



Installation and Maintenance Manual PVQ10/30/



Compact Proportional Solenoid Valve

EMC Directive 89/336/EEC
EN61000-6-2:2001: Electromagnetic Compatibility (EMC) - Immunity
EN61000-6-3:2001: Electromagnetic Compatibility (EMC) - Emission

1 Safety Instructions

- This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.
- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "DANGER", "WARNING" or "CAUTION", followed by important safety information which must be carefully followed.
- To ensure safety ISO4414: Pneumatic fluid power and JIS B 8370: Pneumatic system axiom must be observed, along with other relevant safety practices.

⚠ DANGER	In extreme conditions, there is a possibility of serious injury or loss of life.
⚠ WARNING	If instructions are not followed there is a possibility of serious injury or loss of life.
⚠ CAUTION	If instructions are not followed there is a possibility of injury or equipment damage.

⚠ WARNING

The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here can be used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet specific requirements.

Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced personnel.

Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.

2) When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.

3) Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Supply air into the system gradually to create back pressure, i.e. incorporate a soft-start valve).

Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:

1) Conditions and environments beyond the given specifications, or if the product is to be used outdoors.

2) Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.

3) An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

⚠ CAUTION

- Ensure that the air supply system is filtered to 5 microns.

2 Specifications

2.1 General Specifications

PVQ10					
Standard specifications	Valve construction	Direct operated poppet			
	Fluid	Air, Inert gas			
	Seal material	FKM			
	Body material	C36, Stainless steel			
	Fluid temperature	0 to +50°C			
	Ambient temperature	0 to +50°C			
	Action	N.C. (Normally closed)			
	Mounting orientation	Unrestricted			
	Port size	M5			
	Coil specifications	Power supply	24 VDC	12 VDC	
Coil current		0 to 85 mA	0 to 170 mA		
Power consumption		0 to 2 W			
Characteristic specifications	Coil insulation	Class B			
	Orifice diameter (mmØ)	0.3	0.4	0.6	0.8
	Max. operating pressure differential (MPa) ^{Note 1)}	0.7	0.45	0.2	0.1
	Max. operating pressure (MPa)	1 MPa			
	Min. operating pressure (MPa) (Vacuum) ^{Note 2)}	0 (0.1 Pa.abs)			
	Flow rate (l/min) (at max. operating pressure differential)	0 to 5	0 to 6	0 to 5	
	Hysteresis (at max. operating pressure differential)	10% or less			
	Repeatability (at max. operating pressure differential)	3% or less			
	Start-up current (at max. operating pressure differential)	50% or less			

Note 1) Maximum operating pressure differential indicates pressure differential (difference between inlet and outlet pressure) which can be allowed for operation with the valve closed or open. If the pressure differential exceeds the max. operating pressure differential of orifice, the valve may leak.
Note 2) For a vacuum application, the maximum operating pressure range is 0.1 Pa.abs to maximum operating pressure differential. A(2) port is applicable for vacuum pressure.

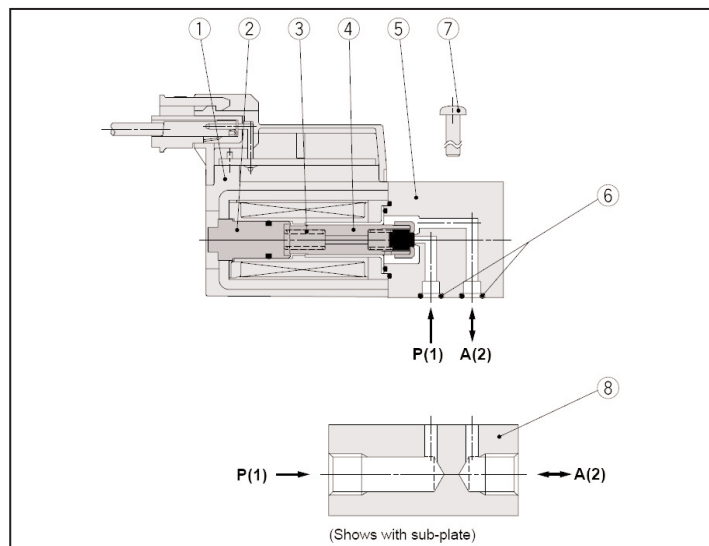
PVQ30

PVQ30					
Standard specifications	Valve construction	Direct operated poppet			
	Fluid	Air, Inert gas			
	Seal material	FKM			
	Body material	C37 (Standard), Stainless steel			
	Fluid temperature	0 to +50°C			
	Ambient temperature	0 to +50°C			
	Action	N.C. (Normally closed)			
	Mounting orientation	Unrestricted			
	Enclosure	IP40			
	Port size	Rc 1/8			
Coil specifications	Power supply	24 VDC	12 VDC		
	Coil current	0 to 165 mA	0 to 330 mA		
	Power consumption	0 to 4 W			
Characteristic specification	Coil insulation	Class B			
	Orifice diameter (mmØ)	1.6	2.3	4.0	
	Max. operating pressure differential (MPa) ^{Note 1)}	0.7	0.35	0.12	
	Max. operating pressure (MPa)	1 MPa			
	Min. operating pressure (MPa) (Vacuum) ^{Note 2)}	0 (0.1 Pa.abs)			
	Flow rate (l/min) (at max. operating pressure differential)	0 to 100	0 to 75		
	Hysteresis (at max. operating pressure differential)	10% or less	13% or less		
	Repeatability (at max. operating pressure differential)	3% or less			
	Start-up current (at max. operating pressure differential)	50% or less	65% or less		

Note 1) Maximum operating pressure differential indicates pressure differential (difference between inlet and outlet pressure) which can be allowed for operation with the valve closed or open. If the pressure differential exceeds the max. operating pressure differential of orifice, the valve may leak.
Note 2) For a vacuum application, the maximum operating pressure range is 0.1 Pa.abs to maximum operating pressure differential. A(2) port is applicable for vacuum pressure.

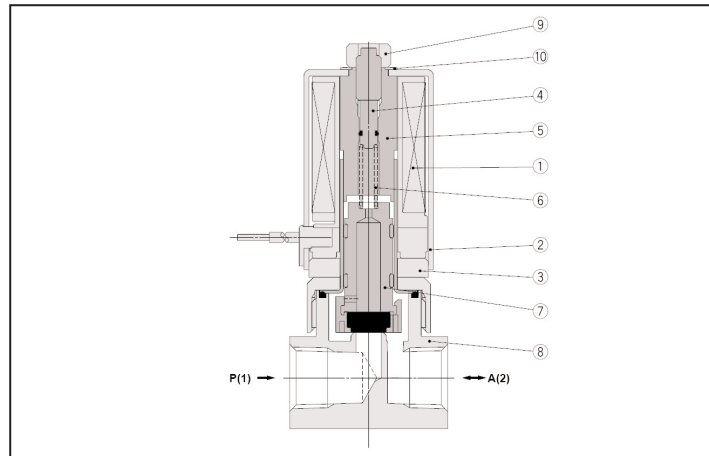
2.2 Names / Functions of Individual Parts

PVQ10



No.	Description	Note
1	Solenoid coil assembly	
2	Core	
3	Return spring	
4	Armature assembly	
5	Body	
6	O-ring	
7	Round head combination screw	M1.7 x 0.35 x 17L, 2 pcs.
8	Sub-plate	Part no. PVQ10-15-M5

PVQ30



No.	Description	Material	Note
1	Solenoid coil assembly	-	
2	Coil cover	SPCE	
3	Magnetic plate	SUY	
4	Adjusting screw	Stainless steel	
5	Tube assembly	Stainless steel	
6	Return spring	Stainless steel	
7	Armature assembly	Stainless steel, PPS, PTFE, FKM	
8	Body	C37 or Stainless steel	
9	Nut	Steel	
10	Wave washer	Stainless steel	
11	Round head combination screw	Steel	Base mounted only M3 x 0.5 x 8L, 2 pcs.
12	Sub-plate	C36 or Stainless steel	Part no. PVQ30-15 -01
13	O-ring	FKM	
14	O-ring	FKM	

3 Installation

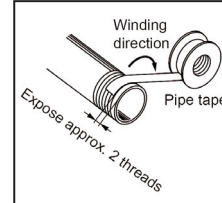
3.1 Environment

⚠ 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.

3.2 Piping

⚠ CAUTION

- 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.
- Wrapping of pipe tape
When connecting pipes, fittings, etc., be sure that chips from the pipe threads and sealing material do not enter the valve.
Furthermore, when pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.

- Avoid connecting ground lines to piping, as this may cause electric corrosion of the system.
- 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
M5	1.5 to 2
Rc 1/8	7 to 9

*Reference

Tightening of M5 fitting threads
After tightening by hand, tighten approximately 1/6 turn further with a tightening tool. However, when using miniature fittings, tighten an additional 1/4 turn after tightening by hand. (In cases where there are gaskets in two places, such as a universal elbow or universal tee, double the additional tightening to 1/2 turn.)

3.3 Valve Mounting

⚠ CAUTION

When mounting a valve to the sub-plate, tighten the screw securely with the tightening torque shown in the table below after checking the installation condition of the O-ring on the interface side.

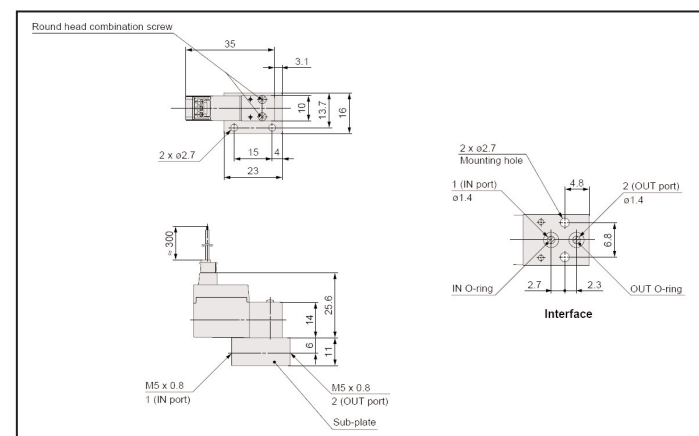
Proper Tightening Torque (N*m)

PVQ10 (Base mounted)	PVQ30 (Base mounted)
0.15 to 0.22	0.8 to 1.0

3.4 Outline Dimensions (mm)

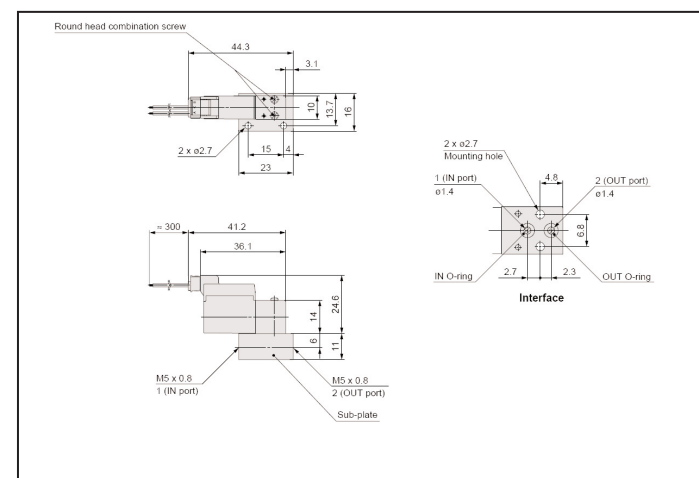
L plug connector

PVQ13-L-M5

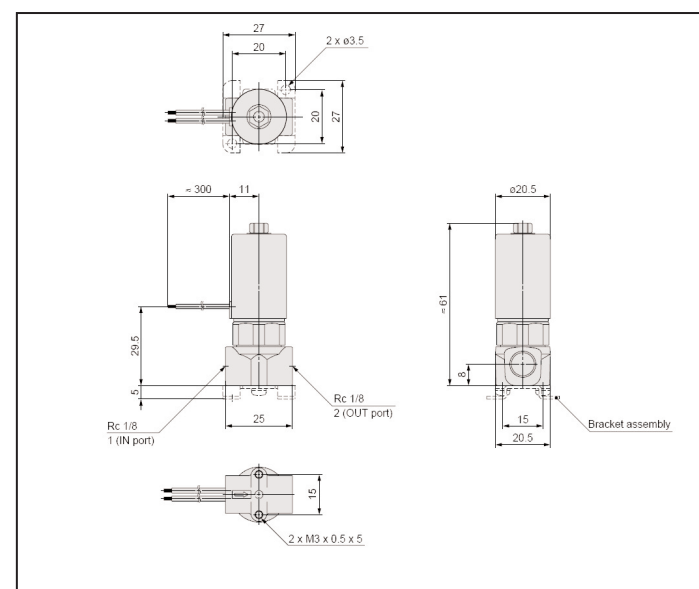


M plug connector

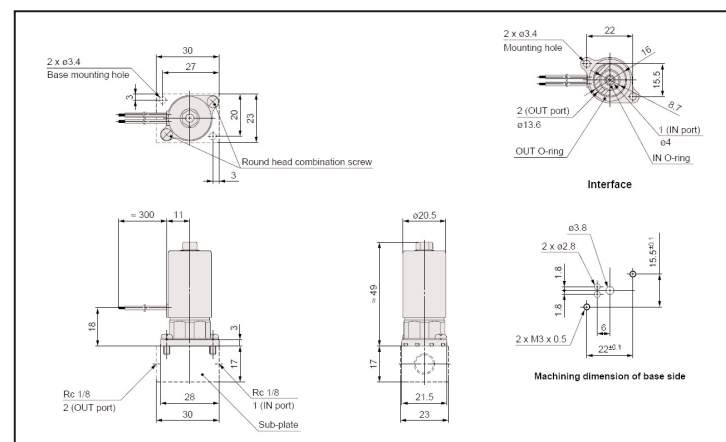
PVQ13-M-M5



PVQ31



PVQ33



5 Maintenance

5.1 General Maintenance

WARNING

- Removing the product
 - Shut off the fluid supply and release the fluid pressure in the system.
 - Shut off the power supply.
 - Dismount the product.
- Low frequency operation

Switch valve at least once every 30 days to prevent malfunction. Also, in order to use it under the optimum state, conduct a regular inspection once every six months.
- Do not disassemble the product. Products that have been disassembled cannot be guaranteed. If disassembly is necessary, please contact SMC.

CAUTION

- Filters and strainers
 - Be careful regarding clogging of filters and strainers.
 - Replace filter elements after one year of use, or earlier if the pressure drop reaches 0.1 MPa.
 - Clean strainers when the pressure drop reaches 0.1 MPa.
- Exhaust the drain from an air filter periodically.

5.2 Handling

CAUTION

- This product is adjusted to the respective specifications at a SMC factory before delivery. Do not disassemble the product or remove parts as it could cause damage to the product.
- The flow rate is controlled by balancing the valve body. Do not expose the product to external vibration and impact as it changes the flow rate.

6 Limitations of Use

6.1 Design

CAUTION

- This valve cannot be used as an emergency shutoff valve, etc. The valves presented in this catalogue 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.
- Extended periods of continuous energization

Please consult with SMC when using with energization for long periods of time.
- This solenoid valve cannot be used for explosion proof applications.
- Maintenance space

The installation should allow sufficient space for maintenance activities (removal of valve, etc.)
- 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.
- Pressure (including vacuum) holding

It is not usable for an application such as holding the pressure (including vacuum) inside of a pressure vessel because air leakage is entailed in a valve.

6.2 Power Source Selection

CAUTION

This product makes proportional control possible with constant current. If controlled with voltage, the output flow rate cannot be kept constant due to current fluctuation. Use stable DC power source of sufficient capacity without much ripple.

6.3 Pressure Difference

CAUTION

Leakage from the valve may occur if the pressure difference is larger than the maximum operating pressure differential of the respective models.

6.4 Operation in Vacuum

CAUTION

When the product is used in vacuum, apply vacuum pressure to A(2) port. The pressure at P(1) should be larger than the pressure at A(2) port.

6.5 Continuous Energization

CAUTION

Do not touch the valve directly with hands. The coil can be hot depending on the ambient temperature or energizing time. Install a protective cover over the valve if it can be touched directly with hands.

7 Contacts

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