

Part number:

HYDROMA

HYDRAULICKÉ SYSTÉMY

**HIDROMA
SYSTEMS**

UKŁADY HYDRAULICZNE

HYDROMA

ГИДРАВЛИЧЕСКИЕ СИСТЕМЫ



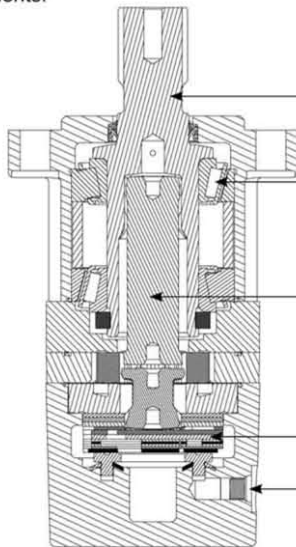
WS

SERIES HYDRAULIC MOTORS

WS

OVERVIEW

The WS product family features flow rates up to 76 LPM [20 GPM], torque up to 824 Nm [7,295 lb-in], and pressures up to 207 bar [3000 PSI] at continuous ratings. The WS targets agricultural equipment, skid steer attachments, and other applications that require greater torque under demanding conditions. A distinguishing feature of the WS in relation to competitive products is its heavy duty drive link with a larger pitch diameter. This enables the WS to better withstand pressure and torque spikes and is reflected in its intermittent and peak performance ratings. Additional product features include a three zone commutator valve, heavy-duty tapered roller bearings, and case drain with integral internal drain*. The WS offers displacements from 80cc [4.8in³] to 496cc [30.3in³]. Nine (9) shaft and seven (7) mounting options are available to meet the most common SAE and European requirements.



KEY FEATURES

- **Nine shaft and seven mounting options** to meet the most common SAE and European requirements.
- **Heavy-duty tapered roller bearings** for extra side load capacity.
- **Heavy-duty drive link** with larger pitch diameter than competitors for greater resistance to pressure and torque spikes.
- **Three zone commutator valve** for high flow capacity.
- **Standard case drain with integral internal drain*** for extended shaft seal life.

*See page 17 for allowable back pressure when utilizing the internal drain.

SPECIFICATIONS

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

CODE	Displacement cc [in ³ /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
080	79 [4.78]	870	1060	61 [16]	68 [18]	207 [1832]	286 [2528]	207 [3000]	276 [4000]	276 [4000]
100	100 [6.10]	745	880	76 [20]	95 [25]	280 [2475]	416 [3680]	207 [3000]	310 [4500]	310 [4500]
110	112 [6.85]	675	840	76 [20]	95 [25]	307 [2715]	468 [4145]	207 [3000]	310 [4500]	310 [4500]
130	129 [7.86]	580	730	76 [20]	95 [25]	370 [3275]	550 [4865]	207 [3000]	310 [4500]	310 [4500]
160	162 [9.90]	465	700	76 [20]	114 [30]	462 [4090]	618 [5465]	207 [3000]	276 [4000]	310 [4500]
200	202 [12.31]	375	560	76 [20]	114 [30]	576 [5100]	768 [6795]	207 [3000]	276 [4000]	310 [4500]
230	228 [13.92]	325	490	76 [20]	114 [30]	642 [5685]	806 [7135]	207 [3000]	276 [4000]	310 [4500]
320	325 [19.81]	235	350	76 [20]	114 [30]	789 [6980]	1029 [9105]	190 [2750]	224 [3250]	259 [3750]
400	399 [24.36]	190	280	76 [20]	114 [30]	816 [7225]	1034 [9150]	155 [2250]	190 [2750]	224 [3250]
500	496 [30.29]	155	230	76 [20]	114 [30]	824 [7295]	1041 [9210]	121 [1750]	155 [2250]	172 [2500]

		Pressure - bars [psi]							Max. Cont.	Max. Inter.
080		17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	172 [2500]	207 [3000]	242 [3500]	276 [4000]
79 cc [4.8 in ³ /rev.] Intermittent Ratings are below and to the right of the BOLD line. Intermittent Ratings - 10% of Operation										
Flow - lpm [gpm]	2 [0.5]									
	4 [1]	7 [61] 47	23 [201] 47							
	8 [2]	9 [79] 97	28 [244] 95	64 [568] 90	100 [887] 85	135 [1192] 78				
	15 [4]	9 [79] 194	27 [242] 192	64 [567] 186	101 [896] 178	137 [1216] 167	174 [1536] 157	207 [1832] 142		
	23 [6]	7 [58] 291	25 [224] 289	62 [550] 282	99 [875] 271	136 [1202] 258	172 [1519] 242	207 [1830] 222	242 [2141] 198	
	30 [8]	3 [29] 388	22 [196] 388	59 [524] 380	95 [841] 367	131 [1162] 349	167 [1479] 328	203 [1795] 305	240 [2123] 279	281 [2484] 221
	38 [10]		19 [171] 484	56 [495] 477	92 [814] 464	128 [1129] 444	164 [1447] 420	200 [1766] 393	236 [2092] 361	279 [2470] 306
	45 [12]		14 [127] 581	53 [465] 575	88 [781] 562	125 [1102] 540	159 [1411] 513	195 [1730] 481	233 [2062] 441	278 [2456] 381
	53 [14]		9 [80] 678	48 [422] 674	79 [704] 658	119 [1055] 635	155 [1373] 606	191 [1689] 571	229 [2028] 527	
	61 [16]		2 [14] 775	38 [336] 771	75 [662] 757	111 [985] 736	151 [1337] 704	182 [1611] 664	238 [2109] 608	282 [2499] 540
68 [18]			34 [298] 871	68 [602] 858	101 [896] 833	141 [1244] 806	188 [1661] 750	238 [2104] 680	283 [2507] 605	
Torque - Nm [lb-in], Speed rpm Overall Efficiency - 70 - 100% <input type="checkbox"/> 40 - 69% <input type="checkbox"/> 0 - 39% <input type="checkbox"/>										
		22 [194]	44 [388]	88 [777]	132 [1165]	176 [1553]	219 [1942]	263 [2330]	307 [2718]	351 [3107]
Theoretical Torque - Nm [lb-in] Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]										

25
49
97
194
291
388
484
581
678
775
871

		Pressure - bars [psi]							Max. Cont.	Max. Inter.	
100		17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	172 [2500]	207 [3000]	242 [3500]	276 [4000]	310 [4500]
100 cc [6.10 in ³ /rev.] Intermittent Ratings are below and to the right of the BOLD line. Intermittent Ratings - 10% of Operation											
Flow - lpm [gpm]	2 [0.5]	14 [120] 11	35 [313] 8	77 [681] 6	116 [1025] 4						
	4 [1]	15 [129] 37	38 [337] 35	80 [710] 10	122 [1079] 7	162 [1436] 5					
	8 [2]	16 [138] 75	40 [354] 74	88 [781] 71	136 [1205] 68	181 [1602] 58	227 [2007] 44	267 [2364] 43	315 [2791] 42	352 [3119] 41	383 [3386] 33
	15 [4]	16 [138] 151	40 [354] 149	89 [790] 146	138 [1222] 143	187 [1654] 137	235 [2079] 129	282 [2495] 119	324 [2871] 110	370 [3277] 101	411 [3636] 87
	23 [6]	14 [127] 226	39 [344] 225	88 [779] 221	137 [1214] 217	186 [1647] 210	234 [2071] 200	282 [2494] 188	324 [2869] 174	371 [3279] 162	415 [3676] 147
	30 [8]	12 [109] 302	37 [326] 300	86 [765] 297	136 [1200] 292	184 [1625] 284	232 [2049] 273	280 [2474] 258	323 [2859] 240	369 [3268] 224	416 [3682] 206
	38 [10]	10 [88] 378	34 [305] 376	83 [738] 372	133 [1174] 366	181 [1601] 357	229 [2026] 343	276 [2446] 326	318 [2810] 300	366 [3235] 281	415 [3672] 261
	45 [12]	7 [65] 453	32 [282] 451	81 [713] 447	129 [1145] 441	178 [1574] 430	226 [2002] 415	274 [2423] 396	316 [2793] 367	364 [3220] 345	413 [3653] 324
	53 [14]	4 [39] 528	29 [254] 527	77 [686] 522	126 [1116] 515	175 [1546] 504	222 [1968] 486	266 [2351] 455	315 [2791] 433	362 [3203] 407	411 [3637] 384
	61 [16]	2 [15] 604	25 [221] 602	74 [652] 597	122 [1084] 590	171 [1513] 578	219 [1941] 559	264 [2340] 527	312 [2760] 502	360 [3182] 475	409 [3616] 447
68 [18]		21 [186] 678	69 [614] 672	118 [1047] 664	167 [1481] 651	216 [1910] 632	260 [2300] 596	309 [2735] 570	356 [3152] 541	407 [3601] 513	
76 [20]		16 [144] 754	65 [573] 747	114 [1009] 739	163 [1441] 725	211 [1872] 704	257 [2278] 677	307 [2712] 652	353 [3121] 624	403 [3568] 595	
83 [22]					156 [1379] 801	205 [1814] 782	253 [2239] 758	300 [2653] 730	347 [3075] 698	398 [3526] 668	
91 [24]						199 [1762] 850	246 [2179] 826	294 [2604] 799	343 [3037] 768	395 [3495] 733	
95 [25]						196 [1737] 883	246 [2176] 863	294 [2605] 835	342 [3028] 800	392 [3472] 770	
Torque - Nm [lb-in], Speed rpm Overall Efficiency - 70 - 100% <input type="checkbox"/> 40 - 69% <input type="checkbox"/> 0 - 39% <input type="checkbox"/>											
		27 [243]	55 [485]	110 [971]	165 [1456]	219 [1942]	274 [2427]	329 [2913]	384 [3398]	439 [3883]	494 [4369]
Theoretical Torque - Nm [lb-in] Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]											

19
38
76
152
228
303
379
455
531
606
682
758
834
909
947

WS

PERFORMANCE

		Pressure - bars [psi]										Max. Cont.		Max. Inter.	
110		17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	172 [2500]	207 [3000]	242 [3500]	276 [4000]	310 [4500]				
112 cc [6.85 in ³ /rev.]		Intermittent Ratings are below and to the right of the BOLD line.										Intermittent Ratings - 10% of Operation			
Flow - lpm [gpm]	2 [0.5]	12 [106]	38 [334]	86 [757]	132 [1166]										
	4 [1]	12 [110]	38 [334]	89 [788]	137 [1213]	184 [1624]									
	8 [2]	15 [129]	42 [373]	98 [863]	152 [1341]	206 [1823]	255 [2257]	297 [2629]	341 [3015]	377 [3334]	396 [3502]				
	15 [4]	15 [134]	43 [378]	97 [863]	152 [1350]	208 [1838]	261 [2314]	314 [2776]	357 [3158]	402 [3558]	438 [3879]				
	23 [6]	15 [128]	42 [373]	97 [856]	151 [1337]	206 [1826]	260 [2302]	313 [2770]	359 [3179]	411 [3633]	458 [4054]				
	30 [8]	12 [108]	40 [351]	94 [833]	148 [1313]	203 [1798]	258 [2281]	311 [2753]	359 [3177]	413 [3656]	466 [4122]				
	38 [10]	9 [80]	36 [322]	91 [803]	145 [1280]	199 [1761]	253 [2236]	307 [2715]	358 [3165]	413 [3652]	468 [4144]				
	45 [12]	8 [69]	33 [293]	87 [770]	141 [1247]	194 [1716]	249 [2205]	303 [2684]	353 [3124]	408 [3613]	467 [4133]				
	53 [14]	4 [38]	29 [254]	82 [728]	136 [1202]	189 [1676]	243 [2152]	294 [2605]	351 [3108]	407 [3601]	464 [4109]				
	61 [16]		24 [210]	78 [687]	131 [1162]	185 [1635]	239 [2114]	290 [2564]	346 [3058]	402 [3553]	462 [4092]				
	68 [18]		18 [163]	72 [639]	126 [1116]	180 [1594]	234 [2068]	286 [2534]	341 [3016]	397 [3515]	458 [4051]				
	76 [20]		13 [117]	68 [598]	121 [1068]	174 [1541]	228 [2017]	282 [2494]	336 [2977]	393 [3481]	454 [4017]				
	83 [22]			67 [596]	115 [1015]	169 [1500]	221 [1960]	276 [2445]	332 [2942]	388 [3436]	447 [3953]				
	91 [24]			62 [549]	109 [967]	164 [1452]	218 [1926]	272 [2403]	326 [2885]	383 [3385]	441 [3906]				
	95 [25]			60 [528]	105 [939]	161 [1425]	215 [1901]	270 [2389]	323 [2861]	380 [3361]	439 [3886]				
Torque - Nm [lb-in], Speed rpm		Overall Efficiency - 70 - 100% <input type="checkbox"/> 40 - 69% <input type="checkbox"/> 0 - 39% <input type="checkbox"/>													
		31 [273]	62 [545]	123 [1090]	185 [1635]	246 [2180]	308 [2726]	370 [3271]	431 [3816]	493 [4361]	554 [4906]				
		Theoretical Torque - Nm [lb-in]										Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]			

17
34
68
135
203
270
338
405
473
540
608
675
742
810
844

		Pressure - bars [psi]										Max. Cont.		Max. Inter.	
130		17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	172 [2500]	207 [3000]	242 [3500]	276 [4000]	310 [4500]				
129 cc [7.86 in ³ /rev.]		Intermittent Ratings are below and to the right of the BOLD line.										Intermittent Ratings - 10% of Operation			
Flow - lpm [gpm]	2 [0.5]	13 [114]	41 [367]	94 [830]											
	4 [1]	16 [144]	45 [400]	101 [890]	151 [1334]	201 [1780]	256 [2264]	306 [2706]							
	8 [2]	19 [172]	52 [456]	115 [1022]	180 [1592]	235 [2081]	294 [2600]	348 [3084]	402 [3560]	448 [3962]	477 [4219]				
	15 [4]	21 [182]	53 [469]	117 [1037]	182 [1609]	246 [2175]	309 [2735]	369 [3265]	424 [3749]	480 [4249]	528 [4671]				
	23 [6]	20 [174]	52 [460]	116 [1026]	180 [1591]	244 [2163]	308 [2730]	371 [3285]	427 [3783]	489 [4330]	547 [4837]				
	30 [8]	17 [150]	49 [436]	113 [1004]	178 [1571]	242 [2143]	307 [2714]	370 [3276]	426 [3767]	488 [4322]	550 [4866]				
	38 [10]	14 [120]	46 [403]	110 [974]	174 [1537]	238 [2109]	303 [2677]	367 [3246]	423 [3741]	486 [4305]	549 [4860]				
	45 [12]	10 [86]	42 [367]	106 [935]	169 [1499]	234 [2069]	298 [2633]	362 [3204]	417 [3688]	482 [4264]	547 [4837]				
	53 [14]	8 [53]	37 [329]	101 [891]	165 [1458]	229 [2027]	294 [2600]	349 [3092]	414 [3661]	478 [4230]	544 [4818]				
	61 [16]		33 [289]	96 [853]	160 [1415]	224 [1979]	287 [2543]	344 [3048]	409 [3620]	474 [4195]	539 [4773]				
	68 [18]			91 [803]	155 [1369]	219 [1934]	282 [2498]	340 [3007]	404 [3571]	469 [4147]	536 [4744]				
	76 [20]			85 [753]	148 [1314]	212 [1879]	277 [2447]	335 [2960]	399 [3528]	464 [4108]	533 [4714]				
	83 [22]			77 [681]	140 [1242]	204 [1805]	267 [2362]	332 [2938]	397 [3510]	461 [4076]	526 [4651]				
	91 [24]			71 [625]	134 [1185]	198 [1751]	261 [2307]	325 [2872]	389 [3442]	453 [4011]	520 [4599]				
	95 [25]			68 [601]	131 [1158]	195 [1722]	258 [2285]	322 [2849]	384 [3399]	450 [3986]	519 [4594]				
Torque - Nm [lb-in], Speed rpm		Overall Efficiency - 70 - 100% <input type="checkbox"/> 40 - 69% <input type="checkbox"/> 0 - 39% <input type="checkbox"/>													
		35 [313]	71 [625]	141 [1251]	212 [1876]	283 [2502]	353 [3127]	424 [3753]	495 [4378]	565 [5004]	636 [5629]				
		Theoretical Torque - Nm [lb-in]										Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]			

15
30
59
118
177
236
294
353
412
471
530
588
647
706
735

160	Pressure - bars [psi]						Max. Cont.			Max. Inter.	
	17 [250]	35 [500]	69 [1000]	104 [1500]	138 [2000]	172 [2500]	207 [3000]	242 [3500]	259 [3750]	276 [4000]	

162 cc [9.90 in³/rev.] Intermittent Ratings are below and to the right of the BOLD line. Intermittent Ratings - 10% of Operation

Flow - lpm [gpm]	2 [0.5]	20 [173]	55 [485]	125 [1102]	190 [1679]	255 [2258]														12	
	4 [1]	22 [199]	59 [523]	135 [1194]	207 [1831]	274 [2425]	338 [2989]	397 [3511]													24
	8 [2]	32 [283]	63 [554]	144 [1273]	223 [1974]	298 [2635]	368 [3255]	433 [3830]	480 [4251]	504 [4459]	527 [4664]										47
	15 [4]	31 [278]	69 [609]	145 [1287]	228 [2014]	308 [2728]	388 [3416]	460 [4071]	526 [4654]	557 [4931]	583 [5163]										94
	23 [6]	29 [257]	69 [615]	143 [1265]	225 [1990]	306 [2711]	386 [3412]	464 [4108]	535 [4737]	573 [5074]	607 [5370]										140
	30 [8]	26 [226]	66 [583]	138 [1225]	221 [1958]	303 [2678]	383 [3387]	462 [4088]	538 [4761]	578 [5116]	617 [5463]										187
	38 [10]	21 [188]	62 [547]	133 [1180]	216 [1914]	298 [2633]	379 [3353]	458 [4055]	534 [4730]	575 [5085]	616 [5451]										234
	45 [12]	16 [145]	57 [509]	135 [1192]	210 [1861]	292 [2581]	372 [3289]	452 [4000]	530 [4688]	570 [5046]	613 [5423]										280
	53 [14]	11 [97]	51 [455]	133 [1178]	205 [1817]	286 [2530]	365 [3231]	441 [3905]	523 [4627]	563 [4986]	606 [5363]										327
	61 [16]	5 [44]	45 [402]	125 [1110]	199 [1761]	280 [2474]	359 [3173]	436 [3857]	517 [4572]	557 [4934]	599 [5301]										374
	68 [18]	37 [331]	118 [1048]	192 [1697]	272 [2408]	351 [3104]	427 [3779]	508 [4498]	548 [4853]	592 [5240]											420
	76 [20]	30 [265]	111 [980]	183 [1616]	264 [2337]	343 [3036]	419 [3712]	500 [4424]	540 [4777]	584 [5167]											467
	83 [22]	22 [193]	103 [913]	176 [1557]	256 [2264]	335 [2965]	413 [3658]	492 [4358]	533 [4721]	575 [5093]											514
	91 [24]	175 [1553]	246 [2180]	327 [2890]	405 [3587]	484 [4286]	524 [4639]	568 [5027]													560
	95 [25]	163 [1443]	241 [2134]	321 [2843]	400 [3543]	481 [4253]	521 [4611]	561 [4968]													584
114 [30]	138 [1222]	217 [1917]	296 [2618]	376 [3324]	456 [4034]	495 [4383]	534 [4729]													700	

Torque - Nm [lb-in], Speed rpm Overall Efficiency - 70 - 100% 40 - 69% 0 - 39%

45 [394]	89 [788]	178 [1576]	267 [2363]	356 [3151]	445 [3939]	534 [4727]	623 [5515]	668 [5909]	712 [6303]
----------	----------	------------	------------	------------	------------	------------	------------	------------	------------

Theoretical Torque - Nm [lb-in] 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]	172 [2500]	190 [2750]	207 [3000]	242 [3500]	276 [4000]	

202 cc [12.31 in³/rev.] Intermittent Ratings are below and to the right of the BOLD line. Intermittent Ratings - 10% of Operation

Flow - lpm [gpm]	2 [0.5]	28 [249]	72 [638]	157 [1388]																	10	
	4 [1]	33 [291]	81 [713]	170 [1508]	254 [2250]	335 [2961]	411 [3636]	454 [4019]	508 [4498]													19
	8 [2]	39 [343]	85 [757]	185 [1637]	280 [2474]	365 [3232]	446 [3948]	483 [4279]	521 [4609]	568 [5024]												38
	15 [4]	40 [354]	87 [773]	187 [1654]	289 [2554]	388 [3430]	481 [4254]	523 [4627]	564 [4995]	627 [5548]	696 [6156]											76
	23 [6]	38 [334]	89 [789]	184 [1624]	285 [2524]	387 [3425]	486 [4299]	533 [4721]	579 [5128]	654 [5790]	732 [6478]											113
	30 [8]	34 [298]	85 [752]	180 [1593]	281 [2488]	384 [3394]	484 [4285]	534 [4722]	582 [5149]	670 [5931]	755 [6685]											151
	38 [10]	29 [255]	80 [709]	174 [1544]	276 [2446]	378 [3345]	479 [4240]	529 [4683]	576 [5098]	674 [5965]	768 [6793]											188
	45 [12]	22 [197]	74 [651]	168 [1491]	270 [2385]	371 [3284]	473 [4190]	520 [4600]	572 [5064]	670 [5930]	767 [6789]											226
	53 [14]	16 [139]	67 [593]	163 [1439]	263 [2324]	363 [3216]	465 [4111]	513 [4537]	563 [4980]	664 [5880]	764 [6765]											263
	61 [16]	8 [70]	60 [530]	159 [1409]	255 [2260]	355 [3145]	454 [4022]	506 [4477]	557 [4929]	656 [5809]	756 [6688]											301
	68 [18]	302	50 [446]	153 [1358]	246 [2181]	347 [3067]	447 [3955]	493 [4363]	547 [4838]	648 [5731]	747 [6612]											338
	76 [20]	376	41 [363]	144 [1277]	237 [2100]	336 [2977]	437 [3868]	487 [4305]	537 [4754]	637 [5639]	740 [6546]											376
	83 [22]	376	31 [276]	134 [1186]	227 [2007]	326 [2888]	427 [3783]	478 [4230]	527 [4685]	628 [5555]	730 [6463]											413
	91 [24]	414		411	216 [1908]	315 [2790]	417 [3693]	467 [4137]	518 [4581]	618 [5466]	723 [6395]											451
	95 [25]				210 [1856]	309 [2737]	413 [3656]	464 [4107]	513 [4543]	614 [5436]	718 [6353]											470
114 [30]				181 [1598]	281 [2486]	382 [3380]	433 [3831]	482 [4267]	580 [5136]	689 [6100]											563	

Torque - Nm [lb-in], Speed rpm Overall Efficiency - 70 - 100% 40 - 69% 0 - 39%

55 [490]	111 [980]	221 [1959]	332 [2939]	443 [3918]	553 [4898]	609 [5388]	664 [5878]	775 [6857]	886 [7837]
----------	-----------	------------	------------	------------	------------	------------	------------	------------	------------

Theoretical Torque - Nm [lb-in] Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]

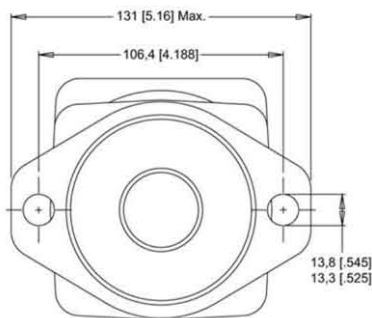
		Pressure - bars [psi]									Max. Cont.	Max. Inter.
400		17 [250]	35 [500]	69 [1000]	86 [1250]	104 [1500]	121 [1750]	138 [2000]	155 [2250]	172 [2500]	190 [2750]	
399 cc [24.36 in ³ /rev.] Intermittent Ratings are below and to the right of the BOLD line. Intermittent Ratings - 10% of Operation												
Flow - lpm [gpm]	2 [0.5]	81 [717]	173 [1534]	356 [3148]								5
	4 [1]	85 [752]	181 [1605]	369 [3263]	460 [4074]	550 [4865]	638 [5648]	724 [6404]	816 [7222]			10
	8 [2]	86 [762]	187 [1654]	387 [3422]	483 [4274]	575 [5090]	662 [5861]	747 [6613]	826 [7310]			19
	15 [4]	82 [724]	185 [1635]	391 [3460]	493 [4361]	592 [5240]	688 [6086]	776 [6871]	866 [7667]	942 [8337]		38
	23 [6]	75 [663]	178 [1573]	383 [3393]	486 [4301]	588 [5201]	686 [6074]	783 [6926]	876 [7750]	963 [8524]	1056 [9345]	57
	30 [8]	66 [585]	168 [1490]	374 [3306]	476 [4216]	578 [5119]	679 [6007]	776 [6868]	872 [7716]	966 [8545]	1055 [9341]	76
	38 [10]		154 [1365]	361 [3197]	464 [4110]	567 [5015]	664 [5880]	764 [6764]	862 [7626]	956 [8463]	1050 [9289]	95
	45 [12]		140 [1237]	346 [3066]	450 [3978]	551 [4880]	649 [5744]	750 [6638]	848 [7503]	945 [8361]	1039 [9195]	114
	53 [14]		125 [1104]	330 [2924]	434 [3838]	536 [4745]	634 [5609]	735 [6504]	833 [7369]	929 [8217]	1024 [9058]	133
	61 [16]		106 [934]	311 [2755]	415 [3672]	518 [4580]	617 [5456]	718 [6357]	817 [7228]	913 [8079]	1007 [8913]	152
	68 [18]			291 [2578]	395 [3493]	498 [4405]	597 [5279]	699 [6185]	798 [7065]	896 [7931]	991 [8774]	171
	76 [20]			269 [2379]	371 [3286]	475 [4205]	575 [5084]	678 [5997]	777 [6879]	876 [7754]	972 [8606]	190
	83 [22]			246 [2174]	348 [3076]	451 [3987]	555 [4911]	654 [5789]	754 [6671]	852 [7543]	951 [8413]	209
	91 [24]			226 [2000]	322 [2850]	424 [3756]	528 [4668]	629 [5571]	728 [6446]	828 [7332]	926 [8197]	228
99 [26]			197 [1739]	294 [2600]	397 [3515]	500 [4421]	602 [5323]	702 [6214]	801 [7093]	900 [7963]	247	
114 [30]			131 [1162]	237 [2100]	338 [2991]	441 [3901]	542 [4798]	643 [5687]	743 [6574]	843 [7458]	285	
Torque - Nm [lb-in], Speed rpm Overall Efficiency - 70 - 100% <input type="checkbox"/> 40 - 69% <input type="checkbox"/> 0 - 39% <input type="checkbox"/>												
		110 [969]	219 [1939]	438 [3877]	548 [4846]	657 [5816]	767 [6785]	876 [7754]	986 [8723]	1095 [9693]	1205 [10662]	
Theoretical Torque - Nm [lb-in] Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]												

		Pressure - bars [psi]									Max. Cont.	Max. Inter.
500		17 [250]	35 [500]	52 [750]	69 [1000]	86 [1250]	104 [1500]	121 [1750]	138 [2000]	155 [2250]		
496 cc [30.29 in ³ /rev.] Intermittent Ratings are below and to the right of the BOLD line. Intermittent Ratings - 10% of Operation												
Flow - lpm [gpm]	2 [0.5]	94 [832]	210 [1861]	323 [2859]	435 [3853]							4
	4 [1]	98 [868]	197 [1743]	314 [2781]	430 [3802]	542 [4797]	652 [5766]	777 [6876]				8
	8 [2]	100 [882]	205 [1812]	328 [2905]	447 [3959]	565 [5001]	677 [5990]	780 [6900]	879 [7779]			16
	15 [4]	95 [843]	204 [1803]	332 [2938]	460 [4070]	584 [5170]	703 [6225]	815 [7212]	917 [8118]	1012 [8956]		31
	23 [6]	89 [783]	196 [1737]	324 [2869]	453 [4009]	580 [5133]	705 [6237]	824 [7296]	930 [8234]	1033 [9141]		46
	30 [8]	79 [696]	185 [1639]	314 [2778]	443 [3918]	570 [5047]	696 [6161]	814 [7205]	930 [8231]	1041 [9210]		62
	38 [10]	68 [600]	172 [1523]	300 [2652]	429 [3800]	557 [4929]	684 [6052]	805 [7123]	924 [8175]	1037 [9175]		77
	45 [12]		177 [1568]	262 [2318]	410 [3624]	519 [4593]	644 [5696]	770 [6811]	891 [7885]	1008 [8916]		92
	53 [14]		157 [1389]	286 [2533]	415 [3673]	544 [4810]	669 [5918]	794 [7027]	914 [8092]	1031 [9122]		107
	61 [16]		138 [1219]	265 [2347]	394 [3486]	523 [4630]	649 [5740]	775 [6861]	897 [7936]	1013 [8968]		123
	68 [18]		114 [1004]	243 [2147]	370 [3277]	500 [4424]	626 [5536]	752 [6659]	876 [7753]	995 [8806]		138
	76 [20]		96 [849]	217 [1919]	344 [3047]	473 [4190]	600 [5311]	728 [6446]	852 [7537]	972 [8606]		153
	83 [22]		78 [688]	154 [1360]	276 [2439]	406 [3595]	534 [4724]	660 [5839]	784 [6938]	907 [8028]		168
	91 [24]			160 [1416]	268 [2371]	397 [3512]	524 [4633]	650 [5755]	776 [6863]	898 [7950]		184
99 [26]			129 [1138]	231 [2048]	321 [2844]	451 [3988]	576 [5097]	703 [6218]	827 [7320]		199	
114 [30]			186 [1647]	292 [2581]	383 [3387]	508 [4494]	636 [5631]	761 [6738]			229	
Torque - Nm [lb-in], Speed rpm Overall Efficiency - 70 - 100% <input type="checkbox"/> 40 - 69% <input type="checkbox"/> 0 - 39% <input type="checkbox"/>												
		136 [1205]	272 [2410]	409 [3616]	545 [4821]	681 [6026]	817 [7231]	953 [8436]	1090 [9642]	1226 [10847]		
Theoretical Torque - Nm [lb-in] Displacement tested at 54°C [129°F] with an oil viscosity of 46cSt [213 SUS]												

WS

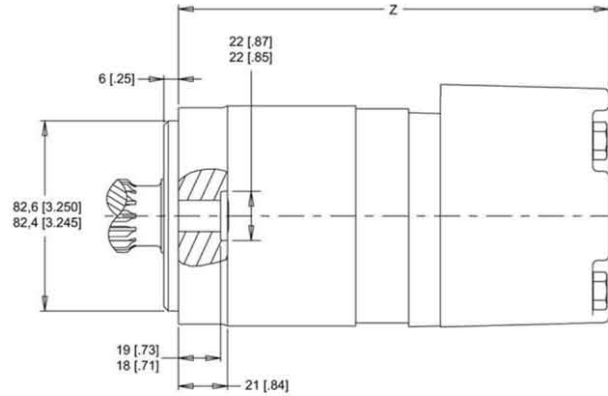
355 & 356 SERIES HOUSINGS

A0 2-Hole SAE A Mount with End Ports

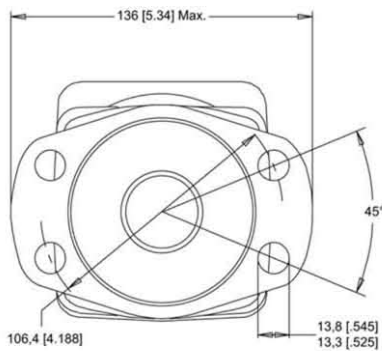


 **NOTE:** Dimension Z is found on page 10.

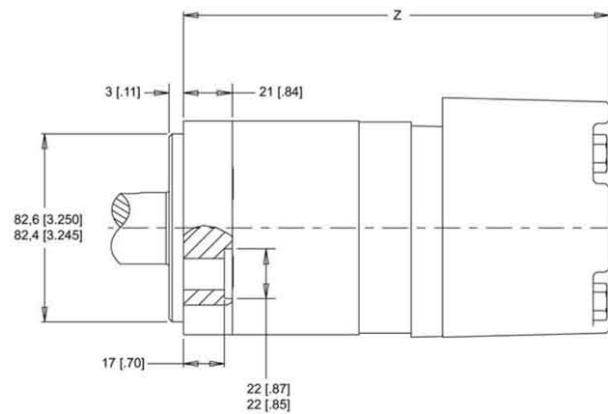
A7 2-Hole SAE A Mount with Side Ports



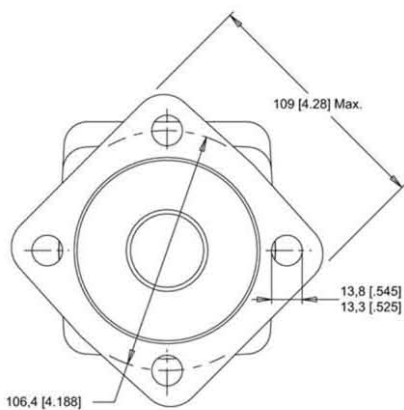
A2 4-Hole Magneto with End Ports



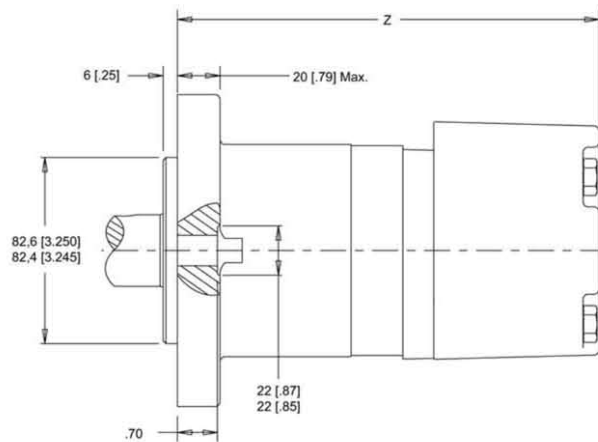
A8 4-Hole Magneto with Side Ports



AG 4-Hole Square SAE A Mount with End Ports

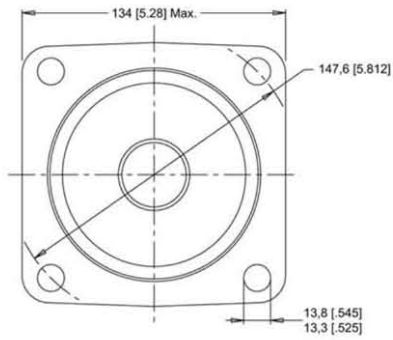


AH 4-Hole Square SAE A Mount with Side Ports



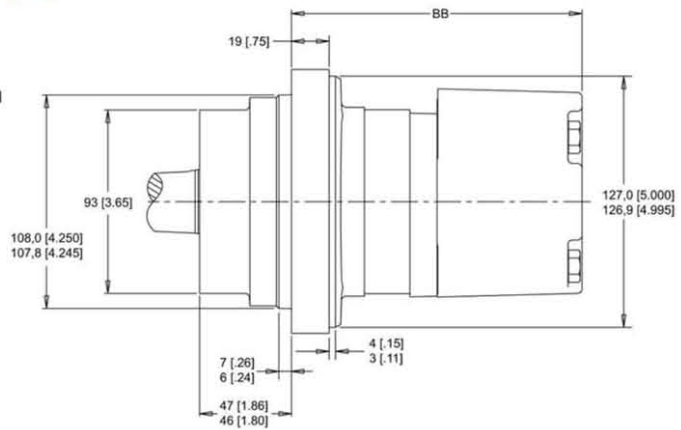
355 & 356 SERIES HOUSINGS (WHEEL MOUNTS)

Y2 4-Hole 4.25" Pilot Wheel Mount with End Ports

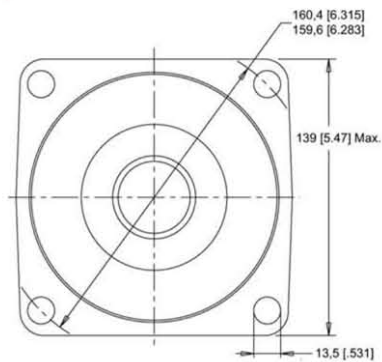


NOTE: Dimension BB is found on page 11.

Y8 4-Hole 4.25" Wheel Mount with Side Ports

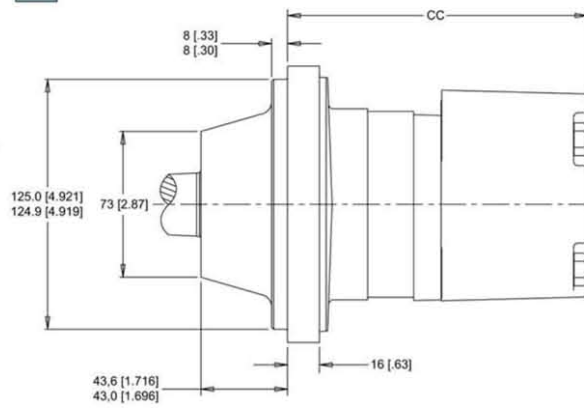


Z2 4-Hole Euro Wheel Mount with End Ports



NOTE: Dimension CC is found on page 11.

Z8 4-Hole Euro Wheel Mount with Side Ports

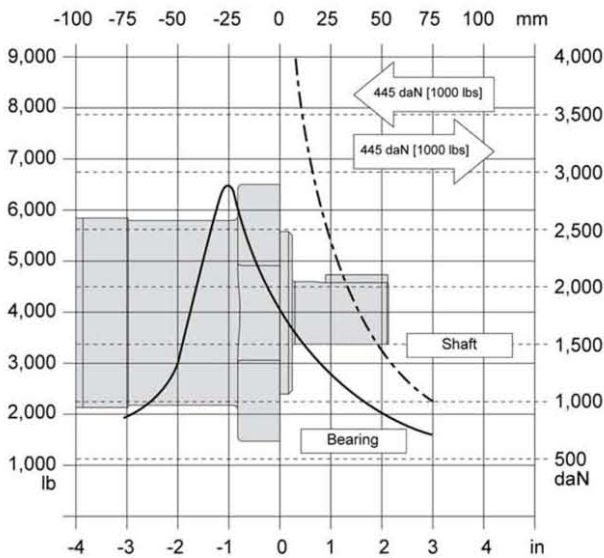


WS

355 & 356 SERIES TECHNICAL INFORMATION

Bearing Curve: The bearing curve represents allowable bearing loads for a B10 life of 2,000 hours at 100 rpm. The curve includes affects of 1,000 lbs inward/outward net thrust* (see note on page 11). Radial loads for speeds other than 100 rpm may be calculated using the multiplication factor table on page 13.

SAE "A" MOUNT



LENGTH / WEIGHT CHART
SAE A Mount - Dimension Z

Code	mm [in]	kg [lb]
080	193 [7.60]	10,8 [23.8]
100	193 [7.60]	10,8 [23.8]
110	196 [7.70]	11,0 [24.1]
130	199 [7.83]	11,1 [24.5]
160	205 [8.08]	11,5 [25.4]
200	213 [8.38]	11,9 [26.2]
230	219 [8.62]	12,3 [27.1]
320	237 [9.33]	13,3 [29.2]
400	237 [9.33]	13,3 [29.2]
500	252 [9.93]	14,0 [30.9]

NOTE:
WS motor weights vary $\pm 0,5$ kg [1 lbs] depending upon motor configuration. Add 3,8 mm [1,5 in] to dimension AA for Magneto mount.

LENGTH / WEIGHT CHART
Short Motor - Dimension GG

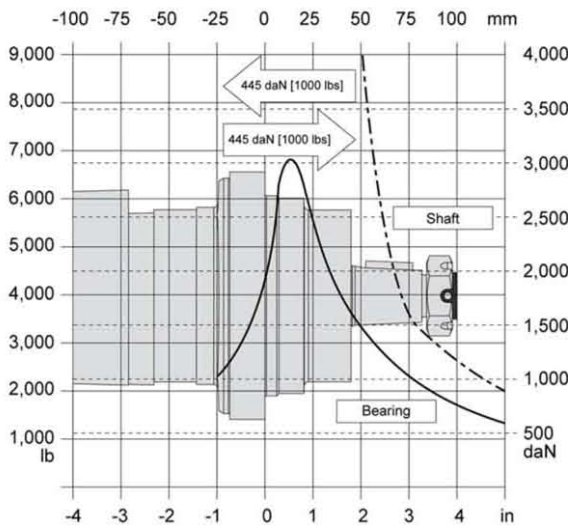
Code	mm [in]	kg [lb]
080	142 [5.60]	9,6 [21.2]
100	142 [5.60]	9,6 [21.2]
110	145 [5.70]	9,8 [21.5]
130	148 [5.83]	9,9 [21.8]
160	154 [6.08]	10,4 [22.8]
200	162 [6.38]	10,7 [23.6]
230	168 [6.62]	11,1 [24.5]
320	186 [7.33]	12,0 [26.5]
400	186 [7.33]	12,0 [26.5]
500	201 [7.93]	12,9 [28.3]

NOTE:
WS motor weights vary $\pm 0,5$ kg [1 lbs] depending upon motor configuration.

355 & 356 SERIES TECHNICAL INFORMATION

Bearing Curve: The bearing curve represents allowable bearing loads for a B10 life of 2,000 hours at 100 rpm. The curve includes affects of 1,000 lbs inward/outward net thrust*. Radial loads for speeds other than 100 rpm may be calculated using the multiplication factor table on page 13.

4.25" PILOT & EURO WHEEL MOUNTS



* Case pressure will push outward on the shaft. If case drain line is attached and routed directly to tank, case pressure should be negligible. If case drain line is not attached, case pressure will be nearly the same as motor return pressure. When case pressure is acting, the allowable inward axial load can be increased and the allowable outward axial load must be decreased at a rate of 59 kg / 7 bar [130 lb / 100 psi] for shaft codes 02, 10, 12, 20, 21, 22 & 23. The rate for shaft codes 28 & 31 is 78 kg / 7 bar [175 lb / 100 psi].

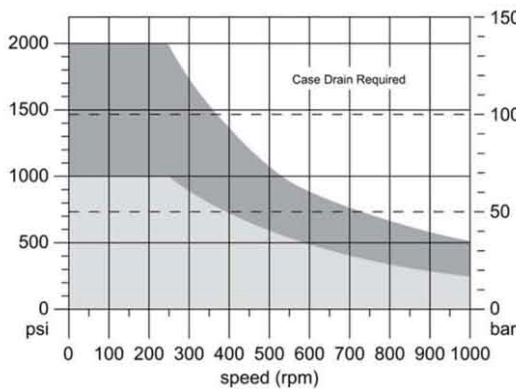
LENGTH / WEIGHT CHART 4.25" Wheel Mount - Dimension BB		
Code	mm [in]	kg [lb]
080	153 [6.02]	12,0 [26.5]
100	153 [6.02]	12,0 [26.5]
110	155 [6.12]	12,2 [26.8]
130	159 [6.25]	12,4 [27.2]
160	165 [6.50]	12,8 [28.1]
200	173 [6.80]	13,1 [28.9]
230	179 [7.04]	13,5 [29.8]
320	197 [7.75]	14,5 [31.9]
400	197 [7.75]	14,5 [31.9]
500	212 [8.35]	15,3 [33.6]

NOTE:
WS motor weights vary $\pm 0,5$ kg [1 lbs] depending upon motor configuration.

LENGTH / WEIGHT CHART Euro Wheel Mount - Dimension CC		
Code	mm [in]	kg [lb]
080	156 [6.14]	11,8 [26.0]
100	156 [6.14]	11,8 [26.0]
110	158 [6.24]	12,2 [26.3]
130	162 [6.37]	12,0 [26.7]
160	168 [6.62]	12,5 [27.6]
200	176 [6.92]	12,9 [28.4]
230	182 [7.16]	13,3 [29.3]
320	200 [7.87]	14,3 [31.4]
400	200 [7.87]	14,3 [31.4]
500	215 [8.47]	15,0 [33.1]

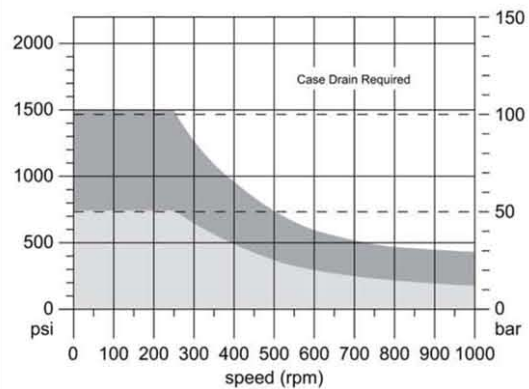
NOTE:
WS motor weights vary $\pm 0,5$ kg [1 lbs] depending upon motor configuration.

PERMISSIBLE SHAFT SEAL PRESSURE



■ Intermittent - Case Drain Optional ■ Continuous - Case Drain Optional

NOTE: Above chart references shaft options 1-1/4" and smaller.



■ Intermittent - Case Drain Optional ■ Continuous - Case Drain Optional

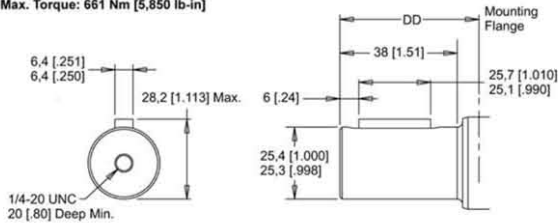
NOTE: Above chart references shaft options larger than 1-1/4".

WS

355 & 356 SERIES SHAFTS

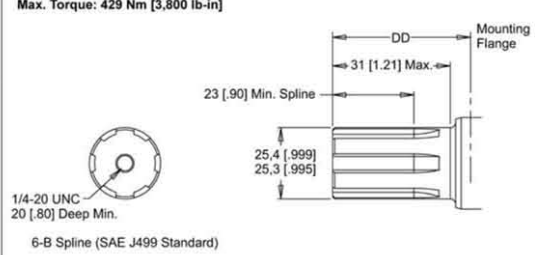
10 1" Straight

Max. Torque: 661 Nm [5,850 lb-in]



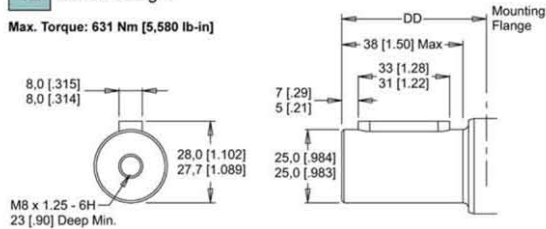
02 6-B Spline

Max. Torque: 429 Nm [3,800 lb-in]



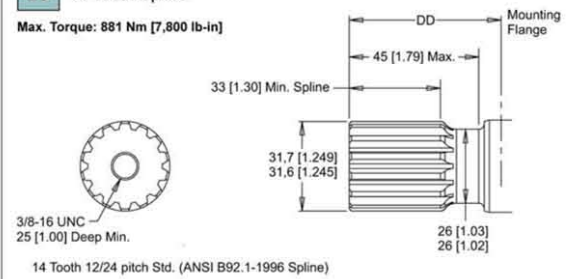
12 25mm Straight

Max. Torque: 631 Nm [5,580 lb-in]



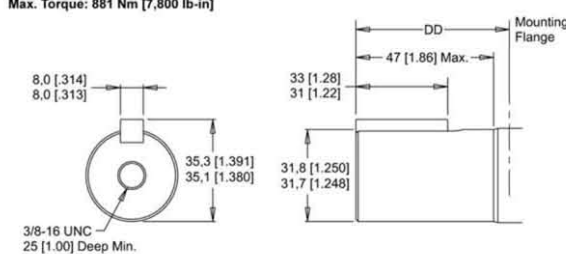
23 14 Tooth Spline

Max. Torque: 881 Nm [7,800 lb-in]



20 1-1/4" Straight

Max. Torque: 881 Nm [7,800 lb-in]



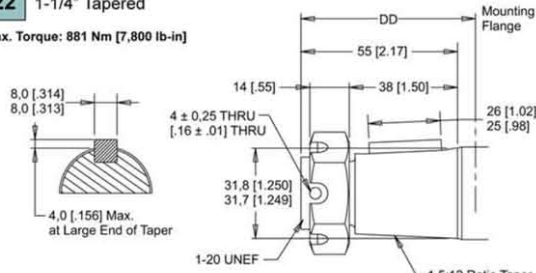
MOUNTING FLANGE TO SHAFT END - Dimension DD

Code	A0, A7, AG, & AH	A2 & A8	W2 & W8	Y2 & Y8	Z2 & Z8
02	51 [2.00]	47 [1.85]	85 [3.34]	91 [3.58]	88 [3.45]
10	51 [2.00]	47 [1.85]	85 [3.34]	91 [3.58]	88 [3.45]
12	51 [2.00]	56 [1.86]	85 [3.34]	91 [3.58]	88 [3.46]
20	55 [2.18]	52 [2.03]	89 [3.52]	96 [3.76]	92 [3.63]
21	65 [2.54]	61 [2.39]	99 [3.88]	105 [4.12]	101 [3.99]
22	64 [2.51]	60 [2.36]	103 [4.04]	104 [4.09]	101 [3.96]
23	55 [2.17]	52 [2.03]	89 [3.51]	95 [3.75]	92 [3.63]
28	N/A	N/A	102 [4.02]	107 [4.20]	104 [4.08]
31	N/A	N/A	117 [4.62]	123 [4.86]	120 [4.73]

NOTE: Shaft lengths vary ± 0.8 mm [0.030 in.]

22 1-1/4" Tapered

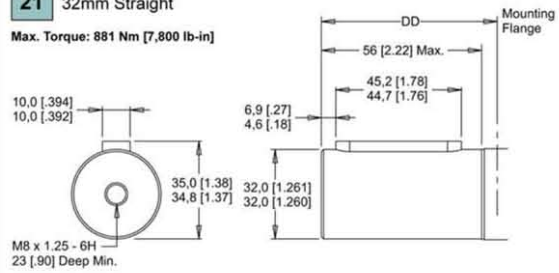
Max. Torque: 881 Nm [7,800 lb-in]



Recommended Nut Torque: 275 lb-ft Dry - 225 lb-ft Lubricated
Plus Torque Required to Align the Slotted Nut with the Shaft Crosshole.

21 32mm Straight

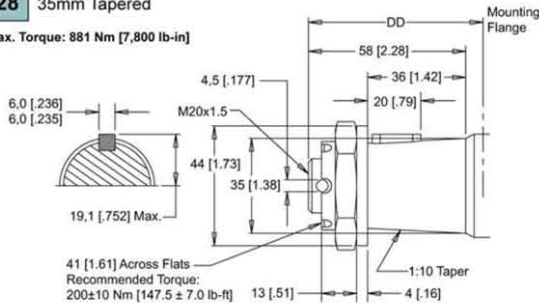
Max. Torque: 881 Nm [7,800 lb-in]



M8 x 1.25 - 6H
23 [0.90] Deep Min.

28 35mm Tapered

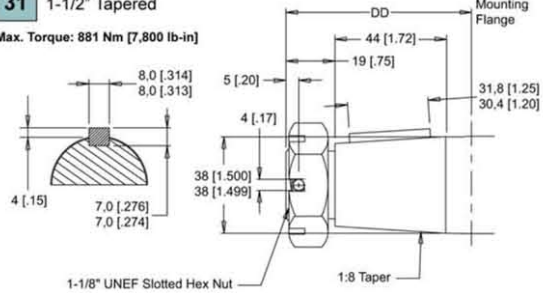
Max. Torque: 881 Nm [7,800 lb-in]



41 [1.61] Across Flats
Recommended Torque:
200±10 Nm [147.5 ± 7.0 lb-ft]

31 1-1/2" Tapered

Max. Torque: 881 Nm [7,800 lb-in]



 NOTE: Dimension DD is found on page 12.



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

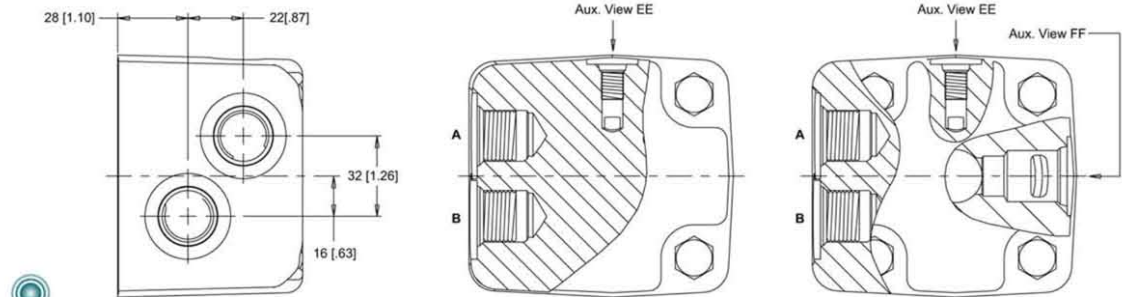
WS

355 & 356 SERIES PORTING OPTIONS

SIDE PORTS

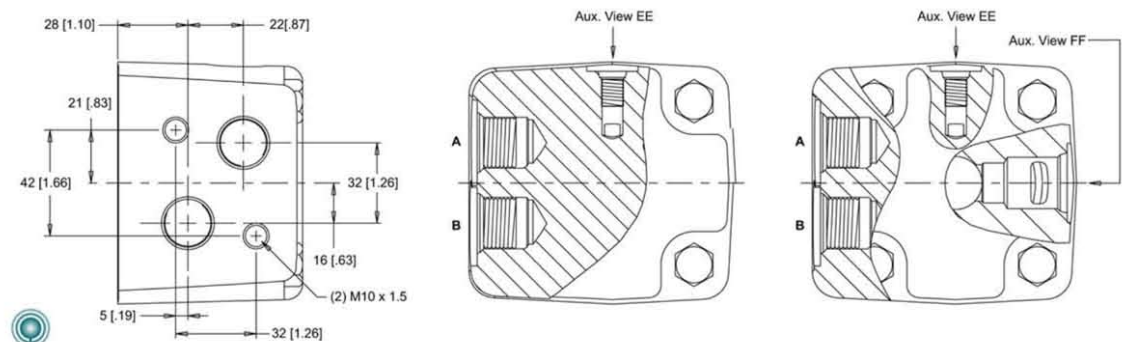
1 7/8" O-Ring with 7/16" Drain Port

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



NOTE: The #1 and #2 WS side ported options can be ordered with a relief valve cavity (10 Series / 2 Way Valve Cavity 7/8" - 14 UNF-2B). See page 15 for Auxillary views EE and FF.

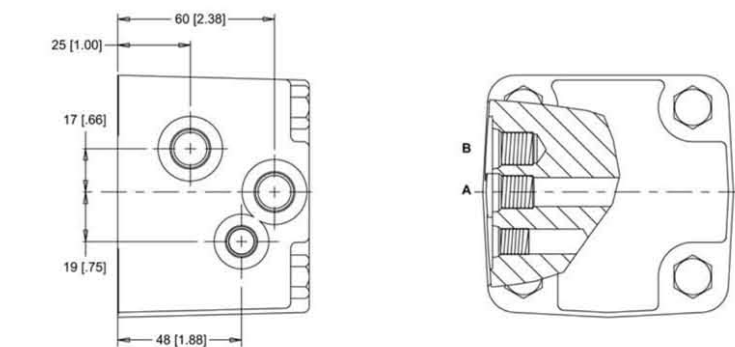
3 1/2" BSP.F Offset Manifold with 1/4" Drain Port



NOTE: The #3 WS side ported option can be ordered with a relief valve cavity (10 Series / 2 Way Valve Cavity 7/8" - 14 UNF-2B). See page 15 for Auxillary views EE and FF.

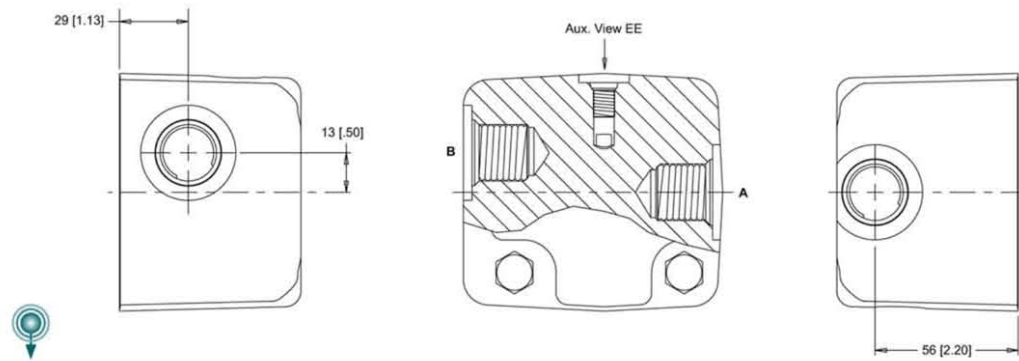
5 9/16" O-Ring with 7/16" Drain Port

9 3/8" BSP.F with 1/4" Drain Port



SIDE PORTS

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

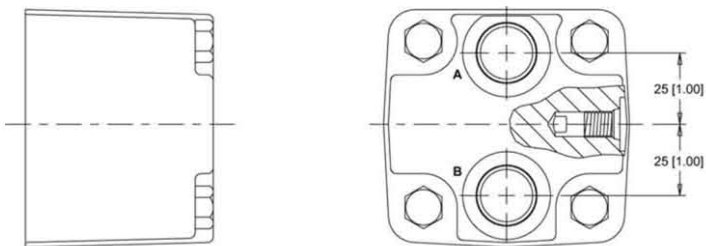


NOTE: See below for Auxiliary view EE.

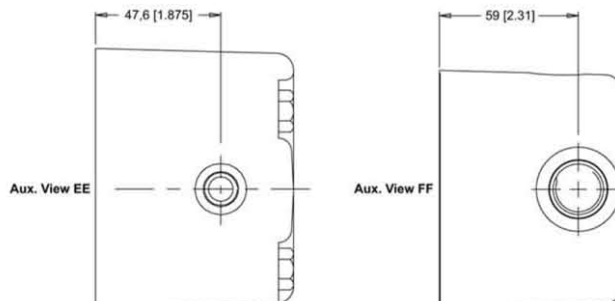
END PORTS

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

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



AUXILLARY VIEWS



WS

355 & 356 SERIES SHORT MOTOR

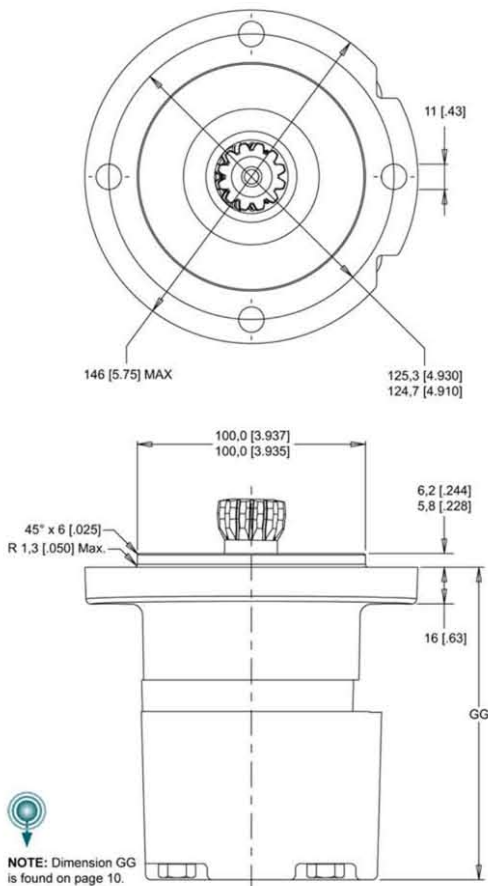
SHORT MOTOR OVERVIEW

The WS short motor comes without bearings or an output shaft. It is designed for direct mounting onto a gearbox or similar add-on component that provides the internal splined input shaft and bearings.

The add-on component must be fitted with a shaft seal on its input shaft if it is desired to prevent the motor leakage oil from flowing into the add-on component. In addition, the recommended 4mm diameter hole in the bottom of the add-on component input shaft should be omitted or plugged. If a shaft seal is used, make sure the motor back pressure or case pressure will never exceed the pressure rating of the shaft seal. A case drain line is recommended to keep pressure on the shaft seal low.

HOUSINGS

S2 Short Motor with End Ports **S8** Short Motor with Side Ports



SHAFT

The recommended shaft material is SAE 8620 or similar case hardening steel such as 20 MoCr4 (900 N/mm²) hardened to 59 - 62 HRC to a depth of 0,762 - 1,016 [.030 - .040]

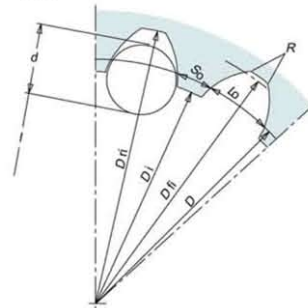
0A Cardan

Fillet Root Side Fit

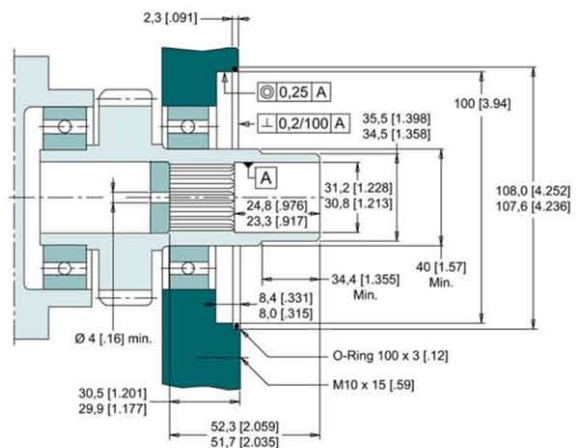
Number of Teeth	12
Pitch	10.9091
Pressure Angle	30°
Pitch Diameter D	27,94 [1.1]
Base Diameter	24,199 [.9527]
Major Diameter D_{fl}	30,7 [1.210] - 30,5 [1.200]
Form Diameter (Min.) D_{fl}	29,97 [1.180]
Minor Diameter D_i	25,578 [1.007] - 25,705 [1.012]
* Space Width (Circular) L_o	
Max. Actual	4,232 [1.666]
Min. Effective	4,155 [1.636]
Fillet Radius R_{max}	0,38 [0.15]
Max. Distance Between Pins l	21,51 [8469]
Pin Diameter d	4,5085 [1.775]

with 3,175 [.125] Flat for Root Clearance

* Dimensions apply after heat treatment.



INPUT DIMENSIONS

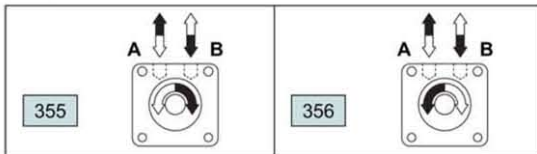


355 & 356 SERIES MODEL CODE BUILDER

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

- 355 Clockwise Rotation
- 356 Counterclockwise Rotation



STEP 2 - Select a displacement option

080	78 cc	[4.8 in ³ /rev]	200	202 cc	[12.3 in ³ /rev]
100	100 cc	[6.1 in ³ /rev]	230	228 cc	[13.9 in ³ /rev]
110	112 cc	[6.9 in ³ /rev]	320	325 cc	[19.8 in ³ /rev]
130	129 cc	[7.9 in ³ /rev]	400	399 cc	[24.4 in ³ /rev]
160	162 cc	[9.9 in ³ /rev]	500	496 cc	[30.3 in ³ /rev]

STEP 3 - Select a mounting option

NOTE: To complete the three (3) digit WS 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 SAE A Mount With End Ports
A2	4-Hole Magneto With End Ports
A7	2-Hole SAE A Mount With Side Ports
A8	4-Hole Magneto With Side Ports
AG	4-Hole Square SAE A Mount With End Ports
AH	4-Hole Square SAE A Mount With Side Ports
S2	Short Motor With End Ports
S8	Short Motor With Side Ports
Y2	4-Hole 4.25" Pilot Wheel Mount With End Ports
Y8	4-Hole 4.25" Pilot Wheel Mount With Side Ports
Z2	4-Hole Euro Wheel Mount with End Ports
Z8	4-Hole Euro Wheel Mount with Side Ports

WS series motors have been tested per NFPA/T2.6.1-1974 in order to establish ratings for infinite housing life. These ratings are based on pressure cycles with the case drain closed. The ratings for each housing are listed below:

Mounting Option	Rated Fatigue Pressure
4-Hole Square SAE A and 4-Hole Euro Wheel Mounts	34 bar [500 psi]
2-Hole SAE A and 4-Hole Magneto Mounts	48 bar [700 psi]
3.25" and 4.25" Wheel Mounts	117 bar [1700 psi]

* The MA option is available on the A0, A2, A7, & A8 mounting options.

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
- 9 3/8" BSP.F With 1/4" Drain

STEP 4 - Select a shaft option

02	6B Spline	22	1-1/4" Tapered
10	1" Straight	23	14 Tooth Spline
12	25mm Straight	28	35mm Tapered
20	1-1/4" Straight	31	1-1/2" Tapered
21	32mm Straight	0A	Cardan (Drive Link Only)

NOTE: The 0A shaft must be used on the Short Motor and only the Short Motor. The 28 and 31 shafts are not available on the SAE A mounts or the Magneto mounts.

STEP 5 - Select a paint option

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

NOTE: The WS short motor (S2 & S8 mounting options with 0A shaft) is only available with the Z paint code.

STEP 6 - Select a valve cavity option and installed valve

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

NOTE: Valve cavity is only available on Side Ports 1, 2, and 3. The B option will not have a valve cartridge listed above installed.

STEP 7 - Select an add on option

- A Standard
- B Lock Nut
- C Solid Hex Nut

STEP 8 - Select a miscellaneous option

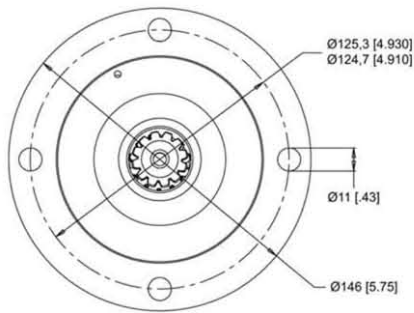
- AA None
- *MA Mounting Rotated 90°

WS

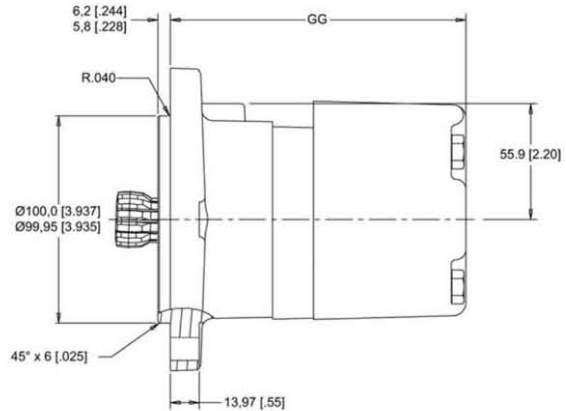
357 & 358 SERIES SHORT MOTOR

HOUSINGS

SG Short Motor with End Ports



SH Short Motor with Side Ports



SHAFT

The recommended shaft material is SAE 8620 or similar case hardening steel such as 20 MoCr4 (900 N/mm²) hardened to 59 - 62 HRC to a depth of 0,762 - 1,016 [.030 - .040]

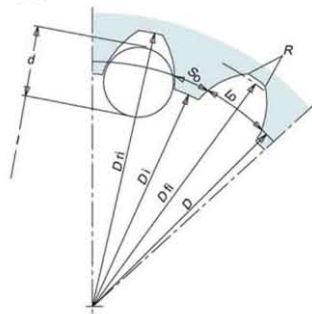
00 Cardan

Fillet Root Side Fit

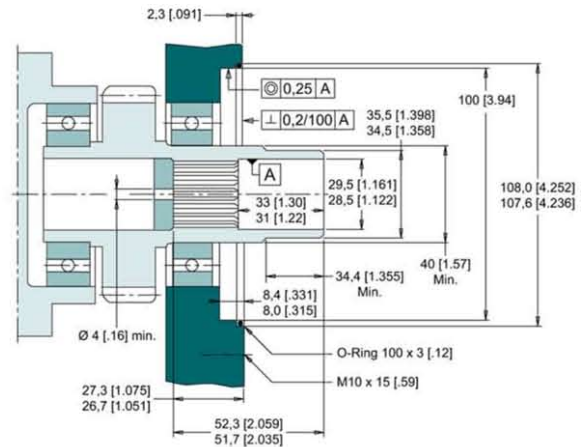
Number of Teeth.....	12
Pitch.....	12/24
Pressure Angle.....	30°
Pitch Diameter <i>D</i>	25,4 [1.000]
Major Diameter <i>D_{ri}</i>	28,0 [1.10] - 27,9 [1.096]
Form Diameter (Min.) <i>D_f</i>	27,6 [1.09]
Minor Diameter <i>D_i</i>	23,033 [.9068] - 23,0 [.9055]
Space Width (Circular) <i>L_o</i>	4,328 [.1704] - 4,288 [.1688]
Tooth Thickness (Circular) <i>S_o</i>	2,341 [.09217]
Fillet Radius <i>R_{min}</i>	0,2 [.008]
Max. Distance Between Pins <i>l</i>	17,77 [.700] - 17,62 [.694]
Pin Diameter <i>d</i>	4,836 [.19034] - 4,834 [.19026]

Internal involute spline data per ANSI B92.1-1970, class 5 (corrected $m \cdot X = 0.8$; $m = 2.1166$)

* Dimensions apply after heat treatment.



INPUT DIMENSIONS



LENGTH / WEIGHT CHART

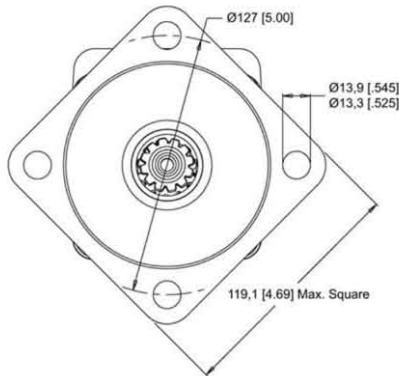
Short Motor - Dimension GG

Code	mm [in]	kg [lb]
080	142 [5.60]	9,6 [21.2]
100	142 [5.60]	9,6 [21.2]
110	145 [5.70]	9,8 [21.5]
130	148 [5.83]	9,9 [21.8]
160	154 [6.08]	10,4 [22.8]
200	162 [6.38]	10,7 [23.6]
230	168 [6.62]	11,1 [24.5]
320	186 [7.33]	12,0 [26.5]
400	186 [7.33]	12,0 [26.5]
500	201 [7.93]	12,9 [28.3]

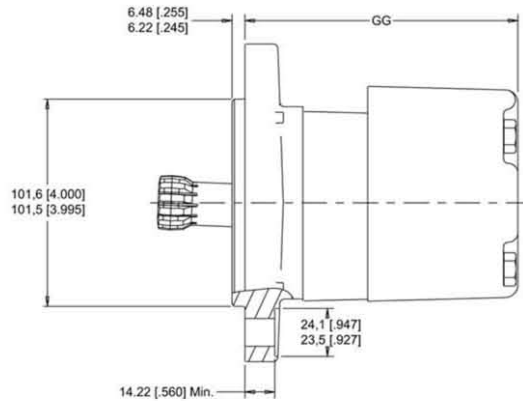
NOTE:
WS motor weights vary ± 0.5 kg [1 lbs] depending upon motor configuration.

HOUSINGS

S2 Short Motor with End Ports



S8 Short Motor with Side Ports



SHAFT

The recommended shaft material is SAE 8620 or similar case hardening steel such as 20 MoCr4 (900 N/mm²) hardened to 59 - 62 HRc to a depth of 0,762 - 1,016 [0.030 - .040]

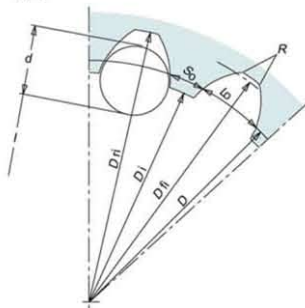
OB Cardan

Fillet Root Side Fit

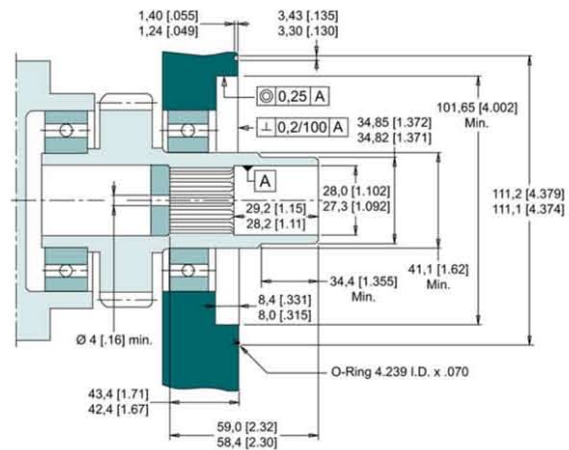
Number of Teeth	12
Pitch	12/24
Pressure Angle	30°
Pitch Diameter <i>D</i>	25,4 [1.000]
Base Diameter	21,997 [0.8660]
Major Diameter <i>D_{fl}</i>	27,74 [1.092] - 27,59 [1.086]
Form Diameter (Min.) <i>D_{fl}</i>	26,93 [1.060]
Minor Diameter <i>D_{fl}</i>	23,224 [0.9143] - 23,097 [0.9093]
* Space Width (Circular) <i>L_o</i>	
Max. Actual	4,318 [0.1700]
Min. Effective	4,216 [0.1660]
Fillet Radius <i>R</i>	0,76 [0.030] - 0,64 [0.025]
Max. Distance Between Pins <i>l</i>	19,190 [0.7555] - 19,020 [0.7488]
Pin Diameter <i>d</i>	4,496 [0.1770]

with 3,38 [0.133] Flat for Root Clearance

* Dimensions apply after heat treatment.



INPUT DIMENSIONS



LENGTH / WEIGHT CHART

Short Motor w / OB - Dimension GG

Code	mm [in]	kg [lb]
080	122 [4.80]	12,5 [27.5]
100	122 [4.80]	12,5 [27.5]
110	124 [4.89]	12,6 [27.8]
130	128 [5.02]	12,8 [28.2]
160	134 [5.27]	13,3 [29.2]
200	142 [5.57]	13,6 [29.9]
230	148 [5.81]	14,0 [30.8]
320	166 [6.52]	15,0 [32.9]
400	166 [6.52]	15,0 [32.9]
500	181 [7.12]	15,8 [34.7]

NOTE:
WS motor weights vary ± 0.5 kg [1 lbs]
depending upon motor configuration.

WS

357 & 358 SERIES MODEL CODE BUILDER

CODE	Displacement cc [in ³ /rev]	Max. Torque Nm [lb-in]	Max. Pressure bar [psi]			
			Inter.	Cont.	Inter.	Peak
080	78 [4.78]	342 [3030]	207 [3000]	275 [3990]	276 [4000]	
100	100 [6.10]	390 [3450]	207 [3000]	275 [3990]	295 [4280]	
110	112 [6.85]	418 [3700]	207 [3000]	275 [3990]	295 [4280]	
130	129 [7.86]	490 [4340]	207 [3000]	275 [3990]	295 [4280]	
160	162 [9.90]	600 [5310]	207 [3000]	260 [3770]	280 [4060]	
200	202 [12.31]	720 [6370]	207 [3000]	250 [3630]	270 [3920]	
230	228 [13.92]	806 [7135]	207 [3000]	250 [3630]	270 [3920]	
320	325 [19.81]	990 [8760]	190 [2750]	224 [3250]	259 [3750]	
400	399 [24.36]	990 [8760]	155 [2250]	190 [2750]	210 [3050]	
500	496 [30.29]	990 [8760]	121 [1750]	140 [2030]	160 [2320]	

SHORT MOTOR SPECIFICATIONS



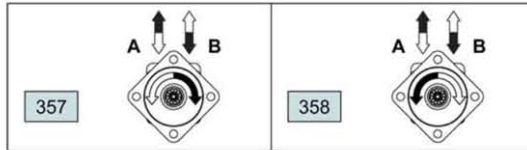
NOTE: The specifications chart to the left references a torque reduction in Short Motor operation when the WS 00 and WS 0B Cardan Shaft is used.

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

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

- 357 Clockwise Rotation
 358 Counterclockwise Rotation



STEP 2 - Select a displacement option

<input type="checkbox"/> 080	78 cc [4.8 in ³ /rev]	<input type="checkbox"/> 200	202 cc [12.3 in ³ /rev]
<input type="checkbox"/> 100	100 cc [6.1 in ³ /rev]	<input type="checkbox"/> 230	228 cc [13.9 in ³ /rev]
<input type="checkbox"/> 110	112 cc [6.9 in ³ /rev]	<input type="checkbox"/> 320	325 cc [19.8 in ³ /rev]
<input type="checkbox"/> 130	129 cc [7.9 in ³ /rev]	<input type="checkbox"/> 400	399 cc [24.4 in ³ /rev]
<input type="checkbox"/> 160	162 cc [9.9 in ³ /rev]	<input type="checkbox"/> 500	496 cc [30.3 in ³ /rev]

STEP 3 - Select a mounting option

NOTE: To complete the three (3) digit WS 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.

- SG Short Motor End Ports S2 Short Motor End Ports
 SH Short Motor Side Port S8 Short Motor Side Ports

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

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

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
 9 3/8" BSP.F With 1/4" Drain

STEP 4 - Select a shaft option

- 00 Cardan Shaft 0B Cardan Shaft

NOTE: The 00 cardan shaft must be used with the SG or SH mounting option. The 0B cardan shaft must be used with the S2 or S8 mounting option.

STEP 5 - Select a paint option

- Z No Paint

STEP 6 - Select a valve cavity option and installed valve

- | | |
|------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> A None | <input type="checkbox"/> F 121 bar [1750 psi] |
| <input type="checkbox"/> B Relief Valve Cavity | <input type="checkbox"/> G 138 bar [2000 psi] |
| <input type="checkbox"/> C 69 bar [1000 psi] | <input type="checkbox"/> J 173 bar [2500 psi] |
| <input type="checkbox"/> D 86 bar [1250 psi] | <input type="checkbox"/> L 207 bar [3000 psi] |
| <input type="checkbox"/> E 104 bar [1500 psi] | |

NOTE: Valve cavity is only available on Side Ports 1, 2, and 3. The B option will not have a valve cartridge listed above installed.

STEP 7 - Select an add on option

- A Standard

STEP 8 - Select a miscellaneous option

- AA None