Thermal Mass Flow Controller/Meter

MODEL8300series
(RS-232C)
Instruction Manual

Standard type

KOJIMA INSTRUMENT INCORPORATION
Please read this instruction manual before installing and using the product to maintain the performance and safety of the product. This will prevent failure resulting from improper use or damage to the product.

In the event when the product fails to operate properly or when readjustment is necessary, please contact our branch office near you for request. Our experienced service personnel will handle the case, so please make sure to follow his/her instruction.

Please note that repair by customer may result in serious accident and will not be exempted from official warranty.

Description in this instruction manual is subject to change due to product improvement etc. without notice. We take all care to ship the product and this document, but if you have find any irregular, erroneous, or missing descriptions, please be so good as to contact us.

《Prior to Use》 and 《Precautions for Safe Use》

Various visual signs are contained in this manual and attached to the product to ensure correct handling of the product and to prevent possible personal injury and property damage. Their meanings are as follows.

⚠️ **DANGER**

Ignoring this sign and handling the product incorrectly will immediately result in death or serious injury.

⚠️ **WARNING**

Ignoring this sign and handling the product incorrectly may result in death or serious injury.

⚠️ **CAUTION**

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

Thank you for purchasing the mass flow equipment Model 8000 series. Please read this instruction manual carefully and use the equipment properly.

2. Precautions in use

Make sure to check the following items before use:

- Is the type of gas and its flow rate met with the purpose?
- Is the equipment installed properly? (Is the direction of gas appropriate?)
- Are there no leaks in gas piping?
- Is the pressure of the control gas within the range?
- Is the ambient temperature in the range of 15 to 35 °C?
- Are the voltage (24V), polarity, and capacity of the power source appropriate?
- Does the set up of dip switch meet with purpose?
- Is the external input within the level of 5V (or 20 mA)?
  (Maximum acceptable input voltage is 7V (The maximum acceptable input current is 28 mA).)
- When flow output is used, is the voltage endurance of the input equipment more than or equal to 15V?
  (Flow output is configured so that 15V is output at the full open operation).
- Is the line filter set at the gas input (0.1μm or less)?
- When a highly responsive gas is used, is the pipe fully purged?
- When complete shut off is required, is there a special valve for shut off?
- Have you checked the identification plate for specifications?
  (The product you have ordered is assembled and adjusted for the specifications. Gas that can be used and the flow etc. are indicated on the identification plate located on the back of the case. Please make sure the specifications are as you ordered.)

Check list

1. Model
2. flow rate:  
   SCCM = ml/min at 0 °C: 1 atm (101.325 kPa)  
   SLM = l/min at 0 °C: 1 atm (101.325 kPa)  
   NCCM = ml/min at 20 °C: 1 atm (101.325 kPa)  
   NLM = l/min at 20 °C: 1 atm (101.325 kPa)
3. Name of the fluid
4. Presence of the serial No.
3. Precautions about moving the product

To prevent damage to the product during transfer, bring the product to the location of installation keeping the condition of shipment as far as possible.

4. Precautions about storing the product

If you do not use the product for long time after it is delivered, unexpected failure may occur. If you know you are not going to use the product for a long time, please note the following:

- Store the product in the package as it has been shipped as far as possible.
- Store the product where the following conditions are satisfied:
  (1) No rain or water
  (2) No vibrations or shocks
  (3) The temperature and humidity can be kept within the normal range (about 25 °C and 65%).
  (4) Little dust
  (5) No corrosive gas
  (6) No electric or magnetic field
- Always purge the product with clean air or N₂ so that no measurement gas remains in the flow meter before storing the product after use.

Protect the inlet/outlet of the measurement gas with caps to prevent commingling of dust or dirt.

Caution

- When using the mass flow unit, avoid places where noise can be generated, wet or dusty places, high temperature, or corrosive gas in the ambience. It may result in serious failure.

Caution

- Never clean the pipes after installing the mass flow unit. It may result in serious failure.
5. Product Overview

The mass flow unit 8300 series is a high-performance gas flow meter in which a flow sensor that has been developed based on the principle of thermal mass flow sensor and the flow control valve are combined (controller type).

8300 series has the following functions and features:

- Normally close type. (controller type)
- High lift actuator realizes high flow in a compact body. (controller type)
- Equipped with the display and configuration device and can be operated by a single 24V power source.
- A 14-bit converter is mounted for input/output process of the display and configuration device and operation at four and a half digits is available.
- For the external input/output, 4 to 20 mA current input as well as 0 to 5.0 VDC voltage signals can be used.
  This can be selected using dip switches, so four kinds of operations can be selected. In addition, differential input is available for the voltage input, so error due to common potential can be removed.
- The effect of atmospheric temperature is less and the range of working temperature is broad because the sensor temperature.
- Particle free structure.
- The metal case, EMI filter etc. ensure stable operation in an environment with high frequency noise or direct current magnetic field.

Caution

The valve control of Model 8300 controller type is designed for precision control, not for complete shut off.
If complete shut off is required, install a shut off valve to the inlet or the outlet.

If you install a solenoid-operated valve for complete shut off in Model 8300 controller type, a little amount of gas will be blocked between the downstream side of the mass flow controller and the solenoid-operated valve. Note that as a result, a surge will occur when the mass flow controller is started.
You can change the effect of the surge by shortening the interval of the controller and the solenoid-operated valve or by installing the solenoid-operated valve at upper stream of the controller.
6. Construction and special functions

(1) Construction

The mass flow unit 8000 series consists of the sensor, bypass, electric circuit, and the valve (controller type) and can measure and control flow of any gas. It can be operated by a single DC 24V power source. 8100 series is equipped with flow display and configuration device so it can be used without complicated peripheral equipment. In addition, 8100 series has various special functions including flow accumulation function as the standard equipment, so it can be used in various applications.

(2) Special features

- Capable of switching between instantaneous and integrated flow value displays.
- Capable of setting instantaneous flow set value, instantaneous flow indicated value (full scale flow), lower limit alarm value, upper limit alarm value and maximum indicated value of integrated measurement.
- LED indicator of upper/lower limit alarm (red) and allowable range alarm (green).
- Capable of open collector output for upper/lower limit alarm and allowable range alarm.
- Capable of resetting integrated flow values.
- Capable of analog voltage (0 - 5 V) output (Can be changed to predetermined value).
- Capable of memorizing 5 different set values of flow and switching over the set values.
- MFC command operation via serial communication.
- Capable of the output of valve voltage monitoring output in unison with the instantaneous flow set value and input of forced opening/closing of valve.
- Detachable indicator.
- AUTO ZERO function
### 7. Standard specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F.S. flow</strong></td>
<td>8300, 8350</td>
</tr>
<tr>
<td><strong>N2 converted</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O₂, 13A, Air, etc</td>
</tr>
<tr>
<td><strong>Sensor method</strong></td>
<td>High-speed upstream/downstream coil sensor</td>
</tr>
<tr>
<td><strong>Method of valve actuation</strong></td>
<td>Solenoid normally close</td>
</tr>
<tr>
<td><strong>Valve method</strong></td>
<td>Poppet valve</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
</tr>
<tr>
<td>Range of control</td>
<td>2% to 100%F.S.</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>0 → 98% Within 2 sec (At the time of 100%F.S. setup)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±1.5%F.S. (±2.0%F.S.)</td>
</tr>
<tr>
<td>Reproducibility</td>
<td>±1.0%F.S. (±1.5%F.S.)</td>
</tr>
<tr>
<td><strong>Pressure</strong></td>
<td></td>
</tr>
<tr>
<td>Withstand pressure</td>
<td>980KPa</td>
</tr>
<tr>
<td>Operative differential pressure</td>
<td>49KPa to 294KPa</td>
</tr>
<tr>
<td>low differential pressure option</td>
<td>2KPa to 149KPa *Only 8300</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
</tr>
<tr>
<td>Operative temperature</td>
<td>0 °C to 50 °C</td>
</tr>
<tr>
<td>Temperature at which accuracy is guaranteed</td>
<td>15°C to 35 °C</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td></td>
</tr>
<tr>
<td>Operative humidity</td>
<td>10% to 90% (no condensation)</td>
</tr>
<tr>
<td><strong>Flow configuration</strong></td>
<td></td>
</tr>
<tr>
<td>Configuration method</td>
<td>(1) Key operation (2) external input (3) Pattern key input (5pattern)</td>
</tr>
<tr>
<td>Configurable input</td>
<td>(1) 0V to 5V(2) 4mA to 20mA (Arbitrary specification)*1</td>
</tr>
<tr>
<td><strong>Flow output</strong></td>
<td></td>
</tr>
<tr>
<td>Output range</td>
<td>(1) 0V to 5V(2) 4mA to 20mA (Arbitrary specification)*1</td>
</tr>
<tr>
<td><strong>Flow display</strong></td>
<td></td>
</tr>
<tr>
<td>Display method</td>
<td>Four-digit 7-segment LED</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.1%</td>
</tr>
<tr>
<td><strong>Alarm</strong></td>
<td></td>
</tr>
<tr>
<td>Number of outputs</td>
<td>Alarm output: 2 (Open collector output: max 35V:50mA)</td>
</tr>
<tr>
<td>Resolution</td>
<td>1mV (1 digit)</td>
</tr>
<tr>
<td><strong>Power source</strong></td>
<td></td>
</tr>
<tr>
<td>Rating</td>
<td>DC 24V consumption current 300mA max</td>
</tr>
<tr>
<td>Accepted range of voltage and current</td>
<td>DC22.8V to 25.2V</td>
</tr>
<tr>
<td><strong>Material of gas-contacting parts</strong></td>
<td>SUS316L, Viton (Neoprene)</td>
</tr>
<tr>
<td><strong>Fitting</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standard: 1/4SWL (3/8SWL), Other: 9/16-18UNF, Re1/4, 1/4VCR</td>
</tr>
<tr>
<td><strong>Installed position</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No specification</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>About 1200g (About 1500g)</td>
</tr>
</tbody>
</table>

*1 0V to 5V and 4mA to 20mA are the contents chosen at the time of order.

*2 The inside of ( ) is MODEL8350.
8. Indicator Specification (For specific models)

- Sampling rate: 2.5/sec.
- Scale out: Blinking
- Display range of instantaneous flow: -0.5 V to 6.0 VDC in voltage input
- Display range of integrated flow: 0000 – 9999 in indicated value
- Display accuracy: +/- 0.1 %, +/- 1 digit for analog voltage input

9. Integration Specification Features

(1) Input conversion
   This is set in the unit used to indicate hourly-integrated flow value of the maximum flow
   (flow at 5 VDC).
(2) Measuring method
   Addition of instantaneous value per 0.1 sec.
(3) Power failure countermeasures
   Integrate data are written into a serial EEPROM every one minute. Re-counting will start when
   the power comes back on.
(4) Scale out
   Blinks “9999”

10. Upper/Lower Limit Alarm and Allowable Range Alarm Specifications

(1) When the instantaneous flow value is higher than the upper limit alarm value or lower than the lower
    limit alarm value, the alarm (AL) LED is lit (Red) and upper/lower limit alarm output is turned ON.
(2) When the instantaneous flow value is between the lower limit and upper limit alarm values, the alarm
    (OK) LED is lit (Green) and the allowable range alarm output is turned ON.

Note: If the alarm set value is less than 1 % of the instantaneous flow indicated value (full scale flow); the
alarm function will not work.

The alarm function will not work by forced opening or closing status.

11. Integrated Analog Voltage Output Specifications

(1) Analog voltage ranging from 0 to 5 VDC is output in unison with the integrated value.
(2) The integrated value of “0000” corresponds to 0 volt and blinking “9999” to 5 volts.
### 12. Compliant connectors and pin alignment

**Connector: DX10M - 20S (HRS)**

**Recommended compliant connector: DX40M - 20P; Cover: DX30M - 20 - CV (HRS)**

<table>
<thead>
<tr>
<th>Terminal number</th>
<th>Signal name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forced valve open/close input signal</td>
<td>+5V: FULL OPEN, COM: FULL CLOSE, OPEN: CONTROL</td>
</tr>
<tr>
<td>2</td>
<td>Flow output signal</td>
<td>0 to 5VDC or 4 to 20 mA (Selectable using the built-in dip switch on the board) * 1</td>
</tr>
<tr>
<td>3</td>
<td>Power supply input</td>
<td>+24VDC</td>
</tr>
<tr>
<td>4</td>
<td>Power supply input COM</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>+5V output</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Flow setting external input signal</td>
<td>0 to 5VDC or 4 to 20 mA</td>
</tr>
<tr>
<td>7</td>
<td>Flow output signal COM</td>
<td>(Selectable using the built-in dip switch on the board)</td>
</tr>
<tr>
<td>8</td>
<td>Flow setting external input signal COM</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Valve voltage monitor output signal</td>
<td>0 to 5V (actuator impressed voltage value)</td>
</tr>
<tr>
<td>10</td>
<td>Setting range checking signal output</td>
<td>Open collector output (max spec.: 35V, 50 mA)</td>
</tr>
<tr>
<td>11</td>
<td>Upper /lower limit alarm output</td>
<td>Open collector output (max spec.: 35V, 50 mA)</td>
</tr>
<tr>
<td>12</td>
<td>Integrated analog output signal</td>
<td>0 to 5VDC</td>
</tr>
<tr>
<td>13</td>
<td>Selection pattern1</td>
<td>ON by COM short circuit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(When do zero calibration, connect to No.7 pin)</td>
</tr>
<tr>
<td>14</td>
<td>Selection pattern2</td>
<td>ON by COM short circuit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(When do zero calibration, connect to No.7 pin)</td>
</tr>
<tr>
<td>15</td>
<td>Selection pattern3</td>
<td>ON by COM short circuit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(When do zero calibration, connect to No.7 pin)</td>
</tr>
<tr>
<td>16</td>
<td>Selection pattern4</td>
<td>ON by COM short circuit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(When do zero calibration, connect to No.7 pin)</td>
</tr>
<tr>
<td>17</td>
<td>Selection pattern5</td>
<td>ON by COM short circuit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(When do zero calibration, connect to No.7 pin)</td>
</tr>
<tr>
<td>18</td>
<td>TRx+</td>
<td>RS232C + input and output</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(When do zero calibration, connect to No.7 pin)</td>
</tr>
<tr>
<td>19</td>
<td>TRx-</td>
<td>RS232C - input and output</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(When do zero calibration, connect to No.7 pin)</td>
</tr>
<tr>
<td>20</td>
<td>TR_COM</td>
<td>Communication signal COM</td>
</tr>
</tbody>
</table>

Note:  
*1: Voltage output (load current 5 mA or less), current output (load resistance 250Ω or less)  
*2: If five pins (No.13 to No.16 and No.7) are short circuited, AUTO ZERO function is all stop.
CAUTION
The flow signal output from Model 8300 will reach almost +10 VDC at the valve is fully open (at over flow) when voltage output is used. Call it into account when you connect a circuit.

DANGER
Don’t switch on simultaneously different power supply for power supply input terminal of Dsub20pin and pin jack power supply terminal. Failure may cause ignition etc. in a meter.

CAUTION
Nothing should wire No.13 pin to No.16 pin of Dsub20pin except when doing zero calibration. An external noise is gathered from wiring, and it becomes malfunction and the result of equipment failure.

13. Installation

(1) Location
1) Model 8300 series is for indoor use. Never install the product to a location where it could be subject to rain. It may result in malfunction. Install the product to a well-ventilated and little humidity change location.
2) Install the product where no vibrations or shock will occur.
3) Avoid direct sunlight, high temperature or high humidity.
4) Install the product where is not too dusty.
5) Avoid corrosive gas.
6) Avoid strong electric or magnetic field.
7) Always perform leak test of piping after installation.
8) Basically, install the product horizontally. If you install the product vertically, warm up enough and perform zero point adjustment.
9) Use the attached special connectors.
   (If the cable is too long, voltage drop may occur and accurate flow cannot be measured.)

Note that improper (out of specifications) use may result in failure.

(2) Dirt of piping
Use very clean commercial pipes and joints for piping. Although the product comes with a standard filter, if too many impurities accumulate on the filter, it may obstruct the gas flow.
When you use air from a compressor or ventilating fan, a large amount of oil mist or water droplets may enter. Install an oil filter or water removing filter.
(3) Installation position
Basically, install the product horizontally. If you install the product vertically, warm up enough and perform zero point adjustment.
Install the gas inlet and outlet pipes to the directions of the arrows on the plate.

(4) Installation method
Use the threaded hole (M4) on the bottom of the body block to install the product.
1/4" Swedge Lock or Rc 1/4 joints are used as standard joints for piping. Lay the pipes to the joints so that there is no leak.

(5) Wiring
See (12, Compliant connectors and pin alignment) for wiring.
Use the attached special connectors. Firmly insert connectors to the specified position to install.

14. Basic operations

(1) Warming up
While no gas pressure is placed on the inlet of the body (when the differential pressure between the inlet and outlet is exactly zero), turn on the power.
Warm up for at least 15 minutes while both external and internal flow setting inputs are set to exactly zero.
If you do not warm up the product, measuring will be inaccurate.

(2) Zero and span calibration
The AUTO ZERO function is prepared in MODEL8300. A gap of 2% or more is not in a zero point and after when gas is not flowing, a forced valve open/close setting is set as full close, an internals circuit adjust a zero point automatically every dozens of seconds. Therefore, expect when a zero point causes a gap of F.S.2% or more, it is not necessary to do zero point calibration.
If you have a calibration gas flow meter, span calibration is also available. If you don't, perform zero calibration only. Wherein an AUTO ZERO function is stopped so that a calibration error may not be caused, please perform a zero and span calibration.
1) Zero calibration
No.13 to No.16 pin of Dsub20P is short-circuited with No.7 pin and stopped AUTO ZERO function and after warming up the product and when the flow output indication is stable when gas is stopped, turn the upper stand volume on the side of the case with a flathead screwdriver until the output changes about 1 V or the indicated value changes about 20%/F.S.
Next, turn the volume counterclockwise so the indicated value becomes 0% or 0 VDC.
When you perform the adjustment described above, make sure the indicated value or output is always positive and always adjust the zero point from the positive side.

2) Span calibration
Usually, you do not have to perform calibration. However, if span calibration is necessary because of calibration of our standard calibrator to your calibration gas flow meter or regular calibration etc., perform span calibration according to the following steps:

*If you do not have a calibration gas flow meter, never touch the "SPAN" volume.*

A) Connect the calibration gas flow meter to the gas outlet of the body.
B) Apply gas pressure within the range of used pressure to the inlet side and set the setting input to 100% (5.0 VDC).
C) Keep this status for about five minutes and then measure the flow. Turn the span volume so that the flow meter indicates full scale flow.

* Because it may take some time until the flow becomes completely stable, wait for about five minutes after operating the span volume for high-precision calibration.

(3) Operation
After completing above described sections (1) and (2), Model 8000 series is ready for measurement. You can set the flow using the configuration device on the top or the external input.
* The number of displayed digits and accuracy of the configuration device on the top and those of the display device that can be connected to outside are different, so there may be a little difference between the displayed numbers depending on the valid maximum value that can be displayed.

(4) Precautions on use
1) Used pressure
The operating differential pressure of the thermal mass flow Model 8000 series is determined by the specification flow range. (For more information, see (7. standard specifications).)
To guarantee proper operation, always use the product within the pressure range compliant with the specifications.
The withstand pressure is 980 kPa.
2) Gas calibration
As for the air, N₂, O₂, H₂, He, Ar, and CO₂, calibration is performed using the gas, but as for other gas
types, conversion factor is used.
When you use a gas that is not in the specifications, check the corrosion resistance of the materials of
gas-contacting parts.

3) Gas stop
The controller type uses normally-close method, but install a stop valve at the gas inlet or outlet for
complete shut-off.

(5) When using a gas that is not in the specifications (conversion factor)
If you use the thermal mass flow that is calibrated for a certain type of gas with another type of gas, the
indication is different from the actual flow.
For example, if you use the product that is calibrated using N₂ for He, the gas flows 143% more than the
indicated value.
Please note the above factor and contact us for the conversion factor if you use a gas that is not in the
specifications.
15. Name and functions of indicator and setting device of Model 8300

(1) DISPLAY switch
Switches between instantaneous flow rate and integrated flow rate displays.
Switching can be done with a single action.
When LED is lit Green, it displays the instantaneous flow rate, and when the LED is lit Red, it displays the integrated flow rate.
This also works as a functional switch to permit digit movement (e.g., entering the flow set value).

(2) MODE switch
This switch is used to start the setting of each function.
Each setting operates in the order shown below and returns to display either the instantaneous flow rate or integrated flow rate value after the set value input has been switched over.

Setting the “Instantaneous flow indicated value (full scale flow)” → Setting the “Maximum indicated value of integrated measurement” → Setting “Lower limit alarm value” → Setting “Upper limit alarm value” → Setting “External input”
1. Setting the “Instantaneous flow indicated value (full scale flow)”
   Set the instantaneous flow indicated value (full scale flow).
   Operation:
   Specify numerical values → ENTER switch → Specify decimal point → ENTER switch
   In this operation, the instantaneous flow indicated value is fixed.

2. Setting the “Maximum indicated value of integrated measurement”
   Enter the integrated flow value per hour.
   Out of the 4 digits of DPM, the upper 3 figures are Integer entries and the least significant
digit is the EXP value entry.

   Example: If the display must be “150”, that is 1.50x10^2, set the value to “1502” (1.50 is
   the integer and 2 is the EXP value).

   Operation: Specify numerical values → ENTER switch
   In this operation, setting value is fixed.

3. Setting “Lower limit alarm value”
   Enter the lower limit value of the instantaneous flow value.
   The set numerical value is a percentage of the full-scale flow set value (2.0 – 100.0 %), and if
   it is less than 2.0 %, the function will be disabled.

   Operation: Specify numerical values → ENTER switch
   In this operation, setting value is fixed.

Note1: During setting operation, the display will show 0.0 - 199.9 %, however the actual settable range is 0.0 -
100.0 %. A value rounded within the effective range is set in the internal circuit.

   Example: If "199.9" is specified, "100.0" is set in the internal circuit.
4. Setting “Upper limit alarm value”
   Enter the lower limit value of the instantaneous flow value.
   The set numerical value is a percentage of the full-scale flow set value (0.0 – 199.9 %), and if it is less than 2 %, the function will be disabled.

   Operation: Specify numerical values → ENTER switch
   In this operation, setting value is fixed.

5. Setting “Input change”
   Select per use, either the analog voltage of instantaneous flow set value from the external input terminal (D-sub, HP 20 P) or the flow set input from the display-setting device.

   0 displayed: Indicator setting (instantaneous flow set value)
   1 displayed: External setting input (flow rate setting input)
   In this stage, all setting of MODE setting becomes effective.

   Operation: Specify numerical values → ENTER switch
   In this operation, setting value is fixed.

(3) ENTER switch
   This switch confirms various set values.
   The integrated flow value is reset to 0 only if the ENTER switch is held down for 3 seconds.

(4) ▲ UP switch
   Switch, to start setting the instantaneous flow set value and flow pattern (5 patterns).
   Each setting operates in the order shown below and returns to display either the instantaneous flow rate or integrated flow rate value after pattern 5 is set.
   This also works as a switch to change numerical values in various function settings.
   Numerical values are counted up from 0 to 9, and then reset to 0.

< Only instantaneous flow setting >
   \[ d_0 \rightarrow \text{Instantaneous flow set value} \rightarrow \text{ENTER} \]

< After instantaneous flow setting, doing pattern1 to 5 setting >
   \[ d_0 \rightarrow \text{Instantaneous flow set value} \rightarrow \text{MODE} \rightarrow d_1 \rightarrow \text{Pattern1 setting} \rightarrow \text{ENTER} \rightarrow d_2 \rightarrow \text{Pattern2 setting} \rightarrow \text{ENTER} \rightarrow d_3 \rightarrow \text{Pattern3 setting} \rightarrow \text{ENTER} \rightarrow d_4 \rightarrow \text{pattern4 setting} \rightarrow \text{ENTER} \rightarrow d_5 \rightarrow \text{pattern5 setting} \rightarrow \text{ENTER} \]
(5) ▼ DOWN switch
Switch to set forced opening/closing of valve.
The initial value 0 is displayed when the DOWN switch is pressed.
In this state, each time UP is pressed the switch changes displays in the following order.

\[
1 \to 2 \to 0 \to 1 \to 2 \to 0 \cdots
\]

Each time ENTER is pressed the switch specifies the indicated data according to the situation at the time. The settings for each figure are as follows.

<table>
<thead>
<tr>
<th>Setting Value</th>
<th>Contents of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Control action (Initial value)</td>
</tr>
<tr>
<td>1</td>
<td>Valve full open</td>
</tr>
<tr>
<td>2</td>
<td>Valve full close</td>
</tr>
</tbody>
</table>

This also works as a switch to change numerical values in various function settings.
The numerical value is counted down from 9 to 0, and then reset to 9 if the digit movement function is enabled.
This also works as a switch for digit movement for value entry when the digit movement function is allowed.

(6) Alarm status display LED
This LED indicator tells that the instantaneous flow rate value exceeds the upper/lower limit set values. When the LED is lit Green, it shows that the flow rate is controlled within the upper/lower limit values. When LED is lit Red, it shows that the flow rate exceeds the upper/lower limit values.
The LED indicator becomes lit if the instantaneous flow value stays in the range of determined values for over 5 seconds.
LED lighting is in conjunction with pin 11 and pin 13 of the connector, so the LED is turned off and output is disconnected instantly during alarm avoidance status.
The LED is turned off when the flow rate set value is 1 % or less when in the forced opening/closing state.

(7) Instantaneous/integrated flow value determination LED
This is LED light which indicates whether the value of indicator is an instantaneous flow rate or an integrated flow rate.
If the LED is lit Green, the displayed value of is an instantaneous flow rate. If lit Red, it is an integrated flow rate.

(8) Instantaneous/integrated flow display LED
This is a numerical display LED that shows instantaneous flow rate or integrated flow rate depending on the operation of the DISPLAY switch.
16. Basic Operation for the Indicator and Setting Device

(1) Entering the MODE switch operation 100 % F.S at the maximum displayed value

1) Press MODE switch.

Indication blinks.

2) Enter any numerical value (Full Scale flow).
   Set each digit from the least significant of the 4 digits.
   ▲ UP Switch counts up by 1 and addition with carrying up is performed.
   \[0 \rightarrow 1 \rightarrow \cdots \rightarrow 9\]
   ▼ DOWN Switch counts down by 1 and subtraction with carrying down is performed.
   \[0 \rightarrow 9 \rightarrow \cdots \rightarrow 0\]

Example: 2SLM at 100%F.S.

Enter arbitrary numerical value (indication value at 100%F.S.)
To change a specific digit, press the DISPLAY switch to allow digit movement, and then perform the following procedure using ▼ DOWN switch:

4th digit → ⋯ ⋯ ⋯ → 1st digit → 4th digit ⋯ ⋯ ⋯

▲ UP switch will change value,

0 → 1 → ⋯ ⋯ ⋯ → 9

but addition with carrying up is not performed. The digit to be set should be blinking.

Only arbitrary figure blinks.

Press digit move permission switch.

3) Temporarily fix the input value (maximum value of displayed flow) by pressing ENTER key. 

ENTER switch temporarily fixes the numerical value.

Temporarily fix the input value by pressing ENTER switch.

Note: If no switch operation is made for 10 seconds, the numerical value is unchanged, and returns to the instantaneous flow rate or integrated flow rate value display.
(2) Entering the MODE switch operation of decimal point

Specify position of decimal point.
The decimal point to be set will be blinking, the ▲ switch moves it in the order of
4digit → 3digit → 2digit → 1digit → 4digit ・・・

and the ▼ switch moves it in the order of
4digit → 1digit → 2digit → 3digit → 4digit ・・・

Pressing the ENTER switch temporarily fixes the position.

Decimal point (Present decimal point position blinks).

---

Note: If no switch operation is made for 10 seconds, the numerical value is unchanged, and returns to the instantaneous flow rate or integrated flow rate value display.
(3) Entering the MODE switch operation integrated value

Specify the displayed integrated value per hour.

For example, if you configure the standardized settings in mass flow of 100% F.S 2SLM, supposing a direct reading in the flow rate unit for the integrated value, it will be 2 liter/min.

The maximum integrated amount per hour is,
2 (liter) \times 60 (minutes) = 120 liters

Therefore, the value to be set to 8300 is:
1.202 from 120 = 1.20 \times 10^2.

"1.20" indicates the displayed value per hour and the last digit of "2" indicates to the 10th power.

Numerical setting is performed like operation of (1).

▲ UP switch will change the value,
0 \rightarrow 1 \rightarrow \cdots \rightarrow 9 \rightarrow 0

and addition with carrying up is performed.

▼ DOWN switch will change the value,
0 \rightarrow 9 \rightarrow \cdots \rightarrow 1 \rightarrow 0

and subtraction with carrying down is performed.

Switch to allow digit movement (DISPLAY switch) is available for this operation.

After entering any numerical value, press the ENTER switch to temporarily fix the value.

Digit move permission switch.

Decimal point position is fixed.
Change is impossible.

Note: If no switch operation is made for 10 seconds, the numerical value is unchanged, and returns to the instantaneous flow rate or integrated flow rate value display.
(4) Entering the MODE switch alarm lower limit value

Set the permissible range lower limit value of the flow output value. The setting range is 0 – 100.0 %.

Referring to the current digital set value, determine the permissible range lower limit of flow in terms of percentage of the referenced value then set that numerical value. For example, in 100 % F.S 2SLM mass flow, supposing the flow set value is 1SLM and the lower limit is 800sccm,(800/1000*100) = 80.0 %

Therefore, the value to be entered is 080.0.

▲ UP switch will change the value,
0 → 1 → · · · → 9 → 0
and addition with carrying up is performed.

▼ DOWN switch will change the value,
0 → 9 → · · · → 1 → 0
and subtraction with carrying down is performed.

Switch to allow digit movement (DISPLAY switch) is available for this operation.
After entering any numerical value, press the ENTER switch to temporarily fix the value.

Digit move permission switch.

Addition or numerical change switch.

Subtraction or digit move switch.

Decimal point position is fixed.
Temporary fixation is carried out with ENTER switch.
Change is impossible.

Note: If no switch operation is made for 10 seconds, the numerical value is unchanged, and returns to the instantaneous flow rate or integrated flow rate value display.
(5) Entering the MODE switch alarm upper limit value
Set the permissible range upper limit value of the flow output value.
The setting range is 0 – 200.0%.

Referring to the current digital set value, determine the permissible range upper limit of flow in terms of percentage of the referenced value then set that numerical value.
For example, in 100 % F.S 2SLM mass flow, supposing the flow set value is 1SLM and the upper limit is 1.2SLM,

\[
\frac{1.2}{1} \times 100 = 120.0 \%
\]

Therefore, the value to be entered is 120.0.

▲ UP switch will change the value,
\[0 \rightarrow 1 \rightarrow \cdots \rightarrow 9 \rightarrow 0\]
and addition with carrying up is performed.

▼ DOWN switch will change the value,
\[0 \rightarrow 9 \rightarrow \cdots \rightarrow 1 \rightarrow 0\]
and subtraction with carrying down is performed.

Switch to allow digit movement (DISPLAY switch) is available for this operation.
After entering any numerical value, press the ENTER switch to temporarily fix the value.
Digit move permission switch.

Decimal point position is fixed.
Temporary fixation is carried out with ENTER switch.
Change is impossible.

Note: If no switch operation is made for 10 seconds, the numerical value is unchanged, and returns to the instantaneous flow rate or integrated flow rate value display.
(6) Selecting the MODE switch control of flow set value

Select either the external setting voltage from D-sub HP 20 P or the setting value from the display setting device, to be used to control flow set value.

Selected values:
- Selecting “0” utilizes the input value from the upper display setting device for control.
- Selecting “1” utilizes the external setting voltage from the connector for control.

▲ UP switch will change the value,

0 → 1 → ・・・ → 9 → 0

It becomes fixed decision by pushing ENTER switch after inputting arbitrary setting.

Changing to “0” or “1”.

Pressing ENTER switch and fixed decision is carried out so that all setting may be reflected.

Note: If no switch operation is made for 10 seconds, returns to the instantaneous flow rate or integrated flow rate value display.
(7) Selecting control of valve forced opening/closing

Select MFC internal valve operation with the upper display device switch.

Selection values:
Selecting “0” indicates that MFC operations are based on flow setting control.
Selecting “1” indicates that MFC operations are fully closed.
Selecting “2” indicates that MFC operations are fully open.

Start operation by pressing the ▼ DOWN switch.
Change to desired value with the ▲ UP switch.
The numerical value set up now displays blink.

Note: If no switch operation is made for 10 seconds, returns to the instantaneous flow rate or integrated flow rate value display.
(8) Setting instantaneous flow value and pattern flow value

Set the flow rate value with full scale flow value set as the upper limit.
Numerical setting is performed like operation of MODE switch setting.
Perform the procedures shown below:
- Instantaneous flow set value → Flow set value pattern 1 → Flow set value pattern 2 → Flow set value pattern 3 → Flow set value pattern 4 → Flow set value pattern 5

Pressing the ENTER switch after entering flow set value pattern 5 will fix the numerical value and the set value will be reflected.

If no switch operation is made for 10 seconds, the numerical value is unchanged and returns to the instantaneous flow rate or integrated flow rate value display.
If you set the value over the full scale flow indicated value, the value will be set to the same value as the full scale flow indicated value.

Example of entry operation:

▲ UP switch will change the value,

The present set point indication blinks.

Press UP switch.
2) Enter any numerical value (maximum value of displayed flow). Set each digit from the least significant of the 4 digits. The Display switch is pressed when carrying out numerical setting for every digit.

▲ UP switch will change the value,
0 → 1 → ⋮ ⋮ ⋮ → 9 → 0
and addition with carrying up is performed.

▼ DOWN switch will change the value,
0 → 9 → ⋮ ⋮ ⋮ → 1 → 0
and subtraction with carrying down is performed.

Example:
When indicated value is being set to 5.000 by 100% F.S. 5SLM

As for decimal point, the contents of the maximum indication setting reflected.

Inputting arbitrary numerical value (example: 2.000)

After changing any digit, press the DISPLAY switch to allow digit movement, then perform the following procedure using ▼ DOWN switch:

4th digit → ⋮ ⋮ ⋮ → 1st digit → 4th digit ⋮ ⋮ ⋮
▲ UP switch will change the value,
0 → 1 → ⋮ ⋮ ⋮ → 9 → 0
and addition with carrying up is not performed.
The digits to set up become blink.
Press digit move permission switch.

3) Temporarily fix the input value (maximum value of displayed flow) by pressing the ENTER key.

**The ENTER switch temporarily fixes the numerical value.**

4) Repeat steps 1) to 3) to enter the pattern flow value.

**Note:** If no switch operation is made for 10 seconds, returns to the instantaneous flow rate or integrated flow rate value display. And all operations to enter flow set values will become disabled.
(9) Setting ID (for communication)

Enter ID (individual number) necessary to operate multiple Model 8300 units via PC or other devices.

1) Turn on the main while holding the ENTER switch.

2) Enter the ID number.
Set each digit from the more significant of the 2 digits.

The digit which can be set up indicates by blink.

UP switch will change the value,

\[
0 \rightarrow 1 \rightarrow 2 \rightarrow \cdots \cdots \rightarrow 9 \rightarrow 0 \cdots \cdots
\]

When moving a digit, it is made to move with a DOWN switch,

2th digit \rightarrow \cdots \cdots \rightarrow 1st digit \rightarrow 2th digit \cdots \cdots

After fixing, the displayed value will hold without blinking.

Turn on the power again.
Numerical blink stops.

Temporarily fix the input value by pressing ENTER switch.

* Turn on the power again and numerical value is made to reflect.

Note: The identifiable range of ID is from 1 to 31.
If any value out of that range is entered, it will be set as follows.
(Figures from 00 to 99 can be displayed, however the value is written in the range shown below.)
17. Serial Communication

(1) Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronization method</td>
<td>Asynchronous</td>
</tr>
<tr>
<td>Baud rate</td>
<td>9600 bps</td>
</tr>
<tr>
<td>Frame</td>
<td>Start bit: 1</td>
</tr>
<tr>
<td></td>
<td>Data length: 8 bits</td>
</tr>
<tr>
<td></td>
<td>Stop bit: 1</td>
</tr>
<tr>
<td></td>
<td>Parity: None</td>
</tr>
<tr>
<td>Transmission mode</td>
<td>Un-balanced RS-232C compliant, 3-wire system</td>
</tr>
<tr>
<td>Insulation</td>
<td>Communication – Control Circuit: Non-insulated</td>
</tr>
<tr>
<td></td>
<td>Communication – Power Source (24 VDC): Non-insulated</td>
</tr>
<tr>
<td>Factory default setting of ID</td>
<td>01</td>
</tr>
</tbody>
</table>

(2) Communication command table (Register RD command)

<table>
<thead>
<tr>
<th>Host request</th>
<th>8300 responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>SV value reading</td>
<td>@××R S V C_R</td>
</tr>
<tr>
<td>Instantaneous value reading</td>
<td>@××R D T C_R</td>
</tr>
<tr>
<td>Integrated value reading</td>
<td>@××R C T C_R</td>
</tr>
<tr>
<td>VER reading</td>
<td>@××V E R C_R</td>
</tr>
<tr>
<td>Pattern 0 reading</td>
<td>@××RP0 C_R</td>
</tr>
<tr>
<td>Pattern 1 reading</td>
<td>@××RP1 C_R</td>
</tr>
<tr>
<td>Pattern 2 reading</td>
<td>@××RP2 C_R</td>
</tr>
<tr>
<td>Pattern 3 reading</td>
<td>@××RP3 C_R</td>
</tr>
<tr>
<td>Pattern 4 reading</td>
<td>@××RP4 C_R</td>
</tr>
<tr>
<td>ID reading</td>
<td>@××RID C_R</td>
</tr>
<tr>
<td>Effective setting reading</td>
<td>@××QPT C_R</td>
</tr>
</tbody>
</table>

Caution: All command character strings should use a capital letter alphabet. The small letter alphabet isn’t supported.
A) Response value from model 8300 \(+\) 000000  
(Command to read ID in standard CMD, not included. For details on ID reading, refer to command descriptions.)

\[\pm \quad 00 \quad \text{0000} \]

- **SV value:** Instantaneous flow set value, 4 digits (excluding decimal point)
- **Instantaneous value:** Instantaneous flow value, 4 digits (excluding decimal point)
- **Integrated value:** Integrated value, 4 digits (excluding decimal point)
- **VER:** VER 4 digits  
  4th digit: Major number  
  1st to 3rd digit: Minor number

**XX:** ID (01 – 31)  
: Checksum  
  Lower-order 8-bit ASCII summation value from the front of the communication command data to in front of the checksum: Hexadecimal form.

: Status (ASCII hexadecimal form)  
  b7: Out of range alarm (1: Alarm status)  
  b6: In range signal (1: Signal status)  
  b5 – b0: 0 fixed
(3) Communication command table (Register RD command)

<table>
<thead>
<tr>
<th>Command</th>
<th>Host request</th>
<th>8300 responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>SV value setting</td>
<td>@ × × WS V □□□□ △△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>Integrated value reset</td>
<td>@ × × C C T △ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>Maximum indicated value</td>
<td>@ × × W F S □□□□ △△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>of instantaneous flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rate setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum indicated value</td>
<td>@ × × W S M □□□□ △△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>of integrated measurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forced open/close setting</td>
<td>@ × × W C V ◯○○○○○△△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>Upper limit setting</td>
<td>@ × × W U P □□□□ △△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>Lower limit setting</td>
<td>@ × × W L ○□□□□ △△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>Input change setting</td>
<td>@ × × C D g △△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>(Indicator setting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input change setting</td>
<td>@ × × C A N △△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>(External setting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pattern output setting</td>
<td>@ × × W P * □□□□ △△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○○○ Δ Δ c R</td>
</tr>
<tr>
<td>ID setting</td>
<td>@ × × W I D □□□□ △△ Δ c R</td>
<td>No response</td>
</tr>
<tr>
<td>Pattern output</td>
<td>@ × × P T * △△ Δ c R</td>
<td>% × × ◇◇ + 0 0 ○○○○△△ Δ Δ c R</td>
</tr>
<tr>
<td>/ SV value selection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(4) Simultaneous setting function
Function setting is simultaneously performed to MFC connected on the same circuit.
Following two correspond to this function.

- Integrated value reset command
- Forced open/close setting command
Description of register RD command

[Pattern 0 reading to pattern 4 reading]

• Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>RP*</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “RP0” “RP1” “RP2” “RP3” “RP4”
“RP0”: setting value of pattern 0 reading
“RP1”: setting value of pattern 1 reading
“RP2”: setting value of pattern 2 reading
“RP3”: setting value of pattern 3 reading
“RP4”: setting value of pattern 4 reading
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command

• 8300 Response

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Status</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>◯◯◯◯</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
   b7: Out of range alarm (1: Alarm status)
   b6: In range signal (1: Signal status)
   b5 - b0: 0 fixed
Return value: Numeric 4-digit ASCII characters of “0000” to “9999”
   (Present set point of assignment pattern number.)
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
**Reading ID**

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>&quot;00&quot;</td>
<td>RID</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”  
ID: Numeric 2-digit ASCII characters of “01” to “31” (fixed)  
Command: 3 ASCII characters “RID”  
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command

**8300 Response**

<table>
<thead>
<tr>
<th>STX</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”  
Return value: Numeric 4-digit ASCII characters of “0000” to “9999”  
(The present ID).  
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
[Effect set reading]

- Host Request

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Command</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>QPT</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”
ID: Numeric 2digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “QPT”
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command
Operation: This returns setting (SV value / pattern 0 to 4) which is performing the present state output.

- 8300 Response

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Status</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Answer character strings</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”
ID: Numeric 2digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
  b7: Out of range alarm (1: Alarm status)
  b6: In range signal (1: Signal status)
  b5 - b0: 0 fixed
Setting character strings: 2 ASCII characters of “00”, “01”, “02”, “03”, “04”, “05”.
(The present selection output set point.)
  “00”: SV value outputting
  “01”: Pattern 0 outputting
  “02”: Pattern 1 outputting
  “03”: Pattern 2 outputting
  “04”: Pattern 3 outputting
  “05”: Pattern 4 outputting
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
Description of register RD command

[SV value writing]

- Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Setting value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>WSV</td>
<td>□□□□</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “WSV”
Setting value: Numeric 4-digit ASCII characters of “0000” to “9999”
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command

- 8300 Response

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>States</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◊◊</td>
<td>+</td>
<td>00</td>
<td>◎◎◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
  b7: Out of range alarm (1: Alarm status)
  b6: In range signal (1: Signal status)
  b5 - b0: 0 fixed

Return value: Numeric 4-digit ASCII characters of “0000” to “9999” (The present SV set point).
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
[Integrated value reset]

・Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>CCT</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”

<Addressing of simultaneous setting]

ID: Numeric 2-digit ASCII characters of “00”

[Individual addressing]

ID: Numeric 2-digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “CCT”
Setting value: Numeric 4-digit ASCII characters of “0000” to “9999”
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command
Operation: In addressing of simultaneous setting, the integration value of all MFC on a communication circuit is set as “0000”. In individual addressing, the integration value of corresponding MFC is set as “0000”.

・8300 Response

<Addressing of simultaneous setting]
No response

・8300 Response

[Individual addressing]

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>States</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◊◊</td>
<td>+</td>
<td>00</td>
<td>◎◎◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
  b7: Out of range alarm (1: Alarm status)
  b6: In range signal (1: Signal status)
  b5 - b0: 0 fixed

Return value: Numeric 4-digit ASCII characters of “0000” to “9999” (The present SV set point).
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
[Setting the maximum indicated value of instantaneous flow rate]

- Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Setting value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>WFS</td>
<td>□□□□□</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “WFS”
Setting value: Numeric 5-digit ASCII characters of “0000” to “9999” + “1” to “4”
Setting example:
“10003” means “1000×103”
So, the first 4 digits (like 1000) are the integer sections and the lowest digit (like 3) is the index number of 10.
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command

- 8300 Response

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>States</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>◇◇◇◇◇</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
  b7: Out of range alarm (1: Alarm status)
  b6: In range signal (1: Signal status)
  b5 - b0: 0 fixed

Return value: Numeric 5-digit ASCII characters of “0000” to “9999” + “1” to “4” (The present Setting the maximum indicated value of instantaneous flow rate).
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
[Setting the maximum indicated value of integrated measurements]

- Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Setting value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>WSM</td>
<td>□□□□</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “WSM”
Setting value: Numeric 4-digit ASCII characters of “0000” to “9999”
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command

- 8300 Response

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>States</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>□□□□□□□□□□</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
   b7: Out of range alarm (1: Alarm status)
   b6: In range signal (1: Signal status)
   b5 - b0: 0 fixed

Return value: Numeric 4-digit ASCII characters of “0000” to “9999” (The present setting the maximum indicated value of integrated measurements).
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
[Setting forced opening/closing]

- Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Setting character string</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>WCV</td>
<td>◎◎◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”

[Addressing of simultaneous setting]
ID: Numeric 2digit ASCII characters of “00”

[Individual addressing]
ID: Numeric 2digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “WCV”

Setting character strings: character strings to set operations (ASCII character)
Command to open valve: 4 ASCII characters “OPEN”
Command to close valve: 4 ASCII characters “CLSE”
Command to control valve: 4 ASCII characters “CNTL”
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from
STX to command

- 8300 Response

[Addressing of simultaneous setting]
No response

- 8300 Response

[Individual addressing]

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>States</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Answer character strings</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>◎◎◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”
ID: Numeric 2digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
- b7: Out of range alarm (1: Alarm status)
- b6: In range signal (1: Signal status)
- b5 - b0: 0 fixed

Answer character strings: 4 ASCII characters “OPEN”, “CLSE”, and “CNTL”
(current status of valve)
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from
STX to the answer character string
[Setting upper limit]

- Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Setting value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>×</td>
<td>WUP</td>
<td>□□□□</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”

ID: Numeric 2digit ASCII characters of “01” to “31”

Command: 3 ASCII characters “WUP”

Set value: Numeric 4-digit ASCII characters from “0000” - “1999”

“0000” indicates 0.0 % and “1999” indicates 199.9 %.

If any value higher than 1999 is set, the value 1999 will be set.

Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the set value

- 8300 Response

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>States</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>×</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>◇◇◇◇</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”

ID: Numeric 2digit ASCII characters of “01” to “31”

Status: (Information below in ASCII hexadecimal form)

b7: Out of range alarm (1: Alarm status)
b6: In range signal (1: Signal status)
b5 - b0: 0 fixed

Return value: Numeric 4-digit ASCII characters of “0000” to “1999” (The present setting upper limit).

Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
[Setting lower limit]

- Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Setting value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>x</td>
<td>WLO</td>
<td>□□□□</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@"
ID: Numeric 2-digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “WLO”
Set value: Numeric 4-digit ASCII characters from “0000” - “1000”
“0000” indicates 0.0 % and “1000” indicates 100.0 %.
If any value 1000 or higher is set, the value 1000 will be set.
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the set value

- 8300 Response

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>States</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>x</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>◎◎◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%"
ID: Numeric 2-digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
  b7: Out of range alarm (1: Alarm status)
  b6: In range signal (1: Signal status)
  b5 - b0: 0 fixed

Return value: Numeric 4-digit ASCII characters of “0000” to “1000” (The present setting upper limit).
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
### Input change setting (Indicator setting)

#### Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>CDG</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

**STX**: ASCII character “@”  
**ID**: Numeric 2-digit ASCII characters of “01” to “31”  
**Command**: 3 ASCII characters “CDG”  
**Checksum**: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the set value  
**Operation**: Issuing this command will change over to the indicator for external input.

#### 8300 Response

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>States</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>◎◎◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

**STX**: ASCII character “%”  
**ID**: Numeric 2-digit ASCII characters of “01” to “31”  
**Status**: (Information below in ASCII hexadecimal form)  
  - b7: Out of range alarm (1: Alarm status)  
  - b6: In range signal (1: Signal status)  
  - b5 - b0: 0 fixed  

**Return value**: Numeric 4-digit ASCII characters of “STDG” (The present setting external input).  
**Checksum**: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value.
[Setting external input (External setting)]

- Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>CAN</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”
ID: Numeric 2digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “CAN”
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the set value
Operation: Issuing this command will change over to the external input side for external input.

- 8300 Response

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>States</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>◎◎◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

TX: ASCII character “%”
ID: Numeric 2digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
  b7: Out of range alarm (1: Alarm status)
  b6: In range signal (1: Signal status)
  b5 - b0: 0 fixed

Return value: Numeric 4-digit ASCII characters of “STAN” (The present setting external input).
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
[Setting of pattern output]

・Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Setting value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>××</td>
<td>WP*</td>
<td>□□□□</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “@”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “WP0” “WP1” “WP2” “WP3” “WP4”
  “WP0”: writing set value to pattern 0
  “WP1”: writing set value to pattern 1
  “WP2”: writing set value to pattern 2
  “WP3”: writing set value to pattern 3
  “WP4”: writing set value to pattern 4
Set value: Numeric 4-digit ASCII characters of “0000” to “9999”
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command

・8300 Response

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Status</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>××</td>
<td>◇◇</td>
<td>+</td>
<td>00</td>
<td>◎◎◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “%”
ID: Numeric 2-digit ASCII characters of “01” to “31”
Status: (Information below in ASCII hexadecimal form)
  b7: Out of range alarm (1: Alarm status)
  b6: In range signal (1: Signal status)
  b5 - b0: 0 fixed
Return value: Numeric 4-digit ASCII characters of “0000” to “9999”
  (Present set point of the specified pattern number.)
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
[Setting of ID]

- Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Setting value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>†</td>
<td>&quot;00&quot;</td>
<td>WID</td>
<td>□□□□</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “†”
ID: Numeric 2digit ASCII characters of “00”
Command: 3 ASCII characters “WID”
Set value: Numeric 4-digit ASCII characters of “00010” to “0031” (ID value of setting)
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command

- 8300 Response
No response

[Setting of Pattern output / SV value select]

- Host Request

<table>
<thead>
<tr>
<th>STX</th>
<th>ID</th>
<th>Command</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>†</td>
<td>××</td>
<td>PT*</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

STX: ASCII character “†”
ID: Numeric 2digit ASCII characters of “01” to “31”
Command: 3 ASCII characters “PT0” “PT1” “PT2” “PT3” “PT4” “PT5”
- “PT0”: pattern 0 selecting
- “PT1”: pattern 1 selecting
- “PT2”: pattern 2 selecting
- “PT3”: pattern 3 selecting
- “PT4”: pattern 4 selecting
- “PT5”: pattern 5 selecting
Checksum: Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to command
Operation: Issuing this command will change over to the external input side for external input.
### 8300 Response

<table>
<thead>
<tr>
<th></th>
<th>ID</th>
<th>Status</th>
<th>Sign</th>
<th>Fixed value</th>
<th>Return value</th>
<th>Checksum</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>×</td>
<td>◊◊</td>
<td>+</td>
<td>00</td>
<td>◎◎</td>
<td>△△</td>
<td>CR</td>
</tr>
</tbody>
</table>

**STX:** ASCII character “%”  
**ID:** Numeric 2-digit ASCII characters of “01” to “31”  
**Status:** (Information below in ASCII hexadecimal form)  
  - b7: Out of range alarm (1: Alarm status)  
  - b6: In range signal (1: Signal status)  
  - b5 - b0: 0 fixed

**Answer character strings:** Numeric 2-digit ASCII characters of “00” . “01” . “02” . “03” . “04” . “05”  
(Present set point of the selected putout.)  
- “00”: SV value outputting  
- “01”: Pattern 0 outputting  
- “02”: Pattern 1 outputting  
- “03”: Pattern 2 outputting  
- “04”: Pattern 3 outputting  
- “05”: Pattern 4 outputting

**Checksum:** Lower-order 8-bit ASCII characters (hexadecimal) of summation from STX to the return value
18. Failure diagnosis Q&A and precautions about maintenance

(1) Failure diagnosis and actions

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Suspected cause</th>
<th>Check list and action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No sensor output.</td>
<td>a. Power is not supplied.</td>
<td>1. Check if the power indicator is on.</td>
</tr>
<tr>
<td></td>
<td>b. Connector is not connected to the indicators properly.</td>
<td>1. Reconnect the connectors. Check if the color of each wire is properly connected.</td>
</tr>
<tr>
<td></td>
<td>c. Gas is not supplied.</td>
<td>1. Check if the gas container is pressurized and if the valve is open. 2. Check if the electromagnetic valve, three-way valve etc. on the line is operating properly. 3. Check if the line filter is not clogged.</td>
</tr>
<tr>
<td></td>
<td>d. There is a failure in the piping of the outlet side of the mass flow controller.</td>
<td>1. Check the electromagnetic valve, three-way valve, air valve, etc.</td>
</tr>
<tr>
<td></td>
<td>e. Forced close signal is input to the mass flow controller.</td>
<td>1. Check if valve forced close signal (-15 VDC) is input to the pin No. 1.</td>
</tr>
<tr>
<td></td>
<td>f. Power source failure.</td>
<td>1. Disconnect the cable and check the power source voltage 24 VDC (±5% or less) using a tester etc. If the power is not supplied, replace the power source.</td>
</tr>
<tr>
<td></td>
<td>g. Orifice is clogged.</td>
<td>1. Disassembling and cleaning, or replacement of orifice is necessary. Please return the orifice to us.</td>
</tr>
<tr>
<td></td>
<td>h. Sensor tube is clogged.</td>
<td>1. In this case, gas will keep flowing. Sensor must be replaced. Please return the sensor to us.</td>
</tr>
<tr>
<td>2. Output does not become zero. (the product is on for more than 45 minutes)</td>
<td>a. Leak inside or outside of the control valve.</td>
<td>1. Disconnect the piping after the mass flow controller and check if the output becomes zero when the gas is removed.</td>
</tr>
<tr>
<td></td>
<td>b. Bad connection of command and external configuration device.</td>
<td>1. Check the wiring of the command and external configuration device.</td>
</tr>
<tr>
<td></td>
<td>c. If the above wiring is OK, failed sensor or electronic circuit.</td>
<td>1. Failure of the electronic circuit. Return it to us.</td>
</tr>
<tr>
<td></td>
<td>d. Failed sensor or electronic circuit.</td>
<td>1. You could use after zero calibration, but the flow cannot be measured accurately. The process described in above 2. will be necessary. Return it to us.</td>
</tr>
<tr>
<td>3. Flow indication fluctuate while gas is flowing.</td>
<td>a. The pressure of the supplied gas at the inlet of the mass flow controller is always unstable.</td>
<td>1. Install a pressure regulator at the inlet side to stabilize the pressure.</td>
</tr>
<tr>
<td></td>
<td>b. Malfunction of the control valve.</td>
<td>1. Please return it to us.</td>
</tr>
<tr>
<td></td>
<td>c. Failure of the display device.</td>
<td>1. Replace the display device.</td>
</tr>
<tr>
<td></td>
<td>d. Bad connection of the connector.</td>
<td>1. Check if the connector is inserted firmly.</td>
</tr>
<tr>
<td>Symptom</td>
<td>Suspected cause</td>
<td>Check list and action</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>4. The set value is not indicated.</td>
<td>a. Pressure at the inlet of the mass flow controller is too high or there is a failure. The differential pressure between inlet and outlet is inappropriate.</td>
<td>1. Set the supply pressure properly according to the value described in the catalog. Or, set the differential pressure properly.</td>
</tr>
<tr>
<td></td>
<td>b. The pressure loss of the piping is too big, or the pressure loss is being big due to clogged filter or check valve.</td>
<td>2. Place pressure gauges right before and after the mass flow controller to check if the differential pressure is appropriate. Adjust so that the differential pressure is appropriate.</td>
</tr>
<tr>
<td></td>
<td>c. The orifice in the control valve is almost clogged.</td>
<td>3. If the product operates normally when the high pressure is applied, clogged orifice can be suspected. If you want to replace the orifice, return it to us.</td>
</tr>
<tr>
<td>5. Flow is apparently lower than the specified flow.</td>
<td>a. Leak in the piping.</td>
<td>1. Check for leaks due to unfastened or improperly fastened nut on the piping line etc. using evacuation method or leak detection fluid. If you find a leak, fasten the leaking position firmly to stop it.</td>
</tr>
<tr>
<td></td>
<td>b. Leak in the mass flow body.</td>
<td>1. Same as above. When you check for leaks using leak detection fluid, check the joints but not inside of the body cover. After checking, remove the leak detection fluid completely.</td>
</tr>
<tr>
<td></td>
<td>c. Clogged bypass</td>
<td>1. Return the bypass part to us for replacement.</td>
</tr>
<tr>
<td>6. Flow is apparently higher than the specified flow.</td>
<td>a. Sensor tube is almost clogged.</td>
<td>1. Return the sensor tube to us for replacement.</td>
</tr>
<tr>
<td>7. Gas keeps flowing even when the command is set to zero.</td>
<td>a. Flow is controlled by external setting and the setting voltage is not zero. Or print board failure. Disconnection in the command solder.</td>
<td>1. Check operation after switching to command. If the product operates normally, check the external configuration device.</td>
</tr>
<tr>
<td></td>
<td>b. Internal leak due to dirt accumulation to the sealed part of the control valve.</td>
<td>1. Input the valve forced close signal (-15 VDC) to pin No. 1 and check if the gas stops or not. If the gas stops, return the valve to us for readjustment. If the gas stops, failure of the electronic circuit can be suspected. Return it to us.</td>
</tr>
<tr>
<td></td>
<td>c. Zero voltage is misaligned to the negative direction.</td>
<td>1. Return the control valve to us for disassembling and cleaning.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Error of the zero voltage. See symptom 2. Output does not become zero.</td>
</tr>
</tbody>
</table>
19. Maintenance

【7-1  Zero/Span Calibration】
If the user can use the reference flow meter, calibrate both the zero and span. If not, calibrate the zero only.

【7-2  Cleaning the Inlet and Outlet Joints】
Clean the inlet and outlet joints. They should be removed in a clean place where dust will not enter the block. During maintenance, never disassemble the sensor. If it is disassembled, the initial performance cannot be guaranteed.

20. After-sales service
This product is carefully tested before shipping. However, if it fails, contact your dealer or sales representative.

21. Product warranty
Thank you very much for usually using Kofloc products regularly.
Now, when ordering our products by this catalog and when there is no statement of special mention matters, such as estimate, contract and specifications, we apply following requirements and the following contents of a warranty.

1. The contents of warranty
   ① Warranty period
       The warrant period shall be one year after the shipment.

   ② Warranty range
       If a malfunction of the product you purchased occurs because of our responsible reasons, offer of substitute or it will be charge-free repaired in our factory. But if a malfunction of the machine occurs due to the following reasons, even within the warrant period, it becomes the outside for a warranty.

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

       In addition, a warranty here means the warranty of the product simple substance of our company.
       So the damage induced by failure of the products of our company shall be eliminated from the object of warranty.
22. **MODEL 8300**

<table>
<thead>
<tr>
<th>Dimensions (mm)</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8” Swage Lok</td>
<td>22.8</td>
<td></td>
</tr>
<tr>
<td>1/4” Swage Lok</td>
<td>17.4</td>
<td>4.59</td>
</tr>
<tr>
<td>3/8” Swage Lok</td>
<td>17.4</td>
<td>4.59</td>
</tr>
<tr>
<td>1/4” VCR</td>
<td>17.4</td>
<td>4.59</td>
</tr>
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<td>17.4</td>
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</tr>
<tr>
<td>1/4” VCR</td>
<td>17.4</td>
<td>4.59</td>
</tr>
<tr>
<td>3/16” VCR</td>
<td>17.4</td>
<td>4.59</td>
</tr>
</tbody>
</table>

*Values indicated in ( ) denote the dimensions for MODEL 8350.
23. MODEL8300  Indicator one apparatus type

<table>
<thead>
<tr>
<th>Type</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8&quot; Swagelok</td>
<td>122.8 (4)</td>
</tr>
<tr>
<td>1/4&quot; Swagelok</td>
<td>117.4 (4.6)</td>
</tr>
<tr>
<td>3/8&quot; Swagelok</td>
<td>130.0 (5.1)</td>
</tr>
<tr>
<td>1/4&quot; VCR</td>
<td>123.8 (4.8)</td>
</tr>
<tr>
<td>1/4&quot; VCO</td>
<td>115.6 (4.5)</td>
</tr>
<tr>
<td>1/4&quot; UC</td>
<td>112.0 (4.4)</td>
</tr>
</tbody>
</table>

* Values indicated in ( ) denote the dimensions for Model8350.
24. **MODEL8300  Separate type**

—Body—

<table>
<thead>
<tr>
<th>Fitting</th>
<th>L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot; VCR™</td>
<td>123.8</td>
</tr>
<tr>
<td>1/4&quot; Swagelok™</td>
<td>121.4</td>
</tr>
<tr>
<td>Rc 1/4</td>
<td>112</td>
</tr>
<tr>
<td>9/16-18UNF</td>
<td>76</td>
</tr>
</tbody>
</table>

*Values indicated in () denote the dimensions for Model 8350.*
—Indicator—
25. **MODEL8300 (No indicator type)**

![Diagram of MODEL8300](image-url)

<table>
<thead>
<tr>
<th>Fitting</th>
<th>L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot; VCR™</td>
<td>123.8</td>
</tr>
<tr>
<td>1/4&quot; Swagelok™</td>
<td>127.4</td>
</tr>
<tr>
<td>Rc 1/4</td>
<td>102</td>
</tr>
<tr>
<td>3/16-18UNF</td>
<td>76</td>
</tr>
</tbody>
</table>
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Ujitawara Factory 14-1 Shiogadani Tachikawa Ujitawara-cho Tsukuba-gun Kyoto610-0231 TEL.+81-774-88-5522 FAX.+81-774-88-5525