

# Char-Lynn<sup>®</sup> Operator's Manual H Series Motors

**EAT•N** Fluid Power  
Products





## Motor Record

RECORDING THIS INFORMATION  
NOW MAY SAVE TROUBLE LATER.

MOTOR PRODUCT NO. \_\_\_\_\_  
MOTOR DATE CODE NO. \_\_\_\_\_  
DATE OF PURCHASE \_\_\_\_\_  
DEALER'S NAME \_\_\_\_\_

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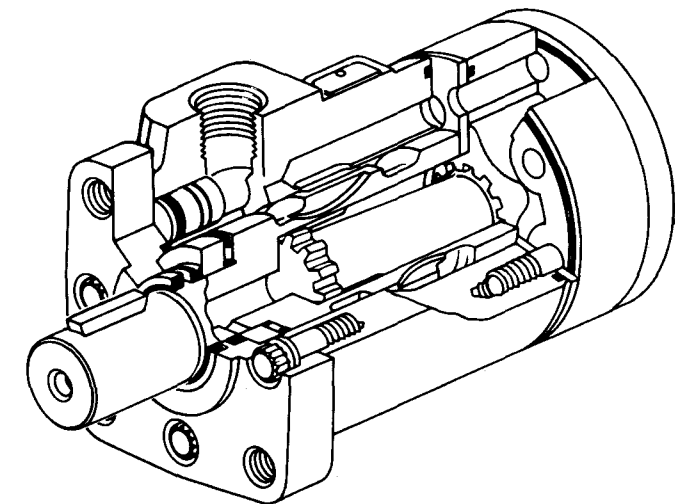
# 4 Introduction

## HYDRAULIC MOTORS

The Char-Lynn® "H" Series Hydraulic Motor is manufactured under very closely controlled conditions and completely tested to insure the highest quality possible. This manual has been prepared to help install and maintain the motor in a manner that will allow you to obtain all the power and utility built into it. For more information concerning the servicing of the motor, a Repair Manual (7-117) is available which gives complete disassembly and reassembly instructions plus other pertinent information about the repair of the motor.

If you have any questions which are not answered in these manuals, contact local representatives or Eaton Corp., Fluid Power Operations, Hydraulics Division.

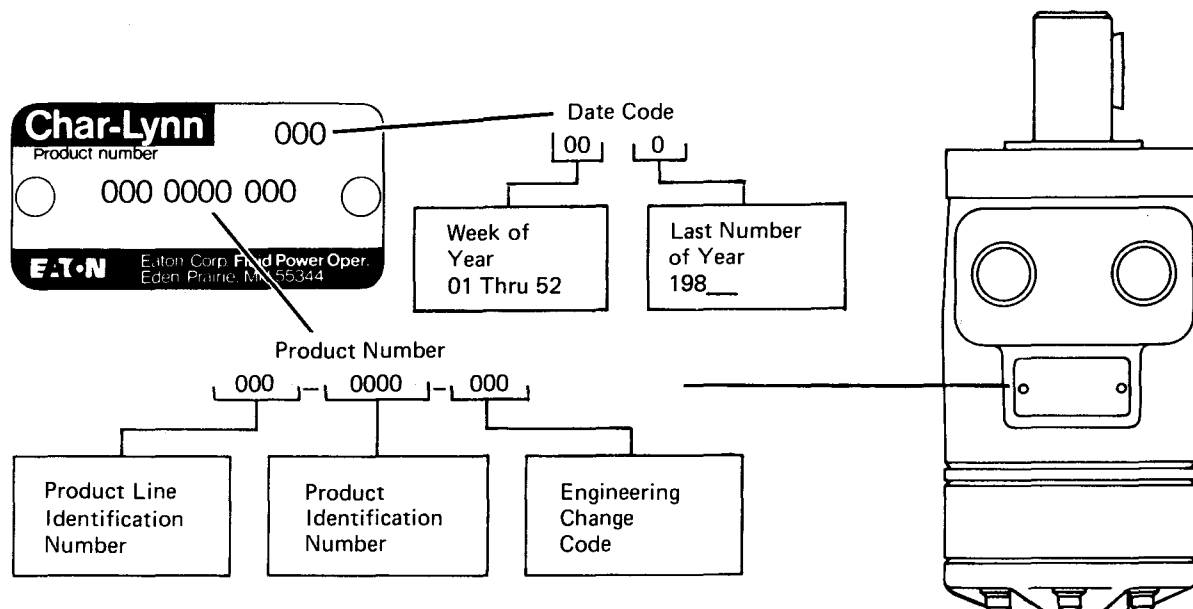
The "H" Series Motor is a relatively simple mechanism utilizing a unique hydraulic principle to develop rotary hydraulic power. It has few moving parts, and develops more usable power per



ounce than many units do per pound. This is possible because its power output is at slow speeds which can be matched to the application without belts, chains, or gear reductions.

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## MOTOR IDENTIFICATION





# 6 Introduction

## MOTOR IDENTIFICATION

Mtg. Prov.	Shaft	Port Connectors	Displacement (cu. in./rev.) Product Number							
			3.0	4.5	6.2	10.3	11.9	14.9	17.9	23.8
4 Bolt Flange	Straight Keyed	½ NPTF	101-1001	101-1002	101-1003	101-1004	101-1005	101-1006	101-1007	101-1008
		¾-14	101-1009	101-1010	101-1011	101-1012	101-1013	101-1014	101-1015	101-1016
		Manifold	101-1017	101-1018	101-1019	101-1020	101-1021	101-1022	101-1023	101-1024
	Splined	½ NPTF	—	—	101-1051	101-1052	101-1053	101-1054	101-1055	101-1056
		¾-14	—	—	—	101-1060	—	—	101-1063	101-1064
		Manifold	—	—	—	—	—	—	—	—
2 Bolt Flange	Straight Keyed	½ NPTF	101-1025	101-1026	101-1027	101-1028	101-1029	101-1030	101-1031	101-1032
		¾-14	101-1033	101-1034	101-1035	101-1036	101-1037	101-1038	101-1039	101-1040
		Manifold	101-1041	101-1042	101-1043	101-1044	101-1045	101-1046	101-1047	101-1048
	Splined	½ NPTF	101-1073	101-1074	101-1075	101-1076	101-1077	101-1078	101-1079	101-1080
		¾-14	—	—	101-1083	101-1084	—	101-1086	101-1087	101-1088
		Manifold	—	—	—	—	—	—	—	—

End cap part number 7611 can be ordered separately for field replacement with a 7/16-20 case drain port.

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## SPECIFICATIONS

Gerotor Width (Inches)		¼	⅜	½	¾	1	1¼	1½	2
Displacement (cu. in./rev.)		3.0	4.5	6.2	10.3	11.9	14.9	17.9	23.8
Speed (RPM)	Per GPM (theo.)	78	52	37	22	19	15	13	10
	@ Max. Flow and @ Continuous PSI	885	748	537	320	276	219	182	137
	Flow (GPM) Max.	12	15	15	15	15	15	15	15
Torque (lb. in.)	Per 100 Δ PSI (theo.)	47	71	98	163	189	236	283	377
	Cont. @ 15 GPM	473	682	867	1327	1371	1562	1696	1930
	Peak **	735	1059	1350	2180	2145	2450	2650	3050
Pressure	Continuous Δ PSI *	1500	1400	1300	1200	1100	1000	900	800
	Peak Δ PSI **	2250	2100	1950	1800	1650	1500	1350	1200
	Peak Back Press.*	1000	1000	1000	1000	1000	1000	1000	1000

\* Maximum pressure at the motor inlet port of 2500 PSI without regard to Δ PSI and/or back pressure ratings or combination thereof.

\*\* A simultaneous peak torque and maximum speed (RPM) condition must not occur. Splined shafts are recommended whenever operating above 2500 lb. in. of torque, especially for those applications subject to frequent reversals.

Δ PSI - True pressure difference between inlet port and outlet port.

**Continuous Rating** Motor may be run continuously at these ratings.

**Peak Operation** 10% of every minute.

**Recommended Minimum Viscosity at Motor** 100 SUS @ Operating Temperature.

**Recommended Maximum System Operating Temperature** 180°F.

**Recommended Filtration** 10 Micrometer or Finer.

To assure optimum motor life, run motor for approximately one hour at 30% of rated pressure before application of full load. Be sure motor is filled with fluid prior to any load applications.





# 8 Introduction

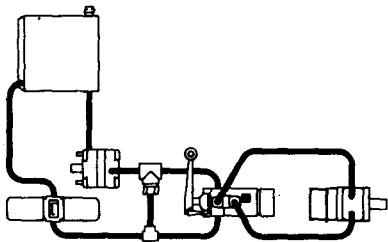
## THE HYDRAULIC SYSTEM

### Single Motor

The simplest system for using one motor is shown below. The motor can be located in a remote spot simply by lengthening the hoses, while the valve can be located close to the motor, close to the rest of the system or anywhere between.

If a 4-way valve, such as the Char-Lynn® valve is used, the motor can be controlled by the valve to rotate in either direction.

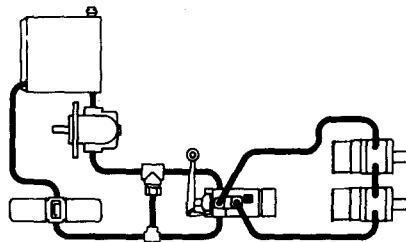
We recommend that you use a 10 micrometer filter in the circuits



### Two Motors in a Series Circuit

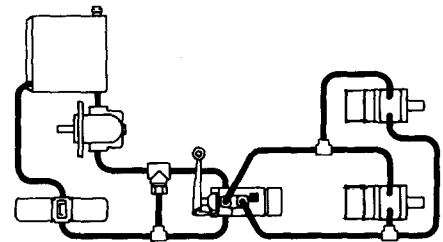
Two motors can be connected together in series and controlled by a single valve as shown below. In a series circuit all of the system fluid passes through each motor. The motor with the highest pressure drop should be located first in the circuit, if possible.

It's shaft seal is then subjected to the least amount of back pressure. Always use the external case drain when motors are connected in series, where back pressure at any motor exceeds 1000 PSI, or used in closed loop applications.



### Two Motors in a Parallel Circuit

In a parallel circuit only a part of the total oil in the system passes through each motor. The pump must be capable of delivering the total volume of oil needed by both motors.



### The Reservoir

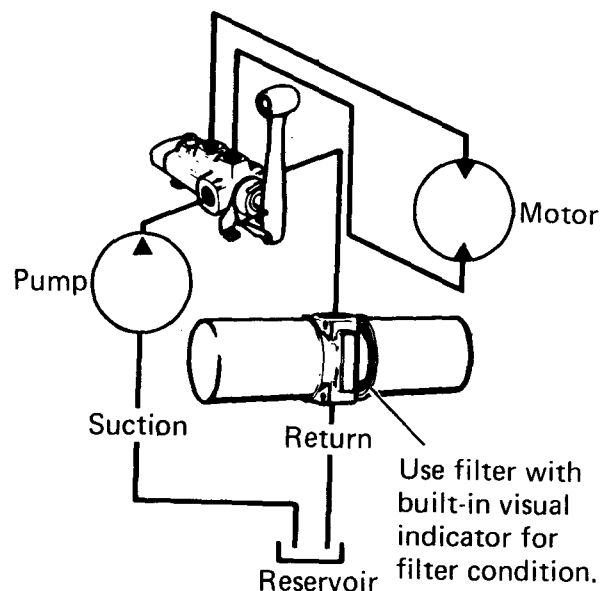
Reservoir size varies with the type of circuit and the application. A ratio of 1:1 is adequate to supply most systems and maintain the proper temperature. The size and ratio (reservoir to pump) also provides for release of air from fluid. This temperature should be around 120° with 180° considered the absolute maximum. If oil temperatures go beyond this range, a larger reservoir or heat exchanger should be added to the circuit. Black iron pipes should be used to replace hoses in some instances. These help keep the temperatures down and also give a more economical installation. The pipe should be in accordance with recognized pressure maximums i.e. STD., XH or XXH. Pipe must be cleaned before installation. \*1 gallon or reservoir capacity for each GPM pumped.

### The Filter

This motor is sensitive to contamination because of close part tolerances. Therefore, it is very important that adequate filtration is included in the system. A 10 micrometer filter or finer is recommended; It could be installed in the return line. Welding slag, dirt or sand in a new reservoir can cause contamination throughout the system at startup. Be sure to flush out the reservoir through the filtering system without the motor and other components connected and operating. Use strainer on suction line to protect system from large size particles.

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### Filter Circuit





# 10 Introduction

## PETROLEUM BASE FLUIDS FOR USE IN CHAR-LYNN® MOTORS

### Viscosity

Proper viscosity at operating temperature is probably the most important property the fluid must possess. Viscosity affects efficiency and life.

For optimum performance Eaton recommends that a fluid used in Char-Lynn products have a viscosity of not less than 100 SUS or 20 centistokes at operating temperature and preferably between 100 and 200 SUS or 20 to 43 centistokes at operating temperature of the system when running continuously. If system temperatures exceed 180° F. (86° C) contact Eaton, Hydraulics Division Service Dept. for recommendations.

### Premium Quality, Industrial Anti-Wear Hydraulic Fluids

In hydraulic systems where the oil serves as a hydraulic fluid only, premium quality, anti-wear type

hydraulic oils are recommended.

These products are balanced to protect Char-Lynn products, maintain proper viscosity for extended periods of time and provide trouble free filtering capabilities.

System operating temperature is the main factor in determining which Viscosity Grade to specify. Fluids are identified by and can be ordered by Viscosity Grade. For example, in a system with operating temperatures

up to 154° F. (68° C) the chart indicates 315 SUS or 68 centistokes premium grade, industrial anti-wear fluid will provide the required viscosity range.

The chart gives a comparison of viscosity grade identification for ISO Viscosity Grade and Saybolt Universal Viscosity Grade at a wide range of system operating temperatures.

### Viscosity Requirements of Industrial Anti-Wear Hydraulic Oils

Operating Temperature Range		Viscosity Grade Industry Identification		Viscosity Range at Operating Temperature	
° Celsius	° Fahrenheit	ISO-VG Cst @ 40°C	SUS @ 100°F	Centi-stokes	SUS
32/52	90/125	32	150	20/43	100/200
41/60	105/140	46	225	20/43	100/200
48/68	118/154	68	315	20/43	100/200
57/77	134/172	100	465	20/43	100/200
66/88	150/190	150	700	20/43	100/200

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### Multi-Grade Automotive Engine Oils (API Service Classification SE)

These oils are acceptable, basically because of general availability. Because different additives are required for internal combustion engines than for hydraulic service, certain filtering problems can arise when these fluids are placed in hydraulic service. However, when high operating temperatures become

the prime consideration and premium hydraulic oils of the proper viscosity are not available, a multi-grade engine oil of the API Service Classification SE quality level may be used with the expectation of more frequent servicing of the filter element. Keep in mind, also, that multi-grade oils may tend to lose viscosity after extended service, therefore the oil should be changed more frequently.

The chart shows temperature and viscosity ranges of both multi-grade and single grade SAE oils, however, multi-grade oils will provide the required viscosity over a wider range of operating temperatures than will single grade oils.

Example: For operation with system temperatures up to 180° F use a 10W/40 multi-grade API service classification SE oil.

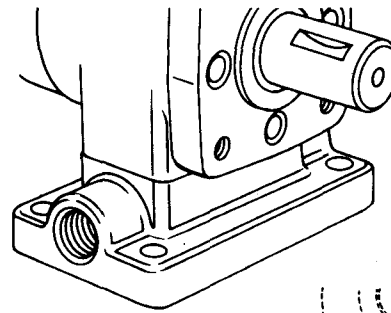
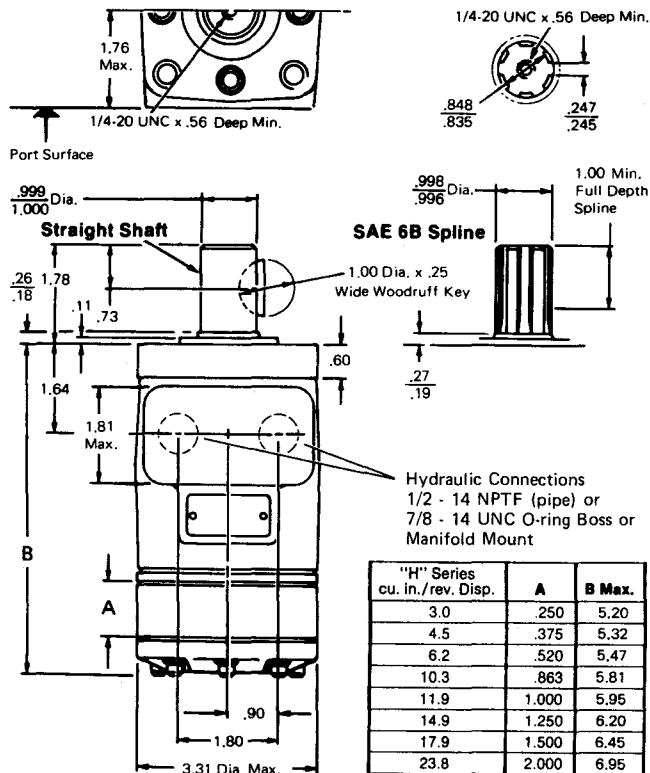
### Examples of Automotive Engine Oils Straight and Multi-Grade SAE — Classification SE

Operating Temperature Range		SAE Viscosity Grade API SE Classification		Viscosity Range at Operating Temperature	
°C	°F			Centistokes	SUS
49/74	120/165	Multi Grade	SAE 10W/30	20/43	100/200
57/82	135/180	Multi Grade	SAE 10W/40	20/43	100/200
61/85	143/185	Multi Grade	SAE 15W/40	20/43	100/200
54/74	130/165	Straight Grade	SAE 30	20/43	100/200
61/84	143/183	Straight Grade	SAE 40	20/43	100/200

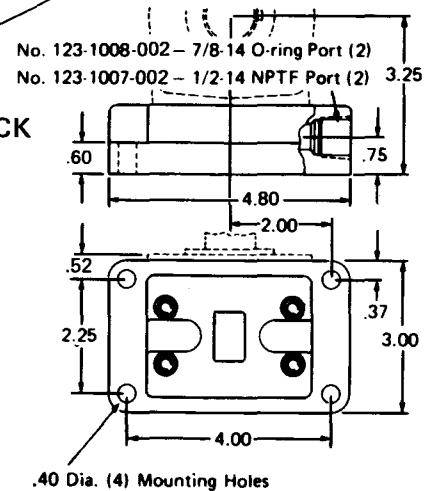


# 12 Installation

## MOUNTING



## BASE BLOCK

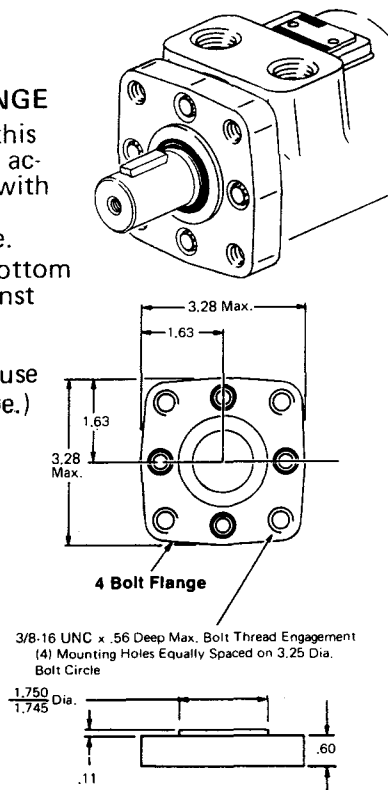


# Installation 13

## MOUNTING

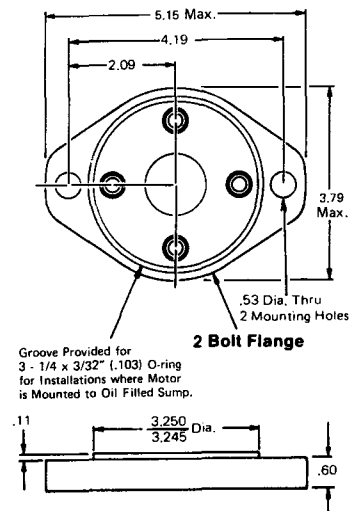
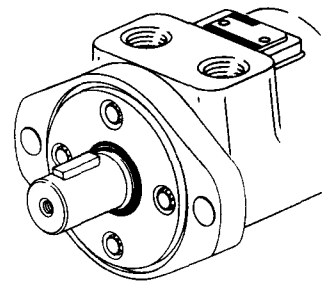
### FOUR HOLE FLANGE

Mounting holes on this flange are tapped to accept a 3/8-16 UNC with 9/16 of an inch of threads in the flange. (Caution—Do not bottom mounting bolts against housing. This will separate flange and housing and may cause breakage and leakage.)



### TWO HOLE FLANGE

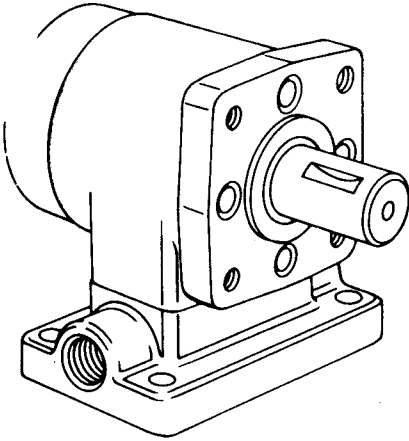
The bolt holes on this flange are not tapped and will accept a 1/2 inch bolt. The bolt can enter from either side of flange.





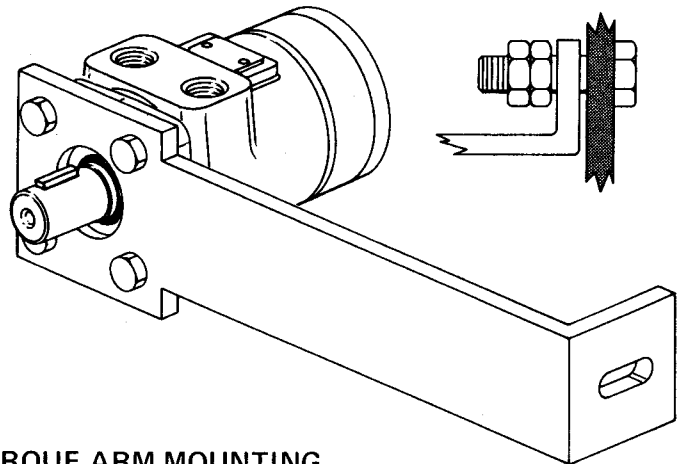
# 14 Installation

## MOUNTING



### BASE BLOCK with Four Hole Flange

In some applications base block mounting may be more convenient than flange mounting. Motors with o-ring ports and mounting holes in the port face are required.

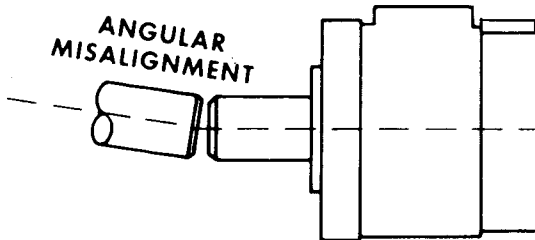


### TORQUE ARM MOUNTING

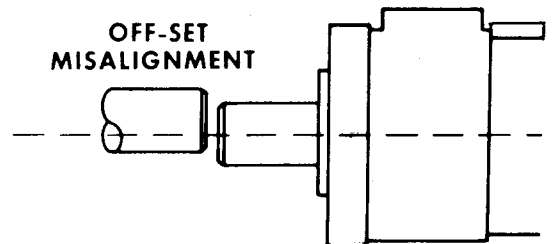
This is a simple, easily made mount and when properly designed and installed, it will compensate for shaft misalignment. The torque arm should be at least 8 inches long to prevent excessive side load. Install on the machine as shown in the inset. This allows for both lateral and longitudinal play and still holds the motor steady with minimum side load.

## Installation 15

### SHAFT ALIGNMENT



### OFF-SET MISALIGNMENT



### Misalignment

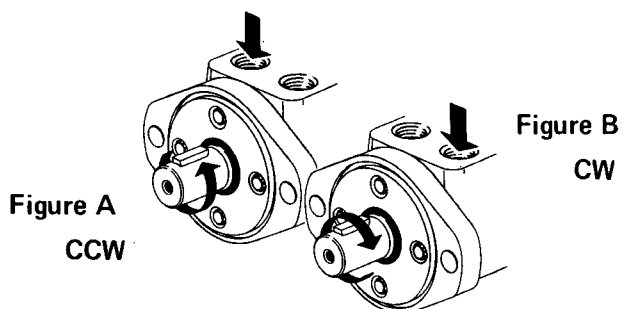
Misalignments must be avoided as it causes excessive side load resulting in motor wear and unsatisfactory performance. A minor amount of angular and offset misalignment can be compensated for with a flexible coupling. A torque arm mounting with a solid coupling can be used to eliminate misalignment problems.





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## SHAFT ROTATION & HOSE CONNECTION



### Connecting the Motor

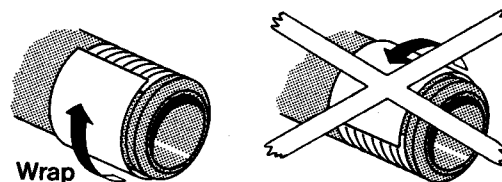
The motor operates equally in either direction depending which port is connected to pressure. When connecting, see Figures above, the shaft will rotate in the direction indicated by the arrow.

### Changing the Rotation of the Motor

Char-Lynn "H" Series Motors are set at the factory to rotate in a clockwise direction when the right port is the pressure port (see Fig. B). The motor can be reversed simply by reversing the oil lines, so the left port is the pressure port.

If for some reason this is impossible, the position of the Gerotor star must be changed to effect a reversal. The procedure is outlined in Repair Manual 7-117.

## Use of Teflon Tape Sealant/Lubricant (with 1/2" NPTF port connectors only)

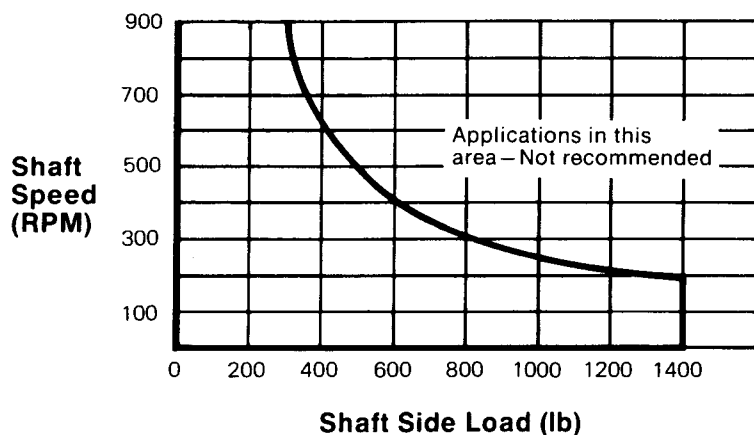


When using fittings with Teflon tape, be careful when taping and tightening. Overtightened or improperly taped fittings can cause damage to housing, or leakage. Use the following procedures:

1. Wrap approx. 1-1/2 turns of 1/2" wide Teflon tape around fitting threads--start tape 2 threads up from end of fitting.
2. Tighten fittings to a maximum 25 ft. lbs.
3. If fittings leak when tightened to maximum torque, either retape, reseal, or replace fittings. DO NOT TIGHTEN FURTHER.

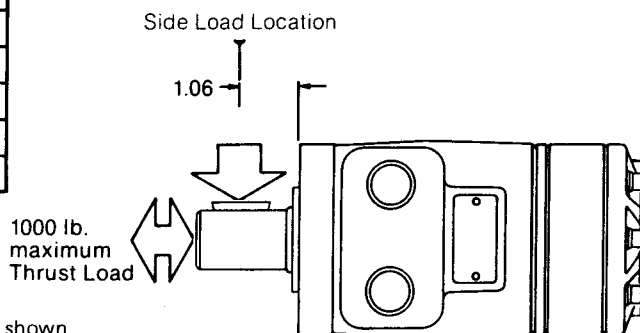
# Installation 17

## SIDE LOAD CAPACITY



This chart is based on the load being applied at the location shown. Side load capacity decreases when load is applied at distances greater than shown.

The side load capacity is more than adequate to handle any externally applied loads such as belts, chains, etc., as long as the motor is applied within its torque rating. The hydrodynamic bearing has long life when load ratings are not exceeded.



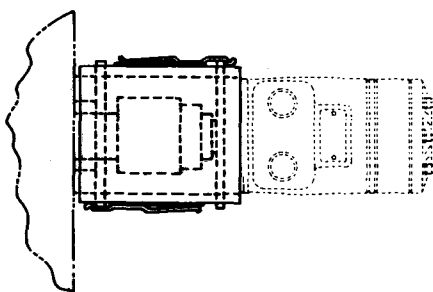


# 18 Installation

## Power Transmission

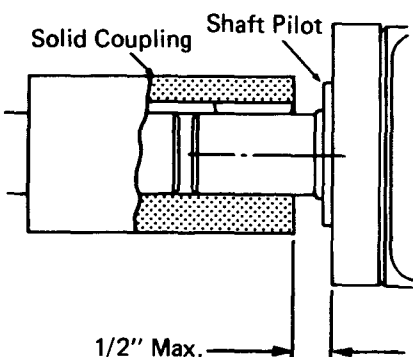
### Universal Mounting Kit

The universal mounting kit, positively eliminates misalignment. The Char-Lynn® -007 series "H" motors are completely interchangeable with all previous Char-Lynn general purpose motors.



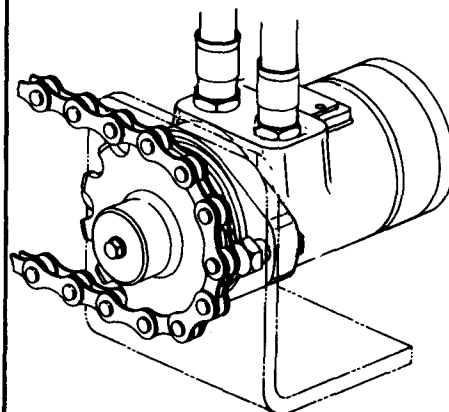
### Rigid or Solid Coupling

A direct drive, motor to shaft, is the simplest method of transmitting the power. This can be accomplished by using a solid coupling, but care must be taken to avoid misalignment. In using this method it is important to have the end of the coupling as close to the motor flange as possible. Maximum spacing is 1/2 inch. If it is more than 1/2 inch, excessive bending stress occurs in the shaft keyway area. Suggest using torque arm mount to eliminate shaft misalignment, see page 14.



### Sprockets or Pulleys

Either one of these two driving elements can be attached directly to the motor shaft. They should be positioned as close to the flange as possible leaving clearance for the chain or belt. The hub should always be on the outboard side. The maximum chain tension (motor torque-pounds inches) divided by 1/2 pitch diameter (inches) should not exceed the maximum side load capacity of the motor, see page 17.



# Installation 19

## Motor Maintenance

A Char-Lynn® hydraulic motor is built to extremely high standards and should be treated as such. It should be returned to your nearest service center if in need of repair. Trained personnel repair and test returned motors so that they meet the highest quality repair and test standards. Upon request, before repairs are made the owner will be notified of the cost and probable cause of the failure except for the replacement of the high pressure shaft seal.

## Insure Trouble-Free Maintenance

The Char-Lynn hydraulic motor was designed and is manufactured to very strict tolerances and assembled under closely controlled conditions. If properly installed and with a minimum of attention it will give long trouble-free service.

\*\*\*\* Avoid nuisance fluid leaks. Typical causes are: dirty, scratched, bowed or inadequately bolted joints; vibrating, unsupported lengths of flexible and rigid piping. The cure: careful assembly, using proper seals. Only compatible seal materials (resistant to fluid and temperatures involved) should be used. Inspect periodically. **DO NOT USE LEAK ADDITIVES.**

\*\*\*\* Eliminate vacuum leaks in suction lines to pumps. Suction leaks lead to noisy pump operation, cavitation, and early pump failure.

\*\*\*\* Avoid shock—limit the rate of pressure buildup. Adjust relief valves, avoid chatter, sudden pressure surges, and higher-than-needed working pressures. Pressure and flow are energy—use them efficiently.

\*\*\*\* Be aware of temperatures. Use oils that will not be too heavy when cold or too light when hot. Either may effect operation and lubrication. (See pages 10 and 11).

\*\*\*\* Include adequate filtration in the system (10 micrometer or finer filter).



**CHAR-LYNN®  
HYDRAULIC MOTOR  
OPERATOR'S MANUAL  
NO. 8-114**

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