

NACHI Hydraulic Pumps

Features

- ① NACHI-FUJIKOSHI guarantees the high quality and performance on all products through finishing with our unique and precise machining technology based on the selected material and traditional heat treatment.
- ② Noise has been thoroughly reduced on hydraulic pumps, a general source of noise on machinery and equipment. All models such as the low noise type IP series can be operated quietly with little noise.
- ③ Attention has been paid to surface treatment and selection of materials in NACHI hydraulic pumps so that they can be applied extensively with fire-resistant hydraulic fluid.

Installation and Maintenance

- ① Limit the eccentricity between the drive shaft and hydraulic pump shaft to 0.05 mm, keep the angle error within 1° and use flexible couplings for connections.
- ② On operating hydraulic pumps with belts, gears and chains, prevent a radial or thrust load exceeding the allowable value from being applied on the pump shaft. Also, if necessary, install a device that prevents a load (bending force) from being applied at right angles on the shaft. Mount hydraulic pumps so that the pump shaft is horizontal.
- ③ Use a rigid mounting base.
- ④ The direction of rotation is determined on each hydraulic pump. Operate the hydraulic pump in the correct direction of rotation after checking the indicated model No. on the nameplate or the arrow indicating the direction of rotation on the body. The direction of rotation is clockwise when viewed from the shaft end.
- ⑤ Limit the suction pressure to within the range -0.03 to +0.03 MPa {-0.3 to +0.3 kgf/cm²}.
- ⑥ On external drain type hydraulic pumps, directly connect the drain to the tank, insert the drain pipe under the oil level, and limit the drain back pressure to 0.03 MPa {0.3 kgf/cm²}.
- ⑦ When connecting steel pipes to the suction and discharge sides, Never apply the abnormal force to the pump by the piping.
- ⑧ Keep the fitting length of couplings and hydraulic pump shafts so that it is within at least 2/3 or more of the coupling width. Also, use a size of coupling that matches the shaft diameter.
- ⑨ When inserting couplings into shafts, insert them gently. When removing couplings from shafts, be sure to use a pulley extractor. Avoid hitting the

shaft when attaching or removing couplings.

- ⑩ Connect to the suction port above the horizontal to keep oil inside hydraulic pumps.
- ① Provide an air bleed valve in circuits where it is difficult to release air at startup.
- ② Be sure to use only specified bolts on hydraulic pumps. Use bolts of 12.9 strength classification or equivalent.

Uni-pumps

Uni-pumps are compact pump/motor units which have a motor directly coupled to the hydraulic pump. Variable volume type vane pumps and piston pumps are available. As each of these pumps are ideally integrated with the motor, they can be easily installed, and more compact equipment configurations can be achieved economically.

- Standard motor:
 - totally-enclosed splashproof housing surface flange cooled self-actuating type (totally enclosed fan-cooled type)
 - 0.4 kW to 4P or less: Class E insulation
 - 0.75 kW to 4P or more: Class B insulation
 - Voltage 200V...50/60 Hz
 - 220V...60 Hz

Management of Hydraulic Operating Fluid

- ① Use mineral oil-based hydraulic operating fluid.
- ② Provide a suction filter of about 100 to 150 mesh on the suction port.
- ③ When operating hydraulic pumps at a high pressure or when using fire-resistant hydraulic operating fluid, oil contamination greatly affect pump service life. So, use a filter of 25μm or less.
- ④ Consult your agent when using fire-resistant hydraulic operating fluid. When using water- or glycol-based hydraulic operating fluid, refer to page N-3 for details on applicable models of hydraulic pumps.
- ⑤ For details on the viscosity of hydraulic operating fluid, refer to the separate section "Hydraulic Operating Fluid."

Terms Used in This Catalog

The following describes the meanings of the following terms used in this catalog:

- Rated pressure:
 - The maximum pressure at which a hydraulic pump can be used continuously.
- Maximum operating pressure:
 - The maximum pressure (including surge pressure) at which a hydraulic pump can be used within six seconds at most within 1/10 of the cycle time.
- Allowable peak pressure:
 - The maximum pressure (set pressure + surge pressure) that can be momentarily allowed
- The following shows the standards in Lists of Sealing Parts:
 - JIS standard B2401 (O-ring)
 - JIS standard B2407 (backup ring)
 - SAE standard AS568 (O-ring)
- Pipe thread type mentioned in this catalog that are indicated as "G*/**" comply with JIS B2351 O-ring seal systems. Note, however, that G3/4 adopts dimensions before JIS revisions were made in 1990. Nachi Fujikoshi adopts P24 as the O-ring size whereas P22.4 is stated in current JIS standards.

Calculation Formula Required when Selecting Hydraulic Pumps and Motor

1. Pump discharge flow rate

$$Q_p = \frac{q \cdot N \cdot \eta_v}{1000} \text{ (l/min)}$$

q=discharge volume per rotation (cm³/rev)

N=revolution speed(min⁻¹)

η_v=volume efficiency

2. Power required for pump drive

$$W_{P1} = \frac{P \cdot Q_p}{60 \eta} \text{ (kW)}$$

$$= \frac{P \cdot Q_p}{44 \eta} \text{ (PS)}$$

P=discharge pressure(MPa)

η=overall efficiency

3. Motor revolution speed

$$N = \frac{120 \cdot f}{P} \cdot (1-S) \text{ (min}^{-1}\text{)}$$

f=frequency(50Hz, 60Hz)

P=number of motor poles

S=slip rate

Hydraulic Pump Selection Table

Pump Type	Name	Type Classification	Rated Pressure MPa {kgf/cm ² }	Displacement cm ³ /rev												Page		
				1	2	5	10	20	50	100	200	500	1000	2000	5000			
Variable piston pumps	PVS series variable piston pump	PVS	21 {214}		3					45								A-3
	Uni-pump	UPV	21 {214}		3					45								A-19
	PZS series variable piston pump	PZS	21 {214}						42				220					A-22
	PZ load-sensitive variable piston pump	PZ	21 {214}			8							220					A-35
Variable discharge volume vane pumps	VDS series compact variable vane pump	VDS	7 {71.4}		3					8.3								B-1
	Uni-pump	USV	7 {71.4}		3					8.3								B-4
	VDR22 design series variable vane pump	VDR	14 {143}			5							44.4					B-6
	Uni-pump	UVD	7 {71.4}			5							33.3					B-12
	VDR13 design series variable vane pump	VDR	6 {61.2}			4							27.8					B-15
	Uni-pump	UVD	6 {61.2}			4							27.8					B-22
	VDC series high-pressure variable vane pump	VDC	14 {143}						5					88.9				B-25
	Uni-pump	UVC	7 {71.4}						5					33.3				B-37
	UVN series variable vane uni-pump	UVN	8 {81.6}			8.1								26.0				
Internal gear pump	IPH series IP pump	IPH	25 {255}						3.6					125.9				C-1
	IPH series double IP pump	IPH	21 {214}						7.2					251.8				C-14