5.0 MPa Pilot Operated 2/3 Port Solenoid Valve & Check Valve

Series VCH

VCH41/42: 2 Port VCH410: 3 Port VCHC40: Check Valve

[Option]

Pilot Operated 2 Port Solenoid Valve

Series VCH40

Stable responsiveness

Response time dispersion within ±2 ms

Service life: 10 million cycles

Non-collision construction between the iron cores keeps equipment abrasion free.

⇓

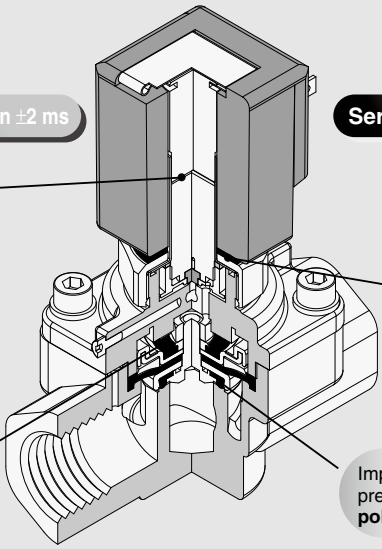
Improved responsiveness when switching off.
Reduced dispersion construction

Improved durability by applying a **special surface treatment** to the sliding parts.

Unnecessary volume inside the pilot chamber is reduced.

⇓

High speed response
Reduced dispersion



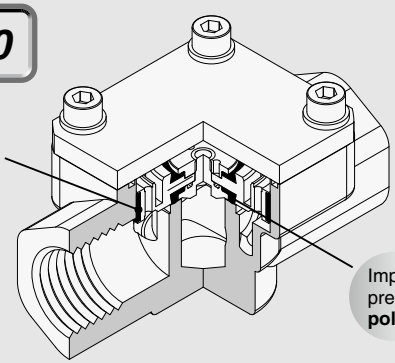
Use of **shock absorbing rubber**, resulting in protection of the pilot valve and electric parts.

Improved durability under a high pressure environment with a **polyurethane elastomer** poppet

Check Valve

Series VCHC40

Using **NSF-H1-certified grease** on the guide ring (sliding part).



Improved durability under a high pressure environment with a **polyurethane elastomer** poppet

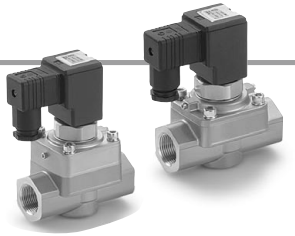
5.0 MPa Pilot Operated 2 Port Solenoid Valve

Series VCH40

CE

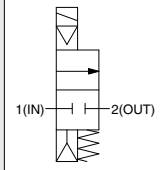
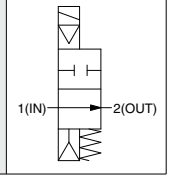
[Option]

How to Order



VCH4 1 – 1 D – 06 G –

Valve type

1	N.C. 
2	N.O. 

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC

∗ Consult with SMC for other voltages.

Electrical entry

D	DIN connector
DL	DIN connector with light
DO	Without DIN connector, with gasket

∗ A surge voltage suppressor is integrated inside the coil as a standard feature.

Port size

06	3/4
10	1

Thread type (Conforming to ISO1179-1 on the pneumatic/hydraulic G thread)

CE-compliant

Nil	—
Q	CE-compliant

∗ In the symbol Port 1 and Port 2 are shown in a blocked condition, but it is not possible to use the valve in cases of reverse pressure, where the Port 2 pressure is higher than the Port 1 pressure.

Made to Order

Made to order specifications
(For details, refer to page 365)

22.0 MPa 2 Port Air Operated Valve

Specifications

Model		VCH41 (N.C.)	VCH42 (N.O.)
Valve specification	Valve construction	Pilot operated, diaphragm poppet	
	Fluid	Air, Insert gas	
	Orifice	ø16	ø17.5
	Flow characteristics: C value (Effective area)	17 dm³/(s•bar) (85 mm²)	22 dm³/(s•bar) (110 mm²)
	Flow characteristics: b	0.08	0.11
	Flow characteristics: Cv	4.5	5.8
	Max. operating pressure	5.0 MPa	
	Operating pressure	0.5 to 5.0 MPa	
	Fluid temperature	5 to 80°C	
	Ambient temperature	5 to 80°C	
	Body material	Brass	
	Main seal material	Polyurethane elastomer	
	Enclosure	Drip proof (Equivalent to IP65)	
	Port size	G3/4, 1 (Conforming to ISO1179-1 on the pneumatic/hydraulic G thread)	
	Impact/Vibration resistance Note 1)	300/100 m/s² Note 2)	
	Mounting orientation	Unrestricted	
	Weight	1.67 kg	1.9 kg
Coil specification	Rated voltage	12 VDC, 24 VDC, 100 VAC, 110 VAC, 200 VAC, 220 VAC (50/60 Hz)	
	Allowable voltage fluctuation	±10% of rated voltage	
	Electrical entry	DIN connector	
	Coil insulation type	Class B	
	Power consumption Note 3)	5 W (DC), 13 VA (AC)	

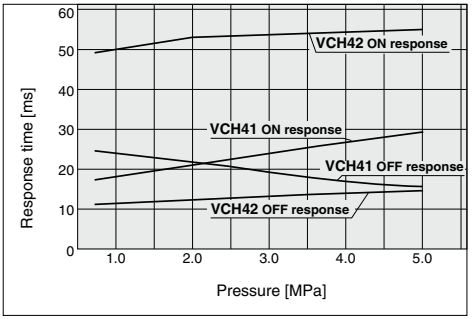
Note 1) Impact resistance: No malfunction resulted in an impact test using a drop impact tester. The test was performed one time each in the axial and right angle directions of the main valve and armature, for both energized and de-energized states. (Value in the initial stage)

Vibration resistance: No malfunction resulted in 8.3 to 2000 Hz, a one-sweep test performed in the axial and right angle directions of the main valve and armature for both energized and de-energized states. (Value in the initial stage)

Note 2) Vibration resistance is 50 m/s² when a light/surge voltage suppressor is attached.

Note 3) No inrush voltages are generated in the AC solenoid because a full-wave rectifier is used.

Response Time



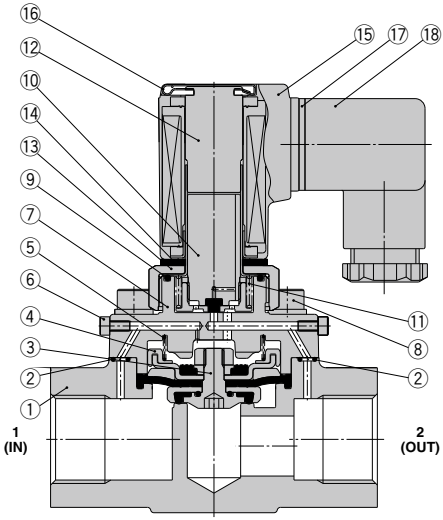
Note 1) DC solenoid

Note 2) AC solenoid: It will cause delays around 20 to 30 msec in the OFF response time.

SMC

Construction

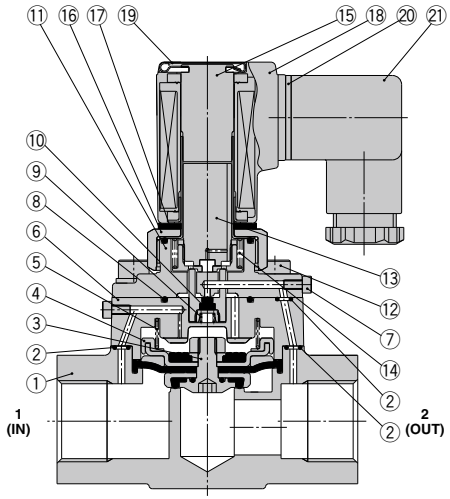
Normally closed (N.C.)



Component Parts

No.	Description	Material
1	**Body**	Brass
2	**O-ring**	NBR
3	**Diaphragm assembly**	Polyurethane elastomer
		Stainless steel
4	**Main valve guide**	Resin
5	**Poppet spring**	Stainless steel
6	**Hexagon socket head cap screw**	Stainless steel
7	**Bonnet**	Brass
8	**Hexagon socket head cap screw (with SW)**	Carbon steel
9	**O-ring**	NBR
10	**Armature assembly**	—
11	**Return spring**	Stainless steel
12	**Tube assembly**	Stainless steel
13	**Nut**	Brass
14	**Rubber mount**	NBR
15	**DIN connector type solenoid coil**	—
16	**Clip**	Stainless steel
17	**DIN terminal gasket**	CR
18	**DIN connector**	—

Normally open (N.O.)

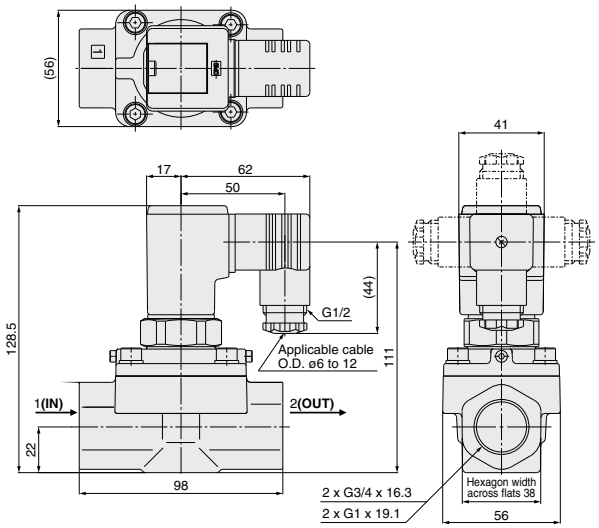


Component Parts

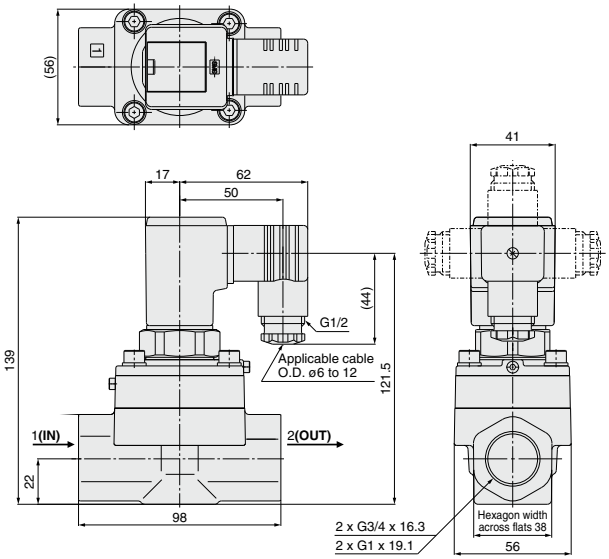
No.	Description	Material
1	**Body**	Brass
2	**O-ring**	NBR
3	**Diaphragm assembly**	Polyurethane elastomer
		Stainless steel
4	**Main valve guide**	Resin
5	**Poppet spring**	Stainless steel
6	**Bonnet plate**	Brass
7	**Hexagon socket head cap screw**	Stainless steel
8	**O-ring**	NBR
9	**Valve spring**	Stainless steel
10	**Poppet**	H-NBR
11	**Bonnet**	Brass
12	**Hexagon socket head cap screw (with SW)**	Carbon steel
13	**Armature assembly**	—
14	**Return spring**	Stainless steel
15	**Tube assembly**	Stainless steel
16	**Nut**	Brass
17	**Rubber mount**	NBR
18	**DIN connector type solenoid coil**	—
19	**Clip**	Stainless steel
20	**DIN terminal gasket**	CR
21	**DIN connector**	—

Dimensions

VCH41 (N.C.)



VCH42 (N.O.)



5.0 MPa Check Valve
Series VCHC40

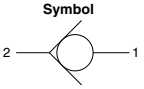
How to Order

VCHC40 – 06 G

- **Thread type (Conforming to ISO1179-1 on the pneumatic/hydraulic G thread)**
- **Port size**

06	3/4
10	1

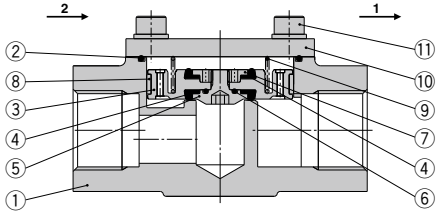
Symbol



Specifications

Model		VCHC40
Operating pressure		0.05 to 5.0 MPa
Cracking pressure		0.05 MPa
Orifice diameter		ø16
Flow characteristics	**C value (Effective area)**	28 dm³/(s·bar) (140 mm²)
	b	0.15
	Cv	7.4
Fluid		Air, Inert gas
Fluid temperature		5 to 80°C
Ambient temperature		5 to 80°C
Body material		Brass
Seal material		Polyurethane elastomer
Port size		G3/4, 1 (Conforming to ISO1179-1 on the pneumatic/hydraulic G thread)
Mounting orientation		Unrestricted
Weight		1.02 kg

Construction

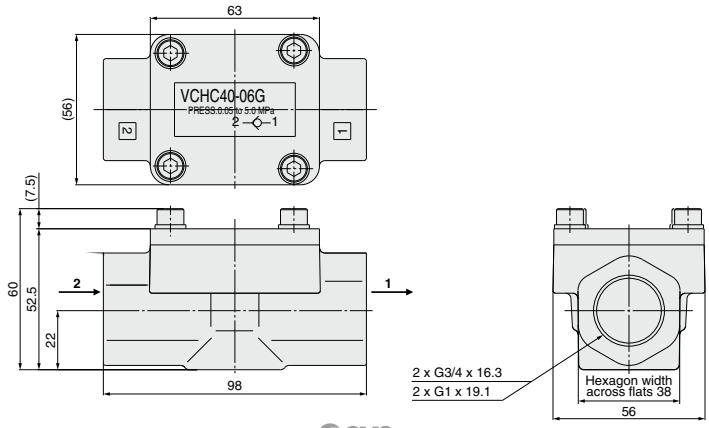


Component Parts

No.	Description	Material
1	**Body**	Brass
2	**O-ring**	NBR
3	**Piston**	Aluminum + Hard anodized
4	**Poppet**	Polyurethane elastomer
5	**Set screw**	Stainless steel
6	**O-ring**	NBR
7	**Nut**	Stainless steel
8	**Guide ring**	Resin
9	**Spring**	Stainless steel
10	**Plate**	Steel + Electroless nickel plated
11	**Hexagon socket head cap screw (with SW)**	Carbon steel

Dimensions

VCHC40



5.0 MPa Pilot Operated 3 Port Solenoid Valve

Series VCH400

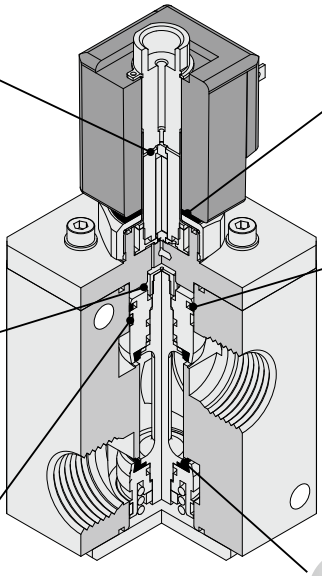
For Air

CE [Option]

Stable responsiveness

Response time dispersion within ±2 ms

Service life: 10 million cycles



Non-collision construction between the iron cores keeps equipment abrasion free.

⇩

Improved responsiveness when switching off.
Reduced dispersion construction

Improved durability by applying a **special surface treatment** to the sliding parts.

Unnecessary volume inside the pilot chamber is reduced.

⇩

High speed response
Reduced dispersion

Using NSF-H1-certified grease on the guide ring (sliding part). Special treatment containing **fluororesin is applied** to the body side sliding face.

Use of **shock absorbing rubber**, resulting in protection of the pilot valve and electric parts.

Special fluororesin sealant is adopted for the sliding part.

⇩

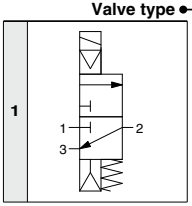
Stable responsivess after extended disuse.
No likely to subject to a pressure.

Improved durability under a high pressure environment with a **polyurethane elastomer** poppet

How to Order

VCH410 − 1 D − 06 G − □

Valve type



Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC

∗ Consult with SMC for other voltages.

Electrical entry

D	DIN connector
DL	DIN connector with light
DO	Without DIN connector, with gasket

∗ A surge voltage suppressor is integrated inside the coil as a standard feature.

Thread type
(Conforming to ISO1179-1 on the pneumatic/hydraulic G thread)

Port size

04	1/2
06	3/4
10	1

CE-compliant

Nil	—
Q	CE-compliant

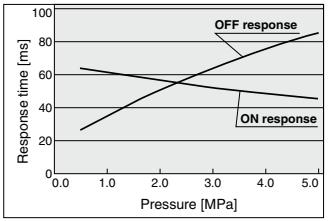
SMC

Specifications

Model		VCH410	
Valve specification	Valve construction	Pilot operated, poppet	
	Fluid	Air, Inert gas	
	Orifice	ø18	
	Flow characteristics: C value (Effective area)	G1/2	1→2:20 dm³/(s·bar) (100mm²) 2→3:22 dm³/(s·bar) (110mm²)
		G3/4, 1	1→2:22 dm³/(s·bar) (110mm²) 2→3:24 dm³/(s·bar) (120mm²)
	Flow characteristics: b	G1/2	0.26
		G3/4, 1	0.36
	Flow characteristics: Cv	G1/2	1→2 5.3 2→3 5.8
		G3/4, 1	1→2 5.8 2→3 6.3
	Max. operating pressure	5.0 MPa	
	Operating pressure Note 1)	0.5 to 5.0 MPa	
	Fluid temperature	5 to 80°C	
	Ambient temperature	5 to 80°C	
	Body material	Aluminum + Hard anodized	
	Main seal material	Polyurethane elastomer	
	Enclosure	Drip proof (Equivalent to IP65)	
	Port size	G1/2, 3/4, 1 (Conforming to ISO1179-1 on the pneumatic/hydraulic G thread)	
	Impact/Vibration resistance Note 2)	300/100 m/s² Note 3)	
	Mounting orientation	Unrestricted	
	Weight	G1/2, 3/4: 1.83 kg, G1: 2.11 kg	
Coil specification	Rated voltage	12 VDC, 24 VDC, 100 VAC, 110 VAC, 200 VAC, 220 VAC (50/60 Hz)	
	Allowable voltage fluctuation	±10% of rated voltage	
	Electrical entry	DIN connector	
	Coil insulation type	Class B	
	Power consumption Note 4)	5 W (DC), 13 VA (AC)	

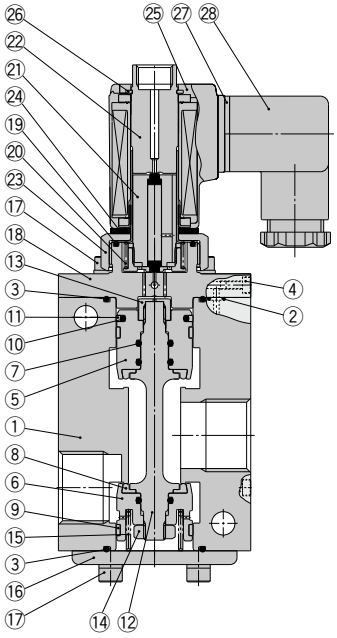
Note 1) When used as a selector valve (pressurizing 1, 3 port), the pressure in the port should be within the range of the port 1 pressure ≧port 3 pressure x 2 (2 times).
Note 2) Impact resistance: No malfunction resulted in an impact test using a drop impact tester. The test was performed one time each in the axial and right angle directions of the main valve and armature, for both energized and de-energized states. (Value in the initial stage)
Vibration resistance: No malfunction resulted in 8.3 to 2000 Hz, a one-sweep test performed in the axial and right angle directions of the main valve and armature for both energized and de-energized states. (Value in the initial stage)
Note 3) Vibration resistance is 50 m/s² when a light/surge voltage suppressor is attached.
Note 4) No inrush voltages are generated in the AC solenoid because a full-wave rectifier is used.

Response Time



Note 1) DC solenoid
Note 2) AC solenoid: It will cause delays around 20 to 30 msec in the OFF response time.

Construction

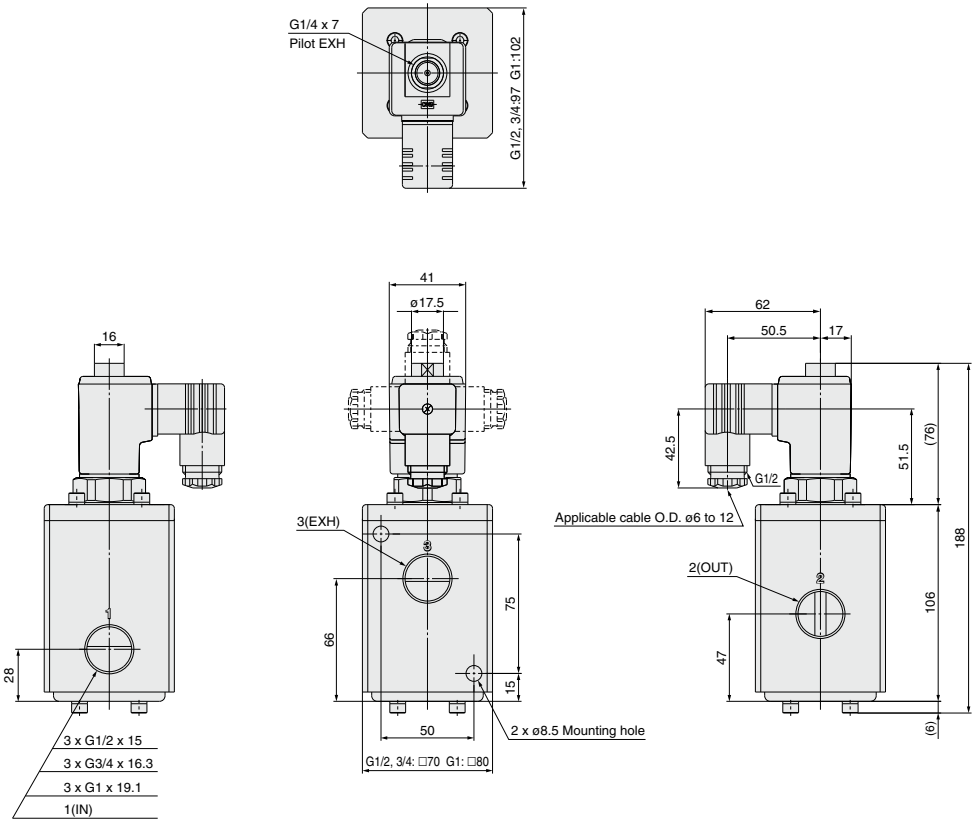


Component Parts

No.	Description	Material
1	Body	Aluminum + Hard anodized
2	O-ring	NBR
3	O-ring	NBR
4	Hexagon socket head cap screw	Stainless steel
5	Piston A	Aluminum + Hard anodized
6	Piston B	Aluminum + Hard anodized
7	O-ring	NBR
8	Poppet	Polyurethane elastomer
9	Guide ring	Resin
10	O-ring	NBR
11	Ring	Resin
12	Rod	Stainless steel
13	Hexagon nut	Brass
14	Hexagon nut class 3	Stainless steel
15	Poppet spring	Stainless steel
16	Plate	Steel + Electroless nickel plated
17	Hexagon socket head cap screw (with SW)	Carbon steel
18	Bonnet	Aluminum + Hard anodized
19	O-ring	NBR
20	Return spring	Stainless steel
21	Armature assembly	—
22	Tube assembly	Stainless steel
23	Nut	Brass
24	Rubber mount	NBR
25	DIN connector type solenoid coil	—
26	Round Type S retaining ring	Carbon steel
27	DIN terminal gasket	CR
28	DIN connector	—

Dimensions

VCH410



Made to Order Specifications:

Made to Order

Please consult with SMC for detailed size, specifications and delivery.

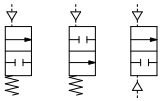
1 22.0 MPa 2 Port Air Operated Valve

AXT836 A

Specifications

Symbol	Passage	Piping size
A	N.C.	1/4" fitting integrated type
B	N.O.	1/4" fitting integrated type
C	N.C.	Flange type
D	N.O.	Flange type
E	Double acting	1/4" fitting integrated type

Symbol



N.C. N.O. Double acting

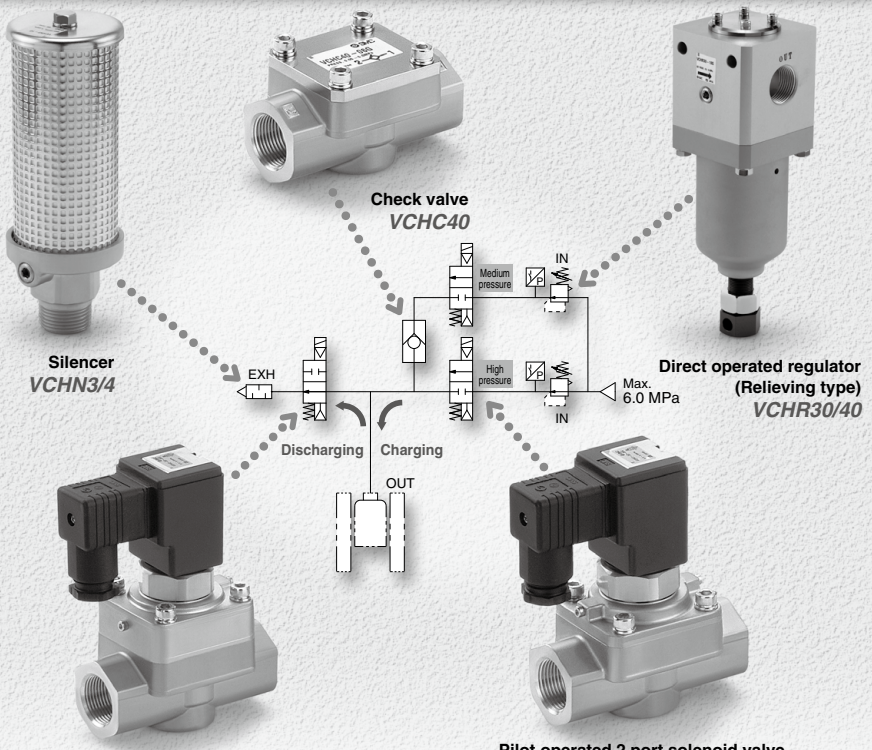
Integrated fitting type **Flange type**

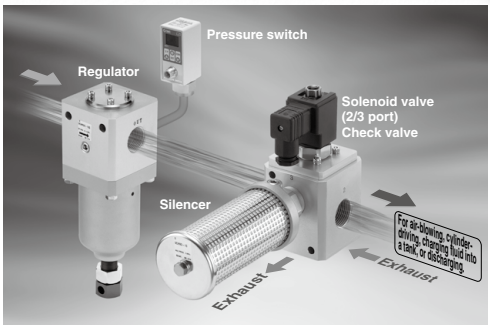
Specifications

	A, C (N.C. type)	B, D (N.O. type)	E (Double acting)
Fluid	Air/Inert gas		
Fluid temperature	−10 to 60°C (No freezing)		
Ambient temperature	−10 to 60°C (No freezing)		
Operating pressure range	0 to 22.0 MPa		0 to 20.0 MPa
Proof pressure	35.0 MPa		
Pilot pressure range	0.4 to 0.7 MPa		0.3 to 0.5 MPa
Valve leakage	0.1 cm^3/min or less		
Orifice diameter	2.8 mm		

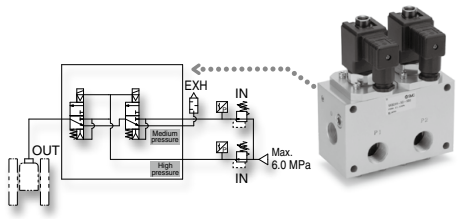
5.0 MPa Pneumatic

Applications included air-blowing, charging fluid into a vessel, or discharging (Blow-molding equipment, etc.)





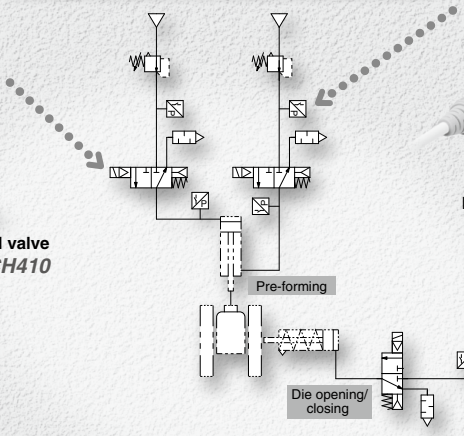
Made to Order/Manifold Unit



Equipment Variation

Pilot operated 3 port solenoid valve
VCH410

Example of driving a cylinder



Pressure switch
ISE75(H)

	Description	Features	Maximum operating pressure (MPa)	Series	Port size 1/4	1/2	3/4	1	1 1/4	1 1/2	Page
	Pilot operated 2 port solenoid valve	**Service life: 10 million cycles** Adopting a polyurethane elastomer poppet in a valve seat. Improved durability under a high pressure environment.	5.0	**VCH41(N.C.)**			●	●			P.358
				VCH42(N.O.)			●	●			
	Check valve		5.0	**VCHC40**			●	●			P.361
	Pilot operated 3 port solenoid valve		5.0	**VCH410**		●	●	●			P.362
	Direct operated regulator (Relieving type)		Inlet pressure 6.0 Set pressure 0.5 to 5.0	**VCHR30**			●	●			Best Pneumatics No.⑤
				VCHR40				●		●	
	Silencer	**Noise reduction 35 dB(A)** (At supply pressure 4.0 MPa, back pressure 2.0 MPa) **Clogging-reduction with double-layer construction**	5.0 (Relief valve release pressure: 1.8 MPa)	**VCHN3**			●	●			Best Pneumatics No.⑥
				VCHN4				●	●	●	

Related Equipment

	Pressure switch	**2-color display Metal body** (Aluminum die-cast)	10.0 15.0	**ISE75(H)**	●						Best Pneumatics No.⑥

Made to Order

1 6.0 MPa pilot operated regulator (Air operated type) ····· Best Pneumatics No.⑤

2 22.0 MPa 2 port air operated valve ····· P.365

5.0 MPa Pilot Operated 2/3 Port Solenoid Valves & Check Valves Precautions 1

Be sure to read this before handling.

Design

⚠ Warning

1. Cannot be used as an emergency shutoff valve, etc.

The valves presented in this catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

2. Extended periods of continuous energization

The solenoid coil will generate heat when continuously energized. Avoid using in a tightly shut container. Install it in a well-ventilated area. Furthermore, do not touch it while it is being energized or right after it is energized.

3. This solenoid valve cannot be used for explosion proof applications.

4. Maintenance space

The installation should allow sufficient space for maintenance activities.

5. Actuator drive

When an actuator, such as a cylinder, is to be driven using a valve, take appropriate measures to prevent potential danger caused by actuator operation.

6. Use caution regarding exhaust port freezing.

If a high pressure air (more than 1.0 MPa) is quickly exhausted, there may be an occurrence in which the valve will not switch properly or the service life will substantially decrease due to condensation or freezing caused by the substantial temperature change. When condensation or freezing occurs, take measures such as using a freeze-reducing silencer (VCHNF series), etc.

7. Use caution regarding back pressure.

1) When port 3 (EXH) of a 3 port solenoid valve (VCH400 series) is excessively throttled or used as a selector valve (pressurizing 1, 3 port), the pressure in the port should be within a range of half the pressure in port 1 (port 1 pressure ≧ twice as strong as port 3 pressure). Using a 3 port valve beyond its back pressure and/or supply pressure range may cause the valve switch to malfunction or result in unstable operation.

2) In the case of a 3 port solenoid valve, when the valve is being switched, a high pressure air will be introduced into the lower pressure side. Therefore, when using this product as a selector valve for switching a high and medium pressure, a relief type regulator (VCHR series) must be used for the medium pressure side.

Selection

⚠ Warning

1. Confirm the specifications.

Give careful consideration to the operating conditions such as the application, fluid and environment, and use within the operating ranges specified in this catalog.

2. Fluid

Corrosive gas

Cannot be used since it will lead to cracks by stress corrosion or result in other incidents.

3. Air quality

1) Use clean air.

Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

2) Install air filters.

Install air filters close to valves at their upstream side. A filtration degree of 5 μm or less should be selected.

3) Install an air dryer or after-cooler, etc.

Compressed air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer or after cooler, etc.

4) If excessive carbon powder is generated, eliminate it by installing mist separators at the upstream side of valves.

If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause a malfunction.

Refer to Best Pneumatics No. 5 for further details on compressed air quality.

4. Ambient environment

Use within the operable ambient temperature range. Confirm the compatibility between the product's composition materials and the ambient atmosphere. Be sure that the fluid used does not touch the external surface of the product.

5. Supply source

If the primary side air is throttled, flow may be reduced resulting in the malfunction of the switch or instability in the response time because of the pilot operated solenoid valve. Conduct piping work suited for the secondary side piping (air consumption). Also, when a regulator is installed, the air supply will stop right after the solenoid valve is switched due to the response time of the regulator. Thus, when using it below the minimum operating pressure, adjust the pipe size, length or provide an air tank, etc.

5.0 MPa Pilot Operated 2/3 Port Solenoid Valves & Check Valves Precautions 2

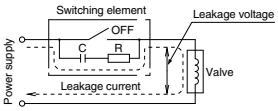
Be sure to read this before handling.

Selection

⚠Caution

1. Leakage voltage

Particularly when using a resistor in parallel with a switching element and using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor, C-R element, etc., creating a possible danger that the valve may not turn off.



AC coil: 10% or less of rated voltage
DC coil: 2% or less of rated voltage

Mounting

⚠Warning

1. If air leakage increases or equipment does not operate properly, stop operation.

After mounting is completed, confirm that it has been done correctly by performing a suitable function test.

2. Do not apply external force to the coil section.

Be sure to apply the wrench to the external part of the piping connection. (Hexagonal parts or width across flats) Also, use caution when mounting a silencer or piping to the VCH410 series 3 port solenoid valve because the top (G1/4) is a pilot exhaust port.

3. Be sure not to position the coil downwards.

When mounting a valve with its coil positioned downwards, foreign objects in the fluid will adhere to the iron core leading to a malfunction.

4. Avoid sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.

Piping

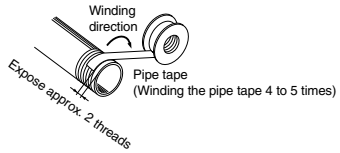
⚠Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.
Avoid pulling, compressing, or bending the valve body when piping.

2. Wrapping of pipe tape

Pipe tape is not necessary since this product uses a pneumatic and hydraulic purpose G thread which conforms to ISO 1179-1. When an R (taper) thread is used, leave 1 to 2 threads at the tip exposed before winding the piping thread around it 4 to 5 times.



Connecting a R thread

3. Always tighten threads with the proper tightening torque.

When attaching fittings to valves, tighten with the proper tightening torque shown below.

Tightening Torque for Piping

Connection threads	Proper tightening torque N·m
G, Rc 1/2	28 to 30
G, Rc 3/4	28 to 30
G, Rc 1	36 to 38

4. Connection of piping to products

When connecting piping to a product, refer to its instruction manual to avoid mistakes regarding the supply port, etc.

- Port 1: Supply port
- Port 2: Output port
- Port 3: Exhaust port

Note) Supply port when used as a selector valve.
However, use within the range of the port 1 pressure ≧ port 3 pressure x 2 (2 times).

5.0 MPa Pilot Operated 2/3 Port Solenoid Valves & Check Valves Precautions 3

Be sure to read this before handling.

Wiring

⚠ Caution

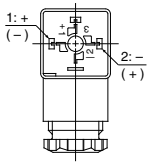
1. **As a rule, use electrical wire with a cross sectional area of 0.5 to 1.25 mm^2 for wiring. Furthermore, do not allow excessive force to be applied to the lines.**
2. **Use electrical circuits which do not generate chattering in their contacts.**
3. **Use voltage which is within ±10% of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within ±5% of the rated value. The voltage drop is the value in the lead wire section connecting the coil.**
4. **When a surge from the solenoid affects the electrical circuitry, install a surge absorber, etc., in parallel with the solenoid. Or, adopt an option that comes with the surge voltage protection circuit. (However, a surge voltage occurs even if the surge voltage protection circuit is used. For details, please consult with us.)**

Electrical Connections

⚠ Caution

DIN connector

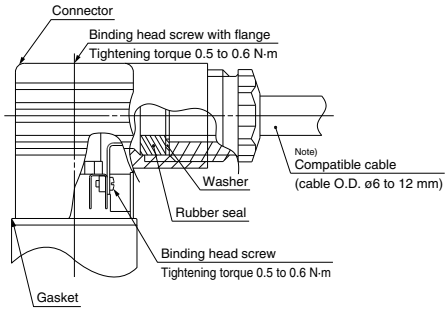
Since internal connections are as shown below for the DIN connector, make connections to the power supply accordingly.



Terminal no.	1	2
DIN terminal	+ (−)	− (+)

∗ There is no polarity.

- Use the compatible heavy-duty cords with cable O.D. of ø6 to 12 mm.
- Use the tightening torques below for each section.

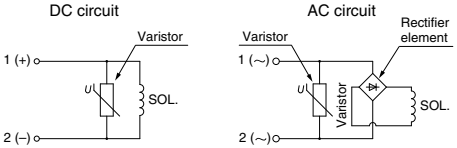


Note) For an outside cable diameter of ø9 to 12 mm, remove the internal parts of the rubber seal before using.

Electrical Circuits

⚠ Caution

DIN connector



Operating Environment

⚠ Warning

1. **Do not use the valves in an atmosphere having corrosive gases, chemicals, salt water, water, steam, or where there is direct contact with any of these.**
2. **Do not use in explosive atmospheres.**
3. **Do not use in locations subject to vibration or impact.**
4. **Do not use in locations where radiated heat will be received from nearby heat sources.**
5. **Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.**

Maintenance

⚠ Warning

1. Removing the product

1) Shut off the fluid supply and release the fluid pressure in the system.
2) Shut off the power supply.
3) Dismount the product.

2. Low frequency operation

Switch valves at least once every 30 days to prevent malfunction. Also, in order to use it under the optimum state, conduct a regular inspection once a half year.

⚠ Caution

1. Storage

In the case of long term storage, thoroughly remove all moisture to prevent rust and deterioration of rubber materials, etc.

2. Exhaust the drain from an air filter periodically.