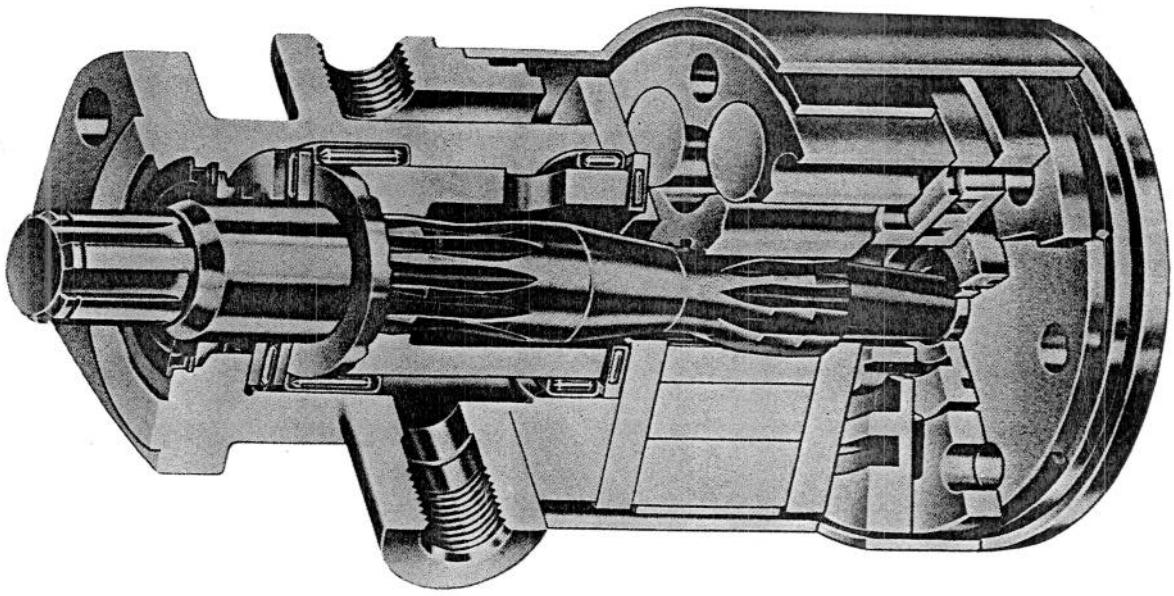
Torqmotor™

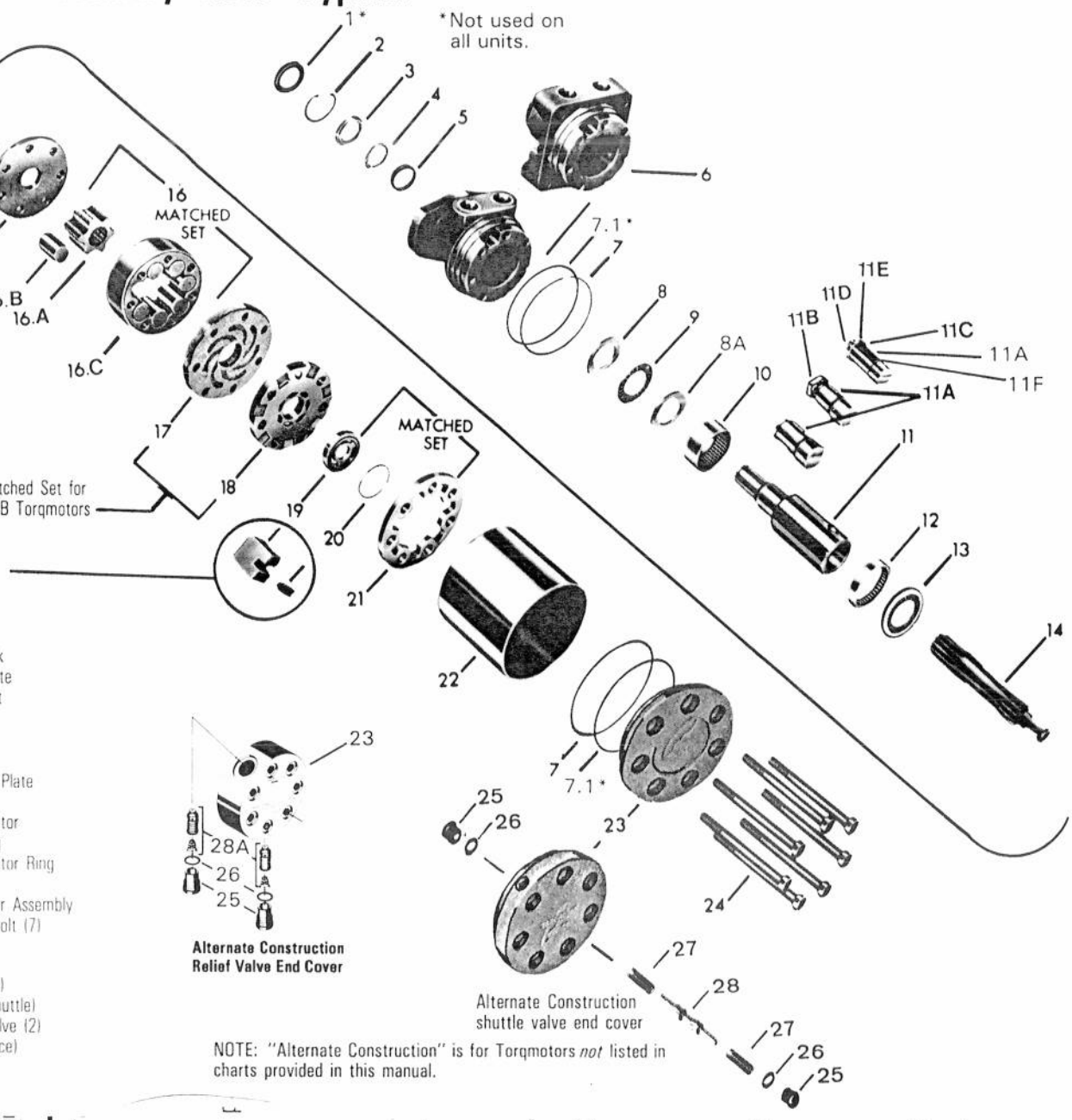
MAB and MAE Series Service Procedure



Ross Gear Division

Price $3.00

MAB/MAE Torqmotor™ Exploded Assembly View—Typical

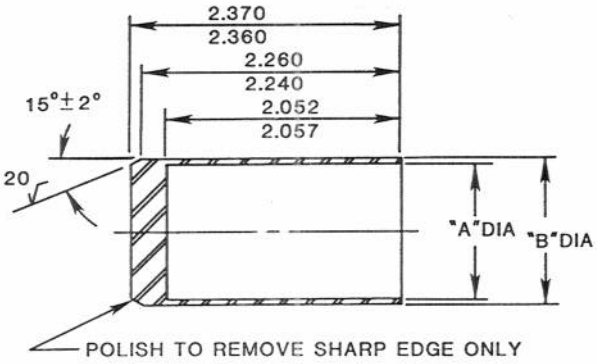


NOTE: Assemble Seal Flat Side Out as Shown in Enlarged View of Sectioned Segments of Items Number 19 and 20.

Item No.			
*1.	Seal	14.	Drive Link
2.	Retaining Ring	15.	Wear Plate
3.	Back-Up Washer	16.	Rotor Set
4.	Washer	16A.	Rotor
5.	Seal	16B.	Vane (7)
6.	Housing	16C.	Stator
7.	Seal Ring (2)	17.	Manifold Plate
*7.1	Back Up Ring (2)	18.	Manifold
8.	Thrust Washer	19.	Commutator
8A.	Thrust Washer	20.	Seal Ring
9.	Thrust Bearing	21.	Commutator Ring
10.	Bearing	22.	Sleeve
11.	Coupling Shaft	23.	End Cover Assembly
11A.	Key	24.	Special Bolt (7)
11B.	Nut	25.	Plug
11C.	Washer	26.	O-Ring
11D.	Bolt	27.	Spring (2)
11E.	Lock Washer	28.	Valve (Shuttle)
11F.	Retaining Ring	28A.	Relief Valve (2) (Two piece)
12.	Bearing		
13.	Thrust Bearing		

NOTE: "Alternate Construction" is for Torqmotors *not* listed in charts provided in this manual.

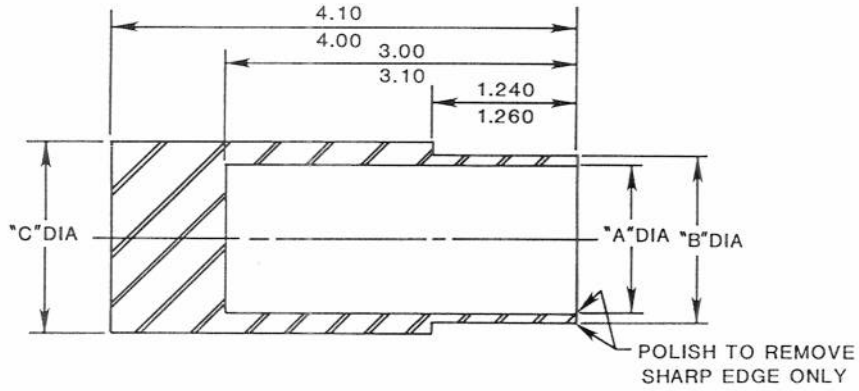
Seal Installation Tools



Dimensions Shown in Inches

Tool No.	Shaft Seal Dia.	Dim. "A"	Dim. "B"
J26751	1¼	1.252/1.258	1.290/1.280
J33074-1	1½	1.502/1.508	1.540/1.530

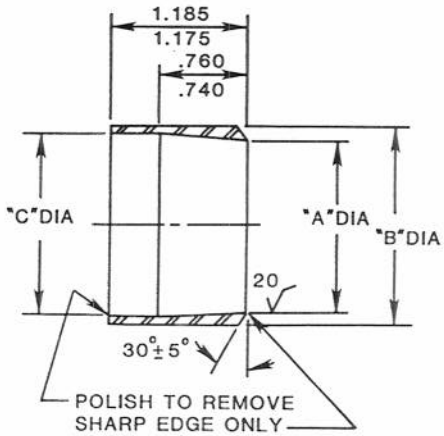
Seal Thimble
Figure 1.



Dimensions Shown in Inches

Tool No.	Shaft Seal Dia.	Dim. "A"	Dim. "B"	Dim. "C"
J26752	1¼	1.300/1.350	1.500/1.498	1.800/1.600
J33074-2	1½	1.550/1.600	1.747/1.745	2.400/2.200

Seal Driver
Figure 2.



Dimensions Shown in Inches

Tool No.	Shaft Seal Dia.	Dim. "A"	Dim. "B"	Dim. "C"
J26753	1¼	1.502/1.504	1.735/1.715	1.590/1.610
J33074-3	1½	1.751/1.753	1.985/1.965	1.840/1.860

Seal Compression Ring
Figure 3.

CONVERSIONS

Inches	mm	Inches	mm
.740	18.80	1.610	40.89
.760	19.30	1.715	43.55
1.175	29.85	1.735	44.07
1.185	30.10	1.745	44.32
1.240	31.50	1.747	44.37
1.252	31.80	1.751	44.48
1.258	31.95	1.753	44.53
1.260	32.00	1.800	45.72
1.280	32.51	1.840	46.74
1.290	32.77	1.860	47.24
1.300	33.02	2.052	52.12
1.350	34.29	2.057	52.25
1.498	38.05	2.200	55.88
1.500	38.10	2.240	56.90
1.502	38.15	2.260	57.40
1.504	38.20	2.360	59.94
1.508	38.30	2.370	60.20
1.530	38.87	2.400	60.96
1.540	39.12	3.00	76.2
1.550	39.37	3.10	78.7
1.590	40.39	4.00	101.6
1.600	40.46	4.10	104.1

NOTE: Tool Kit J26905 for 1¼ inch (32 mm) seal diameter coupling shaft includes tools J26751, J26752 and J26753.

Tool Kit J33074 for 1½ inch (38 mm) seal diameter coupling shaft includes tools J33074-1, J33074-2 and J33074-3.

Tool Kits available from: Kent-Moore, 29784 Little Mack, Roseville, Michigan 46066, Phone (313) 774-9500.

MAE (Standard) Service Parts List Chart (1¼ Inch, 31.8 mm, Seal Dia. Coupling Shaft)

CHART USE EXAMPLE: MAE-10002 TORQMOTOR™ INCLUDES PART NUMBERS LISTED TO THE RIGHT OF MAE, 10- AND -002 SHOWN IN LEFT HAND COLUMN OF CHART.

CAUTION: THE CHARTED COMPONENT SERVICE INFORMATION IS FOR THE TORQMOTORS LISTED ONLY. REFER TO THE ORIGINAL EQUIPMENT MANUFACTURER OF THE EQUIPMENT USING THE TORQMOTOR FOR ASSEMBLY NUMBERS NOT LISTED BELOW.

	EXPLODED VIEW ITEM #	1*	2*	3*	4*	5*	7*		
	DESCRIPTION	Seal	Retaining Ring	Back-Up Washer	Washer	Seal	Seal Ring(2)		
MAE	SERVICE PART #	032436	401393	028398	029106	032633	032519		
	EXPLODED VIEW ITEM #	8 & 8A**	9**	10**	12**	13**	19+21	20*	
	DESCRIPTION	Thrust Washer(2)	Thrust Bearing	Bearing	Bearing	Thrust Bearing	Commutator Assy.	Seal Ring	
MAE	SERVICE PART #	400103	067029	070502	070501	067031	MAB018000S1	032435	
	EXPLODED VIEW ITEM #	14	15	16	17	18	22	23	24
	DESCRIPTION	Drive Link	Wear Plate	Rotor Set	Manifold Plate	Manifold	Sleeve	End Cover Assy.	Special Bolt(7)
10-	SERVICE PART #	MAE103000	477259	MAE107000	477260	MAE015000	099082	MAE016000A1	021271
14-	SERVICE PART #	MAE143000	477259	MAE147000	477260	MAE015000	099096	MAE016000A1	021352
20-	SERVICE PART #	MAE203000	477259	MAE207000	477260	MAE015000	099092	MAE016000A1	021340
24-	SERVICE PART #	MAE243000	477259	MAE247000	477260	MAE015000	099066	MAE016000A1	021273
34-	SERVICE PART #	MAE343000	477257	MAE347000	477256	MAB015003	099064	MAB016000A1	021273
68-	SERVICE PART #	MAE683000	477257	MAE687000	477256	MAB015003	099079	MAB016000A1	021329
	EXPLODED VIEW ITEM ✓	6	11	11A	11B***	11C	11D	11E	11F
	DESCRIPTION	Housing	Coupling Shaft	Key	Nut	Washer	Bolt	Lock Washer	Retaining Ring
-002	SERVICE PART #	MAB012000A1	091443						
-003	SERVICE PART #	MAB012002A1	091442	039027	025126				
-004	SERVICE PART #	MAB012000A1	091442	039027	025126				
-005	SERVICE PART #	MAB012002A1	091443						
-008	SERVICE PART #	MAB012000A1	091445						
-009	SERVICE PART #	MAB012002A1	091445						
-010	SERVICE PART #	MAB012000A1	091441	039028		028413	G223734	G103325	401333
-011	SERVICE PART #	MAB012002A1	091441	039028		028413	G223734	G103325	4013[illegible]
-014	SERVICE PART #	MAB012002A1	091453			028413	G223734	G103325	
-015	SERVICE PART #	MAB012000A1	091452						
-016	SERVICE PART #	MAB012000A1	091453			028413	G223734	G103325	
-017	SERVICE PART #	MAB012002A1	091452						
-029	SERVICE PART #	MAB012007A2****	091460	039027	025126				

NOTES:

*Included in MAB500003—standard seal kit. Other kits: MAB500004—viton, synthetic fluid applications; MAB500005—cold temperature applications.

**Included with item #6, Service Housing Assembly.

***Item #11B nut service part number listed is for Torqmotor assembly part numbers with an A1 suffix only.
Item #11B nut service part number for Torqmotor assembly part number with an A4 suffix is 025113.
Item #11B nut service part number for Torqmotor assembly part number with an A7 suffix is 025132.

****Housing MAB012007A2 uses chamfered washer #400135 for item 8A in the exploded assembly view.

MAE Service Parts List Chart (1½ Inch, 38.1 mm, Seal Dia. Coupling Shaft)

CHART USE EXAMPLE: MAE10037 TORQMOTOR™ INCLUDES PART NUMBERS LISTED TO THE RIGHT OF MAE, 10- and -037 SHOWN IN LEFT HAND COLUMN OF CHART.

CAUTION: THE CHARTED COMPONENT SERVICE INFORMATION IS FOR THE TORQMOTORS LISTED ONLY. REFER TO THE ORIGINAL EQUIPMENT MANUFACTURER OF THE EQUIPMENT USING THE TORQMOTOR FOR ASSEMBLY NUMBERS NOT LISTED BELOW.

	EXPLODED VIEW ITEM #	1*	2*	3*	4*	5*	7*		
	DESCRIPTION	Seal	Retaining Ring	Back-Up Washer	Washer	Shaft Seal	Seal Ring (2)		
MAE	SERVICE PART #	032752	401431	028475	029107	032726	032519		
	EXPLODED VIEW ITEM #	8**	8A**	9**	10&12**	13**	19+21	20*	
	DESCRIPTION	Thrust Washer	Thrust Washer	Thrust Bearing	Bearing(2)	Thrust Bearing	Commutator Assy.	Seal Ring	
MAE	SERVICE PART #	400136	400138	069017	071017	068024	MAB018000S1	032435	
	EXPLODED VIEW ITEM #	14	15	16	17	18	22	23	24
	DESCRIPTION	Drive Link	Wear Plate	Rotor Set	Manifold Plate	Manifold	Sleeve	End Cover Assy.	Special Bolt(7)
10-	SERVICE PART #	MAE103000	477259	MAE107000	477260	MAE015000	099082	MAE016000A1	021271
14-	SERVICE PART #	MAE143000	477259	MAE147000	477260	MAE015000	099096	MAE016000A1	021352
20-	SERVICE PART #	MAE203000	477259	MAE207000	477260	MAE015000	099092	MAE016000A1	021340
24-	SERVICE PART #	MAE243000	477259	MAE247000	477260	MAE015000	099066	MAE016000A1	021273
34-	SERVICE PART #	MAE343000	477257	MAE347000	477256	MAB015003	099064	MAB016000A1	021273
68-	SERVICE PART #	MAE683000	477256	MAE687000	477256	MAB015003	099079	MAB016000A1	021329
	EXPLODED VIEW ITEM #	6	11	11A	11B*** For A1 Assys.	11B*** For A4 Assys.	11B*** For A7 Assys.		
	DESCRIPTION	Housing	Coupling Shaft	Key	Nut	Nut	Nut		
-037	SERVICE PART #	MAB012015A1	091468	039039	025131				
-038	SERVICE PART #	MAB012013A1	091466	039027	025126	025113	025132		
-039	SERVICE PART #	MAB012014A1	091466	039027	025126	025113			
-040	SERVICE PART #	MAB012014A1	091468	039039	025131	025133			
-048	SERVICE PART #	MAB012015A1	091466	039027	025126	025113			

NOTES:

*Included in MAE500003—Standard seal kit.

**Included with item #6, Service Housing Assembly.

***Item #11B nut service part number varies as shown for Torqmotor assembly part numbers listed that have an A1, A4 or A7 suffix.

Disassembly and Inspection Procedures

PREPARATION BEFORE DISASSEMBLY

Before disconnecting hoses, thoroughly clean off all outside dirt around fittings. (After disconnecting hoses and before removing from vehicle, IMMEDIATELY plug portholes.) Drain fluid and finish cleaning and drying assembly before placing on a clean work surface. (A piece of clean paper makes an excellent disposable top.) All disassembled parts should be cleaned separately in clean petroleum-based solvent and blown dry with air to avoid nicks and burrs. Discard all seal and seal rings as they are removed from Torqmotor. Use Ross Gear Division or OEM approved service parts.

WARNING: SINCE THEY ARE FLAMMABLE, BE EXTREMELY CAREFUL WHEN USING ANY SOLVENT. EVEN A SMALL EXPLOSION OR FIRE COULD CAUSE INJURY OR DEATH.

WARNING: WEAR EYE PROTECTION AND BE SURE TO COMPLY WITH OSHA OR OTHER MAXIMUM AIR PRESSURE REQUIREMENTS.

CAUTION: Never steam or high pressure wash hydraulic components. Do not force or abuse closely fitted parts.

REPLACEMENT OF HIGH PRESSURE SEAL (5) WITHOUT COMPLETE TORQMOTOR™ DISASSEMBLY

(Reference Exploded Assembly View)

1. Remove and discard dirt seal (1) and retaining ring (2) from Torqmotor. [Some applications may not require dirt seal (1).]

2. Completely fill Torqmotor with oil. Plug "A" and "B" ports and set Torqmotor in a clean pan. Place a clean rag around the coupling shaft seal area of the housing to prevent oil spray. Carefully grip coupling shaft with appropriate wrench and rotate coupling shaft rapidly in a counter-clockwise direction. Oil pressure generated by Torqmotor will eject backup washer (3), washer (4) and seal (5).

3. Select the proper seal assembly tools for the 1¼ inch (31.8 mm) or 1½ inch (38.1 mm) seal diameter coupling shaft involved. See Figures 1, 2 and 3, page 2.

   Insert the selected seal compression ring tool (Figure 3), with chamfered end inward, into housing (6) until it bottoms out. Assemble the selected seal thimble tool (Figure 1) over coupling shaft (11). Coat new seal (5) with clean grease and assemble over seal thimble with lip side inward. Push new seal (5) into housing (6) with the appropriate seal driver tool (Figure 2). Remove seal driver, thimble and compression tools.

4. Hold washer (4) between thumb and index finger and slightly collapse washer and assemble into housing (6). Assemble back-up washer (3) tab side out, and retaining ring (2). Be sure rounded edge of retaining ring is faced inward, and that back-up washer tab is between ends of retaining ring. Be sure the new retaining ring (2) is the same thickness as the one removed. (Seal kit contains two retaining rings to select from.) Apply a small amount of clean grease to the back side of new seal (1) and assemble into housing (6) if required.

TORQMOTOR DISASSEMBLY

(Reference Exploded Assembly View)

1. Place Torqmotor in a vise, clamping down on the housing (6) port bosses with the coupling shaft (11) pointed down.

WARNING: IF THE TORQMOTOR IS NOT FIRMLY HELD IN THE VISE, IT COULD BE DISLODGED DURING THE SERVICE PROCEDURES, CAUSING INJURY.

2. If the end cover assembly (23) has a shuttle valve (28), scribe a line on housing (6) in some manner in line with the port in the end cover for reassembly orientation. Loosen the two plugs (25) with a 3/16 or 3/8 inch Allen wrench, for later disassembly. Remove the seven special bolts (24) using a 9/16 inch thin wall socket. Inspect bolts for damaged threads, or the sealing ring under the bolt head. Replace damaged bolts.

3. Remove end cover assembly (23) and seal ring (7) and back up ring (7.1) if included by inserting screwdriver between end cover assembly and sleeve (22). Pry up end cover assembly and lift from unit with rings attached. Discard seal ring and back up ring. It may be necessary to use a chisel and hammer to break the end cover loose.

4. If the end cover (23) has shuttle valve (28) or relief valve (28A) and the previously loosened plugs (25), remove the two plugs and o-rings (26).

   CAUTION: Be ready to catch two springs (27) and shuttle valve (28) or relief valve (28A) that will fall out of the end cover valve cavity when the plug assemblies are removed.

   Thoroughly wash cover in proper solvent and blow dry. Be sure the cover valve apertures, including the internal orifice plug, are free of contamination. Inspect end cover for cracks and the bolt head recesses for good bolt head sealing surfaces. Replace cover as necessary.

   NOTE: O-ring (26) is not included in seal kits but is serviced separately if required.

5. Remove commutator ring (21), commutator (19), seal ring (20), and manifold (18) by using two of the special bolts (24) as a lifting tool—insert the two special bolts into two holes and lift out the previously mentioned parts.

6. Remove seal ring (20) from commutator (19), using an air hose to blow air into ring groove until seal ring is lifted out and discard seal ring. Inspect commutator and commutator ring (21) for cracks or burrs. Inspect commutator for wear, scoring, spalling or brinelling. If

any of these conditions exist, replace commutator and commutator ring as a matched set.

7. Remove manifold plate (17) by again using two special bolts (24) as a lifting tool. Inspect manifold (18) and manifold plate (17) for cracks, surface scoring, brinelling or spalling. Replace manifold or manifold plate that exhibits any of these conditions. A polished pattern on the ground surfaces from commutator or rotor rotation is normal.

8. Remove rotor set (16) and wear plate (15), by again using the two bolts as a lifting tool. Retain rotor set in its assembled form, if possible, to maintain the same rotor vane to stator contact surfaces. Inspect the rotor set in its assembled form for nicks, scoring, or spalling, on any surface and broken or worn rotor splines. If any rotor set component requires replacement, the complete rotor set must be replaced as it is a matched set. Inspect the wear plate for cracks, brinelling, or scoring.

9. Place rotor set on a flat surface and center rotor (16A) in stator (16C) such that two rotor lobes (180° apart) and a roller vane (16B) centerline are on the same stator centerline. Check the rotor lobe to roller vane clearance with a feeler gage at this common centerline. If there is more than .005 inches (0.13 mm) of clearance, replace rotor set.

10. Remove drive link (14) from coupling shaft (11) if it was not removed with rotor set and wear plate. Inspect drivelink for cracks and for worn or damaged splines. No perceptible lash (play) should be noted between mating spline parts.

11. Remove thrust bearing (13) and inspect for wear, brinelling, corrosion, and a full complement of retained rollers.

12. Remove coupling shaft (11) by pushing on the output end of shaft. Inspect coupling shaft bearing and seal surfaces for spalling, nicks, grooves, severe wear or corrosion and discoloration. Inspect for damaged or worn internal and external splines or keyway. Replace coupling shaft if any of these conditions exist.

    NOTE: Minor shaft wear in seal area is permissible. If wear exceeds .020 inches (0.51 mm) diametrically, replace coupling shaft.

    A slight "polish" is permissible in the shaft bearing area. Anything more would require coupling shaft replacement.

13. Remove sleeve (22) by inserting screwdriver between sleeve and housing (6) and pry up. Inspect sleeve for deformation from the original cylindrical shape to a "barrel" or "hour glass" shape. Inspect sleeve ends for severe nicks, burrs or corrosion. Replace sleeve if any of these conditions exist.

    NOTE: Minor burrs and corrision that would damage new seal rings during assembly can be removed from sleeve ends.

14. Remove seal ring (7) and back up ring (7.1) if included from housing (6) and discard seal and back up ring.

15. Remove housing (6) from vise, turn over and reclamp in vise with dirt seal (1) end pointed up.

16. Remove dirt seal (1), retaining ring (2), back-up washer (3), washer (4), and seal (5) from housing (6). Discard seals and washers but keep retaining ring (2) for comparison when selecting new retaining ring from seal kit. If burr exists on retaining ring groove, remove with a scraping tool.

17. Inspect housing (6) assembly for cracks, the machined surfaces for nicks, burrs, brinelling or corrosion. Remove burrs that can be removed without changing dimensional characteristics. Inspect tapped holes for thread damage. If the housing is defective in these areas, discard the housing assembly and the disassembly of the Torqmotor is complete.

18. If the housing assembly (6) has passed inspection to this point, inspect the bearings (9), (10), (12) and thrust washers (8) and (8A). The bearing rollers must be firmly retained in the bearing cages, but must rotate and orbit freely. All rollers and the thrust washers must be free of brinelling and corrosion. If the housing has passed this inspection the disassembly of the Torqmotor is completed.

19. If only the outer bearing (12) requires replacement, carefully use a suitable bearing puller to remove bearing so the housing is not damaged.

20. If bearing (10) requires replacement, use a 1.488 inch (37.80mm) maximum diameter shaft or a 1.745 inch (44.32 mm) maximum diameter shaft based on the internal seal (5) bore diameter and press out thrust washers (8), (8A), thrust bearing (9), and bearings (10) and (12). The housing wearplate face should be placed on a block of wood during the pressing operation to protect it. Discard thrust washers (8) and (8A), thrust bearings (9), and bearings (10) and (12) and replace with new parts, as parts will have been damaged when being pressed out.

    NOTE: The depth or location of bearings (10) and (12) in relation to the housing wearplate face should be measured and noted before pressing the bearings out. This will facilitate the correct reassembly of new bearings.

The disassembly of Torqmotor is completed.

TORQMOTOR ASSEMBLY PROCEDURES
(Reference Exploded Assembly View)

Replace all seals and seal rings with new ones each time you reassemble the Torqmotor unit. Lubricate all seals and seal rings with SAE 10W40 oil or clean grease before assembly.

NOTE: Individual seals and seal rings as well as a complete seal kit are available. The parts should be available through most OEM parts distributors or Ross approved Torqmotor distributors. (Contact your local dealer for availability.)

NOTE: Unless otherwise indicated, do not oil or grease parts before assembly.

Wash all parts in clean petroleum-based solvents before assembly. Blow them dry with compressed air. Remove any paint chips from mating surfaces of the end cover, sleeve, and housing and from port and sealing areas.

HOUSING BEARING REPLACEMENT PROCEDURES

1. If bearing components were removed for replacement, assemble new thrust washer (8), new thrust bearing (9) and new thrust washer (8A) in that order into housing (6) bearing cavity. If thrust washer (8A) has a chamfer on the inside diameter, the chamfered side must face away from thrust bearing (9).

   NOTE: Thrust washer (8A) will be identical to thrust washer (8) unless a chamfered inside diameter is required because of coupling shaft design.

   NOTE: An appropriate size piloted bearing mandrel is required to press in housing bearings.

2. If bearings (10) and (12) required are for a 2.25 inch (57.2 mm) diameter (nominal) housing bearing bore, press in new bearing (10) which is 1.0 inch (25.4 mm) long, into housing (6) bearing bore to a depth of 2.410 ± .010 inch (61.2 ± 0.254 mm), measured from the housing wear plate contact surface. Then, press in new bearing (12) which is .5 inch (12.7 mm) long into housing bearing bore to a depth of .115 ± .010 inch (2.92 ± 0.254 mm) measured from the housing wear plate contact surface.

   NOTE: Press against the lettered end of bearing cage when pressing in a roller bearing assembly.

3. If the bearings (10) and (12) required are for a 2.50 inch (63.5 mm) diameter (nominal) bearing bore, press in new bearing (10) which is 1.0 inch (25.4 mm) long into housing (6) bearing bore to a depth of 2.379 ± .010 inch (60.43 ± 0.254 mm) measured from housing wear plate contact surface. Press new bearing (12) which is identical to bearing (10) into housing bearing bore to a depth of .115 ± .010 inch (2.92 ± 0.254 mm) measured from the housing wear plate contact surface.

   NOTE: The bearings (10) and (12) must be assembled to the correct depths to assure the necessary clearance for thrust washer (8A) and thrust bearing (13) and to assure required bearing support.

TORQMOTOR ASSEMBLY

If the sealing diameter of the coupling shaft (11) is larger than any other diameter on the output end of the coupling shaft, begin the Torqmotor assembly procedures with Step 1 below. If there is a diameter on the output end of the coupling shaft equal to the sealing diameter of the coupling shaft begin the procedures with Step 6 below.

1. Place housing (6) in a vise and clamp down on housing port bosses with small bore end pointed up. Apply clean grease to new seal (5) and assemble into housing with seal lip pointed inward.
2. Hold washer (4) between thumb and index finger and slightly collapse to facilitate assembly into housing (6).
3. Assemble back-up washer (3) into housing (6) with the anti-rotation tab facing out.
4. Select a new retaining ring (2) from the seal kit, that is the same thickness as the retaining ring removed. Assemble the new retaining ring into housing (6). Be sure rounded edge of retaining ring is faced inward and that back-up washer tab is between ends of retaining ring.
5. Apply a small amount of clean grease to back side of new seal (1) and assemble into housing (6), if a seal (1) is required.
6. Invert housing (6) in vise so that the large bore end is up.
7. Apply cellophane tape around splines or keyway on coupling shaft (11) to prevent damaging seals.
8. Lubricate and assemble coupling shaft (11), firmly seating it against thrust washer (8A).
9. Assemble thrust bearing (13) onto end of coupling shaft (11).
10. Assemble drive link (14) into coupling shaft (11) with their splines in mesh. (Align hole in drive link with hole in coupling shaft (11), if applicable.)

NOTE: Two alignment studs screwed finger tight into housing (6) bolt holes, approximately 180° apart, will facilitate the assembly and alignment of components as required in the following procedures. The studs can be made by cutting off the heads of 3/8-24 UNF 2A bolts that are over .5 inch (12.7 mm) longer than the bolts (24) used in the Torqmotor.

11. Assemble wear plate (15) over drive link (14) and studs onto housing (6).
12. Install assembled rotor set (16) with counterbore in rotor (16A) down, if applicable, and splines in mesh with drive link splines.

    NOTE: If necessary, go to "Rotor, Stator, Vane Assembly" procedures on page 9.

13. Assemble manifold plate (17), manifold (18) and then the commutator ring (21) over the drive link (14) onto rotor set (16) per the exploded assembly view. Be sure swirls in manifold and manifold plate are faced together.

14. Assemble a new seal ring (20), flat side up, into commutator (19) and assemble commutator over end of drive link (14) onto manifold (18) with seal side up.

15. Assembly new back up ring (7.1) if required and new seal ring (7) on housing (6), apply a generous amount of SAE 10W40 to both ends of sleeve (22) and assemble onto housing. Make sure sleeve is sitting in a non-cocked position.

16. Turn a plug (25) with a new O-ring (26) loosely onto each end of cover (23) valve cavity if shuttle valve (28) is required.

17. Then insert a spring (27), the valve (28) and another spring (27) into the other end of the valve cavity. Turn another plug (25) with new O-ring (26) loosely into cover valve cavity.

    If relief valve (28A) components were removed from the end cover, assemble new O-ring (26) onto the relief valve plugs (25). Assemble the two piece relief valve (28A) with large end of conical spring into the plug first and the small nut of the other valve piece in the small end of the conical spring. Turn these plug and relief valve assemblies into the end cover loosely to be torqued later.

18. Assemble a new back up ring (7.1) if required and a new seal ring (7) onto end cover and assemble end cover onto sleeve (22) in a non-cocked position.

    NOTE: If the end cover has a valve (28) or (28A) use the line you previously scribed on the housing (6) to radially align the end cover port into its original position.

19. Assemble seven special bolts (24) and screw in finger tight. Removal of the two alignment studs should be made after at least two bolts have been assembled. Alternately and progressively tighten the bolts to pull end cover assembly (23) and sleeve (22) into place with a final torque of 50 ± 5 ft.lbs. (68 ± 8 N m).

    Tightening sequence:

    NOTE: The special bolt (24) required for use with the shuttle valve (28) end cover assembly (23) is longer than the bolt required with the standard end cover assembly. Refer to the individual service parts list for correct service part number.

20. Torque the two shuttle plug valve assemblies (25) into a end cover assemble to 12-19 ft.lbs. (16-26 N m). Torque the relief valve plug assemblies (25) into an end cover assembly to 45-55 ft.lbs. (61-75 N m).

21. If seal (5), washer (4), back-up washer (3), snap ring (2) and seal (1) have not yet been assembled, invert housing in vise so the coupling shaft (11) is pointing up and follow procedures #3 and #4 under "Replacement of High Pressure Seal" on page 6 to assemble these components.

The assembly of Torqmotor is now complete except for woodruff key (11A), nut (11B), washer (11C), bolt (11D), lock washer (11E) or retaining ring (11F) if applicable at Torqmotor installation. See final checks. All ports should be plugged until Torqmotor is installed in system.

ROTOR, STATOR, VANE ASSEMBLY PROCEDURE

A disassembled rotor (16A), stator (16C) and vanes (16B) that cannot be readily assembled by hand can be assembled by the following procedures.

1. Place stator (16C) onto wear plate (15) after following Torqmotor assembly procedures 1 through 11.

2. If assembly alignment studs are not being utilized, align stator bolt holes with wear plate bolt holes and turn two bolts (24) finger tight into bolt holes 180° apart to retain stator and wear plate stationary.

3. Assemble six vanes (16B) into the stator vane pockets.

4. Assemble rotor (16A), counterbore down, if applicable, into stator (16C) and onto wear plate (15) with rotor splines in mesh with drive link splines.

5. Grasp the output end of coupling shaft (11) with locking pliers or other appropriate turning devices and rotate coupling shaft, drive link and rotor to seat the rotor and assembled vanes into stator, creating necessary clearance to assemble seventh vane. Assemble the seven vanes using minimum force.

6. Remove the two assembled bolts if used to retain stator and wear plate.

Final Checks

- Pressurize the Torqmotor™ with 100 p.s.i. (6.9 BAR) dry nitrogen and submerge in solvent to check for external leaks.
- Check Torqmotor™ for rotation. Torque required to rotate coupling shaft should not be more than 50 ft.lbs. (68 N m)
- Pressure port with "A" cast under it on housing (6) is for counter-clockwise coupling shaft rotation as viewed from the output end of coupling shaft. Pressure port with "B" cast under it is for clockwise coupling shaft rotation.
- Use test stand if available, to check operation of the Torqmotor™.

Hydraulic Fluid

Keep the hydraulic system filled with one of the following:

- 10W40 SE or SF manufacturers suggested oil.
- Hydraulic fluid as recommended by equipment manufacturer, but the viscosity should not drop below 50 SSU or contain less than .125% zinc anti-wear additives.

CAUTION: Do not mix oil types. Any mixture, or an unapproved oil, could deteriorate the seals. Maintain the proper fluid level in the reservoir. When changing fluid, completely drain old oil from the system. It is suggested also that you flush the system with clean oil.

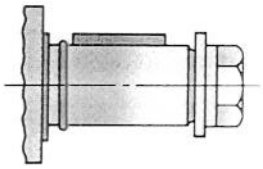
Filtration

Recommended filtration 20-50 micron.

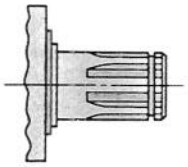
Oil Temperature

Maximum operating temperature 200°F (93.3°C).

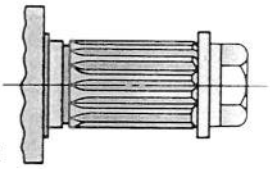
Shafts



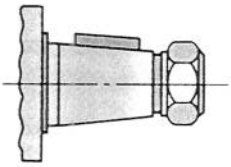
Straight Key



6 B Splined
with
Threaded Hole

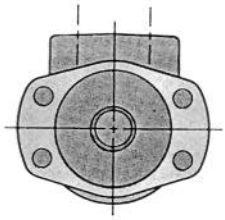


14 Tooth Splined

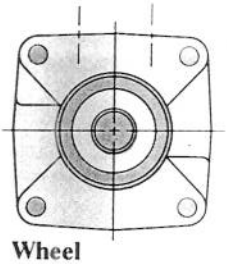


Tapered

Mountings



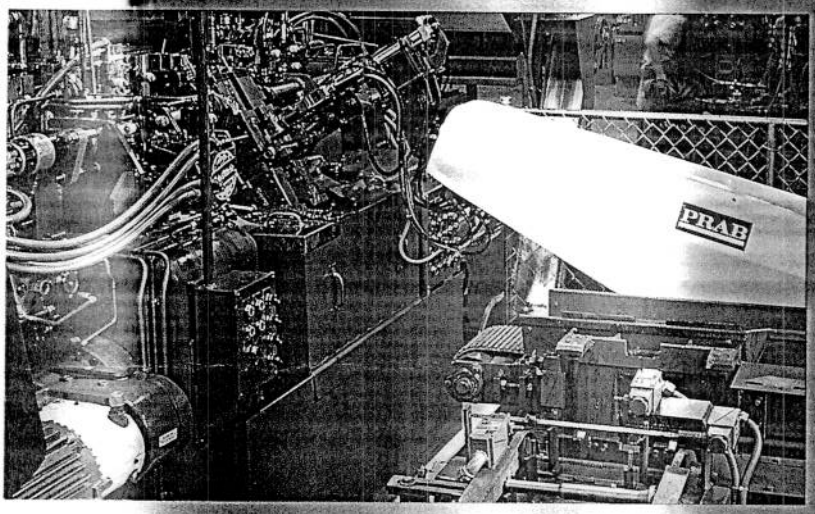
Standard
MAB, MAE



Wheel
MAB, MAE

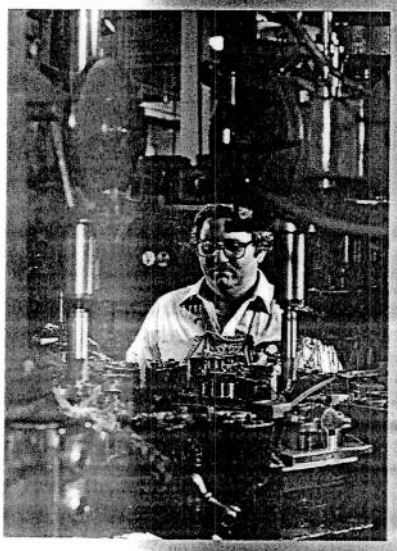
Ross Gear Manufacturing

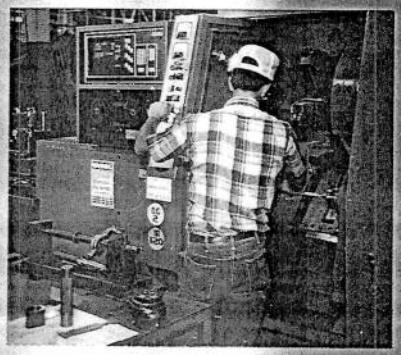
Investing in Quality
At Ross Gear, we commit ourselves to making each product right. We have invested heavily in our manufacturing facilities to ensure that the highest quality gets built into each Ross Gear component.

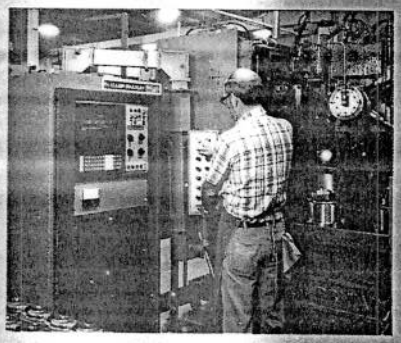


High Tech Requires High Touch
But at Ross Gear we know that automation isn't always the answer. Some operations need a deft, human touch. Even highly automated processes require an able, caring person to make them work. So we've invested heavily in people, too. All along the line, your Ross Gear product is touched by people skillful and concerned enough to make it right.

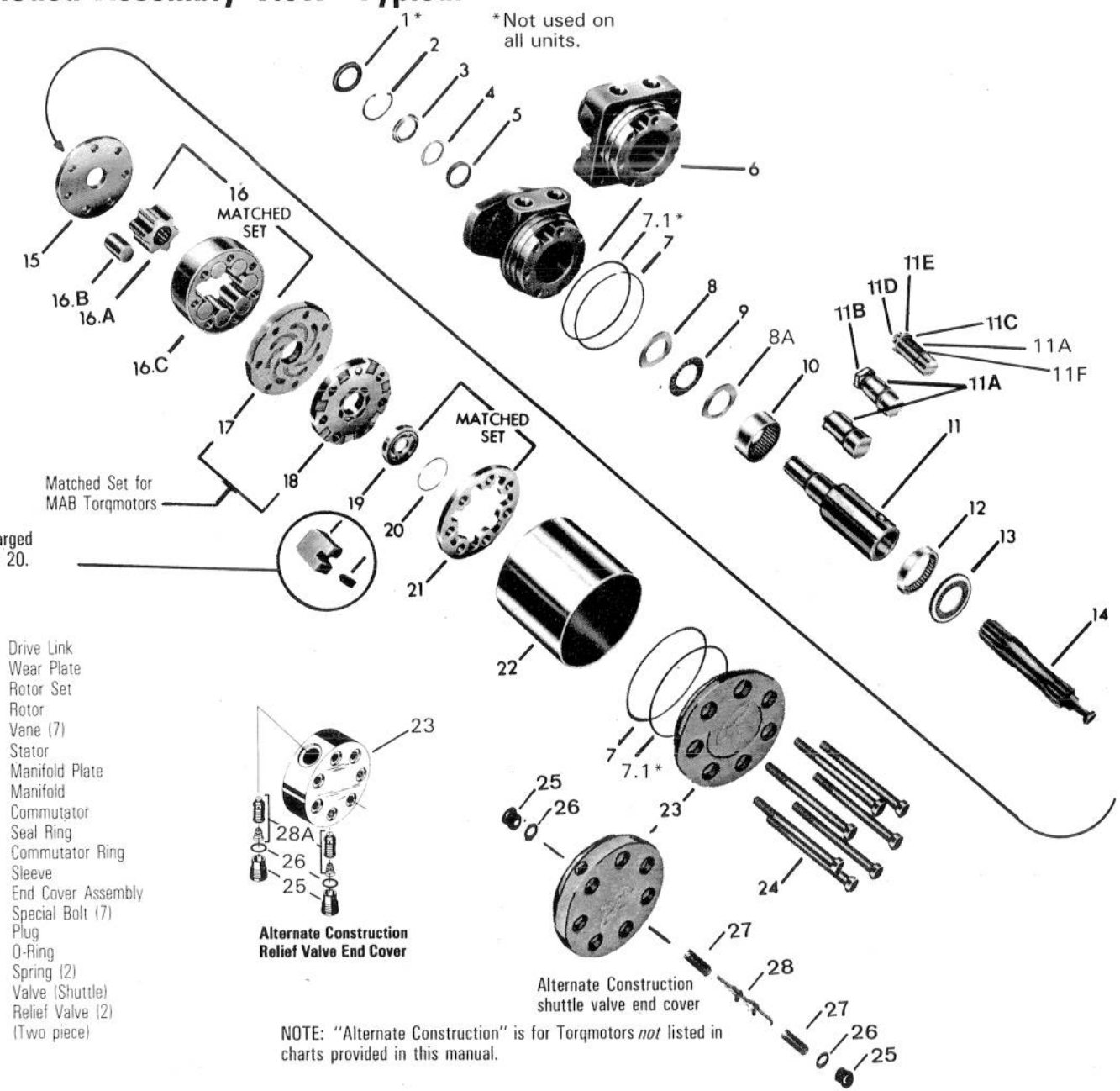
The result is a product which sets standards for the industry.







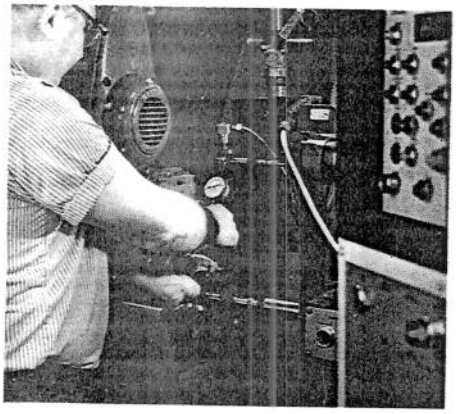
MAB/MAE Torqmotor™ Exploded Assembly View—Typical



NOTE: Assemble Seal Flat Side Out as Shown in Enlarged View of Sectioned Segments of Items Number 19 and 20.

Item No.			
*1.	Seal	14.	Drive Link
2.	Retaining Ring	15.	Wear Plate
3.	Back-Up Washer	16.	Rotor Set
4.	Washer	16A.	Rotor
5.	Seal	16B.	Vane (7)
6.	Housing	16C.	Stator
7.	Seal Ring (2)	17.	Manifold Plate
*7.1	Back Up Ring (2)	18.	Manifold
8.	Thrust Washer	19.	Commutator
8A.	Thrust Washer	20.	Seal Ring
9.	Thrust Bearing	21.	Commutator Ring
10.	Bearing	22.	Sleeve
11.	Coupling Shaft	23.	End Cover Assembly
11A.	Key	24.	Special Bolt (7)
11B.	Nut	25.	Plug
11C.	Washer	26.	O-Ring
11D.	Bolt	27.	Spring (2)
11E.	Lock Washer	28.	Valve (Shuttle)
11F.	Retaining Ring	28A.	Relief Valve (2) (Two piece)
12.	Bearing		
13.	Thrust Bearing		

NOTE: "Alternate Construction" is for Torqmotors *not* listed in charts provided in this manual.



Torqmotor™

Specifications

	English / Metric	MAE						MAB					
Torqmotor™ Series		10	14	20	24	34	68	06	08	10	16	24	32
Displacement	(in³/rev)	8.6	12.1	17.7	20.6	29.0	58.0	4.9	5.9	7.4	11.8	17.8	23.6
	(cm³/rev)	141	198	290	338	477	950	80	97	121	193	292	387
Pressure (psi)	Continuous (differential)	3000	3000	3000	3000	2000	1000	3000	2250	2000	2000	2000	1400
(kg/cm²)		210.9	210.9	210.9	210.9	140.6	70.3	210.9	158.2	140.6	140.6	140.6	98.4
	Peak (differential)	4000	4000	4000	4000	3000	1500	4000	3500	3000	3000	3000	2200
		281.2	281.2	281.2	281.2	210.9	105.4	281.2	246.0	210.9	210.9	210.9	154.7
	Back (maximum)	3000	3000	3000	3000	3000	3000	1500	1500	1500	1500	1500	1500
		210.9	210.9	210.9	210.9	210.9	210.9	105.4	105.4	105.4	105.4	105.4	105.4
Torque (in-lbs)	Theoretical/ (100 psi)	137	193	283	328	463	926	78	94	118	188	283	376
(kg-m)	(7 kg/cm²)	1.6	2.2	3.3	3.8	5.4	10.7	0.9	1.1	1.4	2.2	3.3	4.3
	@ Rated pressure & flow	3356	4739	6961	8247	7458	6828	1955	1708	1899	3103	4564	4159
		38.8	54.8	80.5	95.3	86.2	78.9	22.6	19.8	21.9	35.9	52.7	48.0
	@ Peak pressure & rated flow	4317	6149	9234	10942	11774	10903	2561	2661	2941	4698	6989	6434
		49.9	71.1	106.7	126.5	136.1	126.0	29.6	30.8	34.0	54.3	80.8	74.3
Flow (gpm)	Continuous	20	20	20	20	20	20	12	15	15	15	20	20
(liters/min)		76	76	76	76	76	76	45	57	57	57	76	76
	Peak	25	25	25	25	25	25	15	20	20	20	25	25
		95	95	95	95	95	95	57	76	76	76	95	95
Speed (rpm)	@ Continuous rated flow & pressure	481	344	239	199	141	77	491	536	446	268	224	187
(rpm)		481	344	239	199	141	77	491	536	446	268	224	187
	Maximum[1]	668	478	336	279	199	98	700	783	629	393	329	246
		668	478	336	279	199	98	700	783	629	393	329	246
Weight (lbs)	Standard mount	29	29	30	30	35	45	24	24	25	27	30	33
(kg)		13.2	13.2	13.6	13.6	15.9	20.4	10.9	10.9	11.3	12.2	13.6	15.0
	Wheel mount	31	31	32	32	37	47	26	26	27	29	32	35
		14.1	14.1	14.5	14.5	16.8	21.3	11.8	11.8	12.2	13.2	14.5	15.9
"A" Dimensions (in)	Standard mount	7.99	8.24	8.61	8.86	9.03	11.15	7.40	7.40	7.53	7.90	8.40	8.90
(mm)		202.9	209.3	218.7	225.0	229.4	283.2	188.0	188.0	191.3	200.7	213.4	226.1
	Wheel mount	6.20	6.46	6.83	7.08	7.24	9.37	5.62	5.62	5.74	6.12	6.62	7.12
		157.5	163.8	173.5	179.8	183.9	238.0	142.7	142.7	145.8	155.4	168.1	180.8

[1]For applications with rpm requirements in excess of the maximum rating, contact your authorized Ross Gear representative.

Spezielle Orbital-Steuerung
- geringe innere Leckage
- hohe volumetrische Wirkungsgrade

Rollen im Rotorsatz
- reduzierte Reibung
- lange Lebensdauer

Verwendung von Rollenlager
- hohe Seitenlastkapazität

Patentierte Hochdruckwellendichtung
- keine Leckölleitung
- keine Rückschlagventile

Vielzahl von Varianten
- großer Einsatzbereich

Zero leak commutation valve
- for greater, more consistent volumetric efficiency

Roller vane rotor set
- reduces friction and inernal leakage
- maintaining efficiency throughout the life of the motor

Roller bearings
- provide superior shaft support for exceptional radial loading capacity

A patented high-pressure shaft seal
- no case drain and check valves needed
- no extra plumbing

Wide choice of displacement range, flange and shaft options
- greater efficiency in system design to suit your application

Une distribution orbitale particulière assure:
- fuites internes minimales
- rendements volumétriques élevés

Le rotor à rouleaux
- réduit les frottements
- augmente la durée de viè

Les roulements à aquilles
- permettant des charges radiales élevées

Par l'utilisation de joints d'arbre haute pression brevetés
- pas de conduite de drainage
- pas de clapets anti-retour

Gràce de nombreuses variantes
- larges domaines d'application

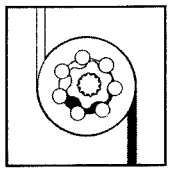
Una particolare distribuzione orbitale assicura:
- trafilamento ridotto
- elevato rendimento volumetrico

Con lo statore a rullo
- si riduce l'attrito interno
- si mantiene nel tempo l'efficieza del motore

I cuscinetti sull'albero
- consentono un'elevato carico radiale

Una guarnizione di tenuta ad alta pressione brevettata elimina la necessità
- die una linea di drenaggio esterna
- e di valvole di non ritorno

Un'ampia gamma di cilindrate, flangiature ed alberi
- consentono scelte adeguate ad ogni esigneza costruttiva



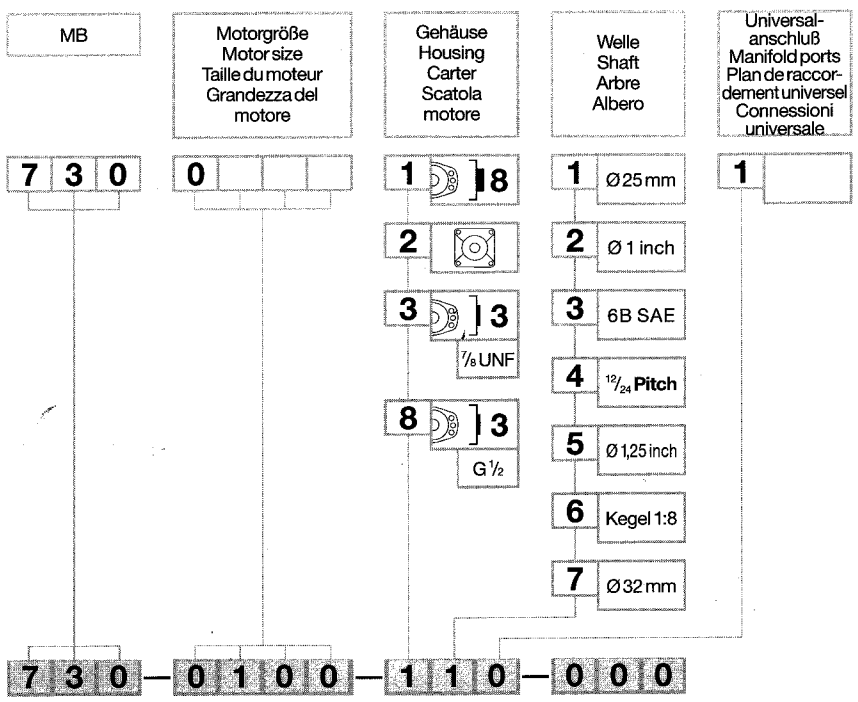
Serie **MB**	Geometrisches Schluckvolumen Geometric displacement Cylindrée Cilindrata cm³/U cm³/rev cm³/tr cm³/giro	Max. Drehzahl cont./int. Max. speed cont./int. Vélocité di rotazione max cont./int. Vitesse de rotation maxi cont./int. U/min rev/min tr/min giri/min	Max. Schluckstrom cont./int. Max. oil flow cont./int. Débit d'huile maxi cont./int. Portata max cont./int. l/min ltr/min ltr/min l/min	Max. Druckgefälle cont./int. Max. differential pressure cont./int. Chute de pression maxi cont./int. Caduta di pressione max cont./int. bar	Max. Eingangs-/Rücklaufdruck Max. inlet or outlet pressure Pression maxi entrée et retour Pressione max in entrata e uscita bar	Max. Moment cont./int. Max. torque cont./int. Couple maxi cont./int. Coppia max cont./int. Nm	Max. Leistungsabgabe Max. performance Puissance de sortie maxi Potenza meccanica max kW	Gewicht Weight Poids Peso kg
MB 80	81	550/730	45/60	200/280	310	215/295	19	13,5
MB 100	100	600/750	60/75	160/240	310	210/315	21	13.5
MB 130	128	470/580	60/75	140/200	310	240/350	19	14
MB 170	169	355/440	60/75	140/200	310	330/485	19	14,5
MB 190	195	300/380	60/75	140/200	310	380/560	19	14,7
MB 240	237	320/420	75/100	140/200	310	460/685	24	15
MB 280	280	270/350	75/100	140/200	310	550/800	24	15,5
MB 370	365	205/270	75/100	95/150	310	480/770	18	16

Seitenbelastung Side loads Charges latérales Carico radiale
16.000 N

int. = Intermittierende Werte: max. 10% von jeder Betriebsminute
Fonctionnement intermittent: 10% max. de chaque minute d'utilisation

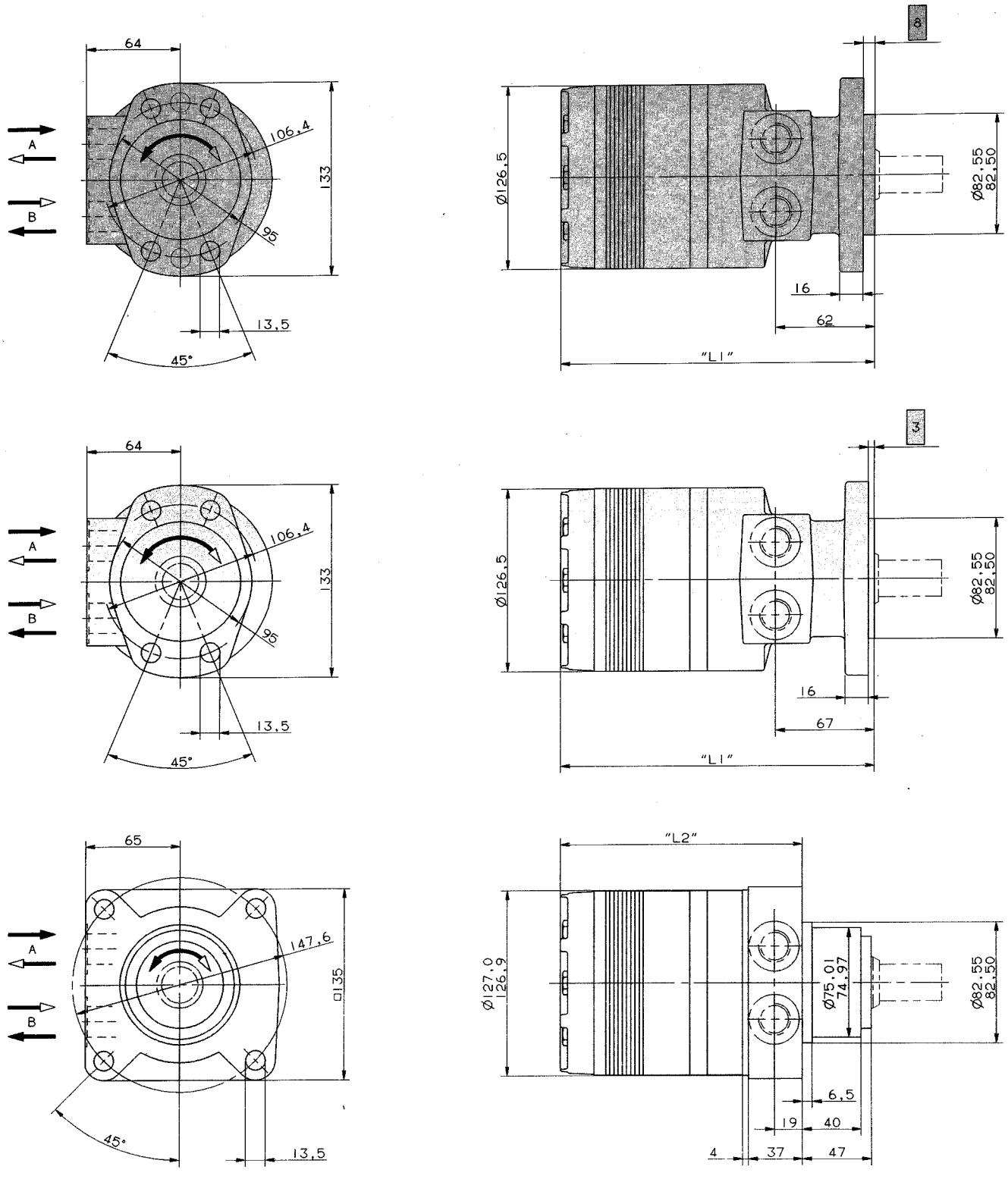
int. = Intermittent operation rating applies to 10% of every minute
Servizio intermittente: 10% max di ogni minuto di utilizzazione

Bestellsystem
Ordering system
Système de commande
Sistema di ordinazione

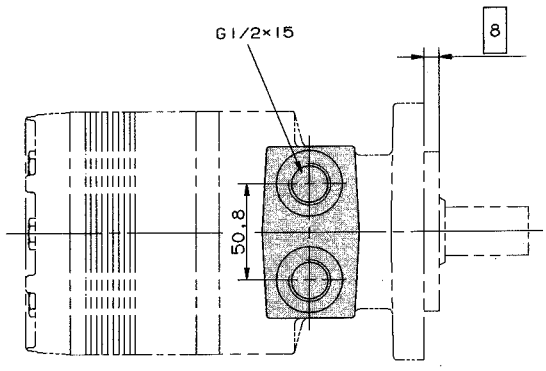


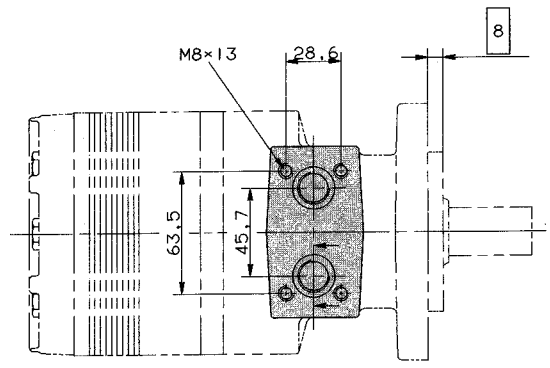
Bestellbeispiel:
Ordering example:
Exemple de commande:
Sigla ordinazione:

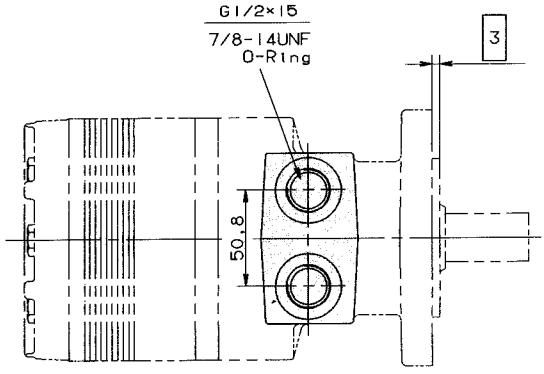
7 3 0 — 0 1 0 0 — 1 1 0 — 0 0 0

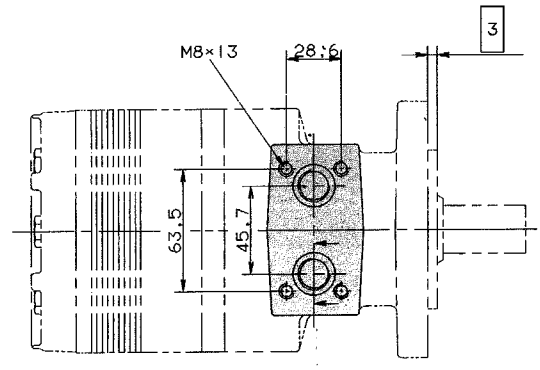


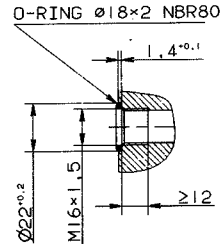
	MB 80	MB 100	MB 130	MB 170	MB 190	MB 240	MB 280	MB 370
„L1"	194	194	197	202	205	210	214	224
„L2"	145	145	148	153	157	161	166	176

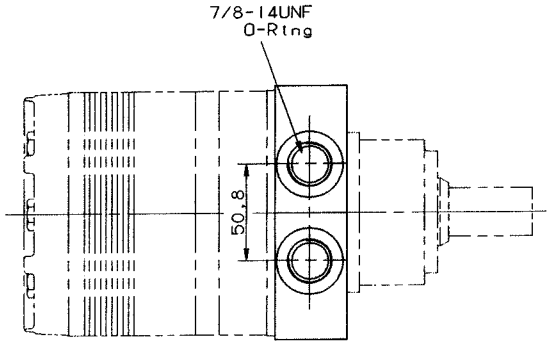


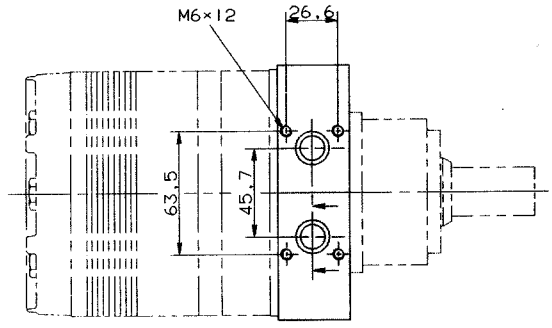










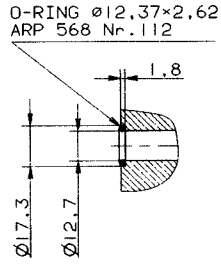


Zum Motor mit Universalanschluß werden 2 O-Ringe geliefert.

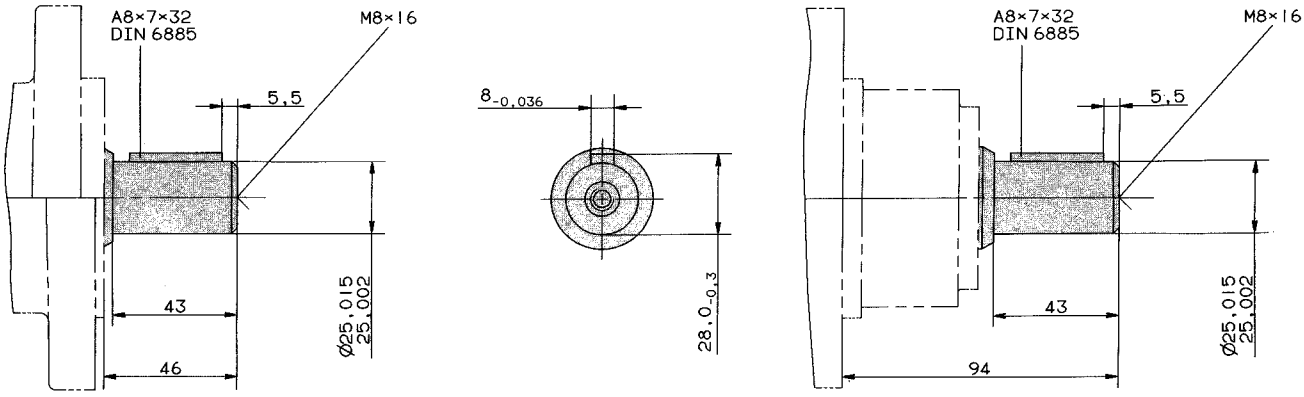
Motor with manifold mount is supplied with 2 O-rings.

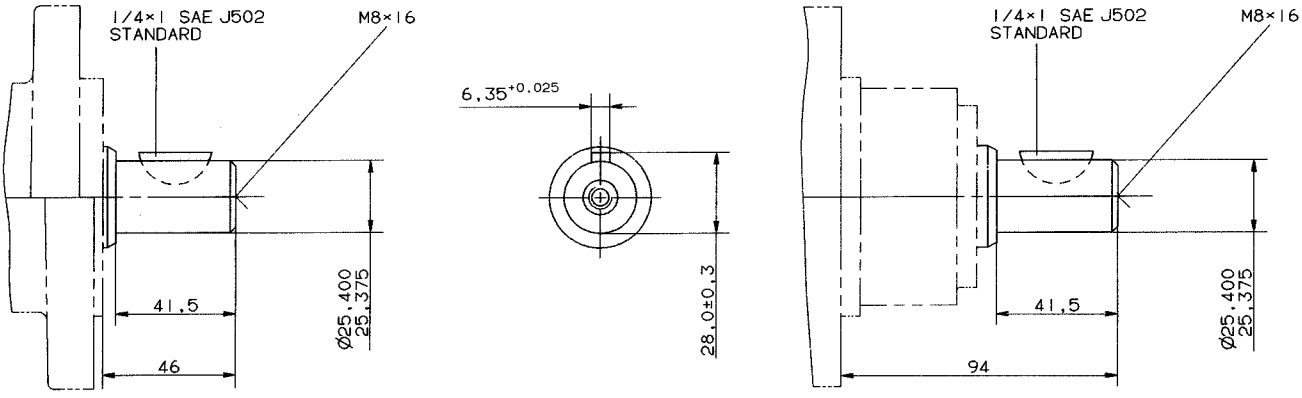
Deux joints toriques sont livrés avec les moteurs a plan de raccordement universel.

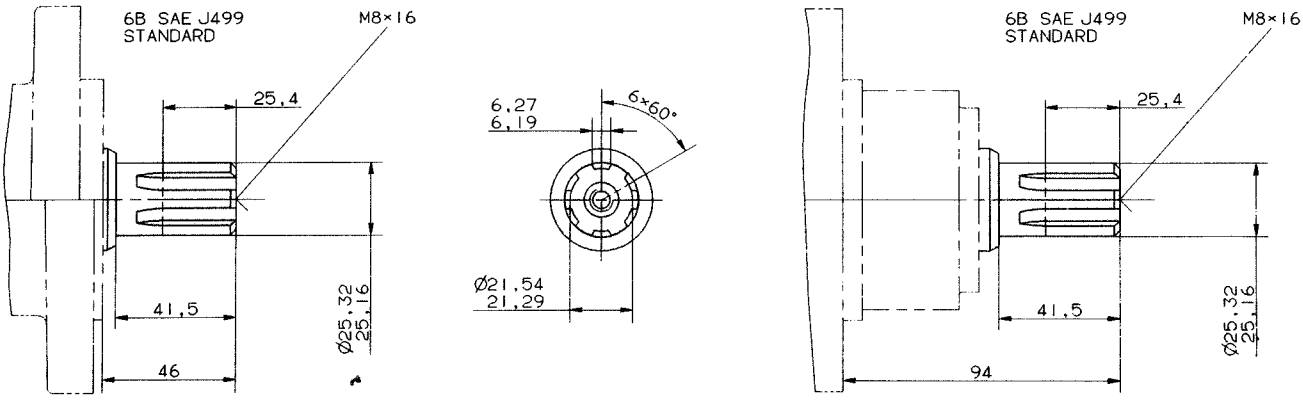
Il blocchetto connessioni è corredato da 2 OR.

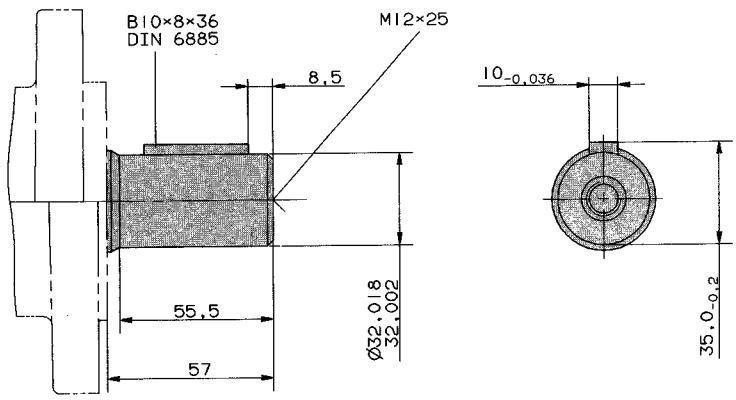


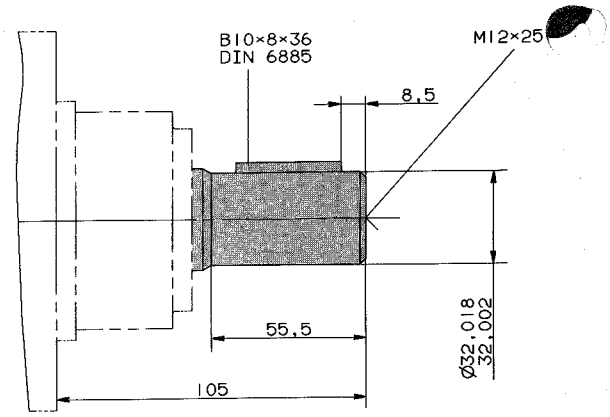
Abtriebswelle Coupling shaft Arbre Eje salida	Ø 25 mm Ø 1 inch 6B SAE	Max. Moment cont./int. Max. torque cont./int. Couple maxi cont./int. Coppia max cont./int.	450/550 Nm

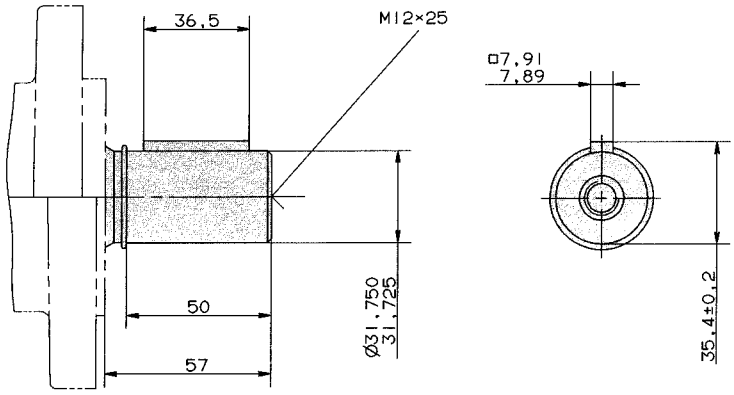


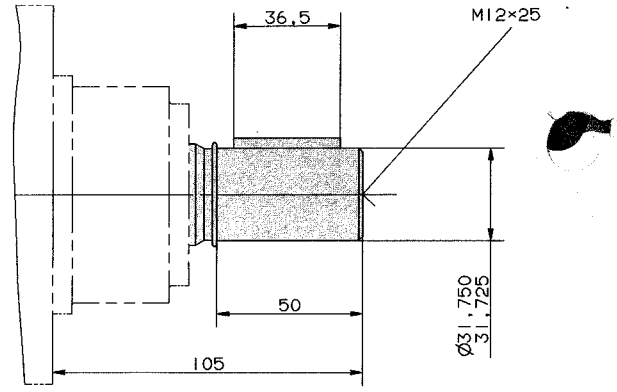


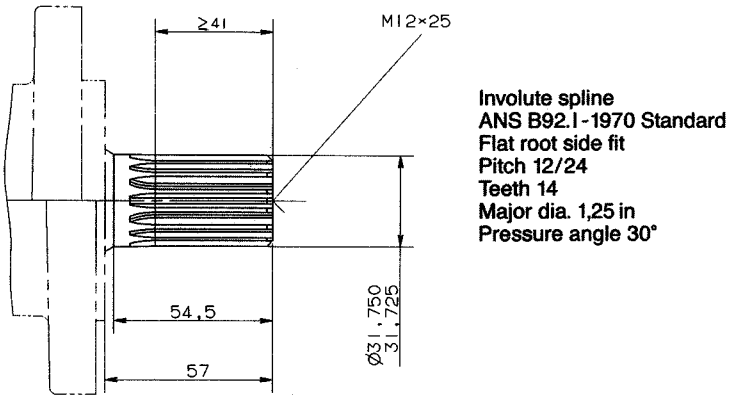




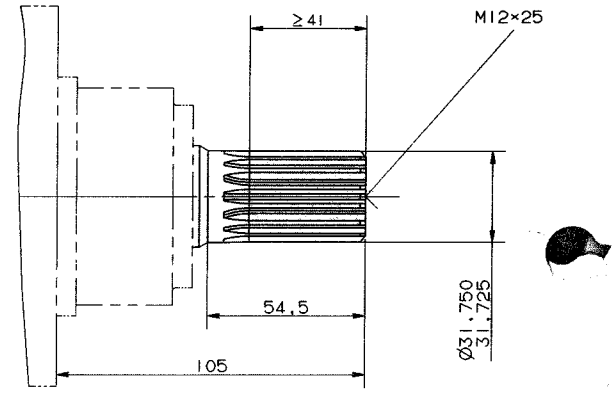


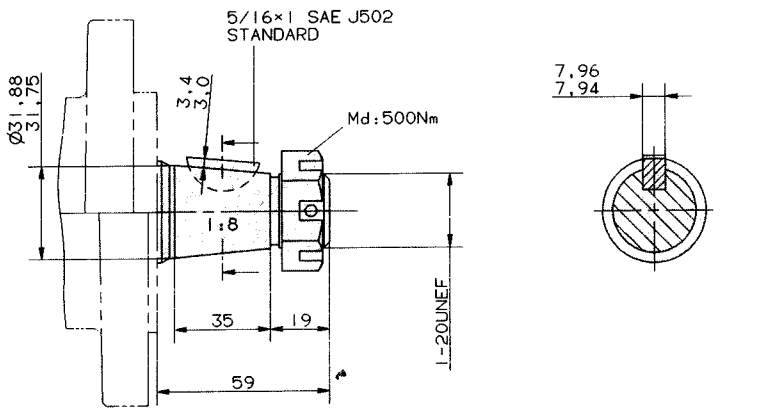


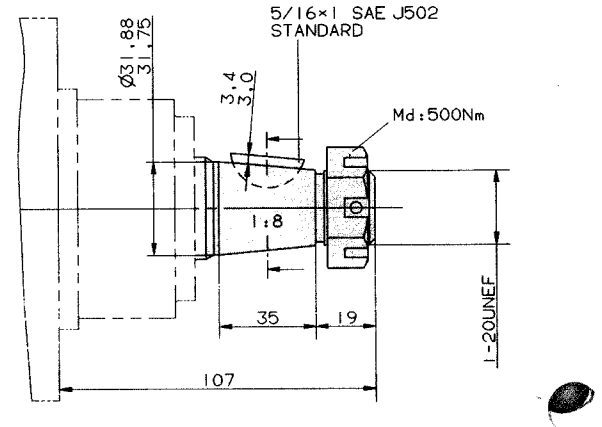




Involute spline
ANS B92.1-1970 Standard
Flat root side fit
Pitch 12/24
Teeth 14
Major dia. 1,25 in
Pressure angle 30°

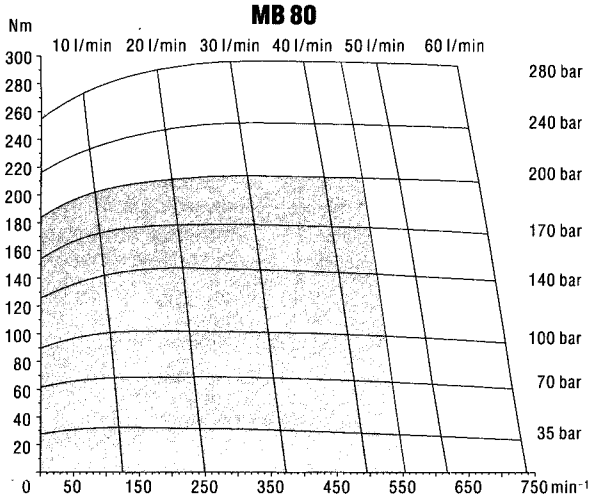






cont.
int.

MB 80



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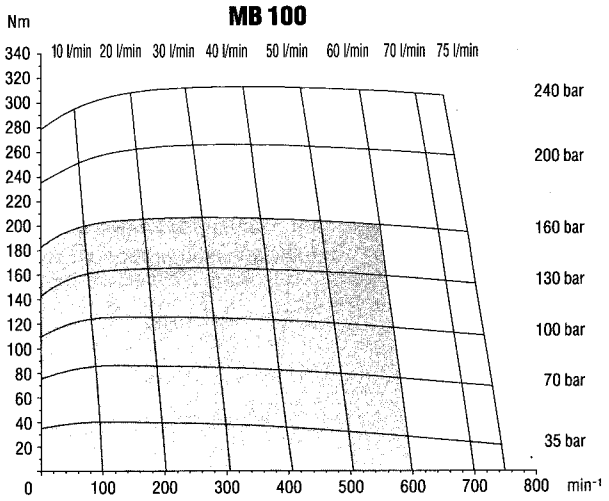
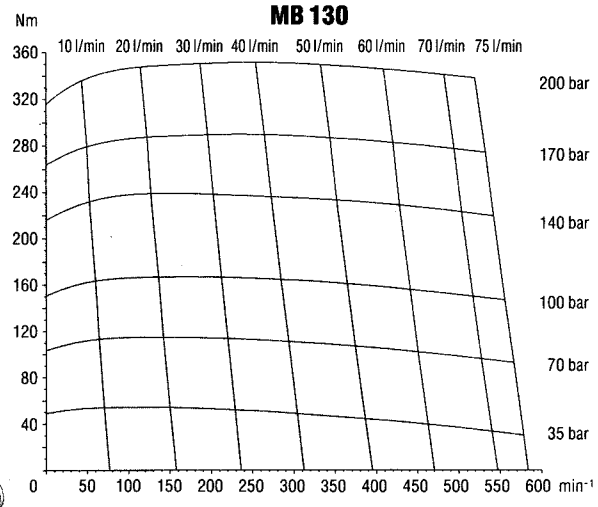
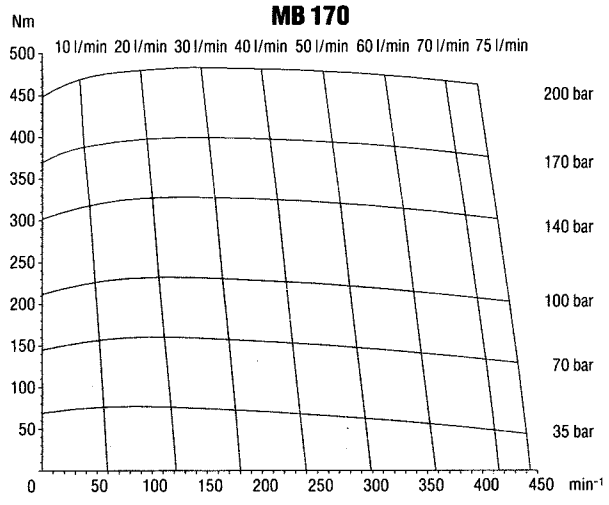


MB 130



MB 170



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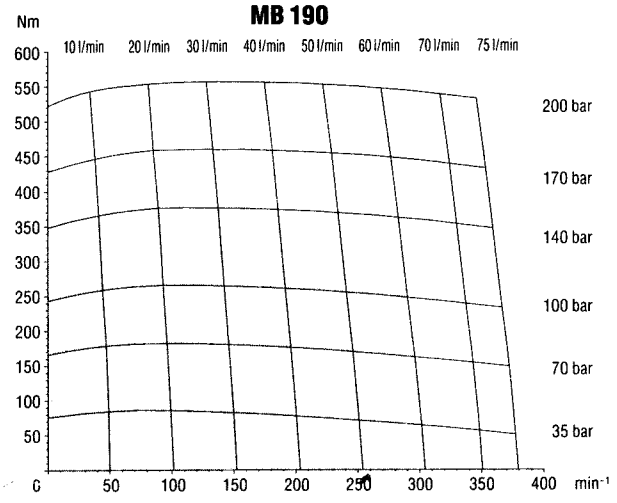
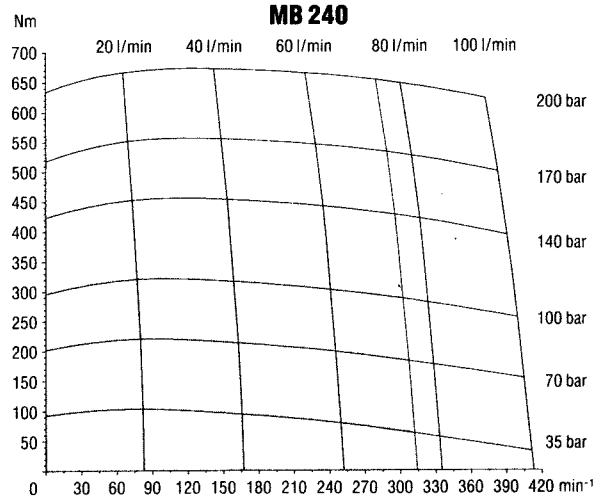
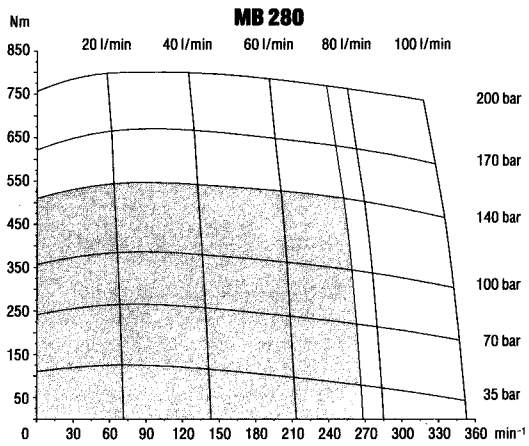
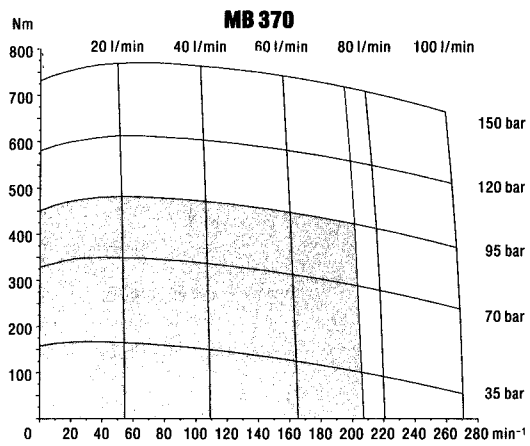


MB 240



cont.
int.





Die Lebensdauer der Radiallager (L_h in Stunden) läßt sich nach folgender Formel berechnen.

Die Größe F_R ist durch die mechanische Festigkeit der Abtriebswelle begrenzt (siehe Diagramm).
Das Maß „l" ist das Längenmaß vom Gehäuseflansch bis zum Angriffspunkt der Radialkraft F_R.

La durée de vie des roulements radiaux (L_h en heures) peut être calculée par les formules suivantes.

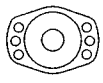
La grandeur F_R est limitée par les résistances mécaniques de l'arbre de sortie (voir diagramme).
La cote ‹l› est la longueur entre la bride du carter jusqu'au point d'appui de l'effort radial F_R.

Life time (L_h in hours) of the radial bearings can be calculated with the following formula.

The value F_R is limited by the mechanical strength of the shaft (see diagram).
The measurement "l" is the length from the housing flange up to the point of impact of the radial force F_R.

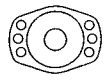
La durata dei cuscinetti (L_h in ore) può essere calcolata con la seguente formula.

Il valore F_R è limitato dalla resistenza meccanica dell'albero (vedi diagramma).
La quota „l" è la distanza tra la flangia del corpo ed il punto di applicazione della forza radiale F_R.



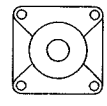
8 mm

$$L_h = \frac{\left(\frac{670000}{(0{,}95 + \frac{l}{100}) \times F_R}\right)^{3{,}3}}{n}$$



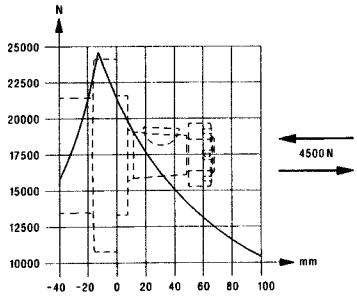
3 mm

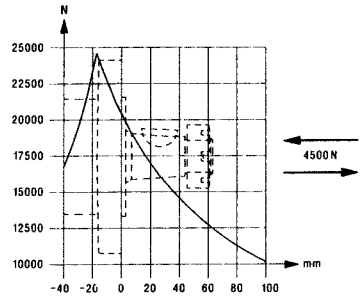
$$L_h = \frac{\left(\frac{670000}{(1 + \frac{l}{100}) \times F_R}\right)^{3{,}3}}{n}$$

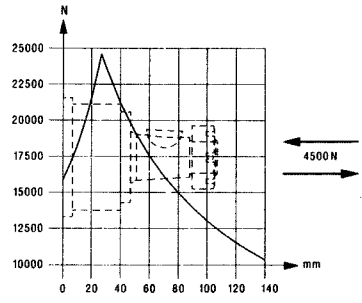


$$L_h = \frac{\left(\frac{670000}{(0{,}56 + \frac{l}{100}) \times F_R}\right)^{3{,}3}}{n}$$

l = mm
F_R = N
n = U/min







Vorstehende Formeln gelten für eine B 10-Lebensdauer.
The preceding formulas are valid for a B 10 duration of life.

Les formules précédentes sont valables pour une durée de vie B 10.
Le formule precedenti sono valevoli per una durata della vita B 10.

Spezielle Orbital-Steuerung
- geringe innere Leckage
- hohe volumetrische Wirkungsgrade

Rollen im Rotorsatz
- reduzierte Reibung
- lange Lebensdauer

Verwendung von Rollenlager
- hohe Seitenlastkapazität

Patentierte Hochdruckwellendichtung
- keine Leckölleitung
- keine Rückschlagventile

Vielzahl von Varianten
- großer Einsatzbereich

Zero leak commutation valve
- for greater, more consistent volumetric efficiency

Roller vane rotor set
- reduces friction and inernal leakage
- maintaining efficiency throughout the life of the motor

Roller bearings
- provide superior shaft support for exceptional radial loading capacity

A patented high-pressure shaft seal
- no case drain and check valves needed
- no extra plumbing

Wide choice of displacement range, flange and shaft options
- greater efficiency in system design to suit your application

Une distribution orbitale particulière assure:
- fuites internes minimales
- rendements volumétriques élevés

Le rotor à rouleaux
- réduit les frottements
- augmente la durée de viè

Les roulements à aquilles
- permettant des charges radiales élevées

Par l'utilisation de joints d'arbre haute pression brevetés
- pas de conduite de drainage
- pas de clapets anti-retour

Gràce de nombreuses variantes
- larges domaines d'application

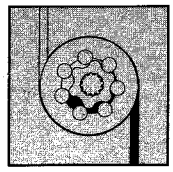
Una particolare distribuzione orbitale assicura:
- trafilamento ridotto
- elevato rendimento volumetrico

Con lo statore a rullo
- si riduce l'attrito interno
- si mantiene nel tempo l'efficieza del motore

I cuscinetti sull'albero
- consentono un'elevato carico radiale

Una guarnizione di tenuta ad alta pressione brevettata elimina la necessità
- die una linea di drenaggio esterna
- e di valvole di non ritorno

Un'ampia gamma di cilindrate, flangiature ed alberi
- consentono scelte adeguate ad ogni esigneza costruttiva



Serie **ME**	Geometrisches Schluckvolumen Geometric displacement Cylindrée Cilindrata cm³/U cm³/rev cm³/tr cm³/giro	Max. Drehzahl cont./int. Max. speed cont./int. Vélocité di rotazione max cont./int. Vitesse de rotation maxi cont./int. U/min rev/min tr/min giri/min	Max. Schluckstrom cont./int. Max. oil flow cont./int. Débit d'huile maxi cont./int. Portata max cont./int. l/min ltr/min ltr/min l/min	Max. Druckgefälle cont./int. Max. differential pressure cont./int. Chute de pression maxi cont./int. Caduta di pressione max cont./int. bar	Max. Eingangs-/Rückdruck Max. inlet or outlet pressure Pression maxi entrée ou retour Pressione max in entrata o uscita bar	Max. Moment cont./int. Max. torque cont./int. Couple maxi cont./int. Coppia max cont./int. Nm	Max. Leistungsabgabe Max. performance Puissance de sortie maxi Potenza meccanica max kW	Gewicht Weight Poids Peso kg
ME 140	140	530/710	75/100	200/280	310	400/ 545	33	14
ME 170	169	440/575	75/100	200/280	310	485/ 670	33	14,5
ME 190	195	380/510	75/100	200/280	310	560/ 770	33	15
ME 240	237	320/420	75/100	200/280	310	685/ 945	32	15,5
ME 280	280	270/350	75/100	200/280	310	800/1100	31	16
ME 330	337	225/290	75/100	200/280	310	980/1350	30	16,5
ME 400	405	185/245	75/100	170/240	310	960/1350	27	17
ME 470	476	160/240	75/115	140/200	310	960/1400	28	17,5
ME 530	529	140/215	75/115	140/170	310	1050/1280	23	18
ME 620	624	120/185	75/115	120/160	310	1040/1360	20	19
ME 790	786	95/145	75/115	100/140	310	1150/1490	17	20,5
ME 960	958	78/119	75/115	70/100	310	925/1390	12	22

Seitenbelastung Side loads Charges latérales Carico radiale
16.000 N

int. = Intermittierende Werte: max. 10% von jeder Betriebsminute
Fonctionnement intermittent: 10% max. de chaque minute d'utilisation

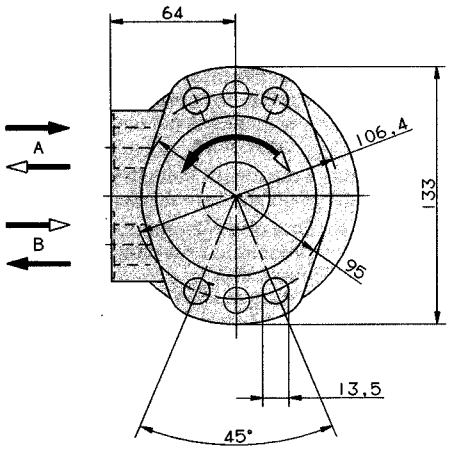
int. = Intermittent operation rating applies to 10% of every minute
Servizio intermittente: 10% max di ogni minuto di utilizzazione

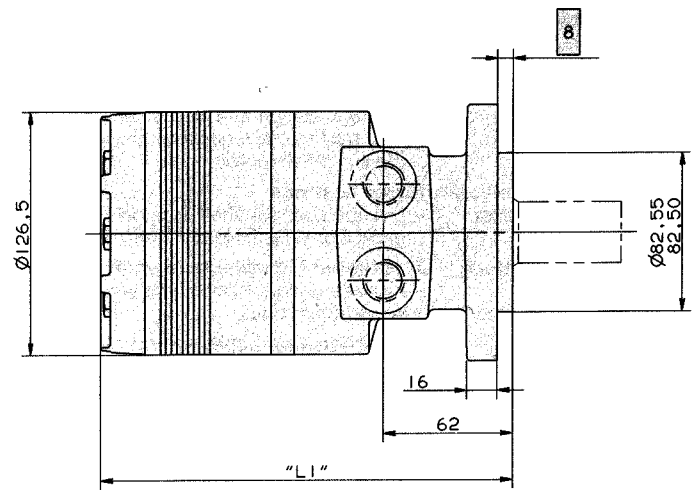
Bestellsystem
Ordering system
Système de commande
Sistema di ordinazione

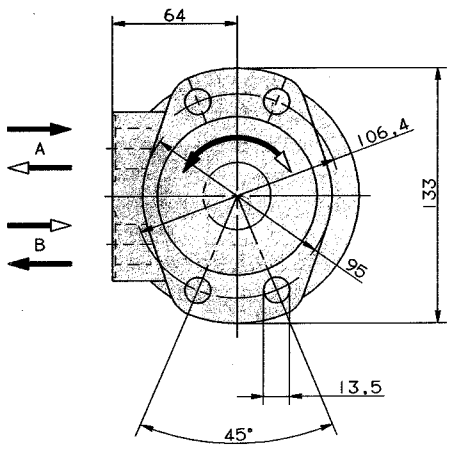
ME	Motorgröße Motor size Taille du moteur Grandezza del motore	Gehäuse Housing Carter Scatola motore	Welle Shaft Arbre Albero	Universal-anschluß Manifold ports Plan de raccordement universel Connessioni universale
780	0	1 – 18	4 – 12/24 Pitch	1
		2	5 – Ø 1,25 inch	
		3 – 3 – 7/8 UNF	6 – Kegel 1:8	
		8 – 3 – G 1/2	7 – Ø 32 mm	

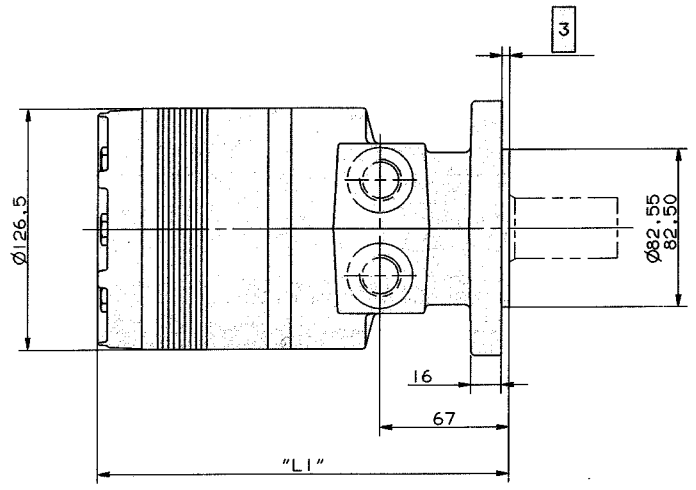
Bestellbeispiel:
Ordering example:
Exemple de commande:
Sigla ordinazione:

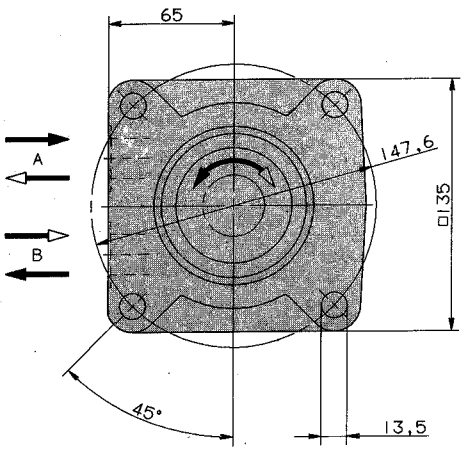
780 — 0140 — 150 — 000

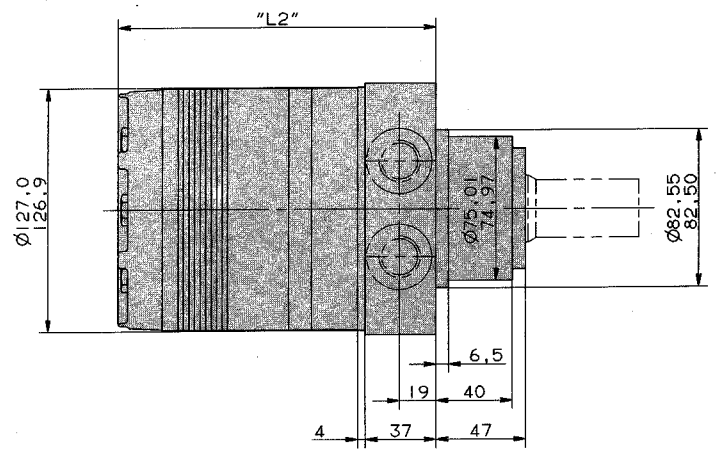




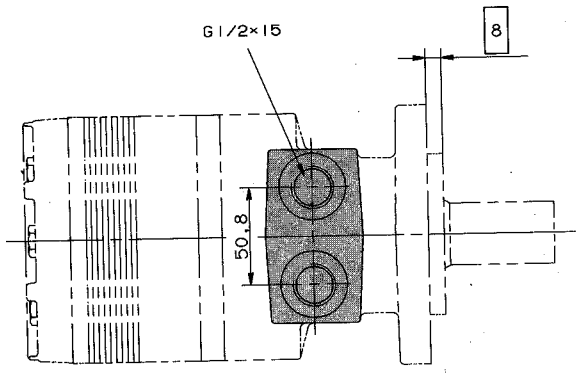


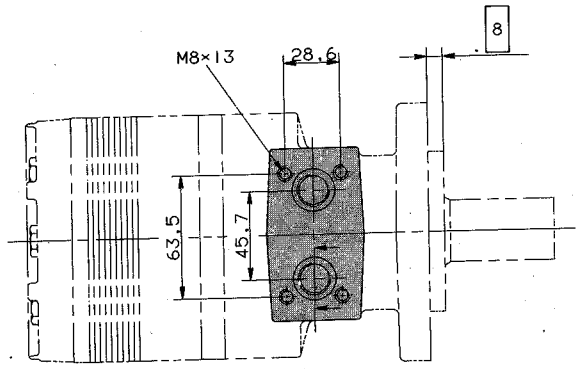


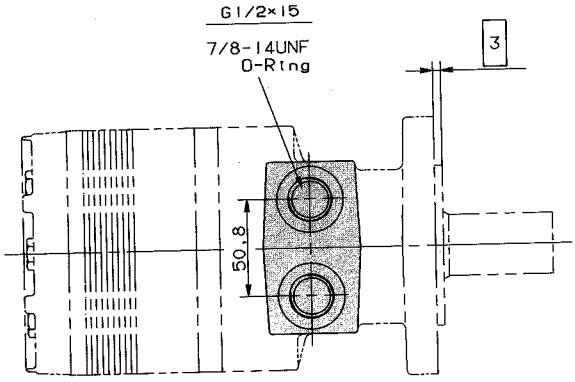


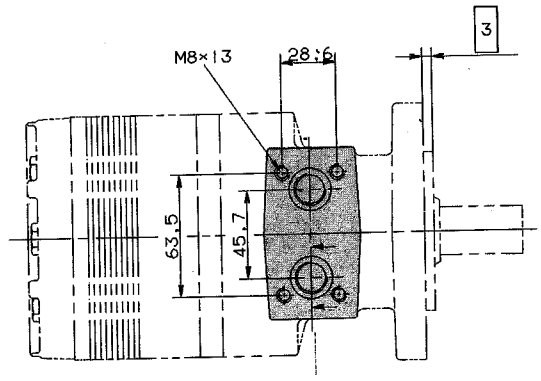


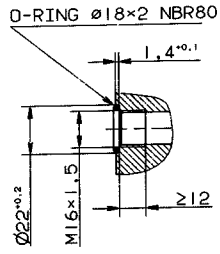
	ME 140	ME 170	ME 190	ME 240	ME 280	ME 330	ME 400	ME 470	ME 530	ME 620	ME 790	ME 960
„L1"	199	202	205	210	215	221	228	237	243	253	272	291
„L2"	150	154	157	162	166	173	180	188	195	204	224	243

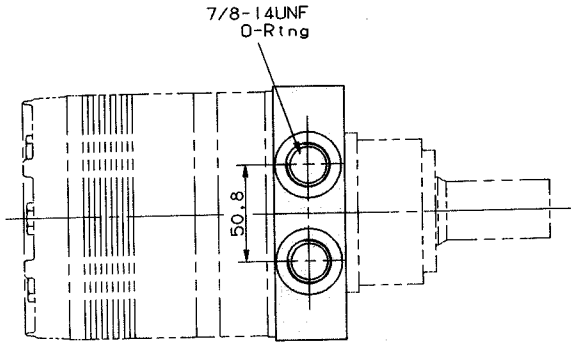


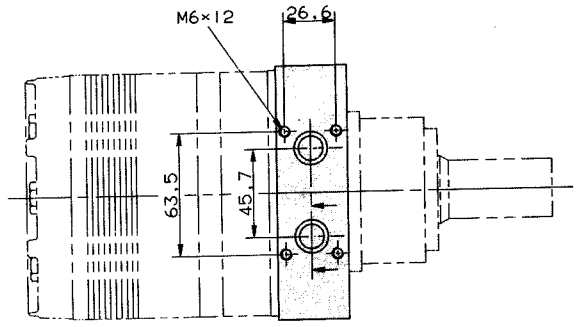










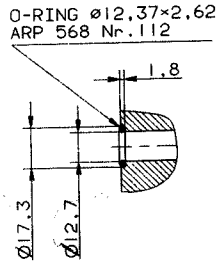


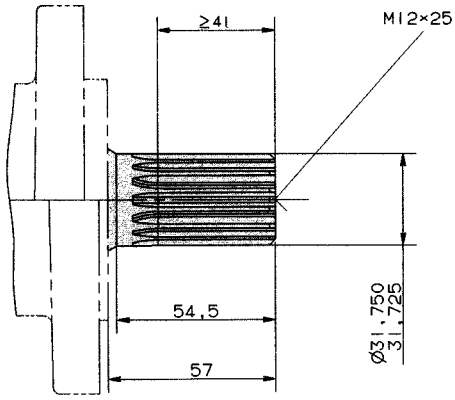
Zum Motor mit Universalanschluß werden 2 O-Ringe geliefert.

Motor with manifold mount is supplied with 2 O-rings.

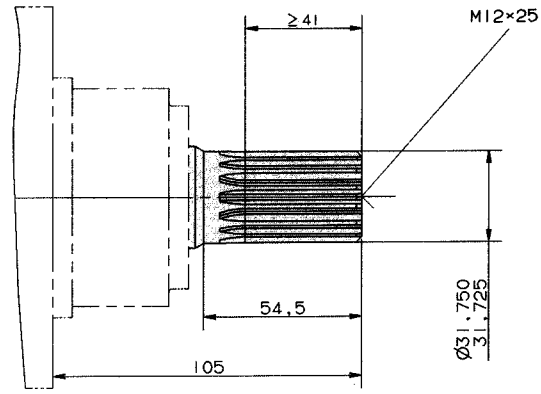
Deux joints toriques sont livrés avec les moteurs à plan de raccordement universel.

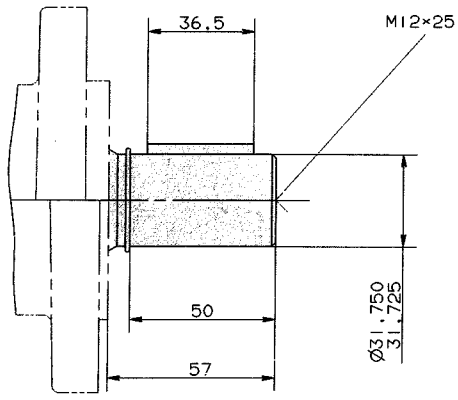
Il blocchetto connessioni è corredato da 2 OR.

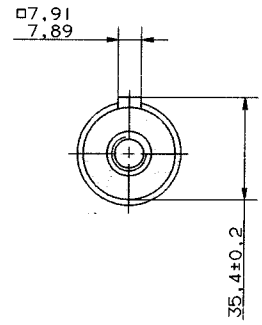


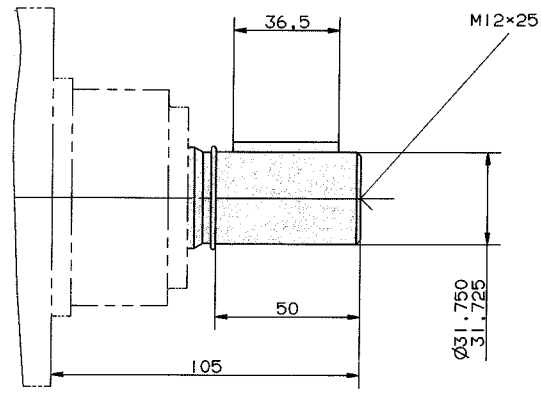


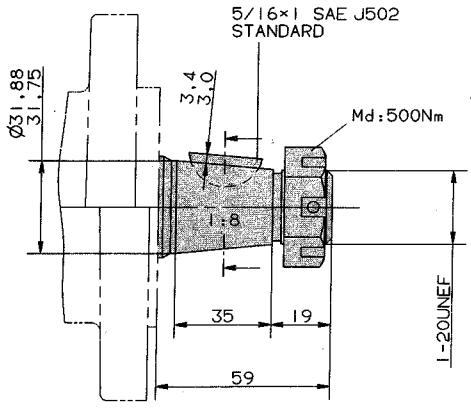
Involute spline
ANS B92.1-1970 Standard
Flat root side fit
Pitch 12/24
Teeth 14
Major dia. 1,25 in
Pressure angle 30°

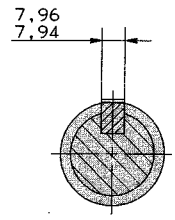


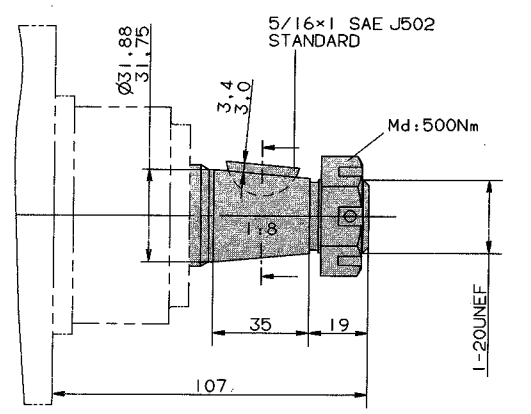


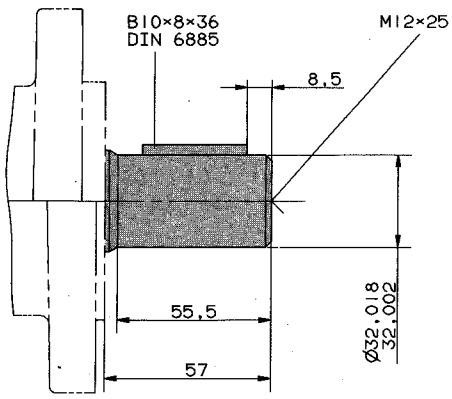


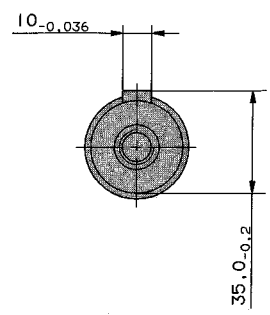


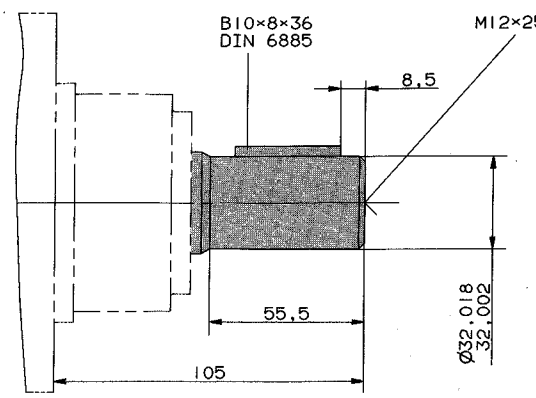












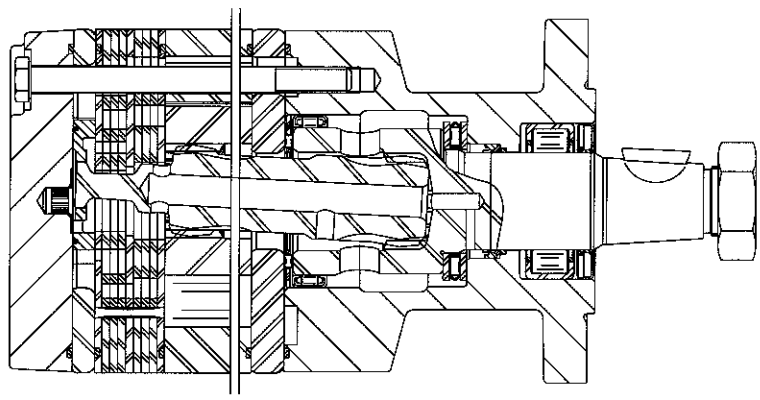
ME Series Torqmotor™

Introduction:

The ME Series Torqmotor™ is the premier motor in its class, providing high torque and maximum endurance under strenuous conditions. The ME Series Torqmotor™ is a time-proven top performer in applications such as wheel drives for skid steer loaders, commercial mowers, airport ground support equipment and municipal sweepers. Phase shift orbit valving, an industry first, minimizes cross port leakage keeping volumetric efficiency high and output speeds constant as pressure varies.

Features:

- Roller vane motor design reduces internal friction and compensates for wear, extending the useful life of the Torqmotor™.
- Heavy duty thrust and roller bearings provide greater thrust and side load capacity.
- Patented 60-40 spline member arrangement of the mating internal splines transmits more output torque with less weight.
- Full flow lubrication maximizes cooling and provides up to 50% longer life than hydraulic motors not having this feature.
- Sealed commutation valve provides more consistent volumetric efficiency over a wide operating pressure range and throughout the endurance life of the Torqmotor™.
- Shaft seal design withstands full system pressures eliminating the added cost of a case drain line.
- More starting torque than competitive motors in applications where the shaft is side loaded. Competitive designs require more pressure and flow to start the motor rotating.
- Overall design is less sensitive to hydraulic system contamination than competitive hydraulic motors.
- Orbital phase shift commutation at 6 times shaft speed provides smooth operation at low shaft speeds.
- Balanced performance in both directions of rotation.



12 Displacements	...8.6 to 58.5 in^3/rev
Pressures (PSI)	...to 3000 continuous
	...to 4000 intermittent
Flow (GPM)	...to 30
Speed (RPM)	...to 660
Output Torque (lb-in)	...to 9239 continuous
	...to 12636 intermittent

DISPLACEMENTS	MOUNTS	PORTS	OUTPUT SHAFTS	OPTIONS
8.6	SAE A (2 Bolt)	SAE 7/8"-14 O-Ring	1.0" keyed	Paint
10.3	Standard (4 Bolt)	1/2" BSPF	1.0" 6B spline	Black
11.9	SAE B (2 Bolt)	Manifold	1.25" straight keyed	White epoxy
14.5	Wheel Mounts (4 Bolt)	Rear Ports	1.25" tapered	Corrosion resistant
17.1	-w/Brake Mount	-SAE 7/8"-14 O-Ring	15 tooth spline	Free running rotor set
20.6	(4 Bolt)	-Manifold	10B spline	Reverse rotation
24.7	-Optional Wheel		19 tooth spline	Fluorocarbon seals
29.1	(4 Bolt)		14 tooth spline	Speed sensor
32.3			1.38" tapered	Hot oil shuttle endcover
38.0			1.38" straight keyed	Cross port relief endcover
48.0				
58.5				

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Series Specifications

Torqmotor™ Series		ME09	ME10	ME12	ME15	ME18	ME21	ME24	ME29	ME33	ME37	ME48	ME58
Displacement	**(in³/rev)**	**8.6**	**10.3**	**12.0**	**14.5**	**17.1**	**20.6**	**24.7**	**29.1**	**32.3**	**38.0**	**48.0**	**58.5**
	(cm³/rev)	*140*	*169*	*195*	*237*	*280*	*337*	*405*	*476*	*529*	*624*	*786*	*958*
Pressure	Continuous	**3000**	**3000**	**3000**	**3000**	**3000**	**3000**	**2500**	**2000**	**2000**	**1750**	**1500**	**1000**
(PSI)	(Differential)[a,d]	*210,9*	*210,9*	*210,9*	*210,9*	*210,9*	*210,9*	*175,8*	*140,6*	*140,6*	*123,0*	*105,5*	*70,3*
(kg/cm²)	Intermittent	**4000**	**4000**	**4000**	**4000**	**4000**	**4000**	**3500**	**3000**	**2500**	**2250**	**2000**	**1500**
	(Differential)[a,d,e]	*281,2*	*281,2*	*281,2*	*281,2*	*281,2*	*281,2*	*246,1*	*210,9*	*175,8*	*158,2*	*140,6*	*105,5*
Torque	At Continuous Pressure	**3455**	**4216**	**4919**	**5991**	**7044**	**8533**	**8336**	**7853**	**8701**	**8725**	**9239**	**6843**
(lb-in)	& Continuous Flow	*39,81*	*48,57*	*56,67*	*69,02*	*81,16*	*98,31*	*96,04*	*90,48*	*100,25*	*100,52*	*106,44*	*78,84*
(kg-m)	At Intermittent Pressure	**4692**	**5714**	**6663**	**8081**	**9499**	**11479**	**11877**	**12145**	**11086**	**11424**	**12636**	**11227**
	& Continuous Flow	*54,06*	*65,83*	*76,77*	*93,10*	*109,44*	*132,25*	*136,83*	*139,92*	*127,72*	*131,61*	*145,58*	*129,35*
	Minimum Starting at	**2791**	**3331**	**3989**	**5152**	**5972**	**7458**	**7002**	**6549**	**7737**	**7924**	**8772**	**6752**
	Continuous Pressure	*32,16*	*38,37*	*45,96*	*59,36*	*68,80*	*85,93*	*80,67*	*75,45*	*89,14*	*91,29*	*101,06*	*77,79*
	Minimum Starting at	**3706**	**4469**	**5408**	**6865**	**7699**	**9889**	**10133**	**9909**	**9657**	**10312**	**11876**	**10419**
	Intermittent Pressure	*42,70*	*51,48*	*62,31*	*79,09*	*88,70*	*113,93*	*116,74*	*114,16*	*111,26*	*118,06*	*136,83*	*120,04*
Flow	Continuous	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
(GPM)		*76*	*76*	*76*	*76*	*76*	*76*	*76*	*76*	*76*	*76*	*76*	*76*
(lpm)	Maximum	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**30**	**30**	**30**	**30**	**30**
		95	*95*	*95*	*95*	*95*	*95*	*95*	*114*	*114*	*114*	*114*	*114*
Speed	At Cont. Flow & Pressure	459	399	331	268	227	182	162	149	129	109	85	76
(RPM)	At Maximum Flow[b]	660	554	477	393	334	277	232	237	213	182	143	118
Weight	Standard (4 Bolt) or	**31.4**	**32.0**	**32.5**	**33.3**	**34.2**	**35.1**	**36.4**	**37.9**	**39.5**	**41.1**	**44.5**	**48.3**
(lbs)	SAE A (2 Bolt)	*14,23*	*14,49*	*14,74*	*15,11*	*15,53*	*15,91*	*16,53*	*17,19*	*17,92*	*18,64*	*20,19*	*21,89*
(kg)	SAE B (2 Bolt)	**32.8**	**33.4**	**33.9**	**34.7**	**35.6**	**36.5**	**37.8**	**39.3**	**40.9**	**42.5**	**45.9**	**49.7**
		14,87	*15,15*	*15,37*	*15,74*	*16,14*	*16,55*	*17,14*	*17,82*	*18,55*	*19,27*	*20,82*	*22,54*
	Wheel (4 Bolt)	**32.2**	**32.7**	**33.3**	**34.1**	**35.0**	**35.8**	**37.2**	**38.6**	**40.3**	**41.8**	**45.3**	**49.0**
		14,57	*14,82*	*15,08*	*15,45*	*15,87*	*16,25*	*16,86*	*17,53*	*18,26*	*18,97*	*20,53*	*22,23*
	Optional Wheel (4 Bolt)[f]	**38.7**	**39.3**	**39.8**	**40.6**	**41.5**	**42.4**	**43.7**	**45.2**	**46.8**	**48.4**	**51.8**	**55.6**
		17,57	*17,85*	*18,07*	*18,43*	*18,84*	*19,25*	*19,84*	*20,52*	*21,25*	*21,97*	*23,52*	*25,24*
Length[c]	Standard (4 Bolt) or	**7.70**	**7.83**	**7.95**	**8.13**	**8.32**	**8.57**	**8.86**	**9.20**	**9.45**	**9.82**	**10.57**	**11.32**
(in)	SAE A (2 Bolt)	*195,6*	*198,9*	*201,9*	*206,5*	*211,3*	*217,7*	*225,0*	*233,7*	*240,0*	*249,4*	*268,5*	*287,5*
(mm)	SAE B (2 Bolt)	**7.44**	**7.57**	**7.69**	**7.88**	**8.07**	**8.32**	**8.61**	**8.94**	**9.19**	**9.57**	**10.32**	**11.07**
		189,0	*192,3*	*195,4*	*200,2*	*205,0*	*211,4*	*218,7*	*227,1*	*233,5*	*243,1*	*262,2*	*281,2*
	Wheel (4 Bolt)	**5.92**	**6.05**	**6.17**	**6.35**	**6.54**	**6.79**	**7.08**	**7.42**	**7.67**	**8.04**	**8.79**	**9.54**
		150,4	*153,7*	*156,7*	*161,3*	*166,1*	*172,5*	*179,8*	*188,5*	*194,8*	*204,2*	*223,3*	*242,3*
	Optional Wheel (4 Bolt)[f]	**6.99**	**7.12**	**7.24**	**7.43**	**7.62**	**7.87**	**8.16**	**8.49**	**8.74**	**9.12**	**9.87**	**10.62**
		177,5	*180,8*	*183,9*	*188,7*	*193,5*	*199,9*	*207,3*	*215,6*	*222,0*	*231,6*	*250,7*	*269,7*

[a] The maximum pressure at the motor inlet or outlet ports without regard to the continuous or intermittent pressure ratings is 4000 PSI (281,2 kg/cm²).

[b] For applications with RPM requirements in excess of the maximum rating, consult the factory.

[c] Nominal length from the motor mounting face to the back end of the motor.

[d] Differential pressure is the difference between inlet and outlet port pressures.

[e] Intermittent pressure applies to a maximum of 10% of every minute.

[f] Already includes the use of endcover ports.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Series Performance Charts

Series: ME09 (8.6 in³/rev)

Pressure: (PSID)	500	1000	1500	2000	2500	3000	3500	4000
Flow (GPM)	Speed (RPM)							
	Torque (lb-in)							
0.5	9	4						
	519	1060						
1.0	22	17	11	6				
	540	1090	1635	2180				
2.0	49	43	36	30	23	19	12	12
	569	1156	1730	2286	2827	3368	3899	4447
3.0	75	69	62	55	47	40	33	29
	565	1159	1744	2321	2899	3477	4048	4608
4.0	102	94	87	80	72	64	57	52
	564	1170	1768	2358	2943	3517	4082	4644
5.0	128	120	112	105	97	89	81	76
	556	1170	1776	2375	2968	3556	4135	4701
7.0	182	172	164	155	146	138	130	123
	540	1160	1779	2390	2994	3592	4181	4763
9.0	235	225	215	206	196	187	179	171
	515	1143	1768	2385	2996	3601	4199	4794
12.0	315	303	292	281	271	261	252	243
	471	1096	1729	2356	2974	3587	4193	4794
15.0	395	381	368	357	346	336	325	314
	418	1042	1673	2307	2933	3549	4163	4771
20.0	528	512	497	484	472	459	447	435
	299	931	1565	2198	2825	3455	4078	4692
25.0	660	643	626	612	598	583	569	555
	173	794	1426	2059	2695	3332	3961	4579

Series: ME10 (10.3 in³/rev)

Pressure: (PSID)	500	1000	1500	2000	2500	3000	3500	4000
Flow (GPM)	Speed (RPM)							
	Torque (lb-in)							
0.5	9	7	5	4	3	2		
	620	1284	1945	2613	3293	3983		
1.0	20	18	16	14	12	11	8	8
	652	1337	2006	2683	3375	4063	4744	5402
2.0	42	40	37	35	32	30	27	25
	678	1390	2105	2822	3535	4226	4909	5587
3.0	64	61	58	56	53	50	46	44
	678	1397	2117	2836	3554	4263	4963	5652
4.0	86	83	80	77	74	71	67	64
	679	1409	2142	2872	3596	4310	5021	5716
5.0	108	104	101	98	94	91	87	83
	675	1413	2150	2885	3616	4339	5057	5761
7.0	153	148	143	140	136	132	127	123
	661	1405	2152	2900	3642	4374	5101	5818
9.0	197	191	186	181	177	173	168	163
	632	1385	2140	2891	3638	4380	5114	5838
12.0	263	256	250	244	239	234	228	223
	583	1334	2096	2860	3617	4362	5101	5823
15.0	330	322	314	308	302	296	289	283
	524	1275	2035	2804	3572	4327	5070	5801
20.0	442	432	422	413	406	399	391	383
	382	1143	1908	2683	3455	4216	4972	5714
25.0	554	543	531	520	511	501	492	483
	239	983	1747	2523	3299	4071	4839	5591

Testing was done at 130°F using 10W40 Oil.

Data is based on average performance of randomly selected motors.

- Intermittent rating- all others continuous.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Series Performance Charts

Series: ME12 (11.9 in³/rev)

Pressure: (PSID)	500	1000	1500	2000	2500	3000	3500	4000
Flow (GPM)	Speed (RPM)							
	Torque (lb-in)							
0.5	7	3						
	733	1503						
1.0	16	13	8	3				
	761	1546	2326	3104				
2.0	35	32	27	21	16	11	7	6
	799	1638	2465	3270	4046	4813	5589	6375
3.0	55	50	45	39	34	28	23	19
	794	1639	2476	3303	4132	4970	5792	6595
4.0	74	69	64	58	52	46	40	35
	794	1654	2509	3356	4196	5023	5830	6635
5.0	93	88	83	76	70	64	58	52
	783	1653	2517	3375	4224	5065	5895	6710
7.0	131	126	120	113	106	99	92	86
	762	1637	2514	3384	4245	5098	5940	6772
9.0	170	164	157	150	142	135	127	120
	731	1616	2499	3373	4239	5093	5936	6774
12.0	228	221	213	205	196	188	179	172
	677	1562	2455	3343	4217	5081	5934	6776
15.0	285	278	269	260	251	242	232	223
	613	1498	2389	3283	4169	5040	5907	6765
20.0	381	373	363	353	342	331	321	310
	448	1350	2245	3141	4031	4919	5798	6663
25.0	477	468	457	445	433	421	409	397
	334	1158	2044	2941	3837	4729	5612	6500

Series: ME15 (14.5 in³/rev)

Pressure: (PSID)	500	1000	1500	2000	2500	3000	3500	4000
Flow (GPM)	Speed (RPM)							
	Torque (lb-in)							
0.5	6	4	2					
	932	1907	2894					
1.0	14	12	9	6	3	2		
	960	1954	2950	3943	4939	5930		
2.0	30	27	24	20	17	14	11	9
	988	2031	3065	4090	5107	6100	7068	8037
3.0	45	42	39	35	31	27	23	20
	983	2029	3071	4101	5128	6161	7182	8184
4.0	61	58	54	49	45	42	37	33
	978	2037	3090	4136	5176	6207	7230	8234
5.0	77	73	69	64	60	56	51	47
	962	2030	3092	4144	5190	6231	7259	8271
7.0	108	104	99	94	89	84	78	73
	933	2005	3078	4141	5194	6239	7275	8298
9.0	140	135	129	123	117	112	106	100
	890	1972	3048	4112	5169	6213	7245	8271
12.0	187	181	175	167	161	154	147	140
	832	1912	2996	4071	5125	6163	7195	8224
15.0	235	228	220	212	204	196	188	180
	753	1832	2921	4009	5081	6137	7182	8212
20.0	314	306	297	287	278	268	258	248
	559	1654	2744	3834	4917	5991	7045	8081
25.0	393	384	373	363	352	340	328	317
	524	1427	2507	3595	4690	5780	6853	7913

Testing was done at 130°F using 10W40 Oil.

- Intermittent rating- all others continuous.

Data is based on average performance of randomly selected motors.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Series Performance Charts

Series: ME18 (17.1 in³/rev)

Pressure: (PSID)	500	1000	1500	2000	2500	3000	3500	4000
Flow (GPM)	Speed (RPM)							
	Torque (lb-in)							
0.5	5	4	2					
	1056	2177	3323					
1.0	12	10	8	6	5	3	3	2
	1087	2223	3378	4552	5734	6930	8135	9350
2.0	25	23	21	18	16	14	12	11
	1124	2313	3513	4700	5880	7060	8239	9400
3.0	39	36	34	31	28	25	22	19
	1124	2323	3532	4740	5940	7143	8346	9536
4.0	52	49	47	43	40	37	33	30
	1126	2346	3568	4786	6004	7214	8415	9596
5.0	65	62	59	56	52	49	45	41
	1115	2350	3582	4816	6044	7256	8457	9641
7.0	92	88	85	80	76	72	67	63
	1091	2338	3586	4832	6072	7301	8515	9706
9.0	118	114	110	105	101	96	90	85
	1046	2309	3564	4811	6051	7280	8499	9707
12.0	159	154	148	143	137	132	125	118
	981	2242	3506	4757	5992	7221	8444	9652
15.0	199	193	186	180	174	168	160	152
	898	2164	3437	4702	5951	7187	8416	9625
20.0	266	258	250	243	235	227	218	209
	691	1976	3255	4529	5795	7044	8275	9499
25.0	334	324	314	305	296	286	276	267
	703	1726	2987	4260	5540	6815	8071	9311

Series: ME21 (20.6 in³/rev)

Pressure: (PSID)	500	1000	1500	2000	2500	3000	3500	4000
Flow (GPM)	Speed (RPM)							
	Torque (lb-in)							
0.5	4	3						
	1297	2699						
1.0	10	8	7	5	4	2	2	
	1329	2741	4176	5630	7084	8551	10036	
2.0	21	19	17	15	13	11	9	8
	1369	2832	4308	5787	7265	8718	10136	11534
3.0	32	30	27	25	22	20	17	14
	1366	2838	4326	5817	7301	8781	10248	11685
4.0	43	40	38	35	32	29	25	22
	1368	2858	4358	5861	7358	8850	10317	11748
5.0	54	51	48	45	42	38	34	30
	1355	2858	4368	5880	7386	8880	10352	11791
7.0	76	73	69	65	61	57	53	47
	1323	2840	4363	5888	7407	8908	10384	11829
9.0	98	94	90	85	81	76	71	64
	1266	2791	4326	5856	7376	8884	10372	11834
12.0	131	127	121	116	110	105	98	90
	1177	2698	4230	5759	7273	8773	10261	11726
15.0	165	159	153	146	140	134	126	116
	1075	2594	4127	5654	7170	8670	10153	11613
20.0	221	214	205	197	189	182	173	161
	833	2372	3915	5463	7008	8533	10026	11479
25.0	277	269	259	248	239	230	219	209
	678	2142	3663	5189	6726	8257	9757	11219

Testing was done at 130°F using 10W40 Oil.

Data is based on average performance of randomly selected motors.

- Intermittent rating- all others continuous.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Series Performance Charts

Series: ME24 (24.7 in³/rev)

Pressure: (PSID)	500	1000	1500	2000	2500	3000	3600
Flow (GPM)	Speed (RPM)						
	Torque (lb-in)						
0.5	4	3	2				
	1544	3178	4840				
1.0	8	7	6	6	5	4	3
	1593	3256	4928	6607	8303	9987	11652
2.0	17	16	15	14	13	12	11
	1636	3351	5084	6817	8550	10272	11978
3.0	27	25	23	22	21	19	18
	1637	3365	5106	6847	8588	10314	12031
4.0	36	34	32	30	29	27	26
	1645	3394	5159	6920	8668	10402	12130
5.0	45	43	41	39	37	35	33
	1640	3408	5201	6983	8733	10466	12194
7.0	64	61	59	56	54	51	49
	1606	3396	5211	7003	8772	10527	12271
9.0	82	80	77	73	70	67	64
	1551	3350	5176	6981	8763	10519	12269
12.0	110	107	103	99	95	91	88
	1428	3238	5075	6888	8670	10424	12172
15.0	138	135	130	125	120	115	111
	1310	3112	4948	6759	8545	10306	12060
20.0	185	181	175	168	162	156	151
	1136	2862	4692	6518	8336	10122	11877
25.0			219	212	204	197	190
			4492	6303	8084	9848	11585

Series: ME29 (29.1 in³/rev)

Pressure: (PSID)	500	1000	1500	2000	2500	3000
Flow (GPM)	Speed (RPM)					
	Torque (lb-in)					
0.5	3	3	2			
	1768	3732	5733			
1.0	7	7	6	5	4	3
	1868	3878	5879	7851	9838	11830
2.0	15	14	14	12	10	8
	1964	4055	6180	8237	10241	12136
3.0	23	22	21	19	17	13
	1972	4074	6208	8321	10379	12355
4.0	31	30	29	27	24	20
	2005	4135	6287	8382	10463	12496
5.0	39	38	37	34	31	26
	2004	4129	6304	8428	10514	12544
7.0	55	54	52	50	45	40
	1990	4133	6308	8445	10555	12602
9.0	70	69	68	65	60	54
	1924	4104	6285	8430	10528	12608
12.0	94	93	91	87	82	75
	1775	3974	6157	8328	10446	12528
15.0	118	116	114	110	104	96
	1619	3784	5990	8188	10311	12372
20.0	157	156	153	149	141	132
	1314	3373	5629	7853	10038	12145
25.0	197	196	193	189	182	174
	1141	3029	5220	7427	9629	11757
30.0	237	236	233	230	224	219
	606	2505	4649	6766	8878	10989

Testing was done at 130°F using 10W40 Oil.

- Intermittent rating- all others continuous.

Data is based on average performance of randomly selected motors.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Series Performance Charts

Series: ME33 (32.3 in³/rev)

Pressure: (PSID)	500	1000	1500	2000	2500
Flow (GPM)	Speed (RPM) Torque (lb-in)				
0.5	3	3	2	2	
	2080	4256	6479	8726	
1.0	7	6	6	5	4
	2158	4372	6592	8779	10994
2.0	14	13	12	11	9
	2246	4567	6869	9126	11376
3.0	21	20	19	17	14
	2242	4578	6916	9237	11500
4.0	28	27	25	23	20
	2253	4625	6977	9296	11586
5.0	35	34	32	29	26
	2235	4629	7002	9333	11626
7.0	49	48	46	42	38
	2182	4599	7006	9362	11659
9.0	63	62	59	55	50
	2095	4535	6960	9330	11650
12.0	85	83	80	75	69
	1943	4390	6825	9217	11549
15.0	106	104	100	95	87
	1753	4199	6638	9052	11408
20.0	141	139	135	129	120
	1327	3783	6262	8701	11086
25.0	177	175	171	165	158
	1011	3300	5751	8210	10639
30.0	213	211	208	203	197
	269	2698	5083	7415	9814

Series: ME37 (38.0 in³/rev)

Pressure: (PSID)	500	1000	1500	1750	2250
Flow (GPM)	Speed (RPM) Torque (lb-in)				
0.5	2				
	1939				
1.0	5	3	2	2	
	2087	4665	7283	8680	
2.0	11	9	8	7	5
	2338	4991	7590	8853	11458
3.0	17	15	13	12	9
	2386	5101	7753	9055	11689
4.0	23	21	19	17	14
	2457	5202	7872	9174	11769
5.0	29	27	25	23	18
	2479	5246	7943	9242	11821
7.0	41	39	36	34	28
	2464	5273	7995	9306	11859
9.0	53	51	48	45	39
	2401	5223	7993	9337	11935
12.0	71	69	65	62	54
	2254	5092	7886	9239	11900
15.0	89	87	83	80	70
	2052	4901	7721	9086	11763
20.0	120	117	112	109	98
	1600	4490	7334	8725	11424
25.0	151	148	144	140	131
	1063	3933	6818	8235	11021
30.0	182	180	176	172	165
	359	3250	6074	7443	10179

Testing was done at 130°F using 10W40 Oil.

- Intermittent rating- all others continuous.

Data is based on average performance of randomly selected motors.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Series Performance Charts

Series: ME48 (48.0 in³/rev)

Pressure: (PSID)	500	1000	1500	2000
Flow (GPM)	Speed (RPM)			
	Torque (lb-in)			
0.5	2	2		
	2910	6153		
1.0	4	4	3	3
	3011	6296	9670	12910
2.0	9	8	7	6
	3217	6536	9935	13060
3.0	14	13	11	8
	3220	6613	9977	13079
4.0	19	17	15	13
	3265	6679	10021	13078
5.0	23	22	19	16
	3263	6703	10047	13103
7.0	33	31	28	24
	3218	6722	10068	13062
9.0	43	41	36	31
	3107	6664	10108	13185
12.0	57	55	49	42
	2892	6489	9959	13082
15.0	71	69	62	54
	2643	6238	9733	12938
20.0	95	92	85	75
	2044	5673	9239	12636
25.0	119	117	110	101
	2313	4976	8571	12073
30.0	143	141	137	130
	496	4104	7582	11024

Series: ME58 (58.5 in³/rev)

Pressure: (PSID)	500	1000	1500
Flow (GPM)	Speed (RPM)		
	Torque (lb-in)		
0.5	2		
	3692		
1.0	3	3	3
	3788	7858	11895
2.0	7	7	6
	3900	8045	12058
3.0	11	11	10
	3905	8078	12135
4.0	15	14	13
	3939	8155	12210
5.0	19	18	17
	3923	8173	12238
7.0	27	26	24
	3860	8160	12262
9.0	35	34	31
	3733	8074	12224
12.0	47	45	42
	3475	7848	12062
15.0	58	57	53
	3149	7545	11823
20.0	78	76	72
	2437	6843	11227
25.0	98	96	92
	2969	5990	10360
30.0	118	117	113
	603	4919	9170

Testing was done at 130°F using 10W40 Oil.

- Intermittent rating- all others continuous.

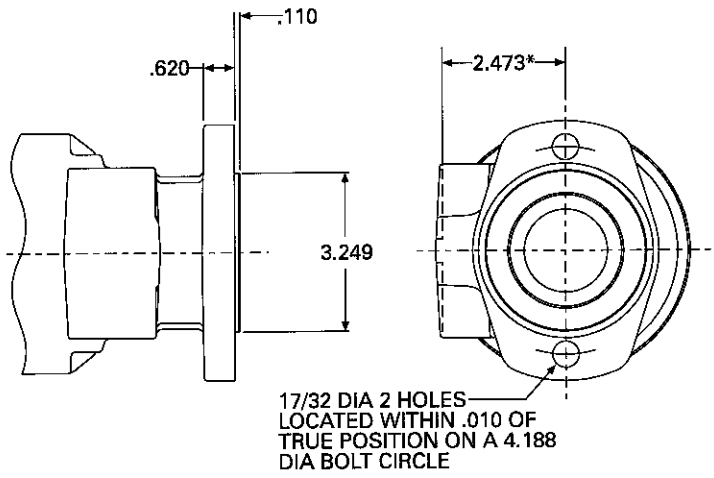
Data is based on average performance of randomly selected motors.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

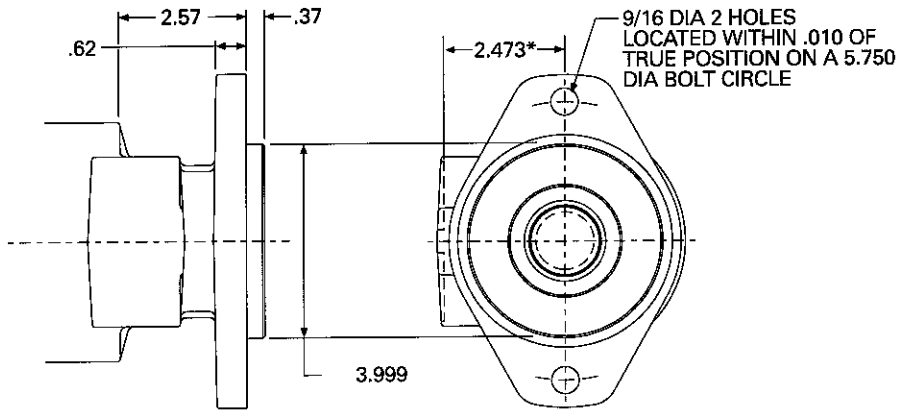
MOUNTING

* TO PORT SPOTFACE

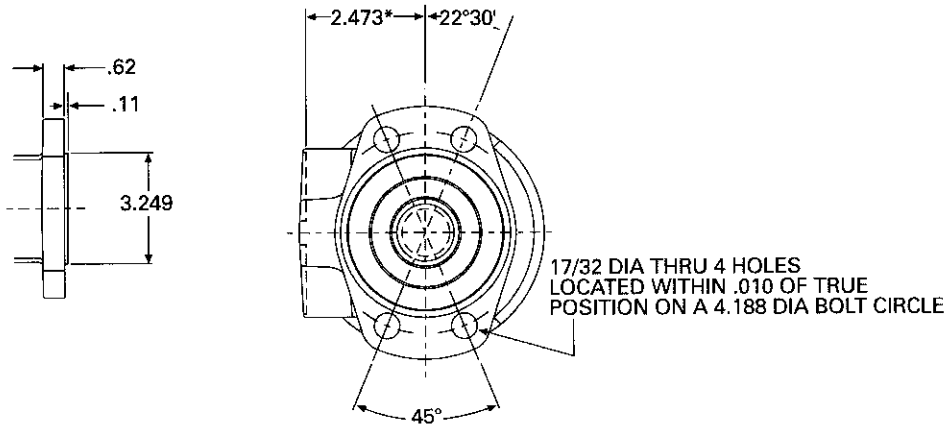
SAE A (2 Bolt)
Housing Codes:
-06
-07
-10
-16



SAE B (2 Bolt)
Housing Code:
-26



Standard (4 Bolt)
Housing Codes:
-01
-04
-19
-25



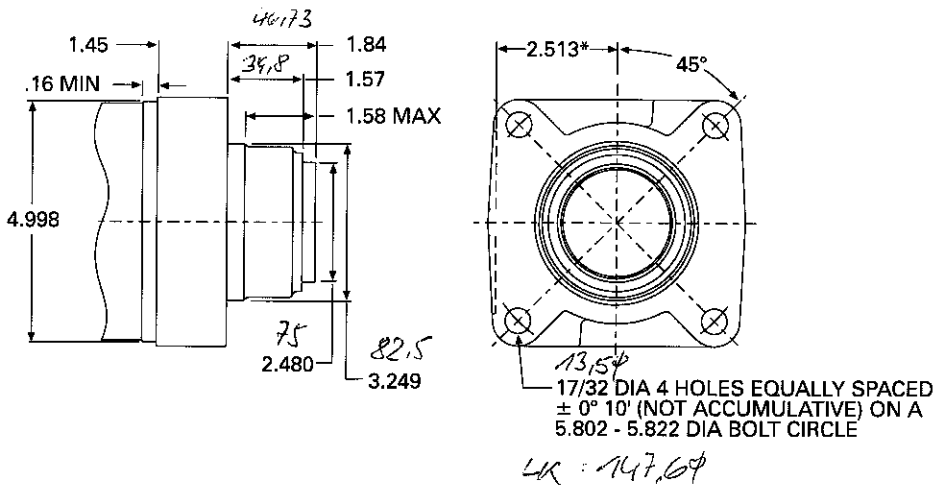
Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Series Dimensions

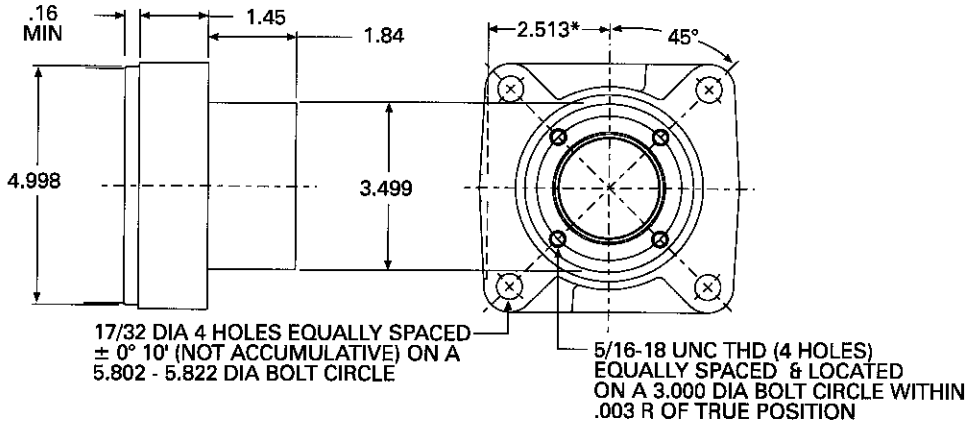
MOUNTING

* TO PORT SPOTFACE

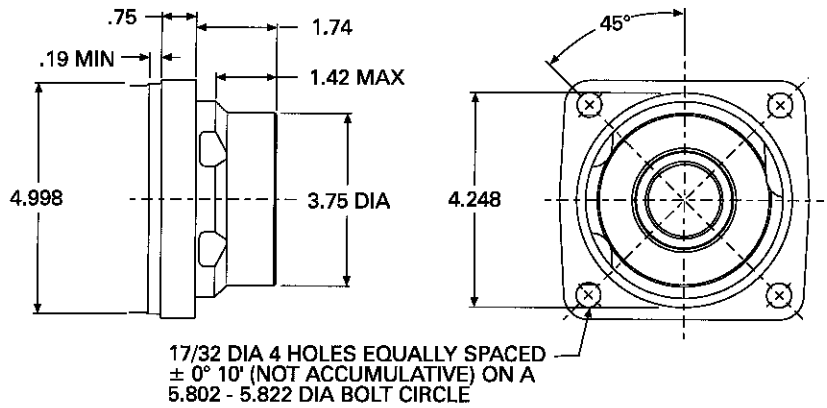
Wheel
Housing Codes:
-02
-05
-14 (Machined Nose)



Wheel w/Brake Mount
Housing Code:
-15



Wheel, Optional
Housing Code:
-21



Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

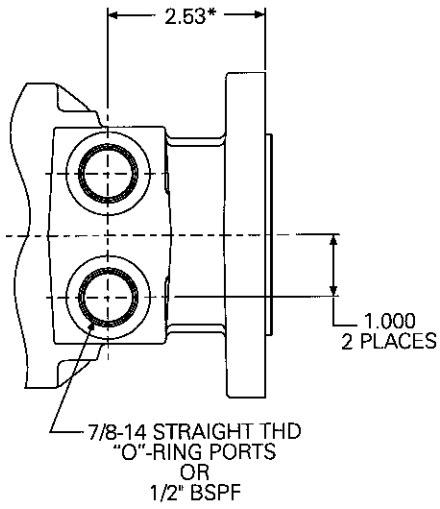
ME Series Dimensions

PORTING

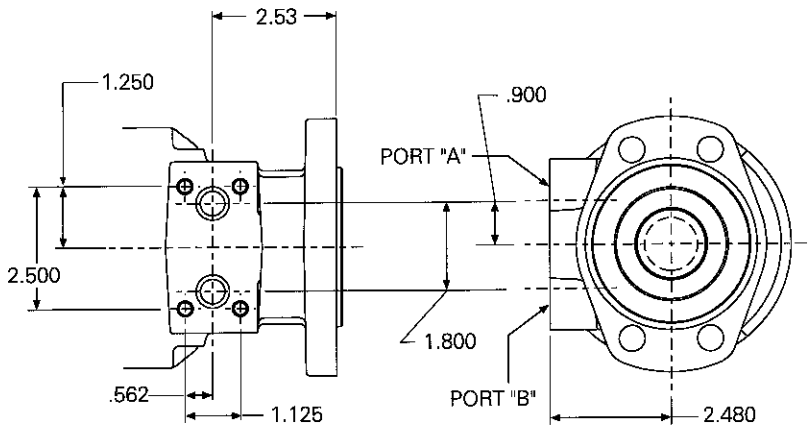
* SUBTRACT 1.78" FOR WHL. MT.
SUBTRACT .26" FOR SAE "B" MT.

7/8-14 O-Ring
Housing Codes:
-01
-02
-06
-14
-15
-24
-26

BSPF
Housing Code:
-19

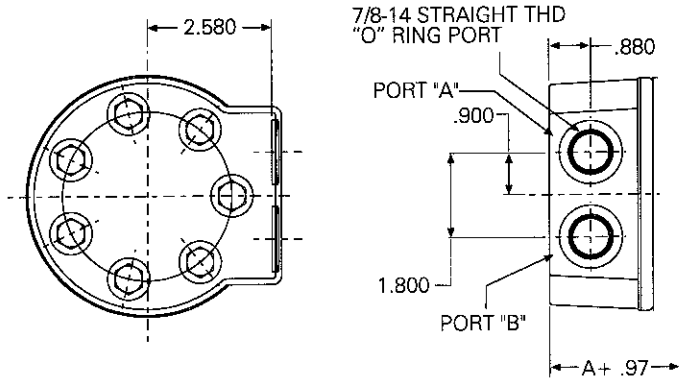


Manifold
Housing Code:
-25

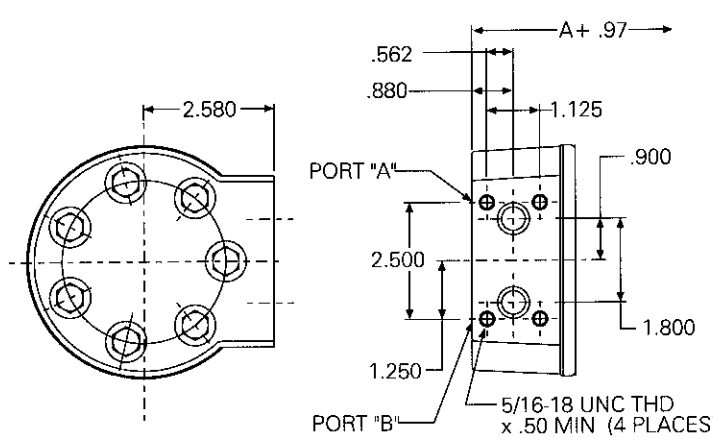


ME SERIES

REAR PORTS
7/8-14 O-Ring
Housing Codes:
-04
-05
-07
-21
Option Codes:
AAAM
AAAN



Manifold
Housing Codes:
-04
-05
-07
-21
Option Codes:
AAAP
AACA



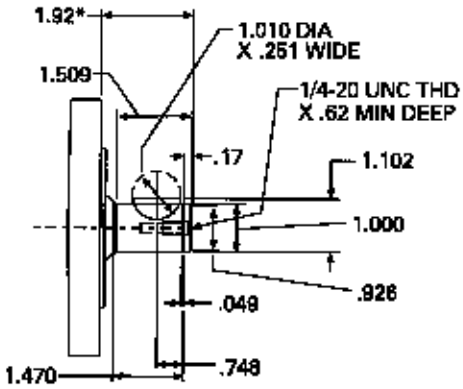
Notes:
1. All dimensions are for reference only.
2. Counter clockwise rotation (as viewed from shaft end) pressurize Port "A" (front ported).
3. Counter clockwise rotation (as viewed from shaft end) pressurize Port "B" (rear ported).

For "A" Dimensions see ME Specification Chart on page 22

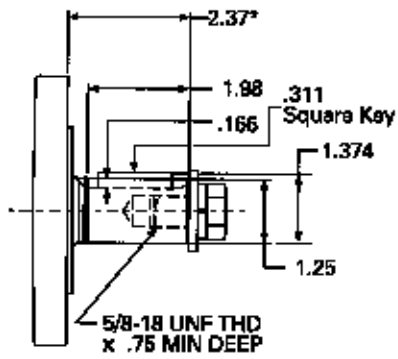
Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Series Shaft Options

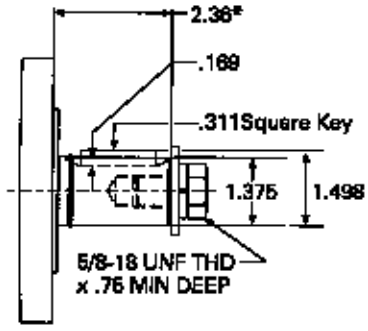
SHAFTS



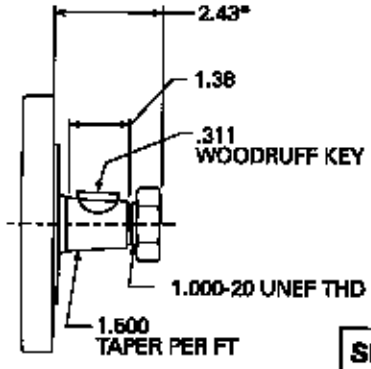
1" Keyed
Shaft Code: -02



1 1/4" Keyed
Shaft Code: -03

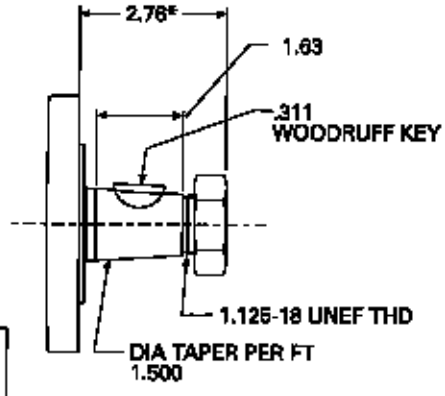


1 3/8" Keyed
Shaft Code: -20
Key Width: .311

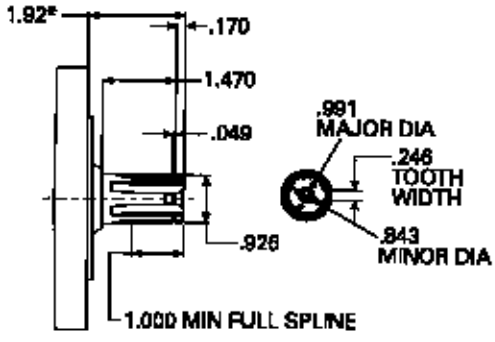


1 1/4" Tapered
Shaft Code: -08

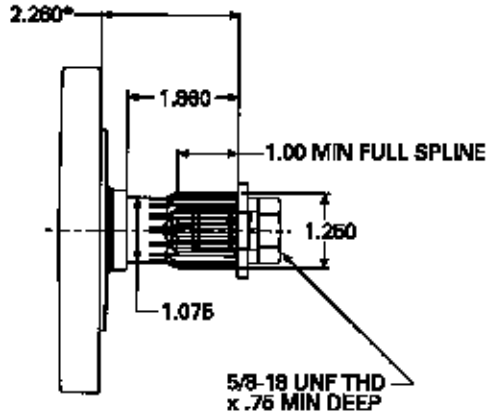
Shaft Code -04: 10B Spline
Shaft Code -06: 19 Tooth Spline
Shaft Code -07: 15 Tooth Spline



1 3/8" Tapered
Shaft Code: -19



1" 6B Spline
Shaft Code: -01



1 1/4" 14 Tooth Spline
Shaft Code: -05

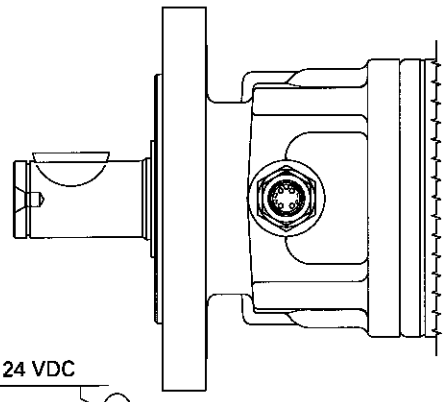
* Add .26" for SAE B Mount
Add 1.78" for Wheel Mount
Add 1.68" for Optional Wheel Mount

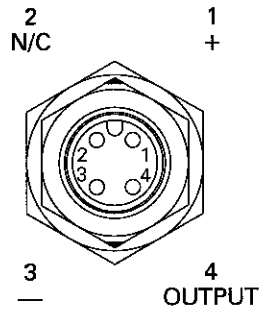
Ross Operation
2745 Snappa Ferry Road
Greeneville, TN 37745 USA

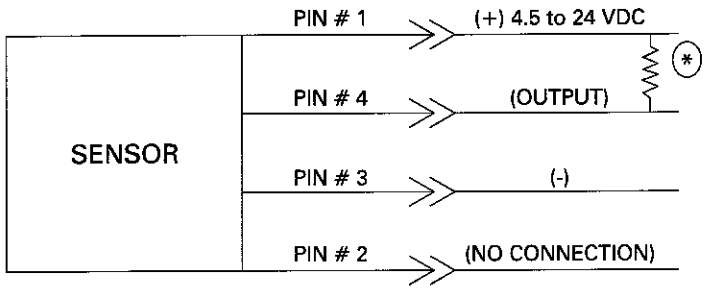
ME Series Speed Sensor Option

Used to monitor the motion/speed of the Torqmotor™ coupling shaft. The rugged, weather resistant design is ideal for industrial and mobile applications. Applications include salt/sand/fertilizer spreader drives, conveyer drives and injection molder compression drives. The sensor is a hall-effect type, which when externally powered outputs 30 square wave digital pulses per coupling shaft revolution, 60 count per revolution can be obtained by signal multiplication. The connector is a user friendly universally available 12 mm 4 pin allowing for simplified field service. The integrated design does not effect the side load capacity or performance of the Torqmotor™.

12 Displacements	...8.6 to 58.5 in^3/rev
Pressures (PSI)	...to 3000 continuous
	...to 4000 intermittent
Flow (GPM)	...to 30
Speed (RPM)	...to 660
Output Torque (lb-in)	...to 9239 continuous
	...to 12636 intermittent







Cable is *not* supplied

Sensor Characteristics:

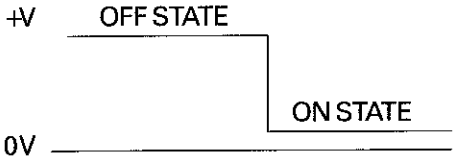
Operating Voltage Range ..... 4.5 to 24 VDC
Operating Temperature ..... -40°F to 200°F
Operating Frequency Range ..... 0 to 100 KHZ
Maximum Sink Current ..... 20 mA

Sensor Output = 30 Pulses per Revolution which can be doubled electronically

* Pull-up Resistor Value Formula for 1/4 Watt, 5% Tolerance

$$\frac{\text{V SUPPLY (4.5 - 24 VDC)}}{\text{DESIRED SINK CURRENT (0 - 20 mA } \pm 20\%)} = \text{RESISTOR VALUE (K-OHMS)}$$

On State Current: 5 mA
Higher wattage resistor will be needed for higher sink current.



MIN OFF STATE = > 95% +V

MAX ON STATE = .400 VDC

NOTE:
The sensor has reverse polarity protection and no short circuit protection.

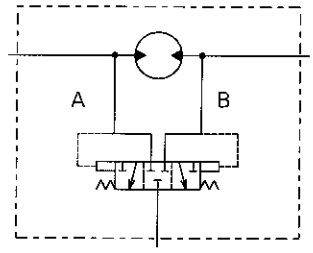
Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

Hot Oil Shuttle Endcover

Diverts approximately 1.5 GPM @ 125 PSI from the return side of the Torqmotor™. Typical application is for closed loop hydraulic systems to divert the oil to a cooler, filter or tank to reduce the temperature and provide fresh filtered oil in the closed loop. The oil is removed from the return side of the motor, therefore does not sacrifice volumetric efficiency.

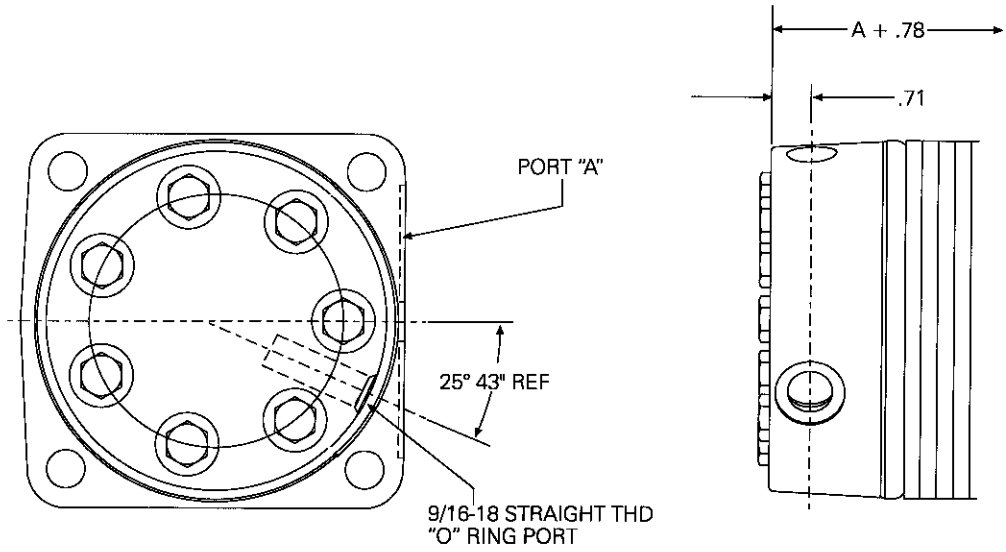
Option adds .78" to overall length of Torqmotor™ and 3.1 lbs weight.

For ordering codes reference ME Series Model Number Explanation.



ME SERIES

Not available with rear ports or cross port relief endcover option.



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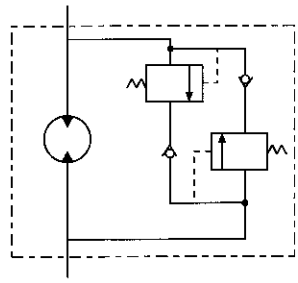
Cross Port Relief Endcover

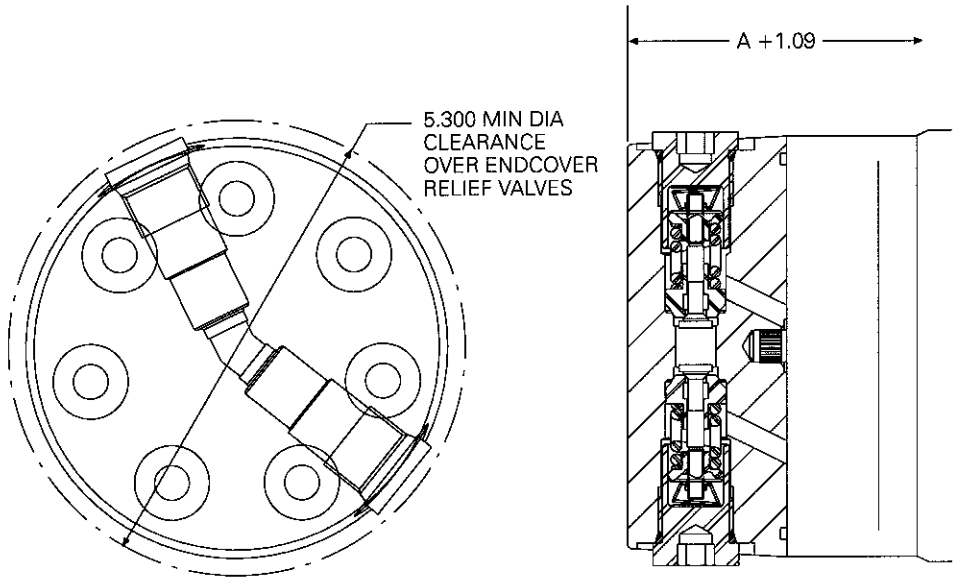
Integrated design relieves high pressure to the low pressure side of the Torqmotor™. Relief option functions for both ports. A variety of relief settings are available for your application needs. Note, relief setting not to exceed intermittent rating of the motor.

Option adds 1.09" to overall length of Torqmotor™ and 4.5 lbs weight.

For ordering codes reference ME Series Model Number Explanation.



Not available with rear ports or Hot Oil Shuttle endcover option.



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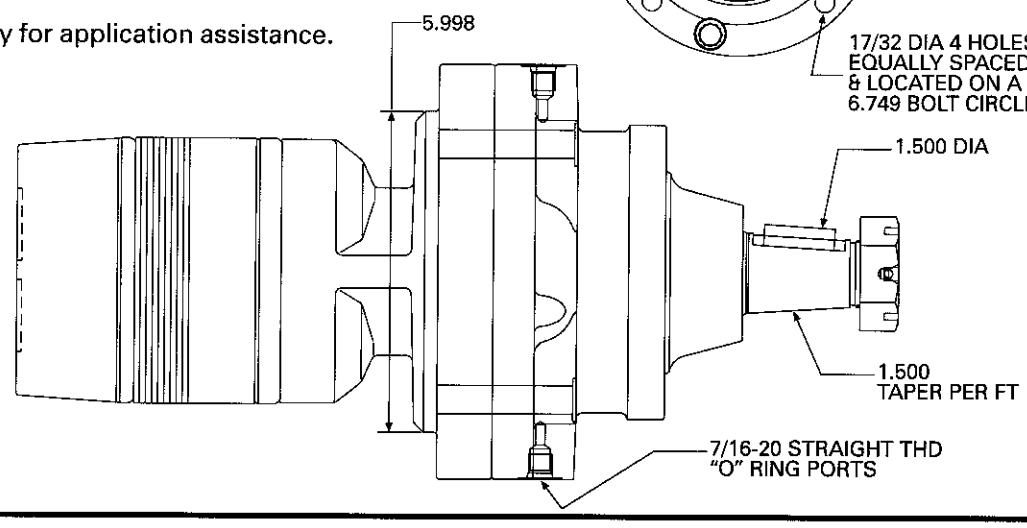
Greeneville, TN 37745 USA

ME Series Brake

The package offers the ME Series Torqmotor™ combined with a front mounted brake. The brake is a spring set, hydraulically released multi wet disc brake. Pilot port can withstand full system pressure.

Reference ME Series section for Torqmotor™ performance.

Please consult the factory for application assistance.

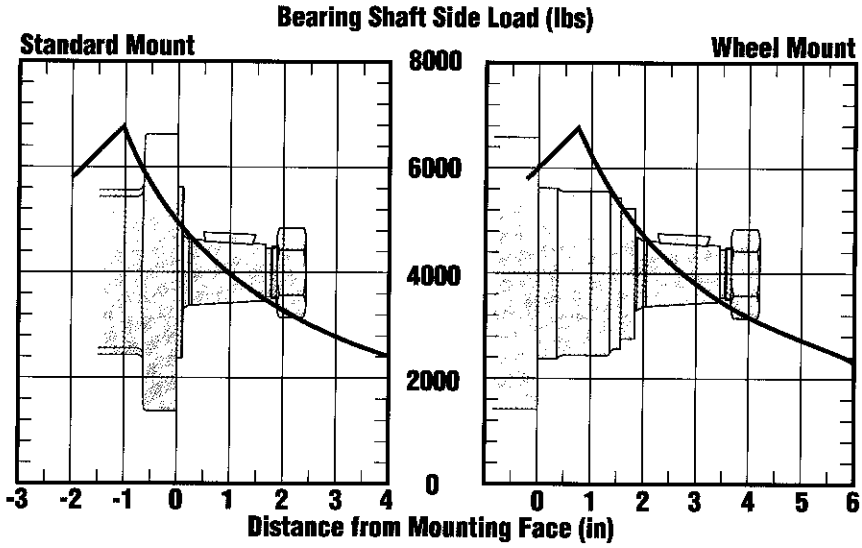


BRAKE HOLDING
TORQUE
10,200 lb-in

Allowable ME Series Side Load Limits

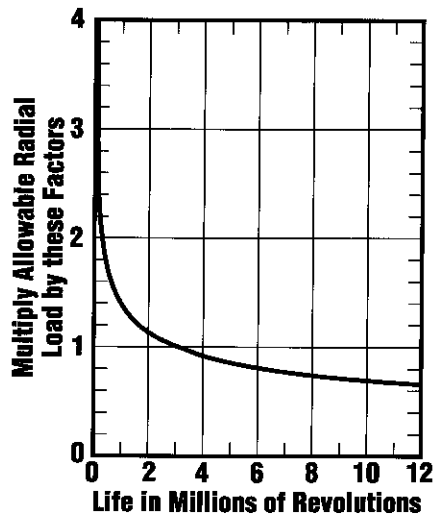
The allowable radial load curve (Chart A) for the ME series is based on uni-directional steady state loads for 3 x 10^6 revolutions and B_{10} bearing life. For different load-life relationships see Chart B. Use the multiplier times the allowable radial load to predict different bearing life.

Chart A:
Allowable Radial Load Curve for Standard Side Load Motors



Note: Shock loads not exceeding two times the charted value are acceptable.

Chart B:
Bearing Life Factor Curve



Note:
Side load should be considered a vector sum of all imposed loads.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

ME Torqmotor™ Assembly Part Numbering

Series	Disp.Code	Mounts/Ports	Shaft	Options	-Unpainted	-Painted	Description
ME	-09	-01 Standard (4 Bolt) 7/8" O-ring	-01	Long 6B Spline Snapwire Groove	-AAAB	—	No Paint
	-10	-02 Wheel Mt. (4 Bolt) 7/8" O-ring	-02	Long Woodruff, 1/4" Tap Snapwire Groove	—	-AAAA	Black Paint
	-12	*-04 Standard (4 Bolt) Rear Port	-03	1.25" Straight Keyed	—	-AAAC	Corrosion Resistant Paint
	-15	*-05 Wheel Mt. (4 Bolt) Rear Port	-04	10B Spline	—	-AAFC	White Epoxy Paint
	-18	-06 SAE A (2 Bolt) 7/8" O-ring	-05	14 Tooth Spline	-AAAH	-AAAG	Fluorocarbon Seals
	-21	*-07 SAE A (2 Bolt) Rear Port	-06	19 Tooth Spline	-AABK**	-AABJ**	Free Running Rotor Set
	-24	-10 SAE A (2 Bolt) Manifold	-07	15 Tooth Spline	-AADK**	-AACD**	Free Running Rotor Set & Fluorocarbon Seals
	-29	-14 Wheel (-02) with Machined Pilot Nose	-08	1.25" Tapered Shaft	-AADD	—	Vespel™ Commutator Seal & Fluorocarbon Seals
	-33	-15 Wheel w/Brake (4 Bolt) 7/8" O-ring	-19	1.38" Tapered Shaft	-AABP	-AAAF	Castle Nut Replaces Patch Lock Nut
	-37	-16 SAE A (2 Bolt) 1/2"-BSPF	-20	1.38" Straight Keyed		-AAAJ	Vespel™ Commutator Seal
	-48	-19 Standard (4 Bolt) 1/2"-BSPF			-AADJ		Vespel™ Commutator Seal & Castle Nut
	-58	*-21 Optional Wheel Mt. (4 Bolt) Rear Port			-AADM	-AAAM	Rear Port 7/8" O-ring Ports
		-25 Standard (4 Bolt) Manifold				-AAFK	Rear Port 7/8" O-ring Ports & Free Running Rotor Set
		-26 SAE B (2 Bolt) 7/8" O-ring				-AACP**	Castle Nut & Free Running Rotor Set
					-AABM**	-AABL**	Free Running Rotor Set Except No Commutator Seal
						-AABW	Corrosion Resistant Paint & Fluorocarbon Seals
						-AAAN	Rear Port 7/8" O-ring Ports & Castle Nut
						-AAAT***	Hot Oil Shuttle Endcover 11:00
						-AAAU***	Hot Oil Shuttle Endcover 11:00 & Castle Nut
						-AAAW***	Hot Oil Shuttle Endcover 11:00 & Vespel™ Commutator Seal
						-AADW***	Hot Oil Shuttle Endcover 11:00 & Fluorocarbon Seals
		Please Consult Factory for Brake Option Codes				-AADA	Rear Port 7/8" O-ring Port & Corrosion Resistant Paint
						-AADB	Rear Port 7/8" O-ring Port & Fluorocarbon Seals
						-BBBA	1000 PSI Cross Port Relief Endcover
					-BBBJ	-BBBG	1500 PSI Cross Port Relief Endcover
						-BBBB	2000 PSI Cross Port Relief Endcover
					-BBBF	-BBBC	3000 PSI Cross Port Relief Endcover
						-BBBD	4000 PSI Cross Port Relief Endcover
		ISO 6149 Ports Available				-AACA	Manifold Rear Port & Vespel™ Commutator Seal
					-CCCB	-CCCA	Reverse Timed Manifold
					-FFAB	-FFAA	Speed Sensor Option
						-AAAP	Rear Port Manifold
					-JCAA		Brake Motor, 7/8" O-Ring Side Rear Ports
					-JCAB		Brake Motor, 7/8" O-Ring Axial Rear Ports
					-JCAC		Brake Motor, 7/8" O-Ring Radial Front Ports

Example:
ME-18-06-02-AAAG signifies a ME Series motor with a displacement of 17.1 in^3/rev.; SAE A (2 Bolt) Mount with 7/8" O-ring ports in the housing; long Woodruff Key, 1/4" Tap, Snapwire Groove Shaft; Fluorocarbon Seals and Black Paint.

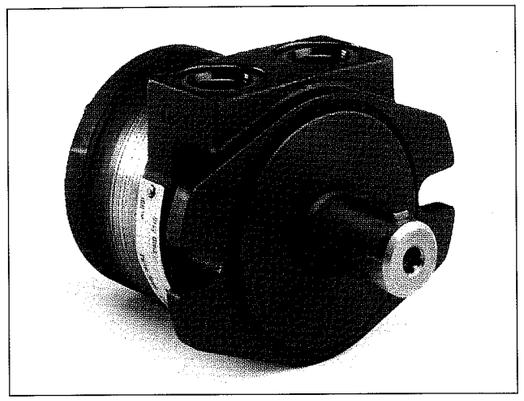
* No ports in housing, select ports in endcover.
** Not applicable to ME37, ME48 and ME58 Rotor Sets.
*** Shuttle port position as viewed from shaft end of motor.

For other motor options, consult the factory.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

Compact Power in an Economical Package

The Nichols unique wear compensating power element provides long, trouble free life in this powerful motor. Providing up to 4044 lb in of torque in less than six inches of length, hydraulic pressure seals the power element against internal leakage, for high volumetric efficiency. Its volumetric efficiency will not degrade with use, and we guarantee that it will outlive any competitive motor on the market.



Features

- **Self Sealing Power Element** — For High Volumetric Efficiency
- **Wear Compensated Power Element** — Means Performance Will Not Degrade With Use
- **Low Speed Disc Valve** — For High Overall Efficiency
- **Long Life**
- **High Starting Torque**
- **Most Compact Motor on the Market**
- **High Strength Ductile Iron Housing**

Options

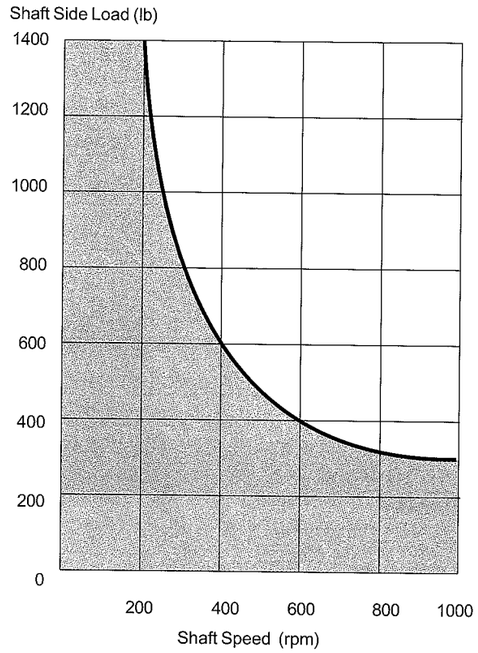
- All Common 1 inch, 25 mm and 7/8 inch 13 Tooth Shafts.
- SAE O-Ring, NPTF, Manifold and BSPP Porting
- SAE A and 4 Bolt Mounting
- Integral Cross-Over Relief Valve Package
- External Case Drain

Specifications

Code		030	036	045	054	071	088	106	129	141	164	181	220
Displacement	cu in/rev	3.0	3.6	4.5	5.4	7.1	8.8	10.6	12.9	14.1	16.4	18.1	22.0
	(cc/rev)	(49,2)	(59,0)	(73,8)	(88,5)	(116,4)	(144,2)	(173,7)	(211,4)	(231,1)	(268,8)	(296,7)	(360,6)
Max Speed (rpm) @ Max Continuous Flow		1097	909	732	610	465	377	311	263	239	207	188	155
Pressure Differential (psi) Max Continuous		2000	2000	2000	2000	2000	1900	1850	1800	1800	1500	1500	1300
Max Intermittent		2500	2500	2500	2500	2500	2350	2250	2000	2000	1800	1800	1500
Max Torque (lb in) @ Max Continuous Pressure		840	1008	1261	1461	1966	2315	2715	2772	3030	3054	3370	3596
Max Intermittent Pressure		1038	1246	1558	1783	2345	2732	3226	3039	3321	3524	3889	4044

Maximum transient (less than 1% of duty cycle) pressure is not to exceed 3000 psi.

Maximum Side Load Capacity



This chart is based on loads applied at a distance of 1.18" from the flange of the motor. Side load capacity decreases when load is applied at greater distances from the flange.

The hydrodynamic sleeve bearing has infinite life when the chart load ratings are not exceeded.

Performance Data

Continuous / Intermittent* Operation

□ = Continuous

▨ = Intermittent*

** Intermittent operation is defined as less than 10% of duty cycle.*

Performance data based on testing using hydraulic fluid with a viscosity of 180 SUS at 120°F.

3.0 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1600	1800	2000	2500
2	162 **141**	238 **140**	317 **139**	415 **132**	493 **126**	582 **119**	657 **108**	748 **94**		
4	147 **295**	232 **292**	321 **290**	401 **283**	493 **277**	582 **268**	665 **259**	748 **249**	840 **237**	
6	139 **439**	223 **437**	309 **435**	392 **434**	476 **430**	568 **420**	649 **411**	739 **402**	831 **388**	1038 **351**
8	128 **587**	215 **585**	302 **583**	382 **581**	458 **579**	548 **573**	634 **561**	722 **548**	812 **536**	1015 **499**
10	99 **733**	186 **731**	271 **729**	358 **727**	447 **725**	521 **724**	626 **708**	705 **701**	783 **685**	1003 **647**
12	80 **879**	163 **877**	248 **875**	329 **873**	413 **871**	495 **869**	588 **859**	670 **850**	764 **832**	979 **804**
14	48 **1025**	132 **1023**	218 **1021**	306 **1019**	390 **1017**	475 **1015**	558 **1013**	645 **992**	726 **981**	943 **949**
15	34 **1097**	117 **1095**	202 **1093**	291 **1089**	372 **1085**	461 **1081**	550 **1077**	627 **1074**	716 **1051**	931 **1016**
18		69 **1305**	157 **1303**	253 **1298**	350 **1296**	441 **1294**	535 **1291**	619 **1289**	716 **1261**	

FLOW (GPM)

TORQUE (LB IN) 619
SPEED (RPM) 1289

3.6 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1600	1800	2000	2500
2	195 **120**	285 **118**	380 **116**	498 **110**	591 **105**	698 **99**	788 **90**	879 **78**		
4	176 **244**	278 **242**	385 **241**	481 **236**	591 **231**	698 **223**	798 **216**	897 **208**	1008 **198**	
6	167 **368**	268 **366**	371 **364**	470 **362**	571 **358**	682 **350**	779 **343**	887 **335**	997 **323**	1246 **293**
8	154 **490**	258 **489**	362 **487**	458 **485**	550 **483**	658 **477**	761 **467**	866 **457**	974 **447**	1218 **416**
10	119 **615**	223 **612**	325 **610**	430 **608**	536 **605**	626 **603**	752 **590**	846 **584**	940 **571**	1203 **539**
12	96 **736**	196 **734**	298 **731**	395 **729**	495 **726**	594 **724**	706 **716**	804 **708**	917 **693**	1175 **670**
14	57 **857**	158 **854**	261 **852**	367 **848**	468 **846**	570 **844**	669 **834**	773 **826**	871 **817**	1132 **791**
15	41 **909**	141 **907**	243 **905**	350 **902**	447 **900**	553 **897**	660 **896**	753 **895**	859 **876**	1117 **847**
18		83 **1089**	188 **1086**	304 **1084**	419 **1082**	529 **1079**	642 **1076**	743 **1074**	859 **1051**	

FLOW (GPM)

4.5 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1600	1800	2000	2500
2	244 **96**	357 **94**	476 **92**	623 **88**	739 **84**	872 **79**	985 **72**	1122 **63**		
4	221 **195**	348 **194**	481 **193**	602 **189**	739 **185**	872 **179**	997 **172**	1122 **166**	1261 **158**	
6	209 **293**	335 **292**	464 **291**	587 **290**	713 **286**	852 **280**	974 **274**	1109 **268**	1246 **259**	1558 **234**
8	192 **391**	322 **390**	453 **389**	573 **387**	688 **386**	822 **382**	951 **374**	1083 **365**	1218 **357**	1522 **333**
10	149 **490**	279 **489**	407 **487**	537 **486**	670 **484**	782 **483**	940 **472**	1057 **467**	1175 **457**	1504 **431**
12	120 **586**	245 **585**	372 **583**	494 **582**	619 **581**	742 **579**	882 **573**	1006 **567**	1146 **554**	1468 **536**
14	72 **684**	198 **683**	327 **682**	458 **681**	584 **680**	712 **678**	837 **676**	967 **661**	1089 **654**	1414 **632**
15		176 **732**	304 **728**	437 **726**	559 **724**	692 **720**	825 **718**	941 **716**	1074 **701**	1397 **678**
18			235 **869**	380 **867**	524 **865**	662 **863**	802 **860**	928 **859**	1074 **841**	

FLOW (GPM)

7.1 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1600	1800	2000	2500
2	384 **61**	583 **59**	777 **57**	983 **54**	1180 **53**	1313 **51**	1501 **48**	1709 **43**	1966 **40**	
4	371 **126**	570 **124**	759 **121**	961 **118**	1153 **116**	1345 **115**	1537 **111**	1729 **107**	1921 **104**	
6	330 **187**	529 **185**	732 **184**	938 **182**	1125 **180**	1313 **176**	1501 **170**	1688 **168**	1876 **164**	2345 **154**
8	303 **250**	488 **247**	696 **245**	881 **242**	1071 **239**	1281 **237**	1483 **234**	1648 **229**	1853 **226**	2317 **216**
10	271 **312**	461 **310**	624 **308**	825 **306**	1017 **303**	1218 **299**	1410 **296**	1607 **293**	1785 **290**	2232 **280**
12	226 **379**	366 **377**	579 **374**	768 **367**	963 **363**	1155 **363**	1338 **359**	1526 **355**	1718 **351**	2147 **340**
14	203 **438**	339 **435**	497 **433**	701 **430**	895 **428**	1076 **424**	1266 **419**	1464 **417**	1627 **414**	2091 **401**
15	199 **467**	339 **465**	488 **462**	667 **459**	854 **456**	1044 **454**	1248 **449**	1424 **447**	1605 **444**	2062 **434**
20		258 **619**	362 **617**	497 **614**	664 **612**	838 **609**	1012 **605**	1220 **603**	1379 **599**	

FLOW (GPM)

TORQUE (LB IN) 1220
SPEED (RPM) 603

5.4 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1600	1800	2000	2500
2	292 **82**	423 **80**	578 **78**	731 **75**	866 **73**	1023 **70**	1169 **66**	1299 **57**		
4	265 **167**	423 **164**	571 **161**	722 **159**	877 **157**	1035 **154**	1169 **149**	1315 **144**	1461 **140**	
6	248 **251**	397 **249**	543 **246**	688 **244**	856 **241**	987 **236**	1141 **231**	1284 **228**	1444 **221**	1783 **203**
8	223 **336**	376 **333**	509 **329**	653 **325**	804 **322**	963 **318**	1114 **315**	1253 **311**	1409 **305**	1762 **287**
10	172 **417**	320 **415**	474 **411**	619 **409**	753 **406**	914 **402**	1059 **398**	1198 **389**	1358 **385**	1955 **364**
12	124 **498**	273 **496**	419 **493**	567 **492**	712 **488**	866 **483**	1018 **477**	1160 **472**	1306 **462**	1676 **447**
14	62 **580**	217 **577**	371 **575**	533 **573**	660 **569**	806 **563**	963 **557**	1098 **551**	1255 **545**	1633 **527**
15		211 **610**	371 **609**	524 **607**	639 **605**	782 **603**	908 **597**	1083 **590**	1220 **584**	1590 **565**
20			213 **816**	370 **813**	526 **810**	650 **804**	784 **801**	913 **796**	1049 **787**	

FLOW (GPM)

8.8 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1600	1800	1900	2350
2	476 **49**	723 **47**	964 **46**	1218 **44**	1462 **43**	1627 **41**	1860 **39**	2118 **35**	2315 **33**	
4	459 **101**	706 **100**	941 **98**	1190 **96**	1429 **93**	1667 **92**	1905 **89**	2143 **87**	2262 **84**	
6	409 **152**	655 **150**	908 **147**	1162 **146**	1395 **145**	1627 **142**	1860 **137**	2092 **135**	2209 **132**	2732 **124**
8	375 **202**	605 **199**	863 **197**	1092 **195**	1328 **193**	1588 **191**	1838 **189**	2042 **185**	2182 **183**	2699 **174**
10	336 **250**	571 **249**	773 **248**	1022 **247**	1261 **244**	1510 **241**	1748 **239**	1992 **236**	2102 **234**	2600 **226**
12	280 **303**	454 **301**	717 **299**	952 **296**	1193 **294**	1431 **293**	1658 **290**	1891 **287**	2022 **284**	2501 **274**
14	252 **355**	420 **351**	616 **349**	868 **347**	1109 **345**	1333 **342**	1569 **338**	1815 **336**	1916 **334**	2436 **323**
15	246 **377**	420 **375**	605 **372**	826 **370**	1059 **368**	1294 **366**	1546 **362**	1765 **360**	1889 **358**	2403 **350**
20		319 **499**	448 **497**	616 **495**	824 **493**	1039 **490**	1255 **488**	1513 **485**	1623 **483**	

FLOW (GPM)

Performance data is typical. Actual data may vary slightly from one production motor to another.

10.6 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1600	1800	1850	2250
2	574 **41**	871 **39**	1161 **38**	1468 **37**	1761 **36**	1960 **34**	2240 **32**	2551 **29**	2715 **27**	
4	553 **83**	850 **82**	1134 **81**	1434 **79**	1721 **78**	2008 **77**	2294 **74**	2581 **71**	2653 **70**	3226 **64**
6	493 **126**	790 **125**	1093 **124**	1400 **122**	1680 **120**	1960 **118**	2240 **114**	2520 **112**	2590 **110**	3151 **103**
8	452 **167**	729 **166**	1039 **164**	1316 **162**	1599 **160**	1913 **159**	2213 **157**	2460 **153**	2559 **152**	3113 **145**
10	405 **209**	688 **207**	931 **205**	1232 **204**	1518 **203**	1819 **200**	2105 **198**	2399 **196**	2466 **194**	2999 **187**
12	337 **251**	547 **250**	864 **248**	1147 **246**	1437 **245**	1724 **243**	1997 **241**	2278 **238**	2372 **235**	2885 **228**
14	304 **292**	506 **291**	742 **290**	1046 **288**	1336 **287**	1606 **284**	1889 **281**	2186 **280**	2247 **278**	2809 **268**
15	297 **311**	506 **310**	729 **309**	995 **307**	1275 **306**	1559 **304**	1862 **301**	2126 **299**	2216 **297**	2771 **291**
20		385 **413**	540 **412**	742 **411**	992 **410**	1252 **407**	1512 **405**	1822 **403**	1904 **401**	

FLOW (GPM)

TORQUE (LB IN) 540
SPEED (RPM) 412

12.9 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1600	1800	2000
2	657 **33**	1010 **32**	1314 **30**	1663 **26**	1922 **24**	2271 **23**	2562 **19**	2735 **18**	
4	649 **69**	985 **68**	1330 **67**	1642 **65**	1946 **64**	2271 **63**	2529 **62**	2772 **58**	3039 **54**
6	591 **104**	936 **103**	1265 **102**	1601 **101**	1897 **100**	2213 **98**	2497 **97**	2772 **93**	2998 **90**
8	526 **140**	875 **139**	1199 **138**	1519 **137**	1823 **136**	2127 **135**	2398 **133**	2698 **130**	2915 **127**
10	443 **176**	788 **175**	1100 **174**	1417 **173**	1749 **172**	2041 **169**	2332 **168**	2587 **167**	2833 **163**
12	353 **210**	690 **209**	1068 **208**	1355 **207**	1626 **206**	1926 **205**	2201 **204**	2513 **202**	2751 **198**
14	279 **245**	579 **244**	887 **243**	1211 **242**	1503 **241**	1811 **240**	2070 **239**	2365 **238**	2587 **236**
15	271 **263**	517 **262**	838 **261**	1129 **260**	1429 **259**	1725 **258**	2004 **257**	2291 **255**	2505 **252**
20		296 **347**	460 **346**	801 **345**	1109 **344**	1380 **342**	1642 **341**	1922 **340**	

FLOW (GPM)

14.1 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1600	1800	2000
2	718 **30**	1104 **29**	1436 **28**	1818 **24**	2100 **21**	2482 **23**	2801 **17**	2989 **16**	
4	709 **63**	1077 **62**	1454 **61**	1795 **60**	2127 **58**	2482 **57**	2765 **56**	3030 **53**	3321 **49**
6	646 **95**	1023 **94**	1382 **93**	1750 **92**	2074 **91**	2419 **89**	2729 **88**	3030 **86**	3030 **83**
8	574 **128**	956 **127**	1311 **126**	1661 **125**	1993 **124**	2325 **123**	2621 **122**	2949 **119**	3187 **117**
10	485 **160**	862 **159**	1203 **158**	1548 **157**	1912 **156**	2231 **155**	2549 **154**	2828 **152**	3097 **149**
12	386 **192**	754 **191**	1167 **190**	1481 **189**	1777 **188**	2105 **187**	2406 **186**	2747 **185**	3007 **181**
14	305 **222**	633 **222**	969 **221**	1324 **220**	1643 **219**	1979 **219**	2262 **218**	2585 **217**	3007 **216**
15	296 **239**	566 **238**	916 **238**	1234 **237**	1562 **236**	1885 **235**	2190 **234**	2504 **233**	2738 **231**
20		323 **317**	503 **316**	875 **315**	1212 **314**	1508 **313**	1795 **312**	2100 **311**	

FLOW (GPM)

16.4 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1500	1800
2	835 **26**	1284 **25**	1670 **24**	2114 **20**	2443 **19**	2887 **18**	3054 **16**	
4	825 **55**	1253 **54**	1691 **53**	2088 **52**	2474 **51**	2887 **50**	3015 **49**	3524 **46**
6	752 **82**	1190 **81**	1608 **80**	2036 **79**	2412 **78**	2814 **77**	2976 **76**	3524 **74**
8	668 **110**	1112 **109**	1524 **108**	1932 **107**	2318 **106**	2704 **106**	2858 **105**	3430 **103**
10	564 **138**	1002 **137**	1399 **136**	1801 **135**	2224 **134**	2594 **133**	2780 **132**	3289 **131**
12	449 **167**	877 **166**	1357 **165**	1723 **164**	2082 **163**	2448 **162**	2623 **161**	3195 **159**
14	355 **193**	736 **193**	1128 **192**	1540 **191**	1911 **190**	2302 **189**	2467 **188**	3007 **187**
15	345 **207**	658 **207**	1065 **206**	1436 **205**	1817 **204**	2193 **203**	2388 **202**	2913 **201**
20		376 **273**	585 **273**	1018 **272**	1409 **271**	1754 **270**	1958 **269**	

FLOW (GPM)

Performance data is typical. Actual data may vary slightly from one production motor to another.

Performance Data

18.1 cu in / rev

PRESSURE (PSI)

	400	600	800	1000	1200	1400	1500	1800
2	922 **24**	1417 **23**	1844 **22**	2333 **18**	2696 **17**	3186 **16**	3370 **15**	
4	910 **50**	1383 **49**	1867 **48**	2305 **47**	2731 **46**	3186 **45**	3327 **44**	3889 **41**
6	830 **75**	1314 **74**	1775 **73**	2247 **71**	2662 **70**	3105 **70**	3284 **69**	3889 **67**
8	737 **100**	1227 **99**	1682 **98**	2132 **97**	2558 **96**	2984 **96**	3154 **95**	3785 **93**
10	622 **126**	1106 **125**	1544 **124**	1988 **123**	2454 **122**	2863 **121**	3068 **120**	3630 **119**
12	495 **151**	968 **150**	1498 **149**	1901 **148**	2335 **147**	2702 **146**	2895 **145**	3526 **144**
14	392 **175**	812 **174**	1244 **174**	1700 **173**	2109 **172**	2541 **171**	2722 **170**	3319 **169**
15	380 **188**	726 **187**	1175 **186**	1584 **185**	2005 **184**	2420 **184**	2636 **183**	3215 **182**
20		415 **247**	645 **246**	1123 **246**	1556 **245**	1936 **244**	2161 **243**	

TORQUE (LB IN) 2161
SPEED (RPM) 243

FLOW (GPM)

22.0 cu in / rev

PRESSURE (PSI)

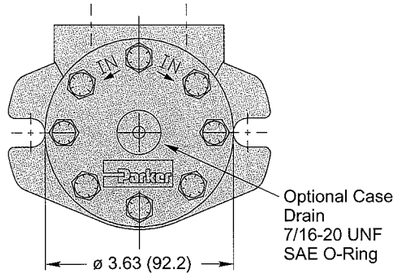
	400	600	800	1000	1200	1300	1500
2	1120 **19**	1723 **19**	2241 **18**	2836 **14**	3277 **13**	3596 **12**	
4	1106 **42**	1681 **42**	2269 **41**	2801 **40**	3319 **39**	3458 **38**	4044 **37**
6	1008 **63**	1597 **62**	2157 **61**	2731 **60**	3235 **59**	3370 **58**	3992 **57**
8	896 **84**	1492 **83**	2045 **82**	2591 **81**	3109 **80**	3368 **79**	3834 **78**
10	756 **104**	1345 **104**	1877 **103**	2416 **102**	2983 **101**	3232 **100**	3729 **99**
12	602 **124**	1176 **124**	1821 **123**	2311 **122**	2773 **121**	3050 **121**	3519 **120**
14	476 **145**	987 **144**	1513 **144**	2066 **143**	2563 **142**	2868 **141**	3309 **140**
15	462 **155**	882 **155**	1429 **154**	1926 **153**	2437 **152**	2731 **151**	3204 **150**
20		504 **204**	784 **203**	1366 **203**	1891 **202**	2185 **201**	

FLOW (GPM)

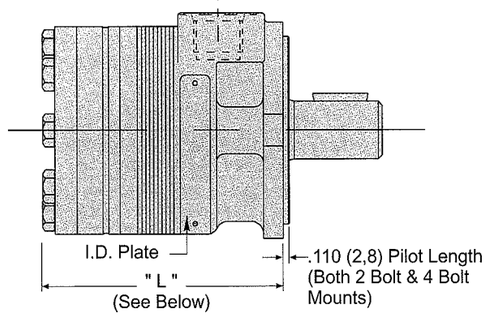
Performance data is typical. Actual data may vary slightly from one production motor to another.

Dimensions - Body

Metric equivalents are shown in (**)



Rear View



Side View

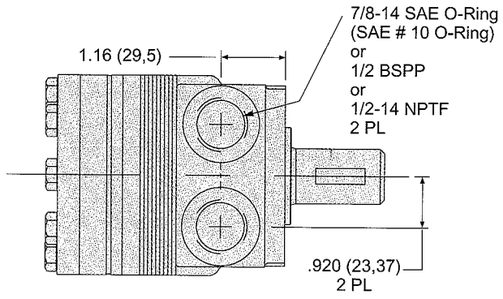
Length "L" and Weight

Displacement, Code		030	036	045	054	071	088
Length "L"	Inches	3.88	3.95	4.05	4.14	4.32	4.51
	(mm)	(99)	(100)	(103)	(105)	(110)	(115)
Weight	Lb	10.4	10.6	10.9	11.1	11.7	12.2
	(kg)	(4,7)	(4,8)	(4,9)	(5,0)	(5,3)	(5,5)
Displacement, Code		**106**	**129**	**141**	**164**	**181**	**220**
Length "L"	Inches	4.71	4.96	5.09	5.34	5.53	5.95
	(mm)	(120)	(125)	(129)	(136)	(141)	(151)
Weight	Lb	12.7	13.3	13.6	14.3	14.8	15.8
	(kg)	(5,8)	(6,0)	(6,2)	(6,5)	(6,7)	(7,2)

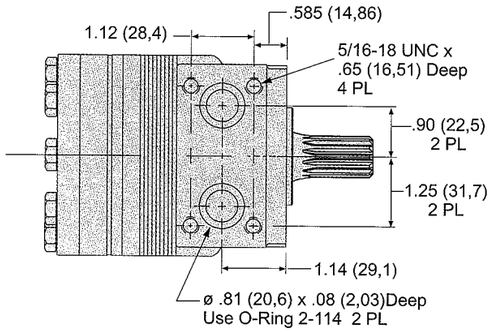
Mounting

Millimeter equivalents for inch dimensions are shown in (**)

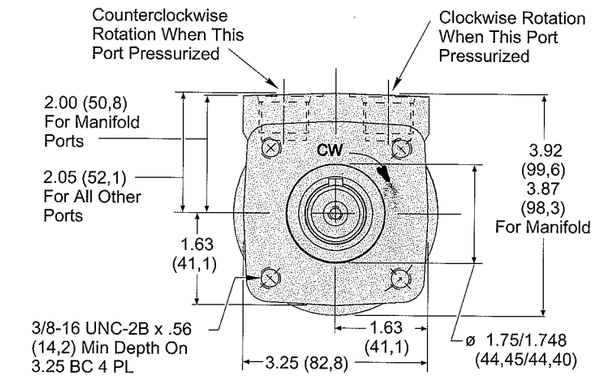
SAE O-Ring & NPTF & BSPP



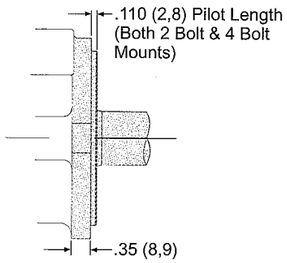
Manifold

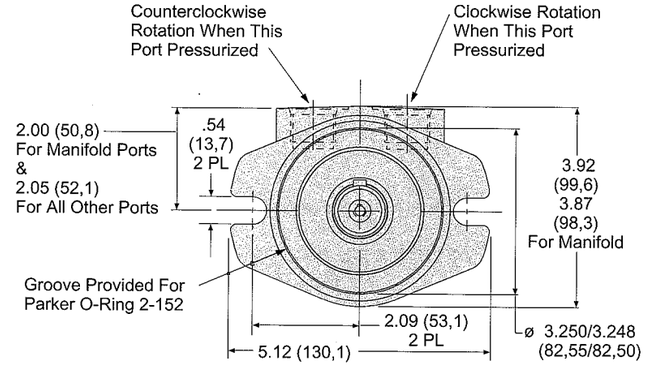


4 Bolt Flange



SAE A 2 Bolt Flange

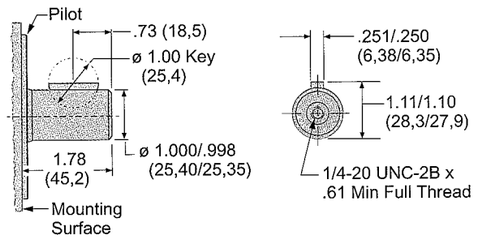




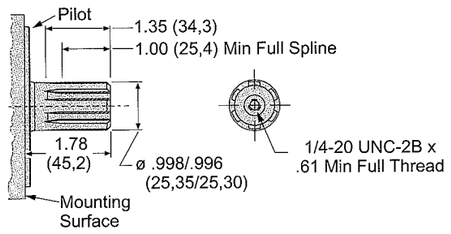
Shafts

Millimeter equivalents for inch dimensions are shown in (**)

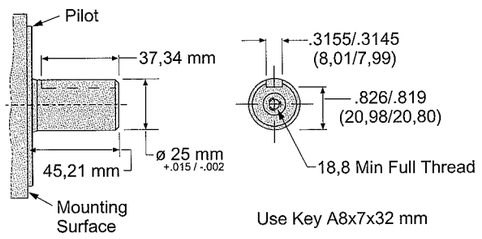
1" Woodruff Keyed



1" SAE 6B Spline

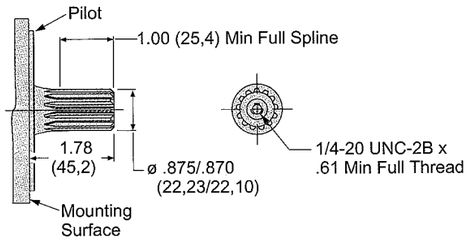


25 mm Keyed

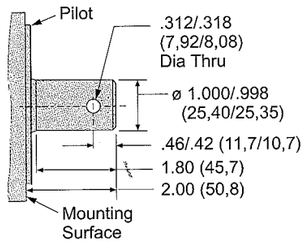


Use Key A8x7x32 mm

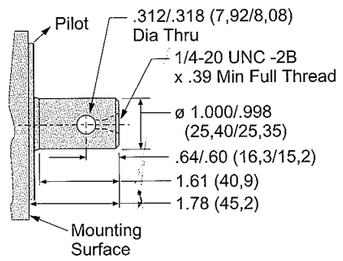
13 Tooth 16/32 Spline



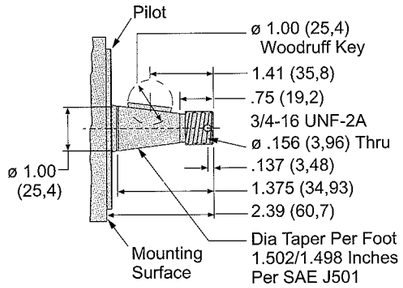
1" Dia Straight Shaft w/ .315 Dia. Crosshole



1" Dia Straight Shaft w/.406 Dia. Crosshole

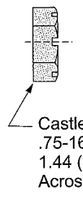


1" Dia J501 Taper



3/4"-16 Hex Nut

Torque castle nut to 80-90 lb ft then continue until cotter pin slot lines up with shaft cross-hole.



0 6 — [Shaft] — [Displacement] — [Mounting] [Porting] — [Shaft Material] [Case Drain] [Cross-Over Relief Valve] [Paint]

Series | Shaft | Displacement | Mounting | Porting | Shaft Material | Case Drain | Cross-Over Relief Valve | Paint

Code	Shaft
0	1" Keyed
1	1" 6B Spline
2	25 mm Keyed
6	7/8" 13T Spline
9	1" J501 Taper
A	1" Straight Shaft w/.315 Crosshole
B	1" Straight Shaft w/.406 Crosshole

Code	Displacement
030	3.0 cu in/rev
036	3.6 cu in/rev
045	4.5 cu in/rev
054	5.4 cu in/rev
071	7.1 cu in/rev
088	8.8 cu in/rev
106	10.6 cu in/rev
129	12.9 cu in/rev
141	14.1 cu in/rev
164	16.4 cu in/rev
181	18.1 cu in/rev
220	22.0 cu in/rev

Code	Mounting
A	SAE A 2 Bolt
F	4 Bolt (3.25" BC)

Code	Porting
S	7/8"-14 SAE O-Ring
P	1/2"-14 NPTF Pipe
T	1/2" BSPP
M	Manifold

Code	Shaft Material
Omit	For Alloy Steel
N	Corrosion Resistant

Code	Case Drain
Omit	For no Case Drain
C	External Case Drain

Code	Cross-Over Relief Valve
R1	Adjustable to 3500 psi (Factory Set at 1750 psi) (Manifold Mount Required)
Omit	If Not Required

Code	Paint
F	Black
W	White Epoxy
Omit	For No Paint

7 Displacements	(3.6 – 16.4 in³/rev)
7 Schluckvolumen	**59…269 cm³/rev**
7 Cylindrée	
7 Despazamientos	

	Cont	Int
Maximum Pressure	(to 2500 psi)	(to 3000 psi)
Eingangsdruck	**…172.4 bar**	**…206.8 bar**
Pression entrée		
Presion Maxima		

Maximum Oil Flow	(to 30 gpm)
Schluckstrom	**…113.6 lpm**
Débit d'huile	
Caudal Maximo de Aceite	

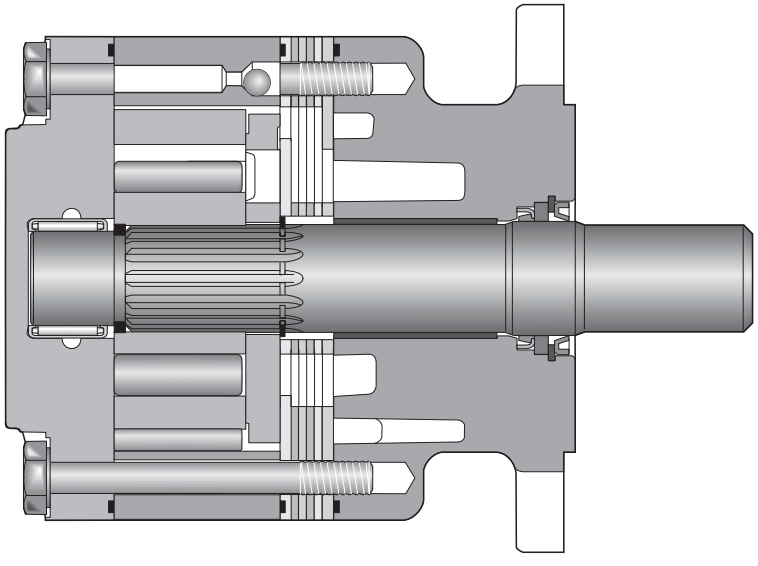
Maximum Speed	**858 rpm**
Drehzahl	
Vitesse de rotation	
Velocidad Maxima	

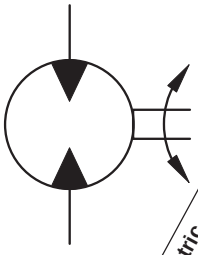
	Cont	Int
Maximum Torque	(to 4164 lb in)	(to 5215 lb in)
Max Drehmoment	**…470 Nm**	**…589 Nm**
Couple		
Torque Maximo		

Maximum Side Load at Key	(to 1450 lb)
Seitenlast	**… 6450 N**
Charges latèrales	
Carga Maxima Lateral	

When the Ultimate in Efficiency and Reliability is a Must

This high performance motor contains a power element that is pressure loaded against internal leakage for high volumetric efficiency. It is wear compensated, so that its volumetric efficiency will not degrade with use. It can provide up to 5215 lb-in of torque through a one-piece solid fixed axis shaft. This shaft design allows for full stationary spline contact between shaft and rotor, minimizing spline contact stresses. It also allows the shaft to be extended through the rear cover for mounting parking brakes, auxiliary drive functions or encoders for speed readout or closed loop control. Low internal pressure drop means high mechanical efficiency and higher flow capability. This rugged motor is the most compact on the market.





Motor Series 110A	**cm³/rev** in³/rev	rev/min	***cont / int**** **l/min** g/min		***cont / int**** **bar** psi		***max*** **bar** psi	***cont / int**** **Nm** lb-in		***max*** **KW** HP
110A 036	**59** 3.6	858	**45.4** 12	**53** 14	**170** 2500	**210** 3000	**225** 3250	**127** 1125	**149** 1319	**8.5** 11.4
110A 054	**89** 5.4	740	**60.6** 16	**68.1** 18	**170** 2500	**210** 3000	**225** 3250	**182** 1608	**213** 1884	**11.2** 15.1
110A 071	**116** 7.1	684	**75.7** 20	**83.3** 22	**170** 2500	**210** 3000	**225** 3250	**256** 2267	**308** 2725	**14.2** 19.1
110A 088	**144** 8.8	622	**75.7** 20	**94.6** 25	**170** 2500	**210** 3000	**225** 3250	**324** 2874	**389** 3449	**14.6** 19.6
110A 106	**174** 10.6	519	**75.7** 20	**94.5** 25	**155** 2250	**210** 3000	**225** 3250	**352** 3115	**465** 4121	**13.1** 17.6
110A 129	**211** 12.9	437	**75.7** 20	**94.6** 25	**155** 2250	**190** 2750	**225** 3250	**412** 3651	**503** 4453	**12.9** 17.3
110A 164	**269** 16.4	415	**75.7** 20	**114** 30	**140** 2000	**170** 2500	**225** 3250	**470** 4164	**589** 5215	**12.1** 16.2

Performance data based on tests using 15W40 oil with a viscosity of 55 cSt (215 SUS) at 54° C (130° F.) Performance data is typical. Actual data may vary slightly from one production motor to another.

Les donnees sur les performances sont basees sur des tests utilisant de l'huile 15W40 d'une viscosite de 55 cSt (215 SUS) a 54°C (130°F). Ces donnees correspondent a des situations typiques. Les donnees reelles peuvent varier legerement d'un moteur de production a l'autre.

Leistugsdaten sind gemessen mit SAE 15W40 bei einer Viskositaet von 43,1 Cst beo 54°C. Geringfuegige Abweichungen von den Katalogerten sond moeglich.

Datos tecnicos obtenidos con aceite 15W40 de 55 cSt (215 SUS) de viscosidad a 54°C (130°F). Los datos proporcionados son valores tipcos. Los valores exactos reales podrian tener una pequena variacion entre distintos motores.

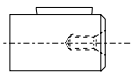
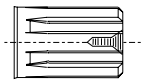
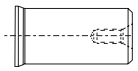
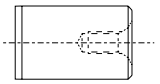
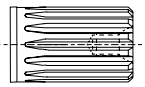
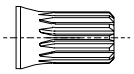
✱Intermittent operation rating applies to 10% of every minute.

Intermittierende Werte maximal 10% von jeder Betriebsminute.

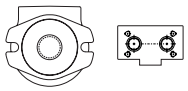
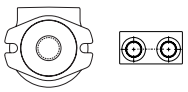
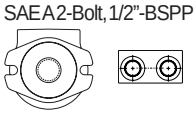
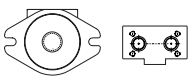
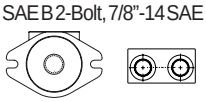
Fonctionnement interm. 10% max. de chaque minute d`utilisation.

Capacidad de funcionamiento intermitente valida para 10% por cada minuto.

11	X	A	–	XXX	–	X	X	–	X	–	X	X	X
Series	Shaft Welle Arbre Ejes	Engineering Design technischer Entwurf Conception technique Diseño de ingeniería		Displacement Schluckvolumen Cylindrée Desplazamiento		Mounting Gehäuse Carter Montaje	Ports Anschluß Plan de raccordement Lumbreras		Thru-Shaft durchgehende Welle arbre traversant Eje pasante		Shaft Material Wellenmaterial Matériel d'arbre Material del eje	Cross-Over Relief Valve Bremslüftventil Soupape de sûreté transversale Válvula de alivio transversal	Paint

Code	
0	1" Keyed 
1	1" 6B Spline 
2	25mm Keyed 
3	1-1/4" Keyed 
5	1-1/4"-14 Tooth Spline 
6	7/8"-13 Tooth Spline 

Code	cm³/U cm³/tr cm³/giro	cu in³/rev
036	59	3.6
054	89	5.4
071	116	7.1
088	144	8.8
106	174	10.6
129	211	12.9
164	269	16.4

Code	
AM	SAE A 2-Bolt, Manifold 
AS	SAE A 2-Bolt, 7/8"-14 SAE 
AT	SAE A 2-Bolt, 1/2"-BSPP 
BM	SAE B 2-Bolt, Manifold 
BS	SAE B 2-Bolt, 7/8"-14 SAE 

Code	
0	No Thru Shaft
1	Thru Shaft
E	Endcoder

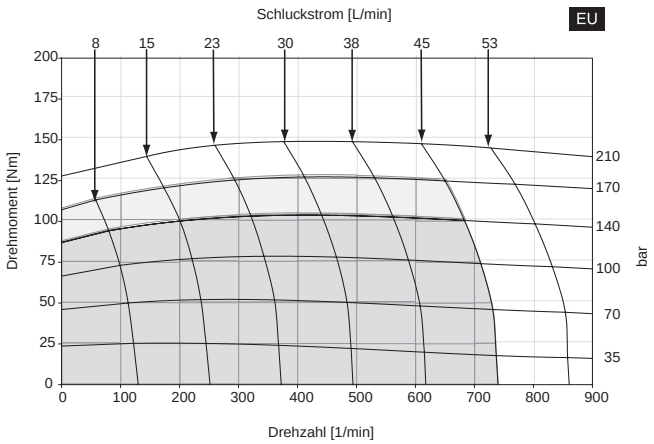
Code	
Omit	If Not Required
S	Stainless Steel

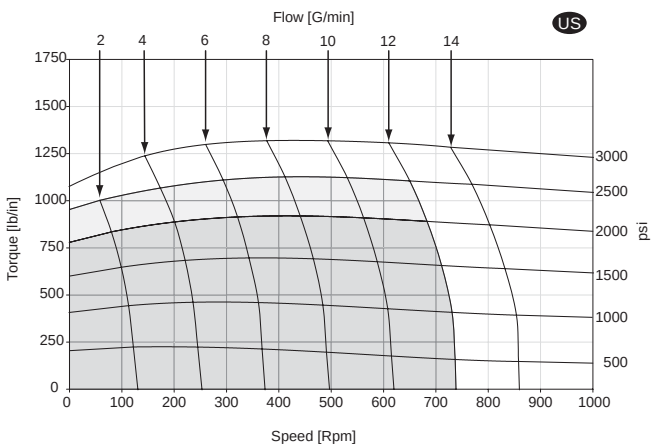
Code	
Omit	If Not Required
R1	Cross-Over Relief Valve

Code	
Omit	No Paint
F	Black Paint Schwarz lackiert

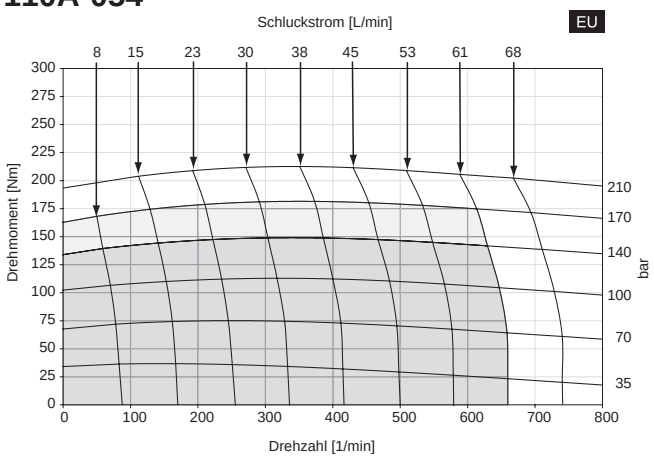
Consult factory for other available options, configurations ordering codes and lead times.

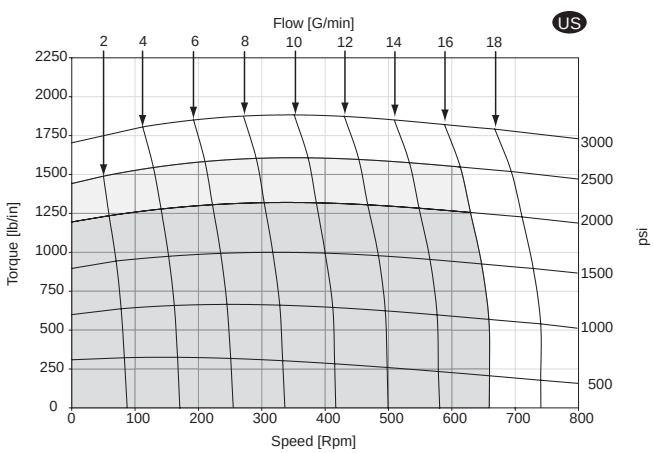
110A 036



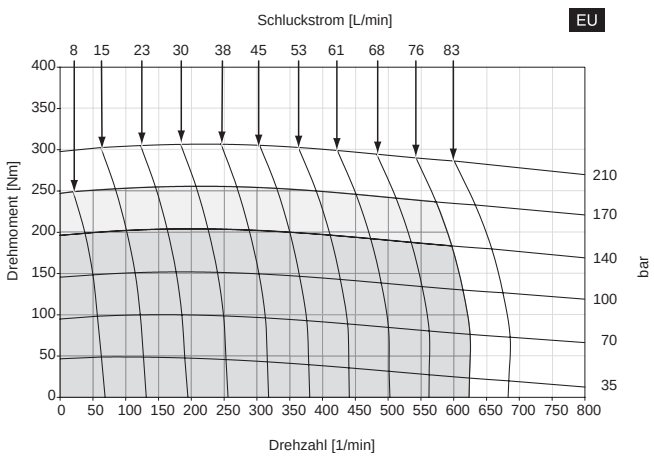


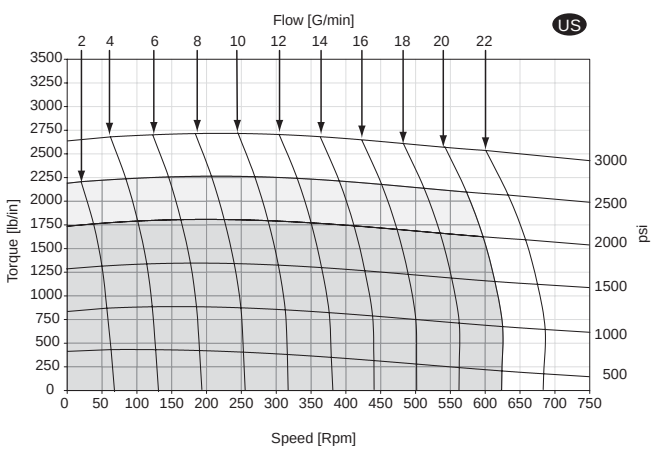
110A 054





110A 071





☐ Cont. ☐ Cont. with no side load
Int. with rated side load ☐ Int.

Intermittent operation rating applies to 10% of every minute.

Fonctionnement interm. 10% max. de chaque minute d`utilisation.

Performance data based on tests using 15W40 oil with a viscosity of 55 cSt (215 SUS) at 54° C (130° F.) Performance data is typical. Actual data may vary slightly from one production motor to another.

Les donnees sur les performances sont basees sur des tests utilisant de l'huile 15W40 d'une viscosite de 55 cSt (215 SUS) a 54°C (130°F). Ces donnees correspondent a des situations typiques. Les donnees reelles peuvent varier legerement d'un moteur de production a l'autre.

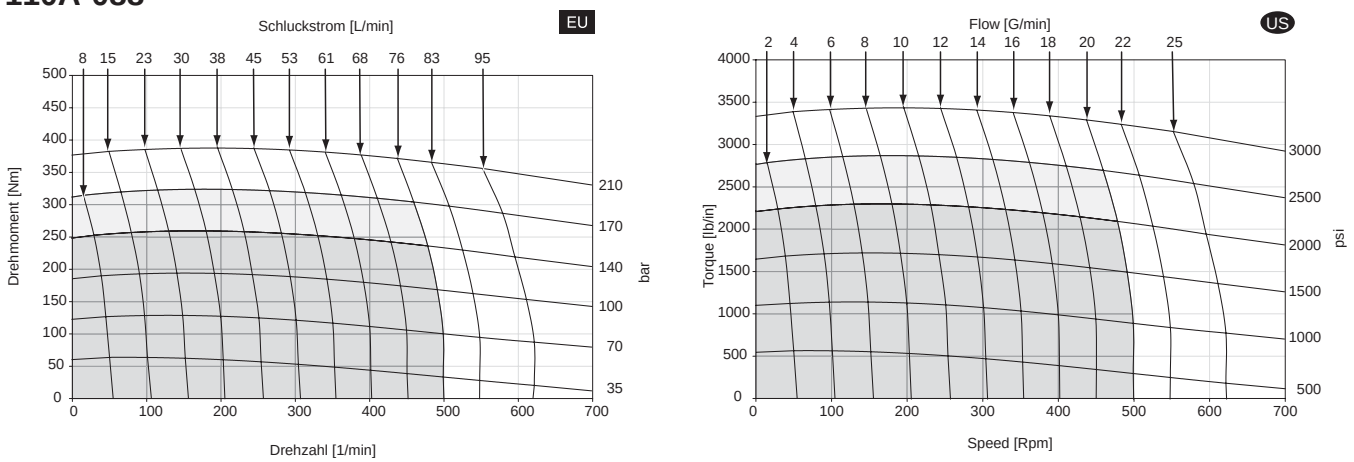
Intermittierende Werte maximal 10% von jeder Betriebsminute.

Capacidad de funcionamiento intermitente valida para 10% por cada minuto.

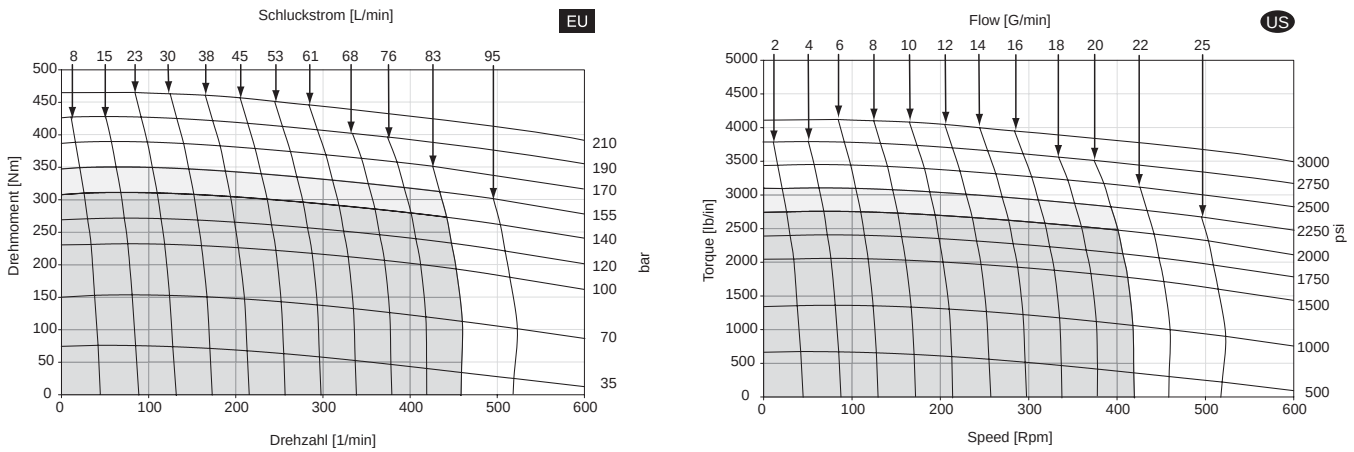
Leistugsdaten sind gemessen mit SAE 15W40 bei einer Viskositaet von 43,1 Cst beo 54°C. Geringfuegige Abweichungen von den Katalogerten sond moeglich.

Datos tecnicos obtenidos con aceite 15W40 de 55 cSt (215 SUS) de viscosidad a 54°C (130°F). Los datos proporcionados son valores tipcos. Los valores exactos reales podrian tener una pequena variacion entre distintos motores.

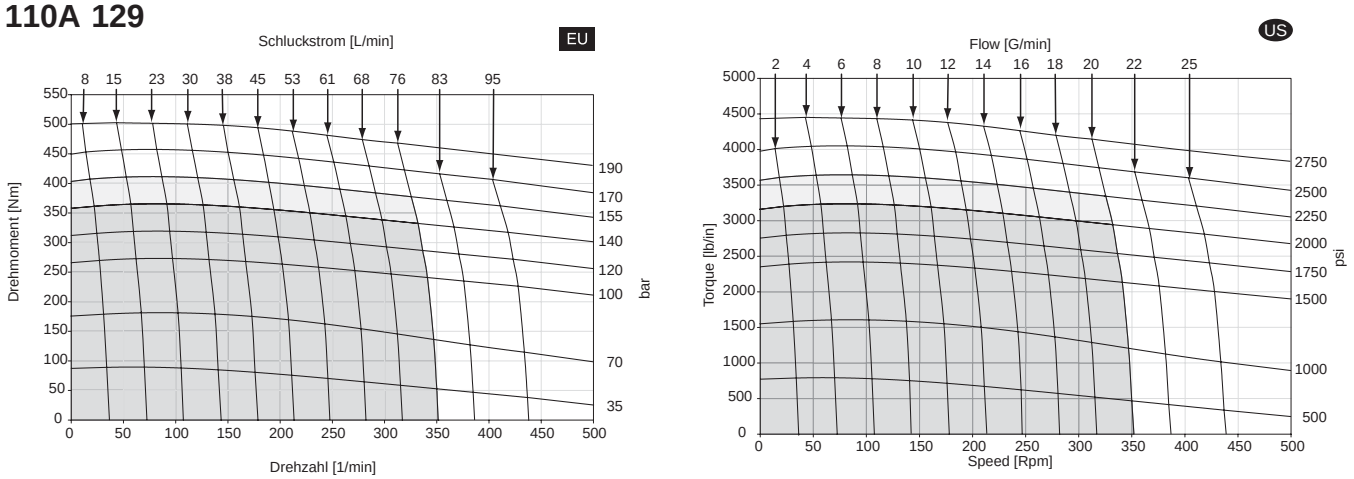
110A 088



110A 106



110A 129



☐ Cont. ☐ Cont. with no side load
Int. with rated side load ☐ Int.

Intermittent operation rating applies to 10% of every minute.

Fonctionnement interm. 10% max. de chaque minute d`utilisation.
Performance data based on tests using 15W40 oil with a viscosity of 55 cSt (215 SUS) at 54° C (130° F.) Performance data is typical. Actual data may vary slightly from one production motor to another.

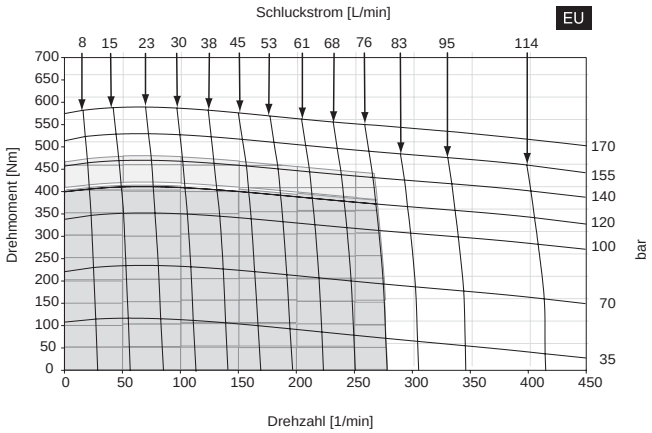
Les donnees sur les performances sont basees sur des tests utilisant de l'huile 15W40 d'une viscosite de 55 cSt (215 SUS) a 54°C (130°F). Ces donnees correspondent a des situations typiques. Les donnees reelles peuvent varier legerement d'un moteur de production a l'autre.

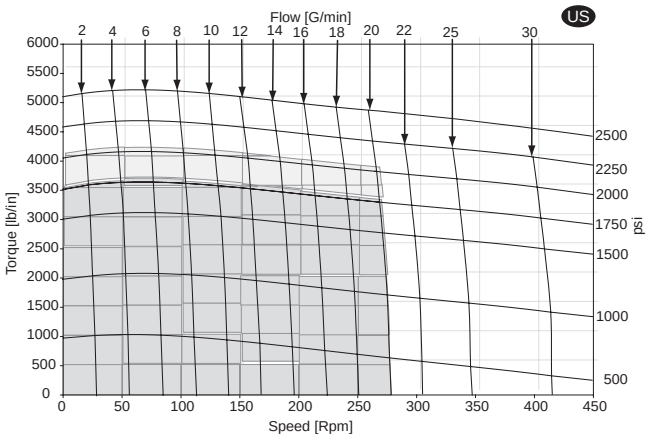
Intermittierende Werte maximal 10% von jeder Betriebsminute.

Capacidad de funcionamiento intermitente valida para 10% por cada minuto.
Leistugsdaten sind gemessen mit SAE 15W40 bei einer Viskositaet von 43,1 Cst beo 54°C. Geringfuegige Abweichungen von den Katalogerten sond moeglich.

Datos tecnicos obtenidos con aceite 15W40 de 55 cSt (215 SUS) de viscosidad a 54°C (130°F). Los datos proporcionados son valores tipcos. Los valores exactos reales podrian tener una pequena variacion entre distintos motores.

110A 164





☐ Cont. ☐ Cont. with no side load
Int. with rated side load ☐ Int.

Intermittent operation rating applies to 10% of every minute.

Fonctionnement interm. 10% max. de chaque minute d`utilisation.

Performance data based on tests using 15W40 oil with a viscosity of 55 cSt (215 SUS) at 54° C (130° F.) Performance data is typical. Actual data may vary slightly from one production motor to another.

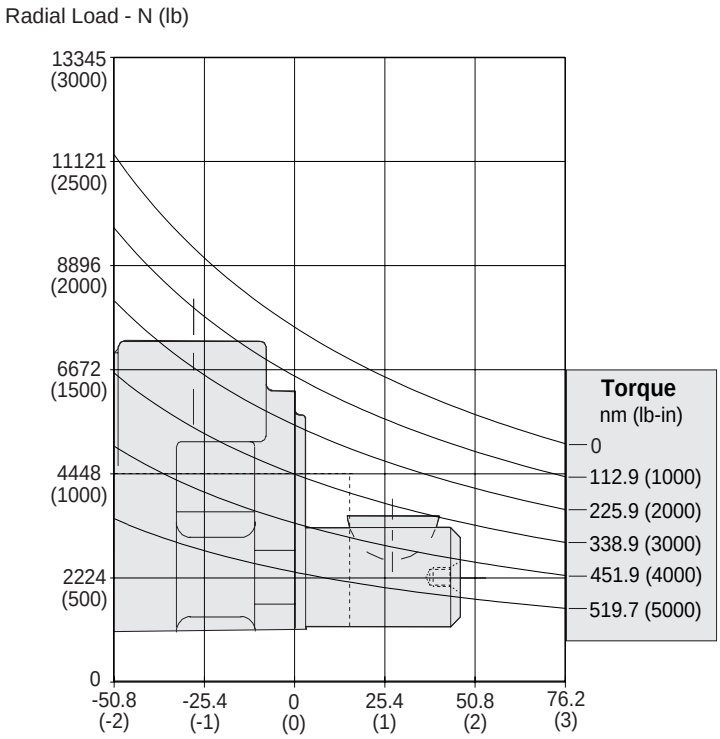
Les donnees sur les performances sont basees sur des tests utilisant de l'huile 15W40 d'une viscosite de 55 cSt (215 SUS) a 54°C (130°F). Ces donnees correspondent a des situations typiques. Les donnees reelles peuvent varier legerement d'un moteur de production a l'autre.

Intermittierende Werte maximal 10% von jeder Betriebsminute.

Capacidad de funcionamiento intermitente valida para 10% por cada minuto.

Leistugsdaten sind gemessen mit SAE 15W40 bei einer Viskositaet von 43,1 Cst beo 54°C. Geringfuegige Abweichungen von den Katalogerten sond moeglich.

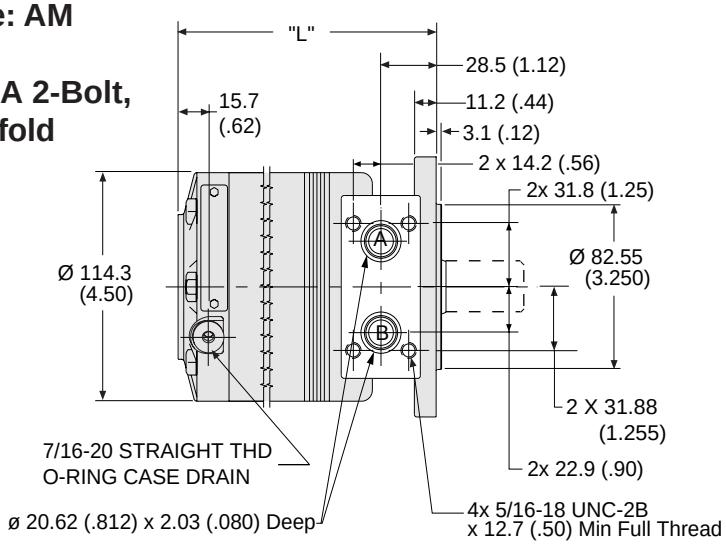
Datos tecnicos obtenidos con aceite 15W40 de 55 cSt (215 SUS) de viscosidad a 54°C (130°F). Los datos proporcionados son valores tipcos. Los valores exactos reales podrian tener una pequena variacion entre distintos motores.

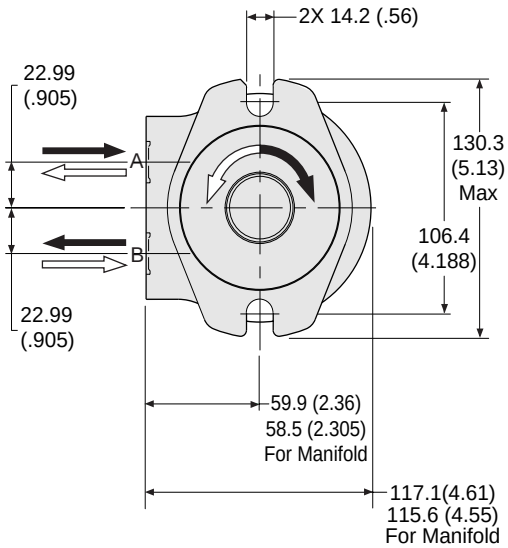


The allowable side load curve is based on L_{10} bushing life of 3 x 10^6 revolutions @ 100 RPM.
Die zulassige radiale Wellenbelastung bezieht sich auf die Lager-Lebensdauer 3 x 10^6 Umdrehungen.
L'effort radial admissible sur l'arbre depend a une duree de vie 3 x 10^6 de rotation.
La curva de carga lateral admisible se basa en vida util de cojinete de 3 x 10 revoluciones.

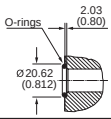
Code: AM

SAE A 2-Bolt, Manifold





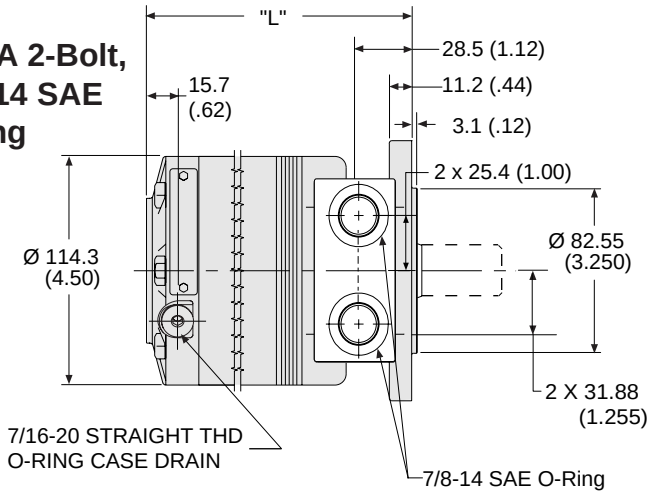
Motor with manifold mount is supplied with 2 O-rings.
Zum Motor mit Universalanschluß werden 2 O-Ringe geliefert.
Deux joints toriques sont livrés avec les moteurs a plan de raccordement universel.
Il blocchetto connessioni é corredato da 2 OR.

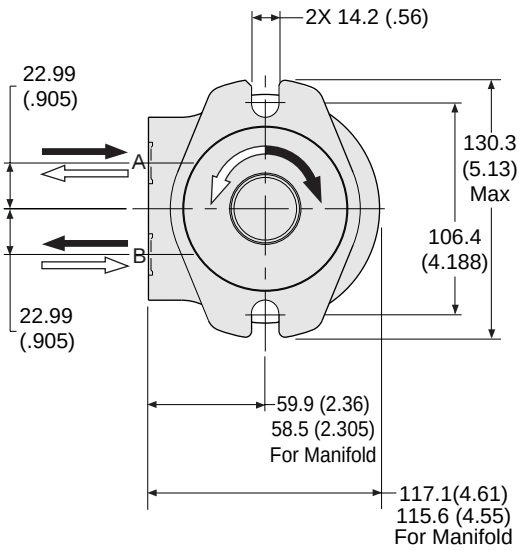


Code AM		036	054	071	088	106	129	164
Weight/Gewicht	**kg**	**7.0**	**7.4**	**7.7**	**8.0**	**8.4**	**8.7**	**9.4**
Poids/Peso	(lb)	(15.4)	(16.2)	(16.9)	(17.5)	(18.4)	(19.1)	(20.6)
Length	**"L" mm**	**112**	**117**	**121**	**127**	**131**	**138**	**147**
	"L" (in)	(4.41)	(4.60)	(4.78)	(4.98)	(5.17)	(5.42)	(5.80)

Code: AS

SAE A 2-Bolt, 7/8“-14 SAE O-Ring



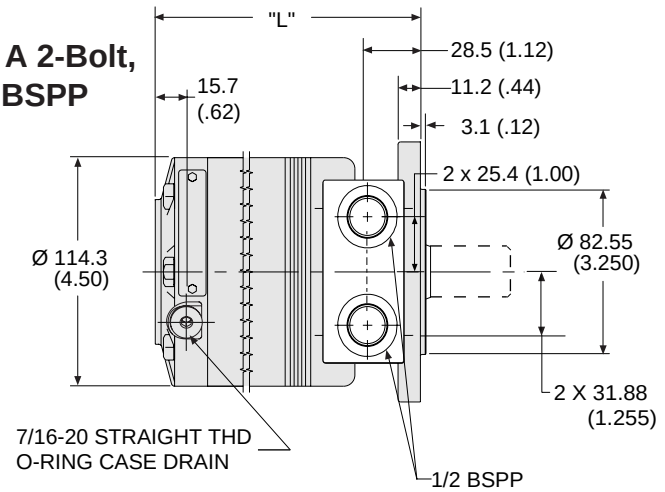


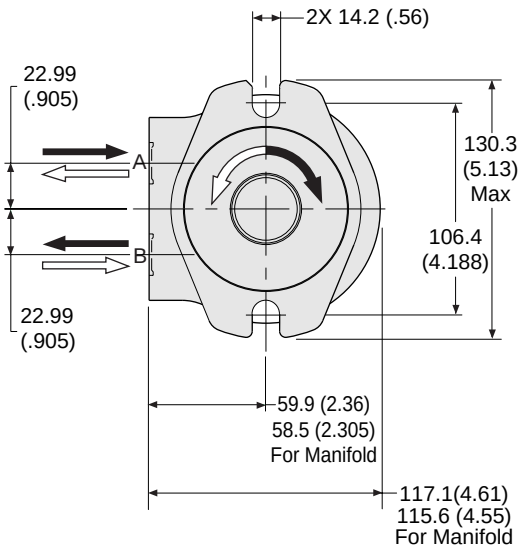
Code AS		036	054	071	088	106	129	164
Weight/Gewicht	**kg**	**7.0**	**7.4**	**7.7**	**8.0**	**8.4**	**8.7**	**9.4**
Poids/Peso	(lb)	(15.4)	(16.2)	(16.9)	(17.5)	(18.4)	(19.1)	(20.6)
Length	**"L" mm**	**112**	**117**	**121**	**127**	**131**	**138**	**147**
	"L" (in)	(4.41)	(4.60)	(4.78)	(4.98)	(5.17)	(5.42)	(5.80)

English equivalents for metric specifications are shown in ( ).

Code: AT

SAE A 2-Bolt, 1/2“ BSPP

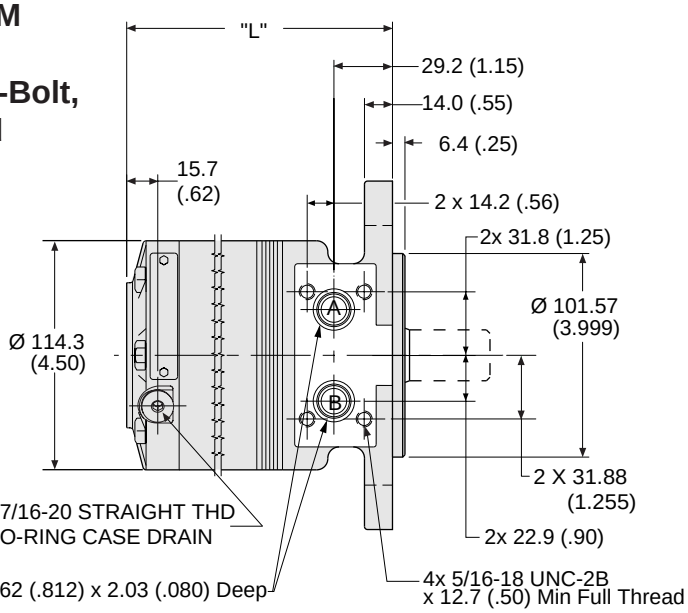


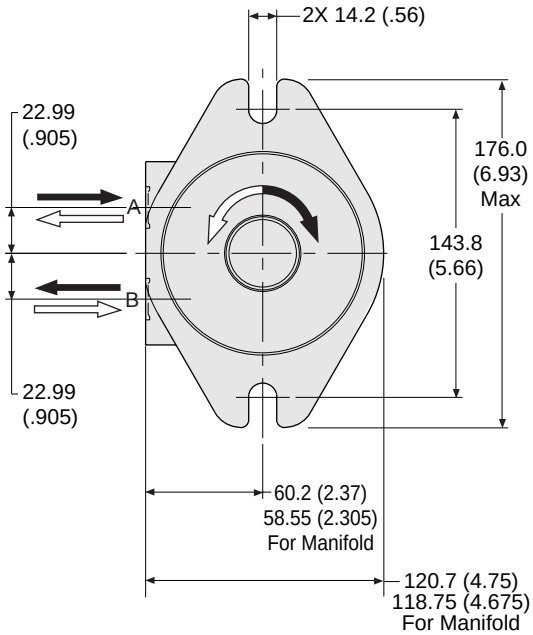


Code AT		036	054	071	088	106	129	164
Weight/Gewicht	**kg**	**7.0**	**7.4**	**7.7**	**8.0**	**8.4**	**8.7**	**9.4**
Poids/Peso	(lb)	(15.4)	(16.2)	(16.9)	(17.5)	(18.4)	(19.1)	(20.6)
Length	**"L" mm**	**112**	**117**	**121**	**127**	**131**	**138**	**147**
	"L" (in)	(4.41)	(4.60)	(4.78)	(4.98)	(5.17)	(5.42)	(5.80)

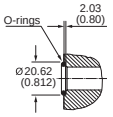
Code: BM

SAE B 2-Bolt, Manifold





Motor with manifold mount is supplied with 2 O-rings.
Zum Motor mit Universalanschluß werden 2 O-Ringe geliefert.
Deux joints toriques sont livrés avec les moteurs a plan de raccordement universel.
Il blocchetto connessioni é corredato da 2 OR.

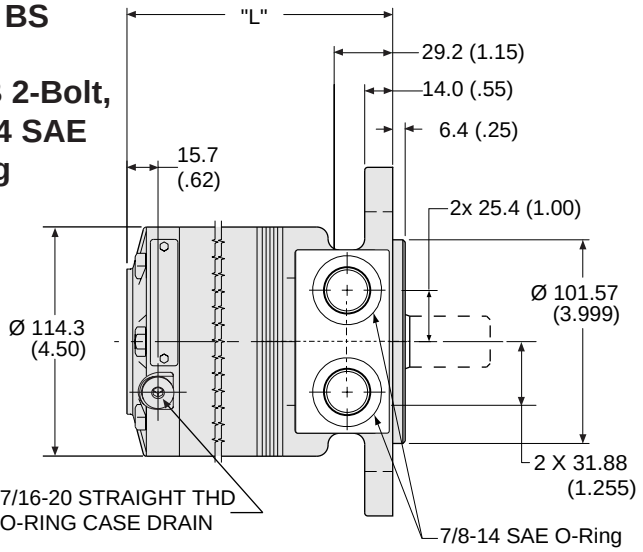


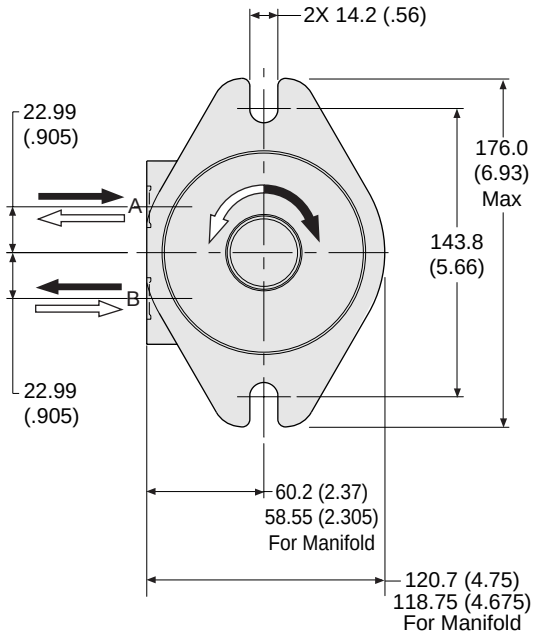
Code BM		036	054	071	088	106	129	164
Weight/Gewicht	**kg**	**7.0**	**7.4**	**7.7**	**8.0**	**8.4**	**8.7**	**9.4**
Poids/Peso	(lb)	(15.4)	(16.2)	(16.9)	(17.5)	(18.4)	(19.1)	(20.6)
Length	**"L" mm**	**112**	**117**	**121**	**127**	**131**	**138**	**147**
	"L" (in)	(4.41)	(4.60)	(4.78)	(4.98)	(5.17)	(5.42)	(5.80)

English equivalents for metric specifications are shown in ( ).

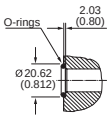
Code: BS

SAE B 2-Bolt, 7/8“-14 SAE O-Ring



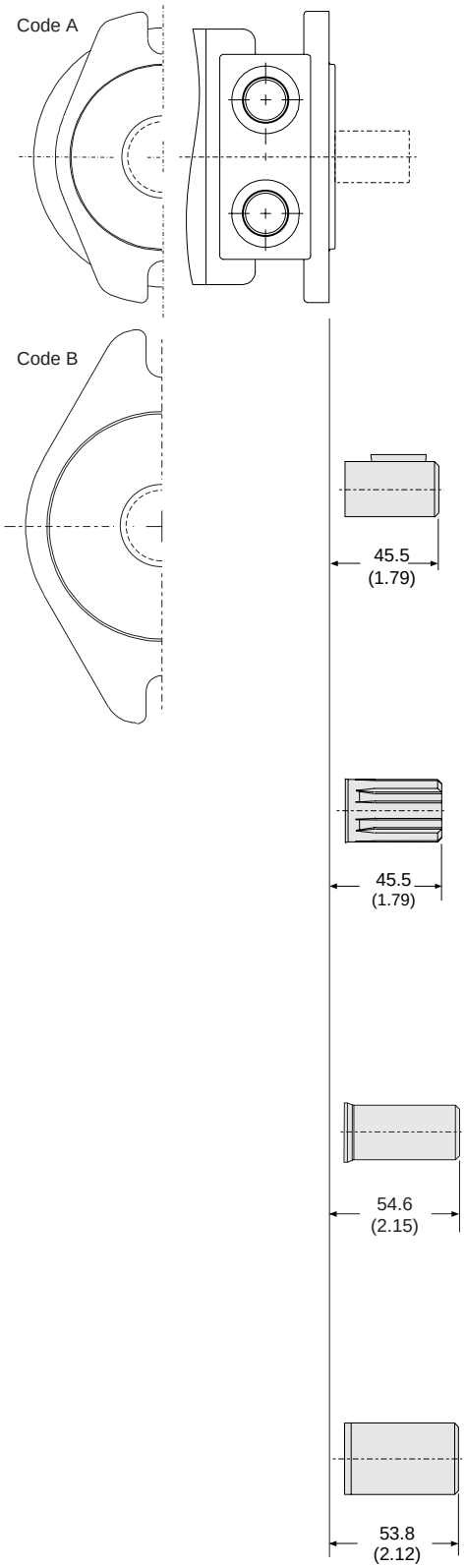


Motor with manifold mount is supplied with 2 O-rings.
Zum Motor mit Universalanschluß werden 2 O-Ringe geliefert.
Deux joints toriques sont livrés avec les moteurs a plan de raccordement universel.
Il blocchetto connessioni é corredato da 2 OR.



Code BS		036	054	071	088	106	129	164
Weight/Gewicht	**kg**	**7.0**	**7.4**	**7.7**	**8.0**	**8.4**	**8.7**	**9.4**
Poids/Peso	(lb)	(15.4)	(16.2)	(16.9)	(17.5)	(18.4)	(19.1)	(20.6)
Length	**"L" mm**	**112**	**117**	**121**	**127**	**131**	**138**	**147**
	"L" (in)	(4.41)	(4.60)	(4.78)	(4.98)	(5.17)	(5.42)	(5.80)

English equivalents for metric specifications are shown in ( ).



Code: 0

1" Keyed

Code: 1

1" 6B Spline

Code: 2

25mm Keyed

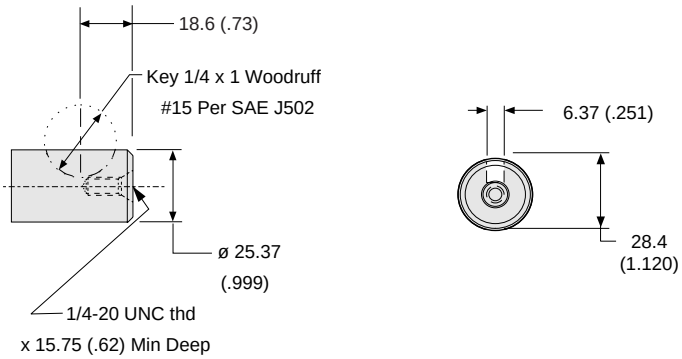
Code: 3

1-1/4" Keyed

English equivalents for metric specifications are shown in ( ).

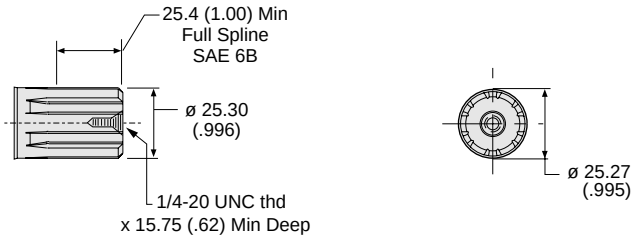
Code: 0

1" Keyed



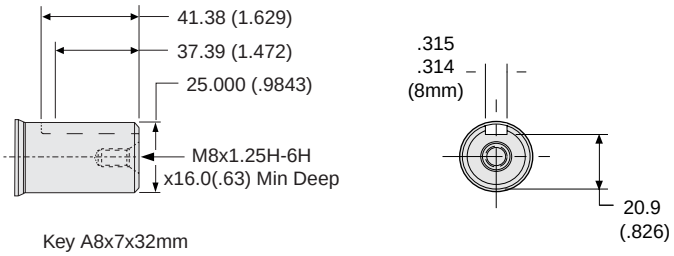
Code: 1

1" 6B Spline



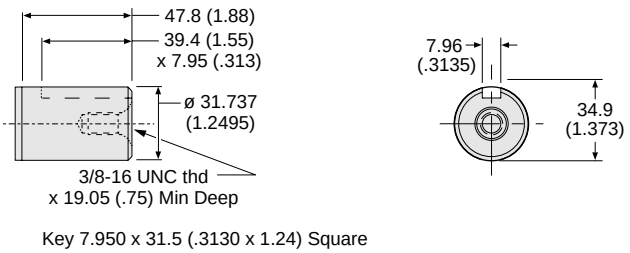
Code: 2

25mm Keyed

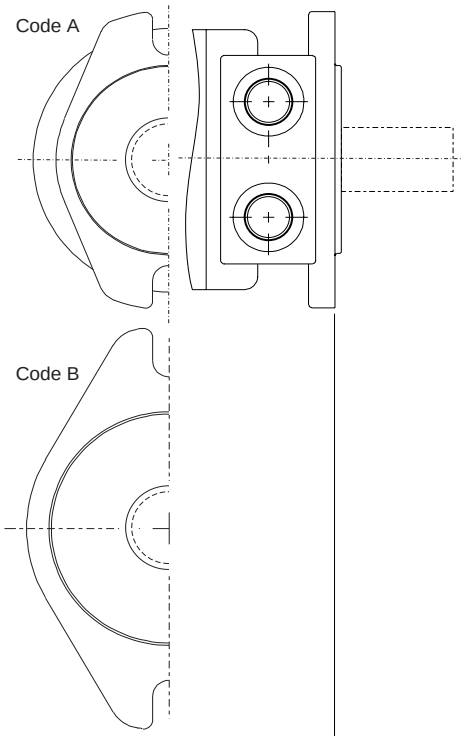


Code: 3

1-1/4" Keyed

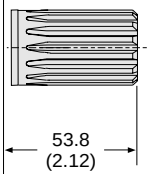


English equivalents for metric specifications are shown in ( ).



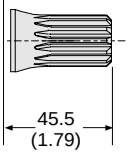
Code: 5

1-1/4"-14 Tooth Spline



Code: 6

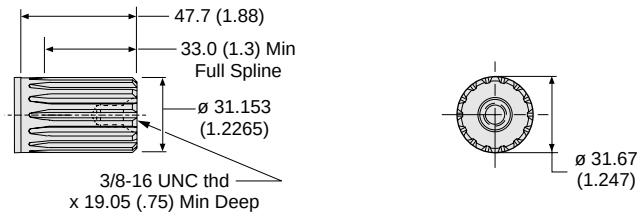
7/8"-13 Tooth Spline



English equivalents for metric specifications are shown in ( ).

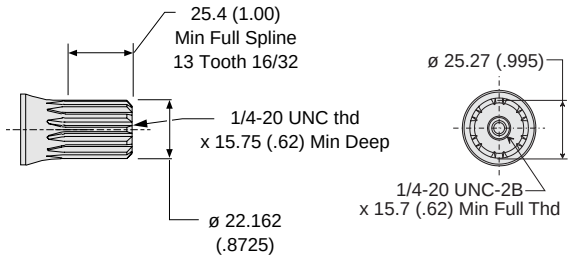
Code: 5

1-1/4"-14 Tooth Spline



Code: 6

7/8"-13 Tooth Spline



English equivalents for metric specifications are shown in ( ).

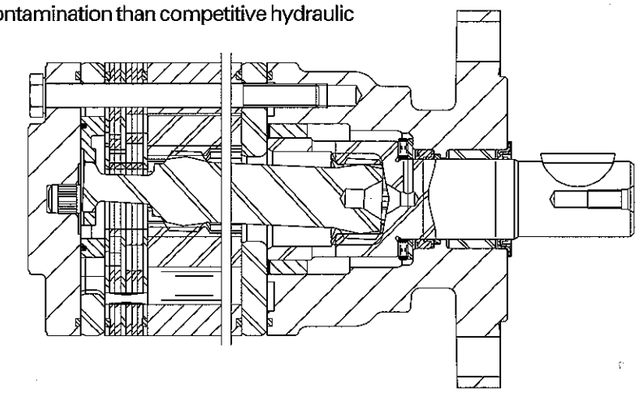
MG Series Torqmotor™

Introduction:

The MG Series Torqmotor™ provides an economical hydraulic motor for light to medium duty applications such as grain augers, spreaders and car wash brushes which require dependable service life. The MG Torqmotor™ is available with industry standard porting, coupling shafts and mounting configurations. In addition, these versatile motors are compatible with many hydraulic systems with regard to pressure, torque and speed requirements.

Features:

- Roller vane rotor set design reduces internal friction and compensates for wear, extending the useful performance life of the Torqmotor™.
- Patented 60-40 spline member arrangement of the mating internal splines transmits more output torque with less weight.
- Full flow lubrication maximizes cooling and provides up to 50% longer life than hydraulic motors not having this feature.
- Balanced performance in both directions of rotation.
- Shaft seal design withstands full system pressures eliminating the added cost of a case drain line.
- Orbital phase shift commutation at 6 times shaft speed provides smooth operation at low shaft speeds.
- Commutation is not affected by side loads, as are competitive spool valve designs. Thus allowing the Torqmotor™ to maintain volumetric efficiency over time.
- More starting torque than competitive motors in applications where the shaft is side loaded. Competitive designs require more pressure and flow to start the motor rotating.
- Overall design is less sensitive to hydraulic system contamination than competitive hydraulic motors.



14 Displacements	...2.7 to 24.0 in³/rev.
Pressures (PSI)	...to 1800 continuous
	...to 2400 intermittent
Flow (GPM)	...to 15
Speed (RPM)	...to 805
Output Torque (lb-in)	...to 3541 continuous
	...to 4418 intermittent

DISPLACEMENTS	MOUNTS	PORTS	OUTPUT SHAFTS	OPTIONS
2.7	SAE A (2 Bolt)	SAE 7/8"-14 O-Ring	1.0" keyed	Paint
3.0	Standard (4 Bolt)	1/2"-14 NPTF	1.0" 6B spline	Black
4.0	4 Bolt	1/2" BSPF	1.0" tapered	White epoxy
5.0	SAE A Long Pilot	Manifold	1.0" w/.38" pin	Corrosion resistance
6.0	(2 Bolt)	Rear Ports	1.0" w/ double pin hole	Free running rotor set
8.0			25 mm keyed	Reverse rotation
10.0			Corrosion resistant	Fluorocarbon seals
12.0				
14.0				
16.0				
18.0				
20.0				
22.6				
24.0				

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

MG Series Specifications

Torqmotor™ Series		MG02	MG03	MG04	MG05	MG06	MG08	MG10	MG12	MG14	MG16	MG18	MG20	MG22	MG24
Displacement	**(in³/rev)**	**2.7**	**3.0**	**4.0**	**5.0**	**6.0**	**8.0**	**10.0**	**12.0**	**14.0**	**16.0**	**18.0**	**20.0**	**22.6**	**24.0**
	(cm³/rev)	*45*	*49*	*65*	*82*	*99*	*130*	*163*	*195*	*228*	*260*	*293*	*328*	*370*	*392*
Pressure	Continuous	**1800**	**1800**	**1800**	**1800**	**1800**	**1800**	**1800**	**1800**	**1500**	**1450**	**1400**	**1350**	**1250**	**1200**
(PSI)	(Differential)[a,d]	*126,6*	*126,6*	*126,6*	*126,6*	*126,6*	*126,6*	*126,6*	*126,6*	*105,5*	*101,9*	*98,4*	*94,9*	*87,9*	*84,4*
(kg/cm²)	Intermittent	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2250**	**2100**	**2000**	**1900**	**1800**	**1650**	**1525**	**1450**
	(Differential)[e,d,e]	*168,7*	*168,7*	*168,7*	*168,7*	*168,7*	*168,7*	*158,2*	*147,6*	*140,6*	*133,6*	*126,6*	*116,0*	*107,2*	*101,9*
Torque	At Continuous Pressure	**555**	**675**	**920**	**1173**	**1347**	**1842**	**2317**	**2821**	**2626**	**2903**	**3141**	**3391**	**3488**	**3541**
(lb-in)	& Continuous Flow	*6,39*	*7,78*	*10,60*	*13,51*	*15,52*	*21,22*	*26,69*	*32,50*	*30,25*	*33,45*	*36,19*	*39,07*	*40,20*	*40,80*
(kg-m)	At Intermittent Pressure	**770**	**936**	**1267**	**1609**	**1863**	**2550**	**2980**	**3360**	**3645**	**3953**	**4194**	**4269**	**4393**	**4418**
	& Continuous Flow	*8,87*	*10,78*	*14,60*	*18,54*	*21,46*	*29,38*	*34,33*	*38,71*	*41,99*	*45,54*	*48,32*	*49,18*	*50,63*	*50,90*
	Minimum Starting at	**341**	**319**	**582**	**816**	**1050**	**1482**	**1760**	**2388**	**2354**	**2573**	**2724**	**2942**	**3296**	**3003**
	Continuous Pressure	*3,93*	*3,68*	*6,71*	*9,40*	*12,10*	*17,07*	*20,28*	*27,51*	*27,12*	*29,64*	*31,38*	*33,90*	*37,98*	*34,60*
	Minimum Starting at	**461**	**619**	**875**	**1226**	**1400**	**2024**	**2331**	**2872**	**3121**	**3498**	**3544**	**3590**	**4021**	**3845**
	Intermittent Pressure	*5,31*	*7,13*	*10,08*	*14,12*	*16,13*	*23,32*	*26,86*	*33,09*	*35,96*	*40,30*	*40,83*	*41,36*	*46,34*	*44,30*
Flow	Continuous	**9**	**9**	**9**	**9**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
(GPM)		*34*	*34*	*34*	*34*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*
(lpm)	Maximum	**9**	**9**	**9**	**9**	**12**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**
		34	*34*	*34*	*34*	*45*	*57*	*57*	*57*	*57*	*57*	*57*	*57*	*57*	*57*
Speed	At Cont. Flow & Pressure	722	623	476	379	430	327	257	221	190	167	147	131	117	
111															
(RPM)	At Maximum Flow[b] 785	678	511	409	454	430	343	287	246	216	191	171	147	143	
Weight	4 Bolt	**12.4**	**12.5**	**12.8**	**13.1**	**13.4**	**13.9**	**14.6**	**15.5**	**15.8**	**16.3**	**16.8**	**17.5**	**18.2**	**18.5**
(lbs)		*5,61*	*5,68*	*5,82*	*5,93*	*6,08*	*6,32*	*6,61*	*6,91*	*7,14*	*7,39*	*7,63*	*7,92*	*8,26*	*8,38*
(kg)	SAE A (2 Bolt)	**13.3**	**13.5**	**13.8**	**14.0**	**14.3**	**14.9**	**15.5**	**16.2**	**16.7**	**17.2**	**17.8**	**18.4**	**19.1**	**19.4**
		6,03	*6,10*	*6,24*	*6,36*	*6,51*	*6,76*	*7,03*	*7,34*	*7,57*	*7,81*	*8,06*	*8,34*	*8,66*	*8,81*
	Standard (4 Bolt)	**13.9**	**14.1**	**14.4**	**14.6**	**14.9**	**15.5**	**16.1**	**16.8**	**17.3**	**17.9**	**18.4**	**19.0**	**19.7**	**20.0**
		6,03	*6,40*	*6,53*	*6,62*	*6,76*	*7,03*	*7,30*	*7,62*	*7,85*	*8,12*	*8,35*	*8,62*	*8,94*	*9,07*
	SAE Long Pilot	**13.5**	**13.7**	**14.0**	**14.2**	**14.5**	**15.1**	**15.7**	**16.4**	**16.9**	**17.4**	**18.0**	**18.6**	**19.3**	**19.6**
	(2 Bolt)	*6,12*	*6,21*	*6,35*	*6,44*	*6,58*	*6,85*	*7,12*	*7,44*	*7,67*	*7,89*	*8,16*	*8,44*	*8,75*	*8,89*
Length[c]	SAE A (2 Bolt) or 4 Bolt	**5.36**	**5.42**	**5.54**	**5.67**	**5.79**	**6.04**	**6.29**	**6.54**	**6.79**	**7.04**	**7.29**	**7.54**	**7.82**	**8.05**
(in)	or Standard (4 Bolt)	*136,1*	*137,7*	*140,7*	*144,0*	*147,0*	*153,4*	*159,8*	*166,1*	*172,5*	*178,8*	*185,2*	*191,5*	*198,6*	*204,5*
(mm)	SAE A Long Pilot	**5.18**	**5.24**	**5.36**	**5.49**	**5.61**	**5.86**	**6.11**	**6.36**	**6.61**	**6.86**	**7.11**	**7.36**	**7.64**	**7.87**
	(2 Bolt)	*131,6*	*133,1*	*136,1*	*139,5*	*142,5*	*148,8*	*155,2*	*161,5*	*167,9*	*174,2*	*180,6*	*186,9*	*194,1*	*199,9*

[a] The maximum pressure at the motor inlet or outlet ports without regard to the continuous or intermittent pressure ratings is 2400 PSI (168,7 kg/cm²).

[b] For applications with RPM requirements in excess of the maximum rating, consult the factory.

[c] Nominal length from the motor mounting face to the back end of the motor.

[d] Differential pressure is the difference between inlet and outlet port pressures.

[e] Intermittent pressure applies to a maximum of 10% of every minute.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

MG Series Performance Charts

Series: MGO2 (2.7 in³/rev)

Pressure: (PSID)	500	1000	1500	1800	2000	2400
Flow (GPM)	Speed (RPM)					
	Torque (lb-in)					
0.5	31	17				
	116	263				
1.0	76	61	43	36	29	18
	124	276	427	518	579	706
2.0	167	149	131	121	113	97
	134	294	453	547	609	731
3.0	256	239	220	210	200	183
	132	293	455	553	617	746
4.0	344	326	307	295	285	268
	132	296	465	567	635	769
5.0	433	414	393	380	370	352
	128	294	465	569	639	779
7.0	609	589	566	551	540	520
	117	284	458	564	635	779
9.0	785	764	739	722	710	689
	107	275	449	555	627	770

Series: MGO3 (3.0 in³/rev)

Pressure: (PSID)	500	1000	1500	1800	2000	2400
Flow (GPM)	Speed (RPM)					
	Torque (lb-in)					
0.5	26	13				
	144	319				
1.0	65	50	35	28	21	9
	154	338	518	625	697	840
2.0	141	127	110	102	94	80
	163	360	555	671	746	896
3.0	218	203	186	177	169	153
	161	358	557	675	753	907
4.0	295	279	261	251	243	227
	160	361	567	691	774	937
5.0	371	355	337	326	317	301
	155	358	566	693	777	946
7.0	525	507	487	474	466	448
	143	346	558	686	772	946
9.0	678	658	638	623	614	595
	133	336	546	675	761	936

Testing was done at 130°F using 10W40 Oil.

Data is based on average performance of randomly selected motors.

▒▒▒ - Intermittent rating- all others continuous.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

MG Series Performance Charts

Series: MGO4 (4.0 in³/rev)

Pressure: (PSID)	500	1000	1500	1800	2000	2400
Flow (GPM)	Speed (RPM)					
	Torque (lb-in)					
0.5	22	14	6			
	213	459	709			
1.0	51	42	34	29	25	17
	224	479	734	887	989	1193
2.0	108	99	90	85	81	71
	233	500	767	926	1033	1244
3.0	166	156	147	141	136	126
	231	498	769	932	1039	1252
4.0	224	214	203	197	192	181
	229	501	778	945	1056	1278
5.0	281	271	260	252	247	237
	223	497	777	946	1058	1284
7.0	396	385	372	364	359	347
	206	481	764	936	1050	1280
9.0	511	499	485	476	470	457
	192	467	749	920	1035	1267

Series: MG05 (5.0 in³/rev)

Pressure: (PSID)	500	1000	1500	1800	2000	2400
Flow (GPM)	Speed (RPM)					
	Torque (lb-in)					
0.5	17	10	4			
	256	562	877			
1.0	40	33	26	21	18	10
	269	585	905	1097	1226	1487
2.0	86	78	70	66	62	53
	285	616	950	1150	1283	1550
3.0	132	124	116	110	106	97
	285	619	959	1163	1298	1566
4.0	178	170	161	155	151	141
	286	628	976	1187	1327	1608
5.0	225	216	206	200	196	185
	282	627	979	1193	1335	1621
7.0	317	307	296	290	285	274
	267	615	972	1189	1333	1624
9.0	409	398	387	379	374	362
	252	600	956	1173	1318	1609

Testing was done at 130°F using 10W40 Oil.

Data is based on average performance of randomly selected motors.

▒▒▒ - Intermittent rating- all others continuous.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

MG Series Performance Charts

Series: MG06 (6.0 in³/rev)

Pressure: (PSID)	500	1000	1500	1800	2000	2400
Flow (GPM)	Speed (RPM)					
	Torque (lb-in)					
0.5	16	13	9	7	5	
	310	669	1035	1258	1408	
1.0	35	32	27	25	23	18
	330	697	1073	1298	1448	1737
2.0	73	69	64	61	59	53
	346	732	1121	1353	1509	1822
3.0	111	107	102	98	95	89
	345	735	1134	1371	1530	1844
4.0	149	144	139	135	132	126
	347	747	1158	1403	1569	1892
5.0	187	182	176	172	169	162
	343	750	1164	1411	1578	1909
7.0	264	257	250	246	242	235
	327	738	1159	1411	1580	1917
9.0	340	333	325	319	316	307
	301	715	1139	1395	1566	1909
12.0	454	446	437	430	426	417
	257	669	1091	1347	1518	1863

Series: MG08 (8.0 in³/rev)

Pressure: (PSID)	500	1000	1500	1800	2000	2400
Flow (GPM)	Speed (RPM)					
	Torque (lb-in)					
0.5	12	10	7	5	3	
	446	955	1479	1797	2011	
1.0	27	24	21	19	17	13
	465	989	1515	1831	2043	2469
2.0	55	52	49	46	44	40
	481	1023	1571	1901	2120	2558
3.0	84	81	77	74	72	67
	482	1029	1581	1912	2133	2570
4.0	113	109	105	102	100	95
	483	1042	1605	1940	2164	2608
5.0	142	138	133	130	128	122
	478	1041	1610	1951	2179	2632
7.0	199	195	190	186	184	177
	450	1019	1597	1943	2174	2632
9.0	257	252	246	242	239	233
	414	984	1563	1911	2145	2612
12.0	343	338	331	327	323	316
	335	907	1489	1842	2076	2550
15.0	430	424	416	411	407	399
	253	816	1393	1740	1974	2443

Testing was done at 130°F using 10W40 Oil.

Data is based on average performance of randomly selected motors.

▒▒▒▒ - Intermittent rating- all others continuous.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

MG Series Performance Charts

Series: MG10 (10.0 in³/rev)

Pressure: (PSID)	500	1000	1500	1800	2250
Flow (GPM)	Speed (RPM)				
	Torque (lb-in)				
0.5	9	7	4	3	
	529	1137	1769	2149	
1.0	21	18	15	13	9
	556	1181	1819	2201	2776
2.0	44	40	37	34	29
	580	1238	1909	2314	2912
3.0	67	63	59	56	51
	584	1248	1926	2332	2934
4.0	90	86	82	78	73
	592	1276	1968	2382	3000
5.0	113	109	104	101	95
	588	1283	1988	2412	3045
7.0	159	154	149	145	139
	560	1268	1987	2418	3062
9.0	205	200	194	190	183
	517	1230	1957	2393	3047
12.0	274	268	262	257	250
	425	1141	1874	2317	2980
15.0	343	337	330	325	317
	321	1033	1759	2197	2859

Series: MG12 (11.9 in³/rev)

Pressure: (PSID)	500	1000	1500	1800	2100
Flow (GPM)	Speed (RPM)				
	Torque (lb-in)				
0.5	9	8	7	6	5
	688	1490	2329	2841	3353
1.0	18	17	16	15	14
	718	1537	2380	2890	3402
2.0	38	36	35	33	32
	746	1580	2443	2962	3480
3.0	57	55	53	52	50
	745	1592	2452	2973	3494
4.0	76	74	72	71	69
	746	1607	2482	3008	3528
5.0	95	93	91	89	87
	737	1601	2480	3011	3537
7.0	134	131	129	127	125
	697	1572	2455	2986	3514
9.0	172	169	167	164	162
	641	1510	2398	2934	3472
12.0	230	227	223	221	217
	530	1391	2283	2821	3360
15.0	287	284	280	277	273
	399	1252	2130	2662	3200

Testing was done at 130°F using 10W40 Oil.

Data is based on average performance of randomly selected motors.

▒▒▒▒ - Intermittent rating- all others continuous.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

MG Series Performance Charts

Series: MG14 (13.9 in³/rev)

Pressure: (PSID)	500	1000	1500	2000
Flow (GPM)	Speed (RPM)			
	Torque (lb-in)			
0.5	8	7	6	5
	796	1704	2640	3597
1.0	16	15	14	13
	818	1733	2681	3649
2.0	32	31	30	28
	840	1775	2732	3700
3.0	49	47	46	43
	845	1789	2750	3725
4.0	65	64	62	59
	848	1815	2789	3762
5.0	82	80	78	74
	840	1813	2797	3782
7.0	114	112	110	106
	799	1790	2785	3776
9.0	147	145	142	138
	741	1738	2738	3741
12.0	197	194	190	185
	613	1615	2626	3645
15.0	246	243	239	233
	473	1643	2457	3467

Series: MG16 (15.9 in³/rev)

Pressure: (PSID)	500	1000	1450	1900
Flow (GPM)	Speed (RPM)			
	Torque (lb-in)			
0.5	7	6	5	4
	906	1947	2910	3896
1.0	14	13	12	11
	932	1984	2964	3957
2.0	28	27	26	24
	958	2032	3025	4032
3.0	43	41	40	38
	961	2047	3045	4052
4.0	57	56	54	52
	963	2074	3086	4098
5.0	71	70	68	65
	954	2074	3096	4117
7.0	100	99	96	93
	909	2049	3084	4112
9.0	129	127	125	121
	844	1991	3032	4070
12.0	172	170	167	162
	696	1851	2903	3953
15.0	216	213	209	204
	540	1683	2711	3753

Testing was done at 130°F using 10W40 Oil.

Data is based on average performance of randomly selected motors.

- Intermittent rating- all others continuous.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

MG Series Performance Charts

Series: MG18 (17.9 in³/rev)

Pressure: (PSID)	500	1000	1400	1800
Flow (GPM)	Speed (RPM)			
	Torque (lb-in)			
0.5	6	5	4	3
	1039	2229	3208	4200
1.0	12	11	10	9
	1069	2281	3265	4248
2.0	25	24	22	20
	1098	2332	3337	4343
3.0	38	36	35	32
	1100	2344	3353	4356
4.0	50	49	47	44
	1098	2366	3386	4398
5.0	63	61	60	57
	1086	2361	3391	4415
7.0	89	87	85	81
	1034	2325	3361	4394
9.0	114	112	109	106
	955	2250	3295	4337
12.0	153	150	147	142
	792	2085	3141	4194
15.0	191	188	185	180
	506	1879	2908	3955

Series: MG20 (20.0 in³/rev)

Pressure: (PSID)	500	1000	1350	1650
Flow (GPM)	Speed (RPM)			
	Torque (lb-in)			
0.5	5	4	4	3
	1192	2498	3425	4227
1.0	11	10	9	8
	1224	2555	3495	4299
2.0	22	21	20	18
	1255	2620	3581	4406
3.0	34	32	31	29
	1259	2633	3597	4424
4.0	45	43	42	40
	1258	2666	3645	4480
5.0	56	55	53	51
	1243	2665	3657	4505
7.0	79	77	75	73
	1186	2627	3634	4492
9.0	102	100	97	94
	1092	2544	3563	4431
12.0	137	134	131	127
	905	2363	3391	4269
15.0	171	168	165	161
	692	2129	3136	4001

Testing was done at 130°F using 10W40 Oil.

Data is based on average performance of randomly selected motors.

- Intermittent rating- all others continuous.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

MG Series Performance Charts

Series: MG22 (22.6 cid)

Pressure: (PSID)	500	1000	1250	1525
Flow (GPM)	Speed (RPM)			
	Torque (lb-in)			
0.5	5	4	4	3
	1393	2942	3734	4617
1.0	10	9	9	8
	1444	3005	3796	4672
2.0	20	19	18	17
	1494	3090	3890	4769
3.0	30	29	28	27
	1485	3082	3883	4765
4.0	40	39	38	36
	1477	3089	3897	4783
5.0	50	49	48	46
	1452	3075	3887	4775
7.0	70	69	67	65
	1371	3009	3826	4719
9.0	90	89	87	85
	1260	2899	3721	4621
12.0	121	119	117	115
	1002	2658	3488	4393
15.0	151	149	147	144
	709	2355	3190	4095

Series: MG24 (24.0 in³/rev)

Pressure: (PSID)	500	1000	1200	1450
Flow (GPM)	Speed (RPM)			
	Torque (lb-in)			
0.5	4	3	2	2
	1309	2885	3534	4359
1.0	9	8	7	6
	1368	2948	3589	4394
2.0	18	17	16	15
	1417	3028	3683	4516
3.0	28	26	26	24
	1427	3058	3714	4540
4.0	37	36	35	34
	1443	3102	3764	4595
5.0	47	45	45	43
	1439	3120	3790	4630
7.0	66	65	64	62
	1392	3110	3792	4642
9.0	85	84	83	81
	1297	3040	3732	4597
12.0	114	112	111	110
	1087	2835	3541	4418
15.0	143	141	140	138
	831	2571	3272	4145

Testing was done at 130°F using 10W40 Oil.

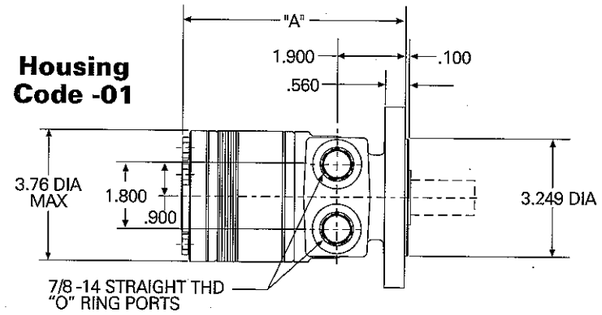
Data is based on average performance of randomly selected motors.

▒▒▒ - Intermittent rating- all others continuous.

Ross Operation
2745 Snapps Ferry Road
Greeneville, TN 37745 USA

MG Series Dimensions

Housing Code -01



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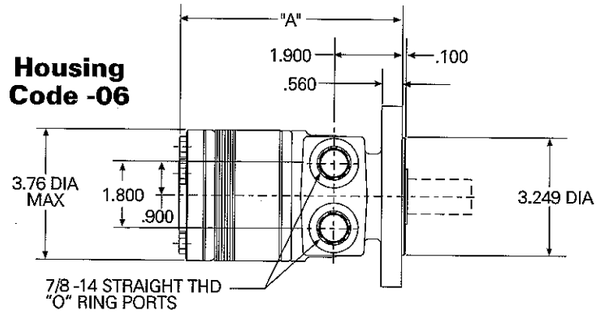
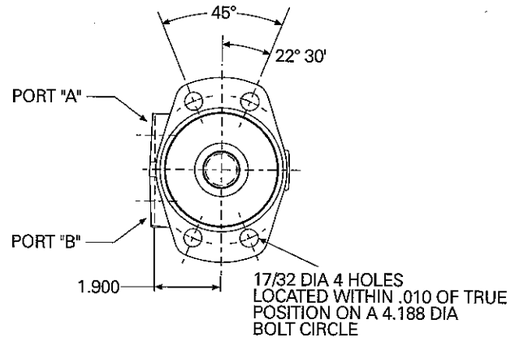
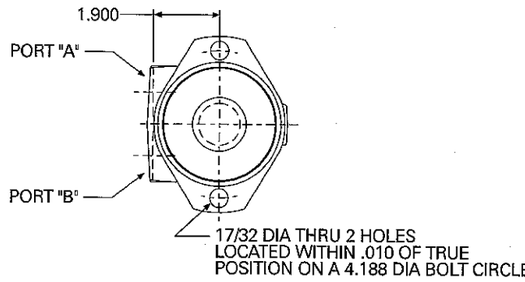
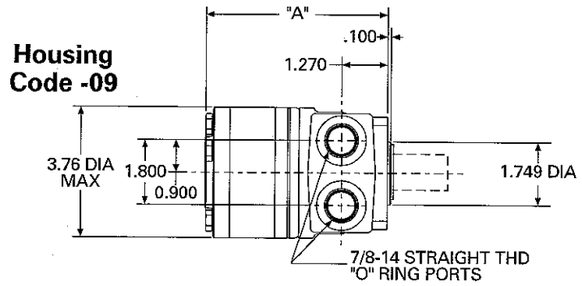
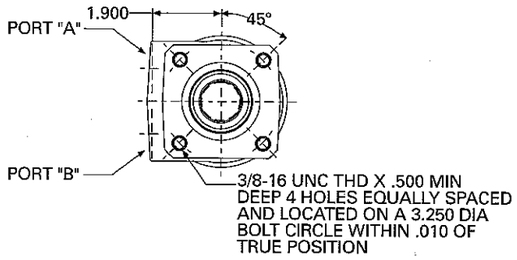






Housing Code -09





Notes:

1. All dimensions are for reference only.
2. Counter clockwise rotation (as viewed from shaft end) pressurize Port "B".

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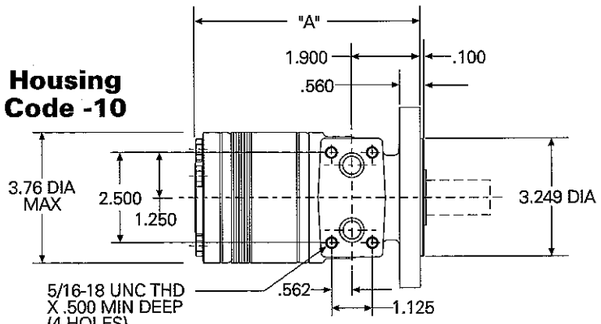
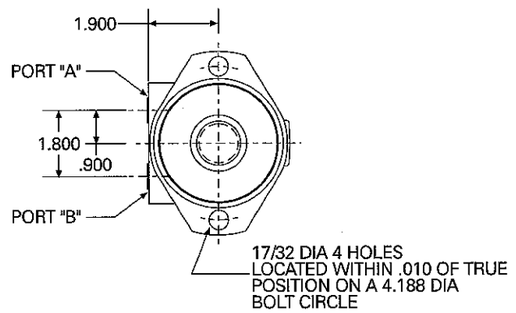
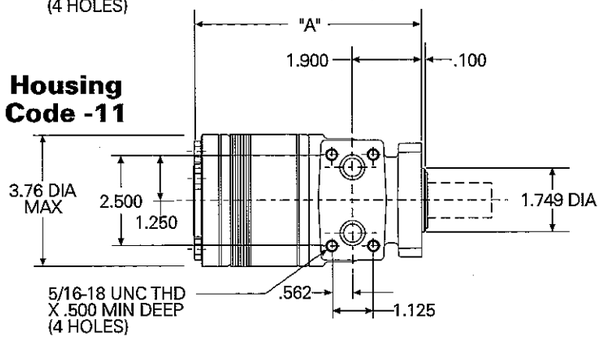
MG Series Dimensions

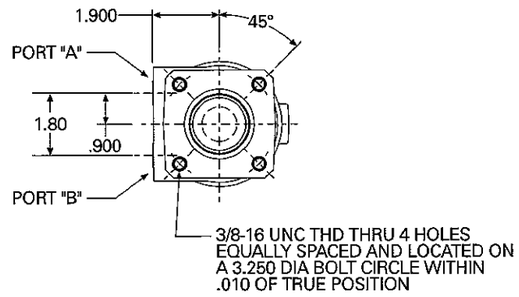
Housing Code -10



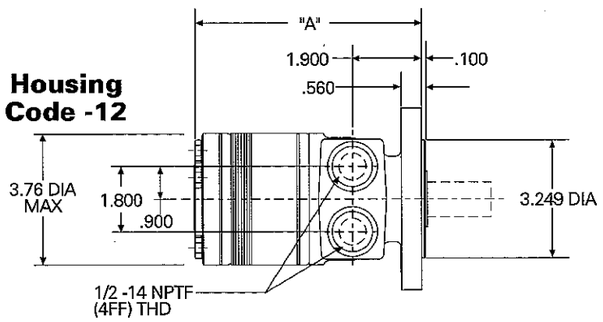


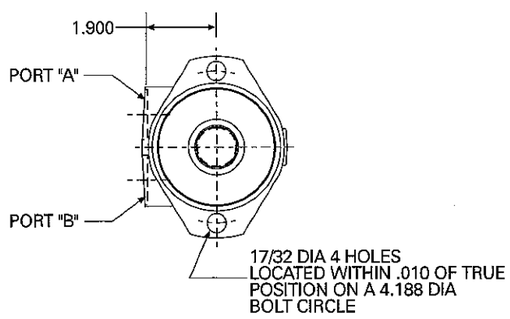
Housing Code -11



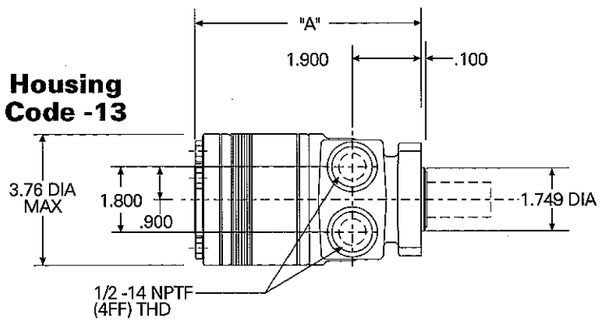


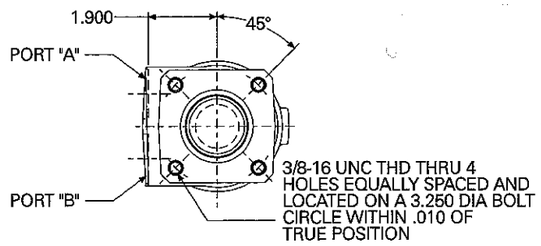
Housing Code -12





Housing Code -13





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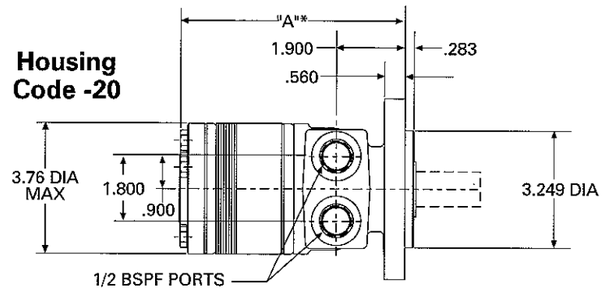
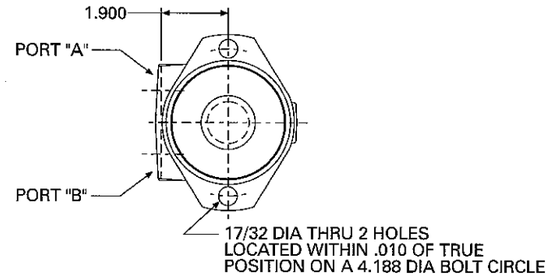
MG Series Dimensions

Housing Code -20





Housing Code -16: Same as Housing Code -06 except 1/2 BSPF Ports.
Housing Code -18: Same as Housing Code -09 except Rear Ports.
Housing Code -19: Same as Housing Code -01 except 1/2 BSPF Ports.
Housing Code -25: Same as housing Code -01 except with Manifold Ports.
Housing Code -30: Same as Housing Code -09 except with M8 Threads and 7/8-14 "O" Ring Ports.

*For Housing Code -20 subtract .18 from "A" dimension value

"A" Dimensions

		MG02	MG03	MG04	MG05	MG06	MG08	MG10	MG12	MG14	MG16	MG18	MG20	MG22	MG24
SAE A (2 Bolt)/	**(in)**	**5.32**	**5.38**	**5.50**	**5.63**	**5.75**	**6.00**	**6.25**	**6.50**	**6.75**	**7.00**	**7.25**	**7.50**	**7.82**	**8.01**
Standard/4 Bolt*	*(mm)*	*135,1*	*136,7*	*139,7*	*143,0*	*146,1*	*152,4*	*158,8*	*165,1*	*171,5*	*177,8*	*184,2*	*190,5*	*198,6*	*203,5*

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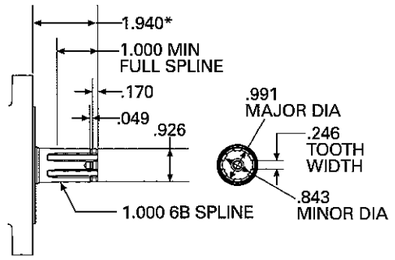
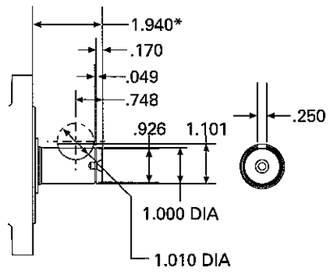
MG Series Shaft Options

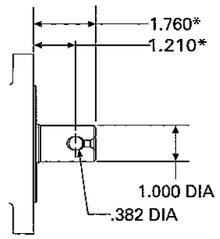
Shaft Code -01



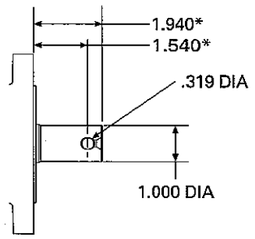
Shaft Code -13



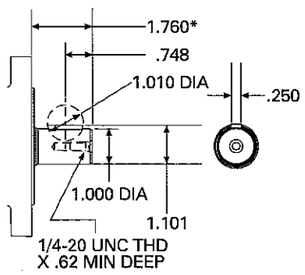
Shaft Code -09



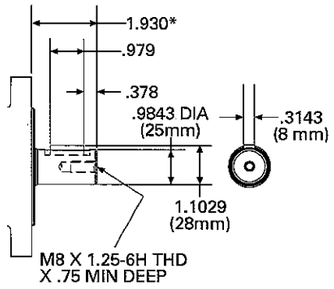
Shaft Code -15



Shaft Code -10



Shaft Code -26



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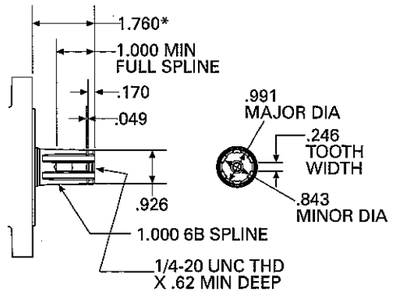

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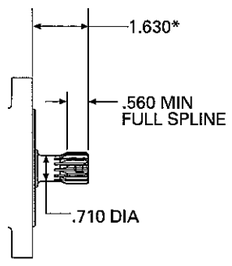

Notes:

1. All dimensions are for reference only.
2. For dimensions of other shaft options consult the factory.

* For Housing Code -20 add .18 to dimension shown.

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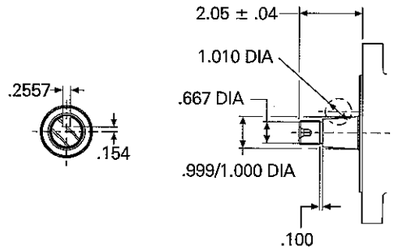
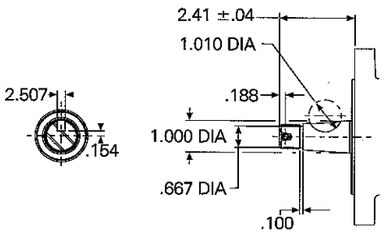
MG Series Shaft Options

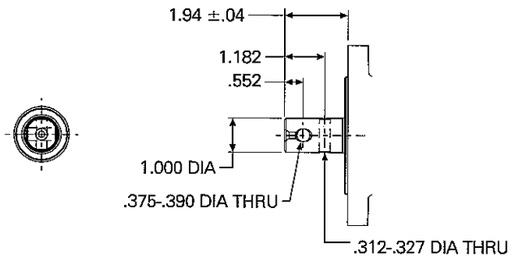
Shaft Code -12



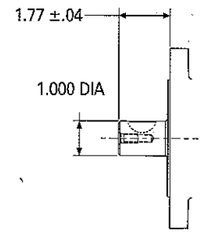
Shaft Code -25



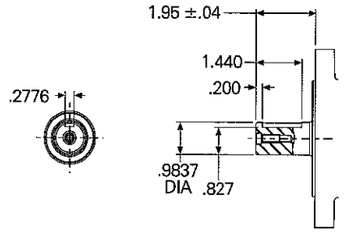
Shaft Code -14



Shaft Code -21



Shaft Code -22



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MG SERIES

Allowable MG Series Radial Load Curves

The allowable radial load curve (Chart A) for the MG series is based on uni-directional steady state loads for 2.5 x 10^6 revolutions and B_{10} bearing life. For different load-life relationships see Chart B. Use the multiplier times the allowable radial load to predict different bearing life. **See Allowable Radial Load Limits section for load calculations.**

Chart A:
Allowable Radial Load Curve

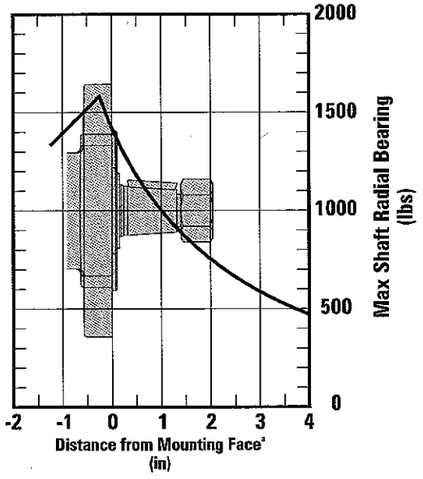
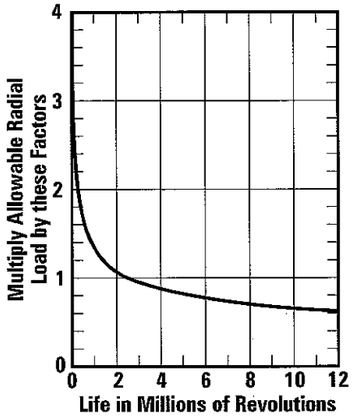


Chart B:
Bearing Life Factor Curve



Note:
Side load should be considered a vector sum of all imposed loads.

a - This curve is for the SAE A (2 Bolt) Mount, Standard Mount (4 Bolt) and 4 Bolt Mount housing styles. For SAE A (2 Bolt) (Long Pilot) Mount, subtract .18" from the actual radial load center line to the motor mount face distance; use this value to find the allowable radial load.

MG Series Model Number Explanation

MG Torqmotor™ Assembly Part Numbering

Series	Disp. Code	Mounts/Ports	Shaft	Options	-Unpainted	-Painted	Description
MG	-02	-01 Standard (4 Bolt) 7/8 O-ring	-01	Long 6B Snapwire Groove	-AAAB	—	No Paint
	-03	-04 Standard (4 Bolt) Rear Port	-09	.38 Pinhole .55 from end	—	-AAAA	Black Paint
	-04	-06 SAE A (2 Bolt) 7/8 O-ring	-10	1" Short Woodruff Key 1/4" Tap	—	-AAAC	Corrosion Resistant Paint
	-05	-07 SAE A (2 Bolt) Rear Port	-11	1" Short 6B Spline, 1/4 Snapwire Groove	—	-AAFC	White Epoxy Paint
	-06	-09 4 Bolt 7/8 O-ring	-12	1" Tapered (Short)	-AAAH	-AAAG	Fluorocarbon Seals
	-08	-10 SAE A (2 Bolt) Manifold	-13	1" Long Woodruff Snapwire Groove	-AABK*	-AABJ*	Free Running Rotor Set
	-10	-11 4 Bolt Manifold	-14	Double Pinhole	-AADK*	-AACD*	Free Running Rotor Set & Fluorocarbon Seals
	-12	-12 SAE A (2 Bolt) 1/2 NPTF	-15	.32 Pinhole .4 from end	-AAFA	—	Vespel™ Commutator Seal & Fluorocarbon Seals
	-14	-13 4 Bolt 1/2 NPTF	-21	"-10 Code" plus Corrosion Resistant	-AABP	-AAAF	Castle Nut Replacing Patch Lock Nut
	-16	-16 SAE A (2 Bolt) 1/2 BSPF	-22	25 mm Straight Shaft with 7 mm Key		-AAAJ	Vespel™ Commutator Seal
	-18	-18 4 Bolt Mount Rear Port	-25	1" Tapered SAE	-AADJ	AAFB	Vespel™ Commutator Seal & Castle Nut
	-20	-19 Standard (4 Bolt) 1/2 BSPF	-26	25 mm Straight with 8 mm Key	-AADH*		3/4" O-ring Rear Ports & Free Running Rotor Set
	-22	-20 SAE A (2 Bolt)-7 mm (Long Pilot) 1/2-BSPF	-28	13 Tooth Spline	-AAAL	-AAAK	3/4" O-ring Rear Ports
	-24	-25 Standard (4 Bolt) Manifold				-AACP*	Castle Nut & Free Running Rotor Set
		-30 4 Bolt Mount w/M8 Threads 7/8 O-ring		AABM		-AABL*	Free Running Rotor Set & No Commutator Seal
		ISO 6149 Ports Available				-AABW	Corrosion Resistant Paint & Fluorocarbon Seals
				-CCCB		-CCCA	Reverse Timed Manifold
				-AADT		-AADY	3/4" O-ring Rear Ports & Fluorocarbon Seals

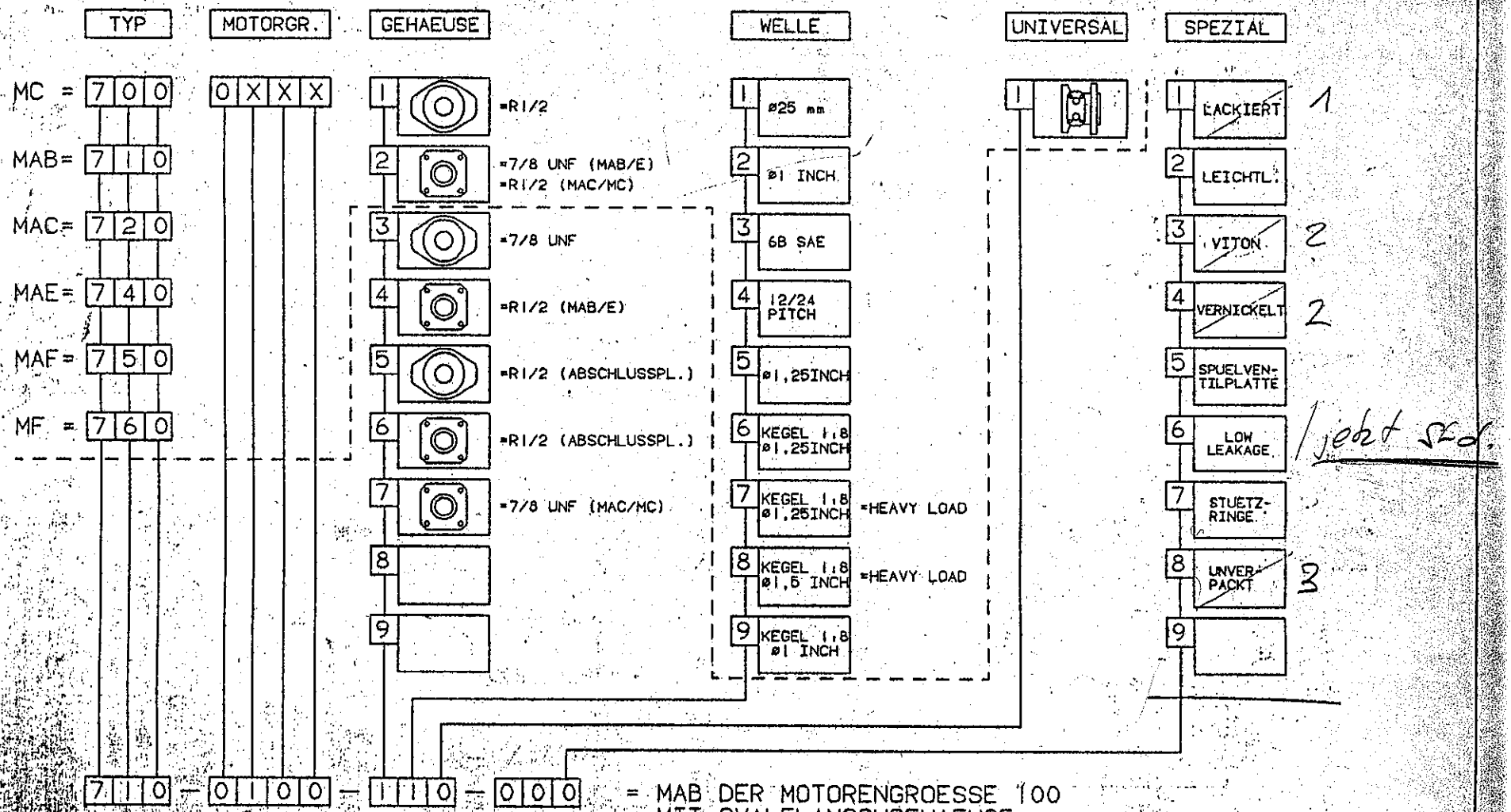
* Not applicable to MG24

Example:
MG-24-12-21-AAAB signifies a MG Series motor with a displacement of 24.0 in³/rev; SAE A (2 bolt) mount with 1/2"-14 NPTF pipe ports in the housing; 1.76 length, corrosion resistant, 1" woodruff keyed shaft with 1/4" tap and the motor is not painted.

For other motor options, consult the factory.

TRW EHRENREICH SEP 88

TORQMOTOR BESTELLSYSTEM



DRIVE RATIOS with PULLEYS & BELTS SAME SPEED & SAME TORQUE

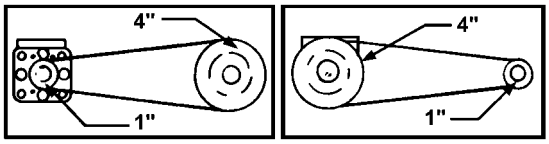
A Motor running at 600 RPM Speed and 2,500 pounds pressure requires 16 gallons and develops 1,600 inch-pounds of torque and 15 horsepower. With a 4-inch driving and a 4-inch driven pulley (1 to 1 ratio), this torque and horsepower are transmitted to the driven shaft. The driven shaft has 600 RPM speed and 1,600 inch-pounds of torque and 15 horsepower.

SPEED REDUCTION & TORQUE INCREASE

A Motor running at 600 RPM Speed and 2,500 pounds pressure requires 16 gallons and develops 1,600 inch-pounds of torque. With a 4-inch drive pulley and a 16-inch driven pulley (1 to 4 ratio) it runs the equipment at 150 RPM speed and develops 6,400 inch-pounds of torque and 15 horsepower.

SPEED INCREASE & TORQUE REDUCTION

A Motor running at 600 RPM Speed and 2,500 pounds pressure requires 16 gallons and develops 1,600 inch-pounds of torque. With a 16-inch drive pulley and a 4-inch driven pulley (4 to 1 ratio) it runs the equipment at 2,400 RPM speed and develops 400 inch-pounds of torque and 15 horsepower.

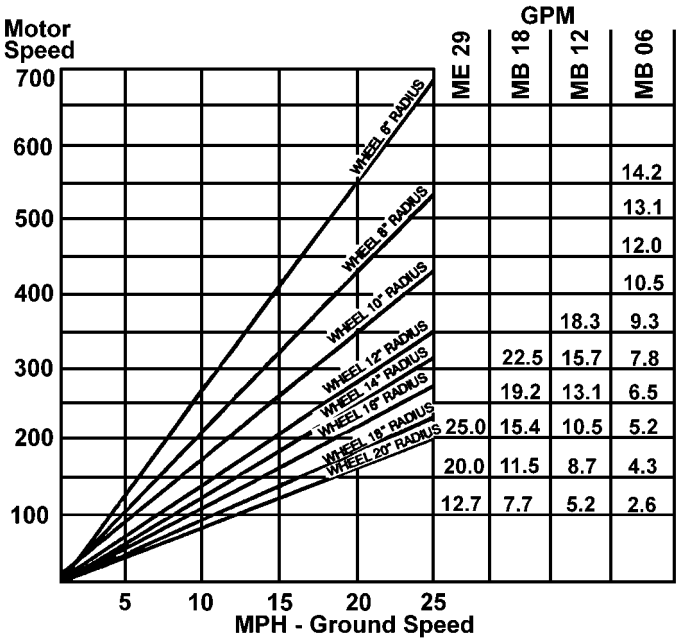


SPEED REDUCTION AND TORQUE INCREASE

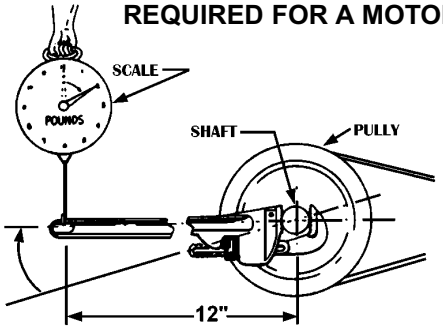
SPEED INCREASE AND TORQUE REDUCTION

TRW ROSS TORQMOTORS

MPH vs RPM & Flow with Different Rolling Radius Wheels



HOW TO MEASURE TORQUE REQUIRED FOR A MOTOR

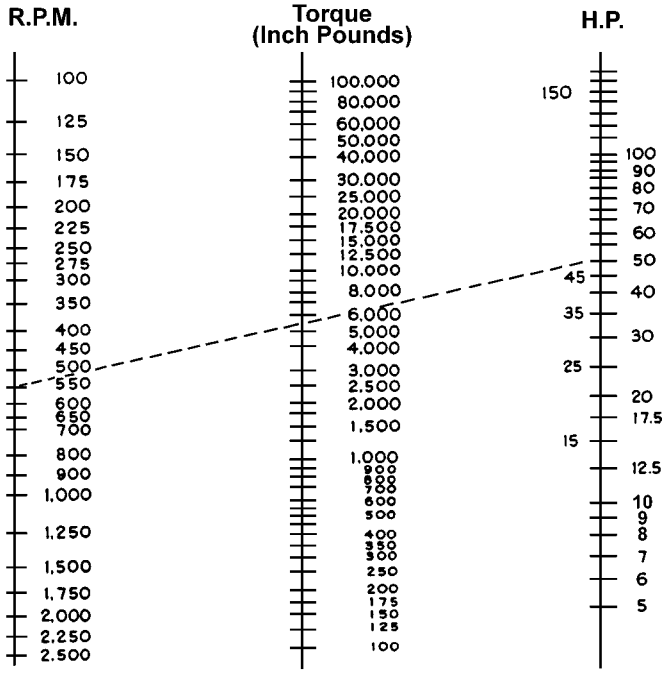


TORQUE is important because it is the measurement of rotary or turning force. Torque is expressed in inch-pounds.

A simple spring scale and a wrench can be used to determine the amount of torque required to turn a shaft. Place a 12 inch pipe wrench on the shaft, attaching the wrench's handle to the spring scale. Pull on the other end of the scale, reading the dial when the shaft moves. This figure (number of pounds) when multiplied by the length of the wrench (in this case 12 inches) will give the torque required to turn the shaft.

EXAMPLE: A 50 pound pull on the end of a 12 inch wrench indicates 600 inch-pounds of torque (50 x 12 = 600).

TORQUE HORSEPOWER SPEED RELATIONSHIP FOR HYDRAULIC MOTORS



RULE OF THUMB FOR HYDRAULIC MOTOR APPLICATIONS

Where Gasoline Engines or Electric Motors Are Now Used

1 Electric Motor H.P. Equals 1-1/2 Hydraulic Motor H.P.
1 Gasoline Engine H.P. Equals 3/4 Hydraulic Motor H.P.
1 Hydraulic Motor H.P. Equals 1-2/3 Gasoline Engine H.P.
1 Hydraulic Motor H.P. Equals 2/3 Electric Engine H.P.
1 Electric Motor H.P. Equals 2-1/2 Gasoline Engine H.P.

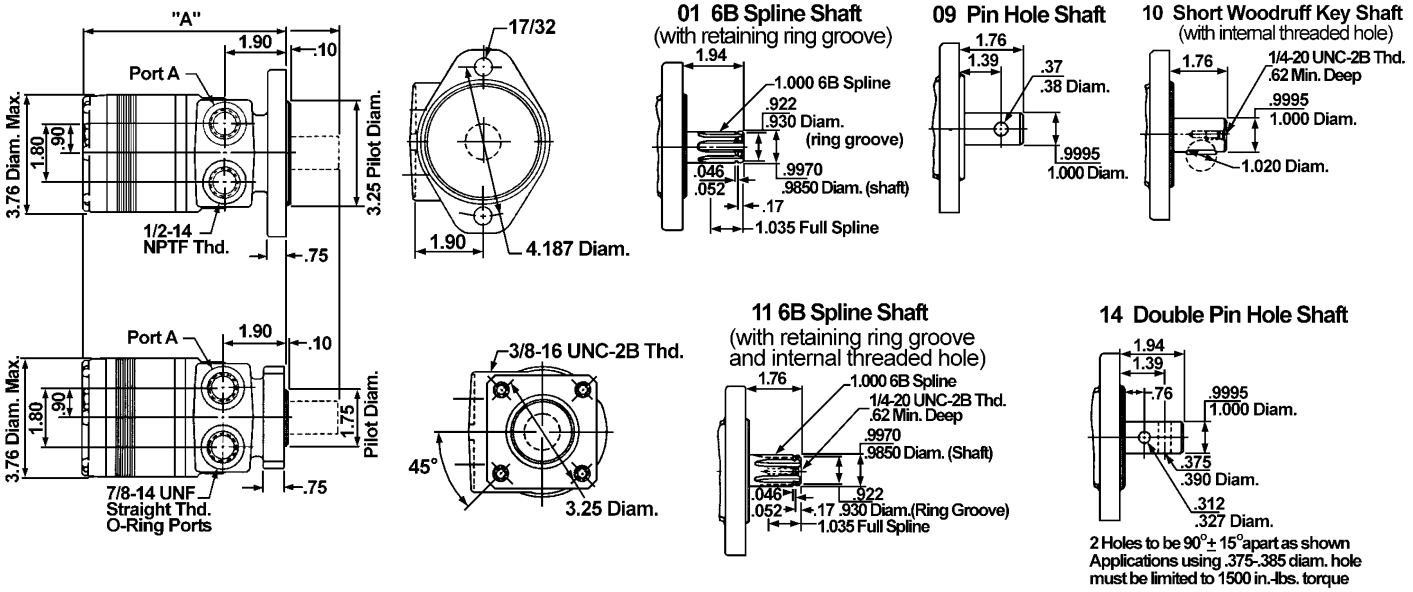
TF and TG SERIES MODEL NUMBER EXPLANATION

Example: **TF0080-US-080-AAAA** This model number identifies an MB series motor with a 5 in 3/revolution displacement, a standard mount housing with 7/8 inch O-Ring, a long 6B shaft with snapwire groove and standard black paint.

TF Series	TG Series	Displacements Cu. Inch/rev	Housing	Shaft	Option
TF0080		4.9	**-MF** Standard mount 7/8 O-Ring	**-01** Long 6B snapwire groove	**-AAAA**
TF0100		6.1	**-US** Long wheel mount 7/8 O-Ring	**-02** Long Woodruff, 1/4" tap	"Standard"
TF0130		7.8	snapwire groove	black paint	
TF0140		8.6	**-MB** Standard mount rearport	**-03** 1.25" straight keyed	**-AAAB**
TF0170		10.3	**-UB** Long wheel mount rearport	**-04** 10B spline	Unpainted
TF0195	**TG0195**	12.0	**-AS** SAE 2 bolt 7/8 O-Ring	**-05** 14 tooth spline	
TF0240	**TG0240**	14.5	**-AB** SAE 2 bolt rearport	**-06** 19 tooth spline	
TF0280	**TG0280**	17.1		**-07** 15 tooth spline	
	TG0335	20.6		**-08** 1.25" tapered shaft	
TF0405	**TG0405**	24.7		**-19** 1.38" tapered shaft	
	TG0475	29.1		**-20** 1.38" straight keyed shaft	
	TG0530	32.3			
	TG0625	38.0			
	TG0785	48.0			
	TG0960	58.5			

Prices subject to change without notice*

TB Torqmotor Series Dimensions



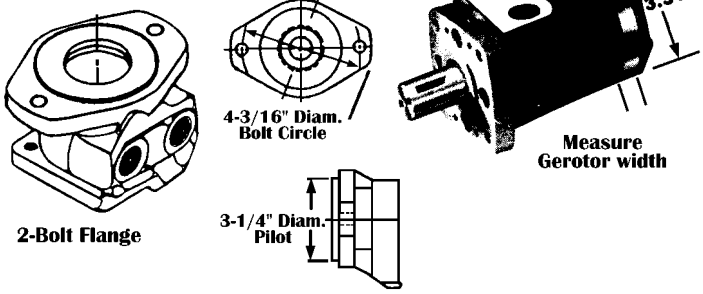
5 HP up to 9 HP Roller Stator - Two Bronze Bushings and One Needle Thrust Bearing

NEW Ross Motor Number	OLD Ross Motor Number	Similar to CharLynn &/or White		Max. PSI	Disp	Max. Torq	Max. Flow	RPM No Load	Max. Cont. PSI	At 5 GPM Max Cont. PSI RPM	At 5 GPM Max Cont. PSI HP	HP at 50 RPM Max. Cont. PSI GPM	HP at 50 RPM Max. Cont. PSI HP
TB0045FP130AAAB	MG 021313AAAB			2300	2	707	9	88	1800	395	2.5	.60	.44
TB0045FP110AAAB	MG 021311AAAB			2300	2	707	9	88	1800	395	2.5	.60	.44
TB0045AP130AAAB	MG 021213AAAB			2300	2	707	9	88	1800	395	2.5	.60	.44
TB0045AP110AAAB	MG 021211AAAB			2300	2	707	9	88	1800	395	2.5	.60	.44
TB0050FP130AAAB	MG 031313AAAB	101-1001	RSAA1	2300	3	879	9	76	1800	354	3.0	.70	.50
TB0050FP110AAAB	MG 031311AAAB		RSAA6	2300	3	879	9	76	1800	354	3.0	.70	.50
TB0050AP130AAAB	MG 031213AAAB	101-1025	RSDA1	2300	3	879	9	76	1800	354	3.0	.70	.50
TB0050AP110AAAB	MG 031211AAAB	101-1073	RSDA6	2300	3	879	9	76	1800	354	3.0	.70	.50
TB0065FP130AAAB	MG 041313AAAB	101-1002	RSAB1	2200	4	1106	9	57	1800	276	3.125	.90	.70
TB0065FP110AAAB	MG 041311AAAB		RSAB6	2200	4	1106	9	57	1800	276	3.125	.90	.70
TB0065AP130AAAB	MG 041213AAAB	101-1026	RSDB1	2200	4	1106	9	57	1800	276	3.125	.90	.70
TB0065AP110AAAB	MG 041211AAAB	101-1074	RSDB6	2200	4	1106	9	57	1800	276	3.125	.90	.70
TB0080FP130AAAB	MG 051313AAAB			2200	5	1387	9	45	1800	208	4.5	1.19	.90
TB0080FP110AAAB	MG 051311AAAB			2200	5	1387	9	45	1800	208	4.5	1.19	.90
TB0080AP130AAAB	MG 051213AAAB			2200	5	1387	9	45	1800	208	4.5	1.19	.90
TB0080AP110AAAB	MG 051211AAAB			2200	5	1387	9	45	1800	208	4.5	1.19	.90
TB0100FP130AAAB	MG 061313AAAB	101-1003	RSAC1	2000	6	1501	12	38	1800	179	3.0	1.40	1.00
TB0100FP110AAAB	MG 061311AAAB	101-1051	RSAC6	2000	6	1501	12	38	1800	179	3.0	1.40	1.00
TB0100AP130AAAB	MG 061213AAAB	101-1027	RSDC1	2000	6	1501	12	38	1800	179	3.0	1.40	1.00
TB0100AP110AAAB	MG 061211AAAB	101-1075	RSDC6	2000	6	1501	12	38	1800	179	3.0	1.40	1.00
TB0130FP130AAAB	MG 081313AAAB			2000	8	2044	15	28	1800	135	3.187	1.80	1.46
TB0130FP110AAAB	MG 081311AAAB			2000	8	2044	15	28	1800	135	3.187	1.80	1.46
TB0130AP130AAAB	MG 081213AAAB			2000	8	2044	15	28	1800	135	3.187	1.80	1.46
TB0130AP110AAAB	MG 081211AAAB			2000	8	2044	15	28	1800	135	3.187	1.80	1.46
TB0165FP130AAAB	MG 101313AAAB	101-1004	RSAE1	2000	10	2515	15	23	1800	110	3-1/5	2.30	1.80
TB0165FP110AAAB	MG 101311AAAB	101-1052	RSAE6	2000	10	2515	15	23	1800	110	3-1/5	2.30	1.80
TB0165AP130AAAB	MG 101213AAAB	101-1028	RSDE1	2000	10	2515	15	23	1800	110	3-1/5	2.30	1.80
TB0165AP110AAAB	MG 101211AAAB	101-1076	RSDE6	2000	10	2515	15	23	1800	110	3-1/5	2.30	1.80
TB0195FP130AAAB	MG 121313AAAB	101-1005	RSAG1	2000	12	3028	15	19	1800	91	3.125	2.70	2.20
TB0195FP110AAAB	MG 121311AAAB	101-1053	RSAG6	2000	12	3028	15	19	1800	91	3.125	2.70	2.20
TB0195AP130AAAB	MG 121213AAAB	101-1029	RSDG1	2000	12	3028	15	19	1800	91	3.125	2.70	2.20
TB0195AP110AAAB	MG 121211AAAB	101-1077	RSDG6	2000	12	3028	15	19	1800	91	3.125	2.70	2.20
TB0230FP130AAAB	MG 141313AAAB	101-1006	RSAK1	2000	14	3495	15	17	1500	79	3.187	3.15	2.00
TB0230FP110AAAB	MG 141311AAAB	101-1054	RSAK6	2000	14	3495	15	17	1500	79	3.187	3.15	2.00
TB0230AP130AAAB	MG 141213AAAB	101-1030	RSDK1	2000	14	3495	15	17	1500	79	3.187	3.15	2.00
TB0230AP110AAAB	MG 141211AAAB	101-1078	RSDK6	2000	14	3495	15	17	1500	79	3.187	3.15	2.00
TB0260FP130AAAB	MG 161313AAAB			1500	16	2924	15	14	1450	68	2.36	3.60	2.00
TB0260FP110AAAB	MG 161311AAAB			1500	16	2924	15	14	1450	68	2.36	3.60	2.00
TB0260AP130AAAB	MG 161213AAAB			1500	16	2924	15	14	1450	68	2.36	3.60	2.00
TB0260AP110AAAB	MG 161211AAAB			1500	16	2924	15	14	1450	68	2.36	3.60	2.00
TB0295FP130AAAB	MG 181313AAAB	101-1007	RSAM1	1400	18	2993	15	13	1400	62	2-1/5	4.00	2.50
TB0295FP110AAAB	MG 181311AAAB	101-1055	RSAM6	1400	18	2993	15	13	1400	62	2-1/5	4.00	2.50
TB0295AP130AAAB	MG 181213AAAB	101-1031	RSDM1	1400	18	2993	15	13	1400	62	2-1/5	4.00	2.50
TB0295AP110AAAB	MG 181211AAAB	101-1079	RSDM6	1400	18	2993	15	13	1400	62	2-1/5	4.00	2.50
TB0330FP130AAAB	MG 201313AAAB	101-1008	RSAP1	1400	20	3411	15	11	1350	55	1.875	4.60	2.60
TB0330FP110AAAB	MG 201311AAAB	101-1056	RSAP6	1400	20	3411	15	11	1350	55	1.875	4.60	2.60
TB0330AP130AAAB	MG 201213AAAB	101-1032	RSDP1	1400	20	3411	15	11	1350	55	1.875	4.60	2.60
TB0330AP110AAAB	MG 201211AAAB	101-1080	RSDP6	1400	20	3411	15	11	1350	55	1.875	4.60	2.60

NOTE: At Constant Pressure and Constant Flow the Horsepower will be the same and the RPM will vary as the displacement varies. With a constant RPM and a constant PSI the horsepower will increase with an increase in displacement.

Prices subject to change without notice

Use TRW ROSS "TB" SERIES MOTORS
For CHAR-LYNN "H" SERIES OR WHITE "RS" SERIES MOTORS
TB Series Roller Stator Has Two Bronze Bushings and One Needle Thrust Bearing
White Motors and Ross Motors rotate in the same direction as Char-Lynn Motors
All Motors are reversible

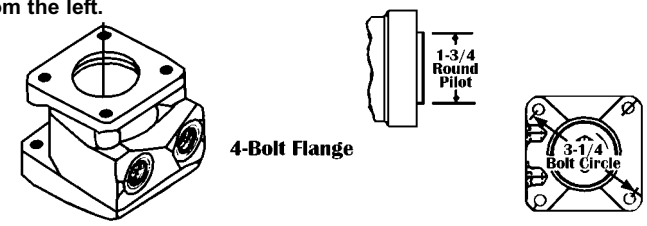


2-Bolt Flange mount will match SAE type A Mount-Bolts are 4-3/16" center to center with 3-1/4" round pilot.

The positive displacement hydraulic motor utilizes planetary gear action in the driven members to multiply actual displacement and torque by six; thus creating a low-speed, high torque hydraulic motor.

HOW TO IDENTIFY A CHAR-LYNN MOTOR

Measure the width of the gerotor gear just before the end cap of the motor. The width will be either 1/4, 3/8, 1/2, 3/4, 7/8, 1, 1-1/4, 1-1/2, or 2 inches. You can easily identify the motor using the fourth column from the left.



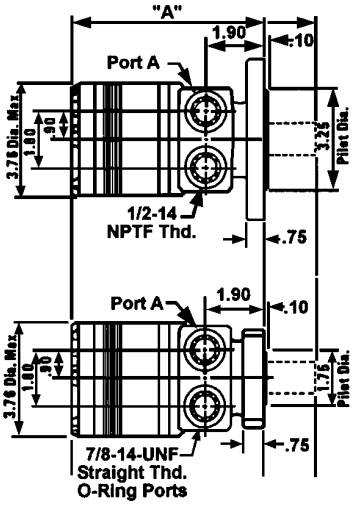
4-Bolt Mount has 3-1/4" bolt circle & a 1-3/4" round pilot.

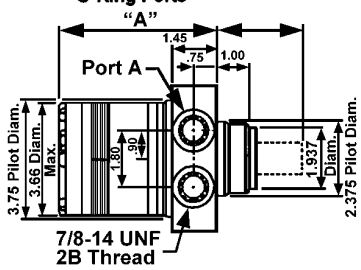
The hydraulic pumping & commutating action takes place at high-speed; & the output shaft rotates at the slow-speed, high torque. The output shaft is designed to accept heavy side loads and has an outboard shaft bearing. The torque that the motor delivers to the output shaft is dependent upon the pressure of the oil. The RPM of the output shaft is dependent upon the gallons per minute being pumped.

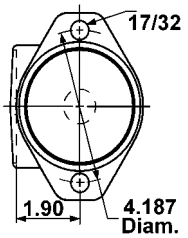
			With 1/2" PIPE PORTS						With 7/8" O-RING PORTS			
NEW TRW-Ross Motor Number	Our Sequence Number	Per Each	Aprox. Disp. Cu.In.	Char-Lynn Gerotor Width	NEW Char-Lynn Motor Number	OLD TRW-Ross Motor Number	White Motor Number	NEW Char-Lynn Motor Number	Old Char-Lynn Motor Number	OLD TRW-Ross Motor Number	White Motor Number
4-Bolt Light Mounting Flange-1" Straight Shaft with Key											
TB0045FP130AAAB	706958	**$387.26**	2			MG 021313AAAB				MG 020913AAAB	
TB0050FP130AAAB	706963	**388.36**	3	1/4	101-1001	MG 031313AAAB	RSAA1	101-1009	BA1	MG 030913AAAB	RSBA1
TB0065FP130AAAB	706968	**389.46**	4	3/8	101-1002	MG 041313AAAB	RSAB1	101-1010	BB1	MG 040913AAAB	RSBB1
TB0080FP130AAAB	706969	**382.86**	5			MG 051313AAAB				MG 050913AAAB	
TB0100FP130AAAB	706973	**401.56**	6	1/2	101-1003	MG 061313AAAB	RSAC1	101-1011	BC1	MG 060913AAAB	RSBC1
TB0130FP130AAAB	706974	**399.36**	8			MG 081313AAAB				MG 080913AAAB	
TB0165FP130AAAB	706978	**425.77**	10	7/8	101-1004	MG 101313AAAB	RSAE1	101-1012	BE1	MG 100913AAAB	RSBE1
TB0195FP130AAAB	706983	**449.97**	12	1	101-1005	MG 121313AAAB	RSAG1	101-1013	BG1	MG 120913AAAB	RSBG1
TB0230FP130AAAB	706988	**480.77**	14	1-1/4	101-1006	MG 141313AAAB	RSAK1	101-1014	BK1	MG 140913AAAB	RSBK1
TB0260FP130AAAB	706989	**501.68**	16			MG 161313AAAB				MG 160913AAAB	
TB0295FP130AAAB	706993	**519.28**	18	1-1/2	101-1007	MG 181313AAAB	RSAM1	101-1015	BM1	MG 180913AAAB	RSBM1
TB0330FP130AAAB	706998	**525.88**	20	2	101-1008	MG 201313AAAB	RSAP1	101-1016	BP1	MG 200913AAAB	RSBP1
TB0390FP130AAAB	706995	**589.69**	24			MG 241313AAAB					
4-Bolt Light Mounting Flange-1" 6 Spline Shaft											
TB0045FP110AAAB	707941	**376.26**	2			MG 021311AAAB				MG 020911AAAB	
TB0050FP110AAAB	707942	**377.36**	3	1/4		MG 031311AAAB	RSAA6		BA6	MG 030911AAAB	RSBA6
TB0065FP110AAAB	707943	**378.46**	4	3/8		MG 041311AAAB	RSAB6		BB6	MG 040911AAAB	RSBB6
TB0080FP110AAAB	707944	**382.86**	5			MG 051311AAAB				MG 050911AAAB	
TB0100FP110AAAB	707946	**401.56**	6	1/2	101-1051	MG 061311AAAB	RSAC6		BC6	MG 060911AAAB	RSBC6
TB0130FP110AAAB	707947	**399.36**	8			MG 081311AAAB				MG 080911AAAB	
TB0165FP110AAAB	707948	**413.66**	10	7/8	101-1052	MG 101311AAAB	RSAE6	101-1060	BE6	MG 100911AAAB	RSBE6
TB0195FP110AAAB	707949	**449.97**	12	1	101-1053	MG 121311AAAB	RSAG6		BG6	MG 120911AAAB	RSBG6
TB0230FP110AAAB	707951	**480.77**	14	1-1/4	101-1054	MG 141311AAAB	RSAK6		BK6	MG 140911AAAB	RSBK6
TB0260FP110AAAB	707952	**501.68**	16			MG 161311AAAB				MG 160911AAAB	
TB0295FP110AAAB	707953	**503.88**	18	1-1/2	101-1055	MG 181311AAAB	RSAM6	101-1063	BM6	MG 180911AAAB	RSBM6
TB0330FP110AAAB	707954	**525.88**	20	2	101-1056	MG 201311AAAB	RSAP6	101-1064	BP6	MG 200911AAAB	RSBP6
2-Bolt A Mounting Flange-1" Straight Shaft with Key											
TB0045AP130AAAB	707041	**376.26**	2			MG 021213AAAB				MG 020613AAAB	
TB0050AP130AAAB	707043	**377.36**	3	1/4	101-1025	MG 031213AAAB	RSDA1	101-1033	GA1	MG 030613AAAB	RSGA1
TB0065AP130AAAB	707048	**389.46**	4	3/8	101-1026	MG 041213AAAB	RSDB1	101-1034	GB1	MG 040613AAAB	RSGB1
TB0080AP130AAAB	707049	**388.36**	5			MG 051213AAAB				MG 050613AAAB	
TB0100AP130AAAB	707053	**401.56**	6	1/2	101-1027	MG 061213AAAB	RSDC1	101-1035	GC1	MG 060613AAAB	RSGC1
TB0130AP130AAAB	707054	**399.36**	8			MG 081213AAAB				MG 080613AAAB	
TB0165AP130AAAB	707058	**425.77**	10	7/8	101-1028	MG 101213AAAB	RSDE1	101-1036	GE1	MG 100613AAAB	RSGE1
TB0195AP130AAAB	707063	**449.97**	12	1	101-1029	MG 121213AAAB	RSDG1	101-1037	GG1	MG 120613AAAB	RSGG1
TB0230AP130AAAB	707068	**466.47**	14	1-1/4	101-1030	MG 141213AAAB	RSDK1	101-1038	GK1	MG 140613AAAB	RSGK1
TB0260AP130AAAB	707069	**501.68**	16			MG 161213AAAB				MG 160613AAAB	
TB0295AP130AAAB	707073	**503.88**	18	1-1/2	101-1031	MG 181213AAAB	RSDM1	101-1039	GM1	MG 180613AAAB	RSGM1
TB0330AP130AAAB	707078	**541.28**	20	2	101-1032	MG 201213AAAB	RSDP1	101-1040	GP1	MG 200613AAAB	RSGP1
2-Bolt A Mounting Flange-1" 6 Spline Shaft											
TB0045AP110AAAB	707160	**376.26**	2			MG 021211AAAB				MG 020611AAAB	
TB0050AP110AAAB	707161	**388.36**	3	1/4	101-1073	MG 031211AAAB	RSDA6		GA6	MG 030611AAAB	RSGA6
TB0065AP110AAAB	707165	**378.46**	4	3/8	101-1074	MG 041211AAAB	RSDB6		GB6	MG 040611AAAB	RSGB6
TB0080AP110AAAB	707166	**382.86**	5			MG 051211AAAB				MG 050611AAAB	
TB0100AP110AAAB	707170	**389.46**	6	1/2	101-1075	MG 061211AAAB	RSDC6	101-1083	GC6	MG 060611AAAB	RSGC6
TB0130AP110AAAB	707171	**399.36**	8			MG 081211AAAB				MG 080611AAAB	
TB0165AP110AAAB	707175	**413.66**	10	7/8	101-1076	MG 101211AAAB	RSDE6	101-1084	GE6	MG 100611AAAB	RSGE6
TB0195AP110AAAB	707177	**436.77**	12	1	101-1077	MG 121211AAAB	RSDG6	101-1085	GG6	MG 120611AAAB	RSGG6
TB0230AP110AAAB	707180	**466.47**	14	1-1/4	101-1078	MG 141211AAAB	RSDK6	101-1086	GK6	MG 140611AAAB	RSGK6
TB0260AP110AAAB	707181	**501.68**	16			MG 161211AAAB				MG 160611AAAB	
TB0295AP110AAAB	707185	**503.88**	18	1-1/2	101-1079	MG 181211AAAB	RSDM6	101-1087	GM6	MG 180611AAAB	RSGM6
TB0330AP110AAAB	707190	**525.88**	20	2	101-1080	MG 201211AAAB	RSDP6	101-1088	GP6	MG 200611AAAB	RSGP6

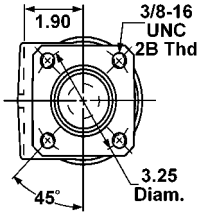
Prices subject to change without notice

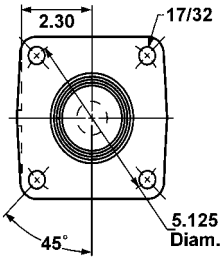
TE Torqmotor Series Dimensions

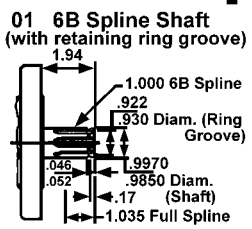


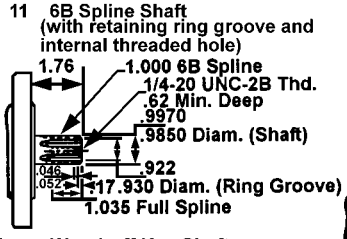


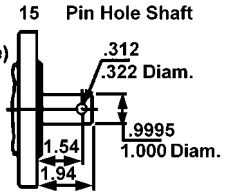


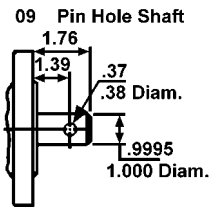


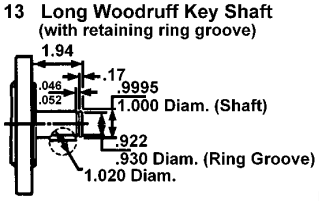


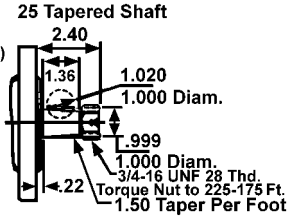


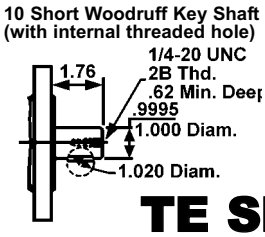


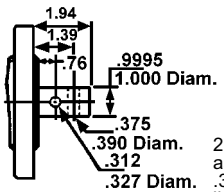












TE Shafts

2 Holes to be 90º ± 15º apart as shown Applications using .375-.385 diam. hole must be limited to 1500 In.-Lbs. (169.5 Min.) Torque

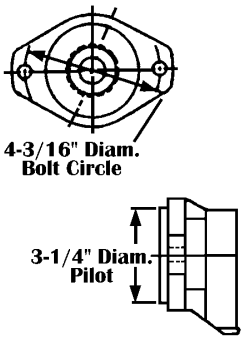
5 HP up to 12 HP Roller Stator - Two Needle Bearings and One Needle Thrust Bearing

NEW Ross Motor Number	OLD Ross Motor Number	Similar to CharLynn &/or White		Max. PSI	Disp	Max. Torq	Max. Flow	RPM No Load	Max. Cont. PSI	At 5 GPM Max Cont. PSI RPM	At 5 GPM Max Cont. PSI HP	HP at 50 RPM Max. Cont. PSI GPM	HP at 50 RPM Max. Cont. PSI HP
TE0045FP130AAAA	MF 021313AAAA			2500	2.5	776	9	88	2000	383	3.125	.63	.50
TE0045FP110AAAA	MF 021311AAAA			2500	2.5	776	9	88	2000	383	3.125	.63	.50
TE0045AP130AAAA	MF 021213AAAA			2500	2.5	776	9	88	2000	383	3.125	.63	.50
TE0045AP110AAAA	MF 021211AAAA			2500	2.5	776	9	88	2000	383	3.125	.63	.50
TE0050FP130AAAA	MF 031313AAAA		RSAA1	2500	3	965	12	76	2000	347	3.50	.75	.60
TE0050FP110AAAA	MF 031311AAAA		RSAA6	2500	3	965	12	76	2000	347	3.50	.75	.60
TE0050AP130AAAA	MF 031213AAAA		RSDA1	2500	3	965	12	76	2000	347	3.50	.75	.60
TE0050AP110AAAA	MF 031211AAAA		RSDA6	2500	3	965	12	76	2000	347	3.50	.75	.60
TE0065FP130AAAA	MF 041313AAAA	103-1002	RSAB1	2500	4	1244	15	58	2000	275	3.50	.97	.80
TE0065FP110AAAA	MF 041311AAAA	103-1050	RSAB6	2500	4	1244	15	58	2000	275	3.50	.97	.80
TE0065AP130AAAA	MF 041213AAAA	103-1026	RSDB1	2500	4	1244	15	58	2000	275	3.50	.97	.80
TE0065AP110AAAA	MF 041211AAAA	103-1074	RSDB6	2500	4	1244	15	58	2000	275	3.50	.97	.80
TE0080FP130AAAA	MF 051313AAAA			2500	5	1557	15	45	2000	209	3.50	1.19	1.00
TE0080FP110AAAA	MF 051311AAAA			2500	5	1557	15	45	2000	209	3.50	1.19	1.00
TE0080AP130AAAA	MF 051213AAAA			2500	5	1557	15	45	2000	209	3.50	1.19	1.00
TE0080AP110AAAA	MF 051211AAAA			2500	5	1557	15	45	2000	209	3.50	1.19	1.00
TE0100FP130AAAA	MF 061313AAAA	103-1003	RSAC1	2500	6	1883	15	38	2000	175	3.50	1.40	1.23
TE0100FP110AAAA	MF 061311AAAA	103-1051	RSAC6	2500	6	1883	15	38	2000	175	3.50	1.40	1.23
TE0100AP130AAAA	MF 061213AAAA	103-1027	RSDC1	2500	6	1883	15	38	2000	175	3.50	1.40	1.23
TE0100AP110AAAA	MF 061211AAAA	103-1075	RSDC6	2500	6	1883	15	38	2000	175	3.50	1.40	1.23
TE0130FP130AAAA	MF 081313AAAA			2500	8	2584	15	29	2000	133	3.75	1.85	1.66
TE0130FP110AAAA	MF 081311AAAA			2500	8	2584	15	29	2000	133	3.75	1.85	1.66
TE0130AP130AAAA	MF 081213AAAA			2500	8	2584	15	29	2000	133	3.75	1.85	1.66
TE0130AP110AAAA	MF 081211AAAA			2500	8	2584	15	29	2000	133	3.75	1.85	1.66
TE0165FP130AAAA	MF 101313AAAA	103-1004	RSAE1	2500	10	3291	15	23	2000	108	3.75	2.34	2.00
TE0165FP110AAAA	MF 101311AAAA	103-1052	RSAE6	2500	10	3291	15	23	2000	108	3.75	2.34	2.00
TE0165AP130AAAA	MF 101213AAAA	103-1028	RSDE1	2500	10	3291	15	23	2000	108	3.75	2.34	2.00
TE0165AP110AAAA	MF 101211AAAA	103-1076	RSDE6	2500	10	3291	15	23	2000	108	3.75	2.34	2.00
TE0195FP130AAAA	MF 121313AAAA	103-1005	RSAG1	2500	12	3732	15	19	2000	90	3.75	2.79	2.50
TE0195FP110AAAA	MF 121311AAAA	103-1053	RSAG6	2500	12	3732	15	19	2000	90	3.75	2.79	2.50
TE0195AP130AAAA	MF 121213AAAA	103-1029	RSDG1	2500	12	3732	15	19	2000	90	3.75	2.79	2.50
TE0195AP110AAAA	MF 121211AAAA	103-1077	RSDG6	2500	12	3732	15	19	2000	90	3.75	2.79	2.50
TE0230FP130AAAA	MF 141313AAAA	103-1006	RSAK1	2150	14	3498	20	16	1750	81	3.16	3.20	2.30
TE0230FP110AAAA	MF 141311AAAA	103-1054	RSAK6	2150	14	3498	20	16	1750	81	3.16	3.20	2.30
TE0230AP130AAAA	MF 141213AAAA	103-1030	RSDK1	2150	14	3498	20	16	1750	81	3.16	3.20	2.30
TE0230AP110AAAA	MF 141211AAAA	103-1078	RSDK6	2150	14	3498	20	16	1750	81	3.16	3.20	2.30
TE0260FP130AAAA	MF 161313AAAA	103-1007	RSAM1	1850	16	3462	20	14-1/4	1650	69	2.40	3.60	2.50
TE0260FP110AAAA	MF 161311AAAA	103-1055	RSAM6	1850	16	3462	20	14-1/4	1650	69	2.40	3.60	2.50
TE0260AP130AAAA	MF 161213AAAA	103-1031	RSDM1	1850	16	3462	20	14-1/4	1650	69	2.40	3.60	2.50
TE0260AP110AAAA	MF 161211AAAA	103-1079	RSDM6	1850	16	3462	20	14-1/4	1650	69	2.40	3.60	2.50
TE0295FP130AAAA	MF 181313AAAA			1650	18	3470	20	13	1550	62	2.25	4.60	2.60
TE0295FP110AAAA	MF 181311AAAA			1650	18	3470	20	13	1550	62	2.25	4.60	2.60
TE0295AP130AAAA	MF 181213AAAA			1650	18	3470	20	13	1550	62	2.25	4.60	2.60
TE0295AP110AAAA	MF 181211AAAA			1650	18	3470	20	13	1550	62	2.25	4.60	2.60
TE0330FP130AAAA	MF 201313AAAA	103-1008	RSAP1	1500	20	3427	20	11	1450	55	2.00	4.50	2.70
TE0330FP110AAAA	MF 201311AAAA	103-1056	RSAP6	1500	20	3427	20	11	1450	55	2.00	4.50	2.70
TE0330AP130AAAA	MF 201213AAAA	103-1032	RSDP1	1500	20	3427	20	11	1450	55	2.00	4.50	2.70
TE0330AP110AAAA	MF 201211AAAA	103-1080	RSDP6	1500	20	3427	20	11	1450	55	2.00	4.50	2.70

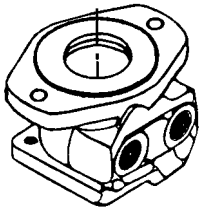
NOTE: At Constant Pressure and Constant Flow the Horsepower will be the same and the RPM will vary as the displacement varies.
Prices subject to change without notice

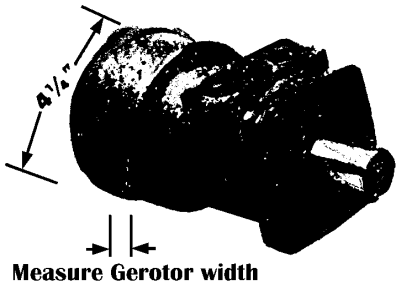
Use TRW ROSS "TE" SERIES MOTORS
For CHAR-LYNN "S" SERIES OR WHITE "RS" SERIES MOTORS
TE Series Roller stator With Two Needle Bearings and One Needle Thrust Bearing

HOW TO IDENTIFY A CHAR-LYNN "S" TYPE MOTOR

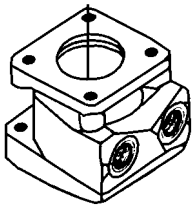


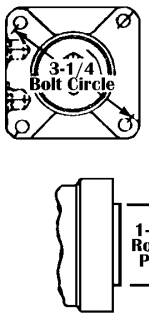
2-Bolt Flange mount will match SAE type A Mount. Bolts are 4-3/16" center to center with 3-1/4" round pilot and 1" round keyed shaft. This will match the "S" Char-Lynn motor with 2-bolt mount.





Measure the width of the gerotor gear just before the end cap of the motor. The width will be either 1/4, 3/8, 1/2, 3/4, 7/8, 1, 1-1/4, 1-1/2 or 2 inches. You can easily identify the motor using the fourth column from the left.





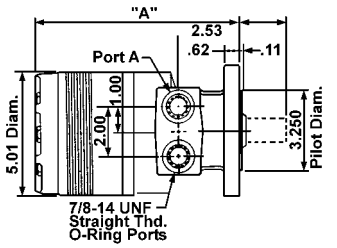
4-Bolt Mount has 3-1/4" bolt circle and a 1-3/4" round pilot. This will match the "S" type Char-Lynn motor with 4-bolt mount.

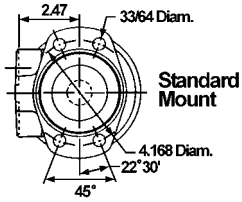
FLOWS FROM 7 to 20 GPM - DISPLACEMENT FROM 3 CU. IN. to 24 CU. IN.
All Motors are Reversible

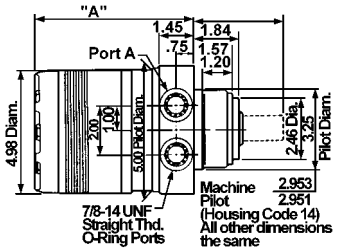
			With 1/2" PIPE PORTS					With 7/8" O-RING PORTS		
TRW-Ross Motor Number	Our Sequence Number	Per Each	Approx. Disp. Cu. In.	Char-Lynn Gerotor Width	NEW Char-Lynn Motor Number	OLD TRW-Ross Motor Number	White Motor Number	NEW Char-Lynn Motor Number	OLD TRW-Ross Motor Number	White Motor Number
4-Bolt Square Light Mounting Flange - 1" Straight Shaft										
TE0045FP130AAAA	707651	**$509.38**	2			MF 021313AAAA			MF 020913AAAA	
TE0050FP130AAAA	707652	**510.48**	3			MF 031313AAAA	RSAA1		MF 030913AAAA	RSBA1
TE0065FP130AAAA	707653	**526.98**	4	3/8	103-1002	MF 041313AAAA	RSAB1	103-1010	MF 040913AAAA	RSBB1
TE0080FP130AAAA	707654	**551.19**	5			MF 051313AAAA			MF 050913AAAA	
TE0100FP130AAAA	707655	**552.29**	6	1/2	103-1003	MF 061313AAAA	RSAC1	103-1011	MF 060913AAAA	RSBC1
TE0130FP130AAAA	707656	**581.99**	8			MF 081313AAAA			MF 080913AAAA	
TE0165FP130AAAA	707657	**565.49**	10	7/8	103-1004	MF 101313AAAA	RSAE1	103-1012	MF 100913AAAA	RSBE1
TE0195FP130AAAA	707658	**596.29**	12	1	103-1005	MF 121313AAAA	RSAG1	103-1013	MF 120913AAAA	RSBG1
TE0230FP130AAAA	707662	**619.40**	14		103-1006	MF 141313AAAA	RSAK1	103.1014	MF 140913AAAA	RSBK1
TE0260FP130AAAA	707663	**661.20**	16	1-1/2	103-1007	MF 161313AAAA	RSAM1	103-1015	MF 160913AAAA	
TE0295FP130AAAA	707667	**670.00**	18			MF 181313AAAA			MF 180913AAAA	
TE0330FP130AAAA	707669	**714.01**	20	2	103-1008	MF 201313AAAA	RSAP1	103-1016	MF 200913AAAA	RSBP1
4-Bolt Square Light Mounting Flange - 1" 6 Spline Shaft										
TE0045FP110AAAA	707698	**509.38**	2			MF 021311AAAA			MF 020911AAAA	
TE0050FP110AAAA	707701	**510.48**	3			MF 031311AAAA	RSAA6		MF 030911AAAA	RSBA6
TE0065FP110AAAA	707706	**511.58**	4	3/8	103-1050	MF 041311AAAA	RSAB6		MF 040911AAAA	RSBB6
TE0080FP110AAAA	707708	**551.19**	5			MF 051311AAAA			MF 050911AAAA	
TE0100FP110AAAA	707711	**552.29**	6	1/2	103-1051	MF 061311AAAA	RSAC6		MF 060911AAAA	RSBC6
TE0130FP110AAAA	707716	**564.39**	8			MF 081311AAAA			MF 080911AAAA	
TE0165FP110AAAA	707721	**565.49**	10	7/8	103-1052	MF 101311AAAA	RSAE6	103-1060	MF 100911AAAA	RSBE6
TE0195FP110AAAA	707726	**578.69**	12	1	103-1053	MF 121311AAAA	RSAG6		MF 120911AAAA	RSBG6
TE0230FP110AAAA	707724	**600.69**	14		103-1054	MF 141311AAAA	RSAK6	103-1062	MF 140911AAAA	RSBK6
TE0260FP110AAAA	707728	**661.20**	16	1-1/2	103-1055	MF 161311AAAA		103-1063	MF 160911AAAA	
TE0295FP110AAAA	707731	**670.00**	18			MF 181311AAAA	RSAM6		MF 180911AAAA	RABM6
TE0330FP110AAAA	707730	**693.11**	20	2	103-1056	MF 201311AAAA	RSAP6		MF 200911AAAA	RSBP6
2-Bolt A Mounting Flange - 1" Straight Shaft										
TE0045AP130AAAA	707491	**509.38**	2			MF 021213AAAA			MF 020613AAAA	
TE0050AP130AAAA	707492	**510.48**	3			MF 031213AAAA	RSDA1		MF 030613AAAA	RSGA1
TE0065AP130AAAA	707493	**526.98**	4	3/8	103-1026	MF 041213AAAA	RSDB1	103-1034	MF 040613AAAA	RSGB1
TE0080AP130AAAA	707494	**551.19**	5			MF 051213AAAA			MF 050613AAAA	
TE0100AP130AAAA	707496	**552.29**	6	1/2	103-1027	MF 061213AAAA	RSDC1	103-1035	MF 060613AAAA	RSGC1
TE0130AP130AAAA	707498	**564.39**	8			MF 081213AAAA			MF 080613AAAA	
TE0165AP130AAAA	707500	**583.09**	10	7/8	103-1028	MF 101213AAAA	RSDE1	103-1036	MF 100613AAAA	RSGE1
TE0195AP130AAAA	707501	**596.29**	12	1	103-1029	MF 121213AAAA	RSDG1	103-1037	MF 120613AAAA	RSGG1
TE0230AP130AAAA	707502	**600.69**	14		103-1030	MF 141213AAAA	RSDK1	103.1038	MF 140613AAAA	RSGK1
TE0260AP130AAAA	707503	**661.20**	16	1-1/2	103-1031	MF 161213AAAA	RSDM1	103-1039	MF 160613AAAA	
TE0295AP130AAAA	707504	**670.00**	18			MF 181213AAAA			MF 180613AAAA	
TE0330AP130AAAA	707506	**693.11**	20	2	103-1032	MF 201213AAAA	RSDP1	103-1040	MF 200613AAAA	RSGP1
2-Bolt A Mounting Flange - 1" 6 Spline Shaft										
TE0045AP110AAAA	707619	**509.38**	2			MF 021211AAAA			MF 020611AAAA	
TE0050AP110AAAA	707621	**510.48**	3			MF 031211AAAA	RSDA6		MF 030611AAAA	RSGA6
TE0065AP110AAAA	707623	**511.58**	4	3/8	103-1074	MF 041211AAAA	RSDB6	103-1082	MF 040611AAAA	RSGB6
TE0080AP110AAAA	707627	**551.19**	5			MF 051211AAAA			MF 050611AAAA	
TE0100AP110AAAA	707632	**552.29**	6	1/2	103-1075	MF 061211AAAA	RSDC6	103-1083	MF 060611AAAA	RSGC6
TE0130AP110AAAA	707637	**564.39**	8			MF 081211AAAA			MF 080611AAAA	
TE0165AP110AAAA	707642	**565.49**	10	7/8	103-1076	MF 101211AAAA	RSDE6	103-1084	MF 100611AAAA	RSGE6
TE0195AP110AAAA	707643	**578.69**	12	1	103-1077	MF 121211AAAA	RSDG6	103-1085	MF 120611AAAA	RSGG6
TE0230AP110AAAA	707644	**600.69**	14		103-1078	MF 141211AAAA	RSDK6	103-1086	MF 140611AAAA	RSGK6
TE0260AP110AAAA	707646	**661.20**	16	1-1/2	103-1079	MF 161211AAAA		103-1087	MF 160611AAAA	
TE0295AP110AAAA	707648	**670.00**	18			MF 181211AAAA	RSDM6		MF 180611AAAA	RAGM6
TE0330AP110AAAA	707650	**693.11**	20	2	103-1080	MF 201211AAAA	RSDP6	103-1088	MF 200611AAAA	RSGP6

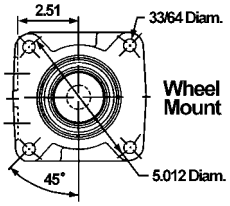
Prices subject to change without notice

TF Torqmotor Series Dimensions

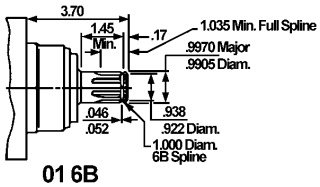




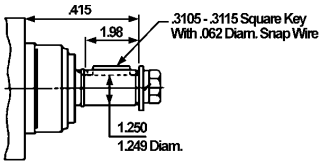




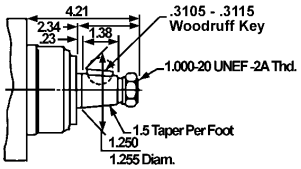
Wheel Mount



01 6B

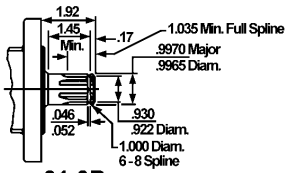


03 1.25" Straight Key

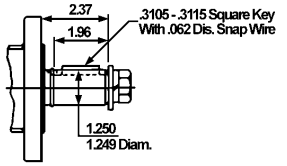


08 1.25" Tapered

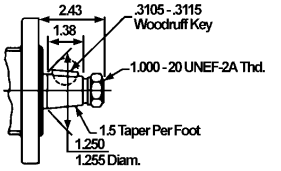
Standard Mount



01 6B



03 1.25" Straight Key



08 1.25" Tapered

Roller Stator - Two Needle Bearings and Two Needle Thrust Bearings

NEW Ross Motor Number	OLD Ross Motor Number	Similar to CharLynn &/or White	Max. PSI	Disp	Max. Torq	Max. Flow	RPM No Load	Max. Cont. PSI	At 5 GPM Max Cont. PSI RPM	At 5 GPM Max Cont. PSI HP	HP at 50 RPM Max. Cont. PSI GPM	HP at 50 RPM Max. Cont. PSI HP
TF0080MS020AAAA	MB 050102AAAA	104-1001	4000	5.0	2563	15	47	3000	198	6.00	1.23	1.50
TF0080MS030AAAA	MB 050103AAAA	104-1022	4000	5.0	2563	15	47	3000	198	6.00	1.23	1.50
TF0080MS010AAAA	MB 050101AAAA	104-1015	4000	5.0	2563	15	47	3000	198	6.00	1.23	1.50
TF0080MS050AAAA	MB 050105AAAA		4000	5.0	2563	15	47	3000	198	6.00	1.23	1.50
TF0080MS080AAAA	MB 050108AAAA		4000	5.0	2563	15	47	3000	198	6.00	1.23	1.50
TF0100MS020AAAA	MB 060102AAAA	104-1002	3500	6.0	2760	15	38	2250	180	5.00	1.16	1.60
TF0100MS030AAAA	MB 060103AAAA	104-1023	3500	6.0	2760	15	38	2250	180	5.00	1.16	1.60
TF0100MS010AAAA	MB 060101AAAA	104-1016	3500	6.0	2760	15	38	2250	180	5.00	1.16	1.60
TF0100MS050AAAA	MB 060105AAAA	104-1030	3500	6.0	2760	15	38	2250	180	5.00	1.16	1.60
TF0100MS080AAAA	MB 060108AAAA	104-1009	3500	6.0	2760	15	38	2250	180	5.00	1.16	1.60
TF0130MS020AAAA	MB 080102AAAA	104-1003	3000	7.8	3082	20	30	2000	142	4.50	1.85	1.60
TF0130MS030AAAA	MB 080103AAAA	104-1024	3000	7.8	3082	20	30	2000	142	4.50	1.85	1.60
TF0130MS010AAAA	MB 080101AAAA	104-1017	3000	7.8	3082	20	30	2000	142	4.50	1.85	1.60
TF0130MS050AAAA	MB 080105AAAA	104-1031	3000	7.8	3082	20	30	2000	142	4.50	1.85	1.60
TF0130MS080AAAA	MB 080108AAAA	104-1010	3000	7.8	3082	20	30	2000	142	4.50	1.85	1.60
TF0140MS020AAAA	MB 090102AAAA		3000	8.6	3451	20	27	2000	128	4.50	2.00	1.78
TF0140MS030AAAA	MB 090103AAAA		3000	8.6	3451	20	27	2000	128	4.50	2.00	1.78
TF0140MS010AAAA	MB 090101AAAA		3000	8.6	3451	20	27	2000	128	4.50	2.00	1.78
TF0140MS050AAAA	MB 090105AAAA		3000	8.6	3451	20	27	2000	128	4.50	2.00	1.78
TF0140MS080AAAA	MB 090108AAAA		3000	8.6	3451	20	27	2000	128	4.50	2.00	1.78
TF0170MS020AAAA	MB 100102AAAA	104-1004	3000	10.2	4030	20	22	2000	105	4.50	2.40	2.20
TF0170MS030AAAA	MB 100103AAAA	104-1025	3000	10.2	4030	20	22	2000	105	4.50	2.40	2.20
TF0170MS010AAAA	MB 100101AAAA	104-1018	3000	10.2	4030	20	22	2000	105	4.50	2.40	2.20
TF0170MS050AAAA	MB 100105AAAA	104-1032	3000	10.2	4030	20	22	2000	105	4.50	2.40	2.20
TF0170MS080AAAA	MB 100108AAAA	104-1011	3000	10.2	4030	20	22	2000	105	4.50	2.40	2.20
TF0195MS020AAAA	MB 120102AAAA	104-1005	3000	12.1	4719	20	19	2000	92	4.50	2.80	2.56
TF0195MS030AAAA	MB 120103AAAA	104-1026	3000	12.1	4719	20	19	2000	92	4.50	2.80	2.56
TF0195MS010AAAA	MB 120101AAAA	104-1019	3000	12.1	4719	20	19	2000	92	4.50	2.80	2.56
TF0195MS050AAAA	MB 120105AAAA	104-1033	3000	12.1	4719	20	19	2000	92	4.50	2.80	2.56
TF0195MS080AAAA	MB 120108AAAA	104-1012	3000	12.1	4719	20	19	2000	92	4.50	2.80	2.56
TF0240MS020AAAA	MB 150102AAAA	104-1006	3000	14.6	5992	25	16	2000	75	4.50	3.36	3.00
TF0240MS030AAAA	MB 150103AAAA		3000	14.6	5992	25	16	2000	75	4.50	3.36	3.00
TF0240MS010AAAA	MB 150101AAAA	104-1020	3000	14.6	5992	25	16	2000	75	4.50	3.36	3.00
TF0240MS050AAAA	MB 150105AAAA	104-1034	3000	14.6	5992	25	16	2000	75	4.50	3.36	3.00
TF0240MS080AAAA	MB 150108AAAA	104-1013	3000	14.6	5992	25	16	2000	75	4.50	3.36	3.00
TF0280MS020AAAA	MB 180102AAAA	104-1007	3000	17.7	6941	25	13	2000	64	4.50	3.97	3.57
TF0280MS030AAAA	MB 180103AAAA	104-1028	3000	17.7	6941	25	13	2000	64	4.50	3.97	3.57
TF0280MS010AAAA	MB 180101AAAA	104-1021	3000	17.7	6941	25	13	2000	64	4.50	3.97	3.57
TF0280MS050AAAA	MB 180105AAAA	104-1035	3000	17.7	6941	25	13	2000	64	4.50	3.97	3.57
TF0280MS080AAAA	MB 180108AAAA	104-1014	3000	17.7	6941	25	13	2000	64	4.50	3.97	3.57
TF0405MS020AAAA	MB 250102AAAA		2500	24.7	5800	25	9	1850	40	4.00	6.00	5.00
TF0405MS030AAAA	MB 250103AAAA		2500	24.7	5800	25	9	1850	40	4.00	6.00	5.00
TF0405MS010AAAA	MB 250101AAAA		2500	24.7	5800	25	9	1850	40	4.00	6.00	5.00
TF0405MS050AAAA	MB 250105AAAA		2500	24.7	5800	25	9	1850	40	4.00	6.00	5.00
TF0405MS080AAAA	MB 250108AAAA		2500	24.7	5800	25	9	1850	40	4.00	6.00	5.00

TFXXXXMS020AAAA Std. 7/8 O-Ring Thread Ports 1" Keyed Shaft
TFXXXXMS030AAAA Std. 7/8 O-Ring Thread Ports 1-1/4" Keyed Shaft
TFXXXXMS010AAAA Std. 7/8 O-Ring Thread Ports 1" 6 Spline Shaft
TFXXXXMS050AAAA Std. 7/8 O-Ring Thread Ports 1-1/4" 14 Spline Shaft
TFXXXXMS080AAAA Std. 7/8 O-Ring Thread Ports 1-1/4" Taper Shaft
Other shaft options are available and normally in stock.

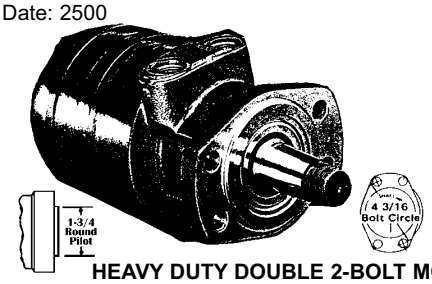
Prices subject to change without notice

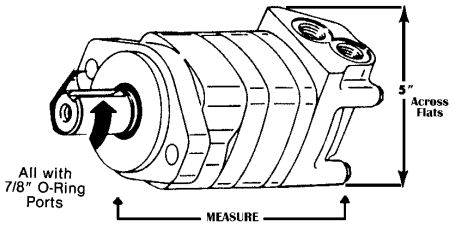
Use TRW ROSS "TF/TG" SERIES MOTORS For CHAR-LYNN "2000" SERIES OR WHITE "RE" SERIES MOTORS

TF/TG Series Roller Stator Has Two Needle Bearings and Two Needle Thrust Beaings

HEAVY DUTY ROLLER GEROTOR TYPE

All Motors are Reversible





HEAVY DUTY DOUBLE 2-BOLT MOUNTING FLANGE

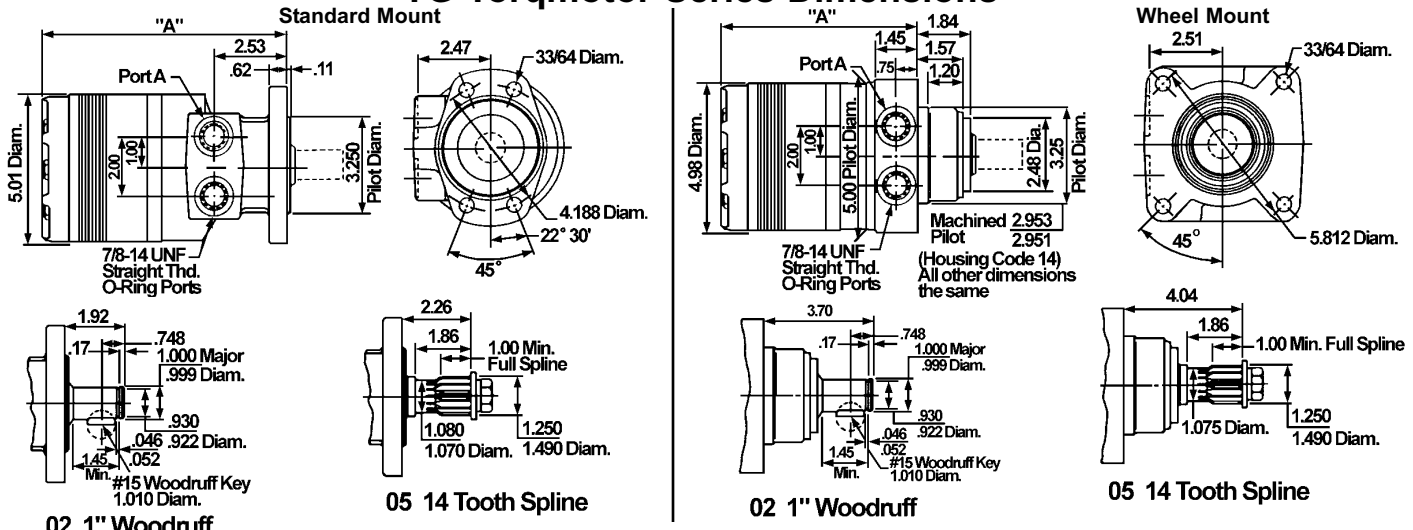
Heavy duty roller gerotor motor has double 2-bolt oval flange mount SAE Type A for four 1/2" bolts for stronger and more versatile mounting.

Char-Lynn industrial 2-bolt flange mount for two 1/2" bolts on 4-3/16" bolt circle and 3-1/4" round pilot.

NEW TRW Ross Motor Number	Our Sequence Number	Per Each	Approx. Disp. Cu. In.	Char-Lynn Motor Number	OLD TRW Ross Motor Number	NEW TRW Ross Number	Our Sequence Number	Per Each	Approx. Disp. Cu. In.	OLD TRW Ross Motor Number
2-Bolt A Mounting Flange - 1" Straight Keyed Shaft - 7/8" O-Ring Ports										
TF0080MS020AAAA	706796	**$804.22**	5	104-1001	MB 050102AAAA					
TF0100MS020AAAA	706801	**805.32**	6	104-1002	MB 060102AAAA					
TF0130MS020AAAA	706806	**807.53**	8	104-1003	MB 080102AAAA					
TF0140MS020AAAA	706807	**839.43**	9		MB 090102AAAA	TG0140MS020AAAA	707461	**$1207.89**	9	ME 090102AAAA
TF0170MS020AAAA	706808	**811.93**	10	104-1004	MB 100102AAAA	TG0170MS020AAAA	707460	**1052.86**	10	ME 100102AAAA
TF0195MS020AAAA	706811	**837.23**	12	104-1005	MB 120102AAAA	TG0195MS020AAAA	707462	**1072.67**	12	ME 120102AAAA
TF0240MS020AAAA	706813	**854.83**	15	104-1006	MB 150102AAAA	TG0240MS020AAAA	707463	**1117.77**	15	ME 150102AAAA
TF0280MS020AAAA	706816	**861.43**	18	104-1007	MB 180102AAAA	TG0280MS020AAAA	707464	**1297.85**	18	ME 180102AAAA
- - - - -		**....**	23		- - - - -	TG0335MS020AAAA	707465	**1137.58**	20	ME 210102AAAA
TF0405MS020AAAA	706822	**1037.46**	24	104-1143	MB 250102AAAA	TG0405MS020AAAA	707467	**1247.59**	24	ME 240102AAAA
- - - - -		**....**			- - - - -	TG0475MS020AAAA	707466	**1470.93**	29	ME 290102AAAA
- - - - -		**....**			- - - - -	TG0785MS020AAAA	707469	**1762.47**	48	ME 480102AAAA
2-Bolt A Mounting Flange - 1-1/4" Straight Keyed Shaft - 7/8" O-Ring Ports										
TF0080MS030AAAA	706829	**780.02**	5	104-1022	MB 050103AAAA					
TF0100MS030AAAA	706831	**805.32**	6	104-1023	MB 060103AAAA					
TF0130MS030AAAA	706836	**831.73**	8	104-1024	MB 080103AAAA					
TF0140MS030AAAA	706838	**814.13**	9		MB 090103AAAA	TG0140MS030AAAA	707329	**1016.56**	9	ME 090103AAAA
TF0170MS030AAAA	706839	**811.93**	10	104-1025	MB 100103AAAA	TG0170MS030AAAA	707330	**1084.77**	10	ME 100103AAAA
TF0195MS030AAAA	706841	**837.23**	12	104-1026	MB 120103AAAA	- - - - -		**....**		
TF0240MS030AAAA	706842	**829.53**	15		MB 150103AAAA	TG0240MS030AAAA	707333	**1117.77**	15	ME 150103AAAA
TF0280MS030AAAA	706846	**861.43**	18	104-1028	MB 180103AAAA	TG0280MS030AAAA	707336	**1160.68**	18	ME 180103AAAA
- - - - -		**....**	23		- - - - -	TG0335MS030AAAA	707341	**1171.68**	21	ME 210103AAAA
TF0405MS030AAAA	706852	**1069.37**	24	104-1228	MB 250103AAAA	TG0405MS030AAAA	707343	**1247.59**	24	ME 240103AAAA
- - - - -		**....**			- - - - -	TG0475MS030AAAA	707346	**1470.93**	29	ME 290103AAAA
- - - - -		**....**			- - - - -	TG0530MS030AAAA	707347	**1511.63**	33	ME 330103AAAA
- - - - -		**....**			- - - - -	TG0785MS030AAAA	707348	**1762.47**	48	ME 480103AAAA
- - - - -		**....**			- - - - -	TG0960MS030AAAA	707351	**2214.64**	58	ME 580103AAAA
2-Bolt A Mounting Flange - 1" 6 Spline Shaft - 7/8" O-Ring Ports										
TF0080MS010AAAA	706706	**780.02**	5	104-1015	MB 050101AAAA					
TF0100MS010AAAA	706711	**781.12**	6	104-1016	MB 060101AAAA					
TF0130MS010AAAA	706716	**807.53**	8	104-1017	MB 080101AAAA					
TF0140MS010AAAA	706718	**814.13**	9		MB 090101AAAA	TG0140MS010AAAA	707571	**1016.56**	9	ME 090101AAAA
TF0170MS010AAAA	706719	**811.93**	10	104-1018	MB 100101AAAA	TG0170MS010AAAA	707570	**1052.86**	10	ME 100101AAAA
TF0195MS010AAAA	706721	**837.23**	12	104-1019	MB 120101AAAA	TG0195MS010AAAA	707572	**1072.67**	12	ME 120101AAAA
TF0240MS010AAAA	706723	**829.53**	15	104-1020	MB 150101AAAA	TG0240MS010AAAA	707573	**1117.77**	15	ME 150101AAAA
TF0280MS010AAAA	706726	**836.13**	18	104-1021	MB 180101AAAA	TG0280MS010AAAA	707574	**1126.57**	18	ME 180101AAAA
- - - - -		**....**	23		- - - - -	TG0335MS010AAAA	707575	**1137.58**	21	ME 210101AAAA
TF0405MS010AAAA	706732	**1037.46**	24		MB 250101AAAA	TG0405MS010AAAA	707577	**1247.59**	24	ME 240101AAAA
- - - - -		**....**			- - - - -	TG0475MS010AAAA	707576	**1470.93**	29	ME 290101AAAA
2-Bolt A Mounting Flange - 1-1/4" 14 Spline Shaft - 7/8" O-Ring Ports										
TF0080MS050AAAA	706916	**780.02**	5		MB 050105AAAA					
TF0100MS050AAAA	706921	**781.12**	6	104-1030	MB 060105AAAA					
TF0130MS050AAAA	706926	**807.53**	8	104-1031	MB 080105AAAA					
TF0140MS050AAAA	706927	**814.13**	9		MB 090105AAAA	TG0140MS050AAAA	707386	**1016.56**	9	ME 090105AAAA
TF0170MS050AAAA	706928	**836.13**	10	104-1032	MB 100105AAAA	TG0170MS050AAAA	707389	**1052.86**	10	ME 100105AAAA
TF0195MS050AAAA	706931	**813.03**	12	104-1033	MB 120105AAAA	TG0195MS050AAAA	707387	**1072.67**	12	ME 120105AAAA
TF0240MS050AAAA	706932	**829.53**	15	104-1034	MB 150105AAAA	TG0240MS050AAAA	707394	**1117.77**	15	ME 150105AAAA
TF0280MS050AAAA	706936	**836.13**	18	104-1035	MB 180105AAAA	TG0280MS050AAAA	707396	**1126.57**	18	ME 180105AAAA
- - - - -		**....**	23		- - - - -	TG0335MS050AAAA	707401	**1137.58**	21	ME 210105AAAA
TF0405MS050AAAA	706940	**1037.46**	24	104-1229	MB 250105AAAA	TG0405MS050AAAA	707402	**1247.59**	24	ME 240105AAAA
- - - - -		**....**			- - - - -	TG0475MS050AAAA	707406	**1470.93**	29	ME 290105AAAA
- - - - -		**....**			- - - - -	TG0530MS050AAAA	707407	**1511.63**	33	ME 330105AAAA
- - - - -		**....**			- - - - -	TG0785MS050AAAA	707408	**1762.47**	48	ME 480105AAAA
- - - - -		**....**			- - - - -	TG0960MS050AAAA	707409	**2214.64**	58	ME 580105AAAA
2-Bolt A Mounting Flange - 1-1/4" Taper Shaft - 7/8" O-Ring Ports										
TF0080MS080AAAA	706763	**780.02**	5		MB 050108AAAA					
TF0100MS080AAAA	706764	**781.12**	6	104-1009	MB 060108AAAA					
TF0130MS080AAAA	706771	**807.53**	8	104-1010	MB 080108AAAA					
TF0140MS080AAAA	706773	**814.13**	9		MB 090108AAAA	TG0140MS080AAAA	707303	**1016.56**	9	ME 090108AAAA
TF0170MS080AAAA	706777	**811.93**	10	104-1011	MB 100108AAAA	TG0170MS080AAAA	707304	**1052.86**	10	ME 100108AAAA
TF0195MS080AAAA	706779	**813.03**	12	104-1012	MB 120108AAAA	TG0195MS080AAAA	707305	**1072.67**	12	ME 120108AAAA
TF0240MS080AAAA	706782	**829.53**	15	104-1013	MB 150108AAAA	TG0240MS080AAAA	707308	**1117.77**	15	ME 150108AAAA
TF0280MS080AAAA	706787	**836.13**	18	104-1014	MB 180108AAAA	TG0280MS080AAAA	707311	**1126.57**	18	ME 180108AAAA
- - - - -		**....**	23		- - - - -	TG0335MS080AAAA	707312	**1137.58**	21	ME 210108AAAA
TF0405MS080AAAA	706790	**1037.46**	24		MB 250108AAAA	TG0405MS080AAAA	707313	**1247.59**	24	ME 240108AAAA
- - - - -		**....**			- - - - -	TG0475MS080AAAA	707314	**1470.93**	29	ME 290108AAAA
- - - - -		**....**			- - - - -	TG0530MS080AAAA	707316	**1511.63**	33	ME 330108AAAA
- - - - -		**....**			- - - - -	TG0785MS080AAAA	707317	**1762.47**	48	ME 480108AAAA
- - - - -		**....**			- - - - -	TG0960MS080AAAA	707320	**2214.64**	58	ME 580108AAA

Prices subject to change without notice

TG Torqmotor Series Dimensions



Roller Stator - Two Needle Bearings and Two Needle Thrust Bearings

NEW Ross Motor Number	OLD Ross Motor Number	Similar to CharLynn &/or White	Max. PSI	Disp	Max. Torq	Max. Flow	RPM No Load	Max. Cont. PSI	At 5 GPM Max Cont. PSI RPM	At 5 GPM Max Cont. PSI HP	HP at 50 RPM Max. Cont. PSI GPM	HP at 50 RPM Max. Cont. PSI HP
TG0140MS030AAAA	ME 090103AAAA		4000	8.6	472.5	25	27	3000	124	6.75	2.10	2.74
TG0140US030AAAA	ME 090203AAAA		4000	8.6	472.5	25	27	3000	124	6.75	2.10	2.74
TG0140MS010AAAA	ME 090101AAAA		4000	8.6	472.5	25	27	3000	124	6.75	2.10	2.74
TG0140MS020AAAA	ME 090102AAAA		4000	8.6	472.5	25	27	3000	124	6.75	2.10	2.74
TG0140MS050AAAA	ME 090105AAAA		4000	8.6	472.5	25	27	3000	124	6.75	2.10	2.74
TG0140MS080AAAA	ME 090108AAAA		4000	8.6	472.5	25	27	3000	124	6.75	2.10	2.74
TG0195MS030AAAA	ME 120103AAAA	RE844	4000	12.1	6434	25	19	3000	87	6.75	3.00	3.90
TG0195US030AAAA	ME 120203AAAA		4000	12.1	6434	25	19	3000	87	6.75	3.00	3.90
TG0195MS010AAAA	ME 120101AAAA	RE842	4000	12.1	6434	25	19	3000	87	6.75	3.00	3.90
TG0195MS020AAAA	ME 120102AAAA	RE846	4000	12.1	6434	25	19	3000	87	6.75	3.00	3.90
TG0195MS050AAAA	ME 120105AAAA	RE845	4000	12.1	6434	25	19	3000	87	6.75	3.00	3.90
TG0195MS080AAAA	ME 120108AAAA	RE843	4000	12.1	6434	25	19	3000	87	6.75	3.00	3.90
TG0240MS030AAAA	ME 150103AAAA		4000	14.6	8154	25	16	3000	72	6.75	3.73	4.75
TG0240US030AAAA	ME 150203AAAA		4000	14.6	8154	25	16	3000	72	6.75	3.73	4.75
TG0240MS010AAAA	ME 150101AAAA		4000	14.6	8154	25	16	3000	72	6.75	3.73	4.75
TG0240MS020AAAA	ME 150102AAAA		4000	14.6	8154	25	16	3000	72	6.75	3.73	4.75
TG0240MS050AAAA	ME 150105AAAA		4000	14.6	8154	25	16	3000	72	6.75	3.73	4.75
TG0240MS080AAAA	ME 150108AAAA		4000	14.6	8154	25	16	3000	72	6.75	3.73	4.75
TG0280MS030AAAA	ME 180103AAAA	RE864	4000	17.7	9619	25	13	3000	61	6.75	4.40	5.50
TG0280US030AAAA	ME 180203AAAA		4000	17.7	9619	25	13	3000	61	6.75	4.40	5.50
TG0280MS010AAAA	ME 180101AAAA	RE862	4000	17.7	9619	25	13	3000	61	6.75	4.40	5.50
TG0280MS020AAAA	ME 180102AAAA	RE866	4000	17.7	9619	25	13	3000	61	6.75	4.40	5.50
TG0280MS050AAAA	ME 180105AAAA	RE865	4000	17.7	9619	25	13	3000	61	6.75	4.40	5.50
TG0280MS080AAAA	ME 180108AAAA	RE863	4000	17.7	9619	25	13	3000	61	6.75	4.40	5.50
TG0335MS030AAAA	ME 210103AAAA	RE874	4000	20.6	11,126	25	11	3000	49.25	6.50	5.49	6.77
TG0335US030AAAA	ME 210203AAAA		4000	20.6	11,126	25	11	3000	49.25	6.50	5.49	6.77
TG0335MS010AAAA	ME 210101AAAA	RE872	4000	20.6	11,126	25	11	3000	49.25	6.50	5.49	6.77
TG0335MS020AAAA	ME 210102AAAA	RE876	4000	20.6	11,126	25	11	3000	49.25	6.50	5.49	6.77
TG0335MS050AAAA	ME 210105AAAA	RE875	4000	20.6	11,126	25	11	3000	49.25	6.50	5.49	6.77
TG0335MS080AAAA	ME 210108AAAA	RE873	4000	20.6	11,126	25	11	3000	49.25	6.50	5.49	6.77
TG0475MS030AAAA	ME 290103AAAA	RE884	3000	29	12,013	30	8	2000	36	4.00	6.70	6.23
TG0475US030AAAA	ME 290203AAAA		3000	29	12,013	30	8	2000	36	4.00	6.70	6.23
TG0475MS010AAAA	ME 290101AAAA	RE882	3000	29	12,013	30	8	2000	36	4.00	6.70	6.23
TG0475MS020AAAA	ME 290102AAAA		3000	29	12,013	30	8	2000	36	4.00	6.70	6.23
TG0475MS050AAAA	ME 290105AAAA	RE885	3000	29	12,013	30	8	2000	36	4.00	6.70	6.23
TG0475MS080AAAA	ME 290108AAAA	RE883	3000	29	12,013	30	8	2000	36	4.00	6.70	6.23
TG0530MS030AAAA	ME 330103AAAA		2500	32.6	10,735	30	7	2000	31.75	4.00	7.75	6.90
TG0530US030AAAA	ME 330203AAAA		2500	32.6	10,735	30	7	2000	31.75	4.00	7.75	6.90
TG0530MS010AAAA	ME 330101AAAA		2500	32.6	10,735	30	7	2000	31.75	4.00	7.75	6.90
TG0530MS050AAAA	ME 330105AAAA		2500	32.6	10,735	30	7	2000	31.75	4.00	7.75	6.90
TG0530MS080AAAA	ME 330108AAAA	RE893	2500	32.6	10,735	30	7	2000	31.75	4.00	7.75	6.90
TG0785MS030AAAA	ME 480103AAAA	RE894	2000	48.1	11,789	30	5	1500	21.75	3.00	11.76	7.30
TG0785US030AAAA	ME 480203AAAA		2000	48.1	11,789	30	5	1500	21.75	3.00	11.76	7.30
TG0785MS050AAAA	ME 480105AAAA	RE895	2000	48.1	11,789	30	5	1500	21.75	3.00	11.76	7.30
TG0785MS080AAAA	ME 480108AAAA		2000	48.1	11,789	30	5	1500	21.75	3.00	11.76	7.30
TG0960US030AAAA	ME 580203AAAA		1500	58	10,954	30	4	1000	20	2.00	13.15	5.40
TG0960MS050AAAA	ME 580105AAAA		1500	58	10,954	30	4	1000	20	2.00	13.15	5.40
TG0960MS080AAAA	ME 580108AAAA		1500	58	10,954	30	4	1000	20	2.00	13.15	5.40

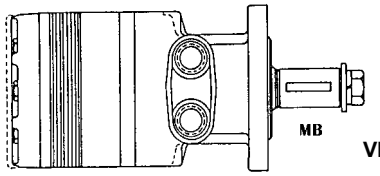
TGXXXXMS030AAAA Std. 7/8 O-Ring Thread Ports 1-1/4" Keyed Shaft
TGXXXXUS030AAAA WH. 7/8 O-Ring Thread Ports 1-1/4" Keyed Shaft
TGXXXXMS050AAAA Std. 7/8 O-Ring Thread Ports 1-1/4" 14 Spline Shaft
TGXXXXMS080AAAA Std. 7/8 O-Ring Thread Ports 1-1/4" Taper Shaft

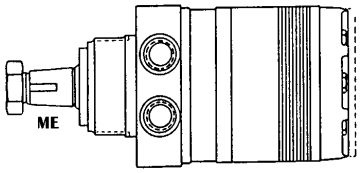
TGXXXXMS010AAAA Std. 7/8 O-Ring Thread Ports 1" 6 Splin Shaft
TGXXXXMS020AAAA Std. 7/8 O-Ring Thread Ports 1" Keyed Shaft

Other shaft options are available and normally in stock.

Prices subject to change without notice

TRW ROSS "TF/TG" SERIES WHEEL MOUNT MOTORS





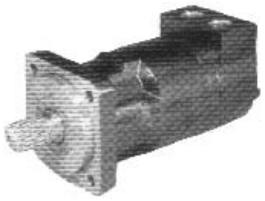
VERY HEAVY DUTY WHEEL MOUNT 4-BOLT MOUNTING FLANGE
All Motors are Reversible

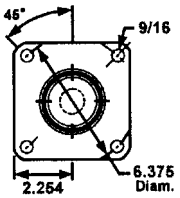
Heavy-duty roller gerotor motor has 4-bolt square wheel mount flange for four 1/2" bolts or 5-13/16" bolt circle with 3-1/4" round pilot that fits DICO wheel hub. This wheel mount motor has 1-1/4" round shaft with straight key and heavy bearings. This wheel mount motor is best for overhung loads like sprockets, pulleys & wheel hubs because the outboard bearing is nearer end of shaft. Wt. 33 lbs.

Roller Stator - Both Have Two Needle Bearings and Two Thrust Bearings

NEW TRW Ross Motor Number	Our Sequence Number	Per Each	Approx. Disp. Cu. In.	OLD TRW Ross Motor Number	NEW TRW Ross Number	Our Sequence Number	Per Each	Approx. Disp. Cu. In.	OLD TRW Ross Motor Number
Large 4-Bolt Mounting Flange - Wheel Mount - 1-1/4" Straight Shaft - 7/8" O-Ring Ports									
TF0080US030AAAA	706856	**$857.03**	5	MB 050203AAAA					
TF0100US030AAAA	706861	**858.13**	6	MB 060203AAAA					
TF0130US030AAAA	706866	**884.54**	8	MB 080203AAAA					
TF0140US030AAAA	706867	**891.14**	9	MB 090203AAAA	TG0140US030AAAA	707356	**$1093.57**	9	ME 090203AAAA
TF0170US030AAAA	706868	**888.94**	10	MB 100203AAAA	TG0170US030AAAA	707358	**1129.88**	10	ME 100203AAAA
TF0195US030AAAA	706871	**890.04**	12	MB 120203AAAA	TG0195US030AAAA	707361	**1149.68**	12	ME 120203AAAA
TF0240US030AAAA	706873	**906.54**	15	MB 150203AAAA	TG0240US030AAAA	707362	**1194.79**	15	ME 150203AAAA
TF0280US030AAAA	706876	**913.14**	18	MB 180203AAAA	TG0280US030AAAA	707366	**1203.59**	18	ME 180203AAAA
- - - - -		**....**		- - - - -	TG0335US030AAAA	707377	**1214.59**	21	ME 210203AAAA
TF0405US030AAAA	706882	**1114.47**	25	MB 250203AAAA	TG0405US030AAAA	707380	**1324.61**	24	ME 240203AAAA
- - - - -		**....**		- - - - -	TG0475US030AAAA	707376	**1594.15**	29	ME 290203AAAA
- - - - -		**....**		- - - - -	TG0530US030AAAA	707378	**1588.65**	33	ME 330203AAAA
- - - - -		**....**		- - - - -	TG0785US030AAAA	707379	**1839.49**	48	ME 480203AAAA
- - - - -		**....**		- - - - -	TG0960US030AAAA	707381	**2291.66**	58	ME 580203AAAA
Large 4-Bolt Mounting Flange - Wheel Mount - 1-1/4" Splined Shaft - 7/8" O-Ring Ports									
TF0080US050AAAA	706891	**857.03**	5	MB 050205AAAA					
TF0100US050AAAA	706893	**884.54**	6	MB 060205AAAA					
TF0130US050AAAA	706895	**884.54**	8	MB 080205AAAA					
TF0140US050AAAA	706896	**891.14**	9	MB 090205AAAA	TG0140US050AAAA	707417	**1093.57**	9	ME 090205AAAA
TF0170US050AAAA	706897	**888.94**	10	MB 100205AAAA	TG0170US050AAAA	707415	**1129.88**	10	ME 100205AAAA
TF0195US050AAAA	706900	**890.04**	12	MB 120205AAAA	TG0195US050AAAA	707418	**1149.68**	12	ME 120205AAAA
TF0240US050AAAA	706902	**906.54**	15	MB 150205AAAA	TG0240US050AAAA	707419	**1194.79**	15	ME 150205AAAA
TF0280US050AAAA	706905	**913.14**	18	MB 180205AAAA	TG0280US050AAAA	707421	**1203.59**	18	ME 180205AAAA
- - - - -		**....**		- - - - -	TG0335US050AAAA	707423	**1214.59**	21	ME 210205AAAA
TF0405US050AAAA	706911	**1114.47**	25	MB 250205AAAA	TG0405US050AAAA	707420	**1324.61**	24	ME 240205AAAA
- - - - -		**....**		- - - - -	TG0475US050AAAA	707424	**1547.94**	29	ME 290205AAAA
Large 4-Bolt Mounting Flange - Wheel Mount - 1-1/4" Tapered Shaft - 7/8" O-Ring Ports									
TF0080US080AAAA	706736	**857.03**	5	MB 050208AAAA					
TF0100US080AAAA	706741	**858.13**	6	MB 060208AAAA					
TF0130US080AAAA	706746	**884.54**	8	MB 080208AAAA					
TF0140US080AAAA	706747	**891.14**	9	MB 090208AAAA	TG0140US080AAAA	707287	**1093.57**	9	ME 090208AAAA
TF0170US080AAAA	706748	**888.94**	10	MB 100208AAAA	TG0170US080AAAA	707288	**1129.88**	10	ME 100208AAAA
TF0195US080AAAA	706751	**890.04**	12	MB 120208AAAA	TG0195US080AAAA	707289	**1149.68**	12	ME 120208AAAA
TF0240US080AAAA	706754	**906.54**	15	MB 150208AAAA	TG0240US080AAAA	707291	**1194.79**	15	ME 150208AAAA
TF0280US080AAAA	706756	**940.65**	18	MB 180208AAAA	TG0280US080AAAA	707293	**1203.59**	18	ME 180208AAAA
- - - - -		**....**		- - - - -	TG0335US080AAAA	707295	**1214.59**	21	ME 210208AAAA
TF0405US080AAAA	706762	**1114.47**	25	MB 250208AAAA	TG0405US080AAAA	707296	**1324.61**	24	ME 240208AAAA
- - - - -		**....**		- - - - -	TG0475US080AAAA	707297	**1547.94**	29	ME 290208AAAA
- - - - -		**....**		- - - - -	TG0530US080AAAA	707299	**1588.65**	33	ME 330208AAAA
- - - - -		**....**		- - - - -	TG0785US080AAAA	707301	**1839.49**	48	ME 480208AAAA
- - - - -		**....**		- - - - -	TG0960US080AAAA	707302	**2291.66**	58	ME 580208AAAA

NEW TRW ROSS TK SERIES MOTOR

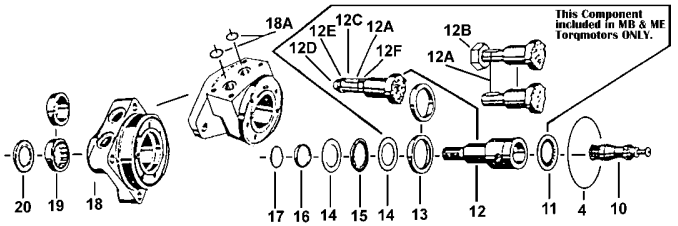


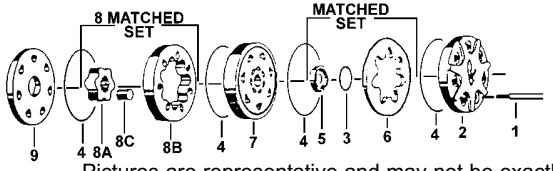


Part Number	Our Sequence Number	Per Each	Similar to Eaton Number	Disp. (cu. in.).	Cont. PSI	Peak PSI	Torq at Cont. PSI & RPM	Torq at Peak PSI & RPM	GPM Cont. Flow	GPM Max. Flow	RPM at Cont. Flow	RPM at Max. Flow
1-1/2" ROUND 4 BOLT WITH 1-5/16 ORING PORTS												
TK0250K5320AAB	707982	**$1630.45**	112-1065	15.3	3500	4750	7204	9234	30	35	453	523
TK0315K5320AAB	707984	**1662.36**	112-1066	19.2	3500	4750	9105	11625	30	35	361	413
TK0400K5320AAB	707986	**1708.56**	112-1067	24.4	3000	4750	10201	13484	30	40	284	373
TK0500K5320AAB	707988	**1990.21**	112-1068	30.5	3000	4750	12736	16940	30	40	227	298
TK0630K5320AAB	707990	**2033.12**	112-1107	38.4	3000	4750	14313	15187	30	40	241	237
TK1000K5320AAB	707992	**2539.19**	112-1069	61.0	2500	4750	21360	23540	40	60	151	218
1-1/2" - 17 SPLINE 4 BOLT WITH 1-5/16 ORING PORTS												
TK0250K5360AAB	707983	**1630.45**	112-1059 / 113-1071	15.3	3500	4750	7204	9234	30	35	453	523
TK0315K5360AAB	707985	**1662.36**	112-1060 / 113-1072	19.2	3500	4750	9105	11625	30	35	361	413
TK0400K5360AAB	707987	**1708.56**	112-1061 / 113-1073	24.4	3000	4750	10201	13484	30	40	284	373
TK0500K5360AAB	707989	**1990.21**	112-1062 / 113-1074	30.5	3000	4750	12736	16940	30	40	227	298
TK0630K5360AAB	707991	**2033.12**	112-1109 / 113-1093	38.4	3000	4750	14313	15187	30	40	241	237
TK1000K5360AAB	707993	**2539.19**	112-1063 / 113-1075	61.0	2500	4750	21360	23540	40	60	151	218

Prices subject to change without notice

PARTS FOR TRW ROSS HIGH TORQUE LOW SPEED MOTORS





Pictures are representative and may not be exactly like your particular motor part.

1. Special Bolts (5 or 7)
1A. Special Bolts (7)
1B. Special Bolts (7)
1C. Special Bolts (7)
2. End Cover
3. Seal Ring-Commutator
4. Seal Ring (5)
5. Commutator
6. Commutator Ring
7. Manifold
8. Rotor Set
8A. Rotor
8B. Stator/Stator Half
8C. Vane (7)
8D. Stator Half
8E. Vane (7)
9. Wear Plate
10. Drive Link
11. Thrust Bearing
12. Coupling Shaft
12A. Key
12B. Nut
12C. Washer
12D. Bolt
12E. Lock Washer
12F. Retaining Ring
13. Bearing/Bushing, Inner
14. Thrust Washer
15. Thrust Bearing
16. Seal
17. Backup Washer
18. Housing
18A. O-Ring (2)
19. Bearing/Bushing, Outer
20. Dirt & Water Seal

COMMON PARTS

Item # → / Motor Series	#2 End Cover	#3 Commutator Seal	#4 Seal Ring	#16 Inner Seal	#5 & #6 (Set) Commutator Assembly	#7 Manifold	#9 Wear Plate	#11 Thrust Bearing	#13 Inner Bearing	#14 Thrust Washer	#15 Thrust Bearing	#17 Backup Washer	#19 Outer Bearing	#20 Dirt & Water Seal
TE	**MF016000**	**032435**	**032821**	**032377**	**MF018000-A1**	**MF015000**	**477341**	**- - -**	**B268**	**028483**	**065066**	**028516**	**065506**	**478036**
Sequence #	708662	709223	708750	708742	708648	708654	708755		379520	708734	708762	708738	708763	708758
	$109.32	**$3.78**	**$2.01**	**$28.94**	**$128.61**	**$220.25**	**$94.85**	**$....**	**$12.29**	**$28.94**	**$27.33**	**$14.71**	**$46.62**	**$25.72**
TF & TG	**ME016000**	**032435**	**032819**	**032817**	**ME018000-A1**	**ME015000**	**477342**	**068024**	**071019**	**- - -**	**069017**	**028515**	**068027**	**478035**
Sequence #	708666	709223	708748	708746	708650	708658	708754	708764	708772		708768	708736	708766	708756
	$175.24	**$3.78**	**$3.22**	**$49.84**	**$157.55**	**$353.69**	**$247.58**	**$17.68**	**$64.31**	**$....**	**$45.01**	**$17.68**	**$41.80**	**$32.15**

ROTOR ASSEMBLY

Motor Series	02 / 0045	03 / 0050	04 / 0065	05 / 0080	06 / 0100	08 / 0130	10 / 0165	12 / 0195	14 / 0230	16 / 0260	18 / 0295	20 / 0330
TB & TE	**MF027003**	**MF037003**	**MF047003**	**MF057003**	**MF067003**	**MF087003**	**MF107003**	**MF127003**	**MF147003**	**MF167003**	**MF187003**	**MF207003**
Sequence #	708588	708590	708592	708594	708596	708598	708600	708602	708604	708606	708608	708610
	$332.79	**$360.12**	**$390.66**	**$414.78**	**$422.82**	**$463.01**	**$496.77**	**$532.14**	**$577.15**	**$638.25**	**$694.51**	**$734.71**
	05 / 0080	06 / 0100	08 / 0130	09 / 0140	10 / 0170	12 / 0195	15 / 0240	18 / 0280		23 / 0360		
TF	**MB057003**	**MB067003**	**MB087003**	**MB097003**	**MB107003**	**MB127003**	**MB157003**	**MB187003**	**- - -**	**MB237003**	**- - -**	**- - -**
Sequence #	708612	708614	708616	708618	708620	708622	708624	708626		708628		
	$520.89	**$520.89**	**$533.75**	**$548.22**	**$548.22**	**$570.72**	**$614.13**	**$638.25**	**$....**	**$763.64**	**$....**	**$....**
		09 / 0140		12 / 0195	15 / 0240	18 / 0280	21 / 0335	23 / 0360	29 / 0475	33 / 0530	48 / 0785	58 / 0960
TG	**- - -**	**ME097003**	**- - -**	**ME127003**	**ME157003**	**ME187003**	**ME217003**	**ME237003**	**ME297003**	**ME337003**	**ME487003**	**ME587003**
Sequence #		708630		708632	708634	708636	708638			708642	708644	708646
	$....	**$999.97**	**$....**	**$1046.59**	**$1093.22**	**$1139.84**	**$1180.03**	**$....**	**$....**	**$1350.44**	**$1573.91**	**$1747.54**

DRIVE LINK

Motor Series	02 / 0045	03 / 0050	04 / 0065	05 / 0080	06 / 0100	08 / 0130	10 / 0165	12 / 0195	14 / 0230	16 / 0260	18 / 0295	20 / 0330
TB & TE	**MF023000**	**MF033000**	**MF043000**	**MF053000**	**MF063000**	**MF083000**	**MF103000**	**MF123000**	**MF143000**	**MF163000**	**MF183000**	**MF203000**
Sequence #	708532	708534	708536	708538	708540	708542	708544	708546	708548	708550	708552	708554
	$106.11	**$106.11**	**$106.11**	**$106.11**	**$106.11**	**$106.11**	**$115.75**	**$115.75**	**$115.75**	**$125.40**	**$125.40**	**$125.40**
	05 / 0080	06 / 0100	08 / 0130	09 / 0140	10 / 0170	12 / 0195	15 / 0240	18 / 0280		23 / 0360		
TF	**MB063000**	**MB063000**	**MB083000**	**MB093000**	**MB103000**	**MB123000**	**MB153000**	**MB183000**	**- - -**	**MB233000**	**- - -**	**- - -**
Sequence #	708556	708556	708557	708558	708560	708562	708564	708566		708568		
	$136.65	**$136.65**	**$138.26**	**$138.26**	**$138.26**	**$143.08**	**$152.73**	**$168.81**	**$....**	**$197.74**	**$....**	**$....**
		09 / 0140		12 / 0195	15 / 0240	18 / 0280	21 / 0335		29 / 0475	33 / 0530	48 / 0785	58 / 0960
TG	**- - -**	**ME093000**	**- - -**	**ME123000**	**ME153000**	**ME183000**	**ME213000**	**- - -**	**ME293000**	**ME333000**	**ME483000**	**ME583000**
Sequence #		708570		708572	708574	708576	708578		708580	708582	708584	708586
	$....	**$184.88**	**$....**	**$197.74**	**$205.78**	**$215.43**	**$223.47**	**$....**	**$242.76**	**$247.58**	**$270.09**	**$294.20**

COUPLING SHAFTS

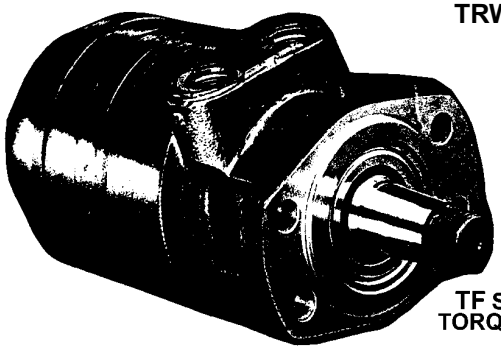
Motor Series	01-1" 6 Spline	09-1" Rd. .38 Pinhole	10-1" Rd. 1/4 Tap	11-1" 6 Spline	12-1" Tapered	13-1" Round	14-1" Rd. Dbl. Pinhole	15-1" Rd. .312 Pinhole	17	18	19-1.38" Tapered	20-1.38" Str. Keyed
TB & TE	**MF019007**	**MF019000**	**MF019006**	**MF019003**	**- - -**	**MF019005**	**MF019001**	**MF019002**	**- - -**	**- - -**	**- - -**	**- - -**
Sequence #	708494	708480	708492	708486		708490	708482	708484				
	$372.98	**$334.40**	**$319.93**	**$352.08**	**$....**	**$337.61**	**$332.79**	**$332.79**	**$....**	**$....**	**$....**	**$....**
	01-1" 6 Spline	02-1" Rd. 1/4 Tap	03-1-1/4" Str. Keyed	04-10B Spline	05-1-1/4" 14 Spline	06-19 Spline	07-15 Spline	08-1-1/4" Tapered	17	18	19-1.38" Tapered	20-1.38" Str. Keyed
TF	**MB019001**	**MB019002**	**MB019003**	**MB019004**	**- - -**	**MB019006**	**MB019007**	**MB019000**	**- - -**	**- - -**	**- - -**	**- - -**
Sequence #	708498	708500	708502	708504		708508	708510	708496				
	$419.60	**$401.92**	**$414.78**	**$517.67**	**$....**	**$450.15**	**$463.01**	**$419.60**	**$....**	**$....**	**$....**	**$....**
TG	**ME019001**	**ME019002**	**ME019003**	**ME019004**	**ME019005**	**ME019006**	**ME019007**	**ME019000**	**- - -**	**- - -**	**ME019010**	**ME019011**
Sequence #	708514	708516	708518	708520	708522	708524	708526	708512			708528	708530
	$512.85	**$512.85**	**$528.92**	**$601.27**	**$512.85**	**$520.89**	**$549.82**	**$512.85**	**$....**	**$....**	**$538.57**	**$520.89**

HOUSINGS

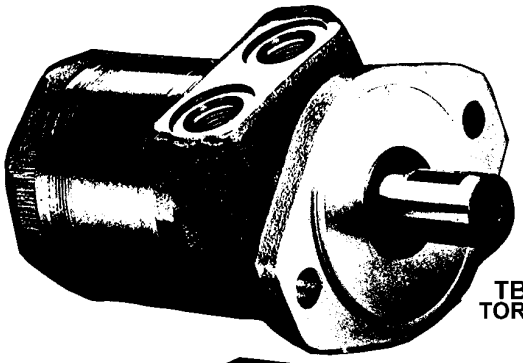
Includes Items 13 & 19	Includes Items 13 & 19	Includes Items 13 & 19	Includes Items 13 & 19	Includes Items 13, 14, 15, 19	Includes Items 13, 14, 15, 19	Includes Items 13, 14, 15, 19	Includes Items 13, 14, 15, 19
TB2 Bolt MF12006-A2	TB4 Bolt MF12007-A2	TE2 Bolt MF12006-A1	TE4 Bolt MF12007-A2	TF Std. ME012001-A1	TFWH ME012002-A1	TG Std. ME012001-A1	TGWH ME012002-A1

Standard Seal Kit Includes Items 3, 4, 16, 17, 20 & Grease **SK000090** 708674 **$61.85** **SK000092** 708678 **$93.84**

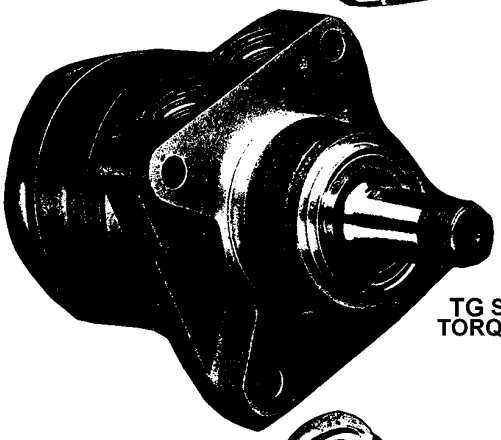
Prices subject to change without notice



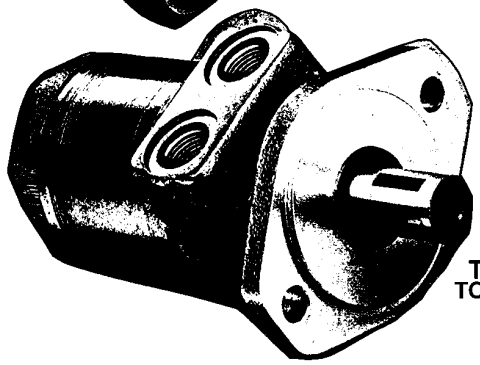
TF SERIES TORQMOTOR



TB SERIES TORQMOTOR



TG SERIES TORQMOTOR



TE SERIES TORQMOTOR

TF SERIES TORQMOTOR is for heavy-duty continuous applications that require up to 12 HP continuous with 20 HP peak. 4.9 CIPR to 29 CIPR, work PSI 49 to 18, 2000 PSI. Roller stator - 2 needle bearings in housing and 2 needle thrust bearings. Heavy back cover with 7 bolts

TB SERIES TORQMOTOR is for light-duty intermittent applications that require up to 4-3/4 HP continuous with 10 HP peak. 2.7 CIPR to 24 CIPR, work PSI 2.7 to 12, 1800 PSI. Roller stator - 1 bushing in housing and 1 needle bearing. Standard back cover with 5 bolts

TG SERIES TORQMOTOR is for heavy-duty continuous applications that require up to 17 HP continuous with 35 HP peak. 8.9 CIPR to 58.5 CIPR, work PSI 8.9 to 20.6, 3000 PSI. Roller stator - 2 needle bearings in housing and 2 needle thrust bearings. Heavy back cover with 7 bolts.

TE SERIES TORQMOTOR is for medium-duty intermittent applications that require up to 6 HP continuous with 13 HP peak. 2.7 CIPR to 24 CIPR, work PSI 2.7 to 12, 2000 PSI. Roller stator - 2 needle bearings in housing and 1 needle thrust bearing. Heavy back cover with 7 bolts.

THE TG, TF, TE, & TB TORQMOTORS ARE DESIGNED TO CARRY SIDE LOADS OF UP TO 2,000 POUNDS; THIS ALLOWS THE MOTOR TO DELIVER ITS FULL TORQUE, DRIVING A SPROCKET, GEAR OR PULLEY ON THE STANDARD OUTPUT SHAFT.

PEAK SHAFT SIDE LOAD CAPACITY IN POUNDS

Distance From Mount Face Inches	TG Continuous Side Load Capacity Pounds	TF Continuous Side Load Capacity Pounds	TB & TE Intermittent Side Load Capacity Pounds
1/4	4,000	2,500	- - -
1/2	3,800	2,300	2,400
1	3,400	2,200	2,000
1-1/4	3,100	2,000	1,900
1-1/2	2,900	1,933	1,800
2	2,500	1,865	1,700
2-1/4	2,300	1,800	- - -
3	2,000	1,600	- - -
3-1/4	1,900	1,500	- - -
4	1,700	- - -	- - -
5	1,500	- - -	- - -

RATING IS INTERMITTENT FOR TB & TE
RATING IS CONTINUOUS FOR TF & TG

RECOMMENDED HYDRAULIC OIL

The TORQMOTOR will perform best at top power rating with the use of oils per the following chart:

Hydraulic System Operating Temperature Range (Min. to Max.)	SAE Viscosity Designation	American Petroleum Institute (API) Service Classification
0º F. to 200º F.	10W-40	MS or SD
50º F. to 200º F.	20-20W	MS or SD

Manufacturer Recommends 10W40 Oil.

Use 10 Micron Filters

HYDRAULIC MOTOR REQUIREMENTS FOR AUGER USE UNDER NORMAL CONDITIONS

Auger Size Diam. x Length	Speed Range RPM	Hydraulic HP Required	Torqmotor Number	GPM Required	Pressure Required	Gas Engine HP Required	Electric Motor HP Required
6" x 25'	375-475	3 to 5	TB0100	9 to 12	1,000 PSI	5 HP	3 HP
6" x 30'	375-475	3 to 5	TB0100	9 to 12	1,000 PSI	7 HP	3 HP
6" x 35'	375-475	3 to 5	TB0100	9 to 12	1,000 PSI	7 HP	5 HP
6" x 42'	375-475	4 to 7	TE0100	9 to 12	1,000 PSI	10 HP	5 HP
6" x 47'	375-475	4 to 7	TE0100	9 to 12	1,000 PSI	12 HP	7-1/2 HP
6" x 52'	375-475	4 to 7	TE0100	9 to 12	1,000 PSI	12 HP	7-1/2 HP
8" x 25'	400-450	9 to 11	TF0130	10 to 12	1,500 PSI	10 HP	5 HP
8" x 30'	400-450	9 to 11	TF0130	10 to 12	1,500 PSI	12 HP	5 HP
8" x 35'	400-450	9 to 12	TF0195	18 to 20	1,500 PSI	15 HP	7-1/2 HP
8" x 40'	400-450	9 to 12	TF0195	18 to 20	1,500 PSI	20 HP	10 HP
8" x 45'	400-450	11 to 14	TF0195	18 to 20	2,000 PSI	25 HP	15 HP
8" x 52'	400-450	12 to 18	TF0195	18 to 20	2,000 PSI	30 HP	15 HP
8" x 57'	350-425	12 to 20	TF0195	18 to 20	2,500 PSI	30 HP	15 HP

Increase Flow for more Speed; Increase Pressure for more Torque

Prices subject to change without notice

HOW TO SELECT YOUR TRW ROSS TORQMOTORS HIGH TORQUE LOW SPEED MOTORS

Use **STANDARD** Gerator Motor for 1000 PSI to 2000 PSI Pressure.
Use **MEDIUM** Gerotor Motor for 1000 PSI to 2500 PSI Pressure.
Use **HEAVY** Gerator Motor for 1000 PSI to 3000 PSI Pressure.
Use **EXTRA-HEAVY** Gerator Motor for 1000 PSI to 4000 PSI Pressure.

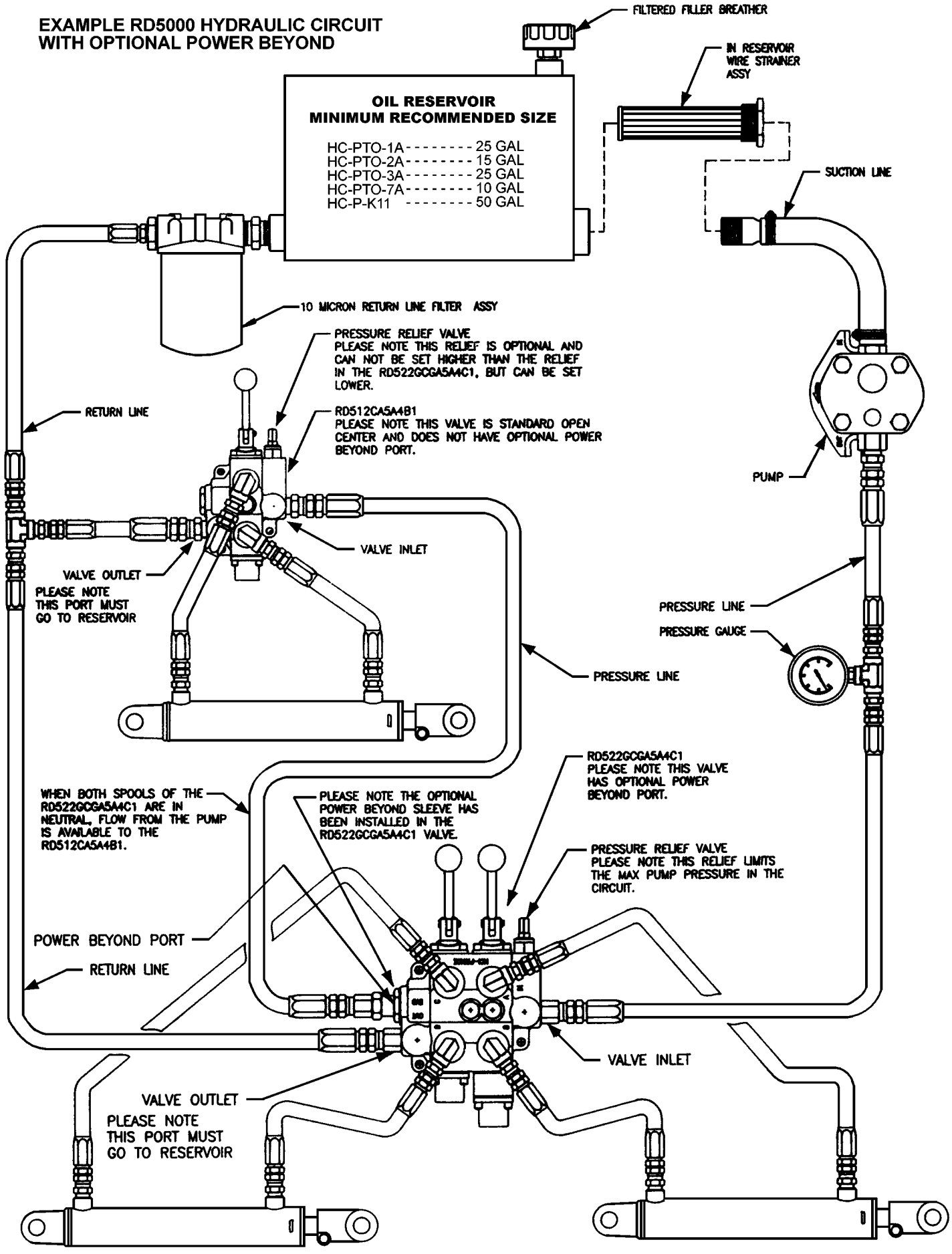
Maximum pressure should be considered extreme usage and for short duration.
The numbers indicate first, second, and third choice motor for the machine you want to drive depending upon your tractors oil output. **REMEMBER** that your **TRACTOR** provides the **HORSEPOWER** to drive the motor.

The **DIFFERENT SIZE MOTORS** only turn that **HORSEPOWER** into **MORE TORQUE & LESS SPEED** or **LESS TORQUE & MOTOR SPEED** and just act like a **GEARBOX** and **YOU** are **CHOOSING THE GEAR RATIO.**
Flow in gallons per minute gives you the speed; pressure in PSI gives you the torque. Torque times speed divided by 63025 gives you horsepower. Torque is nearly constant over the pressure range. The Torque is generally 15 to 20% less starting than running. If possible you should start empty (unloaded) and then load the motor.

TG0960 - LIMIT TOP PRESSURE TO 1000 PSI **TF0360 - LIMIT TOP PRESSURE TO 1500 PSI**
TE0330, TE0295, TE0260, TB0296, TB0260 - LIMIT TOP PRESSURE TO 1200 PSI

TRW Very Heavy Duty	TRW Heavy Duty	TRW Med. Duty	TRW Std. Duty	Speed Per Gal.at Cont. Rate PSI & RPM per GPM	In Lbs. Tor-que Per 100 PSI	Under Load Appx. Max. Speed RPM	4" Augers Up to 30 Feet	5" Augers Up to 30 Feet	6" Augers Up to 40 Feet	6" Augers Up 40 Feet to 60 Feet	7" Augers Up to 30 Feet	Elevators with Speed Jack Up to 60 Feet	Elevators with Boot Shaft	Combine Discharge Auger	Blender Mixer	Bale Conveyor	Sprayer Pumps	Post Hose Digger with 9" Auger	Unloader Wagon	Drill Fill Auger
TG0960				4	691	76														
TG0785				4	582	76														
TG0530				6	416	127														
TG0475				7	366	145														
TG0335				10	278	197														
	TF0360			10	276	200														
		TE0330		11	212	164														
			TB0330	11	213	132														
TG0280				12	235	245														
		TE0295		12	190	186												3		
			TB0295	12	203	149												2		
	TF0280			13	219	257												1		
		TE0260		14	169	206														
			TB0260	14	182	164														
TG0240				14	200	288														
	TF0240			15	189	301													2	
			TB0230	16	170	189														
		TE0230		16	159	243														
TG0195				17	157	349														
		TE0195		18	149	216														
			TB0195	18	145	219														
	TF0195			18	175	275												1		
	TF0170			21	133	315									1					
		TE0165		22	127	259									1					
			TB0165	22	123	263									1					
TG0140				25	115	494			3	3										
	TF0140			26	110	368			3	3		3	3			3				
		TE0130		27	101	320			3	3	2									
			TB0130	27	99	324			3	3	2									
	TF0130			29	99	427	3	3	2	2	1	2	2	2						
		TE0100		35	73	421	3	3	2	2	1			1		2				
			TB0100	36	72	430	3	2	2	1	1			1			2			
	TF0100			36	77	540	3	2	1	1		1	1			1				3
	TF0080			40	64	476	3	2	1	1										
			TB0080	42	61	375	3	2	1											
		TE0080		42	60	501	2	1	1								1			
		TE0065		55	47	660	2	1												2
			TB0065	55	47	497	2	1												
		TE0050		69	36	624	1	1												
			TB0050	71	35	637	1	1												
		TE0045		77	29	690	1													1
			TB0045	79	28	712	1													

EXAMPLE RD5000 HYDRAULIC CIRCUIT WITH OPTIONAL POWER BEYOND



TROUBLE SHOOTING FOR HYDRAULICS

CAUSES	REMEDIES
A-PUMP UNUSUALLY NOISY OR CAVITATION	
1. Low oil supply.	1. Fill oil to proper level.
2. Oil too heavy.	2. Change to proper weight oil.
3. Dirty oil filter	3. Clean and replace filter element.
4. Suction line too small.	4. Increase size of suction line.
5. Restriction or partially clogged suction line.	5. Remove restriction in suction line.
6. Clogged suction or sump filter.	6. Clean out filter or replace element.
7. Air bubbles in intake oil.	7. Use non-foaming hydraulic oil.
8. Reservoir air vent plugged.	8. Air must be allowed to breasthe into reservoir. Clean out or replace breather.
9. Pump running too fast.	9. Check recommended maximum speeds, and get bigger pump, or reduce speed.
10. Air leaks at pump intake piping joint or at pump shaft packing or inlet pipe opening.	10. Test by pouring oil on joints while listening for change in sound of operation. Tighten joints.
11. Flexible coupling misalignment.	11. Re-align flexible coupling.
12. Filter too small.	12. Filter capacity may be adequate only when just cleaned, filter should be larger size.
13. Stuck pump vane (in vane type pumps.)	13. Inspect for chips wedged in pump or sticky oil and reassemble.
14. Worn or broken parts.	14. Replace parts.
15. Pump head too loose or faulty head gasket.	15. Test by pouring oil over pump head, and tighten head carefully or replace gasket.
B-PUMP TAKES TOO LONG TO RESPOND OR FAILS TO RESPOND	
1. Low oil supply.	1. Fill oil to proper level.
2. Relief valve pressure set too low.	2. Reset to correct pressure setting using gauge.
3. Pump worn or damaged.	3. Inspect, repair, or replace pump.
4. Oil intake pipe or suction filter plugged.	4. Clean filter or clean out intake pipe.
5. Wrong direction of shaft rotation.	5. Must be reversed immediately to prevent seizure and breakage of parts due to lack of oil.
6. Pump shaft turning too slowly to prime itself. (Vane type pumps only.)	6. Check minimum recommended speed.
7. Dirt in pump.	7. Dismantle and clean pump.
8. Air leak in suction line, preventing priming.	8. Repair leaks.
9. Oil too heavy to pick up prime.	9. Use lighter oil.
C-NO PRESSURE IN THE SYSTEM	
1. Pump not delivering oil.	1. Follow remedies given above.
2. Relief valve setting not high enough.	2. Increase pressure setting of relief valve.
3. Relief valve leaking.	3. Check valve seat for scoring mark and reseat.
4. Spring in relief valve broken.	4. Replace spring and readjust valve.
5. Free circulation of oil to tank being allowed through system.	5. Control valve may be in neutral, or return line open unintentionally.
6. Internal leakage in control valves or cylinders.	6. Repair and replace.
D-EXCESSIVE WEAR ON PUMP	
1 Abrasive material in the hydraulic oil being circulated through the pumps.	1. Install adequate filter, operate one hour, the replace element.
2. Oil weight too light at working conditions.	2. Check for recommended oil weight.
3. Sustained high pressure above maximum pump rating.	3. Check relief valve maxumum setting.
4. Sustained high speed at PRESSURE above maximum pump rating.	4. Check maximum recommended speed.
5. Drive misalignment or tight belt drive or supporting pump by its drive shaft.	5. Check and correct.
6. Air circulation causing chatter in system.	6. Remove air from system.
E-BREAKAGE OF PARTS INSIDE PUMP HOUSING	
1 Excessive pressure above maximum pump rating.	1. Check relief valve maximum setting.
2. Seizure of parts due to lack of oil.	2. Check reservoir level, oil filter, rotation direction and restriction in suction line.
3. Solid material being wedged in pump.	3. Install filter in system.
4. Excessive tightening of head screws.	4. Follow pump makers recommendations.
F-EXCESSIVE HEATING OF OIL	
1 Foreign material lodged between the relief valve plunger and relief valve seat.	1. Inspect and remove foreign material.
2. Using too heavy oil.	2. Drain and refill with proper weight oil.
3. Using too heavy oil.	3. Use recommended weight oil.
4. Dirty oil.	4. Drain, flush, and refill with clean oil, and install filter.
5. Oil level too low.	5. Fill to proper oil level.
6. Relief valve pressure too high or too low.	6. Set relief valve at correct pressure.
7. Pump worn and oil slips by pump.	7. Replace or repair pump.

CAUSES	REMEDIES
F-EXCESSIVE HEATING OF OIL - Continued	
8. Leaking relief valve.	8. Replace or repair relief valve.
9. Relief valve does not operate.	9. Replace or repair relief valve.
10. Pump assembled too tightly which produces.	10. Is unlikely unless parts are out of place in pump or not in tolerance. Should check by turning shaft with pliers before installing pump.
G - HEATING BECAUSE OF CONDITIONS IN SYSTEM	
1. Hoses or valves too small.	1. Replace with larger hoses or valves.
2. Restricted lines or piping.	2. Reroute lines to eliminate restriction.
3. Reservoir too small to provide adequate cooling.	3. Replace with larger reservoir or install cooler or radiator.
4. Insufficient heat radiation.	4. Use radiator cooling.
5. Internal leaks.	5. Locate leaks and repair.
H- OIL FOAMING	
1. Air leaking into suction line from tank to pump.	1. Tighten all connections.
2. Wrong kind of oil.	2. Drain and refill with non-foaming type of hydraulic oil.
3. Oil level too low.	3. Fill to proper oil level.
4. Improper tank or reservoir baffling.	4. Put correct type of baffles in reservoir.
I - CYLINDERS CREEP WHEN STOPPED IN INTERMEDIATE POSITION	
1. Internal leakage in cylinder or control valves.	1. Replace piston packing or replace cylinder if walls are scored. Replace or repair valve.
J - TIMES OF OPERATION LONGER THAN SPECIFIED	
1. Worn pump.	1. Repair or replace pump.
2. Internal leak in cylinder or control valve.	2. Replace piston packing or replace cylinder if walls are scored. Replace or repair valve.
3. Air in system.	3. Bleed the system and tighten joints.
4. If action is slow on starting up, then speeds up after oil heats up; oil is too heavy. If action slows down after oil heats up; oil is too light weight.	4. Use oil weight recommended by manufacturer.
K - EXTERNAL OIL LEAKAGE ON CYLINDERS	
1. End caps leaking.	1. Tighten if possible or replace gasket if necessary.
2. Packing gland leaking.	2. Tighten or replace packing if necessary.
L - ABNORMAL PACKING GLAND WEAR ON CYLINDERS	
1. Cylinder not securely fastened to frame.	1. Tighten cylinder to frame, check this periodically.
2. Misalignment of cylinder and piston rod extension.	2. Check and correct misalignment.
3. Side load on piston rod.	3. Change construction to eliminate side loads.
4. Burr on piston rod tears out packing.	4. Remove burr and replace packing.
M - MOTOR TURNING IN WRONG DIRECTION	
1. Incorrect piping between motor and control valve.	1. Check layout to determine correct piping.
N - MOTOR NOT TURNING OVER OR NOT DEVELOPING PROPER SPEED OR TORQUE	
1. Relief valve adjustment not set high enough.	1. Check pressure and reset relief valve.
2. Relief valve sticking open.	2. Remove dirt under ball or piston in relief valve.
3. Free circulation of oil to reservoir being allowed through system.	3. Control valve is in neutral or return line unintentionally open.
4. Pump not delivering sufficient pressure or volume.	4. Check pumps output and pressure.
5. Driven mechanism binding because of misalignment.	5. Realign motor and check torque requirement of driven shaft.
P - MOTOR SHAFT SEAL LEAKS, MOTOR SHAFT BREAKS, HOUSING BREAKS, HOSES BURST	
1. When a standard control valve is returned to neutral to stop or start a motor, sudden excess pressure is created which will break seals, tear off motor shafts, burst motor housings, or burst hoses. This sudden shock cannot be relieved through the primary relief valve in the system.	1. Must use a free-wheeling control valve, SPXTE-F4-HP. Can also use a DWV-75 or RC12DD CUSHION VALVE when using a standard 4-way control valve BA11AG3EBO or SP-4 or when using no control valve.

POWER BEYOND (Also referred to as high-pressure carryover), obtained by using a sleeved outlet that carries oil under pressure directly from the open center passageway of a control valve to the inlet of a down-stream control valve bank. This sleeve outlet prevents back pressure on the exhaust or return passage of a control valve which normally is not designed to take high pressure. This option also prevents back pressure on spool seals and also does not put back pressure on the built-in relief valve which, if allowed, tends to increase the relief valve opening point to the total of the relief valve's original setting by the amount of back pressure in the control valve's exhaust passage. This option is often used to obtain more valve sections or spools than normally obtainable by one control valve bank, or used when additional spools need to be added in the field. Still another use is to obtain a circuit in which it is desirable to have certain valve functions take "Priority" on flow. This is accomplished by having those functions requiring "Priority" flow be controlled by the upstream valve bank equipped with power beyond, then whenever a spool of the power beyond valve is fully activated, this will take all oil from pump and stop the flow of oil to any downstream valve until the power beyond valve spool is returned to neutral, at which time oil will again flow to the downstream valves. **NOTE: It is always necessary to provide a tank return port on all power beyond valves in order that the "return" or "dump" oil from a cylinder or motor can be returned to the tank.**

When several valves are fitted in a power beyond hook-up, it is also possible to provide different relief valve settings for each bank of valves in the circuit provided the highest pressure is in the valve bank closest to the pump and the next highest in the second bank, etc. If all valve spool functions are to operate at same pressure, then only the first valve bank needs to be equipped with a relief valve and all downstream valve banks do not need a relief valve, however if they are equipped, the reliefs in all valve banks should have the same setting.

CLOSED CENTER VALVE has a blocked "open-center" flow passage thus stopping the pump flow from going to the tank when the control valve is in neutral position. This can be accomplished by either of two methods. One by the design of the spool lands to block the flow or use standard open-center spools and block a power beyond sleeve or provide a closed center plug which serves the same purpose as a plugged power beyond sleeve.

OPEN CENTER VALVE (Also referred to as tandem-center), has an open center flow passage provided by the spool land openings that connect the pump flow to the tank when the control valve spool is in its neutral position.

PARALLEL VALVE is a multiple spool valve whereby all spools may simultaneously control different functions. The oil flow will be divided equally providing the operating pressure requirements for all functions are the same. The function requiring the lowest pressure will operate first. The next function will operate when pressure reaches it's requirements, before or after the first function is fully operated. The CROSS "BA" valve is an example of a Parallel Valve.

SERIES-PARALLEL VALVE is a multi-spool valve which feeds pressure to the cylinder ports from the open center passage, so that only the upstream spool, if fully actuated, would take priority over all pump flow. However, the return circuit is common to all cylinder ports so that actually a double-acting cylinder and a single-acting cylinder (when lowering) can both be operated simultaneously. The CROSS model "CA", "CD" or "CS" two spool valves are of this type.

FOUR-WAY VALVE (Also referred to as double-acting). A valve which has four functional port connections so that either a double-acting cylinder or a reversible hydraulic motor can be operated. Ports usually consist of two work ports, a "pump" or "inlet" port and a "tank" or "return" port.

THREE-WAY VALVE (Also referred to as single-acting). A valve which has three functional flow port connections so that either a single-acting cylinder or undirectional motor can be operated with such a valve. Ports usually consist of one "work" port, a "pump" or "inlet" port and a "tank" or "return" port.

MOTOR SPOOL (Also referred to as free-flow). A spool designed to provide flow from "work" ports to "tank" when spool is in neutral position. This allows a motor to coast to a stop after the spool is placed in neutral position.

FLOAT SPOOL A spool designed to provide for a position called "Float" whereby the "work" ports and "pump" ports (in open center valve) are connected to the "tank" port when spool is in "Float" position. This type of 4-position spool is a 3-position spool with a fourth position in the "Float" which has a detent to hold in "Position", allowing the cylinder or motor to "Float" or travel back and forth at will.

"Float" function can also be obtained with a three-way or "single-acting" spool by using a "IN" spool - 1 position detent (with spring centering) spool action option. With a three-way spool in the "lowering cylinder" position the pump flow and cylinder port flow are both open to tank (with an open-center valve), thus a "float" position is achieved.

LOAD CHECK (Sometimes called lift-check). This is a feature which will keep a given load from dropping as the control valve spool is being shifted until the inlet pressure and flow is equal to a greater load requirement. At this time the load check will open and movement of the load can then be controlled by control valve spool. Please note that the load check has nothing to do with the load holding ability of the valve when the spool is in the neutral position, only when the spool is being shifted.

RELIEF VALVES are used to control system pressures or the pressure within an individual circuit of a hydraulic system. The Relief Valve installed in a control valve will normally be used to control the maximum pressure of a complete hydraulic circuit (i.e. pump, valve, cylinder, motor, etc.). A relief valve is a separate housing can often be used as a circuit relief for a specific function (i.e. protecting one end of a cylinder from external loads, when the control valve spool is in the "neutral" position). Relief valve performance refers to the difference or differential between the cracking pressure (i.e. that pressure when the first drop of oil flows over the relief) and its "Full-Flow" setting, (i.e. that pressure at which the full pump flow passes through the relief). In actual practice it is very difficult to find the "cracking" pressure of a relief valve, so normally, with a pressure gauge in the circuit, the user is seeing the pressure of the full flow if oil through the relief. Therefore in Cross pre-setting of relief valves it should be noted in our sales literature that all relief valves, unless otherwise specified, are set to the customers pressure requirements at a flow of 10 GPM. If the customer prefers this setting at a different gallonage, it can easily be done at the factory with a conversion chart. Even though we use 10 GPM, we can adjust the pressure to give the proper setting at the customer's gallonage.

Various types of relief valves are used in mobile hydraulic applications and three of the most common being the ball-spring, pilot-operated, and differential type. CROSS actually manufactures all three types of variations thereof. The Model CA, CD, CS, and FC, use a ball spring type relief, while the RV relief is a pilot-operated type, and the BA control valve and the RD relief are a variation of the differential type relief which is actually a "hydraulically-dampened" differential poppet relief.

HOW TO SELECT THE RIGHT PUMP AND CYLINDER

How to Select a New Pump for Existing Cylinders

First you must find the displacement of the cylinder or volume of oil required to extend the cylinder. On Graph No. 2 draw a straight line connecting the cylinder diameter in the center column with the cylinder stroke in the right-hand column. For example: The dotted line shows that a 3-1/2 inch cylinder with a 10 inch stroke needs 95 cubic inches of oil to fully extend it as shown in the left-hand column. Multiply this by two if you have two cylinders operating at once.

Next you must find how large a pump is required to extend this cylinder in a given time. For example: You wish to extend your 3-1/2 x 10 inch cylinder in 3 seconds. On Graph No. 3 draw a straight line connecting 95 cubic inches in the left-hand column with 3 seconds in the middle column. The dotted line shows you need a pump that will deliver 8-1/2 gallons per minute as shown in the right-hand column.

Look at the page showing Gresen Vane pumps and assume the crankshaft speed of your tractor is 1200 RPM. You will find a TB-9 Vane pump will deliver 9.6 gallons at 1200 RPM.

You can also use Graph No. 1 to find the pump size required if you know the cylinder diameter and the speed of operation required in inches per minute. For example: If you desire to extend an 8 inch cylinder at 10 inches per minute, draw a straight line connecting 8 inches in the left-hand column with 10 inches per minute in the right-hand column. The dotted line on Graph No. 1 shows this will require a pump that will deliver 2-1/4 gallons per minute as shown in the middle column.

How Much Horsepower is Required to Drive a Pump

To find the horsepower required to drive you pump use Graph No. 4. If you have a pump with 20 gallons per minute output operating up to 1,500 pounds pressure, draw a straight line connecting 20 gallons per minute in the left-hand column and 1,500 pounds in the right-hand column. The dotted line shows this pump will require up to 18 horsepower to drive it as shown in the middle column.

How to Select the Correct Cylinder Diameter for an Existing Pump

For example: You have a pump that delivers 8-1/2 gallons per minute and you want a 10 inch stroke cylinder to extend in 3 seconds. On Graph No. 3 draw a straight line connecting 3 seconds in the middle column and 8-1/2 gallons per minute in the right-hand column. The dotted line shows this will extend a cylinder with 95 cubic inch displacement as shown in the left-hand column.

Next you must find a 10 inch stroke cylinder with the required 95 cubic inch displacement. On Graph No. 2 draw a straight line connecting 95 cubic inch displacement. in the left-hand column with 10 inch stroke in the right-hand column. The dotted line shows that this will require a 3-1/2 inch diameter cylinder as shown in the middle column.

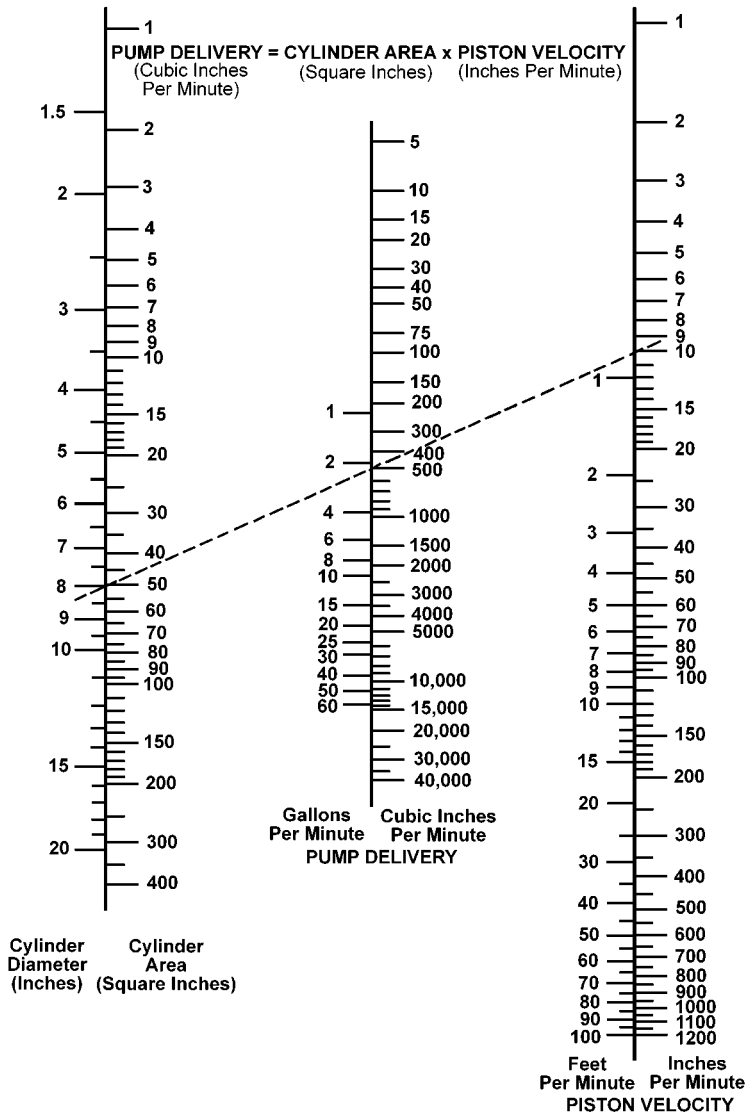
To Find How Large a Cylinder is Required to Produce a Particular Force

For example: You require a 5,000 pound or 2-1/2 ton force and you have a 500 pound per square inch system. On Graph No. 5 draw a straight line connecting 5,000 pounds in the left-hand column with 500 pounds pressure in the right-hand column. The dotted line shows that a 3-1/2 inch diameter cylinder will produce this force as shown in the middle column.

To Find How Much Force a Particular Cylinder Will Produce

For example: You have a 3-1/2 inch diameter cylinder and a 500 pound pressure system. On Graph No. 5 draw a straight line connecting 3-1/2 inches in the middle column with 500 pounds pressure in the right-hand column. The dotted line shows that this will produce 5,000 pounds pushing force as shown in the left-hand column.

Use the edge of a piece of clear plastic sheet as a straight edge to read these graphs for best results. This allows you to see the entire graph when you are using it, including the part of the graph covered by the piece of plastic.

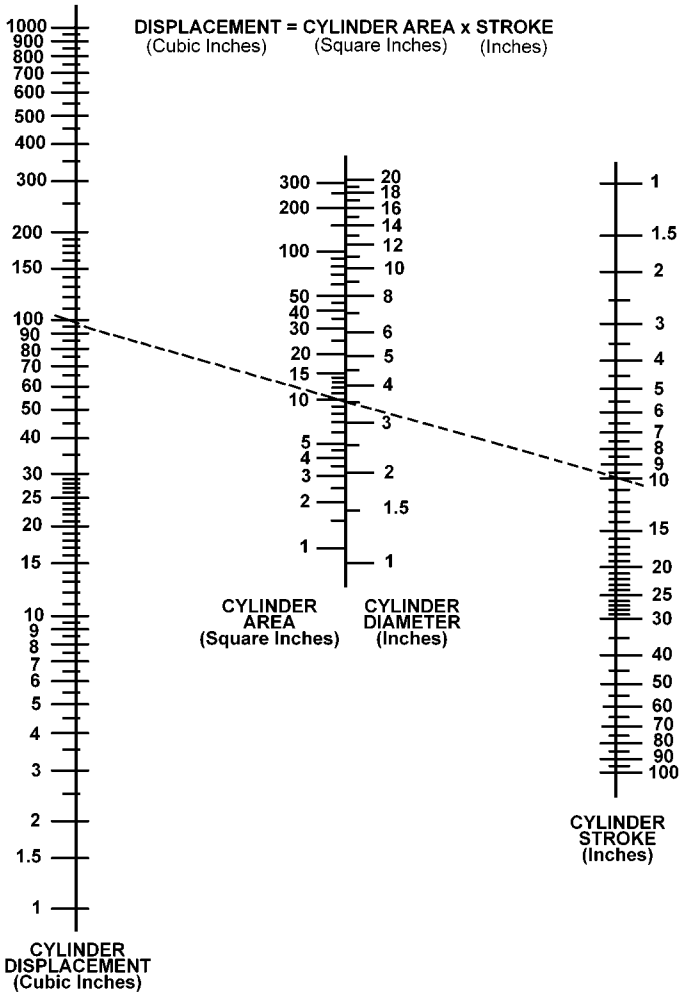


GRAPH NO. 1 PUMP SIZE (PUMP DELIVERY)

This graph will determine what size pump is required to operate a particular cylinder.

To determine the size of pump (GPM) needed to operate a particular cylinder, find the piston velocity desired in the right-hand column and the cylinder diameter in the left-hand column. Draw a straight line through these two points. The point this line touches on the center column is the pump delivery in gallons per minute (GPM) needed to operate the cylinder.

For example: The dotted line shows that to extend a 8 inch cylinder at a rate of 10 inches per minute (piston velocity) a pump with a delivery of not less than 2-1/4 gallons per minute (GPM) is needed.

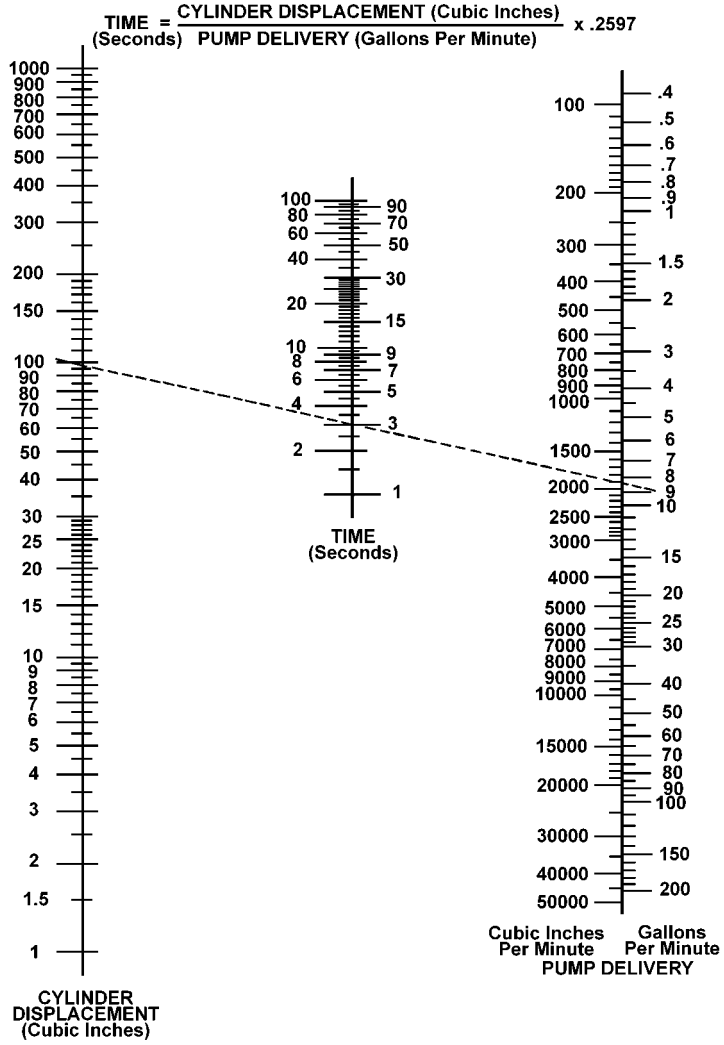


GRAPH NO. 2 VOLUME PER STROKE (DISPLACEMENT)

This graph determines the volume of oil needed to fully extend a cylinder.

To determine the volume of oil needed to fully extend a cylinder, fine the length of the cylinder stroke in the right hand column and the cylinder diameter in the center column. Draw a straight line through these two points and extend to the left-hand column. The point this line touches on the left-hand column is the volume of oil in cubic inches needed to fully extend the cylinder.

For example: The dotted line shows that a 3-1/2 inch cylinder with a 10 inch stroke needs 95 cubic inches of oil to fully extend it.

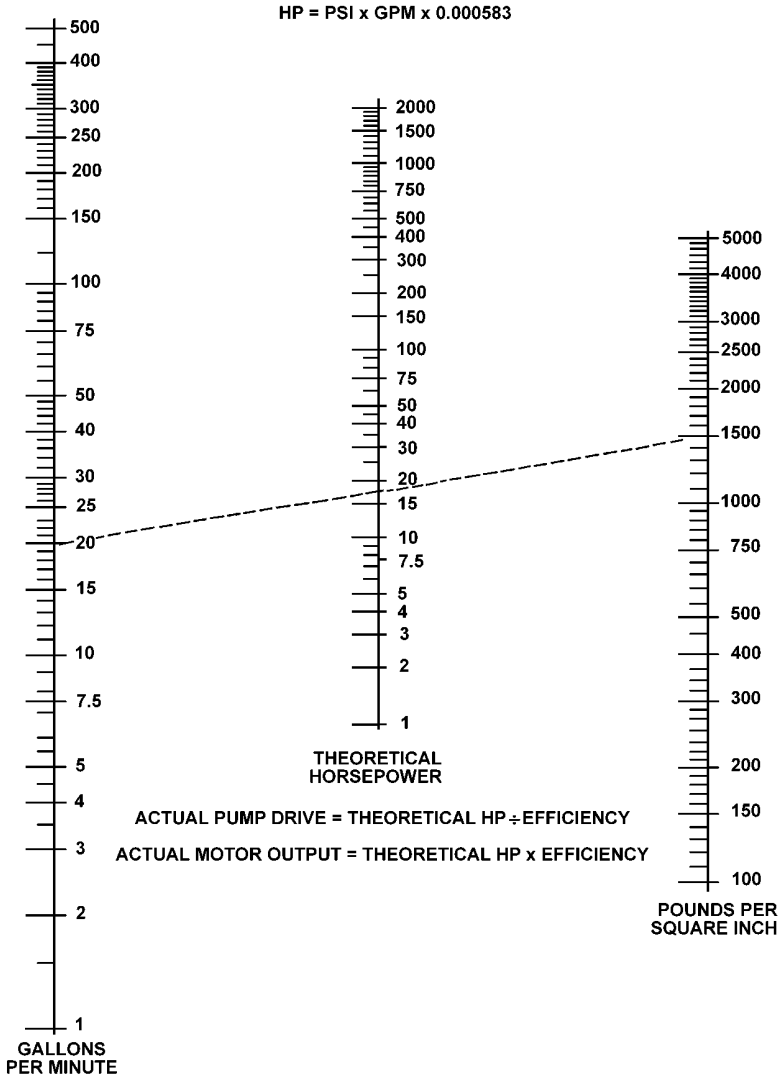


GRAPH NO. 3 CYLINDER SPEED (TIME)

This graph determines how fast a cylinder will act with a particular oil volume (GPM) from a pump.

To determine the time it will take to fully extend a cylinder, find the volume of oil the pump will deliver (GPM) in the right column and the volume (displacements) of the cylinder in the left-hand column. Draw a straight line through these two points. The point this line touches on the center column is the time needed to fully extend the cylinder.

For example: The dotted line shows that a pump delivering 8-1/2 gallons per minute (GPM) will fully extend a cylinder with a 97 cubic inch volume (displacement) in 3 seconds.

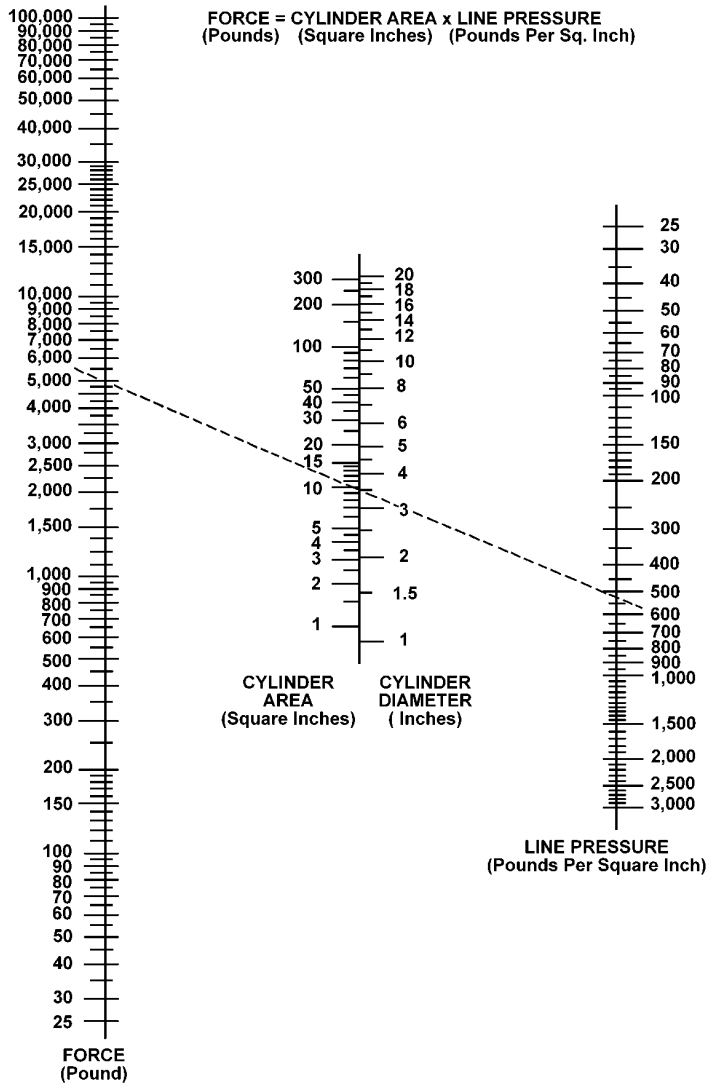


GRAPH NO. 4 PUMP HORSEPOWER

This graph determines what horsepower is required to operate a particular size of pump at a particular hydraulic pressure.

To determine the horsepower needed to operate a particular pump, find the hydraulic pressure to be used in the right-hand column and the maximum gallons per minute the pump will deliver in the left-hand column. Draw a straight line through these two points. The point this line touches in the center column is approximately the horsepower required to operate the pump.

For example: The dotted line shows that a pump that will deliver 20 gallons per minute (GPM) operating at 1,500 PSI pressure requires approximately 18 horsepower to operate the pump.



GRAPH NO. 5 LOAD CAPACITY (FORCE)

This graph determines the load or force a cylinder will lift or push at a known pressure.

To determine the force that a cylinder will produce, find the hydraulic pressure in the right-hand column and the cylinder diameter in the center column. Draw a straight line through these two points and extend to the left-hand column. The point this line touches on the left-hand column is the force the cylinder will produce.

For example: The dotted line shows that a 3-1/2 inch cylinder operated at 500 lb. pressure will lift or push a 5,000 lb. load.

NOTE: For pulling force in double-acting cylinders, the rod area must be subtracted from the cylinder area, and the difference between these used (net cylinder area).

FUNDAMENTAL INFORMATION ON OIL HYDRAULICS

PUSHING AND PULLING FORCE OF HYDRAULIC CYLINDERS

Cylinder Diameter, Inches	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2
Cylinder Area, Square Inch	.7854	1.767	3.142	4.909	7.065	9.621	12.57	15.90	19.64	23.76	28.27	33.18
Pushing Force, Lbs @ 1000 PSI	780	1767	3142	4909	7065	9621	12750	15900	19640	23760	28270	33180
Pulling Force, Lbs @ 1000 PSI	343	1325	2034	3801	5951	8513	11460	14790	18530	22650	27160	32070

FORMULAS AND ABBREVIATIONS

HP- Horsepower
1 Gallon - 231 Cubic Inches
GPM - Gallons per Minute
RPM - Revolutions per Minute
GPS - Gallons per Second
PSI x Cylinder area Force
PSI - Pounds per square inch
Horsepower = GPM x PSI ÷ 1714
Horsepower = Torque(foot lbs.) x RPM ÷ 5252

PUMP CAPACITY OR OUTPUT REQUIRED

To determine gallon capacity or output of the pump required to operate a cylinder or cylinders at a predetermined or required speed, proceed as follows:

(1) Establish in seconds the time required to extend the cylinder to its full length.
(2) Determine cubic inch capacity of cylinder (area x length of stroke.)
(3) Convert cubic inches capacity of cylinders to gallons. (Cubic inches ÷ 231 = cylinder capacity in gallons.)
(4) Cylinder capacity in gallons ÷ required speed in seconds = Gallons per second (GPS).
(5) GPS x 60 = Gallons per minute (GPM).

Example: If it has been determined that a 3” x 50” stroke cylinder must extend the full length in 4 seconds, proceed as follows:

Find cylinder area from table above.
Area of a 3” cylinder is 7.065 square inches.
Capacity of cylinder is 7.065 x 50 = 353.25 cubic inches.
353.25 cubic inches ÷ 231 = 1.530 gallons.
1.530 gallons ÷ 4 seconds = .3825 gallons per second.
.3825 gallons per second x 60 = 22.90 gallons per minute.

Therefore, the pump required must have output of 22.95 gallons per minute.

HORSEPOWER REQUIREMENTS

A practical formula for determining horsepower requirements for pumps is as follows:

Gallons per minute x PSI Required ÷ 1714 = Horsepower.

Example: If a pump delivers 12 GPM and assuming that the required operating pressure is 1,000 PSI.
Then multiply 12 GPM x 1,000 PSI = 12,000.
12,000 ÷ 1714 = 7.0 horsepower.
Therefore, it takes 7.0 horsepower to operate the pump.

HYDRAULIC CYLINDER FORCE

To determine the force exerted by hydraulic cylinder:
Multiply the hydraulic pressure by the cylinder area.

Example: Find force for a 3” cylinder at 1,000 PSI.
Find cylinder area from table above.
Area of a 3” cylinder is 7.065 square inches.
7,065 square inches x 1,000 PSI = 7065 lbs. pushing force. If pulling power is desired, find the area of piston rod.
For 1-3/16” rod, 1.1875 x 1.1875 x .785 = 1.114 square inch.
This is subtracted from the cylinder area.
7.065 minus 1.114 = 5.951 square inches.
5.951 square inches x 1,000 PSI = 5951 lbs. pulling force.

HYDRAULIC CYLINDER CUBIC DISPLACEMENT

To determine the cubic displacement of hydraulic cylinder:
Multiply the cylinder area by the length of the cylinder stroke.

Example: A 3” cylinder with 50” stroke.
Find cylinder area from table above.
Area of a 3” cylinder = 7.065 square inches.
7.065 square inches x 50” = 353.45 cubic inches.
To convert to gallons, divide by 231.
353.45 ÷ 231 = 1.530 gallons displacement.

CYLINDER PRESSURE CHART

PUSH With Various Pressures Cylinder Power in Pounds At Various Pressure

Pump Pressure →	3,000	2,500	2,000	1,500	1,250	1,000	750	500
5" Bore	58,899	49,083	39,267	29,451	24,543	19,635	14,724	9,816
4" Bore	37,694	31,412	25,130	18,848	15,707	12,566	9,423	6,282
3-1/2" Bore	28,861	24,051	19,241	14,431	12,026	9,621	7,215	4,810
3" Bore	21,204	17,670	14,136	10,602	8,835	7,068	5,301	3,534
2-1/2" Bore	14,724	12,270	9,816	7,362	6,136	4,908	3,681	2,454
2" Bore	9,421	7,851	6,281	4,711	3,926	3,141	2,355	1,570
1-1/2" Bore	5,295	4,413	3,531	2,649	2,208	1,767	1,323	882

PULL With Various Pressures

Pump Pressure →	3,000	2,500	2,000	1,500	1,250	1,000	750	500
5" Bore, 2" Shaft	49,478	41,232	32,986	24,740	20,617	16,494	12,369	8,246
5" Bore, 1-1/2" Shaft	53,604	44,670	35,736	26,802	22,335	17,868	13,401	8,934
4" Bore, 2" Shaft	28,273	23,561	18,849	14,137	11,781	9,425	7,068	4,712
4" Bore, 1-1/2" Shaft	32,391	26,993	21,595	16,197	13,498	10,799	8,097	5,398
4" Bore, 1-1/4" Shaft	34,011	28,343	22,675	17,007	14,173	11,339	8,502	5,668
3-1/2" Bore, 2" Shaft	19,440	16,200	12,960	9,720	8,100	6,480	4,860	3,240
3-1/2" Bore, 1-1/2" Shaft	23,558	19,632	15,706	11,780	9,817	7,854	5,889	3,926
3-1/2" Bore, 1-1/4" Shaft	25,178	20,982	16,786	12,590	10,492	8,394	6,294	4,196
3" Bore, 1-1/2" Shaft	15,901	13,251	10,601	7,951	6,626	5,301	3,975	2,650
3" Bore, 1-1/4" Shaft	17,521	14,601	11,681	8,761	7,301	5,841	4,380	2,920
3" Bore, 1-1/8" Shaft	18,218	15,182	12,146	9,110	7,592	6,074	4,554	3,036
2-1/2" Bore, 1-1/16" Shaft	12,062	10,052	8,042	6,032	5,027	4,022	3,015	2,010
2" Bore, 1-1/16" Shaft	6,759	5,633	4,507	3,381	2,818	2,255	1,689	1,126
1-1/2" Bore, 3/4" Shaft	3,974	3,312	2,650	1,988	1,657	1,326	993	662

NOTE: - The Pull at a given pressure will change according to shaft size.

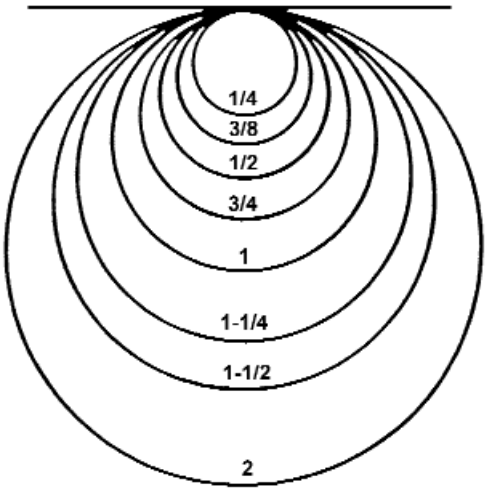
Thread Data

To determine the thread size of a fitting, measure the outside diameter of the male thread (D) or the inside diameter of the female thread (d) and then identify the number of threads per inch in the case of American and BSP threads or the pitch for Metric threads.

American Fittings

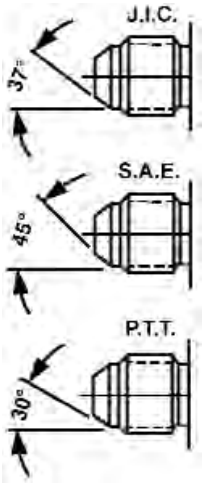
NPT threads

To obtain the nominal dimensions of an NPT thread, place the threaded end on the appropriate circle and read the diameter.



American threads have an angle of 60º and are identified by the “Diameter and the number of threads per inch”, e.g. 1/2-20. “UN” means standard thread. “F” is fine thread, “EF” is extra fine thread, “S” is special thread.

The size is the nominal diameter in 1/16 of an inch, e.g. - 8 = 1/2 inch



D = outside diameter male thread

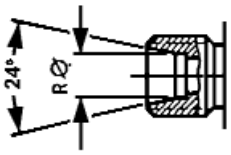
d = inside diameter female thread

Thread	D Inches	d Inches	JIC Size	SAE Size	PTT Size
7/16-20UNF	.437	.395	-4	-4	
1/2-20UNF	.500	.457	-5	-5	
9/16-18UNF	.562	.511	-6		
5/8-18UNF	.625	.573		-6	
3/4-16UNF	.750	.691	-8	-8	
7/8-14UNF	.875	.807	-10	-10	
1-1/16-12UN	1.062	.982	-12		
1-1/16-14UNS	1.062	1.000		-12	
1-5/16-12UN	1.312	1.232	-16		
1-5/16-14UNS	1.312	1.251			-16
1-5/8-12UN	1.625	1.545	-20		
1-5/8-14UNS	1.625	1.564			-20
1-7/8-12UN	1.875	1.795	-24		
1-7/8-14UNS	1.875	1.814			-24
2-1/2-12UN	2.500	2.420	-32		-32
3-12UN	3.000	2.920	-40		
3-1/2-12UN	3.500	3.420	-48		

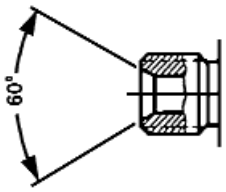
Metric Fittings

D = outside diameter male thread d = inside diameter female thread

Thread	D (mm)	d (mm)	Male inverted flare 24º – RØ DIN. l.Rh. (mm)	Male inverted flare 24º – RØ DIN. s.Rh. (mm)
M12 x 1	12.0	11.0		
M12 x 1.5	12.0	10.5	6	
M14 x 1.5	14.0	12.5	8	6
M16 x 1.5	16.0	14.5	10	8
M18 x 1.5	18.0	16.5	12	10
M20 x 1.5	20.0	18.5		12
M22 x 1.5	22.0	20.5	15	14
M24 x 1.5	24.0	22.5		16
M26 x 1.5	26.0	24.5	18	
M27 x 1.5	27.0	25.5		
M30 x 1.5	30.0	28.5		
M30 x 2	30.0	27.9	22	20
M33 x 1.5	33.0	31.5		
M36 x 1.5	36.0	34.5		
M36 x 2	36.0	33.9	28	25
M38 x 1.5	38.0	36.5		
M39 x 1.5	39.0	37.5		
M42 x 1.5	42.0	40.5		
M42 x 2	42.0	39.9		30
M45 x 1.5	45.0	43.5		
M45 x 2	45.0	42.9	35	
M48 x 1.5	48.0	46.5		
M52 x 1.5	52.0	50.5		
M52 x 2	52.0	49.9	42	38
M54 x 2	54.0	51.9		
M58 x 2	58.0	55.9		
M65 x 2	65.0	62.9		
M78 x 2	78.0	75.9		
M90 x 2	90.0	87.9		
M100 x 2	100.0	97.9		
M110 x 2	110.0	107.9		
M120 x 2	120.0	117.9		



Male inverted flare 24º (for flareless tube fittings)



Male inverted flare 60º (for female Globeseal™ fittings)

BSP Fittings

D = outside diameter male thread
d = inside diameter female thread

Nominal thread diameter	Threads per inch	D (inches)	d (inches)
1/8	28	.383	.338
1/4	19	.518	.451
3/8	19	.656	.589
1/2	14	.825	.734
5/8	14	.902	.811
3/4	14	1.041	.950
1	11	1.309	1.193
1-1/4	11	1.650	1.534
1-1/2	11	1.882	1.766
1-3/4	11	2.116	2.000
2	11	2.347	2.231
2-1/2	11	2.587	2.471