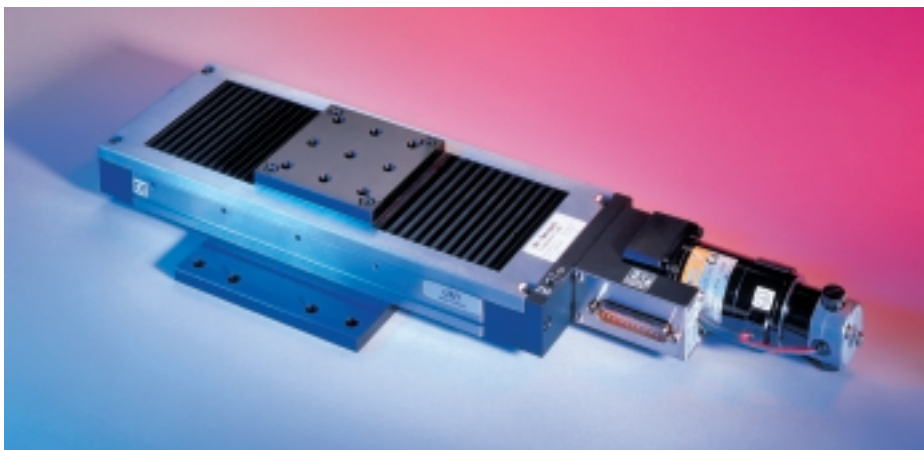


UTM Series

Mid-Range Travel Steel Linear Stages

Key Features

- All-steel construction offers high stiffness and thermal stability with up to 150 mm travel range
- Multiple motor and feedback configurations allow exact matching to your application
- Backlash compensated lead screw with reduction gear provides 0.1 μm resolution with high position stability
- Vacuum compatible versions up to 10^{-6} Torr



The UTM Series linear stages feature an all-steel construction with preloaded linear ball bearing slides to provide high stiffness and thermal stability in a space-saving format. A large variety of DC, stepper, and manual drives, all available with different resolutions, allow selection of a stage that exactly meets your application.

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 design includes anti-backlash preloading and a sophisticated decoupling system that prevents lead screw eccentricity errors from affecting stage movement.

All UTM stages include a center home position switch, supplemented by an index pulse signal from the encoder for precise origin location. The home position may also be set to either end of the stage's travel via an external switch on the stage body.

Stepper Drive Versions

Stepper-motor-driven stages are offered in four variants:

Two mini-step drive versions with resolutions of 1 μm (PP1HL) and 0.1 μm (PP.1). These combine high speed positioning and smooth displacement from 1/10-step per encoder count driving mode. For ultra-smooth low-speed positioning, micro-stepping up to 250x is possible using ESP Series Controllers.

Two full-step versions with resolutions of 1 μm (PE1) and 0.1 μm (PE.1). These are primarily designed for applications requiring the position to be maintained within the stage's resolution when power is switched off, such as operation in vacuum.

UTM (M-UTM)	Resolution (μm)	Maximum Speed (mm/s)	Motor
PP1HL	1	20	UE41PP
PP.1	0.1	2	UE31PP
PE1	1	2	UE31PP
PE.1	0.1	0.2	UE31PP

Motion Controller Options

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



XPS (page 1024)



ESP6000 with UNIDRIV6000 (page 1034)
Except PEV6



ESP300 (page 1039)
Except PEV6



ESP100 (page 1045)
Except PEV6

DC-Servo Drive Versions

Four DC-motor-driven configurations are available:

Two high-power DC-servo versions with resolutions of 1 μm (CC1HL) and 0.1 μm (CC.1). The CC1HL features a built-in tachometer to provide superior speed stability.

Two low-power versions with resolutions of 1 μm (CC1DD) and 0.1 μm (CC.1DD). These stages offer a cost-effective performance alternative for those who have precision positioning needs with budget limitations.

UTM (M-UTM)	Resolution (μm)	Maximum Speed (mm/s)	Motor
CC.1	0.1	5	UE33CC
CC1HL	1	20	UE404CC
CC1DD	1	2.5	UE31CC
CC.1DD	0.1	0.25	UE31CC

Manual Drive Versions

Two manual drive versions are available with resolutions of 1 μm (MS1) and 0.1 μm (MS.1). In addition to the vernier scale on the manual drive, position may be determined using the output from the incremental shaft encoder. A connector for the CV1000 encoder display is provided.

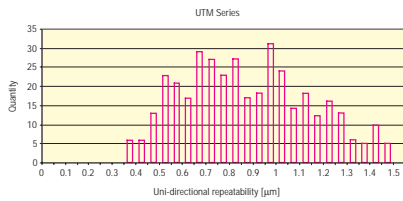
Drive Specifications

UTM (M-UTM)	Resolution (μm)	Travel per Revolution (mm/rev)
MS1	1	2
MS.1	0.1	0.2

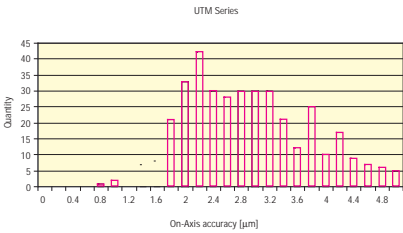
Design Details

Base Material	Stainless Steel
Bearings	Linear ball bearings
Drive Mechanism	Backlash-compensated leadscrew
Drive Screw Pitch (mm)	2
Reduction Gear	10:1 on all versions with 0.1 μm resolution ¹⁾
Feedback	2,000 pts/rev. rotary encoder with index pulse
Limit Switches	Mechanical
Origin	Centered, can be set to left or right travel limit via external switch
Cable	3 m long cable included
Protection	Bellows
Vacuum Compatibility	Vacuum compatible versions are available up to 10 ⁻⁶ Torr using full-step motor (PE1 and PE.1)
Weight	see page 1085

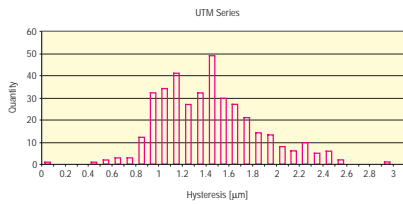
1) Additional motor mounted gear on some drive options, see page 1057



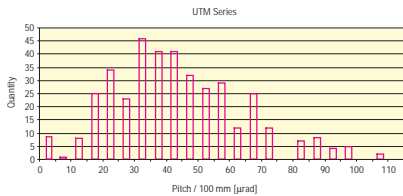
Uni-directional repeatability plot for UTM Series stages. The typical (mean) uni-directional repeatability is 0.9 µm. The guaranteed value is 1.5 µm.



On-axis accuracy plot for UTM Series stages. The typical (mean) on-axis accuracy is 3.5 µm. The guaranteed value is 5.0 µm



Reversal value (Hysteresis) plot for UTM Series stages. The typical (mean) reversal value is 2 µm. The guaranteed value is 3.5 µm



Pitch plot for UTM Series stages. The typical (mean) pitch is 45 µrad. The guaranteed value is 110 µrad

Load Characteristics

Cz	(N)	200
-Cx	(N)	10
+Cx	(N)	50
k _{oxx}	(µrad/Nm)	10
k _{oxy}	(µrad/Nm)	15

Q	Off-center load, $Q \leq Cz / (1 + D/50)$	
D	Cantilever distance in mm	
Cz	Normal center load capacity on bearings	
+Cx	Direct load capacity on X axis	
-Cx	Inverse load capacity on X axis	
k _{oxx}	Angular stiffness (Roll)	
k _{oxy}	Angular stiffness (Pitch)	

Specifications

Travel Range (mm)	25; 50; 100 and 150
Uni-directional Repeatability (µm)	0.9 typical, 1.5 guaranteed
Reversal Value (Hysteresis) (µm)	1.5 typical, 3.0 guaranteed (PP1, PE1, CC1HL, CC1DD) 2 typical, 3.5 guaranteed (PP.1, PE.1, CC.1, CC.1DD)
On-Axis Accuracy ⁽¹⁾ (µm)	3.5 typical, 5.0 guaranteed
αy Pitch ⁽¹⁾ (µrad)	45 typical, 110 guaranteed
αz Yaw ⁽¹⁾ (µrad)	35 typical, 70 guaranteed

1) For a travel of 100 mm

See the Metrology Tutorial section for more information on typical and guaranteed specifications

Ordering Information

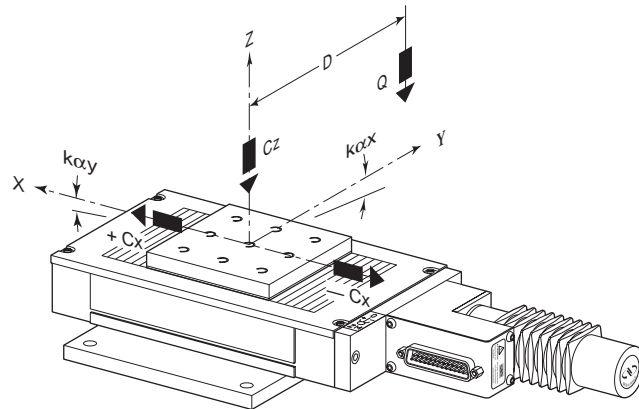
The UTM Series linear stages are numbered as follows:

Model	Series	Travel Range (mm)	Drive	Resolution (µm)	Vacuum Preparation ⁽¹⁾	
M-	UTM	25	PP	1HL .1	V6	
			PE	1 .1		
		50	CC	1HL .1		
				1DD .1DD		
		100	MS	1		
				.1		
		150				

Example
The **M-UTM100PP.1** is an UTM linear stage, metric version, with 100 mm travel range and 0.1 µm resolution (mini-step) stepper motor drive.

M-: Metric version PP: Mini-step PE: Full-step CC: DC MS: Manual

1) Vacuum compatible to 10⁻⁶ Torr. In this case max. speed and load capacity have to be divided by two.



Assembly Pattern

Stacking UTM Series stages either together or with other Newport stages is easily accomplished using optional Captive Screws (M-CAP-M41)(see page 964). Shown below are the assembly patterns used. These interfaces are accessed by removing the upper and lower plates of the stages. For assemblies requiring precise orthogonality (<math><50 \mu\text{rad}</math>), please consult our technical staff.

Dimensions

Model (Metric)	Thread		Dimension [in. (mm)]	
	A	B		
UTM (M-UTM)	1/4-20 (M6)	25.4 (25)		
Travel	25	50	100	150
L1	155	180	230	280

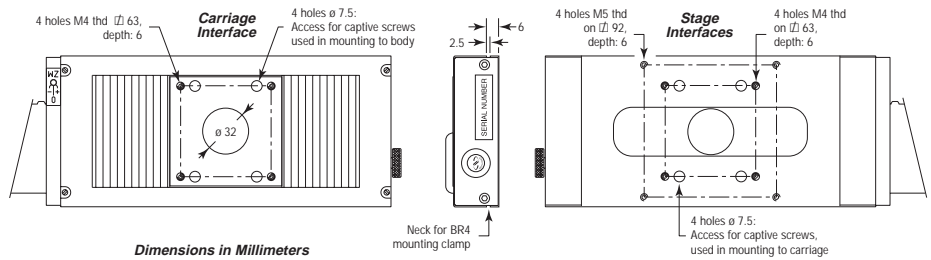
Accessories



Use the CV1000 to display encoder pulses when manually driving UTM stages (page 1055).



Use EQ100 Series right-angle brackets for vertical mounting configurations, page 963.



UTM (M-UTM)	Dimension (mm)	
	L2	H
MS1	100.5	32
MS.1	141.5	32
PP1HL	90.5	42
PP.1	131.5	42
PE1	139	32
PE.1	180	32
CC.1	133	48.5
CC1HL	148	48.5
CC1DD	116.5	32
CC.1DD	157.5	32

