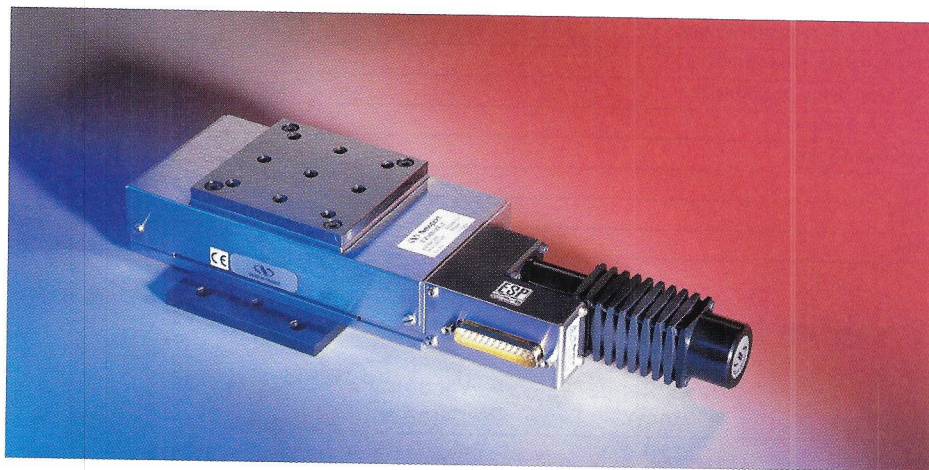


U Z M Series

Vertical Translation Stages

Key Features

- 4 or 9 mm vertical motion in a very low profile design
- Exceptional high load capacity based on opposing wedges motion concept
- Screw mounted rotary encoder provides up to 0.05 μm resolution
- Vacuum-compatible versions up to 10^{-6} Torr



The UZM Series linear stages offer high-precision vertical translation for applications requiring submicron resolution. Their low-profile design makes them particularly suited for space-limited XYZ positioning applications. Unlike vertically-mounted linear stages, UZM Series stages center payload mass directly over the bearings, avoiding positioning errors caused by cantilever loads.

High-resolution vertical motion is achieved with a precision inclined-plane design, consisting of two opposing wedges which move past each other via inclined, ball bearing races.

A precision lead screw translates the lower edge horizontally, and this motion is converted into vertical translation by the inclined ball races between the two wedges. To avoid unwanted side motion, the upper wedge is constrained by vertical mounted precision ball bearing slides.

For automatic return to a pre-determined height, all UZM Series stages include a center home position. Positioning feedback is supplied by a 2,000 pts/rev. rotary encoder supplemented by an index pulse for precise origin location.

Design Details

Base Material	Stainless steel
Bearings	Linear ball bearings
Drive Mechanism	2 wedge design with Transmission ratio of 4:1, Backlash-compensated leadscrew
Drive Screw Pitch	UZM160: 0.8 mm UZM80: 4 mm
Reduction Gear	10:1 on all UZM160 ⁽¹⁾
Feedback	2,000 pts/rev rotary encoder with index pulse
Limit Switches	Mechanical
Origin	Optical, at center of travel
Cable	3 m long cable included
Vacuum Compatibility	Vacuum compatible versions are available up to 10^{-6} Torr using stepper motor (PE.05 and PE.1)

Note: (1) Additional motor mounted gear on some drive options, see page 1116

Specifications

Travel Range	8 mm; 25 mm
Resolution	0.055 μm (DC Brush Servo), 0.074 μm (Stepper motor)
Minimum Incremental Motion	0.2 μm
Uni-directional Repeatability	1 μm
Reversal Value (Hysteresis)	3 μm
On Axis Accuracy	10 μm
Maximum Speed	0.3 mm/s
Roll	60 μrad
Pitch	100 μrad
Yaw	100 μrad

Ordering Information

Model	Series	Travel Range (mm)	Drive	Vacuum Preparation ⁽¹⁾
M-	MFN	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 08 25 </div>	PP — V6 CC	
M-: Metric version PP: Stepper CC: DC				

Example

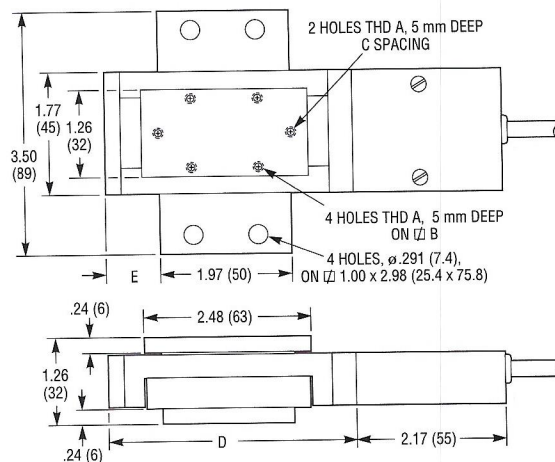
The **M-MFN25PP** is a linear stage, metric version, with 25 mm travel range and a stepper motor drive.

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

Dimensions

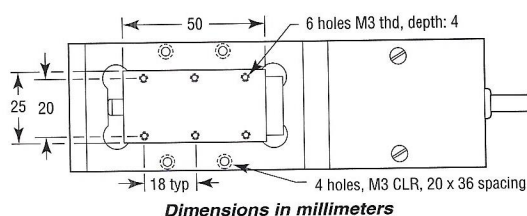
MODEL MFN25 SHOWN

MODEL	THREAD		DIMENSION				
	A	B	C	D	E		
ENGLISH INCHES							
MFN08	8-32	1.000	2.000	2.95	.43		
MFN25	8-32	1.000	2.000	3.62	.77		
METRIC MILLIMETERS							
M-MFN08	M4	25.0	50.0	75	11		
M-MFN25	M4	25.0	50.0	92	19.5		



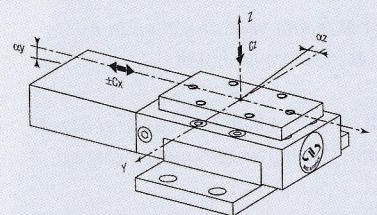
Assembly Pattern

MFN stages can easily be assembled into XY configurations by removing the top and bottom plates and using the hole patterns shown here.



Load Characteristics

Cz	(N)	50
-Cx	(N)	10
+Cx	(N)	10
k α x	($\mu\text{rad}/\text{Nm}$)	60
k α y	($\mu\text{rad}/\text{Nm}$)	100



Q Off-center load, $Q \leq C_z / (1 + D/20)$

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

Motion Controller Options

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

ESP7000
(page 1084)
Except MFNPPV6



MM4006
(page 1088)



ESP6000 with
UNIDRIV6000
(page 1094)
Except MFNPPV6



ESP6000 with DCIB
(page 1101)
Only MFNCC



ESP300 (page 1104)
Except MFNPPV6



ESP100 (page 1107)
Except MFNPPV6



MANUAL LINEAR
TRANSLATION STAGES

MOTORIZED LINEAR
TRANSLATION STAGES

MANUAL ROTATION
STAGES

MOTORIZED ROTATION
STAGES

FIBER POSITIONERS

ACTUATORS

CONTROLLERS &
AMPLIFIERS

TECHNICAL REFERENCE

Stepper Drive Versions

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

One mini-step drive version with resolutions of 0.1 μm (UZM80PP.1) and 0.05 μm (UZM160PP.05). 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.

One full-step version with step-down gear and resolutions of 0.1 μm (UZM80PE.1) and 0.05 μm (UZM160PE.05). 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.

	Resolution (μm)	Maximum Speed (mm/s)	Motor
UZM80PP.1	0.1	2	UE41PP
UZM80PE.1	0.1	0.2	UE31PP
UZM160PP.05	0.05	1	UE41PP
UZM160PE.05	0.05	0.1	UE41PP

DC-Servo Drive Versions

One DC-motor-driven configuration is available, with resolutions of 0.1 μm (UZM80CC.1) and 0.05 μm (UZM160CC.05). The UZM80CC may be directly connected to our ESP6000DCIB, with no need for larger

power/driver units, while the UZM160CC features a built-in tachometer that provides superior motion control accuracy in higher dynamic applications.

	Resolution (μm)	Maximum Speed (mm/s)	Motor
UZM80CC.1	0.1	0.25	UE31CC
UZM160CC.05	0.05	1	UE404CC

Manual Drive Versions

The UZM Series vertical translation stages are also available with manual drive. These are offered with resolutions of 0.1 μm (UZM80MS) and 0.05 μm (UZM160MS). 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.

	Resolution (μm)	Travel per Revolution (mm/rev)
UZM80MS.1	0.1	0.2
UZM160MS.05	0.05	0.1

Motion Controller Options

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

ESP7000 (page 1084)
Module Option 01
Except V6 versions



MM4006
(page 1088)



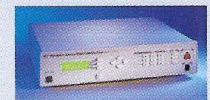
ESP6000 with
UNIDRIV6000
(page 1094)
Except V6 versions



ESP6000 with DCIB
(page 1101)
Only UZM80CC.1



ESP300 (page 1104)
Except V6 versions



ESP100 (page 1107)
Except V6 versions



MANUAL LINEAR
TRANSLATION STAGESMOTORIZED LINEAR
TRANSLATION STAGESMANUAL ROTATION
STAGESMOTORIZED ROTATION
STAGES

FIBER POSITIONERS

ACTUATORS

CONTROLLERS &
AMPLIFIERS

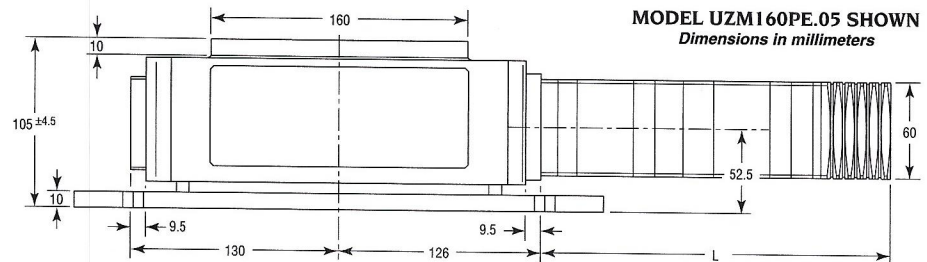
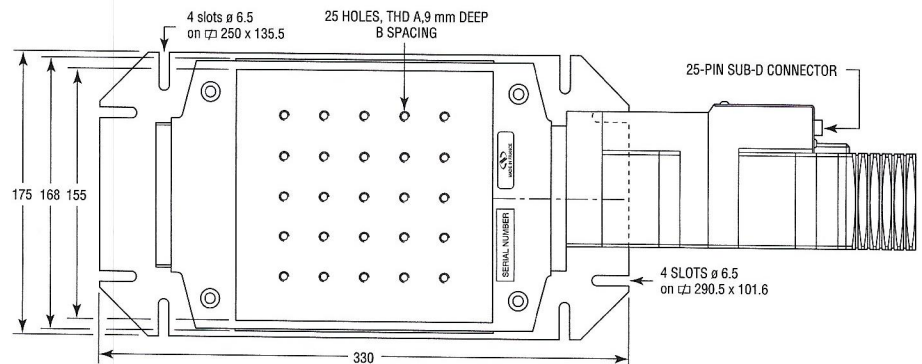
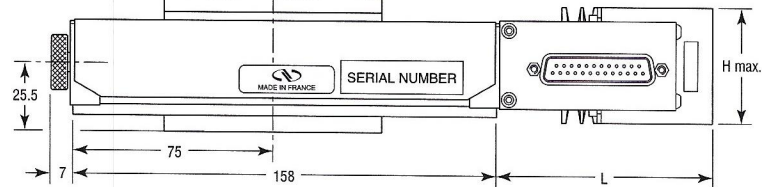
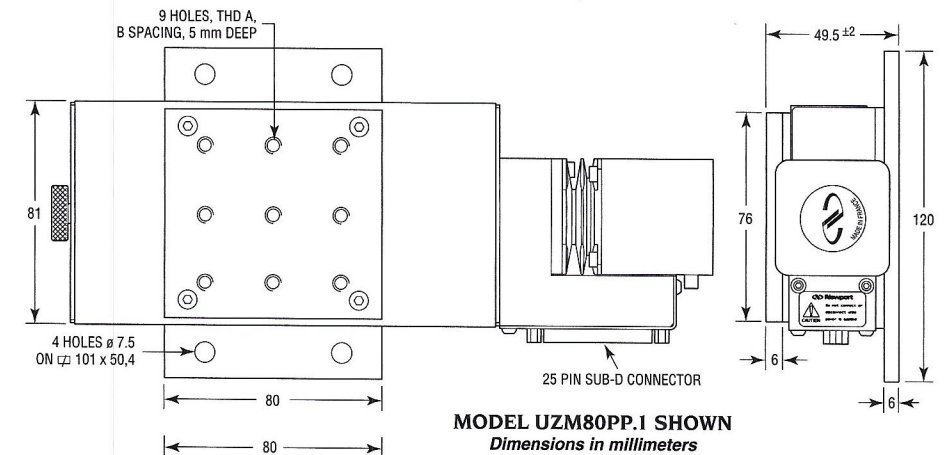
TECHNICAL REFERENCE

Dimensions

(M-)UZM80	L	H
PP.1	78.5	42
PE.1	129	32
CC.1	106.5	32
MS.1	90.5	32

MODEL	THREAD	DIMENSION
	A	B
ENGLISH		
UZM80	1/4-20	25.4
UZM160	1/4-20	25.4
METRIC		
M-UZM80	M6	25
M-UZM160	M6	25

(M-)UZM160	L
PP.05	177
PE.05	218
CC.05	237
MS.05	230



Specifications

	UzM80	UzM160
Travel Range	4 mm	9 mm
Resolution	0.1 μm	0.05 μm
Uni-directional Repeatability	0.2 μm	0.5 μm
Reversal Value (Hysteresis)	3 μm	5 μm
On Axis Accuracy	4 μm	8 μm
α y Pitch	100 μrad	100 μrad
α z Yaw	200 μrad	200 μrad

Ordering Information

The UZM Series translation stages are numbered as follows:

Model	Series	Wide Plate (mm)	Resolution Drive (μm)	Vacuum Preparation ⁽³⁾
M-	UZM	80 160	PP PE CC MS	.1 ⁽¹⁾ .05 ⁽²⁾ V6

Example
The **M-UZM80PP.1** is a UZM translation stage, metric version, with a 80 mm-wide plate and a 0.1 μm resolution (mini-step) stepper motor drive.

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

1) Resolution for UZM80 only.

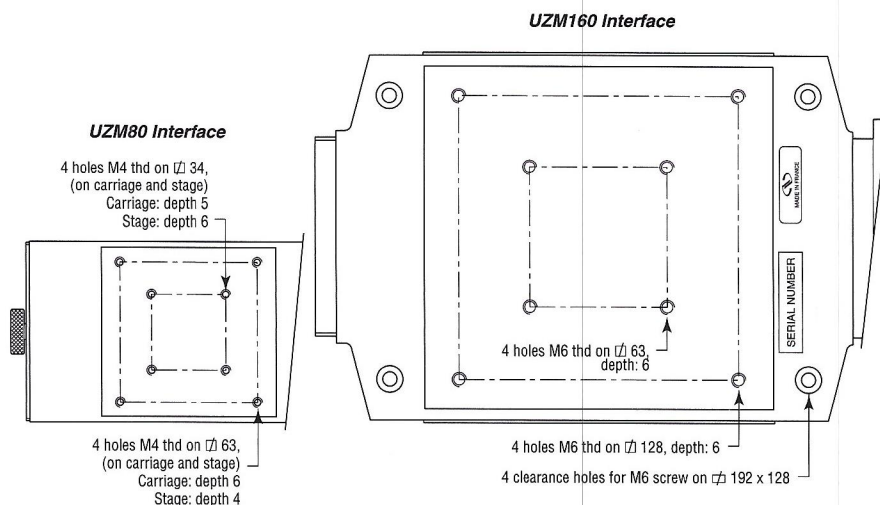
2) Resolution for UZM160 only.

3) Add V6 to a Full-step motor drive stage PE type for a preparation at a 10^{-6} Torr for a vacuum environment.

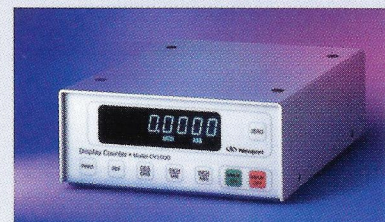
Assembly Pattern

Stacking UZM Series stages with other Newport stages is easily accomplished. Shown below are the assembly

patterns used. These interfaces are accessed by removing the upper and lower plates of the stages.



Accessories



Use the CV1000 to display encoder pulses when manually driving UZM stages (page 1114).

Load Characteristics

		UzM80	UzM160
Cz	(N)	± 30	-200, +300
Q x D	(N.m)	0.75	20
Cx and Cy	(N)	± 150	± 200
k α x	($\mu\text{rad}/\text{Nm}$)	25	0.13
k α y	($\mu\text{rad}/\text{Nm}$)	100	0.65

Q Off-center load

D Cantilever distance in mm

Q x D Max. torque

Cz Normal center load capacity on bearings

+Cx, Cy Direct load capacity on X or Y axis

-Cx, Cy Inverse load capacity on X or Y axis

k α x Angular stiffness (Roll)

k α y Angular stiffness (Pitch)

