

MM-4M-EX and MM-4M-R

16 Position Encoder Resolution Data Sheet

Linear Motion: MM-4M-EX, 80 TPI Lead Screw, 13mm mtr, 16 enc. *lines/mtr rev

Gearhead Ratio	Actual Gear Ratio	Resolution ¹		Max Travel Rate ²	
		Inch/count	mm/count	Inch/s	mm/s
14:1	13.795918367:1	14.1573 x 10 ⁻⁶	0.3595 x 10 ⁻³	0.30	7.6
43:1	42.920634921:1	4.5506 x 10 ⁻⁶	0.1155 x 10 ⁻³	0.096	2.4
66:1	66.220408163:1	2.9494 x 10 ⁻⁶	0.0749 x 10 ⁻³	0.062	1.5
134:1	133.530864198:1	1.4627 x 10 ⁻⁶	0.0371 x 10 ⁻³	0.030	0.78
159:1	159.419501134:1	1.2251 x 10 ⁻⁶	0.0311 x 10 ⁻³	0.025	0.64
246:1	245.961516035:1	0.7941 x 10 ⁻⁶	0.0201 x 10 ⁻³	0.016	0.41
415:1	415.429355281:1	0.4701 x 10 ⁻⁶	0.0119 x 10 ⁻³	0.010	0.25
592:1	592.129575640:1	0.3298 x 10 ⁻⁶	0.0083 x 10 ⁻³	0.006	0.16
989:1	988.891428571:1	0.1975 x 10 ⁻⁶	0.0050 x 10 ⁻³	0.0036	0.092
1,526:1	1,525.718204082:1	0.1280 x 10 ⁻⁶	0.0032 x 10 ⁻³	0.0027	0.069
2,608:1	2,625.740771277:1	0.0744 x 10 ⁻⁶	0.0018 x 10 ⁻³	0.0015	0.039
4,365:1	4,385.142457309:1	0.0445 x 10 ⁻⁶	0.0011 x 10 ⁻³	0.0009	0.023
5,647:1	5,666.953329446:1	0.0345 x 10 ⁻⁶	0.0008 x 10 ⁻³	0.0007	0.018

Rotary Motion: MM-4M-R, 90:1 Worm Drive Ratio 13mm mtr, 16 enc. *lines/mtr rev

Gearhead Ratio	Actual Gear Ratio	Resolution ¹		Max Travel Rate ²
		degree/count	arc-s/count	Degree/s
14:1	13.795918367:1	4.53032 x 10 ⁻³	16.3091	96.63
43:1	42.920634921:1	1.45617 x 10 ⁻³	5.2422	31.00
66:1	66.220408163:1	0.94381 x 10 ⁻³	3.3977	20.09
134:1	133.530864198:1	0.46805 x 10 ⁻³	1.6850	9.90
159:1	159.419501134:1	0.39204 x 10 ⁻³	1.4113	8.36
246:1	245.961516035:1	0.25410 x 10 ⁻³	0.9147	5.36
415:1	415.429355281:1	0.15044 x 10 ⁻³	0.5416	3.18
592:1	592.129575640:1	0.10555 x 10 ⁻³	0.3799	2.18
989:1	988.891428571:1	0.06320 x 10 ⁻³	0.2275	1.361
1,526:1	1,525.718204082:1	0.04096 x 10 ⁻³	0.1474	0.90
2,608:1	2,625.740771277:1	0.02380 x 10 ⁻³	0.0856	0.54
4,365:1	4,385.142457309:1	0.01425 x 10 ⁻³	0.0513	0.27
5,647:1	5,666.953329446:1	0.01102 x 10 ⁻³	0.0397	0.23

Notes:

1) The lead values shown above in both travel rate and resolution calculations, are for 80 (1/80) thread per Inch (TPI) lead-screws. For a 40 TPI leadscrew, substitute 0.025 inch lead.

2) Max travel rate calculated with motor armature running at a maximum speed of 20,000 RPM

*The resultant quadrature output is equal to 64 encoder counts per motor armature revolution. (mtr rev)

Travel rate calculations:

Output Shaft RPM	= RPM of motor / Gearhead Ratio
Distance per minute	= Output shaft RPM x Lead (0.0125 inch, 0.03175mm)
Distance per second	= Distance per minute/60
Distance in millimeter	= inch/39.37 X 10 ⁻³
Distance in micrometer	= inch/39.37 x 10 ⁻⁶

Conversion:

1 inch	= 25.4 mm
1 inch	= 25,400µm
1 millimeter (mm)	= 39.37 x 10 ⁻³ inch
1 micrometer (µm)	= 39.37 x 10 ⁻⁶ inch
1 degree	= 3,600 arc-s
1 arc-s	= 0.277 x 10 ⁻³ degree

The information contained in this data sheet is subject to change without notice. Critical dimensions or specifications should be verified with our technical support staff.

MTR-13-16E-HT MicroMini™ Motor

Linear 80 TPI/Rotary 90:1 Connection Specifications

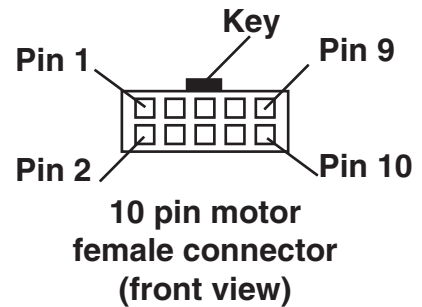
Motor Connector Pin Assignments:

Motor Type: MTR-13-16E

Connector Type: Dual Row IDC

*Mate Part # (Male Pin):

Pancon Part #057-010-115



Pin #	Name	Pin #	Name
1	Motor+	6	Motor -
2	Encoder+V	7	Limit ground
3	Encoder Ch A	8	No connection**
4	Encoder Ch B	9	Reverse limit
5	Ground (case)	10	Forward limit

**Optional: +5V with Optical Limit Switches

Electrical Specifications:

Supply Voltage Nom. (Volts)	6
Armature Resistance (Ohm) ±12%	2.83
Max Power Output (Watts) ¹	3.11
Max Efficiency (%) ¹	81
No-Load Speed (RPM) ±12% ¹	10,600
Friction Torque (at no-load speed)(mNm)	0.12
No-Load Current (mA) ±50% ²	22
Stall Torque (mNm.) ¹	11.2
Velocity Constant (RPM/Volt)	1,790
Back EMF Constant (mV/RPM)	0.560
Torque Constant (mNm/A)	5.35
Armature Inductance (mH)	0.07
Recommended Values	
Speed (RPM)	up to 12,000
Torque (mNm)	up to 3.2
Current (mA)	up to 810

Encoder Specifications:

Supply Voltage	5 VDC Nom.
Max Supply Voltage	5.5 VDC
Operating Current	6 mA Nom. @ 5 VDC
Signal Phase Shift	90°
Max Signal Frequency	20 Khz
Operating Temp. Range	-25°C to +85°C
Signal Rise Time	0.1µs max.
Phase Relationship	Ch. A leads Ch. B when motor rotation is clockwise as viewed from shaft end.
Pulses Per Revolution	16 (2 channels)
Quadrature	64 encoder counts

Output signal CMOS and TTL compatible

Mechanical Specifications (Motor):

Mechanical Time Constant (ms) ¹	7
Armature Inertia (g-cm ²)	0.71
Angular Acceleration (x 10 ³ rad/sec ²) ¹	160
Thermal Resistances (C°/W)	
Rotor to Case	6
Case to Ambient	25
Max Shaft Load	
Radial at 3,000 RPM (3mm from bearing)	1.2 N
Axial (Static)	20 N
Weight	19 g
Max Operating Temp. Range	-30°C to +85°C
Max Rotor Temp.	125°C

(1) Specified at nominal supply voltage.

(2) Specified with shaft diameter = 1.5mm at no-load speed.

*Note: Mating connectors may be purchased from National Aperture, Inc.

The information contained in this data sheet is subject to change without notice. Critical dimensions or specifications should be verified with our technical support staff.

National Aperture, Inc. - 16 Northwestern Dr. - Salem, N.H. 03079-4810 - Tel. (800) 360-4598 - (603) 893-7393 - FAX (603) 893-7857 - www.nationalaperture.com/www.naimotion.com