



ORIGINAL INSTRUCTIONS

Instruction Manual
Power Valve: Regulator Valve
VEX1 Series



The intended use of this valve is as a large capacity relief regulator.

1 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC^{*)}, and other safety regulations.

- *) ISO 4414: Pneumatic fluid power - General rules relating to systems.
- ISO 4413: Hydraulic fluid power - General rules relating to systems.
- IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Danger	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

- **Always ensure compliance with relevant safety laws and standards.**
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Caution

- The product is provided for use in manufacturing industries only. Do not use in residential premises.

2 Specifications

2.1 Valve specifications

Model:	VEX###					
	1101	1201	1301	1501	1701	1901
Operation type	External pilot solenoid					
Fluid	Air					
Max. operating pressure [MPa]	1.0					
Set Pressure range [MPa]	0.05 to 0.7			0.05 to 0.9		
Ambient and fluid temperature [°C] ^{Note 1)}	0 to 50 (No freezing) (No condensation)					
Flow characteristics	Refer to catalogue					
Hysteresis	0.03 MPa					
Repeatability	0.01 MPa					
Sensitivity	0.01 MPa					
Relief time	Refer to catalogue					

2 Specification – continued

Duty cycle	Contact SMC						
Setting pressure characteristics	Refer to catalogue						
Min. operating frequency	1 cycle / 30 days						
Mounting orientation	Unrestricted						
Manual override	Non-locking push type						
Lubrication	Not required						
Weight [kg]	0.2	0.3	0.5	1.4	2.0	4.0	
Enclosure (based on IEC60529)	VEX1101/1201/1301	IP30 equivalent					
	VEX1501/1701/1901	IP50 equivalent					

Table 1.

2.2 Pilot solenoid valve specifications

Model	VEX1101/1201/1301		VEX1501/1701/1901		
Pilot valve	VK334-###		VO307K-###1		
Electrical entry	Grommet, DIN terminal				
Coil rated voltage [V]	DC	12, 24			
	AC (50/60 Hz)	100, 110, 200, 220, 240			
Coil insulation class	Contact SMC				
Allowable voltage fluctuation (of rated voltage)	±10%		-15 to 10%		
Apparent Power (VA)	AC	Inrush	50 Hz	9.5	12.7
			60 Hz	8	10.7
		Holding	50 Hz	7	7.6
			60 Hz	5	5.4
Power consumption [W]	DC	Without indicator light	4		
		With indicator light	4.3	4.2	
Surge voltage suppressor	AC	Varistor			
		DC	24 VDC	Diode	
			12 VDC	Varistor	
Indicator light	AC	Neon bulb		LED	
	DC	LED			

Table 2.

2.3 Manifold specifications (VEX2-1-#-02#)

Valve stations ^{Note 1)}	2 to 8
Port specification	Common SUP, EXH
Port size (Port 1 (P), 2 (A), 3 (R))	1/4 (Rc, NPTF, G, NPT)
Applicable valve ^{Note 2)}	VEX1201
Applicable blanking plate	VEX1-17 (with gasket and bolts)

Table 3.

Note 1) If there are more than 5 stations, supply pressure to ports 1 (P) and exhaust from ports 3 (R) on both ends of the manifold.

Note 2) VEX 1201 (external pilot operated) is individual external pilot type, the pilot port P1 on each valve must be supplied with pilot air supply.

2.4 Pressure characteristics

Refer to catalogue

2.5 Pneumatic symbol

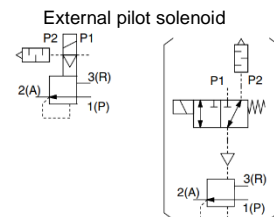


Figure 1. VEX1 pneumatic diagrams

2.6 Special products

Warning

Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Installation

3.1 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.

3.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.

3.3 Piping

Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1 thread exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Connection thread size (R, NPT)	Proper tightening torque [N·m]
M5 ^{Note 1)}	1 to 1.5
1/8	3 to 5
1/4	8 to 12
3/8	15 to 20
1/2	20 to 25
3/4	28 to 30
1	36 to 38
1 1/4	40 to 42
1 1/2	48 to 50
2	

Table 4.

Note 1) First, tighten by hand, then use a wrench appropriate for the hexagon flats of the body to tighten an additional 1/6 to 1/4 turn

3.3.1 External pilot piping

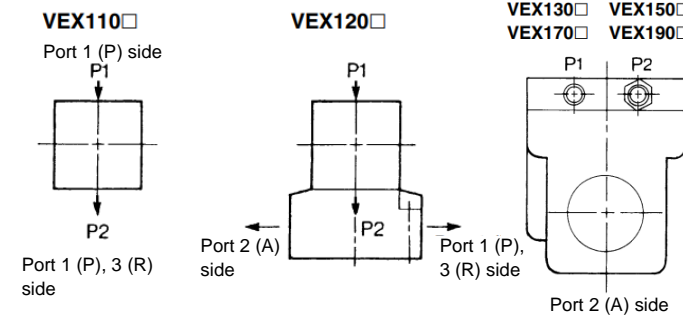


Figure 2. External pilot piping diagrams

Port	VEX1#01
P1	External pilot
P2	Pilot exhaust ^{Note 1)}

Table 5.

Note 1) A silencer is mounted to port P2 for VEX1 3/5/7/9 01 as a standard. For the 2 steps directional control and multiple steps pressure, control setting, use the product after removing a silencer.

3.4 Lubrication

Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, refer to catalogue for details.

3 Installation - continued

3.5 Air supply

Warning

- Use clean air. If the compressed air supply includes chemicals, synthetic materials (including organic solvents), salinity, corrosive gas etc., it can lead to damage or malfunction.

Caution

- Install an air filter upstream of the valve. Select an air filter with a filtration size of 5 µm or smaller.

3.6 Manual override

Warning

- Regardless of an electric signal for the valve, the manual override is used for switching the main valve. Since connected equipment will operate when the manual override is activated, confirm that conditions are safe prior to activation.
- Refer to the catalogue for details of manual override operation.

3.7 Mounting

Caution

Model	Mounting	Thread size	Tightening torque [N·m]
VEX1101	Valve to bracket	M3	0.63 ± 0.06
VEX1201	Valve to subplate/manifold	M4	1.4 ± 0.15
VEX1301	Valve to bracket	M5	3.0 ± 0.3
VEX1501, VEX1701, VEX1901	Valve to bracket	M6	5.2 ± 0.52

Table 6.

- For mounting screw locations and dimensions refer to VEX1 catalogue.
- When mounting valves on a manifold ensure correct orientation and position, refer to figure 10 and to the catalogue for more information.
- Ensure gaskets are in good condition, not deformed and are dust and debris free.
- When mounting valves ensure gaskets are

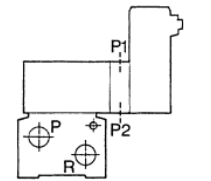


Figure 3. Valve mounting on manifold diagram

present, aligned and securely in place and tighten screws as per table 6.

3.8 Electrical circuits

Caution

In the case of valves without surge suppressor, the machine designer shall add suppression as close as possible to the valve.

3.8.1 VEX1101, 1201, 1301

Caution

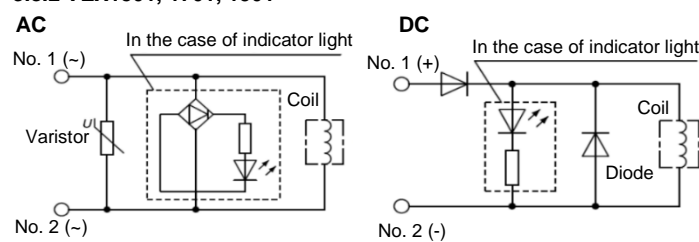
Rated voltage	Grommet type (G)	DIN terminal (D)	Part no. symbol
AC	W/o indicator light	No.1 (-) Varistor No.2 (-) There is no polarity.	S
		None	Z
AC	With indicator light	No.1 (-) Varistor No.2 (-) There is no polarity.	Z
		None	Z

3 Installation – continued

DC (24 V)	W/o indicator light		S
	With indicator light	None	Z
DC (12 V)	W/o indicator light		S
	With indicator light	None	Z

Table 7.

3.8.2 VEX1501, 1701, 1901



Note) There is no polarity (+,-) for AC

Figure 4. Light/ Surge voltage suppressor (VEX1501/1701/1901)

3.9 Electrical connections

3.9.1 Grommet

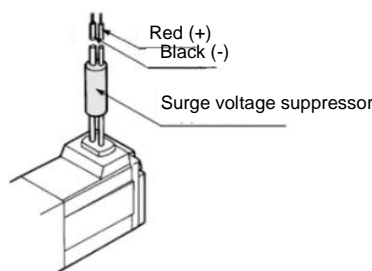


Figure 5. Grommet diagram (VEX1101/1201/1301)(DC Only)

3 Installation – continued

3.9.2 DIN terminal type

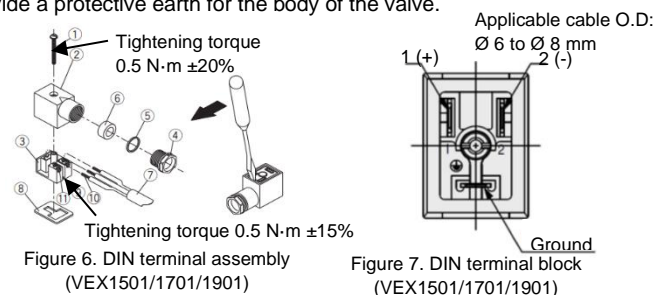
3.9.2.1 Connector for DIN terminal (VEX1501/1701/1901)

Caution

Refer to VT307 catalogue for additional information.

Warning

The ground terminal is connected to the coil assembly only and does not provide a protective earth for the body of the valve.



- Connector part number: GM209NJ-B17.

3.9.2.2 Connector for DIN terminal (VEX1101/1201/1301)

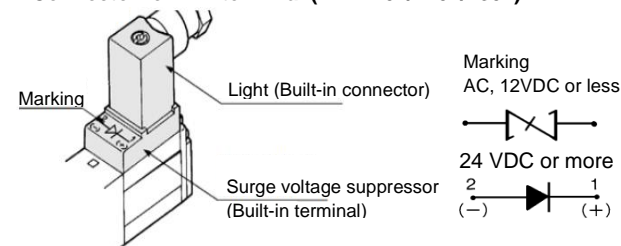


Figure 8. DIN terminal diagram

Caution

- Use heavy duty cable with O.D. of Ø3.5 mm to Ø7 mm, otherwise it will not meet the IP65 (enclosure) standard (reference: 0.5 mm² 2 core and 3 core wires equivalent to JIS C 3306).

- Tighten the ground nut and set screw within the specified torque range.
- Refer to VK300 catalogue for additional information.

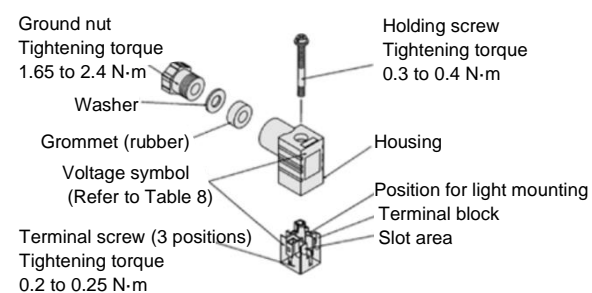


Figure 9. DIN terminal assembly (VEX1101/1201/1301)

- Connector without indicator light part number: VK300-82-1.
- Connector with indicator light part number:

Rated voltage	Voltage symbol	Part no.	
AC	100	100V	VK300-82-2-01
	110	110V	VK300-82-2-03
	200	200V	VK300-82-2-02
	220	220V	VK300-82-2-04
	240	240V	VK300-82-2-07
DC	12	12V	VK300-82-4-06
	24	24VD	VK300-82-3-05

Table 8.

3 Installation – continued

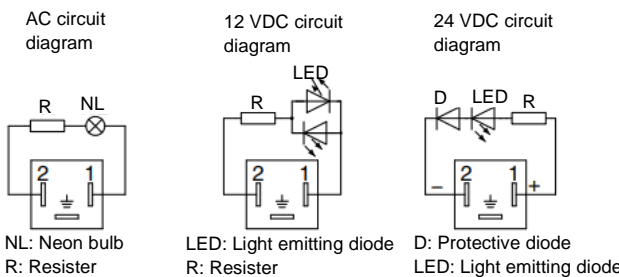


Figure 10. DIN circuit diagram (VEX1101/1201/1301)

3.10 Residual voltage

Caution

- If a varistor voltage suppressor is used, the suppressor arrests the back EMF voltage from the coil to a level in proportion to the rated voltage.
- Ensure the transient voltage is within the specification of the host controller.
- Contact SMC for the varistor residual voltage.
- In the case of a diode, the residual voltage is approximately 1 V.
- Valve response time is dependent on surge suppression method selected.

3.11 Countermeasure for surge voltage

Caution

- At times of sudden interruption of the power supply, the energy stored in a large inductive device may cause non-polar type valves in a de-energised state to switch.
- When installing a breaker circuit to isolate the power, consider a valve with polarity (with polarity protection diode), or install a surge absorption diode across the output of the breaker.

3.12 Extended period of continuous energization

Caution for high temperature
Be aware that the valve surface may get hot.

Warning

- The solenoid coil will generate heat when continuously energized, this will likely adversely affect the performance of the solenoid valve and any nearby peripheral equipment, so avoid installing in an enclosed space. Install the valve in a well-ventilated area.
- If the valve is energized continuously for a long time, switch the valve at least once every 30 days and the operating time should not exceed 1400 hours (equivalent to 2 months) per year.
- If the valve is used for special applications, please contact your SMC sales representative.
- Do not touch the coil while it is being energized or immediately after energization.
- If the valve is to be energized continuously for extended periods of time or the total energization time per day is longer than the non-energized time, consider using the valve with a N.O. (Normal open) function. This can be achieved by supplying pilot air to the P2 port, which will shorten the energization time.

3.13 Effect of back pressure when using a manifold

Warning

Use caution when valves are used on a manifold, because an actuator may malfunction due to back-pressure.

4 How to Order

Refer to catalogue for 'How to Order', or to product drawing for special products.

5 Outline Dimensions

Refer to catalogue for outline dimensions.

6 Maintenance

6.1 General maintenance

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.

6 Maintenance – continued

- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly, and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

6.2 Mounting

Caution

Refer to 3.7 for mounting the valve to a sub-plate or manifold.

7 Limitations of Use

7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

7.2 Holding of pressure

Warning

Since valves are subject to air leakage, they cannot be used for applications such as holding pressure (including vacuum) in a system.

7.3 Cannot be used as an emergency shut-off valve

Warning

This product is not designed for safety applications such as an emergency shut-off valve. If the valves are used in this type of system, other reliable safety assurance measures should be adopted.

7.4 Leakage voltage

Caution

Ensure that any leakage voltage caused by the leakage current when the switching element is OFF causes the percentage indicated (See Table 9) of the rated voltage across the valve.

	VEX1101, VEX1201, VEX1301	VEX1501, VEX1701, VEX1901
DC	≤ 2%	≤ 3%
AC	≤ 20%	≤ 15%

Table 9.

7.5 Low temperature operation

Caution

Unless otherwise indicated in the specifications for each valve, operation is possible to 0°C, but appropriate measures should be taken to avoid solidification or freezing of drainage and moisture, etc.

8 Product Disposal

This product shall not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

9 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor/importer.

SMC Corporation

URL : <https://www.smcworld.com> (Global) <https://www.smc.eu> (Europe)
SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan
Specifications are subject to change without prior notice from the manufacturer.
© 2021 SMC Corporation All Rights Reserved.
Template DKP50047-F-085M