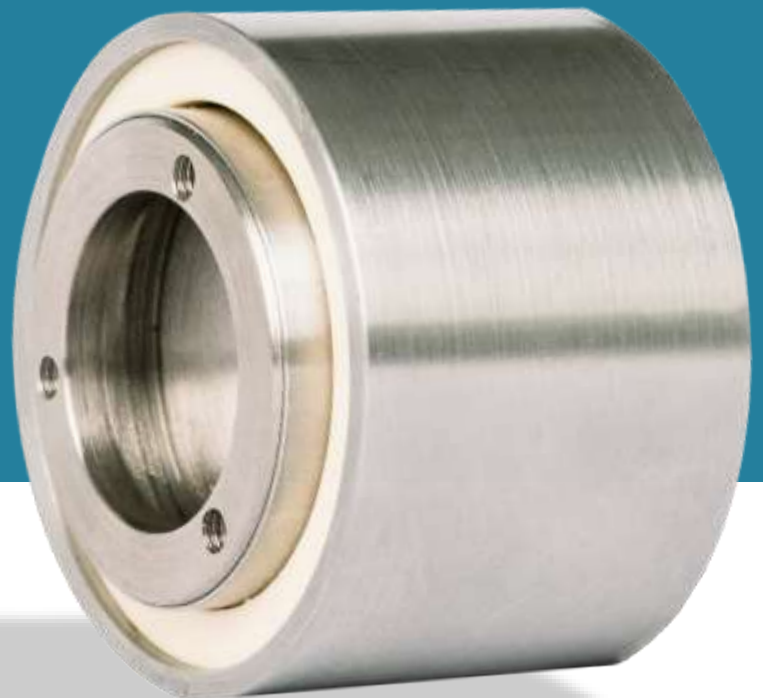


**MAGNETIC  
INNOVATIONS**

# LINEAR VOICE COIL ACTUATOR & CONTROLLER

MI-MMA / MI-MMB  
Series



**the direct drive  
motor company**

# MOVING MAGNET VOICE COIL ACTUATOR

## Are you having problems with?

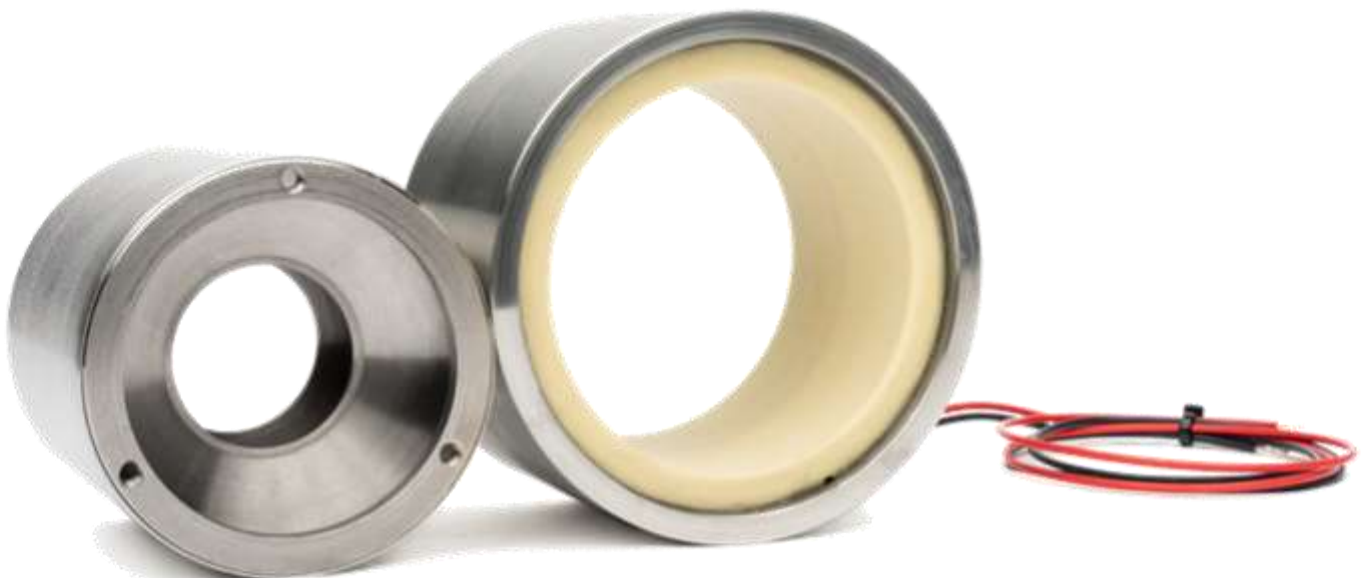
- High system cost
- High maintenance cost
- Moving wires, causing system failure
- Control complexity
- Poor motor life

## If so, you are looking for our Voice Coil Actuators!

The design of the Moving Magnet Voice Coil Actuators have been proven in various high end industrial equipment. These actuators can be applied frequently where high speed and high force density are required.

Key parameters of our motor Moving Magnet Voice Coil Actuators are:

- Compact design
- No heat load on the moving part
- Suitable for vacuum environments
- High peak and continuous force possible
- Low maintenance cost
- Very high acceleration
- High reliability and lifetime due to the absence of moving wires
- A fair price



# WORKING PRINCIPLE

Voice coil actuators have been around for many years, it is a type of direct drive linear motor. It consists of a permanent magnet assembly (permanent magnets and ferrous steel) and a coil assembly. Actuators are used for a wide range of applications. They compete most directly against rotary motors with spindles and pneumatic actuators.

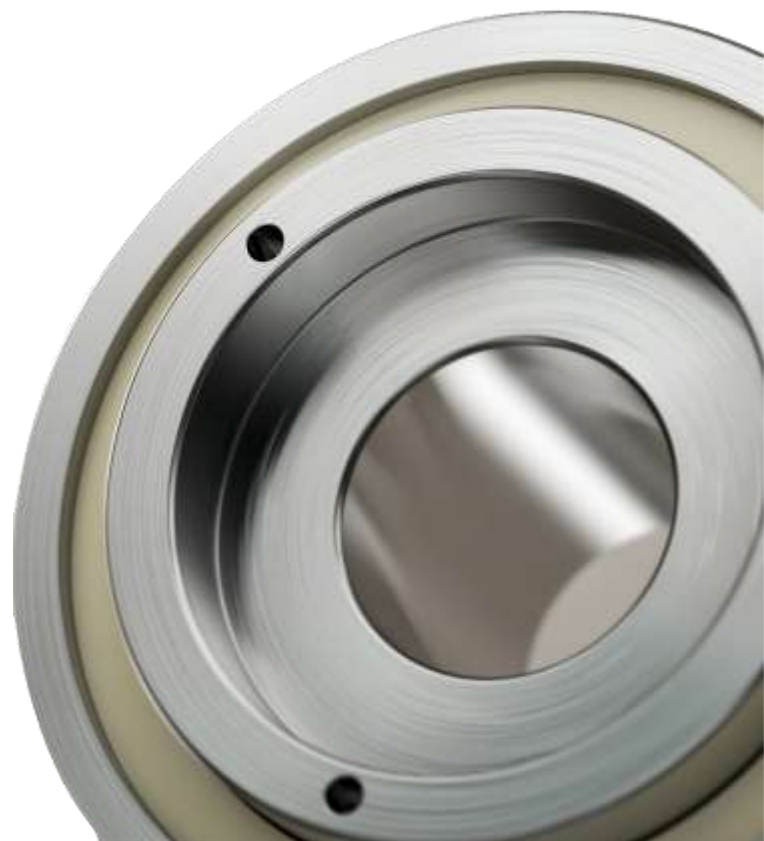
Voice Coil Actuators can be designed in different ways. The type that most professionals are familiar with are the moving coil type actuators. But another type of actuator is winning in popularity, the moving magnet design. With this actuator the coil is fixed and magnet assembly moves.

## Moving Magnet Voice Coil Actuator

The working principle of the Moving Magnet Voice Coil Actuator is that the moving part is a magnet. The coils are attached to the static part of the actuator which enables a good thermal path. In the basics this actuator, operates as a linear single phase DC-motor.

A key advantage of a moving magnet voice coil actuator is that they are very reliable and durable. This is, in comparison to moving coil Actuators, due to the lack of moving wires. Compared to other electric actuators motors with gearboxes, they:

- Can accelerate quickly and then come to a gentle stop at a very precise point.
- Are compact.
- Have zero mechanical wear.
- Have no backlash.
- Have zero mechanical friction.



# MI-MMA SERIES - FRAMELESS

With a Frameless Moving Magnet Voice Coil Actuator you can count on a motor with high speed, high force density, high reliability and a long lifetime. This frameless actuator family allows for a free choice of external guiding system depending on the required linear accuracy of the system. The absence of moving wires leads to a very high reliability and does not limit the achievable accelerations and speeds.

## MMA Actuator Series Performance Parameters

Parameters	Unit	1525	1555	3070	5536	9054	240-380
OD <sup>1</sup>	mm	15	15	30	55	90	240
Height <sup>1</sup>	mm	25	55	70	36	54	380
Stroke <sup>1</sup>	mm	5	18	25	8	12	36
F continuous middle position	N	2.6 <sup>2</sup>	2.6 <sup>2</sup>	16.6 <sup>2</sup>	39 <sup>2</sup>	140 <sup>2</sup>	2909 <sup>4</sup>
F peak	N	6.2 <sup>3</sup>	6.2 <sup>3</sup>	60 <sup>3</sup>	131 <sup>3</sup>	605 <sup>3</sup>	11151 <sup>5</sup>
Maximum operating Voltage	Vdc	48	48	48	48	48	400
Moving mass	Kg	0.0063	0.0175	0.090	0.175	0.700	51.5

<sup>1</sup> Standard range. Other dimensions and force ranges available upon request.

<sup>2</sup> Continuous force at 40°C ambient and 120°C coil temperature

<sup>3</sup> Peak force for 5 sec. at 25°C ambient and 120 °C coil temperature

<sup>4</sup> Continuous force at 20°C ambient and max 110°C coil temperature

<sup>5</sup> Peak force for 5 sec. at 20°C ambient and max 110 °C coil temperature

## Features Moving Magnet Voice Coil Actuator

- High force Density
- Low power
- High reliability and lifetime
- Single-phase DC
- Bi-directional
- Moving Magnet technology
- Frameless (external guiding is required)



Mechanical drawings are available upon request.

# MI-MMB SERIES - WITH SLIDE BEARING

This is our most complete actuator, it comes with an integrated bearing systems. The Moving Magnet Voice Coil Actuator can support high positioning resolutions in combination with external position sensors and motion controllers. In the basics this actuator, operates as a linear single phase DC-motor.

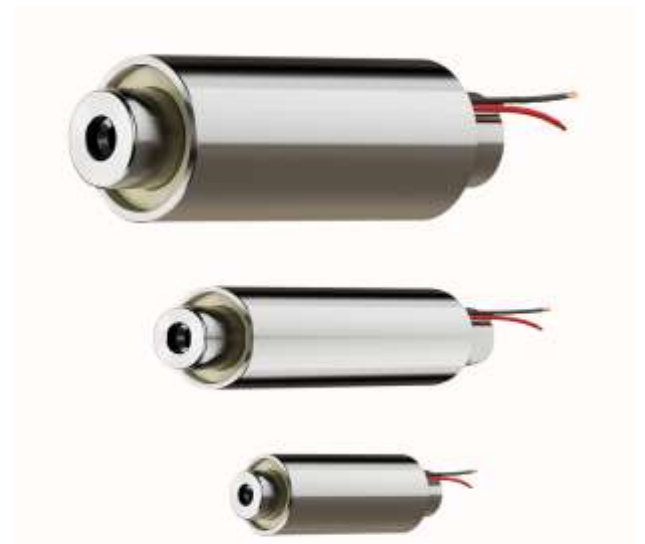
## MMB Actuator Series Performance Parameters

Parameters	Unit	1525	1555	3070	4090	5536	9054
OD <sup>1</sup>	mm	15	15	30	40	55	90
Height <sup>1</sup>	mm	25	55	70	90	36	54
Stroke <sup>1</sup>	mm	5	18	25	35	8	12
F continuous middle position <sup>2</sup>	N	2	2	13	29.7	31	110
F peak <sup>3</sup>	N	6	6	60	123	131	605
Maximum operating Voltage	Vdc	48	48	48	48	48	48
Moving mass	Kg	0.0063	0.0175	0.090	0.256	0.175	0.700

<sup>1</sup> Standard range. Other dimensions and force ranges available upon request.

<sup>2</sup> Continuous force at 40°C ambient and 90°C coil temperature

<sup>3</sup> Peak force for 10 sec. at 25°C ambient and max. 90°C coil temperature



Mechanical drawings are available upon request.

# MOVING MAGNET VCA CONTROLLER

Magnetic Innovations' Moving Magnet VCA MMB series are matched with a dedicated motor controller which is able to establish sensorless position control (no external encoder required). Hence only 2 wires are required to power and position control the actuator. The controller is an encoder and drive in one package at the size of a matchbox which can power Moving Magnet VCA's up to 1kW.

## Single phase 2-wire VCA Drive

Customers are able to program their required motion patterns into the motor controller utilizing a HMI running on a PC. After programming the motor controller one is able to save all data onboard in non-volatile memory and the MI Moving Magnet VCA will operate standalone after power up. Activation and de-activation of the motion pattern is invoked by controlling digital inputs, allowing for simple integration with customer specific applications.



### Motion patterns

Available motion patterns (executed motion with configurable filter settings to omit high frequent content):

- Sinusoidal point-to-point movement with specific frequency
- Triangular point-to-point movement
- Block point-to-point movement
- Point-to-point movement

Two configurable analog inputs allow for external analog control of current, position and 2 configurable analog outputs allow for remote monitoring of a variety of parameters (among which position, velocity, temperature, force, etc.).

## Features VCA Motor Controller

- No encoder required.
- 2-wire actuator control.
- 48Vdc, 340W drive power.
- Digital I/O (4+5).
- Configurable Analog inputs (2) & outputs (2).
- Compatible w/all MI MMB Series Moving Magnet VCA's.
- Canbus & Analog interface.
- Small in size: 100mm x 65mm x 21mm.
- HMI included.



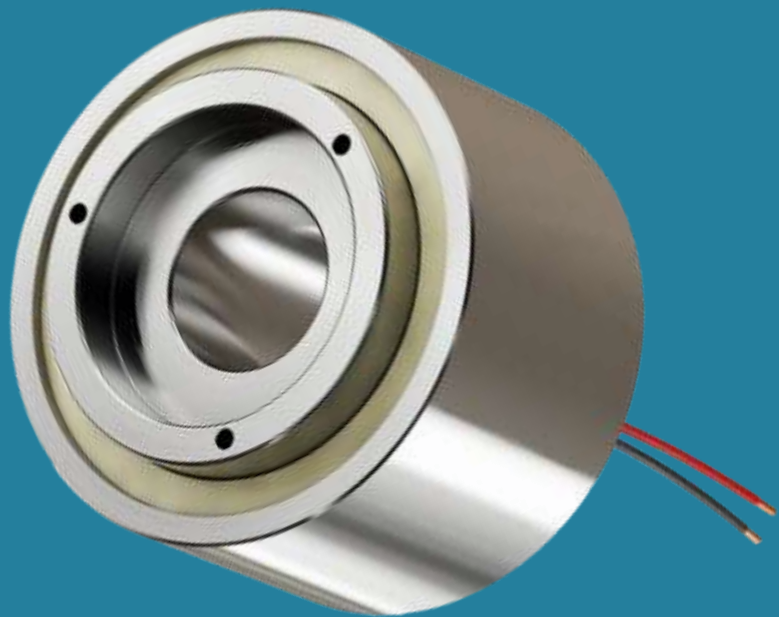
Evaluation kits are available for most actuator/controller combinations.  
Contact Magnetic Innovations for more details!

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INNOVATIONS**

the direct drive  
motor company

# GO DIRECT DRIVE!

Compact actuator design with  
high dynamic capability and high  
force density to suit your linear  
motion system



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