

PH series High pressure variable displ. piston pumps

Model Code	Working Pressure MPa	Maximum Speed min ⁻¹	Maximum Displacement cm ³ /rev								Page		
			1	5	10	20	50	100	200				
PH56	*2 Rated 28 *1 Intermittent 30	1800							56			A1-1	
PH80									80				
PH100										100			
PH130											130		
PH170	*2 Rated 21 *1 Intermittent 22.5									170			

Note: *1 Intermittent pressure which operable time is limited to 10% of operating cycle (max. 6 seconds).
Consult Tokyo Keiki for working pressure above rated pressure.
*2 Rated pressure of electric direct control EDHS is 21 MPa. This pressure is limited by safety valve.

The **PH Series** is a low-noise variable displacement piston pump with rated pressure of 28 MPa. This series was developed based on the low-noise P**V series which has won high reputation from various customers. The PH Series also feature lower noise levels, and more compact size.

- Low operation noise: highly rigid pump construction and proprietary noise reduced design enables low operational sound levels.
- Long life: high efficiency design with 28 MPa rated pressure.

- To improve their resistance to contamination, these pumps use bushed cylinder blocks made of wear-resistant copper alloy. They also feature a long-life design thanks to the bearings with their high load capability.
- Superior controllability: in addition to pressure compensator control, load sensing control, and electric direct control, torque limiter control is also offered.
- Wide array of configuration: direct coupled same displacement double pump, direct coupled fixed double, triple pump combinations.

PH**F series Low noise fixed displacement piston pumps

Model Code	Working Pressure MPa	Maximum Speed min ⁻¹	Maximum Displacement cm ³ /rev								Page	
			1	5	10	20	50	100	200			
PH40F	Rated 21 *1 Intermittent 22.5	2300							40			A3-1
PH56F		2300							56			
PH80F		2000								80		
PH100F		2000									100	
PH130F		1800									130	
PH170F		1800									170	

Note: *1 Intermittent pressure which operable time is limited to 10% of operating cycle (max. 6 seconds).
Consult Tokyo Keiki for working pressure above rated pressure.

The **PH**F Series** is a fixed displacement version of the PH variable displacement piston pumps designed for Direct Drive Systems, with more lighter weight and more compact size.

- Compared with the PH series, this series of pumps is designed to have about 40% less weight.
- They also incorporate relief valves to achieve a safety design that protects the hydraulic circuit from overloads.

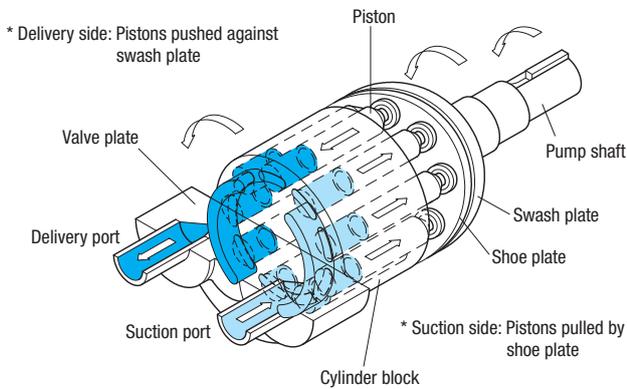
P**V series Variable displ. piston pumps

Model Code	Maximum Working Pressure MPa	Maximum Speed min ⁻¹	Maximum Displacement cm ³ /rev										Page					
			1	2	3	4	5	10	20	50	100	200						
P16VM	14	1800							16									
P21VM										21								
P16V	21								16									
P21V									21									
P31V										31								
P40V											40							
P70V												70						
P100V													100					
P130V														130				
P** V Series																A4-1		

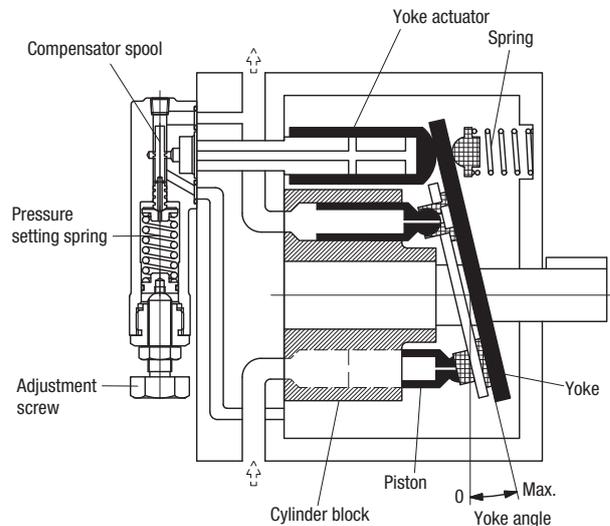
The **P**V Series** high performance variable axial piston pump offers a wide range of displacements, a wealth of features, energy-saving design, low noise, high speed, electronics compatibility to meet the diverse needs of users in the machine tool, general industrial machinery, mobile construction markets, etc.

- Low noise: approx. 68.5dB(A) [P70V] at pressure, 21 MPa and speed, 1800 min⁻¹.
- Offers many types of pump control functions: (single stage, multi-stage, proportional) pressure compensator control, load sensing control, dual pressure dual flow self-pressurized control, electric direct control, etc. In addition, configurations which include manifold blocks which incorporate various function valves can be mounted at the delivery port, with a capacitor-like function which reduces pulsations are possible which simplify hydraulic circuits and reduce noise.

○ Var. Piston Pump Principle of Operation



○ Control Example (Pressure compensator control)



When pump delivery pressure approaches setting pressure, compensator spool is actuated and pressurized oil is fed to control piston which acts to reduce pump delivery.

Notes on Operation

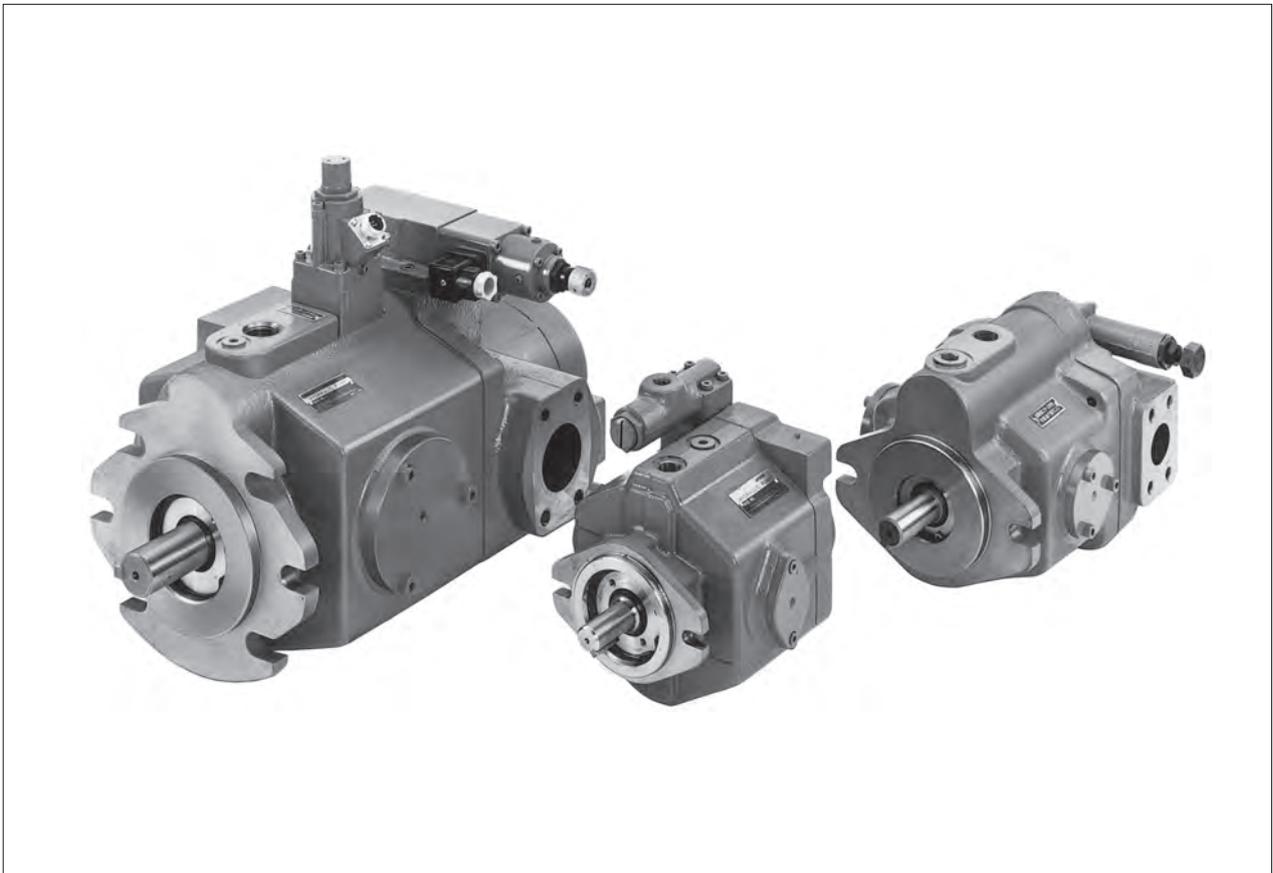
Installation and Shaft Alignment

- The base for the electric motor and pump should offer sufficient rigidity. Vibration absorbing construction is recommended.
- Flexible type coupling is recommended to join the drive shaft of the prime mover and the pump shaft. (DO NOT USE tire shaped coupling)
- Recommended shaft alignment value, TIR (Total Indicator Reading) is below 0.05mm.
- Poor shaft alignment may cause shaft damage, heat and friction of bearings, leakage from oil seals, pump noise and vibration, etc. Thus shaft should be aligned with care.
- In principle, there should be no external radial or thrust loads on shaft ends. Please consult Tokyo Keiki if belt, chain, or gear couplings are to be used.
- Care should be paid that no air remains in the pump case. Pump should be mounted with drain port facing upward. Pump shaft should be installed horizontally.

Piping and Filtration

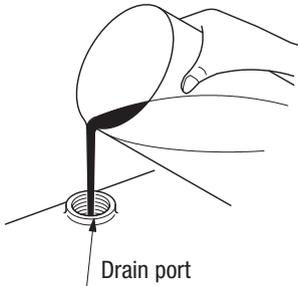
- Filtration
 - On the suction side, a 100 μm (150 mesh) or equivalent tank filter (suction filter) should be used.
 - On the delivery side, a full flow filter which provides filtration of less than 20 μm or bypass filter which provides filtration of less than 10 μm should be installed.
- Suction pressure (gauge pressure)
 - For mineral oil based fluid, pressure should be in the range +35 ~ -16.7 kPa and for water glycol based fluid, +35 ~ -10.1 kPa.

- Suction path flow velocity should be kept at less than max. 1.5 m/s.
- Suction, return piping
 - Stipulated suction pressure should be considered and suction resistance should be kept as low as possible.
 1. Use large diameter pipe with as few bends as possible.
 2. Height from pump suction port to tank standard oil level should be less than 1 m.
 - Distance from suction piping end to tank bottom should be more than 50 mm.
 - Air in system causes noise, vibration, and parts damage. As air can easily be drawn in through suction piping, care should be paid to ensure that joints, especially, are airtight.
 - The end of the return pipe should always be below the oil level regardless of fluctuations in oil level.
 - A baffle should be installed in the tank between the suction and return lines.
 - Use of flexible rubber hose piping instead of steel piping for pump suction, delivery, and drain lines provides effective vibration dampening and reduces noise.
- Drain piping
 - Pressure in pump case should not exceed 50 kPa. Drain piping should be installed on the upward side of the pump and the pump case should always be filled with fluid.
 - Drain line should be led to tank separate and should not be mixed with the flow from the return piping and should be installed so that it is set apart from the suction pipe and should also extend below the oil level in the tank.



Cautions at Operation Startup

- Filling oil
 - Pump should be filled with clean fluid through the drain port and fill ports and the pump case should be filled completely. Improper or insufficient fluid filling will lead to pump problems.
 - In the case of the PH**F series, proceed with lubrication immediately prior to starting up the pump.



Model Code	Displ. mL
P16/21VM	700
P16V	700
P21/31V	800
P40V	1000
P70V	1500
P100V	2000
P130V	2300
PH56	1300
PH80	1600
PH100	2500
PH130	3700
PH170	3700
PH40/56F	500
PH80/100F	1200
PH130/170F	1900

- Air bleed

At startup of pump operation, pump should be run at no load, maximum flow until air is completely bled from piping and pump case. Effective air bleed can be accomplished if an air bleed valve is installed on the pump delivery side. For details on the air bleed valve, see page R3-1.
- Warm up

During startup, if viscosity is higher than proper viscosity (54 mm²/s), system should be warmed up with pressure less than half of maximum working pressure until viscosity falls below 54 mm²/s.

Hydraulic fluid

- Note that pump specifications such as maximum working pressure and maximum speed may differ with the type of hydraulic fluid used. See Appendix 1 regarding hydraulic fluid selection.
- Mineral oil based fluid
 - General industrial anti-wear hydraulic fluid is recommended.
- Water glycol based fluid
 - Do not use this fluid with the standard pump intended for mineral oil based fluids.
 - Consult Tokyo Keiki regarding specifications for pump using this fluid.

Hydraulic fluid viscosity and temperature

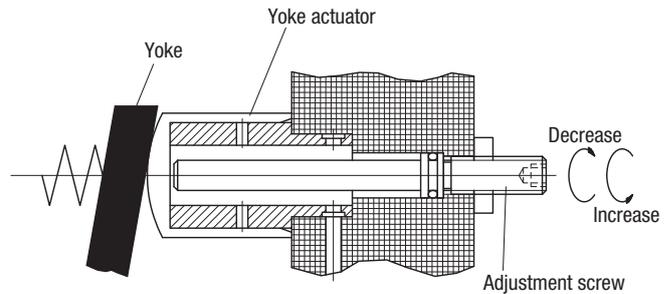
- Pump should be operated with hydraulic fluid viscosity range of 13 ~ 54 mm²/s. At pump startup a maximum viscosity of 860 mm²/s is allowed however care should be paid to observe the section 'Cautions at Operation Startup' regarding warm up of hydraulic fluid.
- Hydraulic fluid temperature range should be 0 ~ 60°C.

Pump Control Adjustment

- Pressure compensator control

Turning the compensator adjustment screw clockwise will increase the setting pressure, turning it counterclockwise will decrease the setting pressure.
- Maximum displacement adjustment function

This function allows adjustment of full flow displacement. Turning the adjustment screw clockwise will decrease the full flow displacement, turning the screw counterclockwise will increase the displacement.



- Maximum displacement adjuster

- Torque limiter control

This function adjusts delivery volume to match the allowable load of the electric motor used to drive the pump. Turning the adjustment screw clockwise will increase the delivery and turning the screw counterclockwise will decrease the delivery. Perform the adjustment while the pump is running.

