

## 2 Port Pilot Operated Solenoid Valve for Compressed Air Compact Air Blow Valve EXA Series

2 PORT PILOT OPERATED SOLENOID VALVE FOR COMPRESSED AIR EXA SERIES

### Energy efficiency and large flow rate

Flow rate

**450**  $\ell/\text{min}$  and over

Estimating figure with  $\phi 6$  push-in fittings Primary pressure: 0.5MPa  
Secondary pressure: Release to atmospheric pressure

Power consumption

**0.6**  $\text{W}$



Oil-prohibition type



Screw-in connection body type



Manifold type

To realize customer's expectation.  
Expanded series.



# Energy efficiency and

Flow

# 450 l/min or more

Estimating figure with ø6 push-in fittings  
Primary pressure: 0.5MPa  
Secondary pressure: Release to atmospheric pressure

**New!!**

**Oil-prohibition type**  
Suitable for oil-restricted environment

Power consumption

# 0.6W

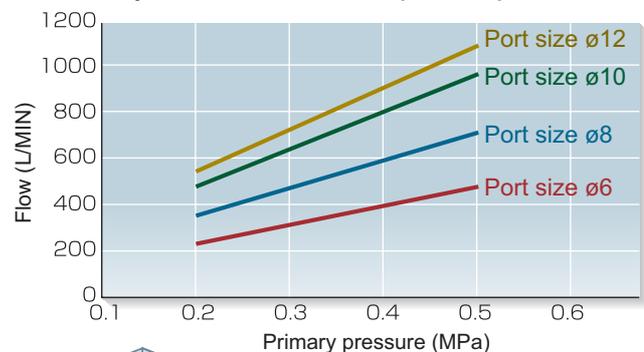


## Energy efficiency and large flow rate

Realizing energy efficiency and large flow at once with a low wattage (0.6W) 3 way pilot valve. (Can be directly operated from PC)

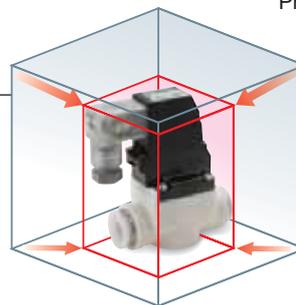
**Contributes to space and energy efficiency**

Secondary flow in the atmospheric pressure



## Compact, light weight

Weight reduced by optimization of materials. Now, the volume has been reduced by 30%, weight by 70%.



Compared to CKD's conventional models

Up to **30%** smaller

Up to **70%** lighter



## Standard push-in fitting

Reduce man hours with built in push-in fitting.

**New!!** Can support screw-in fitting.

Applicable connection {  
**Push-in fitting:**  
**ø6, ø8, ø10, ø12**  
**Screw-in fitting:**  
**Rc 1/4, Rc 3/8**

\* Flow rate is subject to change depending on piping and pressure conditions. Check the flow rate with the actual product referring to pages 12 through 17.

# large flow rate



**Screw-in connection body type**

**Manifold type**  
Achieving various piping layout

2 port pilot operated solenoid valve for compressed air

# EXA Series

## Wide optional variation

### Option

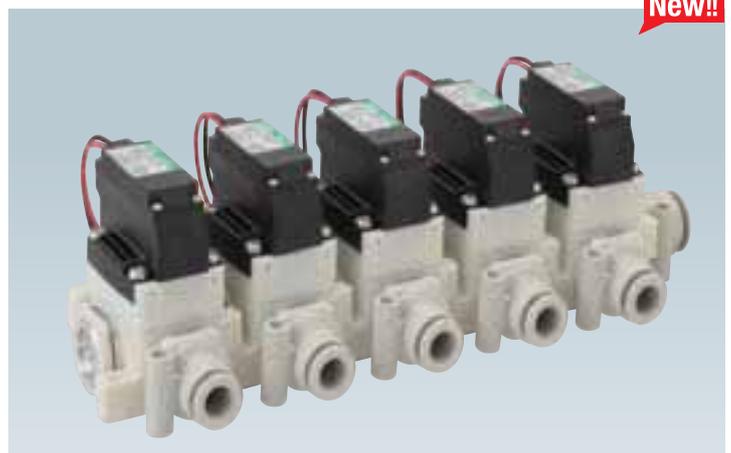
- 1 DIN terminal box with M12 connector cable (24 VDC only)
- 2 Supporting oil-prohibited (grease free) specification
- 3 Supporting screw-in fitting (Rc 1/4, Rc 3/8)



\* Refer to page 16 for oil-prohibited specifications

### Variation

- 1 **Manifold type added to lineup**  
Light weight compact manifold made of resin of IN port are optionally available.





2 port pilot operated solenoid valve for compressed air

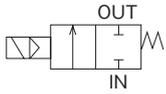
# EXA Series

- NC (normally closed)
- Port size: push-in fitting  $\varnothing 6$ ,  $\varnothing 8$ ,  $\varnothing 10$ , and  $\varnothing 12$
- Diaphragm structure



## JIS symbol

- NC (normally closed)



## Specifications

Descriptions	EXA-C6	EXA-C8	EXA-C10	EXA-C12
Working fluid	Compressed air			
Working pressure differential MPa	0.01 to 0.7 (external exhaust specification: 0.01 to 0.3)			
Max. working pressure MPa	0.7 (external exhaust specification: 0.3)			
Withstanding pressure (water) MPa	1.05			
Fluid temperature °C	0 to 55 (no freezing)			
Ambient temperature °C	-5 to 55			
Atmosphere	Place where the product does not contact water, and is free from corrosive or flammable gas.			
Valve structure	Pilot operated diaphragm structure			
Internal leakage cm <sup>3</sup> /min	2 or less			
External leakage cm <sup>3</sup> /min	2 or less			
Mounting attitude	Free			
Port size	$\varnothing 6$ push-in fitting	$\varnothing 8$ push-in fitting	$\varnothing 10$ push-in fitting	$\varnothing 12$ push-in fitting
C [dm <sup>3</sup> /(s·bar)]	1.6	3.0	3.3	3.6
b	0.45	0.33	0.26	0.20
Weight Note 2 g	56	57	68	69

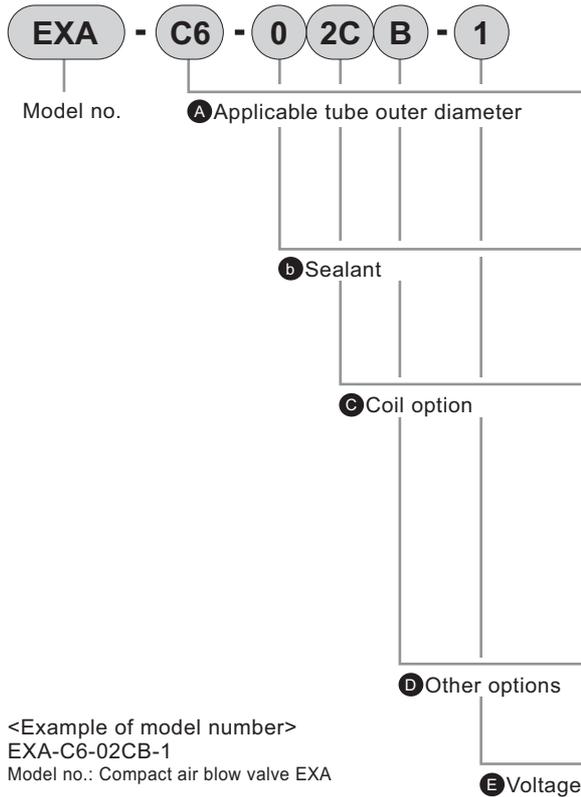
### Electrical specifications

Rated voltage	100 VAC (50/60 Hz), 24 VDC, 12 VDC			Note 1
Apparent power VA	1.2			
Power consumption W	DC	0.6		
Heat proof class	B			
Protective structure (IEC standards: 529)	Lead wire type: IPX0, with DIN terminal box: IPX5			

Note 1: Voltage fluctuation range is  $\pm 10\%$

Note 2: Models with DIN terminal box weighs 20 g more.

### How to order



- A** Applicable tube outer diameter: ø6
- B** Sealant: H-NBR
- C** Coil option: Lead wire
- D** Other options: Mounting plate
- E** Voltage: 100 VAC

### ⚠ Note on model no. selection

Note 1: When using the product under the condition where the differential pressure of the front and the back of the solenoid valve is low, select Symbol 1 for combinations of sealant and pilot. (Refer to page 12 "Design and Selection, 1. Confirmation of specifications" for detail.)

Symbol	Descriptions	
<b>A Applicable tube outer diameter</b>		
<b>C6</b>		ø6
<b>C8</b>		ø8
<b>C10</b>		ø10
<b>C12</b>		ø12
<b>b Sealant</b>		
<b>0</b>		H-NBR, internal exhaust specification
<b>1</b>		H-NBR, external exhaust specification Note 2
<b>H</b>		H-NBR, oil-prohibited specification, internal exhaust specification
<b>C Coil option Note 1</b>		
<b>2C</b>	Standard	Lead wire (without indicator light and surge suppressor)
<b>2G</b>	Option	DIN terminal box (Pg7), without indicator light
<b>2GS</b>		DIN terminal box (Pg7), without indicator light, with surge suppressor
<b>2H</b>		DIN terminal box (Pg7), with indicator light (inside terminal box)
<b>2HS</b>		DIN terminal box (Pg7), with indicator light (inside terminal box) and surge suppressor
<b>2KS</b>		DIN terminal box, with M12 connector cable, indicator light (inside terminal box) and surge suppressor
<b>D Other options</b>		
<b>Blank</b>		None
<b>B</b>		With mounting plate
<b>E Voltage Note 1</b>		
<b>1</b>		100 VAC
<b>3</b>		24 VDC
<b>4</b>		12 VDC

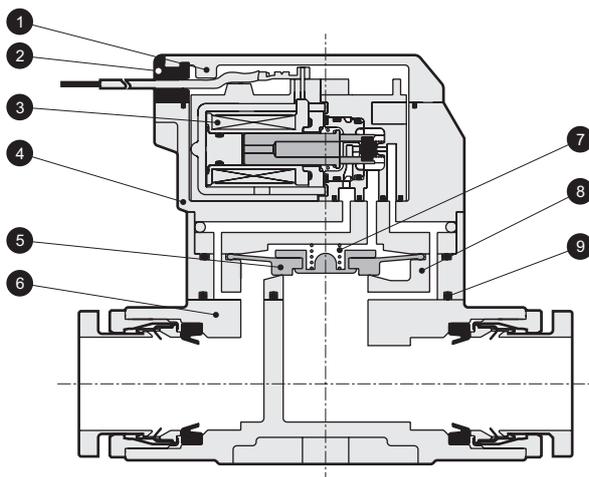
Note 1: Refer to the table on the left for available combinations of coil options and voltage.

Note 2: Refer to pressure specifications.

Coil option	Voltage		
	1	3	4
<b>2C</b>	●	●	●
<b>2G</b>	●		
<b>2GS</b>		●	●
<b>2H</b>	●		
<b>2HS</b>		●	●
<b>2KS</b>		●	

Select from the circle (●) mark above.

### Internal structure and parts list

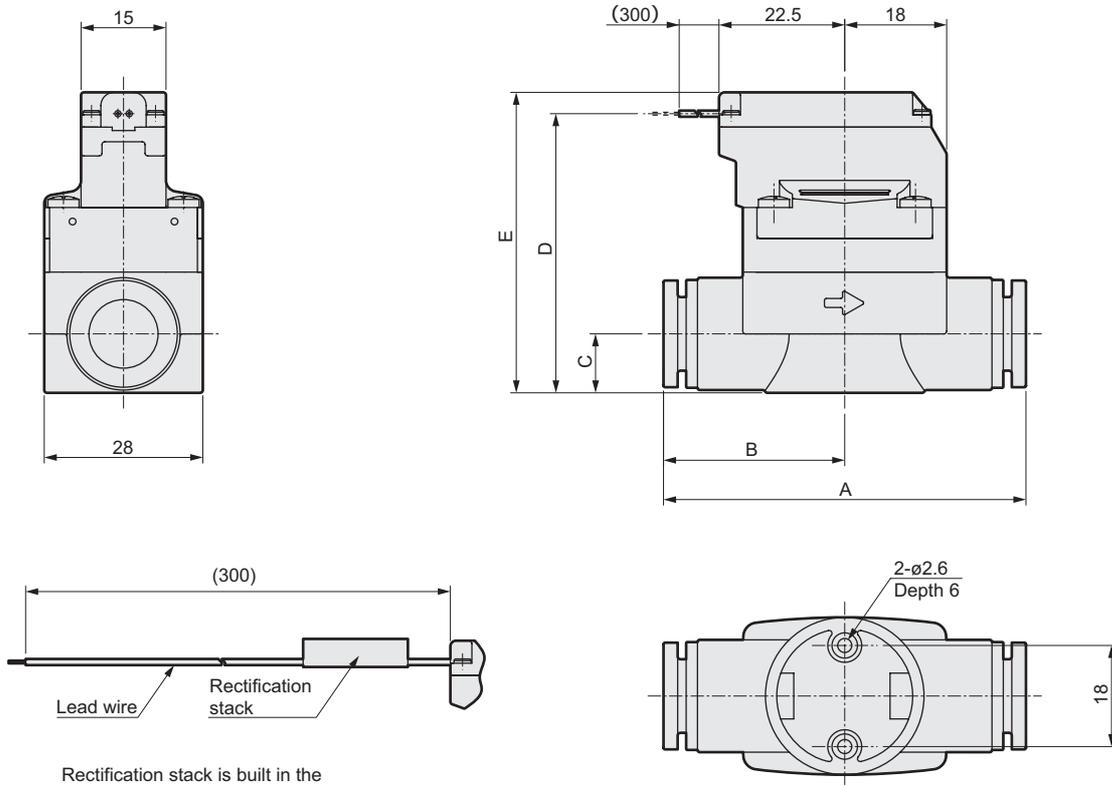


No.	Parts name	Material	
1	Cover (Note 1)	PBT	Polybutylene terephthalate (PBT)
2	Bush	NBR	Nitrile rubber
3	Coil assembly	-	-
4	Stuffing	PPS	Polyphenylene sulfide
5	Diaphragm assembly	H-NBR/PPS	Hydrogenated nitrile rubber/ Polyphenylene sulfide
6	Main body	PBT	Polybutylene terephthalate (PBT)
7	Spring	SUS	Stainless steel
8	Valve body	PBT	Polybutylene terephthalate (PBT)
9	Gasket	H-NBR	Hydrogenated nitrile rubber

Note 1: PA66, polyamide will be used if DIN terminal box is attached.

## Dimensions

- Lead wire type  
EXA-\*-\*2C

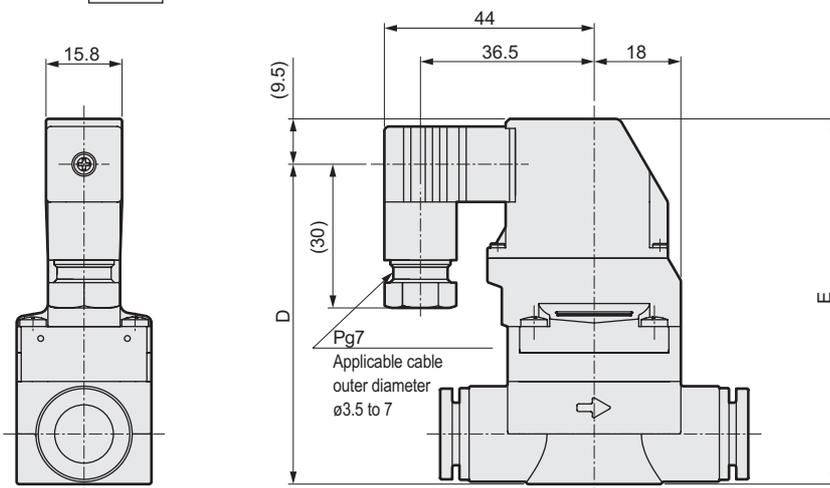


Model no.	A	B	C	D	E
EXA-C6	52	28	8	45	48.5
EXA-C8	53	28.5	8	45	48.5
EXA-C10	62	31	11.5	51	54.5
EXA-C12	64	32	11.5	51	54.5

## Optional dimensions

- DIN terminal box (Pg7)

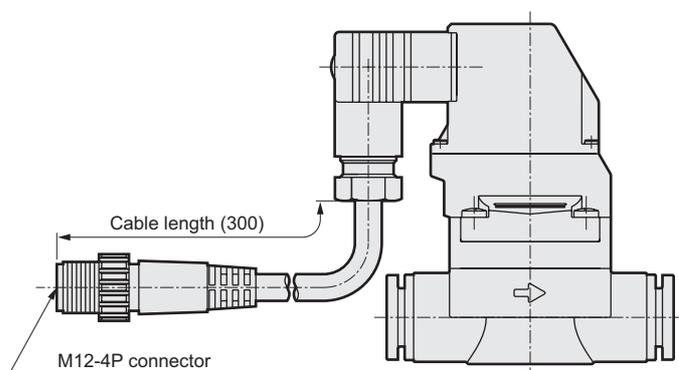
EXA-\*-\*  
2G  
2GS  
2H  
2HS



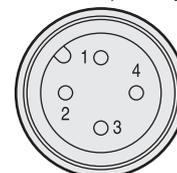
Model no.	D	E
EXA-C6	62	71.5
EXA-C8	62	71.5
EXA-C10	68	77.5
EXA-C12	68	77.5

### Optional dimensions

- With DIN terminal box, M12 connector lead, and indicator lamp  
EXA-\*-\*2KS

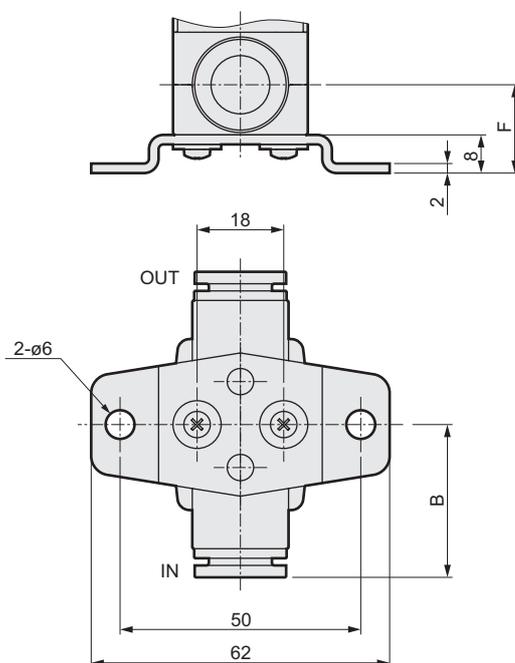


Connector pin array



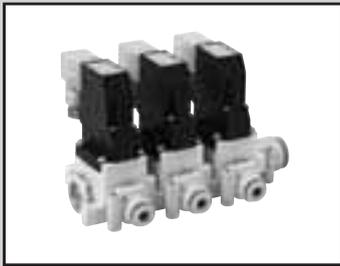
PIN No.	Applications
1 PIN	(Not used)
2 PIN	(Not used)
3 PIN	Power supply -
4 PIN	Power supply +

- With mounting plate  
EXA-\*-\*B



※Contact CKD for mounting plate.

Model no.	B	F
EXA-C6	28	16
EXA-C8	28.5	16
EXA-C10	31	19.5
EXA-C12	32	19.5



2 port pilot operated solenoid valve manifold for compressed air

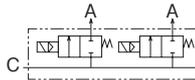
# GEXA Series

- NC (normally closed)
- Port size: push-in fitting  $\varnothing 6$ ,  $\varnothing 8$ ,  $\varnothing 10$ , and  $\varnothing 12$
- Diaphragm structure



## JIS symbol

- NC (normally closed)
- Common supply type
- Port C pressurization



## Specifications

Descriptions	GEXA-□C6	GEXA-□C8	GEXA-□C10	GEXA-□C12
Working fluid	Compressed air			
Working pressure differential MPa	0.01 to 0.7 (external exhaust specification: 0.01 to 0.3)			
Max. working pressure MPa	0.7 (external exhaust specification: 0.3)			
Withstanding pressure (water) MPa	1.05			
Fluid temperature °C	0 to 55 (no freezing)			
Ambient temperature °C	-5 to 55			
Atmosphere	Place where the product does not contact water, and is free from corrosive or flammable gas.			
Valve structure	Pilot operated diaphragm structure			
Internal leakage cm <sup>3</sup> /min	2 or less (per one station)			
External leakage cm <sup>3</sup> /min	3 or less (per one station)			
Mounting attitude	Free			
A port size (Port C...push-in $\varnothing 10$ , $\varnothing 12$ )	$\varnothing 6$ push-in fitting	$\varnothing 8$ push-in fitting	$\varnothing 10$ push-in fitting	$\varnothing 12$ push-in fitting
C value	1.6	3.0	3.3	3.6
b	0.36	0.24	0.18	0.16

### Electrical specifications

Rated voltage	100 VAC (50/60 Hz), 24 VDC, 12 VDC			Note 1
Apparent power VA	1.2			
Power consumption W	DC	0.6		
Heat proof class	B			
Protective structure (IEC standards: 529)	Lead wire type: IPX0, with DIN terminal box: IPX5			

Note 1: Voltage fluctuation range is  $\pm 10\%$ .

Refer to page 2 for internal structure.

### How to order

**GEXA - C10 - C8 - 3 - 1 - 2HS - 3**

Model no.

**A** Applicable tube outer diameter of Port C

**B** Applicable tube outer diameter of Port A

**C** Station no.

**D** Combination of sealant and pilot

**E** Coil option

**F** Voltage

<Example of model number>

**GEXA-C10C8-3-12HS-3**

- A** Applicable tube outer diameter of Port C:  $\varnothing 10$
- B** Applicable tube outer diameter of Port A:  $\varnothing 8$
- C** Station no. : 3 stations
- D** Combination of sealant and pilot : H-NBR  
Pilot air external exhaust
- E** Coil option : DIN terminal box (Pg7)  
With indicator light (inside terminal box) and surge suppressor

### Note on model no. selection

Note 1: When using the product under the condition where the differential pressure of the front and the back of the solenoid valve is low, select Symbol 1 for combinations of sealant and pilot. (Refer to page 12 "Design and Selection, 1. Confirmation of specifications" for detail.)

Symbol	Descriptions	
<b>A Applicable tube outer diameter of Port C</b>		
C10		$\varnothing 10$
C12		$\varnothing 12$
<b>B Applicable tube outer diameter of Port A</b>		
C6		$\varnothing 6$
C8		$\varnothing 8$
C10		$\varnothing 10$
C12		$\varnothing 12$
<b>C Station no.</b>		
2		2 stations
to		to
5		5 stations
<b>D Combination of sealant and pilot</b>		
0		H-NBR, internal exhaust specification
1		H-NBR, external exhaust specification Note 1
<b>E Coil option Note 1</b>		
2C	Standard	Lead wire (without indicator light and surge suppressor)
2G	Option	DIN terminal box (Pg7), without indicator light
2GS		DIN terminal box (Pg7), without indicator light, with surge suppressor
2H		DIN terminal box (Pg7), with indicator light (inside terminal box)
2HS		DIN terminal box (Pg7), with indicator light (inside terminal box) and surge suppressor
2KS		DIN terminal box with M12 connector cable, indicator light (inside terminal box), and surge suppressor
<b>F Voltage Note 1</b>		
1		100 VAC
3		24 VDC
4		12 VDC

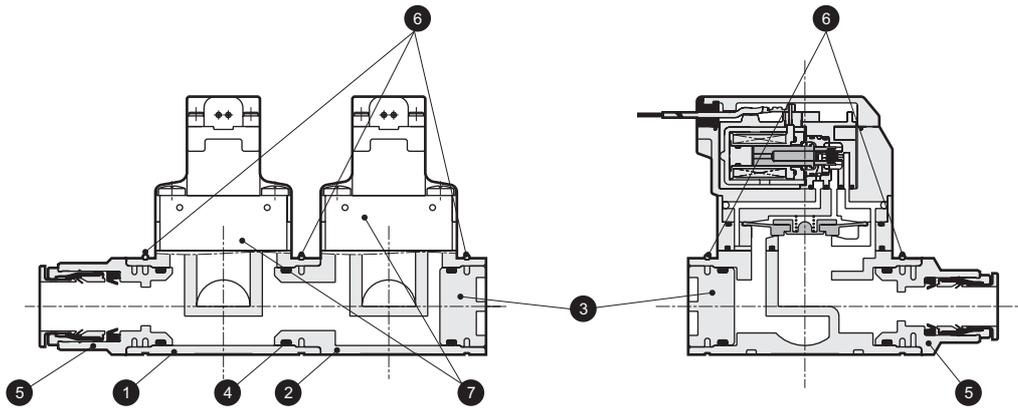
Note 1: Refer to the table below for available combinations of coil options and voltage.

Note 2: Refer to pressure specifications.

Coil option	Voltage		
	1	3	4
2C	●	●	●
2G	●		
2GS		●	●
2H	●		
2HS		●	●
2KS		●	

Select from the circle (●) mark above.

## Internal structure and parts list

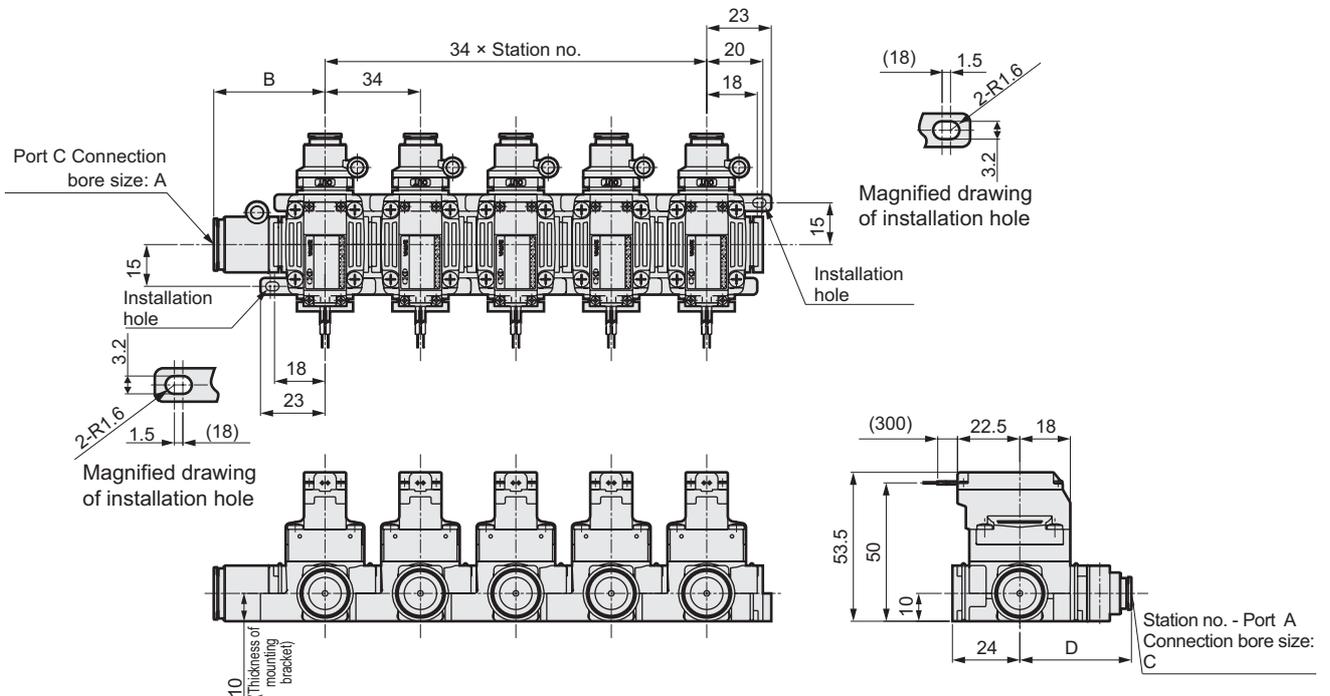


No.	Parts name	Material	
1	Block body A	PBT	Polybutylene terephthalate (PBT)
2	Block body B	PBT	Polybutylene terephthalate (PBT)
3	Plug assembly	A, NBR	Aluminum, nitrile rubber
4	O ring	NBR	Nitrile rubber
5	Fitting assembly	PBT, C, NBR	Polybutylene terephthalate (PBT), brass, nitrile rubber
6	Stopper ring	SUS	Stainless steel
7	EXA actuator assembly	-	(Refer to page 2 for internal structure.)

\*These drawing is for 2 station type.

## Dimensions

### ● Lead wire type GEXA-\*\*-\*. \*2C

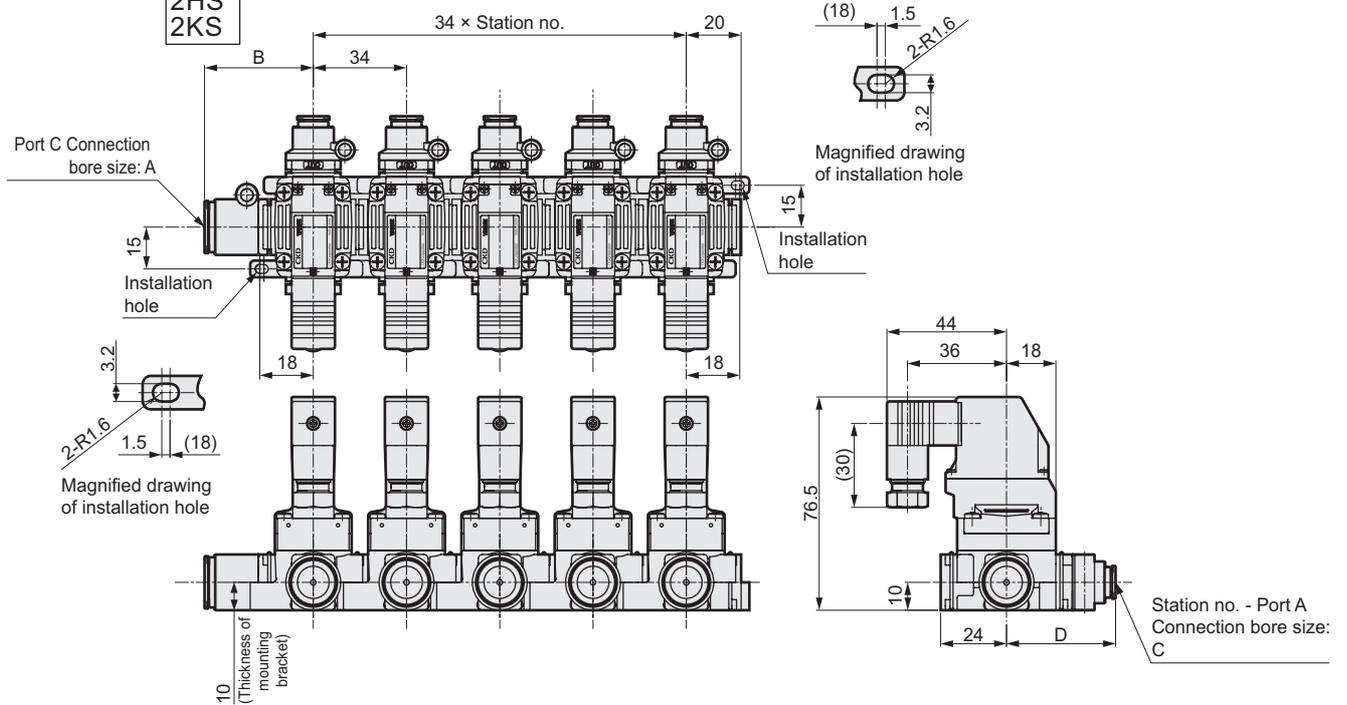


Model no.	A	B	C	D
GEXA-C10C6	ø10	38	ø6	40
GEXA-C10C8			ø8	
GEXA-C10C10			ø10	
GEXA-C10C12			ø12	
GEXA-C12C6	ø12	40	ø6	40
GEXA-C12C8			ø8	
GEXA-C12C10			ø10	
GEXA-C12C12			ø12	

### Dimensions

● DIN terminal box type

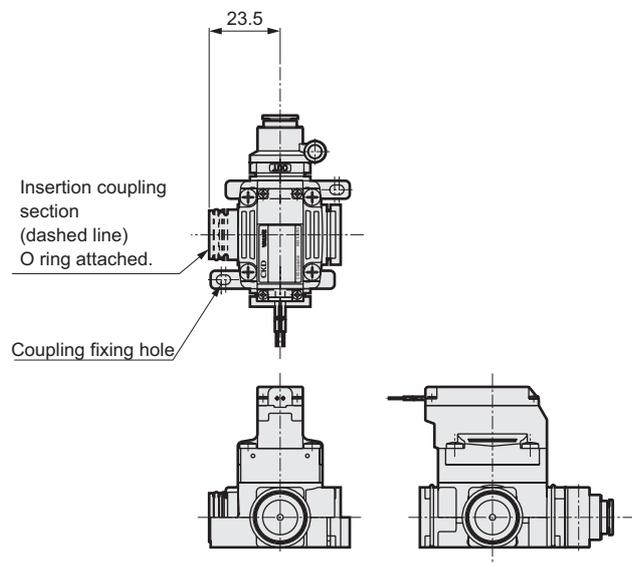
GEXA-\*\*-\*\*-\*\*  
 2G  
 2GS  
 2H  
 2HS  
 2KS



Model no.	A	B	C	D
GEXA-C10C6	ø10	38	ø6	40
GEXA-C10C8			ø8	
GEXA-C10C10			ø10	
GEXA-C10C12			ø12	
GEXA-C12C6	ø12	40	ø6	40
GEXA-C12C8			ø8	
GEXA-C12C10			ø10	
GEXA-C12C12			ø12	

● Discrete accessories for expanding manifold (model no.: GEXA-CX

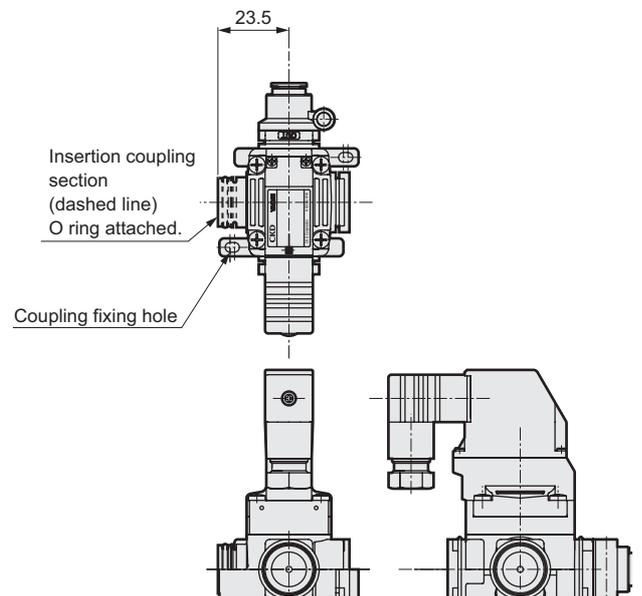
● Lead wire type



C6  
 C8  
 C10  
 C12

● D E F-KIT

● DIN terminal box type



Note 1: Refer to dimension drawings of manifold type on pages 7 and 8 for position other than above and dimension after connection.

Note 2: Parts listed below are enclosed.

Stopper pin: 1 pc. Fixing screw for connection: 1 pc.

Note 3: Contact CKD if you are planning to expand manifold.



2 port pilot operated solenoid valve for compressed air

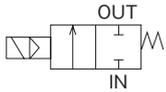
# EXA Series Screw-in connection body type

- NC (normally closed)
- Port size: Rc1/4, Rc3/8



## JIS symbol

- NC (normally closed)



## Specifications

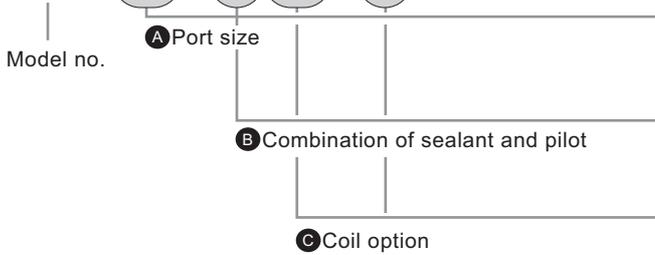
Descriptions	EXA-02	EXA-03
Working fluid	Compressed air	
Working pressure differential MPa	0.01 to 0.7 (external exhaust specification: 0.01 to 0.3)	
Max. working pressure MPa	0.7 (external exhaust specification: 0.3)	
Withstanding pressure (water) MPa	1.05	
Fluid temperature °C	0 to 55 (no freezing)	
Ambient temperature °C	-5 to 55	
Atmosphere	Place where the product does not contact water, and is free from corrosive or flammable gas.	
Valve structure	Pilot operated diaphragm structure	
Internal leakage cm <sup>3</sup> /min	2 or less	
External leakage cm <sup>3</sup> /min	2 or less	
Mounting attitude	Free	
Port size	Rc1/4	Rc3/8
C [dm <sup>3</sup> /(s·bar)]	4.5	4.7
b	0.32	0.36
Weight Note 2 g	56	57
Electrical specifications		
Rated voltage	100 VAC (50/60 Hz), 24 VDC, 12 VDC Note 1	
Apparent power VA	1.2	
Power consumption W	0.6	
Heat proof class	B	
Protective structure (IEC standards: 529)	Lead wire type: IPX0, with DIN terminal box: IPX5	

Note 1: Voltage fluctuation range is ±10%.

Note 2: Models with DIN terminal box weighs 20 g more.

## How to order

EXA - 02 - 1 2C - 3



<Example of model number>  
EXA-02-12C-3

- A** Port size: Rc1/4
- B** Combination of sealant and pilot  
: H-NBR, specification of pilot air external exhaust
- C** Coil option  
: Lead wire (without indicator light and surge suppressor)
- D** Voltage : 24 VDC

Coil option	Voltage		
	1	3	4
2C	●	●	●
2G	●		
2GS		●	●
2H	●		
2HS		●	●
2KS		●	

Select from the circle (●) mark above.

Refer to page 10 for internal structure.

Symbol	Descriptions	
A Port size Note 3		
02	Rc1/4	
03	Rc3/8	
B Combination of sealant and pilot		
0	H-NBR, internal exhaust specification	
1	H-NBR, external exhaust specification Note 2	
C Coil option Note 1		
2C	Standard Lead wire (without indicator light and surge suppressor)	
2G	Option DIN terminal box (Pg7), without indicator light	
2GS		DIN terminal box (Pg7), without indicator light, with surge suppressor
2H		DIN terminal box (Pg7), with indicator light (inside terminal box)
2HS		DIN terminal box (Pg7), with indicator light (inside terminal box) and surge suppressor
2KS		DIN terminal box with M12 connector cable, indicator light (inside terminal box), and surge suppressor
D Voltage Note 1		
1	100 VAC	
3	24 VDC	
4	12 VDC	

Note 1: Refer to the table on the left for available combinations of coil options and voltage.

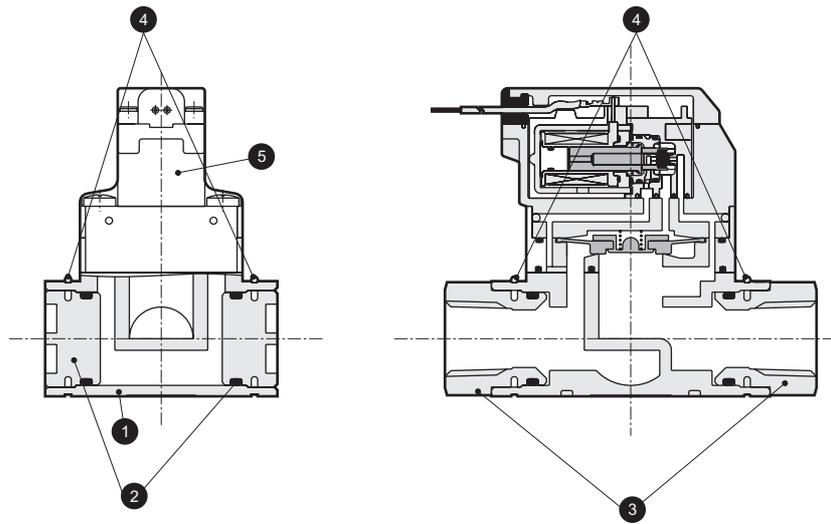
Note 2: Refer to pressure specifications.

Note 3: G thread and NPT thread are custom order.

## ! Note on model no. selection

Note 1: When using the product under the condition where the differential pressure of the front and the back of the solenoid valve is low, select Symbol 1 for combinations of sealant and pilot. (Refer to page 12 "Design and Selection, 1. Confirmation of specifications" for detail.)

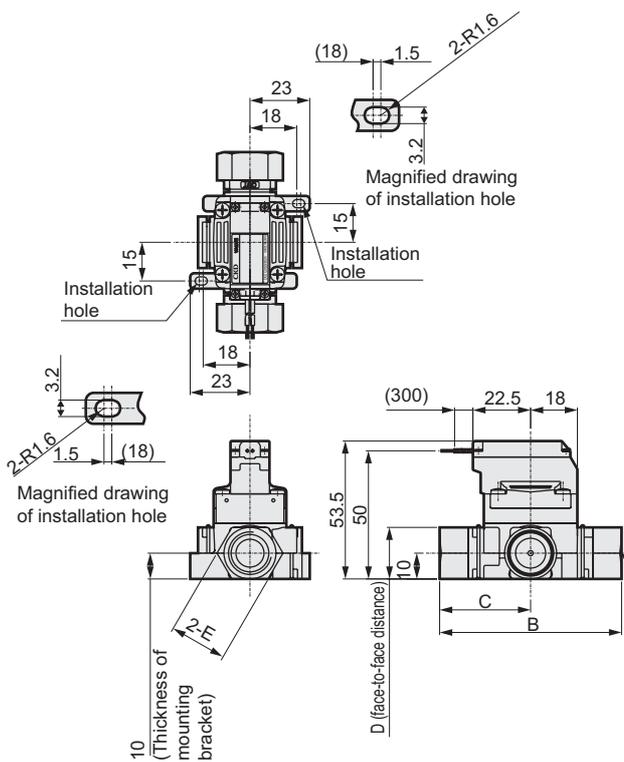
### Internal structure and parts list



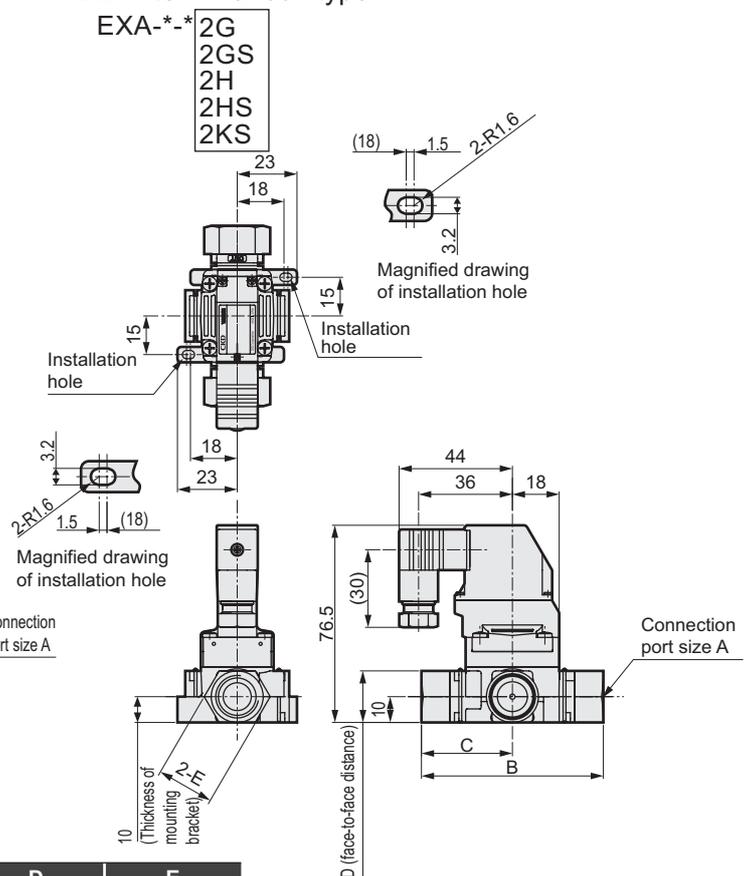
No.	Parts name	Material
1	Block body A	PBT Polybutylene terephthalate (PBT)
2	Plug assembly	A, NBR Aluminum, nitrile rubber
3	Screw-in fitting assembly	A, NBR Aluminum, nitrile rubber
4	Stopper ring	SUS Stainless steel
5	EXA actuator assembly	— (Refer to page 2 for internal structure.)

### Dimensions

#### ● Lead wire type EXA-\*-\*2C



#### ● DIN terminal box type EXA-\*-\*



Model no.	A	B	C	D	E
EXA-02	Rc1/4	64	32	17	17
EXA-03	Rc3/8	70	35	20	22



# Safety precautions

Always read this section before starting use.

When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanism, pneumatic control circuit, or hydraulic control circuit and the system operated by electrical control that controls the devices is secured.

It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely. Observe warnings and precautions to ensure device safety.

Check that device safety is ensured, and manufacture a safe device.

## WARNING

- 1** This product is designed and manufactured as a general industrial machine part. It must be handled by an operator having sufficient knowledge and experience in handling.
- 2** Be sure to use this product in accordance of specifications.

This product must be used within its stated specifications. Do not attempt to modify or additionally machine the product. This product is intended for use as a general-purpose industrial device or part. It is not intended for use outdoors or for use under the following conditions or environment.  
(Note that this product can be used when CKD is consulted prior to use and the customer consents to CKD product specifications. The customer must provide safety measures to avoid risks in the event of problems.)

  - ①** Use for special applications requiring safety including nuclear energy, railroad, aviation, ship, vehicle, medical equipment, equipment or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
  - ②** Use for applications where life or assets could be adversely affected, and special safety measures are required.
- 3** Observe corporate standards and regulations, etc., related to the safety of device design and control, etc.

ISO 4414, JIS B 8370 (pneumatic system rules)  
JFPS2008 (Principles for pneumatic cylinder selection and use)  
Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, body standards and regulations, etc.
- 4** Do not handle, pipe, or remove devices before confirming safety.
  - ①** Inspect and service the machine and devices after confirming safety of the entire system related to this product.
  - ②** Note that there may be hot or charged sections even after operation is stopped. Therefore, care should be taken.
  - ③** When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Discharge any compressed air from the system, and pay attention to possible water leakage and leakage of electricity.
  - ④** When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.
- 5** Observe warnings and cautions on the pages below to prevent accidents.

The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

-  **DANGER:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.
-  **WARNING:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.
-  **CAUTION:** When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. In any case, important information that must be observed is explained.

## Disclaimer

- 1** Term of warranty  
The warranty period for CKD products is one (1) year from the first delivery to the customer.
- 2** Scope of warranty  
In case any defect attributable to CKD is found during the term of warranty, CKD will provide a replacement for the relevant product or necessary repair parts free of charge, or repair such defect product at our factory, also free of charge. Note that the following faults are excluded from the warranty term:
  - (1) Product abuse/misuse contrary to conditions or environment recommended in its catalogs/specifications
  - (2) Failure caused by other than the delivered product
  - (3) Faults caused by improper product use
  - (4) Third-party repair or modification
  - (5) Faults caused by matters that could not be predicted with the technology applied when the product was delivered.
  - (6) Failure attributable to force majeureThe warranty mentioned here covers the discrete delivered product. Only the scope of warranty shall not cover losses induced by the failure of the delivered product.
- 3** Compatibility confirmation  
In no event shall CKD be liable for the compatibility of your systems, devices, or equipment to CKD product. Customers are required to confirm the compatibility.



## Safety precautions

# Fluid control components: Warnings, cautions

Always read before starting use.

Refer to the "General Purpose Valves (Catalog No. CB-03-1SA)" and "Air Unit CXU Series (Catalog No. CC-901A)" for details on precautions for general purpose valves.

Specific precautions: 2 port pilot operated solenoid valve for compressed air EXA Series

## Design & Selection

### 1. Confirmation of specifications

#### ⚠ WARNING

■ Use this product within the specification range. Using this product at a pressure or temperature exceeding specifications could cause ruptures or malfunctions. Refer to specifications. Consult with CKD when using fluids other than compressed air.

#### ■ Working fluid

Active gases are not applicable. Consult with our sales office when using it.

■ When using this product under the condition that the differential pressure of the primary side and secondary side cannot be ensured when the valve is opened, diaphragm operation becomes unstable and the diaphragm may be damaged. When using this product under the condition that could cause low differential pressure and low flow rate as mentioned above, it is recommended to use the pilot air external exhaust type. Please contact CKD.

- When there is restriction at the primary or secondary side of solenoid valve.
- When multiple solenoid valves, for which pipe is connected in parallel, open simultaneously. (Differential pressure will become difficult to generate between the primary and secondary, due to the drop in source pressure of solenoid valve.)

### 2. Design for Safety

#### ⚠ Warning

■ Take measures to protect personnel and equipment against injury or damage if this product fails.

■ DIN terminal box connection type protection property symbol (IPX5)

IPX5 (IEC 60529 [IEC529: 1989-11]) standards are applied to the test. Avoid use in condition which water or coolant could directly contact the valve.

Explanation of protection property symbols and examination method of IPX5

#### ● Protective structure

Note: IP-X5 is a test based on the following standard.

#### ■ IEC (International Electrotechnical Commission) Standards

(IEC60529[IEC529:1989-11])

IP - □ □

Protection property symbols (International Protection)

1st characteristic number (protective class against external solids)

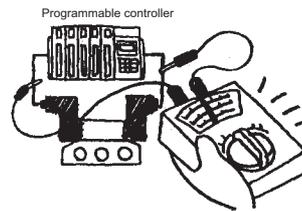
2nd characteristic number (protection grade against entry of water)

Grade	Degree of protection	Overview of test method (fresh water is used.)
5	Protection from jet No harmful effects occur even when water is sprayed with nozzles from all directions.	Using the following test device, spray water for 1 minute per 1 m <sup>2</sup> of test sample area from all directions, for a total of 3 minutes or more. Spray nozzle inner diameter: ø6.3 mm

#### ⚠ CAUTION

■ 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 solenoid valve to malfunction. The value affected by leakage current differs with the solenoid valve.



When voltage is 100 VAC	2.0 mA or less
When voltage is 12 VDC	1.5 mA or less
When voltage is 24 VDC	1.8 mA or less

■ Observe the following precautions when using nylon tubes or urethane tubes for piping material.

- Use flame resistant tubes where spatter could scatter.
- When using the standard push-in fitting on the spiral tube, fix the base of the tube with a hose band. The tube will rotate and holding force will drop if not fixed.

### 3. Working environment

■ Use clean air.

- The product could break or malfunction if used with compressed air containing chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, etc.
- Maintain the ozone concentration in the compressed air below 0.1 ppm. Increase in ozone concentration will result in deficiencies such as malfunctions and leakage.

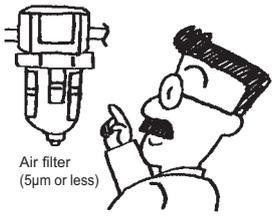
## 4. Durability

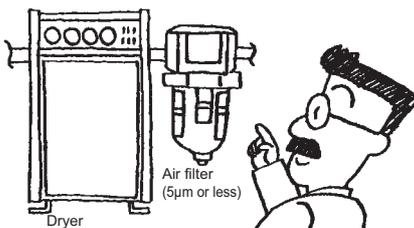
### ⚠ Warning

- Use in continuous energizing could deteriorate the solenoid valve's performance. Contact CKD for such applications.

## 5. Pneumatic pressure source

### ⚠ CAUTION

- Install the air filter just before the circuit using the pneumatic component.
 
- Do not supply other than compressed air.
- Use clean compressed air that does not contain corrosive gases.
- Use dry compressed air so that water drops do not form in pipes.



- Drainage will form if the temperature drops in the pneumatic piping or pneumatic component.
- Operation faults could occur if drainage enters the air flow path in pneumatic components or if it temporarily blocks passage.
- Drainage could cause rust to form and lead to pneumatic component faults.
- Use compressed air free of oxidized oil, tar, or carbon from the air compressor.
  - If oxidized oil, tar, or carbon enter the air compressor and solidify, resistance at the sliding section will increase, and could lead to operation faults.
- Use compressed air free of solid foreign matter.
  - Solid foreign matter in compressed air could enter the air compressor and cause wear, sticking, or leakage at the sliding section.

## 6. Surge suppressor

### ⚠ CAUTION

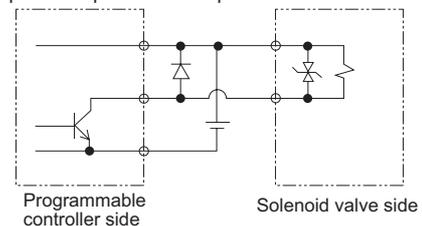
- The surge suppressor enclosed with the solenoid valve is to protect the output contact for that solenoid valve's drive. There is no significant protection for the other peripheral devices, and devices could be damaged or malfunction by the surge. Surge generated by other devices could be absorbed and which may result in an accident such as burning. Care must be taken for points below.

- The surge suppressor functions to limit a solenoid valve surge voltage, which can reach several hundred volts, to a low voltage level that the output contact can withstand. Depending on the output circuit used, this may be insufficient and could result in damage or malfunction. Check whether the surge suppressor can be used by the surge voltage limit of the solenoid valve in use, the output device's withstand pressure and circuit structure, and by the degree of return delay time. If necessary, provide other surge measures. Reverse voltage surge generated at OFF is suppressed to the following levels by the solenoid valve with surge suppressor of this product.

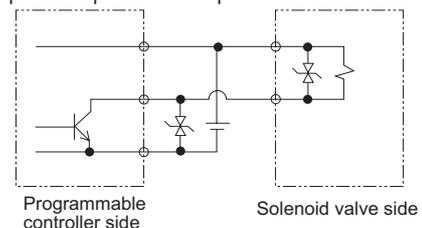
Rated voltage	Reverse voltage value when power is turned OFF
12 VDC	Approx. 27 V
24 VDC	Approx. 47 V

- When using NPN output, voltage given in the upper table and surge voltage equivalent to the power voltage could be applied on the output transistor. Install contact protection circuits in this case.

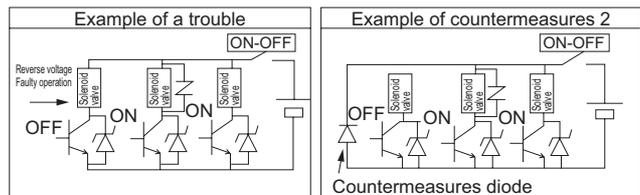
(Example of output transistor protective circuit installation 1)



(Example of output transistor protective circuit installation 2)



- If another device or solenoid valve is connected in parallel to the solenoid valve, the inverse voltage surge generated when the solenoid valve is OFF would apply to those devices. Even when using the solenoid valve for the surge suppressor for 24 VDC, surge voltage may reach minus several ten volts depending on the model. This reverse polarity voltage could damage or cause other devices connected in parallel to malfunction. Avoid parallel connection of devices susceptible to reversing polarity voltages, e.g., LED indicators. When driving several solenoid valves in parallel, the surge from other solenoid valves could enter the surge suppressor of one solenoid valve with a surge suppressor. Depending on the current value, that surge suppressor could burn. When driving several solenoid valves with surge suppressors in parallel, surge current could concentrate at the surge suppressor with the lowest limit voltage and cause similar burning. Even if the solenoid valve type is the same, the surge suppressor's limit voltage can be inconsistent, and in the worst case, could result in burning. Avoid driving several solenoid valves in parallel.



- The surge suppressor incorporated in the solenoid valve often short-circuits if damaged by excessive voltage or current the other solenoid valves. If the surge suppressor fails, if a large current flows when output is on, the output circuit or solenoid valve could be damaged or ignite. Do not leave the solenoid valve energized in a faulty state. Provide an overcurrent protection circuit on the power or drive circuit, or use a power supply with overcurrent protection so that no large current flows continuously.

7. 100 VAC specifications

**CAUTION**

- For 100 VAC, all wave rectified circuit is incorporated.

When using an SSR to turn the solenoid valve on and off, a solenoid valve reset fault may occur depending on the SSR.  
Select the SSR appropriately. (Consult with the relay or PLC manufacturer for details.)

Installation & Adjustment

1. Installation

**WARNING**

- Do not support valves with piping when installing valves.
  - Install and fix the valve body.
- Avoid washing with water or solvents, or painting after installation.
  - Resin parts could be damaged.
- Do not remove the solenoid valve's packaging until just before piping.
  - If the packing is removed from the piping port before pipes are connected, foreign matter could enter the solenoid valve from the piping port and could lead to faults or malfunctions.
- Check that fittings and tubing are not twisted or pulled, and that moment load is not applied.
- Check that tubing is not worn or damaged.
  - Tubing could be crushed, ruptured, or dislocated.

- Check that fittings and tubing are not twisted or pulled, and that moment load is not applied.
- Use the designated tube.
  - Mount an insert sleeve especially when using extremely flexible urethane tubing.
- Securely insert the tube to the tube end, and make sure that the tube cannot be pulled off.
- Cut the tube at right angles using a dedicated cutting tool.

2. Confirmation before operation

**CAUTION**

- When supplying compressed air for the first time after connecting pipes, do not apply high pressure suddenly.
  - Piping connection could deviate and cause piped tubing to pop off and lead to accidents.
- When supplying compressed air for the first time after connecting pipes, confirm that no air is leaking from any pipe connections.
  - Apply a leakage detection agent on pipe connections with a brush, and check for air leaks.

4. Lead wire wiring

**CAUTION**

- Wire in a suitable method for the lead wire.

The lead wires used are as follows.

Electric connection symbol	Descriptions	Conductor size	Conductor cross-section areas	Isolator outer diameter	Sheath outer diameter
Blank	Grommet lead wire	AWG #24	0.22 equivalent	1.42	-

5. DIN terminal box

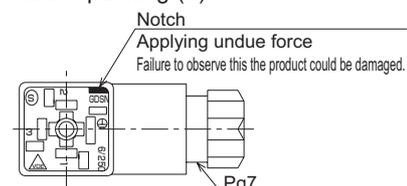
**Warning**

- Turn power OFF before disassembling or assembling the terminal box. There is a risk of electric shock.

**CAUTION**

- Disassembling
  - Loosen the screw (1), and pull the cover (2) in the direction of screw (1). The connector will come off the coil assembly (12).
  - Remove the screw (1) out of the cover (2).
  - There is a notch (9) (next to GDSN mark) on the bottom of the terminal block (3). Insert a small flat-tip screwdriver between the housing (2) and terminal block (3), and twist it. The terminal block (3) will come off the cover (2). (Refer to Fig. 1.) Do not apply excessive force. Failure to observe this the product could be damaged.
  - Remove the cable gland (4), and remove the washer (5) and rubber packing (6).

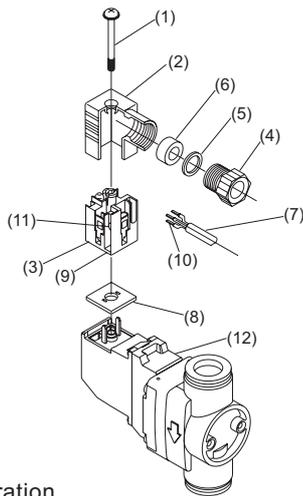
Fig. 1



3. Piping

- Pipe so that piping connection does not deviate by the device's movement, vibration, tension, etc.
  - When using the push in fitting, cut the tube at right angles using a dedicated tool.
  - Confirm that the tube has been inserted properly, and make sure that there is no tension during use. The tube could be dislocated or damaged if there is any tension.

## Exploded diagram



### Wiring

#### Wiring preparation

- Applicable dimensions for cable (7) are VCTF2 (3) core ( $\phi 3.5$  to 7) specified in JISC3306.
- Strip 10 mm of the cable's lead sheath.
- Either twisted wires or single conductors are connected.
- When using twisted wires, avoid connecting soldered wires.
- When using a crimping sleeve (10) on the end of the twisted wire, use the Japan Weidmuller H0.5/6 (0.3 to 0.5 mm<sup>2</sup>), H0.75/6 (0.75 mm<sup>2</sup>) or another equivalent product. The crimping sleeve must be prepared by the user.

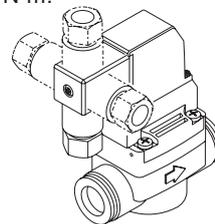
#### Wiring

- Pass the cable gland (4), washer (5) and rubber packing (6) in order through the cable (7), and insert into cover (2).
- Connect to terminal 1 and 2. There is no polarity.
- Recommended tightening torque is 0.2 to 0.25N·m.

#### Assembly

- Set the wired terminal gland (3) on cover (2) (Press in until it clicks.)
  - \* The terminal block can be set in four directions (Fig.2).
- Set the rubber packing (6) and washer (5) in order into the cover (2) cable lead-in port, and then securely tighten the cable gland (4).
  - Remarks: Reference tightening torque of cable gland is 1.0 to 1.5 N·m.
  - Check that the cable cannot be pulled out.
- Set the gasket (8) between the bottom of the terminal block (3) and the coil assembly (12) plug, and insert the connector. Insert the screw (1) from the top of the cover (2) and tighten.
  - Remarks: Recommended tightening torque of a screw is 0.2 to 0.25 N·m.

Fig. 2



## During Use & Maintenance

### 1. COMMON

#### CAUTION

- Energizing for a long time could impair solenoid valve performance. Similar caution is required in the following use.

- During intermittent energizing, it takes longer than non-energizing.
- During intermittent energizing, one energizing session exceeds 30 min.

Consider heat dissipation when installing. Consult with CKD when using this device in continuous energizing.

- Instantaneous leakage phenomenon  
When using the 2 port pilot operated solenoid valve, sudden application of pressure (e.g. starting up compressor) could momentarily open a closed valve and cause fluid to leak.
- Disassembly  
Do not disassemble this valve. Disassembling this valve may drop the valve performance.
- Do not touch coils or actuators with hands or otherwise while power is on or immediately after turning power on. The solenoid valve's coil and actuator will heat up when electricity is passed through them.
- Differential pressure  
Keep the differential pressure with the valve open above 0.01 MPa in the following situations. If the differential pressure when the valve is opened cannot be ensured at 0.01 MPa and over, the diaphragm may be damaged.
  - If a restriction is attached to the secondary side.
  - When several solenoid valves are connected to the pipe in

parallel (modular/manifold connection) and they are opened at the same time (it becomes difficult for the differential pressure between the primary and the secondary side to occur due to the source pressure drop.)

- When the differential pressure between the primary and the secondary side of solenoid valve at valve opening can not be ensured or could be unknown, select "1" from option symbol of combination of sealant and pilot type.
- Please note that the secondary side pressure is maintained when the solenoid valve is opened and the primary side pressure is lower than the secondary side pressure. (When the solenoid valve is closed, the flow direction is from the secondary side to the primary side.)
- Install in such a manner that tension will not be applied to the coil section lead wire.
- Hold the product body when carrying the product. (Do not hold onto the lead wire and dangle it.)
- When the regulator and solenoid valve are directly connected, the parts could mutually vibrate causing resonance and chattering.
- If the piping cross section on the fluid supply side is restricted, operation may become unstable because of a differential pressure fault when the valve functions. Use a pipe that matches the port size on the supply side.
- Depending on the working conditions, the operation of the solenoid valve may become unstable if left unused for a long period. Always have a trial run before using.
- Avoid use in applications involving continuous turning or swaying. Otherwise the fitting could be damaged.

**During Use & Maintenance**

**2. Specification of pilot air external exhaust**

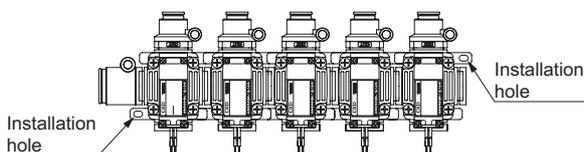
- With the option product, a small amount of pilot air is discharged to the outside of the product at the opening operation when operating solenoid valve. Use this product while considering the impact of the liquid, which is discharged outside, on the surrounding environment. In addition, although exhaust noise of fluid occurs during operation, it is not abnormal.

**3. Oil-prohibited specifications**

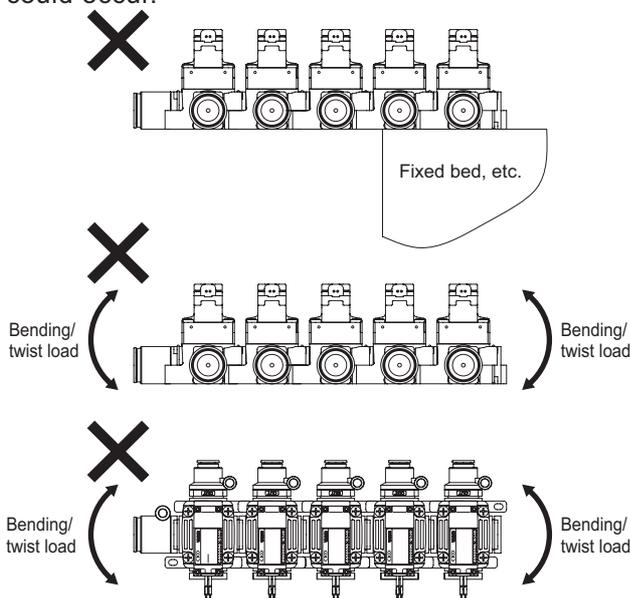
- The oil-prohibition specification of this product stands for performing cleaning and assembly under the following conditions.
  - Cleaning target: Main flow path components that contact liquid (except for components, which performance deteriorates by cleaning.)
  - Cleaning solution: industrial alcohol or fluorine cleaning solution
  - Assembly equipment: Use equipment for assembling and inspecting standard products.

**4. Manifold type**

- Contact CKD for expanding and reducing the manifold or changing the applicable tube size.
- When installing the product, use the mounting hole provided as mentioned below and install it on a smooth and flat place.



- Do not install or transport with single support, and hold or transport in such a manner that it causes twisting and bending force to the manifold body section. External leakage when applying fluid pressure or damage to product could occur.



- Do not drop the product or use it as a footing. The product could fail or be damaged.

**5. Screw-in body type**

- When screwing in the fitting, do not apply pressure in the direction as indicated in the following Fig. 1. The product will be damaged. Firmly tighten the screw in the direction as indicated in the Fig. 2 and apply torque.

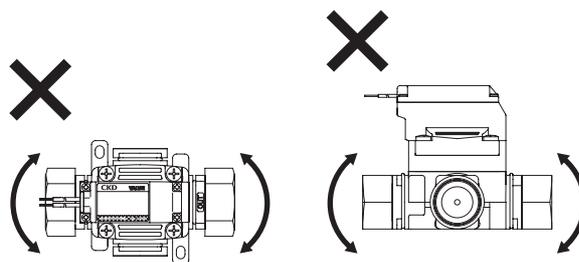


Fig. 1

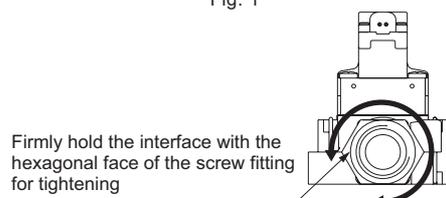


Fig. 2

- Tightening of the fitting for this product is intended for tightening of pneumatic push-in fitting. Do not use this product for pneumatic circuit of steel pipe connection. When this product is used for steel pipe connection, excessive force is applied to the body section due to the misalignment of steel pipe on the IN side and on the OUT side, which could damage the product. Contact CKD for steel pipe connection.

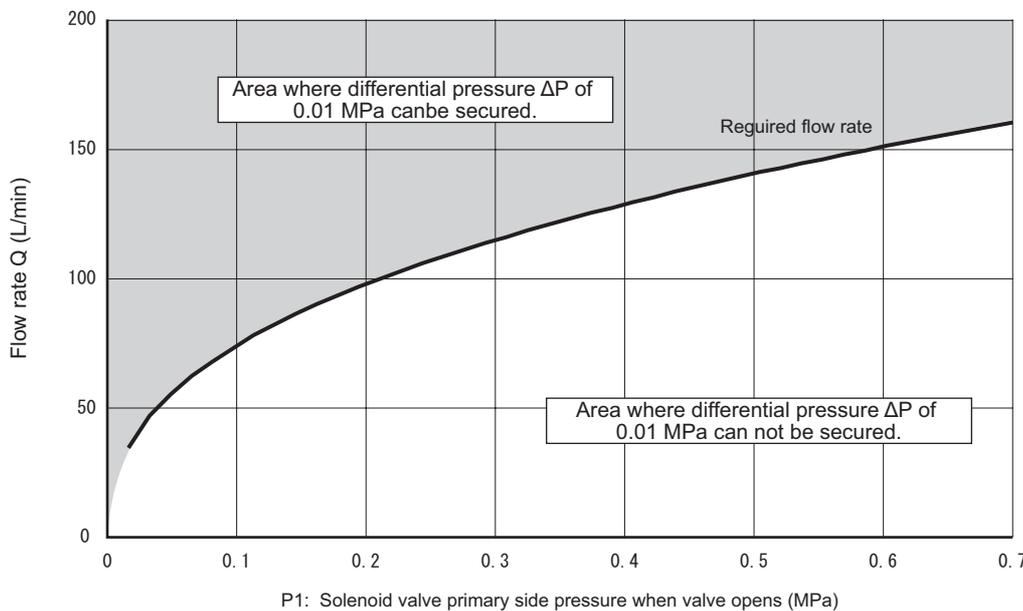
During Use & Maintenance

6. Internal exhaust specification Securing the lowest working differential pressure

Applicable model no. EXA  
GEXA -[port size]-0 [coil option][mounting plate option]-[voltage symbol]

This product is a pilot operated solenoid valve using the differential pressure of the front and the back of the solenoid valve. In order to make sure the valve opening operation works properly, it is necessary to ensure that the differential pressure ( $\Delta P = P1-P2$ ) is 0.01 MPa or over when the valve opens. If the differential pressure ( $\Delta P$ ) cannot be ensured, then the diaphragm could be damaged during use.

The differential pressure ( $\Delta P$ ) is determined by the flow rate Q, which flows in the solenoid valve and the larger the flow rate Q is, the higher the differential pressure ( $\Delta P$ ) that can be ensured. The rough guide for "required flow rate for operation" to obtain differential pressure  $\Delta P = 0.01$  MPa or over when the valve is opened is indicated in the following figure.



- (1) Prior to selecting this product, check the above figure and confirm that differential pressure  $\Delta P$  can be ensured at the required flow rate.
- (2) Please note that the differential pressure  $\Delta P$  and flow rate may not be ensured under the following cases.
  - When the flow rate becomes lower at the front and the back of the solenoid valve, due to items such as restriction, nozzle, and long piping.
  - When the air supply rate of the solenoid valve primary side is low (lack of regulator capacity, installation of restriction and long piping)
  - When air consumption amount at the other devices that share air supply source of solenoid valve primary side increases constantly or temporarily.
  - When flow rate changes and decreases due to the fluctuation of source pressure of air supply source of solenoid valve primary side.
  - When open operation is performed for multiple solenoid valves at the same time.
- (3) When performing open operation of multiple CKD products at use of manifold type, select the device so that the following flow rate can be ensured.  
 Required flow rate for operation of solenoid valve 1 station = required flow rate for operation < supply flow rate  
  
 (E.g.) When solenoid valve is opened and when P1 = 0.3 MPa, opening operation for all 3-station manifold is performed simultaneously.  
 Flow rate with which differential pressure  $\Delta P = 0.01$  MPa or over can be ensured at P1 = 0.3 MPa - Approximately 110 L/min, according to the above figure.  
 Required flow rate for operation: 110 L/min x release station number: 3 station = required flow rate for supply: 330 L/min or over
- (4) In case the required flow rate for operation cannot be ensured or flow rate cannot be confirmed, consider using pilot air external exhaust option or contact CKD.

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## Related products

### Air Unit CXU Series

Catalog No. CC-901A

Air unit modularized and combined with various pneumatic equipment such as filter regulator and valve.

- No more piping or problems
  - Chore piping design and piping job not required. Installation space is also reduced with the elimination of piping and tubes.
  - No screw-in section prevents external leakage and foreign particle when piping.
- Flexible combination
  - Vertical and horizontal pipes can be arranged versatility. Solenoid valve can be connected directly.
  - Due to module connection type, change in air component and easy expansion



### Small size flow sensor Rapiflow® FSM2 Series

Catalog No. CC-886A

The sensor that meets your demand.

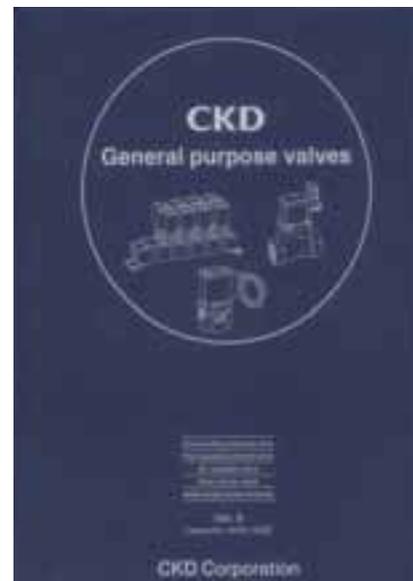
- New in the industries! Measuring flow in the normal and reverse directions available
- Flow range enlarged
- Large flow yet compact
- Accuracy improved
- Dual display/2 color indicator function
- Auto reference

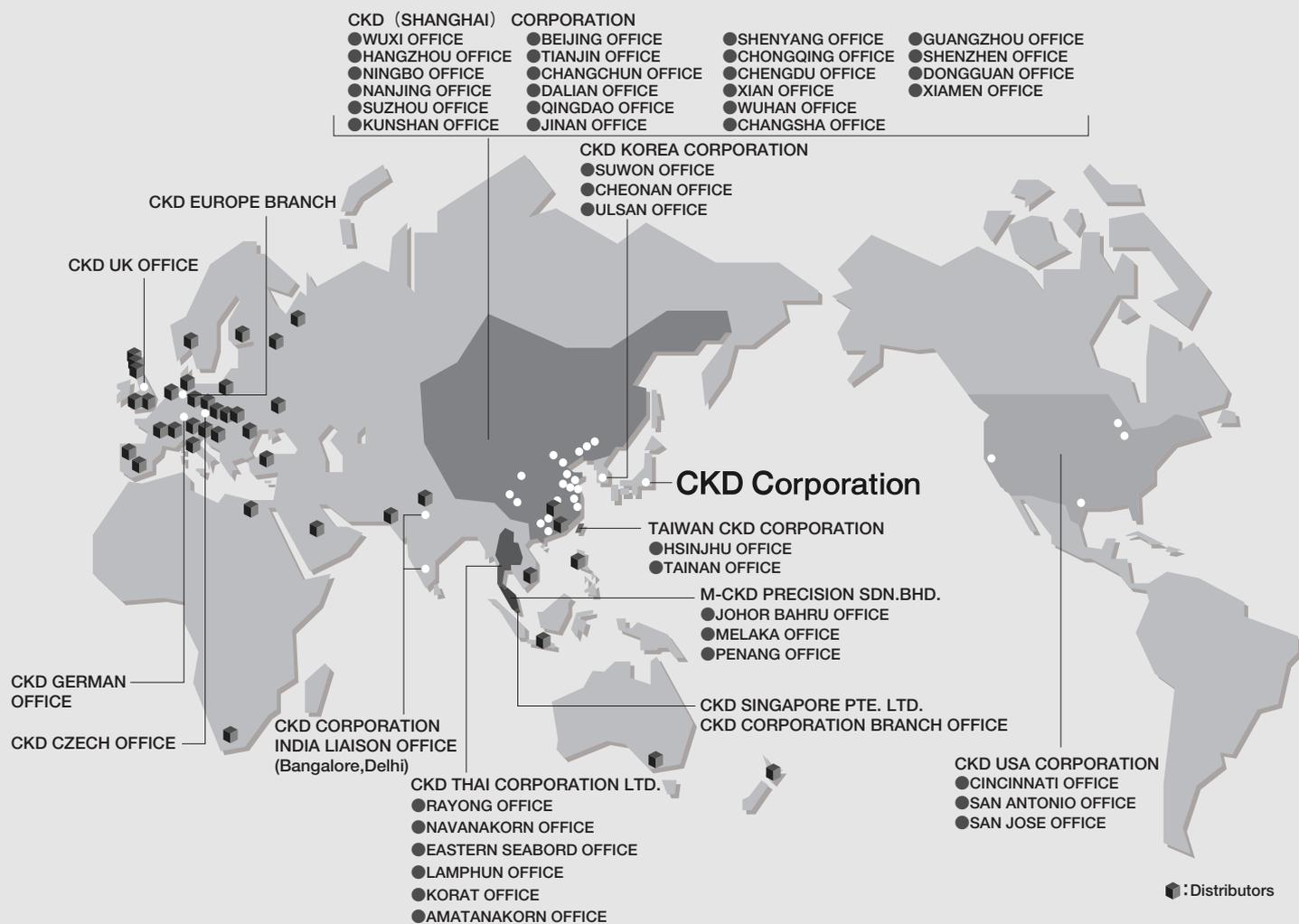


### General purpose valves

Catalog No. CB-03-1SA

- High quality, wide range of choices
- Best suited fluid control components for the requirement is available.
  - 2, 3 port direct acting solenoid valve
  - 2 port pilot operated solenoid valve
  - 2, 3 port air operated valve
  - 2, 3 port motor driven type valve
  - 2, 3 port explosion proof solenoid valve
  - Medical analysis process components





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