



Mass Flow Meter with indicator

# EX-700R

Instruction Manual

**KOFLOC Corp.**

Please read this manual thoroughly prior to installing and using the product. This way it is possible to ensure the performance and safety of the product and prevent possible accidents and damage to the product due to incorrect use.

When the product has failed or is considered to require readjustment, please contact our sales office or the dealer which you purchased the product from. Our experienced technical staff will give you appropriate advice. Please follow the instructions given.

Please note that if you repair/modify the product yourself, not only serious accidents may occur, but our warranty will become void.

The contents of the manual are subject to change without notice for improvement. Prior to shipment, every care has been taken in preparing this manual not to mention the product itself, but if you notice any imperfections, errors or omission, please contact our sales office or the dealer.

### **<< Prior to use >> and << Precautions for use >>**

Various alert symbols and signal words are used in this manual and attached to the product to ensure correct use of the product and to prevent possible personal injury or loss of life and property damage. The symbols and meanings of the signal words are as follows:



Ignoring this symbol and handling the product incorrectly may result in loss of life or serious injury.



Ignoring this symbol and handling the product incorrectly may result in personal injury or damage to property.



The symbol  $\triangle$  is shown to warn or to draw attention to hazards that may be caused by apparent misoperation or misuse.



The symbol  $\bigcirc$  is shown to prohibit certain actions to prevent the occurrence of hazards.



The symbol  $\bullet$  is shown to require (instruct) certain actions to prevent the occurrence of hazards.

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## 1. Foreword

Thank you for your selection of the Digital Mass Flow Meter EX-700R.

Prior to using your new equipment, please read this manual thoroughly to ensure it is used in a safe manner.

Please keep in mind that this instruction manual may be revised without notice.

## 2. Precautions for Handling

### ◆Prior to use

All the products have been assembled and adjusted one by one in accordance with the specifications.

The type of gas to use, flow rate and other data are shown on the ID plate attached to the back of the case.

Check the ID plate and make sure these specifications meet your order.

- Date shown on the ID plate

### ① MODEL : Model name – Use of Needle valve – Flow rate – Output

•Model name	[EX-700R] : Mass Flow Meter
•Needle Valve	[0] : without needle valve [V] : with needle valve
•Flow rate※	[F1]10SCCM~[F14]500SLM
•Output	[I] : Current 4-20mA

### ※Flow range table

#### ◆Main Body Block 25mm square

Code	F1	F2	F3	F4	F5	F6	F7	F8
Flow rate	10SCCM	50SCCM	100SCCM	500SCCM	1SLM	5SLM	10SLM	20SLM

#### ◆Main Body Block 34mm square

Code	F9	F10	F11
Flow rate	50SLM	100SLM	200SLM

#### ◆Main Body Block 40mm square

Code	F12	F13	F14
Flow rate	300SLM	400SLM	500SLM

### ② GAS : Applicable gas

### ③ FLOW RATE

SCCM =ml/min (0°C 1atm(101.325kPa))

SLM =l/min (0°C, 1atm(101.325kPa))

### ④ CALIB.: Calibration gas

### ⑤ PRESSURE : Supply pressure /Outlet pressure

### ⑥ SERIAL No.

### ◆ Handling

- (1) Use the equipment within the pressure range shown in the specification.
- (2) Use the equipment at the ambient temperature and humidity shown in the specification.
- (3) This is precision equipment. Keep it protected against strong shock.



	Do not apply a pressure exceeding the allowable level. Otherwise, the product may be damaged
	This product is precision equipment. Exercise caution to protect it from shocks by, for example, falling and hitting. Otherwise, the product may be damaged.

### ◆ Transportation

Wherever possible, transport the product in the condition in which it has been received from KOFLOC to the installation site in order to prevent damage due to accidents during transportation.

### ◆ Installation and piping

#### (1) Installation place

- ① This equipment is designed for indoor use.  
Never install the equipment in a place where it is likely to be wetted by water or rain.  
The equipment may fail. Install the equipment in a place where sufficient ventilation is provided and changes in humidity are minimal.
- ② Install the equipment in a place free of vibration and impact.
- ③ Do not use the equipment under direct sunlight or at high temperature/humidity.
- ④ Install the equipment in a place free of dust.
- ⑤ Install the product in a place free of corrosive gases.
- ⑥ Install the product in a place free of a strong electric/magnetic field.  
The frame to fix the block shall be connected to an electrically stable point (e.g. being grounded).
- ⑦ Install the product in a place where ambient temperature is 15 to 35°C.

(2) Lay piping so that the flow direction matches the arrow (▶) shown on the body.

(3) Install the product horizontally.

Install the product in such a way that the LED/switches do not face downward.

(4) Be sure to install a line filter (100 μm or finer) on the inlet side of gas.

(5) Where complete shutoff is required, provide a shutoff valve.

(6) To use a highly reactive gas, be sure to conduct complete purge with inert gas before and after use.

#### ■ Installation method

Install the product with two M4 screws from the back using threaded holes on the bottom

For the location of threaded holes, see 「5. External View」(p9~).



## WARNING



Never let gas exceeding the explosion limit flow to the product. Otherwise, it may cause explosion accidents



Never use the product the gas contact part of which has not been degreased (oil-free treatment) for oxygen. Otherwise, a fire may break out.  
Even when the product has been degreased, if it has been used for a gas other than oxygen, never use it for oxygen.



## CAUTION



Ensure that no foreign matter will flow into the product. If piping rust, water droplets, oil mist, dust, etc. flow into the product, they may cause measurement/control errors and damage to the product.

If there is a possibility that foreign matter will flow into the product, install a suitable device such as a filter, strainer and mist trap having a capacity to remove foreign matter larger than 100µm in the upstream and inspect or replace it periodically.



The needle valve of this product has not been designed for complete shutoff.  
If complete closing is required, please install a shutoff valve externally separately.



High-temperature baking (over 80°C) is a cause of serious failure.



Install the product on a horizontal pipe. Ensure that the display will not face downward.



Install the product firmly so that it will not vibrate. Otherwise, it may malfunction or fail.



After piping, inspect it to ensure that no gas will leak.



Be sure to use the product within the flow rate range defined in the product specifications.  
Also in order to prevent an excessive flow rate, control the proper supply pressure and provide instrumentation in consideration of installation of a throttle valve, etc.



If damages are envisaged due to a problem of the product, use a redundant design.

### ◆ Wiring

Connect wires referring to 7. Connectors and Pin Assignment.

**Attention** : EX-700R and EX-700(old model) are different adapter inputs.

### ◆ Storage of the product

If the product is not put in use for a long time after it was received, unexpected troubles may occur.

When it is expected that the product will be kept in storage for a long time, take the following precautions:

- (1) Store the product in the package in which it was received from KOFLOC, wherever possible.
- (2) Store the product in a place described below:
  - ① A place free of rain and water.
  - ② A place free of vibration and impact.
  - ③ A place of normal temperature and normal humidity (around 25°C, RH65%).
  - ④ A place free of dust.
  - ⑤ A place free of corrosive gases.
  - ⑥ A place free of a strong electric/magnetic field.
- (3) To store the product that has been used, purge it with clean air or N<sub>2</sub> so that measuring gas will not remain in the flow meter. Cover the inlet and outlet sides (joints) of measuring gas with caps to prevent intrusion of dust and dirt.



## CAUTION



To dispose of the product, follow the rules and regulations imposed by your local authority.

### 3. Overview

EX-700R is a mass flow meter equipped with an indicator that employs a proven flow sensor. It has a function to indicate the integrated flow rate, in addition to the existing instantaneous flow rate indication.

A type with a flow sensor and precision needle valve in one unit is also available.

- The employment of a precision needle valve enables minute flow control and monitoring.
- Flow monitoring alarm 2 points output. (2 points each for any flow rate value)
- Instantaneous flow rate / analog output. (Voltage 0-5V or 1-5V or Current 4-20mA), integrated flow rate / pulse output installed.
- Compact and light weight.
- The flow meter is equipped with an indicator and can start measurement of flow rates as soon as a 24 VDC power supply is connected.
- "Mass flow" enables direct reading of flow rates without a need of troublesome flow rate compensation calculation by temperature/pressure.

#### 3-1 Principle of operation

The flow detect sensor is designed with heating wire (resistance wire) wound around the outside of 2 point of the metallic capillary.

When a gas flows through the capillary, it takes heat from the resistance wire in the upstream to cause its temperature to drop. The heat in the upstream is transferred to the downstream, causing a deviation in the resistance value. A difference in temperature in these two places is proportional to the flow rate of gas. The difference in the resistance value caused by this temperature difference is converted to an electric signal to indicate a flow rate.

The installation of a bypass capillary to bypass the flow to the sensor pipe restricts the flow of gas to the sensor to enable the use in a wide range of flow rates.

The detected flow rate is indicated on the indicator and output as an electric signal from the terminals.



#### 4. Standard Specifications

EX-700R			
Flow range (N <sub>2</sub> conversion)		F.S.10SCCM~20SLM	F.S.50, 100, 200SLM    F.S.300, 400, 500SLM
Accuracy*1		±1%F.S.	±1.5%F.S.
Applicable gas *2		N <sub>2</sub> (Air, H <sub>2</sub> , He, Ar, O <sub>2</sub> , CO <sub>2</sub> ,CH <sub>4</sub> /By N <sub>2</sub> conversion)	N <sub>2</sub> , (Air, Ar/By N <sub>2</sub> conversion)    N <sub>2</sub> , (Air,/By N <sub>2</sub> conversion)
Temperature	Accuracy guarantee temperature	15~35℃	
	Operating temperature	5~50℃	
	Storage temperature	-10~60℃	
Operating humidity		10~90%RH (no condensation)	
Pressure resistance		980kPa (G)	
Fitting (Standard)		1/4SWL	3/8SWL    1/2SWL
Materials of parts in contact with gases		SUS316, SUS316L, PTFE, PCTFE (only 300-500SLM), FKM (op. : NBR, CR)	
Power supply		DC24V (±10%) , 100mA or lower	
Flow rate indication	Indicator	4-digit 7-segment LED (Zero blanking)	
	Instantaneous flow rate indication update cycle	25, 50, 100, 200, 500, 1000msec (selectable)	
	Low cut function	Indication of a value below 0.5% F.S. settable to "0"	
	Indication range	When the low cut function is not used; from approx. -10% F.S. to approx. 125% F.S. (indication limiter flashing)	
	Integrated flow rate indication range *3	8-digit indication (Max. 99,999,999, indication limiter flashing) The units of indication are the same as the instantaneous flow rate.	
Digital communication		RS485 (MODBUS RTU) ,ID:1~247	
External output	Number of outputs	2 points (Each output selected and set to instantaneous flow rate upper limit, lower limit, upper/lower limit or integrated flow rate reach. 1 point may be integrating pulse.) Inversion of outputs is possible.	
	Output method	NPN open collector (Max. rating: 30 VDC, 50 mA)	
	Integrating pulse output rate	1%F.S.~100%F.S. / pulse, pulse width: approx. 50ms	
	Alarm indication	LED lamps (OUT1, OUT2) turning on	
	Analog output*4	Standard: 4-20mA (500Ω or below) Switchable: 1-5V or 0-5V (10kΩ or over)	
Weight		Approx. 600g	Approx. 700g    Approx. 1000g
Needle valve parts	Flow adjust knob turning	Approx. 12 turns	
	Materials of parts in contact with gases	SUS316, PTFE, FKM (op. NBR, CR)	

\*1. The accuracy is guaranteed for nitrogen gas.

\*2. The full scale of the selected gas is the same as the full scale of N<sub>2</sub>.

\*3. The indication of integrated flow rates is for reference. It is held when the power is turned off.

## 5. External View

### ◆F.S.10SCCM~F.S.20SLM

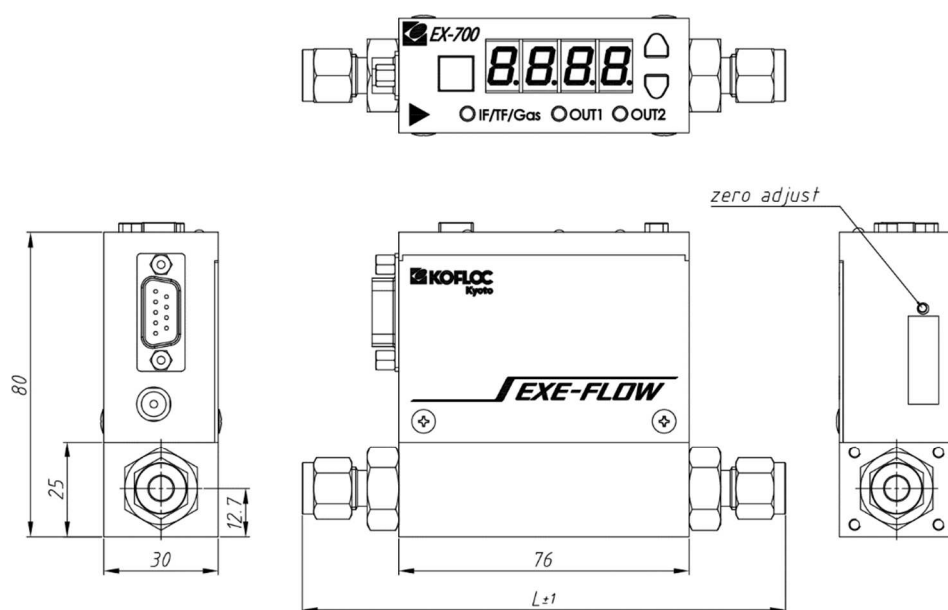
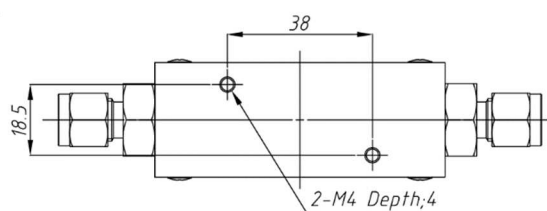


Table 1. Various fittings and "L" dimension

Fitting	Dimension L[mm]
1/4F900	126.6
1/8F900	122.6
3/8F900	131.6
1/4UJR	123.0
Rc1/4	102.0
1/8SWL	122.8
1/4SWL	127.4
3/8SWL	130.4
1/4VCR	123.8



### ◆F.S.50, 100, 200SLM

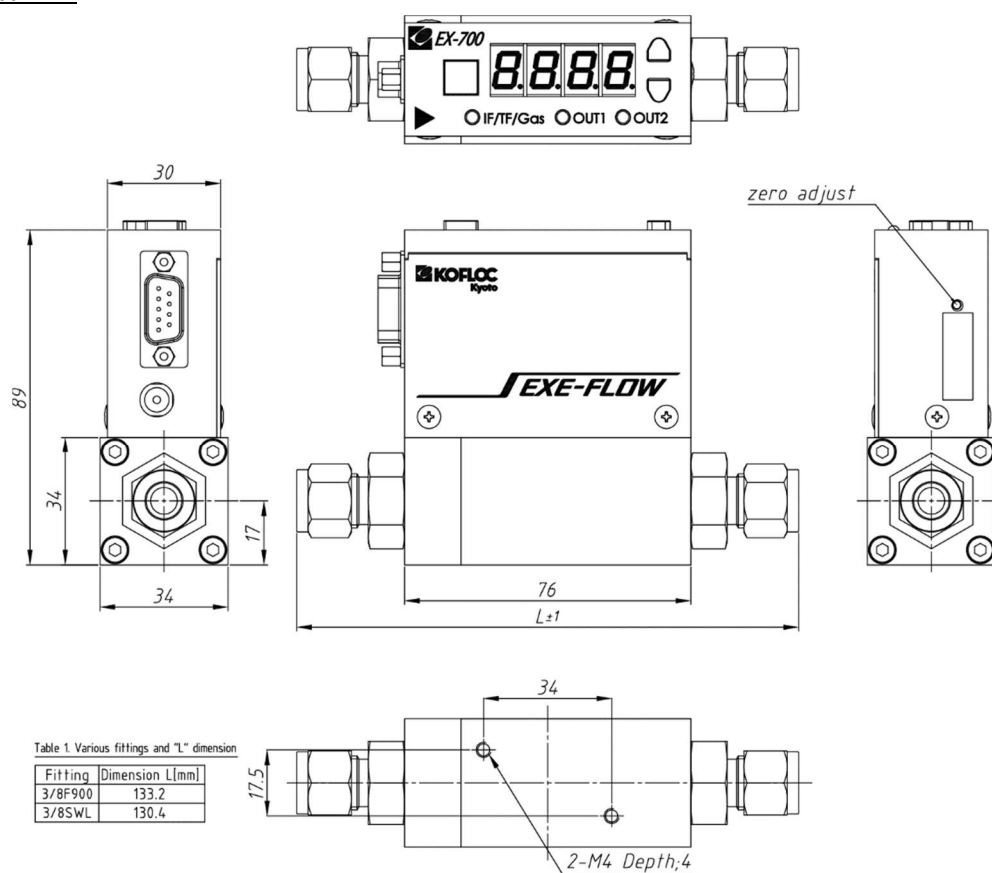
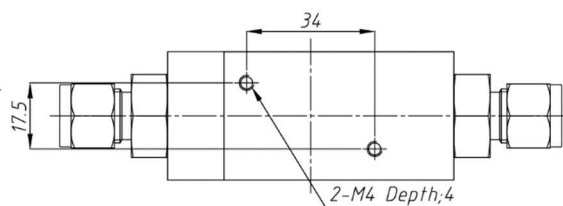
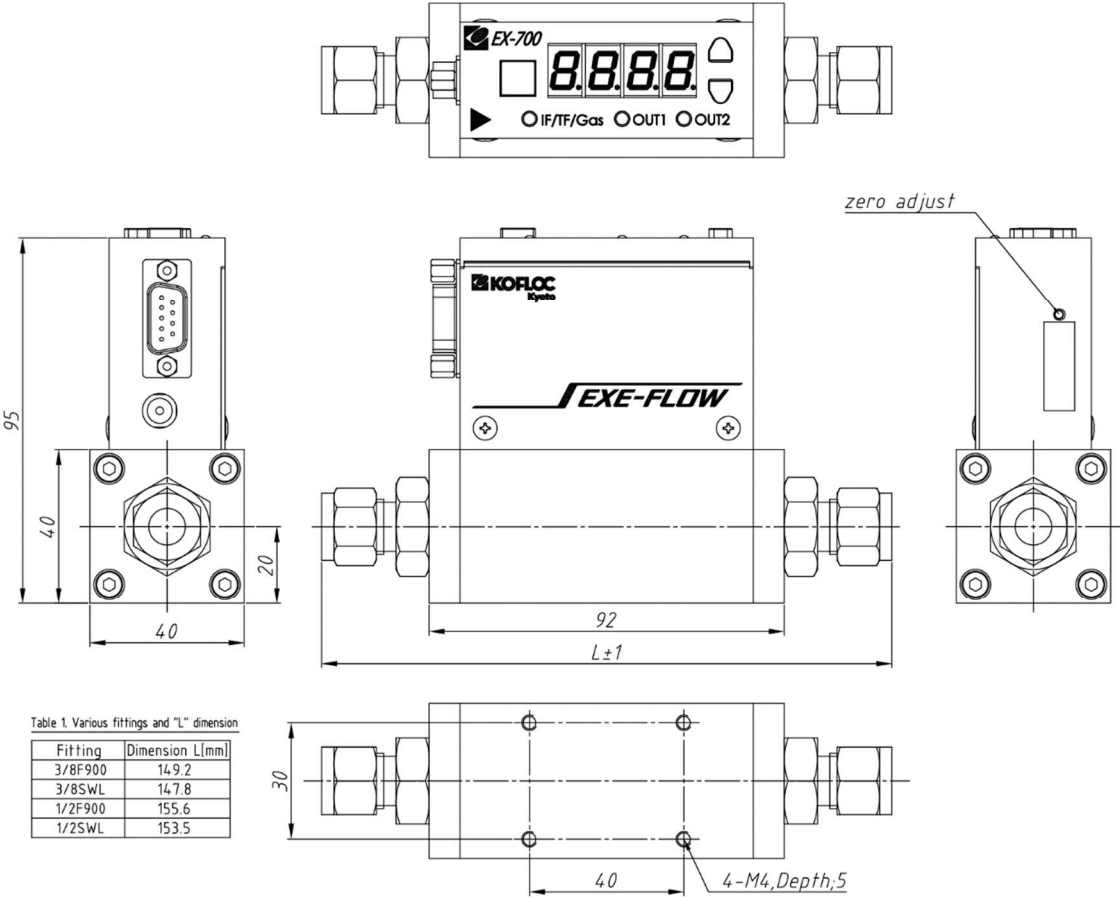


Table 1. Various fittings and "L" dimension

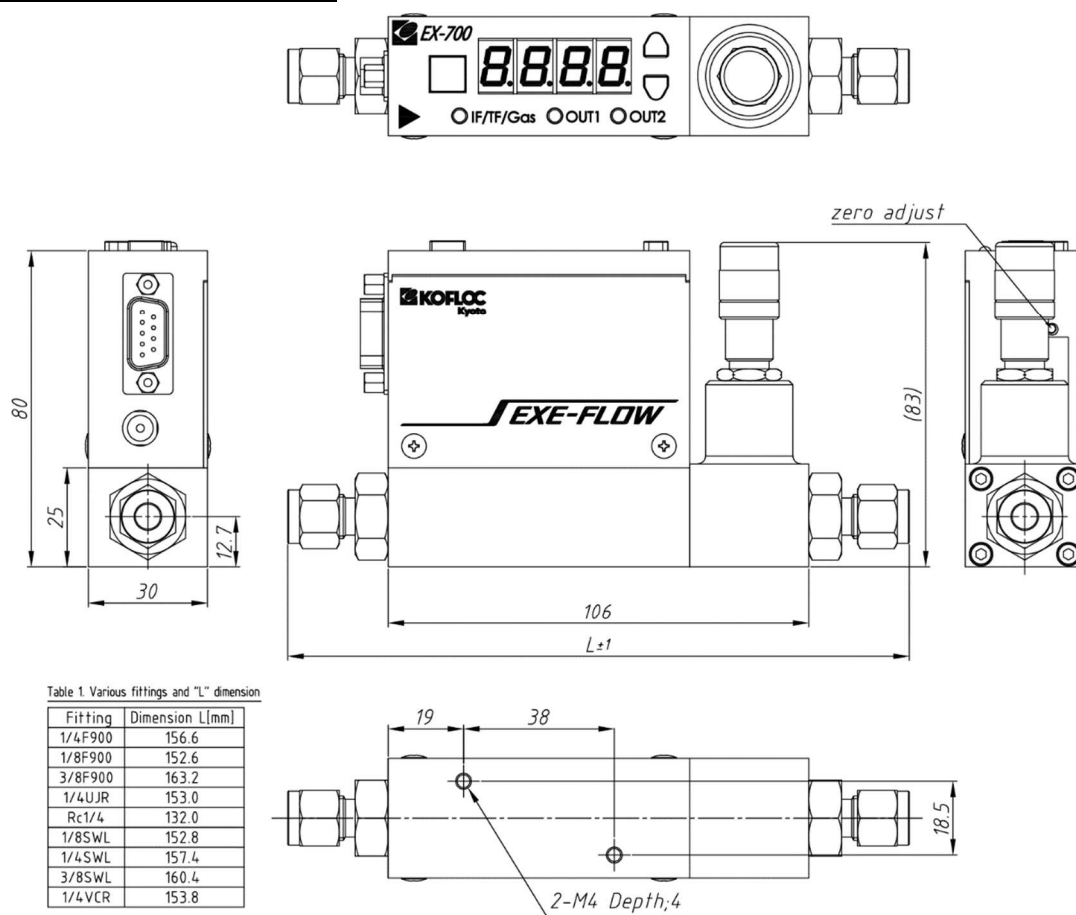
Fitting	Dimension L[mm]
3/8F900	133.2
3/8SWL	130.4



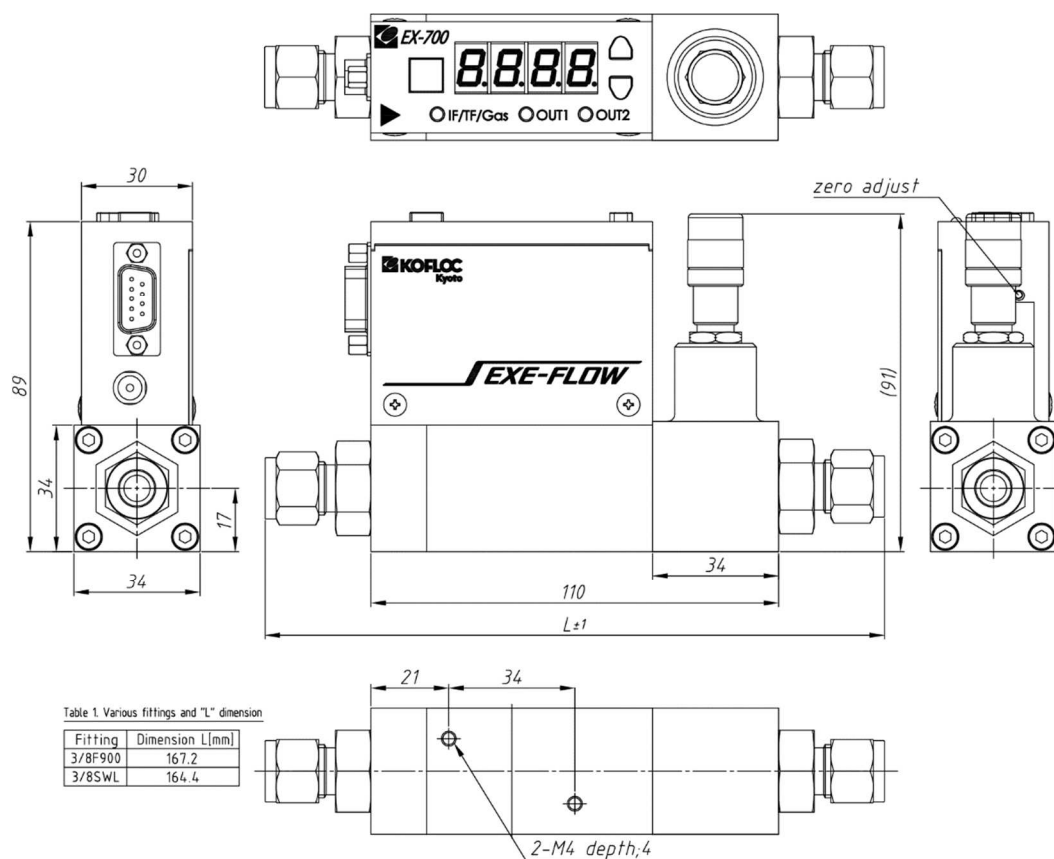
◆F.S.300,400,500SLM



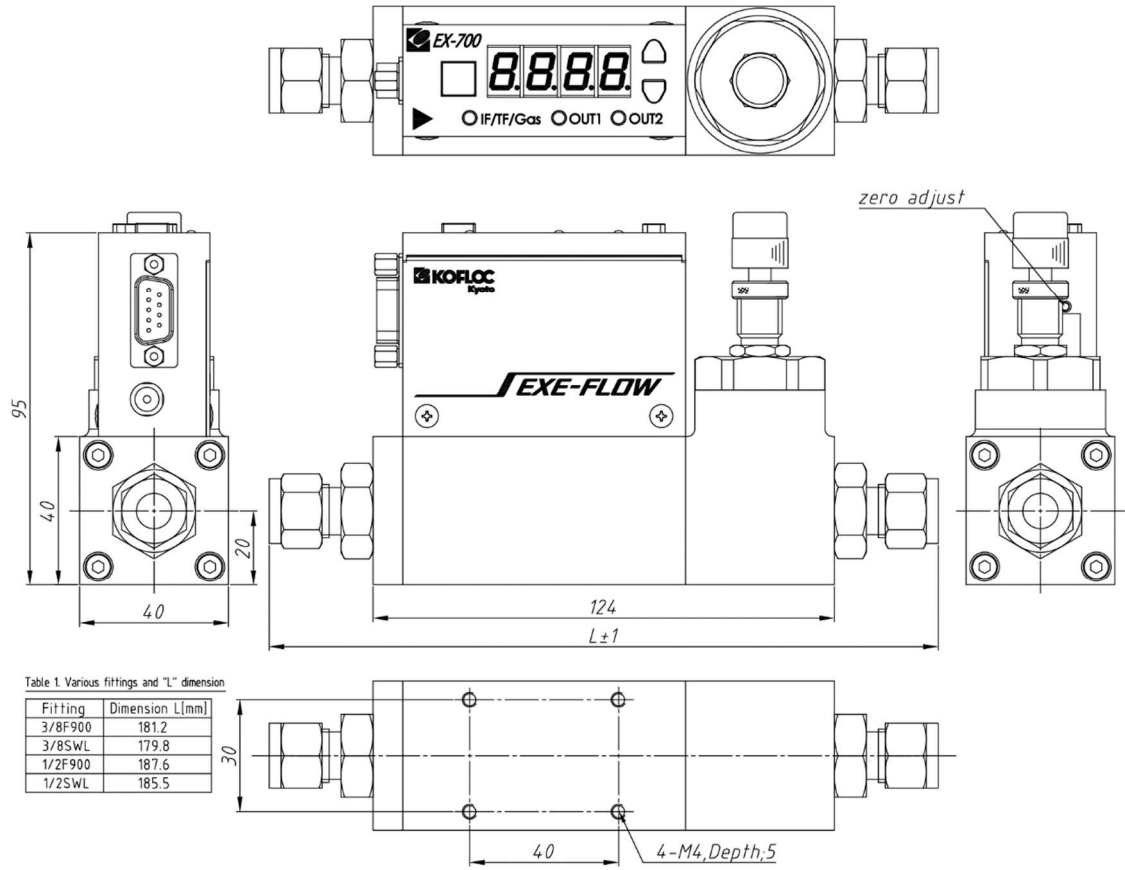
## ◆F.S.10SCCM~F.S.20SLM With Needle valve



## ◆F.S.50, 100, 200SLM With Needle valve

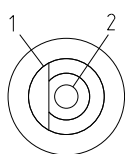


◆F.S.300, 400, 500SLMWith Needle valve



## . Connectors and Pin Assignment

### (1) DC Jack



Pin No.	Signal Name	Description
1	Power supply COM	Power supply COM
2	Power supply +24V	Power supply +24V

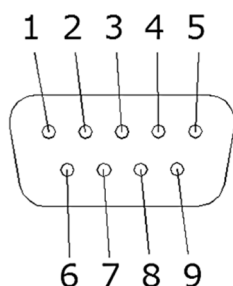
CAUTION : EX-700R and EX-700(old model) are different adapter inputs.

### (2) Connectors

Product side connector : D-subminiature9pin male (M2.6 short screw)

Applicable connectors : D-subminiature9pin female (M2.6 short screw)

### (3) Pin Assignment



Signal table

Pin No.	Signal Name	Description
1	Power supply +24V	Power supply +24V
2	Power supply COM	Power supply COM
3	OUT1	Event output 1
4	OUT2	Event output 2
5	OUT COM	Event output COM
6	Analog output	Analog output
7	TR+	RS485 communications
8	TR-	RS485 communications
9	Analog output COM TR COM	Analog output COM RS485 communications COM



## CAUTION



Prior to turning on the power, make sure that the product has been wired correctly. Incorrect wiring will cause damage and malfunction.

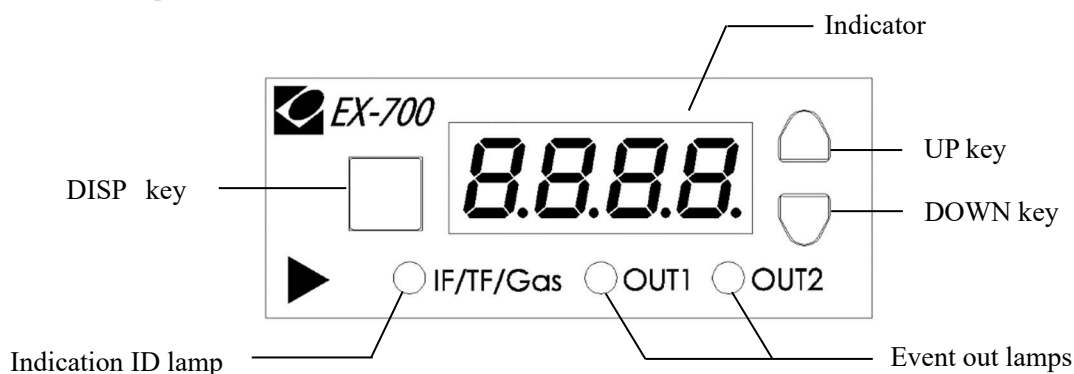
## 7. Operation

### 7-1 Warming-up

Warm up the equipment at least 15 minutes after it was powered on.

### 7-2 Operating procedure

#### ◆Indicator panel



#### ◆Indicator

Indicates an instantaneous flow rate or integrated flow rate. When lower 4 digits of the integrated flow rate are indicated, the decimal point is shown.

The decimal point is not shown for upper 4 digits.

During setting, the parameter No. or set value is shown here.

#### ◆Event out lamps

When the Event output 1 is on, “OUT1” lights and when the Event output 2 is on, “OUT2” lights

#### ◆Indication ID lamp

Lights when an instantaneous flow rate is being indicated and flashes when an integrated flow rate is being indicated.

#### ◆DISP key [□]

##### 【Measurement】

○Press: Switches over the indication.

The indication switches over in the order of instantaneous flow rate → integrated flow rate (lower 4 digits) → integrated flow rate (upper 4 digits) → gas type → instantaneous flow rate.

The integrated flow rate (upper 4 digits) is not indicated if the integrated flow rate value has not reached the upper 4 digits.

○Press & hold: Goes to a setting mode.

• Pressing and holding this key when an instantaneous flow rate is being indicated shows “Parameter setting mode”. Continuing to press and hold this key after “Parameter setting mode” has appeared shows “Zero adjustment mode”.

• Pressing and holding this key when an integrated flow rate is being indicated shows “Integrated flow rate resetting mode”.

## 【Setting】

○Press: Selects items and accepts values entered in each setting mode.

○Press & hold : 【Parameter setting mode】Returns to the instantaneous flow rate indication.

【Zero adjustment mode】 When <Yes> is shown, the zero point adjustment is executed.

【Integrated flow rate resetting mode】 When <Yes> is shown, the integrated flow rate is reset.

◆UP key[  ]/DOWN key[  ]

【Parameter setting mode】

○Press: Increases/decreases the value of the flashing digit.





○Press and hold: Shifts the digit.

【Zero adjustment mode】 : switching <Yes>/<No>

【Integrated flow rate resetting mode】 : switching <Yes>/<No>

**CAUTION:** This meter has been adjusted in the flow rate in the factory and adjustment data has been stored in an F-RAM. Please keep in mind that if several keys on the indicator panel are pressed and held simultaneously when turning on the power, the indicator shows the mode where the stored data will be rewritten. When the meter has entered this mode, turn off the power. If rewrite has not been enabled yet, the data may be recovered. If the data has been rewritten, it is necessary to correct the data.

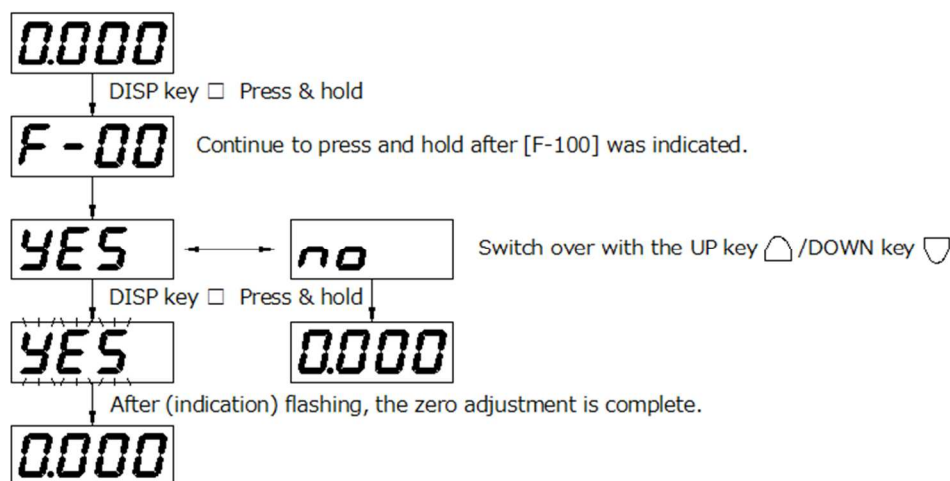
### 7-3. 【Zero adjustment mode】

Stop the flow of gas completely with an instantaneous flow rate being indicated. In this state, pressing and holding the DISP key [  ] shows “Parameter setting mode” and <F-00> will be shown. Continuing to press and hold the key shows “Zero adjustment mode” and <Yes> will be shown. Switch over <Yes>/<No> with the UP key[  ]/DOWN key[  ] and when <Yes> is being shown, pressing and holding the DISP key [  ] completes zero adjustment.

When <No> is being shown, pressing the DISP key [  ] returns to the instantaneous flow rate indication.

(If flickering of a figure near 0 is annoying, select the low cut function. The indication of a figure below 0.5% F.S. is cut.)

**CAUTION:** If the indicated value is largely different (2% or more) from the zero point set in the factory, the zero adjustment is not possible. In this case, please contact our sales office or the dealer.

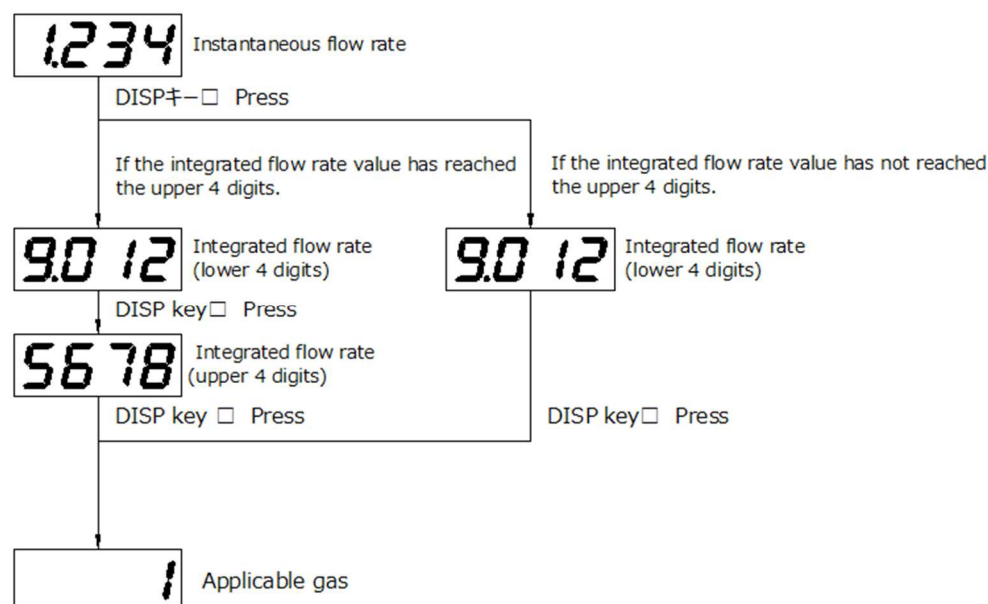




## 7-4 Flow rate indication

## ① Switching over flow rates to indicate

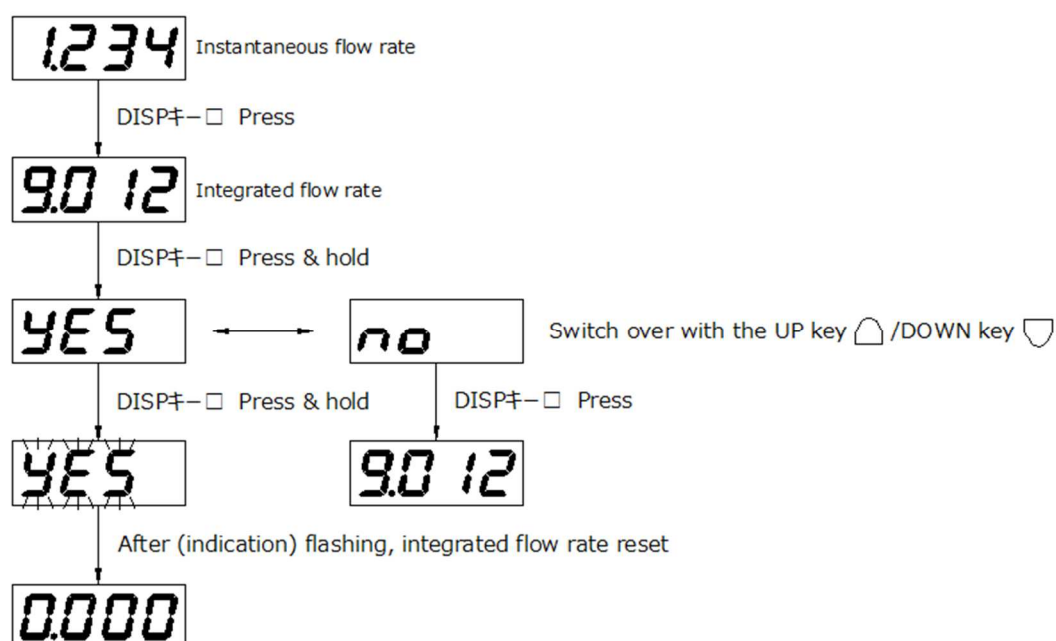
Each time the DISP key [ ] on the flow rate indicator panel is pressed, indication is switched over in the order of instantaneous flow rate → integrated flow rate (lower 4 digits) → integrated flow rate (upper 4 digits) → Applicable gas. The integrated flow rate (upper 4 digits) will not be indicated, however, when the integrated flow rate value has not reached the upper 4 digits.



## ② 【Integrated flow rate resetting】

In the state of integrated flow rate indication setting, press and hold the DISP key [ ]. Then the indicator will show <yes>. <yes> and <no> can be switched over with the UP [ ] key or DOWN key [ ].

When <yes> is being shown, pressing and holding the DISP key [ ] causes <yes> to flash. When the DISP key [ ] is pressed and held, the integrated flow rate value will be reset.



## 7-5. 【Parameter setting mode】

When an instantaneous flow rate is being indicated, pressing and holding DISP key [□] sets the parameter setting mode. Each time DISP key [□] is pressed, the indication changes in the order of mode No. → set value → mode No. → set value.

To change the set value, use the UP key [△] or DOWN key [▽]. When the UP key [△] or DOWN key [▽] is pressed and held, the digit can be shifted.

After setting a parameter, pressing and holding DISP key [□] registers the set value and returns the mode to the flow rate indication mode.

## ① Default values

Mode No.	Default Value				Set Item
	A	B	C	D	
F-00	※	※	※	※	Indication of max. value (unchangeable)
P-00				※	Reference condition on flow rate
P-01				1	Low cut function selection
P-02				3	PV filter
P-03				3	Instantaneous flow rate indication update cycle
P-04				0	Integrated flow rate hold selection
P-05				0	Analog output selection
P-10			0	0	OUT1 output selection
P-11	9	9	9	9	OUT1 instantaneous flow rate upper limit preset setting
P-12	9	9	9	9	OUT1 instantaneous flow rate lower limit preset setting
P-13			3	0	Dead time value
P-14	9	9	9	9	OUT1 integrated flow rate reach preset setting upper 4 digits
P-15	9	9	9	9	OUT1 integrated flow rate reach preset setting lower 4 dig-its
P-16		0	1	0	Integrating pulse output rate
P-20			0	0	OUT2 output selection
P-21	9	9	9	9	OUT2 instantaneous flow rate upper limit preset setting
P-22	9	9	9	9	OUT2 instantaneous flow rate lower limit preset setting
P-23			3	0	Dead time value
P-24	9	9	9	9	OUT2 integrated flow rate reach preset setting upper 4 digits
P-25	9	9	9	9	OUT2 integrated flow rate reach preset setting lower 4 dig-its
P-26		0	1	0	Integrating pulse output rate
P-30				1	Applicable gas selection
P-31	1.	0	0	0	CF value
P-40				1	Communication ID
P-41				2	Transmission speed selection
P-42				0	Parity

※ According to the ordered specifications.

## ②Setting mode No. and description of set values

Mode No.	Set Item	Description of set values	Default Value
F-00	Indication of max. value (Full scale)	<div> <div>A B C D</div> <div>2 0 0 0</div> </div> <p>The value of the full scale is indicated. Unchangeable. Max value :2000</p>	※
P-00	Reference condition on flow rate	<div> <div>A B C D</div> <div>0</div> </div> <p>Reference condition on flow rate            0: 20℃,1atm            1: 0℃,1atm            2: 25℃,1atm</p> <p>Set the flow rate reference condition.            ※The default values are as per the specifications.</p>	※
P-01	Low cut function selection	<div> <div>A B C D</div> <div>1</div> </div> <p>Low cut function selection (±0.5%F.S.)            0: Disable            1: Enable</p> <p>0:Disable: Instantaneous flow rates below 0.5% F.S. are indicated. Negative values are also indicated.            1:Enable: Instantaneous flow rates below 0.5% F.S. are indicated as 0. Negative values are also indicated as 0.</p>	1
P-02	PV filter	<div> <div>A B C D</div> <div>0</div> </div> <p>PV filter            0: No.            1: Moving average of sampling 2 times            2: Moving average of sampling 4 times            3: Moving average of sampling 8 times            4: Moving average of sampling 16 times            5: Moving average of sampling 32 times</p> <p>Input signals are measured during the period set here and an average value is calculated. Therefore, the indication is averaged and updated at the set cycle.</p>	3
P-03	Instantaneous flow rate indication update cycle	<div> <div>A B C D</div> <div>0</div> </div> <p>Instantaneous flow rate indication update cycle            0: 25ms            1: 50ms            2: 100ms            3: 200ms            4: 500ms            5: 1000ms</p>	3
P-04	Integrated flow rate hold selection	<div> <div>A B C D</div> <div>0</div> </div> <p>(The integrated flow rate value hold cycle :1min.)            Integrated flow rate hold            0: disable            1: enable</p> <p>0:Disable: The integrated flow rate value is reset when the power is turned off.            1:Enable: The integrated flow rate value is held after the power is turned off.            The integrated flow rate value hold cycle is 1 minute.</p>	1
P-05	Analog output selection	<div> <div>A B C D</div> <div>0</div> </div> <p>Analog output            0: 4-20mA            1: 0-5V            2: 1-5V</p>	0

Parameter setting No.	Set Item	Description of set values	Default Value
P-10	OUT1 output selection	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">00</div> <div>00:No</div> </div> <div style="margin-top: 5px;">10: Instantaneous flow rate upper limit : ON</div> <div style="margin-top: 5px;">11: Instantaneous flow rate upper limit : OFF</div> <div style="margin-top: 5px;">20: Instantaneous flow rate lower limit : ON</div> <div style="margin-top: 5px;">21: Instantaneous flow rate lower limit : OFF</div> <div style="margin-top: 5px;">30: Instantaneous flow rate upper/lower limit : ON</div> <div style="margin-top: 5px;">31: Instantaneous flow rate upper/lower limit : OFF</div> <div style="margin-top: 5px;">40: Integrated flow rate reach : ON</div> <div style="margin-top: 5px;">41: Integrated flow rate reach : OFF</div> <div style="margin-top: 5px;">50: Integrating pulse : ON</div> <div style="margin-top: 5px;">51: Integrating pulse : OFF</div> <p>※ON:Normal output, OFF:Inverted output</p> <p>The function works according to results of comparison between the indicated value and the preset value. [OUT1 setting] 00:The event output mode is not used. 10:Instantaneous flow rate upper limit output Output when “instantaneous flow rate value <math>\geq</math> P-11 upper limit preset value”. 20:Instantaneous flow rate lower limit output Output when “instantaneous flow rate value <math>\leq</math> P-12 lower limit preset value”. 30:Instantaneous flow rate upper/lower limit output Output when “instantaneous flow rate value <math>\geq</math> P-11 upper limit preset value” or “instantaneous flow rate value <math>\leq</math> P-12 lower limit preset value”. ※The alarm is constantly output when “P-11 upper limit preset value <math>\leq</math> P-12 lower limit preset value” is set. 40: Integrated flow rate reach Output when “integrated flow rate value <math>\geq</math> P-13 upper limit preset value”. 50:Pulses of approx. 50 ms are output every preset value of P-16 of the integrated flow rate value.</p>	00
P-11	OUT1 instantaneous flow rate upper limit preset setting	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9999</div> <div>Setting of output 1 preset value: 0000 – 9999</div> </div> <p>Indicated only when [10]/[11] or [30]/[31] are selected in P-10.</p>	9999
P-12	OUT1 instantaneous flow rate lower limit preset setting	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0000</div> <div>Setting of output 1 preset value: 0000 – 9999</div> </div> <p>Indicated only when [20]/[21] or [30]/[31] are selected in P-10.</p>	0000
P-13	Dead time value	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">00</div> <div>Setting of output 1 preset value: 00~30 (unit:sec.)</div> </div> <p>Indicated only when [10]/[11] or [20]/[21] or [30]/[31] are selected in P-10. The upper limit, lower limit and upper/lower limit are output when each condition is met during this period continuously.</p>	00
P-14	OUT1 integrated flow rate reach preset setting upper 4 digits	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9999</div> <div>(Upper 4 digits)</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9999</div> <div>Setting of output 1 preset value: 0000 – 9999</div> </div> <p>Indicated only when [40]/[41] are selected in P-10.</p>	9999
P-15	OUT1 integrated flow rate reach preset setting lower 4 digits	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9999.</div> <div>(Lower 4 digits)</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9999</div> <div>Setting of output 1 preset value: 0000 – 9999</div> </div> <p>Indicated only when [40]/[41] are selected in P-10. * The decimal point is shown in lower 4 digits. The position of the decimal point varies depending on specification flow rates.</p>	9999
P-16	Integrating pulse output rate	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">010</div> <div>Setting of output 1 preset value: 001~100(unit:%FS)</div> </div> <p>Indicated only when [50]/[51] are selected in P-10.</p>	10

Parameter setting No.	Set Item	Description of set values	Default Value
P-20	OUT2 output selection	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> </div> <ul style="list-style-type: none"> <li>00:No</li> <li>10: Instantaneous flow rate upper limit : ON</li> <li>11: Instantaneous flow rate upper limit : OFF</li> <li>20:Instantaneous flow rate lower limit : ON</li> <li>21:Instantaneous flow rate lower limit : OFF</li> <li>30:Instantaneous flow rate upper/lower limit : ON</li> <li>31:Instantaneous flow rate upper/lower limit : OFF</li> <li>40:Integrated flow rate reach : ON</li> <li>41:Integrated flow rate reach : OFF</li> <li>50:Integrating pulse : ON</li> <li>51:Integrating pulse :OFF</li> </ul> <p style="text-align: center;">※ON:Normal output, OFF:Inverted output</p> <p>The function works according to results of comparison between the indicated value and the preset value.  [OUT2 setting]  00:The event output mode is not used.  10:Instantaneous flow rate upper limit output  Output when “instantaneous flow rate value <math>\geq</math> P-21 upper limit preset value”.  20:Instantaneous flow rate lower limit output  Output when “instantaneous flow rate value <math>\leq</math> P-22 lower limit preset value”.  30:Instantaneous flow rate upper/lower limit output  Output when “instantaneous flow rate value <math>\geq</math> P-21 upper limit preset value” or “instantaneous flow rate value <math>\leq</math> P-22 lower limit preset value”.  ※The alarm is constantly output when “P-11 upper limit preset value <math>\leq</math> P-22 lower limit preset value” is set.  40: Integrated flow rate reach  Output when “integrated flow rate value <math>\geq</math> P-23 upper limit preset value”.  50:Pulses of approx. 50 ms are output every preset value of P-26 of the integrated flow rate value.</p>	00
P-21	OUT2 instantaneous flow rate upper limit preset setting	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> </div> <p style="text-align: center;">Setting of output 2 preset value: 0000 – 9999</p> <p>Indicated only when [10]/[11] or [30]/[31] are selected in P-20.</p>	9999
P-22	OUT2 instantaneous flow rate lower limit preset setting	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> </div> <p style="text-align: center;">Setting of output 2 preset value: 0000 – 9999</p> <p>Indicated only when [20]/[21] or [30]/[31] are selected in P-20.</p>	0000
P-23	Dead time value	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> </div> <p style="text-align: center;">Setting of output 2 preset value: 00~30 (unit:sec.)</p> <p>Indicated only when [10]/[11] or [20]/[21] or [30]/[31] are selected in P-20.The upper limit, lower limit and upper/lower limit are output when each condition is met during this period continuously.</p>	00
P-24	OUT2 integrated flow rate reach preset setting upper 4 digits	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> </div> <p style="text-align: center;">(Upper 4 digits)</p> <p style="text-align: center;">Setting of output 2 preset value: 0000 – 9999</p> <p>Indicated only when [40]/[41] are selected in P-20.</p>	9999
P-25	OUT2 integrated flow rate reach preset setting lower 4 digits	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">9.</div> </div> <p style="text-align: center;">(Lower 4 digits)</p> <p style="text-align: center;">Setting of output 2 preset value: 0000 – 9999</p> <p>Indicated only when [40]/[41] are selected in P-20. * The decimal point is shown in lower 4 digits. The position of the decimal point varies depending on specification flow rates.</p>	9999
P-26	Integrating pulse output rate	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>A</span><span>B</span><span>C</span><span>D</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">1</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> </div> <p style="text-align: center;">Setting of output 2 preset value: 001~100(unit:%FS)</p> <p>Indicated only when [50]/[51] are selected in P-20.</p>	10

Parameter setting No.	Set Item	Description of set values	Default Value
P-30	Applicable gas selection	<div> <div>A    B    C    D</div> <div> <div>0</div> </div> </div> <p>Applicable gas and CF value setting</p> <p>0: CF value setting  1: N<sub>2</sub>  2: Air  3: H<sub>2</sub>  4: He  5: Ar  6: O<sub>2</sub>  7: CO<sub>2</sub>  8: CH<sub>4</sub></p> <p>※Default:N2. FS.50~200SLM:[0]or[1]or[2]or[5], FS.300~500SLM:[0]or[1]</p>	1
P-31	CF value	<div> <div>A    B    C    D</div> <div> <div>1.    0    0    0</div> </div> </div> <p>0.500~1.500</p> <p>Indicated only when [0] is selected in P-10.  ※The input range of the CF value is 0.500-1.500.</p>	1.000
P-40	Communication ID	<div> <div>A    B    C    D</div> <div> <div>0    0    1</div> </div> </div> <p>Communication ID: 1~247, -</p> <p>[-]:Communication is disabled. [001] to [247]:Modbus conforming</p>	1
P-41	Transmission speed selection	<div> <div>A    B    C    D</div> <div> <div>0</div> </div> </div> <p>Transmission speed</p> <p>0: 9600bps  1: 19200bps  2: 38400bps</p> <p>Not indicated when [-] is selected in P-40.  Fixed value: Start bit:1bit, Data length:8bit, Stop bit:1bit</p>	2
P-42	Parity	<div> <div>A    B    C    D</div> <div> <div>0</div> </div> </div> <p>Parity</p> <p>0: No parity  1: Odd parity  2: Even parity</p> <p>Not indicated when [-] is selected in P-40.  Fixed value: Start bit:1bit, Data length:8bit, Stop bit:1bit</p>	0

## 8. Troubleshooting

Problem	Probable Cause	Check Item and Corrective Action
1. The indicator shows nothing.	a. The power is not on.	1. Check to see if the power has been turned on.
	b. The connector has not been connected to the meter properly.	1. Connect the connector properly. Check to see if the pin numbers of wires and destinations match.
2. The indication of a flow rate remains 0.	a. Gas is not flowing.	1. Check the source pressure of the gas cylinder and check the valve to see if it is open. 2. Check to see if the solenoid valve, three-way valve, etc. in the line are operating properly. 3. Check to see if the line filter is not clogged.
	b. The outlet side piping of the mass flow meter is blocked somewhere.	1. Check the solenoid valve, three-way valve, air valve, etc.
	c. The power supply is faulty.	1. Disconnect the cable and check the voltage 24 VDC (within $\pm 5\%$ ) with a tester. If the correct voltage is not present, replace the power supply.
	d. The sensor tube is clogged.	1. If it is clogged, gas keeps flowing. The sensor must be replaced. Please send it to our sales office or the dealer.
3. The output will not become zero (more than 45 minutes after power on).	a. The control valve is leaking internally or externally.	1. Disconnect the pipe before of the mass flow controller and remove gas to see if the output will become zero.
	b. The zero point of the sensor has moved.	1. Conduct zero adjustment.
	c. The sensor is faulty or the electronic circuit is faulty.	1. The meter may be used after zero point adjustment, but the flow accuracy will be impaired. Please send them to our sales office or the dealer for replacement.
4. The indication of a flow rate flickers when gas is flowing.	a. The supply pressure on the inlet side is constantly instable.	1. Install a pressure regulator on the inlet side to keep the pressure constant.
	b. The connector connection is poor.	1. Check to see if the connector has been connected correctly.
	c. The power supply is faulty.	1. Disconnect the cable and check the voltage 24 VDC (within $\pm 5\%$ ) with a tester. If the voltage is not stable, replace the power supply.

\* If the problem cannot be solved by the above corrective actions, please contact our sales office or the dealer.

## 9. Precautions for maintenance

### Cleaning the inlet and outlet joints

When removing the joints for cleaning, conduct the work in clean environment so that no dust and dirt will enter the product. However, never disassemble or overhaul the product nor remove the protective seals.

**If the product has been disassembled or overhauled or the protective seals have been removed, it is considered that the user has waived his/her right to warranty even within the warranty period.**

## 10. After-sale Service

This product has been subjected to strict inspection prior to shipment. Should it fail, however, please contact the dealer or sales agent.

Please note that the product that is serviced by us will have the user-set parameters reset to the initial settings before shipment from KOFLOC.

## 11. Warranty

### Contents of warranty

#### (1) Warranty period

The warranty period is one (1) year after ex-factory date of KOFLOC.

#### (2) Scope of warranty

If the KOFLOC product fails during the warranty period due to a cause attributable to KOFLOC, KOFLOC will, at its option and expense, provide a replacement product or repair the failed product at the KOFLOC factory. The scope of warranty is limited to the product itself and KOFLOC shall not be held liable whatsoever for damages suffered by the customer due to a failure of the KOFLOC product regardless of significance and kind of such damages.

#### (3) Out of warranty

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

- a) Failure due to misuse or improper repair or modification. (Failure resulting from use under conditions different from the manufacturing specifications is included.)
- b) Failure due to dropping of the product after purchase.
- c) Failure due to fire, earthquake, flood, lightning or other natural disaster, or riot, war or the like.
- d) Failure due to intrusion of foreign matter from piping.
- e) Failure caused by a problem specific to a combination with other incorporated product.
- f) Other failures which are considered not attributable to KOFLOC.
- g) When the product is used on your equipment (machinery), this warranty shall not apply to damages that are considered avoidable should your equipment be equipped with functions, structure and safety measures that are commonly employed according to the industry practice.



**KOFLOC Corp.**

URL : <https://www.kofloc.co.jp>