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MOTOR MIKE™

18012 SERIES

Please read these instructions completely before operating this equipment. If there are any questions or problems regarding the use of this equipment, please contact: ORIEL INSTRUMENTS - or - the representative from whom this equipment was purchased.

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I

INTRODUCTION

These operating procedures cover the Motor Mikes™ listed in Table 1. These actuators incorporate a DC motor with integral gear head in a compact cylindrical casing. Fig. 1 below and Table 1 on the following page list the dimensions and models. Fig. 2 on page 5 shows the components. We offer all models with flat and spherical tip which can be interchanged.

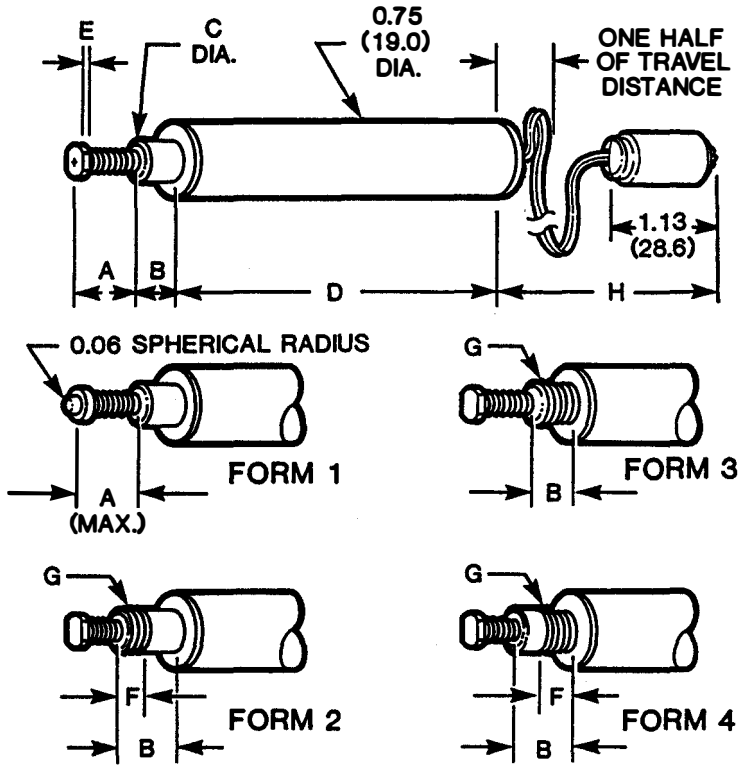


Fig. 1 Motor Mike™ Dimensions. Dimensions corresponding to the letters, "A", "B", etc., are tabulated on the next page.

Table 1 Motor Mike™ Dimensions*

Travel Length In. (mm)	Type	Dimensions (In)							Equivalent Micrometer	Models	
		A	B	C	D	E	F	G		Flat Tip	Spherical Tip
0.5	1	0.75	0.37	0.375	2.74	0.20	—	—	Starrett Series 463	18012	18013
(12.7)	1	0.69	0.37	0.375	2.74	0.14	—	—	Mitutoyo 148-104, 148-112, 148-801, 148-811	18014	18015
	1	0.61	0.37	0.375	2.74	0.06	—	—	Mitutoyo 148-501, 148-503, 148-861, 148-863, 148-851, 148-853	18018	18019
	1	0.67	0.59	0.375	2.74	0.12	—	—	Mitutoyo 149-132, 149-148, 149-601, 149-611	18020	18021
	2	0.61	0.37	0.375	2.74	0.06	0.16	3/8-32	Mitutoyo 148-502, 148-504, 148-852, 148-854	18022	18023
	2	0.67	0.59	0.375	2.74	0.12	0.16	3/8-32	Mitutoyo 149-131, 149-182, 149-802, 149-812, 149-822, 149-832	18024	18025
	2	0.67	0.59	—	2.74	0.12	0.20	3/8-40	NRC D-05, D-05M	18026	18027
	4	0.18	0.53	—	2.74	0.06	0.47	M12x.5	Klinger BD 17.4	18028	18029
	3	0.75	0.50	—	2.74	0.20	—	1/2-40		18030	18031
	4	0.38	1.00	0.709	2.74	0.06	0.50	M20x1	Klinger BD-30.01	18032	18033
1.0	1	1.06	0.59	0.3937	3.24	0.06	—	—	Mitutoyo 150-192, 250-190, 250-192, 150-801	18036	18037
(25.4)	1	1.40	0.59	0.375	3.24	0.35	—	—	Starrett Series 263 (Special)	18038	18039
	1	1.06	0.59	0.375	3.24	0.06	—	—	Mitutoyo 150-206, 250-208, 250-206, 150-811	18040	18041
	1	1.03	0.59	0.375	3.24	0.06	—	—	Scherr-Tumico 266	18042	18043
	1	1.12	0.59	0.375	3.24	0.07	—	—	Scherr-Tumico 265	18044	18045
	1	1.25	0.75	0.500	3.24	0.20	—	—	Starrett Series 263	18046	18047
	1	1.73	0.75	0.500	3.24	0.66	—	—		18048	18049
	3	1.50	0.50	—	3.24	0.45	—	1/2-40	Lansing 22.501	18050	18051
	3	1.17	0.50	—	3.24	0.12	—	1/2-40	Lansing 22.301	18052	18053
	2	1.06	0.59	—	3.24	0.06	0.24	3/8-32	Mitutoyo 150-812, 250-205, 250-207	18054	18055
	2	1.34	1.14	0.500	3.24	0.29	0.24	1/2-40	Mitutoyo 151-237, 151-239, 151-240, 151-238	18056	18057
	3	1.07	0.35	—	3.24	0.06	—	M10x.5	Klinger BM 16 25	18058	18059
	2	1.34	1.14	0.472	3.24	0.29	0.24	M12x.5	Mitutoyo 151-222, 151-224, 151-223, 151-221	18062	18063
	2	1.06	0.59	0.3937	3.24	0.06	0.24	3/8-32	Mitutoyo 150-802, 150-822, 250-189, 250-191	18064	18065
2.0	3	2.17	0.50	—	4.24	0.12	—	1/2-40	Lansing 22.302	18066	18067
(50.8)	1	2.25	0.75	0.500	4.24	0.20	—	—	Starrett Series 63	18068	18069
	1	2.56	0.55	0.709	4.24	0.51	—	—	Mitutoyo Series 197, 297	18074	18075
	2	2.32	1.14	0.472	4.24	0.27	0.24	M12x.5	Mitutoyo 151-256, 151-255	18076	18077
	2	2.32	1.14	0.500	4.24	0.27	0.24	1/2-40	Mitutoyo 151-271, 151-272	18078	18079

* See Fig. 1 for letter key A, B, etc.

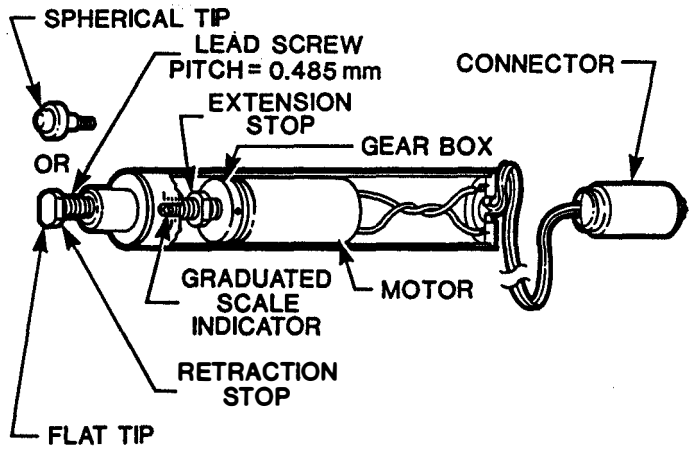


Fig. 2 Motor Mike™ Components

You can operate any Motor Mike™ with one of the following Oriel Controllers, or build your own controller:

18002 Hand held controller for pinpoint positioning of a single Motor Mike™.

18006 Hand held controller for scanning and positioning of a single Motor Mike™.

18000 Joystick controller for three Motor Mikes™.

18005 Controller for scanning and positioning two Motor Mikes™.

For information on Oriel Motor Mike™ actuators operated by these controllers, refer to the Controller Operation Manual. If you want to build your own controller, contact the Oriel Sales Department for further technical details on Motor Mikes™.

Oriel controllers drive these actuators by applying a voltage to the integral 12V DC motor. (Normally the speed of the actuator will then depend on the load, and if the load changes the speed will also change.) Oriel controllers ensure that the actuator runs at a constant speed, independent of the load, by sensing the speed dependent back EMF of the motor and regulating the drive voltage for constant back EMF.

Fig. 3 shows the maximum regulated speed against the load for 18008 - 18010 Controllers. If, for example, your load is 8 kgf, then the maximum regulated speed will be ~ 180 mm/s. You can operate the Motor Mike™ with this controller, at any speed to this limiting value.

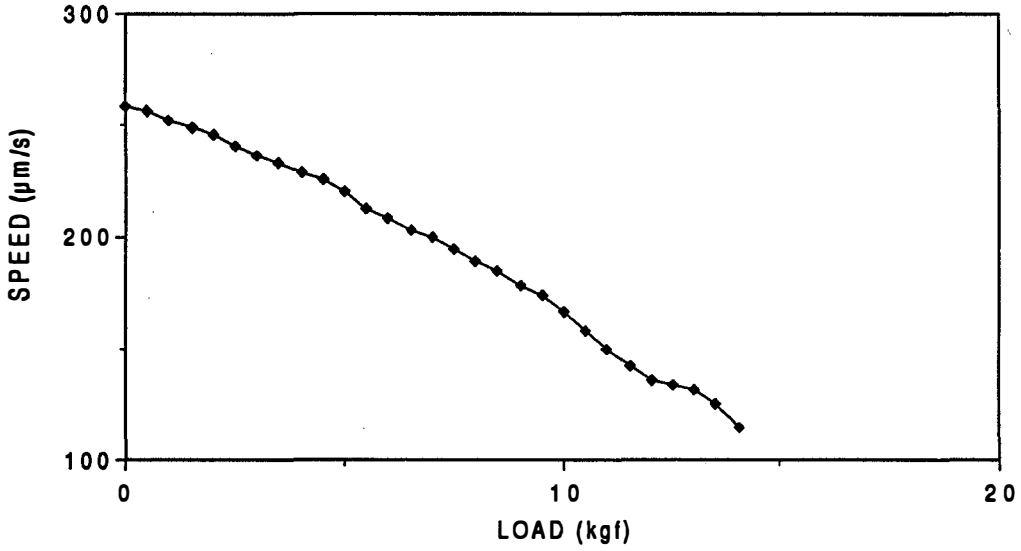


Fig. 3 Typical Speed Limit vs. Load Curve of Motor Mikes™.

Load, what do we mean?

The load cited in the limiting speed vs. load curve, Fig. 3, is the load directed against the forward movement of the actuator. This is not the same as the mass on a **horizontal** translator driven by the actuator. The maximum recommended load is 15 kgf, while the translator could carry several hundred kg.

The actual load presented by a horizontal translator (or rotator) depends on the translator springs and the bearing design. Ideal bearings with low rolling friction, produce only a small additional load. Ball bearings become slightly distorted and if the translator is heavily loaded, the balls make small plastic and sometimes permanent indentations in the bearing surfaces. (Roller bearings are better for heavy loads as the load is distributed over a larger area.) Usually the stationary load is higher than the dynamic load. The load presented by a stationary, heavily loaded horizontal translator should be measured to determine whether these actuators are suitable.

With a **vertical** translator, the 15 kgf maximum means that the maximum mass on the translator (including the translator stage) should be 13.5 kgf. Translator springs typically produce 1.5 kgf.

II

SPECIFICATIONS

Maximum Linear Speed:	270 µm/s
Minimum Linear Speed*:	0.5 µm/s
Backlash:	< 6 µm
Maximum Recommended Load**:	15 kgf
Temperature Range:	0 - 65 °C
Vacuum Compatibility:	Units may be operated at pressures $<10^{-6}$ Torr. Standard units contain some outgassing materials so pumping is required.

* With Oriel Controllers using back EMF speed regulation.
** Refer to Section I for clarification of load specifications.

III

MOTOR MIKE™ OPERATION

The performance of any precision positioner depends on proper design and integration of the

- Controller
- Actuator
- Driven System

Ensure that these actuators are not side loaded, and that the bearing surface is chosen correctly, i.e. spherical Motor Mike™ tip on hardened flat or flat Motor Mike™ tip onto hardened sphere.

1. Check that the Motor Mike™ hub matches the micrometer being replaced or the mating part into which it is being installed. Check that the proper tip, flat or spherical, is being used.

2 Install the Motor Mike™ in the mating part using appropriate hardware. Check the mechanical configuration for sturdiness. Where a set screw is used to secure the Motor Mike™, check that the set screw is tight enough to prevent the motor from being forced out of its mount under load, but do not overtighten.

3 Connection to Oriel Controllers:

a Connect the Motor Mike™ cable to the Controller cable. **Make sure the connections are properly seated before applying power.** We supply 2.0 foot (610 mm) long cables with Motor Mikes™, and 6.0 foot (1.8 m) long cables with controllers. You can use cables up to 100 feet (30.5 m) in length with some loss in performance.

b Turn on the switch. If the actuator runs in the opposite direction, the cables are connected upside down. Turn the switch off, disconnect the cables, and reconnect correctly.

IV

DO'S AND DON'TS

1 **Highest Resolution Operation**
To reach a precise position with an Oriel Controller, run the actuator close to the position, turn off the drive, and set the speed control for low speed. Using the jog button (i.e., short voltage pulses) move the actuator to the final position.

2 **Backlash**
Like all mechanical assemblies, Motor Mikes™ exhibit backlash. This can be as much as 6 μm (but is usually 2 to 4 μm). This means that after you have driven to a point and reversed the motor, the motor turns but the spindle does not move until the gear backlash is taken out. High resolution is best achieved by approaching the desired point from one direction. If you overshoot the set point, back up at least 10 μm, and re-approach from the original direction.

The backlash is repeatable to 0.1 μm under constant load/drive conditions.

3 These Motor Mikes™ have hard stops at the end of travel, in either direction. They can be driven against these internal or external stops for extended periods without damage when operated by an Oriel Controller (provided the appropriate input voltage level is not exceeded).

4 Do not rotate the spindle manually against the motor. This will destroy the mechanism.

5 Fig. 4 shows the recommended technique for driving a translator. The tip should push against a hard, smooth, bearing surface to prevent brinelling. (The tips are interchangeable.)

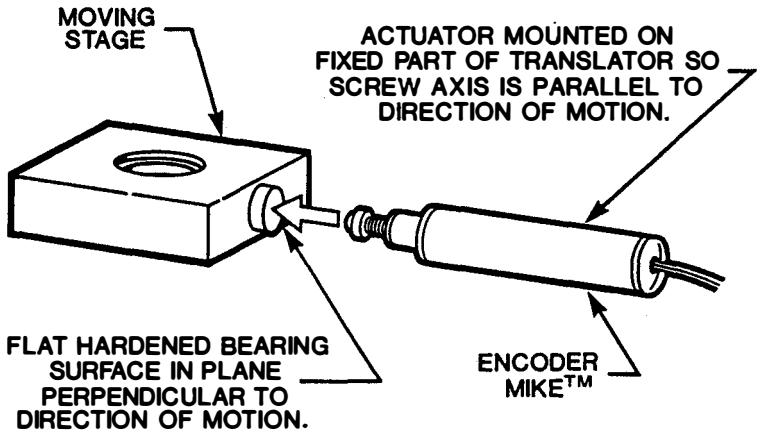


Fig. 4 Recommended technique for driving a translator with a Motor Mike™.

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