

Hydraulic Fluids

Hydraulic Fluids

Use petroleum base oil such as anti-wear type hydraulic oils or R & O (Rust and oxidation inhibitor) type hydraulic oils equivalent to ISO VG-32 or 46. The recommended viscosity range is from 20 to 400 mm²/s and temperature range is from 0 to 60 °C, both of which have to be satisfied for the use of the above hydraulic oils.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the operating oil which can otherwise lead to breakdowns and shorten the life of the unit.

Please maintain the degree of contamination within NAS Grade 10.

The suction port must be equipped with at least a 100 μm (150 mesh) reservoir type filter and the return line filter of under 10 μm.

Instructions

Mounting

When installing the pump the filling port should be positioned upwards

Alignment of Shaft

Employ a flexible coupling whenever possible, and avoid any stress from bending or thrust. Maximum permissible misalignment is less than 0.1 mm TIR and maximum permissible misangular is less than 0.2°.

Suction Pressure

Permissible suction pressure at inlet port of the pump between -16.7 and +50 kpa (5 in.Hg Vacuum and 7 PSIG). For piping to the suction port, use the pipe of the same diameter as that of the pump suction port is within 1meter from the oil level in the reservoir.

Hints on Piping

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise. Whenever there is fear of excessive load, please use rubber hoses.

Suction Piping

In case the pump is installed above the oil level, the suction piping and suction line filter should be located lower than the pump to prevent air in the suction line.

Drain Piping

Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a normal pressure of less than 1 Kgf/cm² and surge pressure of less than 5 Kgf/cm².

Length of piping should be less than 1 m, and the pipe end should be submerged in oil.

In case AR16 and AR22 pump, a screw-in torque of fitting is 40 to to 50 Nm. Do not apply bending and thrust torque to the fitting.

[Recommended Drain piping Size]

Model No.	Fitting Size		Inside Dia. of Pipe
	Japanese Std. "JIS" and European Design Std.	N.American Design Std.	
AR16, AR22	3/8 [Inside Dia. 8.5 mm or more]	SAE #8	10 mm
A10	3/8 [Inside Dia. 8.5 mm or more]	SAE #6	10 mm
A16 A22	3/8 [Inside Dia. 8.5 mm or more]	SAE #8	
A37	1/2 [Inside Dia. 10 mm or more]	SAE #10	12 mm
A56 A70 A90 A145	3/4 [Inside Dia. 16 mm or more]	SAE #12	19 mm
A3H16 A3H37	1/2 [Inside Dia. 12 mm or more]	SAE #10	12 mm
A3H56 A3H180	1/2 [Inside Dia. 16 mm or more]	SAE #12	19 mm

* For A3HG and A7H, consult YUKEN for details.

Bleeding Air

It may be necessary to bleed air from pump case and outlet line to remove cause of vibration. An air bleed valve (Model Number ST1004-※-1080, refer EIC-L-1001, page 6) is recommended for this purpose.

Starting

Before first starting, fill pump case with clean operating oil via the filling port.

In order to avoid air blockage when first starting, adjust the control valves so that the discharged oil from the pump is returned direct to the reservoir or the actuator moves in a free load.

Volume of Pre-fill Oil Required

Model	Volume cm ³
AR16/AR22	430
A10	370
A16 /A22	600
A37/A56	1200
A70	2100
A90	2500
A145	3300
A3H16	400
A3H37	700
A3H56	900
A3H71	1300
A3H100	1700
A3H145	2400
A3H180	3200

* For A3HG and A7H, consult YUKEN for details.

Setting Discharge Pressure and Delivery

At the time of shipment, the unit has been preset to maximum delivery and minimum discharge pressure. Adjust the preset delivery and pressure to meet your system requirements.

Adjustment of Discharge Pressure

Turning the adjustment screw clockwise, increases pressure.

Volume adjusted by each full turn of the pressure adjustment screw.

Model Numbers	Adjustment Volume
AR16/AR22-FR01B	29
AR16/AR22-FR01C	54
A10-FR01B	29
A10-FR01C/H	54
A16/A22/A37/A56-※-R0-01-B	35
A16/A22/A37/A56-※-R0-01-C	65
A16/ A37/A56-※-R-01-H	79
A70/A90/A145-※-R01B	23
A70/A90/A145-※-R01C	32
A70/A90/A145-※-R01H	40
A70/A90/A145-※-R01K	47
A3H16/A3H37/A3H56-01	55
A3H71/A3H100/A3H145-01	63
A3H180-01	57

* For A3HG and A7H, consult YUKEN for details.

Adjustment of Delivery

Turning the delivery adjustment screw clockwise, decreases delivery.

The minimum adjustable flow and adjustable volume of each full turn of the delivery adjustment screw

Model Numbers	Adjustable With each full turn of the adjustment Screw cm ³	Minimum adjustable flow cm ³ /rev
AR16	1.5	6.0
AR22	2.1	8.5
A10	1.1	2.0
A16	1.4	4.0
A22	2.0	6.0
A37	2.9	10
A56	3.9	12
A70	4.4	30
A90	4.8	56
A145	7.2	83
A3H16	1.4	8
A3H37	3.3	16
A3H56	4.2	35
A3H71	4.9	45
A3H100	6.2	63
A3H145	9.4	95
A3H180	10.3	125

* For A3HG and A7H, consult YUKEN for details.

Mounting Bolt Tightening Torques

Sl. No.	Size	Tightening Torque Kgf-cm
1	M4	44.0
2	M5	90.0
3	M6	154.0
4	M8	365.0
5	M10	720.0
6	M12	1235.0
7	M16	3010.0
8	M20	5860.0

* For A3HG and A7H, consult YUKEN for details.

Hydraulic Fluids

Types of Hydraulic Fluids

1. Types of Hydraulic Fluids

Any type of hydraulic fluids listed in the table 1 below can be used. However, the specifications of the pumps such as maximum pressure and maximum pump speed may be changed according to the type of hydraulic fluids to be used. For details, please refer to the specifications of the pump concerned.

- **Hydraulic Fluids**

(Table 1)

Petroleum base oil		Use anti-wear type oils or R & O (Rust and oxidation inhibitor) type oils (equilant to ISO VG32 or 46).
Synthetic Fluids		Use phosphate ester type fluids When phosphate ester type fluid is used, prefix “ fluids When phosphate ester type fluid is used, prefix “F-” to the model number because the special seals (fluororubber) are required to be used.
Water Containing Fluids	Water-Glycols	Standard pumps can be used without conditions. However, if any type other than those in table 2 is used, the maximum operating Pressure is limited.
	Water in Oil Emulsion	Standard pumps can be used without conditions.

- **Anti -Wear type Water-glycols**

(Table 2)

Fluid Manufacturer	Commercial Trade Name
Exxon Mobil	Mobil Nybac FR 200 D
Japan Energy Corp.	Jomo Hydria G
Nippon Oil Corporation	Hurando Frx 46
Showa Shell Sekiyu K.K	Shell HFC Fluid 46
Matsumura Oil Research Corp.	Hydol Haw
Cosmo Oil Lubricants Co.Ltd.	Cosmo Fluid HQ 46 Cosmo Fluid GS 46

2. Fluid Viscosity and Temperature

Use the hydraulic fluids which satisfy the recommended viscosity and temperature given in the left table below however, please note that if any of the pumps listed in the right table is started at low speed, the maximum fluid viscosity is limited.

- **Fluid Viscosity and Temperature**

(Table 3)

Fluid	Temperature °C	Viscosity cSt
Petroleum base Oil	0-70	20-400
Phosphate Ester		
Water Glycols	0-50	
Water in Emulsions	5-50	

- **Maximum Viscosity for low start-up speed**

(Table 4)

Pump Type	Start-up speed r/min.	Max. Viscosity cSt
PVR1T	750	100
PVR50	750	100
PVR150	750	100
PVR1050	750	100
PVR50150	750	100
PV2R1	750	100
PV2R2	600	100
PV2R3	600	100
PV2R4	600	100
PV2R12	750	100
PV2R13	950	200
PV2R14		
PV2R23	600	100
PV2R24		
PV2R33	600	100
PV2R34		
SVP1	750	100
SVP2	600	100
SVP3	600	100
SVP12	600	100
SVP23	600	100
HPV2	400	100
HPV3	400	100
HPV22	400	100
HPV32	800	100
RV20	800	100

3. Control of Contamination

Contamination of hydraulic fluids result in pump failures and reduced pump lives. Carry out sufficient contamination control for hydraulic fluid and keep contamination level within NAS class 12.

Also, use a 100 μ m (150-mesh) tank filter on the suction side, more than 50 mm away from the tank bottom.

■ Mounting Bolt Tightening Torques

Sl. No.	Size	Tightening Torque Kgf-cm
1	M10	720.0
2	M12	1235.0
3	M16	3010.0
4	M18	4150.0
5	M20	5860.0

Instructions

1. Alignment of shaft

Employ a flexible coupling whenever possible, and avoid any stress from bending or thrust.

Maximum permissible misalignment is less than 0.1 mm TIR and maximum permissible misangular is less than 0.2°.

2. Suction Pressures

Set the suction pressure at pump inlet port at the value given in the table below. Furthermore, use the pipes in the suction side having the diameter as indicated on the installation drawings. In case where the pump is installed on the tank or at the position higher than the tank top cover, the height of the suction port of the pump should be less than 1 meter from the oil level {less than 0.8 meter in case of using phosphate ester fluids or water containing fluids}.

Pump Type		Suction Pressure			
		Minimum			
		Petroleum base oil	Phosphate ester type fluid water containing fluid	Maximum	
“PVR” Series Single pumps	PVR1T PVR50 PVR150	-0.2 Kgf/cm ²	-0.16 Kgf/cm ²	+0.3 Kgf/cm ²	
	“PVR” Series Double pumps				PVR1050 PVR50150
“PV2R” Series Single pumps	PV2R1 PV2R2				
	PV2R3 PV2R4				
“PV2R” Series Double pumps	PV2R12 PV2R13 PV2R14 PV2R23 PV2R24 PV2R33 PV2R34				
	“SVP” Series Single pumps				SVP1 SVP2 SVP3
	“SVP” Series Double pumps				SVP12 SVP23
	“HPV” Series Single pumps				HPV2 HPV3
	“HPV” Series Double pumps				HPV22 HPV32
“RV” Series Variable Displacement Pump	RV20				

* In relation to the rotating speed of the pump, the minimum suction pressure may be restricted for a certain nominal displacement. For details, please refer to the specifications of the pump concerned.

3. Precautions at starting

At an initial operation or at an operation after a long rest, the pump may have difficulty in sucking up fluid. In such cases, an air bleed valve should be installed beforehand on the discharge side (model No. ST1004-※-10※, refer EIC-L-1001, page 18), or discharge air by slightly slackening the connection on the discharge side. At starting operate the pump intermittently as far as possible with no load.

For fluid viscosity at starting, see the item of “Hydraulic Fluids”.

4. Other precautions

If a pump is used at speed below 1200 r/min., install the pump with the suction port upside so that the pump can suck up fluid easily at starting.