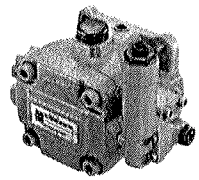
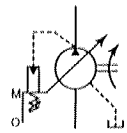
NACHI

VDC SERIES HIGH PRESSURE TYPE
VARIABLE VOLUME VANE PUMP



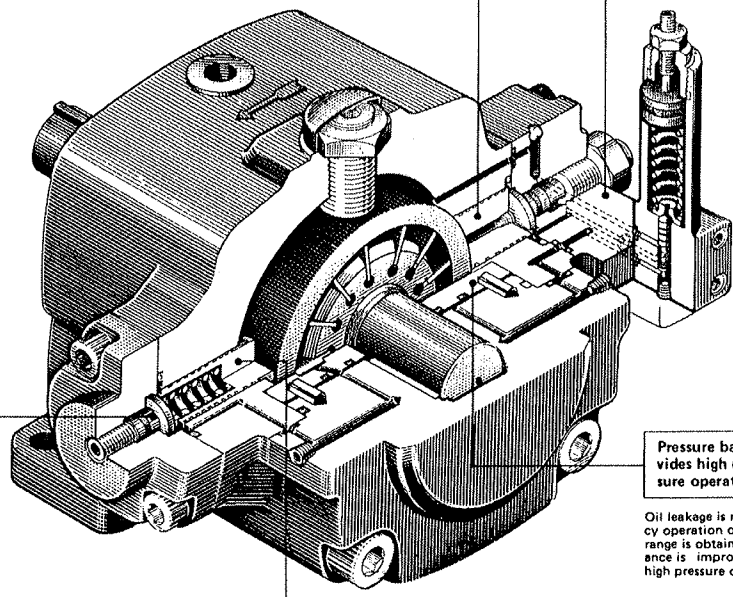


VDC Series
High-Pressure Type Variable Volume Vane Pump

7.9 to 31.7gpm
2000psi

Overview

The VDC series high pressure variable volume vane pumps are a new series of pumps. In addition to Nachi's three exclusive mechanisms (pressure control; pressure balance; ring stopper mechanism), a unique and exclusive three-point ring support system which makes maximum utilization of high pressure oil has been adopted to provide stable high pressure and quiet operation.
The new series of hydraulic pumps are ideal for applications, such as: machine tools, industrial machinery and vehicles.



Features

①High efficiency, high pressure operation

The unique pressure regulator and pressure balance mechanism, plus the exclusive three-point ring support system has improved performance during high pressure operation. The pump operates with high efficiency and stable performance up to a maximum of 140kgf/cm² (2000 psi).

②Low vibration and noise levels

The new mechanisms reduces vibration and noise levels. Of particular note is the unique and exclusive three-point support system which uses, a regulating piston and a bias piston to eliminate vibration. The mechanism, together with improvements to the shape of the inlet and outlet ports and high performance journal bearings, has reduced the noise level during operation.

③Fast response

The ring stopper mechanism serves to allow swift response whether in starting, stopping, or with load fluctuations, for high precision operation.

④Stable discharge with sharp cut-off characteristics

A revolutionary pressure compensator type pressure regulation mechanism provides, stable sharp cut-off characteristics. The compensator serves to provide stable and constant volume through our the pressure ranges.

⑤High efficiency operation with reduced power loss

Efficiency has been improved with the new mechanisms and Nachi's high precision machining technology. Power loss has been reduced, expecially during dead-heading.

⑥Easy adjusting in maintenance and handling

Maintenance is easier due to the positioning of the pressure adjusting mechanism and the volume adjusting mechanism on the same side of the pump.

Specifications

Single Pump

Model type		Flow at no load ℓ/min (gpm)		Pressure adjusting range kgf/cm² (psi)	Drive speed rpm		Max setting pressure kgf/cm² (psi)	Weight kgf (lbs)
Foot mounting	Flange mounting	1800 rpm	1500 rpm		Max.	Min.		
VDC-1A-1A2-※20	VDC-1B-1A2-※20/35	30 (7.9)	25 (6.6)	15 ~ 35 (214 ~ 500)	1800	800	35 (500)	9.5 (20.9)
VDC-1A-1A3-※20	VDC-1B-1A3-※20/35			20 ~ 70 (286 ~ 1000)			70 (1000)	
VDC-1A-1A4-※20	VDC-1B-1A4-※20/35			50 ~ 105 (714 ~ 1500)			105 (1500)	
VDC-1A-1A5-※20	VDC-1B-1A5-※20/35			70 ~ 140 (1000 ~ 2000)			140 (2000)	
VDC-1A-2A2-※20	VDC-1B-2A2-※20/35	40 (10.5)	33 (8.7)	15 ~ 35 (214 ~ 500)	1800	800	35 (500)	9.5 (20.9)
VDC-1A-2A3-※20	VDC-1B-2A3-※20/35			20 ~ 70 (286 ~ 1000)			70 (1000)	
VDC-2A-1A2-※20	VDC-2B-1A2-※20/35	54 (14.2)	45 (11.8)	15 ~ 35 (214 ~ 500)	1800	800	35 (500)	25 (55.1)
VDC-2A-1A3-※20	VDC-2B-1A3-※20/35			20 ~ 70 (286 ~ 1000)			70 (1000)	
VDC-2A-1A4-※20	VDC-2B-1A4-※20/35			50 ~ 105 (714 ~ 1500)			105 (1500)	
VDC-2A-1A5-※20	VDC-2B-1A5-※20/35			70 ~ 140 (1000 ~ 2000)			140 (2000)	
VDC-2A-2A2-※20	VDC-2B-2A2-※20/35	70 (18.4)	58 (15.3)	15 ~ 35 (214 ~ 500)	1800	800	35 (500)	25 (55.1)
VDC-2A-2A3-※20	VDC-2B-2A3-※20/35			20 ~ 70 (286 ~ 1000)			70 (1000)	
VDC-3A-1A2-※20	VDC-3B-1A2-※20	120 (31.7)	100 (26.4)	15 ~ 35 (214 ~ 500)	1800	800	35 (500)	A type 47 (103.6) B type 33 (72.7)
VDC-3A-1A3-※20	VDC-3B-1A3-※20			20 ~ 70 (286 ~ 1000)			70 (1000)	
VDC-3A-1A4-※20	VDC-3B-1A4-※20			50 ~ 105 (714 ~ 1500)			105 (1500)	
VDC-3A-1A5-※20	VDC-3B-1A5-※20			70 ~ 140 (1000 ~ 2000)			140 (2000)	

Double Pump

Model type	Head end pump			Shaft end pump			Drive speed rpm		Weight kgf (lbs)
	Flow at no load ℓ/min (gpm)		Pressure adjusting range kgf/cm² (psi)	Flow at no load ℓ/min (gpm)		Pressure adjusting range kgf/cm² (psi)	Max.	Min.	
	1800 rpm	1500 rpm		1800 rpm	1500 rpm				
VDC-11B-2A3-2A3-※20/35	40 (10.5)	33 (8.7)	20 ~ 70 (286 ~ 1000)	40 (10.5)	33 (8.7)	20 ~ 70 (286 ~ 1000)	1800	800	20 (44.1)
VDC-11B-2A3-1A5-※20/35				30 (7.9)	25 (6.6)	70 ~ 140 (1000 ~ 2000)			
VDC-12B-2A3-2A3-※20/35	40 (10.5)	33 (8.7)	20 ~ 70 (286 ~ 1000)	70 (18.4)	58 (15.3)	20 ~ 70 (286 ~ 1000)	1800	800	35 (77.2)
VDC-12B-2A3-1A5-※20/35				54 (14.2)	45 (11.8)	70 ~ 140 (1000 ~ 2000)			
VDC-12B-1A5-2A3-※20/35	30 (7.9)	25 (6.6)	70 ~ 140 (1000 ~ 2000)	70 (18.4)	58 (15.3)	20 ~ 70 (286 ~ 1000)			
VDC-12B-1A5-1A5-※20/35				54 (14.2)	45 (11.8)	70 ~ 140 (1000 ~ 2000)			
VDC-22B-2A3-2A3-※20/35	70 (18.4)	58 (15.3)	20 ~ 70 (286 ~ 1000)	70 (18.4)	58 (15.3)	20 ~ 70 (286 ~ 1000)	1800	800	50 (110.3)
VDC-22B-2A3-1A5-※20/35				54 (14.2)	45 (11.8)	70 ~ 140 (1000 ~ 2000)			
VDC-13B-2A3-1A3-※20	40 (10.5)	33 (8.7)	20 ~ 70 (286 ~ 1000)	120 (31.7)	100 (26.4)	20 ~ 70 (286 ~ 1000)	1800	800	48 (105.3)
VDC-13B-2A3-1A5-※20						70 ~ 140 (1000 ~ 2000)			
VDC-13B-1A5-1A3-※20	30 (7.9)	25 (6.6)	70 ~ 140 (1000 ~ 2000)			20 ~ 70 286 ~ 1000			
VDC-13B-1A5-1A5-※20						70 ~ 140 (1000 ~ 2000)			

• Handling

1 The rotation is clockwise as 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 piping should comply with the conditions shown in the table below to ensure that back pressure due to pipe resistance does not exceed 0.1MPa. When using a pump that has drain ports at two locations, use the drain port that is higher after the pump is installed.

In the case of a double pump, run separate pipes from both the shaft side and the head side drains directly connect to the tank, so the drain pipe is below the surface of the oil.

Item \ Model No.	VDC-1	VDC-2	VDC-3
Pipe Joint Size	At least 1/4"	At least 1/4"	At least 3/8"
Pipe I.D.	At least ϕ7.6	At least ϕ7.6	At least ϕ9.6
Pipe Length	1m or less	1m or less	1m or less

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.

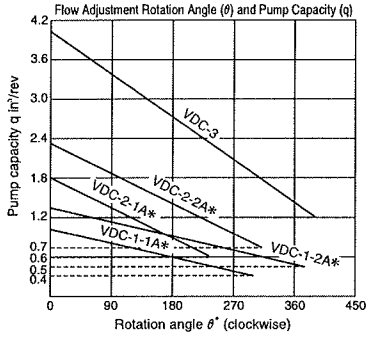
The graph below provides general guidelines for the relationship between the rotation angle of the flow rate adjusting screw and the no-load discharge rate.

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

Q : No-load Discharge RateQ ℓ/min

q : Volume cm³/rev

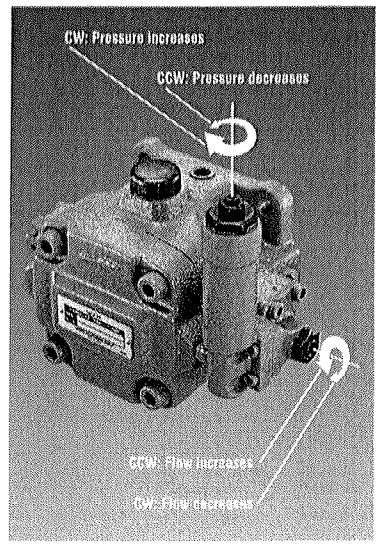
N : Revolution Speed min^{-1}



Note)

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

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



4 Pressure Adjustment Pressure is increased by clockwise (rightward) rotation of the discharge rate adjusting screw, and decreased by counterclockwise (leftward) rotation.

Loosen the lock nut before making adjustments. After adjustment is complete, re-tighten the lock nut.

5 P-Q adjustment at time of shipment from plant

- Flow adjustment: Has already been adjusted to maximum flow indicated for the model type in the catalog.
- Pressure adjustment: Has already been adjusted to preset pressures given in Table below:

Pump pressure adjusting range	Preset pressure when shipped from plant
2: 15~35 kgf/cm² (214~500 psi)	35 kgf/cm² (500 psi)
3: 20~70 kgf/cm² (286~1000 psi)	35 kgf/cm² (500 psi)
4: 50~105 kgf/cm² (714~1500 psi)	50 kgf/cm² (714 psi)
5: 70~140 kgf/cm² (1000~2000 psi)	70 kgf/cm² (1000 psi)

6 Thrust Screw and Stopper

The thrust screw and stopper are precision adjusted at the factory during assembly. Never touch them.

See callouts 15/43 and 15/38 in the VDC-1A and 2A/3A cross-section diagrams on pages V-19 and V-20.

7 An unload circuit is required when the motor is started under condition $\lambda - \Delta$. Contact your agent about the unload circuit.

8 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.

9 Sub Plate

Use the table below for to specify a sub plate type when one is required.

(Continued on following page)

Sub Plate Number

Pump Model No.	Sub Plate Number	Motor (kW)
VDC-1A-1A*-20	MVD-1-115-10	0.75 to 1.5
	MVD-1-135-10	2.2 to 3.7
VDC-1A-2A*-20	MVD-1-115Y-10	0.75 to 1.5
	MVD-1-135Y-10	2.2 to 3.7
VDC-2A-*A*-20	MVD-2-135-10	2.2 to 3.7
	MVD-2-160-10	5.5
VDC-2A-2A*-20	MVD-2-160Z-10	5.5

10 Foot Mounting
For a double pump with VDC-3 foot mounting, the foot mounting kit and pump are sold as a set. When only the mounting feet are required, pump mounting bolts, washers and other parts are sold together as the Foot Mounting Kit.

11 Hydraulic oil: When the pump is to be used at pressures of less than 70kgf/cm² (1000 psi), use good quality petroleum base hydraulic oil with a rating of 30~50cSt (141~232 SUS) (equivalent to ISO VG32) at 40°C (104°F). Operation at pressure exceeding 70kgf/cm2 (1000 psi), use oil with a rating of 50~70cSt (232~324 SUS) (equivalent to ISO VG68) at 40°C (104°F).

12 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.

13 Suction pressure is -0.03 to +0.03MPa (-4.3 to +4.3psi), and the suction port flow rate should be no greater than 2m/sec.

14 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.

15 Provide a suction strainer with a filtering grade of about 100μm (150 mesh). For the return line to the tank, use a 25μm line filter.

16 Manage hydraulic operating fluid so contamination is maintained at class NAS10 or lower. Take care to avoid contamination with water and 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.

17 Contact your agent about using water- and glycol-based hydraulic operating fluids.

18 At startup, repeat the inching operation (start-stop) to bleed air from the pump and pipes.

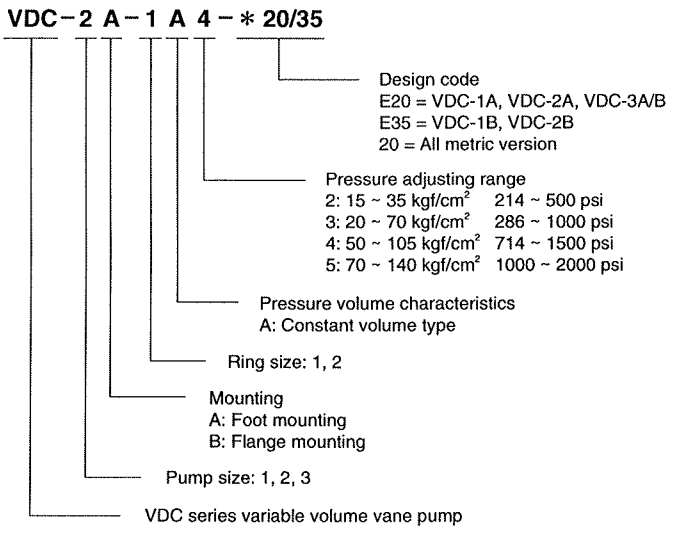
19 Equip an air bleed valve in circuits where it is difficult to bleed air before startup.

20 To ensure proper lubrication of the pump's rubbing surfaces, supply oil to the interior of the pump before starting operation.

21 Alignment: Alignment between the pump shaft and the motor shaft should be parallel within 0.05mm (0.002 inch), and within 1° for the angle between the two shafts. Use a pump mounting base of sufficient rigidity.

Understanding Model Numbers

Single Pump



Note: Remote control pressure compensating type is available. Please check with factory.

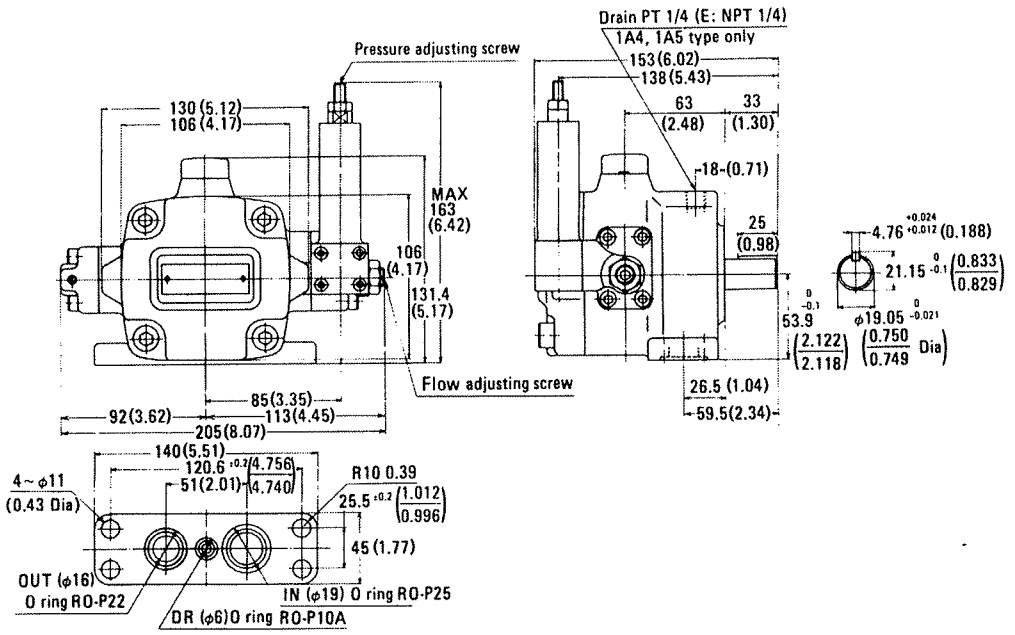
Double Pump

VDC−1 2 B−1 A 5−2 A 3−* 20

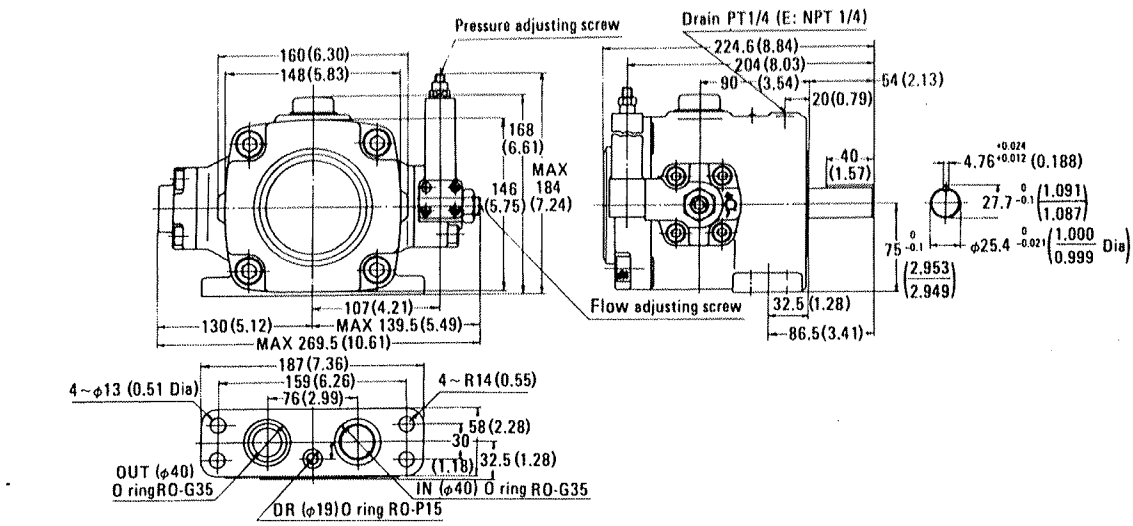
- Design code
  E35 = VDC-11B, VDC-12B
  E20 = VDC-13B
  20 = All metric version
- Pressure adjusting range of shaft end pump
  3: 20 ~ 70 kgf/cm² 286 ~ 1000 psi
  5: 70 ~ 140 kgf/cm² 1000 ~ 2000 psi
- Pressure volume characteristics of shaft end pump
  A: Constant volume type
- Ring size of shaft end pump: 1, 2
- Pressure adjusting range of head end pump
- Pressure volume characteristics of head end pump
- Ring size of head end pimp
- Mounting B: Flange mounting
- Pump size of shaft end pump: 1, 2, 3
- Pump size of head end pump: 1, 2
- VDC series double variable volume vane pump

Installation Dimension Drawings

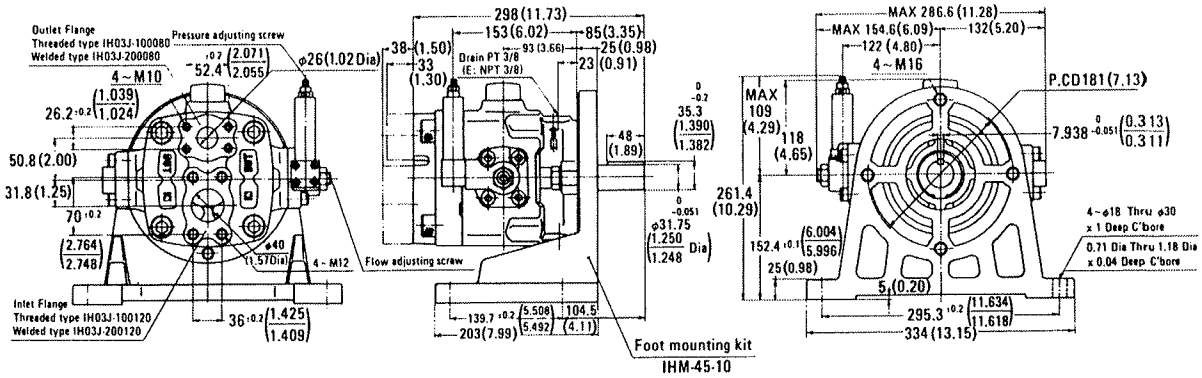
VDC-1A-*A*-*20 mm(inch)



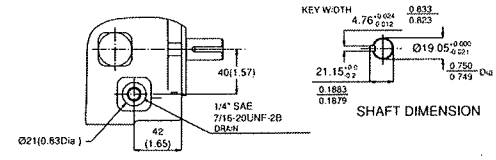
VDC-2A-*A*-*20 mm(inch)



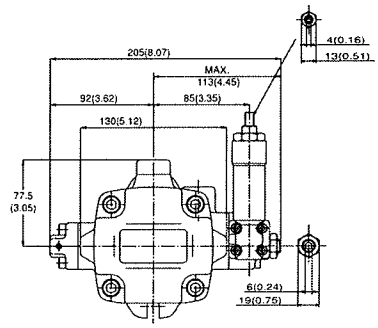
VDC-3A-1A*-*20 mm(inch)

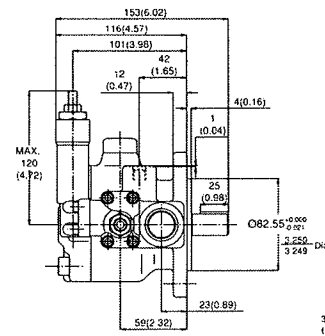


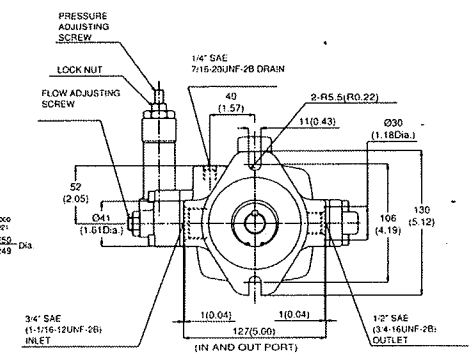
VDC-1B-*A*-E35
(SAE-A MOUNT)



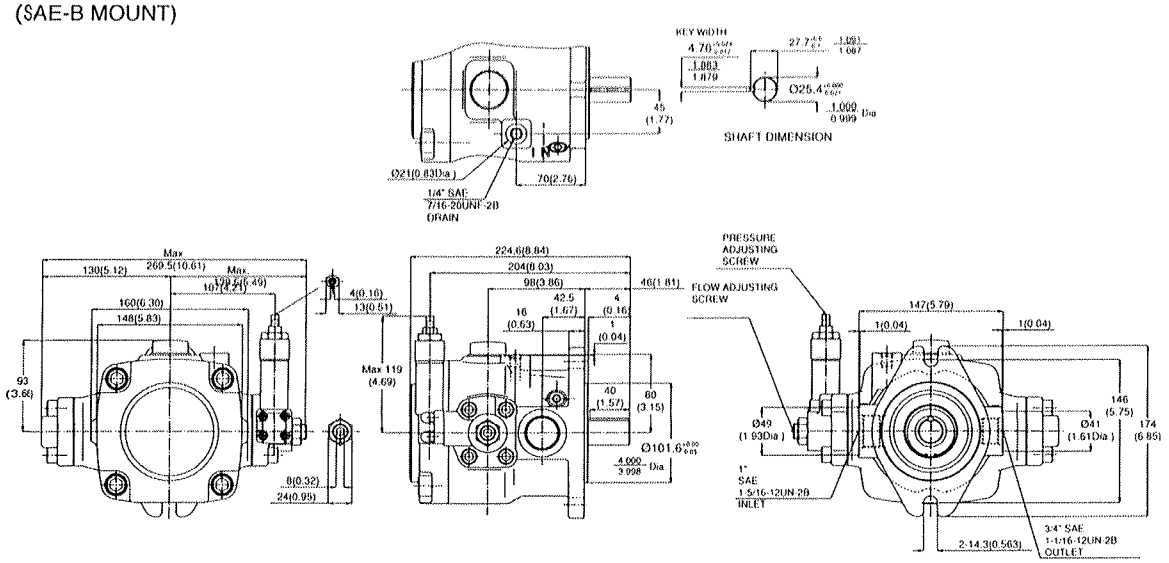
SHAFT DIMENSION



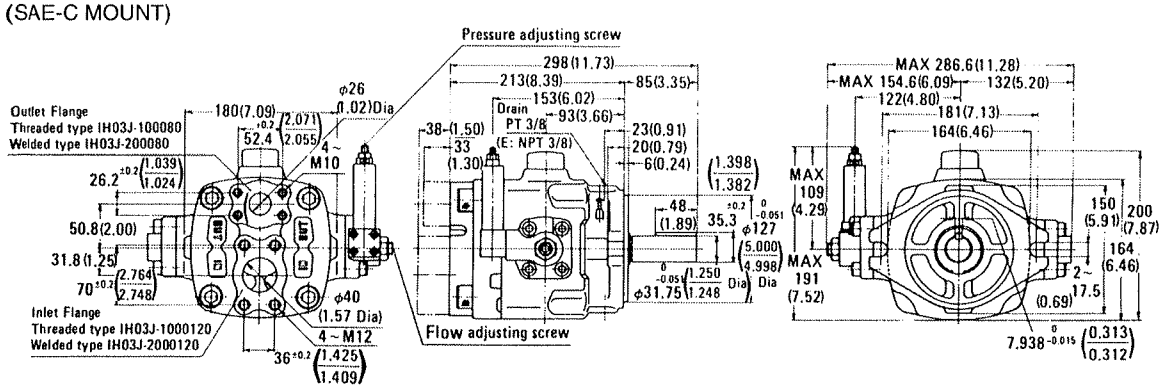




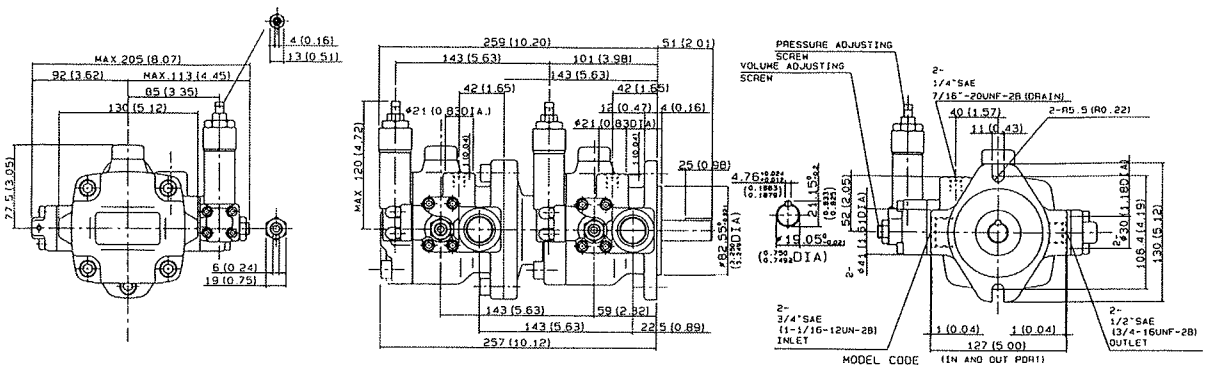
VDC-2B-*A*-E35
(SAE-B MOUNT)



VDC-3B-A*-20 mm(inch)
(SAE-C MOUNT)



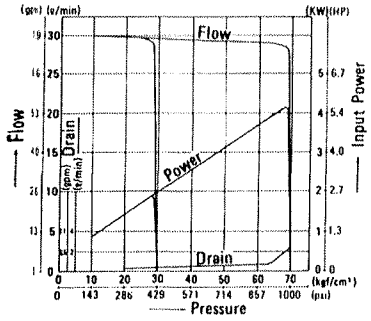
VDC-11B-*A*-*A*-E35 mm(inch)



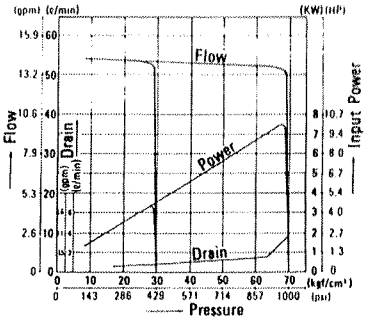
Performance Curves

Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

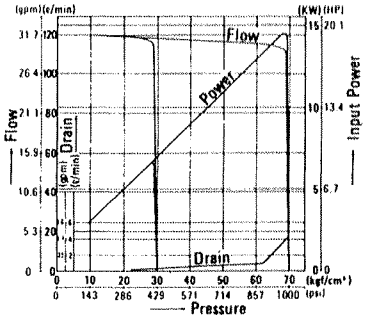
VDC-1A(B)-1A3-20/35



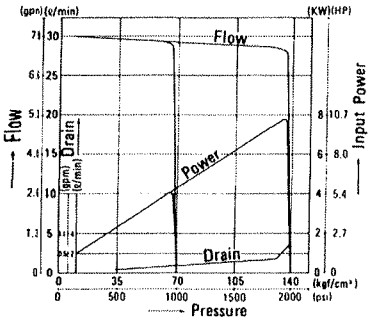
VDC-2A(B)-1A3-20/35



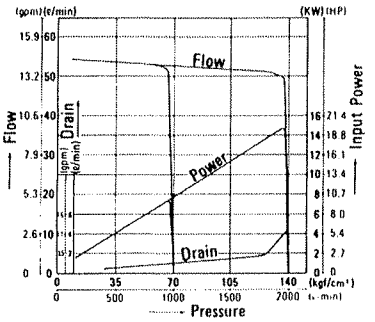
VDC-3A(B)-1A3-20



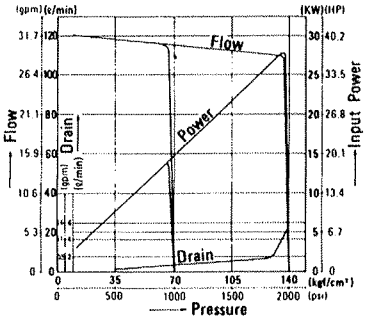
VDC-1A(B)-1A5-20/35



VDC-2A(B)-1A5-20/35

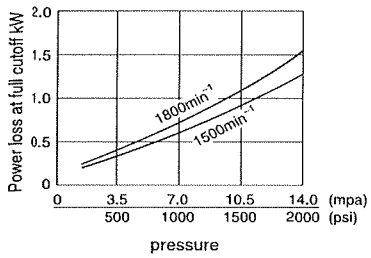


VDC-3A(B)-1A5-20

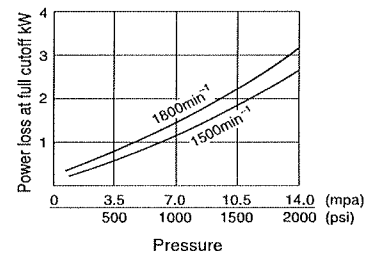


Power loss

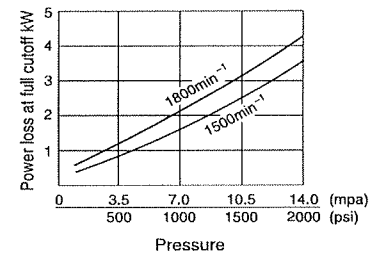
VDC-1



VDC-2

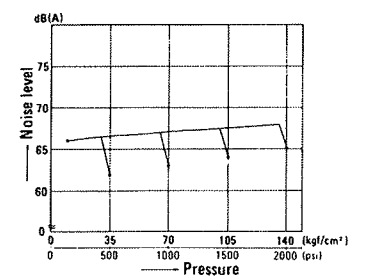


VDC-3

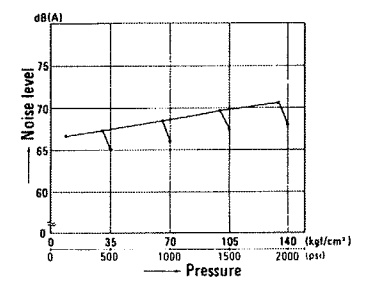


Noise Characteristics

VDC-1*-1A*-20/35



VDC-2*-1A*-20/35



VDC-3*-1A*-20/35