Hydraulics Industry

Char-Lynn®

Spool Valve Hydraulic Motors

No. 11-111
February, 1999

EATON

W Series Geroler® Motors

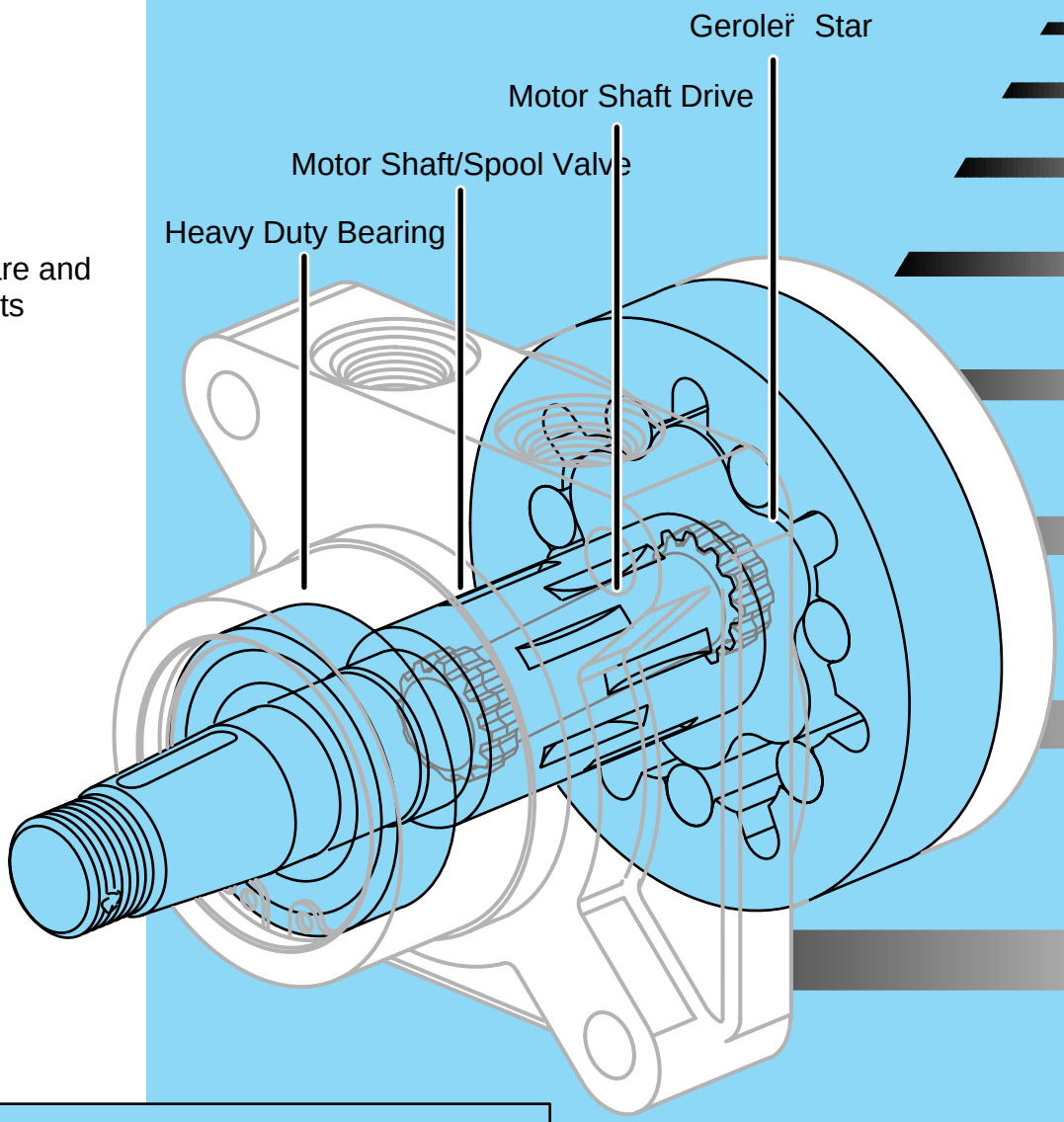
We Manufacture

Solutions

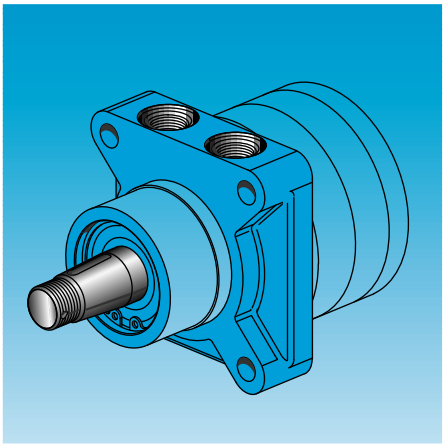
ÒWÓ Series Motors

Features

- ¥ Compact Size
- ¥ High Efficiency
- ¥ Tailored to Turf Care and Scissors Lift Markets
- ¥ Great Value



W Series



W

W Series

Geroler Element	7 Displacements
Flow l/min [GPM]	68 [18] Continuous**
	76 [20] Intermittent*
Speed	200 RPM
Pressure bar [PSI]	165 [2400] Cont.
	179 [2600] Inter.
Torque Nm [lb-in]	410 [3624] Cont.
	562 [4970] Inter.

Char-Lynn W Series motors with the Geroler displacement element offer the same low-friction and long-life advantages as the S and T Series. The W Series features the simplicity of EatonÕs proven spool valve and a Geroler element that provides superior drive life and smooth performance. In addition, this motor has a rugged housing with an extra large capacity side load bearing.

W Series Displacement Size = cubic centimeter per shaft revolution (cm^3/r)
¥ 80 [4.9] = cubic inch per shaft revolution ([in^3/r])
¥ 126 [7.7]
¥ 154 [9.4]
¥ 195 [11.9]
¥ 251 [15.3]
¥ 303 [18.5]
¥ 374 [22.8]

Mounting Flange
¥ 4 Bolt (Wheel) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes 147,6 [5.81] Dia. B.C., 27,0 [5.00] Dia. Rear Mount Pilot

Output Shaft
¥ 1-1/4 inch Dia. 14 Tooth Involute Spline 3/8-16 Threaded End
¥ 1-1/4 inch Dia. Tapered with Woodruff Key and Nut
¥ 32mm Dia. Straight withf Key
¥ 1-1/4 inch Dia. Straight with Key

Port Type
¥ 7/8-14 O-ring
¥ G1/2 (BSP)

Case Flow Options
¥ 7/16-20 O-ring Port
¥ G1/4 (BSP) Port
¥ Internal Check Valves

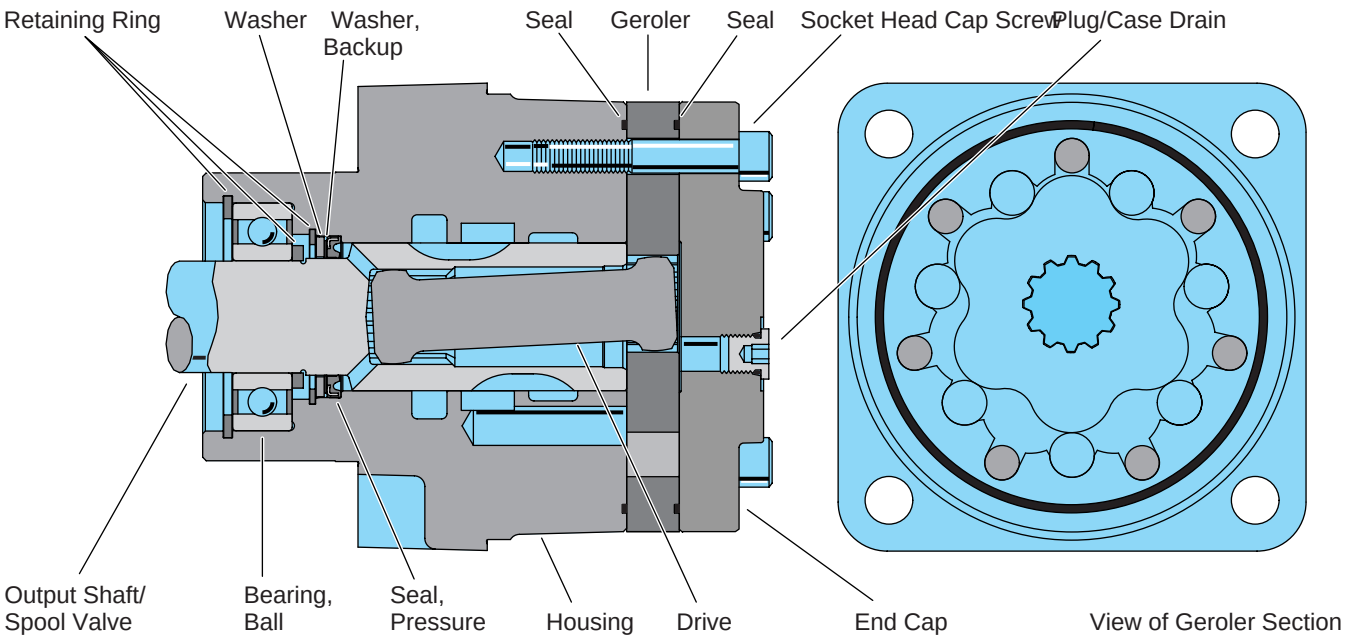
Special Features Available
¥ Viton Seals
¥ Reverse Rotation

Paint
¥ No Paint (Standard)
¥ Painted Low Gloss Black

** ContinuousÑ (Cont.) Continuous rating, motor may be run continuously at these ratings.

* IntermittentÑ (Inter.) Intermittent operation, 10% of every minute.

Specifications W Series



Specification DataÑW Series

Displ. cm³/r [in³/r]		80 [4.9]	126 [7.7]	154 [9.4]	195 [11.9]	251 [15.3]	303 [18.5]	374 [22.8]
Max. Speed (RPM*)		267	288	214	200	200	200	200
Flow l/min [GPM]	Continuous	23 [6]	30 [8]	34 [9]	38 [10]	53 [14]	62 [16.5]	68 [18]
	Intermittent	23 [6]	30 [8]	34 [9]	38 [10]	53 [14]	62 [16.5]	76 [20]
Torque Nm [lb-in]	Continuous	176 [1555]	279 [2470]	318 [2813]	318 [2816]	375 [3319]	387 [3429]	410 [3624]
	Intermittent**	189 [1676]	298 [2640]	373 [3301]	439 [3882]	548 [4849]	539 [4769]	562 [4970]
Pressure D bar [D PSI]	Continuous*	165 [2400]	165 [2400]	152 [2200]	124 [1800]	110 [1600]	97 [1400]	83 [1200]
	Intermittent**	179 [2600]	179 [2600]	179 [2600]	179 [2600]	165 [2400]	138 [2000]	124 [1800]

Maximum Allowable Case Pressure Ñ 103 bar [1500 PSI] without case drain.

* A simultaneous maximum torque and maximum speed NOT recommended. For permissible continuous and intermittent operating combinations of pressure and flow refer to performance data on pages 6 and 7.

** Maximum Inlet Pressure Ñ 179 bar [2600 PSI]. Do not exceed D pressure rating (see chart above)

Return Pressure Ñ Do not exceed D pressure rating (see chart above). Case drain required.

Note: Optional version can be used without case drain.

D bar [D PSI] Ñ True pressure difference between inlet port and outlet port.

Continuous Rating Ñ Motor may be run continuously at these ratings.

Intermittent Operation Ñ 10% of every minute.

Peak Operation Ñ 1% of every minute.

Recommended Fluids Ñ Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature (see page 13).

Recommended Maximum System Operating Temps Ñ 82¡ C [180¡ F]

Recommended Filtration Ñ per ISO Cleanliness Code, level 18/13

Low Speed Spool Ñ Standard

Higher Speeds with Reduced Low Speed Performance Ñ Available upon request.

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

Performance Data W Series

80 cm³/r [4.9 in³/r]

D Pressure bar [PSI]
Continuous

Flow l/min [GPM]	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2200] 152	[2400] 165	[2600] 179
[2] 7,6	[204] 23 93	[337] 38 89	[474] 54 88	[612] 69 84	[748] 85 83	[883] 100 79	[1019] 115 73	[1149] 130 69	[1281] 145 69	[1412] 160 61	[1540] 174 56	[1610] 182 39
[4] 15,1	[223] 25 178	[357] 40 172	[489] 55 170	[627] 71 168	[769] 87 165	[902] 102 159	[1035] 117 157	[1169] 132 154	[1295] 146 146	[1424] 161 142	[1555] 176 131	[1676] 189 117
[6] 22,7	[255] 29 267	[342] 39 265	[477] 54 262	[612] 69 258	[749] 85 257	[879] 99 252	[1014] 115 248	[1154] 130 241	[1286] 145 235	[1408] 159 229	[1533] 173 219	[1648] 186 206

126 cm³/r [7.7 in³/r]

D Pressure bar [PSI]
Continuous

Flow l/min [GPM]	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2200] 152	[2400] 165	[2600] 179
[2] 7,6	[390] 44 58	[605] 68 56	[817] 92 55	[1032] 117 51	[1248] 141 49	[1448] 164 45	[1656] 187 43	[1871] 211 41	[2069] 234 33	[2243] 253 32	[2414] 273 26	[2513] 284 17
[4] 15,1	[382] 43 113	[605] 68 106	[817] 92 106	[1036] 117 104	[1252] 141 93	[1463] 165 97	[1694] 191 94	[1908] 216 88	[2113] 239 82	[2306] 261 79	[2470] 279 74	[2640] 298 60
[6] 22,7	[367] 41 172	[587] 66 167	[802] 91 164	[1017] 115 161	[1236] 140 156	[1444] 163 152	[1668] 188 147	[1882] 213 141	[2091] 236 134	[2284] 258 130	[2459] 278 120	[2637] 298 103
[8] 30,3	[346] 39 228	[561] 63 225	[769] 87 220	[981] 111 216	[1203] 136 213	[1419] 160 208	[1634] 185 201	[1849] 209 195	[2039] 230 188	[2217] 250 174	[2432] 275 163	[2633] 297 149

154 cm³/r [9.4 in³/r]

D Pressure bar [PSI]
Continuous

Flow l/min [GPM]	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2200] 152	[2400] 165	[2600] 179
[2] 7,6	[450] 51 47	[723] 82 47	[989] 112 46	[1249] 141 44	[1512] 171 40	[1769] 200 39	[2021] 228 36	[2269] 256 33	[2502] 283 30	[2714] 307 26	[2904] 328 19	[3019] 341 10
[4] 15,1	[470] 53 94	[737] 83 93	[1009] 114 90	[1276] 144 89	[1540] 174 87	[1802] 204 84	[2064] 233 81	[2323] 262 78	[2570] 290 73	[2813] 318 67	[3019] 341 65	[3242] 366 52
[6] 22,7	[435] 49 143	[715] 81 140	[984] 111 138	[1252] 141 137	[1513] 171 134	[1787] 202 131	[2020] 228 128	[2274] 257 124	[2521] 285 117	[2812] 318 112	[3042] 344 103	[3301] 373 91
[8] 30,3	[407] 46 190	[677] 76 188	[945] 107 186	[1214] 137 184	[1477] 167 182	[1740] 197 179	[2005] 227 176	[2260] 255 171	[2503] 283 166	[2735] 309 158	[2964] 335 148	[3206] 362 137
[9] 34	[380] 43 214	[648] 73 212	[914] 103 210	[1183] 134 207	[1452] 164 206	[1714] 194 202	[1981] 224 200	[2243] 253 196	[2499] 282 191	[2733] 309 182	[2964] 335 173	[3195] 361 162

195 cm³/r [11.9 in³/r]

D Pressure bar [PSI]
Continuous

Flow l/min [GPM]	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2200] 152	[2400] 165	[2600] 179
[2] 7,6	[478] 54 38	[827] 93 38	[1171] 132 37	[1511] 171 36	[1839] 208 35	[2153] 243 34	[2452] 277 34	[2756] 311 30	[3027] 342 29	[3275] 370 26	[3513] 397 22	[3673] 415 16
[4] 15,1	[515] 58 75	[872] 99 73	[1220] 138 73	[1558] 176 71	[1886] 213 70	[2206] 249 69	[2518] 284 66	[2816] 318 64	[3107] 351 62	[3382] 382 56	[3647] 412 52	[3882] 439 44
[6] 22,7	[524] 59 114	[878] 99 111	[1214] 137 111	[1551] 175 110	[1875] 212 108	[2199] 248 106	[2518] 284 105	[2824] 319 103	[3113] 352 99	[3389] 383 95	[3666] 414 91	
[8] 30,3	[518] 59 151	[856] 97 150	[1187] 134 150	[1524] 172 149	[1861] 210 147	[2187] 247 145	[2499] 282 144	[2782] 314 143	[3064] 346 141	[3334] 377 136		
[10] 38	[462] 52 190	[797] 90 188	[1133] 128 187	[1468] 166 186	[1799] 203 184	[2118] 239 184	[2442] 276 182	[2739] 309 179	[3023] 342 176	[3281] 371 160		

[3673] 415 16 } Torque [lb-in] Nm Speed RPM

Motors run with high efficiency in all areas designated with a number for torque and speed. However, for best motor life, select a motor to run with a torque and speed range shown in the light blue area.

Continuous
Intermittent

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

Performance Data W Series

251 cm³/r [15.3 in³/r]
D Pressure bar [PSI]
Continuous

Flow l/min[GPM]	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 140	[2200] 152	[2400] 165
[2] 7,6	[759] 86 30	[1194] 135 29	[1683] 190 29	[2122] 240 28	[2535] 286 27	[2928] 331 27	[3319] 375 25	[3634] 411 22	[3946] 446 17	[4242] 479 15	[4553] 514 14
[4] 15,1	[806] 91 59	[1257] 142 58	[1691] 191 58	[2130] 241 56	[2563] 290 55	[2988] 338 55	[3381] 382 52	[3799] 429 48	[4147] 469 47	[4515] 510 41	[4849] 548 40
[6] 22,7	[780] 88 90	[1219] 138 88	[1646] 186 87	[2084] 235 86	[2515] 284 85	[2933] 331 83	[3336] 377 83	[3716] 420 79			
[8] 30,3	[720] 81 120	[1148] 130 118	[1590] 180 117	[2029] 229 117	[2449] 277 114	[2861] 323 112	[3236] 366 111	[3627] 410 108			
[10] 37,9	[645] 73 148	[1080] 122 147	[1513] 171 147	[1947] 220 145	[2371] 268 145	[2779] 314 143	[3151] 356 141	[3515] 397 137			
[12] 45,4	[557] 63 178	[992] 112 177	[1428] 161 176	[1864] 211 174	[2292] 259 174	[2697] 305 172	[3087] 349 169				
[14] 53,0	[460] 52 208	[888] 100 206	[1330] 150 206	[1761] 199 203	[2191] 248 202	[2615] 295 200	[3035] 343 197				

303 cm³/r [18.5 in³/r]
D Pressure bar [PSI]
Continuous

Flow l/min[GPM]	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 140
[2] 7,6	[920] 104 24	[1454] 164 24	[1974] 223 24	[2480] 280 23	[2969] 335 22	[3429] 387 22	[3859] 436 20	[4230] 478 18	[4583] 518 16
[4] 15,1	[960] 108 49	[1487] 168 49	[2007] 227 47	[2513] 284 47	[3006] 340 46	[3457] 391 45	[3905] 441 44	[4338] 490 41	[4769] 539 39
[6] 22,7	[911] 103 73	[1445] 163 73	[1961] 222 72	[2473] 279 72	[2952] 334 71	[3411] 385 69	[3842] 434 68	[4276] 483 66	
[8] 30,3	[843] 95 99	[1375] 155 98	[1888] 213 97	[2393] 270 96	[2886] 326 95	[3350] 379 94	[3763] 425 93		
[10] 37,9	[752] 85 123	[1274] 144 122	[1789] 202 122	[2303] 260 120	[2792] 316 119	[3274] 370 119	[3650] 412 118		
[12] 45	[652] 74 148	[1170] 132 147	[1691] 191 146	[2199] 248 145	[2691] 304 145	[3123] 353 144			
[14] 53	[526] 59 172	[1039] 117 172	[1560] 176 171	[2064] 233 170	[2548] 288 169	[2999] 339 168			
[16.5] 62	[353] 40 203	[864] 98 203	[1367] 154 201	[1876] 212 200	[2369] 268 200				

[4583] 518 16 } Torque [lb-in] Nm
Speed RPM

Continuous
Intermittent

374 cm³/r [22.8 in³/r]
D Pressure bar [PSI]
Continuous

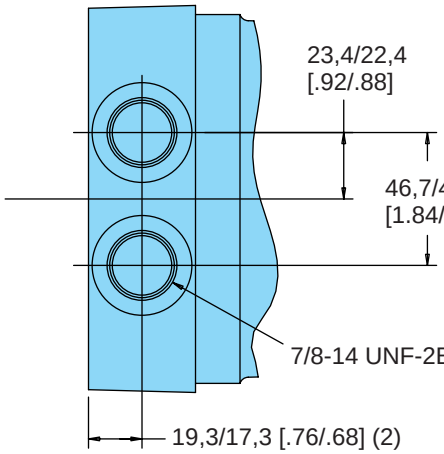
Flow l/min[GPM]	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124
[2] 7,6	[1086] 123 20	[1753] 198 19	[2365] 267 17	[2960] 334 16	[3533] 399 14	[4025] 455 12	[4484] 507 12	[4970] 562 11
[4] 15,1	[1152] 130 39	[1797] 203 39	[2431] 275 38	[3048] 344 36	[3624] 409 34	[4129] 467 33	[4599] 520 31	
[6] 22,7	[1099] 124 60	[1749] 198 58	[2377] 269 57	[2996] 339 56	[3557] 402 54	[4077] 461 53		
[8] 30,3	[1018] 115 80	[1662] 188 79	[2290] 259 78	[2894] 327 76	[3440] 389 75	[3952] 447 74		
[10] 37,9	[940] 106 100	[1582] 179 99	[2210] 250 97	[2812] 318 96	[3346] 378 95	[3816] 431 95		
[12] 45,4	[809] 91 120	[1454] 164 119	[2077] 235 117	[2677] 302 116	[3216] 363 115			
[14] 53,0	[648] 73 141	[1284] 145 139	[1907] 215 138	[2506] 283 137	[3033] 343 137			
[16] 60,6	[485] 55 160	[1107] 125 159	[1722] 195 157	[2315] 262 157	[2838] 321 157			
[18] 68,1	[307] 35 180	[930] 105 179	[1543] 174 178	[2133] 241 178				
[20] 75,7	[111] 13 201	[730] 82 199	[1342] 152 198	[1939] 219 197				

Motors run with high efficiency in all areas designated with a number for torque and speed. However, for best motor life, select a motor to run with a torque and speed range shown in the light blue area.

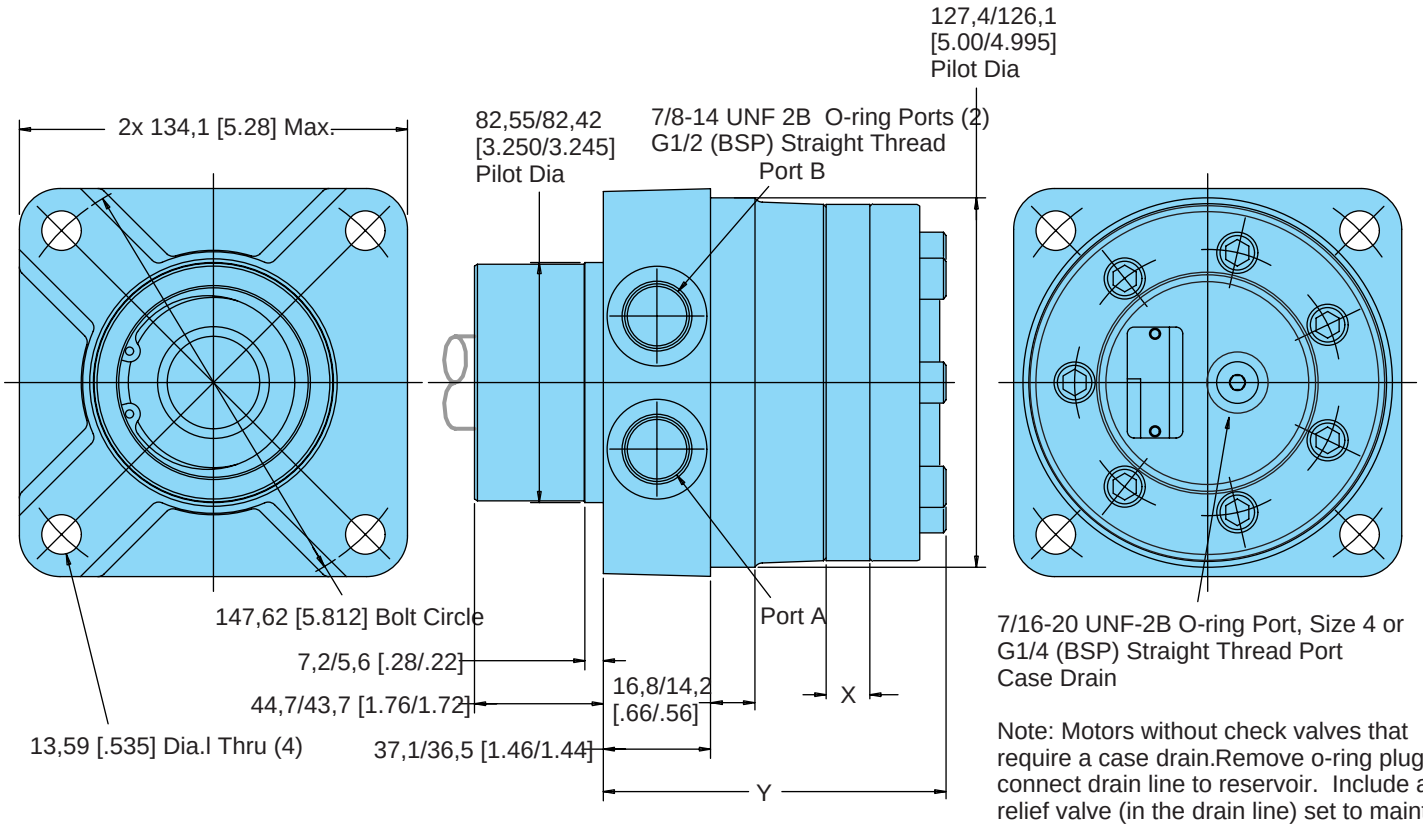
Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

Dimensions W Series

Displ. cm³/r [in³/r]	X Dim. Max.	Y Dim. Max.
80 [4.9]	9,1 [.36]	116,6 [4.59]
126 [7.7]	11,9 [.47]	119,6 [4.71]
154 [9.4]	14,7 [.58]	122,2 [4.81]
195 [11.9]	18,5 [.73]	126,2 [4.97]
251 [15.3]	23,9 [.94]	131,6 [5.18]
303 [18.5]	29,0 [1.14]	136,4 [5.37]
374 [22.8]	35,6 [1.40]	143,3 [5.64]



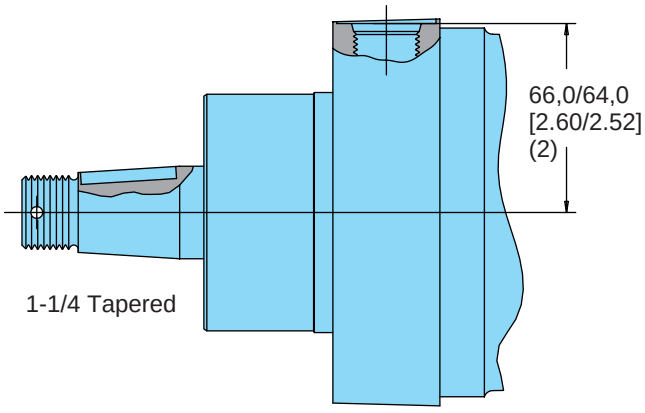
Standard Rotation
Viewed from Shaft End
Port A Pressurized Ñ CW
Port B Pressurized Ñ CCW



7/16-20 UNF-2B O-ring Port, Size 4 or G1/4 (BSP) Straight Thread Port Case Drain

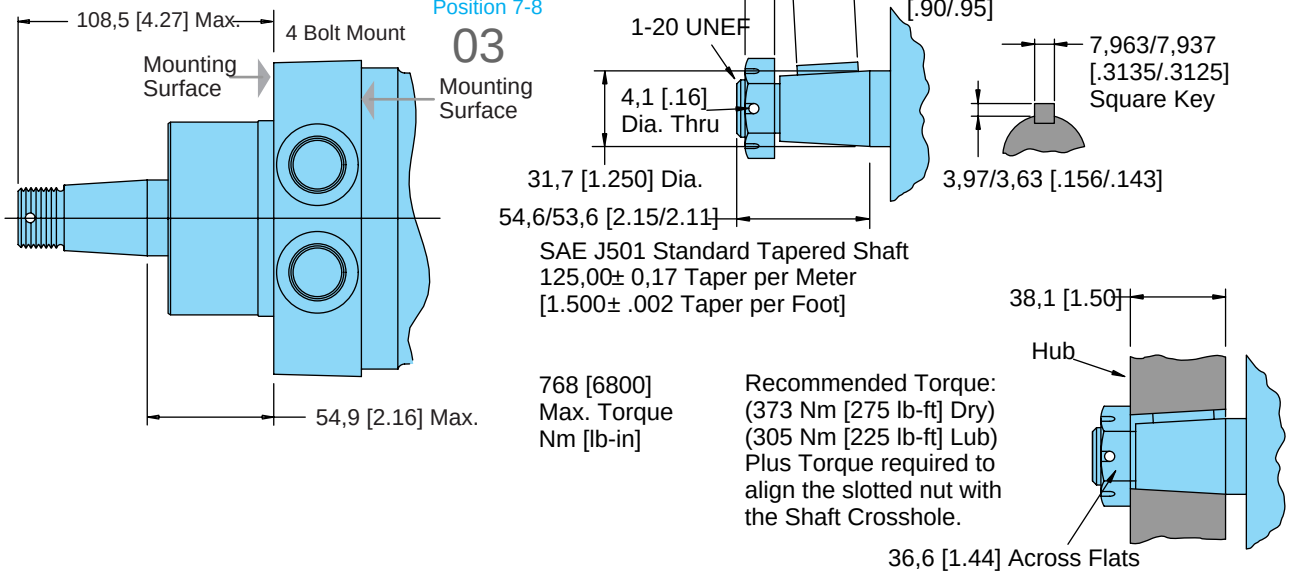
Note: Motors without check valves that require a case drain.Remove o-ring plug, connect drain line to reservoir. Include a relief valve (in the drain line) set to maintain 3,4 bar [50 PSI] motor case pressure.

Shaft Dimensions Ñ
see page 8 and 9
1-1/4 Inch Tapered
1-1/4 Inch Straight
32 mm Straight
1-1/4 Inch 14 Tooth Splined

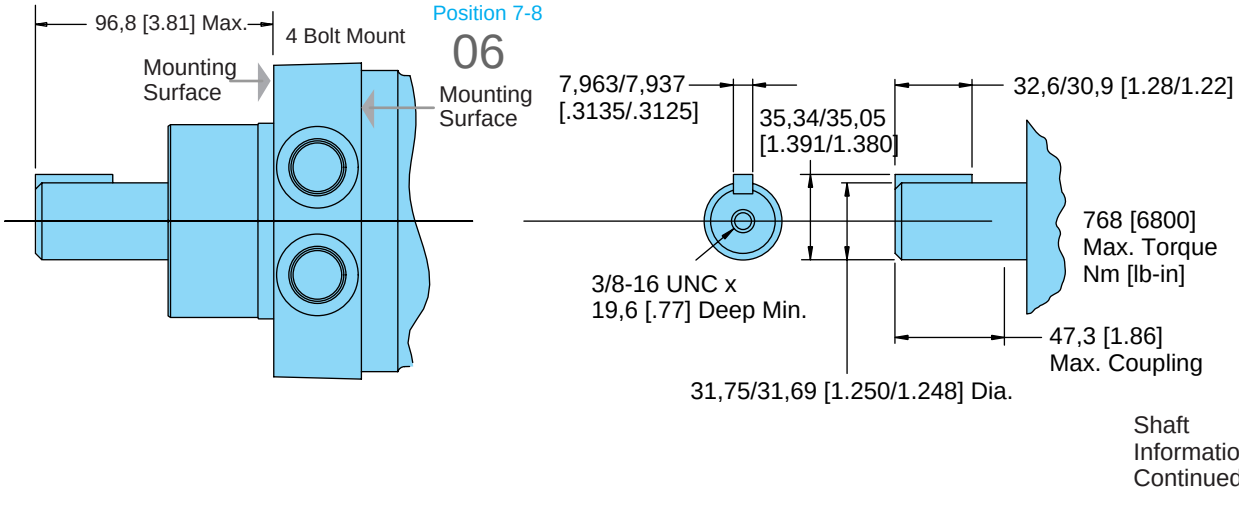


Shaft Dimensions W Series

1-1/4 Tapered



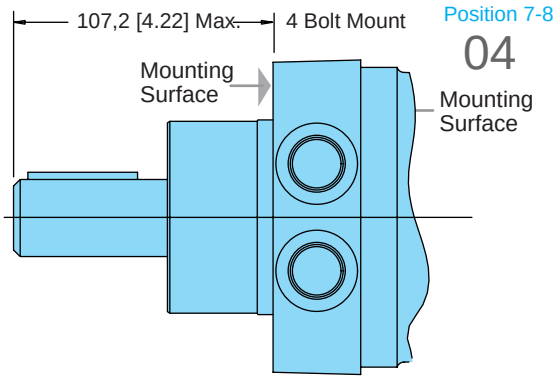
1-1/4 Inch Straight

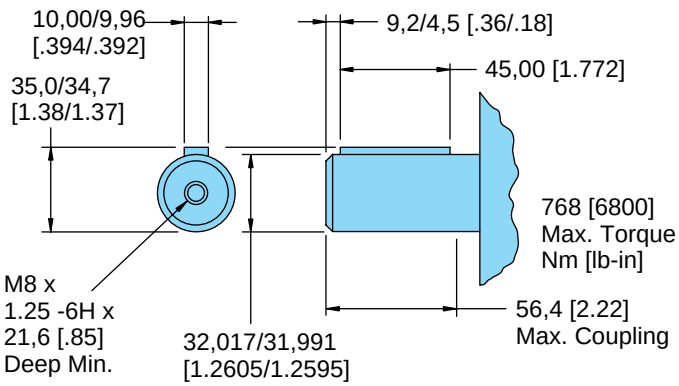


Shaft Information Continued

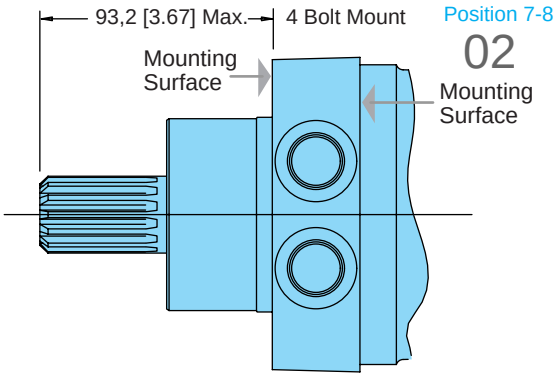
Shaft Dimensions W Series

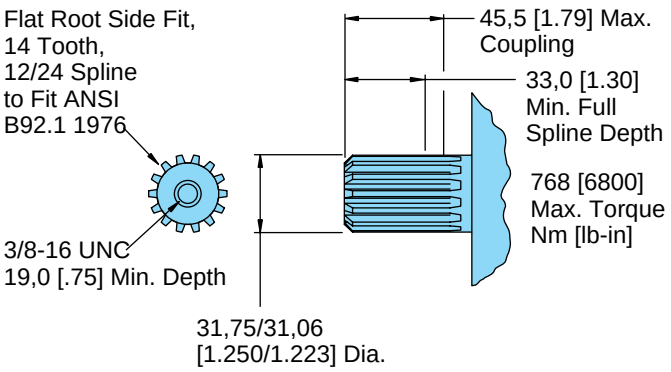
32 mm Straight





1-1/4 14 Tooth Splined





Shaft Side Load Capacity W Series

Chart A Ñ Expected B10 Life (hrs) of Bearing Under Various Loads

Axial Thrust N [lbf]	Radial Load at Centerline of keyway at 100 RPM 1110 [250]	2225 [500]	3335 [750]	4450 [1000]	4560 [1250]	6670 [1500]	7785 [1750]	8895 [2000]	11120 N [2500 lbf]	13345 N [3000 lbf]
445 [100]	410 600	66 000	19 600	8 300	4 200	2 400	1 500	1 000	530	310
1335 [300]	92 700	40 900	19 600	8 300	4 200	2 400	1 500	1 000	530	310
2225 [500]	39 400	20 900	12 400	7 900	4 200	2 400	1 500	1 000	530	310
3115 [700]	21 400	12 600	8 100	5 500	3 900	2 400	1 500	1 000	530	310
4005 [900]	13 300	8 400	5 700	4 000	2 900	2 200	1 500	1 000	530	310
4895 [1100]	9 000	6 000	4 200	3 100	2 300	1 800	1 400	1 000	530	310
5785 [1300]	6 500	4 500	3 200	2 400	1 900	1 500	1 200	900	530	310
6670 [1500]	4 800	3 500	2 600	2 000	1 500	1 200	1 000	800	530	310
7560 [1700]	3 700	2 800	2 100	1 600	1 300	1 000	840	700	490	310
8450 [1900]	3 000	2 200	1 700	1 400	1 100	900	730	610	440	310
9340 [2100]	2 400	1 900	1 500	1 200	900	770	640	540	390	290
10230 [2300]	2 000	1 600	1 200	1 000	810	670	570	480	350	270
11120 [2500]	1 700	1 300	1 100	870	710	600	500	430	320	240

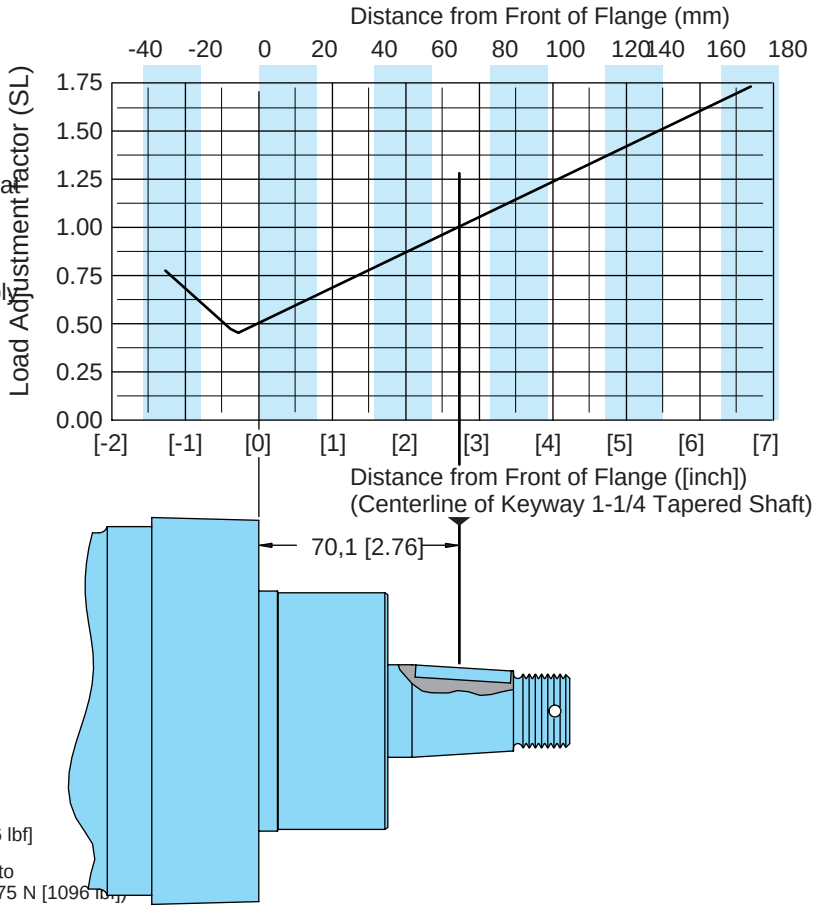
Note: 1) Case pressure needs to be added to the outward axial thrust load and subtracted from inward axial thrust load Ñ Case Pressure bar x 87,1 [PSI x 1.35]

2) Life values in Chart A can be adjusted for speeds up to 200 rpm. $\frac{\text{Life value x 100 rpm}}{\text{application rpm}}$

3) Shaded area are intermittent loading at speeds greater than 100 rpm.

4) To convert application radial load at any load location to sideload at the center of keyway multiply load by the application factor from Chart B

Chart B Ñ Load Adjustment factor



Example:

Side Load: 4849 N @ 120 mm [1090 lbf @ 4.75 inch] from flange.

Average Thrust Load: 890 N [200 lbf] inward (toward motor).

Case Pressure: 66 bar [960 PSI].

Average Speed: 150 rpm.

Expected Life Caculation:
Adjust side load value (due to load variation): from Chart B look at 120mm [4.75 inch] read at angled curve for load adjustment factor of 1.38. Adjusted load is:

(4849 N [1090 lbf]) x (1.38) = 6690 N [1504 lbf]

Thrust Load Value (due to case pressure):

(960 PSI) x (1.35) = [1296 lbf]

(66 bar) x (87,1) = 5750 N

Average thrust load found to be 890 N [200 lbf] inwards so subtract from thrust load due from case pressure.

5750 N - 890 N = 4860 N or [1296 lbf] - 200 lbf = [1096 lbf]

Read Life Expectancy from Chart A Value from chart reading across top to 6672 [1500] (6090 N [1504 lbf]) and down left side to 4895 [1100] (4875 N [1096 lbf])

Life = 1800 Hours

Speed Adjustment for over 100 rpm:

$\frac{\text{(1800 hrs) x (100 rpm)}}{\text{150 rpm}}$ = 1200 Hours

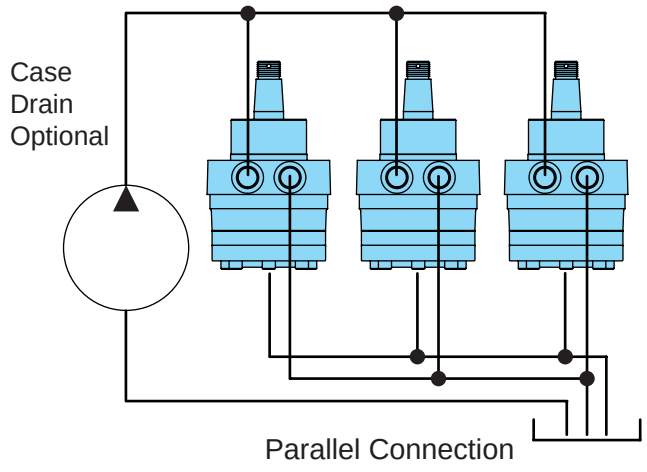
Case Drain W Series

Parallel or Series Connection

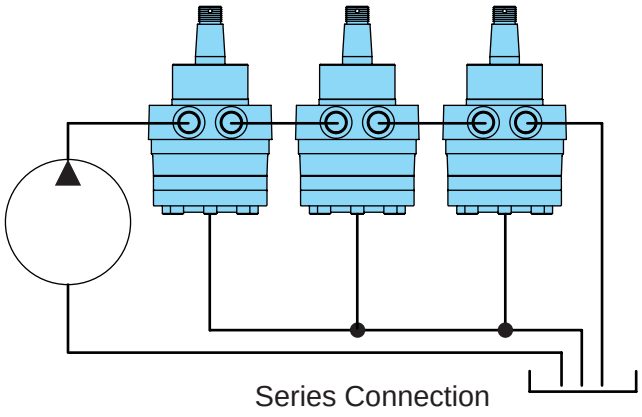
Hydraulic lines bringing pressurized fluid from the pump to the motor and return flow from the motor back to tank can be flexible or rigid. One power source and one pump can be sized to supply one motor or many motors. Furthermore, one pump and multiple motors can be connected in series or in parallel (see illustration below). When connecting the pump to the motors in series, excess internal case pressure is created in the motor. This excess pressure in each motor must be ported back to tank. However, when making a parallel connection from the pump to the motors, no excess case pressure will be added. Hence, using the case drain ports are not necessary. Meanwhile, check the application to see if this optional case drain port can be connected to your advantage, whether it be a single motor to pump connection, multiple motors connected to pump in parallel, as well as multiple motors connected to pump in series...

...Case Drain Advantage Ñ In addition to providing lower case pressures for motors connected in series, there are advantages for adding an external case drain line to motors with normal case pressures as well. These advantages are: Contamination Control Ñ flushing the motor case. Cooler Systems Ñ exiting oil draws motor heat away. Extend Motor Seal Life Ñ maintain low case pressure with a preset restriction installed in the case drain line.

Motors ordered with case drain port will be shipped with steel hex socket plug installed in that end cap drain port.



Parallel Connection



Series Connection

Fluid Recommendations
W Series

Introduction

The ability of Eaton hydraulic components to provide the desired performance and life expectancy depends largely on the fluid used. The purpose of this section is to provide readers with the knowledge required to select the appropriate fluids for use in systems that employ Eaton hydraulic components.

One of the most important characteristics to consider when choosing a fluid to be used in a hydraulic system is viscosity. Viscosity choice is always a compromise; the fluid must be thin enough to flow easily, but thick enough to seal and maintain a lubricating film between bearing and sealing surfaces. Viscosity requirements, see chart below.

Viscosity and Temperature

Fluid temperature affects viscosity. In general, as the fluid warms it gets thinner and its viscosity decreases. The opposite is true when fluid cools. When choosing a fluid, it is important to consider the start-up and operating temperatures of the hydraulic system. Generally, the fluid is thick when the hydraulic system is started. With movement, the fluid warms to a point where a cooling system begins to operate.

From then on, the fluid is maintained at the temperature for which the hydraulic system was designed. In actual applications this sequence varies; hydraulic systems are used in many environments, from very cold to very hot. Cooling systems also vary from very elaborate to very simple, so ambient temperature may affect operating temperature. Equipment manufacturers who use Eaton hydraulic components in their products should anticipate temperature in their designs and make the appropriate fluid recommendations to their customers.

Cleanliness

Cleanliness of the fluid in a hydraulic system is extremely important. Eaton recommends that the fluid used in its hydraulic components be maintained at ISO Cleanliness Code 18/13 per SAE J1165. This code allows a maximum of 2500 particles per milliliter greater than 5 µm and a maximum of 80 particles per milliliter greater than 15 µm. Cleanliness requirements for specific products are given in the table below.

OEMÕs and distributors who use Eaton hydraulic components in their products should provide for these requirements in their designs. A reputable filter supplier can supply filter information.

Fluid Maintenance

Maintaining correct fluid viscosity and cleanliness level is essential for all hydraulic systems. Since Eaton hydraulic components are used in a wide variety of applications it is impossible for Eaton to publish a fluid maintenance schedule that would cover every situation. Field testing and monitoring are the only ways to get accurate measurements of system cleanliness. OEMÕs and distributors who use Eaton hydraulic components should test and establish fluid maintenance schedules for their products. These maintenance schedules should be designed to meet the viscosity and cleanliness requirements laid out in this document.

Fluid Selection

Premium grade petroleum based hydraulic fluids will provide the best performance in Eaton hydraulic components. These fluids typically contain additives that are beneficial to hydraulic systems. Eaton recommends fluids that contain anti-wear agents, rust inhibitors, anti-foaming agents, and oxidation inhibitors. Premium grade petroleum based hydraulic fluids carry an ISO VG rating.

SAE grade crankcase oils may be used in systems that employ Eaton hydraulic components, but it should be noted that these oils may not contain all of the recommended additives. This means using crankcase oils may increase fluid maintenance requirements.

Hydraulic fluids that contain V.I. (viscosity index) improvers, sometimes called multi-viscosity oils, may be used in systems that employ Eaton hydraulic components. These V.I. improved fluids are known to Òshear-downÓ with use. This means that their actual viscosity drops below the rated value. Fluid maintenance must be increased if V.I. improved fluids are used. Automotive automatic transmission fluids contain V.I. improvers.

Synthetic fluids may be used in Eaton hydraulic components. A reputable fluid supplier can provide information on synthetic fluids. Review applications that require the use of synthetic fluids with your Eaton representative.

Product Line	Viscosity		ISO Cleanliness Requirements
	Minimum	Best Range	
W Series	70 SUS 13 cSt	100-200 SUS 20-43 cSt	18/13

Additional Notes:

¥ Fluids too thick to flow in cold weather start-ups will cause pump cavitation and possible damage. Motor cavitation is not a problem during cold start-ups.

¥ When choosing a hydraulic fluid, all the components in the system must be considered and the best viscosity range adjusted accordingly. For example, when a medium duty piston pump is combined with a Geroler motor the best viscosity range becomes 100 - 150 SUS [20 - 32 cSt] and viscosity should never fall below 70 SUS [13 cSt].

¥ If the natural color of the fluid has become black it is possible that an overheating problem exists.

¥ If the fluid becomes milky a water contamination problem may exist.

¥ Take fluid level reading when the system is cold.

¥ Contact your Eaton representative if you have specific questions about the fluid requirements of Eaton hydraulic components.

Product Numbers and Model Code for W Series Motors

Product NumbersÑW Series

Add three digit prefix Ñ 162- to four digit number from chart for complete product number Ñ Example 162-1009.
Orders will not be accepted without three digit prefix.

Displ. cm^3/r [in^3/r]	80 [4.9]	126 [7.7]	154 [9.4]	195 [11.9]	251 [15.3]	303 [18.5]	374 [22.8]
Standard	162-1016	-1017	-1018	-1019	-1020	-1021	-1022
w/Case Drain	162-1023	-1024	-1025	-1009	-1008	-1026	-1027

Note: All above motors have 1-1/4 inch tapered output shaft, 7/8 inch o-ring ports.

162-1009

For W Series motors with a configuration not shown in the charts above: Use the model code number system to specify the product in detail.

Model Code for W Series

The following 16-digit coding system has been developed to identify all of the configuration options for the W Series motor. Use this model code to specify a motor with the desired features. All 16-digits of the code must be present when ordering. You may copy the matrix below to ensure that each number is entered in the correct box.

Model Code Ñ W Series Spool Valve Motors

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
M	0	W											3	0	0

Position 1 Product Series

M ..... Motor

Position 2, 3 W Series

OW ..... W Series

Position 4, 5 Displacement cm³/r [in³/r]

05 ..... 30 [4.9]

08 ..... 126 [7.7]

09 ..... 154 [9.4]

12 ..... 195 [11.9]

15 ..... 251 [15.3]

19 ..... 303 [18.5]

23 ..... 374 [22.8]

Position 6 Mounting Flange

B ..... 4 Bolt (Wheel) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes 147,6 [5.81] Dia., B.C., 127,0 [5.00] Dia. Rear Mount Pilot

Position 7, 8 Output Shaft

02 ..... 1-1/4 inch Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline with 3/8-16 UNC-2B Thread in End, 33,0 [1.30] Min. Full Spline

03 ..... 1-1/4 inch Dia. .125:1 Tapered Shaft Per SAE J501 with 1Ð 20 UNEF -2A Threaded Shaft End and Slotted Hex Nut, 7,938 [.3125] Square x 22,22 [.875] Straight Key

04 ..... 32mm Dia. Straight Shaft with M8 x 1, 25-6H Thread in End, 9,982 [.3930] Wide x 7,995 [.3132] High x 45,00 [1.772] Long Key

06 ..... 1-1/4 inch Dia. Straight Shaft with 3/8 Ð 16 UNC 2B Thread in End, 7.938 [.3125] Square x 34,92 [1.375] Straight Key

Position 9 Port Type

A ..... 7/8 Ð 14 UNF - 2B SAE O-ring Port

B ..... G 1/2 (BSP) Stright Thread Port

Position 10 Case Flow Options

A ..... 7/16 - 20 UNF - 2B SAE O-ring Port

B ..... G 1/4 (BSP) Straight Thread Port

C ..... Internal Check Valve

Position 11, 12 Special Features (Hardware)

00 ..... None

01 ..... Viton Seals

Position 13 Special Features (Assembly)

0 ..... None

1 ..... Reverse Rotation

Position 14 Paint/Special Packaging

0 ..... No Paint (Standard)

A ..... Painted Low Gloss Black

Position 15 Eaton Assigned Code when Applicable

0 ..... Assigned Code

Position 16 Eaton Assigned Design Code

0 ..... Assigned Design Code

W Series

Eaton Corporation is a global manufacturer of highly engineered products that serve industrial, vehicle, construction, commercial and semiconductor markets. Principal products include electrical power distribution and control equipment, truck drivetrain systems, engine components, hydraulic products, ion implanters and a wide variety of controls. Headquartered in Cleveland, the company has 49,000 employees and 143 manufacturing sites in 26 countries around the world. Sales for 1997 were $7.6 billion.

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