



# PATRIOT

## Low Speed High Torque Motors

### PHDM4E SERIES



Driven by Innovation  
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# PHDM4E SERIES

## PHDM4E MOTOR CROSS REFERENCE GUIDE

Brand	Series
Eaton Char-Lynn	4000
Danfoss	OMP
Parker	TE

PHDM4E





# DESCRIPTION

**PHDM5E**

The PHDM4 hydraulic orbital motor is a type of hydraulic motor commonly used in various industrial and mobile applications such as excavators, cranes, and other heavy machinery. It is designed to convert hydraulic energy into mechanical energy, which can be used to drive a load through a shaft.

The motor consists of a housing, an internal gear set, a rotor, and a set of vanes. The hydraulic fluid is fed into the inlet port, where it is then pressurized by the pump and directed into the vane chambers. The pressure of the fluid causes the vanes to extend and compress against the rotor, generating torque. The internal gear set converts the rotary motion of the vanes into orbital motion, which drives the shaft attached to the motor.

## Applications

The PHDM4 hydraulic orbital motor is also highly customizable, with a variety of options available for controlling its speed, direction, and torque. This allows it to be adapted to a wide range of applications, from simple machinery to complex industrial systems.

Overall, the PHDM4 hydraulic orbital motor is a versatile and reliable solution for converting hydraulic energy into mechanical energy in a range of applications. Its compact design, high power density, and efficiency make it an excellent choice for demanding industrial and mobile applications.







# PHDM4ES MOTOR ORDERING CODE

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1

**PHDM4ES**

2	6
Disp	Special
160 200 250 320 400 500	<b>OMIT</b> Standard

**PHDM4E**

6





## PHDM4E MOTOR ORDERING CODE

PHDM4E		160	200	250	320	400	500
<b>Displacement</b>	CC	158.8	200.8	252.2	317.5	401.6	535.3
	[in <sup>3</sup> /rev]	[9.69]	[12.25]	[15.39]	[19.37]	[24.51]	[32.67]
<b>Max Pressure Drop</b>	cont. bar	200	200	200	200	180	160
	[PSI]	[2900]	[2900]	[2900]	[2900]	[2610]	[2320]
	int. bar	240	240	240	240	210	180
	[PSI]	[3480]	[3480]	[3480]	[3480]	[2030]	[2030]
	peak. bar	290	290	290	290	240	210
	[PSI]	[4061]	[4061]	[4061]	[4061]	[3480]	[3045]
<b>Max Torque</b>	cont. bar	450	561	710	902	1008	1121
	[PSI]	[3982]	[4965]	[6284]	[7983]	[8921]	[9921]
	int. bar	559	714	883	1143	1255	1377
	[PSI]	[4947]	[6319]	[7815]	[10116]	[11107]	[12187]
	peak. bar	663	818	1021	1322	1431	1598
	[PSI]	[5868]	[7239]	[9036]	[11700]	[12665]	[14143]
<b>Max Speed</b>	cont. RPM	625	495	395	310	245	185
<b>Max Flow</b>	cont. LPM	100	100	100	100	100	100
	[GPM]	[26.4]	[26.4]	[26.4]	[26.4]	[26.4]	[26.4]
<b>Weight</b>	Kg	20.3	20.8	21.4	22.4	23	24
	[lbs]	[26.9]	[45.8]	[47.2]	[49.4]	[50.7]	[52.9]
<b>Max Output Power</b>	cont. KW	20.1	25.2	25.2	25.2	22	21
	HP	[26.9]	[33.8]	[33.8]	[33.8]	[29.5]	[28.2]

**PHDM4E**



# Performance Data

**PHDM4 160(158.8cc)**

		[580]	[1160]	[1450]	[1740]	[2320]	[2900]	[3480]	[PSI]
		40	80	100	120	160	200	240	BAR
[GPM]	[2.64]	[752]	[1495]	[1938]	[2336]	[3071]	[3796]	[4549]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	10	85 61	169 60	219 59	264 57	347 55	429 51	514 45	
L/min	[5.28]	[761]	[1540]	[1991]	[2354]	[3159]	[3903]	[4735]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	20	86 123	174 122	225 119	266 116	357 111	441 105	535 97	
Flow	[10.57]	[770]	[1531]	[2000]	[2354]	[3239]	[4000]	[4867]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	40	87 254	173 251	226 248	266 241	366 235	452 228	550 216	
Flow	[15.85]	[669]	[1513]	[2000]	[2354]	[3239]	[3982]	[4859]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	60	79 378	171 374	226 369	266 363	366 356	450 347	549 337	
Flow	[21.13]	[663]	[1469]	[1947]	[2345]	[3221]	[3956]	[4814]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	80	75 502	166 499	220 495	265 488	364 480	447 472	544 457	
Max cont.	[26.42]	[593]	[1363]	[1849]	[2283]	[3142]	[3867]	[4744]	Max cont.
Max int.	[33.02]	[495]	[1256]	[1867]	[2221]	[3053]	[3805]	[4690]	Max int.
	125	56 785	142 779	211 773	251 765	345 756	430 746	530 729	

**PHDM4 200(200.8cc)**

		[580]	[1160]	[1450]	[1740]	[2320]	[2900]	[3480]	[PSI]
		40	80	100	120	160	200	240	BAR
[GPM]	[2.64]	[1053]	[1956]	[2433]	[2858]	[3814]	[4708]	[5629]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	10	119 48	221 47	275 46	323 43	431 40	532 38	636 34	
L/min	[5.28]	[1062]	[2009]	[2504]	[2920]	[3938]	[4841]	[5850]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	20	120 97	227 96	283 94	330 92	445 89	547 86	661 77	
Flow	[10.57]	[1017]	[2026]	[2487]	[2956]	[3991]	[4956]	[6018]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	40	115 199	229 197	281 195	334 191	451 187	560 182	680 171	
Flow	[15.85]	[982]	[1991]	[2478]	[2956]	[4018]	[4956]	[6036]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	60	111 306	225 301	280 298	334 296	454 288	560 282	682 269	
Flow	[21.13]	[911]	[1947]	[2433]	[2947]	[3982]	[4929]	[6018]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	80	103 403	220 401	275 397	333 392	450 385	557 378	680 367	
Max cont.	[26.42]	[831]	[1911]	[2407]	[2894]	[3956]	[4876]	[5983]	Max cont.
Max int.	[33.02]	[708]	[1752]	[2318]	[2796]	[3858]	[4761]	[5859]	Max int.
	125	80 627	198 623	262 619	316 614	436 607	538 600	662 584	
Max int.	[39.62]	[593]	[1628]	[2186]	[2726]	[3761]	[4655]	[5735]	Max int.
	150	67 758	184 754	247 749	308 741	425 731	526 720	648 696	

**PHDM4 250(252.2cc)**

		[580]	[1160]	[1450]	[1740]	[2320]	[2900]	[3480]	[PSI]
		40	80	100	120	160	200	240	BAR
[GPM]	[2.64]	[1186]	[2451]	[3044]	[3593]	[4797]	[6098]	[7080]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	10	134 39	277 39	344 38	406 37	542 35	689 33	800 32	
L/min	[5.28]	[1230]	[2540]	[3124]	[3708]	[4982]	[6266]	[7328]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	20	139 78	287 77	353 76	419 74	563 72	708 69	828 64	
Flow	[10.57]	[1194]	[2584]	[3195]	[3779]	[5089]	[6399]	[7593]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	40	135 159	292 157	361 155	427 152	575 149	723 145	858 137	
Flow	[15.85]	[1132]	[2522]	[3195]	[3788]	[5080]	[6239]	[7620]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	60	128 242	285 241	361 238	428 234	574 228	705 223	861 211	
Flow	[21.13]	[1106]	[2433]	[3124]	[3717]	[5036]	[6186]	[7611]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	80	125 323	275 322	353 320	420 314	569 309	699 305	860 290	
Max cont.	[26.42]	[1088]	[2425]	[3044]	[3664]	[5000]	[6151]	[7549]	Max cont.
Max int.	[33.02]	[1000]	[2230]	[2920]	[3558]	[4876]	[6036]	[7416]	Max int.
	125	113 505	252 502	330 498	402 492	551 485	682 478	838 463	
Max int.	[39.62]	[752]	[2079]	[2743]	[3407]	[4735]	[5894]	[7275]	Max int.
	150	85 603	235 600	310 596	385 591	535 583	666 576	822 558	

**PHDM4 320(317.5cc)**

		[580]	[1160]	[1450]	[1740]	[2320]	[2900]	[3480]	[PSI]
		40	80	100	120	160	200	240	BAR
[GPM]	[2.64]	[1548]	[3053]	[3805]	[4584]	[6168]	[7496]	[8948]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	10	175 31	345 30	430 29	518 28	697 27	847 26	1011 24	
L/min	[5.28]	[1593]	[3195]	[3973]	[4726]	[6363]	[7709]	[9328]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	20	180 62	361 61	449 60	534 58	719 56	871 54	1054 52	
Flow	[10.57]	[1610]	[3203]	[4071]	[4797]	[6505]	[8018]	[9665]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	40	182 126	362 125	460 123	542 120	735 117	906 114	1092 109	
Flow	[15.85]	[1593]	[3195]	[4186]	[4814]	[6487]	[8089]	[9700]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	60	180 189	361 187	473 185	544 181	733 178	914 176	1096 166	
Flow	[21.13]	[1504]	[3133]	[4062]	[4779]	[6461]	[8018]	[9691]	TORQUE [LB-IN] TORQUE N·M SPEED RPM
	80	170 251	354 249	459 248	540 243	730 238	906 234	1095 224	
Max cont.	[26.42]	[1424]	[3026]	[3956]	[4752]	[6372]	[7921]	[9611]	Max cont.
Max int.	[33.02]	[1239]	[2841]	[3779]	[4593]	[6266]	[7735]	[9479]	Max int.
	125	140 391	321 389	427 386	519 382	708 378	874 373	1071 360	
Max int.	[39.62]	[1000]	[2681]	[3646]	[4434]	[5991]	[7514]	[9222]	Max int.
	150	113 471	303 469	412 466	501 462	677 457	849 444	1042 438	



# Performance Data

**PHDM4 400(401.6cc)**

	[435] 30	[870] 60	[1305] 90	[1740] 120	[2175] 150	Max cont. [2610] 180	Max int. [3045] 210	[PSI] BAR
[GPM]	[2.64]	[1460]	[3035]	[4637]	[5921]	[7319]	[8691]	[10001]
L/min	10	165	343	524	669	827	982	1130
	[5.28]	[1478]	[3062]	[4673]	[6009]	[7443]	[8859]	[10231]
	20	167	346	528	679	841	1001	1156
		51	50	49	46	44	42	40
	[10.57]	[1460]	[3062]	[4690]	[6062]	[7602]	[9027]	[10452]
	40	165	346	530	685	859	1020	1181
		99	98	96	93	90	86	82
	[15.85]	[1442]	[2991]	[4655]	[6036]	[7611]	[9063]	[10505]
	60	163	338	526	682	860	1024	1187
		149	147	143	139	135	131	125
	[21.13]	[1371]	[2920]	[4575]	[5947]	[7549]	[8974]	[10452]
	80	155	330	517	672	853	1014	1181
		199	197	194	190	186	182	176
	[26.42]	[1239]	[2805]	[4451]	[5859]	[7416]	[8833]	[10364]
	100	140	317	503	662	838	998	1171
		249	247	245	241	235	231	225
	[33.02]	[1115]	[2557]	[4336]	[5691]	[7222]	[8647]	[10107]
	125	126	289	490	643	816	977	1142
		311	309	307	303	298	294	287
	[39.62]	[1044]	[2416]	[4204]	[5514]	[7054]	[8443]	[9903]
	Max cont.	118	273	475	623	797	954	1119
	Max int.	375	373	369	365	361	357	350

TORQUE [LB-IN]  
TORQUE N•M  
SPEED RPM

Max cont.  
Max int.

**PHDM4 500(535.3cc)**

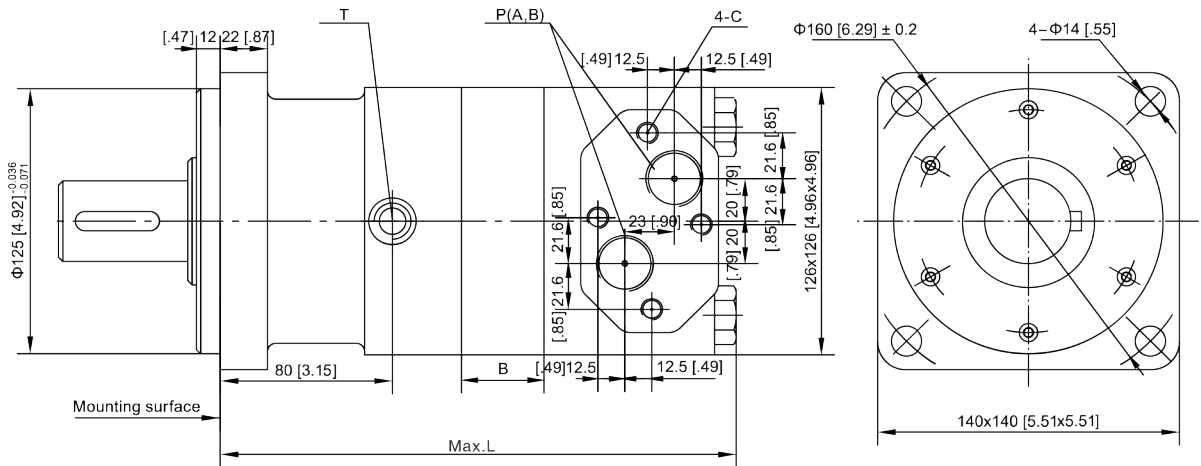
	[435] 30	[870] 60	[1305] 90	[1740] 120	[2030] 140	Max cont. [2320] 160	Max int. [2610] 180	[PSI] BAR
[GPM]	[2.64]	[1805]	[3673]	[5637]	[7266]	[8549]	[9718]	[10912]
L/min	10	204	415	637	821	966	1098	1233
	[5.28]	[1885]	[3779]	[5806]	[7478]	[8709]	[9930]	[11213]
	20	213	427	656	845	984	1122	1267
		37	36	35	34	33	32	30
	[10.57]	[1876]	[3796]	[5921]	[7664]	[8912]	[10134]	[11576]
	40	212	429	669	866	1007	1145	1308
		75	74	73	72	70	68	64
	[15.85]	[1832]	[3726]	[5814]	[7664]	[8859]	[10142]	[11470]
	60	207	421	657	866	1007	1146	1296
		113	112	111	109	107	105	101
	[21.13]	[1734]	[3513]	[5664]	[7549]	[8762]	[10134]	[11408]
	80	196	397	640	853	990	1145	1289
		151	150	149	147	145	143	138
	[26.42]	[1584]	[3425]	[5540]	[7337]	[8656]	[9965]	[11258]
	100	179	387	626	829	978	1126	1272
		189	188	187	185	183	181	177
	[33.02]	[1486]	[3239]	[5221]	[7142]	[8337]	[9762]	[11010]
	125	168	366	590	807	942	1103	1244
		237	236	235	233	231	229	225
	[39.62]	[1194]	[3000]	[5036]	[6947]	[8178]	[9505]	[10789]
	Max cont.	135	339	569	785	924	1074	1219
	Max int.	284	283	282	280	278	276	272

TORQUE [LB-IN]  
TORQUE N•M  
SPEED RPM

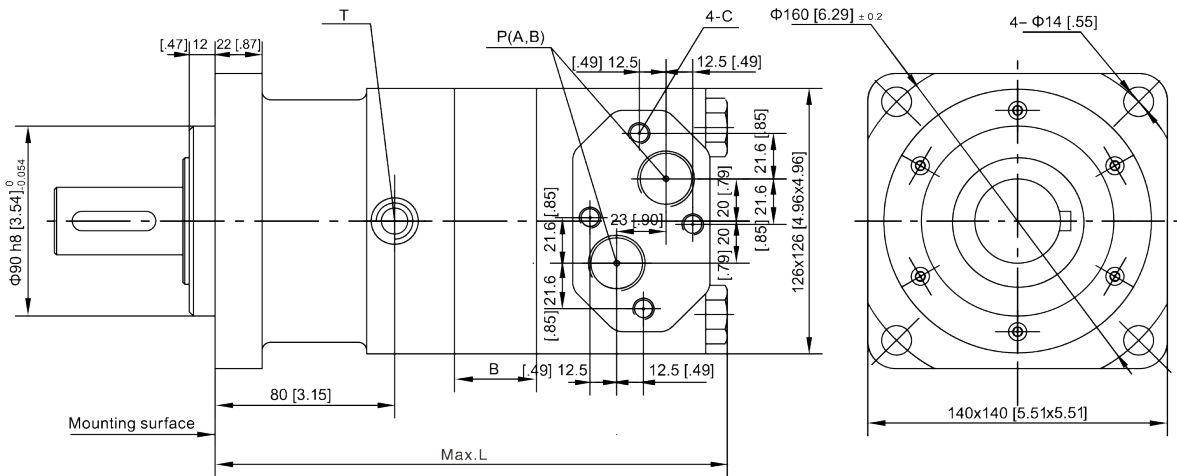
Max cont.  
Max int.

## PHDM4E Mounts

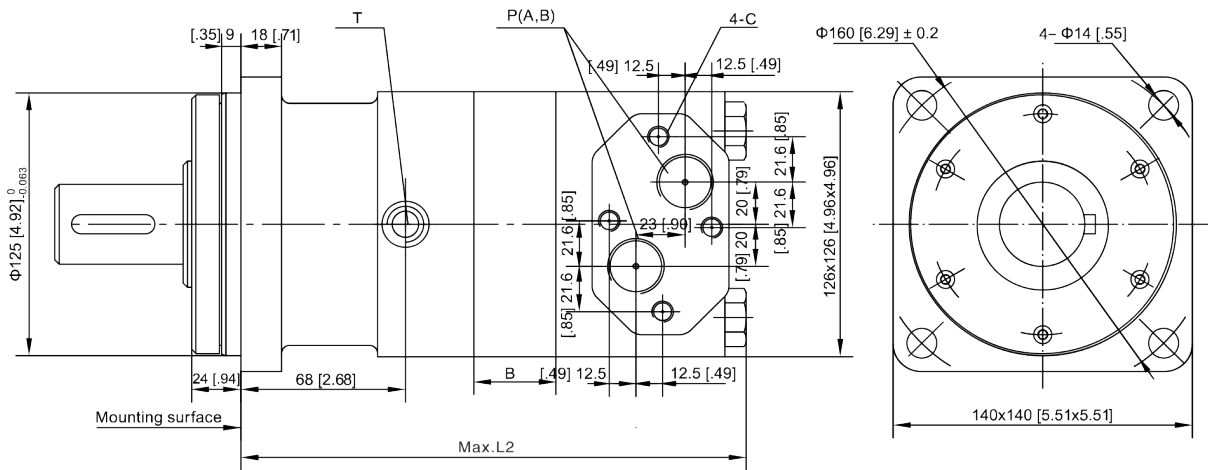
Square flange A



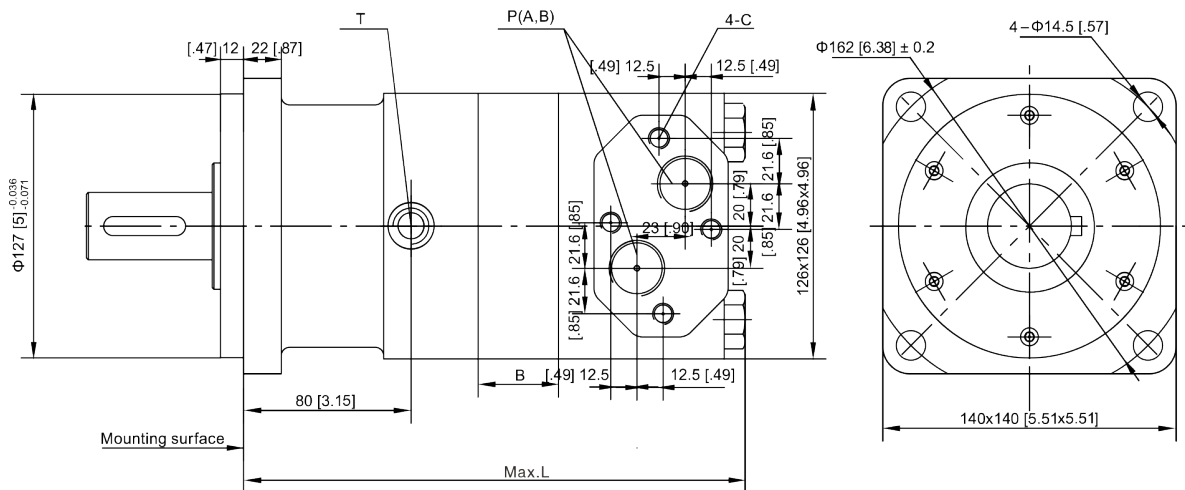
Square flange A1



Square flange A4



Square flange A7





## PHDM4E Lengths

PHDM4E	160	200	250	320	400	500
L	217.5 [8.56]	222 [8.74]	227.5 [8.96]	234.5 [9.23]	243.5 [9.58]	262 [10.31]
B	12 [.47]	16.5 [.65]	22 [.87]	29 [1.14]	38 [1.49]	56.5 [2.22]
L2	205.5 [8.09]	210 [8.27]	215.5 [8.48]	222.5 [8.76]	231.5 [9.11]	250 [9.84]

**PHDM4E**

## PHDM4E Port Options

<i>Port Codes</i>	<i>Ports (A,B)</i>	<i>Mounting Thread</i>	<i>Drain Port</i>
Y	G 3/4	M10	G 1/4
Y3	M27 x 2	M10	M14 x 1.5
Y4	M22 x 1.5	M10	M14 x 1.5
Y8	M20 x 1.5	---	7/16-(20) UNF
Y10	1-1/16-(12) UNF	---	9/16-(18) UNF





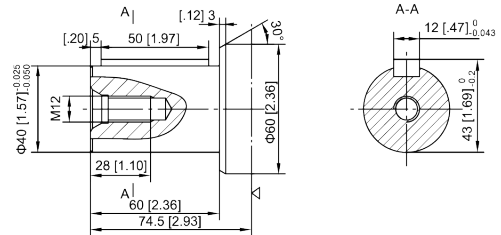
# SHAFTS

**PHDM4E**

## PHD SHAFT P

- 40MM Keyed Shaft
- Keyway [12]x[8]x[50]
- 1.57" Keyed Shaft
- Keyway [.47]x[.31]x[1.97]

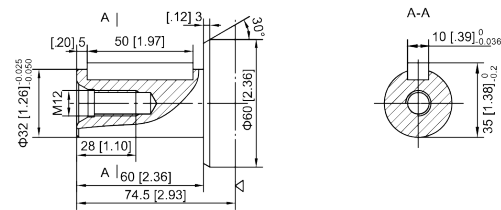
P:  $\Phi$ [1.57] Cylindrical shaft, parallel key [.47] x [.31] x [1.97]  
 $\Phi$ 40 Cylindrical shaft, parallel key 12 x 8 x 50



## PHD SHAFT P1

- 32MM Keyed Shaft
- Keyway [10]x[8]x[50]
- 1.26" Keyed Shaft
- Keyway [10]x[8]x[50]

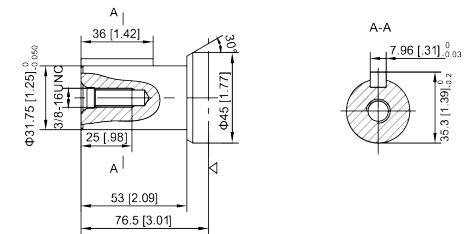
P1 :  $\Phi$ [1.26] Cylindrical shaft, parallel key [.39] x [.31] x [1.97]  
 $\Phi$ 32 Cylindrical shaft, parallel key 10 x 8 x 50



## PHD SHAFT P13

- 1-1/4" Keyed Shaft
- Keyway [.31]x[.31]x[1.42]
- 31.75MM Keyed Shaft
- Keyway [7.96]x[7.96]x[36]

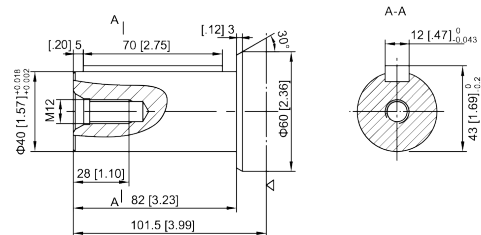
P13:  $\Phi$ [1.25] Cylindrical shaft, parallel key [.31] x [.31] x [1.42]  
 $\Phi$ 31.75 Cylindrical shaft, parallel key 7.96 x 7.96 x 36



## PHD SHAFT P33

- 40MM Keyed Shaft
- Keyway [12]x[8]x[70]
- 1.57" Keyed Shaft
- Keyway [.47]x[.31]x[2.75]

P33:  $\Phi$ [1.57] Cylindrical shaft, parallel key [.47] x [.31] x [2.75]  
 $\Phi$ 40 Cylindrical shaft, parallel key 12 x 8 x 70



# SHAFTS

## PHD SHAFT H4

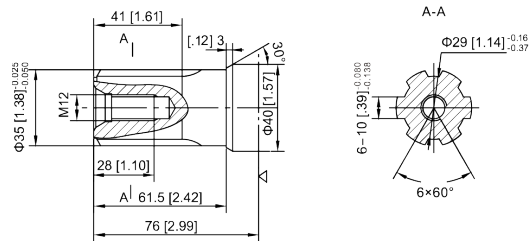
35MM Splined Shaft

6-[35]x[29]x[10]

1.38" Splined Shaft

6-[1.38]x[1.14]x[.39]

H4:  $\Phi$ [1.38] Splined shaft, 6-[1.38] x [1.14] x [.39]  
 $\Phi$ 35 Splined shaft, 6-35 x 29 x 10



## PHD SHAFT H5

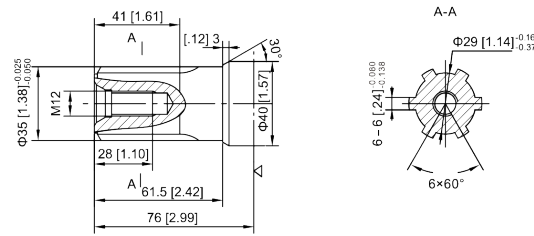
35MM Splined Shaft

6-[35]x[29]x[6]

1.38" Splined Shaft

6-[1.38]x[1.14]x[.24]

H5:  $\Phi$ [1.38] Splined shaft, 6-[1.38] x [1.14] x [.24]  
 $\Phi$ 35 Splined shaft, 6-35 x 29 x 6



## PHD SHAFT K3

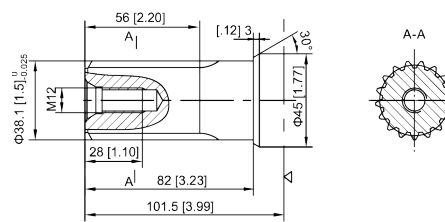
1.5" Involute Splined Shaft

17-DP12/24 a=30°

38.1MM Involute Splined Shaft

17-DP12/24 a=30°

K3:  $\Phi$ [1.5] Involute splined shaft 17-DP12/24 a=30°  
 $\Phi$ 38.1 involute splined shaft 17-DP12/24 a=30°



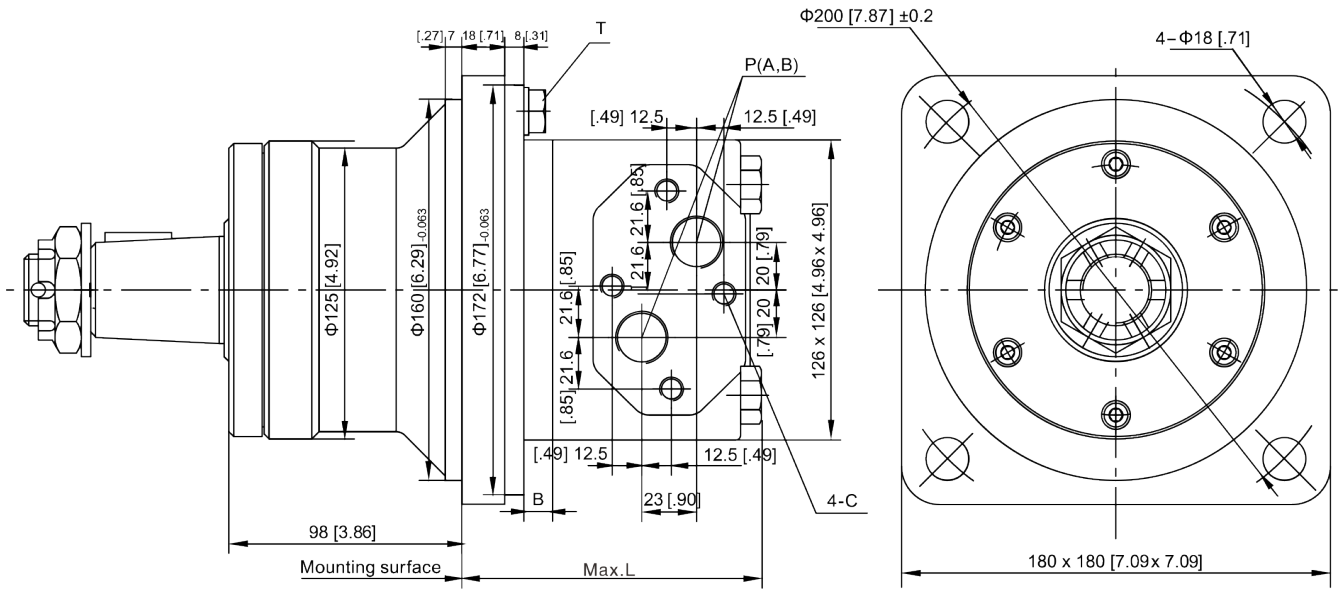
Note: Flange with A4 type hydraulic motor shaft from the mounting surface to increase 12MM.

PHDM4E



## PHDM4ES MOTOR ORDERING CODE

**PHDM4EW**



### PHDM4EW Lengths

PHDM4EW	160	200	250	320	400	500
L	131.5 [5.18]	136 [5.35]	142.5 [5.61]	149.5 [5.88]	158.5 [6.24]	177 [6.96]
B	12 [.47]	16.5 [.65]	22 [.87]	29 [1.14]	38 [1.49]	56.5 [2.22]





# PHDM4EW Ports

Port Codes	Ports (A,B)	Mounting Thread	Drain Port
Y	G 3/4	M10	G 1/4

**PHDM4EW**

## SHAFTS

### PHD SHAFT P31

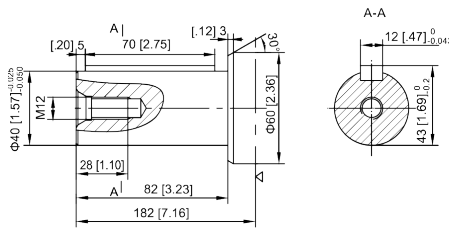
40MM Keyed Shaft

Keyway [12]x[8]x[70]

1.57" Keyed Shaft

Keyway [.47]x[.31]x[2.75]

P31 :  $\Phi$ [1.57] Cylindrical shaft, parallel key [.47] x [.31] x [2.75]  
 $\Phi$ 40 Cylindrical shaft, parallel key 12 x 8 x 70



### PHD SHAFT Z2

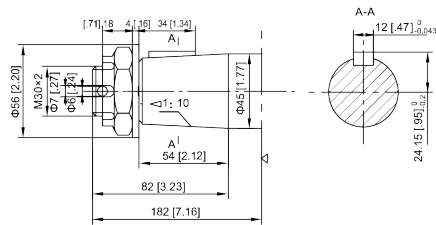
45MM 1:10 Tapered Shaft

Keyway [12]x[8]x[28]

1.77" 1:10 Tapered Shaft

Keyway [.47]x[.31]x[1.10]

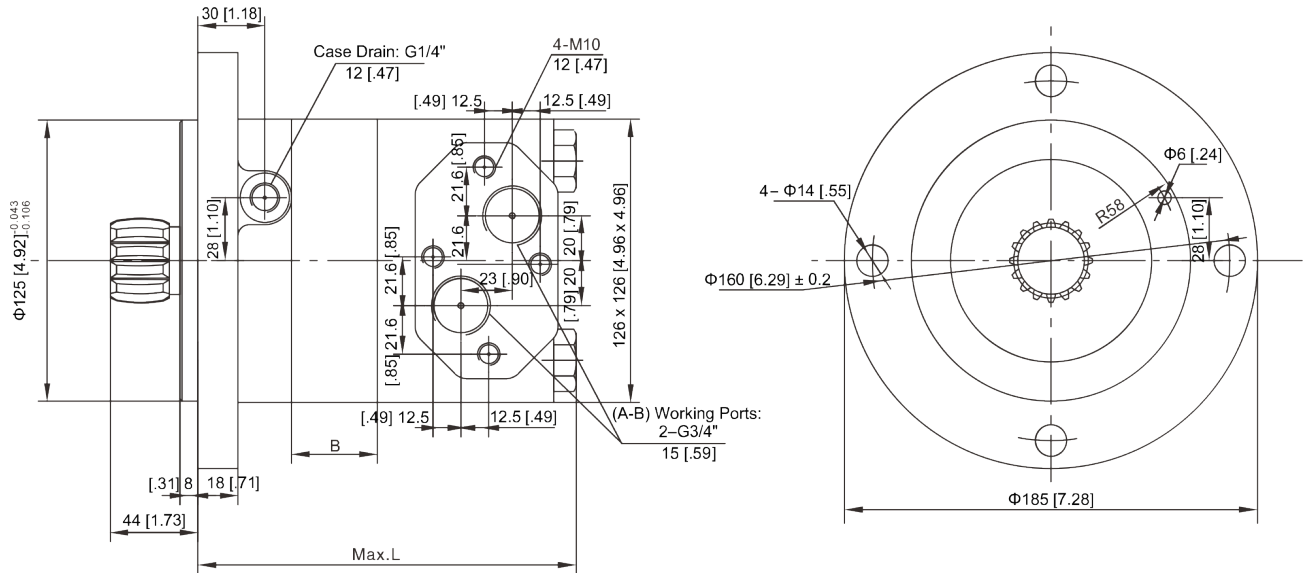
Z2 :  $\Phi$ [1.77] Tapered shaft, taper 1:10, parallel key [.47] x [.31] x [1.10]  
 $\Phi$ 45 Tapered shaft, taper 1:10, parallel key 12 x 8 x 28





# PHDM4ES Mount Dimensions

**PHDM4ES**



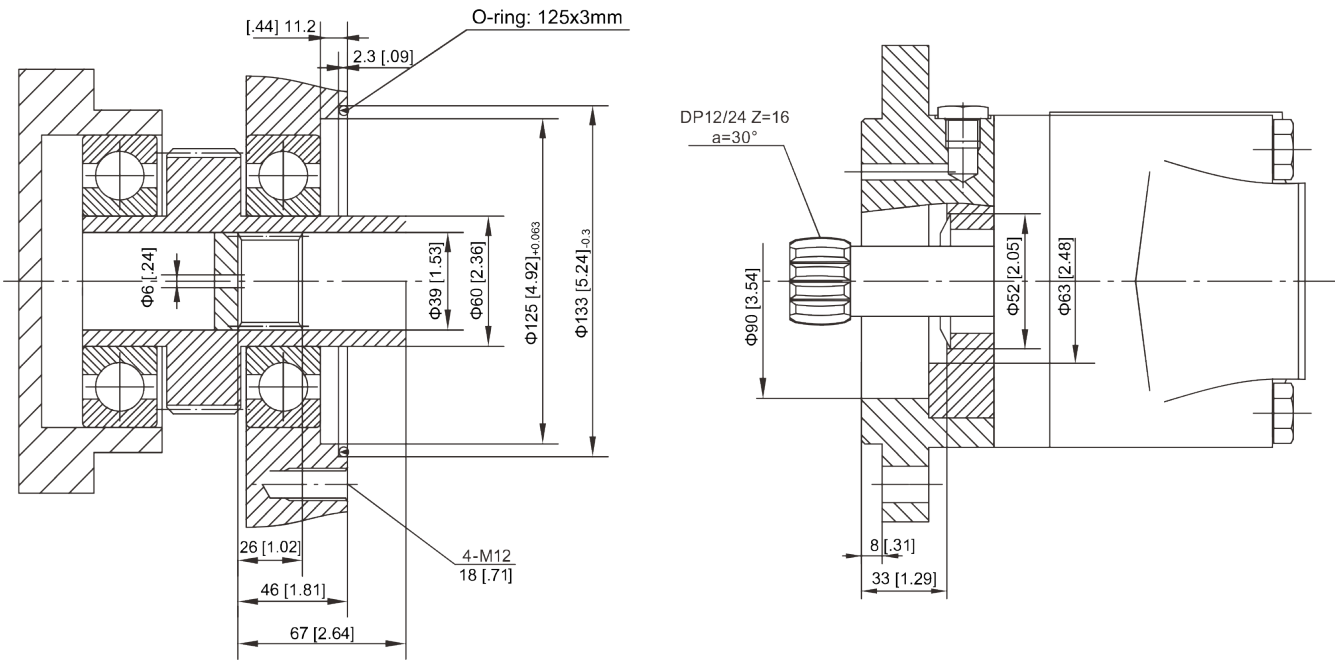
## PHDM4ES Lengths

PHDM4ES	160	200	250	320	400	500
L	148.5 [5.85]	153 [6.02]	158.5 [6.24]	165.5 [6.51]	174.5 [6.87]	193 [7.59]
B	12 [.47]	16.5 [.65]	22 [.87]	29 [1.14]	38 [1.49]	56.5 [2.22]





# PHDM4ES Shaft Dimensions

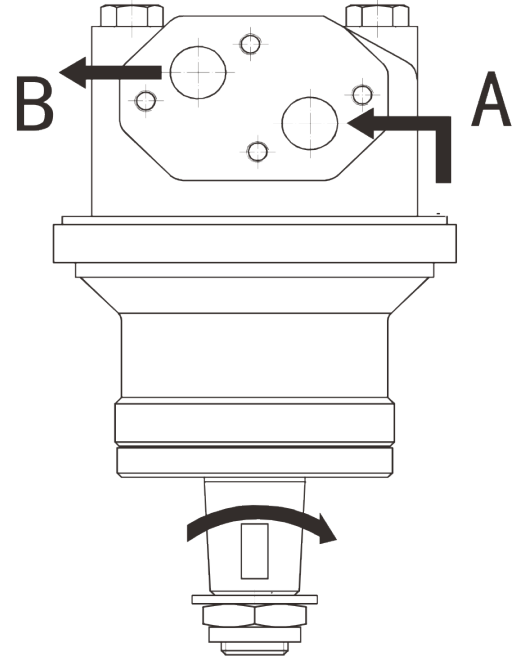
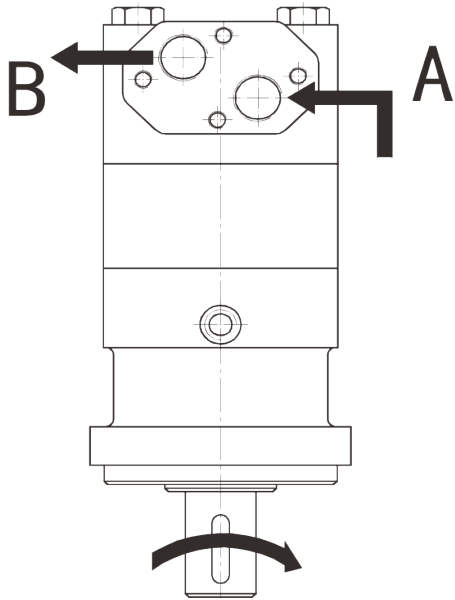


**PHDM4ES**

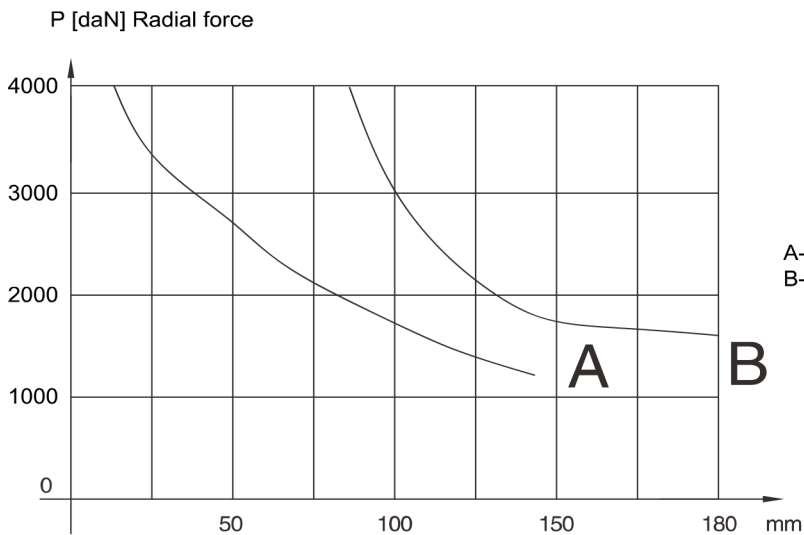


Direction of shaft rotation: Standard

When facing shaft end of motor, shaft to rotate:  
 Clockwise when port "A" is pressurized.  
 Counter-clockwise port "B" is pressurized.



**PERMISSIBLE SHAFT LOADS**



A--PHDM4  
 B--PHDM4W

