

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

Series VCH

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

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

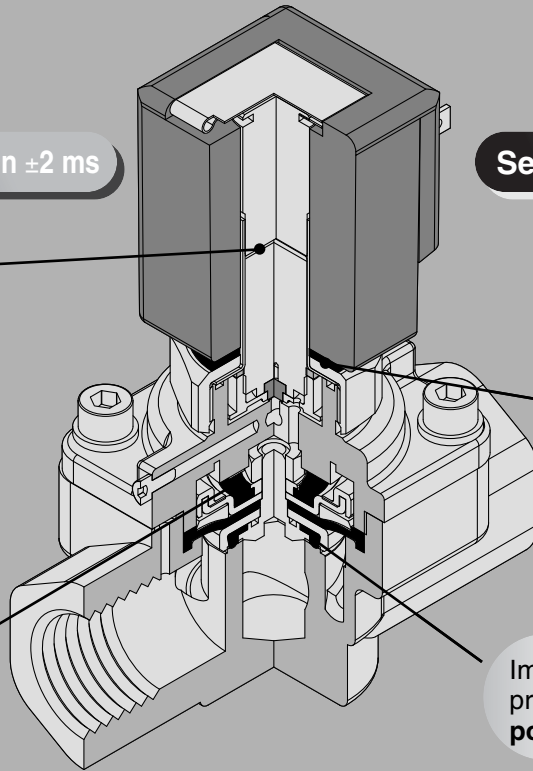
Improved durability by applying a **special surface treatment** to the sliding parts.

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

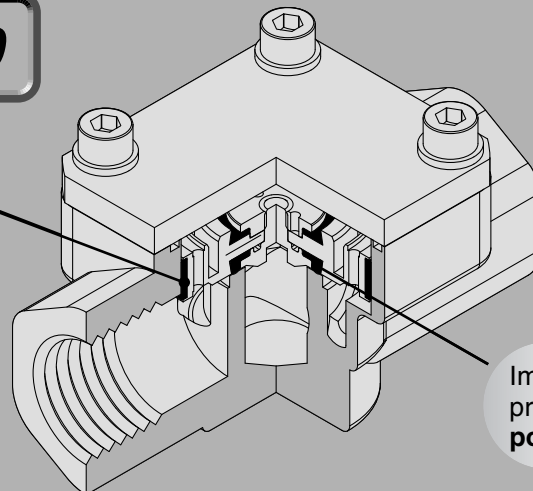


Check Valve

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



VX2

VXD

VXZ

VXE

VXP

VXR

VXH

VXF

VX3

VXA

VCH□

VDW

VQ

LVM

VCA

VCB

VCL

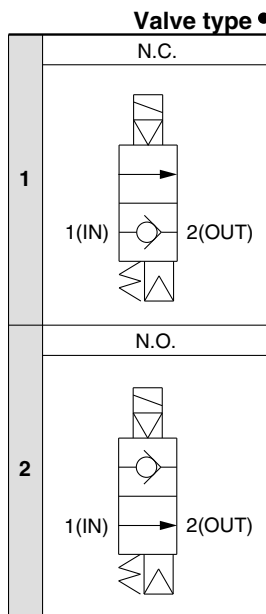
VCS

VCW

5.0 MPa Pilot Operated 2 Port Solenoid Valve Series VCH40

How to Order

VCH4 **1** - **1** **D** - **06** **G**



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. CE marking compliant products are only available with 50 VDC or less.

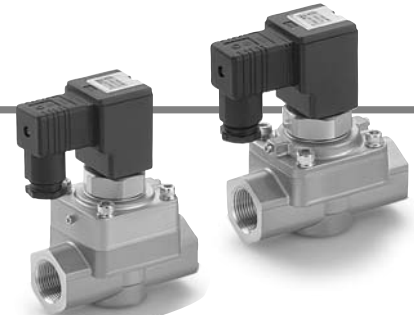
• Thread type
(Conforming to ISO1179-1 on the pneumatic/hydraulic G thread)

Port size	
06	3/4
10	1

• Electrical entry

D	DIN connector
DL	DIN connector with light

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



Made to order specifications
(For details, refer to page 235)

22.0 MPa 2 Port Air Operated Valve

Specifications

Model	VCH41 (N.C.)	VCH42 (N.O.)
Valve construction	Pilot operated, diaphragm poppet	
Fluid	Air, Inert gas	
Orifice	ø16	ø17.5
C value (Effective area)	17 dm ³ /(s·bar) (85 mm ²)	22 dm ³ /(s·bar) (110 mm ²)
b	0.08	0.11
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/s ² ^{Note 2)}	
Mounting orientation	Unrestricted	
Mass	1.67 kg	1.9 kg
Rated voltage	12 VDC, 24 VDC, 100 VAC, 200 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)	

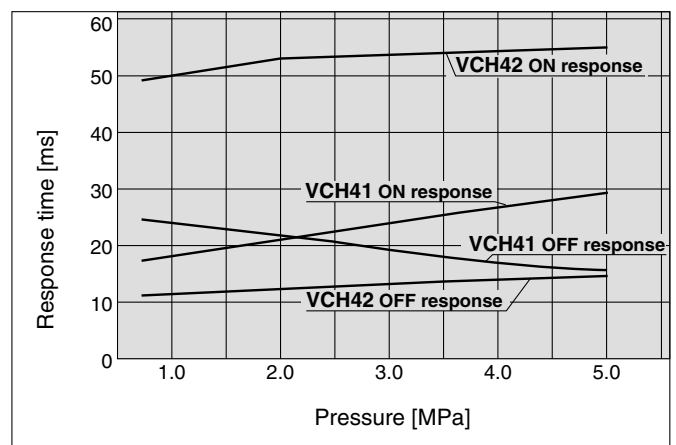
Note 1) Impact resistance: No malfunction resulted in an impact test using a drop impact tester. The test was performed one time each in the axial and right angle directions of the main valve and armature, for both energized and de-energized states. (Value in the initial stage)

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

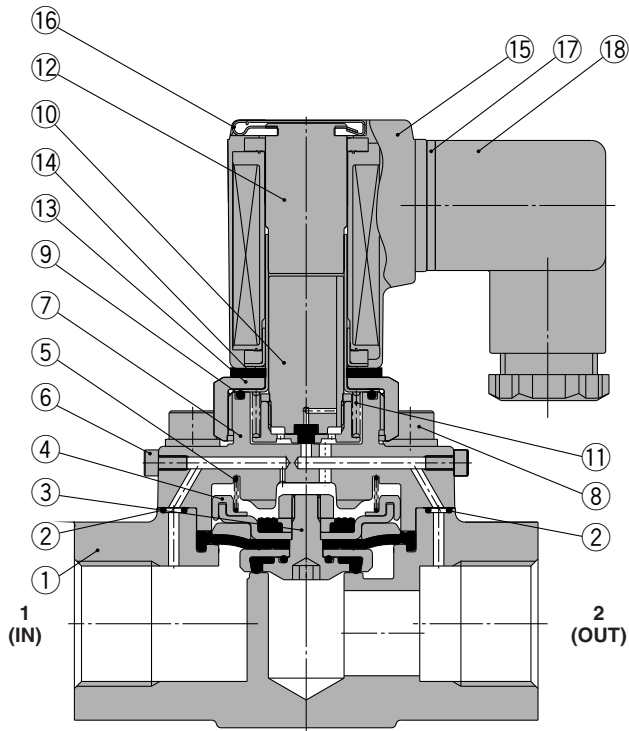


Note 1) DC solenoid without a light/surge voltage suppressor

Note 2) AC or DC solenoid with an indicator light: It will cause delays around 20 to 30 msec in the OFF response time.

Construction

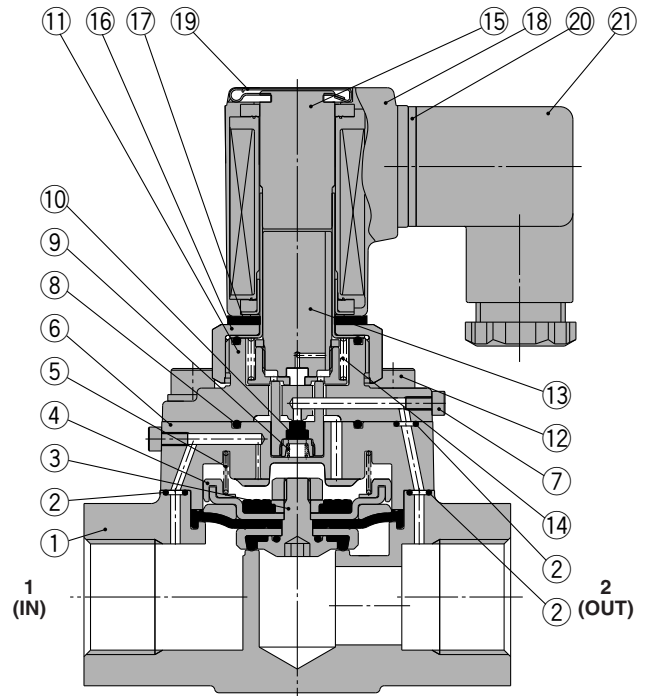
Normally closed (N.C.)



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	—

VX2

VXD

VXZ

VXE

VXP

VXR

VXH

VXF

VX3

VXA

VCH

VDW

VQ

LVM

VCA

VCB

VCL

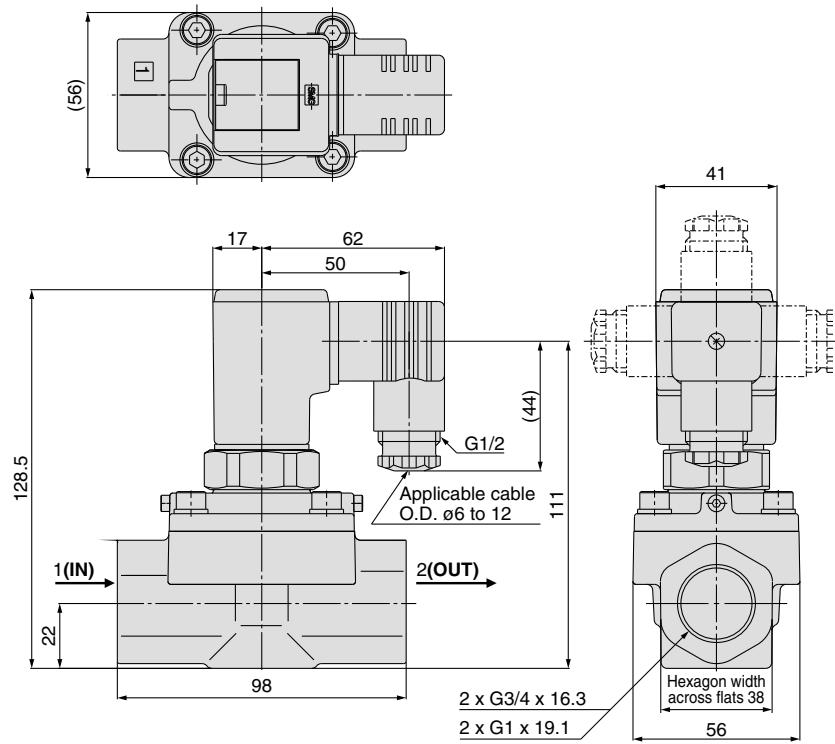
VCS

VCW

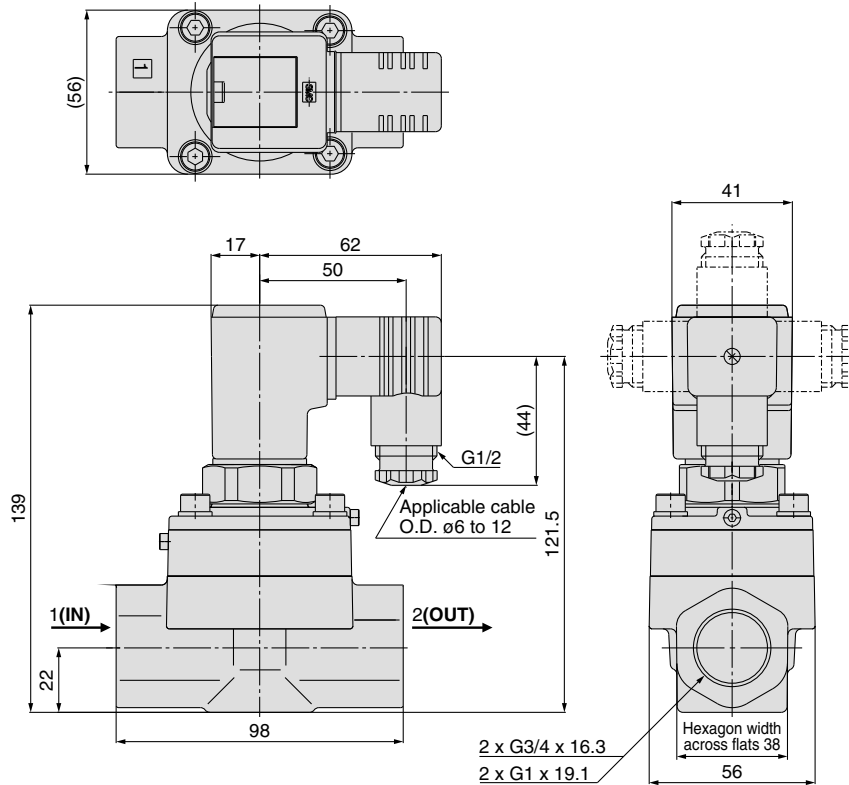
Series VCH40

Dimensions

VCH41 (N.C.)



VCH42 (N.O.)



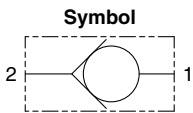
5.0 MPa Check Valve

Series VCHC40

How to Order



VCHC40 - **06** **G**



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

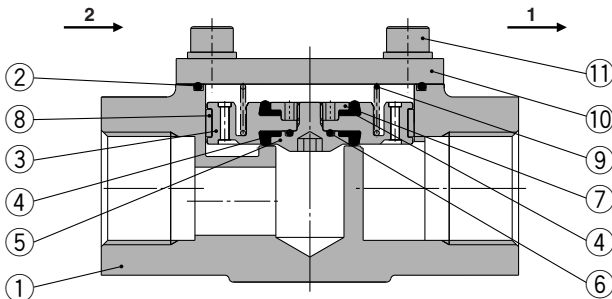
• **Port size**

06	3/4
10	1

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 dm ³ /(s·bar) (140 mm ²)
	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	
Mass	1.02 kg	

Construction

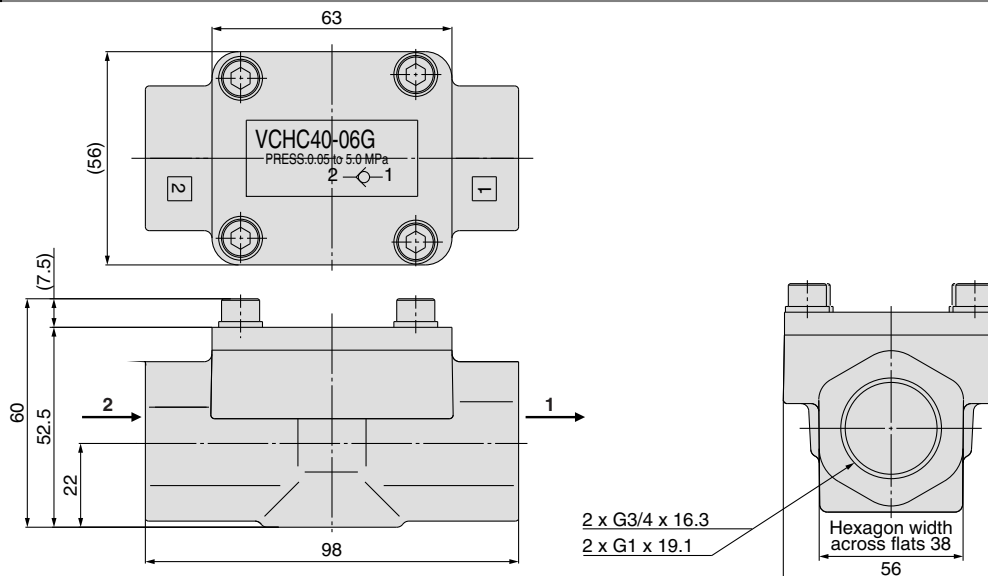


Component Parts

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



VX2

VXD

VXZ

VXE

VXP

VXR

VXH

VXF

VX3

VXA

VCH□

VDW

VQ

LVM

VCA

VCB

VCL

VCS

VCW

5.0 MPa Pilot Operated 3 Port Solenoid Valve

Series VCH400

For Air

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

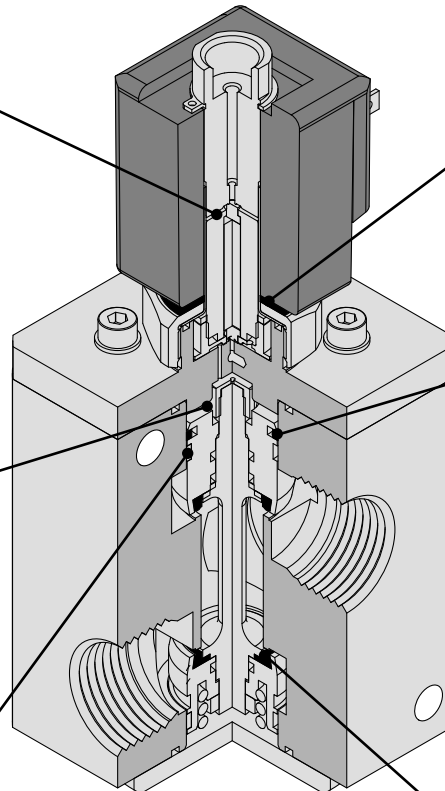
Improved durability by applying a **special surface treatment** to the sliding parts.

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 **fluoresin** is applied to the body side sliding face.



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

Special fluoresin sealant is adopted for the sliding part.

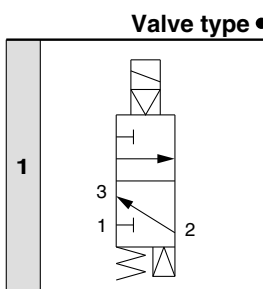


Stable responsiveness after extended disuse.
No likely to subject to a pressure.

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. CE marking compliant products are only available with 50 VDC or less.

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

Port size

04	1/2
06	3/4
10	1

Electrical entry

D	DIN connector
DL	DIN connector with light

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

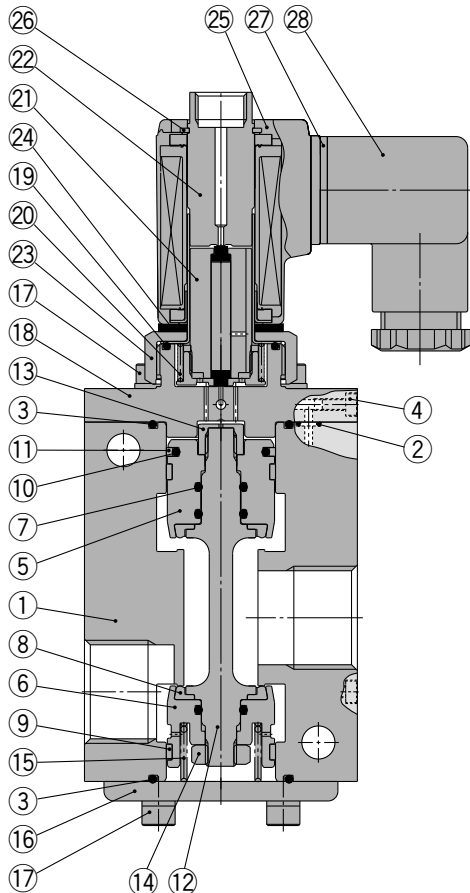


Specifications

Model		VCH410	
Valve construction		Pilot operated, poppet	
Fluid		Air, Inert gas	
Orifice		ø18	
Flow characteristics	C value (Effective area)	G1/2 1→2:20 dm ³ /(s·bar) (100mm ²) 2→3:22 dm ³ /(s·bar) (110mm ²)	G3/4, 1 1→2:22 dm ³ /(s·bar) (110mm ²) 2→3:24 dm ³ /(s·bar) (120mm ²)
	b	G1/2 0.26	G3/4, 1 0.36
	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 <small>Note 1)</small>		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 <small>Note 2)</small>		300/100 m/s ² <small>Note 3)</small>	
Mounting orientation		Unrestricted	
Mass		G1/2, 3/4: 1.83 kg, G1: 2.11 kg	
Coil specification	Rated voltage	12 VDC, 24 VDC, 100 VAC, 200 VAC (50/60 Hz)	
	Allowable voltage fluctuation	±10% of rated voltage	
	Electrical entry	DIN connector	
	Coil insulation type	Class B	
	Power consumption <small>Note 4)</small>	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.

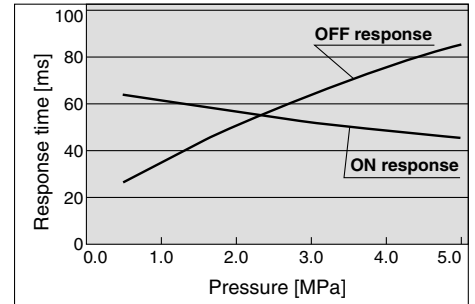
Construction



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	—

Response Time



Note 1) DC solenoid without a light/surge voltage suppressor
 Note 2) AC or DC solenoid with an indicator light: It will cause delays around 20 to 30 msec in the OFF response time.

VX2

VXD

VXZ

VXE

VXP

VXR

VXH

VXF

VX3

VXA

VCH

VDW

VQ

LVM

VCA

VCB

VCL

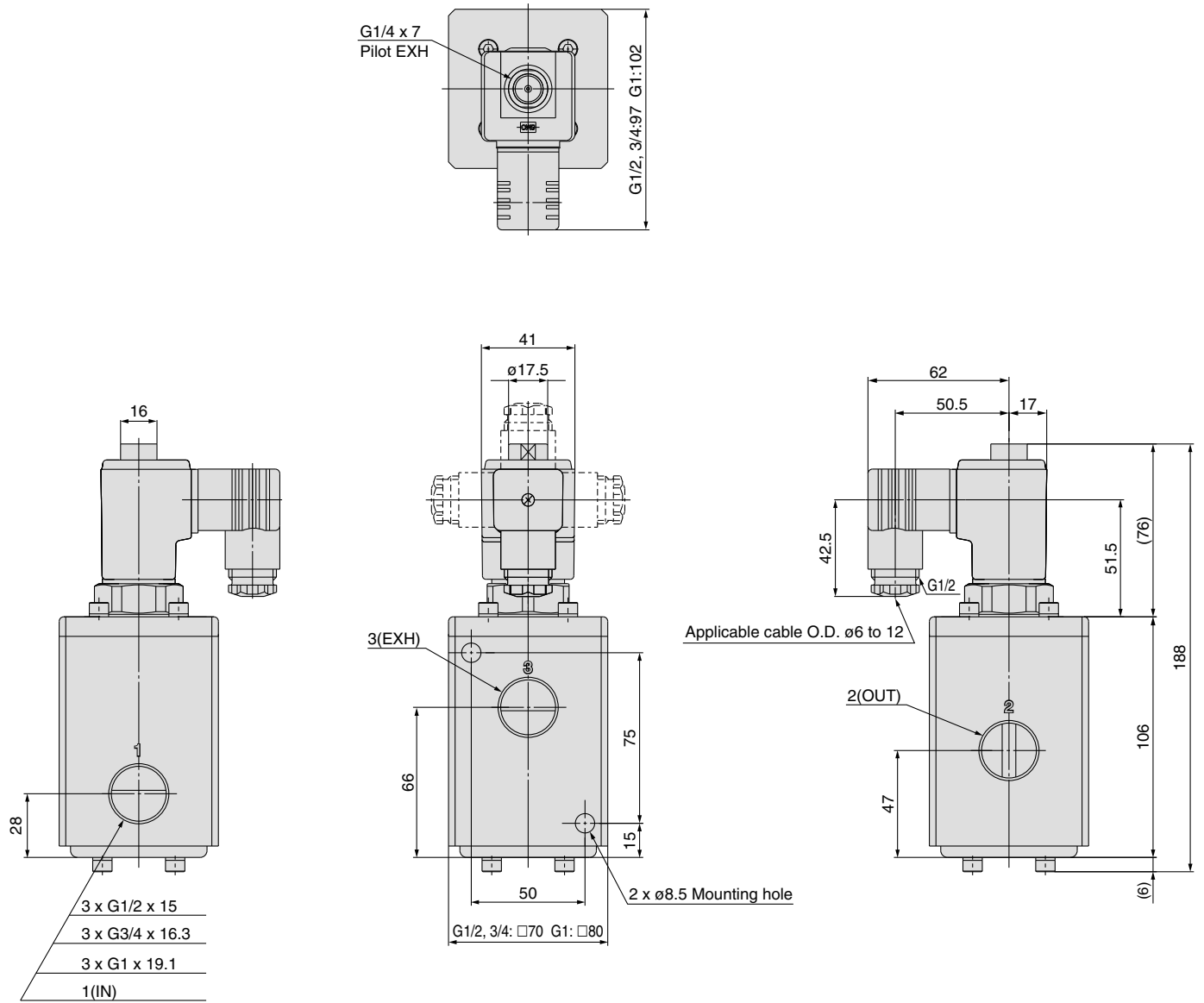
VCS

VCW

Series VCH400

Dimensions

VCH410



Made to Order Specifications:



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

1 22.0 MPa 2 Port Air Operated Valve

AXT836 A

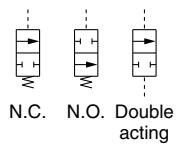
Specifications

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



Integrated fitting type Flange type

Symbol



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	0.45 to 0.7 MPa	0.3 to 0.5 MPa	
Valve leakage	0.1 cm ³ /min or less		
Orifice diameter	2.8 mm		

VX2

VXD

VXZ

VXE

VXP

VXR

VXH

VXF

VX3

VXA

VCH

VDW

VQ

LVM

VCA

VCB

VCL

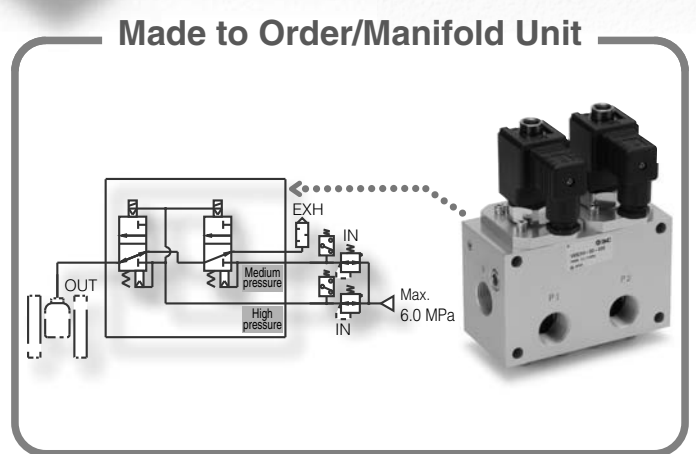
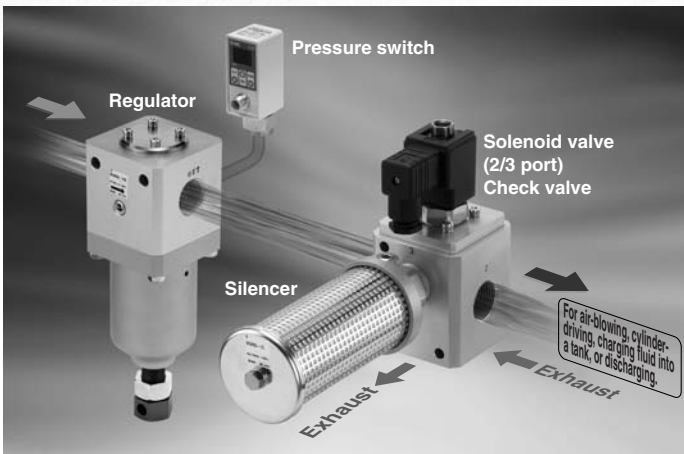
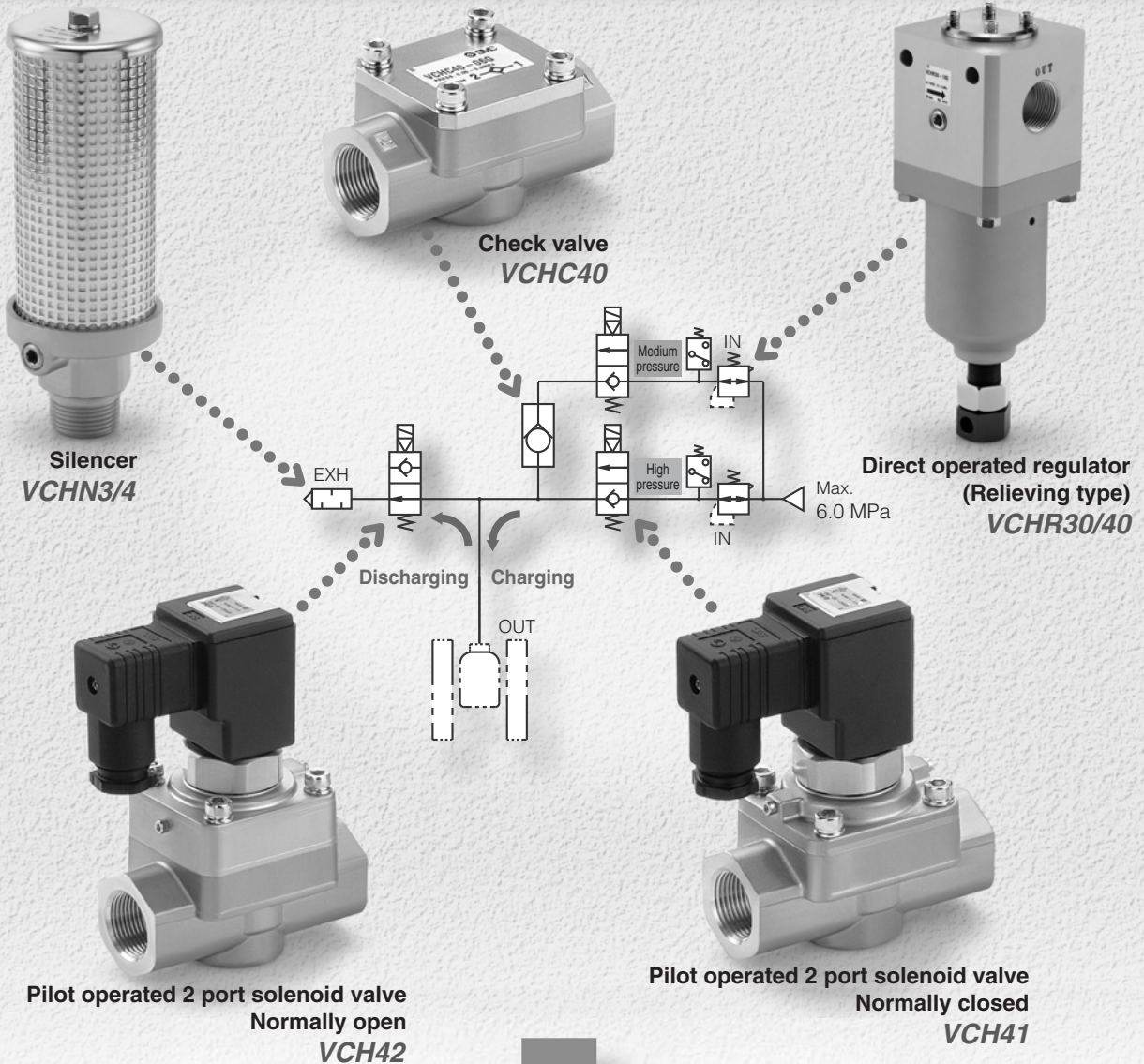
VCS

VCW

5.0 MPa

Pneumatic

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

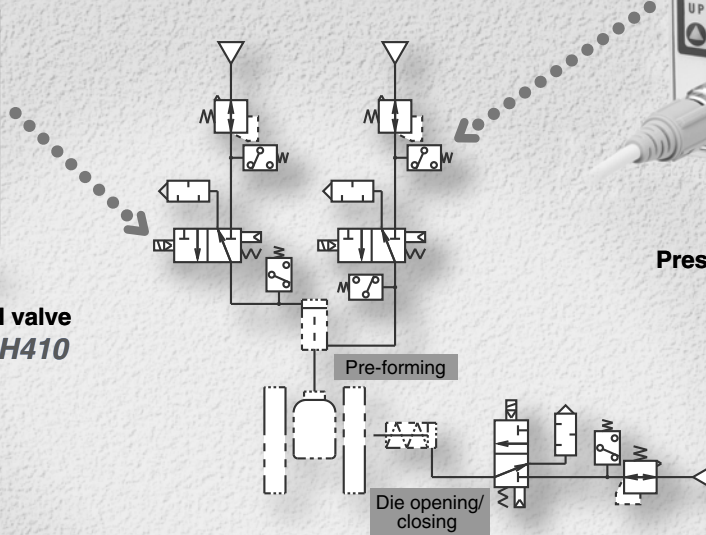


Equipment Variation

Example of driving a cylinder



Pilot operated 3 port solenoid valve
VCH410



Pressure switch
ISE75(H)

	Description	Features	Maximum operating pressure (MPa)	Series	Port size						Page
					1/4	1/2	3/4	1	1 1/4	1 1/2	
	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.228
	VCH42(N.O.)					●	●				
	Check valve		5.0	VCHC40			●	●			P.231
	Pilot operated 3 port solenoid valve		5.0	VCH410			●	●	●		P.232
	Direct operated regulator (Relieving type)		Inlet pressure 6.0 Set pressure 0.5 to 5.0	VCHR30			●	●			Best Pneumatics No.⑤
	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
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Made to Order

- 6.0 MPa pilot operated regulator (Air operated type) Best Pneumatics No.⑤
- 22.0 MPa 2 port air operated valve P.235



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 \geq 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

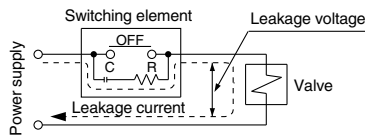
Be sure to read this before handling.

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

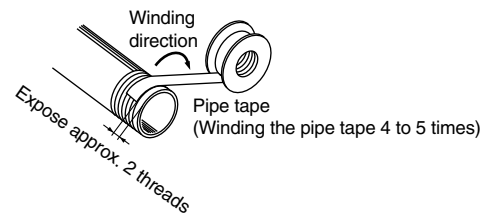
1. Preparation before piping

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 \geq port 3 pressure x 2 (2 times).

VX2

VXD

VXZ

VXE

VXP

VXR

VXH

VXF

VX3

VXA

VCH

VDW

VQ

LVM

VCA

VCB

VCL

VCS

VCW



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

Be sure to read this before handling.

Wiring

⚠ Caution

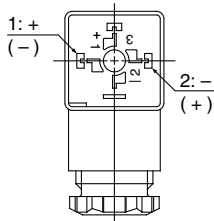
- As a rule, use electrical wire with a cross sectional area of 0.5 to 1.25 mm² for wiring. Furthermore, do not allow excessive force to be applied to the lines.
- Use electrical circuits which do not generate chattering in their contacts.
- Use voltage which is within $\pm 10\%$ of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within $\pm 5\%$ of the rated value. The voltage drop is the value in the lead wire section connecting the coil.
- 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

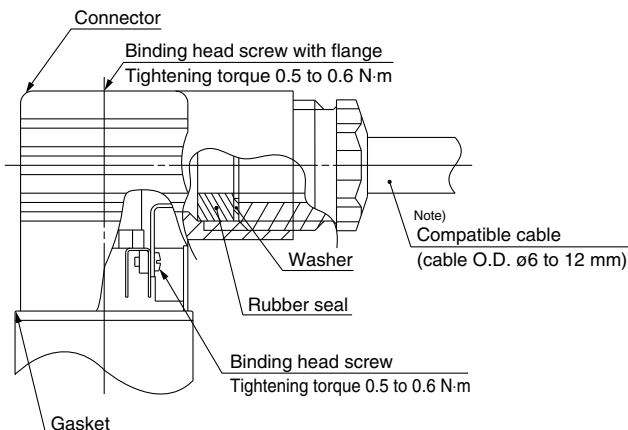
DIN connector

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 $\phi 6$ to 12 mm.
- Use the tightening torques below for each section.

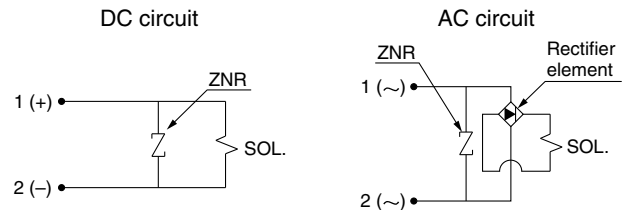


Note) For an outside cable diameter of $\phi 9$ to 12 mm, remove the internal parts of the rubber seal before using.

Electrical Circuits

⚠ Caution

DIN connector



Operating Environment

⚠ Warning

- 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.
- Do not use in explosive atmospheres.
- Do not use in locations subject to vibration or impact.
- Do not use in locations where radiated heat will be received from nearby heat sources.
- Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.

Maintenance

⚠ Warning

1. Removing the product

- Shut off the fluid supply and release the fluid pressure in the system.
- Shut off the power supply.
- 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.