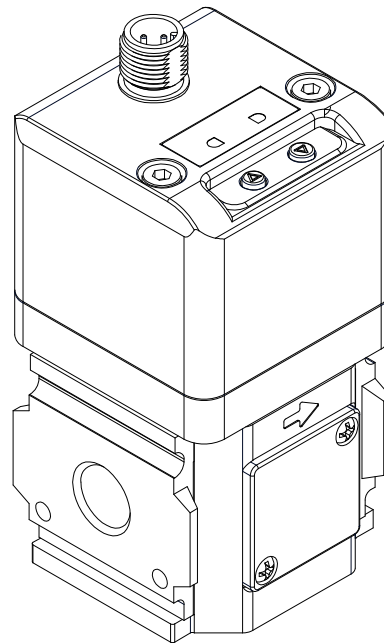


## INSTRUCTION MANUAL

### Electro-pneumatic Regulator

### EVR series



- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

## For Safety Use

To use this product safely, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (ISO 4414 \*1 JIS B 8370 \*2).


We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.


Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your application, requirements, and how to use it.


This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents **read this operation manual carefully for proper operation.**

Observe the cautions on handling described in this manual, as well as the following instructions:

Additionally, the caution is classified into the following three groups, "CAUTION", "WARNING", and "DANGER", to identify the degree of the danger it presents and possible hazard.

 **DANGER:** Failure to pay attention to DANGER notices may cause a situation that results in a fatality or serious injury and that requires urgent addressing.

 **WARNING:** Failure to pay attention to WARNING notices may result in a fatality or serious injury.

 **CAUTION:** Failure to pay attention to WARNING notices may result in injury or damage to equipment or facilities.

\*1) ISO 4414 : Pneumatic fluid power ... Recommendations for the application of equipment to transmission and control systems.

\*2) JIS B 8370 : General rule for pneumatic systems

# INDEX

## Electro-Pneumatic Regulator EVR series

Manual No. SM-606132-A

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• 1. DESIGN AND SELECTION



**WARNING:**

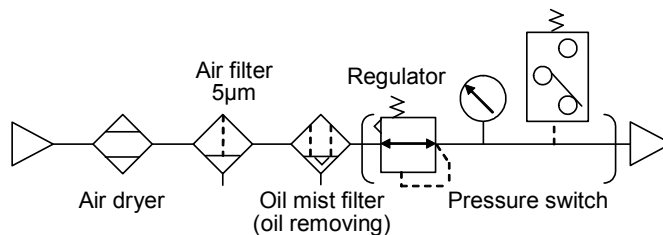
- This product is designed and manufactured as a general industrial machine part. It must be handled by an operator having sufficient knowledge and experience in handling.
- Supply only “compressed air”.
- For compressed air, always use clean air that does not contain corrosive gas.
- Be sure to use oil-free filtrated dry air “ISO 8573-1:2010[1.3.2]”.
- With a thorough understanding of compressed air characteristics, design a pneumatic circuit.
  - Where instantaneous stop holding at emergency stop is required, the same function as in the mechanical or hydraulic or electrical units cannot be expected.
  - There arise pop-up, jet-out and leaking phenomena caused by compressibility and expansibility, which are air characteristics.
- Prior to use, always ensure that the product withstands the operating environment.
  - The product cannot be used in corrosive gas, chemical liquid solvent, water, water vapor (steam) and ozone atmosphere. When a product is exposed to water droplets, oil or metallic powder, such as spatters and chips, be sure to protect it.
  - No product can be used in the explosive gas atmosphere.
- Always give special care to the electric circuit during emergency stop, and cylinder operation, etc. during power failure.
- Attach a “pressure switch” and “residual pressure discharge valve” to the compressed air inlet of the equipment.
  - The pressure switch controls operation so that it cannot be carried out where the set pressure is not reached.
  - The residual pressure discharge valve discharges compressed air remaining inside the pneumatic circuit, to prevent accidents caused by pneumatic equipment operation due to residual pressure.
- If the product is left as it is with the supply pressure when no power is turned ON, the secondary side pressure may increase up to the supply pressure.

If some trouble is concerned on safety, take proper safety measures in the system; for example, use a valve on inlet or outlet.



## CAUTION:

- Note the maintenance conditions clearly in the equipment instruction manual.
  - The product functions may significantly lower, depending on the operating condition, operating environment and maintenance situation, thereby safety might not be secured. If this maintenance work is conducted accurately and correctly, it is possible to exhibit the product function and performance sufficiently.
- Use be a constant voltage power supply.
- To avoid malfunction caused by electrical noise:
  - Insert a line filter into the AC power line.
  - Use a surge suppresser like a CR or diode in the inductive load (solenoid valve, relay and so on) to remove any noise at the source.
  - Keep cables connected to this product as far away as possible from power line.
  - Wire the power line as short as possible.
  - Do not share the power with devices that generate the noise, such as inverter motor.
  - Do not wire the power line or input signal line in parallel with other lines.
- This product is wired, the power ground and signal common are shared. When driving several EVR units with one PLC and D/A unit, depending in the D/A unit circuit, wiring could prevent the correct signal from being input. Consult with the PLC maker.
- Use the product correctly under the working pressure range.
- The response time is affected by the supply pressure and load capacity. When stable reproducibility is required for this responsibility, set up a regulator in the pre-stage.
- Bad quality air makes its characteristics and durability worse. For the pneumatic source, use cleaned air from which the solids, water and oil contents were eliminated sufficiently, using an air dryer, air filter and oil mist filter. Do not use lubricated as it will adversely affect the characteristics.



- When the secondary pressure is lowered with an input signal, etc., secondary air passes through the product inside and is discharged from the exhaust(EXH) port. Contamination of secondary piping and the inside of the load adversely affects characteristics, etc. Keep the inside of the piping as clean as possible.



## CAUTION:

- If the power is turned off under pressure, the secondary pressure is held.
  - In this case, if you need to be in an exhaust state, lower the control pressure first and then turn off the power or use the exhaust valve. However, the maintained pressure is not guaranteed to last for very long.
- Since the supply pressure is supposed to provide the exact control pressure, it is important for the working pressure not to drop below the minimum working pressure.
  - If working pressure is interrupted while the power is on, the solenoid valve will continue to operate and the product life will be shortened. The same phenomenon may occur even when the working pressure falls below the minimum operating pressure.  
If the working pressure is insufficient or blocked, please turn off this product.
- Do not use this product for blowing or leak occurs to the secondary side piping. If used in such applications, this product will not be able to achieve the specified pressure. Moreover, a large oscillation noise will be heard and the product's durability will be greatly reduced.
- When selecting a dryer, air filter, oil mist filter or regulator, select a device with a flow rate higher than that used by proportional pressure controls.
- Operating environment
  - Avoid operating the product in places where it may be affected by direct sunlight, water or oil.  
For operation in other than the specification requirements or for special purposes, contact us.
  - Protective structure IP64 is applied only when installed with facing indicator upward.
- With this product, even if set to more less than 1%F.S., secondary pressure is impossible to control.
  - Avoid waiting in the state where the input signal 1%F.S. is set.  
If the boundary line at which the product operation shifts from stop to start is the input signal 1%F.S. and the standby signal is set in the vicinity of the boundary, the operation becomes unstable and the deterioration of the product life is promoted there is.
  - Secondary pressure is not released and remains at less than 1%F.S.
  - If 0MPa is required, install a 3-way valve on the secondary side to switch to atmosphere, etc.

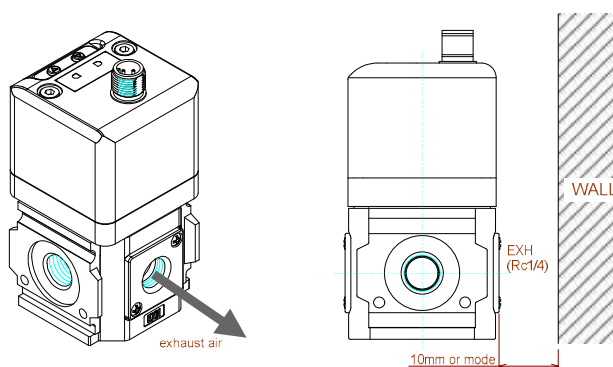
• 2. INSTALLATION

 **WARNING:**

- For EVR installation, do not use the method of supporting the EVR with piping.
  - Please fix the main body of EVR with bracket options.
- Do not wash and coat this product, using water and solvent.
  - Some plastics parts may be damaged.
  - The coating agent may block the exhaust port, causing malfunctions.
- Check the piping port position by the product label or nameplate, etc. for correct connections.
  - Wrong piping connection causes abnormal operation of the actuator.

 **CAUTION:**

- Keep a sufficient space for removal & re-installation, wiring and piping work around this product.
- Provide a pneumatic filter just in the pre-stage of the circuit in which the pneumatic equipment is used.
- Do not block exhaust port. Reserve space necessary for exhaust air.

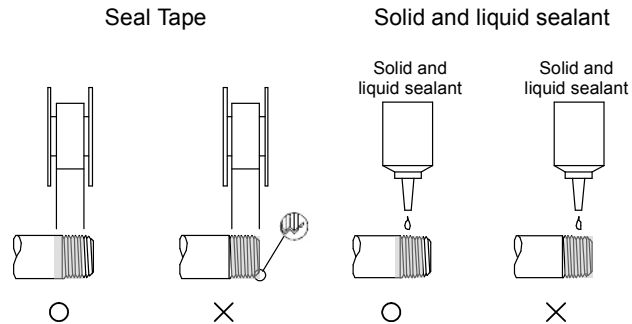


- Because there is not normal pressure control when a plug is done by an exhaust port, please throw this product open in the atmosphere by all means.
- Do not detach the product packing bag until piping work is started.
  - If the packing bag is removed before piping work, foreign substance may intrude into the interior product form the piping port, thus causing trouble and malfunctions, etc.
- In piping work, flushing is required just before connecting to the pneumatic equipment.
  - Foreign substance intruding inside during piping work must not incorporate into the product.
- When the piping connection has been completed and compressed air is supplied, take care so that no high pressure is applied suddenly.
  - The piping is disconnected and the piping tube springs out, causing accidents.
- Do not throttle the input port.
  - Supply pressure lowers during equipment operation, resulting in malfunctions.



**CAUTION:**

- When applying a seal tape, start from a position 2-mm or more away from the end of the thread portion on the tube, to a direction opposite to the tip of the tube, and wind the tape around the tube in a direction reverse to the direction of the thread.
  - If a part of the seal tape is positioned clear to the tip of the tube than the thread portion, the tape may be threaded into pieces as the tube is screwed into the joint; they may go into the pneumatic equipment and cause trouble.



■ Piping Connection

<Minimum Tube Length>

- The standard length of output port (A) side tube used should correspond to the tube internal volume of 1m<sup>l</sup> or more. (Otherwise, oscillation may result)

<Tube Cutting>

- Using the tube cutter, cut a tube vertically in the axial direction. Insertion of the tube cut aslant cause air leakage.

- Correct pressure control is not possible if the exhaust port is plugged. Release this port to the atmosphere.
- Tighten pipes with the appropriate torque.
  - Pipes must be connected with the appropriate torque to prevent air leakages and screw damage.
  - First tighten the screw by hand to prevent damage to screw threads, then use a tool.

[Recommended tightening torque]

Port screw	Tightening torque N·m
Rc1/4	6 to 8

- When supplying compressed air after connecting pipes, check that high pressure is not supplied suddenly.
- Before supplying compressed air after connecting pipes, check that there are no air leaks at any pipe connections.
  - Apply leakage detection fluid onto pipe connections, and check for air leaks.

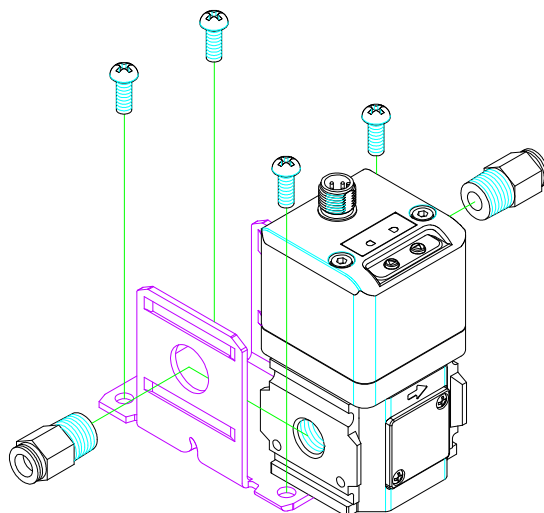


**CAUTION:**

- There are no restrictions on the installation position of the EVR series, but as a principle, it should be installed upright with its resin cover facing upward (housing).
- When fitting the bracket to the body, insert it until it is fixed and cannot be removed. The pipe installation work should be performed after fitting the bracket to the body.

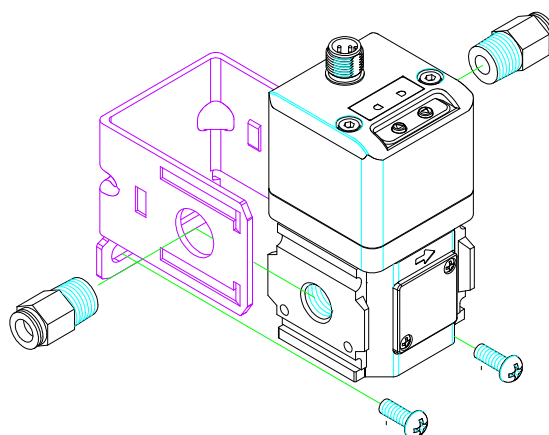
**【Installation of bracket】**

**(1) Floor installation type(B type bracket)**



\*\* The B type bracket cannot perform the installation to a manifold type.

**(2) Wall installation type (C type bracket)**





**CAUTION:**

【Panel mounting】

A manifold type accepts panel mounting.

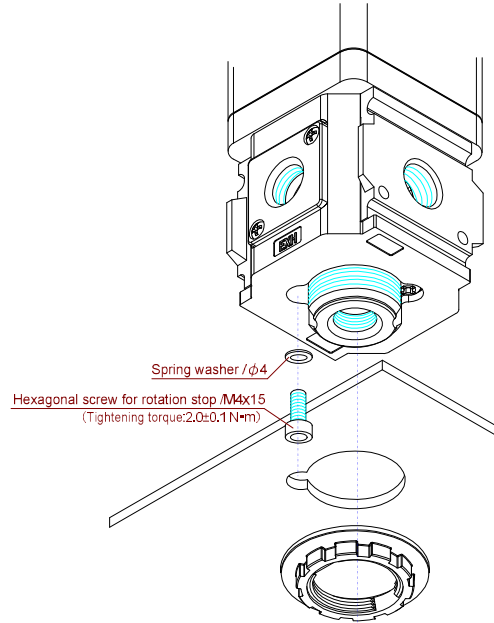


Fig. Panel mounting

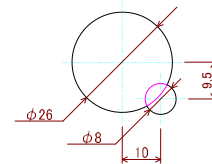



Fig. Panel cutting


- Select a panel 3.2mm or less in thickness and drill the mounting points as indicated in the fig. Panel cutting.
- If the prevention of itself rotation is necessary for the body, replace one of the two Cross-recessed head tapping screws for the panel mounting face with the specified hexagon socket head cap screw and fit it to the specified tightening torque.
- However, when using a screw to prevent rotation use a panel 0.8 to 3.2mm in thickness.
- If a panel 1.6mm or less in thickness is used, removed the spring washer that is attached to the screw.

• 2-1. Wiring method

 **WARNING:**

- When performing wiring, check the connector pin and cable conductor color when connecting a cable. Connection of a wrong cable will cause breakage, failure or malfunction.
- Check if the wiring is properly insulated.
  - Avoid contacting other circuits, ground faults, and terminal-to-terminal continuity.
- Use a rated DC regulated power supply isolated from the commercial alternating current power source. The non-isolated power supply will cause electric shock. With unregulated power supply, the peak value will exceed the rating, causing breakage of this product or poor accuracy.
- Stop the controllers and mechanical equipment and turn the power off before connecting wiring. Sudden activation will cause unexpected actions, possibly causing danger. First, while leaving controllers and mechanical equipment stopped, perform a power-on test, Discharge static electricity from human bodies, tools and equipment before and during work. Connect a flexible cable, such as the one for robots, to moving parts.
- Do not exceed the source voltage range during operation. An excessive voltage or an alternating current power supply (100VAC) will cause fracture or during.
- Do not short-circuit the load. Otherwise fracture and burning will be caused.

• 2-2. Connector connection


 **CAUTION:**

- Because you do not turn, please never turn the cable connector of the L type.
- Please pull a connector after switching off the product and shine, and, please do it.
- The omission grafting of the connector, please take a connector by all means.
- Please do not pull it up with a cable.
- When you connect a connector, put the salient of this side of the body connector terminal part and the concave region of the cable connector terminal part not to injure a thread.

<note>  
Please warn the connector of this side of the body excessively when you protest too much because you might be damaged.  
(Tightening torque : 0.4 to 0.49 N·m)

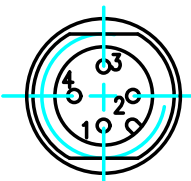
2  
INSTALLATION

•2-3. Cable Connection

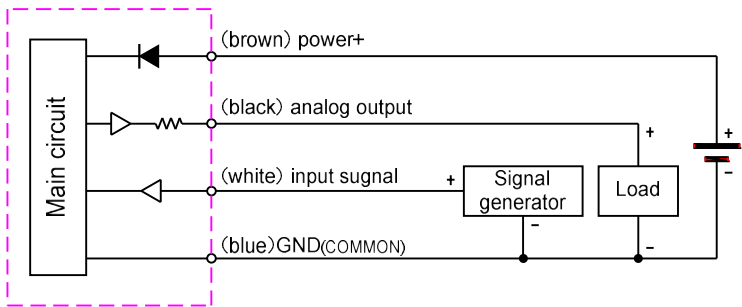
 **CAUTION:**

- Check the product code and take sufficient care of connection.
- Handle the unused analog output, so that it does not make contact with other cables.

<Connection procedure for individual types> (body)

Connector plug	Pin No.	use	Type of signal	Insulation Color
	1	Power +	DC24V	Brown
	2	Analog output	1 to 5VDC	Black
	3	Common	0VDC	Blue
	4	Input signal	(depend on model)	White

<Internal circuit and connection>



• 3. PRODUCTS



**DANGER :**

- Use the specified for the source voltage and output.  
If an excessive voltage is added, malfunction, breakage of the sensor, electric shock and/or fire may be caused. As well, do not use loads exceeding the output rating. Otherwise breakage of the output or fire may be caused.

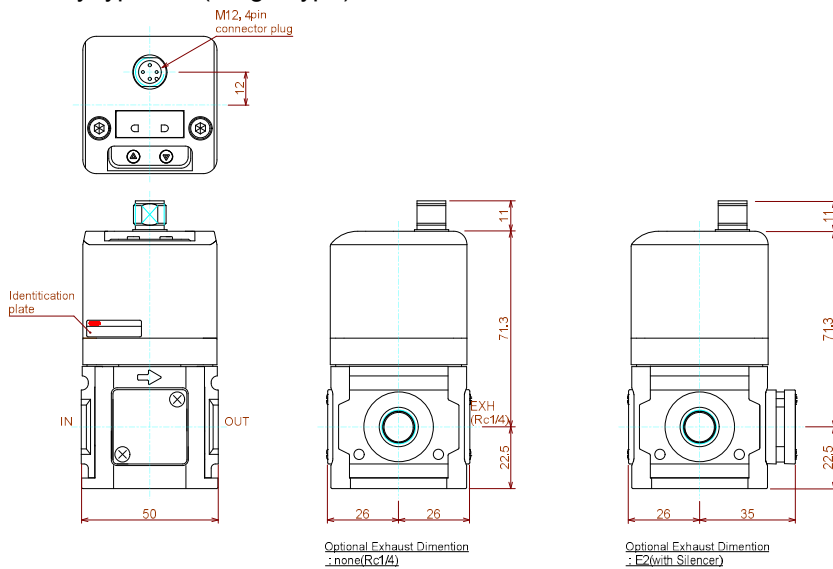


**CAUTION:**

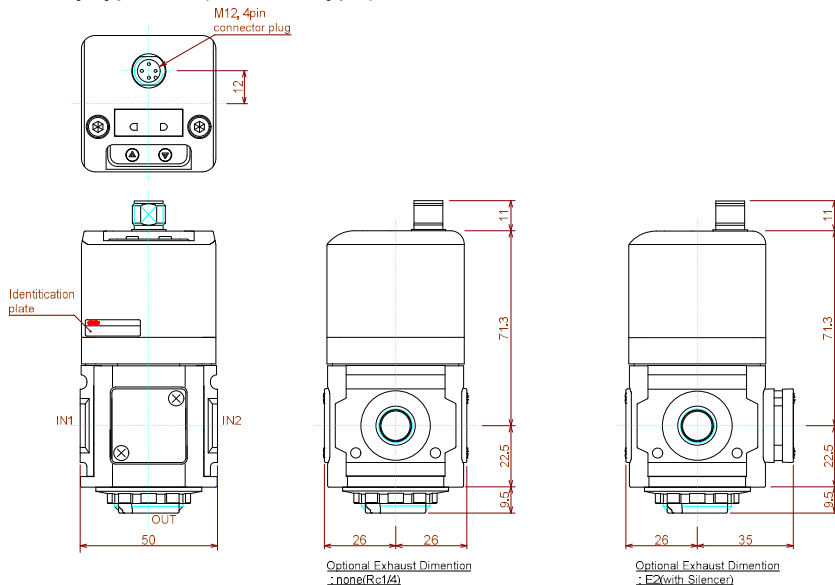
- This product does not conduct pressure control for about two seconds for self diagnosis immediately after it is turned on. Build a control circuit or program to ignore signals for about two seconds immediately after power-on.
- When you change the setting by switch operating, please be careful having possibilities to work that a control system device do not intend.  
And, please confirm that a set point changed it by a operator.

• 3-1. Dimensions

<Body type : "0"(Single type)>



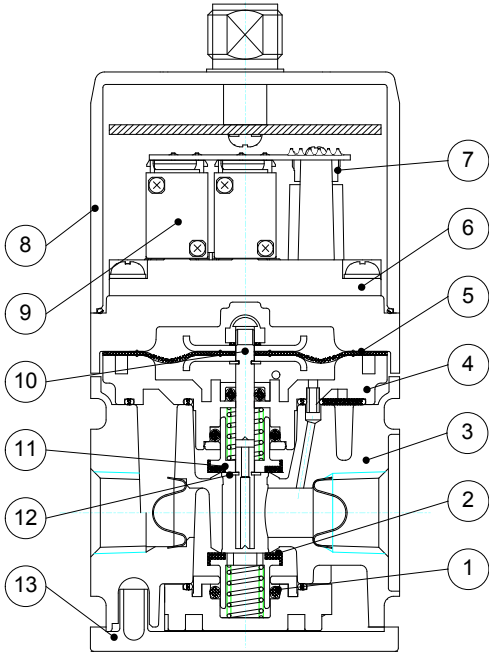
< Body type : "9"(Manifold type)>



3  
PRODUCT

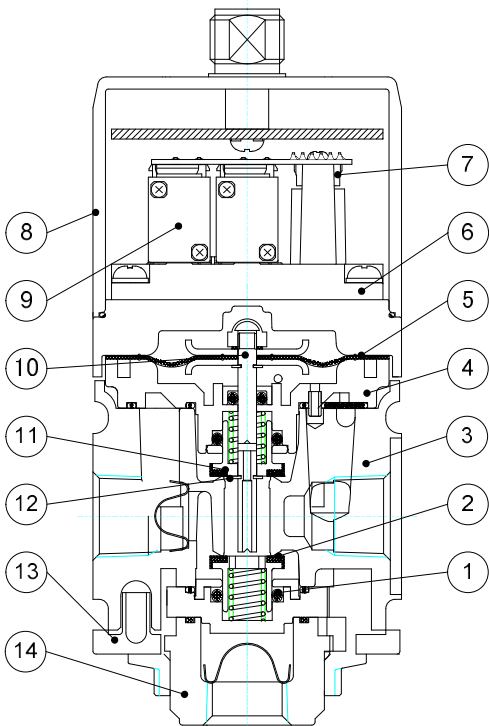
• 3-2. Inside structure

<Body type : "0"(Single type)>



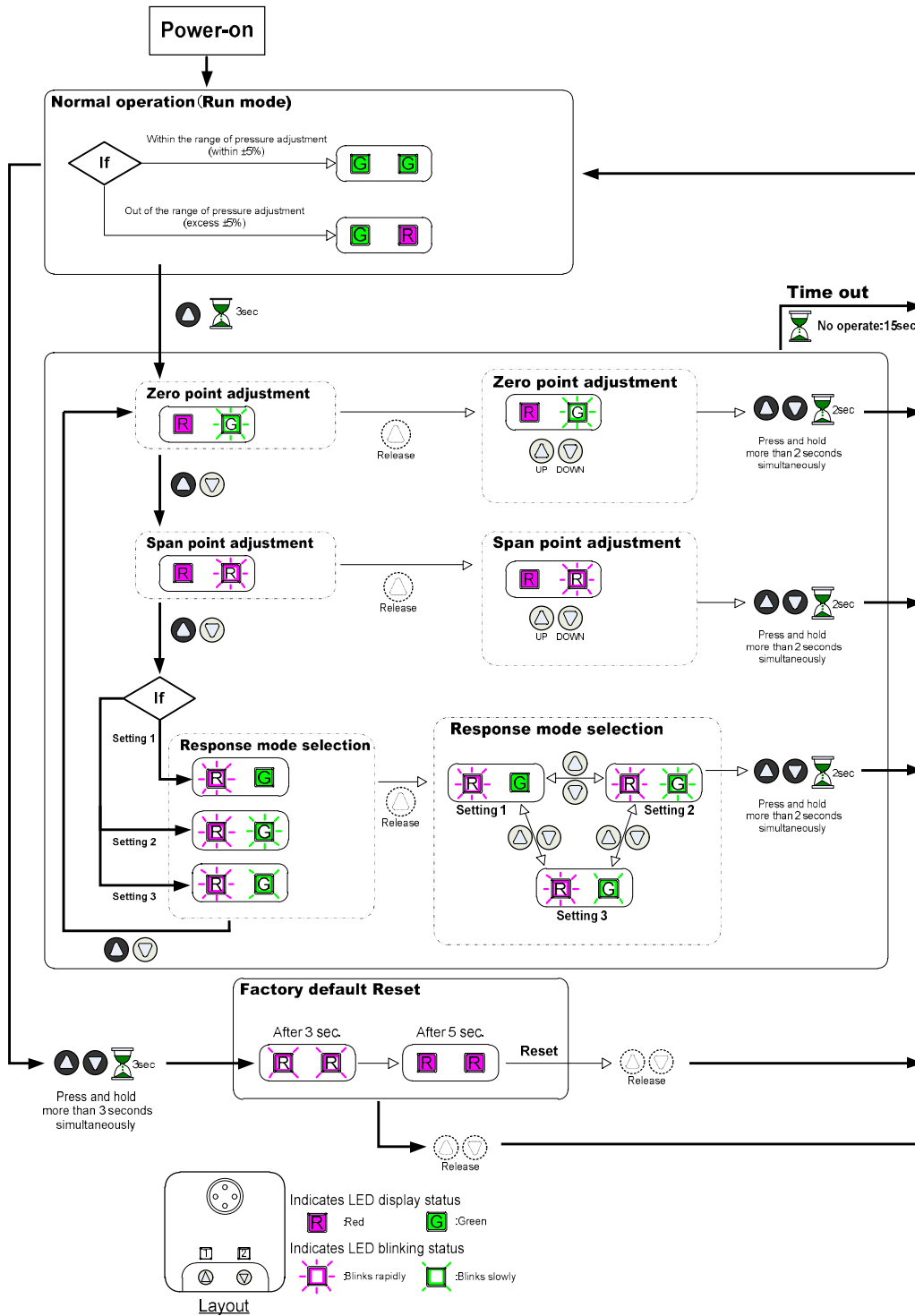
No	PARTS	MATERIAL
1	O-ring	FKM
2	Bottom Valve	Brass/H-NBR
3	Body	Aluminum Alloy
4	Disc	Aluminum Alloy
5	Diaphragm	H-NBR
6	Valve Base	Resin
7	Pressure Sensor	(Diffusion semiconductor)
8	Housing case	Resin
9	2 way-valve	—
10	Rod	Stainless Steel
11	Top Valve	Brass/H-NBR
12	E-ring	Steel
13	Plate cover	Resin

<Body type : "9"(Manifold type)>



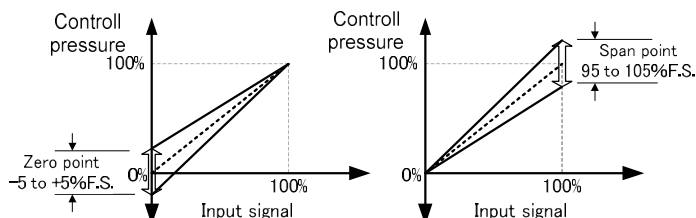
No	PARTS	MATERIAL
1	O-ring	FKM
2	Bottom Valve	Brass/H-NBR
3	Body	Aluminum Alloy
4	Disc	Aluminum Alloy
5	Diaphragm	H-NBR
6	Valve Base	Resin
7	Pressure Sensor	(Diffusion semiconductor)
8	Housing case	Resin
9	2 way-valve	—
10	Rod	Stainless Steel
11	Top Valve	Brass/H-NBR
12	E-ring	Steel
13	Plate cover	Resin
14	Manifold Outlet	Resin

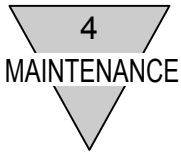
• 3-3. Setting method by the switch operation



<Adjustable range (Zero point/Span point)>

\*The adjustment range is not a guarantee level. Please assume it an aim level.  
\*When you adjust EVR. Please supply a bigger signal more than 1%F. S..





## ▪ 4. MAINTENANCE



### **WARNING:**

- Prior to maintenance work, be sure to turn the power off and stop the compressed air supply to ensure that no residual pressure present.
  - These operations are the conditions required for securing operational safety.



### **CAUTION:**

- Carry out routine and periodic checking as planned so that maintenance control is implemented correctly.
  - Unless this maintenance control is satisfactory, the product functions remarkably lower, leading to equipment malfunction and accidents, such as short service life, damage and malfunctioning.
- 1. Pressure control to supply compressed air
  - Check to see if the set pressure is supplied.  
Check to see if the pressure gauge during equipment operation is pointing to the set pressure.
- 2. Pneumatic filter control
  - Check to see if drain is removed.
  - Check to see if the bowl and element fouling condition is normal.
- 3. Control for compressed air leak in the piping connection part
  - Check to see if the condition of the connection section especially in the movable part is normal.  
Leakage from piping may obstruct correct operation.
- 4. Operating condition control
  - Check for operation delay and check to see if the exhaust status is normal.
- 5. Control for pneumatic actuator operating condition
  - Check to see if the pneumatic actuator is working smoothly. Check to see if the stopped condition at the stroke end is normal.
  - Check to see if the section coupled with the load is normal.
- The recommended procedure for stopping the product is as follows.
  1. Set the input signal to zero and exhaust the air on the secondary side.
  2. Stop power supply.
  3. Stop air supply.
- When removing the product from the device, please remove the wiring / piping after performing the recommended procedure to stop the product.
- If an error is found during operation, turn the power off and stop the compressed air supply immediately and stop operation.
- Perform periodic inspection at least 18 month to check for correct operation.
- The case is made of resin. Do not use solvent, alcohol, detergent or other chemicals when removing dirt. They may cause damage to the resin. Use waste cloth immersed in diluted neutral detergent and squeezed.

• 4.1 Troubleshooting

Phenomenon of trouble	Cause	Remedy
There is loud deep.	Leakage from secondary piping or load.	Continuation of operation in this state causes substantial reduction of the life. Examine the operation method
	Air beyond the relief performance flows into the secondly piping.	Continuation of operation in this state causes substantial reduction of the life. Examine the operation method
	While no primary pressure is supplied, the power is turned on and input signals are supplied.	Supply the primary pressure when supplying power and setting the input signal.
	Pressure has come off from the range in the primary pressure range.	Supply the primary pressure within the range of the specification.
	The power supply voltage outside the specification range is impressed	Supply the supply power volatage within the range of the specification.
	The input signal outside the specification range is impressed	Supply the input signal within the range of the specification.
	Exhaust(EXH) port is used or squeezes a duct of the exhaust.	Install EVR so that air exhausts it from exhaust (EXH) port.
Even after the power is turned off, 1%F.S. or a larger pressure output.	The power is turned off while the input signal remains supplied.	Turn the power on and reduce the input signal to 0%.
	The product is left for a long time while the power is turned off and the primary pressure is supplied.	If tis product is not operated for a long time, release the primary pressure to zero. If the secondary pressure should rise, turn the power on and reduce the input signal to 0%.
The supply pressure is output without change.	Mistake of the plumbing or the wiring	Check the piping and wiring for faults
	Failure of the product.	Check the piping and wiring for faults and replace the product.
The pressure is out of control.	Error in input signal.	Confirm whether for the input signal and GND of the power supply to have been wired together.
	Failure of pressure sensor.	Replace the product. Check if routing from another piping causes an excessive pressure in the secondary circuit.
No pressure is output.	The primary pressure is not supplied.	Supply the primary pressureel within the range of the specification.
	Wiring error.	Reconfirm wiring. Moreover, please confirm whether the connection of the connector is steady.
The pressure does not rise to the setting.	Low supply pressure.	Supply the primary pressureel within the range of the specification.
The pressure does not lower.	The exhaust port path is blocked.	Set to be able to exhaust air from the exhaust port.
The pressure is unstable.	The source voltage is unstable.	Use a stabilized power supply matching the specifications of the product.
	The input signal is unstable.	Confirm the influence of the noise.
	The primary pressure is unstable.	Install a regulator in the primary circuit to stabilize the primary pressure.
	Leakage from secondary piping or load.	Check the Leakage from secondary piping or load.
Pulsating the control pressure.	The load capacity is small.	Pulsation is avoided in some cases through modification of the piping condition. If possible, examine the piping diameter, modification of the load volume.
	Pressure has come off from the range in the primary pressure range.	Supply the primary pressure within the range of the specification.
The color which the indicator has lighted up is red. (Secondary pressure did not reach the set value±5%F.S.)	Leakage from secondary piping or load.	Check the Leakage from secondary piping or load.
	Low supply pressure.	Supply the primary pressureel within the range of the specification.

• 5. SPECIFICATIONS AND PRODUCT CODE

• 5-1. Specifications

<Common item>

Model	EVR-2*0-*	EVR-2*9-*	
Item	(Body type:Discrete)	(Body type:Manifold)	
Applicable fluid	Clean compressed air (ISO 8573-1:2010[1:3:2])		
Power supply voltage	DC24V±10% (stabilized power supply with ripple rate of 1% or less)		
Current consumption	0.1A or less (power supply rush current 0.6A or less when power turned ON)		
Input signal (input impedance)	0V to 10V (6kΩ)		
	0V to 5V (10kΩ)		
	4mA to 20mA (250Ω)		
Analog output (connected load impedance)	1VDC to 5VDC (10kΩ or more)		
Insulation resistance	100MΩ(DC500V) or more		
Withstand voltage	AC1000V 1 minute		
Vibration resistance	98m/s <sup>2</sup> (JIS C 60068-2-6)		
Ambient humidity	5°C to 50°C		
Mounting orientation	Free		
Degree of protection	*1	IP64 or equivalent	
Weight	*2	300g	320g

\*1 Specifications with the pressure with a connector as the top surface.

\*2 Weight not to include an optional cable and an optional bracket.

<Control pressure range : 0.1MPa>

Model	EVR-210*-*	
Item		
Working pressure	「Setting pressure + 0.05MPa」 to 0.20MPa	
Proof pressure	Inlet	0.30MPa
	Outlet	0.15MPa
Control pressure range	*1	0.005MPa to 0.100MPa
Accuracy	Hysteresis	0.3kPa or less
	Linearity	±0.5 kPa or less
	Resolution	0.1 kPa or less
	Repeatability	0.2 kPa or less
Step response	Load less	0.2sec. or less
	1L load	0.6sec. or less
Max. flow rate	*5	250ℓ/min(ANR)
Temperature characteristics	Zero drift	±0.06 kPa /°C (reference temperature 25°C)
	Span drift	±0.06 kPa /°C (reference temperature 25°C)

\*1 Control pressure is not released and remains at less than 1%F.S.of input signal.

\*2 Condition : Responsive setting is 1.

\*3 Above characteristics are where power voltage is 24.0±0.1VDC, and ambient temperature is 25±3°C, and exhaust port is atmosphere opening, and secondary is closed circuit, and warm-up for 30min or more. There are values where control pressure is 10 to 100%F.S.

\*4 Working pressure : 0.20MPa, Step rate :  
50% F.S. → 100% F.S.  
50% F.S. → 60% F.S.  
50% F.S. → 40% F.S.

\*5 Working pressure : 0.20MPa, Control pressure : Maximum control pressure.



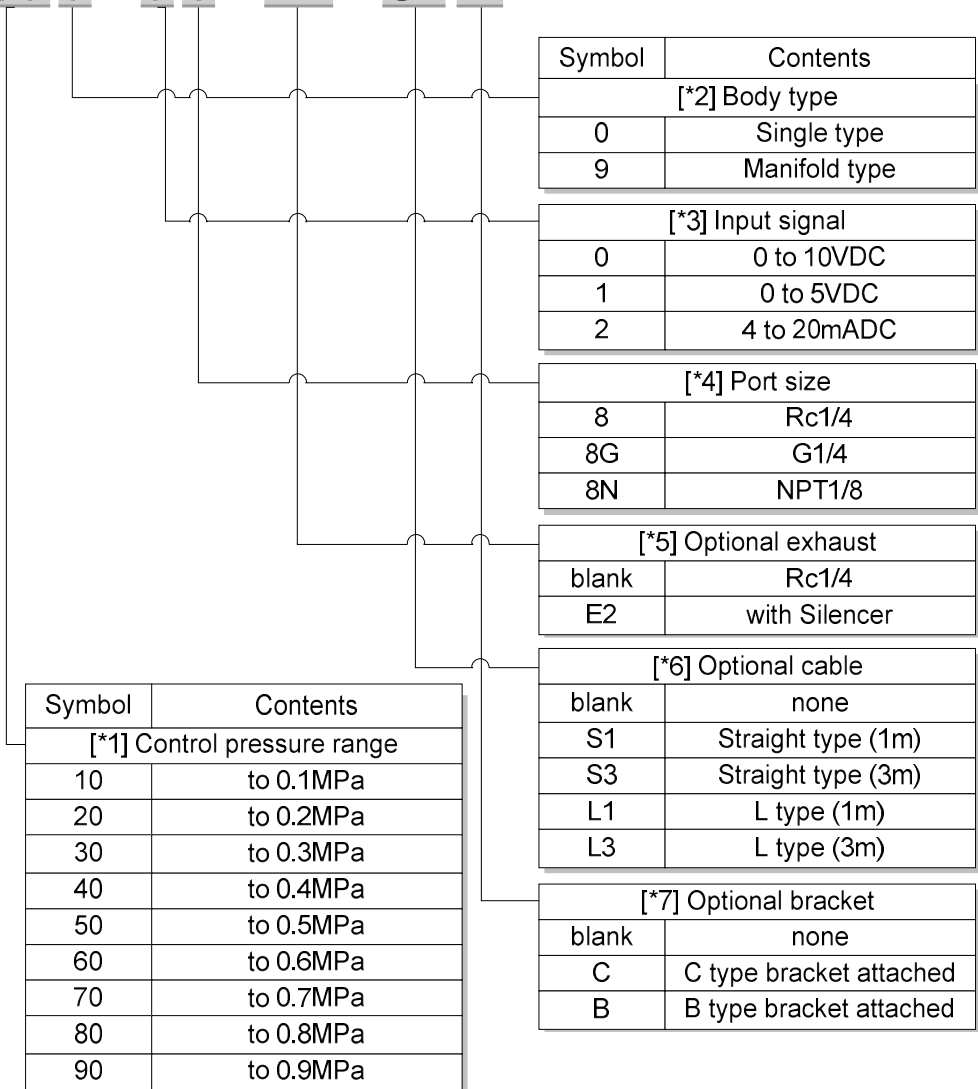






• 5.2 How to order

**EVR - 2 50 0 - 0 8 - E2 - S1 B**



Note1) When you choose a manifold type in a body type, "B" of the bracket option can not select.

Note2) The exhaust option does not support "G1/4" and "NPT1/4". Please choose "E2".

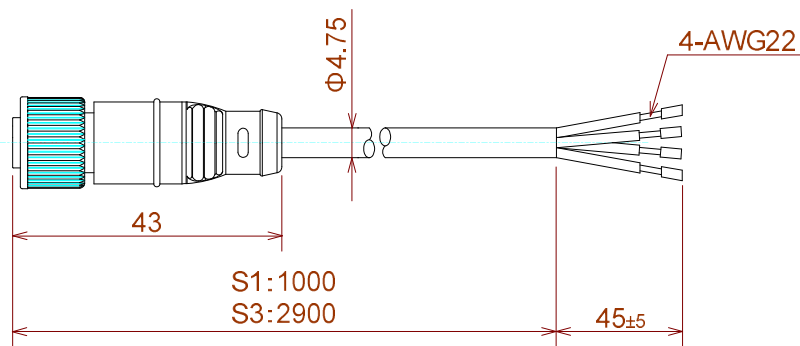
• 5.3 Optional individual code

•5.3.1 Optional cable

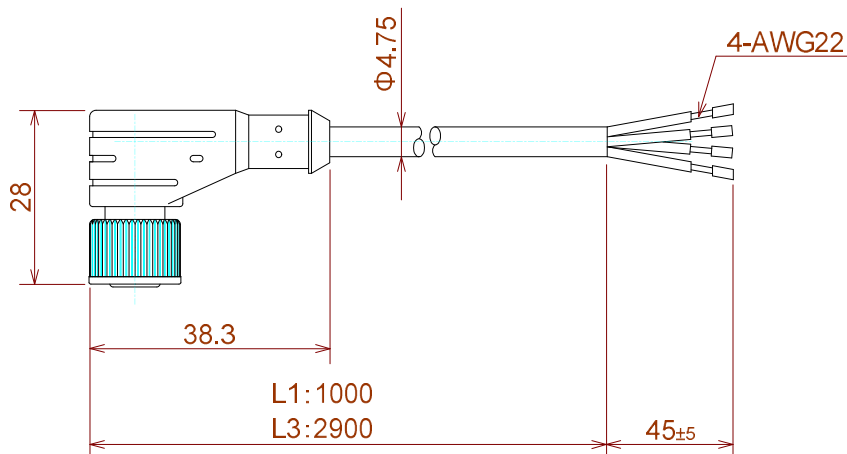
EVR - S1

Symbol	Contents
Optional cable	
S1	Straight type (1m)
S3	Straight type (3m)
L1	L type (1m)
L3	L type (3m)

•Straight type : "EVR-S1", "EVR-S3"



•L type : "EVR-L1", "EVR-L3"



※ If you are not going to use the specified cable connector, the following cable sockets are recommended.

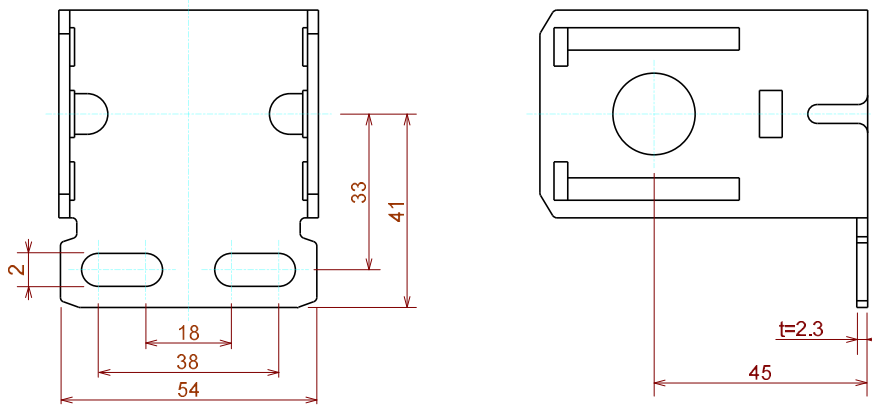
• Soldering type : Type XS2CD422 (OMRON Ltd.)

•5.3.2 Optional bracket

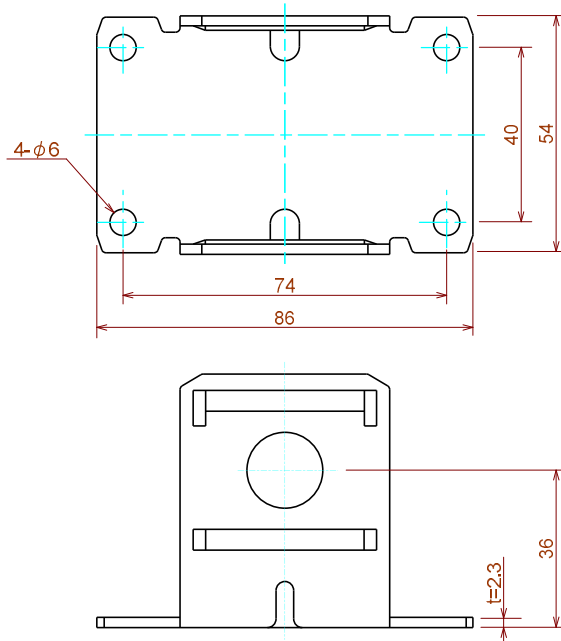
**EVR - C**

Symbol	Contents
Optional bracket	
C	C type bracket attached
B	B type bracket attached

●C-type bracket : "EVR-C"(Wall mounted type)



●B-type bracket : "EVR-B"(Floor mounted type)



Note) The bracket option "B" cannot be used when using the body type of manifold type.