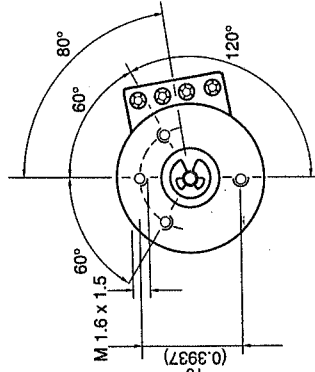
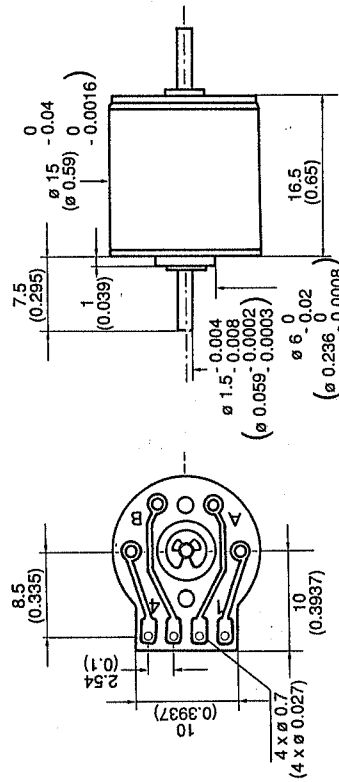


Two phase stepper motors AM 1524 - 24 steps per revolution



Phase		Direction of rotation
A	B	
+	+	↺
+	-	↻
-	+	↺
-	-	↻

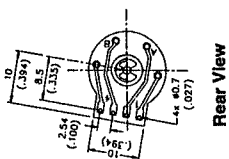
Driving sequence
Full step
2 phases ON

scale: 2 : 1
weight: 12g (0.42 ounces)
step angle: 15°
dimensions in mm (inches)

CHARACTERISTICS	UNITS	Voltage mode			Current mode
		V-6-35	V-12-150	V-24-590	A-0.25-12.5
Electrical parameters:					
Phase resistance:	ohms	35	150	590	12.5
Phase inductance (1 kHz):	mH	15	65	239	5.5
Nominal current / phase (2 ph. on):	A	0.15/6 Volts	0.075/12 Volts	0.037/24 Volts	0.25
Nominal current / phase (1 ph. on):	A	0.20/8 Volts	0.100/15 Volts	0.052/34 Volts	0.35
Back e.m.f amplitude:	V/ksteps/s	6	12	24	3.5
Torque parameters: ⁽¹⁾					
Nominal holding torque (2 ph. on):	mNm (oz-in)	6 (0.84)	6 (0.84)	6 (0.84)	6 (0.84)
Holding torque (2 x nominal current):	mNm (oz-in)	10 (1.4)	10 (1.4)	10 (1.4)	10 (1.4)
Detent plus friction torque:	mNm (oz-in)	0.9 (0.12)	0.9 (0.12)	0.9 (0.12)	0.9 (0.12)
Thermal parameters:					
Thermal resistance coil-air:	°C/W	55	55	55	55
Maximum coil temperature:	°C	130	130	130	130
Ambient working temperature: ⁽²⁾	°C	-20/+45	-20/+45	-20/+45	-20/+45
Thermal time constant	s	220	220	220	220
Angular accuracy: ⁽³⁾					
Absolute angular accuracy (2 ph. on, full step)	% of full step	+/-3	+/-3	+/-3	+/-3
Mechanical parameters: ⁽⁴⁾					
Rotor inertia:	Kgm ² 10 ⁻³ (moiss. 10 ⁻³)	45 (6.37)	45 (6.37)	45 (6.37)	45 (6.37)
Maximum radial load:	N (lbf)	0.5 (0.11)	0.5 (0.11)	0.5 (0.11)	0.5 (0.11)
Maximum axial load:	N (lbf)	0.5 (0.11)	0.5 (0.11)	0.5 (0.11)	0.5 (0.11)
Radial play (0.2 N): (max.)	µm (in. 10 ⁻³)	15 (0.59)	15 (0.59)	15 (0.59)	15 (0.59)
Axial play (0.2 N): (max.)	µm (in. 10 ⁻³)	150 (5.9)	150 (5.9)	150 (5.9)	150 (5.9)
Various parameters:					
Dielectric test (1 mm):	Vrms	500	500	500	500
Resonance frequency:	Hz	120	120	120	120
Electrical time constant:	ms	0.4	0.4	0.4	0.4
Nominal acceleration:	rad/s ²	130 000	130 000	130 000	130 000

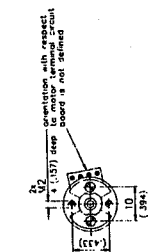
(1) With bipolar driver
(2) For higher temperature, derate phase current
(3) Assuming balanced phase currents
(4) Sleeve bearings version

Dimensional Outlines:

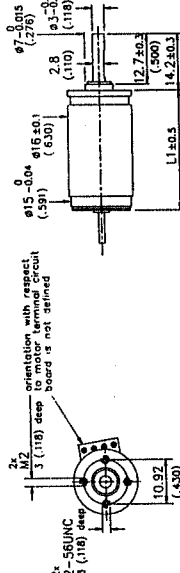


Front View

Rear View

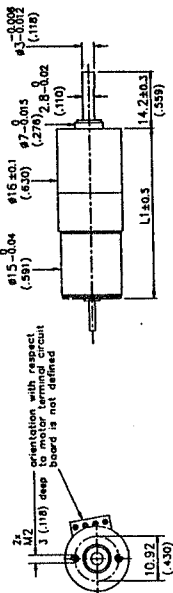


**Front View
With Gearhead 16A**



Front View

*15/8 Available with ratios 76:1 thru



**Front View
With Gearhead 16/7**

Gear Ratio	L1	in	
		mm	
11.8:1	26.0	1.02	
22:1	27.8	1.10	
41:1	27.8	1.10	
76:1	29.6	1.17	
141:1	29.6	1.17	
262:1	31.3	1.23	
485:1	31.3	1.23	
900:1	33.1	1.30	
1670:1	33.1	1.30	
3101:1	34.8	1.37	
5752:1	34.8	1.37	

Gear Ratio	L1	
	mm	in
6.3:1	30.1	1.19
11.8:1	30.1	1.19
22:1	33.8	1.33
41:1	33.8	1.33
76:1	35.9	1.41
141:1	35.9	1.41
262:1	38.0	1.50
485:1	38.0	1.50
900:1	40.1	1.58
1670:1	40.1	1.58
3101:1	42.2	1.66
5752:1	42.2	1.66
10663:1	44.3	1.74
19183:1	44.3	1.74
36796:1	46.4	1.83
682945:1	46.4	1.83
12674:1	48.5	1.91
235067:1	48.5	1.91

Gear	Ratio	L1	
		mm	in
	3.71:1	33.3	1.31
	14:1	38.0	1.50
	43:1	42.1	1.66
	66:1	45.1	1.78
	134:1	46.2	1.82
	159:1	48.2	1.92
	246:1	46.2	1.82
	415:1	50.3	1.98
	592:1	50.3	1.98
	989:1	50.3	1.98
	1526:1	50.3	1.98
	2608:1	54.4	2.14
	4365:1	54.4	2.14
	5647:1	54.4	2.14

Forque (mNm)	F
0	0
10	10
20	20
30	30
40	40
50	50
60	60
70	70
80	80
90	90
100	100
110	110
120	120
130	130
140	140
150	150
160	160
170	170
180	180
190	190
200	200
210	210
220	220
230	230
240	240
250	250
260	260
270	270
280	280
290	290
300	300
310	310
320	320
330	330
340	340
350	350
360	360
370	370
380	380
390	390
400	400
410	410
420	420
430	430
440	440
450	450
460	460
470	470
480	480
490	490
500	500
510	510
520	520
530	530
540	540
550	550
560	560
570	570
580	580
590	590
600	600
610	610
620	620
630	630
640	640
650	650
660	660
670	670
680	680
690	690
700	700
710	710
720	720
730	730
740	740
750	750
760	760
770	770
780	780
790	790
800	800
810	810
820	820
830	830
840	840
850	850
860	860
870	870
880	880
890	890
900	900
910	910
920	920
930	930
940	940
950	950
960	960
970	970
980	980
990	990
1000	1000

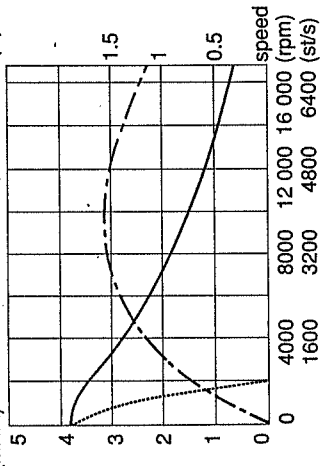
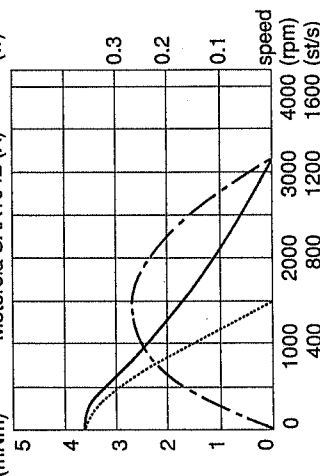
AM1524-A...

AM1524-V-...

Power

Current mode

power (w)



Start-stop mode
Load inertia: $10^{-3} \text{ kg} \cdot \text{m}^2$

Slew mode operation
Load inertia: $8 \times 10^{-8} \text{ kg} \cdot \text{m}^2$

Mechanical power

Main features of the AM 1524 stepper motor

- High holding torque per unit volume or mass
 - High start-stop speed capability
 - Very high speed operation possible in current drive mode
 - High mechanical power per unit volume or mass
 - Broad line of 16 mm Ø spur, planetary and anti-backlash gearheads readily available
 - Accepts encoders of 16 mm Ø or larger
 - Dual shafts standard, single shaft available
 - Accepts flat wire cable or in-line header pins; round connecting circuit board available
 - Sleeve bearings standard, ball bearings optional
- For other options consult factory.

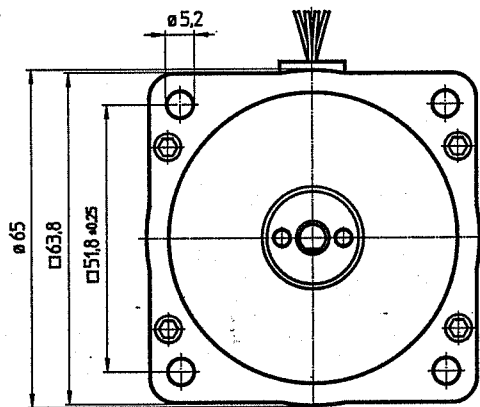
DONOVAN MICRO-TEK, INC.
50 VISTA LAGO DRIVE
SIMI VALLEY, CA 93065
PHN (805) 522-4330
FAX (805) 522-4464



Manufacturer reserves the right to make any changes, at any time in order to improve the products.

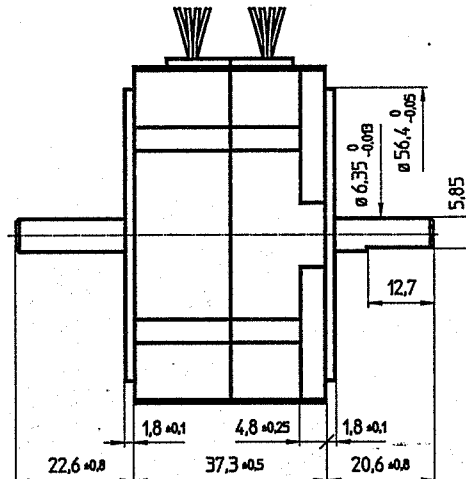
Stepper Motor escap[®] P 632

Step angle: 3.6°



scale: 2/3
dimensions in mm
mass: 430 g
Protection class IP 54
lead wires: 380 ± 15 mm
0.35 mm² (AWG 22)

P 632-258 ... 00

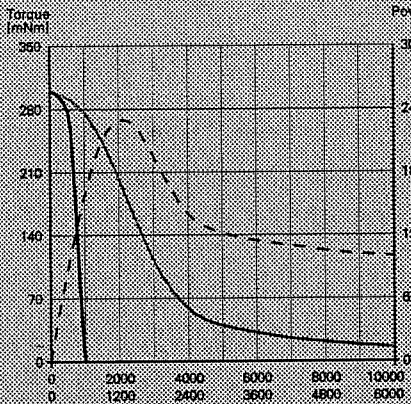


Standard types available from stock		P632-258-C coils in series			P632-258-C coils in parallel			P632-258-B coils in series			P632-258-B coils in parallel		
Coil dependent parameters		min	typ	max	min	typ	max	min	typ	max	min	typ	max
Phase resistance	ohm	2.16	2.4	2.64	0.54	0.6	0.66	1.3	1.44	1.6	0.32	0.36	0.4
Phase inductance (1 kHz)	mH		4.8			1.2			2.7			0.68	
Nominal phase current (2 ph. on)	A		1.4			2.8			1.8			3.6	
Nominal phase current (1 ph. on)	A		1.9			3.9			2.5			5	
Back-EMF amplitude	V/kst/s	9.6	10.6	11.6	4.8	5.3	5.8	7.2	8	8.8	3.6	4	4.4
Coil independent parameters ^[1]								min		typ		max	
Torque parameters													
Holding torque (nominal current)					mNm (oz-in)			290 (41.1)		320 (45.3)		350 (49.6)	
Holding torque (twice nominal current) ^[2]					mNm (oz-in)			510 (72.2)		600 (85.0)		690 (97.7)	
Detent torque amplitude and friction					mNm (oz-in)					35 (5.0)		50 (7.1)	
Thermal parameters													
Thermal resistance coil-ambient ^[3]					°C/W					3.8			
Coil temperature					°C							155	
Operating ambient temperature					°C			-20				50	
Angular accuracy													
Absolute accuracy (2 ph. on full-step mode)					% full-step					±3		±5	
Mechanical parameters													
Rotor inertia					kgm ² · 10 ⁻⁷					39			
Radial load ^[4]					N							20	
Axial load ^[5]					N							30	
Radial shaft play (20 N)					µm							25	
Axial shaft play (30 N)					µm							25	
Other parameters													
Test voltage (1 min)					V _{RMS}					500			
Natural resonance frequency (nominal current)					Hz					230			
Electrical time constant					ms					2			
Angular acceleration (nominal current)					rad/s ²					82000			
Power rate (nominal current)					kW/s					26			

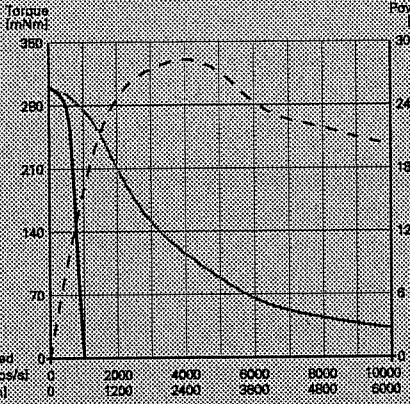
- Notes: [1] Bipolar driver
[2] The maximum coil temperature must be respected
[3] Motor mounted to an aluminium plate 10 x 20 x 1.3 cm
[4] Load applied at 12 mm from mounting face
[5] Shaft must be supported for press-fitting a pulley or pinion

Particular versions include options such as special shafts (hollow shaft), optical encoders and so forth.

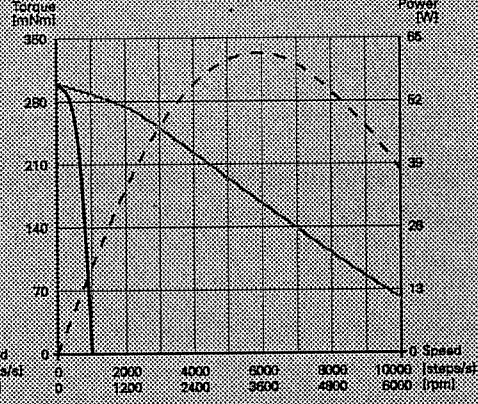
P632-258 C
Coils in series
escap® ESD-200
36V, 2A



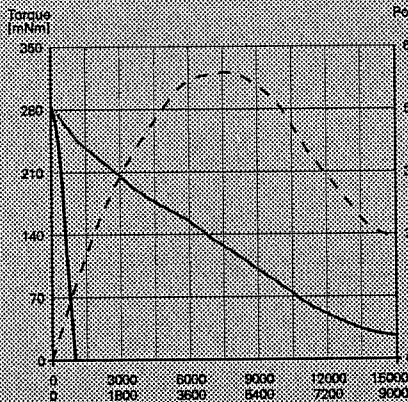
P632-258 B
Coils in series
escap® ESD-300
36V, 2.5A



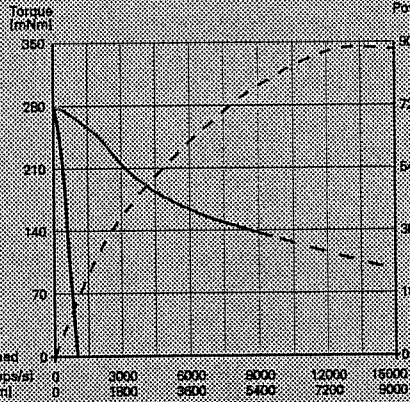
P632-258 C
Coils in parallel
escap® ESI-402
45V, 3.9A



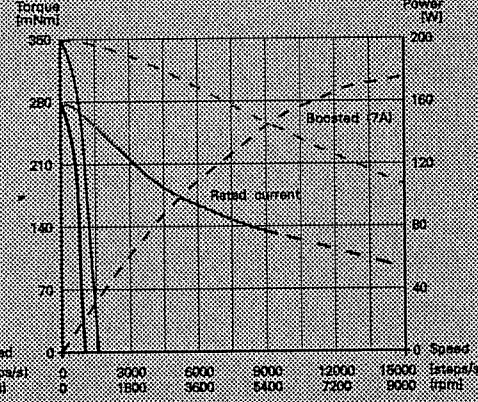
P632-258 B
Coils in parallel
escap® EDB-106
45V, 5A



P632-258 B
Coils in parallel
escap® EDB-106
80V, 5A



P632-258 B
Coils in parallel
escap® EDB-1010
80V



— Pull-in range
- - - Pull-out range
... Power output

Notes

The low inertia, extended pull-in range, high peak speed and boost torque capability of this motor are benefits for fast incremental motion.

The speed scale is indicated in full-steps/s for all drive modes.

The motor is driven in half-steps unless otherwise specified.

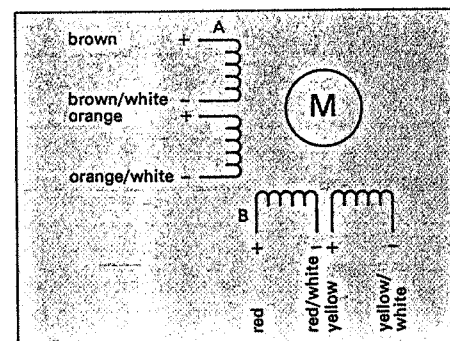
The motor is energised with nominal current unless otherwise specified.

Pull-in is measured with a load inertia equal to the rotor inertia.

The following escap® drive circuits are recommended with the P632 motor, depending on the drive mode and the dynamic performance required: ESD-200, ESD-300, ESI-402, EDB-106, EDB-1010.

Please refer to page 104/105 for more information on terminology and definitions.

Motor connections

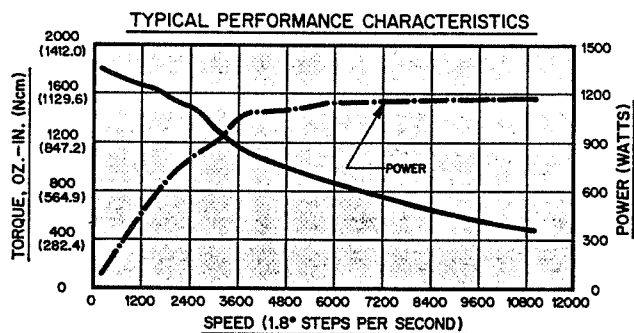


For any further options:
see pages 116 and 117.

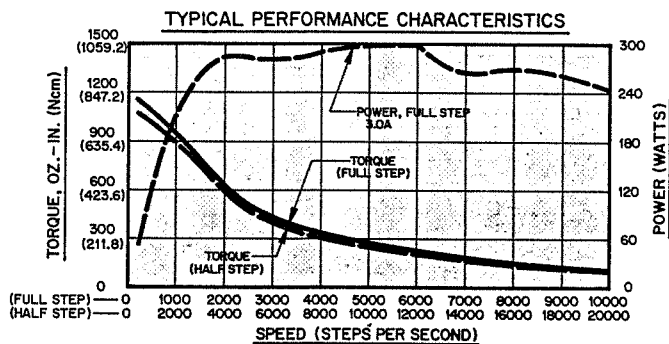
Specifications, MH112 Motors

PARAMETER	UNITS	MH112-FJ8020			MH112-FJ8030			MH112-FJ4201		
		MINIMUM	TYPICAL	MAXIMUM	MINIMUM	TYPICAL	MAXIMUM	MINIMUM	TYPICAL	MAXIMUM
Resistance, 1ø Series Connection	Ohms @ 25°C	--	0.532	--	--	0.232	--	--	0.8	--
Inductance, 1ø Parallel Connection	mH @ 1 kHz	--	11.92	--	--	4.12	--	--	16.8	--
Counter emf Constant, 1ø Series Connection	Vp/krpm	--	192	--	--	120	--	--	230	--
PARAMETER	UNITS	MH112-FJ8020			MH112-FJ8030			MH112-FJ4201		
		MINIMUM	TYPICAL	MAXIMUM	MINIMUM	TYPICAL	MAXIMUM	MINIMUM	TYPICAL	MAXIMUM
Resistance, 1ø Parallel Connection	Ohms @ 25°C	--	0.133	--	--	0.058	--	--	--	--
Inductance, 1ø Parallel Connection	mH @ 1 kHz	--	2.98	--	--	1.03	--	--	--	--
Counter emf Constant, 1ø Parallel Connection	Vp/krpm	--	96	--	--	60	--	--	--	--
Current per Phase, (Rated)										
Two-On, Bipolar Series Connection	Amperes	--	7.1	--	--	10.6	--	--	4.0	--
Two-On, Bipolar Parallel Connection	Amperes	--	14.1	--	--	21.2	--	--	--	--
Holding Torque, Two-On, Bipolar*										
@ Rated Current	oz-in (Ncm)	1760 (12.4)	2400 (17.0)	--	1760 (12.4)	2400 (17.0)	--	1500 (10.6)	2100 (14.8)	--
@ 50% Rated Current	oz-in (Ncm)	--	1490 (10.5)	--	--	1490 (10.5)	--	--	1300 (9.2)	--
Pull-Out Torque, 2k Pulses/Sec*	oz-in (Ncm)	1360 (9.6)	1630 (11.5)	--	1360 (9.6)	1680 (11.9)	--	--	--	--
Pull-Out Torque, 4k Pulses/Sec*	oz-in (Ncm)	880 (6.2)	1130 (8.0)	--	1240 (8.8)	1620 (11.4)	--	--	--	--
Residual Torque (Dient Torque)	oz-in (Ncm)	85 (0.60)	100 (0.70)	135 (0.95)	85 (0.60)	100 (0.70)	135 (0.95)	85 (0.6)	100 (0.70)	135 (0.95)
Time For Single Step (2-On)*	ms	--	3	--	--	2.8	--	--	--	--
Damping Time (90% Decay)*	ms	--	140	--	--	130	--	--	--	--
Rotor Polar Moment of Inertia	lb-in ² (kg-cm) ²	--	3.22 (9.42)	--	--	3.22 (9.42)	--	--	3.22 (9.42)	--
Winding Temperature Limit	°C	--	--	155	--	--	155	--	--	155
Frame Temperature Limit	°C	--	--	125	--	--	125	--	--	125
Thermal Resistance										
Winding to Frame	°C/Watt	--	0.8	--	--	0.8	--	--	0.8	--
Frame to Air	°C/Watt	--	1.87	--	--	1.87	--	--	1.87	--
Frame to Heat Sink	°C/Watt	--	4.1	--	--	4.1	--	--	4.7	--
Step Angle	Degrees	--	1.8	--	--	1.8	--	--	1.8	--
Step Angle Error (@ Rated Current)	%	--	± 2.0	± 5.0	--	± 2.0	± 5.0	--	± 2.0	± 5.0
Step Position Error (@ Rated Current)	%	--	± 2.0	± 5.0	--	± 2.0	± 5.0	--	± 2.0	± 5.0
Dialectric Withstand (Winding to Frame)	Vms for 1 sec.	1800	--	--	1800	--	--	1800	--	--
Dialectric Withstand (Between Phases)	Vms for 1 sec.	1000	--	--	1000	--	--	1000	--	--
Bearings (Two)		ABEC-1			ABEC-1			ABEC-1		
Radial Static Load (Without Damage)	lb (N)	--	--	100 (450)	--	--	100 (450)	--	--	100 (450)
Axial Static Load (Without Damage)	lb (N)	--	--	50 (225)	--	--	50 (225)	--	--	50 (225)
Termination	8 Terminals arranged for series or parallel connection							4 Terminal Arrangement		
Weight	lb (kg)	20.5 (9.3)			20.5 (9.3)			20.5 (9.3)		

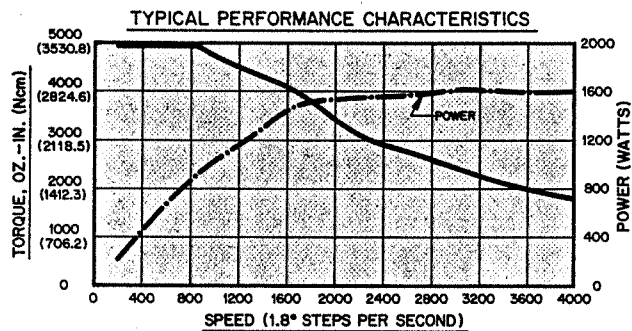
* Operation from a circulating bipolar drive in the half-step mode with motor windings of each phase connected in series. Peak "1-On" current is limited to rated 2-On unipolar current with a supply voltage of approximately 240 VDC. specifications are subject to change without notice.



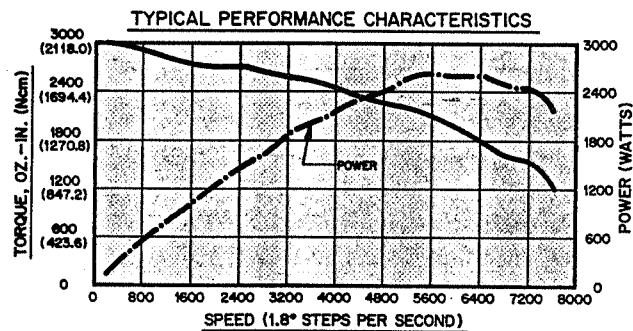
**MH112-FJ-8030 MOTOR WITH
 MODULYNX MOTION CONTROL
 DRD004 DRIVER, SERIES CONNECTION**



**MH112-FJ-4201 MOTOR WITH 3180
 MODEL SLO-SYN MICRO SERIES
 MOTION CONTROLS**

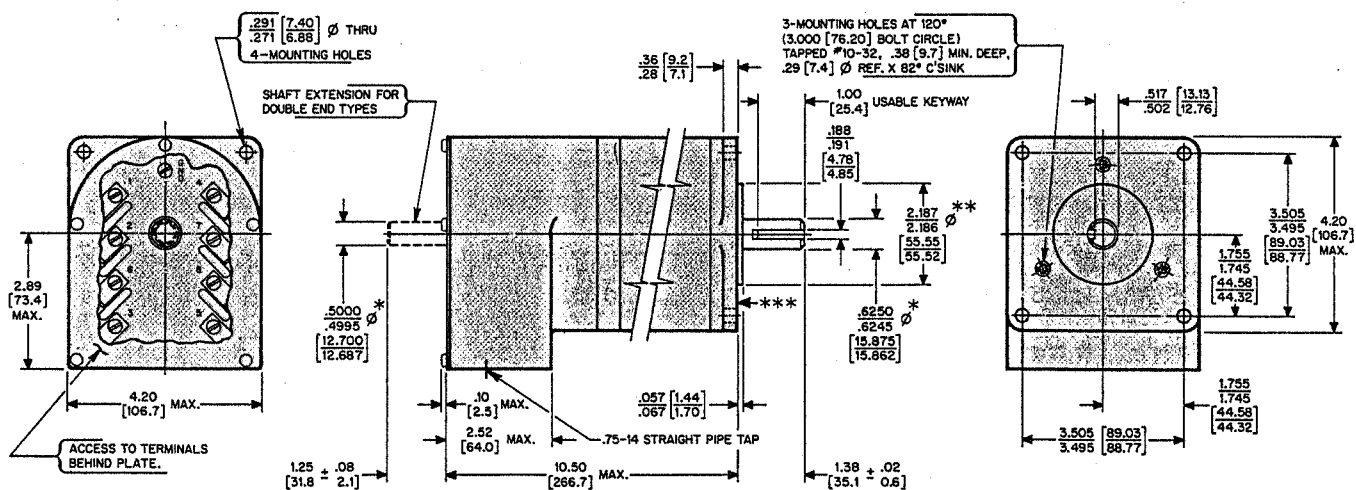


**MH172-FD-8030 MOTOR WITH
 MODULYNX MOTION CONTROL
 DRD004 DRIVER, SERIES CONNECTION**



**MH172-FD-8030 MOTOR WITH
 MODULYNX MOTION CONTROL
 DRD004 DRIVER, PARALLEL CONNECTION**

DIMENSIONS



Dimensions in brackets are millimeters.

Dimensions shown apply before painting.

This drawing shows only those features which are pertinent to the form, fit, and function of the motor.

* SHAFT RUNOUT .002 [0.051] MAX.

** DIAMETER CONCENTRIC TO SHAFT DIAMETER WITHIN .003 [0.077] T.I.R.

*** SURFACE SQUARE TO SHAFT DIAMETER WITHIN .003 [0.077] T.I.R.

MH112 MOTORS, STANDARD AND DOUBLE END MODELS