



**Hydraulic
Triplex
Pumps**

**At the
Heart of
Industry**

“KOBE TRIPLEX PUMPS really stand up under pressure”

Kobe Triplex Pumps are extremely dependable, heavy-duty pumps designed to serve as high pressure sources of hydraulic power for many types of hydraulic systems. They are particularly adapted for severe service involving frequent hydraulic shocks in the system, high temperatures, and a variety of hydraulic fluids. They are plunger type pumps for pressures up to 30,000 psi and for displacements up to 200 gpm.

There are three basic sizes (Size 2, Size 3 and Size 4) with several modifications available for each. All Kobe Triplex Pumps include vertical design, automotive type crankcase, spring-loaded ball type valves with replaceable seats or disc-type valves, a built-in lubricating oil pump for dual pressure and splash lubrication, an optional scavenging pump to return plunger leakage to the system, and built-in reduction gears. Units are available with integral motor drive or with external drive shaft for separate coupling drive.

Chrome-plated steel plungers, lap fitted to liners centrifugally cast of high-grade alloy iron, are available with a variety of cylinder blocks to accommodate pressures above 5,000 psi. Packing is available for other applications where needed. Plungers and liners are interchangeable, as assemblies, to meet a wide range of pressure and volume requirements. The Kobe Triplex is a complete, self-contained unit and the most compact high pressure triplex pump on the market today.

Easily installed and maintained

Installing a Kobe Pump is a breeze. There are no alignment problems. No special mounting base is necessary – four hold-down bolts are sufficient. Compactness saves valuable floor space. One man can easily service the unit and replacements are no problem. The tall spacer block provides large, unobstructed hand-hole openings. Plungers and liners may be changed quickly and easily.

Maximum safety

The Kobe Triplex has no exposed moving parts, no gears, plungers, or tie-rods requiring screens or guard rails. Most units have a built-in relief valve to prevent over-pressuring the system.

Integral electric drive is optional

Kobe Triplex Pumps are available with an integral motor drive, or with a stub shaft for separate drive. Standard motors are 230/460 volt, three phase, induction type, operating at 1800 rpm. Variations are available upon request.

Horizontal mounting available

The Kobe Triplex is a vertical design but for special applications is available in a horizontal mounted position.

SUMMARY OF APPLICABILITY

SERVICE	To 5,000 psi	To 10,000 psi	To 20,000 psi	To 30,000 psi
Any Hydraulic Fluid	X	X	X	X
Chemically Active Fluids	Possible	Possible		
Water and Soluble Oil	X	X	X	X
Straight Water	X	X	X	
Hydraulic Fluids – Temperatures (to + 1000°F)	X	X	Possible	
Liquid Gases	X	X	Possible	

VALVES – ball type with stainless steel followers and springs. Hardened and ground stainless steel seats, seated in a taper, have inside threads for easy removal.

PLUNGERS AND LINERS – metal to metal, lapped fit – no packing required. Packed plunger and liners are available for fluids being pumped at pressures below 5,000 psi. Liners are secured in the cylinder block by a 4-bolt flange, and are quickly and easily removed. Plungers are free-floating in the plunger connector. A wide range of pressures and volumes can be achieved by changing plunger and liner sizes.

SCAVENGER PUMP (optional) – disposes of plunger drippage in the spacer block through an external tube connected to the scavenger pump.

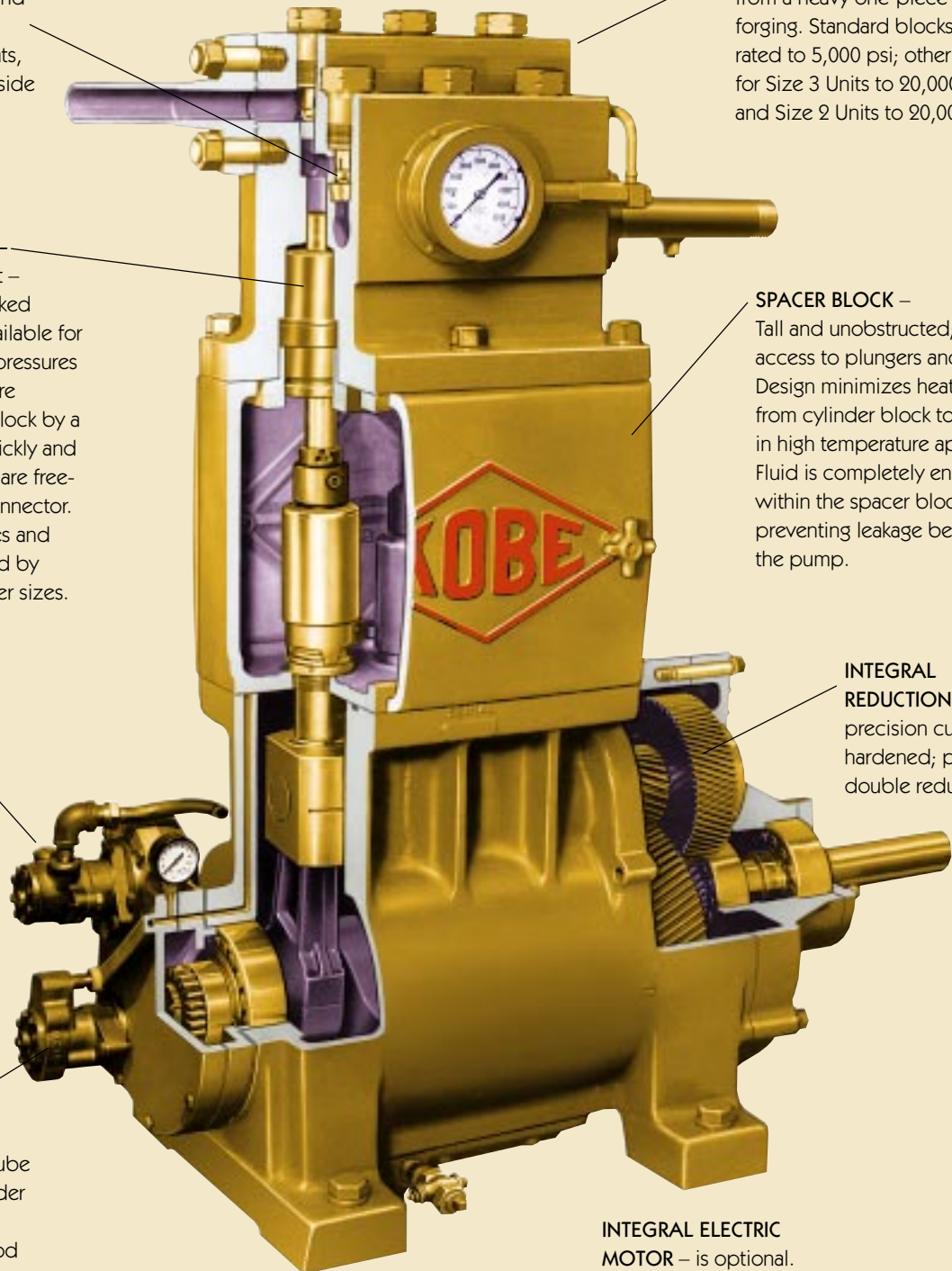
LUBRICATION – built-in lube oil pump supplies oil under pressure to crosshead guides and connecting rod bushing. Excess oil is delivered to the reduction gears. Splash lubrication is within the crankcase.

CYLINDER BLOCK – machined from a heavy one-piece steel forging. Standard blocks are rated to 5,000 psi; other blocks for Size 3 Units to 20,000 psi, and Size 2 Units to 20,000 psi.

SPACER BLOCK – Tall and unobstructed; easy access to plungers and liners. Design minimizes heat transfer from cylinder block to crankcase in high temperature applications. Fluid is completely enclosed within the spacer block preventing leakage beyond the pump.

INTEGRAL REDUCTION GEARS – precision cut and hardened; provide double reduction.

INTEGRAL ELECTRIC MOTOR – is optional. Motors are 230/460 volt, 60 Hz, induction type.



SIZE 2 Triplex Pump

The 5,000 psi cylinder block in the standard Size 2 product line accommodates interchangeable plungers and liners of nine different sizes. The 20,000 psi block handles six different plunger and liner sizes and is limited to lubricating fluid service only. The 30,000 psi version has three valve



The Size 2 Triplex Pump is used throughout steel rolling mills for high pressure bearing lubrication and general hydraulics.

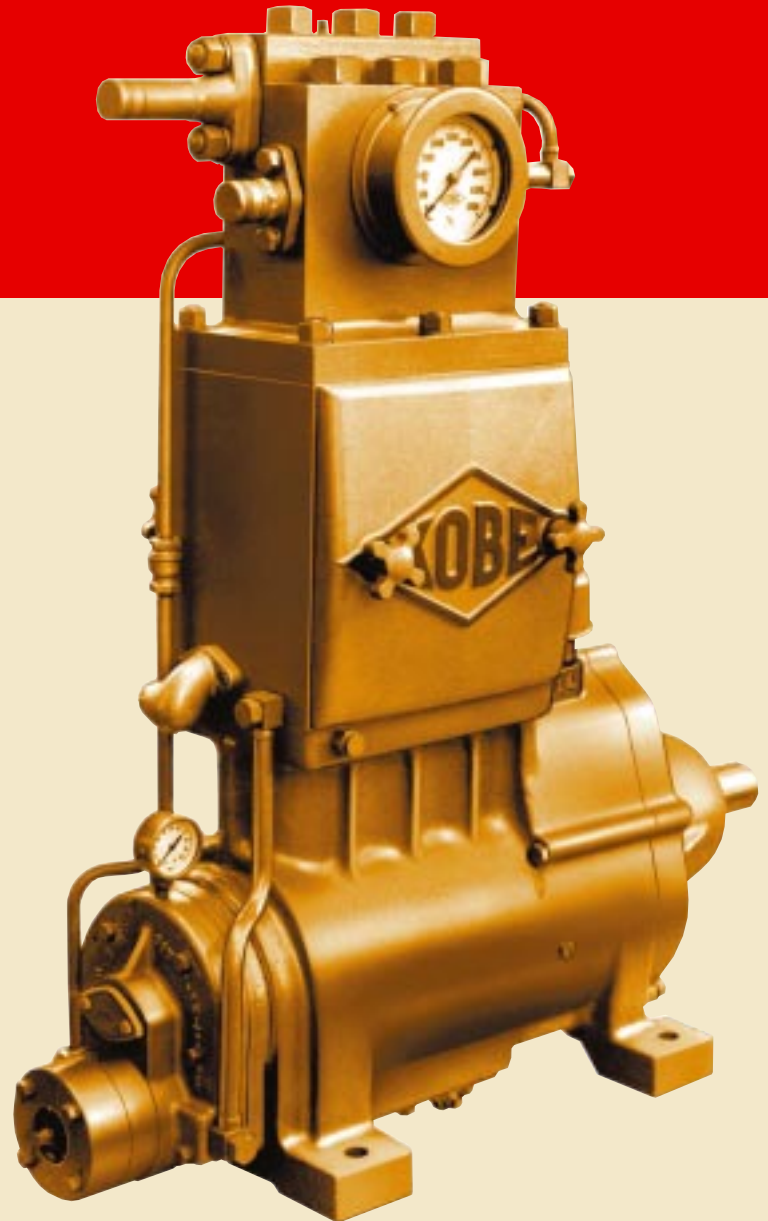
cylinders (rather than the forged cylinder block) and has four sizes of interchangeable plungers and liners. Inlet and outlet connections are at the same end of the cylinder block. Integral motor types available are drip-proof, TEFC, or explosion-proof, and are 230/460 volts, 3 phase, 60 Hz, 1800 RPM. Speed reduction gear ratios available are 3.986 or 5.204.

The 5,000 psi version of this unit can be obtained with modifications which make it capable of handling straight water, high temperature fluids, or other special services.

The displacement figures on the next page are in GPM and the pressures in psi.

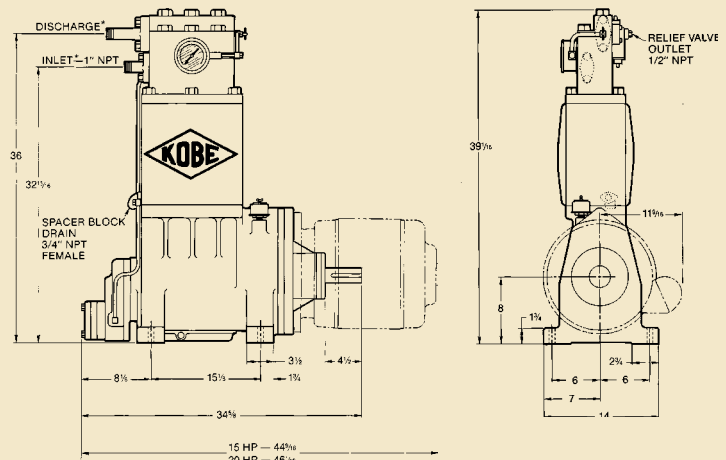


Size 2 Triplex with integral electric motor



SIZE 2 RATINGS

- Maximum Power Output - 20 HP
- Maximum Pressure - 5,000 psi, 20,000 psi or 30,000 psi
- Maximum Speed - 450 RPM
- Maximum Volume - 21 GPM



*Inlet and discharge connections will vary in size and will be determined by pressure rating and fluid end design. Dimensions for reference only – actual dimensions may vary.

20 H.P.

For pressures up to 30,000 psi

SIZE 2	Plunger Diam. Inches	Disp. GPM per 100RPM	Integral Gear Ratio, 60HZ, 1800 RPM Input			
			5.204		3.986	
			Disp.@ 346 RPM	Max. Pressure	Disp.@ 450 RPM	Max. Pressure
Standard Pump (5,000 psi)	$\frac{5}{8}$	1.20	4.14	5,000	5.34	5,000
	$\frac{11}{16}$	1.45	5.00	5,000	6.51	5,000
	$\frac{3}{4}$	1.72	5.96	4,330	7.74	4,330
	$\frac{13}{16}$	2.02	6.98	3,690	9.09	3,690
	$\frac{7}{8}$	2.34	8.10	3,180	10.5	3,180
	$\frac{15}{16}$	2.69	9.30	2,770	12.1	2,770
	1	3.06	10.58	2,430	13.8	2,430
	$1\frac{1}{8}$	3.87	13.40	1,920	17.4	1,920
	$1\frac{1}{4}$	4.78	16.54	1,560	21.5	1,560
High Pressure Pump (20,000 psi)	$\frac{5}{16}$	.30	1.03	20,000	1.34	20,000
	$\frac{3}{8}$	.43	1.48	17,320	1.94	17,320
	$\frac{7}{16}$	.59	2.02	12,720	2.64	12,720
	$\frac{1}{2}$	.76	2.64	9,740	3.44	9,740
	$\frac{9}{16}$	.97	3.36	7,690	4.36	7,690
	$\frac{5}{8}$	1.20	4.14	6,230	5.38	6,230
Very High Pressure Pump (30,000 psi)	$\frac{9}{32}$	.24	.84	30,000	1.09	30,000
	$\frac{5}{16}$	.30	1.03	24,900	1.34	24,900
	$\frac{3}{8}$	.43	1.48	17,320	1.94	17,320
	$\frac{7}{16}$	.59	2.02	12,720	2.64	12,720

Displacements are based on 100% volumetric efficiency.
Stroke 3 inches

SIZE 3 Triplex Pump

The Standard Size 3 Triplex has a 5,000 psi cylinder block which accommodates interchangeable plungers and liners of nine different sizes. The high volume version has a maximum pressure rating of 2,000 psi and six different sizes of plungers and liners. The 5,000 psi version of this unit can be obtained with modifications which make it capable of handling

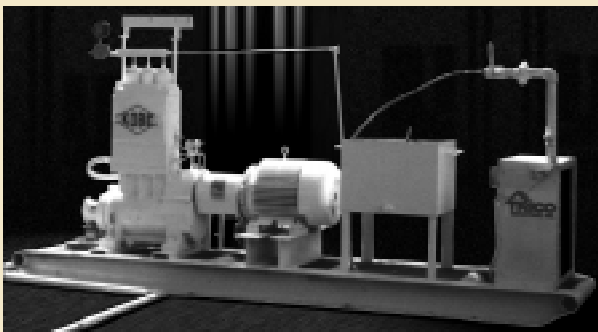


High-pressure, high-temperature aircraft test stand installation.

straight water, high temperature fluids, or other special services. For 10,000 psi duty, a block is available to accommodate four sizes of interchangeable plungers and liners. The 30,000 psi unit has three sizes of plunger and liner assemblies.

For separate drive units, reduction gear ratios of 3.079, 3.579, 4.330, 4.864, 5.941 and 8.815 are optional at no extra cost. The integral drive units are available as drip-proof, TEFC, or explosion-proof enclosures, and are 1800 RPM, 230/460 volt, 3 phase, 60 hertz.

The table on the next page shows the pressure / displacement relationship provided by these units. Displacements are in GPM, pressures are in psi.



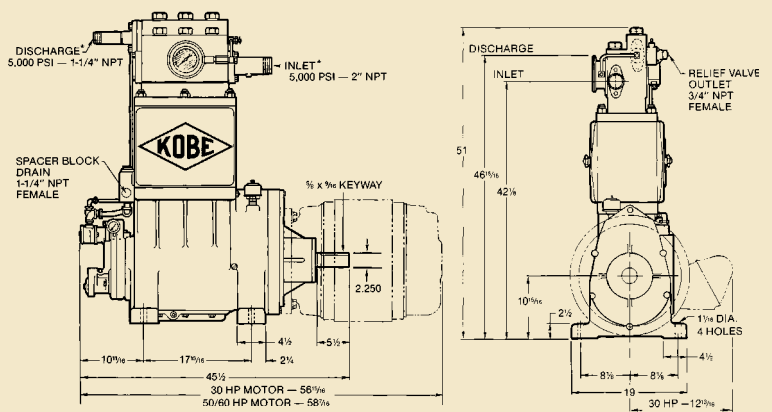
Size 3 Triplex for methanol pumping on offshore drilling rigs at 10,000 psi. and higher.

*Inlet and discharge connections will vary in size and will be determined by pressure rating and fluid end design. Dimensions for reference only – actual dimensions may vary.



SIZE 3 RATINGS

- Maximum Power Output - 100 HP
- Maximum Pressure - 2,000 psi to 30,000 psi
- Maximum Speed - 450 RPM
- Maximum Volume - 106 GPM
- (Shown above 100 HP 5,000 and 10,000 PSI Models)



100 H.P.

For pressures up to 30,000 psi

SIZE 3	Plunger Diam. Inches	Disp. GPM per 100RPM	Integral Gear Ratio, 60HZ, 1800 RPM Input							
			8.815 Gear Ratio		5.941 Gear Ratio		4.864 Gear Ratio		4.330 Gear Ratio	
			Disp.@ 205 RPM	Max. Pressure	Disp.@ 303RPM	Max. Pressure	Disp.@ 370RPM	Max. Pressure	Disp.@ 416RPM	Max. Pressure
High Volume Pump (2,000 psi)	1 7/8	14.3	29.4	2,000	43.5	2,000	53.1	2,000	59.7	2,000
	2	16.3	33.5	2,000	49.5	2,000	60.4	2,000	67.9	2,000
	2 1/8	18.4	37.8	2,000	55.8	2,000	68.2	2,000	76.7	1,900
	2 1/4	20.7	42.3	1,850	62.6	1,850	76.4	1,850	85.9	1,700
	2 3/8	23.0	47.1	1,650	69.8	1,650	85.2	1,650	95.6	1,500
	2 1/2	25.6	52.1	1,480	77.4	1,480	94.4	1,480	106.0	1,350
Standard Pump (5,000 psi)	3/4	2.30	4.71	5,000	6.96	5,000	8.50	5,000	9.58	5,000
	7/8	3.12	6.40	5,000	9.46	5,000	11.5	5,000	13.0	5,000
	1	4.08	8.36	5,000	12.4	5,000	15.1	5,000	17.0	5,000
	1 1/8	5.16	10.6	5,000	15.6	5,000	19.1	5,000	21.4	5,000
	1 1/4	6.38	13.1	5,000	19.3	5,000	23.6	5,000	26.6	5,000
	1 3/8	7.72	15.8	5,000	23.4	5,000	28.6	5,000	32.2	4,700
	1 1/2	9.18	18.8	4,200	27.8	4,200	34.0	4,200	38.2	3,900
	1 5/8	10.8	22.1	3,600	32.6	3,600	39.9	3,600	44.9	3,300
	1 3/4	12.5	25.6	3,100	37.8	3,100	46.2	3,100	52.0	2,800
High Pressure Pump (10,000 psi)	5/8	1.60	3.27	10,000	4.83	10,000	5.89	10,000	6.62	10,000
	3/4	2.30	4.71	10,000	6.96	10,000	8.50	10,000	9.58	10,000
	7/8	3.12	6.40	10,000	9.46	10,000	11.5	10,000	13.0	10,000
	1	4.08	8.36	9,700	12.4	9,700	15.1	9,300	17.0	8,900
High Pressure Pump (20,000 psi)	9/16	1.29	2.65	20,000	3.90	20,000	4.78	20,000	5.37	20,000
	5/8	1.60	3.27	20,000	4.83	20,000	5.90	20,000	6.63	20,000
Very High Pressure Pump (30,000 psi)	31/64	.956	1.96	30,000	2.90	30,000	3.54	30,000	3.98	30,000
	9/16	1.29	2.65	30,000	3.90	30,000	4.78	28,500	5.37	27,000
	5/8	1.60	3.27	24,200	4.83	23,500	5.90	23,000	6.63	22,200
Cryogenic			205 RPM		303 RPM					
			Disp.	Pressure	Disp.	Pressure				
	Liquid Nitrogen		10.6	6,000	15.6	6,000				
	Liquid Nitrogen		8.36	10,000	12.4	10,000				
Liquid Hydrogen		8.36	10,000	12.4	10,000					

Displacements are based on 100% volumetric efficiency.

SIZE 4 Triplex Pump



30,000 psi design pumping straight water @ 13,000 psi for high pressure jet cutting.

For these units, single reduction gear ratios available are 2.607, 3.407, 3.958, 4.318 or 4.850.

For integral motor driven units, the motor is flange mounted and may be either drip-proof, totally enclosed, or explosion-proof type. Standard motors are 1800 RPM, 460 volt, 3 phase, 60 Hz.



5,000 psi design pumping water and soluble oil for deburring machined metal parts.

The Size 4 Triplex has a 5,000 psi cylinder block with eight sizes of plungers and liners. The 10,000 psi version has three valve cylinders (rather than the forged cylinder block) and has three sizes of plungers and liners. The 30,000 psi unit, also with three cylinders, has four sizes of plungers.

Size 4 Triplexes are available for separate drive either directly coupled to the prime mover or belt driven.

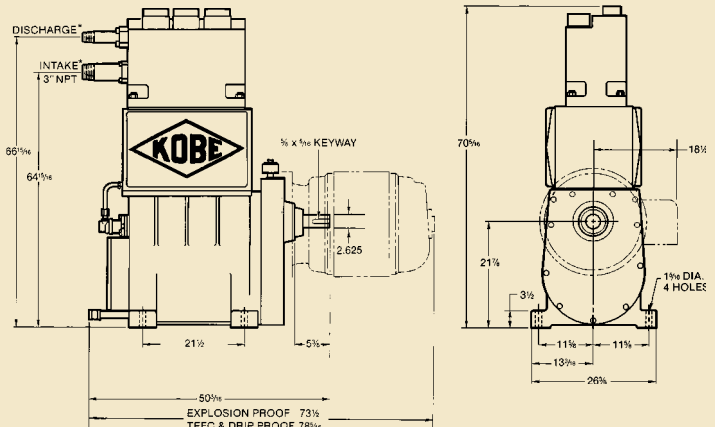
Optional Size 4 units are available to handle fluid temperatures to 650°F.

The selection table on the next page indicates displacements in GPM of the various sizes of plungers and liners. Pressure ratings are shown in psi.



SIZE 4

3 cylinder shown with integral electric motor. Separate drive available.



*Inlet and discharge connections will vary in size and will be determined by pressure rating and fluid end design. Dimensions for reference only – actual dimensions may vary.

200 H.P.

For pressures up to 30,000 psi

SIZE 4	Plunger Diam. Inches	Disp. GPM per 100RPM	Integral Gear Ratio, 60HZ, 1800 RPM Input			
			4.850 Gear Ratio		3.958 Gear Ratio	
			Disp.@ 371 RPM	Max. Pressure	Disp.@ 455 RPM	Max. Pressure
Standard Pump (5,000 psi)	1 1/2	11.5	42.6	5,000	52.3	5,000
	1 5/8	13.5	50.0	5,000	61.4	5,000
	1 3/4	15.6	57.9	5,000	71.0	4,350
	1 7/8	17.9	66.5	4,400	81.5	3,800
	2	20.4	75.7	3,900	92.8	3,320
	2 1/8	23.0	85.5	3,400	105	2,940
	2 1/4	25.8	95.8	3,100	117	2,640
	2 3/8	28.8	107	2,800	131	2,360
High Pressure Pump (10,000 psi)	1 1/8	6.45	23.9	10,000		
	1 1/4	7.95	29.5	10,000		
	1 3/8	9.65	35.7	8,300		
Very High Pressure Pump (30,000 psi)	5/8	1.99	7.38	30,000		
	3/4	2.89	10.7	28,000		
	7/8	3.92	14.5	20,000		
	1	5.10	18.9	15,700		

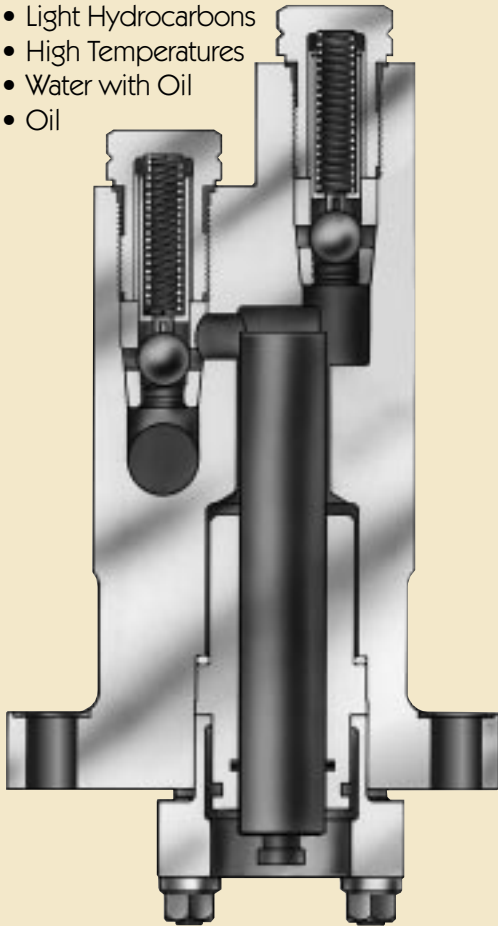
Displacements are based on 100% volumetric efficiency.
Stroke 5 inches

FLUID END DESIGNS ...

Shown here are some of the fluid end designs available for a wide range of services offered in the Kobe triplex pumps. All are characterized by unique features and all offer exceptional dependability and simplicity of maintenance.

STANDARD

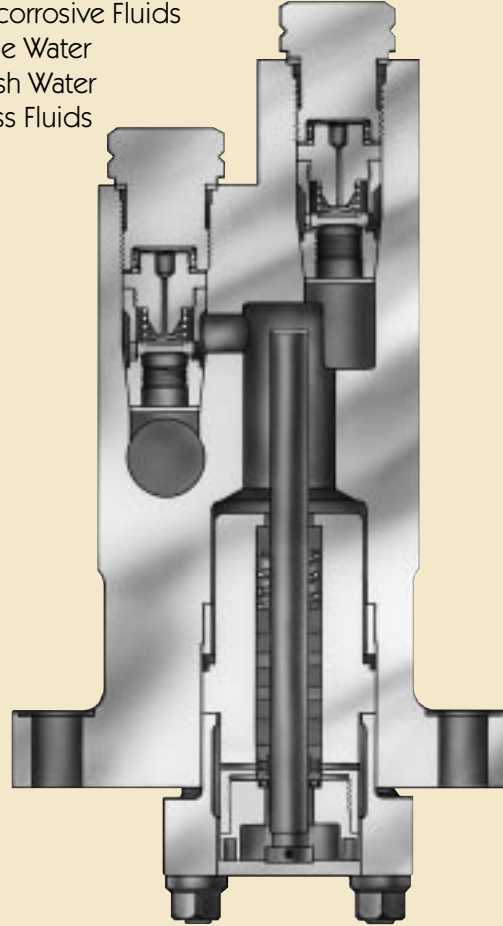
- Light Hydrocarbons
- High Temperatures
- Water with Oil
- Oil



This basic design is utilized to 10,000 psi in most applications. Valving is spring loaded ball-type and seats are tapered inserts. Plunger and liner design is metal-to-metal with a close clearance to provide dynamic seal. For fluids near ambient temperature, an "O" ring is utilized as a secondary seal. Cylinder block typically is alloy steel forging.

WATER

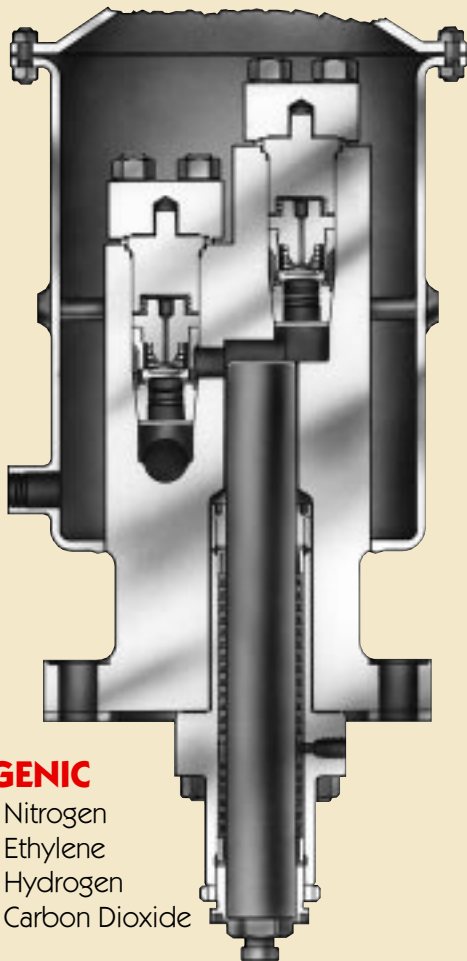
- Semi-corrosive Fluids
- Potable Water
- Brackish Water
- Process Fluids



This design is utilized to 5,000 psi in most applications. For higher pressures, the design is similar to the 30,000 psi version. Stainless steel valving is spring loaded disc-type and seats are tapered inserts. Plunger and liner assemblies are self-adjusting for packing wear. Plunger and liner assemblies are easily installed and removed so that re-packing may be done on a bench. Cylinder block is alloy steel for most applications.

for a wide range of applications

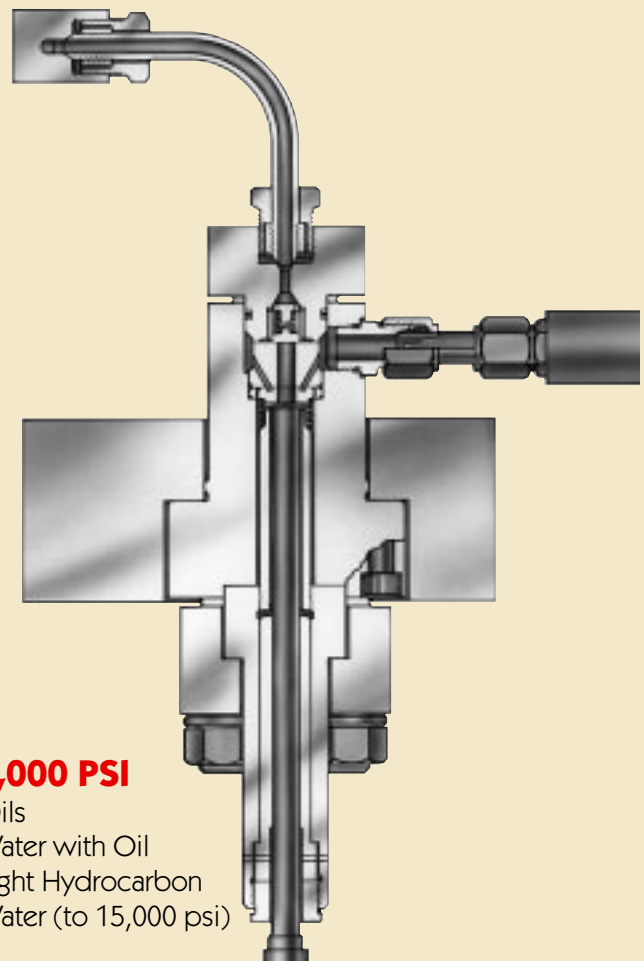
In each case, the illustration represents the complete fluid end which is bolted to the spacer block. The button at the bottom of the plunger has a floating connection to the crosshead stem.



CRYOGENIC

- Liquid Nitrogen
- Liquid Ethylene
- Liquid Hydrogen
- Liquid Carbon Dioxide

This design is utilized for most cryogenic fluids in pressures to 6,000 psi. For higher pressures, the design is similar to the 30,000 psi version. Jacketed stainless steel cylinder block provides a means of immersing the fluid end in the fluid being pumped. Stainless valving is spring loaded disc-type and seats are tapered inserts. In the plunger and liner assembly there are a series of sealing elements consisting of Teflon rings with stainless steel contracting rings.



30,000 PSI

- Oils
- Water with Oil
- Light Hydrocarbon
- Water (to 15,000 psi)

For higher pressures, the Kobe fluid end consists of three valve cylinders with external inlet and discharge manifolds. Valving is stainless steel, disc-type and in tandem arrangement. All sections of the stainless steel valve cylinder subject to stress are circular and free of intersecting holes. As with other fluid ends, the plunger and liner assemblies are flange retained and easily interchangeable.

Triplex Pump Applications

SERVICES	FORMING					TESTING					POWER				OTHER									
	Compression Molding	Extruding	Die Casting	Hydrostatic Compaction	Hydrostatic Forming	Cold Drawing	Pressure Testing	Fatigue Testing	Stress Analysis	Burst Testing	Component Testing	High Temperature	Coil Handling	Roll Balancing	Pressure Storage	Central Hyd. Systems	Hydrostatic Lubrication	Jet Cleaning	Cryogenic Pumping	Processes	High Temperature	Jet Cutting	Methanol Injection	
FLUIDS	Hydrocarbon Fluids																							
	Hydraulic Oil																							
	Synthetic Oil																							
	Non-Flammable Oil																							
	Water and Oil																							
	Water																							
	Liquid Gases																							
	Freon																							
	Methanol																							
	Other																							
PRESSURES	1,500 psi																							
	3,000 psi																							
	5,000 psi																							
	10,000 psi																							
	20,000 psi																							
	30,000 psi																							
INDUSTRIES	Rubber																							
	Plastic																							
	Steel																							
	Aluminum																							
	Brass and Bronze																							
	Metal Forming																							
	Lumber																							
	Hydraulic Mfrs.																							
	Aircraft																							
	Missile & Space Vehicle																							
	Chemical																							
	Paper																							
	Petroleum Refining																							
	Ceramics																							
	Sintered Carbides																							
	Mining																							



INDUSTRIAL TRIPLEX PUMPS

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