MM-1M-F-5mm

50 Position Encoder Resolution Data Sheet

Linear Motion: 6mm Motor w/80 TPI Leadscrew

	Max Travel Rate[2]		Resolution[1]	
Gearhead Ratio	Inch per second	mm per second	µinch per count	µm per count
64:1	0.046	1.17	0.651041$\overline{6}$	0.01654

Travel rate calculations:

Leadscrew RPM = [RPM of motor/(Gearhead Ratio x Pinion Gear Ratio)] = [(Motor RPM)/(64 x 1.5)] = Motor RPM/96
Distance per minute = Output shaft RPM x Lead (0.025 inch, 0.635 mm)
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}

Encoder resolution calculations:

Encoder counts per shaft revolution = encoder counts x Gearhead ratio
Minimum encoder count (inch) = Lead (0.0125 inch)/ Encoder counts per output shaft revolution
Minimum encoder count (millimeter) = Minimum encoder count (inch)/39.37 x10^{-3}
Minimum encoder count (micrometer) = Minimum encoder count (inch)/39.37 x 10^{-6}

Conversion:

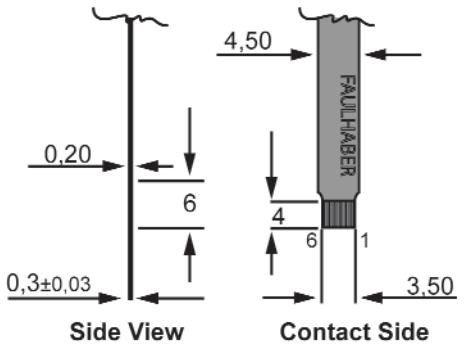
1 inch (in) = 25.4 mm
1 inch (in) = 25,400 µm
1 millimeter (mm) = 39.37 x 10^{-3} inch
1 micrometer (µm) = 39.37 x 10^{-6} inch
1 deg (deg) = 3,600 arc-second
1 arc-sec = 0.277 x 10^{-3} degree

Notes:

1) Max travel rate calculated with motor armature running at a maximum speed of 20,000 RPM.
2) The 6mm motors used with linear stages incorporate dual channel 50 position, optical encoders. The resultant quadrature output is equal to 200 encoder counts per motor armature revolution. speeds measured at 4.5 VDC with 64:1 gearhead.
3) Minimum encoder count = (0.0125 inch) / (50 x 4 x 1.5 x 64) = 0.651 µinch/count
   where 0.0125 is leadscrew pitch (1 inch/80 threads per inch),
   and 50 x 4 (=200) is quadrature counts per encoder revolution,
   and 1.5 x 64 (=96) is pinion gear ratio (21/14) times motor gearhead ratio.

MTR-6-50E-4.5v MicroMini™ Motor (6 mm diameter, 4.5 VDC, 50 place encoder)

Connection Specifications

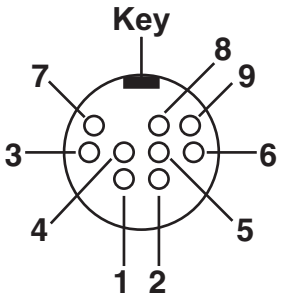


PIN	FUNCTION
1	MOT +
2	Vcc
3	Chan A
4	Chan B
5	Gnd
6	Mot -

Suggested Connector:
Molex 52745 series
Pitch 0.5mm
FPC/FFC, 6 circuits

Motor Connector

Pin#	Name
1	Motor+
2	Encoder Vcc
3	Encoder Ch A
4	Encoder Ch B
5	Encoder Ground
6	Motor (-)
7	Limit Ground Switch
8	Forward Limit
9	Reverse Limit



9 pin Mini-Din motor connector (front view)

Stage Connector

Electrical Specifications:

Supply Voltage Nom. (Volts)	4.5
Armature Resistance (Ohm) ±12%	37.7
Maximum power output (watts)(2)	0.11
Maximum Efficiency (%)(2)	50
No Load Speed (RPM) ±12%(2)	19,500
No Load Current (mA) ±50%(3)	10
Stall Torque (mNm)	0.22
Velocity Constant (RPM/Volt)	4,727
Torque Constant (mNm/A)	2.02
Armature Inductance (µH)	95
Speed/Torque gradient (RPM/mNm)	88,229
Maximum permissible speed (RPM)	13,000
Maximum continuous current (mA)	110
Maximum continuous torque (mNm)	0.11
Maximum power output at nominal voltage (mW)	110

Encoder Specifications:

Supply Voltage	2.7 to 3.3 VDC
Operating Current Vcc=3 VDC	8.5mA
Signal Phase Shift	90° ±45°
Maximum Signal Frequency	35 kHz
Temperature Range	-30°C to +85° C
Output Signal Type	2 channel Square wave
Signal Rise Time	0.3µs
Phase Relationship	Channel B leads Channel A
Pulses per Revolution	50
Quadrature	200 encoder counts

Output signal CMOS and TTL compatible

Mechanical Specifications:

Mechanical Time Constant (ms)(2)	9
Armature Inertia (g - cm²)	0.01
Maximum rotor temperature	+85°C (+185°F)
Axial Play	0.15mm (0.0059 inches)
Thermal Resistance (C°/W)	
Rotor to Case	35
Case to Ambient	76
Maximum Shaft Load	
Radial 1.5mm from flange @3000RPM (N)	0.5
Axial @ standstill (N)	20
Weight	2 g
Planetary Gearhead recommended input speed (max)	<8000 RPM

(1) Ratings are presented independent of each other
(2) Specified at nominal supply voltage
(3) Specified with shaft diameter = 0.8mm at no load
*Mating connectors available through National Aperture, Inc.