCTIONS ATTACHED TO THE STANDARD ONES.