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Mass Flow Meters and Controllers

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FLOW COMPO®	

A

Best Selection

Mass Flow Meters and Controllers



Mass Flow Controller/Meter with Indicator
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Digital Mass Flow Controller
MODEL D3660 SERIES
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Standard Mass Flow Controller
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Low-cost Metal Sealed
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Auto Pressure Controllers
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High-grade Metal Seal
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Small Karman Vortex Flow Meter for Liquids
FM0101/0102/0103/0105 SERIES
Small Karman Vortex Flow Meter for Liquids
MODEL 31 (Teflon/PFA) SERIES
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Multifunctional Readout Unit with Integrator & Alarm
MODEL CR-500
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Compact Readout Unit
MODEL CR-300
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Compact Handy Mass Flow Control/Measurement Unit
FLOW COMPO®
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WHAT IS A MASS FLOW INSTRUMENT (MASS FLOW CONTROLLER/MASS FLOW METER)? (1)

KOFLOC is a general manufacturer of precision flow controllers and produces mechanical float type flow meters and valves, as well as electronic flow meters (mass flow controllers and mass flow meters). Our mass flow measuring/control technology based on mass flow meters and mass flow controllers has been used widely for the manufacture of semiconductors, liquid crystals, optical fibers, and other electronic devices; gas supply for fuel cells; combustion gas control for burners and the like; and for test, production, and inspection equipment in the food industry, biotechnology, and many other industries. In comparison with conventional mechanical products, mass flow measuring instruments offer more sophisticated flow measurement because they are not susceptible to temperature and pressure and they can pick up electric signals from the flow.

KOFLOC manufactures a variety of products related to electronic flow meters (mass flow controllers and mass flow meters), and quickly releases new products. Our products are highly valued by our customers.

1. Volume flow and mass flow

Gas flow meters can be roughly divided into volume flow meters and mass flow meters. Volume flow meters include area flow meters, positive displacement flow meters, and differential pressure flow meters, while mass flow meters include coriolis flow meters, vortex flow meters, and thermal flow meters. The float type flow meters produced by KOFLOC are classified as area flow meters in the category of volume flow meters, while the mass flow instruments produced by KOFLOC are classified as thermal flow meters in the category of mass flow meters. In terms of classification, the terms, "thermal mass flow controllers and thermal mass flow meters," are used according to the basic principle. In this catalog, however, the commonly used mass flow instruments mean mass flow controllers and mass flow meters in general.

The difference between volume flow meters and mass flow meters is explained below using some simple examples. Most of the volume flow meters are used when each section of a flow meter is exposed to the atmosphere as shown in Figure 1, namely, when no pressure is applied to the inside of the flow meter. When pressure is applied, the reading of the volume flow meter calibrated in the atmosphere will not be correct, and a calculation for correcting the reading is necessary. Soap film flow meters and dry/wet gas meters are especially susceptible to even a small resistance, and they are used in the atmosphere in principle. The same applies to float type flow meters; their reading cannot be correct when the gas density changes because of a substantial change in pressure or gas temperature. Therefore, the pressure and temperature conditions must be determined in advance, or calculation for correcting respective factors is necessary for the reading.

Meanwhile, as the name suggests, mass flow meters detect flow by means of weight, permitting the flow to be defined in the same state even if the density changes due to compression of fluid. When gas is detected by means of mass, the reading of the flow mentioned above will be the same even in a pressurized state as shown in Figure 2. Therefore, flow meters can be placed at any location on the flow chart, permitting a system to be configured without significant flow reading errors.

Fig. 1

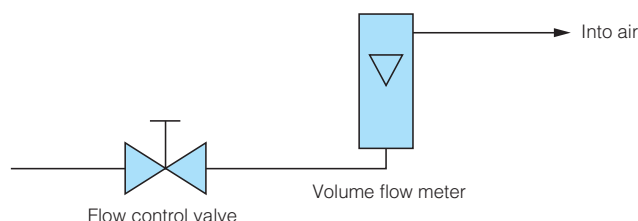
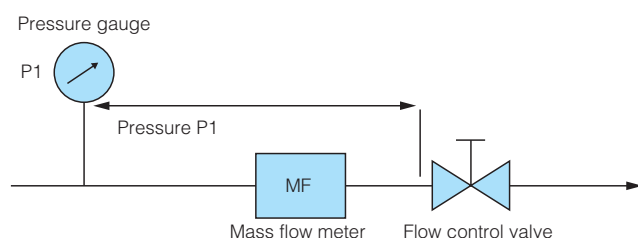


Fig. 2

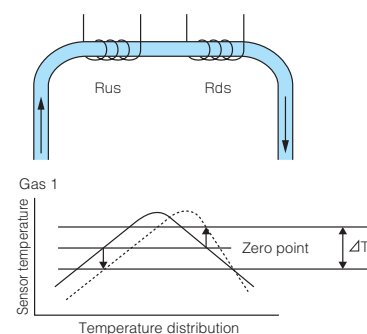


2. Principle of mass flow instruments

The flow sensor used in mass flow is called a thermal flow sensor in general. The principle of detection is as follows.

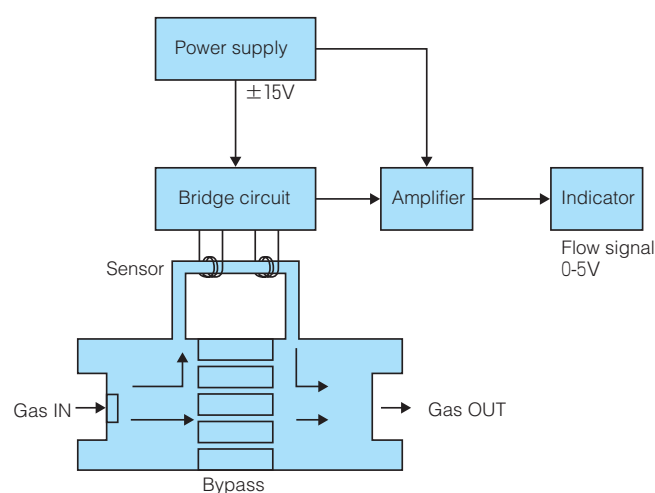
A resistive element with a large temperature coefficient of resistance is wound on the upstream side (Rus) and the downstream side (Rds), respectively, around the capillary tube that is a sensor as shown in Figure 3. When electric current flows through these sections, the two resistive elements generate heat. When no fluid flows in the capillary tube at that time, the temperature of the upstream side is the same as that of the downstream side, matching each other. (The solid line in Figure 3: Zero flow = Position of the zero point used for mass flow instruments.) When the fluid begins to flow in this state, the temperature distribution changes as shown by the broken line in Figure 3. The heat of the upstream side is drawn at that time, and the heat is transferred by the flow to the downstream side conversely. In other words, a temperature difference (ΔT) arises between the upstream and downstream sides.

Fig. 3 Structure of sensor section



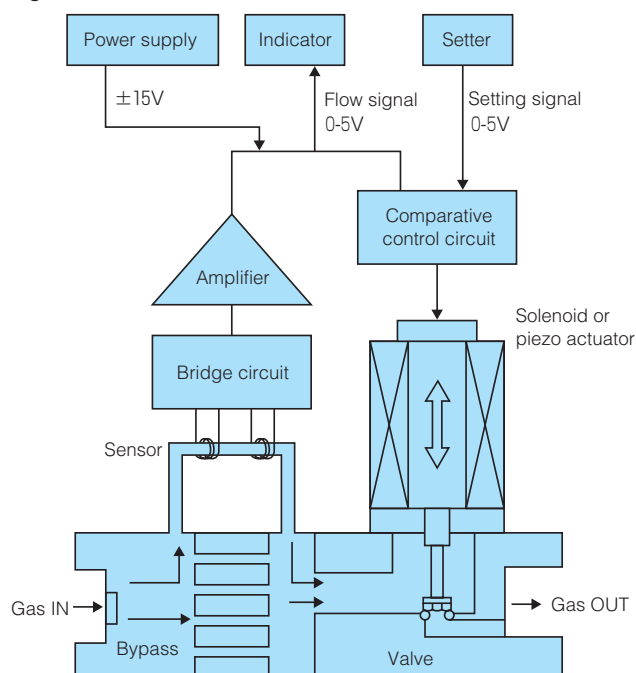
As the temperature difference (ΔT) has a functional relation to the mass flow of fluid, mass flow instruments pick up electric signals that represent the change in respective resistance values and amplify and correct the signal to permit the mass flow to be measured under a certain condition. This is the function of the mass flow meter shown in Figure 4.

Fig. 4 Structural chart of mass flow meter



In the mass flow controller shown in Figure 5, the opening of the flow control valve is controlled by a high-velocity, high-resolution piezo or solenoid actuator based on the comparison between the external flow setting signal and the flow signal output from the sensor. This system permits stable mass flow control, which will hardly be affected by changes of various conditions such as temperature and pressure.

Fig. 5 Structural chart of mass flow controller



3. Unit of flow

A mass flow meter measures the mass flow irrespective of pressure and temperature. When representing mass by the flow, it is necessary to use units such as g/min and kg/min which are different from the familiar units used for general fluid measurement. Therefore, it is common to use volume flow under predetermined standard conditions of pressure and temperature. At present, $\text{Pa} \cdot \text{m}^3/\text{s}$ is used in conformance with the SI units, but SCCM and SLM which have long been used for mass flow instruments are still used as principal units.

With respect to the definition of the standard unit, KOFLOC adopted the definition based on the SEMI standard in October 1998. SCCM is an abbreviation of Standard Cubic Centimeter per Minute,

indicating cc/min at 0°C at 1 atmospheric pressure, while SLM is an abbreviation of Standard Liter per Minute, indicating L/min under the same conditions. Other units of flow, if they are recognized as units of measurement at present, can be used for calibration and manufacture of our products. In some industries other than the semiconductor industry, SCCM and SLM are defined as the units at 20°C at 1 atmospheric pressure and NCCM and NLM as the units at 0°C at 1 atmospheric pressure. Concerning the flow indication of our mass flow instruments, the standard temperature and pressure in units of SCCM (0°C , 1 atm) and NLM (0°C , 1 atm) are shown on our products and in test reports.

4. Calibration with actual gas and conversion factor method

KOFLOC mass flow instruments are calibrated with N_2 gas in principle before shipment. The accuracy of thermal sensors cannot be guaranteed unless they are calibrated with actual gas. The actual gases used for calibration at our company are N_2 , O_2 , H_2 , He, CO_2 , and Ar. Concerning other gases, certain conversion factors (CF) are used for correction after calibration with N_2 gas.

For example, when Ar is flowed through a mass flow instrument that was calibrated with N_2 gas, a 1.4 times larger quantity of Ar than the reading of the mass flow instrument will flow, because the CF of Ar is 1.4. In other words, the flow of Ar = 1.4 x Reading of N_2 mass flow instrument. The CF is calculated for various gases based on

calculation and the accumulation of data obtained through measurement with actual gases. However, the CF of one gas may not be exactly the same depending on the condition of the actual gas (temperature and pressure), the type of sensor of the mass flow instrument, and combination of the bypass (laminar flow element). The public standard CF should be used just as a standard value.

If you desire calibration with actual gas without using a CF, please provide us with the actual gas, and we will use it for calibration (this will incur a separate fee for gas calibration). However, we cannot accept some dangerous gases in view of the safety of products and facilities. Please contact us in advance for details.

WHAT IS A MASS FLOW INSTRUMENT (MASS FLOW CONTROLLER/MASS FLOW METER)? (2)

5. Harness layout - KFC standard

To reduce the wiring length, KOFLOC has been standardizing the harness layout. The Dsub 9-pin per KFC standard has been adopted for small capacity mass flow instruments of 20 SLM or less (excluding special and compact models). (See Figure 6.) This type will likely be adopted uniformly as the standard electric harness layout for mass flow instruments in the industry in the near future. To avoid confusion among users, "KFC standard" is written in the specification column of the catalog of products conforming to the above standard. Harness layouts are introduced on the page of each mass flow instrument with connectors made according to other standards. For details, refer to the operation manual of each product.

Fig. 6 KFC standard

Body connector ... Dsub 9-pin male connector
Compatible connector ... Dsub 9-pin female connector

Pin No.	Signal name	Pin No.	Signal name
1	Valve open/close signal	6	Flow setting signal: Hi
2	Flow output signal	7	Flow output signal COM
3	Power +15 V	8	Flow setting signal: Lo
4	Power COM	9	Valve voltage monitor
5	Power -15 V		

Note: Pin Nos. 1, 6, 8, and 9 are NC for mass flow meters.

6. Indication of specifications

The indication of mass flow instrument specifications in this catalog basically conforms to the SEMI standard. The definitions of representative specifications are explained below.

(1) Accuracy

The accuracy is indicated in the form of "Full scale $\pm\bigcirc\%$." This is the % value with respect to the full-scale value of the error when the calibration standard gas (N_2 , for example) is used for our standard flow meters. Therefore, when the accuracy is $\pm 1\%$ in the range of Full-scale 50 SCCM, the flow rate will be guaranteed with the "uncertainty" of $50 \times (1/100) = \pm 0.5$ SCCM with respect to our standard flow rate.

(2) Repeatability

The form of "Full scale $\pm\bigcirc\%$ " is the same as the accuracy. This value indicates the deviation of the value obtained by measuring the flow, which is set under the same environmental conditions, with our standard flow meters. This definition is different from the

reproducibility that shows the deviation of the value after the environmental condition is changed.

(3) Response

The response is indicated by the time taken for the output of mass flow instruments to stabilize at 98% of the full scale after starting control from zero flow. Such indication is adopted usually because it is difficult to analyze 100% in the case of an asymptotic line.

Note: The value used to indicate the flow range is the full-scale (100%) value only when N_2 (or air) is made to flow. Therefore, when the type of gas and pressure conditions are different, even if the flow is the same, we may not be able to manufacture products according to the desired specifications; please contact us in advance.

7. Product grade

(1) High-grade products

Mass flow instruments that are classified as high-grade products have a structure suitable for high-vacuum applications for semiconductor manufacturing equipment. They are manufactured in a clean room conforming to the ultra clean specifications required for semiconductor manufacturing. Particle counters and He leak detectors are used to check all products before shipment.

Depending on the difference in the sealing material, products are classified into mass flow controllers 5100 and 5400, as well as mass flow meters 5410, equipped with a metal seal and mass flow controllers 3200, as well as mass flow meters 3100, equipped with a rubber seal. Models that permit installation of an SR option for measurement and control of very small flow at full-scale 1 SCCM, as well as models that permit multi-point quick response defined finely throughout the entire flow range at the rate of not only 0–98% but also 0–50% and 0–10%, are high-function products.

(2) Standard low-cost products

Mass flow instruments classified as standard and low-cost products have a structure suitable for exposure to the atmosphere or medium pressure (high pressure partly). Equipped with a rubber seal, products are classified into mass flow controllers 3660 SERIES, mass flow meters 3760 SERIES, and low-cost mass flow meters 3810 SERIES. The HFC/HFM series is used for large flows exceeding the full-scale 100 SLM.

(3) Special usage

Mass flow instruments need to be made specially according to the usage when the temperature exceeds 100°C, the pressure exceeds 1 MPa, or liquid is to be measured and controlled. In order to meet diverse needs of customers, KOFLOC offers originally developed products, as well as products supplied from cooperative companies, for use in various fields. Do not hesitate to contact us for special products not covered by this catalog and products that include other piping or piping equipment.

8. Installation and piping

Refer to the dimensional drawing for installation on a panel or the like. Contact our factory if you are unsure about any aspect of installation.

9. Repair

In the event that our product you are using fails due to aging or some other trouble, we will receive it for repair, because mass flow instruments are precision equipment composed of very delicate parts. To assist quick repairs, our products are packed with an operation

manual and check sheet. When a trouble or failure occurs, check the operation manual first, and then send the check sheet by fax to your nearest KOFLOC or phone us.

Mass Flow Controller/Meter with Indicator

MODEL D8300 SERIES

The digital technology has drastically improved the accuracy and response as compared with conventional models.

As the model has been digitized, the operation system has been simplified for easy handling.

Features

- The built-in microprocessor ensures highly-functional operation.
- Electric interchangeability with conventional models (analog)
- The general-purpose communication function is provided as standard. (RS232C/RS485-compatible)
- Device No. can be set.
- High-precision operation with high-resolution (14 bits or more) AD and DA
- A variety of applications
- A variety of functions by command operation (Pattern setting, time axis pattern setting, etc.)
- Auto-zero function
- Application of various types of gas using CF values

Standard Specifications

Flow rate (at N ₂ calibration condition)		10SCCM-20SLM
Sensor		Thermal mass flow sensor
Valve actuator		Normally closed solenoid valve actuator
Valve type		Poppet valve
Control system	Control range	1%~100% F.S.
	Response	Setting ±2%F.S within 1 sec. (typical)
	Accuracy	Within ±1.0% F.S.
	Repeatability	Within ±0.2% F.S.
Pressure	Proof pressure	1MPa
	Operating differential pressure	50kPa-300kPa
	Low differential pressure (Option)	Less than 50 kPa (Contact us for the possible pressure.)
Temperature	Operating temp.	0°C-50°C
	Accuracy guaranteed temp.	15°C-35°C
Humidity	Allowable operating humidity	10%-90% (No condensation)
Alarm event	Output No.	Alarm output: 1 Event output: 1 (Open collector output Max 35 V: 50 mA)
	Resolution	Max. resolution: 1 mV (1 digit)
Communication	Communication type	RS232C (Multi)/RS485: Communication speed 9600 bps
Power supply	Required power	DC24V (DC18V-36V)
Materials of parts in contact with gasses		SUS316L, SUS316, PTPE, fluororubber, chloroprene rubber (Optional)
Joint		9/16-18UNF, 1/4Rc, 1/4SWL®, 1/4VCR®
Mounting position		No specification
Weight		Approx. 1,000 g

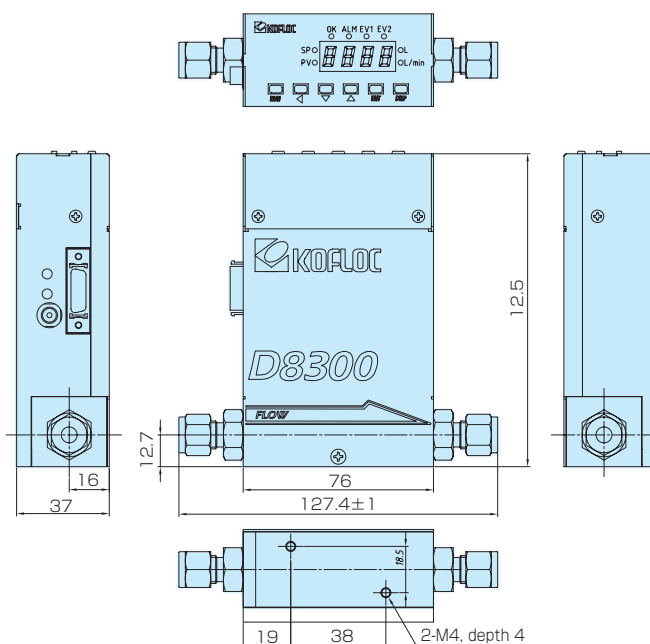
* Select the input/output signal when placing an order for (1) 0-5V and (2) 4-20 mA.

* Select the communication type RS232C or RS485 when placing an order.

* The described contents are subject to change.



Dimensions



Ordering

MODEL	D8300	Joint	Fluid	Flow rate	Signal	Communication	Pressure
MODEL	D8300	9/16-18UNF Rc 1/4 1/4SWL 1/4VCR		Input Output		Type of communication	
				1 0-5V 2 4-20mA 3 0-5V 4 4-20mA	0-5V 4-20mA 4-20mA 0-5V	1 RS232C 2 RS485	

* Please contact us for the outline drawing.

* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.



Digital Mass Flow Controller

MODEL D3660 SERIES

A

Based on the analog Model 3660, the sensor has been made into a high-accuracy digital type. The accuracy and response have been improved exponentially as compared with conventional models, and this model has diverse functions.

Features

- The built-in microprocessor ensures highly-functional operation.
- Electric interchangeability with conventional models (analog)
- The general-purpose communication function is provided as standard. (RS232C/RS485-compatible)
- Device No. can be set.
- High-precision operation with high-resolution (14 bits or more) AD and DA
- Excellent stability
- A variety of functions by command operation (Pattern setting, time axis pattern setting, etc.)
- Auto-zero function

Standard Specifications

Flow rate (at N ₂ calibration condition)		10SCCM-20SLM
Sensor		Thermal mass flow sensor
Valve actuator		Normally closed solenoid valve actuator
Valve type		Poppet valve
Control system	Control range	1%–100% F.S.
	Response	Within 1 sec. for setting $\pm 2\%$ F.S. (typical)
	Accuracy	Within $\pm 1.0\%$ F.S.
	Repeatability	Within $\pm 0.2\%$ F.S.
Pressure	Proof pressure	1MPa
	Operating differential pressure	50kPa-300kPa
	Low differential pressure (Option)	Less than 50 kPa (Contact us for the details of possible pressure.)
Temperature	Operating temp.	0°C-50°C
	Accuracy guaranteed temp.	15°C-35°C
Humidity	Allowable operating humidity	10%–90% (No condensation)
Alarm event	Output No.	Alarm output: 1; event output: 1 (Open collector output Max. 35 V; 50 mA)
	Resolution	Max. resolution: 1 mV (1 digit)
Communication	Communication type	RS232C (Multi)/RS485: Communication speed 9600 bps
Power supply	Required power	DC+15V ($\pm 5\%$) 100mA, DC-15V ($\pm 5\%$) 200mA
Materials of parts in contact with gases		SUS316L, SUS316, PTFE, fluoro-rubber, or chloroprene rubber (option)
Joint		9/16-18UNF, 1/4Rc, 1/4SWL®, 1/4VCR®
Mounting position		No specification
Weight		Approx. 800 g

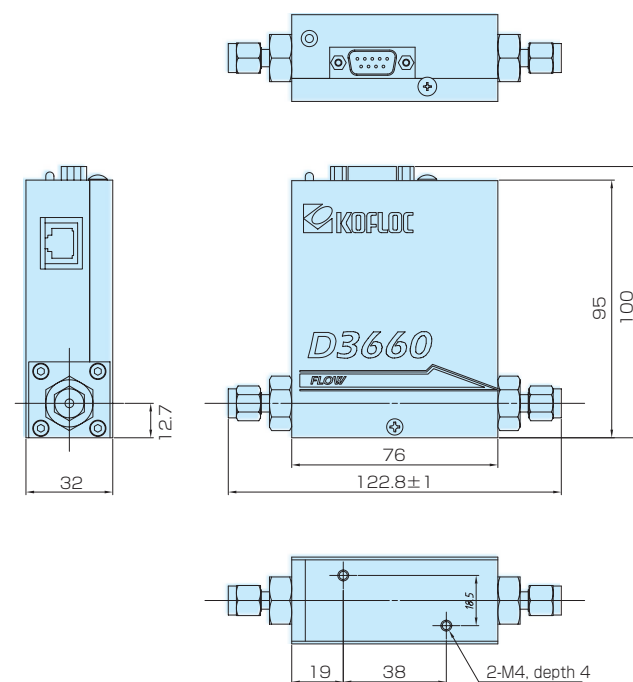
* Select the input/output signal when placing an order for (1) 0-5V and (2) 4-20 mA.

* Select the communication type RS232C or RS485 when placing an order.

* The described contents are subject to change.



Dimensions



Ordering

MODEL	D3660	Joint	Fluid	Flow rate	Signal	Communication	Pressure
MODEL	D3660	9/16-18UNF Rc 1/4 1/4SWL 1/4VCR		Input Output		Type of communication	
				1 0-5V 2 4-20mA 3 0-5V 4 4-20mA	0-5V 4-20mA 4-20mA 0-5V	1 RS232C 2 RS485	

* Please contact us for the outline drawing.

* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

Mass Flow Controller/Mass Flow Meter with Indicator

MODEL 8300 SERIES

The Model 8300 Mass Flow Controller/Meter powered by a 24 V power supply is the successor to the Model 8100. The display offers features such as View Point change and pattern setting functions not available on existing models. A model with a separate display and setter is also available as a sister model.

Features

- The high-lift actuator allows the compact body to handle large flows.
- The display panel and setter permit operation with a 24 VDC power supply.
- The RS232C/RS485 communication function and integration function are provided as standard.
- The 14-bit converter permits display and operation in 4-1/2 digits.
- The heat generation section of the sensor isolated from gas permits flow control of inflammable gases.
- No specific mounting position
- In addition to SV setting, five kinds of pattern setting are possible.
- Auto-zero function

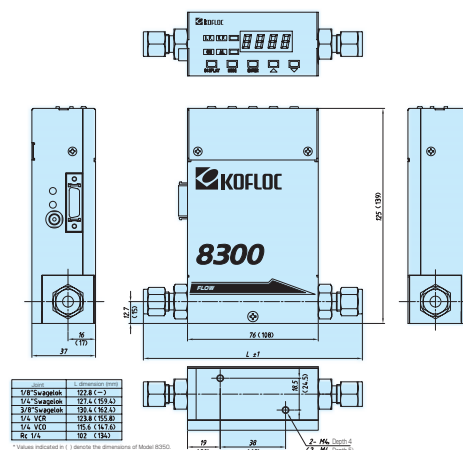
Standard Specifications

Flow rate (at N ₂ calibration condition)		10SCCM-20SLM (8300) 30SLM-100SLM (8350)
Sensor		Thermal mass flow sensor
Valve actuator		Normally closed solenoid valve actuator
Valve type		Poppet valve
Control system	Control range	2%–100% F.S.
	Response	2 sec. or less for 0 to 98% (for 100% F.S. at setting and setting at setting)
	Accuracy	Within ±1.5% F.S. (±2% F.S. for 8350)
	Repeatability	Within ±1.0% F.S. (±1.5% F.S. for 8350)
Pressure	Proof pressure	980kPa
	Operating differential pressure	49kPa-294kPa
	Low differential pressure (Option)	2-149 kPa (not applicable to 8350)
Temperature	Operating temp.	0°C-50°C
	Accuracy guaranteed temp.	15°C-35°C
Humidity	Allowable operating humidity	10%–90% (No condensation)
Flow rate setting	Mode	(1) Input with standard key (2) Input from an external device (3) Input with pattern key (5 patterns)
	Input range	(1) 0V-5V (2) 4mA-20mA (Arbitrary specification)
Flow rate output	Output range	(1) 0V-5V (2) 4mA-20mA (Arbitrary specification)
Flow indication	Method	7-segment LED in 4 digits; Integral display: 0000–9999
	Accuracy	±0.1%
Alarm	Output No.	Alarm output: 2 (Open collector output Max. 35 V; 50 mA)
	Resolution	Max. resolution: 1 mV (1 digit)
Communication	Communication type	RS232C (Multi)/RS485; Communication speed 9600 bps
Power supply	Rating	24 VDC current consumption: 300 mA max.
	Allowable supply voltage range	DC22.8V-25.2V
Materials of parts in contact with gases		SUS316L, Viton®, PTFE, SUS316, or neoprene rubber (option)
Joint		9/16-18UNF, 1/4Rc, 1/4SWL®, 1/4VCR®
Mounting position		No specification
Weight		Integral type: Approx. 1,000 g Separate type: Main unit Approx. 900 g Display Approx. 100 g

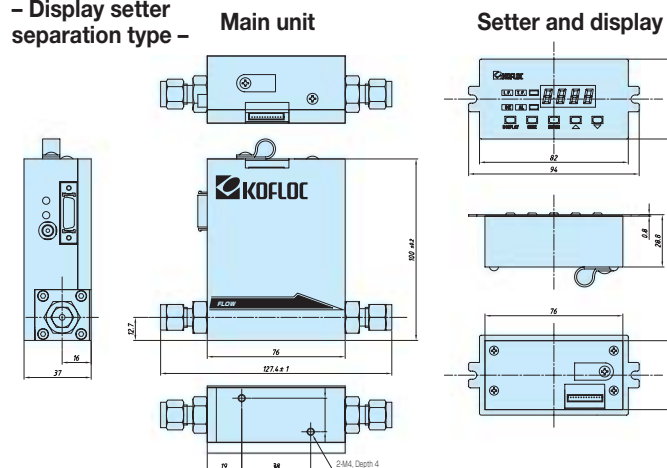


Dimensions

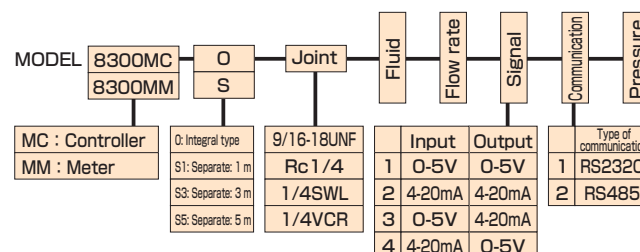
The display and setter can be turned by 180°.



– Display setter
separation type –



Ordering



* Please contact us for the outline drawing.

- * Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.



Standard Mass Flow Controller

MODEL 3660 SERIES

Model 3660 Series Mass Flow Controller has been developed centering the focus on compactness and low cost and is being acclaimed by a wide range of users for diverse applications, including from laboratory research and development activities to the use as a standard mass flow control model for various types of analyzers and vacuum devices in the production line. Varieties of derived models and options are available.

Features

- Equipped with an advanced flow sensor of constant-current temperature difference detection type to ensure high-speed response
- Use of a normally closed valve to ensure safety
- High reliability ensured using a solenoid actuator
- Low differential pressure type control available for combustible gases (LP option)

Standard Specifications

Flow range (at N ₂ calibration conditions)	10SCCM-20SLM (30SLM-100SLM)
Valve types*	Normally closed solenoid poppet valve
Control range	2%-100%F.S. (5%-100%F.S.)
Response	2 sec. or less to within $\pm 2\%$ of full scale of final value typical for 0-100% response
Accuracy	Within $\pm 1.5\%$ F.S. (Within $\pm 2.0\%$ F.S.)
Repeatability*	Within $\pm 0.5\%$ F.S.
Operating differential pressure	F.S. ≤ 5 SLM 49kPa-294kPa * Low differential pressure specification depends on types of gas and flow rates to be used. 5<F.S. ≤ 20 SLM 98kPa-294kPa (147kPa-294kPa)
Proof pressure*	980kPa
Leak rate*	1×10^{-8} Pa·m ³ /s or less (excluding transmission of He)
Working temperature range	5-45°C (Accuracy guaranteed within 15-35°C)
Materials of parts in contact with gases	Body: SUS 316 Valve seat: Viton® (Optional: Neoprene™ or NBR) Seals: Viton® (Optional: Neoprene™ or NBR)
Joint*	Standard: 1/4SWL® (3/8SWL) Optional: 1/8SWL®, 1/4VCR®, Rc 1/4, etc.
Electrical connections*	Dsub 9-pin male connector per KFC/SEMI standards
Flow rate input signals	0-5VDC
Flow rate output signals*	0-5VDC
Required power supply*	+15VDC ($\pm 5\%$) 100mA -15VDC ($\pm 5\%$) 200mA

Items marked with an asterisk (*) indicate common specifications.
Values indicated in () denote the specifications for Model 3665.

Harness Layout

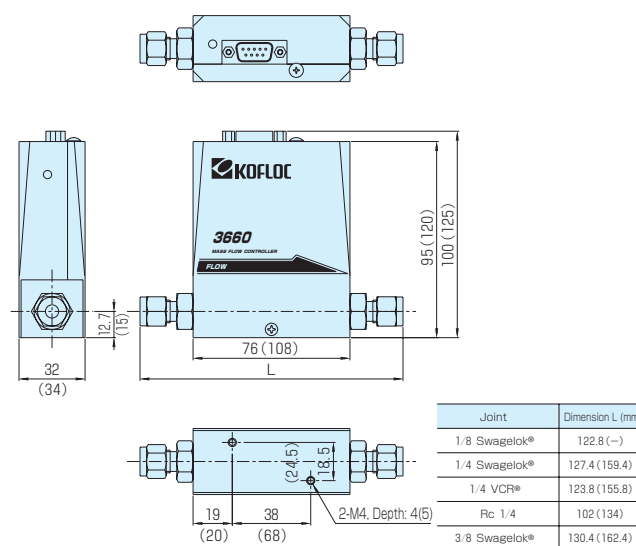
Pin Assignment of Dsub 9-pin Connector per KFC Standard

Pin No.	Signal	Pin No.	Signal
1	Input valve open/close operation	6	Flow input Hi
2	Flow output 0-5 V	7	Flow output COM
3	+15 VDC Power source	8	Flow input Lo
4	Power source COM	9	Output valve voltage
5	-15 VDC Power source		

* Because a differential input system is used for the product, pin 4 (Power source COM) and pin 7 (Flow output COM) are connected inside the mass flow controller while pin 8 (Flow input Lo) is isolated. In case of a single-ended connection, connect pin 8 to pin 4.

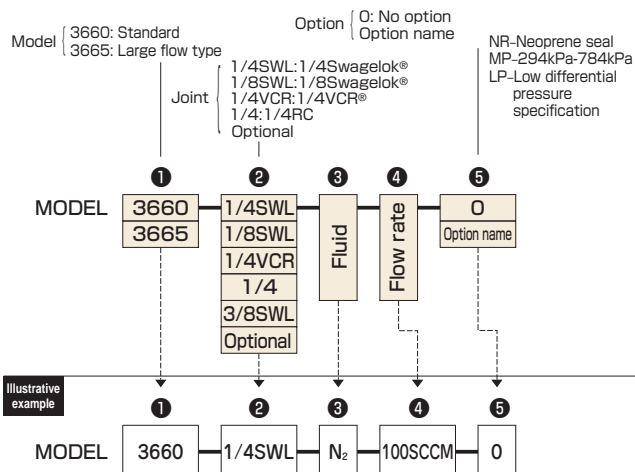


Dimensions



* Values indicated in () denote the dimensions for Model 3665.

Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

High-grade Mass Flow Controller

MODEL 3200 SERIES

Model 3200 Series Mass Flow Controller is an advanced model designed as a successor of the 3910 Series that enjoys a wide use for diverse applications such as manufacture of semiconductors, LCDs, combustion equipment, analytical devices, and biotechnology fields. Its high performance is equal to a new standard of KOFLOC.

Features

- Equipped with a temperature follow-up type current difference detection flow sensor (patent applied for) to ensure high accuracy and high-speed response
- Use of a normally closed valve to ensure safety
- Can be used for control of various types of gases thanks to the incorporated CF switching feature.
- Reduced dead volume thanks to the diaphragm seat valve
- Control of small quantities of flows available up to 1 SCCM full scale (SR option)
- Low differential pressure type control available for combustible gases (LP option)

Standard Specifications

Flow range (at N ₂ calibration conditions)	10SCCM-20SLM
Valve type	Normally closed, Solenoid, Diaphragm seat valve
Control range	2%-100%F.S.
Response	1 sec. or less to within $\pm 2\%$ of full scale of final value typical for 0-100% response
Accuracy	Within $\pm 1.0\%$ F.S.
Linearity	Within $\pm 0.5\%$ F.S.
Repeatability	Within $\pm 0.2\%$ F.S.
Operating differential pressure	F.S. ≤ 5 SLM 49kPa-294kPa * Low differential pressure specification depends on types of gas and flow rates to be used. 5 < F.S. ≤ 20 SLM 98kPa-294kPa
Proof pressure	980kPa
Leak rate	1×10^{-8} Pa·m ³ /s or less
Working temperature range	0-50°C (Accuracy guarantee: 15-35°C)
Materials of parts in contact with gases	Body: SUS 316L Diaphragm: SUS 316 Valve seat: PTFE Seals: Viton® (Optional: Neoprene® or NBR)
Joint	Standard: 1/4SWL® Optional: 1/8SWL®, 1/4VCR®, Rc 1/4, etc.
Electrical connections*	Dsub 9-pin male connector per KFC standard (SEMI standard)
Flow rate input signals	0-5VDC
Flow rate output signals*	0-5VDC
Required power supply *	+15VDC ($\pm 5\%$) 100mA, -15VDC ($\pm 5\%$) 200mA

Harness Layout

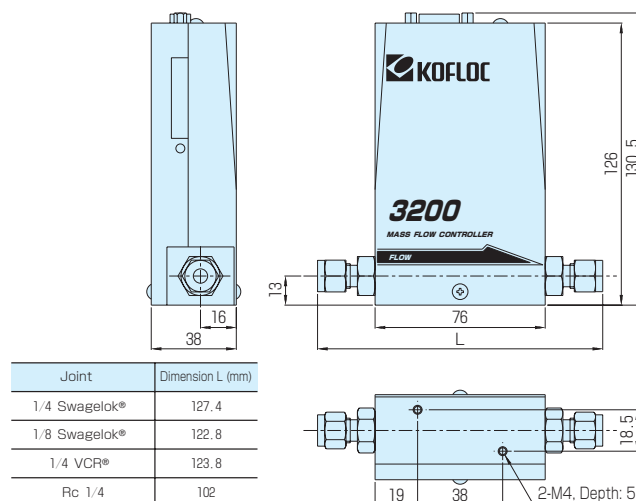
Pin Assignment of Dsub 9-pin Connector per KFC Standard

Pin No.	Signal	Pin No.	Signal
1	Input valve open/close operation	6	Flow input Hi
2	Flow output 0-5 V	7	Flow output COM
3	+15 VDC Power source	8	Flow input Lo
4	Power source COM	9	NC
5	-15 VDC Power source		

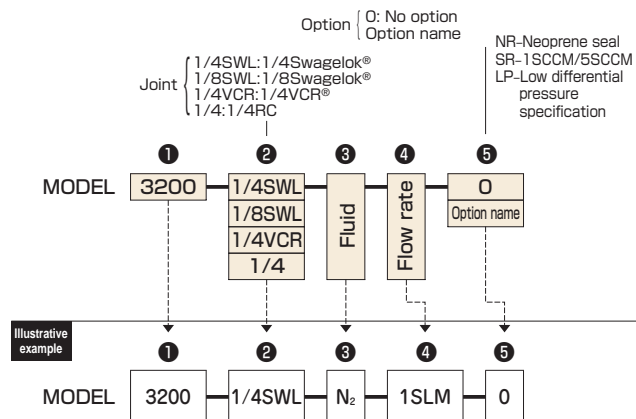
* Because a differential input system is used for the product, pin 4 (Power source COM) and pin 7 (Flow output COM) are connected inside the mass flow controller while pin 8 (Flow input Lo) is isolated. In case of a single-ended connection, connect pin 8 to pin 4.



Dimensions



Ordering



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MODEL 5400 SERIES

Model 5400 Series Mass Flow Controller/Meter features weldless structure, metal seals, accuracy of $\leq \pm 1\%$, response of $\leq \pm 1$ second and other basic performance conditions required for semiconductor process control, and additionally, has achieved a significant price reduction. Model 5410 Series of the same body design are also lined up.

Features

- Equipped with a temperature follow-up type current difference detection flow sensor (patent applied for) to ensure high accuracy and high-speed response
- Use of a normally closed solenoid valve
- Weldless construction and metal seals provides low leakage.
- Reduced dead volume thanks to the diaphragm seat valve
- Spacing, body dimensions and harness layout are designed so that the product is compatible with other manufacturers' controllers.

Standard Specifications

Flow range (at N ₂ calibration conditions)	10SCCM-20SLM
Valve type*	Normally closed, Solenoid, Diaphragm seat valve
Control range*	2%-100%F.S.
Response*	1 sec. or less to within $\pm 2\%$ of the set point typical for 0-100% response QS option provides 1 sec. or less for 0-100% to 0-20% responses.
Accuracy	Within $\pm 1.0\%$ F.S.
Linearity	Within $\pm 0.5\%$ F.S.
Repeatability	Within $\pm 0.2\%$ F.S.
Operating differential pressure*	F.S. ≤ 5 SLM 49kPa-294kPa * Low differential pressure specification depends on types of gas and flow rates to be used. 5 < F.S. ≤ 20 SLM 147kPa-294kPa
Proof pressure	980kPa
Leak rate	1×10^{-11} Pa·m ³ /s or less
Working temperature range	0-50°C (Accuracy guarantee: 15-35°C)
Materials of parts in contact with gases	Body: SUS 316L Diaphragm: Ni-Co Valve seat: PTFE Seals: Ni, SUS 316L
Joint	Equivalent to 1/4VCR®
Electrical connections*	Dsub 9-pin male connector per KFC standard (SEMI standard)
Flow rate input signals*	0-5VDC
Flow rate output signals	0-5VDC
Power supply requirement	5400: +15VDC ($\pm 5\%$) 100mA, -15VDC ($\pm 5\%$) 200mA 5410: +15VDC ($\pm 5\%$) 100mA, -15VDC ($\pm 5\%$) 100mA

* Items marked with an asterisk (*) are those applicable to Model 5400 only.

Harness Layout

Pin Assignment of Dsub 9-pin Connector per KFC Standard

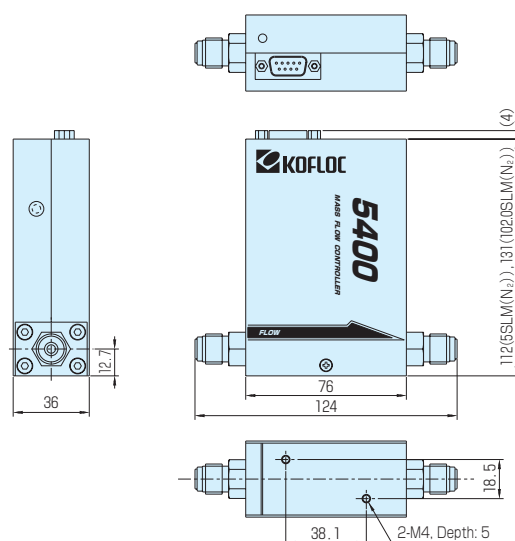
Pin No.	Signal	Pin No.	Signal
1	Input valve open/close operation	6	Flow input Hi
2	Flow output 0-5 V	7	Flow output COM
3	+15 VDC Power source	8	Flow input Lo
4	Power source COM	9	Output valve voltage
5	-15 VDC Power source		

* Because a differential input system is used for the product, pin 4 (Power source COM) and pin 7 (Flow output COM) are connected inside the mass flow controller while pin 8 (Flow input Lo) is isolated. In case of a single-ended connection, connect pin 8 to pin 4.

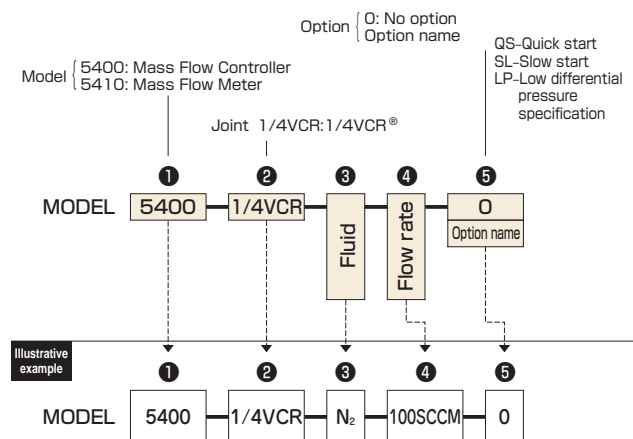
* Pins 2, 3, 4, 5, 7 only for Mass Flow Meter



Dimensions



Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

High Grade Metal Seal Flow Controllers

MODEL 5100 SERIES

Being the successor of the Model 3440 that has been favorably received by many customers, the Model 5100 Series Mass Flow Controller is a multi-range type model provided with improved basic performance features. While, in appearance, it is a conventional mass flow controller, it provides many sophisticated features; particularly, its advanced sensor drive system minimizes zero drift, one of the characteristic features of the predecessor model so acclaimed by customers, so that improved response can be obtained in low ranges.

Features

- Improved control and response performance in every flow range
- Improved performance to follow up set voltage (compatible with voltage ramping specification)
- Range shift function to meet the multi-range requirement
- Optimized valve to maximize the control resolution in each range

Standard Specifications

Flow range	10SCCM-20SLM
Valve type	Diaphragm valve (Normally closed solenoid)
Control range	2%-100%F.S.
Response	1 sec. or less to within $\pm 2\%$ of full scale of final value typical for 0-100% response
Accuracy	Within $\pm 1.0\%$ F.S.
Linearity	Within $\pm 0.5\%$ F.S.
Repeatability	Within $\pm 0.2\%$ F.S.
Working temperature range	0-50°C (Accuracy guarantee: 15-35°C)
Operating differential pressure	F.S. ≤ 5 SLM 49kPa-294kPa 5 < F.S. ≤ 20 SLM 98kPa-294kPa
Proof pressure	980kPa
Materials of parts in contact w/gases	SUS 316L, Au or PTFE
Joint	Standard: Equivalent to 1/4VCR® Optional: 1/4SWL®
External leak integrity	1×10^{-11} Pa·m³/s (He) or less
Input signals	0-5VDC
Output signals	0-5VDC
Power supply	+15VDC ($\pm 5\%$) 100mA, -15VDC ($\pm 5\%$) 200mA
Mounting position	Available in any position

Harness Layout

Pin Assignment of Dsub 9-pin Connector per KFC Standard

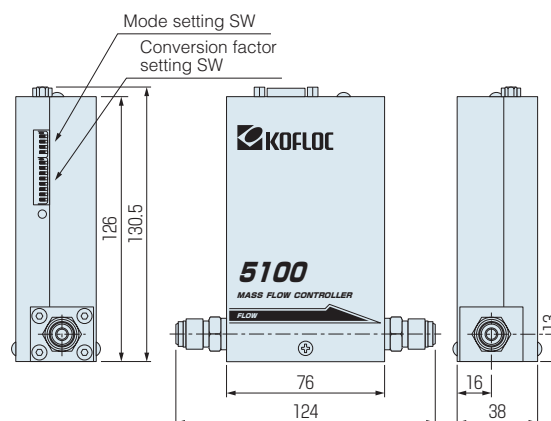
Pin No.	Signal	Pin No.	Signal
1	Input valve open/close operation	6	Flow input Hi
2	Flow output 0-5 V	7	Flow output COM
3	+15 VDC Power source	8	Flow input Lo
4	Power source COM	9	Output valve voltage
5	-15 VDC Power source		

** Because a differential input system is used for the product, pin 4 (Power source COM) is connected inside the mass flow controller while pin 8 (Flow input Lo) is isolated. In case of a single-ended connection, connect pin 8 to pin 4.

* For baking applications on Model 5100B, working temperature is specified up to 80°C.



Dimensions



Ordering

Model 5100
5100B: Model meeting baking temp. up to 80°C

Option { 0: No option
Option name

Joint { 1/4VCR
Optional

KP-Internal Polishing
SR-1SCCM, 5SCCM
LP-Low differential pressure
specification
MP-294kPa-784kPa

MODEL 5100 1/4VCR Fluid Fluid 0
5100B Optional

Illustrative example

MODEL 5100 1/4VCR N₂ 100SCCM 0

* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.



Auto Pressure Controllers

MODEL 9100 SERIES

A

An Auto Pressure Controller (APC) model incorporates a pressure sensor for control of pressure. Model 9100 Series features a KOFLOC solenoid valve whose performance is highly appreciated by customers. By changing the sensor set point, this valve readily permits pressure control both at inlet and at outlet so that it can provide high process performance when used as a single control device or in combination with other mass flow controller.

Features

- Improved control and response performance in every flow range
- Switching between two response speeds
- Use of a normally closed solenoid valve
- Reduced dead volume thanks to the diaphragm seat valve
- Spacing and body dimensions are designed so that the product is compatible with other manufacturers' controllers.

Standard Specifications

Measurement system	Vacuum evaporation type semiconductor strain gauge
Valve type	Diaphragm valve (Normally closed solenoid)
Control range	Gauge pressure type: 10-500 kPa; Absolute pressure type: 10-100 kPa(A)
Response time 1	1 sec. or less for 0-100% response
Response time 2	6 sec. or less for 0-100% response
Pressure regulating valve flow rate	0.5 slm/1 slm/2 slm (Pressure conditions: at primary pressure of 50 kPa, at secondary pressure open to atmospheric air, and at N ₂)
Pressure control accuracy	Within ±1.0% F.S.
Accuracy guarantee temperature range	15°C-35°C
Linearity	Within ±0.5% F.S.
Repeatability	Within ±0.2% F.S.
Working temperature range	0°C-50°C
Proof pressure	Gauge pressure type: 1MPa; Absolute pressure type: 450 kPa
Materials of parts in contact w/gases	SUS 316L, Co-Ni, PTFE, Au (Metal) Viton
Joint	Standard: Equivalent to 1/4VCR®; Optional: 1/4SWL®
External leak rate	6x10 ⁻¹¹ Pa·m ³ /s (Metal) 1x10 ⁻⁸ Pa·m ³ /s (Rubber) (Excluding transmission of He)
Pressure input signals	0.1-5VDC
Pressure output signals	0-5VDC
Power supply	+15VDC (±5%) 100mA, -15VDC (±5%) 200mA
Mounting position	Available in any position

Harness Layout

Pin Assignment of Dsub 9-pin Connector per KFC Standard

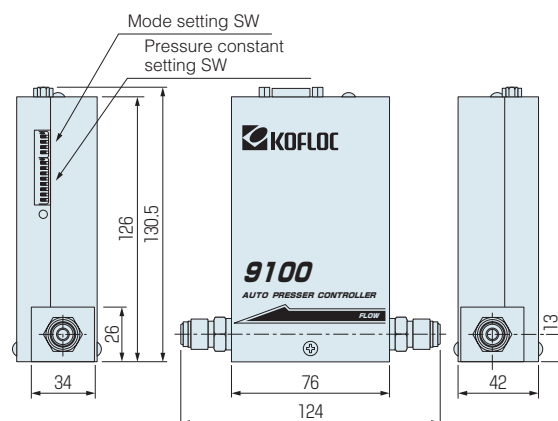
Pin No.	Signal	Pin No.	Signal
1	Input valve open/close operation	6	Flow input Hi
2	Flow output 0-5 V	7	Flow output COM
3	+15 VDC Power source	8	Flow input Lo
4	Power source COM	9	Output valve voltage
5	-15 VDC Power source		

* Because a differential input system is used for the product, pin 4 (Power source COM) is connected inside the mass flow controller while pin 8 (Flow input Lo) is isolated. In case of a single-ended connection, connect pin 8 to pin 4.

* For baking applications on Model 9100B, working temperature is specified up to 80°C.

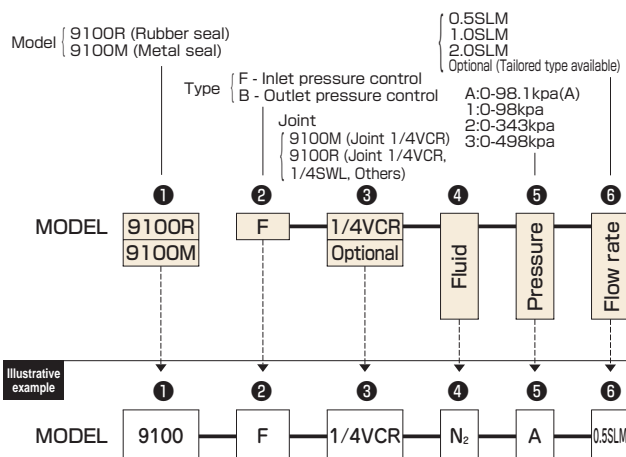


Dimensions



Joint	A
1/4 SWL	127.4
1/8 SWL	122.8
1/4 VCR	124.8
RC 1/4	102.0

Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

Large Capacity Mass Flow Controller

HFC-303 SERIES

The HFC-303, which combines a solenoid type pilot valve and air-driven flow control valve developed for controlling large flows, permits precision control of large gas flows not possible with conventional models. This new model ensures higher accuracy and quicker response as a successor to the HFC-203 Series that has a solid track record in a wide range of industries.

Features

- The 2-stage control valve can control large flows of up to 1,000 SLM.
- Accuracy of $\pm 1.0\%$
- Quicker response than conventional models
- Contact us for details for flows exceeding 1,000 SLM.

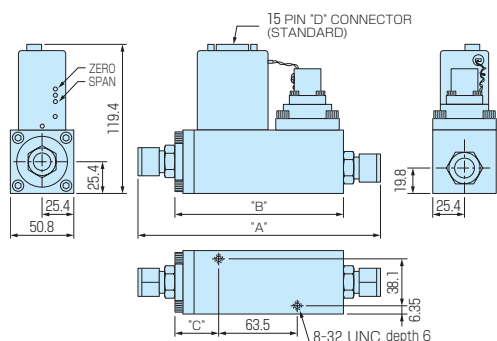


Standard Specifications

Flow range (at air calibration condition)	F.S.100-1000SLM
Valve type	Normally closed solenoid + Pneumatic 2-stage valve
Control range	2-100%F.S.
Response	3 sec or less for 0-100% response (within $\pm 2\%$ typical)
Accuracy	Within $\pm 1\%$ F.S.
Repeatability	Within $\pm 0.25\%$ F.S.
Operating differential pressure	147-343kPa
Proof pressure	3.4 MPa (6.8 MPa for HP option)
Leak rate	1×10^{-8} Pa·m ³ /s or less (excluding transmission of He)
Operating temperature	15-35°C
Materials of parts in contact with gases	Body: SUS316, Ni, SUS302
	Valve seal: Viton®
	Sealing material: Viton®
Joint	Standard: 1/2 SWL® (3/4" SWL® when F.S.>300 SLM)
	Option: 3/4 SWL
Electric connection	Dsub 15-pin male connector Note: Refer to the harness layout.
Flow setting input signal	0-5VDC
Flow output signal	0-5VDC
Required power	± 15 VDC ($\pm 5\%$) 150mA

⚠ Note: Provide straight pipe sections of the same diameter as the piping before and after mass flow instruments for correct flow measurement. The diameter of the straight pipe on the primary side should exceed 300 mm.

Dimensions



<300SLM 1/2"Swagelok

HFC-303 1/2"FITTING

FITTING TYPE	DIM"A"
SWAG. 1/2"W NUT	7.56(197.6)
DIM"B"	5.36(136.1)
DIM"C"	1.36(34.5)

>300SLM 3/4"Swagelok

HFC-303 3/4"FITTING

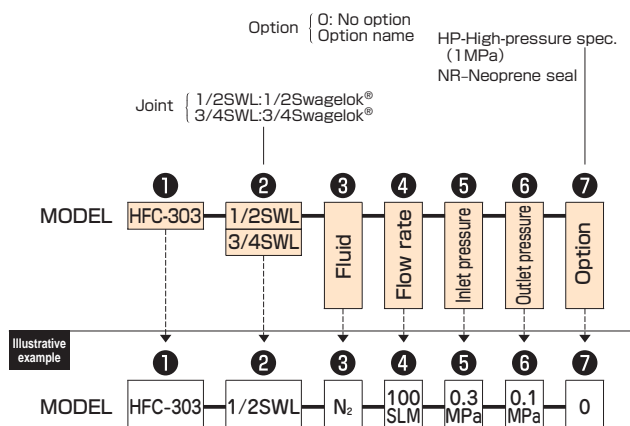
FITTING TYPE	DIM"A"
SWAG. 3/4"W NUT	8.44(214.4)
DIM"B"	5.76(146.3)
DIM"C"	1.56(39.6)

Harness Layout (Dsub 15PIN)

PIN	Signal
1	NC
2	NC
3	NC
4	NC
5	Signal COM
6	0-5 V output signal
7	NC
8	Forced valve closing
9	-15VDC
10	NC
11	+15VDC
12	Power source COM
13	NC
14	Set signal
15	NC

⚠ Note:
The harness layout of the Dsub 15-pin for the 3150/3250/3350/3450 Series is different from that of the Dsub 15-pin for the HFC/HFM Series.
Incorrect connection will cause failure.

Ordering



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Low-cost Mass Flow Meter with Indicator

MODEL 3810DS SERIES

The Model 3810DS is a newly developed mass flow meter integral with an indicator based on the time-tested the Model 3810 mass flow meter. (Low-cost mass flow meter) The driving power has been changed from the conventional ± 15 VDC power supply to a 24 VDC power supply to improve the convenience, and the indicator now has an alarm contact for better functionality.

A model with an integral flow sensor and precision needle valve is also available for flow control at a lower price and smaller installation space.

Features

- Precision needle valve for control and monitoring of very small flows
- Two-point alarm output for flow monitoring
- Compact and lightweight mass flow meter!
- The indicator permits instant use simply after connecting a 24 VDC power supply.
- Mass flow instruments eliminate troublesome flow correction calculations based on the temperature and pressure; the flow can be read directly on the indicator.

Standard Specifications

Flow range (at N ₂ calibration condition)	F.S.10SCCM-20SLM	F.S.30-100SLM
Accuracy	Within $\pm 2\%$ F.S.	Within $\pm 3\%$ F.S.
Proof pressure	980kPa	
Leak rate	1×10^{-7} Pa·m ³ /s or less	
Operating temperature	5°C–45°C (Accuracy guaranteed at: 15°C–35°C)	
Materials of parts in contact with gases	Body: SUS303, Teflon® Sealing material: Viton® (option), Neoprene®	
Joint	Standard: Rc 1/4 (Contact us for other types.)	
Required power	24VDC $\pm 5\%$	
Alarm output No.	NPN open collector 2-stage output Max. rating: 30VDC 50mA	

* Cable connection

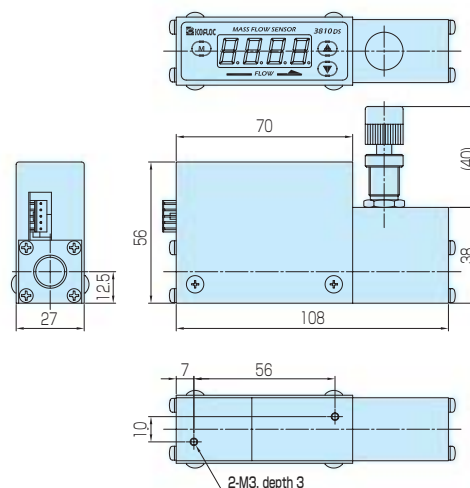
Connector 3810DS side: AMP171826-5

Cable side: AMP171822-5

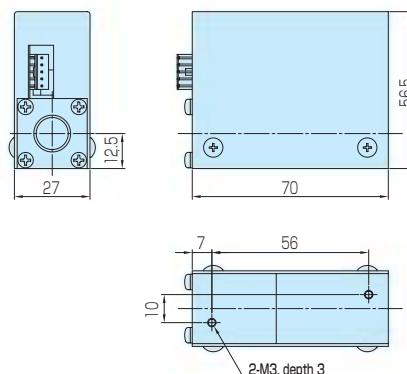
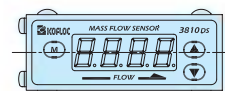


3810DS

Dimensions

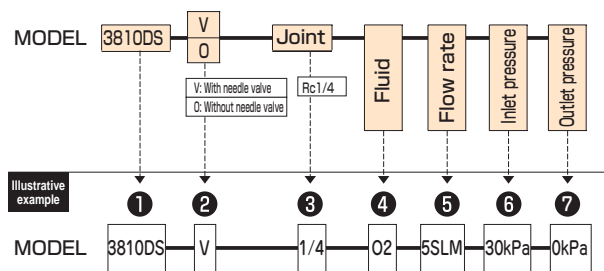


3810DS with needle valve



3810DS

Ordering



High-grade Mass Flow Meter

MODEL 3100 SERIES

The Model 3100 Series Mass Flow Meter is a new, advanced high-precision flowmeter developed based on the Model 3200 Series. The incorporated innovative capillary type flow sensor reduces pressure loss and ensures high response as well as ensuring stability.

Features

- Equipped with a temperature follow-up type current difference detection flow sensor to ensure high accuracy and quick response
- Compatible with various types of gases thanks to the incorporated CF switching feature.
- Measurements of minute flows available up to 1 SCCM full scale (SR option)

Standard Specifications

Flow range (at N ₂ calibration conditions)	10SCCM-20SLM/3100 30SLM-100SLM/3105
Response	1 sec. or less to within $\pm 2\%$ of full scale of final value typical for 0-100% response
Accuracy	Within $\pm 1.0\%$ F.S./3100 Within $\pm 1.5\%$ F.S./3105
Linearity	Within $\pm 0.5\%$ F.S.
Repeatability	Within $\pm 0.2\%$ F.S.
Proof pressure	980kPa
Leak rate	1×10^{-3} Pa·m ³ /s or less (excluding transmission of He)
Working temperature range	0-50°C (Accuracy guarantee: 15-35°)
Materials of parts exposed to gases	Body: SUS 316L, SUS 316, PTFE Seals: Viton® (Optional: Neoprene®)
Joint	Standard: 1/4SWL® (3/8SWL) Optional: 1/8SWL®, 1/4VCR®, Rc 1/4
Electrical connections*	Dsub 9-pin male connector per KFC standard (SEMI standard)
Flow rate output signals*	0-5VDC
Required power supply*	+15VDC ($\pm 5\%$) 100mA, -15VDC ($\pm 5\%$) 100mA

* Values indicated in () are for Model 3105.

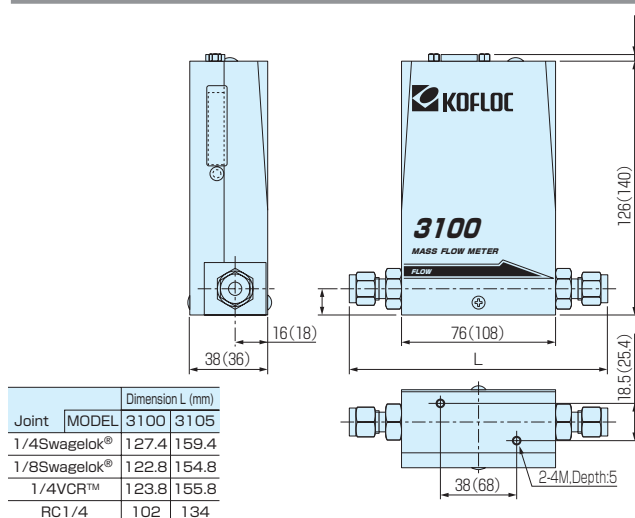
Harness Layout

Pin Assignment of Dsub 9-pin Connector per KFC Standard

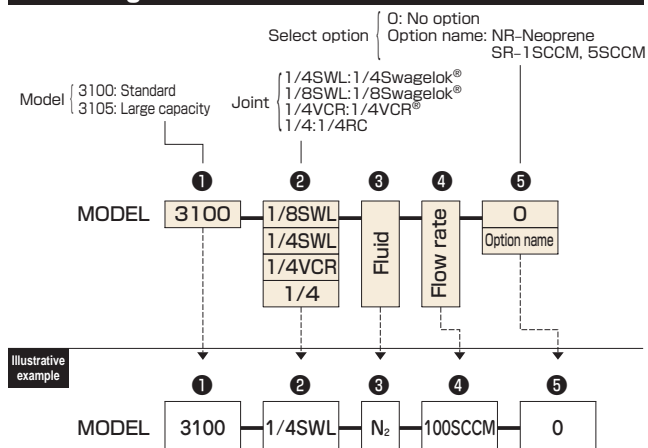
Pin No.	Signal	Pin No.	Signal
1	NC	6	NC
2	Flow output 0-5 V	7	Flow output COM
3	+15 VDC Power source	8	NC
4	Power source COM	9	NC
5	-15 VDC Power source		



Dimensions



Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.



Standard Mass Flow Meter

MODEL 3760 SERIES

The Model 3760 Series is a compact, low-cost mass flow meter developed based on the Model 3660 Series. It has been developed as a standard model of various analyzers and vacuum equipment for research and development at universities and research institutes.

Features

- Improved constant-current temperature difference detection type flow sensor for quick response
- The compact body permits installation at any location.
- Alarm output in combination with DPM-100 (Flow monitoring)
- Flow integration in combination with CR-500 (Consumption management)

Standard Specifications

Flow range (at N ₂ calibration condition)	10SCCM-20SLM/3760 30SLM-150SLM/3765
Response	2 sec. or less (typical)
Accuracy	Within $\pm 1.5\%$ F.S. (Within $\pm 2\%$ F.S.)
Proof pressure	980kPa
Leak rate	1×10^{-9} Pa·m ³ /s or less (excluding transmission of He)
Operating temperature	5°C–45°C (Accuracy guaranteed at: 15°C–35°C)
Materials of parts in contact with gases	Body: SUS316L Sealing material: Viton® (option), Neoprene®
Joint	Standard: 1/4 SWL® (3/8 SWL) Option: 1/8SLM®, 1/4VCR®, Rc1/4, others
Electric connection	Dsub 9-pin male connector per KFC standard
Flow output signal	0-5VDC
Required power	+15VDC $\pm 5\%$ 100mA, -15VDC $\pm 5\%$ 100mA

* Values indicated in () are for the 3765.

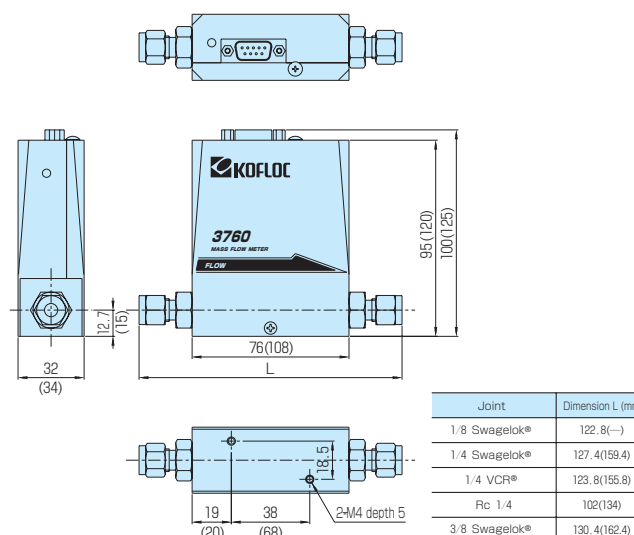
Harness Layout

Pin Assignment of Dsub 9-pin Connector per KFC standard

Pin No.	Signal	Pin No.	Signal
1	NC	6	NC
2	Flow output 0–5 V	7	Flow output COM
3	+15 VDC Power source	8	NC
4	Power source COM	9	NC
5	–15 VDC Power source		

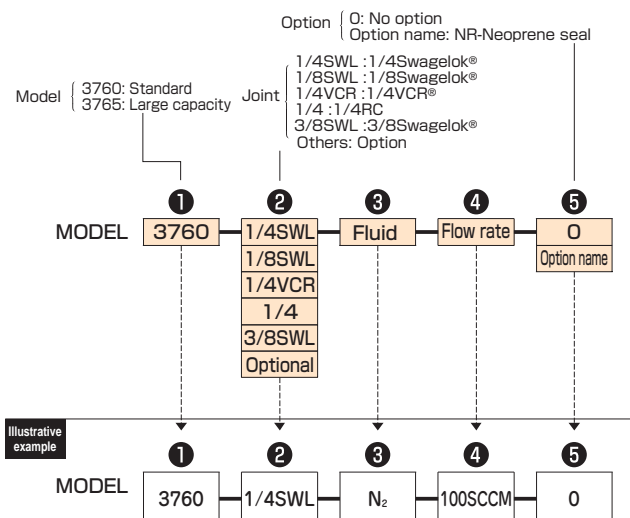


Dimensions



Dimensions indicated in () are for the 3765.

Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

Large Capacity Mass Flow Meter

HFM-301 SERIES

The HFM301 Series can correctly measure gas flow up to 1,000 SLM. The design for high-pressure use (Standard: 3.4 MPa; Option: 6.8 MPa) ensures high reliability for use in a wide range of industries.

Features

- 0–5 V linear flow output signal
- High-accuracy measurement of large flow
- Quicker response than conventional models
- Compact size with smaller footprint

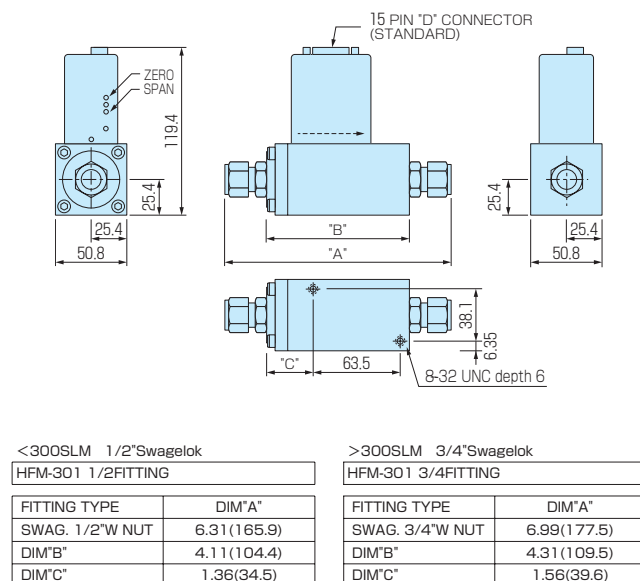


Standard Specifications

Flow range (at air calibration condition)	F.S.100-1000SLM
Response	3 sec. or less (typical)
Accuracy	±1% F.S.
Proof pressure	3.4 MPa (6.8 MPa for HP option)
Leak rate	1x10 ⁻⁸ Pa·m ³ /s or less (excluding transmission of He)
Operating temperature	15-35°C
Materials of parts in contact with gases	Body: SUS316, SUS302, Ni Sealing material: Viton®
Joint	Standard: 1/2 SWL® (3/4 SWL® when F.S.>300 SLM) Option: 3/4 SWL®
Electric connection	Dsub 15-pin male connector Note: Refer to the harness layout.
Flow output signal	0-5VDC
Required power	±15VDC (±5%) 60mA

⚠ Provide straight pipe sections of the same diameter as the piping before and after mass flow instruments for correct flow measurement. The diameter of the straight pipe on the primary side should exceed 300 mm.

Dimensions

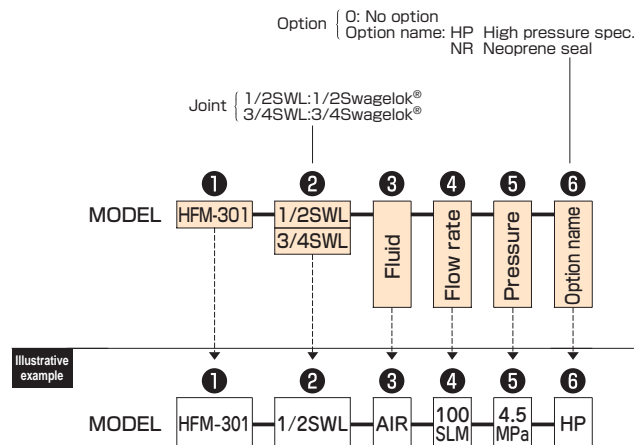


Harness Layout (Dsub 15PIN)

PIN	Signal
1	NC
2	NC
3	NC
4	NC
5	Signal COM
6	0-5 V output signal
7	NC
8	NC
9	-15VDC
10	NC
11	+15VDC
12	Power source COM
13	NC
14	NC
15	NC

⚠ Note:
The harness layout of the Dsub 15-pin for the 3150/3250/3350/3450 Series is different from that of the Dsub 15-pin for the HFC/HFM Series.
Incorrect connection will cause failure.

Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.



Small Pressure Loss Large Capacity Mass Flow Meter

MODEL HFM-200W/LS SERIES

The Model HFM-200 W/LS Series is a mass flow meter developed to measure large gas flows. It is equipped with a laminar flow element for measuring large flows up to 15,000 SLM with little pressure loss, which is difficult for usual mass flow meters.

Features

- The double bypass structure with a laminar flow element enables large flow measurement.
- Measurement with small pressure loss is possible in lines where pressure is not supplied.
- $\pm 1-5\%$ high-precision measurement of large flow
- 0-5 VDC analog flow output permits application to measurement recording, control, alarm, and other uses.
- Mass flow instruments eliminate troublesome flow correction calculations based on the temperature and pressure.



Standard Specifications

Common Specifications

Flow range (at air calibration condition)	Table of Correspondence for Each Type of Laminar Flow Element
Response	6 sec. or less for 0-100% response (within $\pm 2\%$, typical)
Accuracy	Within $\pm 1-5\%$ F.S.
Proof pressure	3.4MPa
Leak rate	1×10^{-7} Pa·m ³ /s (excluding transmission of He)
Operating temperature	15-35°C
Materials of parts in contact with gases	Body: SUS316, Ni Sealing material: Viton®
Connection	Standard: Table of Correspondence for Each Type of Laminar Flow Element Option: Smooth end (Delivery of straight pipe without processing for connection)
Electric connection	Dsub 15-pin male connector Note: Refer to the harness layout.
Flow output signal	0-5VDC
Required power	± 15 VDC ($\pm 5\%$) 50mA

Note:

Provide straight pipe sections of diameter five times larger than the laminar diameter before and after the laminar flow element for correct flow measurement.

Table of Correspondence for Each Type of Laminar Flow Element

Type of laminar	Connection	Corresponding F.S. flow (AIR)
LS-3 (S)	3"NPT	1500SLM
LS-4F/S	4"flange	3000SLM
LS-6F/S	6"flange	6000SLM
LS-8F/S	8"flange	15000SLM

* Check the outline drawing for each model.

* A smooth end (straight) is also available for connection. Add the suffix "S" to the type of laminar when placing an order.

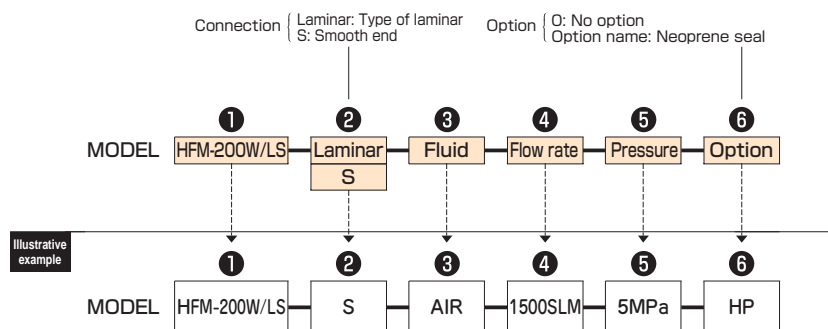
Harness Layout (Dsub 15PIN)

PIN	Signal
1	NC
2	NC
3	NC
4	NC
5	Signal COM
6	0-5 V output signal
7	GND
8	NC
9	-15VDC
10	NC
11	+15VDC
12	Power source COM
13	NC
14	NC
15	NC

Note:

The harness layout of the Dsub 15-pin for the 3150/3250/3350/3450 Series is different from that of the Dsub 15-pin for the HFC/HFM Series.
Incorrect connection will cause failure.

Ordering



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Low-cost Mass Flow Sensor

MODEL 3810S SERIES

Designed on the heritage base construction of the superior class bypass capillary type mass flow sensor, the Model 3810S Mass Flow Sensor centers the focus on economy through a thorough effort towards streamlining with the view to built-in applications. The series is one of the KOFLOC best sellers and is used by many assembly manufacturers as a substitute for the existing float type (tapered pipe type) flow meter.

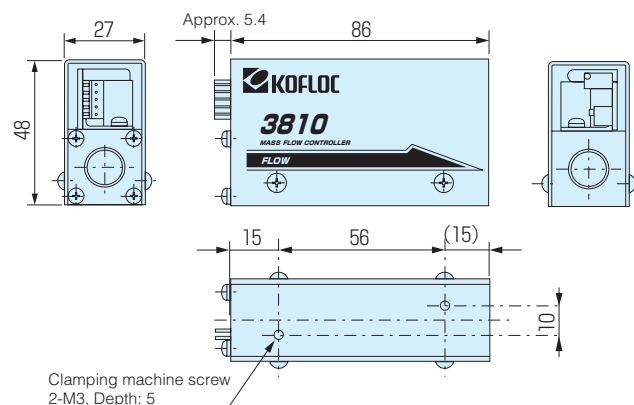
Features

- A low-cost, still, full-fledged sensor based on a combination of the constant-current temperature difference detection type with the bypass capillary type
- A large cost reduction makes Model 3810S almost rival any existing float type flow meter in price.
- 0 to 5VDC analog flow outputs provide various applications such as measurements recording, control and alarm issuance.
- The sensor is mass flow type. The user needs no troublesome calculations for flow correction due to the effects of temperature and pressure.

Standard Specifications

Flow range (at N ₂ calibration conditions)	F.S.10SCCM-2SLM	F.S.3-50SLM
Accuracy	Within $\pm 2.0\%$ F.S.	Within $\pm 5.0\%$ F.S.
Repeatability	Within $\pm 0.5\%$ F.S.	
Proof pressure	980kPa	
Working temperature range	5-45°C (Accuracy guarantee: 15-35°C)	
Materials of parts in contact w/gases	Body: SUS 303, PTFE	
	Sealing material: Viton®	
Joint	Standard: Rc 1/4	
Flow output signals	0-5VDC	
Required power supply	+15VDC ($\pm 5\%$) 40mA, -15VDC ($\pm 5\%$) 10mA	
Weight	250g	350g

Dimensions



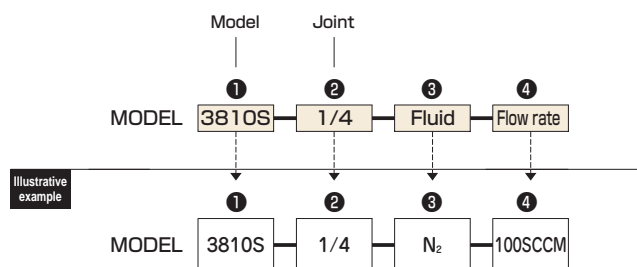
Cable Connections

No.1	Power source +15VDC
No.2	Power source COM
No.3	Power source -15VDC
No.4	Flow output 0-5VDC
No.5	Flow output COM

Note: The Series 3810 pin assignment has been modified from March 2000, and is not compatible with the old model. Please check the following:

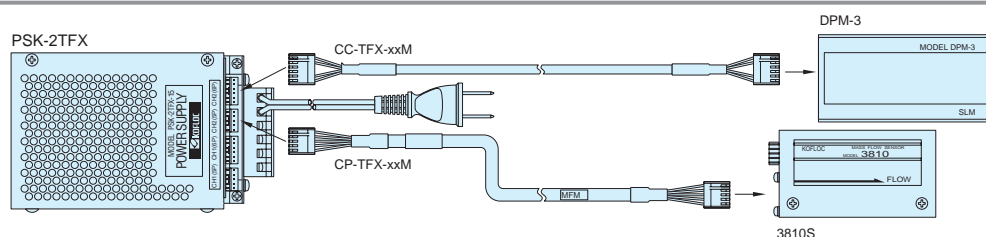
AMP171826-5 on the Connector 3810 side
AMP171822-5 on the cable side

Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

Example of Wiring





Low-cost Digital Mass Flow Meter

MODEL D3810 SERIES

A

The Model D3810 is a completely renovated digital mass flow meter designed on the basic structure of existing KOFLOC Model 3810. Incorporating a CPU inside and is equipped with an innovative sensor, a single unit of this new model covers a broad range of flows from very small to large.

Features

- An economical but high-precision sensor that uses the bypass capillary method
- Digital control allows the user to handle a broad range of flows (100 cc to 50 L).
- Compact design (overall size is one size smaller than the Model 3810)

Standard Specifications

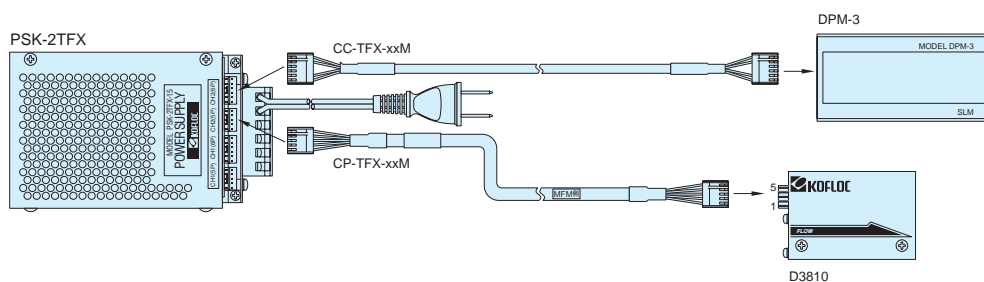
Flow range (at N ₂ calibration conditions)	50SLM
Accuracy	25-50SLM: $\pm 3\%$ RD 0-25SLM: $\pm 3\%$ FS
Repeatability	$\pm 0.5\%$ (FS)
Proof pressure	980kPa
Working temperature range	0-50°C (Accuracy guarantee: 15-50°C)
Materials of parts in contact w/gases	Body: SUS 303, PTFE Sealing material: Viton®
Joint	Standard: Rc 1/4
Flow output signals	0-5VDC
Required power supply	+12VDC ($\pm 5\%$) 60mA, -12VDC ($\pm 5\%$) 60mA
Weight	500g

Cable Connections

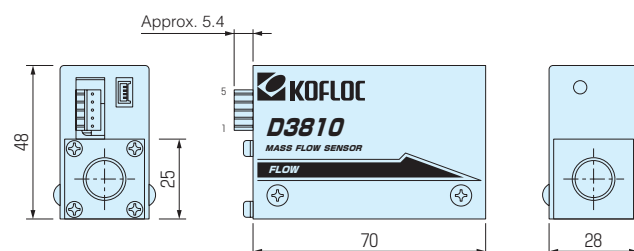
No.1	Power source +15VDC
No.2	Power source COM
No.3	Power source -15VDC
No.4	Flow output 0-5VDC
No.5	Flow output COM

AMP171826-5 on the Connector 3810 side
AMP171822-5 on the cable side

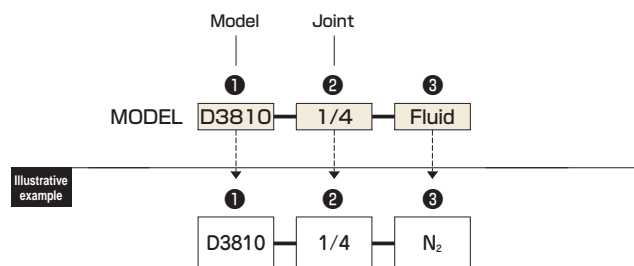
Example of Wiring



Dimensions



Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

Small Karman Vortex Flow Meter for Liquids

FM0101/0102/0103/0105 SERIES

KOFLOC's Karman Vortex Flow Meter FM Series provides an ideal tool for measuring and monitoring liquid flows, including cooling water and cleaning water. Since PPS resin is used for body material, all models of the series offer superior reliability and durability.

Features

- Simple design that minimizes a dead space
- Measurements of very small flows available (up to 0.5 L/min)
- Use of PPS resin has achieved a small, lightweight and rigid.
- The sensor can be used for pure water or deionized water and chemicals (the sensor is acid-/alkali-resistant).
- These models are in the process of application for CE Marking.

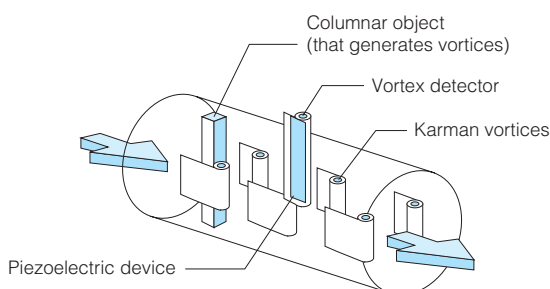
Standard Specifications

Model	FM0101	FM0102	FM0103	FM0105
Dimension (a)	17.8	17.5	17.5	32.5
Dimension (L)	80.6	80.0	80.0	110.0
Connection (X)	R3/8	R1/2	R1/2	25A
Flow range	0.5-4 L/min	2-16 L/min	4-40 L/min	10-150 L/min
Fluids for measurement	Cooling water, cleaning water, etc.			
Measuring accuracy	Within ±3.0% F.S			
Repeatability	Within ±0.5% F.S			
Outputs	S Type: 4-20mA			
	P Type: Pulse (Open collector) (For w/o indicator only)			
	D Type: With indicator			
Supply voltage	12-24VDC			
Liquid temperature range	0-70°C			
Proof pressure	1MPa			
Amb. temperature range	0-50°C			
Amb. humidity range	5-90%RH			
Applicable cleanliness/ waterproofing standards	IP64 (Splashproof construction per JIS C 0920)			
Material for wetted part	PPS with 30% glass mixture		PPS w/o glass mixture	
Cable length	W/o indicator: 2 meters long; terminated/pretinned (presoldered)			
	With indicator: 3 meters long; terminated/pretinned (presoldered)			
Weight	W/o indicator: 85 g (Sensor unit)		165 g (Sensor unit)	
	With indicator: 100 g (Sensor unit)		205 g (Sensor unit)	

Principle of Measurement

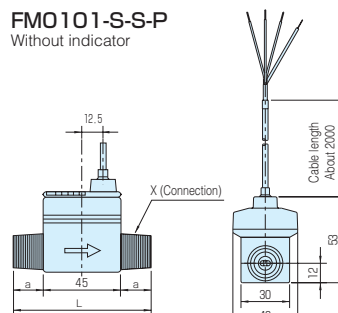
When a columnar object (object that generates vortices) is placed in the flow path of a fluid, regular channels of vortices, called Karman vortex channels, are generated at the back of the object. Since the frequency of a vortex generated is linearly proportional to the flow velocity within a given range, the flow amount can be measured by counting the number of vortices.

These series models make use of this principle. When the frequency of each vortex generated is detected by the incorporated vortex detector (piezoelectric device), the signal processing circuit outputs a signal which is linearly proportional to volume flow.

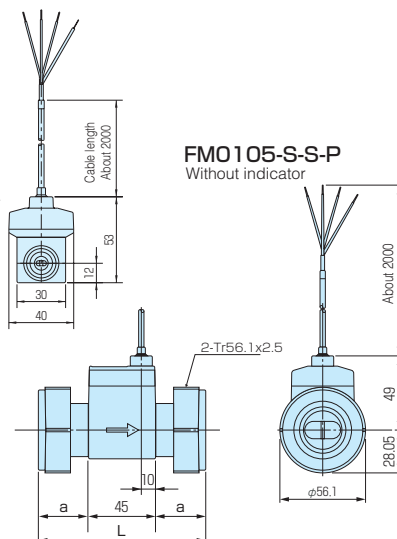


Dimensions

FM0101-S-S-P
Without indicator



FM0105-S-S-P
Without indicator



CAUTION:
DO NOT load excessive clamping torque on the sensor unit and setscrews as they are made of plastics.

Note:
Tolerances for unspecified outside dimensions: ± 0.8
Tolerances for other unspecified dimensions: ± 0.4

Ordering

MODEL01 (PPS)	Flow range	S	Output	P	N	/K
01			S=4-20mADC			
02			P = Pulse			
03			D = 4-20 mADC + Indicator			
05						

* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.



Small Karman Vortex Flow Meter for Liquids

MODEL31 (TEFLON®/PFA) SERIES

A

The Model31 Karman Vortex Flow Meter employs the following principle for measurement of flows:

When a columnar object (object that generates vortices) is placed in the flow path of a fluid, regular channels of vortices, called Karman vortex channels, are generated at the back of the object.

Since the frequency of a vortex generated is linearly proportional to the flow velocity within a given range, the flow amount can be measured by counting the number of vortices.

When the frequency of each vortex generated is detected by the incorporated vortex detector (piezoelectric device), the signal processing circuit outputs a signal which is linearly proportional to volume flow.

Features

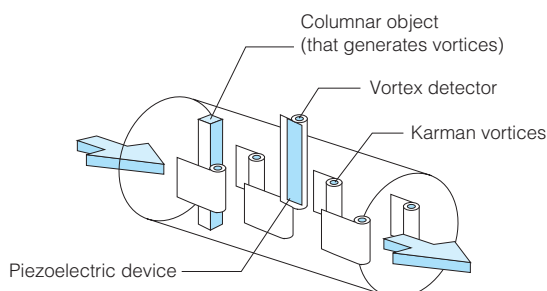
- Because of no moving part, the meter has superior reliability and durability and no error in mounting position is produced.
- Simple construction (its flow path of fluid contains a columnar object and a vortex detector only) ensures low pressure loss and low liquid leak. In addition, the detector does not get into contact with the fluid running through the path, therefore, it is ideal for process monitoring of various liquids.
- Two types of particle-free body materials (PPS and PFA) are available for choice according to your needs.
- Global specifications (Certification for CE Marking already acquired)
- Since Teflon is the material for the entire wetted part and no O-ring is in use, the Model31 Series Karman Vortex Flow Meter is optimum for monitoring liquid flows in the manufacturing process of semiconductors.

Standard Specifications

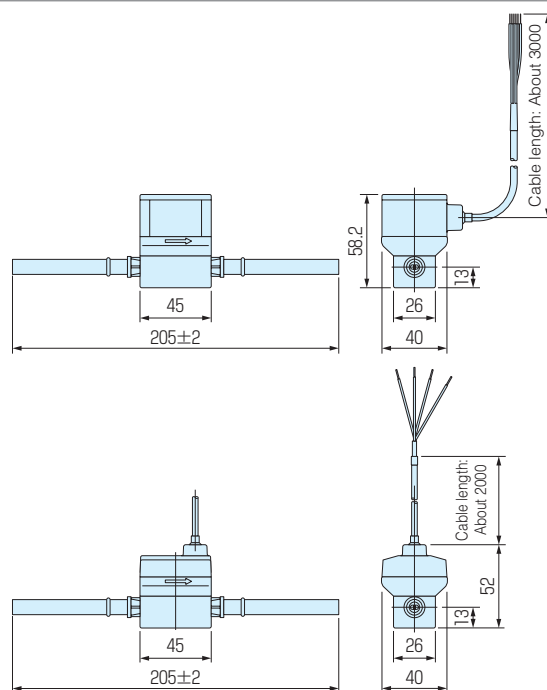
Item	3101	3102	3103	3104
Flow range (L/min)	0.4-4	2-20	5-50	10-100
Connection	3/8" Pipe end	1/2" Pipe end	3/4" Pipe end	1" Pipe end
Fluids for measurement	Ultrapure water, chemicals, and other liquids			
Measuring accuracy	±3.0%+ 1 digit			
Repeatability	Within ±0.5% F.S.			
Liquid temperature range	0-90°C (No bedewing, no boiling)			
Amb. temperature range	0-50°C			
Outputs	With indicator	LED display in 3 digits		
		Current output: 4-20 mA (linear)		
	W/o indicator	Alarm output: Open collector (2 LEDs; 80 mA, 30 VDC max.)		
		Current output: 4-20 mA (linear)		
Supply voltage		Pulse output: Open collector (10 mA, 30 VDC max.)		
Materials	Body	All Teflon® (PFA), without O-rings		
	Cover	Polybutylene terephthalate (PBT) resin		
	Cable	2 meters long; Conductor: Tinned bare annealed copper wire; Sheath: Heat-/cold-resistant polyvinyl chloride (POC)		

Principle of Measurement

When a columnar object (object that generates vortices) is placed in the flow path of a fluid, regular channels of vortices, called Karman vortex channels, are generated at the back of the object. Since the frequency of a vortex generated is linearly proportional to the flow velocity within a given range, the flow amount can be measured by counting the number of vortices. The Model31 Series Karman Vortex Flow Meter makes use of this principle. When the frequency of each vortex generated is detected by the incorporated vortex detector (piezoelectric device), the signal processing circuit outputs a signal which is linearly proportional to volume flow.



Dimensions



Ordering

The Model31 (PFA)	Flow range	P	Output	X	P	/K	Z
	01	S=4-20mADC					P6:6φ pipe end
	02	P = Pulse					P8:8φ pipe end
	03	D = 4-20 mADC + Indicator					P12:12φ pipe end
	04						Blank: Standard

* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

Compact Flow Sensor for Liquids

VISION 2000 SERIES

In the VISION2000 Series, a small turbine contained in its casing rotates in proportion to the flow, which actuates the magnet pickup coil embedded in the upper part of the casing to output pulses.

The VISION2000 Series is made of such materials that are not affected by most of liquids, it is used in many fields of industry.

Features

- Very small in size and very light in weight (15g), the VISION2000 Series can be mounted anywhere.
- Can be used for a large variety of liquids from low to high viscosity.
- Use of a high-quality material (grilamid TR55)
- Maintenance-free
- High performance, low price

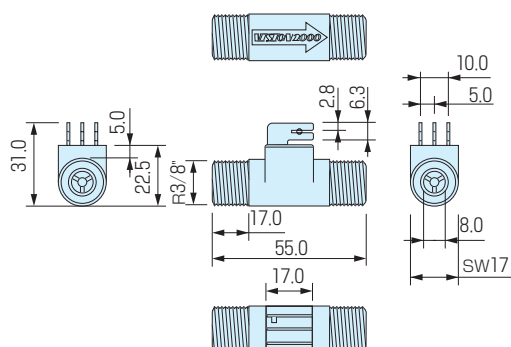


Standard Specifications

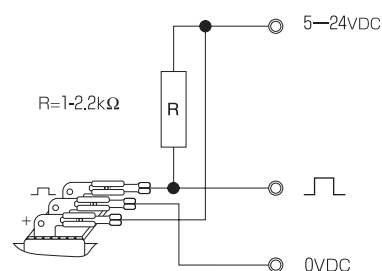
Item	2F66	4F44	4F22	F16.5
Fluid	Water, sea water, pure water, alcohol, gasoline, gas oil, kerosene, various types of solvents, and other liquids			
Flow range	0.5-5 L/min	1-10 L/min	2.5-25 L/min	3.5-35 L/min
Accuracy	Within $\pm 1.5\%$ F.S			
Repeatability	Within $\pm 0.2\%$ F.S			
P/L	6900 pulses/L	3300 pulses/L	1000 pulses/L	750 pulses/L
Operating temperature range	$-20-100^{\circ}\text{C}$			
Maximum operating pressure	2.45MPa			
Machine connection	R3/8 inches			
Driving power	5-24 VDC			
Power consumption	8 mA (20 mA max.)			
Analog output	Voltage pulses (Open collector)			
Materials	Casing	Grilamid TR55		
	Turbine	Grilamid TR55		
	Bearings	PTFE with 15% graphite		

* Liquid viscosity must not exceed 16CP. If you need to use the sensor for control of a liquid whose viscosity exceeds this value (16CP), contact us for consultation.

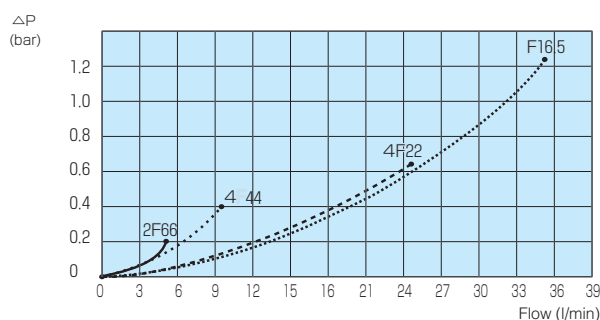
Dimensions



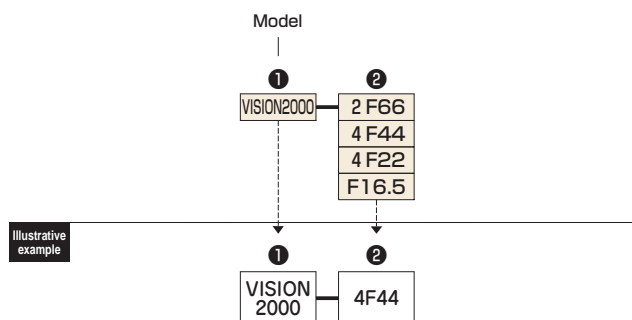
Connection Diagram



Pressure Loss Table



Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.



Flow Indicators

MODELS ALM-4/ACM-10/DPM-3/DPM-240

A

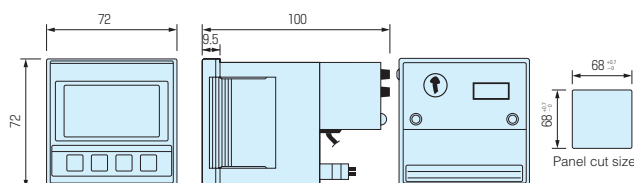
Digital Comparator ALM-4



This digital meter relay carrying a microcomputer sends out Hi, GO or LO logical contact signals to the two set points for bridging the gap between when it receives flow signals from a mass flow meter/controller. The comparator plays a role of photocoupler and relay contact to fetch these signals.

Signal input	0-5 VDC flow signals
Signal output	Photocoupler make contact, relay no-voltage a-contact, and 3 Hi/GO/LO contacts
Contact capacity	Photocoupler collector current: 5 mA; Relay: 250 VAC, 1 A max.
Power supply	+5 VDC

Dimensions



Momentary/Integrated Flow Indicator ACM-10

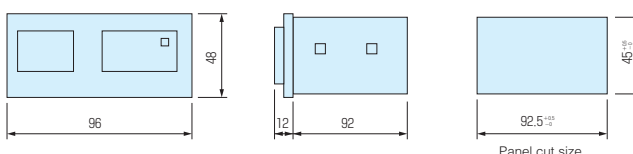


This DIN96x48 front face indicator displays momentary flow values as well as those integrated. Compactly designed with DIN standard size panel cut, the ACM-10 is a 'must' for monitoring gas consumption on site. Specify the flow range your need as the unit is shipped after properly scaled at factory to meet your requirement.

Momentary flow display	3-1/2-digit 7-segment LED
Integrated flow display	6-digit count 7-segment LED
Integrated flow carry	Carry from 0.1 cc of momentary flow display
Power supply	+5 VDC
Signal input	0-5 VDC

* The minimum flow that can be displayed depends upon the full-scale flow value. Please consult us.

Dimensions



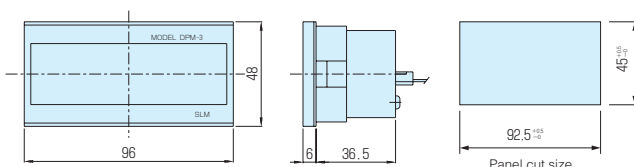
Digital Flow Indicator DPM-3



A dedicated flow indicator for mass flow controller/meter. Either 3-1/2-digit direct reading (standard spec.) or 1000 F.S. display is possible.

Display	3-1/2-digit 7-segment LED, direct reading
Power supply	+5 VDC
Mount type	Panel mount

Dimensions



* DIN48x24 type indicator is also available on customer request.

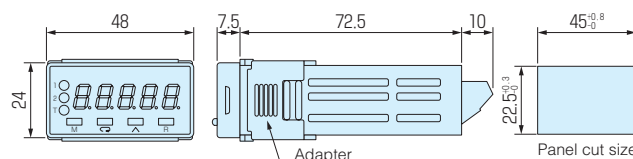
Momentary/Integrated Flow Indicators DPM-240/245



These two models provide display of momentary and cumulative flow values. Model DPM-240 can be used together with a pulse output type flow meter such as the VISION2000 for input of open collector voltage pulses, and Model DPM-245 can be combined with the Model31 Series Small Karman Vortex Flow Meter for input of analog current and voltage values.

Display	4-1/2-digit 7-segment LED, direct reading
Power supply	+24 VDC
Mount type	Panel mount

Dimensions



Functional Flow Input/Display Unit with Alarm

MODEL DPM-100

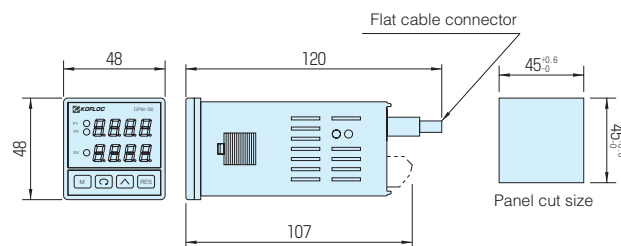
Model DPM-100 is a digital flow input/display unit that allows setting and display of flows on a mass flow controller/meter when used in combination with a PSK-FB Series power unit. Its 48x48 mm compact size can make for saving the space otherwise required for installing a gas line control panel. The DPM-100 incorporates a flow alarm and provides high cost performance.

Features

- Compact size (48 mm wide x 48 mm high) ideal for panel layout when a number of gas lines are to be controlled simultaneously
- Individual alarm output for the upper and lower limits
- Easy entry of values using touch switches
- No troublesome wiring is required. Just plug the cable connector in. (Supply voltage for the DPM-100 is taken from the connected PSK-FB Series power unit.)

Note: The DPM-100 is a dedicated unit for the PSK-FB Series power units. A separate power supply line or wiring may be necessary for a PSK-FB Series power unit shipped before October 2001, other PSK Series unit and any commercial power source available on the market. Please consult us.

Dimensions



Flow Setting Device

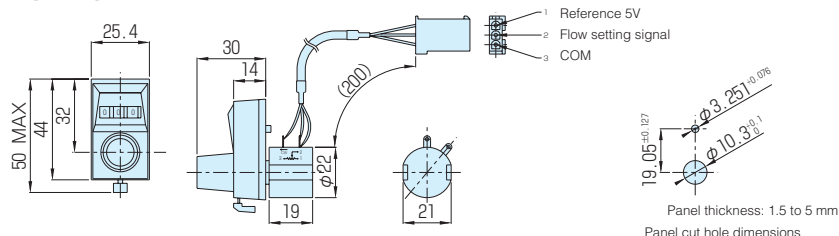
MODEL CK SERIES

These dial type devices generate 0 to 5-volt flow signals for mass flow controllers. Each dial scale has graduations from 000 to 999 to allow the user to set flow values in relation to the full scale. The series include three types, CK-1A, CK-2A and CK-3A, according to the dial shape.

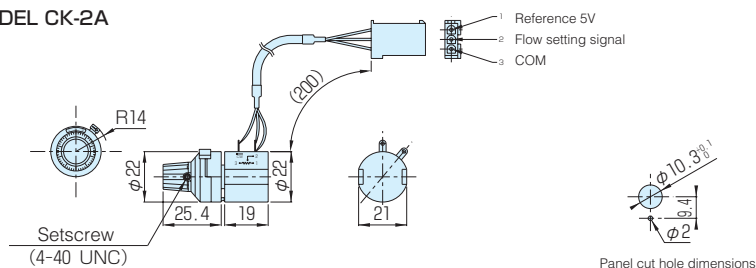


Dimensions

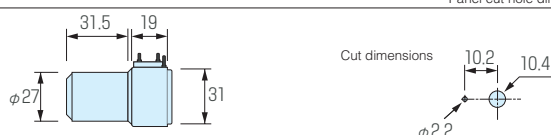
MODEL CK-1A



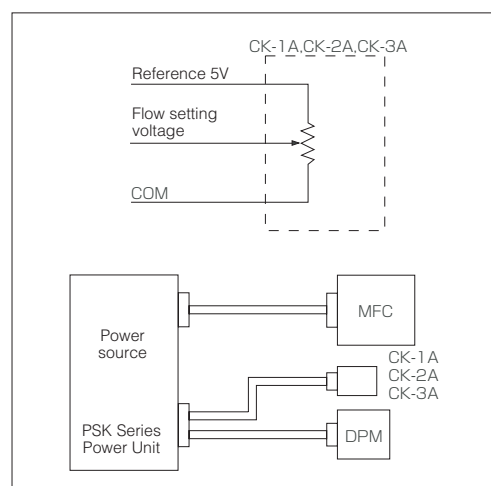
MODEL CK-2A



MODEL CK-3A



Input	5V
Output	5-volt full scale is divided
Resistance	10kΩ (Standard)
Setting accuracy	0.1% full scale
Applicable controller types	All mass flow controllers





Multifunctional Readout Unit with Integrator & Alarm

MODEL CR-700A

The Model CR-700A is a multifunctional readout unit developed exclusively for mass flow controllers and mass flow meters. In addition to flow measuring and controlling functions, the flow integration and alarm output functions are provided for application to mass flow instruments. Furthermore, the RS232C communication function permits communication control from your personal computer.

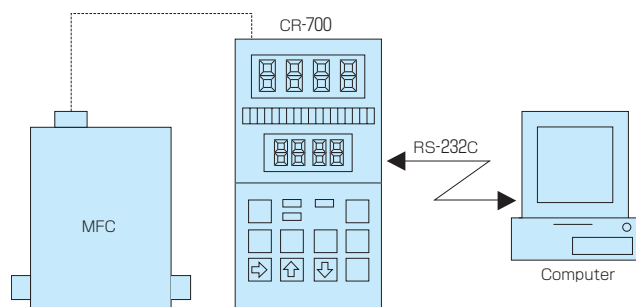
Features

- Highly-readable 4-digit large LED + Bar graph for indication of flow
- Independent display of set value (SV value) for easy flow setting
- Easy communication with your personal computer through RS232C
- One-key layout for simple operation
- Conversion factor setting function for use with multiple gases
- Zero offset function for correction of change of zero point with time
- MFC supply voltage: ± 15 VDC (200 mA max. each)
- 100 VAC driving power

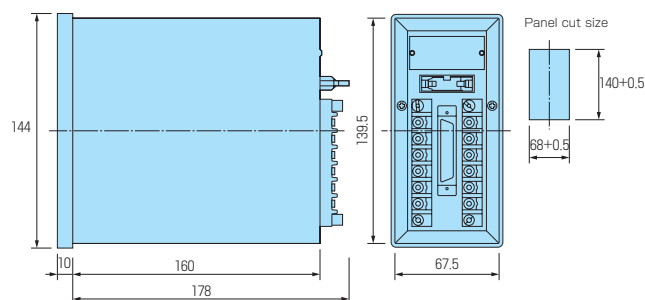
Standard Specifications

Mass flow control	Flow indication/setting, zero offset, and conversion factor setting functions
Mass flow input/output	0-5 VDC
Mass flow power	+15VDC (200mA)
Number of display digits	Momentary flow display: 3-1/2 digits; integrated flow display: 4 digits Bar graph: 0-100% 20 divisions
Display accuracy	$\pm 0.3\%$ F.S. ± 1 digit in relation to the entered value
Display switching	Momentary/integrated value display can be switched over; alarm display
Alarm outputs	Momentary/integrated: Two-stage upper/lower limit alarm output; Photo MOS relay
External control	Rear terminal connector: RS232C
Power consumption	Approx. 25 VA
AC power supply	100VAC
Weight & size	Approx. 900 g: 72 W x 144 H x 178 D (mm)

Layout Example

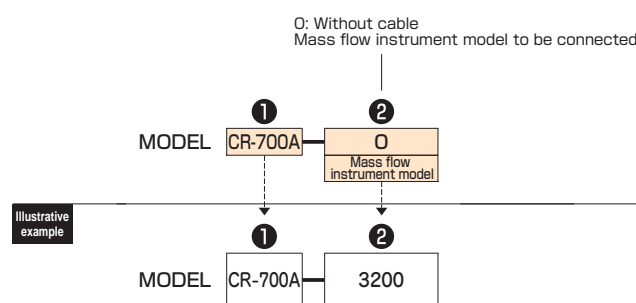


Dimensions



Ordering

Specify the mass flow instrument to which the readout unit is to be connected if you order the CR-700A Readout Unit individually, and not in a set with the mass flow instrument.



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

Note:

If the CR-700A Readout Unit is connected to some old mass flow models, it may malfunction or some of its functions may not work. Please consult with us before placing an order if your KOFLOC mass flow controller/meter is not listed in this catalog or if you want to connect the CR-700A Readout Unit to a competitor's product.

* Cable length: Within 3 m (5400, 5100, 3200, 3100 series)

Multifunctional Readout Unit with Integrator & Alarm

MODEL CR-500

When connected to your mass flow controller or meter, the Model CR-500 Readout Unit provides multiple functions, including flow measurements and control, cumulative flow calculations, alarm outputs, and so on. This readout unit incorporates RS485 data communication kit. A number of the CR-500 units can be controlled from a host computer.

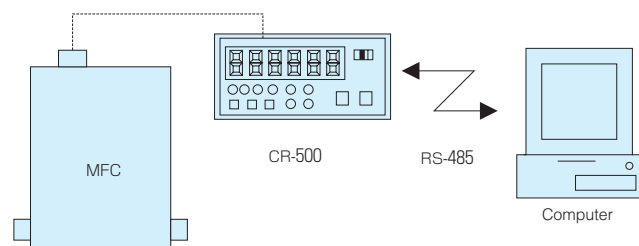
Features

- Compact size (96 mm wide x 48 mm high) ideal for panel layout
- Multiple functions, such as 6-digit display of total flow, individual alarm outputs for the upper/lower limits, etc.
- Mass flow meters can be controlled from a computer via RS485 interface.
- Remote control of both analog and digital signals is possible from an external device.
- Mass flow controller supply voltage: ± 15 VDC (300 mA max. each)
- Can be used anywhere in the world as it can be driven at a voltage within the range of 85 to 264 VAC.

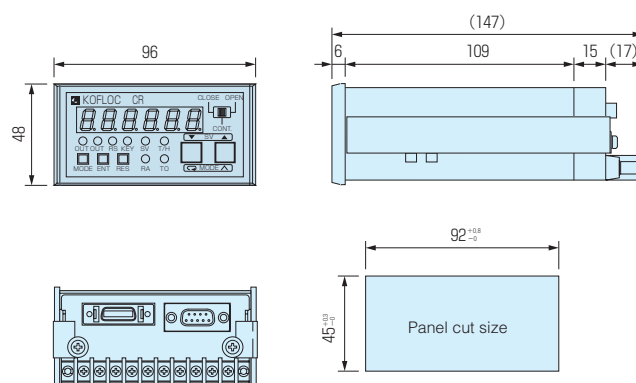
Standard Specifications

Mass flow control	Flow setting, forced valve open/close operation, and zero out
Mass flow input/output	0-5VDC
Mass flow power	± 15 VDC (300mA)
Number of display digits	Momentary flows: 4-1/2; Integrated flows: 6
Display accuracy	$\pm 0.3\%$ F.S. ± 1 digit in relation to the entered value
Display switching	Momentary/Integrated value displays can be switched over.
Alarm outputs	Alarm outputs for the upper/lower limits of momentary/integrated flows (Dual alarm set point photoMOS relay)
Calculating function	Selectable among: Immediate stop/blinking of display when 6-digit counter overflows, Endless display of counts, and x10 display
Uninterruptive power guarantee	3 weeks or more (when properly charged for at least 3 hours)
External control	Back terminal connector: RS-485 (Four-wire dual outputs or two-wire analog signal outputs)
Power consumption	Approx. 25 VA
AC power supply	85-264VAC
Weight & Size	Approx. 500g; 96W x 48H x 147D (mm)

Layout Example with Readout Unit CR-500

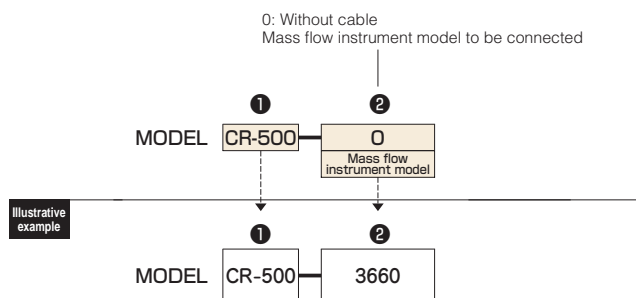


Dimensions



Ordering

(Specify the mass flow instrument to which the readout unit is to be connected if you order the CR-500 Readout Unit individually, and not in a set with the mass flow instrument.)



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

CAUTION:

The CR-500 Readout Unit may malfunction or some of its functions may not work if it is connected to some old mass flow models. Please contact us for consultation before you place a purchase order if your KOFLOC mass flow controller/meter is not on this catalog or if you want to connect the CR-500 Readout Unit to our competitor's product.



Compact Readout Unit

MODEL CR-300

A

When connected to your mass flow controller or meter using a single cable, the Model CR-300 Readout Unit allows you to use basic functions of the controller/meter, such as flow measurements and control.

Features

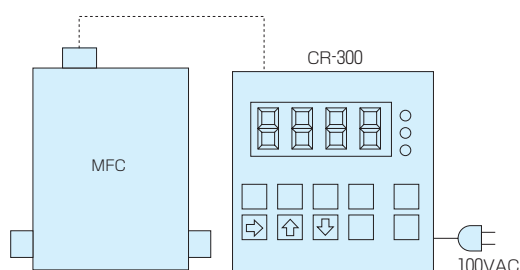
- Space-saving compact size (72 mm wide x 72 mm high)
- The unit controls valve operation of your mass flow controller.
- Remote control available via external control terminal provided on the back panel
- A lock key to prevent misoperation
- Mass flow controller supply voltage: ± 15 VDC (250 mA max. each)



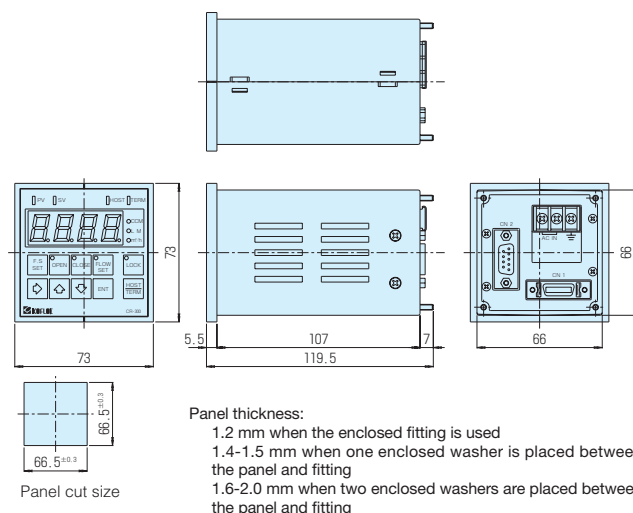
Standard Specifications

Mass flow control	Flow setting, forced valve open/close operation, and zero cut
Mass flow input/output	0-5VDC
Mass flow supply power	± 15 VDC (250mA)
Number of display digits	Momentary flows: 4-digit display every 100 counts (100-2000)
Display accuracy	Within $\pm 0.1\%$ (within ± 2 digits)
External control	Input terminal on the back panel for analog signals
Power consumption	Approx. 25 VA
AC power supply	85-240VAC 47-440Hz
Weight & Size	350g W: 73 x H: 73 x D: 119.5mm

Layout Example with Readout Unit CR-300

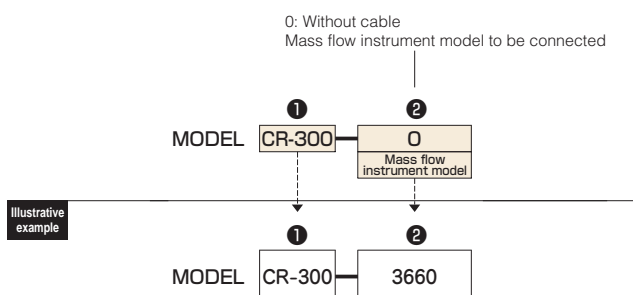


Dimensions



Ordering

(Specify the mass flow instrument to which the readout unit is to be connected if you order the CR-300 Readout Unit individually, and not in a set with the mass flow instrument.)



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

CAUTION:

The CR-300 Readout Unit may malfunction or some of its functions may not work if it is connected to some old mass flow models. Please contact us for consultation before you place a purchase order if your KOFLOC mass flow controller/meter is not on this catalog or if you want to connect the CR-300 Readout Unit to our competitor's product.

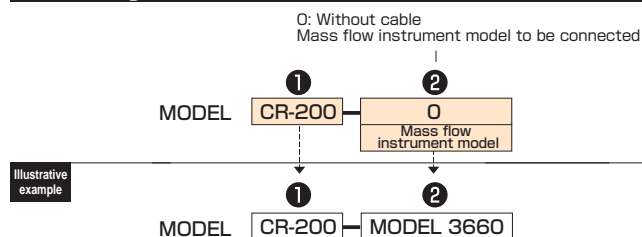
Compact Readout Unit

MODEL CR-200

The Model CR-200 Readout Unit is a simple, convenient unit, providing basic mass flow instrument functions such as measurement and control of flow by connecting it to mass flow controllers and mass flow meters through a single cable.

Ordering

Specify the mass flow instrument to which the readout unit is to be connected if you order the CR-200 Readout Unit individually, and not in a set with the mass flow instrument.



Illustrative example

Specification (2) means the cable used for connection to a mass flow instrument.

* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

Note:

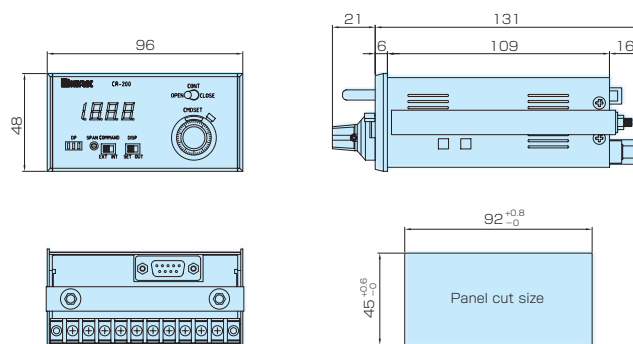
If the CR-200 Readout Unit is connected to some old mass flow models, it may malfunction or some of its functions may not work. Please consult with us before placing an order if your KOFLOC mass flow controller/meter is not listed in this catalog or if you want to connect the CR-200 Readout Unit to a competitor's product.

Standard Specifications

Mass flow control	Flow setting, forced valve open/close operation, and zero cut
Mass flow power	0-5 VDC
Mass flow input/output	± 15 V is 150 mA max. for ± 15 VDC (250 mA) and -15 VDC 250 mA.
Number of display digits	Momentary flow display: 3-1/2 digits
Display accuracy	Within $\pm 0.2\%$ F.S. (Within ± 1 digit)
External control	Rear terminal connector: Analog signal
Power consumption	Approx. 20 VA
AC power supply	85-264 VAC (50/60 Hz)
Weight & size	Approx. 400 g: 96 W x 48 H x 131 D (mm)



Dimensions



Mass Flow Meter Power Unit

MODEL PSK-2TFX

This is a DC power supply for mass flow meters. It can also drive such peripheral equipment as DPM-3 simultaneously. One unit permits operation of two systems – mass flow meters in two systems and the DPM-3 indicator or the like. One-touch connection with a connector permits easy wiring and signal transmission/reception.

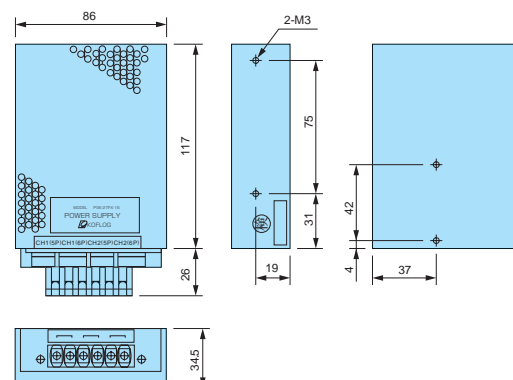
Specifications

Power supply	100 \pm 10 VAC
Power output for mass flow instrument	± 15 VDC, -15 V x 2 systems (± 12 VDC, -12 V x 2 systems)
Input/output signal	0-5 VDC x 2 systems
Object model	Mass flow meters in general DPM-3, ALM-4, ACM-10
External flow output	0-5 VDC x 2 systems

* The indication in () is for PSK-2TFX-12V.



Dimensions





MODEL PSK-FB SERIES



PSK-1FB



PSK-3FB

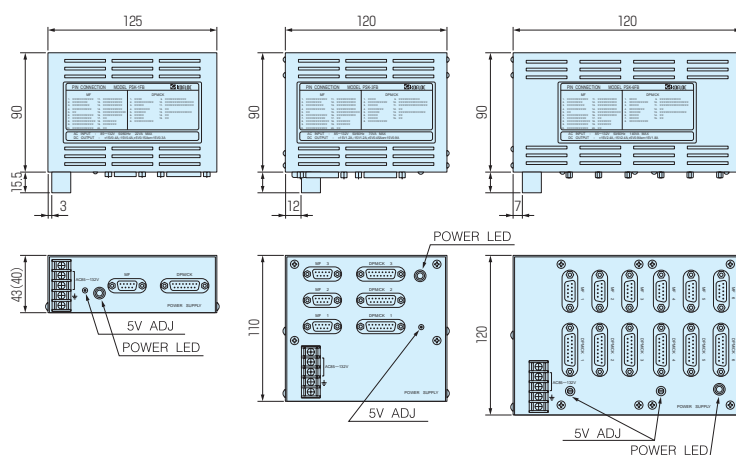


PSK-6FB

These DC power units can be commonly used for mass flow controller and meters. The 1FB, 3FB and 6FB types can supply power to 1, 3 and 6 lines (units) of mass flow controllers/meters, DPM-100 or other input/display units, DPM-3 or other flow indicators, and CK-1A or other setting devices, respectively. A Dsub connector allows quick connection to the unit to which power is to be supplied without time-consuming wiring job, also making signal exchange easier.

Type		PSK-1FB	PSK-3FB	SK-6FB
Application (Power supply for)		1 unit	3 units	6 units
Input voltage (frequency)		85-132VAC (47-66Hz)		
Power consumption		22 W max.	70 W max.	140 W max.
Fuse		125V-0.8A	125V-3.15A	125V-6.3A
Power Output	Power source	±15VDC (±5%)		
	For setting flow values	+5VDC (±1%)		
	For external indicators	+5VDC (±5%), +15VDC (±5%)		
Flow I/O signals		0~+5 VDC (15 VDC max.)		
Set point output signals		0~+5VDC		
Working temperature range		0-40°C		
Working environment (humidity range)		0-90%RH (No condensation)		
Weight		Approx. 0.8 kg	Approx. 1.3 kg	Approx. 1.7 kg

Dimensions



Model 8300 Series Power Cable

PSK-83/CP-83CF SERIES

The PSK-83 is an AC adapter type power supply that can operate one Model 8300 Series system. The CP-83CF cable is used to drive the Model 8300 Series, acting as an interface for various event outputs for power flow signal (analog) digital communication [RS485/232C (Multi)]. (The cable end is loose.)

Ordering

● **Power supply:** PSK-83 (Cable length: 1.5 m only)

● **Cable:** CP-83CF

1M	Cable length: 1.5 m
3M	Cable length: 3 m
5M	Cable length: 5 m
X	Cable length: Contact us for details.

Loose end (* For details of the signal interface, refer to the instruction manual.)

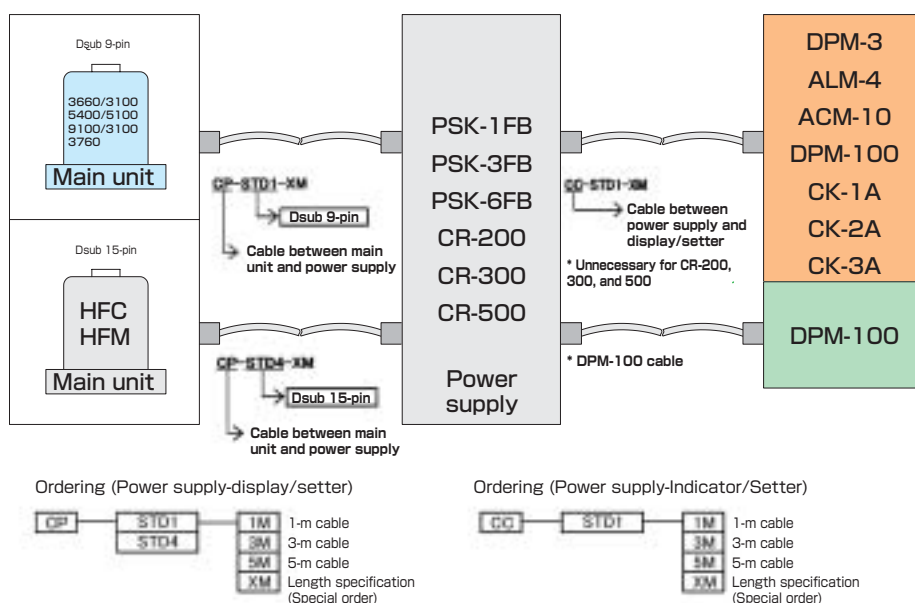
8300 main unit connector
(DS20P half-pitch connector)



TABLE OF COMPATIBILITY - CABLES AND ACCESSORIES FOR KOFLOC MASS FLOW METERS/CONTROLLERS

Example of use of accessories

(1) When standard power supply is used



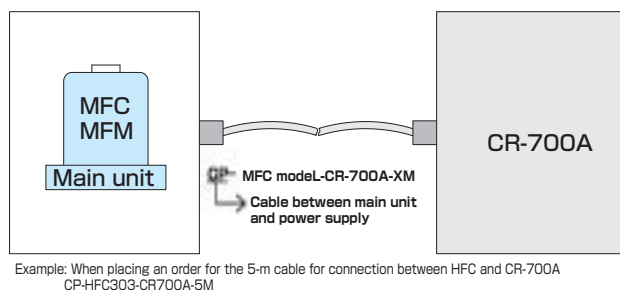
Example: When placing an order for the 5-m cable for connection between 5400 and PSK-1FB
CP-STD1-5M

Example: When placing an order for the 1-m cable for connection between HFC and CR-200
CP-STD4-1M

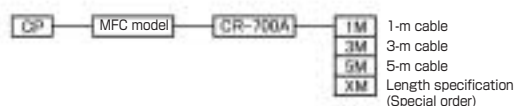
Example: When placing an order for the 3-m cable for connection between PSK-1FB and DPM3/CK-1A
CC-STD1-3M

Example: When placing an order for the 5-m cable for connection between PSK-1FB and DPM100
CC-FBDPM100-5M

(2) When CR-700A is used



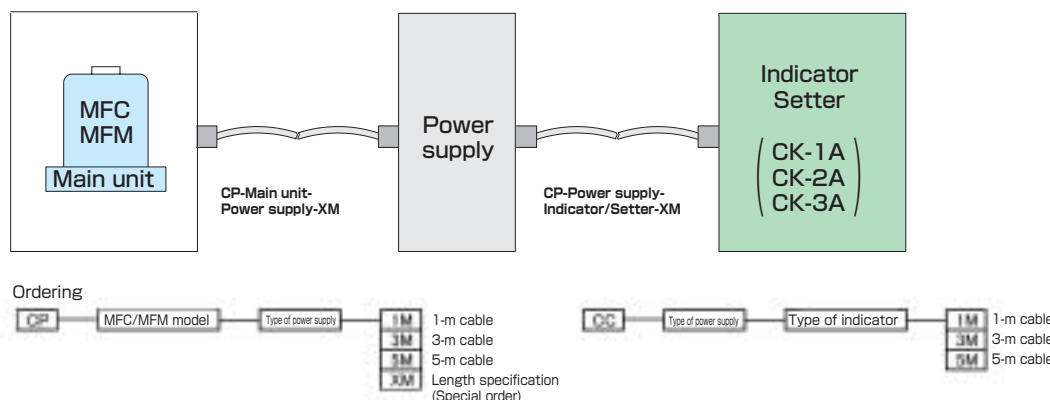
Ordering



Example: When placing an order for the 1-m cable for connection between 3660 and CR-700A



(3) Other MFC/MFM power connection cables (Old model specifications)

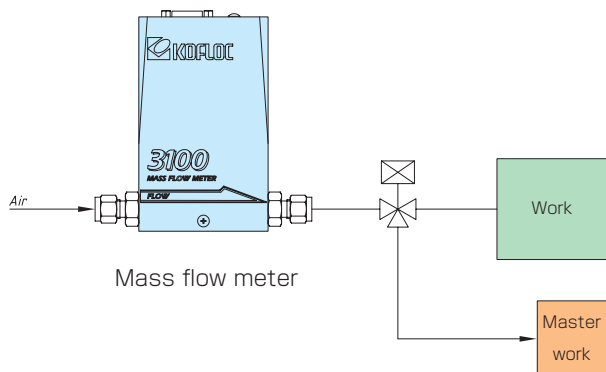


EXAMPLES OF APPLICATIONS OF MASS FLOW METERS/CONTROLLERS

A

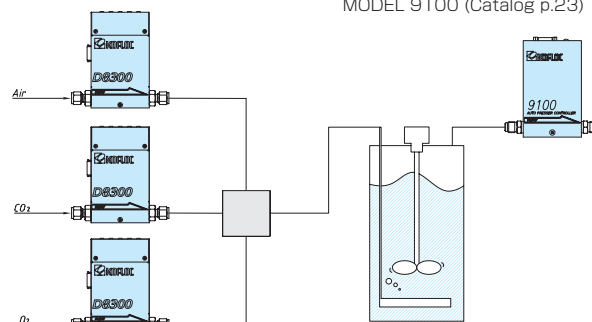
For air leak tester

MODEL 3100 (Catalog p.26)



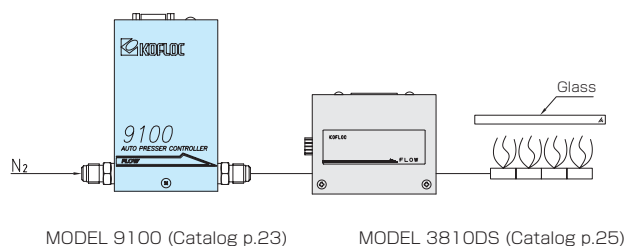
For bioreactor

MODEL 9100 (Catalog p.23)

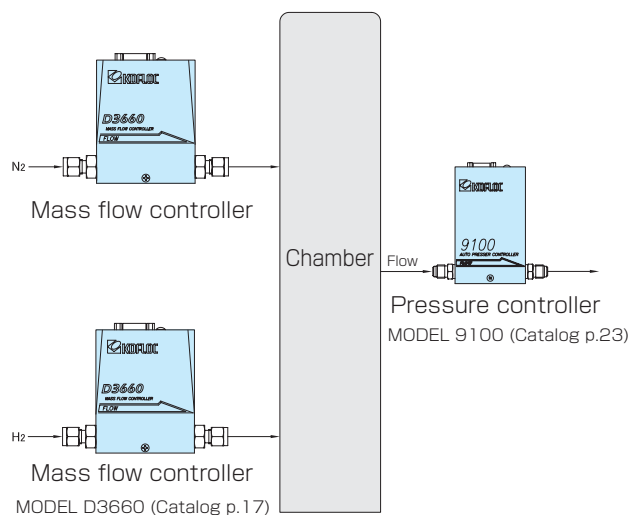


MODEL D8300 (Catalog p.16)

For liquid crystal glass transportation

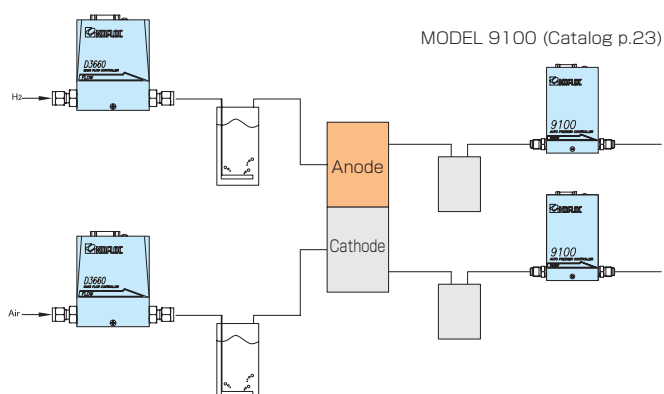


Chamber pressure control

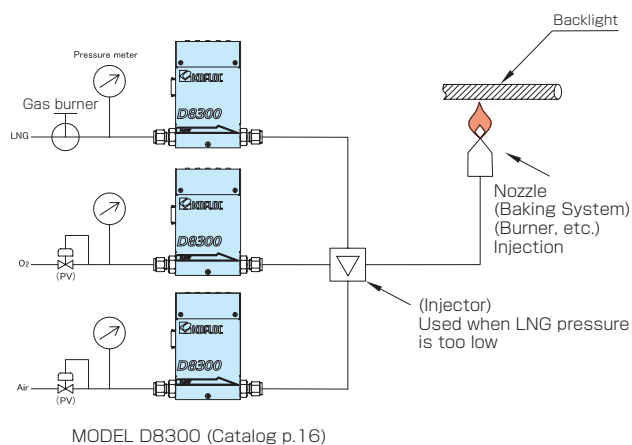


For fuel cell evaluation equipment

MODEL D3660 (Catalog p.17)



For CCFL combustion For burner gas flow control



Compact Handy Mass Flow Control/Measurement Unit

FLOW COMPO®

This is a compact handy flow control/measuring unit made by combining a compact DIN72 x72 power indicator [CR-300] and MFC/MFM.

Features

- Compact, lightweight integral unit
- The touch panel type permits easy FS scaling, flow setting, and valve opening/closing.
- Free selection of joints ranging from one-touch type to Swageloc
- The MFC-equipped type (FCC Series) can be used as MFM by pressing the OPEN switch.
- Please contact us for the metal seal specifications for corrosive gas.

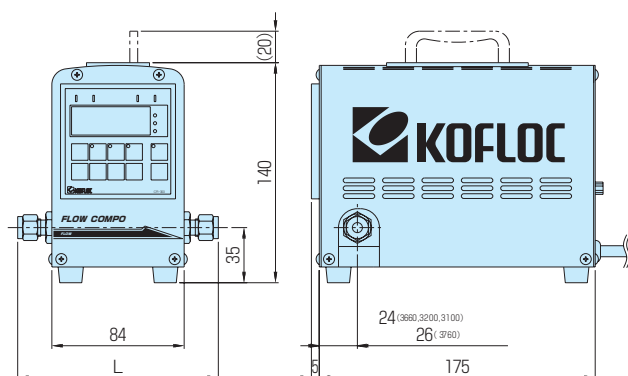


Standard Specifications

MODEL	FCC-3000-G1	FCC-3000-G2	FCM-3000-G1	FCM-3000-G2
Mounting MFC/MFM	3660 (MFC)	3200 (MFC)	3760 (MFM)	3100 (MFM)
Standard flow range (at N ₂ calibration condition)	10SCCM-20SLM	1SCCM-20SLM	10SCCM-20SLM	1SCCM-20SLM
Sealing material	Viton®	Viton®	Viton®	Viton®
Response	Within 2 sec. (F.S. ±2%)	Within 1 sec. (F.S. ±2%)	Within 1 sec.	Within 1 sec.
Operating ambient temperature	5–45°C (Accuracy guaranteed at: 15–35°C)	0–50°C	5–45°C (Accuracy guaranteed at: 15–35°C)	0–50°C
Joint	Various joints are applicable.			

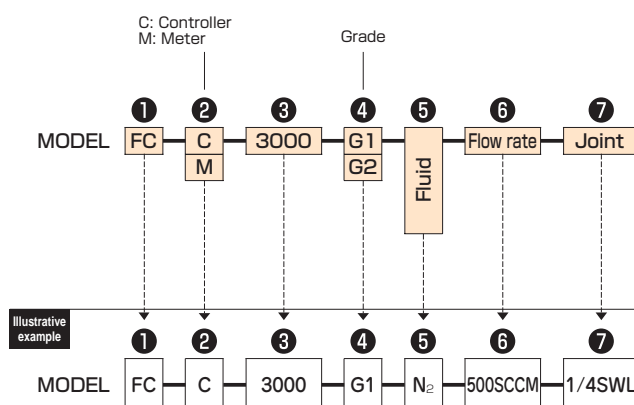
* For details of the specifications, refer to the mounting MFC/MFM and CR-300.

Dimensions



* For L, refer to the face-to-face distance of the joint of respective mounting MFC/MFM.
Note: "FLOW COMPO" is a trademark of our company.

Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.