

Voice Coil Positioning Stage

Travel	0.04-2 inches	[1-50mm]
Acceleration	0.1-20 G's	0.1-20 G's
Peak Force	0.75-300 lbs	[3-1333N]
Continuous Force	0.25-100 lbs	[1-444 N]
Resolution	.000004" or .0005"	[0.1 – 12 micron]

The Voice Coil Positioning Stage is a compact, small footprint positioning stage. It is ideal for closed loop positioning applications with a short stroke where intricate position, velocity, and acceleration control is necessary.

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.

The ironless core coil assembly has no magnetic attractive force to the stationary magnet assembly, which reduces the load on the bearing system, which increases the life of the bearing. There are no magnetic drag forces (hysteresis), which allows for higher accelerations.

These actuators are wound in such a way that no commutation is required for motion to occur. Electrical devices such as Hall Effects are not necessary. The result is a much simpler and more reliable system.

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
- Low Cost

Applications:

- Mirror Tilt and Focusing
- Z Axis for Pick and Place Equipment
- Medical Diagnostic Probes and Laser Beam Steering
- Vision Inspection
- Miniature Position Control

The VCS positioning stage incorporates the latest in linear motion technology:

- **Motors:** non-commutated moving coil (NCC) or moving magnet (NCM) voice coil motors.
- **Bearings:** Linear guidance and stiffness is achieved by using high precision ball slides or cross roller slides. Other types of bearings and bushings are available depending on the application.
- **Feedback:** Non-contact optical or magnetic linear encoders with a center reference mark for homing. Typical encoder output is A and B square wave signals but sinusoidal output is available as an option. Analog feedback is available via LVDT or Force Transducer.
- **Limit Switches:** Soft limits are typically used and monitored by the controller. But, if needed, end of travel limit switches may be included at both ends of the stroke. The switches can be either active high/low (5V to 24V). The limit switches can be used to shut down the amplifier or to signal the controller that an error has occurred. The limit switches can be an integral part of the encoder or can be mounted separately if required.
- **Hard Stops:** Hard stops are incorporated into the ends of the stage to prevent over travel damage in the event of servo system failure.

Required Electronics:

Because of the very low inductance of the actuator, a DC linear servo amplifier is required to provide power to the actuator. If a PWM amplifier is used, it is recommended to have a switching frequency of 50kHz or higher. A linear power supply is also recommended for better performance and noise reduction.

Environmental Considerations:

The stage is a precision device with sensitive components and should not be mounted in an environment that is wet or excessively dirty. The optical encoder scale is open and it should be kept free of debris in order to operate properly. The magnetic encoder scale should be kept away from any ferrous or magnetic materials. The magnetic assembly should not be placed in an area where loose steel particles can be drawn into the magnetic gap. The stage should not be mounted in an environment with ambient temperatures >50°C.

Mounting:

The stage should be mounted to a flat and stiff surface. Counter bored thru holes are present in the base to allow for the mounting of the stage to the customers system. The moving slide assembly has threaded holes for attaching the payload. Custom mounting holes are available if the customer desires so. The stage may be mounted in any orientation. When mounting the stage with the slide moving vertically, it should be noted that the stage will be required to generate additional force due to gravity and that the moving slide will drop down to the bottom hard stop when power fails.

Maintenance:

The ball bearing guides in the stage should be periodically lubricated with the manufacturers recommended grease. The open encoder scale should be wiped down occasionally to clear it of any dust or particles to ensure trouble free operation.

Ordering Info:

It should be noted that for both types of actuators (NCC & NCM) used for these stages, 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. Please consult the factory for long stroke applications.

Stages can be ordered for any stroke up to 2 inches and any continuous force up to 100 lbs. The stages are built as the orders are placed; they are not stocked, as each customer requirement is different.

Model VXSAA - BBB - CC - DD - Y

where: **X** is C for moving coil NCC or M for moving magnet NCM type motor

AA is the stroke in inches (0.5 inch stroke is 05 & 1.0 inch stroke is 10)

BBB is continuous force in lbs (0.5 lbs is 005 & 1.0 lbs is 010)

CC is the bearing type BS = Ball Slide

CR = Cross Roller

LB = Linear Bearing

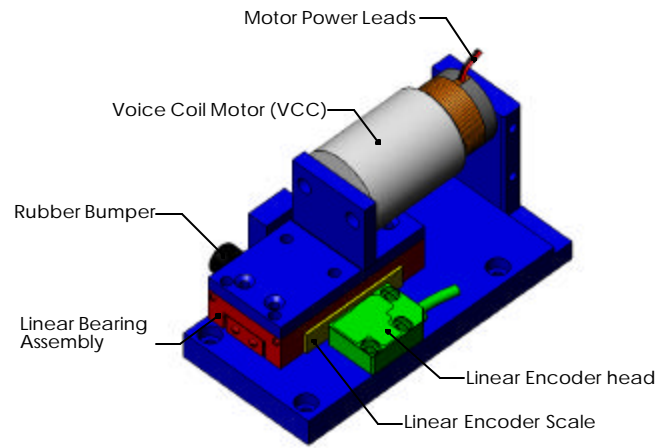
AB = Air Bushing

RB = Roller Bushing

JB = Jeweled Bearing

DD is encoder resolution (01 is for 1 micron, 001 is for 0.1 micron)

Y is special option (M is for magnetic encoder)



i.e. VCS10-023-BS-01-M is a NCC type motor with 1.0" stroke, 2.3 lbs of continuous force, Ball Slide stage with a 1 Micron Magnetic encoder

1	Model #	Stroke	Continuous	Peak	Km lbs/(watt) ^{0.5}	Bearing Type	Encoder Resolution	Encoder Type	Moving Part	Motor P/N
			Force (lbs)	Force	[N/(watt) ^{0.5}]					
1	VCS01-001-CR-001	0.125	0.06	0.18	0.08	Cross Roller	0.1 Micron	Optical	Magnet Assembly	NCC01-07-001-1X
		3.2 [mm]	0.3 [N]	0.9 [N]	0.35					
2	VCS03-050-BS-01-MC	0.25	5.0	15.0	1.82	Ball Slide	1 Micron	Magnetic	Coil Assembly	NCC03-15-050-2X
		6.4 [mm]	22.2 [N]	66.6 [N]	8.07					
3	VCS05-011-BS-01-M	0.50	1.1	3.3	0.67	Ball Slide	1 Micron	Magnetic	Magnet Assembly	NCC05-11-011-1X
		12.7 [mm]	4.9 [N]	14.7 [N]	2.95					
4	VCS05-060-CR-001	0.50	6.0	18.0	1.78	Cross Roller	0.1 Micron	Optical	Magnet Assembly	NCC05-18-060-2X
		12.7 [mm]	26.4 [N]	79.2 [N]	7.83					
5	VCS05-060-CR-001-V	0.50	6.0	18.0	1.78	Cross Roller	0.1 Micron	Optical	Magnet Assembly	NCC05-18-060-2X
		12.7 [mm]	26.4 [N]	79.2 [N]	7.83					
6	VCS05-060-BS-01	0.50	6.0	18.0	1.78	Ball Slide	1 Micron	Optical	Magnet Assembly	NCC05-18-060-2X
		12.7 [mm]	26.4 [N]	79.2 [N]	7.83					
7	VCS05-060-CR-01-M	0.50	6.0	18.0	1.80	Ball Slide	1 Micron	Magnetic	Magnet Assembly	NCC05-18-060-2X
		12.7 [mm]	26.6 [N]	79.9 [N]	8.01					
8	VCS05-060-BS-01-MC	0.50	6.0	18.0	1.78	Ball Slide	1 Micron	Magnetic	Coil Assembly	NCC05-18-060-2X
		12.7 [mm]	26.4 [N]	79.2 [N]	7.83					
9	VCS05-060-BS-01-MCD	0.50	6.0	18.0	1.78	Ball Slide	1 Micron	Magnetic	Coil Assembly	NCC05-18-060-2X
		12.7 [mm]	26.4 [N]	79.2 [N]	7.83					
10	VCS05-060-VBS-V01	0.50	6.0	18.0	1.78	Ball Slide	1 Micron	Optical	Magnet Assembly	NCC05-18-060-2X
		12.7 [mm]	26.4 [N]	79.2 [N]	7.83					
11	VCS05-060-BS-12	0.50	6.0	18.0	1.78	Ball Slide	12 Micron	Optical	Magnet Assembly	NCC05-18-060-2X
		12.7 [mm]	26.4 [N]	79.2 [N]	7.83					
12	VCS05-060-AB-01	0.50	6.0	18.0	1.78	Air Bushing	1 Micron	Optical	Magnet Assembly	NCC05-18-060-2X
		12.7 [mm]	26.4 [N]	79.2 [N]	7.83					
13	VMS05-180-RB-001	0.50	18.0	54.0	2.95	Roller Bushing	0.1 Micron	Optical	Magnet Assembly	NCM05-28-180-2LB
		12.7 [mm]	80 [N]	240 [N]	13.10					
14	VMS05-180-LB-12	0.50	18.0	54.0	2.95	Linear Bushing	12 Micron	Optical	Magnet Assembly	NCM05-28-180-2LB
		12.7 [mm]	80 [N]	240 [N]	13.10					
15	VCS06-005-BS-01-M	0.60	0.5	1.5	0.37	Ball Slide	1 Micron	Magnetic	Magnet Assembly	NCC06-08-005-2X
		15.2 [mm]	2.2 [N]	6.6 [N]	1.65					
16	VCS06-005-BS-12	0.60	0.5	1.5	0.37	Ball Slide	12 Micron	Optical	Magnet Assembly	NCC06-08-005-2X
		15.2 [mm]	2.2 [N]	6.6 [N]	1.65					
17	VCS08-225-LB-01-C	0.80	22.5	67.5	4.00	Linear Bearing	1 Micron	Optical	Coil Assembly	NCC08-33-225-2X
		20.3 [mm]	100 [N]	300 [N]	17.80					
18	VCS10-023-BS-01	1.00	2.3	6.9	0.81	Ball Slide	1 Micron	Optical	Magnet Assembly	NCC10-15-023-1X
		25.4 [mm]	10.2 [N]	30.7 [N]	3.56					
19	VCS10-023-BS-01-M	1.00	2.3	6.9	0.81	Ball Slide	1 Micron	Magnetic	Magnet Assembly	NCC10-15-023-1X
		25.4 [mm]	10.2 [N]	30.7 [N]	3.56					
20	VCS10-023-BS-01-MC	1.00	2.3	6.9	0.81	Ball Slide	1 Micron	Magnetic	Coil Assembly	NCC10-15-023-1X
		25.4 [mm]	10.2 [N]	30.7 [N]	3.56					
21	VCS10-023-BS-01-MH	1.00	2.3	6.9	0.81	Ball Slide	1 Micron	Magnetic	Magnet Assembly	NCC10-15-023-1H
		25.4 [mm]	10.2 [N]	30.7 [N]	3.56					
22	VCS10-023-BS-12	1.00	2.3	6.9	0.81	Ball Slide	12 Micron	Optical	Magnet Assembly	NCC10-15-023-1X
		25.4 [mm]	10.2 [N]	30.7 [N]	3.56					
23	VMS10-020-LB-12	1.00	2.0	6.0	1.05	Linear Bushing	12 Micron	Optical	Magnet Assembly	NCM10-15-020-2LB
		25.4 [mm]	8.9 [N]	20.7 [N]	4.62					
24	VCS10-027-CR-001	1.00	2.7	8.1	0.76	Cross Roller	0.1 Micron	Optical	Coil Assembly	NCC10-15-027-1RC
		25.4 [mm]	12 [N]	36 [N]	3.38					
25	VCS10-046-BS-01-M	1.00	4.6	13.8	0.81	Ball Slide	1 Micron	Magnetic	Magnet Assembly	NCC10-15-023-1X
		25.4 [mm]	20.4 [N]	61.4 [N]	3.56					
26	VCS20-020-BS-01-M	2.00	2.0	6.0	0.73	Ball Slide	1 Micron	Magnetic	Magnet Assembly	NCC20-17-020-1X
		50.8 [mm]	8.9 [N]	26.6 [N]	3.55					
27	VCS20-020-BS-01-MC	2.00	2.0	6.0	0.73	Ball Slide	1 Micron	Magnetic	Coil Assembly	NCC20-17-020-1X
		50.8 [mm]	8.9 [N]	26.6 [N]	3.55					
28	VMS02-012-JB-01	0.20	1.2	3.6	0.49	Jeweled Bearing	1 Micron	Optical	Magnet Assembly	NCM02-10-012-2JBE
		5.1 [mm]	5.3 [N]	16 [N]	2.17					
29	VMS02-035-2F-05-M	0.11	3.5	10.5	0.90	Two Flexures	5 Micron	Magnetic	Magnet Assembly	NCM02-17-035-2F
		2.8 [mm]	3.6 [N]	46.6 [N]	3.99					
30	VCS06-010-BS-01-MXY	0.62	0.8	2.3	0.34	Ball Slide	1 Micron	Magnetic	Coil Assembly	NCC06-24-010-XY
		15.8 [mm]	3.6 [N]	10.2 [N]	1.51					
31	VCS10-023-LB-01-MD	1.00	2.3	6.9	0.81	Linear Bearing	1 Micron	Magnetic	Magnet Assembly	NCC10-15-023-1X
		25.4 [mm]	10.2 [N]	30.7 [N]	3.56					