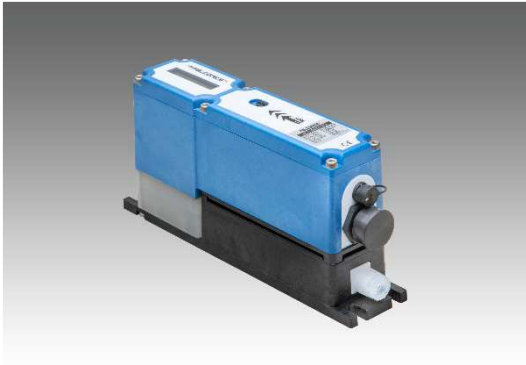


# ***Dymatrix™***

## **AVFCS2 Flow controller Instruction Manual**

**User's Manual**



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## (1) Cautions on the product

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Be sure to comply with the product specifications, precautions, and so on when using the product.

- ❑ ASAHI YUKIZAI CORPORATION. is trying to increase product qualities and reliabilities, but do not assure product perfectibilities. Particularly, when you are going to use the product in a facility that is seriously related to human lives, bodies, and/or properties, you must take appropriate safety designing and measures against possible troubles and accidents. If you use the product in such a facility without any written permission from ASAHI YUKIZAI CORPORATION. ASAHI YUKIZAI CORPORATION is not liable for damages and losses.
- ❑ Peruse and comprehend this manual and technical information before selecting, piping, installing and operating this product.

### Cautions on product design and selection

#### **Warning**

1. Design the system and select the product in the specified ranges considering medium, temperature, pressure, and other operating conditions. (Using the product out of specification may result in breakage.)
2. For suitability of product materials and process media, see the Medium Suitability List in the latest Dymatrix catalog (AV-V-029-EJ). For suitability of other media to the product materials, call ASAHI YUKIZAI CORPORATION. When using a compressible medium, its safety will not be warranted.
3. When using the product for foreign matter-contained fluid, install filter. (If omitted, the valve may go out of control.)
4. When using the product for crystalline substance-contained fluid, consult us. (If omitted, the valve may go out of control.)
5. Always use the product in the specified pressure range.
6. Always use the product in the specified medium temperature range.
7. Always use the product in the specified ambient temperature range. Check the suitability of the product materials to the ambient atmosphere. Always keep product surfaces clean away from the medium.
8. For the specification of fitting portion: operating pressure, temperature and ambient temperature, see the relevant fitting instruction manuals issued by each fitting manufacturer.
9. Provide an escape valve on the system. Do not make the system hermetically sealed.
10. Provide a maintenance clearance around the product.

### Cautions on installation and piping

#### **Warning**

1. Peruse and comprehend this manual before installing and piping the system.
2. Fully flush clean the inside of pipes and remove foreign matters before installing and piping them.
3. Always check the coupled pipe system for leaks and make sure there is no leak from the joints. (For the checking, use hydrostatic pressure. If you use compressed air, its safety will not be warranted.)
4. Do not give any excessive pulling, compressing, and bending forces on valves.
5. Do not put any weighty stuff or objects on the valve.
6. Always flow medium in a specified direction when the flow direction is marked on the product.
7. For "air to open" actuator, open a port with no pilot pressure to the atmosphere.
8. Keep the product away from fire, flammables and high temperature objects. (If omitted, that may result in deformation, breakage and a fire.)
9. Do not use valves at places where are vulnerable to flooding.

 **Cautions**

1. Do not give an impact to the product by throwing, dropping, or otherwise. (That may damage the product.)
2. Do not scratch, pierce, or otherwise damage the product with a knife or other sharp object, when unpacking. (That may damage the product.)

**Precautions for use** **Warning**

1. Use the product in the specified ranges considering medium, temperature, pressure, and other operating conditions. (Using the product out of specification may result in breakage.)

 **Cautions**

1. For suitability of product materials and process media, see the Medium Suitability List in the latest Dymatrix catalog (AV-V-029-EJ). (Some chemicals may damage the product.) For suitability of other media to the product materials, call ASAHI YUKIZAI CORPORATION.
2. A water hammer may occur at a certain pressure. Adjust the on/off operating speed by speed controller.
3. A pump cavitation may occur in a certain operating condition. In such a case, check and review the medium pressure and piping conditions
4. Do not apply negative pressure to valves.
5. The product is precisely washed and packed in double-clean bag assuming the product will be installed in a clean room. Be careful not to contaminate the product when unpacking it.
6. For the flow rate adjusting type and bypass type, do not overtighten their handles.
7. Always use clean pilot air with no organic solvents and corrosive gas contained
8. Always flow medium in a specified direction. The flow direction of this product is specified.

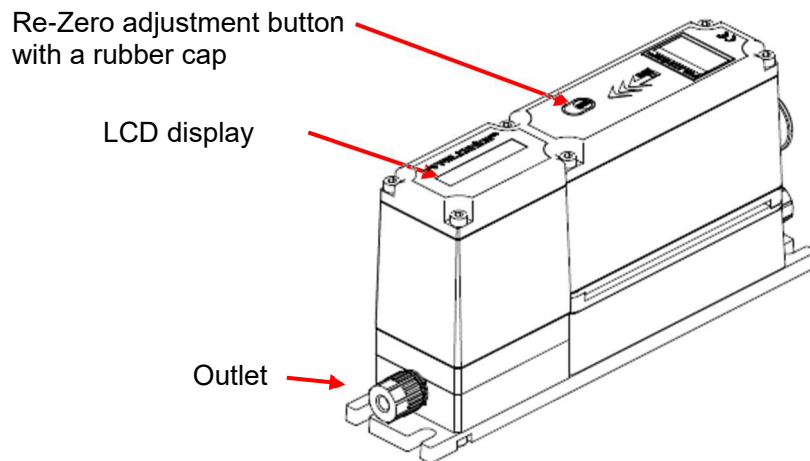
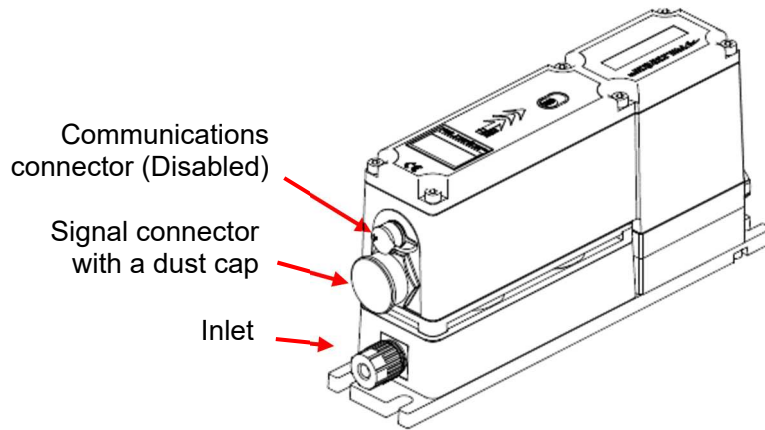
**Precautions for maintenance** **Warning**

1. Drain the medium from the system before starting maintenance.
2. Remove the medium from valves and pipes and fully clean their insides with DIW and air before starting maintenance.
3. Do not disassemble the product. When disassembled, the product may deteriorate its performance and specifications and will not be warranted.
4. To run the product in the best status, periodically check valves and coupling for leaks.

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## (2) Component names

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**Caution**

Use a separately sold signal cable (AVFCS2-CBL0-00000-1) to connect to the signal connector.

**(3) Type selection**

AVFCS2	—	A		N			—		—	1
--------	---	---	--	---	--	--	---	--	---	---

Flowrate range	0 2 5 0	25 - 250 ml/min	
	0 5 0 0	50 - 500 ml/min	
Chemical resistance model	N	Standard *1	
Coupling type	F	Flare type 1/4" fitting	
	3	Super 300 P 1/4" fitting	
Standard	I	Inch	
	M	mm	
Option code *2	0 0 0 0 0		

\*1: The standard model is calibrated against the following materials:

Wet material: Silicon-based rubber, PFA, PTFE

Other shielding material: FKM

\*2: The option code is used if "(13) Optional features" in this manual is specified, and will be specified by us.

**(4) Specifications**

○ General specifications

Item	Unit	Specification		
Working environment	Fluid temperature	°C	15 to 35	
	Structural pressure resistance *1	MPa	1.0	
	Working pressure difference range	MPa	0.1 to 0.3	
	Working pressure range *1	MPa	0.1 to 0.3	
	Ambient temperature	°C	20 to 30	
	Working humidity	%	30 to 80 (no-condensing)	
	Frequency of opening and closing	Times/min.	< 10	
	Mounting posture	-	Restricted *2	
Inlet/outlet	Wetted: material	-	PFA/PTFE/silicon-based rubber	
	Connection	-	Flare Type	Super 300 Pillar fitting
	Aperture	mm	6.35 × 4.35	6.35 × 3.95 6 × 4
	Orifice	mm	1.6	
Weight	kg	0.9		

\*1: For the relationship between the fluid temperature and the working pressure range, refer to the coupling manufacturer's specification.

\*2: See "(6) Clamping method."

○ Performances

Item	Unit	Specification	
		AVFCS2-A0250	AVFC2-A0500
Maximum flowrate	ml/min	250	500
Minimum flowrate	ml/min	25	50
Flowrate accuracy *1	-	1%R.D. (> 50 ml/min) 0.75 ml/min (≤ 50 ml/min)	
Repeatability *1	-	0.5%R.D. (> 50mL/min) 0.5mL/min (≤50mL/min)	
Response time	Second	≤ 1 (Typical)	
Closure time	Second	≤ 1 (Typical)	
Valve seat leakage	-	0 cm <sup>3</sup> /min (at hydraulic pressure, 23°C) ( at hydraulic pressure, 23°C )	
Cv value *2	-	0.05	

\*1: Performance is a deionized water temperature of 25°C for the temperature correction-less type.

\*2: Value at fully open time

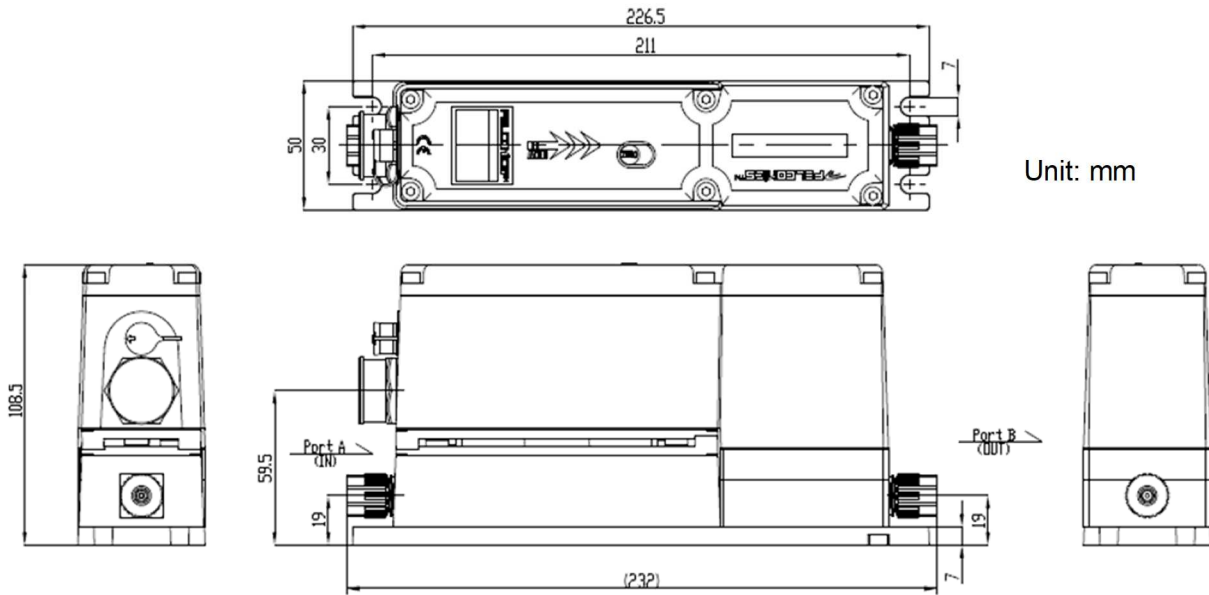
○ Electrical specifications

Item	Unit	Specification		
		AVFCS2-A0250	AVFCS2-A0500	
Power supply	-	24 VDC ± 10%		
Current consumption	A	≤ 0.4		
Set flowrate input	Type *1	Current 4-20 mA		
	Analog signal span	ml/min	0-250	0-500
	Input impedance	Ω	200	
	Allowable input range	mA	0 to 24	
	Measurement accuracy	-	± 0.2%F.S.	
	Sampling period	msec	25	
	Resolution	-	2900	
Flowrate output	Type *1	Current 4-20 mA		
	Analog signal span	ml/min	0-500	0-250
	Load resistance	Ω	≤ 600 Ω	
	Output accuracy	-	± 0.2F.S.	
	Sampling period	msec	25 msec	
	Resolution	-	4000	
Re-Zero input	Type	Photo coupler		
	Limiting resistor	kΩ	2.2	
Alarm output	Type	Transistor		
	Maximum load current	mA	50	
	Logic *2	-	A-contact (normally open)	

\*1: The product can be purchased, customized with 0-5V or 0-10V selected. See "(13) Optional features.

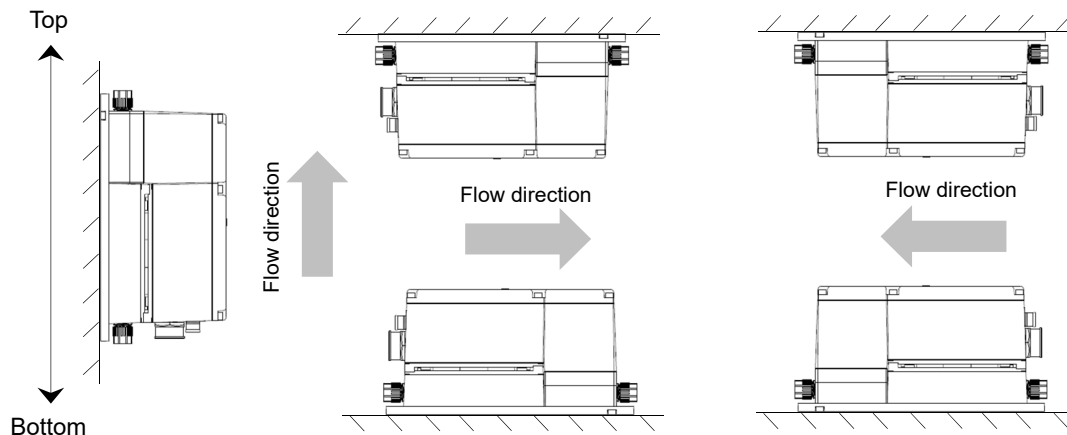
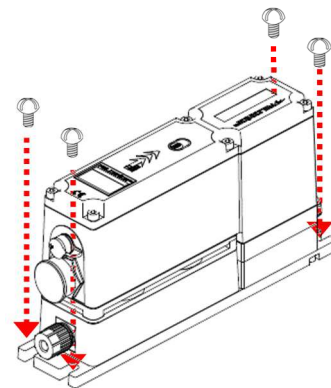
\*2: The product can be purchased, customized with the B-contact (normally closed) selected, though it is enabled about 500 msec after the product is switched on because of a software mechanism that reverses logic.

**(5) Dimensions**



**(6) Clamping method**

- Install the product in places that are:
  - 1) In an ambient temperature range of 20 to 30°C and not exposed to direct sunlight.
  - 2) Free from concern over dielectric interference.
  - 3) Not subject to water drops or corrosive gases.
  - 4) Readily accessible for maintenance and inspection.
- Clamp the product with the mounting screw holes in the bottom of the unit as shown to the right. For the mounting position, see "(5) Dimensions."
- Mount the product in the directions shown below. Performance of the product would be unpredictable if it is mounted in any other direction.



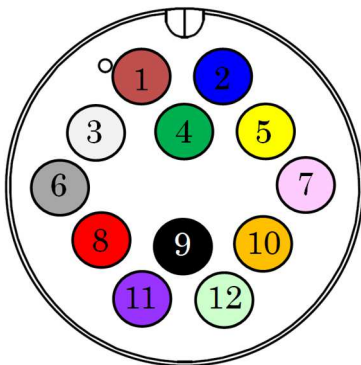


**Caution**

- Observe the thread length (to avoid possible damage).
- Tighten screws with a torque of 0.4 to 0.6N·m; be careful not to overtighten to avoid possible damage).

**(7) Wiring Method**

Connect the power and signal lines to the product. Use a separately sold signal cable (AVFC2-CBL0-00000-1) to make connections as shown below.



Pin No. allocation of signal connector

Pin	Cable color	Designation	Polarity
1	Brown	Alarm	-
2	Blue	Power supply 24 VDC	+
3	White	Flowrate output 4-20 mA	+
4	Green	Alarm	+
5	Yellow	Flowrate output 4-20 mA	-
6	Gray	Flowrate output 0-5 V/0-10 V	+
7	Pink	Flowrate output 0-5 V/0-10 V	-
8	Red	Power supply 24 VDC	-
9	Black	Re-Zero signal	+
10	Orange	Set flowrate 4-20 mA	+
11	Purple	Set flowrate 0-5 V/0-10 V	+
12	Light Green	Set flowrate common	-

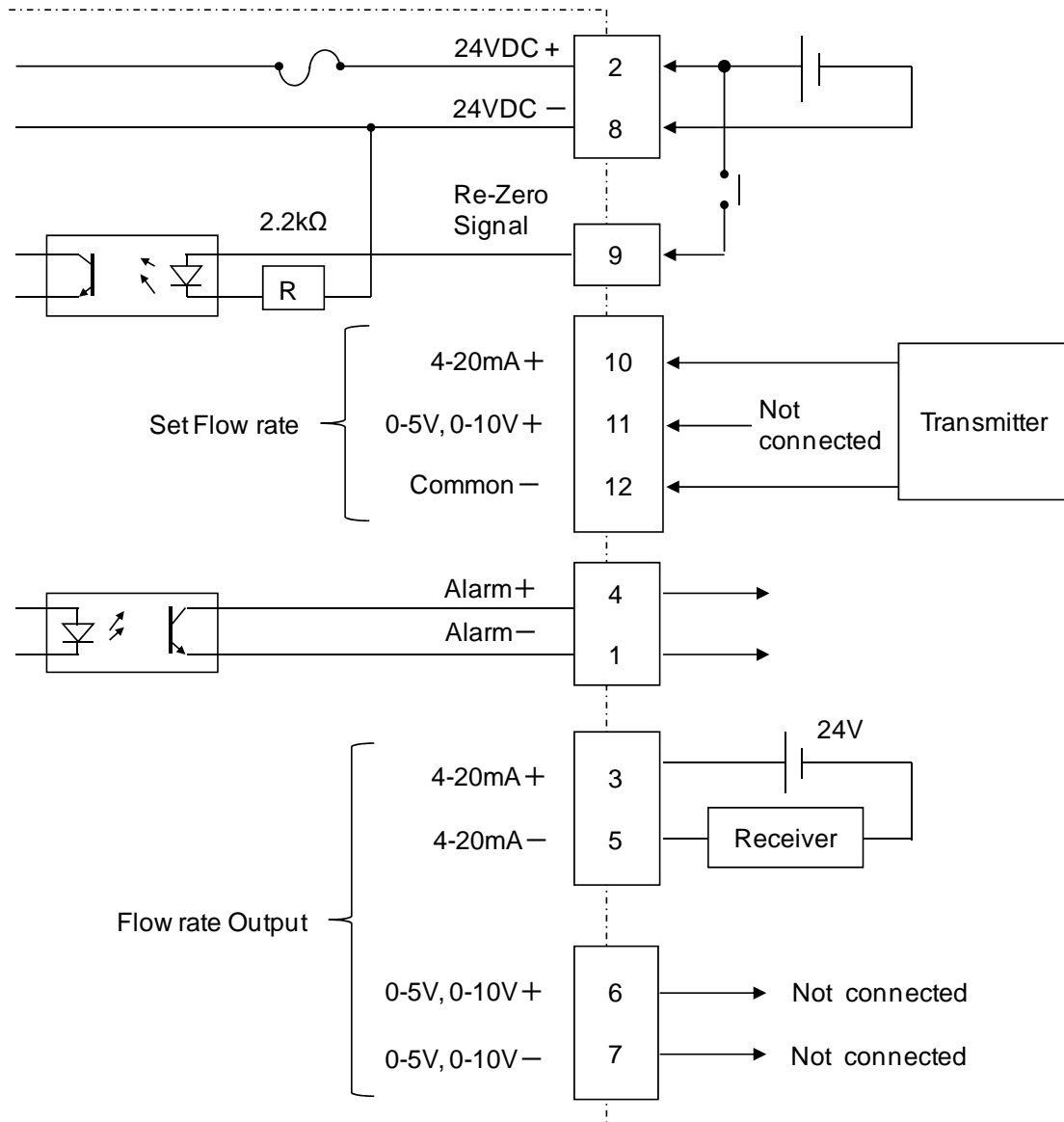


**Caution**

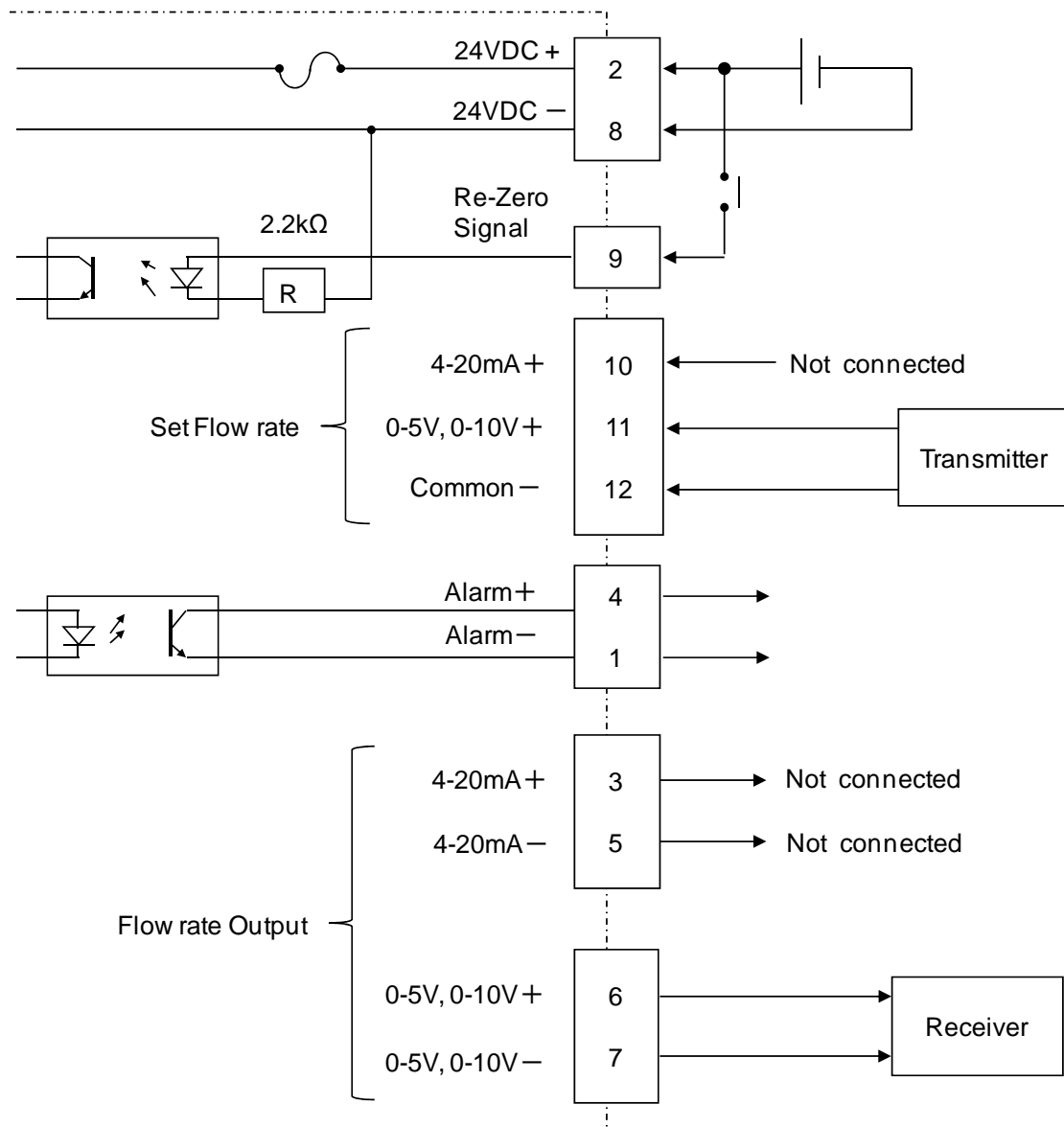
- Insert the connector in the correct direction (to avoid possible damage).
- Check the supply voltage is correct (to avoid possible damage).
- Leave unconnected pins open (to avoid possible malfunctioning).
- Connect the signal connector and make connections with the product switched off. Check also that the product is properly wired before switching it on.
- Confirm the maker's (Amphenol) instructions and notes in connecting the signal connector and cable.  
 Signal connector type: Amphenol ACD-12PMMS-LC7001  
 Signal cable connector type: Amphenol ACD-12BFFM-LL7000
- Keep the signal connector and the communications connector capped with a dust cap attached to them when they are out of use.
- While the power supply and analog I/O (4-20 mA set flow, 4-20mA flow output) are protected against instantaneous 30 VDC input, continuous input could cause them to fail.
- Digital I/O (Re-Zero signal, alarm signal) is protected against 30 VDC input.
- This product is not designed to withstand a 100 VAC source. AV voltage input could cause the product to fail.



- Internal circuitry and sample connections (4-20mA model)



- Internal circuitry and sample connections (0-5V / 0-10V model)

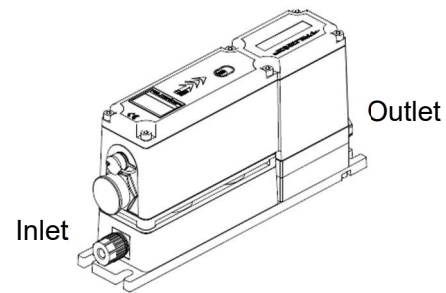


**⚠ Caution** Keep lines open when they are out of service (to avoid possible malfunctioning).

## (8) Tubing method

### ○ Inlet and outlet tubing

This product has the direction of fluid flow prescribed.  
Construct tubing to suit the needs of your system.



### Fitting connection method

[Flare-type fitting machining and installation]

- 1) Cut the tip of the tube at a right angle and pass a nut through the tube.
- 2) Using a dedicated jig, expand the tip of the tube into a flare.
- 3) Insert the tube into the tip of the fitting, and tighten the union nut firmly by hand and then, clamp it with a spanner or the like until a desired clearance is achieved.
- 4) Use a dedicated clearance gauge for tightening management.

[Super 300 P machining and installation]

- 1) Squarely cut off the tube tip and insert a nut into the tube.
- 2) By using the dedicated jig, insert the sleeve into the tube tip.
- 3) Use the dedicated feeler gauge for controlling the tightness.



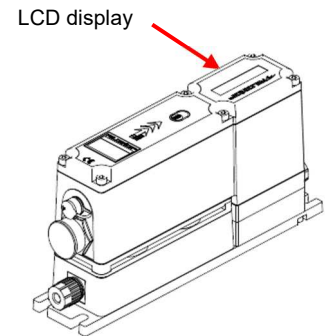
### **Caution**

- Do not overtighten the fitting nuts (to avoid possible damage).
- Check that the direction of flow is correct.

**(9) Control method**

○ Application of supply voltage

- Check the following things before application of supply voltage.
  - Check correct connection.
  - Check the power supply voltage ( $\pm 10\%$  of 24V)
  - Check the safety of the tool and environment then turn the power
- After having spent a power supply, please confirm that LCD displays it.



○ Zero flowrate adjustment (Re-Zero)

This feature resets the currently measured flowrate to zero. Implement it while the channel in the product is filled up with a fluid and the fluid flow is still.

< Making Zero flowrate adjustment (1) External signal >

- 1) Check the that power supply and also that at least 120 minutes
- 2) Fill up the channel in this product with a fluid.
- 3) Keep the fluid flow still (not flowing).
- 4) Check that the set flow rate to the product is zero.
- 5) Feed the Re-Zero signal for 100 msec or longer and then release it. Re-Zero will start on detection of the trailing edge of the signal.
- 6) Keep the fluid flow still for at least 12 seconds.

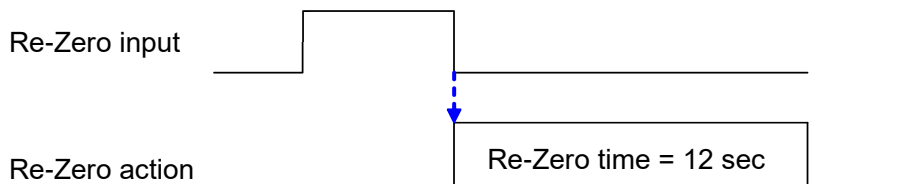
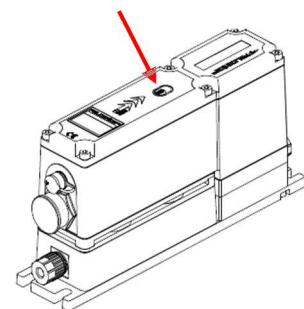


Figure 9-1. Re-Zero input time and operation

< Making Zero flowrate adjustment (2) Re-Zero button >

- 1) Check the that power supply and also that at least 120 minutes.
- 2) Fill up the channel in this product with a fluid.
- 3) Keep the fluid flow still (not flowing).
- 4) Check that the set flow rate to the product is zero.
- 5) After having excluded a re-zero rubber cap, with a thin stick less than  $\phi 3\text{mm}$ , please push the re-zero button. Re-Zero will start on detection of the trailing edge of the signal.
- 6) Keep the fluid flow still for at least 12 seconds.

Re-zero button / Rubber cap



< Making Zero flowrate adjustment (3) Dedicated application >  
Please refer to user's manual (DTS190 and DTS191).

< Situations and symptoms that recommend the implementation of zero flowrate adjustment >

Implementation of zero flowrate adjustment is recommended in the following situations or following symptoms are observed:

1. Measured flowrate deviates from the actual flowrate
2. Initial installation or after extended periods of outage
3. Changing fluids to use

 **Caution**

- Re-Zero input is enabled 500 msec after the product is switched on. Input prior to the expiry of the 500 msec period is ignored.
- Re-Zero launches at the trailing edge of the Re-Zero signal.
- Re-Zero data is invalidated if the product is switched off during the Re-Zero sequence, with the previous data being put to use.
- If a measurement disabled state, such as one caused by air bubbles, occurs during the Re-Zero sequence, it is terminated.
- If Re-Zero is carried out during a control sequence, its flowrate is set to zero. Be sure to carry out Re-Zero with the fluid flow positively kept still.
- If control launches during a Re-Zero sequence, it would set the measured flowrate to zero, disabling valid operations subsequently. Once Re-Zero is turned off, keep the fluid flow still with the valve closed for at least 12 seconds.

(10) LCD display

The LCD displays the operation status, error status, and current flow rate.

- At startup S e a r c h The valve origin is automatically searched.
  
- Fully closed C           0 . 0 "C" is displayed in the leftmost section.
  
- Control in progress F           5 0 0 . 0 "F" is displayed in the leftmost section, being followed by the current flow rate in mL/min.
  
- Fully open P           x x x . x "P" is displayed in the leftmost section.
  
- Error
 

C F 0 x x x . x
↑ ↓
E F 0 x x x . x

"E" and "C" is repetitively displayed in the leftmost section.



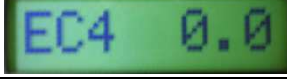


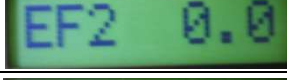


<List of LCD displays>

Operation	Error	Current flow rate
C : Fully closed	Org Err: Valve origin detection error	— xx.x ~ xxx.x (Unit: mL/min)
F : Control in progress	C2: Flow Unit error	
P : Purge	C4: Flow alarm	
Z : Zero flow rate adjustment in progress	F0: Bubble Error	
H: Hold	F1: Zero Reset Error	
E :Error	F2: Temperature alarm	
	F3: Sensor error	
	F4: Valve error	

<Operation statuses>

Operation names	Operation
C : Fully closed	Valve closed
F : Control	Feedback-controlled with respect to the set flow rate
P : Purge	Purged (valve in the specified opening degree position)
Z : Zero flow rate adjustment	Zero flow rate adjustment in progress
H: Hold	Hold the opening degree immediately before operation.
E :Error	Error effective

<LCD display when an error >

Error	LCD Display
Org Err: Valve origin error	
C2: Flow Unit error	
C4: Flow alarm	
F0: Bubble Error	
F1: Zero Reset Error	
F2: Temperature alarm	
F3: Sensor error Write over error	
F4: Valve error	

**(11) Errors**

Errors occur on this product due to the following events.

< Conditions of error occurrence and troubleshooting >

Error	Occurrence conditions	Causes	Troubleshooting
Valve origin Error	In case valve initialization is not completed after power-on.	Malfunction. Failure of limit sensor.	Reboot of power supply. (Turn on the power again) Contact the manufacturer.
Flow Unit Error	Communication fault between the substrates inside the body.	Abnormality of the board.	Product exchange.
Flow Alarm	In case 3.0 seconds (default) or more elapsed with the measured flow rate remaining as having a variation of $\pm 15\%RD$ (default) or more comparing to the set flow rate.	Reduction in supply pressure. Contamination of foreign matter.	Confirm supply pressure. Valve opening check by application. DIW flushing at maximum flow rate.
Bubble Error	Flow measurement impossible state lasts 9.5 seconds. (default)	Bubble inclusion in flow sensor.	Removal of air bubbles by maximum flow of liquid.
Zero Reset Error	In case zero flow rate adjustment (Re-Zero) failed.	Inability to measure flow rate (bubble inclusion)	Removal of air bubbles by maximum flow of liquid. Zero flow rate adjustment.
Temperature Alarm	Measure the temperature above the set threshold.	Failure of the temperature sensor.	Contact the manufacturer.
Sensor Error	Failure of flow meter sensor.	Possibility of deterioration of flow sensor.	Zero flow rate adjustment. Contact the manufacturer.
Write over Error	The accumulated number of zero flow adjustment reaches the upper limit. (1 million times)	Fluctuation of zero flow rate.	Product exchange.
Valve Error	When the deviation amount is equal to or greater than the set threshold value at the time of execution of auto zero execution.	Fluctuation of zero flow rate. Leaked of pinch valve	Zero flow rate adjustment. Contact the manufacturer.

<Motion in case of Bubble Error occurrence>

[Case example: “Open” for auto-purge mode; default for alarm setting]

The valve opening degree prior to the detection of bubbles is held for 1.5 seconds immediately after the detection, and then said degree is held at full open for 8.0 seconds. An alarm is issued total 9.5 seconds after the detection of bubbles. During this period, a flow rate immediately before the detection of bubbles remains displayed. After the alarm is issued, the flow rate is displayed as zero.

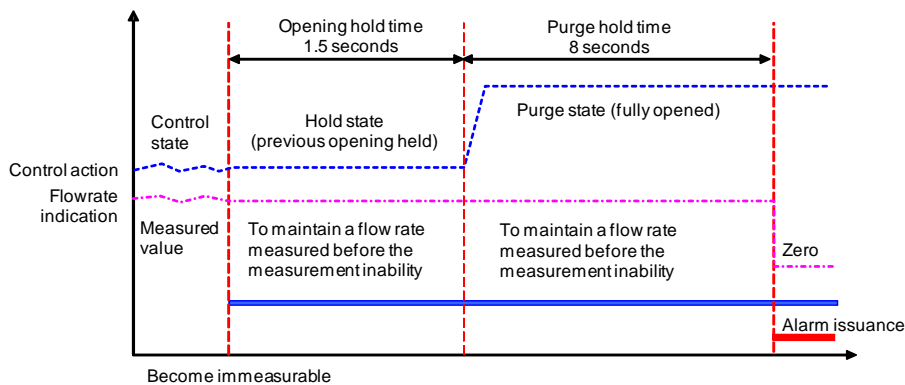


Fig. 11-1 Motion in case of bubble incorporation

Note that if normal measurement is restored during the hold time of opening degree and purge, control is restarted and no alarm is issued.

<Alarm release>

Any alarm is automatically released once alarm occurrence conditions are removed. In case of no automatic release enabled, see Table 17-1, “Troubleshooting,” described later.



## (12) Functions

This product has the following functions of which setting is changeable. Use the adjustment set AVFCS2 (AVFCS2-ADJ-00000-1) separately sold to conduct adjustment or setting change.

Function		Measurement ranges	Default values
Alarm	Alarm output logic	Normal or Reverse	Normal
	Flow rate alarm upper limit	0-100%	15%
	Flow rate alarm lower limit	0-100%	15%
	Flow rate alarm delay time	0-750sec	3 sec
Analog input/output	Analog input range F.S._SP	1-1000mL/min	250 / 500
	Analog output range F.S._PV	1-1000mL/min	250 / 500
	Analog output low-cut	-10~20% F.S._PV	1% (500mL/min) 2% (250mL/min)
Valve operation switching	Control setting flow rate range	2-10% F.S._SP	2%
	Hold motion setting	Disable / Enable	Disable
	Flow rate range set for hold	2-50% F.S._SP	—
	Purge motion setting	Disable / Enable	Disable
	Flow rate range for purge	80-100% F.S._SP	—
Auto purge	Function setting	Disable / Enable	Enable
	Function select	Open/Set position/Hold	Open (Fully open)
	Select set position	0.3 - 2.0 mm	2.0mm
	Opening hold time	0-5sec	1.5sec
	Purge hold time	0-20sec	8.0sec

### <Alarm>

- Alarm output logic

For alarm output, selection can be made with not only standard contact A (normally open) but also contact B (normally closed).

\* Contact B becomes valid about 500 ms after power-on due to the structure of flipping up the logic on software.

- Upper/lower limit value and alarm delay time of the flow rate upper/lower limit error

An alarm is issued in case a measured flow rate varies from the set flow rate by  $\pm 15\%RD$  or more and remains as is for 3.0 seconds or more during control in progress. An amount of the variance and time for this event are settable.

Setting range of an amount of the variance: 0 to 100%RD (integer value)

Setting range of time: 0 to 750 s (integer value)

### <Analog input / output range>

- Analog input range

The analog input range (F.S.\_SP) determining a set flow rate is changeable.

Settable range: 1 to 1000 mL/min

However, an upper limit value is limited. The settable range of the flow rate is 1.8 times the range at delivery.

Example: If a flow rate range of 25 to 250 mL/min is set at delivery, the upper limit is settable to 450 mL/min at most.

Example: If a flow rate range of 50 to 500 mL/min is set at delivery, the upper limit is settable to 900 mL/min at most.

• Analog output range

The analog output range (F.S.\_PV) determining a current flow rate is changeable.

Settable range: 1 to 1000 mL/min

However, an upper limit value is specified as limited, similarly to the analog output range. The settable range of the flow rate is 1.8 times the range at delivery.



**Caution**

- Even if setting of the analog input or output range is changed, assured accuracy of controlled flow rate remains same as the range at delivery.
- Conduct adjustment or setting by considering the control flow rate and connected equipment use as there is effect from the resolution of analog signals.

• Analog output low-cut

This function forcibly set zero for analog output of XX% or less with respect to the range F.S.\_PV of the current flow rate (measured flow rate).

Settable range: -10 to 20% F.S.\_PV



**Caution**

- Care should be taken that if a value exceeding the flow rate range desired to use is set, analog output becomes zero even with liquid flowing.

<Valve operation switching>

• Set input amount for control stop

Feedback control starts for supplying liquid on this product when the set flow rate is set to 2%F.S.\_SP (analog input range) or more. The control stops and the valve close totally when the set flow rate is set to less than 2%F.S.\_SP (analog input range).

The set flow rate for stopping the control is settable in the following range:

Motion at the time of control stop : Valve closed (closing motion)  
 Set flow rate to stop the control : Changeable in a range of 2 to 10% (integer only)

• Relationship between set flow rate input and valve motion

The following kinds of valve action can be assigned to this product according to the size of set flowrate input:

Valve action name	Action	Selection range
Hold	Holds the opening in effect just before the hold action	Operation enabled/disabled Operation range (any value from control stop to 50%)
Flow	Set flow rate feedback control	—
Purge	Fully open	Operation enabled/disabled Operation range (any value from 80 to 100%)



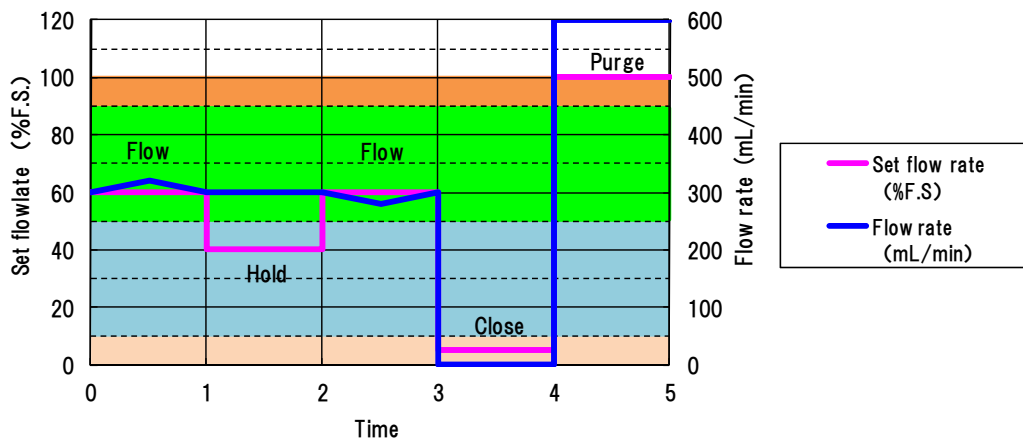
**Caution**

- Be sure to also use closing operation when using hold operation. Otherwise, the flow rate control might be disabled.

The following exemplifies setting and illustrates consequent motions.

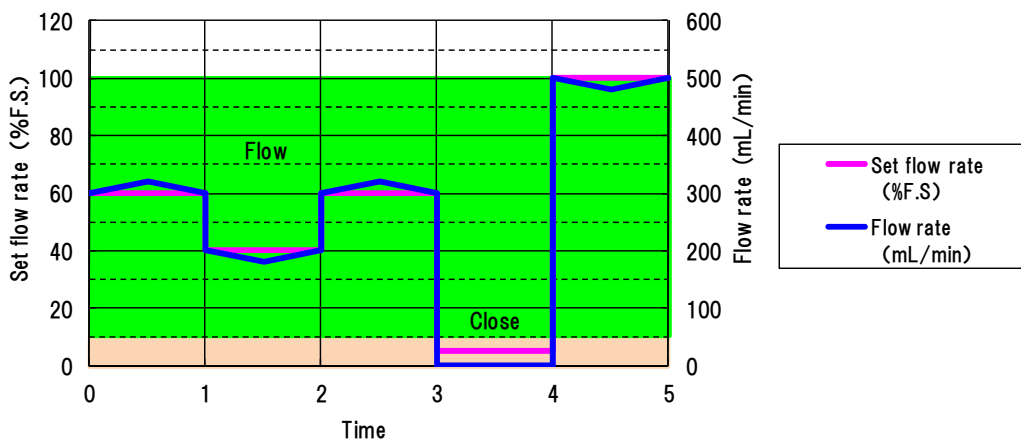
Sample settings and operation image (1)

- Analog input range : 500mL/min
- Flow rate range : 50 to 500mL/min
- Action with control stopped : Operation enabled, "Close" 10% set flow rate
- Hold action : Operation enabled, 50% operation range
- Purge action : Operation enabled, 90% operation range



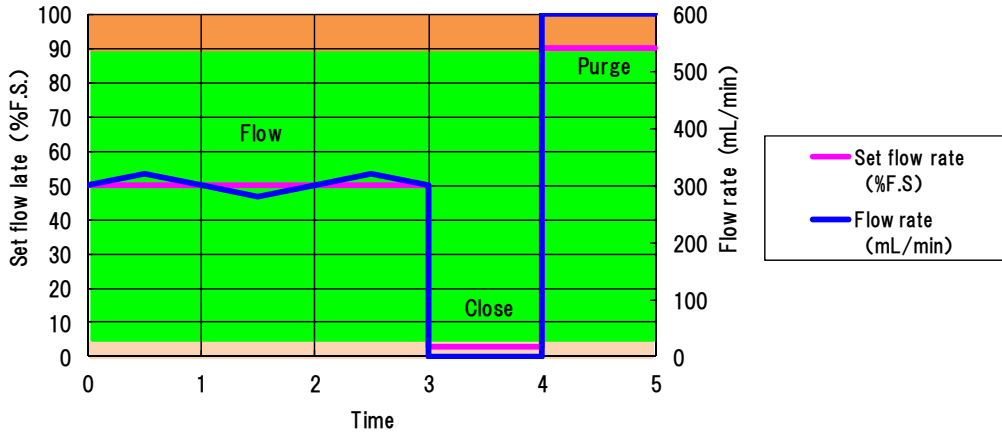
Sample settings and operation image (2)

- Analog input range : 500mL/min
- Flow rate range : 50 to 500mL/min
- Action with control stopped : Operation enabled, "Close," 10% set flow rate
- Hold action : Operation disabled
- Purge action : Operation disabled



Sample settings and operation image (3)

Analog input range : 600mL/min  
 Flow rate range : 50 to 500mL/min  
 Action with control stopped : Operation enabled, "Close," 5% set flow rate ⇒ 30mL/min and less  
 Hold action : Operation disabled  
 Purge action : Operation enabled, 90% operation range ⇒ 540mL/min and more



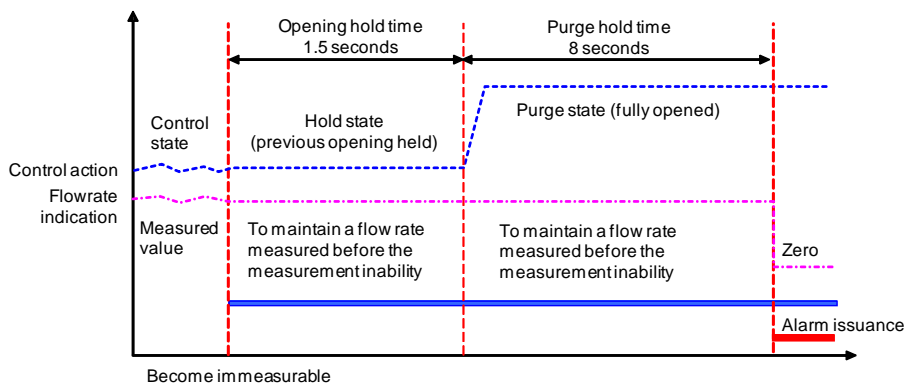
<Auto-purge function>: Valve motion at bubble error occurrence

In case bubbles and/or foreign matter is incorporated into inside the flow meter to cause disabled measurement (independent from control ON/OFF), the valve opening degree prior to the bubble detection is held for 1.5 seconds (default) immediately after the detection and then a motion is executed toward an opening degree corresponding to the operation setting for 8.0 seconds (default: fully open). An alarm is issued total 9.5 seconds after bubble detection. During this period, a flow rate immediately before the detection of bubbles remains displayed. After the alarm is issued, the flow rate is displayed as zero.

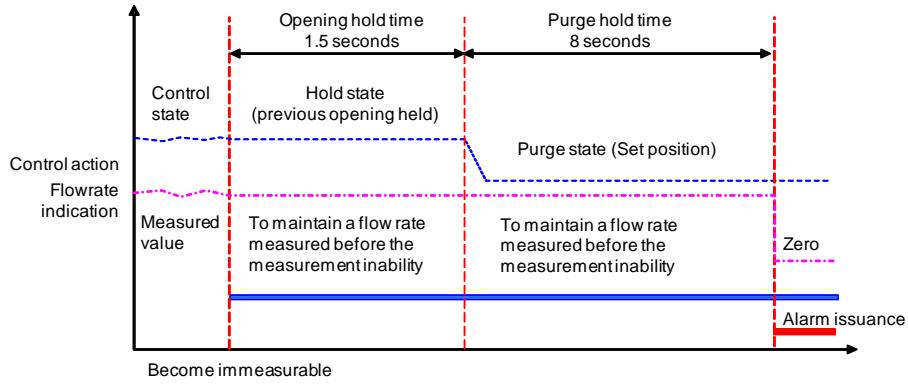
Function selectable range

Auto-Purge-Active : disable or enable  
 Operation setting : Fully open (Fig. 1: default), Set position (Fig. 2), Hold (Fig. 3)  
 Valve set position range : 0.3 to 2.0 mm (operation setting: Only at set position)  
 Hold time range : 0 to 5 sec (default: 1.5 sec)  
 Purge hold time range : 0 to 20 sec (default: 8.0 sec)

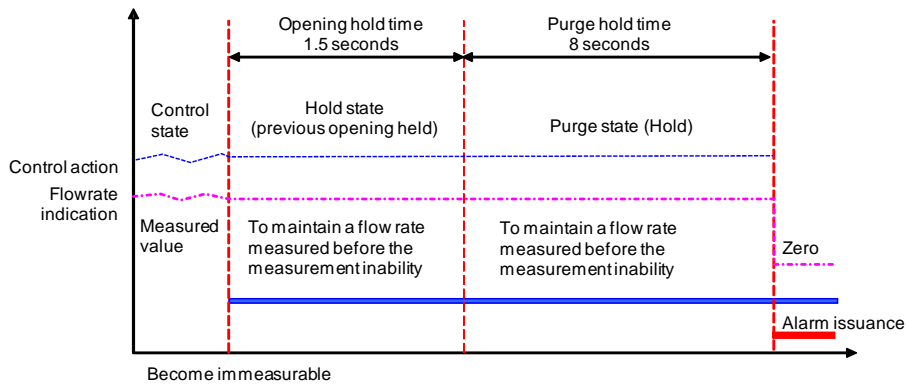
Fig 1. Open



**Fig 2. Set position**



**Fig 3. Hold**



### (13) Optional features

This product can be purchased, customized with the following features selected:

1. Set flowrate input and output analog signal type.

The analog signal is selectable from among 4-20mA, 0-5V and 0-10V as specified in the table below.

Item		Specification		
Analog input	Input type	Current 4-20 mA	Voltage 0-5 V	Voltage 0-10 V
	Input impedance	200 Ω	550 kΩ	550 kΩ
	Input bias current	1 mA or less	1 mA or less	1 mA or less
	Allowable input range	0-24 mA	0-12 V	0-12 V
	Measurement accuracy	± 0.1%FS at 4-20 mA	± 0.1%FS at 0-5 V	± 0.1%FS at 0-10 V
	Sampling period	25 msec	25 msec	25 msec
	AD conversion range	2.4 to 21.6 mA	-0.5 to 5.5 V	-1 to 10.1 V
	Resolution	12 bits (22.5 mA F.S) 2,900 divisions	12 bits (5.56 V F.S) 3,600 divisions	12 bits (11.25 V F.S) 3,600 divisions
Analog output	Output type	Current 4-20 mA (external power supply)	Voltage 0-5 V	Voltage 0-10 V
	Resolution	12 bits (20 mA F.S) 4,000 divisions	12 bits (5 V F.S) 1,800 divisions	12 bits (10 V F.S) 3,600 divisions
	Load resistance	600 Ω or less	1 kΩ or more	1 kΩ or more
	Output accuracy	0.1%FS	0.2%FS	0.1%FS
	Defined performance range	4 to 20 mA	0.1 to 5 V	0.1 to 10 V

### (14) Extended periods of outage

Before leaving the product out of service for an extended period of time, do the following:

1. Replace the chemical and other fluids in the product with deionized water.
2. Switch off the product.

### (15) Inspection items

- Carry out maintenance (inspection) on a scheduled basis.  
(Maintenance (inspection) at least once each year is recommended.)
- If faults are noticed, please contact the location listed at the end of the manual.

Points to check
(1) Visual flaws, cracks, deformation and discoloration (2) Fluid leaks from the flow inlet and outlet (inlet and outlet tubes loosening or not) (3) Unusual noise while opening and closing (4) Control signal cable breakage

**(16) Storage**

- Storage during until use from delivery is following.
  1. Place the product in a room which humidity is within 0 to 80% RH and 10 - 40 degree C of temperature. (No condensation is allowed.)
  2. Do not place the product where exposed to direct sunlight or dust.
  3. Do not place the product where have an impact or vibration.
  4. The product is double-packed after the precision cleaning. Do not open the package before the actual usage.
  
- If the product is required to remove and store after a certain period of use, please follow the following procedure.
  1. Flash the remaining fluid by high purity water, and be dried enough.
  2. Protect the connectors of both inlet and outlet flow passes for the prevention of damages.
  3. Attach any dust-caps to the signal connectors and communication connectors.



**Caution**

- If the product is improperly stored , it causes failure of product or deterioration of accuracy.

**(17) Troubleshooting and remedial actions**

Symptom	Problem cause	Remedial action
Product does not operate	Insufficient supply power	Check the supply voltage and current.
	Faulty or broken connection	Make a correct connection.
Fluid won't flow	Set flow not available (4-20mA set flow input)	Check the connection for breakage.
	Low primary supply pressure	Check the primary supply pressure and set it within the specified pressure range.
	Large secondary pressure loss	Replace with a tube having a less pressure loss.
Erratic control flow	Pulsating primary supply pressure	Remove the pulsation of the primary supply pressure.
	Insufficient primary supply pressure	Check the primary supply pressure and set it within the specified pressure range.
	Set flow out of range	Use within the specified flow range. 50 to 500mL/min or 25 to 250mL/min
	Air bubbles present	Flush with DIW or otherwise take actions to remove air bubbles.

\* Please let us know whenever the product is suspected faulty or to have failed.

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**(18) Disposal of Remaining and Waste Materials**

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**Caution**

Pass remaining and waste materials on to a specialized disposer for disposal.  
(Their combustion would result in toxic gas generation.)



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# AVFCS2

Flow controller

## ASAHI YUKIZAI CORPORATION

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