Precision Vertical Linear Stages

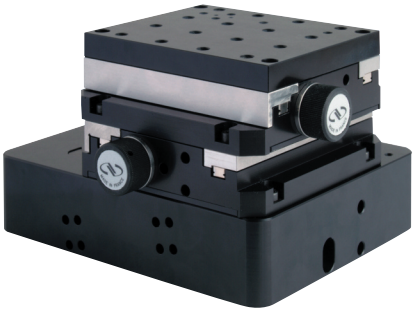
V P - 5 Z A

The VP-5ZA is an ultra-low profile, precision vertical translation stage ideally suited for semiconductor wafer inspection, photonics test and packaging, micro-assembly, precision metrology, and surface inspection systems. Based on the industry-proven technology used in the VP-25X linear stages, the VP-5ZA offers highly reliable motion with nanometer sensitivity, high responsiveness, and a perfectly straight trajectory.

- 4.8 mm of precision vertical motion with unique inclined plane concept
- Ultra-low profile design for compact XYZ configurations
- Unobstructed access to the moving platform from any direction
- Highly repeatable and accurate motion with integrated linear encoder
- Excellent 60 nm minimum incremental motion
- Plug and play ESP compatibility

Build Low Profile XYZ Stage Stacks

Ultra low-profile precision XYZ system consisting of two VP-25XA linear stages and one VP-5ZA vertical translation stage. Compared to traditional stacks of stages, this solution offers a lower-profile alternative with easy access to the load from any direction.



Efficient Inclined Plane Design

Using a unique arrangement of two wedges which move past each other via inclined, recirculating ball bearings and 2 pairs of vertically mounted double-row linear ball bearing slides result in pure vertical motion.

Keep Payload Over the Bearings

The lifting approach of the VP-5ZA allows centering of the payload over the bearings and close to the position feedback. This avoids any cantilevered loads that cause angular deformations and results in more precise motion with a higher load capacity.

A VP-5ZA stage mounted on top of an ILS High-Performance Mid-Range Travel Linear Stages with optional VP-BP base plate.

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Broad Stage Compatibility

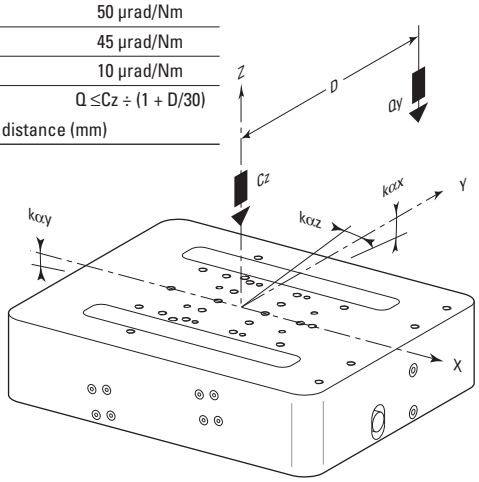
A pattern of threaded holes on the top plate provides compatibility with the VP-25X linear stages and other Newport positioning products. A standard 3-point mounting interface for a wafer chuck is provided as well. For mounting the VP-5ZA to optical tables or to the ILS linear stages, use the optional base plate VP-BP. Manual vertical adjustments can be conveniently made using a flat screw driver.

High Torque DC Motor

An efficient, high torque DC motor with a precision preloaded, long-life, ball screw ensures high speed motion with minimum settling time. A high-resolution linear scale is directly attached to the moving rail, eliminating all drive-train induced motion errors. In addition, the space-saving, fixed read head design avoids any moving cables. The result is a robust and long lasting stage with an MTBF of 20,000 hours.

LOAD CHARACTERISTICS AND STIFFNESS

Cz,	Normal centered load capacity	50 N
Kαx,	Compliance in roll	50 µrad/Nm
Kαy,	Compliance in pitch	45 µrad/Nm
Kαz,	Compliance in yaw	10 µrad/Nm
Q,	Off-center load (N)	Q ≤Cz ÷ (1 + D/30)
	Where D = Cantilever distance (mm)	



RECOMMENDED CONTROLLERS/DRIVERS

Model	Description
XPS-D	1- to 8-axis universal high-performance motion controller/driver
XPS-DRV11	Universal digital driver card for stepper, DC and direct motors
XPS-RL	1- to 4-axis universal high-performance motion controller/driver
XPS-DRV01	PWM drive module for DC brush and stepper motors, 3 A/43 V max.
XPS-DRV03	High performance PWM drive module for DC motors, 5 A/43 V max.
ESP301	1- to 3-axis motion controller/driver
SMC100CC	Single-axis DC motor controller/driver

DESIGN DETAILS

Base Material	Aluminum
Bearings	Recirculating ball bearings,double-row linear ball bearings for vertical guidance
Drive Mechanism	Inclined plane design with transmission ratio of 5:1; Backlash-free ball screw
Drive Screw Pitch (mm)	1
Feedback	Linear steel scale, 20 µm signal period, 0.1 µm resolution
Limit Switches	Optical
Origin	Optical, at center of travel, including mechanical zero signal
Motor	DC servo motor with tachometer
Cable Length (m)	1.5

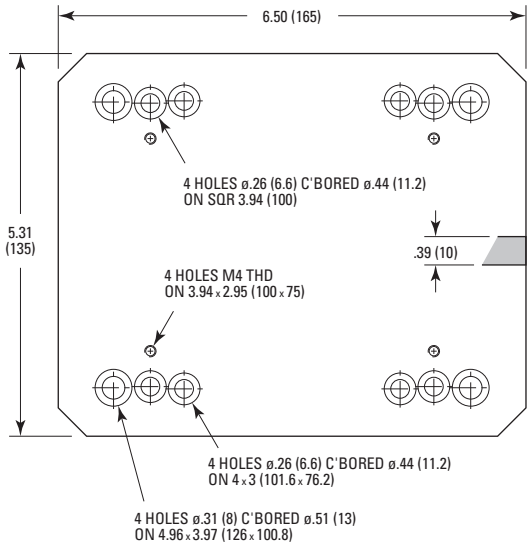
SPECIFICATIONS

Travel Range (mm)	4.8
Minimum Incremental Motion (µm)	0.06
Uni-directional Repeatability[1], Typical (Guaranteed) (µm)	±0.06 (±0.15)
Bi-directional Repeatability[1], Typical (Guaranteed) (µm)	±0.10 (± 0.25)
Accuracy[1], Typical (Guaranteed) (µm)	±0.6 (±1.5)
Maximum Speed (mm/s)	5
Pitch[1][2], Typical (Guaranteed) (µrad)	±30 (±50)
Roll[1][2], Typical (Guaranteed) (µrad)	±30 (±50)
MTBF (h)	20,000

1) For the definition of Typical and Guaranteed specifications see "Motion Basics Terminology & Standards" Tutorial at www.newport.com

2) To obtain arcsec units, divide µrad value by 4.8.

VP-BP



ORDERING INFORMATION

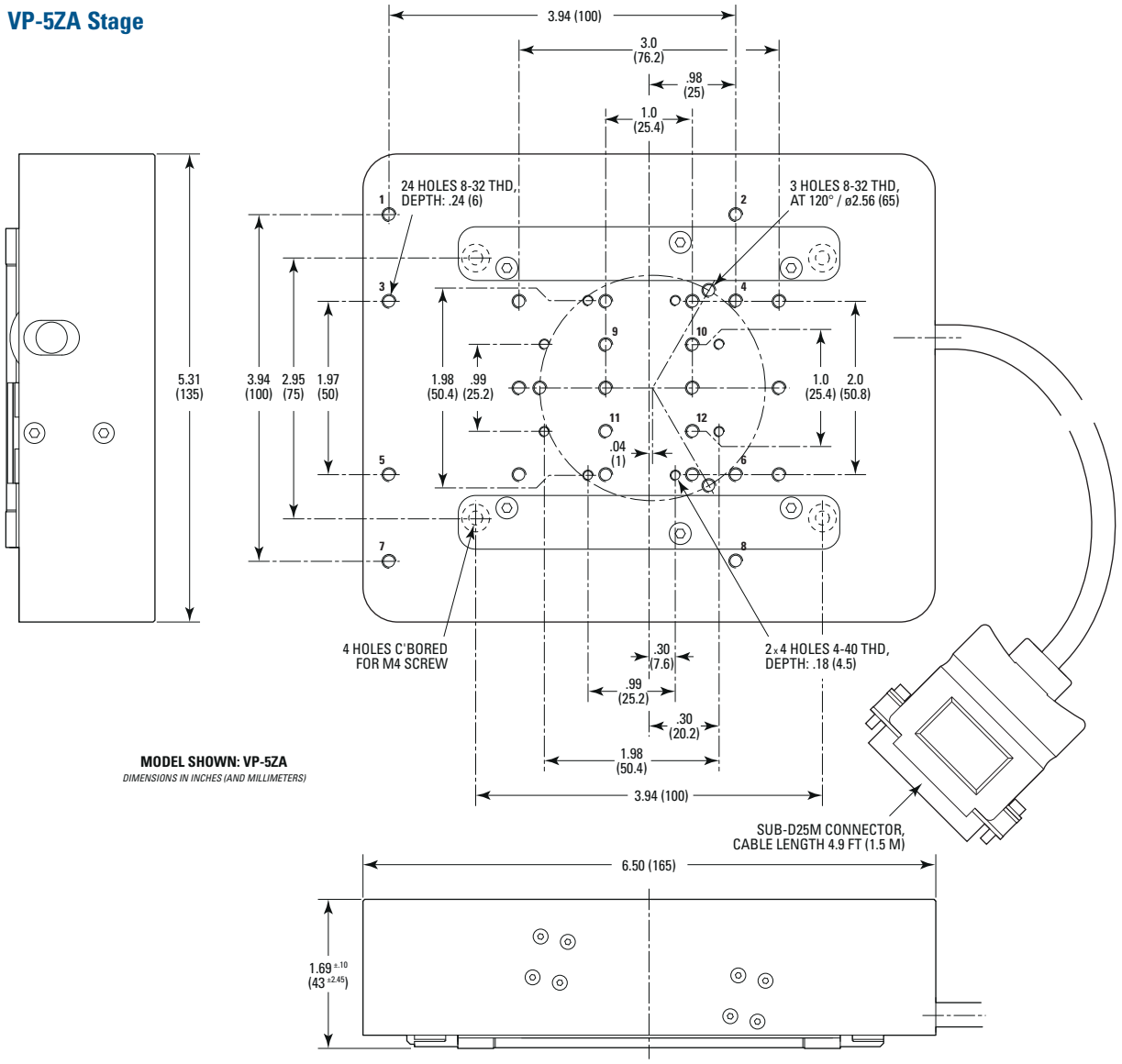
Model	Description
VP-5ZA	Compact Precision Vertical Stage, 4.8 mm Travel, DC Servo with Tachometer, 4-40 and 8-32
M-VP-5ZA	Compact Precision Vertical Stage, 4.8 mm Travel, DC Servo with Tachometer, M3 and M4

ACCESSORIES

Model	Description
VP-BP	Universal Base Plate, VP Series Stages

DIMENSIONS

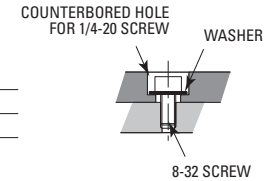
VP-5ZA Stage



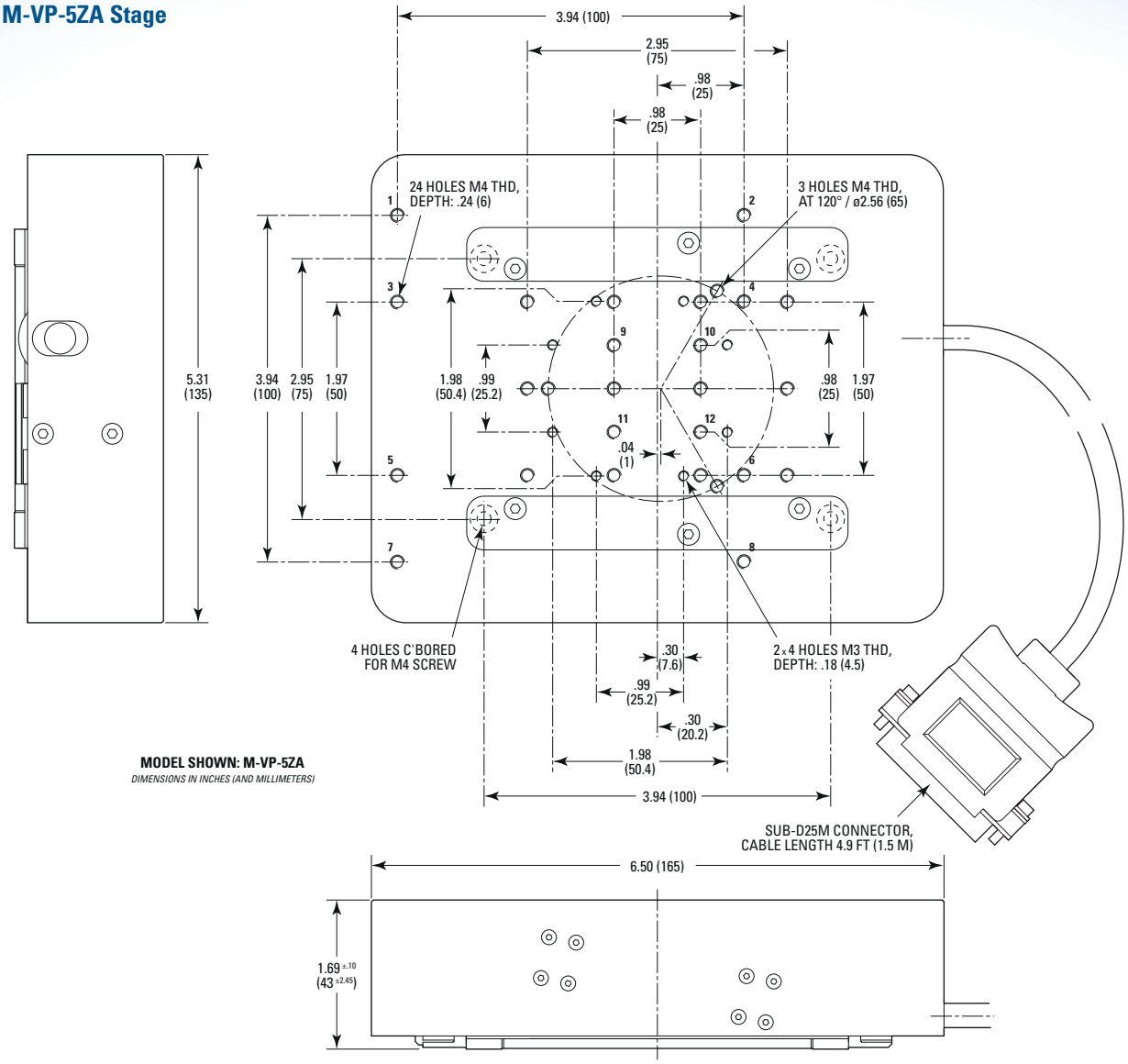
MODEL SHOWN: VP-5ZA
DIMENSIONS IN INCHES (AND MILLIMETERS)

Components with counterbored holes for 1/4-20 screws can be attached to the top plate of the VP-5ZA using 8-32 and the washers supplied with each stage.

STAGE MOUNTED	HOLES USED	USING SUPPLIED WASHERS
RGV100BL/HL	1-2-7-8	●
M-VP-25XA	1-2-5-6 OR 3-4-7-8	–



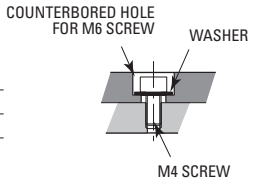
M-VP-5ZA Stage



MODEL SHOWN: M-VP-5ZA
DIMENSIONS IN INCHES (AND MILLIMETERS)

Components with counterbored holes for M6 screws can be attached to the top plate of the M-VP-5ZA using M4 and the washers supplied with each stage.

STAGE MOUNTED	HOLES USED	USING SUPPLIED WASHERS
RGV100BL/HL	1-2-7-8	●
M-VP-25XA	1-2-5-6 OR 3-4-7-8	–



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