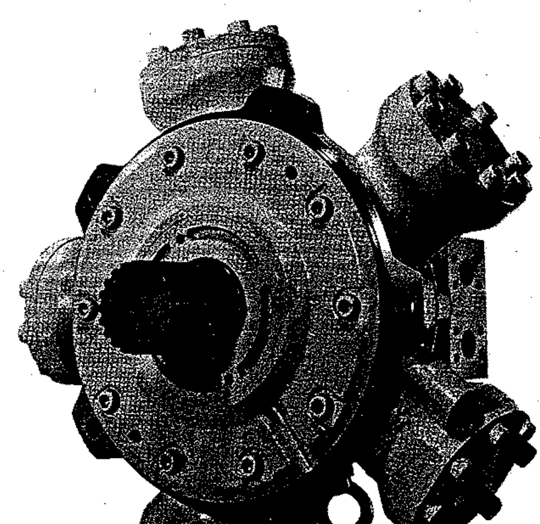
MRH-135
MRH 2-135

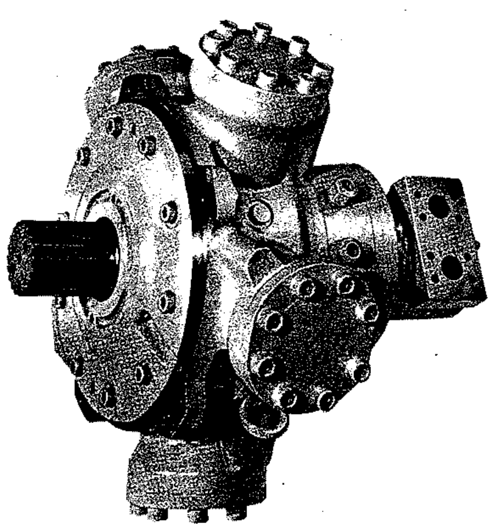
Low Speed—High Torque

SINGLE SPEED HYDRAULIC MOTOR

MULTIPLE SPEED HYDRAULIC MOTOR

HYDROSTAR®



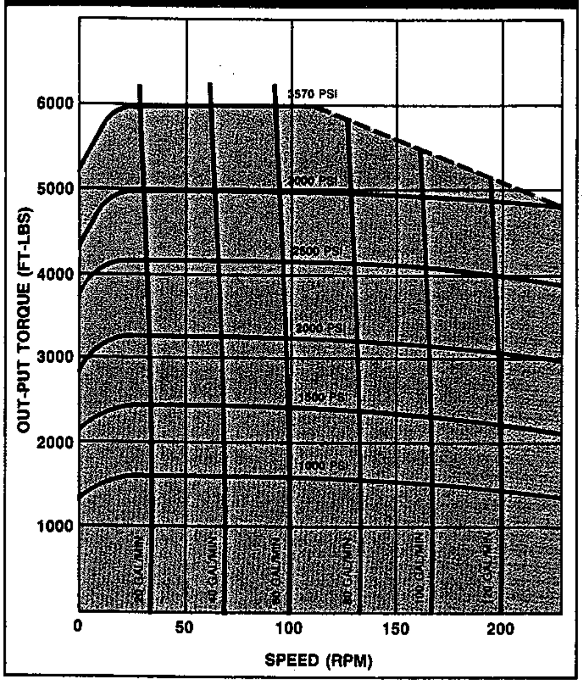


SAMT HYDRAULICS

KYB®

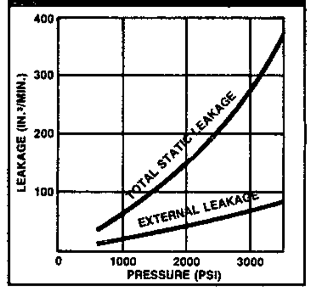
MRH-135 Single Speed Hydraulic Moto

MRH-135 Performance Curve



Graph 1

Static Leakage

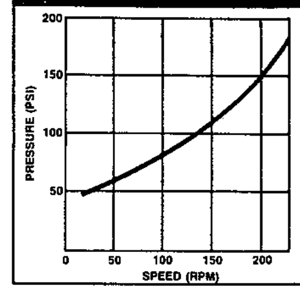


Total static leakage is: internal leakage & external leakage. Total static leakage is used when the outlet port is blocked and the torque load attempts to rotate the shaft as in winch applications. Values given will be considerably greater unless sufficient inlet pressure is maintained. The creep speed can be calculated from the following formula:

$$\text{Creep Speed (RPM)} = \frac{\text{Total Static Leakage (IN.}^3\text{/MIN.)}}{133.9\ \text{(IN.}^3\text{/REV.)}}$$

Graph 2

Idling Pressure Requirement



Graph 2 indicates pressure difference required to idle the motor at various speeds and no output torque. Values will be slightly greater at higher viscosities.

Caution should be taken to assure sufficient inlet pressure is maintained to prevent cavitation when the motor operates as a pump or when the load overruns the motor. Sufficient back pressure should be maintained to counteract centrifugal forces in the motor. Back or boost pressure is the pressure present at the low pressure port of the motor. These minimum pressures can be calculated as follows:

Boost or Back Pressure (PSI) = 1/2 Idling Pressure (PSI) + Crankcase Pressure (PSI)

Specifications

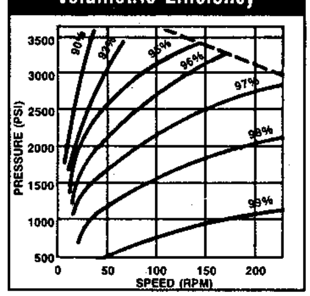
Displacement	133.9 IN³/REV
Maximum continuous pressure	3570 PSI
Intermittent peak pressure	4000 PSI
Maximum continuous back pressure	350 PSI
Maximum intermittent back pressure	1000 PSI
Maximum continuous output torque	5940 FT.-LBS.
Starting torque at 3570 PSI	4640 FT.-LBS.
Maximum continuous speed	220 RPM
Maximum continuous power	200 HP
Moment of inertia (GD²)	1787 LB.-IN².
Maximum fluid temperature	175°F
Dry weight	496 LBS

How To Order

Model	Displacement	Shaft Type	Ports
MRH	135	☐	W
		S—Spline T—Taper	SAE 4-Bolt Flange

Graph 3

Volumetric Efficiency



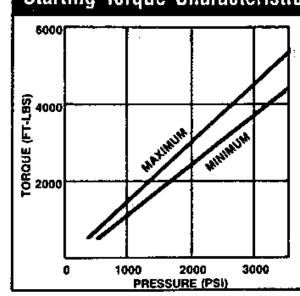
Input flow required to attain any given speed and pressure can be calculated from the graph using the nominal motor displacement of 133.9 cu. in./rev.

$$\text{Input Flow (IN.}^3\text{/MIN.)} = 133.9\ \text{(IN.}^3\text{/REV.)} \times \frac{\text{Motor Speed (RPM)} \times 100}{\text{Motor Volumetric Efficiency (\%)}}$$

1 GAL./MIN. = 231 IN.³/MIN.

Graph 4

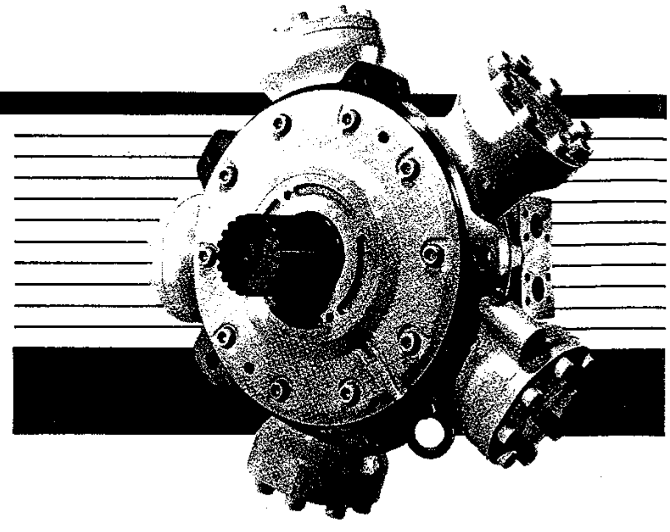
Starting Torque Characteristic



Starting torque varies with the crankshaft angle and maximum and minimum values are shown by the graph. A reduction in torque occurs if back pressure is excessive but viscosity effects are negligible.

Above curves are results obtained on mineral oil of 160-200 SUS viscosity.

by Hydrostar®



Oil and Filtration

Because the oil not only transfers the force but also lubricates mating parts of the motor, care must be taken to assure minimum fluid viscosity is 120 SUS. However, it is recommendable for continuous operation to maintain the viscosity between 165 and 345. Operating temperature should be less than 175°F.

However, even when the proper oil is used, wear will accelerate as oil becomes contaminated. The hydraulic fluid's life depends on conditions under which it is used and only experience can determine precise intervals at which fluid should be changed. With mineral oils it is recommended that samples be taken at about 1000 hour intervals and sent to the manufacturer for analysis. This will help determine the best timing for fluid changes. Filtration recommendation is 25 micron. Generally the pumps are more critical to contamination, therefore, it is advisable to investigate what filtration will be required to sustain the life of the pump.

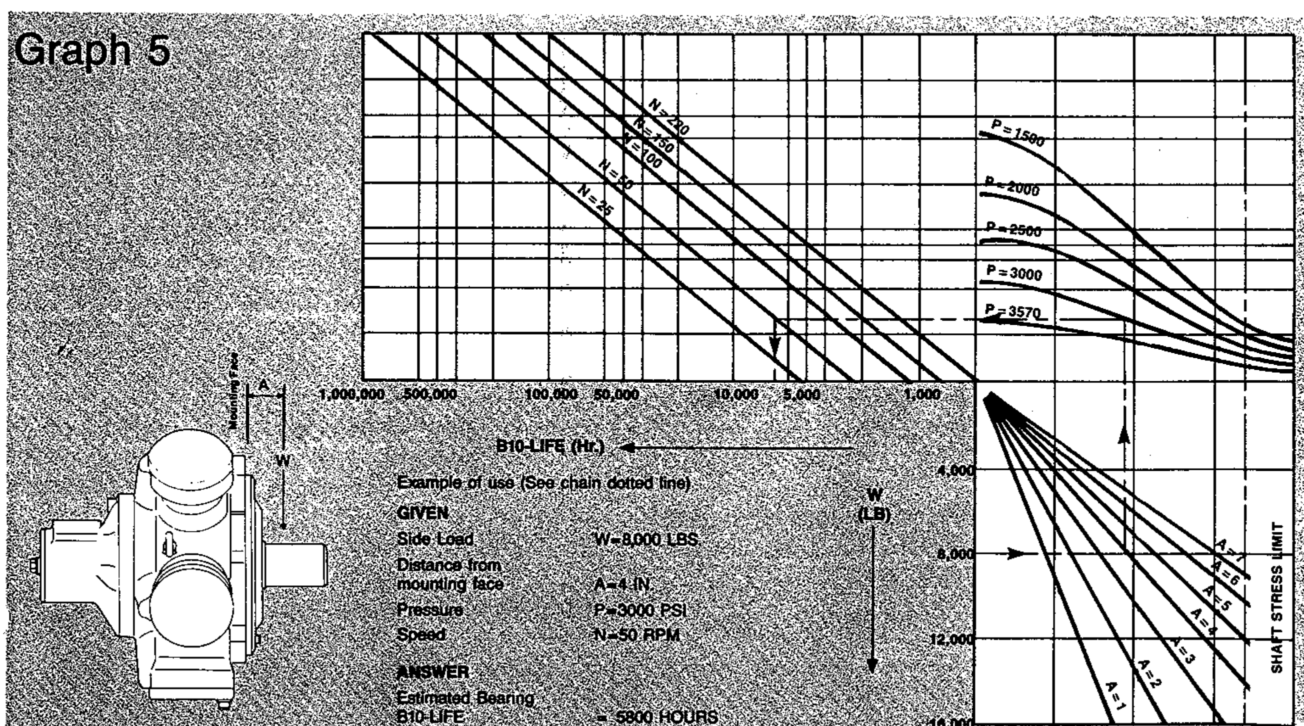
Minimum Operating Speed

Minimum operating speed of 1 rpm is possible depending on load characteristics, but smooth performance of 3 rpm is normal. Starting torque varies with crankshaft angle. A reduction in torque occurs if the back pressure is excessive, but viscosity effects are negligible.

Bearing B10-LIFE

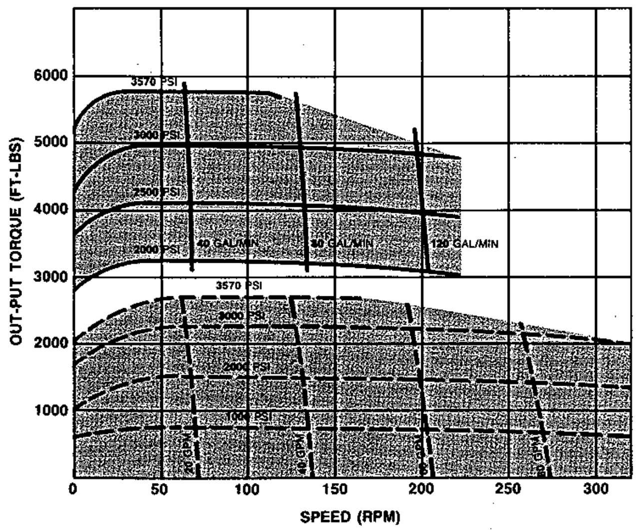
Bearing B10-LIFE of taper roller bearings used in HYDROSTAR® motors is explained in Graph 5 below. Bearing B10-LIFE is the number of hours at which 10% of the bearings may be expected to show some evidence of wear. The other 90% will be satisfactory. In fact, the average life of the bearings is 4 times the B10-LIFE.

Graph 5



MRH 2-135 Multiple Speed Hydraulic Motor

MRH 2/3-135 Performance Curve



——— 100% Displacement
– – – – 50% Displacement

Specifications

		MRH2 - 135	
		MRH2-135-1	MRH2-135-2
Displacement (IN³/REV.)		133.9/66.9	133.9/0
Max. Continuous Pressure (PSI)		3570	3570/150
Intermittent Peak Pressure (PSI)		4000	4000/250
Max. Continuous Back Pressure (PSI)		350	350/–
Max. Intermittent Back Pressure (PSI)		1000	1000/–
Max. Continuous Output Torque (FT.-LBS.)		5820/2710	5820/0
Maximum Speed (RPM)	@3570 PSI	110/165	110/–
	@3000 PSI	220/330	220/–
	Free Wheeling	–	2000
Max. Continuous Power (HP)		200	
Max. Fluid Temperature (°F)		175	
Dry Weight (LBS.)		551	

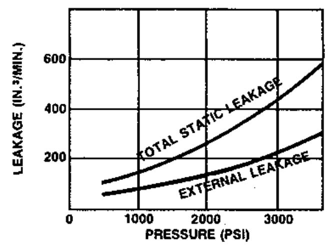
For other displacement combinations consult KYB.

How To Order

Model	No. of Speeds	Displacement	Shaft Type	Ports
MRH	2	–135– ☐	S	W
		See specification chart for displacement designation	(Standard)	SAE 4-bolt Flange

Graph 6

Static Leakage

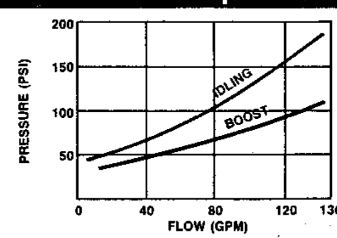


Total static leakage is the combination of internal leakage and external leakage. Total static leakage is used when the outlet port is blocked and the torque load attempts to rotate the shaft, such as a winch application. Unless significant back pressure is maintained, the creep speed will increase drastically and the motor may rotate out of control. The creep speed can be calculated from the following formula:

$$\text{Creep Speed (RPM)} = \frac{\text{Total Static Leakage (IN.}^3\text{/MIN.)}}{\text{133.9 or 66.9 (IN.}^3\text{/REV.)}}$$

Graph 7

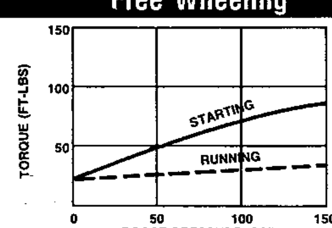
Idling Pressure and Boost Pressure Requirement



Boost or Back Pressure (PSI) = 1/2 Idling Pressure (PSI) + Crankcase Pressure (PSI)

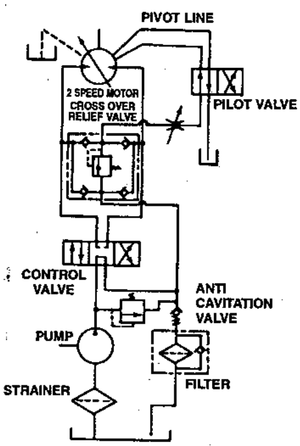
Graph 8

Torque Requirement When Free Wheeling

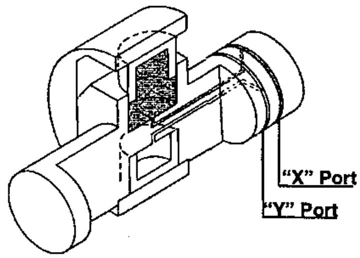


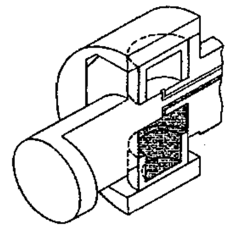
Input torque to motor when free wheeling.

Typical Circuit



TWO SPEED MOTOR





2-Speed Motor

The illustration shows how to change the motor displacement. When "X" port is pressurized, the eccentric cam moves away from the crankshaft, and the motor operates at full displacement.

When the "Y" port is pressurized, the eccentric cam moves toward the center of the crankshaft, and the motor will operate at the minimum displacement. This can be half or less of the full displacement, dependent upon the piston length used to change stroke.

Note: System pressure is required to actuate the change.

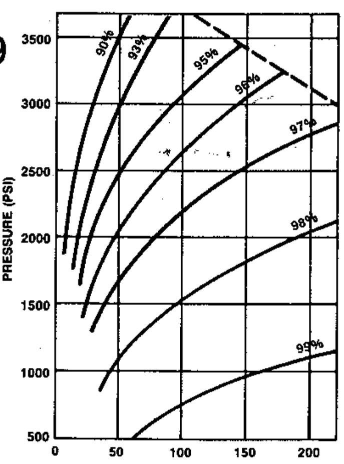
	"X" Port	"Y" Port
Large Displacement	Pressurize	To the Reservoir
Small Displacement	To the Reservoir	Pressurize

NOTE:

1. Pilot pressure should be equal to or greater than system pressure and at least 150 psi.
2. When freewheeling the pressure above the pistons should be less than 200 psi.
3. Cooling may be required if motor is freewheeled for long periods. Consult KYB.

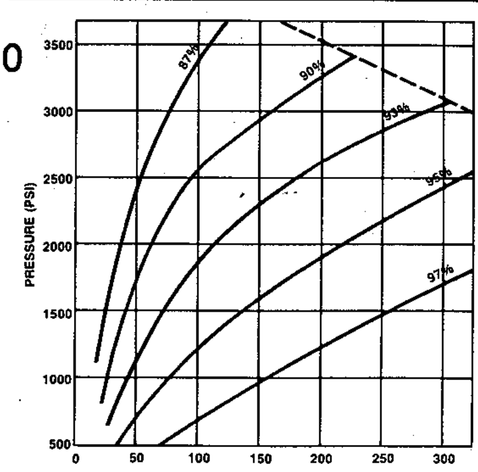
Volume Efficiency (Full Displacement)

Graph 9



Volume Efficiency (Half Displacement)

Graph 10



Input flow required to attain any given speed and pressure can be calculated from the graph using the nominal motor displacement of 133.9 IN³./REV. (Graph 9) or 66.9 IN³./REV. (Graph 10).

Input Flow (IN.³/MIN.) =

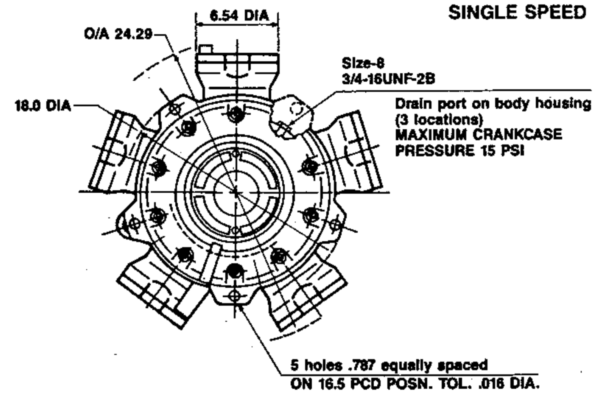
$$\frac{133.9\ (\text{IN.}^3/\text{REV.}) \times \text{Motor Speed (RPM)} \times 100}{\text{Motor Volumetric Efficiency (\%)}} \quad \text{OR} \quad \frac{66.9\ (\text{IN.}^3/\text{REV.}) \times \text{Motor Speed (RPM)} \times 100}{\text{Motor Volumetric Efficiency (\%)}}$$

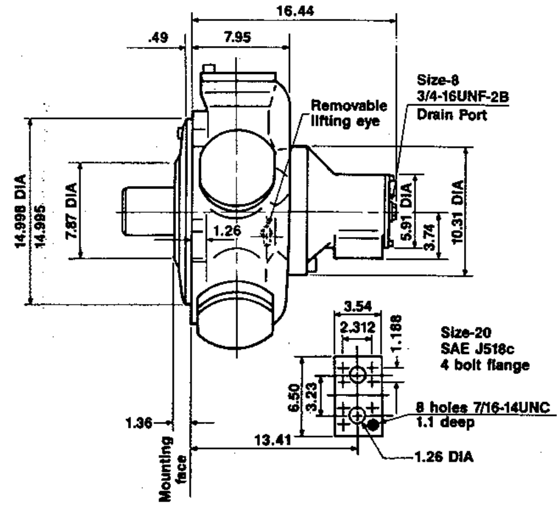
1 GAL./MIN. = 231 IN.³/MIN.

Above curves are results obtained on mineral oil of 160-200 SUS viscosity.

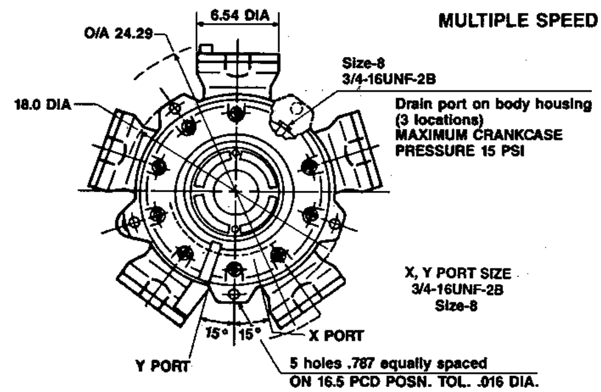
DIMENSIONS (IN INCHES)

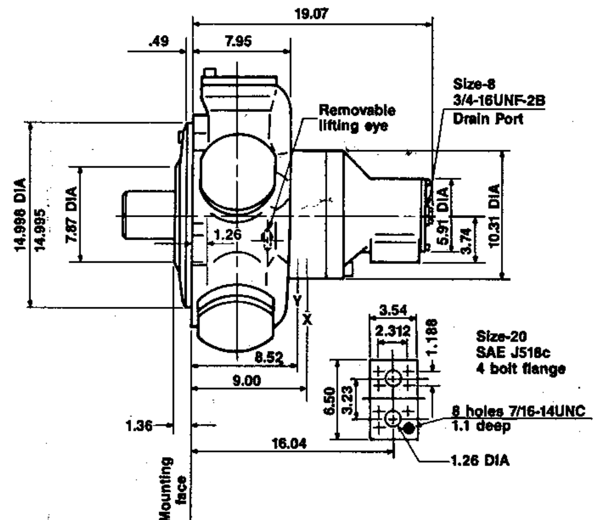
SINGLE SPEED



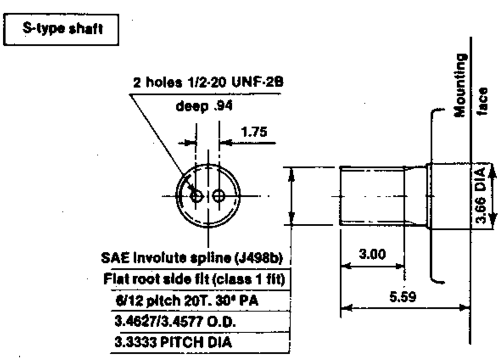


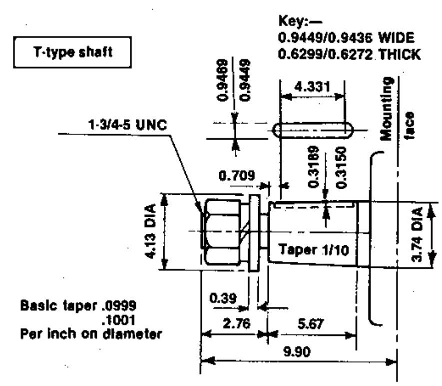
MULTIPLE SPEED





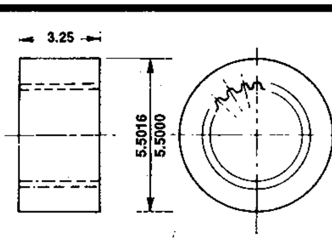
NOTE: FOR 2 SPEED MOTOR ONLY. S-TYPE SHAFT STANDARD





Spline adapter billets

A steel billet having internal splines to match the motor spline shaft is available. The shaft fits into the billet, which is intended for welding onto drive gears, sprockets, etc.



KYB®

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