



VDR Design Series Variable Volume Vane Pump

7.9 gpm at 2030 psi
10.5 gpm at 1000 psi

Features

Stable, highly efficient operation up to 2030 psi

A biased piston that minimizes ring vibration and leak-free pressure balance construction enables highly efficient high-pressure operation, and very stable performance up to 2030 psi.

High-precision instantaneous response

Response has been improved by a special bias piston mechanism. Prompt response at both ON-OFF and OFF-ON

ensures instantaneous, stable, high-precision operation.

Silent operation, even in the high pressure range

CQuiet journal bearings, a bias piston that allows a 3-point support system, and new suction and discharge port shapes all contribute to minimize operation noise. Silent, vibration-free operation is ensured, even in the high pressure range.

A combination of NACHI-original mechanical innovations and precision machining create a pump that minimizes power loss, especially at full cutoff.

Solid construction stands up to harsh operating conditions

The tough and rugged construction of this pump is made possible by a long history of quality pump designs. This, in combination with specially selected materials and skilled workmanship, provides outstanding durability.

Reduced power loss

Specifications

Single Pump

Model Type		No-load Discharge Rate l/min (gpm)			Pressure Adjustment Range psi	Allowable Peak Pressure psi	Revolution Speed min ⁻¹		Weight lbs
Foot Mounting	Flange Mounting	1800 rpm	1500 rpm	1200 rpm			Min.	Max.	
VDR-1A-1A2-*22	VDR-1B-1A2-*22	30 (7.9)	25 (6.6)	20 (5.3)	217 ~ 507	500	800	1800	19.9
VDR-1A-1A3-*22	VDR-1B-1A3-*22				435 ~ 1015	1000			
VDR-1A-1A4-*22	VDR-1B-1A4-*22				942 ~ 1522	1500			
VDR-1A-1A5-*22	VDR-1B-1A5-*22				1305 ~ 2030	2000			
VDR-1A-2A2-*22	VDR-1B-2A2-*22	40 (10.6)	33 (8.7)	27 (7.1)	214 ~ 500	500	800	1800	19.9
VDR-1A-2A3-*22	VDR-1B-2A3-*22				429 ~ 1000	1000			

Double Pump

Model No.	Vent Side		Shaft Side		Vent Side	Shaft Side	Revolution Speed min ⁻¹		Weight lbs
Foot Mounting Type (Flange Mounting Type)	Discharge Rate gpm	Pressure Adjustment Range psi	Discharge Rate gpm	Pressure Adjustment Range psi	Allowable Peak Pressure psi		Min.	Max.	
VDR-11A(B)-1A2-1A2-22 VDR-11A(B)-1A2-1A3-22	7.9	217 ~ 507	7.9	435 ~ 1015	2030		800	1800	37
VDR-11A(B)-1A3-1A3-22		435 ~ 1015		435 ~ 1015					
VDR-11A(B)-2A2-2A2-22 VDR-11A(B)-2A2-2A3-22	10.5	217 ~ 507	10.5	435 ~ 1015	2030		800	1800	37
VDR-11A(B)-2A3-2A3-22		435 ~ 1015		435 ~ 1015					

Note: 1. The discharge rate is the value at 1800min⁻¹ no load.

2. The change from design number 21 to design number 22 represents a change in the shaft key width from .125 in to .187 in. This means that when using a .125 in key coupling, you need to use a stepped key (VD31J-302000) or add a new key groove at .187 in.

• Handling

1 Rotation Direction

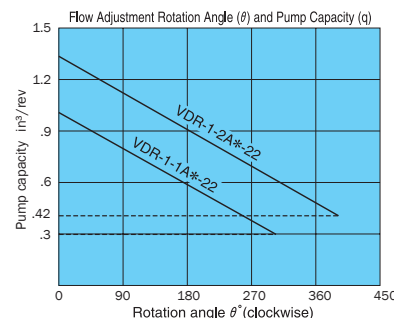
The direction of rotation is always clockwise (rightward) when viewed from the shaft side.

2 Drain

Drain piping must be direct piping up to a point that is below the tank fluid level, and back pressure due to pipe resistance should not exceed 4.35 psi. When using a pump that has drain ports at two locations, use the drain port that is higher after the pump is installed.

3 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 on the right provides general guidelines for the relationship between the rotation angle of the flow rate adjusting screw and the no-load discharge rate.



(continued on following page)

Flow rate gpm: $Q = \frac{\text{in}^3 \times \text{rpm}}{231}$

Q: No-load Discharge Rate Q r/min

q: Volume cm^3/rev

N: Revolution Speed min^{-1}

The broken line shows the flow volume adjustment range lower limit value.

Note:

The values indicated above are at maximum discharge volume with the flow volume adjusting screw at the 0° position.

4 Pressure Adjustment

Pressure is decreased by clockwise (rightward) rotation of the discharge rate

adjusting screw, and increased by counterclockwise (leftward) rotation.

5 Factory Default P-Q Settings (Standard Model)

- Flow Rate Setting = Maximum flow rate for model as indicated in the catalog
- Pressure Setting = Pressure shown in table to the right

6 Thrust Screw

The thrust screw is precision adjusted at the factory during assembly. Never touch the thrust screw. See callout ②1 in the cross-section diagram on page B-11.

Factory Default Pressure Settings
kgf/cm² (psi)

2	: 35.7 (507)
3	: 30.6 (435)
4	: 66.3 (942)
5	: 91.8 (1305)

7 Initial Operation

Before operating the pump for the first time, put the pump discharge side into the no-load state and then repeatedly start and stop the motor to bleed all air from inside the pump and the suction piping. After confirming that the pump is discharging oil, continue the no-load operation for at least 10 minutes to discharge all the air from the circuit.

Provide an air bleed valve in circuits where it is difficult to bleed air before startup.

8 Sub Plate

Use the following table for specification when a sub plate is required.

For detailed dimensions, see pages B-17 through B-19.

- 9 For the hydraulic operating fluid, use type ISO VG32 or equivalent (viscosity index of at least 90) for pressures of 1015 psi or lower, and type ISO VG68 or equivalent (viscosity index of at least 90) for pressures greater than 1015 psi.

Pump Model No.	Sub Plate Number	Motor(hp)
VDR-1A-1A*-22	MVD-1-115-10	1 ~ 2
	MVD-1-135-10	3 ~ 5
VDR-1A-2A*-22	MVD-1-115Y-10	1 ~ 2
	MVD-1-135Y-10	3 ~ 5
VDR-11A-*A* -*A*-22	MVD-11-135-10	2 ~ 5
	MVD-11-135X-10	

- 10 The operating temperature range is 59 to 140°F. When the oil temperature at startup is 59°F or less, perform a warm-up operation at low pressure until the oil temperature reaches 59°F. Use the pump in an area where the temperature is within the range of 32 to 140°F.

- 11 Suction pressure is 4.35 psi, and the suction port flow rate should be to greater than 6 ft/sec.

Avoid pulley, gear, and other drive systems that impart a radial or thrust load on the end of the pump shaft. Mount the pump so its pump shaft is oriented horizontally.

(Continued on following page)

Understanding Model Numbers

Single Pump

VDR -- 1 A -- 1 A 2 -- *22

Design Number
E: NPT Piping

Pressure Adjustment Range
2: 15 ~ 35 kgf/cm² (217 ~ 507 psi)
3: 30 ~ 70 kgf/cm² (435 ~ 1015 psi)
4: 65 ~ 105 kgf/cm² (942 ~ 1522 psi)
5: 90 ~ 140 kgf/cm² (1305 ~ 2030 psi)
Note: Ring size: in the case of 2, maximum setting pressure is 1015 psi

Flow Rate Characteristics A: Constant discharge rate type

Ring Size 1: 7.9 gpm } at 1800 min⁻¹
2: 10.5 gpm }

Mounting Method

A: Foot Type Mounting B: Flange Type Mounting

Pump Size 1

Pump Type: VDR Series Variable Discharge Rate Vane Pump

Double pump

VDR -- 11 A -- 1 A 2 -- 1 A 3 -- 22

Design Number
E: NPT Piping

Shaft Side Pressure Adjustment Range
2: 15.3 to 35.7kgf/cm² (217 to 507)
3: 30.6 to 71.4kgf/cm² (435 to 1015)

Shaft Side Flow Rate Characteristics
(based on single pump)

Shaft Side Ring Size
(based on single pump)

Head Side Pressure Adjustment Range
2: 15.3 to 35.7kgf/cm² (217 to 507)
3: 30.6 to 71.4kgf/cm² (435 to 1015)

Head Side Flow Rate Characteristics
(based on single pump)

Head Side Ring Size
(based on single pump)

Mounting Method

A: Foot type mounting B: Flange type mounting

Pump Size: 11

Pump Type: VDR Series Variable Discharge Rate Vane Pump

- ## Installation Dimension Drawings

Installation Dimension Drawings

DR-0A-1A*-10

Pressure adjusting screw

Flow rate adjusting screw

NPT 1/4" DR (1A4, 1A5 type only)

Technical drawing of the DR-0A-1A*-10 pressure reducing valve. The drawing includes a front view, a side view, and a detail of the pressure adjusting screw. Dimensions are provided in millimeters (mm). The front view shows a total width of 222 mm, with a distance of 129.5 mm from the left edge to the center of the valve body and 92.5 mm from the center to the right edge. The height of the valve body is 131.4 mm, with a top flange thickness of 77.5 mm and a base thickness of 14 mm. The side view shows a total length of 149.6 mm, with a distance of 29.6 mm from the left edge to the center of the valve body and 33 mm from the center to the right edge. The height of the valve body is 102 mm, with a top flange thickness of 18 mm and a base thickness of 25 mm. The detail of the pressure adjusting screw shows a diameter of 4.76 mm with a tolerance of +0.024/-0.012 mm and a height of 21.15 mm with a tolerance of 0/-0.2 mm.

50

35

129.5

222

92.5

131.4

77.5

14

102

29.6

87

149.6

33

18

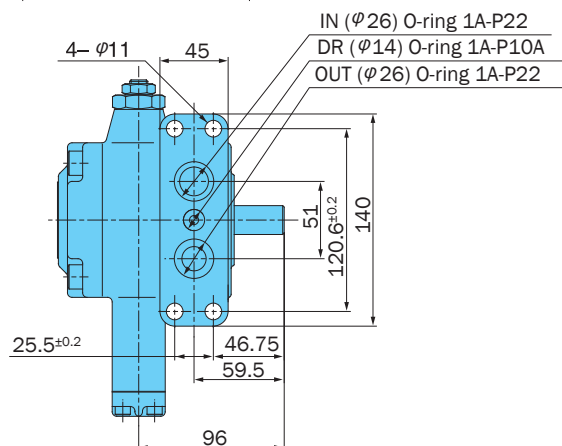
25

$\phi 19.05^{+0.021}_{-0.021}$

53.9 $^{+0.1}_{-0.1}$

4.76 $^{+0.024}_{-0.012}$

21.15 $^{0}_{-0.2}$



DR-1B-A*-22

Not SAE Mount

NPT 1/4" DR (1A4,1A5 type only)

Pressure adjusting screw

Flow rate adjusting screw

DR port position

NPT 1/4 DR

NPT 1/2 IN

4 to $\phi 11$

NPT 3/8" OUT

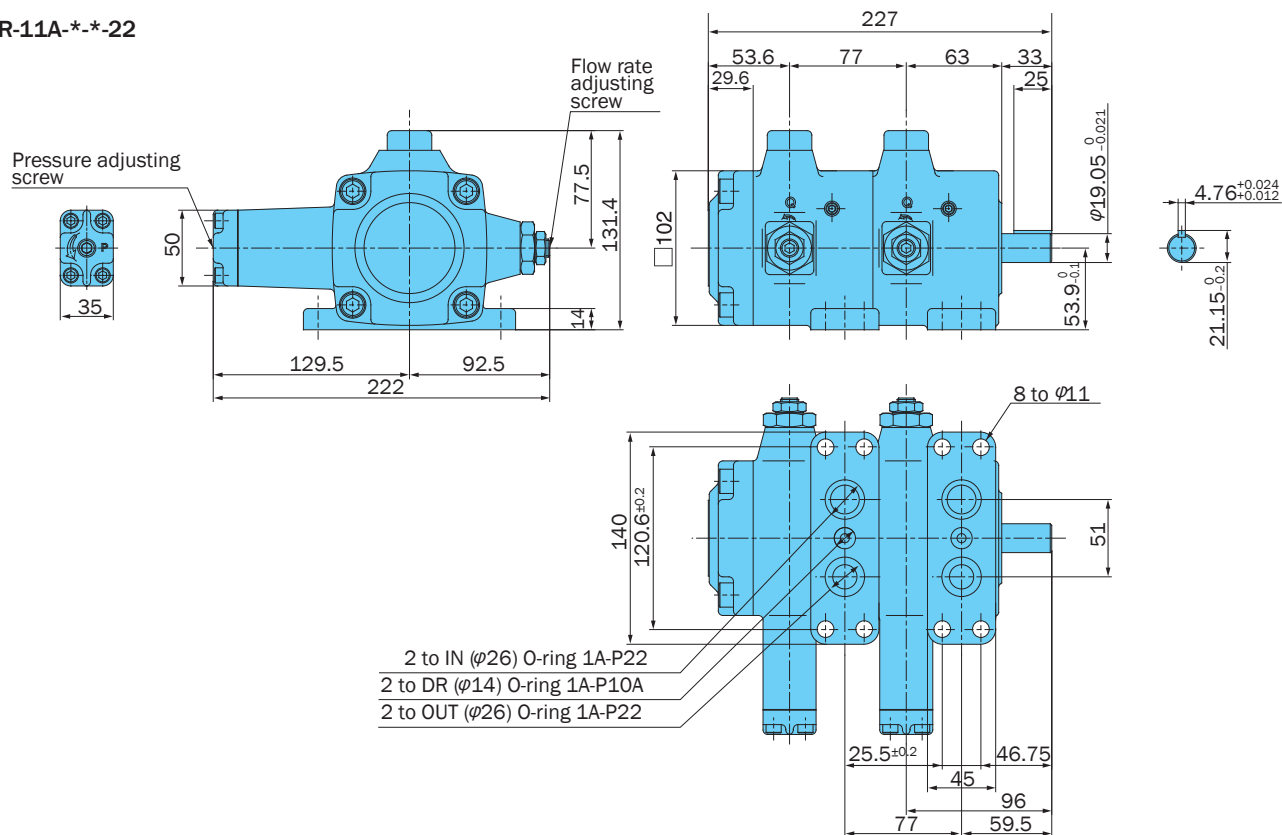
Auxiliary View A

Dimensions (mm):

- Front View: 35, 50, 129.5, 222, 92.5, 77.5
- Side View: 102, 25, 16, 22.5, 4, 33, 29.6, 87, 149.6, 14, 55, $\phi 95.02_{-0.04}^0$, 21.15 $_{-0.2}^{0}$, 19.05 $_{-0.021}^0$
- Auxiliary View A: 113, 90 ± 0.2 , 37, 4.76 $_{-0.012}^{+0.024}$, 90 ± 0.2 , 113, 130

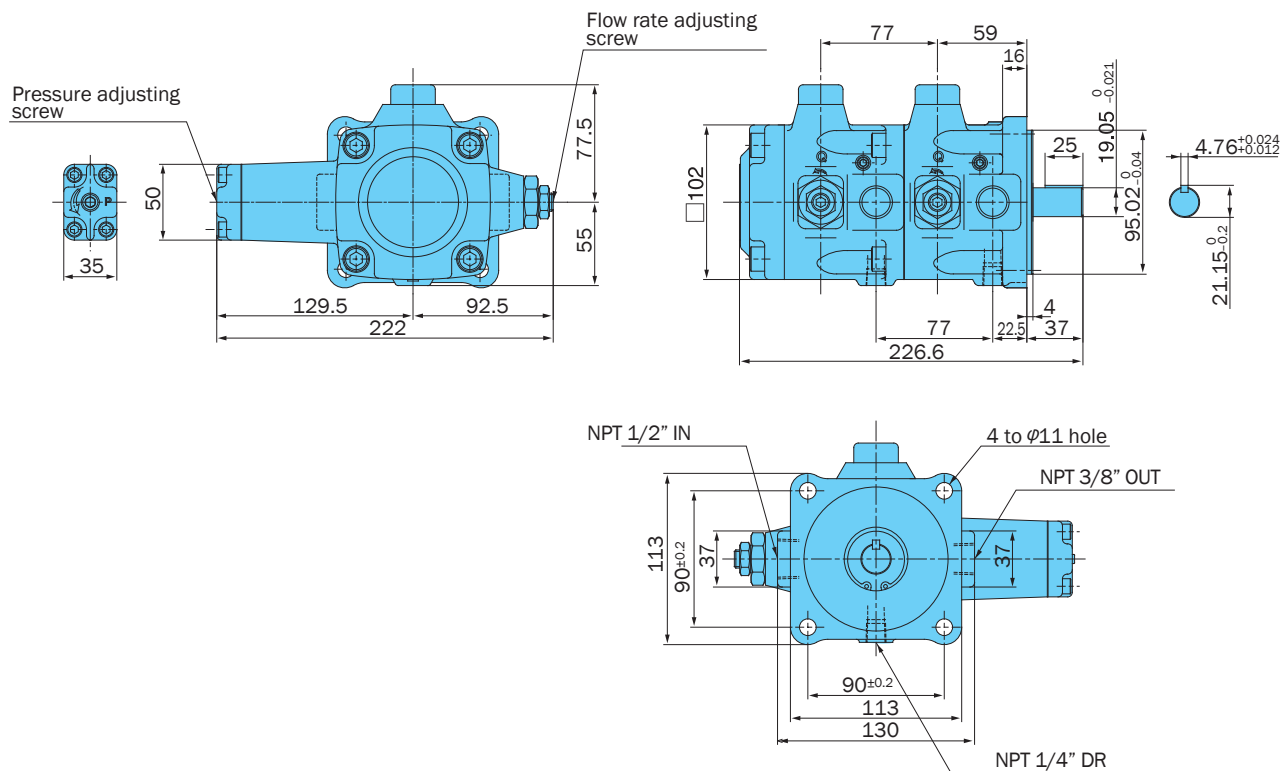
Auxiliary View A

VDR-11A-*. *-22



VDR-11B-*. *-22

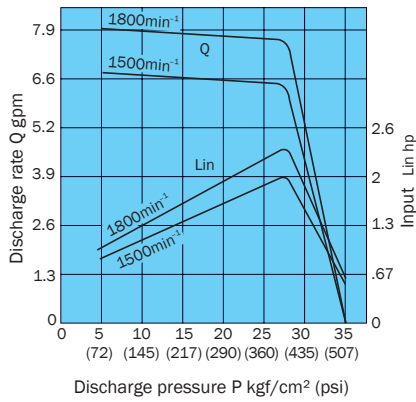
Not SAE Mount



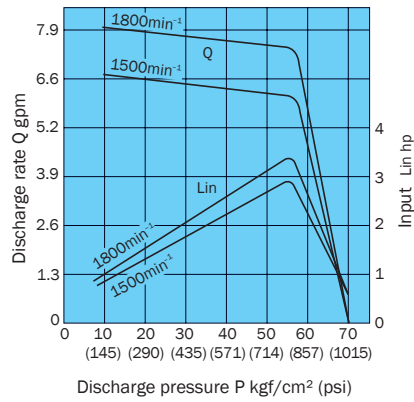
Performance Curves

Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 centistokes.

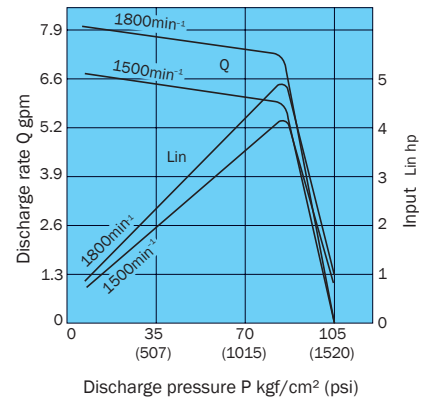
VDR-1*-1A2-22



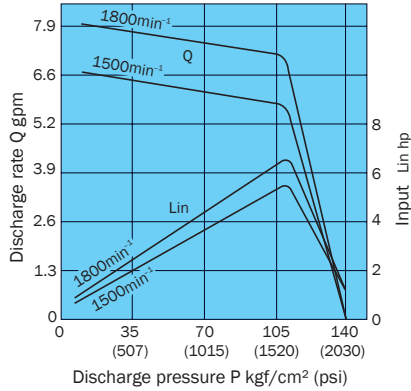
VDR-1*-1A3-22



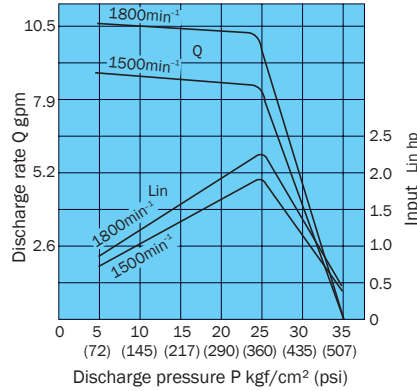
VDR-1*-1A4-22



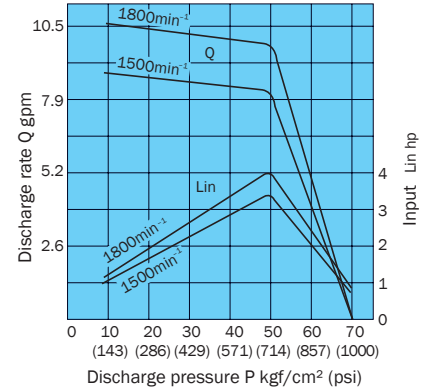
VDR-1*-1A5-22



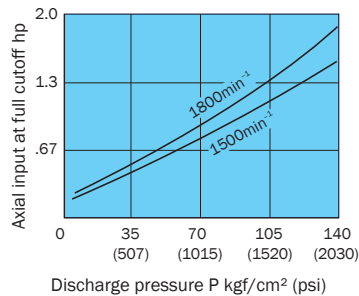
VDR-1*-2A2-22



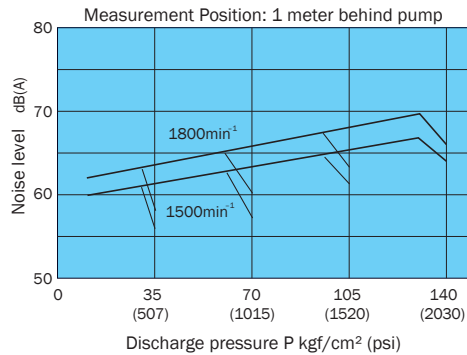
VDR-1*-2A3-22



Axial Input At Full Cutoff

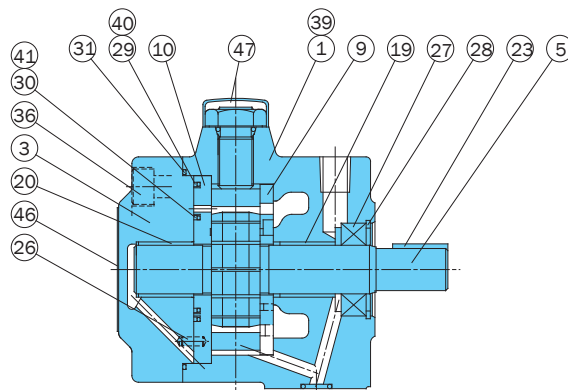
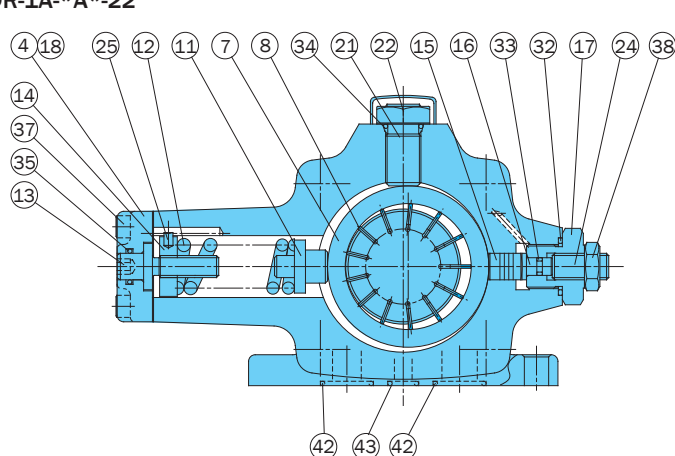


Noise Characteristics



Cross-Sectional Drawing

VDR-1A-*A*-22



List of Sealing Parts

Single Pump

Part No.	Applicable Pump Model No.	VDR-1A-*A*-22	
	Seal Kit Number	VDBS-101A00	
	Part Name	Part Number	Q'ty
18	Packing	VDB32-101000	1
27	Oil seal	ISRD-224211	1
29	Backup ring	VDB34-101000	1
30	Backup ring	VDB34-201000	1
31	O-ring	S85(NOK)	1
32	O-ring	1A-P22	1
33	O-ring	1A-P5	1
34	O-ring	1A-P14	1
35	O-ring	1A-P12	1
40	O-ring	AS568-036	1
41	O-ring	AS568-029	1
42	O-ring	1A-P22	2
43	O-ring	1A-P10A	1

Note:

- Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
- O-ring 1A-** refers to JIS B2401-1A-**.
- For VDR-1B-*A*-22, the seal kit number becomes VDBS-101B00, without the 42 and 43 O-rings.

Double Pump

Part Name	Applicable Pump Model No.	VDR-11A-*A*-22	
	Seal Kit Number	VDBS-111A00	
	Part Name	Part Number	Q'ty
18	Packing	VDB32-101000	2
27	Oil seal	ISRD-224211	1
29	Backup ring	VDB34-101000	2
30	Backup ring	VDB34-201000	2
31	O-ring	S85(NOK)	2
32	O-ring	1A-P22	2
33	O-ring	1A-P5	2
34	O-ring	1A-P14	2
35	O-ring	1A-P12	2
40	O-ring	AS568-036	2
41	O-ring	AS568-029	2
42	O-ring	1A-P22	4
43	O-ring	1A-P10A	2

Note:

- Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
- O-ring 1A-** refers to JIS B2401-1A-**.
- For VDR-11B-*A*-22, the seal kit number becomes VDBS-111B00, without the 42 and 43 O-rings.

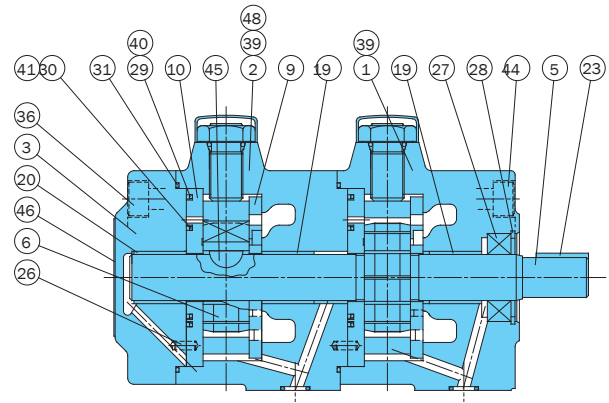
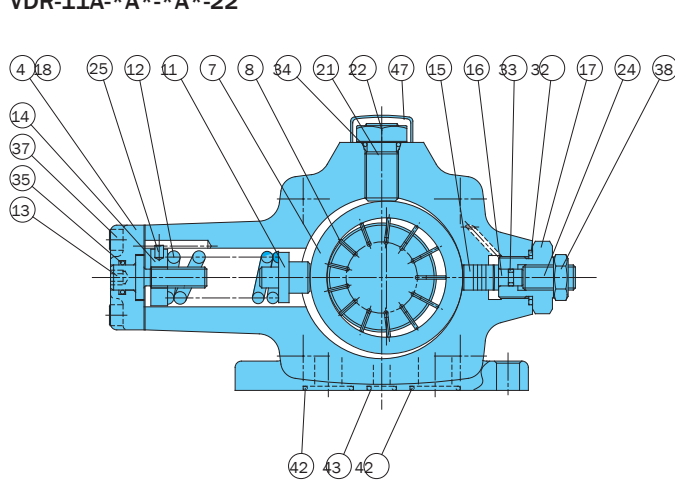
Part No.	Part Name	Part No.	Part Name
1	Body (A)	25	Pin
2	Body (B)	26	Spring pin
3	Cover	27	Oil seal
4	Cover	28	Snap ring
5	Shaft	29	Backup ring
6	Rotor	30	Backup ring
7	Ring	31	O-ring
8	Vane	32	O-ring
9	Plate (S)	33	O-ring
10	Plate (H)	34	O-ring
11	Piston	35	O-ring
12	Spring	36	Screw
13	Screw	37	Screw
14	Nut	38	Nut
15	Piston	39	Plug
16	Holder	40	O-ring
17	Adapter	41	O-ring
18	Packing	42	O-ring
19	Bearing (S)	43	O-ring
20	Bearing (H)	44	Screw
21	Thrust screw	45	Key
22	Nut	46	Nameplate
23	Key	47	Cap
24	Screw	48	Pin

Cartridge Kit:

VDR-1-22; VDBC-101*A*

Includes Items: 5, 7, 8, 9, 10, 23, 25

VDR-11A-*A*-*A*-22



Uni-Pump Specifications

(CE mark standard compliant)

Understanding Model Numbers

Single Pump

UVD - 1 A - 2 A 2 - 1.5 - 4 - 40

- Design Number - E=NPT
- Number of Motor Poles: 4 (P) 200V
4 (G) 230V
4 (M) 460V
- Motor Output kw (hp)
0.75, 1.5, 2.2, 3.7 (1, 2, 3, 5)
- Pressure Adjustment Range
2: 15.3 to 35.7kgf/cm² (217 to 507)
3: 30.6 to 71.4kgf/cm² (435 to 1015)
- Flow Characteristics A: Constant Discharge Type
- Ring Size
None: 7.9 gpm } at 1800min⁻¹
2 : 10.5 gpm }
- A: Foot Type Mounting
- Pump Size 1: VDR-1B (22D)
- Pump Type: VDR (220) Series Uni-Pump

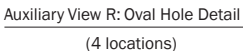
Double Pump

UVD - 11 A - 2 A 2 - 2 A 2 - 3.7 - 4 - 40

- Design Number - E=NPT
- Number of Motor Poles: 4 (P) 200V
4 (G) 230V
4 (M) 460V
- Motor Output kw (hp)
1.5, 2.2, 3.7 (2, 3, 5)
- Shaft Side Pump Pressure Adjustment Range
2: 15.3 to 35.7kgf/cm² (217 to 507)
3: 30.6 to 71.4kgf/cm² (435 to 1015)
- Shaft Side Pump Flow Rate Characteristics
A: Constant Discharge Type
- Shaft Side Pump Ring Size
None: 7.9 gpm } at 1800min⁻¹
2 : 10.5 gpm }
- Head Side Pump Pressure Adjustment Range:
Same as the shaft side pump
- Head Side Pump Flow Rate Characteristics
A: Constant Discharge Type
- Head Side Pump Ring Size
None: 7.9 gpm } at 1800min⁻¹
2 : 10.5 gpm }
- A: Foot Type Mounting
- Pump Size 11: VDR-11B (22D)
- Pump Type: VDR (220) Series Uni-Pump

Specifications

Model No.	Maximum Working Pressure kgf/cm ² (psi)	Maximum Flow Rate gpm (A*)		Maximum Flow Rate gpm (2A*)	
		50Hz	60Hz	50Hz	60Hz
UVD-1A	71.4 (1015)	6.6	7.9	8.7	10.5
UVD-11A	71.4 (1015)				



1. 2 to 3 hp model does not have hangers.
1. Standard drive motor is the fully enclosed fan-cooled B 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).