

Voice Coil Linear Actuators



Travel	2 inches	[50 mm]
Acceleration	20 G's	20 G's
Peak Force	300 lbs	[1333 N]
Continuous Force	100 lbs	[444 N]
Resolution	.00004" or .0002"	[1 or 5 micron]

H2W Technologies [Non commutated DC Linear \(NC\) Actuators](#) are ideal for short stroke (typically less than 2 inches) closed loop servo applications. Their compact size allows them to fit into small spaces. They have very low electrical and mechanical time constants. The low moving mass allows for high accelerations of light payloads.

These actuators are wound in such a way that no commutation is required for motion to occur (hence the name non commutated). The result is a much simpler and more reliable system.

Coupling the actuators with a bearing system (if not supplied), position feedback device, linear servo amplifier and motion controller yields a system that is capable of intricate position, velocity, and acceleration control. These actuators can also be used for precise force control because of the linear force versus current characteristics.

NC Actuators operate on the principal of the [Lorentz Force Equation](#)

$$\text{Force} = B \times I \quad \text{where: } B = \text{Flux density (Tesla)}$$

$$I = \text{Current (Amps)}$$

Simply stated, a current carrying conductor placed in a magnetic field will have a force exerted upon it. This force is proportional to the direction and magnitude of the current and the flux density field. Since the permanent magnet flux density field is fixed, the direction of the linear displacement depends on the polarity of input current. The amount of force that is produced is directly proportional to the magnitude of the input current.

They are available in both standard as well as custom sizes. You can choose from either the moving magnet ([NCM type](#)) or moving coil type ([NCC Type](#)),

- The moving coil actuators, [NCC Type](#) (sometimes referred to as voice coils) are typically supplied without bearings or a shaft, but can be added if desired. They are generally larger in diameter and shorter in length. Higher forces can be achieved by increasing the diameter. This type of actuator can be designed with large radial clearances to ensure no contact between the coil and magnet assembly if a tilt or radial movement is required.
- The moving magnet actuators, [NCM Type](#) are supplied with bearings and a shaft. This type is generally smaller in diameter and longer in length. Higher forces can be achieved by increasing the number of poles, which increases the length, or by increasing the diameter. The main advantage is that there are no moving leads since the coil assembly is stationary. Optional no power magnetic latching is available at one or both ends of the stroke.

It should be noted that for both types of actuators, longer strokes are available but the efficiency or motor constant (Km) decreases as the stroke increases. This is due to the fact that the motor constant is inversely proportional to the stroke. If higher efficiency is desired for longer stroke actuators, the coil assembly can be wound as a multiphase coil and then it will have to be commutated.

Advantages:

- Small Size, High Force to Weight Ratio
- High Accelerations
- No Cogging or Commutation
- Custom Designs with Quick Turnaround Times
- High Flux Density Neodymium Magnets are Used

Applications:

- Z Axis for Pick and Place Equipment
- Medical Diagnostic Probes and Laser Beam Steering
- Hermetically Sealed Cryo Cooler Actuators
- Mirror Tilt and Focusing Actuators
- Miniature Position Control

Required Electronics:

Because of the very low inductance of the actuator, a DC linear servo amplifier is required to provide power to the [NC Actuator](#). A programmable motion controller is required to close the position loop on the system.

Environmental Considerations:

The NC Actuators should not be mounted in an environment that is wet or excessively dirty or in an environment with ambient temperatures (>50°C).

Mounting:

Mounting holes are provided on the housing, shaft and / or coil assemblies for mounting the actuator to customer supplied base and payload

Maintenance:

No maintenance is required.

Ordering Info:

NC Actuators are available in many different standard and custom sizes, strokes and configurations. Custom actuators can be delivered in 4 to 5 weeks. Standard units are available from stock and can be shipped within 48 hours.

Model # NCABB – CC – DDD – EX

where: A is C for moving coil or M for moving magnet
BB is the stroke (.05 is 0.5 inch)

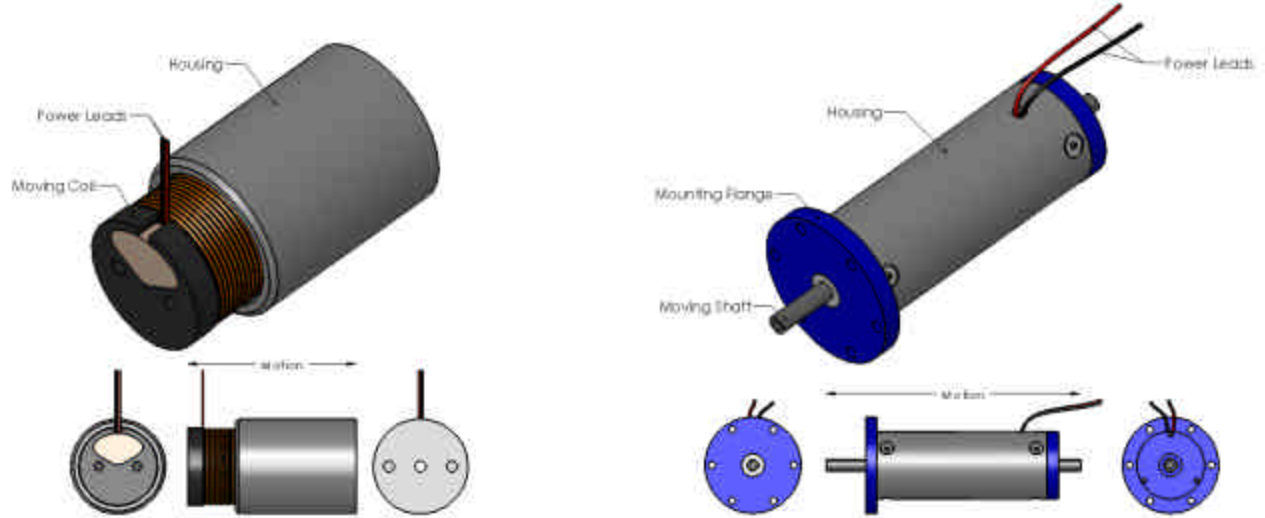
CC is the outside housing diameter (15 is 1.5 inch)

DDD is continuous force in lbs (140 is 14.0 lbs)

E is the number of poles

X is for special options

(I.e. NCC05-15-020-2X is a moving coil actuator with 0.5" stroke, 1.5" OD, 2.0 lbs of continuous force, 2 pole magnet assembly and no special options)



Model #	Stroke	Continuous Force	Peak Force	Km lbs/(watt) ^{0.5}		Outside Diameter (D)	Housing Length (L)
					[N/(watt) ^{0.5}]		
NCC01-04-001-1X	0.05" [1.3 mm]	0.06 lbs [0.3 N]	0.18 lbs [0.9 N]	0.08 [0.35]		0.438" [9.5 mm]	0.36" [9.1 mm]
NCC03-14-010-1SL	0.28" [7.1 mm]	0.8 lbs [3.6 N]	2.40 lbs [10.7 N]	0.35 [1.56]		1.45" [36.8 mm]	1.65" [41.9 mm]
NCC03-15-050-2X	0.25" [6.4 mm]	5.00 lbs [22 N]	15.0 lbs [66 N]	1.38 [6.01]		1.50" [38.1 mm]	1.50" [38.1 mm]
NCC04-10-005-1X	0.41" [10.4 mm]	0.50 lbs [2.2 N]	1.50 lbs [6.6 N]	0.37 [1.65]		0.98" [25 mm]	0.85" [21.5 mm]
NCC05-11-011-1X	0.50" [12.7 mm]	1.10 lbs [4.9 N]	3.30 lbs [14.7 N]	0.67 [2.95]		1.20" [30.5 mm]	1.10" [27.9 mm]
NCC05-18-060-2X	0.50" [12.7 mm]	6.0 lbs [26.4 N]	18.0 lbs [79.2 N]	1.78 [7.83]		1.80" [45.7 mm]	1.95" [50 mm]
NCC06-08-005-2X	0.60" [15.2 mm]	0.50 lbs [2.2 N]	1.50 lbs [6.6 N]	0.37 [1.65]		0.81" [20.6 mm]	1.65" [41.9 mm]
NCC10-15-023-1X	1.00" [25.4 mm]	2.25 lbs [10 N]	6.75 lbs [30 N]	0.81 [3.56]		1.50" [38.1 mm]	1.91" [49 mm]
NCC20-18-020-1X	2.00" [50.8 mm]	2.00 lbs [8.9 N]	6.00 lbs [26.7 N]	0.86 [3.78]		1.50" [38.1 mm]	2.75" [70 mm]
NCC52-20-020-1X	5.20" [132.1 mm]	2.00 lbs [8.9 N]	6.00 lbs [26.7 N]	0.30 [1.32]		2.00" [50.4 mm]	5.90" [150 mm]

Model #	Stroke	Continuous Force	Peak Force	Km lbs/(watt) ^{0.5}		Outside Diameter (D)	Housing Length (L)
					[N/(watt) ^{0.5}]		
NCM02-05-005-4JB	0.15" [3.8 mm]	0.50 lbs [2.2 N]	1.50 lbs [6.6 N]	0.32 [1.41]		0.52" [13.2 mm]	1.67" [42.4 mm]
NCM03-06-005-5JB	0.26" [6.6 mm]	0.50 lbs [2.2 N]	1.50 lbs [6.6 N]	0.38 [1.67]		0.65" [16.5 mm]	3.57" [90.6 mm]
NCM04-25-250-2LVE	0.40" [12.7 mm]	25.0 lbs [80 N]	75.0 lbs [240.3 N]	2.88 [13.1]		3.49" [88.6 mm]	10.21" [259 mm]
NCM05-28-180-2X	0.50" [12.7 mm]	18.0 lbs [80 N]	54.0 lbs [240.3 N]	2.95 [13.1]		2.98" [75.7 mm]	4.75" [121 mm]
NCM05-08-005-2JB	0.50" [12.7 mm]	0.5 lbs [2.2 N]	1.5 lbs [6.6 N]	0.30 [1.32]		0.98" [25 mm]	2.74" [69.5 mm]
NCM05-23-100-3LB	0.50" [12.7 mm]	10.0 lbs [25 N]	30.0 lbs [75 N]	2.08 [6.22]		2.25" [38.1 mm]	4.76" [121 mm]
NCM06-06-004-3JB	0.60" [15.2 mm]	0.40 lbs [1.75 N]	1.20 lbs [5.25 N]	0.15 [0.66]		0.65" [16.5 mm]	2.77" [70.5 mm]
NCM10-15-020-2LB	1.00" [25.4 mm]	2.00 lbs [8.9 N]	6.00 lbs [26.4 N]	1.05 [4.62]		1.50" [38.1 mm]	4.25" [108.0 mm]
NCM15-15-032-2LB	1.50" [38.1 mm]	3.20 lbs [15 N]	9.60 lbs [42.7 N]	0.80 [3.52]		1.50" [38.1 mm]	5.50" [140 mm]
NCM30-25-090-2X	3.00" [76.2 mm]	9.0 lbs [40.1 N]	27.0 lbs [120 N]	1.16 [5.16]		2.50" [63.5 mm]	7.70" [195.6 mm]

*The peak force (@10% Duty) is equal to 3 times the continuous force.

Note: This is a partial listing; other sizes, forces and strokes are available. NCM and NCC Actuators can be custom designed to meet your specifications. Consult H2W for more information