KOFLOC Kyoto

Thermal Mass Flow Meter /Mass Flow Controller

MODEL 3100/3200

Instruction Manual

KOFLOC Corp.

1. Overview

Thank you very much for selecting the KOFLOC Corp. Mass Flow Meter MODEL3100 series, Mass Flow Controller MODEL3200 series.

Read this manual completely and carefully before handling, installation and operation, in order to avoid injury or serious damage to this equipment and/ or surrounding equipment.

Sincerely,

KOFLOC Corp.

【1-1 Principle of Operation】

The flow detect sensor is wound by heating wires on the outside of the metallic capillary in two places. When gas flows to this capillary, the heat of the heating wire in the upstream is removed by the gas and its temperature drops. The heat in the upstream is conducted to the downstream to cause a difference in the resistance values of these heating wires.

The difference in temperature in these two places is proportional to the flow rate of the gas. This temperature difference is used to calculate a flow rate, which is converted to an electric signal.

When a bypass capillary to bypass the flow to the sensor pipe is incorporated, the gas flow to the sensor is restricted to enable the equipment to be used for a wide range of flow rates.

Mass flow controller is additionally attached with valve. The flow signal set by the flow setting appliance is compared with the flow signal of the sensor. This comparison allows controlling of the current on the solenoid valve. The valve is normally closing-type. When the power switch is OFF, the flow path is held closing.

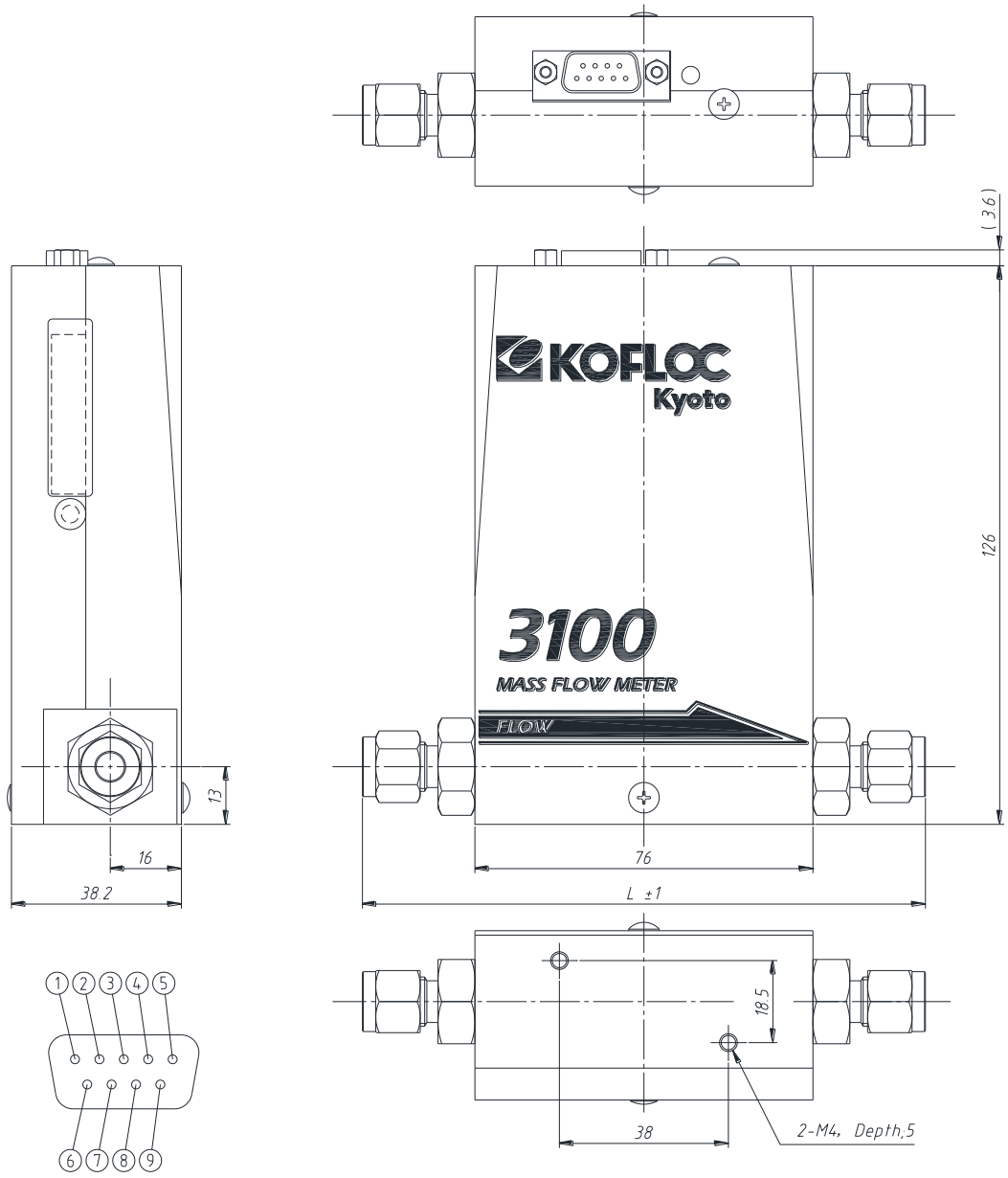
【1-2 Standard Specifications】

Flow Range （at N_2 Calibration conditions）	1SCCM-20SLM
Valve type*	Normally close/solenoid/ diaphragm seat valve
Control range*	2～100%F.S.
Response	0-100% response 1sec.（within±2%, typical）
Accuracy	±1.0%F.S.(15-35℃)
Linearity	±0.5%F.S.
Repeatability	±0.2%F.S.
Operating differential pressure*	F.S.≦5SLM 50kPa-300kPa Low differential pressure specification depends on types of gas and flow rates to be used.
	5＜F.S.≦20SLM 100kPa-300kpa
Proof pressure	980kPa
Working temperature range	0 to 50℃
Materials of parts in contact w/gases	Body: SUS316L Diaphragm: SUS316 Valve seat: PTFE Seals: FKM (Optional: CR or NBR)
fitting	Standard：1/4F900 Optional：1/8SWL, 1/4VCR, Rc1/4,etc.
Flow rate input signals	0～5VDC
Flow rate output signals*	0～5VDC
Required power supply	+15VDC 100mA,-15VDC 200mA(Model3100:100mA)
Connector	Dsub 9P male connector KFC standard (SEMI standard Reference pin arrangement)

***is specifications only for MODEL3200.**

【1-3 Outline】

MODEL3100

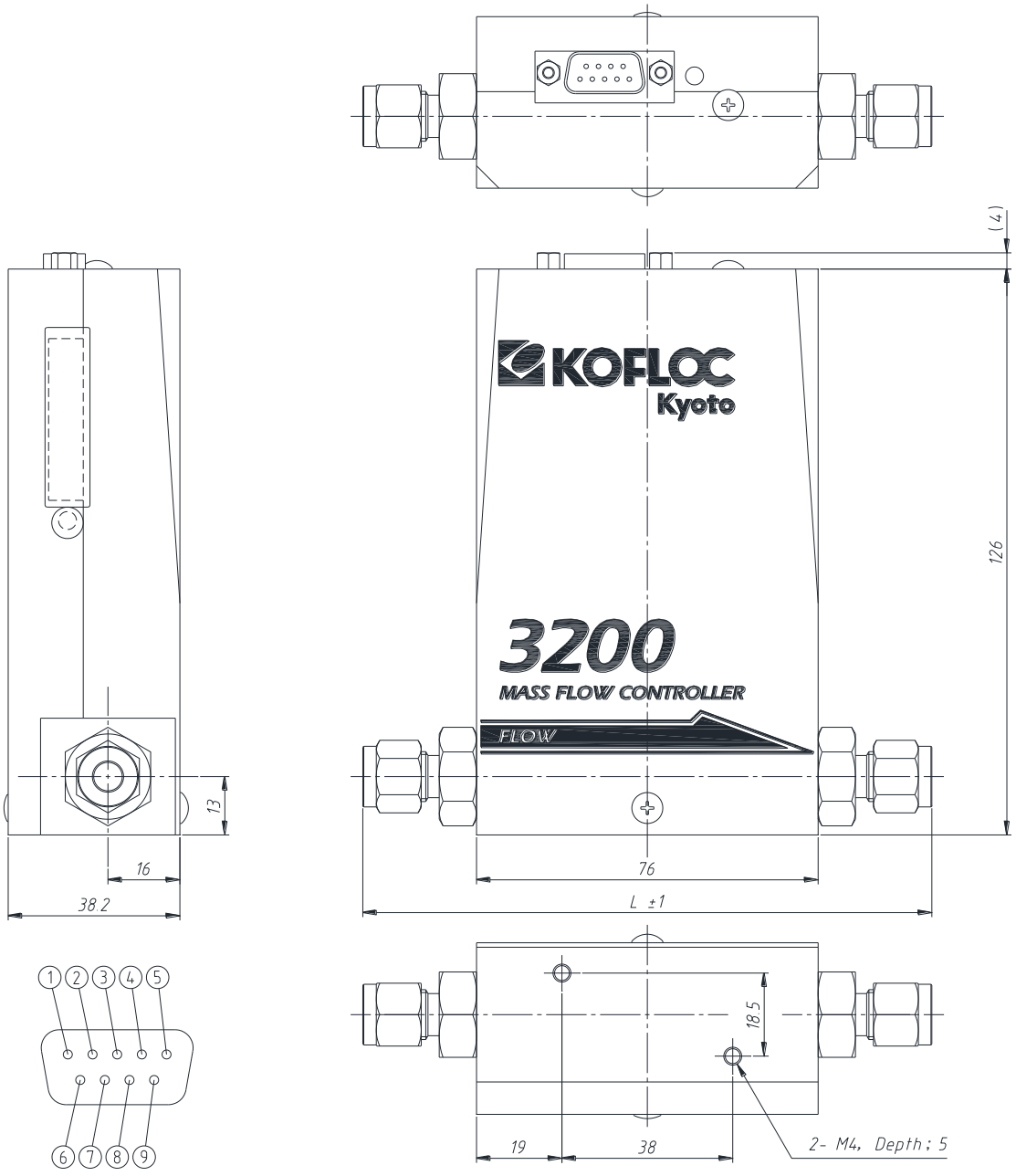


D-sub connector (male)

Fitting	Demension L(mm)
1/8"F900	122.6
1/4"F900	126.6
1/4"UJR	123
Rc 1/4	102

Pin No.	Signal Name
1	NC
2	Output Signal
3	Power +15VDC
4	Power Common
5	Power -15VDC
6	NC
7	Signal Common
8	NC
9	NC

MODEL3200



D-sub connector (male)

Fitting	Dimension L(mm)
1/8"F900	122.6
1/4"F900	126.6
1/4"UJR	123
Rc 1/4	102

Pin No.	Signal Name
1	Valve Open/Close
2	Output Signal
3	Power +15VDC
4	Power Common
5	Power -15VDC
6	SetPoint Hi
7	Signal Common
8	SetPoint Lo
9	NC

2. Configuration

【2-1 Configuration of the Thermal Mass Flow Meter/Controller】

Required power supply to operate the mass flow Meter (Model 3100) and
Mass Flow Controller(Model 3200).

DC constant voltage power supply: ±15 VDC±2%, +100 mA/-200 mA(Model 3100：-100mA)

1) Peripheral equipment of Model3100,Model3200

① DC power supply: PSK-1FB, AC85-132V(50/60Hz) 0.2A

② Flow rate indicator: DPM-3 +5 VDC±5% 120 mA

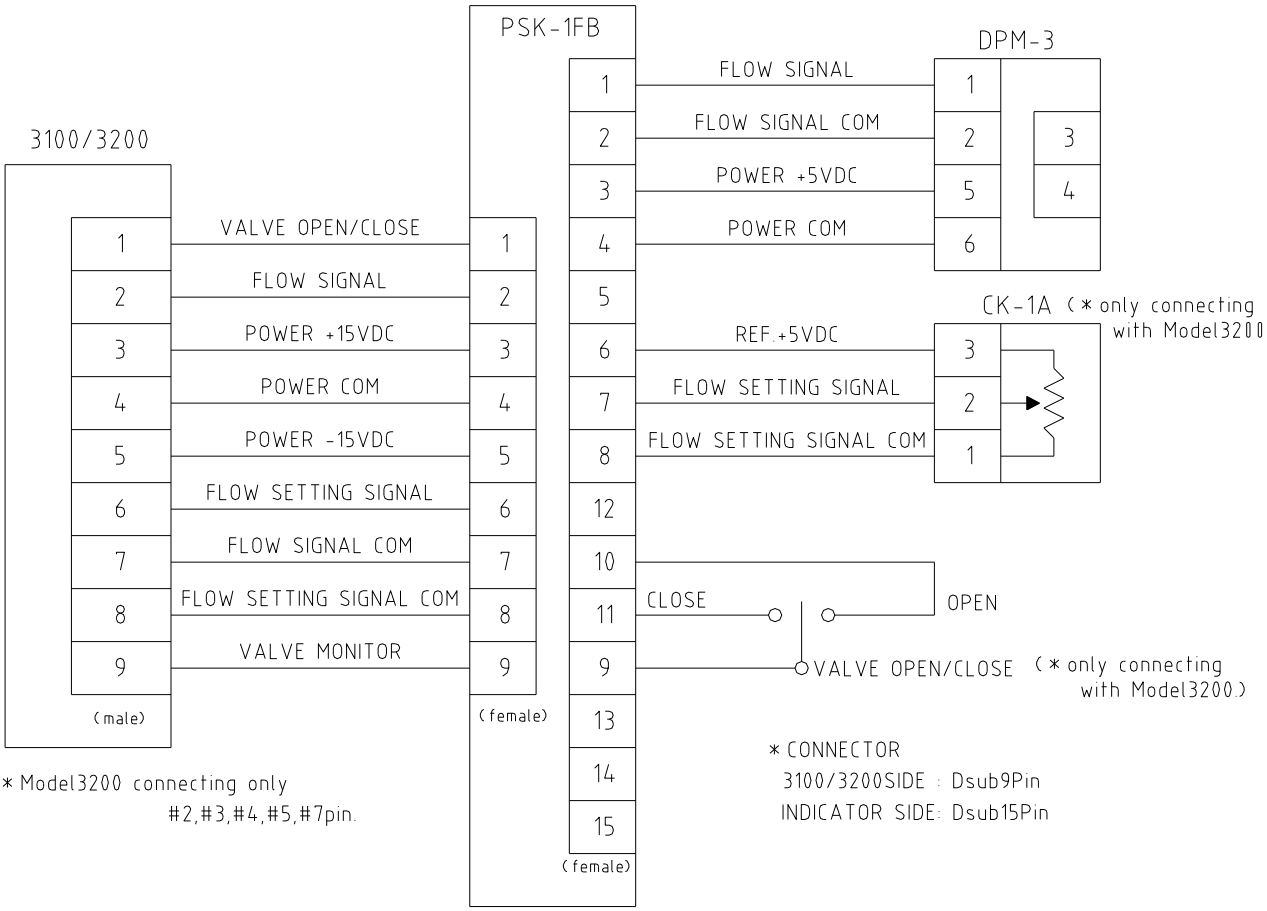
③ Flow Setting Device: CK-1A (Resistance 10kΩ)

④ One set of special connecting cables (If a cable longer than 1 m is required, please contact KOFLOC.)

＊With peripheral equipment, there are type CR-300/500/700A that, in addition, ①－③ become one unit.

2) Electric wiring diagram of Model3100/Model3200

Example: A combination of Model3100/Model3200 and ①－③ mentioned above.



＊Model3100 connecting only #2,#3,#4,#5,#7pin.

【2-2 Precautions】

1) Use clean and dry gas with the mass flow Controller / meter. The dryness condition must be a dew point below –20℃ at atmospheric pressure.
2) A 100-micron filter is installed at the gas inlet. However, if the meter is to be used in a line where dust and mist might be produced, install a filter of about 10-micron in front of the meter to remove them.
3) Install a stop valve for gas stop completely.

A control valve of mass flow controller is “normally close” , but cannot completely shut off it. Please avoid using it as a substitute of a stop valve.

3. Installation

【3-1 Installation Site】

1) The mass flow meter is designed for indoor use.
   Never install the meter in a place where it may be wetted. The meter may fail.
   Install the meter in a place that is well ventilated and has little change in humidity.
2) Install the meter in a place free of vibration and impact.
3) Do not install the meter in a place that is under direct sunlight or very hot or humid.
4) Install the meter in a place free of dust.
5) Install the meter in a place free of corrosive gases.
6) Install the meter in a place free of strong electric or magnetic field.
7) Be sure to conduct leak tests of the piping after installation.
8) Always use the special connecting cables.

Note that the use of the meter out of the specifications is a cause of failure.

【3-2 Contamination of the Piping System】

Be sure to use well-cleaned pipes and joints for piping. A standard filter has been installed. However, if a large amount of dust adheres, the gas flow will be disturbed. In particular, if air from a compressor or blower fan is used, it is likely that a large amount of oil mist and water may enter the meter. In such a case, always install an oil filter or water removing filter in front of the meter.

【3-3 Installation Method】

1) For installation, utilize the mounting threaded holes (M4) on the bottom of the meter block.
2) The standard piping connection is 1/4”Swagelok. Use suitable joints and be sure that they will not leak.

【3-4 Wiring】

For a detailed description of wiring, refer to 3. Configuration.

Be sure to use special connecting cables.

Be sure to insert the connectors firmly to the designated places.

4. Operation

【4-1 Warming Up】

After the power was turned on, warm up the meter for 15 minutes or longer with the supply of gas stopped.

If the meter is not warmed up, the measuring accuracy will deteriorate.

【4-2 Zero/Span Calibration】

If the user has the reference flow meter, the span may be calibrated. If no reference meter is available, conduct the zero calibration only.

1) Zero calibration

   When the indication has become stable with gas shut off after the meter was warmed up, using a small screwdriver, adjust the “ZERO” variable resistor installed on the top of the case to zero. Be sure that the indicated value or the output becomes zero.

2) Span calibration

   If the reference meter is not available, never tinker with the “SPAN” variable resistor.

   In case of Model 3100, make the gas flow in full scale flow rate, and adjust “SPAN” volume as output flow signal voltage becomes DC5V.

   In case of Model3200, set flow-setting command to 10.00 (or adjust flow set voltage to 5V), and adjust “SPAN” volume as the reference flow meter shows full scale.

<u>If the user does not have the reference flow meter, never tinker with the “SPAN” variable resistor. Please avoid calibration with user as much as possible, and please send it back to Kofloc.</u>

【4-3 Run】

Model 3100/3200 has been set ready for measurement

■Flow rate setting

1) When using power supply PSK-FB, DPM-3, CK-1A doing it at a dial scale of them.

2) When using read out unit CR-300/CR500 etc, please refer to the instruction manual of them.

【4-4 Caution for using】

1) Working Pressure

Working differential pressure of MODEL3200 is decided with a flow range. (The details please refer to 1-2 “Standard Specifications”.

Please use it in this range by all means.

2) Calibration of actual gases

Mass flow meter/controller are calibrated with N_2 gas basically and shipping it. For O_2, H_2, He, CO_2, Ar gas calibration with actual gas are possible.

Other gases are calibrated by use of a conversion factor.

If gases mot listed in the specifications are to be used, always test the corrosion resistance of the areas in contact with gas.

【4-5 Gases Not Listed in Specifications (Conversion Factor)】

If the thermal mass flow meter that has been calibrated with one type of gas is used for other gas, the indicated value does not match the actual flow rate.

For example, if Helium is let flow to the meter that has been calibrated with Nitrogen, the actual flow rate is 1.40 times the indicated flow rate.

For detailed data of the conversion factors, please contact KOFLOC.

5. Troubleshooting

【5-1 No Output】

1	No power	Check the output of the DC power supply.
2	Connector connection failure	Check to see if the connectors are fitted correctly.
3	Cable breakage	Check the continuity with a tester.
4	No gas flow	Check the gas source pressure and gas flow.
5	Clogged piping	Check the solenoid valve, etc. after the outlet.
6	Clogged sensor pipe	Please contact KOFLOC.
7	Sensor amp. failure	Please contact KOFLOC.
8	Indication meter failure	Replace the meter.

【5-2 Unstable Flow Rate Indication】

1	Source pressure valve faulty	Check the supply adjust valve.
2	Constant flow valve faulty	Please contact KOFLOC.
3	Sensor amp. failure	Please contact KOFLOC.
4	Power supply faulty	Please contact KOFLOC.

【5-3 Significantly Different Flow Rate Indication】

2	Gas leak	Piping ・・・・・・・・・・・・・・・・ Stop the leak. Sensor, valve ・・・・・・・・・・ Contact KOFLOC.

【5-4 Significantly Different Zero】

1	Incorrect power supply voltage	Replace the power supply.
2	Sensor faulty	Please contact KOFLOC.
3	valve faulty	Please contact KOFLOC.

6. Maintenance

Clean the inlet and outlet joints. They should be removed in a clean place where dust will not enter the block. During maintenance, never disassemble the sensor.

If it is disassembled, the initial performance cannot be guaranteed.

7. Product warranty

1. The contents of warranty

① Warranty period

The warrant period shall be one year after the shipment.

② Warranty range

If a malfunction of the product you purchased occurs because of our responsible reasons, offer of substitute or it will be charge-free repaired in our factory. But if a malfunction of the machine occurs due to the following reasons, even within the warrant period, it becomes the outside for a warranty.

(a) Malfunctions due to erroneous applications, repairs or remodeling.
(Including the case in which the manufacturing specification differs from the application conditions.)
(b) Malfunctions due to the falling after the purchase.
(c) Malfunctions caused by natural disasters such as fire, earthquake, water disaster and lightning stoke, or riots or wars.
(d) Malfunctions caused by mixing-in of foreign matters out of the piping.
(e) Malfunctions caused by the peculiar problems due to combinations with other built in equipment.

In addition, a warranty here means the warranty of the product simple substance of our company. So the damage induced by failure of the products of our company shall be eliminated from the object of warranty.

KOFLOC Corp.

URL : http://www.kofloc.co.jp