

MagSpring®

Magnetic Spring



MagSprings, unlike mechanical springs, deliver a constant force over their entire working range



MagSpring, consists of only two components: a stator and a slider



MagSprings are totally passive. Their operation is based entirely on a unique application of permanent magnets - no electricity at all.

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MagSpring M01-20

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MagSpring

MagSpring products can best be described as "magnetic springs." The term "spring", however, is to be understood to mean that MagSpring components generate a constant force over their entire working range, while the characteristic curve for a typical mechanical spring shows an increase in force with increasing displacement. The generation of force that is independent of the stroke makes MagSprings preferable for balancing weight forces in vertical drive applications.

Mode of Operation

The mode of operation is based on the attractive force of permanent magnets. Accordingly, no energy source (electricity, compressed air, etc.) is needed, so that safety-related applications can also be addressed. The special design of the flow-guiding components and the magnets translates the strongly non-linear relationship between force and displacement in magnet-iron arrangements into a constant force curve. Depending on the strength class of the MagSpring, the permanent magnets are either in the stator, in the slider, or in both components. The slider is guided by an integrated plain bearing, so that MagSprings can be used comparably to gas pressure springs in a design.



Weight Load Compensation

Linear motors and other direct drives must provide a constant force in vertical orientations, in order to oppose the weight load.

Using a MagSpring installed in parallel with the linear motor, this weight load can be passively balanced. The linear motor is then only used for the actual positioning operation and dynamic forces, and can therefore be correspondingly smaller in design.

Application of Constant Force

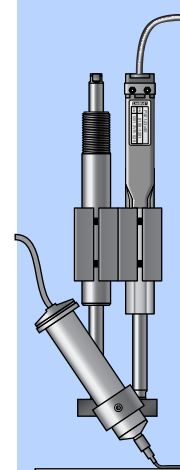
Thanks to the constant force-displacement curve, many other applications are possible, such as the generation of a constant



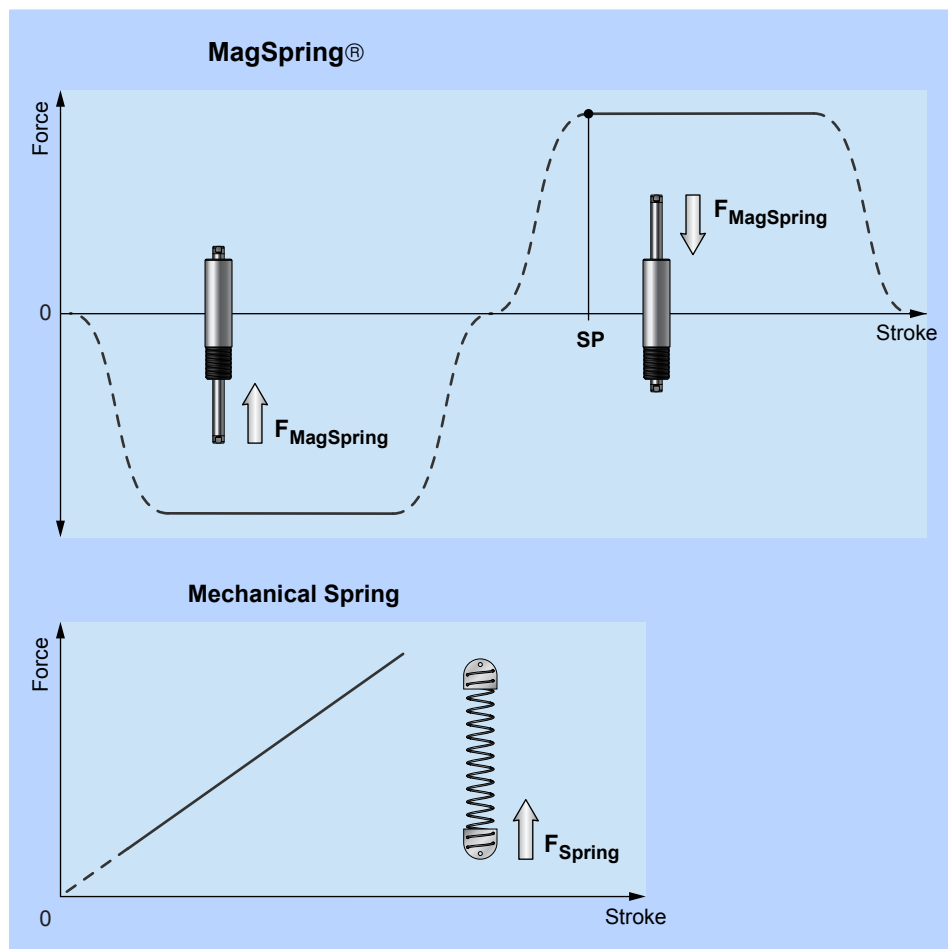
press force, regardless of position; application of a constant holding force across a large stroke range; or single-sided force support in drive applications.

The effective force is in the range of +/- 10% of the nominal force, due to material and manufacturing tolerances.

Holding Function (Power Off)



Since MagSprings are purely passive elements, a defined function or position of a device can be ensured in a power-off condition. For example, a gripper or press head on a vertical mount can be held up, or a slider can be pushed in or pulled out with a constant force.



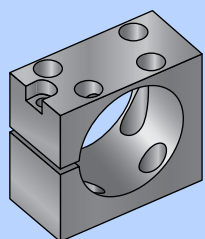
Working Range

In the relaxed state, the slider is approximately centered in the stator, while the working end of the slider extends somewhat out of the end of the stator. Fundamentally, however, both ends of the slider can be used to mount loads. From this rest position, the slider can be pulled or pushed out of the stator in both directions. The force in

creases from zero to the nominal force within a short stroke length. The working stroke then continues with a constant force. The start position (SP) describes the distance between the working end of the slider and the end of the stator at the beginning of the constant force range.

Mounting

The stators can be mounted via the screw thread, or with a clamp, as desired. There are appropriate mounting flanges for both sizes. When attaching the slider to the load mass, care should be taken that any parallelism errors are compensated for with a flexible coupler.



Combination with H-Guides

The above illustration shows a vertical arrangement of an H01 linear guide together with a MagSpring. The MagSpring presses upward with a constant force. The weight load is balanced by the MagSpring, and the linear motor thus bears less load.

If the electrical power supply is interrupted, the MagSpring supports the load, or moves it into a safe waiting position.

Materials



Slider:
Chromium-Nickel Steel 1.4301

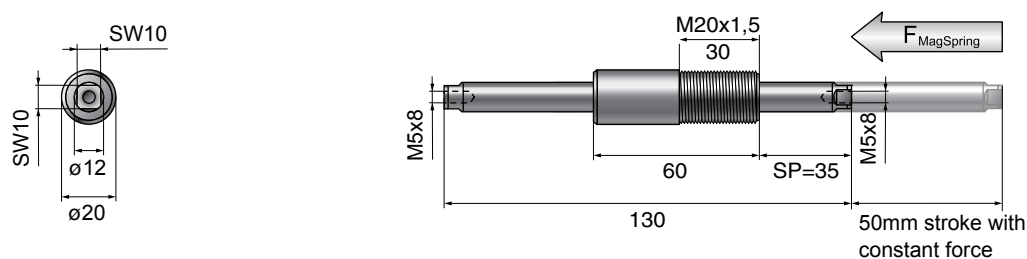


Stator:
Iron, electroless nickel plated



Bearing:
POM based

M01-20x60/50: Force 11-22N / Stroke 50mm

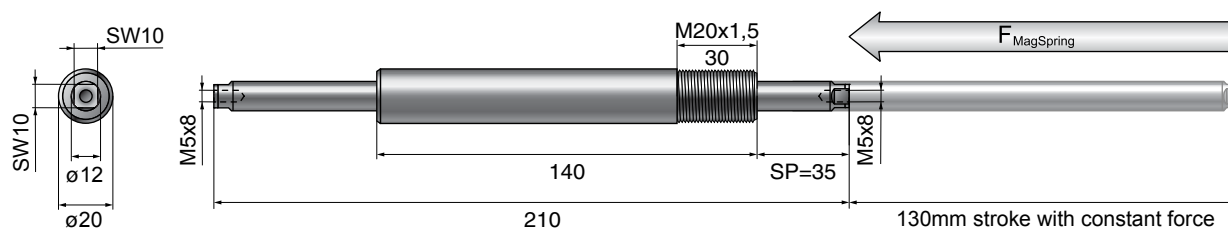


Dimensions in mm

The MagSpring has a constant force, as soon as the slider has been pulled out or pushed by the distance SP. The distance SP is measured between the unmarked slider end and the end of the stator (threaded end).

MagSpring	Constant force [N]	Stator mass [g (lb)]	Slider mass [g (lb)]
M01-20x60/50-11	11	75 (0.16)	75 (0.16)
M01-20x60/50-17	17	75 (0.16)	75 (0.16)
M01-20x60/50-22	22	75 (0.16)	75 (0.16)

M01-20x140/130: Force 11-22N / Stroke 130mm

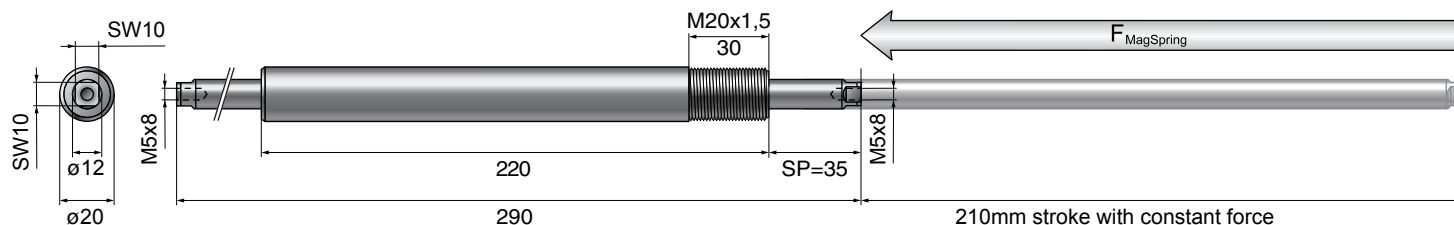


Dimensions in mm

The MagSpring has a constant force, as soon as the slider has been pulled out or pushed by the distance SP. The distance SP is measured between the unmarked slider end and the end of the stator (threaded end).

MagSpring	Constant force [N]	Stator mass [g (lb)]	Slider mass [g (lb)]
M01-20x140/130-11	11	180 (0.39)	155 (0.34)
M01-20x140/130-17	17	180 (0.39)	155 (0.34)
M01-20x140/130-22	22	180 (0.39)	155 (0.34)

M01-20x220/210: Force 11-22N / Stroke 210mm

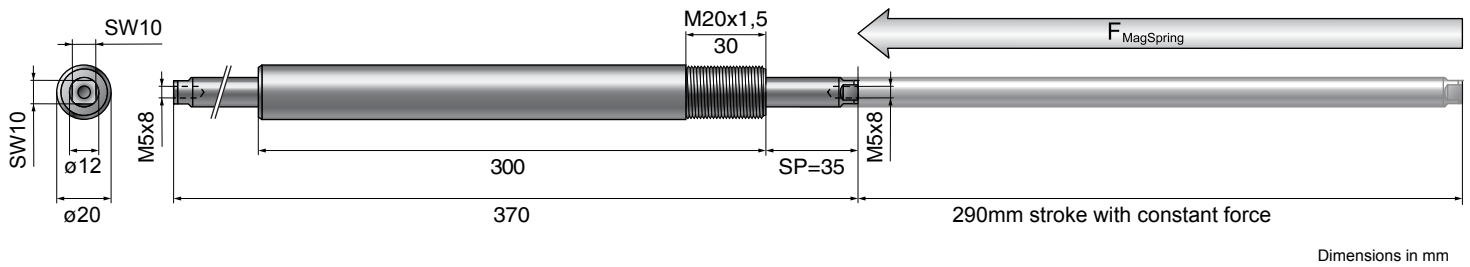


Dimensions in mm

The MagSpring has a constant force, as soon as the slider has been pulled out or pushed by the distance SP. The distance SP is measured between the unmarked slider end and the end of the stator (threaded end).

MagSpring	Constant force [N]	Stator mass [g (lb)]	Slider mass [g (lb)]
M01-20x220/210-11	11	285 (0.62)	220 (0.49)
M01-20x220/210-17	17	285 (0.62)	220 (0.49)
M01-20x220/210-22	22	285 (0.62)	220 (0.49)

M01-20x300/290: Force 11-22N / Stroke 290mm



The MagSpring has a constant force, as soon as the slider has been pulled out or pushed by the distance SP.
The distance SP is measured between the unmarked slider end and the end of the stator (threaded end).

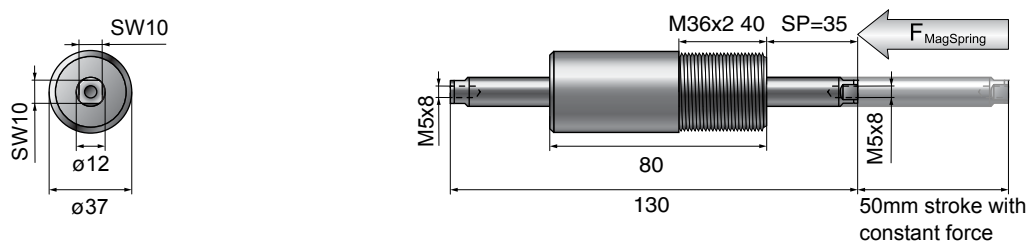
MagSpring	Constant force [N]	Stator mass [g (lb)]	Slider mass [g (lb)]
M01-20x300/290-11	11	388 (0.86)	280 (0.61)
M01-20x300/290-17	17	388 (0.86)	280 (0.61)
M01-20x300/290-22	22	388 (0.86)	280 (0.61)



Ordering Information

M01-20x60/50		MagSpring M01-20 with 50mm stroke		
Stator	MS01-20x60	MagSpring Stator 20x60mm		0250-2200
Slider	ML01-12x130/80-10	Slider for MagSpring M01-20x60/50, Force 11N		0250-2300
	ML01-12x130/80-15	Slider for MagSpring M01-20x60/50, Force 17N		0250-2308
	ML01-12x130/80-20	Slider for MagSpring M01-20x60/50, Force 22N		0250-2301
M01-20x140/130		MagSpring M01-20 with 130mm stroke		
Stator	MS01-20x140	MagSpring Stator 20x140mm		0250-2201
Slider	ML01-12x210/160-10	Slider for MagSpring M01-20x140/130, Force 11N		0250-2302
	ML01-12x210/160-15	Slider for MagSpring M01-20x140/130, Force 17N		0250-2309
	ML01-12x210/160-20	Slider for MagSpring M01-20x140/130, Force 22N		0250-2303
M01-20x220/210		MagSpring M01-20 with 210mm stroke		
Stator	MS01-20x220	MagSpring Stator 20x220mm		0250-2202
Slider	ML01-12x290/240-10	Slider for MagSpring M01-20x220/210, Force 11N		0250-2304
	ML01-12x290/240-15	Slider for MagSpring M01-20x220/210, Force 17N		0250-2310
	ML01-12x290/240-20	Slider for MagSpring M01-20x220/210, Force 22N		0250-2305
M01-20x300/290		MagSpring M01-20 with 290mm stroke		
Stator	MS01-20x300	MagSpring Stator 20x300mm		0250-2207
Slider	ML01-12x370/320-10	Slider for MagSpring M01-20x300/290, Force 11N		0250-2311
	ML01-12x370/320-15	Slider for MagSpring M01-20x300/290, Force 17N		0250-2312
	ML01-12x370/320-20	Slider for MagSpring M01-20x300/290, Force 22N		0250-2313

M01-37x80/50: Force 40-60N / Stroke 50mm

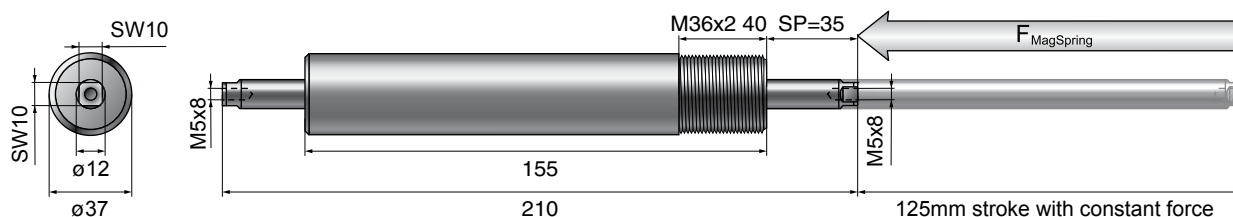


Dimensions in mm

The MagSpring has a constant force, as soon as the slider has been pulled out or pushed by the distance SP. The distance SP is measured between the unmarked slider end and the end of the stator (threaded end).

MagSpring	Constant force [N]	Stator mass [g (lb)]	Slider mass [g (lb)]
M01-37x80/50-40	40	440 (0.90)	75 (0.16)
M01-37x80/50-50	50	440 (0.90)	75 (0.16)
M01-37x80/50-60	60	440 (0.90)	75 (0.16)

M01-37x155/125: Force 40-60N / Stroke 125mm

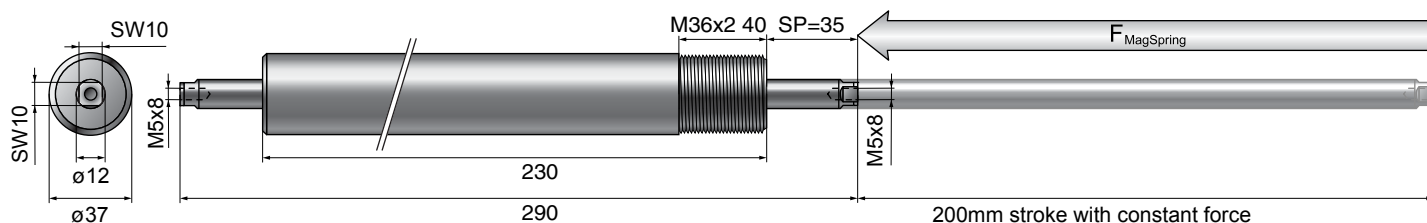


Dimensions in mm

The MagSpring has a constant force, as soon as the slider has been pulled out or pushed by the distance SP. The distance SP is measured between the unmarked slider end and the end of the stator (threaded end).

MagSpring	Constant force [N]	Stator mass [g (lb)]	Slider mass [g (lb)]
M01-37x155/125-40	40	880 (1.80)	155 (0.34)
M01-37x155/125-50	50	880 (1.80)	155 (0.34)
M01-37x155/125-60	60	880 (1.80)	155 (0.34)

M01-37x230/200: Force 40-60N / Stroke 200mm

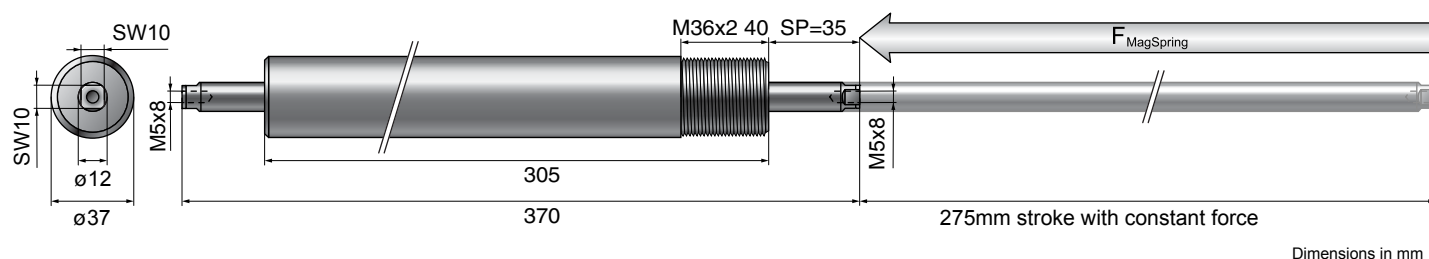


Dimensions in mm

The MagSpring has a constant force, as soon as the slider has been pulled out or pushed by the distance SP. The distance SP is measured between the unmarked slider end and the end of the stator (threaded end).

MagSpring	Constant force [N]	Stator mass [g (lb)]	Slider mass [g (lb)]
M01-37x230/200-40	40	1320 (2.70)	220 (0.49)
M01-37x230/200-50	50	1320 (2.70)	220 (0.49)
M01-37x230/200-60	60	1320 (2.70)	220 (0.49)

M01-37x305/275: Force 40-60N / Stroke 275mm



The MagSpring has a constant force, as soon as the slider has been pulled out or pushed by the distance SP. The distance SP is measured between the unmarked slider end and the end of the stator (threaded end).

MagSpring	Constant force [N]	Stator mass [g (lb)]	Slider mass [g (lb)]
M01-37x305/275-40	40	1800 (3.90)	280 (0.61)
M01-37x305/275-50	50	1800 (3.90)	280 (0.61)
M01-37x305/275-60	60	1800 (3.90)	280 (0.61)

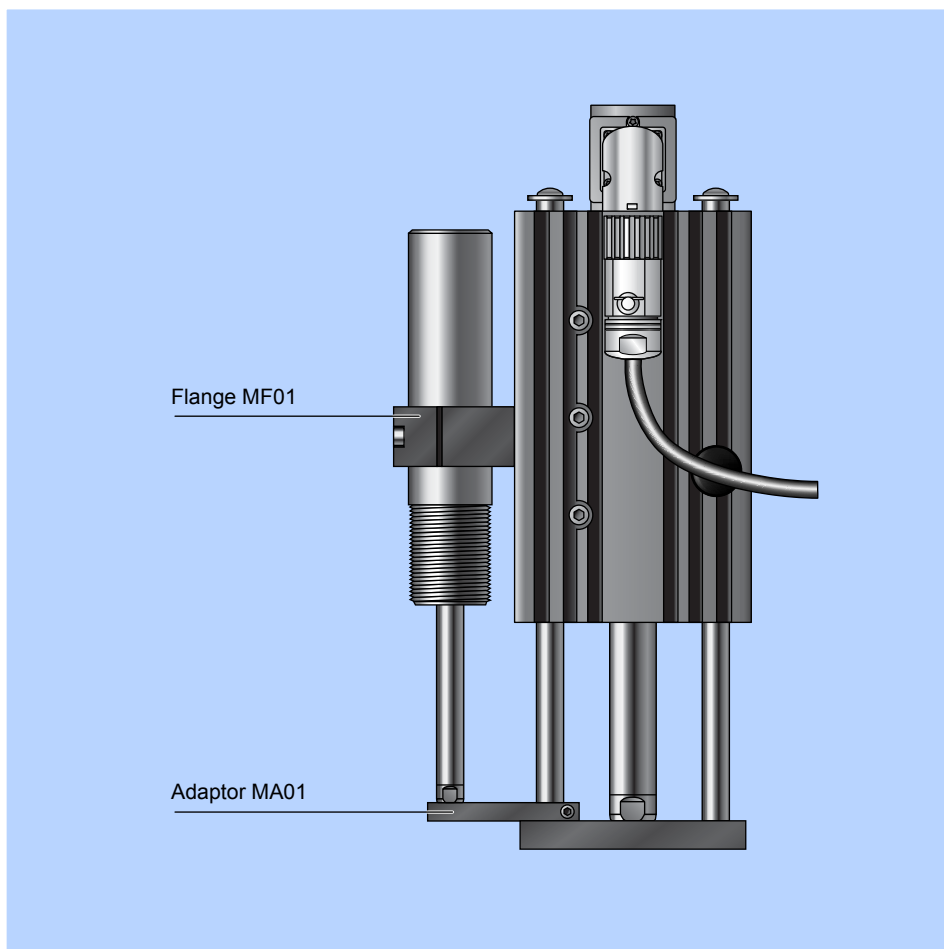


Ordering Information

M01-37x80/50				
MagSpring M01-37 with 50mm stroke				
Stator	MS01-37x80	MagSpring Stator 37x80mm		0250-2203
Slider	ML01-12x130/80-10	Slider for MagSpring M01-37x80/50, Force 40N		0250-2300
	ML01-12x130/80-15	Slider for MagSpring M01-37x80/50, Force 50N		0250-2308
	ML01-12x130/80-20	Slider for MagSpring M01-37x80/50, Force 60N		0250-2301
M01-37x155/125				
MagSpring M01-37 with 125mm stroke				
Stator	MS01-37x155	MagSpring Stator 37x155mm		0250-2204
Slider	ML01-12x210/160-10	Slider for MagSpring M01-37x155/125, Force 40N		0250-2302
	ML01-12x210/160-15	Slider for MagSpring M01-37x155/125, Force 50N		0250-2309
	ML01-12x210/160-20	Slider for MagSpring M01-37x155/125, Force 60N		0250-2303
M01-37x230/200				
MagSprings M01-37 with 200mm stroke				
Stator	MS01-37x230	MagSpring Stator 37x230mm		0250-2205
Slider	ML01-12x290/240-10	Slider for MagSpring M01-37x230/200, Force 40N		0250-2304
	ML01-12x290/240-15	Slider for MagSpring M01-37x230/200, Force 50N		0250-2310
	ML01-12x290/240-20	Slider for MagSpring M01-37x230/200, Force 60N		0250-2305
M01-37x305/275				
MagSprings M01-37 with 275mm stroke				
Stator	MS01-37x305	MagSpring Stator 37x305mm		0250-2206
Slider	ML01-12x370/320-10	Slider for MagSpring M01-37x305/275, Force 40N		0250-2311
	ML01-12x370/320-15	Slider for MagSpring M01-37x305/275, Force 50N		0250-2312
	ML01-12x370/320-20	Slider for MagSpring M01-37x305/275, Force 60N		0250-2313

Accessories

Mounting flanges and adapters are available for mounting MagSpring magnetic springs. Using these accessories, the magnetic springs can be mounted directly on an H01 linear guide or a B01 bridge guide.



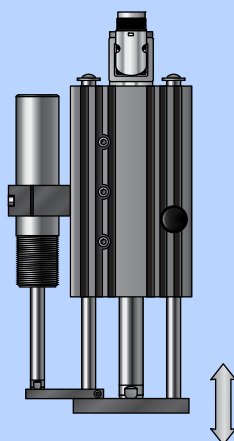
Mounting

The flange for mounting the MagSpring stators is secured with T-nuts in the T-slot provided for this purpose on the linear or bridge guide.

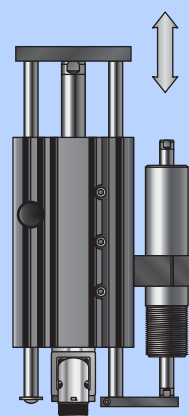
For weight balancing in vertical installations, the lower slider end of the MagSpring is attached to the guide shaft of the guide using the adapter.

Depending on the installation orientation of the guide, the adapter is attached to the guide shaft at the front mounting plate (motor on top) or the rear end of the guide shaft (motor on the bottom).

Motor on the top



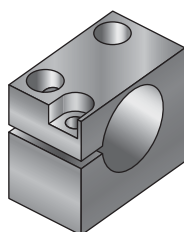
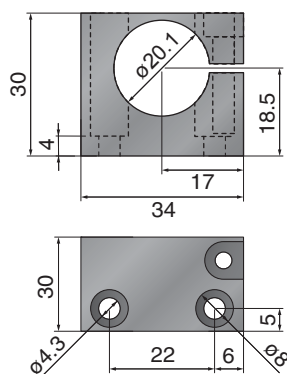
Motor on the bottom



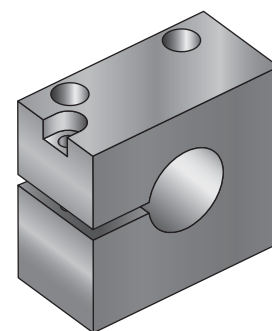
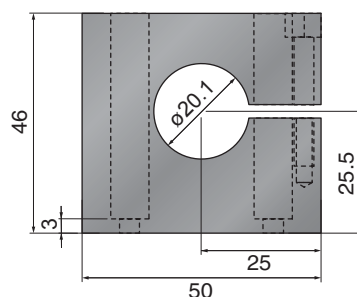
Flange and Adaptor for MagSpring



Flanges for MagSpring M01-20



MF01-20/H23



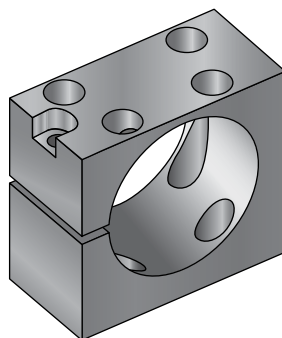
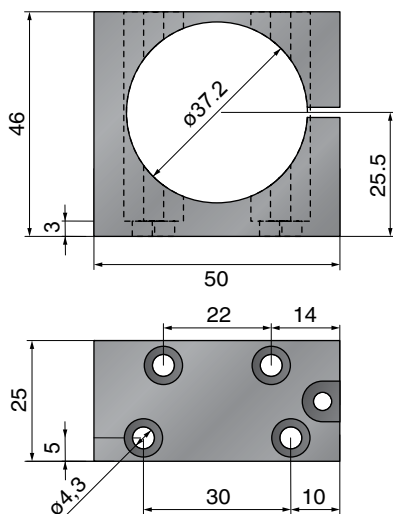
MF01-20/H37

Material: Aluminum (AlMgSi), black anodized
 Mass: MF01-20/H23 approx. 30g (0.066lb)
 MF01-20/H37 approx. 125g (0.276lb)

Dimensions in mm

Item	Description	Part Number
MF01-20/H23	Flange MagSpring M01-20 - fits guides H01-23	0250-2306
MF01-20/H37	Flange MagSpring M01-20 - fits guides H01-37	0250-2315

Flange for MagSpring M01-37

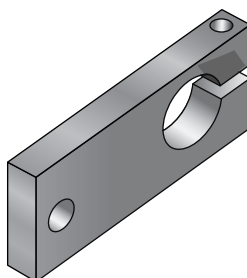
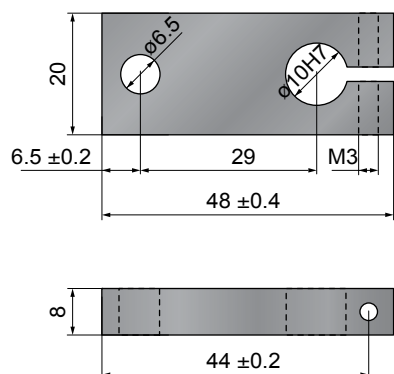


Material: Aluminum (AlMgSi), black anodized
 Mass: approx. 70g (0.15lb)

Dimensions in mm

Item	Description	Part Number
MF01-37/H37	Flange MagSpring M01-37 - fits guides H01-37 and B01-37 - fits guides H01-48 and B01-48	0250-2307

Adaptor for MagSpring M01-20 and Guides H01-23

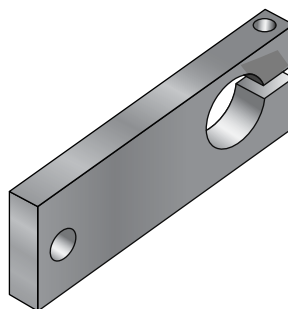
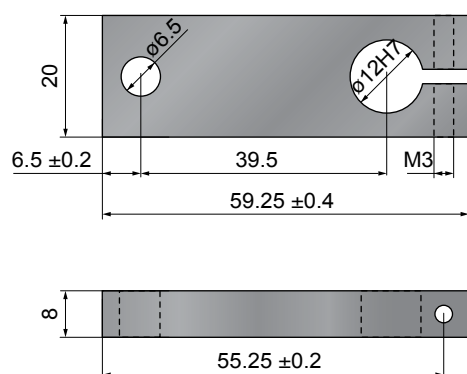


Material: Aluminum (AlMgSi), black anodized
Mass: approx. 18g (0.066lb)

Dimensions in mm

Item	Description	Part Number
MA01-20/H23	Adaptor MagSpring M01-20 / Guides H01-23	0250-0116

Adaptor for MagSpring M01-37 and Guides H01-37 / B01-37

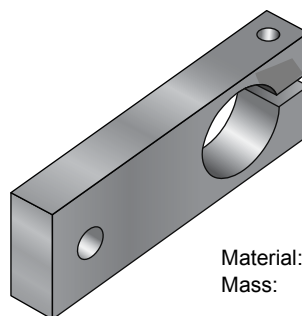
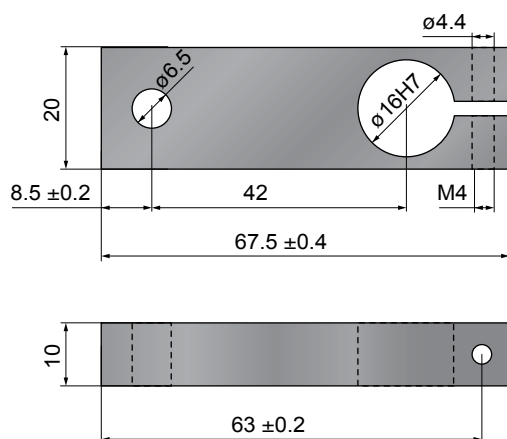


Material: Aluminum (AlMgSi), black anodized
Mass: approx. 18g (0.066lb)

Dimensions in mm

Item	Description	Part Number
MA01-37/H37	Adaptor MagSpring M01-37 / Guides H01-37 and B01-37	0250-0117

Adaptor for MagSpring M01-37 and Guides H01-48 / B01-48



Material: Aluminum (AlMgSi), black anodized
Mass: approx. 32g (0.034lb)

Dimensions in mm

Item	Description	Part Number
MA01-37/H48	Adaptor MagSpring M01-37 / Guides H01-48 and B01-48	0250-0118

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