# Power Valve: 3 Position Valve

# VEX3 Series

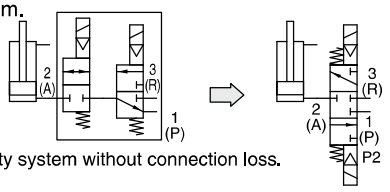
**The body sizes 12/22/32/42 have been remodeled. For details, refer to page 1721.**

## 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.



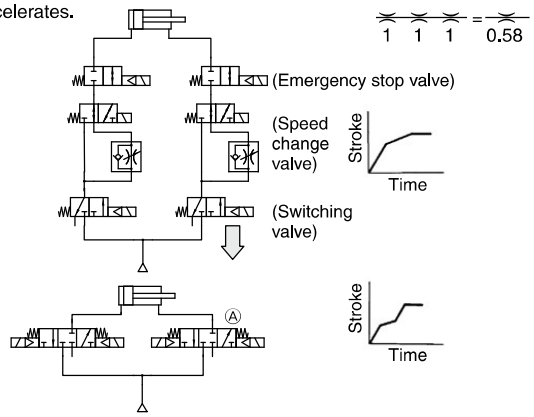

• A large capacity system without connection loss.

1 1 = 0.71 (Valves and piping can be made smaller.)

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

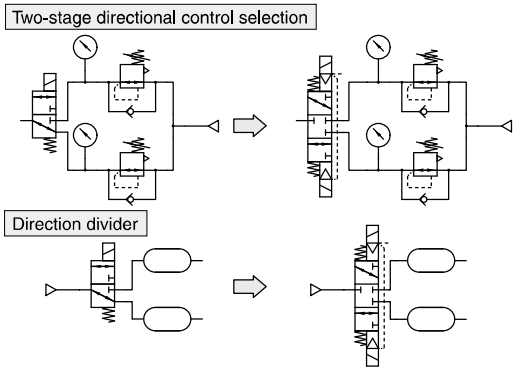
The simple system configuration permits sharp response. The large capacity system configuration without connection loss allows the use of smaller valves and piping.

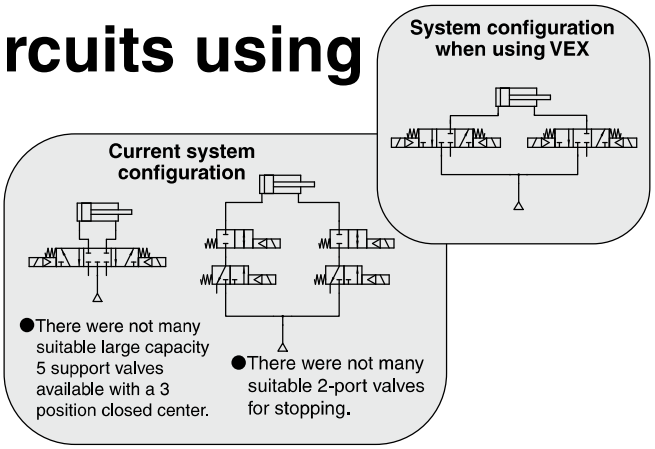
• For example, when solenoid (b) of valve (A) is turned off while the cylinder is extending, the exhaust port closes and cylinder movement decelerates.




#### Universal porting could be used as a selector/ divider valve

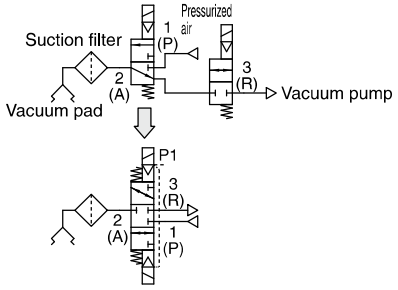
The pressure balancing poppet valve that permits any flow direction allows sequential switching operation, preventing blow by and air entrainment.




#### 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.



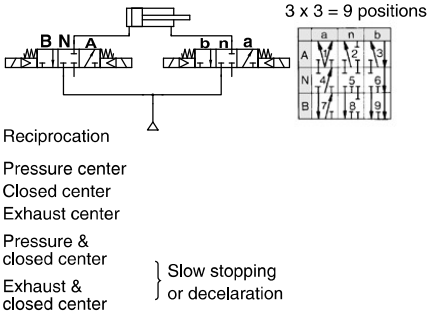

●There is no blow-by when switched from vacuum suction to vacuum release or vice versa.

**⚠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.



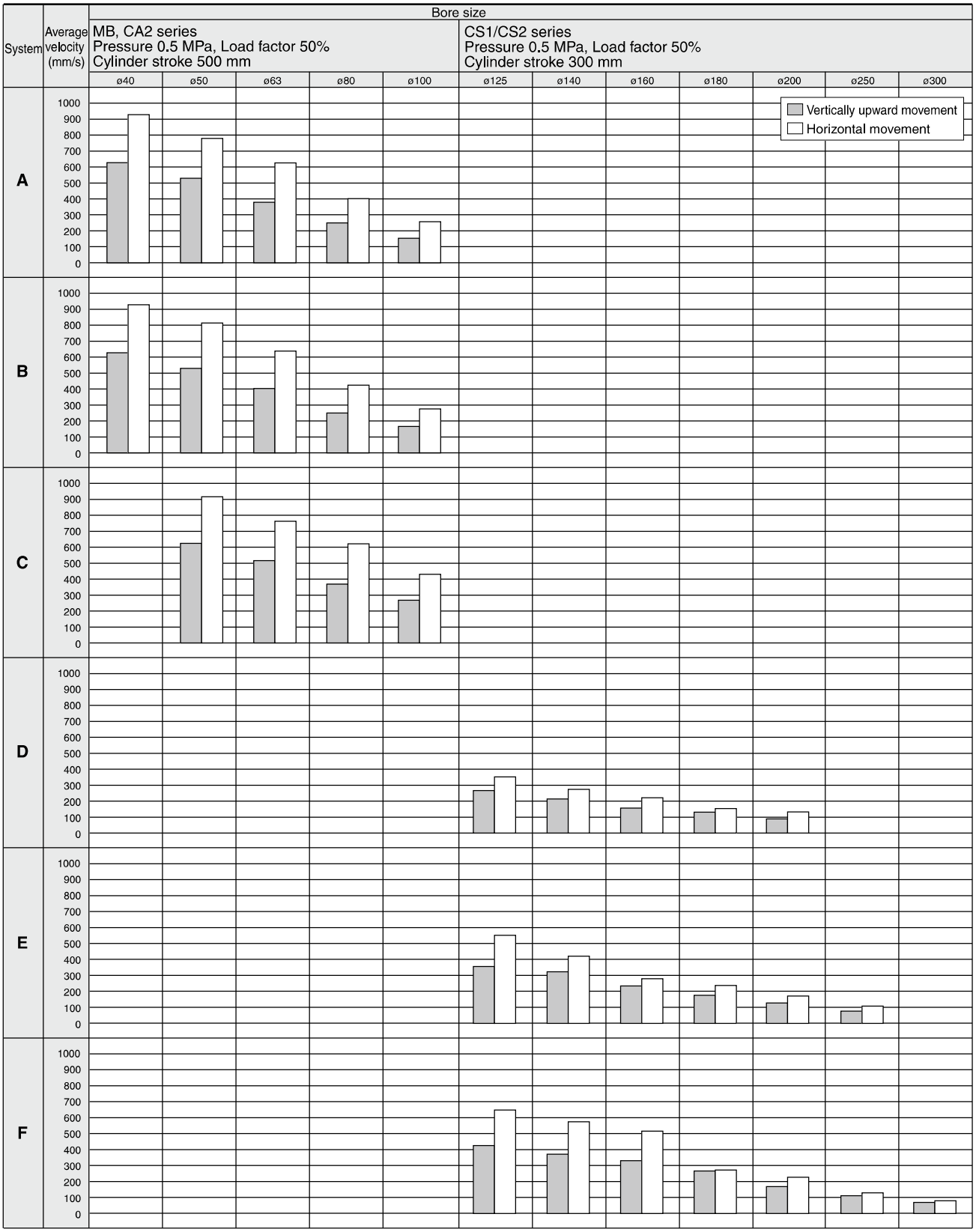

**⚠Caution**

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

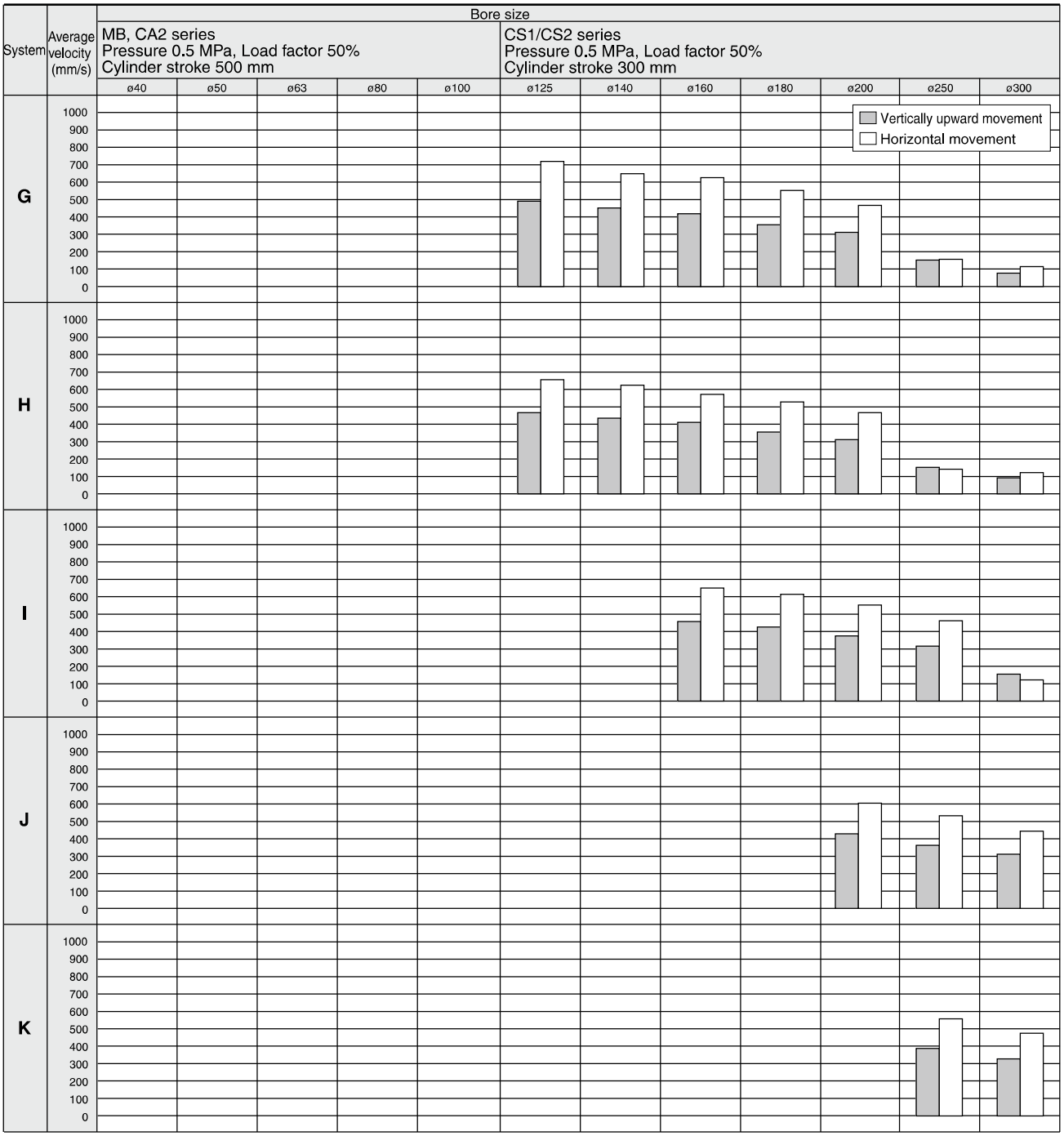
VEX

## 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%




∗ 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□-$\frac{03}{04}$ | AS420-03 | AN30-03 | ø12 x 1 m |
| D | | AS420-04 | AN40-04 | SGP15A x 1 m |
| E | VEX350□-$\frac{04}{06}$ $\frac{}{10}$ | 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□-$\frac{10}{12}$ | AS600-10 | AN600-10 | SGP25A x 1 m |
| I | | AS800-12 | AN700-12 | SGP32A x 1 m |
| J | VEX390□-$\frac{14}{20}$ | AS900-14 | AN800-14 | SGP40A x 1 m |
| K | | AS900-20 | AN900-20 | SGP50A x 1 m |

VEX

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

## How to Order

**Body size** **Port size**

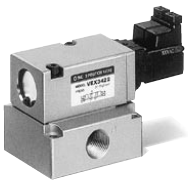
| Body size | Port size | | |
|---|---|---|---|
| | Port | 1 (P), 2 (A) | 3 (R) |
| 12 | 01 | 1/8 | |
| | 02 | 1/4 | |
| 32 | 02 | 1/4 | |
| | 03 | 3/8 | |
| | 04 | 1/2 | |
| 50 | 04 | 1/2 | |
| | 06 | 3/4 | |
| | 10 | 1 | |
| 70 | 10 | 1 | 1 1/4 |
| | 12 | 1 1/4 | |
| 90 | 14 | 1 1/2 | 2 |
| | 20 |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

**Electrical entry (Only with solenoid)**

| Body size | Symbol | Electrical entry (Only with solenoid) | Electrical entry (Only with solenoid) | | |
|---|---|---|---|---|---|
| | | | Nil | 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.)

| | |
|---|---|
| Nil | None |
| B | Bracket (1) |
| F | Foot (VEX312□ and VEX332□ only) |
| N | Silencer for pilot exhaust (P2) port (Only with solenoid) |

Note1) Except VEX322□, VEX332□ and VEX342□

**Body size** **Port size**

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

Note 2) Not conforming to ISO1179-1.

**Thread type**

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

**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.

**Light/Surge voltage suppressor**

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

**Electrical entry (3) (Only with solenoid)**

| Symbol | Electrical entry (Only with solenoid) | Electrical entry (Only with solenoid) | | |
|---|---|---|---|---|
| | | Nil | 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 | **VEX1 – 9 – 1** □ □ **P**<br>**Port size**<br>Symbol: A = 1/8, B = 1/4<br>**Thread type**<br>Symbol: Nil = Rc, F = G, N = NPT, T = NPTF | **VEX4 – 2A –** □ □ **P**<br>**Port size**<br>Symbol: A = 1/8, B = 3/8, C = 1/2<br>**Thread type**<br>Symbol: Nil = Rc, F = G, N = NPT, T = NPTF |
| Base gasket | **VEX1 – 11 – 2** | **VEX4 – 4** |

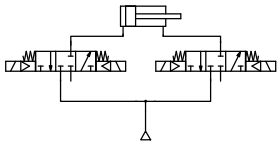
## ⚠Caution

**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.**

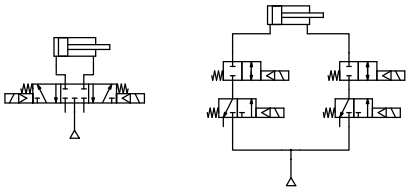
**Variety of circuits in simple construction**

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

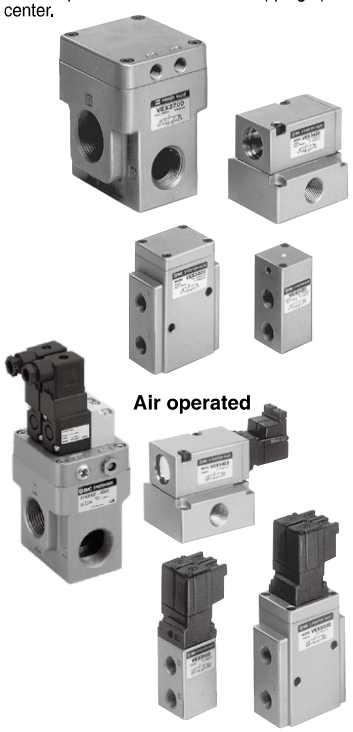
**System construction with VEX**



**Current system construction**



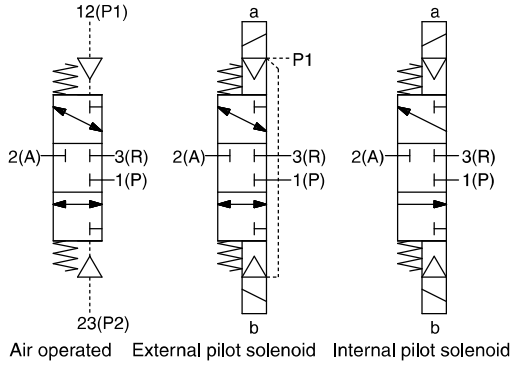
- There were not many suitable large capacity 5 port valves available with a 3 position closed center.
- There were not many suitable large capacity 2 port valves available for stopping operations.



**Air operated**

**Internal pilot solenoid/External pilot solenoid**

**Symbol**




## 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 0.7 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<br>VEX3122, VEX3222, VEX3322, VEX3422 | VEX3501, VEX3701, VEX3901<br>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)** | | 100V, 110V, 200V, 220V, 240V | |
| | **DC** | | 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 | 12.7 VA (50 Hz), 10.7 VA (60 Hz) |
| | | **Holding** | 3.5 VA/50 Hz, 3 VA/60 Hz | 7.6 VA (50 Hz), 5.4 VA (60 Hz) |
| **Power consumption** | **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 Note) | **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

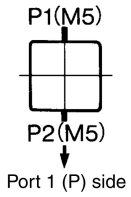
## Flow Rate Characteristics

| Model | | Port size | Flow rate characteristics | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 (P)→2 (A) | | | 2 (A)→1 (P) | | | 3 (R)→2 (A) | | | 2 (A)→3 (R) | | |
| | | | C[dm³/(s·bar)] | b | Cv | C[dm³/(s·bar)] | b | Cv | C[dm³/(s·bar)] | b | Cv | C[dm³/(s·bar)] | b | Cv |
| 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 |
| | **VEX350□-04** | 1/2 | 24 | 0.32 | 6.4 | 24 | 0.30 | 6.4 | 25 | 0.31 | 6.4 | 22 | 0.27 | 5.7 |
| Base mounted (With sub-plate) | **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 |

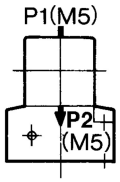
| Model | | Port size | Effective area (mm²) | Cv |
|---|---|---|---|---|
| Body ported | **VEX350□-06** | 3/4 | 160 | 8.9 |
| | **VEX350□-10** | 1 | 180 | 10 |
| | **VEX370□-10** | 1 | 300 | 17 |
| | **VEX370□-12** | 1 1/4 | 330 | 18 |
| | **VEX390□-14** | 1 1/2 | 590 | 33 |
| | **VEX390□-20** | 2 | 670 | 37 |

## External Pilot Piping

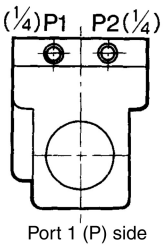
**VEX312□**




**VEX322□**




**VEX350□**
**VEX370□**
**VEX390□**




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

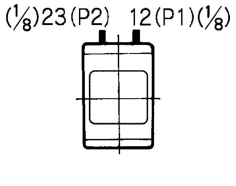
### ⚠Caution

**●VEX3$^{3}_{4}$2$^{1}_{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.

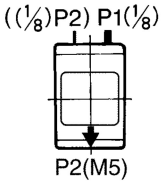
Note) Body for VEX332$^{1}_{2}$, sub-plate for VEX342$^{1}_{2}$

**VEX3320**
**Air operated**



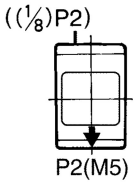

Port 1 (P), 3 (R) side

**VEX3321**
**External pilot solenoid**



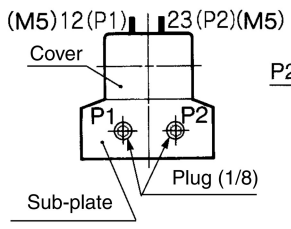

Port 1 (P), 3 (R) side

**VEX3322**
**Internal pilot solenoid**

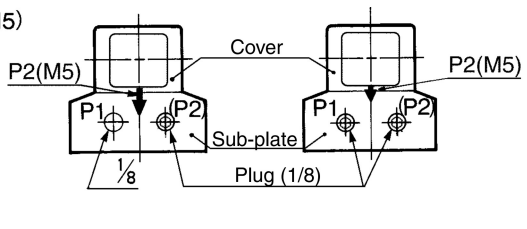



Port 1 (P), 3 (R) side

**VEX3420**
**Air operated for sub-plate**



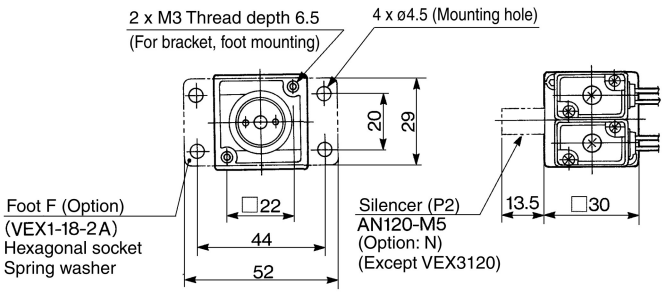

**VEX3421**
**External pilot solenoid for subplate**




**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)

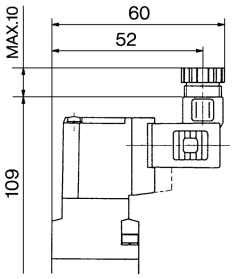
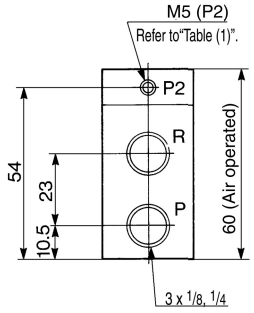
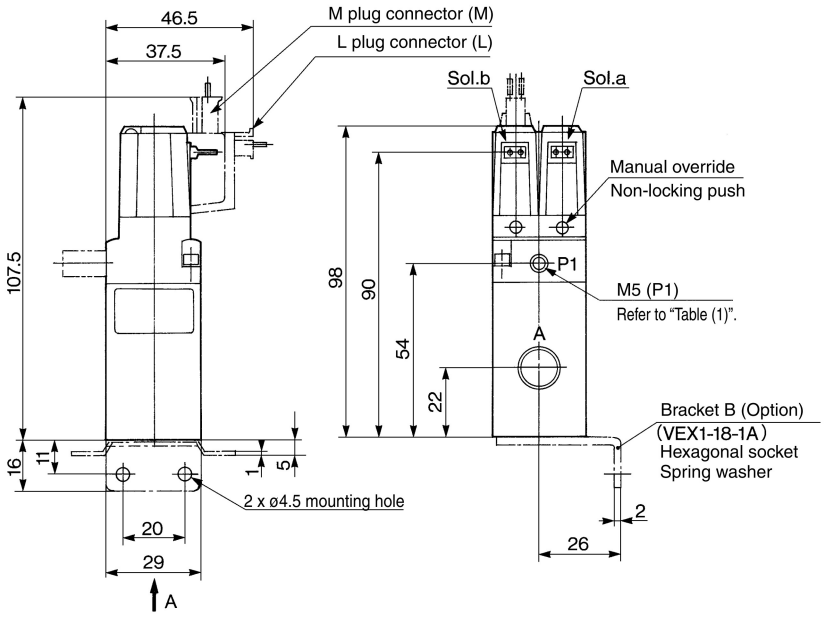



**Table (1)**
**With/Without Plug for M5 Port**

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



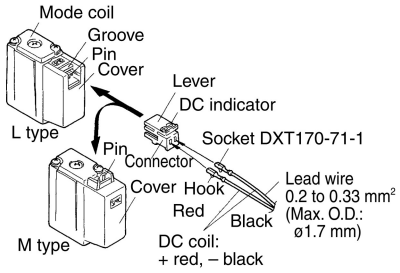

## ⚠Caution

### How to Use Plug Connector/Applicable Model: VEX312$\frac{1}{2}$/322$\frac{1}{2}$/332$\frac{1}{2}$/342$\frac{1}{2}$

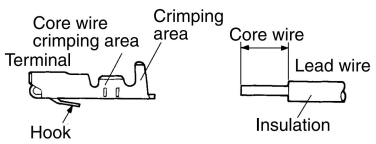
**Attaching/Detaching of a plug**

**1. 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.

**2. To deinstall the connector**
Press the lever against the connector and pull the connector away straight from the solenoid.



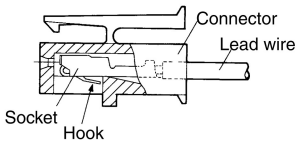

**Crimping lead wire and socket**
Peel 3.2 to 3.7 mm of the tip of the lead wire, enter the core wires neatly into a socket and press contact it with a press tool. Be careful so that the cover of lead wire does not enter into the core press contacting part. (Please contact SMC for the dedicated crimping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




**Attaching/Detaching of a socket with lead wire**

**1. 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.

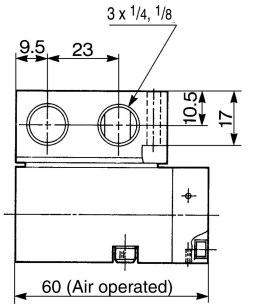
**2. Detaching**
For pulling out a socket from connector, pull out the lead wire while pushing the hook of a socket with a stick with a fine point (1 mm). If a socket is to be re-used as it is, return the hook to the outside.



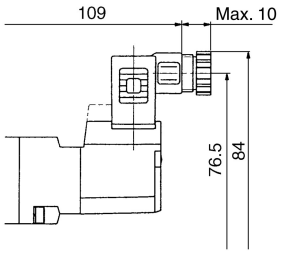

VEX

## Base Mounted: VEX322□

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




**DIN terminal (D)**



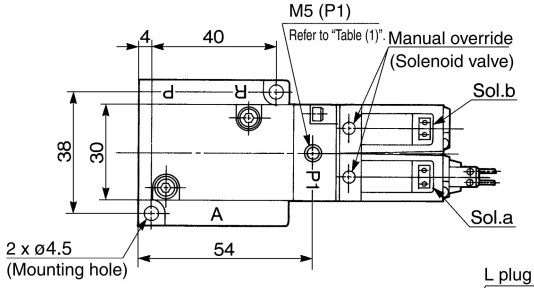
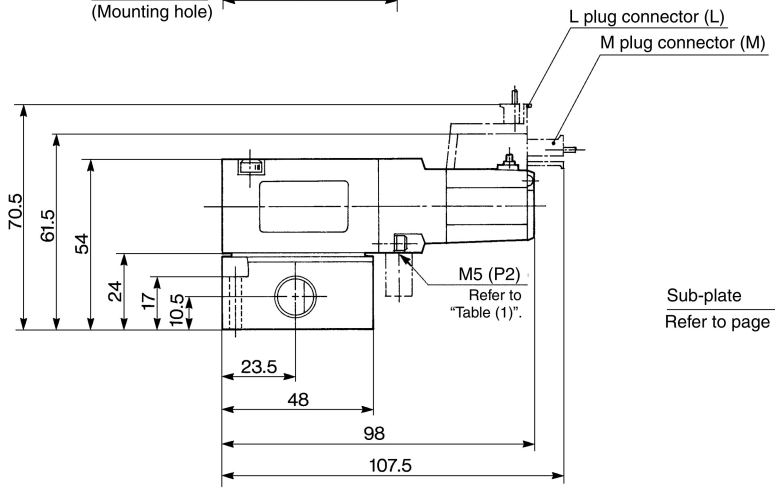
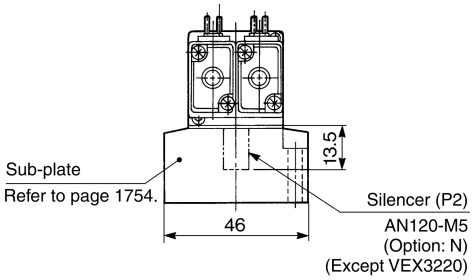




**Table (1)**
**With/Without Plug for M5 Port**

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



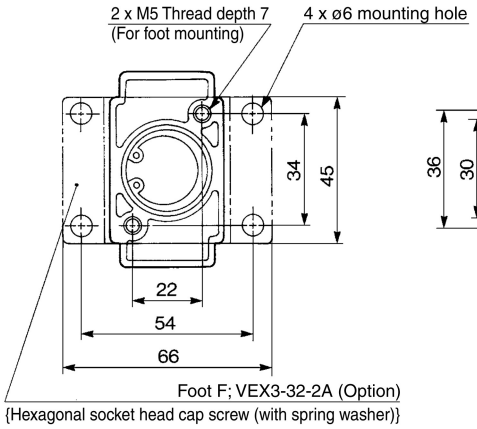

## ⚠Caution

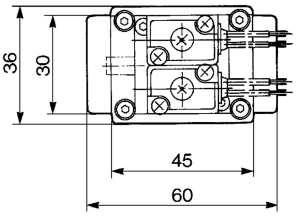
**How to Use DIN Terminal**

Refer to page 1768.

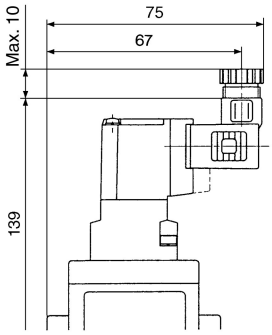
## Body Ported: VEX332□

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



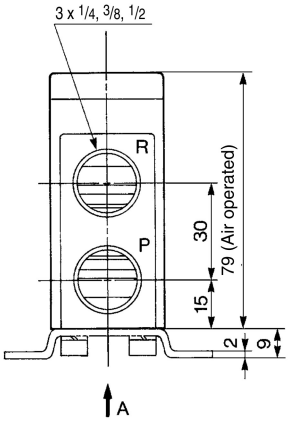

**DIN terminal (D)**

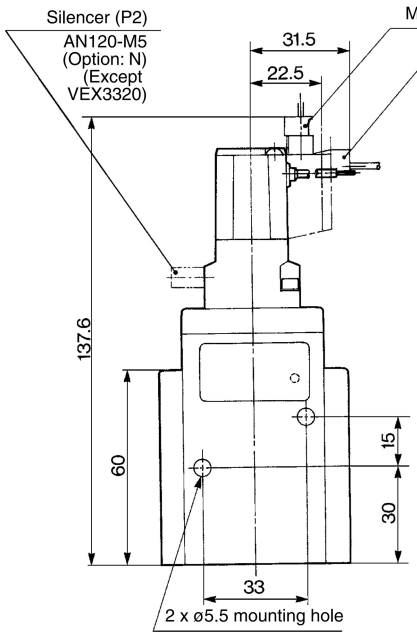


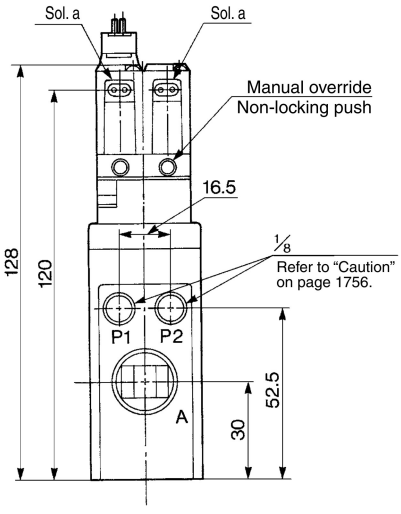

**A perspective drawing**

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

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



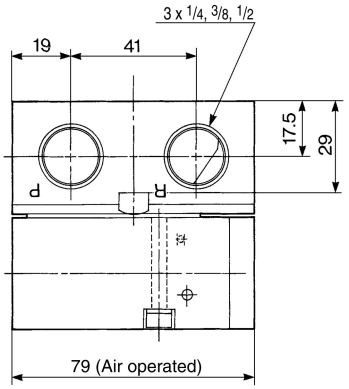



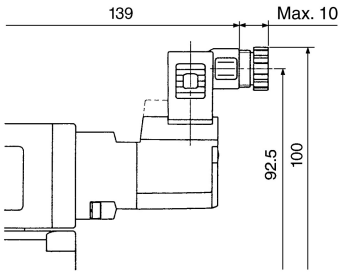

VEX

## Base Mounted: VEX342□

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




**DIN terminal (D)**



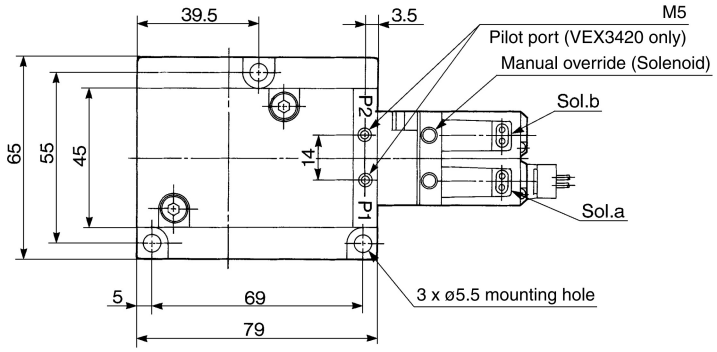
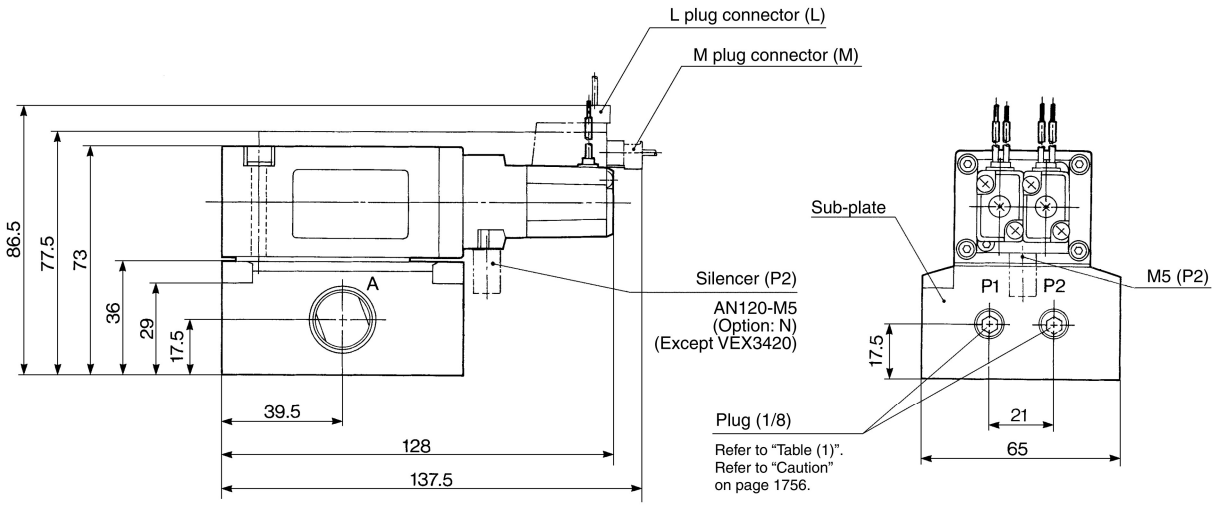




**Table (1)**
**With/Without Plug for Sub-plate**

| 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

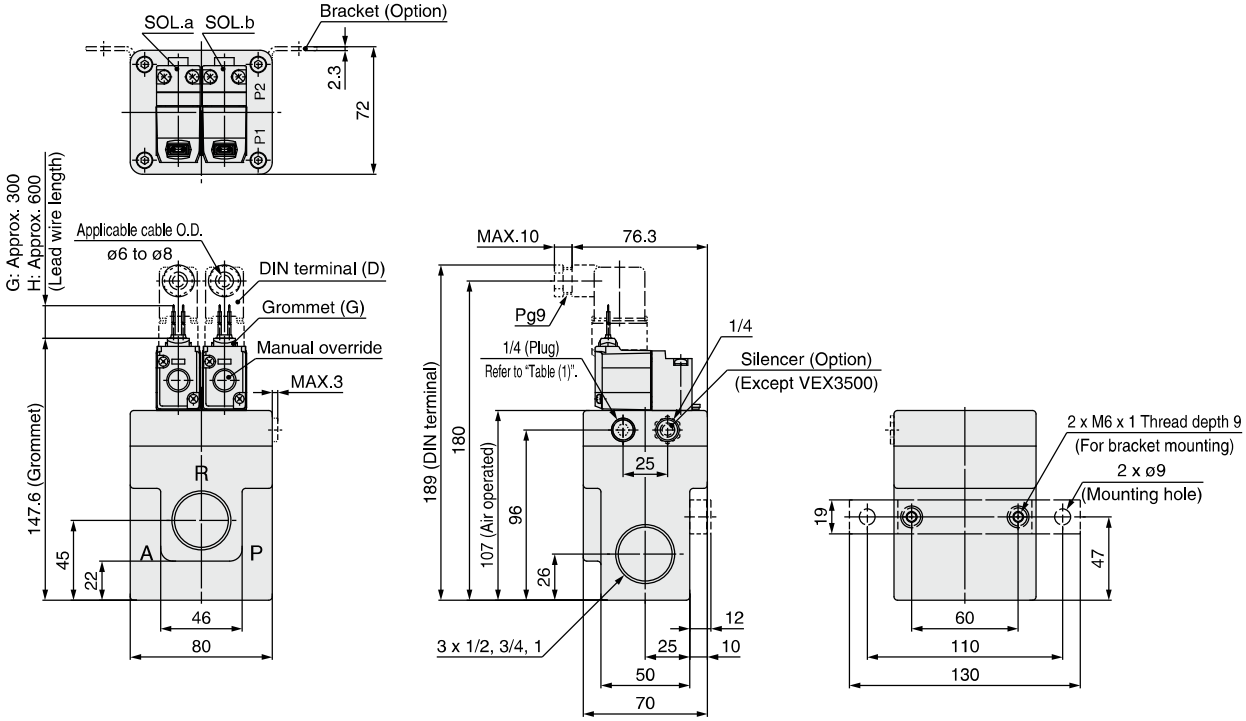
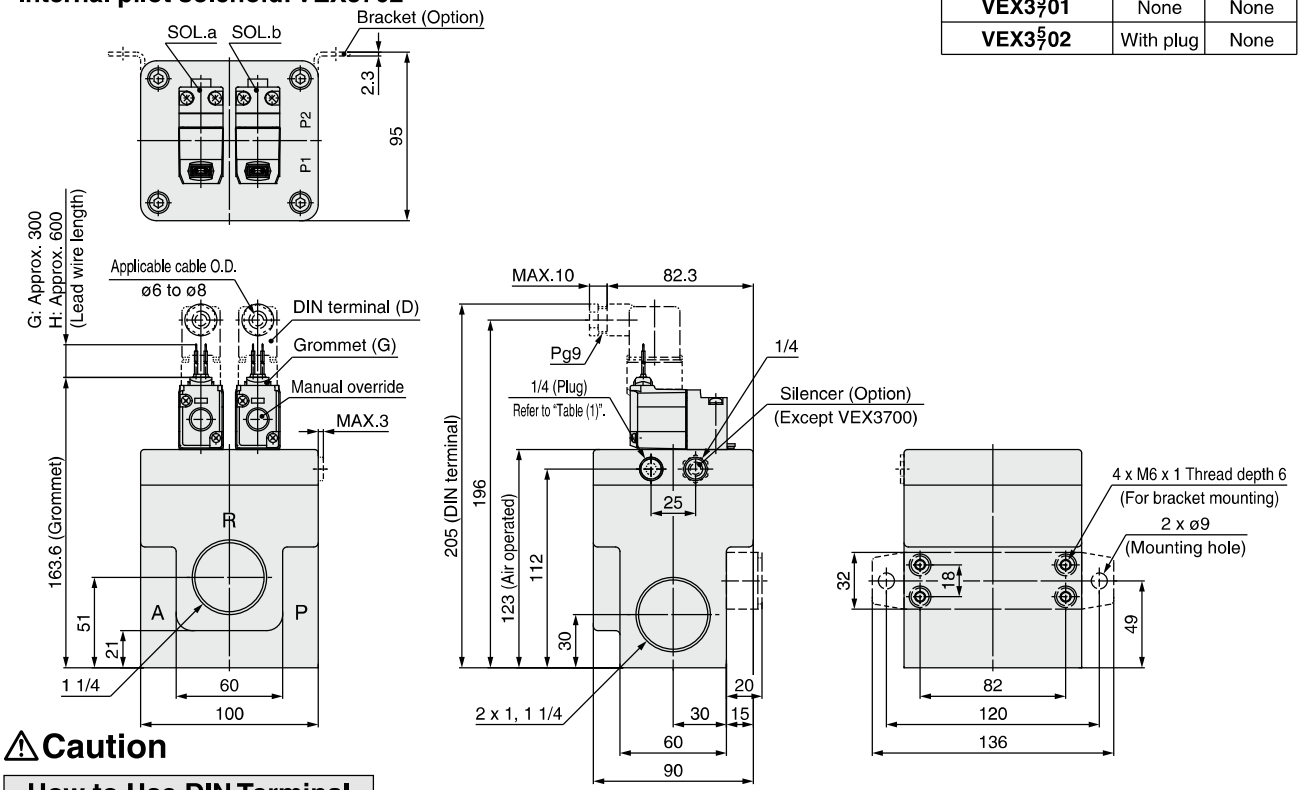



**Table (1) With/Without Plug for 1/4 Port**

| Model | P1 | P2 |
|---|---|---|
| VEX3$^{5}_{7}$00 | None | None |
| VEX3$^{5}_{7}$01 | None | None |
| VEX3$^{5}_{7}$02 | 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

## Base Mounted: VEX390□

**Air operated: VEX3900**
**External pilot solenoid: VEX3901**
**Internal pilot solenoid: VEX3902**

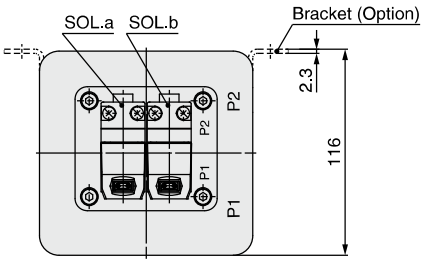
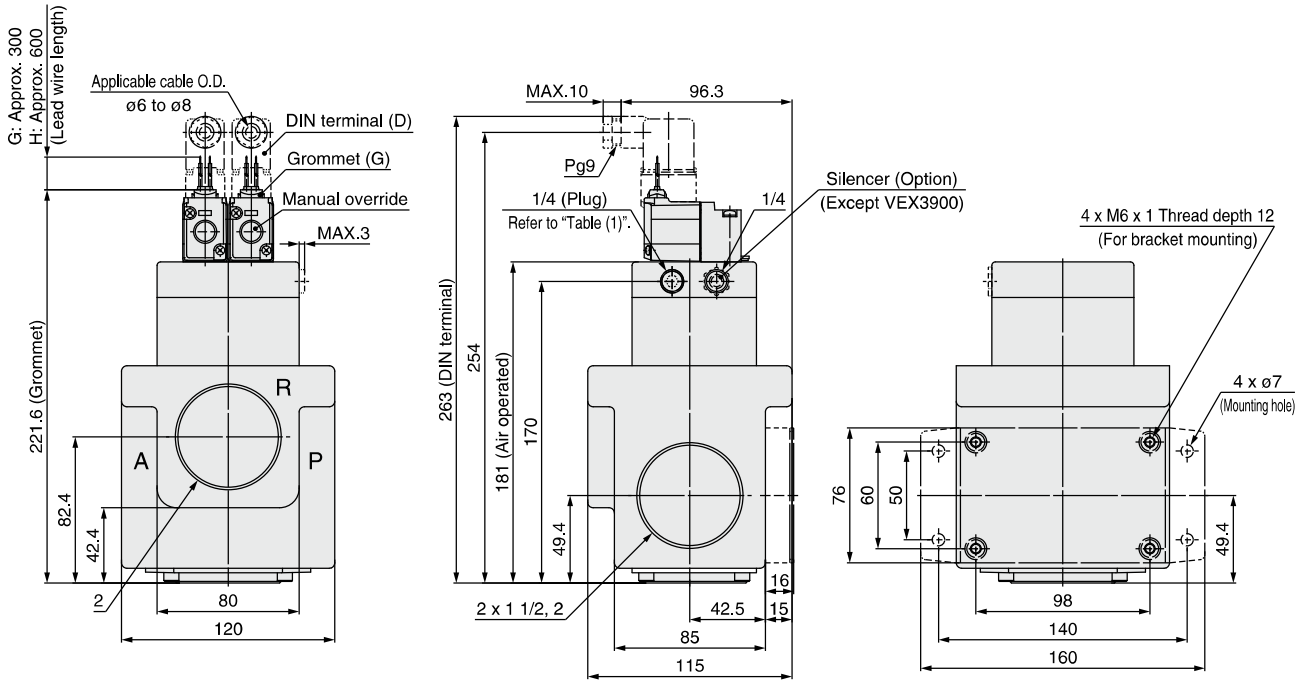



**Table (1)**
**With/Without Plug for 1/4 Port**

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



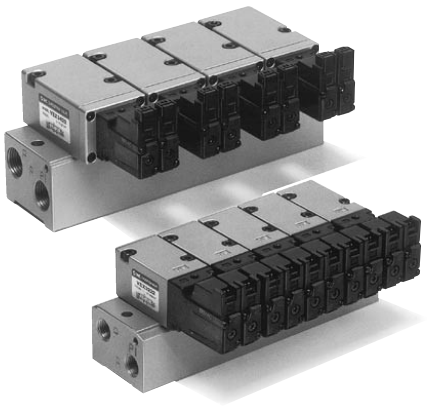

## ⚠Caution

**How to Use DIN Terminal**

Refer to page 1435 for VT307 series.

# *VEX3 Series*
# Manifold Specifications

## Manifold: VVEX Series



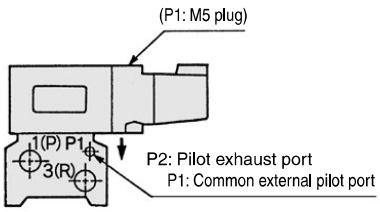
### Specifications

| 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) | | | | |
| Applicable blanking plate | | VEX1-17 (With gasket, screw) | VEX4-5 (With gasket, screw) | | |

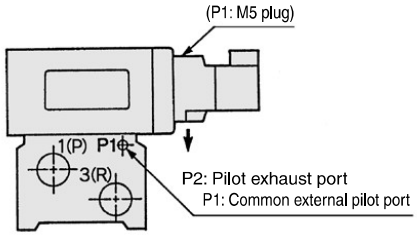
Note) When VVEX2 series is used with more than 5 stations, or VVEX4 series is used with more than 4 stations, apply pressure to the port 1 (P) on both sides and exhaust from the port 3 (R) on both sides.

### Common External Pilot Piping

**VVEX2-2**




**VVEX4-2**




### How to Order Manifold Base

**VVEX 2– 1 – 6 – 02** □

**Thread type**

| | |
|---|---|
| **Nil** | Rc |
| **N** | NPT |
| **F** | G |
| **T** | FNPT |

**Body size** • **Pilot type** • **Valve stations** • **Port size**

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

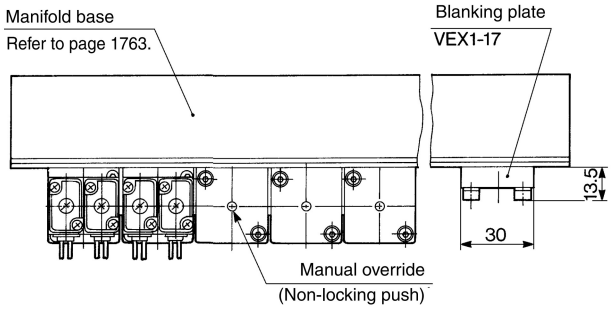
**VEX3 manifold (Size 2, 4) Pilot type**

| 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 | | |

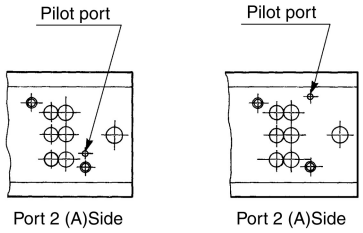
Note) If external pilot types are used, the common external pilot type is recommended.

## Manifold: VVEX2-□

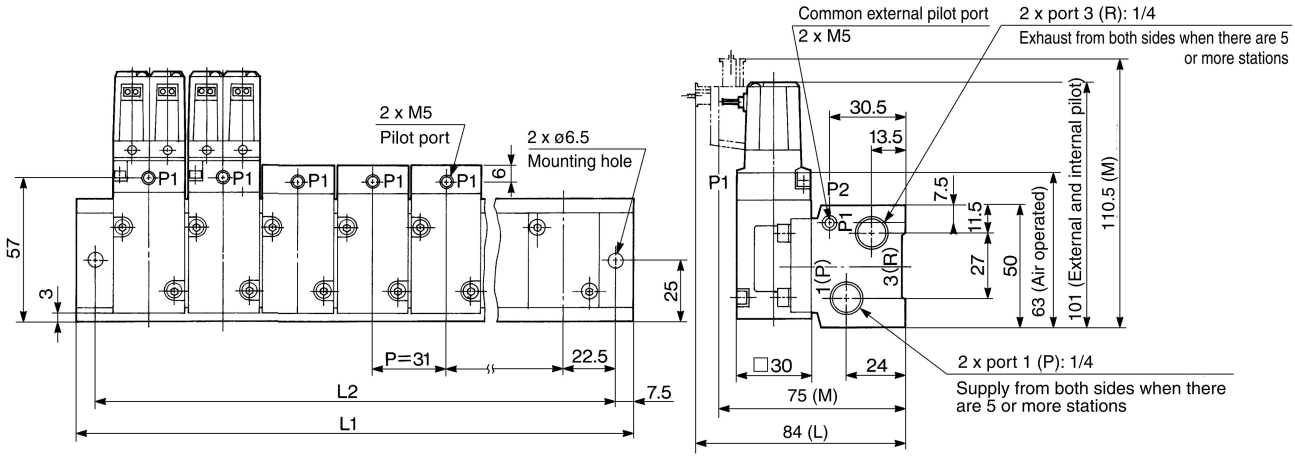
### VVEX2-$\frac{1}{2}$ Applicable valve: VEX3220/3222

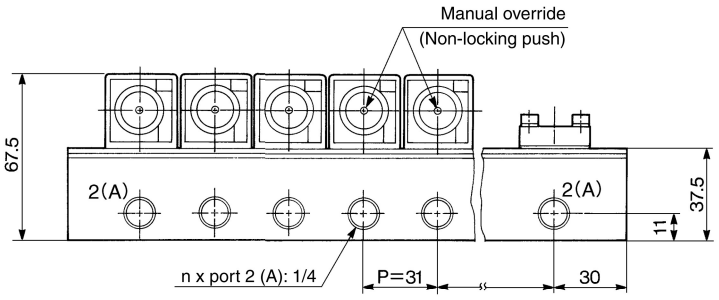



### Valve mounting side




**Internal pilot type** **Common external pilot**



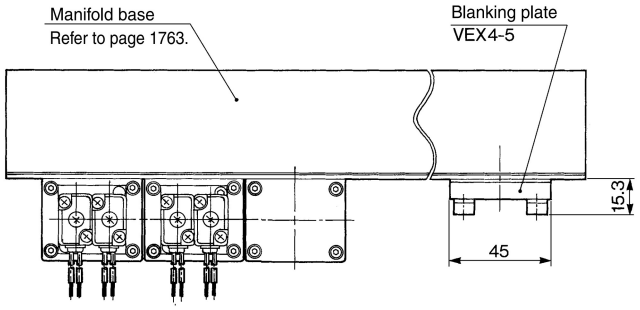

### L Dimension

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

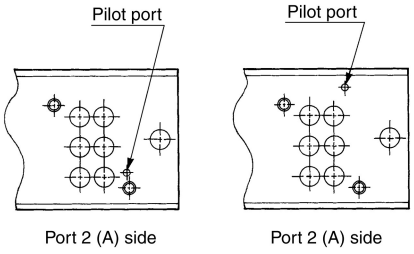
| L \ n | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| **L1** | 91 | 122 | 153 | 184 | 215 | 246 | 277 |
| **L2** | 76 | 107 | 138 | 169 | 200 | 231 | 262 |

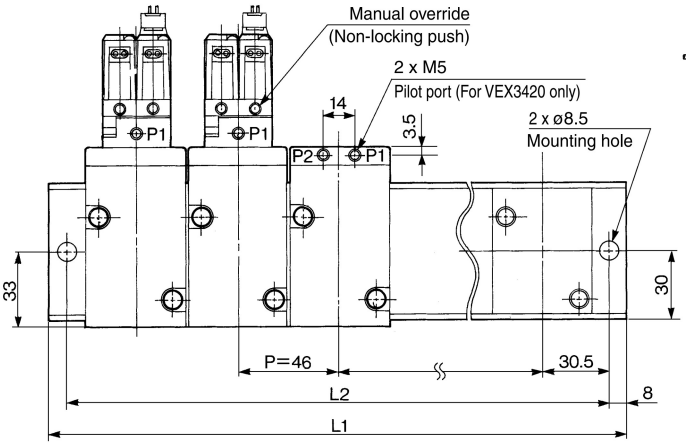
## Manifold: VVEX4-□

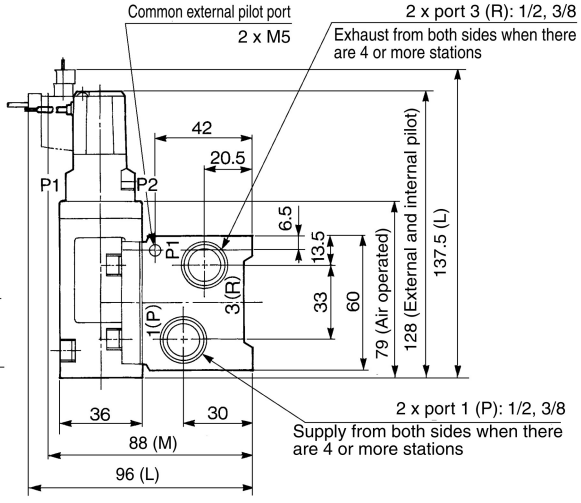
### VVEX4-1 Applicable valve: VEX3420/3422
### VVEX4-2 Applicable valve: VEX3420/3422

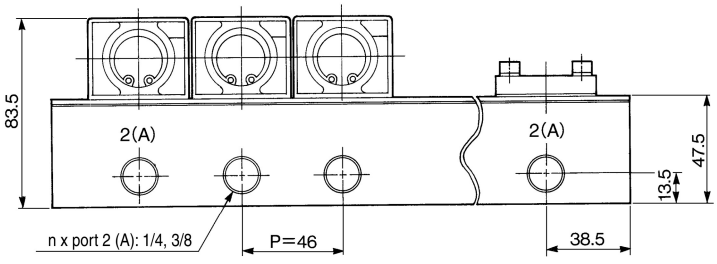



### Valve mounting side




### L Dimension

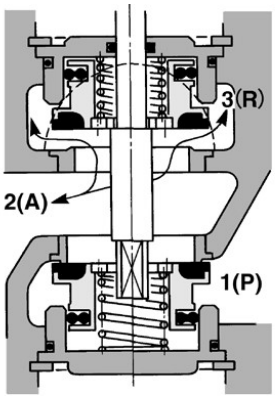
$L_1 = 46n + 31$, $L_2 = 46n + 15$ n: Station

| L \ n | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| $L_1$ | 123 | 169 | 215 | 261 | 307 |
| $L_2$ | 107 | 153 | 199 | 245 | 291 |

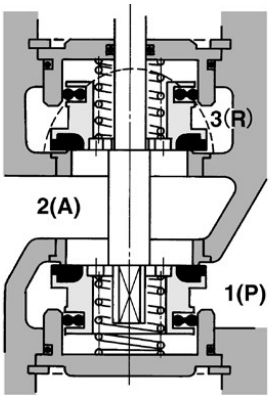
VEX

## Construction/Working Principle/Component Parts

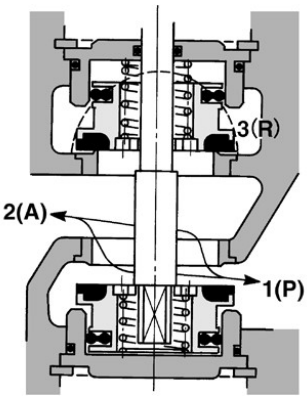
(1) 2(A)←→R 3(R)




(2) Closed center

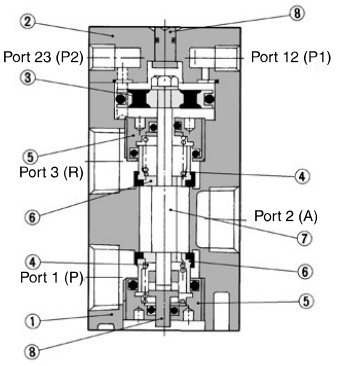



(3) 2(A)←→R 3(R)

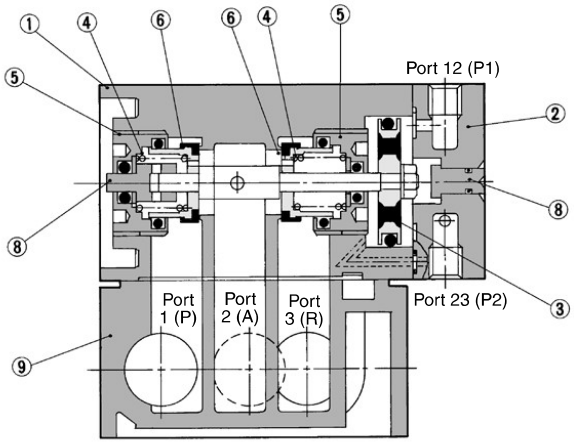



- This is a 3 port switch valve in which the shaft ⑦ - extending from the driving piston ③ opens/closes a pair of poppet valves ⑥. The poppet valve has a pressure balancing mechanism in which port 2 (A) pressure is constantly applied from the back and the center spring ④ is acting as a backup.
- When 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)

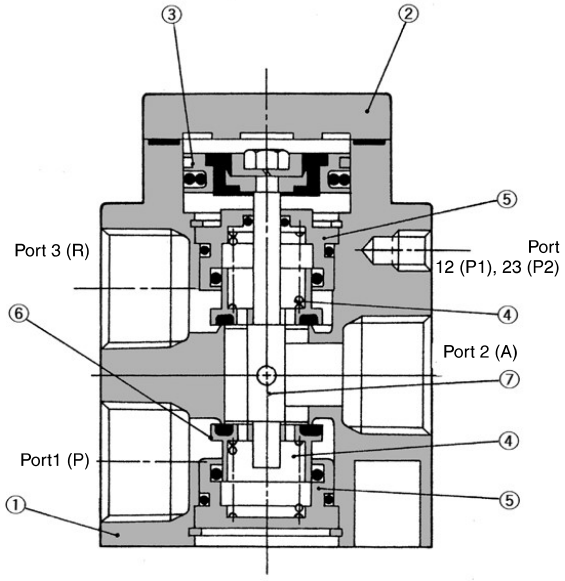



### Component Parts

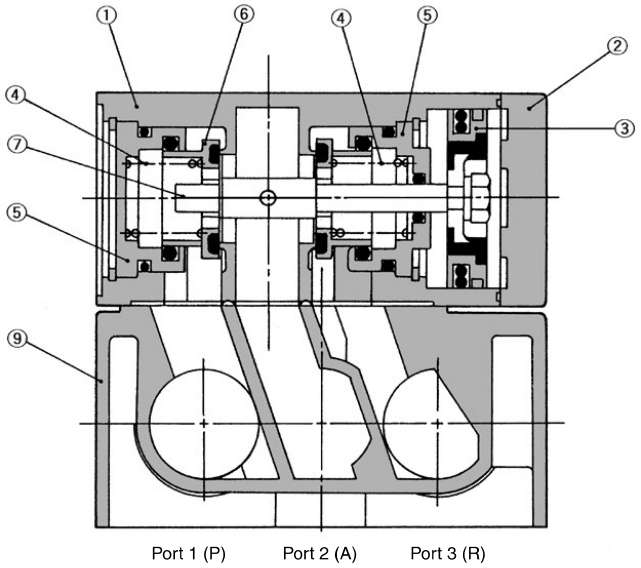
| No. | Description | Material |
|---|---|---|
| 1 | **Body** | Aluminum alloy |
| 2 | **Cover** | Aluminum alloy |
| 3 | **Working piston** | Aluminum alloy |
| 4 | **Center spring** | Stainless steel |
| 5 | **Valve guide** | Aluminum alloy |
| 6 | **Poppet valve** | Aluminum alloy, Rubber |
| 7 |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

## Construction/Working Principle/Component Parts

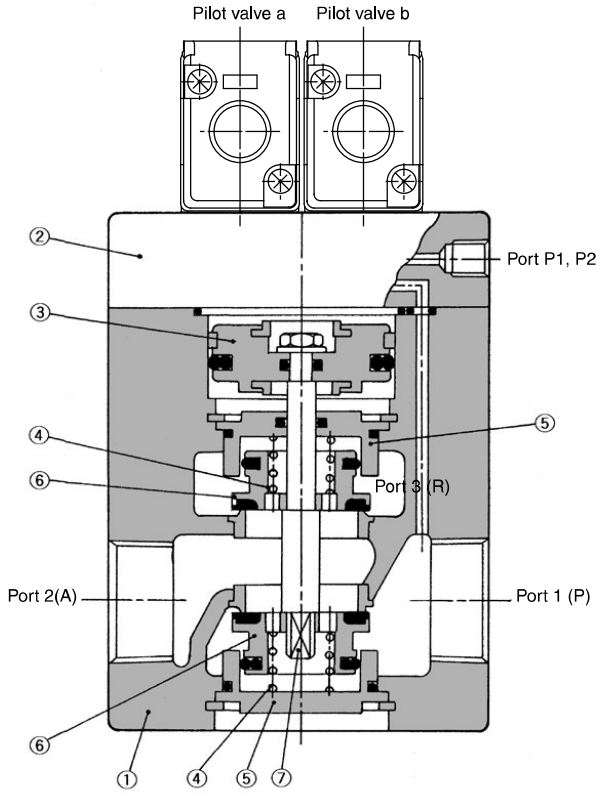
### VEX3320 (Air operated)




### VEX3420 (Air operated)




### VEX350□/370□/390□ (Solenoid)




VEX

# *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** ● **Lead wire length** ●

| 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 |

| 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.

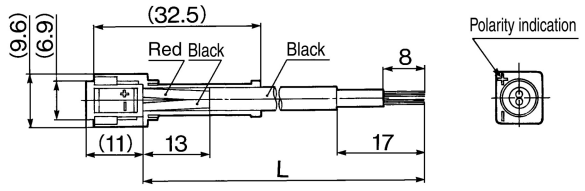
#### How to Order

**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**
1) Loosen the set screws and pull out connector from the terminal block of solenoid valve.
2) Pull out screws and insert a screwdriver to the slit area near the bottom of terminal block to separate the terminal block and housing.
3) 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.
4) 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).

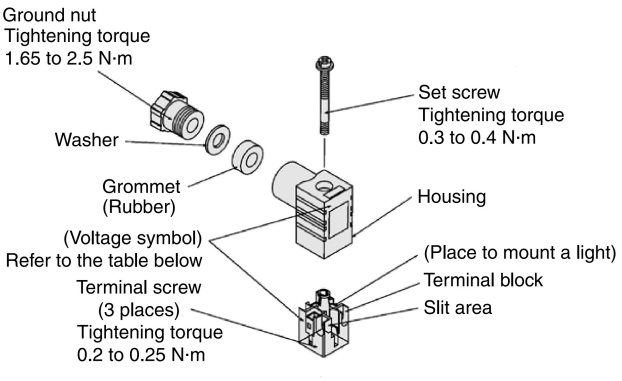
∗ When equipped with light, avoid damaging the light with lead wire.

**Caution**

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

**Applicable cables**

Cord O.D.: ø3.5 to ø7
(Reference) 0.5 mm² 2-core and 3-core wires equivalent to JIS C 3306.




### DIN connector part no.

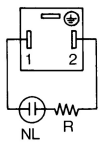
| | |
|---|---|
| Without light | DXT170-176-1 |

**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 |

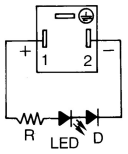
**Connector with light circuit**

AC circuit




NL: Neon light
R: Resistor

DC circuit




D: Protective diode
LED: LED diode
R: Resistor