

Power Valve: Regulator Valve

VEX1 Series

Large capacity relief regulator

Rapid tank internal pressure setting, air blow, constant pressure supply and driving, balance and driving, 2 steps directional control setting and multiple steps pressure control



Air operated

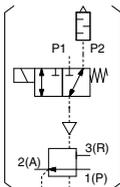
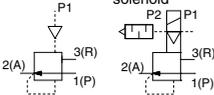


External pilot solenoid

Symbol

Air operated

External pilot solenoid



Specifications

| Model | VEX110□-01-02 | VEX120□-01-02 | VEX130□-02-03-04 | VEX150□-04-06-08-10-12 | VEX190□-14-20 | | | | | | | | | |
|-------------------------|---|---------------|------------------|------------------------|-----------------|-----|-----|-----|-----|-----|----|-------|-------|----|
| Operation type | Air operated, External pilot solenoid | | | | | | | | | | | | | |
| Fluid | Air | | | | | | | | | | | | | |
| Max. operating pressure | 1.0 MPa | | | | | | | | | | | | | |
| Set pressure range | Air operated | | 0.05 to 0.9 MPa | | | | | | | | | | | |
| | Solenoid | | 0.05 to 0.7 MPa | | 0.05 to 0.9 MPa | | | | | | | | | |
| Ambient and fluid temp. | 0 to 50°C (Air operated: 0 to 60°C) No condensation | | | | | | | | | | | | | |
| Hysteresis | 0.03 MPa | | | | | | | | | | | | | |
| Repeatability | 0.01 MPa | | | | | | | | | | | | | |
| Sensitivity | 0.01 MPa | | | | | | | | | | | | | |
| Mounting | Free | | | | | | | | | | | | | |
| Lubrication | Not required (Use turbine oil Class 1 ISO VG32, if lubricated.) | | | | | | | | | | | | | |
| Port size | Port | 01 | 02 | 01 | 02 | 02 | 03 | 04 | 06 | 10 | 10 | 12 | 14 | 20 |
| | 1(P) | | | | | | | | | | 1 | | | |
| | 2(A) | 1/8 | 1/4 | 1/8 | 1/4 | 1/4 | 3/8 | 1/2 | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 | 2 |
| 3(R) | | | | | | | | | | | | 2 | | |
| Weight (kg) | Air operated | 0.1 | 0.2 | 0.4 | 1.3 | 1.9 | 3.9 | | | | | | | |
| | Solenoid | 0.2 | 0.3 | 0.5 | 1.4 | 2.0 | 4.0 | | | | | | | |

Note) Non-lubricated specifications are not available for this product.

Pilot Solenoid Valve Specifications

| Model | VEX1101 / 1201 / 1301 | VEX1501 / 1701 / 1901 |
|------------------------|-----------------------|---|
| Pilot valve | VK334-□□□ | VO307K-□□□1 |
| Electrical entry | Grommet, DIN terminal | Grommet, DIN terminal |
| Coil rated voltage (V) | AC(50/60Hz) | 100 V, 110 V, 200 V, 220 V, 240 V |
| | DC | 12 V, 24 V |
| Allowable voltage | ±10% of rated voltage | -15 to +10% of rated voltage |
| Apparent | AC | Inrush 9.5 VA/50 Hz, 8 VA/60 Hz |
| | Holding | 7 VA/50 Hz, 5 VA/60 Hz |
| power | DC | 4 W (Without indicator light), 4.3 W (With indicator light) |
| | DC | 4 W (Without indicator light), 4.2 W (With indicator light) |
| Manual override | Non-locking push type | |

Option

| Description | Part no. | | | | | |
|---------------------------------|---------------|---------------|------------------|------------------------|---------------|---------------|
| | VEX110□-01-02 | VEX120□-01-02 | VEX130□-02-03-04 | VEX150□-04-06-08-10-12 | VEX170□-10-12 | VEX190□-14-20 |
| Bracket (With bolt and washer) | B | VEX1-18-1A | — | VEX3-32A | VEX5-32A | VEX7-32A |
| Pressure gauge ^{Note)} | F | VEX1-18-2A | — | — | — | — |
| | G | G27-10-01 | G36-10-01 | — | — | G46-10-01 |

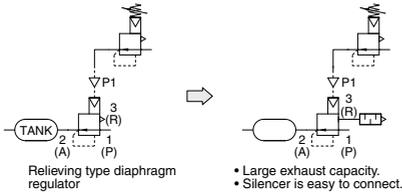
Note) When requiring a gauge different than that mentioned above, specify the model number.

Option is packed with it.
(Refer to Best Pneumatics No. 7.)
Example: VEX1300-03
G36-4-01

Application Example

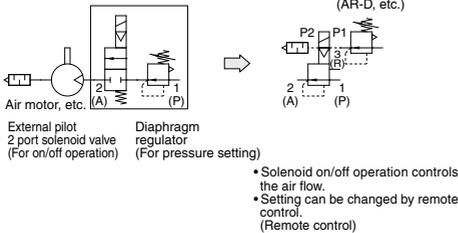
1. Relief regulator (Rapid tank internal pressure setting)

(Relieving type regulator e.g. AR-D)



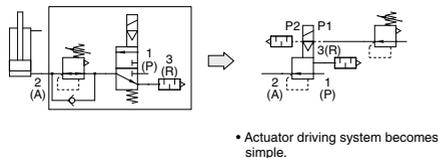
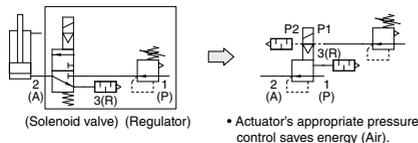
2. Air blow (As 2 port directional control regulator valve)

(AR-D, etc.)

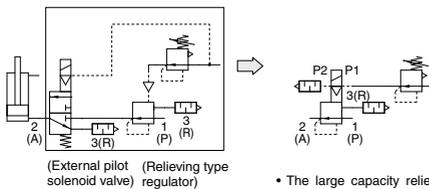


3. Constant pressure supply and driving (As 3 port directional control regulator valve)

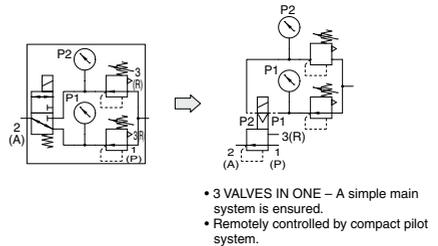
Note) The pressure is about 0.01 MPa when OFF because of leakage.



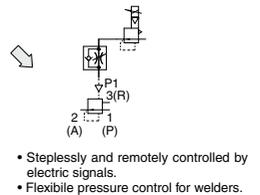
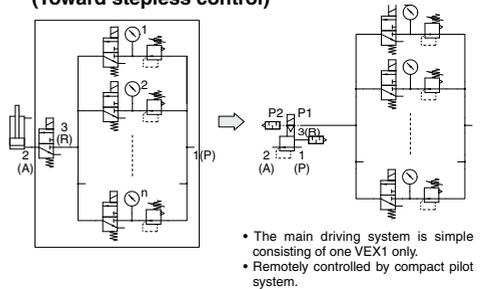
4. Balance and driving



5. 2 steps directional control setting



6. Multiple steps pressure control (Toward stepless control)



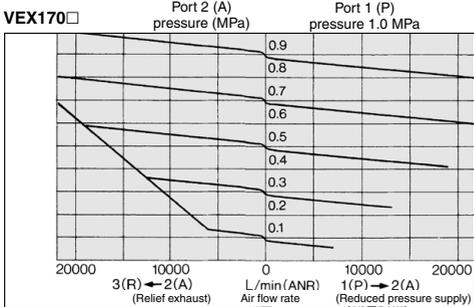
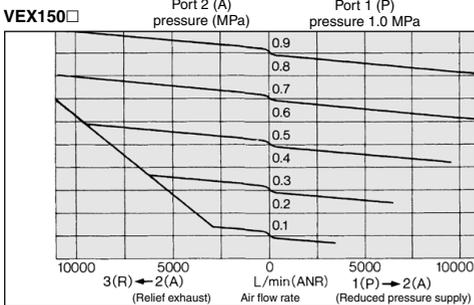
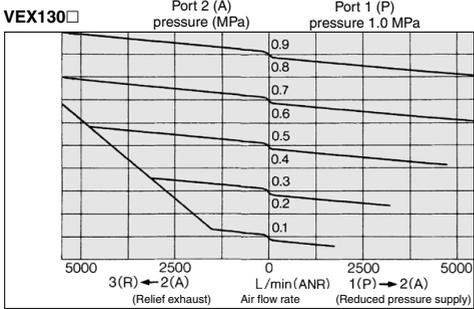
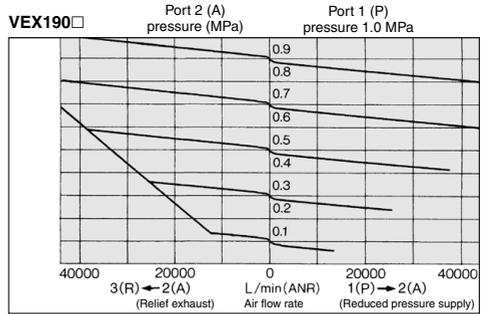
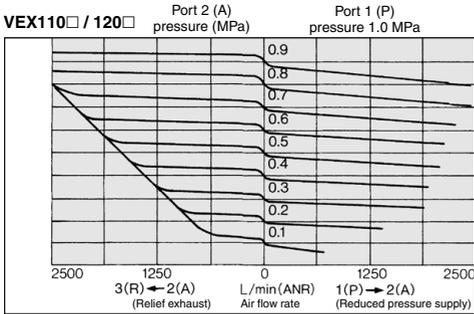
⚠ Caution

- When the VEX outlet side capacity is small, install a speed controller AS2000, in the pilot pipe to lower the pilot pressure for vibration prevention. (Meter-in)

⚠ Caution ((5) 2 steps directional control setting, (6) multiple steps pressure control setting)

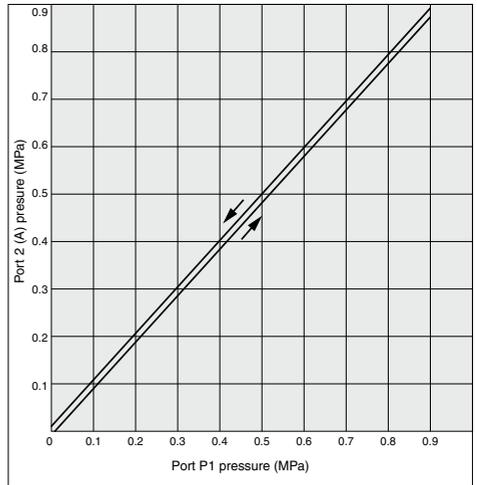
- Relieving type regulator such as AR-D, etc. should be used as pilot regulator in the application. (When the non-relieving type is used, pressure cannot be changed from high to low.)
- A sensitive regulator such as the ARP30, etc. should be used as a pilot regulator on the low pressure side, particularly with 5. 2 steps directional control setting and 6. multiple steps pressure control. (Using a non-sensitive regulator may cause unstable pressure.)

Flow Rate Characteristics

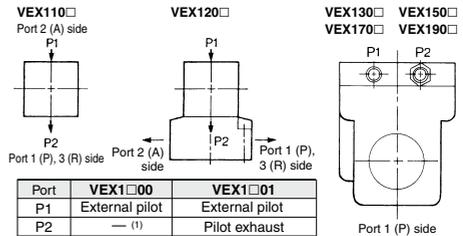


Setting Pressure Characteristics

Port P1 pressure is set according to port 2 (A) pressure.



External Pilot Piping



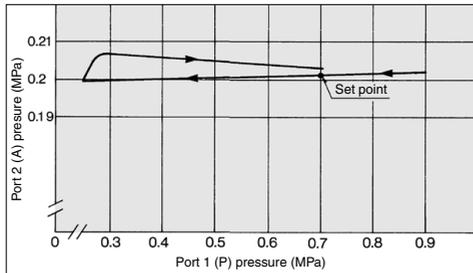
VEX

VEX1 Series

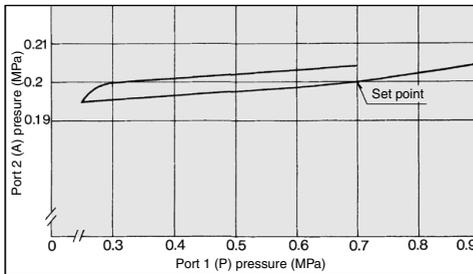
Pressure Characteristics

Shows the outlet pressure (Port 2 (A)) change against the inlet pressure (Port 1 (P)) change. They conform to JIS B 8372 (Air pressure regulator).

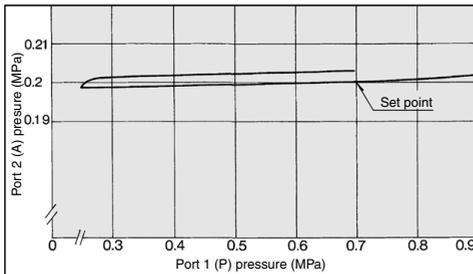
VEX110□ / 120□



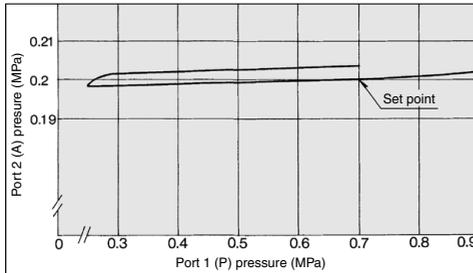
VEX130□



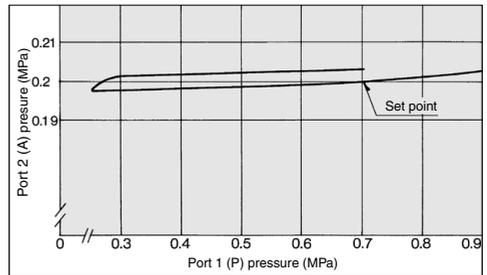
VEX150□



VEX170□

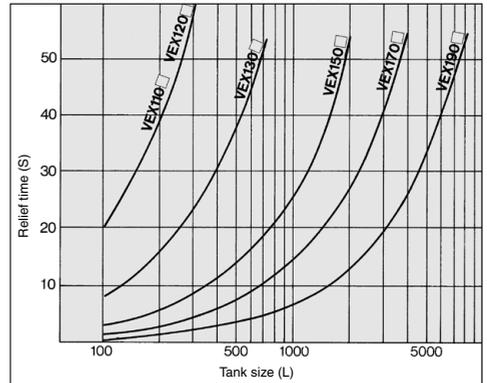


VEX190□

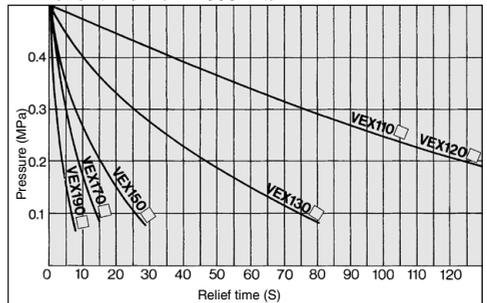


Relief Time

1. Relief time from 0.5 MPa to 0.1 MPa

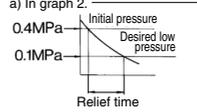


2. Relief time from 1000 L tank



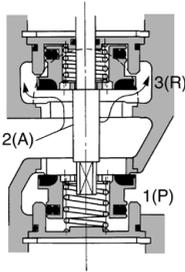
3. Relief time from an arbitrary pressure

[Example] VEX 1500 lowers 2000 L tank from 0.4 MPa to 0.1 MPa:

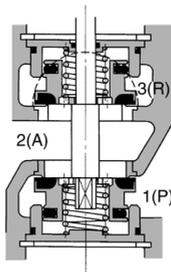
- a) In graph 2. 
- b) The relief time for the 2000 L tank is found by conversion as shown below.
- $$t = \frac{\text{Tank capacity}}{1000} \times \left[\frac{\text{Relief time}}{\text{that is read}} \right]$$
- $$= \frac{2000}{1000} \times 23$$
- $$= 46$$
- From above, the relief time is 26 - 3 = 23 s
- The result is 46 s.

Construction/Working Principle/Component Parts

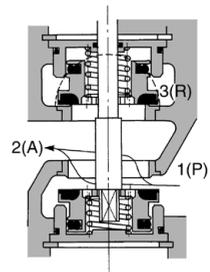
(1) When Port 2 (A) pressure is high Relief exhausting



(2) Setting pressure condition

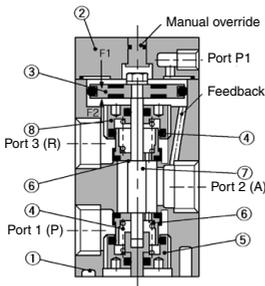


(3) When Port 2 (A) pressure is low Pressure reducing supply

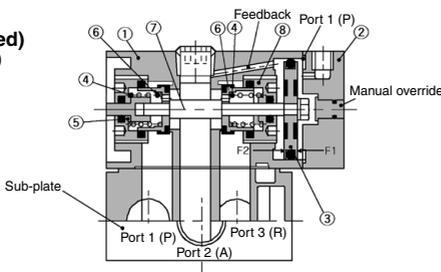


- The balance between the acting force F_1 of the pilot pressure (port P1) over the upper surface of the pressure regulating piston ③ and the acting force F_2 of the pressure at port 2 (A) leading to a space under the piston through the feed back flow root closes a couple of poppet valves ⑥ and sets port 2 (A) pressure that corresponds to port P1 pressure. The poppet valves are backed up by spring ④ - in the pressure balance structure by means of port 2 (A) pressure. (DRW (2))
- When port 2 (A) pressure exceeds port P1 pressure, F_2 becomes larger than F_1 , and the pressure regulating piston moves upward, opening the upper poppet valves. Thus air is released from port 2 (A) to port 3 (R) (DRW (1)). When port 2 (A) pressure lowers enough to restore the balance with port P1 pressure, the regulator valve returns again to the DRW (2) condition.
- When port 2 (A) pressure is lower than port P1 pressure, F_1 becomes larger than F_2 , and the pressure regulating piston moves downwards, opening the lower poppet valves. Thus air is supplied from port P1 to port 2 (A) (DRW (3)). When port 2 (A) pressure rises enough to restore the balance with port P1 pressure, the regulator valve returns again to the DRW (2) condition.

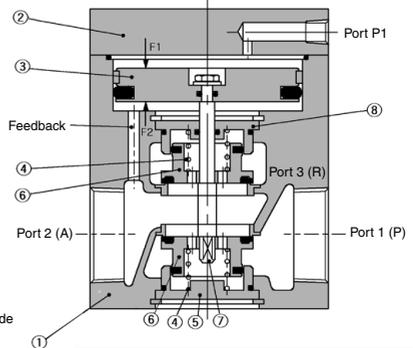
**(Air operated)
VEX1100**



**(Air operated)
VEX1200**



**(Air operated)
VEX1300/1500/1700/1900**



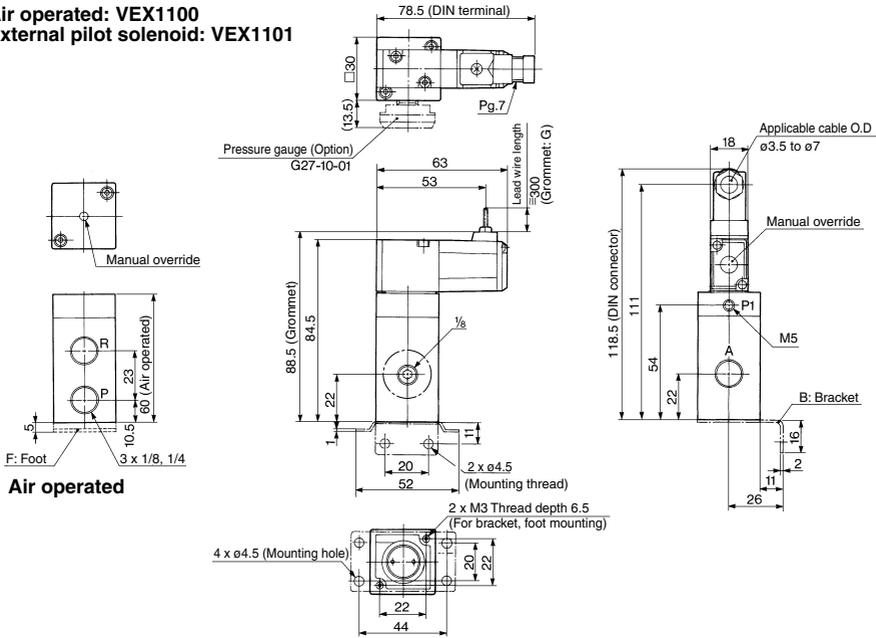
VEX

| No. | Description | Material |
|-----|-------------------|------------------------|
| 1 | Body | Aluminum alloy casted |
| 2 | Cover | Aluminum alloy casted |
| 3 | Regulation piston | Aluminum alloy |
| 4 | Spring | Stainless steel |
| 5 | Valve guide | Aluminum alloy |
| 6 | Poppet valve | Aluminum alloy, Rubber |
| 7 | Shaft | Stainless steel |
| 8 | Valve guide | Aluminum alloy |

VEX1 Series

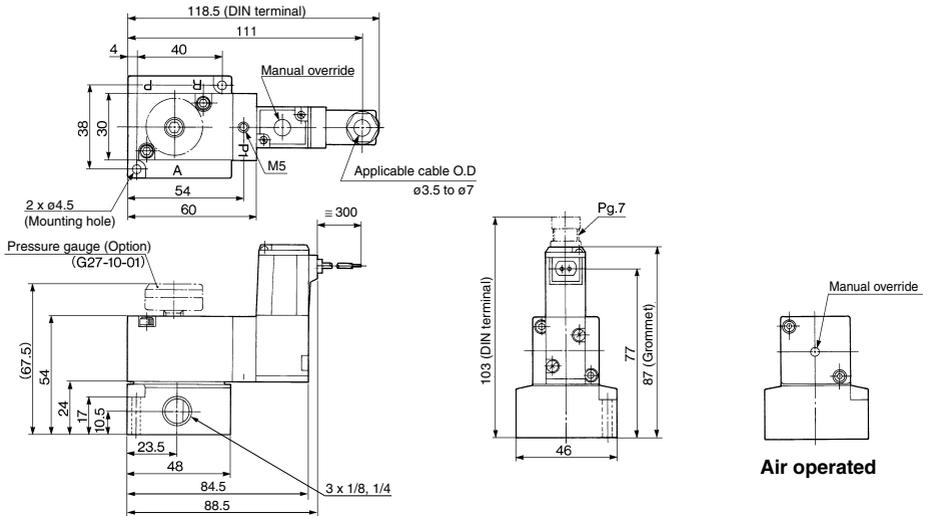
Dimensions

Air operated: VEX1100
External pilot solenoid: VEX1101



Air operated

Air operated: VEX1200
External pilot solenoid: VEX1201



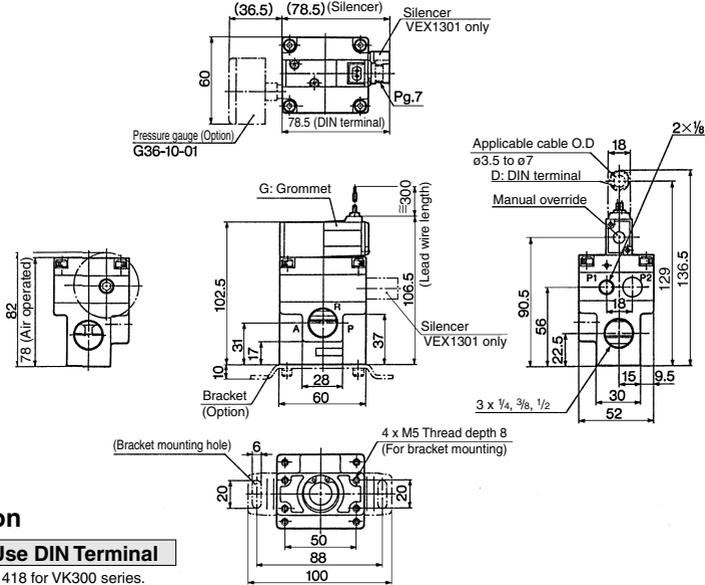
⚠ Caution

How to Use DIN Terminal

Refer to page 1418 for VK300 series.

Dimensions

Air operated: VEX1300
External pilot solenoid: VEX1301

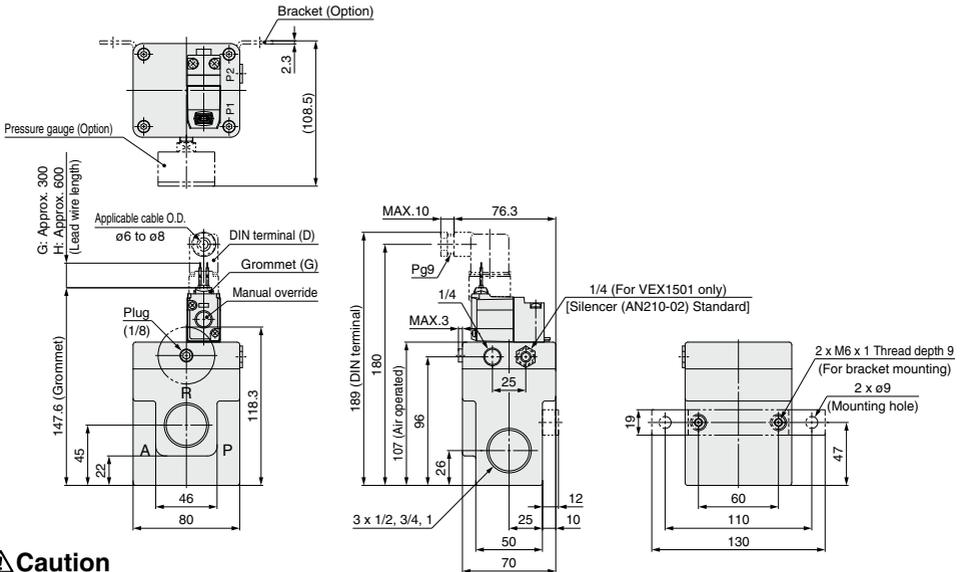


Caution

How to Use DIN Terminal

Refer to page 1418 for VK300 series.

Air operated: VEX1500
External pilot solenoid: VEX1501



Caution

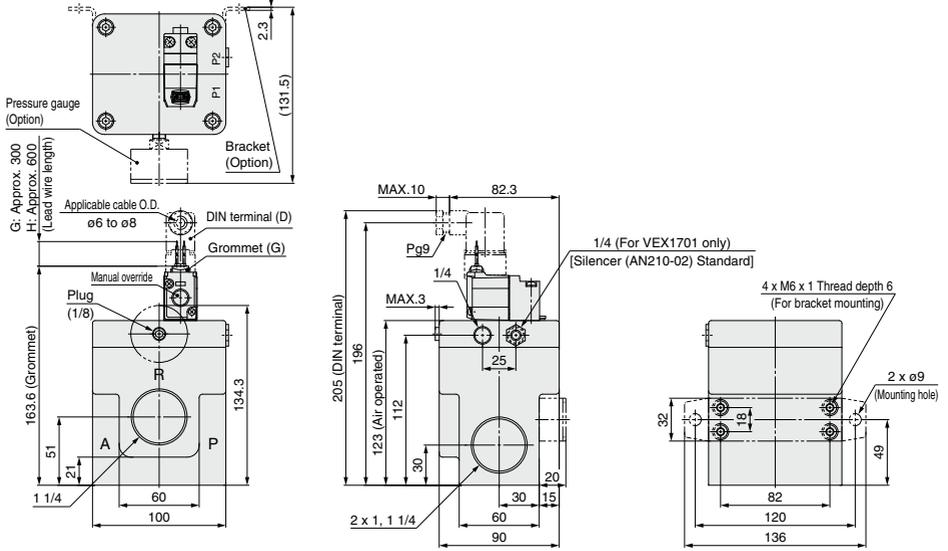
How to Use DIN Terminal

Refer to page 1435 for VT307 series.

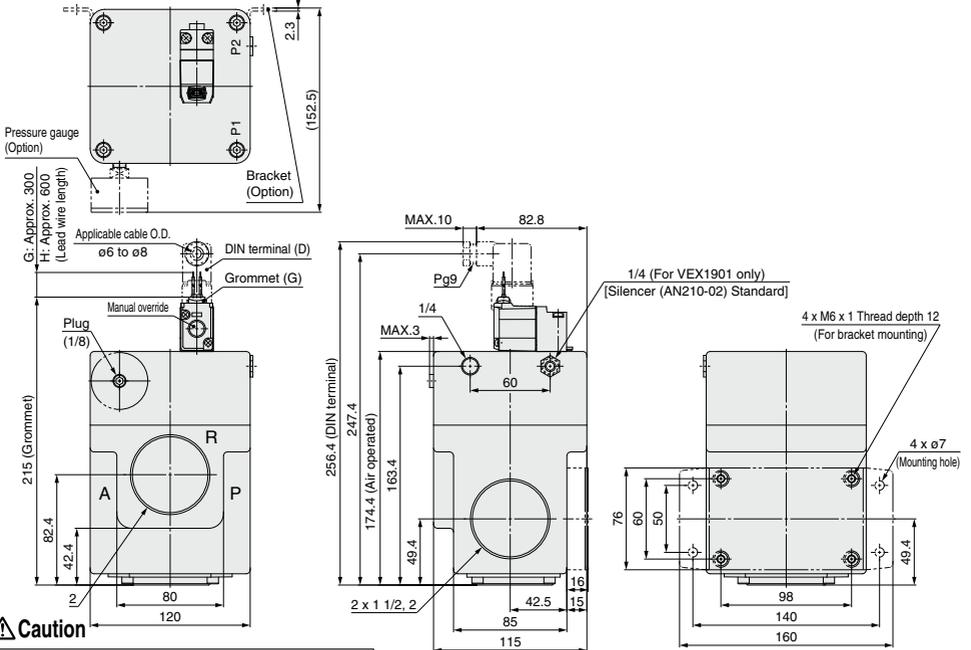
VEX1 Series

Dimensions

Air operated: VEX1700 External pilot solenoid: VEX1701



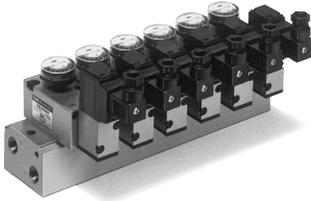
Air operated: VEX1900 External pilot solenoid: VEX1901



How to Use DIN Terminal

Refer to page 1435 for VT307 series.

VEX1 Series Manifold Specifications



Specifications

| | |
|--------------------------------------|---------------------------------|
| Valve stations | 2 to 8 ⁽¹⁾ |
| Port specifications | Common SUP, EXH |
| Port size (Port 1 (P), 2 (A), 3 (R)) | Rc, NPTF, G, NPT 1/4 |
| Applicable valve | VEX1200/1201 ⁽²⁾ |
| Applicable blanking plate | VEX1-17 (With gasket and bolts) |

Note 1) If there are more than 5 stations, apply pressure from port 1(P) on both sides and exhaust from port 3 (R) on both sides.

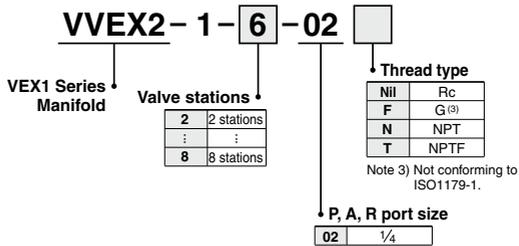
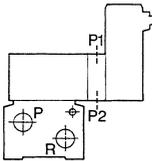
Note 2) VEX1200 (air operated) and VEX1201 (external pilot solenoid) are both individual external pilot type. The port P1 on the valve is used as a pilot port, but not the P1 hole on the manifold base.

How to Order

External Pilot Piping

| Valve port | Type | Air operated | External pilot solenoid valve |
|------------------|--------------------|----------------|-------------------------------|
| Applicable valve | | VEX1200 | VEX1201 |
| P1 | External pilot | External pilot | External pilot |
| P2 | — ^{Note)} | — | Pilot exhaust |

Note) Port P2 is not available for VEX 1200



How to Order Manifold

Specify the part numbers for the regulator valve and blanking plates starting from the left of manifold base (After making the port 2 (A) face the front).

(Ex.) VVEX2-1-5-02N.....1 5 station manifold base, Port thread NPT

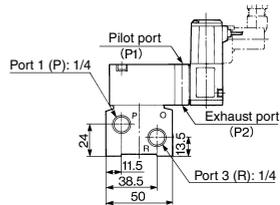
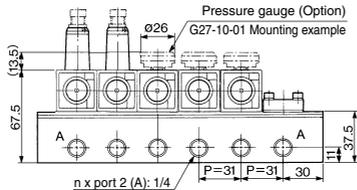
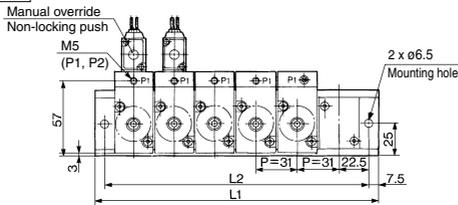
* VEX1201-5DZ-G.....4 Regulator valve, External pilot solenoid valve, 24 VDC, DIN terminal, with light/surge voltage suppressor, Option... with pressure gauge^{Note)}

* VEX1-17.....1 Blanking plate

Note) In the case of manifold, pressure gauge: G27-10-01 only (O.D. ø26)

Dimensions

VVEX2-1-1-Station-02



| | n | 2 | 3 | 4 | 5 | 6 | 7 | 8 | n: Station |
|----|----|-----|-----|-----|-----|-----|-----|-----|------------------|
| L1 | 91 | 122 | 153 | 184 | 215 | 246 | 277 | 277 | L1 = 31 x n + 29 |
| L2 | 76 | 107 | 138 | 169 | 200 | 231 | 262 | 262 | L2 = 31 x n + 14 |

Power Valve: 3 Position Valve

VEX3 Series

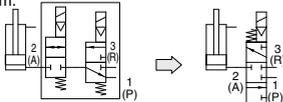
The body sizes 12/22/32/42 have been remodeled. For details, refer to page 1721.

Realize a variety of circuits using simple components.

Intermediate and emergency stops of large-sized cylinders

Intermediate and emergency cylinder stops

The 3 position closed center valve produces a simple and large capacity system.



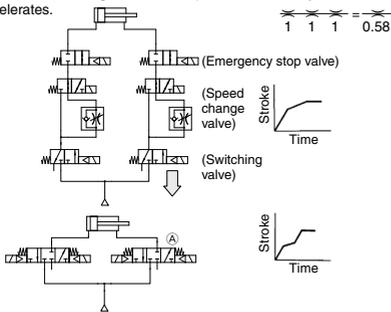
- A large capacity system without connection loss.

$\frac{1}{1} = \frac{1}{0.71}$ (Valves and piping can be made smaller.)

Terminal deceleration and an intermediate speed change circuit can be produced easily.

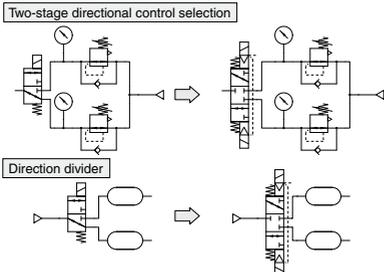
The simple system configuration permits sharp response. The large capacity system configuration without connection loss allows the use of smaller valves and piping.

- For example, when solenoid (b) of valve (A) is turned off while the cylinder is extending, the exhaust port closes and cylinder movement decelerates.

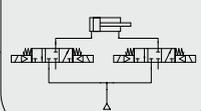


Universal porting could be used as a selector/divider valve

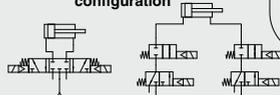
The pressure balancing poppet valve that permits any flow direction allows sequential switching operation, preventing blow by and air entrainment.



System configuration when using VEX



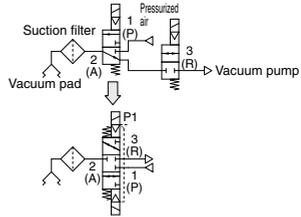
Current system configuration



- There were not many suitable large capacity 5 support valves available with a 3 position closed center.
- There were not many suitable 2-port valves for stopping.

Vacuum suction and release

The 3 port, 3 position double solenoid that permits vacuum suction, release, and suspension (closed) is ideal for a system where many valves are used.



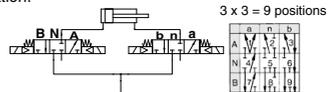
- There is no blow-by when switched from vacuum suction to vacuum release or vice versa.

Caution

- When maintaining the vacuum of port 2 (A), the vacuum may decrease due to leakage from the vacuum pad or piping. Conduct vacuum suction at the vacuum adsorption position. Furthermore, it cannot be used as an emergency cutoff valve.

For operation control of double acting cylinders

Two power valves driven by a double acting cylinder allows operation control in 9 positions (3 positions x 3 positions = 9 positions) including slow stopping, acceleration, and deceleration.



- 3 } — Reciprocation
- 7 } — Pressure center
- 1 } — Closed center
- 5 } — Exhaust center
- 2 } — Pressure & closed center
- 4 } — Exhaust & closed center
- 6 } — Slow stopping or deceleration
- 8 } — Slow stopping or deceleration

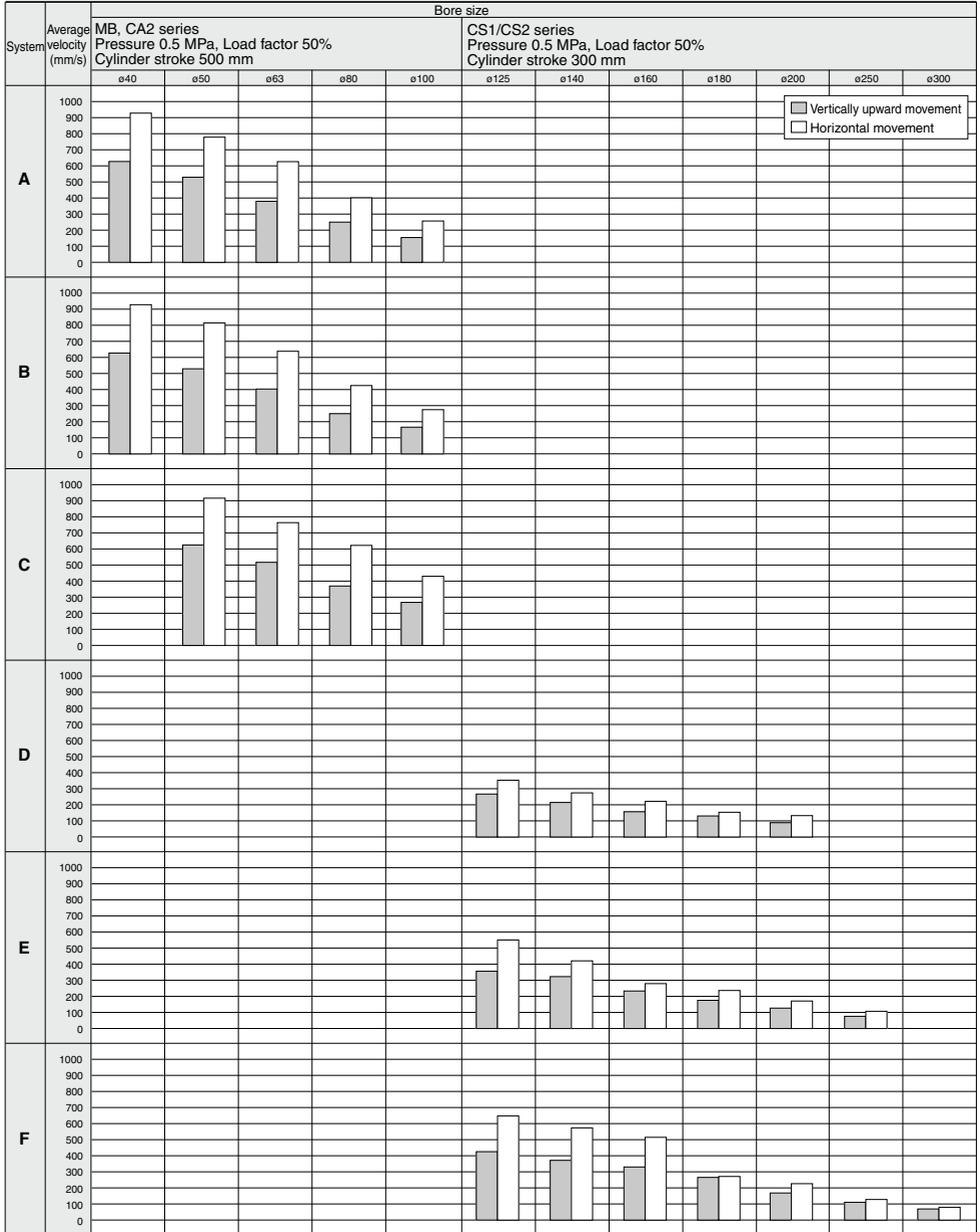
Caution

- This valve is not a non-leak specification, and thus cannot be used for long term intermediate stops or emergency stops.

VEX3 Series

Please assume the chart is offered as the guideline. For details about various each condition, please make use of SMC Model Selection Software and then decide it.

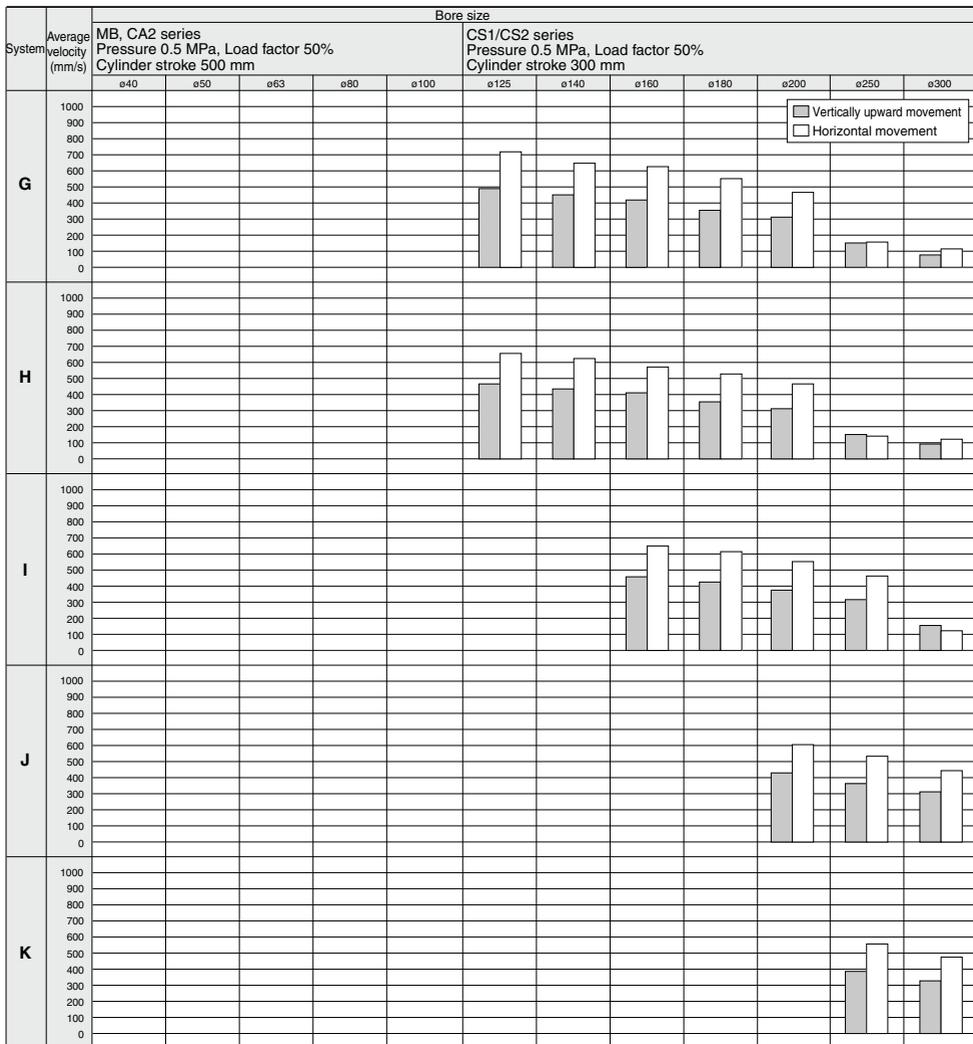
Cylinder Speed Chart



* When the cylinder is extended, the speed controller is metered-out, is connected with the cylinder directly, and its needle is fully open.

* Values on the average velocity of a cylinder are obtained from the stroke length divided by full stroke time.

* Load proportion is $((\text{load weight} \times 9.8) / \text{theoretical force}) \times 100\%$



* When the cylinder is extended, the speed controller is metered-out, is connected with the cylinder directly, and its needle is fully open.
 * Values on the average velocity of a cylinder are obtained from the stroke length divided by full stroke time.
 * Load proportion is ((load weight x 9.8)/theoretical force) x 100%

Conditions of Speed Chart

| System | Solenoid valve | Speed controller | Silencer | Tubing diameter x Length |
|--------|--------------------------|------------------|----------|--------------------------|
| A | VEX3 $\frac{1}{2}$ 2□-02 | AS4000-02 | AN20-02 | ø10 x 1 m |
| B | | | | ø12 x 1 m |
| C | VEX3 $\frac{3}{4}$ 2□-03 | AS420-03 | AN30-03 | ø12 x 1 m |
| D | | | | SGP15A x 1 m |
| E | VEX350□-06 | AS420-04 | AN40-04 | SGP15A x 1 m |
| F | | AS500-06 | AN500-06 | SGP20A x 1 m |
| G | | AS600-10 | AN600-10 | SGP25A x 1 m |
| H | VEX370□-10 | AS600-10 | AN600-10 | SGP25A x 1 m |
| I | | AS800-12 | AN700-12 | SGP32A x 1 m |
| J | VEX390□-14 | AS900-14 | AN800-14 | SGP40A x 1 m |
| K | | AS900-20 | AN900-20 | SGP50A x 1 m |



The body sizes 12/22/32/42 have been remodeled. For details, refer to page 1721.

How to Order



| Body size | Port size ⁽¹⁾ | | |
|-----------|--------------------------|--------------|-------|
| | Port | 1 (P), 2 (A) | 3 (R) |
| 12 | 01 | 1/8 | |
| | 02 | 1/4 | |
| 32 | 02 | 1/4 | |
| | 03 | 3/8 | |
| 50 | 04 | 1/2 | |
| | 04 | 1/2 | |
| | 06 | 3/4 | |
| 70 | 10 | 1 | |
| | 10 | 1 | 1 1/4 |
| | 12 | 1 1/4 | |
| 90 | 14 | 1 1/2 | |
| | 20 | 2 | |

Electrical entry (Only with solenoid)

| Body size | Symbol | Electrical entry (Only with solenoid) | Electrical entry (Only with solenoid) | | |
|----------------|--------|---|---------------------------------------|---|---|
| | | | NII | S | Z |
| 12 32 | G | Grommet, Lead wire length 300 mm | ● | ● | × |
| | H | Grommet, Lead wire length 600 mm | ● | ● | × |
| | L | L plug connector, Lead wire length 300 mm | ● | ● | ● |
| | LN | L plug connector, Without lead wire | ● | ● | ● |
| | LO | L plug connector, Without connector | ● | ● | ● |
| | M | M plug connector, Lead wire length 300 mm | ● | ● | ● |
| | MN | M plug connector, Without lead wire | ● | ● | ● |
| | MO | M plug connector, Without connector | ● | ● | ● |
| | D | DIN terminal | ● | ● | ● |
| | DO | DIN terminal, Without connector | ● | ● | × |
| 50 70 90 | G | Grommet, Lead wire length 300 mm | ● | ● | × |
| | H | Grommet, Lead wire length 600 mm | ● | ● | × |
| | D | DIN terminal | ● | × | ● |

Body ported

VEX3 12 0 - 01 [] 5 D [] - B

Base mounted

VEX3 22 0 - 01 [] 5 D [] - B



Operation type

| | |
|---|-------------------------|
| 0 | Air operated |
| 1 | External pilot solenoid |
| 2 | Internal pilot solenoid |

Option

(Only bracket or foot may be mounted.)

| | |
|-----|---|
| NII | None |
| B | Bracket ⁽⁴⁾ |
| F | Foot (VEX312□ and VEX332□ only) |
| N | Silencer for pilot exhaust (P2) port (Only with solenoid) |

Note 4) Except VEX322□, VEX332□ and VEX342□

Light/Surge voltage suppressor

| | |
|---|--|
| | None |
| S | With surge voltage suppressor (Grommet only for a body size of 50 or more) |
| Z | With light/surge voltage suppressor (Except grommet) |

| Body size | Port size ⁽¹⁾ | | |
|-----------|--------------------------|-------------------|-------|
| | Port | 1 (P), 2 (A) | 3 (R) |
| 22 | NII | Without sub-plate | |
| | 01 | 1/8 | |
| | 02 | 1/4 | |
| 42 | NII | Without sub-plate | |
| | 02 | 1/4 | |
| | 03 | 3/8 | |
| | 04 | 1/2 | |

Note 1) Face seal type One-touch fittings cannot be used.

Thread type

| | |
|-----|------------------|
| NII | Rc |
| F | G ⁽²⁾ |
| N | NPT |
| T | NPTF |

Note 2) Not conforming to ISO1179-1.

Rated voltage (Only with solenoid)

| | |
|---|--------------------|
| 1 | 100 VAC (50/60 Hz) |
| 2 | 200 VAC (50/60 Hz) |
| 3 | 110 VAC (50/60 Hz) |
| 4 | 220 VAC (50/60 Hz) |
| 5 | 24 VDC |
| 6 | 12 VDC |
| 7 | 240 VAC (50/60 Hz) |

For other rated voltages, please consult with SMC.

Electrical entry⁽³⁾ (Only with solenoid)

| Symbol | Electrical entry (Only with solenoid) | Electrical entry (Only with solenoid) | | |
|--------|---|---------------------------------------|---|---|
| | | NII | S | Z |
| G | Grommet, Lead wire length 300 mm | ● | ● | × |
| H | Grommet, Lead wire length 600 mm | ● | ● | × |
| L | L plug connector, Lead wire length 300 mm | ● | ● | ● |
| LN | L plug connector, Without lead wire | ● | ● | ● |
| LO | L plug connector, Without connector | ● | ● | ● |
| M | M plug connector, Lead wire length 300 mm | ● | ● | ● |
| MN | M plug connector, Without lead wire | ● | ● | ● |
| MO | M plug connector, Without connector | ● | ● | ● |
| D | DIN terminal | ● | ● | ● |
| DO | DIN terminal, Without connector | ● | ● | × |

Note 3) Refer to page 1768 for individual part numbers of plug and DIN connectors. (Common with VZ series)

Sub-plate and base gasket part no.

| Valve size | 2 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|-------------|-------------|-------------|--|--------|-----------|--------|-------------|---|-----|-----|----|---|-----|---|---|--|--|---|-----|--|--|---|------|--|-----------|--|-------------|--|--------|-----------|--------|-------------|---|-----|-----|----|---|-----|---|---|---|-----|---|-----|--|--|---|------|
| Sub-plate | <p>VEX1-9-1 [] [] P</p> <table border="1"> <thead> <tr> <th colspan="2">Port size</th> <th colspan="2">Thread type</th> </tr> <tr> <th>Symbol</th> <th>Port size</th> <th>Symbol</th> <th>Thread type</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>1/8</td> <td>NII</td> <td>Rc</td> </tr> <tr> <td>B</td> <td>1/4</td> <td>F</td> <td>G</td> </tr> <tr> <td></td> <td></td> <td>N</td> <td>NPT</td> </tr> <tr> <td></td> <td></td> <td>T</td> <td>NPTF</td> </tr> </tbody> </table> | Port size | | Thread type | | Symbol | Port size | Symbol | Thread type | A | 1/8 | NII | Rc | B | 1/4 | F | G | | | N | NPT | | | T | NPTF | <p>VEX4-2A-[] [] P</p> <table border="1"> <thead> <tr> <th colspan="2">Port size</th> <th colspan="2">Thread type</th> </tr> <tr> <th>Symbol</th> <th>Port size</th> <th>Symbol</th> <th>Thread type</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>1/8</td> <td>NII</td> <td>Rc</td> </tr> <tr> <td>B</td> <td>3/8</td> <td>F</td> <td>G</td> </tr> <tr> <td>C</td> <td>1/2</td> <td>N</td> <td>NPT</td> </tr> <tr> <td></td> <td></td> <td>T</td> <td>NPTF</td> </tr> </tbody> </table> | Port size | | Thread type | | Symbol | Port size | Symbol | Thread type | A | 1/8 | NII | Rc | B | 3/8 | F | G | C | 1/2 | N | NPT | | | T | NPTF |
| Port size | | Thread type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Symbol | Port size | Symbol | Thread type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | 1/8 | NII | Rc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | 1/4 | F | G | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | N | NPT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | T | NPTF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Port size | | Thread type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Symbol | Port size | Symbol | Thread type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | 1/8 | NII | Rc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | 3/8 | F | G | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | 1/2 | N | NPT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | T | NPTF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Base gasket | VEX1-11-2 | VEX4-4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

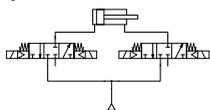
Caution

Be sure to read this before handling the products.
Refer to back page 50 for Safety Instructions and pages 3 to 9 for 3/4/5 Port Solenoid Valve Precautions.

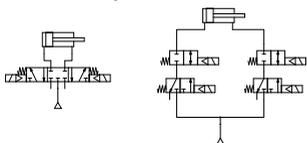
Variety of circuits in simple construction

3 position valve suitable for intermediate and emergency stop of large size cylinder.

System construction with VEX



Current system construction



- There were not many suitable large capacity 5 port valves available with a 3 position closed center.
- There were not many suitable large capacity 2 port valves available for stopping operations.



Air operated

Specifications

| | | | | | | |
|--|-------------------------|---|------------------|------------------------------|---------------|---------------|
| Model | Body ported | VEX312□-01/02 | VEX332□-02/03/04 | VEX350□-04/06/10 | VEX370□-10/12 | VEX390□-14/20 |
| | Base mounted | VEX322□-01/02 | VEX342□-02/03/04 | — | — | — |
| Operation type | | Air operated, External pilot solenoid, Internal pilot solenoid | | | | |
| Fluid | | Air | | | | |
| Pressure range | Air operated | Main pressure Low vacuum to 1.0 MPa External pilot pressure 0.2 to 1.0 MPa | | | | |
| | External pilot solenoid | Main pressure Low vacuum to 1.0 MPa External pilot pressure 0.2 to 0.9 MPa | | | | |
| | Internal pilot solenoid | Main pressure 0.2 to 0.7 MPa | | Main pressure 0.2 to 0.9 MPa | | |
| Ambient and fluid temperature | | 0 to 50°C (Air operated 60°C) | | | | |
| Response time (Pilot pressure 0.5 MPa) | | 40 ms or less | | 60 ms or less | | |
| Max. operating frequency | | 3 cycles/sec. | | | | |
| Mounting | | Free | | | | |
| Lubrication | | Not required (Use turbine oil Class 1 ISO VG32, if lubricated.) | | | | |

Note) Non-lubricated specifications are not available for this product.

Pilot Solenoid Valve Specifications

| | | |
|------------------------|--|--|
| Model | VEX3121, VEX3221, VEX3321, VEX3421 VEX3122, VEX3222, VEX3322, VEX3422 | VEX3501, VEX3701, VEX3901 VEX3502, VEX3702, VEX3902 |
| Pilot valve | Exclusive pilot valve | VO307K-□□□1 |
| Electrical entry | Grommet, L plug connector, M plug connector, DIN terminal | Grommet, Grommet terminal, Conduit terminal, DIN terminal |
| Coil rated voltage (V) | AC(50/60Hz) DC | 100V, 110V, 200V, 220V, 240V 6V, 12V, 24V, 48V |
| Temperature rise | | -15 to +10% of rated voltage |
| Apparent power | AC Inrush | 4.5 VA/50 Hz, 4.2 VA/60 Hz |
| | AC Holding | 3.5 VA/50 Hz, 3 VA/60 Hz |
| Power consumption | DC | 12.7 VA (50 Hz), 10.7 VA (60 Hz) 7.6 VA (50 Hz), 5.4 VA (60 Hz) |
| Manual override | DC | 1.8 W (Without indicator light), 2.1 W (With indicator light) 4 W (Without indicator light), 4.2 W (With indicator light) |
| Manual override | | Non-locking push type Non-locking push type |

Note) When replacing the pilot valves specified for valve sizes 1 to 4, please request SMC to replace them at the factory.

Option

| Description | | Part no. | | | | | | |
|---|---|---------------|---------------|------------------|------------------|------------------|---------------|---------------|
| | | VEX312□-01/02 | VEX322□-01/02 | VEX332□-02/03/04 | VEX342□-02/03/04 | VEX350□-04/06/10 | VEX370□-10/12 | VEX390□-14/20 |
| Bracket (With bolt and washer) | B | VEX1-18-1A | — | — | — | VEX5-32A | VEX7-32A | VEX9-32A |
| Foot (With bolt and washer) | F | VEX1-18-2A | — | VEX3-32-2A | — | — | — | — |
| Pilot exhaust port P2 silencer <small>Note)</small> | N | AN120-M5 | | | AN210-02 | | | |

Note) Only with solenoid.

Weight

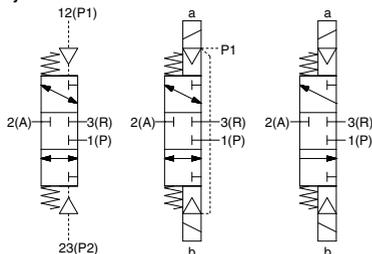
(kg)

| Model | VEX312□-01/02 | VEX322□-01/02 | VEX332□-02/03/04 | VEX342□-02/03/04 | VEX350□-04/06/10 | VEX370□-10/12 | VEX390□-14/20 |
|--------------|---------------|---------------|------------------|------------------|------------------|---------------|---------------|
| Air operated | 0.1 | 0.2 | 0.3 | 0.6 | 1.4 | 2.1 | 3.3 |
| Solenoid | 0.2 | 0.3 | 0.4 | 0.7 | 1.6 | 2.3 | 3.5 |

VEX

Internal pilot solenoid/External pilot solenoid

Symbol



Air operated External pilot solenoid Internal pilot solenoid

VEX3 Series

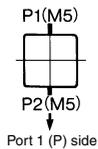
Flow Rate Characteristics

| Model | Port size | Flow rate characteristics | | | | | | | | | | | | |
|----------------------------------|------------|---|------|----------------|---|------|----------------|---|------|----------------|---|------|----------------|------|
| | | 1 (P) → 2 (A) | | | 2 (A) → 1 (P) | | | 3 (R) → 2 (A) | | | 2 (A) → 3 (R) | | | |
| | | C _d (dm ³ /s·bar) | b | C _v | C _d (dm ³ /s·bar) | b | C _v | C _d (dm ³ /s·bar) | b | C _v | C _d (dm ³ /s·bar) | b | C _v | |
| Body ported | VEX312□-01 | 1/8 | 2.4 | 0.19 | 0.59 | 2.4 | 0.31 | 0.59 | 2.3 | 0.36 | 0.59 | 2.5 | 0.22 | 0.61 |
| | VEX312□-02 | 1/4 | 3.5 | 0.35 | 0.89 | 3.3 | 0.49 | 0.89 | 3.1 | 0.46 | 0.89 | 3.5 | 0.33 | 0.93 |
| | VEX332□-02 | 1/4 | 4.1 | 0.36 | 1.1 | 4.3 | 0.42 | 1.1 | 4.1 | 0.41 | 1.1 | 4.6 | 0.25 | 1.2 |
| | VEX332□-03 | 3/8 | 8.7 | 0.29 | 2.2 | 7.9 | 0.52 | 2.2 | 7.8 | 0.51 | 2.4 | 8.7 | 0.33 | 2.4 |
| | VEX332□-04 | 1/2 | 9.8 | 0.37 | 2.7 | 9.6 | 0.52 | 2.7 | 9.1 | 0.53 | 3.0 | 11 | 0.37 | 3.0 |
| Base mounted (With sub-plate) | VEX350□-01 | 1/2 | 24 | 0.32 | 6.4 | 24 | 0.30 | 6.4 | 25 | 0.31 | 6.4 | 22 | 0.27 | 5.7 |
| | VEX322□-01 | 1/8 | 3.3 | 0.34 | 0.86 | 3.5 | 0.39 | 0.86 | 3.3 | 0.37 | 0.86 | 3.5 | 0.36 | 0.87 |
| | VEX322□-02 | 1/4 | 4.1 | 0.28 | 0.99 | 4.1 | 0.39 | 0.99 | 3.8 | 0.38 | 0.97 | 4.4 | 0.23 | 1.1 |
| | VEX342□-02 | 1/4 | 8.1 | 0.34 | 2.0 | 7.9 | 0.39 | 2.0 | 8.2 | 0.33 | 2.1 | 8.1 | 0.37 | 2.2 |
| | VEX342□-03 | 3/8 | 12 | 0.26 | 3.2 | 12 | 0.29 | 3.2 | 12 | 0.28 | 3.1 | 13 | 0.28 | 3.3 |
| VEX342□-04 | 1/2 | 13 | 0.20 | 3.3 | 13 | 0.24 | 3.3 | 12 | 0.29 | 3.2 | 14 | 0.20 | 3.3 | |

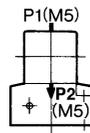
| Model | Port size | Effective area (mm ²) | C _v | |
|-------------|------------|-----------------------------------|----------------|-----|
| Body ported | VEX350□-06 | 3/4 | 160 | 8.9 |
| | VEX350□-10 | 1 | 180 | 10 |
| | VEX370□-10 | 1 | 300 | 17 |
| | VEX370□-12 | 1 1/4 | 330 | 18 |
| | VEX390□-14 | 1 1/2 | 590 | 33 |
| | VEX390□-20 | 2 | 670 | 37 |

External Pilot Piping

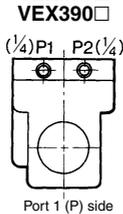
VEX312□



VEX322□



VEX350□
VEX370□
VEX390□



| Port | VEX3□□0 | VEX3□□1 | VEX3□□2 |
|------|----------------|----------------|---------------|
| P1 | External pilot | External pilot | Plug |
| P2 | External pilot | Pilot exhaust | Pilot exhaust |

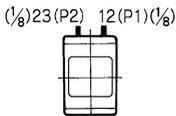
⚠ Caution

● VEX3¹/₂2¹/₂ (Solenoid)

When the VEX3240 air operated power valve is delivered from our factory, the M5 threaded pilot port P2 in the cover is open and the 1/8 pilot port in the sub-plate is plugged. When port P2 on the body^{Note} is used as a pilot exhaust port, remove the 1/8 plug and put the M5 plug into the pilot valve port P2 to cover it.

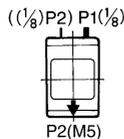
^{Note} Body for VEX332¹/₂, sub-plate for VEX342¹/₂

VEX3320
Air operated



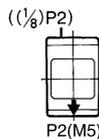
Port 1 (P), 3 (R) side

VEX3321
External pilot solenoid



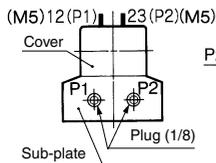
Port 1 (P), 3 (R) side

VEX3322
Internal pilot solenoid

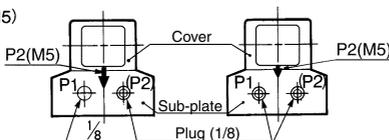


Port 1 (P), 3 (R) side

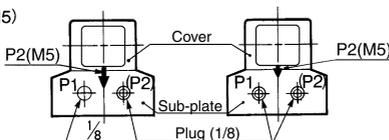
VEX3420
Air operated
for sub-plate



VEX3421
External pilot solenoid
for subplate

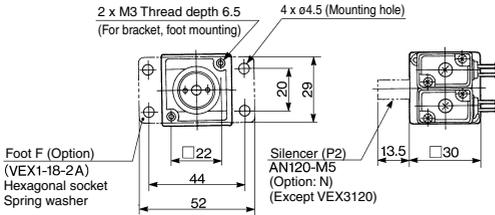


VEX3422
Internal pilot solenoid
for subplate



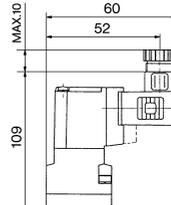
Body Ported: VEX312□

Air operated: VEX3120 External pilot solenoid: VEX3121 Internal pilot solenoid: VEX3122



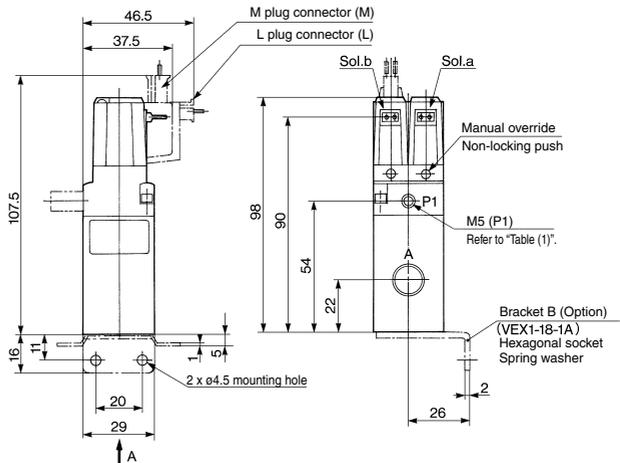
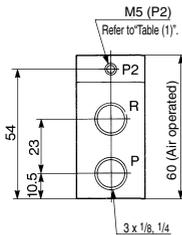
A perspective drawing

DIN terminal (D)



**Table (1)
With/Without Plug for M5 Port**

| Model | P1 | P2 |
|----------------|-----------|------|
| VEX3120 | None | None |
| VEX3121 | None | None |
| VEX3122 | With plug | None |



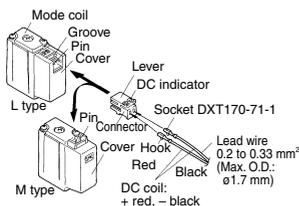
⚠ Caution

How to Use Plug Connector/Applicable Model: VEX312₂/322₂/332₂/342₂

Attaching/Detaching of a plug

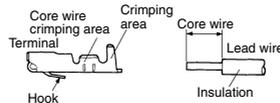
- To install the connector**
Push the connector straight on the pins of the solenoid, making sure the lip of the lever is securely positioned in the groove on the solenoid cover.

- To disinstall the connector**
Press the lever against the connector and pull the connector away straight from the solenoid.



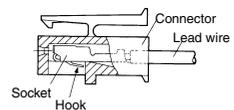
Crimping lead wire and socket

Peel 3.2 to 3.7 mm of the tip of the lead wire, enter the core wires neatly into a socket and press contact it with a press tool. Be careful so that the cover of lead wire does not enter into the core press contacting part. (Please contact SMC for the dedicated crimping tools.)



Attaching/Detaching of a socket with lead wire

- Attaching**
Insert a socket into the square hole (indicated at +, -) of connector, push fully the lead wire and lock by hanging the hook of a socket to the seat of connector. (Pushing in can open the hook and lock it automatically.) Then confirm the locking by lightly pulling on the lead wire.
- Detaching**
For pulling out a socket from connector, pull out the lead wire while pushing the hook of a socket with a stick with a fine point (1 mm). If a socket is to be re-used as it is, return the hook to the outside.

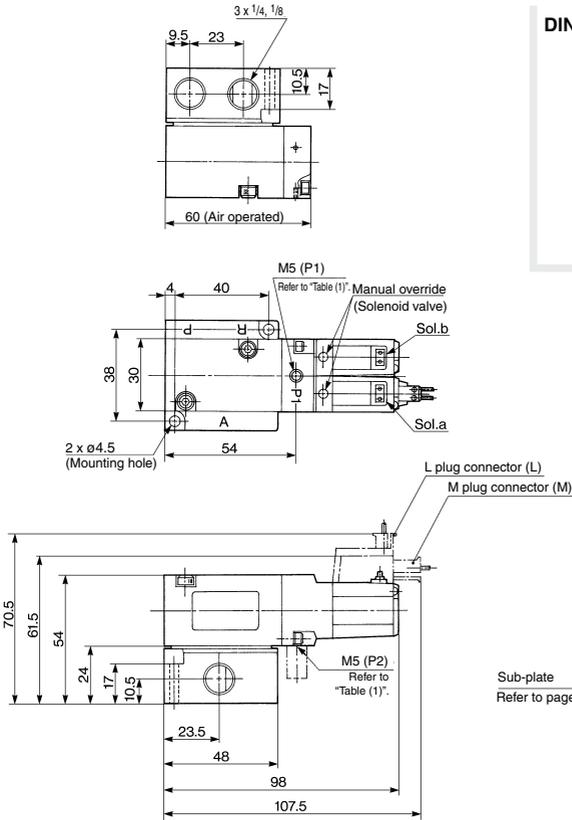


VEX

VEX3 Series

Base Mounted: VEX322□

Air operated: VEX3220 External pilot solenoid: VEX3221 Internal pilot solenoid: VEX3222



DIN terminal (D)

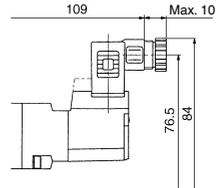
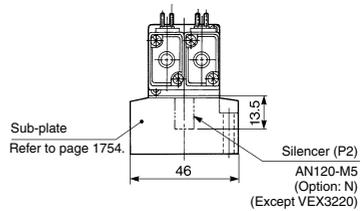


Table (1)
With/Without Plug for M5 Port

| Model | P1 | P2 |
|---------|-----------|------|
| VEX3220 | None | None |
| VEX3221 | None | None |
| VEX3222 | With plug | None |



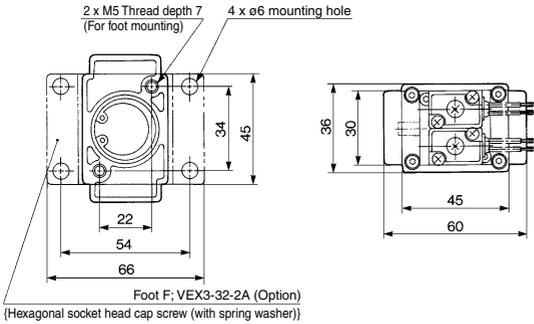
⚠ Caution

How to Use DIN Terminal

Refer to page 1768.

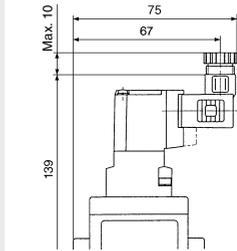
Body Ported: VEX332□

Air operated: VEX3320 External pilot solenoid: VEX3321 Internal pilot solenoid: VEX3322



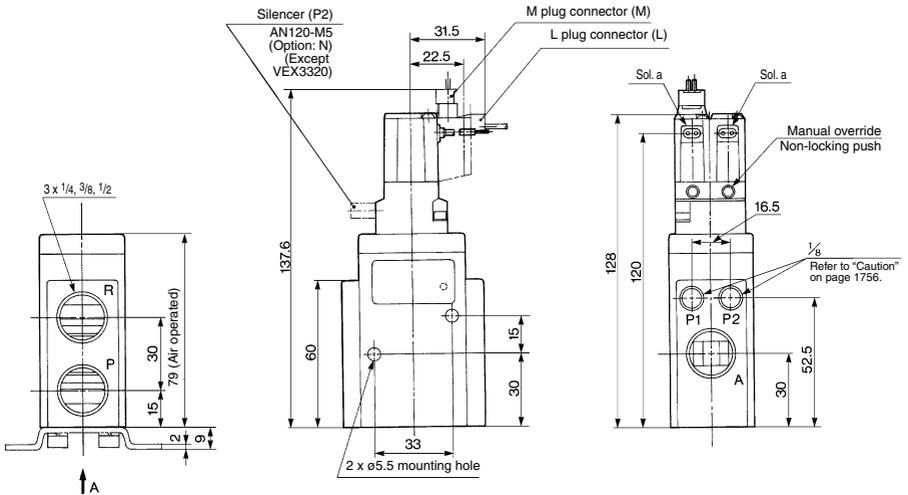
A perspective drawing

DIN terminal (D)



**Table (1)
With/Without Plug for 1/8 Port**

| Model | P1 | P2 |
|----------------|-----------|-----------|
| VEX3320 | None | None |
| VEX3321 | None | With plug |
| VEX3322 | With plug | With plug |

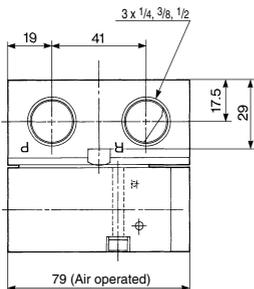


VEX

VEX3 Series

Base Mounted: VEX342□

Air operated: VEX3420 External pilot solenoid: VEX3421 Internal pilot solenoid: VEX3422



DIN terminal (D)

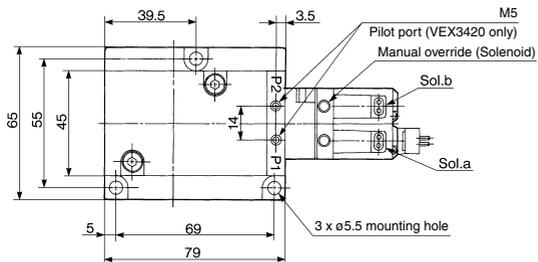
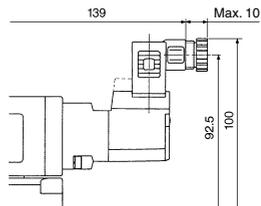
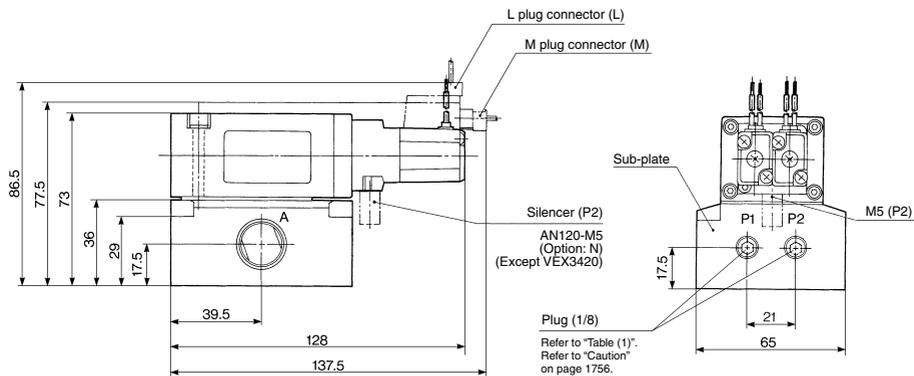


Table (1)

With/Without Plug for Sub-plate

| Model | P1 | P2 |
|---------|-----------|-----------|
| VEX3420 | With plug | With plug |
| VEX3421 | None | With plug |
| VEX3422 | With plug | With plug |



Body Ported: VEX350□/370□

Air operated: VEX3500

External pilot solenoid: VEX3501

Internal pilot solenoid: VEX3502

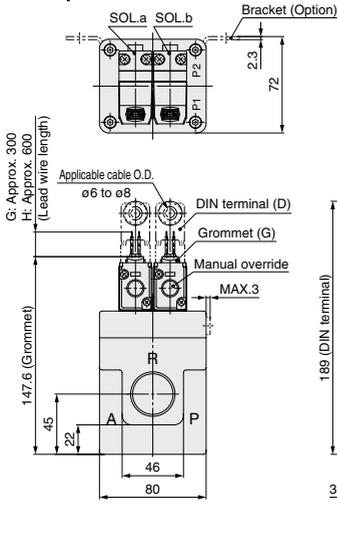


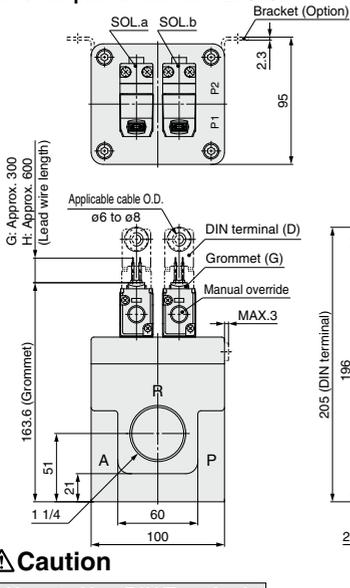
Table (1) With/Without Plug for 1/4 Port

| Model | P1 | P2 |
|----------------|-----------|------|
| VEX3500 | None | None |
| VEX3501 | None | None |
| VEX3502 | With plug | None |

Air operated: VEX3700

External pilot solenoid: VEX3701

Internal pilot solenoid: VEX3702



⚠ Caution

How to Use DIN Terminal

Refer to page 1435 for VT307 series.

VEX

VEX3 Series

Base Mounted: VEX390□

Air operated: VEX3900

External pilot solenoid: VEX3901

Internal pilot solenoid: VEX3902

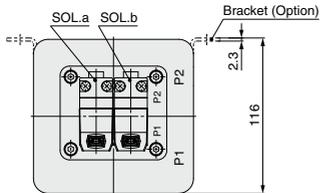
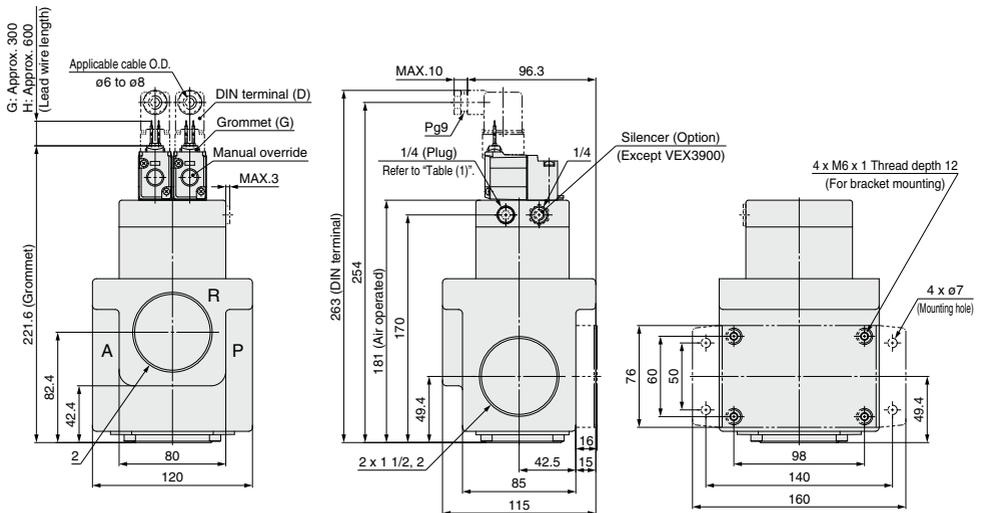


Table (1)
With/Without Plug for 1/4 Port

| Model | P1 | P2 |
|---------|-----------|------|
| VEX3900 | None | None |
| VEX3901 | None | None |
| VEX3902 | With plug | None |



⚠ Caution

How to Use DIN Terminal

Refer to page 1435 for VT307 series.

VEX3 Series Manifold Specifications

Manifold: VVEX Series



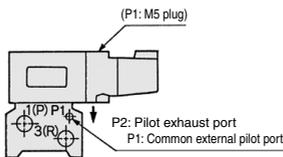
Specifications

| Model | VVEX2 | | VVEX4 | | |
|---------------------------------|---------------------------------------|-----|--------------------------------|-----|-----|
| Applicable valve | VEX3220/VEX3222 | | VEX3420/VEX3422 | | |
| Valve stations (Note) | 2 to 8 | | 2 to 6 | | |
| Port specifications | Common SUP, EXH | | | | |
| Pilot type | Internal pilot, Common external pilot | | | | |
| Common external pilot port size | M5 x 0.8 Length of thread 5 | | | | |
| Port size | 1 (P) | 1/4 | 3/8 | 3/8 | 1/2 |
| | 3 (R) | | 1/4 | 3/8 | 3/8 |
| | 2 (A) | | | 3/8 | 3/8 |
| Applicable blanking plate | VEX1-17 (With gasket, screw) | | VEX4-5 (With gasket, screw) | | |

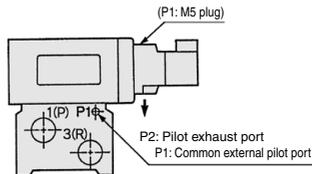
Note) When VVEX2 series is used with more than 5 stations, or VVEX4 series is used with more than 4 stations, apply pressure to the port 1 (P) on both sides and exhaust from the port 3 (R) on both sides.

Common External Pilot Piping

VVEX2-2



VVEX4-2



How to Order Manifold Base

VVEX 2 - 1 - 6 - 02

| Body size | Pilot type | Applicable valve | Valve stations | Port size | | Thread type | |
|-----------|-------------------------|--|----------------|-----------|-------------------|-------------|-----|
| | | | | Port | 1 (P) 3 (R) 2 (A) | | |
| 2 | 1 Internal pilot | VEX3222 (Air operated: VEX3220 (Note)) | 2 | 2 | 02 | 1/4 | |
| | | | 6 | 6 | | | |
| | 2 Common external pilot | 8 | 8 | | | | |
| | | 6 | 6 | | | | |
| 4 | 1 Internal pilot | VEX3422 (Air operated: VEX3420 (Note)) | 2 | 2 | A | 3/8 | 1/4 |
| | | | 6 | 6 | B | 3/8 | |
| | 2 Common external pilot | 6 | 6 | C | 1/2 | 3/8 | |
| | | | | | | | |

Note) Air operated

VEX 3220 and VEX3420 (air operated) are used. Distinction between the pilots (internal or external pilot) of the manifold base does not matter. Either may be used.

Example for ordering a manifold base:

The valve and blank plate for manifold arrangement should be specified in order from the left side of the manifold base (with the port 2 (A) on your side).

(Example)
 VVEX2-2-7-02N
 *VEX3222-1LN 6 pcs. } Solenoid
 *VEX1-17 1 pc.
 VVEX4-2-6-A
 *VEX3420 5 pcs. } Air operated
 *VEX4-5 1 pc.

VEX

VEX3 manifold (Size 2, 4) Pilot type

| Manifold pilot type | Manifold part no. | Applicable valve part no. | Operating pressure range | Pilot pressure range |
|--------------------------------|-------------------|---------------------------|--------------------------|----------------------|
| Air operated type | VVEX□-□-□-□ | VEX3220/VEX3420 | Low vacuum to 1.0 MPa | 0.2 to 1.0 MPa |
| Internal pilot type | VVEX□-1-□-□ | VEX3222/VEX3422 | 0.2 to 0.7 MPa | — |
| Common external pilot type | VVEX□-2-□-□ | VEX3222/VEX3421/VEX3422 | Low vacuum to 1.0 MPa | 0.2 to 0.7 MPa |
| Individual external pilot type | VVEX□-□-□-□ | VEX3221 | | |

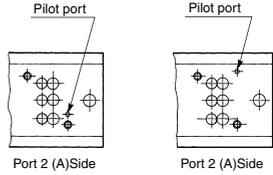
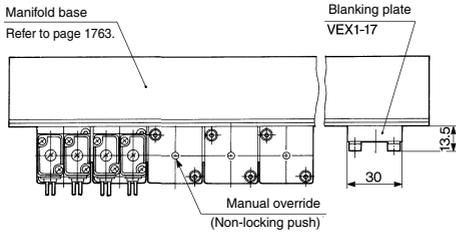
Note) If external pilot types are used, the common external pilot type is recommended.

VEX3 Series

Manifold: VVEX2-□

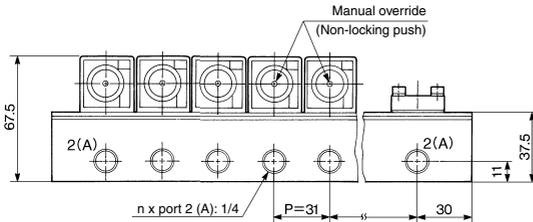
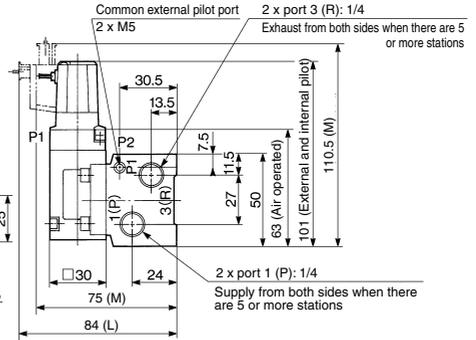
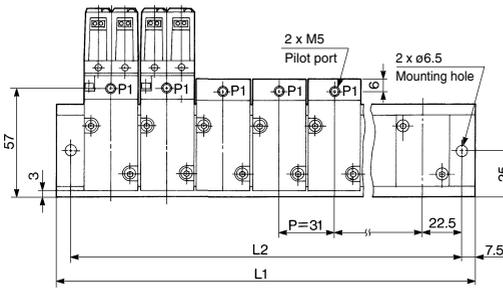
VVEX2- $\frac{1}{2}$ Applicable valve: VEX3220/3222

Valve mounting side



Internal pilot type

Common external pilot



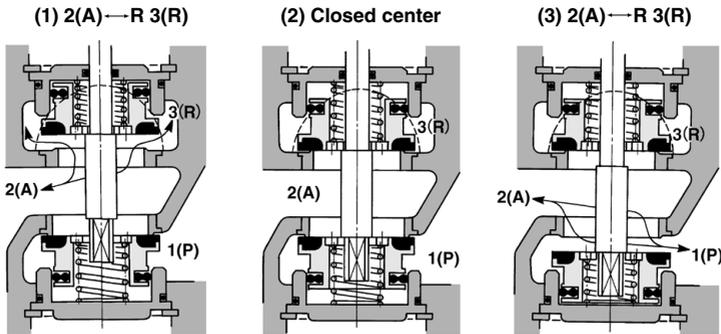
L Dimension

Formula $L_1 = 31n + 29$, $L_2 = 31n + 14$ n: Station

| n | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----|----|-----|-----|-----|-----|-----|-----|
| L1 | 91 | 122 | 153 | 184 | 215 | 246 | 277 |
| L2 | 76 | 107 | 138 | 169 | 200 | 231 | 262 |

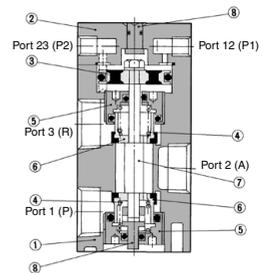
VEX3 Series

Construction/Working Principle/Component Parts

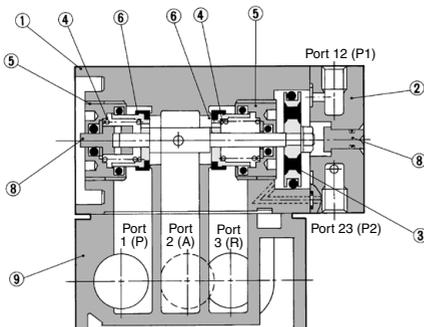


- This is a 3 port switch valve in which the shaft (7) - extending from the driving piston (3) opens/closes a pair of poppet valves (6). The poppet valve has a pressure balancing mechanism in which port 2 (A) pressure is constantly applied from the back and the center spring (4) is acting as a backup.
- When neither the pilot solenoid valve "a" nor "b" are energized (or when air is exhausted both from the port 12 (P1) and 23 (P2) of the air operated type), no force will act on the working piston, and the spring closes the poppet valve, thus the valve assumes the closed center position (DRW (2)).
- When the pilot solenoid valve "a" is energized (or when pressurized air enters through the port 12 (P1) of the air operated type), pilot air that enters the space above the working piston pushes down the piston and opens the lower poppet valve, thus connecting the port 1 (P) and port 2 (A) (DRW (3)). The upper poppet valve continues to close the port 3 (R) by means of pressure balance and the spring.
- When the pilot solenoid valve "b" is energized (or when pressurized air enters through the port 23 (P2) of the air operated type), the pilot air that enters the space under the working piston pushes the piston upward and opens the upper poppet valve, thus connecting the port 2 (A) and port 3 (R) (DRW (1)). The lower poppet valve continues to close the port 1 (P) by means of pressure balance and the spring.

VEX3120 (Air operated)



VEX3220 (Air operated)

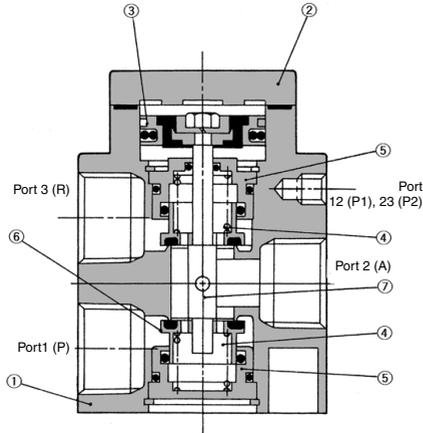


Component Parts

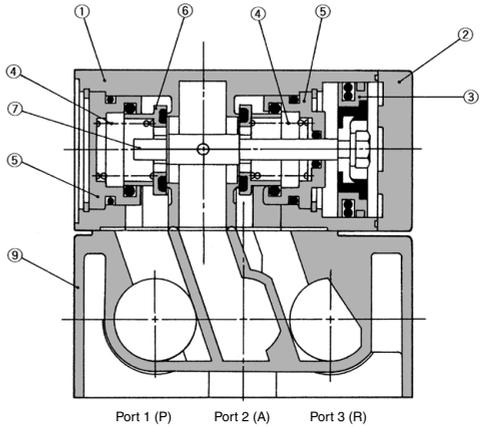
| No. | Description | Material |
|-----|-----------------|------------------------|
| 1 | Body | Aluminum alloy |
| 2 | Cover | Aluminum alloy |
| 3 | Working piston | Aluminum alloy |
| 4 | Center spring | Stainless steel |
| 5 | Valve guide | Aluminum alloy |
| 6 | Poppet valve | Aluminum alloy, Rubber |
| 7 | Shaft | Stainless steel |
| 8 | Manual override | POM |
| 9 | Sub-plate | Aluminum alloy |

Construction/Working Principle/Component Parts

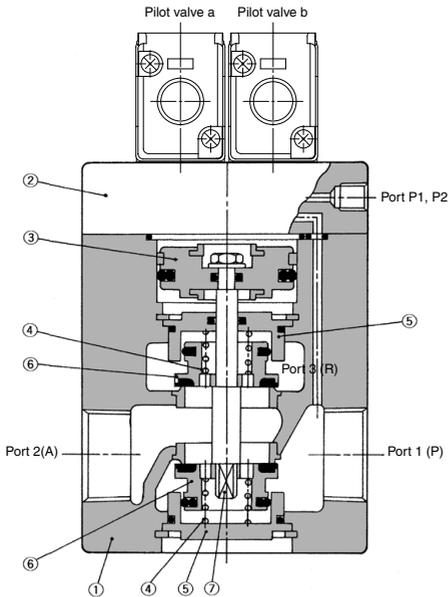
VEX3320 (Air operated)



VEX3420 (Air operated)



VEX350□/370□/390□ (Solenoid)





VEX3 Series Specific Product Precautions

Be sure to read this before handling the products.
Refer to back page 50 for Safety Instructions.

Connectors for the VEX3 Series Body Sizes 12, 22, 32 and 42 (For connectors for body sizes 50, 70, and 90, refer to VT307 series.)

Plug Connector Lead Wire Length

⚠ Caution

The standard length of a plug connector with lead wire is 300 mm, but the following lengths are also available.

How to Order Connector Assembly

DXT170-80-□ A-□

Lead wire colors

| Symbol | Lead wire with socket | Note |
|--------|-----------------------|-------------------|
| Nil | Socket only (2 pcs.) | Without lead wire |
| 1 | Blue (2 pcs.) | For 100 VAC |
| 2 | Red (2 pcs.) | For 200 VAC |
| 3 | Gray (2 pcs.) | For other VAC |
| 4 | Red: +, Black: - | For DC |

Lead wire length

| Symbol | Lead wire length (L mm) |
|--------|-------------------------|
| Nil | 300 |
| 6 | 600 |
| 10 | 1000 |
| 15 | 1500 |
| 20 | 2000 |
| 25 | 2500 |
| 30 | 3000 |

How to Order

Specify the connector assembly part number together with the part number for the plug connector's solenoid valve without connector. (Note) The solenoid valve and the connector assembly are shipped separately.

Connector Assembly with Cover

⚠ Caution

- Connector assembly with protective cover enhances dust protection.
- Effective to prevent short circuit accidents due to penetration of foreign matter into the connector part.
- Cover material adopts the chloroprene rubber which is excellent in weather ability and electric insulation properties. However, use caution not to splash cutting oil, etc. onto it.
- Simple and unencumbered appearance by adopting a round-shaped cord.

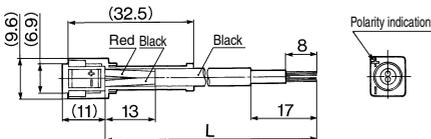
How to Order

DXT170-123-A-□

Lead wire length

| Symbol | Lead wire length (L mm) |
|--------|-------------------------|
| Nil | 300 |
| 6 | 600 |
| 10 | 1000 |
| 15 | 1500 |
| 20 | 2000 |
| 25 | 2500 |
| 30 | 3000 |

Connector assembly with cover: Dimensions



How to Use DIN Connector

⚠ Caution

Wiring

- Loosen the set screws and pull out connector from the terminal block of solenoid valve.
- Pull out screws and insert a screwdriver to the slit area near the bottom of terminal block to separate the terminal block and housing.
- Loosen the terminal screws (slotted screws) on the terminal block, insert the core of the lead wire into the terminal in accordance with the wiring method, and secure with the terminal screws.
- Tighten the ground nut to secure the cord.

Change of electrical entry

After separating the terminal block and housing, the cord entry direction can be changed by attaching the housing in the desired direction (4 directions in 90° increments).

* When equipped with light, avoid damaging the light with lead wire.

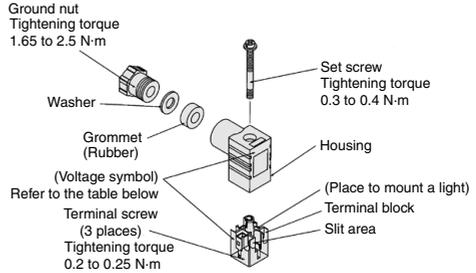
Caution

Plug a connector in or out vertically, never at an angle.

Applicable cables

Cord O.D.: $\phi 3.5$ to $\phi 7$

(Reference) 0.5 mm² 2-core and 3-core wires equivalent to JIS C 3306.



DIN connector part no.

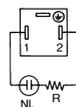
| Without light | DXT170-176-1 |
|---------------|--------------|
|---------------|--------------|

With Light

| Rated voltage | Voltage symbol | Part no. |
|---------------|----------------|-----------------|
| 100 VAC | 100 V | DXT170-176-2-01 |
| 200 VAC | 200 V | DXT170-176-2-02 |
| 110 VAC | 110 V | DXT170-176-2-03 |
| 220 VAC | 220 V | DXT170-176-2-04 |
| 240 VAC | 240 V | DXT170-176-2-07 |
| 6 VDC | 6 VD | DXT170-176-3-51 |
| 12 VDC | 12 VD | DXT170-176-3-06 |
| 24 VDC | 24 VD | DXT170-176-3-05 |
| 48 VDC | 48 VD | DXT170-176-3-53 |

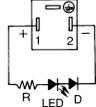
Connector with light circuit

AC circuit



NL: Neon light
R: Resistor

DC circuit



D: Protective diode
LED: LED diode
R: Resistor

Power Valve: Economy Valve

Series VEX5

Three functions (pressure regulator, switching valve, and speed controller) are provided by a single valve.

The conventional valve combination circuit has been condensed into a single valve.

A large capacity and economical system.

This valve provides twice the system capacity of the conventional circuit. Therefore, it is possible to downsize 1 or 2 sizes (for example, a conventional 32A circuit can be changed to a 25A or a 20A). It is economical, as its performance cost (system price/effective area) is one half of the conventional type. (Comparison based on SMC data.)

Standard Specifications

| Model | VEX55□□- ⁰⁴ / ₀₆ / ₁₀ | VEX57□□- ¹⁰ / ₁₂ | VEX59□□- ¹⁴ / ₂₀ | | | | | |
|--------------------------------------|---|--|--|-------|-----|-----|-------|-----|
| Operation type | Air operated, External pilot solenoid | | | | | | | |
| Fluid | Air | | | | | | | |
| Pressure range | 0 to 1.0 MPa | | | | | | | |
| Set pressure range | 0.05 to 0.9 MPa | | | | | | | |
| Ambient and fluid temperature | Max. 50°C (Air operated 60°C) | | | | | | | |
| Pilot pressure | P1: 0.05 to 0.9 MPa P2: 0.2 to 0.9 MPa (Air operated: P2, P3: 0.2 to 0.9 MPa P2 ≤ P3) | | | | | | | |
| Repeatability | 0.01 MPa | | | | | | | |
| Sensitivity | 0.01 MPa | | | | | | | |
| Response time | 60 ms or less | | | | | | | |
| Max. operating frequency | 3 cycles/sec. | | | | | | | |
| Number of needle rotations | 6 turns | | 8 turns | | | | | |
| Mounting | Free | | | | | | | |
| Lubrication | Not required (Use turbine oil Class 1 ISO VG32, if lubricated.) | | | | | | | |
| Port size | Port | 04 | 06 | 10 | 10 | 12 | 14 | 20 |
| | 1 (P) | | | | 1 | | 1 1/4 | |
| | 2 (A) | 1/2 | 3/4 | 1 | | | | 2 |
| Effective area | 3 (R) | | | 1 1/4 | | | 2 | |
| | mm² | 130 | 160 | 180 | 300 | 330 | 590 | 670 |
| | Cv | 7.2 | 8.9 | 10 | 17 | 18 | 33 | 37 |
| Weight (kg) | Air operated | Basic type | 2.0 | | 3.2 | | 4.7 | |
| | | Select type | 2.3 | | 3.5 | | 5.0 | |
| | Solenoid | Basic type | 2.2 | | 3.5 | | 4.9 | |
| | | Select type | 2.6 | | 3.8 | | 5.3 | |

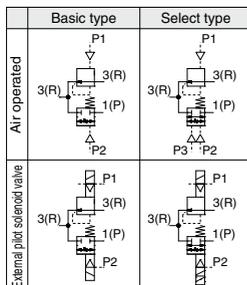
Note) Non-lubricated specifications are not available for this product.



Basic type



Select type



Note) With this valve, the port 3(R) is a supply port and port 1(P) is an exhaust port.

Pilot Solenoid Valve Specifications

| Model | VEX5511/5711/5911/5501/5701/5901 | | |
|-------------------------------|---|---|------------------------------|
| Pilot valve | SF4-□□-20 | | |
| Electrical entry | Grommet (G), Grommet terminal (E), Conduit terminal (T), DIN terminal (D) | | |
| Coil rated voltage (V) | AC (50/60Hz) | 100 V, 200 V, Other (Option) | |
| | DC | 24 V, Other (Option) | |
| Allowable voltage | -15 to +10% of rated voltage | | |
| Apparent power | AC | Inrush | 5.6 VA (50Hz), 5.0 VA (60Hz) |
| | | Holding | 3.4 VA (50Hz), 2.3 VA (60Hz) |
| Power consumption | DC | 1.8 W (Without indicator light), 2 W (With indicator light) | |
| Manual override | Non-locking push type | | |

Accessory/Part No.

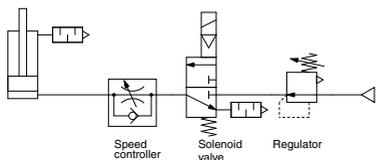
| Description | Model | Part no. | | |
|--------------------------------|-------|--|--|--|
| | | VEX55□□- ⁰⁴ / ₀₆ / ₁₀ | VEX57□□- ¹⁰ / ₁₂ | VEX59□□- ¹⁴ / ₂₀ |
| Bracket (With bolt and washer) | | VEX5-32A | VEX7-32A | VEX9-32A |
| Pressure gauge | | G46-10-01 | | |

VEX

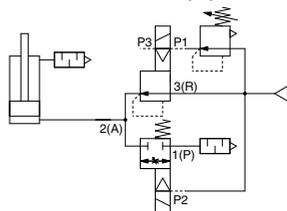
Applicable System/Example of Single Acting Circuit (The valves can be used also for double acting circuits, too. Please consult with SMC for details.)

1. Speed control

Conventional circuit



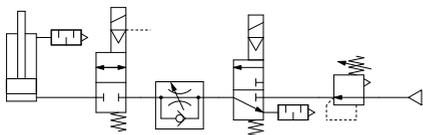
Economy system



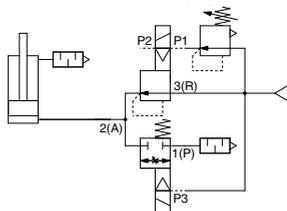
- Ascending speed is controlled by a pilot regulator.
- Descending speed is controlled by needle setting.

2. Intermediate (emergency) stop

Conventional circuit

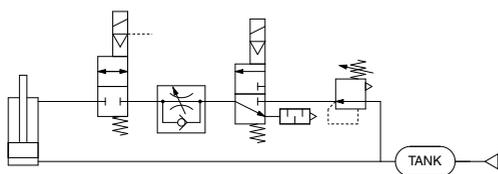


Economy system

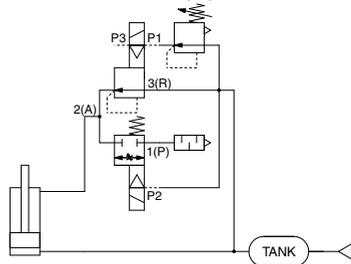


3. Double pressure driving...Energy-saving lifter (Air saving counter balance)

Conventional circuit

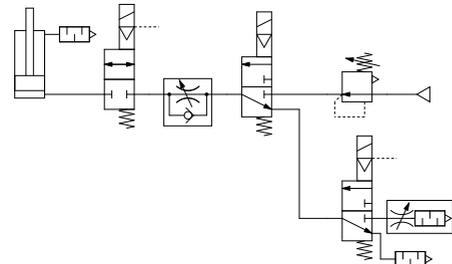


Economy system

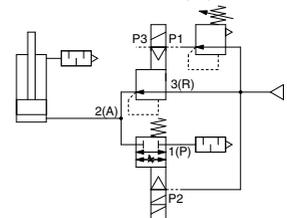


4. Two speed driving

Conventional circuit



Economy system



Energy-saving Lifter

• Simple

Two economy valves and a tank move the double-acting cylinder to raise and lower heavy objects.

• Energy-saving

The balancing air reciprocates between the lower cylinder chamber and the tank, thus not being consumed. Low pressure air alone is exhausted from the upper chamber in every cycle, so the air consumption is reduced to 20 to 30% of the air consumption by the double acting cylinder with an ordinary change over valve.

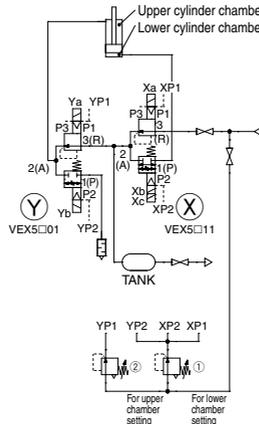
• Excellent operation control

The economy valve sets pressure and permits high speed and low speed operation as well as suspension of operation. While the piston moves up and down, the valve controls speed change in the middle of strokes, terminal deceleration, inching, and emergency stops.

• Simple operation

The pilot system is composed of a small regulator and solenoid valve (which is unnecessary for solenoid style), remote controls the economy valve. Therefore, change in the pilot system sequence allows selection of a cylinder operation mode. Change in the large capacity main piping system is not necessary.

<System configuration and operation of circuit in which external pilot solenoid is used>



The two economy valves (hereinafter called VEX) (X) and (Y) and a tank composes a main system that drives the double acting cylinder, and the small regulator (hereinafter called REG) and pilot valve (hereinafter called SOL) remote control the economy valve.

Action

| Cylinder | SOL | Xa | Xb | Xc | Yb | Ya | Mode |
|----------|------------|------------|-----------|------------|-----------|----|------|
| | | High speed | Low speed | High speed | Low speed | | |
| Upward | High speed | ON | ● | OFF | ● | — | a |
| | Low speed | ● | ● | ● | ● | — | b |
| Downward | High speed | — | ● | — | — | ● | c |
| | Low speed | — | ● | ● | ● | ● | d |
| Stop | | — | — | — | — | — | e |

- The air in the upper cylinder chamber is exhausted from the port 1 (P) of VEX (Y), and the air in the tank flows in through the port 1 (P) of VEX (X).
- Air flows into the lower cylinder chamber through a throttled opening, set by a needle, from the port 2 (A) to 1 (p) of VEX (X).
- The air in the tank flows into the upper cylinder chamber at a preset low pressure from the port 2 (A) of VEX (Y), while the air in the lower cylinder chamber returns to the tank through VEX (X).
- Air returns to the tank through a throttled opening from the port 1 (P) to 2 (A) of VEX (X).
- The air in the lower cylinder chamber is blocked at the port 1 (P) of VEX (X), while the air in the upper cylinder chamber is blocked at the port 2 (A) of VEX (Y).

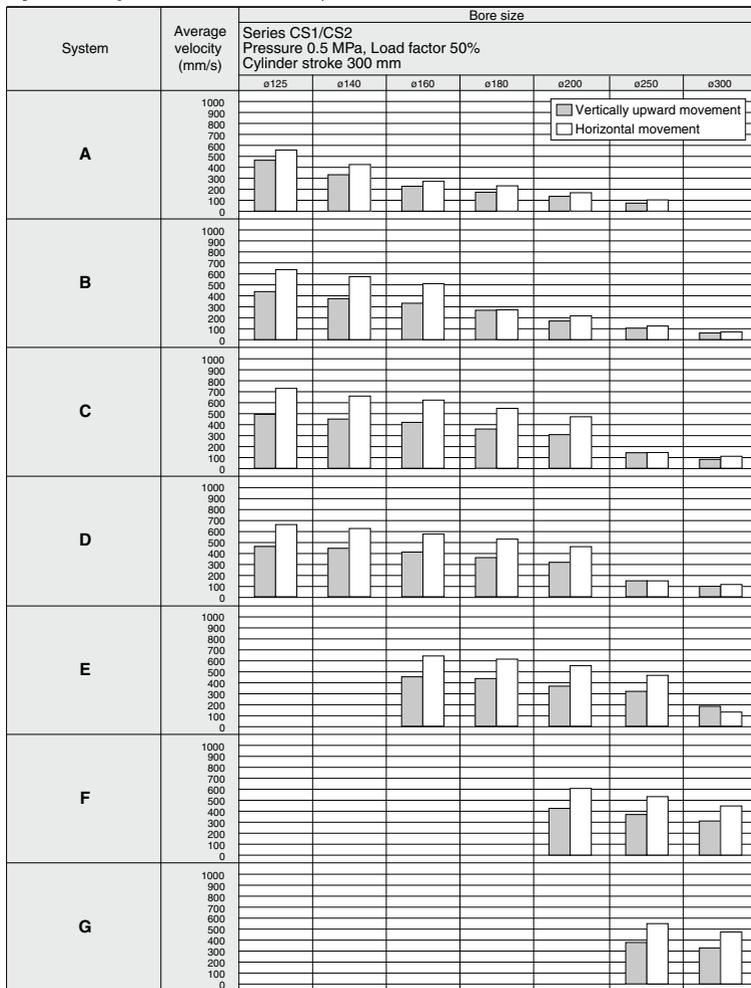
⚠ Caution

A lifter circuit can be composed of air operated valves. Please contact SMC for details.

Series VEX5

Cylinder Speed Chart

Please assume the chart is offered as the guideline. For details about various each condition, please make use of SMC Model Selection Software and then decide it.



* When the cylinder is extended, the speed controller is metered-out, is connected with the cylinder directly, and its needle is fully open.

* Values on the average velocity of a cylinder are obtained from the stroke length divided by full stroke time.

* Load proportion is ((load weight x 9.8)/theoretical force) x 100%

Conditions of Speed Chart

| System | Solenoid valve | Speed controller | Silencer | Tubing diameter x Length |
|--------|------------------------|------------------|----------|--------------------------|
| A | VEX55□□-04 06 10 | AS420-04 | AN40-04 | SGP15A x 1 m |
| B | | AS500-06 | AN500-06 | SGP20A x 1 m |
| C | | AS600-10 | AN600-10 | SGP25A x 1 m |
| D | VEX57□□-10 12 | AS600-10 | AN600-10 | SGP25A x 1 m |
| E | | AS800-12 | AN700-12 | SGP32A x 1 m |
| F | VEX59□□-14 20 | AS900-14 | AN800-14 | SGP40A x 1 m |
| G | | AS900-20 | AN900-20 | SGP50A x 1 m |

How to Order

VEX5 5 1 1 - 06 2 E Z - B

Economy valve

Type

| | |
|---|--------|
| 0 | Basic |
| 1 | Select |

Operation type

| | |
|---|-------------------------|
| 0 | Air operated |
| 1 | External pilot solenoid |

Body size

| Body size | Port size | | |
|-----------|-----------------|-----------|-------|
| | port 1(P), 2(A) | port 3(R) | |
| 5 | 04 | 1/2 | 1/2 |
| | 06 | 3/4 | 3/4 |
| | 10 | 1 | 1 |
| 7 | 10 | 1 | 1 1/4 |
| | 12 | 1 1/4 | |
| 9 | 14 | 1 1/2 | 2 |
| | 20 | 2 | |

Port size

Option

| | |
|-----|----------------|
| Nil | None |
| B | Bracket |
| G | Pressure gauge |

Light/Surge voltage suppressor (Only with solenoid)

| | |
|-----|--|
| Nil | None |
| S | With surge voltage suppressor (Grommet only) |
| Z | With light/surge voltage suppressor (Except grommet) |

Electrical entry (Only with solenoid)

| | |
|---|----------------------------------|
| G | Grommet, Lead wire length 300 mm |
| H | Grommet, Lead wire length 600 mm |
| E | Grommet terminal |
| T | Conduit terminal |
| D | DIN terminal |

Rated voltage (Only with solenoid)

| | |
|----|------------------|
| 1 | 100 VAC 50/60 Hz |
| 2 | 200 VAC 50/60 Hz |
| 3* | 110 VAC 50/60 Hz |
| 4* | 220 VAC 50/60 Hz |
| 5 | 24 VDC |
| 6* | 12 VDC |
| 7* | 240 VAC 50/60 Hz |
| 9* | Other |

* Option

Thread type

| | |
|-----|------------------|
| Nil | Rc |
| F | G ⁽¹⁾ |
| N | NPT |
| T | NPTF |

How to order pilot valves

SF4 - [] [] [] - 20

Light/Surge voltage suppressor

Electrical entry

Rated voltage

(Ex.) SF4-1G-20

100 VAC, Grommet

(Ex.)
VEX5511-062EZ-BG
Body size 5, Select, External pilot solenoid
Port size 3/4
200 VAC, Grommet terminal, with light/surge voltage suppressor
Option--Bracket, with pressure gauge

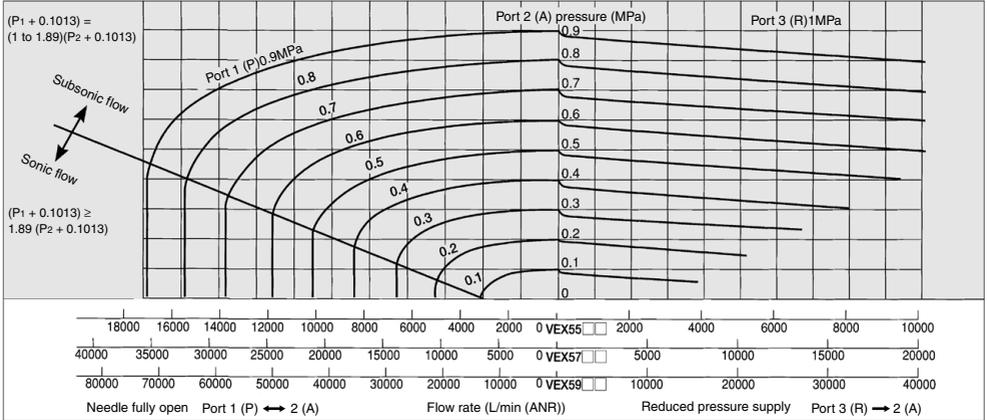
Note 1) Not conforming to ISO1179-1.

Model

| Model | Basic type | | Select type | | Port size | |
|---------------|--------------|-------------------------|--------------|-------------------------|-------------------|-------------|
| | Air operated | External pilot solenoid | Air operated | External pilot solenoid | Port 1 (P), 2 (A) | Port 3 (R) |
| Economy valve | VEX5500 | VEX5501 | VEX5510 | VEX5511 | 1/2, 3/4, 1 | 1/2, 3/4, 1 |
| | VEX5700 | VEX5701 | VEX5710 | VEX5711 | 1, 1 1/4 | 1 1/4 |
| | VEX5900 | VEX5901 | VEX5910 | VEX5911 | 1 1/2, 2 | 2 |

Series VEX5

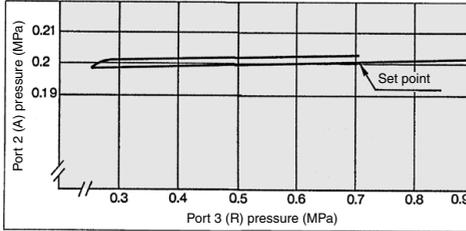
Flow Characteristics



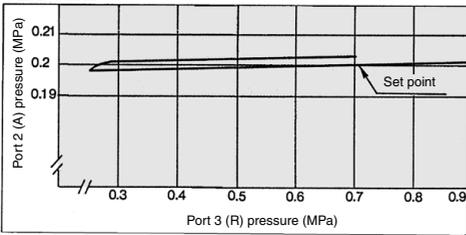
Pressure Characteristics

Shows the outlet pressure (port 3 (R)) change against the inlet pressure (port 2 (A)) change. They conform to JIS B 8372 (Air pressure regulator).

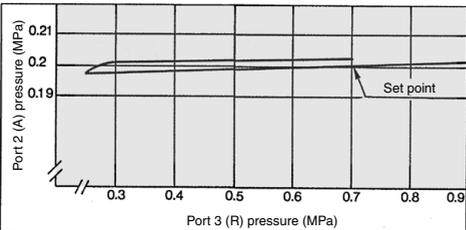
VEX55 □ □



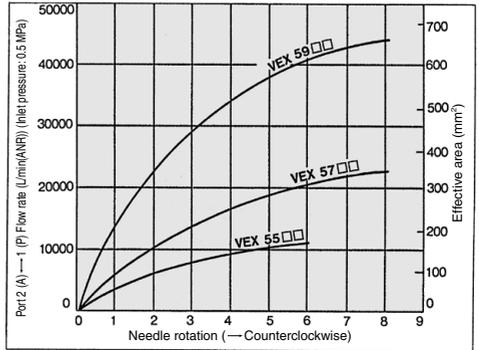
VEX57 □ □



VEX59 □ □

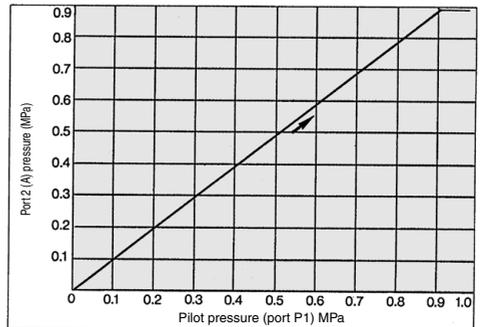


Needle Characteristics Port 2 (A) → 1 (P)



Setting Pressure Characteristics

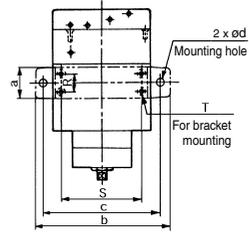
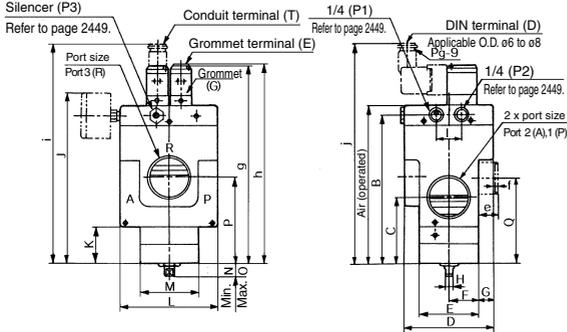
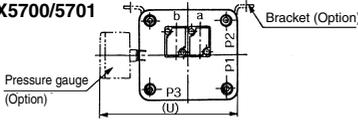
Port 2 (A) pressure is set according to pilot pressure. (port 3 (R) → 2 (A): Non-relief regulator)



Basic Type/Dimensions

VEX5500/5501

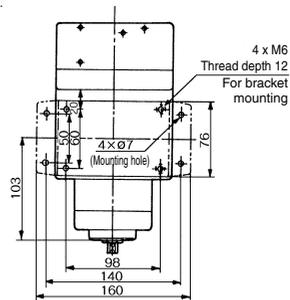
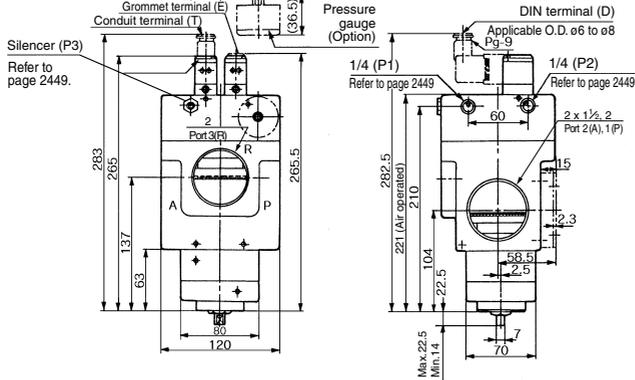
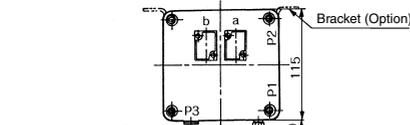
VEX5700/5701



| Model | Port size | | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---------|-------------------|-------------|-------|-------|------|----|----|----|----|---|----|-------|------|-----|----|------|----|------|------|--------|----|-----------------------|-------|
| | Port 2 (A), 1 (P) | Port 3 (R) | | | | | | | | | | | | | | | | | | | | | |
| VEX5500 | 1/2, 3/4, 1 | 1/2, 3/4, 1 | 143.5 | 133.5 | 62.5 | 70 | 50 | 25 | 10 | 7 | 25 | 156.5 | 36.5 | 80 | 60 | 16.5 | 20 | 81.5 | 83.5 | Center | 60 | 2 x M6 Thread depth 9 | 116.5 |
| VEX5700 | 1, 1 1/4 | 1 1/4 | 160.5 | 150.5 | 62.5 | 90 | 60 | 30 | 15 | 7 | 25 | 173.5 | 37.5 | 100 | 60 | 13 | 17 | 88.5 | 86.5 | 18 | 82 | 2 x M6 Thread depth 6 | 136.5 |

| Model | Bracket mounting dimensions | | | | | Grommet g | Grommet terminal h | Conduit terminal i | DIN terminal j |
|---------|-----------------------------|-----|-----|---|--------|-----------|--------------------|--------------------|----------------|
| | a | b | c | d | e f | | | | |
| VEX5500 | 19 | 130 | 110 | 9 | 12 2.3 | 187 | 187.5 | 205.5 | 205 |
| VEX5501 | | | | | | | | | |
| VEX5700 | 32 | 136 | 120 | 9 | 20 2.3 | 204 | 204.5 | 222.5 | 222 |
| VEX5701 | | | | | | | | | |

VEX5900/5901

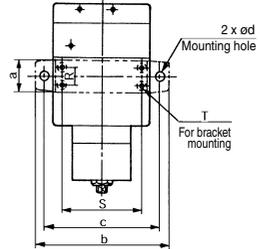
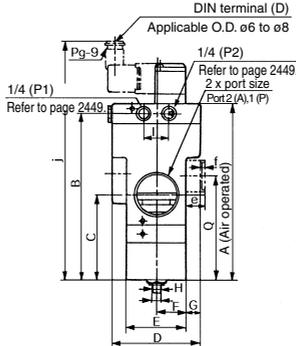
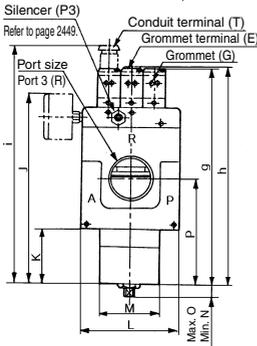
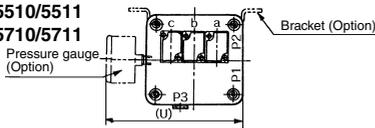


Series VEX5

Select Type/Dimensions

VEX5510/5511

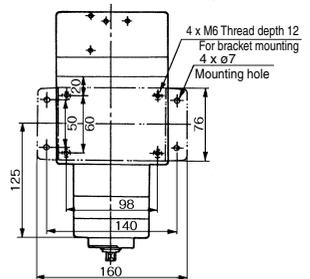
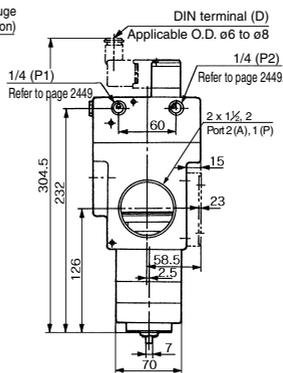
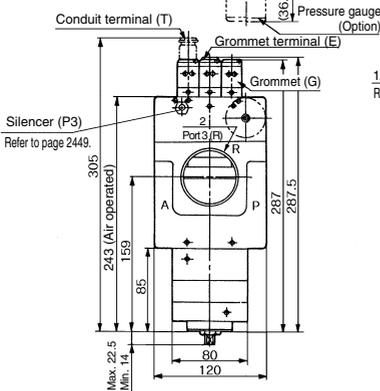
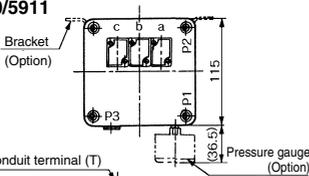
VEX5710/5711



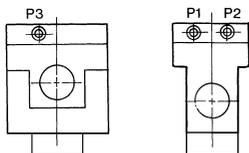
| Model | Port size | | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|--------------------|-------------------|-------------|-------|-------|------|----|----|----|----|---|----|-------|------|-----|----|----|----|-------|-------|--------|----|-----------------------|-------|
| | Port 2 (A), 1 (P) | Port 3 (R) | | | | | | | | | | | | | | | | | | | | | |
| VEX5510 VEX5511 | 1/2, 3/4, 1 | 1/2, 3/4, 1 | 160 | 150 | 79 | 70 | 50 | 25 | 10 | 7 | 25 | 173 | 53 | 80 | 60 | 13 | 18 | 98 | 100 | Center | 60 | 2 x M6 Thread depth 9 | 116.5 |
| VEX5710 VEX5711 | 1, 1 1/4 | 1 1/4 | 177.5 | 167.5 | 84.5 | 90 | 60 | 30 | 15 | 7 | 25 | 190.5 | 54.5 | 100 | 60 | 13 | 17 | 105.5 | 103.5 | 18 | 82 | 4 x M6 Thread depth 6 | 136.5 |

| Model | Bracket mounting dimensions | | | | | | Grommet | Grommet terminal | Conduit terminal | DIN terminal |
|--------------------|-----------------------------|-----|-----|---|----|-----|---------|------------------|------------------|--------------|
| | a | b | c | d | e | f | | | | |
| VEX5510 VEX5511 | 19 | 130 | 110 | 9 | 12 | 2.3 | 204 | 204.5 | 222 | 221.5 |
| VEX5710 VEX5711 | 32 | 136 | 120 | 9 | 20 | 2.3 | 221 | 221.5 | 239.5 | 239 |

VEX5910/5911



External Pilot Piping



Port 3 (R) side

Port 1 (P) side

| Model | P1 | P2 | P3 |
|---------|----------------|----------------|--------------------------------|
| VEX5□00 | External pilot | External pilot | Plug |
| VEX5□01 | External pilot | External pilot | Pilot ^{Note)} exhaust |
| VEX5□10 | External pilot | External pilot | External pilot |
| VEX5□11 | External pilot | External pilot | Pilot ^{Note)} exhaust |

Note) For pilot exhaust port, silencer AN210-02 is mounted.

⚠ Caution

Refer to front matter 53 for Safety Instructions and pages 3 to 8 for 3/4/5 Port Solenoid Valve Precautions.

How to Use DIN Terminal

1. Disassembly

- 1) After loosening the screw ①, then if the housing ② is pulled in the direction of the screw ①, the connector will be removed from the body of equipment (solenoid, etc.).
- 2) Pull the screw ① out of the housing ②.
- 3) On the bottom part of the terminal block ③, there's a cut-off part ⑨. If a small flat head screwdriver is inserted between the opening in the bottom, terminal block ③ will be removed from the housing ②. (Refer to the figure-1.)
- 4) Remove the cable gland ④, plain washer ⑤ and rubber seal ⑥.

2. Wiring

- 1) Pass the cable ⑦ through the cable gland ④, plain washer ⑤ and rubber seal ⑥ in this order, and then insert them into the housing ②.
- 2) Loosen the screw ① attached to the terminal block ③. Then, pass the lead wire ⑩ through the terminal block ③ and tighten the screw ① again.
Note 1) Tighten within the tightening torque of 0.5 N·m ±15%.
Note 2) Cable ⑦ outside diameter: ø6 to ø8 mm

3. Assembly

- 1) Pass the cable ⑦ through the cable gland ④, plain washer ⑤ and rubber seal ⑥ in this order and connect to the terminal block ③. Then, mount the terminal block ③ on the housing ②. (Push it down until you hear the click sound.)
- 2) Put the rubber seal ⑥ and plain washer ⑤ in this order into the cable entry of the housing ②, and then tighten the cable gland ④ securely.
- 3) Insert the gasket ⑧ between the bottom part of terminal block ③ and the plug attached to the equipment. Then, screw in ① from the top of the housing ② to tighten it.
Note) Tighten within the tightening torque of 0.5 N·m ±20%.

Changing the entry direction

The orientation of a connector can be changed 180°, depending on the combination of a housing ② and a terminal block ③.

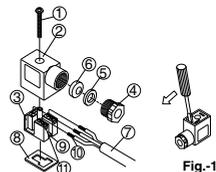


Fig-1

Related Products:

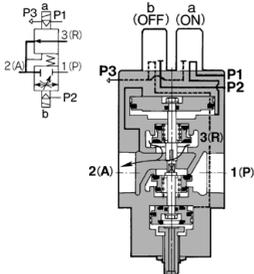
Silencer (Series AN)

- Over 30 dB noise reduction
- Sufficient effective area
- Refer to Best Pneumatics No. 6 for details.

Exhaust Cleaner (Series AMC)

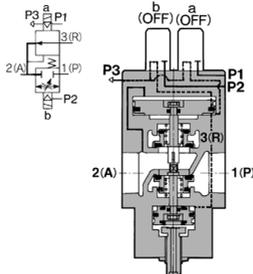
- Provides a silencing capability and an oil mist recovery function.
- Can also be used in a centralized piping system.
- Refer to Best Pneumatics No. 6 for details.

1. 3 (R) → 2 (A) Reduced pressure supply



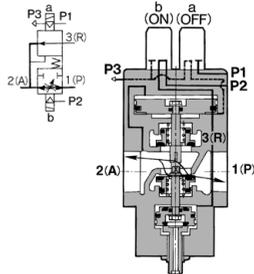
When the pilot solenoid valve "a" is energized (or when pilot pressure is applied to the port P1 of the air operated type) while the port P1 is under the pilot pressure, reduced pressure is supplied from the port 3 (R) to the port 2 (A). The acting force of the pilot pressure (port P1) reaches the space under the pressure control piston ③ pushes the piston upward and opens the poppet valve ⑥. Thus air is supplied from the port 3 (R) to the port 2 (A). The air entering through the port 2 (A) flows through the feedback passage to the space above the piston, and when its pressure balances with the pilot pressure under the pressure control piston, the poppet valve closes, thus setting the port 2 (A) pressure corresponding to the pilot pressure (port P1). (port P1 pressure: port 2 (A) pressure = 1:1)
When the reduced pressure is supplied from 3 (R) to 2 (A), air will not be exhausted from 2 (A) to 1 (P) even when the pilot pressure (port P1) is larger than the port 2 (A) pressure.

2. Closed center



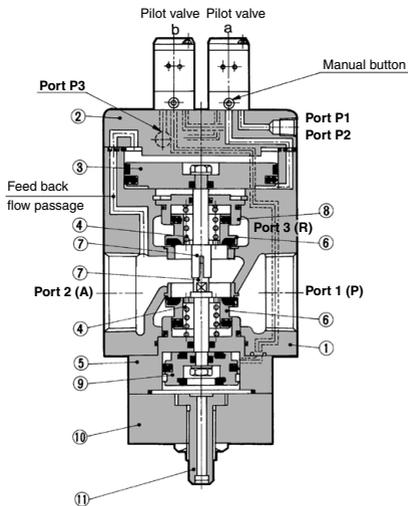
When neither the pilot solenoid valves "a" or "b" is energized (or when no pilot pressure is applied to the ports P1 and P2 of the air operated type), no acting force is applied to the pressure control piston ③ and operation piston ⑨, and the spring ④ closes both poppet valves ⑥, thus the valves assume the closed center position. While the port 2 (A) is being pressurized, air will not be released even if electrical power to the pilot solenoid valve "a" is turned off (or pilot pressure is released from the port P1 of the air operated type).

3. 2 (A) ↔ 1 (P) Throttled exhaust



When the pilot solenoid valve "b" is energized while pilot pressure is in the port P2 (or when the pilot pressure is applied to the port P2 of the air operated type), an acting force generated above the operation piston ⑨ pushes the operation piston down, and thus the port 1 (P) and port 2 (A) are connected. At that time, the lower poppet valve ⑥ opens by the degree preset by the needle ⑪. (Counterclockwise rotation of the needle opens the poppet valve.) The upper and lower poppet valves operate independently. When the pilot solenoid valves "a" and "b" are energized alternately (or when pilot pressure is applied to the ports P1 and P2 of the air operated style alternately), the supplied reduced pressure (3 (R) → 2 (A)) can be throttled and exhausted (2 (A) → 1 (P)).

Construction



(Basic type: External pilot solenoid)

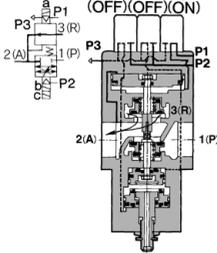
Component Parts

| No. | Description | Material |
|-----|-------------------------|-----------------------|
| 1 | Body | Aluminum alloy casted |
| 2 | Cover | Aluminum alloy casted |
| 3 | Pressure control piston | Aluminum alloy |
| 4 | Spring | Stainless steel |
| 5 | Chamber | Aluminum alloy |
| 6 | Poppet valve | NBR |
| 7 | Rod | Stainless steel |
| 8 | Valve guide | Aluminum alloy |
| 9 | Operation piston | Aluminum alloy |
| 10 | Bottom cover | Aluminum alloy |
| 11 | Needle | Brass |

Select Type/Construction/Working Principle/Component Parts

Note) With this valve, the port 3 (R) is a supply port and port 1 (P) is an exhaust port.

1. 3 (R) → 2 (A)
Reduced pressure supply
(OFF)(OFF)(ON)



When the pilot solenoid valve "a" is energized (or when pilot pressure is applied to the port P1 of the air operated type) while the port P1 is under the pilot pressure, reduced pressure is supplied from the port 3 (R) to the port 2 (A).

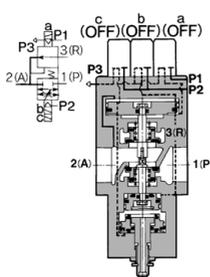
The acting force of the pilot pressure (port P1) reaches the space under the pressure control piston ③ pushes the piston upward and opens the poppet valve ⑥. Thus air is supplied from the port 3 (R) to the port 2 (A).

The air entering through the port 2(A) flows through the feedback passage to the space above the piston and when its pressure balances with the pilot pressure under the pressure control piston, the poppet valve closes, thus setting the port 2 (A) pressure corresponding to the pilot pressure (port P1).

(port P1 pressure: port 2(A) pressure = 1:1)

When the reduced pressure is supplied from 3 (R) to 2 (A), air will not be exhausted from 2 (A) to 1 (P) even when the pilot pressure (port P1) is larger than the port 2 (A) pressure.

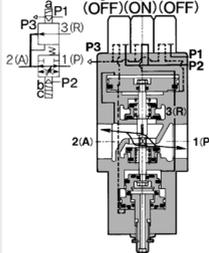
2. Closed center
(OFF)(OFF)(OFF)



When neither the pilot solenoid valve "a" nor "b" is energized (or when no pilot pressure is applied to the ports P1 and P2 of the air operated type), no acting force is applied to the pressure control piston ③ and operation piston ⑨, and the spring ④ closes both poppet valves ⑥, thus the valve assumes the closed center position.

While the port 2(A) is being pressurized, air will not be released even if electrical power to the pilot solenoid valve "a" is turned off (or pilot pressure is released from the port P1 of the air operated type).

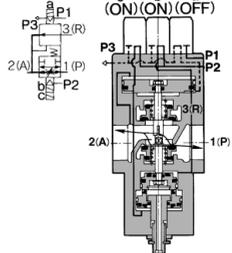
3. 2 (A) ↔ 1 (P)
Fully open exhaust
(OFF)(ON)(OFF)



When the pilot solenoid valve "b" is energized while pilot pressure is in the port P2 (or when the pilot pressure is applied to the port P2 of the air operated type), an acting force generated above the operation piston ⑨, and pushes down the operation piston ⑨, and thus the ports 1(P) and 2 (A) are connected.

At that time, the lower poppet valve ⑥ fully opens.

4. 2 (A) ↔ 1 (P)
Throttled exhaust
(ON)(ON)(OFF)



When the pilot solenoid valves "b" and "c" are energized simultaneously while pilot pressure is in the port P2 (or when the pilot pressure is applied simultaneously to the ports P2 and P3 of the air operated type), an acting force generated above the operation piston ⑨ pushes the piston down and another acting force generated under the stopper ⑪ pushes up the stopper, and thus the ports 1 (P) and 2 (A) are connected.

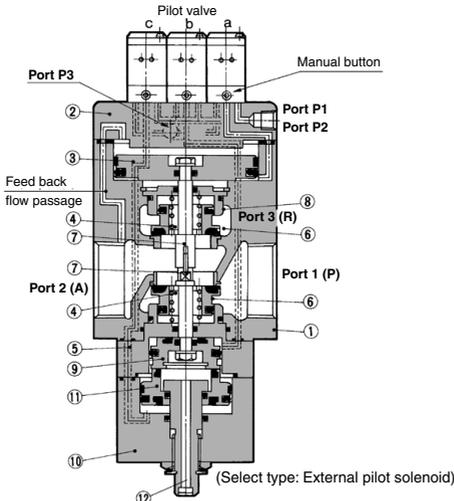
At that time, the lower poppet valve ⑥ opens by the degree preset by the needle ⑫. (Counter-clockwise rotation of the needle opens the poppet valve.)

The upper and lower poppet valves operate independently. When the pilot solenoid valves "a" and "b" are energized alternately (or when pilot pressure is applied alternately to the ports P1 and P2 of the air operated type), the supplied reduced pressure (3 (R) → 2 (A)) can be throttled and exhausted (2 (A) → 1 (P)).

* The pilot solenoid valve "c" remains energized (or pilot pressure remains applied to the port P3 of the air operated type).

By turning on/off the pilot solenoid valve "c" (or by supplying/exhausting pilot pressure to/from the port P3 of the air operated type) while electric power is being supplied to the pilot solenoid valve "b" (or pilot pressure is being applied to the port P2 of the air operated type), either throttling or fully open exhaust can be selected (deceleration/ acceleration) for the port 2 (A) ↔ 1 (P).

Construction



Component Parts

| No. | Description | Material |
|-----|-------------------------|-----------------------|
| 1 | Body | Aluminum alloy casted |
| 2 | Cover | Aluminum alloy casted |
| 3 | Pressure control piston | Aluminum alloy |
| 4 | Spring | Stainless steel |
| 5 | Chamber | Aluminum alloy |
| 6 | Poppet valve | NBR |
| 7 | Rod | Stainless steel |
| 8 | Valve guide | Aluminum alloy |
| 9 | Operation piston | Aluminum alloy |
| 10 | Bottom cover | Aluminum alloy |
| 11 | Stopper | Aluminum alloy |
| 12 | Needle | Brass |

VEX