Precision Motion Control

2022 Catalog Addendum

Linear Stages

Rotation Stages

Actuators

Hexapods

Controllers

Air Bearing Stages

mks | Newport™

Mid-Travel Steel Linear Stages

- 100kg central and 10 kg axial load capacity
- All steel construction for high stiffness and thermal stability
- Ball screw drive for high dynamics and long lifetime
- Non-migrating ball cage design for reliable performance
- Plug and Play - ESP compatible

MTN-BLHS's are reliable, all-steel construction stages with excellent stiffness, load capacity and thermal stability. They are ideal for applications that require moving heavy loads at high-speeds with very fine repeatability. Available in 100, 200 and 300 mm travel versions, the MTN-BLHS stages can bear up to 100 kg centered load, when mounted horizontally. The linear guides guarantee smooth and accurate motion trajectory, while the non migrating ball cage design prevents from drift. The MTN-BLHS is much faster than MTN-CC and MTN-PP series and provides same 10 kg axial load capacity in both directions due to ball screw drive mechanism (note, that this is the holding force at power off).

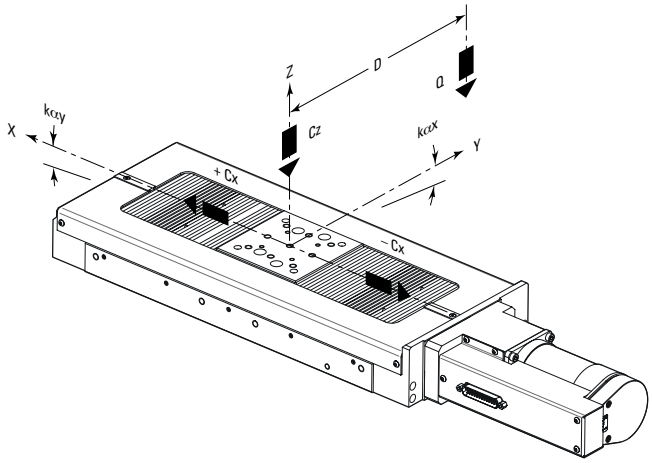
Specifications

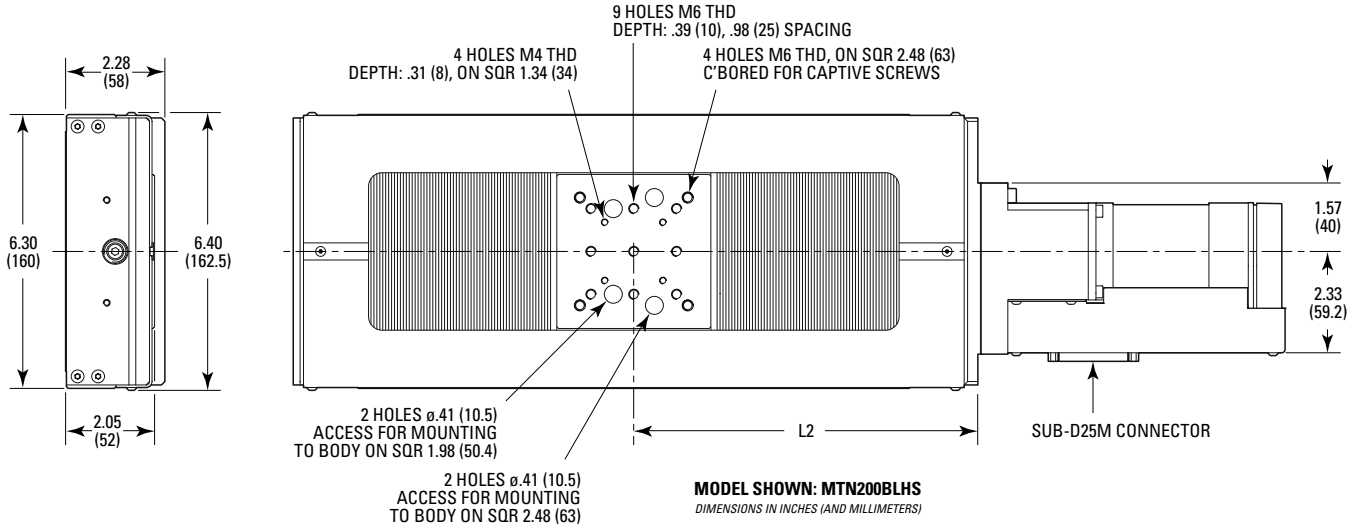
Travel Range (mm)	100	200	300
MIM (µm)	0.3		
Uni-directional Repeatability (µm), Typical (Guaranteed) (1)	±0.2 (±0.3)		
Bi-directional Repeatability (µm) Typical (Guaranteed) (1)	±0.3 (±0.5)		
Accuracy (µm), Typical (Guaranteed) (1)	±2.0 (±4.0)		
Maximum Speed (mm/s)	250		
Pitch, Typical (Guaranteed) (1) (2) (µrad) (3)	±10 (±20)	±20 (±40)	±30 (±60)
Yaw (µrad) (3), Typical (Guaranteed) (1) (2)	±10 (±17)	±17 (±35)	±30 (±53)

1) For the definition of Typical and Guaranteed specifications see "Motion Basics Terminology & Standards" at www.newport.com.
2) Over 100 mm travel.
3) To obtain arcsec units, divide mrad value by 4.8.

Load Characteristics and Stiffness

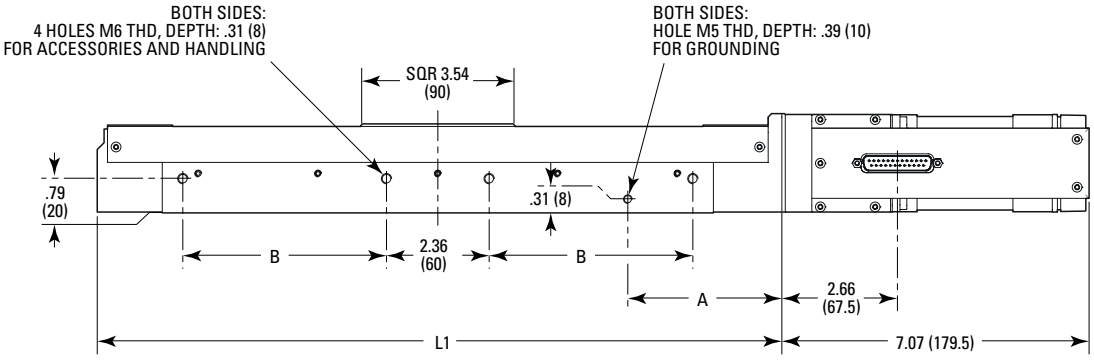
Cz, Normal centered load capacity on bearings	1000 N
+Cx, Axial load capacity	200 N
-Cx, Inverse axial load capacity	200 N
Holding force at power off	100N
kαx, Compliance in roll	4 µrad/Nm
kαy, Compliance in pitch	6 µrad/Nm
kαz, Compliance in yaw	5 µrad/Nm
Q, Off-center load where: D = Cantilever distance in mm	Q ≤Cz ÷ (1 + D/100)

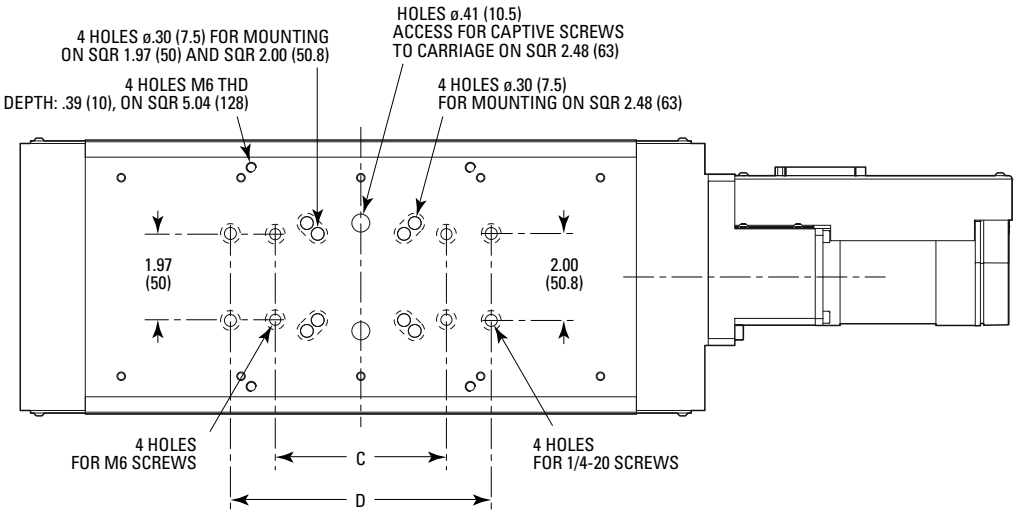




MODEL SHOWN: MTN200BLHS

DIMENSIONS IN INCHES (AND MILLIMETERS)





Model	A	B	C	D	L1	L2
MTN100BLHS	2.95 (75)	2.20 (56)	–	–	11.81 (300)	5.94 (151)
MTN200BLHS	3.54 (90)	4.69 (119)	3.94 (100)	6.00 (152.4)	15.75 (400)	7.91 (201)
MTN300BLHS	3.54 (90)	6.14 (156)	8.00 (203.2)	9.84 (250)	19.69 (500)	9.88 (251)

Recommended Controllers/Drivers

MODEL	DESCRIPTION
XPS-Dx	1- to 8-axis universal high-performance motion controller/driver
XPS-RLDx	1 to 4 axis universal motion controller
XPS-DRV11BL	Digital driver card for MTN brushless motor

Ordering Information

MODEL	DESCRIPTION
MTN100BLHS	100 mm Travel Steel Linear Stage, Brushless Motor
MTN200BLHS	200 mm Travel Steel Linear Stage, Brushless Motor
MTN300BLHS	300 mm Travel Steel Linear Stage, Brushless Motor

Accessories

Use EQ160 right-angle bracket for vertical mounting configurations.

MODEL	DESCRIPTION
EQ160	Right-Angle Bracket
MTN-BP	Base Plate
MTN-TP	Top Plate with Imperial Hole Pattern
M-CAP-M61	Captive Screws for MTN XY Mounting

MLT Low Profile Cross Roller Bearing Linear Stage

- Compact, low profile, high repeatability design
- Stiff, FEM-optimized aluminum body to prevent thermal bending effects
- Precision crossed roller bearing slides for accurate linear motion
- Easy to build multi-axis configuration
- Plug and Play - ESP compatible

The MLT stage family is a compact, low profile, high precision linear stage series that connects ultra-precision performance with compactness. Each MLT stage is constructed with high strength and stable aluminum alloy, creating a FEA-optimized base for high rigidity and thermal performance. High load recirculating ball bearings, high force linear motors, and high precision linear encoders extends the stage's lifespan and substantially increases performance. With all these components and the stage's low profile, easy integration, high repeatability, straightness, and flatness makes it ideal for industrial production, research, testing, and calibrating.

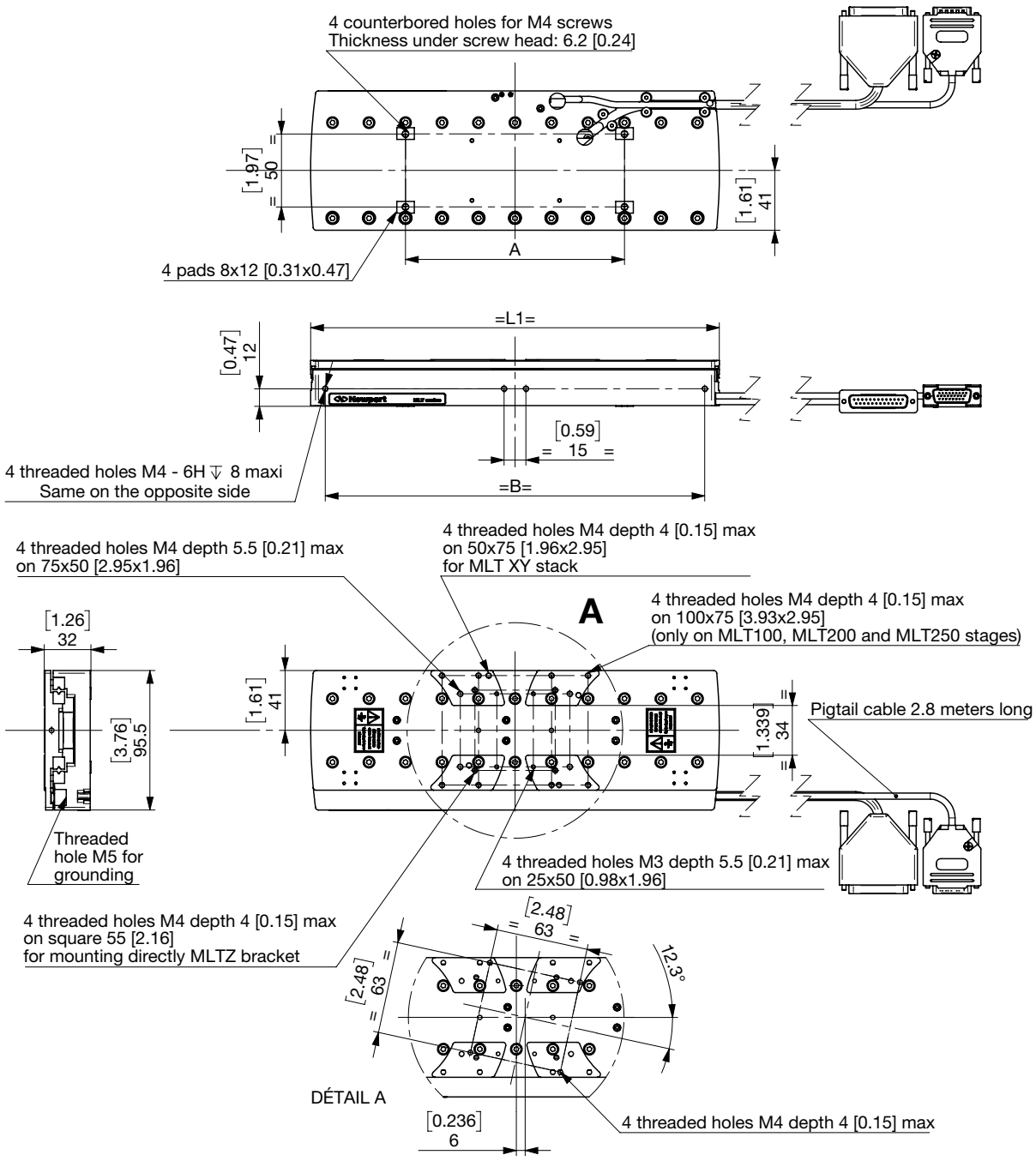
Specifications

	MLT25	MLT50	MLT100	MLT200	MLT250	MLT25-Z[6]	MLT50-Z[6]	MLT25-XYZL/R[6]	MLT50-XYZL[6]
Travel Range (mm)	25	50	100	200	250	25	50	25, 25, 25	50,50,50
MIM, linear [4][5] (µm)	0.005								
Bi-directional repeatability, guaranteed [1][2] (±µm)	0.15								
Accuracy, guaranteed [1][2] (±µm)	0.3	0.6	1.25	2.5	3	0.3	0.6	0.3	0.6
Maximum speed [5] (no load) (m/s)	0.5								
Maximum acceleration [5] (no load) (G)	0.75	0.75	0.75	0.5	0.5	0.5	0.5	0.5	0.5
Max. force (cont.) [5] (N)	3								
Drag force (N)	0.5								
Load capacity stage horizontal (N)	50	70	70	70	70	5			
Straightness, guaranteed [1][2] (±µm)	1	2	3	5	5	1	2	1	2
Flatness, guaranteed [1][2] (±µm)	1	2	3	5	10	1	2	1	2
Yaw, guaranteed [1][2][4] (±µm) [3]	50	75	75	125	150	50	75	50	75
Pitch, guaranteed [1][2] (±µm) [3]	50	75	75	150	200	50	75	50	75
MTBF (h) 24% load, 30% duty cycle	20,000								

1) For the definition of Typical and Guaranteed specifications see "Motion Basics Terminology & Standards" Tutorial at www.newport.com
2) Middle 80% of travel
3) To obtain arcsec units, divide µrad value by 4.8
4) Requires operation in a controlled environment to achieve specification
5) With XPS-DRV11, maximum value is driver dependent. Contact Newport for additional information
6) All the specs are per axis

Dimensions

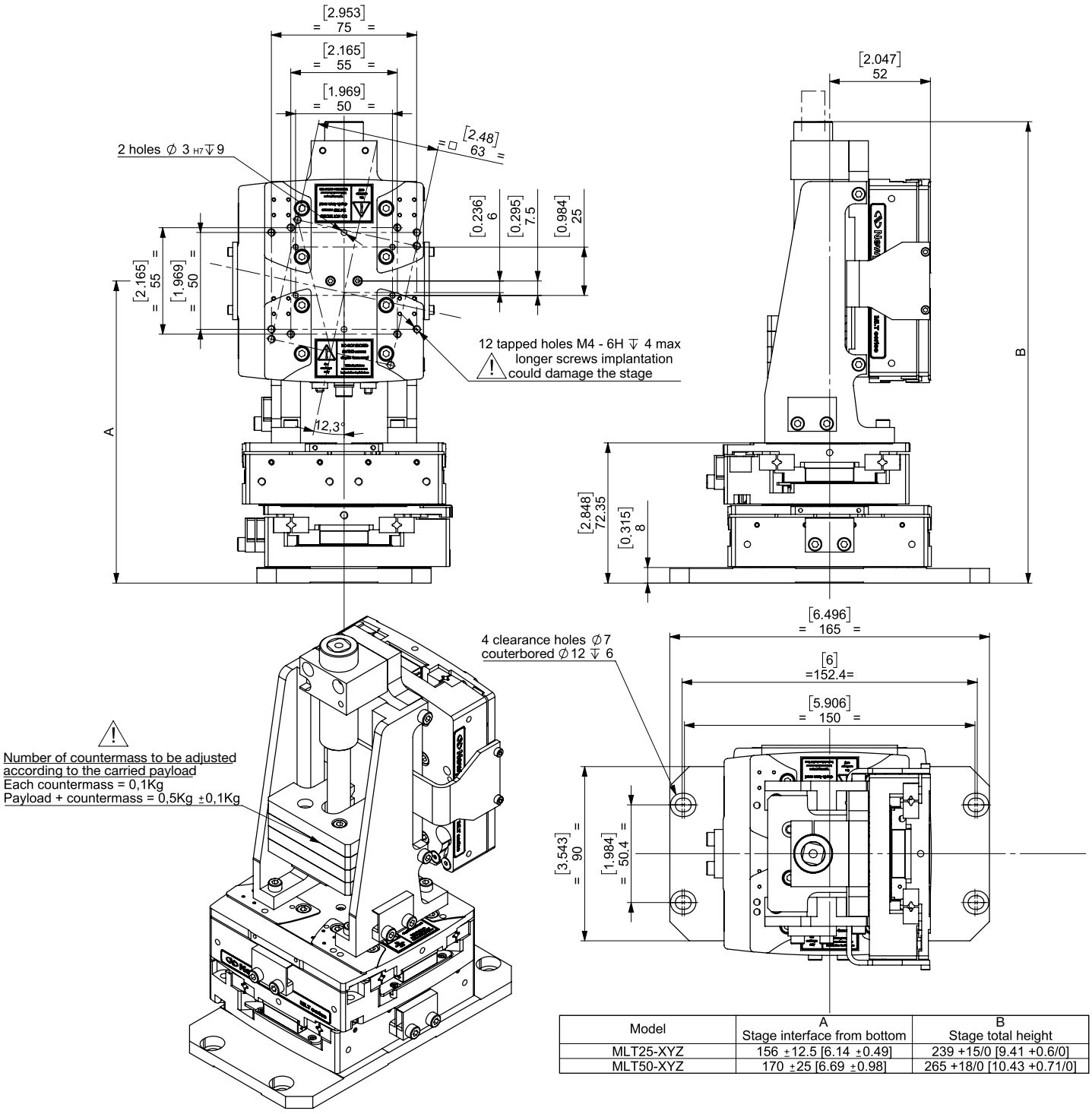
MLT



Model	A	B	L1
MLT25	75 [2.95]	85 [3.35]	105 [4.13]
MLT50	75 [2.95]	110 [4.33]	130 [5.12]
MLT100	75 [2.95]	160 [6.29]	180 [7.08]
MLT200	150 [5.9]	260 [10.2]	280 [11]
MLT250	200 [7.87]	310 [12.2]	330 [12.99]

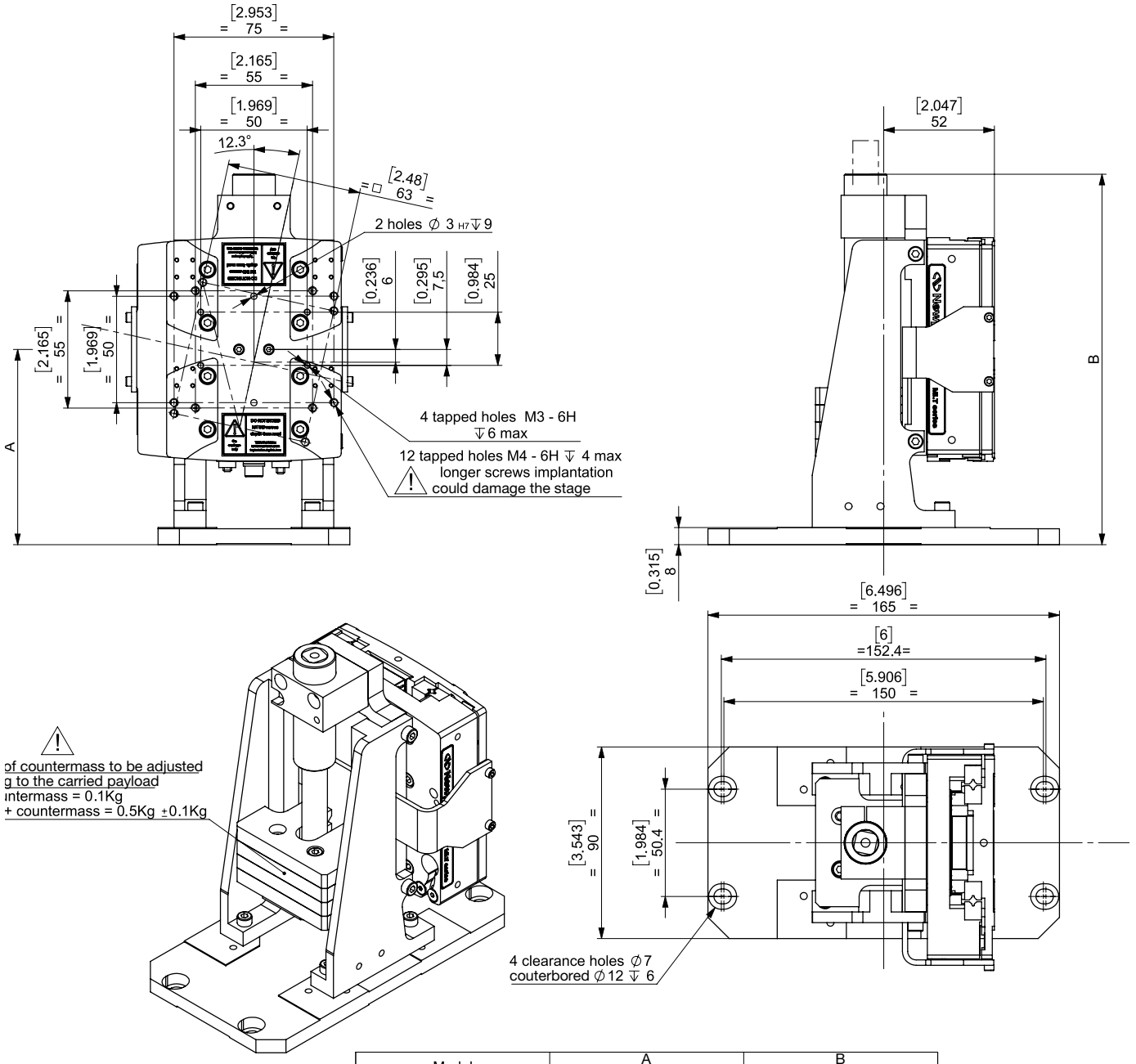
Dimensions

MLT-XYZ



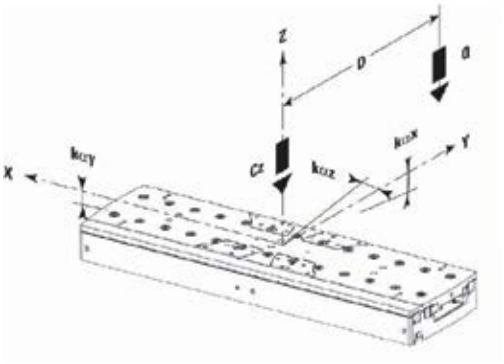
Model	A Stage interface from bottom	B Stage total height
MLT25-XYZ	156 ±12.5 [6.14 ±0.49]	239 +15/0 [9.41 +0.6/0]
MLT50-XYZ	170 ±25 [6.69 ±0.98]	265 +18/0 [10.43 +0.71/0]

MLT-Z



Model	A Stage interface from bottom	B Stage total height
MLT25-Z	91.5 ±12.5 [3.6 ±0.49]	174.5 +15/0 [6.87 +0.6/0]
MLT50-Z	106 ±25 [4.17 ±0.98]	201 +18/0 [7.91 +0.71/0]

Load Characteristics and Stiffness



	MLT25	MLT50	MLT100	MLT200	MLT250
Cz, Normal centered load capacity (N)	50	70	70	70	70
kαx, Compliance in roll (µrad/Nm)	11	12	21	24.6	30
kαy, Compliance in pitch (µrad/Nm)	13	8.4	6.9	13.8	13.2
kαz, Compliance in yaw (µrad/Nm)	12.3	5.8	3.9	3.3	2.3
Refer to the manual for load curves					

Recommended Controllers/Drivers

MODEL	DESCRIPTION
XPS-Dx	1- to 8-axis universal high-performance motion controller/driver
XPS-RLDx	1- to 4-axis universal high-performance motion controller/driver
XPS-DRV11	Universal digital driver card for stepper, DC and direct motors

Ordering Information

MODEL	DESCRIPTION
MLT25	Low profile linear stage, 25mm
MLT50	Low profile linear stage, 50mm
MLT100	Low profile linear stage, 100mm
MLT200	Low profile linear stage, 200mm
MLT250	Low profile linear stage, 250mm
MLT25-Z	Motorized linear stage, 25 mm, vertical
MLT50-Z	Motorized linear stage, 50 mm , vertical
MLT25-XYZL	Motorized XYZ linear stage, 25 mm, left handed
MLT25-XYZR	Motorized XYZ linear stage, 25 mm, right handed
MLT50-XYZL	Motorized XYZ linear s tage, 50 mm, left handed

Accessories

MODEL	DESCRIPTION
MLT-XYPLATE*	Magnetic barrier plate for XY
MLT-BP	Base plate, MLT
TR-M4M6	Inserts, set of 4
MLT-CMS**	Cable chain kit, MLT25, MLT50
MLT-CML**	Cable chain kit, MLT100, 200, 250

* Required for XY configuration to prevent upper to lower stage disturbance
** Magnetic barrier plate and 2 locating pins are included

Super Agilis Series

CONEX-SAG-LSxx Linear Stages Integrated with CONEX-SAG Controller

- **Fast: >10 mm/s**
- **Compact (only 24 mm height for XY stack)**
- **Easy to stack and setup**
- **Stainless steel parts**
- **Easy to use GUI**

The Conex-SAG-LSxx are open loop piezo motor linear stages integrated with a CONEX-SAG piezo motor controller and driver. The stainless-steel stages are fast, and the controllers come with a simple and intuitive CONEX GUI, accessible with USB. Both the controller and stage are compact and easily integrated into any applications that is tight on space and need sub-micron precise motion.

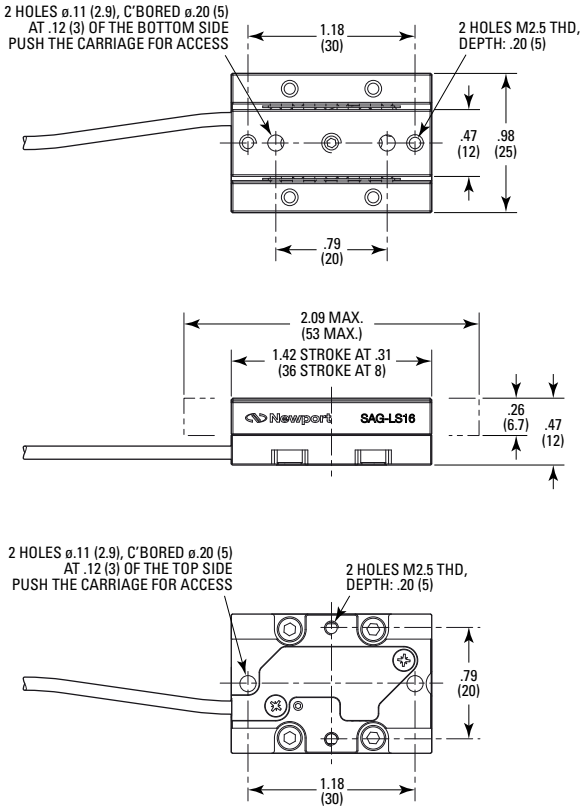
Specifications

Travel Range (mm)	16	32	48
Maximum Speed (mm/s)	>10	>10	>10
Material	Stainless Steel	Stainless Steel	Stainless Steel
Centered Load Capacity (N)	20	30	30
Axial/Vertical Load Capacity (N)	2	2	2
Holding Force (N)	3	3	3
Minimum Incremental Motion (nm)	100	100	100
Pitch/Yaw	150		
Cable Length (m)	1.5	1.5	1.5
Limit Switches	Not Available	Not Available	Not Available
Operating Temperature (°C)	10 to 35	10 to 35	10 to 35
Weight, Without Cable (g)	65	93	127

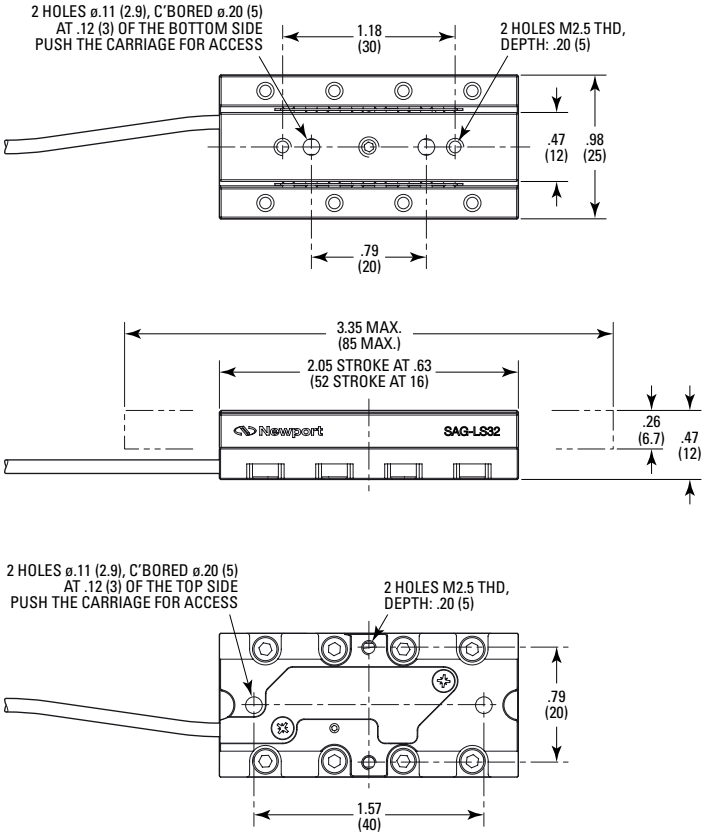
To reach specification, stage must be fixed on a plane surface with flatness of 2 µm or use SAG-BP1 plate

Dimensions

SAG-LS16 Stage

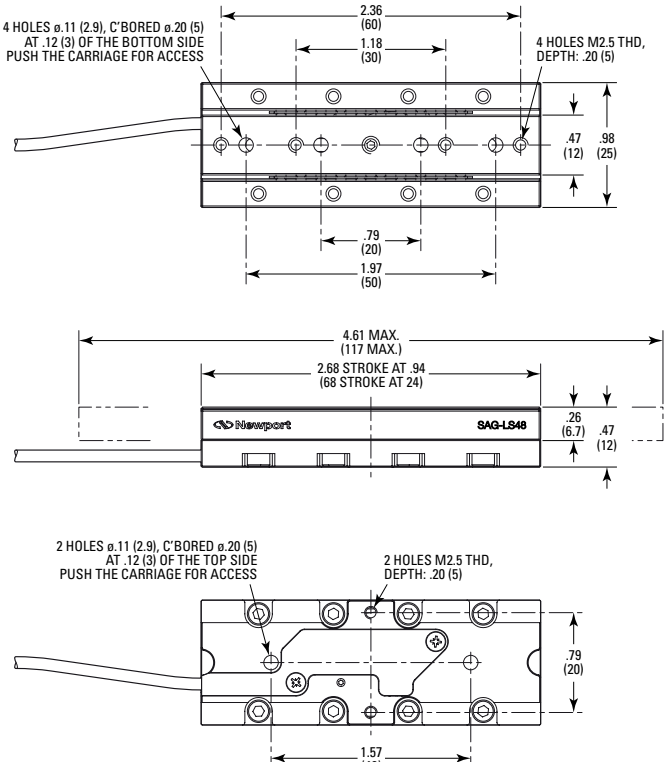


SAG-LS32 Stage

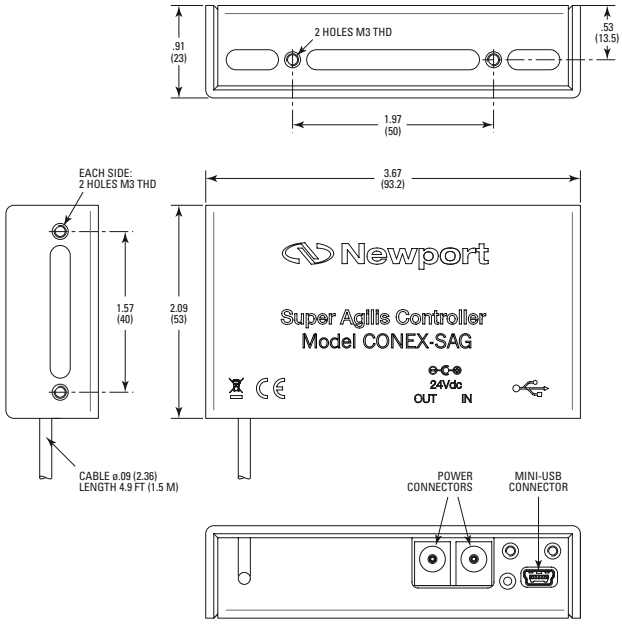


Dimensions

SAG-LS48 Stage



CONEX-SAG Controller



Ordering Information

MODEL	DESCRIPTION
CONEX-SAG-LS16	16 mm Travel Stage & CONEX-SAG Controller
CONEX-SAG-LS32	32 mm Travel Stage & CONEX-SAG Controller
CONEX-SAG-LS48	48 mm Travel Stage & CONEX-SAG Controller
ACCESSORIES	
CONEX-BP	Base Plate, Mounts Multiple CONEX Controllers
SAG-BP1	Slotted Based Plate, Conex-SAG series
SAG-AB90-16	90 Degree Angle Braket, Conex-SAG Series
Conex-PS	Power Supply, 24 V- DC, Conex Motion Controller

Make a footnote to “SAG-BP1 “- Use CHC M2,5x6 scres to mount Conex-SAG-LSxx to SAG-BP1

Super Agilis Series

CONEX-SAG-LSxxP Linear Stages Integrated with CONEX-SAG Controller

- Fast: >10 mm/s
- Compact (only 24 mm height for XY stack)
- Easy to stack and setup
- Stainless steel parts
- Integrated encoder for closed loop operation
- Easy to use GUI

The Conex-SAG-LSxxP series are close loop piezo motor linear stages integrated with a CONEX-SAG piezo motor controller and driver. The stainless-steel stages are fast, and the controllers come with a simple and intuitive CONEX GUI, accessible with USB. Both the controller and stage are compact and easily integrated into any applications that is tight on space and need sub-micron precise motion.

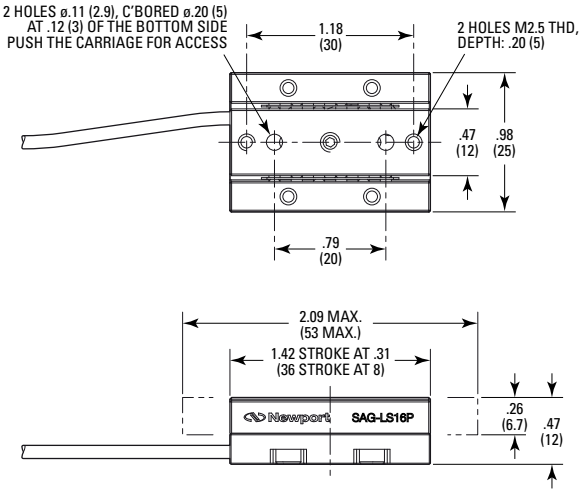
Specifications

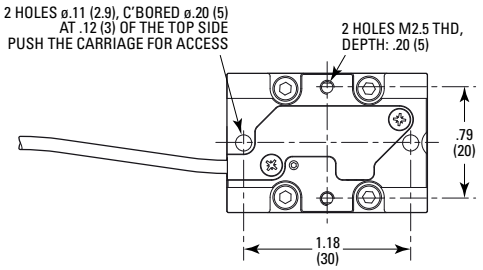
Travel Range (mm)	16	32	48
Maximum Speed (mm/s)	>10		
Material	Stainless Steel		
Centered Load Capacity (N)	20	30	
Axial/Vertical Load Capacity (N)	2		
Holding Force (N)	3		
Minimum Incremental Motion (nm)	25		
Pitch/Yaw (µrad)	150		
Bi-directional repeatability(nm)	120 (at full stoke) /25 (in scanning mode for ~100nm steps)		
Cable Length (m)	1.5		
Limit Switches	Not Available		
Operating Temperature (°C)	10 to 35		
Weight, Without Cable (g)	65	93	127

To reach specification, stage must be fixed on a plane surface with flatness of 2 µm or use SAG-BP1 plate

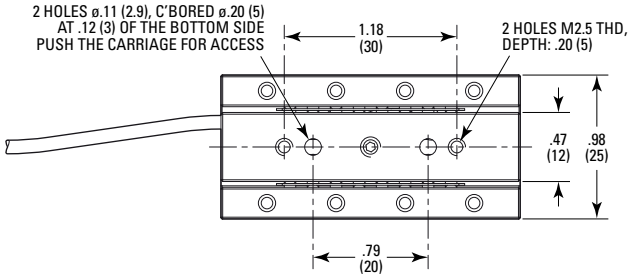
Dimensions

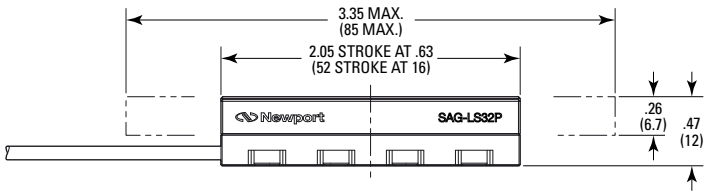
SAG-LS16P Stage

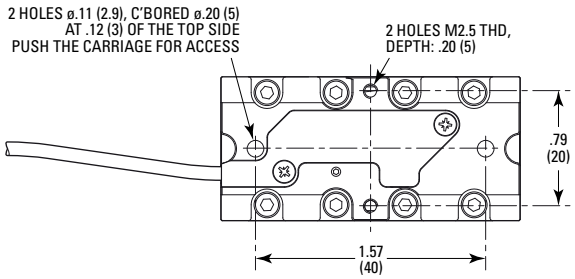




SAG-LS32P Stage

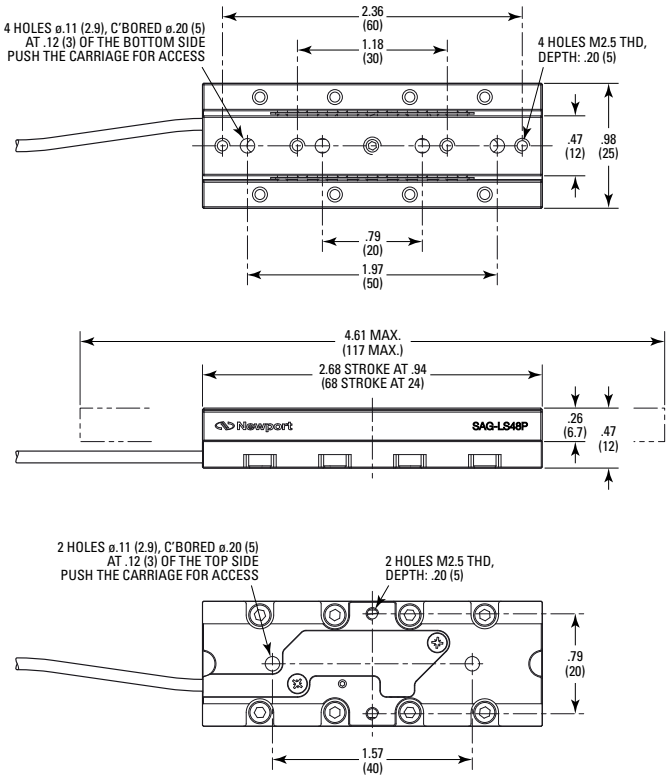




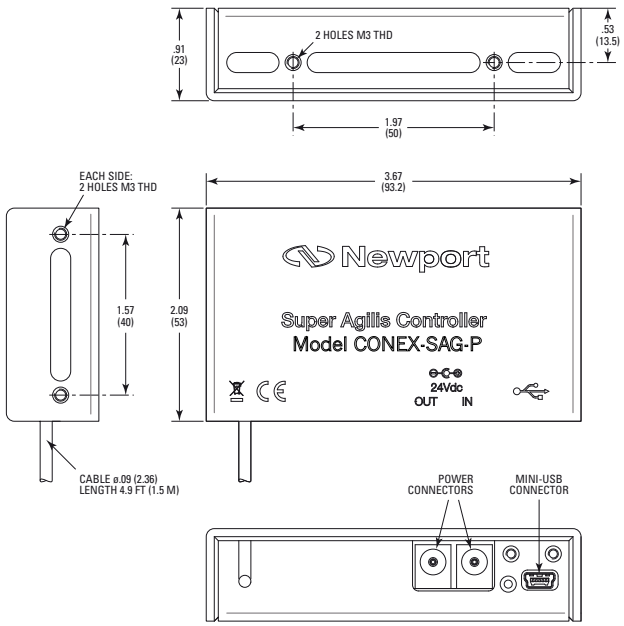


Dimensions

SAG-LS48P Stage



CONEX-SAG-P Controller



Ordering Information

MODEL	DESCRIPTION
CONEX-SAG-LS16P	16 mm Travel Stage & CONEX-SAG Controller
CONEX-SAG-LS32P	32 mm Travel Stage & CONEX-SAG Controller
CONEX-SAG-LS48P	48 mm Travel Stage & CONEX-SAG Controller
Accessories	
CONEX-BP	Base Plate, Mounts Multiple CONEX Controllers
SAG-BP1[1]	Slotted Based Plate, Conex-SAG series
SAG-AB90-16	90 Degree Angle Braket, Conex-SAG Series
Conex-BP	Base plate, multiple Conex controllers
Coex-PS	Power Supply, 24 VDC, Conex Motion Controller

1) Use CHC M2,5x6 screws to mount Conex-SAG-LSxxP to SAG-BP1

GTS70V Series

Compact, Long Travel Vertical Stage

- 70 mm of precision vertical travel in a compact unit
- Unobstructed access to the payload from any direction
- High sensitivity, excellent repeatability and high accuracy motion from an integrated linear or rotary encoder

The GTS70V is a compact, long travel, and motorized vertical stage with outstanding trajectory accuracy, excellent repeatability, high sensitivity, and precision capability ideal for applications requiring high precision and long travel vertical motion of 70 mm. Some features that make this stage the best compared to other vertical stage are a vertical guide system composed of matched pairs of anti-creep crossed roller bearings, ripple-free motion, and a folded DC motor with a precision ground and low-friction lead screw. The stage is easily integrated into any applications and has a manual knob when coarse and quick adjustments are needed.

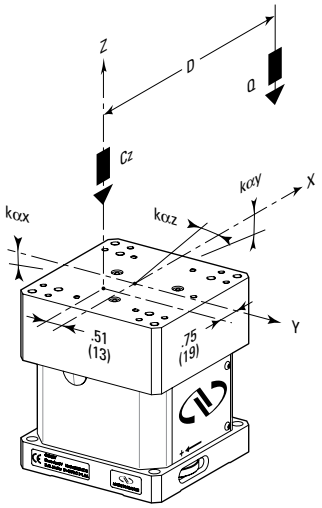
	GTS70VCC	GTS70V
	Rotary Encoder	Linear Encoder
Travel Range (mm)[1]	70	70
Minimum Incremental Motion (µm)	0.25	0.1
Bi-directional Repeatability (µm)	±0.5	±0.2
Accuracy (µm)	±1.75	±1
Maximum Speed (mm/s)	5[2]	10
Centered Load Capacity (N)	70	40
Straightness, Flatness(µm)	±5	±5
Pitch/Roll (µrad) [3]	±80	±80
MTBF (h)	20,000 hours at 25% load and with a 30% duty cycle	

1) GTS30V: -5 to+25mm
GTS70V: 0 to +70mm, when driven by ESP302 and XPS and -5 to +65 mm, when driven by SMC100CC
GTS70VCC: 0 to +70mm
2) 10 mm/s, if used with 40 N payload
3) To obtain arcsec units, divide µrad value by 4.8

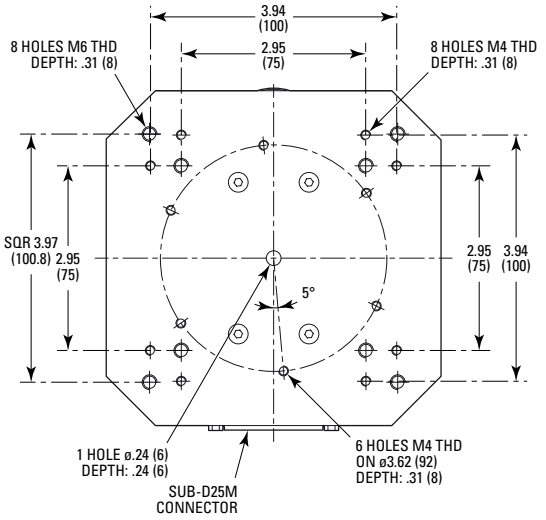
Load Characteristics and Stiffness

	GTS70V	GTS70VCC
Cz, Centered load capacity	40 N	70 N
Kax, Compliance in roll	8 µrad/Nm	
Kay, Compliance in pitch	33 µrad/Nm	
Kaz, Compliance in yaw	50 µrad/Nm	
Q, Off-center load (N)	Q <Cz ÷ (1 + D/30)	

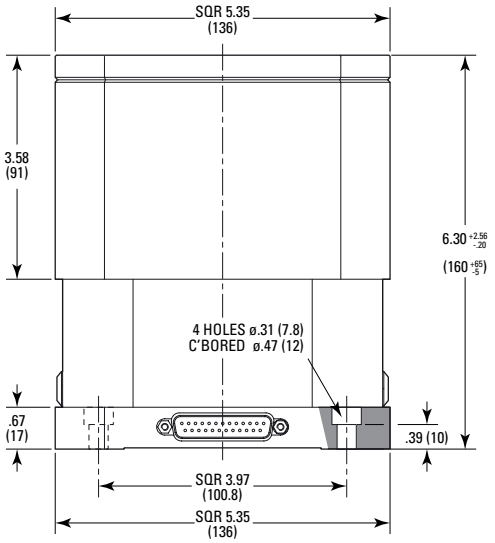
Where D = Cantilever distance (mm) and DMAX. = 100 mm

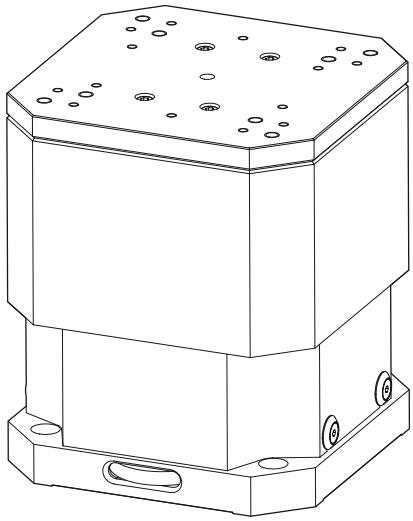


Dimensions



DIMENSIONS IN INCHES (AND MILLIMETERS)





Recommended Controllers/Drivers

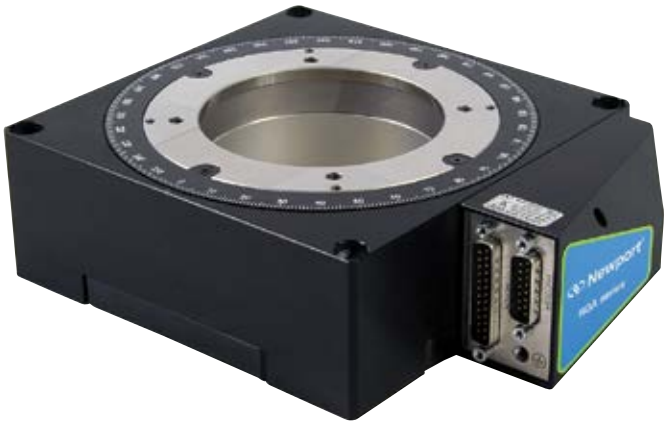
MODEL	DESCRIPTION
XPS-Dx	1- to 8-axis universal high-performance motion controller/driver
XPS-DRV11	Universal digital driver card for stepper, DC and direct motors
XPS-RLDx	1- to 4-axis universal high-performance motion controller/driver
ESP302-Nx	1- to 3-axis motion controller/driver
SMC100CC	Single-axis DC motor controller/driver

Ordering Information

MODEL	DESCRIPTION
GTS70VCC	High Precision Vertical Stage, Rotary Encoder, 70 mm Travel
GTS70V	High Precision Vertical Stage, Linear Encoder, 70 mm Travel

RGA 150 Series

Low Profile Rotation Stage



- Fast rotation, low profile, large aperture
- All steel construction for high stiffness and thermal stability
- Non-migrating ball cage design
- Plug and Play - ESP compatibility

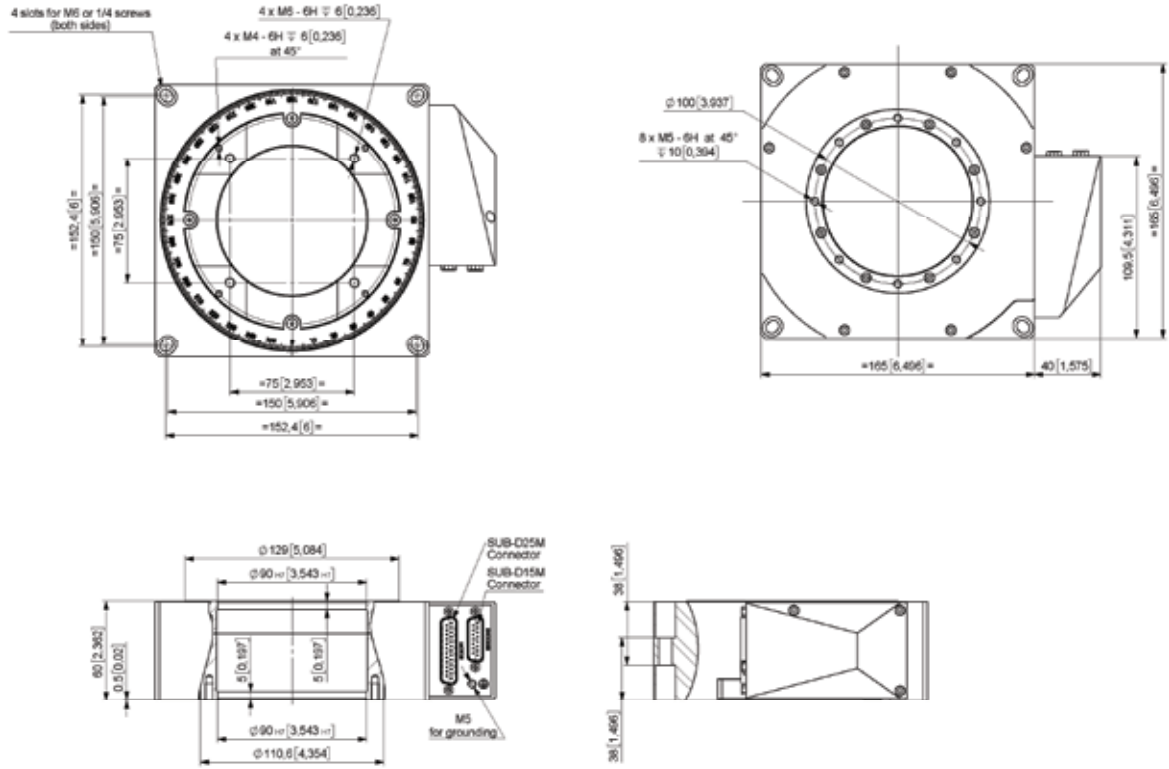
The RGA150 low-profile and large aperture rotary stage addresses the need for quick angle adjustments of wafers and vacuum chucks. Although specifically tailored to semiconductor applications, the RGA150 can also be utilized in other industrial applications, such as through hole imaging/inspection or laser processing, automation or any general positioning application that requires fast positioning.
Also available in high accuracy version (RGA150MAP).

Specifications

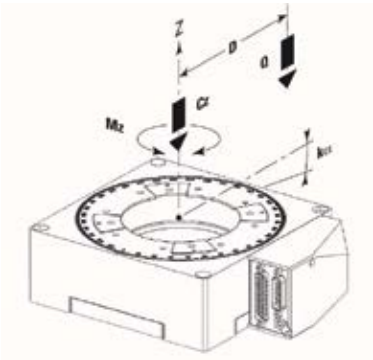
	RGA150
Travel range (deg)	360 continuous
Minimum Incremental Motion typical [1][3] (mdeg)	0.01
Uni-directional repeatability, typical [1][3] (mdeg)	±0.035
Bi-directional repeatability, typical [1][3] (mdeg)	±0.0975
Accuracy, typical (guaranteed) [1][3] (mdeg)	±4 (±8)
Mapped accuracy, guaranteed [1][3][4] (mdeg)	±1
Maximum speed [3] (deg/s-rpm)	1800
Inertia (no load) (kg.m2)	0.0062
Static Bearing Drag Torque [5] (N.m)	0.4
Dynamic Bearing Drag Torque [5] (N.m/deg/s)	0.001
Wobble, typical (guaranteed) [1] [2] (µrad)	±12 (±26)
Ecentricity, typical (guaranteed) [1] (µm)	±0.5 (±1)
MTBF (1800 deg/s, 25% load capacity, 30% duty cycle) (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
3) With XPS-DRV11 Drive, maximum value is driver dependant. Contact Newport for additional information
4) Require ordering RGA150MAP
5) Total Drag Torque = 0.4 + Speed/1000

Dimensions



Load Characteristics and Stiffness



	RGA150
Cz, Normal centered load capacity	50 (N)
kα, Transversal compliance	5 (µrad/Nm)
Max, transverse dynamic moment	11 (Nm)
Mz, Maximum torque @ 0 deg/s	2.25 (Nm)
Q, Off-center load Where D=Cantilever distance in mm	Q≤Cz÷(1+D/55)

Recommended Controllers/Drivers

Model	Description
XPS-Dx	1- to 8-axis universal high-performance motion controller/driver
XPS-DRV11	Universal digital driver card for stepper, DC and direct motors

Ordering Information

Model	Description
RGA150	Low profile fast rotation stage
RGA150MAP	Low profile fast rotation stage, mapped

831X Series

Picomotor Actuators

8310CE

8311

- Built-in rotary encoder for closed-loop operation
- Forward/reverse limit switches (8310CE)
- <30 nm minimum incremental motion
- 22 N axial load capacity
- Set-and-forget long-term stability
- Easy-to-use flexible motion controller/drive
- Easy integration with standard sized 0.375-inch shank

The 8311 is a compact closed-loop picomotor actuator that has exceptional accuracy, easy-to-use controls, and able to easily integrate into any applications. They are ideal for applications that need closed-loop control and absolute position calibration with their built-in rotary encoder and manual knob. The 8311 has high accuracy and position calibration in closed-loop operations because it will adjust the motor to the precise requested encoder count and then stop motion when it moves to a specified location, achieving zero count encoder error
8310CE

The 8310CE is a closed loop picomotor actuator that has exceptional accuracy, easy-to-use controls, and able to easily integrate into any applications. They are ideal for applications that need closed-loop control and absolute position calibration with their built-in rotary encoder and limit switches. The 8310CE has high accuracy and position calibration in closed-loop operations because it will adjust the motor to the precise requested encoder count and then stop motion when it moves to a specified location, achieving zero count encoder error.

With 8743-CL you can control two 8310CE, two 8311 or one of each making it possible to build a system incorporating multiple closed-loop Picomotor actuators at the same time on the same control network.
The closed-loop Picomotor actuator can be integrated into most of our optomechanical mounts and is compatible with our translation stages. Please call us for more information on customized orders.

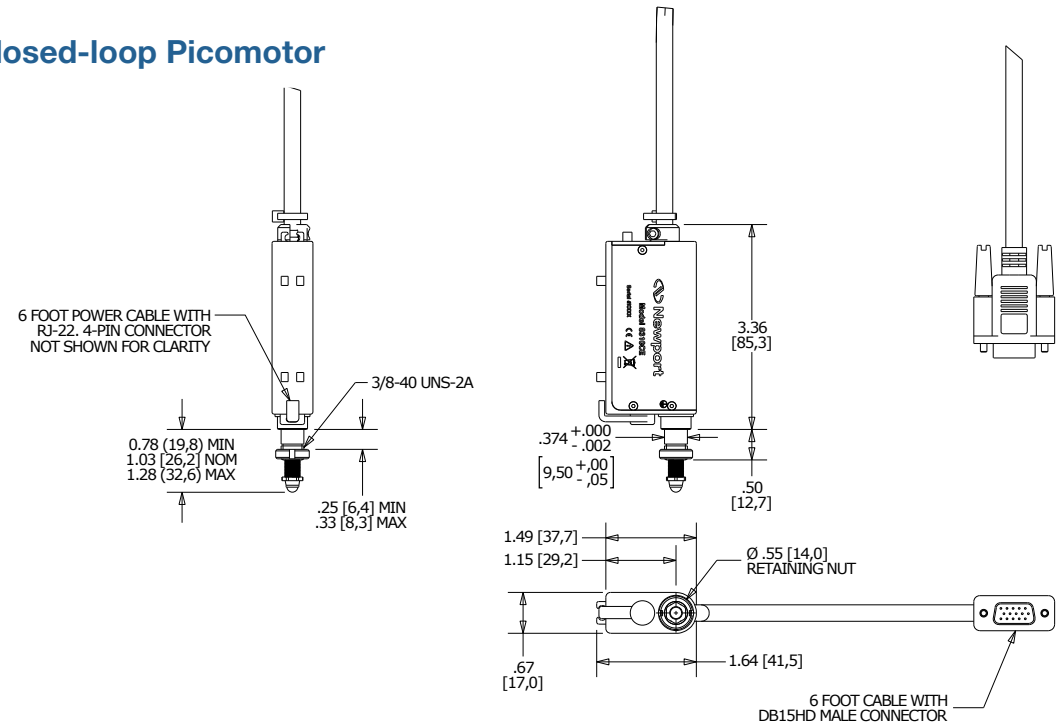
Specifications

	8310CE	8311
Bi-Directional Repeatability	±1 µm Over Full Travel (from either direction)	N/A
Uni-Directional Repeatability	±0.5 µm Over Full Travel (from same direction)	
Speed (@ 2 kHz pulse rate)	1.2 mm/min (20 µm/s typical)	
Closed loop Settling Time	<100 ms with 8743-CL Controller	
Closed loop Steady-State Error	0 counts with 8743-CL Controller	
Encoder Resolution	52.9 nm per encoder count (1)	49.6 nm per encoder count (2)
Limit Switches: Forware/Reverse	Yes/Yes	No/No
Connector Type: One Each	15-Pin High-Density D-sub and 4-Pin RJ-22	
Survival Temperature Range (non-operating)	-30 to +85 °C	
Mounting	0.375” (9.5 mm) Shank	
Linear Travel	0.50” (12.7 mm)	
Minimum Incremental Motion	<30 nm	
Angular Resolution	<0.6 mrad	
Maximum Load	5 lbs (22 N)	
Torque	2.5 oz-in (0.018 N·m)	
Operating Temperature	10–40 °C	
Lifetime	1 Billion Steps (3)	
Cable Length	6 Feet, Both Cables	

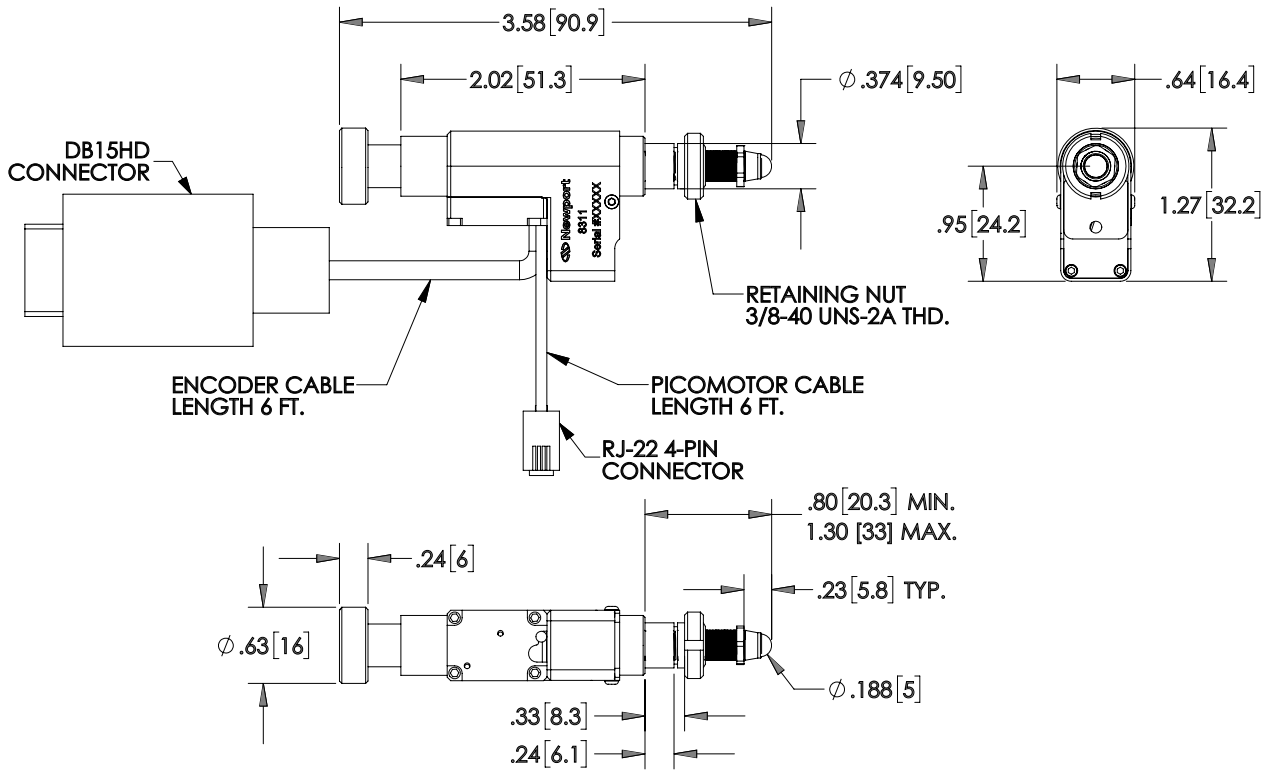
1) The encoder resolution is 1500 cycles per revolution, and with quadrature encoding this results in 6000 counts per revolution. With the 80-pitch (80 turns per inch) screw sets used in the Model 8310CE, this results in an encoder resolution of 52.9 nm per encoder count
2) The encoder resolution is 6400 counts per revolution. With the 80-pitch (80 turns per inch) screw sets used in the Model 8311, this results in an encoder resolution of 49.6 nm per encoder count.
3) Lifetime is tested by cycling actuator out 1 mm of travel range and back pushing a 5 lb load.

Dimensions

8310CE - Closed-loop Picomotor



8311 - Closed-loop Picomotor



Recommended Controllers/Drivers

MODEL	DESCRIPTION
8743-CL	2-axis closed-loop intelligent motion controller/driver
8745-PS	Power Supply, 8742 and 8743-CL Controller/Driver, 12V

Ordering Information

MODEL	DESCRIPTION
8310CE	Closed-loop Picomotor actuator
8311	Compact Closed-loop Picomotor actuator

ESP302-GPIB-ADPT

ESP302 Controller Adapter

- IEEE-488 (GPIB) to Serial converter
- 2 operations modes: Data and Command
- Diagnostics LEDs to know the status
- CE and UKCA certified
- The ESP302-GPIB-ADPT permits to control the ESP302-xN from a GPIB controller.

The ESP302-GPIB-ADPT GPIB to Serial adapter is an add-on to be used with ESP302 controller that permits communication from customer's GPIB controller to the ESP302 serial interface.
An ESP302-CAB-1.2 cable (sold separately) is needed to connect the ESP302-GPIB-ADPT to the serial port of ESP302 controller.
The product is not supplied with a GPIB Cable.

Dimensions

Specifications

Size	5.6" L x 3.4" W x 1.0" H (13.97cm L x 8.38 cm W x 2.54 cm H)
Weight, including adapter	1 lbs. (0.45 kg.)
Operating Temperature	-10° C to +55° C
Storage Temperature	-20° C to +70° C
Humidity	0-90% RH without condensation
Power	100-240 Vac @ 0.05 Ampere with power adapter
Connectors	IEEE 488 Interface: Amphenol 57-20240 female with metric studs RS-232 Interface: Cinch DE-9P with lock studs
Input buffer size	4,096 bytes
Baud rate	19200

Recommended Controllers

MODEL	Description
ESP302-1N	Motion Controller & Driver, 1-Axis, Ethernet, RS232
ESP302-2N	Motion Controller & Driver, 2-Axis, Ethernet, RS232
ESP302-3N	Motion Controller & Driver, 3-Axis, Ethernet, RS232

Order Information

MODEL	DESCRIPTION
ESP302-GPIB-ADPT	GPIB to Serial Adaptor for ESP302
ESP302-CAB-1.2	Serial Cable Adapter, Serial Port to RS232, 1.2 m

www.newport.com