

# Plunger Pump Model 654

## SPECIFICATIONS

	U.S. Measure	Metric Measure
Volume	4.5 G.P.M.	(17 L/M)
Discharge Pressure	4000 P.S.I.	(280 BAR)
Max. Inlet Pressure	- 5 to 60 P.S.I.	(- 0.35 to 4 BAR)
RPM	790 RPM	(790 RPM)
Bore	0.709"	(18 mm)
Stroke	1.180"	(30 mm)
Crankcase Capacity	42 oz.	(1.26 L)
Maximum Fluid Temperature	160°F	(71°C)
Inlet Ports (2)	3/4" NPT	(3/4" NPT)
Discharge Ports (2)	1/2" NPT	(1/2" NPT)
Pulley Mounting	Either side	(Either side)
Shaft Diameter	1.180"	(30 mm)
Weight	44 lbs.	(19.9 kg)
Dimensions	15.83" x 12.99" x 6.46" (402 x 330 x 164 mm)	

## FEATURES

### SUPERIOR DESIGN

- Triplex plunger design gives smoother fluid flow.
- Wetted seal design keeps high pressure seals completely lubricated and cooled.
- Inlet and discharge valve and seat assemblies interchange for easier maintenance.
- Lubricated low pressure seal provides double protection against external leakage.
- Oil bath crankcase assures proper lubrication.
- Plunger design results in extra quiet operation.
- The close tolerance concentricity of the ceramic plunger maximizes seal life.

### QUALITY MATERIALS

- All stainless steel valves are heat treated and seats are roller burnished for a positive seal and extended valve life.
- Aluminum Bronze manifold is strong and corrosion resistant.
- Polished surface of solid ceramic plungers results in extended seal life.
- Extra hard finish of ceramic plunger is durable and abrasion resistant.
- Die cast aluminum crankcase provides lightweight strength and precision tolerance control.
- Forged, nitrited chrome-moly crankshaft gives unmatched strength and surface hardness.
- Oversized crankshaft bearings mean longer bearing life.

### EASY MAINTENANCE

- Wet end is easily serviced without entering crankcase, requiring less time and effort.
- Valve assemblies are accessible without disturbing piping, for quick service.
- Preset packings mean no packing gland adjustment is necessary, reducing maintenance costs.

## HORSEPOWER REQUIREMENTS

Flow		PRESSURE			MOTOR PULLEY SIZE	
		PSI 2000	PSI 3000	PSI 4000	Using 1725 RPM Motor & Std. Pump Pulley O.D.	
GPM	L/M	BAR 140	BAR 210	BAR 280	RPM	Pulley O.D.
4.5	17	6.2	9.3	12.4	790	4.5
4.0	15	5.3	8.3	11.0	702	4.0
3.5	13	4.8	7.2	9.6	615	3.5

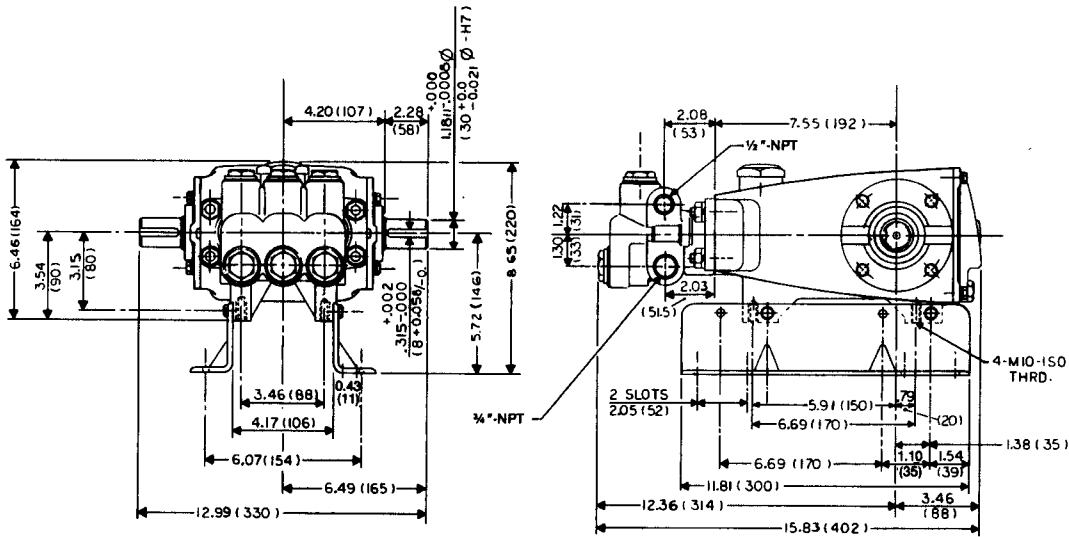
**DETERMINING THE PUMP R.P.M.**       $\frac{\text{Rated G.P.M.}}{\text{Rated R.P.M.}} = \frac{\text{"Desired" G.P.M.}}{\text{"Desired" R.P.M.}}$

**DETERMINING THE REQUIRED H.P.**       $\frac{\text{GPM} \times \text{PSI}}{1460} = \text{Electric Brake H.P. Required}$

**DETERMINING MOTOR PULLEY SIZE**       $\frac{\text{Motor Pulley O.D.}}{\text{Pump R.P.M.}} = \frac{\text{Pump Pulley O.D.}}{\text{Motor R.P.M.}}$

Note: Consult engine manufacturer when using gas or diesel engine

**WORLD LEADER IN TRIPLEX HIGH PRESSURE PUMPS**



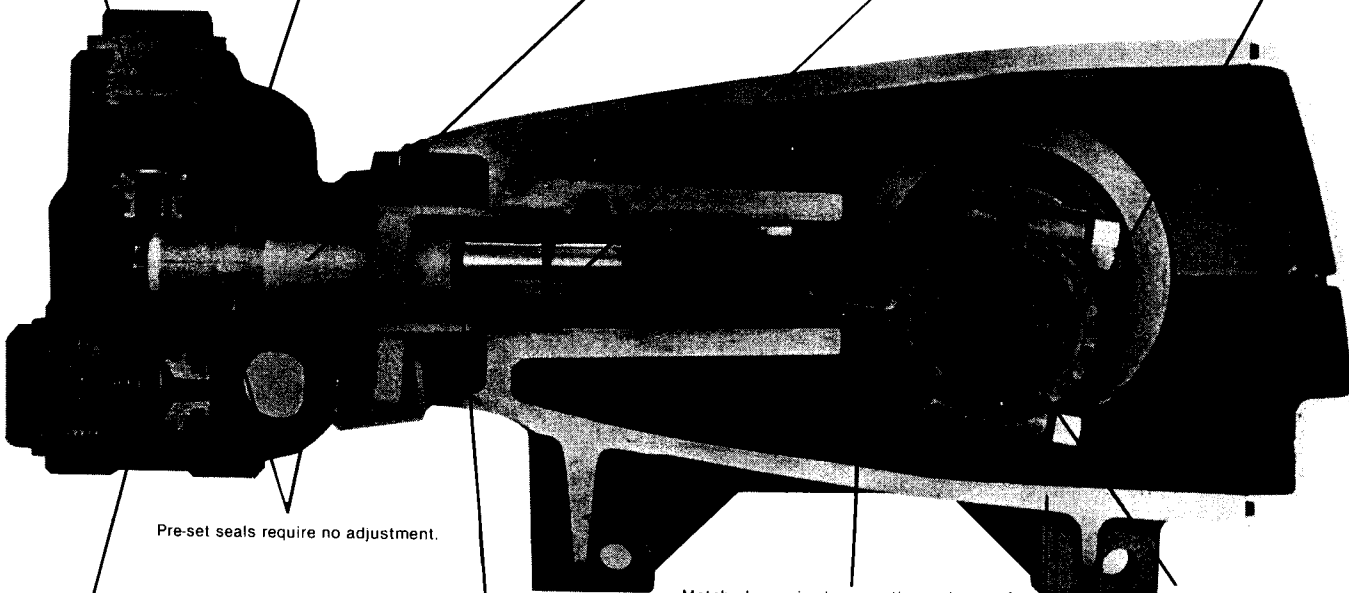
Completely interchangeable stainless steel inlet and discharge valves for easy service.

Polished, solid ceramic plungers for resistance to corrosion and abrasion which means a longer service life.

Main bearings are oversized for pump life.

100% wetted seal design lubricated and cooled by pumped fluid on both sides for extended seal life.

Stainless steel plunger rod for strength.



Pre-set seals require no adjustment.

Matched oversized connecting rods are of Zamak, a material noted for strength and bearing quality.

Crankshaft is nitrided chrome-moly forged. Cat Pumps is the only pump manufacturer in the world utilizing this quality.

Valve seats are roller burnished and valves are heat treated for positive seating and long life.

Stainless steel slinger keeps pumped fluid out of crankcase.

Diecast aluminum crankcase means high strength, light weight and excellent tolerance control.

654S-284 5M



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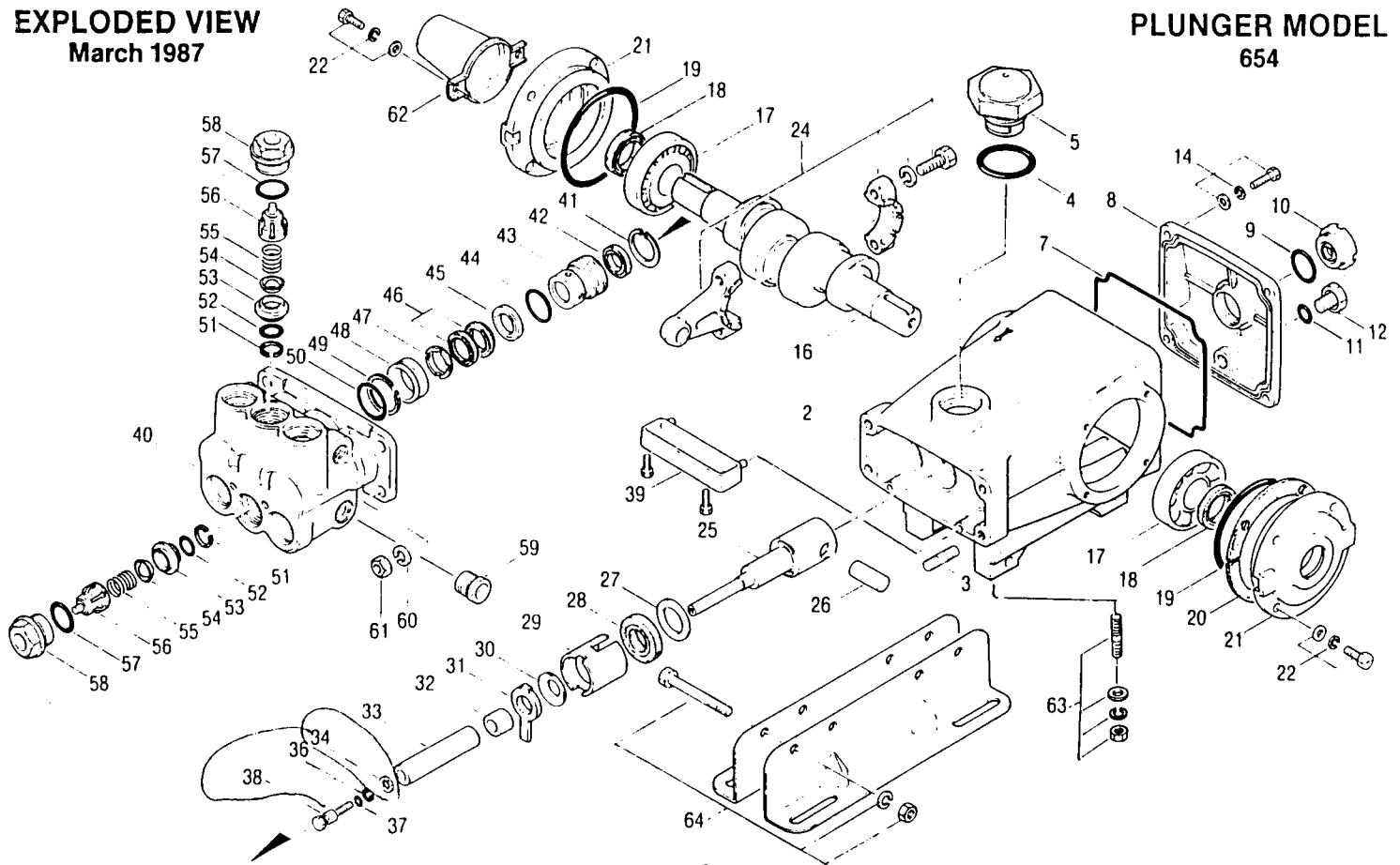
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# EXPLODED VIEW

March 1987

# PLUNGER MODEL

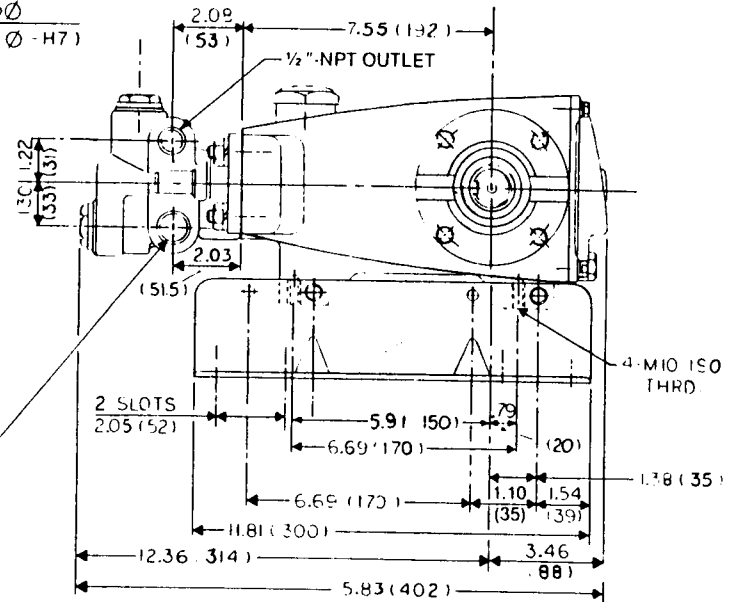
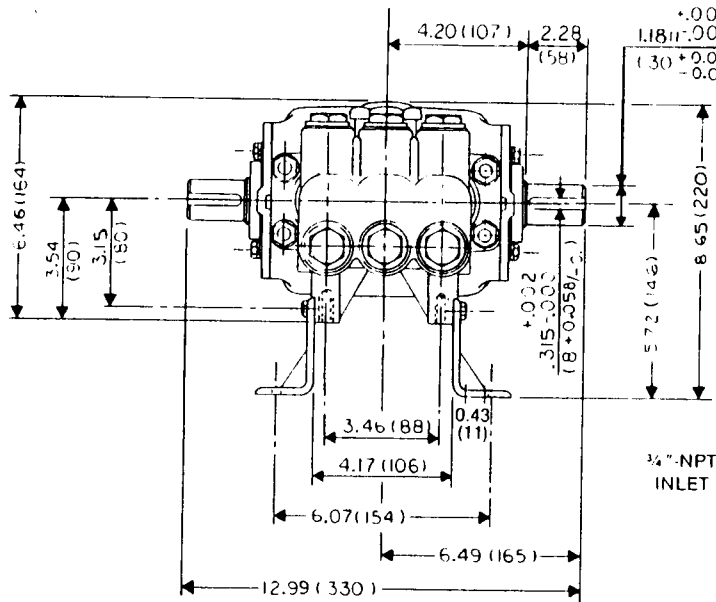
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## PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY.	ITEM	PART NO.	DESCRIPTION	QTY.
2	43488	Crankcase	1	45*	43319	V-Packing (Buna-N Compound)	6
3	14050	Study Bolt (M10 x 45)	4	46*	43589	V-Packing (Buna-N Compound)	6
4	14177	O-ring, Cap (Buna-N)	1	47*	43590	Male Adapter	3
5	43211	Oil Filler Cap	1	48	43518	Adapter	3
7	43492	O-ring, Crankcase Cover (Buna-N)	1	49	43519	Back-up Ring (Teflon)	3
8	43491	Crankcase Cover	1	50	13984	O-ring (Buna-N)	3
9	44428	Flat Flex. Gasket (Buna-N)	1		14333	O-ring (Viton)	3
10	43987	Bubble Oil Gauge	1	51	43248	Back Up Ring (Teflon)	6
11	23170	O-ring, Drain Plug (Buna-N)	1	52	43249	O-ring Valve Seat (Buna-N)	6
12	25625	Drain Plug	1		44383	O-ring Valve Seat (Viton)	6
14	92520	Sems Comb. Head Screw (M6 x 20)	4	53	43722	Valve Seat	6
16	43494	Crankshaft - Dual End	1	54	43721	Valve	6
17	39060	Bearing, Tapered Roller	2	55	43751	Valve Spring	5
18	43495	Oil Seal	2	56	44564	Retainer (Nylon) (43836 S.S.)	6
19	11340	O-Ring, Bearing Case	2	57	17617	O-ring (Buna-N)	6
20	43520	Split Adj. Shim, Bearing Case	2-4		11691	O-ring (Viton)	6
21	43496	Bearing Case	2	58	43851	Valve Plug - Chromed	6
22	92519	Sems Comb. Head Screw (6 x 16)	8		43850	Valve Plug - Unchromed	6
24	43497	Connecting Rod	3	59	20326	Plug - 3/4" - Chrome	1
25	43501	Plunger Rod	3	60	12503	Split Lock Washer (M10)	4
26	43507	Plunger Pin	3	61	81048	Hex Nut (M10)	4
27	43504	Washer	3	62	30764	Shaft Protector W/2 Screws	1
28	43500	Oil Seal (Buna-N)	3	63	30264	Direct Mounting	
29	43509	Seal Retainer	3		14050	Stud	4
30	43506	Barrier Slinger	3		12490	Washer	4
31*	43585	Wick	3		12503	Split Lock Washer	4
32*	43584	Collar	3		81048	Hex Nut	5
33*	43232	Ceramic Plugner	3		30661	Mounting Kit (Includes Rails	
34	43645	Copper Gasket, Plunger	3			Pulley, Hub, Key, S.P.)	1
36	43235	Back Up Ring (Teflon)	3	64	30613	Rail Assembly	1
37	17399	O-ring (Buna-N)	3		30635	Rail	2
	14160	O-ring (Viton)	3		30903	Hex Cap Screw	2
38	104360	Plunger Retainer - W/Stud-S.S.	3		30921	Split Lock Wahser	2
39	44664	Oil Pan W/Screws	1		30912	Hex Nut	2
40	43971	Manifold Head - Aluminum Bronze	1		30059	Hub (M30) W/Screw (M8 Keyway)	1
41	101791	Retaining Seal, (Buna N)	3		30063	Key (M8)	1
42*	43586	Lo-Pressure Seal (Buna N)	3		30206	9.75" Pulley	1
43*	43512	Seal Case	3		30820	Valve Kit (PVFP)	2
44	14762	O-ring, (Buna-N)	3		30919	Seal Kit	1
	11732	O-ring (Viton)	3		43523	Seal Case Removal Tool	
					30696	Valve Seat Removal Tool	

\*These parts are exclusive to 654. Remaining parts are interchangeable with Model 650.



### HORSEPOWER REQUIREMENTS

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<b>DETERMINING THE REQUIRED H.P.</b>		GPM x PSI		=	Electric Brake H.P. Required	
		1460		=		
<b>DETERMINING MOTOR PULLEY SIZE</b>		Motor Pulley O.D.		=	Pump Pulley O.D.	
		Pump R.P.M.		=	Motor R.P.M.	

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## INLET CONDITION CHECK-LIST

Inadequate inlet conditions can cause serious malfunctions in the best designed pump. Surprisingly, the simplest of things can cause the most severe problems. Some of these conditions can go unnoticed to the unfamiliar or untrained eye. To help eliminate some of these costly headaches, we have put together a check list of probable cause areas which should be evaluated before operation of any system. Remember, no two systems are alike, so there can be no **ONE** best way to set-up a system. All factors must be carefully considered.

**INLET SUPPLY** should be adequate to accommodate the maximum flow being delivered by the pump.

- Avoid closed loop systems, especially at higher temperatures and larger volumes. By-pass should be returned to a holding tank.
- Low vapor pressure fluids, such as solvents, require a booster pump for adequate inlet supply.
- Higher viscosity fluids require a positive NPSH for adequate inlet supply.
- Higher temperature fluids tend to vaporize and require a positive NPSH for adequate supply.
- When using an inlet holding tank, size it to provide adequate fluid to accommodate the maximum output of the pump, generally a minimum of five times the GPM (however, a combination of system factors can change this requirement significantly); provide adequate baffling in the tank to eliminate air bubbles and turbulence; install diffusers on all return lines to the tank.

**INLET LINE SIZE** should be adequate to avoid starving the pump.

- The line should generally be 1-1/2 to 2 times the specified pump inlet port size.
- The line **MUST** be a FLEXIBLE hose, NOT a rigid pipe, and reinforced on SUCTION systems to avoid collapsing.
- The simpler the inlet plumbing the less the potential for problems. Keep the length to a minimum, the number of elbows and joints to a minimum (ideally no elbows) and the inlet accessories to a minimum.
- Use pipe sealant to assure air-tight, positive sealing pipe joints.

**INLET PRESSURE** should fall within the specifications of the pump. These conditions vary slightly from the plunger to the piston pumps.

- Higher temperatures require pressurized inlet.
- Optimum pump performance is achieved with a flooded or pressurized inlet, however, negative feed is possible under ideal conditions.

**INLET ACCESSORIES** are designed to protect against overpressurization, monitor inlet flow, control contamination, control temperature and provide ease of servicing.

- All accessories should be sized to avoid restricting the inlet flow.
- A pressure gauge is recommended to monitor the inlet pressure and should be mounted AS CLOSE TO THE PUMP INLET as possible.
- All accessories should be compatible with the solution being pumped to avoid malfunction.

**BY-PASS TO INLET** Care should be exercised when deciding the method of by-pass. It is recommended the by-pass be directed to a baffled reservoir tank, with at least one baffle between the by-pass line and the inlet line to the pump. Although not recommended, by-pass fluid may be returned to the inlet line of the pump if the system is properly designed to protect your pump. When using this method a PRESSURE REDUCING VALVE should be installed on the inlet line to avoid excessive pressure to the inlet of the pump. (REDUCING VALVE SHOULD BE INSTALLED BETWEEN THE BY-PASS CONNECTION AND THE INLET TO THE PUMP) It is also recommended that a TEMPERATURE SENSING VALVE be used to monitor the temperature build-up in the by-pass loop to avoid premature seal failure.

- A low-pressure, flexible cloth braid (not metal braid) hose should be used from the by-pass connection to the inlet of the pump.
- It is recommended to use a minimum 24" by-pass hose.
- On any new installation or during periodic maintenance or troubleshooting, it is recommended that the pressure in the by-pass line be checked to avoid overpressurizing the inlet.

See High Pressure Guide for more information on pump protection and maintenance.