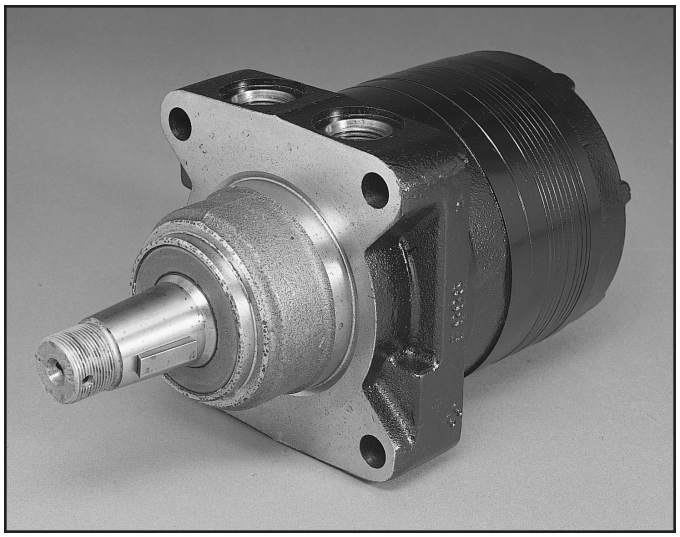
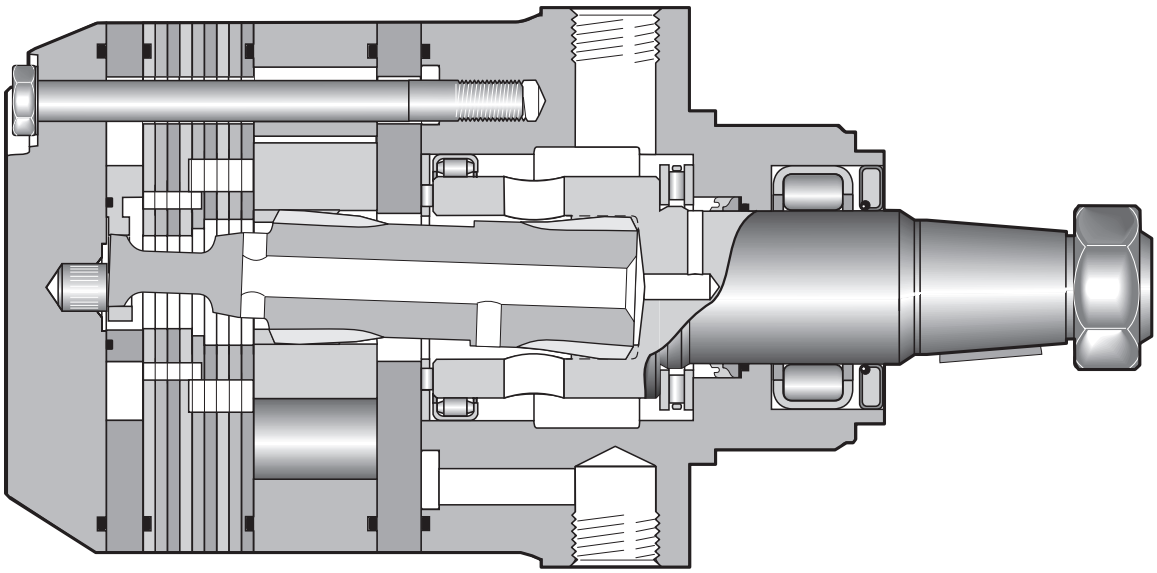
13 Displacements		(8.6 to 58.5 in³/rev) **141 . . . 959 cm³/rev**
Maximum Pressure	**Cont.** (3000 psid) **. . . 207 bar**	**Int.** (4000 psid) **. . . 276 bar**
Maximum Oil Flow		(30 gpm) **. . . 114 lpm**
Maximum Speed		(660 rpm) **660 rpm**
Maximum Torque	**Cont.** (9,239 lb in) **1044 Nm**	**Int.** (12,636 lb in) **1428 Nm**
Maximum Side Load at Key		(3597 lb) **. . . 16000 N**

Exceptional Strength and Durability in a High Performance Motor

The heart of Parker's TG Series powertrain, the drive link, is an extra heavy duty part that includes unique 60:40 spline geometry. Rugged construction throughout allows the transmission of up to 13,000 lb-in of torque. The entire powertrain is continually washed in cool, high flow fluid to assure long life. Roller vanes and sealed commutator maintain high efficiency and provide smooth low speed performance.

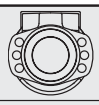
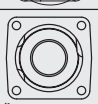


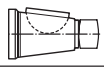
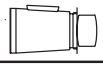


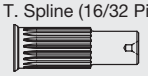
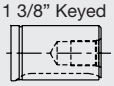
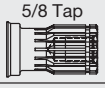
TG	XXXX	XX	XX
Series	Displacement	Mounting/Ports	Shaft

Code	cm³/tr cm³/giro cm³/U	in³/rev
0140	141 /	8.6
0170	169 /	10.3
0195	195 /	11.9
0240	238 /	14.5
0280	280 /	17.1
0310	310 /	18.9
0335	337 /	20.6
0360	360 /	22.2
0405	405 /	24.7
0475	477 /	29.1
0530	528 /	32.3
0625	623 /	38.0
0785	786 /	48.0
0960	959 /	58.5

Code	Mounting	
AS	SAE "A" 2 Bolt, 7/8-14 SAE	 
LS	Wheel, Front Brake, 7/8-14 SAE	 
MS	Magneto, 7/8-14 SAE	 
UB	Wheel, Standard 7/8-14 SAE O-Ring; Rear Radial	 
US	Wheel, Standard, 7/8-14 SAE	 
ZS	Four Bolt Flange, 7/8-14 O-Ring; Extended Pilot With O-Ring Groove	 

Custom Order			
	EB	6 Hole Mount Deep Pilot, 7/8-14 SAE Rear Radial	 
	HK	Wheel, Machined Pilot Nose, M6 Manifold	 
	HW	Wheel, Machined Pilot Nose, G1/2 (1/2 BSPP) Milled Port Face	 
	JS	Wheel, Machined Pilot Nose, 1/2 -13 UNC Tapped Holes, 7/8 O-ring ports	 
	MB	Magneto 7/8-14 SAE O-Ring; Rear Radial	 
	MM	Magneto, 5/16-18 UNC Manifold	 
	RS	Wheel Mount For Ø1-1/2" shaft, 7/8-14 front ports	 
	UE	Wheel, Standard Manifold; Rear Radial	 
	WC	Wheel Mount. 7/8 O-ring Rear Radial w/ 2.43" Dimension To C/L	 
	WE	Wheel, Optional Manifold; Rear Radial	 

Code	Shaft	
01*	1" 6B Spline	
03	1 1/4" Keyed	
05	1 1/4" 14 Tooth Spline	
08	1 1/4" Tapered	
19	1 3/8" J501 Taper	

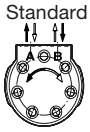
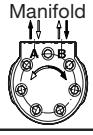
Custom Order		
02	Long Wood. Key, 1/4 Tap, Groove	
06	19 Tooth Spline	
17	19 T. Spline (16/32 Pitch)	
20	1 3/8" Keyed	
38	1.378" Special Long Straight	
39	14 Tooth, Groove, 5/8 Tap	
44	14 T. Spline (12/24 P.), 12mm Tap	
46	32 mm Keyed	
85	1 1/4", Captured Straight Keyway, No Taped Hole & No Ring Groove	
86	1 1/4" With Captured Straight Keyway, No Taped Hole & No Ring Groove	

* Conforms to SAE recommended length

0

Rotation

Code	Rotation
0	Standard 
1	Reverse Timed Manifold 

Code	Rear Rotation
0	Standard 
1	Reverse Timed Manifold 

Rotation viewed from shaft end.

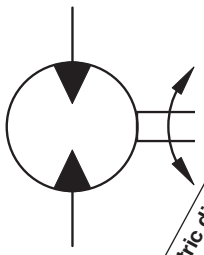
XXXX

Options

Code	Options
AAAA[8]	"Standard", Black Paint
AAAB	"Standard", No Paint
AAAC[8]	"Standard", Double Paint
AABJ[8]	Free Running Rotor Set, Black Paint
AABT[1,2,8]	No Nut, Black Paint
AAFA	Fluorocarbon Seals, High Temp Commutator Seal, No Paint
AAFW[8]	Fluorocarbon Seals, High Temp Commutator Seal, Black Paint
AAJH[1,2,8]	Fluorocarbon Seals, High Temp Commutator Seal, Spl paint area, Black Paint
AAJL[1,2]	No Nut, No Paint
AAUP[1,2,8]	Fluorocarbon Seals, High Temp Commutator Seal, No Nut, Special Paint Area, Black Paint
AAVE[8]	Free Running Rotor Set, Fluorocarbon Seals, High Temp Commutator Seal, High Temp Section Seals, Black Paint
ABCW[1,2,7,8]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, High Temp Section Seals, Bidirectional shuttle (.062 Orifice) (11:00*), Black Paint
ABCZ[8]	Fluorocarbon Seals, High Temp Commutator Seal , High Temp Section Seals, Double paint (045247)
BBGV[1,2,7,8]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, 1015 PSI Int Bidirectional Relief, Black Paint
BBGW[1,2,7,8]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, 1450 PSI Int Bidirectional Relief, Black Paint
BBGX[1,2]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, 2031 PSI Int Bidirectional Relief, Black Paint
BBGY[1,2,3]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, 3046 PSI Int Bidirectional Relief, Black Paint
BBGZ[1,2,4,7,8]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, 4061 PSI Int Bidirectional Relief, Black Paint
BBHC[8]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, 725 PSI Int Bidirectional Relief, Black Paint
BBHD[8]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, 2538 PSI Int Bidirectional Relief, Black Paint
FSEK[1,2,8]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, High Temp Section Seals, Parker ECD Speed Sensor, Black Paint
FSEN[1,2]	No Shaft Hardware, Fluorocarbon Seals, High Temperature Commutator Seal, High Temp Section Seals, Parker ECD Speed Sensor, No Paint

[1] No Nut with shaft code 08 or 19
[2] No bolt, washer or lock washer with shaft code 03, 05 (may need to add more shaft codes here ??) need to check with eng.
[3] Not applicable with displacement 0530,0625,0785 and 0960
[4] Not applicable with displacements 0360, 0405, 0475, 0530,0625, 0785 and 0960
[5] Not applicable with displacement 0360, 0405 or 0475
[6] Only available with displacement 0080
[7] Only available with front porting option
[8] Paint area all over except front and rear pilot and mounting flanges and shaft

Coupling shaft Ø 1 inch Max. torque cont./int. } 450/550 N



Motor Series TG	Geometric displacement cm^3/rev / in^3/rev	Max. speed @ Max. intermittent flow rev/min	Max. oil flow *cont* / *int** l/min / g/min		Max. differential pressure *cont* / *int** bar / psid		Max. supply pressure *max* bar / psig	Max. torque *cont* / *int** Nm / lb-in		Max. performance *max* KW / HP	Min. starting torque *cont* / *int** Nm / lb-in	
TG 0140	**141** 8.6	660	**76** 20	**95** 25	**207** 3000	**276** 4000	**300** 4350	**390** 3455	**530** 4692	**33** 45	**315** 2791	**418** 3706
TG 0170	**169** 10.3	554	**76** 20	**95** 25	**207** 3000	**276** 4000	**300** 4350	**476** 4216	**646** 5714	**33** 45	**376** 3331	**505** 4469
TG 0195	**195** 11.9	477	**76** 20	**95** 25	**207** 3000	**276** 4000	**300** 4350	**556** 4919	**753** 6663	**33** 45	**451** 3989	**611** 5408
TG 0240	**238** 14.5	393	**76** 20	**95** 25	**207** 3000	**276** 4000	**300** 4350	**677** 5991	**913** 8081	**32** 44	**582** 5152	**776** 6865
TG 0280	**280** 17.1	334	**76** 20	**95** 25	**207** 3000	**276** 4000	**300** 4350	**796** 7044	**1073** 9499	**31** 42	**675** 5972	**870** 7699
TG 0310	**310** 18.9	303	**76** 20	**95** 25	**207** 3000	**276** 4000	**300** 4350	**924** 8184	**1229** 10817	**31** 41	**778** 6882	**1005** 8893
TG 0335	**337** 20.6	277	**76** 20	**95** 25	**207** 3000	**276** 4000	**300** 4350	**964** 8533	**1297** 11479	**30** 41	**843** 7458	**1117** 9889
TG 0360	**360** 22.2	259	**76** 20	**95** 25	**172** 2500	**241** 3500	**300** 4350	**894** 7913	**1254** 11093	**29** 39	**703** 6224	**1017** 9007
TG 0405	**405** 24.7	232	**76** 20	**95** 25	**172** 2500	**241** 3500	**300** 4350	**942** 8336	**1342** 11877	**27** 37	**791** 7002	**1145** 10133
TG 0475	**477** 29.1	237	**76** 20	**114** 30	**138** 2000	**207** 3000	**300** 4350	**887** 7853	**1372** 12145	**28** 38	**740** 6549	**1120** 9909
TG 0530	**528** 32.3	213	**76** 20	**114** 30	**138** 2000	**172** 2500	**300** 4350	**983** 8701	**1253** 11086	**23** 31	**874** 7737	**1091** 9657
TG 0625	**623** 38.0	182	**76** 20	**114** 30	**121** 1750	**155** 2250	**300** 4350	**986** 8727	**1291** 11424	**20** 27	**895** 7924	**1165** 10312
TG 0785	**786** 48.0	143	**76** 20	**114** 30	**103** 1500	**138** 2000	**300** 4350	**1044** 9239	**1428** 12636	**17** 23	**991** 8772	**1341** 11876
TG 0960	**959** 58.5	118	**76** 20	**114** 30	**69** 1000	**103** 1500	**300** 4350	**773** 6843	**1268** 11227	**12** 16	**763** 6752	**1177** 10419

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

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

TG 0140

8.6 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000	3500	4000
.5	519 **9**	1060 **4**						
1	540 **22**	1090 **17**	1635 **11**	2180 **6**				
2	569 **49**	1156 **43**	1730 **36**	2286 **30**	2827 **23**	3368 **19**	3899 **12**	4447 **12**
3	565 **75**	1159 **69**	1744 **62**	2321 **55**	2899 **47**	3477 **40**	4048 **33**	4608 **29**
4	564 **102**	1170 **94**	1768 **87**	2358 **80**	2943 **72**	3517 **64**	4082 **57**	4644 **52**
5	556 **128**	1170 **120**	1776 **112**	2375 **105**	2968 **97**	3556 **89**	4135 **81**	4701 **76**
7	540 **182**	1160 **172**	1779 **164**	2390 **155**	2994 **146**	3592 **138**	4181 **130**	4763 **123**
9	515 **235**	1143 **225**	1768 **215**	2385 **206**	2996 **196**	3601 **187**	4199 **179**	4794 **171**
12	471 **315**	1096 **303**	1729 **292**	2356 **281**	2974 **271**	3587 **261**	4193 **252**	4794 **243**
15	418 **395**	1042 **381**	1673 **368**	2307 **357**	2933 **346**	3549 **336**	4163 **325**	4771 **314**
20	299 **528**	931 **512**	1565 **497**	2198 **484**	2825 **472**	3455 **459**	4078 **447**	4692 **435**
25	173 **660**	794 **643**	1426 **626**	2059 **612**	2695 **598**	3332 **583**	3961 **569**	4579 **555**

TORQUE (LB IN) 3961
SPEED (RPM) 569

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0170

10.3 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000	3500	4000
.5	620 **9**	1284 **7**	1945 **5**	2613 **4**	3293 **3**	3983 **2**		
1	652 **20**	1337 **18**	2006 **16**	2683 **14**	3375 **12**	4063 **11**	4744 **8**	5402 **8**
2	678 **42**	1390 **40**	2105 **37**	2822 **35**	3535 **32**	4226 **30**	4909 **27**	5587 **25**
3	678 **64**	1397 **61**	2117 **58**	2836 **56**	3554 **53**	4263 **50**	4963 **46**	5652 **44**
4	679 **86**	1409 **83**	2142 **80**	2872 **77**	3596 **74**	4310 **71**	5021 **67**	5716 **64**
5	675 **108**	1413 **104**	2150 **101**	2885 **98**	3616 **94**	4339 **91**	5057 **87**	5761 **83**
7	661 **153**	1405 **148**	2152 **143**	2900 **140**	3642 **136**	4374 **132**	5101 **127**	5818 **123**
9	632 **197**	1385 **191**	2140 **186**	2891 **181**	3638 **177**	4380 **173**	5114 **168**	5838 **163**
12	583 **263**	1334 **256**	2096 **250**	2860 **244**	3617 **239**	4362 **234**	5101 **228**	5823 **223**
15	524 **330**	1275 **322**	2035 **314**	2804 **308**	3572 **302**	4327 **296**	5070 **289**	5801 **283**
20	382 **442**	1143 **432**	1908 **422**	2683 **413**	3455 **406**	4216 **399**	4972 **391**	5714 **383**
25	239 **554**	983 **543**	1747 **531**	2523 **520**	3299 **511**	4071 **501**	4839 **492**	5591 **483**

TORQUE (LB IN) 4839
SPEED (RPM) 492

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0195

11.9 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000	3500	4000
.5	733 **7**	1503 **3**						
1	761 **16**	1546 **13**	2326 **8**	3104 **3**				
2	799 **35**	1638 **32**	2465 **27**	3270 **21**	4046 **16**	4813 **11**	5589 **7**	6375 **6**
3	794 **55**	1639 **50**	2476 **45**	3303 **39**	4132 **34**	4970 **28**	5792 **23**	6595 **19**
4	794 **74**	1654 **69**	2509 **64**	3356 **58**	4196 **52**	5023 **46**	5830 **40**	6635 **35**
5	783 **93**	1653 **88**	2517 **83**	3375 **76**	4224 **70**	5065 **64**	5895 **58**	6710 **52**
7	762 **131**	1637 **126**	2514 **120**	3384 **113**	4245 **106**	5098 **99**	5940 **92**	6772 **86**
9	731 **170**	1616 **164**	2499 **157**	3373 **150**	4239 **142**	5093 **135**	5936 **127**	6774 **120**
12	677 **228**	1562 **221**	2455 **213**	3343 **205**	4217 **196**	5081 **188**	5934 **179**	6776 **172**
15	613 **285**	1498 **278**	2389 **269**	3283 **260**	4169 **251**	5040 **242**	5907 **232**	6765 **233**
20	448 **381**	1350 **373**	2245 **363**	3141 **353**	4031 **342**	4919 **331**	5798 **321**	6663 **310**
25	334 **477**	1158 **468**	2044 **457**	2941 **445**	3837 **433**	4729 **421**	5612 **409**	6500 **397**

TORQUE (LB IN) 5612
SPEED (RPM) 409

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0240

14.5 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000	3500	4000
.5	932 **6**	1907 **4**	2894 **2**					
1	960 **14**	1954 **12**	2950 **9**	3943 **6**	4939 **3**	5930 **2**		
2	988 **30**	2031 **27**	3065 **24**	4090 **20**	5107 **17**	6100 **14**	7068 **11**	8037 **9**
3	983 **45**	2029 **42**	3071 **39**	4101 **35**	5128 **31**	6161 **27**	7182 **23**	8184 **20**
4	978 **61**	2037 **58**	3090 **54**	4136 **49**	5176 **45**	6207 **42**	7230 **37**	8234 **33**
5	962 **77**	2030 **73**	3092 **69**	4144 **64**	5190 **60**	6231 **56**	7259 **51**	8271 **47**
7	933 **108**	2005 **104**	3078 **99**	4141 **94**	5194 **89**	6239 **84**	7275 **78**	8298 **73**
9	890 **140**	1972 **135**	3048 **129**	4112 **123**	5169 **117**	6213 **112**	7245 **106**	8271 **100**
12	832 **187**	1912 **181**	2996 **175**	4071 **167**	5125 **161**	6163 **154**	7195 **147**	8224 **140**
15	753 **235**	1832 **228**	2921 **220**	4009 **212**	5081 **204**	6137 **196**	7182 **188**	8212 **180**
20	559 **314**	1654 **306**	2744 **297**	3834 **287**	4917 **278**	5991 **268**	7045 **258**	8081 **248**
25	524 **393**	1427 **384**	2507 **373**	3595 **363**	4690 **352**	5780 **340**	6853 **328**	7913 **317**

Cont. Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0280

17.1 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000	3500	4000
.5	1056 **5**	2177 **4**	3323 **2**	4512 **1**				
1	1087 **12**	2223 **10**	3378 **8**	4552 **6**	5734 **5**	6930 **3**	8135 **3**	9350 **2**
2	1124 **25**	2313 **23**	3513 **21**	4700 **18**	5880 **16**	7060 **14**	8239 **12**	9400 **11**
3	1124 **39**	2323 **36**	3532 **34**	4740 **31**	5940 **28**	7143 **25**	8346 **22**	9536 **19**
4	1126 **52**	2346 **49**	3568 **47**	4786 **43**	6004 **40**	7214 **37**	8415 **33**	9596 **30**
5	1115 **65**	2350 **62**	3582 **59**	4816 **56**	6044 **52**	7256 **49**	8457 **45**	9641 **41**
7	1091 **92**	2338 **88**	3586 **85**	4832 **80**	6072 **76**	7301 **72**	8515 **67**	9706 **63**
9	1046 **118**	2309 **114**	3564 **110**	4811 **105**	6051 **101**	7280 **96**	8499 **90**	9707 **85**
12	981 **159**	2242 **154**	3506 **148**	4757 **143**	5992 **137**	7221 **132**	8444 **125**	9652 **118**
15	898 **199**	2164 **193**	3437 **186**	4702 **180**	5951 **174**	7187 **168**	8416 **160**	9625 **152**
20	691 **266**	1976 **258**	3255 **250**	4529 **243**	5795 **235**	7044 **227**	8275 **218**	9499 **209**
25	703 **334**	1726 **324**	2987 **314**	4260 **305**	5540 **296**	6815 **286**	8071 **276**	9311 **267**

Flow (GPM)

TORQUE (LB IN) 8071
SPEED (RPM) 276

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0310

18.9 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000	3500	4000
.5	1188 **4**	2464 **3**	3766 **2**	5102 **1**				
1	1220 **11**	2508 **9**	3812 **7**	5145 **5**	6477 **4**	7822 **2**	9181 **2**	10530 **1**
2	1259 **23**	2598 **21**	3950 **19**	5298 **17**	6642 **14**	7972 **13**	9282 **10**	10574 **9**
3	1257 **35**	2606 **33**	3889 **30**	5332 **28**	6688 **25**	8044 **22**	9392 **19**	10693 **16**
4	1259 **47**	2628 **44**	4003 **42**	5377 **39**	6749 **36**	8114 **33**	9461 **29**	10780 **26**
5	1247 **59**	2629 **56**	4252 **52**	5401 **50**	6782 **47**	8149 **42**	9499 **39**	10823 **35**
7	1218 **84**	2614 **80**	4013 **76**	5413 **72**	6806 **68**	8184 **64**	9543 **60**	10874 **56**
9	1167 **107**	2574 **103**	3983 **99**	5386 **94**	6780 **90**	8162 **85**	9529 **80**	10877 **75**
12	1089 **143**	2493 **139**	3904 **133**	5308 **128**	6696 **122**	8075 **117**	9443 **110**	10793 **102**
15	995 **180**	2400 **173**	3817 **167**	5225 **160**	6621 **154**	8003 **148**	9371 **140**	10718 **131**
20	769 **241**	2194 **234**	3618 **225**	5043 **218**	6462 **210**	7863 **203**	9238 **194**	10588 **183**
25	626 **303**	1955 **294**	3359 **284**	4771 **274**	6251 **265**	7608 **256**	8998 **246**	10360 **236**

TORQUE (LB IN) 7608
SPEED (RPM) 256

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0335

20.6 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000	3500	4000
.5	1297 **4**	2699 **3**	4128 **1**	5584 **1**				
1	1329 **10**	2741 **8**	4176 **7**	5630 **5**	7084 **4**	8551 **2**	10036 **2**	11496 **1**
2	1369 **21**	2832 **19**	4308 **17**	5787 **15**	7265 **13**	8718 **11**	10136 **9**	11534 **8**
3	1366 **32**	2838 **30**	4326 **27**	5817 **25**	7301 **22**	8781 **20**	10248 **17**	11685 **14**
4	1368 **43**	2858 **40**	4358 **38**	5861 **35**	7358 **32**	8850 **29**	10317 **25**	11748 **22**
5	1355 **54**	2858 **51**	4368 **48**	5880 **45**	7386 **42**	8880 **38**	10352 **34**	11791 **30**
7	1323 **76**	2840 **73**	4363 **69**	5888 **65**	7407 **61**	8908 **57**	10384 **53**	11829 **47**
9	1266 **98**	2791 **94**	4326 **90**	5856 **85**	7376 **81**	8884 **76**	10372 **71**	11834 **64**
12	1177 **131**	2698 **127**	4230 **121**	5759 **116**	7273 **110**	8773 **105**	10261 **98**	11726 **90**
15	1075 **165**	2594 **159**	4127 **153**	5654 **146**	7170 **140**	8670 **134**	10153 **126**	11613 **116**
20	833 **221**	2372 **214**	3915 **205**	5463 **197**	7008 **189**	8533 **182**	10026 **173**	11479 **161**
25	678 **277**	2142 **269**	3663 **259**	5189 **248**	6726 **239**	8257 **230**	9757 **219**	11219 **209**

TORQUE (LB IN) 8257
SPEED (RPM) 230

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0360

360 cm³ / rev (22.2 in³ / rev)

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000	3500
.5	1386 **4**	2883 **3**	4410 **1**	5965 **1**			
1	1420 **9**	2928 **7**	4461 **7**	6014 **5**	7567 **4**	9135 **2**	10721 **2**
2	1462 **20**	3025 **18**	4602 **16**	6182 **14**	7761 **12**	9313 **10**	10828 **8**
3	1459 **30**	3031 **28**	4621 **25**	6214 **23**	7799 **21**	9380 **19**	10947 **16**
4	1461 **40**	3053 **37**	4655 **36**	6261 **33**	7884 **30**	9454 **27**	11021 **23**
5	1447 **51**	3053 **48**	4666 **45**	6281 **42**	7890 **39**	9486 **36**	11059 **32**
7	1413 **71**	3034 **68**	4661 **65**	6290 **61**	7913 **57**	9516 **53**	11093 **50**
9	1352 **92**	2981 **88**	4621 **84**	6256 **80**	7879 **76**	9490 **71**	11080 **66**
12	1257 **123**	2882 **119**	4519 **113**	6152 **109**	7769 **103**	9372 **98**	10961 **92**
15	1148 **154**	2771 **149**	4409 **143**	6040 **137**	7659 **131**	9262 **125**	10846 **118**
20	890 **207**	2534 **200**	4182 **192**	5836 **184**	7486 **177**	9115 **170**	10710 **162**
25	724 **259**	2288 **252**	3913 **242**	5543 **232**	7185 **224**	8821 **215**	10423 **205**

TORQUE (LB IN) 8821
SPEED (RPM) 215

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0405

24.7 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000	3500
.5	1544 **4**	3178 **3**	4840 **2**	6515 **1**	8185 **1**		
1	1593 **8**	3256 **7**	4928 **6**	6607 **6**	8303 **5**	9987 **4**	11652 **3**
2	1636 **17**	3351 **16**	5084 **15**	6817 **14**	8550 **13**	10272 **12**	11978 **11**
3	1637 **27**	3365 **25**	5106 **23**	6847 **22**	8588 **21**	10314 **19**	12031 **18**
4	1645 **36**	3394 **34**	5159 **32**	6920 **30**	8668 **29**	10402 **27**	12130 **26**
5	1640 **45**	3408 **43**	5201 **41**	6983 **39**	8733 **37**	10466 **35**	12194 **33**
7	1606 **64**	3396 **61**	5211 **59**	7003 **56**	8772 **54**	10527 **51**	12271 **49**
9	1551 **82**	3350 **80**	5176 **77**	6981 **73**	8763 **70**	10519 **67**	12269 **64**
12	1428 **110**	3238 **107**	5075 **103**	6888 **99**	8670 **95**	10424 **91**	12172 **88**
15	1310 **138**	3112 **135**	4948 **130**	6759 **125**	8545 **120**	10306 **115**	12060 **111**
20	1136 **185**	2862 **181**	4692 **175**	6518 **168**	8336 **162**	10122 **156**	11877 **151**
25			4492 **219**	6303 **212**	8084 **204**	9848 **197**	11585 **190**

TORQUE (LB IN) 9848
SPEED (RPM) 197

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0475

29.1 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500	3000
.5	1768 **3**	3732 **3**	5733 **2**	7744 **1**	9762 **1**	
1	1868 **7**	3878 **7**	5879 **6**	7851 **5**	9838 **4**	11830 **3**
2	1964 **15**	4055 **14**	6180 **14**	8237 **12**	10241 **10**	12136 **8**
3	1972 **23**	4074 **22**	6208 **21**	8321 **19**	10379 **17**	12355 **13**
4	2005 **31**	4135 **30**	6287 **29**	8382 **27**	10463 **24**	12496 **20**
5	2004 **39**	4129 **38**	6304 **37**	8428 **34**	10514 **31**	12544 **26**
7	1990 **55**	4133 **54**	6308 **52**	8445 **50**	10555 **45**	12602 **40**
9	1924 **70**	4104 **69**	6285 **68**	8430 **65**	10528 **60**	12608 **54**
12	1775 **94**	3974 **93**	6157 **91**	8328 **87**	10446 **82**	12528 **75**
15	1619 **118**	3784 **116**	5990 **114**	8188 **110**	10311 **104**	12372 **96**
20	1314 **157**	3373 **156**	5629 **153**	7853 **149**	10038 **141**	12145 **132**
25	1141 **197**	3029 **196**	5220 **193**	7427 **189**	9629 **182**	11757 **174**
30	606 **237**	2505 **236**	4649 **233**	6766 **230**	8878 **224**	10989 **219**

TORQUE (LB IN) 6766
SPEED (RPM) 230

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0530

32.2 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000	2500
.5	2080 **3**	4256 **3**	6479 **2**	8726 **2**	11012 **1**
1	2158 **7**	4372 **6**	6592 **6**	8779 **5**	10994 **4**
2	2246 **14**	4567 **13**	6869 **12**	9126 **11**	11376 **9**
3	2242 **21**	4578 **20**	6916 **19**	9237 **17**	11500 **14**
4	2253 **28**	4625 **27**	6977 **25**	9296 **23**	11586 **20**
5	2235 **35**	4629 **34**	7002 **32**	9333 **29**	11626 **26**
7	2182 **49**	4599 **48**	7006 **46**	9362 **42**	11659 **38**
9	2095 **63**	4535 **62**	6960 **59**	9330 **55**	11650 **50**
12	1943 **85**	4390 **83**	6825 **80**	9217 **75**	11549 **69**
15	1753 **106**	4199 **104**	6638 **100**	9052 **95**	11408 **87**
20	1327 **141**	3783 **139**	6262 **135**	8701 **129**	11086 **120**
25	1011 **177**	3300 **175**	5751 **171**	8210 **165**	10639 **158**
30	269 **213**	2698 **211**	5083 **208**	7415 **203**	9814 **197**

TORQUE (LB IN) 9814
SPEED (RPM) 197

☐ Cont. ☐ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0625

38.0 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	1750	2250
.5	1939 **2**	4593 **1**			
1	2087 **5**	4665 **3**	7283 **2**	8680 **2**	11579 **1**
2	2338 **11**	4991 **9**	7590 **8**	8853 **7**	11458 **5**
3	2386 **17**	5101 **15**	7753 **13**	9055 **12**	11689 **9**
4	2457 **23**	5202 **21**	7872 **19**	9174 **17**	11769 **14**
5	2479 **29**	5246 **27**	7943 **25**	9242 **23**	11821 **18**
7	2464 **41**	5273 **39**	7995 **36**	9306 **34**	11859 **28**
9	2401 **53**	5223 **51**	7993 **48**	9337 **45**	11935 **39**
12	2254 **71**	5092 **69**	7886 **65**	9239 **62**	11900 **54**
15	2052 **89**	4901 **87**	7721 **83**	90861 **80**	1763 **70**
20	1600 **120**	4490 **117**	7334 **112**	8725 **109**	11424 **98**
25	1063 **151**	3933 **148**	6818 **144**	8235 **140**	11021 **131**
30	359 **182**	3250 **180**	6074 **176**	7443 **172**	10179 **165**

TORQUE (LB IN) 7443
SPEED (RPM) 172

■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

TG 0785

48.0 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500	2000
.5	2910 **2**	6153 **2**	9607 **1**	12950 **1**
1	3011 **4**	6296 **4**	9670 **3**	12919 **3**
2	3217 **9**	6536 **8**	9935 **7**	13060 **6**
3	3220 **14**	6613 **13**	9977 **11**	13079 **9**
4	3265 **19**	6679 **17**	10021 **15**	13078 **13**
5	3263 **23**	6703 **22**	10047 **19**	13103 **16**
7	3218 **33**	6722 **31**	10068 **28**	13062 **24**
9	3107 **43**	6664 **41**	10108 **36**	13185 **31**
12	2892 **57**	6489 **55**	9959 **49**	13082 **42**
15	2643 **71**	6238 **69**	9733 **62**	12938 **54**
20	2044 **95**	5673 **92**	9239 **85**	12636 **75**
25	2313 **119**	4976 **117**	8571 **110**	12073 **101**
30	496 **143**	4104 **141**	7582 **137**	11024 **130**

TORQUE (LB IN) 11024
SPEED (RPM) 130

TG 0960

58.5 cu in / rev

PRESSURE (PSID)

Flow (GPM)	500	1000	1500
.5	3692 **2**	7712 **1**	11750 **1**
1	3788 **3**	7858 **3**	11895 **3**
2	3900 **7**	8045 **7**	12058 **6**
3	3905 **11**	8078 **11**	12135 **10**
4	3939 **15**	8155 **14**	12210 **13**
5	3923 **19**	8173 **18**	12238 **17**
7	3860 **27**	8160 **26**	12262 **24**
9	3733 **35**	8074 **34**	12224 **31**
12	3475 **47**	7848 **45**	12062 **42**
15	3149 **58**	7545 **57**	11823 **53**
20	2437 **78**	6843 **76**	11227 **72**
25	2969 **98**	5990 **96**	10360 **92**
30	603 **118**	4919 **117**	9170 **113**

TORQUE (LB IN) 9170
SPEED (RPM) 113

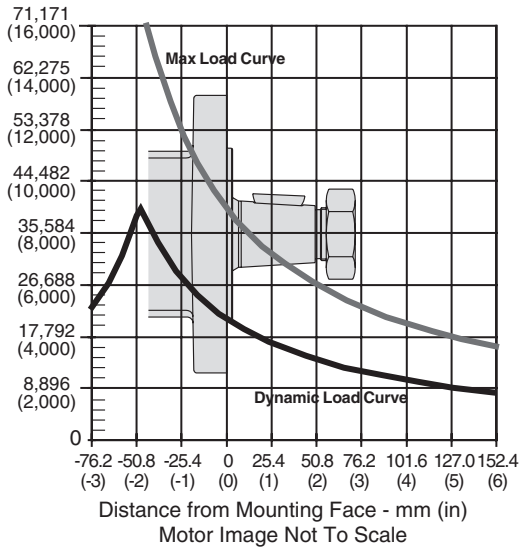
■ Cont. □ Int.

Intermittent operation rating applies to 10% of every minute.

Performance data based on testing using 10W40 oil with a viscosity of 200 SUS at 54° C (130° F.). Performance data is typical. Actual data may vary slightly from one production motor to another.

Flange Mount

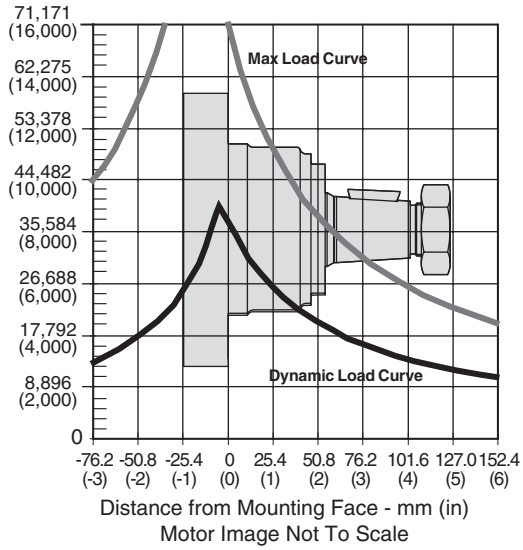
Side Load - N (lbs)



The dynamic side load curve is based on uni-directional steady state loads for L_{10} bearing life at 3 x 10^6 revolutions.

Wheel Mount

Side Load - N (lbs)



The maximum load curve is defined by bearing static load capacity. This curve should not be exceeded at any time including shock loads.

Equation to Calculate the Expected Radial Bearing Life

Equation to calculate the dynamic bearing life for a given load:

Use F_a, F_b and S in equation to determine hours of L_{10} bearing life.

$$L = \frac{3 \times 10^6}{60 \times S} \left\{ \frac{F_a}{F_b} \right\}^{3.33}$$

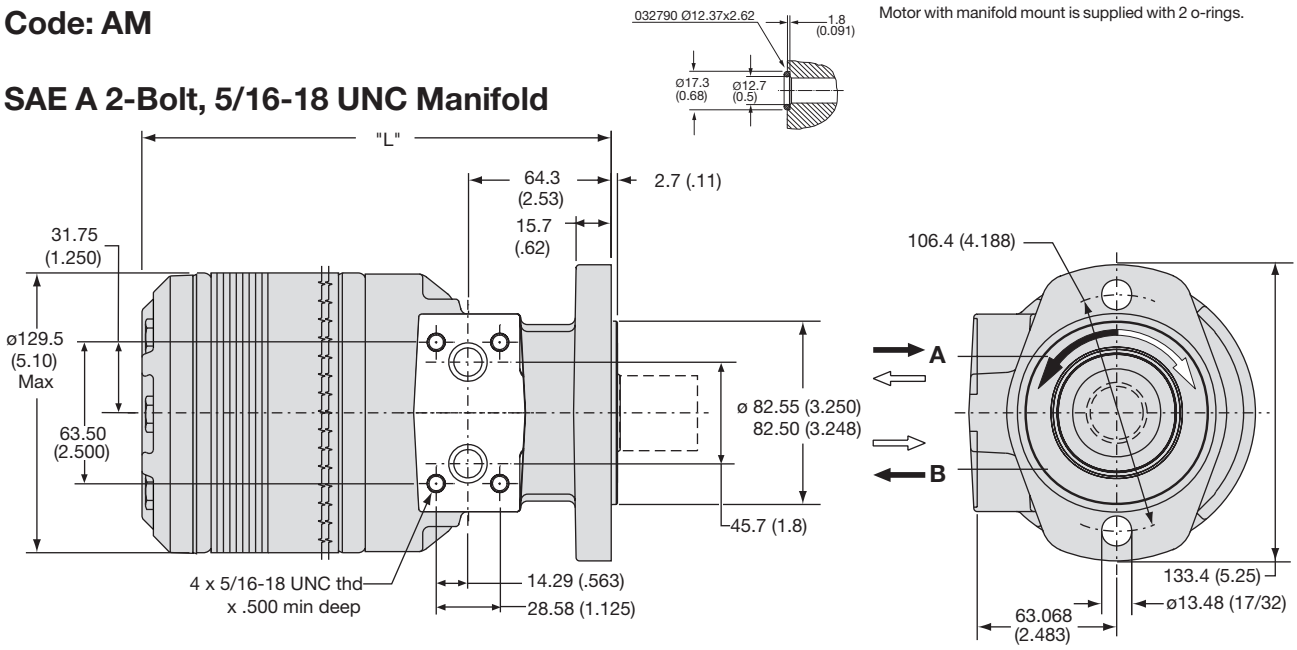
Where / Mit:

S = Shaft Speed RPM
L = Life In Hours
F_a = Dynamic side load defined by above curve at a distance from mounting flange.
F_b = Application side load.

Note: Calculations are based on L_{10} bearing life per ISO 281.

Code: AM

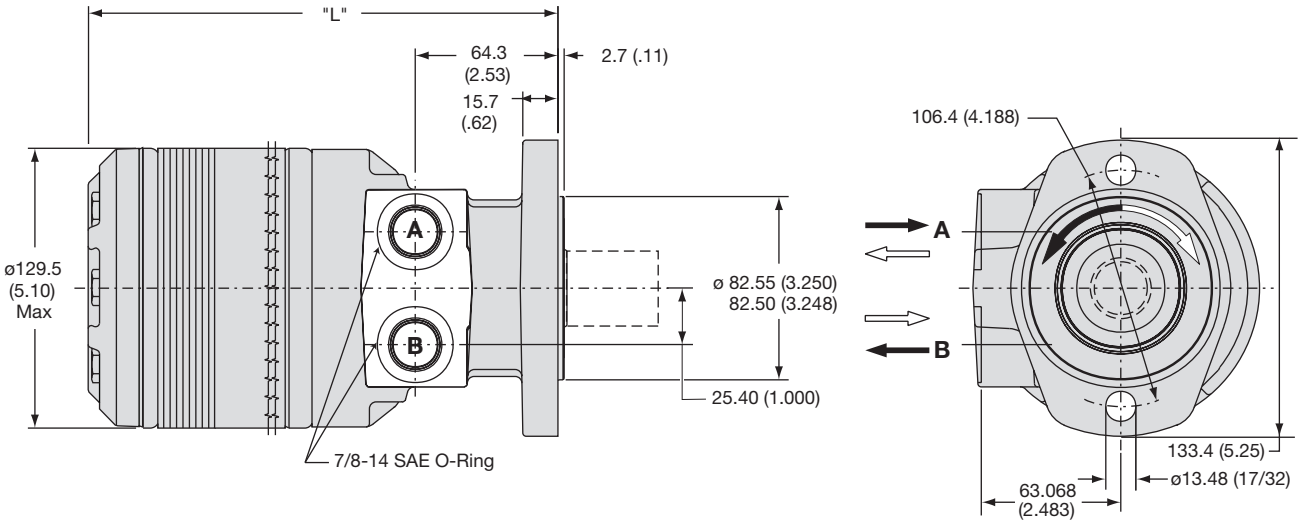
SAE A 2-Bolt, 5/16-18 UNC Manifold



Code AM	disp.	0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	**kg**	**14.2**	**14.5**	**14.7**	**15.1**	**15.5**	**15.7**	**15.9**	**16.5**	**17.2**	**17.9**	**18.6**	**20.2**	**21.9**
Poids/Peso	(lb)	(31.4)	(32.0)	(32.5)	(33.3)	(34.2)	(34.7)	(35.1)	(36.4)	(37.9)	(39.5)	(41.1)	(44.5)	(48.3)
Length	**"L" mm**	**195.6**	**198.6**	**201.4**	**206.5**	**211.3**	**214.8**	**217.7**	**225.0**	**233.7**	**240.0**	**249.4**	**268.4**	**287.5**
	"L" (in)	(7.70)	(7.82)	(7.95)	(8.13)	(8.32)	(8.46)	(8.57)	(8.86)	(9.20)	(9.45)	(9.82)	(10.57)	(11.32)

Code: AS

SAE A 2-Bolt, 7/8-14 SAE

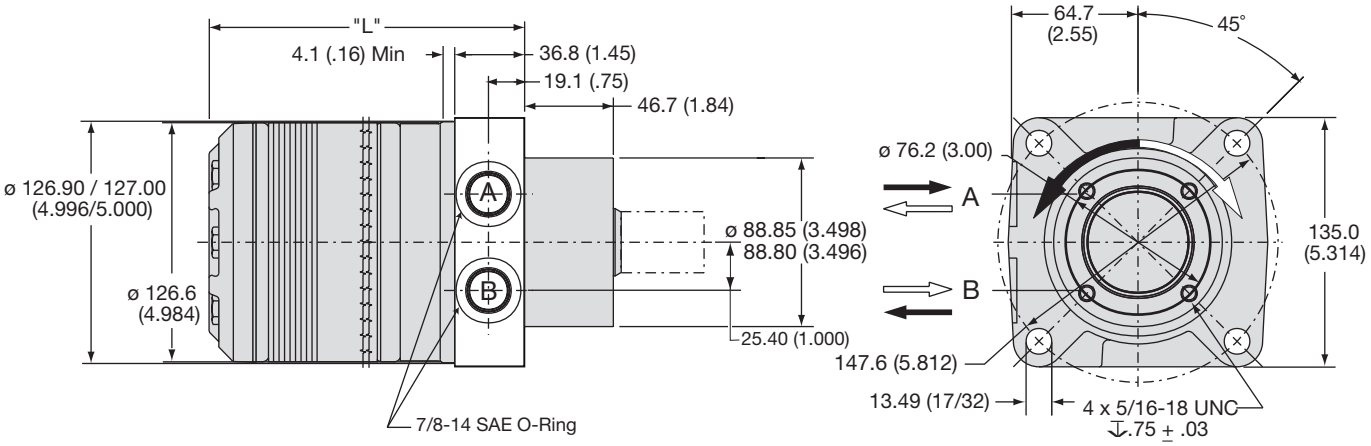


Code AS	disp.	0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight	**kg**	**14.2**	**14.5**	**14.7**	**15.1**	**15.5**	**15.7**	**15.9**	**16.5**	**17.2**	**17.9**	**18.6**	**20.2**	**21.9**
Poids	(lb)	(31.4)	(32.0)	(32.5)	(33.3)	(34.2)	(34.7)	(35.1)	(36.4)	(37.9)	(39.5)	(41.1)	(44.5)	(48.3)
Length	**"L" mm**	**195.6**	**198.6**	**201.4**	**206.5**	**211.3**	**214.8**	**217.7**	**225.0**	**233.7**	**240.0**	**249.4**	**268.4**	**287.5**
	"L" (in)	(7.70)	(7.82)	(7.95)	(8.13)	(8.32)	(8.46)	(8.57)	(8.86)	(9.20)	(9.45)	(9.82)	(10.57)	(11.32)

English equivalents for metric specifications are shown in ( ).

Code: LS

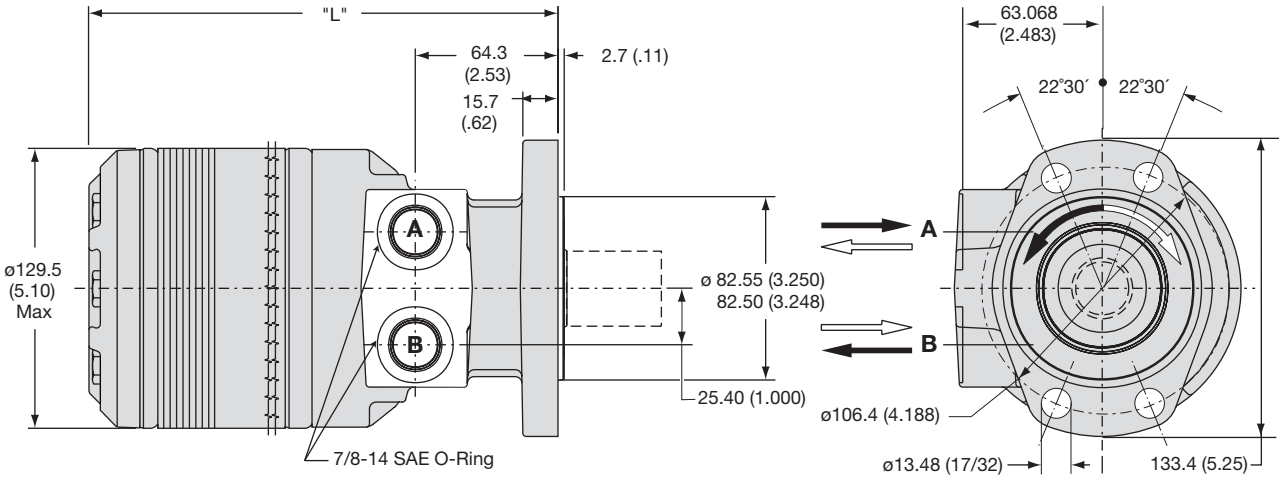
Wheel, Front Brake Nose, 7/8-14 SAE



Code LS	disp.	0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	**kg**	**14.6**	**14.8**	**15.1**	**15.5**	**15.9**	**16.1**	**16.3**	**16.9**	**17.5**	**18.3**	**19.0**	**20.5**	**22.2**
Poids/Peso	(lb)	(32.2)	(37.7)	(33.3)	(34.1)	(35.0)	(35.5)	(35.8)	(37.2)	(38.6)	(40.3)	(41.8)	(45.3)	(49.0)
Length	**"L" mm**	**150.3**	**153.4**	**156.7**	**161.3**	**168.1**	**169.7**	**172.5**	**179.8**	**188.5**	**194.8**	**204.2**	**233.3**	**242.3**
	"L" (in)	(5.92)	(6.04)	(6.17)	(6.35)	(6.54)	(6.68)	(6.79)	(7.08)	(7.42)	(7.67)	(8.04)	(8.79)	(9.54)

Code: MS

Magneto, 7/8-14 SAE

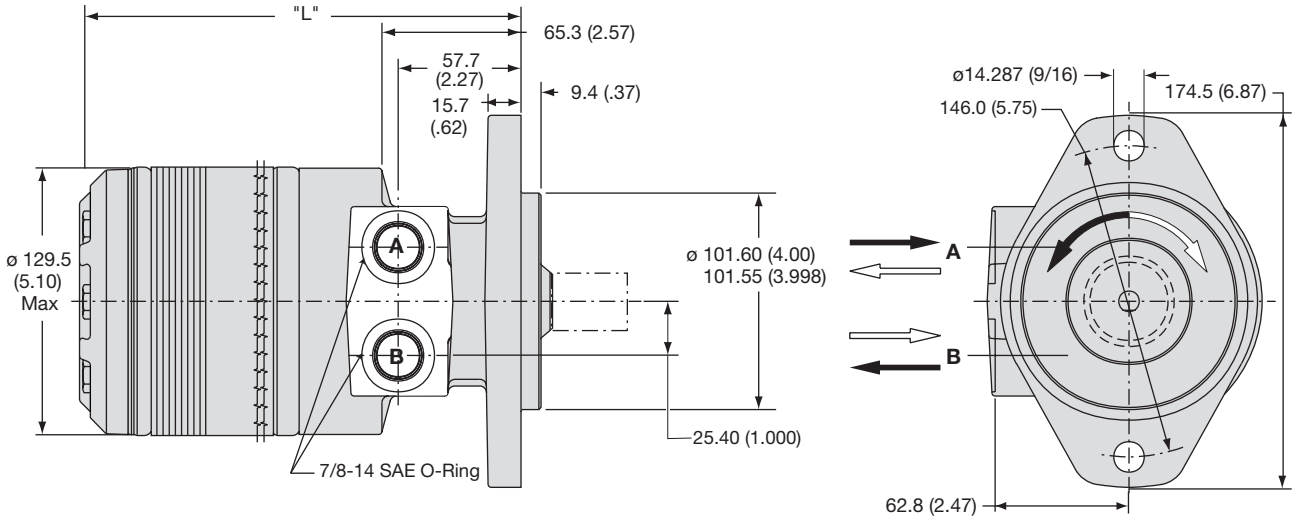


Code MS	disp.	0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	**kg**	**14.2**	**14.5**	**14.7**	**15.1**	**15.5**	**16.1**	**15.9**	**16.5**	**17.2**	**17.9**	**18.6**	**20.2**	**21.9**
Poids/Peso	(lb)	(31.4)	(32.0)	(32.5)	(33.3)	(34.2)	(35.5)	(35.1)	(36.4)	(37.9)	(39.5)	(41.1)	(44.5)	(48.3)
Length	**"L" mm**	**195.6**	**198.6**	**201.4**	**206.5**	**211.3**	**214.8**	**217.7**	**225.0**	**233.7**	**240.0**	**249.4**	**268.4**	**287.5**
	"L" (in)	(7.70)	(7.82)	(7.95)	(8.13)	(8.32)	(8.46)	(8.57)	(8.86)	(9.20)	(9.45)	(9.82)	(10.57)	(11.32)

English equivalents for metric specifications are shown in ( ).

Code: BS

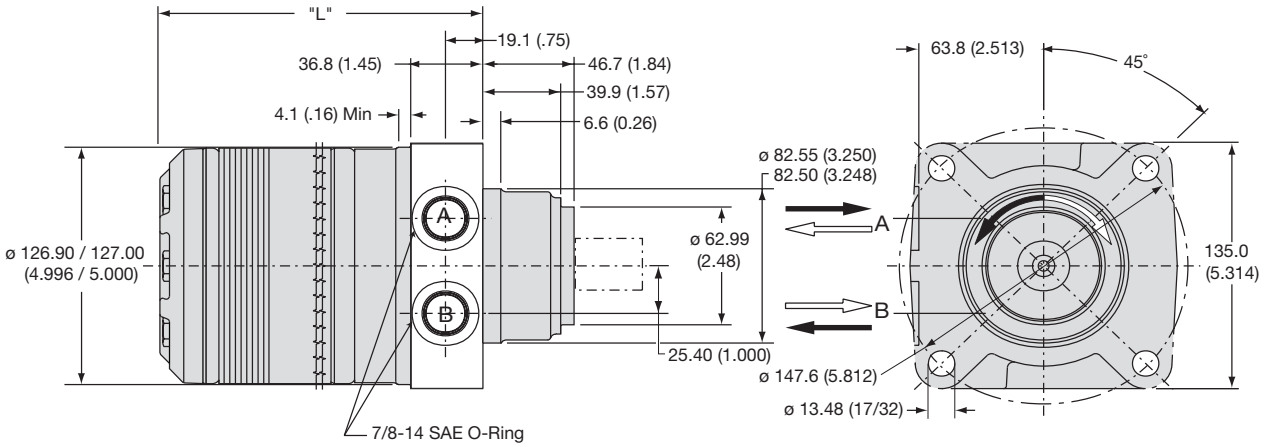
SAE B 2-Bolt, 7/8-14 SAE O-Ring



Code BS	disp.	0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	**kg**	**14.9**	**15.2**	**15.3**	**15.7**	**16.1**	**16.4**	**16.6**	**17.1**	**17.8**	**18.6**	**19.3**	**20.8**	**22.5**
Poids/Peso	(lb)	(32.8)	(33.4)	(33.9)	(34.7)	(35.6)	(36.1)	(36.5)	(37.8)	(39.3)	(40.9)	(42.5)	(45.9)	(49.7)
Length	"L" mm	**195.6**	**198.6**	**201.4**	**206.5**	**211.3**	**214.8**	**217.7**	**225.0**	**233.7**	**240.0**	**249.4**	**268.4**	**287.5**
	"L" (in)	(7.70)	(7.82)	(7.95)	(8.13)	(8.32)	(8.46)	(8.57)	(8.86)	(9.20)	(9.45)	(9.82)	(10.57)	(11.32)

Code: US

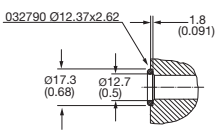
Wheel, Standard, 7/8-14 SAE



Code US	disp.	0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	**kg**	**14.6**	**14.8**	**15.1**	**15.5**	**15.9**	**16.1**	**16.3**	**16.9**	**17.51**	**18.3**	**19.0**	**20.5**	**22.2**
Poids/Peso	(lb)	(32.2)	(32.7)	(33.3)	(34.1)	(35.0)	(35.5)	(35.8)	(37.2)	(38.6)	(40.3)	(41.8)	(45.3)	(49.0)
Length	**"L" mm**	**150.3**	**153.4**	**156.7**	**161.3**	**168.1**	**169.7**	**172.5**	**179.8**	**188.5**	**194.8**	**204.2**	**233.3**	**242.3**
	"L" (in)	(5.92)	(6.04)	(6.17)	(6.35)	(6.54)	(6.68)	(6.79)	(7.08)	(7.42)	(7.67)	(8.04)	(8.79)	(9.54)

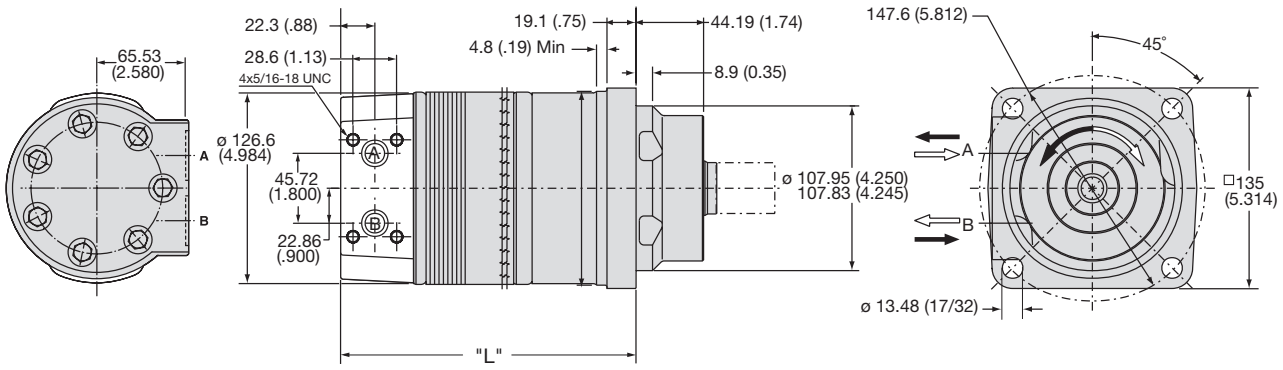
English equivalents for metric specifications are shown in ( ).

Code: WE



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

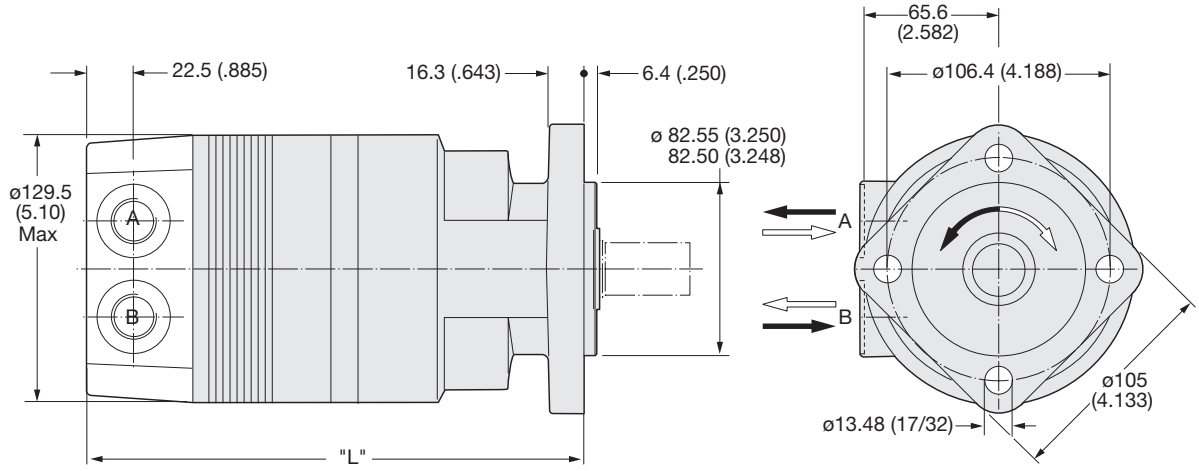
Wheel, Optional, Manifold Rear Port



Code WE	disp.	0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	**kg**	**17.6**	**17.8**	**18.1**	**18.4**	**18.8**	**19.1**	**19.3**	**19.8**	**20.5**	**21.3**	**22.0**	**23.5**	**25.2**
Poids/Peso	(lb)	(38.7)	(39.3)	(39.8)	(40.6)	(41.5)	(42.0)	(42.4)	(43.7)	(45.2)	(46.8)	(48.4)	(51.8)	(55.6)
Length	**"L" mm**	**177.5**	**180.6**	**183.9**	**188.7**	**193.3**	**196.9**	**199.6**	**207.0**	**215.6**	**222.0**	**231.6**	**250.7**	**269.7**
	"L" (in)	(6.99)	(7.11)	(7.24)	(7.43)	(7.61)	(7.75)	(7.86)	(8.15)	(8.49)	(8.74)	(9.12)	(9.87)	(10.62)

Code: VB

SAE A 4-Bolt, 7/8-14 SAE Rear Port

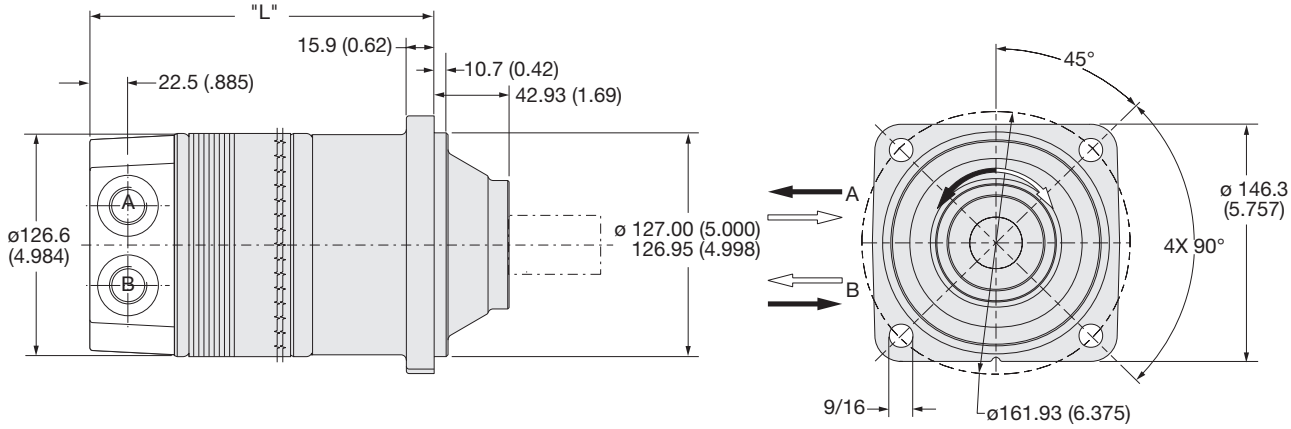


Code VB	disp.	0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	**kg**	**16.1**	**16.3**	**16.6**	**17.0**	**17.4**	**17.6**	**17.8**	**18.4**	**19.0**	**19.8**	**20.5**	**22.0**	**23.7**
Poids/Peso	(lb)	(35.5)	(35.9)	(36.6)	(37.5)	(38.4)	(38.8)	(39.2)	(41.0)	(41.9)	(43.7)	(45.2)	(48.5)	(52.2)
Length	**"L" mm**	**216.7**	**219.7**	**223.0**	**227.8**	**232.4**	**236.0**	**238.8**	**246.1**	**254.8**	**261.1**	**270.8**	**289.8**	**308.9**
	"L" (in)	(8.53)	(8.65)	(8.78)	(8.97)	(9.15)	(9.29)	(9.40)	(9.69)	(10.03)	(10.28)	(10.66)	(11.41)	(12.16)

English equivalents for metric specifications are shown in ( ).

Code: DB

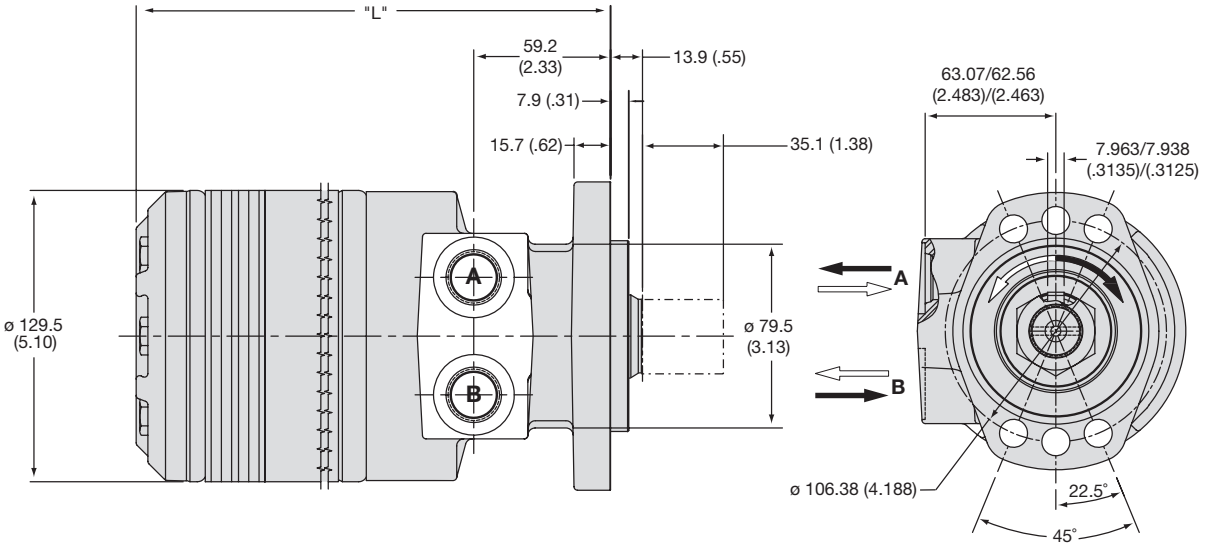
Large Wheel Mount, 7/8-14 SAE Rear Port



Code DB	disp.	0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	**kg**	**17.6**	**17.8**	**18.1**	**18.4**	**18.8**	**19.1**	**19.3**	**19.8**	**20.5**	**21.3**	**22.0**	**23.5**	**25.2**
Poids/Peso	(lb)	(38.7)	(39.3)	(39.8)	(40.6)	(41.5)	(42.0)	(42.4)	(43.7)	(45.2)	(46.8)	(48.4)	(51.8)	(55.6)
Length	**"L" mm**	**178.8**	**182.1**	**185.2**	**190.0**	**194.8**	**198.4**	**201.2**	**208.5**	**216.9**	**223.3**	**232.9**	**252.0**	**271.0**
	"L" (in)	(7.04)	(7.17)	(7.29)	(7.48)	(7.67)	(7.81)	(7.92)	(8.21)	(8.54)	(8.79)	(9.17)	(9.92)	(10.67)

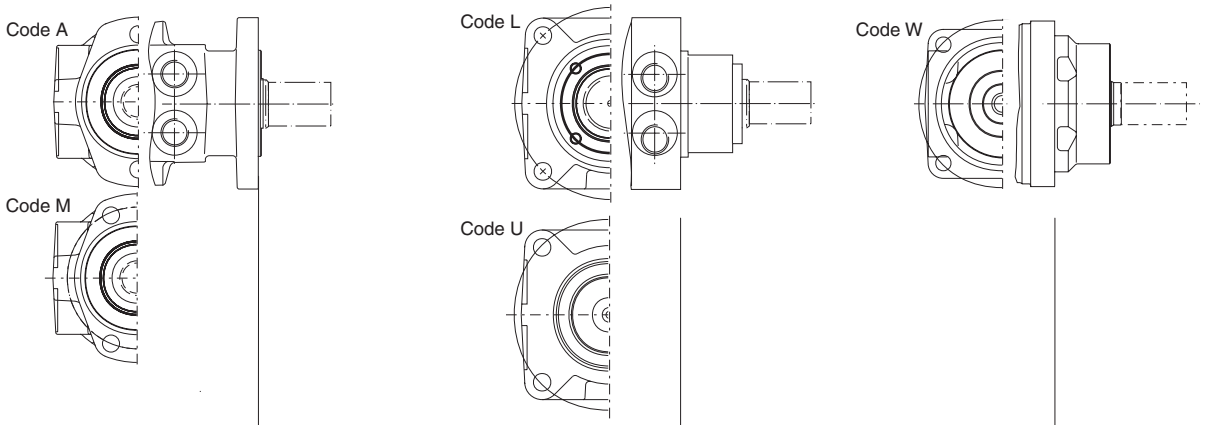
Code: ES

Modified SAE A 6-Bolt, 7/8-14 SAE O-Ring



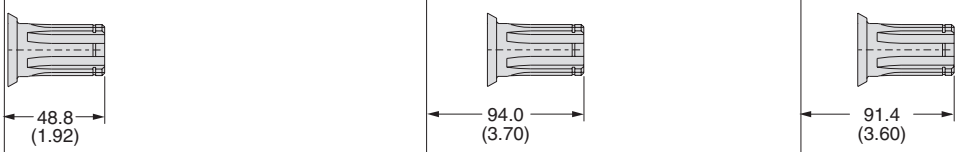
Code ES	disp.	0140	0170	0195	0240	0280	0310	0335	0360	0405	0475	0530	0625	0785	0960
Weight/Gewicht	**kg**	**14.2**	**14.5**	**14.7**	**15.1**	**15.5**	**16.1**	**16.3**	**16.4**	**16.5**	**17.2**	**17.9**	**18.6**	**20.2**	**21.9**
Poids/Peso	(lb)	(31.4)	(32.0)	(33.3)	(33.3)	(34.2)	(35.5)	(35.9)	(36.2)	(36.4)	(37.9)	(39.5)	(41.1)	(44.5)	(48.3)
Length	**"L" mm**	**189.5**	**192.5**	**195.8**	**200.4**	**205.2**	**208.5**	**211.6**	**214.9**	**218.9**	**227.6**	**233.9**	**243.3**	**262.4**	**281.4**
	"L" (in)	(7.46)	(7.58)	(7.71)	(7.89)	(8.08)	(8.21)	(8.33)	(8.46)	(8.62)	(8.96)	(9.21)	(9.58)	(10.33)	(11.08)

English equivalents for metric specifications are shown in ( ).



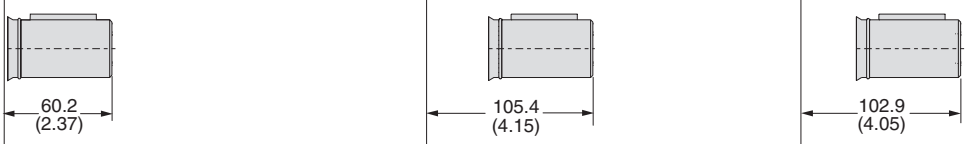
Code: 01

1" 6B Spline



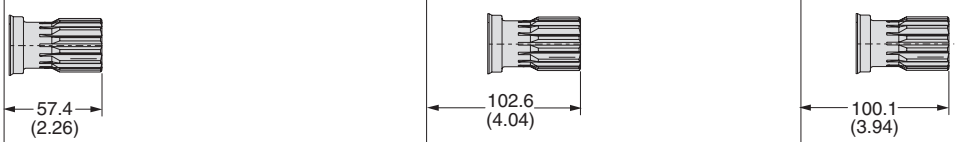
Code: 03

1 1/4" Keyed



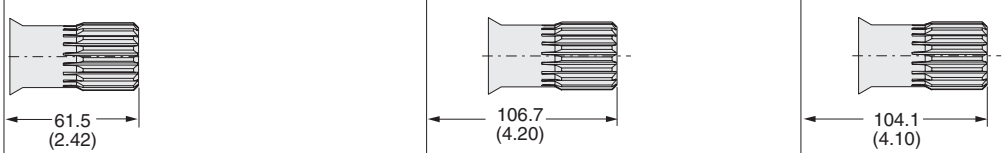
Code: 05

1" 1/4 14 Tooth Spline



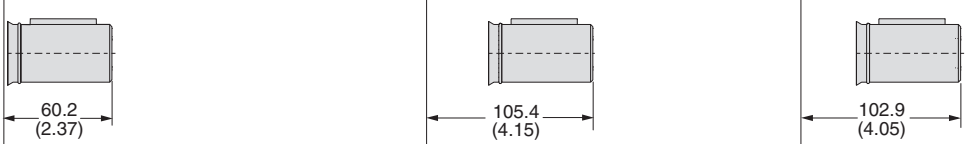
Code: 06

19 Tooth Spline



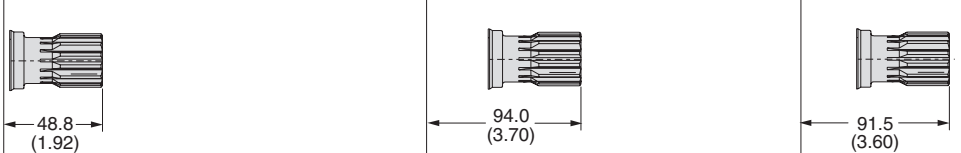
Code: 46

32 mm Keyed



Code: 62

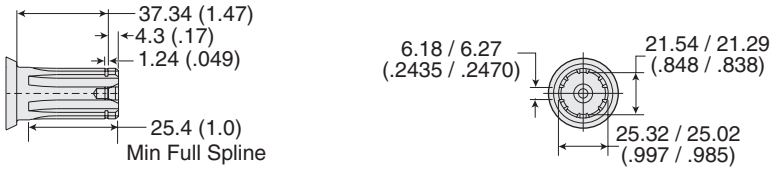
1" 1/4 14 Tooth Spline SAE



English equivalents for metric specifications are shown in ( ).

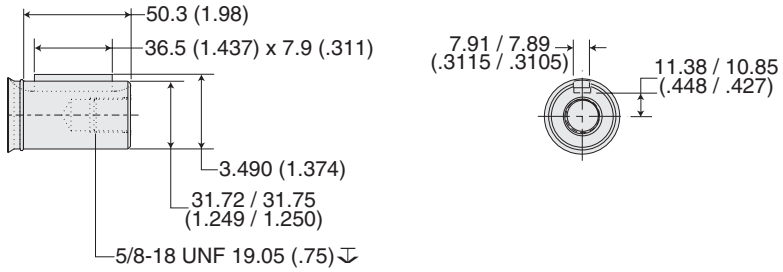
Code: 01

1" 6B Spline



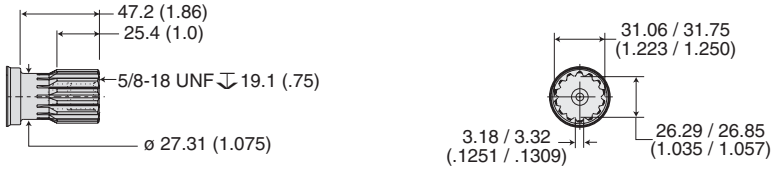
Code: 03

1 1/4" Keyed



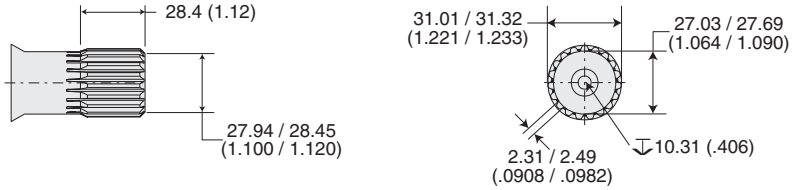
Code: 05

1" 1/4 14 Tooth Spline



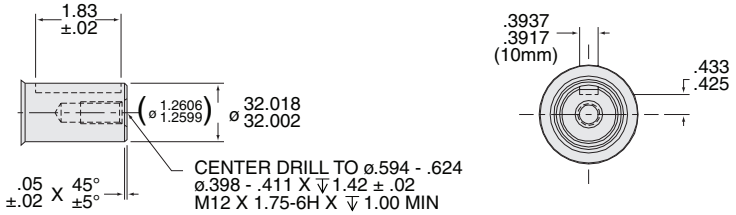
Code: 06

19 Tooth Spline



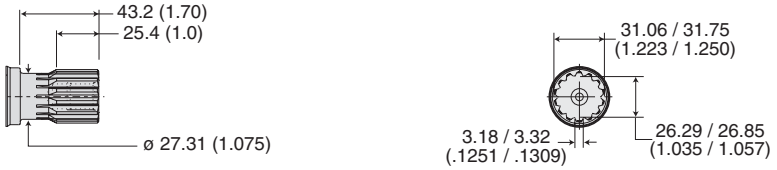
Code: 46

32 mm Keyed

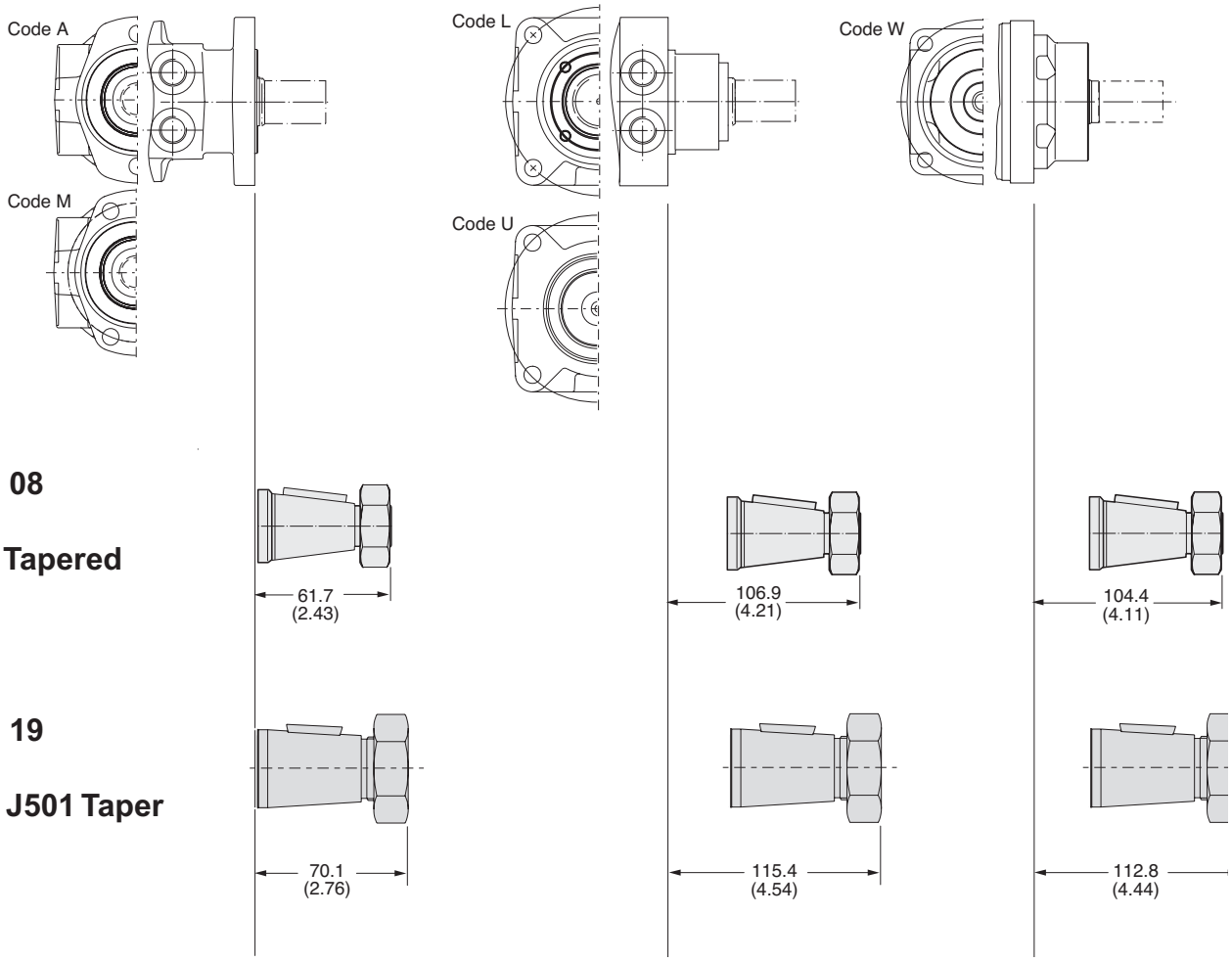


Code: 62

1" 1/4 14 Tooth Spline SAE

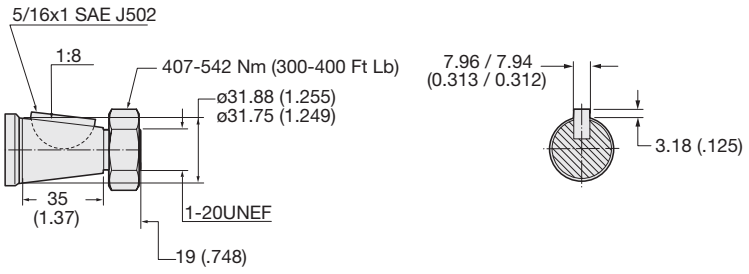


English equivalents for metric specifications are shown in ( ).



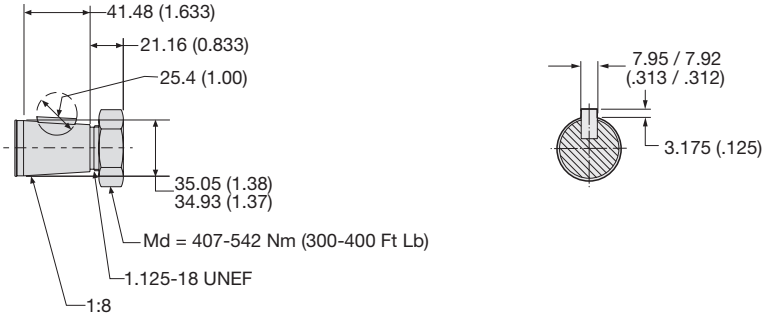
Code: 08

1 1/4" Tapered



Code: 19

1 3/8" J501 Taper



English equivalents for metric specifications are shown in ( ).

Hydraulic Formulas

$$HP_{in} = \frac{Q \Delta P}{1714}$$

$$HP_{out} = \frac{NT}{63025}$$

$$T = \frac{D \Delta Pe_m}{2 \pi}$$

$$Q = \frac{DN}{231\ e_v}$$

Where

- HP = Horsepower
- Q = Flow, GPM
- P = Pressure, PSI
- ΔP = Pressure differential across the motor
- π = 3.1416
- T = Torque, lb in
- D = Motor displacement, cubic inches per revolution
- N = Shaft Speed, RPM
- e_m = Mechanical efficiency
- e_v = Volumetric efficiency

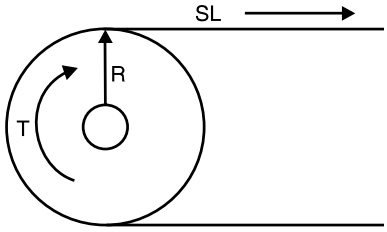
To Convert → Into → Multiply By		
Into ← To Convert ← Divide By		
bars	pounds/sq.in.	14.5
BTU/min	horsepower	.02356
BTU/min	kilowatts	.01757
centigrade	fahrenheit	(C°x9/5)+32
centimeters	inches	.3937
cu. cms.	cu. inches	.06102
cu. cms.	liters	.001
cu. inches	cu.cms.	16.39
cu. inches	liters	.01639
feet	meters	.3048
gallons	cu. inches	231
gallons	liters	3.785
horsepower	kilowatts	.7457
inches	millimeters	25.4
kilograms	pounds	2.205
pounds	newtons	4.448
pound-inches	newton-meters	.113
pound-inches	daNM	.0113
radians	degrees	57.3
square inches	sq. cms.	6.452

Side Load

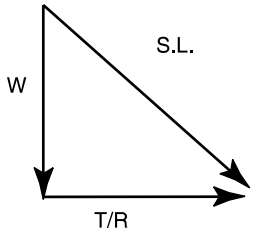
Side loads are imposed upon the shaft of a motor by:

- Driving the load through a pulley or gear
- Supporting the weight of a vehicle or other load on the shaft

Or both



If the load above requires torque T pound-inches and is driven with a pulley on the motor shaft a with a radius of R inches, the side load imposed on the motor shaft is T/R pounds. If the motor shaft is connected to a sprocket for a chain drive, R is one half the pitch diameter of the sprocket. If an external load with a weight of W pounds is also being supported by the motor shaft above, the total side load on the shaft is:



$$(SL)^2 = W^2 + (T/R)^2$$

$$\text{Side Load(lb)} = \sqrt{W^2 + (T/R)^2}$$

Warning

This Catalog is not a Controlled Document. All Dimensions listed herein are for reference only. Consult a Sales engineer for detailed information.

Vehicle Propulsion Systems

Hydraulic motors are often used to drive off-highway vehicles, either directly or through gear reducers. The power required to propel the vehicle, called "Tractive Effort," is supplied by the hydraulic motor(s). It is normally expressed in pounds and is the sum of the forces below:

TE = (RR+GR+F+DP) x 1.1 Where:

RR = Rolling Resistance
GR = Grade Resistance
F = Acceleration Force
DP = Drawbar Pull

Definitions

• Tractive Effort (TE)

Tractive effort is the total linear force that a vehicle can exert on the ground. Sometimes called "rim pull," it is the axle torque divided by the distance from the axle to the surface it is traversing.

• Rolling Resistance (RR)

Rolling resistance is the force in pounds required to propel a vehicle at constant speed over level terrain. It varies with the weight of the vehicle and the type of surface it is traversing. Soft sand, for example, offers more resistance to movement than concrete.

RR = GVW x R where:

RR = Rolling Resistance (lbs.)
GVW = Gross Vehicle Weight (lbs.)
R = Rolling Resistance Factor dependent upon type and condition of surface. Typical "R" values are shown in the accompanying table.

Surface Type	Surface Condition	R Value
Concrete	Excellent	0.010 lb.
Concrete	Good	0.015 lb.
Concrete	Poor	0.020 lb.
Asphalt	Good	0.012 lb.
Asphalt	Fair	0.017 lb.
Asphalt	Poor	0.022 lb.
Macadam	Good	0.015 lb.
Macadam	Fair	0.022 lb.
Macadam	Poor	0.037 lb.
Cobbles	Ordinary	0.055 lb.
Cobbles	Poor	0.085 lb.
Grass		0.025 lb.
Snow	2 In.	0.025 lb.
Snow	4 In.	0.037 lb.
Dirt	Smooth	0.025 lb.
Dirt	Sandy	0.037 lb.
Mud		0.037 to 0.150 lb.
Sand	Level/Soft	0.060 to 0.150 lb.
Sand	Dune	0.150 to 0.300 lb.

• Grade Resistance (GR)

Grade resistance is the additional force required to move a vehicle up an incline. The grade of a slope is normally expressed as a percentage, and represents the number of feet of rise in 100 feet of length. A slope that rises 10 feet in 100 feet has a grade of 10%. The gradeability of a vehicle is defined as the maximum grade the vehicle can climb.

GR = 0.01 x GVW x G where:

GR = Grade Resistance (lbs.)
GVW = Gross Vehicle Weight (lbs.)
G = Grade (%)

The following table gives the approximate relationship between grade in percent and slope in degrees.

Grade (Percent)	Slope (Degrees)
1%	0° 35'
2%	1° 9'
5%	2° 51'
6%	3° 26'
8%	4° 35'
10%	5° 43'
12%	6° 54'
15%	8° 31'
20%	11° 19'
25%	14° 3'
32%	18°
60%	31°

• Acceleration Force (F)

The force required to accelerate a vehicle from an initial speed V_1 (in feet/second) to speed V_2 in T seconds is the accelerating force in pounds. If the acceleration is from rest, V_1 is zero.

$$F = \frac{V \times GVW}{T \times 32.16}$$ where

V = Change in Velocity (ft. per Second) (Final Velocity - Initial Velocity)
GVW = Gross Vehicle Weight (lbs.)
T = Time for Velocity Change (Seconds)
Note - To obtain velocity in feet per second when MPH is known, Multiply MPH by 1.467.

• Drawbar Pull (DP)

Drawbar Pull is the force a vehicle can exert on a load in addition to the force required to propel itself.

Actual force to tow or push a load can be calculated based upon Rolling Resistance, Accelerating Force and Grade Resistance of towed or pushed load.

• Motor Torque

The total Tractive effort required to propel a vehicle is the sum of the forces due to Rolling Resistance, Grade Resistance, Acceleration and Drawbar Pull plus 10% for friction and other variables:

TE = (RR + GR + F + DP) x 1.1

When Tractive Effort has been calculated, hydraulic motor torque can be estimated by:

$$T = \frac{TE \times r}{G \times N}$$ where:

T = Hydraulic Motor Torque (lbs. in.)
TE = Tractive Effort
r = Rolling Radius of Driven Tires (inches)
G = Gear Reduction Ratio Between Hydraulic Motors and Driven Wheels (if none, use a value of 1)
N = Number of Driving Motors

• Slip Torque

Slip torque is the torque at the motor shaft that will cause the wheels or tracks to break traction and skid. It is affected by the weight of the vehicle and the coefficient of friction between the wheels or tracks and the surface.

$$ST = \frac{VW \times u \times r}{G \times N}$$ where:

- ST = Hydraulic Motor Slip Torque (lb in)
- VW = Maximum Weight on Driven Wheel (lb) Including: Allowable Vehicle Overload Dynamic Weight Shift.
- u = Coefficient of Friction Between Tire and Ground. (A value of 0.6 is used for "normal" tires and an average road surface)
- r = Rolling Radius of Driven Tires (inches)
- G = Gear Reduction Ratio Between Hydraulic Motors and Driven Wheel.
- N = Number of Driving Motors

• Rolling Radius

The rolling radius should be based on actual application factors such as Plyrating, Rated Load and inflation pressure can result in different values.

• Hydraulic Motor Speed

$$S = \frac{168 \times V \times G}{r}$$ where:

- S = Required Hydraulic Motor Speed (RPM)
- V = Desired Vehicle Velocity (MPH)
- G = Gear Reduction Ratio Between Hydraulic Motors and Driven Wheels (if none, use a value of 1)
- r = Rolling Radius of driven Tires (inches)

The chart below will estimate the wheel RPM -vs- vehicle velocity for various rolling radii.

MPH -vs- RPM
for different Rolling Radii