



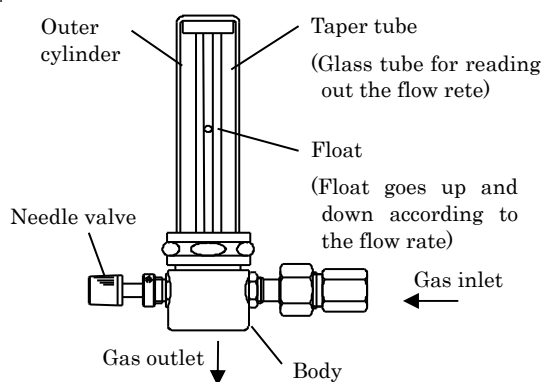
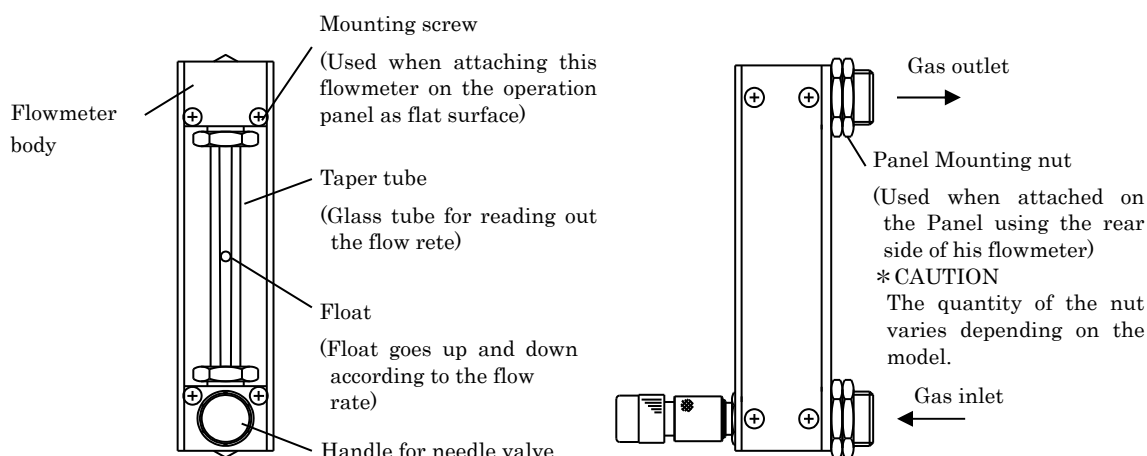
INSTRUCTION MANUAL FOR FLOWMETER

Thank you for introducing 'KOFLOC FLOWMETER'.

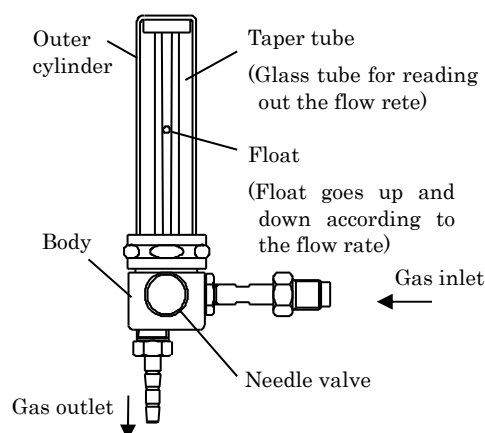
Please refer to this manual fully and make best use of these flowmeters.

1. Name and function of each component

【Flowmeter with precision needle valve】 (Exmple : RK1200)



【Burner gas flowmeter RK4450】



【 Precision flowmeter for pressure regulator RK4400 】

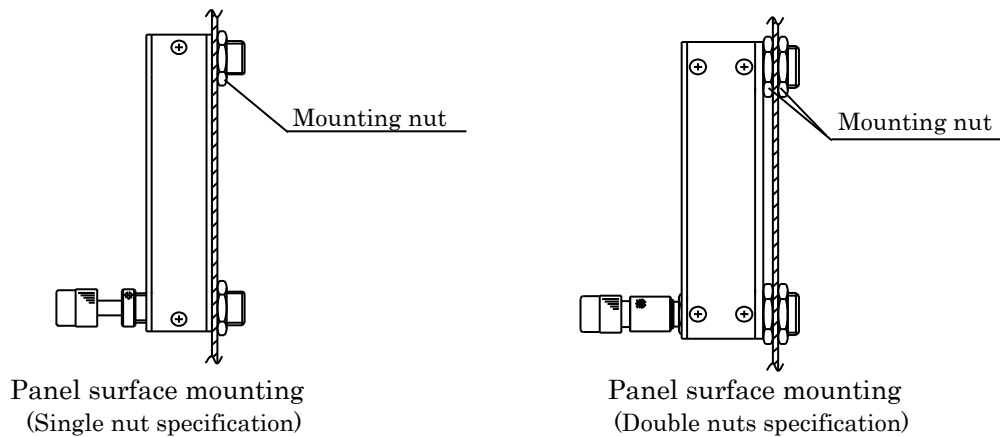
2. Attaching, piping

2-1

Use the accompanying nuts as shown in the figure when installing the flow meter on a panel.

Refer to the dimensions shown in the catalogue for the panel processing method.

If you find any unclear point concerning the mounting, contact our factory.

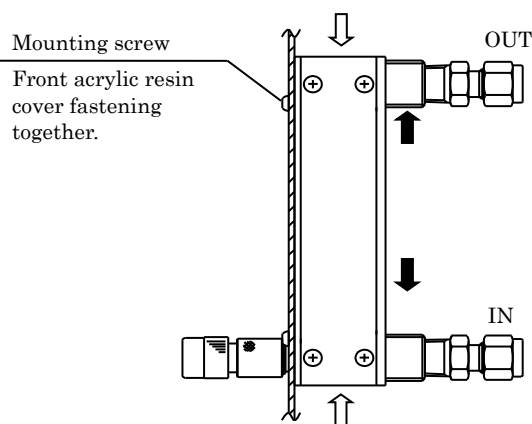


2-2

If the flowmeter is to be embedded in a panel, use the screw hole at the front of the body shown in the figure.

In case of model RK1400,1200,1000 and 1600R, please use the screw hole which fixes acrylic resin cover on the front surface.

In case of model RK1450 and 1250, the screw hole comes out by revealing the label stuck on the front surface.



Embedding in panel

* CAUTION

When tightening the fitting, fix the white arrow or black arrow on the same side with a vise, spanner, monkey wrench or the like and perform attachment of the fitting work.

2-3

The piping should be done using the proper pipe joint. Please take care not to strain the flowmeter by unnatural piping.

* CAUTION

- Please set the flowmeter upright.
- Nuts and screws should be fixed with minimum necessary power.
- When installing a flowmeter such as the Rc 1/4 specification such as the on the flowmeter of O ring seal type or attaching / detaching the pipe fitting, in order to prevent loosening of the flowmeter fitting, (Black arrow part in the panel embedded figure) with a spanner fixed and work please.

After installation please be sure to perform leak test with soapy water etc.

[Object products] RK1100,RK1150,RK120X,RK140X,RK120XM

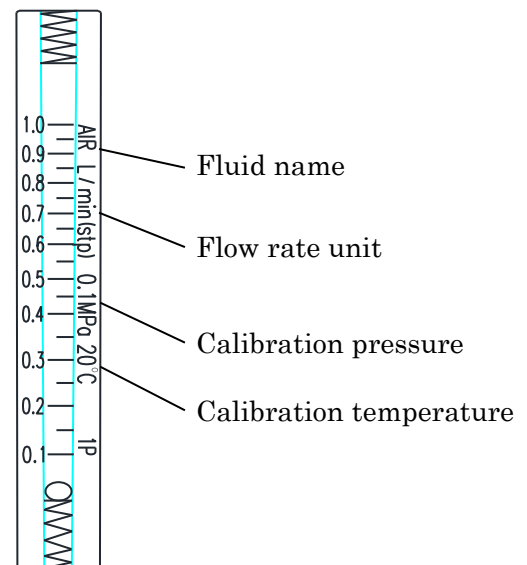
3.How to use

3-1 Scales and letters cut on the taper tube

Fluid name, flow rate unit, temperature and pressure to be used are cut on the taper tube. When the fluid other than that cut is used, no correct flow rate will be shown.

Also the temperature shown is that the flow rate is calibrated. In the temperature other than this, the deviation from the correct value will come out. When no pressure is shown on it, the outlet should be open to air or having almost no outlet flow resistance (atmospheric pressure scale).

When some pressure values are shown on it, this pressure should be adapted on the inlet. (Pressure loaded scale, explained later).



3-2 Unit of the flow rate

Generally the notation that is used to the flow meter are 20°C 1atm of standard state (std, stp etc.) and 0°C 1atm of normal state (normal, nor, ntp etc).

We define it as follows. In principle, the flow rate notation in the catalog specification of our flow meters is the standard state flow rate.

Name	Flow rate unit temperature	Flow rate unit pressure	Notation	Example
Standard State	20°C	1atm (Atmospheric pressure)	(stp)	L/min (stp), mL/min (stp)
Normal State	0°C	1atm (Atmospheric pressure)	(ntp)	L/min (ntp), mL/min (ntp)

3-3 Flow rate unit, calibration temperature and pressure notation of the taper tube

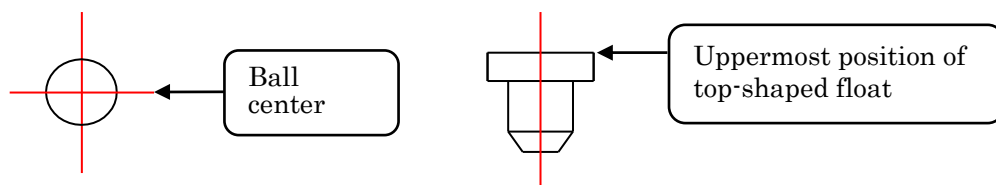
	Production conditions	Indication on taper tube
Example for gas	Fluid : AIR Flow rate unit : Standard state mL/min Calibration pressure : 0MPa(G) (Atmospheric pressure) Calibration temperature : 20°C	AIR mL/min(stp) 0MPa 20°C
	Fluid : N2 Flow rate unit : Normal state L/min Calibration pressure : 0.2MPa(G) (Loaded pressure) Calibration temperature : 20°C	N2 L/min(ntp) 0.2MPa 20°C
Example for liquid	Fluid : H2O Flow rate unit : mL/min Calibration temperature : 20°C	H2O mL/min at20°C

3-4 How to read flow rate

Small to medium flow region: Read the rate at the center of the ball float.

Large region: Read the rate at the uppermost position of the top-shaped float.

The tapered tube acts as a lens. Read the rate at the same level (or at a right angle).



3-5 Flow rate adjustment

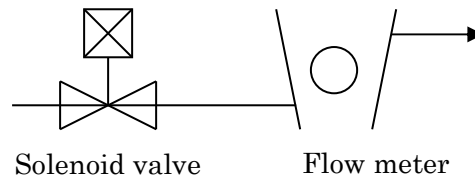
In case of model RK1200 and RK1250, please adjust the flow rate by turning the handle of the needle valve attached. The flow increases by turning it anti-clockwise (open) and decreases by turning it clockwise. The pressure-flow rate character of the valve will be referred on the catalogue.

When no request is indicated on the purchase order, the flow rate is calibrated on the 0.1MPa pressure difference.

*CAUTION

- This flowmeter has a very small gap between taper tube inside and float ball for measuring very small flow rate. Therefore, this will not act good or become unstable when dust or water comes in while measuring gas flow rate. Please use clean and dry gas so that dust will not enter.
- Sudden change of pressure or flow rate makes the float jump up and may cause the breakage of glass tube. This sometimes happens when solenoid valve and flowmeter are connected serially like shown in the figure even the inlet pressure is not so high. In this case, please take care not to add the pressure directly on the flowmeter by inserting some proper regulator between them.

Incorrect use



- Please do not turn the handle of the needle valve with your full power. This will cause the damage of the orifice inside and will not work well. Needle valve is not a shut-off valve and should be treated more softly.
- There is the possibility for the taper glass tube to be broken by the rapid temperature changes or by the thermal shock comes from its repeat, and such usage is prohibited.



CAUTION

Our products measure the fluid indicated on the tapered tube, and in principle withstand pressure and temperature resistance are determined as follows according to model.

【Specifications of our main products】

(In case of gas)

Proof pressure : 0.5MPa(G) above 10L/min

0.7MPa(G) below 5L/min

1.0MPa(G) below 100mL/min

Operating environment temperature : 60°C

Specifications of other products

[Proof pressure]

- RK2000 : 0.7MPa
- RK1100,RK1150,RK1700,RK1930,
RK1970,RK1860,RK120X,
RK140X,RK120XM,RK130,RK230,
RK260 : 0.5MPa(G)
- RK4450,RK4400 : 0.3MPa(G)

[Operating environment temperature]

- RK130,RK230,RK260 : 50°C
- RK1150,RK1860,RK4450,RK4400 : 40°C
- RK1935,RK1975,RK2005 : 10~35°C
- RK1812,RK1814 : 5~55°C

*** For detailed specifications for each model, please check the catalog specifications.**

When measuring the flow rate, in order to prevent the taper pipe and other parts from being damaged, please use the operating pressure at 70% or less of the withstand pressure.

The use of the flowmeter with fluids other than those described on the flowmeter such as toxic gases and corrosive fluids or at temperatures or pressures above the maximum allowable levels may cause personal injury. Never use the flowmeter in such a manner.

4.The effect of the temperature and pressure used

4-1 Temperature

Gas changes its density according to the temperature. Generally, the scale is cut at 20°C in the float type flowmeter, and we also make them calibrated in the constant temperature room of 20°C.

Optionally, we make them calibrated at the other temperature. The temperature cut on the taper tube is that the flowmeter should be used. When the flowmeter is used other than this temperature, the error of such a degree as shown in the example below will come out. But this is only the theoretical formula and shows only rough estimation.

Example) When the flowmeter calibrated at 0°C is used at 20°C,

$$Q(20^{\circ}\text{C}) = Q(0^{\circ}\text{C}) \sqrt{\frac{273+0}{273+20}} \doteq 0.97 Q(0^{\circ}\text{C})$$

Therefore, the real flow rate will be smaller than that shown on the scale of that flowmeter.

4-2 Pressure

Float type flowmeter is used generally as the outlet open to air or no load (no resistance caused by pressure loss) as shown in the figure A. However, in the real case, it sometimes used under the stage of having outlet pressure loaded resistance like shown in the figure B. In this case, the density of the gas changes and the indicated flow rate deviates from the real value.

The degree of the deviation will be shown on the formula below. This formula may be used for calibration, but this is the theoretical one and sometimes has the value slightly different from real one. In this case, the value can be calibrated by using the inlet pressure when this inlet pressure is known beforehand. As for example, this is shown in Figure C. In this case, inlet pressure is kept constant by the pressure regulator, and the flowmeter is calibrated by changing the flow rate using the flow regulating valve set between the flowmeter and load resistor. This scale is called 'Load pressure scale'.

When the pressure is cut on the taper tube, the scale is cut as load pressure scale.

Example)

When the flowmeter of atmospheric pressure outlet (0MPa · G) is used under the load pressure of 0.3MPa

$$Q(0.3\text{MPa}) = Q(0\text{MPa}) \sqrt{\frac{0.1+0.3}{0.1+0}} \doteq 2 Q(0\text{MPa})$$

Therefore, the real flow rate is larger than that shown on the scale of that flowmeter.

Figure A

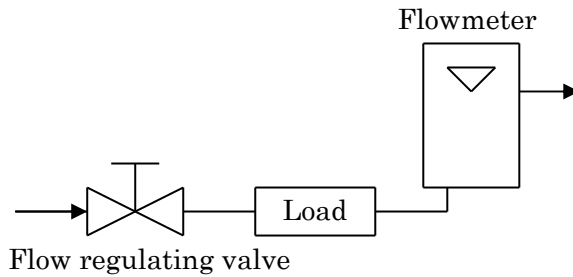


Figure B

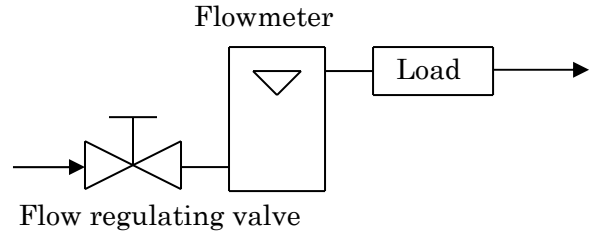
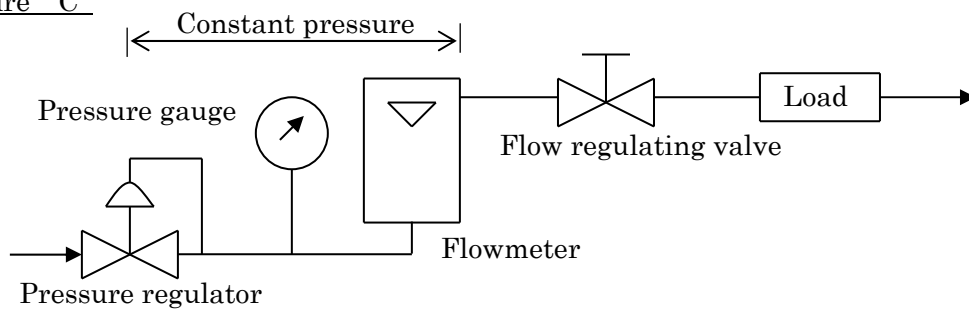


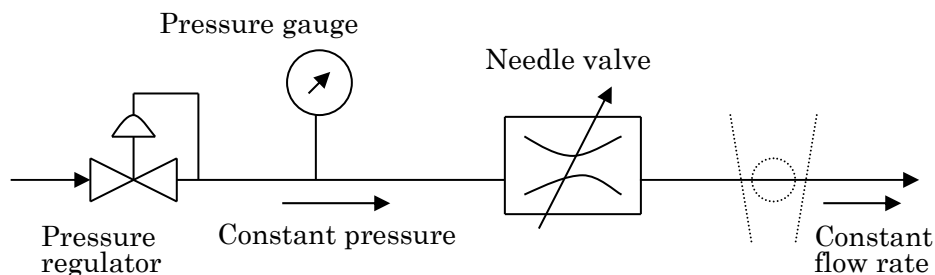
Figure C



5. Flowmeter with needle valve RK1200, RK1250, RK1600R, RK1650

In the needle valve, flow rate is changed by changing the flow resistance through regulating the gap made between the orifice and the rod type needle inserted into that orifice. Therefore, the flow rate changes when the inlet pressure of that needle valve is changed. In this case, the pressure is made constant by the pressure regulator set before this flowmeter, and constant flow rate will be obtained. The needle valve has various types of various size, and the proper one should be chosen as the flow rate and inlet pressure.

The larger flow rate will be obtained as the pressure difference between inlet and outlet is larger. But too much pressure difference makes the flow unstable. We select the proper needle when these conditions are indicated beforehand. When there is no such indication, we adjust these conditions as the pressure difference is 0.1MPa. Please give us your order considering these conditions.



6. Trouble shooting

* Float will not move:

Dust or particles are considered to come inside the gap. We will overhaul and wash out them.

* Float moving is unstable:

- 1) Please check this comes from real flow rate deviation or not.
- 2) When needle valve is the cause of this, we will mend it.

* Float will not go up:

- 1) Check whether gas is supplied or not.
- 2) When needle valve is the cause of this, we will mend it.
- 3) Check dusts or particles getting inside the gap or not.

* Flow is insufficient:

- 1) Check gas leaks or not.
- 2) Check the lack of inlet pressure.
- 3) Needle damage will be mended by us.

* Gas cannot be stopped (RK1200,1250,1600R,1650):

- 1) Needle damage will be mended by us.
- 2) The small leakage which is not shown on the flowmeter scale can be considered. In this case, let us know.

【Product Warranty Policy】

Thank you for your continued support of KOFLOC products.

Unless specified otherwise in quotations, contracts or specifications when you place orders for KOFLOC products, the following warranty policy will apply.

Warranty Policy:

① Warranty period

The warranty period is one (1) year from shipment, provided that the product is used within the KOFLOC specification.

② Scope of warranty

If the KOFLOC product fails during the warranty period due to a cause attributable to KOFLOC, KOFLOC shall, at its option and expense, provide a replacement product or repair the failed product at the KOFLOC factory.

This warranty, however, shall not cover damages due to a cause not attributable to KOFLOC; opportunity loss, lost profit, secondary disaster, accident compensation suffered by the customer and damage to other equipment and any other damages due to a failure of the KOFLOC product.

③ Non-warranty

The warranty shall not apply to the following failures and damages even if they occur during the warranty period:

- ① Failure due to misuse or improper repair or modification. (Failures resulting from use under conditions different from the manufacturing specifications are included.)
- ② Damage and failure due to dropping of the product after purchase.
- ③ Failure due to fire, earthquake, flood, lightning or other natural disaster; or riot, war or the like.
- ④ Failure due to intrusion of foreign matter from piping.
- ⑤ Failure caused by a specific problem due to combination with other incorporated equipment.
- ⑥ Other failures and damages which are considered not attributable to KOFLOC.

Please be aware that the warranty shall not cover opportunity loss suffered by you or your customer or damage to other equipment or any other damages due to a failure of the KOFLOC product.