High-Pressure Type Variable Volume Vane Pump

Features

1. Highly efficient and stable high-pressure operation
Innovative pressure control and pressure balance mechanisms combine with an original 3-point ring support system to dramatically improve high-pressure operation. The result is outstanding performance at high pressures up to 14MPa.

2. Low vibration and noise
A number of innovative new mechanisms are adopted to minimize vibration and noise. In particular, a 3-point support system is used for the control piston and bias piston to increase ring stability. This minimizes ring vibration and delivers quiet operation.

3. Outstanding response, high-precision operation
An innovative new ring stopper eliminates excessive ring displacement and improves response. The result is high precision operation at all times, including during starts, stops, and load changes.

4. Precise characteristics for a stable discharge rate
A revolutionary new pressure compensator type pressure control mechanism ensures a highly stable fixed discharge rate, even in the high pressure range.

5. High efficiency operation with minimal power loss
New mechanical innovations minimize power loss, especially at full cutoff.

6. Simplified maintenance and handling
Pressure adjusting and discharge rate adjusting mechanisms are located on the same side of the pump for simplified maintenance and handling.

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Capacity cm³/rev</th>
<th>No-load Discharge Rate ℓ/min</th>
<th>Pressure Adjustment Range MPa (kgf/cm²)</th>
<th>Allowable Peak Pressure MPa (kgf/cm²)</th>
<th>Revolution Speed min⁻¹</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1000min⁻¹</td>
<td>1200min⁻¹</td>
<td>1500min⁻¹</td>
<td>1800min⁻¹</td>
<td>Min.</td>
</tr>
<tr>
<td>VDC-1A(B)-1A3-2A2-20</td>
<td>16.7 16.7 20 25 30</td>
<td>1.5 to 3.5 (15.3 to 35.7) 2 to 7 (20.4 to 71.4) 5 to 10.5 (51 to 107) 7 to 14 (71.4 to 143)</td>
<td>14 (143)</td>
<td>800</td>
<td>1800</td>
<td>9.5</td>
</tr>
<tr>
<td>VDC-1A(B)-1A4-2A2-20</td>
<td>22 22 27 33 40</td>
<td>1.5 to 3.5 (15.3 to 35.7) 2 to 7 (20.4 to 71.4) 5 to 10.5 (51 to 107) 7 to 14 (71.4 to 143)</td>
<td>14 (143)</td>
<td>800</td>
<td>1800</td>
<td>9.5</td>
</tr>
<tr>
<td>VDC-1A(B)-1A5-2A2-20</td>
<td>30 30 36 45 54</td>
<td>1.5 to 3.5 (15.3 to 35.7) 2 to 7 (20.4 to 71.4) 5 to 10.5 (51 to 107) 7 to 14 (71.4 to 143)</td>
<td>14 (143)</td>
<td>800</td>
<td>1800</td>
<td>25</td>
</tr>
<tr>
<td>VDC-3A(B)-1A3-2A3-20</td>
<td>67 67 80 100 120</td>
<td>1.5 to 3.5 (15.3 to 35.7) 2 to 7 (20.4 to 71.4) 5 to 10.5 (51 to 107) 7 to 14 (71.4 to 143)</td>
<td>14 (143)</td>
<td>800</td>
<td>1800</td>
<td>47 (33)</td>
</tr>
</tbody>
</table>

Double Pump

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Vent Side</th>
<th>Shaft Side</th>
<th>Discharge Rate ℓ/min</th>
<th>Pressure Adjustment Range MPa (kgf/cm²)</th>
<th>Discharge Rate ℓ/min</th>
<th>Pressure Adjustment Range MPa (kgf/cm²)</th>
<th>Revolution Speed min⁻¹</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1800min⁻¹ 1500min⁻¹</td>
<td>1800min⁻¹ 1500min⁻¹</td>
<td>Min.</td>
<td>Max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VDC-11A(B)-2A3-2A5-20</td>
<td>40 33</td>
<td>2 to 7 (20.4 to 71.4)</td>
<td>40 33</td>
<td>2 to 7 (20.4 to 71.4)</td>
<td>800</td>
<td>1800</td>
<td>Type A 27 Type B 20</td>
<td></td>
</tr>
<tr>
<td>VDC-11B(B)-2A3-1A5-20</td>
<td>40 33</td>
<td>2 to 7 (20.4 to 71.4)</td>
<td>70 58</td>
<td>2 to 7 (20.4 to 71.4)</td>
<td>70 58</td>
<td>2 to 7 (20.4 to 71.4)</td>
<td>800</td>
<td>1800</td>
</tr>
<tr>
<td>VDC-12A(B)-2A3-2A5-20</td>
<td>30 25</td>
<td>7 to 14 (71.4 to 143)</td>
<td>70 58</td>
<td>7 to 14 (71.4 to 143)</td>
<td>70 58</td>
<td>7 to 14 (71.4 to 143)</td>
<td>800</td>
<td>1800</td>
</tr>
<tr>
<td>VDC-22A(B)-2A3-1A5-20</td>
<td>70 58</td>
<td>7 to 14 (71.4 to 143)</td>
<td>70 58</td>
<td>7 to 14 (71.4 to 143)</td>
<td>70 58</td>
<td>7 to 14 (71.4 to 143)</td>
<td>800</td>
<td>1800</td>
</tr>
</tbody>
</table>

Note: 1. VDC-3A, VDC-11A, VDC-12A and VDC-13A are foot mounting types, and come with foot mountings.
2. VDC-1A and VDC-2A are sub plate types. Sub plates are not included.
Discharge Volume Adjustment

The discharge flow rate is decreased by clockwise (rightward) rotation of the discharge rate adjusting screw, and increased by counterclockwise (leftward) rotation. Loosen the lock nut before making adjustments. After adjustment is complete, re-tighten the lock nut.

The graph below provides general guidelines for the relationship between the rotation angle of the flow rate adjusting screw and the no-load discharge rate.

However: \[ Q = q \times N \times 10^{-3} \]

where:
- \( Q \) : No-load Discharge Rate \( \text{Qℓ/min} \)
- \( q \) : Volume \( \text{cm}^3/\text{rev} \)
- \( N \) : Revolution Speed \( \text{min}^{-1} \)

Pressure Setting = Pressure shown in catalog

<table>
<thead>
<tr>
<th>Pressure Setting ( \text{MPa} {\text{kgf/cm}^2} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 : 3.5 (35.7)</td>
</tr>
<tr>
<td>3 : 3 (30.6)</td>
</tr>
<tr>
<td>4 : 5 (51)</td>
</tr>
<tr>
<td>5 : 7 (71.4)</td>
</tr>
</tbody>
</table>

Sub Plate Number

<table>
<thead>
<tr>
<th>Pump Model No.</th>
<th>Sub Plate Number</th>
<th>Motor kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDC-1A-1A*-20</td>
<td>MVD-1-115-10</td>
<td>0.75 to 1.5</td>
</tr>
<tr>
<td>VDC-1A-2A*-20</td>
<td>MVD-1-115-10</td>
<td>0.75 to 1.5</td>
</tr>
<tr>
<td>VDC-2A-A*-20</td>
<td>MVD-2-135-10</td>
<td>2.2 to 3.7</td>
</tr>
<tr>
<td>VDC-2A-A*-20</td>
<td>MVD-2-160-10</td>
<td>5.5</td>
</tr>
<tr>
<td>VDC-2A-A*-20</td>
<td>MVD-2-160Z-10</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Note: See pages B-17 and B-18 for detailed dimensions.
**Explaination of model No.**

**Single Pump**

**VDC - 2 A - 1 A 2 - 20**

- **Design number**
- **Pressure adjustment range**
  2: 1.5 to 3.5MPa (15.3 to 35.7kgf/cm²)
  3: 2 to 7MPa (20.4 to 71.4kgf/cm²)
  4: 5 to 10.5MPa (51 to 107kgf/cm²)
  5: 7 to 14MPa (71.4 to 143kgf/cm²)
- **Note:** Ring size: In the case of 2, maximum setting pressure is 7MPa (71.4kgf/cm²).
- **Flow characteristics**
  - A: Constant discharge type
- **Ring size**
- **Mounting method**
  - A: Foot type mounting
  - B: Flange type mounting
- **Pump size**
  1: Type 1
  2: Type 2
  3: Type 3
- **Pump Type:** VDC Series High-pressure Variable Discharge Rate Vane Pump

**Double Pump**

**VDC - 1 2 A - 1 A 5 - 2 A 3 - 20**

- **Design number**
- **Shaft side pressure adjustment range**
  3: 2 to 7MPa (20.4 to 71.4kgf/cm²)
  5: 7 to 14MPa (71.4 to 143kgf/cm²)
- **Shaft side flow rate characteristics**
  - A: Constant discharge rate type
- **Shaft side ring size** 1, 2
  (Size 1 only for VDC-3)
- **Head side pressure adjustment range** 3, 5
- **Head side flow rate characteristics**
  - A: Constant discharge rate type
- **Head side ring size** 1, 2
- **Mounting method**
  - A: Foot type mounting
  - B: Flange type mounting
- **Shaft side pump size** 1, 2, 3
- **Head side pump size** 1, 2
- **Pump Type:** VDC Series High-pressure Variable Discharge Rate Vane Pump
Installation Dimension Drawings

Single Pump
VDC-1A-*A*-20

Pressure adjusting screw
Rc 1/4 DR
(1A4, 1AS type only)

Flow rate adjusting screw

OUT (φ26)
O-ring 1A-P22

IN (φ31)
O-ring 1A-P25

Flow rate adjusting screw

Pressure adjusting screw
VDC-1B-*A*-20

Rc 1/4 DR

Rc 3/4 IN

4 to φ11

4 to φ11

Rc 1/2 OUT

O-ring 1A-P10A

O-ring 1A-P25

IN (φ14)
O-ring 1A-P10A

OUT (φ26)
O-ring 1A-P22

φ
φ
φ

φ
φ
φ

±

±
VDC-2A-*A*-20

Pressure adjusting screw

Flow rate adjusting screw

4 to 13

Rc 1/4 DR

224.6

204

90

54

40

4.76

0.024

0.012

27.7

0

0.1

25.4

0.01

Note) O-ring 1A-** refers to JIS B2401-1A-**.

VDC-2B-*A*-20

Pressure adjusting screw

Flow rate adjusting screw

4 to Φ13.5

Rc 1/4 DR

224.6

204

98

46

40

4.76

0.024

0.012

27.7

0

0.1

25.4

0.01

Note) O-ring 1A-** refers to JIS B2401-1A-**.
Note) Use the following table when specifying the piping flange kit.

<table>
<thead>
<tr>
<th>Type</th>
<th>Flange Kit model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw-in</td>
<td>IHF-5-T-20</td>
</tr>
<tr>
<td>Welded</td>
<td>IHF-5-E-20</td>
</tr>
</tbody>
</table>

For dimensions, components, and other details, see the IP pump piping flange kits on pages C-10 and C-11.
Double Pump
VDC-11B-*A-*A*-20

VDC-12B-*A-*A*-20

VDC-22B-*A-*A*-20

VDC-13B-*A-*A*-20

Note 1. VDC-*A has the foot mounting kit shown on page B-36 installed.
2. Rc-* previously was PT*.
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

Axial input at full cutoff

VDC-1

VDC-2

VDC-3
Noise Characteristics

Cross-sectional Drawings

VDC-1A-*A*-20
VDC-2A-*A*-20

Seal Component Table (VDC-1*,VDC-2*)

Part No. Part Name
1 Body (1) 19 Key
2 Body (2) 20 Pin
3 Cover (1) 21 Holder
4 Cover (2) 22 Holder
5 Shaft 23 Orifice
6 Ring 24 Oil seal
7 Vane 25 O-ring
8 Plate (3) 26 O-ring
9 Plate (4) 27 O-ring
10 Piston (1) 28 O-ring
11 Piston (2) 29 O-ring
12 Bearing 30 O-ring
13 Bearing 31 O-ring
14 Spring 32 O-ring
15 Thrust screw 33 O-ring
16 Screw 34 O-ring
17 Nut 35 O-ring
18 Nut 36 Backup ring

Note) 1. Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
2. The materials and hardness of the O-ring conform with JIS B2401.
3. For VDR-*B*-20, the seal kit number becomes VDBS-10*B00, without the 33, 24, and 35 O-rings.
VDC-3A-1A*-20

Seal Component Table (VDC-3*)

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Part Number</th>
<th>Q'ty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body (1)</td>
<td>TCN-385811-V</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Body (2)</td>
<td>NBR-70-1 G130</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Mounting</td>
<td>AS568-154(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Cover (1)</td>
<td>NBR-70-1 G40</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Cover (2)</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Shaft</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Ring</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Vane</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Plate (S)</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Plate (H)</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Piston (1)</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Piston (2)</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Bearing</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Spring</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Thrust screw</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Screw</td>
<td>AS568-151(NBR-80)</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: 1. Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
2. The materials and hardness of the O-ring conform with JIS B2401.
## VDC Series
### Double Pump

![Diagram of double pump](image)

### List of Sealing Parts

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>VDC-11A-***-20</th>
<th>VDC-12A-***-20</th>
<th>VDC-22A-***-20</th>
<th>VDC-13A-***-20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Part Number</td>
<td>Q'ty</td>
<td>Part Number</td>
<td>Q'ty</td>
</tr>
<tr>
<td>6</td>
<td>O-ring</td>
<td>-</td>
<td></td>
<td>NBR-70-1 G60</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>O-ring</td>
<td>NBR-70-1 G85</td>
<td>1</td>
<td>NBR-70-1 G45</td>
<td>1</td>
</tr>
</tbody>
</table>

Note) In the case of a double pump, use single pump parts in addition to the 10 parts listed above.

### Notes:
1. See the description of the single pump for seal parts that are not included in the list.
2. The materials and hardness of the O-ring conform with JIS B2401.
# Foot Mounting Installation Measurement Chart

For VDC-11A, VDC-12 and VDC-22 (for double pump)

For VDC-3A and VDC-13A

<table>
<thead>
<tr>
<th>Foot Mounting Kit Model No.</th>
<th>Applicable Pump Model No.</th>
<th>Accessories</th>
<th>Dimensions mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Bolt</td>
<td>Q’ty</td>
</tr>
<tr>
<td>VCM-11-20 VDC-11 VDC-11</td>
<td>TH-10×30 4 WS-B-10 4</td>
<td>171.45</td>
<td>204</td>
</tr>
<tr>
<td>VCM-22-20 VDC-12 VDC-22</td>
<td>TH-12×35 4 WS-B-12 4</td>
<td>235</td>
<td>267</td>
</tr>
<tr>
<td>IHM-45-10 VDC-3 VDC-13</td>
<td>TB-16×40 2 WP-16 2</td>
<td>295.3</td>
<td>334</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Foot Mounting Kit Model No.</th>
<th>Dimensions mm</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(I) (J) K N P</td>
<td>Q S T U</td>
</tr>
<tr>
<td>VCM-11-20</td>
<td>66.5 33 18 18</td>
<td>M10 180 32.5 50</td>
</tr>
<tr>
<td>VCM-22-20</td>
<td>84.5 40 20 20</td>
<td>M12 232 44.5 57.5</td>
</tr>
<tr>
<td>IHM-45-10</td>
<td>104.5 60 25 25</td>
<td>M16 259 44.5 61</td>
</tr>
</tbody>
</table>
**Uni-pump Specifications**

**Single Pump**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Maximum Working Pressure MPa/kgf/cm²</th>
<th>Motor output (kW)</th>
<th>Pressure adjustment range</th>
</tr>
</thead>
<tbody>
<tr>
<td>UVC-1A</td>
<td>7 (71.4)</td>
<td>0.75, 1.5, 2.2, 3.7</td>
<td>2: 1.5 to 3.5MPa (15.3 to 35.7kgf/cm²)</td>
</tr>
<tr>
<td>UVC-2A</td>
<td>7 (71.4)</td>
<td></td>
<td>3: 2.0 to 7.0MPa (20.4 to 71.4kgf/cm²)</td>
</tr>
<tr>
<td>UVC-11A</td>
<td>7 (71.4)</td>
<td></td>
<td>4: 5 to 10.5MPa (51 to 107kgf/cm²)</td>
</tr>
</tbody>
</table>

**Double Pump**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Maximum Working Pressure MPa/kgf/cm²</th>
<th>Motor output (kW)</th>
<th>Pressure adjustment range</th>
</tr>
</thead>
<tbody>
<tr>
<td>UVC-11A</td>
<td>7 (71.4)</td>
<td>1.5, 2.2, 3.7</td>
<td>2: 1.5 to 3.5MPa (15.3 to 35.7kgf/cm²)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: 2.0 to 7.0MPa (20.4 to 71.4kgf/cm²)</td>
</tr>
</tbody>
</table>

**Flow characteristics**

- **A**: Constant discharge type

**Ring size**

- None: 30ℓ/min at 1800min⁻¹
- 2: 40ℓ/min³

**Pump size**

1: VDC–1B(20D)
2: VDC–2B(20D)

**Pump Type**: VDC Series Uni-pump

---

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Maximum Working Pressure MPa/kgf/cm²</th>
<th>Maximum Flow Rate ℓ/min (A*)</th>
<th>Maximum Flow Rate ℓ/min (2A*)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50Hz</td>
<td>60Hz</td>
<td>50Hz</td>
</tr>
<tr>
<td>UVC-1A</td>
<td>25</td>
<td>30</td>
<td>33</td>
</tr>
<tr>
<td>UVC-2A</td>
<td>45</td>
<td>54</td>
<td>58</td>
</tr>
<tr>
<td>UVC-11A</td>
<td>25-25</td>
<td>30-30</td>
<td>33-33</td>
</tr>
</tbody>
</table>

---

**Motor selection curves**

- Selecting a motor
  - The area under a motor output curve in the graph to the left is the operating range for that motor under the rated output for that motor.
  - Example:
    - To find the motor that can produce pressure of 3.5MPa and a discharge rate of 25.0 ℓ/min.
    - Selection Process
      - Since the intersection of the two broken lines from a pressure of 3.5MPa and discharge rate of 25.0 ℓ/min intersect in the area under the 2.2kW curve, it means that a 2.2kW motor should be used. In the case of a double pump configuration, select a motor that is larger than the total power required by both pumps.

---

* Select a uni-pump that has a pressure and flow rate that is within the range of the drive so that the drive will not overload.
* When the startup current of the uni-pump becomes higher for the IE1 motor, breakers may need to be changed.
**Vane Pumps**

**UVC-1A**

1. Standard drive motor is the fully enclosed fan-cooled F type.
2. Standard voltage for drive motor is 200 VAC, 50/60 Hz or 220 VAC, 60 Hz.
3. Standard terminal box is B terminal (right side viewed from pump).

4. See page A-21 for the characteristics of the drive motor for the unipump (domestic standard 3 rating).

**UVC-2A**

1. Standard drive motor is the fully enclosed fan-cooled F type.
2. Standard voltage for drive motor is 200 VAC, 50/60 Hz or 220 VAC, 60 Hz.
3. Standard terminal box is B terminal (right side viewed from pump).

4. See page A-21 for the characteristics of the drive motor for the unipump (domestic standard 3 rating).
1. Standard drive motor is the fully enclosed fan-cooled F type.
2. Standard voltage for drive motor is 200 VAC, 50/60 Hz or 220 VAC, 60 Hz.
3. Standard terminal box is B terminal (right side viewed from pump).
4. See page A-21 for the characteristics of the drive motor for the unipump (domestic standard 3 rating).