



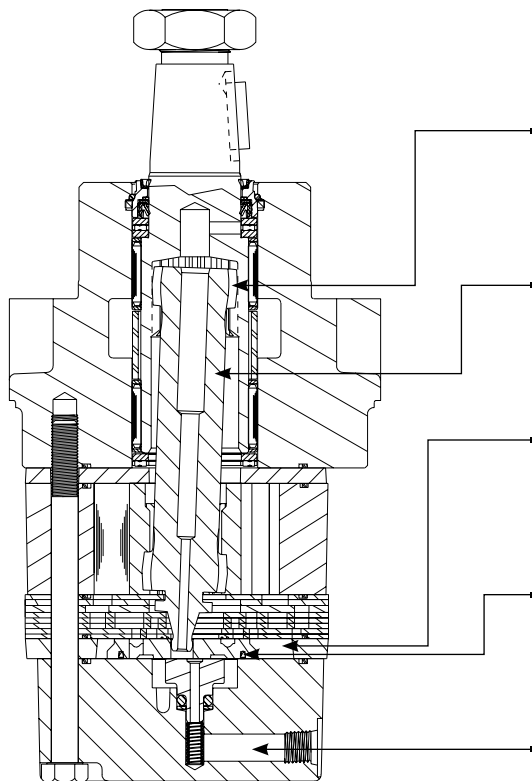
**HB**

SERIES HYDRAULIC MOTORS

# HB

## OVERVIEW

The HB Series motor is the leader in its class, offering high efficiency and durability. The three-zone orbiting 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. Case oil leakage 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 driveline, offering 30% more torque capacity than competitive designs. These features make the HB Series motor the preferred choice for applications requiring peak efficiency for continuous operation.



### KEY FEATURES

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

## SPECIFICATIONS

Intermittent Ratings - 10% of Operation    Peak Ratings - 1% of Operation

CODE	Displacement cc [in <sup>3</sup> /rev]	Max. Speed rpm		Max. Flow lpm [gpm]		Max. Torque Nm [lb-in]		Max. Pressure bar [psi]		
		cont.	inter.	cont.	inter.	cont.	inter.	cont.	inter.	peak
050	52 [3.2]	680	830	38 [10]	45 [12]	135 [1200]	158 [1400]	207 [3000]	242 [3500]	276 [4000]
080	76 [4.6]	800	950	53 [14]	64 [17]	191 [1700]	222 [1975]	207 [3000]	242 [3500]	276 [4000]
090	89 [5.4]	680	840	61 [16]	76 [20]	225 [2000]	270 [2400]	207 [3000]	242 [3500]	276 [4000]
110	111 [6.8]	680	850	76 [20]	95 [25]	298 [2650]	349 [3100]	207 [3000]	242 [3500]	276 [4000]
125	127 [7.7]	580	740	76 [20]	95 [25]	338 [3000]	394 [3500]	207 [3000]	242 [3500]	276 [4000]
160	164 [10.0]	460	580	76 [20]	95 [25]	448 [3975]	512 [4550]	207 [3000]	242 [3500]	276 [4000]
200	205 [12.5]	370	460	76 [20]	95 [25]	569 [5050]	653 [5800]	207 [3000]	242 [3500]	276 [4000]
250	254 [15.5]	290	370	76 [20]	95 [25]	704 [6250]	799 [7100]	207 [3000]	242 [3500]	276 [4000]
300	293 [17.9]	250	320	76 [20]	95 [25]	811 [7200]	929 [8250]	207 [3000]	242 [3500]	276 [4000]
400	409 [24.9]	180	230	76 [20]	95 [25]	946 [8400]	1019 [9050]	173 [2500]	189 [2750]	207 [3000]



**050**

Pressure - bars [psi]							Max. Cont.	Max. Inter.
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	242 [3500]	

52 cc [3.2 in<sup>3</sup>/rev.]

Max. Max. Inter. Cont.	Flow - lpm [gpm]	2 [0.5]	4 [1]	8 [2]	15 [4]	23 [6]	30 [8]	38 [10]	45 [12]
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**Intermittent Ratings - 10% of Operation**

<b>Torque - Nm [lb-in], Speed rpm</b>								
7 [66]	18 [158]	38 [314]	51 [447]	66 [587]				
36	31	26	21	9				
9 [77]	19 [164]	38 [335]	57 [505]	71 [631]	87 [772]	98 [866]		
72	69	65	63	33	32	9		
9 [75]	19 [164]	39 [342]	59 [521]	78 [690]	95 [840]	109 [964]	123 [1086]	
142	140	135	133	122	102	77	57	
8 [68]	19 [164]	38 [340]	57 [507]	78 [688]	99 [872]	112 [993]	129 [1145]	
288	286	285	284	265	245	211	189	
		36 [319]	56 [492]	76 [669]	97 [859]	114 [1009]	134 [1182]	
		431	427	416	396	347	321	
		34 [304]	53 [467]	73 [646]	95 [841]	113 [1001]	134 [1183]	
		577	572	568	543	488	463	
			51 [451]	71 [628]	92 [810]	111 [978]	133 [1174]	
			699	683	665	634	604	
			48 [427]	68 [606]	88 [781]	111 [980]		
			847	825	798			

37	Theoretical rpm
73	
145	
289	
434	
578	
722	
867	

**Overall Efficiency** - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

14 [127]	29 [255]	58 [510]	86 [764]	115 [1019]	144 [1274]	173 [1529]	202 [1783]
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Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]

**080**

Pressure - bars [psi]							Max. Cont.	Max. Inter.
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	242 [3500]	

76 cc [4.6 in<sup>3</sup>/rev.]

Max. Max. Inter. Cont.	Flow - lpm [gpm]	2 [0.5]	4 [1]	8 [2]	15 [4]	23 [6]	30 [8]	38 [10]	45 [12]	53 [14]	61 [16]	64 [17]
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**Intermittent Ratings - 10% of Operation**

<b>Torque - Nm [lb-in], Speed rpm</b>										
14 [127]	30 [262]	61 [543]	91 [806]	120 [1062]	145 [1285]	169 [1496]	191 [1693]			
25	24	21	18	17	11	11	9			
16 [140]	32 [286]	63 [559]	95 [839]	124 [1099]	151 [1340]	178 [1579]	203 [1796]			
50	50	43	43	34	32	32	31			
16 [139]	32 [280]	64 [563]	97 [857]	129 [1139]	157 [1390]	187 [1652]	211 [1865]			
100	100	99	92	87	79	78	77			
14 [127]	31 [275]	65 [572]	99 [872]	131 [1155]	160 [1420]	186 [1643]	216 [1911]			
200	200	199	191	181	174	160	154			
13 [113]	30 [262]	63 [557]	96 [853]	130 [1149]	160 [1420]	186 [1646]	218 [1930]			
301	300	297	295	284	271	253	245			
10 [91]	27 [243]	61 [536]	93 [826]	127 [1125]	159 [1409]	187 [1654]	220 [1945]			
401	400	398	390	384	372	346	339			
	24 [212]	58 [511]	89 [790]	123 [1087]	156 [1379]	185 [1638]	213 [1883]			
	502	500	499	498	485	443	433			
	20 [177]	54 [482]	87 [767]	120 [1060]	164 [1451]	193 [1711]	228 [2021]			
	602	601	600	597	540	526	510			
	14 [127]	50 [445]	84 [741]	124 [1098]	155 [1369]	185 [1640]	217 [1918]			
	690	689	688	658	644	631	613			

26	Theoretical rpm
51	
101	
201	
302	
402	
503	
603	
704	
804	
904	

**Overall Efficiency** - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

21 [183]	41 [366]	83 [732]	124 [1099]	166 [1465]	207 [1831]	248 [2197]	290 [2564]
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Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]



### 090

Pressure - bars [psi]						Max. Cont.	Max. Inter.
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	242 [3500]

89 cc [5.4 in<sup>3</sup>/rev.]

Flow - lpm [gpm]	Torque - Nm [lb-in], Speed rpm								Theoretical rpm
	12 [106]	26 [231]	69 [609]	100 [889]	142 [1259]	174 [1537]	206 [1826]	232 [2049]	
2 [0.5]	21	19	17	15	13	10	7	5	22
4 [1]		30 [264]	68 [605]	107 [947]	146 [1296]	180 [1596]	212 [1875]	242 [2142]	43
8 [2]		33 [291]	71 [629]	108 [958]	149 [1323]	183 [1620]	221 [1956]	251 [2223]	86
		84	79	73	67	66	60	59	
15 [4]			72 [636]	113 [1003]	153 [1351]	188 [1664]	225 [1990]	260 [2300]	172
			167	158	149	143	141	135	
23 [6]			72 [633]	112 [995]	151 [1340]	187 [1654]	226 [1996]	260 [2304]	257
			252	243	233	227	222	218	
30 [8]			68 [598]	109 [960]	151 [1340]	188 [1660]	227 [2012]	263 [2326]	343
			339	331	317	309	301	300	
38 [10]				108 [959]	150 [1328]	188 [1667]	229 [2024]	270 [2393]	428
				416	403	391	381	370	
45 [12]				109 [961]	153 [1356]	195 [1728]	232 [2049]	271 [2398]	514
				505	490	475	462	448	
53 [14]				145 [1287]	190 [1678]	213 [1886]	241 [2135]	282 [2495]	599
				590	578	558	544	530	
61 [16]				134 [1190]	187 [1654]	192 [1701]	227 [2007]	269 [2384]	685
				677	660	644	629	610	
68 [18]					136 [1201]	189 [1675]	240 [2122]		770
					748	729	719		
76 [20]					136 [1205]	174 [1536]	216 [1916]		856
					835	819	806		

Overall Efficiency - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

24 [215]	49 [430]	97 [860]	146 [1290]	194 [1720]	243 [2150]	291 [2580]	340 [3010]
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Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]

### 110

Pressure - bars [psi]						Max. Cont.	Max. Inter.
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	242 [3500]

111 cc [6.8 in<sup>3</sup>/rev.]

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

Overall Efficiency - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

31 [271]	61 [541]	122 [1083]	184 [1624]	245 [2166]	306 [2707]	367 [3248]	428 [3790]
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Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]



**125**

Pressure - bars [psi]						Max. Cont.	Max. Inter.
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	242 [3500]

127 cc [7.7 in<sup>3</sup>/rev.]

Torque - Nm [lb-in], Speed rpm Intermittent Ratings - 10% of Operation

Flow - lpm [gpm]	2 [0.5]	14 [127]	44 [394]	109 [961]	159 [1408]	217 [1922]	267 [2364]	313 [2766]	355 [3146]	Theoretical rpm
	4 [1]	16 [138]	45 [401]	108 [952]	167 [1475]	226 [2004]	278 [2459]	332 [2936]	367 [3245]	
	8 [2]		49 [432]	108 [953]	165 [1462]	231 [2046]	286 [2528]	332 [2941]	387 [3421]	
	15 [4]		59 [519]	107 [949]	167 [1479]	229 [2024]	284 [2513]	342 [3023]	392 [3467]	
	23 [6]			102 [902]	166 [1473]	223 [1973]	279 [2473]	337 [2985]	393 [3477]	
	30 [8]			179 [157]	160 [1420]	222 [1968]	287 [2541]	337 [2987]	391 [3459]	
	38 [10]			239 [209]	160 [1420]	222 [1968]	287 [2541]	337 [2987]	391 [3459]	
	45 [12]			239 [209]	154 [1359]	217 [1919]	273 [2413]	332 [2940]	387 [3428]	
	53 [14]			299 [259]	147 [1304]	207 [1831]	267 [2361]	329 [2914]	406 [3590]	
	61 [16]			359 [309]	146 [1293]	204 [1801]	268 [2375]	332 [2935]	419 [3704]	
	68 [18]			419 [369]	168 [1484]	198 [1756]	258 [2287]	327 [2895]	386 [3419]	
	76 [20]			473 [413]	193 [1704]	214 [1894]	278 [2460]	360 [3188]	386 [3412]	
	83 [22]				205 [1815]	245 [2164]	290 [2567]	344 [3040]	408 [3606]	
	91 [24]				577 [507]	561 [491]	537 [467]	505 [445]	453 [393]	
	95 [25]				151 [1336]	201 [1781]	260 [2298]	320 [2832]		

Overall Efficiency - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

35 [307]	69 [613]	139 [1226]	208 [1839]	277 [2452]	346 [3065]	416 [3678]	485 [4291]
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Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]

**160**

Pressure - bars [psi]						Max. Cont.	Max. Inter.
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	242 [3500]

164 cc [10.0 in<sup>3</sup>/rev.]

Torque - Nm [lb-in], Speed rpm Intermittent Ratings - 10% of Operation

Flow - lpm [gpm]	2 [0.5]	24 [216]	61 [538]	143 [1267]	213 [1881]	287 [2536]	351 [3106]	411 [3640]	470 [4159]	Theoretical rpm
	4 [1]	28 [244]	67 [596]	145 [1287]	215 [1899]	291 [2578]	355 [3145]	425 [3758]	493 [4366]	
	8 [2]		66 [588]	148 [1306]	224 [1983]	301 [2666]	366 [3241]	441 [3904]	508 [4493]	
	15 [4]		46 [404]	146 [1291]	226 [2002]	313 [2769]	375 [3318]	451 [3990]	516 [4569]	
	23 [6]		92 [80]	146 [1295]	224 [1986]	307 [2718]	379 [3358]	449 [3975]	515 [4553]	
	30 [8]		137 [119]	142 [1258]	221 [1954]	299 [2644]	376 [3329]	447 [3952]	520 [4603]	
	38 [10]			184 [161]	216 [1909]	289 [2558]	371 [3282]	448 [3961]	520 [4598]	
	45 [12]			230 [200]	208 [1842]	284 [2510]	357 [3161]	436 [3862]	512 [4529]	
	53 [14]			277 [240]	202 [1788]	275 [2438]	353 [3124]	427 [3781]	509 [4508]	
	61 [16]			323 [283]	187 [1659]	275 [2431]	338 [2994]	418 [3698]	496 [4392]	
	68 [18]			369 [324]	175 [1553]	257 [2278]	325 [2874]	405 [3587]	480 [4246]	
	76 [20]			415 [365]	169 [1499]	246 [2176]	328 [2906]	397 [3514]	477 [4223]	
	83 [22]			461 [401]	147 [1297]	232 [2049]	315 [2792]	385 [3411]		
	91 [24]			507 [447]	131 [1157]	218 [1928]	300 [2655]	378 [3344]		
	95 [25]			553 [483]	121 [1073]	208 [1844]	291 [2577]	365 [3229]		

Overall Efficiency - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

45 [398]	90 [796]	180 [1592]	270 [2389]	360 [3185]	450 [3981]	540 [4777]	630 [5573]
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Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]



**200**

Pressure - bars [psi]							Max. Cont.	Max. Inter.
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	242 [3500]	

205 cc [12.5 in<sup>3</sup>/rev.]

Flow - lpm [gpm]	Torque - Nm [lb-in], Speed rpm								Theoretical rpm
	35 [314]	83 [734]	179 [1581]	267 [2365]	353 [3121]	443 [3921]	505 [4469]	579 [5120]	
2 [0.5]	9	9	8	7	6	5	4	3	10
4 [1]	18	18	17	14	13	11	9	8	19
8 [2]	36	36	35	31	27	24	21	20	37
15 [4]	73	73	72	68	61	53	49	46	74
23 [6]	110	109	106	98	89	81	74	74	111
30 [8]		147	144	136	123	112	104	104	148
38 [10]		184	182	173	162	151	141	141	185
45 [12]		221	219	214	200	187	176	176	222
53 [14]		258	256	250	238	224	213	213	259
61 [16]		295	290	286	277	264	242	242	296
68 [18]		331	327	323	319	303	289	289	333
76 [20]			369	365	360	343	331	331	370
83 [22]			405	401	395	382			407
91 [24]			442	441	438	425			444
95 [25]			460	458	456	444			462

Overall Efficiency - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

56 [498]	112 [995]	225 [1990]	337 [2986]	450 [3981]	562 [4976]	675 [5971]	787 [6967]
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Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]

**250**

Pressure - bars [psi]							Max. Cont.	Max. Inter.
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	242 [3500]	

254 cc [15.5 in<sup>3</sup>/rev.]

Flow - lpm [gpm]	Torque - Nm [lb-in], Speed rpm								Theoretical rpm
	43 [381]	104 [924]	221 [1955]	339 [3001]	449 [3974]	551 [4872]			
2 [0.5]	7	6	6	5	3	1			8
4 [1]	14	14	13	11	9	7	4		15
8 [2]	29	29	28	26	22	17	13	9	30
15 [4]	59	58	57	56	51	41	33	25	60
23 [6]	89	88	88	87	82	69	58	48	90
30 [8]	119	118	117	115	101	87	76	76	120
38 [10]	149	148	147	141	129	114	104	104	150
45 [12]			178	176	174	165	147	127	179
53 [14]			208	206	205	197	176	158	209
61 [16]			238	235	233	227	205	191	239
68 [18]			268	266	263	259	245	222	269
76 [20]			298	295	292	289	277	252	299
83 [22]			326	323	319	307			328
91 [24]			357	355	353	342			358
95 [25]			371	368	365	360			373

Overall Efficiency - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

70 [617]	139 [1234]	279 [2468]	418 [3702]	558 [4936]	697 [6170]	837 [7404]	976 [8639]
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Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]



**300**

Pressure - bars [psi]						Max. Cont.	Max. Inter.
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	242 [3500]

293 cc [17.9 in<sup>3</sup>/rev.]

Torque - Nm [lb-in], Speed rpm Intermittent Ratings - 10% of Operation

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

Overall Efficiency - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

81 [713]	161 [1425]	322 [2850]	483 [4275]	644 [5701]	805 [7126]	966 [8551]	1127 [9976]
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Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]

**400**

Pressure - bars [psi]						Max. Cont.	Peak
17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	173 [2500]	207 [3000]	

409 cc [24.9 in<sup>3</sup>/rev.]

Torque - Nm [lb-in], Speed rpm Intermittent Ratings - 10% of Operation

Flow - lpm [gpm]	2 [0.5]	85 [757] 4	193 [1710] 4	367 [3248] 3	534 [4721] 2					Theoretical rpm	
	4 [1]	88 [776] 9	185 [1640] 8	383 [3386] 8	580 [5129] 6	745 [6590] 4	899 [7954] 1				5
	8 [2]	86 [762] 18	196 [1734] 18	394 [3487] 17	586 [5184] 15	764 [6763] 11	927 [8204] 5				10
	15 [4]	85 [749] 37	188 [1661] 36	404 [3571] 35	602 [5325] 32	796 [7047] 24	962 [8517] 18	1108 [9804] 9			19
	23 [6]	71 [629] 55	180 [1593] 55	387 [3428] 54	596 [5274] 49	787 [6969] 39	978 [8653] 28	1141 [10094] 20			38
	30 [8]		165 [1462] 74	373 [3299] 73	595 [5264] 69	792 [7010] 58	966 [8552] 44	1149 [10167] 31			56
	38 [10]		143 [1269] 92	356 [3150] 90	581 [5144] 88	782 [6923] 79	974 [8617] 62	1156 [10231] 45			75
	45 [12]		122 [1076] 111	333 [2950] 109	545 [4823] 107	749 [6624] 98	957 [8470] 83	1143 [10116] 61			93
	53 [14]		95 [842] 129	313 [2774] 128	521 [4607] 126	717 [6344] 117	931 [8235] 103	1131 [10007] 78			112
	61 [16]			282 [2493] 147	496 [4385] 145	685 [6063] 141	919 [8131] 121	1100 [9733] 100			130
	68 [18]			244 [2156] 166	453 [4009] 165	681 [6023] 158	871 [7708] 142	1071 [9478] 121			149
	76 [20]			197 [1741] 185	420 [3713] 183	650 [5756] 179	838 [7417] 166	1051 [9302] 145			167
	83 [22]			164 [1448] 203	378 [3344] 201	588 [5200] 198	810 [7171] 186				186
	91 [24]				333 [2947] 222	559 [4945] 220	750 [6640] 211				205
	95 [25]				303 [2682] 231	539 [4773] 228	764 [6760] 221				223

Overall Efficiency - 70 - 100%  40 - 69%  0 - 39%

Theoretical Torque - Nm [lb-in]

112 [991]	224 [1982]	448 [3965]	672 [5947]	896 [7930]	1120 [9912]	1344 [11895]
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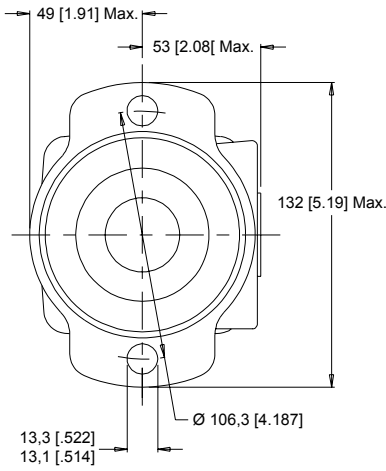
Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]



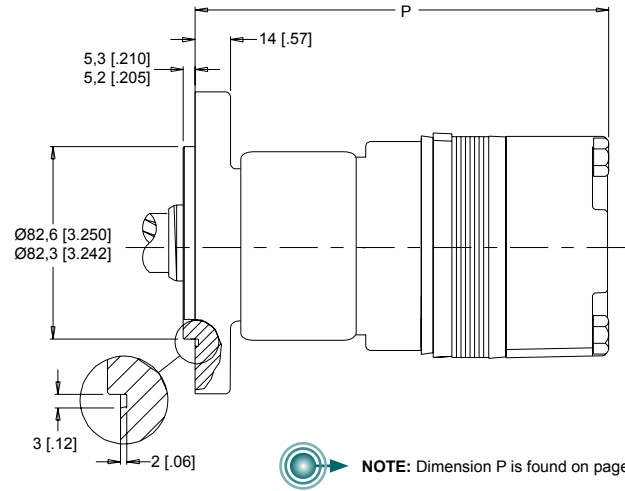
NOTE: Dimensions shown are without paint. Paint thickness can be up to 0,13 [.005]

## 300 SERIES HOUSINGS (MAGNETO MOUNTS)

**A0** 2-Hole with End Ports

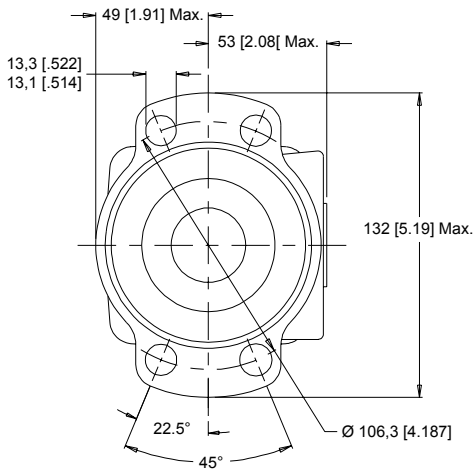


**A7** 2-Hole with Side Ports

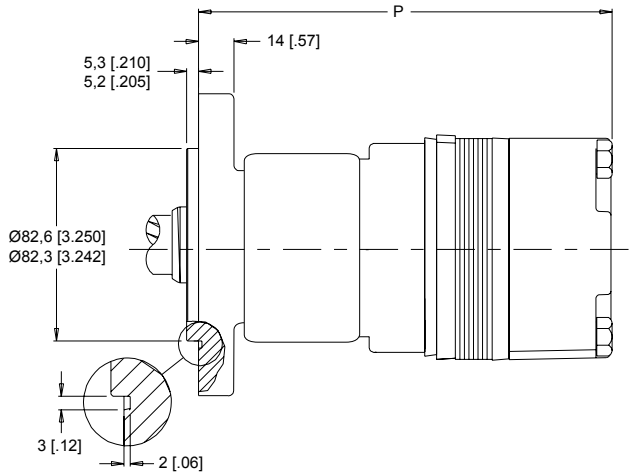


NOTE: Dimension P is found on page 10.

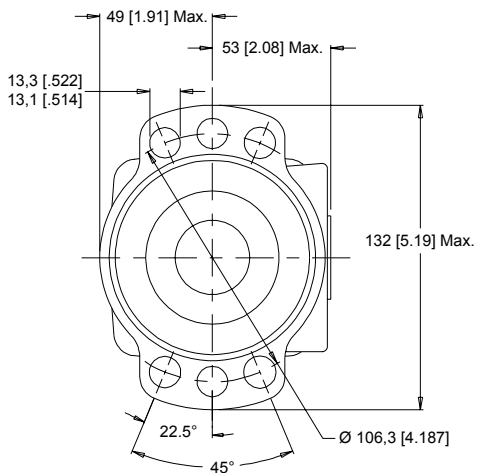
**A2** 4-Hole with End Ports



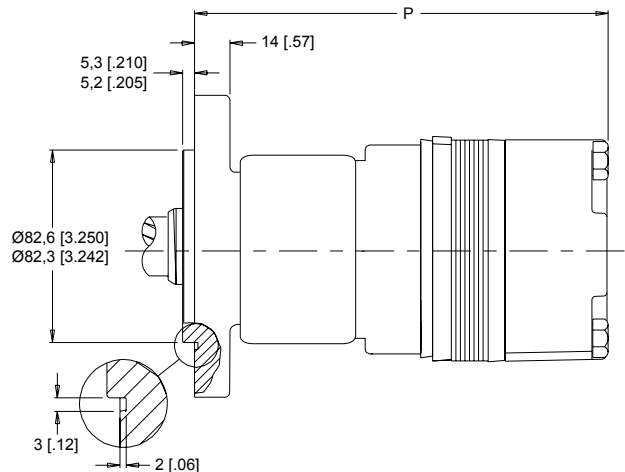
**A8** 4-Hole with Side Ports



**A4** 6-Hole with End Ports



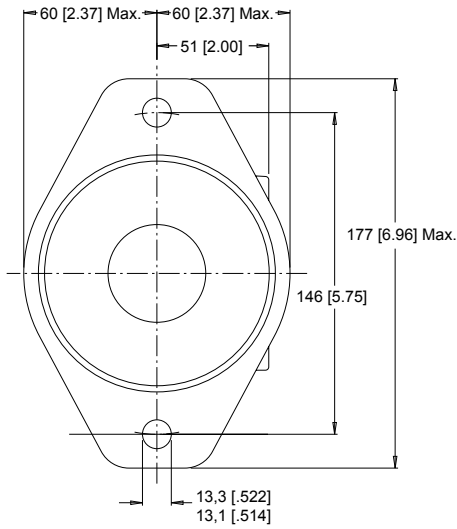
**A9** 6-Hole with Side Ports



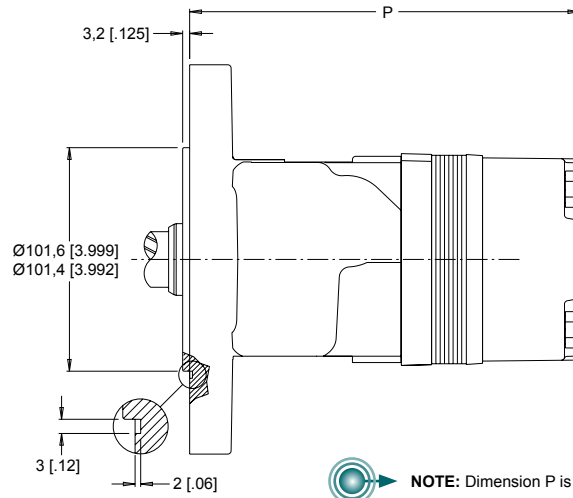


300 SERIES HOUSINGS (SAE B, WHEEL, & 4-HOLE SQUARE MOUNTS)

**B0** 2-Hole with End Ports

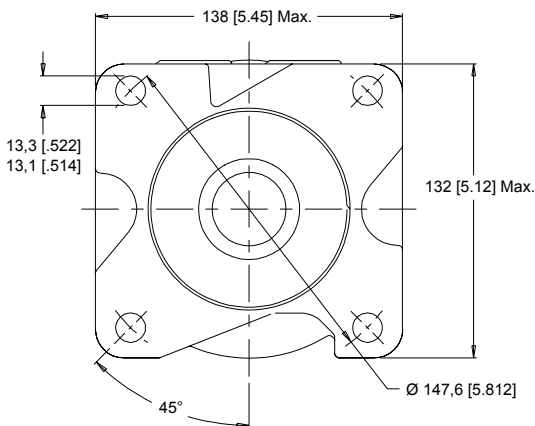


**B7** 2-Hole with Side Ports

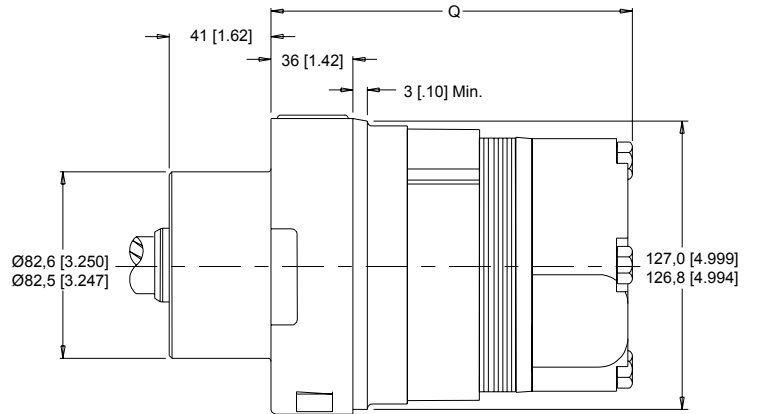


NOTE: Dimension P is found on page 10.

**W2** 4-Hole with End Ports

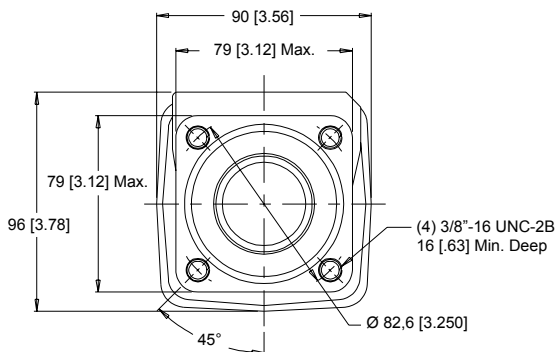


**W8** 4-Hole with Side Ports

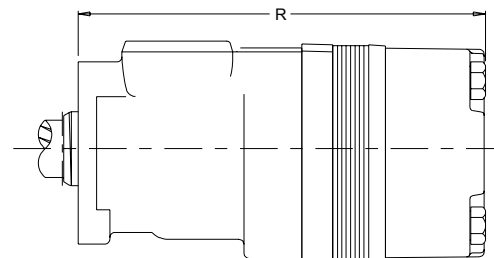


NOTE: Dimension Q is found on page 10.

**F2** 4-Hole with End Ports



**F8** 4-Hole with Side Ports



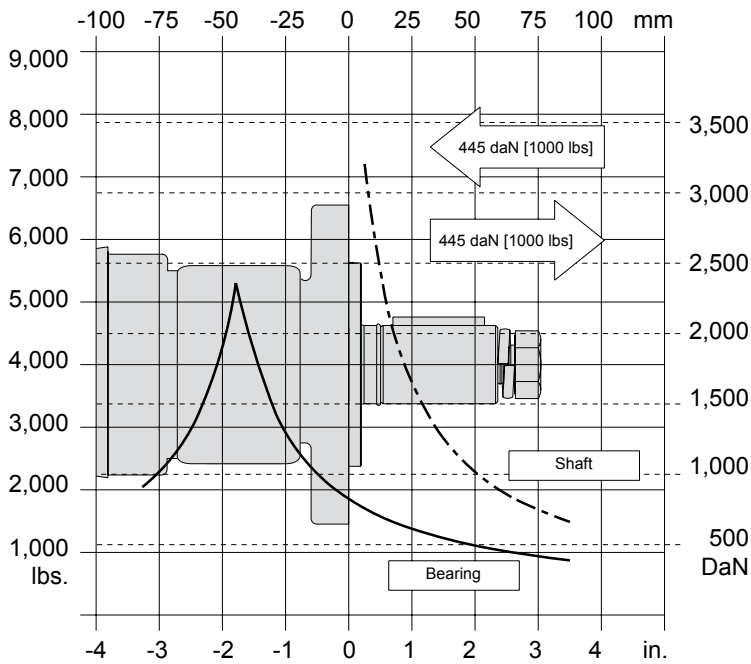
NOTE: Dimension R is found on page 11.



## 300 SERIES TECHNICAL INFORMATION

**Bearing Curve:** The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an  $L_{10}$  life of 2,000 hours at 100 rpm. Radial loads for speeds other than 100 rpm may be calculated using the multiplication factor table located below.

### SAE A & B MOUNTS



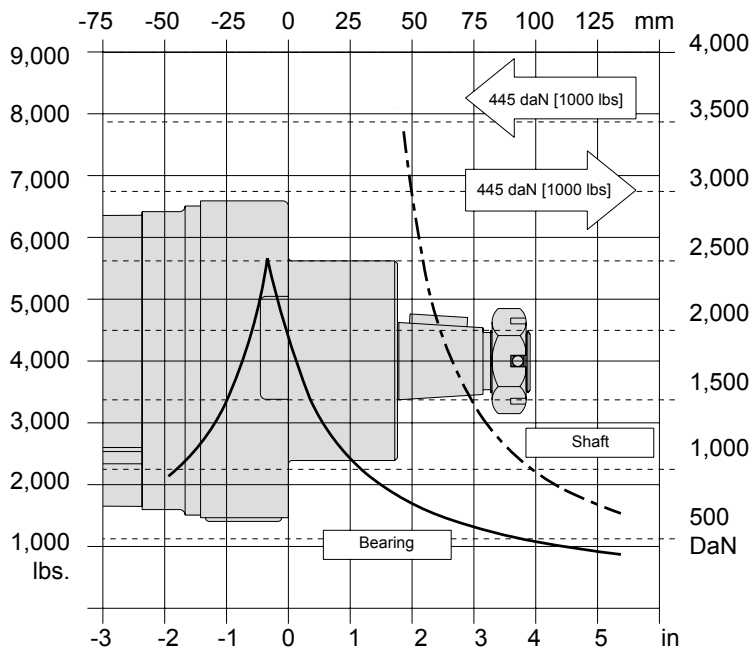
LENGTH / WEIGHT CHART SAE A & B Mounts - Dimension P		
Code	mm [in]	kg [lb]
050	195 [7.68]	8,8 [19.5]
080	199 [7.82]	9,1 [20.0]
090	201 [7.90]	9,2 [20.2]
110	204 [8.04]	9,4 [20.7]
125	207 [8.14]	9,5 [21.0]
160	212 [8.36]	9,8 [21.7]
200	219 [8.61]	10,2 [22.5]
250	226 [8.91]	10,6 [23.4]
300	232 [9.15]	11,0 [24.3]
400	251 [9.86]	12,0 [26.4]

**NOTE:**  
HB motor weights vary  $\pm 1.0$  kg [2 lbs] depending upon motor configuration. Add 1,2 kg [2.7 lb] to motor weight for the SAE B mount. Subtract 18 [7.1] from Dimension P if side ports 5, 6, or 7 and end ports 1 or 2 are used.

LENGTH / WEIGHT CHART Wheel Mount - Dimension Q		
Code	mm [in]	kg [lb]
050	158 [6.22]	11,5 [25.3]
080	162 [6.36]	11,7 [25.7]
090	163 [6.41]	11,8 [25.9]
110	166 [6.55]	12,0 [26.5]
125	169 [6.64]	12,1 [26.7]
160	174 [6.87]	12,4 [27.4]
200	181 [7.12]	12,8 [28.3]
250	188 [7.42]	13,2 [29.7]
300	195 [7.66]	13,6 [30.0]
400	213 [8.37]	14,6 [32.1]

**NOTE:**  
HB motor weights vary  $\pm 1.0$  kg [2 lbs] depending upon motor configuration. Subtract 18 [7.1] from Dimension Q if side ports 5, 6, or 7 and end ports 1 or 2 are used.

### WHEEL MOUNT



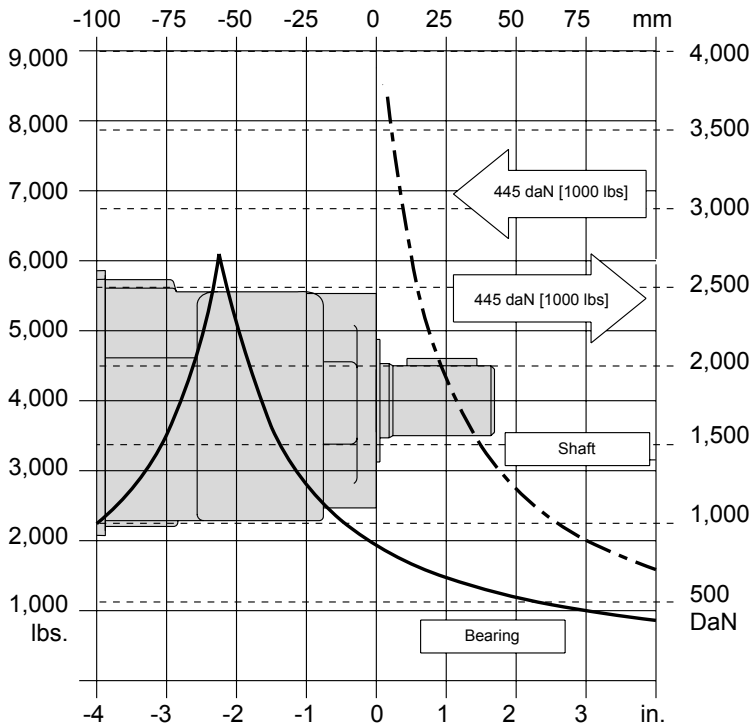
BEARING LOAD MULTIPLICATION FACTOR TABLE	
RPM	FACTOR
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.50



## 300 SERIES TECHNICAL INFORMATION

**Bearing Curve:** The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an  $L_{10}$  life of 2,000 hours at 100 rpm. Radial loads for speeds other than 100 rpm may be calculated using the multiplication factor table located on page 10.

### 4-HOLE SQUARE MOUNT



LENGTH / WEIGHT CHART 4-Hole Sq. Mount - Dimension R		
Code	mm [in]	kg [lb]
050	198 [7.80]	8,3 [18.4]
080	202 [7.94]	8,6 [18.9]
090	204 [8.02]	8,7 [19.1]
110	207 [8.16]	8,9 [19.6]
125	210 [8.26]	9,0 [19.9]
160	215 [8.48]	9,3 [20.6]
200	222 [8.73]	9,7 [21.4]
250	229 [9.03]	10,1 [22.3]
300	236 [9.27]	10,5 [23.2]
400	254 [9.98]	11,5 [25.3]

**NOTE:**  
HB motor weights vary  $\pm 1.0$  kg [2 lbs] depending upon motor configuration. Subtract 18 [7.1] from Dimension R if side ports 5, 6, or 7 and end ports 1 or 2 are used.

### MOUNTING FLANGE TO SHAFT END - Dimension S

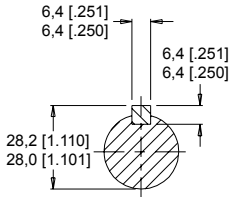
Code	SAE A & B Mounts mm [in]	Wheel Mounts mm [in]	4-Hole Sq. Mounts mm [in]
01	44 [1.75]	82 [3.21]	41 [1.63]
02	49 [1.93]	86 [3.39]	46 [1.81]
07	62 [2.46]	100 [3.93]	60 [2.35]
08	62 [2.46]	100 [3.93]	60 [2.35]
10	49 [1.93]	86 [3.39]	46 [1.81]
12	55 [2.17]	92 [3.63]	52 [2.05]
15	51 [1.99]	88 [3.45]	47 [1.87]
20	61 [2.40]	99 [3.87]	58 [2.29]
21	61 [2.40]	98 [3.87]	58 [2.29]
22	66 [2.58]	103 [4.04]	63 [2.46]
23	57 [2.23]	94 [3.69]	54 [2.11]

**NOTE:** Shaft lengths vary  $\pm 0,8$  mm [.030 in.]

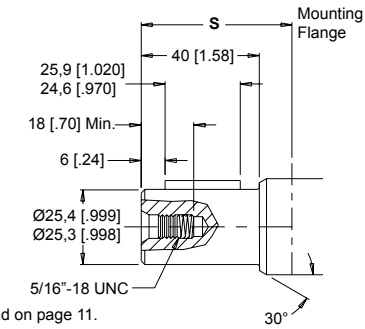


### 10 1" Straight

Max. Torque: 661 Nm [5850 lb-in]

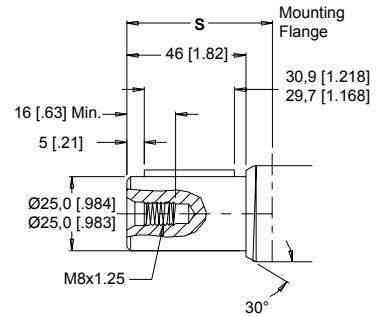
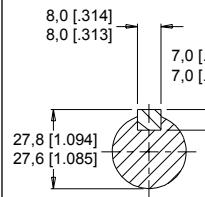


### \*15 1" Straight Extended



### 12 25mm Straight

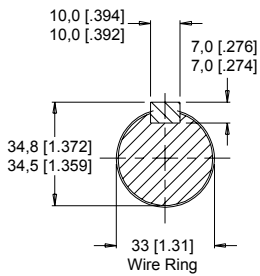
Max. Torque: 631 Nm [5580 lb-in]



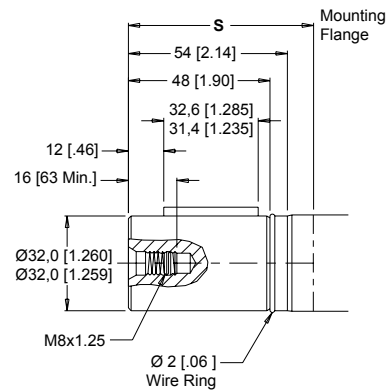
**NOTE:** Dimension S is found on page 11.

### 21 32mm Straight

Max. Torque: 882 Nm [7804 lb-in]

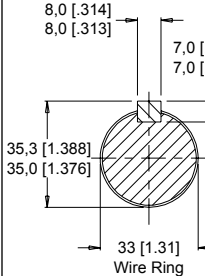


### \*08 32mm Straight Extended

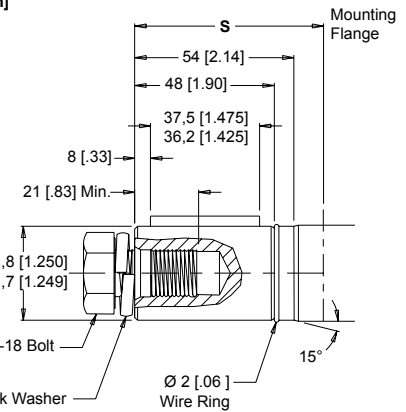


### 20 1-1/4" Straight

Max. Torque: 882 Nm [7804 lb-in]

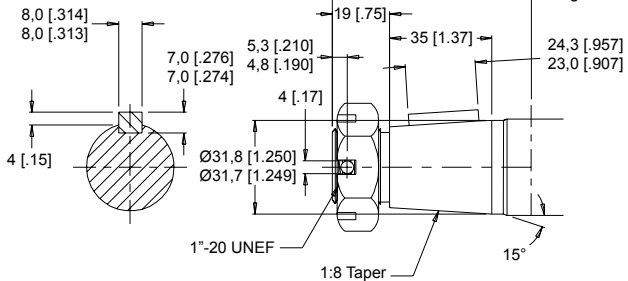


### \*07 1-1/4" Straight Extended



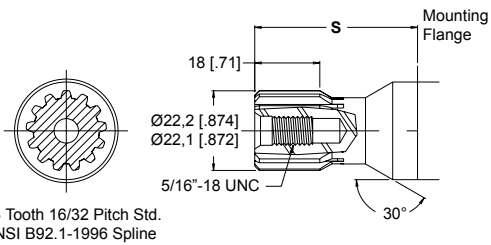
### 22 1-1/4" Tapered

Max. Torque: 882 Nm [7804 lb-in]



### 01 13 Tooth Spline

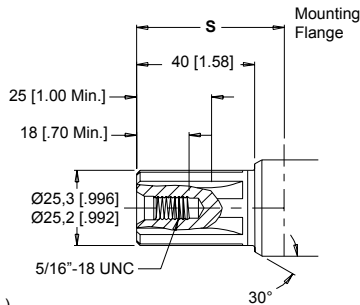
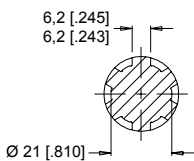
Max. Torque: 170 Nm [1500 lb-in]



**NOTE:** A slotted nut is standard on this shaft.

### 02 6-B Spline

Max. Torque: 429 Nm [3800 lb-in]

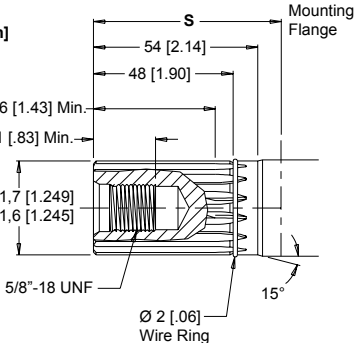
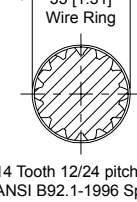


1.00-6-B Spline (SAE J499 Std.)

**NOTE:** \*Shafts for speed sensor use only.

### 23 14 Tooth Spline

Max. Torque: 882 Nm [7804 lb-in]

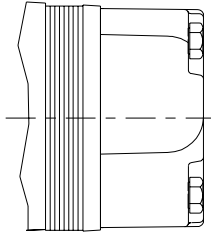


14 Tooth 12/24 pitch Std. ANSI B92.1-1996 Spline

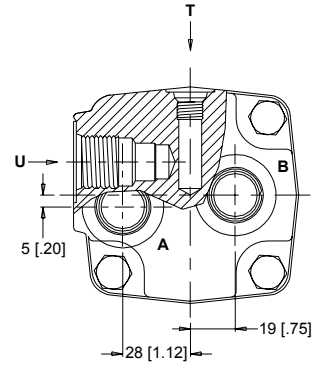
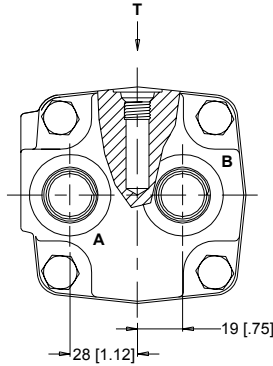


### END PORTS

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



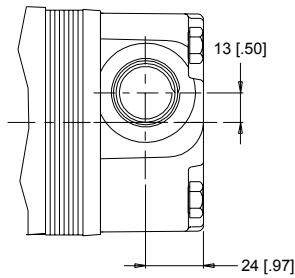
**2** 1/2" BSP.F with 1/4" Drain



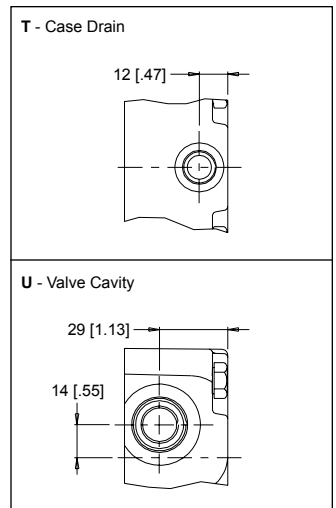
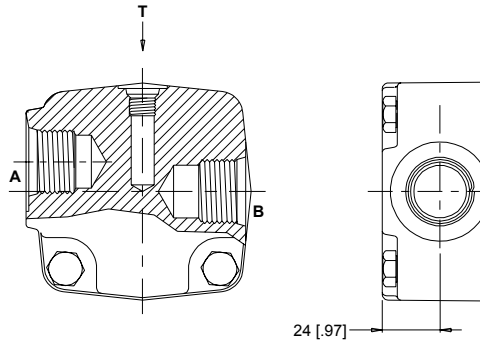
**NOTE:** The 1 & 2 porting options can be ordered with an internal drain and/or a relief valve cavity. U - 10 Series/2-way Valve Cavity (7/8-14 UNF-2B)

### SIDE PORTS

**6** 1-1/16" O-Ring with 7/16" Drain

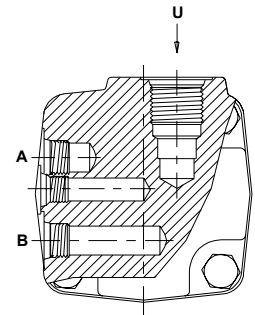
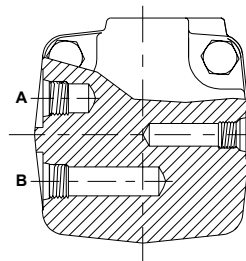
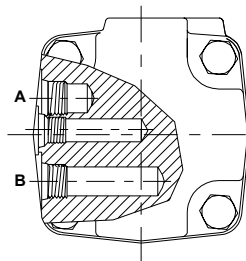
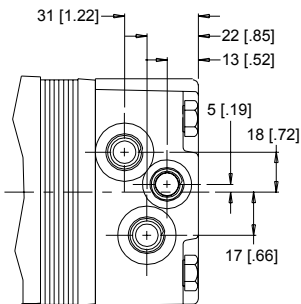


**7** 1/2" BSP.F with 1/4" Drain



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

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



**NOTE:** The 5 porting option can be ordered with an internal drain or a relief valve cavity. U - 10 Series/2-way Valve Cavity (7/8-14 UNF-2B)

# HB

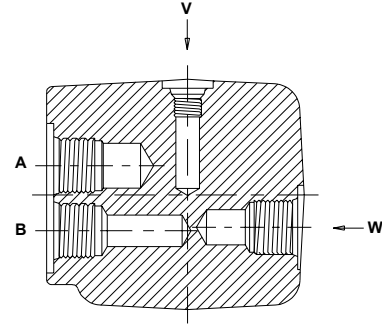
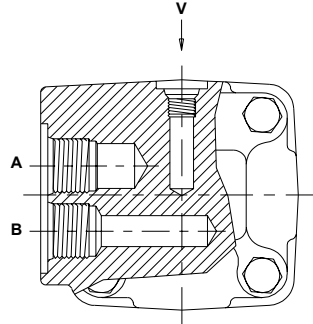
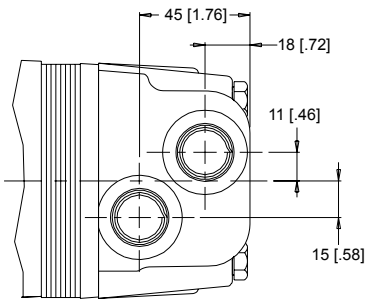


## 300 SERIES PORTING OPTIONS

### SIDE PORTS

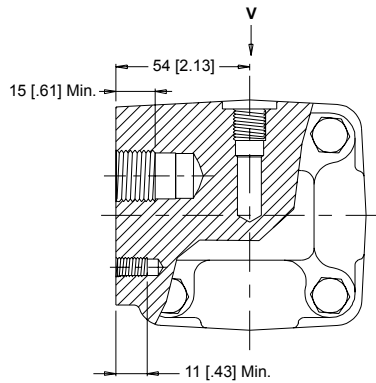
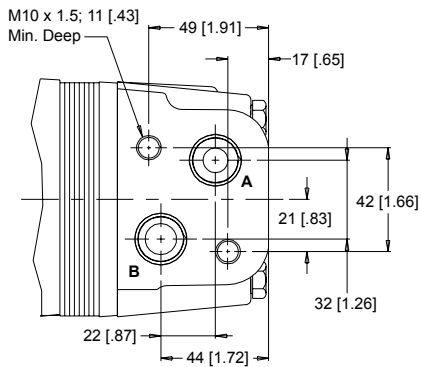
**1** 7/8" O-Ring with 7/16" Drain

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

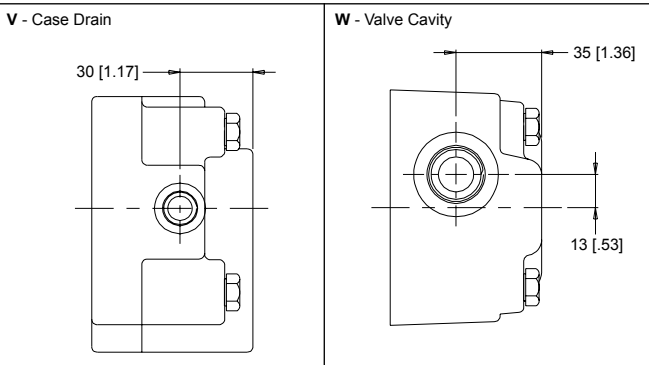


**NOTE:** The 1 & 2 porting options can be ordered with an internal drain and/or a relief valve cavity. **W** - 10 Series/2-way Valve Cavity (7/8-14 UNF-2B)

**3** 1/2" BSP.F Offset Manifold With 1/4" Drain



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





## 300 SERIES MODEL CODE BUILDER

SERIES	DISPLACEMENT	HOUSING	SHAFT	PAINT	CAVITY	ADD ON	MISCELLANEOUS
STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7	STEP 8

### STEP 1 - Select a series

300 High Pressure HB Series

### STEP 2 - Select a displacement option

050	52 cc	[3.2 in <sup>3</sup> /rev]	160	164 cc	[10.0 in <sup>3</sup> /rev]
080	76 cc	[4.6 in <sup>3</sup> /rev]	200	205 cc	[12.5 in <sup>3</sup> /rev]
090	89 cc	[5.4 in <sup>3</sup> /rev]	250	254 cc	[15.5 in <sup>3</sup> /rev]
110	111 cc	[6.8 in <sup>3</sup> /rev]	300	293 cc	[17.9 in <sup>3</sup> /rev]
125	127 cc	[7.7 in <sup>3</sup> /rev]	400	409 cc	[24.9 in <sup>3</sup> /rev]

### STEP 3 - Select a mounting option

**NOTE:** To complete the three (3) digit HB Series housing code a two (2) digit mounting option must be followed with the single (1) digit porting option found in STEP 3 part II. Side port mounting options need side port porting options and end port mounting options need end port porting options.

A0	2-Hole End Port Magneto Mount (S)
A7	2-Hole Side Port Magneto Mount (S)
A2	4-Hole End Port Magneto Mount (S)
A8	4-Hole Side Port Magneto Mount (S)
A4	6-Hole End Port Magneto Mount (S)
A9	6-Hole Side Port Magneto Mount (S)
B0	2-Hole End Port SAE B Mount
B7	2-Hole Side Port SAE B Mount
W2	4-Hole End Port Wheel Mount
W8	4-Hole Side Port Wheel Mount
F2	4-Hole End Port Square Mount (S)
F8	4-Hole Side Port Square Mount (S)

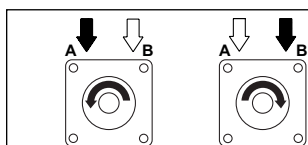
### STEP 3 (part II) - Select a porting option

#### END PORTS

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

#### SIDE PORTS

1	7/8" O-Ring With 7/16" Drain
2	1/2" BSP.F With 1/4" Drain
3	1/2" BSP.F Offset Manifold With 1/4" Drain
5	9/16" O-Ring With 7/16" Drain
6	1-1/16" O-Ring With 7/16" Drain
7	1/2" BSP.F With 1/4" Drain



**NOTE:** HB Series motors do not have internal components that allow the motor to turn in either direction. Refer to the diagram to the left to determine which way the motor will turn when either port A or port B is pressurized.

### STEP 4 - Select a shaft option

01	7/8" 13 Tooth Spline	15	1" Straight Ext. (S)
02	1" 6-B Spline	20	1-1/4" Straight
07	1-1/4" Straight Ext. (S)	21	32mm Straight
08	32mm Straight Ext. (S)	22	1-1/4" Tapered
10	1" Straight	23	1-1/4" 14 Tooth Spline
12	25mm Straight		

### STEP 5 - Select a paint option

A	Black
B	Black (unpainted flange face)
Z	No Paint

### STEP 6 - Select a valve cavity option

A	None
B	Relief Valve Cavity
C	69 bar [1000 psi] Relief Valve Installed
D	86 bar [1250 psi] Relief Valve Installed
E	104 bar [1500 psi] Relief Valve Installed
F	121 bar [1750 psi] Relief Valve Installed
G	138 bar [2000 psi] Relief Valve Installed
J	173 bar [2500 psi] Relief Valve Installed
L	207 bar [3000 psi] Relief Valve Installed

**NOTE:** Valve cavity option is only available on side ports 1, 2, & 5 and end ports 1 & 2.

### STEP 7 - Select an add on option

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

**NOTE:** (S) - STEP 3 Mountings available for use with speed sensors. STEP 4 Shafts available for use with speed sensors. STEP 7 Speed sensor options.

### STEP 8 - Select a miscellaneous option

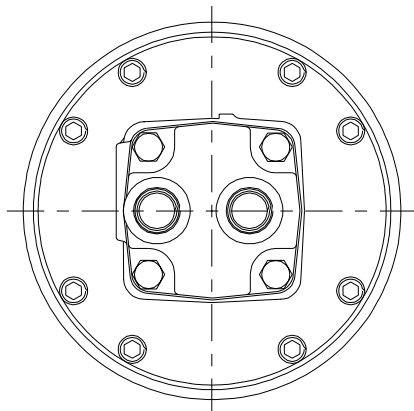
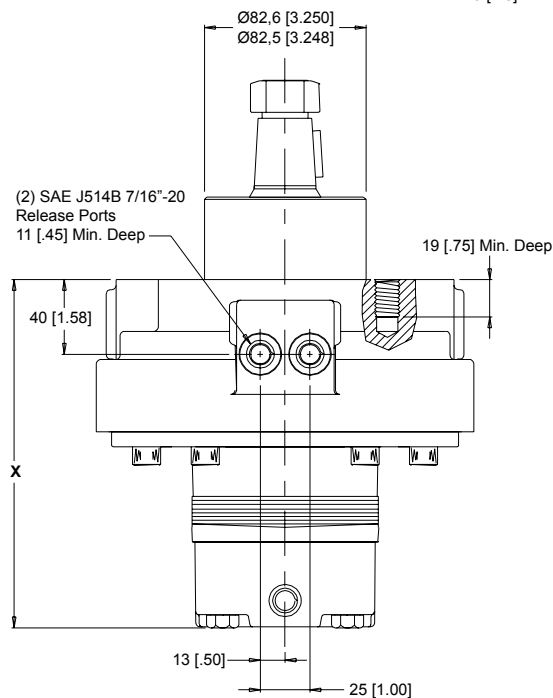
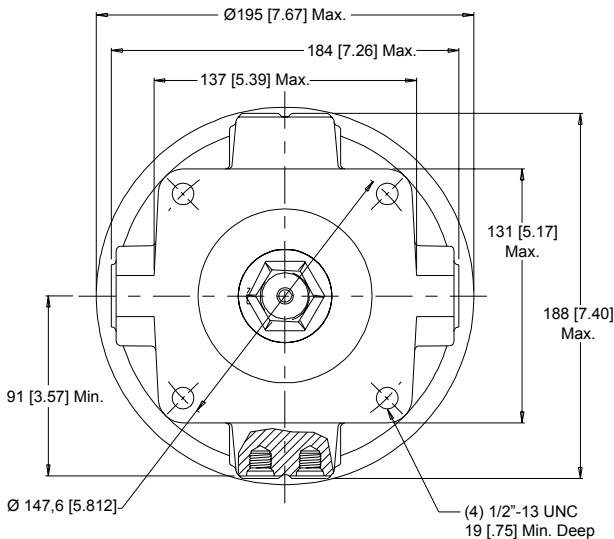
AA	None
AB	Internal Drain
AC	Freeturning Rotor
AD	Internal Drain with Freeturning Rotor



NOTE: Dimensions shown are without paint. Paint thickness can be up to 0,13 [.005]

## 310 SERIES (HB MOTOR/BRAKE)

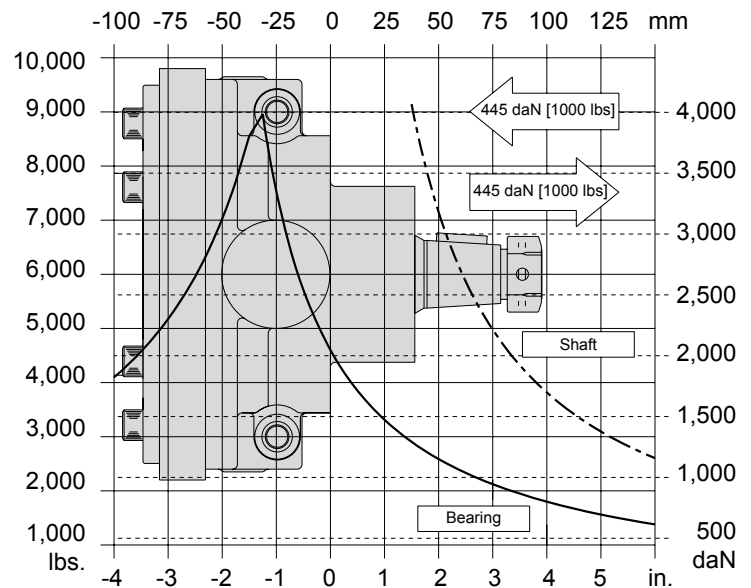
**W2** 4-Hole with End Ports    **W8** 4-Hole with Side Ports



Rated brake torque ..... 904 Nm [8000 lb-in]  
 Initial release pressure ..... 21 bar [300 psi]  
 Full release pressure ..... 31 bar [450 psi]  
 Maximum release pressure ..... 207 bar [3000 psi]  
 Release volume ..... 13-16 cc [0.8 - 1.0 cu in]

NOTE: See page 19 for important motor/brake operating recommendations.

**Bearing Curve:** The bearing curve represents allowable bearing loads based on ISO 281 bearing capacity for an  $L_{10}$  life of 2,000 hours at 100 rpm. Radial loads for speeds other than 100 rpm may be calculated using the multiplication factor table located on page 10.



**LENGTH / WEIGHT CHART**  
 310 Wheel Mount - Dimension X

Code	mm [in]	kg [lb]
050	173 [6.80]	19,1 [42.2]
080	175 [6.88]	19,4 [42.7]
090	178 [7.02]	19,5 [42.9]
110	182 [7.16]	19,7 [43.4]
125	184 [7.26]	19,8 [43.7]
160	190 [7.48]	20,1 [44.4]
200	196 [7.73]	20,5 [45.3]
250	204 [8.03]	20,9 [46.1]
300	210 [8.27]	21,3 [47.0]
400	228 [8.98]	22,3 [49.1]

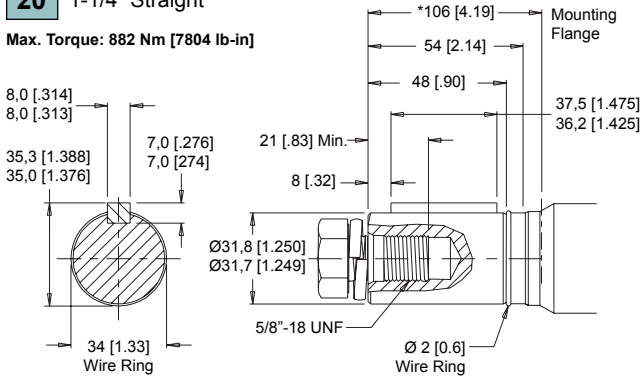
NOTE:  
 HB motor weights vary  $\pm 1,0$  kg [2 lbs] depending upon motor configuration. Subtract 18 [.71] from Dimension X if side ports 5, 6, or 7 and end ports 1 or 2 are used.



## 310 SERIES (HB MOTOR/BRAKE SHAFTS)

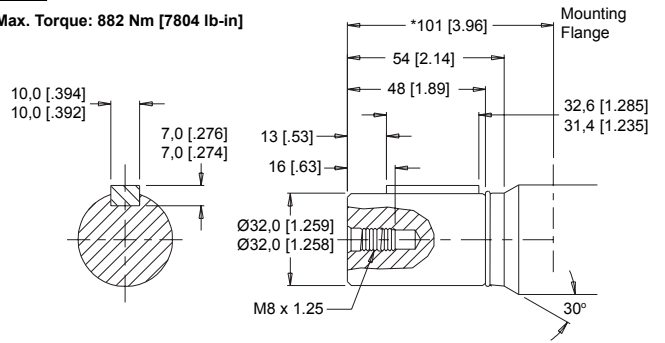
### 20 1-1/4" Straight

Max. Torque: 882 Nm [7804 lb-in]



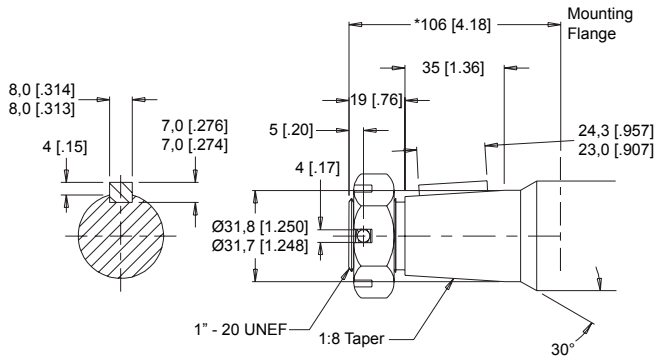
### 21 32mm Straight

Max. Torque: 882 Nm [7804 lb-in]



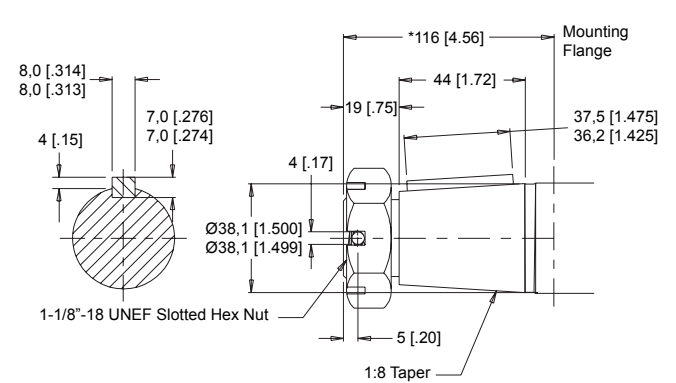
### 22 1-1/4" Tapered

Max. Torque: 882 Nm [7804 lb-in]



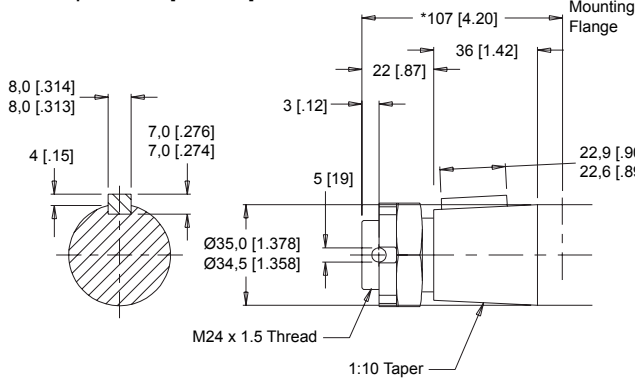
### 31 1-1/2" Tapered

Max. Torque: 882 Nm [7804 lb-in]



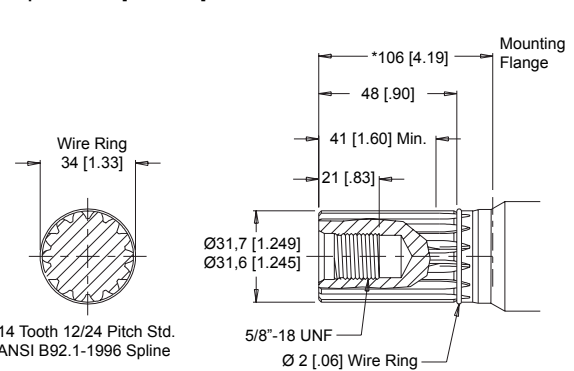
### 28 35mm Tapered

Max. Torque: 882 Nm [7804 lb-in]



### 23 1-1/4" 14 Tooth Spline

Max. Torque: 882 Nm [7804 lb-in]



NOTE: A slotted hex nut is standard on all tapered shafts. \* Shaft lengths may vary ± 0,8mm [0.030 in]



## 310 SERIES MODEL CODE BUILDER

SERIES	DISPLACEMENT	HOUSING	SHAFT	PAINT	CAVITY	ADD ON	MISCELLANEOUS
STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7	STEP 8

### STEP 1 - Select a series

**310** HB Series Motor/Brake

### STEP 2 - Select a displacement option

<b>050</b>	52 cc	[3.2 in <sup>3</sup> /rev]	<b>160</b>	164 cc	[10.0 in <sup>3</sup> /rev]
<b>080</b>	76 cc	[4.6 in <sup>3</sup> /rev]	<b>200</b>	205 cc	[12.5 in <sup>3</sup> /rev]
<b>090</b>	89 cc	[5.4 in <sup>3</sup> /rev]	<b>250</b>	254 cc	[15.5 in <sup>3</sup> /rev]
<b>110</b>	111 cc	[6.8 in <sup>3</sup> /rev]	<b>300</b>	293 cc	[17.9 in <sup>3</sup> /rev]
<b>125</b>	127 cc	[7.7 in <sup>3</sup> /rev]	<b>400</b>	409 cc	[24.9 in <sup>3</sup> /rev]

### STEP 3 - Select a mounting option

**NOTE:** To complete the three (3) digit HB Series housing code a two (2) digit mounting option must be followed with the single (1) digit porting option found in STEP 3 part II. Side port mounting options need side port porting options and end port mounting options need end port porting options.

<b>W2</b>	4-Hole End Port Wheel Mount
<b>W8</b>	4-Hole Side Port Wheel Mount

### STEP 3 (part II) - Select a porting option

#### END PORTS

<b>1</b>	7/8" O-Ring With 7/16" Drain
<b>2</b>	1/2" BSP.F With 1/4" Drain

#### SIDE PORTS

<b>1</b>	7/8" O-Ring With 7/16" Drain
<b>2</b>	1/2" BSP.F With 1/4" Drain
<b>3</b>	1/2" BSP.F Offset Manifold With 1/4" Drain
<b>5</b>	9/16" O-Ring With 7/16" Drain
<b>6</b>	1-1/16" O-Ring With 7/16" Drain
<b>7</b>	1/2" BSP.F With 1/4" Drain

**NOTE:** HB Series motors do not have internal components that allow the motor to turn in either direction. Refer to the diagram to the left to determine which way the motor will turn when either port A or port B is pressurized.

### STEP 4 - Select a shaft option

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

### STEP 5 - Select a paint option

<b>A</b>	Black
<b>B</b>	Black (unpainted flange face)
<b>Z</b>	No Paint

### STEP 6 - Select a valve cavity option

<b>A</b>	None
<b>B</b>	Relief Valve Cavity
<b>C</b>	69 bar [1000 psi] Relief Valve Installed
<b>D</b>	86 bar [1250 psi] Relief Valve Installed
<b>E</b>	104 bar [1500 psi] Relief Valve Installed
<b>F</b>	121 bar [1750 psi] Relief Valve Installed
<b>G</b>	138 bar [2000 psi] Relief Valve Installed
<b>J</b>	173 bar [2500 psi] Relief Valve Installed
<b>L</b>	207 bar [3000 psi] Relief Valve Installed

**NOTE:** Valve cavity option is only available on side ports 1, 2, & 5 and end ports 1 & 2.

### STEP 7 - Select an add on option

<b>A</b>	Standard
<b>B</b>	Lock Nut
<b>C</b>	Solid Hex Nut

### STEP 8 - Select a miscellaneous option

<b>AA</b>	None
<b>AC</b>	Freeturning Rotor



**NOTE:** The HB 310 series motor/brakes are available with different holding torque specifications. For additional information please contact White Drive Products Customer Service & Technical Support or your local White Drive Products' distributor.

## OPERATING AND TECHNICAL INFORMATION

### WHITE DRIVE PRODUCT MOTOR/BRAKE PRECAUTION

**CAUTION!** - White Drive Products' 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 34 bar [500 psi] or less. Case drain back pressure above 34 bar [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 below. Although maximum brake release pressure may be used for an application, a 34 bar [500 psi] pressure reducing valve is recommended to promote maximum life for the brake release piston seals. However, if a pressure reducing valve is used in a system which has case drain back pressure, the pressure reducing valve should be set to 34 bar [500 psi] over the expected case pressure to ensure full brake release. 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

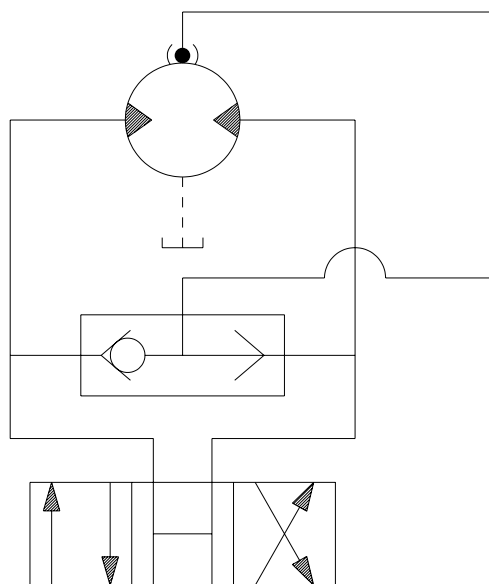


Figure A



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



**Delivering The Power To Get Work Done.**

### United States

White Drive Products, Inc.  
P.O. Box 1127  
Hopkinsville, KY. USA 42241  
Phone: +1.270.885.1110  
Fax: +1.270.886.8462  
[infousa@whitedriveproducts.com](mailto:infousa@whitedriveproducts.com)

### Germany

White Drive Products GmbH  
Halskestrasse 15  
D-40880 Ratingen, Germany  
Phone: +49 2102-1237770  
Fax: +49 2102-1237779  
[infoeu@whitedriveproducts.com](mailto:infoeu@whitedriveproducts.com)

### China

White (China) Drive Products Co., Ltd.  
1-8 Ning Zhen Gong Lu  
Zhenjiang, 212021, Jiangsu, China  
Phone: +86 511 5729988  
Fax: +86 511 5728921  
[infochina@whitedriveproducts.com](mailto:infochina@whitedriveproducts.com)



**whitedriveproducts**

[www.whitedriveproducts.com](http://www.whitedriveproducts.com)