

### VDR22 Design Series Variable Volume Vane Pump

30 ℓ /min 14MPa  
40 ℓ /min 7MPa

#### Features

##### ① Stable, highly efficient operation up to 14MPa

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 14MPa.

##### ② 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.

##### ③ Silent operation, even in the high pressure range

Quiet 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.

##### ④ Reduced power loss

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

##### ⑤ 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.

#### Specifications

##### Single Pump

Model No.	Capacity cm <sup>3</sup> /rev	No-load Discharge Rate (ℓ/min)				Pressure Adjustment Range MPa(kgf/cm <sup>2</sup> )	Allowable Peak Pressure MPa(kgf/cm <sup>2</sup> )	Revolution Speedmin <sup>-1</sup>		Weight kg
		1000min <sup>-1</sup>	1200min <sup>-1</sup>	1500min <sup>-1</sup>	1800min <sup>-1</sup>			Min.	Max.	
VDR-1A(B)-1A2-22 1A3 1A4 1A5	16.7	16.7	20	25	30	1.5 to 3.5 {15.3 to 35.7} 3 to 7 {30.6 to 71.4} 6.5 to 10.5 {66.3 to 107} 9 to 14 {91.8 to 143}	14 {143} 21 {214}	800	1800	9
VDR-1A(B)-2A2-22 2A3	22	22	27	33	40	1.5 to 3.5 {15.3 to 35.7} 3 to 7 {30.6 to 71.4}	14 {143}	800	1800	9

##### Double Pump

Model No.	Vent Side		Shaft Side		Vent Side	Shaft Side	Revolution Speedmin <sup>-1</sup>		Weight kg
	Discharge Rate ℓ/min	Pressure Adjustment Range MPa(kgf/cm <sup>2</sup> )	Discharge Rate ℓ/min	Pressure Adjustment Range MPa(kgf/cm <sup>2</sup> )			Allowable Peak Pressure MPa(kgf/cm <sup>2</sup> )	Min.	
VDR-11A(B)-1A2-1A2-22 VDR-11A(B)-1A2-1A3-22	30	1.5 to 3.5 {15.3 to 35.7}	30	1.5 to 3.5 {15.3 to 35.7} 3 to 7 {30.6 to 71.4}	14 {143}	800	1800	17	
VDR-11A(B)-1A3-1A3-22		3 to 7 {30.6 to 71.4}		3 to 7 {30.6 to 71.4}					
VDR-11A(B)-2A2-2A2-22 VDR-11A(B)-2A2-2A3-22	40	1.5 to 3.5 {15.3 to 35.7}	40	1.5 to 3.5 {15.3 to 35.7} 3 to 7 {30.6 to 71.4}	14 {143}	800	1800	17	
VDR-11A(B)-2A3-2A3-22		3 to 7 {30.6 to 71.4}		3 to 7 {30.6 to 71.4}					

Note) 1. The discharge rate is the value at 1800min<sup>-1</sup> no-load.

2. The change from design number 21 to design number 22 represents a change in the shaft key width from 3.2mm to 4.76mm. This means that when using a 3.2mm key coupling, you need to use a stepped key (VD31J-302000) or add a new key groove at 4.76.

#### ● Handling

##### ① Rotation Direction

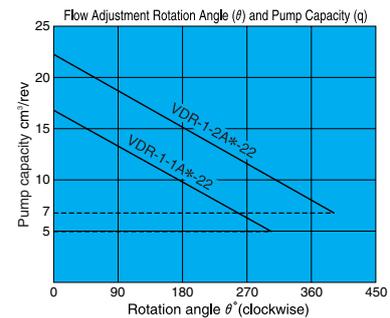
The direction of rotation is always clockwise (rightward) when viewed from the shaft side.

##### 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 0.03MPa. 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)

However:  $Q=q \times n \times 10^{-3}$

Q :No-load Discharge Rate Q ℓ/min

q :Volume cm<sup>3</sup>/rev

N :Revolution Speed min<sup>-1</sup>

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

Factory Default Pressure Settings MPa{kgf/cm <sup>2</sup> }	
2	: 3.5 {35.7}
3	: 3 {30.6}
4	: 6.5 {66.3}
5	: 9 {91.8}

the cross-section diagram on page B-11.

**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.

Pump Model No.	Sub Plate Number	Motor(kW)
VDR-1A-1A*22	MVD-1-115-10	0.75 to 1.5
	MVD-1-135-10	2.2 to 3.7
VDR-1A-2A*22	MVD-1-115Y-10	0.75 to 1.5
	MVD-1-135Y-10	2.2 to 3.7
VDR-11A-*A* -*A*22	MVD-11-135-10	1.5 to 3.7
	MVD-11-135X-10	

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 7MPa or lower, and type ISO VG68 or equivalent (viscosity index of at least 90) for pressures greater than 7MPa.

**10**The operating temperature range is 15 to 60°C. When the oil temperature at startup is 15°C or less, perform a warm-up operation at low pressure until the oil temperature reaches 15°C. Use the pump in an area where the temperature is within the range of 0 to 60°C.

**11**Suction pressure is -0.03 to +0.03MPa (-0.3 to +0.3kgf/cm<sup>2</sup>), and the suction port flow rate should be to greater than 2m/sec.

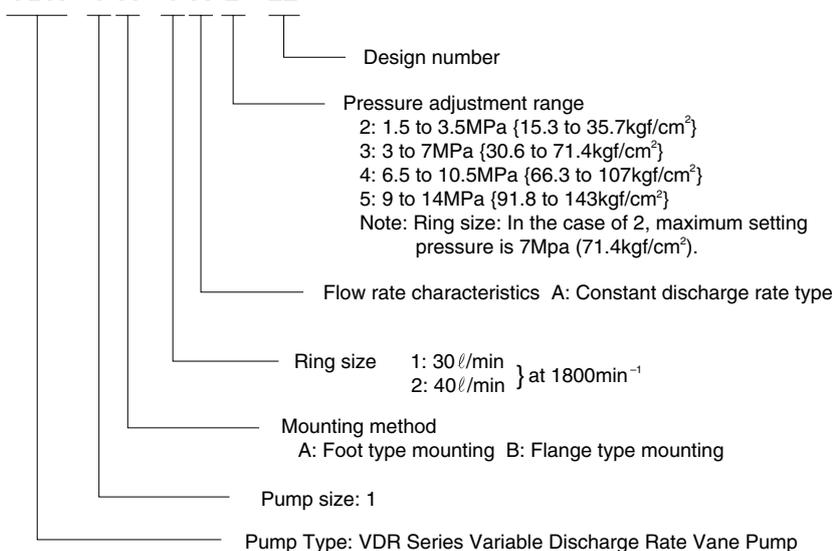
**12**Avoid pulley, gear, and other drive systems that impart a radial or thrust load on the end of the pump shaft. Mount the pump so its pump shaft is oriented horizontally.

(Continued on following page)

## Understanding Model Numbers

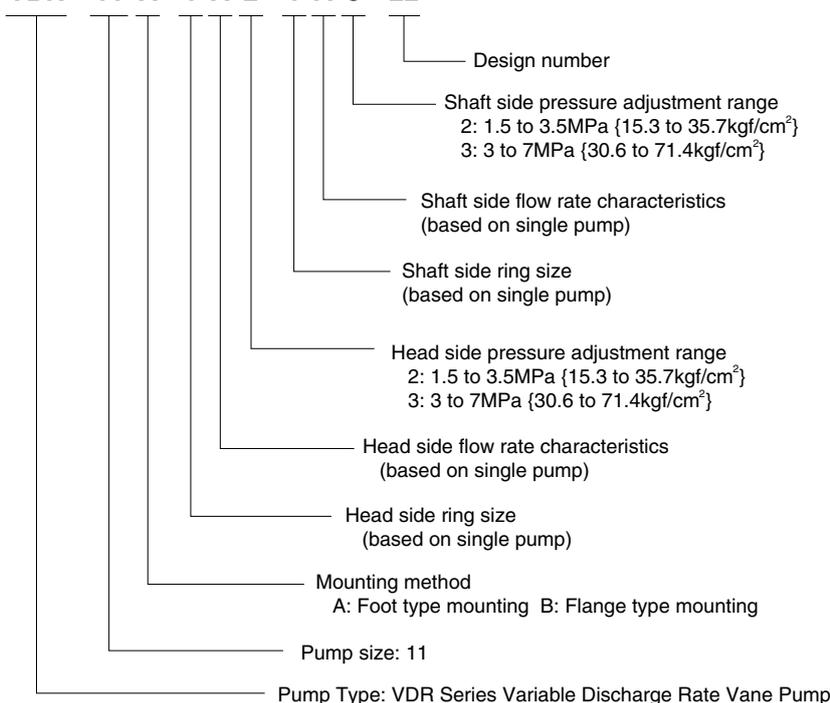
Single pump

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



Double pump

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



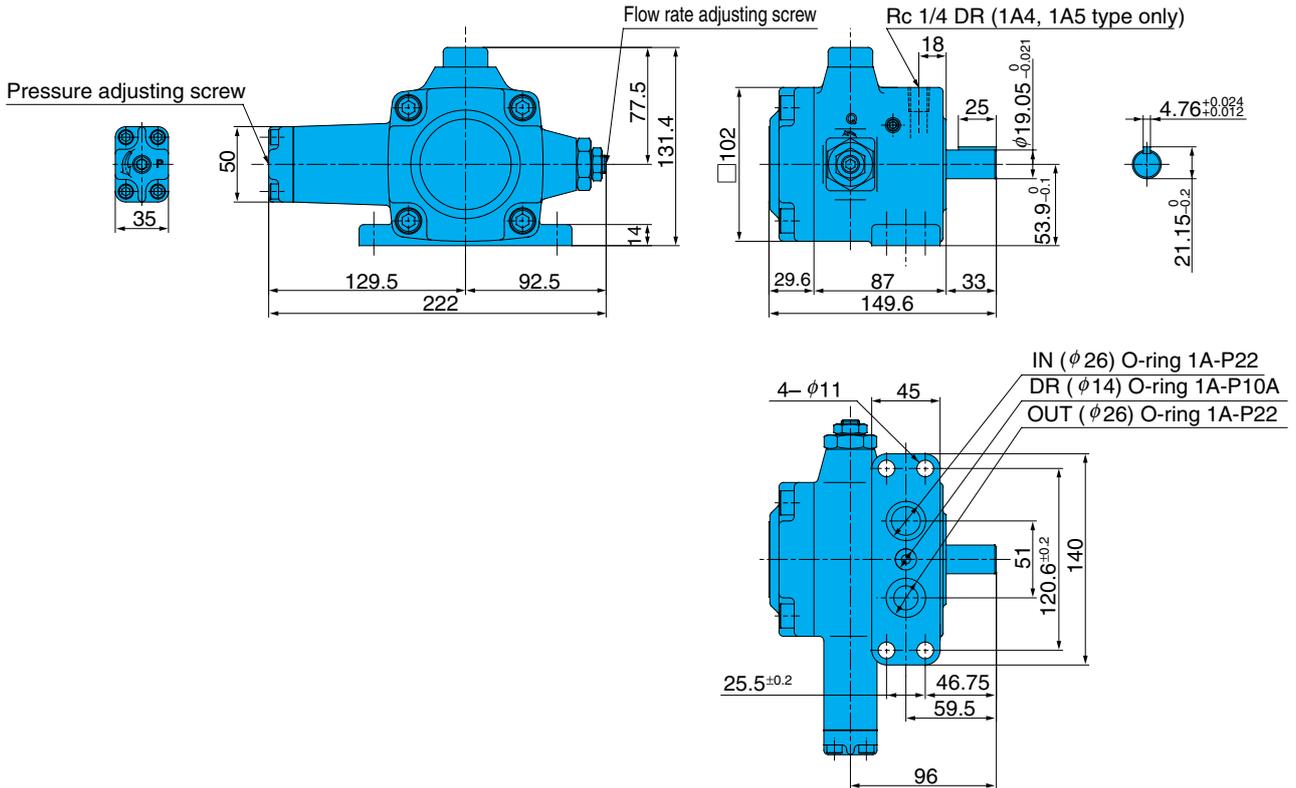
- 13 Provide a suction strainer with a filtering grade of about 100 μm (150 mesh). For the return line to the tank, use a 25μm line filter.
- 14 Manage hydraulic operating fluid so contamination is maintained at class NAS10 or lower. Take care to avoid contamination with water or other foreign matter, and watch out for discoloration. Whitish fluid indicates that air has contaminated the

- fluid, and brownish fluid indicates the fluid is dirty.
- 15 Contact your agent about using water- and glycol-based hydraulic operating fluids.
- 16 At startup, repeat the inching operation (start-stop) to bleed air from the pump and pipes.
- 17 Equip an air bleed valve in circuits where it is difficult to bleed air before startup. See page C-13 for

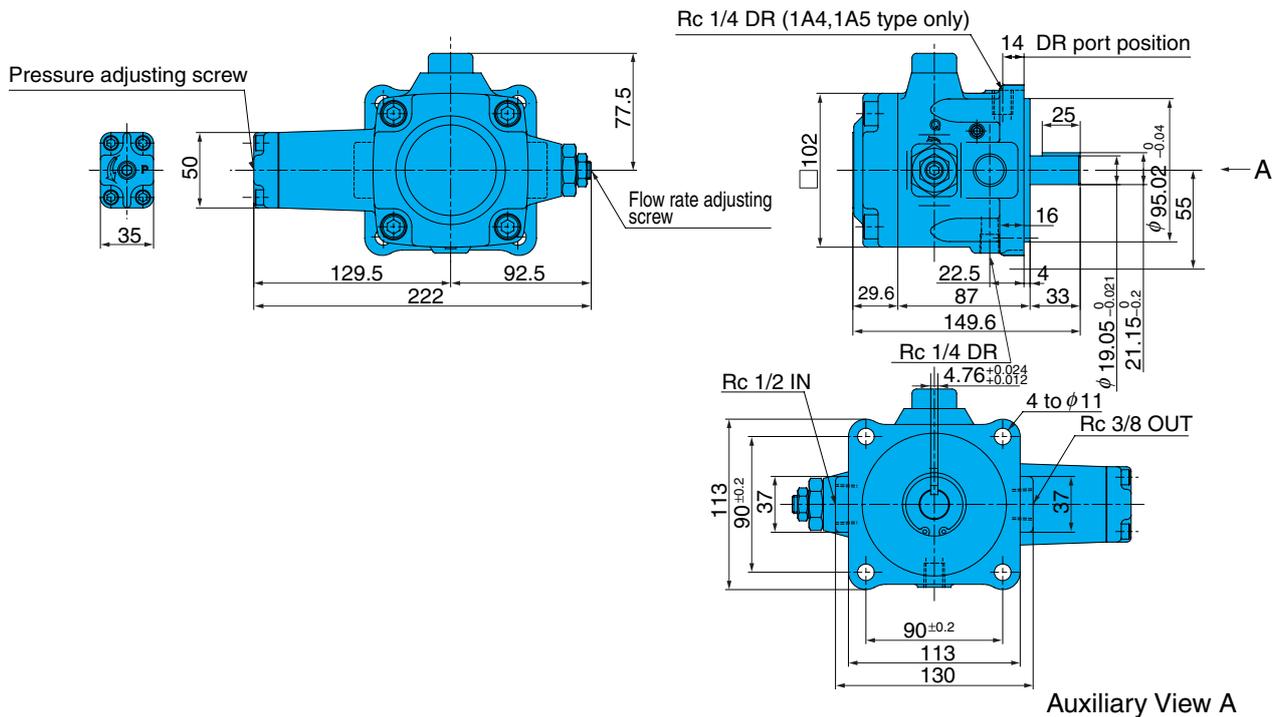
- more information.
- 18 To ensure proper lubrication of the pump's rubbing surfaces, supply oil to the interior of the pump before starting operation.
- 19 When centering the pump shaft, eccentricity with the motor shaft should be no greater than 0.05mm. Use a pump mounting base of sufficient rigidity. The angle error should be no greater than 1°.

## Installation Dimension Drawings

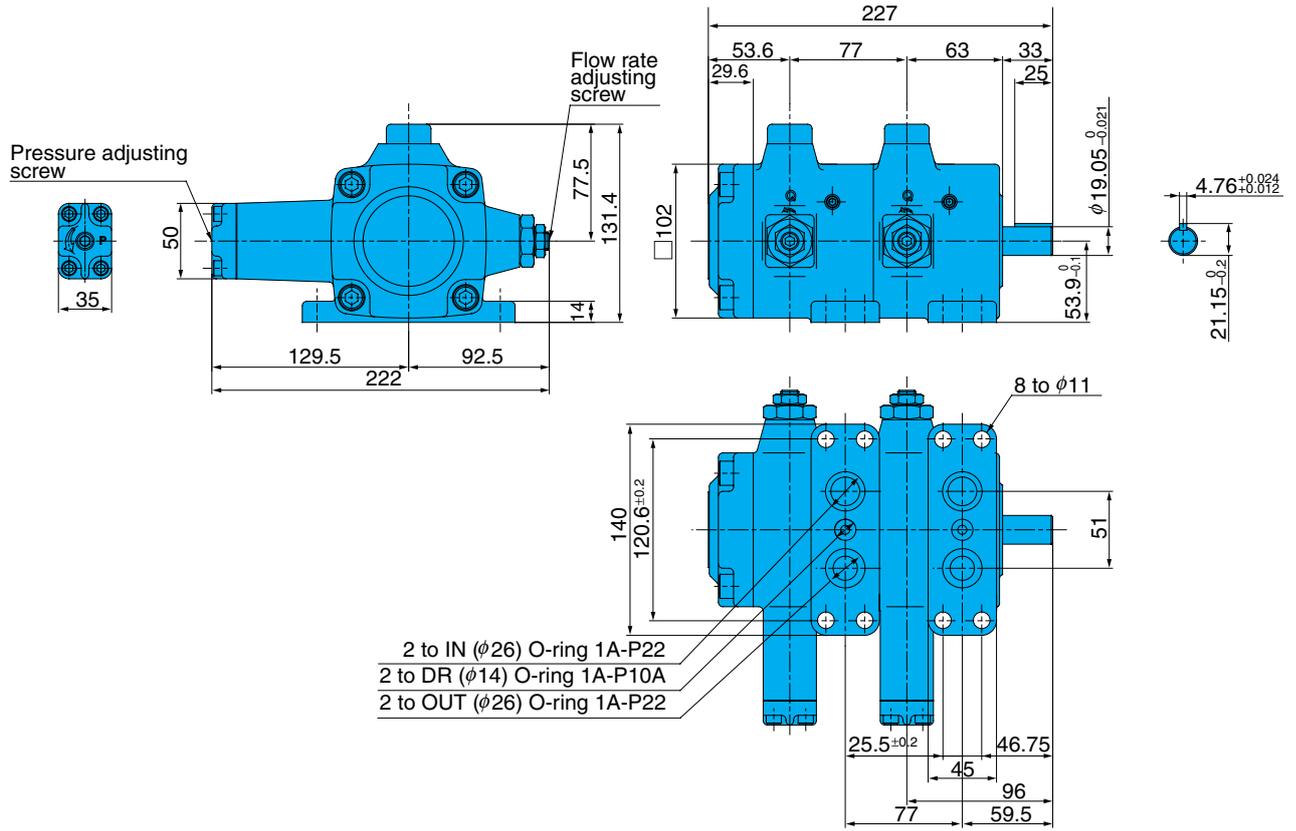
VDR-1A-\*A\*-22



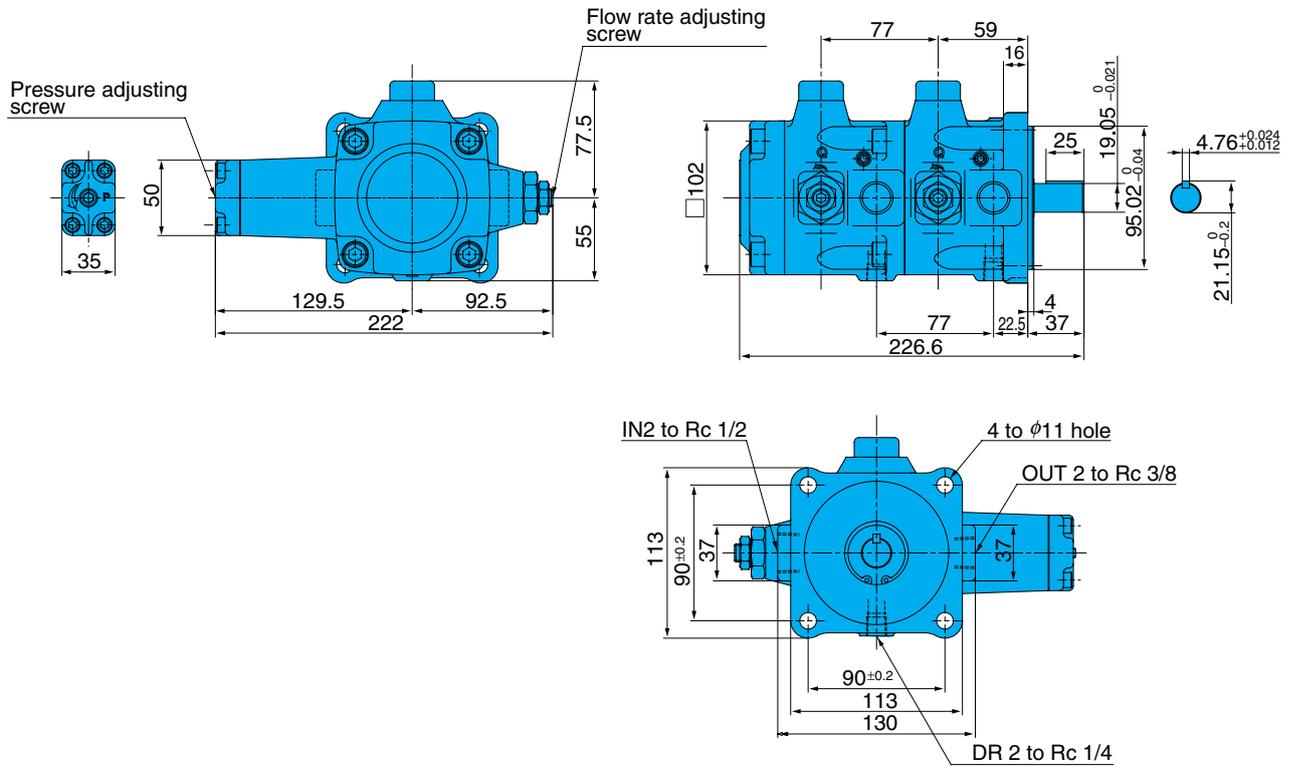
VDR-1B-\*A\*-22



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



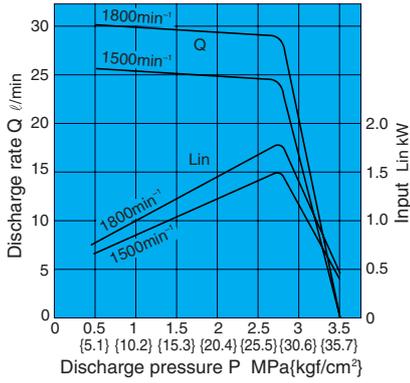
VDR-11B-\*\*-\*-22



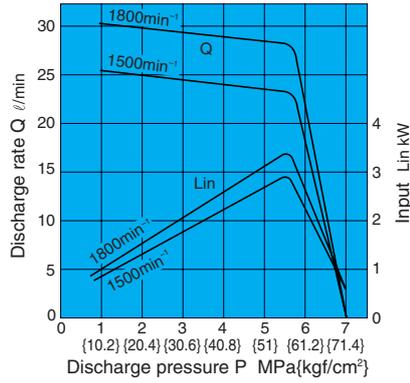
# Performance Curves

Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm<sup>2</sup>/s

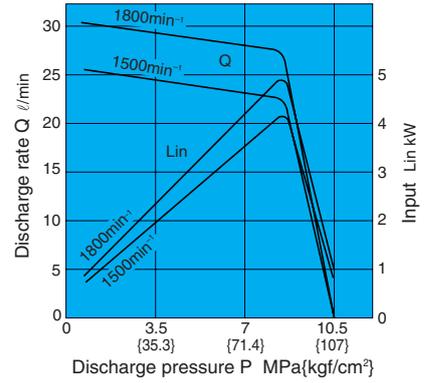
VDR-1\*-1A2-22



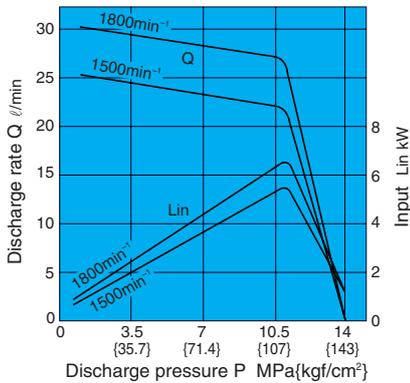
VDR-1\*-1A3-22



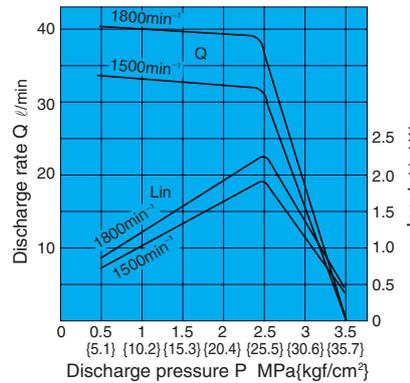
VDR-1\*-1A4-22



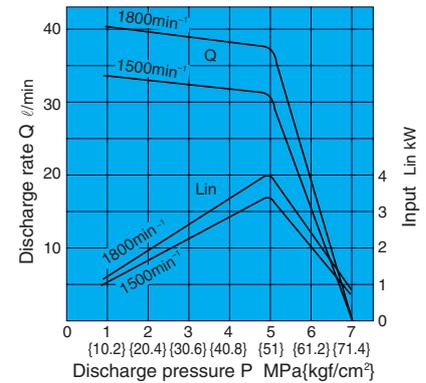
VDR-1\*-1A5-22



VDR-1\*-2A2-22



VDR-1\*-2A3-22

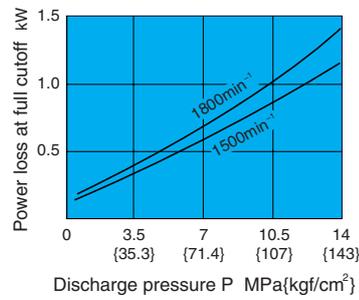


Use the formula below to calculate a pump's required drive force.

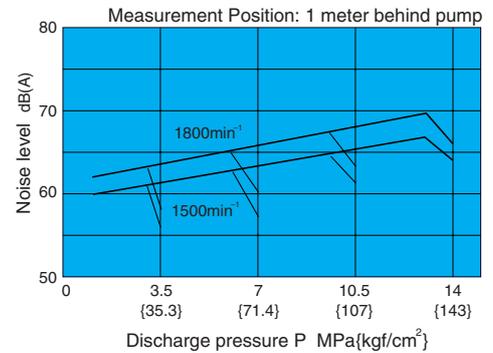
$$H = \frac{PQ}{60} + L$$

H : Input (kW)  
 P : Pressure MPa  
 Q : Flow rate l/min  
 L : Power loss kW

Power Loss Curve

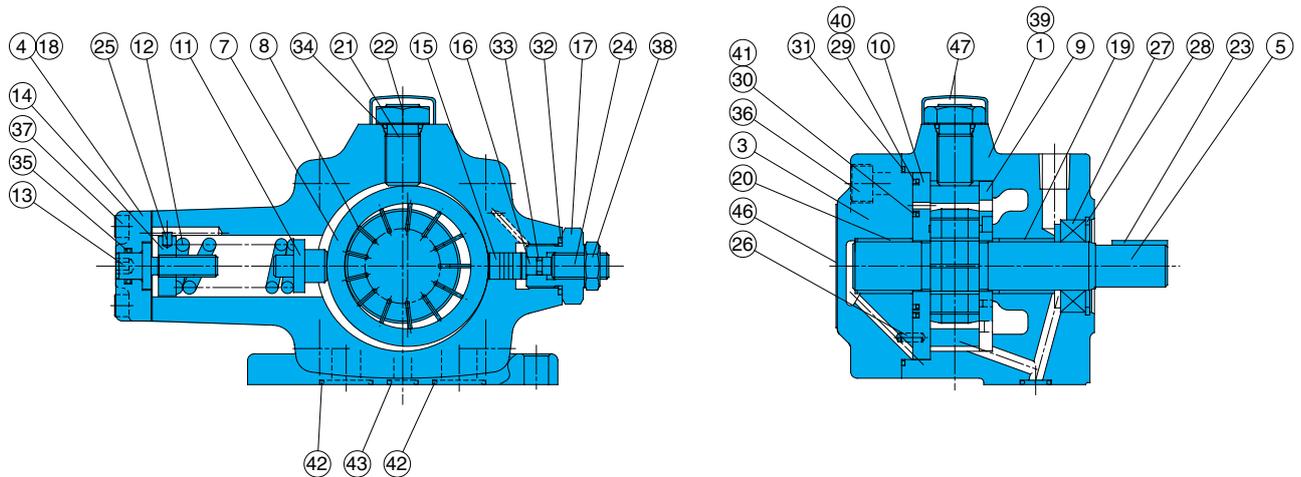


Noise Characteristics



# 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.

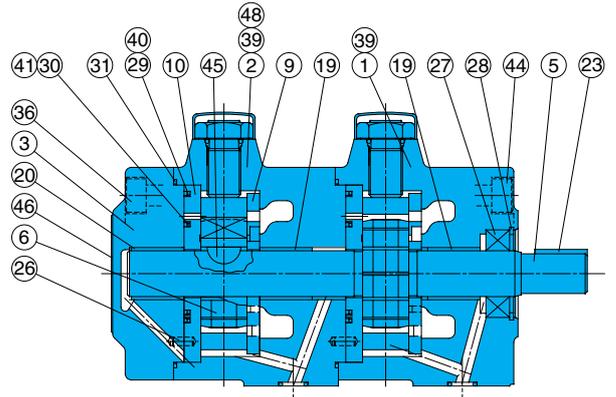
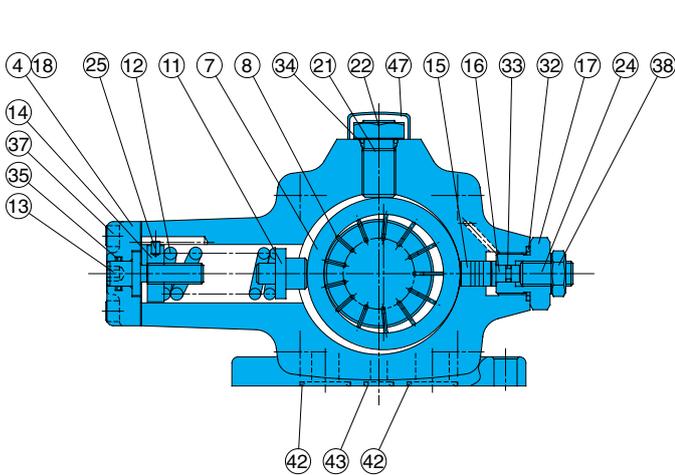
### Double Pump

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.

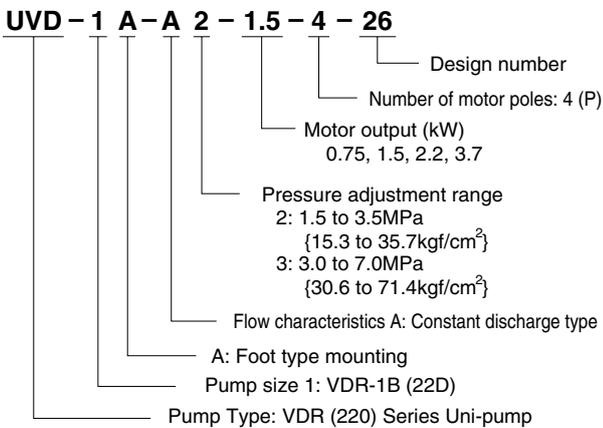
Part No.	Part Name	Part No.	Part Name
1	Body (A)	25	Pin
2	Body (B)	26	Spring pin
3	Cover	27	Oil seal
4	Cover	28	Snap ring
5	Shaft	29	Backup ring
6	Rotor	30	Backup ring
7	Ring	31	O-ring
8	Vane	32	O-ring
9	Plate (S)	33	O-ring
10	Plate (H)	34	O-ring
11	Piston	35	O-ring
12	Spring	36	Screw
13	Screw	37	Screw
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



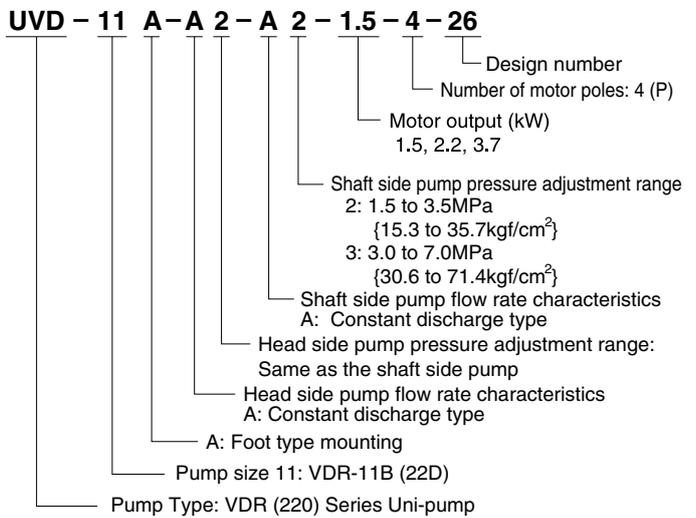
### Uni-pump Specifications

#### Understanding Model Numbers

##### Single Pump



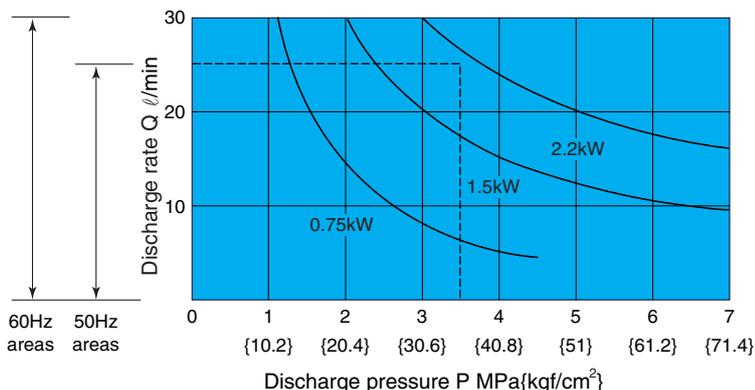
##### Double Pump



#### Specifications

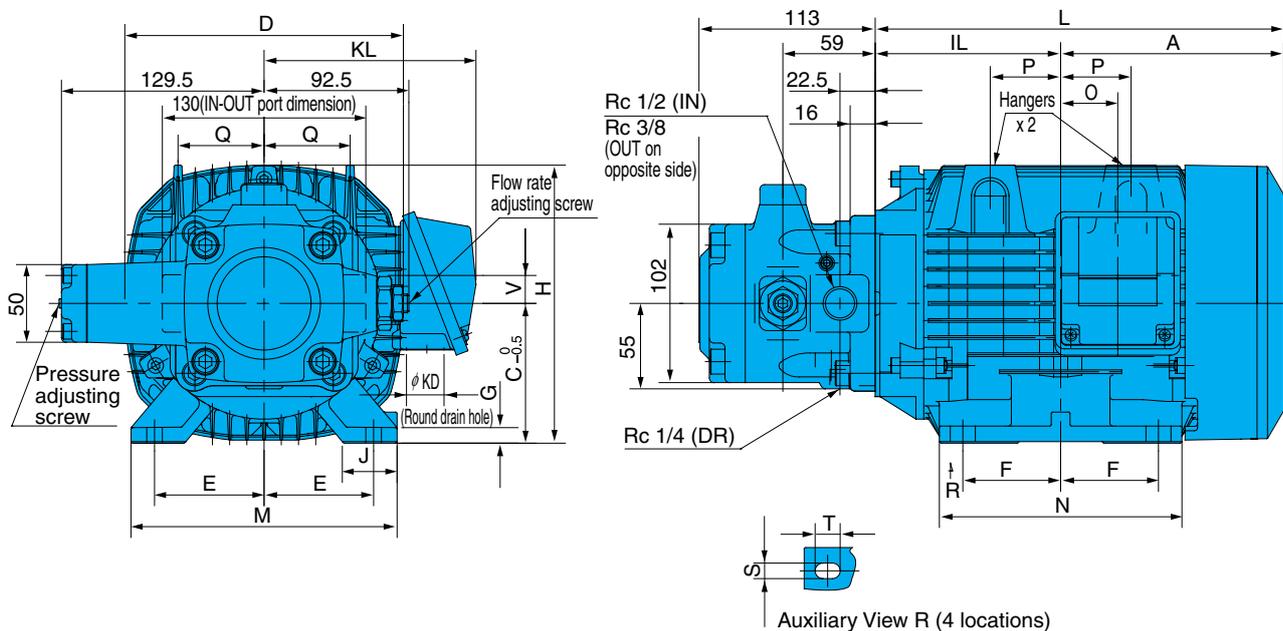
Model No.	Maximum Working Pressure MPa{kgf/cm <sup>2</sup> }	Maximum Flow Rate ℓ/min	
		50Hz	60Hz
UVD-1A	7{71.4}	25	30
UVD-11A	7{71.4}	25-25	30-30

**Motor selection curves**



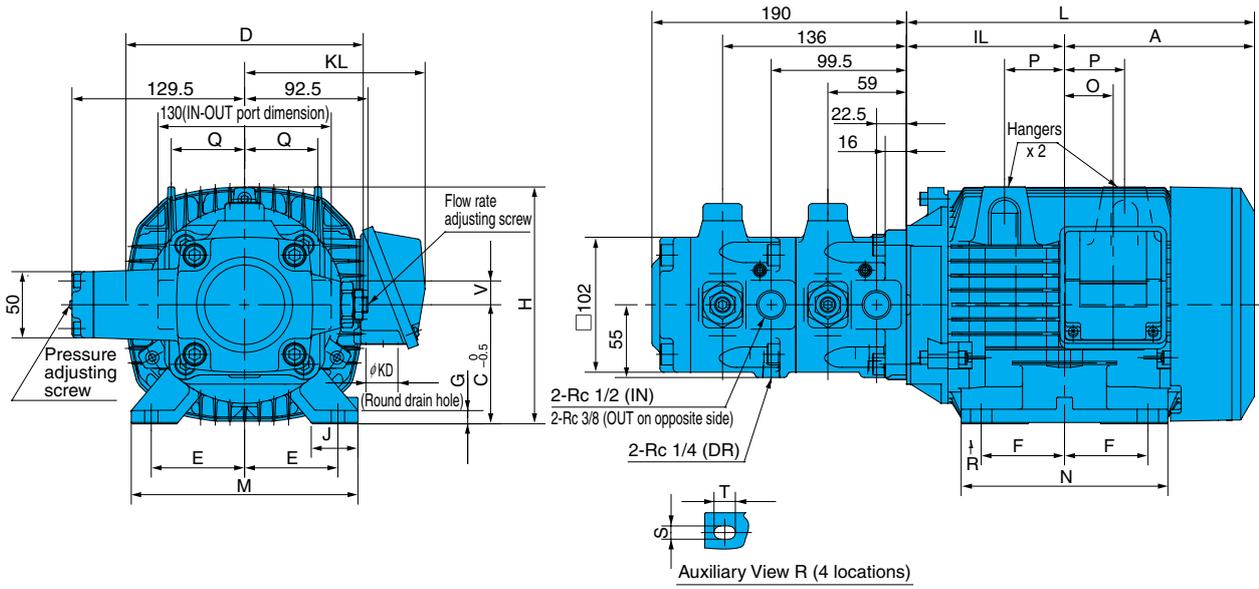
● **Selecting a motor**  
 The area under a motor output curve in the graph to the left is the operating range for that motor under the rated output for that motor.  
**Example:**  
 To find the motor that can produce pressure of 3.5MPa and a discharge rate of 25 l/min. **Selection Process**  
 Since the intersection of the two broken lines from a pressure of 3.5MPa and discharge rate of 25 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.

**Installation Dimension Drawings UVD-1A**



Uni-pump	Motor Dimensions mm																			Frame No.	Output kW (4 poles)	Weight kg
	A	IL	C	D	E	F	G	H	J	L	M	N	S × T	KD	KL	O	P	Q	V			
UVD-1A-A2-0.75-4-26	124	105	80	160	62.5	50	10	160	34	229	155	135	10 × 25	φ22	126	21	—	—	16.5	80M	0.75	21
UVD-1A-A2-1.5-4-26	142.5	118.5	90	178	70	62.5	10	179	35	261	170	155	10 × 16	φ22	136	36.5	45	55	18	90L	1.5	25
UVD-1A-A3-1.5-4-26																						
UVD-1A-2A2-1.5-4-26	160.5	133	100	195	80	70	13	197.5	45	293.5	195	175	12 × 25	φ22	150	45.5	50	55	22	100L	2.2	29
UVD-1A-A2-2.2-4-26																						
UVD-1A-A3-2.2-4-26																						
UVD-1A-2A2-2.2-4-26	171	140	112	219	95	70	14	221.5	45	311	224	175	12 × 25	φ22	161	53	55	66	22	112M	3.7	38
UVD-1A-A3-3.7-4-26																						
UVD-1A-2A2-3.7-4-26																						
UVD-1A-2A3-3.7-4-26																						

0.75kW model does not have hangers.



Uni-pump	Motor Dimensions mm																			Frame No.	Output kW (4 poles)	Weight kg	
	A	IL	C	D	E	F	G	H	J	L	M	N	S × T	KD	KL	O	P	Q	V				
UVD-11A-A2-A2-1.5-4-26																							
UVD-11A-A2-A3-1.5-4-26	142.5	118.5	90	178	70	62.5	10	179	35	261	170	155	10×16	ϕ22	136	36.5	45	55	18	90L	1.5	33	
UVD-11A-A3-A3-1.5-4-26																							
UVD-11A-A2-A2-2.2-4-26																							
UVD-11A-A2-A3-2.2-4-26	160.5	133	100	195	80	70	13	197.5	45	293.5	195	175	12×25	ϕ22	150	45.5	50	55	22	100L	2.2	37	
UVD-11A-A3-A3-2.2-4-26																							
UVD-11A-2A2-2A2-2.2-4-26																							
UVD-11A-A2-A2-3.7-4-26																							
UVD-11A-A2-A3-3.7-4-26																							
UVD-11A-A3-A3-3.7-4-26	171	140	112	219	95	70	14	221.5	45	311	224	175	12×25	ϕ22	161	53	55	66	22	112M	3.7	46	
UVD-11A-2A2-2A2-3.7-4-26																							
UVD-11A-2A2-2A3-3.7-4-26																							