Electro pneumatic regulator

■ Components for air preparation and pressure adjustment / F.R.L. unit

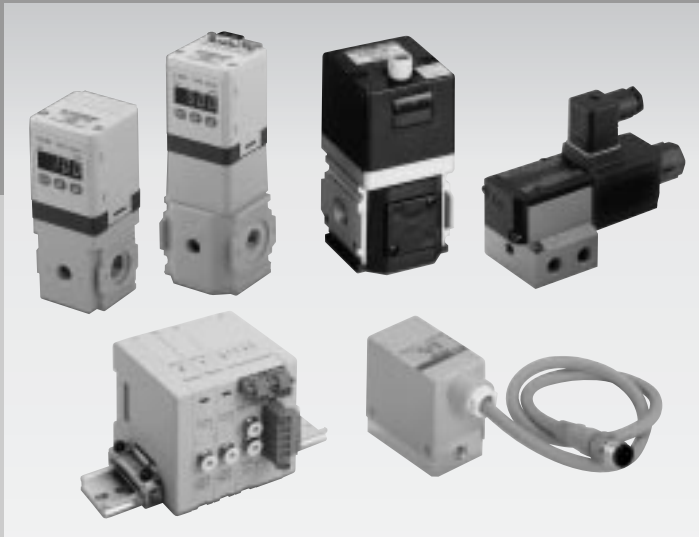
Overview

Components controlling air pressure and flow rate electrically.

Features

(1) High precision / quick response system
Controlling pressure, flow rate continuously according to applications.

(2) Changes pneumatics lines
Pressure setting for regulators in pneumatic lines is enabled with using a remote computer control, etc. Thrust/speed, etc., of cylinder can be flexibly controlled.



CONTENTS

Complying with FA and FMS with proportional control and systematization. Realize highly advanced electronic control.

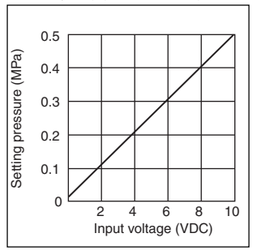
Pressure controls based on proportional control

Proportional control technology is at the core of Proportional pressure controls. In simple terms, this technology attains an output and flow rate proportional to the input voltage (current), and input and output are linearly proportional. Using this technology expands applications of conventional ON-OFF control pneumatic components to enable continuous analog control.

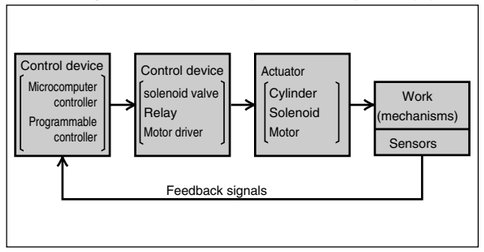
Proportional pressure controls for advanced use

Proportional pressure controls enable the pneumatic cylinder's speed, thrust, position, etc., to be freely controlled. Continuous high accuracy variable device control, remote pressure setting of pneumatic lines, and use in FA and FMS are accurately realized. The features of this system are well expressed in the flexible robot finger.

● Static diagram of proportional control valve input to control



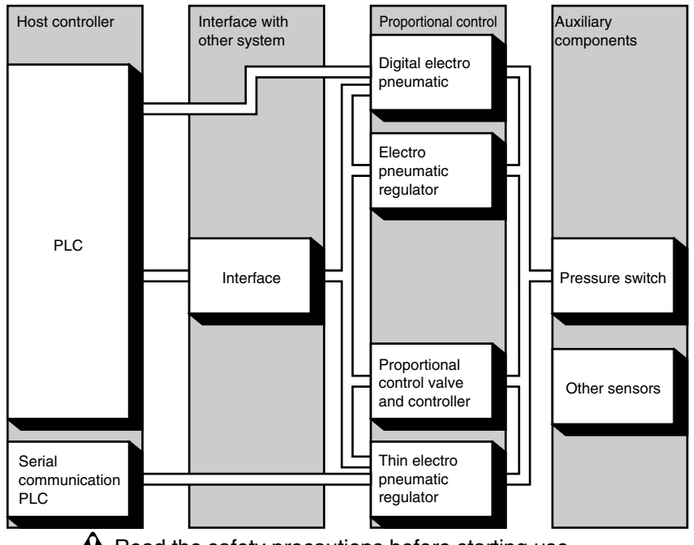
● Block diagram of control concept in machinery and equipment



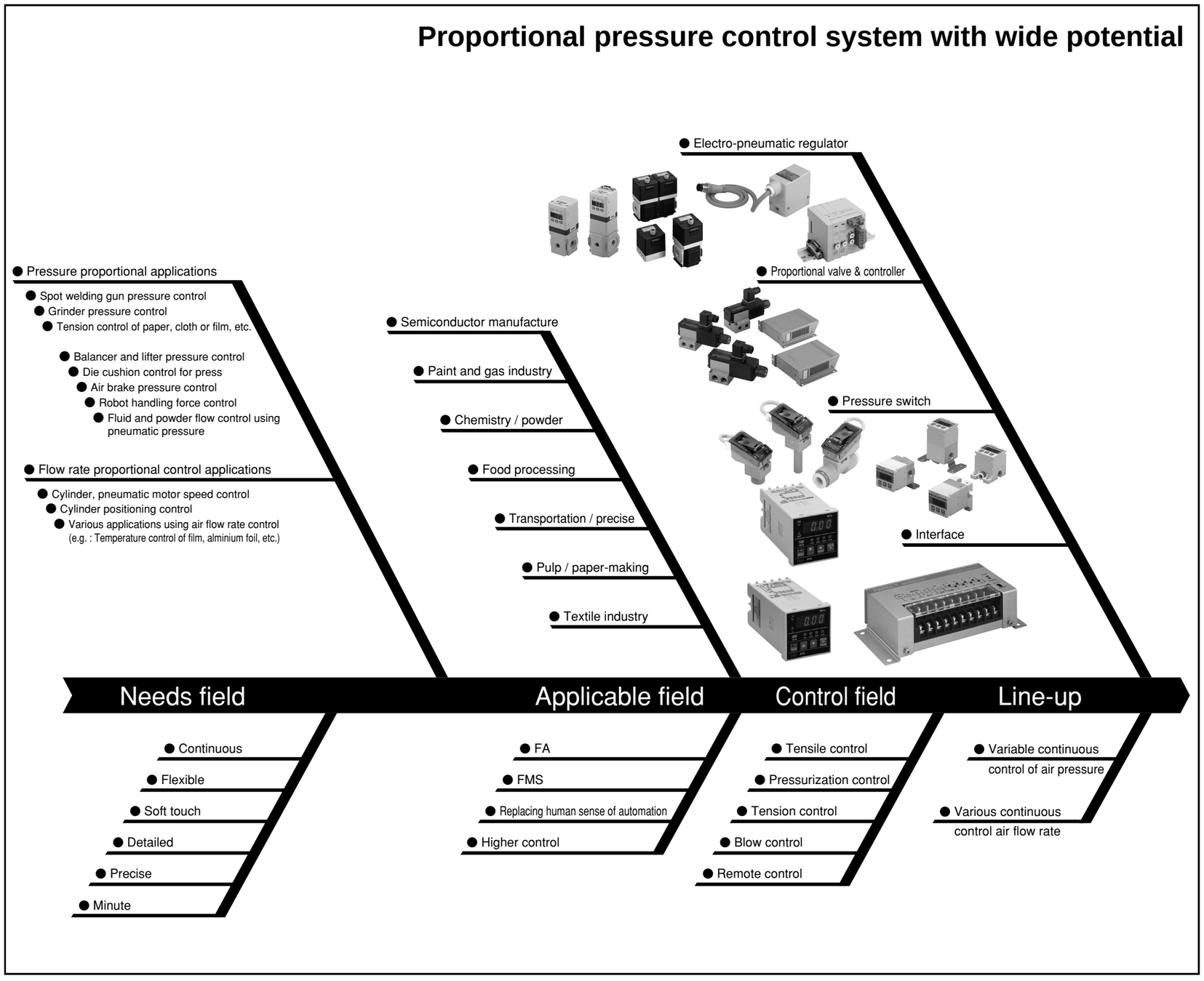
Proportional pressure control system

The proportional pressure control system includes an interface that connects with the host controller (programmable controller, etc.), the regulator and proportional valve that conduct proportional control, and the pressure switch that also functions as the system sensor. These can be used in combination or independently based on the purpose and application.

● Proportional pressure control system



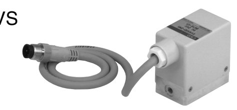
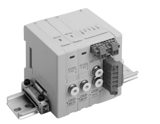
Proportional pressure control system with wide potential



⚠ Read the safety precautions before starting use.

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact conf. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)
Ending

◎: Appropriate
○: Sufficient

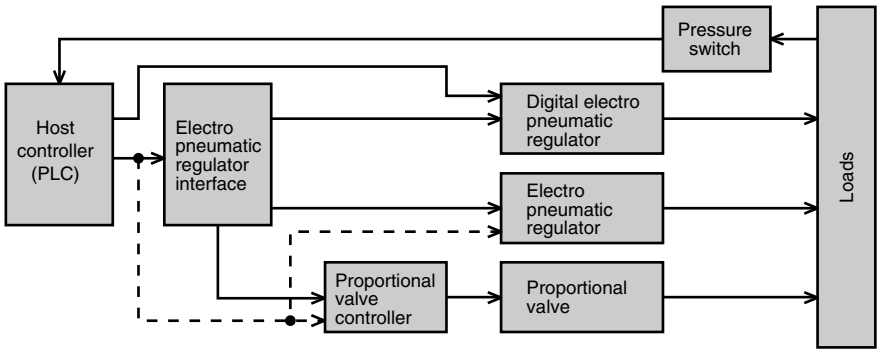
Control method	Model name		Wiring method					Port size					Power voltage					Input signal					Control pressure range					Step response (Loadless)					Maximum flow rate (ℓ/min. (ANR))									Linearity (%F.S.)				Hysteresis (%F.S.)					Applications					Page
			Terminal box	D sub-connector	Serial transmission	FA connector	DIN terminal	M5	Rc1/4	Rc3/8	Push-in ø4	Push-in ø6	Non	11 to 16 VDC	24 VDC	100 VAC	200 VAC	0-10 VDC	0-5 VDC	4-20mADC	Variable resistance input	Parallel 10bit	-101.3 to0kPa	0 to 100kPa	0 to 500kPa	0 to 900kPa	0 to 600kPa and over	0.1s or less	0.2s or less	0.6s or less	0.8s or less	2s or less	2	6	120	150	400	500	700	800	1500	±0.3 or less	±0.5 or less	±1.5 or less	±2.5 or less	0.4 or less	0.5 or less	1.0 or less	3.0 or less	7 or less	Pilot pressure control	Tension	Tension	Blow	Suction of work	
Solenoid valve type	EVD-1000 	Functions include pressure display and error display and direct memory. The 10-bit parallel model has been added to the input signal type.		●					●						●			●	●	●		●		●	●	●			●								●					●					●					◎	◎	◎		736
Solenoid valve type	EVD-3000 	Functions include pressure display and error display and direct memory. The 10-bit parallel model has been added to the input signal type. Flow is large compared to the EVD-1000.		●					●	●					●			●	●	●		●		●	●	●			●												●	●					●					◎	◎	◎		740
Solenoid valve type	EV2000 	Feedback control with semiconductor pressure sensor and electronic control circuit is used. This electro pneumatic regulator allows continuous and precise controlling air pressure by electric signals.				●			●						●			●	●	●	●				●					●										●			●					●				◎	◎	◎		760
Solenoid valve type	EV2100V 	Feedback control with semiconductor pressure sensor and electronic control circuit is used. This electro pneumatic regulator allows continuous and precise controlling vacuum by electric signal.				●			●						●			●	●	●	●		●							●					●	●							●					●							◎	771
Solenoid valve type	EV0000 	Feedback control with semiconductor pressure sensor and electronic control circuit is used. This pneumatic proportional pilot valve allows continuous and precise controlling air pressure by electric signals.				●		●							●			●	●	●	●			●	●				●				●	●									●					●			◎	○	○			765
Solenoid valve type	EVS 	Smaller than conventional models. Body extending cable is used for this pneumatic proportional pilot valve to achieve ultimate convenience and space saving.				●		●							●			●	●	●				●	●				●				●	●									●					●			◎	○	○			768
Solenoid valve type	MEVT 	Reduced wiring thin shape. Ultimate space saving due to manifold. Thin type electro pneumatic regulator with higher accuracy and performance than conventional mechanism.	●	●	●						●	●			●			●	●	●				●	●			●					●	●									●			●					◎	○	○			776
Proportional solenoid method	3AP 	Pressure control type with regulator function. Enabling continuous variable control for thrust. Speed, cushion effect, etc. for cylinders.					●		●	●			●					*2									●		●									●							●				●			○	◎	○		800
Proportional solenoid method	2AF/3AF 	Flow rate control type with regulator function. Enabling continuous variable control for thrust. Speed, cushion effect, etc. for cylinders.					●		●	●			●					*2					Max. effective sectional area (mm) 2AF: 20, 16, 10, 5 3AF: 17, 11, 6, 3						●																					●				◎		800
Proportional solenoid method	APC 	Amplifier to control current of proportional valve with 0 to10V of input signal. At the same time, dither is added to impressed current to achieve the max. performance of proportional valve with PWM method.	●												●	●	●																																		Control of proportional control valve					804
Interface	PI 	Interface components to easily connect to proportional control valve. Digital 8 bit and BCD input is converted to analog signals.	●													●	●																																		Control of proportional control valve					808

*1: Interface (PI Series) and pressure controller (PPS2 Series; refer to page 1154) are available only for 0 to 10 V input components (including APC).
* 2: Controlled via controller (APC Series). (Available only for 0 to 10V input.)

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact conf. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)
Ending

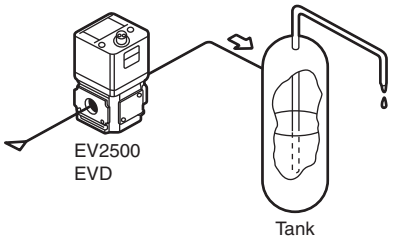
Basic system functions

Pneumatic proportional control components attain an output and flow rate proportional to the input voltage or current. The input voltage and output pressure/flow rate must be lineally proportional. To achieve this, the pressure and flow rate are varied with electric signals, and an electric controller enables variable continuous control. When used as a system, the circuit is configured so signals from the host controller are converted to 0 to 10 VDC signals, etc., by the D/A converter (interface). These signals operate the proportional control valve via the controller, controlling the thrust and speed of each actuator, etc. Highly accurate control is possible by feeding back the state with sensors as required.

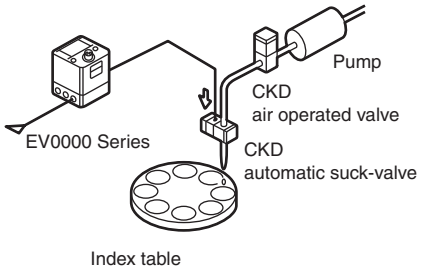


Examples of using proportional pressure controls

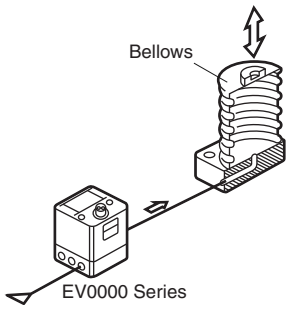
● Fluid discharge control



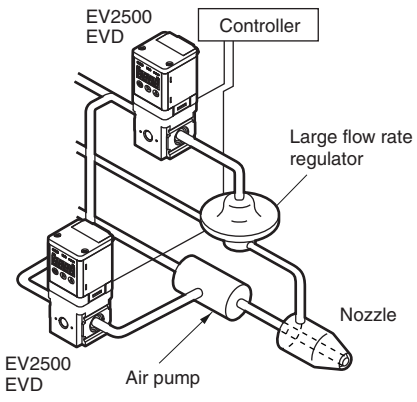
● Chemical drip prevention control



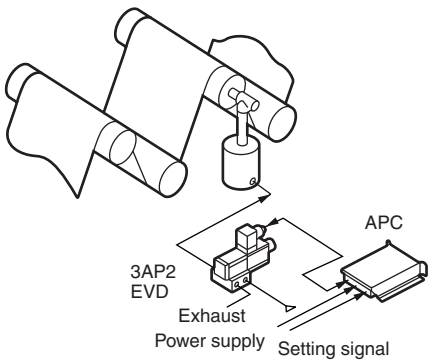
● Micro position control



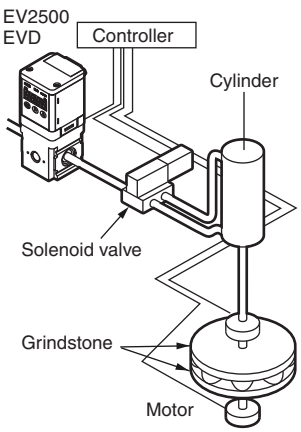
● Fluid pressure control



● Balancer tension control

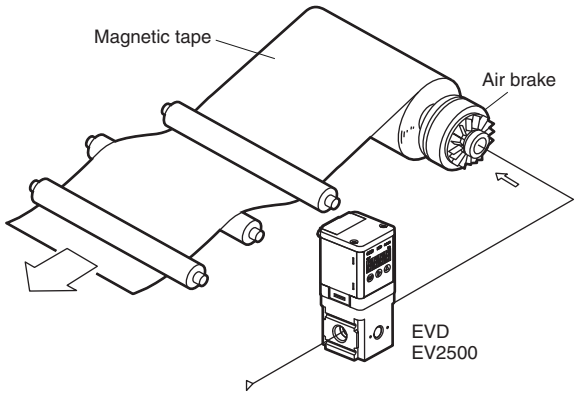


● Grinding force control

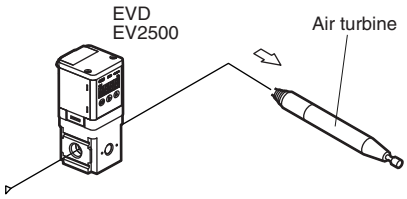


Examples of using proportional pressure controls

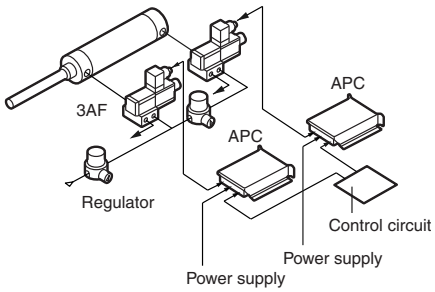
● Tension control using air brakes



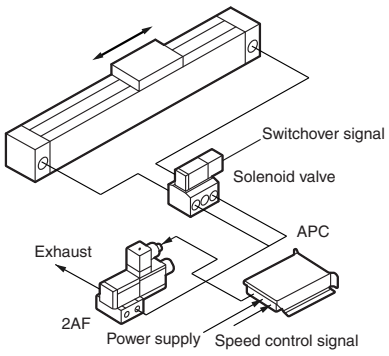
● Air turbine speed control



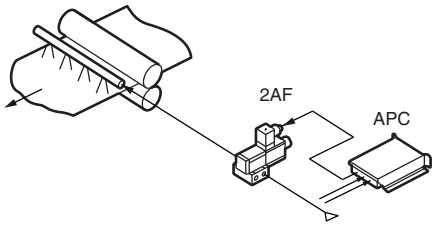
● Shock free cylinder operation



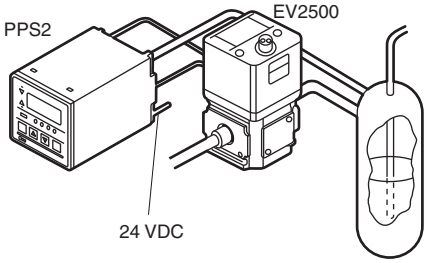
● Speed cushion control



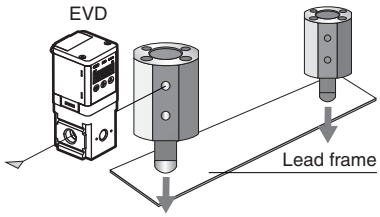
● Air flow control



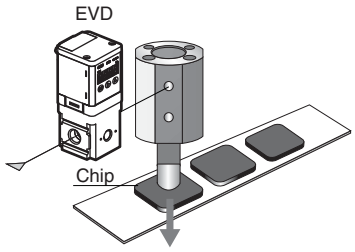
● Applications for fluid pressure feeding



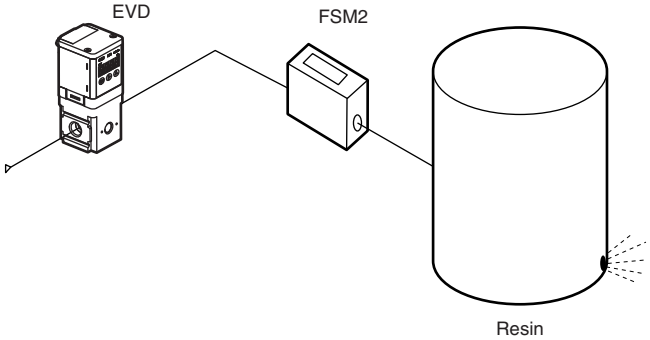
● Fixing such as lead frame, etc.,



● Chip part assembly



● Leakage inspection



Safety precautions

Always read this section before starting use.
Refer to Intro 67 for general precautions for pneumatic components, and to
"⚠ Safety precautions" in this section for detailed cautions pertaining to each series.

Electro-pneumatic regulator

Design & Selection

⚠CAUTION

■ Response is affected by working pressure and load volume. If repeatability with stable responsiveness is required, install a regulator in the proceeding stage.

■ Take the following countermeasures to prevent malfunction caused by noise.
- Insert a line filter in the AC power supply line.
- Use a surge suppressor, such as a CR or diode on the load (solenoid valve, relay, etc.), to remove noise where it is generated.
- Separate wiring to proportional pressure controls from strong magnetic fields.
- Connect wiring to proportional pressure controls with a shield wire.
- Ground the shield wire on the power supply side. Note that the shielding wire for the serial transmission communication cable must be treated based on communication specifications.

■ When releasing secondary control pressure, such as an air blowing, to the atmosphere, pressure could fluctuate depending on piping conditions and flow conditions. Test under actual working conditions, or consult with CKD before using this method.

■ When selecting dryer, air filter, oil mist filter or regulator, select a device with a flow rate higher than that used by proportional pressure controls.

■ This product has moving parts due to its operation and structure, and the accuracy, etc., can change over time. Before starting use, evaluate the part in the system. Depending on the operation frequency, use this product as a periodic maintenance part, etc.

Installation & Adjustment

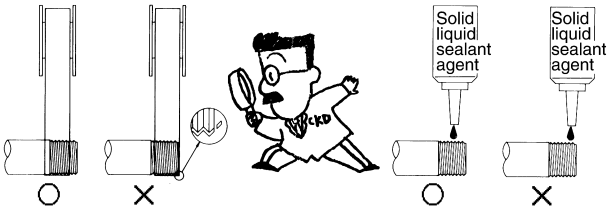
⚠CAUTION

■ Do not use the product where the product is exposed to direct-sunlight or may come in contact with water or oil.

■ Sufficiently flush air pipes before connecting to proportional pressure controls. Prevent pipe from catching tips of sealing tape when piping.

■ Mount the product as indicated in the individual precautions.

■ When connecting pipes, wrap sealing tape in the opposite direction from threads starting 2 mm inside from the end of piping threads.
- If sealing tape protrudes from pipe threads, it could be cut when screwed in. This could cause the tape to enter the pneumatic components and lead to faults.



■ Correct pressure control is not possible if the exhaust port is plugged. Release this port to the atmosphere.

■ Apply adequate torque when connecting pipes.
- To prevent air leakage and screw damage.
- First tighten the screw by hand to prevent threads, then use a tool.

(Recommended tightening torque)

Port thread	Tightening torque N·m
M5	1 to 1.5
Rc1/4	6 to 8
Rc3/8	13 to 15

■ When using the CKD cable option M12 connector type, tighten with the appropriate torque. (EV, EVS Series)
Recommended tightening torque 0.4 to 0.49 N·m

During Use & Maintenance

⚠CAUTION

■ Disassembling the regulator could result in problems. Operation after disassembly cannot be guaranteed.

■ Do not use with the cover and housing removed.
- An electronic board is assembled inside. Using the product with the cover or housing removed could result in unexpected accidents or trouble.

EVD Series

Design & Selection

⚠ WARNING

■ Understand compressed air features before designing a pneumatic circuit.
- The same functions as mechanical, hydraulic, and electrical methods cannot be anticipated if instantaneous service interruption and holding are required during an emergency stop.
- Pop-out, air discharge, or leakage due to air compression and expansion could occur.

■ Confirm that the product will withstand the working environment.
- This product cannot be used in an environment containing corrosive gas, chemical liquids, solvents, water or steam. If water, oil, or metal chips (spatter or cutting chips, etc.) could come in contact with the product, provide appropriate protection.
- A gauge pressure type pressure sensor is built-in. To protect the sensor, do not seal the product, and make sure that air can be introduced.
- This product cannot be used in a flammable environment.

■ Care must be taken to the electrical circuit during emergency stop and cylinder operation, etc., during a service interruption.

■ Install a "pressure switch" and "shut-off valve" on the device's compressed air supply side.
- The pressure switch uses disable operation if set pressure cannot be reached. The shut-off valve exhausts compressed air in the pneumatic circuit, and prevents accidents caused by operation of the pneumatic devices by residual pressure.

■ If the regulator is left standing with power off and primary pressure applied, secondary pressure could rise to the primary pressure level. Due to the structure, a small amount of air is consumed from the EXH port when secondary pressure is generated. Set the primary regulator to 0 or use a valve on the primary side to shut off the supply source when not using the regulator.

⚠ CAUTION

■ Indicate the maintenance conditions in the device's instruction manual.
- The product's function can drop markedly with working status, working environment, and maintenance, and can prevent safety from being attained. With correct maintenance, the product functions can be used to the fullest.

■ Use the constant voltage power supply.

■ Check leakage current to prevent malfunction caused by leakage current from other fluid control components.
- When using a programmable controller, etc., leakage current could cause the electro pneumatic regulator to malfunction.

For 24 VDC	1.8mA or less

■ Response is affected by working pressure and load volume. If repeatability with stable responsiveness is required, install a regulator in the proceeding stage.

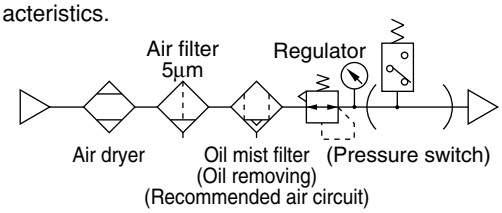
■ Take the following countermeasures to prevent malfunction caused by noise.
- Insert a line filter in the AC power supply line.
- Use a surge suppressor, such as a CR or diode on the load (solenoid valve, relay, etc.), to remove noise where it is generated.
- Separate wiring to the EVD device from strong magnetic fields.
- Connect wiring to EVD device with a shield wire.
- Ground the shield wire on the power supply side.
- Keep the power supply cable as short as possible.
- Do not share power with an inverter or components causing motor noise, etc.
- Do not lay the power wire, signal wire, and other power cables in parallel.

■ When the current input type is wired, the power ground and signal common are shared.
- When driving several EV units with one PLC and D/A unit, depending on the D/A unit circuit, wiring could prevent the correct signal from being input. Consult with the PLC maker.

■ The current input type can be used with input signal 1 to 5V, but as opposed to other voltage input types, input impedance is small (250Ω). Use an appropriate voltage generator.

■ Poor air quality will worsen the characteristics and adversely affect the durability.

■ The air quality must satisfy the clean dry air “ISO 8573-1 Class 1.3.2 or equivalent” or “JIS B 8392-1 Class 1.3.2 or equivalent”.
- For the pneumatics source, always supply clean air, from which solids, moisture and oil have been sufficiently removed with a dryer, air filter and oil mist filter.
  Do not use lubricated air as it will adversely affect the characteristics.



- When the secondary pressure is lowered with an input signal, etc., the secondary air passes through the product and is discharged from the EXH port. Contamination on the secondary piping and the inside of the load will have an adverse effect on the characteristics, etc. Thus, keep the inside of the piping as clean as possible.

■ If power is turned OFF under pressure, secondary pressure is held.
- To discharge pressure, lower set pressure with an input signal and then turn OFF, or use a shut-off valve, etc. This holding state is not guaranteed for a long time.

Design & Selection

⚠ CAUTION

■ Primary pressure:

●For 100kPa pressure specifications, make sure that the pressure is not less than “set secondary pressure + 50kPa”.

●For 500 or 900kPa pressure specifications, make sure that the pressure is not less than “set secondary pressure + 100kPa”.

● Product life is shortened if primary pressure is not supplied for a long time while power is on. Do not use this way.

■ When releasing secondary control pressure, such as an air blowing, to the atmosphere, pressure could fluctuate depending on piping conditions and flow conditions. Test under actual working conditions, or consult with CKD before using this method.

■ When selecting dryer, air filter, oil mist filter or regulator, select a device with a flow rate higher than that used by proportional pressure controls.

■ Working environment
Do not use the product where the product is exposed to direct-sunlight or may come in contact with water or oil, etc. Consult with CKD on specifications when using outside designated specifications or for special applications.

■ Drip-proof environment
This product’s protective structure is equivalent to IP40. Do not install this product where water, salt, dust, or swarf is present or in a pressurized or depressurized environment. Use where the temperature changes greatly or where high humidity environment could cause damage through dew condensation.

■ Even when pressure is set to 0 MPa at 1%F.S. or less of maximum control pressure, secondary pressure is not completely released. If precise 0 MPa is required, bleed the secondary side or install a 3-way valve on the secondary side to switch the secondary side to atmospheric pressure.

Installation & Adjustment

⚠ DANGER

Installation

■ Use power voltage and output within the specified voltage. Using voltage exceeding the specified voltage could cause malfunctions, controller damage, electrical shock, or fire.
Do not use a load exceeding the output rating. Failure to observe this could result in output damage or fire.

⚠ WARNING

Wiring

■ Check the connector pin and cable conductor wire color when wiring. Incorrect connections could cause damage, problems, or malfunctions. Check the wire color against instructions and precautions before wiring.

■ Check wiring insulation.
Check that wires do not contact other circuits, that no ground faults occur, and that the insulator between terminals is not defective. Overload could damage the product.

■ Use a stabilized DC power supply, within the specified rating, insulated from the AC power supply. Not insulating the power supply could cause electrical shock. If power is not stabilized, the peak value could exceed the rating and damage the product or reduce precision.

■ Stop the control device and equipment and turn power off before wiring. Starting operation suddenly could cause unpredictable operation and hazards. Conduct an energized test with control devices and equipment stopped. Be sure to discharge any accumulated electrostatic discharge among personnel or tools before and during work. Connect and wire bending resistant material, such as robot wire material for movable sections.

■ Do not use this product at levels exceeding the power voltage range. If voltage exceeding the specified range or AC power (100 VAC) is applied, the controller could break or burn.

■ Do not short-circuit the load. The product could break or burn.

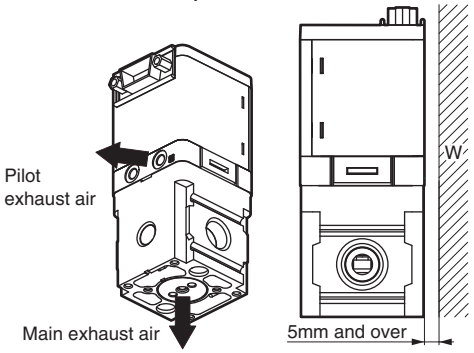
⚠ CAUTION

Installation

■ Mounting attitude
There are no restrictions to the mounting direction or mounting attitude, but provide sufficient space around the product for operation, mounting, removal, wiring and piping work.

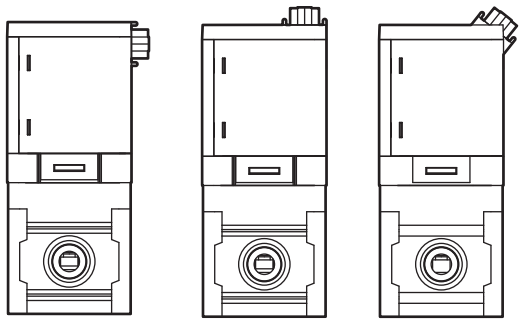
■ Install an air filter just before the pneumatic component in the circuit.

■ Install so that the exhaust port is not blocked and provide sufficient space for exhaust.



Installation & Adjustment

■ The D-sub connector's rotating mechanism is not designed for use in moving applications. Use it at the top or side, not inclined. Fix any cables that could move in place.



⚠ CAUTION

Piping

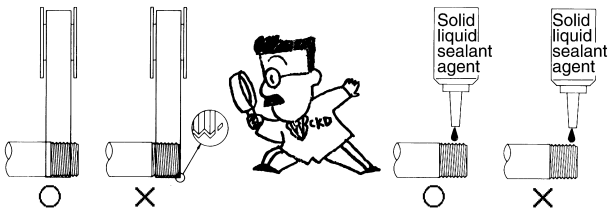
■ Do not remove the port seal until just before piping the product.

- Removing the port seal from the piping port before piping work starts could let foreign matter enter from the piping port and cause faults or faulty operation.

■ Flash the pipe carefully before installation. Prevent pipe from catching tips of sealing tape when piping.

■ When connecting pipes, wrap sealing tape in the opposite direction from threads starting 2 mm inside from the end of piping threads.

- If sealing tape protrudes from pipe threads, it could be cut when screwed in. This could cause the tape to enter the pneumatic components and lead to faults.



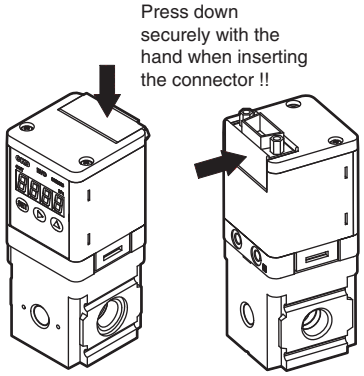
Wiring

■ The optional shield cable connector is a shielded wire.

- Insulate wires not being used so that they do not contact other wires, including shielded wires. Unintended connection to the ground, etc., could cause malfunction or damage the product.

■ Insert and fit the D-sub connector securely on the back.

■ The D-sub connector has a 90° rotating mechanism. When fitting the D-sub connector, press it in by hand so that it faces the top or side.



■ Correct pressure control will not be possible if plugged into the exhaust port. Always release to the atmosphere.

■ Apply adequate torque when connecting pipes.

- To prevent air leakage and screw damage.
- First tighten the screw by hand to prevent threads, then use a tool.
- The electric components are assembled onto main body with two hooks on the housing side. Carefully handle so that excessive force is not applied.

(Recommended tightening torque)

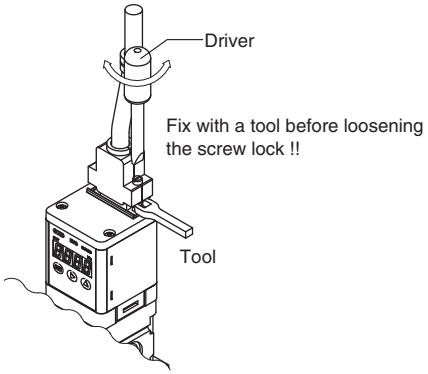
Port thread	Tightening torque N·m
Rc1/4	6 to 8
Rc3/8	13 to 15

■ When supplying compressed air for the first time after connecting pipes, do not apply high pressure suddenly.

■ Before supplying compressed air after connecting pipes, check that there are no air leaks at any pipe connections.

- Apply a leakage detection agent on pipe connections with a brush, and check for air leaks.

■ Lock the D-sub connector so that it will not be dislocated. Fix the fixed bed in place with a tool, etc., when releasing the screw lock.



During Use & Maintenance

⚠ WARNING

■ Do not supply other than compressed air.

■ Use clean compressed air that does not contain corrosive gases.

■ Use “ISO 8573-1 Class 1.3.2 or equivalent” or “JIS B 8392-1 Class 1.3.2 or equivalent” clean dry air from which oil has been removed.

■ Be sure to turn power off, stop supplied compressed air, and check that there is no residual pressure before starting maintenance.

● This is required to ensure safety.

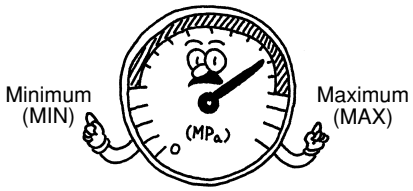
⚠ CAUTION

■ Plan daily inspections and periodic inspections to ensure that maintenance is correctly controlled.

● If maintenance is not correctly controlled, the product's functions could drop markedly and lead to a shortened life, damage, malfunctions, faults, and accidents.

1. Control of supplied compressed air pressure

● Is the set pressure supplied? Does the pressure gauge indicate the set pressure during operation of the device?



2. Control of pneumatics filter

● Is the drain correctly discharged?
Is the bowl or element dirty?

3. Control of compressed air leaks from piping connections

● Is the state of the connection, especially at movable sections, normal?
Leaks in piping could cause incorrect operation.

4. Operational status control

● Are operations delayed? Is exhaust normal?

5. Control of pneumatic actuator operation

● Is operation smooth? Is the end stop state normal?
Is coupling with the load normal?

■ If abnormal operation occurs, turn power and air pressure sources off immediately and stop use.

■ Use this product within the working pressure range.

■ This product does not start pressure control for two seconds or so after power is turned on to complete self-diagnostics. Provide a control circuit and program that ignores signals for at least two seconds after power is turned on.

■ If the output setting value is changed, control system devices could operate unintentionally. Stop devices before changing settings.

■ Regularly inspect the product at least once a year or more, and confirm that it is operating correctly.

● This product uses a compact solenoid valve as the actuator. The life may change according to the operation frequency by pressure switching and the working conditions, etc.
The warranty term is set as one year or 3,000,000 repeated operations, whichever is earlier, so use this as an inspection guideline.
* The conditions for the 3,000,000 operations listed in the warranty are as follows.
When the input signal which causes the control pressure to rise from zero to the maximum control pressure is repeatedly applied in steps. The working air quality in this case shall be clean compressed air from the recommended air circuit. The secondary side load capacity shall be 300cm^3

■ The case is made of resin. Do not use solvent, alcohol or any other cleaning agent to remove contamination, etc., or the resin case could be corroded or damaged. Wipe contaminations with a well wrung rag, etc., after soaked in weakened neutral detergent.

EV2000/EV0000/EVS000 Series

Design & Selection

⚠WARNING

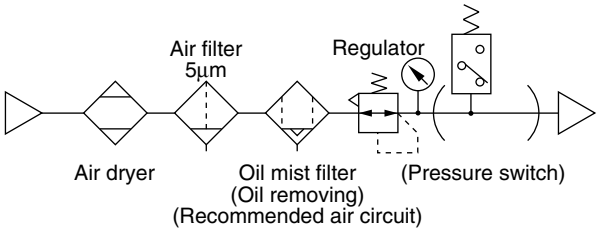
■ If the regulator is left standing with power off and primary pressure applied, secondary pressure could rise to the primary pressure level. Due to the structure, a small amount of air is consumed from the EXH port when secondary pressure is generated.

⚠CAUTION

■ Poor air quality will worsen the characteristics and adversely affect the durability.

■ The air quality must satisfy the clean dry air “ISO 8573-1 Class 1.3.2 or equivalent” or “JIS B 8392-1 Class 1.3.2 or equivalent”.

● For the pneumatics source, always supply clean air, from which solids, moisture and oil have been sufficiently removed with a dryer, air filter and oil mist filter.
Do not use lubricated air as it will adversely affect the characteristics.



● When secondary pressure is lowered with an input signal, etc., secondary air passes through the EV and is discharged from the exhaust port (EXH port or R port). Contamination on the secondary piping and the inside of the load will have an adverse effect on the characteristics, etc. Thus, keep the inside of the piping as clean as possible.

■ If power is turned OFF under pressure, secondary pressure is held.

● To discharge pressure, lower set pressure with an input signal and then turn OFF, or use a shut-off valve, etc. This holding state is not guaranteed for a long time.

■ Primary pressure must be over " Setting secondary pressure + max. control pressure x 0.1".

● If primary pressure is not supplied for a long time when secondary pressure is set within more than 0MPa to 12%F.S., product life is shortened. Avoid this use.

■ Do not leave the product nonpressurized with power and input signals applied. Product life and properties could be reduced.

■ If an input signal exceeding the specified range, as shown below, is applied the solenoid valve will operate excessively and can cause life or characteristics to degrade. Always use within the specified range.

0-10 V type	0-5 V type	4-20mA type
Less than 0V Over 10V	Less than 0V Over 5V	Less than 4mA Over 20mA

■ When the current input type is wired, the power ground and signal common are shared.

● When operating several EV units with one PLC and D/A, depending on the D/A unit circuit, wiring could prevent the correct signal from being input. Consult with PLC maker.

■ The current input type can be used with input signal 1 to 5 V, but as opposed to other voltage input types, input impedance is small (250Ω). Use an appropriate voltage generator.

■ With the EV2000 Series, even if pressure is set to 0MPa, secondary pressure is not released and remains at less than 5kPa. If 0MPa is required, bleed the secondary side, or install a 3-way valve on the secondary side to switch to atmosphere, etc.

■ The EV2509 Series has two supply port systems on the left and right of the unit. These are indicated as IN1 and IN2. Always plug the system that is not being used.

■ The EV0000 and EVS000 Series have small flow specifications, so leaks in secondary piping could cause vibration.

● Leaks in secondary piping prevents set pressure from being maintained when released into atmospheric pressure, including blowing, or if reverse pressure is applied to the secondary side such as when using a cylinder, such as a fine speed cylinder, with large leakage. Groaning may occur and life and properties could be reduced. Do not use in this way.

■ Drip-proof environment
The protective structure of this product can be confirmed in the specifications of each product. Do not use this product if a problem could occur in the applicable work environment.

Installation & Adjustment

■ Mounting attitude
There are no restrictions to the mounting direction or mounting attitude, but provide sufficient space for exhausting from the exhaust port.

During Use & Maintenance

⚠CAUTION

■ The optional shield cable connector is a 4-conductor shield wire.

■ When not using the green special application wire (monitor output, etc.) with the EV2000 Series or EV0000 Series, insulate the wire so it does not contact the other wires (including the shielding wire). If the wire inadvertently contacts the ground, etc.

● The shielding wire on the main side of the EVS000 is connected to the green wire of the optional shielding cable connector, so connect the green wire and shielding wire to the power supply ground.

■ Regularly inspect the product at least once a year or more, and confirm that it is operating correctly.

● This product uses a compact solenoid valve as the actuator. The life may change according to the operation frequency by pressure switching and the working conditions, etc.
The warranty term is set as one year or 1,000,000 repeated operations, whichever is earlier, so use this as an inspection guideline.

* The conditions for the 1,000,000 operations listed in the warranty are as follows.
When repeatedly, in a step, applying an input signal which causes the control pressure to rise from zero to the maximum control pressure. The working air quality in this case must be clean compressed air from the recommended air circuit. The secondary load capacity shall be 300cm^3 for the EV2000 Series and 15cm^3 for the EV0000 or EVS Series.

EV210*V Series

Design & Selection

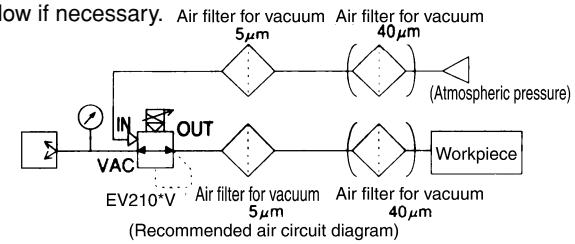
⚠WARNING

■ If the product is left with working pressure (vacuum source pressure) applied when power is not ON, the secondary pressure degree of vacuum could rise to the working pressure. If this poses a safety hazard, take measures using a valve on the secondary side, etc.

⚠CAUTION

■ If poor quality air is supplied to the primary side (atmosphere side), characteristics could deteriorate and durability be adversely affected.

- When using this product in a dusty environment, etc., remove dust with a filter.
- As with secondary side load, if piping or the inside of the load is contaminated, characteristics and durability could be adversary affected. Blow air piping with compressed air to remove foreign matter before connecting.
- Install an air filter as shown in the recommended air circuit below if necessary.



(Recommended air circuit diagram)

■ If power is turned off while the working pressure side is in a vacuum state, secondary pressure is held.

- To release secondary pressure to the atmospheric level, lower the input signal and then turn power off, or use a shut-off valve, etc. This holding state is not guaranteed for a long time.

■ Supply pressure is used to supply specified pressure to control pressure. Use the device within the working pressure range.

- If working pressure is not supplied for a long time when secondary pressure is set within more than 0MPa to 12% F.S., or if the product is left for a long time with working pressure at "control pressure + (- 10kPa)" or less, product life is shortened. Avoid this use.

■ Set the input signal within the specifications.

- Applying a signal exceeding the range could reduce the life and properties. Do not use in this way.

■ The current input type can be used with input signal 1 to 5V, but as opposed to other voltage input types, input impedance is small (250Ω).

■ When the current input type is wired, the power ground and signal common are shared.

- When operating several EV units with one PLC and D/A, depending on the D/A unit circuit, wiring could prevent the correct signal from being input. Consult with PLC maker.

■ Even if pressure is set to 0MPa, secondary pressure is not released and remains as is within 0 to -5kPa range.

- If 0MPa is required, install a 3-way valve on the secondary side to switch to atmosphere, etc.

During Use & Maintenance

⚠CAUTION

■ Correct pressure control is not possible if the IN port is plugged. Release this port to the atmosphere.

■ When connecting a joint to the piping port (VAC, OUT, IN), use seal material (sealing tape, gel sealant) to prevent leaks. Check that seal material or piping screw swarf does not enter the port. When tightening the VAC port joint, use a wrench on the intake block (*27).

■ When using the manifold and connecting several units with a module connection, atmosphere release ports (IN1 and IN2) are shared.

■ The optional shield cable connector is a 4-conductor shield wire.

■ When not using the green special application wire (monitor output, etc.), insulate so that there is no contact with other wires (including the shield wire). Unintended connection to the ground, etc., could cause malfunction or damage the product.

■ When using a hydraulic rotary type vacuum pump, be sure to prevent oil from entering by breaking the vacuum with a residual pressure discharge valve, etc., after the vacuum pump power is turned off.

■ Regularly inspect the product at least once a year or more, and confirm that it is operating correctly.

- This product uses a compact solenoid valve as the actuator. The life may change according to the operation frequency by pressure switching and the working conditions, etc. The warranty term is set as one year or 1,000,000 repeated operations, whichever is earlier, so use this as an inspection guideline.
  * The conditions for the 1,000,000 operations listed in the warranty are as follows. When repeatedly, in a step, applying an input signal which causes the control pressure to rise from zero to 90% of the maximum control pressure. The working air quality in this case must be clean compressed air from the recommended air circuit. The secondary load capacity shall be 300cm³.

Thin electro-pneumatic regulator MEVT Series

Design & Selection

Circuit design

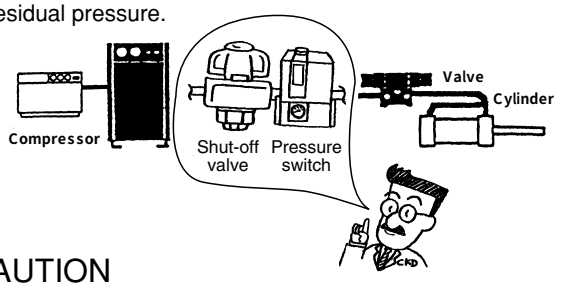
⚠WARNING

■ Understand compressed air features before designing a pneumatic circuit.
- The same functions as mechanical, hydraulic, and electrical methods cannot be anticipated if instantaneous service interruption and holding are required during an emergency stop.
- Pop-out, air discharge, or leakage due to air compression and expansion could occur.

■ Confirm that the product will withstand the working environment.
- This product cannot be used in an environment containing corrosive gas, chemical liquids, solvents, water, vapor, or ozone. If water, oil, or metal chips (spatter or cutting chips, etc.) could come in contact with the product, provide appropriate protect.
- This product cannot be used in a flammable environment.

■ Care must be taken to the electrical circuit during emergency stop and cylinder operation, etc., during a service interruption.

■ Install a "pressure switch" and "shut-off valve" on the device's compressed air supply side.
- The pressure switch uses disable operation if set pressure cannot be reached. The shut-off valve exhausts compressed air in the pneumatic circuit, and prevents accidents caused by operation of the pneumatic devices by residual pressure.



⚠CAUTION

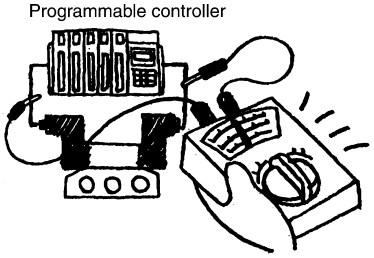
■ Indicate the maintenance conditions in the device's instruction manual.
- The product's function can drop markedly with working status, working environment, and maintenance, and can prevent safety from being attained. With correct maintenance, the product functions can be used to the fullest.

■ Use the constant voltage power supply.

■ Set the input signal within the specifications.
- Applying a signal exceeding the range could reduce the life and properties. Do not use in this way.

■ Check leakage current to prevent malfunction caused by leakage current from other fluid control components.

When using a programmable controller, etc., leakage current could cause the EVT to malfunction.



For 24 VDC	1.8mA or less

■ Take the following countermeasures to prevent malfunction caused by noise.
- Insert a line filter in the AC power supply line.
- Use a surge suppressor, such as a CR or diode on the load (solenoid valve, relay, etc.), to remove noise where it is generated.
- Separate wiring to the MEVT device from strong magnetic fields.
- Use the designated wire material for the serial transmission line.
- If operation could be affected by noise, wire the power supply independently for each manifold when possible.
- Keep the power supply cable as short as possible.
- Do not share power with an inverter or components causing motor noise, etc.
- Do not lay the power wire, signal wire, and other power cables in parallel.

■ Precautions for wiring
- When wiring the common gland and D-sub connector, the power supply gland and signal common are shared. When driving several EVT units with one PLC and D/A unit, depending on the D/A unit circuit, wiring could prevent the correct signal from being input. Consult with the PLC maker. When using a shield wire, connect it to the ground on the power supply side.

■ This regulator cannot be used with a cylinder having a large leakage rate, such as an air bearing cylinder.
- When using for blowing applications or when back pressure is applied on the secondary side, it is not be possible to maintain the set pressure. A large beating sound is generated and life is shortened. Avoid this use.

■ Residual pressure of 2 kPa or less (EVT100) or 10 kPa or less (EVT500) is generated even when the input signal is set to 0%. If 0 MPa is required, install a three-way valve on the secondary side or release into to the atmosphere, etc.

⚠CAUTION

■ Use a valve on the primary or secondary side when required.
- If the product is left with the supply pressure applied when power is not on, secondary pressure could rise to the primary pressure. If this could pose a safety hazard, take measures on the system by using a valve on the primary side or secondary side, etc.

■ Working environment

Avoid using this product where it is subject to direct sunlight, water, or oil, etc. Consult with CKD on specifications when using outside designated specifications or for special applications.
- Ambient temperature
  - Do not use this product in an environment hotter than 50˚C or colder than 5˚C.
- Vibration and shock
  - Do not use this product where vibration exceeds 50m/s^2, or where impact exceeds 300m/s^2.

■ Drip-proof environment

This product's protective structure is equivalent to IP40. Do not install this product where water, salt, dust, or swarf is present or in a pressurized or depressurized environment. Use where the temperature changes greatly or where high humidity environment could cause damage through dew condensation.

Installation & Adjustment

Installation

⚠WARNING

■ Do not install the MEVT by supporting it with pipes.
- Fix the MEVT.

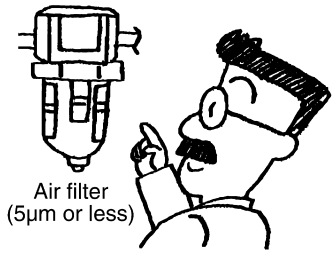
■ Do not wash the MEVT with water or solvent, or paint the body.
- The MEVT is made of resin parts, and could be damaged. Paint could plug the exhaust port and result in malfunctions.

⚠CAUTION

■ Secure sufficient space around the MEVT for installation, removal, wiring, and piping work.

■ Install an air filter just before the pneumatic component in the circuit.

■ Response is affected by working pressure and load volume. If repeatability with stable responsiveness is required, install a regulator in the proceeding stage.



■ Mounting attitude
- The MEVT is mounted on a DIN rail. If the manifold's total weight exceeds 1kg, or when using the MEVT in an environment with vibration or impact, fix the DIN rails on the mounting surface at pitch of 50 to 100mm. Check that there are no problems with installation.
- There is no restriction for installation or mounting, but vibration could loosen set screws and drop the manifold.
- Mounting and removal method of MEVT

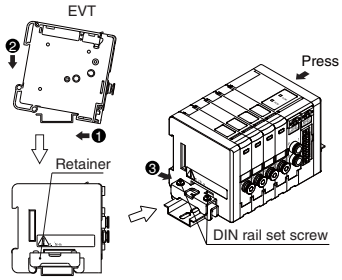
  Removing

  Loosen the four DIN rail set screw (two each on left/right).

  Installation

  1. Catch the jaws into the DIN rail in the order of (1), (2).
  2. Press the retainer in the direction of (3).
  3. While holding down so that there is no gap between blocks, tighten DIN set screws. (recommended tightening torque 0.6 to 0.8N·m).

Note: If retainer jaw are not securely set, air could leak or the product could drop. Check that these jaws are secure.



Piping

⚠CAUTION

■ Do not remove the MEVT packaging until just before piping.
- If the package is removed before connecting pipes, foreign matter could enter the EVT from the piping port and result in fault or malfunction.

■ Always flush just before piping pneumatic component.
- Check that foreign matter in pipes does not enter the EVT.

■ Connect piping so that connections are not dislocated by system movement, vibration, or tension.

■ Release the exhaust port (R) to the atmosphere to that exhaust is proper.

■ Do not restrict the EVT exhaust port (R) to a bore smaller the piping connection port.
Valving element operation causes breathing at the EVT exhaust port (R), so foreign matter exhaust port (R) is facing upward.
Install a silencer or pipe in the exhaust port (R) facing downward.
- The actuator does not function correctly if exhaust is not smooth. When using a manifold, exhaust could prevent the other EVT units from functioning correctly.

■ When supplying compressed air for the first time after connecting pipes, do not apply high pressure suddenly.
- The pipe connection could dislocate causing the pipe tube to bounce and result in accidents.
- Note: If compressed air is supplied too slowly, the sealing mechanism in he EVT does not form a seal and result in air leaks.

■ Before supplying compressed air after connecting pipes, check that there are no air leaks at any pipe connections.
- Apply a leakage detection agent on pipe connections with a brush, and check for air leaks.

■ Observe the following precautions when using nylon tubes or urethane tubes for piping material.
- Use flame-resistant tubes where spatter could scatter.

■ Connecting port

● Applicable tube

Use us assignment's tube.
Soft nylon (F-1500 Series)
Urethane (U-9500 Series)
When using a commercially available tube, check external dimension accuracy, thickness, and hardness. Use a urethane tube with a hardness of 93˚ and over (rubber hardness meter). If a tube that does not satisfy the diameter accuracy or hardness is used, the chucking force may drop, the tube may dislocate, or may be difficult to insert.

Outer diameter

Outer diameter mm	Bore size mm	
	Nylon	Urethane
ø4	ø2.5	ø2
ø6	ø4	ø4

Tolerance of outer diameter

Soft and hard nylon	±0.1mm
Urethane ø4, ø6	+0.1mm
	-0.15mm

● Bending radius of tube

The tube's bending radius must be larger than the minimum bending radius. (Otherwise, this could result in dislocation or leaks)

Bore size	Minimum bending radius mm	
	Nylon	Urethane
ø4	10	10
ø6	20	20

● Minimum tube length

As a guide, the output port (A) tube length should have a capacity of 1cc and over.
(Otherwise this could result in vibration)

Bore size	Min. length mm	
	Nylon	Urethane
ø4	200	320
ø6	80	80

● Cut of tube

Use a tube knife (AZ1200), and cut at a right angle to the axis. Air could leak if a tube cut at a slant is inserted.

● Tube connection state

Provide a straight section as long as the O.D. of the tube being used from the end of the joint, and avoid piping with a sudden bending at the joint insertion port. Check that the tube's tensile strength in the lateral direction does not exceed 40N.

● Applicable blanking plug

Use a CKD-designated blanking plug.
Blanking plug GWP*-B Series

During Use & Maintenance

Quality of air

⚠WARNING

■ Do not supply other than compressed air.

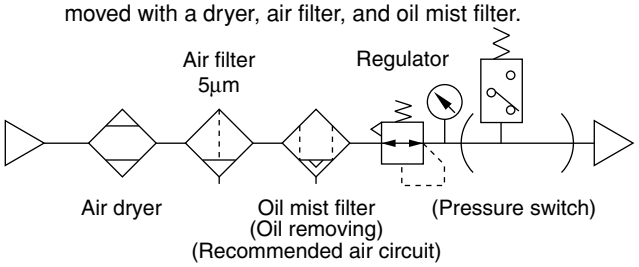
■ Use clean compressed air that does not contain corrosive gases.

■ The air quality must satisfy the clean dry air “ISO 8573-1 Class 1.3.2 or equivalent” or “JIS B 8392-1 Class 1.3.2 or equivalent”.

⚠CAUTION

■ Poor air quality will worsen the characteristics and adversely affect the durability.

● For the pneumatic pressure source, supply clean air from which solids, moisture, and oil have been sufficiently removed with a dryer, air filter, and oil mist filter.



● When control pressure is lowered with an input signal, etc., secondary air pressure through the EVT and is discharged from the exhaust port (R). Contamination of secondary piping and the inside of the load side adversely affect characteristics, etc. Keep the inside of piping as clean as possible.

● The pneumatic component must be disassembled and assembled by a qualified worker.
The grade not less than Pneumatics technique certification grade 2 is required.

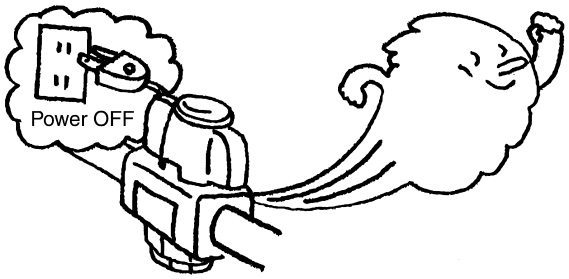
● Read the relevant product instruction manual thoroughly and fully familiarize yourself with work before disassembling or assembling the pneumatic component.

During Use & Maintenance

⚠WARNING

■ Be sure to turn power off, stop supplied compressed air, and check that there is no residual pressure before starting maintenance.

● This is required to ensure safety.



⚠CAUTION

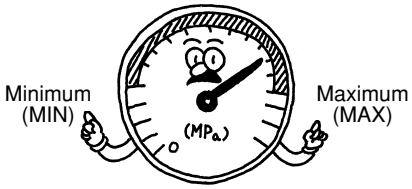
■ Correct maintenance

Plan daily inspections and periodic inspections.

● If maintenance is not correctly controlled, the product's functions could drop markedly and lead to a shortened life, damage, malfunctions, faults, and accidents.

1. Control of supplied compressed air pressure

● Is the set pressure supplied? Does the pressure gauge indicate the set pressure during operation of the device?



2. Control of air filter

● Is the drain correctly discharged?
Is the bowl or element dirty?

3. Control of compressed air leaks from piping connections

● Is the state of the connection, especially at movable sections, normal?

4. EVTOperational status control

● Are operations delayed? Is exhaust normal?

5. Control of pneumatic actuator operation

● Is operation smooth? Is the end stop state normal?
Is coupling with the load normal?

■ Regularly inspect the product at least once a year or more, and confirm that it is operating correctly.

● This product uses a compact solenoid valve as the actuator. The life may change according to the operation frequency by pressure switching and the working conditions, etc.
The warranty term is set as one year or 1,000,000 repeated operations, whichever is earlier, so use this as an inspection guideline.

* The conditions for the 1,000,000 operations listed in the warranty are as follows.
When the input signal which causes the control pressure to rise from zero to the maximum control pressure is repeatedly applied in steps. The working air quality in this case shall be clean compressed air from the recommended air circuit. The secondary side load capacity shall be 15cm^3.

Other

⚠CAUTION

■ Disassembling the regulator could result in problems.

Operation after disassembly cannot be guaranteed.

■ If power is turned OFF under pressure, control pressure is held.

To discharge pressure, lower set pressure and turn power OFF, or use a shut-off valve, etc. This holding state is not guaranteed for a long time.

■ Check that supply pressure does not drop to less than the "Setting secondary pressure + maximum control pressure x 0.1",

If supply pressure in not supplied for a long time when control pressure is set within more than 0MPa to 12% F.S., large bearing sound is generated and product life cut. Avoid using so.

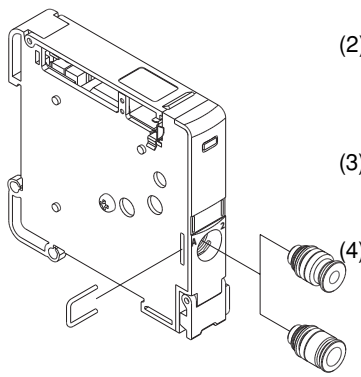
■ When using the EVT Series, if there are leaks in secondary piping, vibration could occur.

Securely pipe the system so that there are no leaks. Leaks will prevent set pressure from being held, large beating sound is generated and product life is shortened. Avoid using so.

How to replace cartridge join

⚠CAUTION

Check procedures before changing the push-in joint size. If installed not correctly, leakage could be occurred.



(1) Stop pin extract with driver, etc.,
(2) Pull the joint out.
* Check that the filter is not removed when replacing.
(3) Insert the joint for replacement vertically until it reaches the back.
(4) Insert the stopper pin. Pull on the joint to confirm that it is properly installed.

Cartridge type push-in joint model no.

Model	Parts name	Model no.
EVT	ø4 straight	4G1–JOINT–C4
	ø6 straight	4G1–JOINT–C6

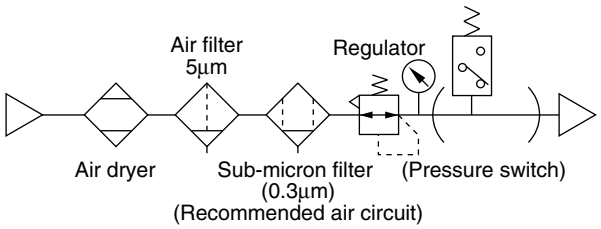
Proportional valve 3AP, 2/3AF Series

Design & Selection

⚠CAUTION

■ This regulator has a highly accurate metal spool structure, so poor quality air adversely affects characteristic and durability.

● Use an air filter to suppress the generation of drain, and a submicron air filter (0.3μm) to remove solid such as tar and carbon.



■ This regulator can be used in prelubricated applications. If lubrication is required, use Turbin Oil Class 1 (ISO VG32). Lubrication is effective in lowering the effect of air quality and lengthens life.

■ When using the pressure type (3AP), design secondary load volume as 300cm^3 and over to prevent secondary pressure from vibrating.

■ Characteristic of flow control (2AF, 3AF) indicate the effective sectional area for the valve. When designing the system, the composite effective sectional area with piping and joints is applied and linearity changes. The effective sectional area of parts other than the valve should be designed with 1.4-fold to 2-fold larger effective sectional area. Note that if the cylinder has a restricted connection port, the required speed may not be attained.

Installation & Adjustment

⚠CAUTION

■ Install the proportional valve so the spool is parallel.

■ The proportional valve will become hot, so do not install it near devices, etc., affected by heat.

■ Vibration is generated from the proportional valve body, so use vibration proofing when installing the valve near devices, etc., easily affected by vibration.

APC Series

Installation & Adjustment

⚠WARNING

■ When using AC power specifications, there is a risk of electrical shook if the AC power supply section is touched while power is on. Turn power off before starting wiring. Do not touch the charged sections with wet hands.

⚠CAUTION

■ The controller is damaged if power terminal and input signal terminal polarities are reversed.

■ Do not input a setting signal from an external source while the potentiometer is connected.

■ Do not excessively tighten terminal screws.

■ The APC body becomes hot, so do not install it near device, etc., affected by heat.

PI Series

Design & Selection

⚠WARNING

■ Use a 2kΩ or lager external variable resistor for manual purposes.

■ EV Series and input signal differ depending on the model no. Select the "0 to 10V" type input signal when using the PI Series.

EV250*-0**····· 0 to 10VDC
EV0*00-0**····· 0 to 10VDC
EVS*00-0**····· 0 to 10VDC
EV210*V-0**····· 0 to 10VDC

Installation & Adjustment

⚠WARNING

■ There is a risk of electrical shock if the AC power supply section is touched while power is ON. Turn power off before starting wiring. Do not touch the charged sections with wet hands.

⚠CAUTION

■ Do not wire the output terminal over long distances.

■ Do not excessively tighten terminal screws.

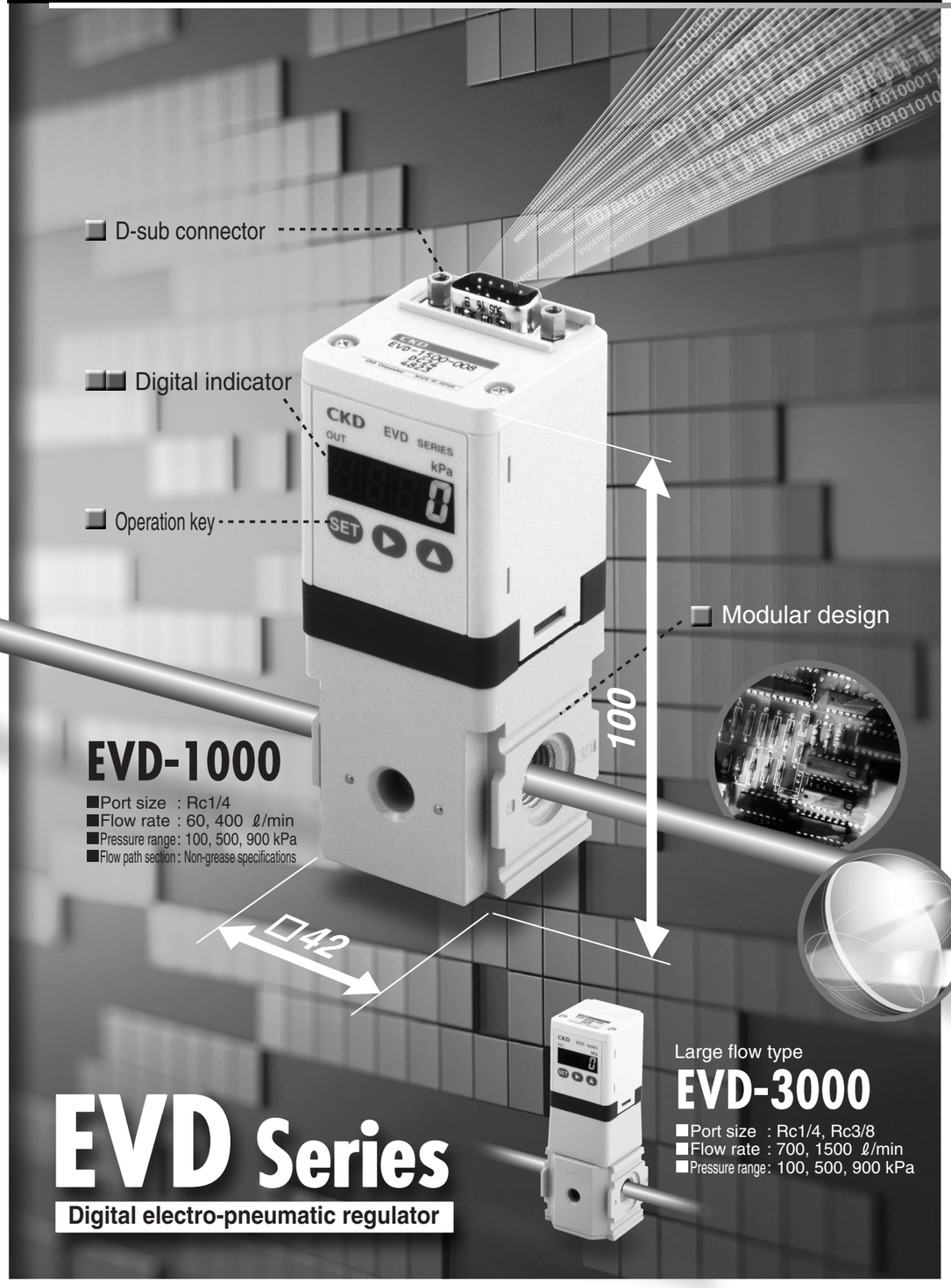
■ Do not connect the external output power source except to the EV Series.
(The controller cannot be connected)

■ Do not use this product where there are vibration or impact.

■ Twist the PI output wire when possible (Twist the two wires).

■ Check polarity of a COM terminal.

Compact, high-function, digital control



EDV Series digital electro pneumatic regulator - realizing high functions and ease-of-use in a compact size with a variety of new functions including pressure display, error display and direct memory functions.

User-friendly with outstanding installation performance

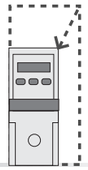
Digital display shows the control state at a glance.

The output pressure value is displayed digitally with three digits. The output state (switch output ON-OFF) is displayed in addition to the error display.

Output display 3-digit LED display

Parallel input type available as a standard

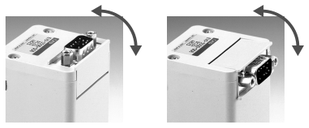
Direct control from the PLC is possible.



Compact design is 25% smaller (CKD comparison)

Highly universal D-sub connector allows connections in two directions

The connection can be rotated 90° from the top to side allowing a top or side connection to be selected freely according to the usage state.



Modular design

Filters and regulators, such as the C1000 Series, can be connected.

Realizing high-functions with microcomputer

Error display function

Errors are displayed and notified with electrical signals.

Zero/span adjustment function

Zero and span can be adjusted according to the usage methods.

Direct memory function

Input signals from an external source are no longer required.
Freely adjust the secondary pressure with the product's operation keys.

Preset input function

Up to 8 channels of pressure can be saved in the main unit and switched with external signals.

Switch output function

Switch outputs (built-in overcurrent protection) is possible by setting the upper/lower limit pressure.

Attaining high-accuracy, high-response pressure control

Linearity	±0.3%
Hysteresis	0.5%
Response time	0.2sec

Proportional value change function (Only EVD*100)

Highly accurate and stable control is possible by adjusting the proportional value upward (one stage) or proportional value downward (ten stages).

Eco-friendly design

Complies with RoHS Directives RoHS

All substances, such as lead and hexavalent chromium, which can adversely affect the global environment, have been eliminated from the materials.

Energy saving

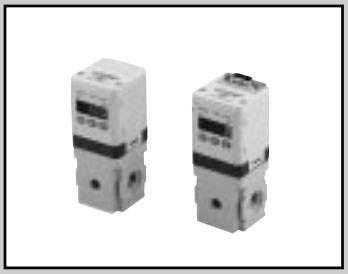
The automatic power OFF function can automatically turn OFF the digital display.

Material indication

Material names are indicated on the main components to facilitate sorting for recycling.

Digital electro-pneumatic regulator variation

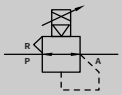
Series	Pressure range	Input signal	Port size	Output method	Max. flow rate	Flow path section material
EVD-1000	100 kPa, 500 kPa, 900 kPa	Analog, 10bit Parallel	Rc1/4	NPN PNP Switch output, Analog output	60 ℓ/min, 400 ℓ/min	Grease free
EVD-3000	100 kPa, 500 kPa, 900 kPa	Analog, 10bit Parallel	Rc1/4, Rc3/8	NPN PNP Switch output, Analog output	700 ℓ/min, 1500 ℓ/min	Fluorine grease, Vaseline (custom order)



Digital electro-pneumatic regulator

EVD-1000 Series

JIS symbol



RoHS CAD

Specifications

Descriptions		EVD-1100-*08* Analog type (*··· 0/1/2)	EVD-1100-P08* Parallel type	EVD-1500-*08* Analog type (*···0/1/2)	EVD-1500-P08* Parallel type	EVD-1900-*08* Analog type (*···0/1/2)	EVD-1900-P08* Parallel type
Working fluid		Clean compressed air (ISO 8573-1 Class 1.3.2 or equivalent or JIS B 8392-1 Class 1 1.3.2 or equivalent)					
Max. working pressure		160kPa		700kPa		1000kPa	
Min. working pressure		Control pressure + 50kPa		Control pressure + 100kPa			
Withstanding pressure	Inlet side	240kPa		1050kPa		1500kPa	
	Output side	150kPa		750kPa		1350kPa	
Control pressure range Note 1		0 to 100kPa		0 to 500kPa		0 to 900kPa	
Power voltage		24 VDC 10% (safety power supply with ripple ratio 1% or less)					
Current consumption		0.15A or less (power supply rush current 0.6A or less when power turned ON)					
Input signal (Input impedance)		0-10 VDC (6.7kΩ) 0-5 VDC (10kΩ) 4-20mADC(250Ω)	10bit	0-10 VDC (6.7kΩ) 0-5 VDC (10kΩ) 4-20mADC(250Ω)	10bit	0-10 VDC (6.7kΩ) 0-5 VDC (10kΩ) 4-20mADC(250Ω)	10bit
Pre-set input		8 points	None	8 points	None	8 points	None
Output signal Note 2		Output accuracy: ±6%F.S or less, analog output: 1-5 VDC (connected load impedance 500kΩ or more)					
		Switch output: NPN or PNP open collector output, 30V or less 50mA or less, voltage drop 2.4V or less, PLC and relay compatible					
Error output signal		NPN or PNP open collector output, 30V or less 50mA or less, voltage drop 2.4V or less, PLC and relay compatible					
Direct memory setting		1 to 100kPa (Minimum setting width 1kPa/setting resolution 1kPa)		5 to 500kPa (Minimum setting width 1kPa/setting resolution 1kPa)		9 to 900kPa (Minimum setting width 1kPa/setting resolution 2kPa)	
Pressure display	Display method	7-segment LED 3 digits, display accuracy: ±2%F.S. or less					
	Display range	0 to 100kPa		0 to 500kPa		0 to 900kPa	
	Display resolution	1kPa		1kPa		1kPa	
Hysteresis Note 3		0.5%F.S. or less					
Linearity Note 3		±0.3%F.S. or less					
Resolution Note 3		0.2%F.S. or less					
Repeatability Note 3		0.3%F.S. or less					
Temperature characteristics	Zero point variation	0.15%F.S./˚C or less					
	Span variation	0.07%F.S./˚C or less					
Maximum flow rate (ANR) Note 4		60 ℓ/min.		400 ℓ/min.			
Step response Note 5	Loadless	0.2sec. or less					
Mechanical vibration proof		98m/s² or less					
Ambient temperature		5 to 50˚C					
Working fluid temperature		5 to 50˚C					
Piping connection port size		Rc1/4					
Installation direction		Free					
Weight (body)		250 g					
Protective circuit		Power reverse connection protection, switch output reverse connection protection, switch output load short-circuit protection					

Note 1: There is a 1%F.S. or less residual pressure when the input signal is 0%. (EVD-1100: 1kPa, EVD-1500: 5kPa, EVD-1900: 9kPa)
Note 2: Select the analog output or switch output.
Note 3: The above characteristics apply in the control pressure 10 to 90% range with a 24 VDC power voltage and the working pressure set to maximum control pressure +50kPa (EVD-1100), or maximum control pressure +100kPa (EVD-1500, 1900).
Also, limited to a closed circuit in the secondary side, and the pressure may vary if used as air blow etc.
Note 4: The characteristics where working pressure is maximum and control pressure is maximum are shown.
Note 5: Working pressure: Max. working pressure and step rate: 50% F.S.→100% F.S.
50% F.S. → 60% F.S.
50% F.S. → 40% F.S.

Secondary battery compliant device specifications (Catalog No. CC-947)

EVD1500/1900 - [Input specifications, port diameter, output specifications] - [Option] - 3 - P4*

EVD3500/3900 - [Input specifications, port diameter, output specifications] - [Option] - 3 - P4*

Contact your nearest CD sales office or dealer for details.

How to order

EVD-1 500 - 0 08 AN - C1B1 - 3

- Ⓐ Pressure specifications
- Ⓑ Input specifications
- Ⓒ Port diameter
- Ⓓ Output specifications
- Ⓔ Option
- Ⓕ Power voltage

Symbol	Descriptions
Ⓐ Pressure specifications	
100	100kPa
500	500kPa
900	900kPa
Ⓑ Input specifications	
0	0-10 VDC
1	0-5 VDC
2	4-20mADC
P	Parallel 10bit
Ⓒ Port diameter	
08	Rc1/4
Ⓓ Output specifications	
AN	1-5V analog, error (NPN)
AP	1-5V analog, error (PNP)
SN	Switch (NPN), error (NPN)
SP	Switch (PNP), error (PNP)
Ⓔ Option	
Cable option	
Blank	None
C1	Analog 9-conductor, cable 1m
C3	Analog 9-conductor, cable 3m
P1	Parallel 15-conductor, cable 1m
P3	Parallel 15-conductor, cable 3m
Bracket option enclosed	
Blank	None
B1	B-type bracket, floor mounted type
L1	L-type bracket, wall mounted type
Ⓕ Power voltage	
3	24 VDC

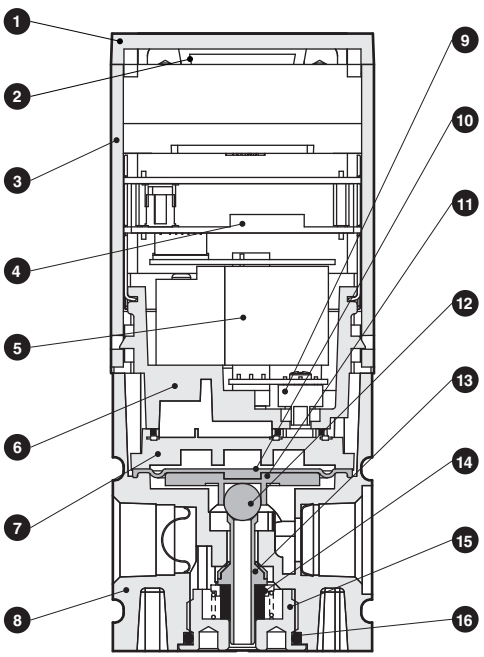
*Contact your nearest CD sales office or dealer for details on UL compliant parts.

● Discrete option (cable, bracket) model no.

EVD- C1

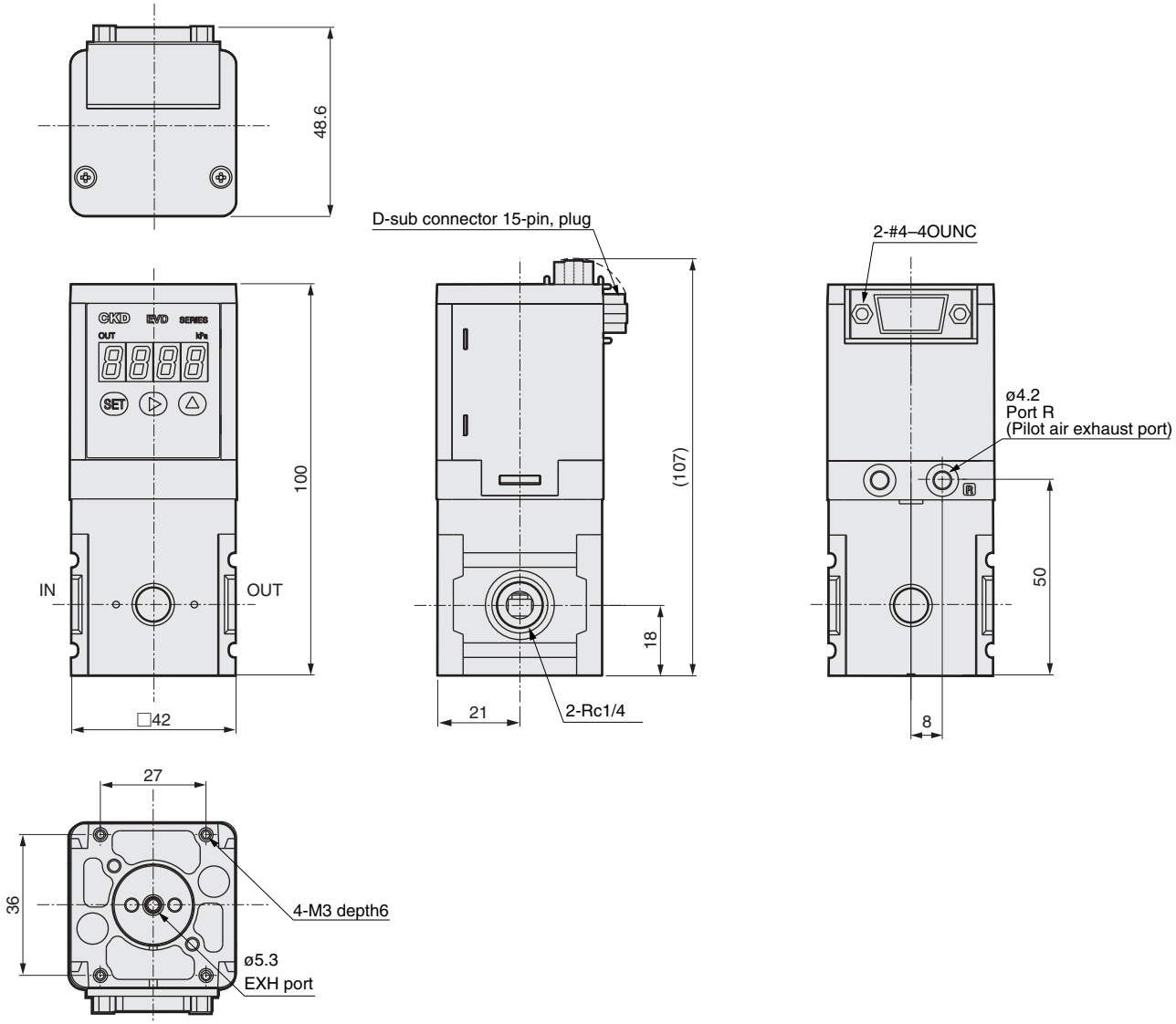
Ⓔ Option

Internal structure and parts list



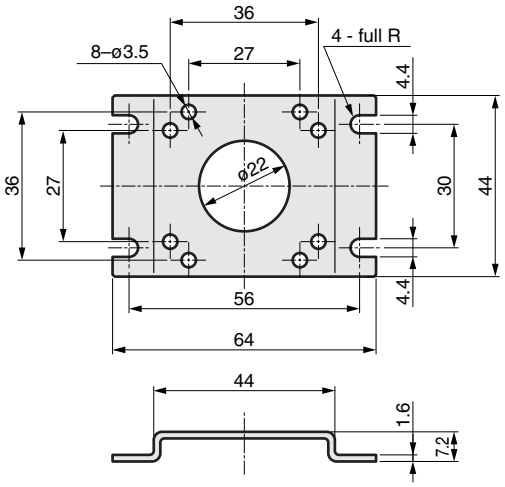
No.	Parts name	Material
1	Cover	PBT resin
2	D sub-connector	–
3	Housing	ABS resin
4	Controller board	–
5	3 way valve	–
6	Valve base	Polyphenylene sulfide resin
7	Pilot chamber	Polyphenylene sulfide resin
8	Body	Aluminum alloy die-casting
9	Pressure sensor	–
10	Diaphragm	Special nitrile rubber
11	Relief sheet	Aluminum alloy
12	Steel ball (exhaust valve)	Stainless steel
13	Valve	Special nitrile rubber, stainless steel
14	Bottom rubber	Silicon rubber
15	Bottom plug	Brass, electroless nickel plating
16	O ring	Fluoro rubber

Dimensions CAD

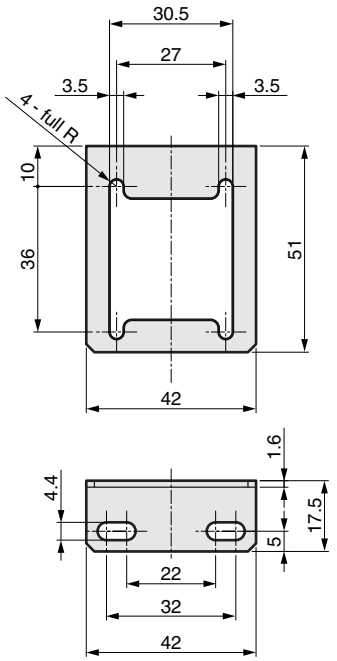


Option external dimensions

● B-type bracket(-B1): Floor mounted type



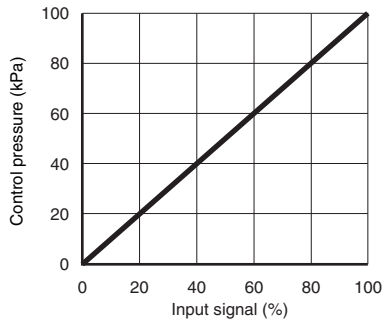
● L-type bracket(-L1): Wall mounted type



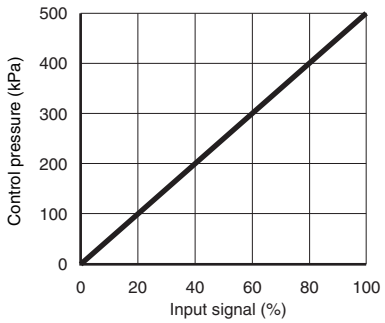
*Refer to page 745 for details on the outline dimensions of the cable options.

I/O characteristics

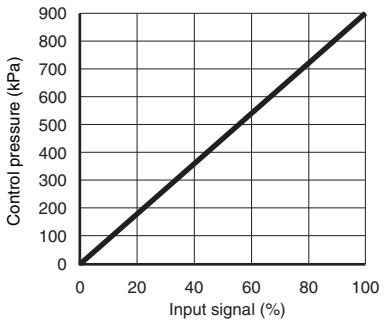
● EVD–1100



● EVD–1500

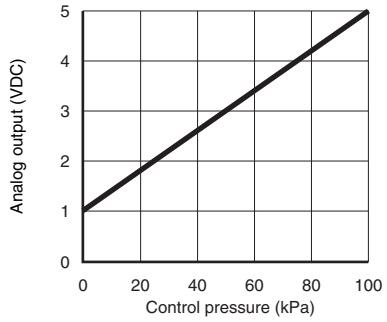


● EVD–1900

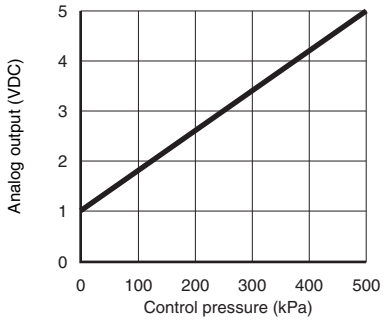


Monitor output (Only analog output type: Model AN/AP)

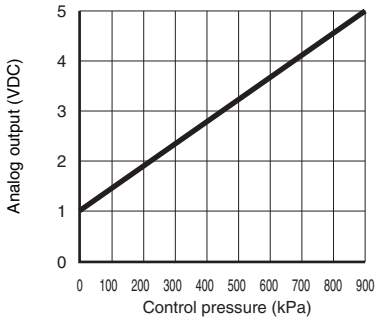
● EVD–1100



● EVD–1500

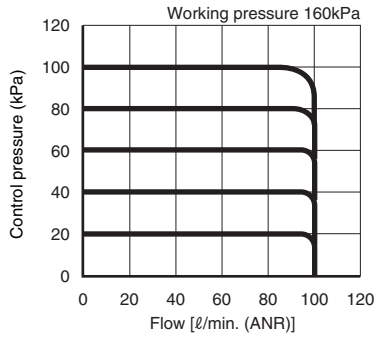


● EVD–1900

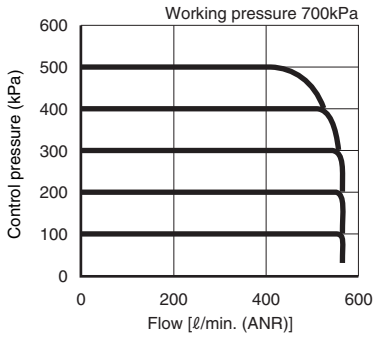


Flow characteristics

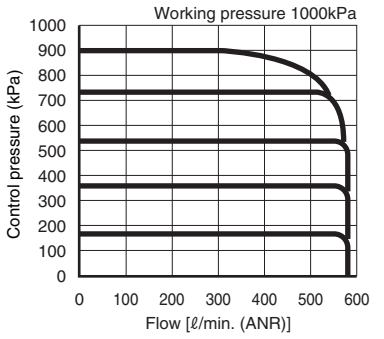
● EVD–1100



● EVD–1500

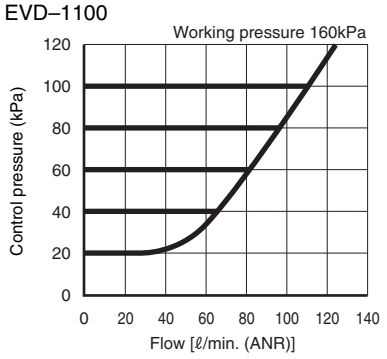


● EVD–1900

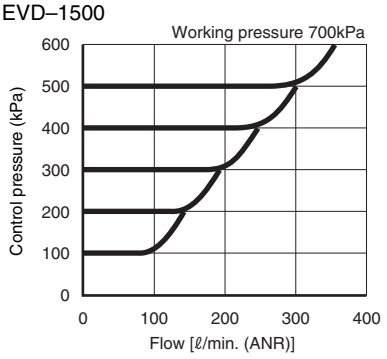


Relief characteristics

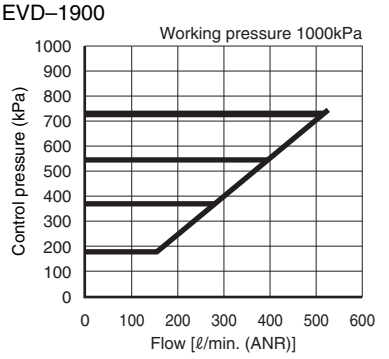
● EVD–1100

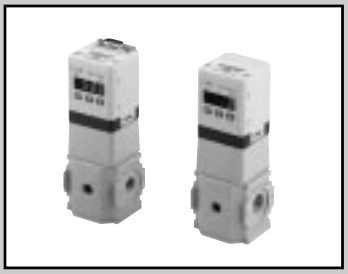


● EVD–1500



● EVD–1900

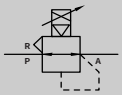




Digital electro-pneumatic regulator

EVD-3000 Series

JIS symbol



Specifications

Descriptions		EVD-3100-*08* EVD-3100-*10* Analog type (*··· 0/1/2)	EVD-3100-P08* EVD-3100-P10* Parallel type	EVD-3500-*08* EVD-3500-*10* Analog type (*···0/1/2)	EVD-3500-P08* EVD-3500-P10* Parallel type	EVD-3900-*08* EVD-3900-*10* Analog type (*···0/1/2)	EVD-3900-P08* EVD-3900-P10* Parallel type
Working fluid		Clean compressed air (ISO 8573-1 Class 1.3.2 or equivalent or JIS B 8392-1 Class 1 1.3.2 or equivalent)					
Max. working pressure		160kPa		700kPa		1000kPa	
Min. working pressure		Control pressure + 50kPa		Control pressure + 100kPa			
Withstanding pressure	Inlet side	240kPa		1050kPa		1500kPa	
	Output side	150kPa		750kPa		1350kPa	
Control pressure range	Note 1	0 to 100kPa		0 to 500kPa		0 to 900kPa	
Power voltage		24 VDC 10% (safety power supply with ripple ratio 1% or less)					
Current consumption		0.15A or less (power supply rush current 0.6A or less when power turned ON)					
Input signal (Input impedance)		0-10 VDC (6.7kΩ) 0-5 VDC (10kΩ) 4-20mADC (250Ω)	10bit	0-10 VDC (6.7kΩ) 0-5 VDC (10kΩ) 4-20mADC (250Ω)	10bit	0-10 VDC (6.7kΩ) 0-5 VDC (10kΩ) 4-20mADC (250Ω)	10bit
Pre-set input		8 points	None	8 points	None	8 points	None
Output signal	Note 2	Output accuracy: ±6%F.S or less, analog output: 1-5 VDC (connected load impedance 500kΩ or more)					
		Switch output: NPN or PNP open collector output, 30V or less 50mA or less, voltage drop 2.4V or less, PLC and relay compatible					
Error output signal		NPN or PNP open collector output, 30V or less 50mA or less, voltage drop 2.4V or less, PLC and relay compatible					
Direct memory setting		1 to 100kPa (Minimum setting width 1kPa/setting resolution 1kPa)		5 to 500kPa (Minimum setting width 1kPa/setting resolution 1kPa)		9 to 900kPa (Minimum setting width 1kPa/setting resolution 2kPa)	
Pressure display	Display method	7-segment LED 3 digits, display accuracy: ±2%F.S. or less					
	Display range	0 to 100kPa		0 to 500kPa		0 to 900kPa	
	Display resolution	1kPa		1kPa		1kPa	
Hysteresis	Note 3	0.5%F.S. or less					
Linearity	Note 3	±0.3%F.S. or less					
Resolution	Note 3	0.2%F.S. or less					
Repeatability	Note 3	0.3%F.S. or less					
Temperature characteristics	Zero point variation	0.15%F.S./˚C or less					
	Span variation	0.07%F.S./˚C or less					
Maximum flow rate (ANR)	Note 4	700ℓ /min.		1500ℓ/min.			
Step response Note 5	Loadless	0.2sec. or less					
Mechanical vibration proof		98m/s² or less					
Ambient temperature		5 to 50˚C					
Working fluid temperature		5 to 50˚C					
Piping connection port size	IN, OUT port	Port diameter option 08:Rc1/4, 10: Rc3/8					
	EXH port	Rc3/8					
Installation direction		Free					
Weight (body)		450g					
Protective circuit		Power reverse connection protection, switch output reverse connection protection, switch output load short-circuit protection					

Note 1: There is a 1%F.S. or less residual pressure when the input signal is 0%. (EVD-1100: 1kPa, EVD-1500: 5kPa, EVD-1900: 9kPa)
Note 2: Select the analog output or switch output.
Note 3: The above characteristics apply in the control pressure 10 to 90% range with a 24 VDC power voltage and the working pressure set to maximum control pressure +50kPa (EVD-1100), or maximum control pressure + 100kPa (EVD-1500, 1900).
Also, limited toa closed circuit in the secondary side, and the pressure may vary if used as air blow etc.
Note 4: The characteristics where working pressure is maximum and control pressure is maximum are shown.
Note 5: Working pressure: Max. working pressure and step rate: 50% F.S. →100% F.S.
50% F.S. → 60% F.S.
50% F.S. → 40% F.S.

How to order

EVD-3 500 - 0 08 AN - C1B3 - 3

- Ⓐ Pressure specifications
- Ⓑ Input specifications
- Ⓒ Port diameter (IN,OUT)
- Ⓓ Output specifications
- Ⓔ Option
- Ⓕ Power voltage

Symbol	Descriptions
Ⓐ Pressure specifications	
100	100kPa
500	500kPa
900	900kPa
Ⓑ Input specifications	
0	0-10 VDC
1	0-5 VDC
2	4-20mADC
P	Parallel 10bit
Ⓒ Port diameter (IN,OUT)	
08	Rc1/4
10	Rc3/8
Ⓓ Output specifications	
AN	1-5V analog, error (NPN)
AP	1-5V analog, error (PNP)
SN	Switch (NPN), error (NPN)
SP	Switch (PNP), error (PNP)
Ⓔ Option	
Cable option	
Blank	None
C1	Analog 9-conductor, cable 1m
C3	Analog 9-conductor, cable 3m
P1	Parallel 15-conductor, cable 1m
P3	Parallel 15-conductor, cable 3m
Bracket option enclosed	
Blank	None
B3	B-type bracket, floor mounted type
L3	L-type bracket, wall mounted type
Ⓕ Power voltage	
3	24 VDC

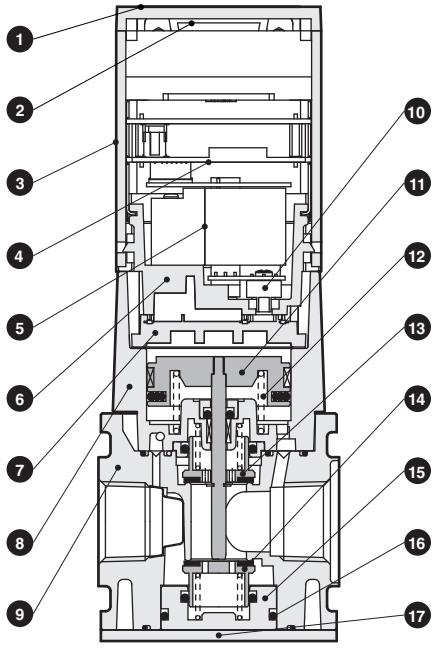
*Contact your nearest CD sales office or dealer for details on UL compliant parts.

● Option (cable, bracket) single part model

EVD- C1

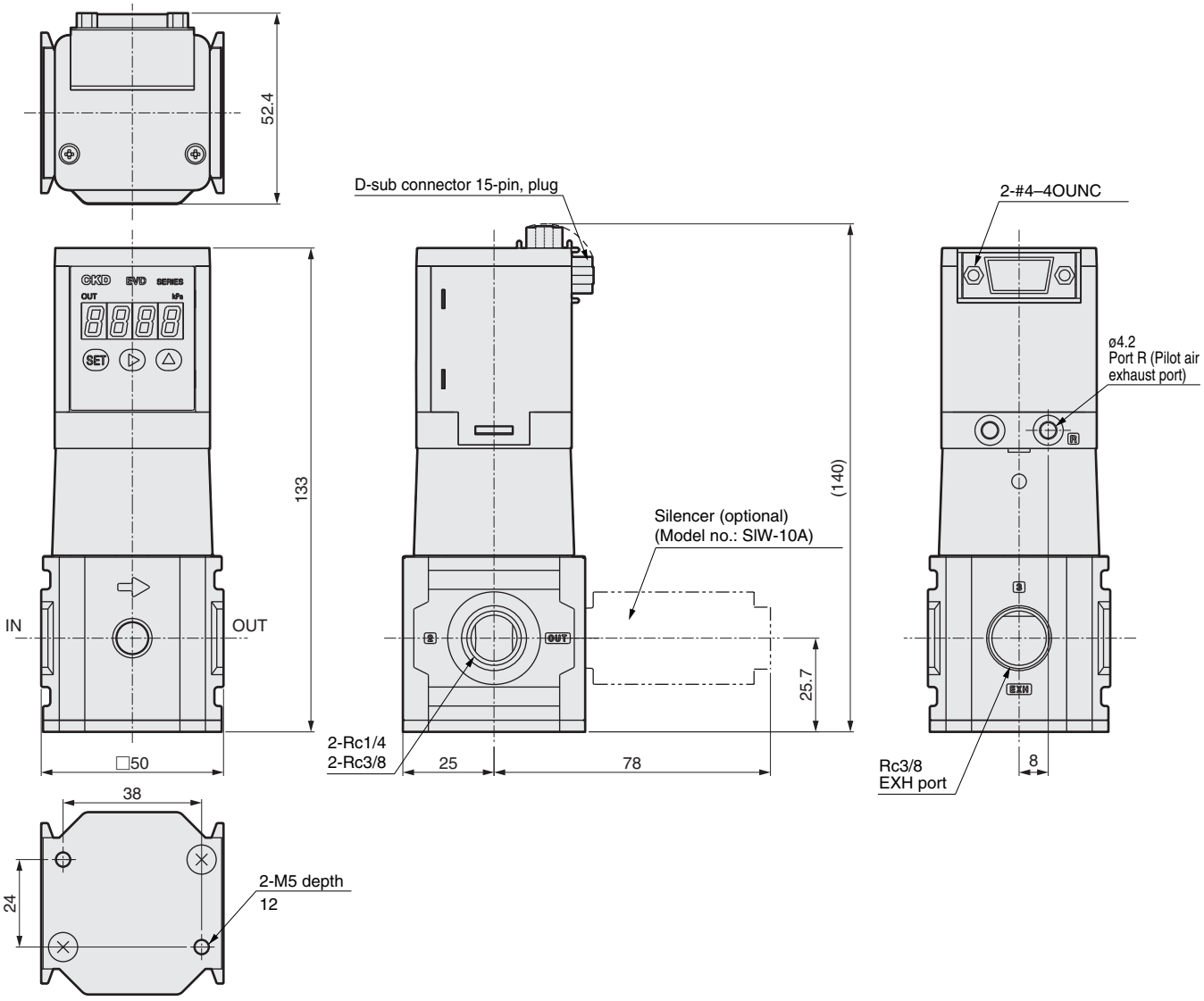
- Ⓔ Option

Internal structure and parts list



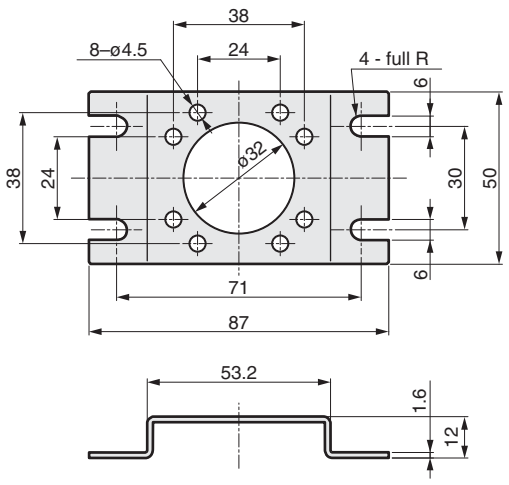
No.	Parts name	Material
1	Cover	PBT resin
2	D sub-connector	–
3	Housing	ABS resin
4	Controller board	–
5	3 way valve	–
6	Valve base	Polyphenylene sulfide resin
7	Pilot chamber	Polyphenylene sulfide resin
8	Piston body assembly	Aluminum alloy die-casting, etc.
9	Body	Aluminum alloy die-casting
10	Pressure sensor	–
11	Piston assembly	Aluminum alloy, stainless steel, etc.
12	Spring	Stainless steel
13	Top valve	Brass, special nitrile rubber
14	Bottom valve	Brass, special nitrile rubber
15	Bottom cap	Brass
16	O ring	Nitrile rubber
17	Base plate	Steel sheet

Dimensions CAD

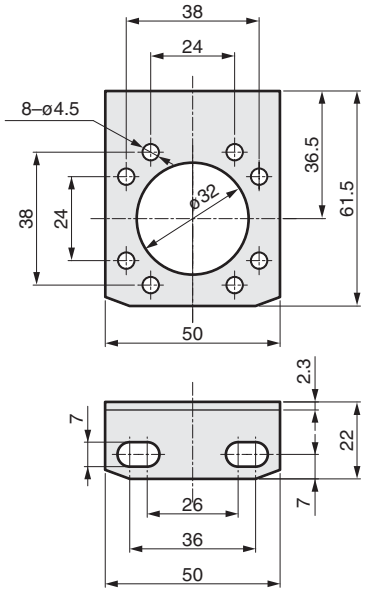


Option dimensions

● B-type bracket (-B3): Floor mounted type



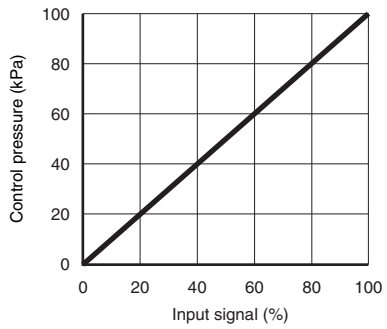
● L-type bracket (-L3): Wall mounted type



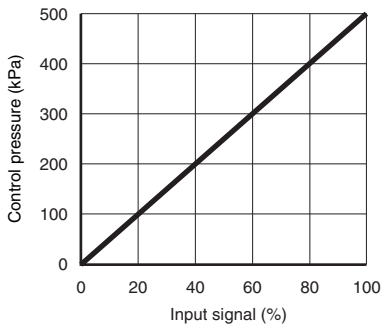
*Refer to page 745 for details on the outline dimensions of the cable options.

I/O characteristics

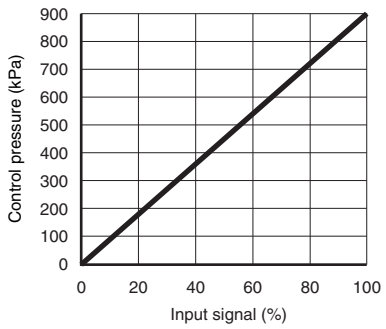
● EVD-3100



● EVD-3500

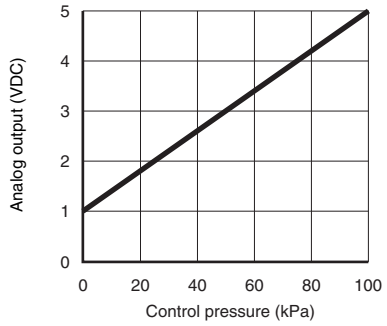


● EVD-3900

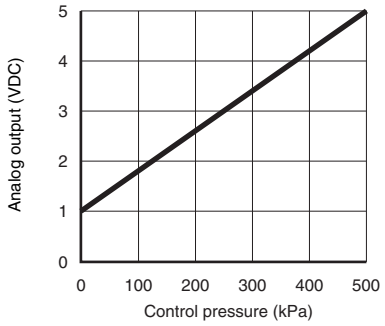


Monitor output (Only analog output type: Model AN/AP)

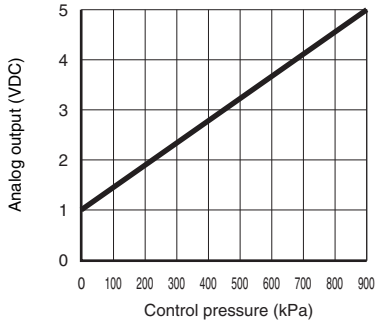
● EVD-3100



● EVD-3500

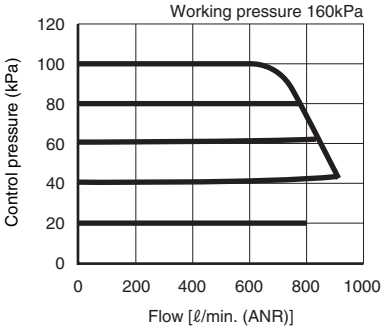


● EVD-3900

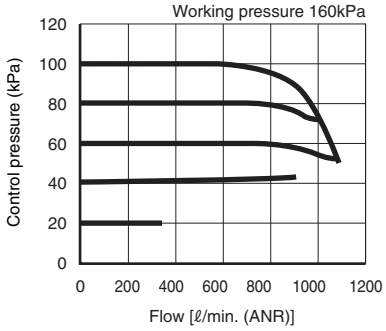


Flow characteristics

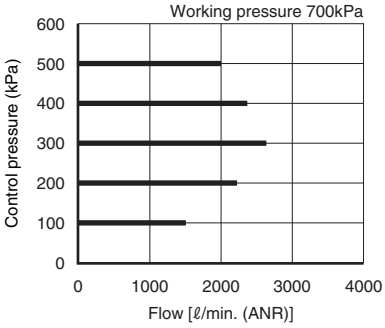
● EVD-3100-*08



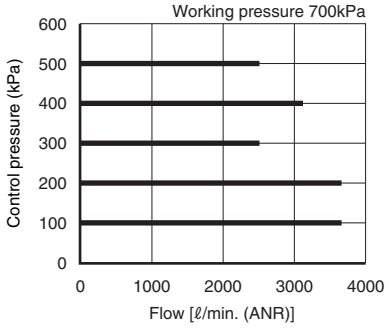
● EVD-3100-*10



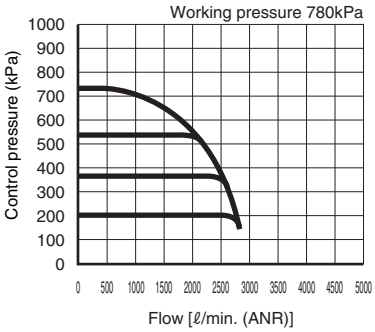
● EVD-3500-*08



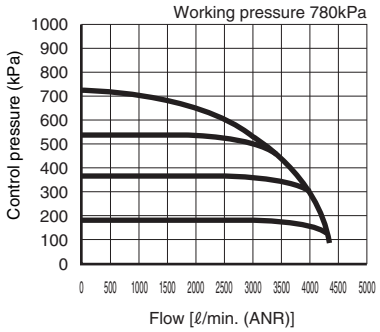
● EVD-3500-*10



● EVD-3900-*08

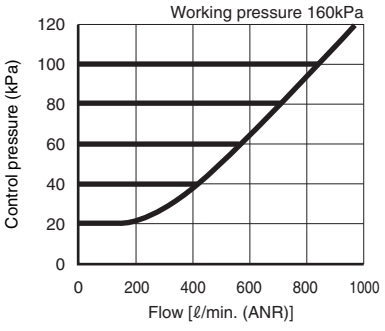


● EVD-3900-*10

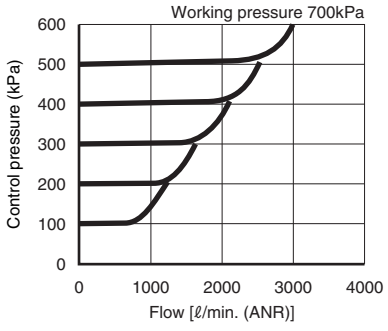


Relief characteristics

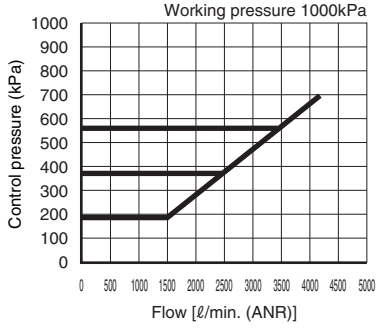
● EVD-3100



● EVD-3500

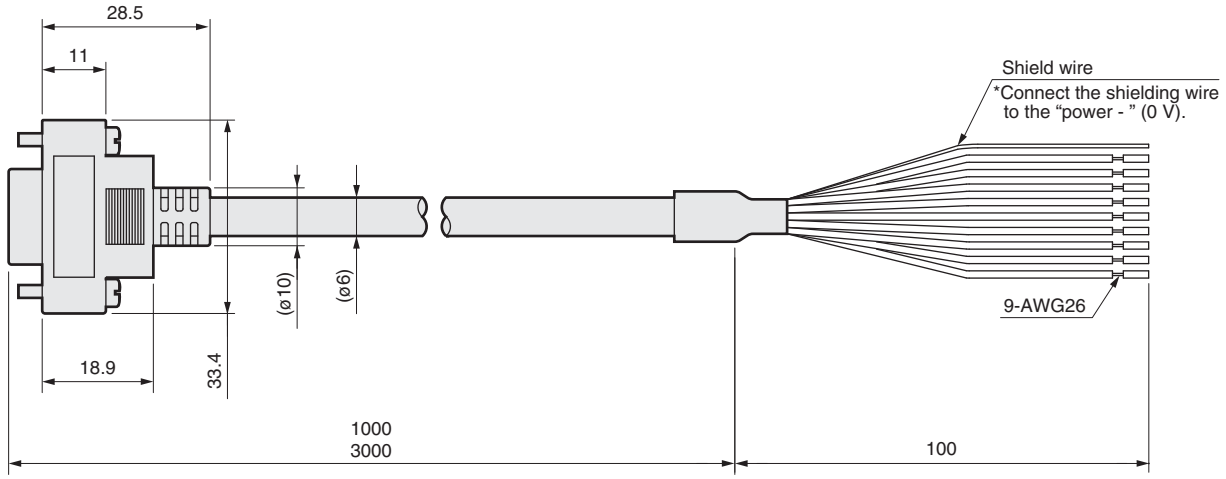


● EVD-3900



Cable optional dimensions

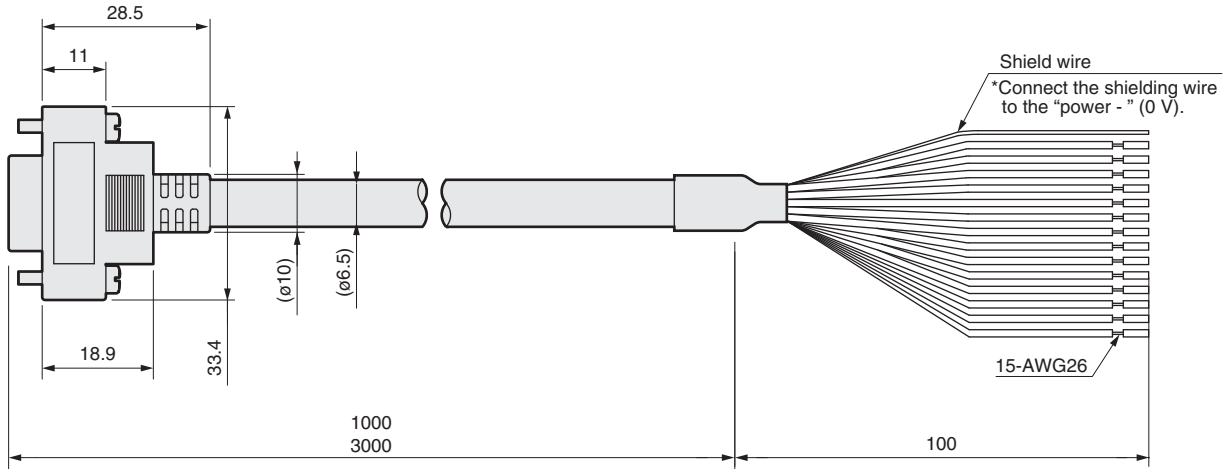
● EVD-C1, EVD-C3



D-sub socket pin No.	1	2	3	4	5	6	7	8	9	10	11			12	13		14	15
Isolator color	Brown	Orange	Yellow	–	Red	–	–	–	–	Gray	White			–	Green		Blue	Black
Name	Pre-set input signal			Vacant	Power supply +	Vacant	Vacant	Vacant	Vacant	Common	Input signal			Vacant	Monitor output	Switch output	Error output	Power supply - (0V)
Input type	Bit 1	Bit 2	Bit 3		+24VDC						0-10 VDC	0-5 VDC	4-20 mADC	Vacant	Output 1-5 VDC	NPN or PNP output	NPN or PNP output	

Note: The No. 10 pin common is the common for the preset input (pin No. 1 to 3).

● EVD-P1, EVD-P3



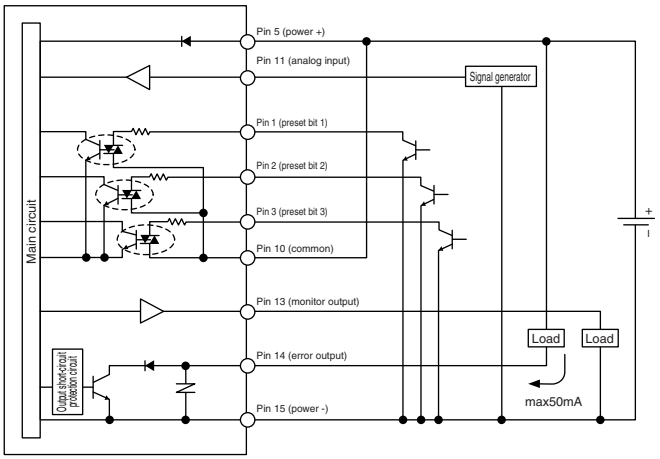
D-sub socket pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13		14	15
Isolator color	Brown	Orange	Yellow	Purple	Red	Light blue	Pink	White (with black line)	Red (with black line)	Gray	White	Green (with black line)	Green		Blue	Black
Name	Parallel input signal				Power supply +	Parallel input signal				Common	Parallel input signal		Monitor output	Switch output	Error output	Power supply - (0V)
Input type	Bit 1	Bit 2	Bit 3	Bit 4	+24VDC	Bit 5	Bit 6	Bit 7	Bit 8		Bit 9	Bit 10	Output 1-5 VDC	NPN or PNP output	NPN or PNP output	

Note1: The No. 10 pin common is the common for the parallel input signal (pin No., 1 to 4, 6 to 9, 11, 12).

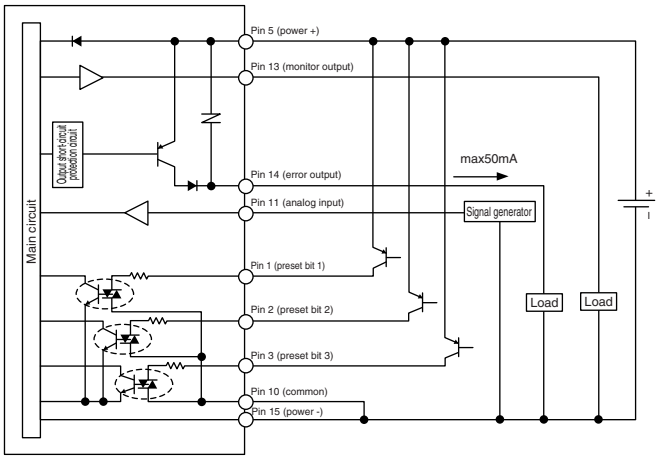
Wiring methods

Example of internal circuit and load connection Analog input type

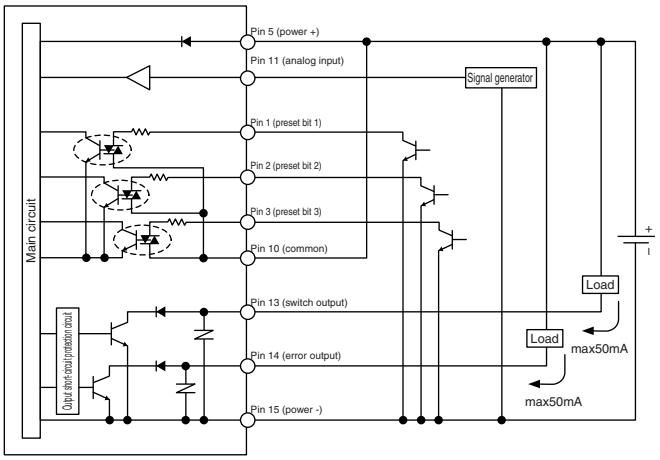
EVD-1*-0*AN-*-*, EVD-1*-1*AN-*, EVD-1*-2*AN-*
EVD-3*-0*AN-*-*, EVD-3*-1*AN-*, EVD-3*-2*AN-*
(Analog input, analog output + error output type NPN output)



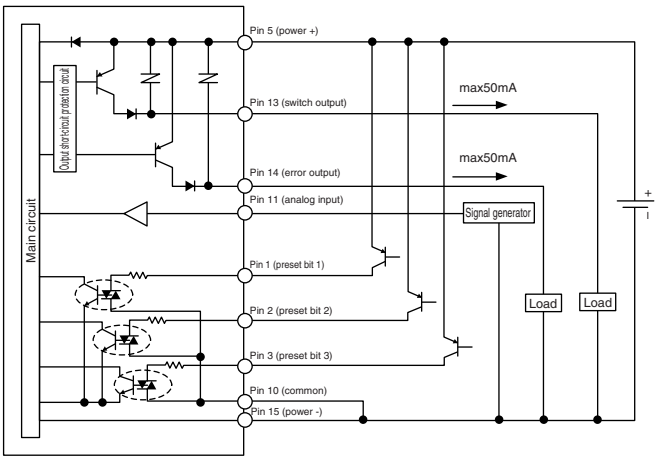
EVD-1*-0*AP-*-*, EVD-1*-1*AP-*, EVD-1*-2*AP-*
EVD-3*-0*AP-*-*, EVD-3*-1*AP-*, EVD-3*-2*AP-*
(Analog input, analog output + error output type PNP output)



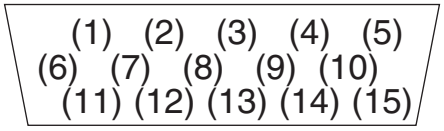
EVD-1*-0*SN-*-*, EVD-1*-1*SN-*, EVD-1*-2*SN-*
EVD-3*-0*SN-*-*, EVD-3*-1*SN-*, EVD-3*-2*SN-*
(Analog input, switch output + error output type NPN output)



EVD-1*-0*SP-*-*, EVD-1*-1*SP-*, EVD-1*-2*SP-*
EVD-3*-0*SP-*-*, EVD-3*-1*SP-*, EVD-3*-2*SP-*
(Analog input, switch output + error output type PNP output)



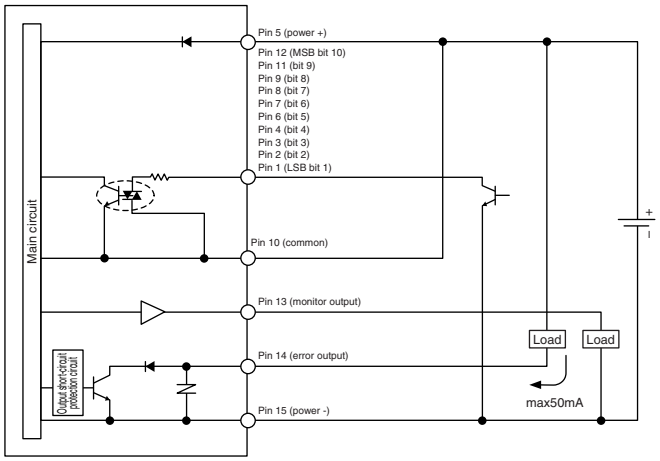
■ Connector pin layout (product side)
(Analog input type)



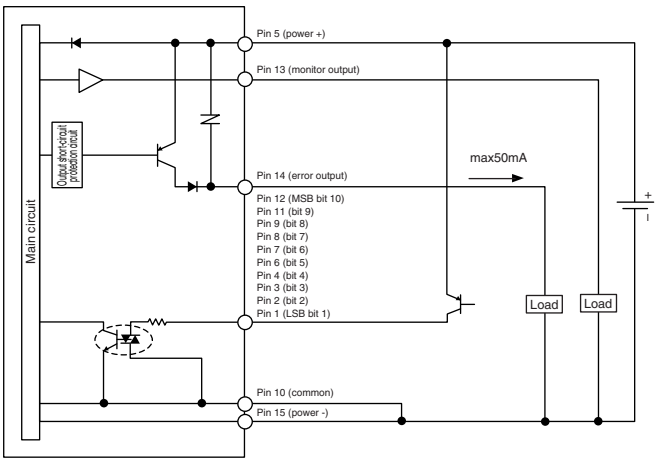
The analog input type does not have the (4), (6), (7), (8), (9) or (12) pins.

Example of internal circuit and load connection Parallel input type

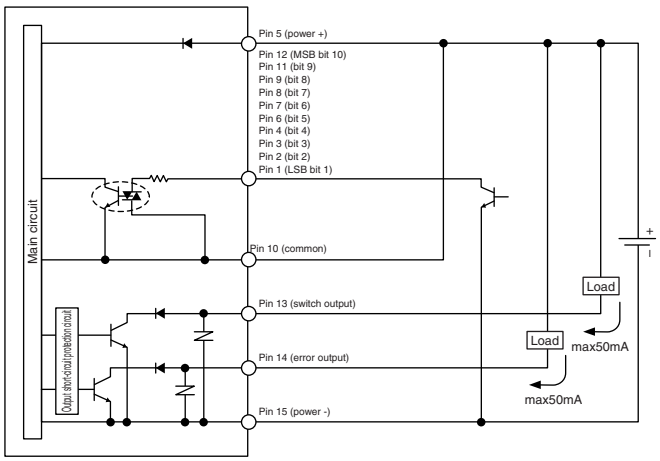
EVD-1*-P*AN-*-*
EVD-3*-P*AN-*-*
(Parallel input, analog output + error output type NPN output)



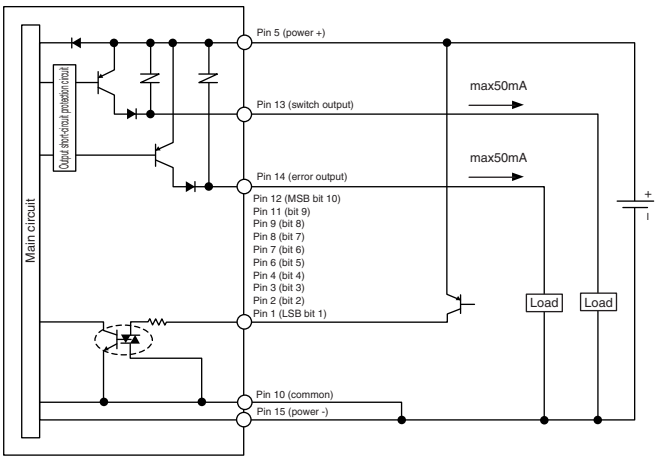
EVD-1*-P*AP-*-*
EVD-3*-P*AP-*-*
(Parallel input, analog output + error output type PNP output)



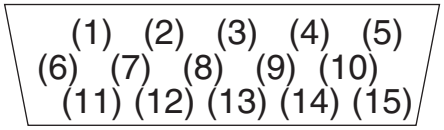
EVD-1*-P*SN-*-*
EVD-3*-P*SN-*-*
(Parallel input, switch output + error output type NPN output)



EVD-1*-P*SP-*-*
EVD-3*-P*SP-*-*
(Parallel input, switch output + error output type PNP output)



■ Connector pin layout (product side)
(Parallel input type)



Input method

■ Relation of parallel type input signal and control pressure

The parallel type input signal has 10 bits, and when converted into a decimal is O-1023.

Input signal = EVD setting pressure (kPa)/maximum control pressure x 1023 The maximum control pressure is 100kPa for EVD-1000
500kPa for EVD-1500
900kPa for EVD-1900.

Example: When setting 300kPa with EVD-1500
300 (kPa) / 500 (kPa) × 1023 = 613.8→614

(When converted and set in 614, then
500 (kPa) × 614 / 1023 ≒ 300 (kPa))

When 614 (decimal) is converted into a binary, the result is 1001100110. 1 sets the input signal ON, and 0 sets the input signal OFF. (Refer to table below).

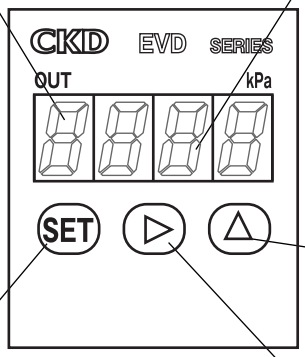
D-sub socket pin No.	12	11	9	8	7	6	4	3	2	1
Cable option isolator color	Green (with black line)	White	Red (with black line)	White (with black line)	Pink	Light blue	Purple	Yellow	Orange	Brown
Type of input	Bit 10 MSB	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1 LSB
Binary [For 614 (decimal)]	1	0	0	1	1	0	0	1	1	0
Input signal	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF

■ Relation of preset memory and input signals

D-sub socket pin No. No.	3	2	1	Pre-set memory
Cable option isolator color	Yellow	Orange	Brown	
Type of input	Bit 3	Bit 2	Bit 1	
Input signal	OFF	OFF	OFF	P1
	OFF	OFF	ON	P2
	OFF	ON	OFF	P3
	OFF	ON	ON	P4
	ON	OFF	OFF	P5
	ON	OFF	ON	P6
	ON	ON	OFF	P7
	ON	ON	ON	P8

MEMO

Names and functions of display and operation section



Output display (red)

- "F" is displayed when confirming the function setting.
- "-" lights when switch output is on. (Only when using switch output specifications.)
  * Blinks when overcurrent is detected.
- "E" lights when error output is on.
  * Blinks when overcurrent is detected.

* If there are conditions of +/-, upper/lower limit, key and are indicated.

SET Key

- Use to enter each setting mode.
- Use to set values, etc., when setting data.

3-digit LED display (green)

- Displays the pressue display and function setting details during RUN mode (pressure display).
  * The setting mode No. and setting details are displayed when displaying details of function settings.
- The value, etc., is displayed when data is set.
- The error code No. is displayed when an error is output.

(Pressure display) (Setting details display) (Error output)

Setting mode No. Setting descriptions Code No.

△

- Setting details are sequentially displayed during RUN mode (pressure display).
- Use to select the setting when setting data.
- Use to count up the value, etc., when setting data.

▷ Key

- Use to select the digit of the value, etc., when setting data.

Function list

Screen display	Name	Display content (RUN MODE)	Setting details (setting mode)	Setting method
	Pressure Display	Secondary pressure is confirmed with the 3-digit numerical display LED. Unit: kPa		
Screen F1	Input signal selection	The selected input signal type and current target value (pressure conversion value) are confirmed. *When pre-set input (8-point) is selected, the currently selected preset No. and setting value are displayed.	For analog input: Analog input, preset memory input, or direct memory input is selected. For pre-set input/direct memory input, input the setting for this mode. For parallel input: Parallel input or direct memory input is selected. For direct memory input, input the setting for this mode.	P.753
Screen F2	Zero/span adjustment	The validity of the zero/span adjustment and the setting value are confirmed. When "valid," the F2.on - zero point adjustment value (L) and span point adjustment value (H) are alternately displayed. * The default setting is set with the full scale (–).	Select whether to use with the full scale or with the zero and span adjusted. When zero/span adjustment is selected, the adjustment value for this mode can be set randomly.	P.754
Screen F3	Automatic power off	The validity of the automatic power off function is confirmed. * The default setting is invalid (– –).	The validity of the automatic power off function is selected. Note: The automatic power off time is about one minute and cannot be changed.	P.754
Screen F4	Switch output * Only switch output specifications	The switch output validity and setting value are confirmed. When "Mode 1 valid" is selected, the F4.0 - - tolerable range setting value (L) - + tolerable range setting value (H) are alternately displayed. When "Mode 2 valid" is selected, F4.1 - minimum setting value (L) - maximum setting value (H) is alternately displayed. * The default setting is invalid (– –).	Switch output validity is selected. When valid, mode 1 or 2 is selected. +/- tolerable values and maximum/minimum values are set randomly. Note: The hysteresis width cannot be set.	P.754
Screen F5	Proportional change	The validity of proportional value changes and the set level are confirmed. When "Proportional Value Up" is selected, F5.H is displayed. When "Proportional Value Down" is selected, the F.5L - setting value is alternately display. * The default setting is the standard value (– –).	Select whether to use the standard value or whether to change the proportional value. The proportional value level is set in this mode only when "Proportional Value Down" is selected. (10 stages)	P.755

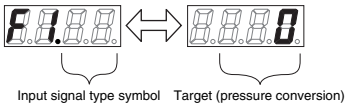
* Only EVD-*100

Operation

RUN MODE dislay content list

■ F1 (input signal selection) screen F1 display descriptions

The input signal type and target value are alternately displayed.



(Analog input type)
EVD-*-0**-*-*,EVD-*-1**-*-*,EVD-*-2**-*-*

Input signal type symbol	Descriptions
F1.A0	Analog 0-10 VDC input *
F1.A1	Analog 0-5 VDC input *
F1.A2	Analog 4-20mADC input *
F1.P1 to F1.P8	Pre-set memory input The selected preset No. is displayed.
F1.dr	Direct memory input

* [F1/A0], [F1/A1], or [F1/A2] display one based on the model.

(Digital input type)
EVD-*-P**-*-*

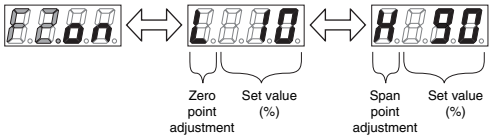
Input signal type symbol	Descriptions
F1.PA	Parallel 10 bit input
F1.dr	Direct memory input

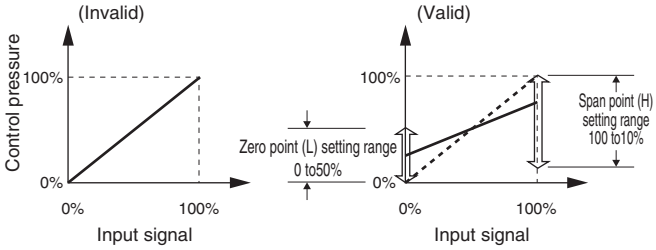
■ F2 (zero/span adjustment) screen F2 display descriptions

The validity of the zero/span adjustment and the setting value are confirmed.
Note: This function is invalid if preset memory input or direct memory input is selected for F1 mode.

Invalid

Valid



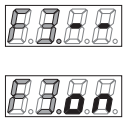


■ F3 (auto power off) screen F2 display descriptions

The validity of the automatic power off function is confirmed.

Invalid

Valid



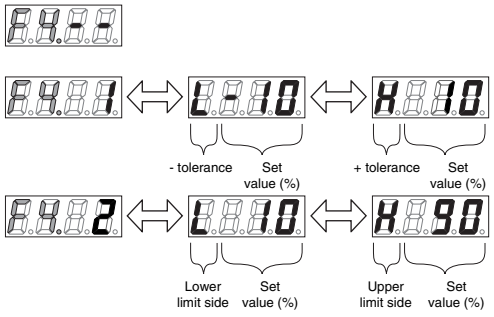
■ F4 (switch output function) screen F4 dislay description (applicable model: EVD-**-**SN, EVD-**-**SP)

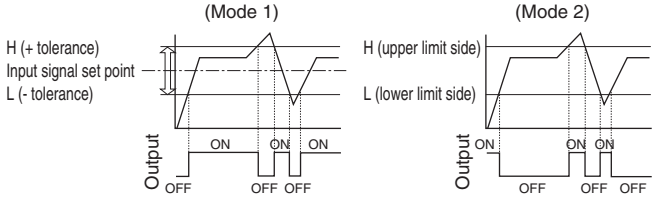
The switch output validity and setting value are confirmed.
Note: This is invalid with analog output specifications. (– –) is displayed on the screen but cannot be used.

Invalid

Mode 1

Mode 2





RUN MODE dislay content list

■ F5 (proportional value change) screen F5 display descriptions

⚠ Applicable model: EVD-1100-***-*-*,EVD-3100-***-*-*
Note) This screen is no displayed for EVD-*500 or EVD-*900.

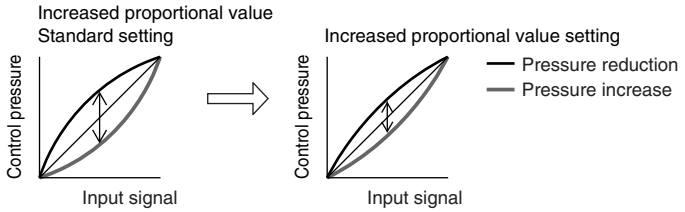
The validity of the proportional value and the set level are confirmed.

- When invalid : control is applied with standard values (default value)
- When valid : "Proportional value up" or "proportional value down" is selected.
  The set level is selected from ten stages only when "proportional value down" is selected.

<Effect of increasing propotional value>

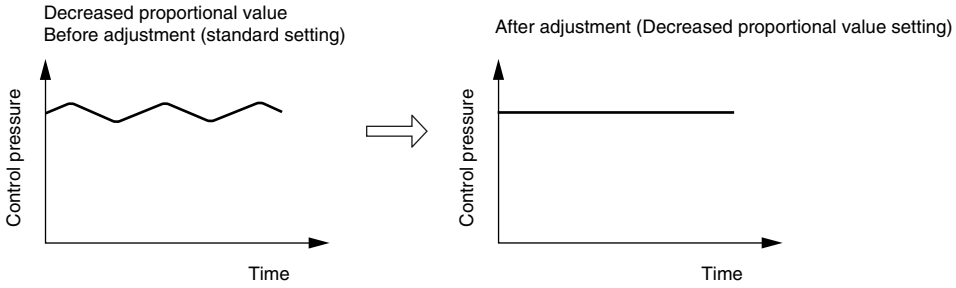
The effect differs with piping and load capacity conditions, but control is done at higher accuracy.

Hunting occures easily, requiring care during use.

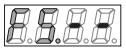


<Effect of decreasing propotional value>

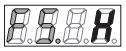
If vibration occures during blow applications or during a leakage test, stabe control is ensured by decreasing the proportional value as shown below.



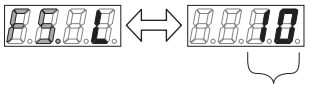
Invalid



When the proportional value is increased (H)



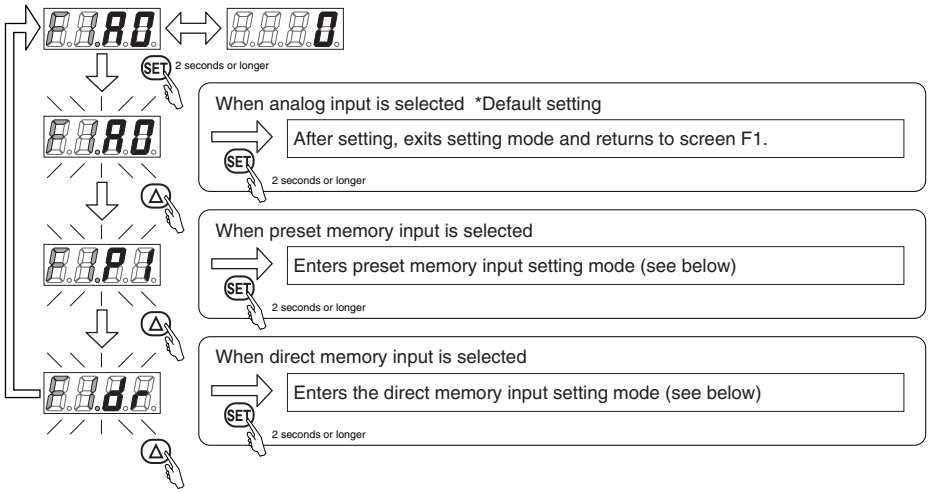
When the proportional value is decreased (H)



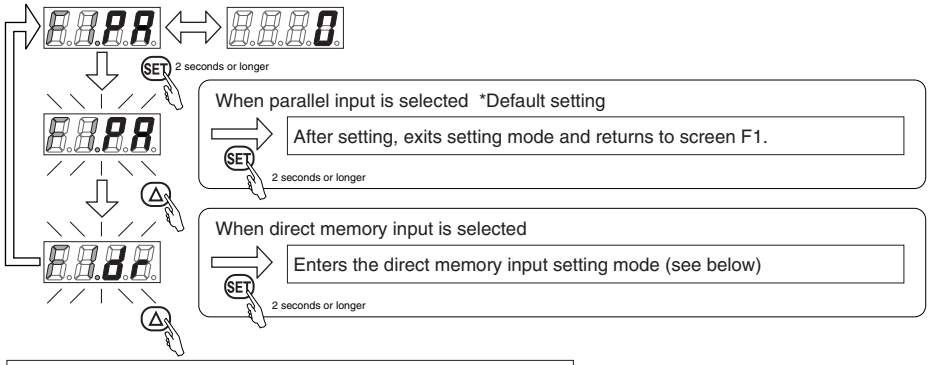
How to set setting mode ⚠ CAUTION Release the key lock before changing setting details. (Refer to page 756.)

■ F1 (input signal selection function) Hold down the SET key for two seconds or longer with the screen F1 displayed. F1 setting mode is entered.

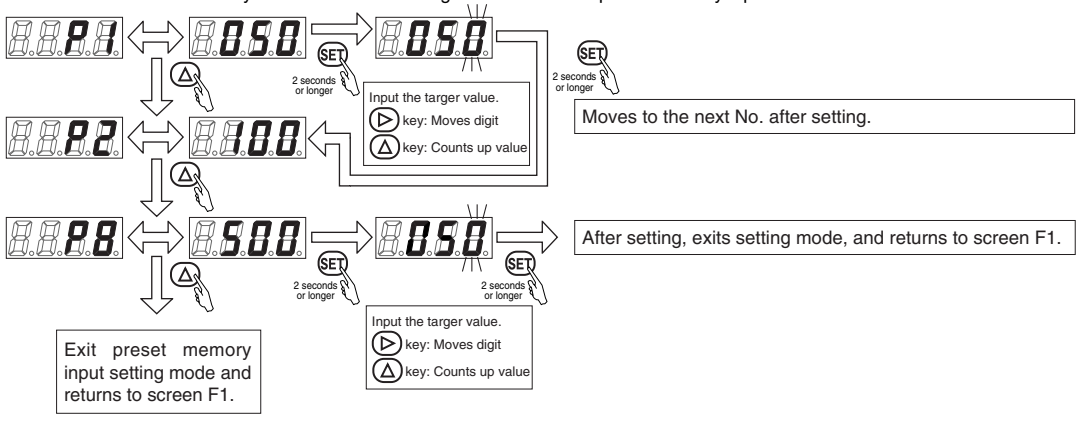
● Changing the analog input signal selection
Note: Anlog input specifications cannot be changed.



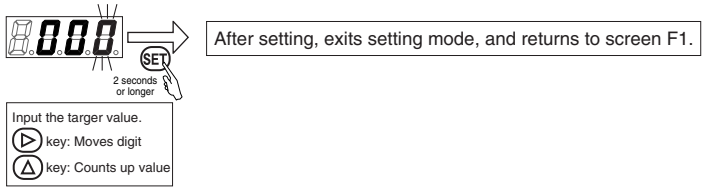
● Changing parallel input signal selection



● Using preset memory input setting mode
* Hold down the SET key for two seconds or longer with screen F1 preset memory input set.

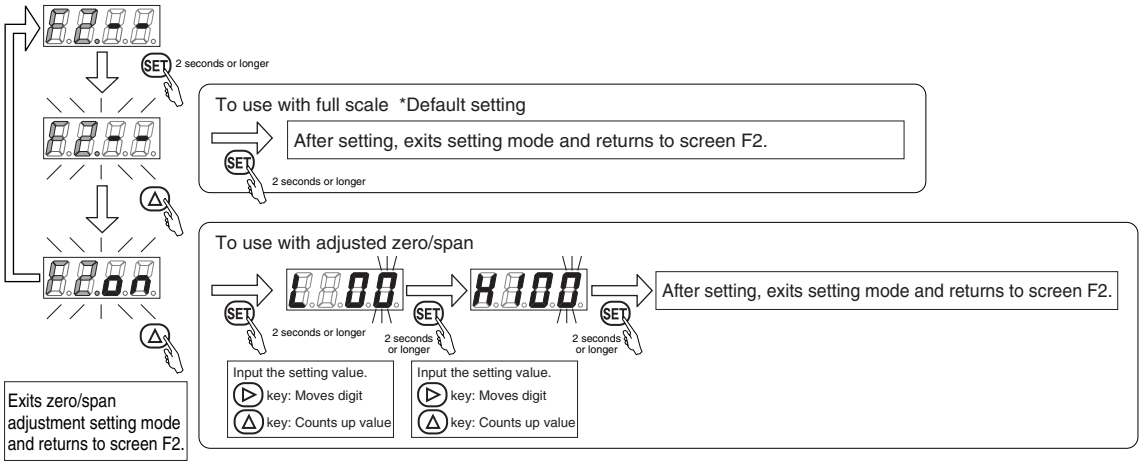


● Using direct memory input setting mode
* Hold down the SET key for two seconds or longer with screen F1 direct memory input set.



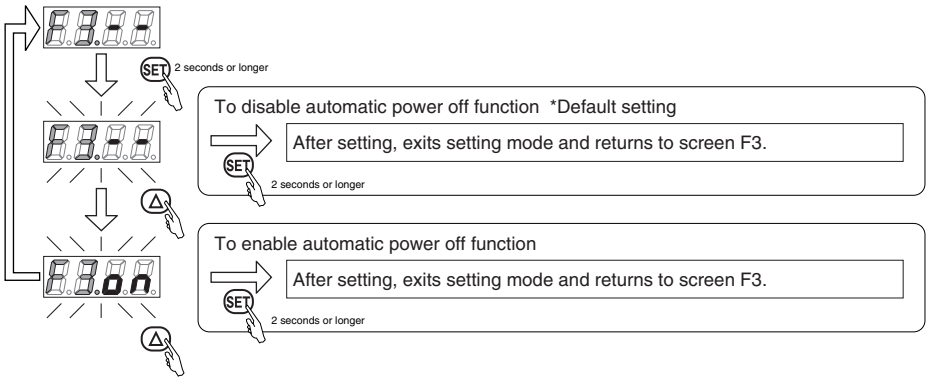
How to set setting mode ⚠ CAUTION Release the key lock before changing setting details. (Refer to page 756.)

■ F2 (zero/span adjustment function) Hold down the SET key for two seconds or longer with the screen F2 displayed. F2 setting mode is entered.



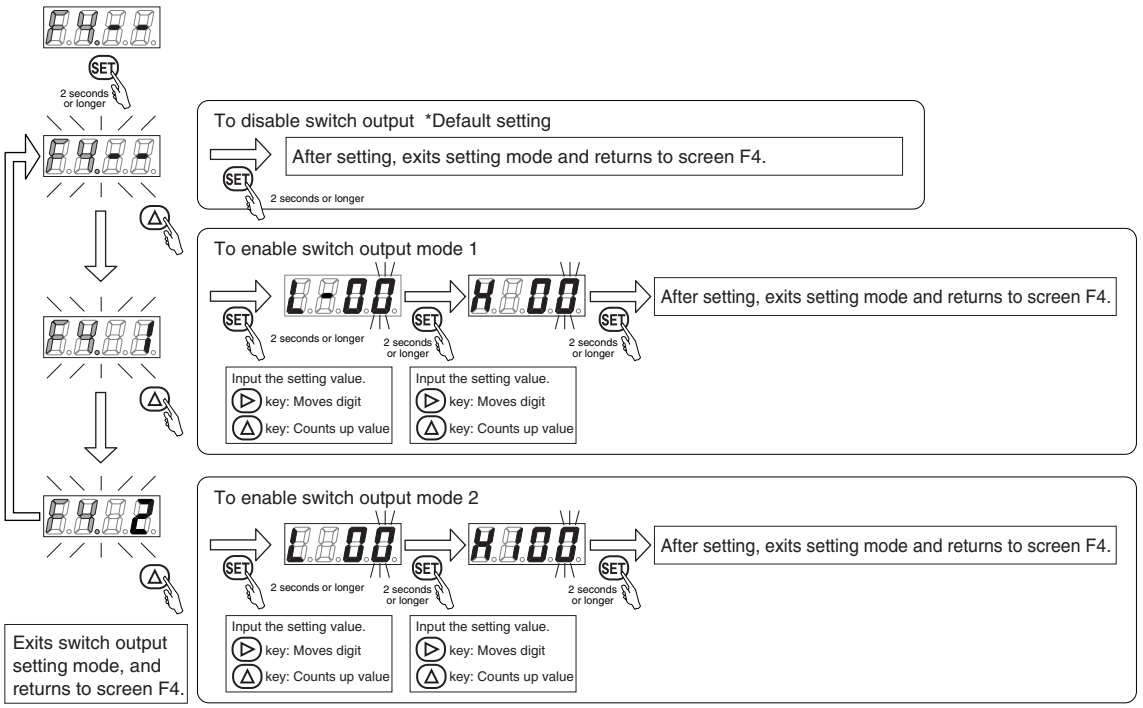
* This function cannot be used when present memory input or direct memory input is selected with F1 (input signal selection function). Only the full scale can be used.

■ F3 (automatic power OFF function) Hold down the SET key for two seconds or longer with the screen F3 displayed. F3 setting mode is entered.



* If any key is pressed during automatic power off, the display is turned on.
* The automatoc power off time is set to about one minute and cannot be changed.

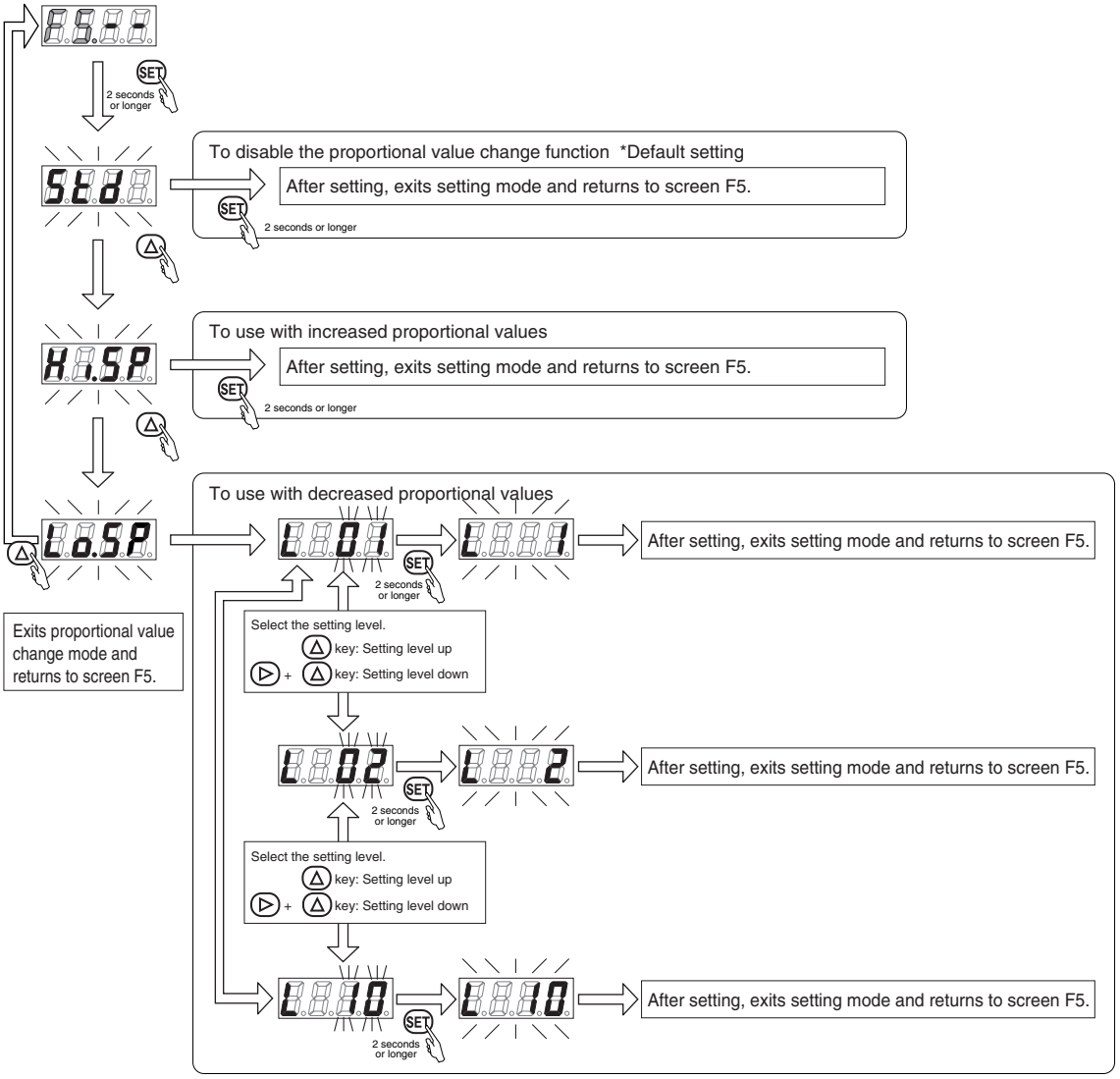
■ F4 (switch output function) Hold down the SET key for two seconds or longer with the screen F4 displayed. F4 setting mode is entered. (Applicable model: EVD-**-**SN,EVD-**-**SP)
Note: This is not vald with analog output specifications. (– –) is displayed on the screen but cannot be used.



How to set setting mode ⚠ CAUTION Release the key lock before changing setting details. (Refer to page 756.)

■ F5 (Proportional value change function) Hold down the SET key for two seconds or longer with the screen F5 displayed. F5 setting mode is entered.

⚠ Applicable model: EVD-1100-***-*-*,EVD-3100-***-*-*
Note) This screen is no displayed for EVD-*500 or EVD-*900.

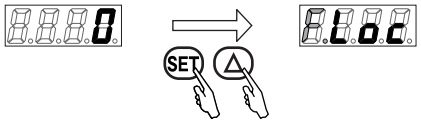


*When used with a decreased proportional value, operation takes place with the set level displayed on the even when the set level is selected. When the set level is decided, press the "SET key" for two seconds or longer to enter the value.

Key lock

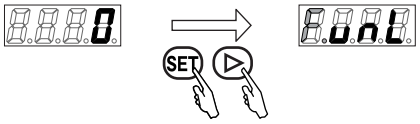
This function prevents incorrect operation. Release the key lock before changing settings.

● Operating the key lock



Hold down simultaneously for two seconds or longer

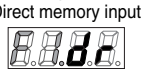
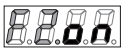
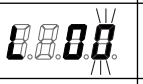
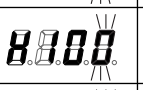
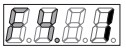
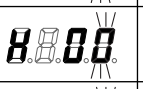
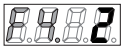
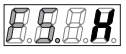
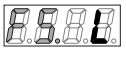
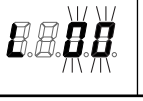
● Releasing the key lock



Hold down simultaneously for two seconds or longer

* The key is locked when power is turned on or turned on again.

Each setting range

Function	Settin display screen	Setting details	Setting specifications
F1: Input signal selection Pre-set memory input 		Set the target value (pressure).	Note 1 Range: *100 / 000 to 100 *500 / 000 to 500 *900 / 000 to 900 Setting min. unit: 1kPa
F1: Input signal selection Direct memory input 		Set the target value (pressure).	Note 1 Range: *100 / 000 to 100 *500 / 000 to 500 *900 / 000 to 900 Setting min. unit: 1kPa
F2: Zero/span adjustment 		Set the zero point adjustment value.	Note 2 Range: 00 to 50 Setting level: 1%
		Set the span point adjustment value.	Note 2 Range: 100 to 010 Setting min. unit: 1%
⚠ F4: Switch output Mode 1 		Set the - tolorable value.	Range: -00 to -50 Setting min. unit: -1%
		Set the + tolorable value.	Range: 00 to 50 Setting min. unit: 1%
⚠ F4: Switch output Mode 2 		Set the minimum value.	Note 2 Range: 00 to 90 Setting min. unit: 1%
		Set the maximum value.	Note 2 Range: 100 to 010 Setting min. unit: 1%
⚠ F5: Proportional value change function Proportional value up 		The level cannot be set.	
⚠ F5: Proportional value change function Proportional value down 		Set the level.	Range: 01 to 10 Setting min. unit: 1

Note 1: If set to a pressure of 1% F.S. or less, it may not be possible to control pressure due to the effect of residual pressure.
Note 2: The setting range may be limited depending on the setting value.

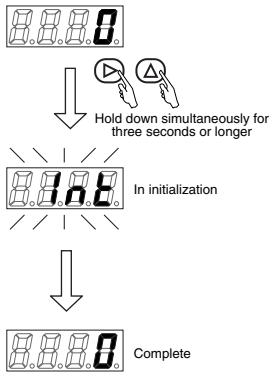
⚠ F4: The switch output function is limited to the switch to the switch output type. It cannot be used with the analog output type.
Applicable model: EVD-**-**SN, EVD-**-**SP

⚠ F5: The proportional value change function is limited to the pressure range 100kPa type.
Applicable model: EVD-1100-***

Default mode settings (Initialization)

Screen display	Name	Setting display	Setting details
Screen F1	Input signal selection	Analog type / Parallel type A0.A1.A2	Analog/parallel input
Screen F2	Zero/span adjustment		Full scale (Zero/span adjustment invalid)
Screen F3	Auto power off		Auto power off invalid
Screen F4	Switch output *Only switch output specifications		Switch output invalid
Screen F5	Proportional value change * Only EVD-*100		Standard setting (Proportional value change invalid)

<Initializing>



Error code

Error display	Cause	Countermeasures
E.01	The power voltage is not within the rating. Detected at 19.5 VDC Detection accuracy ±10%	Check the product's specifications, set the power voltage within the rated range, then turn power on again.
E.02	The input signal exceeded the rating range. Detected at 110% or more input. Detection accuracy ±1%	Check the product's input signal type, set the input signal within the rated range, then turn power on again.
E.03	An error occurred during EEPROM reading or writing.	Contact your CKD branch or dealer.
E.04	An error occurred during memory reading or writing.	Contact your CKD branch or dealer.
E.05	Secondary pressure did not reach the set value for five seconds or more consecutively. (20% F.S. or less of the set value was not attained. Detection accuracy ±6%F.S.)	Check primary pressure provide pressure within the rating range, then turn power on again. Check that ther are no leaks from pipes, joints, or other devices. Correctly connect, then turn power on again. If the error is not resolved, contact your CKD branch or dealer.
	The switch output's overcurrent protection circuit has functioned.	Check whether load current exceeds the rating. Correctly connecct, then turn power on again.

When the above errors occur, the error displays and error output turn on.

■ Glossary

Max. working pressure

Maximum value of primary side pressure which can satisfy the specifications. Differs according to the pressure specifications.

Min. working pressure

The primary pressure value required to control up to the full scale pressure. Differs according to the pressure specifications.

Withstanding pressure

Pressure value under which the electro pneumatic regulator will not break even if temporarily applied. The supply side and output side guaranteed values are given separately to limit the withstand pressure of the pressure sensor mounted on the secondary side.

Control pressure range

Indicates the pressure which can be controlled. Depending on the product, a residual pressure may be generated. With the EVD, 1% F.S. or less residual pressure is generated when the input signal is 0% F.S.

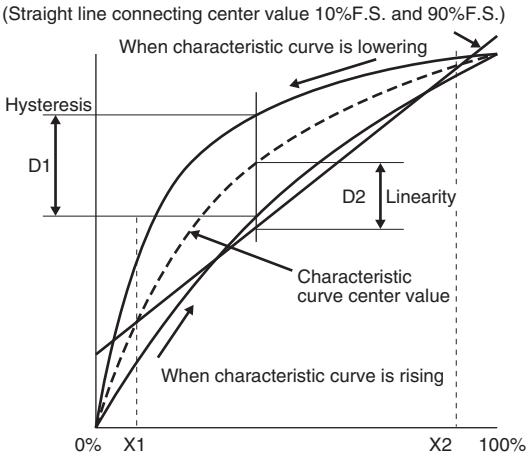
Note: This is different from the guaranteed accuracy range. Refer to the hysteresis and linearity items below.

Hysteresis (measurement circuit 1)

The difference (D1) of the rise curve and lower curve when the input signal is reciprocated once between 0% and 100%, indicated as a percentage of the full scale (FS).

(Hysteresis) = Maximum value of D1 / FS control pressure x 100 [%]

Note: The guaranteed accuracy range will differ according to the product.
For EVD, 10% to 90% F.S. is the guaranteed range.



Linearity (measurement circuit 1)

The difference (D2) from the reference line connecting the input signal (X1) % F.S. and (X2) % F.S. when the input signal is reciprocated once between 0% F.S. to 100% F.S., indicated as a percentage of the full scale (FS).

(Linearity) = Maximum value of D2 / FS control pressure x 100 [%]

Note: The guaranteed accuracy range will differ according to the product.
For EVD, X1=10% F.S., X2=90% F.S. is the guaranteed range.

Resolution (measurement circuit 1)

The minimum value of the input signal generated when the control pressure changes, indicated as a percentage of the full scale (F.S.). The value is indicated as the difference with the input signal obtained after the input signal is pressurized from 0% F.S. to 15% F.S. and held for 10 seconds or longer, then gradually increased until the control pressure starts to rise again. This is applied in the same way for input signal 50% F.S. and 85% F.S.

Repeatability (measurement circuit 1)

The maximum value of the control pressure variation when the same setting value is repeatedly applied is indicated as a percentage of the full scale (F.S.).

The value is calculated with the variation of the control pressure (D2) when the input signals 0% F.S. and 50% F.S. are repeated applied.

(Repeatability) = D3 / FS control pressure x 100 [%]

Temperature characteristics

Indicates the fluctuation of the control temperature according to changes in the ambient temperature (reference temperature 25˚C) converted per 1˚C. The characteristics are indicated for the zero point and span width.

Maximum flow rate (measurement circuit 2)

Indicates flow rate possible at control pressure 100% F.S..

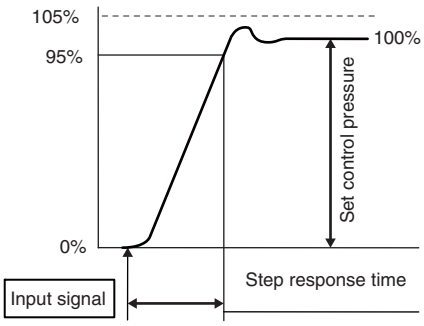
Relief characteristics (measurement circuit 3)

Indicates the relation of the control pressure and exhaust flow rate when a back pressure is applied on the secondary side from an external source in the pressure control state. The relief flow rate when the back pressure is gradually increased is measured.

Step response (measurement circuit 1)

Indicates the time for the control pressure to reach the set pressure in respect to a stepped input signal.

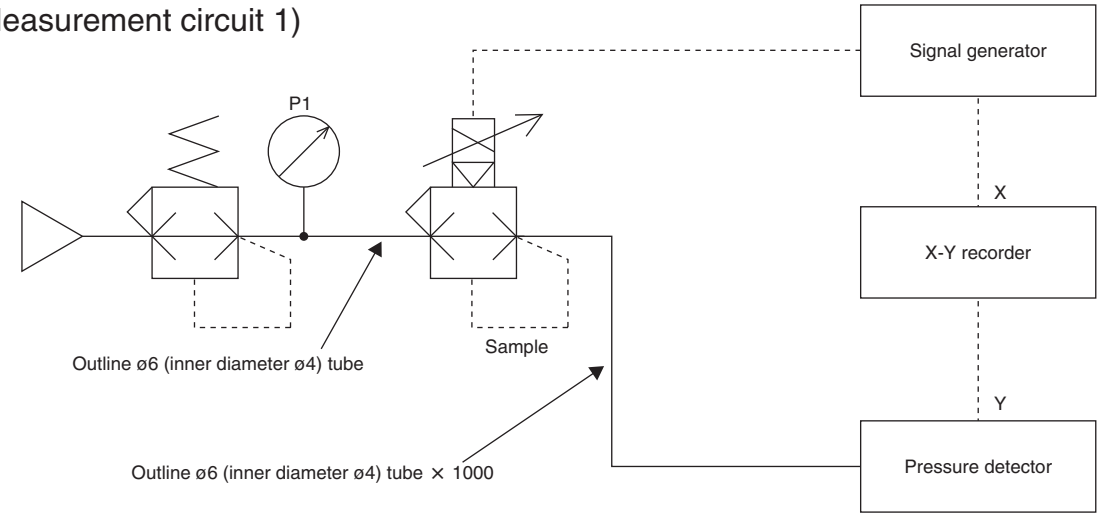
The time for the control pressure to reach the setting value ±5% F.S. range after the input signal is applied is measured.



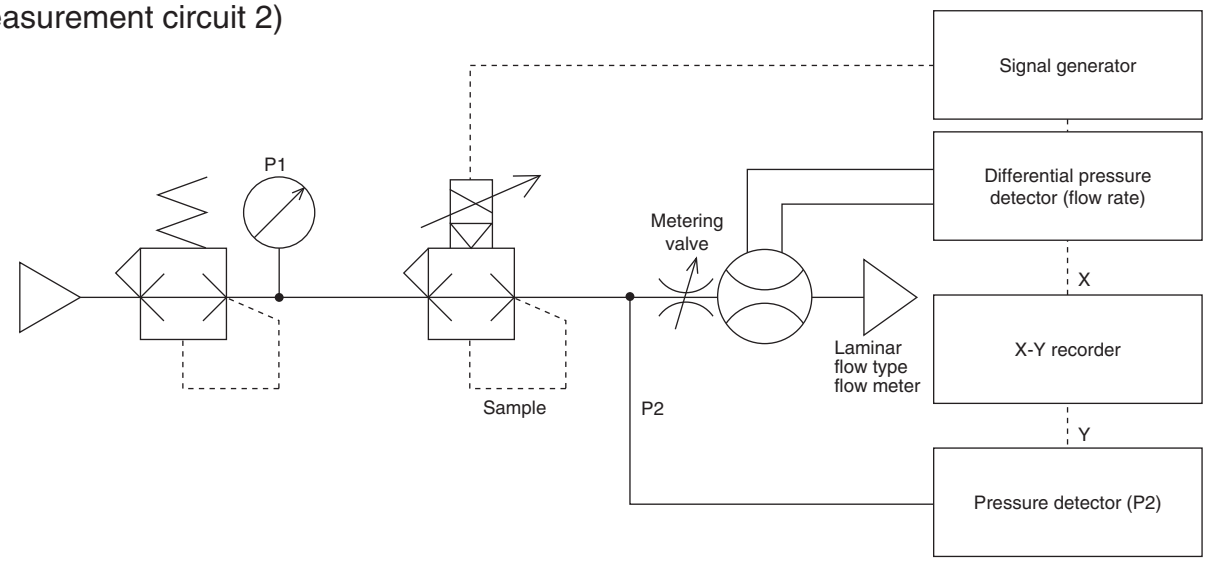
(Response time) = Time to reach within ±5% of final value

CKD measurement circuit

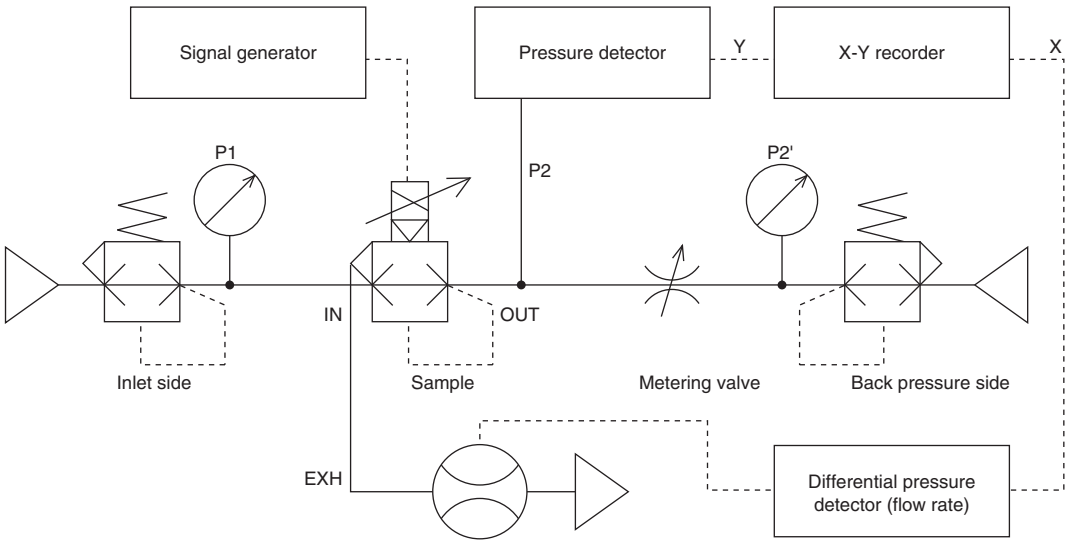
(Measurement circuit 1)

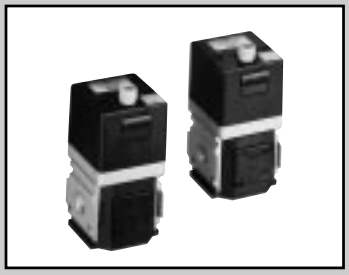


(Measurement circuit 2)



(Measurement circuit 3)





Electro pneumatic regulator (solenoid valve type medium flow)

EV2000 Series

High precision air pressure proportional control valve enabling ultimate space saving of device.

RoHS CAD

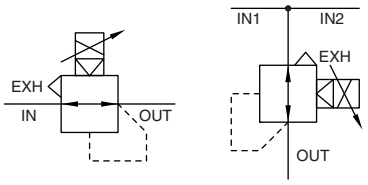
Overview

In this electro pneumatic regulator EV2000 Series, feedback control with semiconductor pressure sensor and electronic control circuit is used. Using electric signals, continuous and precise air pressure control are achieved.

Features

- Compact and light weight
- Compact module design
- Non-bleeding
- High-relief
- High precision / high speed response
- Manifold type available
- Embedding type option
- Various input signal
- Easy wiring
- Pressure monitor available
- Equivalent to protective structure IP64
- Common exhaust

JIS symbol



Specifications

Descriptions		EV2500	EV2509
Working fluid		Clean compressed air (ISO 8573-1 Class 1.3.2 or equivalent or JIS B 8392-1 Class 1 1.3.2 or equivalent)	
Max. working pressure		0.7MPa	
Min. working pressure		Control pressure + 0.05MPa	
Withstanding pressure	(Inlet side)	1.05MPa	
	(Output side)	0.75MPa	
Control pressure range		0 to 0.49MPa	
Power voltage		24 VDC 10% (safety power supply with ripple ratio 1% or less)	
Current consumption		0.1A or less (power supply rush current 0.6A when power turned ON)	
Input signal (Input impedance)		0-10 VDC (20kΩ) 0-5 VDC (10kΩ) 4-20mA DC or 1-5 VDC (250Ω) Note 1 10kΩ variable resistance or 0-10 VDC (20kΩ)	
Monitor output		1-5 VDC (none for 10kΩ variable resistance input)	
Hysteresis		1%F.S. or less Note 2	
Linearity		±0.5%F.S. or less Note 2	
Resolution		0.5%F.S. or less Note 2	
Repeatability		0.5%F.S. or less Note 2	
Temperature characteristics	(Zero point variation)	0.15%F.S./˚C or less	
	(Span variation)	0.07%F.S./˚C or less	
Maximum flow rate (ANR)		800 ℓ/min.	
Step response Note 3	(Loadless)	0.6s or less	
	(1ℓ load)	0.6s or less	
Mechanical vibration proof		98m/s² or less (JIS C60068-2-6)	
Ambient temperature		5 to 50˚C	
Protective structure		IP64 or equivalent, IP67(cable connector) Note 4	
Port size		Rc1/4	
Weight (body)		300g	320g

Note 1: When used with signal voltage 1-5 VDC, 4-20 mA of current flows into inside of EV from the signal source. Confirm specifications of the signal source before starting use.

Note 2: The above characters apply for a control pressure of 10 to100% when power voltage is 24VDC, and working pressure range is 0.54 to 0.7MPa. Also, limited toa closed circuit in the secondary side, and the pressure may vary if used as air blow etc.

Note 3: Working pressure: Max. working pressure and step rate: 50%F.S.→100%F.S.
50%F.S.→ 60%F.S.
50%F.S.→ 40%F.S.

Note 4: Protective structure IP64 is applied only when installed with facing connector upward.

Clean room specifications (catalog No. CB-033S)

- Dust generation preventing structure for use in cleanrooms

EV2500 ····· P70
EV2509 ····· P70

How to order

EV2 5 0 0 – 0 08 – C11E2B

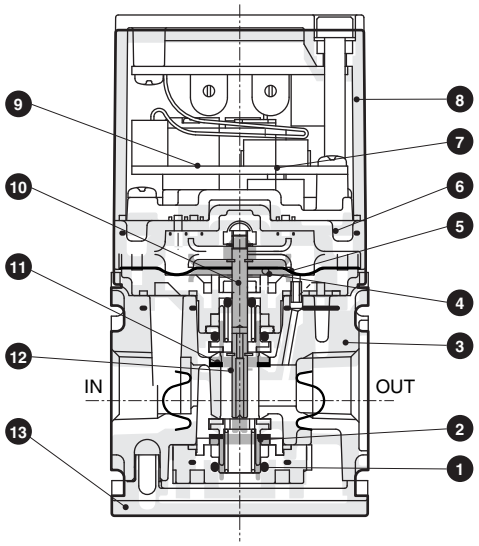
- Ⓐ Control pressure
- Ⓑ Body type
- Ⓒ Input signal
- Ⓓ Port size
- Ⓔ Option
  Note 1
  Note 2
  Note 3

Symbol	Descriptions
Ⓐ Control pressure	
5	0-0.49MPa
Ⓑ Body type	
0	Discrete
9	Discrete manifold
Ⓒ Input signal	
0	0-10 VDC
1	0-5 VDC
2	4-20mA DC or 1-5 VDC
3	10kΩ variable resistance or 0-10 VDC
Ⓓ Port size	
08	Rc1/4
Ⓔ Option	
Cable option	
Blank	None
C11	1m attached
C13	3m attached
Exhaust option	
Blank	Rc1/4 port
E1	ø8 push-in joint
E2	With silencer
Bracket option	
Blank	None
B	C type bracket attached
B4	B type bracket attached

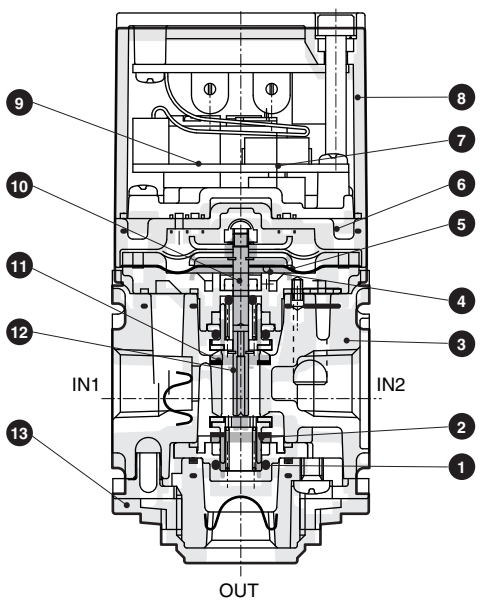
Note 1: Piping adaptor can be used for Rc3/8 or larger, but B type, C type bracket can not be used (refer to other peripheral devices on page 790).
Note 2: Model no. for option is EV2000-option symbol.
Note 3: The bracket option B4 cannot be used when using the EV2509 (manifold type).

Internal structure and parts list

● EV2500



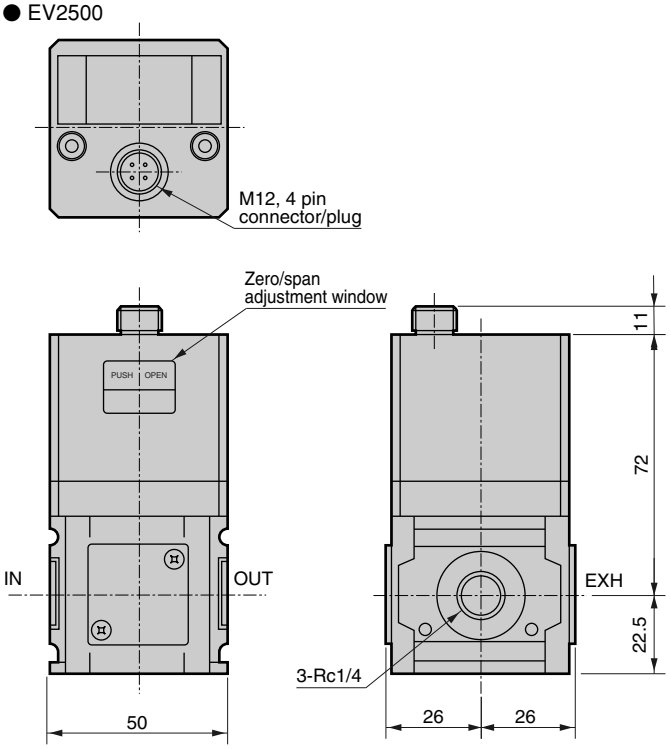
● EV2509



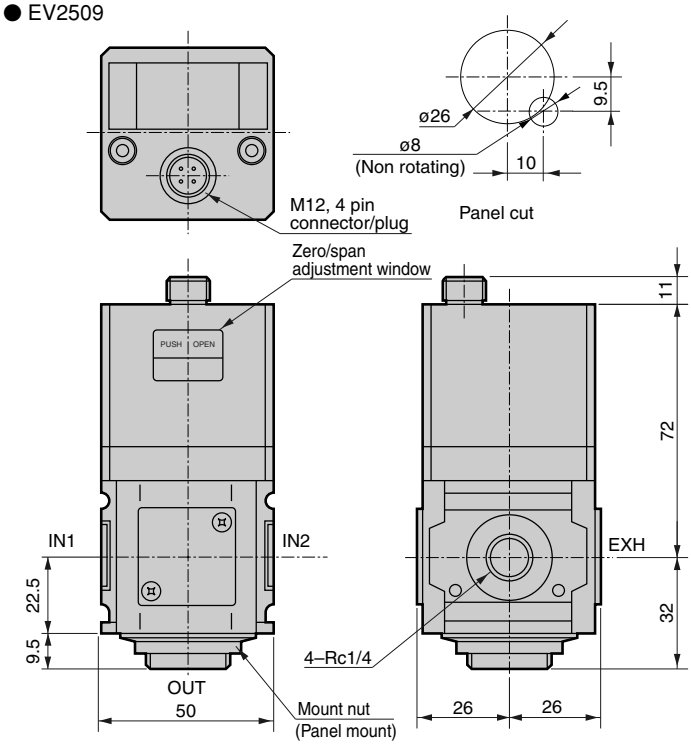
No.	Parts name	Material	No.	Parts name	Material
1	O ring	Fluoro rubber	8	Housing	ABS resin
2	Bottom valve	Brass, special nitrile rubber	9	3 way valve	
3	Body	Aluminum alloy die-casting	10	Rod	Stainless steel
4	Disk	Aluminum alloy	11	Top valve	Brass, special nitrile rubber
5	Diaphragm	Special nitrile rubber	12	E type snap ring	Steel
6	Valve base	Polyphenylene sulfide resin	13	Plate cover	ABS resin
7	Pressure sensor	(Diffusion semiconductor)			

Dimensions

● EV2500



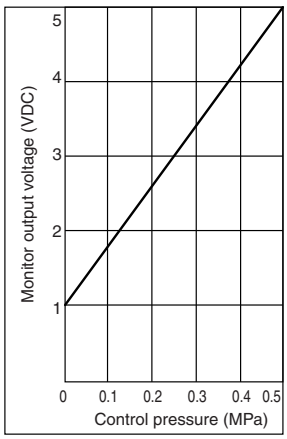
● EV2509



Refer to "cable option" on page 764 for how to wire.
Refer to pages 763 to 764 for optional dimensions.

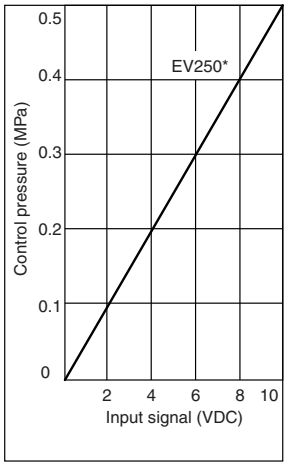
Monitor output

● EV2500/2509

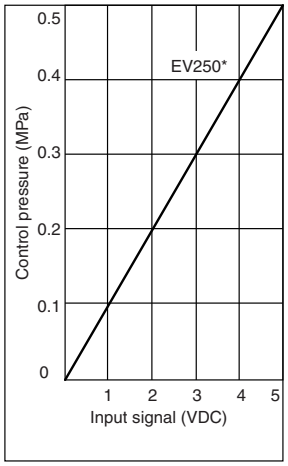


I/O characteristics

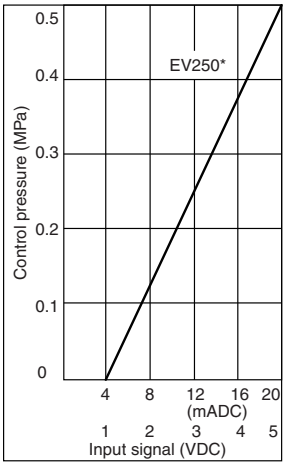
● Input signal 0-10VDC



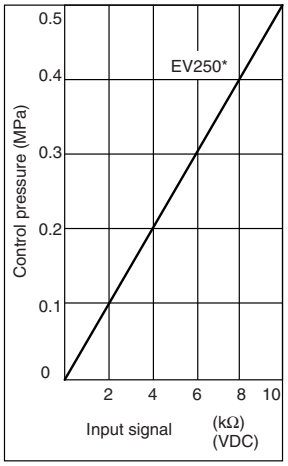
● Input signal 0-5VDC



● Input signal 4-20mA DC or 1-5 VDC

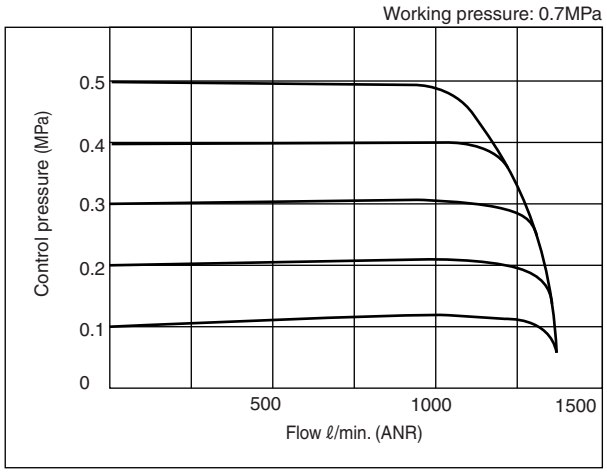


● Input signal 10kΩ variable resistance or 0-10 VDC

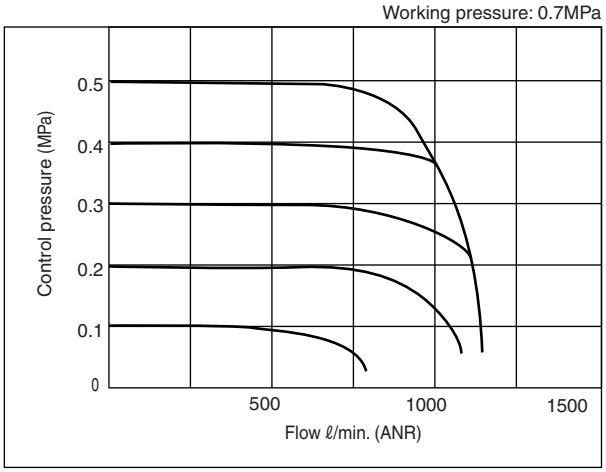


Flow characteristics

● EV2500



● EV2509

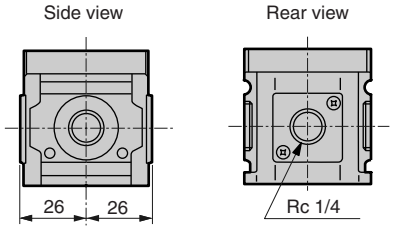


Option dimensions

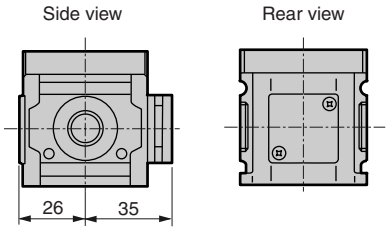
EV2000 Series common option

Embedding type option

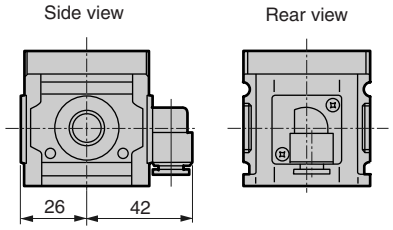
● Standard (blank)



● Dedicated silencer: **-E2

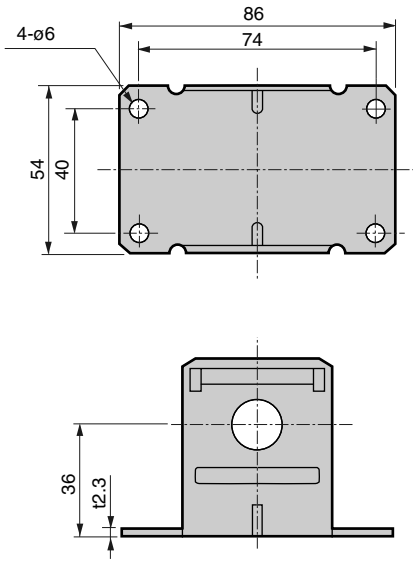


● ø8 push-in: **-E1

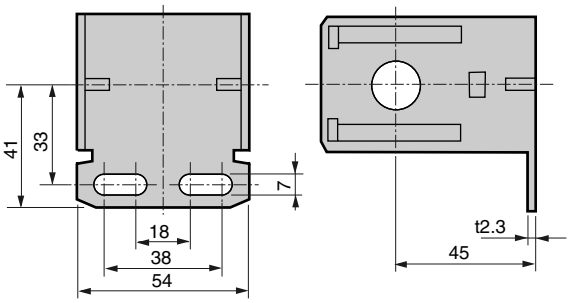


Bracket option

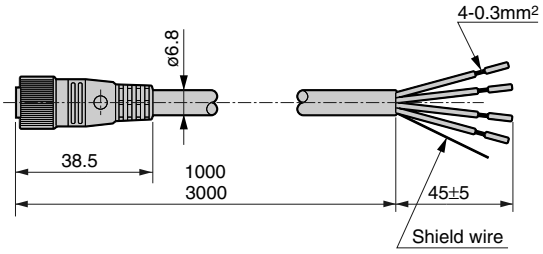
● B type bracket (-B4): Floor installation type



● C type bracket (–B): Wall installation type



Cable option



-C1* shield/cable/connector

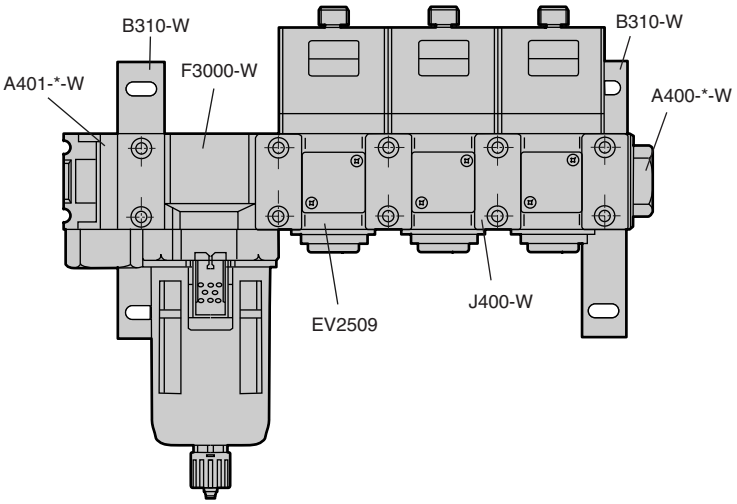
* Pin No.	Isolator color	Applications	Type of input signal			
			0-10V	0-5V	4-20mA 1-5V	10kΩ VR (0-10V)
1	Red	Power supply ⊕	24V			
2	Green	—	Monitor output 1-5V			VR input terminal
3	Black	Common	0V			VR input terminal 0V
4	White	Input signal	0-10V	0-5V	4-20mA 1-5V	VR output terminal (0-10V)

If a cable connector is not used, following recommended cable sockets can be used. Anyway, use a shield wire cable.

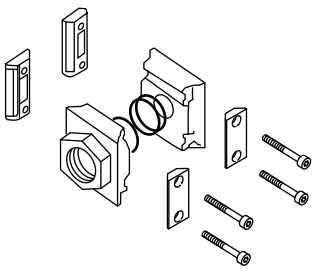
Set screw type ELW1KA4012 CORRENS (HIRSHMAN)
Axial type (solder) XS2C-D421 OMRON
L type (solder) XS2C-D422 OMRON

Other peripheral devices

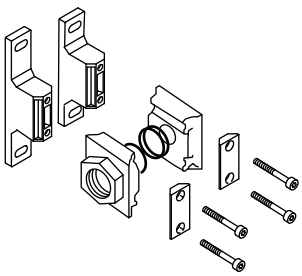
● Example of system up grading



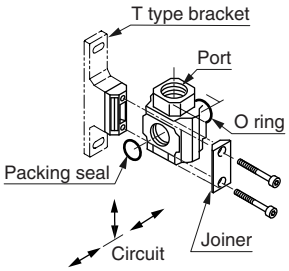
● A400-8/10/15-W
Piping adaptor set



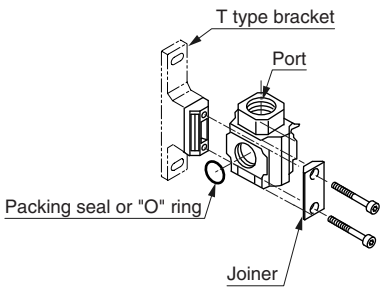
● A400-8-W/10-W/15-W-B31W
Piping adaptor set



● D401-00-8/10/15-W-(B31W)
Distributor



● A401-8/10/15-W-(B31W)
L type piping adapter

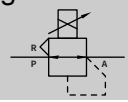


Electro pneumatic regulator (solenoid valve type small flow)

EV0000 Series

High precision air pressure proportional control valve enabling ultimate space saving of device.

JIS symbol



RoHS CAD

Overview

In this electric pneumatic regulator EV0000 Series, feedback control with semiconductor pressure sensor and electronic control circuit is used. Using electric signals, continuous and precise air pressure controlling is achieved.

Features

- Compact and light weight
- Non-bleeding
- High precision / high speed response
- Various input signal
- Easy wiring
- Pressure monitor available
- Equivalent to protective structure IP64
- Two systems of piping port
- Common exhaust

Specifications

Descriptions		EV0100	EV0500
Working fluid		Clean compressed air (ISO 8573-1 Class 1.3.2 or equivalent or JIS B 8392-1 Class 1 1.3.2 or equivalent)	
Max. working pressure		200kPa	0.7MPa
Min. working pressure		Control pressure + max. control pressure x 0.1	
Withstanding pressure	(Inlet side)	300kPa	1.05MPa
	(Output side)	150kPa	0.75MPa
Control pressure range		0 to 98kPa	0 to 0.49MPa
Power voltage		24 VDC 10% (safety power supply with ripple ratio 1% or less)	
Current consumption		0.1A or less (power supply rush current 0.6A when power turned ON)	
Input signal (Input impedance)		0-10 VDC (20kΩ) 0-5 VDC (10kΩ) 4-20mA DC or 1-5 VDC (250Ω) Note 1 10kΩ variable resistance or 0-10 VDC (20kΩ)	
Monitor output		1-5 VDC (none for 10kΩ variable resistance input)	
Hysteresis		1%F.S. or less Note 2	
Linearity		±0.5%F.S. or less Note 2	
Resolution		0.5%F.S. or less Note 2	
Repeatability		0.5%F.S. or less Note 2	
Temperature characteristics	Zero point variation	0.15%F.S./˚C or less	
	Span variation	0.07%F.S./˚C or less	
Maximum flow rate (ANR)		2ℓ/min.	6ℓ/min.
Step response	(Loadless)	0.2s or less	
Note 3	(15cm³ load)	0.5s or less	
Mechanical vibration proof		98m/s² or less (JIS C60068-2-6)	
Ambient temperature		5 to 50˚C	
Protective structure		IP64 or equivalent, IP67(cable connector) Note 4	
Port size		M5	
Weight (body)		180g	

Note 1: When used with signal voltage 1-5 VDC, 4-20 mA of current flows into inside of EV from the signal source. Confirm specifications of the signal source before starting use.

Note 2: The above characters apply for a control pressure of 10 to 100% when power voltage is 24VDC, and working pressure range is: EV0100/110 to 200kPa EV0500/0.54 to 0.7 MPa. Limited to a closed circuit in the secondary side, the pressure may fluctuate if used air blow, etc.

Note 3: Working pressure: Max. working pressure and step rate:
- 50%F.S.→100%F.S.
- 50%F.S.→ 60%F.S.
- 50%F.S.→ 40%F.S.

Note 4: Protective structure IP64 is applied only when installed with facing connector upward.

How to order

EV0 1 00 — 0 M5 — C11

Ⓐ Control pressure
Ⓑ Input signal
Ⓒ Port size
Ⓓ Cable option

Symbol	Descriptions
Ⓐ Control pressure	
1	0-98kPa
5	0-0.49MPa
Ⓑ Input signal	
0	0-10 VDC
1	0-5 VDC
2	4-20mA DC or 1-5 VDC
3	10kΩ variable resistance or 0-10 VDC (Integrated 10 VDC power supply connection)
Ⓒ Port size	
M5	M5
Ⓓ Cable option	
Blank	None
C11	1m attached
C13	3m attached

Note 1 Model no. for option is **EV2000-** **option symbol**.

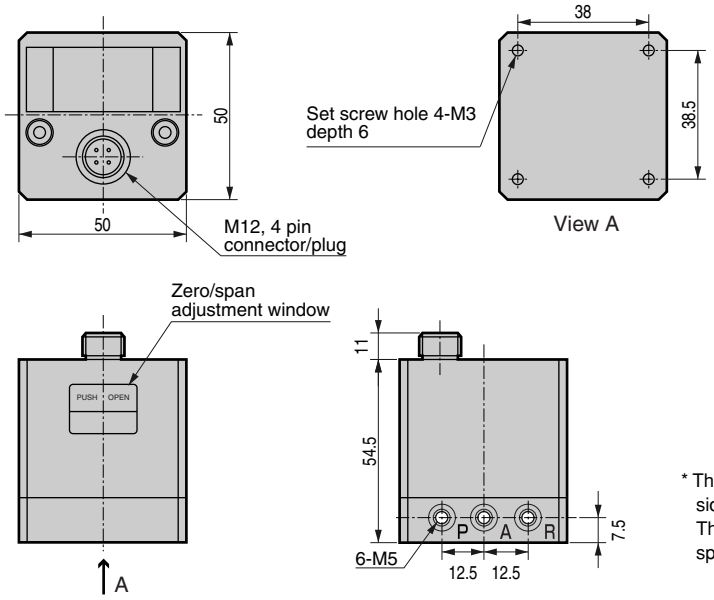
Clean room specifications

(Catalog No. CB-033S)

- Dust generation preventing structure for use in cleanrooms

EV0 ····· P70

Dimensions

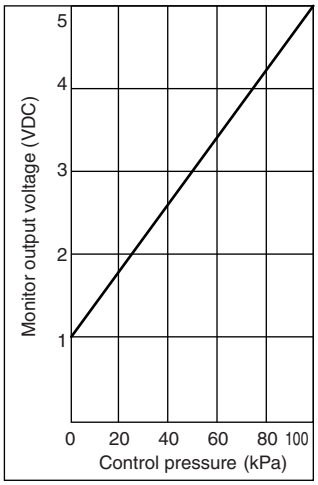


* There are two P/A/R port systems on either side. Use the enclosed plug on the idle port. The R port must be released into the atmosphere.

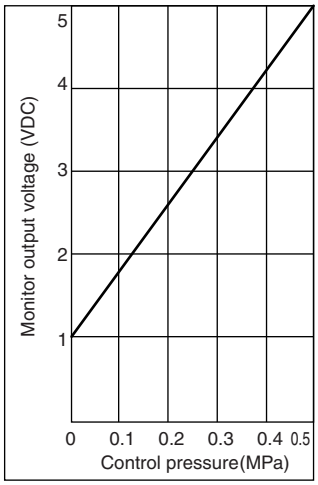
Refer to "cable option" on page 767 for how to wire.

Monitor output

● EV0100

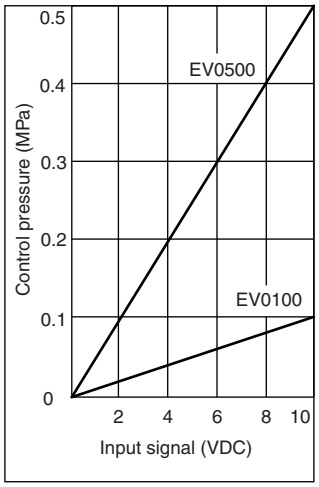


● EV0500

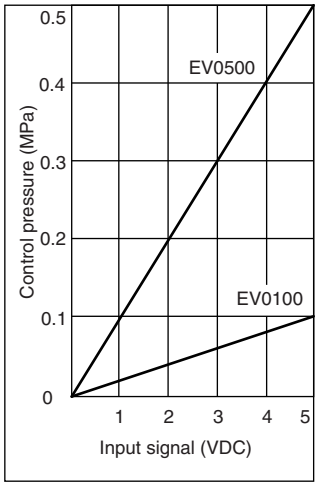


I/O characteristics

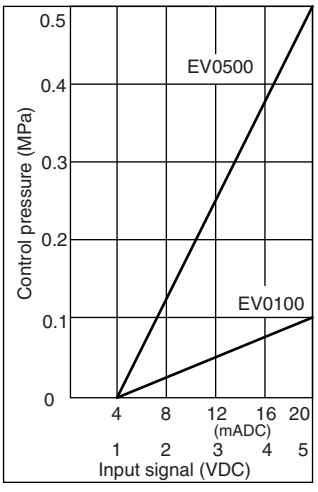
● Input signal 0-10 VDC



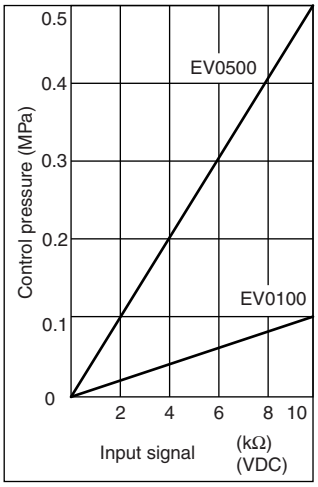
● Input signal 0-5 VDC



● Input signal 4-20mA DC or 1-5 VDC

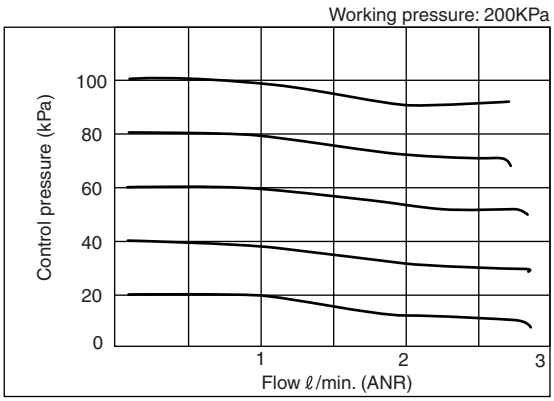


● Input signal 10kΩ variable resistance or 0-10 VDC

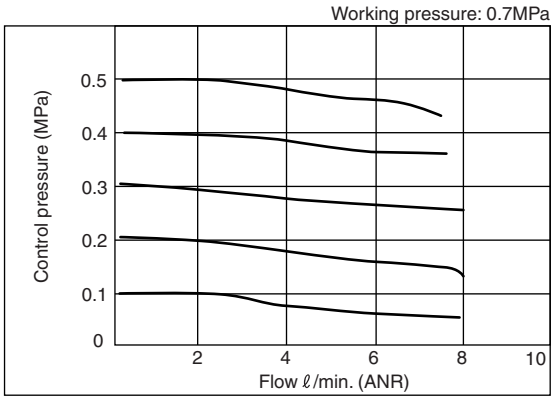


Flow characteristics

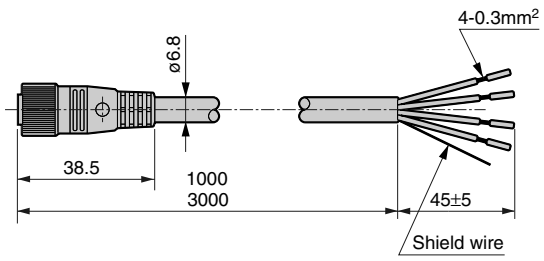
● EV0100



● EV0500



Cable option

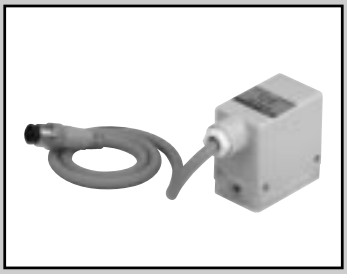


-C1* shield/cable/connector

* Pin No.	Isolator color	Applications	Type of input signal			
			0-10V	0-5V	4-20mA 1-5V	10kΩVR (0-10V)
1	Red	Power supply ⊕	24V			
2	Green	—	Monitor output 1-5V			VR input terminal
3	Black	Common	0V			VR input terminal 0V
4	White	Input signal	0-10V	0-5V	4-20mA 1-5V	VR output terminal (0-10V)

If a cable connector is not used, following recommended cable sockets can be used. Anyway, use a shield wire cable.

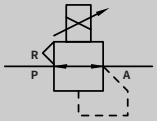
Set screw type	ELW1KA4012 CORRENS (HIRSHMAN)
Axial type (solder)	XS2C-D421 OMRON
L type (solder)	XS2C-D422 OMRON



Electro pneumatic regulator (compact solenoid valve type)

EVS Series

JIS symbol



RoHS CAD

Overview

For electro pneumatic regulator EVS Series, feedback control with semiconductor pressure sensor and electronic control circuit is used to enable continuous and precise controlling pneumatics with electric signals.
Smaller than EV0000, body extending cable is used to achieve ultimate convenience and space saving.

Features

(1) Downsized
Redesigned the internal structure, the volume is reduced by approx. 50% comparing to CKD conventional model (EV0000 Series). (Excluding cable outlet)
(2) Light weight
Minimized body, the weight is reduced by approx. 20% comparing to CKD conventional model (EV0000 Series).
(3) Space saving
Footprint is reduced by 40% comparing to CKD conventional model (EV0000 Series). This enables installation in a narrow space, or in a raw, and contributes to reduce the device size.
(4) Non-bleeding
Oar poppet structure and PWM control are used to elimin.ate constant bleeding. This can be used not only for energy saving, also for the case that air source has no surplus.
(5) Precise/quick response
Precision, high speed response of EV Series is completely succeeded. New model can be directly replaced from old one if the input signal type is matched (when monitor output signal is not used).
(6) Easy wiring
A body extending cable connector is used to reduce man-hours for wiring, installation and maintenance. Shield type is used for cable connector.

Specifications

Descriptions		EVS100	EVS500
Working fluid		Clean compressed air (ISO 8573-1 Class 1.3.2 or equivalent or JIS B 8392-1 Class 1 1.3.2 or equivalent)	
Max. working pressure		200kPa	0.7MPa
Min. working pressure		Control pressure + max. control pressure x 0.1	
Withstanding pressure	Inlet side	300kPa	1.05MPa
	Output side	150kPa	0.75MPa
Control pressure range		0 to 98kPa	0 to 0.49MPa
Power voltage		24 VDC 10% (safety power supply with ripple ratio 1% or less)	
Current consumption		0.1A or less (power supply rush current 0.6A when power turned ON)	
Input signal (input impedance)		0-10 VDC (6.6kΩ) 0-5 VDC (3.3kΩ) 20mA or 1-5 VDC (250Ω)	
How to wire		Shield cable connector or applicable connectors and shield wire	
Insulation resistance		100MΩ (500 VDC mega) and over	
Withstand voltage		1500 VAC for one minute	
Hysteresis	Note 1	1%F.S. or less	
Linearity	Note 1	±0.5%F.S. or less	
Resolution	Note 1	0.5%F.S. or less	
Repeatability	Note 1	0.5%F.S. or less	
Temperature characteristics	Zero point variation	0.15%F.S./˚C or less	
	Span variation	0.07%F.S./˚C or less	
Maximum flow rate (ANR)	Note 2	2 ℓ/min.	6 ℓ/min.
Step response Note 3	Loadless	0.2s or less	
	15cm³ load	0.5s or less	
Ambient temperature		5 to 50˚C	
Fluid temperature		5 to 50˚C	
Lubrication		Not available	
Mounting attitude		Free	
Protective structure		IP60 (without protective structure for water)	
Main dimensions		W30 × D50 × H50	
Port size		M5	
Weight (body)		140g	

Note 1: The above apply for a 10 to 100% control pressure at 24 VDC power voltage, with working pressure between maximum control pressure x 1.1 (EVS100: 110kPa, EVS500: 0.54MPa) and maximum working pressure. Limited to a closed circuit in the secondary side, the pressure may fluctuate if used air blow, etc.
Note 2: Working pressure: Maximum working pressure, Control pressure: Maximum control pressure
Note 3: Working pressure: Maximum working pressure, step amount ┌ 50%F.S.→100%F.S.
50%F.S.→ 60%F.S.
└ 50%F.S.→ 40%F.S.

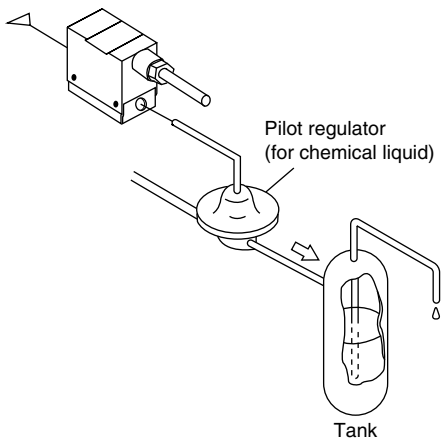
Clean room specifications (catalog No. CB-033S)

● Dust generation preventing structure for use in cleanrooms

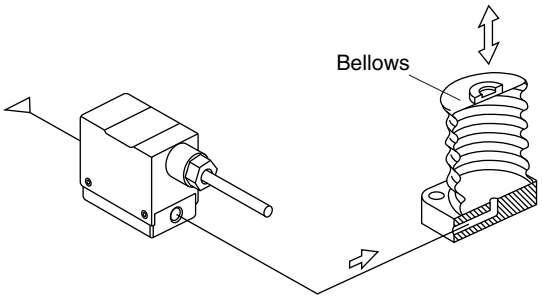
EVS ····· P70

Example of use

● Chemical liquids discharge control



● Fine position control



How to order

EVS 1 00 - 2 M5 - C11

- Model no.
- Ⓐ Control pressure range
- Ⓑ Input control signal
- Ⓒ Port size
- Ⓓ Cable option

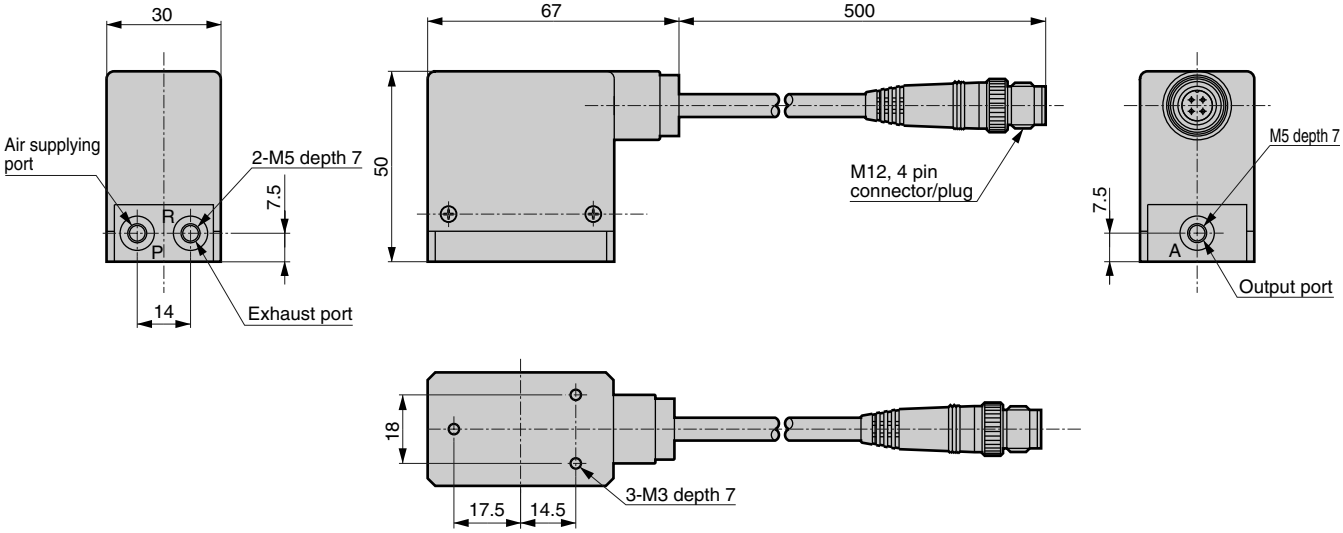
Symbol	Descriptions
Ⓐ Control pressure range	
1	0 to 98kPa
5	0 to 0.49MPa
Ⓑ Input control signal	
0	0 to 10 VDC
1	0 to 5 VDC
2	4 to 20mA DC or 1 to 5 VDC (Input impedance 250Ω)
Ⓒ Port size	
M5	M5
Ⓓ Cable option	
Blank	None
C11	1m (axial)
C13	3m (axial)

⚠ Note on selection guide

Note: Model no. for option is
EV2000 - **Cable option symbol** .

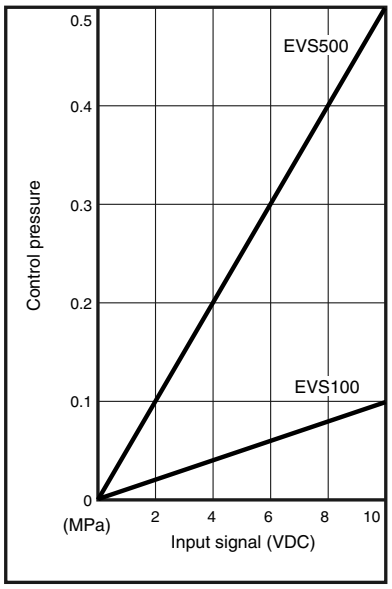
Dimensions

CAD

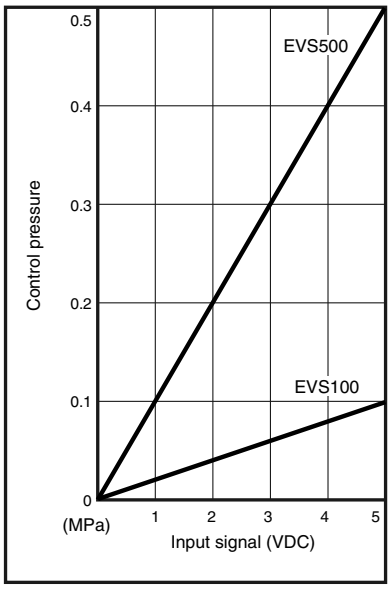


I/O characteristics

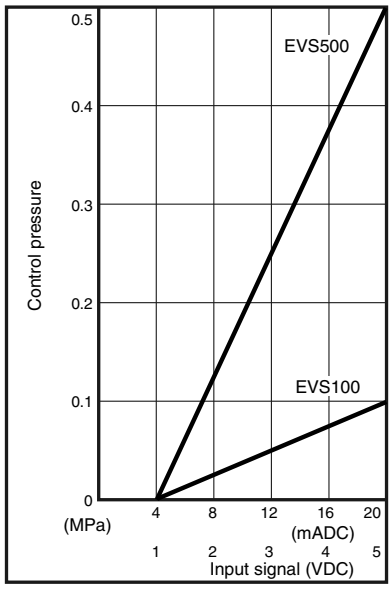
● Input signal 0-10 VDC



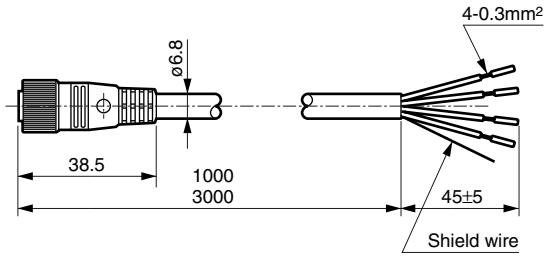
● Input signal 0-5 VDC



● Input signal 4-20mA DC or 1-5 VDC



Cable option

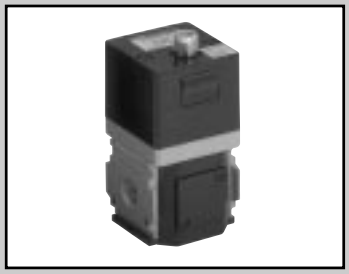


-C1* shield/cable/connector

* Pin No.	Isolator color	Applications	Type of input signal		
			0-10V	0-5V	4-20mA 1-5V
1	Red	Power supply ⊕	24V		
2	Green	—	Vacant		
3	Black	Common	0V		
4	White	Input signal	0-10V	0-5V	4-20mA 1-5V

If a cable connector is not used, following recommended cable sockets can be used. Anyway, use a shield wire cable.

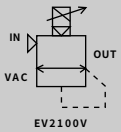
Set screw type	ELW1KA4012 CORRENS (HIRSHMAN)
Axial type (solder)	XS2C-D421 OMRON
L type (solder)	XS2C-D422 OMRON



Electro pneumatic regulator (solenoid valve type vacuum)

EV2100V Series

JIS symbol



RoHS CAD

Overview

For electro pneumatic regulator EV2100V Series, feedback control with semiconductor pressure sensor and electronic control circuit is used to enable continuous and precise vacuum control with electric signals.

Features

- Compact / light weight
- Enabling module
- Non-bleeding
- High-relief
- Precise/quick response
- Manifold type available
- Various input signal
- Easy wiring
- Pressure monitor available
- Equivalent to protective structure IP64

Specifications

Descriptions		EV2100V	EV2109V
Working fluid		Air (using air circuit recommended on page 726)	
Working pressure range		-96kPa to -101.3kPa	
Withstanding pressure	Inlet side	196kPa	
	Output side	196kPa	
Assured pressure range Note 5		-10.1 to -91.2kPa (10 to 90%F.S.)	
Power voltage		24 VDC±10% (safety power supply with ripple ratio 1% or less)	
Current consumption		0.1A or less (power supply rush current 0.6A when power turned ON)	
Input signal (Input impedance)		0-10 VDC (20kΩ) / 0-5 VDC (10kΩ) / 4-20mA DC or 1-5 VDC (250Ω) Note 1 / 10kΩ variable resistance or 0-10 VDC (20kΩ)	
Monitor output		1-5 VDC (none for 10kΩ variable resistance input)	
Hysteresis		1%F.S. or less Note 2	
Linearity		±0.5%F.S. Note 2	
Resolution		0.5%F.S. or less Note 2	
Repeatability		0.5%F.S. or less Note 2	
Temperature characteristics	Zero point variation	0.15%F.S./˚C or less	
	Span variation	0.07%F.S./˚C or less	
Maximum flow rate (ANR)		150 ℓ/min.	120 ℓ/min.
Step response Note 3	Loadless	0.6sec or less	
	1ℓ load	2.0sec or less	
Mechanical vibration proof		98m/s^2 or less (JIS C60068-2-6)	
Ambient temperature		5 to 50˚C	
Protective structure		IP64 or equivalent (body) IP67(cable connector) Note4	
Port size		Rc1/4	
Weight (body)		300g	320g

Note 1: When used with signal voltage 1-5VDC, 4-20mA of current flows into inside of EV from the signal source. Confirm specifications of the signal source before starting use.

Note 2: The above characters apply for a control pressure of 10 to 90% when power voltage is 24 VDC, working pressure is -96.0 to -101.3 kPa. Limited to a closed circuit in the secondary side, the pressure may fluctuate if used air blow, etc.

Note 3: Working pressure: -100kPa, step rate: 50%F.S. → 90%F.S. / 50%F.S. → 60%F.S. / 50%F.S. → 40%F.S.

Note 4: Main body protective structure IP64 is limited to cable connector top vertical installation. Above characteristics are values where used in working pressure range. If used exceeding working pressure range, please consult with CKD.

Note 5: There is a 0 to 5 kPa residual pressure when the input signal is 0%. Refer to the input/output characteristics graph (page 774).

How to order

EV210 ⓪ V - ① ⑧ - C11

Ⓐ Body type

Ⓑ Input signal

Ⓒ Port size

Ⓓ Option Note 1 Note 3

Symbol	Descriptions
Ⓐ Body type	
0	Discrete
9	Discrete manifold
Ⓑ Input signal	
0	0-10 VDC
1	0-5 VDC
2	4-20mA DC or 1-5 VDC
3	10kΩ variable resistance or 0-10 VDC (Integrated 10 VDC power supply connection)
Ⓒ Port size	
08	Rc1/4
Ⓓ Option	
Cable option	
Blank	None
C11	1m attached
C13	3m attached
Intake option	
Blank	Intake block 1
K1	Intake block 2
Bracket option	
Blank	None
B4	B type bracket
T	T type bracket

Note on selection guide

Note 1: Model no. for option is **EV2000-** **option symbol**.

Note 2: However, combination of optional "intake block 1" and " T type bracket" is not available.

Note 3: The bracket option B4 cannot be used when using the EV2109V (manifold type).

Clean room specifications (catalog No. CB-033S)

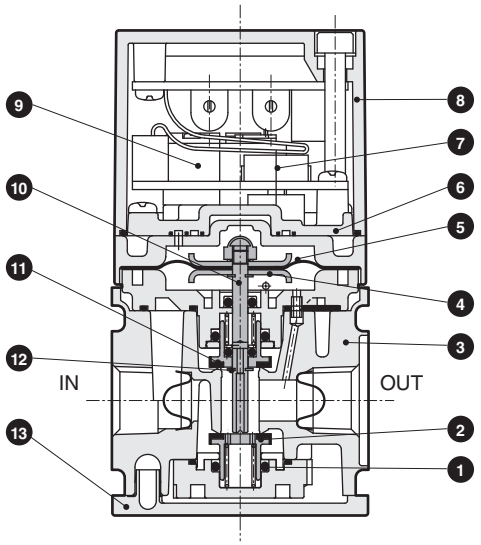
● Dust generation preventing structure for use in cleanrooms

EV2100V —····— P70

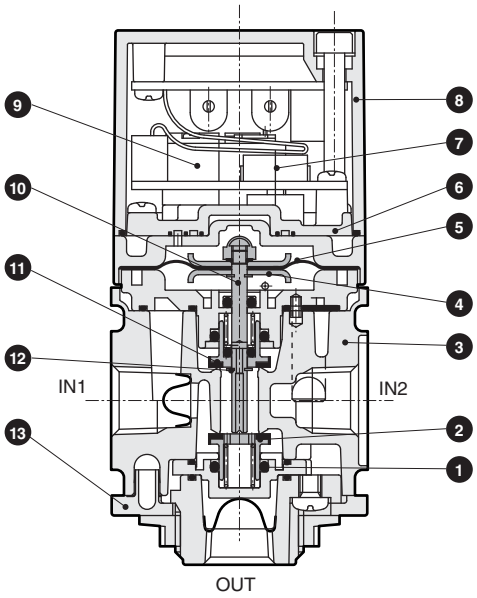
EV2109V —····— P70

Internal structure and parts list

● EV2100V



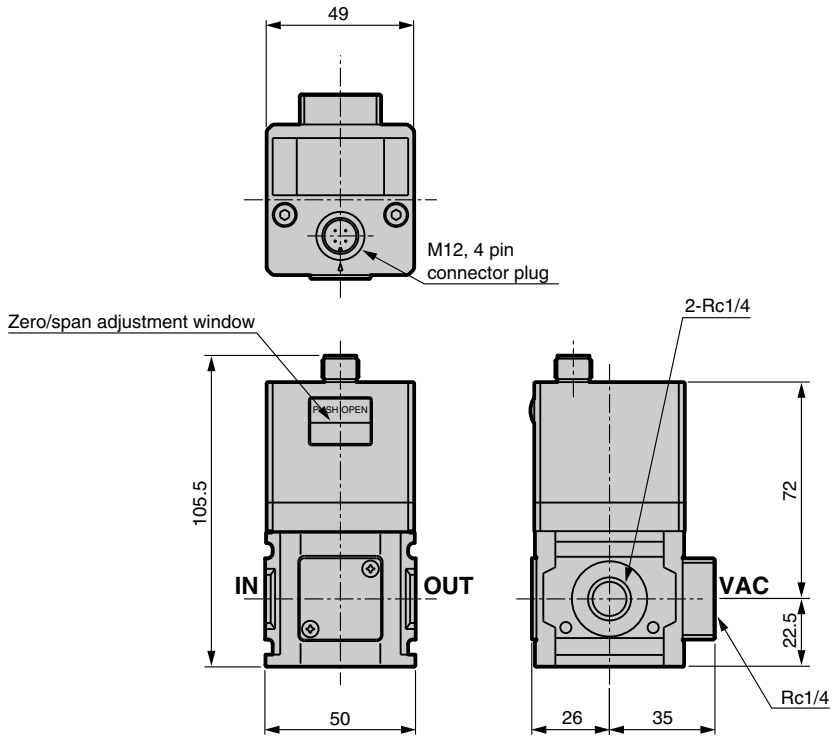
● EV2109V



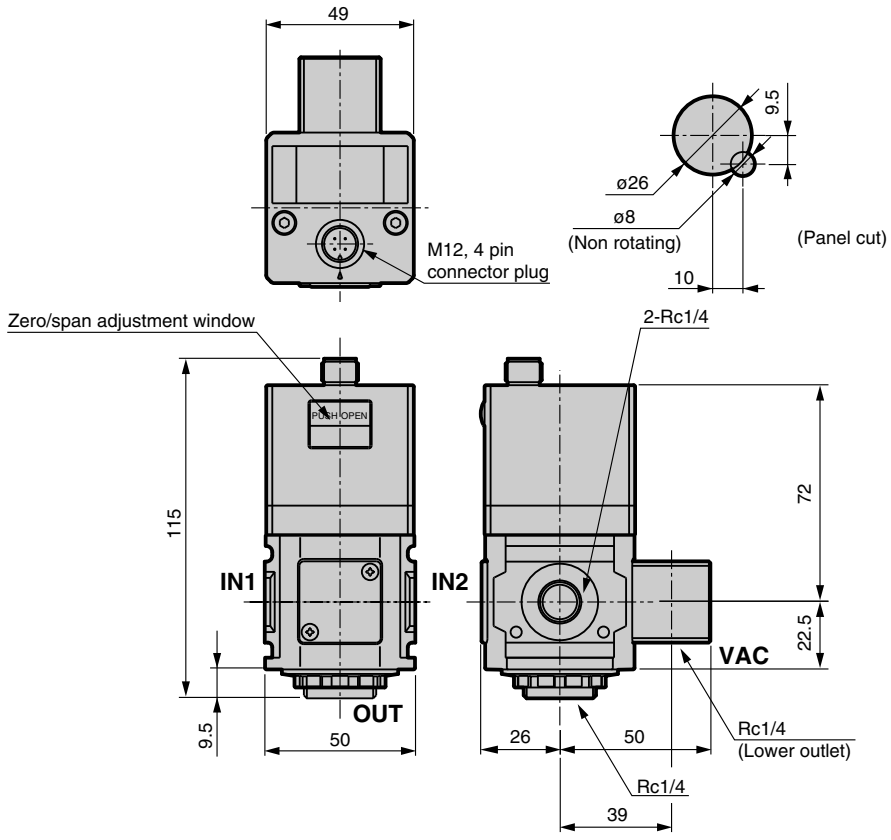
No.	Parts name	Material	No.	Parts name	Material
1	O ring	Fluoro rubber	8	Housing	ABS resin
2	Bottom valve	Brass, special nitrile rubber	9	3 way valve	
3	Body	Aluminum alloy die-casting	10	Rod	Stainless steel
4	Disk	Aluminum alloy	11	Top valve	Brass, special nitrile rubber
5	Diaphragm	Special nitrile rubber	12	E type snap ring	Steel
6	Valve base	Polyphenylene sulfide resin	13	Plate cover	ABS resin
7	Pressure sensor	Diffusion semiconductor			

Dimensions

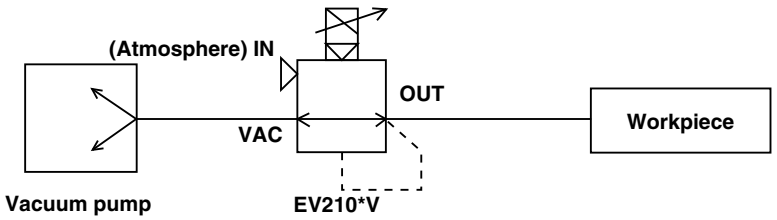
● EV2100V



● EV2109V



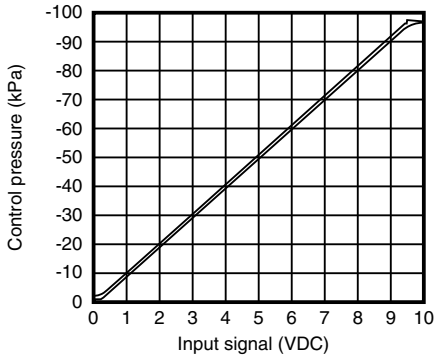
Piping method



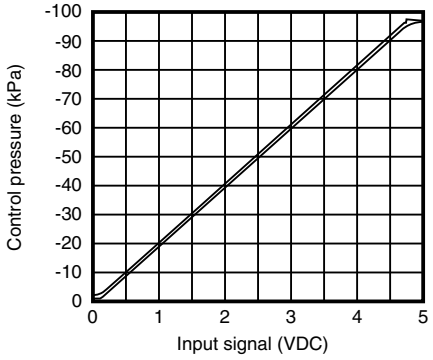
* Refer to the cautions (recommended circuit) on page 727 for details.

I/O characteristics

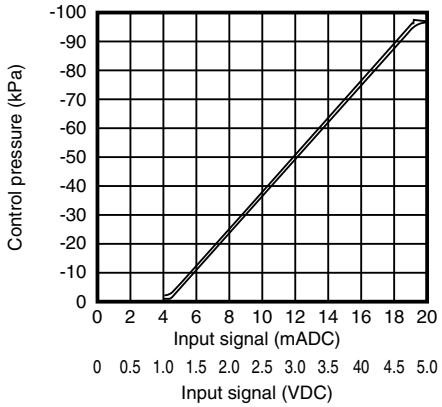
● Input signal 0-10 VDC



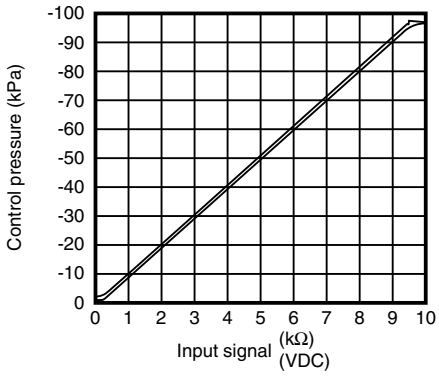
● Input signal 0-5 VDC



● Input signal 4-20mADC or 1-5 VDC

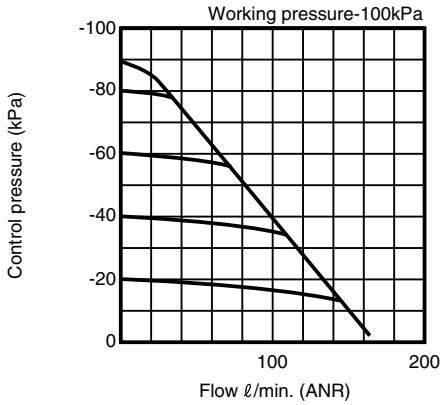


● Input signal 10kΩ variable resistance or 0-10 VDC

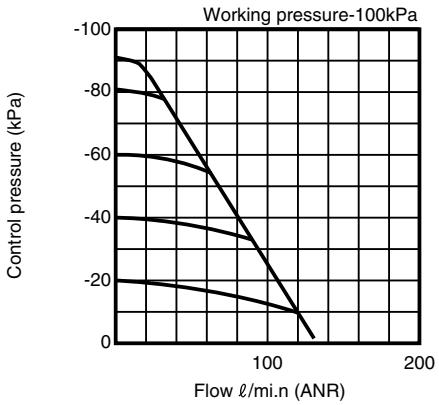


Flow characteristics

● EV2100V

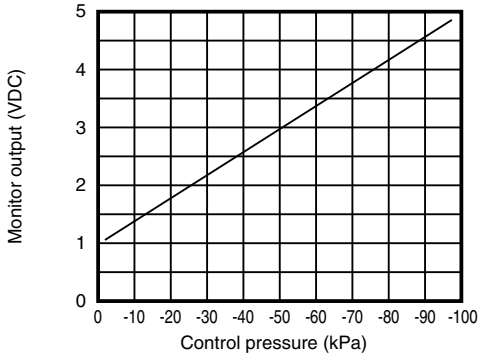


● EV2109V



Monitor output

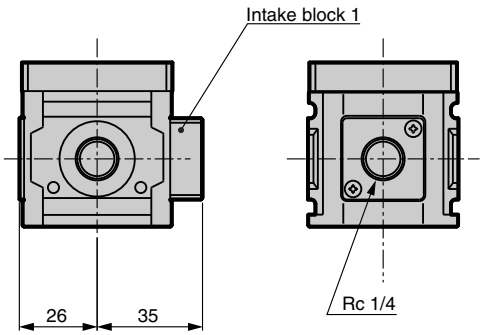
● EV2100V, EV2109V



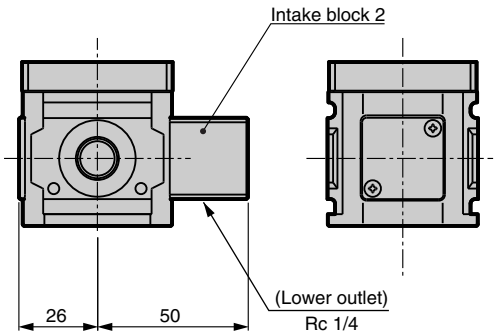
Option status

Optional embedded intake

● Standard (blank)

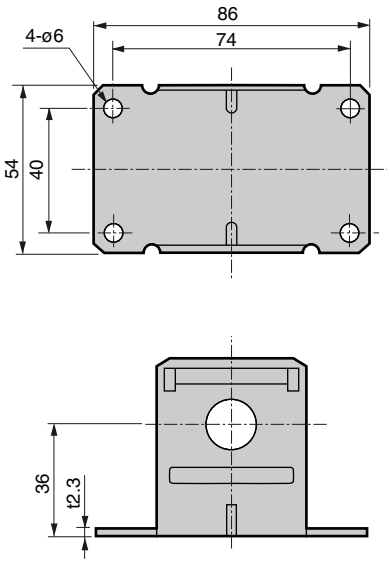


● -K1

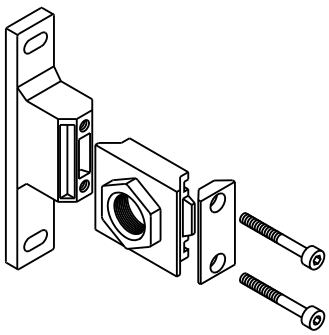


Bracket option

● Floor installation type: **-B4 (B type bracket)



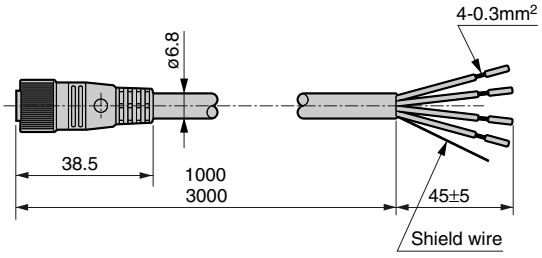
● Rear side installation type: **-T (T type bracket)



* An O ring and a gasket are included.

Note: Refer to page 391 for dimensions of T type bracket.

Cable option



-C1* shield/cable/connector

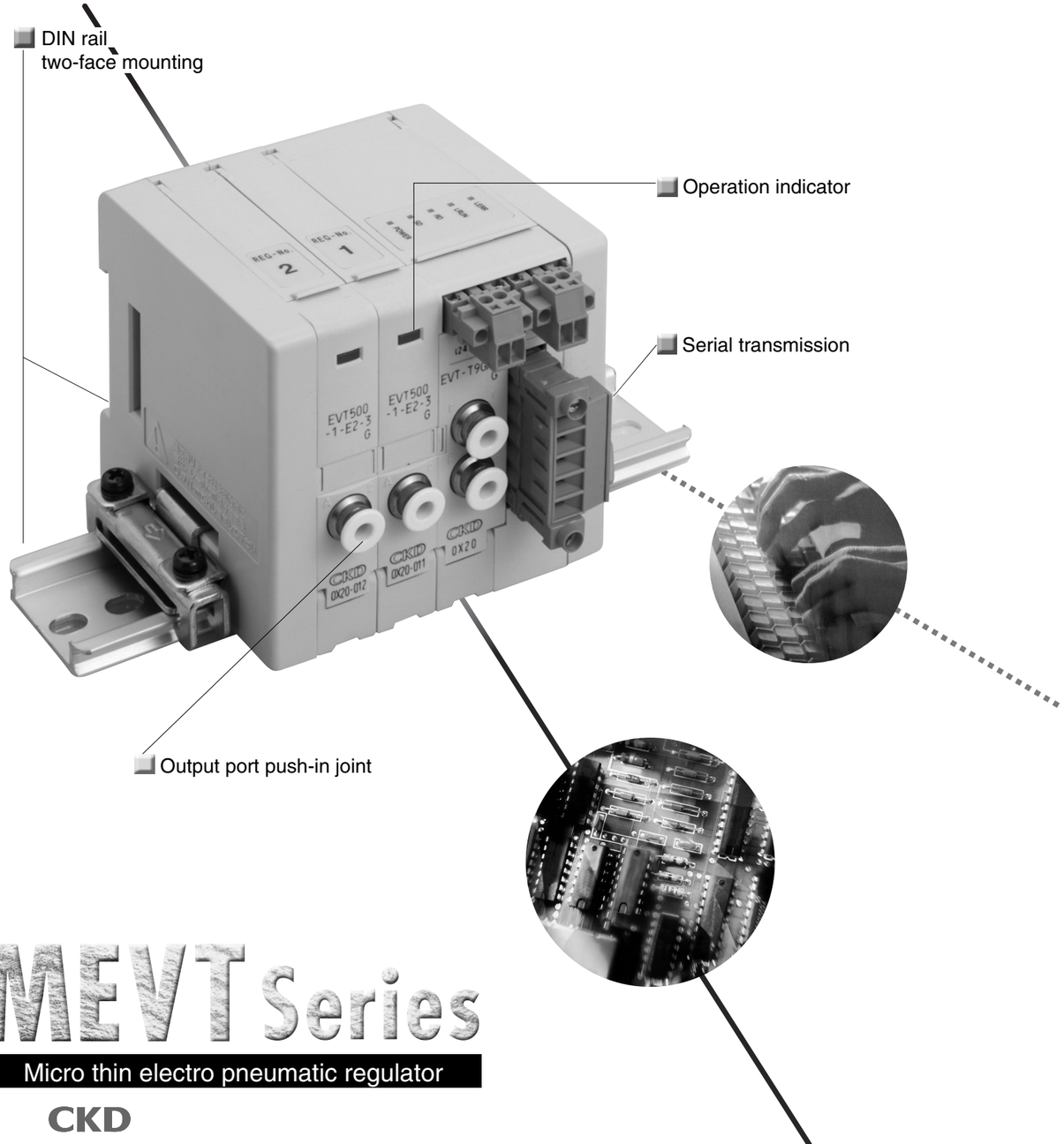
* Pin No.	Isolator color	Applications	Type of input signal			
			0-10V	0-5V	4-20mA 1-5V	10kΩVR (0-10V)
1	Red	Power supply ⊕	24V			
2	Green	—	Monitor output 1-5V			VR input terminal
3	Black	Common	0V			VR input terminal 0V
4	White	Input signal	0-10V	0-5V	4-20mA 1-5V	VR output terminal (0-10V)

If a cable connector is not used, following recommended cable sockets can be used. Anyway, use a shield wire cable.

Set screw type	ELW1KA4012 CORRENS (HIRSHMAN)
Axial type (solder)	XS2C-D421 OMRON
L type (solder)	XS2C-D422 OMRON

Advancing to ultra-precise micro system ranges

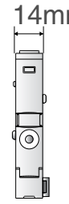
Manifold type thin electro pneumatic regulator compatible with PC control and reduced wiring.
Perfect for pressure control and fine speed cylinder control, etc., in semiconductor fields and precise processing fields, etc.



MEVT Series

Micro thin electro pneumatic regulator

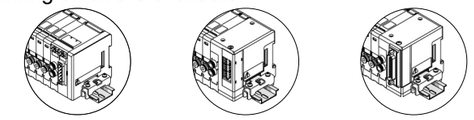
14mm thin and 80g light



With this high integration type, up to 24 manifold stations can be used.

Network-compatible

A serial transmission, common gland and D-sub connector wiring block are available.



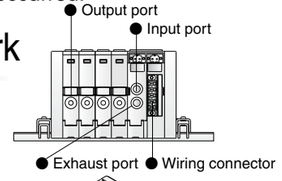
● Serial transmission type ● Common gland type ● D sub-connector type

2-color display of operation status

The 2-color operation indicator (PAT. PEND) indicates the green zone when pressure is at set pressure and the red zone when pressure is not within the setting or when an error has occurred.

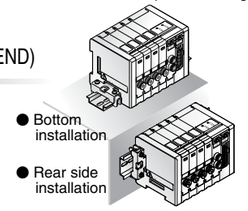
Easy piping and wiring work

Piping and wiring have been centralized on the front, improving workability and reducing space.



2 installation direction (PAT.PEND)

This regulator can be installed either on the bottom or on the back.
The surface for installation and work can be selected freely.



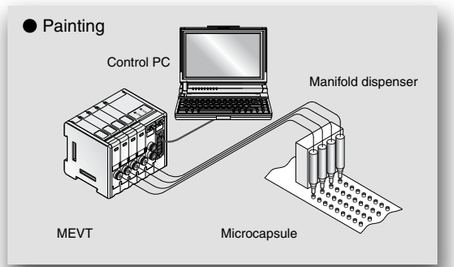
Precise/quick response

Fluid pressure is controlled at high accuracy and high speed response using electrical signals.
Repeatability is 0.3%F.S. and response time is 0.1 sec. (with no load)
* Refer to specifications

Environmental-friendly product

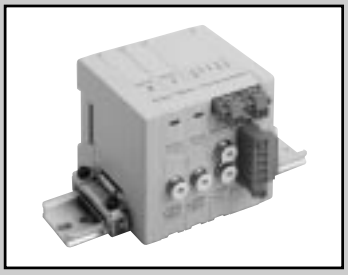
The material name is indicated on main components, making easy to sort parts for recycling.

Applications

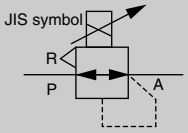


Other applications

- Fluid precise constant discharge system
  - · IC chip bondind
  - · PCB cream soldering
  - · PCB coating
  - · UV adhesive, etc.
- CMP grinder



Thin type Electro-pneumatic regulator
Reduced wiring manifold type
MEVT Series



RoHS CAD

Specifications (Note 1)

Descriptions		EVT100	EVT500
Working fluid		Clean compressed air (ISO 8573-1 Class 1.3.2 or equivalent or JIS B 8392-1 Class 1 1.3.2 or equivalent)	
Max. working pressure		200kPa	0.7MPa
Min. working pressure		Control pressure + max. control pressure x 0.1	
Withstanding pressure	Inlet side	300kPa	1.05MPa
	Output side	150kPa	0.75MPa
Control pressure range		0 to 100kPa	0 to 0.5MPa
Power voltage		24 VDC ±10% (safety power supply with ripple ratio 1% or less)	
Current consumption		0.1A or less	
Input signal (input impedance)		0 to 10 VDC (6.6kΩ) 0 to 5 VDC (3.3kΩ) 4 to 20mA	
Monitor output Note 2		1 to 5 VDC (load impedance 1kΩ and over)	
Insulation resistance		100MΩ (500 VDC mega) and over	
Withstand voltage		1500 VAC for one minute	
Hysteresis Note 3		0.4%F.S. or less	
Linearity Note 3		±0.5% F.S. or less	
Resolution Note 3		0.1% F.S. or less	
Repeatability Note 3		0.3%F.S. or less	
Temperature characteristics	Zero point variation	0.15%F.S./˚C or less	
	Span variation	0.07% F.S./˚C or less	
Maximum flow rate (ANR) Note 4		2ℓ/min.	6ℓ/min.
Step response Note 5	Loadless	0.1s or less	
	15cm³ load	0.5s or less	
Ambient temperature		5 to 50˚C	
Fluid temperature		5 to 50˚C	
Indicator Note 6		2 color indicator	
Lubrication		Not available	
Mounting attitude		Free	
Working environment		Containing corrosive gas is not permissible.	
Main dimensions		W14×D75×H75	
Port size		ø4, ø6 push-in joint (selection)	
Weight (body)		80g	

Note 1: Above characteristics are the values where power voltage is 24V±0.15 VDC, and measured at room temperature.
Note 2: Monitor output is not available for the serial transmission type.
Device Net-compatible (T9DAR) and CC-Link-compatible (T9GAR) types have pressure monitor data. (Refer to the serial transmission slave station specifications on page 819.)
Note 3: Working pressure is to be max. control pressure X1.1 (EVT100: 110kPa, EVT500: 0.55MPa), and the characteristics at control pressure 10 to100% are shown.
Limited to a closed circuit in the secondary side, the pressure may fluctuate if used air blow, etc.
Note 4: The characteristics where working pressure is maximum and control pressure is maximum are shown.
Note 5: Characteristics where working pressure is maximum, and step rates
- 50% F.S. → 100% F.S. are shown.
- 50% F.S. → 60% F.S.
- 50% F.S. → 40% F.S.

Note 6: Operational indicator is just for reference, but not to assure the accuracy.

Manifold specifications

Descriptions		Electric / supply and exhaust block	
		T11R/T30R	T9DAR/T9GAR
Manifold type		Block manifold	
Installation method		DIN rail mount type	
Air supply / exhaust method		Common supply / common exhaust	
Maximum station number		8 stations	12 stations *1
Port size	Output port (A)	ø4, ø6 push-in joint (selection)	
	Input (P)/exhaust port (R)	ø4, ø6 push-in joint (selection)	

*1: The maximum number of stations for one slave unit is four (T9DAR/T9GAR).

How to order

Manifold model no.

MEVT 500 - 0 C4 - T11R - 8 - U - 3

* Always indicate "Manifold specification sheet" (page 799).

Discrete EVT model no.

EVT 500 - 0 C4 — E2 — 3

Model no.

Ⓐ Control pressure range

Ⓑ Input control signal

Ⓒ Port size
Note 1
Note 2

Ⓓ Electric / supply and exhaust block

Ⓔ Lead wire type

Ⓕ Station number

Ⓖ DIN rail installation attitude

Ⓗ Voltage

Symbol	Descriptions
Ⓐ Control pressure range	
100	0 to 100kPa
500	0 to 0.5MPa

Ⓑ Input control signal

		Electric / supply and exhaust block			
		T11R	T30R	T9DAR	T9GAR
0	0 to 10 VDC	●	●		
1	0 to 5 VDC	●	●	●	●
2	4 to 20mA	●	●		

Ⓒ Port size (output port (A))	
C4	ø4 push-in joint
C6	ø6 push-in joint

Ⓓ Electric / supply and exhaust block	
T11R	Common gland type
T30R	D sub-connector type
T9DAR	Serial transmission type (Device Net input 4 point/output 4 point)
T9GAR	Serial transmission type (CC-Link Ver1.10 input 4 point/output 4 point)

Ⓔ Lead wire type

		Electric / supply and exhaust block			
		T11R	T30R	T9DAR	T9GAR
E2	4P connector	●	●	●	●

Ⓕ Station number		
1	1 station	
to		(Differs with the reduced wiring connection specifications.)
12	12 stations	(Refer to manifold specifications on page 778.)

Ⓖ DIN rail installation attitude	
U	Bottom side
B	Rear side

Ⓗ Voltage	
3	24 VDC

⚠ Note on selection guide

Note 1: Indicate port size of input (P)/exhaust (R) at electric/supply and exhaust block section.
Note 2: A filter is integrated to input (P)/output (A).

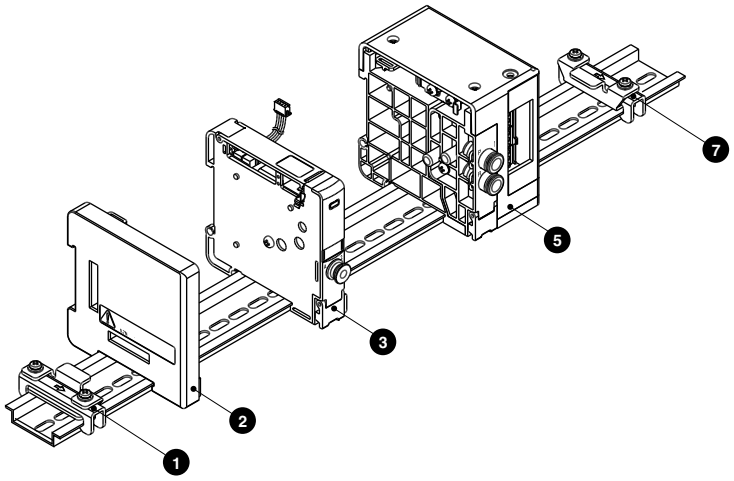
Clean room specifications (catalog No. CB-033S)

● Dust generation preventing structure for use in cleanrooms

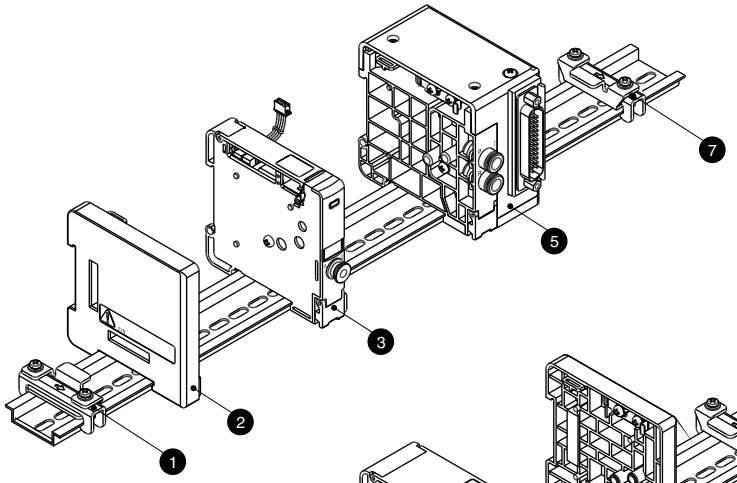
MEVT –·····– P70

MEVT component explanation and part list

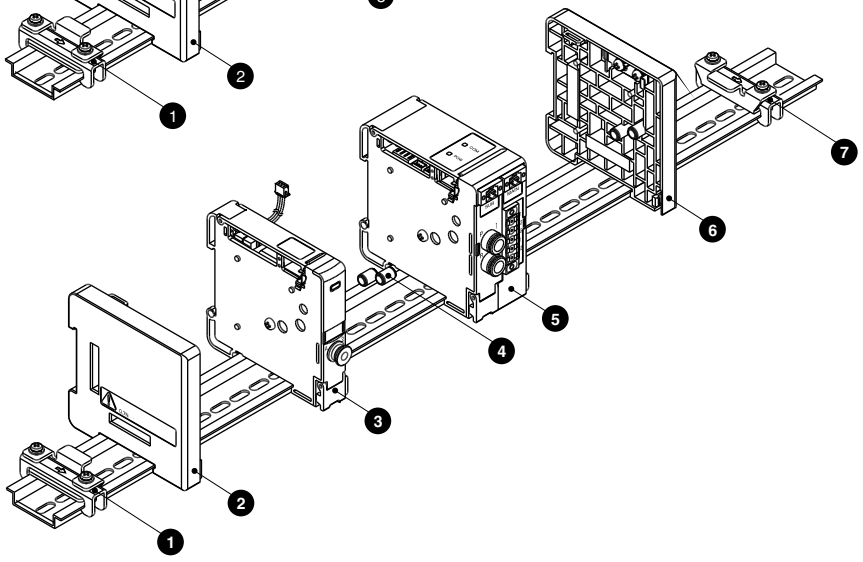
Common gland type



D sub-connector type



Serial transmission type



Main parts list

No.	Block configurations parts name	Model no.	No.	Block configurations parts name	Model no.
1	Retainer L	EVT-HL	5	Electric / supply and exhaust block	EVT-T*
2	End block L	EVT-EL	6	End block R	EVT-ER
3	EVT	EVT*00	7	Retainer R	EVT-HR
4	Piping joint	EVT-P			

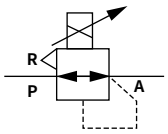
Weight

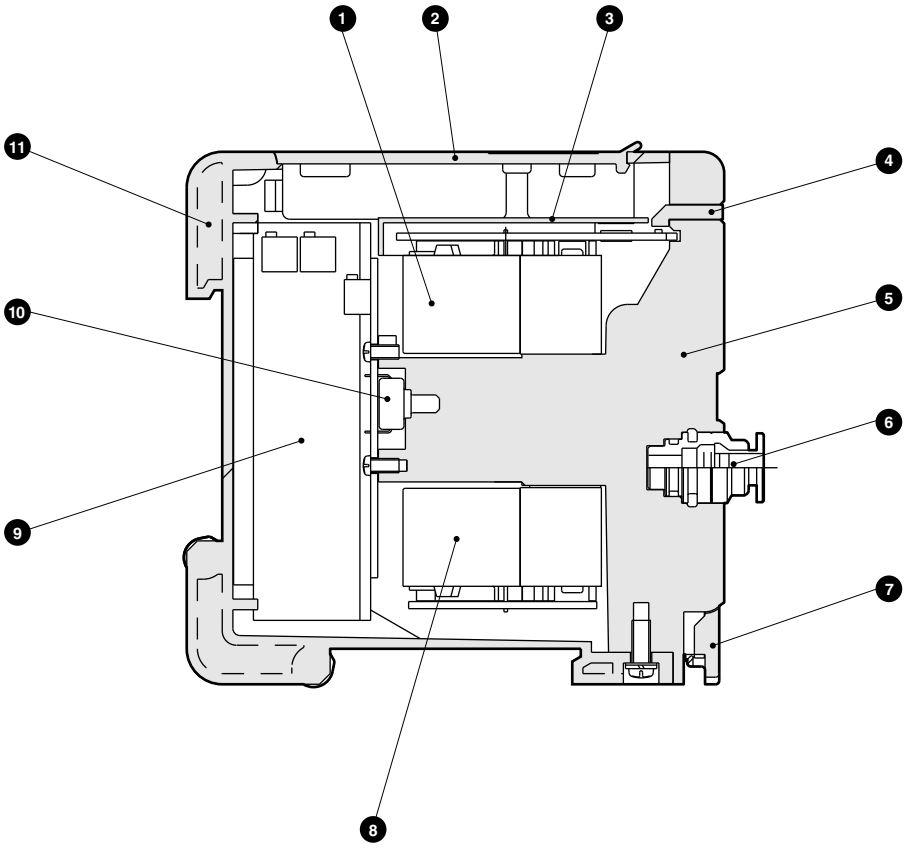
(g)

Block type		Weight	Block type		Weight
EVT	EVT*00	80	Electric / supply and exhaust block	T11R	115
End block	EVT-EL	30		T30R	125
	EVT-ER	30		T9*R	145
			Retainer	EVT-H*	25
			Piping joint	EVT-P	–

Internal structure and parts list

● EVT





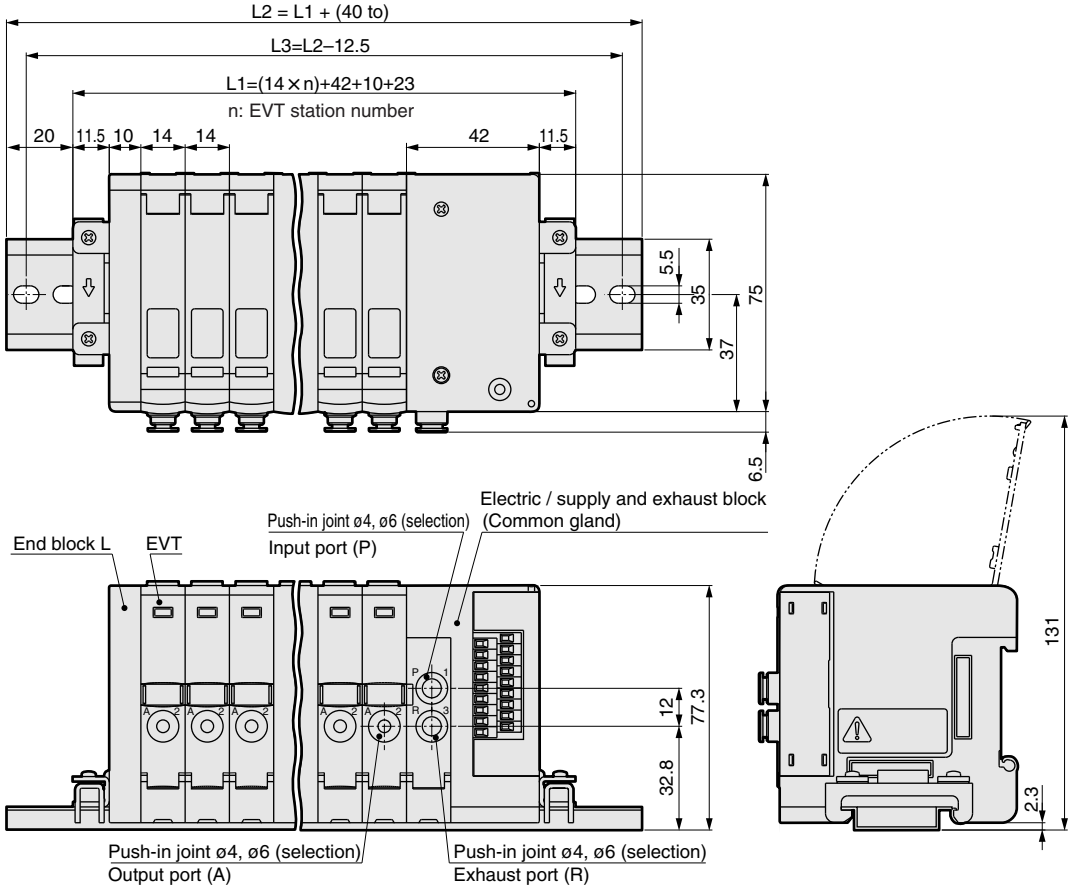
Main parts list

No.	Parts name	Material	No.	Parts name	Material
1	Solenoid valve		7	Connection hook plate	Polyamide resin
2	Wiring cover	ABS resin	8	Solenoid valve for exhaust	
3	Valve guard	ABS resin	9	Control circuit board	
4	Display lens	Polycarbonate resin	10	Pressure sensor	
5	Body	Polyamide resin	11	Case	ABS resin
6	Push-in joint				

Dimensions

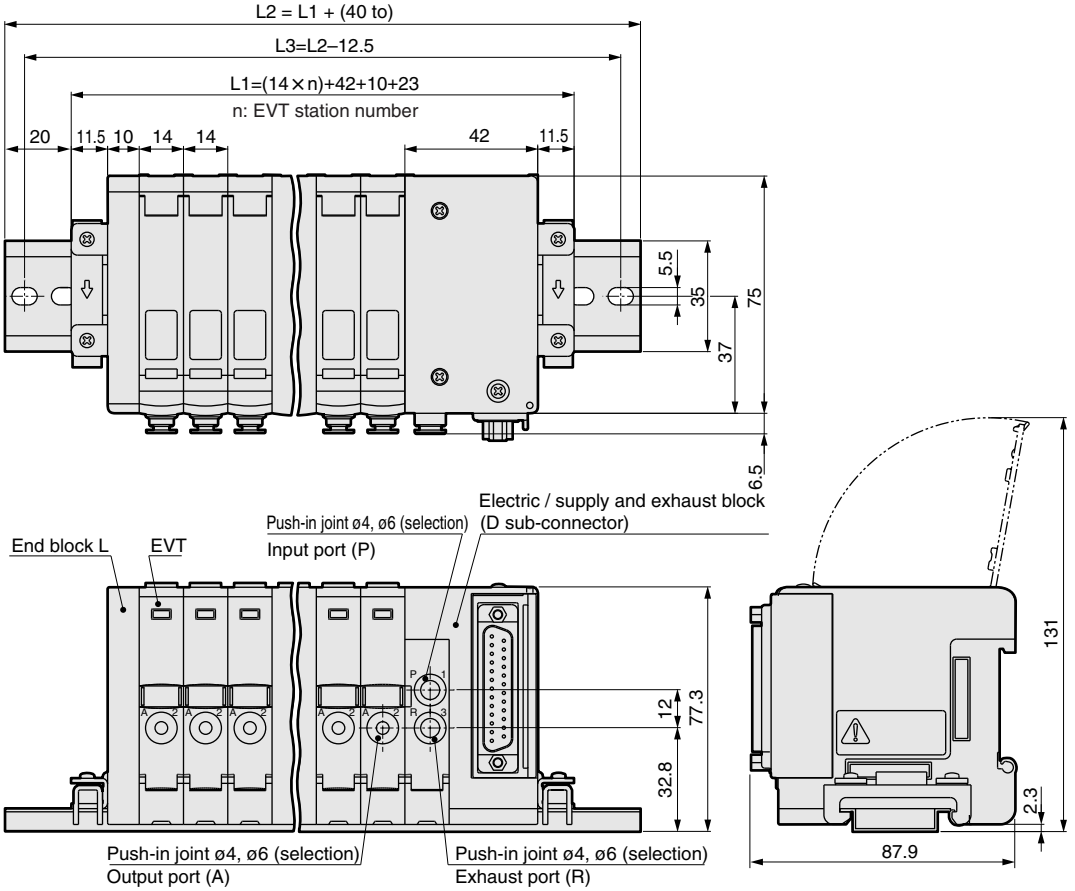
MEVT

● Common gland type (T11R)



MEVT

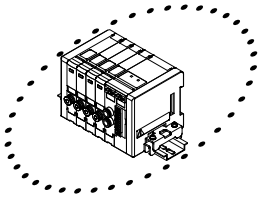
● D sub-connector type (T30R)

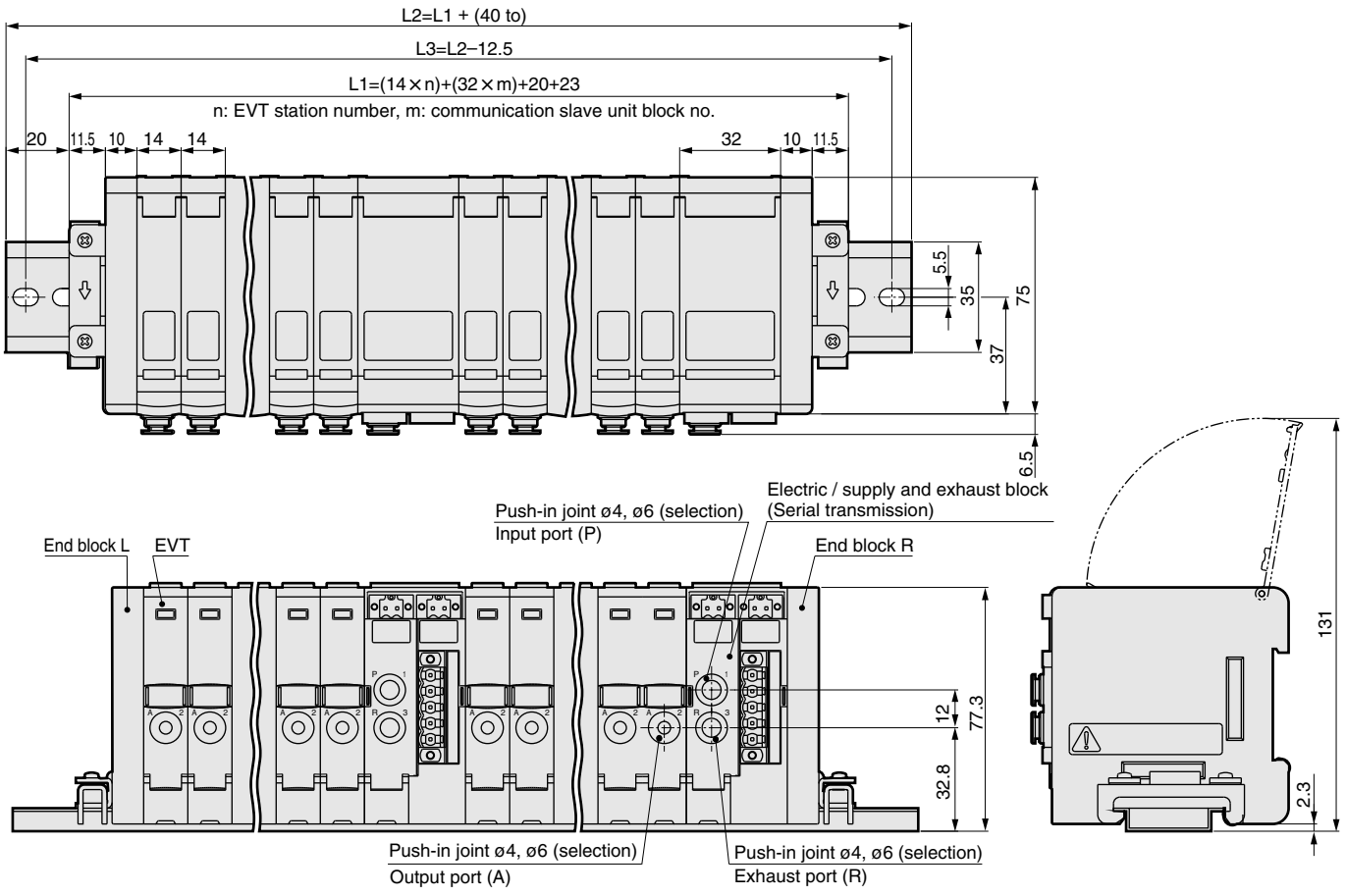


Dimensions

MEVT

● Serial transmission type (T9*)

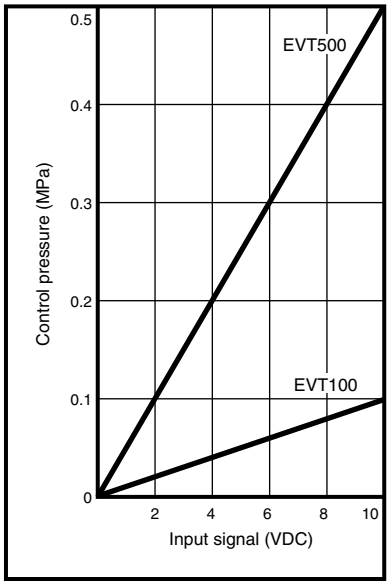




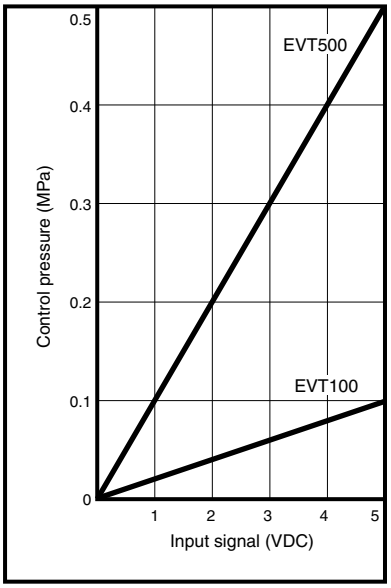
*1: The maximum number of stations for one slave unit is four (T9DAR/T9GAR).

I/O characteristics

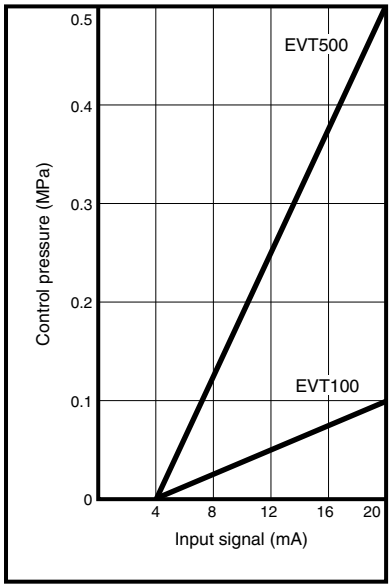
● Input signal 0-10 VDC



● Input signal 0-5 VDC

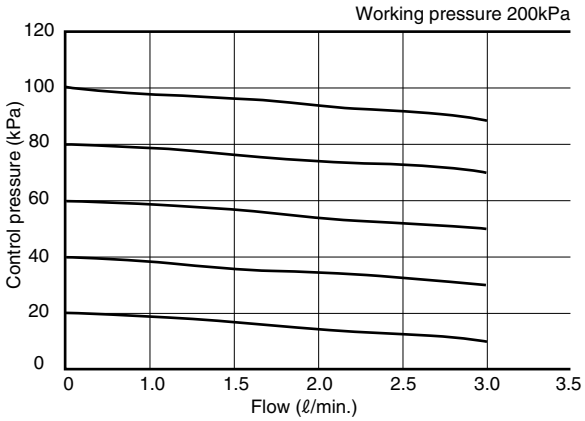


● Input signal 4-20mA

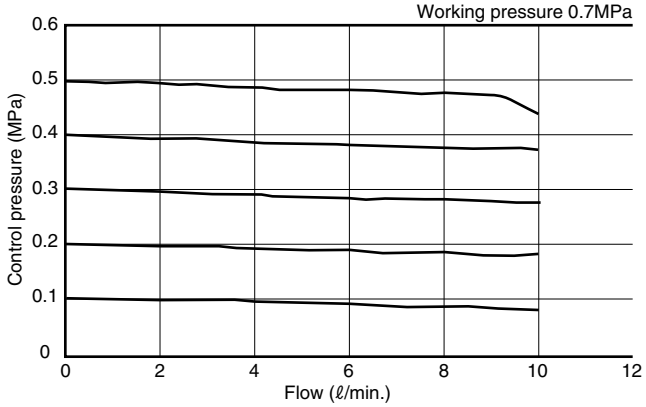


Flow characteristics

● EVT100



● EVT500



MEMO

MEVT: block configurations

● Discrete EVT

(1) Required station No. of EVT can be placed on DIN rail.
However, the maximum station No. is limited by method. (Refer to page 804.)

(2) Viewed from the joint, nominal station No. of EVT is assigned as 1, 2, 3, ··· from right.

(3) The REG-No. indicated on the EVT wiring cover is counted as 1, 2, 3, etc., from the nearest EVT for each electric and supply / exhaust block.

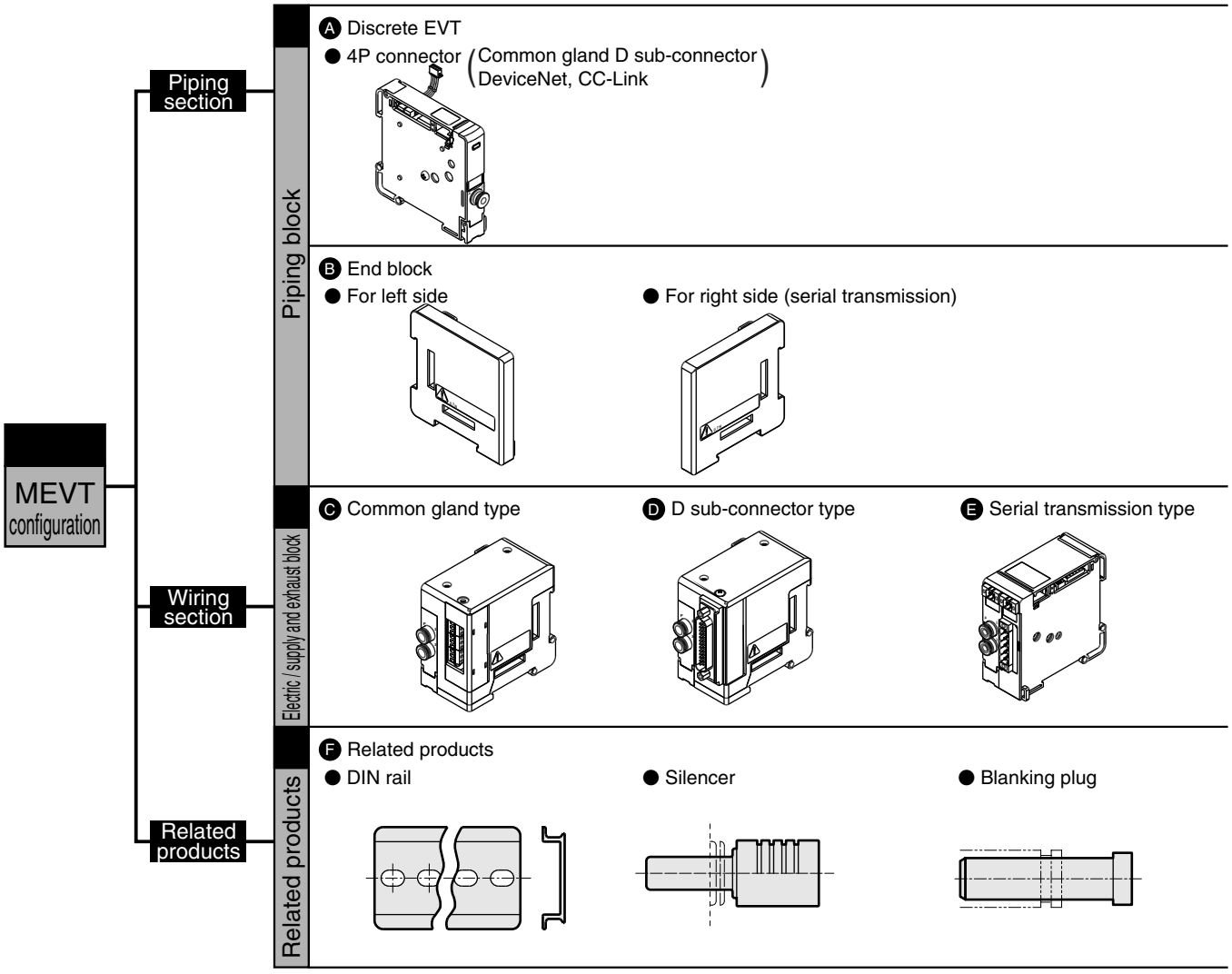
● Electric / supply and exhaust block

(1) Required number can be placed onto the connecting section per block.

● End block

(1) For serial transmission type, install the blocks to both sides.

(2) If common gland or D sub connector type, install this block on the contrary side of electric / supply and exhaust block.



Piping section

A.Discrete EVT

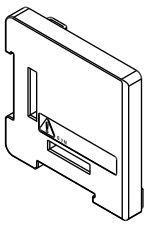
Refer to pages 778 to 779 for selection guide.

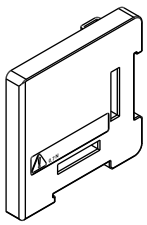
B.End block

For serial transmission type (T9*), install the block to both ends of manifold.
For common gland type (T11R) or D sub connector type (T30R), install the block on the contrary side of electric / supply and exhaust block.

EVT - E R
Model no. Ⓐ Type Ⓑ Installation position

Ⓐ Type		Ⓑ Installation position	
E	Common exhaust	L	For left side
		R	For right side (serial transmission)

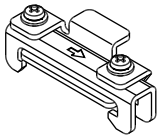


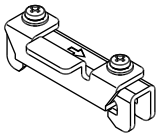


(Retainer)
Fix at both ends of manifold.

EVT - H R
Model no. Ⓐ Installation position

Ⓐ Installation position	
L	For left side
R	For right side



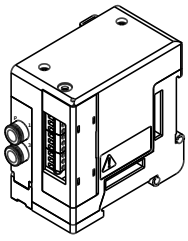


Electric / supply and exhaust block

C.Common gland type

EVT - T11R - C6
Model no. Type Ⓑ Input (P)/exhaust (R) port size

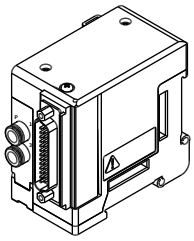
Ⓑ Input (P)/exhaust (R) port size	
C4	ø4 push-in joint
C6	ø6 push-in joint



D.D sub-connector type

EVT - T30R - C6
Model no. Type Ⓑ Input (P)/exhaust (R) port size

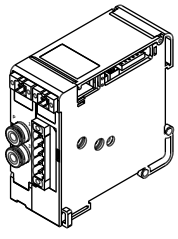
Ⓑ Input (P)/exhaust (R) port size	
C4	ø4 push-in joint
C6	ø6 push-in joint



E.Serial transmission type

EVT - T9DAR - C6
Model no. Ⓐ Type Ⓑ Input (P)/exhaust (R) port size

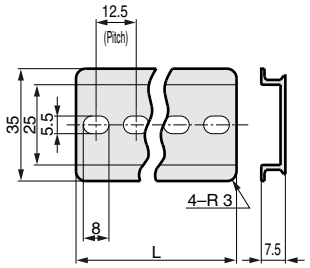
Ⓐ Type		Ⓑ Input (P)/exhaust (R) port size	
T9DAR	DeviceNet input 4 point/output 4 point	C4	ø4 push-in joint
T9GAR	CC-Link Ver1.10 input 4 point/output 4 point	C6	ø6 push-in joint



Related products DIN rail, silencer and blanking plug

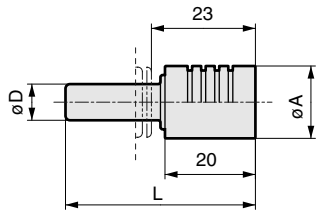
● DIN rail

EVT-BAA (length)



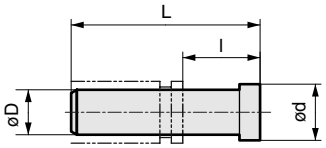
* Select <Length> from the DIN rail length selection table L2 on page 798.

● Silencer



Model no.	D	L	A
SLW-H6	ø6	41	16

● Blanking plug



Model no.	D	L	l	d
GWP4-B	ø4	27	9	6
GWP6-B	ø6	29	11	8

Common gland type (T11R): Wiring method

Notes when wiring

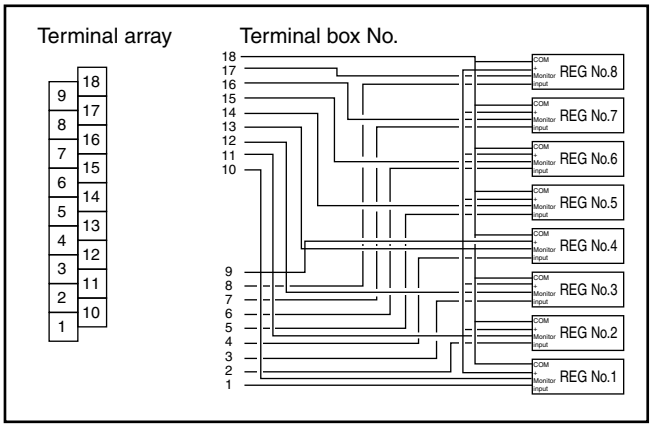
[Common gland type (T11R): Wiring method]

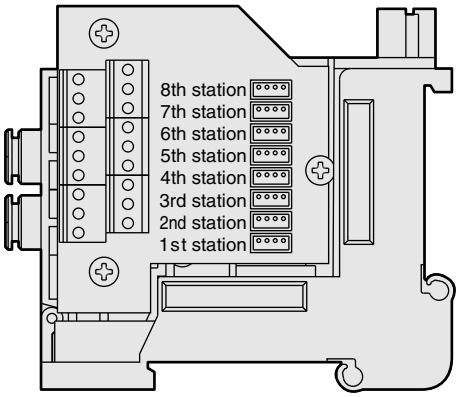
Viewed from piping port, station No. on EVT is **assigned from right.**

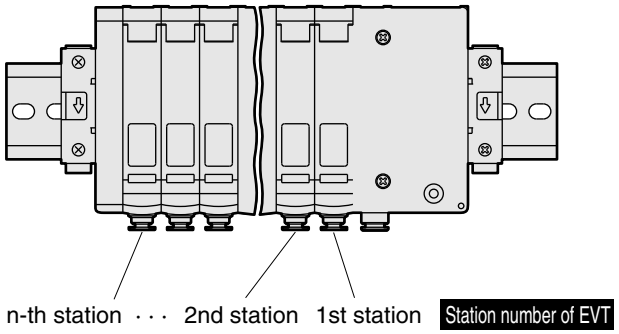
If voltage may drop depending on simultaneous communication or cable length, 4 - 20mA of current type is recommended for input signal.

Terminal box recommended screw tightening torque 0.25N·m

Internal wiring method of T11R (up to 8 stations for EVT)







Terminal array of wiring method T11R

* Maximum station number of EVT is 8 stations.

Terminal No.

18	17	16	15	14	13	12	11	10
9	8	7	6	5	4	3	2	1

(Standard wiring)

Terminal No.	18	17	16	15	14	13	12	11	10
Terminal array	COM	Monitor output 8	Monitor output 7	Monitor output 6	Monitor output 5	Monitor output 4	Monitor output 3	Monitor output 2	Monitor output 1
Terminal No.	9	8	7	6	5	4	3	2	1
Terminal array	Power supply +	Input signal 8	Input signal 7	Input signal 6	Input signal 5	Input signal 4	Input signal 3	Input signal 2	Input signal 1

D sub-connector type (T30R): Wiring method

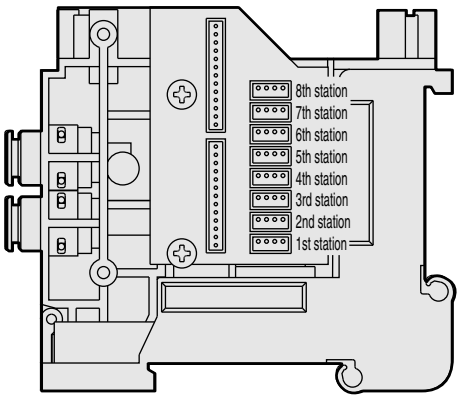
D sub-connector type (T30R)

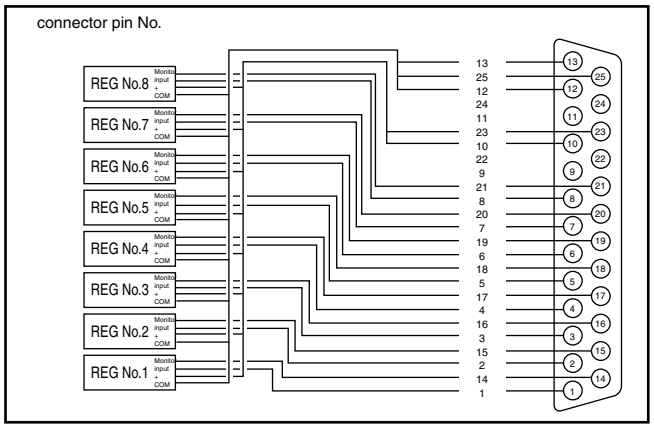
A connector used for wiring method T30R, is generally called as D sub connector and widely used in FA and OA components. Especially, 25P type complying RS-232C standards is a dedicating connector widely used in PC communication board.

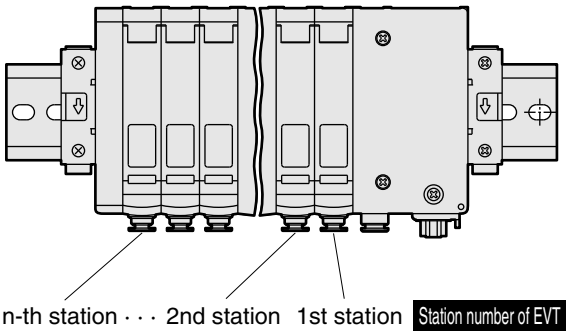
[Cautions for D sub connector type (T30R)]

Viewed from piping port, station No. on EVT is **assigned from right.**

If voltage may drop depending on simultaneous communication or cable length, 4 - 20mA of current type is recommended for input signal.

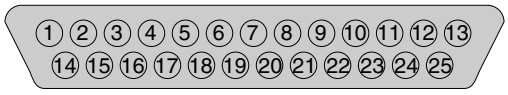






Connector pin array of wiring method T30R

* Maximum station number of EVT is 8 stations.



Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Pin array	Input signal 1	Input signal 2	Input signal 3	Input signal 4	Input signal 5	Input signal 6	Input signal 7	Input signal 8	(Void)	Power supply +	(Void)	COM	COM
Pin No.	14	15	16	17	18	19	20	21	22	23	24	25	
Pin array	Monitor output 1	Monitor output 2	Monitor output 3	Monitor output 4	Monitor output 5	Monitor output 6	Monitor output 7	Monitor output 8	(Void)	Power supply +	(Void)	COM	

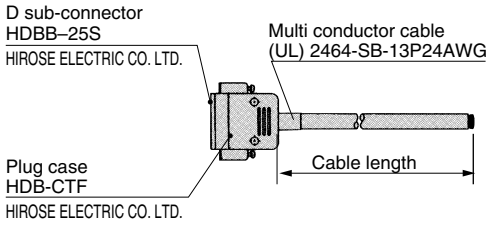
How to order cable with D-sub connector

EVT – CABLE – D00 – 1

	Symbol	Model: EVT
Ⓐ User interface	0	Only cut
	1	With round terminal for M3.5 screw
Ⓑ Cable length	1	1m
	3	3m
	5	5m

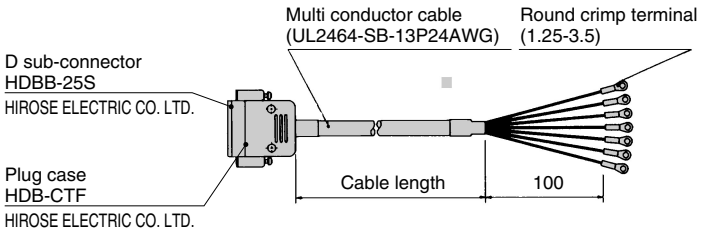
D sub-connector pin No. and conductor

● EVT-CABLE-D00-Ⓑ



D sub-connector pin No.		1	2	3	4	5	6	7	8	9	10	11	12	13
Conductor I.D.	Isolator color	Yellow	Green	Gray	White	Yellow	Green	Gray	White	Yellow	Orange	Green	Orange	Orange
	Mark type	1 point	1 point	1 point	1 point	2 points	2 points	2 points	2 points	3 points	1 point	3 points	1 point	2 points
	Mark color	Black	Black	Black	Black	Black	Black	Black	Black	Black	Red	Black	Black	Black
D sub-connector pin No.		14	15	16	17	18	19	20	21	22	23	24	25	
Conductor I.D.	Isolator color	Yellow	Green	Gray	White	Yellow	Green	Gray	White	Yellow	Orange	Orange	Orange	
	Mark type	1 point	1 point	1 point	1 point	2 points	2 points	2 points	2 points	3 points	2 points	3 points	3 points	
	Mark color	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Black	

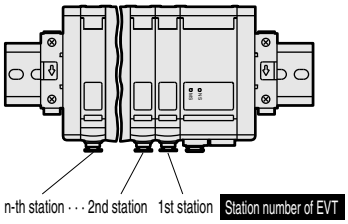
● EVT-CABLE-D01-Ⓑ



D sub-connector pin No.		1	2	3	4	5	6	7	8	9	10	11	12	13
Conductor I.D.	Isolator color	Yellow	Green	Gray	White	Yellow	Green	Gray	White	Yellow	Orange	Green	Orange	Orange
	Mark type	1 point	1 point	1 point	1 point	2 points	2 points	2 points	2 points	3 points	1 point	3 points	1 point	2 points
	Mark color	Black	Black	Black	Black	Black	Black	Black	Black	Black	Red	Black	Black	Black
Mark tube No.		1	2	3	4	5	6	7	8	Cut	10	Cut	12	13
D sub-connector pin No.		14	15	16	17	18	19	20	21	22	23	24	25	
Conductor I.D.	Isolator color	Yellow	Green	Gray	White	Yellow	Green	Gray	White	Yellow	Orange	Orange	Orange	
	Mark type	1 point	1 point	1 point	1 point	2 points	2 points	2 points	2 points	3 points	2 points	3 points	3 points	
	Mark color	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Black	
Mark tube No.		14	15	16	17	18	19	20	21	Cut	23	Cut	25	

Serial transmission type (T9*): Wiring method

[Serial Transmission type (T9*)]

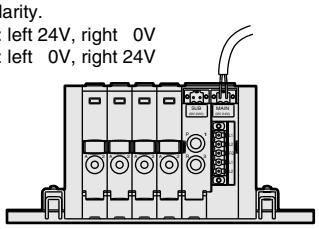


- The slave unit's output No. differs with the maker. The internal connector No. and EVT correspond as shown below.
- EVT station are set in order from the right facing the piping port regardless of wiring block supply / exhaust block positions.
- Since internal connectors are wired in order, if there are fewer EVT stations than total connectors, some connectors are left open. Do not use these open connectors for drives other than EVTs in use.
- Do not remove protective connectors connected to void connectors or a failure may occur.
- The working power is 24 VDC.
- The slave for each communication system is used. Consult with CKD for compatible PC and host station models and communication system specifications. (Refer to page 793)
- To ensure network reliability, use the communication cable recommended for each communication system.
- Securely fix the enclosed connector with set screw. (Refer to the right table)
- The USB power supply terminal is exclusively used as a crossover wire. When using independently, use only the MAIN power supply terminal. Do not apply power on both SUB and MAIN power supply terminals because a malfunction could occur.
- MAIN and SUB power terminals are connected internally. When not using the SUB power terminal, connect the enclosed connector to prevent short-circuiting.

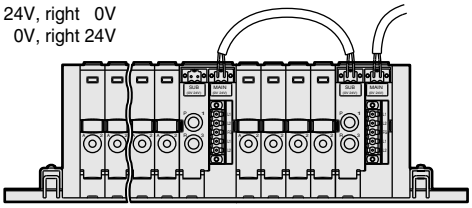
	Cable set screw	connector set screw
Power supply connector	0.25N·m	0.4N·m
Communication connector	0.5N·m	

[Wiring power cable]

When using one wiring block (electric, supply and exhaust block)
Connect the power cable to MAIN.
* Check power polarity.
T9DAR/T9GAR : left 24V, right 0V
T9LOR : left 0V, right 24V



When using more than one wiring block (electric, supply and exhaust block)
Connect one power cable to the first MAIN, and then from SUB to the next MAIN.
* Check power polarity.
T9DAR/T9GAR : left 24V, right 0V
T9LOR : left 0V, right 24V



*See the table below for the number of EVT stations.

EVT maximum station number

Slave unit (electric, supply and exhaust block) model no.	Communication system name	EVT maximum station number		
		When using 1 slave unit	When using 2 slave units	When using 3 slave units
T9DAR	DeviceNet	4 units	8 units	12 units
T9GAR	CC-Link	4 units	8 units	12 units

Up to three slave units can be connected per manifold.

Correspondence of wiring method T9* channel no. and connector no.

T9DAR

Channel No. (Pressure setting data)	0 (1)	1 (2)	2 (3)	3 (4)
Channel No. (Pressure monitor data)	0 (1)	1 (2)	2 (3)	3 (4)
Connector No. (REG No.) (EVT station number)	1	2	3	4

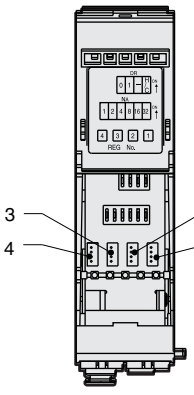
* The channel No. may be counted from "1" depending on the master.

T9GAR

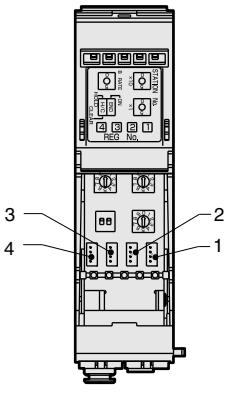
Channel No. (Pressure setting data)	1	2	3	4
Channel No. (Pressure monitor data)	1	2	3	4
Connector No. (REG No.) (EVT station number)	1	2	3	4

Internal connector No.

T9DAR



T9GAR



Serial transmission slave unit specifications (See the table below for the applicable PLC correspondence table)

Descriptions		T9DAR	T9GAR
Communication subject		DeviceNet *1	CC-Link Ver1.10 *2
Communication speed		125kbps/250kbps/500kbps	156kbps/625kbps/2.5Mbps/ 5Mbps/10Mbps
Power voltage		24 VDC ±10% *3 (Unit power supply, regulator power supply common terminal) Communication power supply (V +, V-): 11 to 25 VDC	24 VDC±10% *3 (Unit power supply, regulator power supply common terminal)
Current consumption		60mA or less Load current is not included Communication power supply (V +, V-): 50mA or less	80mA or less Load current is not included
Max. output no. (DA output)		4 points	
Max. input no. (AD input)		4 points	
DA output	Pressure setting data	12 bit	
	Precision *4	±1%F.S. or less	
AD input	Pressure monitor data	12 bit	
	Precision *5	±6%F.S. or less	
Occupied		Occupied output memory: 2 x n (byte) *6 Occupied input memory: 2 x n (byte) *6	Occupied unit No.: 1 station (Remote device station)

*1 Consult with CKD for EDS file .
*2 Consult with CKD for profile.
*3 To secure output accuracy, use safety power supply with 1% or less of ripple ratio.
*4 DA output accuracy does not include EVT accuracy.
*5 AD input accuracy includes EVT monitor accuracy.
*6 The slave unit's memory occupied by the PLC is determined by the number of EVT units (n) connected when the slave unit's power is turned on. (Note that if no units are connected, the memory for four units is occupied)

PLC table

Model no.	Maker name (progress body)	Series	Communication system name	Host station model no.
T9DAR	ODVA	Each Corp. DeviceNet compatible PLC, PC, SBC	DeviceNet	Connect to each maker's DeviceNet compatible master
	OMRON	SYSMAC CS Series SYSMAC CJ Series SYSMAC CV Series SYSMAC α Series SYSMAC C200HS Series Other sensors	DeviceNet (CompoBus/D)	Type CS1W-DRM21-V1 Type CJ1W-DRM21 Type CVM1-DRM21-V1 Type C200HW-DRM21-V1 Type ITNC-EI*01-DRM (master integrated PLC) Type 3G8B3-DRM21 (VME board) Other DeviceNet compatible master
	TOYODA	PC3J/2J Series PC3JD PC2F/PC2FS	DeviceNet (DLNK)	THK-5398 TIC-5642 (master integrated PLC) TFU-5359 Other DeviceNet compatible master
T9GAR	CLPA	Each Corp. CC-Link compatible PLC, PC, SBC	CC-Link	Connect to each maker's CC-Link compatible master
	MITSUBISHI	MELSEC A Series MELSEC QnA Series MELSEC Q Series Other sensors	CC-Link	AJ61BT11 AJ61QBT11 A1SJ61BT11 A1SJ61QBT11 QJ61BT11 A80BD-J61BT11 (PCI bus) Other CC-Link master

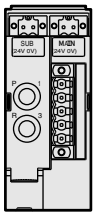
Model no.	LED display	Wiring and setting method

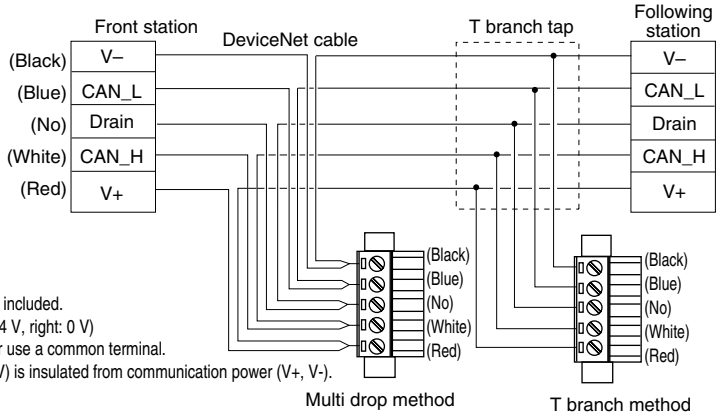
T9DAR

☐ NS
☐ MS

LED name	Display content
NS	Displays network status
MS	Displays slave unit's status

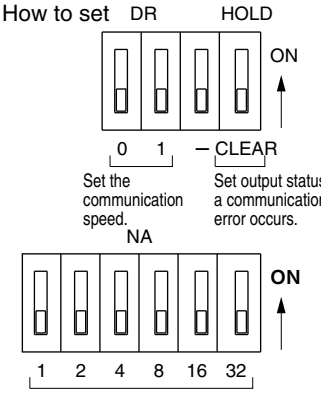
Wiring method





The wiring section connector is included.
Check power's polarity. (Left: 24 V, right: 0 V)
Unit power and regulator power use a common terminal.
The power connector (24 V, 0 V) is insulated from communication power (V+, V-).

How to set



Communication speed	0	1
125kbps	OFF	OFF
250kbps	ON	OFF
500kbps	OFF	ON
Setting not available	ON	ON

Setting HOLD/CLEAR

◆HOLD
If a communication error occurs, the status of output is held in the state just before the error occurred. (Only for set addresses)
Note: Output may not be held depending on the state of the error.
◆CLEAR
If a communication error occurs, all channels are turned off (0 data output to EVT). (Only for set addresses)

Cautions

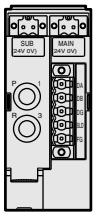
- Output to EVT is output simultaneously for all channels.
- Refer to the slave unit specifications for details on occupied memory.
- Contact CKD for information on the EDS file.

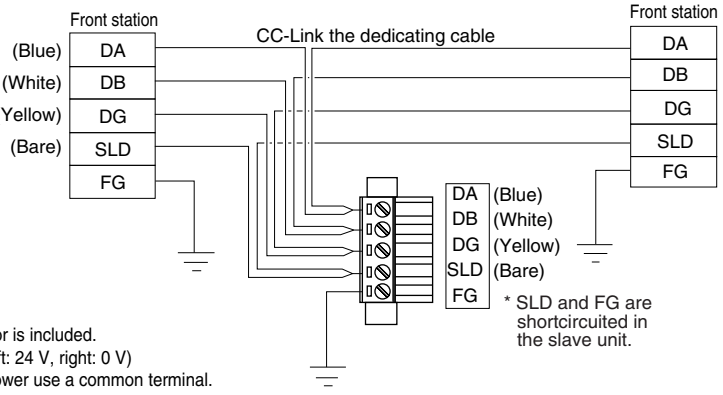
T9GAR

☐ LERR
☐ LRUN
☐ RD
☐ SD
☐ POWER

LED name	Display content
LERR	Lights when transmission error occurs. Turns off when time has lapsed. Lights when the station No. setting or transmission speed setting is incorrect. Blinks when the station number setting or transmission speed setting changes midway.
LRUN	Turns on when accuracy data is received, and turns off when time has lapsed. (Lights when correct data is received.)
RD	Turns on when receiving data.
SD	Turns on when sending data.
POWER	Lights when power is ON.

Wiring method

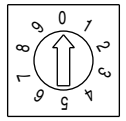




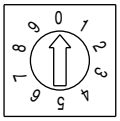
The wiring section connector is included.
Check power's polarity. (Left: 24 V, right: 0 V)
Unit power and regulator power use a common terminal.

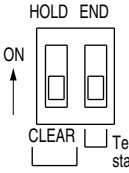
How to set

Set the transmission speed.
0 : 156kbps 3 : 5Mbps
1 : 625kbps 4 : 10Mbps
2 : 2.5Mbps 5 to : Setting not available

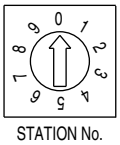

B RATE

How to set
Set the slave unit's station No. (1st place)


STATION No. (X1)



Terminal station setting
Set output status if a communication error occurs.


STATION No. (X10)
Set the slave unit's station No. (1st place)

Setting HOLD/CLEAR

◆HOLD
- When the "analog output enabling signal" flag turns off, output of the corresponding channel is held in the status just before the flag turned off.
- If a communication error occurs, the status of output is held in the state just before the error occurred. (Only for set addresses)
  Note: Output may not be held depending on the state of the error.

◆CLEAR
- When the "analog output enabling signal" flag turns off, all channels are turned off (0 data output to EVT).
- If a communication error occurs, all channels are turned off (0 data output to EVT). (Only for set addresses)

Terminal station setting

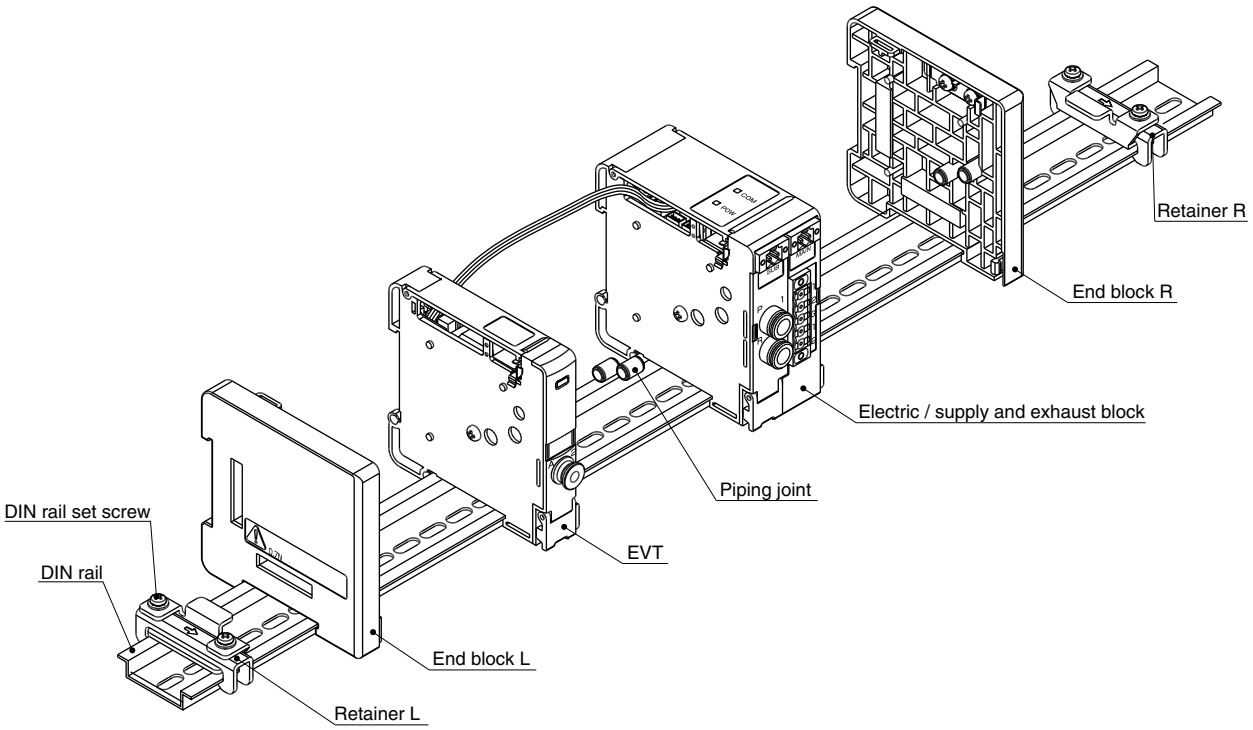
This product has a 110Ω terminator between DA and DB communication lines. The terminal station is set by turning the terminal station setting switch on. A terminator need not be connected to this product's connector.
<CAUTION>
Be sure to turn the terminal station setting switch off when this product is the terminal station and a CC-Link-dedicated cable (CC-Link dedicated high performance cable (Kurashige Denko FANCSBH) requiring a terminal resistance other than 110Ω is used for the communication cable. This also applies when the terminator's connection differs due to the T-branch connection. Connect a commercially available terminator or the one included with the master station to this product's connector based on connection conditions (specifications). Insulate this terminator.

Cautions

- Output to EVT is output simultaneously for all channels.
- Consult with CKD for information on PRO files.

MEMO

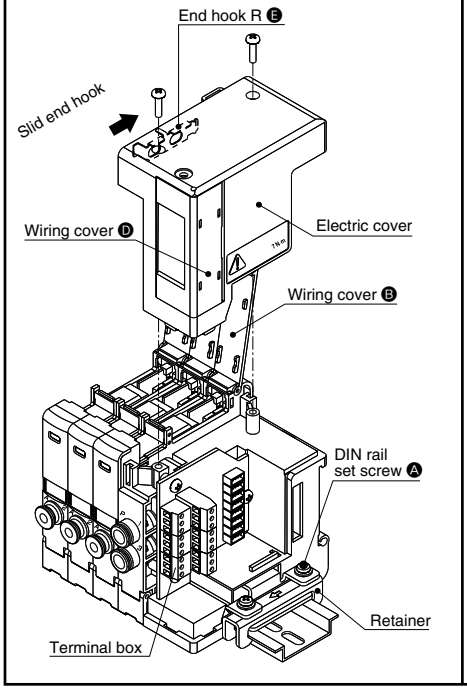
MEVT deal drawing



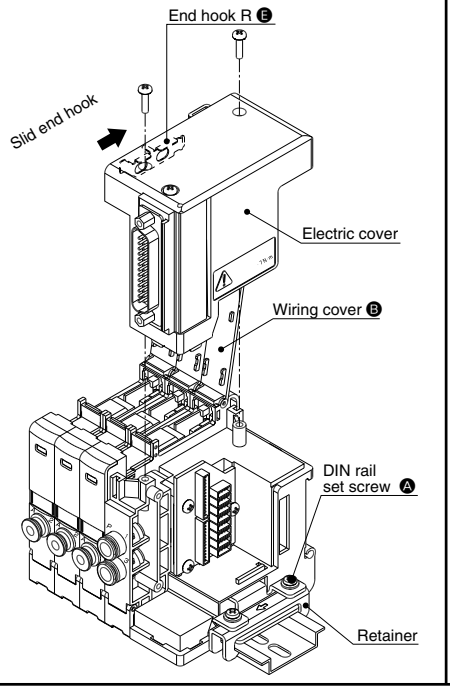
Increasing and reducing the EVT stations

1. Loosen the retainer's DIN rail set screw Ⓐ.
2. Open the EVT wiring cover Ⓑ.
3. When using the common gland or D-sub connector, slide end hook R Ⓔ and release the hook. Next, loosen and remove screws on the electric cover . For serial transmission, open the wiring cover Ⓒ. (For common gland, check that the wiring cover Ⓓ does not catch the gland.)

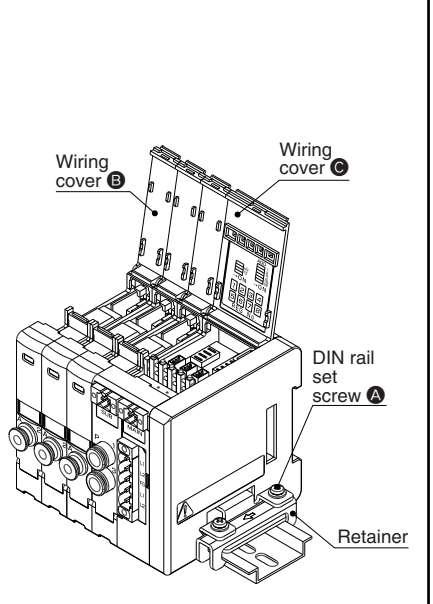
Common gland type (T11R)



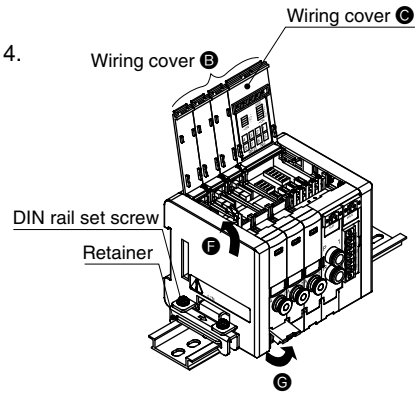
D sub-connector type (T30R)

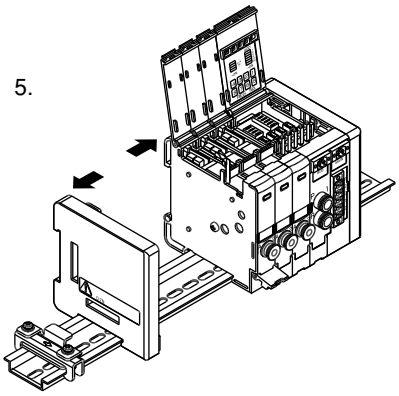


Serial transmission type (T9*)

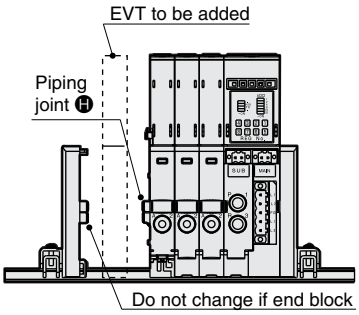


4. Remove the connecting hook spring Ⓕ and connecting hook plate Ⓖ where the manifold is to be increased, and remove the connection between blocks.
5. Separate blocks to be expanded.

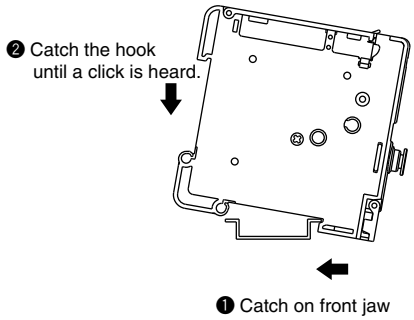




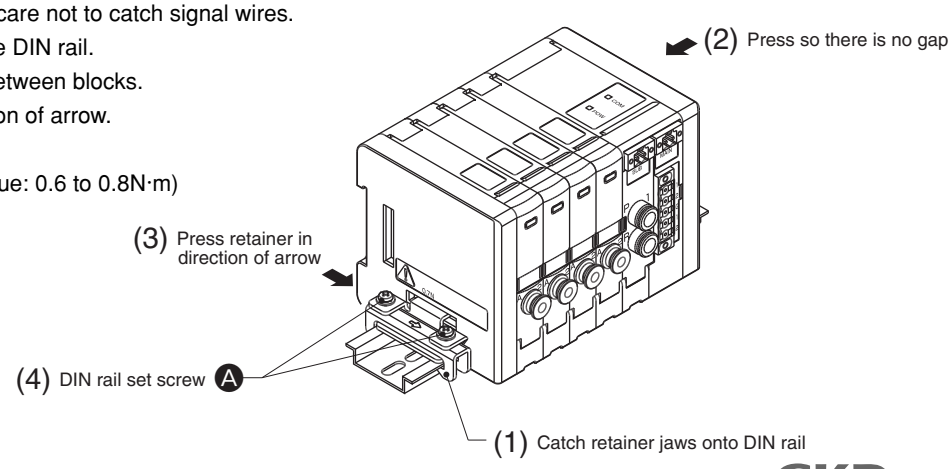
6. Insert two piping joints Ⓗ into the input (P) and exhaust (R) ports at the separated section.
(Note: At the separated section, two piping joints Ⓗ protrude from each side (4 joints in all)).



7. Mount the EVT to be added to the DIN rail.



8. Press so that there is no gap between blocks, and close the connecting hook spring Ⓕ and connecting hook plate Ⓖ to connect blocks.
9. Insert signal wires for the expended EVT to connectors in the wiring and supply / exhaust block.
10. For serial transmission, close the wiring cover Ⓒ . When using the common gland or D-sub connector, fit the electric cover on, fix it in place with screws, and return the end hook R Ⓔ to the original position.
(Tightening torque: 0.35 to 0.5N·m)
11. Close wiring cover Ⓑ while taking care not to catch signal wires.
12. (1) Catch the retainer jaws onto the DIN rail.
(2) Press so that there is no gap between blocks.
(3) Press the retainer in the direction of arrow.
(4) Tighten DIN rail set screw Ⓐ.
(Recommended tightening torque: 0.6 to 0.8N·m)



MEVT How to complete manifold specification sheet (Ver. 2)

● Manifold mode no. (example)

MEVT **500** — **0** **C4** — **T9DAR** — **12** — **U** — **3**

Model no. Ⓐ Pressure control range Ⓑ Control input signal Ⓒ Port size Ⓓ Electric / supply and exhaust block Ⓔ Station number Ⓕ DIN rail installation attitude Ⓖ Voltage

Part name	Model no.	Layout 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Quantity
EVT	EVT 500 - 0 C4		○	○	○	○		○	○	○	○		○	○	○	○																	12
	EVT - -																																
	EVT - -																																
	EVT - -																																
	EVT																																
Electric / supply and exhaust block	EVT-T 9DA R- C4						○					○					○																3
End block	EVT-EL (for left side)	○																															1
	EVT-ER (for right side)																	○															1
DIN rail	L2=	Attached part	Blanking plug GWP4-B			GWP6-B			Silencer SLW-H6																								

*1 DIN rail length (L2)

(1) Find DIN rail length by the calculation shown below.
The obtained length is standard.

(2) For standard length, length (L2) is not required on the specification sheet.
Indicate the length when using a non-standard length.
Select the length based on the following DIN rail length setting table L_2.

● How to calculate length of DIN rail

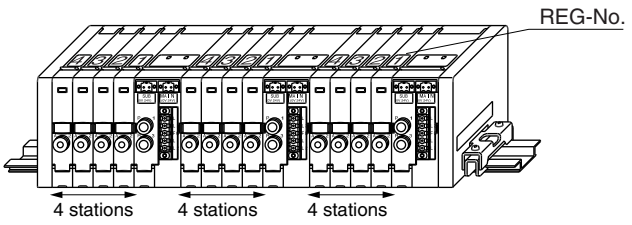
Manifold length (L_1) = $\overset{\text{EVT}}{(A \times n)} + \overset{\text{Electric / supply and exhaust block}}{(B \times m)} + \overset{\text{End block}}{(C \times 1)} + \overset{\text{Retainer}}{D \times 2}$

DIN raillength (L_2) = $L_2' \times 12.5$

$$L_2': \frac{L_1+40}{12.5} \rightarrow \text{round up at the decimal point}$$

DIN rail mounting pitch (L_3) = L_2 - 12.5

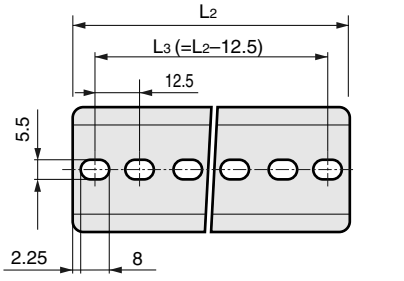
*2 Multiple combinations between serial transmission type
Multiple serial transmission types can be combined and installed on the same DIN rail.
(Maximum station number: 12 for T9DAR/T9GAR)
Install EVT or end block next to serial transmission slave unit.
Indicate the combination on the specification sheet.
Example) EVT: 12 stations, electric/supply and exhaust unit T9DAR: 4 point x 3



(Note)
· Viewed from piping port, allocation position is assigned from left.
· Select the type from the block part configuration (pages 786 to 788).
· Allocation numbers 1 to 31 on the table above are for reference. For REG-No. shown on wiring cover of EVT, numbers 1, 2, 3, ··· are allocated from nearer side per electric/supply and exhaust block connected.

n, m and l show usage per block.
n: EVT m: Electric / supply and exhaust block l:End block
A/B/C/D indicates length (depth) per block.

			Block width (mm)
A	EVT		14
B	Electric / supply and exhaust block	T11R	42
		T30R	42
		T9*	32
C	End block		10
D	Retainer		11.5



● DIN rail length setting table

L1: Manifold length	97.5 or less	97.5 to 110	110 to 122.5	122.5 to 135	135 to 147.5	147.5 to 160	160 to 172.5	172.5 to 185	185 to 197.5	197.5 to 210	210 to 222.5	222.5 to 235	235 to 247.5	247.5 to 260	260 to 272.5	272.5 to 285	285 to 297.5	297.5 to 310	310 to 322.5	322.5 to 335	335 to 347.5	347.5 to 360	360 to 372.5	372.5 to 385	385 to 397.5	397.5 to 410	410 to 422.5	422.5 to 435	435 to 447.5
L2: Rail length	137.5	150	162.5	175	187.5	200	212.5	225	237.5	250	262.5	275	287.5	300	312.5	325	337.5	350	362.5	375	387.5	400	412.5	425	437.5	450	462.5	475	487.5
Pitch L3	125	137.5	150	162.5	175	187.5	200	212.5	225	237.5	250	262.5	275	287.5	300	312.5	325	337.5	350	362.5	375	387.5	400	412.5	425	437.5	450	462.5	475

Note 1: When L1 exceeds this table range, calculate according to "How to calculate DIN rail length".

MEVT Manifold specification sheet (Ver.2)

● Manifold model no.

MEVT ☐ — ☐ ☐ — ☐ — ☐ — ☐ — ☐

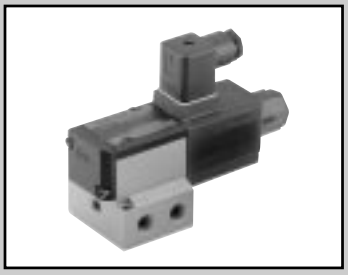
Model no.

Ⓐ Pressure control range / Ⓑ Control input signal / Ⓒ Port size / Ⓓ Electric / supply and exhaust block / Ⓔ Station number / Ⓕ DIN rail installation attitude / Ⓖ Voltage

Part name	Model no.	Layout 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Quantity
EVT	EVT ☐-☐ ☐																																
	EVT ☐-☐ ☐																																
	EVT ☐-☐ ☐																																
	EVT ☐-☐ ☐																																
	EVT ☐-☐ ☐																																
Electric / supply and exhaust block	EVT-T ☐ R-☐																																
End block	EVT-EL (for left side)																																
	EVT-ER (for right side)																																

DIN rail		Attached part	Blanking plug				Silencer	
	L2= ☐		GWP4-B		GWP6-B		SLW-H6	

- Viewed from piping port, allocate positions from left.
- As shown on the wiring cover of EVT, REG-No. is assigned as 1, 2, 3, ··· per electric/supply exhaust block from the nearest side.
- Install electric/supply and exhaust block to right side of EVT.
  Serial transmission type allows left installation. Consult with CKD.



Proportional control valve

3AP/$\frac{2}{3}$AF Series

Variable controlling pressure/flow rate with 0 to 10 V of voltage input (DC).
Flexibly controlling thrust / flow rate / position / cushion, etc.

Overview

In CKD proportional control valves, both pressure control (3AP) type with regulator, and flow rate control type with metering valve (2 way vale: 2AF, 3 way valve: 3AF) are available. Combined with a signal input controller according to applications, continuous variable controlling thrust/speed/cushion effect, etc., of a cylinder, never achieved before, is enabled.

Features

Using proportional control valve, flexible and constant operation controls of a pneumatic cylinder and other actuators are enabled.

● Flexible control

● High speed response / high precision

CKD original plunger mechanism and low friction design. Superior response time and high precision due to precise machining technology.

● Low noise level / low vibration

Noise and vibration are very low level due to design.

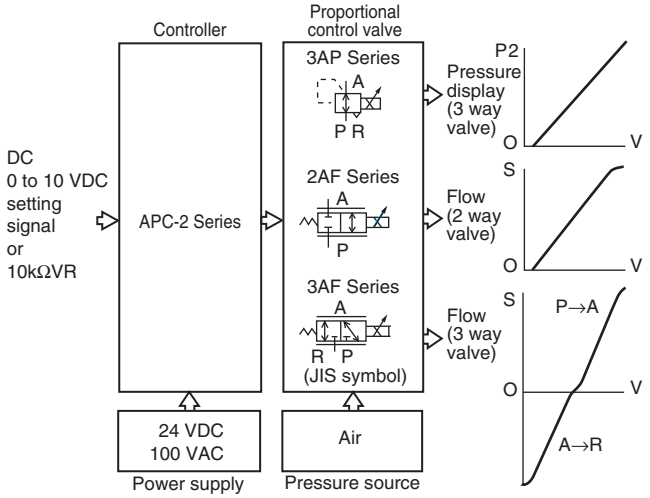
● Common exhaust method

Common exhaust method of type with bleed port This product can be used where contamination is inhibited, vice versa, many dusts are present.

● Compact design

Compact design for all controller for space saving.

System configuration



Specifications

Descriptions	3AP	2AF/3AF
Working fluid	Clean compressed air (refer to page 760 for recommended air circuits)	
Working pressure range	0.1 to 0.97MPa	0 to 0.97MPa
Control range	Refer to the model no. table below.	
Withstanding pressure	1.47MPa	
Rated current	780mA (max. control current)	
Coil resistance	19.5Ω (20˚C)	
Max. temperature rises	80˚C or less (780mA)	
Insulation class	Class B JIS C4003	
Working temperature	5 to 50˚C	
Lubrication	ISO VG32 (oil-free permissible)	
Mounting attitude	tobe installed with horizontal coil section	
Hysteresis	3%F.S. or less	7%F.S. or less
Linearity	2.5%F.S. or less	–
Step response hour	200ms or less Note 1	200ms or less
Port size	Rc1/4, 3/8	
Weight	1.18kg	

Note 1: For load volume 300cm^3

How to order

2AF **2** – **08**

Ⓐ Model no.

Ⓑ Control range Note 1

Ⓒ Port size

Symbol	Descriptions
Ⓐ Model no.	
2AF	2 way valve/control subject: flow
3AF	3 way valve/control subject: flow
3AP	3 way valve/control subject: pressure

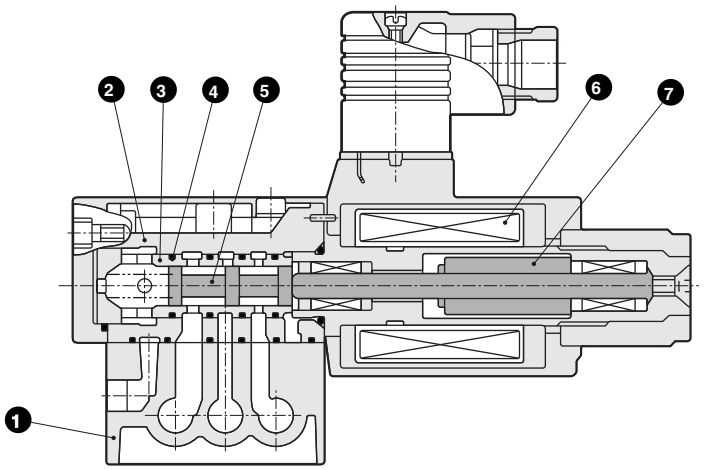
Ⓑ Control range			
Model no.	2AF	3AF	3AP
	Max. effective sectional area	Max. effective sectional area	Pressure range
2	20mm^2	17mm^2	0.05 to 0.59MPa
3	16mm^2	11mm^2	
4	10mm^2	6mm^2	
5	5mm^2	3mm^2	

Ⓒ Port size	
08	Rc1/4
10	Rc3/8

Note on model no. selection

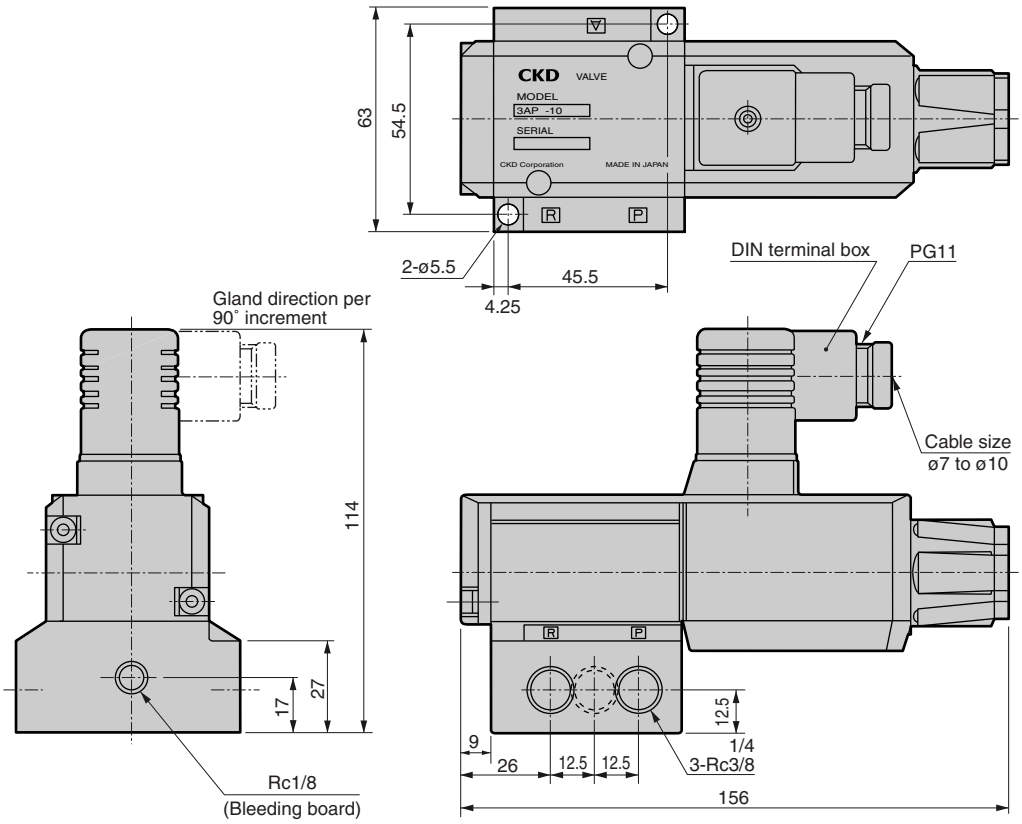
Note 1: Maximum effective sectional area is the value for discrete product.
Note that the total effective sectional area may vary per effective sectional area before and after the product.

Internal structure and parts list



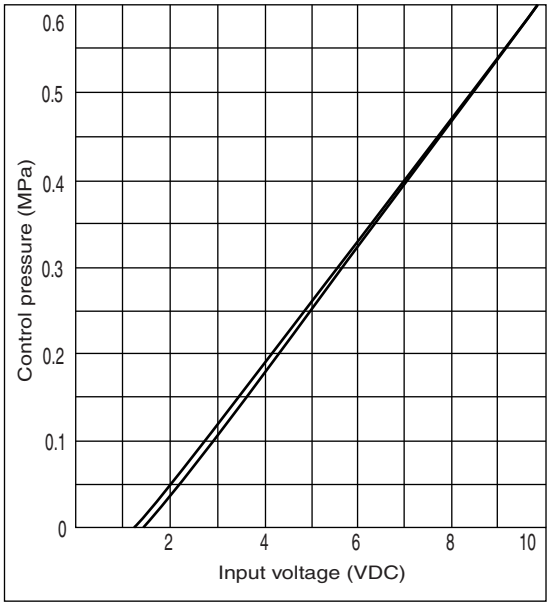
No.	Parts name	Material	No.	Parts name	Material
1	Sub-plate	Aluminum alloy die-casting	5	Spool	Stainless steel
2	Body	Aluminum alloy die-casting	6	Molded coil	
3	Sleeve	Stainless steel	7	Cartridge	
4	O ring	Nitrile rubber			

Dimensions

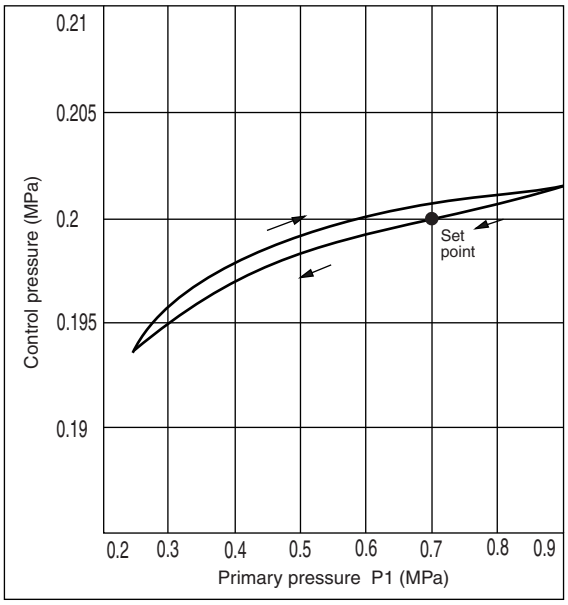


Pressure control type

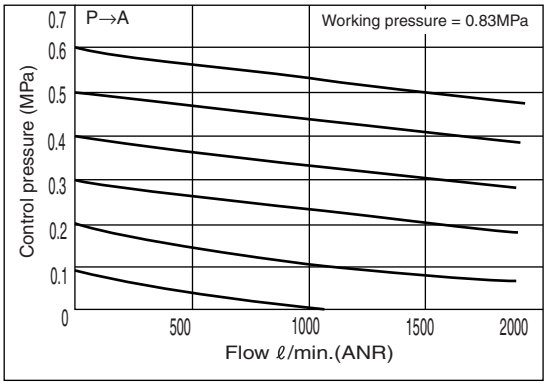
● I/O characteristics



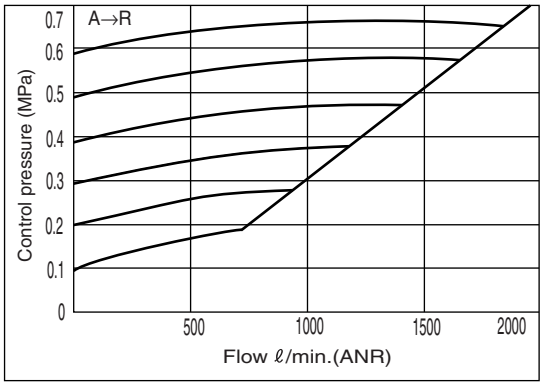
● Pressure control characteristics



● Flow characteristics

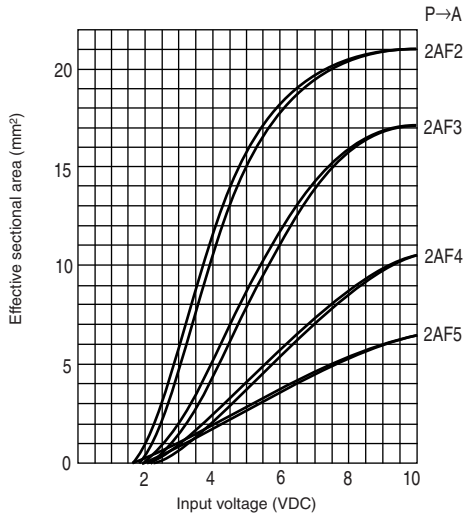


● Relief characteristics

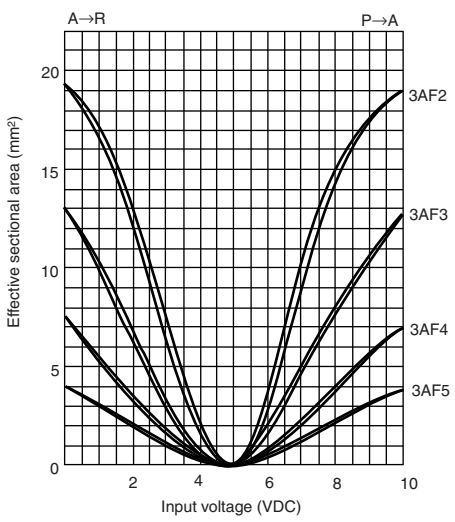


Flow control type

● I/O characteristics 2AF



● I/O characteristics 3AF



MEMO

Controller

APC Series

Dedicated control component required for driving proportional control valves

Overview

This is an amplifier to control current of proportional valve (780mA) with 0 to 10 V of input signal. Dither is applied to impressed current with PWM method at the same time. This controller draws maximum performance of proportional valve.

Specifications

Descriptions	DC power supply type	AC power supply type
Power voltage	24 to 30 VDC (ripple ratio 1% or less)	100AC±10% (50/60Hz)
Power consumption	30W or less	40VA or less
Output current/applicable models	0 to 780mA/ (3AP.2AF.3AF)	
Input impedance	100kΩ	
Set input voltage	0 to 10 VDC	
External potentiometer	10kΩ (1/8W)	
Span adjusting range	50 to 90mA/V (increase ratio in output current for set input voltage)	
Zero point adjusting range	0 to 250mA	
Delay adjusting range	10ms to 1s	
Dither frequency adjusting range	125 to 200Hz	
Output current vs. impedance change	1% or less for 19.5 to 26Ω (780mA F.S. rated voltage)	
Output current vs. power supply variation	1% or less for power source range (780mA F.S. impedance 19.5Ω)	
Output current vs. temperature fluctuation	±0.04%/˚C (780mA F.S. rated voltage)	
Working temperature	0 to 50˚C	
Use humidity	0 to 85%R.H.	
Storage temperature	–10 to 65˚C	
Weight	0.60kg	1.64kg

How to order

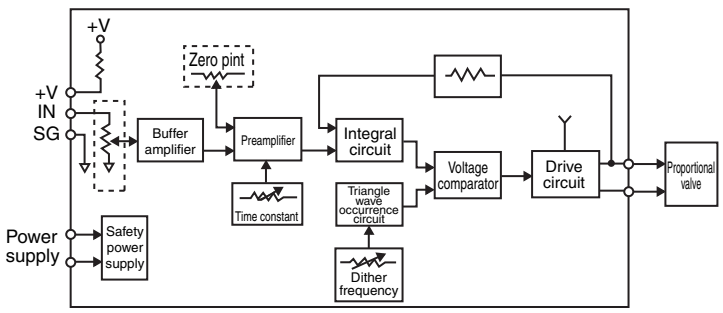
APC – 2 1

Ⓐ Power voltage

Symbol	Descriptions
Ⓐ **Power voltage**	
1	100 VAC (standard)
2	200 VAC (custom order)
3	24 VDC (standard)
7	110 VAC (custom order)
8	220 VAC (custom order)

Operational principle

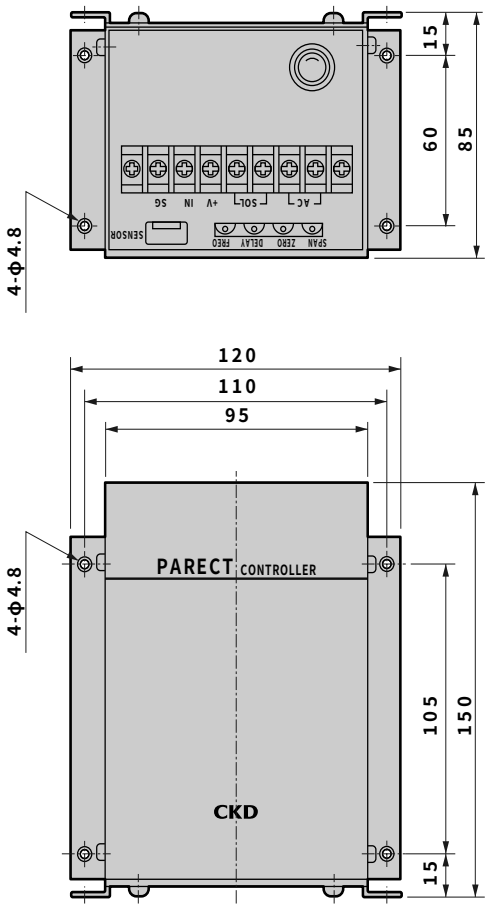
● Circuit structure block diagram



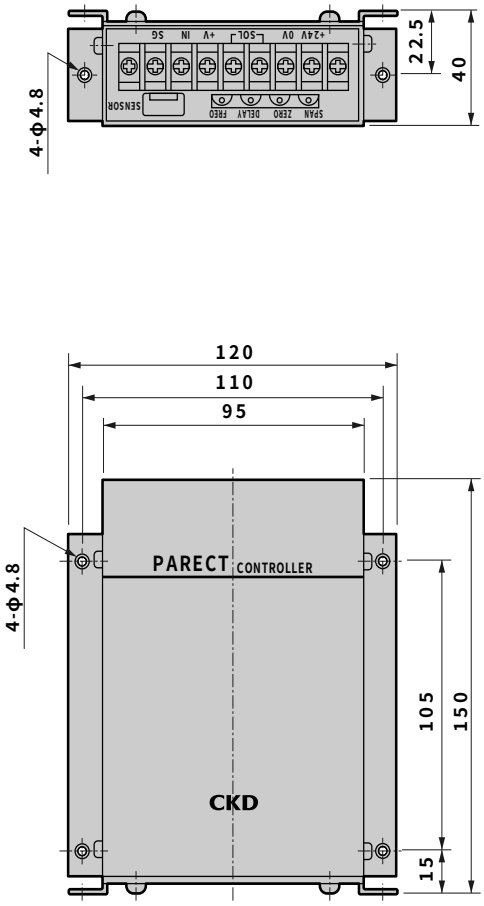
Impressed 0 to 10VDC of signal voltage according to the set input are inputted into the integrating circuit via buffer amplifier and pre-amplifier sections. Integrating circuit output and triangle wave are compared in the voltage comparator after that, and pulse amplitude are rectified. Switching the directive circuit with pulse signals, the proportional valve is driven with receiving dither effect. Performed current feedback by detecting current which flows in proportional valve, the constant current circuit resistant to change in impedance, power supply variation, and temperature fluctuation of a proportional solenoid are configured.

Dimensions

● AC power supply type

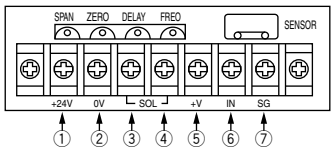


● DC power supply type

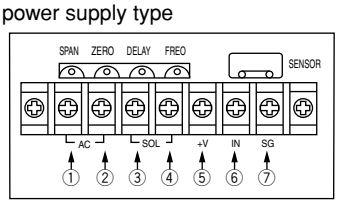


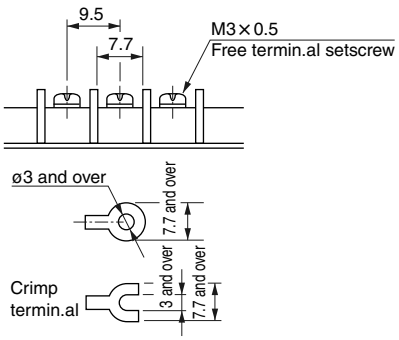
Operation and cautions

● DC power supply type



● AC power supply type





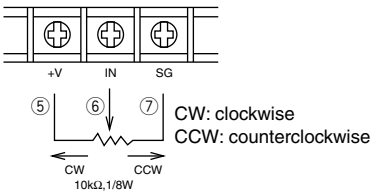
* Use a crimp terminal to wire to the gland.

(1) (2) DC power supply terminal (+ 24V, 0V)
Use power voltage 24VDC and capacity more than 1A, and connect terminal (1) to +, while terminal (2) to -. If connected to wrong polarity, the controller may be damaged.

(1) (2) AC power supply type terminal (AC)
Supply the power voltage indicated on name seal on terminal (1) (2).

(3) (4) Solenoid terminal (SOL)
Connect terminal (3) (4) to coil section of DIN terminal of proportional control valve. The terminal has no polarity.

(5) Power supply terminal for external potentiometer
Used to obtain set input signals from potentiometer. Connect as shown below. Do not input external set signals simultaneously when connecting to the potentiometer.



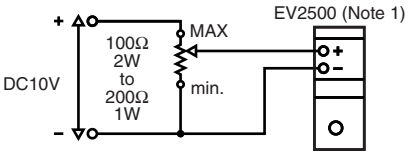
If potentiometer is connected as shown above, output current increases when rotates clockwise.

(6) (7) Setting input terminal (IN, SG)
Supply external 0 to 10 VDC of voltage signals, and connect terminal (6) to +, while terminal (7) to –.

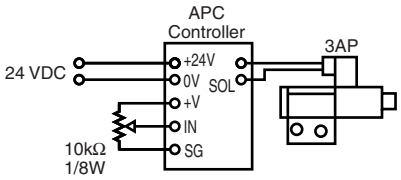
Signal source and interface

To achieve high performance of proportional control valve, understanding input characteristics per control valve and matching output signals.

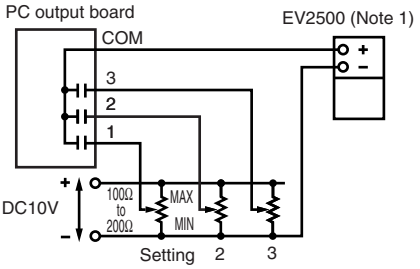
● Pressure controlled manually (1)



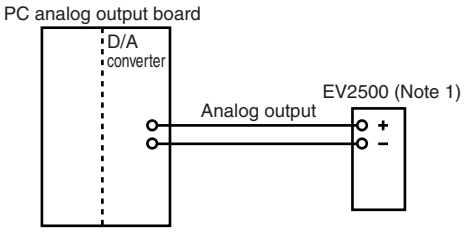
● Pressure controlled manually (2)



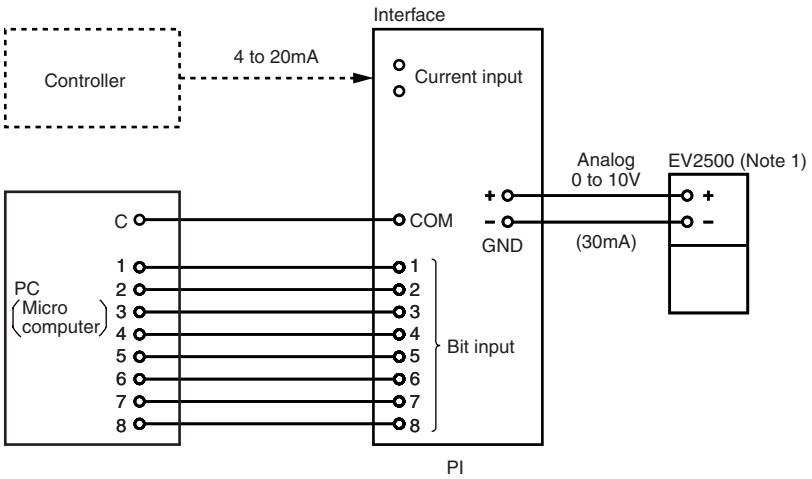
● Automatic pressure switchover circuit by PC



● Precision control by D/A converter of PC

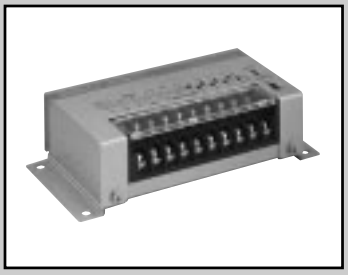


● Diagram of circuit using interface



(Note 1) For EV2500, 24 VDC power supply is required.

MEMO



Interface

PI Series

Interface components to connect proportional control valve easily.
Digital 8 bits, BCD, analog signal compatible.

Overview

This product is an interface between proportional control valve and upper stream controller. This interface eliminates the dedicating controller, and enables flexible controlling electric signals by a common programmable controller. Also, manual operation is done easily with installing external volume.

Features

● All models
Internal power supply enabling direct connect to 100 VAC and 200V.
· Remote manual operation enabled by manual and remote switch terminals.

● Digital input type
· No voltage contact input eliminates power supply for load.
· Input insulation protection by photo coupler.
· Input display by LED.

Specifications

Descriptions		Analog input			Digital input	
		PI-EV-D0	PI-EV-D1	PI-EV-D2	PI-EV-D3	PI-EV-D4
Input specifications	Setting input range	0 to 10 VDC	0 to 5 VDC	4 to 20mA DC	—	—
	Input impedance	1MΩ		250Ω	—	—
	Input no.	—	—	—	8 points	BCD2 digit
	Input method	—	—	—	No-voltage contact or open collector input	
	Insulation method	Not insulated			Photocoupler	
	Input display	None			LED	
Output spec.	Output voltage	0 to 10 VDC				
	Protective circuit	Output short-circuit protection (50mA cut-off)				
Manual specifications	Manual setting method	External volume (2kΩ and over)				
	Switching method	Toggle switch (with remote switching terminal)				
	Manual display	Indicated by turning LED (AUTO) off				
Total precision		±1.5%F.S.				
Power voltage		Rated ±10%				
Power consumption		10W or less Note 1				
External output voltage		24 VDC				
Working temperature		0˚C to 50˚C				
Use humidity		0 to 85%R.H.				
Storage temperature		-10˚C to 65˚C				
Weight		0.7kg				

Note 1: During electronic regulator (EV series) operation

How to order

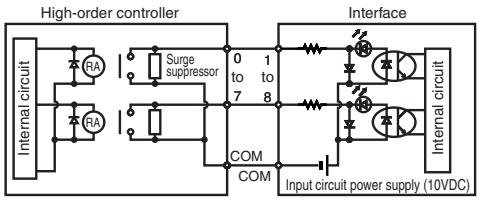
PI – EV – D3 – 1

Symbol	Descriptions
Ⓐ External output power supply	
EV	24 VDC (Electro-pneumatic regulator EV series dedicating power supply)
Ⓑ Input signal	
D0	Voltage 0 to 10 VDC
D1	Voltage 0 to 5 VDC
D2	Current 4DC to 20mA
D3	Digital 8Bit
D4	Digital BCD
Ⓒ Power voltage	
1	100 VAC
2	200 VAC

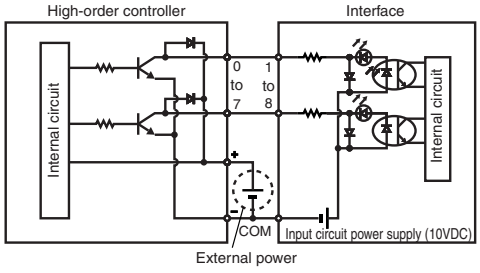
Ⓐ External output power supply
Ⓑ Input signal
Ⓒ Power voltage

Example of connection of digital input type

● Contact output

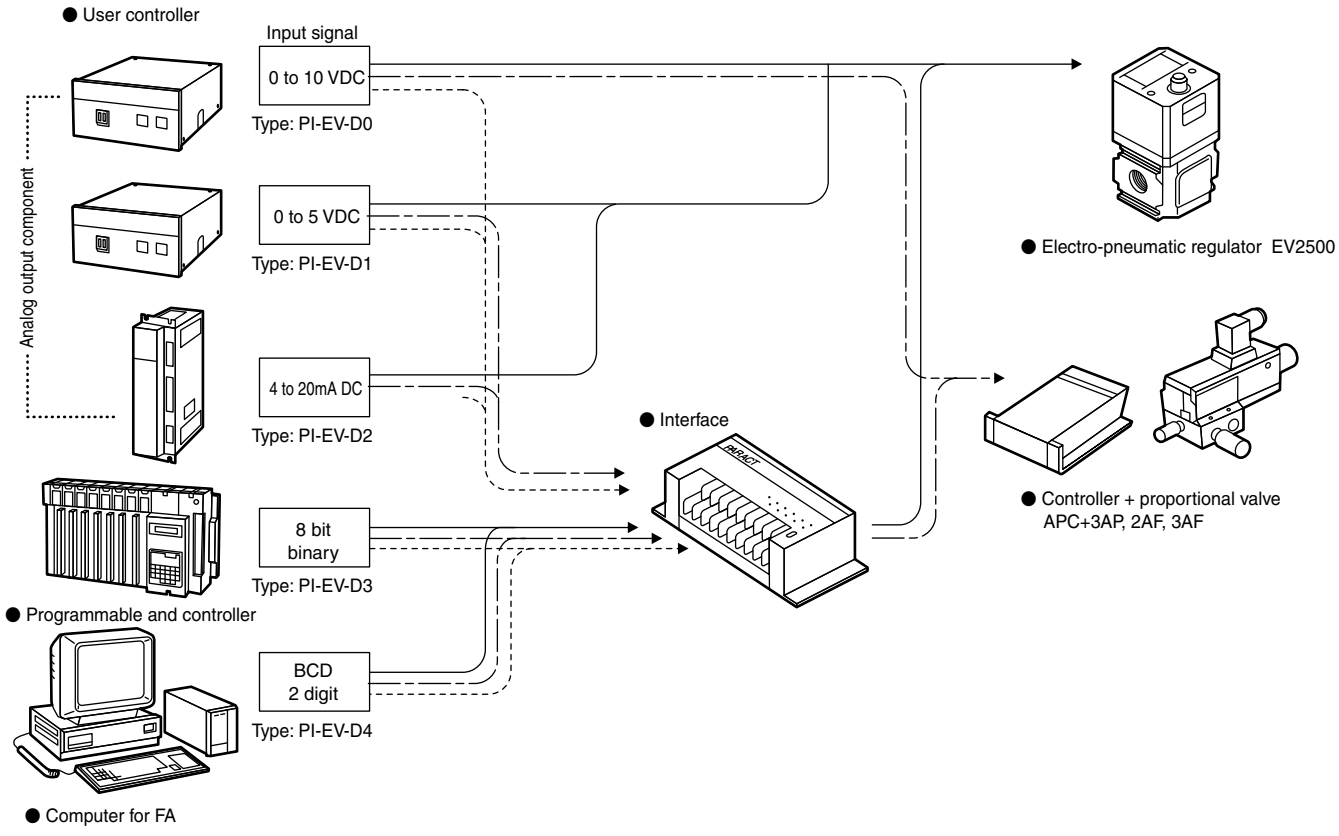


● Transistor output



Note) Transistor source output can not be used.
Note) For external power, the voltage is to be 12 VDC and over.
Note) Connect the COM terminal to external power source 0 V.

System configuration



Dimensions