WHITE HYDRAULICS

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RS

Max cont. flow ..... 20 gpm
Max cont. pressure ..... 1750 psi
Max cont. speed ..... 510 rpm
Max cont. torque ..... 3350 lb-in

HB

Max cont. flow ..... 20 gpm
Max cont. pressure ..... 3000 psi
Max cont. speed ..... 680 rpm
Max cont. torque ..... 8400 lb-in

CE

Max cont. flow ..... 20 gpm
Max cont. pressure ..... 3000 psi
Max cont. speed ..... 370 rpm
Max cont. torque ..... 9575 lb-in

RE

Max cont. flow ..... 22 gpm
Max cont. pressure ..... 3000 psi
Max cont. speed ..... 370 rpm
Max cont. torque ..... 9700 lb-in

DR

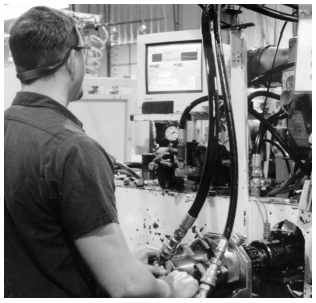
Max cont. flow ..... 25 gpm
Max cont. pressure ..... 3000 psi
Max cont. speed ..... 470 rpm
Max cont. torque ..... 9800 lb-in

DT

Max cont. flow ..... 25 gpm
Max cont. pressure ..... 3000 psi
Max cont. speed ..... 320 rpm
Max cont. torque ..... 23550 lb-in

Commitment to Quality



White Hydraulics commitment to building quality hydraulic motors is present at every stage, from partnering with our suppliers to shipment of the finished product. The difference between a superior motor and an average motor is measured in ten thousandths of an inch. We go to great lengths to ensure that each part meets our specifications. Each state of the art machining center has dedicated gauging allowing us to perform quality checks before releasing materials to the next operation. To ensure the continued accuracy of the gauging, all gauges are serialized and calibrated verification is completed. All of the quality systems in the manufacturing process are operated effectively, random parts are checked on a coordinate measuring machine to verify that finished parts are within our narrow tolerance ranges.

Parts are assembled into complete motors using a single unit flow process. This process consists of assembly at stations specializing in one step of the assembly. Building motors using this method provides the highest degree of consistency and quality in the finished product. Our zeal for quality doesn't stop there. Each assembled motor, is required to pass a demanding two-stage test cycle before being released. The first test stage consists of a leak decay test, which pressurizes the motor with air to verify seal integrity. The second test stage consists of a computerized hydraulic performance test. This test places the motor under load and verifies the actual performance of the motor. Only after passing both of these tests is a motor allowed to be shipped to a customer.

Our belief in building quality products extends to every facet of our operation. We have installed our own heat treat furnaces and freezers to maintain strict control of the quality of the materials used in our products. Our commitment to quality extends to the cleanliness of the oil used in our test stands, which is checked daily using state of the art equipment. In 1993, we received validation of our quality system by becoming the first U.S. manufacturer of hydraulic motors to receive ISO certification. Recertification has required us to demonstrate that we maintain this quality level and continually improve it. All of these actions revolve around one simple objective, to provide our customers with the best gerotor hydraulic motors and accessories on the market today.

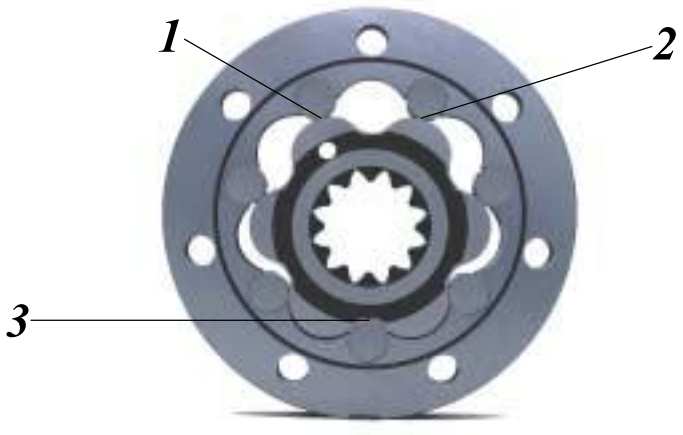
Patented Motor Design

Roller Stator® is the registered trademark (tradename) assigned to White Hydraulics' patented rotor design. Found at the heart of every White Hydraulics motor, this revolutionary rotor design is what sets White motors apart from all other gerotor style hydraulic motors. Although other rotors may appear similar to the Roller Stator® design, closer examination reveals critical differences.

One of the most obvious differences is the use of rollers for the critical sealing contact points. Some manufacturers do not incorporate rollers in all motor series, relying on the basic gerotor design for their low end motors. At White Hydraulics, every motor produced uses rollers to eliminate the sliding friction found in lesser designs, which decreases drag and increases motor life and performance. The less obvious, but most important difference between White motors and other designs lies in the profile of the rotor.

Through exhaustive analysis and testing, it was discovered that minute modifications to the profile of a standard rotor lead to increases in the life and efficiency of the motor. At any given point of rotor rotation, it is necessary for only three points (1, 2, and 3) on the rotor to maintain contact with the sealing rollers to isolate the high and low pressure areas of the motor from each other. Full contact by the remaining four rollers is functionally unnecessary, and robs power from the motor by producing additional friction. By making small dimensional changes to the rotor profile, measured in mere microns, the contact pressure of the rotor on the four rollers in noncritical positions was reduced, bringing about some very positive benefits to overall motor performance.

Reducing pressure on the four noncritical rollers leads to a reduction in drag, which increases the mechanical efficiency of the motor over the entire operating range, producing more usable power at the output shaft. Equally important, allowing the rollers in the noncritical sealing points to relax provides them the opportunity to rebuild the oil film, which is critical in reducing wear and extending motor life. These two key benefits give the Roller Stator motor the technological edge over competitive designs, providing customers with motors that excel in efficiency and durability.



Product Testing

Performance testing is the critical measure of a motor's ability to convert flow and pressure into speed and torque. All product testing is conducted using White Hydraulics' state of the art test facility. This facility utilizes fully automated test equipment and custom designed software to provide accurate, reliable test data. Test routines are standardized, including test stand calibration and stabilization of fluid temperature and viscosity, to provide consistent data. The example below provides an explanation of the values pertaining to each heading on the performance chart.

Pressure refers to the measured pressure differential between the inlet and return ports of the motor during the test.

Flow represents the amount of fluid passing through the motor during each minute of the test.

The maximum continuous pressure rating and maximum intermittent pressure rating of the motor are separated by the dark lines on the chart.

Theoretical RPM represents the RPM that the motor would produce if it were 100% volumetrically efficient. Measured RPM divided by the theoretical RPM give the actual volumetric efficiency of the motor.

Flow GPM (LPM)	Pressure psi (bar) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Max. Inter. 3500 (242)	Theo. RPM
0.5 (2)	184 (21) **14**	418 (47) **13**	745 (84) **10**	1008 (114) **7**					**16**
1 (4)	226 (26) **26**	459 (52) **26**	969 (109) **23**	1387 (157) **21**	1793 (203) **18**	2305 (260) **13**	2566 (290) **10**	2490 (281) **7**	**32**
2 (8)		456 (52) **58**	977 (110) **56**	1424 (161) **51**	1845 (208) **47**	2382 (269) **33**	2746 (310) **29**	3066 (347) **25**	**63**
4 (15)		422 (48) **119**	975 (110) **112**	1497 (169) **103**	1992 (225) **95**	2399 (271) **91**	2896 (327) **83**	3269 (369) **82**	**125**
6 (23)		409 (46) **187**	934 (106) **182**	1402 (158) **177**	1803 (204) **173**	2199 (248) **168**	2630 (297) **160**	3290 (372) **143**	**188**
8 (30)			876 (99) **248**	1389 (157) **244**	1829 (207) **240**	2241 (253) **233**	2857 (323) **205**	3282 (371) **201**	**250**
Max. Cont. 10 (38)			853 (96) **306**	1379 (156) **298**	1834 (207) **293**	2278 (257) **286**	2633 (297) **279**	3178 (359) **269**	**313**
12 (45)			749 (85) **371**	1337 (151) **360**	1823 (206) **352**	2267 (256) **345**	2695 (305) **341**	3042 (344) **335**	**375**
Max. Inter. 14 (53)			684 (77) **437**	1215 (137) **428**	1745 (197) **418**	2222 (251) **409**	2618 (296) **404**	3034 (343) **396**	**438**
16 (61)			633 (71) **499**	1191 (135) **490**	1717 (194) **482**	2163 (244) **467**	2687 (304) **454**	3134 (354) **449**	**500**
Theo. Torque	295 (33)	589 (67)	1178 (133)	1768 (200)	2357 (266)	2946 (333)	3535 (399)	4124 (466)	

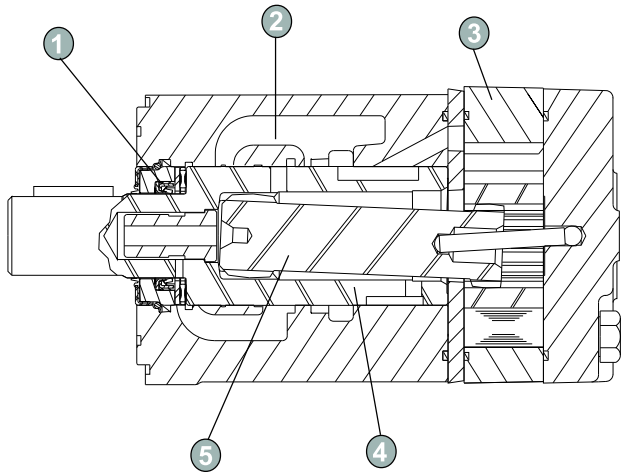
Theoretical Torque represents the torque that the motor would produce if it were 100% mechanically efficient. Actual torque divided by the theoretical torque gives the actual mechanical efficiency of the motor.

Areas within the white shading represent maximum motor efficiencies.

The maximum continuous flow rating and maximum intermittent flow rating of the motor are separated by the dark line on the chart.

Performance numbers represent the actual torque and speed generated by the motor based on the corresponding input pressure and flow. The numbers on the top row indicate torque as measured in lb-in and (Nm), while the bottom number represents the speed of the output shaft.

Features



1. **High Pressure Viton® Shaft Seal** offers superior seal life and performance and eliminates the need for case drain.
2. **Pressure Fed Bearing** surface receives positive flow of clean, cool oil.
3. **Roller Stator® Motor Design** increases efficiency and life by using roller contact versus solid, sliding contact design.
4. **Match Ground Shaft** is matched to housing bore to maintain highest volumetric efficiencies.
5. **Heavy-Duty Drive Link** receives full flow lubrication to provide long life.

Low Cost, Not Low Tech

The RS Series motors are the most economical model in the White Hydraulics product line, but are not low-tech. Unlike competitive products using power robbing, two-piece rotor set designs with sliding contact points, RS Series motors utilize the patented Roller Stator® design. Seven precision rollers for the contact points reduce friction, providing more power and longer life for your application. Each output shaft is custom ground to maintain exact tolerances between the housing and shaft, producing high volumetric efficiencies. Industry standard mounting flanges and output shafts allow the RS Series motors to interchange with competitive designs.

Specifications

Code	Displacement (in^3/rev)	Max. Speed (RPM) - 1)Cont 2)Inter.		Max. Flow (GPM) - 1)Cont 2)Inter.		Max. Torque (lb-in) - 1)Cont 2)Inter.		Max. Pressure (PSI) - 1)Cont 2)Inter. 3)Peak		
		1	2	1	2	1	2	1	2	3
050	3.2	400	490	6	10	730	840	1750	2000	2250
080	4.6	460	540	10	12	1070	1230	1750	2000	2250
090	5.4	420	580	10	14	1300	1480	1750	2000	2250
100	6.3	510	570	14	16	1500	1725	1750	2000	2250
110	6.8	460	600	14	18	1630	1900	1750	2000	2250
125	7.7	410	530	14	18	1600	1850	1500	1750	2250
160	10.0	370	460	16	20	1970	2350	1500	1750	2250
200	12.5	300	370	16	20	2640	3050	1500	1750	2250
250	15.5	300	360	20	24	2540	3040	1250	1500	1750
300	17.9	300	310	20	24	2460	3100	1000	1250	1500
400	24.9	190	220	20	24	3350	4100	1000	1250	1500

Performance

050 *3.2 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	1500 (104)	1750 (121)	2000 (138)	Theo. RPM
0.5 (2)	89 (10) **35**	133 (15) **33**	223 (25) **26**	290 (33) **24**	375 (42) **24**	435 (49) **12**			37
1 (4)	92 (10) **69**	163 (18) **68**	253 (29) **68**	348 (39) **67**	438 (49) **54**	523 (59) **49**	483 (55) **4**		73
2 (8)	90 (10) **142**	181 (20) **140**	274 (31) **138**	366 (41) **136**	464 (52) **127**	556 (63) **103**	653 (74) **78**	690 (78) **34**	145
4 (15)	85 (10) **288**	154 (17) **285**	251 (28) **283**	355 (40) **282**	465 (53) **275**	572 (65) **258**	669 (76) **227**	764 (86) **193**	289
Max. Cont. 6 (23)		168 (19) **433**	243 (27) **432**	342 (39) **430**	445 (50) **429**	549 (62) **408**	656 (74) **380**	755 (85) **346**	434
8 (30)		148 (17) **576**	243 (27) **574**	318 (36) **570**	417 (47) **568**	526 (59) **554**	631 (71) **535**		578
Max. Inter. 10 (38)		119 (13) **718**	218 (25) **711**	307 (35) **701**	429 (48) **700**	499 (56) **689**	593 (67) **682**		722
Theo. Torque	127 (14)	255 (29)	382 (43)	510 (58)	637 (72)	764 (86)	892 (101)	1019 (115)	

Areas within white represent maximum motor efficiencies.

Torque, lb-in (Nm)
Speed, RPM

080 *4.6 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	1500 (104)	1750 (121)	2000 (138)	Theo. RPM
0.5 (2)	107 (12) **25**	227 (26) **21**	341 (39) **20**	456 (51) **9**	509 (58) **5**				26
1 (4)	110 (12) **50**	252 (29) **50**	381 (43) **42**	522 (59) **35**	661 (75) **34**	720 (81) **11**			51
2 (8)	122 (14) **100**	260 (29) **99**	405 (46) **99**	560 (63) **93**	707 (80) **82**	848 (96) **73**	973 (110) **48**	1016 (115) **20**	101
4 (15)		263 (30) **200**	416 (47) **196**	574 (65) **193**	726 (82) **184**	871 (98) **168**	1046 (118) **150**	1184 (134) **121**	201
6 (23)		252 (28) **301**	403 (46) **297**	562 (64) **293**	721 (82) **287**	869 (98) **271**	1020 (115) **252**	1183 (134) **218**	302
8 (30)		221 (25) **400**	379 (43) **399**	555 (63) **393**	703 (79) **390**	860 (97) **375**	1014 (115) **355**	1172 (132) **330**	402
Max. Cont. 10 (38)			341 (39) **502**	502 (57) **500**	657 (74) **498**	819 (93) **496**	980 (111) **472**	1135 (128) **443**	503
Max. Inter. 12 (45)			314 (35) **602**	446 (50) **600**	625 (71) **599**	816 (92) **598**	932 (105) **580**		603
Theo. Torque	183 (21)	366 (41)	549 (62)	732 (83)	916 (103)	1099 (124)	1282 (145)	1465 (166)	

DO NOT operate at maximum pressure and maximum flow simultaneously.

Tested at 129°F with an oil viscosity of 213 SUS

090 *5.4 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	1500 (104)	1750 (121)	2000 (138)	Theo. RPM
0.5 (2)	206 (23) **20**	376 (43) **19**	559 (63) **17**	743 (84) **14**	864 (98) **10**	933 (105) **1**			22
1 (4)		383 (43) **41**	566 (64) **40**	760 (86) **37**	953 (108) **32**	1123 (127) **25**	1225 (138) **12**		43
2 (8)		388 (44) **85**	561 (63) **84**	739 (83) **81**	937 (106) **75**	1121 (127) **66**	1336 (151) **51**	1495 (169) **31**	86
4 (15)			538 (61) **169**	754 (85) **166**	920 (104) **159**	1134 (128) **149**	1309 (148) **133**	1484 (168) **115**	172
6 (23)				720 (81) **251**	902 (102) **244**	1105 (125) **229**	1275 (144) **213**	1450 (164) **191**	257
8 (30)				686 (78) **338**	867 (98) **330**	1080 (122) **318**	1251 (141) **300**	1448 (164) **278**	343
Max. Cont. 10 (38)					824 (93) **417**	1004 (113) **406**	1210 (137) **386**	1422 (161) **365**	428
Max. Inter. 12 (45)					715 (81) **504**	766 (87) **491**	998 (113) **478**		514
14 (53)						845 (95) **581**	1095 (124) **566**		599
Theo. Torque	215 (24)	430 (49)	645 (73)	860 (97)	1075 (121)	1290 (146)	1505 (170)	1720 (194)	

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

100 *6.3 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	1500 (104)	Max. Cont. 1750 (121)	Max. Inter. 2000 (138)	Theo. RPM
0.5 (2)	221 (25) **17**	461 (52) **16**	676 (76) **15**	870 (98) **12**	1020 (115) **7**				19
1 (4)	233 (26) **36**	449 (51) **36**	680 (77) **34**	914 (103) **32**	1116 (126) **28**	1295 (146) **23**	1473 (166) **13**	1336 (151) **1**	37
2 (8)		433 (49) **72**	682 (77) **71**	893 (101) **69**	1108 (125) **65**	1331 (150) **59**	1538 (174) **50**	1758 (199) **37**	74
4 (15)			648 (73) **143**	873 (99) **135**	1088 (123) **124**	1291 (146) **118**	1504 (170) **94**	1721 (195) **75**	147
6 (23)			606 (69) **219**	830 (94) **213**	1062 (120) **203**	1279 (145) **190**	1463 (165) **177**	1717 (194) **154**	220
8 (30)				789 (89) **288**	999 (113) **278**	1254 (142) **264**	1429 (161) **249**	1658 (187) **230**	294
10 (38)				693 (78) **363**	905 (102) **353**	1124 (127) **341**	1380 (156) **322**	1612 (182) **301**	367
12 (45)					755 (85) **433**	1049 (119) **421**	1299 (147) **405**	1526 (172) **384**	440
Max. Cont. 14 (53)					746 (84) **507**	1040 (118) **497**	1198 (135) **484**	1250 (141) **465**	514
Max. Inter. 16 (61)						957 (108) **574**	1197 (135) **566**		587
Theo. Torque	251 (28)	502 (57)	752 (85)	1003 (113)	1254 (142)	1505 (170)	1756 (198)	2006 (227)	

Areas within white represent maximum motor efficiencies.

Torque, lb-in (Nm)
Speed, RPM

110 *6.8 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	1500 (104)	Max. Cont. 1750 (121)	Max. Inter. 2000 (138)	Theo. RPM
0.5 (2)	227 (26) **16**	481 (54) **14**	689 (78) **11**	888 (100) **7**	961 (109) **1**				17
1 (4)	253 (29) **33**	489 (55) **32**	733 (83) **30**	974 (110) **26**	1183 (134) **20**	1356 (153) **10**			34
2 (8)		503 (57) **67**	727 (82) **64**	969 (110) **60**	1199 (135) **52**	1431 (162) **40**	1631 (184) **20**	1590 (180) **1**	68
4 (15)		479 (54) **135**	706 (80) **133**	951 (107) **128**	1190 (134) **120**	1437 (162) **104**	1643 (186) **88**	1911 (216) **58**	136
6 (23)			669 (76) **201**	934 (106) **193**	1144 (129) **183**	1357 (153) **165**	1636 (185) **141**	1826 (206) **114**	204
8 (30)			621 (70) **271**	862 (97) **267**	1092 (123) **256**	1336 (151) **242**	1569 (177) **220**	1788 (202) **196**	272
10 (38)				779 (88) **335**	1025 (116) **324**	1294 (146) **307**	1505 (170) **289**	1783 (201) **254**	340
12 (45)				764 (86) **405**	963 (109) **396**	1226 (139) **376**	1482 (168) **351**	1683 (190) **330**	408
Max. Cont. 14 (53)					901 (102) **463**	1142 (129) **449**	1378 (156) **427**	1626 (184) **406**	476
16 (61)					844 (95) **535**	1075 (121) **523**	1297 (147) **505**		544
Max. Inter. 18 (68)						984 (111) **595**	1205 (136) **579**		612
Theo. Torque	271 (31)	541 (61)	812 (92)	1083 (122)	1354 (153)	1624 (184)	1895 (214)	2166 (245)	

DO NOT operate at maximum pressure and maximum flow simultaneously.

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

125 *7.7 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	Max. Cont. 1500 (104)	Max. Inter. 1750 (121)	Theo. RPM
0.5 (2)	255 (29) **14**	534 (60) **12**	758 (86) **10**	990 (112) **7**	1145 (129) **2**			15
1 (4)	251 (28) **29**	545 (62) **28**	819 (93) **26**	1073 (121) **23**	1319 (149) **18**	1531 (173) **10**	1559 (176) **1**	30
2 (8)		537 (61) **58**	816 (92) **57**	1103 (125) **54**	1356 (153) **49**	1609 (182) **41**	1856 (210) **29**	60
4 (15)		538 (61) **118**	797 (90) **115**	1084 (123) **108**	1338 (151) **99**	1602 (181) **84**	1860 (210) **65**	120
6 (23)			771 (87) **177**	1032 (117) **168**	1321 (149) **158**	1566 (177) **145**	1838 (208) **123**	180
8 (30)			722 (82) **234**	987 (112) **229**	1257 (142) **215**	1548 (175) **203**	1781 (201) **186**	240
10 (38)				927 (105) **290**	1214 (137) **277**	1474 (167) **263**	1720 (194) **244**	300
12 (45)				859 (97) **349**	1066 (120) **339**	1386 (157) **322**	1622 (183) **306**	360
Max. Cont. 14 (53)				787 (89) **409**	1051 (119) **385**	1295 (146) **376**	1536 (174) **367**	420
16 (61)					879 (99) **471**	1163 (131) **459**		480
Max. Inter. 18 (68)					885 (100) **528**	1053 (119) **512**		540
Theo. Torque	307 (35)	613 (69)	920 (104)	1226 (139)	1533 (173)	1839 (208)	2146 (242)	

Areas within white represent maximum motor efficiencies.

Torque, lb-in (Nm)
Speed, RPM

160 *10.0 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	Max. Cont. 1500 (104)	Max. Inter. 1750 (121)	Theo. RPM
0.5 (2)	281 (32) **11**	630 (71) **10**	908 (103) **8**	1247 (141) **6**	1481 (167) **2**			12
1 (4)	308 (35) **22**	677 (76) **21**	983 (111) **20**	1245 (141) **20**	1615 (182) **16**	1867 (211) **11**	2070 (234) **3**	24
2 (8)	320 (36) **45**	694 (78) **45**	1023 (116) **44**	1403 (159) **42**	1707 (193) **39**	1974 (223) **34**	2279 (257) **27**	47
4 (15)		633 (72) **91**	1007 (114) **90**	1375 (155) **86**	1679 (190) **80**	1998 (226) **71**	2319 (262) **56**	93
6 (23)		608 (69) **138**	961 (109) **137**	1318 (149) **132**	1667 (188) **125**	1979 (224) **114**	2359 (267) **101**	139
8 (30)		573 (65) **184**	921 (104) **183**	1233 (139) **180**	1597 (181) **171**	1941 (219) **161**	2284 (258) **148**	185
10 (38)			837 (95) **230**	1184 (134) **229**	1531 (173) **221**	1874 (212) **211**	2220 (251) **197**	231
12 (45)			736 (83) **276**	1095 (124) **275**	1432 (162) **270**	1796 (203) **259**	2133 (241) **245**	278
14 (53)			643 (73) **322**	1010 (114) **321**	1366 (154) **320**	1714 (194) **310**	2045 (231) **295**	324
Max. Cont. 16 (61)				901 (102) **369**	1255 (142) **368**	1585 (179) **362**	1936 (219) **345**	370
18 (68)				824 (93) **415**	1121 (127) **414**	1447 (164) **410**		416
Max. Inter. 20 (76)					980 (111) **460**	1348 (152) **460**		462
Theo. Torque	398 (45)	796 (90)	1194 (135)	1592 (180)	1990 (225)	2389 (270)	2787 (315)	

DO NOT operate at maximum pressure and maximum flow simultaneously.

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

200 *12.5 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	Max. Cont. 1500 (104)	Max. Inter. 1750 (121)	Theo. RPM
0.5 (2)	414 (47) **8**	846 (96) **7**	1250 (141) **6**	1621 (183) **5**	1983 (224) **3**			10
1 (4)	432 (49) **17**	865 (98) **17**	1360 (154) **15**	1732 (196) **14**	2136 (241) **11**	2517 (284) **9**	2811 (318) **5**	19
2 (8)	416 (47) **36**	927 (105) **36**	1386 (157) **34**	1809 (204) **31**	2166 (245) **29**	2642 (299) **23**	3019 (341) **17**	37
4 (15)	380 (43) **73**	849 (96) **73**	1349 (152) **72**	1798 (203) **68**	2204 (249) **65**	2641 (298) **60**	3094 (350) **52**	74
6 (23)		795 (90) **110**	1322 (149) **110**	1721 (194) **106**	2207 (249) **103**	2634 (298) **96**	3007 (340) **90**	111
8 (30)		734 (83) **147**	1228 (139) **146**	1697 (192) **144**	2102 (238) **142**	2621 (296) **133**	2997 (339) **126**	148
10 (38)		666 (75) **184**	1134 (128) **183**	1546 (175) **183**	2013 (227) **181**	2482 (280) **172**	2910 (329) **166**	185
12 (45)			1026 (116) **221**	1475 (167) **220**	1924 (217) **218**	2322 (262) **214**	2795 (316) **205**	222
14 (53)			862 (97) **258**	1358 (153) **257**	1811 (205) **256**	2218 (251) **252**	2656 (300) **249**	259
Max. Cont. 16 (61)			752 (85) **295**	1212 (137) **295**	1687 (191) **294**	2127 (240) **291**	2583 (292) **284**	296
18 (68)				1079 (122) **332**	1541 (174) **331**	1981 (224) **330**		333
Max. Inter. 20 (76)				924 (104) **369**	1366 (154) **368**	1833 (207) **367**		370
Theo. Torque	498 (56)	995 (112)	1493 (169)	1990 (225)	2488 (281)	2986 (337)	3483 (394)	

Areas within white represent maximum motor efficiencies.

Torque, lb-in (Nm)
Speed, RPM

250 *15.5 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	Max. Cont. 1250 (86)	Max. Inter. 1500 (104)	Theo. RPM
0.5 (2)	457 (52) **6**	919 (104) **4**	1327 (150) **2**				8
1 (4)	458 (52) **14**	988 (112) **12**	1491 (168) **10**	1966 (222) **7**	2361 (267) **4**	2658 (300) **1**	15
2 (8)	490 (55) **29**	1018 (115) **27**	1512 (171) **24**	2041 (231) **20**	2547 (288) **14**	2856 (323) **9**	30
4 (15)	437 (49) **59**	1028 (116) **58**	1517 (171) **56**	2064 (233) **51**	2551 (288) **44**	3040 (344) **34**	60
6 (23)	398 (45) **88**	930 (105) **88**	1440 (163) **87**	1966 (222) **82**	2512 (284) **76**	3051 (345) **62**	90
8 (30)		795 (90) **118**	1305 (147) **117**	1649 (186) **115**	2372 (268) **106**	2918 (330) **96**	120
10 (38)		676 (76) **148**	1253 (142) **147**	1738 (196) **146**	2263 (256) **140**	2754 (311) **133**	150
12 (45)		225 (25) **178**	1098 (124) **177**	1642 (186) **176**	2071 (234) **173**	2499 (282) **163**	179
14 (53)			784 (89) **208**	1386 (157) **206**	1962 (222) **204**	2460 (278) **194**	209
16 (61)			722 (82) **237**	1256 (142) **236**	1786 (202) **234**	2306 (261) **228**	239
18 (68)				1096 (124) **266**	1618 (183) **264**	2126 (240) **259**	269
Max. Cont. 20 (76)				842 (95) **297**	1387 (157) **295**	1919 (217) **293**	299
22 (83)					1147 (130) **327**		328
Max. Inter. 24 (91)					874 (99) **356**		358
Theo. Torque	617 (70)	1234 (139)	1851 (209)	2468 (279)	3085 (349)	3702 (418)	

DO NOT operate at maximum pressure and maximum flow simultaneously.

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

300 *17.9 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	Max. Cont. 1000 (69)	Max. Inter. 1250 (86)	Theo. RPM
0.5 (2)	516 (58) **5**	1111 (126) **5**	1638 (185) **5**			7
1 (4)	563 (64) **12**	1096 (124) **12**	1673 (189) **11**	2325 (263) **10**	2912 (329) **9**	13
2 (8)	564 (64) **25**	1180 (133) **25**	1758 (199) **24**	2375 (268) **23**	3033 (343) **21**	26
4 (15)	524 (59) **51**	1193 (135) **51**	1773 (200) **50**	2384 (269) **50**	3145 (355) **47**	52
6 (23)	468 (53) **76**	1116 (126) **76**	1728 (195) **75**	2463 (278) **75**	3096 (350) **74**	78
8 (30)		954 (108) **102**	1650 (186) **101**	2218 (251) **101**	3000 (339) **100**	104
10 (38)		887 (100) **128**	1503 (170) **128**	2132 (241) **127**	2824 (319) **126**	130
12 (45)		698 (79) **154**	1381 (156) **154**	1944 (220) **153**	2660 (301) **152**	155
14 (53)		558 (63) **180**	1206 (136) **180**	1780 (201) **179**	2512 (284) **179**	181
16 (61)			1000 (113) **205**	1630 (184) **204**	2213 (250) **203**	207
18 (68)				1382 (156) **231**	1915 (216) **230**	233
Max. Cont. 20 (76)				1054 (119) **257**	1679 (190) **256**	259
22 (83)				738 (83) **283**		284
Max. Inter. 24 (91)						310
Theo. Torque	713 (81)	1425 (161)	2138 (242)	2850 (322)	3563 (403)	

Areas within white represent maximum motor efficiencies.

Torque, lb-in (Nm)
Speed, RPM

400 *24.9 in³/rev*

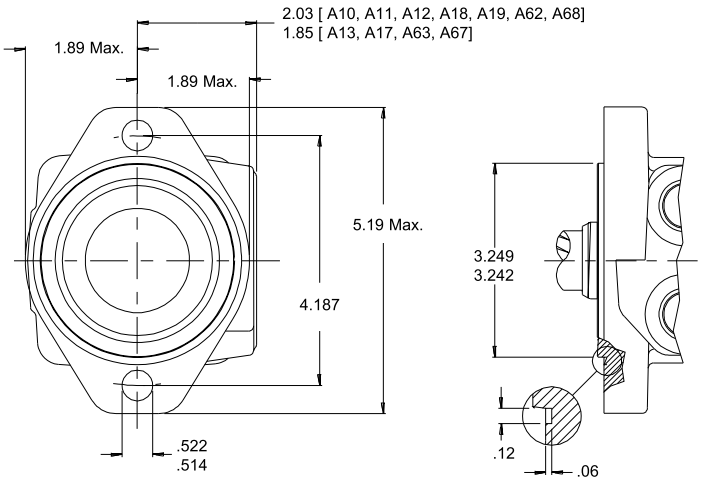
Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	Max. Cont. 1000 (69)	Max. Inter. 1250 (86)	Theo. RPM
0.5 (2)	767 (87) **3**	1656 (187) **2**				5
1 (4)	793 (90) **8**	1597 (180) **8**	2425 (274) **6**	3270 (369) **6**	3951 (446) **3**	10
2 (8)	777 (88) **18**	1550 (175) **17**	2528 (286) **16**	3309 (374) **15**	4124 (466) **12**	19
4 (15)	753 (85) **37**	1565 (177) **36**	2540 (287) **35**	3384 (382) **33**	4153 (469) **29**	38
6 (23)	631 (71) **55**	1498 (169) **55**	2477 (280) **54**	3273 (370) **52**	4122 (466) **49**	56
8 (30)	516 (58) **73**	1396 (158) **71**	2274 (257) **70**	3119 (352) **69**	3901 (441) **68**	75
10 (38)		1247 (141) **92**	2103 (238) **91**	2906 (328) **90**	3837 (434) **87**	93
12 (45)		1042 (118) **110**	1989 (225) **109**	2682 (303) **108**	3613 (408) **107**	112
14 (53)		792 (89) **129**	1670 (189) **128**	2463 (278) **126**	3251 (367) **124**	130
16 (61)		520 (59) **147**	1359 (154) **146**	2204 (249) **144**	2954 (334) **143**	149
18 (68)			1027 (116) **166**	1934 (219) **165**	2746 (310) **164**	167
Max. Cont. 20 (76)			790 (89) **185**	1663 (188) **184**	2336 (264) **183**	186
22 (83)				1242 (140) **204**		205
Max. Inter. 24 (91)				824 (93) **222**		223
Theo. Torque	991 (112)	1982 (224)	2974 (336)	3965 (448)	4956 (560)	

DO NOT operate at maximum pressure and maximum flow simultaneously.

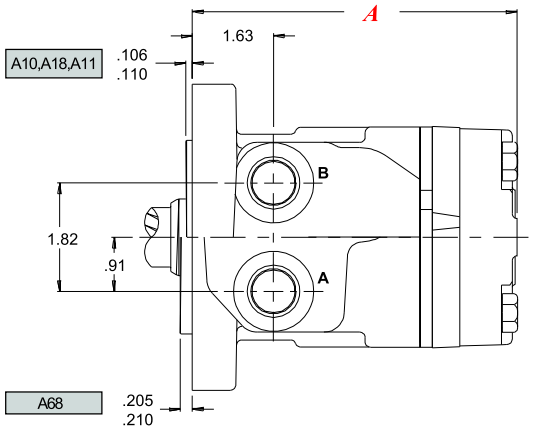
Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

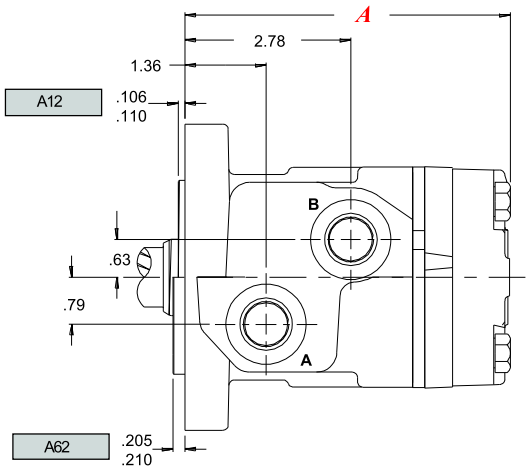
SAE A Flange



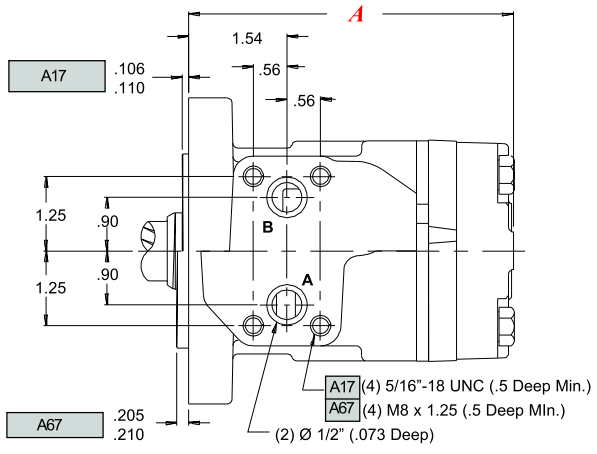
A10 *2-Hole Aligned Ports 1/2" NPT*
A18 *2-Hole Aligned Ports 1/2" BSP.F*
A68 *2-Hole Aligned Ports 1/2" BSP.F*
A11 *2-Hole Aligned Ports 7/8" O-Ring*



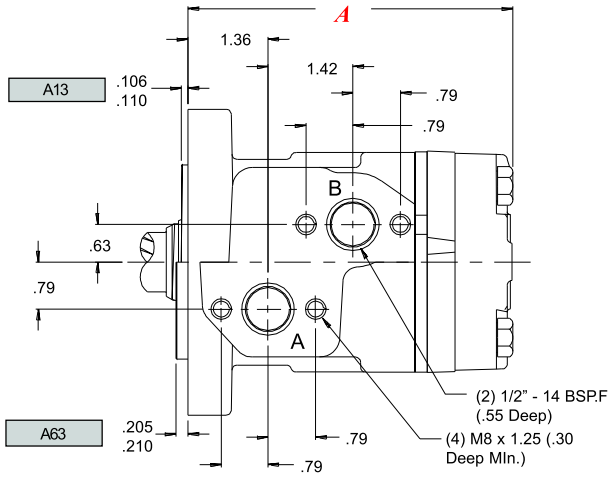
A12 *2-Hole Front Ports 1/2" BSP.F*
A62 *2-Hole Front Ports 1/2" BSP.F*



A17 *2-Hole Manifold Ports*
A67 *2-Hole Manifold Ports*

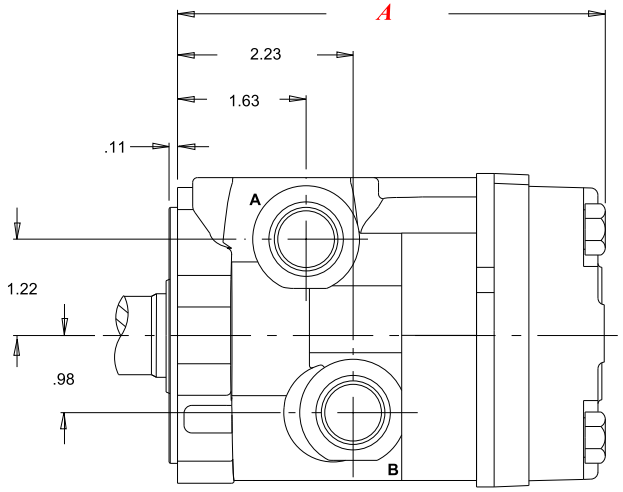


A13 *2-Hole Manifold Ports 1/2" BSP.F*
A63 *2-Hole Manifold Ports 1/2" BSP.F*

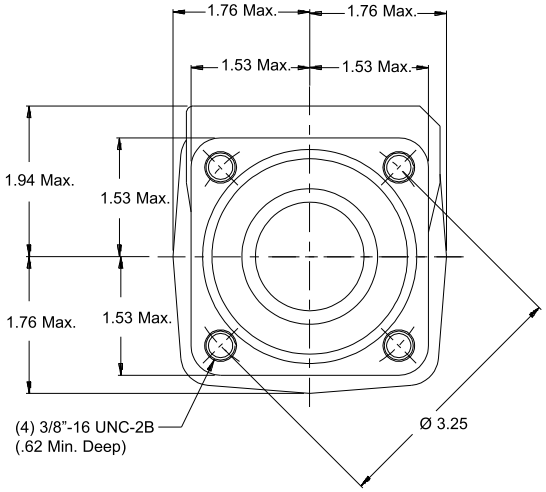


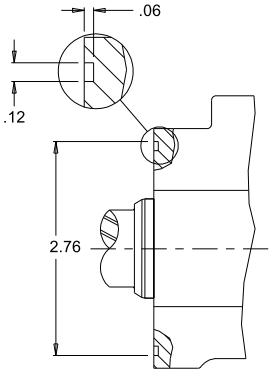
Housings

A70	*2-Hole Side Ports 1/2" NPT*
A71	*2-Hole Side Ports 7/8" O-Ring*
A72	*2-Hole Side Ports 1/2" BSP.F*

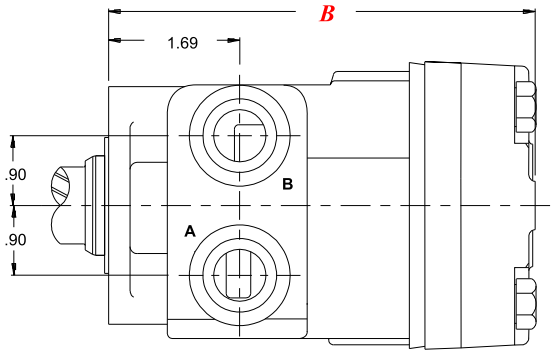


4-Hole Flange

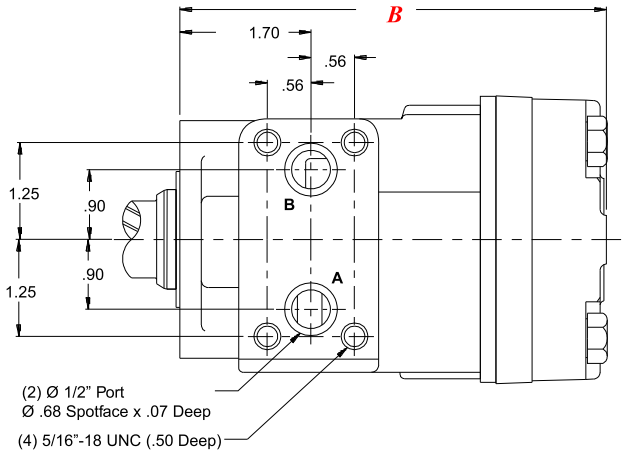




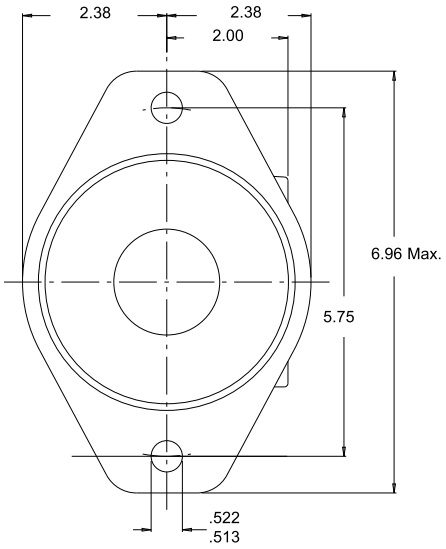
F30	*4-Hole Aligned Ports 1/2" NPT*
F31	*4-Hole Aligned Ports 7/8" O-Ring*

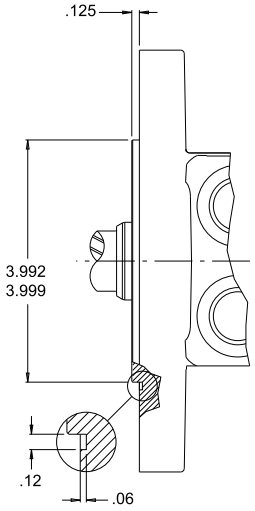


F37	*4-Hole Front Manifold Ports*

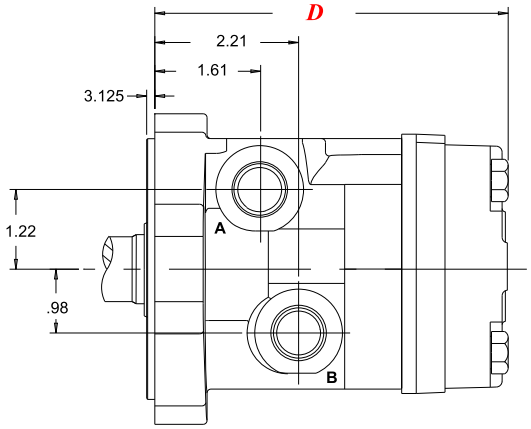


SAE B Flange

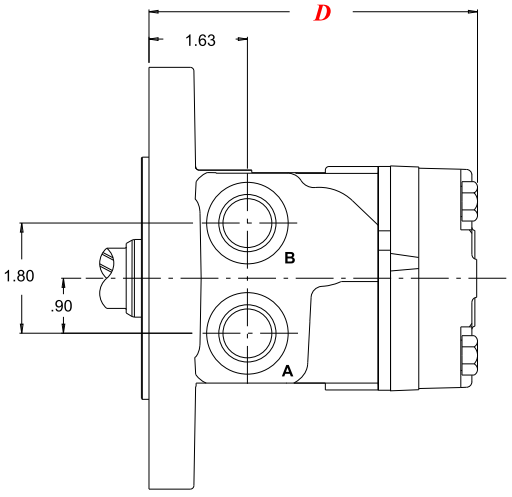




B70	*2-Hole Side Ports 1/2" NPT*
B71	*2-Hole Side Ports 7/8" O-Ring*
B78	*2-Hole Side Ports 1/2" BSP.F*



B18	*2-Hole Aligned Ports 1/2" BSP.F*
B10	*2-Hole Aligned Ports 1/2" NPT*
B11	*2-Hole Aligned Ports 7/8" O-ring*



D is on page 15

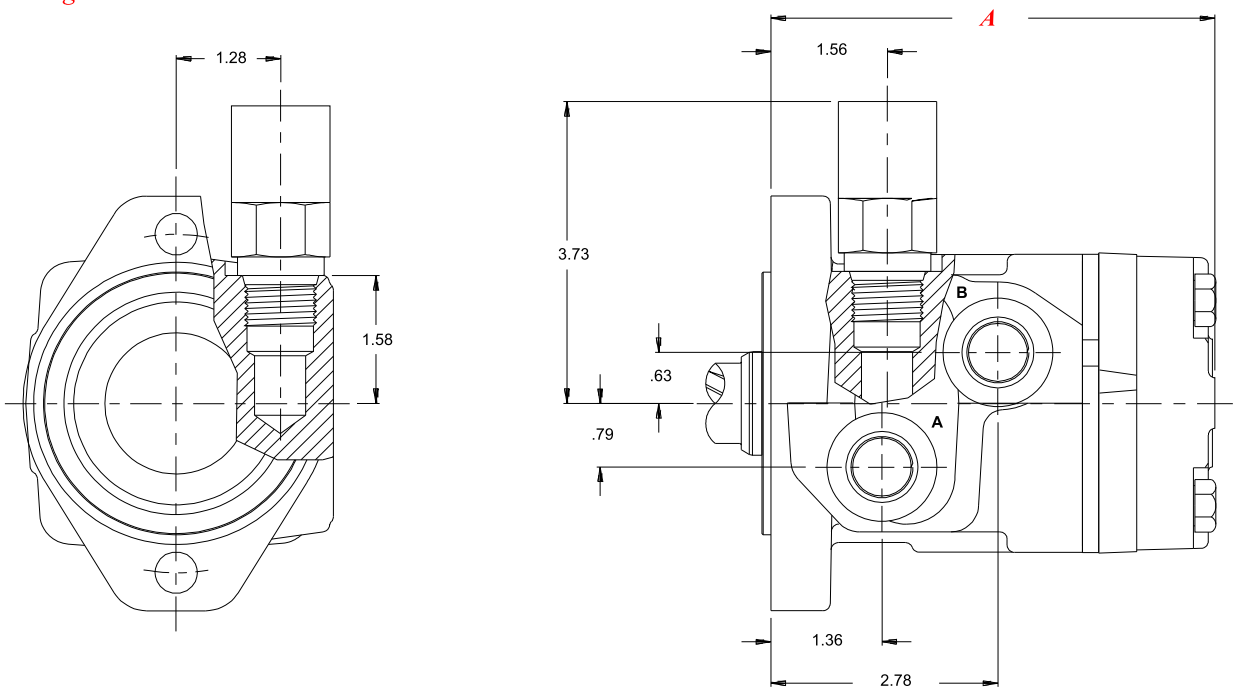
Housings

Valve Cavity Housings

A19 *2-Hole Offset Ports 7/8" O-Ring*

mounting dimensions

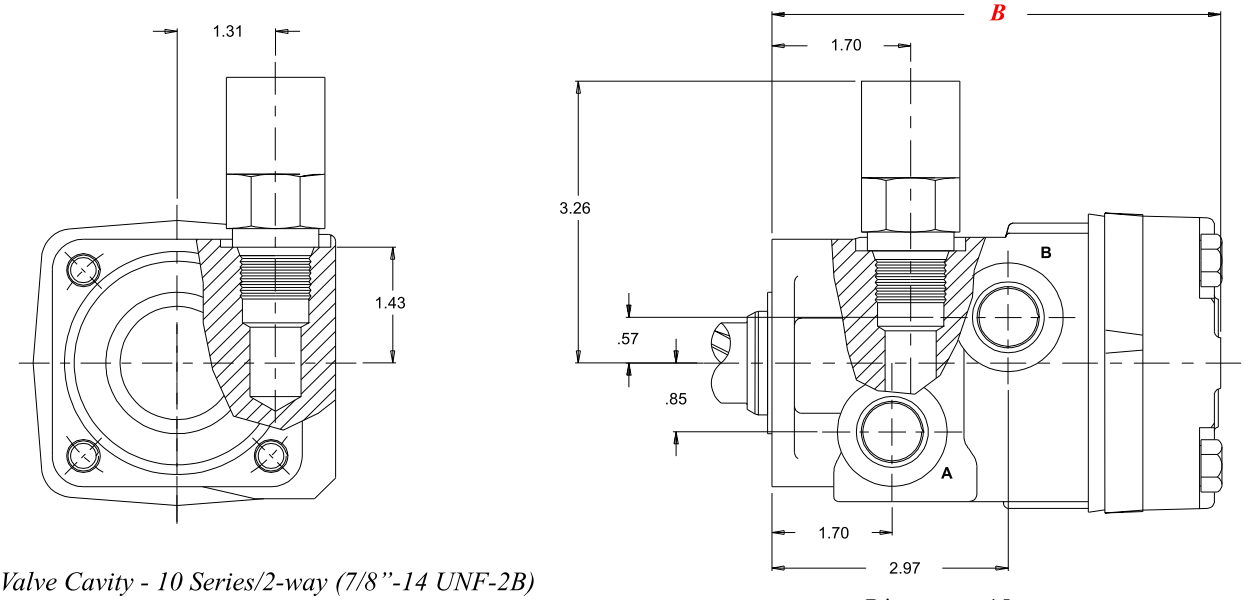
Both housings shown on this page are only available with valve cavities.



F39 *4-Hole Front Offset Ports 7/8" O-Ring*

mounting dimensions

Optional Relief Cartridge Shown Installed



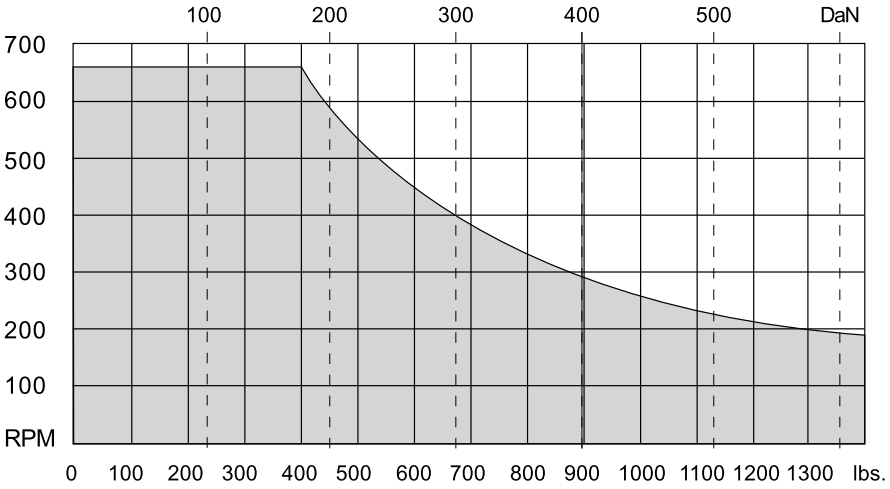
Valve Cavity - 10 Series/2-way (7/8"-14 UNF-2B)

B is on page 15

Allowable Side Load

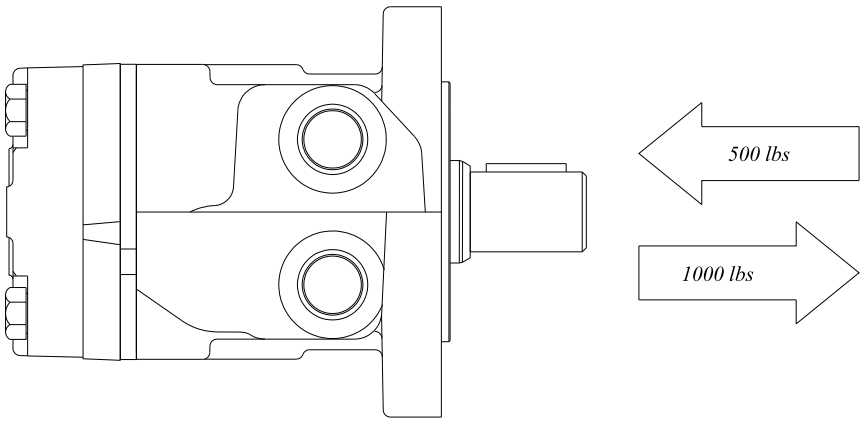
Operating conditions within the shaded area will maintain acceptable oil film lubrication with recommended fluids. Operating conditions outside the shaded area are susceptible to motor failure due to oil starvation and/or excessive heat generation. Fluids with low lubricity or low viscosity may require the maximum load and speed ratings to be derated to provide acceptable motor life and performance.

RS Series Motor



Bearing Curve: The bearing curve above represents the side load capacity of the motor at the centerline of the key for various motor speeds.

Thrust Load



RS motor weights vary ± 1 lb depending upon motor configuration.

Length and Weight Tables

SAE "A" Flange

Code	***A*** in	Weight lbs
050	5.29	16.1
080	5.44	16.5
090	5.51	16.8
100	5.75	17.7
110	5.65	17.2
125	5.75	17.7
160	5.97	18.2
200	6.22	18.8
250	6.53	19.8
300	6.76	20.5
400	7.47	22.7

For Speed Sensor motors add .82 to ***A***

4-Hole Flange

Code	***B*** in	Weight lbs
050	5.36	13.4
080	5.50	13.9
090	5.58	14.1
100	5.82	15.1
110	5.72	14.6
125	5.82	15.1
160	6.04	15.4
200	6.29	16.0
250	6.59	17.1
300	6.83	17.9
400	7.54	20.2

For Speed Sensor motors add .67 to ***B***

SAE "B" Flange

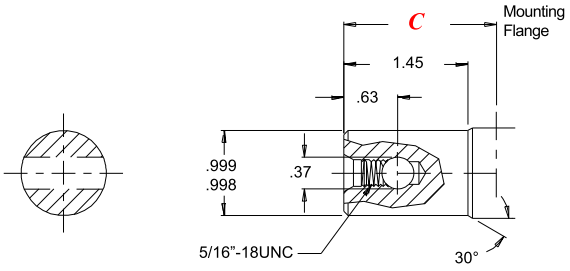
Code	***D*** in	Weight lbs
050	5.29	18.6
080	5.44	19.0
090	5.51	19.3
100	5.75	20.2
110	5.65	19.7
125	5.75	20.2
160	5.97	20.7
200	6.22	21.3
250	6.53	22.3
300	6.76	23.0
400	7.47	25.2

Back

Shafts

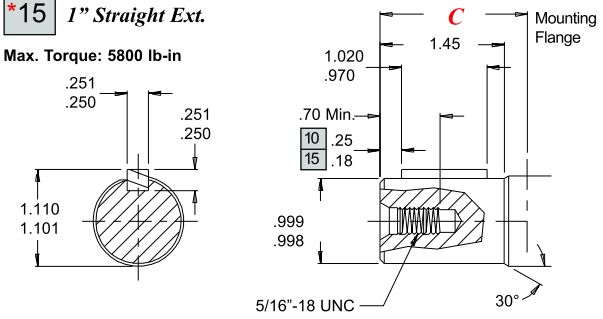
05 *1" Pinhole*

Max. Torque: 6000 lb-in



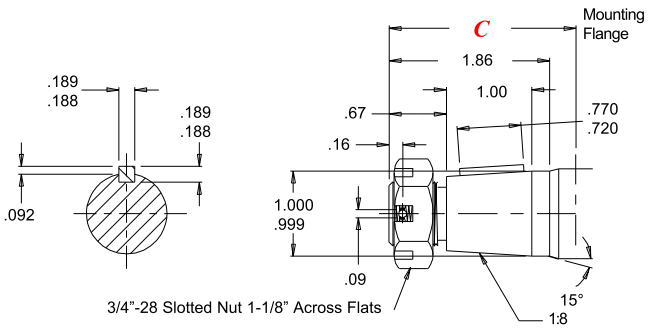
10 *1" Straight*
*15 *1" Straight Ext.*

Max. Torque: 5800 lb-in



13 *1" Tapered*

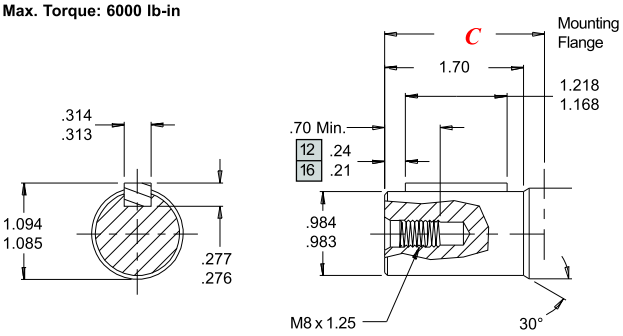
Max. Torque: 5800 lb-in



Note: A slotted nut is standard on this shaft.

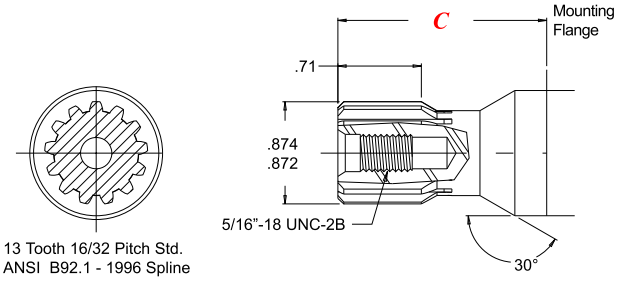
12 *25mm Straight*
*16 *25mm Straight Ext.*

Max. Torque: 6000 lb-in



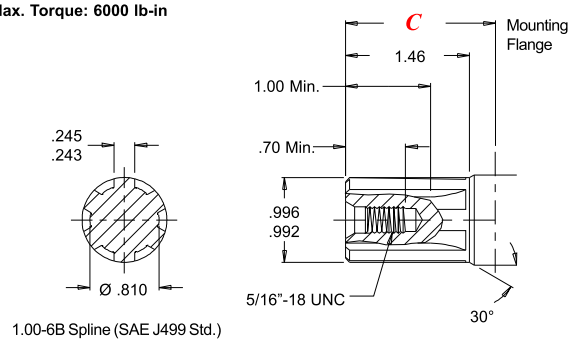
01 *13 Tooth Spline*

Max. Torque: 1500 lb-in



02 *6-B Spline*

Max. Torque: 6000 lb-in



Shaft Lengths

C

Code	SAE "A" Flange (in)	4-Hole Flange (in)	SAE "B" Flange (in)
05	1.77	1.70	1.77
10	1.77	1.70	1.77
02	1.77	1.70	1.77
12	2.20	2.09	2.20
13	2.28	2.17	2.28
15	1.61	1.57	1.61
16	1.61	1.57	1.61
01	1.70	1.57	1.70

Shaft lengths vary ± .030 in

* The #15 and #16 shafts are to be used with speed sensor motors only.

Ordering Information

SERIES
201 — REVERSED TIMING
200

DISPLACEMENT | HOUSING | SHAFT | OPTIONS | MISCELLANEOUS

Code	Displacements
050	3.2 in³/rev
080	4.6 in³/rev
090	5.4 in³/rev
100	6.3 in³/rev
110	6.8 in³/rev
125	7.7 in³/rev
160	10.0 in³/rev
200	12.5 in³/rev
250	15.5 in³/rev
300	17.9 in³/rev
400	24.9 in³/rev

Code	Housings
A10	2-Hole 1/2" NPT Aligned Ports (S)
A11	2-Hole 7/8" O-ring Aligned Ports (S)
A12	2-Hole 1/2" BSP.F Offset Ports (S)
A13	2-Hole1/2" BSP.F Offset Manifold (S)
A17	2-Hole Manifold Ports (S)
A18	2-Hole 1/2" BSP.F Aligned (S)
A19	2-Hole 7/8" O-ring With Valve Cavity (S)
A62	2-Hole 1/2" BSP.F Offset w/.200 Pilot
A63	2-Hole 1/2" BSP.F Offset Manifold w/.200 Pilot
A67	2-Hole Manifold Ports w/.200 Pilot
A68	2-Hole 1/2" BSP.F Aligned w/.200 Pilot
A70	2-Hole 1/2" NPT Side Ports
A71	2-Hole 7/8" O-ring Side Ports
A72	2-Hole 1/2" BSP.F Side Ports
B10	2-Hole SAE B Flange 1/2" NPT Aligned
B11	2-Hole SAE B Flange 7/8" O-ring Aligned
B18	2-Hole SAE B Flange 1/2" BSP.F Aligned
B70	2-Hole SAE B Flange 1/2" NPT Side Ports
B71	2-Hole SAE B Flange 7/8" O-ring Side Ports
B78	2-Hole SAE B Flange 1/2" BSP.F Side Ports
F30	4-Hole 1/2" NPT Aligned Ports (S)
F31	4-Hole 7/8" O-ring Aligned Ports (S)
F37	4-Hole Manifold Ports (S)
F39	4-Hole 7/8" O-Ring W/Valve Cavity (S)

Code	Shafts
01	7/8" 13 Tooth
02	1" 6-B Spline
05	1" Pinhole
10	1" Straight
12	25mm Straight
13	1" Tapered
15	1" Straight Ext. (S)
16	25mm Ext. (S)

PAINT

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

* Available with A19 and F39 housings

** Available with A10, A11, A12, A13, A17, A18, A19, F30, F31, F37, and F39 housings and must use the 15 or 16 shaft

(S) Speed sensor components

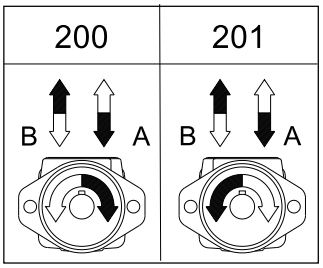
Code	Options
AA	None
AC	Freeturning Rotor

ADD ONS

Code	Options
A	Standard
B	Lock Nut
C	Solid Hex Nut
**W	4-Pin Male Weatherpack Connector (Dual) (S)
**X	4-Pin M12 Male Connector (Dual) (S)
**Y	3-Pin Male Weatherpack Connector (Single) (S)
**Z	4-Pin M12 Male Connector (Single) (S)

CAVITY

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed

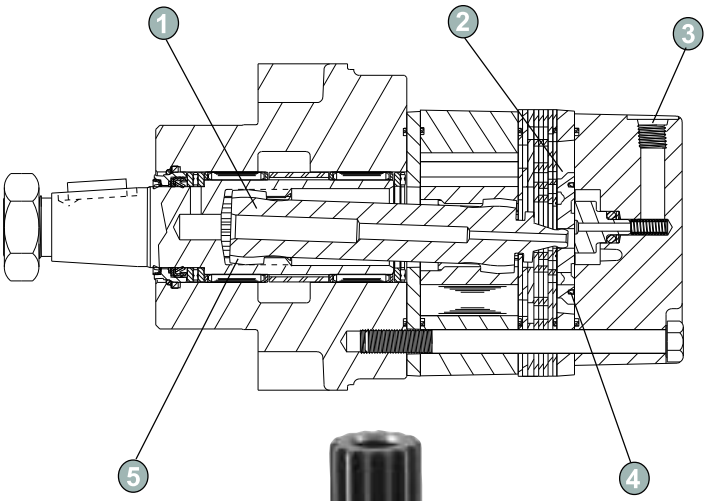


Rotation

For applications requiring the motor to rotate in only one direction, shaft seal life may be prolonged by pressurizing the “B” port of the motor. To obtain the desired direction of shaft rotation, use the graphic at the left to determine the rotation code for the motor. For bidirectional applications, the 200 series is recommended. Preferred rotation is based on rotor timing. Changing preferred direction requires no unique parts.

Features

1. **Heavy-Duty Drive Link** is up to 30% stronger than competitive designs for longer life.
2. **Three-Zone Orbiting Valve** precisely meters oil to produce exceptional volumetric efficiency.
3. **Standard Case Drain** increases shaft seal life by reducing pressure on seal.
4. **Rubber Energized Steel Face Seal** does not extrude or melt under high pressure or high temperature.
5. **Forced Drive Link Lubrication** reduces wear and promotes longer life from motor.



Peak Efficiency For Continuous Duty

The HB Series motor is the leader in its class, offering high efficiency with rugged durability. The three-zone orbiting disk valve, laminated manifold and Roller Stator® motor work harmoniously to produce high overall efficiencies over a wide range of operating conditions. The standard case drain increases shaft seal life by reducing internal pressures experienced by the seal. The case oil is also directed across all driveline components, increasing motor life. An internal drain option is also available. At the heart of the motor is a heavy-duty drivelink, offering 30% more torque capacity than competitive designs. These features make the HB Series motor the motor of choice for applications requiring peak efficiency for continuous operation.

Specifications

Code	Displacement (in³/rev)	Max. Speed (RPM) - 1)Cont 2)Inter.		Max. Flow (GPM) - 1)Cont 2)Inter.		Max. Torque (lb-in) - 1)Cont 2)Inter.		Max. Pressure (PSI) - 1)Cont 2)Inter. 3)Peak		
		1	2	1	2	1	2	1	2	3
050	3.2	680	830	10	12	1200	1400	3000	3500	4000
080	4.6	800	950	14	20	1700	1975	3000	3500	4000
090	5.4	680	840	16	20	2000	2400	3000	3500	4000
110	6.8	680	850	20	25	2650	3100	3000	3500	4000
125	7.7	580	740	20	25	3000	3500	3000	3500	4000
160	10.0	460	580	20	25	3975	4550	3000	3500	4000
200	12.5	370	460	20	25	5050	5800	3000	3500	4000
250	15.5	290	370	20	25	6250	7100	3000	3500	4000
300	17.9	250	320	20	25	7200	8250	3000	3500	4000
400	24.9	180	230	20	25	8400	9050	2500	2750	3000

Performance

050 *3.2 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	3000 (207)	3500 (242)	Theo. RPM
0.5 (2)	66 (7) **36**	158 (18) **31**	314 (35) **26**	447 (51) **21**	587 (66) **9**				37
1 (4)	77 (9) **72**	164 (19) **69**	335 (38) **65**	505 (57) **63**	631 (71) **33**	772 (87) **32**	866 (98) **9**		73
2 (8)	75 (9) **142**	164 (19) **140**	342 (39) **135**	521 (59) **133**	690 (78) **122**	840 (95) **102**	964 (109) **77**	1086 (123) **57**	145
4 (15)	68 (8) **288**	164 (19) **286**	340 (38) **285**	507 (57) **284**	688 (78) **265**	872 (99) **245**	993 (112) **211**	1145 (129) **189**	289
6 (23)			319 (36) **431**	492 (56) **427**	669 (76) **416**	859 (97) **396**	1009 (114) **347**	1182 (134) **321**	434
8 (30)			304 (34) **577**	467 (53) **572**	646 (73) **568**	841 (95) **543**	1001 (113) **488**	1183 (134) **463**	578
Max. Cont. 10 (38)				451 (51) **699**	628 (71) **683**	810 (92) **665**	978 (111) **634**	1174 (133) **604**	722
Max. Inter. 12 (45)				427 (48) **847**	606 (68) **825**	781 (88) **798**	980 (111) **770**		867
Theo. Torque	127 (14)	255 (29)	510 (58)	764 (86)	1019 (115)	1274 (144)	1529 (173)	1783 (202)	

Areas within white represent maximum motor efficiencies.

Torque, lb-in (Nm)
Speed, RPM

080 *4.6 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	3000 (207)	3500 (242)	Theo. RPM
0.5 (2)	127 (14) **25**	262 (30) **24**	543 (61) **21**	806 (91) **18**	1062 (120) **17**	1285 (145) **11**	1496 (169) **11**	1693 (191) **9**	26
1 (4)	140 (16) **50**	286 (32) **50**	559 (63) **49**	839 (95) **43**	1099 (124) **34**	1340 (151) **32**	1579 (178) **32**	1796 (203) **31**	51
2 (8)	139 (16) **100**	280 (32) **100**	563 (64) **99**	857 (97) **92**	1139 (129) **87**	1390 (157) **79**	1652 (187) **78**	1865 (211) **77**	101
4 (15)	127 (14) **200**	275 (31) **200**	572 (65) **199**	872 (99) **191**	1155 (131) **181**	1420 (160) **174**	1643 (186) **160**	1911 (216) **154**	201
6 (23)	113 (13) **301**	262 (30) **300**	557 (63) **297**	853 (96) **295**	1149 (130) **284**	1420 (160) **271**	1646 (186) **253**	1930 (218) **245**	302
8 (30)	91 (10) **401**	243 (27) **400**	536 (61) **398**	826 (93) **390**	1125 (127) **384**	1409 (159) **372**	1654 (187) **346**	1945 (220) **339**	402
10 (38)		212 (24) **502**	511 (58) **500**	790 (89) **499**	1087 (123) **498**	1379 (156) **485**	1638 (185) **443**	1883 (213) **433**	503
12 (45)		177 (20) **602**	482 (54) **601**	767 (87) **600**	1060 (120) **597**	1451 (164) **540**	1711 (193) **526**	2021 (228) **510**	603
Max. Cont. 14 (53)		127 (14) **690**	445 (50) **689**	741 (84) **688**	1098 (124) **658**	1369 (155) **644**	1640 (185) **631**	1918 (217) **613**	704
16 (61)									804
18 (68)									904
Max. Inter. 20 (76)									1005
Theo. Torque	183 (21)	366 (41)	732 (83)	1099 (124)	1465 (166)	1831 (207)	2197 (248)	2564 (290)	

DO NOT operate at maximum pressure and maximum flow simultaneously.

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

090 *5.4 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Max. Inter. 3500 (242)	Theo. RPM
0.5 (2)	106 (12) **21**	231 (26) **19**	609 (69) **17**	889 (100) **15**	1259 (142) **13**	1537 (174) **10**	1826 (206) **7**	2049 (232) **5**	22
1 (4)		264 (30) **41**	605 (68) **38**	947 (107) **34**	1296 (146) **30**	1596 (180) **27**	1875 (212) **26**	2142 (242) **23**	43
2 (8)		291 (33) **84**	629 (71) **79**	958 (108) **73**	1323 (149) **67**	1620 (183) **66**	1956 (221) **60**	2223 (251) **59**	86
4 (15)			636 (72) **167**	1003 (113) **158**	1351 (153) **149**	1664 (188) **143**	1990 (225) **141**	2300 (260) **135**	172
6 (23)			633 (72) **252**	995 (112) **243**	1340 (151) **233**	1654 (187) **227**	1996 (226) **222**	2304 (260) **218**	257
8 (30)			598 (68) **339**	960 (109) **331**	1340 (151) **317**	1660 (188) **309**	2012 (227) **301**	2326 (263) **300**	343
10 (38)				959 (108) **416**	1328 (150) **403**	1667 (188) **391**	2024 (229) **381**	2393 (270) **370**	428
12 (45)				961 (109) **505**	1356 (153) **490**	1728 (195) **475**	2049 (232) **462**	2398 (271) **448**	514
14 (53)				1287 (145) **590**	1678 (190) **578**	1886 (213) **558**	2135 (241) **544**	2495 (282) **530**	599
Max. Cont. 16 (61)				1190 (134) **677**	1654 (187) **660**	1701 (192) **644**	2007 (227) **629**	2384 (269) **610**	685
18 (68)					1201 (136) **748**	1675 (189) **729**	2122 (240) **719**		770
Max. Inter. 20 (76)					1205 (136) **835**	1536 (174) **819**	1916 (216) **806**		856
Theo. Torque	215 (24)	430 (49)	860 (97)	1290 (146)	1720 (194)	2150 (243)	2580 (291)	3010 (340)	

Areas within white represent maximum motor efficiencies.

Torque, lb-in (Nm)
Speed, RPM

110 *6.8 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Max. Inter. 3500 (242)	Theo. RPM
0.5 (2)	106 (12) **16**	347 (39) **16**	777 (88) **14**	1199 (135) **11**	1609 (182) **9**	1977 (223) **8**	2420 (273) **6**	2690 (304) **5**	17
1 (4)	142 (16) **33**	374 (42) **33**	857 (97) **31**	1290 (146) **27**	1763 (199) **21**	2179 (246) **19**	2592 (293) **18**	2916 (329) **16**	34
2 (8)		372 (42) **67**	866 (98) **64**	1313 (148) **59**	1782 (201) **49**	2204 (249) **46**	2629 (297) **44**	3050 (345) **43**	68
4 (15)			835 (94) **134**	1320 (149) **126**	1777 (201) **117**	2223 (251) **110**	2674 (302) **104**	3083 (348) **104**	136
6 (23)			819 (93) **202**	1312 (148) **196**	1775 (201) **186**	2215 (250) **177**	2671 (302) **167**	3078 (348) **163**	204
8 (30)			785 (89) **269**	1287 (145) **267**	1760 (199) **258**	2204 (249) **247**	2648 (299) **237**	3114 (352) **229**	272
10 (38)			738 (83) **339**	1232 (139) **336**	1718 (194) **327**	2163 (244) **315**	2617 (296) **304**	3086 (349) **292**	340
12 (45)			723 (82) **407**	1281 (145) **406**	1853 (209) **397**	2578 (291) **386**	2786 (315) **368**	3031 (343) **360**	408
14 (53)			654 (74) **475**	1143 (129) **473**	1621 (183) **466**	2103 (238) **451**	2539 (287) **441**	3085 (349) **426**	476
16 (61)				1261 (143) **542**	1763 (199) **536**	2224 (251) **523**	2666 (301) **510**	3213 (363) **492**	544
18 (68)				1059 (120) **609**	1586 (179) **603**	2058 (233) **593**	2510 (284) **580**	3071 (347) **561**	612
Max. Cont. 20 (76)				944 (107) **678**	1419 (160) **677**	1918 (217) **661**	2374 (268) **645**	2896 (327) **627**	680
22 (83)				824 (93) **746**	1393 (157) **743**	1823 (206) **735**	2271 (257) **714**		748
24 (91)				762 (86) **813**	1234 (139) **810**	1744 (197) **803**	2214 (250) **783**		816
Max. Inter. 25 (95)				678 (77) **847**	1171 (132) **844**	1694 (191) **835**	2154 (243) **828**		850
Theo. Torque	271 (31)	541 (61)	1083 (122)	1624 (184)	2166 (245)	2707 (306)	3248 (367)	3790 (428)	

DO NOT operate at maximum pressure and maximum flow simultaneously.

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

125 *7.7 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Max. Inter. 3500 (242)	Theo. RPM
0.5 (2)	127 (14) **14**	394 (44) **14**	961 (109) **13**	1408 (159) **13**	1922 (217) **12**	2364 (267) **10**	2766 (313) **9**	3146 (355) **7**	15
1 (4)	138 (16) **29**	401 (45) **29**	952 (108) **29**	1475 (167) **27**	2004 (226) **25**	2459 (278) **23**	2936 (332) **21**	3245 (367) **19**	30
2 (8)		432 (49) **59**	953 (108) **59**	1462 (165) **57**	2046 (231) **54**	2528 (286) **48**	2941 (332) **48**	3421 (387) **45**	60
4 (15)		430 (49) **119**	949 (107) **119**	1479 (167) **118**	2024 (229) **113**	2513 (284) **108**	3023 (342) **102**	3467 (392) **98**	120
6 (23)			902 (102) **179**	1473 (166) **177**	1973 (223) **173**	2473 (279) **169**	2985 (337) **163**	3477 (393) **157**	180
8 (30)			888 (100) **239**	1420 (160) **239**	1968 (222) **235**	2541 (287) **235**	2987 (337) **221**	3459 (391) **214**	240
10 (38)			841 (95) **299**	1359 (154) **298**	1919 (217) **298**	2413 (273) **292**	2940 (332) **281**	3428 (387) **273**	300
12 (45)			738 (83) **359**	1304 (147) **358**	1831 (207) **357**	2361 (267) **350**	2914 (329) **342**	3590 (406) **308**	360
14 (53)			727 (82) **419**	1293 (146) **418**	1801 (204) **417**	2375 (268) **413**	2935 (332) **402**	3704 (419) **340**	420
16 (61)			608 (69) **473**	1484 (168) **463**	1756 (198) **440**	2287 (258) **415**	2895 (327) **384**	3419 (386) **341**	480
18 (68)				1704 (193) **517**	1894 (214) **498**	2460 (278) **472**	3188 (360) **438**	3412 (386) **384**	540
Max. Cont. 20 (76)				1815 (205) **577**	2164 (245) **561**	2567 (290) **537**	3040 (344) **505**	3606 (408) **453**	600
22 (83)				1336 (151) **640**	1781 (201) **623**	2298 (260) **597**	2832 (320) **563**		660
24 (91)				751 (85) **705**	1334 (151) **686**	1930 (218) **662**	2516 (284) **621**		720
Max. Inter. 25 (95)				697 (79) **736**	1227 (139) **723**	1853 (209) **694**	2387 (270) **669**		750
Theo. Torque	307 (35)	613 (69)	1226 (139)	1839 (208)	2452 (277)	3065 (346)	3678 (416)	4291 (485)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

160 *10.0 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Max. Inter. 3500 (242)	Theo. RPM
0.5 (2)	216 (24) **11**	538 (61) **11**	1267 (143) **10**	1881 (213) **9**	2536 (287) **8**	3106 (351) **7**	3640 (411) **5**	4159 (470) **4**	12
1 (4)	244 (28) **23**	596 (67) **22**	1287 (145) **21**	1899 (215) **18**	2578 (291) **16**	3145 (355) **14**	3758 (425) **13**	4366 (493) **11**	24
2 (8)		588 (66) **46**	1306 (148) **44**	1983 (224) **39**	2666 (301) **34**	3241 (366) **32**	3904 (441) **30**	4493 (508) **28**	47
4 (15)		584 (66) **92**	1291 (146) **91**	2002 (226) **87**	2769 (313) **80**	3318 (375) **71**	3990 (451) **67**	4569 (516) **66**	93
6 (23)		551 (62) **137**	1295 (146) **136**	1986 (224) **134**	2718 (307) **125**	3358 (379) **119**	3975 (449) **108**	4553 (515) **106**	139
8 (30)			1258 (142) **184**	1954 (221) **182**	2644 (299) **172**	3329 (376) **161**	3952 (447) **152**	4603 (520) **146**	185
10 (38)			1169 (132) **230**	1909 (216) **229**	2558 (289) **222**	3282 (371) **211**	3961 (448) **195**	4598 (520) **190**	231
12 (45)			1144 (129) **277**	1842 (208) **275**	2510 (284) **270**	3161 (357) **261**	3862 (436) **239**	4529 (512) **228**	278
14 (53)			1040 (117) **323**	1788 (202) **320**	2438 (275) **316**	3124 (353) **305**	3781 (427) **291**	4508 (509) **279**	324
16 (61)			913 (103) **369**	1659 (187) **367**	2431 (275) **364**	2994 (338) **356**	3698 (418) **341**	4392 (496) **325**	370
18 (68)			803 (91) **415**	1553 (175) **413**	2278 (257) **410**	2874 (325) **403**	3587 (405) **389**	4246 (480) **376**	416
Max. Cont. 20 (76)				1499 (169) **461**	2176 (246) **459**	2906 (328) **447**	3514 (397) **438**	4223 (477) **422**	462
22 (83)				1297 (147) **507**	2049 (232) **504**	2792 (315) **498**	3411 (385) **487**		509
24 (91)				1157 (131) **553**	1928 (218) **550**	2655 (300) **546**	3344 (378) **531**		555
Max. Inter. 25 (95)				1073 (121) **577**	1844 (208) **573**	2577 (291) **571**	3229 (365) **557**		578
Theo. Torque	398 (45)	796 (90)	1592 (180)	2389 (270)	3185 (360)	3981 (450)	4777 (540)	5573 (630)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

200 *12.5 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Max. Inter. 3500 (242)	Theo. RPM
0.5 (2)	314 (35) **9**	734 (83) **9**	1581 (179) **8**	2365 (267) **7**	3121 (353) **6**	3921 (443) **5**	4469 (505) **4**	5120 (579) **3**	10
1 (4)	325 (37) **18**	721 (81) **18**	1642 (186) **17**	2536 (287) **14**	2665 (301) **13**	4004 (452) **11**	4777 (540) **9**	5406 (611) **8**	19
2 (8)	349 (39) **36**	790 (89) **36**	1759 (199) **35**	2610 (295) **31**	3412 (386) **27**	4185 (473) **24**	4904 (554) **21**	5687 (643) **20**	37
4 (15)	338 (38) **73**	766 (87) **73**	1689 (191) **72**	2586 (292) **68**	3417 (386) **61**	4252 (480) **53**	5077 (574) **49**	5849 (661) **46**	74
6 (23)		742 (84) **110**	1635 (185) **109**	2542 (287) **106**	3380 (382) **98**	4247 (480) **89**	5046 (570) **81**	5817 (657) **74**	111
8 (30)			1556 (176) **147**	2468 (279) **144**	3327 (376) **136**	4243 (479) **123**	5051 (571) **112**	5827 (658) **104**	148
10 (38)			1471 (166) **184**	2374 (268) **182**	3256 (368) **173**	4131 (467) **162**	4923 (556) **151**	5761 (651) **141**	185
12 (45)			1361 (154) **221**	2275 (257) **219**	3185 (360) **214**	4069 (460) **200**	4939 (558) **187**	5751 (650) **176**	222
14 (53)			1304 (147) **258**	2165 (245) **256**	3141 (355) **250**	3906 (441) **238**	4773 (539) **224**	5666 (640) **213**	259
16 (61)			1089 (123) **295**	2083 (235) **290**	2949 (333) **286**	3797 (429) **277**	4628 (523) **264**	5519 (624) **242**	296
18 (68)			993 (112) **331**	1943 (220) **327**	2669 (302) **323**	3665 (414) **319**	4659 (527) **303**	5451 (616) **289**	333
Max. Cont. 20 (76)				1745 (197) **369**	2740 (310) **365**	3499 (395) **360**	4353 (492) **343**	5273 (596) **331**	370
22 (83)				1525 (172) **405**	2496 (282) **401**	3420 (386) **395**	4252 (480) **382**		407
24 (91)				1390 (157) **442**	2341 (265) **441**	3269 (369) **438**	4005 (453) **425**		444
Max. Inter. 25 (95)				1229 (139) **460**	2234 (252) **458**	3087 (349) **456**	3955 (447) **444**		462
Theo. Torque	498 (56)	995 (112)	1990 (225)	2986 (337)	3981 (450)	4976 (562)	5971 (675)	6967 (787)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

250 *15.5 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Max. Inter. 3500 (242)	Theo. RPM
0.5 (2)	381 (43) **7**	924 (104) **6**	1955 (221) **6**	3001 (339) **5**	3974 (449) **3**	4872 (551) **1**			8
1 (4)	439 (50) **14**	1014 (115) **14**	2128 (240) **13**	3196 (361) **11**	4128 (466) **9**	5080 (574) **7**	5907 (668) **4**		15
2 (8)	455 (51) **29**	1014 (115) **29**	2167 (245) **28**	3262 (369) **26**	4236 (479) **22**	5342 (604) **17**	6303 (712) **13**	7082 (800) **9**	30
4 (15)	428 (48) **59**	930 (105) **58**	2145 (242) **57**	3286 (371) **56**	4363 (493) **51**	5480 (619) **41**	6555 (741) **33**	7496 (847) **25**	60
6 (23)	368 (42) **89**	969 (110) **88**	2069 (234) **88**	3252 (367) **87**	4313 (487) **82**	5542 (626) **69**	6611 (747) **58**	7492 (847) **48**	90
8 (30)		818 (92) **119**	1978 (223) **118**	3159 (357) **117**	4332 (490) **115**	5508 (622) **101**	6587 (744) **87**	7490 (846) **76**	120
10 (38)		712 (80) **149**	1849 (209) **148**	3025 (342) **147**	4176 (472) **141**	5353 (605) **129**	6345 (717) **114**	7472 (844) **104**	150
12 (45)			1757 (199) **178**	2915 (329) **176**	4022 (455) **174**	5142 (581) **165**	6225 (703) **147**	7375 (833) **127**	179
14 (53)			1610 (182) **208**	2743 (310) **206**	3919 (443) **205**	5017 (567) **197**	6296 (711) **176**	7227 (817) **158**	209
16 (61)			1456 (164) **238**	2603 (294) **235**	3873 (438) **233**	4886 (552) **227**	5960 (674) **205**	7114 (804) **191**	239
18 (68)			1285 (145) **268**	2393 (270) **266**	3560 (402) **263**	4694 (530) **259**	5846 (661) **245**	6939 (784) **222**	269
Max. Cont. 20 (76)			1083 (122) **298**	2256 (255) **295**	3359 (380) **292**	4519 (511) **289**	5547 (627) **277**	6697 (757) **252**	299
22 (83)				1955 (221) **326**	3124 (353) **323**	4279 (484) **319**	5368 (607) **307**		328
24 (91)				1775 (201) **357**	2973 (336) **355**	4082 (461) **353**	5297 (599) **342**		358
Max. Inter. 25 (95)				1627 (184) **371**	2768 (313) **368**	3915 (442) **365**	5088 (575) **360**		373
Theo. Torque	617 (70)	1234 (139)	2468 (279)	3702 (418)	4936 (558)	6170 (697)	7404 (837)	8639 (976)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

300 *17.9 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Max. Inter. 3500 (242)	Theo. RPM
0.5 (2)	543 (61) **6**	1044 (118) **5**	2311 (261) **5**	3433 (388) **4**					7
1 (4)	521 (59) **12**	1237 (140) **12**	2397 (271) **11**	3666 (414) **11**	4833 (546) **8**	6025 (681) **5**			13
2 (8)	541 (61) **25**	1134 (128) **25**	2490 (281) **24**	3761 (425) **23**	4970 (562) **19**	6128 (693) **14**	7259 (820) **10**	8095 (915) **4**	26
4 (15)	461 (52) **51**	1130 (128) **51**	2436 (275) **50**	3782 (427) **50**	5119 (578) **44**	6327 (715) **32**	7317 (827) **25**	8457 (956) **19**	52
6 (23)		1017 (115) **77**	2351 (266) **76**	3592 (406) **75**	4931 (557) **70**	6250 (706) **55**	7435 (840) **43**	8361 (945) **37**	78
8 (30)		951 (107) **103**	2223 (251) **102**	3598 (407) **101**	4759 (538) **96**	6117 (691) **82**	7359 (832) **66**	8393 (948) **52**	104
10 (38)		779 (88) **129**	2026 (229) **127**	3475 (393) **126**	4672 (528) **122**	5950 (672) **109**	7307 (826) **90**	8487 (959) **74**	130
12 (45)			1923 (217) **154**	3256 (368) **153**	4457 (504) **150**	5864 (663) **133**	7076 (800) **112**	8239 (931) **97**	155
14 (53)			1782 (201) **180**	3067 (347) **178**	4513 (510) **173**	5713 (646) **161**	7060 (798) **140**	8149 (921) **114**	181
16 (61)			1491 (168) **206**	2865 (324) **204**	4180 (472) **201**	5492 (621) **188**	6765 (764) **171**	8112 (917) **142**	207
18 (68)			1266 (143) **232**	2638 (298) **230**	3783 (427) **227**	5234 (591) **220**	6591 (745) **198**	7773 (878) **176**	233
Max. Cont. 20 (76)			1013 (114) **258**	2501 (283) **256**	3916 (443) **254**	5284 (597) **247**	6344 (717) **227**	7512 (849) **206**	259
22 (83)				2179 (246) **282**	3512 (397) **280**	4943 (559) **274**	6023 (681) **257**		284
24 (91)				1601 (181) **309**	3159 (357) **306**	4442 (502) **304**	5684 (642) **294**		310
Max. Inter. 25 (95)				1466 (166) **321**	2858 (323) **319**	4347 (491) **318**	5577 (630) **300**		323
Theo. Torque	713 (81)	1425 (161)	2850 (322)	4275 (483)	5701 (644)	7126 (805)	8551 (966)	9976 (1127)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

400 *24.9 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	Max. Cont. 2500 (173)	Peak 3000 (207)	Theo. RPM
0.5 (2)	751 (85) **4**	1710 (193) **4**	3248 (367) **3**	4721 (534) **2**				5
1 (4)	776 (88) **9**	1640 (185) **8**	3386 (383) **8**	5129 (580) **6**	6590 (745) **4**	7954 (899) **1**		10
2 (8)	762 (86) **18**	1734 (196) **18**	3487 (394) **17**	5184 (586) **15**	6763 (764) **11**	8204 (927) **5**		19
4 (15)	749 (85) **37**	1661 (188) **36**	3571 (404) **35**	5325 (602) **32**	7047 (796) **24**	8517 (962) **18**	9804 (1108) **9**	38
6 (23)	629 (71) **55**	1593 (180) **55**	3428 (387) **54**	5274 (596) **49**	6969 (787) **39**	8653 (978) **28**	10094 (1141) **20**	56
8 (30)		1462 (165) **74**	3299 (373) **73**	5264 (595) **69**	7010 (792) **58**	8552 (966) **44**	10167 (1149) **31**	75
10 (38)		1269 (143) **92**	3150 (356) **90**	5144 (581) **88**	6923 (782) **79**	8617 (974) **62**	10231 (1156) **45**	93
12 (45)		1076 (122) **111**	2950 (333) **109**	4823 (545) **107**	6624 (749) **98**	8470 (957) **83**	10116 (1143) **61**	112
14 (53)		842 (95) **129**	2774 (313) **128**	4607 (521) **126**	6344 (717) **117**	8235 (931) **103**	10007 (1131) **78**	130
16 (61)			2493 (282) **147**	4385 (496) **145**	6063 (685) **141**	8131 (919) **121**	9733 (1100) **100**	149
18 (68)			2156 (244) **166**	4009 (453) **165**	6023 (681) **158**	7708 (871) **142**	9478 (1071) **121**	167
Max. Cont. 20 (76)			1741 (197) **185**	3713 (420) **183**	5756 (650) **179**	7417 (838) **166**	9302 (1051) **145**	186
22 (83)			1448 (164) **203**	3344 (378) **201**	5200 (588) **198**	7171 (810) **186**		205
24 (91)				2947 (333) **222**	4945 (559) **220**	6640 (750) **211**		223
Max. Inter. 25 (95)				2682 (303) **231**	4773 (539) **228**	6760 (764) **221**		232
Theo. Torque	991 (112)	1982 (224)	3965 (448)	5947 (672)	7930 (896)	9912 (1120)	11895 (1344)	

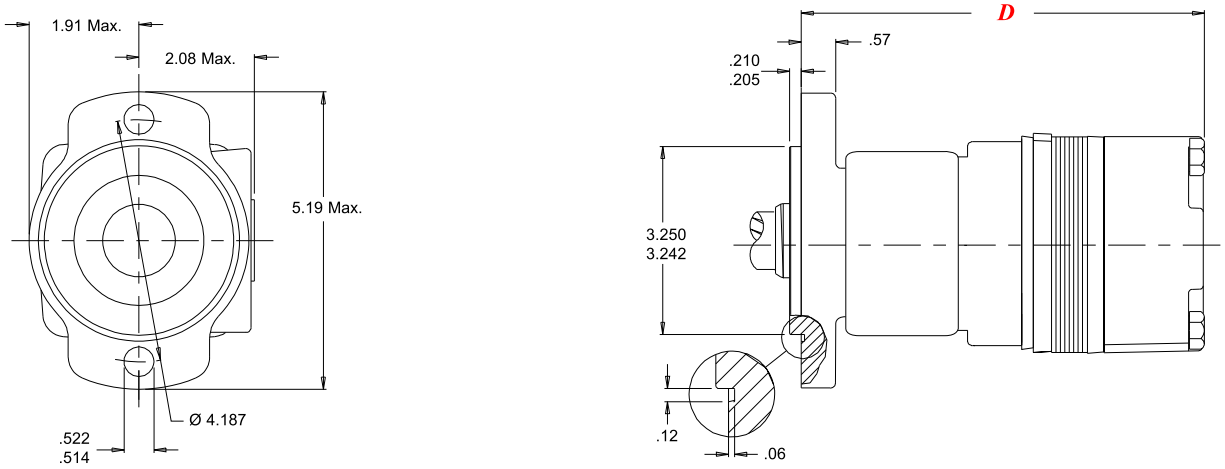
Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

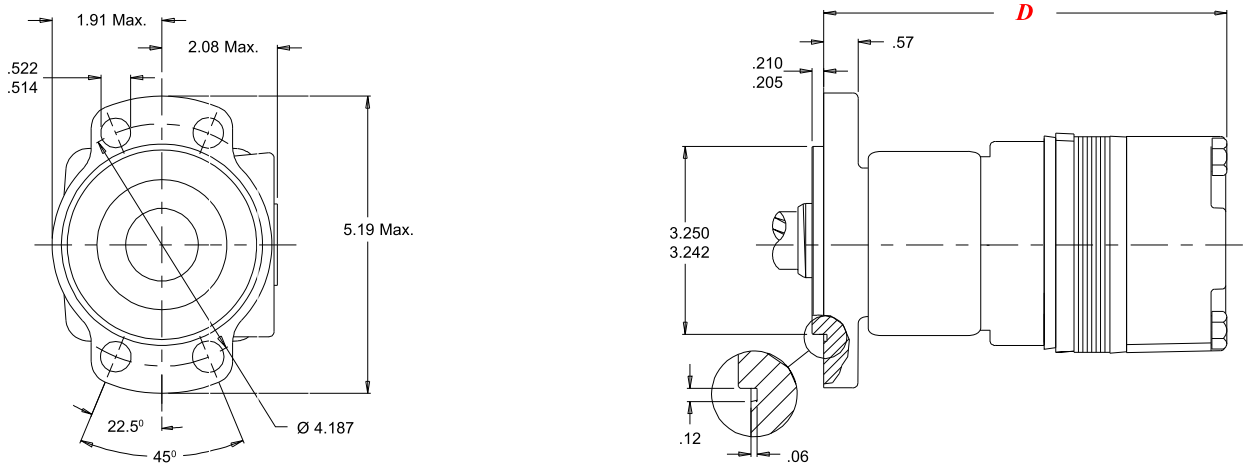
Housings

SAE A Flange

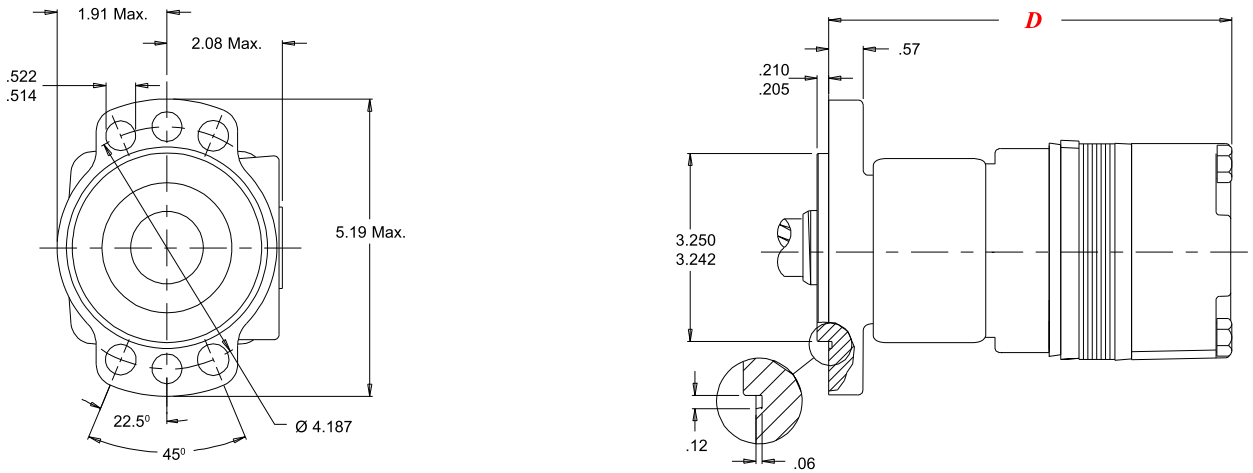
A0 2-Hole with End Ports A7 2-Hole with Side Ports



A2 4-Hole with End Ports A8 4-Hole with Side Ports

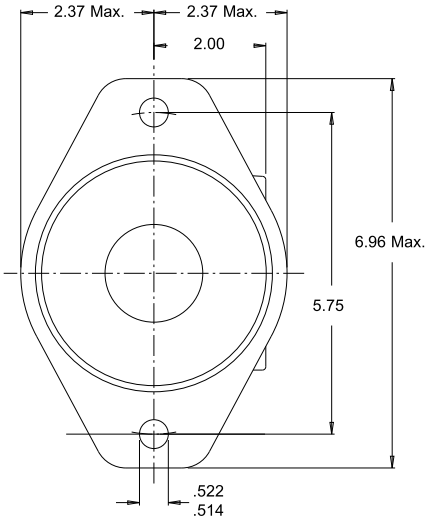


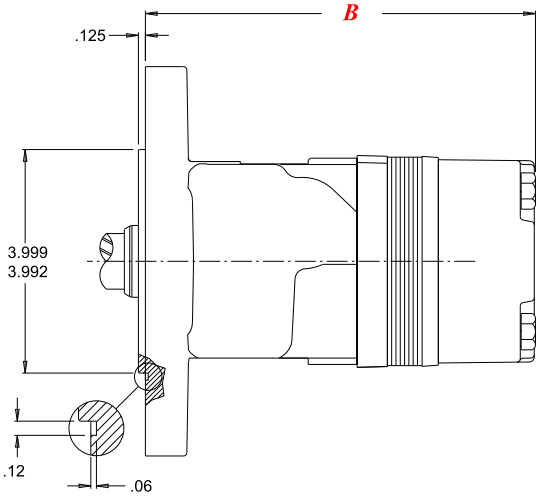
A4 6-Hole with End Ports A9 6-Hole with Side Ports



SAE B Flange

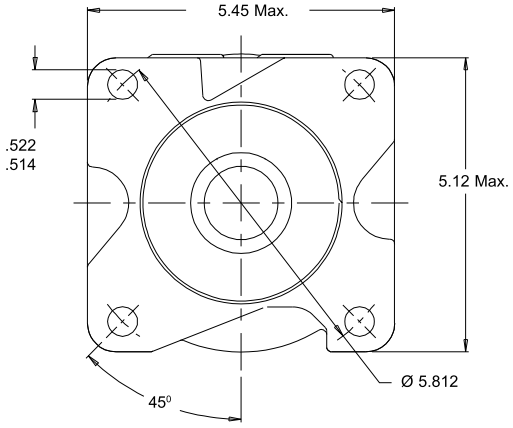
B0 *2-Hole with End Ports* B7 *2-Hole with Side Ports*

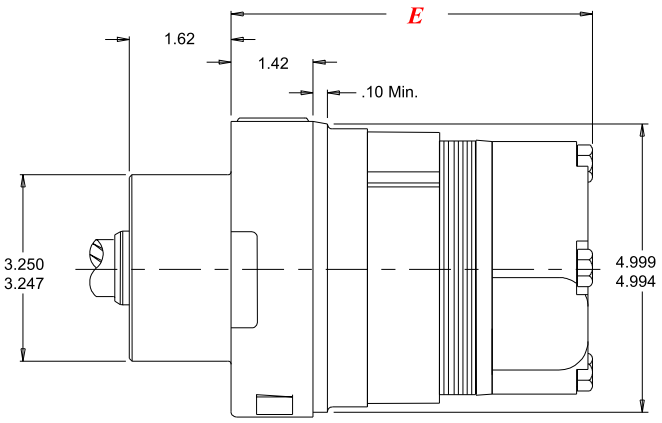




Wheel Mount

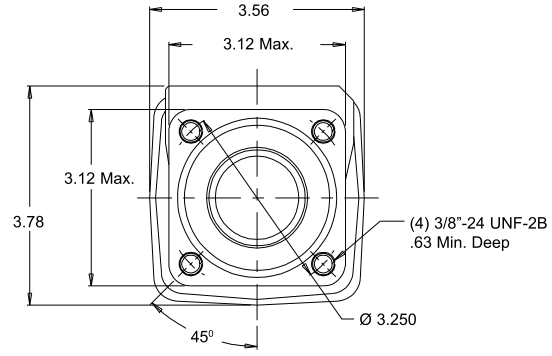
W2 *4-Hole with End Ports* W8 *4-Hole with Side Ports*

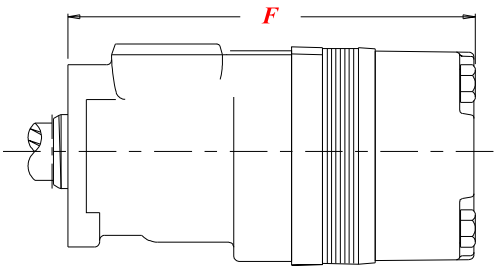




4-Hole Square Mount

F2 *4-Hole with End Ports* F8 *4-Hole with Side Ports*



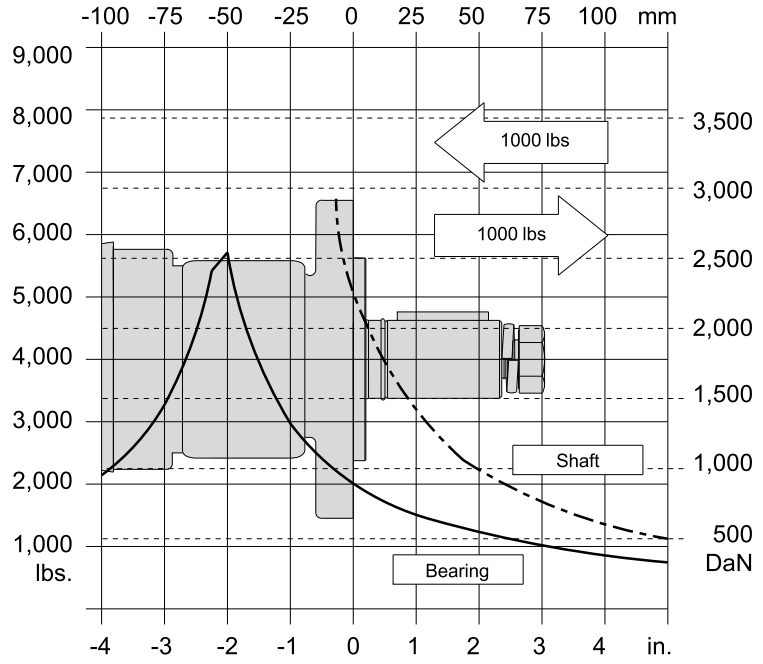


Technical

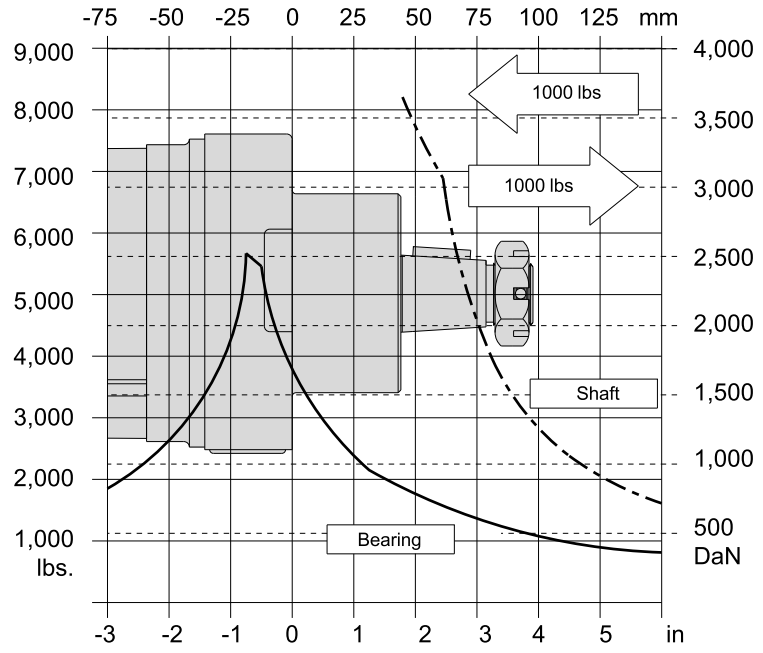
Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

SAE A & B Flange



Wheel Mount



Length and Weight Tables

SAE "A" Flange

Code	*D* * in	Weight lbs
050	7.68	19.5
080	7.82	20.0
090	7.90	20.2
110	8.04	20.7
125	8.14	21.0
160	8.36	21.7
200	8.61	22.5
250	8.91	23.4
300	9.15	24.3
400	9.86	26.4

SAE "B" Flange

Code	*B* in	Weight lbs
050	7.68	22.2
080	7.82	22.7
090	7.90	22.9
110	8.04	23.4
125	8.14	23.7
160	8.36	24.4
200	8.61	25.2
250	8.91	26.1
300	9.15	27.0
400	9.86	29.1

HB motor weights vary ± 2 lbs depending upon motor configuration.
Subtract .71 in. from dimension for motors with side ports 5, 6, & 7 and end ports 1 & 2

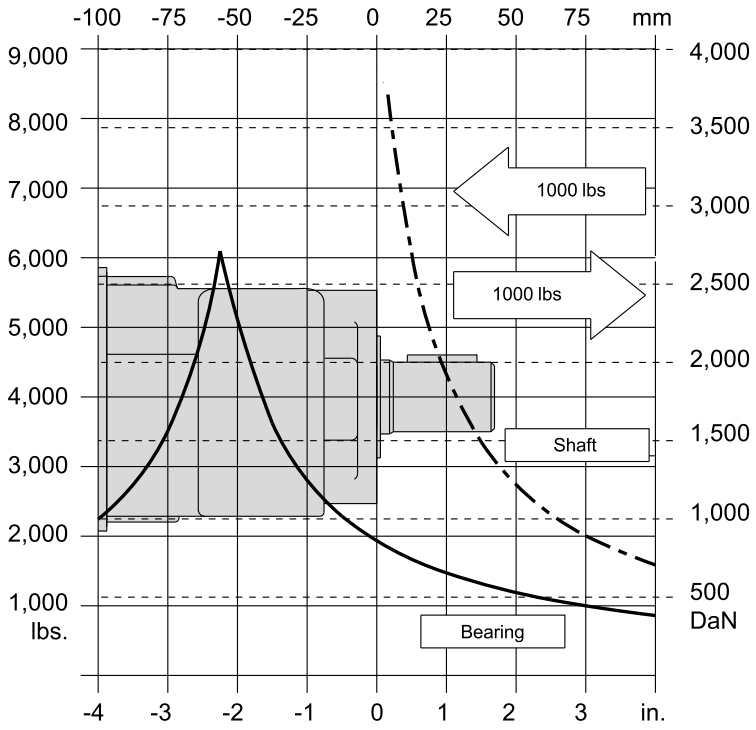
Back

Back

Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

4-Hole



Shaft Lengths

G

Code	A & B Flange in	Wheel Mount in	4-Hole in
01	1.75	3.21	1.63
02	1.93	3.39	1.81
22	2.58	4.04	2.46
20	2.40	3.87	2.29
23	2.23	3.69	2.11
10	1.93	3.39	1.81
12	2.17	3.63	2.05
21	2.40	3.87	2.29
07	2.46	3.93	2.35
15	1.99	3.45	1.87
08	2.46	3.93	2.35

Shaft Lengths vary± .30 in

Back

Length and Weight Tables

4-Hole Square Mount

Code	***F*** * in	Weight lbs
050	7.80	18.4
080	7.94	18.9
090	8.02	19.1
110	8.16	19.6
125	8.26	19.9
160	8.48	20.6
200	8.73	21.4
250	9.03	22.3
300	9.27	23.2
400	9.98	25.3

Back

Wheel Mount

Code	***E*** in	Weight lbs
050	6.22	25.3
080	6.36	25.7
090	6.41	25.9
110	6.55	26.5
125	6.64	26.7
160	6.87	27.4
200	7.12	28.3
250	7.42	29.1
300	7.66	30.0
400	8.37	32.1

HB motor weights vary ± 2 lbs depending upon motor configuration.
Subtract .71 in. from dimension for motors with side ports 5, 6, & 7 and end ports 1 & 2

Back

Bearing Load Multiplication Factor Table

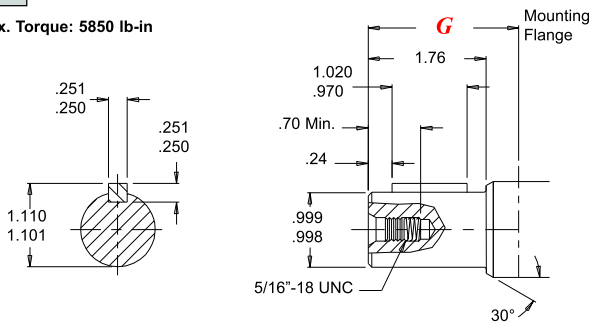
RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.50

Back

Shafts

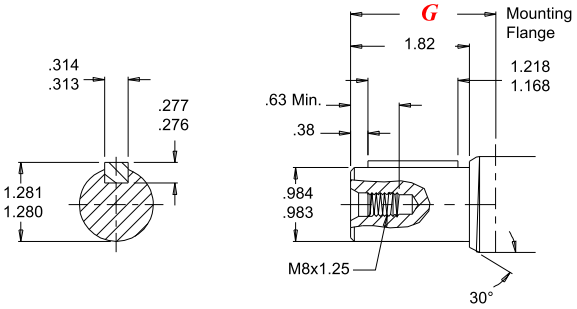
10 *15 1" Straight / 1" Straight Ext.

Max. Torque: 5850 lb-in



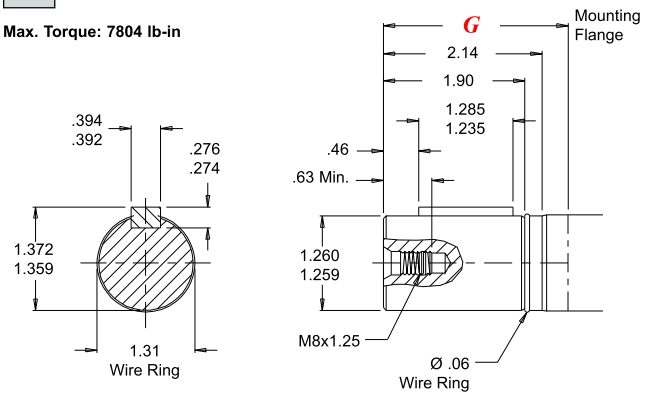
12 25mm Straight

Max. Torque: 5580 lb-in



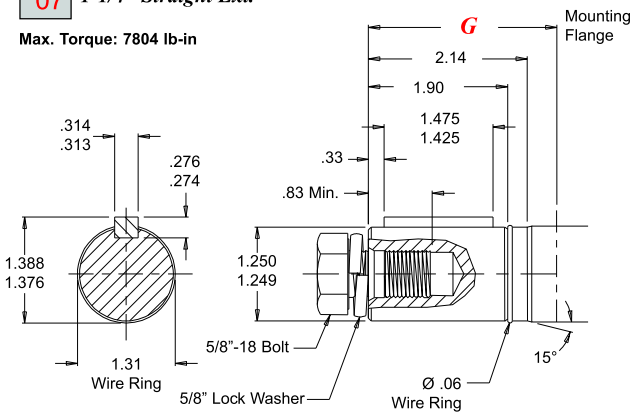
21 *08 32mm Straight / 32mm Straight Ext.

Max. Torque: 7804 lb-in



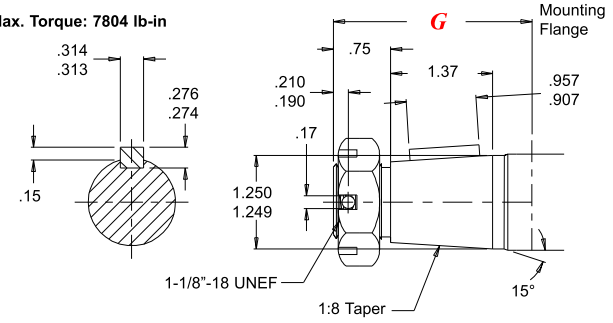
20 *07 1-1/4" Straight / 1-1/4" Straight Ext.

Max. Torque: 7804 lb-in



22 1 1/4" Tapered

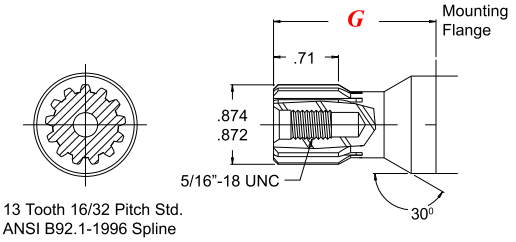
Max. Torque: 7804 lb-in



Note: A slotted nut is standard on this shaft.

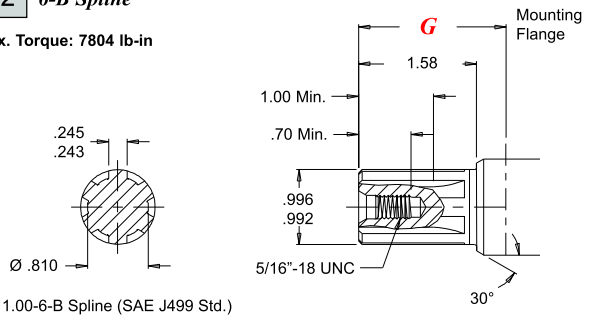
01 13 Tooth Spline

Max. Torque: 1500 lb-in



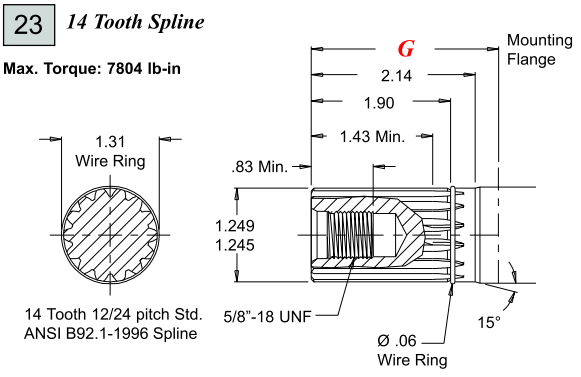
02 6-B Spline

Max. Torque: 7804 lb-in



23 14 Tooth Spline

Max. Torque: 7804 lb-in

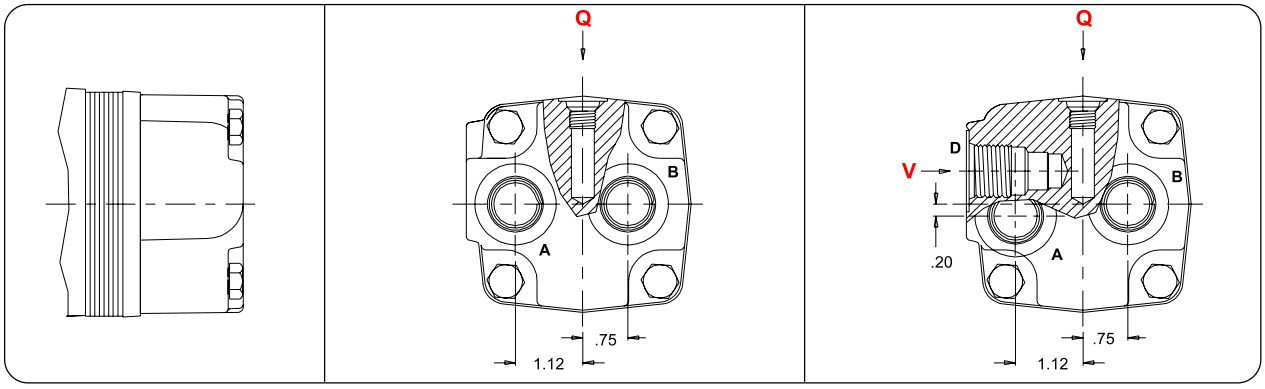


*Speed Sensor Component

End Ports

2	*1/2" BSP.F with 1/4" Drain*
1	*7/8" O-Ring with 7/16" Drain*

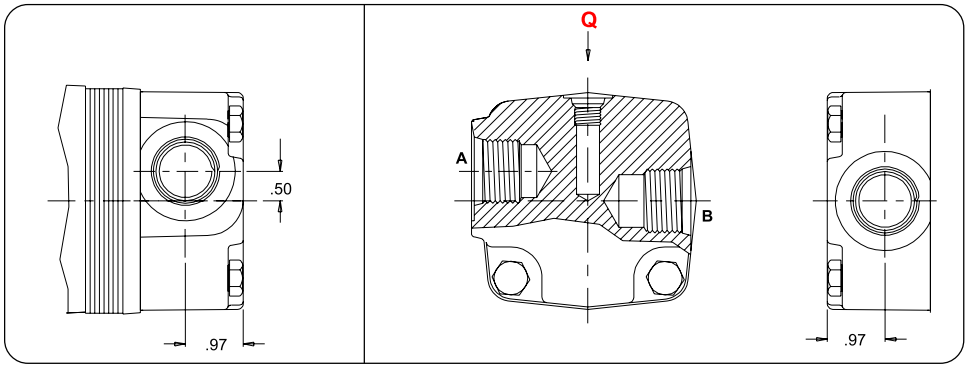
D- 10 Series/2-way Valve Cavity (7/8-14 UNF-2B)



The 1 & 2 porting options can be ordered with an internal drain and/or a relief valve cavity.

Side Ports

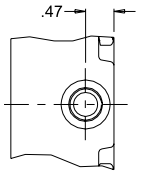
6	*1-1/16" O-Ring with 7/16" Drain*
7	*1/2" BSP.F with 1/4" Drain*



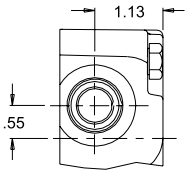
The 6 & 7 porting options can be ordered with an internal drain.

Q and V

Q - Case Drain

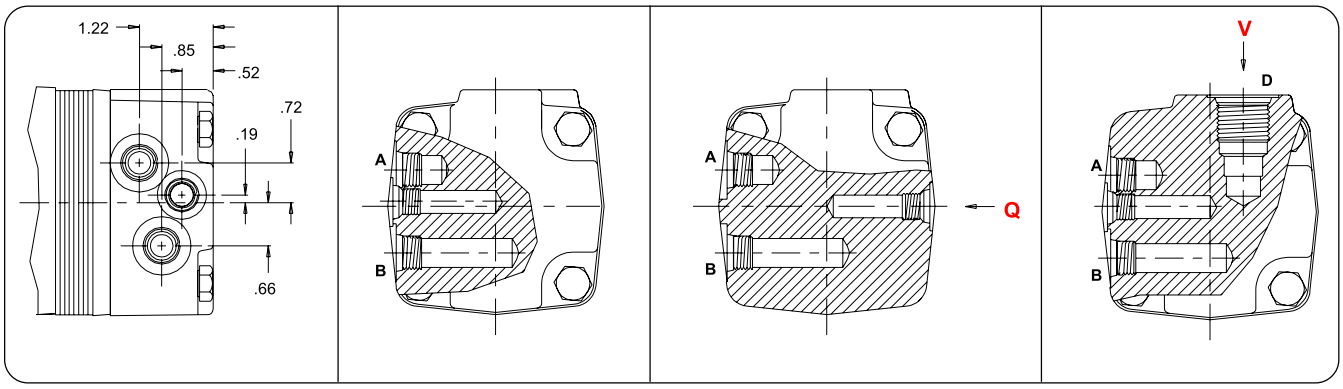


V - Valve Cavity



Back

5	*9/16" O-Ring with 7/16" Drain*



The 5 porting option can be ordered with an internal drain or a relief valve cavity.

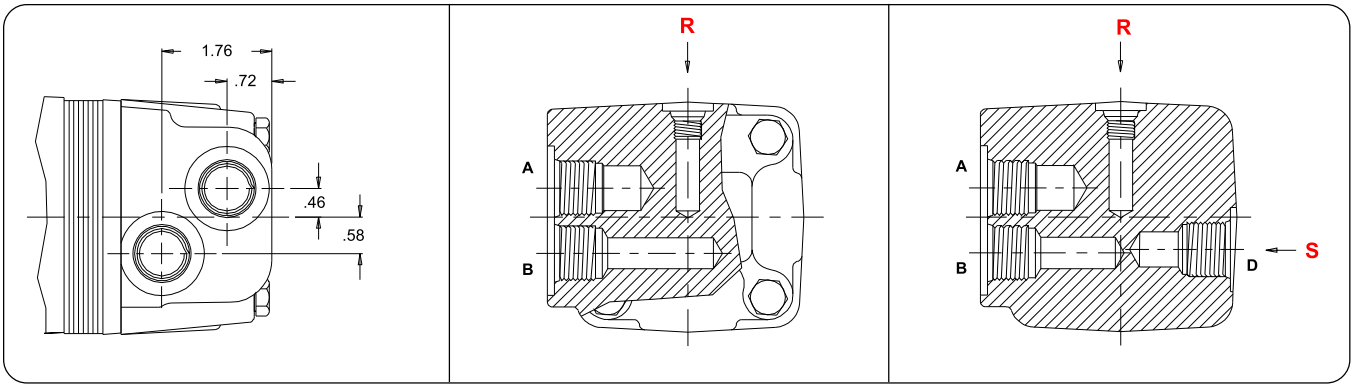
Ports

Side Ports

2 *1/2" BSP.F with 1/4" Drain*

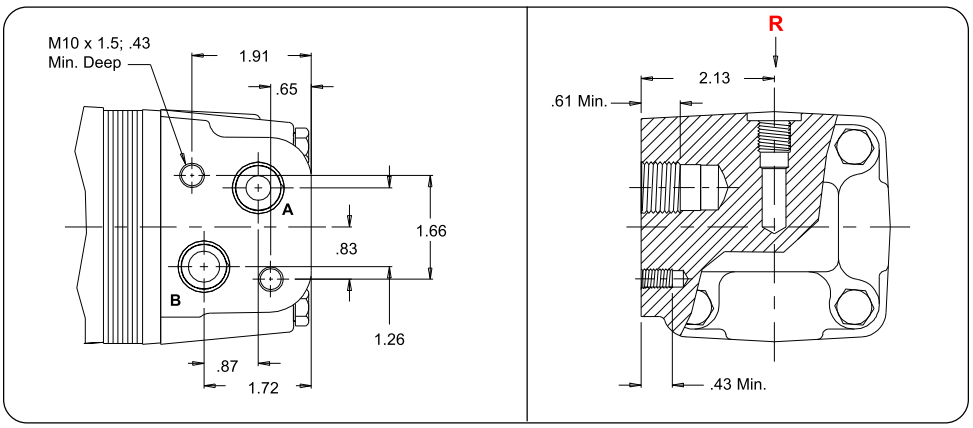
1 *7/8" O-Ring with 7/16" Drain*

D- 10 Series/2-way Valve Cavity (7/8-14 UNF-2B)



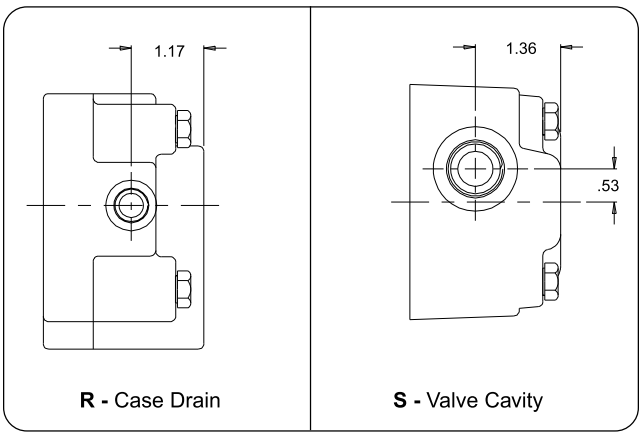
The 1 & 2 porting options can be ordered with an internal drain and/or a relief valve cavity.

3 *1/2" BSP.F with 1/4" Drain*

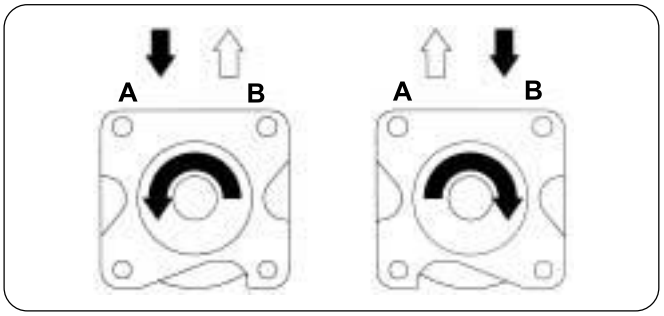


The 3 porting option can be ordered with an internal drain.

R and S



HB Rotation Selection



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Ordering Information

SERIES 300 — DISPLACEMENT — HOUSINGS — SHAFT — OPTIONS — MISCELLANEOUS

Code	Displacements
050	3.2 in³/rev
080	4.6 in³/rev
090	5.4 in³/rev
110	6.8 in³/rev
125	7.7 in³/rev
160	10.0 in³/rev
200	12.5 in³/rev
250	15.5 in³/rev
300	17.9 in³/rev
400	24.9 in³/rev

Code	Housing
A0	2-Hole End Ports (S)
A7	2-Hole Side Ports (S)
A2	4-Hole End Ports (S)
A8	4-Hole Side Ports (S)
A4	6-Hole End Ports
A9	6-Hole Side Ports
B0	2-Hole End Ports
B7	2-Hole Side Ports
W2	4-Hole End Ports
W8	4-Hole Side Ports
F2	4-Hole End Ports
F8	4-Hole Side Ports

PORTS

Code	Side Ports
5	9/16" O-ring
6	180⁰ Ports 1-1/16" O-ring
7	180⁰ Ports 1/2" BSP.F
1	Offset Ports 7/8" O-ring
2	Offset Ports 1/2" BSP.F
3	Manifold Ports 1/2" BSP.F

Code	End Ports
1	Aligned Ports 7/8" O-ring
2	Aligned Ports 1/2" BSP.F

Code	Shafts
01	13 Tooth Spline
02	6-B Spline
22	1-1/4" Tapered
20	1-1/4" Straight
23	14 Tooth Spline
10	1" Straight
12	25mm Straight
21	32mm Straight
07	1-1/4" Straight (S)
15	1" Straight (S)
08	32mm Straight (S)

PAINT

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

Code	Options
AA	None
AB	Internal Drain
AC	Freeturning Rotor
AD	Internal Drain and Freeturning Rotor

ADD ONS

Code	Options
A	Standard
B	Lock Nut
C	Solid Hex Nut
**W	4-Pin Male Weatherpack Connector (Dual) (S)
**X	4-Pin M12 Male Connector (Dual) (S)
**Y	3-Pin Male Weatherpack Connector (Single) (S)
**Z	4-Pin M12 Male Connector (Single) (S)

CAVITY

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

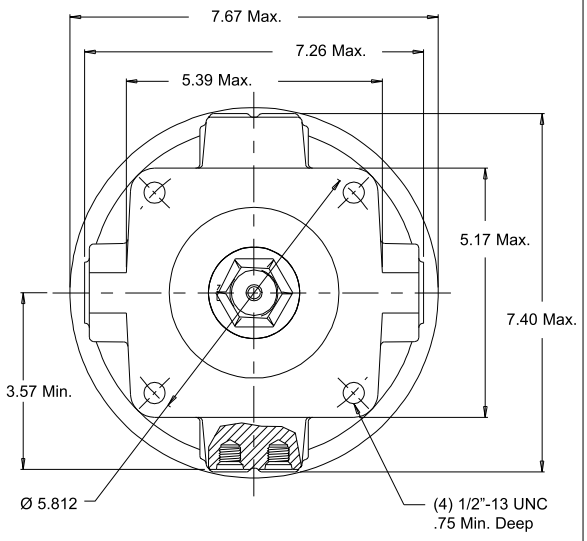
NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: W82 = A wheel mount motor with 1/2" BSP.F threading)

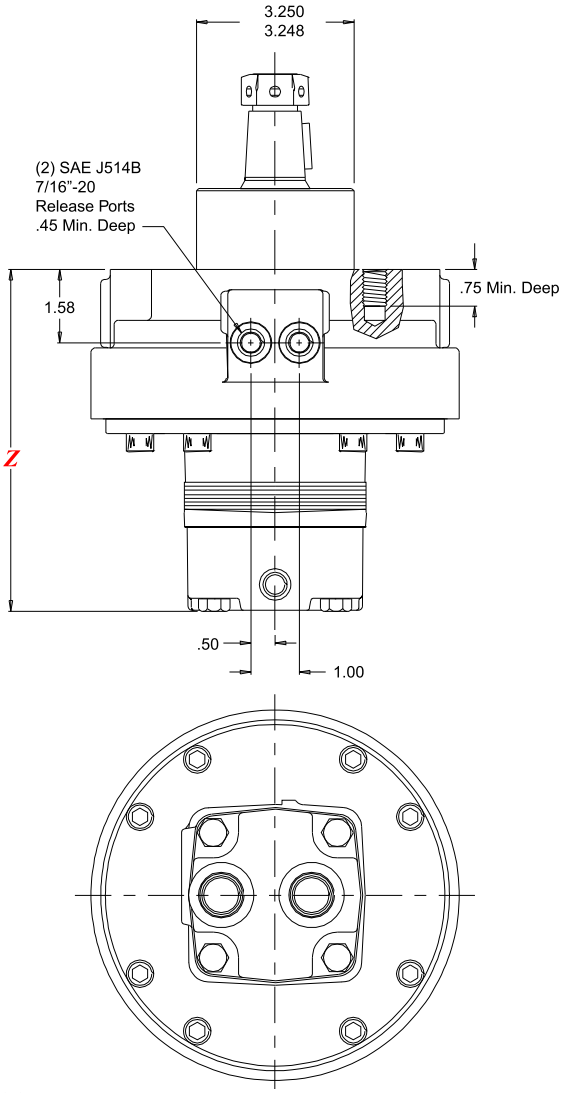
* Available with end ports 1& 2 and side ports 1, 2, & 5
** Available with A0, A2, A7, & A8 housings only and must use speed sensor shafts

(S) Speed Sensor Components

Technical

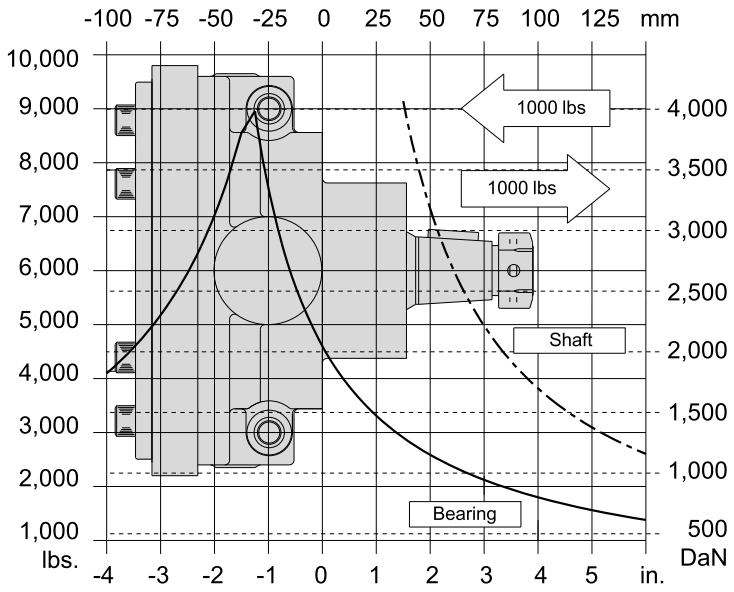
W2 *4-Hole with End Ports*
W8 *4-Hole with Side Ports*





Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.



Length and Weight Tables

HB Brake

Code	*Z* in	Weight lbs
050	6.80	42.2
080	6.88	42.7
090	7.02	42.9
110	7.16	43.4
125	7.26	43.7
160	7.48	44.4
200	7.73	45.3
250	8.03	46.1
300	8.27	47.0
400	8.98	49.1

HB motor weights vary ± 2 lbs depending upon motor configuration.
Subtract .71 in. from dimension for motors with side ports 5, 6, & 7 and end ports 1 & 2

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Operating Recommendations

CAUTION! - White Hydraulics motors/brakes are intended to operate as static or parking brakes. System circuitry must be designed to bring the load to a stop before applying the brake.

CAUTION! - Because it is possible for some large displacement motors to overpower the brake, it is critical that the maximum system pressure be limited for these applications. Failure to do so could cause serious injury or death. When choosing a motor/brake for an application, consult the performance chart for the series and displacement chosen for the application to verify that the maximum operating pressure of the system will not allow the motor to produce more torque than the maximum rating of the brake. Also, it is vital that the system relief be set low enough to insure that the motor is not able to overpower the brake.

To ensure proper operation of the brake, case drain back pressure must be maintained at 500 psi or less. Case drain back pressure above 500 psi can result in erratic operation of the brake. To avoid potential problems with the operation of the brake, a separate case drain line is recommended. Use of the internal drain option is not recommended due to the possibility of return line pressure spikes. A simple schematic of a system utilizing a motor/brake is shown in Figure A at the bottom. Although maximum brake release pressure may be used for an application, a 500 psi pressure reducing valve is recommended to promote maximum life for the brake release piston seals. To achieve proper brake release operation, it is necessary to bleed out any trapped air and fill brake release cavity and hoses before all connections are tightened. To facilitate this operation, all motor/brakes feature two release ports. One or both of these ports may be used to release the brake in the unit. Motor/brakes should be configured so that the release ports are near the top of the unit in the installed position. Once all system connections are made, one release port must be opened to atmosphere and the brake release line carefully charged with fluid until all air is removed from the line and motor/brake release cavity. When this has been accomplished the port plug or secondary release line must be reinstalled. In the event of a pump or battery failure, an external pressure source may be connected to the brake release port to release the brake, allowing the machine to be moved.

Typical motor/brake schematic

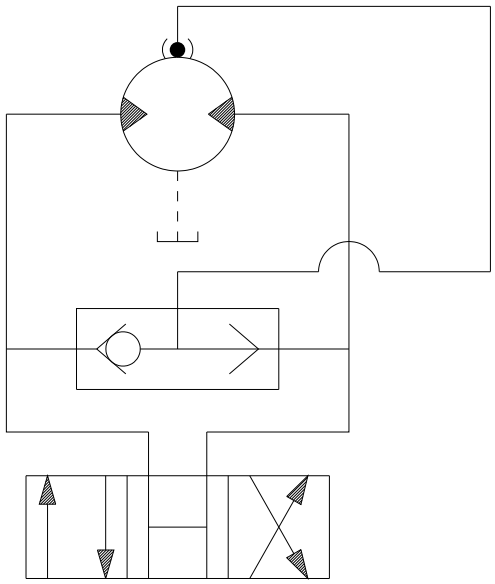


Figure A

CAUTION: It is vital that all operating recommendations be followed. Failure to do so could result in injury or death.

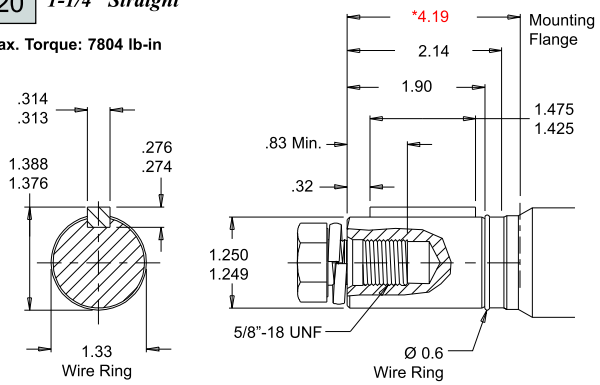
Technical

Rated brake torque ..... 8000 lb-in
Initial release pressure ..... 300 psi
Full release pressure ..... 450 psi
Maximum release pressure ..... 3000 psi
Release volume ..... 0.8 - 1.0 cu in

Shafts

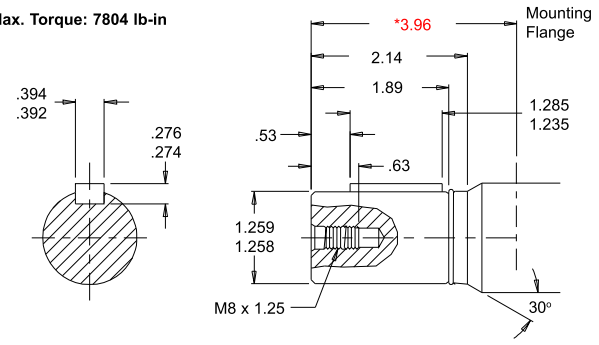
20 *1-1/4" Straight*

Max. Torque: 7804 lb-in



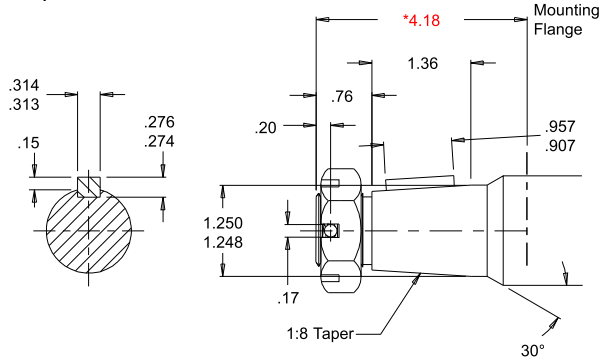
21 *32mm Straight*

Max. Torque: 7804 lb-in



22 *1-1/4" Tapered*

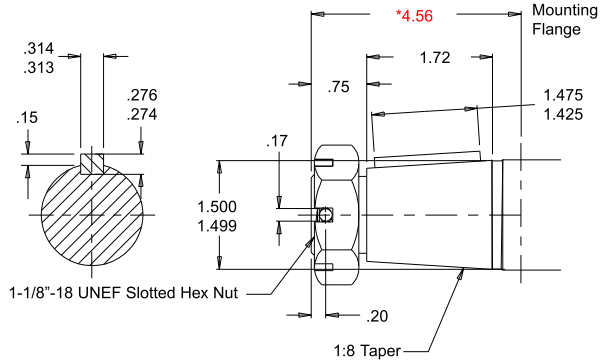
Max. Torque: 7804 lb-in



Note: A slotted nut is standard on this shaft.

31 *1-1/2" Tapered*

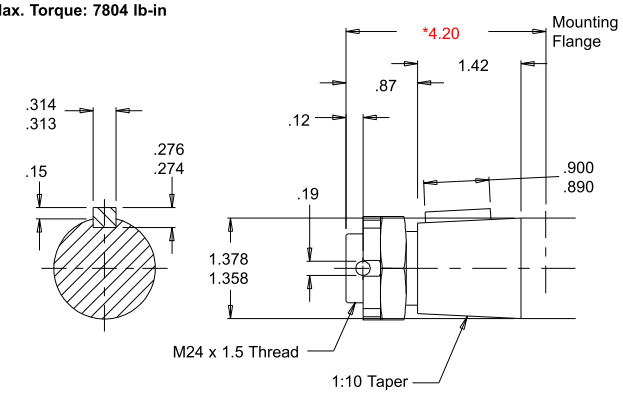
Max. Torque: 7804 lb-in



Note: A slotted nut is standard on this shaft.

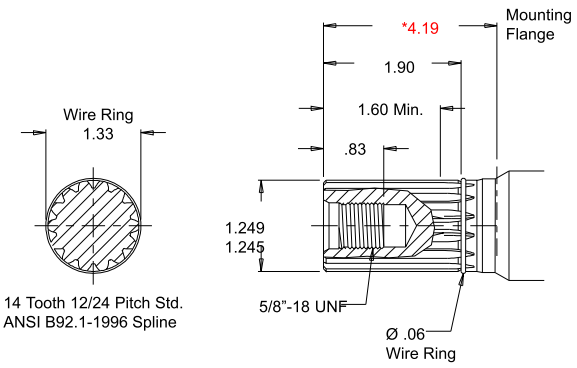
28 *35mm Tapered*

Max. Torque: 7804 lb-in



23 *14 Tooth Spline*

Max. Torque: 7804 lb-in



***Note: Shaft lengths may vary by ± .030 in**

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Ordering Information

SERIES 312 — DISPLACEMENT — HOUSINGS — SHAFT — OPTIONS — MISCELLANEOUS

Code	Displacements
050	3.2 in³/rev
080	4.6 in³/rev
090	5.4 in³/rev
110	6.8 in³/rev
125	7.7 in³/rev
160	10.0 in³/rev
200	12.5 in³/rev
250	15.5 in³/rev
300	17.9 in³/rev
400	24.9 in³/rev

Code	Housing
W2	4-hole End Ports
W8	4-hole Side Ports

PORTS

Code	Side Ports
5	9/16" O-ring
6	180⁰ Ports 1-1/16" O-ring
7	180⁰ Ports 1/2" BSP.F
1	Offset Ports 7/8" O-ring
2	Offset Ports 1/2" BSP.F
3	Manifold Ports 1/2" BSP.F

Code	End Ports
1	Aligned Ports 7/8" O-ring
2	Aligned Ports 1/2" BSP.F

NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: W82 = A wheel mount motor with 1/2" BSP.F threading)

Code	Shafts
22	1-1/4" Tapered
31	1-1/2" Tapered
21	32mm Straight
20	1-1/4" Straight
23	14 Tooth Spline
28	35mm Tapered

PAINT

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

* 22 and 31 Shaft only

** Available with end ports 1& 2 and side ports 1, 2, & 5

Code	Options
AA	None
AC	Freeturning Rotor

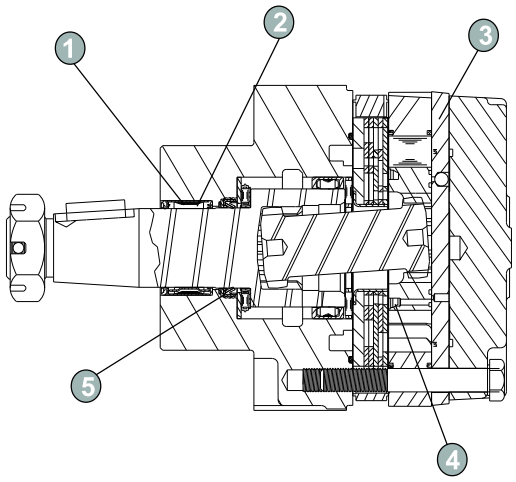
ADD ONS

Code	Options
A	Standard
*B	Lock Nut
*C	Solid Hex Nut

CAVITY

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

Features



1. **Needle Roller Bearing** is in optimum location to allow load to be placed as close to center line of bearing as possible.
2. **Three Bearing Options** allow load carrying capability of motor to be matched to application.
3. **Pressure-Compensated Balance Plate** improves volumetric efficiency at low flows and high pressure.
4. **Valve-In-Rotor Design** provides cost effective, efficient distribution of oil and reduces overall motor length.
5. **High Pressure Viton® Shaft Seal** offers superior seal life and performance.

Shortest And Lightest In Its Class

The combination of compact size, light weight and low speed efficiency make the CE motor the best wheel drive motor available. To reduce overall motor length and weight, all unnecessary material was shaved from the housing, and the valve was placed in the face of the rotor. The pressure-compensated balance plate allows the motor to maintain high volumetric efficiences at startup, and high mechanical efficiencies during running conditions. All of these features unite to make the CE Series motor 10-25% lighter and more compact than competitive designs, making it perfect for applications with strict weight and size requirements.

Specifications

Code	Displacement (in³/rev)	Max. Speed (RPM) - 1)Cont 2)Inter.		Max. Flow (GPM) - 1)Cont 2)Inter.		Max. Torque (lb-in) - 1)Cont 2)Inter.		Max. Pressure (PSI) - 1)Cont 2)Inter. 3)Peak		
		1	2	1	2	1	2	1	2	3
120	7.4	360	490	12	16	2850	3150	3000	3250	3500
160	9.9	370	470	16	20	3750	4430	3000	3250	3500
200	12.4	300	370	16	20	4650	5250	3000	3250	3500
230	14.2	260	320	16	20	4950	5720	3000	3250	3500
260	15.9	260	350	18	24	6250	6730	3000	3250	3500
300	18.3	250	320	20	25	7100	7630	3000	3250	3500
350	21.2	220	270	20	25	8000	9000	3000	3250	3500
375	22.8	200	250	20	25	8600	9200	3000	3250	3500
470	28.3	160	200	20	25	9200	10200	2500	2750	3000
540	32.7	140	170	20	25	8875	10700	2000	2500	3000
750	45.6	100	130	20	25	9575	10950	1500	1750	2000

Performance

120 *7.4 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Peak 3500 (242)	Theo. RPM
0.5 (2)	184 (21) **14**	418 (47) **13**	745 (84) **10**	1008 (114) **7**					16
1 (4)	226 (26) **26**	459 (52) **26**	969 (109) **23**	1387 (157) **21**	1793 (203) **18**	2305 (260) **13**	2566 (290) **10**	2490 (281) **7**	32
2 (8)		456 (52) **58**	977 (110) **56**	1424 (161) **51**	1845 (208) **47**	2382 (269) **33**	2746 (310) **29**	3066 (347) **25**	63
4 (15)		422 (48) **119**	975 (110) **112**	1497 (169) **103**	1992 (225) **95**	2399 (271) **91**	2896 (327) **83**	3269 (369) **82**	125
6 (23)		409 (46) **187**	934 (106) **182**	1402 (158) **177**	1803 (204) **173**	2199 (248) **168**	2630 (297) **160**	3290 (372) **143**	188
8 (30)			876 (99) **248**	1389 (157) **244**	1829 (207) **240**	2241 (253) **233**	2857 (323) **205**	3282 (371) **201**	250
Max. Cont. 10 (38)			853 (96) **306**	1379 (156) **298**	1834 (207) **293**	2278 (257) **286**	2633 (297) **279**	3178 (359) **269**	313
12 (45)			749 (85) **371**	1337 (151) **360**	1823 (206) **352**	2267 (256) **345**	2695 (305) **341**	3042 (344) **335**	375
14 (53)			684 (77) **437**	1215 (137) **428**	1745 (197) **418**	2222 (251) **409**	2618 (296) **404**		438
Max. Inter. 16 (61)			633 (71) **499**	1191 (135) **490**	1717 (194) **482**	2163 (244) **467**	2687 (304) **454**		500
Theo. Torque	295 (33)	589 (67)	1178 (133)	1768 (200)	2357 (266)	2946 (333)	3535 (399)	4124 (466)	

Areas within white represent maximum motor efficiencies.

Torque, lb-in (Nm)
Speed, RPM

160 *9.9 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Peak 3500 (242)	Theo. RPM
0.5 (2)	287 (32) **11**	634 (72) **11**	1341 (152) **10**	1906 (215) **9**	2493 (282) **8**	2888 (326) **6**	3238 (366) **4**	3643 (412) **1**	12
1 (4)	318 (36) **22**	690 (78) **21**	1287 (145) **20**	1991 (225) **19**	2567 (290) **16**	3060 (346) **14**	3236 (366) **8**	3680 (416) **7**	24
2 (8)	296 (33) **45**	649 (73) **44**	1287 (145) **43**	2010 (227) **40**	2586 (292) **36**	3156 (357) **33**	3654 (413) **31**	4108 (464) **28**	47
4 (15)	386 (44) **92**	630 (71) **91**	1296 (146) **88**	2000 (226) **86**	2646 (299) **79**	3226 (364) **74**	3768 (426) **71**	4289 (485) **66**	94
6 (23)		623 (70) **133**	1294 (146) **131**	1991 (225) **128**	2617 (296) **122**	3232 (365) **117**	3786 (428) **115**	4352 (492) **111**	140
8 (30)		583 (66) **181**	1251 (141) **177**	1916 (216) **175**	2533 (286) **171**	3102 (350) **165**	3663 (414) **159**	4210 (476) **152**	187
10 (38)		537 (61) **224**	1224 (138) **223**	1873 (212) **219**	2497 (282) **213**	3072 (347) **211**	3641 (411) **204**	4183 (473) **196**	234
12 (45)		495 (56) **272**	1150 (130) **265**	1829 (207) **264**	2465 (279) **262**	3046 (344) **256**	3603 (407) **249**	4157 (470) **242**	280
14 (53)			1088 (123) **318**	1737 (196) **313**	2384 (269) **306**	2939 (332) **297**	3540 (400) **295**	4111 (464) **284**	327
Max. Cont. 16 (61)			1010 (114) **362**	1659 (187) **356**	2327 (263) **351**	2910 (329) **344**	3499 (395) **334**	4053 (458) **330**	374
18 (68)			903 (102) **410**	1593 (180) **407**	2209 (250) **401**	2822 (319) **385**	3438 (389) **382**		420
Max. Inter. 20 (76)			846 (96) **455**	1536 (174) **448**	2193 (248) **438**	2798 (316) **430**	3353 (379) **423**		467
Theo. Torque	394 (45)	788 (89)	1576 (178)	2365 (267)	3153 (356)	3941 (445)	4729 (534)	5518 (623)	

DO NOT operate at maximum pressure and maximum flow simultaneously.

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

200 *12.4 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Peak 3500 (242)	Theo. RPM
0.5 (2)	358 (40) **8**	817 (92) **8**	1596 (180) **8**	2378 (269) **7**	3083 (348) **6**				10
1 (4)	409 (46) **17**	787 (89) **15**	1597 (180) **15**	2440 (276) **12**	3177 (359) **11**	3782 (427) **9**	4328 (489) **8**		19
2 (8)	395 (45) **36**	807 (91) **34**	1684 (190) **32**	2509 (284) **31**	3268 (369) **28**	3989 (451) **25**	4630 (523) **23**	5189 (586) **19**	38
4 (15)	358 (40) **73**	817 (92) **72**	1662 (188) **69**	2492 (282) **67**	3303 (373) **63**	4006 (453) **60**	4693 (530) **56**	5371 (607) **51**	75
6 (23)		760 (86) **111**	1600 (181) **107**	2457 (278) **104**	3228 (365) **100**	3989 (451) **95**	4636 (524) **90**	5353 (605) **85**	112
8 (30)		663 (75) **148**	1539 (174) **145**	2363 (267) **142**	3176 (359) **137**	3905 (441) **132**	4584 (518) **125**	5286 (597) **120**	150
10 (38)		549 (62) **185**	1430 (162) **184**	2272 (257) **181**	3072 (347) **177**	3798 (429) **171**	4488 (507) **164**	5198 (587) **157**	187
12 (45)			1290 (146) **222**	2159 (244) **217**	2996 (339) **213**	3798 (429) **204**	4476 (506) **198**	5161 (583) **193**	224
14 (53)			1145 (129) **259**	2005 (227) **256**	2905 (328) **250**	3628 (410) **244**	4354 (492) **236**	5049 (571) **226**	261
Max. Cont. 16 (61)			994 (112) **298**	1842 (208) **297**	2795 (316) **284**	3534 (399) **281**	4285 (484) **273**	4971 (562) **266**	299
18 (68)			799 (90) **334**	1833 (207) **330**	2689 (304) **327**	3493 (395) **320**	4260 (481) **316**		336
Max. Inter. 20 (76)			665 (75) **366**	1576 (178) **365**	2495 (282) **361**	3288 (372) **361**	4115 (465) **351**		373
Theo. Torque	494 (56)	987 (112)	1975 (223)	2962 (335)	3949 (446)	4936 (558)	5924 (669)	6911 (781)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

230 *14.2 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Peak 3500 (242)	Theo. RPM
0.5 (2)	406 (46) **7**	866 (98) **7**	1849 (209) **6**	2659 (300) **5**	3367 (380) **2**				9
1 (4)	435 (49) **14**	925 (105) **13**	1903 (215) **12**	2839 (321) **11**	3651 (413) **8**	4315 (488) **6**	4808 (543) **3**		17
2 (8)	438 (50) **30**	945 (107) **28**	1954 (221) **26**	2909 (329) **26**	3803 (430) **22**	4599 (520) **18**	5260 (594) **13**	5856 (662) **9**	33
4 (15)	401 (45) **62**	900 (102) **61**	1895 (214) **59**	2872 (325) **57**	3773 (426) **53**	4623 (522) **47**	5395 (610) **41**	6045 (683) **34**	66
6 (23)	342 (39) **96**	812 (92) **96**	1801 (203) **93**	2808 (317) **91**	3645 (412) **87**	4304 (486) **80**	4953 (560) **72**	5678 (642) **66**	98
8 (30)		743 (84) **128**	1739 (197) **125**	2691 (304) **122**	3627 (410) **119**	4479 (506) **112**	5313 (600) **103**	5728 (647) **95**	131
10 (38)		634 (72) **162**	1650 (186) **159**	2585 (292) **156**	3556 (402) **153**	4363 (493) **146**	5169 (584) **136**	5613 (634) **126**	163
12 (45)			1477 (167) **192**	2494 (282) **191**	3479 (393) **185**	4349 (491) **178**	5094 (576) **167**	5822 (658) **155**	196
14 (53)			1343 (152) **225**	2301 (260) **225**	3310 (374) **220**	4160 (470) **208**	4910 (555) **201**	5818 (657) **186**	228
Max. Cont. 16 (61)			1198 (135) **259**	2209 (250) **259**	3207 (362) **253**	4110 (464) **244**	4895 (553) **232**	5637 (637) **220**	261
18 (68)			1021 (115) **291**	2044 (231) **289**	3042 (344) **286**	3956 (447) **279**	4777 (540) **266**		293
Max. Inter. 20 (76)			822 (93) **325**	1859 (210) **323**	2898 (327) **319**	3825 (432) **311**	4677 (529) **299**		326
Theo. Torque	565 (64)	1131 (128)	2261 (256)	3392 (383)	4522 (511)	5653 (639)	6783 (767)	7914 (894)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

260 *15.9 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Peak 3500 (242)	Theo. RPM
0.5 (2)	514 (58) **6**	1120 (127) **5**	2140 (242) **4**	3068 (347) **3**	3759 (425) **1**				8
1 (4)	547 (62) **12**	1097 (124) **10**	2191 (248) **9**	3133 (354) **8**	3950 (446) **6**	4377 (495) **2**			15
2 (8)	543 (61) **26**	1150 (130) **23**	2200 (249) **20**	3295 (372) **20**	4234 (478) **17**	4972 (562) **13**	5599 (633) **7**		30
4 (15)	536 (61) **54**	1109 (125) **51**	2284 (258) **48**	3339 (377) **46**	4436 (501) **42**	5306 (600) **36**	6192 (700) **30**	6915 (781) **21**	59
6 (23)	500 (57) **84**	1067 (121) **81**	2169 (245) **74**	3326 (376) **74**	4406 (498) **69**	5391 (609) **60**	6309 (713) **53**	7214 (815) **45**	88
8 (30)		981 (111) **113**	2143 (242) **107**	3268 (369) **105**	4327 (489) **100**	5374 (607) **89**	6290 (711) **81**	7167 (810) **71**	117
10 (38)		909 (103) **142**	2034 (230) **137**	3161 (357) **134**	4273 (483) **128**	5267 (595) **119**	6198 (700) **109**	6740 (762) **98**	146
12 (45)		771 (87) **173**	1915 (216) **169**	3057 (345) **166**	4002 (452) **161**	5111 (578) **152**	5708 (645) **143**	6557 (741) **129**	175
14 (53)		664 (75) **203**	1786 (202) **201**	2928 (331) **195**	3841 (434) **191**	4897 (553) **183**	5811 (657) **170**	6718 (759) **157**	204
16 (61)		538 (61) **232**	1687 (191) **231**	2769 (313) **226**	3847 (435) **220**	4892 (553) **210**	5803 (656) **199**	6601 (746) **189**	233
Max. Cont. 18 (68)			1486 (168) **258**	2614 (295) **255**	3664 (414) **248**	4652 (526) **242**	5642 (638) **229**	6567 (742) **215**	262
20 (76)			1345 (152) **287**	2455 (277) **286**	3570 (403) **281**	4598 (520) **271**	5585 (631) **257**		291
22 (83)			1143 (129) **319**	2208 (249) **319**	3372 (381) **312**	4365 (493) **299**	5489 (620) **287**		320
Max. Inter. 24 (91)			924 (104) **348**	2063 (233) **346**	3166 (358) **335**	4168 (471) **333**	4875 (551) **332**		349
Theo. Torque	633 (72)	1266 (143)	2532 (286)	3798 (429)	5064 (572)	6330 (715)	7596 (858)	8861 (1001)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

300 *18.3 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Peak 3500 (242)	Theo. RPM
0.5 (2)	559 (63) **5**	1202 (136) **4**	2518 (285) **3**	3656 (413) **3**	4537 (513) **2**	5129 (580) **1**			7
1 (4)	493 (56) **12**	1230 (139) **10**	2410 (272) **10**	3418 (386) **8**	4272 (483) **6**	4834 (546) **4**			13
2 (8)	522 (59) **23**	1185 (134) **21**	2676 (302) **19**	3781 (427) **19**	4611 (521) **16**	5196 (587) **14**	5952 (673) **10**	6572 (743) **5**	26
4 (15)	503 (57) **47**	1189 (134) **44**	2620 (296) **40**	3602 (407) **38**	4398 (497) **37**	5324 (602) **34**	6161 (696) **29**	6852 (774) **23**	51
6 (23)	447 (50) **73**	1109 (125) **70**	2534 (286) **64**	3886 (439) **62**	4946 (559) **61**	5992 (677) **55**	6978 (789) **48**	7762 (877) **43**	76
8 (30)		986 (111) **97**	2468 (279) **93**	3752 (424) **92**	5020 (567) **86**	6059 (685) **77**	7142 (807) **72**	8139 (920) **64**	101
10 (38)		853 (96) **126**	2306 (261) **121**	3687 (417) **118**	4712 (532) **112**	5832 (659) **104**	7121 (805) **95**	7994 (903) **86**	127
12 (45)		689 (78) **150**	2013 (228) **149**	3252 (367) **146**	4434 (501) **140**	5694 (643) **130**	6781 (766) **121**	7875 (890) **109**	152
14 (53)		525 (59) **176**	1889 (213) **174**	3410 (385) **171**	4383 (495) **166**	5509 (623) **155**	6618 (748) **143**	7186 (812) **136**	177
16 (61)			1603 (181) **200**	3085 (349) **196**	4195 (474) **194**	5484 (620) **181**	6471 (731) **172**	7519 (850) **157**	202
18 (68)			1405 (159) **227**	2823 (319) **225**	4241 (479) **219**	5112 (578) **212**	6356 (718) **196**	7348 (830) **186**	228
Max. Cont. 20 (76)			1115 (126) **252**	2560 (289) **251**	3703 (418) **248**	4962 (561) **240**	6221 (703) **225**	7180 (811) **207**	253
22 (83)			919 (104) **277**	2309 (261) **276**	3454 (390) **274**	4907 (555) **263**	6011 (679) **252**		278
24 (91)			590 (67) **302**	1925 (218) **301**	3441 (389) **299**	4686 (530) **293**	5766 (652) **282**		303
Max. Inter. 25 (95)			496 (56) **314**	1740 (197) **313**	3225 (364) **310**	4281 (484) **309**	5594 (632) **298**		316
Theo. Torque	729 (82)	1457 (165)	2914 (329)	4371 (494)	5828 (659)	7285 (823)	8742 (988)	10199 (1152)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

350 *21.2 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Peak 3500 (242)	Theo. RPM
0.5 (2)	617 (70) **5**	1297 (147) **5**	2383 (269) **4**						6
1 (4)	649 (73) **10**	1318 (149) **10**	2580 (291) **10**	3647 (412) **9**					11
2 (8)	670 (76) **21**	1403 (159) **21**	2767 (313) **21**	4007 (453) **20**	4927 (557) **18**	5915 (668) **16**	6919 (782) **13**		22
4 (15)	609 (69) **43**	1409 (159) **42**	2868 (324) **42**	4101 (463) **40**	5273 (596) **37**	6316 (714) **36**	7261 (820) **32**	8204 (927) **25**	44
6 (23)	544 (62) **65**	1319 (149) **65**	2837 (321) **64**	4228 (478) **61**	5363 (606) **57**	6514 (736) **53**	7475 (845) **52**	8410 (950) **43**	66
8 (30)	395 (45) **87**	1134 (128) **86**	2693 (304) **85**	4134 (467) **84**	5502 (622) **80**	6870 (776) **75**	8022 (906) **67**	8734 (987) **61**	88
10 (38)		962 (109) **108**	2550 (288) **107**	4027 (455) **106**	5500 (621) **100**	6670 (754) **94**	8028 (907) **85**	9105 (1029) **77**	109
12 (45)		833 (94) **130**	2376 (268) **129**	3889 (439) **128**	5205 (588) **124**	6712 (758) **115**	7970 (901) **104**	9120 (1031) **94**	131
14 (53)		575 (65) **152**	2162 (244) **151**	3619 (409) **150**	5059 (572) **148**	6433 (727) **137**	7777 (879) **127**	9070 (1025) **117**	153
16 (61)			1947 (220) **174**	3406 (385) **173**	4855 (549) **171**	6172 (697) **163**	7570 (855) **152**	8853 (1000) **139**	175
18 (68)			1644 (186) **196**	3195 (361) **194**	4599 (520) **192**	6062 (685) **187**	7297 (825) **177**	8555 (967) **165**	197
Max. Cont. 20 (76)			1301 (147) **216**	2863 (324) **213**	4275 (483) **212**	5634 (637) **209**	6993 (790) **194**	8357 (944) **183**	218
22 (83)			960 (109) **239**	2560 (289) **237**	3921 (443) **234**	5357 (605) **232**	6814 (770) **223**		240
24 (91)			684 (77) **261**	2225 (251) **258**	3814 (431) **257**	5207 (588) **256**	6488 (733) **248**		262
Max. Inter. 25 (95)			493 (56) **272**	2004 (226) **270**	3621 (409) **264**	5048 (570) **261**	6435 (727) **259**		273
Theo. Torque	844 (95)	1688 (191)	3376 (381)	5064 (572)	6752 (763)	8439 (954)	10127 (1144)	11815 (1335)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

375 *22.8 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Peak 3500 (242)	Theo. RPM
0.5 (2)	687 (78) **4**	1438 (162) **4**	2840 (321) **4**	3958 (447) **3**	5237 (592) **2**				6
1 (4)	694 (78) **9**	1443 (163) **8**	2951 (333) **8**	4193 (474) **7**	5366 (606) **6**	6457 (730) **4**			11
2 (8)	721 (81) **19**	1495 (169) **18**	3001 (339) **17**	4288 (485) **16**	5533 (625) **15**	6692 (756) **13**	7532 (851) **9**		21
4 (15)	651 (74) **39**	1470 (166) **38**	2837 (321) **36**	4117 (465) **36**	5404 (611) **33**	6624 (748) **29**	7754 (876) **26**	8766 (991) **19**	41
6 (23)	547 (62) **60**	1372 (155) **59**	3015 (341) **58**	4557 (515) **56**	5931 (670) **51**	6946 (785) **44**	7825 (884) **40**	8896 (1005) **33**	61
8 (30)	412 (47) **81**	1223 (138) **80**	2836 (320) **77**	4453 (503) **76**	5880 (664) **71**	7385 (834) **63**	8633 (976) **55**	9442 (1067) **48**	82
10 (38)		1048 (118) **101**	2684 (303) **99**	4382 (495) **97**	5726 (647) **92**	7090 (801) **83**	8161 (922) **74**	9364 (1058) **64**	102
12 (45)		870 (98) **121**	2547 (288) **119**	4147 (469) **117**	5620 (635) **112**	7115 (804) **107**	8605 (972) **93**	9920 (1121) **85**	122
14 (53)		625 (71) **141**	2308 (261) **140**	3849 (435) **139**	5337 (603) **135**	6953 (786) **126**	8298 (938) **114**	9771 (1104) **101**	142
16 (61)		487 (55) **162**	2134 (241) **161**	3744 (423) **160**	5248 (593) **155**	6706 (758) **147**	8160 (922) **135**	9614 (1086) **124**	163
18 (68)			1805 (204) **182**	3461 (391) **181**	4988 (564) **177**	6402 (723) **168**	7899 (893) **164**	9320 (1053) **145**	183
Max. Cont. 20 (76)			1942 (219) **201**	3231 (365) **200**	4714 (533) **198**	5860 (662) **193**	7643 (864) **178**	9112 (1030) **163**	203
22 (83)			1173 (132) **222**	2795 (316) **220**	4552 (514) **219**	5970 (675) **210**	7141 (807) **203**		223
24 (91)			881 (100) **243**	2567 (290) **242**	4202 (475) **241**	5667 (640) **232**	7012 (792) **220**		244
Max. Inter. 25 (95)			711 (80) **253**	2313 (261) **251**	4113 (465) **250**	5454 (616) **242**	6891 (779) **235**		254
Theo. Torque	908 (103)	1815 (205)	3631 (410)	5446 (615)	7261 (821)	9076 (1026)	10892 (1231)	12707 (1436)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

470 *28.3 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	Max. Cont. 2500 (173)	Peak 3000 (207)	Theo. RPM
0.5 (2)	878 (99) **4**	1862 (210) **3**	3713 (420) **3**					5
1 (4)	899 (102) **8**	1856 (210) **7**	3748 (424) **7**	5285 (597) **7**	6847 (774) **6**			9
2 (8)	906 (102) **16**	1968 (222) **15**	3875 (438) **15**	5488 (620) **14**	6922 (782) **13**	8470 (957) **11**	9788 (1106) **9**	17
4 (15)	836 (95) **32**	1837 (208) **31**	3600 (407) **30**	5351 (605) **28**	6922 (782) **25**	8504 (961) **23**	10118 (1143) **20**	33
6 (23)	700 (79) **48**	1736 (196) **48**	3772 (426) **46**	5483 (620) **44**	7204 (814) **41**	8580 (969) **36**	10172 (1149) **31**	49
8 (30)	544 (61) **65**	1588 (179) **65**	3638 (411) **63**	5578 (630) **61**	7498 (847) **57**	9253 (1046) **48**	10541 (1191) **44**	66
10 (38)	352 (40) **81**	1405 (159) **80**	3429 (387) **80**	5471 (618) **77**	7301 (825) **73**	9167 (1036) **67**	11019 (1245) **55**	82
12 (45)		1105 (125) **97**	3245 (367) **96**	5197 (587) **94**	7076 (800) **90**	8891 (1005) **82**	10898 (1232) **72**	98
14 (53)		912 (103) **113**	3007 (340) **113**	5066 (572) **111**	6787 (767) **106**	8720 (985) **100**	10688 (1208) **91**	115
16 (61)		557 (63) **130**	2712 (306) **129**	4662 (527) **128**	6581 (744) **124**	8451 (955) **116**	10285 (1162) **105**	131
18 (68)			2298 (260) **146**	4370 (494) **145**	6262 (708) **142**	8148 (921) **135**	10169 (1149) **126**	147
Max. Cont. 20 (76)			1941 (219) **163**	4035 (456) **163**	5954 (673) **158**	7815 (883) **151**	9647 (1090) **140**	164
22 (83)			1542 (174) **179**	3687 (417) **178**	5612 (634) **176**	7496 (847) **168**		180
24 (91)			1225 (138) **195**	3302 (373) **194**	5354 (605) **193**	7147 (808) **186**		196
Max. Inter. 25 (95)				3079 (348) **204**	4885 (552) **203**	6808 (769) **197**		205
Theo. Torque	1127 (127)	2253 (255)	4506 (509)	6760 (764)	9013 (1018)	11266 (1273)	13519 (1528)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

540 *32.7 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	Max. Cont. 2000 (138)	Max. Inter. 2500 (173)	Theo. RPM
0.5 (2)	940 (106) **3**	2035 (230) **2**					4
1 (4)	927 (105) **6**	1975 (223) **6**	4023 (455) **6**	5797 (655) **5**	7684 (868) **3**		8
2 (8)	991 (112) **13**	2100 (237) **13**	4321 (488) **12**	6358 (719) **10**	8065 (911) **8**	9617 (1087) **3**	15
4 (15)	944 (107) **27**	2174 (246) **26**	4455 (503) **25**	6593 (745) **24**	8426 (952) **21**	10005 (1131) **16**	29
6 (23)	854 (96) **42**	2033 (230) **41**	4571 (516) **40**	6686 (756) **40**	8911 (1007) **36**	10911 (1233) **30**	43
8 (30)	613 (69) **56**	1843 (208) **56**	4214 (476) **54**	6724 (760) **54**	8787 (993) **49**	10676 (1206) **42**	57
10 (38)	521 (59) **70**	1631 (184) **70**	4035 (456) **69**	6367 (720) **67**	8568 (968) **64**	10821 (1223) **56**	71
12 (45)	264 (30) **84**	1376 (155) **83**	3702 (418) **83**	6089 (688) **83**	8195 (926) **78**	10668 (1205) **69**	85
14 (53)		1089 (123) **98**	3456 (391) **98**	5576 (630) **97**	7896 (892) **95**	10165 (1149) **88**	99
16 (61)		793 (90) **113**	3197 (361) **113**	5622 (635) **112**	7925 (896) **109**	10061 (1137) **106**	114
18 (68)		452 (51) **127**	2901 (328) **126**	5238 (592) **125**	7632 (862) **124**	9873 (1116) **118**	128
Max. Cont. 20 (76)			2460 (278) **141**	4869 (550) **140**	7222 (816) **140**	9526 (1076) **132**	142
22 (83)			1980 (224) **154**	3954 (447) **153**	6369 (720) **151**		156
24 (91)			1590 (180) **169**	3971 (449) **168**	6673 (754) **167**		170
Max. Inter. 25 (95)			1358 (153) **176**	3768 (426) **174**	6095 (689) **173**		177
Theo. Torque	1302 (147)	2604 (294)	5207 (588)	7811 (883)	10414 (1177)	13018 (1471)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

750 *45.6 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	Max. Cont. 1500 (104)	Peak 2000 (138)	Theo. RPM
0.5 (2)	957 (108) **2**	2041 (231) **1**				3
1 (4)	1540 (174) **4**	3010 (340) **4**	5760 (651) **4**	8408 (950) **4**	10916 (1233) **3**	6
2 (8)	1467 (166) **9**	3246 (367) **9**	6154 (695) **9**	9024 (1020) **9**	11518 (1302) **7**	11
4 (15)	1501 (170) **19**	3181 (359) **19**	6366 (719) **19**	9607 (1086) **18**	11729 (1325) **16**	21
6 (23)	1477 (167) **29**	3048 (344) **29**	6190 (699) **28**	8979 (1015) **27**	11916 (1346) **25**	31
8 (30)	1142 (129) **40**	2866 (324) **39**	6191 (700) **38**	9316 (1053) **37**	11898 (1345) **35**	41
10 (38)	979 (111) **50**	2606 (295) **49**	5809 (656) **48**	9191 (1039) **47**	12305 (1390) **44**	51
12 (45)	614 (69) **60**	2246 (254) **59**	5586 (631) **58**	8736 (987) **57**	12079 (1365) **56**	61
14 (53)	413 (47)	2009 (227) **68**	5232 (591) **66**	8469 (957) **65**	11913 (1346) **64**	71
16 (61)		1756 (198) **80**	4909 (555) **79**	8243 (931) **77**	11455 (1294) **74**	82
18 (68)		1203 (136) **91**	4571 (517) **90**	7778 (879) **90**	10884 (1230) **87**	92
Max. Cont. 20 (76)		827 (93) **100**	4010 (453) **99**	7257 (820) **98**	10540 (1191) **97**	102
22 (83)			3620 (409) **109**	6958 (786) **108**		112
24 (91)			3010 (340) **120**	6609 (747) **119**		122
Max. Inter. 25 (95)			2810 (318) **126**	6130 (693) **125**		127
Theo. Torque	1815 (205)	3631 (410)	7261 (821)	10892 (1231)	14522 (1641)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

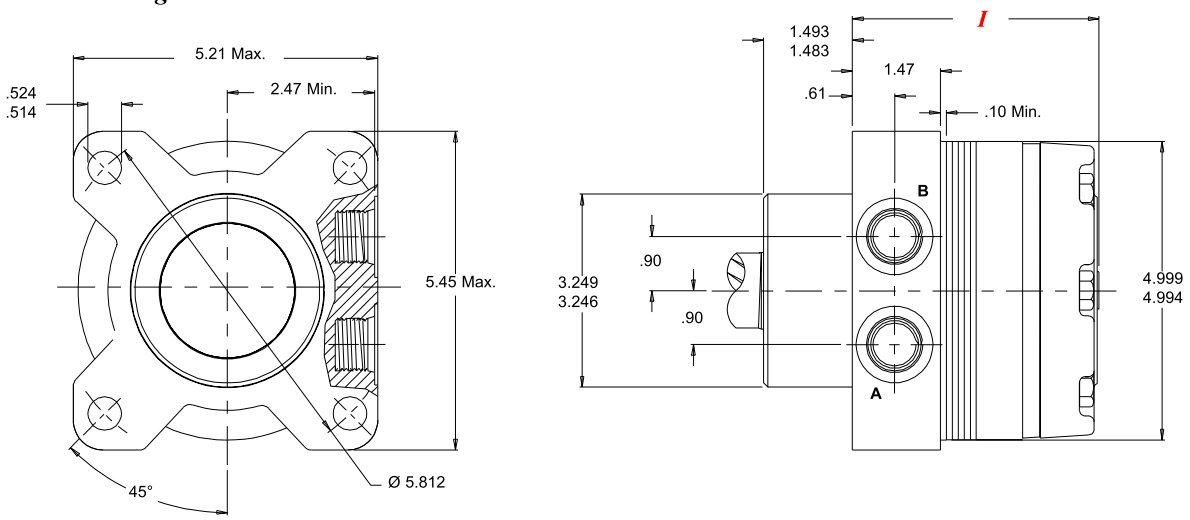
Torque, lb-in (Nm)
Speed, RPM

Tested at 129°F with an oil viscosity of 213 SUS

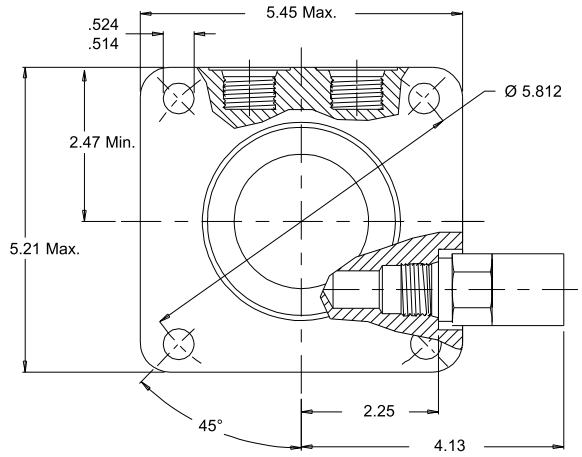
Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

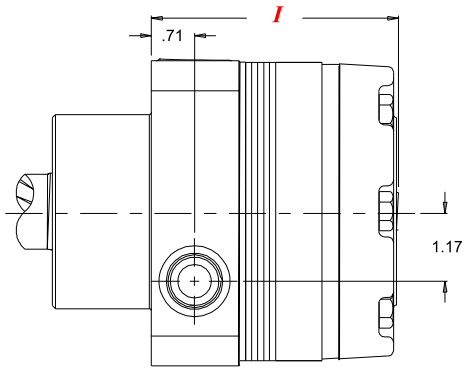
Wheel Mount

W31 *4-Hole Front Aligned Ports 7/8" O-Ring*
W38 *4-Hole Front Aligned Ports 1/2" BSP.F*



Optional Relief Cartridge shown installed and is available for both the W31 and W38 housings.





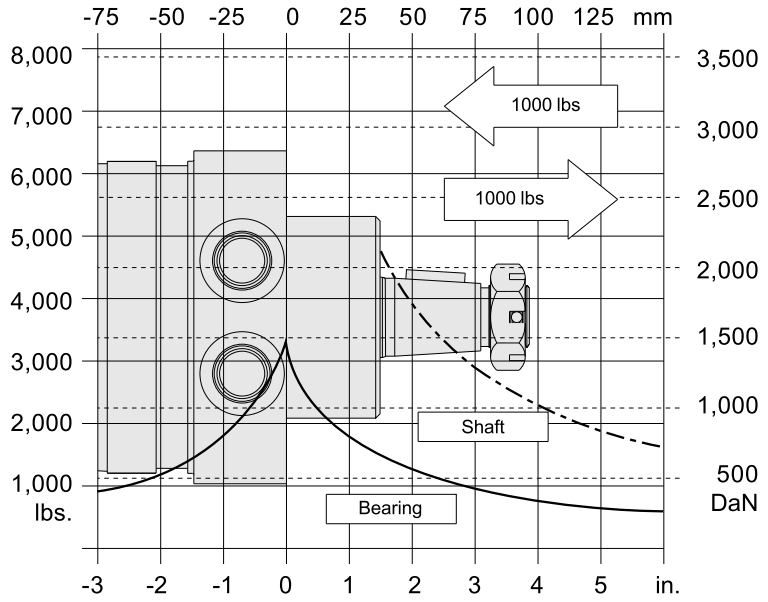
Valve Cavity - 10 Series/2-way (7/8"-14 UNF-2B)

Technical

Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

Wheel Mount



Length and Weight Tables

Wheel Mount

Code	*l* in	Weight lbs
120	3.91	24.1
160	3.91	24.1
200	4.05	24.8
230	4.15	25.2
260	4.24	25.6
300	4.37	26.3
350	4.92	28.8
375	4.62	27.4
470	4.92	28.8
540	5.16	30.0
750	5.87	33.1

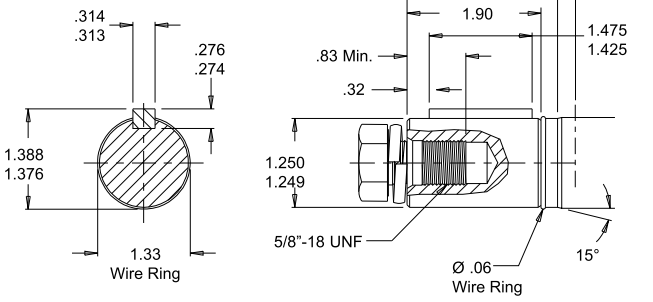
CE motor weights vary ± 1 lb depending upon motor configuration.

Back

Shafts

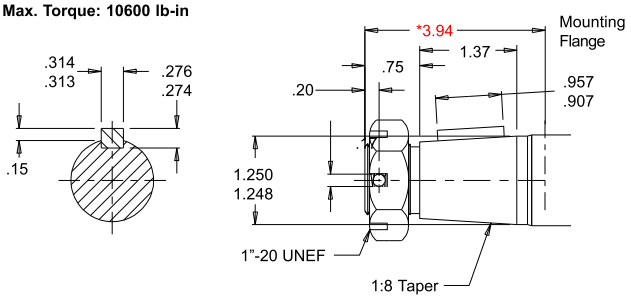
20 *1¼" Straight*

Max. Torque: 10600 lb-in



22 *1¼" Tapered*

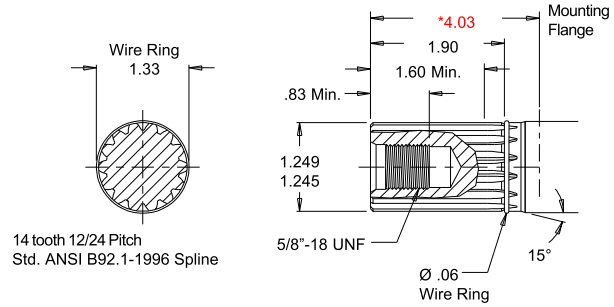
Max. Torque: 10600 lb-in



Note: A slotted nut is standard on this shaft.

23 *14 Tooth Spline*

Max. Torque: 10600 lb-in

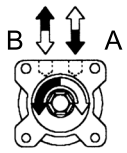
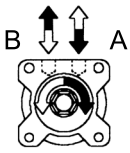


***Note: Shaft lengths may vary by ± .030 in**

Back

Ordering Information

Shaft Rotation

400	401
	

For applications requiring the motor to rotate in only one direction, shaft seal life may be prolonged by pressurizing the "A" port of the motor. To obtain the desired direction of shaft rotation, use the graphic at the left to determine the rotation code for the motor. For bidirectional applications, the 400 series is recommended. Preferred rotation is determined by internal valving design.

SERIES
401
400
REVERSED TIMING
OPTIONS
DISPLACEMENT
HOUSING
SHAFT
MISCELLANEOUS
PAINT
CAVITY
ADD ONS

Code	Displacement
120	7.4 in^3/rev
160	9.9 in^3/rev
200	12.4 in^3/rev
230	14.2 in^3/rev
260	15.9 in^3/rev
300	18.3 in^3/rev
350	21.2 in^3/rev
375	22.8 in^3/rev
470	28.3 in^3/rev
540	32.7 in^3/rev
750	45.6 in^3/rev

Code	Housing
W38	4-Hole Front Ports 1/2" BSP.F
W31	4-Hole Front Ports 7/8" O-ring

Code	Shafts
22	1-1/4" Tapered
20	1-1/4" Straight
23	14 Tooth Spline

Code	Options
AA	None
AC	Freeturning Rotor
AE	Hydraulic Declutch (With Freeturning Rotor)

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

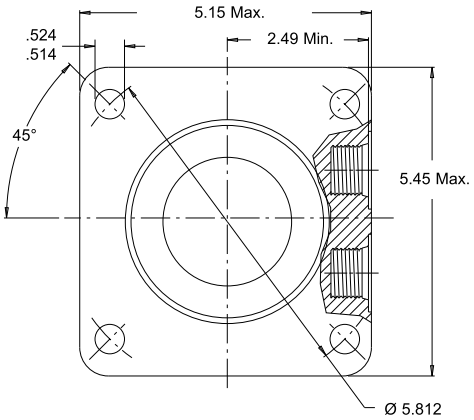
Code	Options
A	Standard
B	Lock Nut
C	Solid Hex Nut

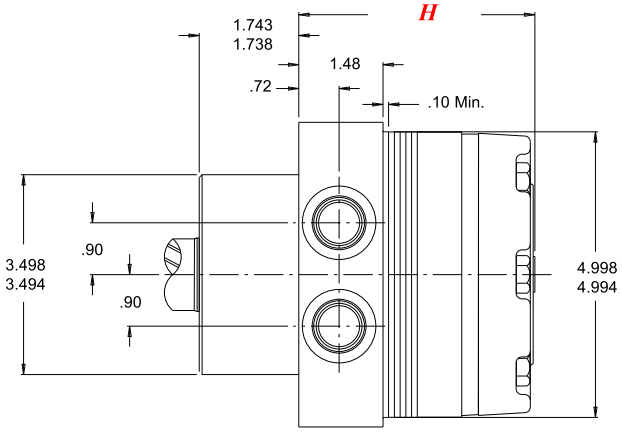
*Must use W31 or W38 Housing.

Housings

Wheel Mount

W35	*4-Hole Front Aligned Ports 9/16" O-Ring*
W38	*4-Hole Front Aligned Ports 1/2" BSP.F*
W31	*4-Hole Front Aligned Ports 7/8" O-Ring*

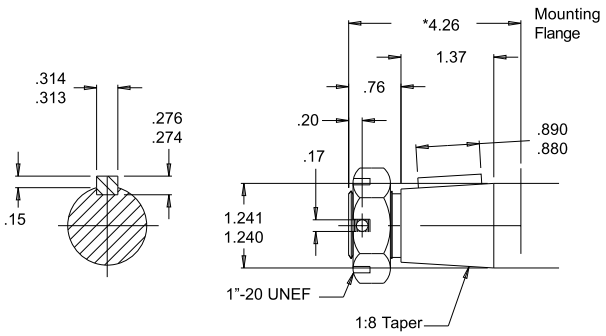




Shafts

22 *1 ¼" Tapered*

Max. Torque: 10600 lb-in



*Shaft Lengths may vary ± .030 in

Length and Weight Tables

Wheel Mount

Code	*H* in	Weight lbs
120	3.91	24.1
160	3.91	24.1
200	4.05	24.8
230	4.15	25.2
260	4.24	25.6
300	4.37	26.3
350	4.92	28.8
375	4.62	27.4
470	4.92	28.8
540	5.16	30.0
750	5.87	33.1

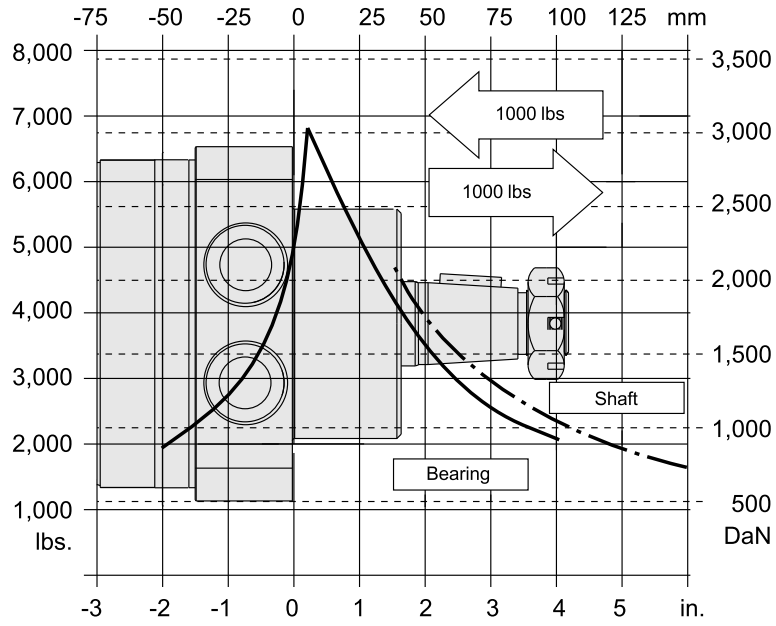
CE motor weights vary ± 1 lb depending upon motor configuration.

Back

Allowable Bearing And Shaft Loads

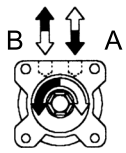
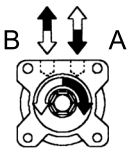
Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

Wheel Mount



Ordering Information

Shaft Rotation

420	421
	

For applications requiring the motor to rotate in only one direction, shaft seal life may be prolonged by pressurizing the "A" port of the motor. To obtain the desired direction of shaft rotation, use the graphic at the left to determine the rotation code for the motor. For bidirectional applications, the 420 series is recommended. Preferred rotation is determined by internal valving design.

SERIES

421 — REVERSED TIMING

420

OPTIONS

DISPLACEMENT | HOUSING | SHAFT | MISCELLANEOUS

Code	Displacement
120	7.4 in^3/rev
160	9.9 in^3/rev
200	12.4 in^3/rev
230	14.2 in^3/rev
260	15.9 in^3/rev
300	18.3 in^3/rev
350	21.2 in^3/rev
375	22.8 in^3/rev
470	28.3 in^3/rev
540	32.7 in^3/rev
750	45.6 in^3/rev

Code	Housing
W35	4-Hole 9/16" O-Ring
W38	4-Hole 1/2" BSP.F
W31	4-Hole 7/8" O-Ring

Code	Shafts
22	1-1/4" Tapered

Code	Options
AA	None
AC	Freeturning Rotor
AE	Hydraulic Declutch (With Freeturning Rotor)

CAVITY

Code	Options
A	None

ADD ONS

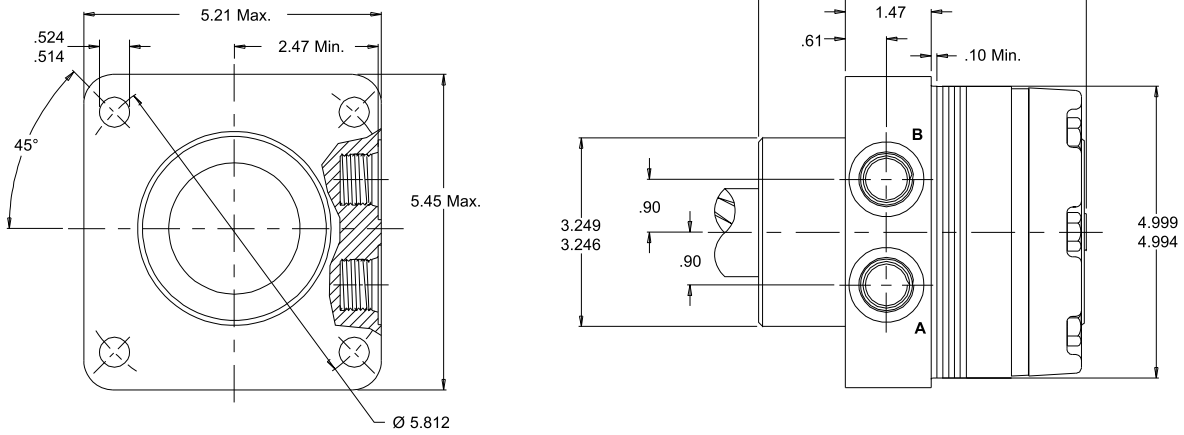
Code	Options
A	Standard
B	Lock Nut
C	Solid Hex Nut

PAINT

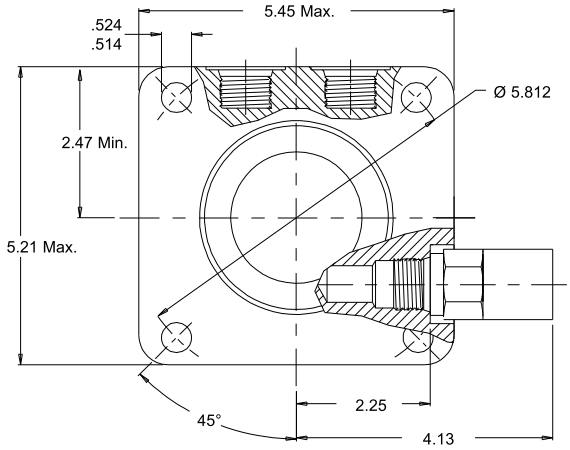
Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

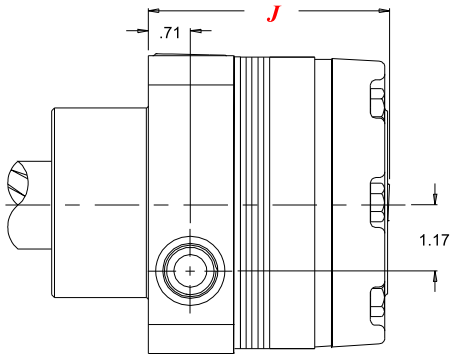
Wheel Mount

W31 *4-Hole Front Aligned Ports 7/8" O-Ring*
W38 *4-Hole Front Aligned Ports 1/2" BSP.F*



Optional Relief Cartridge shown installed and is available for both the W31 and W38 housings.





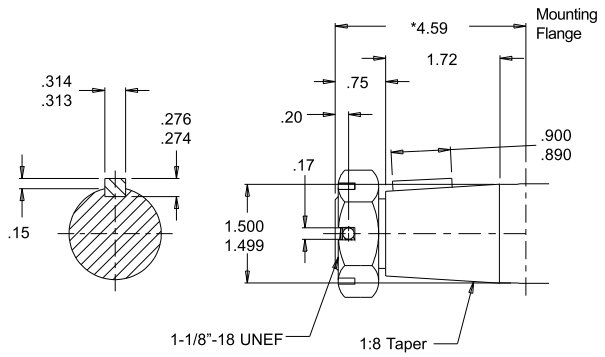
Valve Cavity - 10 Series/2-way (7/8"-14 UNF-2B)

Technical

Shafts

31 *1 ½" Tapered*

Max. Torque: 10600 lb-in

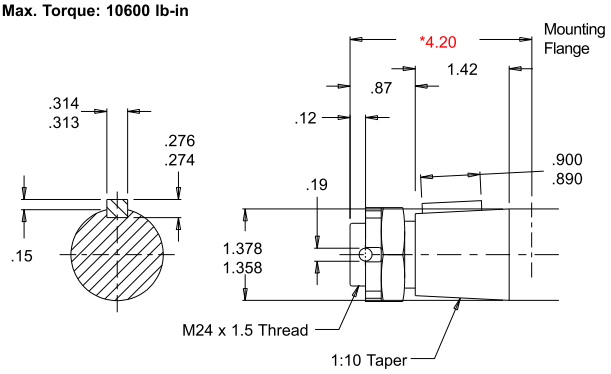


*Shaft Lengths may vary ± .030 in

Back

28 *35mm Tapered*

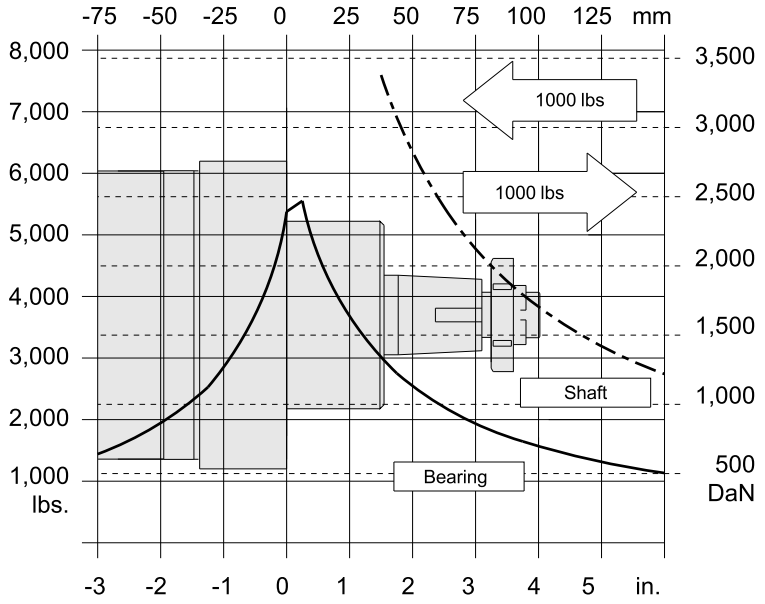
Max. Torque: 10600 lb-in



Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

Wheel Mount



Length and Weight Tables

Wheel Mount

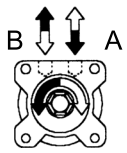
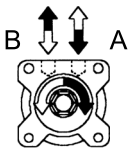
Code	*J* in	Weight lbs
120	3.91	24.1
160	3.91	24.1
200	4.05	24.8
230	4.15	25.2
260	4.24	25.6
300	4.37	26.3
350	4.92	28.8
375	4.62	27.4
470	4.92	28.8
540	5.16	30.0
750	5.87	33.1

CE motor weights vary ± 1 lb depending upon motor configuration.

Back

Ordering Information

Shaft Rotation

430	431
	

For applications requiring the motor to rotate in only one direction, shaft seal life may be prolonged by pressurizing the "A" port of the motor. To obtain the desired direction of shaft rotation, use the graphic at the left to determine the rotation code for the motor. For bidirectional applications, the 430 series is recommended. Preferred rotation is determined by internal valving design.

SERIES
431 — REVERSED TIMING
430

OPTIONS

DISPLACEMENT | HOUSING | SHAFT | MISCELLANEOUS

Code	Displacement
120	7.4 in^3/rev
160	9.9 in^3/rev
200	12.4 in^3/rev
230	14.2 in^3/rev
260	15.9 in^3/rev
300	18.3 in^3/rev
350	21.2 in^3/rev
375	22.8 in^3/rev
470	28.3 in^3/rev
540	32.7 in^3/rev
750	45.6 in^3/rev

Code	Housing
W38	4-Hole Front Ports 1/2" BSP.F
W31	4-Hole Front Ports 7/8" O-ring

Code	Shafts
31	1-1/2" Tapered
28	35mm Tapered

Code	Options
AA	None
AC	Freeturning Rotor
AE	Hydraulic Declutch (With Freeturning Rotor)

PAINT | CAVITY | ADD ONS

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

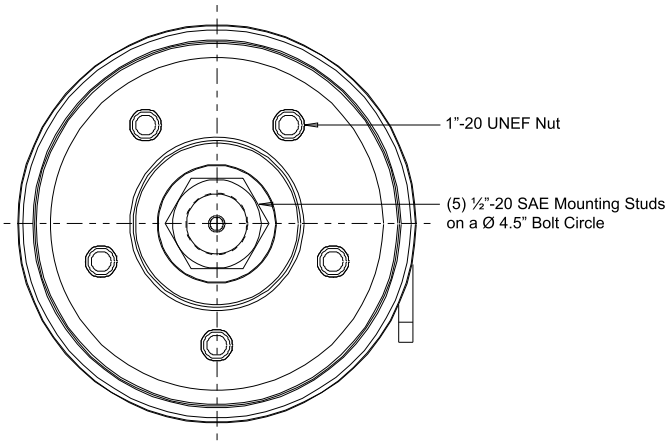
Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

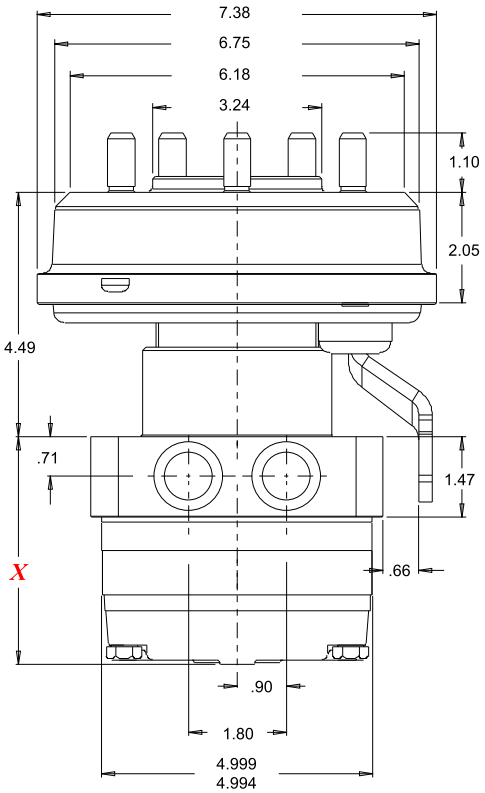
Code	Options
A	Standard
B	Lock Nut
C	Solid Hex Nut

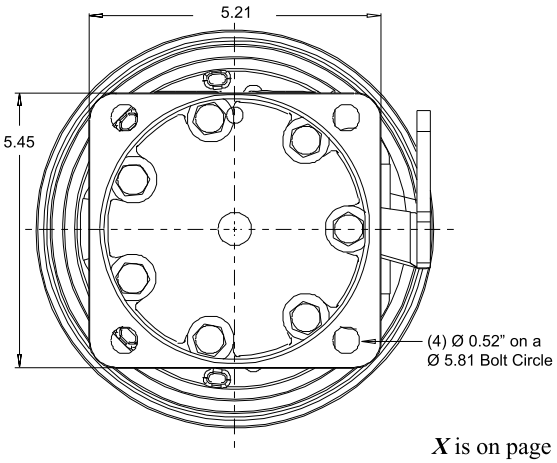
*Must use W31 or W38 Housing.

Features

High Efficiency CE series Motor - provides exceptional low speed performance in one of the smallest wheel drive packages available today
Self-Adjusting Brake Mechanism - makes brake adjustments unnecessary by automatically adjusting for brake wear
Standard Wheel Mount Flange - adapts easily to new designs and can be retro-fitted onto older machines
4 and 5 Bolt Wheel Hubs - are available to accomodate a wide variety of wheel rims
Labyrinth Lip Design - incorporated into hub helps protect brake components from elements
2-Position Brake Lever - provides flexibility in the attachment of brake cables or actuating linkage







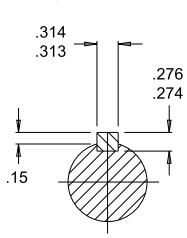
Housings

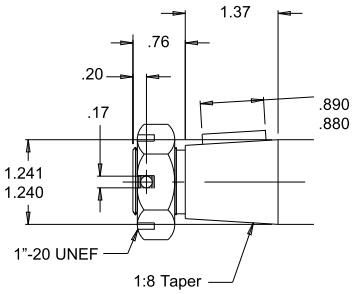
K35	*4-Hole Aligned Ports 9/16" O-Ring with Brake Mount*
K38	*4-Hole Aligned Ports 1/2" BSP.F with Brake Mount*
K31	*4-Hole Aligned Ports 7/8" O-Ring with Brake Mount*

Shafts

22	*1 ¼" Tapered*

Max. Torque: 10600 lb-in



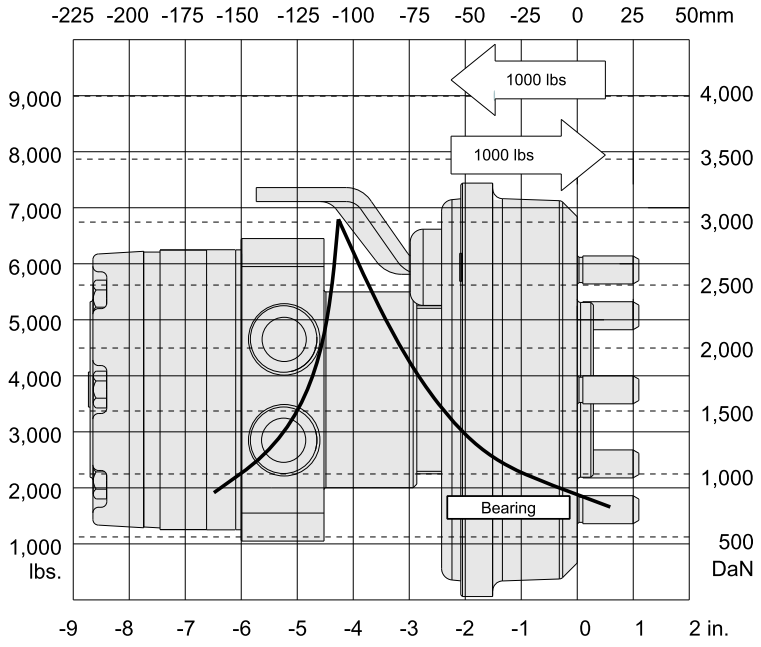


X is on page 53

Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

Wheel Mount with Brake



Length and Weight Tables

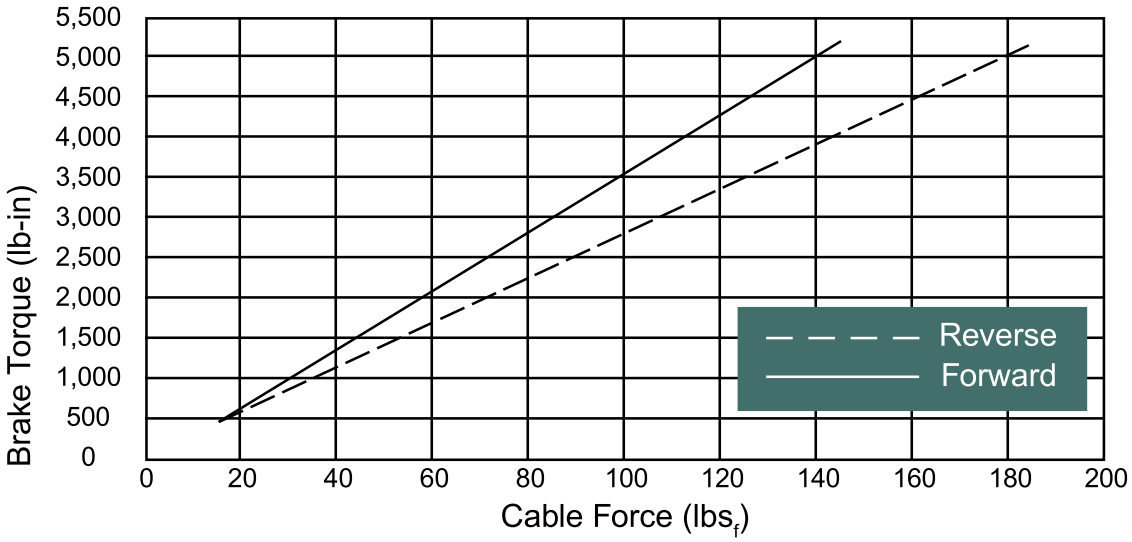
Wheel Mount

Code	X in	Weight lbs
120	3.91	35.2
160	3.91	35.2
200	4.05	35.9
230	4.15	36.3
260	4.24	36.7
300	4.37	37.4
350	4.92	39.9
375	4.62	38.5
470	4.92	39.9
540	5.16	41.1
750	5.87	44.2

CE motor weights vary ± 1 lb depending upon motor configuration.

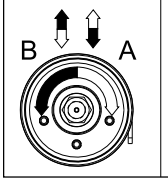
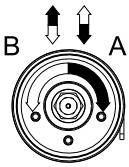
Back

Brake Holding Torque



Ordering Information

Shaft Rotation

410	411
	

For applications requiring the motor to rotate in only one direction, shaft seal life may be prolonged by pressurizing the "A" port of the motor. To obtain the desired direction of shaft rotation, use the graphic at the left to determine the rotation code for the motor. For bidirectional applications, the 410 series is recommended. Preferred rotation is determined by internal valving design.

SERIES

411 — REVERSED TIMING

410

DISPLACEMENT | HOUSING | SHAFT | OPTIONS | MISCELLANEOUS

Code	Displacement
120	7.4 in³/rev
160	9.9 in³/rev
200	12.4 in³/rev
230	14.2 in³/rev
260	15.9 in³/rev
300	18.3 in³/rev
350	21.2 in³/rev
375	22.8 in³/rev
470	28.3 in³/rev
540	32.7 in³/rev
750	45.6 in³/rev

Code	Housing
K31	4-Hole w/Brake Mount 7/8" O-Ring
K38	4-Hole w/Brake Mount 1/2" BSP.F
K35	4-Hole w/Brake Mount 9/16" O-Ring

Code	Shafts
22	1-1/4" Tapered

Code	Options
ZA	Brake Drum Left Hand Position 1, 5 Bolt Hub
YA	Brake Drum Right Hand Position 2, 5 Bolt Hub
ZE	Brake Drum Left Hand Position 1, 4 Bolt Hub
YE	Brake Drum Right Hand Position 2, 4 Bolt Hub

PAINT

Code	Options
A	Dark Metallic Gray
C	Black
Z	No Paint

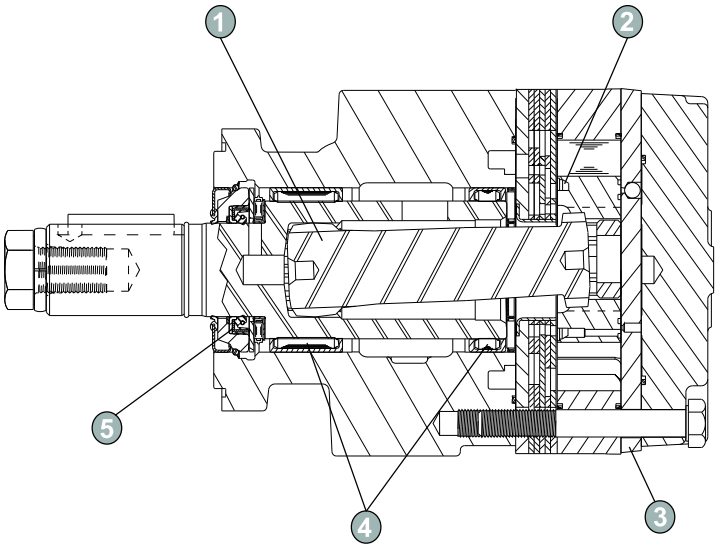
CAVITY

Code	Options
A	None

ADD ONS

Code	Options
A	Standard

Features



1. **Heavy-Duty Drive Link** is the most durable in its class and receives full flow lubrication to provide long life.
2. **Valve-In-Rotor Design** provides cost effective, efficient distribution of oil and reduces overall motor length.
3. **Pressure-Compensated Balance Plate** improves volumetric efficiency at low flows and high pressure.
4. **Three Bearing Options** allow load carrying capability of motor to be matched to application.
5. **High Pressure Viton® Shaft Seal** offers superior seal life and performance and eliminates need for case drain.

Dependable Power, Affordable Price

The RE Series motors offer the perfect compromise between price and performance by producing work horse power at a reasonable cost. Although these motors perform well in a wide range of applications, they are especially suited for low flow, high pressure applications. During startup, pressure causes the balance plate to flex toward the rotor, vastly improving volumetric efficiency. As the motor reaches operating pressure, the balance plate relaxes, allowing the rotor to turn freely which translates into higher mechanical efficiencies. Transmitting this power to the output shaft is the most durable drive link in its class. Three bearing options, combined with standard mounting flanges and output shafts, allow the motor to be configured to suit nearly any application.

Specifications

Code	Displacement (in³/rev)	Max. Speed (RPM) - 1)Cont	Max. Speed (RPM) - 2)Inter.	Max. Flow (GPM) - 1)Cont	Max. Flow (GPM) - 2)Inter.	Max. Torque (lb-in) - 1)Cont	Max. Torque (lb-in) - 2)Inter.	Max. Pressure (PSI) - 1)Cont	Max. Pressure (PSI) - 2)Inter.	Max. Pressure (PSI) - 3)Peak
120	7.4	360	490	12	16	2900	3400	3000	3500	4000
160	9.9	370	470	16	20	4200	4800	3000	3500	4000
200	12.4	300	370	18	22	4800	5600	3000	3500	4000
230	14.2	260	320	18	22	5700	6300	3000	3500	4000
260	15.9	260	350	20	24	6300	7000	3000	3500	4000
300	18.3	250	320	22	25	7300	8300	3000	3500	4000
350	21.2	220	270	22	25	8150	9250	3000	3500	4000
375	22.8	200	250	20	24	8900	10250	3000	3500	4000
470	28.3	160	200	20	24	9700	10475	2500	2750	3000
540	32.7	140	170	20	24	8700	11000	2000	2500	3000
750	45.6	100	130	20	24	9400	10950	1500	1750	2000

Performance

120 *7.4 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	187 (21) **14**	448 (51) **13**	859 (97) **11**	1239 (140) **8**					16
1 (4)	215 (24) **26**	474 (54) **25**	986 (111) **25**	1429 (162) **20**	1991 (225) **13**				32
2 (8)		500 (57) **58**	1043 (118) **53**	1554 (176) **51**	1997 (226) **44**	2400 (271) **40**	2673 (302) **35**	3036 (343) **27**	63
4 (15)		479 (54) **111**	1030 (116) **106**	1642 (186) **97**	2094 (237) **93**	2459 (278) **89**	2964 (335) **85**	3179 (359) **79**	125
6 (23)		433 (49) **174**	1023 (116) **167**	1483 (168) **155**	2051 (232) **150**	2467 (279) **144**	2903 (328) **139**	3185 (360) **137**	188
8 (30)			984 (111) **245**	1497 (169) **214**	1973 (223) **205**	2505 (283) **200**	2884 (326) **197**	3404 (385) **188**	250
10 (38)			923 (104) **294**	1469 (166) **281**	1930 (218) **269**	2411 (272) **261**	2878 (325) **250**	3404 (385) **242**	313
Max. Cont. 12 (45)			872 (99) **358**	1428 (161) **344**	1918 (217) **331**	2444 (276) **326**	2839 (321) **321**	3403 (385) **304**	375
14 (53)			807 (91) **415**	1372 (155) **413**	1845 (208) **398**	2363 (267) **391**	2992 (338) **369**		438
Max. Inter. 16 (61)			745 (84) **487**	1283 (145) **475**	1864 (211) **457**	2403 (272) **447**	2897 (327) **427**		500
Theo. Torque	295 (33)	589 (67)	1178 (133)	1768 (200)	2357 (266)	2946 (333)	3535 (399)	4124 (466)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

160 *9.9 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	326 (37) **7**	685 (77) **3**	1323 (149) **3**	1977 (223) **3**	2741 (310) **2**	3088 (349) **1**			12
1 (4)	264 (30) **21**	704 (80) **18**	1448 (164) **17**	2158 (244) **16**	2865 (324) **14**	3344 (378) **13**	3909 (442) **9**		24
2 (8)	317 (36) **45**	711 (80) **43**	1423 (161) **41**	2143 (242) **39**	2792 (316) **37**	3350 (379) **35**	4258 (481) **32**	4880 (551) **28**	47
4 (15)	342 (39) **92**	664 (75) **90**	1510 (171) **86**	2241 (253) **84**	2838 (321) **82**	3351 (379) **80**	3992 (451) **76**	4569 (516) **72**	94
6 (23)		631 (71) **138**	1395 (158) **134**	2078 (235) **131**	2806 (317) **127**	3447 (389) **122**	4088 (462) **121**	4586 (518) **118**	140
8 (30)		596 (67) **186**	1449 (164) **182**	2090 (236) **179**	2760 (312) **173**	3411 (385) **170**	4033 (456) **167**	4537 (513) **163**	187
10 (38)		640 (72) **232**	1323 (149) **230**	2074 (234) **229**	2736 (309) **222**	3329 (376) **220**	4022 (455) **213**	4623 (522) **207**	234
12 (45)		596 (67) **279**	1275 (144) **279**	1998 (226) **272**	2689 (304) **270**	3270 (369) **264**	3890 (440) **255**	4397 (497) **247**	280
14 (53)			1190 (135) **326**	2022 (228) **323**	2739 (310) **317**	3317 (375) **311**	4040 (457) **304**	4789 (541) **299**	327
Max. Cont. 16 (61)			1087 (123) **372**	1889 (213) **372**	2634 (298) **364**	3253 (368) **361**	3847 (435) **357**	4439 (502) **350**	374
18 (68)			952 (108) **419**	1764 (199) **417**	2501 (283) **416**	3201 (362) **407**	3708 (419) **401**		420
Max. Inter. 20 (76)			929 (105) **466**	1726 (195) **465**	2476 (280) **462**	3092 (349) **453**	4008 (453) **443**		467
Theo. Torque	394 (45)	788 (89)	1576 (178)	2365 (267)	3153 (356)	3941 (445)	4729 (534)	5518 (623)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

200 *12.4 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	358 (40) **7**	808 (91) **4**	1181 (133) **4**	2602 (294) **4**	3323 (375) **3**				10
1 (4)	376 (43) **16**	753 (85) **13**	1769 (200) **12**	2442 (276) **11**	3304 (373) **10**	3915 (442) **9**	4656 (526) **6**		19
2 (8)	385 (44) **34**	821 (93) **31**	1727 (195) **29**	2646 (299) **27**	3311 (374) **27**	4079 (461) **25**	4792 (542) **23**	5451 (616) **20**	38
4 (15)	347 (39) **72**	834 (94) **69**	1752 (198) **67**	2701 (305) **63**	3549 (401) **60**	4222 (477) **58**	4818 (544) **55**	5568 (629) **51**	75
6 (23)		724 (82) **111**	1694 (191) **109**	2518 (284) **107**	3446 (389) **103**	4098 (463) **100**	4894 (553) **99**	5628 (636) **90**	112
8 (30)		704 (80) **148**	1661 (188) **145**	2518 (285) **141**	3556 (402) **136**	4053 (458) **134**	4802 (543) **130**	5554 (628) **124**	150
10 (38)		581 (66) **185**	1592 (180) **181**	2445 (276) **176**	3224 (364) **173**	4051 (458) **170**	4737 (535) **164**	5441 (615) **160**	187
12 (45)			1462 (165) **221**	2312 (261) **214**	3200 (362) **210**	3982 (450) **207**	4731 (535) **198**	5471 (618) **196**	224
14 (53)			1328 (150) **257**	2413 (273) **256**	3253 (368) **247**	3975 (449) **244**	4936 (558) **241**	5328 (602) **235**	261
16 (61)			1183 (134) **296**	2242 (253) **292**	2969 (335) **284**	3850 (435) **277**	4639 (524) **273**	5292 (598) **269**	299
Max. Cont. 18 (68)			1068 (121) **334**	2056 (232) **330**	3003 (339) **327**	3686 (416) **320**	4532 (512) **313**	5299 (599) **308**	336
20 (76)			970 (110) **372**	1823 (206) **372**	2725 (308) **365**	3552 (401) **357**	4484 (507) **352**		373
Max. Inter. 22 (83)				1689 (191) **407**	2520 (285) **403**	3353 (379) **397**	4303 (486) **388**		410
Theo. Torque	494 (56)	987 (112)	1975 (223)	2962 (335)	3949 (446)	4936 (558)	5924 (669)	6911 (781)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

230 *14.2 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	397 (45) **6**	813 (92) **4**	1628 (184) **3**	2590 (293) **2**	3323 (375) **1**				9
1 (4)	429 (48) **14**	890 (101) **12**	1972 (223) **11**	2793 (316) **11**	3660 (414) **9**	4366 (493) **7**	4955 (560) **4**		17
2 (8)	453 (51) **30**	926 (105) **27**	1899 (215) **25**	2911 (329) **25**	3760 (425) **23**	4637 (524) **20**	5468 (618) **17**	6286 (710) **12**	33
4 (15)	384 (43) **63**	960 (108) **59**	1851 (209) **55**	2884 (326) **54**	3846 (435) **52**	4771 (539) **47**	5799 (655) **42**	6381 (721) **39**	66
6 (23)		903 (102) **93**	1889 (213) **88**	3001 (339) **85**	3789 (428) **82**	4747 (536) **77**	5559 (628) **73**	6355 (718) **69**	98
8 (30)		789 (89) **127**	1830 (207) **122**	2793 (316) **120**	3762 (425) **115**	4612 (521) **110**	5653 (639) **107**	6341 (717) **98**	131
10 (38)		690 (78) **161**	1750 (198) **157**	2752 (311) **151**	3856 (436) **148**	4660 (527) **143**	5420 (612) **140**	6218 (703) **132**	163
12 (45)			1669 (189) **191**	2624 (296) **186**	3764 (425) **182**	4517 (510) **176**	5304 (599) **170**	6098 (689) **163**	196
14 (53)			1565 (177) **224**	2596 (293) **216**	3434 (388) **214**	4384 (495) **208**	5197 (587) **205**	6017 (680) **198**	228
16 (61)			1326 (150) **256**	2408 (272) **255**	3509 (397) **249**	4280 (484) **245**	5077 (574) **237**	5925 (669) **227**	261
Max. Cont. 18 (68)			1261 (142) **292**	2333 (264) **286**	3140 (355) **282**	4366 (493) **276**	5032 (569) **274**	5799 (655) **259**	293
20 (76)			1083 (122) **324**	2096 (237) **321**	3068 (347) **316**	4009 (453) **309**	5057 (571) **305**		326
Max. Inter. 22 (83)				1855 (210) **357**	2987 (338) **351**	4104 (464) **345**	4864 (550) **339**		358
Theo. Torque	565 (64)	1131 (128)	2261 (256)	3392 (383)	4522 (511)	5653 (639)	6783 (767)	7914 (894)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

260 *15.9 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	432 (49) **5**	989 (112) **2**							8
1 (4)	475 (54) **12**	998 (113) **11**	2125 (240) **10**	3230 (365) **9**	4227 (478) **8**	5112 (578) **7**	5736 (648) **5**		15
2 (8)	474 (54) **27**	1021 (115) **25**	2184 (247) **24**	3244 (367) **22**	4318 (488) **21**	5230 (591) **19**	6223 (703) **16**		30
4 (15)	429 (49) **57**	1010 (114) **55**	2307 (261) **51**	3214 (363) **51**	4300 (486) **48**	5268 (595) **46**	6171 (697) **43**	7143 (807) **39**	59
6 (23)	397 (45) **86**	1016 (115) **83**	2090 (236) **80**	3221 (364) **78**	4398 (497) **76**	5225 (590) **71**	6379 (721) **68**	7096 (802) **63**	88
8 (30)		833 (94) **114**	2008 (227) **109**	3078 (348) **109**	4224 (477) **105**	5239 (592) **101**	6128 (692) **96**	7027 (794) **88**	117
10 (38)		752 (85) **145**	2044 (231) **144**	3013 (340) **141**	4155 (470) **138**	5180 (585) **133**	6063 (685) **127**	7048 (796) **119**	146
12 (45)		692 (78) **173**	1919 (217) **173**	3135 (354) **168**	4108 (464) **166**	5018 (567) **161**	5945 (672) **153**	7095 (802) **144**	175
14 (53)		563 (64) **202**	1754 (198) **202**	2886 (326) **200**	3941 (445) **196**	5026 (568) **184**	5908 (668) **181**	6771 (765) **176**	204
16 (61)			1608 (182) **231**	2644 (299) **229**	3965 (448) **221**	4884 (552) **219**	5763 (651) **216**	6659 (752) **209**	233
18 (68)			1417 (160) **261**	2693 (304) **261**	3690 (417) **256**	4870 (550) **247**	5689 (643) **240**	6551 (740) **232**	262
Max. Cont. 20 (76)			1204 (136) **290**	2460 (278) **289**	3464 (391) **285**	4614 (521) **277**	5628 (636) **274**	6516 (736) **263**	291
22 (83)			1168 (132) **319**	2325 (263) **319**	3314 (374) **315**	4535 (512) **311**	5442 (615) **301**		320
Max. Inter. 24 (91)			722 (82) **348**	2009 (227) **347**	3190 (361) **345**	4386 (496) **340**			349
Theo. Torque	633 (72)	1266 (143)	2532 (286)	3798 (429)	5064 (572)	6330 (715)	7596 (858)	8861 (1001)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

300 *18.3 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	452 (51) **3**	839 (95) **1**							7
1 (4)	557 (63) **11**	1282 (145) **10**	2675 (302) **9**	3829 (433) **8**	4513 (510) **7**	5552 (627) **4**			13
2 (8)	551 (62) **22**	1400 (158) **20**	2722 (308) **19**	3866 (437) **19**	5056 (571) **16**	6011 (679) **13**	6796 (768) **9**	7346 (830) **5**	26
4 (15)	588 (66) **48**	1281 (145) **47**	2793 (316) **45**	3805 (430) **43**	5107 (577) **38**	6015 (680) **33**	7258 (820) **28**	8040 (908) **21**	51
6 (23)	511 (58) **75**	1241 (140) **75**	2566 (290) **72**	3755 (424) **69**	4830 (546) **65**	6105 (690) **57**	7088 (801) **49**	8372 (946) **40**	76
8 (30)	405 (46) **100**	1136 (128) **100**	2699 (305) **99**	3460 (391) **96**	5056 (571) **87**	6199 (700) **82**	7313 (826) **71**	8233 (930) **62**	101
10 (38)		981 (111) **125**	2493 (282) **124**	3623 (409) **121**	4447 (503) **115**	6043 (683) **106**	7028 (794) **98**	8131 (919) **88**	127
12 (45)		814 (92) **150**	2313 (261) **150**	3435 (388) **148**	4177 (472) **143**	5676 (641) **133**	6927 (783) **122**	7794 (881) **113**	152
14 (53)		684 (77) **176**	2165 (245) **175**	3464 (391) **175**	4687 (530) **173**	5848 (661) **163**	7157 (809) **151**	8398 (949) **138**	177
16 (61)		553 (63) **201**	1983 (224) **201**	3243 (366) **199**	4498 (508) **192**	5599 (633) **187**	7044 (796) **173**	8103 (916) **163**	202
18 (68)			1780 (201) **225**	2999 (339) **225**	4135 (467) **222**	5898 (666) **211**	7115 (804) **199**	7955 (899) **194**	228
20 (76)			1522 (172) **251**	2895 (327) **251**	4247 (480) **247**	5410 (611) **240**	6596 (745) **232**	8051 (910) **217**	253
Max. Cont. 22 (83)			1276 (144) **277**	2836 (321) **276**	4127 (466) **269**	5084 (575) **263**	6474 (732) **254**	7611 (860) **242**	278
24 (91)			1049 (119) **302**	2483 (281) **301**	3853 (435) **300**	4943 (559) **291**	6223 (703) **280**		303
Max. Inter. 25 (95)			928 (105) **315**	2319 (262) **314**	3838 (434) **311**	4894 (553) **307**	6257 (707) **294**		316
Theo. Torque	729 (82)	1457 (165)	2914 (329)	4371 (494)	5828 (659)	7285 (823)	8742 (988)	10199 (1152)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

350 *21.2 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	566 (64) **4**	1183 (134) **4**	2404 (272) **3**	3532 (399) **2**					6
1 (4)	570 (64) **10**	1189 (134) **9**	2619 (296) **8**	3869 (437) **8**					11
2 (8)	607 (69) **21**	1285 (145) **20**	2764 (312) **19**	4092 (462) **18**	5308 (600) **18**	6571 (742) **17**	7569 (855) **14**		22
4 (15)	627 (71) **42**	1340 (151) **41**	2767 (313) **40**	4169 (471) **39**	5577 (630) **37**	6834 (772) **35**	7869 (889) **34**	8785 (993) **28**	44
6 (23)	549 (62) **64**	1318 (149) **63**	2788 (315) **62**	4191 (474) **60**	5577 (630) **57**	6796 (768) **54**	8182 (925) **51**	9137 (1032) **45**	66
8 (30)	472 (53) **86**	1233 (139) **85**	2713 (307) **84**	4058 (459) **82**	5537 (626) **79**	6793 (768) **75**	8210 (928) **69**	9300 (1051) **65**	88
10 (38)		1004 (113) **108**	2639 (298) **108**	3814 (431) **108**	5317 (601) **102**	6593 (745) **100**	8056 (910) **93**	9399 (1062) **87**	109
12 (45)		869 (98) **130**	2346 (265) **129**	3936 (445) **128**	5144 (581) **125**	6552 (740) **117**	7889 (891) **109**	9237 (1044) **104**	131
14 (53)		758 (86) **152**	2226 (252) **151**	3738 (422) **150**	5044 (570) **147**	6398 (723) **139**	7794 (881) **133**	9126 (1031) **120**	153
16 (61)		560 (63) **173**	2079 (235) **173**	3619 (409) **172**	4859 (549) **170**	6375 (720) **163**	7522 (850) **155**	8952 (1012) **147**	175
18 (68)			1948 (220) **195**	3490 (394) **194**	5054 (571) **190**	6134 (693) **187**	7428 (839) **175**	8727 (986) **164**	197
20 (76)			1843 (208) **217**	3320 (375) **216**	4544 (513) **214**	6044 (683) **213**	7385 (835) **195**	8632 (975) **188**	218
Max. Cont. 22 (83)			1583 (179) **239**	3112 (352) **239**	4906 (554) **238**	6064 (685) **233**	7198 (813) **221**	8482 (958) **215**	240
24 (91)			1526 (172) **261**	3186 (360) **261**	4724 (534) **260**	5890 (666) **256**			262
Max. Inter. 25 (95)				3264 (369) **271**	4682 (529) **270**	5730 (647) **265**			273
Theo. Torque	844 (95)	1688 (191)	3376 (381)	5064 (572)	6752 (763)	8439 (954)	10127 (1144)	11815 (1335)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

375 *22.8 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	674 (76) **3**								6
1 (4)	745 (84) **8**	1432 (162) **7**	2911 (329) **6**	4337 (490) **6**	5652 (639) **5**	6756 (763) **3**			11
2 (8)	724 (82) **18**	1510 (171) **17**	3196 (361) **16**	4754 (537) **16**	6095 (689) **14**	7399 (836) **12**	8449 (955) **9**		21
4 (15)	680 (77) **39**	1439 (163) **37**	3164 (358) **37**	4756 (537) **36**	6151 (695) **32**	7587 (857) **29**	8750 (989) **25**	9923 (1121) **20**	41
6 (23)	595 (67) **60**	1398 (158) **59**	3130 (354) **56**	4661 (527) **56**	6155 (695) **52**	7642 (864) **47**	8951 (1011) **40**	10334 (1168) **36**	61
8 (30)	508 (57) **80**	1321 (149) **80**	3010 (340) **78**	4512 (510) **77**	6154 (695) **71**	7476 (845) **65**	8930 (1009) **60**	10229 (1156) **51**	82
10 (38)		1187 (134) **100**	2849 (322) **99**	4383 (495) **96**	6024 (681) **93**	7399 (836) **87**	8913 (1007) **80**	10235 (1157) **71**	102
12 (45)		1013 (115) **121**	2661 (301) **120**	4249 (480) **118**	5711 (645) **113**	7159 (809) **108**	8674 (980) **98**	10098 (1141) **92**	122
14 (53)		819 (93) **141**	2475 (280) **140**	4218 (477) **138**	5602 (633) **134**	7036 (795) **128**	8402 (949) **120**	9887 (1117) **105**	142
16 (61)		646 (73) **161**	2314 (261) **161**	3797 (429) **160**	5296 (598) **155**	6817 (770) **151**	8267 (934) **141**	9605 (1085) **130**	163
18 (68)			2091 (236) **181**	3843 (434) **181**	5282 (597) **177**	6771 (765) **168**	8026 (907) **161**	9554 (1080) **150**	183
Max. Cont. 20 (76)			1851 (209) **202**	3396 (384) **201**	4969 (561) **198**	6549 (740) **191**	7764 (877) **183**	9091 (1027) **168**	203
22 (83)			1576 (178) **222**	3309 (374) **221**	4694 (530) **218**	6160 (696) **213**	7431 (840) **205**		223
Max. Inter. 24 (91)			1246 (141) **242**	2822 (319) **241**	4523 (511) **239**	5860 (662) **233**			244
Theo. Torque	908 (103)	1815 (205)	3631 (410)	5446 (615)	7261 (821)	9076 (1026)	10892 (1231)	12707 (1436)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

470 *28.3 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	Max. Cont. 2500 (173)	Peak 3000 (207)	Theo. RPM
0.5 (2)	823 (93) **2**	1635 (185) **1**						5
1 (4)	857 (97) **7**	1794 (203) **5**	3618 (409) **5**	5402 (610) **5**	7209 (815) **4**			9
2 (8)	865 (98) **15**	1845 (209) **14**	3851 (435) **13**	5836 (659) **13**	7563 (855) **12**	9071 (1025) **11**	10586 (1196) **9**	17
4 (15)	834 (94) **31**	1774 (200) **30**	3932 (444) **28**	5829 (659) **28**	7836 (886) **26**	9434 (1066) **23**	11062 (1250) **21**	33
6 (23)	759 (86) **48**	1704 (193) **47**	3880 (438) **44**	5955 (673) **44**	7715 (872) **41**	9499 (1073) **37**	11128 (1258) **32**	49
8 (30)	643 (73) **64**	1587 (179) **63**	3752 (424) **60**	5863 (663) **60**	7586 (857) **57**	9718 (1098) **50**	11317 (1279) **43**	66
10 (38)	464 (52) **81**	1455 (164) **80**	3597 (407) **78**	5550 (627) **78**	7533 (851) **75**	9444 (1067) **68**	11288 (1276) **61**	82
12 (45)		1248 (141) **97**	3350 (379) **94**	5575 (630) **93**	7363 (832) **90**	9441 (1067) **83**	11264 (1273) **76**	98
14 (53)		1006 (114) **113**	3094 (350) **112**	5133 (580) **111**	7101 (802) **108**	8964 (1013) **102**	10817 (1222) **94**	115
16 (61)		736 (83) **130**	2846 (322) **129**	4819 (545) **127**	7040 (796) **123**	8538 (965) **119**	10528 (1190) **113**	131
18 (68)		497 (56) **146**	2434 (275) **145**	4657 (526) **145**	6519 (737) **142**	8464 (956) **138**	10317 (1166) **128**	147
Max. Cont. 20 (76)			2078 (235) **162**	4239 (479) **161**	6249 (706) **158**	8117 (917) **154**	9933 (1122) **143**	164
22 (83)			1790 (202) **179**	4075 (460) **178**	5920 (669) **176**	7811 (883) **170**		180
Max. Inter. 24 (91)			1392 (157) **195**	3410 (385) **194**	5484 (620) **190**	7464 (843) **186**		196
Theo. Torque	1127 (127)	2253 (255)	4506 (509)	6760 (764)	9013 (1018)	11266 (1273)	13519 (1528)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

540 *32.7 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	Max. Cont. 2000 (138)	Inter. 2500 (173)	Theo. RPM
0.5 (2)	921 (104) **2**	1748 (197) **2**					4
1 (4)	1111 (126) **6**	2031 (230) **5**	4136 (467) **5**	6183 (699) **5**	8310 (939) **5**	10165 (1149) **4**	8
2 (8)	1189 (134) **13**	2120 (240) **13**	4436 (501) **12**	6679 (755) **12**	8646 (977) **11**	10484 (1185) **10**	15
4 (15)	1058 (120) **27**	2055 (232) **27**	4510 (510) **26**	6697 (757) **26**	8740 (988) **24**	10827 (1223) **23**	29
6 (23)	859 (97) **41**	1984 (224) **41**	4469 (505) **40**	6930 (783) **40**	8787 (993) **38**	10838 (1225) **34**	43
8 (30)	692 (78) **56**	1887 (213) **56**	4285 (484) **55**	6635 (750) **54**	8698 (983) **53**	11075 (1251) **48**	57
10 (38)	523 (59) **70**	1678 (190) **70**	4026 (455) **69**	6445 (728) **69**	8487 (959) **67**	11008 (1244) **62**	71
12 (45)		1554 (176) **84**	3879 (438) **83**	6360 (719) **83**	8360 (945) **80**	10646 (1203) **77**	85
14 (53)		1233 (139) **98**	3703 (418) **97**	6035 (682) **96**	8421 (952) **94**	10467 (1183) **91**	99
16 (61)		963 (109) **112**	3407 (385) **111**	5908 (668) **111**	7957 (899) **110**	10290 (1163) **105**	114
18 (68)		736 (83) **126**	3154 (356) **126**	5417 (612) **125**	7694 (869) **124**	9876 (1116) **123**	128
Max. Cont. 20 (76)			2861 (323) **140**	5333 (603) **139**	7335 (829) **138**	9816 (1109) **134**	142
22 (83)			2629 (297) **154**	4753 (537) **153**	7011 (792) **152**		156
Max. Inter. 24 (91)			1905 (215) **169**	4349 (491) **168**	6639 (750) **168**		170
Theo. Torque	1302 (147)	2604 (294)	5207 (588)	7811 (883)	10414 (1177)	13018 (1471)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

750 *45.6 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	Max. Cont. 1500 (104)	Peak 2000 (138)	Theo. RPM
0.5 (2)	1299 (147) **2**	2487 (281) **1**				3
1 (4)	1379 (156) **4**	2852 (322) **4**	5768 (652) **4**	8554 (967) **3**	11571 (1308) **3**	5
2 (8)	1403 (158) **9**	3003 (339) **9**	6134 (693) **9**	9088 (1027) **8**	12033 (1360) **7**	11
4 (15)	1350 (153) **19**	2933 (331) **19**	6241 (705) **19**	9419 (1064) **18**	12534 (1416) **16**	21
6 (23)	1194 (135) **29**	2840 (321) **29**	6166 (697) **28**	9373 (1059) **28**	12462 (1408) **26**	31
8 (30)	1008 (114) **40**	2690 (304) **40**	6002 (678) **39**	9197 (1039) **38**	12573 (1421) **34**	41
10 (38)	722 (82) **50**	2395 (271) **49**	5733 (648) **49**	8980 (1015) **48**	12130 (1371) **47**	51
12 (45)	477 (54) **60**	2207 (249) **60**	5452 (616) **59**	8699 (983) **59**	11902 (1345) **56**	61
14 (53)		1739 (197) **70**	5104 (577) **69**	8372 (946) **68**	11600 (1311) **67**	71
16 (61)		1325 (150) **80**	4718 (533) **79**	8008 (905) **78**	11249 (1271) **76**	82
18 (68)		927 (105) **90**	4374 (494) **90**	7614 (860) **89**	10843 (1225) **88**	92
Max. Cont. 20 (76)		552 (62) **100**	3741 (423) **100**	7123 (805) **99**	10385 (1173) **98**	102
22 (83)			3404 (385) **110**	6608 (747) **110**		112
Max. Inter. 24 (91)			2669 (302) **121**	5932 (670) **120**		122
Theo. Torque	1815 (205)	3631 (410)	7261 (821)	10892 (1231)	14522 (1641)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

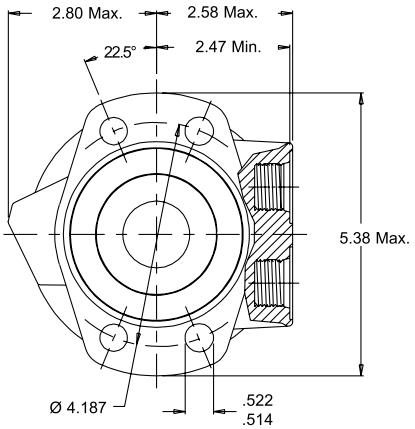
Tested at 129°F with an oil viscosity of 213 SUS

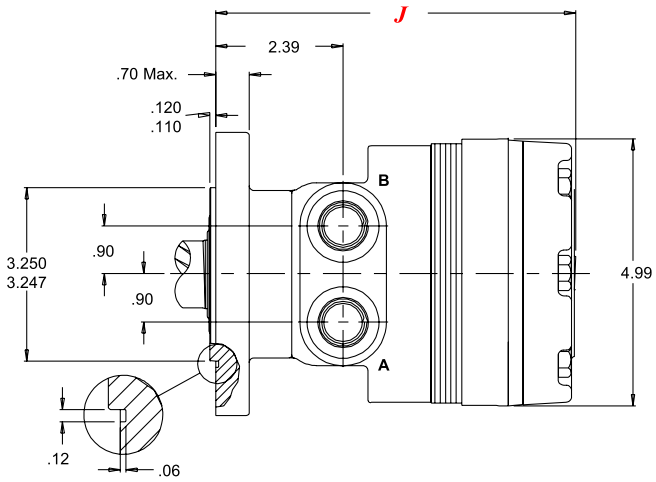
Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Housings

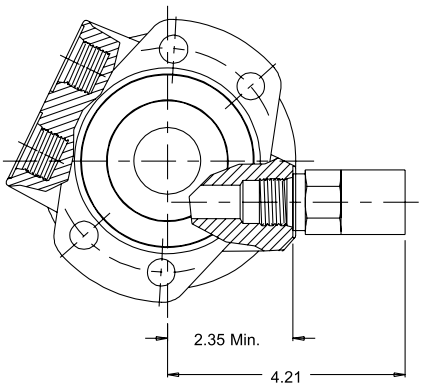
SAE A Flange

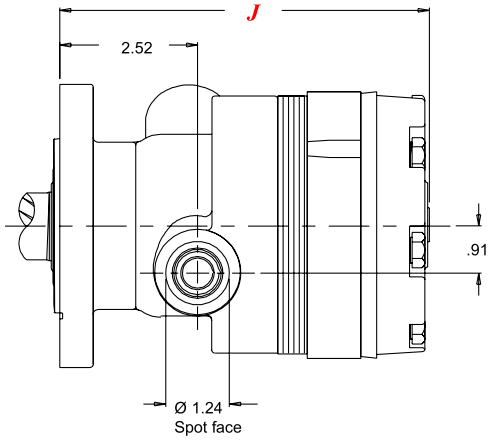
A31 *4-Hole Front Aligned Ports 7/8" O-Ring*
A38 *4-Hole Front Aligned Ports 1/2" BSP.F*





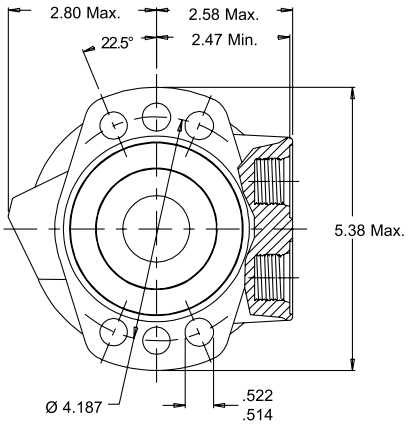
Optional Relief Cartridge shown installed and is available for both the A31 and A38 housings.

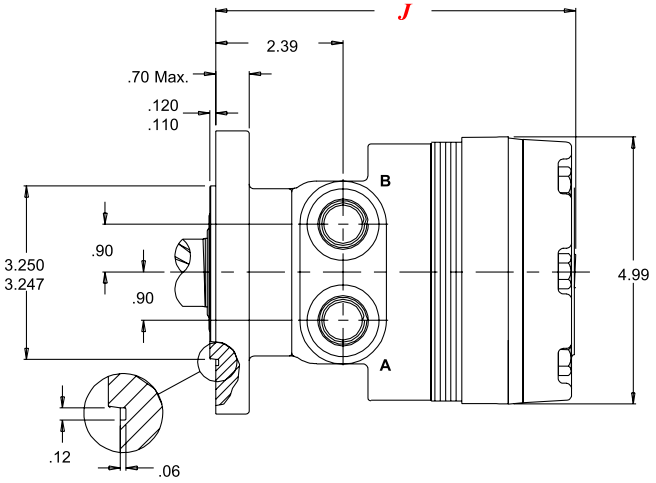




Valve Cavity - 10 Series/2-way (7/8"-14 UNF-2B)

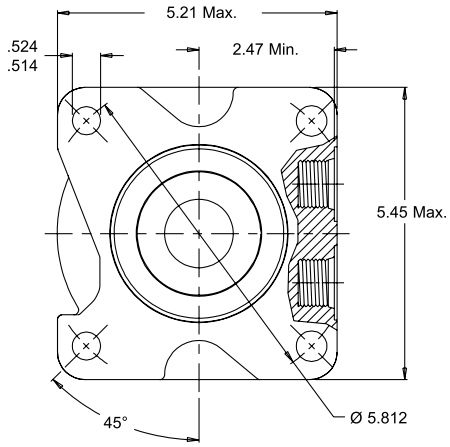
A51 *6-Hole Front Aligned Ports 7/8" O-Ring*
A58 *6-Hole Front Aligned Ports 1/2" BSP.F*

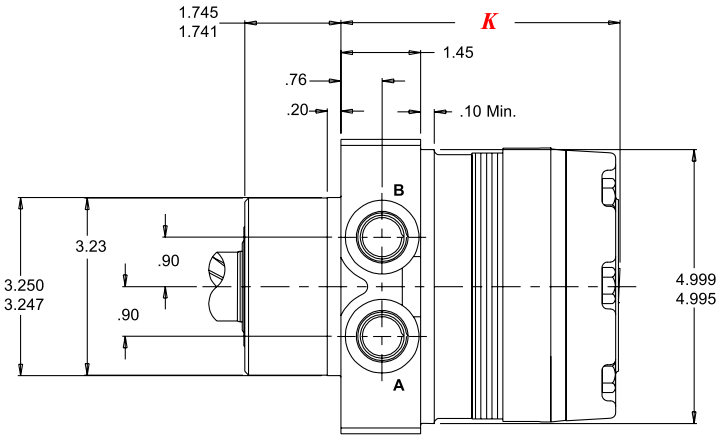




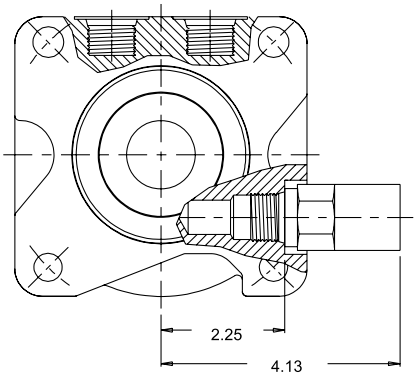
Wheel Mount

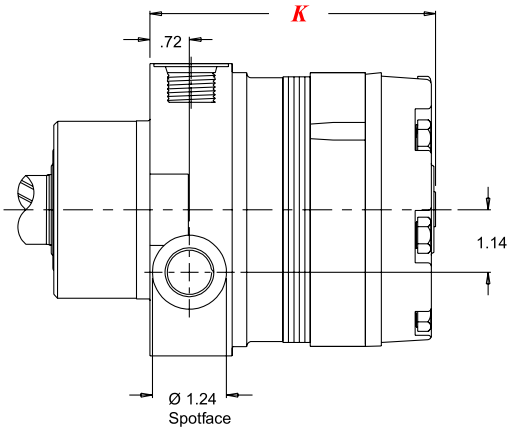
W31 *4-Hole Front Aligned Ports 7/8" O-Ring*
W38 *4-Hole Front Aligned Ports 1/2" BSP.F*





Optional Relief Cartridge shown installed and is available for both the W31 and W38 housings.





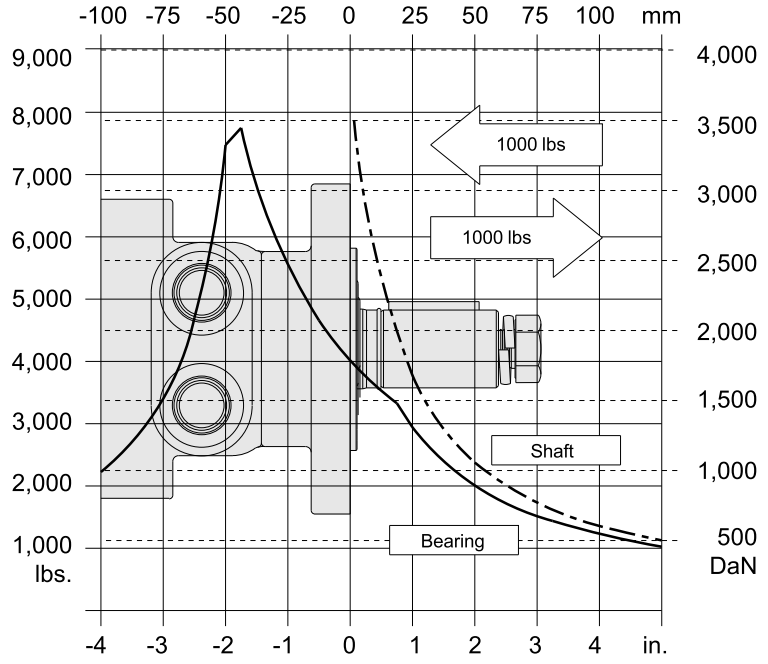
Valve Cavity - 10 Series/2-way (7/8"-14 UNF-2B)

Technical

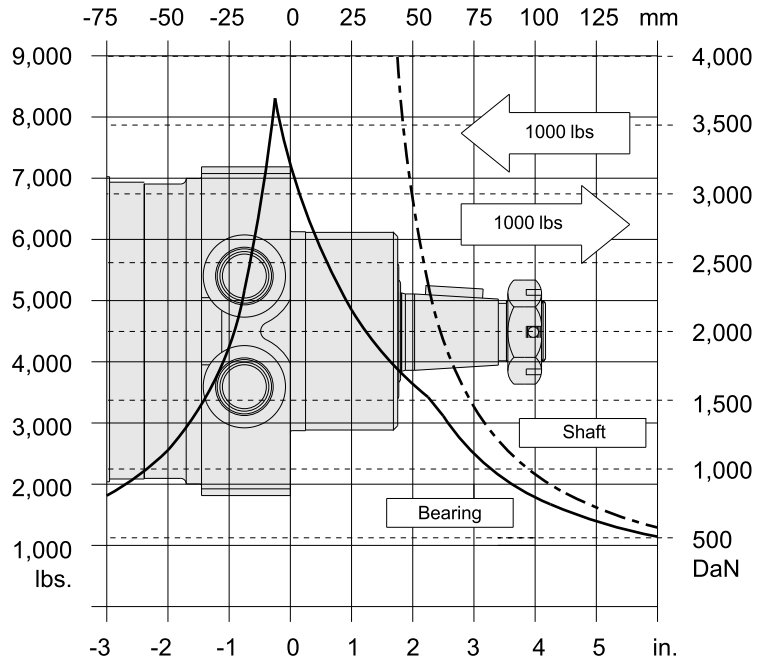
Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

SAE A Flange



Wheel Mount



Length and Weight Tables

SAE A Flange

Code	*J* in	Weight lbs
120	6.37	23.4
160	6.37	23.4
200	6.51	24.2
230	6.61	24.4
260	6.70	25.0
300	6.83	25.8
350	7.38	28.2
375	7.08	27.0
470	7.38	28.2
540	7.62	29.4
750	8.33	32.5

Wheel Mount

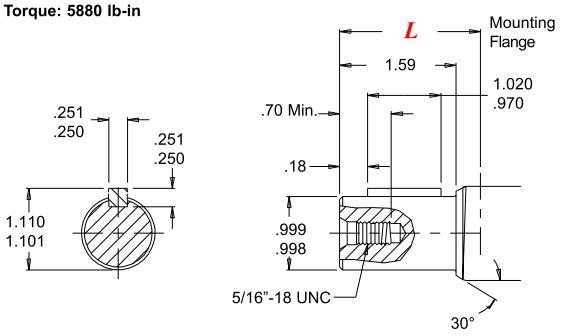
Code	*K* in	Weight lbs
120	4.72	25.8
160	4.72	25.8
200	4.86	26.6
230	4.95	26.8
260	5.05	27.4
300	5.18	28.2
350	5.73	30.6
375	5.43	29.4
470	5.73	30.6
540	5.97	31.8
750	6.68	34.9

RE motor weights vary ± 1 lb depending upon motor configuration.

Back

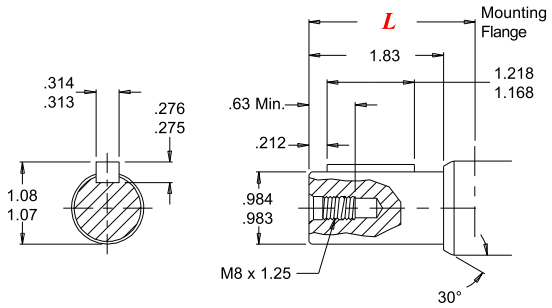
10 *1" Straight*

Max. Torque: 5880 lb-in



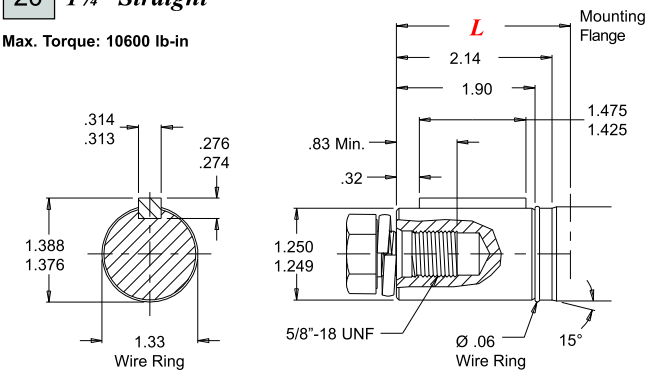
12 *25mm Straight*

Max. Torque: 5617 lb-in



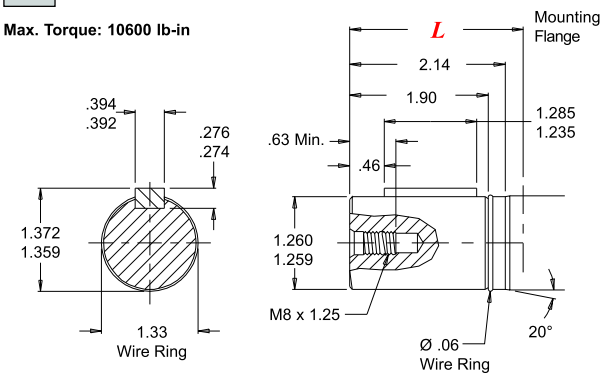
20 *1¼" Straight*

Max. Torque: 10600 lb-in



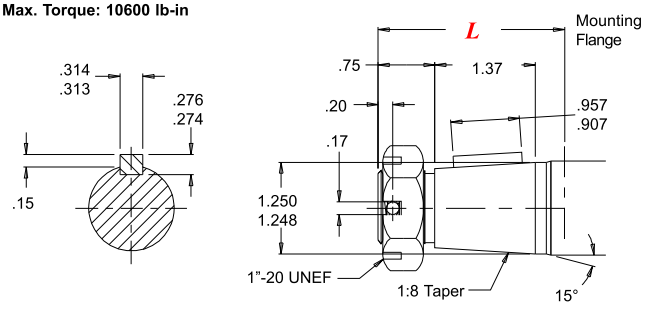
21 *32mm Straight*

Max. Torque: 10600 lb-in



22 *1¼" Tapered*

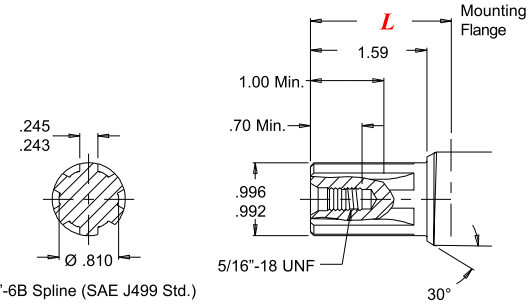
Max. Torque: 10600 lb-in



Note: A slotted nut is standard on this shaft.

02 *6B Spline*

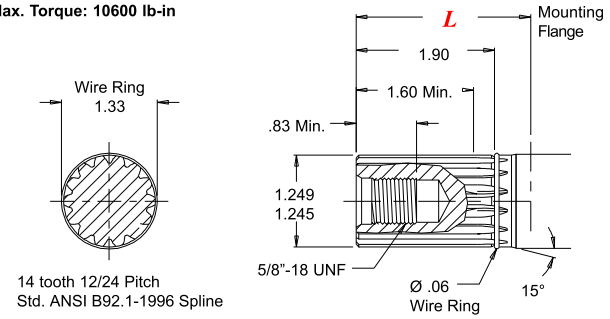
Max. Torque: 10600 lb-in



1"-6B Spline (SAE J499 Std.)

23 *14 Tooth Spline*

Max. Torque: 10600 lb-in



14 tooth 12/24 Pitch
Std. ANSI B92.1-1996 Spline

Shaft Lengths

L

Code	SAE A Flange in	Wheel Mount in
02	1.97	3.60
22	2.58	4.22
20	2.41	4.05
23	2.42	4.06
10	1.97	3.60
21	2.41	4.05
12	2.21	3.84

Back

Ordering Information

SERIES

501 — REVERSED TIMING

500

DISPLACEMENT | HOUSING | SHAFT | OPTIONS | MISCELLANEOUS

Code	Displacement
120	7.4 in³/rev
160	9.9 in³/rev
200	12.4 in³/rev
230	14.2 in³/rev
260	15.9 in³/rev
300	18.3 in³/rev
350	21.2 in³/rev
375	22.8 in³/rev
470	28.3 in³/rev
540	32.7 in³/rev
750	45.6 in³/rev

Code	Housing
W38	4-Hole Front Ports 1/2" BSP.F
A38	4-Hole Front Ports 1/2" BSP.F (S)
W31	4-Hole Front Ports 7/8" O-ring
A31	4-Hole Front Ports 7/8" O-ring (S)
A51	6-Hole Front Ports 7/8" O-ring
A58	6-Hole Front Ports 1/2" BSP.F

Code	Shafts
02	6-B Spline
22	1-1/4" Tapered
20	1-1/4" Straight
23	14 Tooth Spline
10	1" Straight
12	25mm Straight
21	32mm Straight

Code	Options
AA	None
AC	Freeturning Rotor
AE	Hydraulic Declutch (With Freeturning Rotor)

PAINT | CAVITY | ADD ONS

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

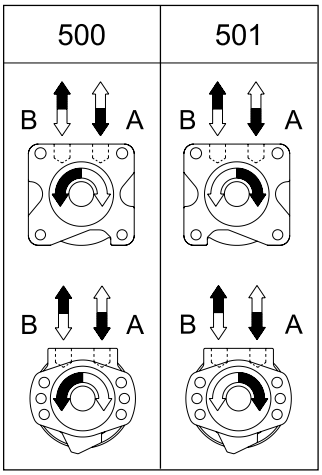
Code	Options
A	Standard
B	Lock Nut
C	Solid Hex Nut
**W	4-Pin Male Weatherpack Connector (Dual)
**X	4-Pin M12 Male Connector (Dual)
**Y	3-Pin Male Weatherpack Connector (Single)
**Z	4-Pin M12 Male Connector (Single)

* Available with A31, A38, W31, and W38 housings

** Available with A31 and A38 housings and must use a medium duty shafts

(S) Speed sensor components

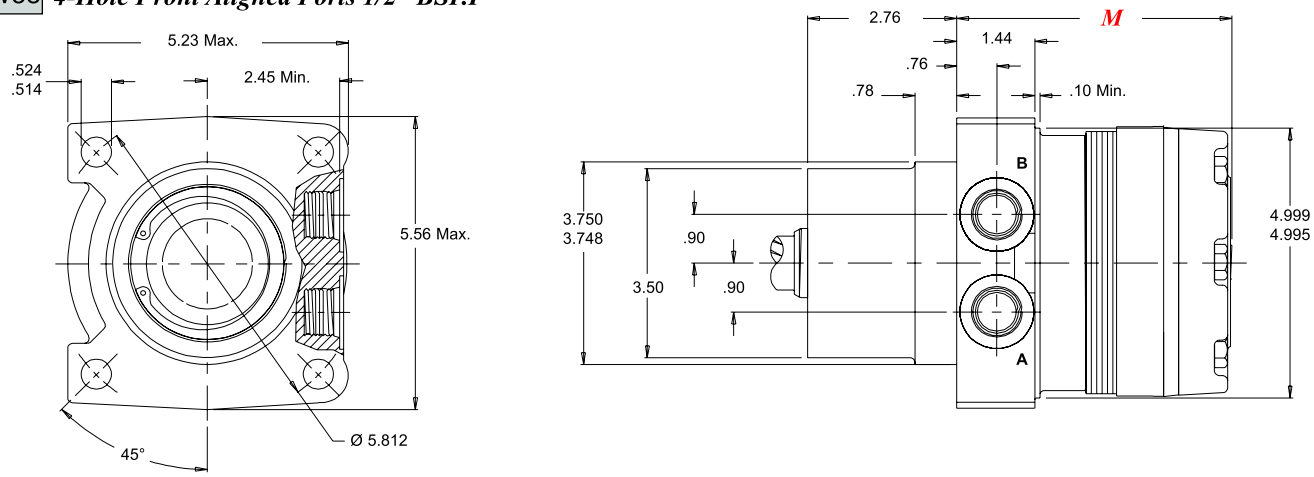
Shaft Rotation



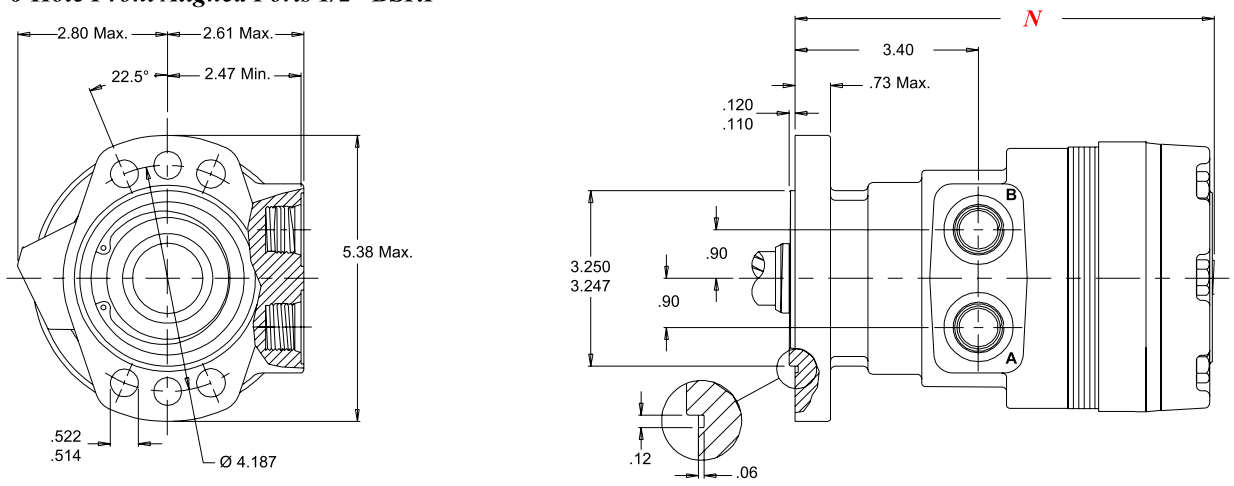
For applications requiring the motor to rotate in only one direction, shaft seal life may be prolonged by pressurizing the “A” port of the motor. To obtain the desired direction of shaft rotation, use the graphic at the left to determine the rotation code for the motor. For bidirectional applications, the 500 series is recommended. Preferred rotation is determined by internal valving design.

Wheel Mount, SAE A Flange

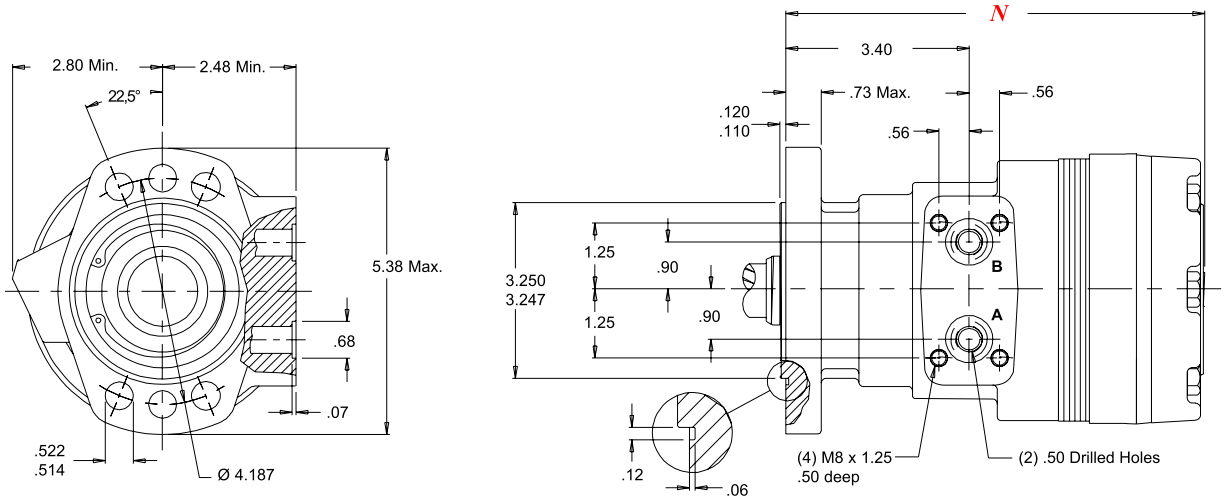
W31 *4-Hole Front Aligned Ports 7/8" O-Ring*
W38 *4-Hole Front Aligned Ports 1/2" BSP.F*



A51 *6-Hole Front Aligned Ports 7/8" O-Ring*
A58 *6-Hole Front Aligned Ports 1/2" BSP.F*



A57 *6-Hole Manifold Aligned Ports*

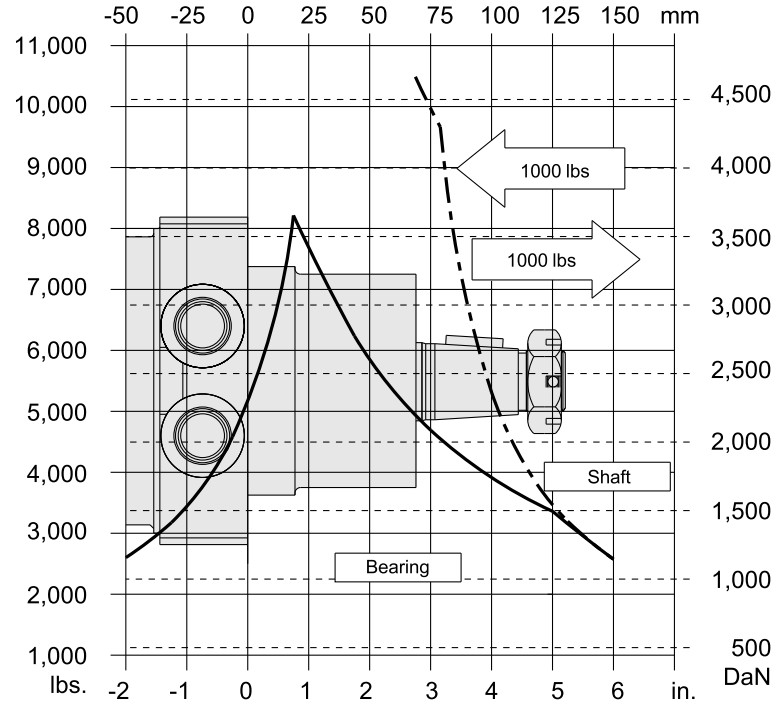


Technical

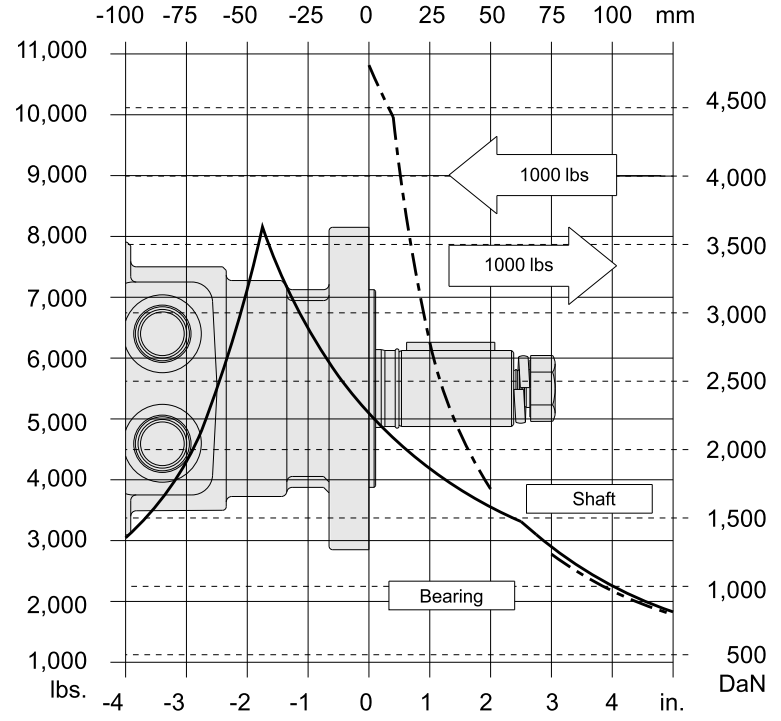
Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

Wheel Mount



SAE A Flange



Length and Weight Tables

Wheel Mount

Code	***M*** in	Weight lbs
120	4.72	28.4
160	4.72	28.4
200	4.86	29.2
230	4.95	29.4
260	5.05	30.0
300	5.18	30.8
350	5.73	33.2
375	5.43	32.0
470	5.73	33.2
540	5.97	34.4
750	6.68	37.5

SAE A Flange

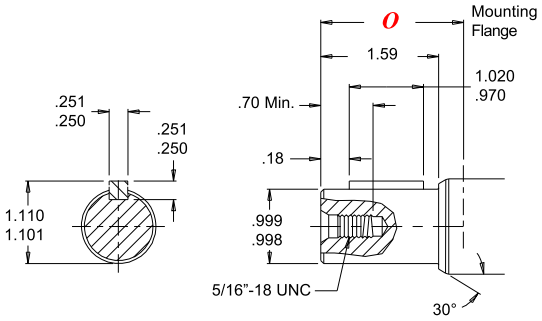
Code	***N*** in	Weight lbs
120	7.37	29.4
160	7.37	29.4
200	7.51	30.2
230	7.61	30.4
260	7.70	31.0
300	7.83	31.8
350	8.38	34.2
375	8.08	33.0
470	8.38	34.2
540	8.62	35.4
750	9.33	38.5

RE motor weights vary ± 1 lb depending upon motor configuration.

Back

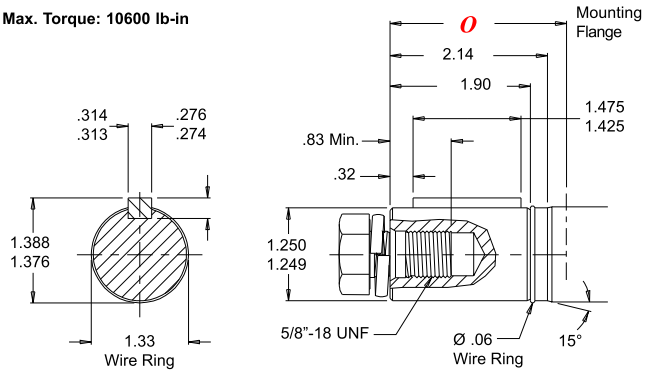
15 *1" Straight*

Max. Torque: 5800 lb-in



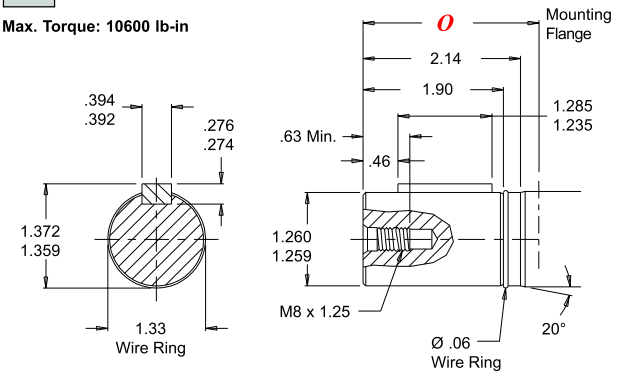
07 *1¼" Straight*

Max. Torque: 10600 lb-in



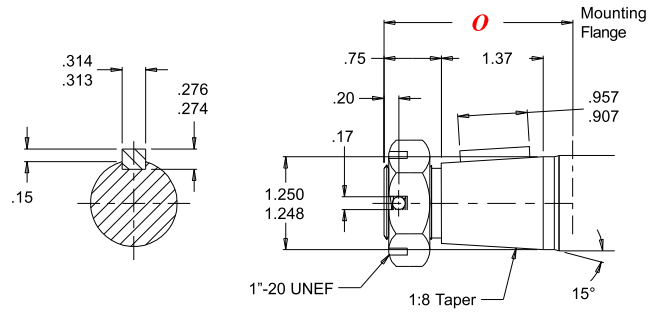
08 *32mm Straight*

Max. Torque: 10600 lb-in



25 *1¼" Tapered*

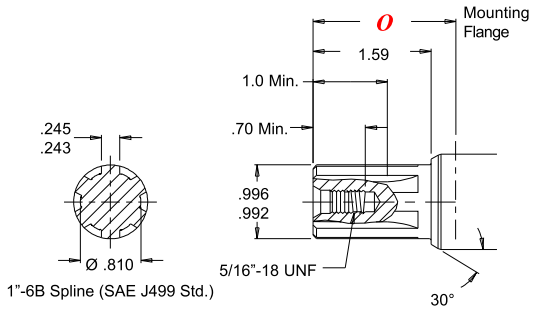
Max. Torque: 10600 lb-in



Note: A slotted nut is standard on this shaft.

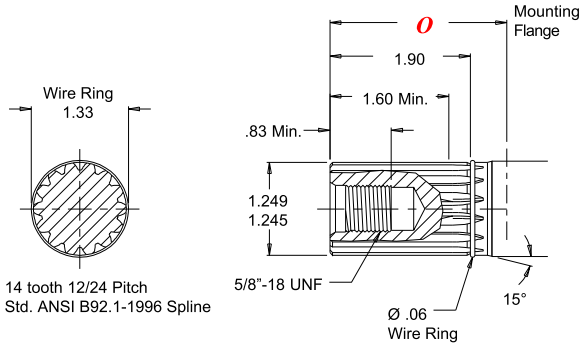
03 *6B Spline / SAE 6b*

Max. Torque: 10600 lb-in



09 *14 Tooth Spline*

Max. Torque: 10600 lb-in



Shaft Lengths

O Code	SAE A Flange in	Wheel Mount in
25	2.63	5.31
07	2.47	5.15
09	2.46	5.14
08	2.47	5.15
03	2.02	4.69
15	2.02	4.69

Back

Ordering Information

SERIES
521
520
REVERSED TIMING

DISPLACEMENT | HOUSING | SHAFT | OPTIONS | MISCELLANEOUS

Code	Displacement
120	7.4 in³/rev
160	9.9 in³/rev
200	12.4 in³/rev
230	14.2 in³/rev
260	15.9 in³/rev
300	18.3 in³/rev
350	21.2 in³/rev
375	22.8 in³/rev
470	28.3 in³/rev
540	32.7 in³/rev
750	45.6 in³/rev

Code	Housings
W31	4-Hole Front Ports 7/8" O-ring
W38	4-Hole Front Ports 1/2" BSP.F
A51	6-Hole Front Ports 7/8" O-ring
A58	6-Hole Front Ports 1/2" BSP.F
A57	6-Hole Manifold Ports

Code	Shafts
25	1-1/4" Tapered Ext.
07	1-1/4" Straight Ext.
09	14 Tooth Spline Ext.
08	32mm Straight Ext.
03	6-B Spline Ext.
15	1" Straight Ext.

Code	Options
AA	None
AC	Freeturning Rotor
AE	Hydraulic Declutch (With Freeturning Rotor)

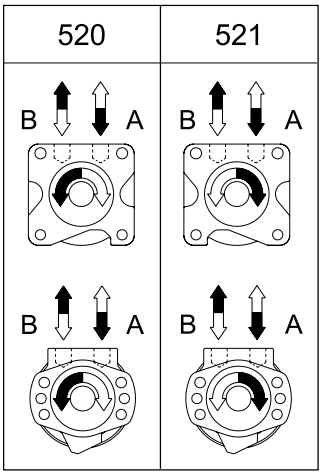
PAINT | CAVITY | ADD ONS

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

Code	Options
A	None

Code	Options
A	Standard
B	Lock Nut
C	Solid Hex Nut

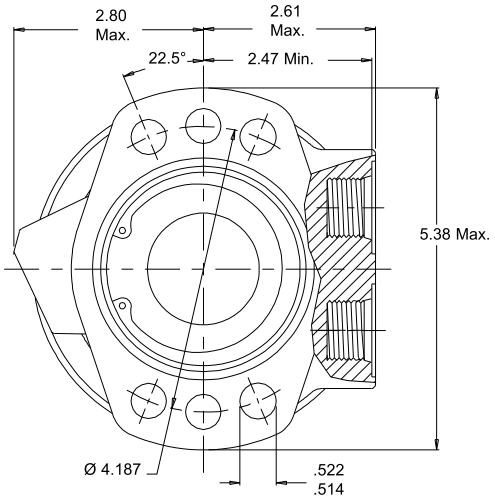
Shaft Rotation

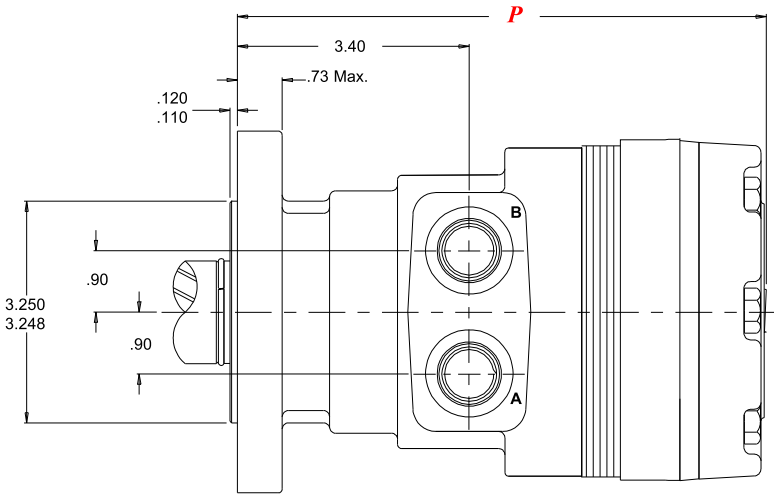


For applications requiring the motor to rotate in only one direction, shaft seal life may be prolonged by pressurizing the “A” port of the motor. To obtain the desired direction of shaft rotation, use the graphic at the left to determine the rotation code for the motor. For bidirectional applications, the 520 series is recommended. Preferred rotation is determined by internal valving design.

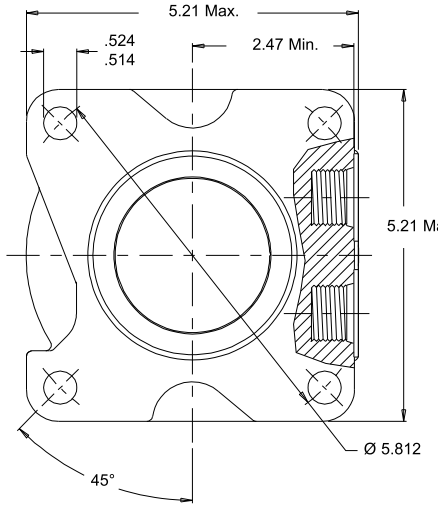
SAE A Flange, Wheel Mount

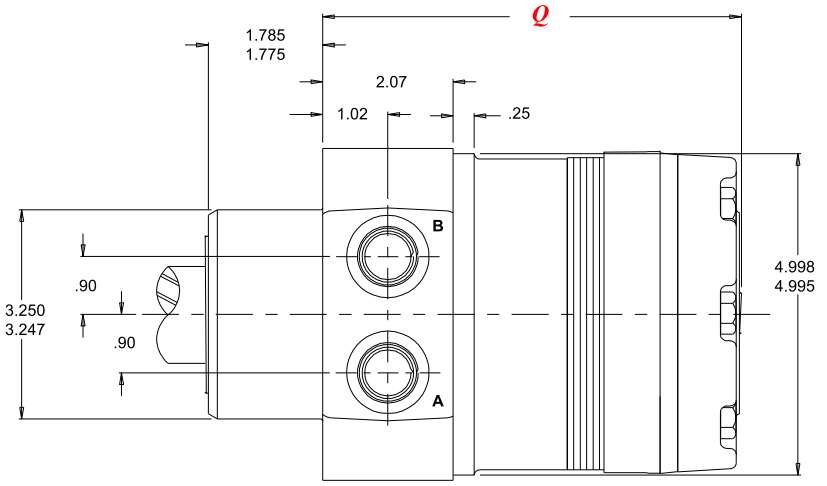
A51 *6-Hole Front Aligned Ports 7/8" O-Ring*
A58 *6-Hole Front Aligned Ports 1/2" BSP.F*





W31 *4-Hole Front Aligned Ports 7/8" O-Ring*
W38 *4-Hole Front Aligned Ports 1/2" BSP.F*



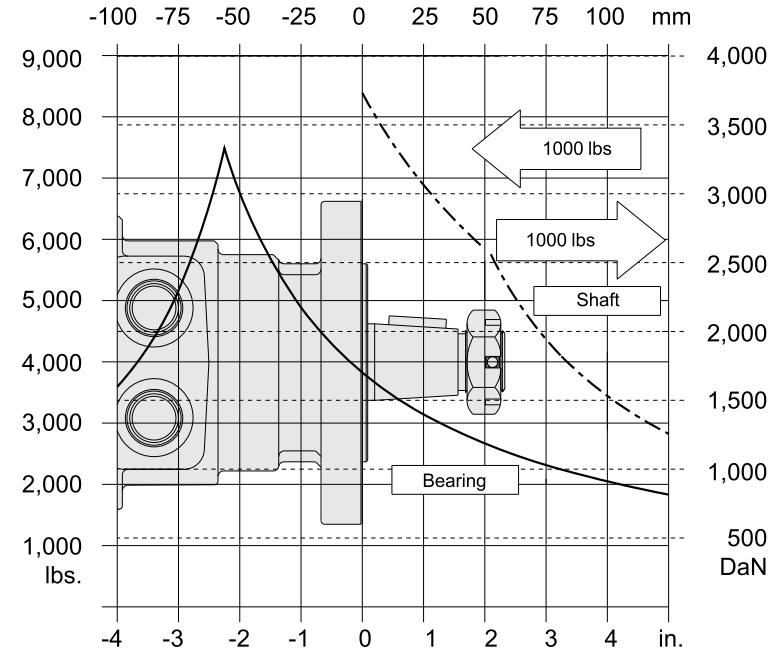


Technical

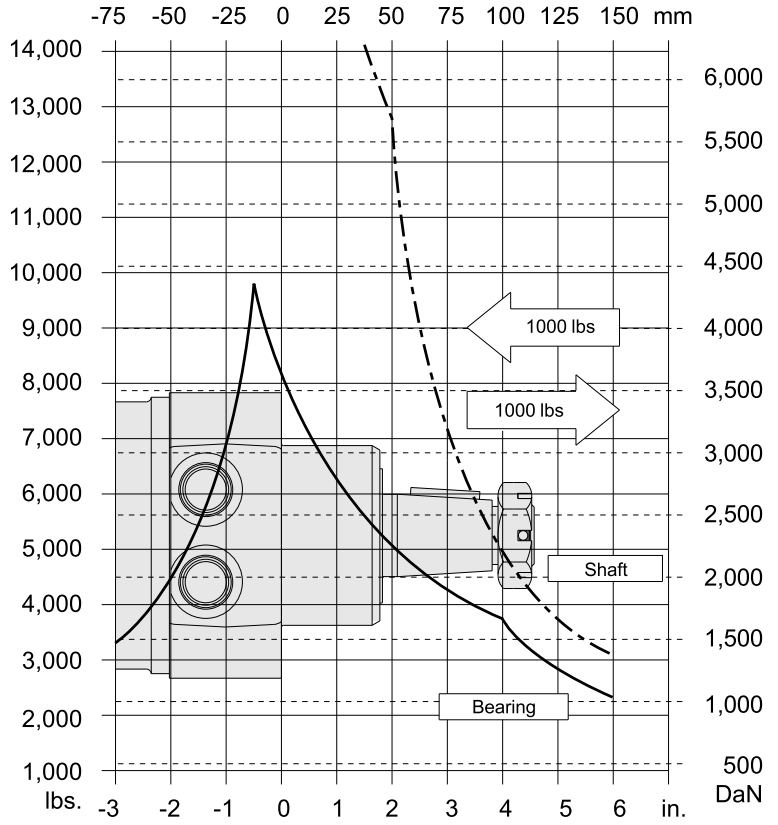
Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

SAE A Flange



Wheel Mount



Length and Weight Tables

SAE A Flange

Code	***P*** in	Weight lbs
120	7.37	29.4
160	7.37	29.4
200	7.51	30.2
230	7.61	30.4
260	7.70	31.0
300	7.83	31.8
350	8.38	34.2
375	8.08	33.0
470	8.38	34.2
540	8.62	35.4
750	9.33	38.5

Wheel Mount

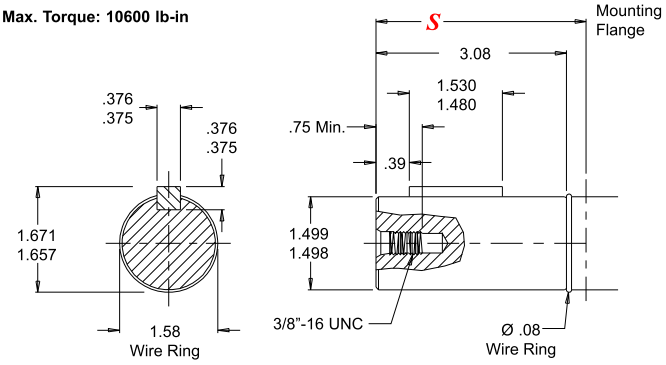
Code	***Q*** in	Weight lbs
120	6.15	32.8
160	6.15	32.8
200	6.29	33.6
230	6.38	33.8
260	6.48	34.4
300	6.61	35.2
350	7.16	37.6
375	6.86	36.4
470	7.16	37.6
540	7.40	38.9
750	8.11	41.9

RE motor weights vary ± 1 lb depending upon motor configuration.

Back

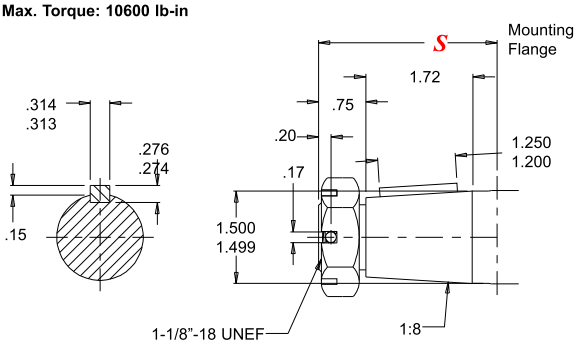
30 1½" Straight

Max. Torque: 10600 lb-in



31 1½" Tapered

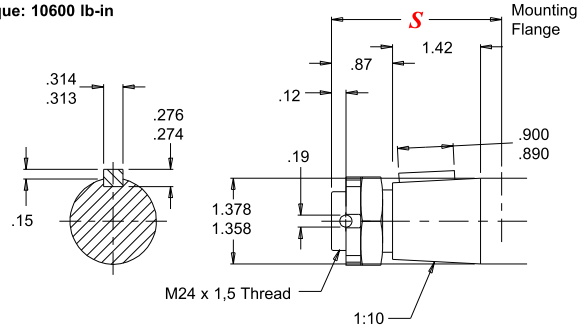
Max. Torque: 10600 lb-in



Note: A slotted nut is standard on this shaft.

28 35mm Tapered

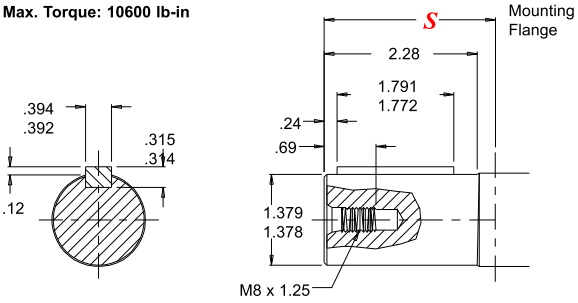
Max. Torque: 10600 lb-in



Available with the W31 and W38 housings only

27 35mm Straight

Max. Torque: 10600 lb-in



Available with the W31 and W38 housings only

Shaft Lengths

S Code	SAE A Flange in	Wheel Mount in
27	—	4.65
28	—	4.20
30	3.32	4.51
31	3.36	4.57

Back

Ordering Information

SERIES
531 — REVERSED TIMING
530

DISPLACEMENT | HOUSING | SHAFT | OPTIONS | MISCELLANEOUS

Code	Displacement
120	7.4 in³/rev
160	9.9 in³/rev
200	12.4 in³/rev
230	14.2 in³/rev
260	15.9 in³/rev
300	18.3 in³/rev
350	21.2 in³/rev
375	22.8 in³/rev
470	28.3 in³/rev
540	32.7 in³/rev
750	45.6 in³/rev

Code	Housings
W31	4-Hole Aligned Ports 7/8" O-Ring
W38	4-Hole Aligned Ports 1/2" BSP.F
A51	6-Hole Aligned Ports 7/8" O-Ring
A58	6-Hole Aligned Ports 1/2" BSP.F

Code	Shafts
31	1-1/2" Tapered
30	1-1/2" Straight
28	35mm Tapered
27	35mm Straight

Code	Options
AA	None
AC	Freeturning Rotor
AE	Hydraulic Declutch (With Freeturning Rotor)

PAINT

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

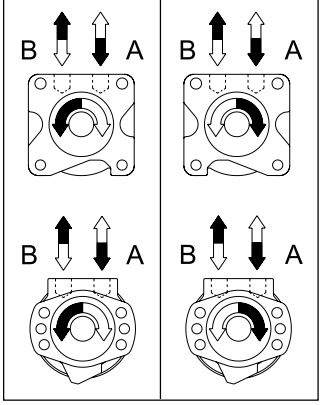
CAVITY

Code	Options
A	None

ADD ONS

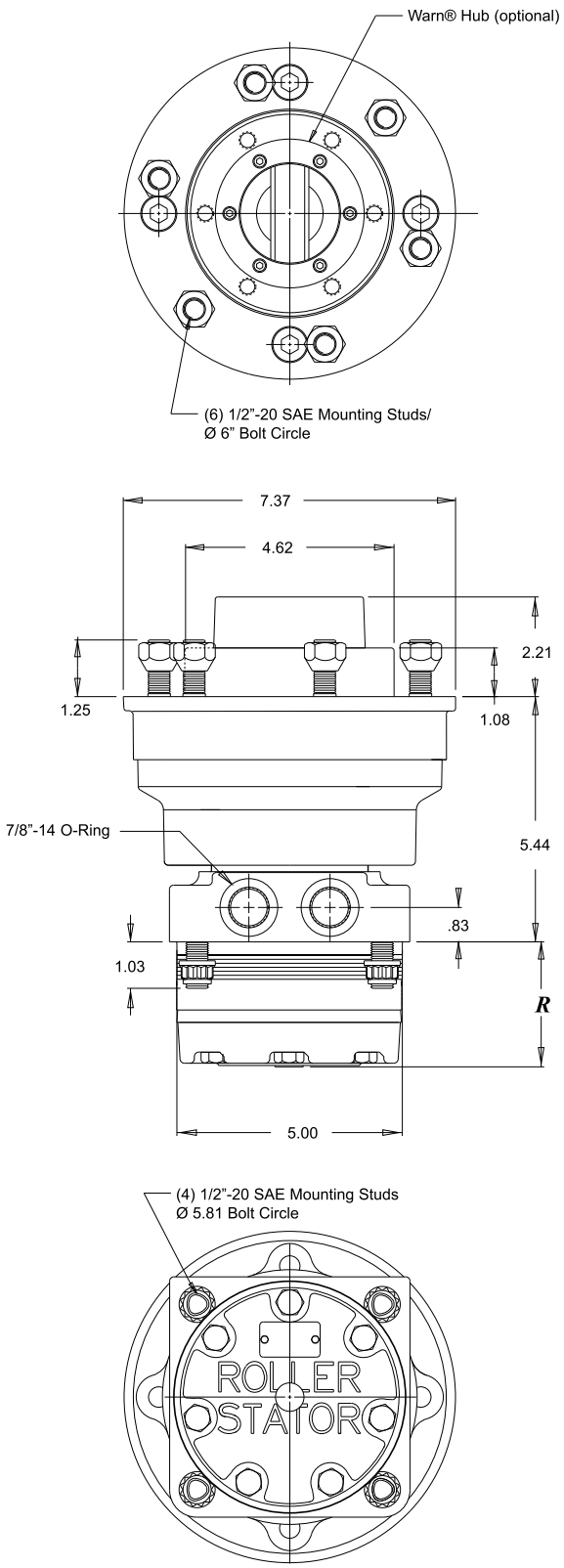
Code	Options
A	Standard
C	Solid Hex Nut

Shaft Rotation

530	531
	

For applications requiring the motor to rotate in only one direction, shaft seal life may be prolonged by pressurizing the “A” port of the motor. To obtain the desired direction of shaft rotation, use the graphic at the left to determine the rotation code for the motor. For bidirectional applications, the 530 series is recommended. Preferred rotation is determined by internal valving design.

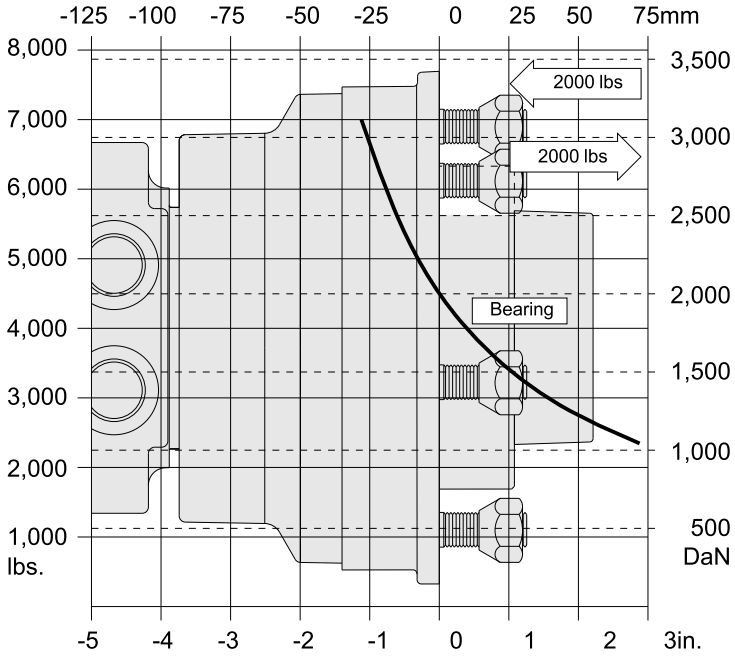
W31 *4-Hole Aligned Ports 7/8" O-Ring*



Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table located on page 27.

Wheel Mount with 125mm Bearing



Length and Weight Tables

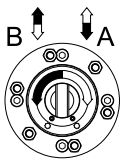
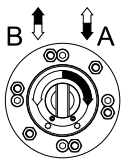
Wheel Mount (125mm Bearing)

Code	*R* in	Weight lbs
120	2.77	49.1
160	2.77	49.1
200	2.90	49.9
230	2.99	50.1
260	3.09	50.7
300	3.22	51.5
350	3.77	53.9
375	3.47	52.7
470	3.77	53.9
540	4.01	55.1
750	4.72	58.2

RE motor weights vary ± 1 lb depending upon motor configuration.

Ordering Information

Shaft Rotation

540	541
	

For applications requiring the motor to rotate in only one direction, shaft seal life may be prolonged by pressurizing the "A" port of the motor. To obtain the desired direction of shaft rotation, use the graphic at the left to determine the rotation code for the motor. For bidirectional applications, the 540 series is recommended. Preferred rotation is determined by internal valving design.

SERIES
541
540
REVERSED TIMING
OPTIONS
DISPLACEMENT
HOUSING
SHAFT
MISCELLANEOUS

Code	Displacement
120	7.4 in^3/rev
160	9.9 in^3/rev
200	12.4 in^3/rev
230	14.2 in^3/rev
260	15.9 in^3/rev
300	18.3 in^3/rev
350	21.2 in^3/rev
375	22.8 in^3/rev
470	28.3 in^3/rev
540	32.7 in^3/rev
750	45.6 in^3/rev

Code	Housing
W31	4-Hole Aligned Ports 7/8" O-ring

Code	Shafts
61	6-Bolt Wheel Flange

Code	Options
AA	None
AC	Freeturning Rotor
AE	Hydraulic Declutch (With Freeturning Rotor)

PAINT

Code	Options
A	Dark Metallic Gray
C	Black
Z	No Paint

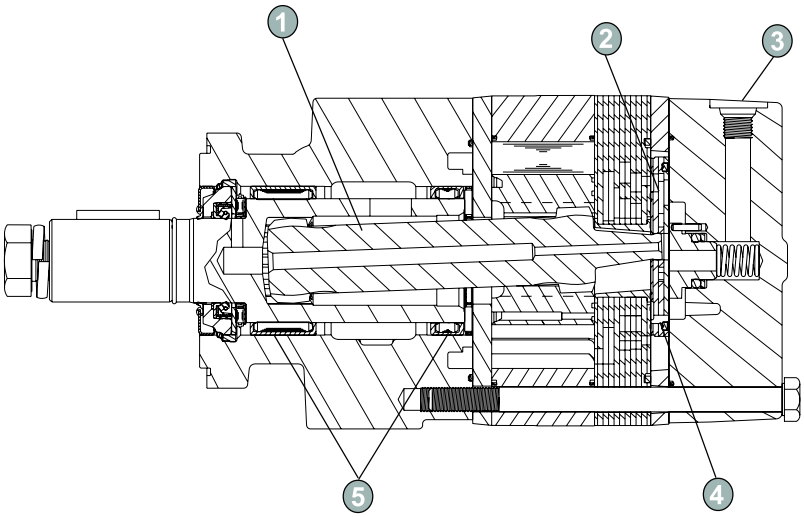
CAVITY

Code	Options
A	None

ADD ONS

Code	Options
A	Standard
H	Warn® Hub

Features



1. **Heavy-Duty Drive Link** is most durable in class and receives case flow lubrication for reduced wear and increased life.
2. **Three-Zone Orbiting Valve** precisely meters oil to produce exceptional volumetric efficiency.
3. **Standard Case Drain** increases shaft seal life by reducing pressure on seal.
4. **Rubber Energized Steel Face Seal** does not extrude or melt under high pressure or high temperature.
5. **Three Bearing Options** allow load carrying capabilities of motor to be matched to application.

High Torque, Wide Speed Range

Due to its case drain design, the DR Series motor is an excellent medium size motor for applications with high duty cycles or frequent direction reversals. The case drain design produces a number of benefits including reduction of pressure on the shaft seal and the ability to provide a cooling loop for the system. The case flow also lubricates the vital drive components, extending motor life. An internal drain option is also available. A laminated manifold and three-zone orbiting valve are used to produce higher overall efficiencies and more usable power. A steel faced seal in the orbiting valve also lessens the risk of the seal extruding or melting, which is possible in competitive designs.

Specifications

Code	Displacement (in^3/rev)	Max. Speed (RPM) - 1)Cont	Max. Speed (RPM) - 2)Inter.	Max. Flow (GPM) - 1)Cont	Max. Flow (GPM) - 2)Inter.	Max. Torque (lb-in) - 1)Cont	Max. Torque (lb-in) - 2)Inter.	Max. Pressure (PSI) - 1)Cont	Max. Pressure (PSI) - 2)Inter.	Max. Pressure (PSI) - 3)Peak
200	12.4	470	560	25	30	4900	5700	3000	3500	4000
260	15.9	360	440	25	30	6590	7600	3000	3500	4000
300	18.3	320	380	25	30	7450	8600	3000	3500	4000
350	21.2	270	320	25	30	8600	9800	3000	3500	4000
375	22.8	250	300	25	30	9600	11000	3000	3500	4000
470	28.3	200	240	25	30	9800	11650	2500	3000	3500
540	32.7	180	210	25	30	9150	11300	2000	2500	3000
750	45.6	130	150	25	30	9200	12300	1500	2000	2500

Performance

200 *12.4 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	335 (38) **7**	683 (77) **4**							10
1 (4)	342 (39) **16**	748 (85) **15**	1543 (174) **13**	2284 (258) **9**	2913 (329) **5**				19
2 (8)	339 (38) **35**	795 (90) **34**	1579 (178) **32**	2396 (271) **28**	3192 (361) **23**	4016 (454) **16**	4594 (519) **11**	4977 (562) **3**	38
4 (15)	323 (36) **73**	749 (85) **72**	1576 (178) **69**	2506 (283) **64**	3346 (378) **57**	4059 (459) **54**	4909 (555) **44**	5625 (636) **35**	75
6 (23)		690 (78) **110**	1562 (177) **106**	2413 (273) **101**	3202 (362) **97**	4085 (462) **89**	4880 (551) **80**	5711 (645) **70**	112
8 (30)		654 (74) **148**	1518 (172) **145**	2368 (268) **141**	3156 (357) **133**	4154 (469) **126**	4936 (558) **117**	5778 (653) **105**	150
10 (38)			1491 (168) **184**	2301 (260) **178**	3091 (349) **174**	3933 (444) **167**	4783 (541) **156**	5646 (638) **144**	187
12 (45)			1381 (156) **221**	2256 (255) **215**	3096 (350) **209**	3985 (450) **204**	4793 (542) **199**	5607 (634) **179**	224
14 (53)			1332 (150) **259**	2219 (251) **254**	2919 (330) **250**	3850 (435) **241**	4653 (526) **231**	5643 (638) **213**	261
16 (61)			1180 (133) **297**	2129 (241) **293**	2970 (336) **286**	3803 (430) **278**	4616 (522) **276**	5423 (613) **256**	299
18 (68)			1082 (122) **335**	2012 (227) **332**	2899 (328) **325**	3692 (417) **319**	4510 (510) **310**	5329 (602) **298**	336
20 (76)			993 (112) **372**	1897 (214) **371**	2732 (309) **365**	3547 (401) **356**	4391 (496) **348**	5198 (587) **337**	373
22 (83)				1757 (199) **409**	2680 (303) **404**	3401 (384) **396**	4358 (493) **384**	5121 (579) **374**	410
24 (91)				1625 (184) **447**	2526 (285) **443**	3366 (380) **433**	4192 (474) **423**	4970 (562) **417**	448
Max. Cont. 25 (95)				1472 (166) **465**	2453 (277) **461**	3244 (367) **454**	4101 (463) **443**	4953 (560) **432**	466
Max. Inter. 30 (114)					1935 (219) **558**	2934 (332) **553**			559
Theo. Torque	494 (56)	987 (112)	1975 (223)	2962 (335)	3949 (446)	4936 (558)	5924 (669)	6911 (781)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

260 *15.9 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	417 (47) **5**	962 (109) **4**							8
1 (4)	454 (51) **13**	972 (110) **11**	2104 (238) **11**	3139 (355) **8**	4074 (460) **5**				15
2 (8)	462 (52) **28**	1004 (113) **27**	2145 (242) **25**	3244 (367) **22**	4292 (485) **18**	5334 (603) **14**	6323 (715) **11**		30
4 (15)	430 (49) **57**	985 (111) **56**	2115 (239) **54**	3247 (367) **51**	4343 (491) **45**	5474 (619) **41**	6598 (746) **36**	7600 (859) **30**	59
6 (23)	391 (44) **87**	950 (107) **86**	2067 (234) **83**	3225 (364) **78**	4311 (487) **72**	5458 (617) **67**	6530 (738) **60**	7557 (854) **54**	88
8 (30)		884 (100) **115**	2016 (228) **113**	3146 (355) **107**	4230 (478) **103**	5418 (612) **95**	6487 (733) **89**	7677 (868) **82**	117
10 (38)		797 (90) **145**	1947 (220) **143**	3080 (348) **138**	4143 (468) **132**	5351 (605) **123**	6498 (734) **115**	7541 (852) **107**	146
12 (45)		748 (84) **174**	1877 (212) **172**	3011 (340) **168**	4094 (463) **162**	5272 (596) **152**	6390 (722) **143**	7481 (845) **133**	175
14 (53)		631 (71) **203**	1813 (205) **201**	2921 (330) **198**	4004 (452) **185**	5195 (587) **179**	6244 (706) **173**	7491 (846) **163**	204
16 (61)			1688 (191) **231**	2807 (317) **228**	3927 (444) **223**	5077 (574) **214**	6221 (703) **203**	7291 (824) **196**	233
18 (68)			1540 (174) **261**	2698 (305) **256**	3798 (429) **251**	4952 (560) **246**	6111 (690) **230**	7214 (815) **220**	262
20 (76)			1383 (156) **290**	2558 (289) **289**	3700 (418) **282**	4817 (544) **268**	5977 (675) **262**	7166 (810) **247**	291
22 (83)			1270 (143) **319**	2431 (275) **317**	3585 (405) **313**	4717 (533) **300**	5828 (659) **293**	6961 (787) **277**	320
24 (91)			1158 (131) **348**	2253 (255) **346**	3421 (387) **342**	4554 (515) **333**	5421 (613) **322**	6805 (769) **311**	349
Max. Cont. 25 (95)				2115 (239) **362**	3301 (373) **357**	4471 (505) **348**	5559 (628) **342**	6832 (772) **328**	364
Max. Inter. 30 (114)				1388 (157) **434**	2637 (298) **432**	3768 (426) **427**			436
Theo. Torque	633 (72)	1266 (143)	2532 (286)	3798 (429)	5064 (572)	6330 (715)	7596 (858)	8861 (1001)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

300 *18.3 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	509 (58) **5**	1039 (117) **4**	2236 (253) **4**						7
1 (4)	517 (58) **12**	1081 (122) **11**	2353 (266) **11**	3396 (384) **11**	4501 (509) **9**	5599 (633) **9**			13
2 (8)	516 (58) **25**	1134 (128) **24**	2360 (267) **24**	3572 (404) **23**	4893 (553) **22**	6045 (683) **21**	7198 (813) **20**	8112 (917) **20**	26
4 (15)	491 (56) **50**	1173 (132) **49**	2425 (274) **49**	3691 (417) **48**	4890 (553) **47**	6225 (703) **44**	7397 (836) **43**	8513 (962) **42**	51
6 (23)	466 (53) **75**	1092 (123) **75**	2384 (269) **74**	3590 (406) **73**	4949 (559) **71**	6207 (701) **69**	7356 (831) **66**	8445 (954) **63**	76
8 (30)	386 (44) **100**	1036 (117) **99**	2263 (256) **97**	3710 (419) **96**	4847 (548) **95**	6256 (707) **93**	7485 (846) **88**	8619 (974) **85**	101
10 (38)		947 (107) **126**	2222 (251) **126**	3448 (390) **125**	4961 (561) **121**	6119 (691) **119**	7396 (836) **113**	8637 (976) **109**	127
12 (45)		841 (95) **151**	2108 (238) **150**	3538 (400) **150**	4685 (529) **149**	6160 (696) **144**	7371 (833) **140**	8573 (969) **135**	152
14 (53)		748 (84) **176**	2053 (232) **175**	3237 (366) **174**	4688 (530) **173**	5978 (676) **168**	7302 (825) **164**	8533 (964) **158**	177
16 (61)		629 (71) **201**	1920 (217) **200**	3277 (370) **198**	4494 (508) **197**	5786 (654) **196**	7104 (803) **187**	8428 (952) **182**	202
18 (68)			1792 (202) **227**	2996 (339) **226**	4448 (503) **226**	5712 (645) **221**	6914 (781) **214**	8253 (933) **211**	228
20 (76)			1631 (184) **252**	2887 (326) **251**	4129 (467) **249**	5619 (635) **244**	6831 (772) **236**	8205 (927) **230**	253
22 (83)			1449 (164) **277**	2726 (308) **275**	3943 (446) **274**	5346 (604) **271**	6592 (745) **269**	7926 (896) **267**	278
24 (91)			1304 (147) **302**	2535 (286) **301**	3871 (437) **300**	5137 (580) **296**	6401 (723) **293**	7620 (861) **285**	303
Max. Cont. 25 (95)			1024 (116) **315**	2574 (291) **314**	3902 (441) **312**	5085 (575) **310**	6255 (707) **309**	7500 (848) **302**	316
Inter. 30 (114)				1805 (204) **378**	3067 (347) **376**	4416 (499) **370**			379
Theo. Torque	729 (82)	1457 (165)	2914 (329)	4371 (494)	5828 (659)	7285 (823)	8742 (988)	10199 (1152)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

350 *21.2 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	606 (69) **4**	1243 (140) **3**	2318 (262) **2**						6
1 (4)	660 (75) **10**	1350 (153) **9**	2733 (309) **7**	4014 (454) **6**					11
2 (8)	667 (75) **21**	1395 (158) **20**	2880 (325) **17**	4326 (489) **16**	5727 (647) **14**	6937 (784) **13**	8119 (917) **11**		22
4 (15)	648 (73) **43**	1405 (159) **42**	2943 (333) **38**	4443 (502) **36**	5988 (677) **33**	7342 (830) **31**	8704 (984) **29**	9935 (1123) **26**	44
6 (23)	594 (67) **65**	1346 (152) **63**	2901 (328) **61**	4439 (502) **55**	5926 (670) **51**	7444 (841) **49**	8940 (1010) **49**	10220 (1155) **46**	66
8 (30)	494 (56) **87**	1268 (143) **85**	2808 (317) **83**	4368 (494) **78**	6002 (678) **72**	7376 (833) **67**	9010 (1018) **65**	10367 (1172) **65**	88
10 (38)		1141 (129) **108**	2700 (305) **105**	4219 (477) **99**	5798 (655) **92**	7345 (830) **88**	8801 (994) **85**	10260 (1159) **83**	109
12 (45)		1068 (121) **130**	2578 (291) **128**	4113 (465) **122**	5672 (641) **115**	7231 (817) **107**	8766 (991) **101**	10342 (1169) **100**	131
14 (53)		907 (103) **151**	2437 (275) **148**	4001 (452) **145**	5572 (630) **136**	7212 (815) **130**	8604 (972) **123**	10284 (1162) **115**	153
16 (61)		755 (85) **174**	2281 (258) **172**	3818 (431) **168**	5390 (609) **161**	6991 (790) **152**	8696 (983) **144**	10099 (1141) **136**	175
18 (68)		587 (66) **196**	2174 (246) **193**	3823 (432) **190**	5161 (583) **185**	6800 (768) **171**	8355 (944) **164**	10012 (1131) **159**	197
20 (76)			1969 (223) **217**	3459 (391) **211**	5026 (568) **206**	6637 (750) **196**	8186 (925) **185**	9742 (1101) **176**	218
22 (83)			1704 (193) **239**	3293 (372) **236**	4825 (545) **230**	6408 (724) **219**	8049 (909) **209**	9666 (1092) **198**	240
24 (91)			1492 (169) **261**	3085 (349) **257**	4755 (537) **253**	6179 (698) **243**			262
Max. Cont. 25 (95)				2874 (325) **272**	4491 (507) **265**	6082 (687) **254**			273
Inter. 30 (114)				2258 (255) **326**	3796 (429) **320**	5354 (605) **315**			327
Theo. Torque	844 (95)	1688 (191)	3376 (381)	5064 (572)	6752 (763)	8439 (954)	10127 (1144)	11815 (1335)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

375 *22.8 in³/rev*

Flow GPM (LPM)	Pressure 250 (17)	psi (bars) 500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	611 (69) **4**								6
1 (4)	651 (74) **9**	1425 (161) **8**	2920 (330) **8**	4369 (494) **7**	5783 (653) **6**	7283 (823) **5**			11
2 (8)	676 (76) **20**	1527 (173) **19**	3133 (354) **18**	4582 (518) **17**	6065 (685) **15**	7611 (860) **13**	9038 (1021) **13**		21
4 (15)	649 (73) **40**	1399 (158) **40**	3098 (350) **38**	4731 (535) **37**	6250 (706) **34**	7814 (883) **32**	9130 (1032) **30**	10541 (1191) **30**	41
6 (23)	588 (66) **60**	1407 (159) **60**	3058 (346) **59**	4841 (547) **57**	6300 (712) **54**	7956 (899) **49**	9561 (1080) **47**	10898 (1231) **45**	61
8 (30)	502 (57) **81**	1301 (147) **80**	2980 (337) **79**	4749 (537) **77**	6192 (700) **74**	7948 (898) **70**	9628 (1088) **65**	10941 (1236) **62**	82
10 (38)		1190 (134) **101**	2856 (323) **100**	4512 (510) **99**	6139 (694) **95**	7849 (887) **90**	9437 (1066) **85**	11029 (1246) **79**	102
12 (45)		1097 (124) **121**	2730 (309) **120**	4385 (496) **119**	6009 (679) **114**	7817 (883) **109**	9493 (1073) **104**	11010 (1244) **99**	122
14 (53)		961 (109) **141**	2563 (290) **140**	4217 (477) **138**	6016 (680) **136**	7556 (854) **130**	9214 (1041) **123**	10888 (1230) **117**	142
16 (61)		728 (82) **162**	2362 (267) **161**	4005 (453) **159**	5641 (637) **157**	7489 (846) **150**	9209 (1041) **144**	10702 (1209) **136**	163
18 (68)			2198 (248) **182**	3842 (434) **180**	5474 (619) **175**	7190 (812) **171**	8864 (1002) **165**	10161 (1148) **162**	183
20 (76)			2026 (229) **202**	3685 (416) **201**	5309 (600) **199**	6994 (790) **192**	8664 (979) **183**	10137 (1145) **180**	203
22 (83)			1764 (199) **222**	3406 (385) **221**	5065 (572) **219**	6738 (761) **215**	8435 (953) **210**	9834 (1111) **201**	223
24 (91)			1490 (168) **243**	3204 (362) **241**	5007 (566) **240**	6471 (731) **235**			244
Max. Cont. 25 (95)				3073 (347) **253**	4905 (554) **250**	6384 (721) **245**			254
Inter. 30 (114)				2314 (261) **303**	3891 (440) **301**	5514 (623) **300**			304
Theo. Torque	908 (103)	1815 (205)	3631 (410)	5446 (615)	7261 (821)	9076 (1026)	10892 (1231)	12707 (1436)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

470 *28.3 in³/rev*

Flow GPM (LPM)	Pressure 250 (17)	psi (bars) 500 (35)	1000 (69)	1500 (104)	2000 (138)	Max. Cont. 2500 (173)	Inter. 3000 (207)	Theo. RPM
0.5 (2)	815 (92) **3**	1723 (195) **2**	3306 (374) **1**					5
1 (4)	967 (109) **7**	1661 (188) **6**	3701 (418) **5**	5447 (615) **4**				9
2 (8)	875 (99) **15**	1924 (217) **14**	3892 (440) **13**	5910 (668) **12**	7709 (871) **9**	9436 (1066) **7**	10855 (1227) **5**	17
4 (15)	825 (93) **32**	1887 (213) **30**	3906 (441) **29**	6086 (688) **28**	8027 (907) **25**	10008 (1131) **22**	11886 (1343) **18**	33
6 (23)	751 (85) **48**	1771 (200) **48**	3841 (434) **46**	6074 (686) **44**	8017 (906) **40**	10098 (1141) **35**	12056 (1362) **30**	49
8 (30)	635 (72) **65**	1645 (186) **64**	3738 (422) **63**	5834 (659) **61**	7871 (889) **58**	10106 (1142) **50**	11963 (1352) **45**	66
10 (38)	472 (53) **81**	1493 (169) **80**	3579 (404) **79**	5657 (639) **77**	7734 (874) **74**	9871 (1115) **66**	11958 (1351) **59**	82
12 (45)		1348 (152) **97**	3561 (402) **96**	5377 (608) **94**	7563 (855) **89**	9836 (1111) **82**	11861 (1340) **76**	98
14 (53)		1175 (133) **114**	3221 (364) **113**	5292 (598) **112**	7374 (833) **107**	9643 (1090) **98**	11673 (1319) **90**	115
16 (61)		910 (103) **130**	2947 (333) **129**	5037 (569) **128**	7110 (803) **123**	9410 (1063) **114**	11450 (1294) **104**	131
18 (68)		661 (75) **146**	2701 (305) **144**	4908 (555) **143**	6765 (764) **141**	9033 (1021) **133**	11214 (1267) **124**	147
20 (76)			2489 (281) **163**	4490 (507) **162**	6597 (745) **156**	8719 (985) **150**	10940 (1236) **141**	164
22 (83)			2011 (227) **179**	4189 (473) **178**	6322 (714) **176**	8391 (948) **168**	10462 (1182) **162**	180
24 (91)			1705 (193) **194**	3827 (432) **192**	6079 (687) **191**	8093 (915) **186**		196
Max. Cont. 25 (95)				3743 (423) **204**	5759 (651) **201**	7928 (896) **191**		205
Inter. 30 (114)				2840 (321) **244**	4761 (538) **242**	6938 (784) **238**		245
Theo. Torque	1127 (127)	2253 (255)	4506 (509)	6760 (764)	9013 (1018)	11266 (1273)	13519 (1528)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

540 *32.7 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	Max. Cont. 2000 (138)	Inter. 2500 (173)	Theo. RPM
0.5 (2)	953 (108) **3**	1900 (215) **2**					4
1 (4)	946 (107) **6**	1995 (225) **6**	4212 (476) **5**	6284 (710) **5**	8138 (920) **3**		8
2 (8)	998 (113) **13**	2133 (241) **12**	4403 (498) **11**	6620 (748) **11**	8674 (980) **9**	10798 (1220) **8**	15
4 (15)	1014 (115) **28**	2137 (242) **27**	4491 (508) **26**	6893 (779) **25**	9188 (1038) **24**	11201 (1266) **20**	29
6 (23)	902 (102) **42**	2067 (234) **42**	4465 (505) **40**	6821 (771) **38**	9022 (1019) **36**	11275 (1274) **32**	43
8 (30)	792 (89) **56**	1962 (222) **56**	4373 (494) **55**	6759 (764) **52**	9029 (1020) **48**	11325 (1280) **43**	57
10 (38)	630 (71) **70**	1782 (201) **70**	4224 (477) **68**	6639 (750) **66**	8994 (1016) **62**	11299 (1277) **57**	71
12 (45)	417 (47) **84**	1661 (188) **84**	4027 (455) **84**	6455 (729) **81**	8858 (1001) **76**	11394 (1288) **69**	85
14 (53)		1397 (158) **98**	3803 (430) **97**	6214 (702) **96**	8803 (995) **89**	11184 (1264) **82**	99
16 (61)		1170 (132) **113**	3564 (403) **112**	5930 (670) **110**	8353 (944) **106**	10970 (1240) **98**	114
18 (68)		856 (97) **127**	3236 (366) **127**	5664 (640) **126**	8276 (935) **120**	10557 (1193) **113**	128
20 (76)		554 (63) **141**	2962 (335) **140**	5345 (604) **139**	7767 (878) **135**	10228 (1156) **129**	142
22 (83)			2680 (303) **155**	4972 (562) **153**	7420 (838) **152**	9868 (1115) **145**	156
24 (91)			2141 (242) **169**	4622 (522) **167**	7194 (813) **164**	9517 (1075) **161**	170
Max. Cont. 25 (95)			1998 (226) **176**	4338 (490) **175**	6832 (772) **174**	9514 (1075) **165**	177
Inter. 30 (114)			864 (98) **211**	3365 (380) **210**	5834 (659) **209**		212
Theo. Torque	1302 (147)	2604 (294)	5207 (588)	7811 (883)	10414 (1177)	13018 (1471)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

750 *45.6 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	Max. Cont. 1500 (104)	Inter. 2000 (138)	Theo. RPM
0.5 (2)	1118 (126) **1**	2450 (277) **1**				3
1 (4)	1378 (156) **4**	2537 (287) **3**	5552 (627) **3**	8155 (922) **2**		6
2 (8)	1357 (153) **9**	2853 (322) **9**	5873 (664) **8**	8722 (986) **7**	11579 (1308) **6**	11
4 (15)	1312 (148) **20**	2898 (327) **19**	6071 (686) **18**	9085 (1027) **17**	12161 (1374) **16**	21
6 (23)	1230 (139) **30**	2860 (323) **29**	6113 (691) **28**	9200 (1040) **27**	12328 (1393) **25**	31
8 (30)	1085 (123) **40**	2712 (306) **40**	6026 (681) **39**	9207 (1040) **36**	12211 (1380) **34**	41
10 (38)	874 (99) **50**	2571 (291) **49**	5897 (666) **48**	9162 (1035) **47**	12382 (1399) **45**	51
12 (45)	664 (75) **60**	2423 (274) **59**	5688 (643) **58**	9012 (1018) **57**	12318 (1392) **55**	61
14 (53)	408 (46)	2113 (239) **70**	5451 (616) **69**	8814 (996) **68**	12146 (1372) **64**	71
16 (61)		1682 (190) **81**	5089 (575) **80**	8479 (958) **78**	11742 (1327) **76**	82
18 (68)		1325 (150) **91**	4738 (535) **90**	8150 (921) **88**	11494 (1299) **86**	92
20 (76)		949 (107) **101**	4298 (486) **100**	7771 (878) **100**	11090 (1253) **97**	102
22 (83)			3978 (449) **111**	7273 (822) **110**	10598 (1198) **108**	112
24 (91)			3401 (384) **121**	6736 (761) **120**	10117 (1143) **117**	122
Max. Cont. 25 (95)			3268 (369) **126**	6523 (737) **125**	9830 (1111) **124**	127
Inter. 30 (114)			1025 (116) **151**	4374 (494) **149**		152
Theo. Torque	1815 (205)	3631 (410)	7261 (821)	10892 (1231)	14522 (1641)	

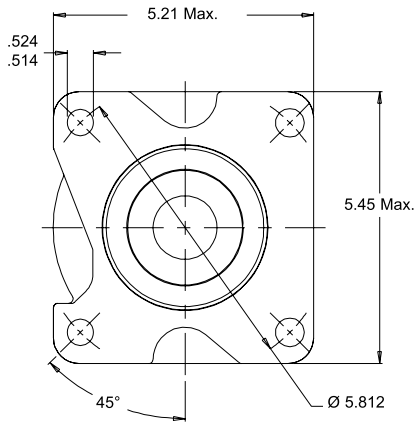
Tested at 129°F with an oil viscosity of 213 SUS

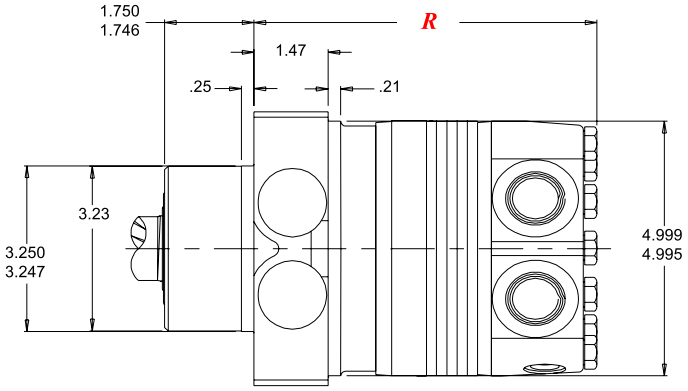
Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Housing

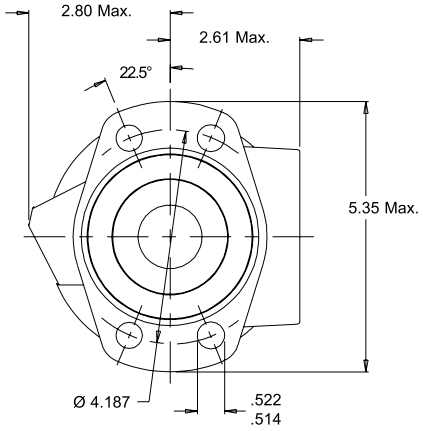
Wheel Mount, SAE A Flange

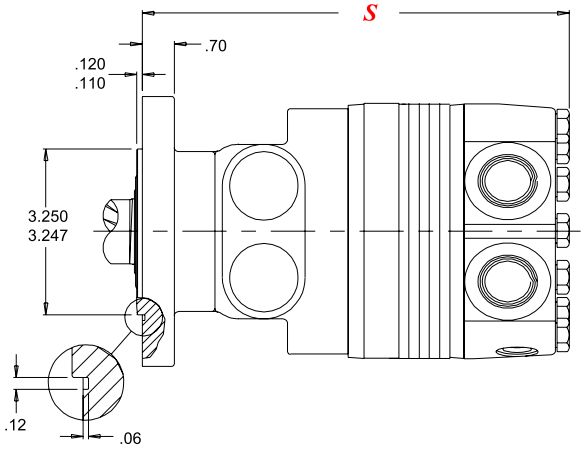
W2 *4-Hole End Ports*
W8 *4-Hole Side Ports*



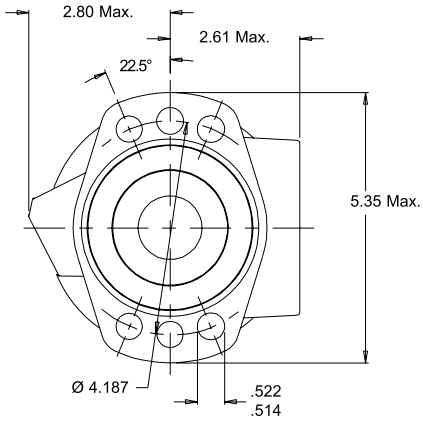


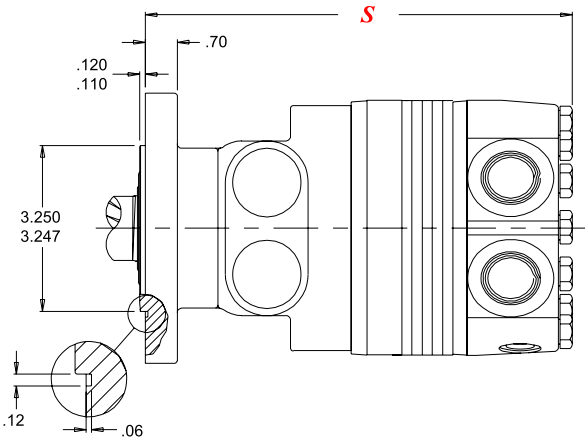
A2 *4-Hole End Ports*
A8 *4-Hole Side Ports*





A4 *6-Hole End Ports*
A9 *6-Hole Side Ports*

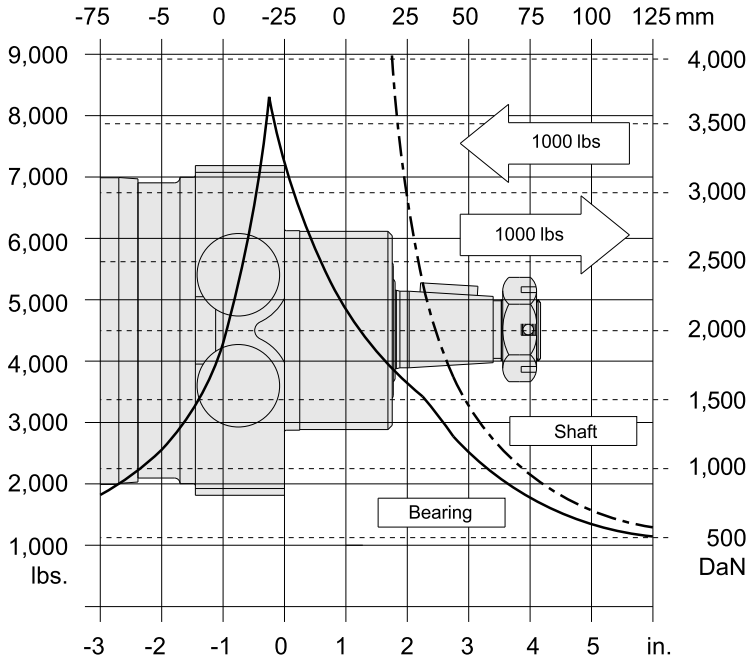




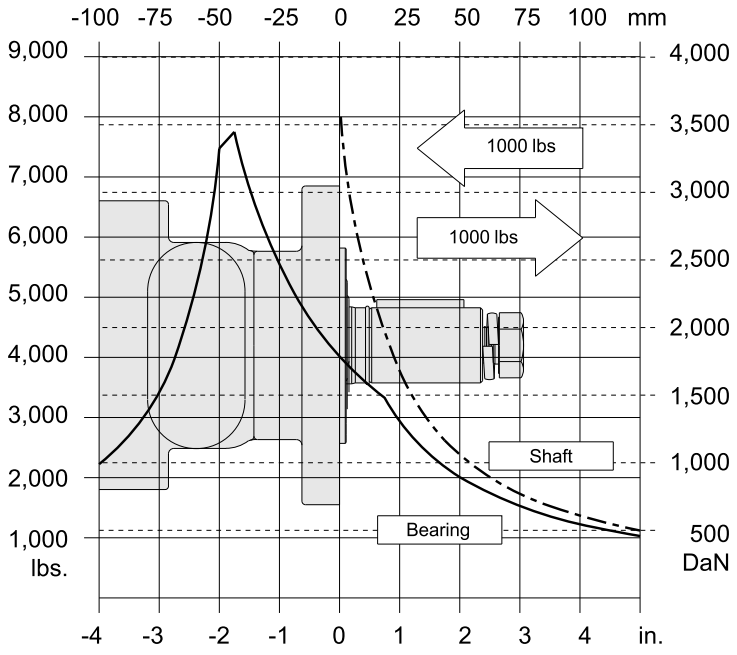
Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

Wheel Mount



SAE A Flange



Length and Weight Tables

Wheel Mount

Code	***R*** in	Weight lbs
200	6.53	29.6
260	6.72	30.6
300	6.85	32.2
350	7.40	34.7
375	7.10	33.4
470	7.40	34.7
540	7.64	35.8
750	8.35	39.1

SAE A Flange

Code	***S*** in	Weight lbs
200	8.19	35.0
260	8.37	36.0
300	8.50	36.6
350	9.06	39.2
375	8.75	37.8
470	9.06	39.2
540	9.29	40.3
750	10.00	43.5

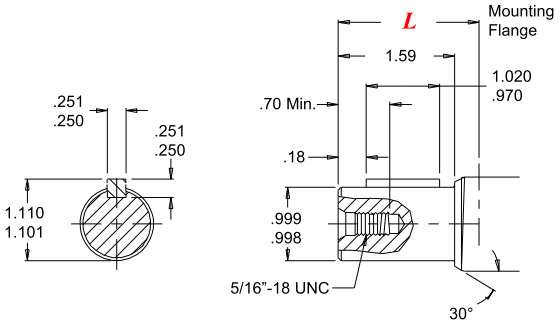
DR motor weights vary ±2 lbs depending upon motor configuration. Subtract .11 in. from ***S*** & ***R*** for motors using the 1,2 or 5 Endcover.

Back

Shafts

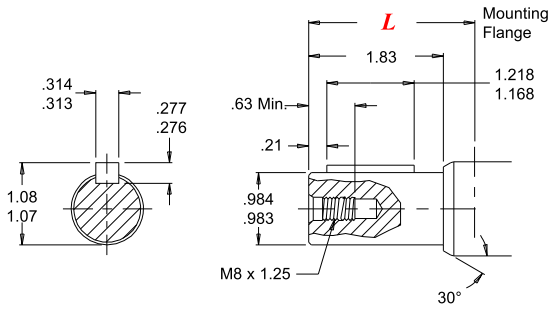
10 1" Straight

Max. Torque: 5880 lb-in



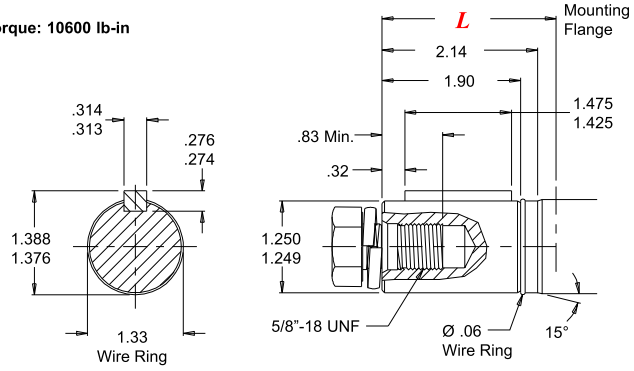
12 25mm Straight

Max. Torque: 5617 lb-in



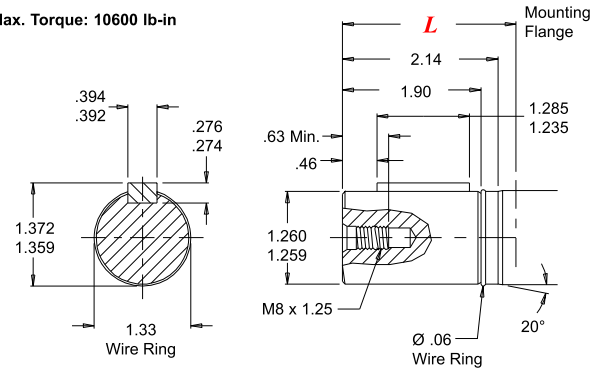
20 1¼" Straight

Max. Torque: 10600 lb-in



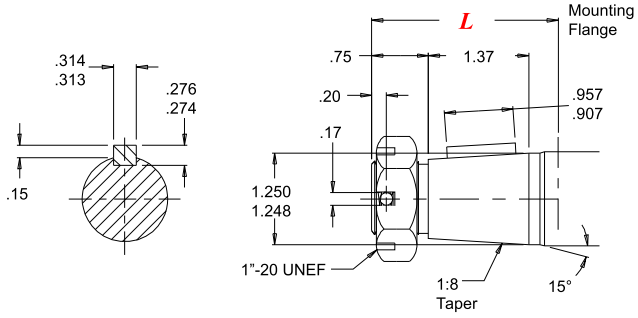
21 32mm Straight

Max. Torque: 10600 lb-in



22 1¼" Tapered

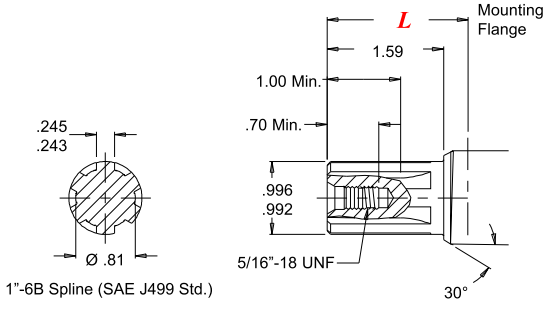
Max. Torque: 10600 lb-in



Note: A slotted nut is standard on this shaft.

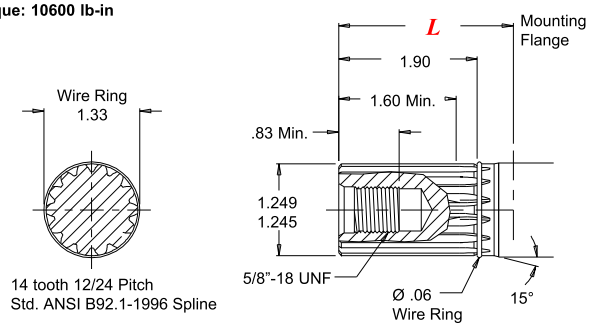
02 6B Spline

Max. Torque: 10600 lb-in



23 14 Tooth Spline

Max. Torque: 10600 lb-in



Shaft Lengths

L

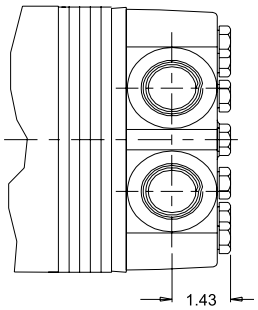
Code	SAE A Flange in.	Wheel Mount in.
02	1.97	3.60
22	2.58	4.22
20	2.41	4.05
23	2.42	4.06
10	1.97	3.60
21	2.41	4.05
12	2.21	3.84

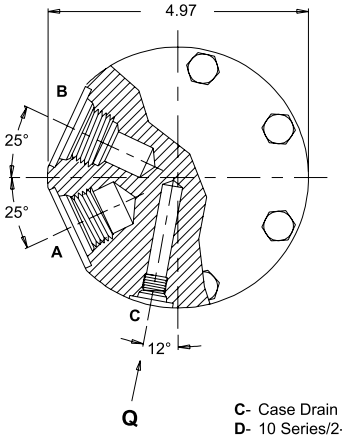
Shaft lengths vary ± .030 inches

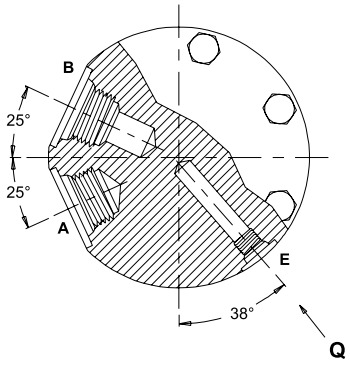
Back

5	*1-1/16" BSP.F with 7/16" Drain*
2	*3/4" O-Ring with 1/4" Drain*

Side Ports



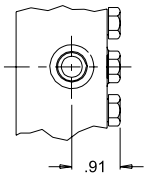




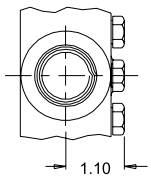
C- Case Drain
D- 10 Series/2-way Valve Cavity (7/8"-14 UNF-2B)
E- Internal Drain

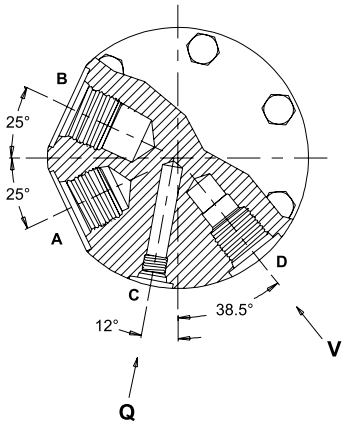
Q and V

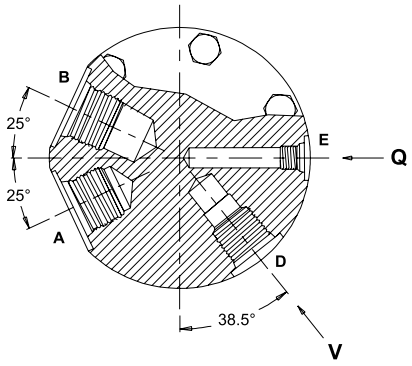
Q - Case Drain



V - Valve Cavity



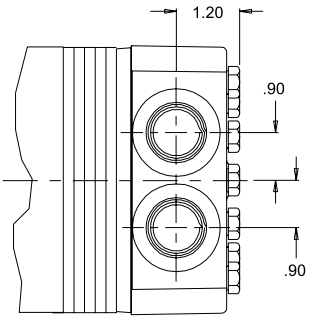


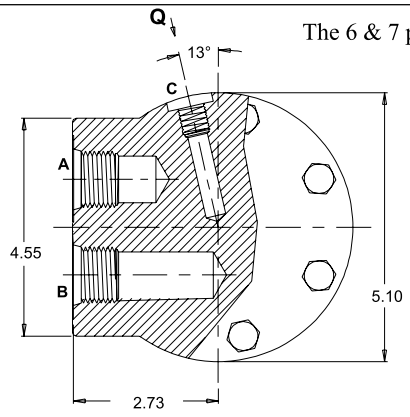


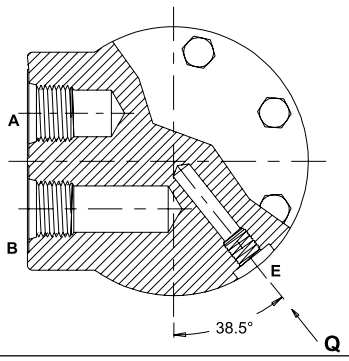
The 2 & 5 porting options can be ordered with an internal drain and/or a relief valve cavity.

6	*1 1/16" O-Ring with 7/16" Drain*
7	*3/4" BSP.F with 1/4" Drain*

The 6 & 7 porting options can be ordered with an internal drain.



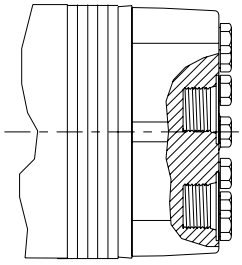


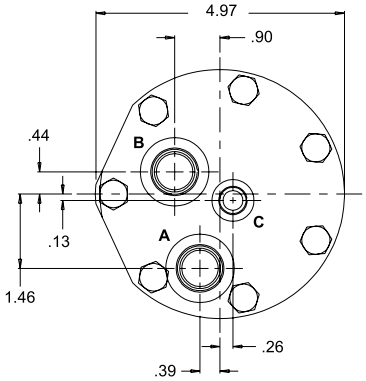


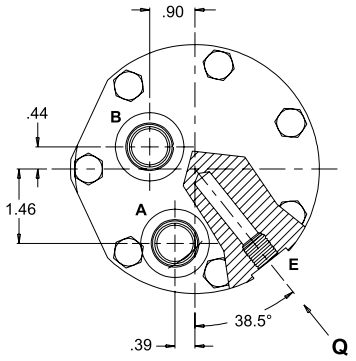
Porting

1 *7/8" O-Ring with 7/16" Drain*

End Ports



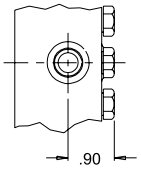




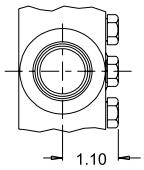
C- Case Drain
D- 10 Series/2-way Valve Cavity (7/8"-14 UNF-2B)
E- Internal Drain

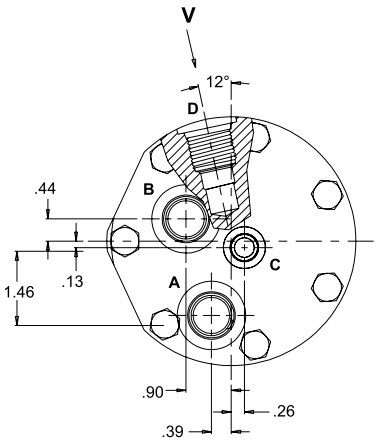
Q and V

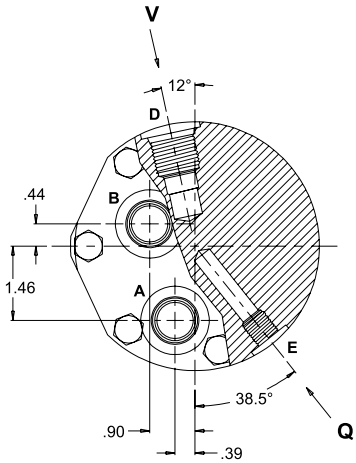
Q - Case Drain



V - Valve Cavity

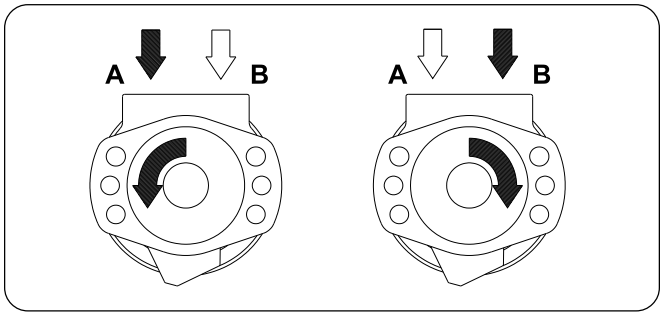






The 1 porting options can be ordered with an internal drain and/or a relief valve cavity.

DR Rotation Selection



Ordering Information

SERIES 600

DISPLACEMENT

Code	Displacement
200	12.4 in^3/rev
260	15.9 in^3/rev
300	18.3 in^3/rev
350	21.2 in^3/rev
375	22.8 in^3/rev
470	28.3 in^3/rev
540	32.7 in^3/rev
750	45.6 in^3/rev

HOUSINGS

Code	Housings
W2	4-Hole End Ports
W8	4-Hole Side Ports
A2	4-Hole End Ports
A8	4-Hole Side Ports
A4	6-Hole End Ports
A9	6-Hole Side Ports

PORTS

Code	Side Ports
5	Radial Ports 1-1/16"-12 O-ring
2	Radial Ports 3/4"-14 BSP.F
6	Parallel Ports 1-1/16"-12 O-ring
7	Parallel Ports 3/4"-14 BSP.F

Code	End Ports
1	7/8"-14 O-ring

SHAFT

Code	Shafts
02	6-B Spline
22	1-1/4" Tapered
20	1-1/4" Straight
23	14 Tooth Spline
10	1" Straight
12	25mm Straight
21	32mm Straight

OPTIONS

PAINT

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

CAVITY

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

ADD ONS

Code	Options
A	Standard
B	Lock Nut
C	Solid Hex Nut
**W	4-Pin Male Weatherpack Connector (Dual)
**X	4-Pin M12 Male Connector (Dual)
**Y	3-Pin Male Weatherpack Connector (Single)
**Z	4-Pin M12 Male Connector (Single)

MISCELLANEOUS

Code	Options
AA	None
AB	Internal Drain
AC	Freeturning Rotor
AD	Internal Drain and Freeturning Rotor

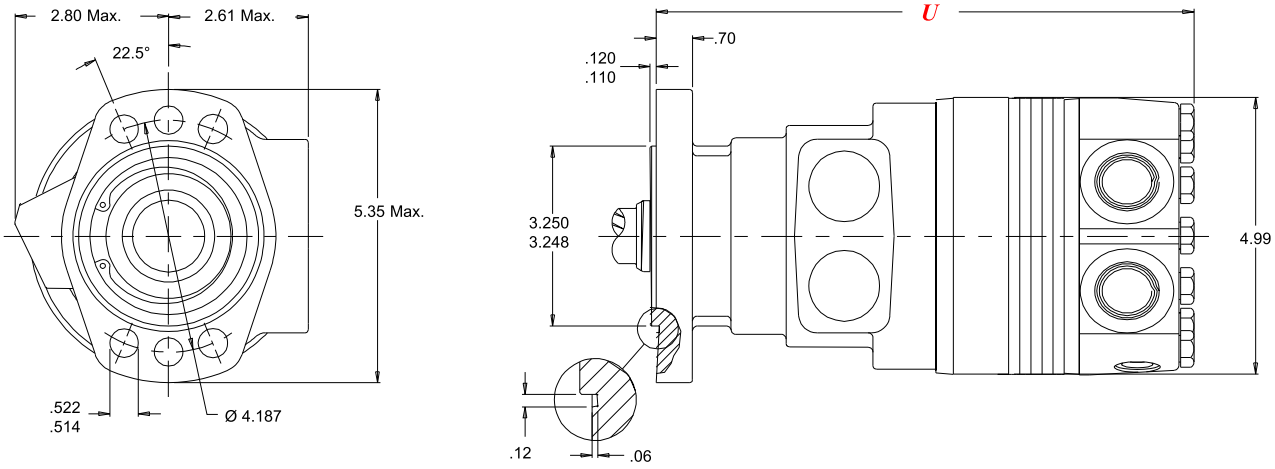
NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: W82 = A 4-Hole radial ported motor with 3/4" BSP.F threading)

* Available with 1, 2, and 5 port options only.

** Available with A2 or A8 housing and must use medium duty shafts.

Technical

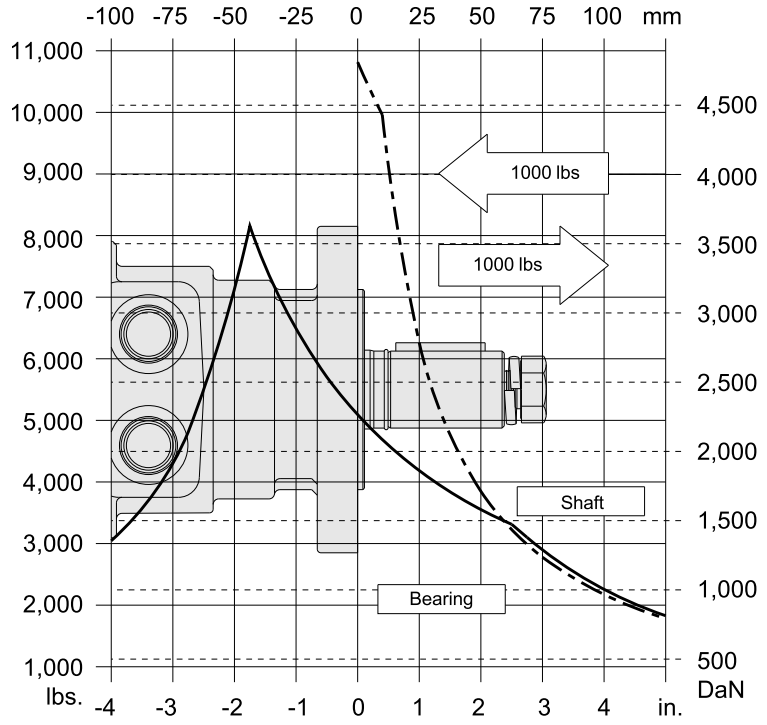
A4 *6-Hole End Ports*
A9 *6-Hole Side Ports*



Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

SAE A Flange



Length and Weight Tables

SAE A Flange

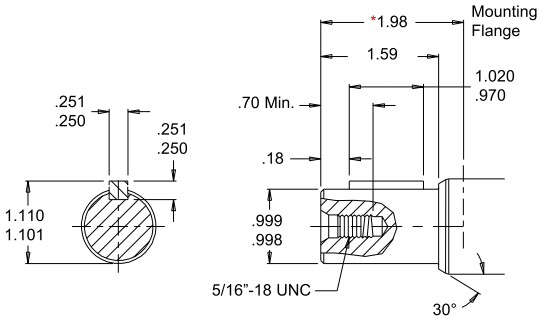
Code	*U* in	Weight lbs
200	9.19	34.6
260	9.38	35.6
300	9.51	37.2
350	10.06	39.7
375	9.76	38.4
470	10.06	39.7
540	10.30	40.8
750	11.01	44.1

DR motor weights vary ±2 lbs depending upon motor configuration. Subtract .11 in. from *U* for motors using the 1,2 or 5 Endcover.

Back

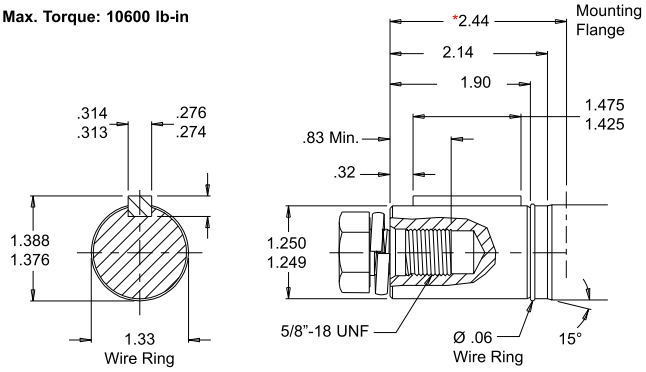
15 1" Straight

Max. Torque: 5800 lb-in



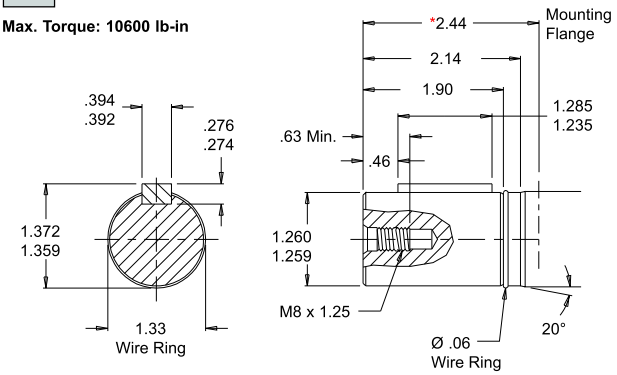
07 1¼" Straight

Max. Torque: 10600 lb-in



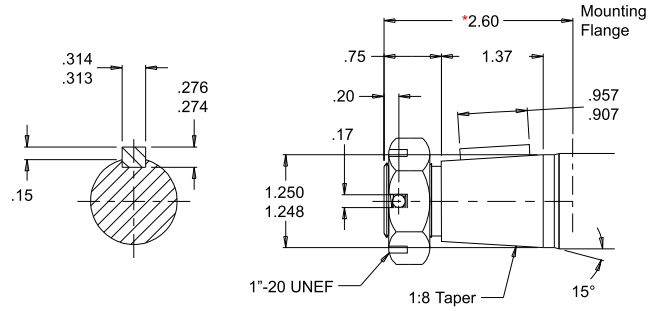
08 32mm Straight

Max. Torque: 10600 lb-in



25 1¼" Tapered

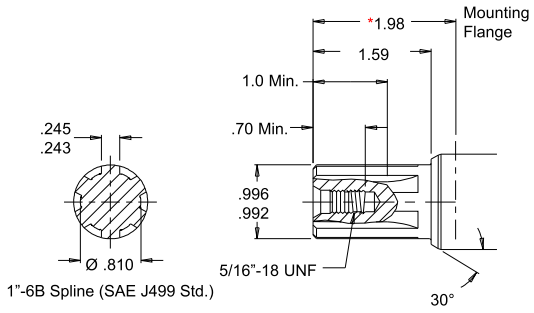
Max. Torque: 10600 lb-in



Note: A slotted nut is standard on this shaft.

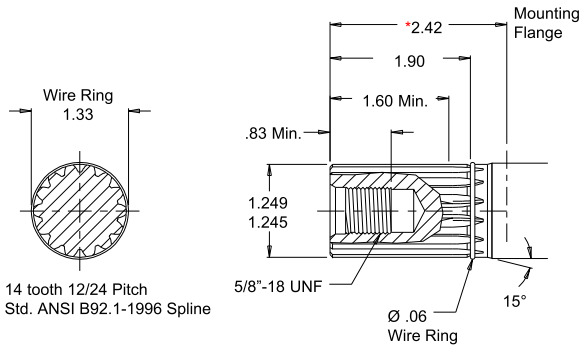
03 6B Spline

Max. Torque: 10600 lb-in



09 14 Tooth Spline

Max. Torque: 10600 lb-in



*Shaft lengths vary ± .030 inches

Back

Ordering Information

SERIES 620 — DISPLACEMENT — HOUSINGS — SHAFT — OPTIONS — MISCELLANEOUS

Code	Displacement
200	12.4 in³/rev
260	15.9 in³/rev
300	18.3 in³/rev
350	21.2 in³/rev
375	22.8 in³/rev
470	28.3 in³/rev
540	32.7 in³/rev
750	45.6 in³/rev

Code	Housings
A4	6-Hole End Ports
A9	6-Hole Side Ports

PORTS

Code	Side Ports
5	Radial Ports 1-1/16"-12 O-ring
2	Radial Ports 3/4"-14 BSP.F
6	Parallel Ports 1-1/16"-12 O-ring
7	Parallel Ports 3/4"-14 BSP.F

Code	End Ports
1	7/8"-14 O-ring

Code	Shafts
25	1-1/4" Tapered
07	1-1/4" Straight
09	14 Tooth Spline
08	32mm Straight
03	6-B Spline
15	1" Straight

PAINT

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

Code	Options
AA	None
AB	Internal Drain
AC	Freeturning Rotor
AD	Internal Drain and Freeturning Rotor

ADD ONS

Code	Options
A	Standard
B	Lock Nut
C	Solid Hex Nut

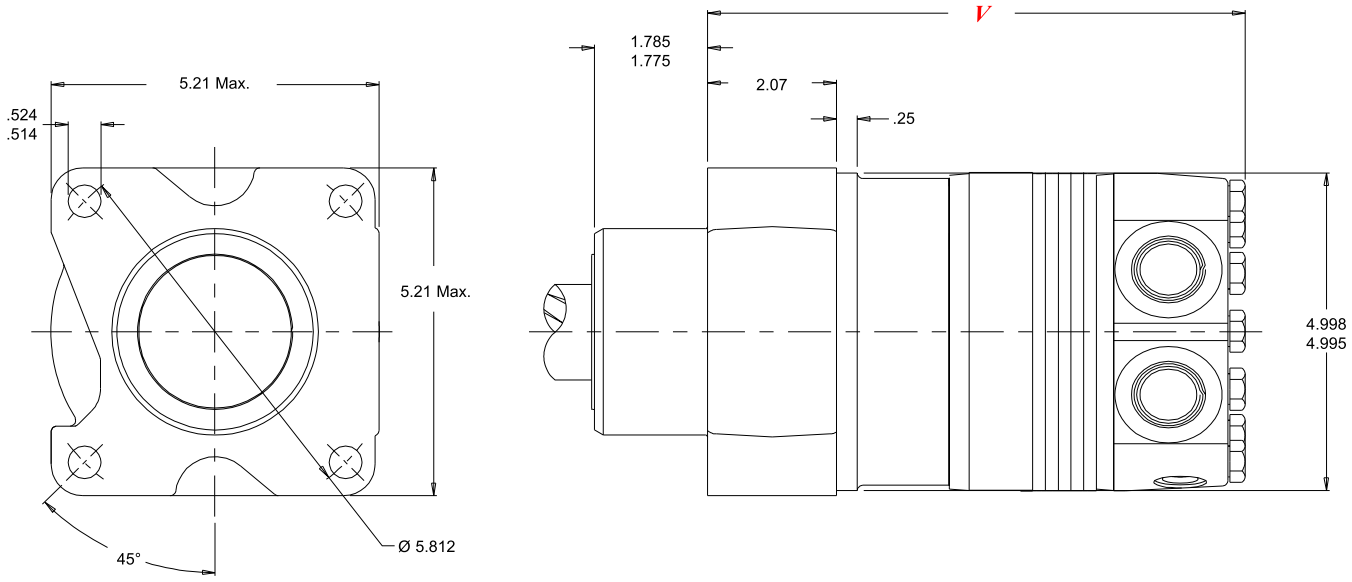
CAVITY

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

* Available with 1, 2, and 5 ports only

NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: A92 = A 6-Hole radial ported motor with 3/4" BSP.F threading)

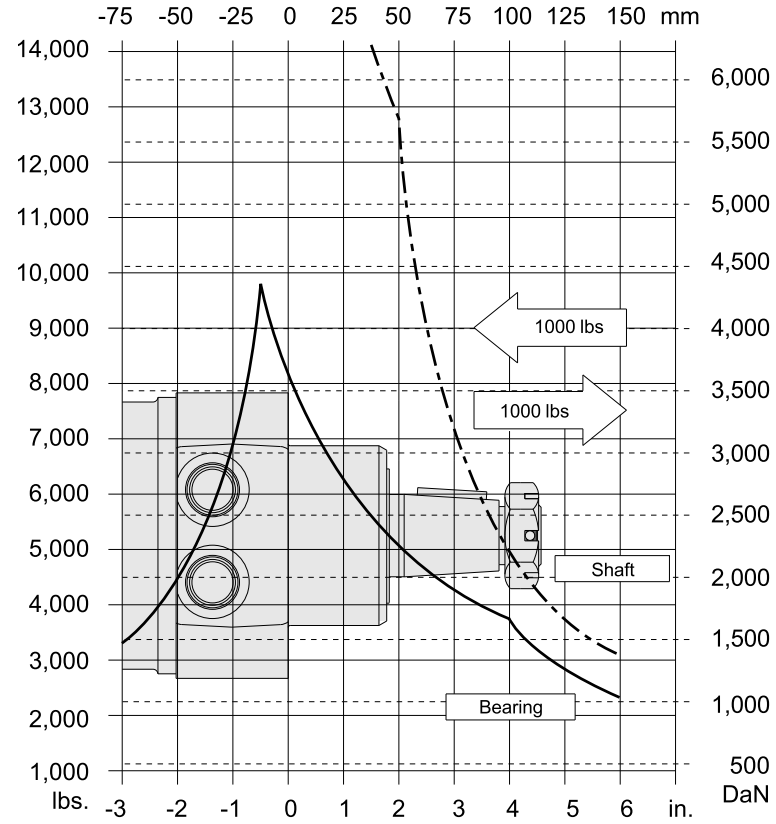
W2 *4-Hole End Ports*
W8 *4-Hole Side Ports*



Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

Wheel Mount



Length and Weight Tables

Wheel Mount

Code	*V* in	Weight lbs
200	7.96	38.5
260	8.15	39.5
300	8.28	40.1
350	8.83	42.6
375	8.53	41.2
470	8.83	42.6
540	9.07	43.7
750	9.78	47.0

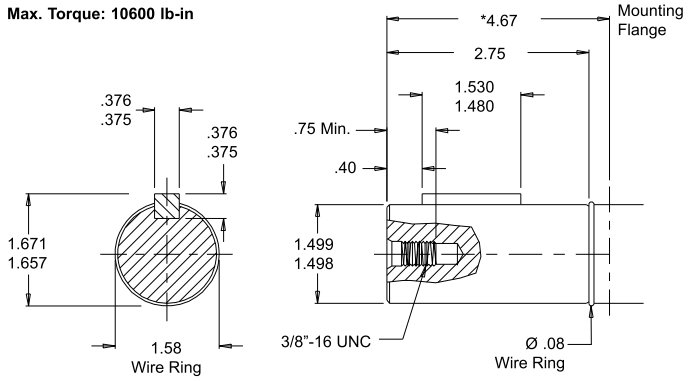
DR motor weights vary ±2 lbs depending upon motor configuration. Subtract .11 in. from *V* for motors using the 1,2 or 5 Endcover.

Back

Shafts

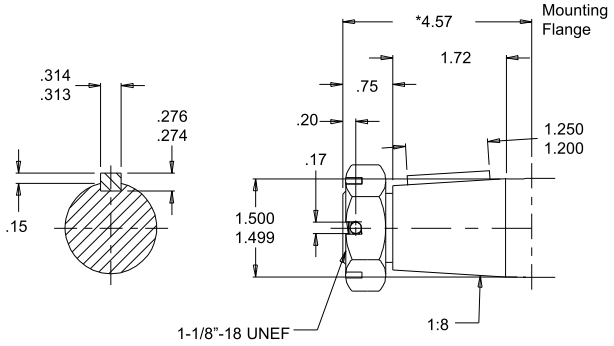
30 1½" Straight

Max. Torque: 10600 lb-in



31 1½" Tapered

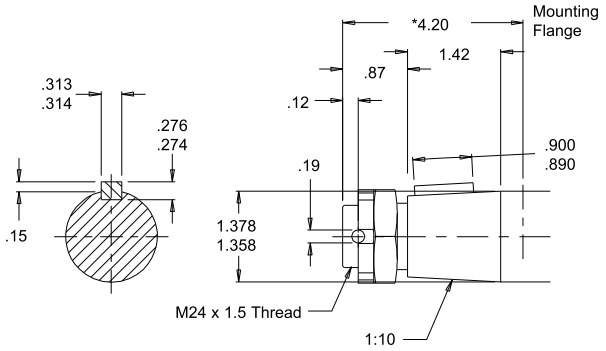
Max. Torque: 10600 lb-in



Note: A slotted nut is standard on this shaft.

28 35mm Tapered

Max. Torque: 10600 lb-in



*Shaft lengths vary ± .030 inches

Ordering Information

SERIES 630 — DISPLACEMENT — HOUSINGS — SHAFT — OPTIONS

Code	Displacement
200	12.4 in³/rev
260	15.9 in³/rev
300	18.3 in³/rev
350	21.2 in³/rev
375	22.8 in³/rev
470	28.3 in³/rev
540	32.7 in³/rev
750	45.6 in³/rev

Code	Housings
W2	4-Hole End Ports
W8	4-Hole Side Ports

PORTS

Code	Side Ports
5	Radial Ports 1-1/16"-12 O-ring
2	Radial Ports 3/4"-14 BSP.F
6	Parallel Ports 1-1/16"-12 O-ring
7	Parallel Ports 3/4"-14 BSP.F

Code	End Ports
1	7/8"-14 O-ring

NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: W82 = A 4-Hole radial ported motor with 3/4" BSP.F threading)

Code	Shafts
31	1-1/2" Tapered
30	1-1/2" Straight
28	35mm Tapered

PAINT

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

MISCELLANEOUS

Code	Options
AA	None
AB	Internal Drain
AC	Freeturning Rotor
AD	Internal Drain and Freeturning Rotor

ADD ONS

Code	Options
A	Standard
C	Solid Hex Nut

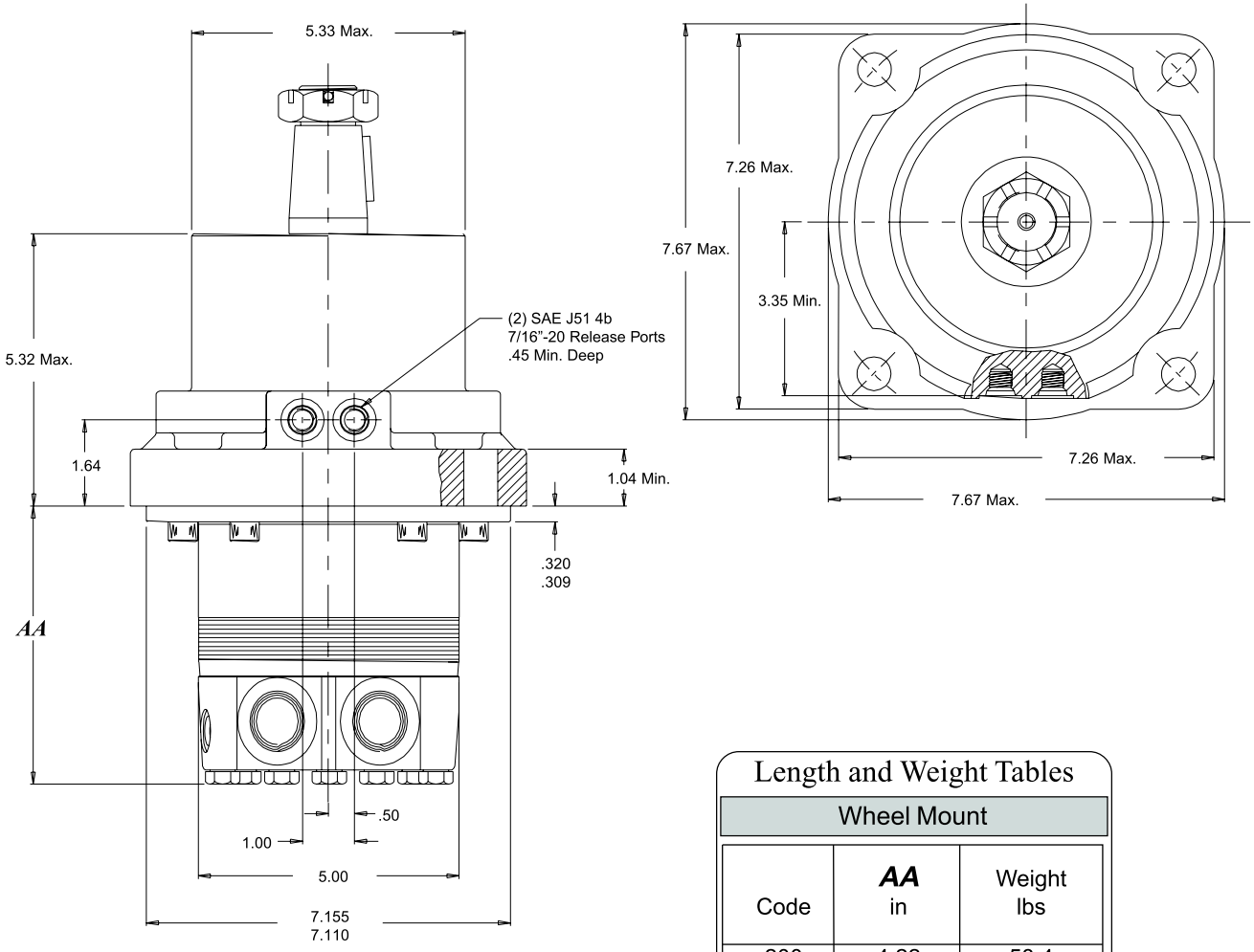
CAVITY

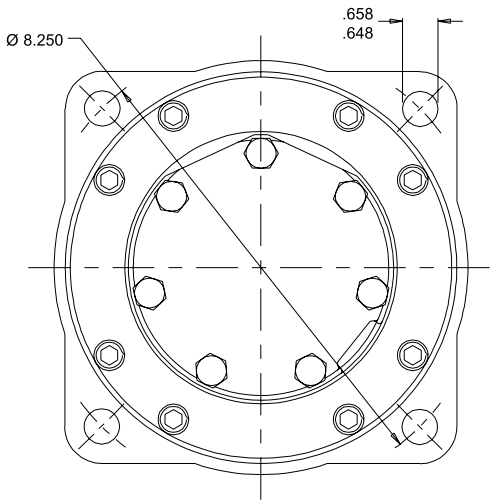
Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

* Available with 1, 2, and 5 ports only

Housing

W2 *4-Hole End Ports*
W8 *4-Hole Side Ports*





Length and Weight Tables

Wheel Mount

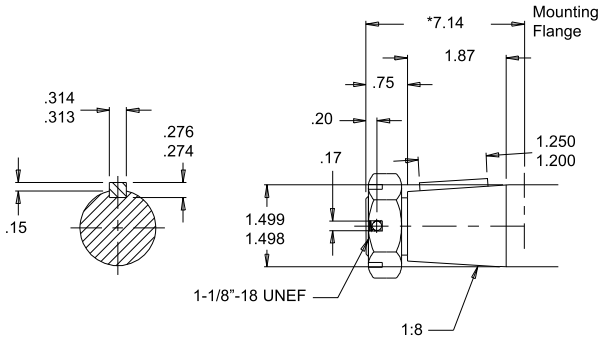
Code	*AA* in	Weight lbs
200	4.22	58.4
260	4.41	59.4
300	4.54	60.0
350	5.09	62.5
375	4.79	61.1
470	5.09	62.5
540	5.33	63.6
750	6.04	66.9

DR motor weights vary ±2 lbs depending upon motor configuration. Subtract .11 in. from ***AA*** for motors using the 1,2 or 5 Endcover.

CAUTION: It is vital that all operating recommendations on page 33 be followed. Failure to do so could result in injury or death.

31 *1½" Tapered*

Max. Torque: 10600 lb-in



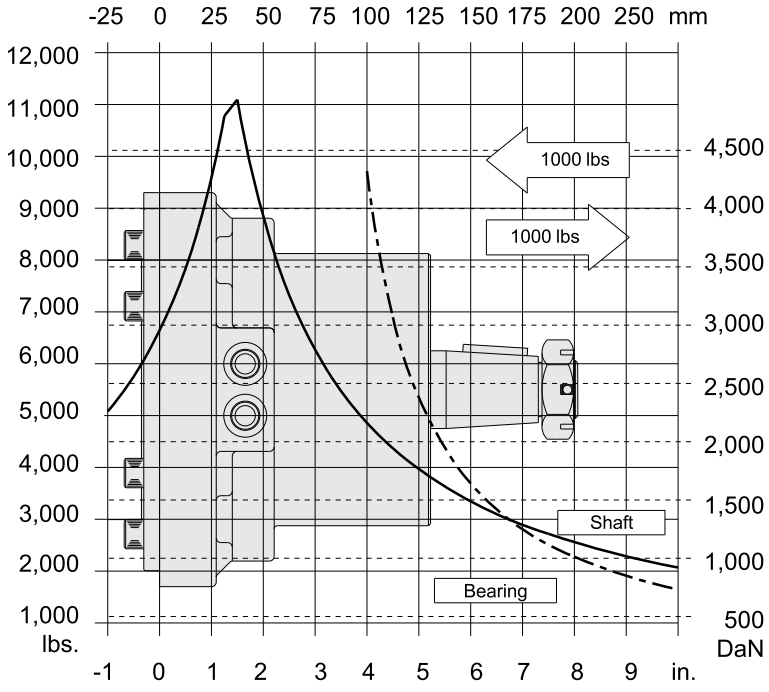
Note: A slotted nut is standard on this shaft.

*Shaft lengths vary ± .030 inches.

Rated brake torque	14,000 lb-in
Initial release pressure	275 psi
Full release pressure	475 psi
Maximum release pressure	3,000 psi
Release volume	0.8-1.0 cu.in.

Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.



Ordering Information

SERIES 612 — DISPLACEMENT — HOUSINGS — SHAFT — OPTIONS — MISCELLANEOUS

Code	Displacement
200	12.4 in^3/rev
260	15.9 in^3/rev
300	18.3 in^3/rev
350	21.2 in^3/rev
375	22.8 in^3/rev
470	28.3 in^3/rev
540	32.7 in^3/rev
750	45.6 in^3/rev

Code	Housings
W2	4-Hole End Ports
W8	4-Hole Side Ports

PORTS

Code	Side Ports
5	Radial Ports 1-1/16" O-ring
2	Radial Ports 3/4" BSP.F
6	Parallel Ports 1-1/16" O-ring
7	Parallel Ports 3/4" BSP.F

Code	End Ports
1	7/8" O-ring

Code	Shafts
31	1-1/2" Tapered

PAINT

Code	Options
A	Dark Metallic Gray
C	Black
Z	No Paint

NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: W82 = A 4-Hole radial ported motor with 3/4" BSP.F threading)

Code	Options
AA	None
AC	Freeturning Rotor

ADD ONS

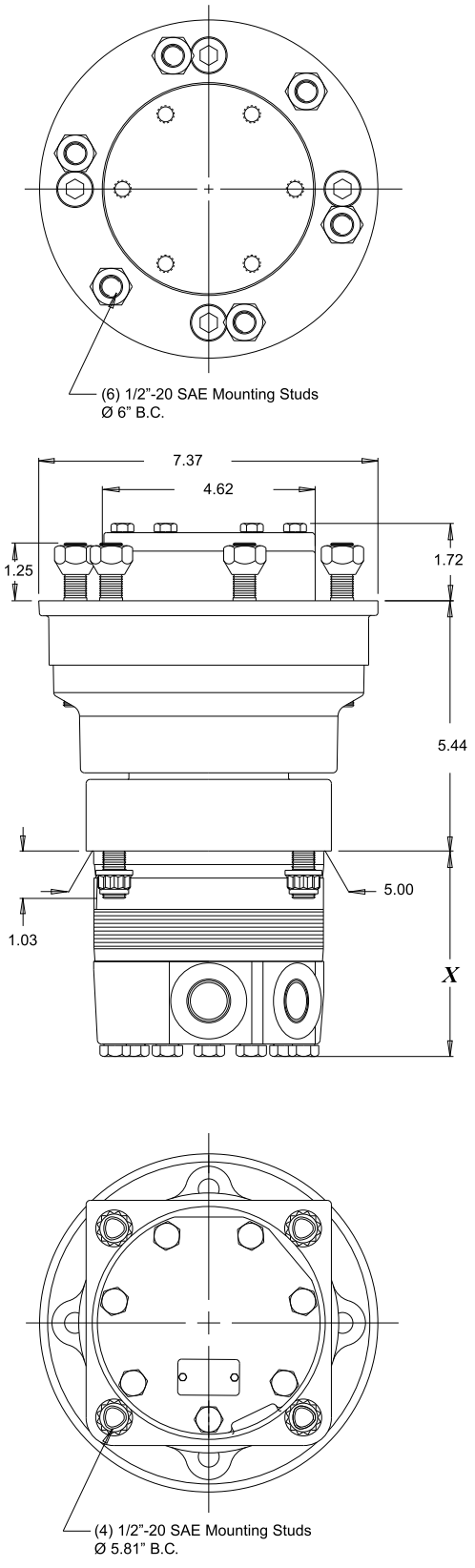
Code	Options
A	Standard
C	Solid Hex Nut

CAVITY

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

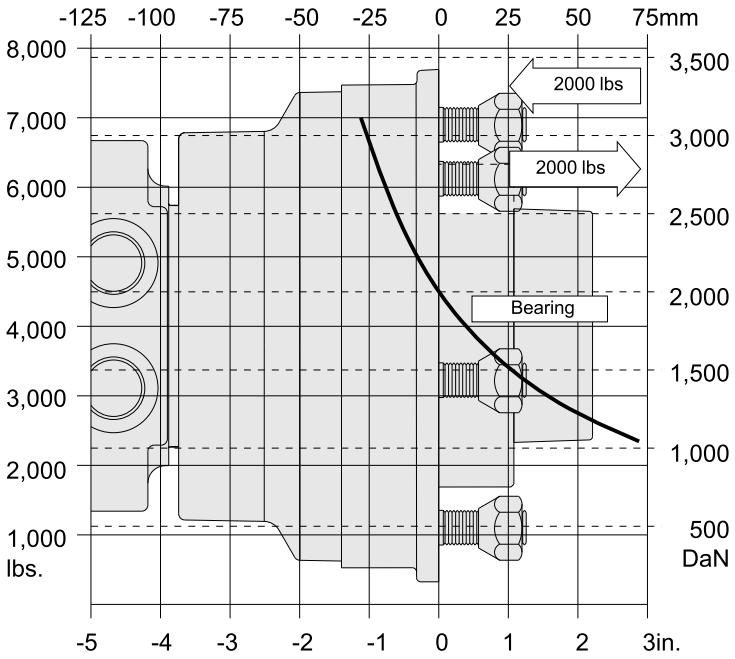
* Available with 1, 2, and 5 ports only

W2 *4-Hole End Ports*
W8 *4-Hole Side Ports*



Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.



Length and Weight Tables

Wheel Mount

Code	*X* in	Weight lbs
200	4.42	53.9
260	4.61	54.7
300	4.74	55.5
350	5.29	57.9
375	4.99	56.7
470	5.29	57.9
540	5.53	59.1
750	6.24	62.2

DR motor weights vary ±2 lbs depending upon motor configuration. Subtract .11 in. from ***X*** for motors using the 1,2 or 5 Endcover.

Ordering Information

SERIES 640 — DISPLACEMENT — HOUSINGS — SHAFT — OPTIONS (PAINT, CAVITY, ADD ONS, MISCELLANEOUS)

Code	Displacement
200	12.4 in^3/rev
260	15.9 in^3/rev
300	18.3 in^3/rev
350	21.2 in^3/rev
375	22.8 in^3/rev
470	28.3 in^3/rev
540	32.7 in^3/rev
750	45.6 in^3/rev

Code	Housings
W2	4-Hole End Ports
W8	4-Hole Side Ports

PORTS

Code	Side Ports
5	Radial Ports 1-1/16"-12 O-ring
2	Radial Ports 3/4"-14 BSP.F
6	Parallel Ports 1-1/16"-12 O-ring
7	Parallel Ports 3/4"-14 BSP.F

Code	End Ports
1	7/8"-14 O-ring

Code	Shafts
61	6-Bolt Wheel Flange

PAINT

Code	Options
A	Dark Metallic Gray
C	Black
Z	No Paint

CAVITY

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

* Available with 1, 2, and 5 ports only

ADD ONS

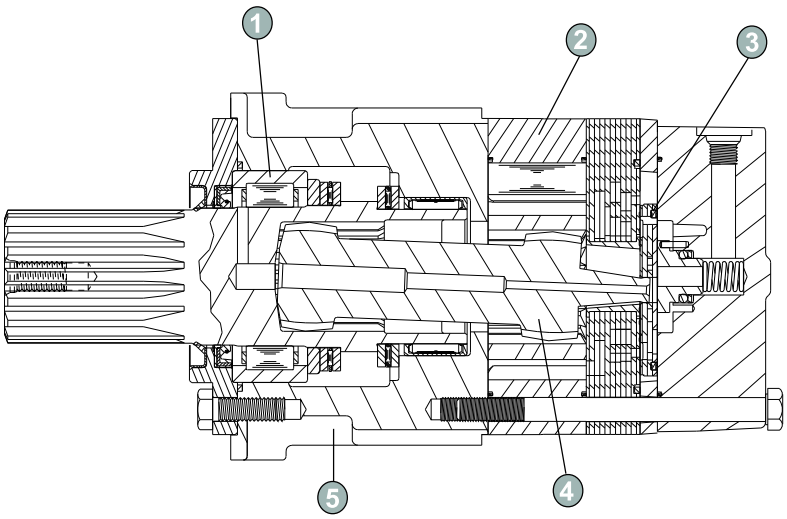
Code	Options
A	Standard
H	Warn® Hub

MISCELLANEOUS

Code	Options
AA	None
AB	Internal Drain
AC	Freeturning Rotor
AD	Internal Drain with Freeturning Rotor

NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: W82 = A 4-Hole radial ported motor with 3/4" BSP.F threading)

Features



1. **Heavy-Duty Roller Bearing** supports high side loads and receives forced lubrication for cooling and increased life.
2. **Roller Stator® Motor** available in displacements up to 127.7 cid for tremendous torque output.
3. **Three-Zone Orbiting Valve** precisely meters oil to produce exceptional volumetric efficiencies.
4. **Heavy-Duty Drive Link** receives forced lubrication for long life and is capable of extreme duty cycles.
5. **Compact Housing** contributes to high power-to-weight ratio of motor and offers front and rear mounting flanges.

Tremendous Torque, Compact Design

The most amazing aspect of the DT Series motors is its huge torque potential from its relatively small size. The DT Series motor is capable of producing output torque comparable to competitive designs, but from a package that is both shorter and much lighter. This savings in space and weight in no way compromises durability, as the motor uses massive shafts, bearings, and drive links to transmit the torque developed by this powerful package. The use of a case drain allows reduced pressure on the shaft seal while maintaining driveline lubrication for maximum motor life. Standard mounting and shaft options offer interchangeability with competitive designs. An internal drain option is also available.

Specifications

Code	Displacement (in³/rev)	Max. Speed (RPM) - 1)Cont 2)Inter.		Max. Flow (GPM) - 1)Cont 2)Inter.		Max. Torque (lb-in) - 1)Cont 2)Inter.		Max. Pressure (PSI) - 1)Cont 2)Inter. 3)Peak		
		1	2	1	2	1	2	1	2	3
300	18.3	320	380	25	30	7250	8450	3000	3500	3750
375	22.8	250	300	25	30	9250	9975	3000	3250	3500
470	28.3	200	240	25	30	9475	12300	2500	3250	3500
540	32.7	180	210	25	30	11300	13500	2500	3000	3500
750	45.6	130	150	25	30	15750	18500	2500	3000	3500
930	56.7	100	120	25	30	15750	18950	2000	2500	3000
1K1	63.9	90	110	25	30	16950	20500	2000	2500	3000
1K5	91.2	60	70	25	30	18500	20500	1500	1750	2000
2K1	127.7	40	50	25	30	23550	29580	1500	1750	2000

Performance

300 *18.3 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3500 (242)	Theo. RPM
0.5 (2)	476 (54) **4**	1014 (115) **3**	2100 (237) **2**						7
1 (4)	415 (47) **11**	952 (108) **9**	2256 (255) **7**	3363 (380) **5**	4304 (486) **3**				13
2 (8)	435 (49) **24**	1057 (119) **23**	2278 (257) **21**	3628 (410) **19**	4801 (543) **15**	5942 (671) **12**	6983 (789) **9**	7959 (899) **7**	26
4 (15)	430 (49) **50**	1064 (120) **49**	2336 (264) **46**	3616 (409) **43**	4904 (554) **37**	6202 (701) **32**	7424 (839) **28**	8595 (971) **26**	51
6 (23)		1025 (116) **75**	2462 (278) **69**	3719 (420) **65**	5019 (567) **58**	6297 (712) **54**	7554 (854) **51**	8701 (983) **48**	76
8 (30)		929 (105) **100**	2222 (251) **97**	3506 (396) **93**	4793 (542) **86**	6122 (692) **78**	7353 (831) **70**	8621 (974) **69**	101
10 (38)		877 (99) **126**	2099 (237) **122**	3438 (388) **115**	4857 (549) **113**	6081 (687) **107**	7369 (833) **96**	8588 (970) **90**	127
12 (45)		762 (86) **151**	2094 (237) **150**	3342 (378) **140**	4666 (527) **135**	5893 (666) **129**	7281 (823) **119**	8523 (963) **113**	152
14 (53)		679 (77) **176**	1864 (211) **175**	3191 (361) **172**	4478 (506) **164**	5802 (656) **156**	7121 (805) **151**	8420 (951) **140**	177
16 (61)		528 (60) **201**	1845 (208) **200**	3179 (359) **189**	4378 (495) **185**	5731 (648) **178**	6999 (791) **172**	8213 (928) **165**	202
18 (68)			1694 (191) **225**	2961 (335) **222**	4402 (497) **211**	5592 (632) **206**	6871 (776) **196**	8093 (914) **189**	228
20 (76)			1489 (168) **251**	2835 (320) **247**	4083 (461) **240**	5401 (610) **233**	6762 (764) **228**	7934 (897) **216**	253
22 (83)			1298 (147) **276**	2675 (302) **272**	3926 (444) **269**	5205 (588) **258**	6570 (742) **249**	7810 (883) **234**	278
24 (91)			1086 (123) **300**	2409 (272) **298**	3666 (414) **296**	4934 (558) **290**	6264 (708) **281**	7535 (851) **272**	303
Max. Cont. 25 (95)			958 (108) **315**	2278 (257) **313**	3482 (393) **308**	4857 (549) **300**	6139 (694) **289**	7421 (839) **280**	316
Inter. 30 (114)				1642 (186) **376**	2945 (333) **372**	4189 (473) **369**			379
Theo. Torque	729 (82)	1457 (165)	2914 (329)	4371 (494)	5828 (659)	7285 (823)	8742 (988)	10199 (1152)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

375 *22.8 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	2500 (173)	Max. Cont. 3000 (207)	Inter. 3250 (224)	Theo. RPM
0.5 (2)	574 (65) **4**	1272 (144) **3**	2670 (302) **2**	3970 (449) **1**					6
1 (4)	583 (66) **9**	1345 (152) **8**	2757 (312) **7**	4208 (475) **5**	5535 (625) **4**				11
2 (8)	596 (67) **19**	1365 (154) **18**	2907 (329) **17**	4388 (496) **14**	5695 (644) **12**	7122 (805) **10**	8524 (963) **8**	9288 (1050) **7**	21
4 (15)	627 (71) **40**	1400 (158) **39**	2982 (337) **37**	4536 (513) **34**	6020 (680) **30**	7596 (858) **27**	8962 (1013) **25**	9723 (1099) **23**	41
6 (23)	570 (64) **60**	1334 (151) **60**	2969 (336) **58**	4598 (520) **54**	6141 (694) **49**	7704 (871) **45**	9275 (1048) **41**	9867 (1115) **41**	61
8 (30)	467 (53) **81**	1337 (151) **80**	2876 (325) **78**	4532 (512) **73**	6113 (691) **69**	7724 (873) **63**	9304 (1051) **60**	9964 (1126) **59**	82
10 (38)		1161 (131) **101**	2768 (313) **99**	4439 (502) **95**	6075 (686) **89**	7824 (884) **82**	9281 (1049) **79**	10011 (1131) **77**	102
12 (45)		995 (112) **121**	2725 (308) **120**	4375 (494) **116**	6059 (685) **109**	7626 (862) **103**	9321 (1053) **98**	10066 (1137) **97**	122
14 (53)		878 (99) **141**	2508 (283) **140**	4149 (469) **136**	5705 (645) **131**	7467 (844) **125**	8965 (1013) **117**	9877 (1116) **115**	142
16 (61)		662 (75) **162**	2319 (262) **161**	3923 (443) **160**	5587 (631) **155**	7283 (823) **148**	8930 (1009) **143**	9859 (1114) **136**	163
18 (68)			2198 (248) **181**	3779 (427) **178**	5416 (612) **175**	7119 (804) **167**	8895 (1005) **160**	9653 (1091) **156**	183
20 (76)			1925 (218) **202**	3568 (403) **200**	5161 (583) **195**	6886 (778) **189**	8549 (966) **178**	9474 (1071) **173**	203
22 (83)			1676 (189) **222**	3318 (375) **221**	4967 (561) **217**	6669 (754) **211**	8335 (942) **201**	9171 (1036) **196**	223
24 (91)			1374 (155) **242**	3041 (344) **240**	4732 (535) **237**	6410 (724) **229**			244
Max. Cont. 25 (95)				2839 (321) **252**	4596 (519) **249**	6283 (710) **241**			254
Inter. 30 (114)				2110 (238) **303**	3820 (432) **301**	5503 (622) **296**			304
Theo. Torque	908 (103)	1815 (205)	3631 (410)	5446 (615)	7261 (821)	9076 (1026)	10892 (1231)	11799 (1333)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

470 *28.3 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	Max. Cont. 2500 (173)	3000 (207)	Inter. 3250 (224)	Theo. RPM
0.5 (2)	762 (86) **3**	1780 (201) **2**	3553 (401) **2**						5
1 (4)	817 (92) **7**	1728 (195) **7**	3597 (406) **6**	5395 (610) **5**	7137 (806) **4**				9
2 (8)	835 (94) **15**	1761 (199) **15**	3702 (418) **14**	5580 (631) **13**	7365 (832) **11**	9226 (1042) **9**	10961 (1239) **8**		17
4 (15)	815 (92) **32**	1784 (202) **32**	3769 (426) **30**	5717 (646) **28**	7513 (849) **24**	9430 (1066) **23**	11256 (1272) **21**	12217 (1381) **19**	33
6 (23)	729 (82) **48**	1799 (203) **47**	3744 (423) **46**	5725 (647) **43**	7565 (855) **39**	9473 (1070) **36**	11287 (1275) **34**	12083 (1365) **32**	49
8 (30)	595 (67) **65**	1641 (185) **64**	3663 (414) **63**	5683 (642) **60**	7671 (867) **54**	9538 (1078) **47**	11508 (1300) **46**	12367 (1398) **44**	66
10 (38)	459 (52) **81**	1506 (170) **80**	3532 (399) **79**	5573 (630) **76**	7584 (857) **69**	9531 (1077) **63**	11352 (1283) **61**	12323 (1393) **58**	82
12 (45)		1354 (153) **97**	3366 (380) **96**	5422 (613) **93**	7454 (842) **88**	9488 (1072) **77**	11523 (1302) **74**	12334 (1394) **68**	98
14 (53)		1121 (127) **114**	3173 (359) **113**	5229 (591) **110**	7282 (823) **104**	9350 (1057) **97**	11242 (1270) **89**	12318 (1392) **85**	115
16 (61)		888 (100) **130**	2964 (335) **129**	4993 (564) **127**	7061 (798) **119**	9118 (1030) **114**	11101 (1254) **108**	12118 (1369) **102**	131
18 (68)		595 (67) **146**	2689 (304) **145**	4734 (535) **143**	6772 (765) **137**	8875 (1003) **132**	10877 (1229) **120**	11926 (1348) **114**	147
20 (76)			2428 (274) **162**	4458 (504) **160**	6485 (733) **155**	8536 (965) **148**	10592 (1197) **139**	11668 (1318) **136**	164
22 (83)			2003 (226) **178**	4050 (458) **175**	6118 (691) **172**	8215 (928) **165**	10181 (1150) **156**	11200 (1266) **154**	180
24 (91)			1554 (176) **194**	3670 (415) **192**	5917 (669) **190**	7833 (885) **183**			196
Max. Cont. 25 (95)				3442 (389) **203**	5589 (632) **198**	7676 (867) **190**			205
Inter. 30 (114)				2451 (277) **243**	4549 (514) **240**	6684 (755) **235**			245
Theo. Torque	1127 (127)	2253 (255)	4506 (509)	6760 (764)	9013 (1018)	11266 (1273)	13519 (1528)	14646 (1655)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Torque, lb-in (Nm)
Speed, RPM

540 *32.7 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	Max. Cont. 2500 (173)	Inter. 3000 (207)	Theo. RPM
0.5 (2)	908 (103) **2**	1907 (215) **2**	3722 (421) **1**					4
1 (4)	917 (104) **6**	2016 (228) **5**	4015 (454) **4**	5897 (666) **3**	7730 (874) **1**			8
2 (8)	954 (108) **13**	2043 (231) **12**	4191 (474) **11**	6231 (704) **9**	8190 (925) **5**	10201 (1153) **4**		15
4 (15)	906 (102) **27**	2052 (232) **26**	4448 (503) **24**	6692 (756) **21**	8799 (994) **18**	10806 (1221) **15**	12930 (1461) **13**	29
6 (23)	866 (98) **42**	2038 (230) **41**	4404 (498) **39**	6774 (766) **36**	9049 (1023) **30**	11225 (1268) **27**	13219 (1494) **24**	43
8 (30)	744 (84) **56**	1883 (213) **55**	4280 (484) **53**	6669 (754) **49**	9130 (1032) **42**	11262 (1273) **38**	13486 (1524) **34**	57
10 (38)	561 (63) **70**	1727 (195) **69**	4122 (466) **68**	6519 (737) **64**	8903 (1006) **57**	11374 (1285) **49**	13556 (1532) **46**	71
12 (45)	373 (42) **84**	1586 (179) **83**	3928 (444) **82**	6349 (717) **79**	8710 (984) **72**	11277 (1274) **65**	13436 (1518) **57**	85
14 (53)		1295 (146) **97**	3722 (421) **95**	6139 (694) **93**	8529 (964) **87**	11091 (1253) **80**	13381 (1512) **70**	99
16 (61)		1025 (116) **113**	3460 (391) **111**	5865 (663) **108**	8230 (930) **103**	10675 (1206) **97**	13086 (1479) **84**	114
18 (68)		798 (90) **127**	3153 (356) **125**	5563 (629) **123**	7969 (900) **116**	10550 (1192) **107**	12841 (1451) **100**	128
20 (76)		498 (56) **141**	2923 (330) **139**	5265 (595) **137**	7850 (887) **133**	10250 (1158) **123**	12578 (1421) **114**	142
22 (83)			2464 (278) **155**	4859 (549) **153**	7271 (822) **148**	9919 (1121) **136**	12283 (1388) **133**	156
24 (91)			2154 (243) **169**	4494 (508) **166**	7024 (794) **164**	9325 (1054) **156**		170
Max. Cont. 25 (95)			1948 (220) **176**	4299 (486) **174**	6741 (762) **169**	9075 (1025) **163**		177
Inter. 30 (114)			800 (90) **211**	3237 (366) **210**	5649 (638) **207**	8144 (920) **203**		212
Theo. Torque	1302 (147)	2604 (294)	5207 (588)	7811 (883)	10414 (1177)	13018 (1471)	15621 (1765)	

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

750 *45.6 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	1000 (69)	1500 (104)	2000 (138)	Max. Cont. 2500 (173)	Inter. 3000 (207)	Theo. RPM
0.5 (2)	1276 (144) **1**	2566 (290) **1**						3
1 (4)	1367 (154) **4**	2863 (323) **3**	5917 (669) **2**	8242 (931) **2**				6
2 (8)	1435 (162) **9**	3015 (341) **9**	6302 (712) **7**	9038 (1021) **6**	11550 (1305) **3**			11
4 (15)	1400 (158) **19**	3080 (348) **19**	6399 (723) **17**	9578 (1082) **15**	12410 (1402) **11**			21
6 (23)	1273 (144) **30**	2927 (331) **29**	6317 (714) **27**	9583 (1083) **24**	12678 (1433) **20**	15430 (1744) **16**		31
8 (30)	1116 (126) **40**	2900 (328) **39**	6167 (697) **37**	9486 (1072) **34**	12843 (1451) **25**	15658 (1769) **20**		41
10 (38)	922 (104) **50**	2574 (291) **50**	5976 (675) **47**	9334 (1055) **44**	12785 (1445) **36**	15805 (1786) **28**	18373 (2076) **19**	51
12 (45)	682 (77) **60**	2382 (269) **59**	5792 (655) **58**	9136 (1032) **54**	12668 (1431) **49**	15801 (1786) **36**	18528 (2094) **30**	61
14 (53)	410 (46)	2116 (239) **69**	5545 (627) **68**	8880 (1003) **65**	12451 (1407) **59**	15634 (1767) **45**	18578 (2099) **37**	71
16 (61)		1780 (201) **81**	5164 (584) **79**	8592 (971) **76**	11907 (1345) **70**	15422 (1743) **57**	18271 (2065) **44**	82
18 (68)		1421 (161) **91**	4819 (545) **90**	8209 (928) **86**	11556 (1306) **80**	15120 (1709) **69**		92
20 (76)		1058 (120) **101**	4395 (497) **100**	7635 (863) **97**	11154 (1260) **90**			102
22 (83)			3926 (444) **110**	7351 (831) **108**	10737 (1213) **101**			112
24 (91)			3447 (389) **121**	6947 (785) **117**	10581 (1196) **111**			122
Max. Cont. 25 (95)			3255 (368) **126**	6697 (757) **124**	10126 (1144) **120**			127
Inter. 30 (114)			1813 (205) **151**	5428 (613) **149**	8665 (979) **146**			152
Theo. Torque	1815 (205)	3631 (410)	7261 (821)	10892 (1231)	14522 (1641)	18153 (2051)	21783 (2462)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Torque, lb-in (Nm)
Speed, RPM

930 *56.7 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	1500 (104)	1750 (121)	Max. Cont. 2000 (138)	2250 (155)	Inter. 2500 (173)	Theo. RPM
0.5 (2)	1590 (180) **1**	3423 (387) **1**	5368 (607) **1**	7089 (801) **1**							3
1 (4)	1734 (196) **4**	3696 (418) **3**	5780 (653) **3**	7649 (864) **3**	9447 (1067) **3**	11451 (1294) **3**					5
2 (8)	1816 (205) **8**	3907 (442) **7**	6015 (680) **7**	7764 (877) **7**	9886 (1117) **7**	11501 (1300) **6**	13365 (1510) **5**				9
4 (15)	1753 (198) **16**	3825 (432) **16**	5878 (664) **15**	8021 (906) **15**	9924 (1121) **15**	11840 (1338) **14**	13769 (1556) **13**	15306 (1730) **11**			17
6 (23)	1633 (185) **24**	3719 (420) **24**	5765 (651) **24**	8034 (908) **24**	9935 (1123) **23**	11991 (1355) **22**	13651 (1543) **20**	15873 (1794) **18**	17532 (1981) **16**		25
8 (30)	1438 (162) **32**	3576 (404) **31**	5624 (636) **30**	7900 (893) **30**	9800 (1107) **29**	11854 (1340) **28**	13988 (1581) **27**	15716 (1776) **24**	17570 (1985) **22**	18632 (2105) **17**	33
10 (38)	1109 (125) **40**	3253 (368) **40**	5536 (626) **39**	7476 (845) **38**	9620 (1087) **38**	11625 (1314) **36**	13251 (1497) **34**	15364 (1736) **31**	17306 (1956) **28**	19054 (2153) **24**	41
12 (45)	807 (91) **48**	3018 (341) **47**	5111 (578) **46**	7213 (815) **45**	9487 (1072) **44**	11630 (1314) **42**	13492 (1525) **41**	15159 (1713) **36**	17222 (1946) **33**	18873 (2133) **32**	49
14 (53)	310 (35)	2565 (290) **56**	4715 (533) **55**	6772 (765) **54**	9059 (1024) **52**	10974 (1240) **50**	13155 (1487) **49**	15287 (1727) **45**	17216 (1945) **43**	19188 (2168) **36**	58
16 (61)		2118 (239) **64**	4281 (484) **63**	6429 (726) **62**	8488 (959) **61**	10708 (1210) **59**	12830 (1450) **57**	15008 (1696) **54**	17039 (1925) **50**	18934 (2140) **46**	66
18 (68)		1811 (205) **72**	3891 (440) **72**	6202 (701) **70**	8143 (920) **69**	10418 (1177) **67**	12580 (1422) **65**	14538 (1643) **64**	16741 (1892) **58**	18625 (2105) **55**	74
20 (76)		1325 (150) **81**	3616 (409) **80**	5590 (632) **79**	7091 (801) **78**	9733 (1100) **76**	12135 (1505) **75**	14148 (1599) **72**	16454 (1859) **67**	18230 (2060) **63**	82
22 (83)		875 (99) **89**	2977 (336) **88**	5139 (581) **87**	7403 (837) **86**	9342 (1056) **83**	11553 (1305) **83**	13816 (1561) **80**	15918 (1799) **77**	17925 (2025) **71**	90
24 (91)			2497 (282) **97**	4438 (501) **96**	6778 (766) **94**	9038 (1021) **93**	11201 (1266) **92**	13179 (1489) **89**	15505 (1752) **86**	17427 (1969) **82**	98
Max. Cont. 25 (95)			2137 (241) **101**	4389 (496) **100**	6390 (722) **100**	8621 (974) **97**	10743 (1214) **96**	12863 (1454) **93**	15286 (1727) **89**	17309 (1956) **84**	102
Inter. 30 (114)			582 (66) **122**	2652 (300) **121**	4711 (532) **120**	6914 (781) **118**	9235 (1044) **118**	11248 (1271) **116**			123
Theo. Torque	2257 (255)	4514 (510)	6771 (765)	9029 (1020)	11286 (1275)	13543 (1530)	15800 (1785)	18057 (2040)	20314 (2296)	22572 (2551)	

1K1 *63.9 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	1500 (104)	1750 (121)	Max. Cont. 2000 (138)	2250 (155)	Inter. 2500 (173)	Theo. RPM
0.5 (2)	1918 (217) **1**	4026 (455) **1**	5940 (671) **0.9**	7879 (890) **0.6**							2
1 (4)	1821 (206) **3**	4410 (498) **2**	6251 (706) **2**	8273 (935) **2**	10518 (1189) **2**						4
2 (8)	1985 (224) **6**	4407 (498) **6**	6672 (754) **6**	8700 (983) **5**	10810 (1222) **5**	12635 (1428) **4**					8
4 (15)	1980 (224) **14**	4180 (472) **13**	6669 (754) **13**	8946 (1011) **13**	11169 (1262) **11**	13147 (1486) **10**	15014 (1697) **9**				15
6 (23)	1500 (170) **21**	4314 (487) **21**	6538 (739) **20**	9023 (1020) **19**	10956 (1238) **18**	13286 (1501) **16**	14998 (1695) **14**	16936 (1914) **12**			22
8 (30)	1451 (164) **28**	3814 (431) **28**	6270 (709) **28**	8580 (970) **27**	10986 (1241) **26**	13106 (1481) **23**	15280 (1727) **20**	17185 (1942) **16**	18971 (2144) **9**		29
10 (38)	1143 (129) **36**	3546 (401) **36**	5975 (675) **35**	8356 (944) **34**	10688 (1208) **32**	12879 (1455) **29**	15168 (1714) **26**	16982 (1919) **26**	18983 (2145) **17**		37
12 (45)	871 (98) **43**	3176 (359) **43**	5526 (624) **42**	7915 (894) **41**	10163 (1148) **40**	12569 (1420) **37**	14981 (1693) **31**	16756 (1893) **25**	18879 (2133) **22**	20456 (2311) **19**	44
14 (53)	390 (44)	2761 (312) **50**	5129 (580) **49**	7535 (851) **49**	9933 (1122) **47**	12237 (1383) **44**	14263 (1612) **40**	16424 (1856) **33**	18569 (2098) **29**	20596 (2327) **25**	51
16 (61)		2220 (251) **57**	4569 (516) **56**	6871 (776) **56**	9402 (1062) **55**	11678 (1320) **52**	14045 (1587) **50**	16261 (1837) **38**	18426 (2082) **30**	20275 (2291) **29**	58
18 (68)		1678 (190) **65**	4053 (458) **65**	6252 (706) **64**	8869 (1002) **62**	11252 (1272) **60**	13738 (1552) **59**	15877 (1794) **52**	18147 (2051) **41**	20130 (2275) **33**	66
20 (76)		1033 (117) **72**	3453 (390) **71**	5774 (652) **71**	8227 (930) **70**	10502 (1187) **69**	12874 (1596) **64**	15246 (1723) **58**	17705 (2001) **57**	19716 (2228) **45**	73
22 (83)		444 (50) **79**	2741 (310) **79**	5034 (569) **78**	7493 (847) **77**	9846 (1113) **76**	12214 (1380) **74**	14599 (1650) **67**	17055 (1927) **62**	18924 (2138) **51**	80
24 (91)			1862 (210) **86**	4346 (491) **85**	6677 (755) **84**	9007 (1018) **83**	11398 (1288) **81**	13777 (1557) **76**	16164 (1827) **71**	18591 (2101) **61**	87
Max. Cont. 25 (95)			1635 (185) **90**	4096 (463) **90**	6281 (710) **89**	8519 (963) **88**	10901 (1232) **85**	13247 (1497) **82**	15844 (1790) **76**	17950 (2028) **71**	91
Inter. 30 (114)				1789 (202) **108**	4217 (477) **107**	6460 (730) **106**	8962 (1013) **105**	10947 (1237) **104**			109
Theo. Torque	2544 (287)	5088 (575)	7631 (862)	10175 (1150)	12719 (1437)	15263 (1725)	17807 (2012)	20350 (2300)	22894 (2587)	25438 (2874)	

Torque, lb-in (Nm)
Speed, RPM

1K5 *91.2 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	Max. Cont. 1500 (104)	Inter. 1750 (121)	Theo. RPM
0.5 (2)	2703 (305) **0.9**	5736 (648) **0.6**						2
1 (4)	2978 (336) **2**	6128 (693) **1**	8942 (1011) **1**					3
2 (8)	3106 (351) **4**	6454 (729) **4**	9597 (1085) **3**	12072 (1364) **3**				6
4 (15)	2925 (331) **9**	6304 (712) **9**	9879 (1116) **8**	13191 (1491) **7**	15668 (1771) **7**			11
6 (23)	2629 (297) **15**	6023 (681) **14**	9632 (1088) **13**	12952 (1464) **12**	15662 (1770) **10**			16
8 (30)	2183 (247) **20**	5662 (640) **19**	9188 (1038) **18**	12655 (1430) **17**	15864 (1793) **15**	18786 (2123) **9**		21
10 (38)	1740 (197) **25**	5159 (583) **24**	8860 (1001) **23**	12189 (1377) **22**	15479 (1749) **19**	18498 (2090) **14**		26
12 (45)	1157 (131) **30**	4695 (531) **29**	8315 (940) **28**	11770 (1330) **27**	15066 (1702) **24**	18059 (2041) **19**	20613 (2329) **14**	31
14 (53)	594 (67)	4282 (484) **35**	7689 (869) **33**	11217 (1267) **32**	14532 (1642) **30**	17612 (1990) **24**	20353 (2300) **15**	36
16 (61)		3457 (391) **40**	6805 (769) **39**	10374 (1172) **37**	13866 (1567) **36**	16941 (1914) **32**	19986 (2258) **21**	41
18 (68)		2602 (294) **45**	6072 (686) **44**	9523 (1076) **43**	13177 (1489) **40**	16334 (1846) **38**	19366 (2188) **27**	46
20 (76)		1607 (182) **50**	5435 (614) **49**	8746 (988) **48**	12320 (1392) **47**	15429 (1743) **44**	18553 (2301) **37**	51
22 (83)		770 (87) **55**	4310 (487) **54**	7720 (872) **53**	11356 (1283) **52**	14442 (1632) **48**	17883 (2021) **46**	56
24 (91)			4032 (456) **60**	6632 (749) **60**	10143 (1146) **58**	13570 (1533) **58**	16568 (1872) **50**	61
Max. Cont. 25 (95)			2589 (293) **63**	6232 (704) **62**	9313 (1052) **62**	12961 (1465) **59**	16306 (1843) **53**	64
Inter. 30 (114)				2174 (246) **75**	5711 (645) **74**	9265 (1047) **73**		76
Theo. Torque	3631 (410)	7261 (821)	10892 (1231)	14522 (1641)	18153 (2051)	21783 (2462)	25414 (2872)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

Performance

2K1 *127.7 in³/rev*

Flow GPM (LPM)	Pressure psi (bars) 250 (17)	500 (35)	750 (52)	1000 (69)	1250 (86)	Max. Cont. 1500 (104)	Inter. 1750 (121)	Theo. RPM
0.5 (2)	3878 (438) **0.8**	7894 (892) **0.8**						1
1 (4)	3891 (440) **1**	8162 (922) **1**	12375 (1398) **1**					2
2 (8)	4073 (460) **3**	8458 (956) **3**	12923 (1460) **3**					4
4 (15)	3920 (443) **7**	8525 (963) **7**	13192 (1491) **6**	17520 (1980) **6**				8
6 (23)	3560 (402) **10**	8179 (924) **10**	13012 (1470) **10**	17370 (1963) **9**				11
8 (30)	2985 (337) **14**	7824 (884) **14**	12613 (1425) **14**	16995 (1920) **13**	21152 (2390) **9**	23613 (2668) **8**		15
10 (38)	2431 (275) **17**	7205 (814) **17**	11944 (1350) **16**	16538 (1869) **16**	20733 (2343) **13**	23564 (2663) **8**		19
12 (45)	1535 (173) **21**	6398 (723) **21**	11171 (1262) **21**	15886 (1795) **20**	20232 (2286) **17**	23588 (2665) **12**		22
14 (53)	587 (66)	5479 (619) **24**	10221 (1155) **24**	15063 (1702) **23**	19519 (2206) **21**	23333 (2637) **13**		26
16 (61)		4391 (496) **28**	9009 (1018) **28**	14046 (1587) **27**	18645 (2107) **26**	22777 (2574) **20**		29
18 (68)		3257 (368) **32**	8052 (910) **32**	12973 (1466) **31**	17527 (1980) **30**	21866 (2471) **26**		33
20 (76)		1991 (225) **36**	6686 (755) **36**	11537 (1304) **36**	16449 (1859) **35**	20878 (2359) **30**		37
22 (83)		628 (71) **39**	5507 (622) **39**	10367 (1171) **39**	14885 (1682) **38**	19575 (2212) **36**		40
24 (91)			3794 (429) **43**	8704 (984) **43**	13665 (1544) **42**	18291 (2067) **40**		44
Max. Cont. 25 (95)			3129 (354) **45**	7883 (891) **45**	12636 (1428) **45**	17445 (1971) **43**		46
Inter. 30 (114)				3803 (430) **54**	8485 (959) **54**	13207 (1492) **53**		55
Theo. Torque	5084 (574)	10167 (1149)	15251 (1723)	20334 (2298)	25418 (2872)	30502 (3447)	35585 (4021)	

Areas within white represent maximum motor efficiencies.

DO NOT operate at maximum pressure and maximum flow simultaneously.

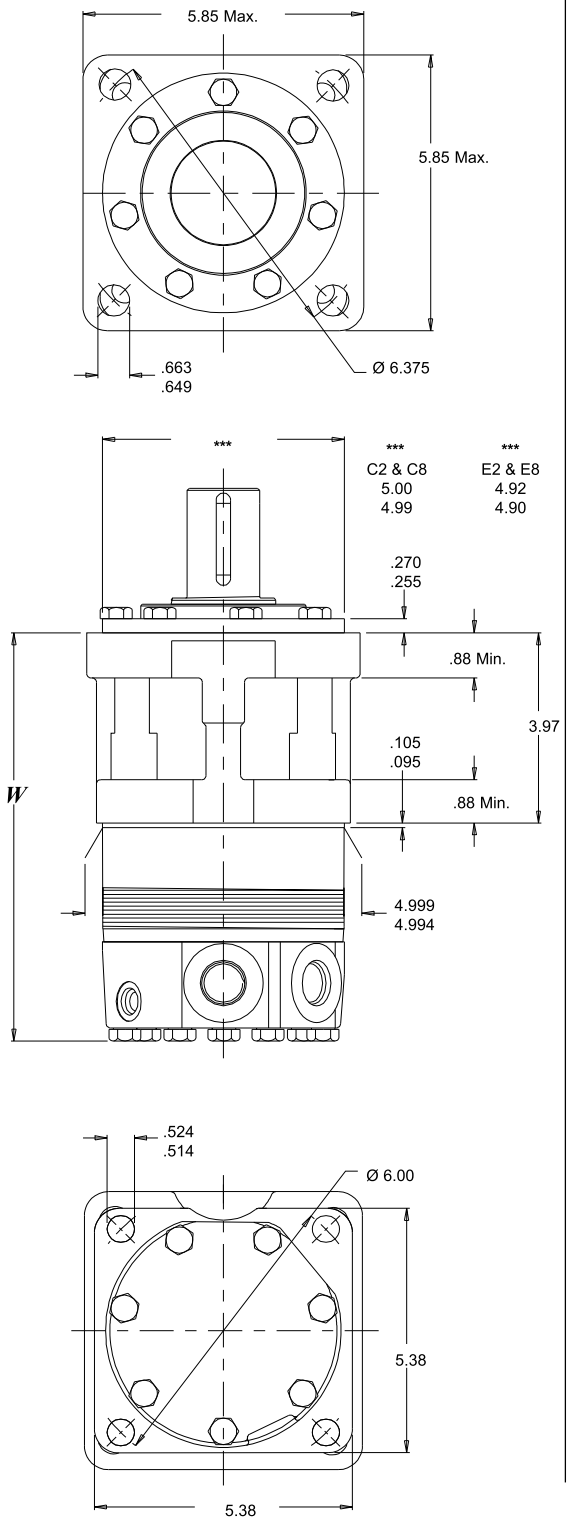
Torque, lb-in (Nm)
Speed, RPM

Tested at 129°F with an oil viscosity of 213 SUS

Note: Performance data is typical. Performance of production units varies slightly from one motor to another.

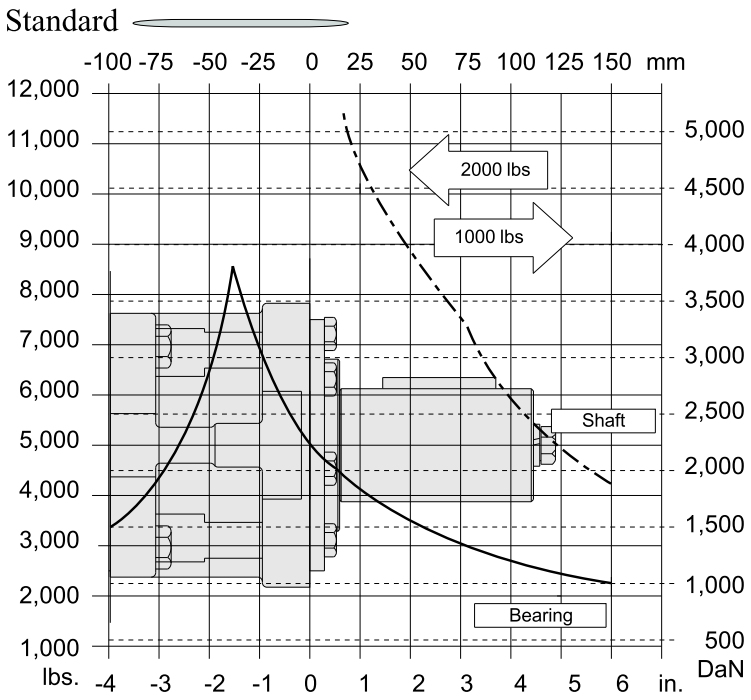
C2 *Standard Mount 5" Pilot End Ports*
E2 *Standard Mount 125mm Pilot End Ports*

C8 *Standard Mount 5" Pilot Side Ports*
E8 *Standard Mount 125mm Pilot Side Ports*



Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.



Length and Weight Tables

Wheel Mount

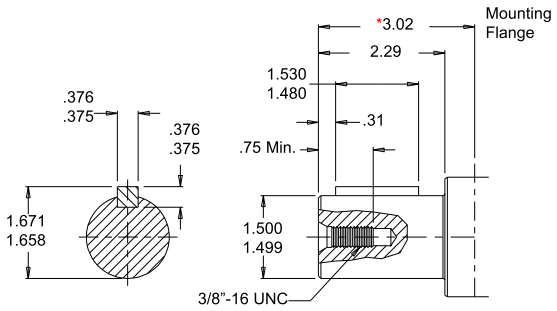
Code	*W* in	Weight lbs
300	8.25	44.6
375	8.50	45.8
470	8.80	47.1
540	9.04	48.2
750	9.75	51.3
930	10.35	53.8
1K1	10.75	55.7
1K5	12.25	62.5
2K1	14.25	71.3

DT motor weights vary ±3 lbs depending upon motor configuration. Subtract .11 in. from *W* for motors using the 1, 2 or 5 Endcover.

Shafts

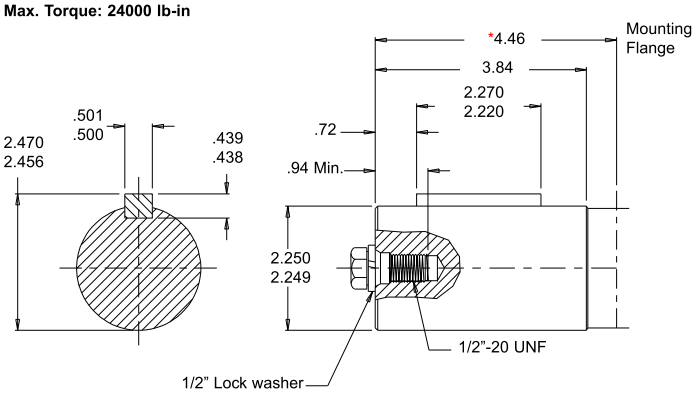
30 *1 ½" Straight*

Max. Torque: 19800 lb-in



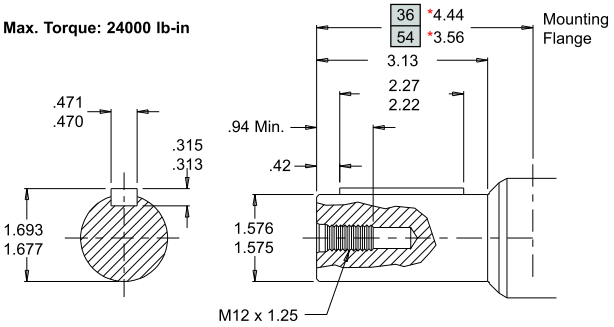
40 *2 ¼" Straight*

Max. Torque: 24000 lb-in



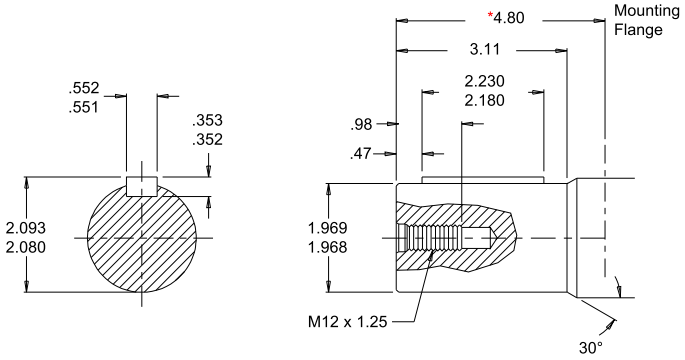
36 *40mm Straight*
†54 *40mm Straight Extended*

Max. Torque: 24000 lb-in



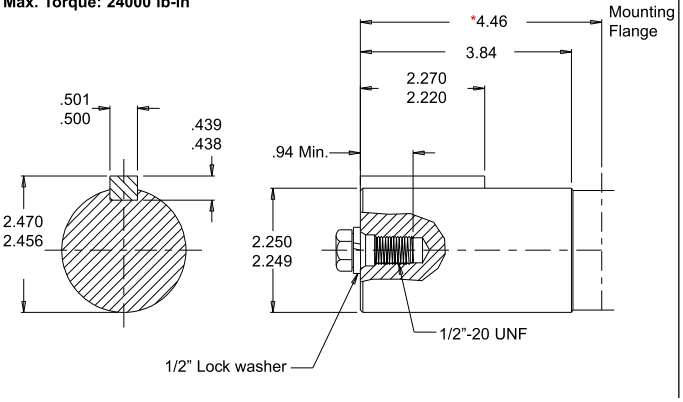
41 *50mm Straight*

Max. Torque: 24000 lb-in



†47 *2 ¼" Straight with Modified Keyway*

Max. Torque: 24000 lb-in

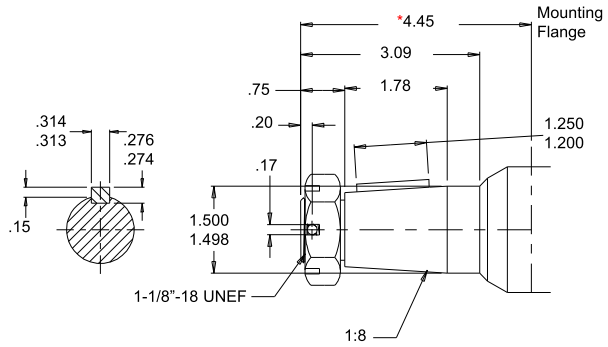


*Shaft Lengths vary ± .030 inches.
†For Speed Sensor Motors Only

Back

31 *1 ½" Tapered*

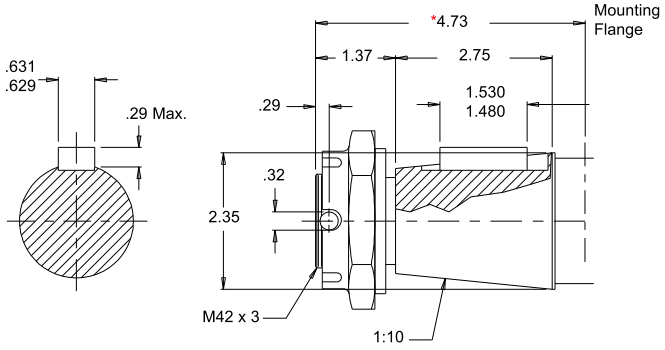
Max. Torque: 19900 lb-in



Note: A slotted nut is standard on this shaft.

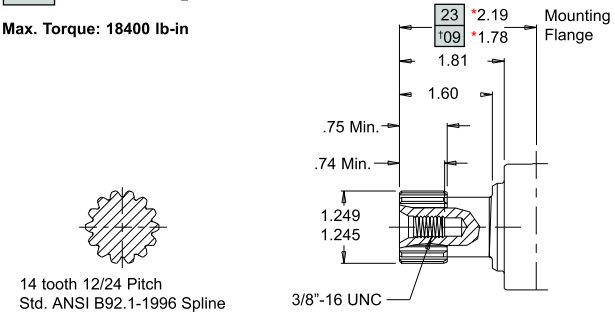
45 *60mm Tapered*

Max. Torque: 24000 lb-in



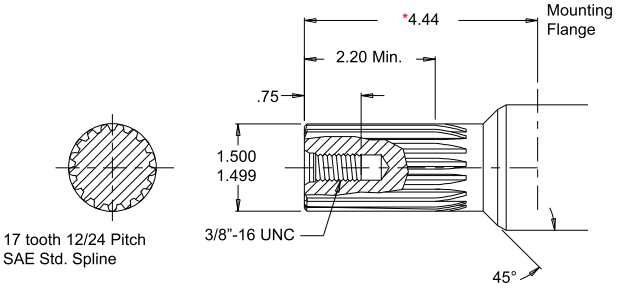
23 *14 Tooth Spline*
†09 *14 Tooth Spline Extended*

Max. Torque: 18400 lb-in



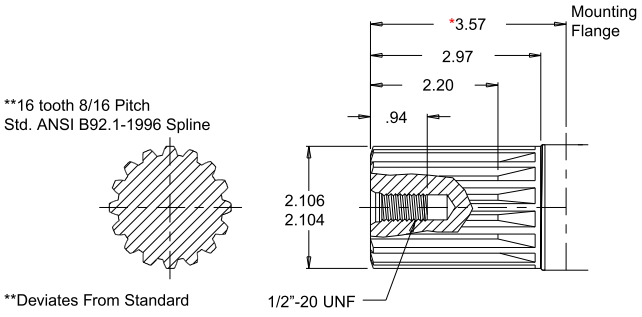
34 *17 Tooth Spline*
†49 *17 Tooth Spline Extended*

Max. Torque: 19900 lb-in



42 *16 Tooth Spline*
†48 *16 Tooth Spline Extended*

Max. Torque: 24000 lb-in

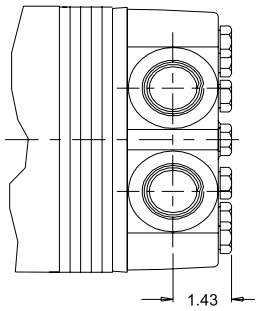


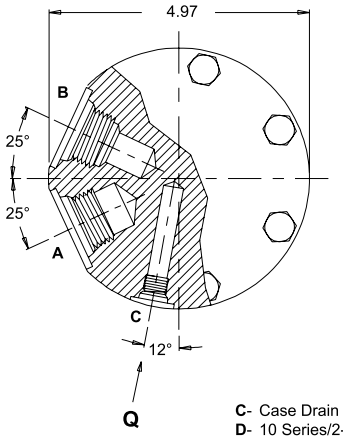
*Shaft Lengths vary ± .030 inches.
†For Speed Sensor Motors Only

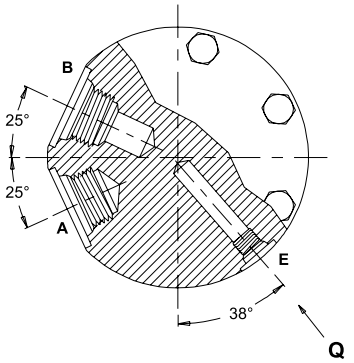
Porting

5	*1-1/16" O-Ring with 7/16" Drain*
2	*3/4" BSP.F with 1/4" Drain*

Side Ports



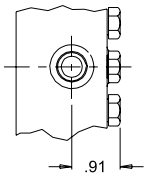




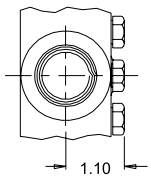
C- Case Drain
D- 10 Series/2-way Valve Cavity (7/8"-14 UNF-2B)
E- Internal Drain

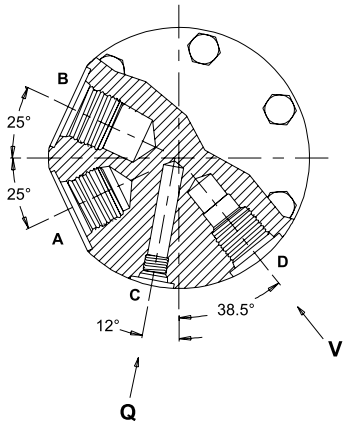
Q and V

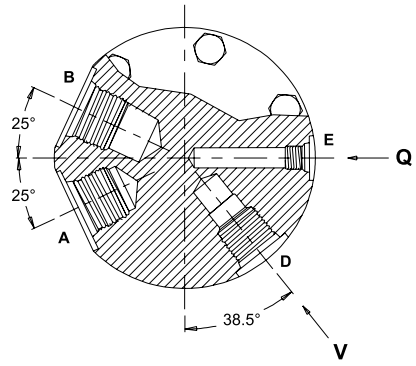
Q - Case Drain



V - Valve Cavity

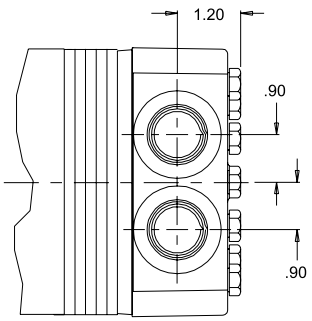


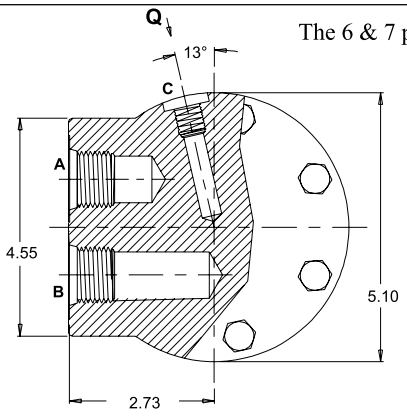


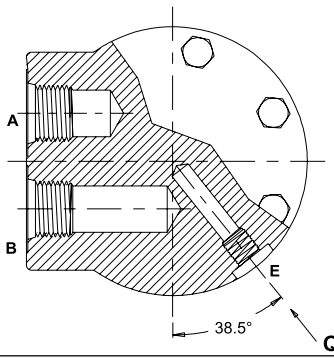


The 2 & 5 porting options can be ordered with an internal drain and/or a relief valve cavity.

6	*1 1/16" O-Ring with 7/16" Drain*
7	*3/4" BSP.F with 1/4" Drain*





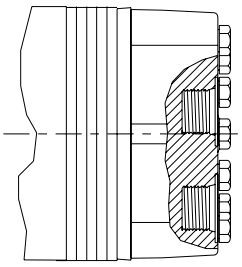


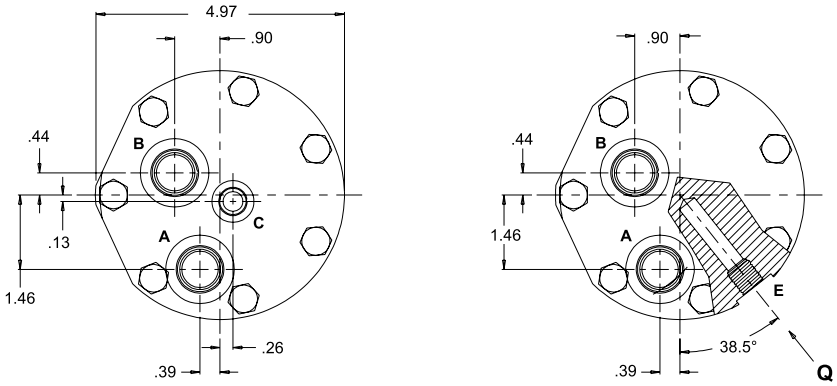
The 6 & 7 porting options can be ordered with an internal drain.

Porting

1 *7/8" O-Ring with 7/16" Drain*

End Ports

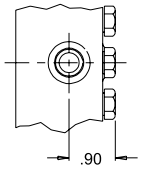




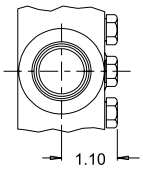
C- Case Drain
D- 10 Series/2-way Valve Cavity (7/8"-14 UNF-2B)
E- Internal Drain

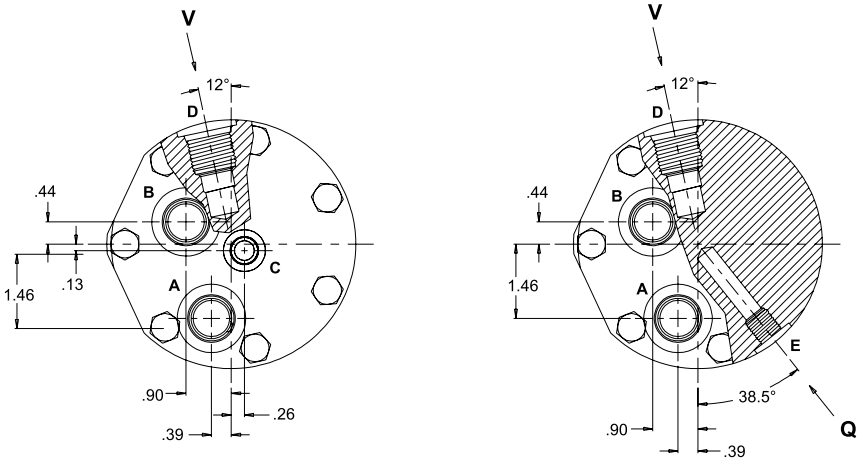
Q and V

Q - Case Drain



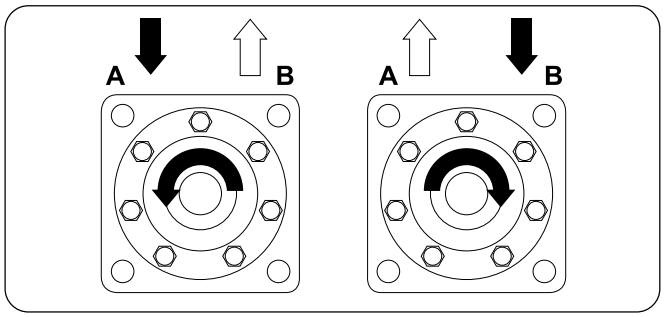
V - Valve Cavity





The 1 porting options can be ordered with an internal drain and/or a relief valve cavity.

DT Rotation Selection



Ordering Information

SERIES 700 — DISPLACEMENT — HOUSINGS — SHAFT — OPTIONS — MISCELLANEOUS

Code	Displacement
300	18.3 in^3/rev
375	22.8 in^3/rev
470	28.3 in^3/rev
540	32.7 in^3/rev
750	45.6 in^3/rev
930	56.7 in^3/rev
1K1	63.9 in^3/rev
1K5	91.2 in^3/rev
2K1	127.7 in^3/rev

Code	Housings
C2	Standard Mount 5" Pilot End Ports
C8	Standard Mount 5" Pilot Side Ports
E2	Standard Mount 125mm Pilot End Ports
E8	Standard Mount 125mm Pilot Side Ports

PORTS

Code	Side Ports
5	Radial Ports 1-1/16-12 O-ring
2	Radial Ports 3/4-14 BSP.F
6	Parallel Ports 1-1/16-12 O-ring
7	Parallel Ports 3/4-14 BSP.F

Code	End Ports
1	7/8-14 O-ring

Code	Shafts
†09	14 Tooth Spline Ext.
23	14 Tooth Spline
30	1-1/2" Straight
31	1-1/2" Tapered
34	17 Tooth Spline
36	40mm Straight
40	2-1/4" Straight
41	50mm Straight
42	16 Tooth Spline
45	60mm Tapered
†47	2-1/4" Straight Mod.
†48	16 Tooth Spline Ext.
†49	17 Tooth Spline Ext.
†54	40mm Straight Ext.

PAINT

Code	Options
A	Dark Metallic Gray
B	Dark Metallic Gray (Unpainted Flange Face)
C	Black
D	Black (Unpainted Flange Face)
Z	No Paint

Code	Options
AA	None
AB	Internal Drain (Low Pressure)
*AC	Freeturning Rotor
AD	Internal Drain with Freeturning Rotor

ADD ONS

Code	Options
A	Standard
W	4-Pin Male Weatherpack Connector (Dual)
X	4-Pin M12 Male Connector (Dual)
Y	3-Pin Male Weatherpack Connector (Single)
Z	4-Pin M12 Male Connector (Single)

CAVITY

Code	Options
A	None
**B	Relief Valve Cavity
**C	1000 psi Relief Valve Installed
**D	1250 psi Relief Valve Installed
**E	1500 psi Relief Valve Installed
**F	1750 psi Relief Valve Installed
**G	2000 psi Relief Valve Installed
**J	2500 psi Relief Valve Installed
**L	3000 psi Relief Valve Installed

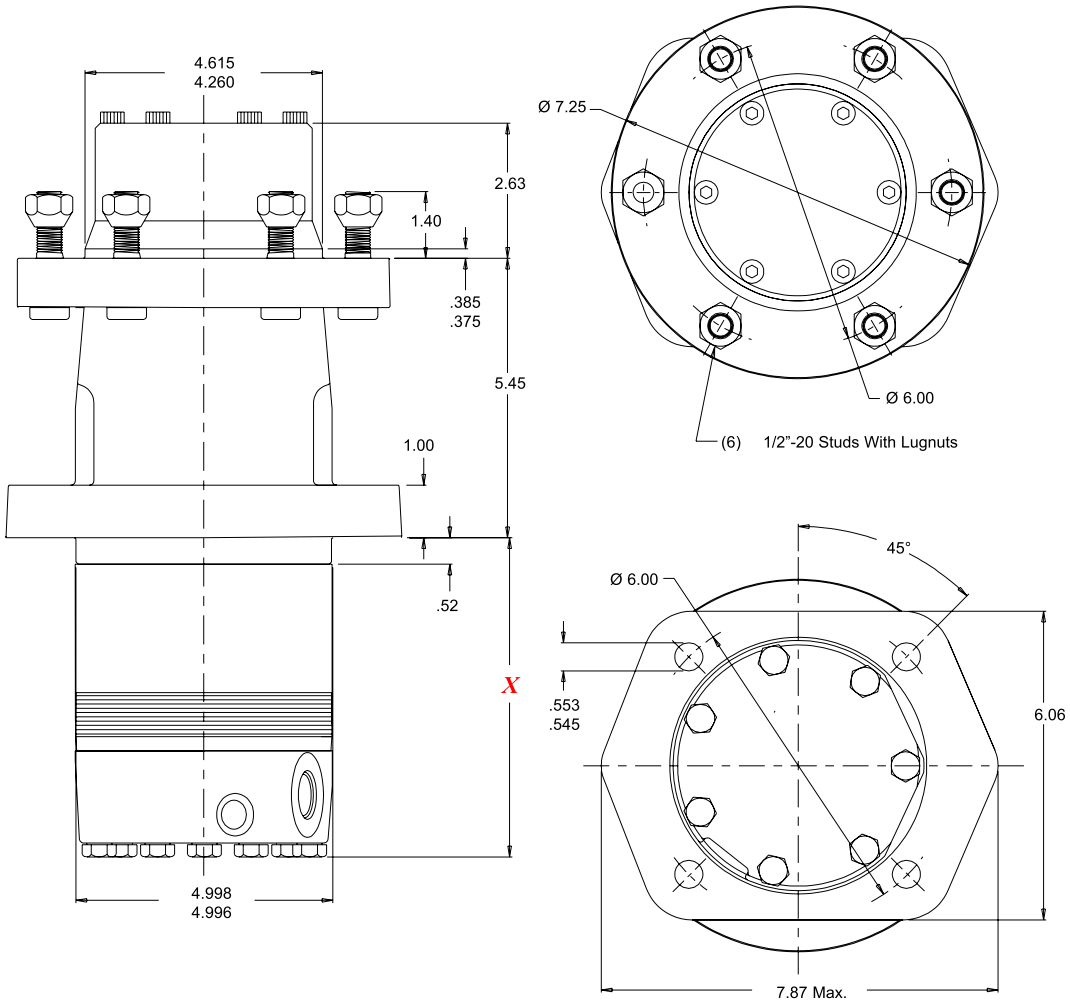
NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: C82 = A standard mount 5" pilot radial side ported motor with 3/4" BSPF threading)

* Standard with 1K5 and 2K1 Displacement Codes.

** Available with 1, 2, and 5 ports only.

† For speed sensor motors only.

W2 *4-Hole End Ports*
W8 *4-Hole Side Ports*



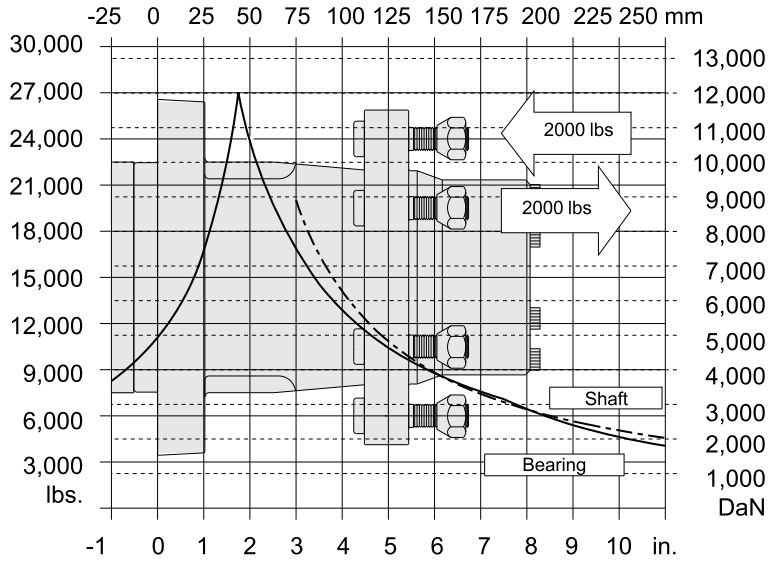
Note: The DT40 Series motor is not available with the internal drain option. Drain line pressure must be maintained below 25 psi. A dedicated line from the motor drain port to the reservoir is recommended.

Technical

Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.

DT40



Length and Weight Tables

Wheel Mount

Code	*X* in	Weight lbs
300	4.74	62.6
375	4.99	63.8
470	5.29	65.1
540	5.53	66.2
750	6.24	69.2
930	6.84	71.8
1K1	7.24	73.7
1K5	8.74	80.5
2K1	10.74	89.3

DT motor weights vary ±3 lbs depending upon motor configuration. Subtract .11 in. from *X* for motors using the 1, 2 or 5 Endcover.

Back

Ordering Information

SERIES 740 — DISPLACEMENT — HOUSINGS — SHAFT — OPTIONS (PAINT, CAVITY, ADD ONS, MISCELLANEOUS)

Code	Displacement
300	18.3 in^3/rev
375	22.8 in^3/rev
470	28.3 in^3/rev
540	32.7 in^3/rev
750	45.6 in^3/rev
930	56.7 in^3/rev
1K1	63.9 in^3/rev
1K5	91.2 in^3/rev
2K1	127.7 in^3/rev

Code	Housings
W2	4-Hole Wheel Mount (6.00 Diameter B.C.) with End Ports
W8	4-Hole Wheel Mount (6.00 Diameter B.C.) with Side Ports

PORTS

Code	Side Ports
5	Radial Ports 1-1/16" O-ring
2	Radial Ports 3/4-14 BSP.F

Code	End Ports
1	7/8" O-ring

Code	Shafts
61	6-Bolt Wheel Flange (6.00 Diameter B.C.)

PAINT

Code	Options
A	Dark Metallic Gray
C	Black
Z	No Paint

CAVITY

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

ADD ONS

Code	Options
A	Standard

MISCELLANEOUS

Code	Options
AA	None
**AC	Freeturning Rotor

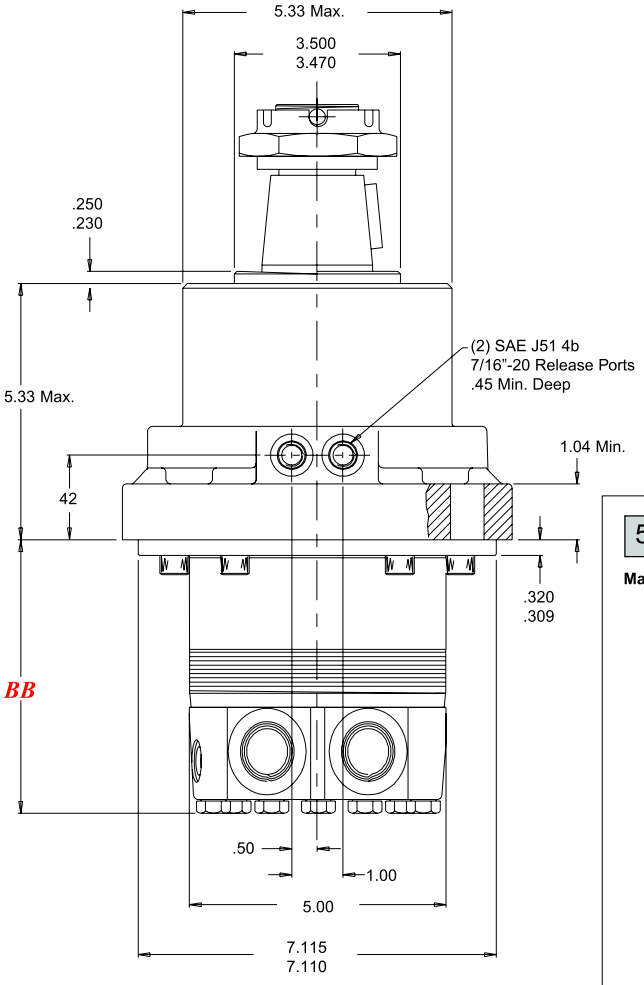
NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: W21 = A 4-Hole wheel mount end ported motor with 7/8" threading.)

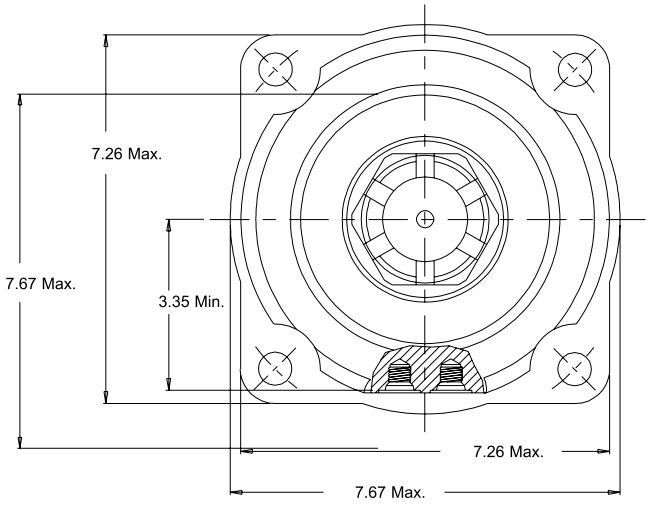
* Available with 1, 2, and 5 ports only
** Standard on 1K5 and 2K1

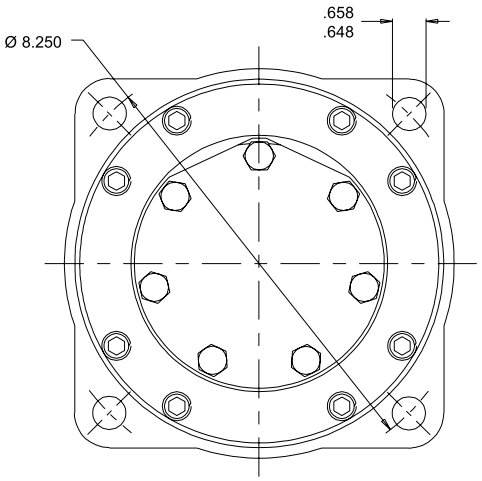
Housing

W2 *4-Hole End Ports*

W8 *4-Hole Side Ports*



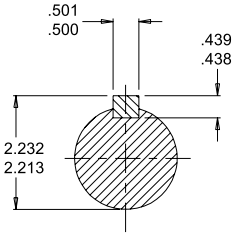


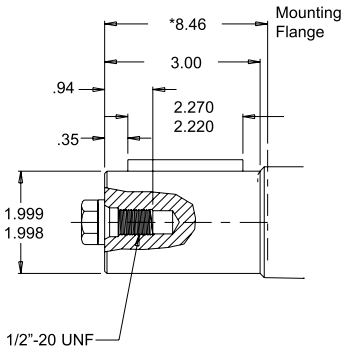


Shafts

50 *2" Straight*

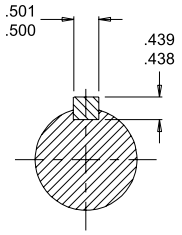
Max. Torque: 24000 lb-in

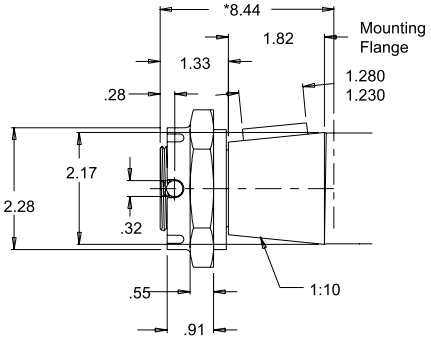




51 *55mm Tapered*

Max. Torque: 24000 lb-in





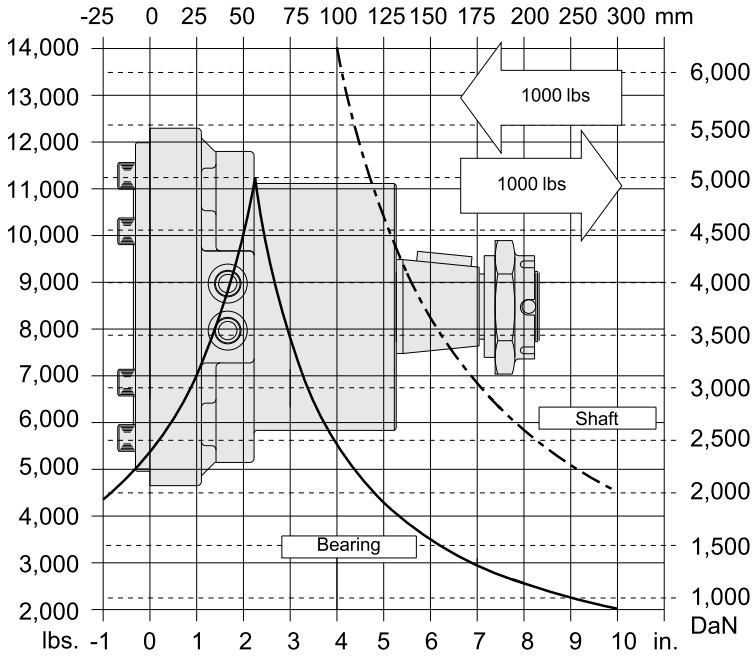
BB is on page 115

Shaft Lengths vary± .030 inches

CAUTION: It is vital that all operating recommendations on page 33 be followed. Failure to do so could result in injury or death.

Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table.



Length and Weight Tables

Wheel Mount

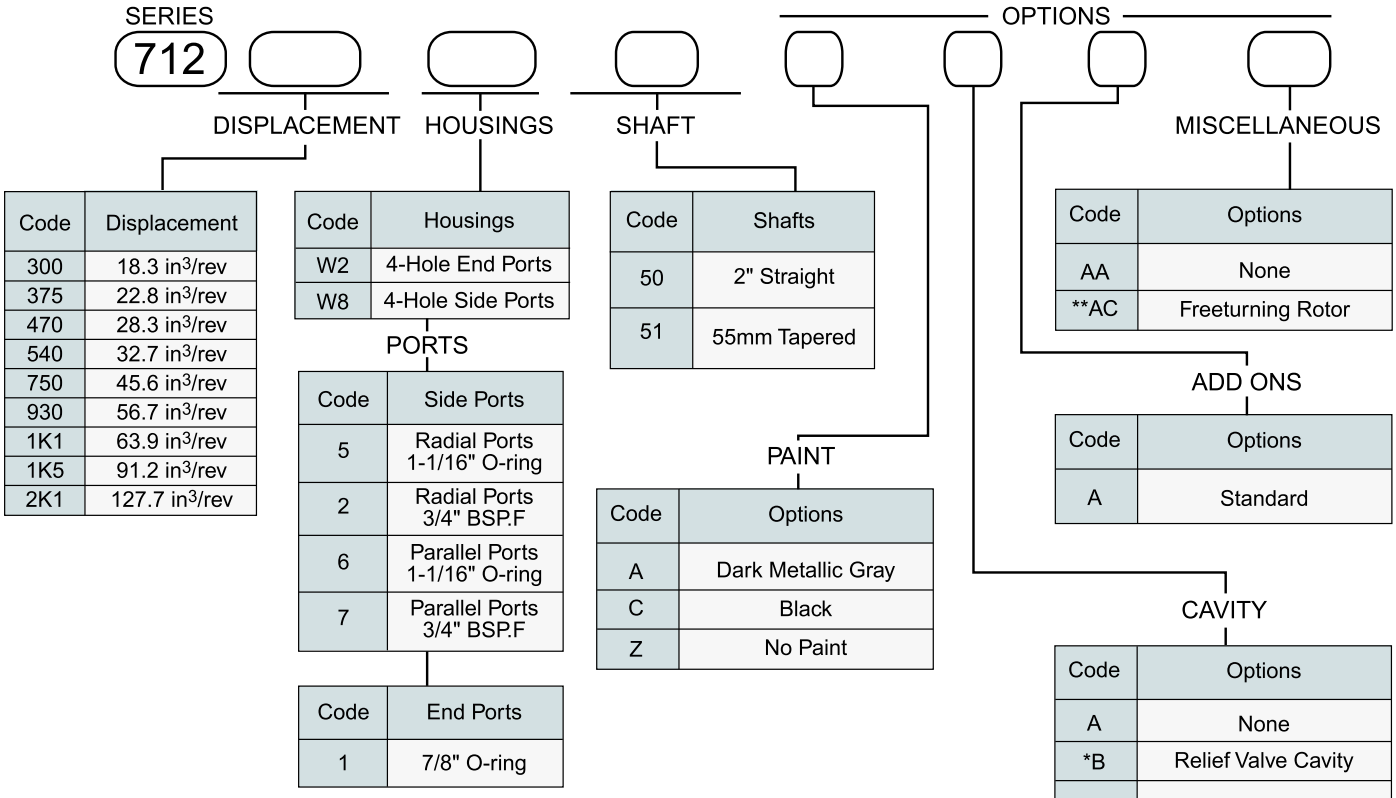
Code	*BB* in	Weight lbs
300	4.54	60.0
375	4.79	61.2
470	5.09	62.5
540	5.33	63.6
750	6.04	66.7
930	6.64	69.2
1K1	7.04	71.1
1K5	8.54	77.9
2K1	10.54	86.7

DT motor weights vary ±3 lbs depending upon motor configuration. Subtract .11 in. from ***BB*** for motors using the 1, 2 or 5 Endcover.

Back

Rated brake torque ..... 14,000 lb-in
Initial release pressure ..... 275 psi
Full release pressure ..... 475 psi
Maximum release pressure ..... 3,000 psi
Release volume ..... 0.8-1.0 cu.in.

Ordering Information



Code	Displacement
300	18.3 in³/rev
375	22.8 in³/rev
470	28.3 in³/rev
540	32.7 in³/rev
750	45.6 in³/rev
930	56.7 in³/rev
1K1	63.9 in³/rev
1K5	91.2 in³/rev
2K1	127.7 in³/rev

Code	Housings
W2	4-Hole End Ports
W8	4-Hole Side Ports

Code	Side Ports
5	Radial Ports 1-1/16" O-ring
2	Radial Ports 3/4" BSP.F
6	Parallel Ports 1-1/16" O-ring
7	Parallel Ports 3/4" BSP.F

Code	End Ports
1	7/8" O-ring

NOTE: To complete the 3 digit housing code, a housing and port option must be entered. A side port housing option must use side port connections, and a end port housing option must use end port connections.
(Example: W82 = A 4-Hole radial ported motor with 3/4" BSP.F threading)

Code	Shafts
50	2" Straight
51	55mm Tapered

Code	Options
A	Dark Metallic Gray
C	Black
Z	No Paint

Code	Options
AA	None
**AC	Freeturning Rotor

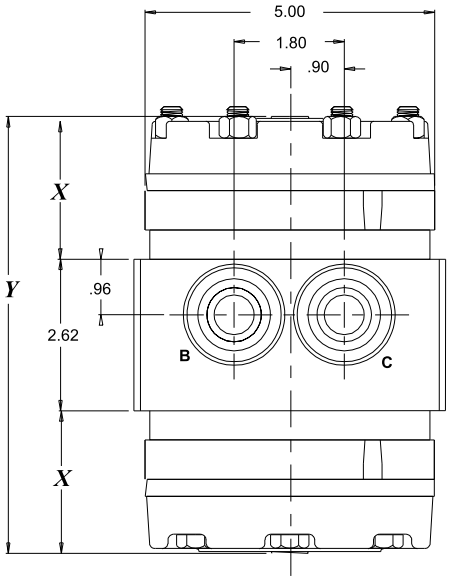
Code	Options
A	Standard

Code	Options
A	None
*B	Relief Valve Cavity
*C	1000 psi Relief Valve Installed
*D	1250 psi Relief Valve Installed
*E	1500 psi Relief Valve Installed
*F	1750 psi Relief Valve Installed
*G	2000 psi Relief Valve Installed
*J	2500 psi Relief Valve Installed
*L	3000 psi Relief Valve Installed

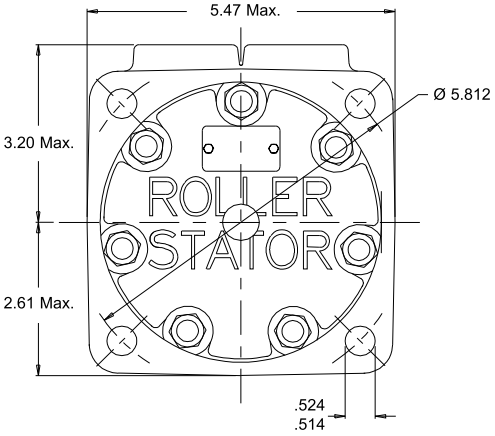
** Standard with 1K5 and 2K1 Displacement Codes.

* Available with 1, 2, and 5 ports only

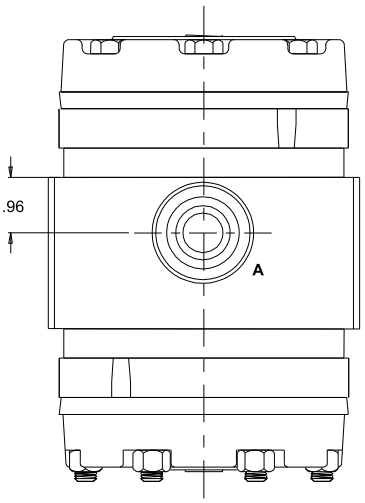
- 3,000 psi maximum pressure
- 2,500 psi maximum pressure differential between outputs



The White Hydraulics flow dividers represent an ingenious use of the patented Roller Stator® gerotor assembly. These highly effective devices use a common housing to supply the input flow to two gerotor assemblies linked by a common drive link. By linking the two gerotor assemblies together, accurate splitting of the flow is assured. These flow dividers use no bearings or rotating seals, eliminating the typical failures in other designs. By using the highly efficient Roller Stator® gerotor elements, high efficiencies are maintained, even at low flows. Because White Hydraulics' flow dividers work at much lower RPMs than most gear dividers, they are also noticeably quieter. These flow dividers are an excellent way to synchronize cylinders or motors. Because these flow dividers tolerate higher output pressure differentials than other designs, they may also be used for pressure intensification by connecting one output to tank.



Caution: The flow dividers are not available with internal relief protection. Inline relief protection for the output lines should be provided due to the possibility of encountering pressure intensification if pressure in one outlet line drops dramatically.



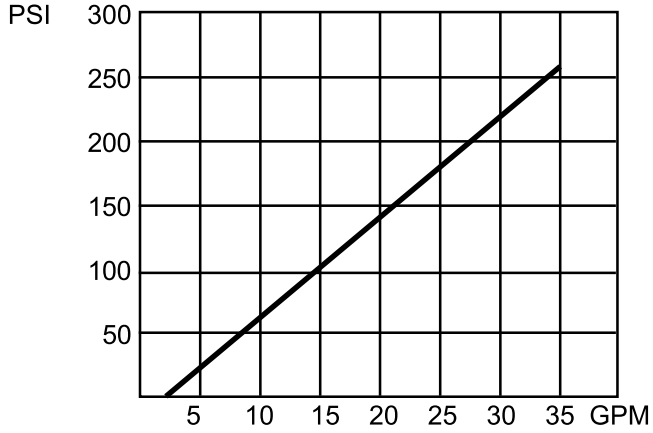
Model	Flow Range GPM	X (in)	Y (in)	Weight (lbs)
950320M8699AAAAA	2-10	2.32	8.69	34.0
950600M8699AAAAA	10-30	2.78	9.61	37.4
950750M8699AAAAA	30-40	3.03	10.11	39.6

FD weights vary ± 1 lb.

A (Inlet) 1-1/16"-12 O-ring
B, C (Outlets) 1-1/16"-12 O-ring

Ordering Information

Pressure Drop



SERIES: 950

DISPLACEMENT

Code	Displacement
320	19.8 in^3/rev
600	36.6 in^3/rev
750	45.6 in^3/rev

HOUSING

Code	Housing
M86	4-Hole Mid Mount Side Opposed with 1-1/16" O-Ring Ports

SHAFT

Code	Shafts
99	No Shaft

OPTIONS

PAINT

Code	Options
A	Dark Metallic Gray
C	Black
Z	No Paint

CAVITY

Code	Options
A	None

MISCELLANEOUS

Code	Options
AA	None

ADD ONS

Code	Options
A	Standard

Features

Heavy-duty roller bearings support high shaft loads and provide long life.

Dual release ports allow easier bleeding of brake release cavity.

Oil-filled cavity immerses all components providing quiet operation and reduced wear.

Holding Torque	10,000 lb-in
Release Pressure	400 psi
Maximum release pressure	3,000 psi
Release volume	0.7 cu. in.
Max. Speed	250 rpm
Max. Operating Temperature	180°F
Weight	37 lbs
Fluid Type	Mineral based oil

Superior Design For Reliable Operation

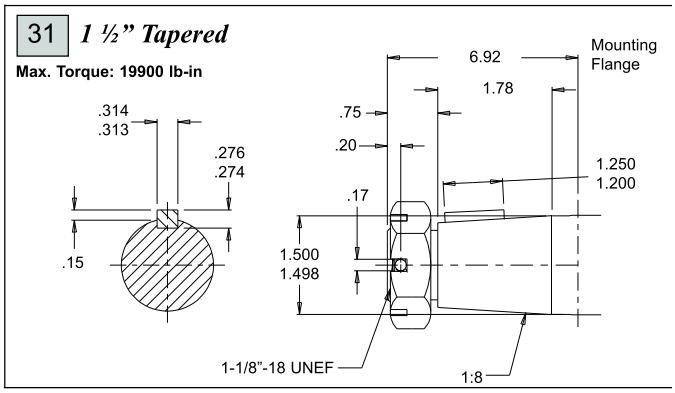
With safety becoming an increasingly important factor in the design and manufacture of equipment, it has become necessary to add a brake to many critical machine functions. In response to that concern, White Hydraulics, Inc. offers the BK10 Series brake. Based on technology proven in White Hydraulics, successful line of integrated motor/brakes, this spring-applied, hydraulically released brake provides 10,000 lb-in of holding torque for static brake applications.

Many other features contribute to the superior operation and durability of the brake as well. All internal components, including roller bearings, brake disks, springs, and seals were chosen for maximum durability. To further extend the life of the unit and reduce noise, all internal components run in an oil bath. Two brake release ports are also provided to simplify plumbing and bleeding of the brake release circuit during installation. All of these features combine to make the BK10 Series brake the top choice for any static brake application requiring 10,000 lb-in of holding torque.

Shaft

31 *1 ½" Tapered*

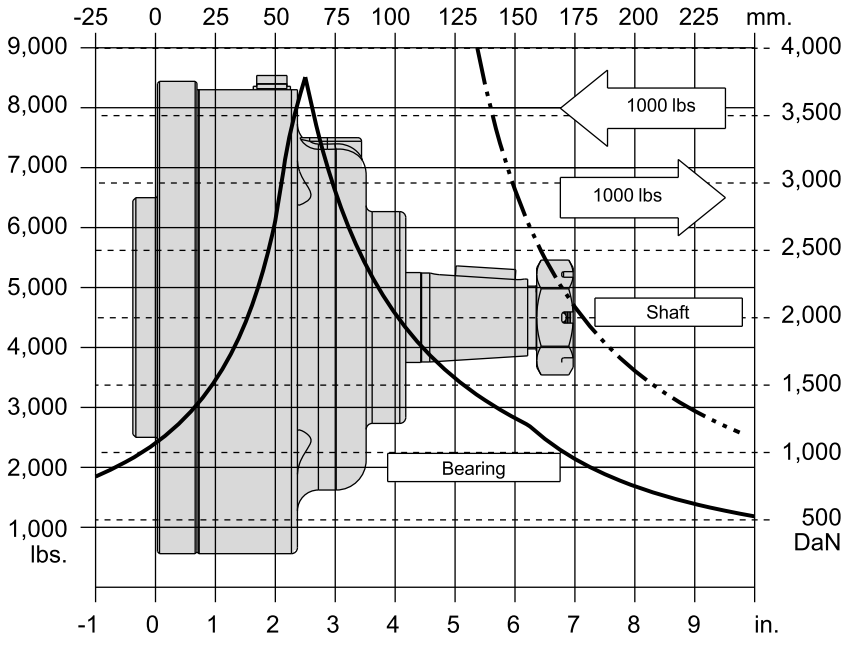
Max. Torque: 19900 lb-in



Note: A slotted nut is standard on this shaft.

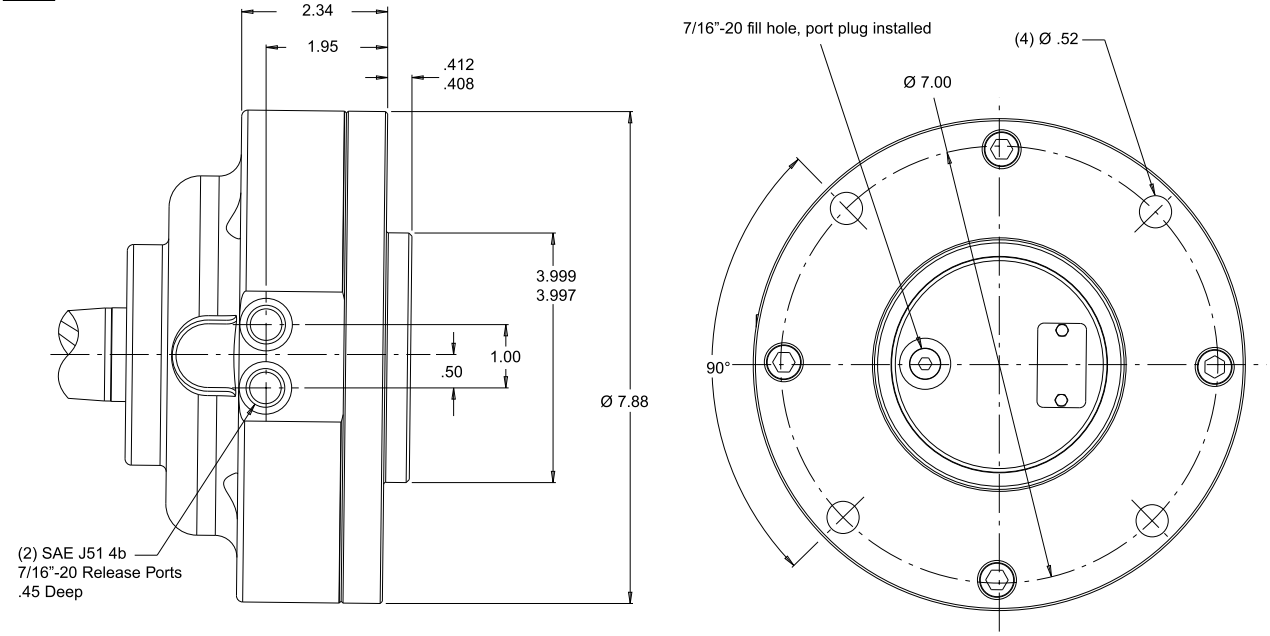
Allowable Bearing And Shaft Loads

Bearing Curve: The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an L_{10} life of 2000 hours at 100 RPM. Radial loads for speeds other than 100 RPM may be calculated using the multiplication factor table located on page 27.



Technical

K30 *4-Hole 7/16" O-Ring*



Ordering Information

SERIES 913 — DISPLACEMENT — HOUSING — SHAFT — OPTIONS — PAINT — CAVITY — ADD ONS — MISCELLANEOUS

Code	Displacement
000	No Displacement

Code	Housings
K30	4-Hole Wheel Mount Front Ports 7/16" O-Ring

Code	Shafts
31	1-1/2" Tapered

Code	Options
AA	Standard

Code	Options
A	Dark Metallic Gray
C	Black
Z	No Paint

Code	Options
A	None

Code	Options
A	None
C	Solid Hex Nut

Free Turn

The ‘AC’ option or “Free turning” option refers to a specially prepared rotor assembly. This rotor assembly has increased clearance between the rotor tips and stator rollers allowing it to turn much more freely than a standard rotor assembly. For the RS Series motors, additional clearance is also provided between the shaft and housing bore. The ‘AC’ option is available for all motor series and displacements, except the DT 1K5 and 2K1 displacements, which receive this option as standard.

There are several applications and duty cycle conditions where the ‘AC’ option performance characteristics can be beneficial. In continuous duty applications that require high flow/high rpm operation, the benefits are twofold. The additional clearance helps to minimize the internal pressure drop at high flows. This clearance also provides a thicker oil film at metal to metal contact areas that can help extend the life of the motor in high rpm or even over speed conditions. The ‘AC’ option should be considered for applications that require continuous operation above 15 GPM and/or 300 rpm.

Applications that are subject to pressure spikes due to frequent reversals or shock loads can also benefit by specifying the ‘AC’ option. The additional clearance serves to act as a buffer against spikes allowing them to be bypassed through the motor rather than being absorbed and transmitted through the drive link to the output shaft.

The trade off for achieving these benefits is a slight loss of volumetric efficiency at high pressures.

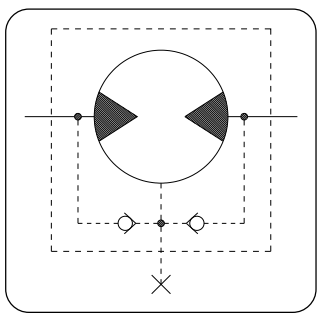
Note:The DT 1K5 and 2K1 displacement motors are standard with the freeturn option.

Internal Drain

The internal drain option is available on all HB, DR, and DT Series motors. Typically, a separate drain line must be installed to direct case leakage of the motor back to the reservoir when using a HB, DR, or DT Series motor. However, the internal drain option eliminates the need for a separate drain line through the installation of two check valves in the motor endcover, thereby simplifying the plumbing requirements for the motor.

These two check valves connect the case area of the motor to each port of the endcover. During normal motor operation, pressure in the input and return lines of the motor close the check valves. However, when the pressure in the case of the motor is greater than that of the return line, the check valve between the case and low pressure line opens allowing the case leakage to flow into the return line. Since the operation of the check valves is dependent upon a pressure differential, the internal drain option operates in either direction of motor rotation.

Although this option can simplify many motor installations, precautions must be taken to insure that return line pressure remains below allowable levels (see table below) to insure proper motor operation and life. If return line pressure is higher than allowable, or experiences pressure spikes, this pressure may feed back into the motor, possibly causing catastrophic seal failure. Installing motors with internal drains in series is not recommended unless overall pressure drop over all motors is below the maximum allowable backpressure as listed in the charts above. If in doubt, contact your authorized White Hydraulics representative.

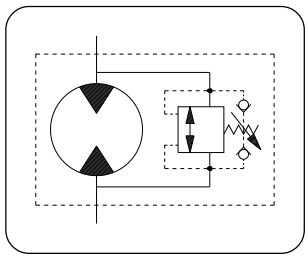


Maximum Allowable Back Pressure

Series	Cont. PSI	Inter. PSI
HB	1000	1500
DR	1000	1500
DT	300	500
Motor/Brakes *Motor/Bremsen*	500	500

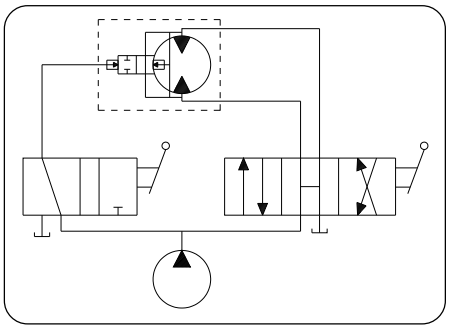
Valve Cavity

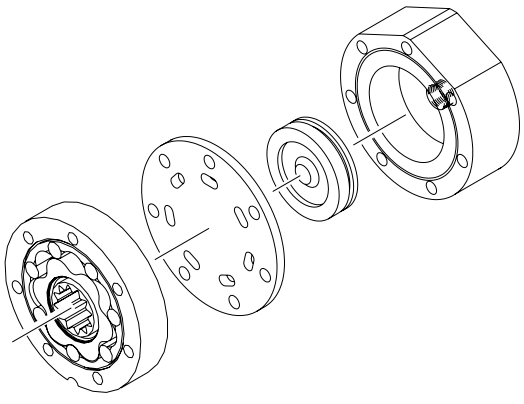
The valve cavity option is available in every motor series and provides a cost effective way to incorporate a variety of valve cartridges integral to the motor. The valve cavity is a standard 10 series 2-way cavity that accepts numerous cartridge valves, including overrunning check valve cartridges, relief cartridges, flow control valves, pilot operated check fuses, and high pressure shuttle valves. Installation of a relief cartridge into the cavity provides an extra margin of safety for applications encountering frequent pressure spikes. Relief cartridges from 1000 to 3000 psi may also be factory installed. For basic systems with fixed displacement pumps, either manual or motorized flow control valves may be installed into the valve cavity to provide a simple method for controlling motor speed. It is also possible to incorporate the speed sensor option and a programmable logic controller with a motorized flow control valve to create a closed loop, fully automated speed control system. For motors with internal brakes, a shuttle valve cartridge may be installed into the cavity to provide a simple, fully integrated method for supplying release pressure to the pilot line to actuate an integral brake. To discuss other alternatives for the valve cavity option, contact an authorized White Hydraulics distributor.



Declutch Option

The declutch or 'AE' option, available on the RE and CE Series motors, has been specifically designed for applications requiring the motor to have the ability to "freewheel" when not pressurized. By making minor changes to the components used within the motor, the torque required to turn the output shaft is minimal. Selection of this option allows freewheeling speeds up to 1,000 RPM depending on the displacement of the motor and duty cycle of the application. To allow the motor to perform this function, the standard rotor assembly is replaced with a freeturn rotor assembly. Next, the standard balance plate and endcover is replaced with a special wear plate and ported endcover. The wear plate features seven holes that connect the stator pockets to each other. The ported endcover features a movable piston capable of sealing the seven holes in the wear plate. When standard motor function is required, pressure is supplied to the endcover port, moving the piston against the wear plate. This action seals the seven holes allowing the motor to function as normal. However, when pressure is removed from the endcover port, the pressure created by the turning rotor assembly pushes the piston away from the wear plate, opening the rotor pockets to each other. In this condition, the oil may circulate freely within the rotor and endcover assemblies, allowing the rotor assembly to rotate freely within the motor. This option is especially useful in applications ranging from winch drives to towable wheel drives. Depending on the valves and hydraulic circuitry, operation of the freewheel function may be manually or automatically selected. A basic schematic is shown below.



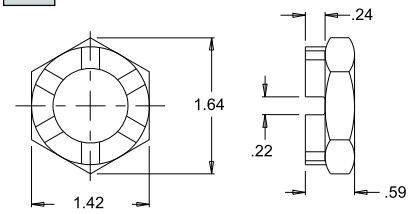


Shaft Nuts

35mm Tapered Shaft

M24 X 1.5 Thread

Std. ***Slotted Nut***



Torque to 300-400 ft.lb.

Precautions

The tightening torques listed with each nut should only be used as a guideline. Hubs may require higher or lower tightening torque depending on the material. Consult the hub manufacturer to obtain recommended tightening torque. To maximize torque transfer from the shaft to the hub, and to minimize the potential for shaft breakage, a hub with sufficient thickness must fully engage the taper length of the shaft.

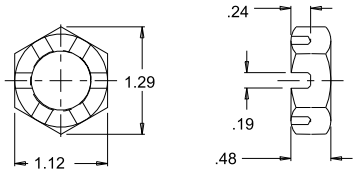
Incorrect Correct

Note: Cotter key pinholes on shaft drawings in this catalog are shown 90° from actual.

1” Tapered Shaft

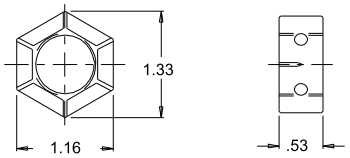
3/4”-28 Thread

Std. ***Slotted Nut***



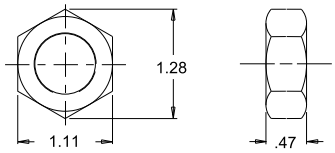
Torque to 150-170 ft.lb.

P ***Pac Nut®***



Torque to 150-170 ft.lb.

X ***Solid Nut***

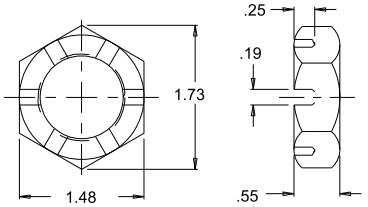


Torque to 150-170 ft.lb.

1-1/4” Tapered Shaft

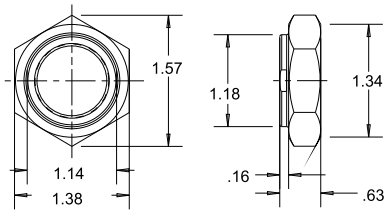
1”-20 Thread

Std. ***Slotted Nut***



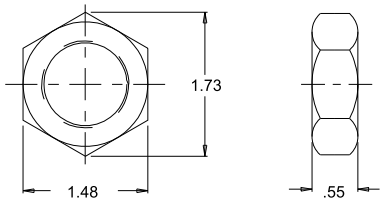
Torque to 300-400 ft.lb.

P ***Lock Nut***



Torque to 240-310 ft.lb.

X ***Solid Nut***

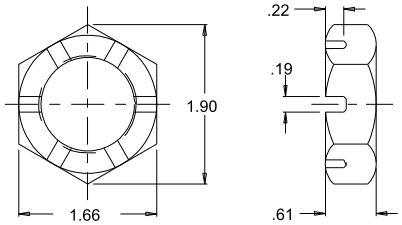


Torque to 300-400 ft.lb.

1-1/2” Tapered Shaft

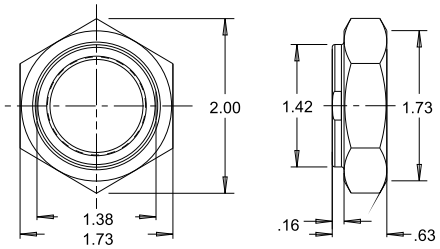
1-1/8”-18 Thread

Std. ***Slotted Nut***



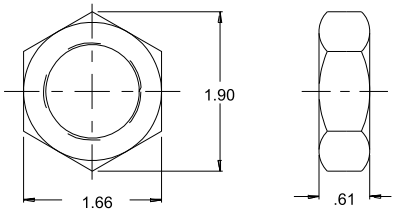
Torque to 300-400 ft.lb.

P ***Lock Nut***



Torque to 250-350 ft.lb.

X ***Solid Nut***



Torque to 300-400 ft.lb.

Operating Recommendations

Oil Type- Hydraulic oils with anti-wear, anti-foam and demulsifiers are recommended for systems incorporating White Hydraulics motors. Straight oils can be used but may require VI (viscosity index) improvers depending on the operating temperature range of the system. Other water based and environmentally friendly oils may be used, however service life of the motor and other components in the system may be significantly shortened. Before using any type of fluid, consult the fluid requirements for all components in the system for compatibility. Testing under actual operating conditions is the only way to determine if acceptable service life may be achieved.

Viscosity Rating- Fluids with a viscosity between 100 - 200 S.U.S. at operating temperature is recommended. Fluid temperature should also be maintained below 180° F. It is also suggested that the type of pump and its operating specifications be taken into account when choosing a fluid for the system. Fluids with high viscosity can cause cavitation at the inlet side of the pump. Systems that operate over a wide range of temperatures may require viscosity improvers to provide acceptable fluid performance.

Filtration- White Hydraulics recommends maintaining an oil cleanliness level of ISO 17-14 or better.

Installation/Start-up- When installing a White Hydraulics motor, it is important that the mounting flange of the motor makes full contact with the mounting surface of the application. Mounting hardware of the appropriate grade and size must be used. Hubs, pulleys, sprockets and couplings must be properly aligned to avoid inducing excessive thrust or radial loads. Although the output device must fit the shaft snug, a hammer should never be used to install any type of output device onto the shaft. The port plugs should only be removed from the motor when the system connections are ready to be made. To avoid contamination, remove all matter from around the ports of the motor and the threads of the fittings. Once all system connections are made, it is recommended that the motor be run-in for 15-30 minutes at no load and half speed to remove air from the hydraulic system.

Motor protection- Over-pressurization of a motor is one of the primary causes of motor failure or damage. To prevent these situations, it is necessary to provide adequate relief protection for a motor based on the pressure ratings for that particular model. For systems that may experience overrunning conditions, special precautions must be taken. In an overrunning condition, the motor functions as a pump and attempts to convert kinetic energy into hydraulic energy. Unless the system is properly configured for this condition, damage to the motor or system can occur. To protect against this condition, a counterbalance valve or relief cartridge must be incorporated into the circuit to reduce the risk of overpressurization. If a relief cartridge is used, it must be installed downline of the motor to relieve the pressure created by the overrunning motor. To provide proper motor protection for an over-running load application, the pressure setting of the pressure relief valve must not exceed the intermittent rating of the motor.

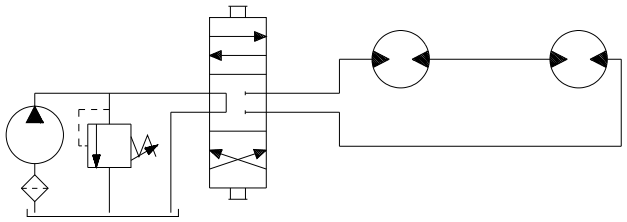
Caution: A hydraulic motor must not be used to hold a suspended load. Due to the necessary internal tolerances, all hydraulic motors will experience some degree of creep when a load induced torque is applied to a motor at rest. All applications that require a load to be held must use some form of mechanical brake designed for that purpose.

Motor Circuits

There are 2 types of circuits used for connecting multiple numbers of motors – series connection and parallel connection.

Series Connection

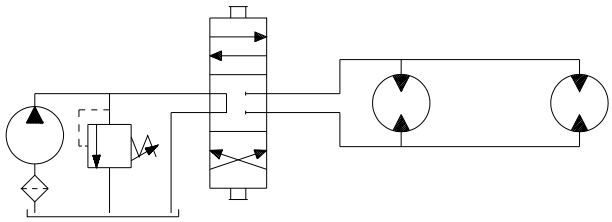
When motors are connected in series, the outlet of one motor is connected to the inlet of the next motor. This allows the full pump flow to go through each motor giving maximum speed. The pressure and torque are distributed between the motors based on the load each motor is subjected to. The maximum system pressure must be no greater than the maximum inlet pressure of the first motor. The allowable back pressure rating for a motor must also be considered. In some series circuits the motors must have an external case drain connected. A series connection is desirable when it is important for all the motors to run the same speed such as a long line conveyor.



Series Circuit

Parallel Connection

In a parallel connection all of the motor inlets are connected. This makes the maximum system pressure available to each motor allowing each motor to produce full torque at that pressure. The pump flow is split between the individual motors according to their loads and displacements. If one motor has no load the oil will take the path of least resistance and all the flow will go to that one motor. The others will not turn. If this condition can occur, a flow divider is recommended to distribute the oil and act as a differential.



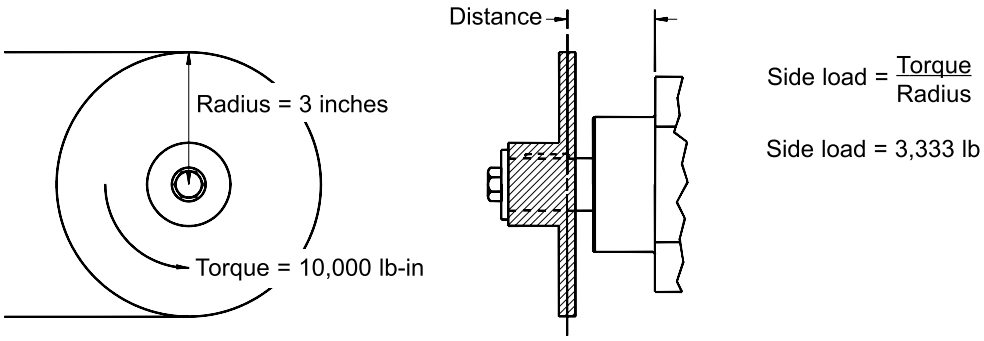
Parallel Circuit

Note: The motor circuits shown above are for illustration purposes only. Components and circuitry for actual applications may vary greatly and should be chosen based on the application.

Induced Side Load

In many cases, pulleys or sprockets may be used to transmit the torque produced by the motor. Use of these components will create a torque induced side load on the motor shaft and bearings. It is important that this load be taken into consideration when choosing a motor with sufficient bearing and shaft capacity for the application.

To determine the side load, the motor torque and pulley or sprocket radius must be known. The side load may be calculated using the formula below. The distance from the pulley/sprocket centerline to the mounting flange of the motor must also be determined. These two figures may then be compared to the bearing and shaft load curve of the desired motor to determine if the side load falls within acceptable load ranges.



$$\text{Side load} = \frac{\text{Torque}}{\text{Radius}}$$

Side load = 3,333 lb

Hydraulic Equations

$$\text{Theo. Speed (RPM)} = \frac{231 \times \text{GPM}}{\text{Displacement (in}^3\text{/rev)}}$$

$$\text{Theo. Torque (Nm)} = \frac{\text{PSI x Displacement (in}^3\text{/rev)}}{6.28}$$

$$\text{Power In (HP)} = \frac{\text{PSI x GPM}}{1714}$$

$$\text{Power Out (HP)} = \frac{\text{Torque (lb-in) x RPM}}{63024}$$

Multiplication Factor	Abbrev.	Prefix
10^{12}	T	tera
10^{9}	G	giga
10^{6}	M	mega
10^{3}	K	kilo
10^{2}	h	hecto
10^{1}	da	deka
10^{-1}	d	deci
10^{-2}	c	centi
10^{-3}	m	milli
10^{-6}	u	micro
10^{-9}	n	nano
10^{-12}	p	pico
10^{-15}	f	femto
10^{-18}	a	atto

Vehicle Drive Calculations

When selecting a wheel drive motor for a mobile vehicle, a number of factors concerning the vehicle must be taken into consideration to determine the required maximum motor RPM, the maximum torque required, and the maximum load each motor must support. The following sections contain the necessary equations to determine these criteria. An example is provided to illustrate the process.

Sample application (vehicle design criteria)

- •vehicle description ..... 4 wheel vehicle
- •vehicle drive ..... 2 wheel drive
- •GVW ..... 1,500 lbs.
- •weight over each drive wheel ..... 425 lbs.
- •rolling radius of tires ..... 16”
- •desired acceleration ..... 0 - 5 mph in 10 sec.
- •top speed ..... 5 mph
- •gradability 20%
- •worst working surface ..... poor asphalt

To determine maximum motor speed

$$RPM = \frac{168 \times MPH \times G}{r\,i} \quad ; \qquad RPM = \frac{2.65 \times KPH \times G}{r\,m}$$

Where:

MPH = max. vehicle speed (miles/hr)
r i = rolling radius of tire (inches)
G = gear reduction ratio (if none, G = 1)
r m = rolling radius of tire (meters)

Example

$$RPM = \frac{168 \times 5 \times 1}{16}$$

RPM = 52.5

To determine maximum torque requirement of motor

To choose a motor(s) capable of producing enough torque to propel the vehicle, it is necessary to determine the Total Tractive Effort (TE) requirement for the vehicle. To determine the total tractive effort, the following equation must be used:

TE = RR + GR + FA + DP (lbs or N)

Where:

TE = Total tractive effort
RR = Force necessary to overcome rolling resistance
GR = Force required to climb a grade
FA = Force required to accelerate
DP = Drawbar pull required

The components for this equation may be determined using the following steps:

Step One: Determine Rolling Resistance

Rolling Resistance (RR) is the force necessary to propel a vehicle over a particular surface. It is recommended that the worst possible surface type to be encountered by the vehicle be factored into the equation.

$$RR = \frac{GVW}{1000} \times R \text{ (lbs or N)}$$

Where:

GVW = gross (loaded) vehicle weight (lbs or kg)
R = surface friction (value from table 1)

Example

$$RR = \frac{1500}{1000} \times 22 \text{ (lbs)}$$

RR = 33 lbs.

Table 1

Rolling Resistance	
Concrete (excellent)	10
Concrete (good)	15
Concrete (poor)	20
Asphalt (good)	12
Asphalt (fair)	17
Asphalt (poor)	22
Macadam (good)	15
Macadam (fair)	22
Macadam (poor)	37
Cobbles (ordinary)	55
Cobbles (poor)	37
Snow (2 inch)	25
Snow (4 inch)	37
Dirt (smooth)	25
Dirt (sandy)	37
Mud	37 to 150
Sand (soft)	60 to 150
Sand (dune)	160 to 300

Step Two: Determine Grade Resistance

Grade Resistance (GR) is the amount of force necessary to move a vehicle up a hill or “grade.” This calculation must be made using the maximum grade the vehicle will be expected to climb in normal operation.

To convert incline degrees to % Grade:

% Grade = [tan of angle (degrees)] x 100

$$GR = \frac{\%\ Grade}{100} \times GVW \text{ (lbs or N)}$$

Example

$$GR = \frac{20}{100} \times 1500 \text{ (lbs)}$$

GR = 300 lbs.

Vehicle Drive Calculations

Step Three: Determine Acceleration Force

Acceleration Force (FA) is the force necessary to accelerate from a stop to maximum speed in a desired time.

$$FA = \frac{MPH \times GVW\ (lbs)}{22 \times t}; \quad FA = \frac{KPH \times GVW\ (N)}{35.32\ t}$$

Where:

t = time to maximum speed (seconds)

Example

$$FA = \frac{5 \times 1500}{22 \times 10}\ (lbs)$$

FA = 34 lbs.

Step Four: Determine Drawbar Pull

Drawbar Pull (DP) is the additional force, if any, the vehicle will be required to generate if it is to be used to tow other equipment. If additional towing capacity is required for the equipment, repeat steps one thru three for the towable equipment and sum the totals to determine DP.

Step Five: Determine Total Tractive Effort

The Tractive Effort (TE) is the sum of the forces calculated in steps one thru three above. On low speed vehicles, wind resistance can typically be neglected. However, friction in drive components may warrant the addition of 10% to the total tractive effort to insure acceptable vehicle performance.

TE = RR + GR + FA + DP (lbs or N)

Example

TE = 33 + 300 + 34 + 0 (lbs)

TE = 367 lbs.

Step Six: Determine Motor Torque

The Motor Torque (T) required per motor is the Total Tractive Effort divided by the number of motors used on the machine. Gear reduction is also factored into account in this equation.

$$T = \frac{TE \times ri}{M \times G}\ (lb\text{-}in\ per\ motor); \quad T = \frac{TE \times rm}{M \times G}\ (N\text{-}m\ per\ motor)$$

Where:

M = number of driving motors

Example

$$T = \frac{367 \times 16}{2 \times 1}\ (lb\text{-}in/motor)$$

T = 2936 lb-in

Step Seven: Determine Wheel Slip

To verify that the vehicle will perform as designed in regards to tractive effort and acceleration, it is necessary to calculate wheel slip (TS) for the vehicle. In special cases, wheel slip may actually be desirable to prevent hydraulic system overheating and component breakage should the vehicle become stalled.

$$TS = \frac{W \times f \times ri}{G}\ (lb\text{-}in\ per\ motor) \qquad TS = \frac{W \times f \times rm}{G}\ (N\text{-}m\ per\ motor)$$

Where:

f = coefficient of friction (see table 2)

W = loaded vehicle weight over driven wheel (lb or N)

Example

$$TS = \frac{425 \times .06 \times 16}{1}\ lb\text{-}in\ per\ motor$$

TS = 4080 lbs.

Table 2

Coefficient of friction (f)	
Steel on steel	0.3
Rubber tire on dirt	0.5
Rubber tire on a hard surface	0.6 - 0.8
Rubber tire on cement	0.7

To determine radial load capacity requirement of motor

When a motor used to drive a vehicle has the wheel or hub attached directly to the motor shaft, it is critical that the radial load capabilities of the motor are sufficient to support the vehicle. After calculating the Total Radial Load (RL) acting on the motors, the result must be compared to the bearing/shaft load charts for the chosen motor to determine if the motor will provide acceptable load capacity and life.

$$RL = \sqrt{W^2 + \left(\frac{T}{r\,i}\right)^2}\ (lbs); \qquad RL = \sqrt{W^2 + \left(\frac{T}{r\,m}\right)^2}\ (kg)$$

Example

$$RL = \sqrt{425^2 + \left(\frac{2936}{16}\right)^2}$$

RL = 463 lbs.

Once the maximum motor RPM, maximum torque requirement, and the maximum load each motor must support have been determined, these figures may then be compared to the motor performance charts and to the bearing load curves to choose a series and displacement to fulfill the motor requirements for the application.

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