

Y, XY and XYZ Motion

Introduction

Many vacuum applications such as sample transfer, beamline diagnostic positioning and sample positioning for analysis require precise manipulation along Y, XY or XYZ axes.

UHV Design provides a field-proven range of precise manipulators that can be used in isolation or combined with magnetically-coupled rotary drives (see Section 1) to build sophisticated manipulators with up to six axes of independent motion.

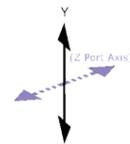
All of our manipulators benefit from kinematic design which ensures smooth, precise motion, high load capability and a minimum bellows design life of 10,000 cycles.

Manipulators can be configured using our modular XYZ and XYZT stages (see pages 126-133). Options include:

- Bellows support tubes
- Service collars
- Rotary drives providing up to 2 additional axes of manipulation

In addition to this modular approach we provide complete sample manipulation solutions which include sample heating, cooling and rotation (see MultiCentre section - page 134).

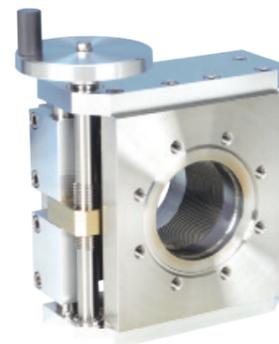
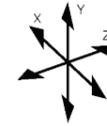
Y Motion Only



X & Y Motion



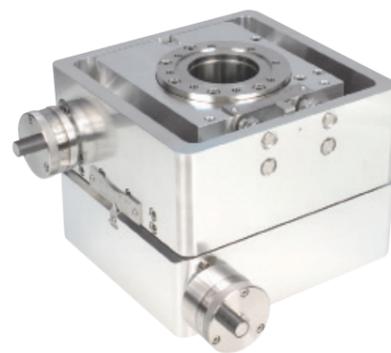
X, Y and Z motion



Y-shift Range

Precise, repeatable axial alignment along Y axis.

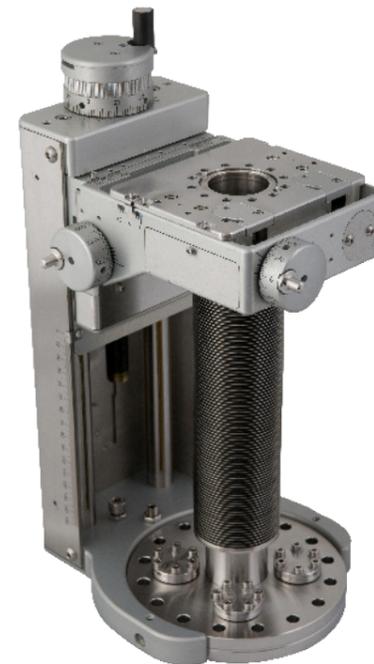
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Multibase XY Stage

XY translation with a range of flange sizes, clear bores and actuation methods.

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XYZT Stage

Compact stage with up to +/-15mm X&Y translation and up to 300mm Z travel. Integrated +/- 2° tilt for final alignment.

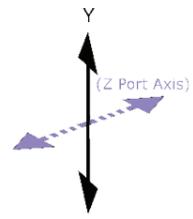
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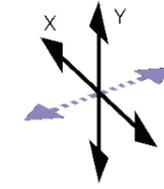
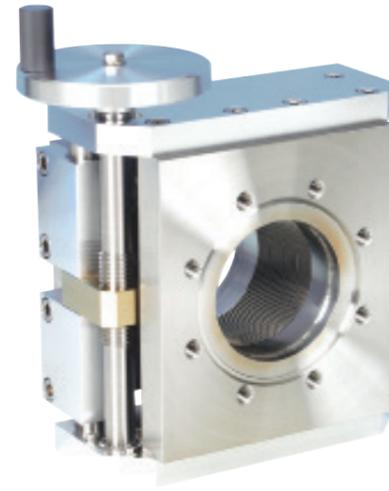
MultiStage XYZ Stage

Modular stage with up to +/- 57mm X & Y translation and up to 1000mm of Z travel.

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Y-shift Range



XY14 Manual



XY31 Manual

MultiBase XY Stages

Accurate, repeatable alignment on the Y-axis. Typically used to lift and lower sample transfer arms for sample transfer.

Y-SHIFT KEY ADVANTAGES

- » Kinematic design provides smooth, precise motion in parallel plane
- » Four different fixed/travelling flange combinations
- » Any-orientation mounting
- » Bellows-sealed all-metal vacuum enclosure

Modular platforms for the manipulation of components in the X and Y planes. Kinematic design ensures smooth and precise motion.

MULTIBASE KEY ADVANTAGES

- » Any-orientation mounting without additional supports
- » High precision kinematic drive and guidance system – eliminates need for vulnerable cross-roller slides
- » Rigid stops limit X/Y travel protecting the bellows
- » Robust construction for high loads

Overview

The Y-Shifts provide accurate, repeatable axial alignment on the Y-axis, and might be used in conjunction with a sample transfer arm, such as a PowerProbe, to effect sample hand-off (see section 4). The robust, production-proven devices offer true UHV performance and are available in two sizes providing +/-7.5mm or +/-31mm Y axis adjustment, with four different fixed/travelling flange combinations.

Suitable for use in both production and R&D applications, the Y-Shifts are supplied with a range of actuation methods including manual hand wheels or stepper motors. Motorised Y-Shifts are supplied with pre-wired bakeable limit switches, terminating with a bakeable, frame-mounted connector. Plug and play motor controllers are available. For more information please see section 13.

Design Concept

The Y-Shift design includes two parallel flanges, one remaining fixed, whilst the other provides the movement. The device works by adjusting the position of the travelling flange in relation to the fixed system mounted flange. The travelling flange position is controlled through an external leadscrew and benefits from an anti-backlash mechanism.

A kinematic guide mechanism ensures smooth and precise motion. Vacuum integrity is ensured through the use of high quality 316L edge-welded bellows which have a minimum design life of 10,000 cycles. The Y-Shift's rigid construction enables large cantilevered loads to be accommodated and allows the units to be mounted in any orientation. Y-Shifts are used for a number of applications, for example in transfer system alignment to adjust a linear probe to achieve sample hand-off (see 'Sample Transfer Section' page 54).

The MultiBase XY stage is the first choice for both research and demanding production environments due to its precise motion, true UHV performance and rugged construction which allows mounting in any-orientation.

The MultiBase design includes two parallel flanges. One remains fixed, whilst the other provides the movement. A high quality, supple, edge-welded bellows spans the flanges to accommodate the required motion while ensuring an all-metal vacuum enclosure. The device works by adjusting the position of the travelling flange in relation to the fixed system mounting flange.

Positioning of the travelling flange is controlled through two external lead-screws, each benefiting from anti-backlash systems.

A kinematic mechanism ensures smooth and precise motion. This novel mechanism incorporates a high precision drive and guidance system, removing the requirement for vulnerable cross-roller slides used by other manufacturers. Combining this with a rigid construction allows mounting in any-orientation without additional supports. Scales are fitted to each axis for resolving the position of the travelling flange on the manual version. The motorised stages are fitted with stepper motors and pre-wired limit and home switches.

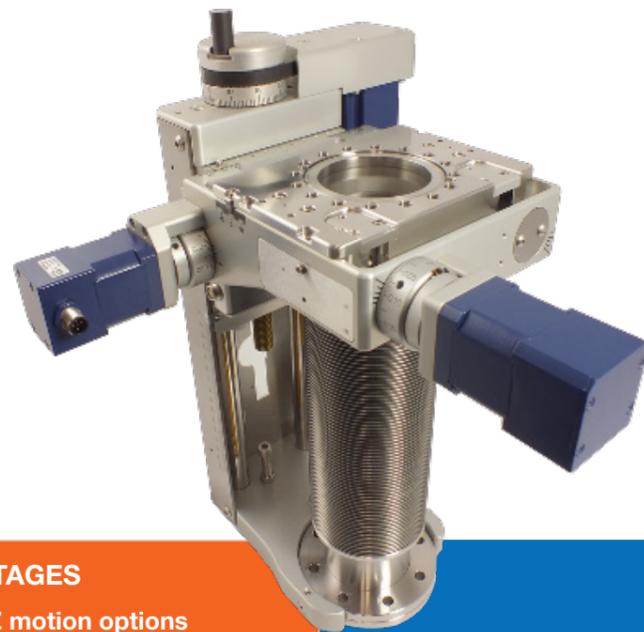
Specification Table

MODEL	LDM64/38	LDM64/64	LDM100/38	LDM100/64
Fixed flange	CF64 114mm (4.5") OD CF		CF100 152mm (6") OD CF	
Travelling flange	CF 38 70mm (2.75") OD CF	CF64 114mm (4.5") OD CF	CF 38 70mm (2.75") OD CF	CF64 114mm (4.5") OD CF
Offset	+/- 7.5mm		+/- 31mm	
Bellows bore	60mm		90mm	
Clear bore	38mm	60mm	38mm	60mm
Flange to flange	87.5mm		182mm	

Specification Table

MODEL	XY14-64-38	XY14-100-38	XY31-100-38	XY31-100-64	XY31-150-64	XY57-150-150
Travelling flange	CF38 70mm (2.75") OD with M6 straddled holes		CF64 114mm (4.5") OD with M8 straddled holes		CF150 203mm (8") OD with M8 straddled holes	
Mounting flange	114mm (4.5") OD CF64 with M8 straddled holes	CF100 152mm (6") OD with M8 straddled holes			CF150 203mm (8") OD with M8 straddled holes	
X Y travel	+/- 14mm (vector)		+/- 31mm (vector)		+/- 57mm (vector)	
X _{MAX} , Y _{MAX}	+/- 10mm		+/- 22mm		+/- 40mm	
Clear bore diameter	51mm		90mm		150mm	
Maximum Probe OD	22mm max to achieve full movement		28mm max to achieve full movement		36.5mm max to achieve full movement	
X Y resolution	Manual drive +/- 0.01mm. Stepper motor driven +/- 0.0005mm				Manual drive +/- 0.01mm. Stepper motor driven +/- 0.0005mm	

TETRAXE XYZT Stage



The ultra-compact TetrAxe manipulator offers precise manipulation in X, Y and Z axis with convenient +/-2° tilt integrated into the mounting flange assembly. Ideal when space is at a premium.

KEY ADVANTAGES

- » 50-300mm Z motion options
- » XY options include +/-12.5mm (38mm bore) and +/-15mm (65mm bore)
- » High resolution performance
- » Easy to retrospectively motorise

In situations where available space is limited, in addition to an ultra-compact footprint, the TetrAxe allows both the X and Y actuation methods to be moved to alternative positions to avoid mechanical clashes if required.

Moving the manual handwheels or motorisation kits requires no specialist tools or training and can be completed on-site by following a simple process.

In addition to this feature, the mounting flange incorporates an integrated +/-2° tilt for convenience during final alignment.

The TetrAxe is available in manual or motorised configurations with the option to upgrade from manual actuation to motorisation at a later date using simple to install motorisation kits which include beakeable limit and home switches.



Simple motorisation upgrade

Specification Table

MODEL	TTX40	TTX63	
Travelling flange	CF40 (2 3/4") metric tapped	CF63 (4 1/2") metric tapped	CF63 (4 1/2") metric tapped
Mounting flange	CF100 (6") clear holes	CF63 (4 1/2") clear holes	CF100 (6") clear holes
XY travel	+/-12mm	+/-15mm	+/-15mm
Z travel	25mm, 50mm, 100mm, 150mm, 200mm, 250mm, 300mm options		
Flange tilt	+/-2° integrated into the mounting flange		
Clear bore diameter	38mm	65mm	65mm
Bakeout temperature	250°C (with motors removed)		
Max probe diameter	13mm (for max. X or Y travel)	22mm (for max. simultaneous X&Y travel)	22mm (for max. simultaneous X&Y travel)

MultiStage XYZ Stages



Manual

Ultra-stable dual bellows stages providing smooth, precise motion with up to +/-31mm X & Y travel and up to 1000mm in Z travel. Can be mounted in any-orientation.

XYZ KEY ADVANTAGES

- » 25mm-1000mm Z motion in combination with XY
- » Mounting in any-orientation without additional supports
- » Smooth, precise kinematic motion
- » Robust construction for high loads
- » True UHV performance

MultiStage manipulators provide precise motion along the X, Y and Z axes. Their robust construction provides a stable platform, enabling mounting in any-orientation.

The range is modular utilising the MultiBase XY stages to provide two generic platforms offering +/-14mm or +/-31mm of motion (vector sum of X & Y). Various Linear Shift Mechanisms can then be fitted to these platforms to provide between 100mm (4") and 1000mm (39") Z stroke. The kinematic motion provided results in smooth and reliable motion.

MultiStage manipulators are offered with manual or motorised actuation. Manual XY actuation is delivered via a combined micrometer handwheel and linear scale assembly. Manual Z motion can be fitted with a 1mm increment scale.

DC and stepper motor driven solutions are also available, along with 'plug and play' motion control systems (see Section 13).

Specification Table

MODEL	XY14-64-38	XY14-100-38	XY31-100-38	XY31-100-64	XY31-150-64
Travelling flange	CF38 70mm (2.75") OD with M6 straddled holes			CF64 114mm (4.5") OD with M8 straddled holes	
Mounting flange	CF64 114mm (4.5") OD with M8 straddled holes	CF100 152mm (6") OD with M8 straddled holes			CF150 203mm (8") OD with M8 straddled holes
X Y travel	+/- 10mm (+/- 14mm vector)		+/- 22mm (+/- 31mm vector)		
X Y resolution	Manual drive +/- 0.01mm. Stepper motor driven +/- 0.005mm (based upon 400 half-steps per revolution).				
Z travel	Z shifts are available with following strokes as standard: 100, 200, 400, 600, 800 and 1000mm.				
Z resolution (manual)	Manual drive +/- 0.5mm with engraved shaft, with digital linear scale 0.01mm				
Z resolution per 1/2 step (motorised)	100 & 200mm Z travel - +/- 0.000254mm 400 & 600mm Z travel - +/- 0.000508mm			100 & 200mm Z travel - +/- 0.000127mm 300 to 1000mm Z travel - +/- 0.000635mm	