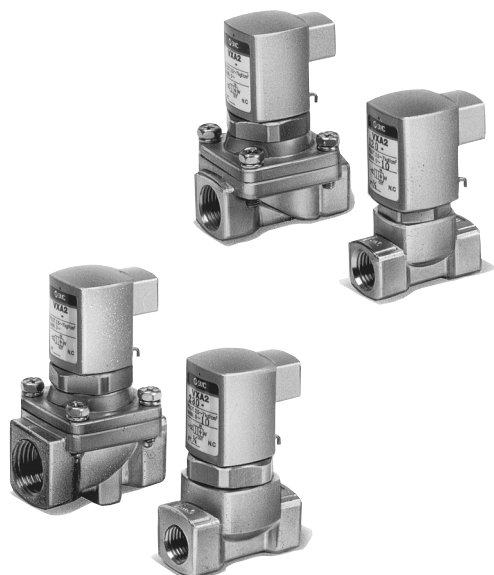


Direct Air Operated 2 Port Valve

Series VXA21/22

For Air, Gas, Vacuum, Water and Oil



- Proper selection of body sealing materials permits application of a wide variety of fluids.

Application can be matched by simply choosing body material (Brass or Stainless steel) and seal material (NBR, FPM, EPR or PTFE).

- Easy to disassemble and reassemble in a short time.

- Compatible with high viscosity fluids (500cSt)

Variations

Valve ●

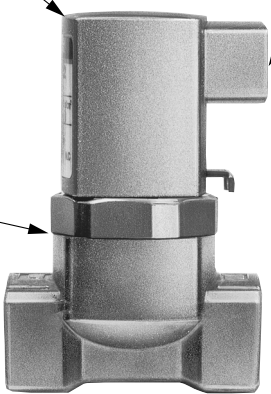
| |
|------------------------|
| Normally closed (N.C.) |
| Normally open (N.O.) |

Pilot port (Free take off direction) ●

| |
|---------------------------------|
| Port size — 1/8 |
| Pilot pressure — 0.25 to 0.7MPa |

Material ●

| | |
|--------|------------------------|
| Body — | Brass, Stainless steel |
| Seal — | NBR, FPM, EPR |



Model

| Model | Port size | Orifice size (mmø) |
|----------------------------------|---------------|--------------------|
| VXA212 ² ₀ | 1/8, 1/4 | 3 |
| VXA213 ² ₀ | 1/8, 1/4 | 4.5 |
| VXA223 ² ₀ | 1/4, 3/8 | 4.5 |
| VXA224 ² ₀ | 1/4, 3/8 | 6 |
| VXA225 ² ₀ | 1/4, 3/8 | 8 |
| VXA226 ² ₀ | 1/4, 3/8, 1/2 | 10 |

Series VXA21/22/31/32

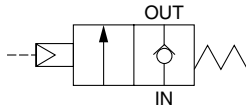


EMC-VXA-01A-UK

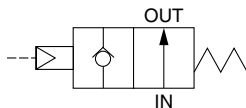
Normally Closed (N.C.)/Normally Open (N.O.)

Symbol

N.C.

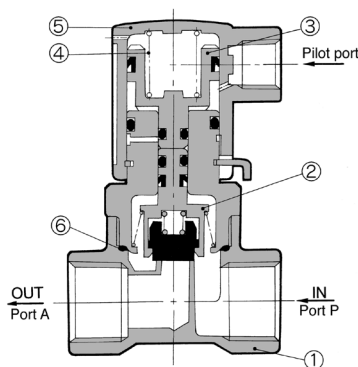


N.O.

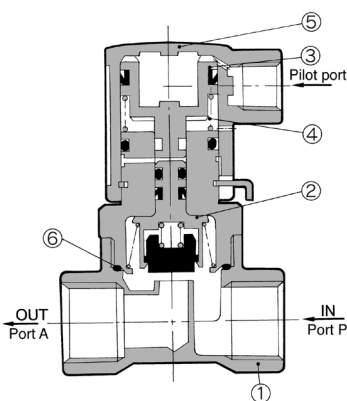


Construction/Components

Normally closed (N.C.)



Normally open (N.O.)



| No. | Description | Material | |
|-----|-----------------|---|-------------------------|
| | | Standard | Option |
| ① | Body | Brass | Stainless steel |
| ② | Valve assembly | Stainless steel, Brass, NBR, Polyacetal | Stainless steel FPM/EPR |
| ③ | Piston assembly | Polyacetal/NBR | — |
| ④ | Piston spring | Stainless steel | — |
| ⑤ | Pilot cover | Aluminium | — |
| ⑥ | O ring | NBR | FPM/EPR |

Applicable Fluids

| Standard | Option ⁽¹⁾ |
|--|---|
| Water (Standard, Up to 40°C) | Vacuum (Up to 10 ⁻³ Torr).....(V, M) |
| Air (Standard, dry), Turbine oil | Non-leak (10 ⁻⁵ atm cc/sec or less).....(V, M) |
| Vacuum (Up to 1 Torr) | |
| Carbon dioxide (CO ₂), Nitrogen gas(N ₂) | |
| Freon11, 113, 114 | |



Note 1) Refer to p.4.0-10 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.

Model/Valve Specifications

| Port size Rc(PT) | Orifice size (mmø) | Flow rate | | Model | Max.operating pressure differential (MPa) | Max. system pressure (MPa) | Proof pressure (MPa) | Weight (g) |
|---------------------|-----------------------|-----------|-------------------------|----------------------------------|--|-------------------------------|-------------------------|----------------------------------|
| | | Nl/min | Effective area (mm²) | | | | | |
| 1/8 (6A) | 3 | 323.9 | 6 | VXA212 ² ₀ | 1.0 | 1.0 | 1.5 | 170 |
| | 4.5 | 598.72 | 11 | VXA213 ² ₀ | 0.5 | | | |
| 1/4 (8A) | 3 | 323.9 | 6 | VXA212 ² ₀ | 1.0 | | | 250 |
| | 4.5 | 598.72 | 11 | VXA213 ² ₀ | 0.5 | | | |
| | | | | VXA223 ² ₀ | 1.0 | | | |
| | | | | 6 | 1030.58 | 19 | | VXA224 ² ₀ |
| | 8 | 1668.55 | 31 | VXA225 ² ₀ | 0.2 | 0.4 | | |
| | 10 | 1864.85 | 34 | VXA226 ² ₀ | 0.1 | | | |
| 3/8 (10A) | 4.5 | 598.72 | 11 | VXA223 ² ₀ | 1.0 | 1.0 | 1.5 | 250 |
| | 6 | 1030.58 | 19 | VXA224 ² ₀ | 0.6 | | | |
| | 8 | 1668.55 | 31 | VXA225 ² ₀ | 0.2 | 0.4 | | 340 |
| | 10 | 2355.6 | 43 | VXA226 ² ₀ | 0.1 | | | |
| 1/2 (15A) | 10 | 2355.6 | 43 | VXA226 ² ₀ | 0.1 | | | 420 |



Note) Refer to p.4.0-13 the glossary for detail of max. operating pressure differential and max. system pressure.

Ambient and Fluid Temperature

| Temperature | Fluid temperature °C | | | | Ambient temperature °C |
|-------------|----------------------|-------------------|-------------------|---------------------------------|---------------------------|
| | Water (Standard) | Air (Standard) | Oil (Standard) | Vacuum ⁽³⁾ (V, M) | |
| Max. | 40 | 60 | 40 | 40 | 40 |
| Min. | 1 | -5 ⁽¹⁾ | -5 ⁽²⁾ | -5 | -5 |



Note 1) Dew point: -5°C or less Note 2) 500cSt or less
Note 3) "V" and "M" in the parenthesis are option symbols.

Tightness of Valve(Leakage)

| Seal | Fluid | Air | Liquid | Non-leak Vacuum ⁽²⁾ V, M |
|---------------|-------|-------------------------|--|--|
| NBR, FPM, EPR | | " 1cm ³ /min | " 0.1cm ³ /min ⁽¹⁾ | " 10 ⁻⁵ atm cc/sec |



Note 1) Different from the operating condition of pressure.
Note 2) Value on option "V", "M" (Non-leak, Vacuum).

Pilot Pressure

| Type | Pressure (MPa) |
|---------|----------------|
| VXA21□□ | 0.25 to 0.7 |
| VXA22□□ | |

How to Order

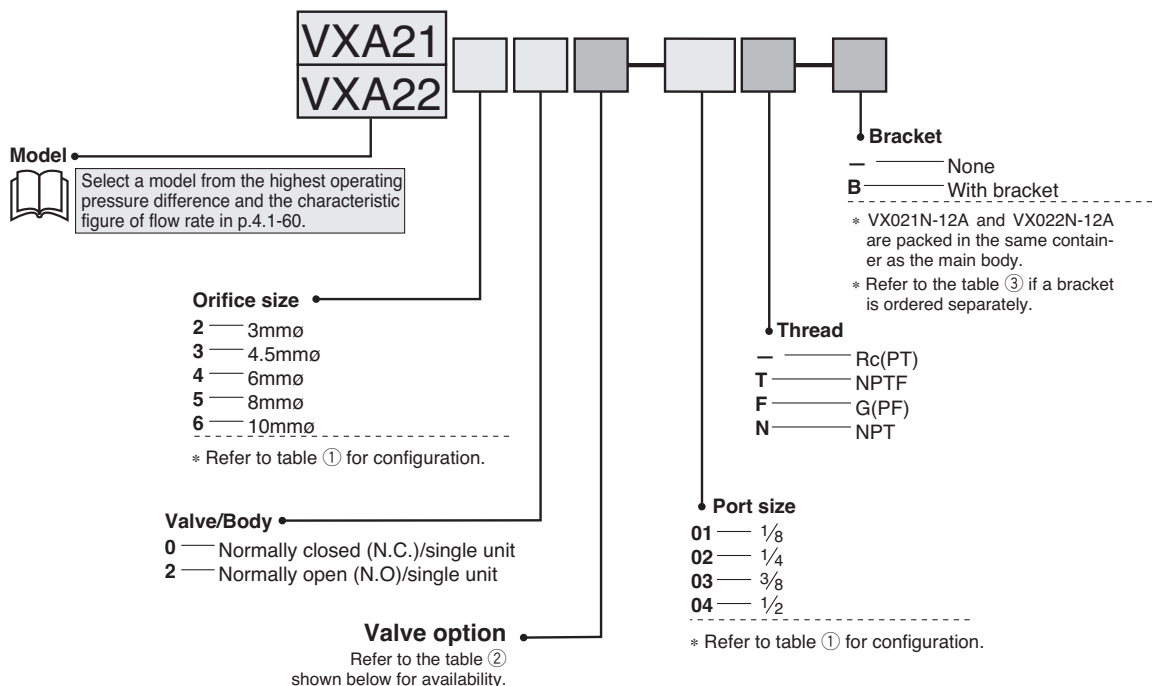


Table ① Port/Orifice Size

| Model | | Orifice size (No.) | | | | |
|----------|----------|--------------------|---------------|-------------|-------------|--------------|
| VXA21 | VXA22 | 2 (3mmø) | 3 (4.5mmø) | 4 (6mmø) | 5 (8mmø) | 6 (10mmø) |
| 01 (1/8) | — | ● | ● | — | — | — |
| 02 (1/4) | — | ● | ● | — | — | — |
| — | 02 (1/4) | — | ● | ● | ● | ● |
| — | 03 (3/8) | — | ● | ● | ● | ● |
| — | 04 (1/2) | — | — | — | — | ● |

Ordering Example

(Example) Series VXA21, Orifice size 4.5mmø, Normal closed, Rc(PT)1/4
(Part number)VXA2130-02

Table ② Valve Option

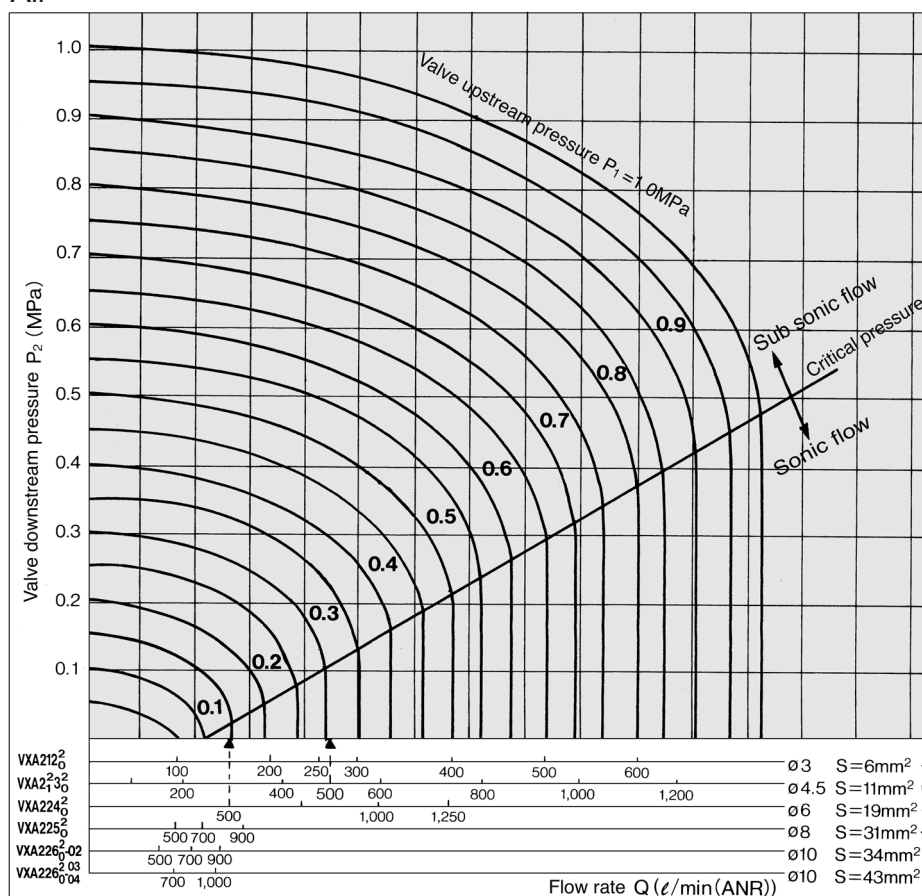
| Option symbol | Seal material | Body material | Holder material | Note |
|------------------------|---------------|-----------------|-----------------|--|
| — | NBR | Brass (C37) | PPS | Non-leak (10 ⁻⁶ Pam ³ /sec), Medium vacuum (0.1 Pa.abs) |
| A | FKM | | | |
| B | EPDM | | | |
| G | NBR | Stainless steel | | |
| H | FKM | | | |
| J | EPDM | | | |
| M <small>Note)</small> | FKM | | | |
| V <small>Note)</small> | | Brass (C37) | | |

Table ③ Bracket Part Number

| Model | Part no. |
|----------------------------------|--------------|
| VX21 ²⁰ ₃₂ | VX021N-12A |
| VX22 ³⁰ ₄₂ | VX022N-12A |
| VX22 ³⁰ ₆₂ | VX023N-12A-L |

VXA21/22

Air



How to Read the Graph

In the sonic flow region:

For a flow of 500 l/min(ANR)

Orifice ø6 (VXA224²₀)...P₁ ≈ 0.14MPa

Orifice ø4.5 valve (VXA212²₀)...P₁ ≈ 0.3MPa

How to Calculate Flow/Air

① Equation in the domain of subsonic flow
 $P_1 + 0.1013 = (1 \text{ to } 1.8941)(P_2 + 0.1013)$

• Calculation by Cv factor

$Q = 4073.4 \cdot C_v \cdot \sqrt{\Delta P (P_2 + 0.1013)}$ l/min(ANR)

• Calculation by effective area

$Q = 226.3 \cdot S \cdot \sqrt{\Delta P (P_2 + 0.1013)}$ l/min(ANR)

② Equation in the domain sonic flow

$P_1 + 0.1013 \geq 1.8941(P_2 + 0.1013)$

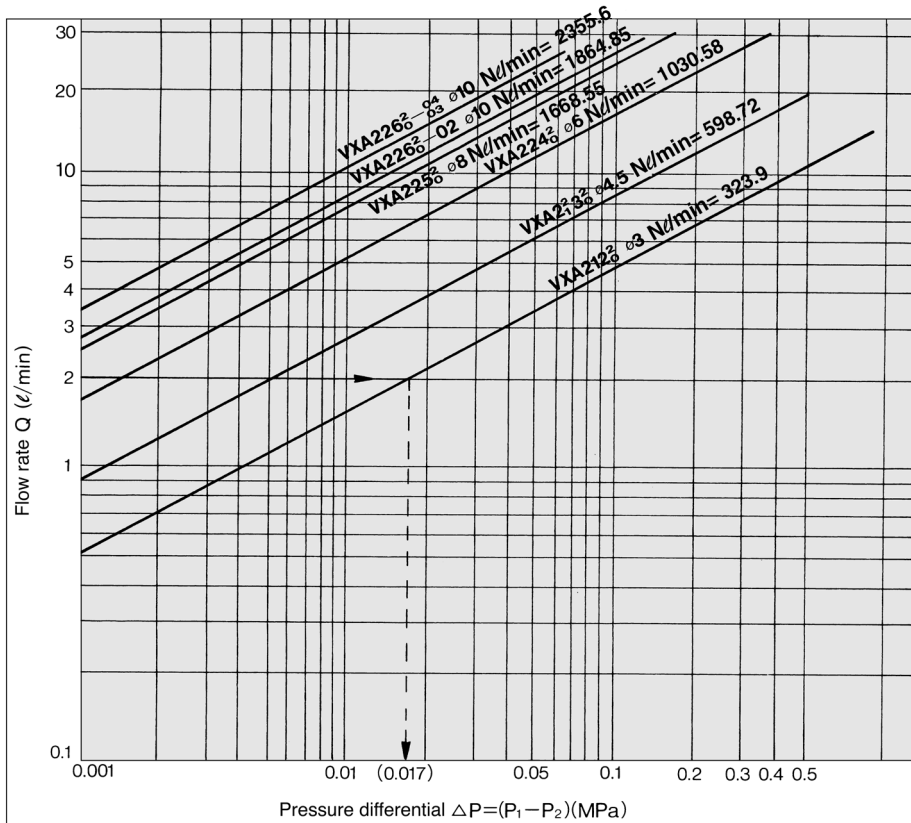
• Calculation by Cv factor

$Q = 1972.8 \cdot C_v \cdot (P_1 + 0.1013)$ l/min(ANR)

• Calculation by effective area

$Q = 109.6 \cdot S \cdot (P_1 + 0.1013)$ l/min(ANR)

Water



How to Read the Graph

In case of a flow of 2 l/min.

Orifice ø3 valve (VXA212²₀)...ΔP ≈ 0.017MPa

How to Calculate Flow/Water

• Calculation by Cv factor

$Q = 14.2 \cdot C_v \cdot \sqrt{10.2 \cdot \Delta P}$ l/min

• Calculation by effective area[Smm²]

$Q = 0.8 \cdot S \cdot \sqrt{10.2 \cdot \Delta P}$ l/min

Q : Flow (Air l/min(ANR)), (Steam kg/h), (Water l/min)

ΔP: Pressure differential (P₁ - P₂)

P₁ : Upstream pressure (MPa)

P₂ : Downstream pressure (MPa)

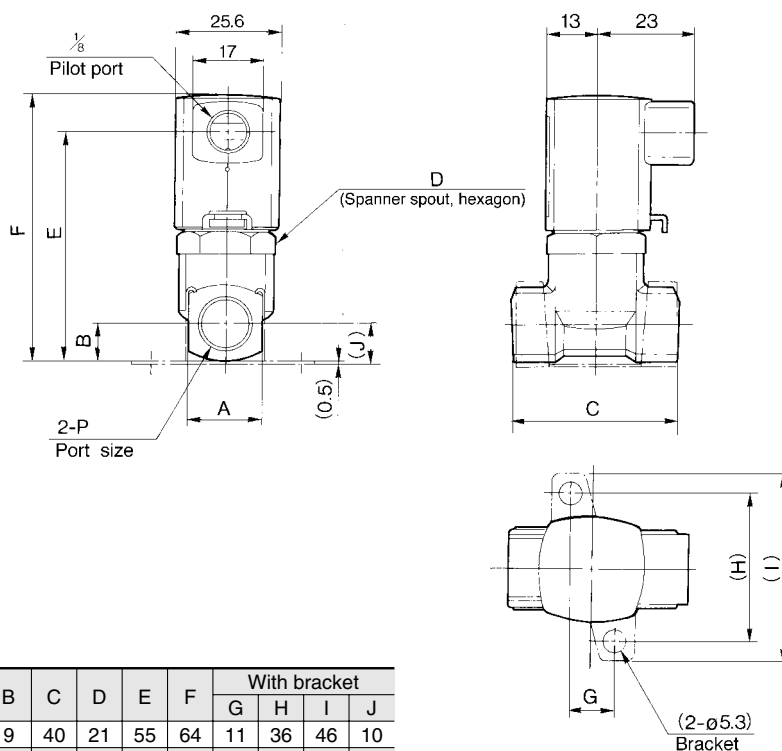
θ : Fluid temperature (°C)

S : Effective area (mm²)

Cv : Cv factor (l)

Dimensions (Orifice size 3 mmø, 4.5 mmø, 6 mmø)

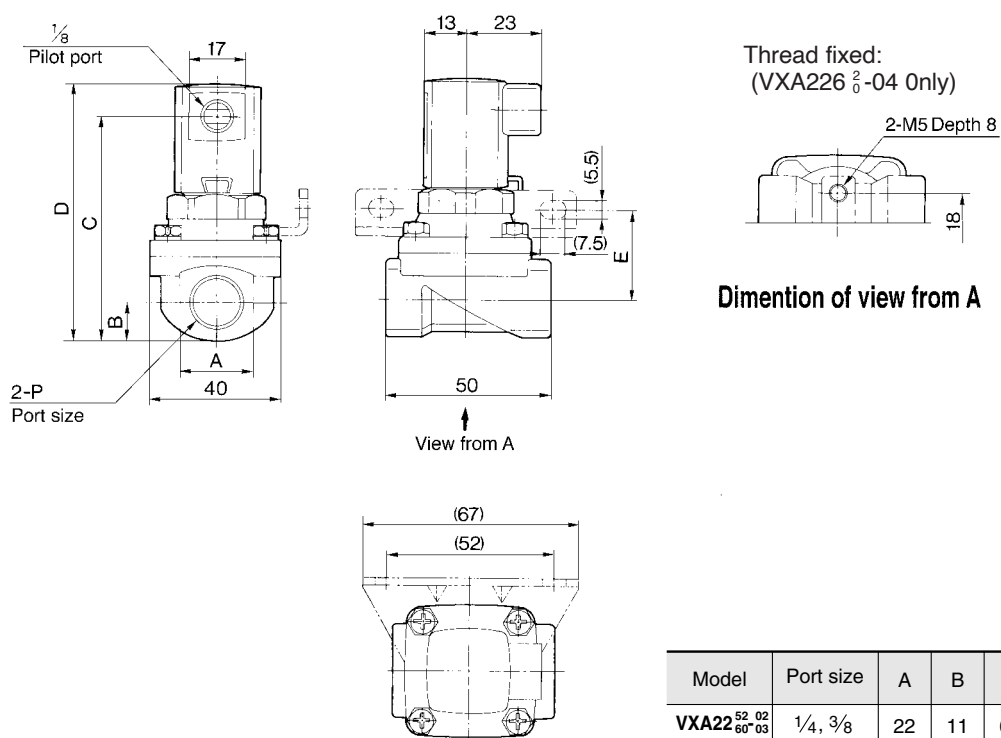
VXA212□, VXA213□, VXA223□, VXA224□



| Model | Port size P | A | B | C | D | E | F | With bracket | | | |
|-------|-------------|----|------|----|----|----|----|--------------|----|----|------|
| | | | | | | | | G | H | I | J |
| VXA21 | 1/8, 1/4 | 18 | 9 | 40 | 21 | 55 | 64 | 11 | 36 | 46 | 10 |
| VXA22 | 1/4, 3/8 | 21 | 10.5 | 45 | 27 | 62 | 71 | 13 | 46 | 56 | 11.5 |

Dimensions (Orifice size 8mmø, 10mmø)

VXA225□, VXA226□



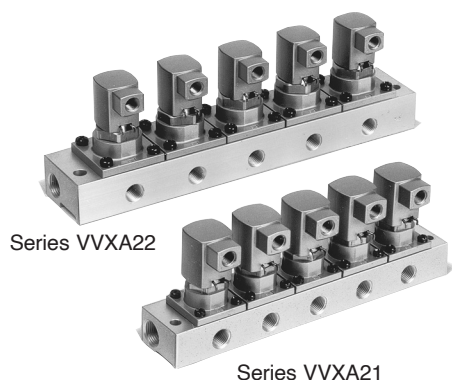
| Model | Port size | A | B | C | D | Bracket |
|---|-----------|----|------|----|----|---------|
| | | | | | | E |
| VXA22 ^{52 02} _{60 03} | 1/4, 3/8 | 22 | 11 | 67 | 77 | 27 |
| VXA226 ^{2 04} * | 1/2 | 28 | 14.5 | 73 | 83 | 30 |

* Fixing with thread is also possible.

Direct Air Operated
2 Port Valve/Manifold

Series VVXA21/22

For Air, Gas, Vacuum and Oil Use



Common SUP style and individual SUP style (for vacuum use) standard models.

Compatible with a wide variety of fluids.

Application can be matched by simply choosing the correct seal materials(NBR, FPM or EPR).

It is possible to replace valve without changing existing piping.

Weight-saving aluminium base and body.
(Not applicable to water or steam)

Variations

Valve

| | Normally closed (N.C.) | | Normally open (N.O.) | |
|--|------------------------|----------------|----------------------|----------------|
| | Common SUP | Individual SUP | Common SUP | Individual SUP |
| | | | | |

Manifold

Manifold style — B mount
Manifold stations — 2 to 10 stations

Material

Base, Body — Aluminum
Seal — NBR, FPM, EPR

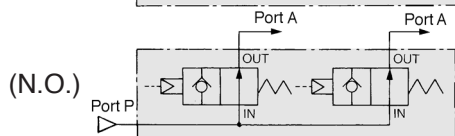
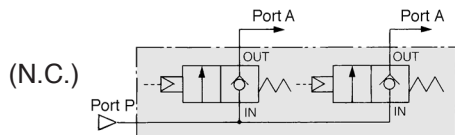
Model

| Manifold base | Individual port | Common port |
|------------------|-----------------|-------------|
| VVXA211-stations | 1/8 | 3/8 |
| VVXA212-stations | 1/4 | |
| VVXA221-stations | 1/8 | |
| VVXA222-stations | 1/4 | |

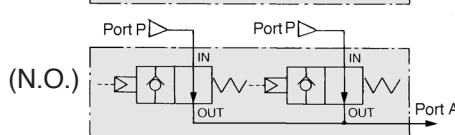
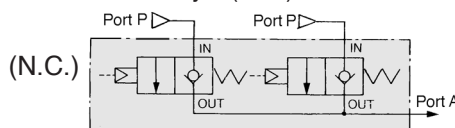
Normally Closed (N.C.)/Normally Open (N.O.)

Symbol

Common SUP style

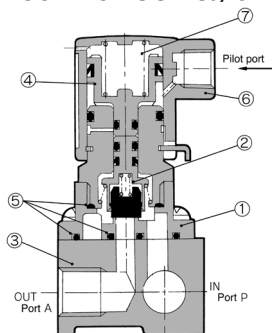


Individual SUP style (N.C.)

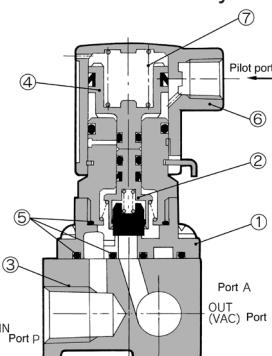


Construction/Components

Common SUP style



Individual SUP style



| No. | Description | Material | |
|-----|-----------------|---|---------|
| | | Standard | Option |
| ① | Body | Aluminium | — |
| ② | Valve assembly | NBR, Stainless steel, Brass, Polyacetal | EPR/FPM |
| ③ | Base | Aluminium | — |
| ④ | Piston assembly | Polyacetal, NBR | — |
| ⑤ | O ring | NBR | FPM/EPR |
| ⑥ | Pilot cover | Aluminium | — |
| ⑦ | Piston spring | Stainless steel | — |

Applicable Fluids

| Standard | Option ⁽¹⁾ |
|---|---|
| Air (Standard, Dry) | Vacuum (Up to 10 ⁻³ Torr)..... (V) |
| Vacuum (Up to 1Torr) | Non-leak (10 ⁻⁵ atm cc/sec or less)..... (V) |
| Turbine oil | |
| Carbon dioxide (CO ₂), Nitrogen gas (N ₂) | |
| Freon11, 113, 114 | |



Note 1) Refer to p.4.0-10 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.

Manifold Specifications

| Manifold | B Mount | |
|---------------------------------------|--|-----------|
| Manifold base | Common pressure supply, individual pressure supply (For vacuum) ⁽¹⁾ | |
| Number of valves | 2 to 10 stations | |
| Blank plate (With O rings, screws) | VVXA21 | VX011-001 |
| | VVXA22 | VX011-006 |



Note 1) Common port is placed on vacuum side.

Manifold Base and Applicable Solenoid Valve

| Manifold base | Individual port | Applicable solenoid valve | Weight per one station |
|------------------|-----------------|---------------------------|------------------------|
| VVXA211-stations | 1/8 | VXA21□ ³ -00 | n X 70+50 |
| VVXA212-stations | 1/4 | | |
| VVXA221-stations | 1/8 | VXA22□ ³ -00 | n X 130+110 |
| VVXA222-stations | 1/4 | | |

Solenoid Valve for Manifold

| Orifice size (mmø) | Flow rate | | Model | Max. operating pressure differential (MPa) | Max. system pressure (MPa) | Proof pressure (MPa) | Weight (g) |
|--------------------|-----------|-----------------------------------|-------------------------|--|----------------------------|----------------------|------------|
| | Nl/min | Effective area (mm ²) | | | | | |
| 3 | 323.9 | 6 | VXA212 ³ -00 | 1.0 | 1.0 | 1.5 | 120 |
| 4.5 | 598.72 | 11 | VXA213 ³ -00 | 0.5 | | | 160 |
| | | | VXA223 ³ -00 | 1.0 | | | |
| 6 | 1030.58 | 19 | VXA224 ³ -00 | 0.6 | | | |



Note) Refer to p.4.0-13 the glossary for detail of max. operating pressure differential and max. system pressure.

Ambient and Fluid

| Temperature | Fluid temperature ℃ | | | Ambient temperature ℃ |
|-------------|---------------------|-------------------|---------------------------|-----------------------|
| | Air (Standard) | Oil (Standard) | Vacuum ⁽³⁾ (V) | |
| Max. | 60 | 40 | 40 | 40 |
| Min. | -5 ⁽¹⁾ | -5 ⁽²⁾ | -5 | -5 |



Note 1) Dew point: -10℃ or less Note 2) 500cSt or less

Note 3) "V" in the parenthesis is option symbol.

Tightness of Valve(Leakage)

| Seal | Fluid | Air | Liquid | Non-leak vacuum ⁽²⁾ |
|------|---------------|-------------------------------|--|-------------------------------------|
| | | 1cm ³ /min or less | 0.1cm ³ /min or less ⁽¹⁾ | 10 ⁻⁵ atm cc/sec or less |
| | NBR, FPM, EPR | | | |



Note 1) Differ from the operating condition of pressure.

Note 2) Value on option "V" (Non-leak, Vacuum).

Pilot Pressure

| Model | Pressure (MPa) |
|---------|----------------|
| VXA21□□ | 0.25 to 0.7 |
| VXA22□□ | |

How to Order/Manifold

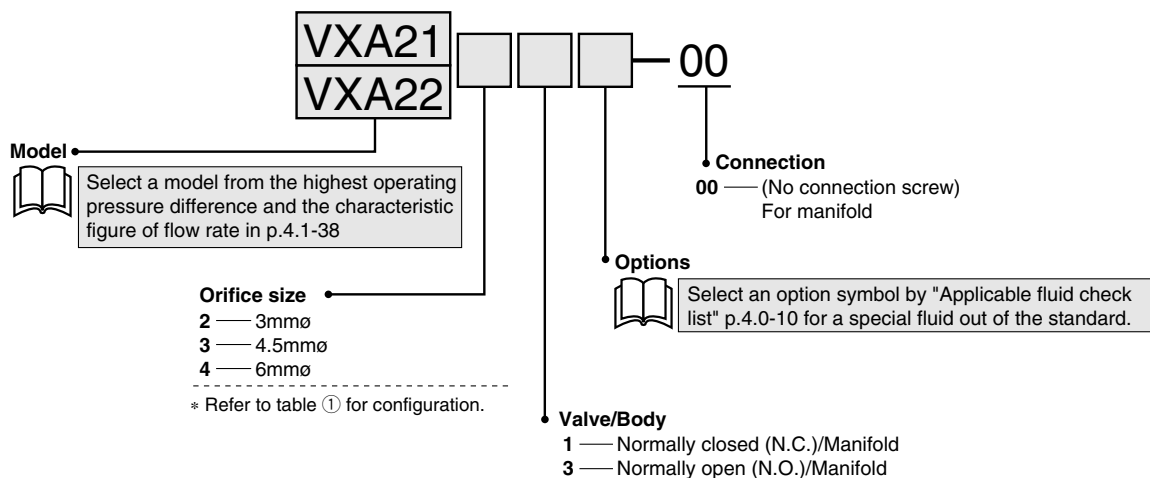
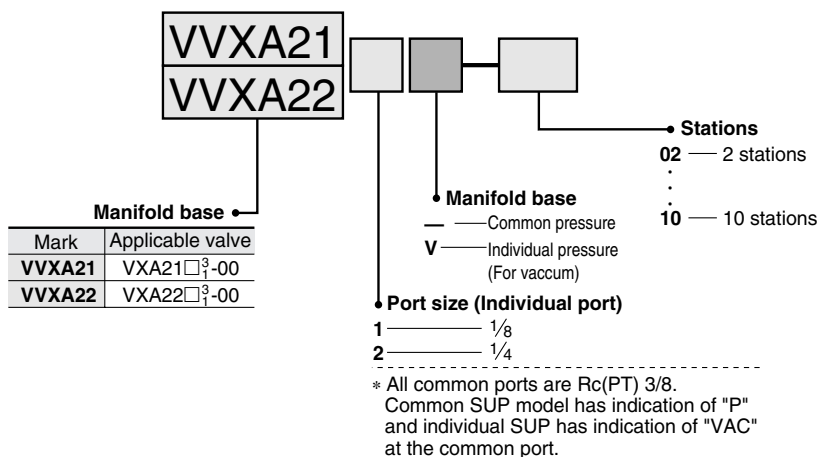


Table ① Orifice Size

| Model | Orifice size (No.) | | |
|-------|--------------------|---------------|-------------|
| | 2 (3mmø) | 3 (4.5mmø) | 4 (6mmø) |
| VXA21 | ● | ● | — |
| VXA22 | — | ● | ● |

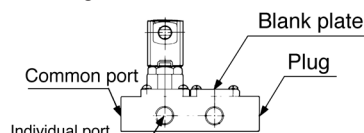
How to Order Manifold Base



■ Write both the base style and the style of valve or blank plate manifold.
(Example) 7 stations of VXA21 common pressure, individual port Rc(PT)1/8.

(Base) VVXA211-07 1 pc.
(Valve) VXA2121-00 6 pcs.
(Blank plate) VX011-001 1 pc.

■ Arrangement of solenoid valves

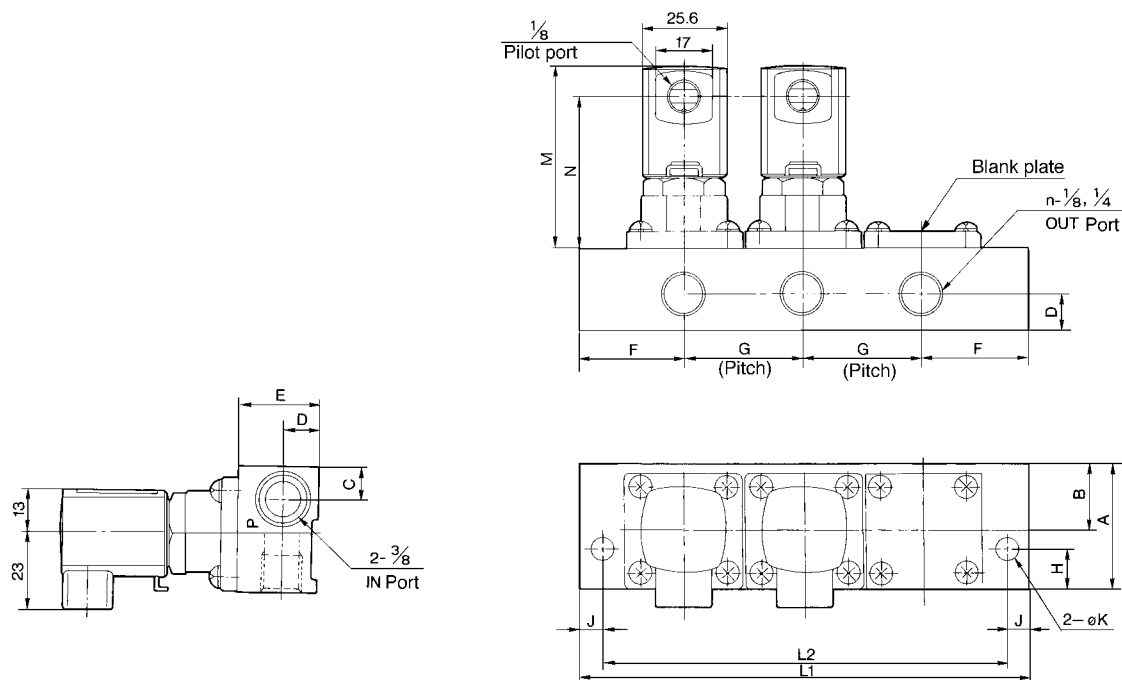


The standard arrangement of manifolds should be placed on an individual port on this side, each solenoid valve from the left side and a blank plate in the right side. The right side of the common port provides plug.

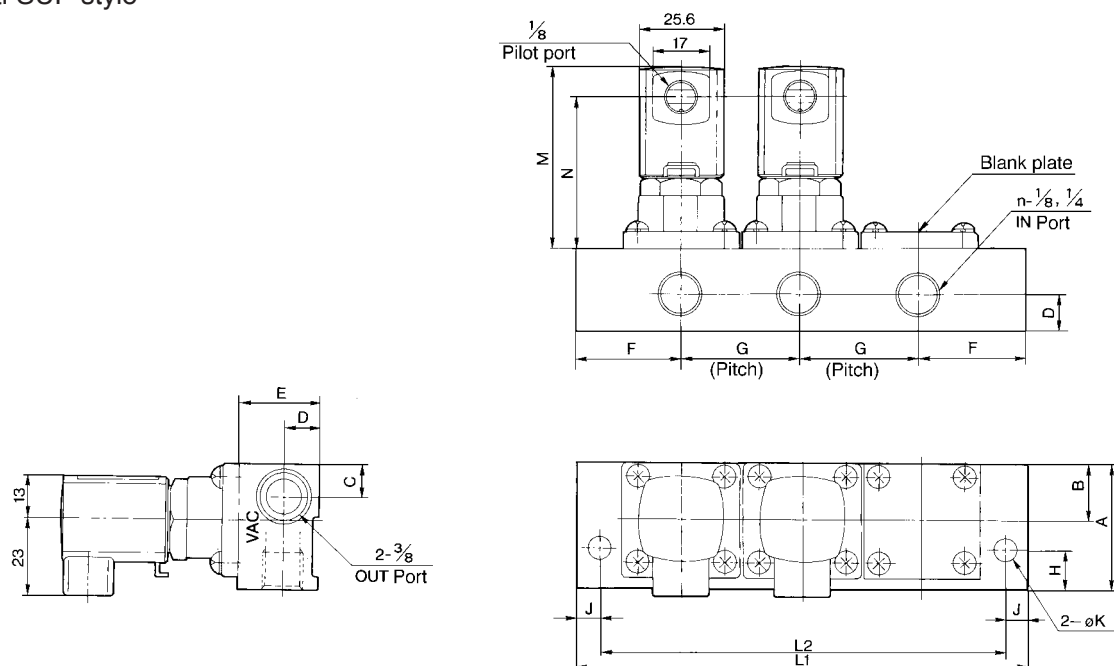
VVXA21/22

Dimensions

Common SUP style



Individual SUP style



L: Dimensions

| Model | Stations | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | L | | | | | | | | | |
| VVXA21□ | L1 | 100 | 136 | 172 | 208 | 244 | 280 | 316 | 352 | 388 |
| | L2 | 86 | 122 | 158 | 194 | 230 | 266 | 302 | 338 | 374 |
| VVXA22□ | L1 | 126 | 172 | 218 | 264 | 310 | 356 | 402 | 448 | 494 |
| | L2 | 108 | 154 | 200 | 246 | 292 | 338 | 384 | 430 | 476 |

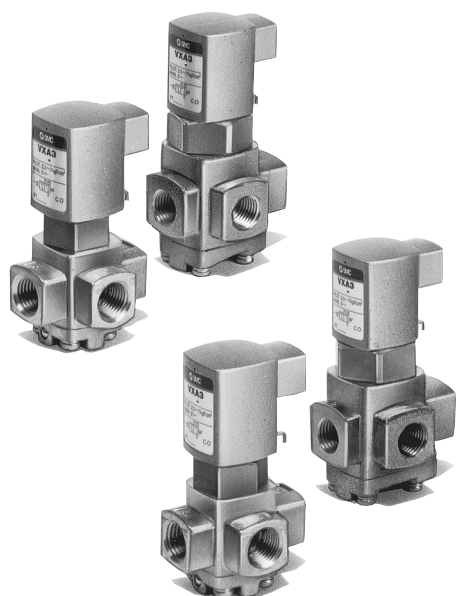
| Model | A | B | C | D | E | F | G | H | J | K | M | N |
|---------|----|-------------|------|----|----|----|----|----|---|-----|----|----|
| VVXA21□ | 38 | 20.5 [17.5] | 10.5 | 11 | 25 | 32 | 36 | 12 | 7 | 6.5 | 54 | 45 |
| VVXA22□ | 49 | 26.5 [22.5] | 13 | 13 | 30 | 40 | 46 | 15 | 9 | 8.5 | 58 | 49 |

[]: Individual pressure style

Direct Air Operated 3 Port Valve

Series VXA31/32

For Air, Gas, Vacuum, Water and Oil



- Proper selection of body and sealing materials permits application of a wide variety of fluids.

Application can be matched by simply choosing body material (Brass or Stainless steel) and seal material (NBR, FPM or EPR).

- C.O. style easy to use; operatable as either N.C. or N.O.
- Easy to disassemble and reassemble in a short time.
- Compatible with high viscosity fluids (500cSt).

Variations

Valve ●

Common (C.O.)

● **Pilot port** (Free take off direction)

Connecting port size — 1/8
Pilot pressure — 0.25 to 0.7 (MPa)

Material ●

| | |
|------|------------------------|
| Body | Brass, Stainless steel |
| Seal | NBR, FPM, EPR |

Model

| Model | Connecting port size | Orifice size (mmø) |
|---------|----------------------|--------------------|
| VXA3114 | 1/8, 1/4 | 1.5 |
| VXA3124 | 1/8, 1/4 | 2.2 |
| VXA3134 | 1/8, 1/4 | 3 |
| VXA3224 | 1/4, 3/8 | 2.2 |
| VXA3234 | 1/4, 3/8 | 3 |
| VXA3244 | 1/4, 3/8 | 4 |

Common (C.O.)

Applicable Fluids

| Standard | Option ⁽¹⁾ |
|---|---|
| Water (Standard, Up to 40°C) Air (Standard, Dry), Turbine oil, Vacuum (Up to 1 Torr), Carbon dioxide (CO ₂), Nitrogen gas (N ₂), Freon11, 113, 114 | Vacuum (Up to 10 ⁻³ Torr) (V, M) Non-leak (10 ⁻⁵ atm cc/sec or less)..... (V, M) |



Note 1) Refer to p.4.0-11 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.

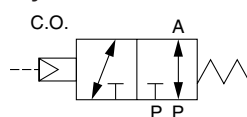
Model/Valve Specifications

| Port size Rc(PT) | Orifice size (mmø) | Flow rate | | Model | Max. operating pressure differential (MPa) | Max. system pressure (MPa) | Proof pressure (MPa) | Weight ⁽¹⁾ (g) |
|---------------------|-----------------------|-----------|---|---------|---|-------------------------------|-------------------------|------------------------------|
| | | Nl/min | Effective orifice (mm ²) | | | | | |
| 1/8 (6A) | 1.5 | 78.52 | 1.4 | VXA3114 | 1.0 | 1.0 | 1.5 | 280 |
| | 2.2 | 157.04 | 2.8 | VXA3124 | 0.5 | | | |
| | 3 | 235.56 | 4.3 | VXA3134 | 0.3 | | | |
| 1/4 (8A) | 1.5 | 78.52 | 1.4 | VXA3114 | 1.0 | | | 410 |
| | | 157.04 | 2.8 | VXA3124 | 0.5 | | | |
| | | 186.49 | 3.4 | VXA3224 | 1.0 | | | |
| | 2.2 | 235.56 | 4.3 | VXA3134 | 0.3 | | | 280 |
| | | 323.9 | 6 | VXA3234 | 0.6 | | | |
| | | 490.75 | 9 | VXA3244 | 0.3 | | | |
| 3/8 (10A) | 2.2 | 186.49 | 3.4 | VXA3224 | 1.0 | | | 410 |
| | 3 | 323.9 | 6 | VXA3234 | 0.6 | | | |
| | 4 | 490.75 | 9 | VXA3244 | 0.3 | | | |

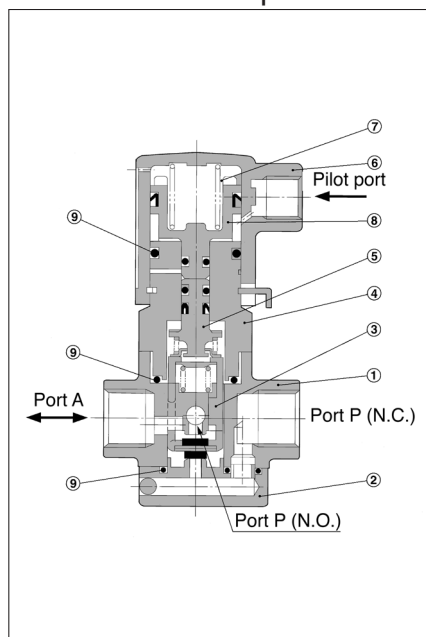


Note 1) Refer to p.4.0-13 the glossary for detail of max.operating pressure differential and max. system pressure.

Symbol



Construction/Components



| No. | Description | Standard | |
|-----|-------------------|-------------------------------------|----------------------------|
| ① | Body assembly | Brass | Stainless steel |
| ② | Retainer assembly | Brass | Stainless steel |
| ③ | Valve assembly | NBR Polyacetal | FPM/EPR Stainless steel |
| ④ | Adapter | Brass | Stainless steel |
| ⑤ | Travel assembly | Stainless steel, NBR, Polyacetal | FPM/EPR Stainless steel |
| ⑥ | Pilot cover | Aluminium | — |
| ⑦ | Piston spring | Stainless steel | — |
| ⑧ | Piston assembly | Polyacetal, NBR | — |
| ⑨ | O ring | NBR | FPM/EPR |

Ambient and Fluid Temperature

| Temperature | Fluid temperature °C | | | | Ambient temperature °C |
|-------------|----------------------|-------------------|-------------------|---------------------------------|---------------------------|
| | Water (Standard) | Air (Standard) | Oil (Standard) | Vacuum ⁽³⁾ (V, M) | |
| Max. | 40 | 60 | 40 | 40 | 40 |
| Min. | 1 | -5 ⁽¹⁾ | -5 ⁽²⁾ | -5 | -5 |

Note 1) Dew point: -10°C or less. Note 2) 500cSt or less.

Note 3) "V", "M" in the parenthesis are option symbols.

Tightness of Valve(Leakage)

| Seal | Fluid | Air | Liquid | Non-leak, Vacuum ⁽²⁾ |
|---------------|-------|-------------------------|--|---------------------------------|
| NBR, FPM, EPR | | " 1cm ³ /min | " 0.1cm ³ /min ⁽¹⁾ | " 10 ⁻⁵ atm cc/sec |



Note 1) Differ from the operating condition of pressure.

Note 2) Value on option "V", "M" (Non-leak, Vacuum).

Pilot Pressure

| Model | Pressure MPa |
|--------------------|--------------|
| VXA31□4 VXA32□4 | 0.25 to 0.7 |

How to Order

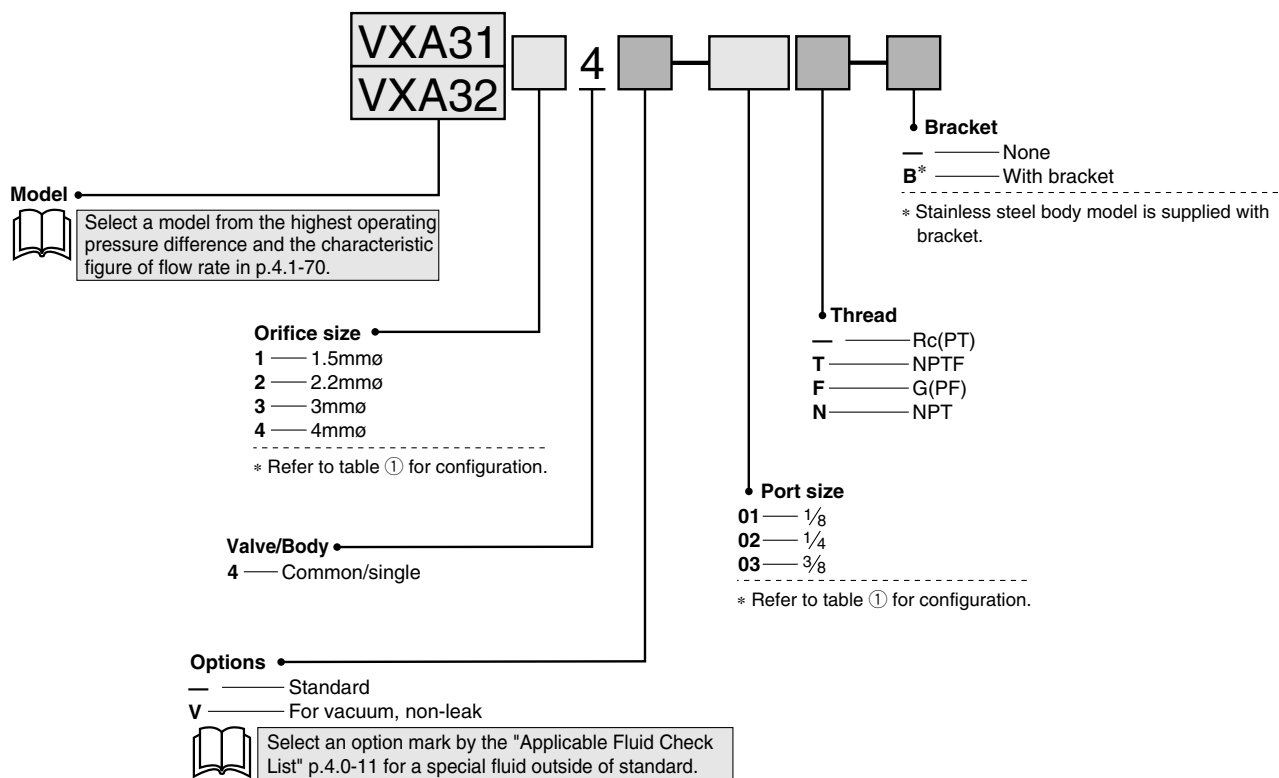


Table ① Port/Orifice Size

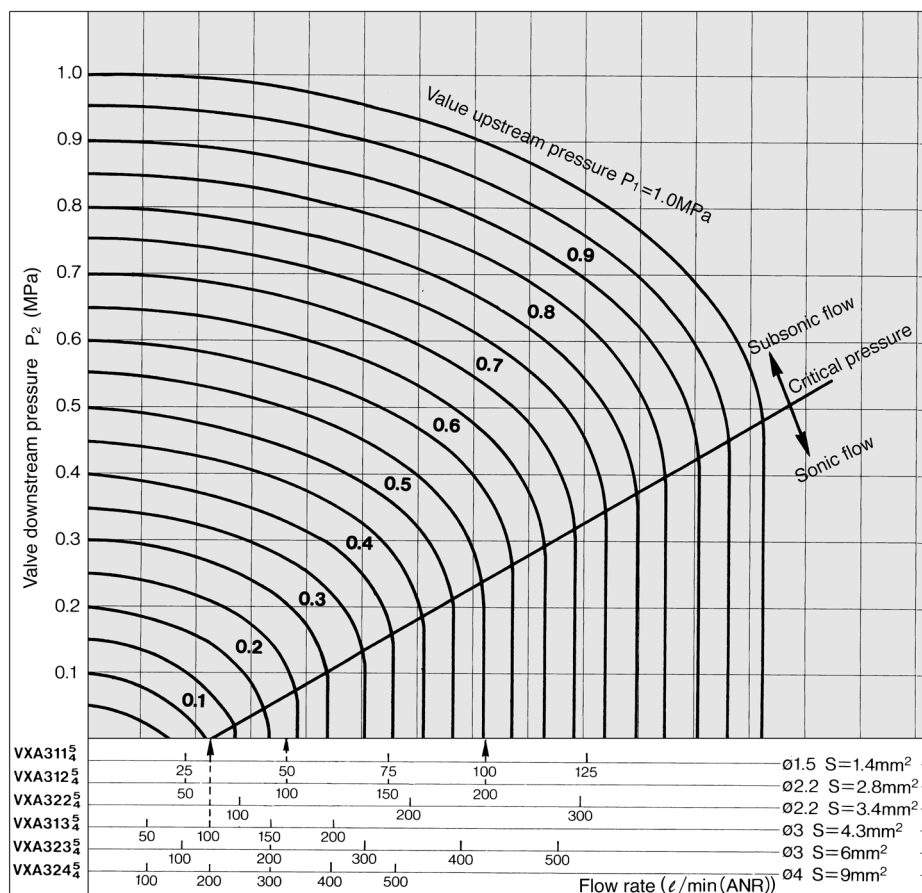
| Valve (Port size) | | Orifice size (No.) | | | |
|-------------------|----------|--------------------|---------------|-------------|-------------|
| VXA31 | VXA32 | 1 (1.5mmø) | 2 (2.2mmø) | 3 (3mmø) | 4 (4mmø) |
| 01 (1/8) | — | ● | ● | ● | — |
| 02 (1/4) | — | ● | ● | ● | — |
| — | 02 (1/4) | — | ● | ● | ● |
| — | 03 (3/8) | — | ● | ● | ● |

Ordering Example

(Example) Series VXA31, Orifice size 1.5mmø, Rc(PT)1/8
(Part number) VXA3114-01

VXA31/32

Air



How to Read the Graph

In the sonic flow region:

For a flow of 100 l/min.(ANR)

Orifice ø3 (VXA313⁵/₄).....P₁ ≅ 0.1MPa

Orifice ø2.2 (VXA312⁵/₄).....P₁ ≅ 0.23MPa

Orifice ø1.5 (VXA311⁵/₄).....P₁ ≅ 0.55MPa

How to Calculate Flow/Air

① Equation in the domain of subsonic flow
 $P_1 + 0.1013 = (1 + 1.8941)(P_2 + 0.1013)$

• Calculation by Cv factor

$Q = 4073.4 \cdot C_v \cdot \sqrt{\Delta P (P_2 + 0.1013)}$ l/min(ANR)

• Calculation by effective area

$Q = 226.3 \cdot S \cdot \sqrt{\Delta P (P_2 + 0.1013)}$ l/min(ANR)

② Equation in the domain of sonic flow

$P_1 + 0.1013 \geq 1.8941(P_2 + 0.1013)$

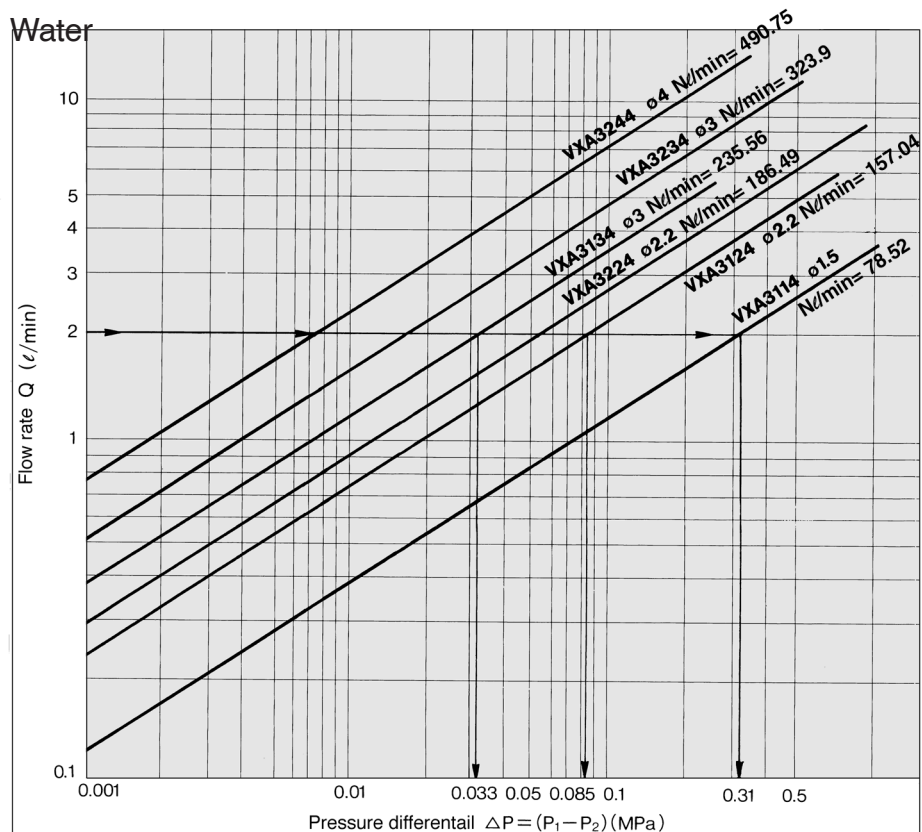
• Calculation by Cv factor

$Q = 1972.8 \cdot C_v \cdot (P_1 + 0.1013)$ l/min(ANR)

• Calculation by effective area

$Q = 109.6 \cdot S \cdot (P_1 + 0.1013)$ l/min(ANR)

Water



How to Read the Graph

In case of a flow of 2 l/min.

Orifice ø3 valve (VXA3134)....ΔP ≅ 0.033MPa

Orifice ø2.2 valve (VXA3124)....ΔP ≅ 0.085 MPa

Orifice ø1.5 valve (VXA3114)....ΔP ≅ 0.31MPa

How to Calculate Flow/Water

• Calculation by Cv factor

$Q = 14.2 \cdot C_v \cdot \sqrt{10.2 \cdot \Delta P}$ l/min

• Calculation by effective area[Smm²]

$Q = 0.8 \cdot S \cdot \sqrt{10.2 \cdot \Delta P}$ l/min

Q : Flow (Air l/min(ANR)), (Steam kg/h),
(Water l/min)

ΔP: Pressure differential (P₁ - P₂)

P₁ : Upstream pressure (MPa)

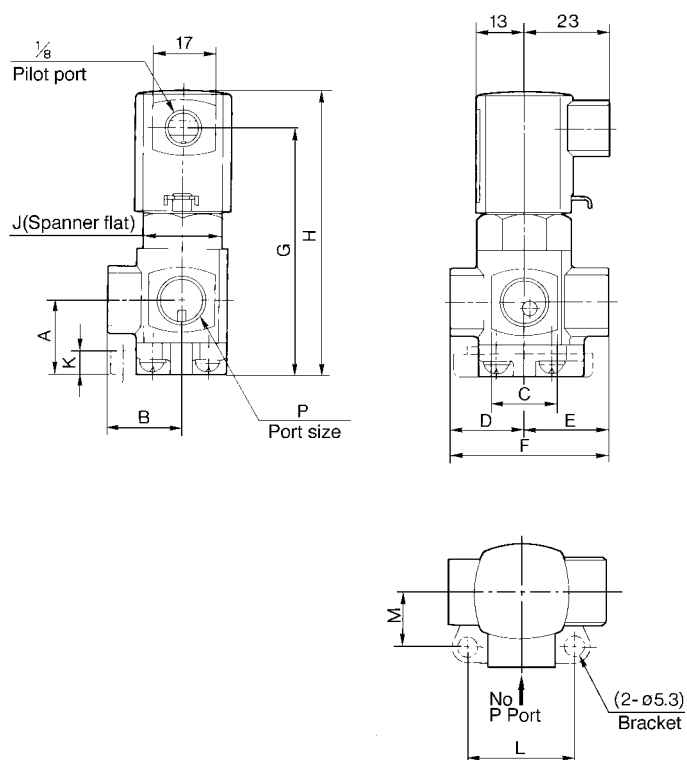
P₂ : Downstream pressure (MPa)

θ : Fluid temperature (°C)

S : Effective area (mm²)

Cv : Cv factor (l)

Dimensions



| Symbol Model | Port size P | A | B | C | D | E | F | G | H | J | With bracket | | |
|-----------------|-------------|----|----|----|----|------|------|----|----|----|--------------|----|------|
| | | | | | | | | | | | K | L | M |
| VXA31 | 1/8, 1/4 | 19 | 20 | 18 | 20 | 22.5 | 42.5 | 71 | 81 | 21 | 6 | 29 | 14.5 |
| VXA32 | 1/4, 3/8 | 25 | 20 | 21 | 20 | 27.5 | 47.5 | 80 | 90 | 27 | 7.5 | 32 | 17 |

Direct Air Operated
3 Port Valve/Manifold

Series VVXA31/32

For Air, Gas, Vacuum and Oil



Compatible with a wide variety of fluids.

Application can be matched by simply choosing the correct seal material (NBR, FPM or EPR).

It is possible to replace valve without changing existing piping.

Configuration can be changed from N.C. to N.O., and from N.O. to N.C. easily.

Weight-saving aluminium base and body.

(Not applicable to water or steam.)

Variations

Valve

Common (C.O.)

Port A

Port P

Port R

Normally closed (N.C.)

Normally open (N.O.)

Material

Base, Body — Aluminium

Seal — NBR, FPM, EPR

Manifold

Manifold style — B mount

Manifold stations — 2 to 10 stations

Model

| Manifold base | Port A | Port P | Port R |
|------------------|--------|--------|--------|
| VVXA311-stations | 1/8 | 1/4 | 1/4 |
| VVXA312-stations | 1/4 | | |
| VVXA321-stations | 1/8 | | |
| VVXA322-stations | 1/4 | | |

VVXA31/32

Common (C.O.)

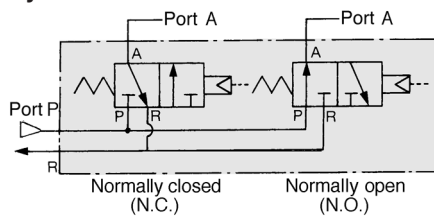
Applicable Fluids

| Standard | Option ⁽¹⁾ |
|---|---|
| Air (Standard, Dry), Vacuum (Up to 1 Torr), Turbine oil, Carbon dioxide (CO ₂), Nitrogen gas (N ₂) Freon 11, 113, 114 | Vacuum (Up to 10 ⁻³ Torr) (V) Non-leak or less (10 ⁻⁵ atm cc/sec or less) (V) Others |

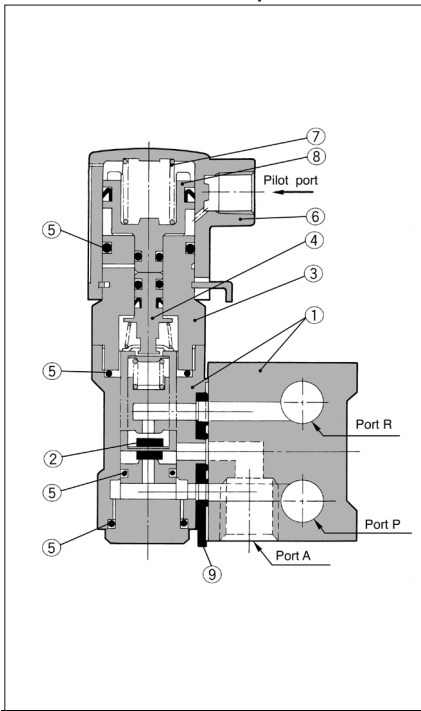


Note 1) Refer to p.4.0-11 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.

Symbol



Construction/Components



| No. | Description | Material | |
|-----|---------------------|-------------------|-------------------------------|
| | | Standard | Options |
| ① | Manifold body, base | Aluminium | Brass (Base is aluminium.) |
| ② | Valve assembly | NBR Polyacetal | EPR/FPM |
| ③ | Adapter | Aluminium | EPR/FPM |
| ④ | Travel assembly | NBR Polyacetal | EPR/FPM |
| ⑤ | O ring | NBR | EPR/FPM |
| ⑥ | Pilot cover | Aluminium | — |
| ⑦ | Piston spring | Stainless steel | — |
| ⑧ | Piston | NBR Polyacetal | — |
| ⑨ | Gasket | NBR | FPM/EPR |

Manifold Specifications

| Manifold | B Mount | |
|---|---|-----------|
| Manifold base | Common supply, Common exhaust, Common out | |
| Number of valves | 2 to 10 stations | |
| Blanking plate (With gasket, screws) | VVXA31 | VX011-004 |
| | VVXA32 | VX011-005 |

Manifold Base and Applicable Valve

| Manifold base | Individual port | Applicable valve | Base weight (g) |
|------------------|-----------------|------------------|-----------------|
| VVXA311-stations | 1/8 | VXA31□5-00 | n X 100+50 |
| VVXA312-stations | 1/4 | | |
| VVXA321-stations | 1/8 | VXA32□5-00 | n X 160+70 |
| VVXA322-stations | 1/4 | | |

Model/Valve Specifications

| Orifice size (mm) | Flow rate | | Model | Max. operating pressure differential (MPa) | Max. system pressure (MPa) | Proof pressure (MPa) | ⁽¹⁾ Weight (g) |
|----------------------|---------------------|--------------------------------------|------------|---|-------------------------------|-------------------------|------------------------------|
| | N ₂ /min | Effective area (mm ²) | | | | | |
| 1.5 | 78.52 | 1.4 | VXA3115-00 | 1.0 | 1.0 | 1.5 | 150 |
| 2.2 | 157.04 | 2.8 | VXA3125-00 | 0.5 | | | 230 |
| | 186.49 | 3.4 | VXA3225-00 | 1.0 | | | 150 |
| 3 | 235.56 | 4.3 | VXA3135-00 | 0.3 | | | 230 |
| | 323.9 | 6 | VXA3235-00 | 0.6 | | | 230 |
| 4 | 490.75 | 9 | VXA3245-00 | 0.3 | | | 230 |



Note 1) • Add the V type (VXA31) 80g, (VXA32) 130g.

• Refer to p.4.0-13 the glossary for detail of max. operating pressure and max. system.

Ambient and Fluid

| Temperature | Fluid temperature °C | | | Ambient temperature °C |
|-------------|----------------------|-------------------|------------------------------|---------------------------|
| | Air (Standard) | Oil (Standard) | Vacuum ⁽³⁾ (V) | |
| Max. | 60 | 40 | 40 | 40 |
| Min. | -5 ⁽¹⁾ | -5 ⁽²⁾ | -5 | -5 |



Note 1) Dew point: -5°C or less

Note 2) 500cSt or less

Note 3) "V" in the parenthesis is option symbol.

Tightness of Valve(Leakage)

| Seal | Fluid | Air | Liquid | Non-leak, Vacuum ⁽²⁾ |
|------|---------------|-------------------------|--|---------------------------------|
| | NBR, FPM, EPR | " 1cm ³ /min | " 0.1cm ³ /min ⁽¹⁾ | " 10 ⁻⁵ atm cc/sec |



Note 1) Differ from the operating condition of pressure.

Note 2) Value on option "V" (Non-leak, Vacuum).

Pilot Pressure

| Model | Pressure MPa |
|--------------------|--------------|
| VXA31□5 VXA32□5 | 0.25 to 0.7 |

How to Order/Manifold

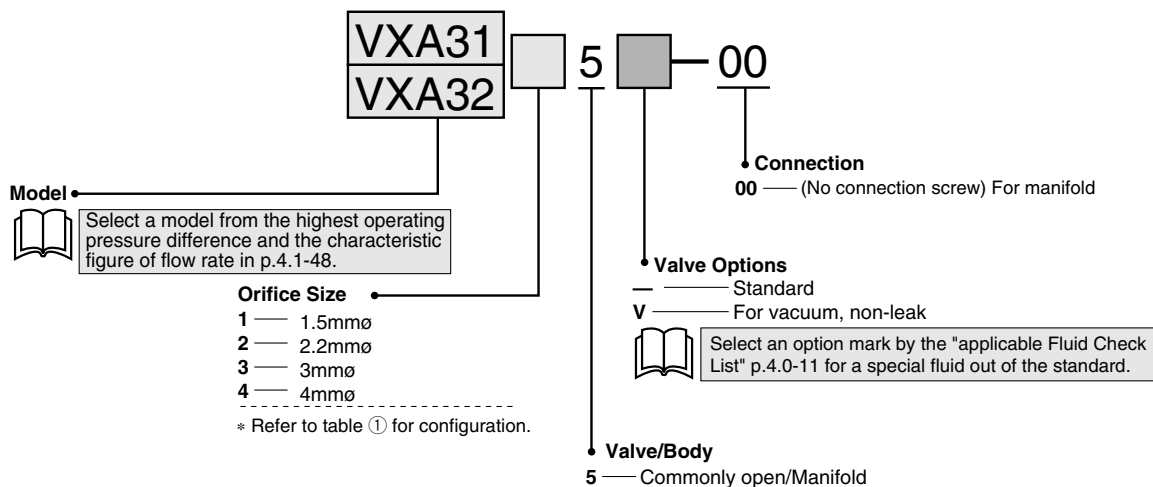
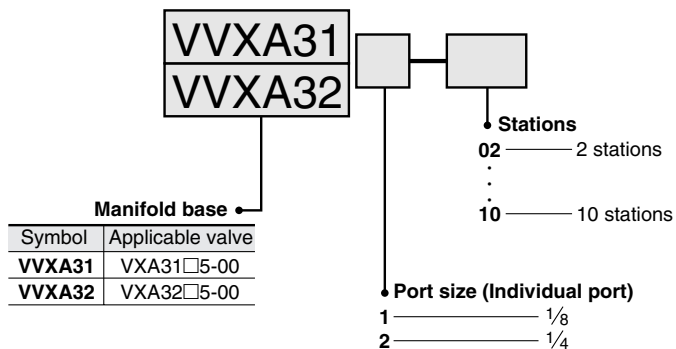


Table ① Orifice Size

| Model | Orifice size (No.) | | | |
|-------|--------------------|---------------|-------------|-------------|
| | 1 (1.5mmø) | 2 (2.2mmø) | 3 (3mmø) | 4 (4mmø) |
| VXA31 | ● | ● | ● | — |
| VXA32 | — | ● | ● | ● |

How to Order Manifold Base

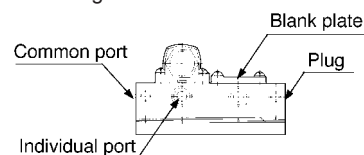


* All common ports are Rc(PT) 1/4.
The common SUP is indicated as "P" on the common port and the individual SUP is indicated as "VAC".

■ Write both the base style and the style of valve or blank plate manifold.
(Example) 7stations of VXA31, Individual port Rc(PT)1/8

(Base) VXA311-07..... 1 pc
(Valve) VXA3115-00..... 6 pcs.
(Blank plate) VX011-004..... 1 pc.

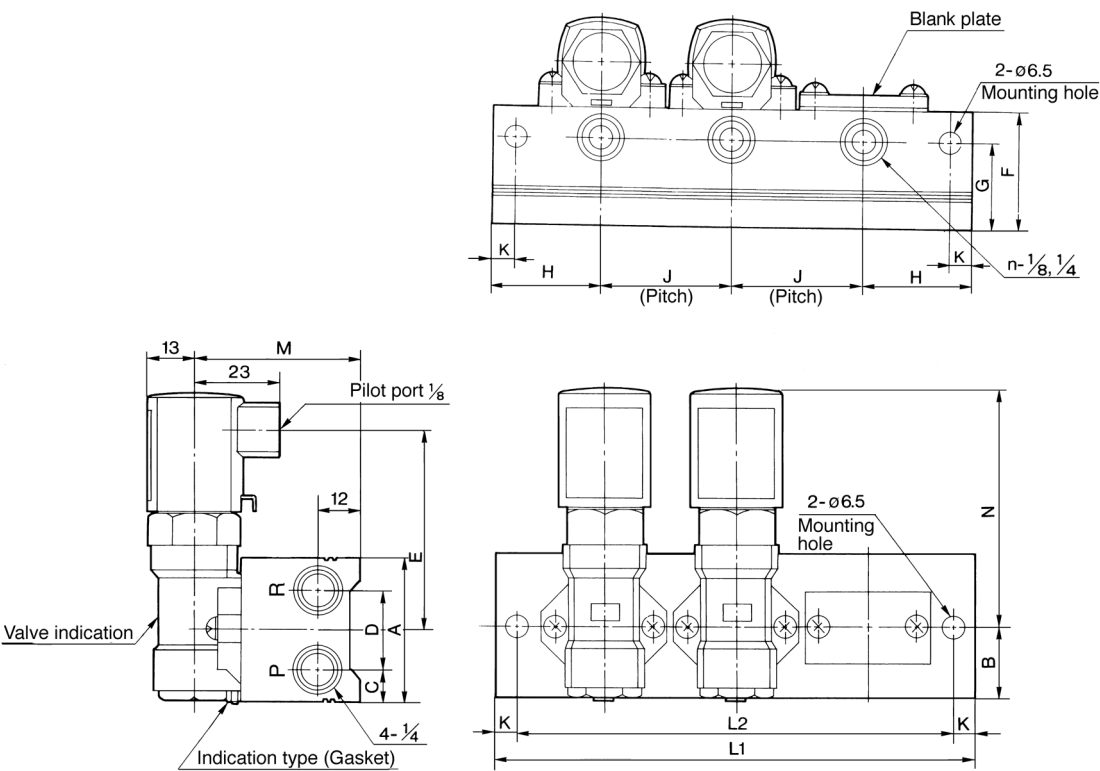
■ Arrangement of solenoid valves



The standard arrangement of manifolds should be placed on an individual port on this side, each solenoid valve from the left side and a blank plate in the right side. The right side of the common port provides plug.

VVXA31/32

Dimensions






| Model \ Stations | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | L | | | | | | | | |
| VVXA31 | L1 | 96 | 132 | 168 | 204 | 240 | 276 | 312 | 348 | 384 |
| | L2 | 84 | 120 | 156 | 192 | 228 | 264 | 300 | 336 | 372 |
| VVXA32 | L1 | 126 | 172 | 218 | 264 | 310 | 356 | 402 | 448 | 494 |
| | L2 | 108 | 154 | 200 | 246 | 292 | 338 | 384 | 430 | 476 |

| Model \ Symbol | A | B | C | D | E | F | G | H | J | K | M | N |
|----------------|----|----|----|----|----|----|----|----|----|---|------|----|
| VVXA31 | 40 | 20 | 9 | 22 | 59 | 33 | 24 | 30 | 36 | 6 | 45.5 | 69 |
| VVXA32 | 44 | 22 | 10 | 24 | 66 | 34 | 25 | 40 | 46 | 9 | 50.5 | 76 |

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) ¹⁾, and other safety regulations.

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

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

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications.

Our products are not developed, designed, and manufactured to be used under the following conditions or environments.

Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogues and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.

Use in non-manufacturing industries is not covered.

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first. ²⁾ Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
 2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
 3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.
- 2) Vacuum pads are excluded from this 1 year warranty.
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.

SMC Corporation (Europe)

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| Croatia | +385 (0)13707288 | www.smc.hr | sales.hr@smc.com |
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| Hungary | +36 23513000 | www.smc.hu | office.hu@smc.com |
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| Slovakia | +421 (0)413213212 | www.smc.sk | sales.sk@smc.com |
| Slovenia | +386 (0)73885412 | www.smc.si | office.si@smc.com |
| Spain | +34 945184100 | www.smc.eu | post.es@smc.com |
| Sweden | +46 (0)86031240 | www.smc.nu | order.se@smc.com |
| Switzerland | +41 (0)523963131 | www.smc.ch | helpcenter.ch@smc.com |
| Turkey | +90 212 489 0 440 | www.smcturkey.com.tr | satis@smcturkey.com.tr |
| UK | +44 (0)845 121 5122 | www.smc.uk | sales.gb@smc.com |
| South Africa | +27 10 900 1233 | www.smcza.co.za | Sales.za@smc.com |