High-Speed and High-Load Precision Rotation Stage

RGV160BL-S

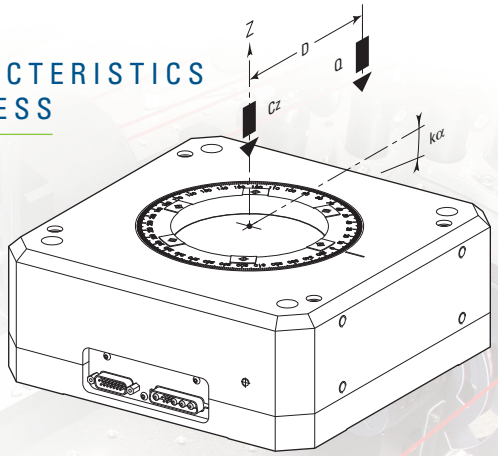
The RGV160BL-S Direct Drive Rotation Stage provides ultra-fast rotation, very high resolution, and outstanding positioning performance. Applications include semiconductor wafer inspection, micro-robotics, and precision metrology. Direct-drive technology eliminates the worm gear of traditional rotation stages providing higher speeds, superior reliability, and enhanced position sensitivity. Speed, resolution, and repeatability are increased by a factor of up to ten times. A high efficiency brushless DC torque motor with rare earth magnets supplies an optimum ratio of torque per inertia for high acceleration, with minimal stage heating. At maximum continuous torque, the temperature of the motor increases by only 30 °C. Precision is ensured by a high-resolution glass scale with 28,800 line pairs per revolution that directly measures the position of the rotating platen. The flat encoder is mounted on a precision ground reference surface and is perfectly aligned with the stage's rotation axis to minimize position errors induced by eccentricity, wobble, or axial runout. The RGV160BL-S features a proprietary 4-point contact ball bearing. This unique, 2-piece design minimizes the number of parts resulting in a more compact stage with superior stiffness, high reliability and outstanding wobble and eccentricity specifications. A 30 mm diameter through-hole allows convenient routing of cables and vacuum lines through the stage. A once-per revolution index pulse permits precision homing to a unique home position. The RGV160BL-S does not include limit switches nor hard stop.

- Direct drive for outstanding speed of 1000 °/s and high reliability
- Large diameter, steel ball bearings for stiffness, low runout and high load capacity
- Precision glass scale encoder for high position repeatability, MIM, and high accuracy
- High torque DC brushless motor

DESIGN DETAILS

Base Material	Aluminum
Bearings	Large diameter steel ball bearings
Motor	High-torque brushless DC motor with rare earth magnets (no Hall effect sensors)
Motor Initialization	Has to be done by the controller (without using Hall effect sensors)
Motor Commutation	Done by the XPS controller on encoder signals
Feedback	Glass scale encoder with 28,800 line pairs per revolution, 1 VPP, 1,250-fold signal subdivision when used with XPS controller
Limit Switches	The RGV160BL-S does not have limit switches nor hard stops
Origin	Optical, fixed at position 0°, including mechanical zero signal
Cable Length	The appropriate 5 m cable kit must be ordered separately

LOAD CHARACTERISTICS AND STIFFNESS



Cz,	Normal centered load capacity	2700 N
Kα,	Transversal compliance	1 µrad/Nm
Q,	Off-center load (N)	Q ≤Cz ÷ (1 + D/50)
	Where D = Cantilever distance (mm)	

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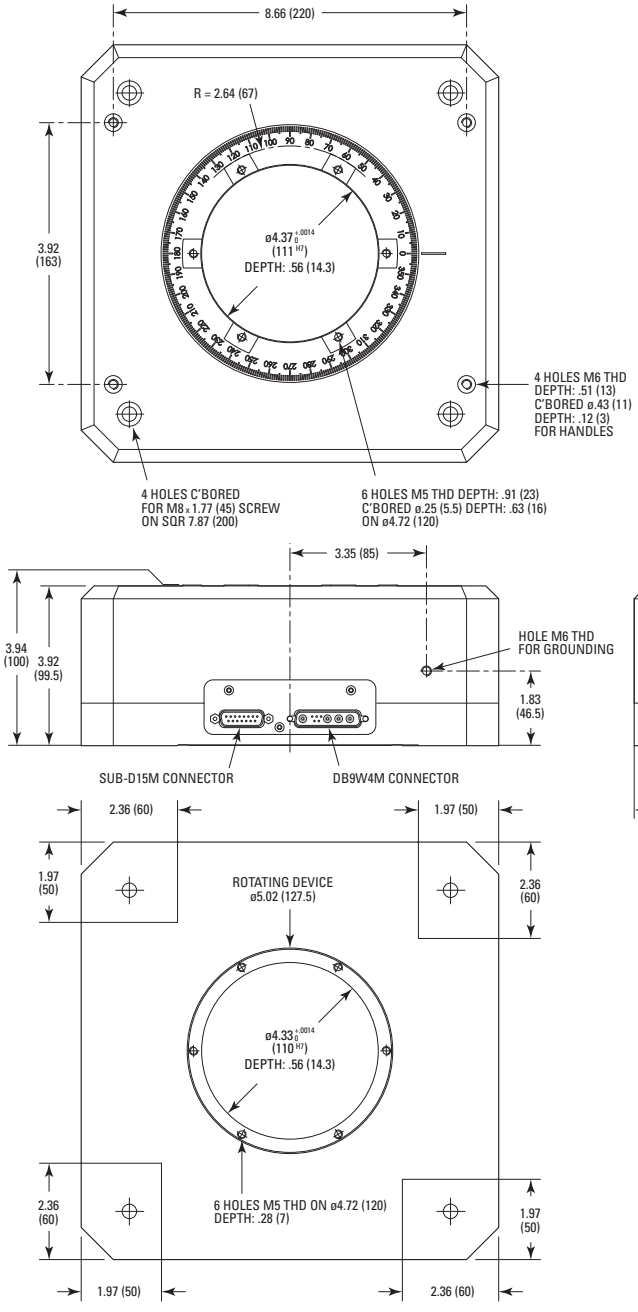
RGV160BL-S HIGH-SPEED AND HIGH-LOAD PRECISION ROTATION STAGE

ORDERING INFORMATION

Model	Description
RGV160BL-S	High Speed, High Load Rotation Stage, 360°, Brushless Direct, Compact

DIMENSIONS



SPECIFICATIONS

Travel Range (°)	360 continuous
Minimum Incremental Motion (mdeg)	0.04
Uni-directional Repeatability, Typical (Guaranteed)[1] (mdeg)	±0.05 (±0.15)
Bi-directional Repeatability, Typical[1] (mdeg)	±0.15
Accuracy, (Guaranteed)[1] (mdeg)	(±7.5)
Max. Speed [no load] (°/s)	1000
Inertia [no load] (kg.m^2)	0.02411
Bearing Drag Torque (Nm)	0.35
Wobble, Typical (Guaranteed)[1][2] (µrad)	±5.0 (±10)
Eccentricity, Typical (Guaranteed)[1] (µm)	±0.8 (±2.0)
MTBF (h)	20,000 with 90 kg load, 1,000 °/s speed and a duty cycle of 30%

[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.

***Note**: The following specifications are controller/drive dependent: MIM, Accuracy, Repeatability, Max. Speed and Max. Acceleration. Refer to the RGV160BL-S page on www.newport.com for specifications achievable with specific Newport controller/drive combination.*

RECOMMENDED CONTROLLERS/DRIVERS

Model	Description
XPS-D	1- to 8-axis universal high-performance motion controller/driver
XPS-RL	1- to 4-axis universal high-performance motion controller/driver
XPS-EDBL	High-power, 3-phase, sinusoidal DC brushless motor driver

CABLE KITS

Model	Description
XPS-RK15	Motorized stage cable kit, for stages RGV160BL-S, XML-S and XPS-EDBL driver module
XPS-DK25	Motorized stage cable kit, for stage RGV160BL-S and XPS-EDBL driver module

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