Section 7

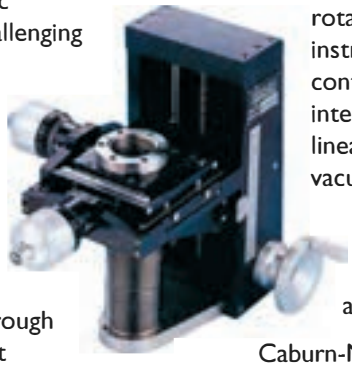
Motion and manipulation

Motion and manipulation

Introduction

Motion technology

Precise motion and manipulation of samples in an atmospheric environment can be a challenging endeavour. The complexity of the task is greatly increased if the samples are isolated from atmosphere inside a vacuum chamber while trying to effect precise manipulation on them through the chamber wall, without compromising vacuum integrity.



This section highlights Caburn-MDC's ongoing efforts in the development and production of practical and dependable air to vacuum sample motion and manipulation solutions for the scientific and industrial vacuum community. It provides scientists, vacuum technologists and engineers with the most comprehensive line of high and ultra-high vacuum motion and manipulation instruments available from one source.

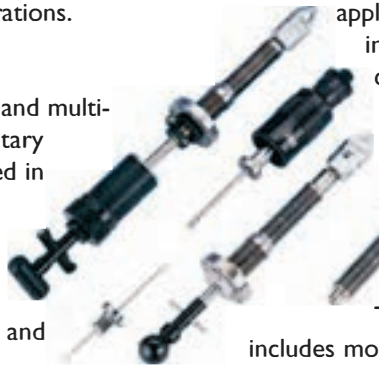
At the heart of our motion and manipulation instrument design is the reliability and performance of edge welded stainless steel bellows. The use of edge welded stainless steel bellows has become a vacuum industry standard and an essential component in the construction of quality vacuum equipment. With the exception of a small number of direct drive products, all Caburn-MDC motion and manipulation actuator seals are fitted with edge welded stainless steel bellows.

Caburn-MDC rotary motion instruments allow the transmission of rotation through a chamber wall via a unique bellows sealed wobble shaft mechanism. Drive shaft bearing supports on both the air and vacuum sides of the drive shaft provide smooth rotary motion. Bearings on all Caburn-MDC motion and manipulation instruments are coated with a Dicronite® UHV compatible dry lubricant impinged on to the metal bearing surfaces. Linear motion is transmitted through a chamber wall using precision fine pitch lead screws coupled to bellows sealed, bearing supported shafts. Caburn-MDC rotary and linear motion instruments are ideal for continuous or intermittent rotary and linear motion within a vacuum system. Sample motion is measured along laser etched scales on an actuator housing.

Caburn-MDC precision micrometers are offered on select instruments. These micrometers employ a unique plus-minus scale which divides the overall travel of a device into positive or negative travel as measured from a central starting position. Products are offered in standard manual, pneumatic and motorized configurations.

Product Line

Basic rotary, linear and multi-motion devices. Rotary products are offered in standard, high temperature, pneumatic, miniature, precision, magnetic and direct drive configurations. Linear products offer most of the configurations listed in the rotary section with the addition of push-pull, rack and pinion and tunnel access drives. Multi-motion products offer both rotary and linear motion within the same instrument in standard, precision and direct drives. Also available in the multi-motion products are various wobble stick configurations.



XYZ stages, load-lock systems, port aligners and in-vacuum accessories. Stages are available in various configurations including V-Plane® modular building block stages. Single and multiple axes stages are also available in compact, standard and heavy duty models. Stages are used for two and three dimensional sample manipulation inside ultra-high vacuum systems.

Load-lock systems are available with circular or rectangular entry ports and come equipped with magnetically coupled sample transporters. Load-lock systems are sample staging chambers used to introduce samples into larger vacuum systems without breaking the larger system's vacuum.

Port aligners are adjustable port flange interfaces designed to correct mate-up between components with alignment imperfections. In-vacuum accessories are available for most motion and manipulation products found in this catalogue.

Cab-Fast® sample holders provide a quick, simple and flexible solution to most sample transfer applications. Rotary and linear in-vacuum accessories are components designed to expand the capabilities of motion products presented in this catalogue.

The motorization section includes motors and the necessary controls required to optimize their operation. Motor specifications for all product motorization options are detailed in this section. Motor specifications are listed as support information for the products specifying their use. In-vacuum stepper motors for both high and ultra-high vacuum applications are also offered.

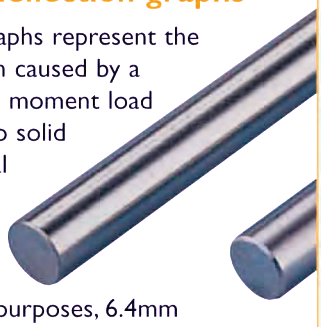
Caution

Anodized aluminium finishes will begin to discolour when baked in excess of 150°C.

This is only a cosmetic condition which does not impact performance or reliability.

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Shaft deflection graphs



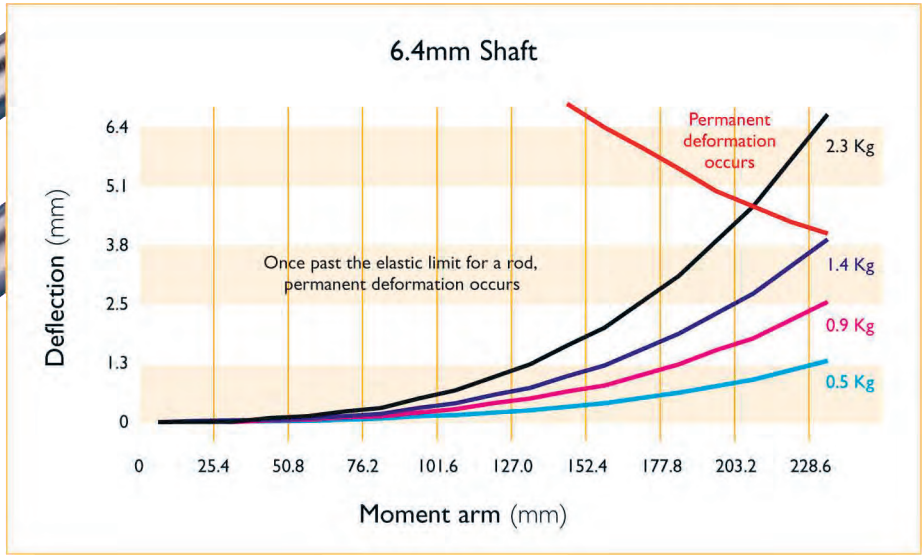
These graphs represent the deflection caused by a lateral or moment load applied to solid cylindrical cross section rods.

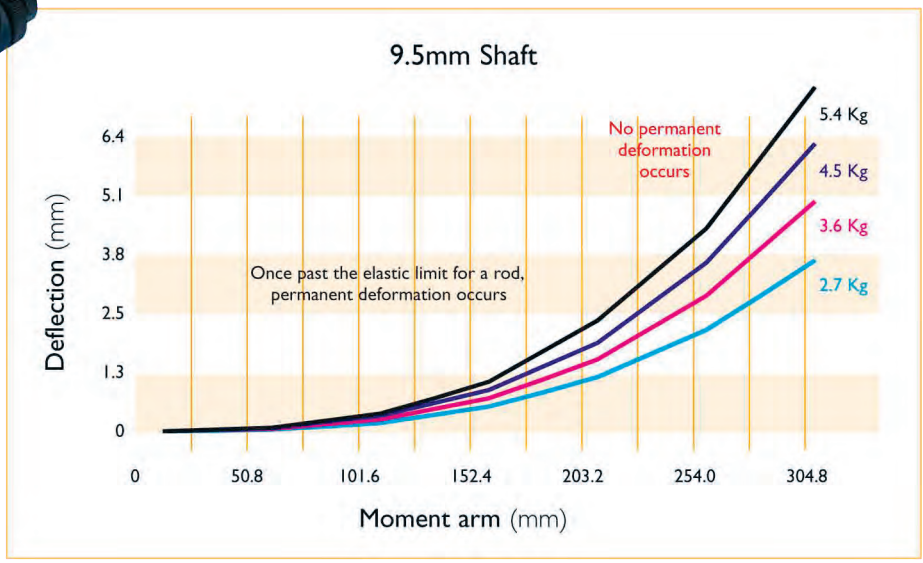
For test purposes, 6.4mm diameter rods in lengths of 25.4 to 229 and 9.5 and 12.7mm diameter rods in lengths of 50 to 300mm were tested. Rods were mounted horizontally with one end fixed and supported while opposite ends were left free and unsupported. Rod end deflection measurements were made after applying each sample load to each unsupported rod length.

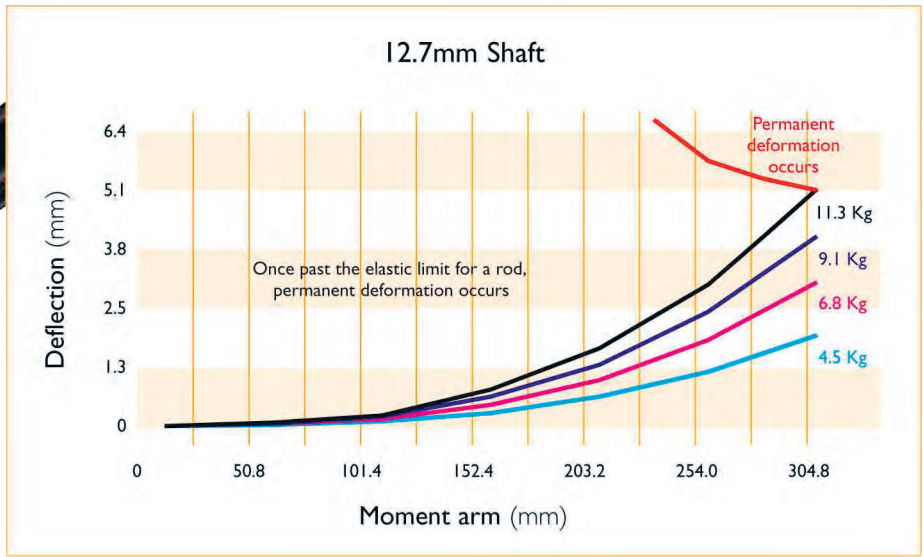
Loads for the 6.4mm diameter rods ranged from 0.4kg to 2.25kg and 2.25kg to 11.4kg for the 9.5 and 6.4mm diameter rods. Rod material is 304 stainless steel, as used in the shaft construction of all Caburn motion and manipulation instruments.

These graphs are for reference only and do not represent actual motion instrument shaft deflection. They are provided as visual aids for understanding the effects of lateral loading of any stainless steel rod.

Since shaft deflection may have a significant effect on the positioning of samples, careful consideration must be given to shaft loading and whether the shaft needs to be supported. Caburn recommends that all shafts in excess of 300mm must have additional linear or radial support.



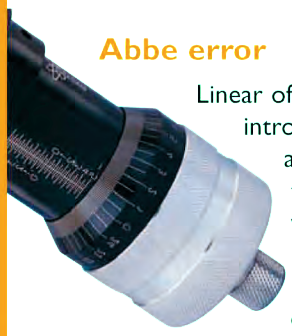




Motion and manipulation

Glossary

Caburn-MDC precision micrometers measure along unique plus-minus laser etched scales.



Abbe error

Linear off-axis error introduced through amplification of tilt and wobble with a long moment arm. This type of error occurs when the point under measurement is at a relatively long distance from the axis of motion.

Accuracy

The maximum expected difference between the actual and a desired position for a given input. Highly dependent on method of actual position measurement.

Accuracy, absolute

The output of a system versus the commanded or ideal input.

Accuracy, on-axis

The uncertainty of position after all sources of linear error are eliminated. Linear errors include: cosine error, lead screw pitch error, abbe error and thermal expansion effects.

Backlash

The maximum magnitude of an input that produces no measurable output upon reversing direction. Typically the result of poor meshing between drivetrain components as with lead screw threads.

Display resolution

The smallest motion detectable by a motion device's precision rule, micrometer or motor controls.

Eccentricity

Sometimes called concentricity, eccentricity in a rotary device is the deviation of the centre of rotation from its mean position as the device turns.

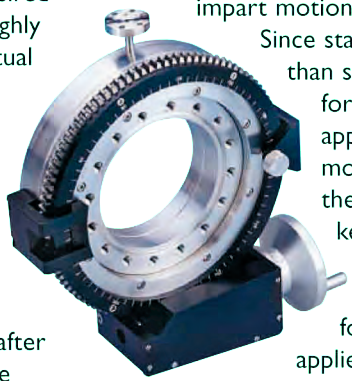
Error

The difference between an obtained performance parameter and the ideal or desired result. Errors fall into two primary categories, on-axis and off-axis errors.

Friction

Friction is defined as the resistance to motion between surfaces in contact. Friction can be constant or it can vary with speed. Elements contributing to overall friction may be in the form of drag, sliding friction, system wear or lubricant viscosity.

Friction, static



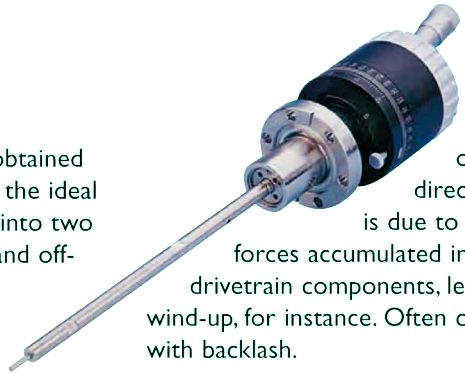
The friction that must be overcome to impart motion to a body at rest. Since static friction is higher than sliding friction, the force which must be applied to impart motion is greater than the force required to keep the body in motion. As a result, when a force is initially applied, the body will begin to move with a jump in some unpredictable and unrepeatable manner, producing non-linear, non-repeatable motion.

Gear ratio, drive train

A motion instrument's drive train gear ratio is the relationship between received input motion and the delivered output motion. Ratios are expressed in the numerical notation a:b, where "a" represents the received motion or device input in revolutions or some other unit, and "b" represents the delivered or resulting output motion in revolutions for rotary devices or 25.4 of travel in linear motion instruments.

Hysteresis

The difference in the absolute position of an object for a given commanded input when approached from opposite directions. It is due to elastic forces accumulated in various drivetrain components, lead screw wind-up, for instance. Often confused with backlash.



Load capacity, stage

The maximum centred load that can be placed directly on an XYZ motion stage and is typically limited by the load capacity of the bearings.

Load capacity, lateral or moment

Also called side or bending load capacity, it is the maximum load that can be applied perpendicular to a shaft's axis of motion.

Load capacity, axial

The maximum centred and balanced compressive or tensile load that can be applied to a stage's or shaft's longitudinal or parallel axis of motion.

Minimum incremental motion

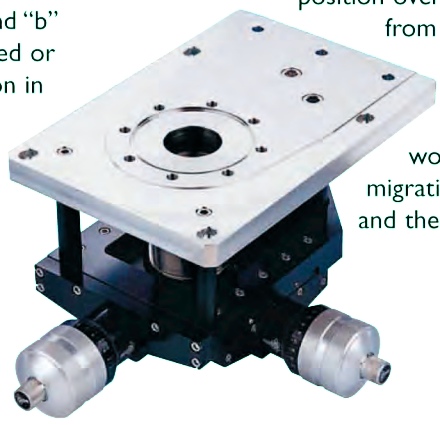
The smallest motion a device is capable of delivering reliably, not the smallest display resolution increment.

Play

Uncontrolled movement due to looseness of mechanical parts. Usually increases with the components age. Play is a contributor to backlash.

Position stability

The ability to maintain a constant position over time. Variation from stable position is called drift. Contributors to drift include worn parts, migration of lubricant, and thermal variation.



Precision

Also known as repeatability, it is the range of deviations in output position that will occur for 95% of the motion excursions from the same error-free input. Accuracy and precision are not the same.

Repeatability

The ability of a motion instrument to reliably achieve a commanded position over many attempts regardless of the direction from which the position is approached.

Runout

The linear, not angular, portion of off-axis error. It is the deviation between ideal straight line motion and actual measured motion in a translation stage. Runout has two orthogonal components, straightness, a measure of in-plane deviation, and flatness, the out-of-plane deviation.

Sensitivity

The minimum input required to produce output motion or the ratio between output motion and input drive. Applicable particularly to manually actuated motion devices.

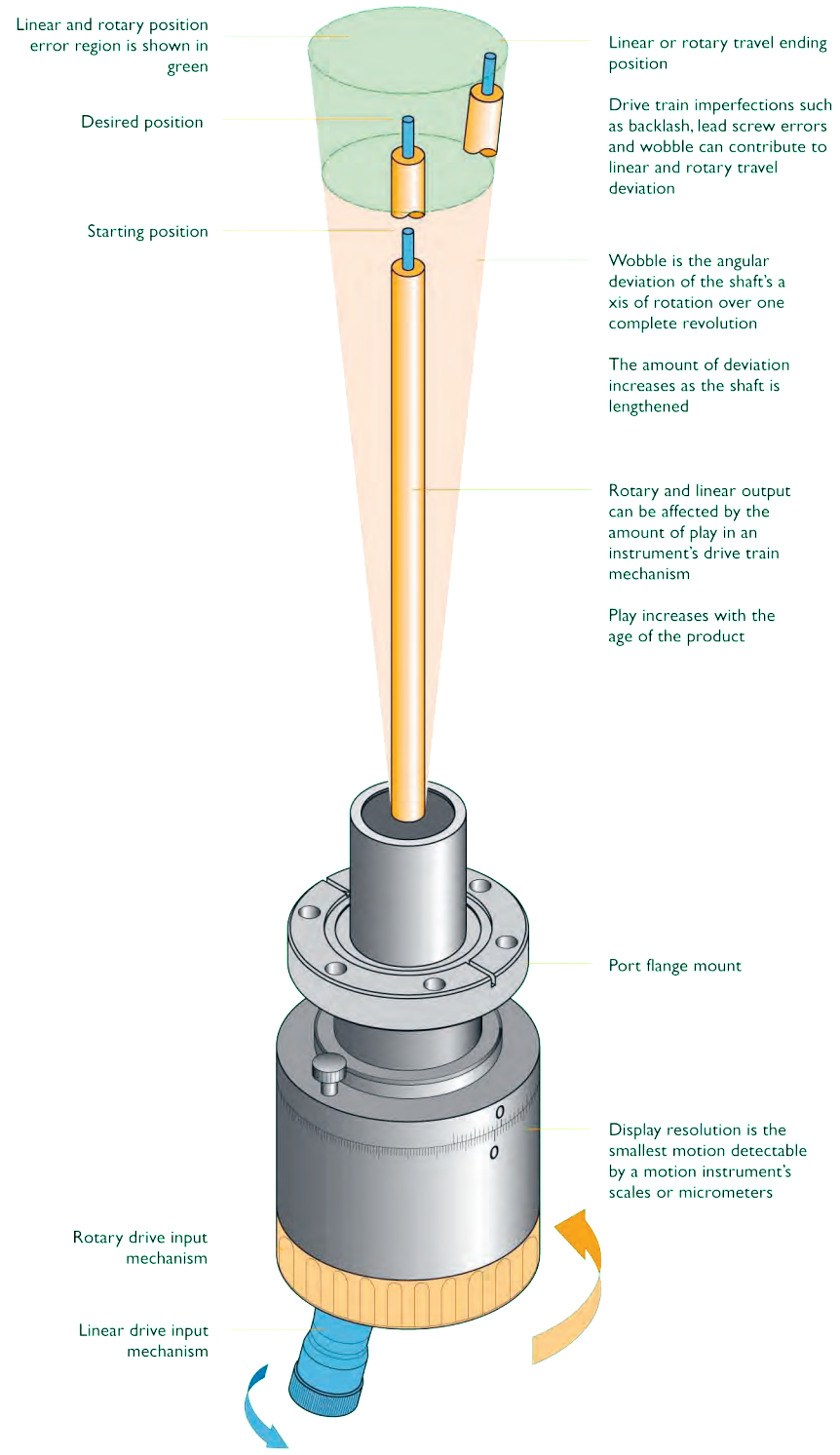
Tilt

The angular portion of off-axis error. It is the deviation between ideal straight line motion and actual measured motion in a translation stage. Tilt and wobble have three orthogonal components commonly referred to as roll, pitch, and yaw.

Wobble

Wobble is the angular deviation of the axis of rotation over one complete revolution.

Common motion deviations



- This illustration is provided for reference only
- Linear and rotary deviations have been exaggerated for illustration purposes

Motion

Introduction

Features

- Motion in vacuum
- Rotary motion
- Linear motion
- Multi-motion

Motion In vacuum

Caburn-MDC motion products are vacuum compatible precision instruments ideal for demanding in-vacuum sample handling applications. The motion feedthrough product line presented in this section is divided into three basic categories including rotary, linear and multi-motion instruments. Each product category is comprised of one or more of the following drive configurations: standard, high-temperature, pneumatic, miniature, precision, magnetic and direct drive.

Motorization is available for most motion instruments featured throughout this catalogue. Please note that motor controls are not included with motorization options and must be purchased separately.

Precision motion instruments detailed herein are available for either high or ultra-high vacuum service. High vacuum products are mounted on ISO standard KF flanges.

Ultra-high vacuum devices are fitted with industry standard, Conflat® compatible, CF metal seal flanges. CF flanges are designed with a standard knife-edge sealing geometry. Bakeout temperatures greater than those specified may be achieved by disassembling and removing temperature sensitive components. Please reference feedthrough instruction manuals or contact Caburn-MDC's technical staff for higher temperature ratings and detailed instructions on instrument disassembly and low temperature component removal. For maximum vacuum integrity, reliability and extended service life all motion device actuator seals incorporate edge welded stainless steel bellows.

Rotary motion

Standard rotary motion feedthroughs are a practical and economical solution for rotary motion in most vacuum applications. Rotary motion position is measured along a 360° laser etched scale graduated in 5° increments. Welded stainless steel bellows with a unique off-axis wobble design, combined with rotary shaft bearing supports, provide rotary motion of unsurpassed reliability and performance. In contrast to standard rotary motion products, the high temperature standard rotary motion devices are constructed entirely of 304 stainless steel to endure the rigors of high temperature vacuum service.

Pneumatic drive rotary products are designed for in-vacuum shutters and other light-duty two-position motion applications. Pneumatic drive rotation is adjustable from 30° to 90°.

Miniature rotary motion feedthroughs are specifically designed for in-vacuum light-duty service where torques will not exceed 0.1Nm. Their small footprint makes them ideal for applications with severe space limitations.

Precision rotary motion instruments are a step higher than standard rotary motion products. They offer greater precision with very low backlash and a display resolution of 0.1°.

Magnetically coupled rotary motion feedthroughs provide basic rotation and UHV compatibility without the use of bellows. This product is intended for light-duty service not exceeding 0.1Nm of torque. Direct drive rotary motion products provide basic rotation with HV compatibility. Vacuum integrity is maintained by a single preloaded FKM / FPM fluoroelastomer shaft seal. Fitted with dual rotary bearing shaft supports, this device can be manually or mechanically operated at intermittent speeds of up to 300 rpm.

Differentially pumped direct drive rotary motion feedthroughs provide 11 Nm maximum rotational torque and 500 rpm maximum rotation. The rotary shaft is supported by two radial bearings located inboard of dual FKM / FPM fluoroelastomer shaft seals. The region between the seals can be differentially pumped through a 3.2mm female pipe thread port provided to attain UHV compatibility to $1x10^{-9}$ mbar.

Linear motion

Standard linear motion feedthroughs are the perfect solution for most linear displacement vacuum applications. Linear position is measured along both radial and linear scales laser etched on actuator barrel and housing. Radial and linear scales are graduated in 0.001" (0.03mm) and 0.025" (0.6mm) increments respectively. One revolution of the barrel translates into 0.025" (0.6mm) of linear travel. The housing's linear scale also includes graduation in 1mm increments. Edge welded stainless steel bellows, a 40 pitch lead screw design and the use of linear bearing shaft support provide devices with excellent durability and performance. Unlike the standard motion products the high temperature linear motion feedthroughs are constructed entirely of 304 stainless steel to endure the rigors of high temperature vacuum service.

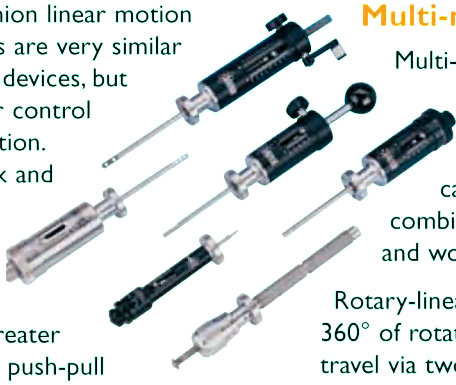
Introduction

Compact high-temperature linear motion feedthroughs have a small foot-print and are constructed with high temperature vacuum-grade materials. Linear position is measured along a laser-etched stainless steel barrel graduated in 20 equally-spaced increments. A full revolution of the barrel translates into 1.25mm of linear travel. Formed stainless steel bellows, a 1.25mm fine pitch lead screw design and the use of radial bearings provide this product with excellent durability and performance. All drive mechanism components are located on the atmosphere side of the reentrant formed bellows.

Miniature linear motion feedthroughs are specifically designed for light-duty service. Full revolution of the barrel translates into 0.6mm of linear travel.

Push-pull linear motion feedthroughs are the most basic of the manual motion devices offered in this catalogue. They provide quick action linear motion via a stainless steel hand-held actuator shaft. They are typically operated by observing instrument motion through a vacuum viewport. For quick and easy positioning the feedthrough body has been laser etched with linear travel graduation marks in increments of 0.025" (0.6mm). The actuator can be locked in position by tightening an integral lock knob located on the actuator housing.

Rack and pinion linear motion feedthroughs are very similar to push-pull devices, but provide finer control of linear motion. The 90° rack and pinion drive mechanism provides a quick-action drive with greater control than push-pull devices. For quick and easy positioning the feedthrough body has been laser etched with linear travel graduation marks in increments of 0.025" (0.6mm). A 31.8mm turn on the handle generates 20mm approximate of linear travel. The actuator can be locked in position by tightening an integral lock knob located on the actuator housing.



Pneumatic linear motion feedthroughs provide two-position fast action linear motion. Typical motion applications would include on-off, open-close and in-out motions similar to those of in-vacuum shutters. Linear travel can be shortened or lengthened via an integral stroke adjustment knob. For quick and easy positioning the feedthrough body has been laser etched with linear travel graduation marks in increments of 0.6mm.

Heavy duty manual, pneumatic and push pull linear motion feedthroughs allow linear displacement of heavier samples and components. With the exception of the precision micrometer fitted unit, these devices do not provide position indication. Position of samples or components being moved must be verified visually. Unlike conventional motion feedthroughs, heavy duty models employ reentrant welded bellows construction.

Multi-motion

Multi-motion feedthroughs are instruments with more than one degree of freedom. This product category includes combinations of linear, rotary and wobble motion.

Rotary-linear standard devices offer 360° of rotation and 25mm of linear travel via two separate drive knob actuators. Both rotary and linear positions are measured along a laser etched actuator barrel and housing. The 360° rotary scale is graduated in 5° increments. The linear scale has both a linear and rotary scale component, the linear portion is graduated in 0.05" (1.3mm) increments while the rotary portion is graduated in 0.001" (0.03mm) increments. Full revolution of the linear scale produces 0.6mm of travel.

Precision rotary-linear motion instruments are a step higher than the standard rotary-linear products. They offer greater precision with very low backlash, a rotary display resolution of 0.1°, and 12.7mm of micrometer precision linear travel with 0.001" (0.03mm) resolution.

Wobble stick multi-motion devices with linear, angular wobble, rotary and articulated pincer configurations are available in this product category. The most elaborate device provides 360° sample rotation, 114mm of push-pull linear travel, 22° of angular tilt or wobble and a mechanical pincer jaw with 22.4mm diameter sample capacity.

Caution

Anodized aluminium finishes will begin to discolour when baked in excess of 150°C.

This is only a cosmetic condition which does not impact performance or reliability.

Rotary motion

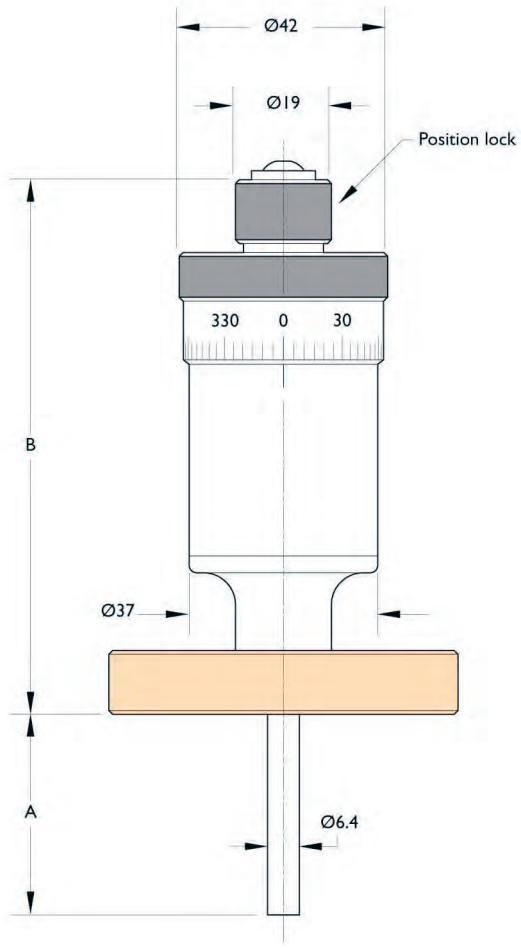
Standard

BRM-133

UHV and HV series

Features

- Continuous rotary motion
- Manual or motorized actuator
- Rotary position lock
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C – CF version bakeable to 180°C
- CF and ISO KF port mounts



- Shown with DN40CF flange
- Metal-seal flanges are non-rotatable with clearance holes

Description

Caburn-MDC standard rotary motion feedthroughs are a popular and economical solution for in-vacuum sample or device rotation. They are constructed of the highest grade vacuum compatible materials. Position is measured along a 360° laser-etched, black anodized barrel graduated in 5° increments. Welded stainless steel bellows, a unique off-axis wobble design and the use of rotary shaft bearing supports provide devices of unsurpassed reliability and performance. Automation can be achieved with one of four motorization options and controls.

Motor controls must be purchased separately.

Specifications

Material	
Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range UHV/HV	1.3×10^{-11} mbar/1.3×10^{-8} mbar
Temperature range[1] UHV/HV	-20°C to 180°C
Speed	20 rpm
Torque	0.4 Nm
Axial load	2.7 kg
Lateral load	4.5 kg
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed and 30°C maximum when motorized

All dimensions are nominal in millimetres unless specified - Weights given are approximate

UHV Series

CF 100°C

Flange size	Flange OD	A	B	M	N	Wt kg	Reference	Part number
DN16CF	34	40	109	143	118	0.5	BRM-133	**670000**
DN40CF	70	40	109	143	118	0.9	BRM-275	**670002**

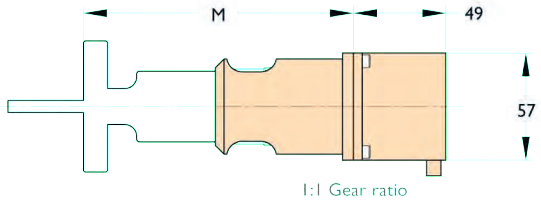
HV Series

ISO KF 100°C

Flange size	Flange OD	A	B	M	N	Wt kg	Reference	Part number
DN16KF	30	37	112	146	123	0.5	K075-BRM	**670020**
DN40KF	55	41	108	142	119	0.9	K150-BRM	**670022**

Motorization options

Option -03



Option -03
In-line stepper motor

Motorization[1]	Motor Specification	Add-on weight kg	Option Number
In-line stepper	D	0.9	**-03**

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above

For example: **670036**-03

For total unit weight, add option weight to component weight

Rotary motion

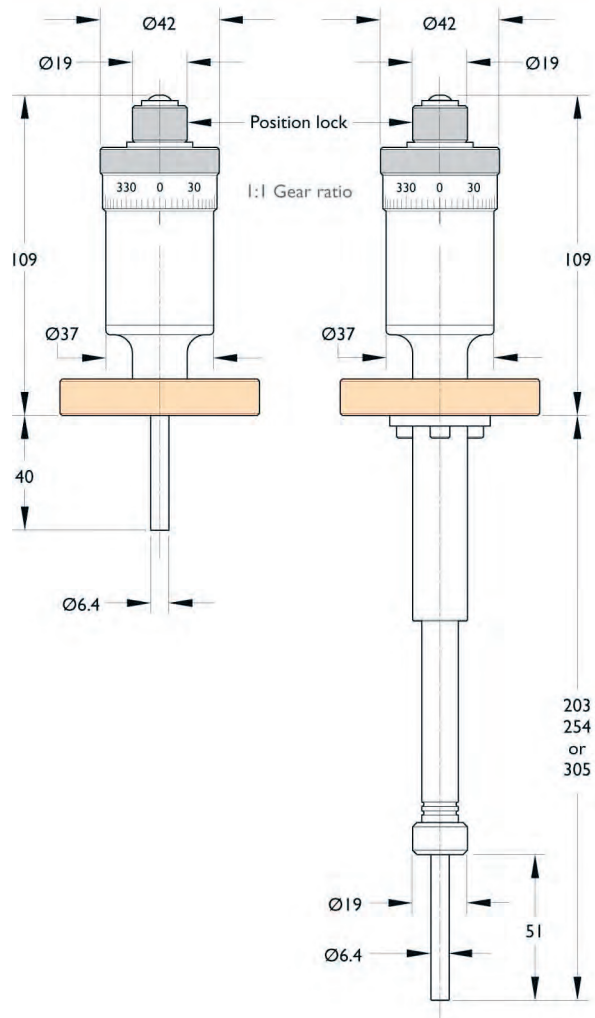
High temperature standard

HTBRM-275-10 HTBRM-275

UHV and HV series

Features

- Continuous rotary motion
- Manual actuator
- Rotary position lock
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 230°C
- CF port mounts
- Guide tube included on extended models



- Metal-seal flanges are non-rotatable with clearance holes

Description

Caburn-MDC high temperature rotary motion feedthroughs are the perfect solution for UHV sample rotation. They are constructed of 304ss to endure the rigors of high temperature vacuum service. Rotation can be measured along a 360° laser etched barrel graduated in 5° increments. Welded stainless steel bellows, a unique off-axis wobble design and the use of rotary shaft bearing supports provide a product of unsurpassed reliability and performance. Extended length models are constructed with bearing fitted shaft support guide tubes for maximum rigidity.

Specifications

Material

Flange/actuator body	304ss
Shaft seal	AM 350 welded bellows
Vacuum range UHV/HV	1.3×10^{-11} mbar
Temperature range[1] UHV/HV	-20°C to 230°C
Torque	0.3 Nm
Axial load	2.7 kg
Lateral load	4.5 kg
Weight and dimensions	See table

Shaft length	Flange	Wt kg	Reference	Part number
Standard UHV series				
40	DN16CF	0.5	HTBRM-133	**670004**
40	DN40CF	0.9	HTBRM-275	**670005**
Extended UHV series				
203	DN40CF	3.6	HTBRM-275-8	**670006**
254	DN40CF	3.6	HTBRM-275-10	**670007**
305	DN40CF	3.6	HTBRM-275-12	**670008**

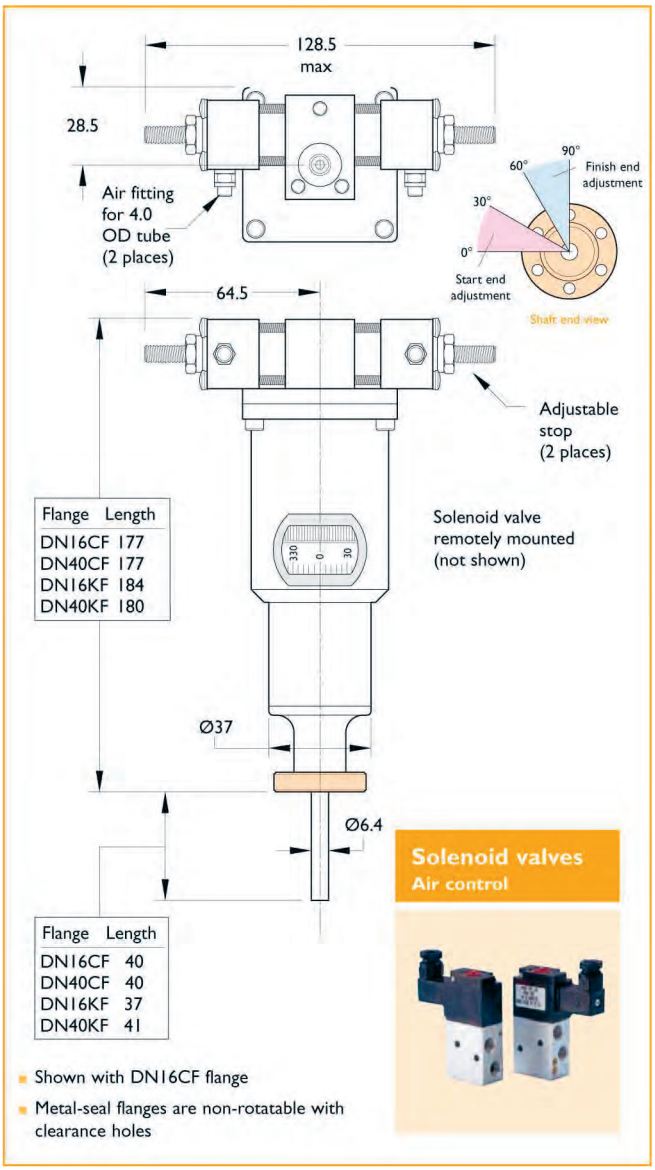
All dimensions are nominal in millimetres unless specified - Weights given are approximate

ABRM-133 Includes solenoid

UHV and HV series

Features

- Adjustable 90° rotary motion
- Pneumatic actuator with 24V DC solenoid
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts
- Complete with 24V DC air control solenoid valve
- 240V AC air control solenoid valve optional



Solenoid valves
Air control

Description

Caburn-MDC pneumatic rotary feedthroughs are designed for in-vacuum shutters and other light-duty two-position rotary motion applications. Feedthrough rotation has two adjustable stops. One adjusts the start position from 0° to 30°, and the other adjusts the finish position from 60° to 90°. One air control solenoid valve is also included. Feedthroughs are available on CF metal seal flanges or ISO KF elastomer seal port mounts.

Specifications

Material

Flange/actuator body	304ss/Anodized aluminium
Shaft seal/piston seal	AM 350 welded bellows/Viton®
Vacuum range UHV/HV	1.3×10^{-11} mbar/1.3×10^{-8} mbar
Temperature range[1] UHV/HV	-20°C to 100°C
Torque	0.4 Nm maximum
Weight and dimensions	See table

Description	Wt kg	Reference	Part number
UHV series			
DN16CF	0.9	ABRM-133	**670050-01**
DN40CF	1.4	ABRM-275	**670051-01**
HV series			
DN16KF	0.9	K075-ABRM	**670052-01**
DN40KF	1.4	K150-ABRM	**670053-01**

[1] UHV units are bakeable to 230°C with actuator removed
Option -01 (24V DC air control solenoid valve) fitted as standard

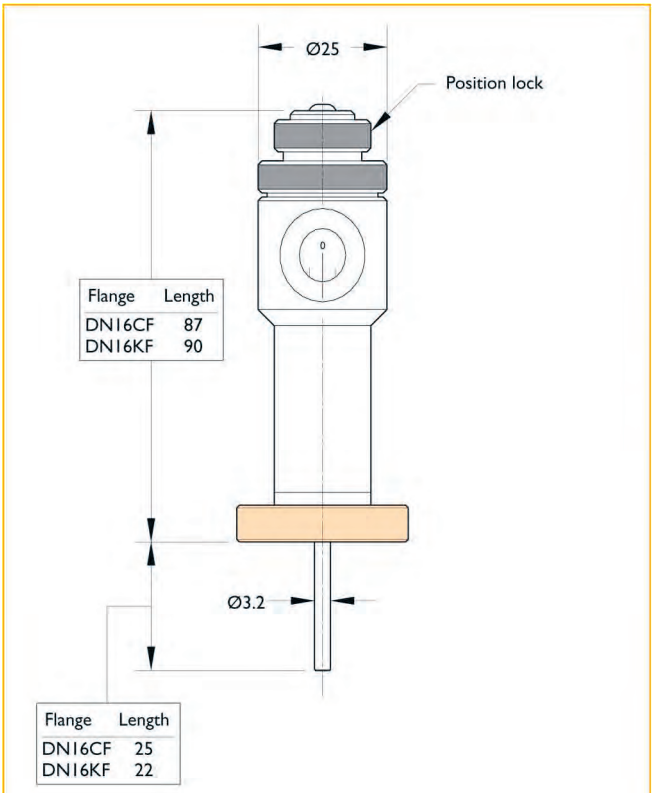
Description	Option number
240V DC Air control control solenoid valve	**-02**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Rotary motion

Miniature

E-MBR-133



UHV and HV series

Features

- Continuous rotary motion
- Manual or motorized actuator
- Rotary position lock
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts

Description

Caburn-MDC miniature rotary feedthroughs are specifically designed for in-vacuum light-duty applications where torques will not exceed 0.1 Nm. Feedthroughs are available in both manual or low voltage DC motor configurations. Motors can be fitted with optional magnetic encoder. Motor controls must be purchased separately.

Specifications

Material

Flange/actuator body	304ss/Anodized aluminium
Shaft seal/piston seal	AM 350 welded bellows/
Vacuum range UHV/HV	1.3×10^{-11} mbar
Temperature range[1] Manual	-20°C to 100°C
Torque	0.18 Nm maximum
Axial load	0.9 kg
Lateral load	2.7 kg
Weight and dimensions	See table

Description	Wt kg	Reference	Part number
UHV Series			
DN16CF	0.9	MBR-133	**671500**
HV Series			
DN16KF	0.9	K075-MBR	**671501**

For total unit weight, add option weight to component weight

All dimensions are nominal in millimetres unless specified - Weights given are approximate

UHV Series

Features

- Continuous rotary motion
- Manual or motorized actuator
- Rotary position lock
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 230°C[1]
- DN40CF port mount
- Low backlash design

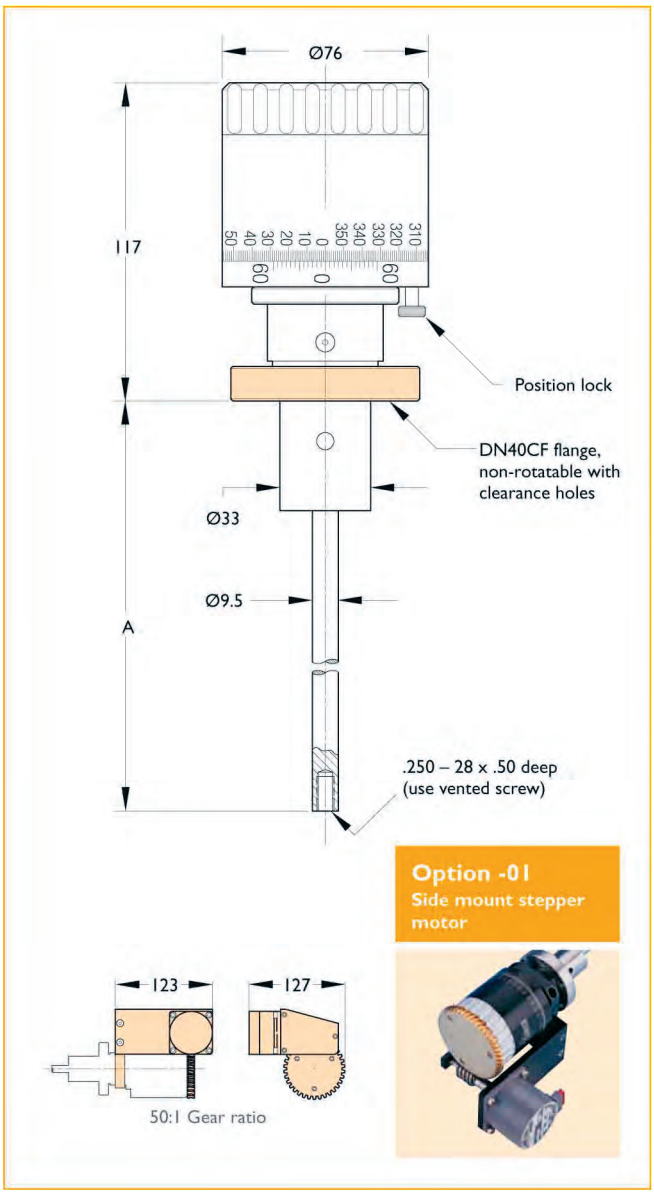
Description

Precision rotary motion feedthroughs are low backlash instruments with a display resolution of 0.1°. Welded stainless steel bellows, a unique off-axis wobble design and the use of rotary shaft bearing supports provide long life and smooth operation. Feedthroughs are available on Conflat® compatible CF metal seal flanges. Motorization option is available. Motor controls must be purchased separately.

Specifications

Material

Flange/actuator knob	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range	1.3x10⁻¹¹ mbar
Temperature range	-20°C to 230°C
Torque	0.79 Nm maximum
Axial load	2.3 kg
Lateral load	4.5 kg
Weight and dimensions	See table



Description	Wt kg	Reference	Part number
UHV Series			
254	3.2	PBRM1-10	**670024**
400	3.2	PBRM1-15	**670027**
600	3.6	PBRM1-23	**670030**
800	3.6	PBRM1-31	**670033**

Motorization[2]	Motor specification	Add-on weight kg	Option Number
Stepper motor	D	2.3	**-01**

[1] Bakeable to 30°C maximum with motor option fitted

[2] When ordering motorized options, add the option number and price to the desired UHV component part number listed above
For example: **670026-01**
For total unit weight, add option weight to component weight

[3] Screws provided

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Rotary motion

Magnetic and direct

MRM-275

UHV

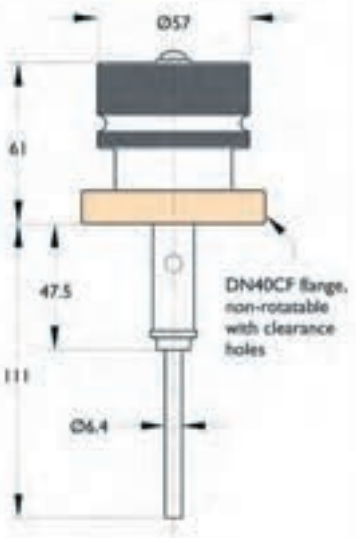
Features

- Continuous rotary motion
- Manual actuator
- Bakeable to 100°C
- DN40CF port mount
- Magnetically coupled

Specifications

Materials	UHV compatible
Vacuum range	1.3×10^{-11} mbar
Temperature range	-20°C to 100°C
Speed	50 rpm maximum
Torque	0.14 Nm maximum
Axial load	1.1kg maximum
Lateral load	2.3 kg @ 101.6mm extension max

Magnetic drive



- Position lock not available

Description

Caburn-MDC magnetically coupled rotary motion feedthroughs provide basic rotation and UHV compatibility without the use of bellows. This product is intended for manually operated light-duty service not exceeding 0.1Nm of torque. Conflat® compatible DN40CF diameter CF metal seal flanges are the standard mount.

Description	Wt kg	Reference	Part number
UHV Series			
Manual actuation DN40CF	0.9	MRM-275	671000

FRM-125

HV

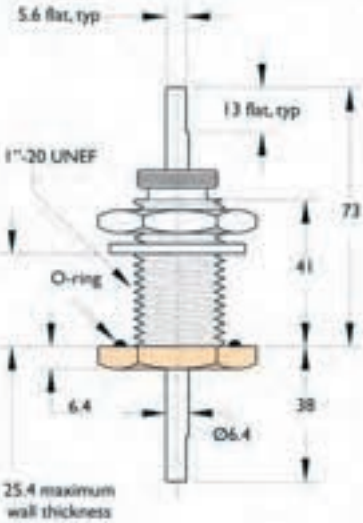
Features

- Continuous rotary motion
- Manual actuator
- FKM / FPM fluoroelastomer shaft seal
- Bakeable to 100°C
- 25.4mm bolt hole installation

Specifications

Materials	HV compatible
Vacuum range	1.3×10^{-7} mbar
Temperature range	-20°C to 100°C
Speed	300 rpm maximum
Torque	0.71 Nm maximum
Axial load	1.1kg maximum
Lateral load higher loads at reduced rpm	2.3 kg

Direct drive



- Hex nut 38.1mm flat-to-flat (2 places).
- O-ring seals on vacuum side of chamber wall.
- Position lock not available.

Description

Caburn-MDC direct drive rotary motion feedthroughs provide basic rotation and HV compatibility. Vacuum integrity is maintained by a single preloaded FKM / FPM shaft seal. Fitted with dual rotary bearing shaft supports, this product can be manually or mechanically operated at intermittent speeds up to 300rpm. It is mounted on the traditional 25.4mm baseplate mount.

Description	Wt kg	Reference	Part number
HV Series			
Manual actuation 25.4mm baseplate HV	0.9	FRM-125	652000

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Rotary motion

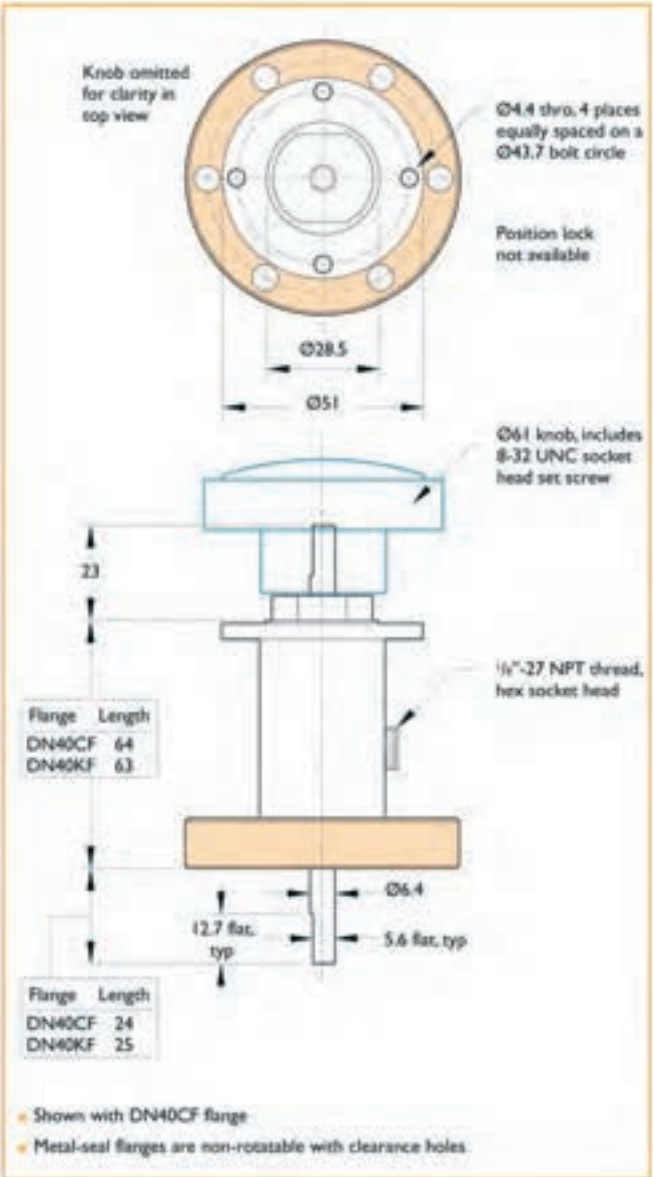
Direct, differentially pumped

DDRM-275

UHV and HV series

Features

- Continuous rotary motion
- Manual actuator
- UHV or HV-compatible materials
- Differentially pumped, Dual **FKM / FPM fluoroelastomer** shaft seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts



- Shown with DN40CF flange
- Metal-seal flanges are non-rotatable with clearance holes

Description

Differentially pumped direct-drive rotary motion feedthroughs provide 11Nm and 500rpm maximum rotation. The rotary shaft is supported by two radial bearings located inboard of dual Viton® elastomer shaft seals. The region between the seals can be differentially pumped through the 3.2mm female pipe thread port provided and thus attain UHV compatibility to 1.3×10^{-9} mbar.

Specifications

Material	
Flange/actuator body	304ss
Shaft seal	Viton®
Vacuum range UHV/HV	1.3×10^{-9} mbar
Temperature range[1] UHV/HV	-20°C to 100°C
Speed	(500rpm) 11 Nm
Torque	11.3 Nm
Axial load	1.1 kg
Lateral load higher loads at reduced rpm	2.3 kg
Weight and dimensions	See table

Description	Wt kg	Reference	Part number
UHV series			
DN40CF	0.9	DDRM-275	**652100**
HV series			
DN40KF	0.9	K150-DDRM	**652101**

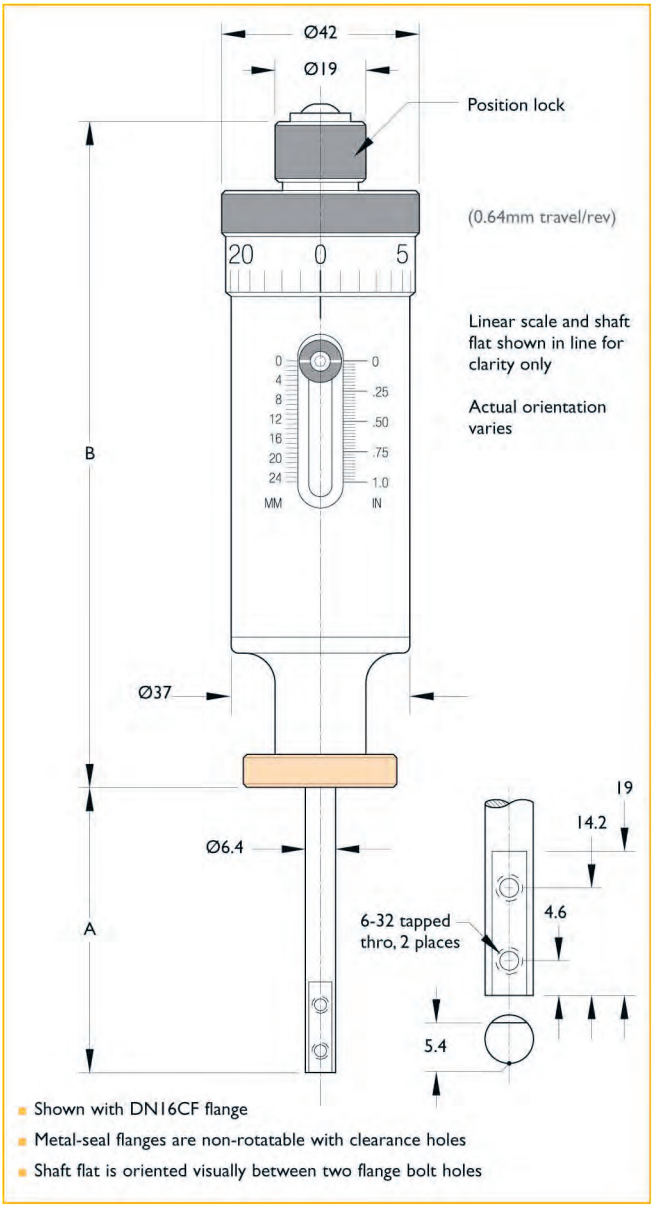
UHV units are bakeable to 150°C with actuator removed.

All dimensions are nominal in millimetres unless specified - Weights given are approximate

UHV and HV series

Features

- 25 to 152mm linear travel
- Manual or motorized actuator
- Linear position lock
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C + 180°C[1]
- CF and ISO KF port mounts



Description

Caburn-MDC standard linear motion feedthroughs are the perfect solution for linear displacement of in-vacuum samples or devices. They are constructed of the highest grade vacuum compatible materials. Linear position is measured along a laser etched black-anodized barrel graduated in 0.001" (0.03mm) increments. A full revolution of the barrel translates into 0.025" (0.6mm) of linear travel. A linear scale on the body is also provided and is marked in both inch and metric units. The inch scale is graduated in increments of 0.025" (0.6mm) while the metric scale is graduated in 1mm increments. Welded stainless steel bellows, a 40 pitch lead screw design and the use of linear bearing shaft support provide devices with excellent durability and performance. They are available on industry standard Conflat® compatible CF metal seal flanges or ISO KF port mounts. Automation can be attained with one of four motorization options and controls. Motor controls must be purchased separately.

Specifications

Material

Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range UHV/HV	1.3×10^{-11} mbar/1.3×10^{-8} mbar
Temperature range[1] UHV/HV	-20°C to 100°C + 180°C
Axial load	2.3 kg
Lateral load	2.3 kg @ 50.8 extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed and 30°C maximum when motorized

All dimensions are nominal in millimetres unless specified - Weights given are approximate

UHV Series

CF 100°C

Flange size	Linear travel	A Min – Max	B	M	N	Wt kg	Reference	Part number
DN16CF	25	90 – 115	140	172	152	0.5	BLM-133-1	**660000**
DN16CF	51	90 – 141	178	210	184	0.9	BLM-133-2	**660004**
DN16CF	102	90 – 192	256	299	273	1.4	BLM-133-4	**660008**
DN16CF	152	90 – 242	319	375	350	1.8	BLM-133-6	**660012**
DN40CF	25	90 – 115	140	172	152	0.5	BLM-275-1	**660002**
DN40CF	51	90 – 141	178	210	184	0.9	BLM-275-2	**660006**
DN40CF	102	90 – 192	256	299	273	1.4	BLM-275-4	**660010**
DN40CF	152	90 – 242	319	375	350	1.8	BLM-275-6	**660014**

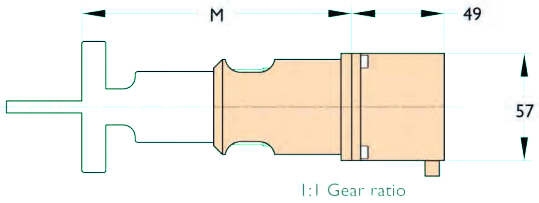
HV Series

ISO KF 100°C

Flange size	Linear travel	A Min – Max	B	M	N	Wt kg	Reference	Part number
DN16KF	25	87 – 112	143	177	152	0.5	K075-BLM-1	**660020**
DN16KF	51	87 – 138	181	216	190	0.9	K075-BLM-2	**660024**
DN16KF	102	87 – 189	270	304	279	1.4	K075-BLM-4	**660028**
DN16KF	152	87 – 239	350	381	355	1.8	K075-BLM-6	**660032**
DN40KF	25	91 – 116	138	173	148	0.5	K150-BLM-1	**660022**
DN40KF	51	91 – 142	177	211	186	0.9	K150-BLM-2	**660026**
DN40KF	102	91 – 193	265	300	275	1.4	K150-BLM-4	**660030**
DN40KF	152	91 – 243	342	376	351	1.8	K150-BLM-6	**660034**

Motorization options

Option -03



Option -03
In-line stepper motor

Motorization[1]	Motor specification	Add-on weight kg	Option Number
In-line stepper	D	0.9	**-03**

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above

For example: **670036**-03

For total unit weight, add option weight to component weight

Linear motion

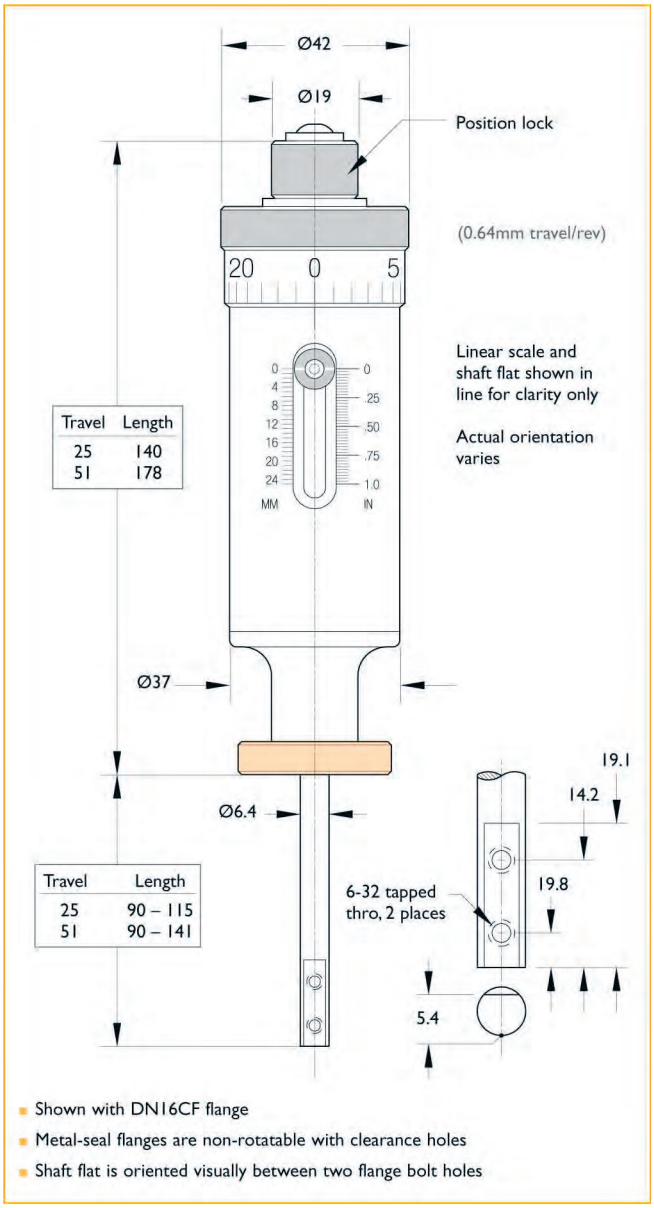
High temperature standard

HBLM-133-1

UHV Series

Features

- 25 to 51mm linear travel
- Manual actuator
- Linear position lock
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 230°C
- CF port mounts



- Shown with DN16CF flange
- Metal-seal flanges are non-rotatable with clearance holes
- Shaft flat is oriented visually between two flange bolt holes

Description

Caburn-MDC high-temperature linear motion feedthroughs are the perfect solution for linear displacement of in-vacuum samples or devices. They are constructed of 304ss to endure the rigors of high temperature vacuum service. Linear position is measured along a laser etched stainless steel barrel graduated in 0.001" (0.03mm) increments. A full revolution of the barrel translates into 0.025" (0.6mm) of linear travel. A linear scale on the body is also provided and is marked in both inch and metric units. The inch scale is graduated in increments of 0.025" while the metric scale is graduated in 1mm increments. Welded stainless steel bellows, a 40 pitch lead screw design and the use of linear bearing shaft support provide devices with excellent durability and performance.

Specifications

Material	
Flange/actuator body	304ss
Shaft seal	AM 350 welded bellows
Vacuum range	1.3×10^{-11} mbar
Temperature range	-20°C to 230°C
Axial load	2.3 kg maximum
Lateral load	2.3 kg @ 50.8 extension maximum
Weight and dimensions	See table

Linear travel	Flange	Wt kg	Reference	Part number
UHV Series				
25	DN16CF	0.5	HTBLM-133-1	**660036**
25	DN40CF	0.9	HTBLM-275-1	**660037**
51	DN16CF	0.9	HTBLM-133-2	**660038**
51	DN40CF	1.4	HTBLM-275-2	**660039**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Linear motion

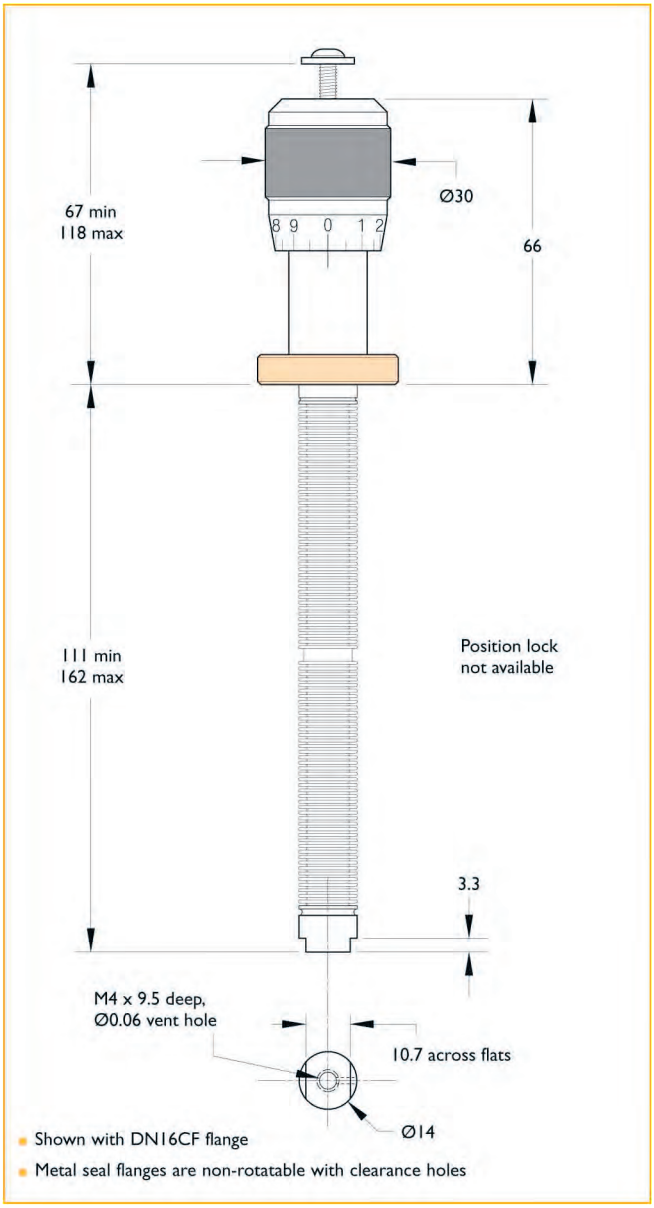
High temperature compact

E-LMD-133-2

UHV Series

Features

- 51mm linear travel
- Manual actuator
- UHV-compatible materials
- Formed bellows seal
- Bakeable to 230°C
- CF port mounts



Description

Compact high-temperature linear motion feedthroughs have the smallest atmosphere side envelope and are constructed with high temperature vacuum grade materials. Linear position is measured along a laser etched stainless steel barrel graduated in 20 equally spaced increments. A full revolution of the barrel translates into 1.25mm of linear travel. Air side linear clearance must be considered to accommodate the rising lead screw mechanism. Formed stainless steel bellows, a 1.25mm pitch lead screw design and the use of radial bearings provide this product with excellent durability and performance. All drive mechanism components are located on the atmosphere side of the formed bellows.

Specifications

Material	
Flange/actuator body	304ss
Shaft seal	Type 312 stainless steel formed bellows
Vacuum range	1×10^{-11} mbar
Temperature range	-20°C to 230°C
Axial load	4.5 kg maximum
Lateral load	2.3 kg @ 50.8 extension maximum
Weight and dimensions	See table

Linear travel	Wt kg	Reference	Part number
UHV Series			
DN16CF	0.5	E-LMD-133-2	**665512**
DN40CF	1.4	E-LMD-275-2	**665513**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Linear motion

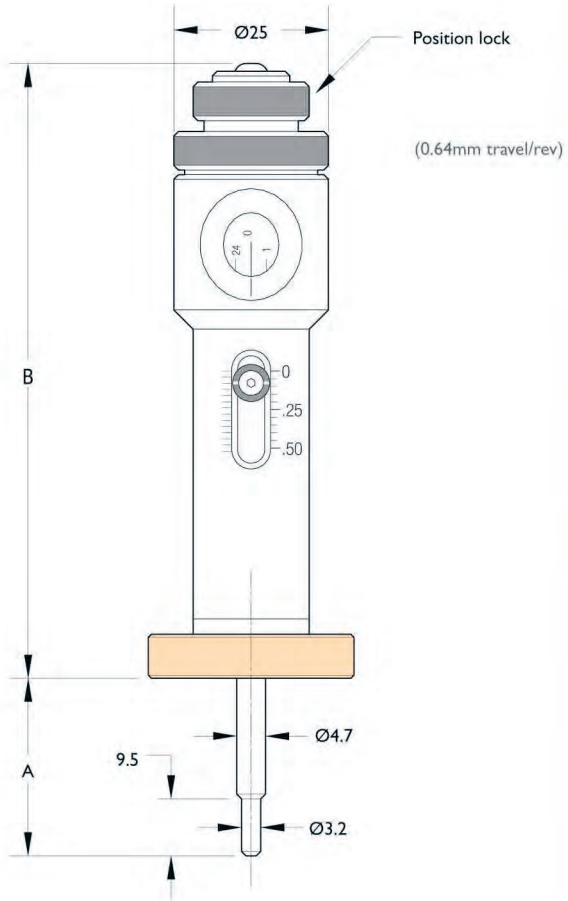
Miniature

E-MBL-133-1

UHV and HV series

Features

- 13 to 25mm linear travel
- Manual or motorized actuator
- Linear position lock
- UHV and HV-compatible materials
- Welded bellows seal
- Bakeable to 180°C[1]
- CF and ISO KF port mounts



- Shown with DN16CF flange
- Metal-seal flanges are non-rotatable with clearance holes

Description

Caburn-MDC miniature linear feedthroughs are specifically designed for in-vacuum light-duty applications. Full revolution of the barrel translates into 0.6mm of linear travel. These instruments are available in both manual or low voltage 12V DC motor configurations. Motor options with an integral magnetic encoder are also available.

Motor controls are not included with the motor options and must be purchased separately.

Specifications

Material	
Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range	$1x10^{-11}$ mbar
Temperature range[1] Manual	-20°C to 100°C
Axial load	1.1 kg
Lateral load	2.3 kg maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed and 30°C maximum when motorized

All dimensions are nominal in millimetres unless specified - Weights given are approximate

UHV Series

CF 100°C

Flange size	Linear travel	A – Min	A – Max	B	Wt kg	Reference	Part number
DN16CF	13	25	38	114	0.9	MBL-133-0	**660500**
DN16CF	25	25	50	127	0.9	MBL-133-1	**660501**

HV Series

ISO KF 100°C

Flange size	Linear travel	A – Min	A – Max	B	Wt kg	Reference	Part number
DN16KF	13	25	38	114	0.9	K075-MBL-133-0	**660502**
DN16KF	25	25	50	127	0.9	K075-MBL-133-1	**660503**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Linear motion

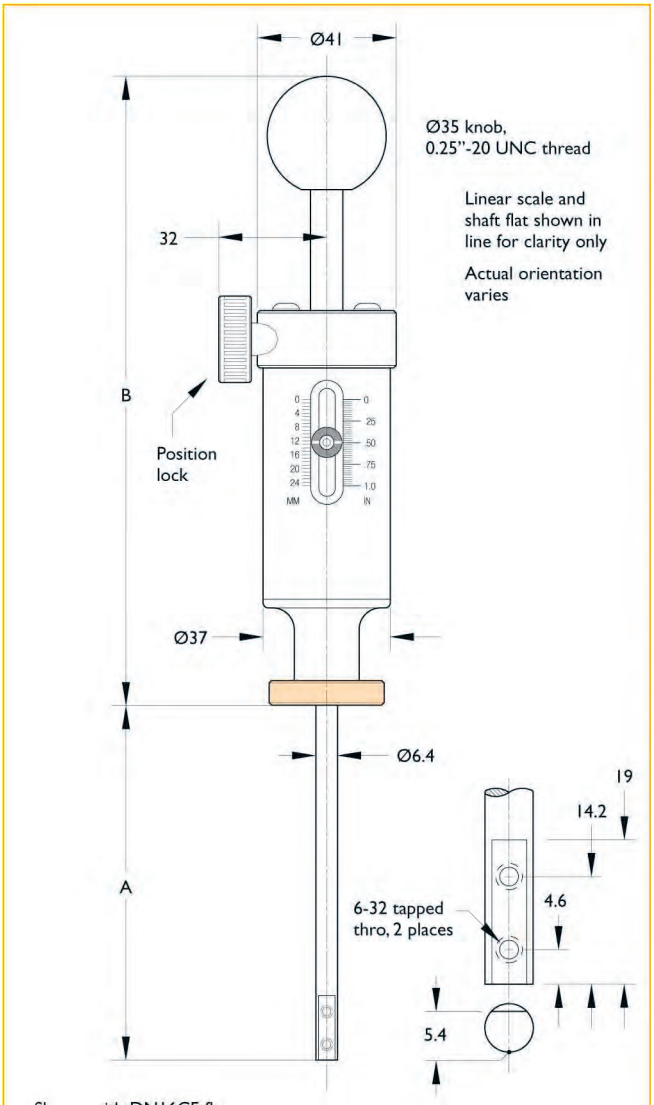
Push-pull

SBLM-133-1

UHV and HV series

Features

- 25 to 152mm linear travel
- Manual actuator
- Linear position lock
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts



- Shown with DN16CF flange
- Metal-seal flanges are non-rotatable with clearance holes
- Shaft flat is oriented visually between two flange bolt holes

Description

Caburn-MDC push-pull linear motion feedthroughs are the most basic of the manual motion devices offered in this catalogue. They provide quick action linear motion via a stainless steel hand-held actuator shaft. They are typically operated by observing the motion process through a vacuum viewport. For quick and easy positioning reference the feedthrough body has been laser etched with linear travel graduation marks in increments of 0.025" (0.6mm). An attractive black anodized finish provides high contrast visibility of the laser etched graduated scale. The actuator can be locked in position by simply tightening the position lock located at the top end of the actuator body.

Push-pull linear motion feedthroughs are constructed of the highest grade vacuum compatible materials. Welded stainless steel bellows and the use of linear bearing shaft supports provide reliability and smooth operation.

Specifications

Material

Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range UHV/HV	1.3×10^{-11} mbar/1.3×10^{-8} mbar
Temperature range[1] UHV/HV	-20°C to 100°C
Axial load	4.5 kg
Lateral load	2.3 kg @ 50.8 extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed and 30°C maximum when motorized

All dimensions are nominal in millimetres unless specified - Weights given are approximate

UHV Series

CF 100°C

Flange size	Linear travel	A – Min	A – Max	B – Min	B – Max	Wt kg	Reference	Part number
DN16CF	25	90	115	165	191	0.5	SBLM-133-1	**663000**
DN16CF	51	90	141	203	254	0.9	SBLM-133-2	**663004**
DN16CF	102	90	192	292	394	1.4	SBLM-133-4	**663016**
DN16CF	152	90	242	368	521	1.8	SBLM-133-6	**663018**
DN40CF	25	90	115	165	191	0.5	SBLM-275-1	**663002**
DN40CF	51	90	141	203	254	0.9	SBLM-275-2	**663006**
DN40CF	102	90	192	292	394	1.4	SBLM-275-4	**663017**
DN40CF	152	90	242	368	521	1.8	SBLM-275-6	**663019**

HV Series

ISO KF 100°C

Flange size	Linear travel	A – Min	A – Max	B – Min	B – Max	Wt kg	Reference	Part number
DN16KF	25	87	112	168	193	0.5	K075-SBLM-1	**663080**
DN16KF	51	87	138	206	257	0.9	K075-SBLM-2	**663012**
DN16KF	102	87	189	297	399	1.4	K075-SBLM-4	**663020**
DN16KF	152	87	239	371	523	1.8	K075-SBLM-6	**663024**
DN40KF	25	91	116	165	193	0.5	K150-SBLM-1	**663010**
DN40KF	51	91	142	203	254	0.9	K150-SBLM-2	**663014**
DN40KF	102	91	193	292	394	1.4	K150-SBLM-4	**663022**
DN40KF	152	91	243	368	521	1.8	K150-SBLM-6	**663026**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

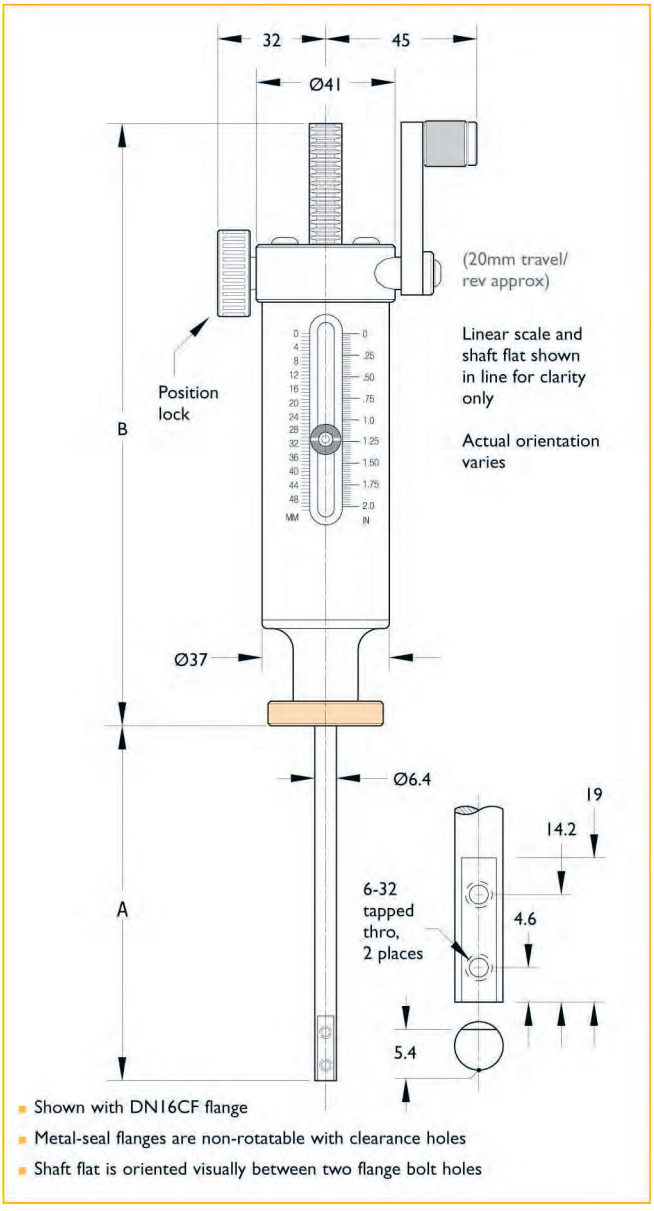
Linear motion

Rack and pinion

UHV and HV series

Features

- 50 to 152mm linear travel
- Manual actuator
- Linear position lock
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts



Description

Caburn-MDC rack and pinion linear motion feedthroughs are very similar to push-pull devices, but provide finer control of linear motion. The rack and pinion drive mechanism is still considered quick-action when compared to rotating actuator, linear motion devices. They too are operated by observing the motion process through a vacuum viewport. For quick and easy positioning reference the feedthrough body has been laser etched with linear travel graduation marks in increments of 0.6mm. A 1¼ turn on the handle generates 25mm of linear travel. An attractive black anodized finish provides high contrast and visibility of the laser etched graduated scale. The actuator can be locked in position by simply tightening the position lock located at the top end of the actuator body.

Rack and pinion linear motion feedthroughs are constructed of high grade vacuum compatible materials. Welded stainless steel bellows and the use of linear bearing shaft supports provide reliability and smooth operation.

Specifications

Material	
Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range UHV/HV	1.3×10^{-11} mbar/1.3×10^{-8} mbar
Temperature range[1] UHV/HV	-20°C to 100°C
Axial load	4.5 kg
Lateral load	2.3 kg @ 50.8mm extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Linear motion

Rack and pinion

UHV Series

CF 100°C

Flange size	Linear travel	A – Min	A – Max	B – Min	B – Max	Wt kg	Reference	Part number
DN16CF	51	90	141	165	216	0.9	RPLM-133-2	**666000**
DN16CF	102	90	192	254	356	1.4	RPLM-133-4	**666002**
DN16CF	152	90	242	330	483	1.8	RPLM-133-6	**666004**
DN40CF	51	90	141	165	216	1.4	RPLM-275-2	**666001**
DN40CF	102	90	192	254	356	1.8	RPLM-275-4	**666003**
DN40CF	152	90	242	330	483	2.3	RPLM-275-6	**666005**

HV Series

ISO KF 100°C

Flange size	Linear travel	A – Min	A – Max	B – Min	B – Max	Wt kg	Reference	Part number
DN16KF	51	87	140	168	219	0.9	K075-RPLM-2	**666006**
DN16KF	102	87	189	257	359	1.4	K075-RPLM-4	**666010**
DN16KF	152	87	239	333	486	1.8	K075-RPLM-6	**666014**
DN40KF	51	91	142	164	215	0.9	K150-RPLM-2	**666008**
DN40KF	102	91	193	253	354	1.4	K150-RPLM-4	**666012**
DN40KF	152	91	243	329	481	1.8	K150-RPLM-6	**666016**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Linear motion

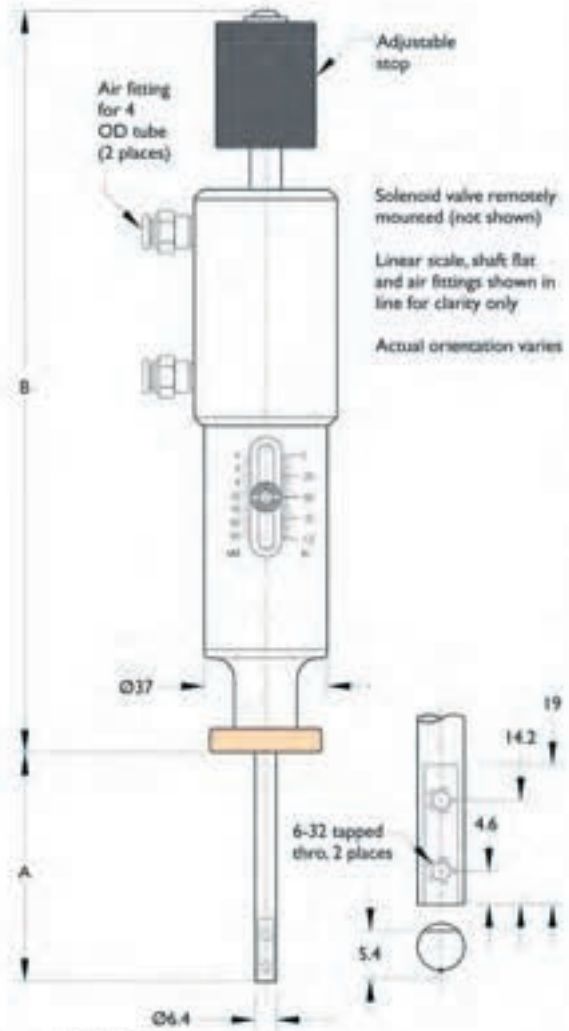
Pneumatic

ABLM-275-2 Includes 24V DC solenoid

UHV and HV series

Features

- 25 to 51mm linear travel
- Pneumatic actuator
- Adjustable linear travel stop
- UHV or HV compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts
- Complete with 24V DC air control solenoid valve
- 240V AC air control solenoid valve optional



- Shown with DN16CF flange
- Metal-seal flanges are non-rotatable with clearance holes
- Shaft flat is oriented visually between two flange bolt holes

Description

Pneumatic linear motion feedthroughs provide two-position fast action linear motion. Typical motion applications would include on-off, open-close and in-out motions similar to those of in-vacuum shutters. Linear travel can be shortened or lengthened by turning the adjustment knob located at the top end of the pneumatic actuator. Once adjusted the jam nut locks the knob in place. For quick and easy positioning the feedthrough body has been laser etched with linear travel graduation marks in increments of 0.025" (0.6mm). A black anodized finish provides high contrast and visibility of the laser etched graduated scale. Pneumatic linear motion feedthroughs are constructed of high grade vacuum compatible materials. Welded stainless steel bellows and the use of linear bearing shaft supports provide reliability and smooth operation.

Specifications

Material	
Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Piston seal	**FKM / FPM fluoroelastomer O-Ring**
Vacuum range UHV/HV	1x10⁻⁹ mbar/1x10⁻⁶ mbar
Temperature range[1] UHV/HV	20°C to 100°C
Axial load	9.1 kg maximum
Lateral load	2.3 kg @ 50.8mm extension maximum
Actuator pressure	4 – 5.5 bar
Piston surface area	5.7 cm²
Solenoid valve	24V DC
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

All dimensions are nominal in millimetres unless specified · Weights given are approximate

UHV Series

CF 100°C

Flange size	Linear travel	A – Min	A – Max	B – Min	B – Max	Wt kg	Reference	Part number
DN16CF	25	90	115	216	241	0.9	ABLM-133-1	**662000-01**
DN16CF	51	90	141	279	330	1.4	ABLM-133-2	**662004-01**
DN40CF	25	90	115	216	241	1.4	ABLM-275-1	**662002-01**
DN40CF	51	90	141	279	330	1.4	ABLM-275-2	**662006-01**

HV Series

ISO KF 100°C

Flange size	Linear travel	A – Min	A – Max	B – Min	B – Max	Wt kg	Reference	Part number
DN16KF	25	87	112	218	244	0.9	K075-ABLM-1	**662008-01**
DN16KF	51	87	138	282	333	1.4	K075-ABLM-2	**662012-01**
DN40KF	25	91	116	216	241	0.9	K150-ABLM-1	**662010-01**
DN40KF	51	91	142	279	330	1.4	K150-ABLM-2	**662014-01**

Air control solenoid valves

Description	Option number
240V AC Air control solenoid valve	**-02**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Linear motion

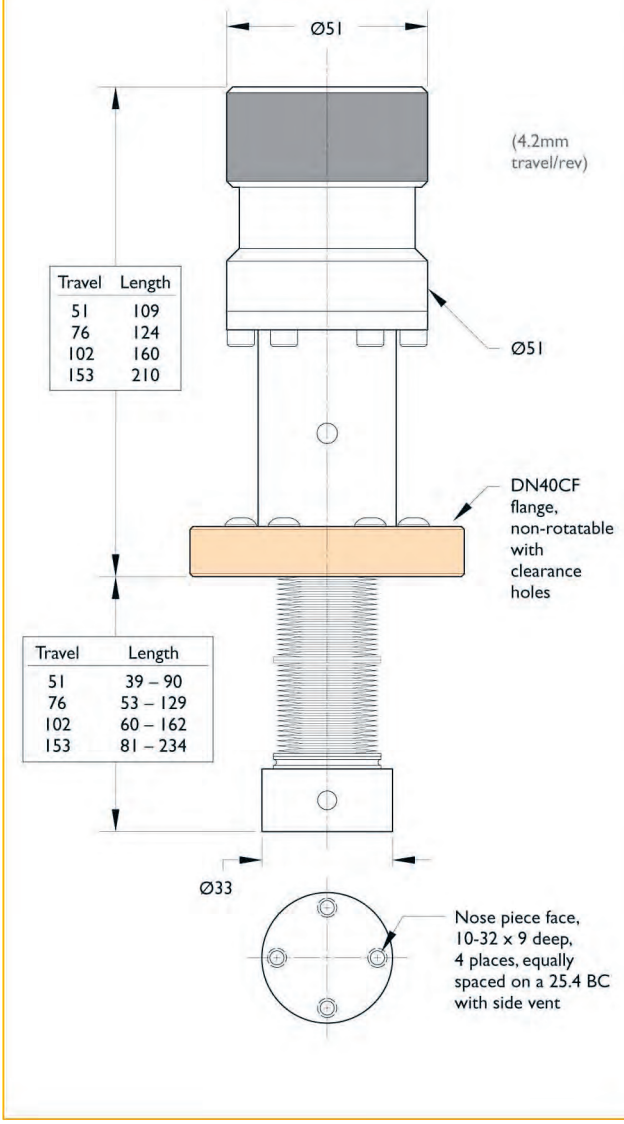
Heavy duty

HLM-275-2

UHV Series

Features

- 50 to 152mm linear travel
- Manual actuator
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- DN40CF port mount



Travel	Length
51	109
76	124
102	160
153	210

Travel	Length
51	39 – 90
76	53 – 129
102	60 – 162
153	81 – 234

Description

Heavy duty linear motion feedthroughs allow linear displacement of larger in-vacuum samples and components. This feedthrough has basic, rotary manual actuation and does not provide position indication. Position must be determined by visual inspection of the in-vacuum sample or component. A heavy duty acme thread lead screw provides 25mm of linear travel for every six revolutions of the actuator knob. Unlike conventional motion feedthroughs, heavy duty models have a re-entrant welded bellows configuration.

Specifications

Material	
Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range	1×10^{-11} mbar
Temperature range[1]	-20°C to 100°C
Axial load	9.1 kg
Lateral load	9.1 kg @ 101.6mm extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

Linear travel	Wt kg	Reference	Part number
UHV Series			
51	0.9	HLM-275-2	**661018**
76	0.9	HLM-275-3	**661000**
102	0.9	HLM-275-4	**661016**
153	1.4	HLM-275-6	**661017**

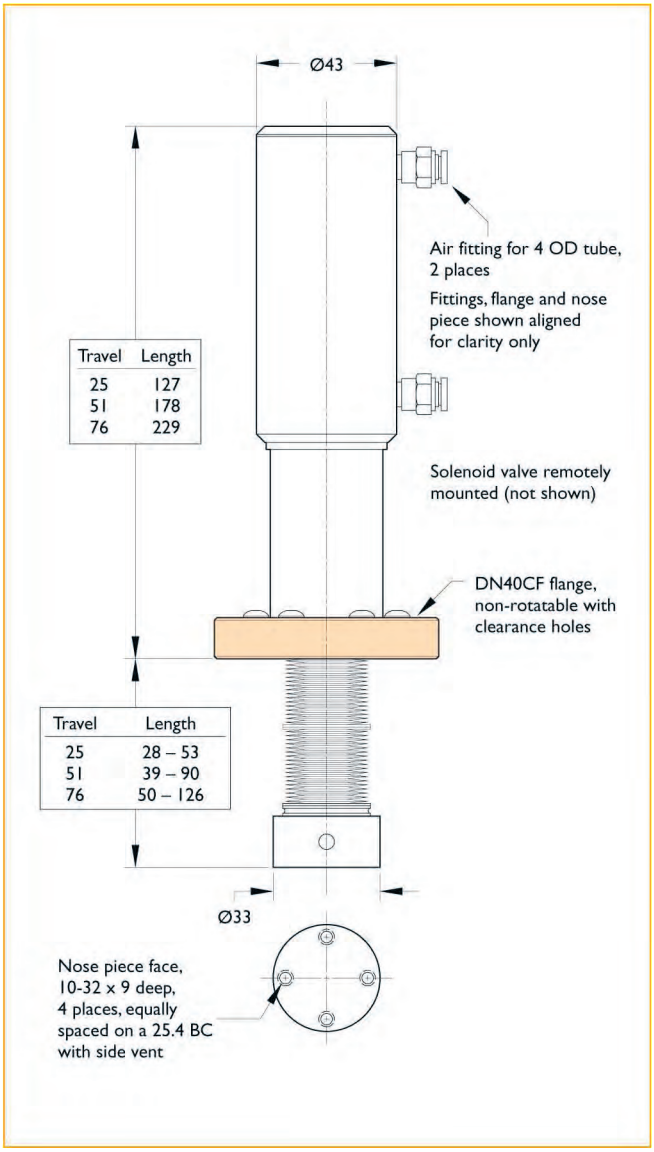
All dimensions are nominal in millimetres unless specified - Weights given are approximate

ALM-275-2 Includes 24V DC solenoid

UHV Series

Features

- 25 to 76mm linear travel
- Pneumatic actuator
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- DN40CF port mount



Travel	Length
25	127
51	178
76	229

Travel	Length
25	28 – 53
51	39 – 90
76	50 – 126

Description

Heavy-duty pneumatic linear motion feedthroughs provide two-position fast-action linear motion for heavy sample loads. Typical motion applications would include open-close or in-out motions similar to those used for in-vacuum shutters.

Specifications

Material

Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Actuator gaskets	Viton®
Vacuum range	1x10⁻¹¹ mbar
Temperature range[1]	-20°C to 100°C
Axial load	9.1 kg
Lateral load	9.1 kg @ 76mm extension maximum
Solenoid valve	24V DC
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

Linear travel	Wt kg	Reference	Part number
UHV series			
25	0.9	ALM-275-1	**661050-01**
51	1.4	ALM-275-2	**661051-01**
76	1.4	ALM-275-3	**661052-01**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Linear motion

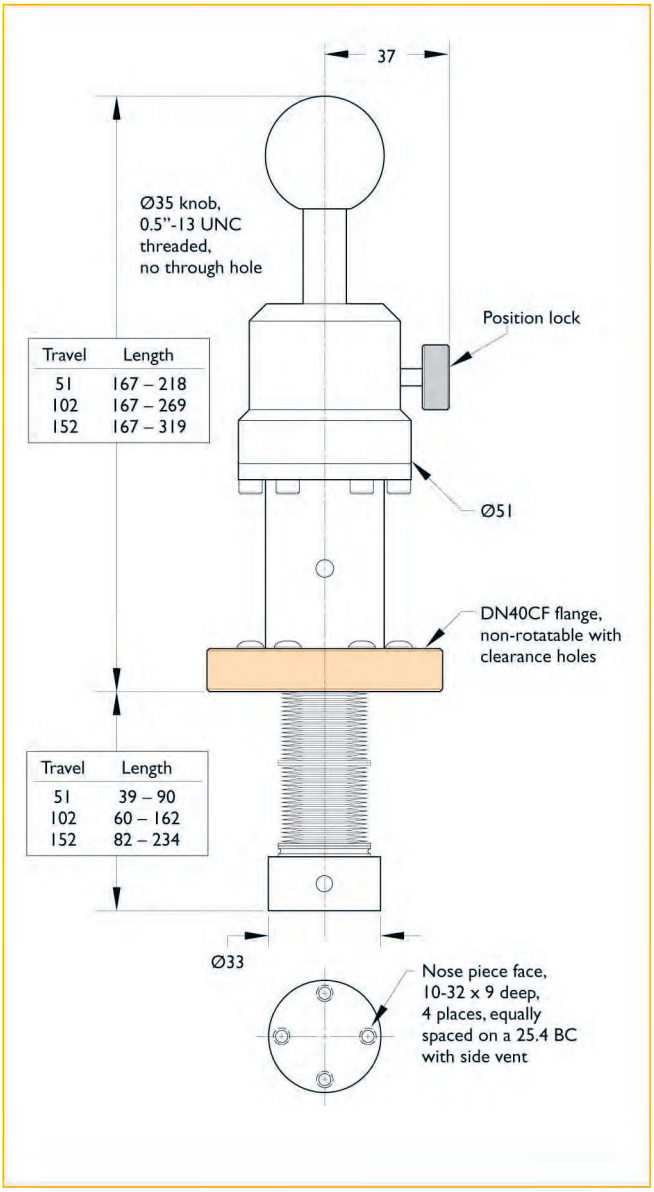
Heavy duty, push-pull

SLM-275-3 Special

UHV Series

Features

- 50 to 152mm linear travel
- Manual actuator
- Linear position lock
- UHV compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- DN40CF port mount



Travel	Length
51	167 – 218
102	167 – 269
152	167 – 319

Travel	Length
51	39 – 90
102	60 – 162
152	82 – 234

Description

Heavy duty push-pull linear motion feedthroughs allow linear displacement of heavier samples and components than conventional designs. These devices do not provide position indication. Sample or component position must be verified visually through a viewport. Sample linear position can be fixed with an integral position lock knob mounted on the actuator housing. Unlike conventional motion feedthroughs, heavy duty models employ re-entrant welded bellows construction allowing the use of sturdier and larger diameter shafts. Push-pull linear motion feedthroughs provide two-position fast action motion ideal for applications including open-close or in-out motions similar to those used for in-vacuum shutters. Special configurations, such as the 76.2mm version displayed in the photograph, may be quoted upon request.

Specifications

Material	
Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range	1×10^{-11} mbar
Temperature range[1]	-20°C to 100°C
Axial load	9.1 kg
Lateral load	9.1 kg @ 76mm extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

Linear travel	Wt kg	Reference	Part number
UHV series			
51	1.4	SLM-275-2	**674001**
102	1.8	SLM-275-4	**674003**
152	2.3	SLM-275-6	**674005**

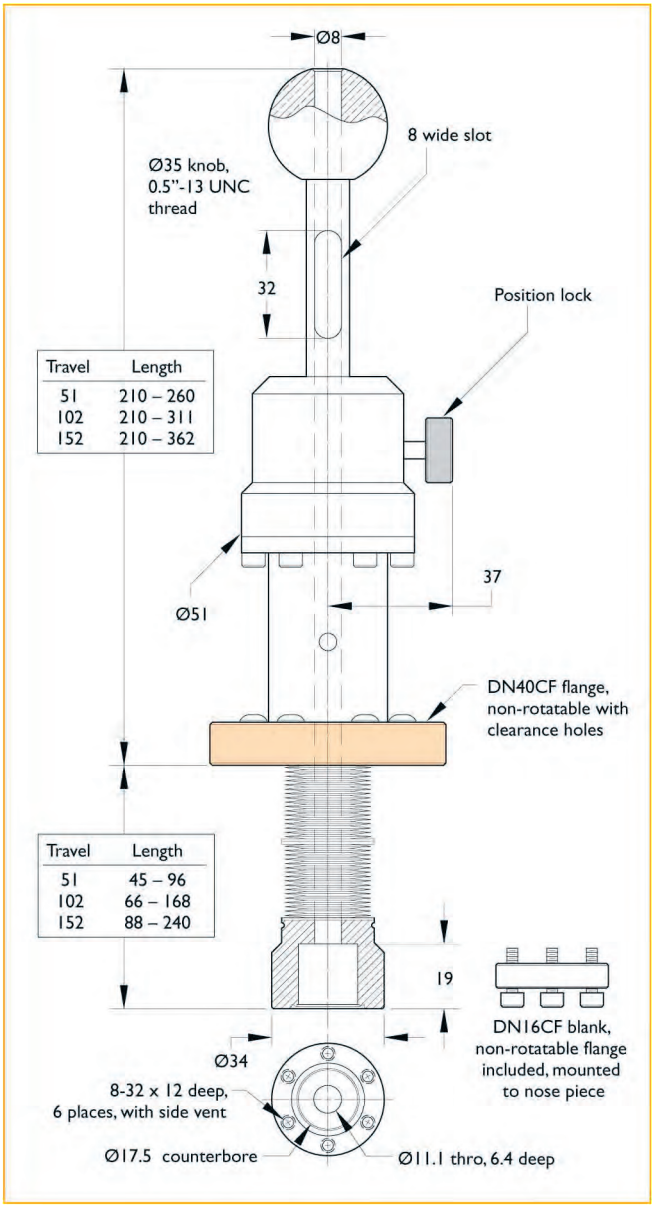
All dimensions are nominal in millimetres unless specified - Weights given are approximate

TLM-275-2

UHV Series

Features

- 50 to 152mm linear travel
- Manual actuator
- Linear position lock
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- DN40CF port mount



Description

Heavy duty tunnel access, push-pull linear motion feedthroughs allow linear displacement of heavy samples and components. The push-pull shaft is hollow providing tunnel access for instrumentation leads such as those used for thermocouple temperature measurements and other low voltage electrical applications. The vacuum nose piece is shipped with a blank DN16CF flange which can be removed or modified to accept electrical feedthroughs as required. These devices do not provide position indication. Sample or component position must be verified visually through a viewport. Sample linear position can be fixed with an integral position lock knob mounted on the actuator housing. Unlike conventional motion feedthroughs, heavy duty models employ re-entrant welded bellows construction allowing the use of sturdier and larger diameter shafts.

Specifications

Material	
Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range	1x10⁻¹¹ mbar
Temperature range[1]	-20°C to 100°C
Axial load	9.1 kg
Lateral load	9.1 kg @ 76mm extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

Linear travel	Wt kg	Reference	Part number
UHV series			
51	1.4	TLM-275-2	**667000**
102	1.8	TLM-275-4	**667001**
152	2.3	TLM-275-6	**667002**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

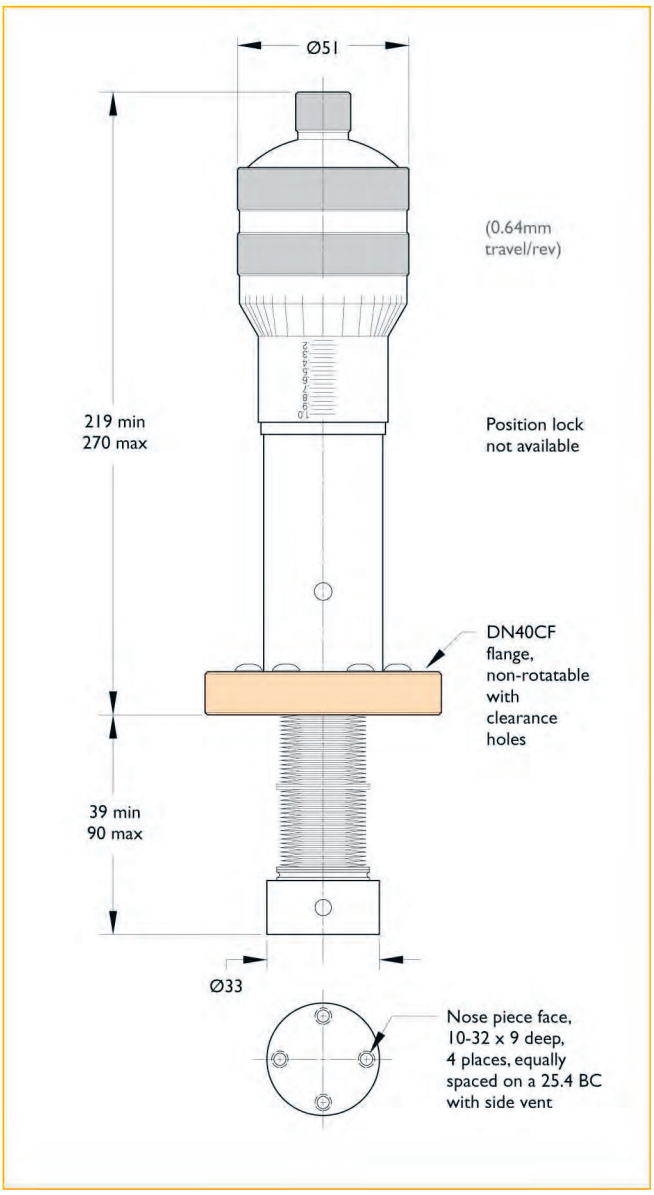
Linear motion

Heavy duty, micrometer

UHV Series

Features

- 50mm linear travel
- Manual, precision micrometer actuator
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- DN40CF port mount



Description

Heavy duty, micrometer driven linear motion feedthroughs allow linear displacement of heavier samples and components with the accuracy and precision of fine pitch thread micrometers. These devices provide position indication on both rotary and linear scales with display resolutions of 0.0025" (0.06mm) on the rotary scale and 0.025" (0.6mm) on the linear scale. A full revolution of the rotary scale translates into 0.025" (0.6mm) of linear travel. Unlike conventional motion feedthroughs, heavy duty models employ re-entrant welded bellows construction allowing the use of sturdier and larger diameter shafts.

Specifications

Material

Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range	1×10^{-11} mbar
Temperature range[1]	-20°C to 100°C
Axial load	4.5 kg maximum
Lateral load	9.1 kg @ 100mm extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

Linear travel	Wt kg	Reference	Part number
UHV series			
51	1.4	LMM-275-2	**668002**

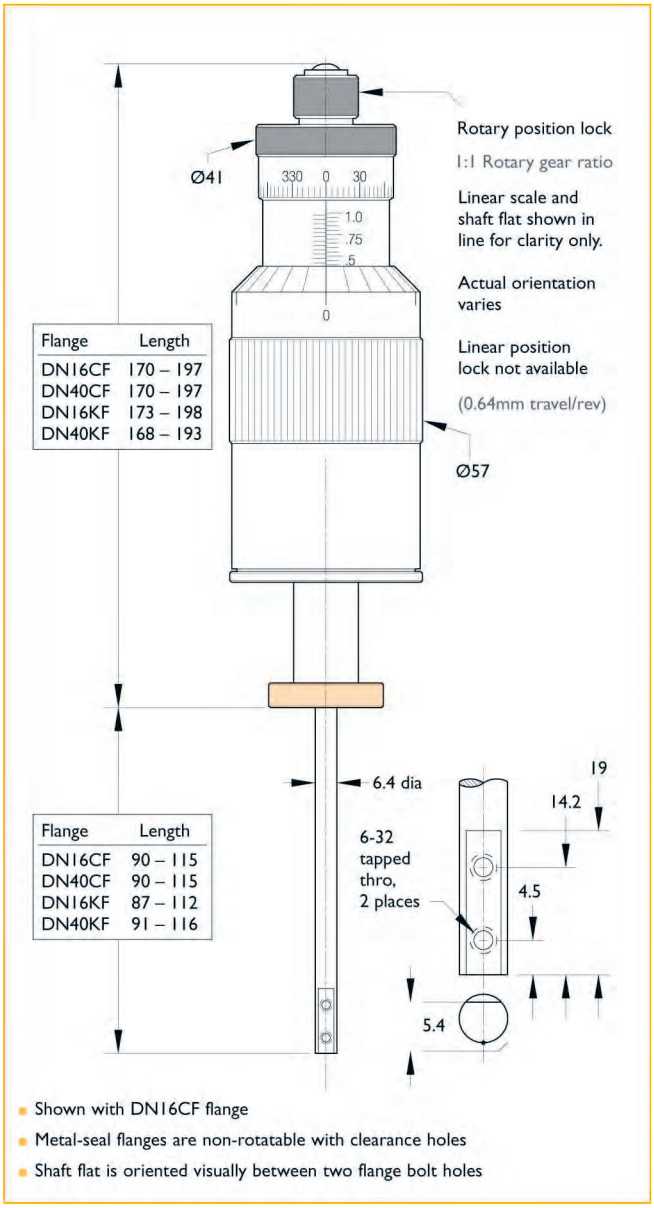
All dimensions are nominal in millimetres unless specified - Weights given are approximate

BRLM-133

UHV and HV series

Features

- 360° rotary motion and 25mm linear travel
- Manual actuator
- Rotary position lock
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts



- Shown with DN16CF flange
- Metal-seal flanges are non-rotatable with clearance holes
- Shaft flat is oriented visually between two flange bolt holes

Description

Rotary-linear standard devices offer 360° of rotation and 25mm of linear travel via two separate drive knob actuators. Both rotary and linear positions are measured along laser etched scales on actuator barrel and housing. The 360° rotary scale is graduated in 5° increments. The linear scale has both a linear and rotary scale components, the linear portion is graduated in 0.025" (0.6mm) increments while the rotary portion is graduated in 0.03mm increments. Full revolution of the linear scale produces 0.6mm of linear travel.

Specifications

Material

Flange/actuator knob	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range	$1x10^{-11}$ mbar/$1x10^{-8}$ mbar
Temperature range	-20°C to 100°C
Torque	3.5 Nm maximum
Axial load	1.8 kg maximum
Lateral load	1.8 kg @ 50mm extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

Description	Wt kg	Reference	Part number
UHV Series			
DN16CF	1.4	BRLM-133	**672000**
DN40CF	1.4	BRLM-275	**672002**
HV Series			
DN16CF	1.4	KM075-BRLM	**672004**
DN40CF	1.4	KM150-BRLM	**672006**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

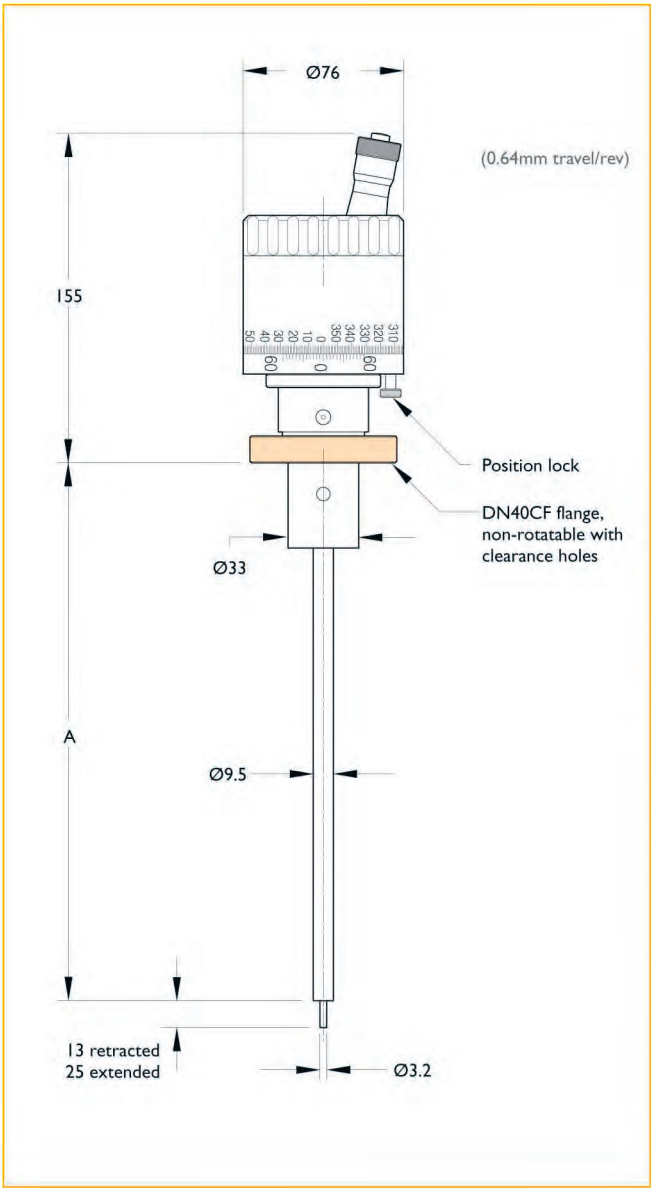
Multi-motion

Rotary-linear, precision

UHV Series

Features

- Continuous rotary motion and 13mm linear travel
- Manual or motorized actuator
- Rotary position lock
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 230°C[1]
- CF port mount



Description

Precision rotary-linear motion feedthroughs are low backlash instruments with a rotary display resolution of 0.1° and a linear display resolution of 0.03mm. Full revolution of the linear drive translates into 0.6mm of linear travel with a maximum overall linear travel of 13mm. Welded stainless steel bellows, a unique off-axis wobble design and the use of rotary shaft bearing supports provide long life and smooth operation. Motorization options are available for both linear and rotary drive components. If motorization is required on both drives, add each option number to the end of the base part number.

Note The entire linear drive mechanism (manual or motorized) will rotate when the rotary drive is actuated. This must be considered when allocating space for its installation.

Motor controls are not included with the motorization options and must be purchased separately.

Specifications

Material	
Flange/actuator body	304ss/Anodized aluminium
Shaft seal	AM 350 welded bellows
Position knob and internal washer	Brass
Vacuum range	1×10^{-11} mbar
Temperature range[1]	-20°C to 230°C
Torque	0.7 Nm maximum
Axial load	
Rotary	2.3 kg maximum
Linear	0.4 kg maximum
Lateral load	4.5 kg @ 50mm extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 30°C with actuator removed

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Multi-motion

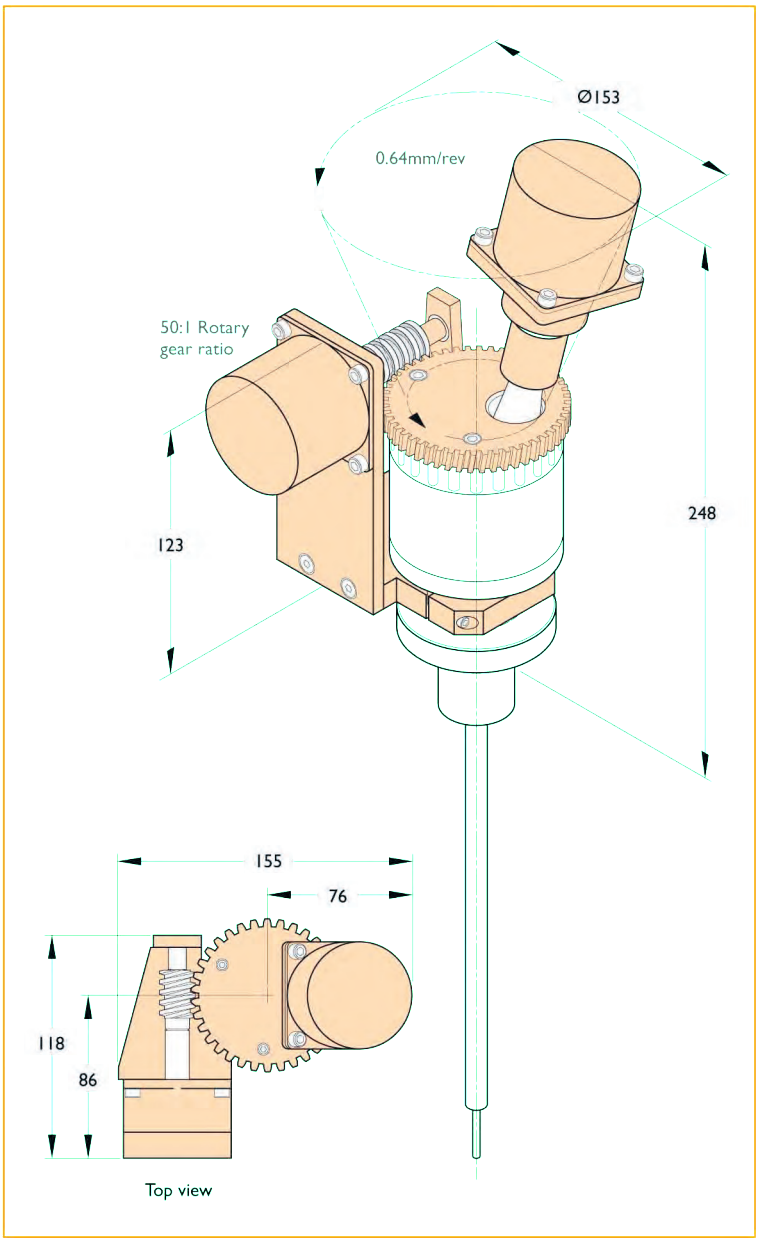
Rotary-linear, precision

UHV Series

CF 230°C

Flange size	A	Wt kg	Reference	Part number
DN40CF	254	3.6	PBRM2-10	**670025**
DN40CF	400	3.6	PBRM2-15	**670028**
DN40CF	600	4.1	PBRM2-23	**670031**
DN40CF	800	4.1	PBRM2-31	**670034**

Motorization options



Option -01
Rotary motorization

Option -02
Linear motorization

Motorization[1]	Motor specification	Add-on weight kg	Option Number
Rotary axis	D	2.3	**-01**
Linear axis	D	0.9	**-02**

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above

For example: **670025**-01-02

For total unit weight, add option weight to component weight

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Multi-motion

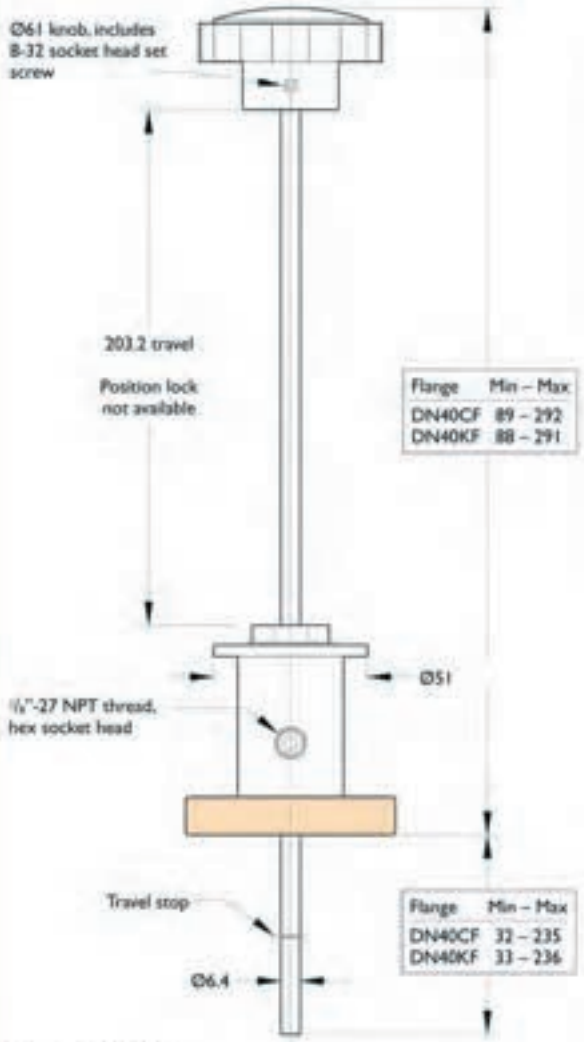
Rotary-linear, direct

CRPP-1

UHV and HV series

Features

- Continuous rotary motion and 203mm linear travel
- Manual actuator
- UHV or HV-compatible materials
- Differentially pumped, Dual **FKM / FPM fluoroelastomer** shaft seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts



- Shown with DN16CF flange
- Metal seal flanges are non-rotatable with clearance holes

Description

Differentially pumped direct drive rotary-linear motion feedthroughs are a basic and economical solution for vacuum applications requiring both rotary and linear motion. Their simple construction provides 11Nm of manual rotational torque.

The rotary shaft is supported by two phosphor bronze bearings and uses dual **FKM / FPM fluoroelastomer** shaft seals. The region between the seals can be differentially pumped through the 1/8" female pipe thread port provided and thus attain UHV compatibility to $1x10^{-9}$ mbar. Feedthroughs are available on industry standard Conflat® compatible DN40CF metal seal flanges or ISO KF DN40 port mounts.

Specifications

Material

Flange/actuator body	304 Stainless steel
Shaft seal	**FKM / FPM fluoroelastomer**
Vacuum range UHV/HV	$1x10^{-9}$ mbar $1x10^{-6}$ mbar
Temperature range[1] UHV/HV	-20°C to 100°C
Torque	11.3 Nm maximum
Axial load No lock to support weight	1.1 kg
Lateral load	2.3 kg @ 50mm extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 150°C with actuator removed

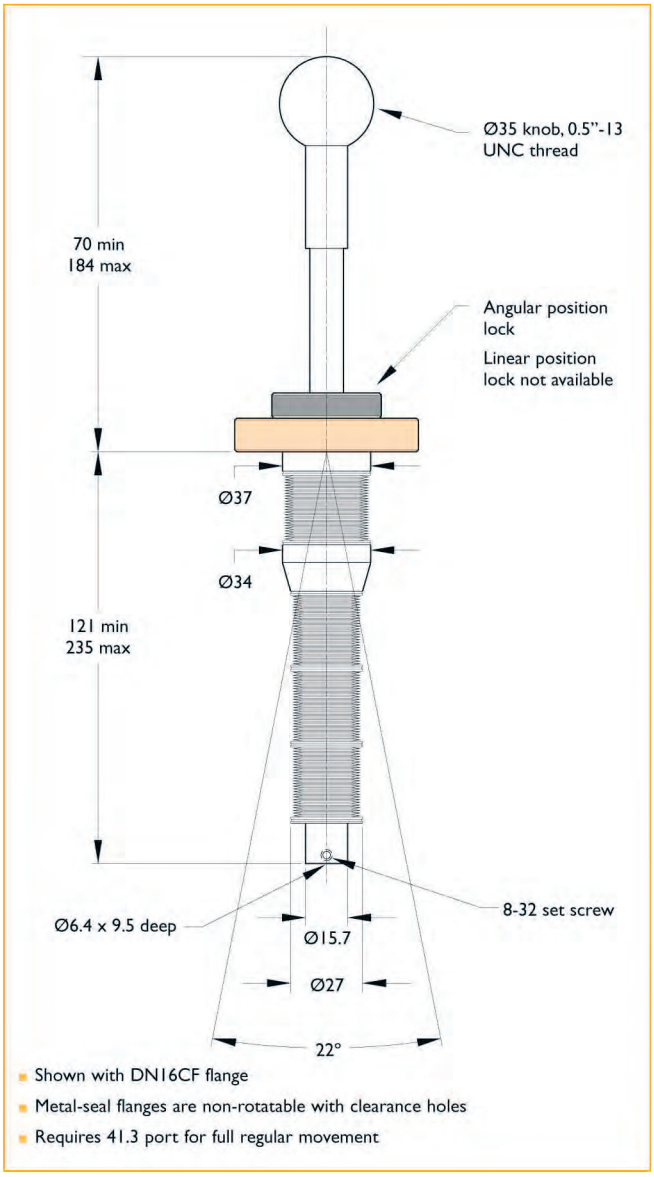
Linear travel	Wt kg	Reference	Part number
UHV		CRPP-1	**672008**
HV		K-CRPP-1	**672009**

All dimensions are nominal in millimetres unless specified · Weights given are approximate

UHV and HV series

Features

- 114mm linear travel and 22° wobble motion
- Manual actuator
- Angular position lock
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts



- Shown with DN16CF flange
- Metal-seal flanges are non-rotatable with clearance holes
- Requires 41.3 port for full regular movement

Description

Wobble stick linear-angular motion feedthroughs are basic and manual sample motion devices. They provide quick action linear travel and angular wobble motion via a stainless steel hand-held actuator shaft with a ball and socket joint design. They are typically operated by observing sample motion through a vacuum viewport. The actuators angular position can be locked in place by tightening the lock collar located on the port mount flange. Wobble stick linear-angular motion feedthroughs are offered with 114mm linear travel and a maximum 22° of angular wobble with unrestricted mating flange and port diameter. Re-entrant, welded stainless steel bellows are standard on these products.

Specifications

Material

Flange/actuator body	304ss
Shaft seal	AM 350 welded bellows
Vacuum range UHV/HV	$1x10^{-11}$ mbar/$1x10^{-8}$ mbar
Temperature range[1] UHV/HV	-20°C to 100°C
Axial load No lock to support weight	9.1 kg
Lateral load	91 kg @ 50mm extension maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

Description	Wt kg	Reference	Part number
UHV Series			
DN40CF	1.4	SU-275	**696000**
HV Series			
DN40KF	0.9	K150-SU	**696001**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

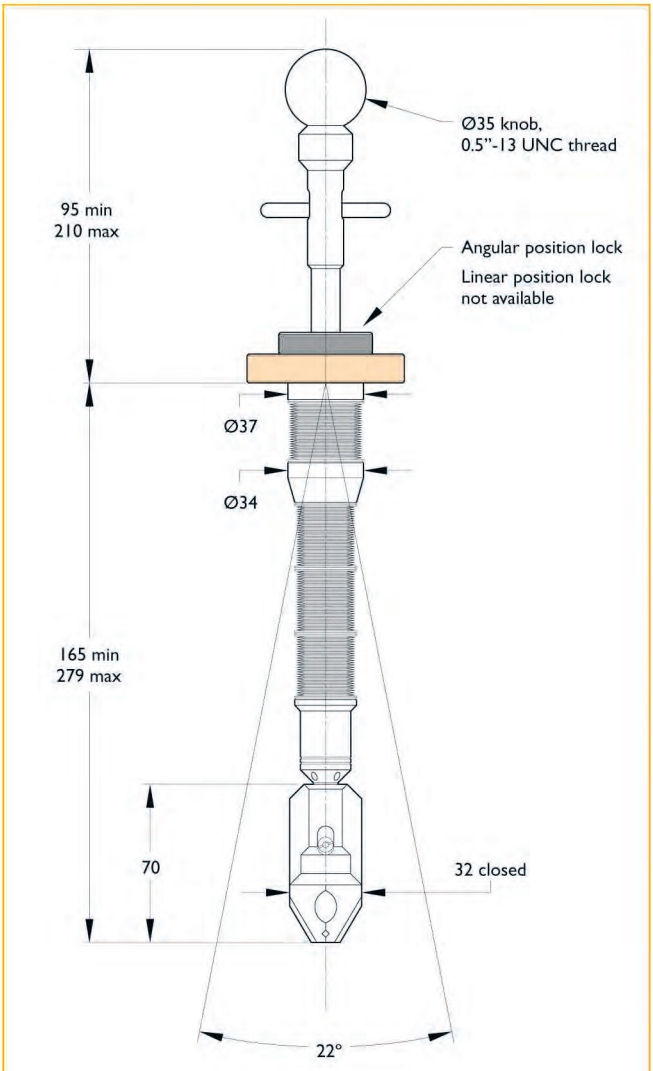
Multi-motion

Wobble stick, pincer

UHV and HV series

Features

- 114mm linear travel and 22° wobble, with pincer-grip
- Manual actuator
- Angular position lock
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts



- Shown with DN16CF flange
- Metal seal flanges are non-rotatable with clearance holes
- Requires 41.3 port for full regular movement

Description

Wobble sticks with pincer action are identical to the wobble-linear products, except for the addition of an integral and articulated sample holding pincer mechanism. The pincer is activated via two shaft mounted finger grips allowing the pincer jaws to grip 22.4mm maximum sample diameters. These feedthroughs provide quick action linear-angular motion via a manually activated shaft with ball and socket joint design. They are typically operated by observing sample motion through a vacuum viewport. Angular position can be locked with an integral lock collar located on the port mount flange.

Specifications

Material

Flange/actuator body	304 Stainless steel
Shaft seal	AM 350 welded bellows
Vacuum range UHV/HV	1×10^{-11} mbar/1×10^{-8} mbar
Temperature range[1] UHV/HV	-20°C to 100°C
Axial load	0.9 kg maximum
Lateral load	0.9 kg maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

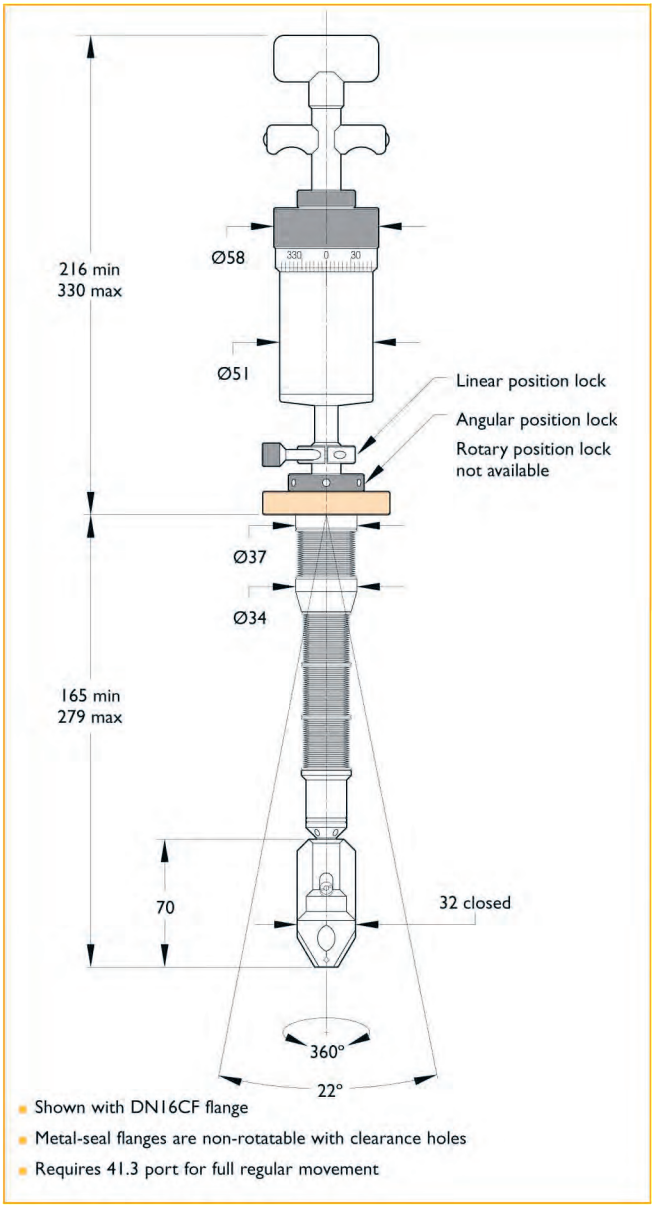
Description	Wt kg	Reference	Part number
UHV Series			
DN40CF	1.4	VGU-275	**695000**
HV Series			
DN40KF	0.9	K150-VGU	**695001**

Description	Wt kg	Reference	Part number
Jaw kit, blank	0.5	DG-275-BJ	**694001**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Multi-motion

Wobble stick, rotary pincer



- Shown with DN16CF flange
- Metal-seal flanges are non-rotatable with clearance holes
- Requires 41.3 port for full regular movement

UHV and HV series

Features

- Continuous rotary motion, 114mm linear travel and 22° wobble, with pincer-grip
- Manual actuator
- Linear and angular position locks
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 100°C[1]
- CF and ISO KF port mounts

Description

These products are rotary-linear-pincer action wobble sticks identical to the linear and linear-pincer wobble stick products with the addition of full 360° rotary motion. The pincer mechanism is activated via two shaft mounted finger grips allowing the pincer jaws to grip up to 22.4mm sample diameters. These feedthroughs provide quick action rotary, linear and angular motion with an actuator shaft ball and socket joint design. Angular and linear positions can be locked with integral lock collars located on the port mount flange and actuator shaft.

Specifications

Material

Flange/actuator body	304ss/Aluminium
Shaft seal	AM 350 welded bellows
Vacuum range UHV/HV	1×10^{-11} mbar/1×10^{-8} mbar
Temperature range[1] UHV/HV	-20°C to 100°C
Torque	0.3 Nm maximum
Axial load	0.9 kg maximum
Lateral load	0.9 kg maximum
Weight and dimensions	See table

[1] UHV units are bakeable to 230°C with actuator removed

Description	Wt kg	Reference	Part number
UHV Series			
DN40CF	1.4	DG-275	**694000**
HV Series			
DN40KF	0.9	K150-DG	**694002**

Description	Wt kg	Reference	Part number
Jaw kit, blank	0.5	DG-275-BJ	**694001**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Multi-motion

Wobble stick, wide angle

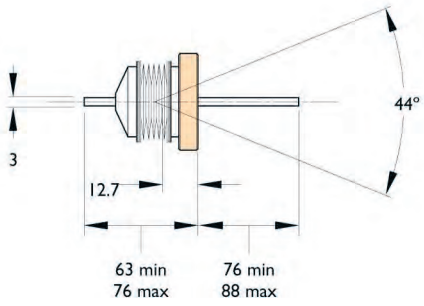
WS-133

UHV and HV series

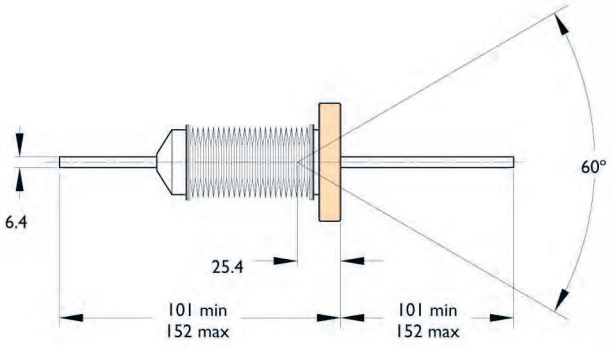
Features

- 13 or 50mm linear travel and 44° or 60° wobble, respectively
- Manual actuator
- UHV or HV-compatible materials
- Welded bellows seal
- Bakeable to 230°C
- CF and ISO KF port mounts

12.7 Linear travel 44° wobble



50.8 Linear travel 60° wobble



- Requires 41.3 port for full regular movement
- Position lock not available

Description

Wide angle wobble sticks, the most basic products of the wobble stick family, provide an economical solution for light duty sample motion and manipulation. They are stripped down wobble sticks ideally suited for user customization. Under vacuum load the bellows are compressed and the shaft completely extended into the vacuum chamber. Offered in two models they provide 44° and 60° of angular displacement respectively.

Specifications

Material	
Flange/actuator body	304 Stainless steel
Shaft seal	AM 350 welded bellows
Vacuum range UHV/HV	1×10^{-11} mbar/1×10^{-8} mbar
Temperature range	
UHV	-20°C to 230°C
HV	-20°C to 150°C
Weight and dimensions	See table

Description	Linear travel	Wt kg	Reference	Part number
UHV Series				
DN16CF	12.7	1.4	WS-133	**693001**
DN40CF	50.8	1.4	WS-275	**693000**

UHV Series	Linear travel			
DN16CF	12.7	1.4	K075-WS	**693002**
DN40CF	50.8	1.4	K150-WS	**693003**

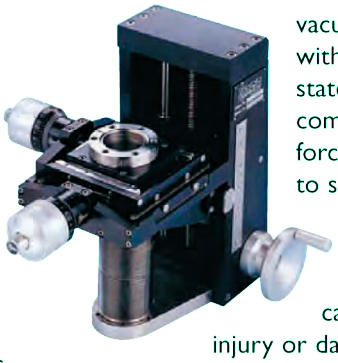
All dimensions are nominal in millimetres unless specified - Weights given are approximate

Manipulation

Introduction

Features

- V-Plane® XY and Z stages
- V-Plane® guide tubes
- Compact XY and Z stages
- Standard XY and Z stages
- Rotatable axis stages



V-Plane® XY and Z stages

Caburn-MDC's V-Plane® modular stages are building block components designed to streamline the implementation of a sample manipulation system. They can be used as stand alone components or combined with other V-Plane® instruments to attain customized motion and manipulation solutions. V-Plane® dual axis XY stages are micrometer driven and guided by cross roller bearing slides. Caburn-MDC micrometers have unique laser etched plus-minus scales that indicate positive or negative port displacement. V-Plane® single axis stages employ handwheel and worm gear reduction drive mechanisms with linear displacement measured along the stage's frame mounted scale.

V-Plane® guide tubes

Caburn-MDC guide tubes provide bellows support for V-Plane® manipulator stages fitted with long-stroke bellows as well as secondary rotary and linear motion feedthroughs installed on the stage. They are supplied with both rotary and linear bearing supports. For applications requiring sample heating, cooling, high voltage biasing, thermocouple temperature measurements, etc., the guide tube tip has been fitted with two slots 180° apart through which wires or tubes can be fed. Four DN16CF and one DN40CF flange accessory ports allow the installation of up to five additional accessory components. When a manipulator stage is not under vacuum or is let up to air with the bellows in some state of compression, the compressed bellows' spring force may force the bellows to shift off-axis at some point during its travel. The off-axis shift could be sudden and violent causing user injury or damage to the bellows. Caburn-MDC recommends that all long-stroke 38mm diameter bore Z axis V-Plane® stages, with linear travels exceeding 150mm, be fitted with guide tubes.

Compact XY and Z stages

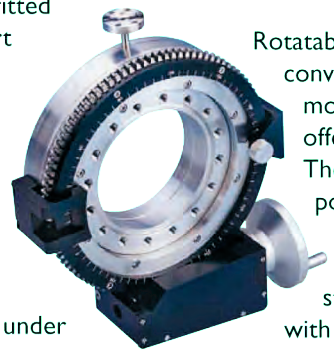
Compact stages are small footprint single or triple axis stages and are ideally suited for applications with limited space. They are available in a Z only or XYZ configuration.

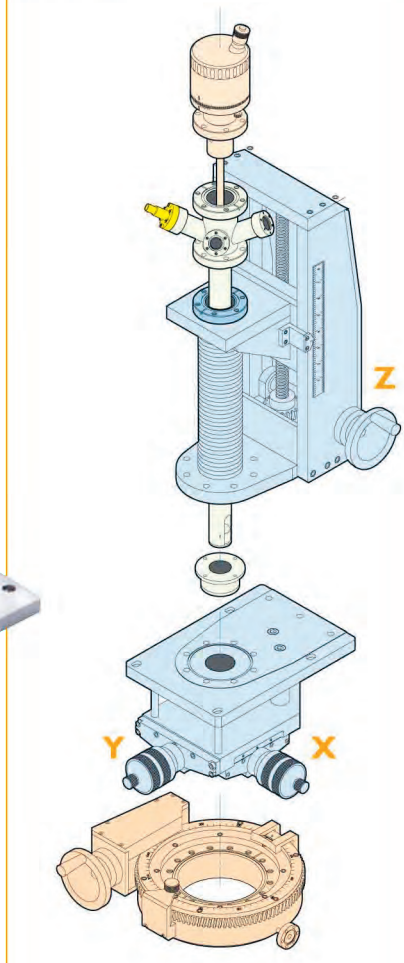
Standard XY and Z stages

Standard XYZ stages are large bore stages which incorporate triple axis motion in a single stage. The XY travels are micrometer driven and guided by cross roller bearing slides. Caburn-MDC micrometers have unique laser etched plus-minus scales that indicate positive or negative port displacement. The Z axis employs a handwheel and worm gear reduction drive mechanism with displacement measured along the stage's frame mounted scale.

Rotatable axis stages

Rotatable axis stages replace conventional rotatable mounting tables previously offered by Caburn-MDC. They provide 360° positioning with greater precision, control and ease of use. Rotatable stages are constructed with worm gear drive mechanisms which offer substantial mechanical advantage over non-geared designs, High torque stepper motors are also available for these stages. Caburn-MDC rotatable stages can be used to rotate heavy samples or sample support apparatus and structures. Two spring energized PTFE face seals are at the heart of the rotatable stage's sealing mechanism. With provision for differential pumping between the seals, these rotatable stages can be used in UHV environments with bakeout temperatures as high as 200°C.





- Intermediate hardware may be required for joining components, these have been omitted for clarity

Caution

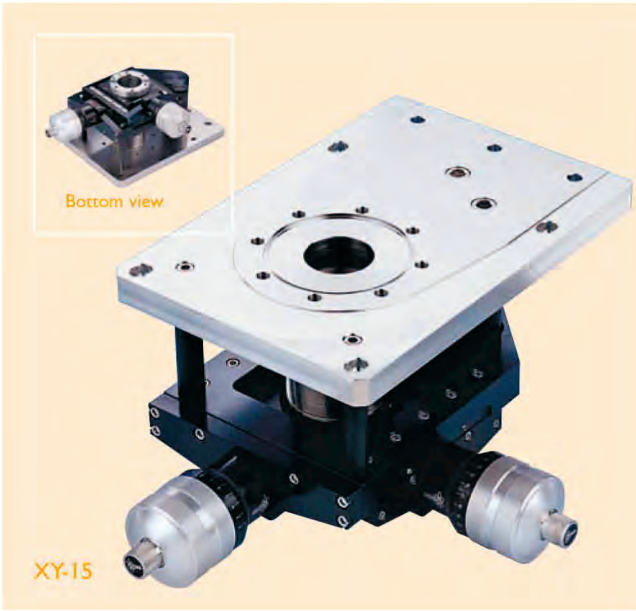
Anodized aluminium finishes will begin to discolour when baked in excess of 150°C.

This is only a cosmetic condition which does not impact performance or reliability.

All dimensions are nominal in millimetres unless specified - Weights given are approximate

V-Plane®

Dual axis XY stage



UHV Series

Features

- V-Plane® building block component
- Plus or minus 13 and 25mm off centre XY motion
- 38 to 102mm bore diameters
- Manual or motorized actuator
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 230°C
- CF port mounts

Description

Caburn-MDC's V-Plane® modular stages are building block components designed to streamline the implementation of a sample manipulation system. They can be used as stand alone components or combined with other V-Plane® instruments to attain customized motion and manipulation solutions.

V-Plane® dual axis XY stages are micrometer driven and guided by cross roller bearing slides. Micrometers have unique laser etched plus-minus scales that indicate positive or negative port displacement. Caburn-MDC V-Plane® dual axis XY stages provide precise motion and manipulation of samples inside ultra-high vacuum environments. Dual axis XY stages can be stacked with V-Plane® single axis Z stages and also fitted with guide tubes to further expand their capabilities.

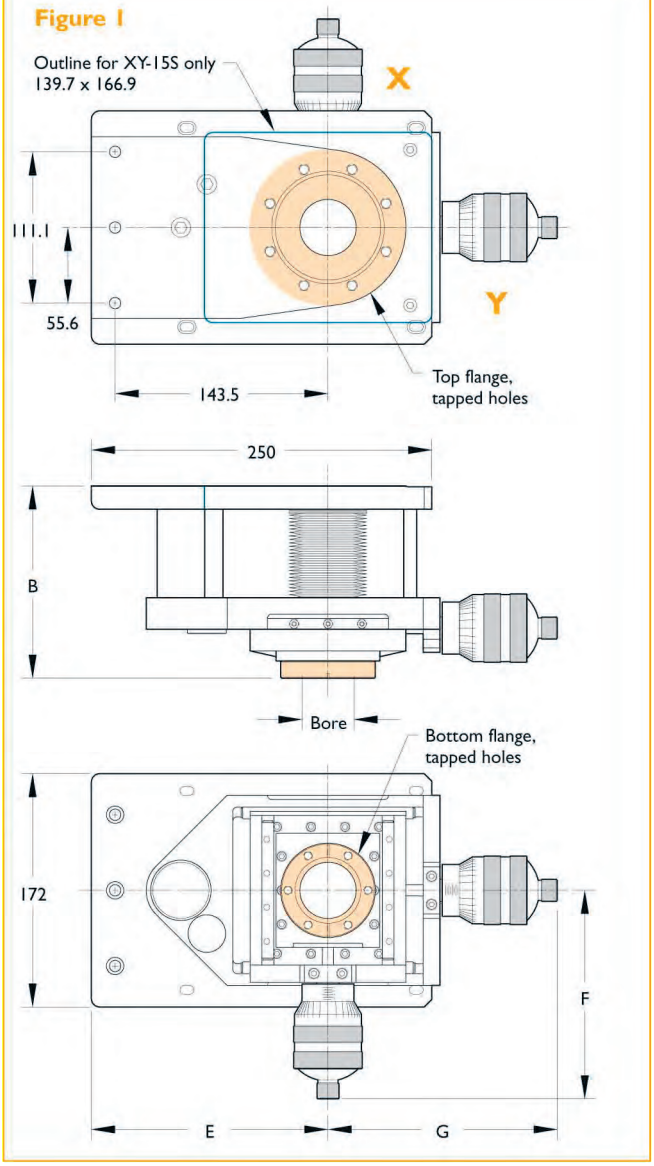
Specifications

Material

Flange	304 Stainless steel
Actuator body	Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range	1.3×10^{-11} mbar
Temperature range[1]	-20°C to 230°C
Weight and dimensions	See table

[1] UHV units are bakeable to 30°C maximum when motorized

Figure 1



All dimensions are nominal in millimetres unless specified - Weights given are approximate

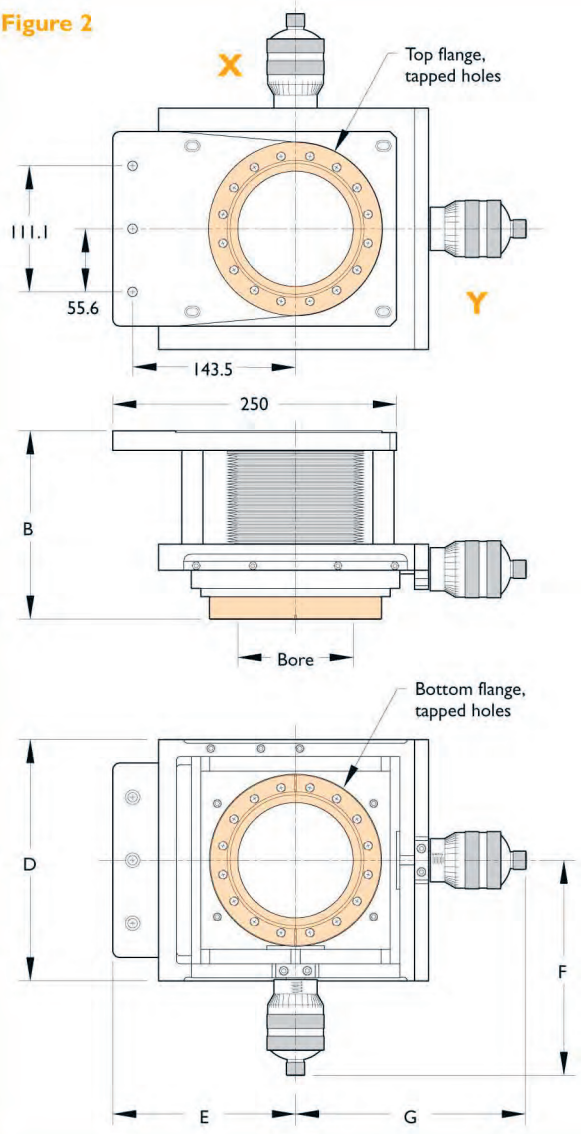
Bore size	Travel[4] ±	Figure	Top flange	Bottom flange	B	D	E	F	G	H	J	Wt kg	Reference	Part number
38.1	12.7	1	DN40CF	DN40CF	127	–	83	146	157	194	209	10.9	E-XY-15S*	**677021**
38.1	12.7	1	DN63CF	DN40CF	143	–	161	146	157	194	209	11.4	E-XY-15	**677009**
63.5	12.7	1	DN63CF	DN63CF	146	–	161	165	175	210	224	12.7	E-XY-25	**677010**
63.5	12.7	1	DN63CF	DN100CF	149	–	161	165	175	230	244	13.2	E-XY-26	**677018**
63.5	25.4	1	DN63CF	DN63CF	168	–	161	232	248	235	251	12.7	E-LXY-25	**677013**
63.5	25.4	1	DN63CF	DN100CF	171	–	161	232	248	256	269	13.2	E-LXY-26	**677019**
101.6[3]	12.7	2	DN63CF	DN100CF	165	213	161	184	194	231	244	13.6	E-XY-40	**677011**
101.6	12.7	2	DN100CF	DN100CF	165	213	161	184	194	231	244	14.5	E-XY-44	**677012**
101.6[3]	25.4	2	DN63CF	DN100CF	184	213	161	254	267	256	269	14.5	E-LXY-40	**677014**
101.6	25.4	2	DN100CF	DN100CF	184	224	161	254	267	256	269	15.4	E-LXY-44	**677015**

[3] 101.6 bore diameter is reduced to 63.5 at DN63CF top flange

[4] Match sample support structure and stage bore for maximum XY travel

* E-XY-155 is a stand alone model unsuitable for combination with Z only columns

Figure 2



Motorization options

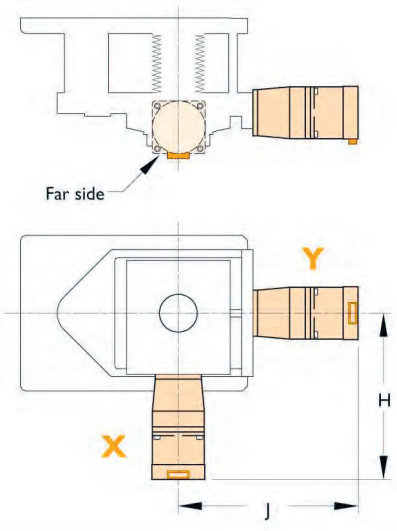
Option -01
In-line stepper motor

Motorization[1]	Motor specification	Add-on weight kg	Option number
XY in-line stepper	D	1.4	**-01**

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above

For example: **670020**-01

For total unit weight, add option weight to component weight



All dimensions are nominal in millimetres unless specified - Weights given are approximate

V-Plane®

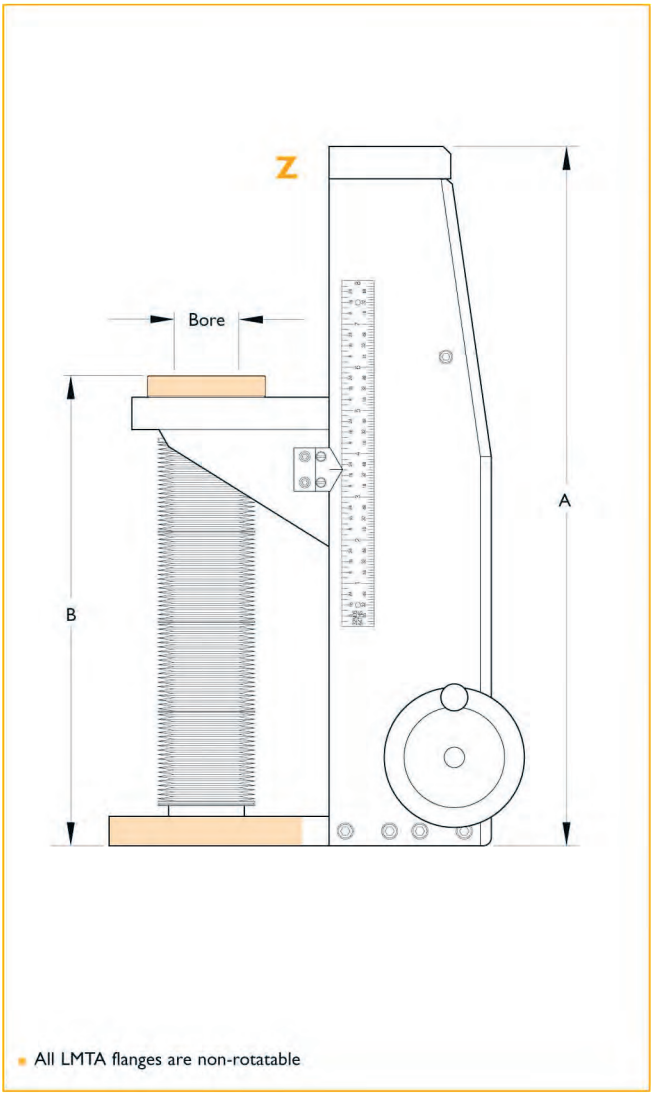
Single axis Z stage

XY-15

UHV Series

Features

- V-Plane® building block component
- 152 to 914mm Z-axis travel
- 38 to 102mm bore diameters
- Manual or motorized actuator
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 230°C
- CF port mounts



All LMTA flanges are non-rotatable

Description

Caburn-MDC's V-Plane® modular stages are building block components designed to streamline the implementation of a sample manipulation system. They can be used as stand alone components or combined with other V-Plane® instruments to attain customized motion and manipulation solutions. V-Plane® single axis stages employ handwheel and worm gear reduction drive mechanisms with linear displacement measured along the stage's frame mounted scale. Z axis linear travels of up to 914.4mm are available. Caburn-MDC V-Plane® stages provide precise sample motion and manipulation of samples inside ultra-high vacuum environments. Caburn-MDC recommends that all long-stroke 38.1mm diameter bore Z axis V-Plane® stages, with linear travels exceeding 150mm, be fitted with guide tubes.

Specifications

Material	
Flange	304 Stainless steel
Actuator body	Anodized aluminium
Shaft seal	AM 350 welded bellows
Vacuum range	1.3×10^{-11} mbar
Temperature range[1]	-20°C to 230°C
Weight and dimensions	See table

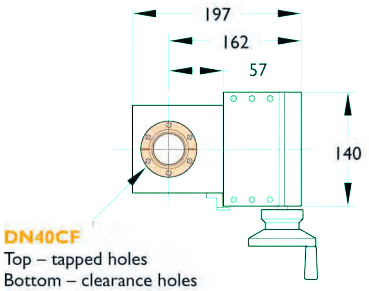
[1] UHV units are bakeable to 30°C maximum when motorized

All dimensions are nominal in millimetres unless specified - Weights given are approximate

UHV Series

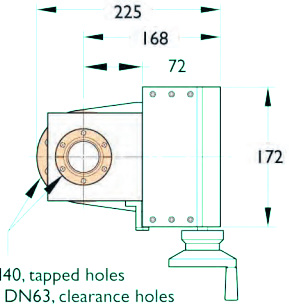
CF **230°C**

End view 1



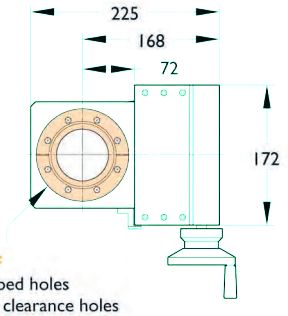
DN40CF
Top – tapped holes
Bottom – clearance holes

End view 2



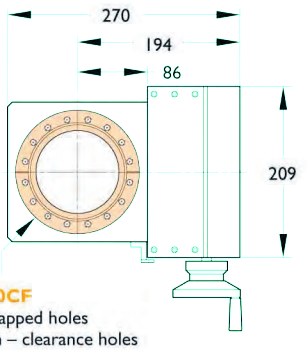
Top – DN40, tapped holes
Bottom – DN63, clearance holes

End view 3



DN63CF
Top – tapped holes
Bottom – clearance holes

End view 4

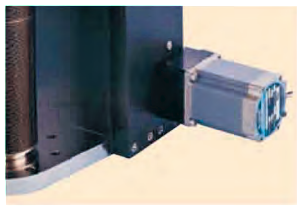


DN100CF
Top – tapped holes
Bottom – clearance holes

Bore size	Z Travel	End view	A	B Min – Max	Wt kg	Reference	Part number
38.1	152.4	1	335	170.1 – 322.6	17	E-LMTA-1506S	665546
38.1	203.2	1	386	170.1 – 373.4	19	E-LMTA-1508S	665547
38.1	304.8	1	544	226.1 – 530.9	23	E-LMTA-1512S	665548
38.1	406.4	1	704	284.5 – 690.9	26	E-LMTA-1516S	665549
38.1	609.6	1	1016	401.3 – 1011.0	34	E-LMTA-1524S	665550
38.1	914.4	1	1501	574.0 – 1988.4	45	E-LMTA-1536S	665551
38.1	152.4	2	361	193.0 – 345.4	18	E-LMTA-1506	665534
38.1	203.2	2	412	193.0 – 396.2	20	E-LMTA-1508	665535
38.1	304.8	2	513	193.0 – 497.8	24	E-LMTA-1512	665536
38.1	406.4	2	666	243.8 – 650.2	27	E-LMTA-1516	665537
38.1	609.6	2	970	345.4 – 955.0	35	E-LMTA-1524	665538
38.1	914.4	2	1428	497.8 – 1412.2	45	E-LMTA-1536	665539
63.5	152.4	3	356	193.0 – 345.4	20	E-LMTA-2506	665558
63.5	203.2	3	406	193.0 – 396.2	22	E-LMTA-2508	665559
63.5	304.8	3	544	228.6 – 533.4	26	E-LMTA-2512	665560
63.5	406.4	3	678	261.6 – 668.0	30	E-LMTA-2516	665561
63.5	609.6	3	950	330.2 – 939.8	37	E-LMTA-2524	665562
63.5	914.4	3	1356	431.8 – 1346.2	48	E-LMTA-2536	665563
101.6	152.4	4	356	195.6 – 348.0	23	E-LMTA-4006	665570
101.6	203.2	4	406	195.6 – 398.8	25	E-LMTA-4008	665571
101.6	304.8	4	508	195.6 – 500.4	28	E-LMTA-4012	665572
101.6	406.4	4	635	223.5 – 629.9	32	E-LMTA-4016	665573
101.6	609.6	4	894	276.9 – 878.8	39	E-LMTA-4024	665574
101.6	914.4	4	1278	355.6 – 1270.0	50	E-LMTA-4036	665575

Motorization options

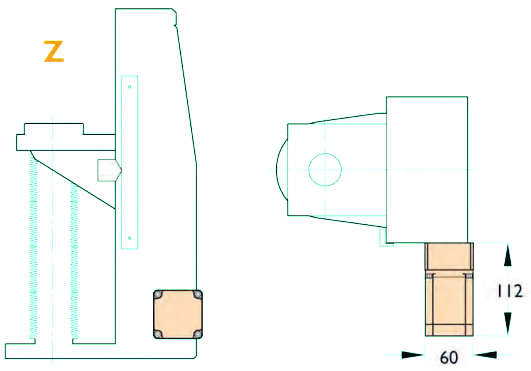
Option -01
In-line stepper motor



Motorization[1]	Motor Specification	Add-on weight kg	Option number
Z In-line stepper	F	1.4	-01

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above. For example: **665546**-01

For total unit weight, add option weight to component weight



All dimensions are nominal in millimetres unless specified - Weights given are approximate

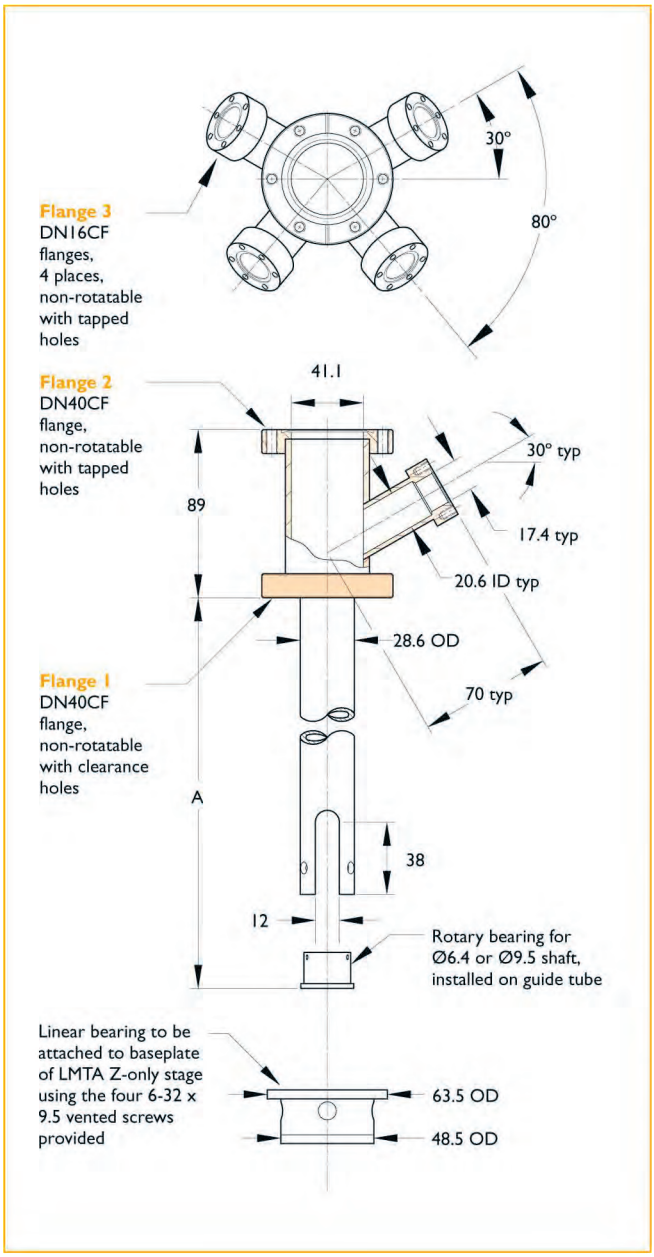
V-Plane®

Z Axis guide tube

UHV Series

Features

- V-Plane® building block component
- Used with 38mm bore Z-axis V-Plane® stages with greater than 152mm travel
- Bakeable to 230°C
- DN16CF access ports
- Linear bearing guide tube support
- Includes 6.4 and 9.5mm diameter shaft rotary bearing supports



Description

Caburn-MDC guide tubes provide bellows support for V-Plane® manipulator stages fitted with long-stroke bellows as well as secondary rotary and linear motion feedthroughs installed on the stage. Guide tubes mount directly onto V-Plane® manipulator stages fitted with DN40CF port flanges with a bore clearance suitable for the 28.6mm guide tube diameter. They are supplied with both rotary and linear bearing supports. Rotary bearings for 6.4 and 9.5mm diameter shafts are included. For applications requiring sample heating, cooling, high voltage biasing, thermocouple temperature measurements, etc., the guide tube tip has been fitted with two slots 180° apart through which wires or tubes can be fed. Four DN16CF and one DN40CF flange accessory ports allow the installation of up to five additional accessory components. When a manipulator stage is not under vacuum or is let up to air with the bellows in some state of compression, the compressed bellows' spring force may force the bellows to shift off-axis at some point during its travel. The off-axis shift could be sudden and violent causing injury or damage to the bellows.

Caburn-MDC recommends that all long-stroke 38.1mm diameter bore Z axis V-Plane® stages, with linear travels exceeding 150mm, be fitted with guide tubes.

Note The linear bearing support requires a 63.5 bore in any mating component.

Specifications

Material

Flange	304 Stainless steel
Bearings	300 Series stainless steel with Dicronite® coating
Vacuum range	1×10^{-11} mbar
Temperature range	-200°C to 230°C
Weight and dimensions	See table

All dimensions are nominal in millimetres unless specified - Weights given are approximate

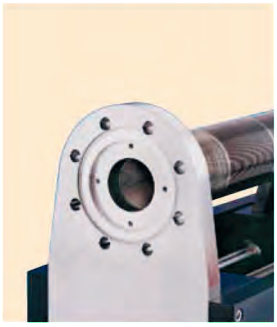
UHV Series

CF 230°C

A	Use[2] with	Flange 1	Flange 2	Flange 3	Wt kg	Reference	Part number
495	665534	DN40	DN40	DN16	4	E-GT-1506	**665582**
546	665535	DN40	DN40	DN16	4	E-GT-1508	**665583**
648	665536	DN40	DN40	DN16	4	E-GT-1512	**665584**
800	665537	DN40	DN40	DN16	5.5	E-GT-1516	**665585**
1105	665538	DN40	DN40	DN16	5.5	E-GT-1524	**665586**
1562	665539	DN40	DN40	DN16	6.5	E-GT-1536	**665587**
Feedthrough multi-port assembly without guide tube						E-GTFA	**1603051**

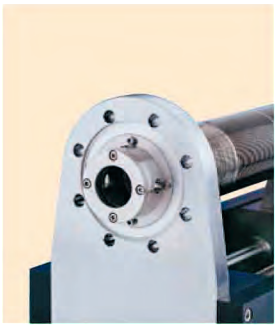
[2] Use with 38.1 bore single axis Z stages

Typical guide tube application



The DN63CF base flange on V-Plane® stages with 38.1mm bore is fitted with a counterbore and four tapped holes. This counterbore and tapped holes provide the means of attaching the guide tube's linear bearing support.

The guide tube extends into vacuum beyond the linear bearing support. The rotary bearing radial screws, located at guide tube tip, may need removing to properly fit guide tube through linear bearing housing.

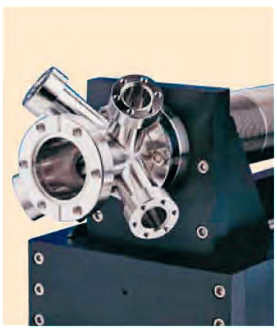


The linear bearing support is shown fastened to the DN63CF base flange of a V-Plane® single axis Z stage using four vented stainless steel socket head screws supplied with each guide tube assembly. The linear bearing support requires a 63.5mm bore in any mating component.

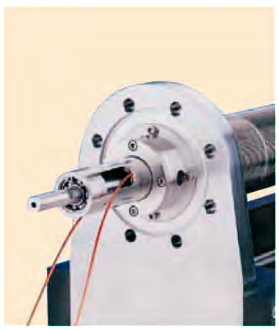
Other motion products may be attached to the guide tube's main flange. Shown here is a precision rotary-linear instrument found in Section 7.1.

Six threaded studs are fastened to the V-Plane® Z axis stage top flange prior to inserting the guide tube through the top flange and bellows.

The rotary-linear drive shaft extends into vacuum beyond the rotary bearing support on the guide tube tip.



The guide tube assembly is secured to the V-Plane® Z axis stage top flange using the nuts and washers supplied.



Four mini CF ports can be used for the input or output of sample voltage biasing as well as thermocouple and other instrumentation signals. Insulated wires exit into vacuum through slots on guide tube tip.

Single axis

Compact Z stage

UHV Series

Features

- 25 to 102mm Z-axis travel
- 13, 38 and 63mm bore diameters
- Manual or motorized actuator
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 230°C[1]
- CF port mounts

Description

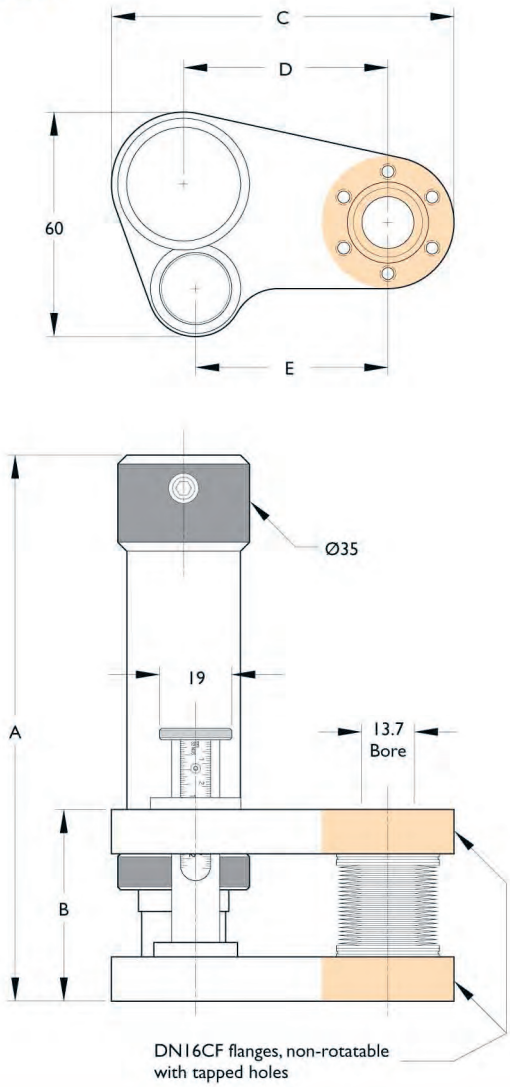
Compact single axis Z stages have smaller footprints than V-Plane® and other stages. They are a practical and economical solution for applications with limited space. Models with 25.4 to 101.6mm of linear travel and bore diameters from 12.7 to 63.5mm are available. The instrument's precision drive employs a fine pitch lead screw mechanism. Approximate positions can be measured along a graduated machinist's scale with both inch and millimetre units included. Top and bottom port flanges are available in DN16CF, DN40CF and DN63CF compatible, tapped CF metal seal flanges. Edge welded stainless steel bellows are used to connect the port flanges on all compact stages.

Specifications

Material	
Flange/body	304 Stainless steel
Bellows	AM 350
Vacuum range	1×10^{-11} mbar
Temperature range[1]	-20°C to 230°C
Weight and dimensions	See table

[1] UHV units are bakeable to 30°C when motorized

Figure 1



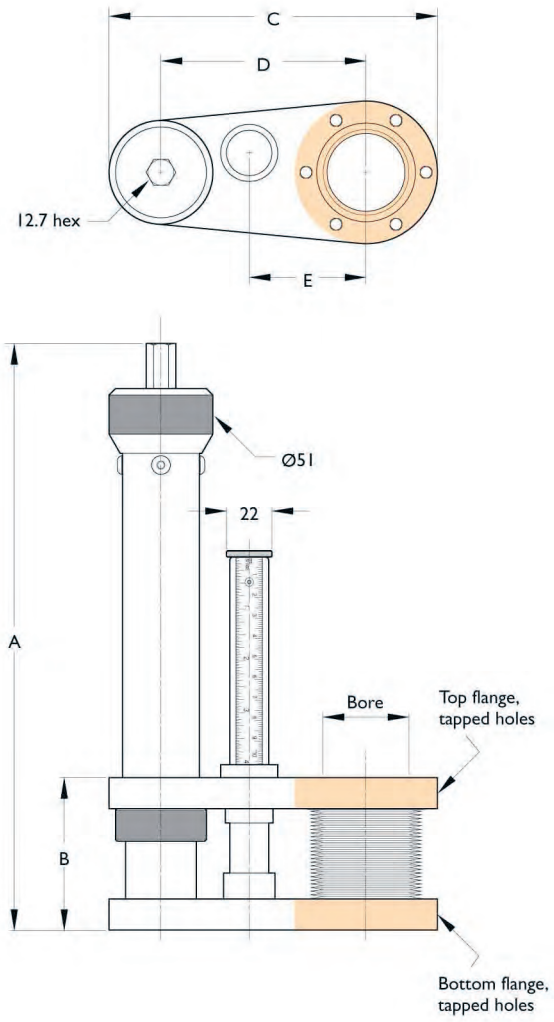
All dimensions are nominal in millimetres unless specified - Weights given are approximate

Single axis

Compact Z stage

Bore size	Linear travel	Flange size	Fig	A Min – Max	B Min – Max	C	D	E	F	Wt G	kg	Reference	Part number
38.1	25.4	DN40CF	2	180.8 – 206.2	55.9 – 81.3	161	100	57	219	212	4	E-LMT-151	**665507**
38.1	50.8	DN40CF	2	180.8 – 231.6	55.9 – 106.7	161	100	57	244	212	4	E-LMT-152	**665509**
38.1	101.6	DN40CF	2	278.1 – 374.7	74.9 – 176.5	161	100	57	387	133	5	E-LMT-154	**665511**
38.1	152.4	DN40CF	2	349.3 – 501.7	82.6 – 235.0	161	100	57	514	212	6	E-LMT-156	**665521**
63.5	25.4	DN63CF	2	180.8 – 206.2	55.9 – 81.3	207	117	73	219	250	4	E-LMT-251	**665525**
63.5	50.8	DN63CF	2	180.8 – 231.6	55.9 – 106.8	207	117	73	244	250	4	E-LMT-252	**665526**
63.5	101.6	DN63CF	2	273.1 – 374.7	74.9 – 176.5	207	117	73	387	250	5	E-LMT-254	**665527**

Figure 2



Motorization options

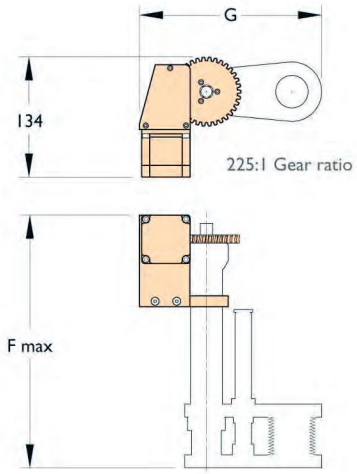
Option -01
Side mount stepper motor

Motorization[1]	Motor specification	Add-on weight kg	Option number
Z Side mount	E	1.4	**-01**

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above

For example: **665518**-01

For total unit weight, add option weight to component weight



All dimensions are nominal in millimetres unless specified - Weights given are approximate

Manipulation

Mini-Z-shifter

UHV Series

Features

- UHV-compatible
- Edge welded bellows
- 14mm clear bore
- Bakeable to 230°C
- Z Travel 25mm or 50mm
- Parallelism of flanges: ± 0.25mm/cm
- Resolution: 1 x 360° turn = 1mm
- Both flanges DN16CF tapped M4

Description

This type of UHV-compatible Z-shifter for applications where space is limited. The MZ types are designed for long service life and high degrees of constructional stability.

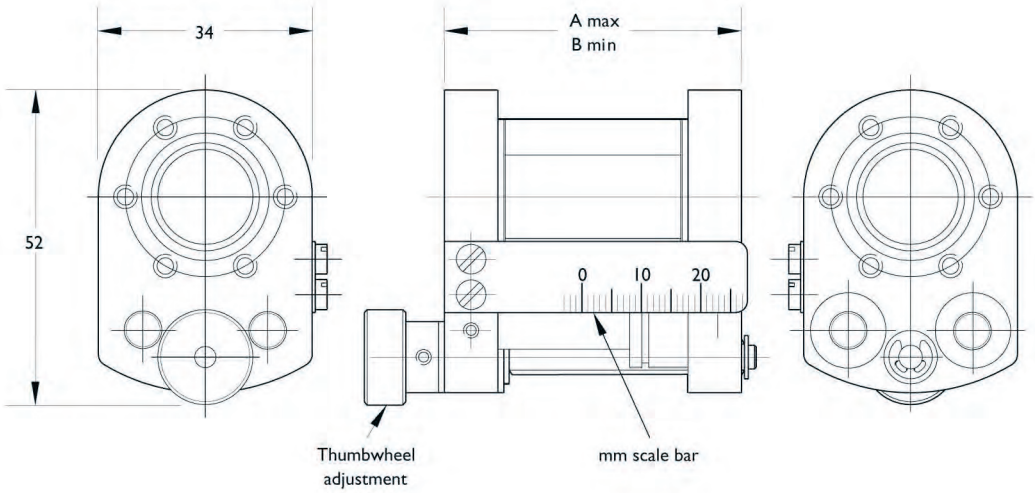
All dimensions are nominal in millimetres unless specified - Weights given are approximate

Mini-Z-shifter

UHV Series

CF 230°C

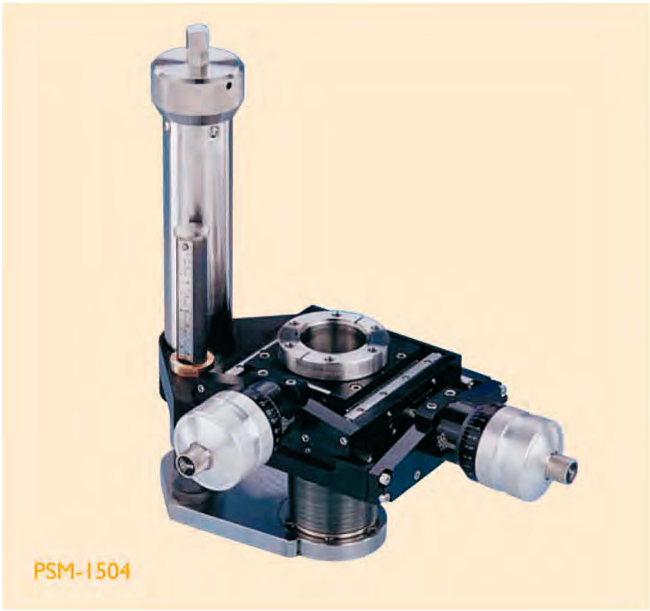
Description	Flange	Travel	Min	Max	Wt kg	Reference	Part number
Mini-Z-Shift	DN16CF	25.4	55	30	0.3	MZ16-25	**1601000**
Mini-Z-Shift	DN16CF	50.8	86	36	0.4	MZ16-50	**1601001**



All dimensions are nominal in millimetres unless specified - Weights given are approximate

Triple axis

Compact XYZ stage



UHV Series

Features

- 50 or 102mm Z-axis travel
- Plus or minus 13mm off-centre XY motion
- 38 and 63mm bore diameters
- Manual or motorized actuators
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 230°C[1]
- CF port mounts

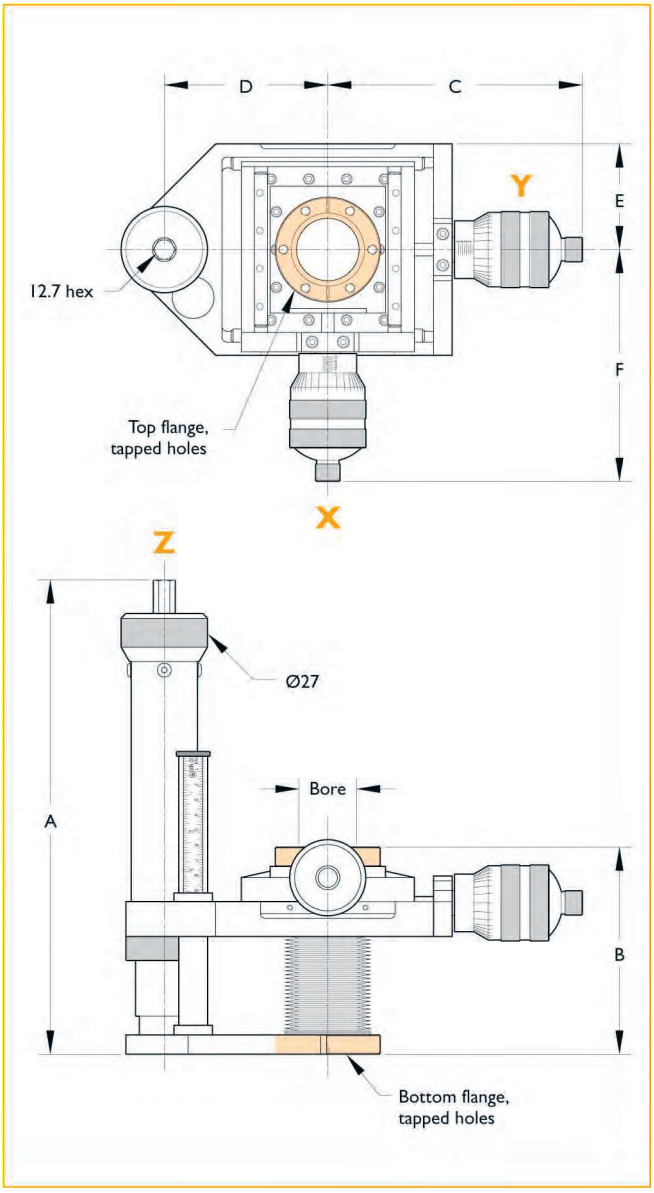
Description

Compact triple axis XYZ stages have smaller footprints than V-Plane® stages. They are a practical and economical solution for applications with limited space. Models with 50 and 100mm of linear travel and bore diameter of 38.1 and 63.5mm are available. The instruments precision Z drive employs a fine pitch lead screw mechanism with approximate positions measured along a graduated machinist's scale with both inch and millimetre units included. The XY axes are micrometer driven and guided by cross roller bearing slides. Micrometers have unique laser-etched plus-minus scales that indicate positive or negative port displacement. Caburn triple axis XY stages provide precise motion and manipulation of samples inside ultra-high vacuum environments. Top and bottom port flanges are available in DN40 and DN63-compatible, tapped CF metal seal flanges. Edge welded stainless steel bellows are used to connect the port flanges on all XYZ compact stages.

Specifications

Material	
Flange/Body	304 Stainless steel
Bellows	AM 350
Vacuum range	1×10^{-11} mbar
Temperature range[1]	-20°C to 230°C
Weight and dimensions	See table

[1] UHV units are bakeable to 30°C when motorized



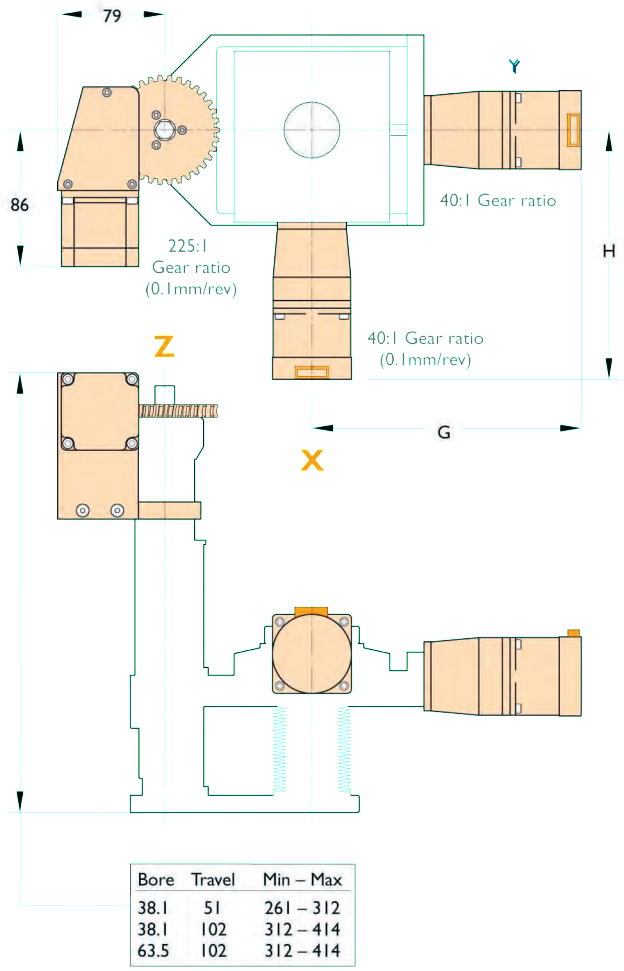
All dimensions are nominal in millimetres unless specified - Weights given are approximate

Triple axis

Compact XYZ stage

Bore size	± XY travel	Z Travel	Flange	A Min	–	A Max	B Min	–	B Max	C	D	E	F	G	H	Wt kg	Reference	Part number
38.1	13	51	DN40CF	248	–	299	124	–	175	164	105	70	150	216	198	11	E-PSM-1502	**678002**
38.1	13	102	DN40CF	299	–	401	124	–	226	164	105	70	150	216	198	11	E-PSM-1504	**678003**
63.5	13	102	DN63CF	299	–	401	147	–	249	178	133	86	162	228	209	13	E-PSM-2504	**678007**

Motorization options



Bore	Travel	Min – Max
38.1	51	261 – 312
38.1	102	312 – 414
63.5	102	312 – 414

Option -01
XY motorization

Option -02
Z motorization

Motorization[1]	Motor specification	Add-on weight kg	Option number
XY In-line stepper	D	1.4	**-01**
Z Side mount	C	1.4	**-02**

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above

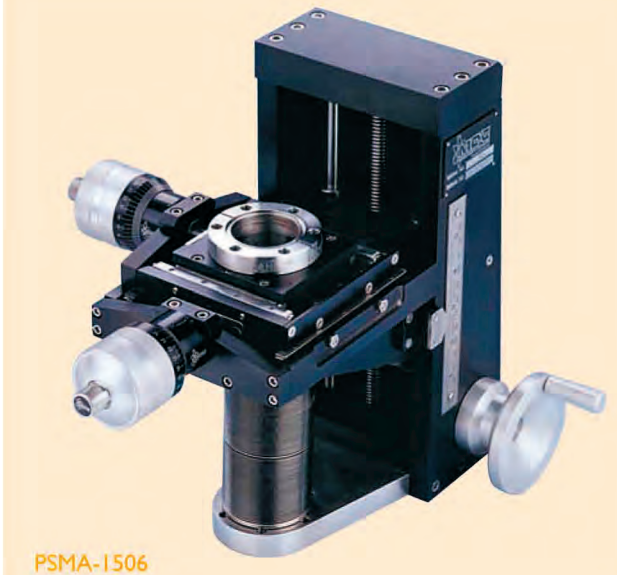
For example: **678002**-01-02

For total unit weight, add option weight to component weight

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Triple axis

Standard XYZ stage



UHV Series

Features

- 102 to 304mm Z-axis travel
- Plus or minus 13 and 25mm off-centre XY motion
- 38, 63 and 102mm bore diameters
- Manual or motorized actuators
- UHV-compatible materials
- Welded bellows seal
- Bakeable to 230°C[1]
- CF port mounts

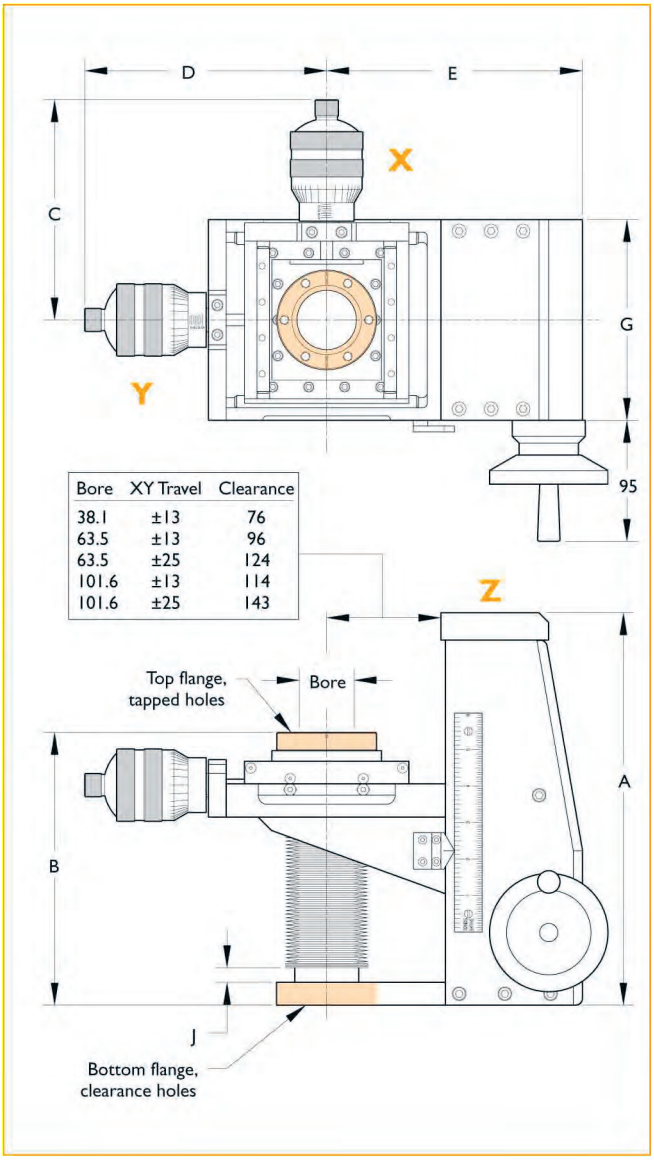
Description

Standard XYZ stages are large bore stages which incorporate triple axis motion in a single stage. The XY travels are micrometer driven and guided by cross roller bearing slides. Caburn-MDC micrometers have unique laser etched plus-minus scales that indicate positive or negative port displacement and are available with either 12.7 or 25.4mm of linear XY displacement. The Z axis employs a handwheel and worm gear reduction drive mechanism with displacement measured along the stage's frame mounted machinist's scale. Z axis linear travels of up to 304.8mm are available. Caburn-MDC standard stages provide precise sample motion and manipulation of samples inside ultra-high vacuum environments.

Specifications

Material	
Flange	304 Stainless steel
Actuator body	Anodized aluminium
Bellows	AM 350
Vacuum range	1×10^{-11} mbar
Temperature range[1]	-20°C to 230°C
Weight and dimensions	See table

[1] UHV units are bakeable to 30°C when motorized



Bore	XY Travel	Clearance
38.1	±13	76
63.5	±13	96
63.5	±25	124
101.6	±13	114
101.6	±25	143

All dimensions are nominal in millimetres unless specified - Weights given are approximate

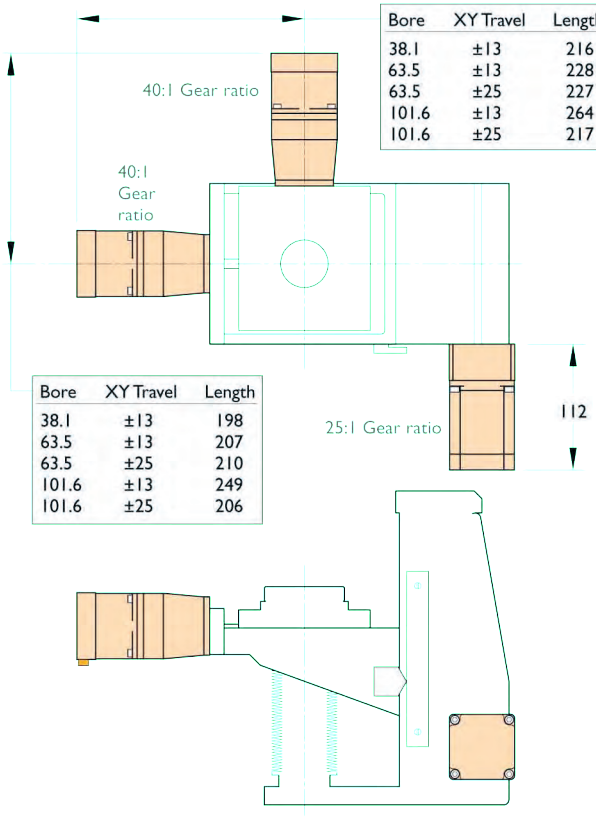
Section 7.2

Triple axis

Standard XYZ stage

Bore size	± XY Travel	Z Travel	Flange	A	Min	B –	Max	C	D	E	G	J	Wt kg	Reference	Part number
38.1	13	102	DN40CF	274	177	–	279	150	164	178	140	32	9	E-PSMA-1504	**678030**
38.1	13	152	DN40CF	325	177	–	329	150	164	178	140	32	12	E-PSMA-1506	**678031**
38.1	13	203	DN40CF	404	208	–	411	150	164	178	140	32	19	E-PSMA-1508	**678032**
38.1	13	305	DN40CF	564	266	–	571	150	164	178	140	32	21	E-PSMA-1512	**678033**
63.5	13	102	DN63CF	297	210	–	312	162	178	196	181	57	20	E-PSMA-2504	**678038**
63.5	13	152	DN63CF	348	210	–	363	162	178	196	181	57	21	E-PSMA-2506	**678039**
63.5	13	203	DN63CF	406	216	–	419	162	178	196	181	57	22	E-PSMA-2508	**678040**
63.5	13	305	DN63CF	513	223	–	528	162	178	196	181	57	23	E-PSMA-2512	**678041**
63.5	25	102	DN63CF	315	228	–	330	206	225	229	187	57	22	E-PSML-2504	**678014**
63.5	25	152	DN63CF	366	229	–	381	206	225	229	187	57	23	E-PSML-2506	**678015**
63.5	25	203	DN63CF	429	236	–	439	206	225	229	187	57	24	E-PSML-2508	**678016**
63.5	25	305	DN63CF	526	236	–	541	206	225	229	187	57	25	E-PSML-2512	**678017**
101.6	13	102	DN100CF	315	228	–	330	184	195	252	213	64	22	E-PSMA-4004	**678046**
101.6	13	152	DN100CF	371	236	–	388	184	195	252	213	64	23	E-PSMA-4006	**678047**
101.6	13	203	DN100CF	429	241	–	444	184	195	252	213	64	24	E-PSMA-4008	**678048**
101.6	13	305	DN100CF	533	246	–	551	184	195	252	213	64	25	E-PSMA-4012	**678049**
101.6	25	102	DN100CF	335	246	–	348	254	267	264	224	64	24	E-PSML-4004	**678022**
101.6	25	152	DN100CF	389	249	–	401	254	267	264	224	64	25	E-PSML-4006	**678023**
101.6	25	203	DN100CF	450	259	–	462	254	267	264	224	64	26	E-PSML-4008	**678024**
101.6	25	305	DN100CF	551	259	–	564	254	267	264	224	64	27	E-PSML-4012	**678025**

Motorization options



Option -01
XY motorization

Option -02
Z motorization

Motorization[1]	Motor specification	Add-on weight kg	Option number
XY In-line stepper	D	1.3	**-01**
Z In-line stepper	F	1.3	**-02**

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above

For example: **678026**-01-02

For total unit weight, add option weight to component weight

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Rotatable axis

360° Adjustable stage

E-RMTG-450

HV Series

Features

- 360° continuous rotary positioning
- Manual or motorized actuator
- Rotary position lock
- Differentially pumped, dual PTFE elastomer seals
- UHV-compatible materials
- Bakeable to 200°C[1]
- CF port mounts

Description

Rotatable axis stages replace conventional rotatable mounting tables previously offered by Caburn-MDC. They provide 360° positioning with greater precision, control and ease of use. Rotatable stages are constructed with worm gear drive mechanisms which offer substantial mechanical advantage over non-geared designs, a feature which allows effortless manual operation, even under a full vacuum load. High torque stepper motors are also available for these stages.

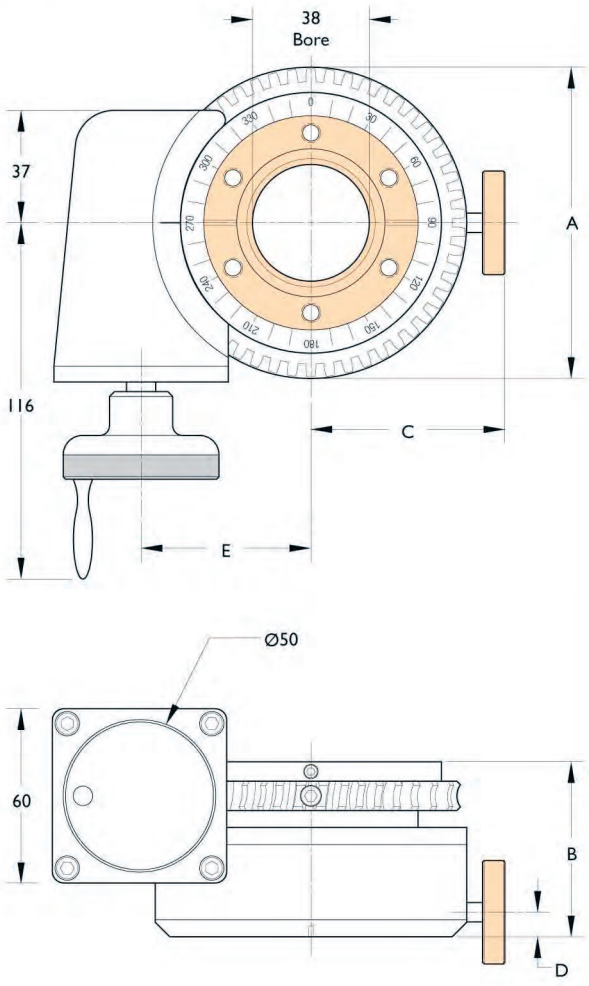
Caburn-MDC rotatable stages can be used to rotate heavy samples or sample support apparatus and structures. Two spring energized PTFE face seals are at the heart of the rotatable stage's sealing mechanism. With provision for differential pumping between the seals, these rotatable stages can be used in UHV environments with bakeout temperatures as high as 200°C.

Specifications

Material	
Flange	304 Stainless steel
Actuator body	Anodized aluminium
Gasket seals	PTFE
Vacuum range	
HV Applications	1×10^{-8} mbar
UHV Applications	Differentially pumped to 1×10^{-9} mbar
Temperature range[1]	-20°C to 200°C
Weight and dimensions	See table

[1] UHV units are bakeable to 30°C when motorized

Figure 1



- Both top and bottom flanges have tapped holes

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Rotatable axis

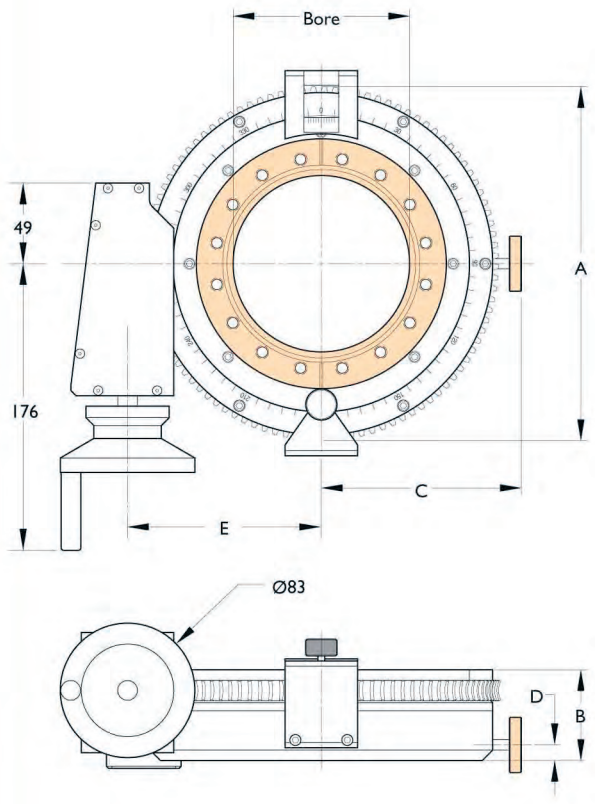
360° Adjustable stage

HV Series

CF 200°C

Bore size	Flange size	Fig	A	B	C	D	E	Wt kg	Reference	Part number
38.1	DN40	1	102	57	63	8	55	5	E-RMTG-275	**665421**
63.5	DN63	2	173	56	114	11	68	9	E-RMTG-450	**665422**
108.0	DN100	2	212	56	122	10	119	12	E-RMTG-600	**665423**
158.8	DN160	2	311	62	159	10	172	18	E-RMTG-800	**665424**
209.6	DN200	2	324	62	184	10	178	25	E-RMTG-1000	**665425**

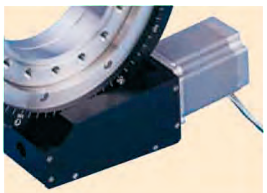
Figure 2



- Both top and bottom flanges have tapped holes

Motorization options

Option -01
Side mount stepper motor

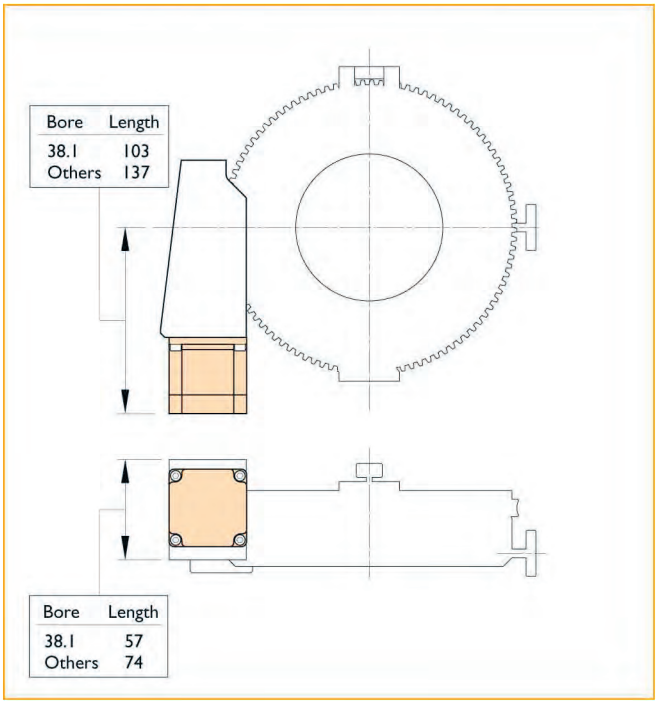


Motorization[1]	Motor specification	Add-on weight kg	Option number
Z Side mount	E	1.4	**-01**

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above

For example: **665518**-01

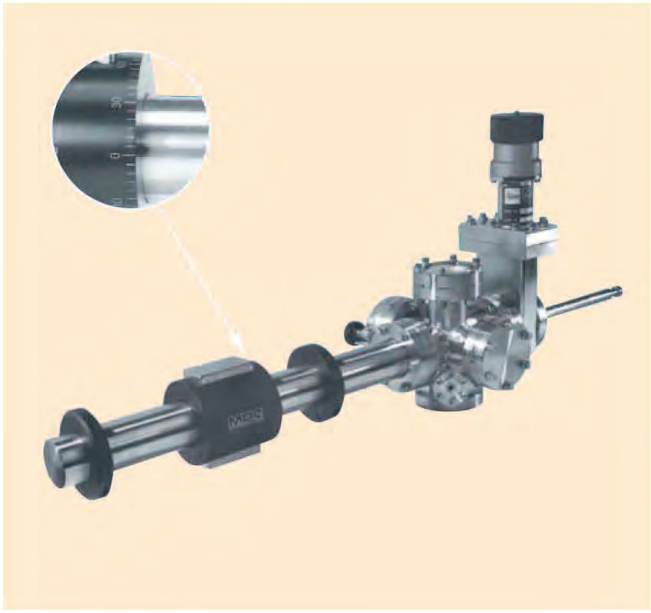
For total unit weight, add option weight to component weight



All dimensions are nominal in millimetres unless specified - Weights given are approximate

Load-lock systems

Introduction



UHV and HV series

Features

- Transfer samples from atmosphere to UHV in minutes
- Choice of 35mm (1 3/8"), 65mm (2 3/8") and 95mm (3 3/4") nominal sample sizes
- Magnetically coupled rotary/linear transporter rod
- Sample chamber with viewport and quick open/close door
- Vertical or horizontal mounting
- Type 304 (1.4301) stainless steel construction
- UHV version bakeable to 200°C

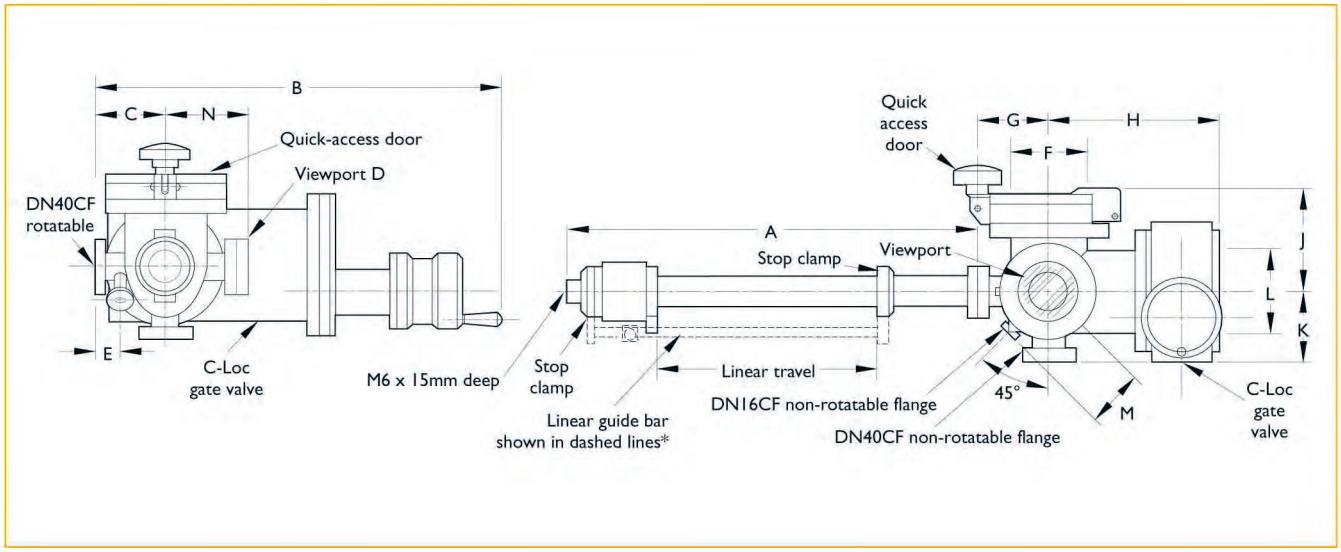
Description

E-FEL fast entry load-lock systems allow quick and easy loading and unloading of a sample in and out of the vacuum chamber, without breaking the system vacuum.

Samples are loaded on to the E-FEL internal transporter through the quick access door on the sample transfer chamber. Loading can be observed through a viewport.

After the transfer chamber is evacuated to the desired level through DNCF flange port, the C-Loc gate valve is opened for access into the main vacuum chamber.

The sample can be moved 305mm (12"), 610mm (24") or 915mm (36"), from the centre of the entry load lock. It can also be rotated 360°. Positioning is controlled by sliding an external sleeve that is magnetically coupled with the transporter rod, connected to the sample holder, inside the system.



E-FEL Series	Valve HT B	C	View dia D	E	G	H	J	K	M	N
E-FEL-100	279	75.2	E-FEL-100	33.5	62.5	113.3	58	63	60.2	61
E-FEL-200	314	86.2	E-FEL-200	34.8	74.4	174.5	99	71	58.7	70
E-FEL-400	522	88.9	E-FEL-400	32.0	93.5	210.1	138	89	72.9	112

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Load-lock systems

Introduction

UHV Series

Nominal sample	Linear travel	(A) Magnetic transporter	Door ID (F)	Valve ID (L)	Reference	Part number
35	304.8	584.2	41.4[1]	38.1[1]	E-FEL-112M	1600011
35	609.6	927.1	41.41	38.11	E-FEL-124M	1600012
35	914.4	1231.9	41.41	38.11	E-FEL-136M	1600013
60	304.8	584.2	60.5	63.5	E-FEL-212M	1600015
60	609.6	927.1	60.5	63.5	E-FEL-224M	1600016
60	914.4	1231.9	60.5	63.5	E-FEL-236M	1600017
95	304.8	584.2	97.3	101.6	E-FEL-412M	1600019
95	609.6	927.1	97.3	101.6	E-FEL-424M	1600020
95	914.4	1231.9	97.3	101.6	E-FEL-436M	1600021

[1] The nominal ID of 100 series door and gate valve gasket is 38.8 ID when using CCG40

HV Series

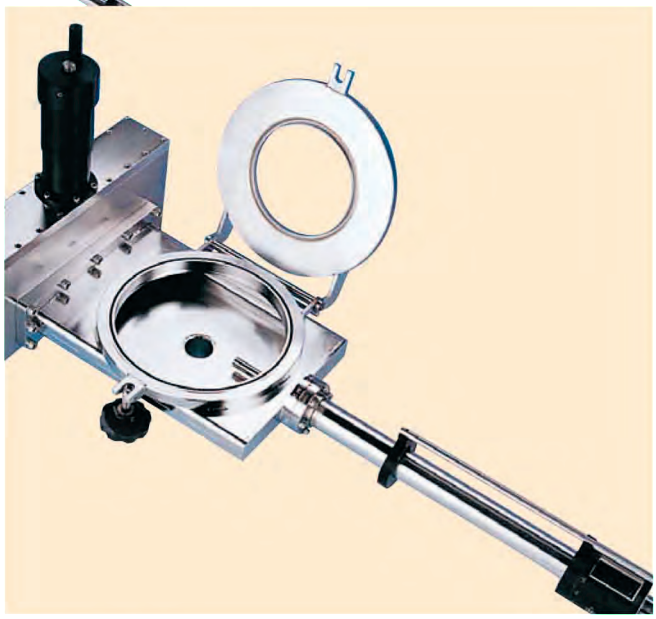
Nominal sample	Linear travel	(A) Magnetic transporter	Door ID (F)	Valve ID (L)	Reference	Part number
35	304.8	584.2	41.4[1]	38.1[1]	E-FEL-112	160000
35	609.6	927.1	41.41	38.11	E-FEL-124	160001
35	914.4	1231.9	41.41	38.11	E-FEL-136	160002
60	304.8	584.2	60.5	63.5	E-FEL-212	160004
60	609.6	927.1	60.5	63.5	E-FEL-224	160005
60	914.4	1231.9	60.5	63.5	E-FEL-236	160006
95	304.8	584.2	97.3	101.6	E-FEL-412	160008
95	609.6	927.1	97.3	101.6	E-FEL-424	160009
95	914.4	1231.9	97.3	101.6	E-FEL-436	1600010

[1] The nominal ID of 100 series door and gate valve gasket is 38.8 ID when using CCG40

Customer note Load lock systems are shipped in component form, for customer assembly on-site.

Load-lock systems

Rectangular



HV Series

Features

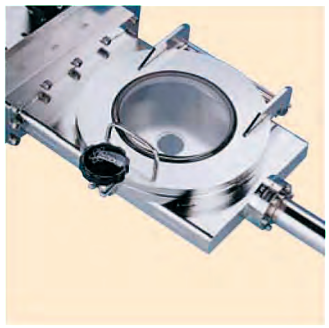
- Fast transfer of samples from atmosphere to UHV
- Up to 203mm (8") diameter sample sizes
- Magnetically coupled rotary/linear transporter rod
- Sample chamber with viewport fitted quick-access door
- Linear guide to lock rotation
- Vertical or horizontal mounting
- Type 304 (1.4301) stainless steel construction
- Bakeable to 200°C

Description

E-RFEL rectangular fast entry load-lock systems allow quick and easy loading and unloading of a sample in and out of the vacuum chamber without breaking the system vacuum.

Samples are loaded on to the E-RFEL internal transporter through the quick-access door on the sample transfer chamber. Loading can be observed through a viewport. After the transfer chamber is evacuated to the desired level through a CF flange port, the C-Loc rectangular port valve is opened for access into the main chamber.

The sample can be moved 305mm (12"), 610mm (24") or 915mm (36"), from the centre of the load lock chamber. It can also be rotated 360° or locked in any position during linear transfer. Positioning is controlled by sliding an external sleeve that is magnetically coupled with the transporter rod, connected to the sample holder, inside the system.



The quick-access door swings clear for sample entry and removal. The tip of the magnetic transporter is accessible through this door. Various sample handling accessories including Cab-Fast® and Auto-Dock™ sample handling systems are available. Doors are sealed with Viton® elastomer gaskets. High temperature Kalrez® elastomers can be used to increase the systems bakeout temperature to 200°C.

Rectangular entry load-lock systems are fitted with UHV-rated magnetic transporters and include a transporter guide rod mechanism. The guide rod mechanism allows rotation lock during sample transfer. The magnets in the transporter actuator (black cylinder in photograph) must be removed for 150°C service or bakeout. The magnets must not be subjected to temperatures in excess of 30°C.

Rectangular to circular flange adaptors provide connectability between rectangular entry load-lock system gate valves and any vacuum chamber fitted with a 13¼" CF mating flange. These flange adaptors are also available in other sizes for use with the full range of Caburn rectangular gate valves. See Section 1 to order other adaptor sizes.

All dimensions are nominal in millimetres unless specified - Weights given are approximate

HV Series

Elastometer seal 150°C

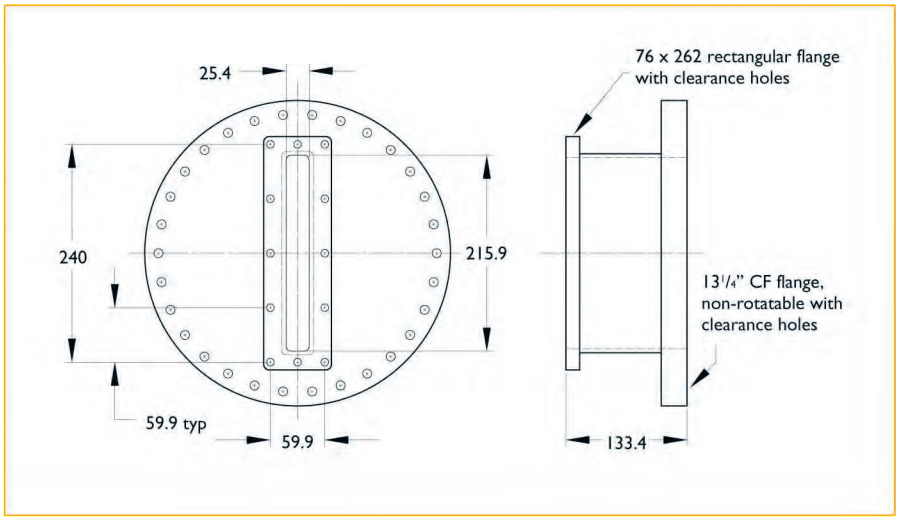
Non sample	Linear travel	Transporter A	Valve aperture	Wt kg	Reference	Part number
203	304.8	584	25.4 x 210.9	48	LLR-812	**665609**
203	609.6	927	25.4 x 210.9	49	LLR-824	**665610**
203	914.4	1232	25.4 x 210.9	50	LLR-836	**665611**

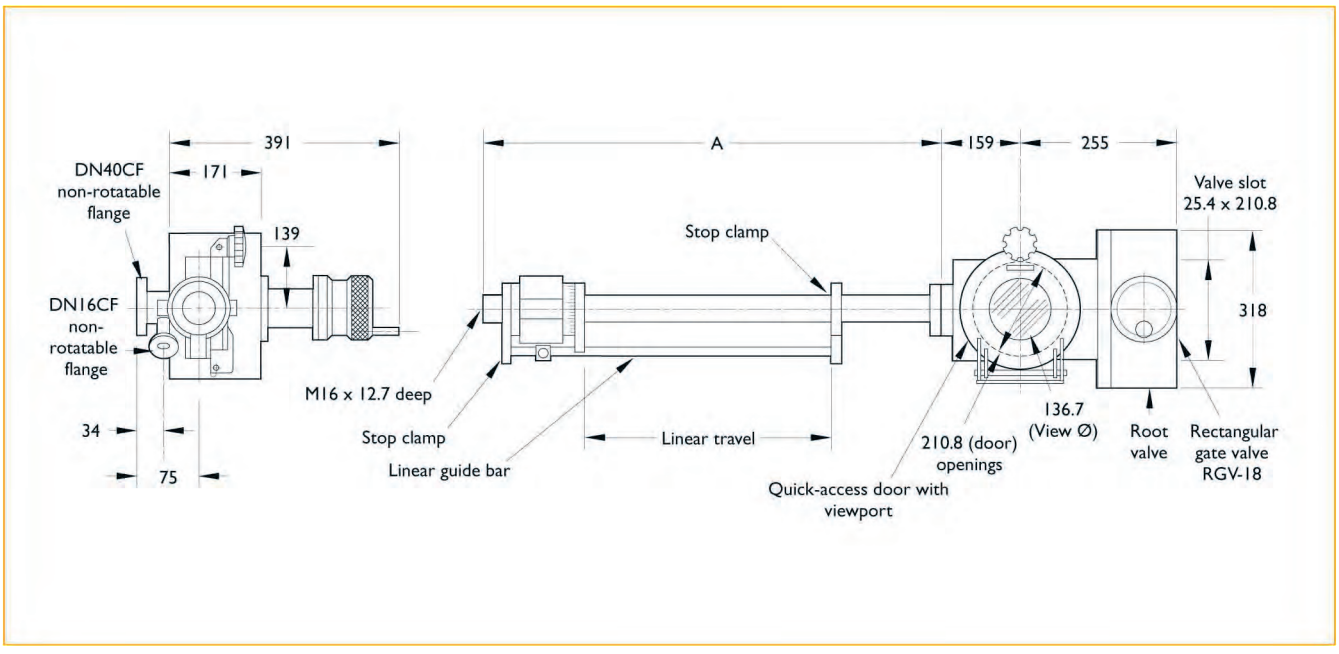
Flange adaptor

This drawing only represents the flange adaptor used with the rectangular entry load-lock systems presented in this section.

A photograph and description appear on the previous page.

Reference	Wt kg	Part Number
FIX8	20.9	**665801**





Customer note Load lock systems are shipped in component form, for customer assembly on-site.

Magnetic transporters

Guided and unguided

E-GMTM-12 Guided transporter

UHV Series

Features

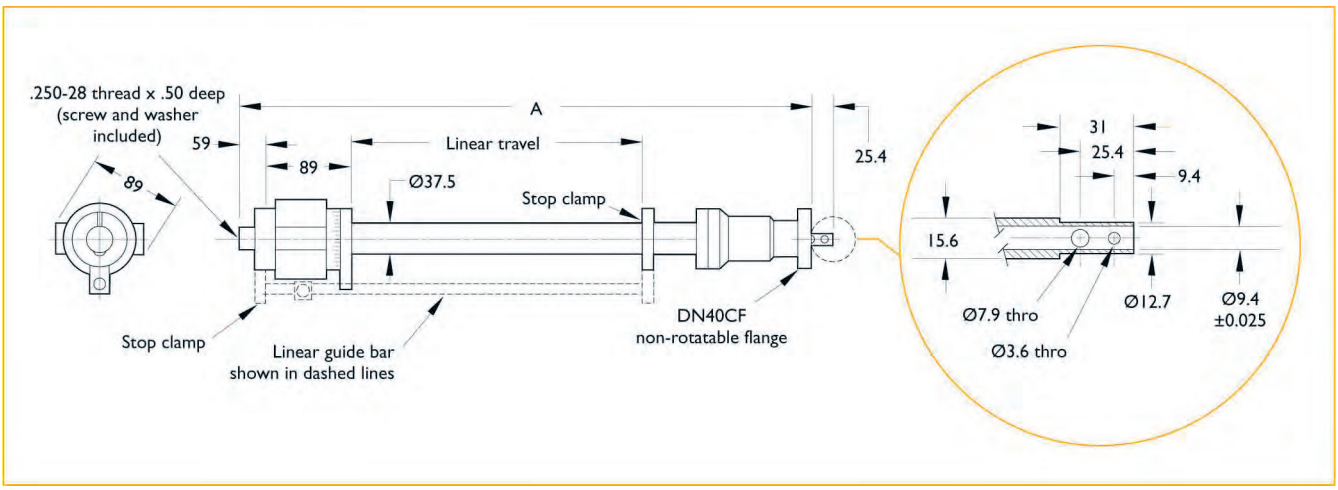
- UHV-compatible materials
- All-metal with ball bearing guides
- Magnetically coupled rotary/linear transporter rod
- Vertical or horizontal mounting
- Guided and unguided models
- 2.27kg maximum axial force
- 1Nm maximum torque
- Type 304 (1.4301) stainless steel construction
- Bakeable to 200°C
- Vacuum range 10^{-11} mbar

Description

MTM series UHV magnetically coupled sample transporters allow samples to be moved 305mm (12"), 610mm (24") or 915mm (36"), depending on the model, into the chamber.

They can also be rotated 360°. Linear positioning is controlled by sliding an external sleeve which is magnetically coupled with the transporter rod and sample holder inside the system.

GMTM models have linear guide bar to lock the rotation in any position during linear travel.



All dimensions are nominal in millimetres unless specified - Weights given are approximate

Magnetic transporters

Guided and unguided

UHV Series

Ball bearings 200°C

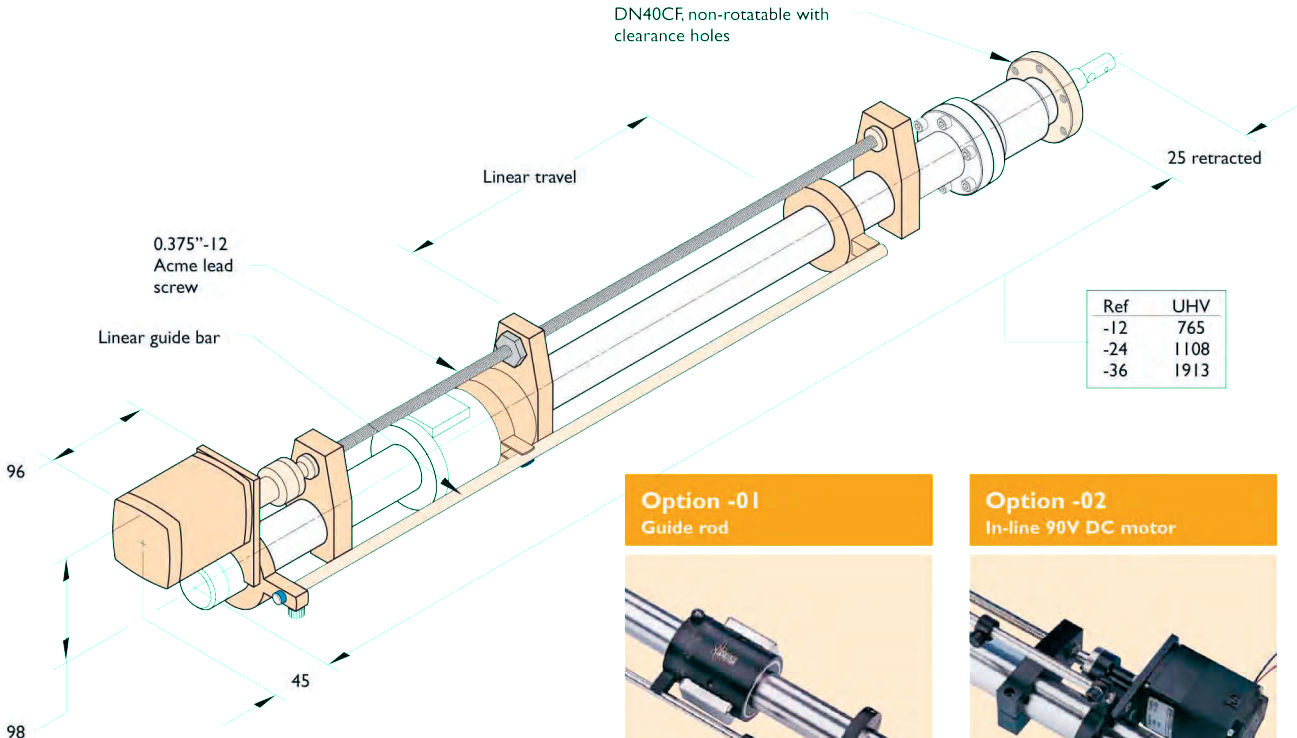
Transporter type	Nominal travel	Transporter A	Wt kg	Reference	Part number
Unguided	305	699	4.5	MTM-12	**665700**
Unguided	610	1041	5.5	MTM-24	**665701**
Unguided	915	1346	6.3	MTM-36	**665702**
Guided	305	699	4.5	GMTM-12	**665700-01**
Guided	610	1041	5.5	GMTM-24	**665701-01**
Guided	915	1346	6.3	GMTM-36	**665702-01**

HV Series

Vespel® bearings 150°C

Transporter type	Nominal travel	Transporter A	Wt kg	Reference	Part number
Unguided	305	584	4.5	MT-12	**665100**
Unguided	610	927	5.5	MT-24	**665101**
Unguided	915	1232	6.3	MT-36	**665102**
Guided	305	584	4.5	GMT-12	**665100-01**
Guided	610	927	5.5	GMT-24	**665101-01**
Guided	915	1232	6.3	GMT-36	**665102-01**

Transporter options



Ref	UHV
-12	765
-24	1108
-36	1913

Option -01
Guide rod

Option -02
In-line 90V DC motor

Motorization[1]	Motor Specification	Add-on weight kg	Option Number
Motor 90V DC	B	1.4	**-02**

Motorized UHV transporter

Motorized option includes a linear guide bar.

[1] When ordering motorized options, add the option number and price to the desired UHV or HV component part number listed above

For example: **665700**-02

For total unit weight, add option weight to component weight

All dimensions are nominal in millimetres unless specified - Weights given are approximate

Quick-access doors

Blank and viewport

HV Series

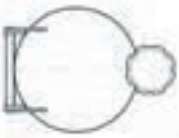
Features

- Blank or viewport fitted doors
- **FKM / FPM fluoroelastomer** door seal
- HV-compatible materials
- Bakeable to 150°C
- CF port mounts
- Clearance hole mounting port flange

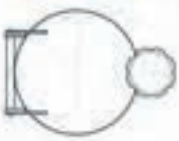
Specifications

Material	
Flange	304ss
Door Seal	**FKM / FPM fluoroelastomer**
Viewport	7056 Glass
Vacuum range	$1x10^{-9}$ mbar
Temperature range*	-20°C to 150°C
Weight and dimensions	See table
Bolt hole orientation	Reference

On centreline — QD-275



Straddles centreline — QD-450, QD-600, QD-800, QD-1000



* Contact factory for high temperature rating

Description

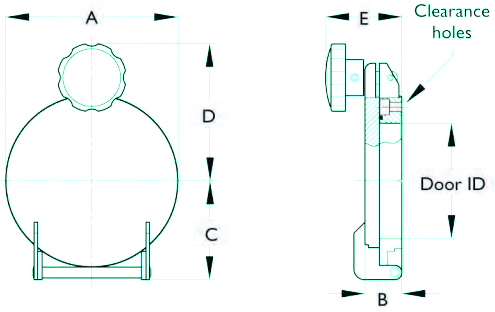
Quick-access doors provide convenient and fast manual loading of samples in and out of vacuum chambers. Doors are hinged and fitted with a swing-away hand knob locking mechanism. viewport fitted doors are constructed with Corning type 7056 glass fused to a Kovar® nickel-iron transition sleeve. All access doors are supplied with **FKM/FPM fluoroelastomer** seals suitable for high vacuum service. High temperature Kalrez® elastomers can be used to increase a door's maximum temperature rating.

Quick-access doors with clearance mounting holes are intended for installation on chamber ports with tapped holes.

Socket-cap head bolts must be used.

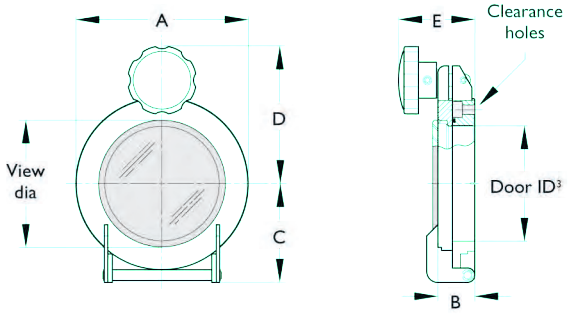
All dimensions are nominal in millimetres unless specified - Weights given are approximate

Blank door
Clearance holes



Flange size	Clear holes	Door diameter	A	B	C	D	E	Wt kg	Reference	Part number
DN40CF	6.7	34.9[2]	70	23	44	57	37	1	QD-275-CH	**665210**
DN63CF	8.4	64	114	27	70	96	47	3	QD-450-CH	**665211**
DN100CF	8.4	102	152	33	87	121	67	5	QD-600-CH	**665212**
DN160CF	8.4	152	203	35	118	147	71	9	QD-800-CH	**665213**
DN200CF	8.4	204	253	38	143	172	74	12	QD-1000-CH	**665214**

viewport door
Clearance holes



Flange size	Clear holes	Door diameter	A	B	C	D	E	Wt kg	Reference	Part number
DN40CF	6.7	34.9	70	23	44	57	37	1	QD-275-VP-CH	**665215**
DN63CF	8.4	68	114	27	70	96	47	3	QD-450-VP-CH	**665216**
DN100CF	8.4	98	152	33	87	121	67	5	QD-600-VP-CH	**665217**
DN160CF	8.4	136	203	35	118	147	71	9	QD-800-VP-CH	**665218**
DN200CF	8.4	136	253	38	143	172	74	12	QD-1000-VP-CH	**665219**

[2] Nominal ID of door gasket is 38.8

[3] For viewport door ID, use blank door ID in table above

Port aligners

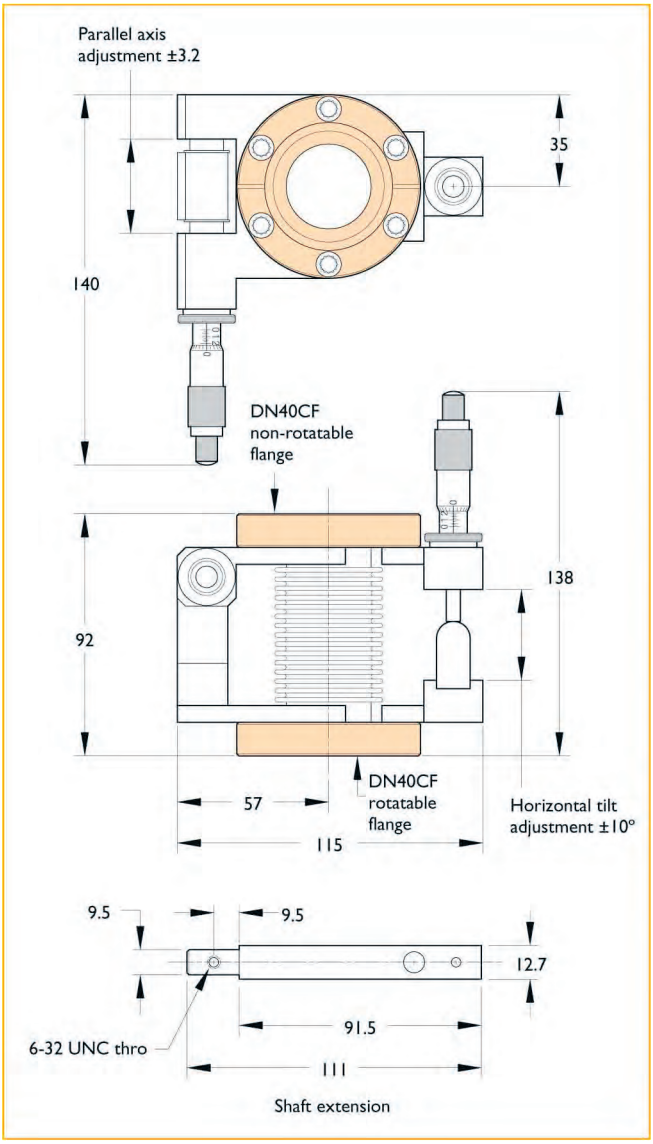
Load-lock gimbal

AG-150

UHV Series

Features

- 10° horizontal tilt
- 3.2mm axial displacement
- Micrometer actuators with position lock
- Formed bellows seal
- Bakeable to 200°C
- CF port mounts
- Includes magnetic transporter extension kit



Description

Port aligners are adjustable port flange interfaces that provide motion instruments with angular tilt and axial shift. They can also be used to correct mate-up between components with minor alignment imperfections.

Load-lock gimbals are unique port alignment instruments specifically designed for the precision alignment of magnetically coupled transporters as used with circular and rectangular entry load-lock systems. Load-lock gimbal port aligners are fitted with precision micrometer adjustments for both horizontal tilt (above and below a horizontal plane of travel) and side to side parallel axis displacement. Load-lock gimbals are intended for horizontal installation with its tilt adjustment micrometer at a bottom 6 o'clock position. They include a stainless steel formed bellows adaptor which mates between the magnetic transporter and the sample staging chamber. A transporter shaft extension kit to compensate for the increase in the transporters overall length is also included.

Specifications

Material

Flange	304 Stainless steel
Body	Anodized aluminium
Bellows, formed	316 Stainless steel
Vacuum range	1×10^{-11} mbar
Temperature range	-20°C to 200°C
Weight and dimensions	See table

Description	Wt kg	Reference	Part number
Alignment gimble	1	AG-150	**665300**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

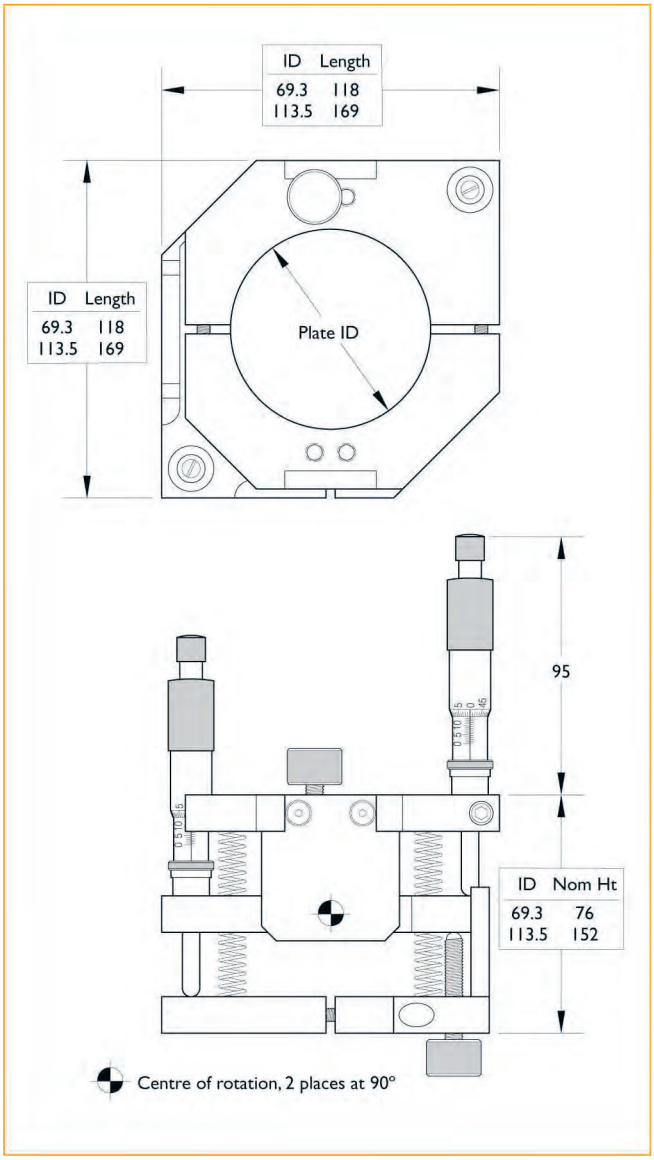
Port aligners

Standard gimbal

UHV Series

Features

- Independent planes provide 15° tilt about X and Y axes
- Tilt position lock for each plane
- Micrometer or screw adjustment actuators
- UHV-compatible materials
- Bakeable to 230°C with screw type actuators
- Designed for use with CF port mount formed bellows adaptors



Description

The standard gimbal geometry consists of three parallel and equidistant aluminium plates interconnected in a universal joint geometry. The top and bottom plates are equally spaced from the centre plate and held in a parallel and neutral position with eight coil springs. Top and bottom plates are fitted with precision micrometers used to produce a 15° tilt about the centre plates X and Y axis respectively. When all adjustment mechanisms are disengaged the springs force the plates back to a neutral and parallel position. Economical screw type adjustments are also available in place of micrometers.

Standard gimbals are designed for use with Caburn-MDC formed bellows flexible adaptors with 50.8 and 31.8mm bore diameters. Flexible bellows adaptors are not included with standard gimbal assemblies and must be purchased separately.

Specifications

Material

Flange	304 Stainless steel
Body	Anodized aluminium
Vacuum range	1×10^{-8} mbar
Temperature range	
Screw type	-20°C to 230°C
Micrometer type	-20°C to 100°C
Weight and dimensions	See table

Plate ID	Type	Wt kg	Reference	Part number
69.3	Micrometer	2	FGC-275-M	**676000**
69.3	Screw	2	FGC-275-S	**676001**
113.5	Micrometer	3	FGC-450-M	**676002**
113.5	Screw	3	FGC-450-S	**676003**
69.3	Bellows	1	150-X	**400003**
113.5	Bellows	2	250-X	**400005**

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

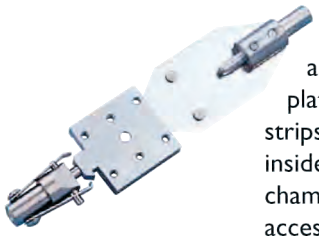
Introduction

Features

- Cab-Fast® right angle sample handlers
- Auto-Dock™ in-line sample handlers
- Rotary-linear accessories

Cab-Fast® right-angle sample handlers

The Cab-Fast® sample handling system provides a simple yet versatile means of loading samples for transportation to manipulators, parking carousels, deposition stations and other locations inside ultra-high vacuum systems. They allow the transfer of samples between linear drive instruments positioned at right angles. Samples are first secured to platens using sample mounting strips. The loaded platen is placed inside a load-lock sample staging chamber through the chambers quick-access door. Inside, the platen is secured and attached to the platen fork previously installed to the tip of a magnetic transporter. Once the staging chamber is evacuated to the desired vacuum level and the gate valve is opened the sample is ready for transfer.



Auto-Dock™ in-line sample handlers

The Caburn-MDC's Auto-Dock™ sample handling system is a patented group of modular sample handling components ideally suited for the transfer of samples between chambers and typically used in tandem with Caburn-MDC magnetic transporters. In contrast with the Cab-Fast® system, Auto-Dock™ allows the transfer of samples between linear drive instruments positioned in-line with each other. The Auto-Dock™ system is comprised of three basic components, a sample-holder plate, a vacuum-dock and a transport-dock. Samples are shuttled back and forth between a vacuum process chamber and a load-lock's sample staging chamber attached to it by fastening samples to the sample-holder plate. The sample-holder plate is manually secured to a transport-dock fixed to the tip of an Caburn-MDC magnetic transporter inside the load-lock's sample staging chamber. The sample is then transported to the process chamber where the vacuum-dock component is strategically positioned and ready to receive the sample-holder plate

Caution

Anodized aluminium finishes will begin to discolour when baked in excess of 150°C.

This is only a cosmetic condition which does not impact performance or reliability.

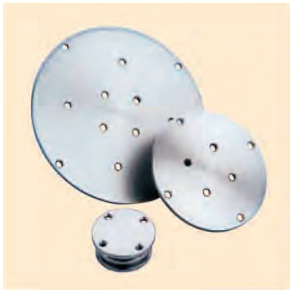
All dimensions are nominal in millimetres unless specified - Weights given are approximate

Rotary-linear accessories

Rotary-linear accessories are an assortment of in-vacuum hardware components used to complement and expand the capabilities of Caburn-MDC rotary and linear motion and manipulation instruments. Various drive shaft attachments are offered including universal joints, bellows couplings, extension couplings, rotary and linear bearings and bearing mounts, ground shaft stock, set-screw collars and vented cap screws.

In-vacuum accessories

Sample handling systems



Cab-Fast® right-angle sample handlers

The Cab-Fast® sample handling system provides a simple yet versatile means of loading samples for transportation to manipulators, parking carousels, deposition stations and other locations inside ultra-high vacuum systems. They allow the transfer of samples between linear drive instruments positioned at right angles to each other. They are ideally suited for use with magnetically coupled transporters and other motion and manipulation instruments.

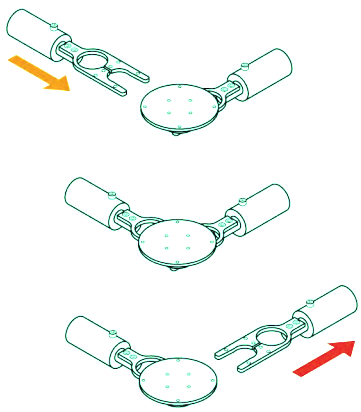
Auto-Dock™ in-line sample handlers

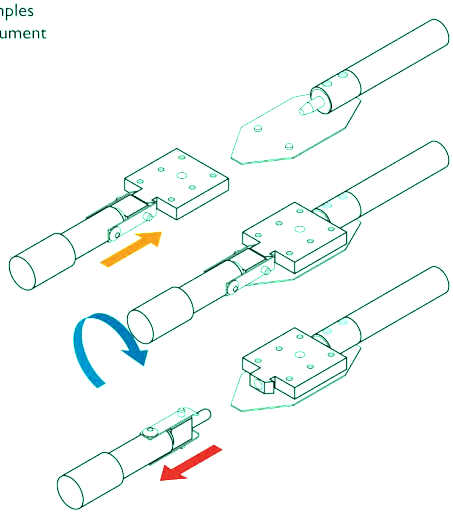
The Auto-Dock™ sample handling system is a group of modular sample handling components ideally suited for the transfer of samples between vacuum chambers when used with Caburn-MDC magnetic transporters. Auto-Dock™ allows the transfer of samples between linear drive instruments positioned in-line with each other. The Auto-Dock™ system is comprised of three basic components, a docking sample-holder, a vacuum-dock and a transport-dock.

Features

- UHV sample handling
- Fast sample transfer
- 304ss construction

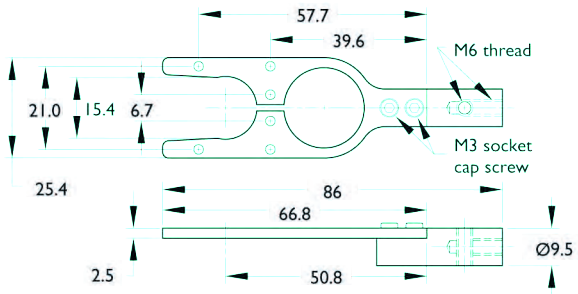
Cab-Fast® sample handling tools are designed to transport samples in and out of vacuum systems. This diagram shows a dual instrument arrangement which allows right angle sample transfer.





Auto-Dock™ sample handling tools are ideally suited for for use with Caburn-MDC magnetic transporters in sample transfer load-lock systems. They are designed for in-line sample transfer.

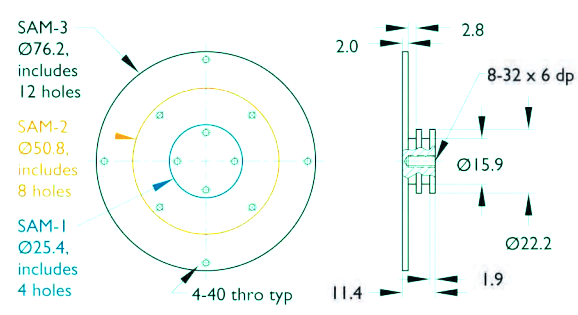
Platen fork



Reference	Part number
FOR-1	7665029

Cab-Fast® platen forks are designed to lock on to and hold Cab-Fast® platens during the transport and transfer of samples between chambers or other motion and manipulation instruments.

Platen sample holder



Reference	Part number
SAM-1	7665026
SAM-2	7665027
SAM-3	7665028

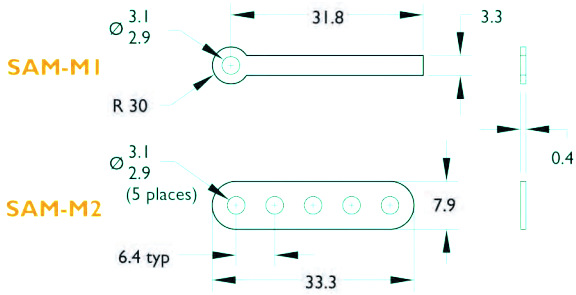
Cab-Fast® sample platens are designed to hold samples during in-vacuum sample processing. Samples can be secured in place using sample mounting strips and screws.

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

Cab-fast® sample handlers

Sample mount strips

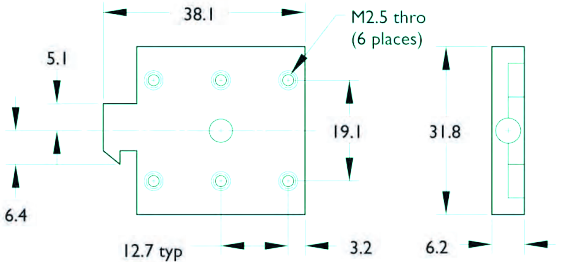


Reference	Part number
SAM-M1	665039
SAM-M2	665040

Caburn-MDC sample mounting strips offer a versatile means of fastening samples to Cab-Fast® sample platens and Auto-Dock™ docking sample-holders.

Sold in packages of 5.

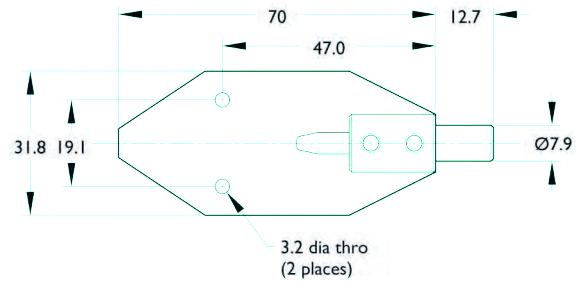
Dock sample-holder



Reference	Part number
STA-1	665016

Auto-Dock™ docking sample-holders are designed to hold samples during in-vacuum sample processing. Samples are secured in place using sample mounting strips and screws.

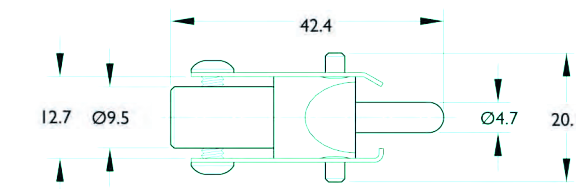
Vacuum-dock



Reference	Part number
STA-2	665017

Auto-Dock™ vacuum-docks are designed to receive and hold Auto-Dock™ sample-holders during in-vacuum sample processing. They are typically fixed inside a vacuum chamber as part of a sample processing structure.

Transport-dock

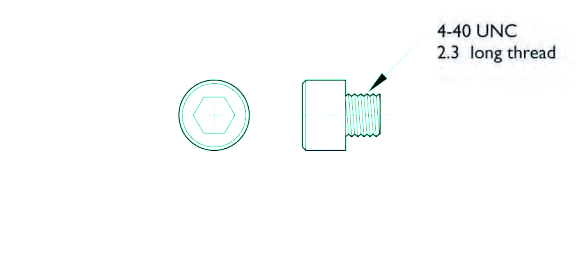


Use with extension rod.
(Part numbers 680060, 680061, 680062 and 680063)

Reference	Part number
STA-3	665015

Auto-Dock™ transporter-docks are designed to receive, hold and transport Auto-Dock™ sample-holders in and out of vacuum sample processing chambers. They are attached to the end of Caburn-MDC magnetic transporter shafts.

Screws, non-vented



Reference	Part number
SAM-S1	665041

Socket head screws made of 300ss ideal for Cab-Fast® and Auto-Dock™ sample handling systems and come in packages of 25 pieces. These screws are not vented and should only be installed into tapped through holes.

In-vacuum accessories

Rotary and linear motion

Rotary-linear accessories

Rotary-linear accessories are an assortment of in-vacuum hardware components used to complement and expand the capabilities of Caburn-MDC rotary and linear motion and manipulation instruments. Various drive shaft attachments are offered including universal joints, bellows couplings, extension couplings, rotary and linear bearings and bearing mounts, ground shaft stock, set-screw collars and vented cap screws.

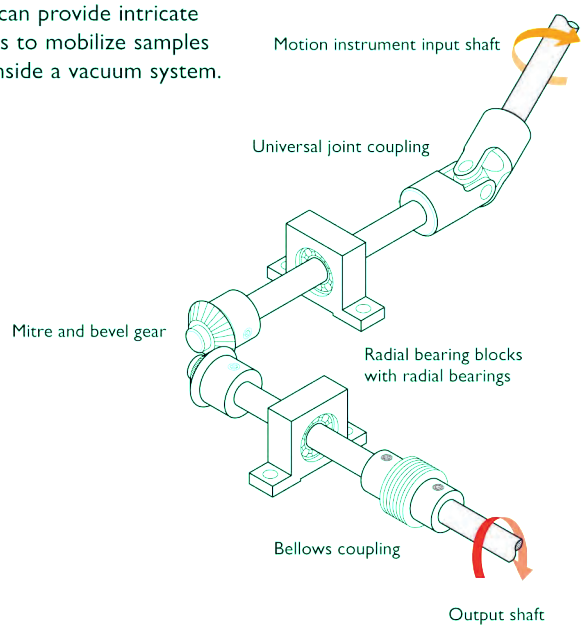
The components presented in this section can also be used in combination with products presented in the Cab-Fast® and Auto-Dock™ accessories sections of this catalogue. Custom designed hardware is also available if required.

Please contact Caburn-MDC's technical sales engineers with your inquiries.

Features

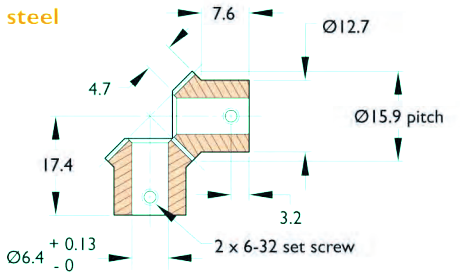
- UHV sample handling
- Fast sample transfer
- 304ss construction

Caburn-MDC rotary and linear accessories can provide intricate motion paths to mobilize samples or devices inside a vacuum system.



Mitre and bevel gear

Stainless steel

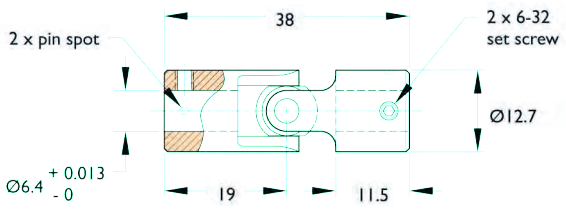


Reference	Part number
AM48-1-S	685000

Mitre and bevel gears provide the means of rotary input with 90° output rotation. They accept 6.4mm diameter shafts and come in a set of two gears fitted with 6-32 UNC set screws for fastening to shafts.

Universal joint

Stainless steel / Phosphor bronze



Reference	Part number
AUJ-3	680000

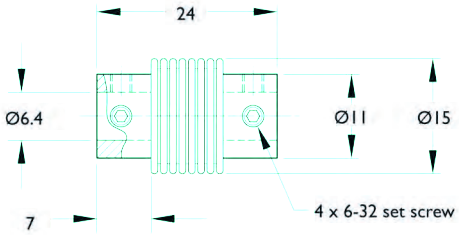
Universal joints provide rotary motion input with variable angle rotary output for 6.4mm shaft diameters. The maximum operating angle is 30° at low speeds and 10° at high speeds.

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

Rotary and linear motion

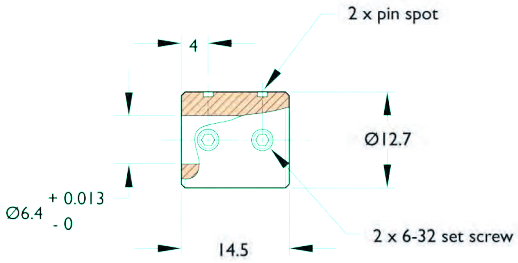
Bellows coupling



Reference	Part number
ACO4-4	682000

Bellows couplings for 6.4mm shaft diameters provide 0.4 Nm maximum torque at a maximum tilt angle of 5° or maximum axial misalignment of 0.3mm. They provide zero backlash and uniform angular velocity with low vibration.

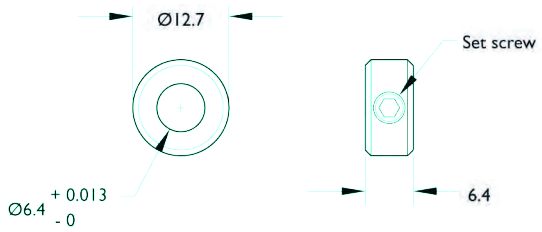
Sleeve coupling



Reference	Part number
ACT-3	683000

Sleeve couplings are used to customize and extend 6.4mm diameter shafts inside a vacuum system. They are fitted with two 6-32 UNC set screws to lock shafts in position.

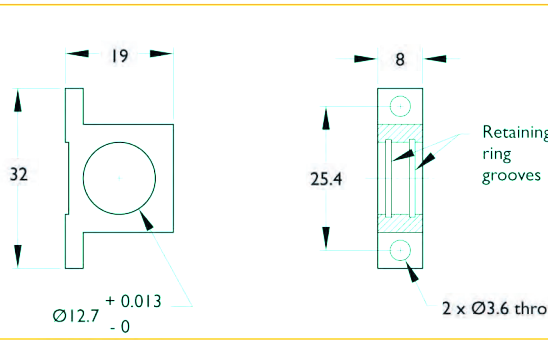
Set screw collar



Reference	Part number
ACS-22	690000

Set screw collars are used to create mechanical stops along a shaft's length. Supplied with 6-32 UNC set screws for position lock.

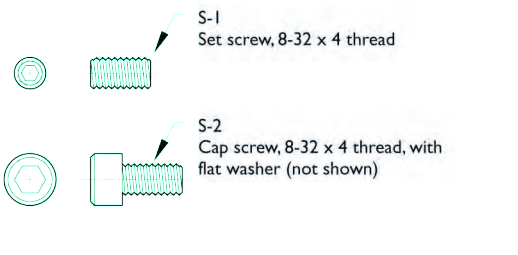
Bearing mount, radial



Reference	Part number
ABME-1	688000

Radial bearing mounts are made of vacuum grade aluminium. They are designed to accept a radial bearing for a 6.4mm shaft diameter. They include two retainer rings to hold the bearing assembly in place.

Screws, non-vented



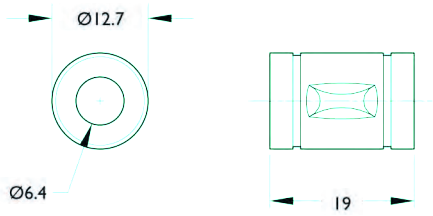
Reference	Part number
S-1	680100
S-2	680101

These are 300 series stainless steel socket head screws. They come in packages of 25 pieces.

In-vacuum accessories

Rotary and linear motion

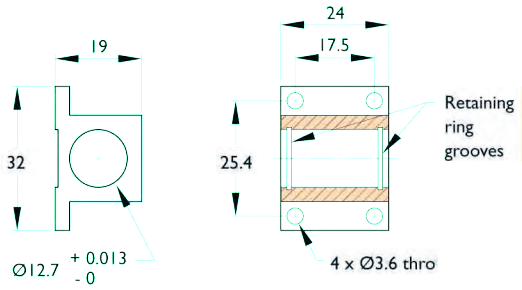
Linear ball bearing



Reference	Part number
ALMB-1	687000

Linear bearings support 6.4mm diameter linear motion drive shafts. They are constructed of 300 series stainless steel and coated with Dicronite® dry lubricant suitable for UHV service.

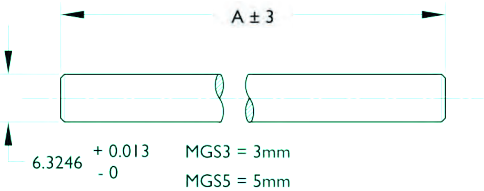
Bearing mount, linear



Reference	Part number
ALME-1	689000

Linear bearing mounts are made of vacuum grade aluminium. They are designed to accept a linear bearing for a 6.4mm shaft diameter. They include two retainer rings to hold the bearing assembly in place.

Ground stock



Three standard lengths:

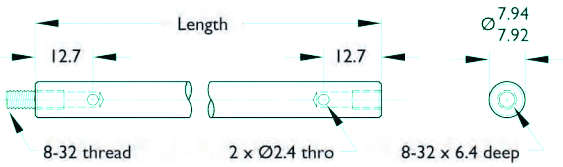
ASI-6	ASI-12	ASI-24
150 (6")	305 (12")	610 (24")

- Custom lengths available on request

Reference	Part number
ASI-6	684000
ASI-12	684001
ASI-24	684002
MGS3-600	1511300
MGS5-600	1511301

Precision ground 304 stainless steel shafts offered in 150, 305 and 610mm lengths. With coupling accessories these shafts can be used to extend motion instrument drive shafts.

Extension rods



Four standard lengths:

ER-1	ER-2	ER-3	ER-4
25.4 (1")	76.2 (3")	152.4 (6")	304.8 (12")

Reference	Part number
ER-1	680060
ER-2	680061
ER-3	680062
ER-4	680063

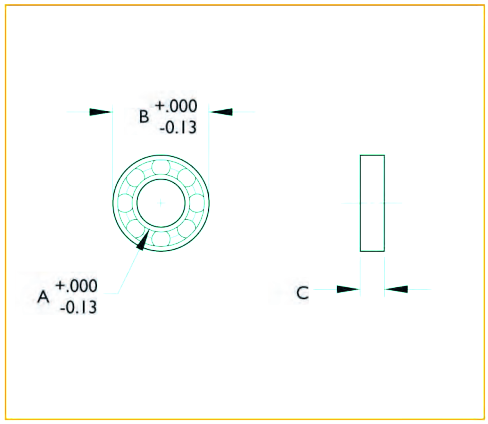
Extension rods have 8-32 UNC male and female threads on opposite ends. They can be connected end to end for custom length structures.

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

Rotary and linear motion

Precision bearings

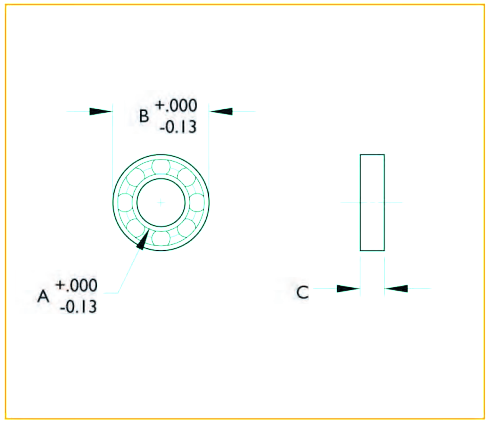


Features

- UHV clean
- No lubricants

ID A	OD B	C	Reference	Part number
Stainless steel				
6.35 (¼")	12.7 (½")	3.17 (⅛")	PBS63	1551100
9.52 (⅜")	22.22 (⅞")	5.55 (7/32")	PBS95	1551101
5	11	3	PBS5-11	1551102
5	16	5	PBS5-16	1551103
3	7	2	PBS3-7	1551104
3	10	4	PBS3-10	1551105

Precision bearings Ceramic



Features

- UHV clean
- No lubricants
- Very long life in UHV

- Ceramic ball races are used for the most demanding long life UHV applications

ID A	OD B	C	Reference	Part number
Stainless steel				
6.35 (¼")	12.7 (½")	3.17 (⅛")	PBC63	1551200
9.52 (⅜")	22.22 (⅞")	5.55 (7/32")	PBC95	1551201
5	11	3	PBC5-11	1551202
5	16	5	PBC5-16	1551203
3	7	2	PBC3-7	1551204
3	10	4	PBC3-10	1551205

All dimensions are nominal in millimetres unless specified - Weights given are approximate

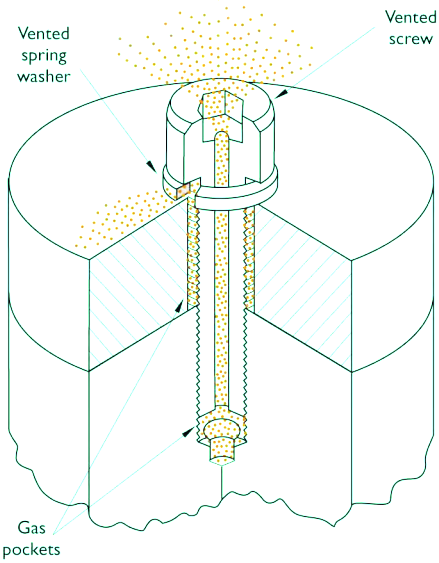
In-vacuum accessories

Vented screws

Description

When making screw attachments in vacuum it is important to avoid trapping even the smallest volumes of gas which can give rise to a 'virtual leak' within the system.

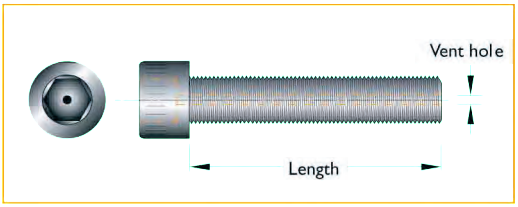
Caburn-MDC offers a full range of vented screws which allow gas to escape down a machined hole through the middle of the screw and through a gap in a vented washer (see drawing). For situations where pump-down is accompanied by high bakeout temperatures we offer molybdenum disulphide coated screws which avoid the problem of seizure due to heat expansion. All screws are cleaned and packed ready for UHV use.



Features

- Stainless steel – UHV cleaned
- Optional MoS_2 coated for high bakeout applications
- Additional vented washers are offered in stainless steel

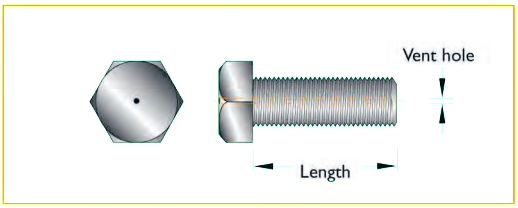
Vented metric socket head screws



Thread	Length	Quantity per pack	Reference	Part number
M1.6[1]	4	10	VMS-16-4	1610000
M1.61	8	10	VMS-16-8	1610001
M2	4	10	VMS-20-4	1610002
M2	6	10	VMS-20-6	1610003
M2	10	10	VMS-20-10	1610004
M2.5	4	10	VMS-25-4	1610005
M2.5	8	10	VMS-25-8	1610006
M2.5	16	10	VMS-25-16	1610007
M3	4	10	VMS-30-4	1610008
M3	8	10	VMS-30-8	1610009
M3	16	10	VMS-30-16	1610010
M4	5	10	VMS-40-5	1610011
M4	10	10	VMS-40-10	1610012
M4	20	10	VMS-40-20	1610013
M5	6	10	VMS-50-6	1610014
M5	12	10	VMS-50-12	1610015
M5	25	10	VMS-50-25	1610016

[1] This size has gas relief flat in place of vent hole

Vented hexagonal head screws MoS_2 coated



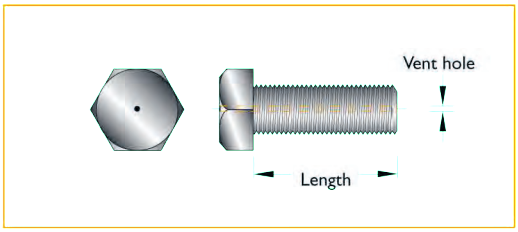
Thread	Length	Quantity per pack	Reference	Part number
M4	6	10	VMHMO-40-6	1610078
M4	12	10	VMHMO-40-12	1610079
M4	25	10	VMHMO-40-25	1610080
M5	6	10	VMHMO-50-6	1610081
M5	12	10	VMHMO-50-12	1610082
M5	25	10	VMHMO-50-25	1610083

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

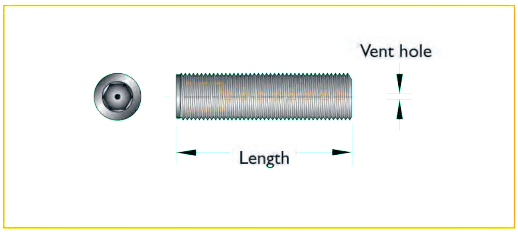
Vented screws

Vented metric hexagon head screws



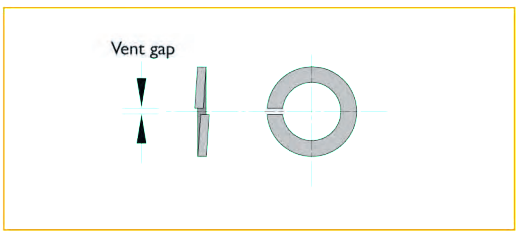
Thread	Length	Quantity per pack	Reference	Part number
M4	6	10	VMH-40-6	1610030
M4	12	10	VMH-40-12	1610031
M4	25	10	VMH-40-25	1610032
M5	6	10	VMH-50-6	1610033
M5	12	10	VMH-50-12	1610034
M5	25	10	VMH-50-25	1610035

Vented metric set screws



Thread	Length	Quantity per pack	Reference	Part number
M2.5	4	10	VMSS-25-4	1610037
M3	4	10	VMSS-30-4	1610038
M4	5	10	VMSS-40-5	1610039
M5	6	10	VMSS-50-6	1610040

Vented spring washers



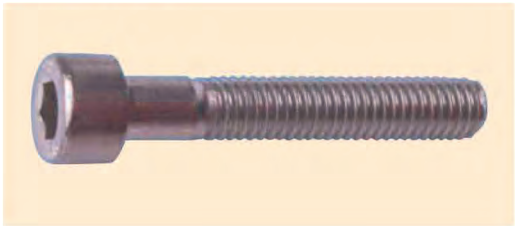
Thread	Quantity per pack	Reference	Part number
M2	10	VMSW-20	1610042
M2.5	10	VMSW-25	1610043
M3	10	VMSW-30	1610044
M4	10	VMSW-40	1610045
M5	10	VMSW-50	1610046

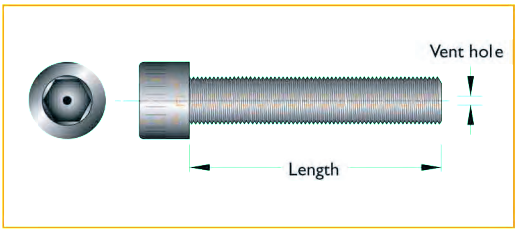
All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

Vented screws

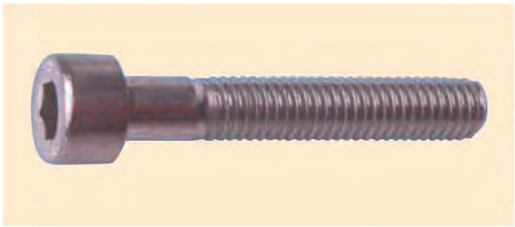
Vented socket heads
UNC Thread

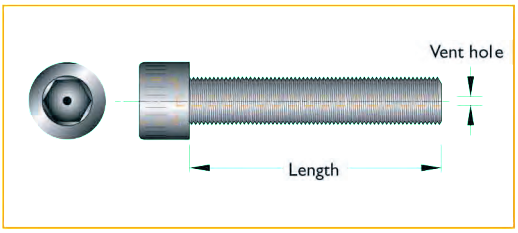




Thread	Length	Quantity per pack	Reference	Part number
6-32	6.4	10	VUNCS-6-32-25	1610095
6-32	12.7	10	VUNCS-6-32-50	1610096
8-32	6.4	10	VUNCS-8-32-25	1610097
8-32	12.7	10	VUNCS-8-32-50	1610098
10-32	6.4	10	VUNCS-10-32-25	1610099
10-32	12.7	10	VUNCS-10-32-50	1610100
¼"-28	19.1	10	VUNCS-1/4-28-75	1610101

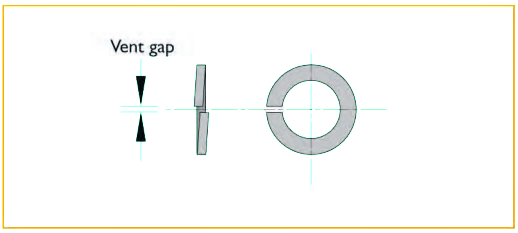
Vented socket head screws
MoS_2 coated





Thread	Length	Quantity per pack	Reference	Part number
M2	4	10	VMSM0-20-4	1610048
M2	8	10	VMSM0-20-8	1610049
M2.5	4	10	VMSM0-25-4	1610050
M2.5	8	10	VMSM0-25-8	1610051
M2.5	16	10	VMSM0-25-16	1610052
M3	4	10	VMSM0-30-4	1610053
M3	8	10	VMSM0-30-8	1610054
M3	16	10	VMSM0-30-16	1610055
M4	5	10	VMSM0-40-5	1610056
M4	10	10	VMSM0-40-10	1610057
M4	20	10	VMSM0-40-20	1610058
M5	6	10	VMSM0-50-6	1610059
M5	12	10	VMSM0-50-12	1610060
M5	25	10	VMSM0-50-25	1610061

Vented spring washers
UNC Thread



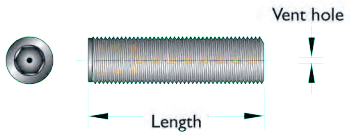
Thread	Quantity per pack	Reference	Part number
6-32	10	VUNCSW-6-32	1610103
8-32	10	VUNCSW-8-32	1610104
10-32	10	VUNCSW-10-32	1610105
¼"-28	10	VUNCSW-1/4-28	1610106

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

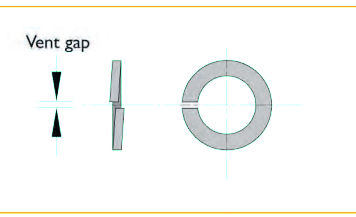
Screws

Vented metric set screws
MoS_2 coated



Thread	Length	Quantity per pack	Reference	Part number
M2.5	4	10	VMSSMO-25-4	1610085
M3	4	10	VMSSMO-30-4	1610086
M4	5	10	VMSSMO-40-5	1610087
M5	6	10	VMSSMO-50-6	1610088

Vented spring washers
MoS_2 coated



Thread	Quantity per pack	Reference	Part number
M2	10	VMSWMO-20	1610090
M2.5	10	VMSWMO-25	1610091
M3	10	VMSWMO-30	1610092
M4	10	VMSWMO-40	1610093
M5	10	VMSWMO-50	1610094

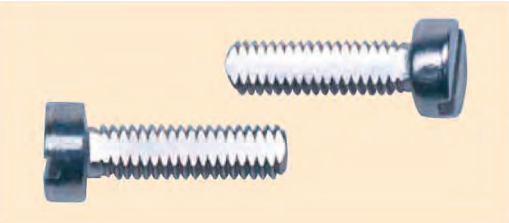
Molybdenum screws

Thread	Size	Quantity per pack	Reference	Part number
Molybdenum screws	M2 x 8	10	MOM2-8	1611400
Molybdenum screws	M3 x 10	10	MOM3-10	1611401
Molybdenum nuts	M2	10	MOM-2N	1611412
Molybdenum nuts	M3	10	MOM-3N	1611413

Features

- Cleaned for UHV with gas relief flats

Tantalum screws



Thread	Size	Quantity per pack	Reference	Part number
Tantalum screws	M2 x 5	1	TAM2-5	1611402
Tantalum screws	M3 x 10	1	TAM3-10	1611403

Features

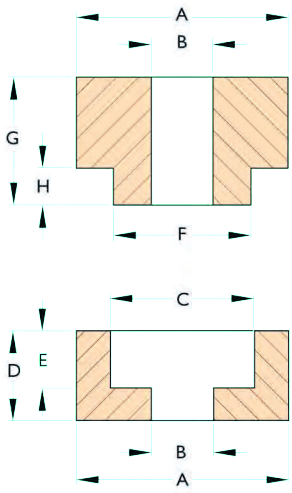
- Cleaned for UHV with gas relief flats

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

Heater and sample transfer accessories

Ceramic split bushes



Description

Ceramic split bushes can be used with UHV manipulators to enable sample plate or heater filaments to be mechanically clamped in position while maintaining electrical isolation. These items are cleaned to UHV standards and supplied in packs of 10.

Type	A	B	C	D	E	F	G	H	Reference	Part number
Stentite KERZZO – DIN40685										
Male	6.85	2.4	–	–	–	4.4	4.1	2.55	CSB-2M	1611405
Female	6.85	2.4	4.85	5.55	2.8	–	–	–	CSB-2F	1611406
Male	7.95	3.05	–	–	–	5.3	4.75	2.55	CSB-3SM	1611407
Female	7.95	3.05	5.7	5.55	2.8	–	–	–	CSB-3SF	1611408
Male	9.52	3.05	–	–	–	6.1	6.35	4.1	CSB-3LM	1611409
Female	9.52	3.05	6.5	7.15	4.9	–	–	–	CSB-3LF	1611410

Machinable ceramics

Features

- Sample kits in various sizes
- Choice of materials
- Macor® – machinable glass ceramic
- Shapal M
- Boron Nitride HP grade
- Customer machining available on request

Description

Macor® machinable glass ceramic can be worked with ordinary tools and does not require firing after machining. It has the same electrical and thermal properties as ordinary ceramic. Caburn-MDC will be happy to quote against your drawings for custom machined parts.

Specifications

Macor® sample kit 4 pieces in following mm sizes

Cylinder	13 diameter x 77 long
Block	64 x 8 x 8
Block	39 x 19 x 6
Block	54 x 20 x 20

Boron nitride HP grade sample kit
3 pieces in following mm size

Cylinder	10 diameter x 75 long
Block	20 x 20 x 75
Plate	10 x 20 x 5

Shape M sample kit 2 pieces in following mm sizes

Cylinder	10 diameter x 50 long
Plate	22 x 9.5 x 3

Mixed ceramic technology All machinable

Shapal M	10 diameter x 50 long
Macor	10 diameter x 50 long
XSBH (composite)	10 diameter x 50 long
Boron nitride HP grade	10 diameter x 50 long

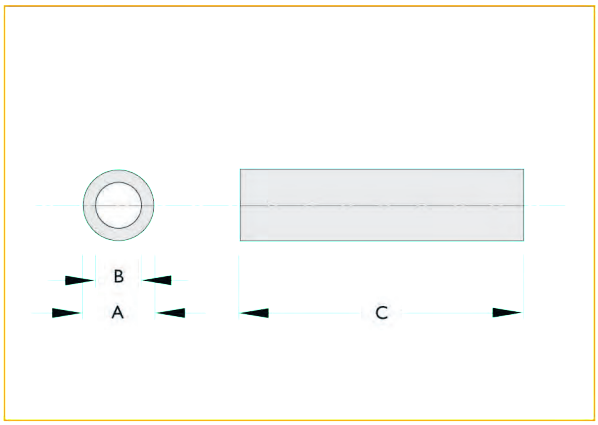
Description	Number of pieces	Reference	Part number
Macor®	4	MGC-1	1611300
Shapal M	2	SHM-1	1611301
Boron nitride HP grade	3	BNHP-1	1611302
Mixed ceramic technology	4	MCT-1	1611303

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

Heater and sample transfer accessories

Ceramic tubes



Features

- UHV clean
- One, two and four hole types
- Material 99.7% A1203
- Maximum temperature 1700°C

Product	A	B	Length C	Number of holes	Quantity per pack	Reference	Part number
Ceramic tube	1.0	0.4	50	1	10	CERT0-50	1611100
Ceramic tube	2.0	1.0	50	1	10	CERT1-50	1611101
Ceramic tube	3.0	2.0	50	1	10	CERT2-50	1611102
Ceramic tube	6.0	4.0	50	1	10	CERT4-50	1611103
Ceramic tube	2.0	1.0	300	1	10	CERT1-300	1611105
Ceramic tube	3.0	2.0	300	1	10	CERT2-300	1611106
Ceramic tube	5.0	3.0	300	1	3	CERT3-300	1611107
Ceramic tube	10.0	7.0	300	1	3	CERT7-300	1611108
Ceramic tube	3.0	0.8	50	2	10	CERT08-50-2	1611110
Ceramic tube	3.0	0.8	300	2	1	CERT08-300-2	1611111
Ceramic tube	2.7	0.8	50	4	10	CERT06-50-4	1611112
Ceramic tube	2.6	0.6	300	4	1	CERT06-300-4	1611113
Ceramic tube	4.6	1.0	50	4	10	CERT1-50-4	1611114
Ceramic tube	4.5	1.0	300	4	1	CERT1-300-4	1611115

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

Heater and sample transfer accessories

Kapton® film

Features

- Very high electrical insulation
- Flexible – can be cut with scissors
- UHV compatible – low outgassing
- Bakeable to 230°C
- Useable to 4k
- Dielectric strength: 154V per mm
- Dielectric constant: 3.5V per mm
- Dissipation factor: 0.0026V per mm
- Volume resistivity: $10^{17}\,\Omega$ cm

Description	Reference	Part number
Kapton® film, 300 x 25 x 0.13mm thick	KAPF1	1611411

All dimensions are nominal in millimetres unless specified - Weights given are approximate

In-vacuum accessories

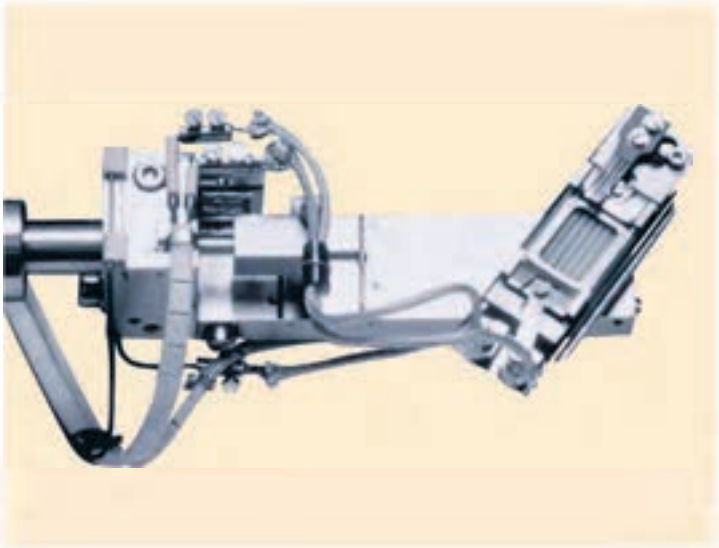
Heater and sample transfer accessories

Description

Caburn-MDC can offer sample holders with resistive heating to 900°C and complete sample transfer systems for bringing samples into the UHV environment and docking them on a parking carousel or UHV manipulator. Please contact the sales office, with details of your application, for a quotation.

The sample loading stage allows the sample holder to be loaded in a fast entry lock and brought into the UHV analysis chamber. The Omicron sample pick-up fits on to a standard MTM series magnetic transporter.

From the loading stage the sample holder can be transferred directly to a transfer head. From the transfer head the sample can be translated to an omicron sample heater on a UHV manipulator.



Description

The Omicron sample heater which is used in the well-established full lab surface science machine is offered as a self-assembly component by Caburn-MDC. As offered, the sample heater includes the sample stage, the acceptor mechanism to group the sample plate, the resistive heater and the brushes for direct heating. The sample is electronically isolated.

Sample plates carried on the transfer head TH-C may be transferred (without use of a wobble stick) to the sample heater RH1-C or RH2-C.

Azimuthal (secondary) sample motor is optional. This requires RH2-C and precision dual axis rotary drive type E-PBRM-2. A K-type thermocouple is included.

Feedthroughs and connector wires are not included. These are offered as options with the demountable in vacuum connection block.

Omicron® type sample heater

- UHV compatible
- Accepts Omicron® style sample plates from transfer head (TH-C)
- Sample heating to 900°C (1200°C with optional direct heating)
- Fits E-PBRM1-10 or PBRM2-10 and all standard UHV manipulators
- Includes K-type thermocouple
- Wiring kits available on request

Please contact sales office stating length and type of UHV manipulator

Description

Heater and sample transfer

Please contact technical sales for details.

All dimensions are nominal in millimetres unless specified - Weights given are approximate