

UTS Series Mid-Travel Steel Linear Stages

Newport's UTS series linear stages incorporate many of the advantages of the popular UTM series providing superior motion performance in an enhanced, shorter, and lower profile package. They use the same optimized body, bearings and lead screw of the UTM stages, but feature a number of mechanical improvements and completely new motor configurations.



UTS linear stages are available in three configurations. The first version, utilizing a DC motor, features an ultra-high resolution 20,000 cts/rev rotary encoder with index pulse for precision homing and is the recommended choice for applications requiring accurate bi-directional positioning. For tightest position control, the rotary encoder is directly mounted on the lead screw. This eliminates the majority of drive train error sources that affect other stages with indirect position read-out. A high-torque DC motor provides the highest dynamic speed control and allows for linear speeds up to 40 mm/s. A 44:16 belt reduction between the motor and the lead screw increases the available output torque, reduces the servo sensitivity and ensures 0.3 μm incremental motion capability with all Newport motion controllers and drivers.

Key Features

- Up to 150 mm travel in very compact and ultra-low profile design
- All-steel construction offers high stiffness and high thermal stability
- 20,000 cts/rev rotary encoder on DC motor versions enables 0.1 μm resolution for tightest position control
- Economical stepper motor version with high motion sensitivity
- Vacuum compatible versions up to 10^{-6} hPa

The stepper motor version is a cost-effective solution for less demanding applications. When used with our XPS, ESP300, or SMC100PP (available May 2007) controllers with high micro-stepping capability, low-noise operation and very small incremental motions are guaranteed. The stepper motor versions do not use encoders. Instead, position is attained by the number of commanded steps and micro-steps. For this purpose, the stepper motor is directly attached to the lead screw with a proprietary bellow coupling with high-torsion stiffness and no gear or belt drive in between. The high output torque of the stepper motor also minimizes the risk of lost steps and provides optimum motion sensitivity with good linearity between commanded micro-steps and the actual motion of the stage. For vacuum applications, a third version with a slightly bigger, stepper motor is available. This motor was qualified for vacuum use by Lawrence Livermore National Laboratory.

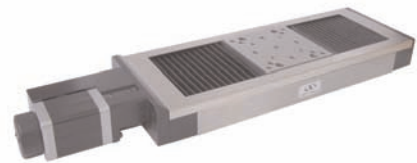
All UTS series linear stages feature all-steel construction with preloaded linear ball bearing slides. Steel has an almost 3-times greater stiffness than Aluminum, and provides the UTS stages comparable stiffness to the popular ILS series, but in a much more compact and significantly lower profile package. In addition, because the bearings, the body, the carriage and the lead screw are all made of steel, the UTS has a completely homogenized design minimizing thermal stress and thermal bending effects. The result is more consistent performance than other Aluminum stage designs.



Example of an XY assembly consisting of one UTS150CC and one UTS50CC.

Smooth motion is provided by a diamond-corrected lead screw and a matched, precision lapped nut to ensure high position stability with high vertical load capacity. The nut includes anti-backlash preloading and a sophisticated decoupling system that prevents lead screw eccentricity errors from affecting stage movement.

For XY configurations of UTS stages, use the M-CAP-M41 captive screws. The same screws can also be used for bolting UTS stages directly to custom mounting surfaces (access via thru-holes at the carriage). For mounting UTS stages to optical tables, please use the base plate M-PBN12.



UTS150PP stage with stepper motor.

Design Details

Base Material	Stainless steel
Bearings	Linear ball bearings
Drive Mechanism	Precision ground backlash-compensated leadscrew with decoupling nut
Drive Screw Pitch	2 mm
Feedback	UTS-CC: Screw mounted rotary encoder, 20,000 cts/rev, index pulse UTS-PP and UTS-PPV6: None
Limit Switches	Optical
Origin	Optical, at center of travel Typical 1 μm repeatability for UTS-CC and 5 μm repeatability for UTS-PP and UTS-PPV6
Motor	UTS-CC: DC servo motor UE34 CC UTS-PP: 2-phase stepper motor UE34PP, 1 Full step = 10 μm UTS-PPV6: 2-phase stepper motor UE41PP, 1 Full step = 10 μm
Cable Length	3 m
MTBF	20,000 hours with 5 kg load and 30% duty cycle

Use EQ100 Series right-angle brackets for vertical mounting configurations.



Load Characteristics and Stiffness

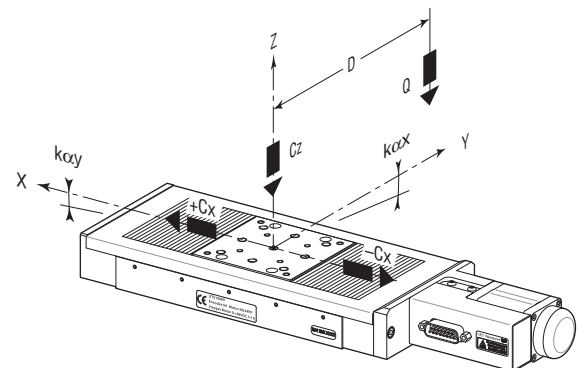
C_z , Normal centered load capacity	200 N
+Cx, Axial load capacity	50 N
-Cx, Inverse axial load capacity	10 N
$K_{\alpha x}$, Compliance in roll	10 $\mu\text{rad}/\text{Nm}$
$K_{\alpha y}$, Compliance in pitch	15 $\mu\text{rad}/\text{Nm}$
$K_{\alpha z}$, Compliance in yaw	15 $\mu\text{rad}/\text{Nm}$
Q, Off-center load	$Q = C_z / (1 + D/50)$

Where D = Cantilever distance in mm

Motion Controller Options

For optimum performance and seamless compatibility, we recommend using one of the following Motion Controllers/Drivers:

- XPS
- ESP300
- SMC100CC for UTS only
- SMC100PP for UTS-PP and UTS-PPV6 will be available May 2007



Specifications

Motorization	CC			PP, PPV6		
Travel Range (mm)	50	100	150	50	100	150
Resolution (μm)	0.1			0.1 ⁽¹⁾		
Minimum incremental motion (μm)	0.3			0.3		
Uni-directional repeatability, guaranteed (μm)	1			1		
Reversal value (Hysteresis), guaranteed (μm)	3			5		
On-axis Accuracy, guaranteed (μm)	4.5	5.5	6.5	6	7	8
Maximum Speed (mm/s)	40 ⁽²⁾			20 ⁽³⁾		
Pitch, guaranteed (μrad)	85	110	140	85	110	140
Yaw, guaranteed (μrad)	50	70	90	50	70	90
Weight (kg)	2.8	3.2	3.7	2.9	3.3	3.8

⁽¹⁾ Equals 1/100 of a full step.

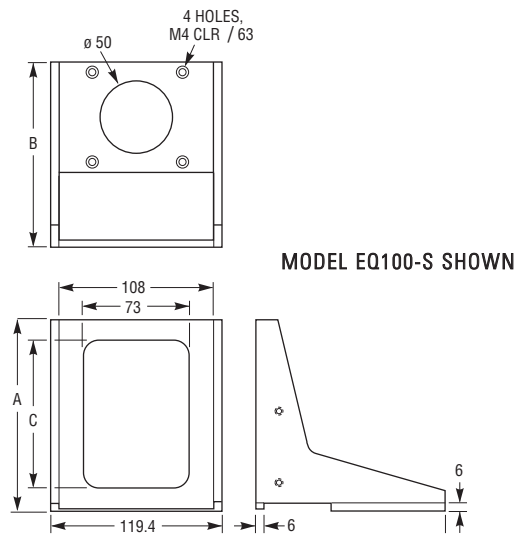
⁽²⁾ With axial loads greater than 1 kg the maximum speed must be reduced to 20 mm/s.

⁽³⁾ 10 mm/s for UTS-PPV6.

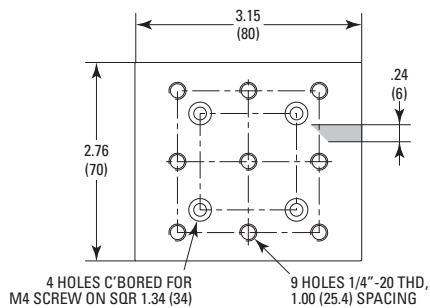
Ordering Information

Model	Description
UTS50CC	UTS linear stage, 50 mm travel, DC motor
UTS50PP	UTS linear stage, 50 mm travel, stepper motor
UTS50PPV6	UTS50PP linear stage, vacuum compatible to 10 ⁻⁶ hPa
UTS100CC	UTS linear stage, 100 mm travel, DC motor
UTS100PP	UTS linear stage, 100 mm travel, stepper motor
UTS100PPV6	UTS100PP linear stage, vacuum compatible to 10 ⁻⁶ hPa
UTS150CC	UTS linear stage, 150 mm travel, DC motor
UTS150PP	UTS linear stage, 150 mm travel, stepper motor
UTS150PPV6	UTS150PP linear stage, vacuum compatible to 10 ⁻⁶ hPa
UTS-TP	Top plate for UTS stages with English holes
M-PBN12	Base plate for UTS stages
M-CAP-M41	Set of 4 captive screws for XY assemblies
EQ100-S	Right-Angle Bracket for UTS50
EQ100-L	Right-Angle Bracket for UTS100 and UTS150

Right-Angle Brackets

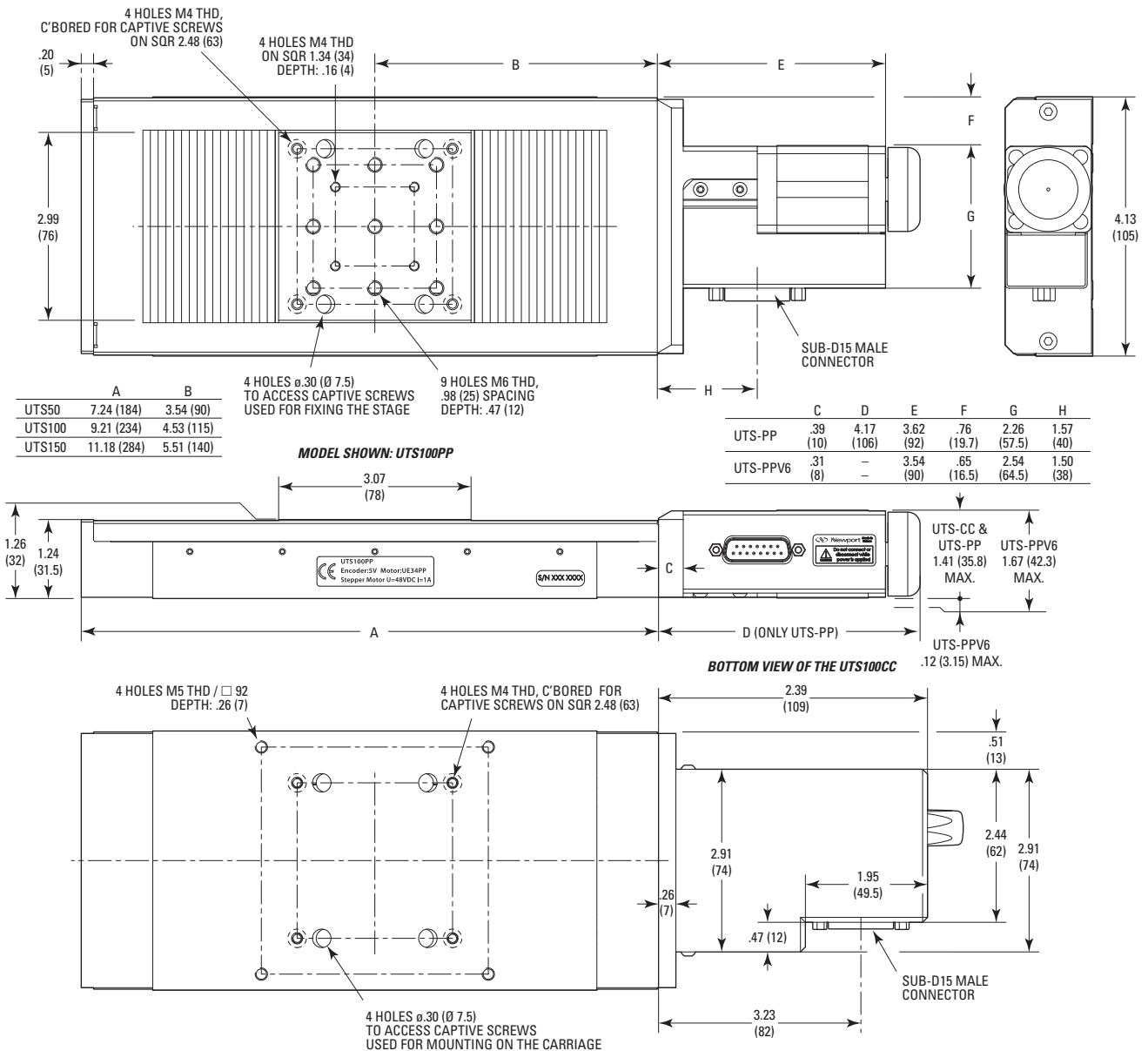


Model UTS-TP



Model	Dimension (mm)		
	A	B	C
EQ100-S	135	130.5	105
EQ100-L	215	144	174

Dimensions



ISO 9001
FM 27207

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Newport Corporation, Irvine, California, has been certified compliant with ISO 9001 by the British Standards Institution.

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