












Motorized Rotation Stage Selection Guide

Motorized rotation stages are precision positioning products designed and built over many decades of experience in providing solutions to research and academia, industry and defense markets. Applications of Rotation Stages include semiconductor wafer inspection or scribing, metrology, micro-robotics, sensor testing, disk texturing, optics positioning like polarizers, waveplates, etc. Newport rotation stages offering ranges from the direct drive, direct read, high rotation speed RGV series to the multi-use low-cost NSRI Universal Rotator, with over 100 model numbers to choose from. Vacuum versions, as well as multiple axis designs, OEM or custom solutions are available upon request.

Motorized rotation stages can be selected based on Minimum Incremental Motion, Bi-directional Repeatability, Accuracy, Maximum Speed, Wobble, Load Capacity, etc.

	Series	Minimum Incremental Motion(°)	Bi-directional Repeatability(°)	Accuracy(°)	Maximum Speed(°/s)	Wobble(μrad)	Normal Load Capacity (Cz)(N)
	RGV-S Series High Speed Precision Rotation Stage see page 94	0.00004 - 0.00011	0.0003	0.015	720 - 1000	20 - 40	100 - 2700
	RV Series High-Performance Precision Rotation Stages see page 96	0.0002 - 0.001	0.0012 - 0.020	0.005 - 0.020	1 - 80	16 - 40	900 - 6500
	RVU Series High Angular Stiffness Rotation Stages see page 102	0.0002 - 1	NA	NA	NA	NA	4000 - 6500
	URS Series Precision Rotation Stages see page 104	0.0002 - 0.002	0.004-0.012	0.023 - 0.050	20 - 80	50	100 - 300
	URB Series High-Speed Belt-Driven Rotation Stage see page 106	0.02	0.094	0.2	720	50	100
	FCR100 Intelligent Stepper Motor Rotary Stage see page 108	0.00025	0.012	0.04	20	50	300
	SR50 and PR50 Series Compact Rotation Stages see page 110	0.004 - 0.02	0.05 - 0.15	0.06 - 0.10	4, 20	100	10, 30
	BG Series Goniometric Cradles see page 112	0.0002 - 0.002	0.003 - 0.024	0.05 - 0.07	2 - 20	200	20 - 500
	CONEX-NSR1 Controller and Accessories see page 162	1	3	NA	120	600	NA
	Agilis™ Series Piezo Motor Driven Rotation Stages see page 115	0.0003	NA	NA	-2	100	2
	Picomotor Motorized Rotation Stages see page 117	0.2	NA	NA	6 - 12	NA	NA

RGV-S

High-Speed Precision Rotation Stage



- Direct drive for outstanding speed of up to 1000 deg/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 with a maximum torque of 112 Nm.



The RGV series are compact, direct-drive rotation stages that provide ultra-fast rotation with very high MIM and outstanding positioning performance. Features include: a direct drive motor which ensures operational reliability due to no wear, high precision glass scales for position repeatability and large diameter bearings for stiffness and low runout. The RGV can be used in positioning or as a spindle. Applications include semiconductor wafer inspection, micro-robotics, precision metrology and motion simulators, specifically for MEMS, gyros and accelerometer testing. The RGV is compatible with the XPS controller with driver options depending on speed and torque requirements.

General Specifications

	RGV100BL-S	RGV100HL-S	RGV160BL-S
Travel Range (°)	360 continuous		
Max. Speed (no load) (°/s)	720		1000
Minimum Incremental Motion (mdeg)	0.10		0.04
Centered Load Capacity (N)	100		2700
Bi-directional Repeatability, Typical ⁽¹⁾ (mdeg)	±0.15		
Uni-directional Repeatability, Typical (Guaranteed) ⁽¹⁾ (mdeg)	±0.08 (±0.15)	±0.10 (±0.15)	±0.05 (±0.15)
Accuracy, Typical (Guaranteed) ⁽¹⁾ (mdeg)	±3.0 (±5.0)		na (±7.5)
Wobble, Typical (Guaranteed) ⁽¹⁾ (µrad)	±5.0 (±10)	±7.0 (±20)	±5.0 (±10)
Eccentricity, Typical (Guaranteed) ⁽¹⁾ (µm)	±1.0 (±1.5)		±0.8 (±2.0)
Inertia (no load) (kg.m ²)	0.00104	0.00123	0.02411
Weight (kg)	2.6	3.6	17.5
MTBF	20,000 with 5 kg load, 720 °/s speed and a duty cycle of 30%		20,000 with 90 kg load, 1,000 °/s speed and a duty cycle of 30%
CE	Compliant		
Aperture Diameter (mm)	30		110

(1) For difference between typical and guaranteed specifications see Motion Control Metrology Primer at www.newport.com

NOTE

The following specifications are controller/drive dependent. Refer the RGVxxx-S page on www.newport.com for specifications achievable with specific Newport controller/drive combination.

- MIM
- Accuracy
- Repeatability
- Max Speed
- Max Acceleration

Ordering Information

Model	Description
RGV100BL-S	High Speed, High Precision Rotation Stage, 360°, Brushless Direct Drive, Ultra-Compact
RGV100HL-S	High Torque, High Precision Rotation Stage, 360°, Brushless Direct Drive, Ultra-Compact
RGV160BL-S	High Load, High Speed Rotation Stage, 360°, Brushless Direct Drive, Compact

Recommended Motion Controller:

XPS-RL see page153

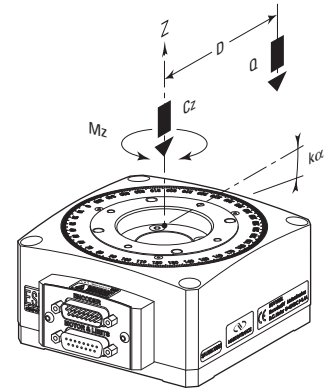
XPS-D see page 148

Driver cards and cable kits to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

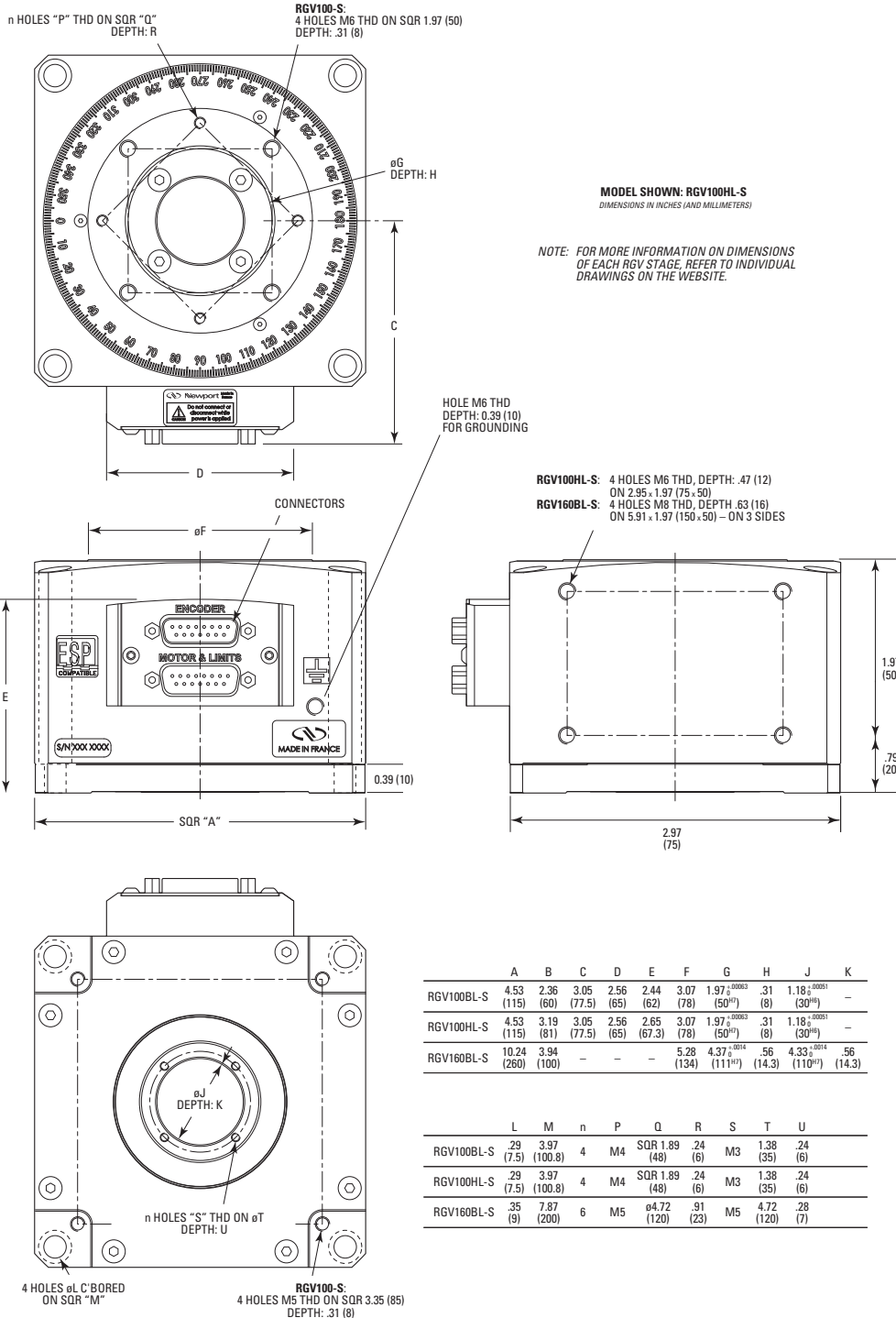
Load Characteristics and Stiffness

	RGV100BLS	RGV100HLS	RGV160BLS
Cz, Normal centered load capacity	100 N	100 N	2700 N
Kα, Transversal compliance	15 μrad/Nm	15 μrad/Nm	1 μrad/Nm
Mz, Maximum torque	0.42 Nm @ 0°/s	-	-
Jz, Maximum Inertia	0.032 kgm ²	0.032 kgm ²	-
Q, Off-center load	$Q \leq Cz/(1+D/35)$		$Q \leq Cz/(1+D/50)$
	and $Q \leq (Jz-Jq)/D^2$		
Where: D = Cantilever distance in mm; Jq = Inertia of payload			



(RGV100BLS shown)

Dimensions

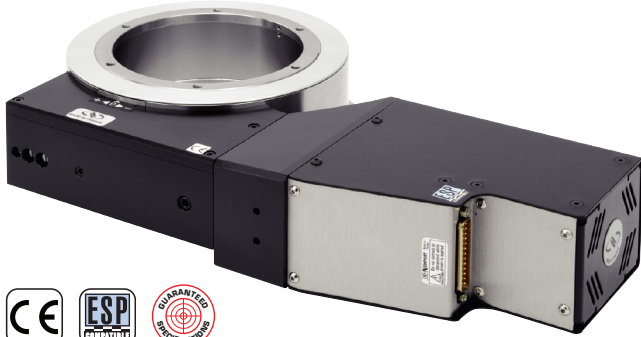


High speed motion simulator with RGV series rotation stages

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RV Series

High-Performance Precision Rotation Stages



- Ideal for high load applications with up to 6500 N load and torque capacity of 80 Nm
- All steel construction offers high stiffness and thermal stability
- Over 50 different versions with varying performance characteristics, diameters, and vacuum compatibility
- Double row ball bearings -Ground worm gear with self compensating preload
- Largest aperture ranging from 78 to 280 mm

The RV Series rotation stages provide high-precision angular positioning accuracy combined with high load capacity. There are five stage sizes and six drive configurations available, optimizing load capacity, torque, speed and resolution for a variety of operating conditions. All RV stages are constructed of tool steel, with rotation accuracy ensured by ground bearing surfaces. A double row of preloaded bearings allows for high off-center loads in a reduced footprint, and the single monolithic design improves stiffness without compromising dynamic performance. The larger models, RV120BPP to RV350BPP, feature a worm mounted rotary encoder for improved accuracy and repeatability and the full-step BPE version is equipped with a reduction gear providing higher torque. The DC motor-driven CCHL and HAHLT versions are equipped with a reduction gear providing higher torque and payload inertia capacity. The HAT and the HAHLT feature a high-resolution direct reading encoder and tachometer for superior repeatability, position stability and speed regulation.

Specifications

	RV120CC	RV120CCHL	RV120HAHLT	RV120HAT	RV120BPE	RV120BPEBV6	RV120BPP	RV160CC	RV160CCHL	RV160HAHLT	RV160HAT	RV160BPE		
Angular Range	360°				±170°				360°				±170°	360°
Maximum Speed	80°/s	16°/s	80°/s	2°/s	1°/s	20°/s	80°/s	16°/s	80°/s	2°/s	80°/s	2°/s		
Maximum Torque	10 N·m	15 N·m	10 N·m	20 N·m	10 N·m	15 N·m	11 N·m	20 N·m	11 N·m	11 N·m	35 N·m	35 N·m		
Centered Load Capacity	1800 N						900 N	1800 N	2700 N					
Minimum Incremental Motion	1.0 mdeg	0.20 mdeg	0.75 mdeg	1.0 mdeg				0.20 mdeg	0.75 mdeg	1.0 mdeg	1.0 mdeg			
Uni-directional Repeatability, Typical	±0.35 mdeg	±0.09 mdeg		±0.35 mdeg				±0.08 mdeg	±0.35 mdeg		±0.35 mdeg			
Uni-directional Repeatability, Guaranteed	±1.0 mdeg	±0.10 mdeg		±1.0 mdeg				±0.10 mdeg	±1.0 mdeg		±1.0 mdeg			
Bi-directional Repeatability, Typical	±0.7 mdeg	±0.4 mdeg		±0.7 mdeg				±0.45 mdeg	±0.7 mdeg		±0.7 mdeg			
Bi-directional Repeatability, Guaranteed	±2.0 mdeg	±0.6 mdeg		±2.0 mdeg				±0.6 mdeg	±2.0 mdeg		±2.0 mdeg			
Accuracy, Typical	±4.0 mdeg	±2.0 mdeg		±4.0 mdeg				±2.0 mdeg	±4.0 mdeg		±4.0 mdeg			
Accuracy, Guaranteed	±7.5 mdeg	±2.5 mdeg		±7.5 mdeg				±5.0 mdeg	±2.5 mdeg		±5.0 mdeg			
Wobble, Typical	±5.0 μrad													
Wobble, Guaranteed	±10 μrad													
Eccentricity, Typical	±0.6 μm						±0.8 μm							
Eccentricity, Guaranteed	±2.0 μm													
Inertia	0.2 kg.m ²	7 kg.m ²	0.2 kg.m ²	70 kg.m ²	1 kg.m ²	0.7 kg.m ²	24 kg.m ²	0.7 kg.m ²	100 kg.m ²	0.7 kg.m ²	100 kg.m ²			
Transversal Compliance	1.5 μrad/N·m						0.6 μrad/N·m							
Origin Repeatability	±0.5 mdeg	±0.1 mdeg		±0.5 mdeg				±0.1 mdeg	±0.5 mdeg		±0.5 mdeg			
Encoder Resolution	0.001°	0.1 mdeg		0.001°				0.075 mdeg	0.001°		0.001°			
Cable Length	3 m													
Diameter	120 mm						160 mm							
Aperture Diameter	78 mm						110 mm							
Vacuum Compatibility	NA	NA	NA	NA	NA	10 ⁻⁶ hPa	NA	NA	NA	NA	NA	NA		
Weight	6.5 kg	8 kg		6.5 kg				9 kg	11 kg		9 kg			
MTBF	20,000 h (25% load, 10% duty cycle)													
CE	Compliant													

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Load Characteristics

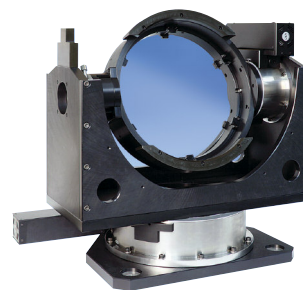
	RVS80	RV120	RV160	RV240	RV350
Cz, Normal centered load capacity (N)	900	1800	2700	4000	6500
a, construction parameter (mm)	30	40	50	70	100
b*, (mm) except HAT & HAHLT	39	53	57	59	73
b*, (mm) for HAT & HAHLT		71	75	77	91
k, radial compliance (μrad/Nm)	3.5	1.5	0.6	0.3	0.1
Q _H , Off-center load, vertical rotation axis	$Q_H \leq Cz / (1+D/a)$				
Q _V , Off-center load, horizontal rotation axis	$Q_V \leq Cz \cdot 2 / (1+D/a)$				

* Construction parameter = Distance between the top surface of the RV stage and the bearing center.

Example:

Q_V at a distance of 80 mm from the top surface for a RV160HAT rotation stage,
 D = 80 mm + 75 mm = 155 mm:

$$Q_V = 2700 \text{ N} / 2 / (1 + 155 \text{ mm} / 50 \text{ mm}) = 329 \text{ N}$$



This Azimuth/Elevation gimbal system positions a 350 mm dia. mirror that can be used for laser based qualification and characterization of precision optical sensors, LIDAR analysis, or target tracking.

RV160BPEV6	RV160BPP	RV240CC	RV240CCHL	RV240HAHLT	RV240HAT	RV120BPE	RV240BPEV6	RV240BPP	RV350CC	RV350HAHLT	RV350HAT	RV350BPE	RV350BPEV6	RV350BPP	RVS80CC	RVS80BPP
360°				±170°		360°				±170°		360°				
1°/s	20°/s	80°/s	16°/s		80°/s	2°/s	1°/s	20°/s	80°/s	16°/s	80°/s	2°/s	1°/s	20°/s	40°/s	20°/s
17 N·m	20 N·m	13 N·m	30 N·m		60 N·m	30 N·m	22 N·m	14 N·m	30 N·m	14 N·m	80 N·m	40 N·m	25 N·m	2 N·m	2 N·m	
1350 N	2700 N	4000 N		2000 N		4000 N	6500 N				3250 N	6500 N	900 N			
1.0 mdeg		0.20 mdeg		0.75 mdeg		1.0 mdeg		0.20 mdeg		0.75 mdeg		1.0 mdeg		0.20 mdeg		
±0.35 mdeg		±0.07 mdeg		±0.35 mdeg		±0.35 mdeg		±0.07 mdeg		±0.35 mdeg		±0.36 mdeg		±0.50 mdeg		
±1.0 mdeg		±0.10 mdeg		±1.0 mdeg		±1.0 mdeg		±0.10 mdeg		±1.0 mdeg		±0.50 mdeg		±1.0 mdeg		
±0.7 mdeg		±0.6 mdeg		±0.4 mdeg		±0.6 mdeg		±0.4 mdeg		±0.6 mdeg		±0.6 mdeg		±1.2 mdeg		
±2.0 mdeg		±0.6 mdeg		±2.0 mdeg		±2.0 mdeg		±0.6 mdeg		±2.0 mdeg		±2.0 mdeg		±3.5 mdeg		
±4.0 mdeg		±3.5 mdeg		±2.0 mdeg		±3.5 mdeg		±2.0 mdeg		±3.5 mdeg		±3.5 mdeg		±7.0 mdeg		
±5.0 mdeg		±2.5 mdeg		±5.0 mdeg		±5.0 mdeg		±2.5 mdeg		±5.0 mdeg		±5.0 mdeg		±10 mdeg		
±5.0 μrad		±4.0 μrad				±8.0 μrad				±8.0 μrad						
±10 μrad		±8.0 μrad				±1.4 μm				±0.5 μm						
±0.8 μm		±2.0 μm				±1.4 μm				±0.5 μm						
100 kg.m ²		3 kg.m ²	1.5 kg.m ²	38 kg.m ²	1.1 kg.m ²	150 kg.m ²	4 kg.m ²	1.8 kg.m ²	10 kg.m ²	1.2 kg.m ²	220 kg.m ²	4 kg.m ²	0.1 kg.m ²	0.5 kg.m ²		
0.6 μrad/N·m		0.3 μrad/N·m				0.1 μrad/N·m				3.5 μrad/N·m						
±0.5 mdeg		±0.1 mdeg		±0.5 mdeg		±0.1 mdeg		±0.5 mdeg		±0.25 mdeg		±10 mdeg				
0.001°		0.05 mdeg		0.001°		0.035 mdeg		0.001°		0.25 mdeg		0.1 mdeg				
3 m																
160 mm		240 mm				350 mm				80 mm						
110 mm		175 mm				280 mm				50 mm						
10 ⁻⁶ hPa	NA	NA	NA	NA	NA	NA	10 ⁻⁶ hPa	NA	NA	NA	NA	NA	10 ⁻⁶ hPa	NA	NA	
9 kg		16 kg		19 kg		16 kg		27 kg		33 kg		27 kg		1.8 kg		
20,000 h (25% load, 10% duty cycle)																
Compliant																

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ROTATION STAGES

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HEXAPODS

CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

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SPECIAL
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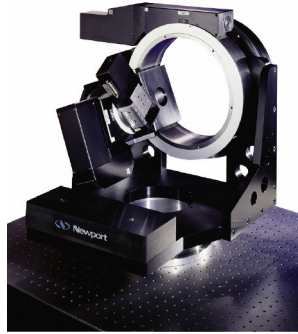
MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

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ROTATION STAGES



SM300 mirror mount for a high power laser application, built with custom, high sensitivity and high angular stiffness RVU rotary stages



Antenna and sensor positioner for guidance and field communication systems

Ordering Information

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LINEAR ACTUATORS

HEXAPODS

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AND DRIVERS

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Series	Diam. (mm)	Drive	Folded Motor	Vacuum Prep. ⁽²⁾
RV	S80 ⁽¹⁾ 120 160 240 350	CC	-F	V6
		CCHL		
		HAHLT		
		HAT		
		BPE		
BPP				

*Example:
The RV240HAHLT-F is a Ø 240 mm RV rotation stage with a DC motor, a reduction gear, an integral optical encoder and with a folded motor.*

- ¹⁾ RVS80 is only available as RVS80CC and RVS80BPP.
- ²⁾ Vacuum compatible to 10⁻⁶ hPa. In this case max. speed and load capacity have to be divided by two.

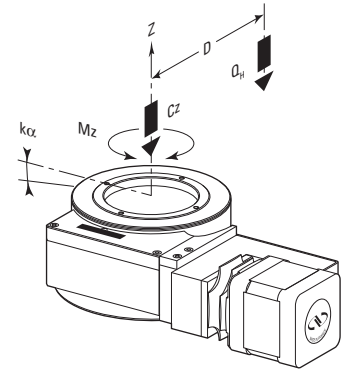
- CC: DC motor
- CCHL: DC motor with reduction gear
- HAHLT: DC motor with reduction gear and integral optical encoder
- HAT: DC motor with integral optical encoder
- BPE: Full-step motor
- BPP: Mini-step motor

Recommended Motion Controllers

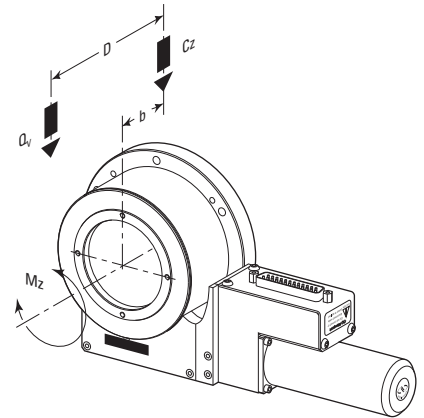
XPS-D see page 148	All models
XPS-RL see page 153	All models
ESP301 see page 157	Except HAT, HAHLT, CC and CCHL
SMC100CC see page 159	RVS80CC only
SMC100PP see page 159	RVS80BPP only

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

Load Rotation Axes



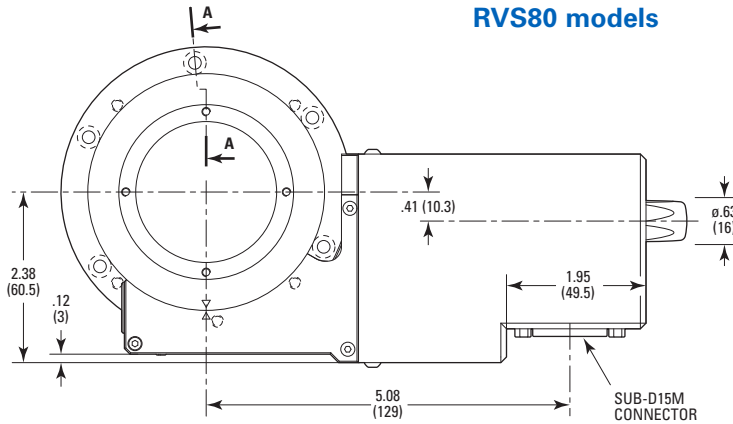
Vertical Axis



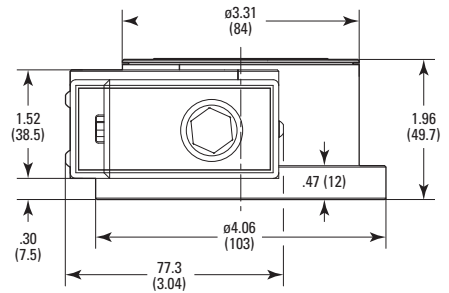
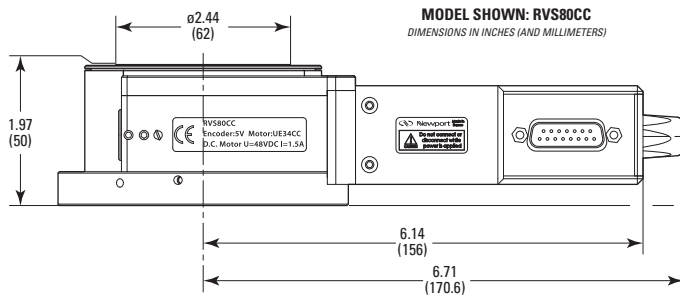
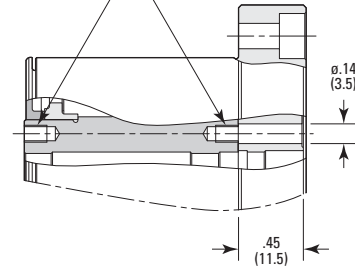
Horizontal Axis

Dimensions

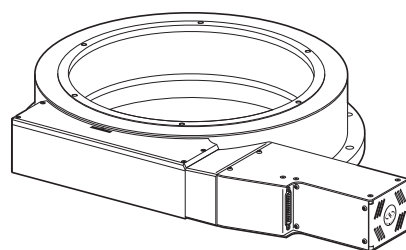
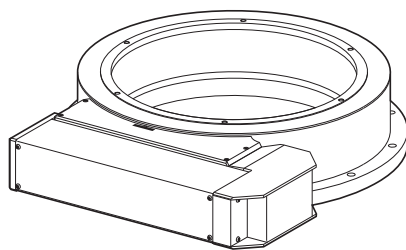
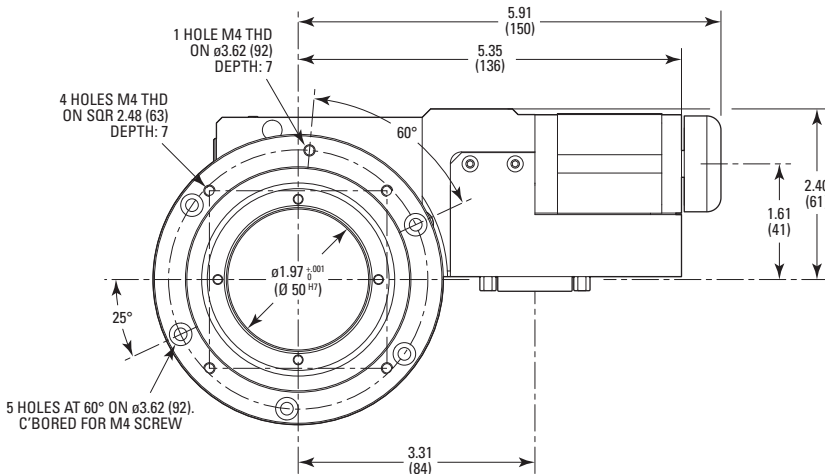
RVS80 models



A - A
 2 x 4 HOLES M3 THD ON ø2.24 (Ø 57),
 DEPTH: .16 (4)
 TOP AND BOTTOM HOLES ARE ALIGNED



BOTTOM VIEW OF THE RVS80PP



ROTATION STAGE, FOLDED MOTOR

MODEL	L ₁	M ₁	L ₂	M ₂
RV120	6.12 (155.5)	2.15 (54.5)		
RV160	6.61 (168)	2.48 (63)	6.32 (160.5)	4.35 (110.5)
RV240	7.60 (193)	3.25 (82.5)		
RV350	8.62 (219)	4.49 (114)		

ROTATION STAGE, DIRECT MOTOR

MODEL	L ₁				M ₁	L ₂	M ₂
	BPP	BPE	CC	CCHL			
RV120	9.90 (251.5)	9.90 (251.5)	9.90 (251.5)	11.87 (301.5)	1.79 (45.5)		
RV160	10.39 (264)	12.36 (314)	10.39 (264)	12.36 (314)	2.13 (54)	4.61 (117)	1.32 (33.5)
RV240	11.38 (289)	13.35 (339)	11.38 (289)	13.35 (339)	2.89 (73.5)		
RV350	12.40 (315)	14.37 (365)	12.40 (315)	14.37 (365)	4.13 (105)		

MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

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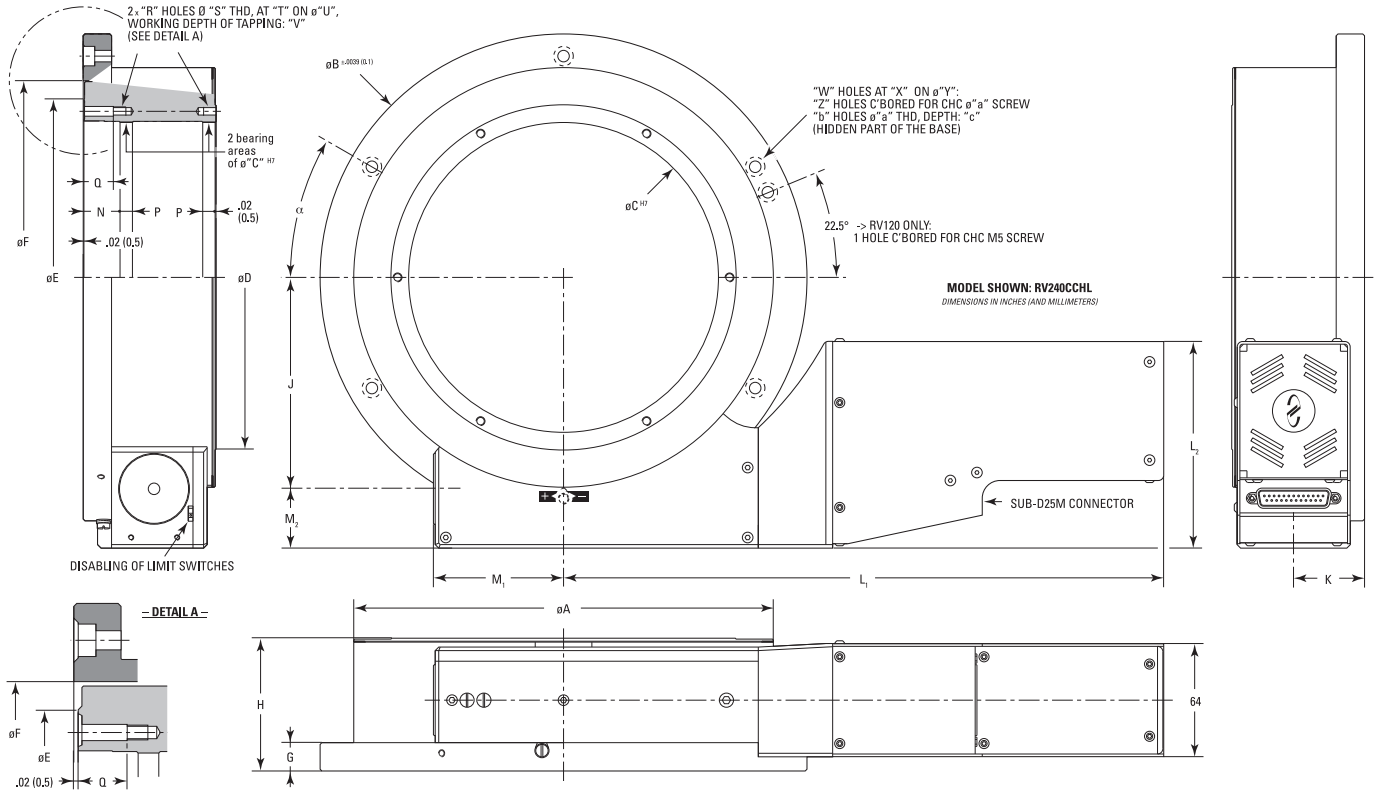
CONTROLLERS
AND DRIVERS

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BEAM
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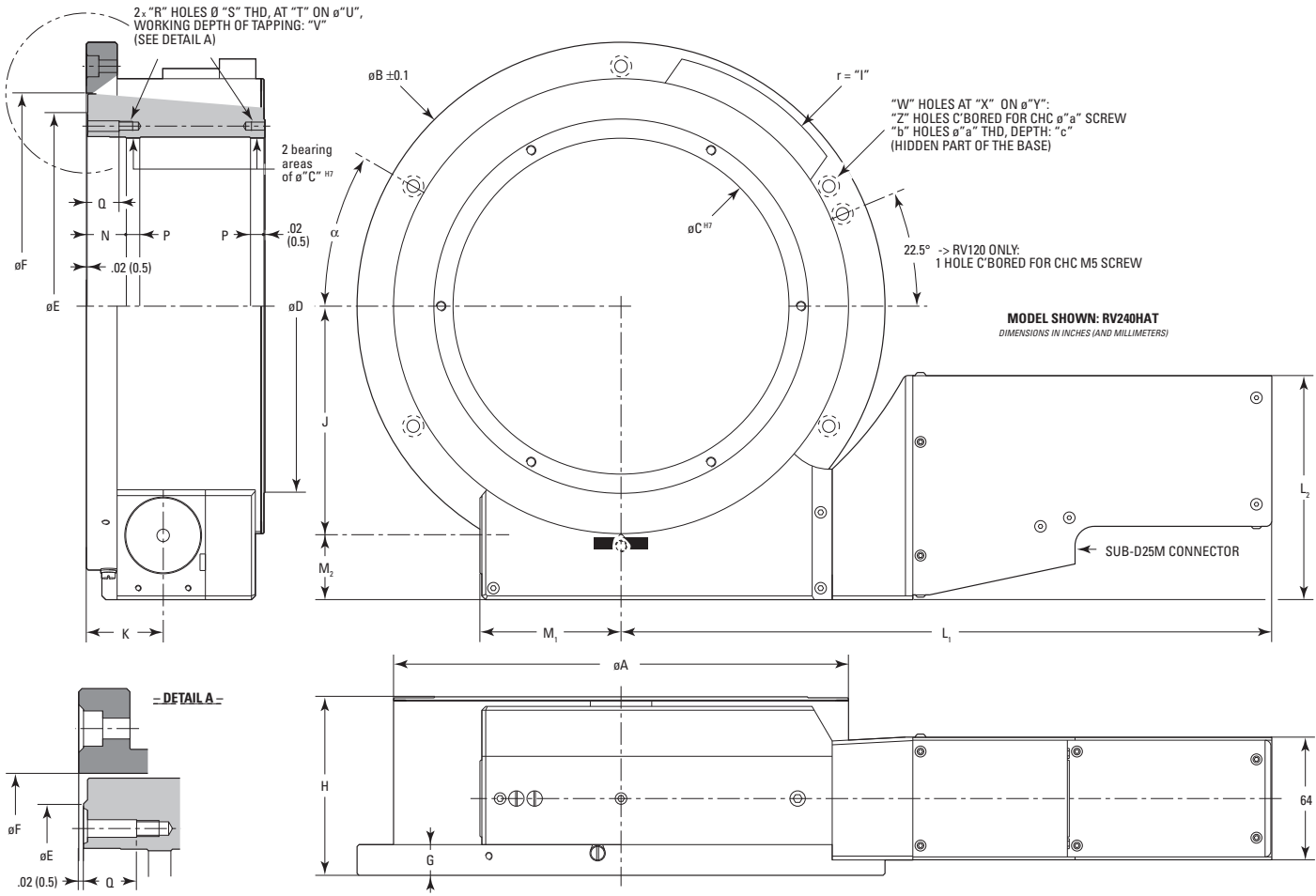
RV120 to RV350 Models



MODEL	A	B	C	D	E	F	G	H	J	K	N	P	Q
RV120	4.96 (126)	6.10 (155)	3.07 (78)	3.66 (93)	3.90 (99)	4.55 (115.5)	.55 (14)	2.68 (68)	2.48 (63)	1.34 (34)	.75 (19)	.16 (4)	.59 (15)
RV160	6.42 (163)	7.56 (192)	4.33 (110)	5.08 (129)	5.28 (134)	5.98 (152)	.55 (14)	2.80 (71)	3.21 (81.5)	1.42 (36)	.73 (18.5)	.20 (5)	.57 (14.5)
RV240	9.33 (237)	10.83 (275)	6.89 (175)	7.64 (194)	8.03 (204)	8.74 (222)	.63 (16)	2.95 (75)	4.70 (119.5)	1.58 (40)	.80 (20.3)	.28 (7)	.65 (16.6)
RV350	14.02 (356)	15.55 (395)	11.02 (280)	11.89 (302)	12.40 (315)	13.05 (331.5)	.69 (17.5)	3.54 (90)	7.05 (179)	1.97 (50)	.84 (21.3)	.31 (8)	.68 (17.3)

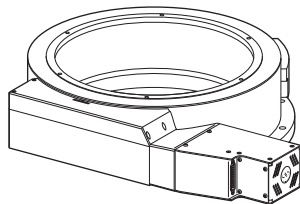
MODEL	R	S	T	U	V	W	X	Y	Z	a	b	c	α
RV120	4	M4	90°	3.44 (87.5)	.24 (6)	6	60°	5.39 (137)	5	M5	1	7	17.5°
RV160	6	M5	60°	4.72 (120)	.28 (7)	6	60°	6.85 (174)	5	M5	1	7	25°
RV240	6	M5	60°	7.38 (187.5)	.28 (7)	6	60°	9.84 (250)	5	M6	1	10	30°
RV350	6	M6	60°	11.61 (295)	.28 (7)	12	30°	14.65 (372)	10	M8	2	12	10°

RVHAT & RVHAHLT Models



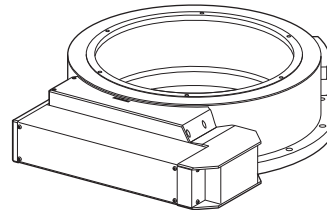
MODEL	A	B	C	D	E	F	G	H	I	J	K	N	P	Q
RV120	4.96 (126)	6.10 (155)	3.07 (78)	3.66 (93)	3.90 (99)	4.55 (115.5)	.55 (14)	3.39 (86)	3.15 (80)	2.48 (63)	1.34 (34)	.75 (19)	.16 (4)	.59 (15)
RV160	6.42 (163)	7.56 (192)	4.33 (110)	5.08 (129)	5.28 (134)	5.98 (152)	.55 (14)	3.50 (89)	3.86 (98)	3.21 (81.5)	1.42 (36)	.73 (18.5)	.20 (5)	.57 (14.5)
RV240	9.33 (237)	10.83 (275)	6.89 (175)	7.64 (194)	8.03 (204)	8.74 (222)	.63 (16)	3.66 (93)	5.22 (132.5)	4.70 (119.5)	1.58 (40)	.80 (20.3)	.28 (7)	.65 (16.6)
RV350	14.02 (356)	15.55 (395)	11.02 (280)	11.89 (302)	12.40 (315)	13.05 (331.5)	.69 (17.5)	4.25 (108)	7.44 (189)	7.05 (179)	1.97 (50)	.84 (21.3)	.31 (8)	.68 (17.3)

MODEL	R	S	T	U	V	W	X	Y	Z	a	b	c	α
RV120	4	M4	90°	3.44 (87.5)	.24 (6)	6	60°	5.39 (137)	5	M5	1	7	17.5°
RV160	6	M5	60°	4.72 (120)	.28 (7)	6	60°	6.85 (174)	5	M5	1	7	25°
RV240	6	M5	60°	7.38 (187.5)	.28 (7)	6	60°	9.84 (250)	5	M6	1	10	30°
RV350	6	M6	60°	11.61 (295)	.28 (7)	12	30°	14.65 (372)	10	M8	2	12	10°



ROTATION STAGE, DIRECT MOTOR

MODEL	L ₁		M ₁	L ₂	M ₂
	HAT	HAHLT			
RV120	11.87 (301.5)	11.87 (301.5)	1.79 (45.5)		
RV160	12.36 (314)	14.06 (357)	2.13 (54)	4.61 (117)	1.32 (33.5)
RV240	13.35 (339)	15.04 (382)	2.89 (73.5)		
RV350	14.37 (365)	16.06 (408)	4.13 (105)		



ROTATION STAGE, FOLDED MOTOR

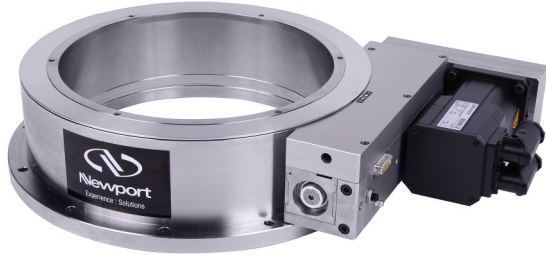
MODEL	L ₁	M ₁		L ₂	M ₂
		HAT-F	HAHLT-F		
RV120	6.12 (155.5)	2.15 (54.5)	3.13 (79.5)		
RV160	6.61 (168)	2.48 (63)	4.23 (107.5)	6.32 (160.5)	4.35 (110.5)
RV240	7.60 (193)	3.25 (82.5)	3.25 (82.5)		
RV350	8.62 (219)	4.49 (114)	4.49 (114)		

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

RVU Series

RVU Series – High Angular Stiffness Rotation Series



- 100:1 harmonic drive box provides high torque & good sensitivity
- Vacuum compatible versions for use in ISO 7 clean environment
- All steel construction offers high stiffness and thermal stability

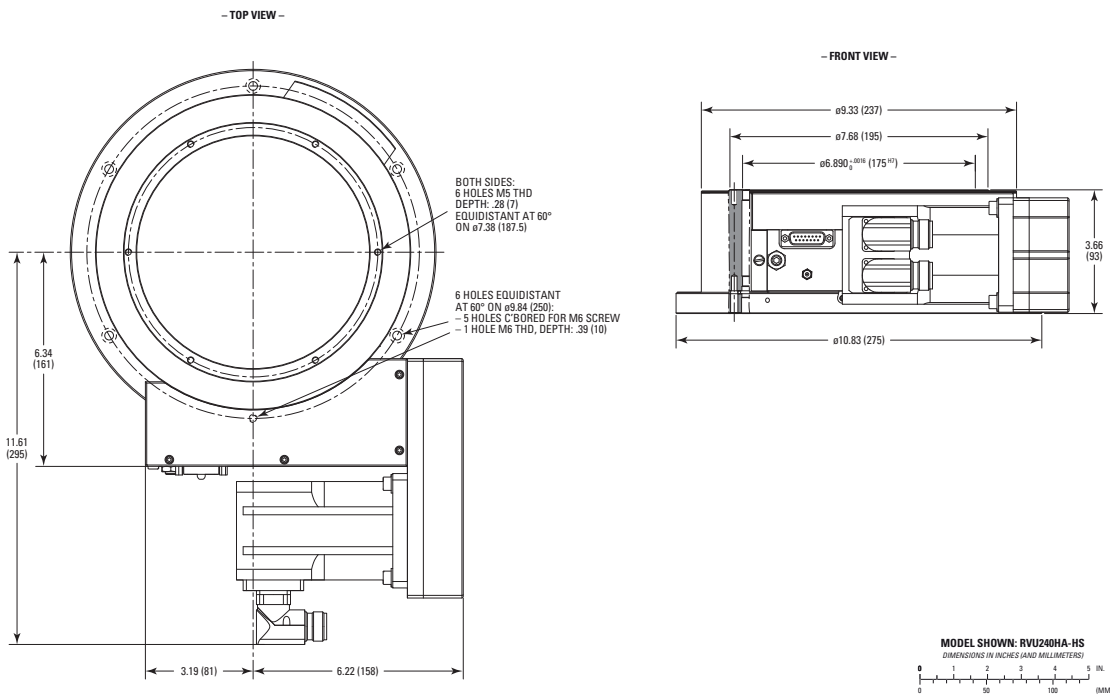
The RVU rotation stages are designed to meet the specifications of large mirror mounts which require high torque, rigidity, and sensitivity.

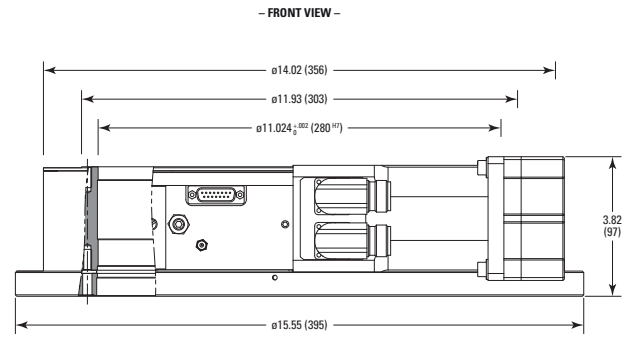
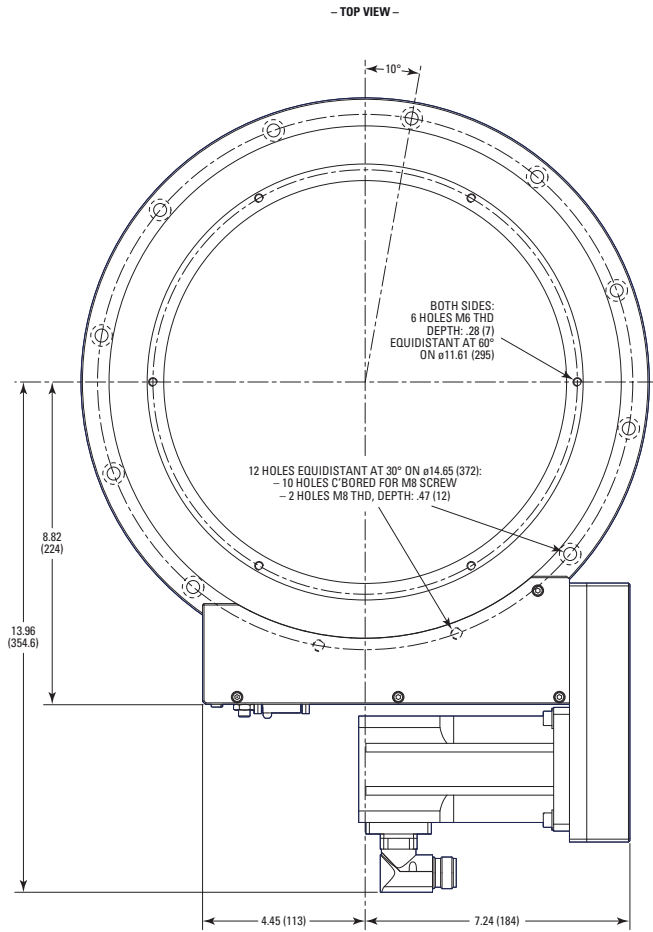
Specifications

	RVU240HAHS	RVU240HS	RVU350HAHS	RVU350HS
Angular Range	±170°			
Centered Load Capacity	4000 N		6500 N	
Minimum Incremental Motion	0.20 mdeg	1 mdeg	0.20 mdeg	1 mdeg
Maximum Torque	130 N-m		250 N-m	
Inertia	100 kgm ²		200 kgm ²	
Origin Repeatability	±0.1 mdeg	±0.5 mdeg	±0.1 mdeg	±0.5 mdeg

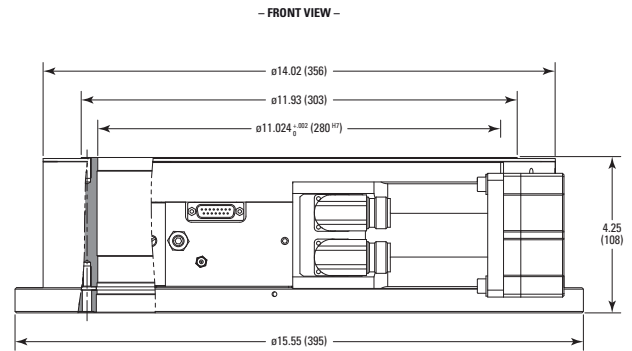
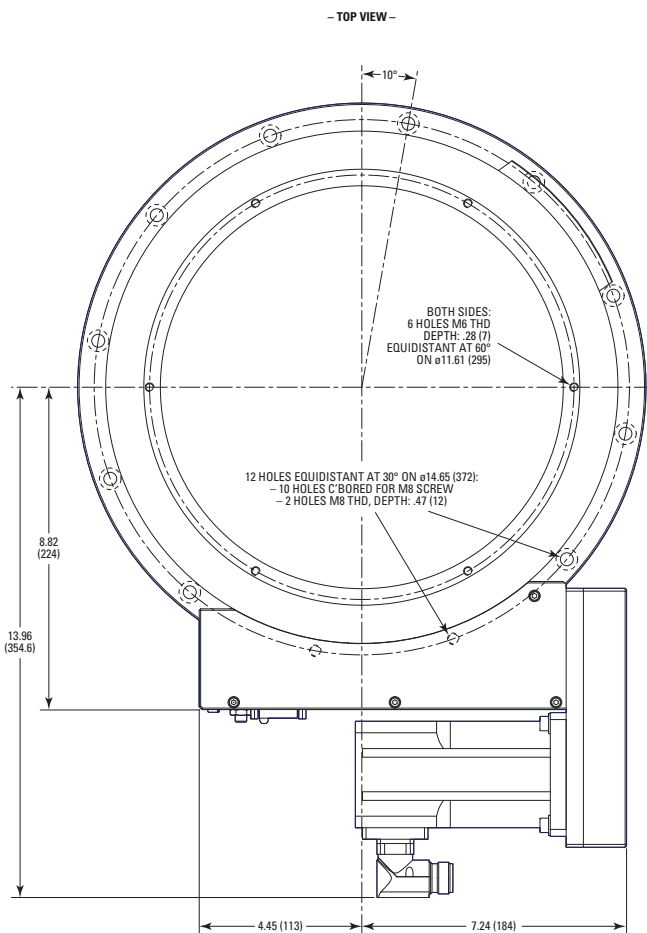
Ordering Information

Model	Description
RVU350HS	Rotation Stage, 350 mm, High Sensitivity, High Speed
RVU240HS	Rotation Stage, 240 mm, High Sensitivity, High Speed
RVU240HAHS	Rotation Stage, 240 mm, High Sensitivity, High Torque
RVU350HAHS	Rotation Stage, 350 mm, High Sensitivity, High Torque





MODEL SHOWN: RVU350-HS
DIMENSIONS IN INCHES (AND MILLIMETERS)



MODEL SHOWN: RVU350HA-HS
DIMENSIONS IN INCHES (AND MILLIMETERS)

URS Series

Precision Rotation Stages



scan QR code
to watch video



- Economical, general purpose
- Flexible preloading system guarantees backlash-free operation
- Tilted worm screw arrangement and 4 symmetric mounting holes provide better support for cantilevered loads with a smaller footprint
- Vacuum compatible version available

URS Series provide precision 360° continuous motion in a low profile package. URS Series stages feature: a proprietary ball bearing with exceptional stiffness, high reliability, minimal wobble and eccentricity; a tilted worm screw arrangement to allow 4 symmetric mounting holes, providing better support for cantilevered loads; adjustable limit switches to prevent over-travel (except for URS50B); and a flexible preloading system to guarantee backlash-free operation with an MTBF of 20,000 hours. The DC motor version features an ultra-high resolution encoder, 8,000 cts/rev, mounted on the worm screw, ensuring excellent bi-directional repeatability and high accuracy motion. The DC motor versions provides the highest dynamic speed range and allows rotation speeds up to 80 °/s. The stepper motor version is an economical solution for less demanding applications and with its high output torque, minimizes any risk of lost steps, providing good linearity between the stage's motion and commanded steps. The URS is also available in vacuum compatible versions down to 10e-6hPa. Additionally the CONEX-URS50BCC is the URS50BCC rotational stage with the integrated CONEX-CC controller/driver and is pre-configured for the highest level of out-of-the-box control. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices.

Specifications

	URS100BCC	URS150BCC	URS50BCC	URS75BCC	URS100BPP	URS150BPP	URS50BPP	URS75BPP
Angular Range	360°							
Maximum Speed	80°/s		20°/s	80°/s	40°/s			
Maximum Torque	1 N·m	2 N·m	0.25 N·m	0.5 N·m	1 N·m	2 N·m	0.25 N·m	0.5 N·m
Centered Load Capacity	300 N		100 N	200 N	300 N		100 N	200 N
Thread Type	M6		M3		M6		M3	
Minimum Incremental Motion	2.0 mdeg		1.0 mdeg	2.0 mdeg	0.20 mdeg		0.50 mdeg	0.20 mdeg
Uni-directional Repeatability, Typical	±0.35 mdeg	±0.35 mdeg	±0.30 mdeg	±0.35mdeg	±0.35mdeg		±0.60mdeg	±0.35mdeg
Bi-directional Repeatability, Typical	±1.4 mdeg	±1.1 mdeg	N/A	±0.30mdeg	±0.35mdeg		±0.60mdeg	±0.35mdeg
Uni-directional Repeatability, Guaranteed	±1.0 mdeg							
Bi-directional Repeatability, Guaranteed	±3.0 mdeg		N/A	±3.0 mdeg	±6.0 mdeg		±3.0 mdeg	±6.0 mdeg
Accuracy, Typical	±6.0 mdeg		±10 mdeg	±6 mdeg	±8.0 mdeg		±12 mdeg	±8 mdeg
Accuracy, Guaranteed	±11.5 mdeg		±20 mdeg	±11.5 mdeg	±15 mdeg		±25 mdeg	±15 mdeg
Wobble, Typical	±12 μrad							
Wobble, Guaranteed	±25 μrad							
Eccentricity, Typical	±0.40 μm	±0.50 μm	±3.0 μm	±0.30 μm	±0.40 μm	±0.50 μm	±3.0 μm	±0.30 μm
Transversal Compliance	10 μrad/N·m	5 μrad/N·m	100 μrad/N·m	30 μrad/N·m	10 μrad/N·m	5 μrad/N·m	100 μrad/N·m	30 μrad/N·m
Origin Repeatability	±0.25 mdeg		±25 mdeg	±0.25 mdeg	±20 mdeg		±25 mdeg	±20 mdeg
Limit Switches	Two independently adjustable optical limit switches							
Cable Length	3 m							
Aperture Diameter	50 mm	90 mm	25.7 mm	30 mm	50 mm	90 mm	25.7 mm	30 mm
Weight	2 kg	3.4 kg	0.7 kg	1.7 kg	2 kg	3.4 kg	0.7 kg	1.7 kg
MTBF	20,000 h (25% load, 10% duty cycle)							
CE	Compliant							

1. URS50 and URS75 also available in a vacuum compatible version -PPV6.
2. Maximum speed is reduced to 20°/s for URS75BPPV6.
3. Uni-directional repeatability varies for URS50BPPV6.
4. Bi-directional repeatability varies for URS50BPPV6.

Ordering Information

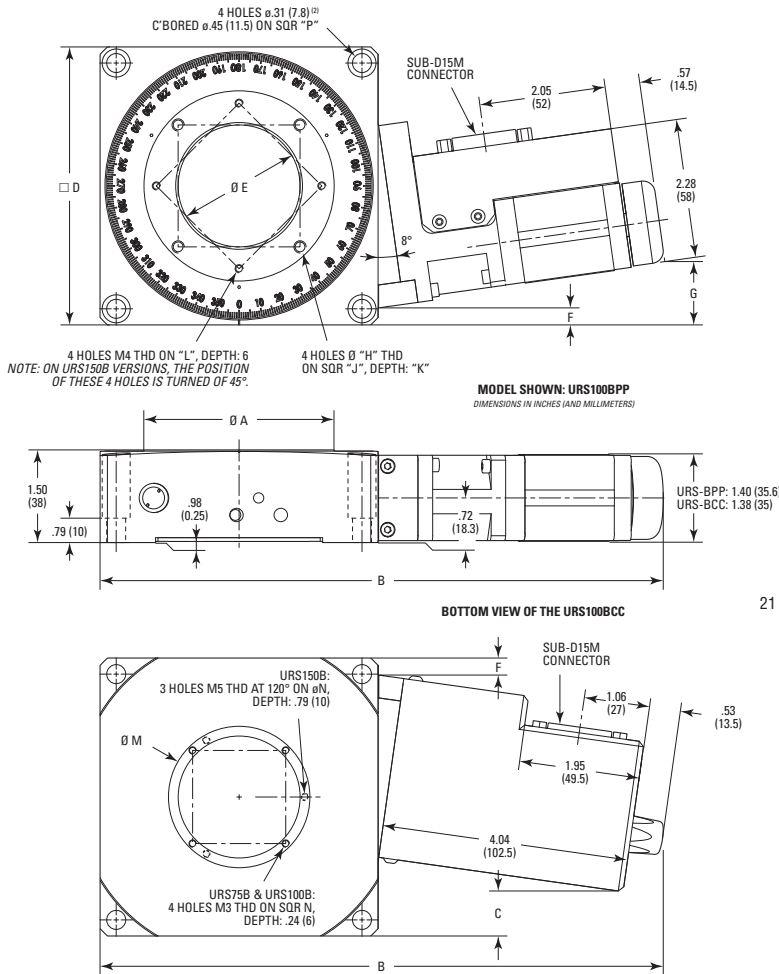
Model (Metric)	Description
URS50BCC	Precision Rotation Stage, DC, Continuous 360° Motion, URS50
URS50BPP	Precision Rotation Stage, Stepper, Continuous 360° Motion, URS50
URS50BPPV6	Vacuum Compatible Precision Rotation Stage, Stepper, URS50
URS75BCC	Precision Rotation Stage, DC, Continuous 360° Motion, URS75
URS75BPP	Precision Rotation Stage, Stepper, Continuous 360° Motion, URS75
URS75BPPV6	Vacuum Rotation Stage, Stepper Motor, URS75
URS100BCC	Precision Rotation Stage, DC, Continuous 360° Motion, URS100
URS100BPP	Precision Rotation Stage, Stepper, Continuous 360° Motion, URS100
URS150BCC	Precision Rotation Stage, DC, Continuous 360° Motion, URS150
URS150BPP	Precision Rotation Stage, Stepper, Continuous 360° Motion, URS150
CONEX-URS50BCC ¹	URS50BCC Rotation Stage Integrated with CONEX Controller
URS75TP (M-URS75TP)	Solid Top Mounting Plate, URS75 Series, M6 Threaded Holes
URS100TP (M-URS100TP)	Solid Top Mounting Plate, URS100 Series, M6 Threaded Holes
URS150TP (M-URS150TP)	Solid Top Mounting Plate, URS150 Series, M6 Threaded Holes
URS75P1	Adapter for B25.4 lens barrel on URS75 stages
URSBK	90° Mounting Bracket URS Series Rotation Stages

¹Order CONEX-PS separately.

Dimensions

Dimensions in inches (millimeters)

MODEL URS100B



	A	B	C	D	E	F	G	H	J	K	L	M	N	P
URS75B	1.97 (50)	8.19 (208)	-.20 ⁽¹⁾ (-5) ^(M)	3.54 (90)	1.18 ^(.0001) (30 ^(.01))	.08 (2)	.83 (21)	M3	1.26 (32)	.24 (6)	1.50 (38)	1.34 (34)	2.98 (75.6)	
URS100B	3.07 (78)	9.13 (232)	.71 (18)	4.49 (114)	1.97 ^(.0003) (50 ^(.01))	.26 (6.5)	1.02 (26)	M6	1.97 (50)	.24 (SQR 48)	1.89 (48)	2.28 (58)	2.13 (54)	3.97 (100.8)
URS150B	5.18 (131.5)	11.14 (283)	2.56 (65)	6.50 (165)	3.54 ^(.0007) (90 ^(.02))	.41 (10.5)	1.14 (29)	M6	2.95 (75)	.31 (8)	ϕ 4.92 (Ø 125)	4.13 (105)	3.86 (98)	5.91 AND 6 ⁽¹⁵⁾ (150 AND 152.4) ^(M)

NOTES:
¹ THE DRIVE BOX OF THE URS75BCC EXCEEDS .20 IN. (5 MM) FROM THE BODY.
² URS150B: 4 SLOTS COUNTERBORED.

Recommended Motion Controllers

XPS-D see page 148

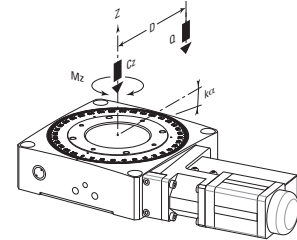
XPS-RL see page 153

ESP301 see page 157

SMC100CC see page 159 CC versions only

SMC100PP see page 159 BPP versions only

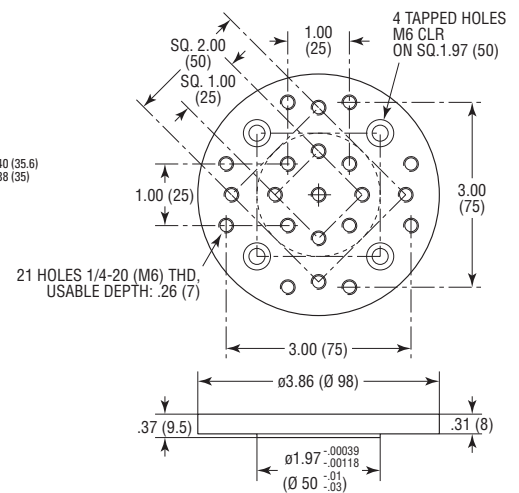
Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.



	URS50	URS75	URS100	URS150
Cz, Normal centered load capacity (N)	100	200	300	300
Kcx, Transversal compliance (µrad/Nm)	100	30	10	5
Mz, Nominal torque (Nm)	±0.25	±0.5	±1.0	±2.0
a, Construction parameter (mm)	20	25	35	55
Q, Off-center load (N)	Q = Cz + (1 + D/a)			

Where D = Cantilever distance (mm)

MODEL (M-)URS100TP



MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

URB100CC

High-Speed Belt-Driven Rotation Stage



- Belt driven version of URS series offers higher rotation speeds without sacrificing life time expectancy
- 720°/s maximum speed
- Most economical for its high speed
- Designed for high speed with small footprint
- Economic motor mounted rotary encoder with 0.01° resolution

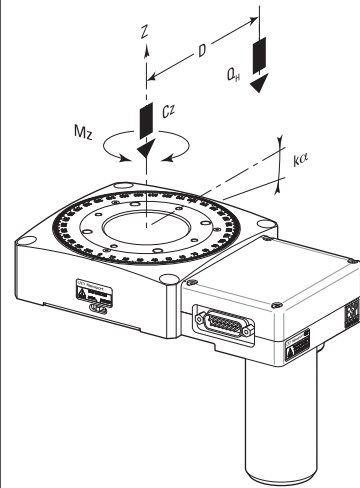


The URB100CC rotation stage is a high-speed, belt driven rotation stage. It is engineered for applications requiring fast moves over larger angles or continuous rotation at very high duty cycles, with high precision requirements. Features include: the belt drive which provides high rotational speeds of up to 720°/s; a proprietary four point contact ball bearing and 2-piece design to provide exceptional stiffness and high reliability while minimizing wobble and eccentricity; an enhanced low-profile package to ensure easy top down mounting. Typical applications for the URB stage are LIDAR, 3D imaging, or film thickness measurements of semiconductor wafers.

Specifications

	URB100CC
Angular Range	360°
Maximum Speed	720°/s
Maximum Torque	0.6 Nm
Maximum Acceleration	1300°/s
Centered Load Capacity	100 N
Minimum Incremental Motion	20 mdeg
Uni-directional Repeatability, Typical	±2.5 mdeg
Uni-directional Repeatability, Guaranteed	±7.5 mdeg
Bi-directional Repeatability, Typical	±15 mdeg
Bi-directional Repeatability, Guaranteed	±47 mdeg
Accuracy, Typical	±50 mdeg
Accuracy, Guaranteed	±100 mdeg
Wobble, Typical	±15 μrad
Wobble, Guaranteed	±25 μrad
Eccentricity, Typical	±0.40 μm
Origin	Optical, centered
Origin Repeatability	±7.5 mdeg
Cable Length	3 m
Aperture Diameter	50 mm
Weight	2 kg
MTBF	20,000 h (25% load, 30% duty cycle)
CE	Compliant

Load Characteristics



Cz, Normal centered load capacity (N)	100
a, Construction parameter (mm)	35
kα, Transversal compliance (μrad/Nm)	10
Mz, Maximum Torque (Nm)	± 0.6
Jz, Maximum Inertia (kg.m ²)	0.025
Q, Off-center load	$Q \leq Cz / (1 + D/a)$
D, Cantilever distance in mm	

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Ordering Information

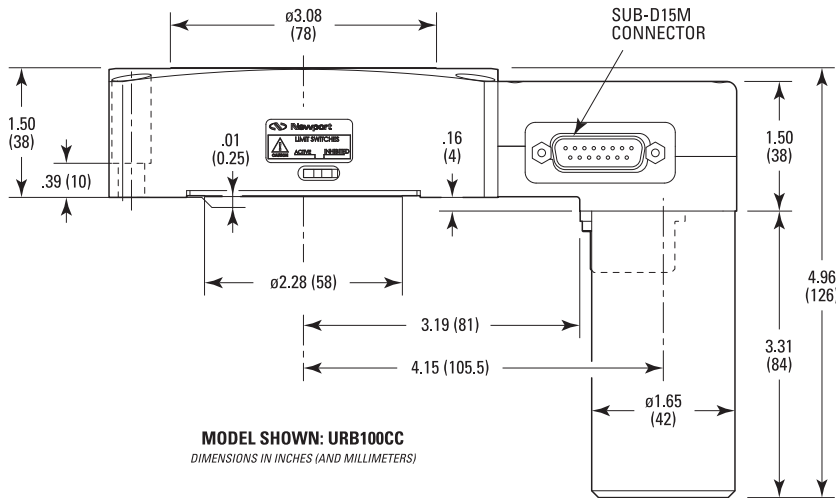
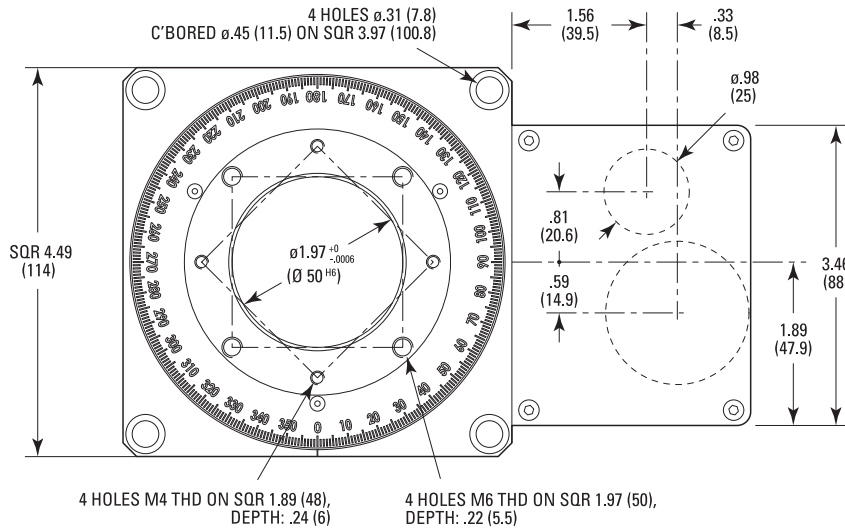
Model (Metric)	Description
URB100CC	Belt Drive Rotation Stage, 360°, DC Servo Motor
URS100TP (M-URS100TP)	Solid Top Mounting Plate, URS100 Series, 1/4-20 Threaded Holes
URSBK	90° Mounting Bracket URS Series Rotation Stages

Recommended Motion Controllers

XPS-D see page 148
XPS-RL see page 153
ESP301 see page 157
SMC100CC see page 159

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

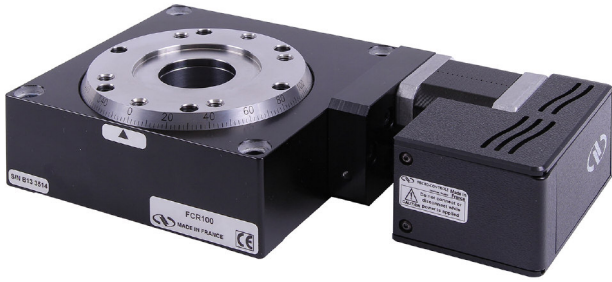
MODEL URB100CC



MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

FCR100

Intelligent Stepper Motor Rotary Stages



- Value-engineered
- Proven and robust construction
- Space-saving (no separate controller box)
- Plug and play
- Easy connection via the USB or directly via RS-422



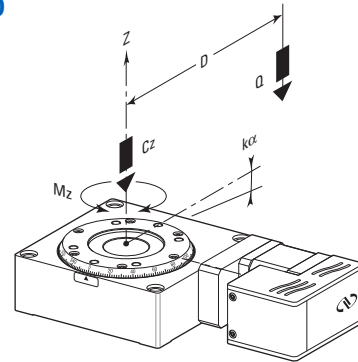
The FCR100 rotation stage combines a fully integrated stepper motor controller (iPP™ technology) and precision rotation stage in a small footprint. Similar to the CONEX series for DC motor, the FCR100 comes fully pre-configured and enables true out-of-box control. The iPP™ technology used in the FC series completely eliminates controller or driver set up, allowing users to simply connect USB communication, plug in the power supply and start the motion GUI. Features of the FCR100 includes: robust construction of crossed roller bearing for high position accuracy and the stepper motor directly attached to the worm screw providing high output torque. Up to 4 FC series units can be daisy-chained and controlled by a single GUI, via USB or direct RS-422 interface.

General Specifications

	FCR100
Travel Range	360°
Load Capacity	300 N
Maximum Speed	20°/s
Maximum Torque	0.5 Nm
Minimum Incremental Motion	0.00025°
Uni-directional Repeatability, Guaranteed	0.002°
Absolute Accuracy, Guaranteed	± 0.02°
Bi-directional Repeatability, Guaranteed	± 0.006°
Wobble	50 µrad
Eccentricity	3 µm
Cable Length	5 m
Transversal Stiffness	12 µrad/Nm
Computer Interfaces	RS422, USB
Weight	2.25 kg
MTBF	20,000 h

Load Characteristics and Stiffness

FCR100



C_z , Normal centered load capacity	300 N
K_α , Transversal compliance	12 µrad/Nm
M_z , Maximum torque	0.5 Nm
J_z , Maximum Inertia	0.1 kgm ²
Q , Off-center load	$Q \leq C_z / (1 + D/30)$
Where: D = Cantilever distance in mm	

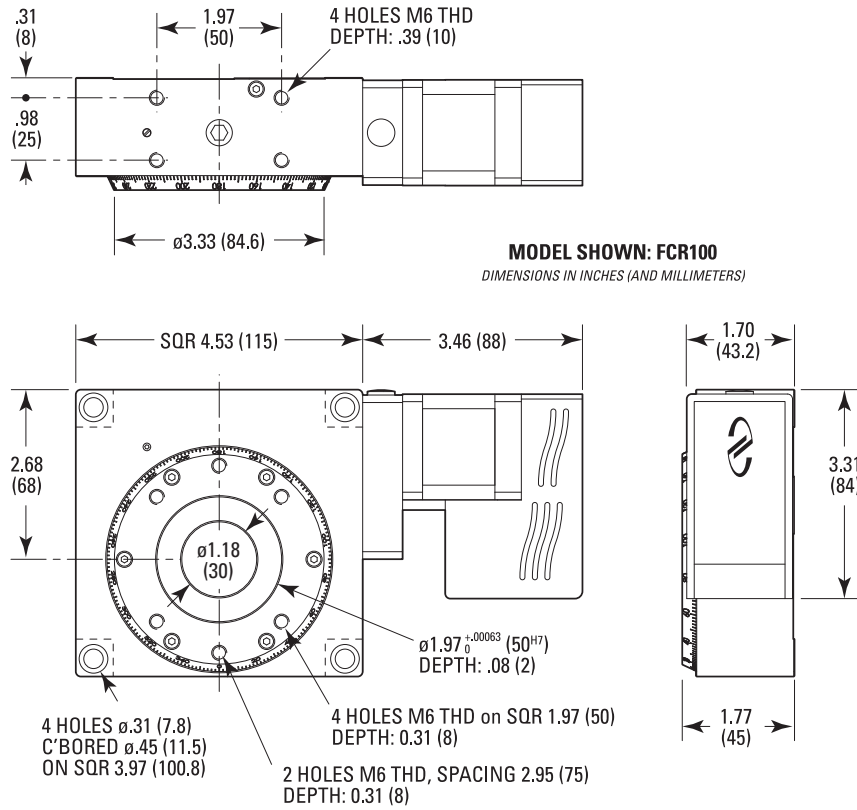
For the definition of specifications visit Newport.com for the Motion Basics and Standards.

Ordering Information

Model	Description
FCR100	Precision Rotation Stage, Intelligent Stepper Motor, Continuous 360° Motion
FC-PS40	Power supply, iPP step motor, RoHS
USB-RS422-1.8	Cable adapter, USB to RS422, 1.8m
FC-CB1	1m communication cable, daisy chain, RS422

Dimensions

FCR100



A typical assembly using FCR100, FCL100 and FCL200



An FCR100 stage mounted to an FCL200 stage

PR50 & SR50 Series

Compact Rotation Stages



- Compact, low-profile rotation stage for 1 in. diameter optics
- Lightweight, folded motor design
- Proprietary ball bearings provide smooth motion with low wobble
- high speed or high resolution versions



The SR50 and PR50 Series are compact, lightweight rotation stages designed for optical components up to 1" in diameter, such as polarizers, wave plates, or wedges. The SR50 stages provide high precision rotation with Minimum Incremental Motion of 0.004° with either DC servo or open-loop stepper motors. The PR50 stages are a cost-efficient alternative to the SR50 for applications that do not require precision of the SR50 or that could benefit from higher speeds up to 20°/s. SR50/PR50 feature: a lightweight, low profile design with the proprietary ball bearings to provide smooth rotation with minimal wobble ($\pm 50 \mu\text{rad}$); a precision ground worm gear producing consistent driving torque to the rotating carriage; an internally foldered motor provides a small footprint for easy integration in the optics path. Typical applications include rotation of optical elements in confined spaces, such as laser cavities, disk texturing machines, or fiber optics component manufacturing.

The CONEX SR50CC and PR50CC are rotation stages with the integrated CONEX-CC controller/driver and is pre-configured for the highest level of out-of-the-box control. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices.

Specifications

	PR50CC	PR50PP	SR50CC	SR50PP
Optic Diameter	25.4 mm			
Aperture Diameter	25.7 mm			
Angular Range	360°			
Maximum Speed	20°/s		4°/s	
Maximum Torque	0.1 Nm		0.4 Nm	
Centered Load Capacity	10 N		30 N	
Minimum Incremental Motion	20 mdeg		4.0 mdeg	
Accuracy, Typical	± 25 mdeg		± 15 mdeg	± 20 mdeg
Bi-directional Repeatability, Typical	± 30 mdeg		± 15 mdeg	± 16 mdeg
Uni-directional Repeatability, Typical	± 5.0 mdeg		± 2.5 mdeg	± 3.5 mdeg
Wobble, Typical	$\pm 20 \mu\text{rad}$			
Inertia	0.015 kg.m ²			
Origin	Optical, centered			
Origin Repeatability	± 25 mdeg			
Cable Length	3 m			
MTBF	10,000 h (25% load, 30% Duty cycle)			
Weight	0.4 kg		0.3 kg	
CE	Compliant			

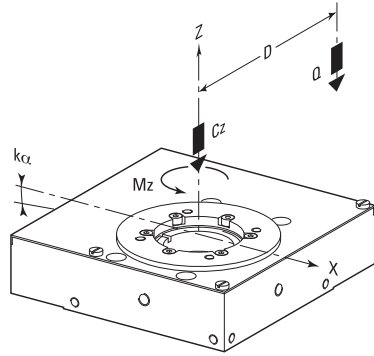


CONEX-PR50CC shown



Two PR50 stages with an EQ45.

For the definition of specifications, visit Newport.com's section on Motion Basics and Standards.



Load Characteristics

	SR50 Series	PR50 Series
Normal Load Capacity (Cz) N	30	10
Construction parameter (a) mm	25	22
Transversal Stiffness (kα) μrad/Nm	160	100
Nominal Torque (Mz) Nm	SR50CC: 0.4 SR50PP: 0.5	0.1
Off-center load (Q)	For SR50 $Q \leq Cz / (1 + D/25)$, where D is a cantilever distance in mm For PR50 $Q \leq Cz / (1 + D/22)$, where D is a cantilever distance in mm	

Also applicable to the PR50 Series

Ordering Information

Model	Description
SR50CC	Compact Rotation Stage, 360°, DC Servo Motor, SR Series
SR50PP	Compact Rotation Stage, 360°, Micro Step Drive Stepper, SR Series
PR50CC	Compact Rotation Stage, 360°, DC Servo Motor, PR Series
PR50PP	Compact Rotation Stage, 360°, Micro Step Drive Stepper, PR Series
CONEX-SR50CC	SR50CC Rotation Stage Integrated with CONEX Controller
CONEX-PR50CC	PR50CC Rotation Stage Integrated with CONEX Controller
EQ45	Right-Angle Bracket for PR50 and SR50

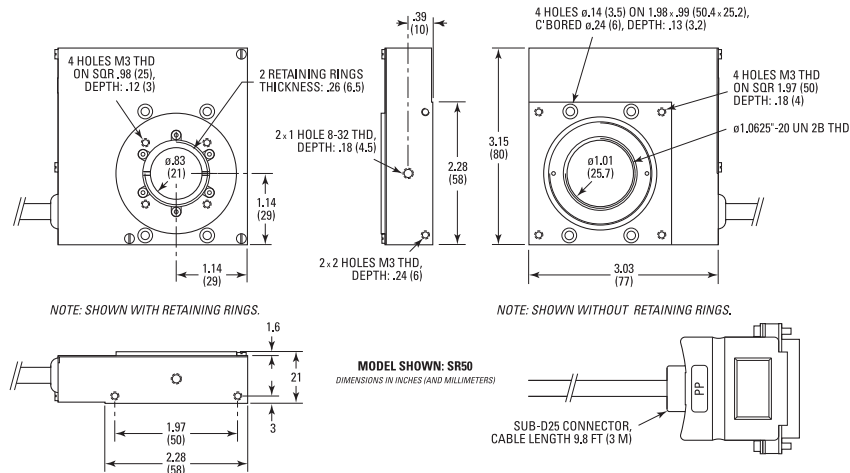
Recommended Motion Controllers

XPS-D see page 148	
XPS-RL see page 153	
ESP301 see page 157	
SMC100CC see page 159	SR50CC and PR50CC
SMC100PP see page 159	SR50PP and PR50PP

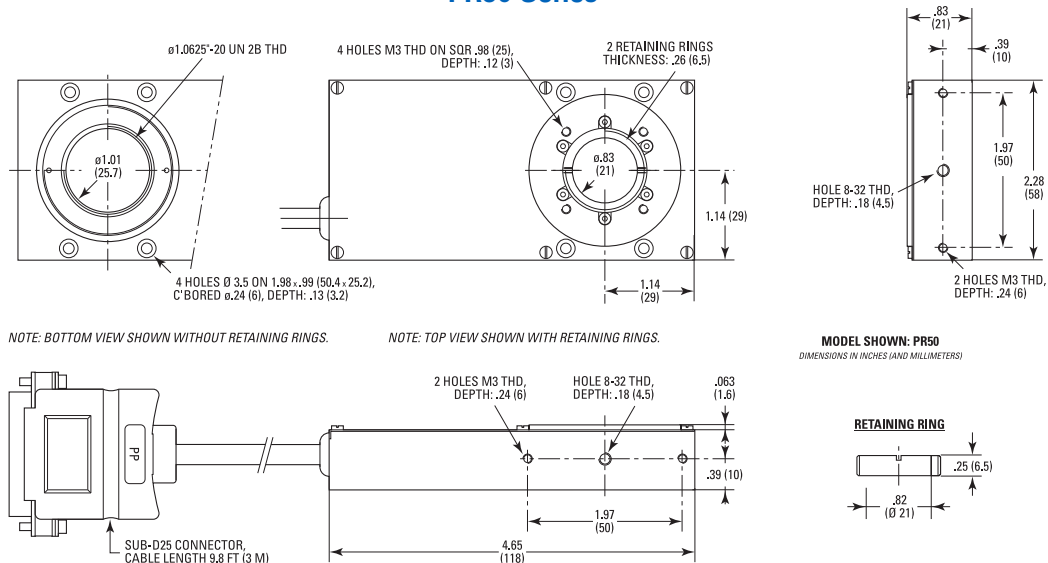
Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

Dimensions

SR50 Series



PR50 Series



MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

BG Series

Goniometric Cradles



- $\pm 45^\circ$ transverse axis rotation with maximum free access to the rotating platform
- Stacked cradles provide orthogonal rotation about the same pivot point
- Precision machined ball bearing races assure smooth motion and high stability
- Precision ground worm gear provides 0.002° MIM
- Vacuum compatible versions up to 10^{-6} hPa

BG Series Goniometric Cradles are designed to provide precision transverse axis rotational motion with maximum free access to the rotating platform and an MIM to 0.0002° . BG stages can be stacked for two-axis rotation about the same pivot point. Mounting a rotation stage under the assembly adds a third orthogonal rotation axis through the same point. Features include: a precision ground, hardened worm gear drive for high accuracy rotation; single row ball bearings and precision ground tool-steel races to ensure smooth rotational motion with minimal wobble and eccentricity; and a home switch conveniently located at the center of travel. BG Series goniometric cradles are available in 5 sizes and may be configured with DC motors (CC) or stepper motors (PP with mini-step or PE with full-step), depending on the applications. These highly versatile stages can be used for applications with high loads or torques, vacuum applications and compact multi-axis rotation assemblies.

The CONEX-BGS50CC is a goniometric cradle stage with the integrated CONEX-CC controller/driver and is pre-configured for the highest level of out-of-the-box control. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices.

Specifications

	BGM120BPP	BGM160CC	BGM160BPE	BGM160PEBV6	BGM160BPP	BGM200CC	BGM200BPE	BGM200BPP	BGS50CC	BGS50BPP	BGS80CC	BGS80BPP		
Stage Type	Motorized Goniometer													
Angular Range	-45 to $+45^\circ$								-30 to $+30^\circ$		-45 to $+45^\circ$			
Load Capacity	200 N		300 N			500 N			20 N		60 N			
Platform Size	120 x 99 mm		160 x 130 mm			200 x 200 mm			50 x 50 mm					
Height	94 mm		138.2 mm			196 mm			57.5 mm					
Rotation Axis Height	164 mm		245 mm								100 mm			
Graduations	1°								1°					
Thread Type	1/4/20								8/32		8/32		1/4/20	
Minimum Incremental Motion	2.0 mdeg								0.50 mdeg		0.20 mdeg		0.50 mdeg 0.20 mdeg	
Maximum Speed	20°/s		2°/s			20°/s			2°/s		20°/s		10°/s 4°/s 20°/s	
Maximum Torque	6 Nm		10 Nm		20 Nm		20 Nm		16 Nm		10 Nm		29 Nm 17 Nm 0.5 Nm 0.5 Nm 1 Nm 1 Nm	
Wobble, Typical	$\pm 100 \mu\text{rad}$													
Absolute Accuracy (Typical)	$\pm 25 \text{ mdeg}$													
Uni-directional Repeatability (Typical)	$\pm 2.0 \text{ mdeg}$								$\pm 0.5 \text{ mdeg}$		$\pm 0.5 \text{ mdeg}$		$\pm 0.5 \text{ mdeg}$ $\pm 0.5 \text{ mdeg}$	
Bi-directional Repeatability (Typical)	$\pm 12 \text{ mdeg}$								$\pm 6.5 \text{ mdeg}$		$\pm 8 \text{ mdeg}$		$\pm 1.5 \text{ mdeg}$ $\pm 2.5 \text{ mdeg}$	
Transversal Compliance	10 $\mu\text{rad}/\text{Nm}$		5 $\mu\text{rad}/\text{Nm}$			2 $\mu\text{rad}/\text{Nm}$			100 $\mu\text{rad}/\text{Nm}$		20 $\mu\text{rad}/\text{Nm}$			
Origin	Optical, centered													
Origin Repeatability	$\pm 2.5 \text{ mdeg}$										$\pm 0.5 \text{ mdeg}$		$\pm 2.5 \text{ mdeg}$	
Limit Switches	Mechanical, at $\pm 45^\circ$													
Cable Length	3 m		3 m		3 m		3 m		3 m		3 m		3 m	
Axial Stiffness				5 N/ μm										
Vacuum Compatibility				10-6 hPa										
Weight	8.5 kg		18 kg			38 kg			0.8 kg		2.1 kg			
MTBF	20,000 h (25% load, 10% duty cycle)													
CE	Compliant													

For the definition of specifications visit Newport.com for the Motion Basics and Standards.

Ordering Information

Model	Series	Travel (mm)	Drive	Vacuum Prep. ⁽²⁾
	BGS	50	CC	Example: The BGM160BPE is an BGM goniometric cradle with a full-step motor drive, English version.
		80		
		120		
M-	BGM	160	BPE ⁽¹⁾	V6
		200		

¹⁾ Only available as BGM Series stage.
²⁾ Vacuum compatible to 10⁻⁶ hPa. In this case max. speed and load capacity are divided by two.

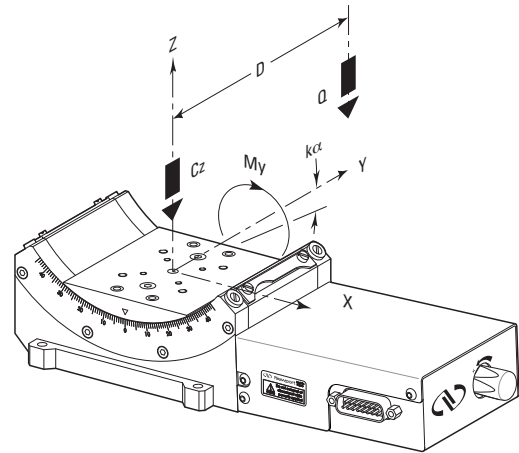
- M-: For metric version
- CC: DC motor
- PP: Micro-step motor
- PE: Full-step motor

Recommended Motion Controllers:

Model	
XPS	see page 148
ESP301	see page 157
SMC100CC	see page 159 BGS50CC and BGS80CC only
SMC100PP	see page 159 BGS50BPP and BGS80BPP only
CONEX-CC	see page 161 BGS50CC only

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146. Motor cables are included.

Load Characteristics and Stiffness



	BGS50	BGS80	BGM120	BGM160	BGM200	
Cz, Normal centered load capacity (N)	20	60	200	300	500	
a, Construction parameter (mm)	30	40	70	90	120	
Kα, Radial compliance (μrad/Nm)	100	20	10	5	2	
My, Maximum torque (Nm)	(PE)		10	20	29	
	(PP)	0.5	1	6	16	17
	(CC)	0.5	1	9	10	10

Q, Off-center load: $Q \leq Cz / (1 + D/a)$, where D = Cantilever distance in mm

Dimensions

BGS50

CABLE LENGTH 9.8 FT (3 M) AND SUB-D25M CONNECTOR

4 HOLES M3 THD ON SQR .79 (20), DEPTH: .20 (5)

8 HOLES M3 THD, DEPTH: .20 (5)

MANUAL KNOB ø.79 (20)

MODEL SHOWN: BGS50

DIMENSIONS IN INCHES (AND MILLIMETERS)

CONEX-BGS50CC shown

BGS80

4 HOLES C'BORED FOR M3 SCREW ON .79 x 2.52 (20 x 64)

4 HOLES ø.18 (4.5) ON ø4.92 (125)

4 HOLES M3 THD ON SQR .79 (20), DEPTH: .20 (5)

4 HOLES M4 THD ON SQR 1.34 (34), DEPTH: .20 (5)

MODEL SHOWN: BGS80CC

DIMENSIONS IN INCHES (AND MILLIMETERS)

4 HOLES M4 THD ON SQR 1.34 (34), DEPTH: .20 (5)

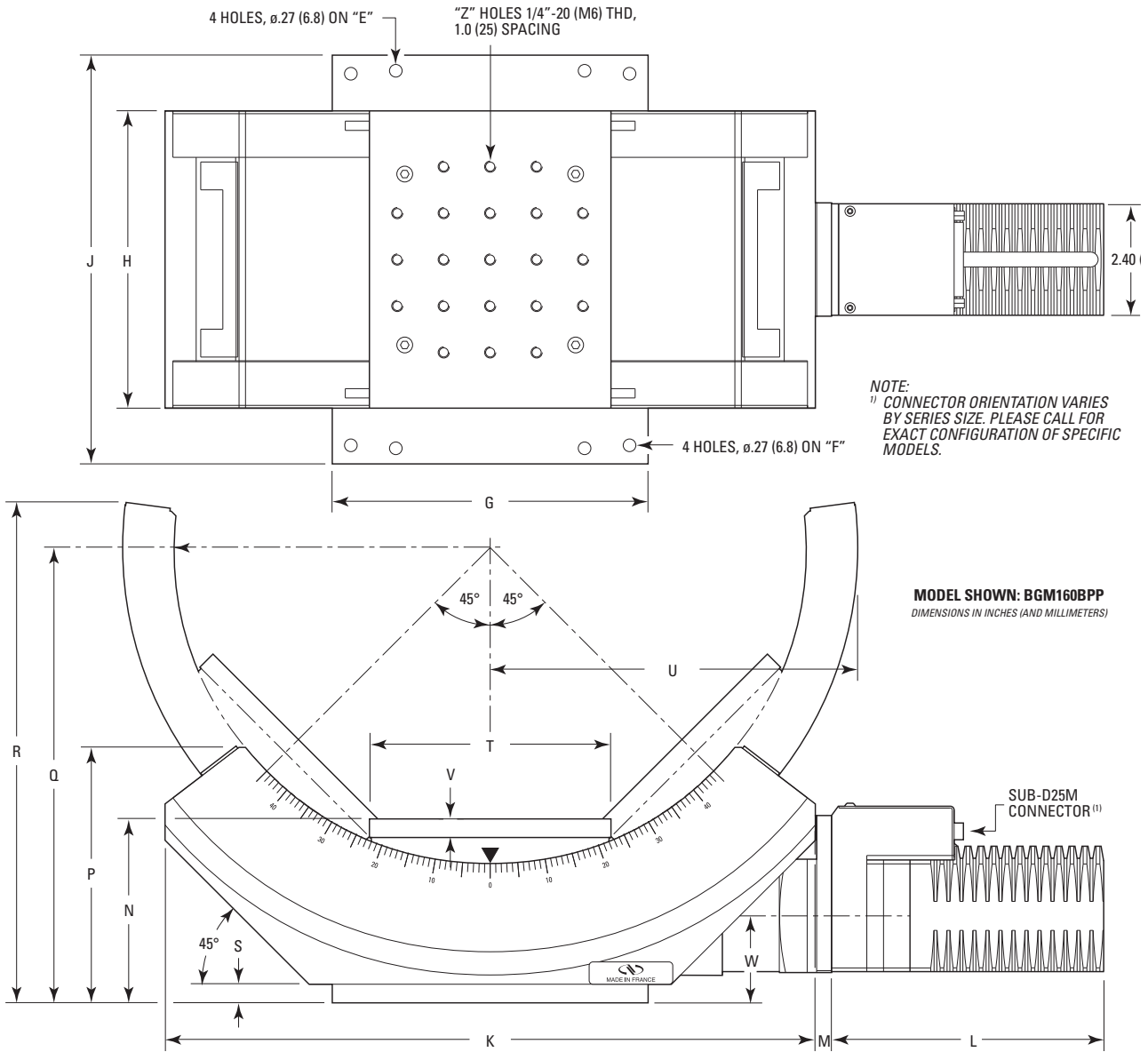
4 HOLES M4 THD ON SQR 1.89 (48), DEPTH: .24 (6)

4 HOLES M4 THD ON SQR 2.48 (63), DEPTH: .24 (6)

BOTTOM VIEW OF THE BGS80BPP

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
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 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

BGM120 to BGM200



MODEL (METRIC)	E	F	G	H	J	K	M
(M)-BGM120	6.0 x 2.0 (152.4 x 50.8)	5.91 x 3.94 (150 x 100)	4.72 (120)	4.72 (120)	6.69 (170)	8.11 (206)	1.22 (31)
(M)-BGM160	8.0 x 4.0 (203.2 x 101.6)	7.87 x 5.91 (200 x 150)	6.69 (170)	6.30 (160)	8.66 (220)	13.78 (350)	.34 (8.7)
(M)-BGM200	10.0 x 8.0 (254 x 203.2)	9.84 x 9.84 (250 x 250)	10.63 (270)	7.87 (200)	10.63 (270)	20.47 (520)	-

MODEL (METRIC)	N	P	Q	R	S	T	U	V	W	Z
(M)-BGM120	2.76 (70)	3.70 (94)	6.46 (164)	7.09 (180)	.31 (8)	3.90 (99)	5.04 (128)	.24 (6)	1.70 (43.2)	15
(M)-BGM160	3.90 (99)	5.44 (138.2)	9.65 (245)	10.63 (270)	.39 (10)	5.12 (130)	7.78 (197.5)	.39 (10)	1.84 (48.8)	21
(M)-BGM200	5.31 (135)	7.72 (196)	15.67 (360)	15.67 (398)	.39 (10)	7.87 (200)	11.81 (300)	.39 (10)	2.46 (62.5)	49

For interface assembly details, refer to the BGM series page at Newport.com.

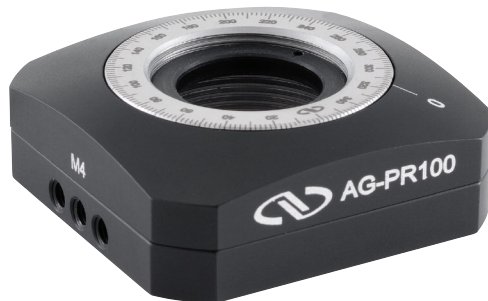
MOTORIZED LINEAR STAGES
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 SPECIAL COLLECTIONS

Agilis™ Series

Piezo Motor Driven Rotation Stages



scan QR code
to watch video



- Highly repeatable angular motion
- High sensitivity (MIM)
- Compact size
- Affordable with quick delivery
- Integrated and easy to set up



The Agilis Series of high precision miniature rotation stages feature Newport's Agilis piezo step direct motor. Agilis stages provides the benefits of ultra-high adjustment sensitivity and convenient remote operation at a price and size comparable to that of a high quality manual stage. Agilis rotation stages include both compact conventional piezo rotation stages and goniometers. The compact and light weight AG-PR100 and CONEX-AG-PR100P rotation stages feature 1" apertures with retaining rings and are ideal for continuous rotation of waveplates and polarizers. The CONEX-AG-PR100P is based on the Agilis AG-PR100 rotary stage, but features an innovative miniature direct read encoder, providing 0.002° uni-directional repeatability. The CONEX-AG-GON Series goniometers provide easy access to the tip/tilt platform and can be stacked for multi-axis rotations.

Specifications

	AG-PR100	AG-PR100V6
Optic Diameter	25.4 mm	25.4 mm
Maximum Speed	2°/s	2°/s
Centered Load Capacity	2 N	2 N
Minimum Incremental Motion	5 μ rad	5 μ rad
Graduations	2°	2°
Transverse Stiffness	100 μ rad	100 μ rad
Cable Length	1.2 m	1.2 m
Operating Temperature	+10 to +35 °C	10 to +35 °C
Weight	135 g	135 g

Vacuum Version Available

	AG-PR100P
Travel Range	340°
Drive Type	Piezo Motor
Stage Type	AG-PR100P
Load Capacity	2 N
Maximum Speed	1.5°/s
Maximum Torque	0.02 Nm
Minimum Incremental Motion	0.001°
Uni-directional Repeatability, Typical	0.002°
Uni-directional Repeatability, Guaranteed	0.002°
Accuracy, Typical	0.08°
Bi-directional Repeatability, Typical	0.003°
Wobble, Typical	100 μ rad
Cable Length	1.8 m
Control Loop	Digital PI loop at 100 Hz servo rate
Operating Temperature	10 to +35 °C
Transversal Stiffness	200 μ rad/Nm
Computer Interfaces	USB
Weight	135 g



AG-PR100 in a vertical mounting position for easy placement in optical path



CONEX-AG-PR100P shown

Ordering Information

Model	Description
AG-PR100	Agilis Piezo Driven Rotation Stage, 1 inch ⁽¹⁾
AG-PR100V6	Vacuum Compatible Piezo Rotation Stage, Agilis ⁽¹⁾
CONEX-AG-PR100P	Piezo Motor Rotation Stage, 1 in., Direct Encoder, Includes Controller
CONEX-AG-GON-UP	Goniometer, Direct Encoder Feedback, CONEX Controller
CONEX-AG-GON-LP	CONEX Goniometer, Direct Encoder Feedback and Integrated Controller
AG-PR100-TP	Top Plate, CONEX-AG-PR100P, Mount AG-LS25 Stages or GON goniometers
RSA-1TI	Solid Insert for RSP-1T Rotation Stage
PRA-05	Polarizer Adaptor, 12.7 mm Optics to 1.063-20 Threaded Mounts
AG-MD4-1.2	Agilis Extension Cable, 1.2 m, 4-wire mini-DIN connector
USB-CH ⁽²⁾	USB Power Supply, Includes clips for US, EU, UK & Australia, 2m Cable

⁽¹⁾ One A-1.25-1RR retaining ring is included with every stage.

⁽²⁾ The USB-CH is required only with AG-UC2 and only if power is not available from a PC.

	CONEX-AG-GON-UP	CONEX-AG-GON-LP
Travel Range	±7.5°	±5.5°
Drive Type	Piezo Motor	
Stage Type	AG-GON-UP	
Normal load capacity (N)	3.5 N	
Maximum Speed	0.45°/sec	0.33°/sec
Minimum Incremental Motion	0.00032°	0.00025°
Uni-directional Repeatability, Guaranteed	0.00064°	0.0005°
Origin repeatability ⁽¹⁾	0.00064°	0.0005°
Encoder Resolution	0.00013°	0.00009°
Cable Length	1.8 m	
Control Loop	Digital PI loop at 100 Hz servo rate	
Operating Temperature	10 to +35 °C	
Computer Interfaces	USB	
Weight	171 g	

(1) Origin is located at the negative limit.

Recommended Motion Controllers

Model

AG-UC2 see page 165

AG-UC8 see page 165

AG-UC8PC see page 165



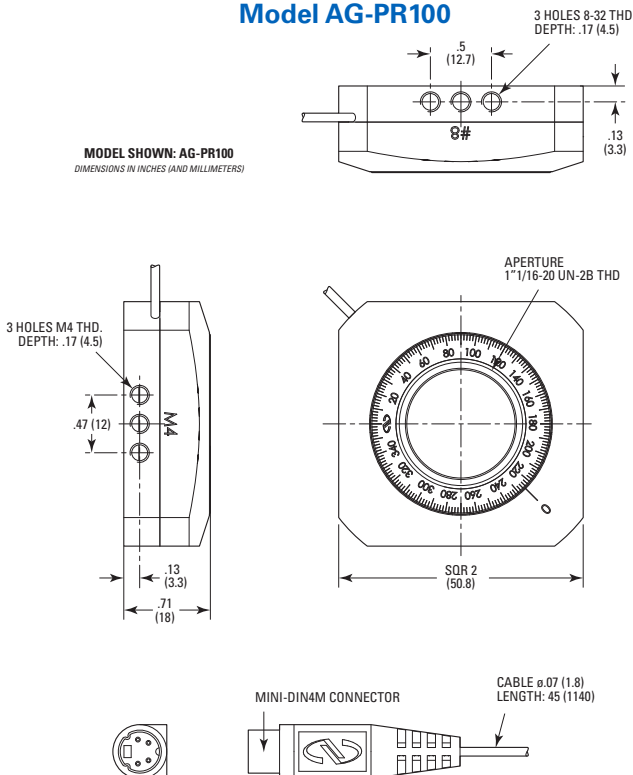
CONEX-AG-GON-LP shown



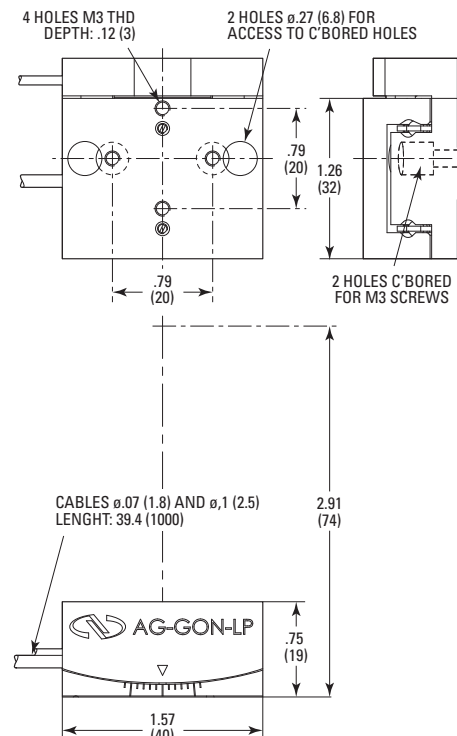
CONEX-AG-GON-LP and CONEX-AG-GON-UP assembly shown

Dimensions

Model AG-PR100

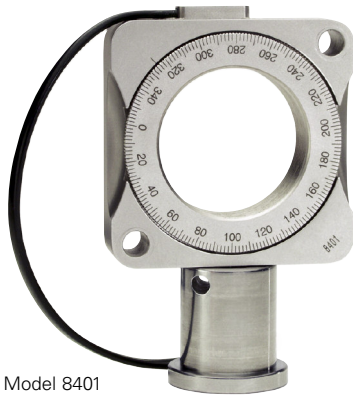


Model CONEX-AG-GON-LP



MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
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MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Picomotor™ Rotary Stages



Model 8401

- Compact design
- 0.7 μrad angular resolution
- Picomotor™ actuators
- Set-and-forget long-term stability
- Easy-to-use, flexible controller/drivers



With a resolution better than 0.011° and an overall thickness of just 0.63" (16.0 mm), the compact Picomotor™ Rotary Stages can be used for a number of applications, including positioning wave plates and polarizers. Each rotary stage includes an adapter for mounting components with a 1" (25-mm) diameter. For motorized beam-steering applications, use our 45° adapter model 9922. For applications requiring high accuracy and repeatability, the 8410 Closed-Loop Picomotor Rotary Stage includes an encoder for superior position feedback. The closed-loop version provides microradian level of precision and continuous 360° rotation.

Specifications

	8401 (-M)	8410
Optic Diameter	25.4 mm	25.4 mm
Maximum Speed	1-2 RPM	1-2 RPM
Angular Resolution	0.2 N	2 μrad
Thread Type	5 μrad	8-32
Centered Load Capacity	4.4 N	4.4 N
Operating Temperature	+10 to +35 °C	10 to 45 °C

Ordering Information

Model	Description
8401(-M)	Picomotor Rotary Stage, Stainless Steel, 1 in. With 0.5 in. Adapter
8410	Closed-Loop Picomotor Rotary Stage, 1 in. Diameter Components



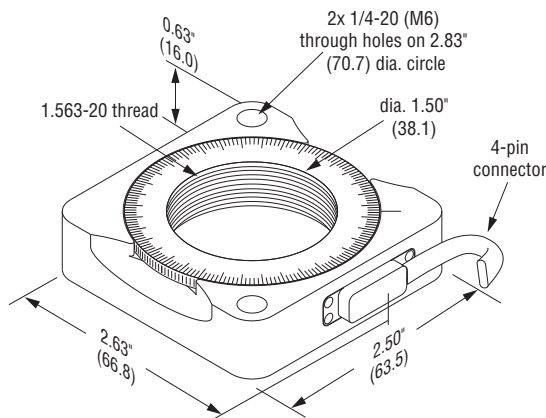
Model 8410

Recommended Motion Controllers

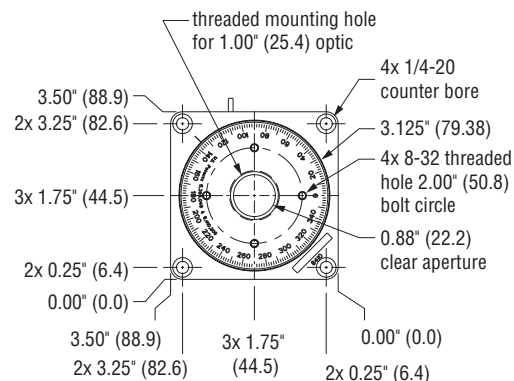
Model	Description
8742	Open-Loop Picomotor Controller & Driver Module, 4 Channels
8743-CL	Closed-Loop Picomotor Controller & Driver Module, 2 Channel

Note: Use 8742 for 8401 (-M) and 8743-CL for 8410

Dimensions



Model 8401



Model 8410

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
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