

Linear Motion and Alignment

Linear Shift Mechanisms (LSMs) provide linear motion along the port axis (Z). Typical applications include the positioning of beamline filters, adjustment of sputter sources and deposition stages through to production style applications.

UHV Design has the largest range of LSMs in the world, ranging from CF35 to CF150 flanges, up to 1m stroke, tilt & X alignment versions with manual, pneumatic and motorisation options, all available with a range of position encoders. Bakeable to 250°C, the range is supplied on CF flanges and provides true UHV performance.

The bellows-sealed LSMs provide smooth, precise motion via a kinematically-designed external leadscrew driven mechanism, complete with anti-rotation and anti-deflection systems.

This design ensures smooth and precise motion along the Z axis. The range has a high load capability ensured through its rigid construction. Ball screw driven versions are available for fast acting, high duty cycle, high load, production applications.

The bellows are manufactured from 316L stainless steel as standard and offer a minimum design life of 10,000 cycles. Customised units are available offering a design life of up to 3 million cycles.

In addition to the standard range of LSMs we offer customised LSMs which are application-specific for use on synchrotrons, and in critical production applications.

LSM KEY ADVANTAGES

- » 2x flange parallelism of conventional designs
- » 2x load-carrying capability of conventional designs
- » Smooth kinematic motion
- » 10,000 cycle lifetime guarantee (3 million cycle option)
- » Demountable bellows assembly
- » Reliable and rigid construction
- » Bakeable to 250°C

Standard LSM

Long Travel LSM

Compact LSM

LSM with Tilt

LSM with X motion

Production LSMs

Port Aligners



Up to 350mm

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Up to 1000mm

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Up to 150mm

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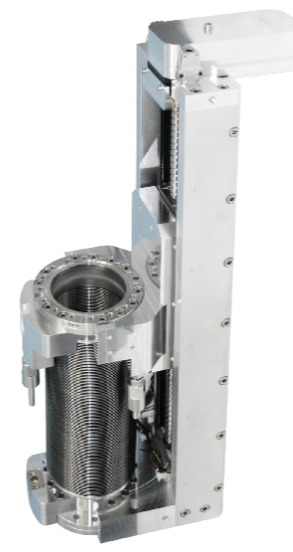
Up to 150mm
+/- 2° tilt

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Up to 150mm
+/- 5mm lateral (x) motion

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Production-proven
LSMs

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+/-5mm linear motion
+/-3° angle adjustment

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Example of long travel LSM

Standard Linear Shift Mechanism

LSM Series



Production-proven linear motion along the port axis (Z) for sample positioning and production applications.

Comprehensive series offering true UHV performance with a vast range of flange sizes, strokes, actuation and encoder options.

LSM KEY ADVANTAGES

- » 2x flange parallelism compared with conventional designs
- » 2x load-carrying capability compared with conventional units
- » Smooth kinematic motion
- » 10,000 cycle lifetime guarantee
- » Demountable bellows assembly
- » Bakeable to 250°C

Overview

The LSM is the most comprehensive series in the range, offering the largest number of flange, stroke and actuation options. All flanges within the series are supplied with tapped bolt holes as standard. Special variants with clear holes on the mounting flange can be provided for most sizes, these are labelled HLSM in the partcodes and specification tables.

Actuation methods

The series can be actuated via a manual handwheel, pneumatic cylinder, DC motor or stepper motor. Each LSM can also be fitted with a digital linear scale, offering visual position indication with 10 micron resolution.

Specification Table

| MODEL | Flange information | | Bolt holes | | Clear Bore (mm) | Maximum Bakeout |
|-------|--------------------|-------------------------|-------------------|-----------------|-----------------|-----------------|
| | Flange code | Flange size | Travelling flange | Mounting flange | | |
| LSM | 38 | CF38 70mm (2.75") OD CF | M6 Tapped | M6 Tapped* | 38 | 250°C |
| | 64 | CF64 114mm (4.5") OD CF | M8 Tapped | M8 Tapped* | | |
| HLSM | 100 | CF100 152mm (6") OD CF | M8 Tapped | Clear holes | 102 | |
| | 150 | CF150 203mm (8") OD CF | | | 149 | |

* Clear bolt holes on mounting flange available (HLSM option).

Motorised LSMs are fitted with bakeable limit and home switches, pre-wired to a single bakeable connector mounted on the frame ('UP' option must be selected). LSMs are compatible with UHV Design's SADC and Stepper motor controller range, details of which can be found in Section 13.

Long Travel Linear Shift Mechanism

HLSML Series



The HLSML provides strokes of up to 1000mm (39") with high precision motion maintained throughout the stroke. The HLSML is also chosen for shorter strokes where ultimate stability is required.

HLSML KEY ADVANTAGES

- » Up to 1m stroke
- » Smooth kinematic motion
- » Reliable and rigid construction
- » 'Plug and play' production solutions
- » True UHV performance
- » Bakeable to 250°C
- » Demountable bellows

Overview

The HLSML series of long travel Linear Shift Mechanisms, incorporates an upgraded structure with rear spine and large bore shafts and supports. The rigid structure maintains precise motion and unrivalled stability with strokes up to 1m.

High duty cycle production HLSMLs are available providing reliable, smooth and rigid motion with long operational life. Production ready HLSMLs can be supplied with pre-wired switches and connectors for 'plug & play' operation.

Specification Table

| MODEL | Flange information | | Bolt holes | | Clear Bore (mm) | Maximum Bakeout |
|-------|--------------------|-------------------------|-------------------|-----------------|-----------------|-----------------|
| | Flange Code | Flange Size | Travelling flange | Mounting flange | | |
| HLSML | 38 | CF38 70mm (2.75") OD CF | M6 Tapped | Clear holes | 38 | 250°C |
| | 64 | CF64 114mm (4.5") OD CF | M8 Tapped | Clear holes | 65 | 250°C |

Actuation methods

The series can be actuated via a manual handwheel, DC motor or stepper motor.

Motorised HLSMLs are fitted with bakeable limit and home switches, pre-wired to a single, bakeable connector mounted on the frame. HLSMLs are compatible with UHV Design's SADC and Stepper motor controller range.

Each HLSML can be supplied with a digital linear scale, offering visual position indication with 10 micron resolution.



Compact Linear Shift Mechanism CLSM Series



A compact solution to linear motion along the port axis (Z). The CLSM series provides the shortest available flange-to-flange dimension, without compromising on performance or reliability.

CLSM KEY ADVANTAGES

- » Compact design
- » Smooth kinematic motion
- » Reliable and rigid construction
- » True UHV performance
- » Bakeable to 250°C
- » Demountable bellows assembly

Overview

The CLSM compact series offers the shortest flange-to-flange dimension in the range. As such, the series is offered with limited flange and stroke options.

Actuation methods

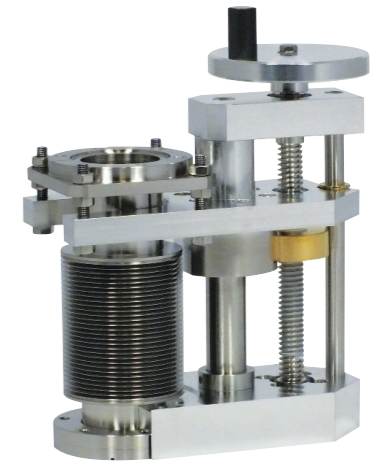
The series can be actuated via a manual handwheel, pneumatic cylinder, DC motor or Stepper motor.

Each CLSM can be supplied with a digital linear scale, offering visual position indication with 10 micron resolution.

Specification Table

| MODEL | Flange information | | Bolt holes | | Clear Bore (mm) | Maximum Bakeout |
|-------|--------------------|-----------------|-------------------|-------------|-----------------|-----------------|
| | Flange code | Flange size | Travelling flange | Base flange | | |
| CLSM | 38 | CF38 (2.75" OD) | M6 Tapped | M6 Tapped | 38 | 250°C |

Linear Shift Mechanism With Tilt LSMT Series



Smooth kinematic linear motion along the port axis (Z) with the additional facility to tilt the travelling flange so it serves as an integrated port aligner. This makes the LSMT ideal for applications where precise alignment with a fixed point is essential.

LSMT KEY ADVANTAGES

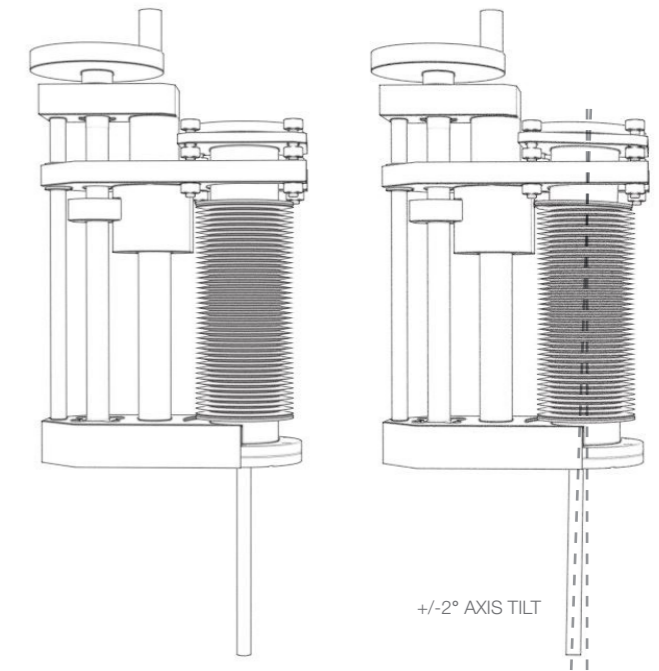
- » Up to 150mm stroke
- » +/- 2° tilt for final alignment
- » Adjustment via 4 threaded support shafts
- » Smooth kinematic motion
- » Bakeable to 250°C
- » Demountable bellows assembly

Overview

The LSMT is based on the standard LSM series with the additional facility to tilt the moving flange by +/- 2° for final alignment, acting as an integrated port aligner. Typically used on beamlines to align diagnostics or for ion/sputter source alignment. Adjustment is actuated via four threaded support shafts. All flanges in the series are supplied with tapped bolt holes on the base flange as standard.

Actuation methods

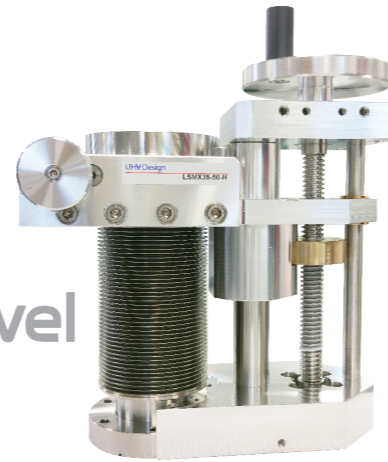
The series can be actuated with a manual handwheel, pneumatic cylinder, DC motor or stepper motor.



Specification Table

| MODEL | Flange information | | Bolt holes | Travelling flange tilt | Clear Bore (mm) | Maximum Bakeout |
|-------|--------------------|-------------------------|------------|------------------------|-----------------|-----------------|
| | Flange code | Flange size | | | | |
| LSMT | 38 | CF38 70mm (2.75") OD CF | M6 Tapped | +/-2° | 38 | 250°C |
| | 64 | CF64 114mm (4.5") OD CF | M8 Tapped | +/-2° | 65 | 250°C |

Linear Shift Mechanism With X Travel LSMX Series



Production-proven Linear Shift Mechanism PLSM Series

Linear motion along the port axis (Z) with the additional facility to adjust the travelling flange laterally (X axis) to facilitate alignment. The travelling flange angle remains constant throughout actuation.

LSMX KEY ADVANTAGES

- » +/- 5mm lateral (X axis) motion
- » Smooth kinematic alignment
- » Reliable and rigid construction
- » True UHV performance
- » Bakeable to 250°C
- » Demountable bellows assembly

In addition to the main ranges of Linear Shift Mechanisms (LSMs), variants designed specifically to work in demanding high duty cycle production environments are available.

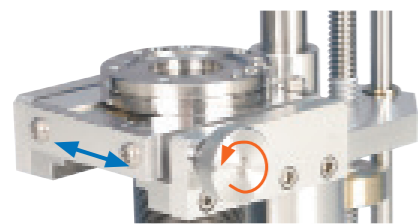
PLSM KEY ADVANTAGES

- » >100m/s translation possible
- » <1 mrad deflection under vacuum
- » Reliable and rigid construction
- » True UHV performance
- » Bellows bakeable to 250°C
- » Demountable bellows assembly

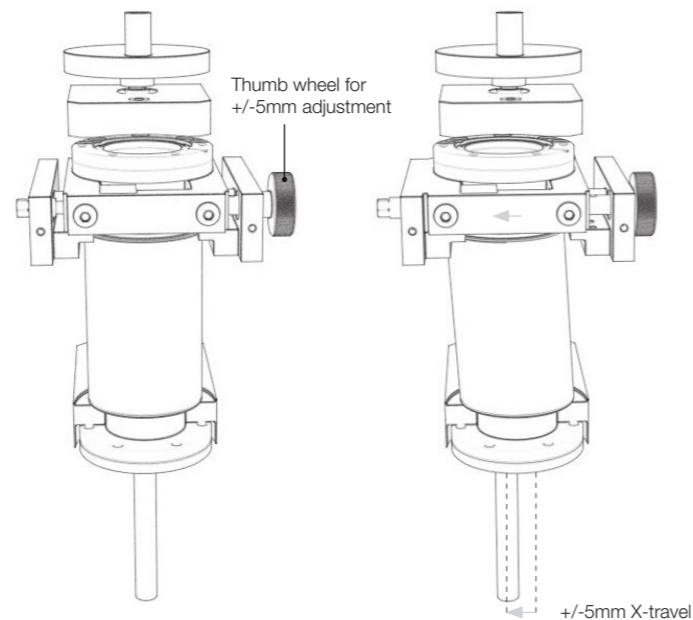
Overview

The LSMX is based on the standard LSM series. Where the LSMX version differs is that, in addition to the Z motion, the user has the option to adjust the X motion of the moving flange by up to +/-5mm via a manual thumb wheel. The thumb wheel can be moved to the opposite side if required.

This is useful if the user needs the flexibility to make lateral alignment adjustments to the linear shift without altering the travelling flange angle. A typical application would be the alignment of a sample holder with a sample transfer arm within the system.



Thumb wheel provides +/-5mm lateral (X axis) movement



Specification Table

| MODEL | Flange information | | Bolt holes | Travelling flange offset (X motion) | Clear Bore (mm) | Maximum Bakeout |
|-------|--------------------|-------------------------|------------|-------------------------------------|-----------------|-----------------|
| | Flange code | Flange size | | | | |
| LSMX | 38 | CF38 70mm (2.75") OD CF | M6 Tapped | +/-5mm | 38 | 250°C |
| | 64 | CF64 114mm (4.5") OD CF | M8 Tapped | +/-5mm | 65 | 250°C |

Application specific design

With the world's largest range of LSMs at their disposal, UHV Design's in-house design team can customise any of the standard designs to specifically match production requirements.

Customised designs can accommodate the required flange size, stroke, bore size, duty cycle and space envelope. In addition, any required sensors, motors and encoders can be incorporated and pre-wired for plug and play operation.

All production LSMs benefit from:

- Ultra-stiff construction for minimal deflection
- High cantilevered load capacity
- Ball screw drive mechanism with recirculating linear slides
- Bellows with greater than 3 million cycles guaranteed

Manufactured and assembled for use in ultra clean applications

UHV Design's in-house manufacturing facility enables us to cost-effectively and rapidly produce highly tolerated, high quality components.

Components are cleaned prior to assembly in an ISO 7 Class 10,000 clean room.



LSM Actuation options

The LSM range is available with a variety of manual, pneumatic and motorised actuation methods.

Manual actuation

- Manual handwheel
- Geared handwheel for large bore linear shifts

Pneumatic actuation

- Wide range of pneumatic options
- 3-position actuators available

Motorised actuation

- DC or stepper motorisation
- pre-wired home & limit switches

Position readout/feedback

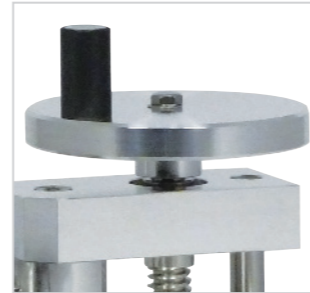
- Engraved shaft
- Digital linear scale with 10 micron resolution
- Magnetic encoder with 10 micron resolution (option to upgrade to 1 micron resolution)
- Absolute encoders

High speed actuation

- Ball screw mechanism can provide up to 100mm/s actuation

Synchrotron specification

- DC or stepper motorisation
- pre-wired home & limit switches



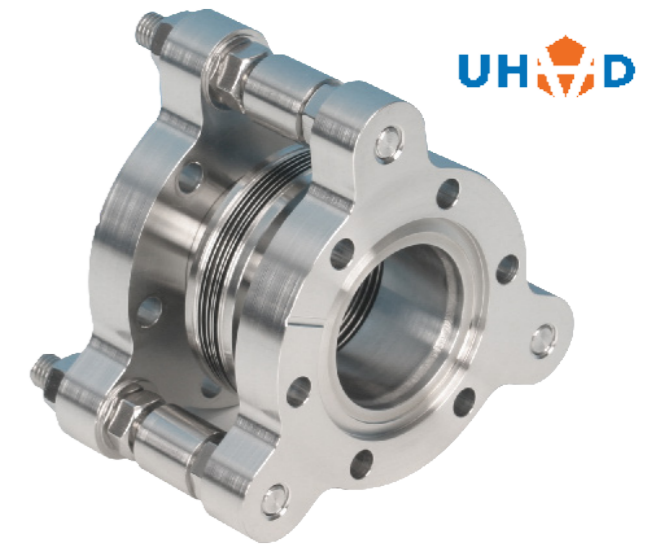
Manual handwheel



Pneumatic actuation



Motorised LSM



Port Aligner Range

Enables the distance and angular relationship between two flanges to be adjusted, where a fixed flange supports three equi-spaced threaded shafts, and in parallel, a travelling flange has adjustable floating mounts. A typical application would be the final alignment of sample transfer arms.

PA KEY ADVANTAGES

- » Any-orientation mounting
- » +/- 5mm axial adjustment
- » +/- 3° angular tilt
- » High quality flexible 316L bellows accommodates motion, whilst maintaining ultra-high vacuum
- » Bakeable to 250°C

Overview

The Port Aligner range enables the distance and angular relationship between two flanges to be adjusted. The range consists of five series, which can be supplied with either tapped or clear bolt holes on the flanges. Each range provides +/-5 mm axial length adjustment, with +/- 3° angular tilt.

Essentially, this is a simple device that once adjusted, provides a stable platform. The design consists of two approximately parallel flanges, one of which remains fixed, whilst the position of the second may be adjusted with respect to the first.

The fixed flange supports three equi-spaced threaded shafts. Alignment of the travelling flange is achieved by adjusting the floating mounts attached to each threaded shaft. The port aligner can be mounted in any-orientation and is bakeable to 250°C.

A high quality, flexible, 316L edge-welded bellows, spans the flanges to accommodate the required motion while ensuring an all-metal vacuum enclosure.

Specification Table

| PART NUMBER | PA35-H | PA35-T | PA64-H | PA64-T | PA100-H | PA100-T | PA150-H | PA150-T | PA200-H | PA200-T |
|-------------------------|----------------------------|--------------|----------------------------|--------------|---------------------------|--------------|---------------------------|--------------|--------------------------------|--------------|
| Flange size | CF38 70mm (2.75") OD CF | | CF64 114mm (4.5") OD CF | | CF100 152mm (6") OD CF | | CF150 203mm (8") OD CF | | CF200 254mm (10") OD CF | |
| Flange bolt hole type | Clear M6 | Tapped M6 | Clear M8 | Tapped M8 | Clear M8 | Tapped M8 | Clear M8 | Tapped M8 | Clear M8 | Tapped M8 |
| Axial length adjustment | +/- 5mm | | | | | | | | | |
| Tilt | +/- 3° | | | | | | | | | |
| Bellows clear bore | 38mm | | 65mm | | 102mm | | 127mm | | 127 - 200mm (made to order) | |
| Bakeout temperature | 250°C | | | | | | | | | |