



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 ±2% of full scale of final value typical for 0-100% response
Accuracy	Within ±1.0% F.S./3100 Within ±1.5% F.S./3105
Linearity	Within ±0.5% F.S.
Repeatability	Within ±0.2% F.S.
Proof pressure	980kPa
Leak rate	1x10 ⁻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 (±5%) 100mA, -15VDC (±5%) 100mA

* Values indicated in () are for Model 3105.

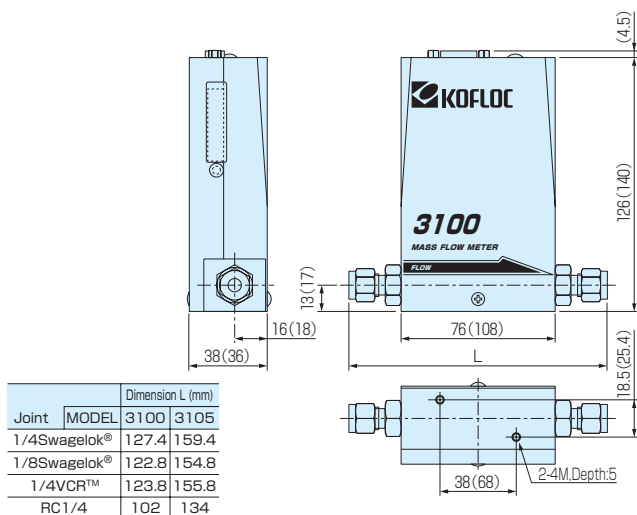
Harness Layout

Pin Assignment of Dsub 9-pin Connector per KFC Standard

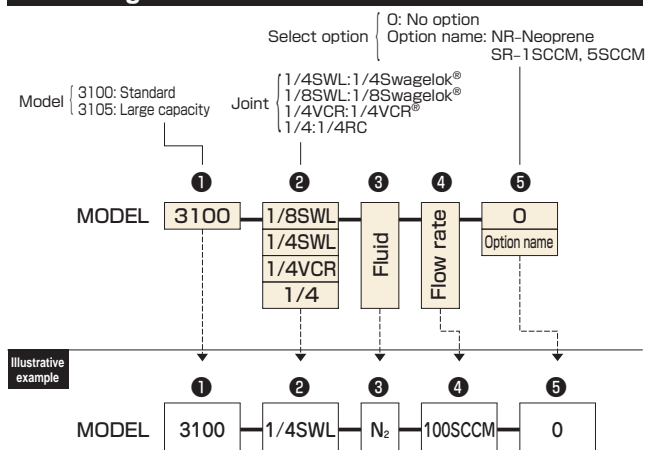
Pin No.	Signal	Pin No.	Signal
1	NC	6	NC
2	Flow output 0-5 V	7	Flow output COM
3	+15 VDC Power source	8	NC
4	Power source COM	9	NC
5	-15 VDC Power source		



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.



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 ±2% of full scale of final value typical for 0-100% response
Accuracy	Within ±1.0% F.S.(@20°C)
Linearity	Within ±0.5% F.S.(@20°C)
Repeatability	Within ±0.2% F.S.(@20°C)
Operating differential pressure	F.S.≤5SLM 49kPa-294kPa * Low differential pressure specification depends on types of gas and flow rates to be used. 5<F.S.≤20SLM 98kPa-294kPa
Proof pressure	980kPa
Leak rate	1x10 ⁻⁶ 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 (±5%) 100mA, -15VDC (±5%) 200mA
Weight	Approx. 1000 g

Harness Layout

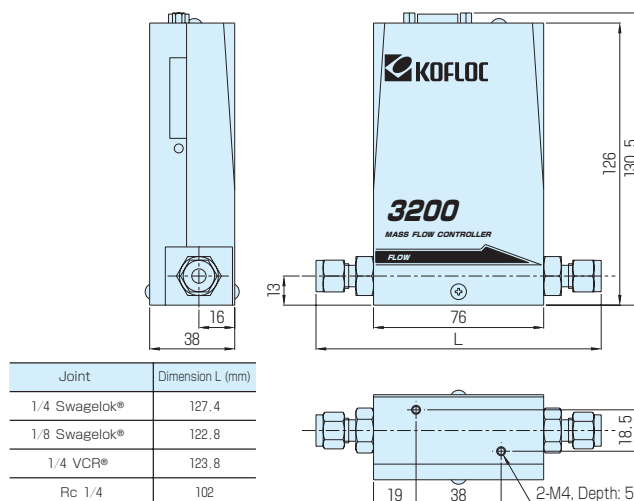
Pin Assignment of Dsub 9-pin Connector per KFC Standard

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		

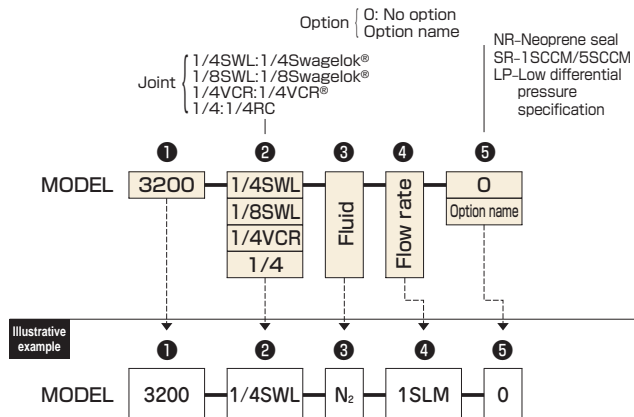
* Because a differential input system is used for the product, pin 4 (Power source COM) and pin 7 (Flow output COM) are connected inside the mass flow controller while pin 8 (Flow input Lo) is isolated. In case of a single-ended connection, connect pin 8 to pin 4.



Dimensions



Ordering



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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 ±2% of full scale of final value typical for 0-100% response
Accuracy	Within ±1.5% F.S. (Within ±2.0% F.S.)(@20°C)
Repeatability*	Within ±0.5% F.S.(@20°C)
Operating differential pressure	F.S. ≤5SLM 49kPa-294kPa
	* Low differential pressure specification depends on types of gas and flow rates to be used.
Proof pressure*	980kPa
Leak rate*	1x10 ⁻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 (±5%) 100mA -15VDC (±5%) 200mA
Weight	Approx. 800 g

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

Harness Layout

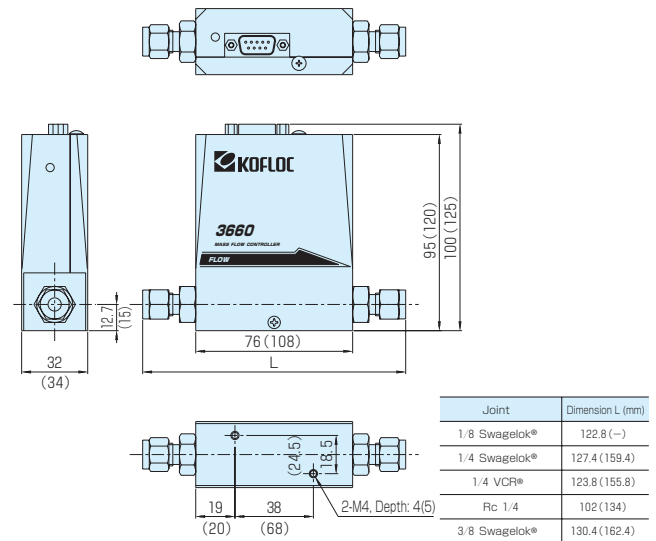
Pin Assignment of Dsub 9-pin Connector per KFC Standard

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.

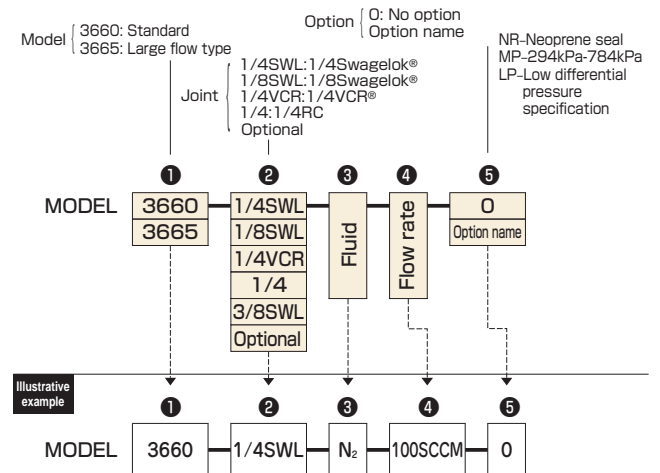


Dimensions



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

Ordering



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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 ±1.5% F.S. (Within ±2% F.S.)(@20°C)
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±5% 100mA, -15VDC±5% 100mA
Weight	Approx. 650 g

* Values indicated in () are for the 3765.

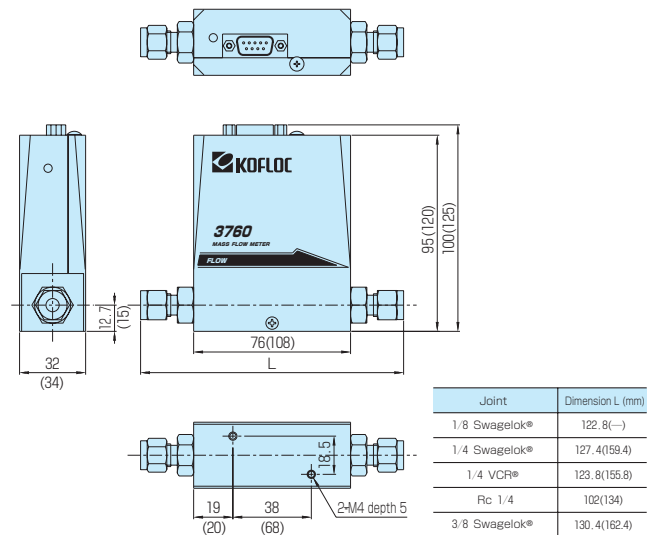
Harness Layout

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		

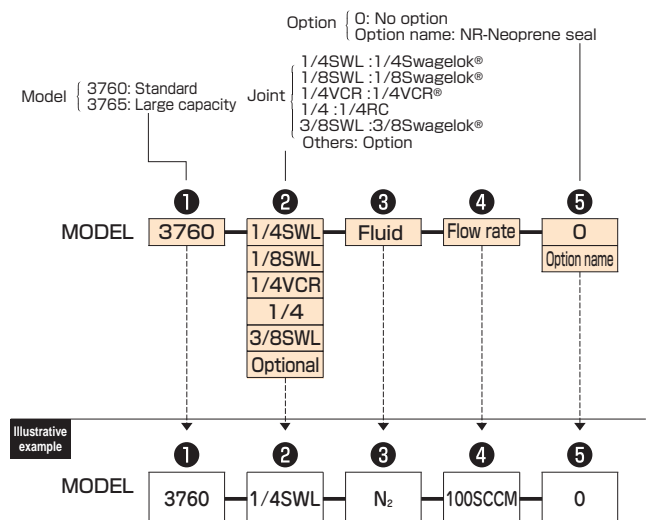


Dimensions



Dimensions indicated in () are for the 3765.

Ordering



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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

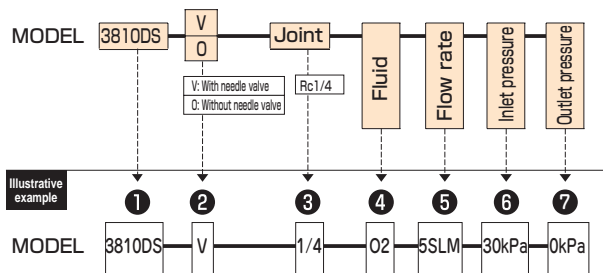
- Precision needle valve for control and monitoring of very small flows
- Two-point alarm output for flow monitoring
- Compact and lightweight mass flow meter!
- The indicator permits instant use simply after connecting a 24 VDC power supply.
- Mass flow instruments eliminate troublesome flow correction 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. (@20°C)	Within $\pm 3\%$ F.S. (@20°C)
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	

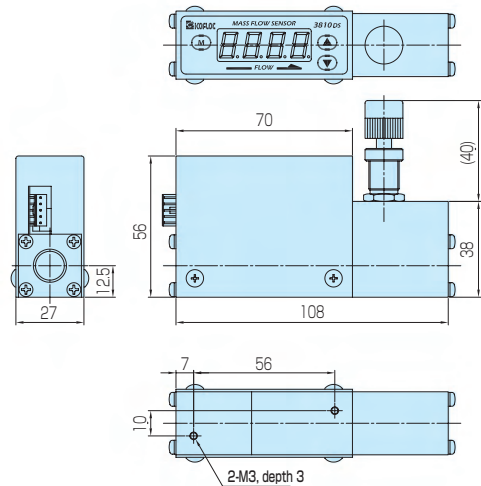
* Cable connection
 Connector 3810DS side: AMP171826-5
 Cable side: AMP171822-5

Ordering

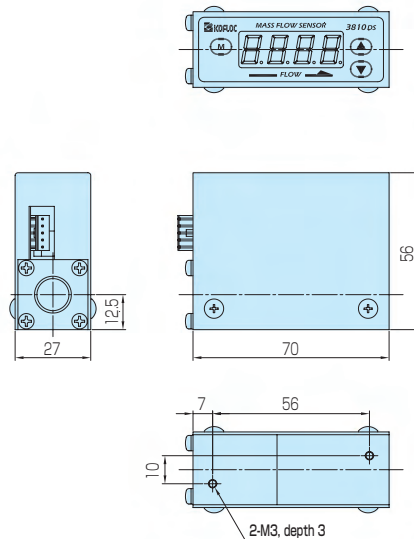


3810DS

Dimensions



3810DS with needle valve



3810DS

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.

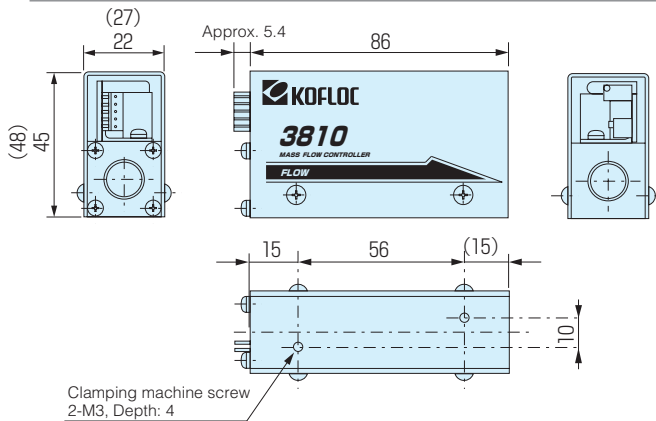
Features

- 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.

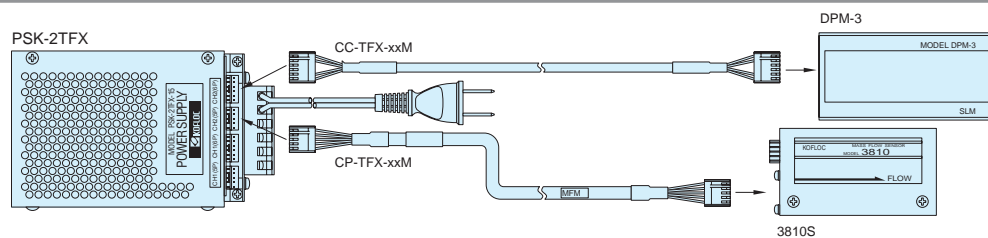
Standard Specifications

Flow range (at N ₂ calibration conditions)	F.S.10SCCM-2SLM	F.S.3-50SLM
Accuracy	Within ±2.0% F.S.(@20°C)	Within ±5.0% F.S.(@20°C)
Repeatability	Within ±0.5% F.S.(@20°C)	
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 (±5%) 40mA, -15VDC (±5%) 10mA	
Weight	250g	350g

Dimensions



Example of Wiring



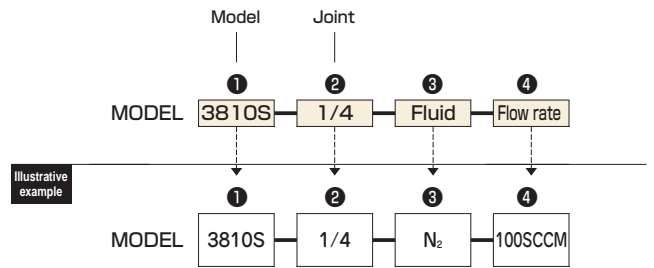
Cable Connections

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



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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. (@20°C)
Linearity	Within $\pm 0.5\%$ F.S. (@20°C)
Repeatability	Within $\pm 0.2\%$ F.S. (@20°C)
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·m ³ /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
Weight	Approx. 1000 g

Harness Layout

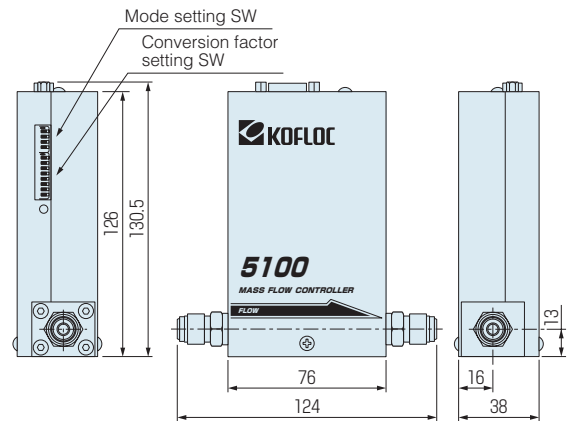
Pin Assignment of Dsub 9-pin Connector per KFC Standard

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 sourc	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.

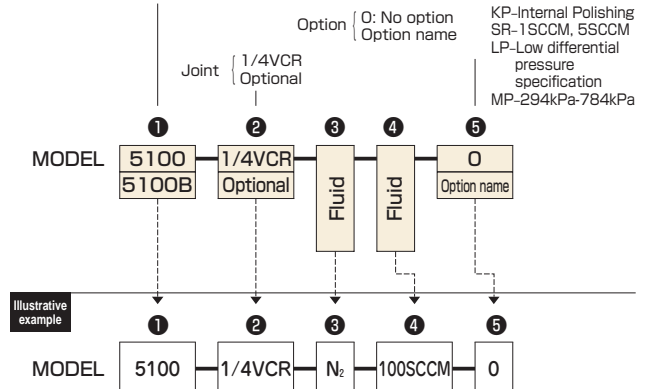


Dimensions



Ordering

SU-SVS Seal(for Cogas)
QS-Quick start, SL-Slow start



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Low-cost Metal Sealed Mass Flow Controller/Meter

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.(@20°C)
Linearity	Within $\pm 0.5\%$ F.S.(@20°C)
Repeatability	Within $\pm 0.2\%$ F.S.(@20°C)
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 98-294kPa
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
Weight	Approx. 1000 g

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

Harness Layout

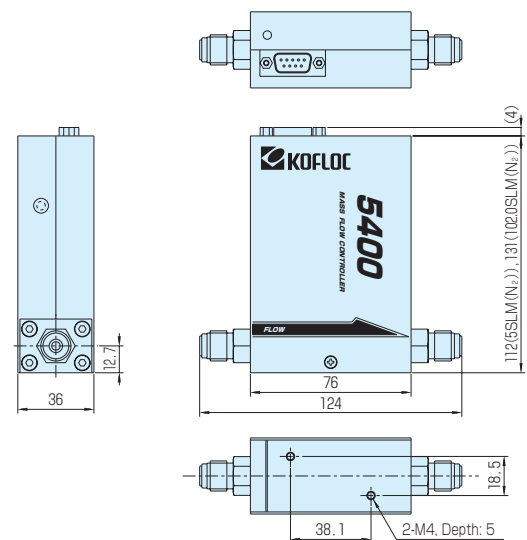
Pin Assignment of Dsub 9-pin Connector per KFC Standard

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		

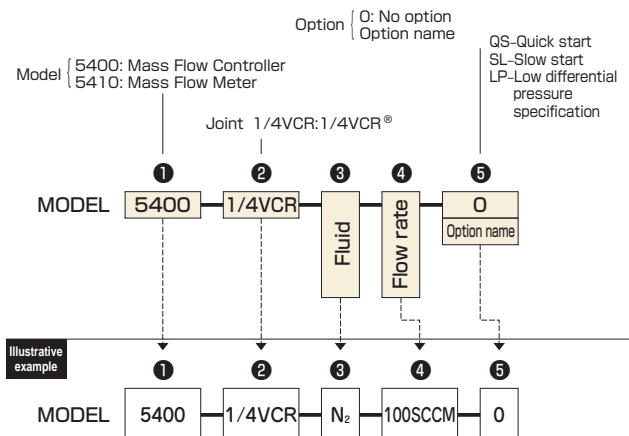
* Because a differential input system is used for the product, pin 4 (Power source COM) and pin 7 (Flow output COM) are connected inside the mass flow controller while pin 8 (Flow input Lo) is isolated. In case of a single-ended connection, connect pin 8 to pin 4.
* Pins 2, 3, 4, 5, 7 only for Mass Flow Meter



Dimensions



Ordering



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Super-Compact Mass Flow Controller

MODEL 7200MC

Upcoming

RoHS compatible

A

The MODEL 7200MC is an ultimately downsized model equipped with a newly-developed chip type thermal sensor.

Compared with conventional products, this new type flow meter ensures substantially improved response and repeatability.

Features

- Equipped with a chip type thermal sensor developed using film forming technology and MEMS technology
- Realization of quick response and high repeatability
- Flow setting input and flow output signal changeover (0-5 V; 4-20 mA)
- Single supply voltage; 24 VDC driving
- Ideal for mounting on portable gas analyzers

Standard Specifications

Valve type	Proportion solenoid		
Valve operation	Normally closed (N.C.)		
Flow range (F.S.)	50SCCM,500SCCM	5SLM,10SLM	20SLM
Object gas	Air,N ₂ ,Ar,He,H ₂ ,CO ₂		
Sensor	Chip sensor		
Control system	Control range	2-100%	
	Response	1sec	
	Accuracy (20°C)	±1%F.S.	±2%F.S.
	Repeatability	0.2%F.S.	
Pressure	Standard differential pressure	500 kPa (Inlet : 500 kPa ; outlet : 0 kPa) gauge pressure	
	Operating differential pressure range	L : 150-400kPa,M : 350-650kPa,H : 600-900kPa	
	Proof pressure	980kPa	
Temperature	Standard temperature	20°C	
	Allowable operating temperature range	0°C~+50°C	
	Allowable storage temperature range	-10°C~+60°C	
Humidity	Allowable operating humidity range	10-90%RH (Dew condensation not allowed.)	
Flow rate signal	Analog input	4-20mA : DC0-5V	
	Analog output	4-20mA : DC0-5V	
Power supply	Rating	24 VDC; power consumption: 350 mA	
	Allowable supply voltage range	24 V ±10% (Ripple: 5%)	
Applicable standards	RoHS and CE Marking compliant		
Materials of parts in contact with gases	Brass, NBR, resin, SUS		
Joint	RC 1/4		
Weight	800g	800g	1000g

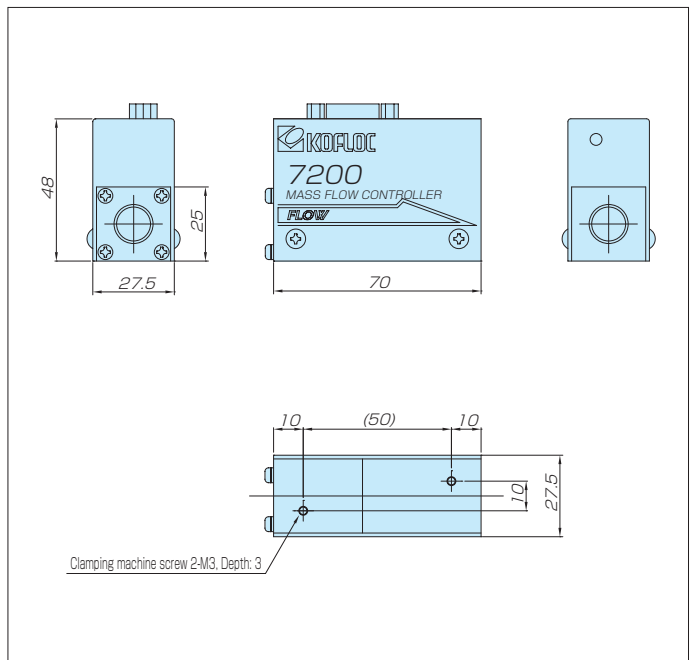
Cable Connections

Dsub 9-pin, male

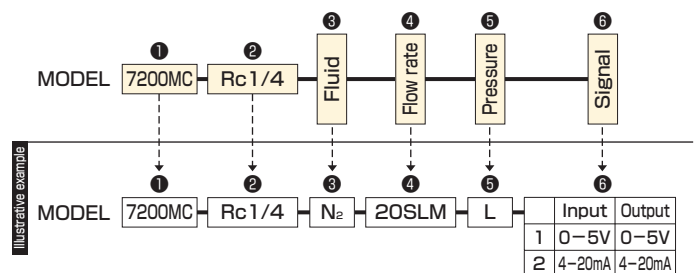
Pin No.	Signal name	Pin No.	Signal name
1	Forced open-close input	6	Flow setting signal input
2	Flow signal output	7	Flow rate signal output: COM
3	Power 24 V input	8	Flow setting signal input: COM
4	Power: COM	9	NC
5	NC		



Dimensions



Ordering



* Refer to "Ordering" and "Illustrative Examples" 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.

Chip Sensor-equipped Mass Flow Meter

MODEL 7800

Upcoming

RoHS compatible

The Model 7800 is a general-purpose mass flow meter equipped with a newly developed chip type thermal sensor.

Maintaining the quick response and high repeatability of the chip type thermal sensor, this model is suitable for use with wide-ranging flow rates and application in various fields.

Features

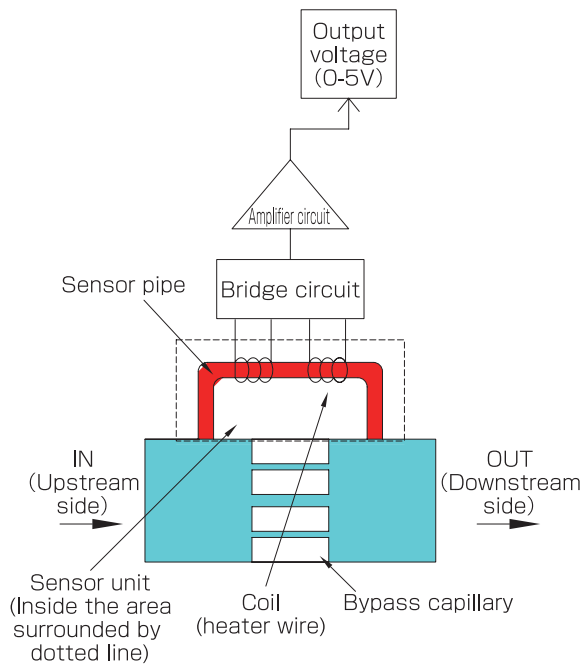
- Equipped with a chip type thermal sensor developed using film forming technology and MEMS technology
- Realization of quick response and high repeatability
- Flow output signal changeover (0-5 V; 4-20 mA)
- Single supply voltage; 24 VDC driving
- Ideal for mounting on portable gas analyzers.



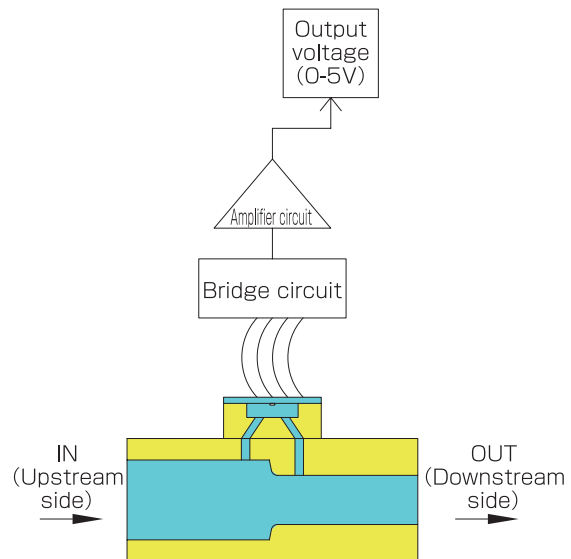
Differences between the MODEL 7800 and conventional products

Conventional coil sensors are made by winding sensor coils of 20 μm in outer diameter around two locations on the upstream and downstream sides of a stainless steel pipe having an outer diameter of 0.4φ and inner diameter of 0.3φ in order to maintain the coil temperature. The rough structure of the representative mass flow meter equipped with such a sensor is shown in Structural Drawing 1 below.

The MODEL 7800 newly developed this time is equipped with a semiconductor micro sensor developed using MEMS technology, having a through-flow space (no structure) inside to drastically reduce the generation of foreign particles. The structure of the new MODEL 7800 is shown in Structural Drawing 2 below.



Structural Drawing 1 (Conventional type)

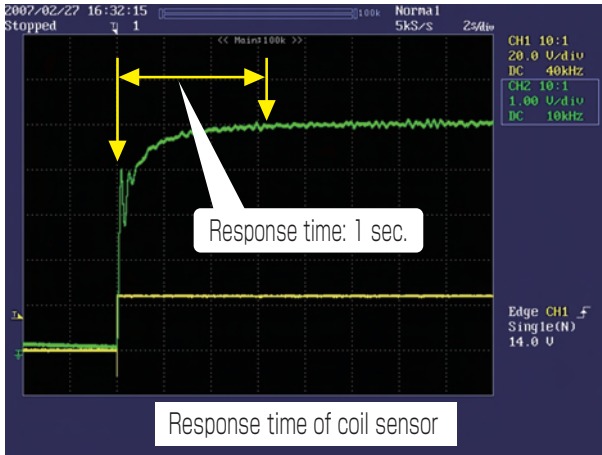


Structural Drawing 2 (Conventional type)

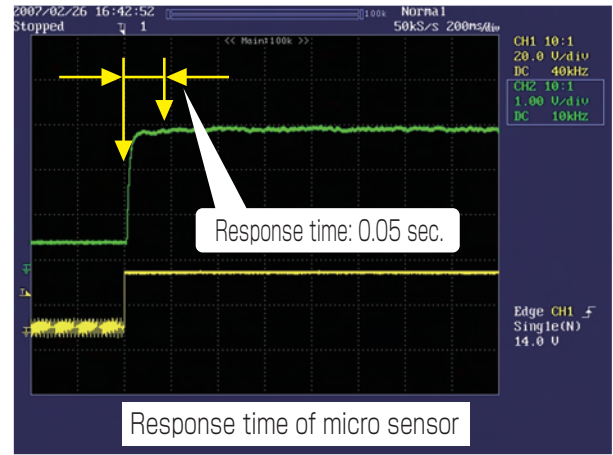
Difference between conventional mass flow meter and MODEL 7800

(1) Improved response

A major difference between conventional mass flow meters and the Model 7800 in terms of performance is response time. The one-minute barrier is very difficult to break for conventional sensors, and even our company had previously determined that it would be impossible to break the barrier after having attempted numerous trials conducted since the founding of the company. However, the semiconductor micro sensor, which we have been permitted to newly develop by the Local Regeneration Consortium, has made it possible to easily break the barrier, successfully achieving speeds as fast as 50 ms (0.05 sec), less than 1/20th conventional speeds. (Refer to the waveforms shown in photos 1 and 2.)



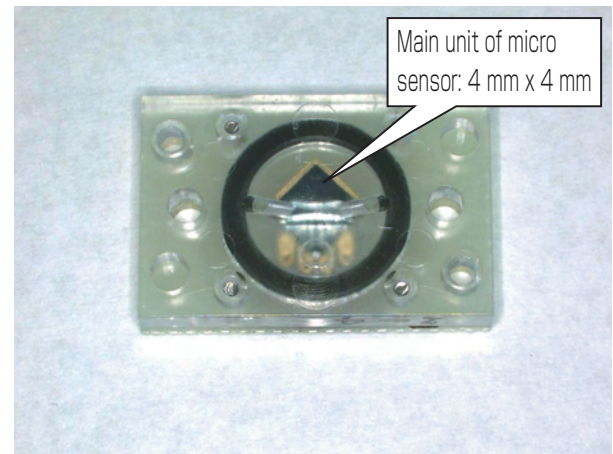
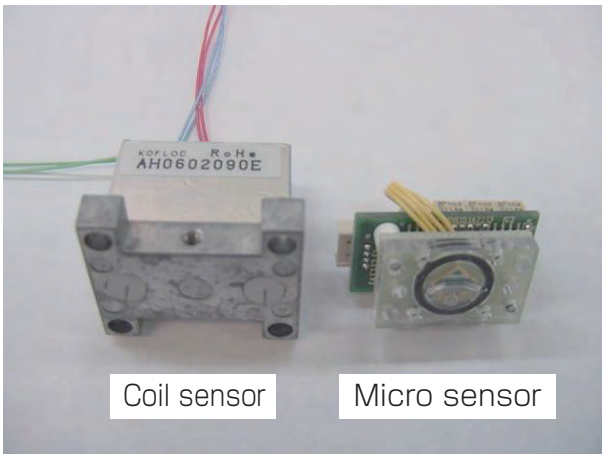
Output Waveform Photo 1 (Conventional Product)



Output Waveform Photo 2 (Model7800)

(2) Downsizing

Another significant difference is the size of the sensor itself. The outside dimensions of conventional sensors are typically 40 mm x 40 mm. Although the sensor for the MODEL 7800 requires a space of 10 mm x 20 mm for installation, the size of the sensor itself is only 4 mm x 4 mm, 1/100th the size of conventional products. (Refer to the photos below.)

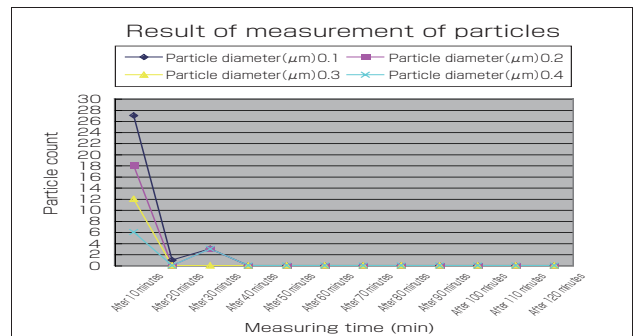


(3) Economy (Low power consumption)

The power consumption of conventional sensors is approximately 400 mW. However, the power consumption of the sensor for the MODEL 7800 is only 10 mW, 1/40th the power consumption of conventional sensors.

(4) Cleanliness

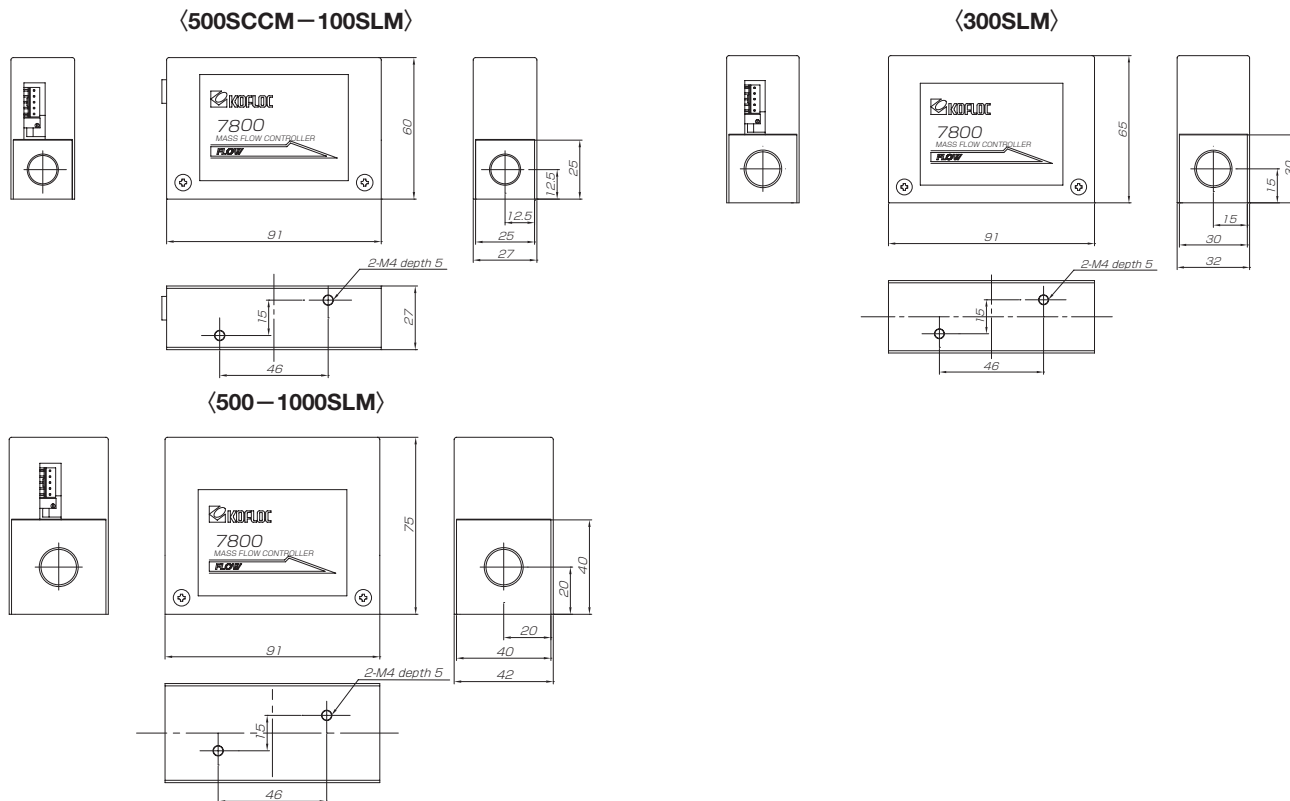
The interior of the MODEL 7800 has been made hollow in accordance with a development concept that emphasizes eliminating the source of foreign particle generation. As a result, the number of particles of 0.1 μm or more in size (fine foreign particles) counted during a 10 minute measurement period per 1 ft³ was zero. (The count was zero as well when the 10-minute measurement was conducted approximately 12 times (for 2 continuous hours).)



The particle count, which did not reach zero in the conventional coil type sensor, reached zero completely after approximately 40 minutes.

(5) Outside dimensions

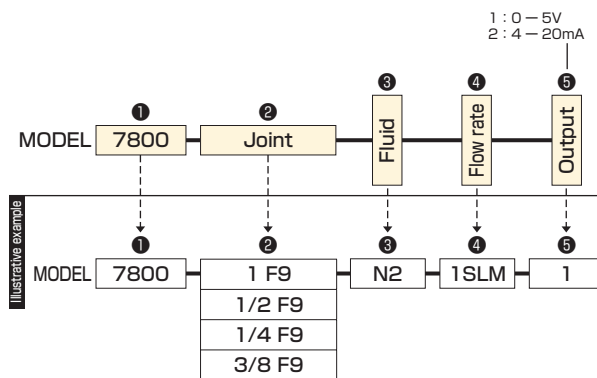
As mentioned before, the sensor has been miniaturized, and the new development of the compact semiconductor micro sensor mounted on the mass flow meter this time has successfully made it possible to reduce the overall dimensions of the entire mass flow meter to half. (The scale of downsizing, compared with that of other products offered by our company, differs slightly depending on the flow rate.)



Standard Specifications

Flow range (F.S.)	500SCCM, 1SLM, 10SLM	50SLM, 100SLM	300SLM	500SLM, 1000SLM
Object gas	Air, N ₂			
Sensor	Chip sensor			
Main specifications	Measuring range	2-100%		5-100%
	Response	300msec	500msec	
	Accuracy (20°C)	±1%F.S.	±2%F.S.	±3%F.S.
	Temperature characteristics	0.2%/°C (15-35°C)		
Pressure	Proof pressure	0.98MPa		
Temperature	Standard temperature	20°C		
	Allowable operating temperature range	0°C+50°C		
	Allowable storage temperature range	-10°C+60°C		
Humidity	Allowable operating humidity range	10-90%RH (Dew condensation not allowed.)		
Flow output	Analog output	4-20mA/DC0-5V		
Power supply	Rating	24 VDC; power consumption: 100 mA		
	Allowable supply voltage range	24 V ±10% (Ripple : 5%)		
Applicable standards	RoHS and CE Marking compliant			
Materials of parts in contact with gases	SUS303, Viton, resin			
Joint	1/4 F900, 3/8 F900		1/2 F900, 1 F900	
Weight	600g		800g	1200g

Ordering



* Refer to "Ordering" and "Illustrative Examples" 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.

* Measurements will be taken for joints other than our standard joints. (Option)

Mass Flow Controller/Mass Flow Meter with Indicator

MODEL 8500

RoHS
compatible

This mass flow controller/meter driven by a 24 VDC power supply has been developed as a successor to the MODEL 8300.

The view point change function of the display unit and the pattern setting function are unique to this model, and noise resistance has been improved dramatically. A sister model with a detachable display and setting unit is also available.

Features

- The high-lift actuator allows this compact model to control a large flow rate.
- Equipped with a display and setting unit, this model can be operated by a 24 VDC power supply.
- The RS232C/RS485 communication function and integration function are provided as standard equipment.
- The 14-bit converter permits display and operation in 4-1/2 digits.
- Control of the flow rate of inflammable gas is possible, because the heat generating part of the sensor is not exposed to gas.
- There are no limitations on the mounting position that may be employed.
- In addition to SV setting, five other patterns can be set.
- Auto zero and auto close functions are also standard.

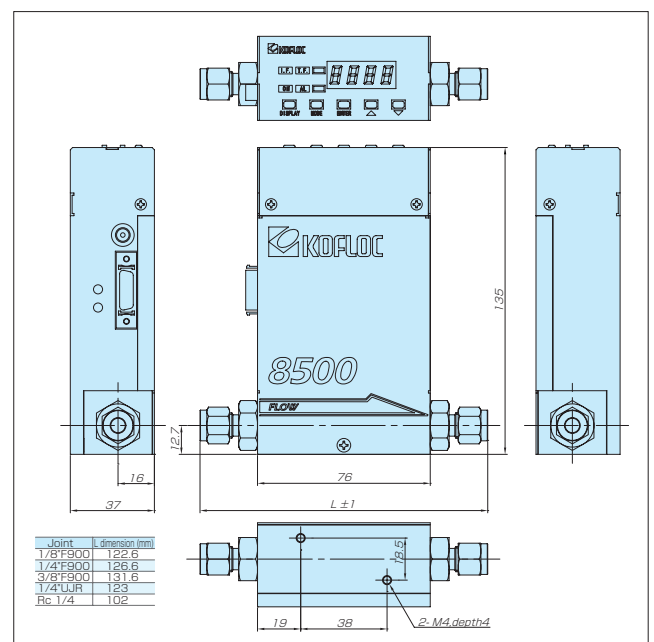
Standard Specifications

Flow range (F.S.) (at N2 calibration conditions)	10SCCM-20SLM	
Sensor	Thermal coil sensor	
Valve actuator	Solenoid; normally-closed	
Valve type	Poppet valve	
Control system	Control range	2%-100% F.S.
	Response	2 sec. or less for 0 to 98%
	Accuracy	±1.5%F.S.(@20°C)
	Repeatability	±1.0%F.S.(@20°C)
Pressure	Proof pressure	980kPa
	Operating differential pressure	F.S.≤5SLM 49-294kPa 5<F.S.≤20SLM 98-294kPa
	Low differential pressure (Option)	2kPa-149kPa
Temperature	Operating temperature	0-50°C
	Accuracy guaranteed temperature	15°C-35°C ±0.2F.S./°C
Humidity	Allowable operating humidity	10-90%RH (Dew condensation not allowed.)
Flow rate setting	Mode	(1) Standard key input (2) External setting input (3) Pattern key input (5 patterns)
	Input range	(1) 0V-5V (2) 4mA-20mA (Arbitrary setting)
Flow rate output	Output range	(1) 0V-5V (2) 4mA-20mA (Arbitrary setting)
Flow indication	Method of display	7-segment LED in 4 digits; Integral display: 0000-9999
	Accuracy of display	±0.1%
Communication		RS485
		RS232C
Alarm	Output No.	Alarm output: 2 (Open collector output Max 35 V: 50 mA)
	Resolution	1mV (1digit)
Power supply	Rating	24 VDC current consumption: 300 mA max.
	Allowable supply voltage range	24 VDC±10%(Ripple 5%)
Materials of parts in contact with gases		Viton, PTFE, SUS316, neoprene (option)
Joint		Rc1/4, 1/4F900, 1/4UJR
Mounting position		No specification
Weight		Approx. 1,200 g

- * Select the input/output signal from (1) 0-5 V and (2) 4-20 mA when placing an order.
- * Please contact us for the 8550 type of 30-100SLM.



Dimensions

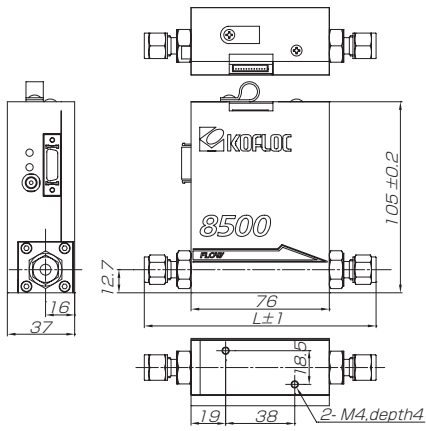


Ordering

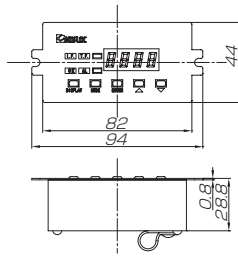
MODEL	8500MC	0	Joint	Fluid	Flow rate	Signal	Communication	Pressure
	8500MM	S						
	MC: Controller	O: Integral type	Rc 1/4		Input	Output		Type of communication
	MM: Meter	S1: Separation 1m	1/4F9	1	0-5V	0-5V	1	RS232C
		S3: Separation 3m	1/4UJR	2	4-20mA	4-20mA	2	RS485
		S5: Separation 5m		3	0-5V	4-20mA		
				4	4-20mA	0-5V		

- * Refer to "Ordering" and "Illustrative Examples" 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.
- * Measurements will be taken for joints other than our standard joints. (Option)

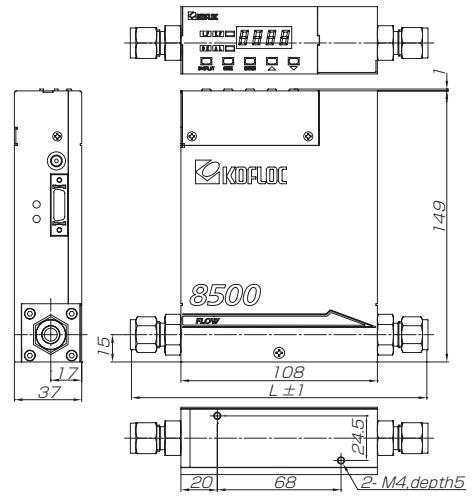
MODEL 8500 separate type – Main unit



MODEL 8500 separate type – Display

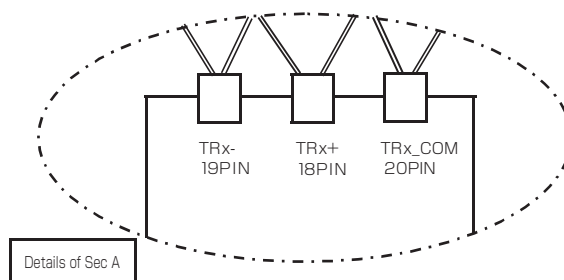
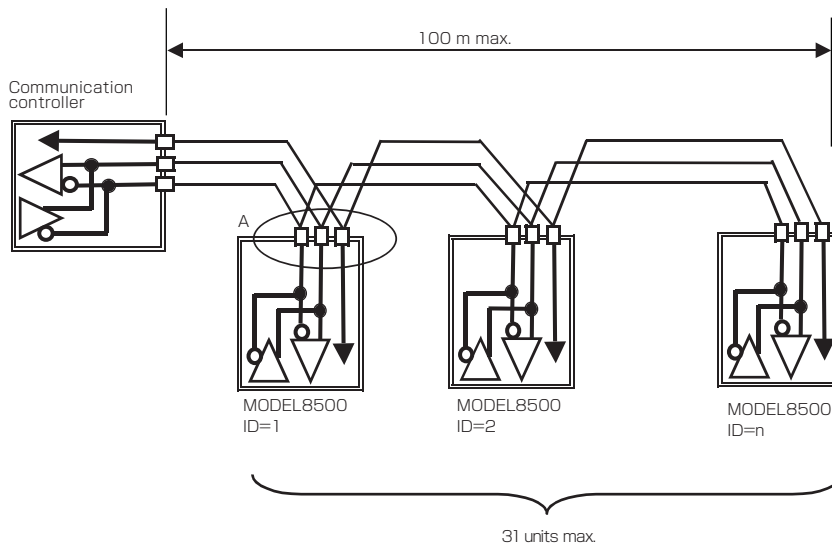


MODEL 8550 (for large flow rate)



Example of RS-485 communication wire configuration

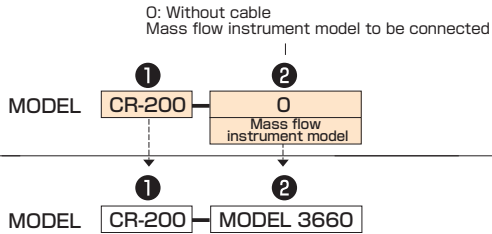
Example of communication system configuration with the MODEL D8500
 One logging PC permits logging and operation of a maximum of 31 units.
 (A communication terminating resistance is mounted. ON/OFF is possible.)



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:

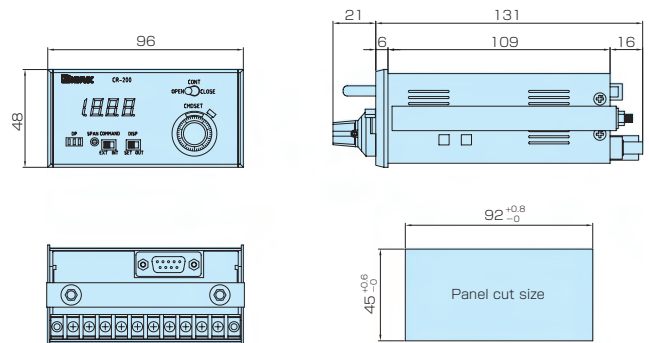
If the CR-200 Readout Unit is connected to some old mass flow models, it may malfunction or some of its functions may not work. Please consult with us before placing an order if your KOFLOC mass flow controller/meter is not listed in this catalog or if you want to connect the CR-200 Readout Unit to a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

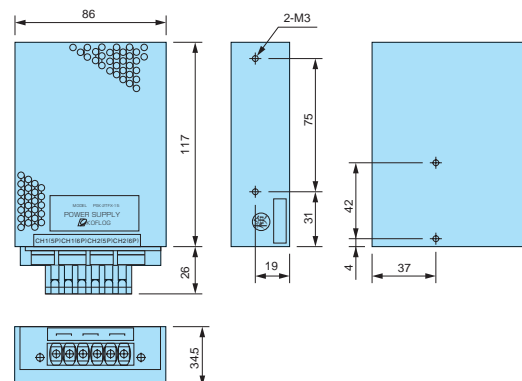
Specifications

Power supply	100 ±10 VAC
Power output for mass flow instrument	±15 VDC, -15 V x 2 systems (200mA) (±12 VDC, -12 V x 2 systems) (200mA)
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





Compact Readout Unit

MODEL CR-300



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

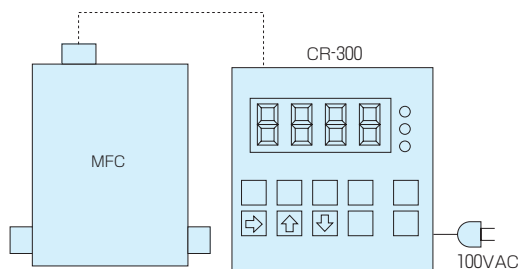
- Space-saving compact size (72 mm wide x 72 mm high)
- The unit controls valve operation of your mass flow controller.
- Remote control available via external control terminal provided on the back panel
- A lock key to prevent misoperation
- Mass flow controller supply voltage: ± 15 VDC (250 mA max.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



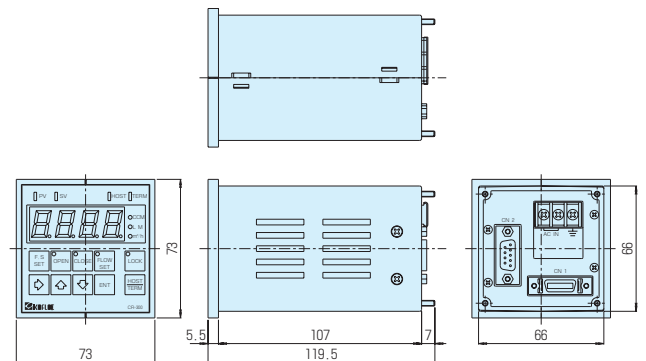
Standard Specifications

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

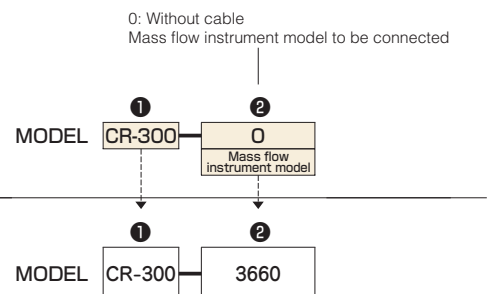


Panel thickness:

- 1.2 mm when the enclosed fitting is used
- 1.4-1.5 mm when one enclosed washer is placed between the panel and fitting
- 1.6-2.0 mm when two enclosed washers are placed between the panel and fitting

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.

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

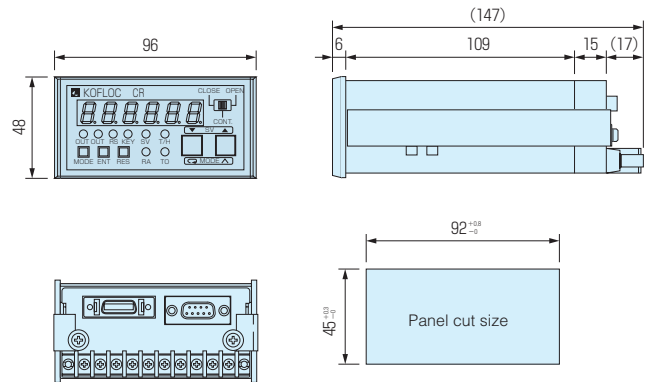
- Compact size (96 mm wide x 48 mm high) ideal for panel layout
- Multiple functions, such as 6-digit display of total flow, individual alarm outputs for the upper/lower limits, etc.
- Mass flow meters can be controlled from a computer via RS485 interface.
- Remote control of both analog and digital 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

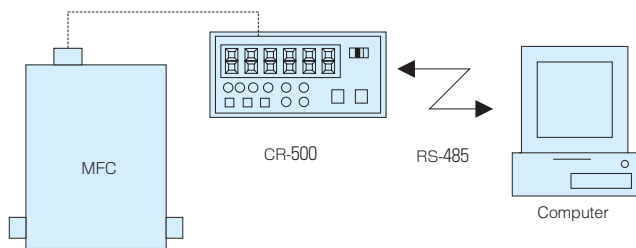
Mass flow control	Flow setting, forced valve open/close operation, and zero out
Mass flow input/output	0-5VDC
Mass flow power	± 15 VDC (300mA)
Number of display digits	Momentary flows: 4-1/2; Integrated flows: 6
Display accuracy	$\pm 0.3\%$ F.S. ± 1 digit in relation to the entered value
Display switching	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)



Dimensions

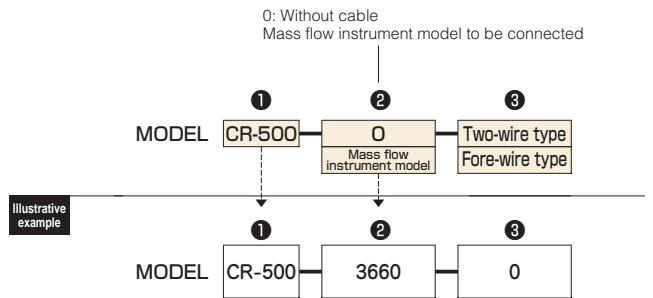


Layout Example with Readout Unit CR-500



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.



Digital Mass Flow Controller

MODEL D3660 SERIES



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

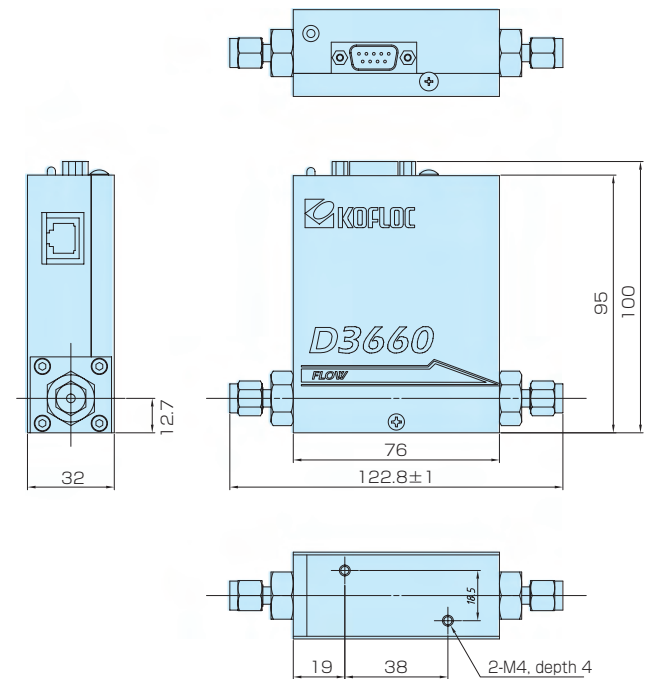


Standard Specifications

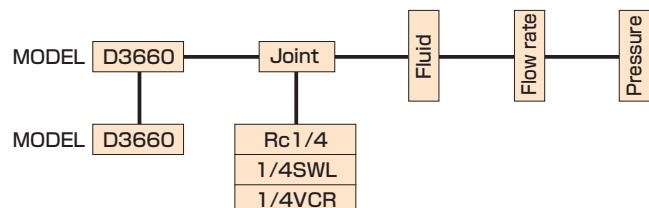
Flow rate (at N ₂ calibration condition)		10SCCM-20SLM
Sensor		Thermal mass flow sensor
Valve actuator		Normally closed solenoid valve actuator
Valve type		Poppet valve
Control system	Control range	2%–100% F.S.
	Response	Setting: 6-100% of F.S. ... Within 1 sec. for setting ±2% Setting: 2-5% of F.S. ... Within 3 sec. for setting ±2%
	Accuracy	Within ±1.0% F.S.(@20°C)
	Repeatability	Within ±0.2% F.S.(@20°C)
Pressure	Proof pressure	0.98MPa
	Operating differential pressure	FS≤5SLM 49-294kPa 5<FS≤20SLM 98-294kPa
Temperature	Operating temp.	0°C-50°C
	Accuracy guaranteed temp.	15°C-35°C ±0.05% F.S./°C
Humidity	Allowable operating humidity	10%–90% (No condensation)
Instrumentation	Flow rate output signals: Analog	Input/output signals: 0-5VDC
	Flow rate input signals: Analog	Input/output signals: 0-5VDC
	Communication	Communication type Connector
Power supply	Rating	+15VDC: 100mA -15VDC: 200mA
	Allowable supply voltage range	±15VDC: ±10% (Ripple 5%)
	Electrical connections	Dsub 9-pin male connector per KFC standards
Materials of parts in contact with gases		SUS316L, SUS316, PTFE, fluoro-rubber, or chloroprene rubber (option)
Joint		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



* 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.



Low-cost Digital Mass Flow Meter

MODEL D3810 SERIES



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

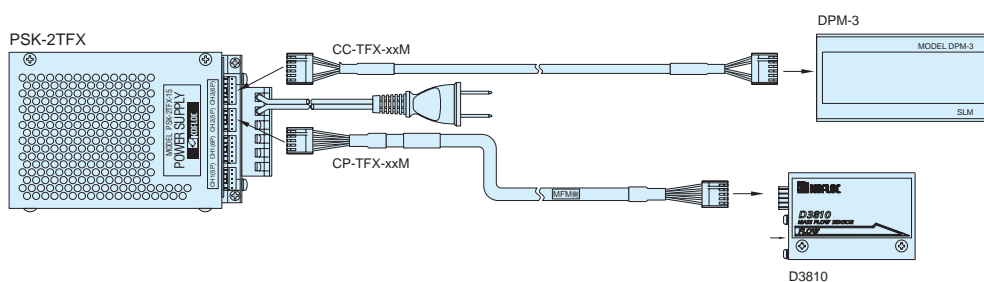
Flow range (at N ₂ calibration conditions)	50SLM
Accuracy	25-50SLM: ±3% RD (@20°C) 0-25SLM: ±3% FS
Repeatability	±0.5% (FS)
Proof pressure	980kPa
Working temperature range	0-50°C (Accuracy guarantee: 15-50°C)
Materials of parts in contact w/gases	Body: SUS 303, PTFE Sealing material: Viton®
Joint	Standard: Rc 1/4
Flow output signals	0-5VDC
Required power supply	+12VDC (±5%) 60mA, -12VDC (±5%) 60mA
Weight	500g

Cable Connections

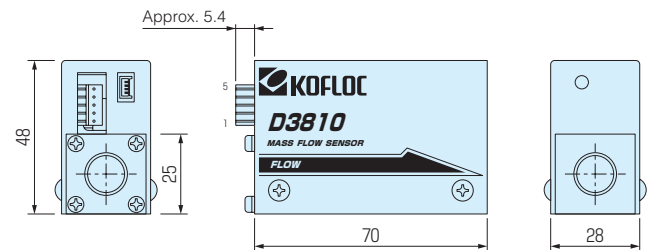
No.1	Power source +15VDC
No.2	Power source COM
No.3	Power source -15VDC
No.4	Flow output 0-5VDC
No.5	Flow output COM

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

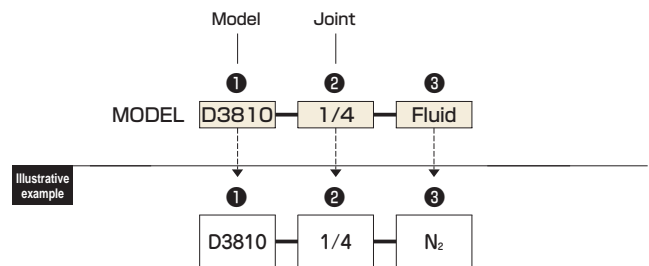
Example of Wiring



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.



Digital Mass Flow Sensor MODEL D7100

Upcoming

RoHS
compatible

Unlike the MODEL 7100NL, the MODEL D7100 uses a digital circuit for high-precision temperature compensation and high-precision linearization compensation. Characterized by high-precision operation and low voltage operation at 5 VDC, this model can be used for diverse applications.

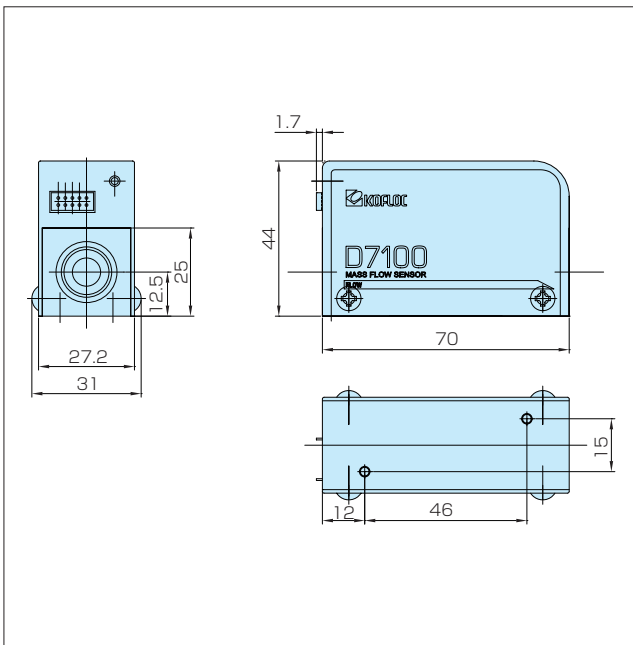
Features

- Equipped with a chip type thermal sensor developed using the film forming technology and MEMS technology
- 300 msec high-speed detection of change in flow rate
- Single low supply voltage drive; 5 VDC driving
- High-precision temperature compensation and high-precision linearization compensation by digital circuit

NEW



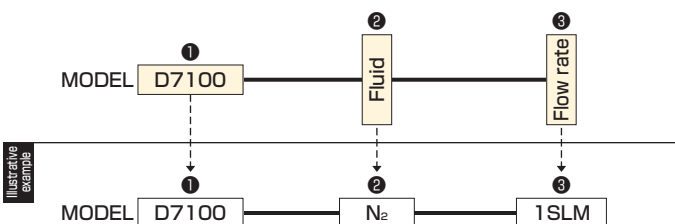
Dimensions



Standard Specifications

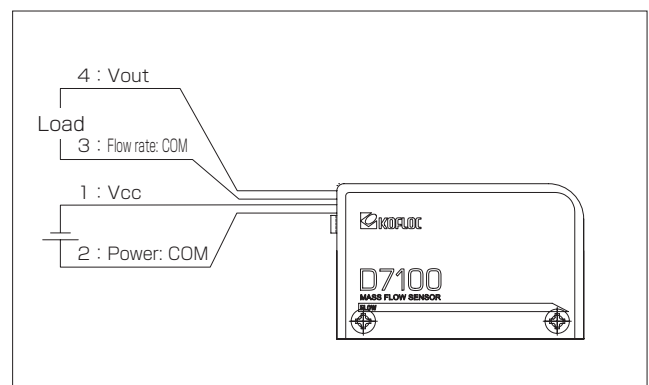
Flow range (F.S.) (at N ₂ calibration conditions)	200SCCM	1SLM, 5SLM, 10SLM, 20SLM
Object gas	Air, N ₂ , Ar	
Sensor	Chip sensor	
Main specifications	Measuring range	2-100%
	Response	300msec
	Accuracy	±1% F.S. or less (temperature effect error and linearity error included)
	Pressure characteristics	0.4%F.S./100kPa or less
Pressure	Repeatability	±0.5%F.S.
	Pressure loss	5kPa or less
	Operating pressure range	0-700kPa
Temperature	Proof pressure	980kPa
	Standard temperature	20°C
	Allowable operating temperature range	+5°C-+45°C
Humidity	Allowable storage temperature range	-10°C-+60°C
	Allowable operating humidity range	10-90%RH (Dew condensation not allowed.)
Flow output signal	DC0.5-3.0V	
Required power	5 VDC (±5%); power consumption: 20 mA	
Applicable standards	RoHS compliant	
Materials of parts in contact with gases	Aluminum, Viton, PC resin, PTFE	
Joint	9/16-18UNF	

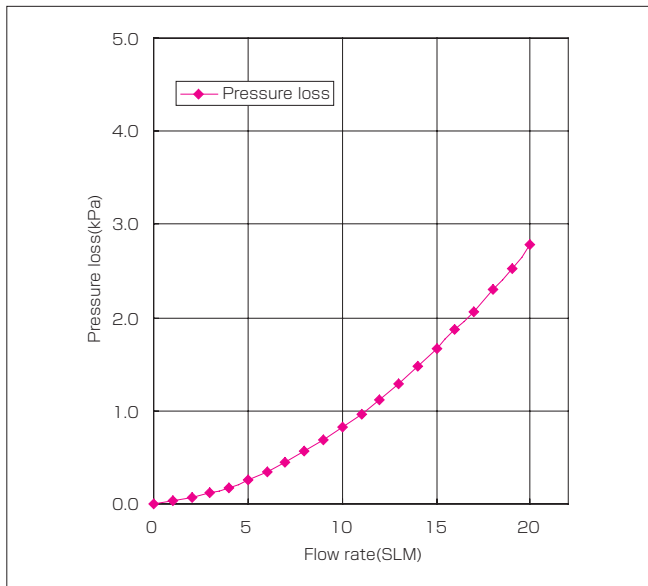
Ordering



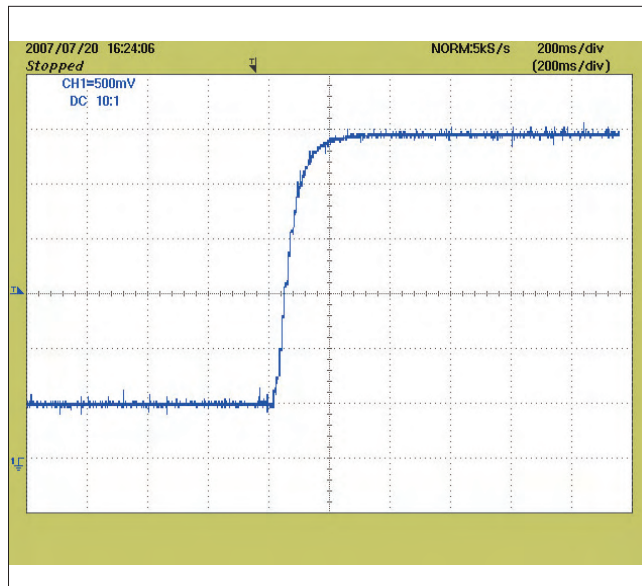
* Refer to "Ordering" and "Illustrative Examples" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.

Example of Wiring

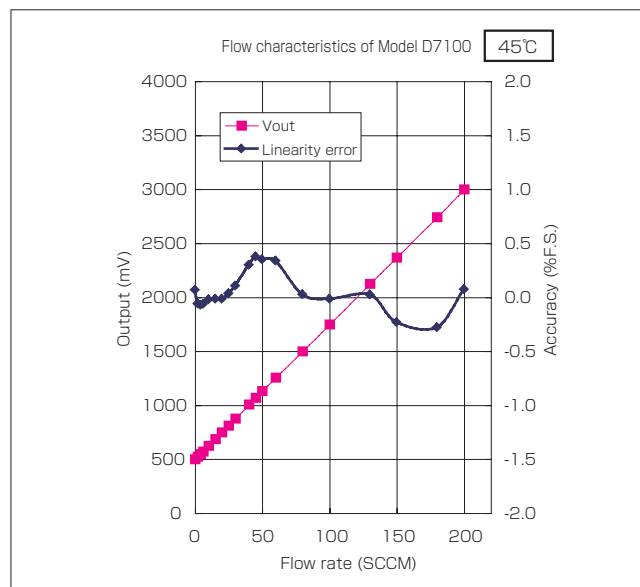
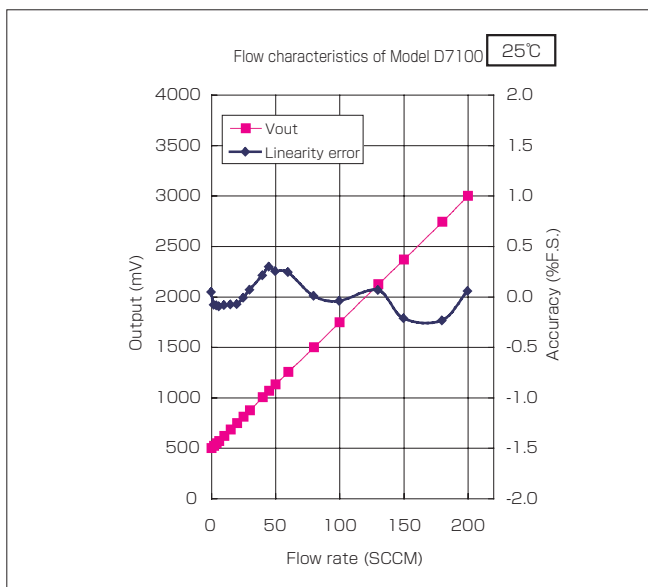
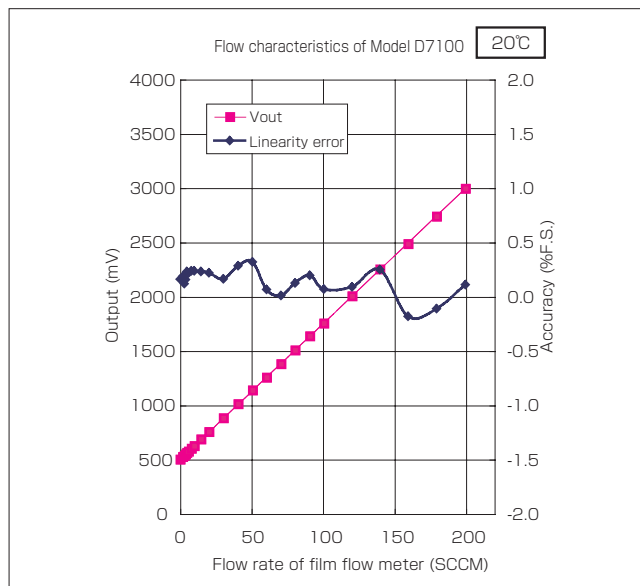
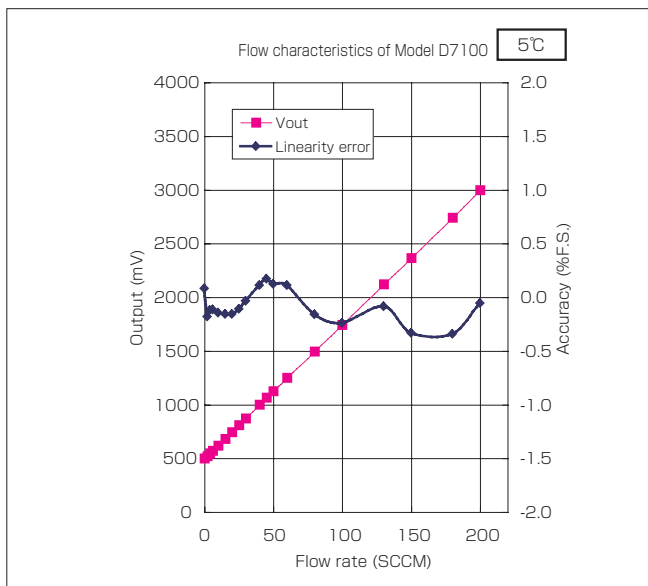




Example of pressure loss of MODEL D7100



Example of response of MODEL D7100



Examples of linearity error of MODEL D7100

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.

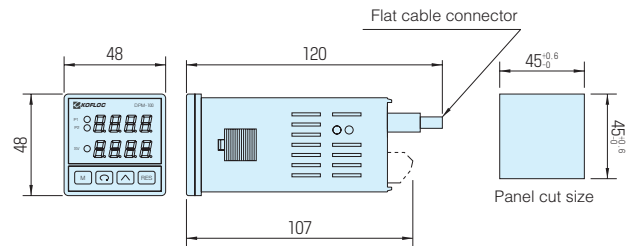


Features

- 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 two types, CK-1A and CK-2A according to the dial shape.

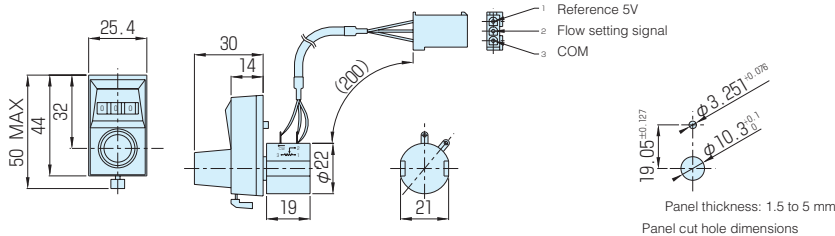


CK-1A

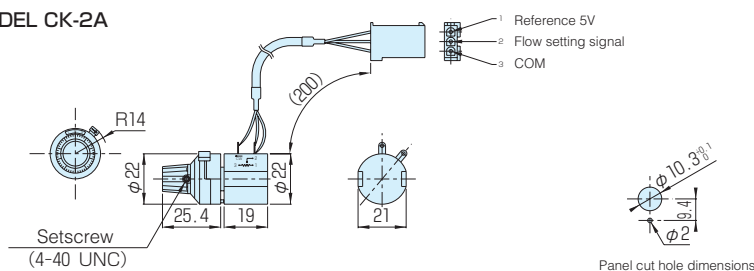
CK-2A

Dimensions

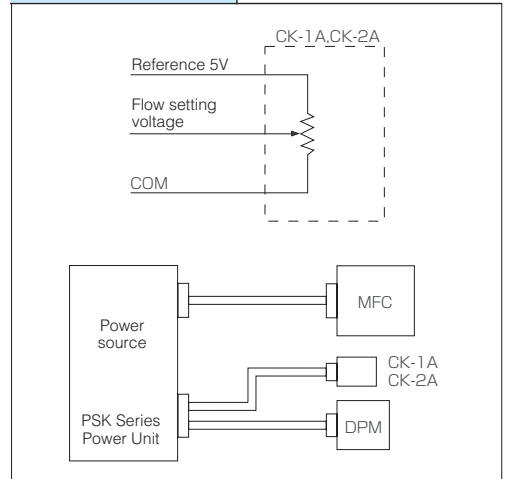
MODEL CK-1A



MODEL CK-2A



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



Flow Indicators

MODELS ALM-4/ACM-10/DPM-3/DPM-243

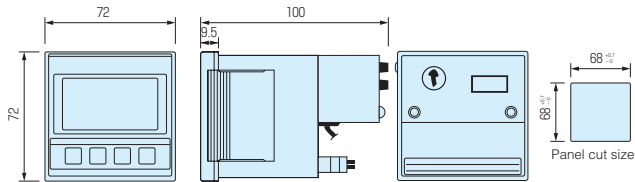
Digital Comparator ALM-4



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

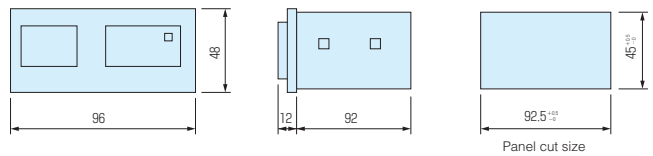


This DIN96x48 front face indicator displays momentary flow values as well as those integrated. Compactly designed with DIN standard size panel cut, the ACM-10 is a 'must' for monitoring gas consumption on site. Specify the flow range your need as the unit is shipped after properly scaled at factory to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



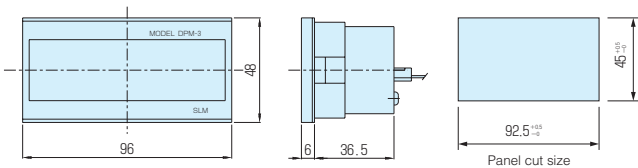
Digital Flow Indicator DPM-3



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.

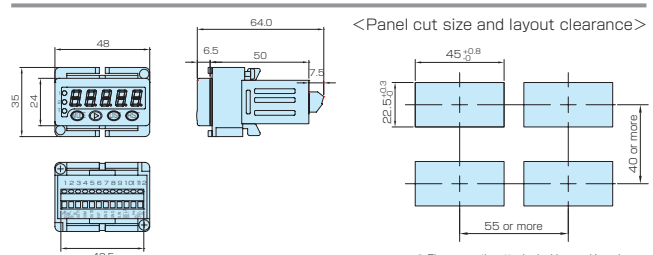
Momentary/Integrated Flow Indicators DPM-243/244



These two models provide display of momentary and cumulative flow values. Model DPM-243 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-244 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



* Please use the attached rubber packing when using the device in a dustproof/waterproof state (IP65) at the front.

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.

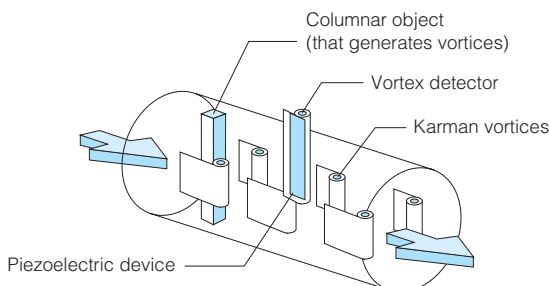
Standard Specifications

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% FS			
Repeatability	Within ±0.5% FS			
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

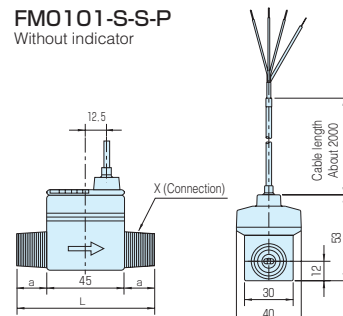
When a columnar object (object that generates vortices) is placed in the flow path of a fluid, regular channels of vortices, called Karman vortex channels, are generated at the back of the object. Since the frequency of a vortex generated is linearly proportional to the flow velocity within a given range,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

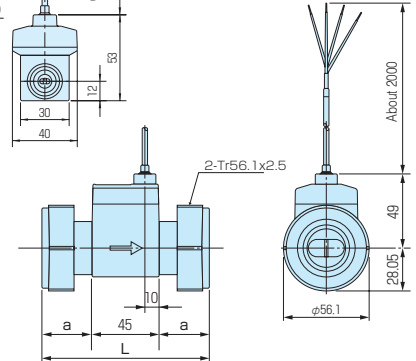


Dimensions

FM0101-S-S-P
Without indicator



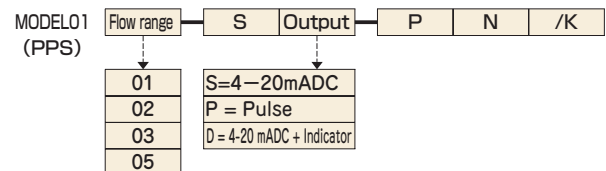
FM0105-S-S-P
Without indicator



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



* 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

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

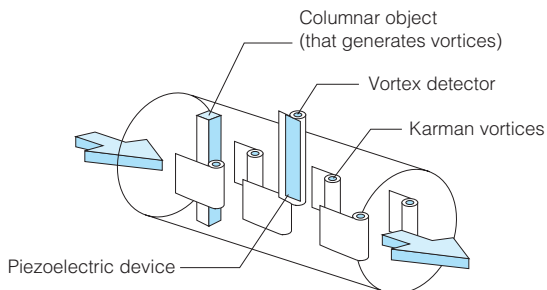
- Because of no moving part, the meter has superior reliability and durability and no error in mounting position is produced.
- Simple construction (its flow path of fluid contains a columnar object and a vortex detector only) ensures low pressure loss and low liquid leak. In addition, the detector does 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

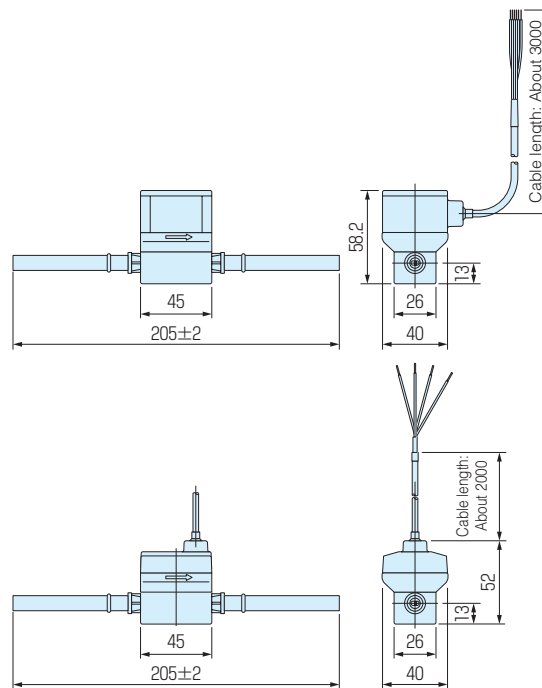
Item	FM3101	FM3102	FM3103	FM3104
Flow range (L/min)	0.4-4	2-20	5-50	10-100
Connection	3/8" Pipe end	1/2" Pipe end	3/4" Pipe end	1" Pipe end
Fluids for measurement	Ultrapure water, chemicals, and other liquids			
Measuring accuracy	±3.0%+ 1 digit			
Repeatability	Within ±0.5% F.S.			
Liquid temperature 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		12-24VDC		
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 ModelFM31 (PFA)	Flow range	P	Output	X	P	/K
	01 02 03 04		S=4-20mADC P = Pulse D = 4-20 mADC + Indicator			

* 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.

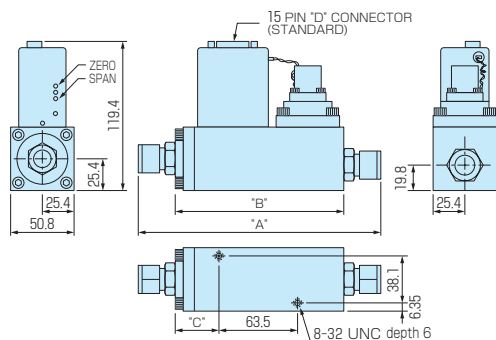


Standard Specifications

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" F900

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" F900

HFC-303 3/4" FITTING

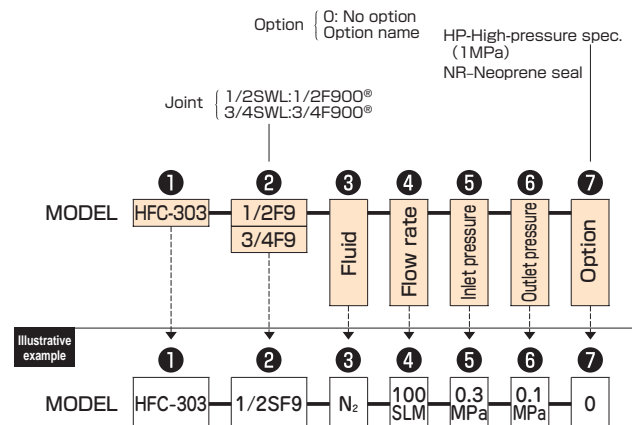
FITTING TYPE	DIM"A"
SWAG. 3/4"W NUT	8.44(214.4)
DIM"B"	5.76(146.3)
DIM"C"	1.56(39.6)

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



* 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

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.

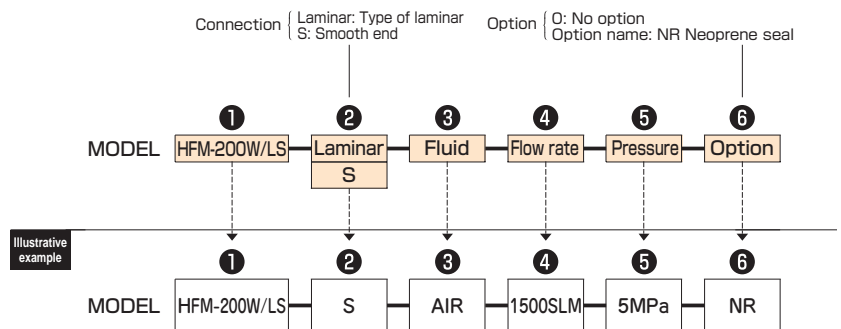
Note:
Provide straight pipe sections of diameter five times larger than the laminar diameter before and after the laminar flow element for correct flow measurement.

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



* 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

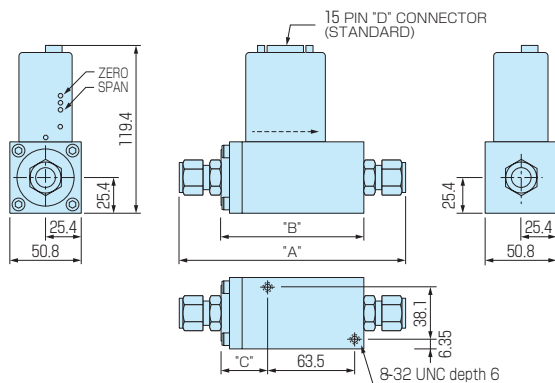


Standard Specifications

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



<300SLM 1/2" F900

HFM-301 1/2 FITTING	
FITTING TYPE	DIM "A"
SWAG. 1/2" W NUT	6.31 (165.9)
DIM "B"	4.11 (104.4)
DIM "C"	1.36 (34.5)

>300SLM 3/4" F900

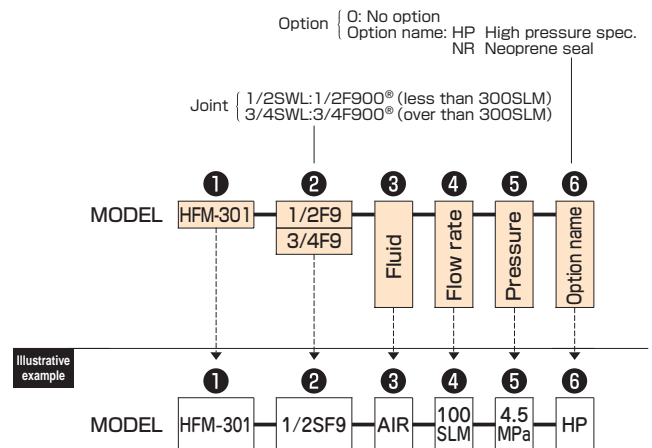
HFM-301 3/4 FITTING	
FITTING TYPE	DIM "A"
SWAG. 3/4" W NUT	6.99 (177.5)
DIM "B"	4.31 (109.5)
DIM "C"	1.56 (39.6)

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	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.

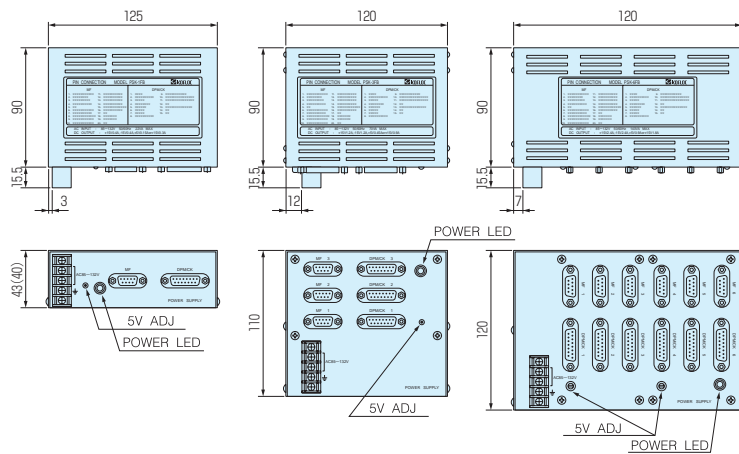
MODEL PSK-FB SERIES



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 8500 Series Power Cable

PSK-85/CP-85CF SERIES

The PSK-85 is an AC adapter type power supply that can operate one Model 8500 Series system. The CP-85CF cable is used to drive the Model 8500 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-85 (Cable length: 1.5 m only)

● **Cable:** CP-85CF ----- 1M ----- Cable length: 1.5 m

Loose end (* For details of the signal interface, refer to the instruction manual.)
8500 main unit connector (DS20P half-pitch connector)



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

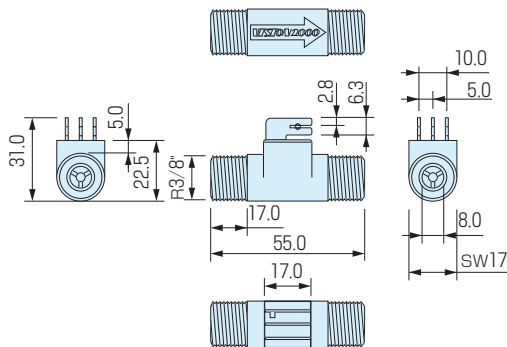


Standard Specifications

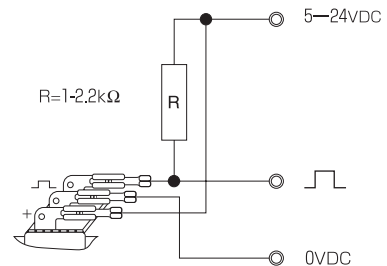
Item	2F66	4F44	4F22	F16.5
Fluid	Water, sea water, pure water, alcohol, gasoline, gas oil, kerosene, various types of solvents, and other liquids			
Flow range	0.5-5 L/min	1-10 L/min	2.5-25 L/min	3.5-35 L/min
Accuracy	Within $\pm 1.5\%$ F.S			
Repeatability	Within $\pm 0.2\%$ F.S			
P/L	6900 pulses/L	3300 pulses/L	1000 pulses/L	750 pulses/L
Operating temperature range	-20-100°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.

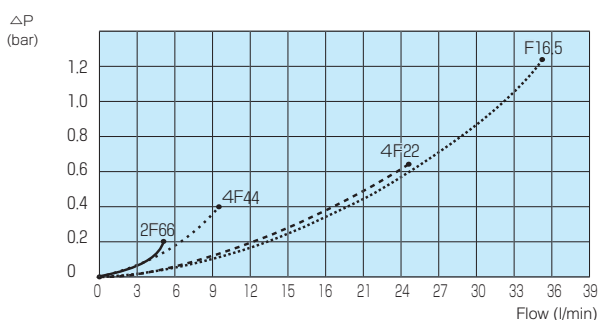
Dimensions



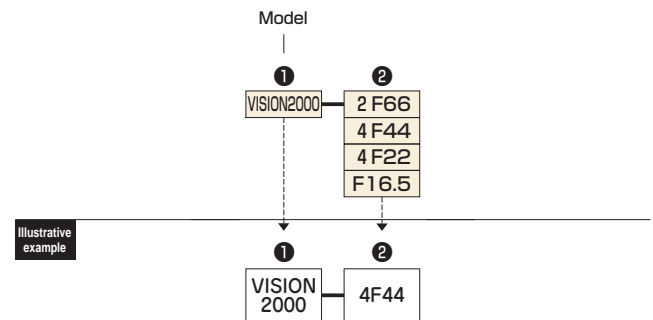
Connection Diagram



Pressure Loss Table



Ordering



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