Compact Direct Operated 2/3 Port Solenoid Valve for Water and Air

Series **VDW**

VDW10/20/30: 2 Port, VDW200/300: 3 Port

Series VDW10/20/30 2-port type has been remodeled to new compact and lightweight series. For details about new series, refer to pages 371 for VDW10/20 and 27 (Series VX2) for VDW30, respectively.

Molded coil specifications have been added!

Grommet/Molded  Flat terminal/Molded
**Series VDW**

**For Water and Air** Compact Direct Operated 2/3 Port Solenoid Valve

Series VDW10/20/30 2-port type has been remodeled to new compact and lightweight series. For details about new series, refer to pages 371 for VDW10/20 and 27 (Series VX2) for VDW30, respectively.

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**Improved durability (Nearly twice the life of the previous series)**

- The use of a unique magnetic material reduces the operating resistance of moving parts, while improving service life, wear and corrosion resistance.

**Improve corrosion resistance**

- Special material introduced

**High flow rate: Cv factor**

- 0.04 to 0.46 (2 port)

**Universal porting**

- VDW200/300 (3 port)

**Improved environment resistance**

- Environment resistance is improved by using a molded coil. (Enclosure IP65 or equivalent, grommet mold)

**Brass (C37)/Stainless steel manifolds added to series**

- (2 port)

**Ease of maintenance has been improved.**

- Changing of the coil is made easy by means of clip design. (2 port)

**Threaded assembly**

- Simplifies maintenance.

**Threaded for bottom mounting**

- Special bracket can be mounted.

---

**Lineup by Compact Design**

<table>
<thead>
<tr>
<th>2 Port</th>
<th>P.391</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø17</td>
<td>VDW10</td>
</tr>
<tr>
<td>ø20.5</td>
<td>VDW20</td>
</tr>
<tr>
<td>ø28</td>
<td>VDW30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 Port</th>
<th>P.402</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø20.5</td>
<td>VDW200</td>
</tr>
<tr>
<td>ø28</td>
<td>VDW300</td>
</tr>
</tbody>
</table>
Series VDW10/20/30 2-port type has been remodeled to new compact and lightweight series. For details about new series, refer to pages 371 for VDW10/20 and 27 (Series VX2) for VDW30, respectively.

How to Order Valves (Single Unit)

*Please consult with SMC regarding other voltages.*
Series VDW10/20/30 2-port type has been remodeled to new compact and lightweight series. For details about new series, refer to pages 371 for VDW10/20 and 27 (Series VX2) for VDW30, respectively.

**Standard Specifications**

### Valve construction
- Direct operated poppet

### Fluid
- Water (except waste water or agricultural water), Air, Low vacuum

### Withstand pressure (MPa)
- 2.0

### Ambient temperature (°C)
- –10 to 50

### Fluid temperature (°C)
- 1 to 50 (No freezing)

### Environment
- Location without corrosive or explosive gases

### Valve leakage (cm³/min)
- 0 (with water pressure) 1 or less (Air)

### Mounting orientation
- Unrestricted

### Vibration/Impact (m/s²)
- 30/150

### Rated voltage
- 24 VDC, 12 VDC, 6 VDC, 5 VDC, 3 VDC, 100 VAC, 110 VAC, 200 VAC, 220 VAC (50/60 Hz)

### Allowable voltage fluctuation (%)
- ±10% of rated voltage

### Coil insulation type
- Class B

### Enclosure
- Dust-tight (equivalent to IP60)

### Power consumption (W)
- 2.5 (VDW10), 3 (VDW20/30)

---

### Made to Order
(For details, refer to page 407.)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>-X22</td>
<td>Non-leak (10⁻⁶ Pa·m³/sec) / Vacuum (0.1Pa- abs) specification</td>
</tr>
<tr>
<td>-X23</td>
<td>Oil-free specification</td>
</tr>
<tr>
<td>-X60</td>
<td>Lead wire length: 600 mm specification</td>
</tr>
<tr>
<td>-X133</td>
<td>Seal material: Perfluoroelastomer specification</td>
</tr>
</tbody>
</table>

**Characteristic Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>Port size</th>
<th>Orifice dia. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDW10</td>
<td>M5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.3</td>
</tr>
<tr>
<td>VDW20</td>
<td>M5 1/8 (6A)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.3</td>
</tr>
<tr>
<td>VDW30</td>
<td>1/8 (6A)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1/4 (8A)</td>
<td>3</td>
</tr>
</tbody>
</table>

### Flow Characteristics

<table>
<thead>
<tr>
<th>Model</th>
<th>Port size</th>
<th>Orifice dia. (mm)</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDW10</td>
<td>M5</td>
<td>1</td>
<td>0.9</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.6</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.3</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>VDW20</td>
<td>M5 1/8 (6A)</td>
<td>1</td>
<td>0.9</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.6</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.3</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/4 (8A)</td>
<td>3</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>0.2</td>
<td></td>
</tr>
</tbody>
</table>

---

Note 1) The maximum operating pressure differential changes depending on the flow direction of the fluid. Refer to page 412 for details.

Note 2) For low vacuum specifications, the operating pressure range is 1 Torr (1.33 x 10⁻⁶ Pa) to 1.0 MPa. Please consult with SMC if using below 1 Torr (1.33 x 10⁻⁶ Pa).

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Note 3) Since the AC coil specification includes a rectifier element, there is no difference in power consumption between inrush and holding. In the case of 110/220 VAC, the VDW10 is 3 W and the VDW20/30 is 3.5 W.

Note 4) Vibration resistance — No malfunction when tested with one sweep of 5 to 200 Hz in the axial direction and at a right angle to the armature, in both energized and deenergized states.

Impact resistance — No malfunction when tested with a drop tester in the axial direction and at a right angle to the armature, one time each in energized and deenergized states.

Note 5) Since electrical connections are exposed, there is no water resistance.
Compact Direct Operated
2 Port Solenoid Valve for Water and Air  **Series VDW10/20/30**

Series VDW10/20/30 2-port type has been remodeled to new compact and lightweight series.
For details about new series, refer to pages 371 for VDW10/20 and 27 (Series VX2) for VDW30, respectively.

### Construction

**VDW11**

1. Body
2. Tube assembly
3. Armature assembly
4. O-ring (Body)
5. Return spring
6. Cover
7. Clip
8. Return spring

**VDW21**

1. Body
2. Tube assembly
3. Armature assembly
4. O-ring (Body)
5. Return spring
6. Cover
7. Clip
8. Return spring

**VDW31**

1. Body
2. Tube assembly
3. Armature assembly
4. O-ring (Body)
5. Return spring
6. Cover
7. Clip
8. Return spring

### Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Standard</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>Brass (C37)</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>2</td>
<td>Tube assembly</td>
<td>Stainless steel</td>
<td>–</td>
</tr>
<tr>
<td>3</td>
<td>Coil assembly</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>4</td>
<td>Armature assembly</td>
<td>Stainless steel, PPS, NBR</td>
<td>FKM, EPDM</td>
</tr>
<tr>
<td>5</td>
<td>O-ring (Body)</td>
<td>NBR</td>
<td>FKM, EPDM</td>
</tr>
<tr>
<td>6</td>
<td>Return spring</td>
<td>Stainless steel</td>
<td>–</td>
</tr>
<tr>
<td>7</td>
<td>Cover</td>
<td>SPCE</td>
<td>–</td>
</tr>
<tr>
<td>8</td>
<td>Clip</td>
<td>Stainless steel</td>
<td>–</td>
</tr>
</tbody>
</table>
Series VDW10/20/30

Dimensions

VDW11-G

- Lead wire: L Approx. 300
- Rectifier element: AC type
- 2 x ø3.2

VDW21-G

- Lead wire: L Approx. 300
- Rectifier element: AC type
- 2 x ø3.5

VDW31-G

- Lead wire: L Approx. 300
- Rectifier element: AC type
- 2 x M2.5 x 3.5

Bracket assembly part no.

- Series 10, 20

VDW 2 0 – 15A – 1

- Series 30

VCW20 – 12 – 01A
Compact Direct Operated
2 Port Solenoid Valve for Water and Air Series VDW10/20/30

Series VDW10/20/30 2-port type has been remodeled to new compact and lightweight series.
For details about new series, refer to pages 371 for VDW10/20 and 27 (Series VX2) for VDW30, respectively.

Dimensions

Bracket assembly part no.
• Series 20

VDW20 — 15A — 1

• Series 30

VCW20 — 12 — 01A
**Series VDW10/20/30**

### How to Order Manifold

**VV2DW**

<table>
<thead>
<tr>
<th>Series</th>
<th>Valve part no.</th>
<th>Option</th>
<th>CE-compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>Nil</td>
<td>Q</td>
<td>Nil</td>
</tr>
<tr>
<td>F</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>With bracket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>CE-compliant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Material**

- Symbol: A
  - Manifold material: Brass (C37)
  - Seal material: FKM
- Symbol: B
  - Manifold material: Stainless steel
  - Seal material: EPDM

**Stations**

- Symbol: G
  - Stations: 2
- Symbol: H
  - Stations: 10
- Symbol: J
  - Stations: 10

**Thread type**

- Symbol: Nil
  - N.C. for manifold
- Symbol: F
  - G
  - N
  - P
  - T
  - X
- Symbol: Rc
  - H
  - N
  - P

**Thread size**

- Symbol: M5
- Symbol: 1/8 (6A)
- Symbol: 1/4 (8A)

**Material**

- Symbol: G
  - Plate material: Stainless steel
  - Seal material: FKM
- Symbol: J
  - Plate material: EPDM

### How to Order Valves (For Manifold)

**VDW**

<table>
<thead>
<tr>
<th>Series</th>
<th>Valve part no.</th>
<th>Option</th>
<th>CE-compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>Nil</td>
<td>Q</td>
<td>Nil</td>
</tr>
<tr>
<td>F</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>With bracket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>CE-compliant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Material**

- Symbol: A
  - Body material: Brass (C37)
  - Seal material: NBR
- Symbol: B
  - Body material: Stainless steel
  - Seal material: EPDM
- Symbol: G
  - Body material: Stainless steel
  - Seal material: FKM
- Symbol: H
  - Body material: Stainless steel
  - Seal material: EPDM
- Symbol: J
  - Body material: Stainless steel
  - Seal material: FKM

**Coil type**

- Symbol: Nil
- Symbol: G
  - Grommet / Tape winding (G)
- Symbol: F
  - Flat terminal / Molded (F)
- Symbol: W
  - Grommet / Molded (W)

**Orifice diameter**

- Symbol: Nil
  - 1
  - 2
  - 3
  - 4

**Note**

- The armature assembly is a corrosion resistant construction.

### Manifold Options

**Blanking plate assembly**

- **Series 10, 20**
  - Symbol: G
    - Material: Stainless steel
    - Seal material: FKM
  - Symbol: J
    - Material: EPDM
  - Symbol: Nil
    - Material: Stainless steel only.

- **Series 30**
  - Symbol: G
    - Material: Stainless steel
    - Seal material: FKM
  - Symbol: J
    - Material: EPDM
Dimensions

**VV2DW1**

2 x +1/8 (IN port)
(=: Thread type)

### L Dimension

<table>
<thead>
<tr>
<th>Dimension</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<tbody>
<tr>
<td>L1</td>
<td>35</td>
<td>52.5</td>
<td>70</td>
<td>87.5</td>
<td>105</td>
<td>122.5</td>
<td>140</td>
<td>157.5</td>
<td>175</td>
</tr>
<tr>
<td>L2</td>
<td>45</td>
<td>62.5</td>
<td>80</td>
<td>97.5</td>
<td>115</td>
<td>132.5</td>
<td>150</td>
<td>167.5</td>
<td>185</td>
</tr>
<tr>
<td>L3</td>
<td>52</td>
<td>69.5</td>
<td>87</td>
<td>104.5</td>
<td>122</td>
<td>139.5</td>
<td>157</td>
<td>174.5</td>
<td>192</td>
</tr>
</tbody>
</table>

| Manifold composition | 2 stns. x 1 | 3 stns. x 1 | 2 stns. x 2 | 2 stns. + 3 stns. | 3 stns. x 2 | 2 stns. x 2 + 3 stns. | 2 stns. + 3 stns. x 2 | 3 stns. x 3 | 2 stns. x 2 + 3 stns. x 2 |

Note) Manifold base is consisted of the junction of 2 and 3 station bases.
Refer to pages 400 and 401 regarding manifold additions.
Series VDW10/20/30

Dimensions

VV2DW2

![Diagram of VDW10/20/30 series]

**L Dimension**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>44</td>
<td>66</td>
<td>88</td>
<td>110</td>
<td>132</td>
<td>154</td>
<td>176</td>
<td>198</td>
<td>220</td>
</tr>
<tr>
<td>L2</td>
<td>53</td>
<td>75</td>
<td>97</td>
<td>119</td>
<td>141</td>
<td>163</td>
<td>185</td>
<td>207</td>
<td>229</td>
</tr>
<tr>
<td>L3</td>
<td>62</td>
<td>84</td>
<td>106</td>
<td>128</td>
<td>150</td>
<td>172</td>
<td>194</td>
<td>216</td>
<td>238</td>
</tr>
</tbody>
</table>

**Manifold composition**

- 2 stns. x 1
- 3 stns. x 1
- 2 stns. x 2
- 3 stns. x 2
- 3 stns. x 3
- 2 stns. + 3 stns. x 2
- 3 stns. + 3 stns. x 2
- 2 stns. x 2 + 3 stns. x 2

**Note**

- When w/o bracket, M4 threads at both ends (4 locations) can be used for other purposes.

Refer to pages 400 and 401 regarding manifold additions.
**L Dimension**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>70</td>
<td>105</td>
<td>140</td>
<td>175</td>
<td>210</td>
<td>245</td>
<td>280</td>
<td>315</td>
<td>350</td>
</tr>
<tr>
<td>L2</td>
<td>82</td>
<td>117</td>
<td>152</td>
<td>187</td>
<td>222</td>
<td>257</td>
<td>292</td>
<td>327</td>
<td>362</td>
</tr>
<tr>
<td>L3</td>
<td>94</td>
<td>129</td>
<td>164</td>
<td>199</td>
<td>234</td>
<td>269</td>
<td>304</td>
<td>339</td>
<td>374</td>
</tr>
<tr>
<td>Manifold composition</td>
<td>2 stns. x 1</td>
<td>3 stns. x 1</td>
<td>2 stns. x 2</td>
<td>2 stns. + 3 stns.</td>
<td>3 stns. x 2</td>
<td>2 stns. x 2 + 3 stns.</td>
<td>2 stns. + 3 stns. x 2</td>
<td>3 stns. x 3</td>
<td>2 stns. x 2 + 3 stns. x 2</td>
</tr>
</tbody>
</table>

Note) Manifold base is consisted of the junction of 2 and 3 station bases. Refer to pages 400 and 401 regarding manifold additions.
Manifold Exploded View

<table>
<thead>
<tr>
<th>Bracket assembly</th>
<th>Manifold base for 2 stations</th>
<th>Passage pipe assembly</th>
<th>Manifold base for 3 stations</th>
<th>Bracket assembly</th>
</tr>
</thead>
</table>

* Figure shows VV2DW2.

**Manifold additions**

1. Install a passage pipe assembly in between the manifold bases to be added.

2. Connect the respective manifold bases with a connecting plate assembly. (Tightening torque: $0.9 \pm 0.1$ N·m)

3. Attach brackets to the manifold bases. (when equipped with brackets) (Tightening torque: $0.9 \pm 0.1$ N·m)

* Note: Manifold can be increased by every 2 or 3-station unit.
  Order one set each of manifold base, connection plate assembly and passage pipe assembly.
<Manifold base>
• Series 10, 20
VVDW 2 0 - 2 C 1 01

Series
1 10
2 20

Material
C Brass (C37)
S Stainless steel

Stations
1 For 2 stations
2 For 3 stations

<Connecting plate assembly>
• Series 10, 20
VVDW 2 0 - 4A

Series
1 10
2 20

Material
C Brass (C37)
S Stainless steel

<Passage pipe assembly>
• Series 10, 20
VVDW 2 0 - 6A

Series
1 10
2 20

Material
C Brass (C37)
S Stainless steel

Note) Two sets of connecting plate and mounting screws.

<Bracket assembly>
• Series 10, 20
VVDW 2 0 - 5A

Series
1 10
2 20

Material
C Brass (C37)
S Stainless steel

Note) Consists of a set for D and U sides.
Compact Direct Operated
3 Port Solenoid Valve for Water and Air
Series VDW200/300

How to Order Valves (Single Unit)

VD W 2 50 - 1 G - 2 - 01 - - - - -

- CE-compliant
  Nil Q CE-compliant

- Made to Order
  (Refer to page 403.)

- Option
  Nil None
  F Foot bracket

Note) The foot bracket is packed with a valve.

- Material and insulation type
  Symbol Body material Seal material Coil insulation
  Nil Brass (C37) NBR Class B
  A Stainless steel FKM
  B EPDM
  G NBR
  H FKM
  J EPDM
  L Nil

Note) The armature assembly is a corrosion resistant construction.

- Thread type
  Nil Rc
  F G
  N NPT

- Port size
  Symbol Port size Series 200 300
  M5 M5 — —
  01 1/8 (6A) — —
  02 1/4 (8A) — —

- Orifice diameter
  Symbol N.C. Orifice diameter (mm ø) N.O. Orifice diameter (mm ø) Series
  1 1 1 200
  2 1.6 1.8 300
  3 2 — —
  4 3 — —

Symbol Voltage Grommet / Tape winding (G) Flat terminal, Molded (F) Grommet / Molded (W)
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 ● ● ●
V 6 VDC ● ● ●
S 5 VDC ● ● ●
R 3 VDC ● ● ●

* Please consult with SMC regarding other voltages.

Symbol Magnet wire protection: Tape winding Magnet wire protection: Resin Molded
G Grommet / Tape winding W Grommet / Molded
Magnet wire protection: Tape winding Magnet wire protection: Resin Molded
F Flat terminal / Molded

Note) The foot bracket is packed with a valve.

1/8 (6A)
1/4 (8A)
## Standard Specifications

### Valve construction
- Direct operated poppet

### Fluid
- Water (except waste water or agricultural water), Air, Low vacuum

### Withstand pressure (MPa)
- 2.0

### Ambient temperature (°C)
- –10 to 50

### Fluid temperature (°C)
- 1 to 50 (No freezing)

### Environment
- Location without corrosive or explosive gases

### Valve leakage (cm³/min)
- 0 (with water pressure)  1 (Air)

### Mounting orientation
- Unrestricted

### Vibration/Impact (m/s²)
- 30/150

### Rated voltage
- 24 VDC, 12 VDC, 100 VAC, 110 VAC, 200 VAC, 220 VAC (50/60 Hz)

### Allowable voltage fluctuation (%)
- ±10% of rated voltage

### Coil insulation type
- Class B

### Enclosure
- Dust-proof (equivalent to IP40)
- Dust-tight (equivalent to IP60)
- Dust-tight / Low jetproof (equivalent to IP65)

### Power consumption (W)
- 3

### Note 1)
- Please consult with SMC when used under conditions which may cause condensation on the exterior of the product.

### Note 2)
- When used with deionized water, select “L” (Stainless steel, FKM) for the material type.

### Note 3)
- Since the AC coil specification includes a rectifier element, there is no difference in power consumption between inrush and holding.

### Note 4)
- Vibration resistance ······ No malfunction when tested with one sweep of 5 to 200 Hz in the axial direction and at a right angle to the armature, in both energized and deenergized states.
- Impact resistance ········ No malfunction when tested with a drop tester in the axial direction and at a right angle to the armature, one time each in energized and deenergized states.

### Note 5)
- Since electrical connections are exposed, there is no water resistance.

### Made to Order
- (For details, refer to page 407.)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>-X22</td>
<td>Non-leak ( (10^{-6}\text{ Pa} \cdot \text{m}^3/\text{sec}) / \text{Vacuum} \ (0.1\text{Pa-abs}) ) specification</td>
</tr>
<tr>
<td>-X23</td>
<td>Oil-free specification</td>
</tr>
<tr>
<td>-X60</td>
<td>Lead wire length: 600 mm specification</td>
</tr>
<tr>
<td>-X133</td>
<td>Seal material: Perfluoroelastomer specification</td>
</tr>
</tbody>
</table>

## Characteristic Specifications

### Model | Port size | Orifice dia. (mm ø) | Max. operating pressure differential (MPa) \(^{\text{Note 2)}} | Operating pressure range (MPa) \(^{\text{Note 3)}} | Weight (kg) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VDW200</td>
<td>M5 1/8 (6A)</td>
<td>1 0.9 0.3</td>
<td>0 to 1.0</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.6 0.7 0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 0.8 0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 0.4 0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 0.2 0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VDW300</td>
<td>1/8 (6A) 1/4 (8A)</td>
<td>2 0.8 0.2</td>
<td>1/8: 0.27 1/4: 0.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 0.4 0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 0.2 0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1) Indicates the maximum operating pressure differential of pressure ports 2 and 3.

Note 2) The maximum operating pressure differential changes depending on the flow direction of the fluid. Refer to page 412 for details.

Note 3) For low vacuum specifications, the operating pressure range is 1 Torr \( (1.33 \times 10^{-2}\\text{ Pa}) \) to 1.0 MPa. Please consult with SMC if using below 1 Torr \( (1.33 \times 10^{-2}\\text{ Pa}) \).

## Flow Characteristics

### Model | Port size | Orifice dia. (mm ø) | Water | Air |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1→2 (IN→N.C.)</td>
<td>1→3 (IN→N.O.)</td>
<td>1→2 (IN→N.C.)</td>
</tr>
<tr>
<td></td>
<td>N.C.</td>
<td>N.O.</td>
<td>C ( \text{dm}^3/(\text{s} \cdot \text{bar}) )</td>
<td>( b )</td>
</tr>
<tr>
<td>VDW200</td>
<td>M5 1/8 (6A)</td>
<td>1</td>
<td>0.72 0.03</td>
<td>0.96 0.04</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>1.7 0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3.8 0.16</td>
<td>3.1 0.13</td>
<td>0.52 0.52 0.16</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6.7 0.28</td>
<td></td>
<td>1.0 0.52 0.30</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>11 0.44</td>
<td></td>
<td>1.5 0.49 0.46</td>
</tr>
<tr>
<td>VDW300</td>
<td>1/8 (6A) 1/4 (8A)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Series VDW200/300

Construction

VDW250

VDW350

Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>Brass (C37), Stainless steel</td>
</tr>
<tr>
<td>2</td>
<td>Tube assembly</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>3</td>
<td>Coil assembly</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Armature assembly</td>
<td>Stainless steel, PPS, NBR, Stainless steel, PPS, FKM, EPDM</td>
</tr>
<tr>
<td>5</td>
<td>O-ring (Body)</td>
<td>NBR, FKM, EPDM</td>
</tr>
<tr>
<td>6</td>
<td>Return spring</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>7</td>
<td>Cover</td>
<td>SPCC</td>
</tr>
<tr>
<td>8</td>
<td>Socket</td>
<td>C36, Stainless steel</td>
</tr>
<tr>
<td>9</td>
<td>O-ring</td>
<td>NBR, FKM, EPDM</td>
</tr>
<tr>
<td>10</td>
<td>Plate</td>
<td>SPCC</td>
</tr>
<tr>
<td>11</td>
<td>Wave washer</td>
<td>Stainless steel</td>
</tr>
</tbody>
</table>
### Dimensions

**VDW250-□W**

- 2 x ø3.5
- 27 mm x ø20.5
- M5, 1/8
- Rectifier element
- Lead wire L Approx. 300
- 3 (N.O.) port

**VDW350-□W**

- 4 x ø5
- 25 mm x ø36 (27.6)
- M5, 1/8
- Rectifier element
- Lead wire L Approx. 300
- 3 (N.O.) port
- Dimensions inside () are for port size 1/8.

---

### Bracket assembly part no.

- **Series 200**
  - VDW20 – 15A – 1

- **Series 300**
  - VCW20 – 12 – 01A
Series VDW200/300

Dimensions

VDW250-□F

VDW350-□F

Bracket assembly part no.

• Series 200

VDW20 — 15A — 1

• Series 300

VCW20 — 12 — 01A
Series VDW
Made to Order Specifications:
Please consult with SMC for detailed size, specifications and delivery.

1. Non-leak (10⁻⁶ Pa·m³/sec)/Vacuum (0.1 Pa-abs) Specification
Symbol -X22
VDW Standard model no. — X22(-Q)

2. Oil-free Specification
Symbol -X23
VDW Standard model no. — X23(-Q)

3. Lead Wire Length: 600 mm Specification
Symbol -X60
VDW Standard model no. — X60(-Q)

Symbol -X133
VDW Standard model no. — X133(-Q)
### Design

#### Warning

1. **Cannot be used as an emergency shutoff valve, etc.**
   The valves presented in this catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

2. **Extended periods of continuous energization**
   Please consult with SMC when using with energization for long periods of time.

3. **Liquid rings**
   In cases with a flowing liquid, provide a by-pass valve in the system to prevent the liquid from entering the liquid seal circuit.

4. **This solenoid valve cannot be used for explosion proof applications.**

5. **Maintenance space**
   The installation should allow sufficient space for maintenance activities (removal of valve, etc.).

### Selection

#### Warning

1. **Confirm the specifications.**
   Give careful consideration to the operating conditions such as the application, fluid and environment, and use within the operating ranges specified in this catalog.

2. **Fluid temperature**
   Please use within the operating fluid temperature range.

3. **Fluid quality**
   **In the case of water**
   The use of a fluid which contains foreign matter can cause problems such as malfunction and seal failure by promoting wear of the valve seat and armature, and by sticking to the sliding parts of the armature, etc. Install a suitable filter (strainer) immediately upstream from the valve. In general, a mesh of about 80 to 100 is a guideline for the filter.

   **In the case of air**
   Please use ordinary compressed air where a filter of 40 µm or less is provided on the inlet side piping. (Except dry air)

#### Caution

1. **Leakage voltage**
   Particularly when using a resistor in parallel with a switching element and using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor, C-R element, etc., creating a possible danger that the valve may not turn off.

2. **Low temperature operation**
   1) The valves can be used up to an ambient temperature of \(-10^\circ\text{C}\), however take measures to prevent solidification of impurities or freezing etc.
   2) When using valves for water application in cold climates, first stop the water supply/discharge of the pump etc., and then take measures to prevent freezing such as draining water in pipe. When heating by steam, be careful not to expose the coil portion to steam. Also, please take measures to prevent freezing such as heating the body.
Series **VDW**

**Specific Product Precautions 2**

Be sure to read this before handling.
Refer to front matter 41 for Safety Instructions, and pages 17 to 19 for 2 Port Solenoid Valves for Fluid Control Precautions.

<table>
<thead>
<tr>
<th>Mounting</th>
<th>Piping</th>
</tr>
</thead>
</table>

---

### Warning

1. **If air leakage increases or equipment does not operate properly, stop operation.**
   After mounting is completed, confirm that it has been done correctly by performing a suitable function test.

2. **Do not apply external force to the coil section.**
   When tightening is performed, apply a wrench or other tool to the outside of the piping connection parts.

3. **Do not warm the coil assembly with a heat insulator, etc.**
   Use tape, heaters, etc., for freeze prevention on the piping and body only. They can cause the coil to burn out.

4. **Secure with brackets, except in the case of steel piping and copper fittings.**

5. **Avoid sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.**

6. **Instruction manual**
   The product should be mounted and operated after the instruction manual is thoroughly read and its contents are understood. Keep the instruction manual where it can be referred to as needed.

7. **Painting and coating**
   Warnings or specifications printed or labeled on the product should not be erased, removed or covered up.

---

### Caution

1. **Preparation before piping**
   Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

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

3. **Avoid connecting ground lines to piping, as this may cause electric corrosion of the system.**

4. **Always tighten threads with the proper tightening torque.**
   When attaching fittings to valves, tighten with the proper tightening torque shown below.

#### Tightening Torque for Piping

<table>
<thead>
<tr>
<th>Connection threads</th>
<th>Proper tightening torque N·m (kgf·cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5</td>
<td>1.5 to 2 (15 to 20)</td>
</tr>
<tr>
<td>Rc 1/8</td>
<td>7 to 9 (70 to 90)</td>
</tr>
<tr>
<td>Rc 1/4</td>
<td>12 to 14 (120 to 140)</td>
</tr>
<tr>
<td>Rc 3/8</td>
<td>22 to 24 (220 to 240)</td>
</tr>
</tbody>
</table>

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

5. **Connection of piping to products**
   - When connecting piping to a product, refer to its instruction manual to avoid mistakes regarding the supply port, etc.
   - Do not apply external force to the coil when holding it to connect piping, as the tube may deform.


**Series VDW**

Specific Product Precautions 3

Be sure to read this before handling.

Refer to front matter 41 for Safety Instructions, and pages 17 to 19 for 2 Port Solenoid Valves for Fluid Control Precautions.

---

**Wiring**

**Caution**

1. As a rule, use electrical wire with a cross sectional area of 0.5 to 1.25 mm² for wiring. Furthermore, do not allow excessive force to be applied to the lines.

2. Use electrical circuits which do not generate chattering in their contacts.

3. Use voltage which is within ±10% of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within ±5% of the rated value. The voltage drop is the value in the lead wire section connecting the coil.

---

**Operating Environment**

**Warning**

1. Do not use the valves in an atmosphere having corrosive gases, chemicals, salt water, water, steam, or where there is direct contact with any of these.

2. Do not use in explosive atmospheres.

3. Do not use in locations subject to vibration or impact.

4. Do not use in locations where radiated heat will be received from nearby heat sources.

5. Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.

---

**Electrical Connections**

**Caution**

**Warning**

1. Perform maintenance according to the procedure in the instruction manual. Incorrect handling will cause damage or malfunction to devices or equipment.

2. Removing the product

   1) Shut off the fluid supply and release the fluid pressure in the system.
   2) Shut off the power supply.
   3) Dismount the product.

3. Low frequency operation

   Switch valves at least once every 30 days to prevent malfunction. Also, in order to use it under the optimum state, conduct a regular inspection once a half year.

**Caution**

1. Filters and strainers

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

2. Storage

   When not using for a long time (more than approx. one month) after use with water, thoroughly remove all moisture to prevent rust and deterioration of rubber materials, etc.

---

**Electrical Circuit**

**Caution**

For details about new series, refer to pages 371 for VDW10/20 and 27 (Series VX2) for VDW30, respectively.
Series VDW
Specific Product Precautions 4

Be sure to read this before handling.
Refer to front matter 41 for Safety Instructions, and pages 17 to 19 for 2 Port Solenoid Valves for Fluid Control Precautions.

Series VDW10/20/30 2-port type has been remodeled to new compact and lightweight series.
For details about new series, refer to pages 371 for VDW10/20 and 27 (Series VX2) for VDW30, respectively.

Replacing the Solenoid Coils

**Caution**

2 port valve

3 port valve

- After removing the socket with a wrench, etc., lift off the plate, wave washer and cover, and replace the coil assembly. After replacing the coil, first tighten the socket by hand while holding down the plate and wave washer, and then tighten it further with a torque of 0.8 to 1 N·m.

- Precautions when attaching and removing the socket
- Be careful that the O-ring installed on the bottom (plate side) of the socket does not fall out or become chewed up, etc.
- Be sure to secure the body by wrench, etc., and tighten the socket within the tightening torque range given above. If the torque is applied excessively, there is a danger of damaging the threads.

OK

NG

Inserted position

Inserted condition
Replacement Parts

- **Solenoid coil part no.**
  - **VDW 2 0 1 C 1 1**
  - **Series**
    - 1 10
    - 2 20, 200
    - 3 30, 300
  - **Coil type**
    - C Grommet / Tape winding
    - F Flat terminal / Molded
    - W Grommet / Molded
  - **Type**
    - 1 10, 20, 30
    - 2 200, 300

**Leak wire length**
- Nil 300 mm
- L1 [mm] 600 mm

**Note:** Type L1 is optional.

**Voltage**
- 1 100 VAC
- 2 200 VAC
- 3 110 VAC
- 4 220 VAC
- 5 24 VDC
- 6 12 VDC
- V 6 VDC
- S 5 VDC
- R 3 VDC

**Fluid Flow Direction**

**Caution**
- The maximum operating pressure differential differs depending on the flow direction of the fluid. If the pressure differential at each port exceeds the values in the table below, valve leakage may occur.

**Coil Type and Voltage Combinations**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Grommet / Tape winding</th>
<th>Flat terminal / Molded</th>
<th>Grommet / Molded</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>110 VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>220 VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** To have a label on the cover, enter the part number below together with the coil part number.

**Socket assembly part no. (3 port)**
- **VDW 2 0 12A 01**
  - **Series**
    - 2 200
    - 3 300

**Material**

- **Symbol**
  - A Brass (C37)
  - G Stainless steel
  - H Stainless steel
  - J Stainless steel
  - M5 M5
  - M5 1/8 (6A)
  - M5 1/4 (8A)
  - N NPT

**Pressure port 1**

<table>
<thead>
<tr>
<th>Model</th>
<th>Orifice diameter (mm ø)</th>
<th>Max. operating pressure differential (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDW10</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>0.4</td>
</tr>
<tr>
<td>VDW20</td>
<td>1.6</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>2.3</td>
<td>0.4</td>
</tr>
<tr>
<td>VDW30</td>
<td>3.2</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.2</td>
</tr>
</tbody>
</table>

**Note:** Type L1 is optional.

**Note 1)** Indicates the maximum operating pressure differential of pressure ports 2 and 3.

**Note 2)** When the port 2 pressure is in the higher pressure side, be careful to avoid vibration and impacts, etc.

**3 Port Valve**

<table>
<thead>
<tr>
<th>Model</th>
<th>Orifice diameter (mm ø)</th>
<th>Max. operating pressure differential (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDW200</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>0.7</td>
</tr>
<tr>
<td>VDW300</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.2</td>
</tr>
</tbody>
</table>

**Note 1)** Indicates the maximum operating pressure differential of pressure ports 2 and 3.

**Note 2)** When the port 2 pressure is in the higher pressure side, be careful to avoid vibration and impacts, etc.

**Socket**

**Cover**

**Piping to 3 Port Valve N.O. Port**

**Caution**
- When piping to an N.O. port, be sure to perform piping work while securing the socket by using wrench or other tool. Refer to back page 409 for other precautions related to piping.

**2 Port Valve**

<table>
<thead>
<tr>
<th>Model</th>
<th>Orifice diameter (mm ø)</th>
<th>Max. operating pressure differential (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDW10</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>0.4</td>
</tr>
<tr>
<td>VDW20</td>
<td>1.6</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>2.3</td>
<td>0.4</td>
</tr>
<tr>
<td>VDW30</td>
<td>3.2</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.2</td>
</tr>
</tbody>
</table>

**Note:** Type L1 is optional.

**Note:** When applying pressure from port 2, be careful to avoid vibration and impacts, etc.

**2 Port Valve**

<table>
<thead>
<tr>
<th>Model</th>
<th>Orifice diameter (mm ø)</th>
<th>Max. operating pressure differential (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDW200</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>0.7</td>
</tr>
<tr>
<td>VDW300</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.2</td>
</tr>
</tbody>
</table>

**Note 1)** Indicates the maximum operating pressure differential of pressure ports 2 and 3.

**Note 2)** When the port 2 pressure is in the higher pressure side, be careful to avoid vibration and impacts, etc.
Pressure Terminology

1. Maximum operating pressure differential
   This indicates the maximum pressure differential (inlet and outlet pressure differential) which can be allowed for operation with the valve closed or open. When the outlet pressure is 0 MPa, this becomes the maximum operating pressure.

2. Maximum operating pressure
   This indicates the limit of pressure that can be applied inside the pipelines. (Line pressure)
   (The pressure differential of the solenoid valve unit must be no more than the maximum operating pressure differential.)

3. Withstand pressure
   The pressure which must be withstood without a drop in performance after returning to the operating pressure range (The value under the prescribed conditions).

Electrical Terminology

1. Surge voltage
   A high voltage which is momentarily generated in the shut-off unit by shutting off the power.

2. Enclosure
   A degree of protection defined in the “JIS C 0920: Waterproof test of electric machinery/appliance and the degree of protection against the intrusion of solid foreign objects”.
   Verify the degree of protection for each product.

<table>
<thead>
<tr>
<th>IP</th>
<th></th>
<th>Second characteristic numeral</th>
<th>First characteristic numeral</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Non-protected</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Protected against solid foreign objects of 50 mm ø and greater</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Protected against solid foreign objects of 12 mm ø and greater</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Protected against solid foreign objects of 2.5 mm ø and greater</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Protected against solid foreign objects of 1.0 mm ø and greater</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Dust-protected</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Dusttight</td>
<td></td>
</tr>
</tbody>
</table>

First Characteristics:
Degrees of protection against solid foreign objects

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<td>6</td>
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</tr>
</tbody>
</table>

Second Characteristics:
Degrees of protection against water

Example) IP65: Dusttight, Low jetproof type
“Low jetproof type” means that no water intrudes inside an equipment that could hinder from operating normally by means of applying water for 3 minutes in the prescribed manner. Take appropriate protection measures, since a device is not usable in an environment where a droplet of water is splashed constantly.

Glossary

**Other**

1. Material
   - NBR: Nitrile rubber
   - FKM: Fluororubber
   - EPDM: Ethylene propylene rubber
   - C37: Brass
   - SUS: Stainless steel

Electrical Terminology

1. Flat terminal/Electrical connection size of molded coil
   (Recommended fastening bolt: M3.5, length 5 mm)