# High-Speed, High-Torque Precision Rotation Stage

**RGV100HL-S** 





The RGV100HL-S Compact Rotation Stage provides ultrafast 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 15,000 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 RGV100HL-S features a proprietary 4-point contact ball bearing. This unique, 2piece 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 easy routing of cables and vacuum lines through the stage. A once-per revolution index pulse permits precision homing to a unique home position. The RGV100HL-S also features two limit switches that can be enabled or disabled by an external switch.



- Direct drive for outstanding speed of 720 °/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

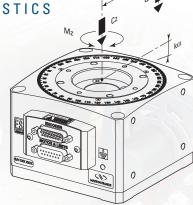
Base Material	Aluminum	
Bearings	Large diameter steel ball bearings	
Motor	High-torque brushless DC motor with rare earth magnets (no	
	Hall effect sensors)	
Motor Initialization	Has to be done by the controller (without using Hall effect	
	sensors)	
Motor Commutation	Done by the XPS controller on encoder signals	
Feedback	Glass scale encoder with 15,000 line pairs per revolution,	
	1 VPP, 32768-fold signal subdivision when used with XPS	
	controller	
Limit Switches	Two optical limit switches at approx. ±168°, disabled by	
	external switch	
	No hard stops included	
Origin	Optical, fixed at position 0°, including mechanical zero signal	
ESP Compatibility	Yes	
Cable Length	The appropriate 5 m cable kit must be ordered separately	

LOAD CHARACTERISTICS AND STIFFNESS

Cz,	Normal centered load capacity	/ 100 N
Κα,	Transversal compliance	15 µrad/Nm
Jz,	Maximum Inertia	0.032 kg.m <sup>2</sup>
۵,	Off-center load (N)	Q ≤Cz ÷ (1 + D/35)
		and $Q \le (Jz - Jq)/D^2$

Where D = Cantilever distance (mm) Jq = Inertia of payload

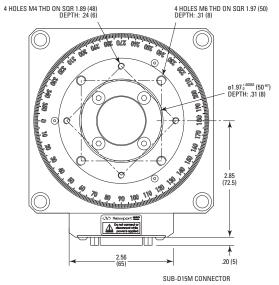




#### ORDERING INFORMATION

Model	Description
RGV100HL-S	High Precision & Torque Rotation Stage, 360°, Brushless, Ultra-Compact

#### DIMENSIONS

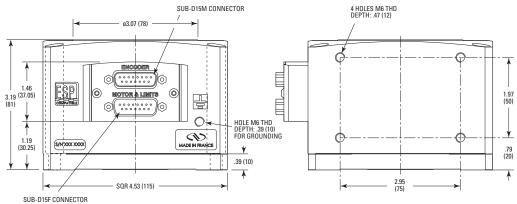


#### SPECIFICATIONS

Travel Range (°)	360 continuous
Minimum Incremental Motion (mdeg)	0.10
Uni-directional Repeatability, Typical (Guaranteed)	(1) (mdeg) ±0.10 (±0.15)
Bi-directional Repeatability, Typical (1) (mdeg)	±0.15
Accuracy, Typical (Guaranteed) (1) (mdeg)	±3.0 (±5.0)
Max. Speed [no load] (°/s)	720
Inertia [no load] (kg.m²)	0.00123
Bearing Drag Torque (Nm)	0.3
Wobble, Typical (Guaranteed) (1) (2) (µrad)	±7.0 (±20)
Eccentricity, Typical (Guaranteed) (1) (µm)	±1.0 (±1.5)
MTBF (h)	20,000 with 5 kg load, 720 °/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
- <sup>2)</sup> 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 RGV100HL-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
XPS-DRV02	PWM drive module for brushless
	motors, 5 A/44 VPP max.

## CABLE KITS

Model	Description
XPS-RK11	Motorized stage cable kit, for stages ILS-LM-S, RGV100BL-S,
	RGV100HL-S and XPS-DRV02 driver module
XPS-RK13	Motorized stage cable kit, for stages ILS-LM-S, RGV100HL-S and XPS-
	EDBL driver module
XPS-DK21	Motorized stage cable kit, for stages ILS-LM-S, RGV100HL-S,
	RGV100BL-S, and XPS-DRV11 driver module
XPS-DK23	Motorized stage cable kit, for stages ILS-LM-S, RGV100HL-S, and
	XPS-EDBL driver



4 HOLES M3 THD ON ø1.38 (35) USABLE DEPTH: .24 (6)

(0)

(0)

0

4 HOLES M5 THD ON SQR 3.35 (85) DEPTH: .31 (8)

0

Φ

(0)

4 HOLES ø.31 (7.8), C'BORED ø .45 (11.5) ON SQR 3.97 (100.8)

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