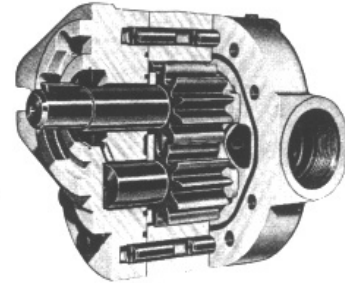


Cross Gear Pumps/Motors



Technical Information

The CROSS fixed displacement, gear type pumps and motors have been designed, manufactured and tested to insure the highest quality. This manual has been prepared to assist in the application and installation in order to obtain optimum performance.



Rated working pressure.....up to 3000 psi
Maximum shock and surge pressure.....up to 3500 psi
Maximum speed, continuous.....see charts
Minimum speed recommended.....600 rpm

PERFORMANCE DATA - PUMPS: GPM/RPM						PERFORMANCE DATA - MOTORS: RPM/GPM						
RPM	1000	1500	2000	2500	3000	GPM	5	10	15	20	30	50
MODEL	GPM	GPM	GPM	GPM	GPM	MODEL	RPM	RPM	RPM	RPM	RPM	RPM
40P005	1.7	2.6	3.5	4.3	5.2	40M005	1732	2310				
40P007	2.8	4.1	5.5	6.9	8.3	40M007	1155					
40P010	3.7	6.5	7.4	9.2	11.0	40M010	866	1732	2599			
40P012	4.9	7.3	9.7	12.1	14.6	40M012	693	1386	2079			
40P015	5.8	8.8	11.7	14.6	17.5	40M015	577	1155	1732	2310		
40P018	7.0	10.5	14.0	17.5		40M018	481	962	1443	1925	2887	
50P015	5.9	8.8	11.8	14.6	17.8	50M015	684	1368	2052	2736		
50P019	7.6	11.4	15.2	19.0	22.8	50M019	533	1066	1599	2132		
50P023	9.0	13.6	18.1	22.6	27.1	50M023	448	896	1344	1792	2688	
50P027	10.7	16.0	21.4	26.7	32.0	50M027	379	759	1138	1518	2276	
50P033	12.9	19.3	25.7	32.1	38.6	50M033	315	630	945	1260	1890	
50P038	14.8	22.2	29.6	37.0		50M038	274	547	821	1094	1641	2736
50P052	20.3	30.4	40.6			50M052	199	400	600	800	1199	1999
60P040	15.8	23.7	31.6	39.4	47.3	60M040	257	513	770	1027	1540	2567
60P051	20.1	30.1	40.1	50.2	60.2	60M051	202	404	606	807	1211	2018
60P061	24.0	36.0	47.9	59.9	71.8	60M061	169	338	507	676	1014	1690
60P071	27.9	41.8	55.7	69.6	83.6	60M071		291	436	582	872	1454
60P081	31.8	47.6	63.5	79.4		60M081		255	383	510	765	1275
60P092	36.0	54.1	72.1	901		60M092		225	337	450	674	1124

NOTE: ABOVE PERFORMANCE FIGURES ARE APPROXIMATE AND ARE BASED ON 2000 PSI OPERATING PRESSURE. OPERATING IN SHADED AREAS IS NOT RECOMMENDED.

FOR DRIVE HP REQUIRED: Multiply flow (gpm) by pressure (psi) and divide by 1714.

$$\text{HP} = \frac{\text{GPM} \times \text{PSI}}{1714}$$

FOR MAX. PUMP SIZE: (for use with gas engine): Multiply rated engine HP by 1028 and divide by pressure (psi). This gives maximum flow rate (gpm). Select the nearest pump size from the above chart according to drive speed.

$$\text{GPM} = \frac{1028 \text{ HP}}{\text{PSI}}$$

FOR MOTOR DRIVE TORQUE: Multiply HP by 5252 and divide by RPM.

$$\text{TORQUE (ft. lbs.)} = \frac{5252 \text{ HP}}{\text{RPM}}$$

FOR HYD. MOTOR SIZE: Multiply torque (ft. lbs.) by 88 and divide by pressure (psi). This gives motor size in cu.in./rev. Select nearest motor size from the above chart. For full load starting, use a 10% larger motor size.

$$\text{DISP.} = \frac{88 \text{ T}}{\text{PSI}}$$

Cross Gear Pumps/Motors



Technical Information

OIL RECOMMENDATIONS: Premium quality anti-wear type oil with a viscosity between 100 and 200 SSU at operating temperatures. Automatic transmission fluids are acceptable. Do not use synthetic fluids.

FILTRATION: 25 micron filters are required with 10 micron preferred. If pump inlet filters are used, be certain inlet flow is not restricted. Cavitation will severely reduce pump life.

PUMP SPEED/PORT SIZE LIMITATIONS: If pumps are operated at speeds higher than shown below, cavitation and pump damage can occur.

PLUMBING SIZE RECOMMENDATIONS:

The following is based on 4 ft./sec. inlet velocity and 15 ft./sec. outlet velocity.

SERIES & SIZE		PUMP INLET PORT SIZE				
		1-1/16 12	1-5/16 12	1-5/8 12	1-7/8 12	2" S.F.
		3/4" (12)	1" (16)	1-1/4" (20)	1-1/2" (24)	2"
40 SERIES	5	3500	3500			
	7	3400	3500			
	10	2500	3500			
	12	2000	3500			
	15	1750	3000			
	18	1400	2500			
50 SERIES	15		3000	3000	3000	
	19		2300	3000	3000	
	23		2000	3000	3000	
	27		1700	2600	3000	
	33		1400	2100	3000	
	38		1200	1800	2700	
60 SERIES	52		1000	1600	2200	
	40			2000	3000	3000
	51			1750	2500	3000
	61			1400	2200	3000
	71			1000	1900	3000
	81			800	1600	2600
	92			600	1400	2500

GPM	PUMP INLET			PUMP OUTLET		
	PIPE	TUBE	HOSE	PIPE	TUBE	HOSE
5	3/4"	7/8"	3/4"	1/4"	3/8"	3/8"
10	1"	1"	1"	3/8"	1/2"	1/2"
15	1 1/4"	1 1/4"	1 1/4"	1/2"	5/8"	1/2"
20	1 1/2"	1 1/2"	1 1/2"	3/4"	3/4"	3/4"
25	1 1/2"	1 1/2"	1 1/2"	3/4"	7/8"	3/4"
30	1 3/4"	1 3/4"	1 3/4"	1"	1"	1"
35	2"	2"	2"	1"	1 1/4"	1"
40	2 1/4"	2 1/4"	2 1/4"	1 1/4"	1 1/4"	1 1/4"
50	2 1/2"	2 1/2"	2 1/2"	1 1/4"	1 1/2"	1 1/4"
75	3"	3"	3"	1 1/2"	1 3/4"	1 1/2"

Tube sizes are OD. Hose sizes are ID.

Reduce plumbing size to match pump port size AT PUMP.

BASED ON INLET RESTRICTION (6" HG MAX. VACUUM)

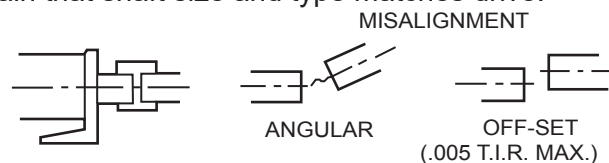
MOUNTING: Pumps and motors may be mounted in any position.

DIRECT FLANGE MOUNTING: Mount directly to gear box or engine PTO, carefully inserting shaft and pilot into mating holes. Make certain that shaft size and type matches drive.

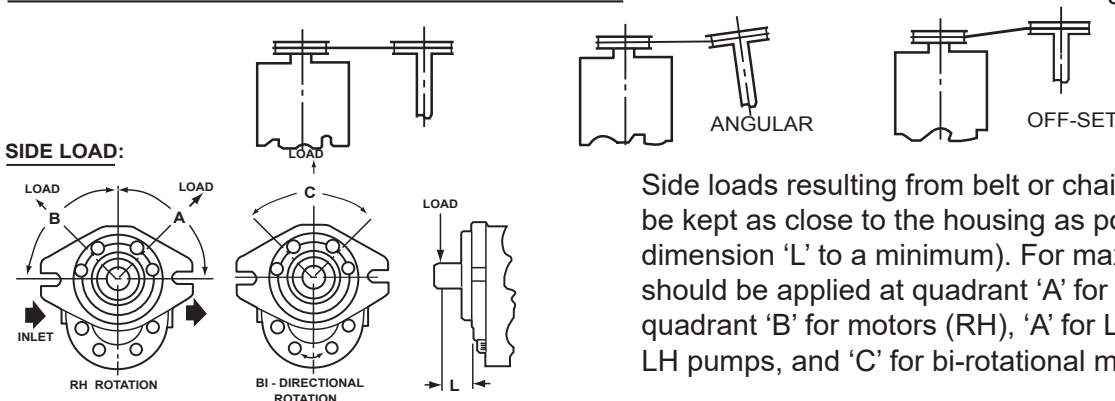
FOOT MOUNT WITH COUPLING:

Excessive wear and reduce life will occur due to misalignment.

Minor misalignment can be compensated for by using a flexible coupling.



FOOT MOUNT WITH BELT OR CHAIN DRIVE: Excessive wear will occur with misalignment.



Side loads resulting from belt or chain drives should be kept as close to the housing as possible (ie., keep dimension 'L' to a minimum). For maximum life, loads should be applied at quadrant 'A' for pumps (RH), quadrant 'B' for motors (RH), 'A' for LH motors, 'B' for LH pumps, and 'C' for bi-rotational motors.

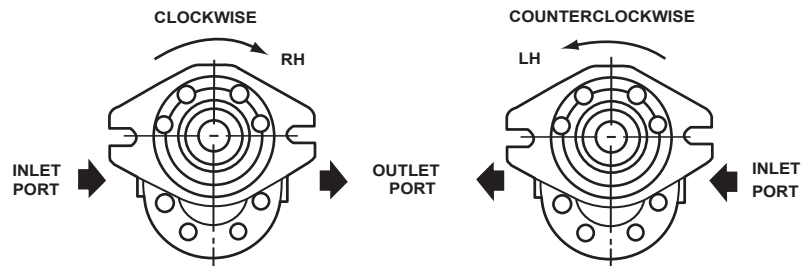
Cross Gear Pumps/Motors



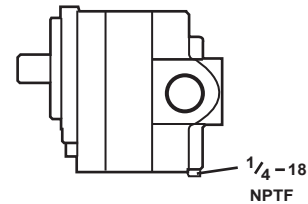
Technical Information

DIRECTION OF ROTATION:

Right hand (RH) or left hand (LH) pumps or motors, if operated in the wrong direction, will result in **THE IMMEDIATE FAILURE** of the shaft seal. Pump and motor rotation is **NOT** field reversible. Dual rotation (D) units may be operated in either direction.



They also can be operated as either a pump or motor. The correct direction of rotation can be determined by the model number stamped on the front cover.



DRAIN PORT CONNECTION: If the motor outlet port pressure exceeds the rating of the shaft seal (20 psi standard), the drain port must be connected directly to the reservoir. Dual rotation pumps have drain port connections for use as motors.

START-UP PROCEDURES:

1. Prior to installation, check pump or motor for possible damage in shipping or handling.
2. Install unit, tighten fittings and fill reservoir with clean fluid.
3. Fill pump/motor with fluid through drain port connection or inlet port.
4. Start engine and run at lowest speed. Check system for air (suction) leaks and oil leaks. (Use a piece of cardboard or wood when searching for possible oil leaks, **DO NOT USE HANDS**). Bleed air from system if necessary. Operate system at normal speed.
5. Gradually increase load to normal, checking for leaks, abnormal noises, binding, etc. Operate system for 15 minutes. Shut off and check filters. Clean or replace as necessary.

MAINTENANCE:

1. Clean or replace filters on a regular basis, as necessary.
2. Check for presence of water in oil (cloudy or milky appearance) and for presence of air (foamy oil). A rancid odour indicates excessive heating of the oil.
3. Check reservoir regularly for proper level. Fill as needed. Repair leaks.

FOR ALL PUMPS AND MOTORS, REFER TO SPECIFIC SPECIFICATION SHEETS FOR ADDITIONAL DATA AND LIST OF OPTIONS AVAILABLE.

NOTE: If chronic shaft seal failure occurs:

1. Check direction of rotation.
2. Check outlet port or drain port pressure.
3. Replace shaft seal with higher pressure rating seal. (See available seal kits)

Cross Gear Pumps/Motors

Technical Information



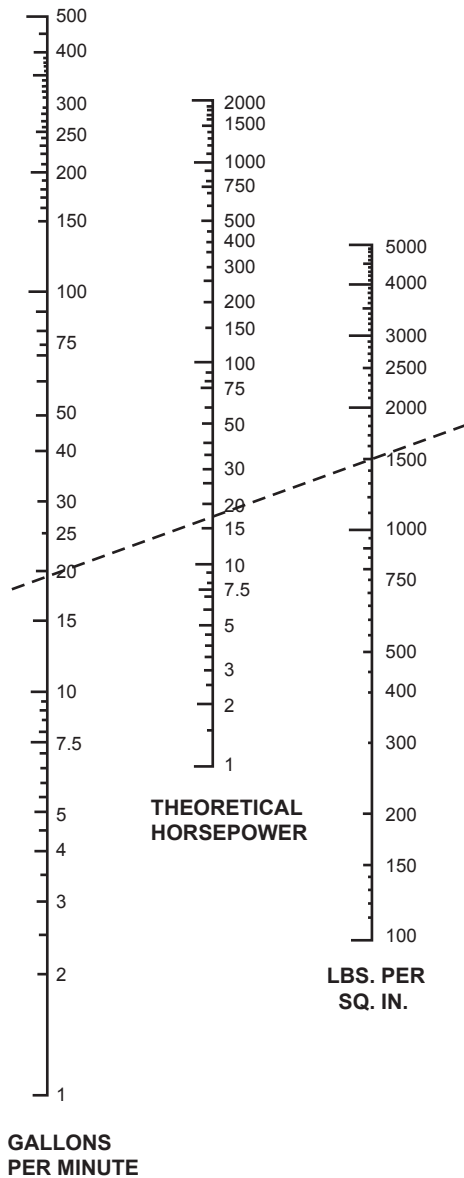
HELPFUL NOMOGRAPHS

PUMP and MOTOR HORSEPOWER

$$HP = PSI \times GPM \times 0.000583$$

$$PUMP\ DRIVE = THL.\ HP \div EFFICIENCY$$

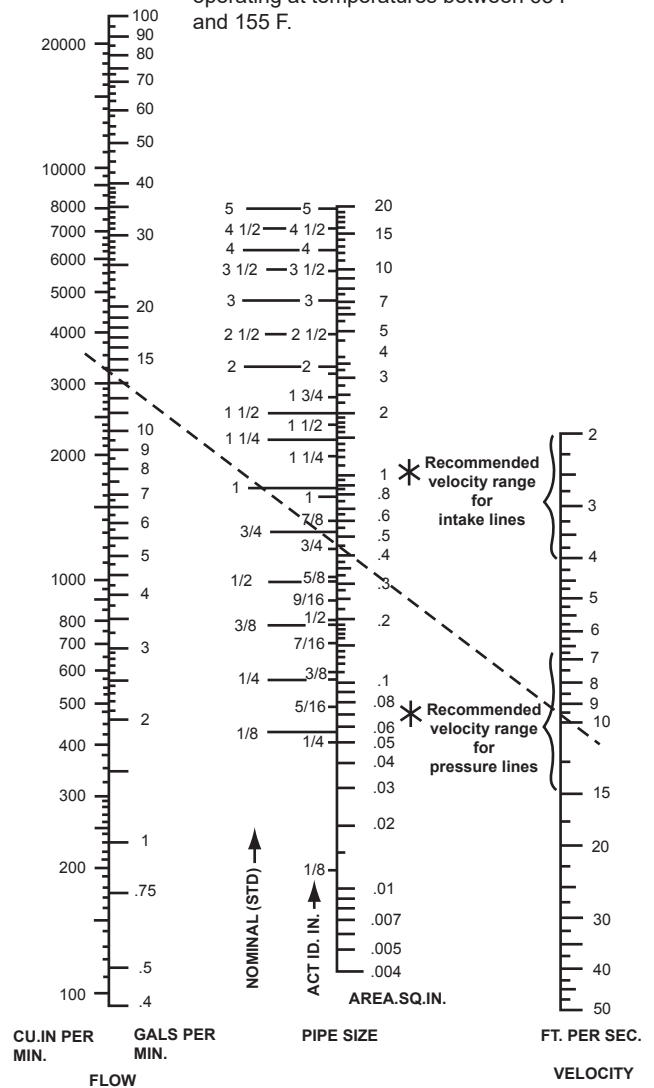
$$MOTOR\ OUTPUT = THL.\ HP \times EFFICIENCY$$



PIPE FLOW CAPACITY

$$AREA = \frac{GPM \times 0.3208}{VELOCITY (FT./SEC.)}$$

*Recommendations are for oils having a maximum viscosity of 315 S.S.U. at 100 F operating at temperatures between 65 F and 155 F.



GPM in these NOMOGRAPHS relates to US. GPM.

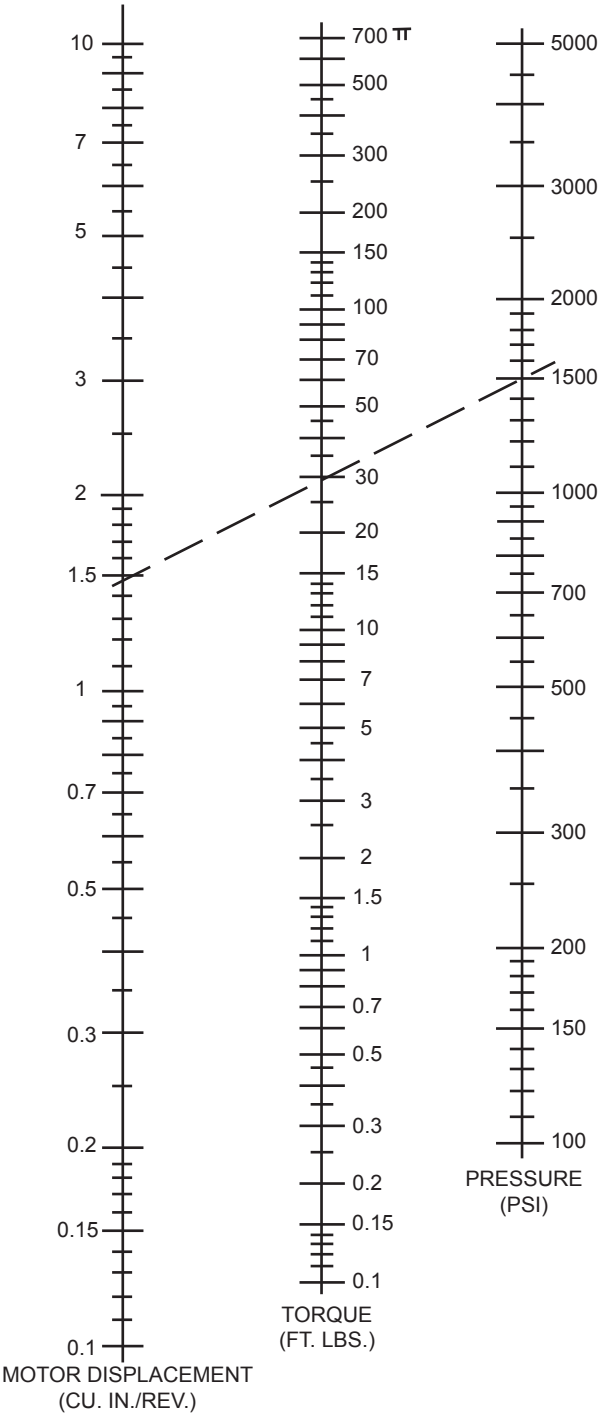
1 US. GPM = 3.79 Litres



HELPFUL NOMOGRAPHS

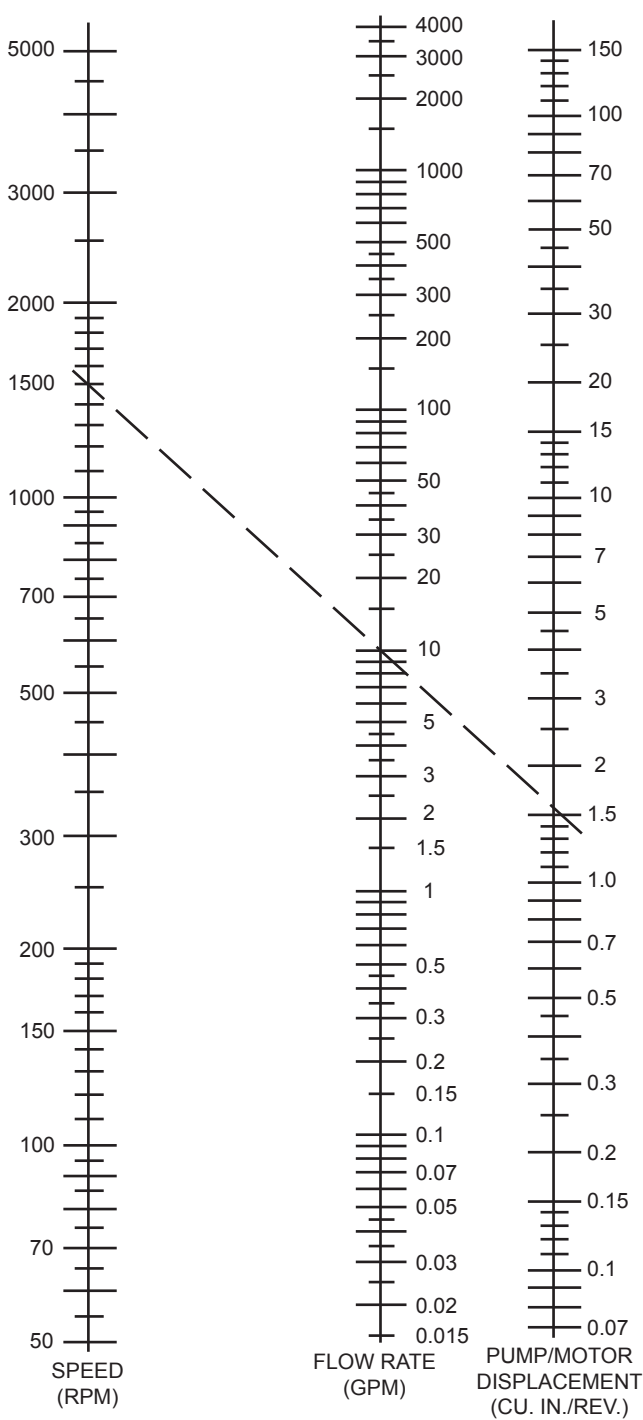
HYDRAULIC MOTOR TORQUE

$$\text{TORQUE} = \frac{\text{DISPL.} \times \text{PRESSURE}}{2}$$



HYDRAULIC MOTOR SPEED

$$\text{FLOW RATE} = \frac{\text{SPEED} \times \text{DISPL.}}{231}$$



GPM in these NOMOGRAPHS relates to US. GPM.

1 US. GPM = 3.79 Litres