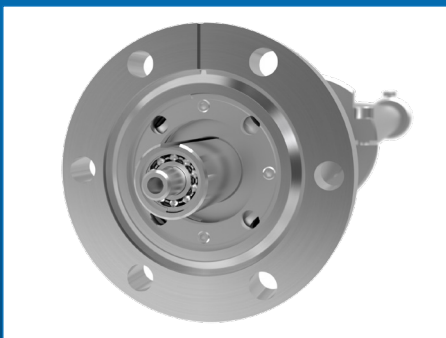




## Sample Transfer Arms

Secure sample transfer solutions



Magnetically-coupled



Linear Telescopic



Rotary Telescopic

# Sample Transfer Arms

Secure sample transfer is an essential design consideration in any UHV/HV system. We provide a wide range of sample transfer products that provide reliable and secure sample transfer for most common sample holder types.

## Magnetically-coupled Transfer Arms

Page 4



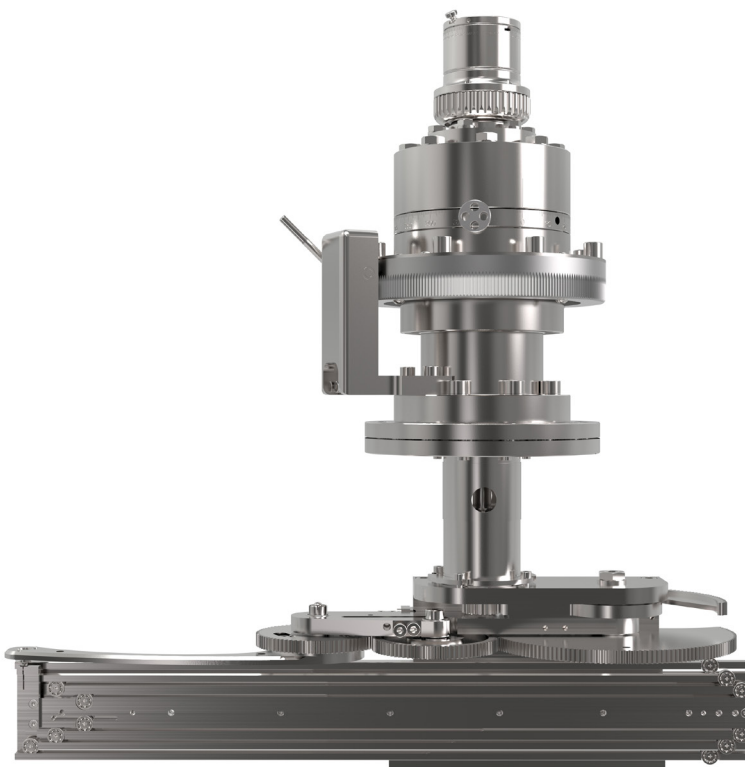
For most applications the use of magnetically-coupled transfer arms is proven to be the most reliable and economical option. We offer a range of transfer arms and grippers to suit your application requirement.

## Linear Telescopic Transfer Arms

Page 18



In situations where space is limited, the Linear Telescopic Transfer Arm provides up to 914mm of reach with minimal installation footprint and optional 20mm arm lift/lower.



Designed for use with Radial Distribution Chambers, the RTTA offers up to 760mm arm extension with 360 degree rotation and option to incorporate 50mm of arm lift/lower.

# Magnetically-coupled Transfer Arms

**PowerProbe sample transfer arms enable secure transfer of samples within UHV.**

**This is a consequence of their unrivalled magnetic coupling strength.**

**In addition to linear and linear/rotary probes, this extensive range includes the Elevating PowerProbe, Dual-Axis PowerProbe and Triple-Axis PowerProbe designed to transfer specific industry-standard sample holders using a variety of actuation methods.**

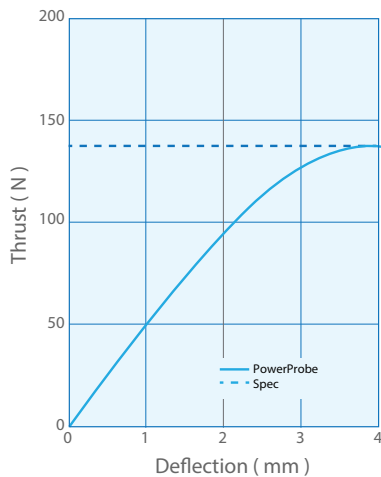


Figure 1

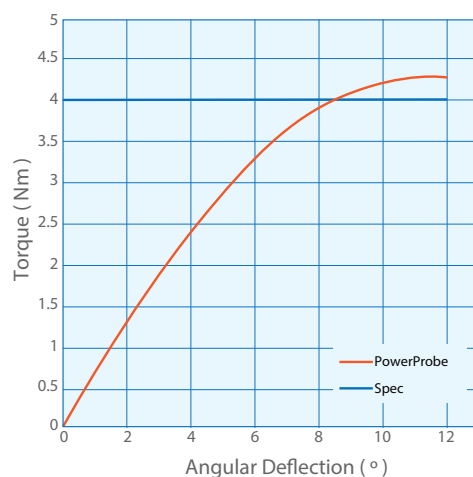


Figure 2

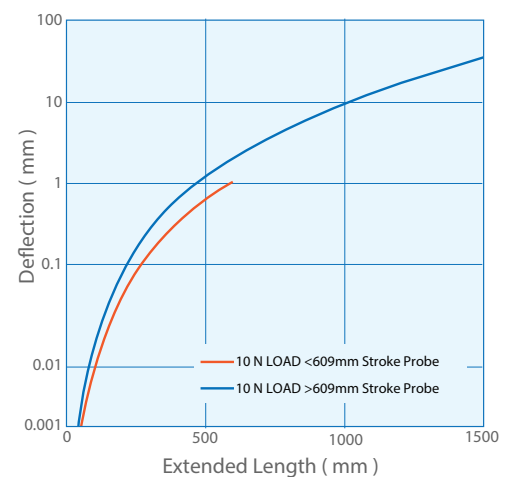
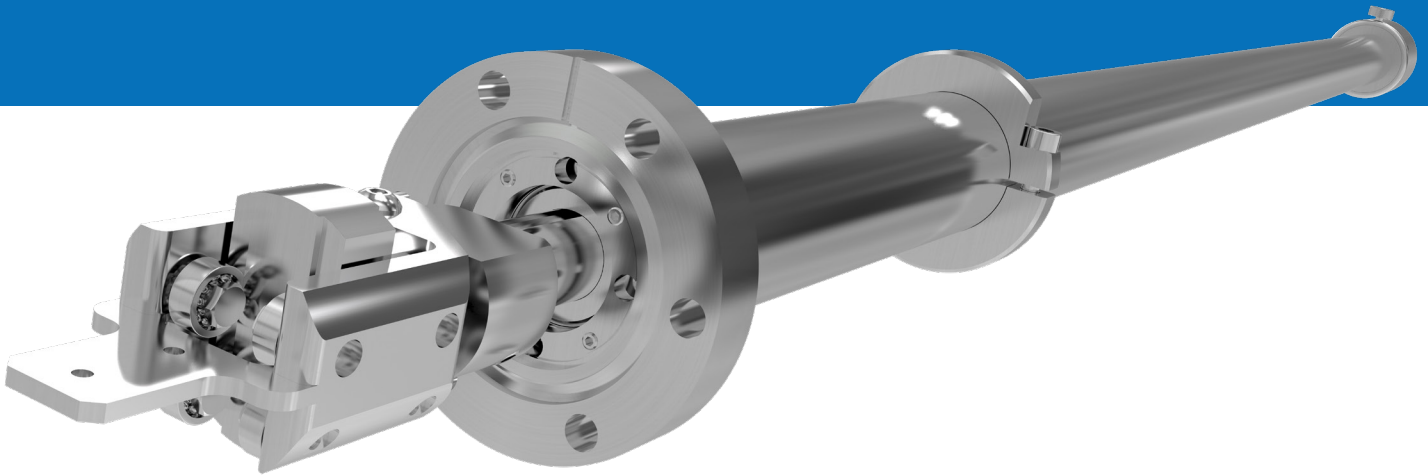


Figure 3



## Exceptional Performance

PowerProbes have unrivalled axial thrust performance with a break-away force of 140 N (31.5 lbf).

Figure 1 illustrates the axial stiffness of the coupling under load, demonstrating that the standard probe deflects <1mm for a 98 N (22 lbf) load.

The PowerProbe range offers 4 Nm (3 lbf ft) break-away rotational torque. This is four times the level offered by more conventional units. The unique rotary coupling retains the renowned angular rigidity of the MagiDrive series (see Figure 2). Figure 3 shows the vertical deflection at the end of a horizontally-mounted PowerProbe transfer arm as a function of extended length, and with an applied weight/load of 10 N on the end of the probe. The relationship between load and deflection is approximately linear for typical transfer loads.

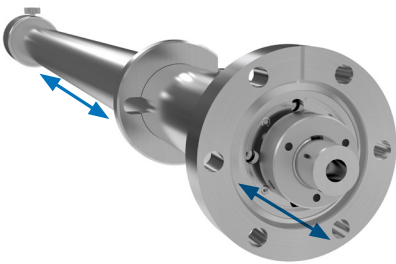
The crucial aspect of these performance characteristics is not necessarily the load-carrying capacity, but the stiffness of the coupling. The probes are, therefore, ideal for sample transfer applications.

All PowerProbes are fully bakeable to 250°C without the need to remove any of the magnetic assemblies.

# Power Probe Range

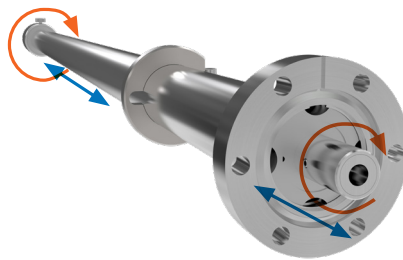
Linear PowerProbe
Linear/Rotary PowerProbe
Elevating PowerProbe
Dual Axis PowerProbe
Triple Axis PowerProbe

## LPP: Linear PowerProbe



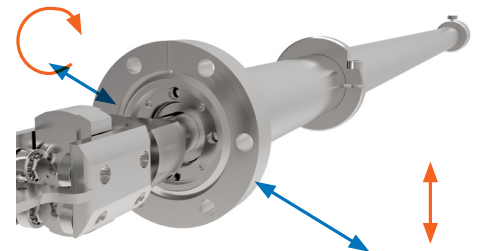
The Linear PowerProbe should be selected where only linear motion is required and where twisting or turning of the sample would be undesirable.

## PP: Linear & Rotary PowerProbe



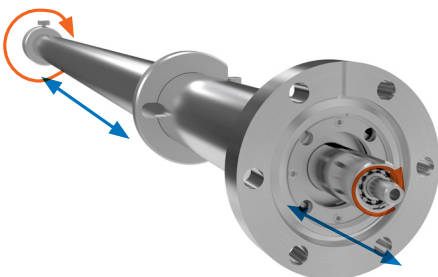
The PowerProbe provides both linear and rotary motion of the sample, via a single actuator.

## EPP: Elevating PowerProbe



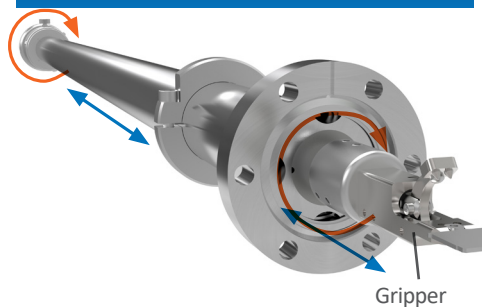
The Elevating PowerProbe incorporates an internally-guided linear motion, with the ability to elevate its end-effector throughout its stroke, providing 12.7mm of lift (with 25mm and 50mm options) in the Y axis for sample hand-off.

## DAPP: Dual Axis PowerProbe



For system designers our Dual Axis PowerProbe provides an outer tubular shaft with linear only motion and an inner shaft with independent rotary motion. Ideal for grippers, elevators and other manipulators.

## TAPP: Triple Axis PowerProbe



The Triple Axis PowerProbe provides linear and rotary motion with a unique sample gripping mechanism, allowing samples to be locked on and off of the probe.

# Linear PowerProbe (LPP Series)

## Linear Motion Only

High performance magnetically-coupled linear devices, designed for sample transfer where only linear motion is required and rotation is undesirable.

Available in standard stroke lengths from 304mm to 1524mm with motorisation options. The LPP is bakeable to 250°C without removing any of the magnetic components.

### LPP KEY ADVANTAGES

- » Internal anti-rotation system ensures straight in-line motion
- » No need for conventional external linear guide bars
- » Unrivalled axial coupling strength
- » Exceptional axial stiffness
- » Zero backlash under low load

The LPP series of PowerProbes should be selected where only linear motion is required and twisting or turning of the sample would be undesirable.

An anti-rotation system is fitted internally ensuring straight, in-line motion, despite any rotation of the external drive thimble. This removes the need for the unwieldy and bulky external linear guide bars used by other manufacturers and guarantees no rotation during the stroke.

A retracted switch option is available which provides indication when the probe is fully retracted. This signal can be interlocked to prevent, for example, the premature closing of a gate valve before the PowerProbe has fully retracted.

For demanding UHV applications, we recommend using the 'XLPP' series with rolling metal & ceramic bearings for smooth low friction actuation with minimal outgassing.

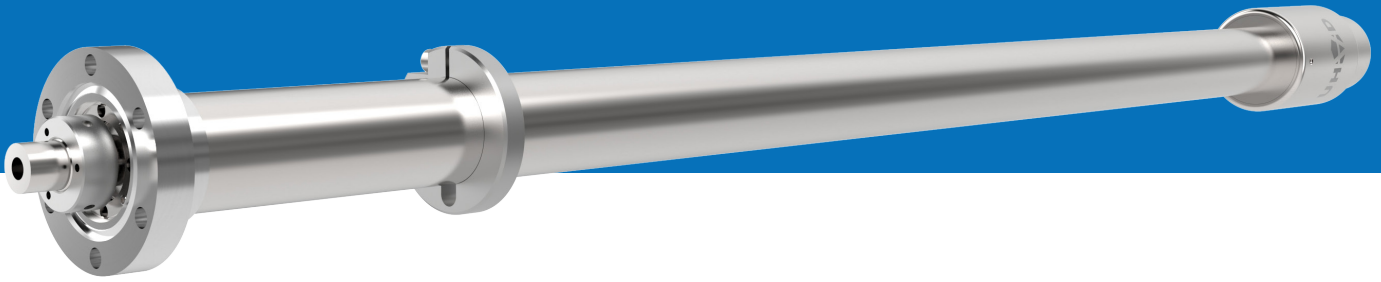
### Specification Table

LINEAR POWERPROBE (LPP)	STANDARD	
Mounting flange size	CF40 70mm (2.75") OD CF	CF63 114mm (4.5") OD CF
Linear axial coupling break-away force	140 N (31.5 lbf)	
Sample weight / load capacity	Maximum recommended internal load-carrying capacity will be a function of probe extension, but we recommend not to exceed a moment of 20 Nm (177 in-lbs).	
Maximum recommended internally applied load when vertically installed	This is a function of the load acceleration. In a static case the load may approach the coupling linear break-away force, however, it would be wise to apply a sensible safety factor.	
Bakeout temperature	PowerProbes are bakeable to 250°C without the removal of any components (except for motors).	
Position locking	Thumbscrew (manual only)	
Axial & Torsional Stiffness	Refer to graphs on page 4	

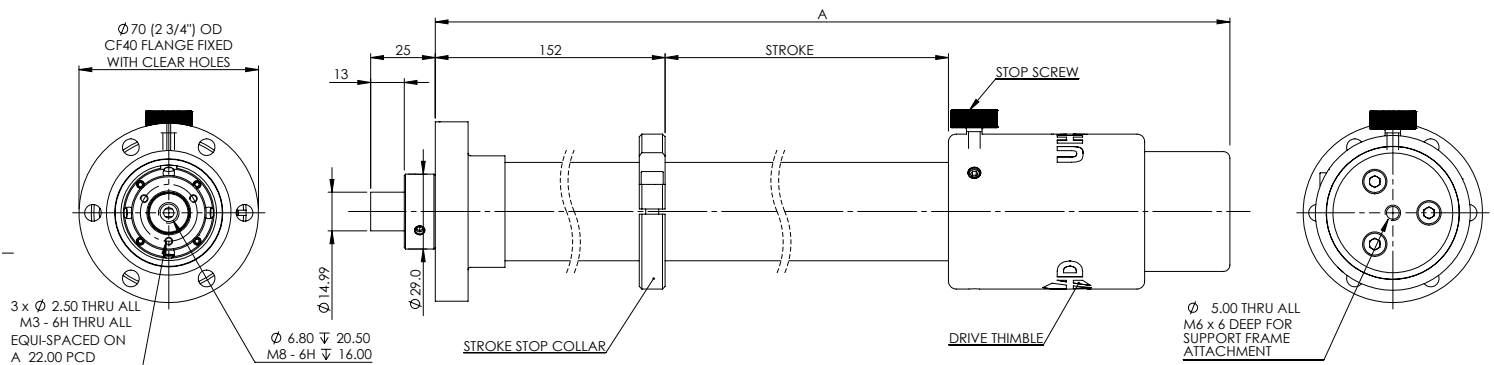


# Sample Transfer Arms

Magnetically-coupled



## Base Probe Dimensions



Stroke (mm)	304	457	609	914	1219	1524
A	514	692	870	1225	1530	1843

## Part Number & 3D models

View, configure and download the complete LPP series using our interactive Product Configurator at:

<http://www.uhvdesign.com/products/sample-transfer-arms/linear-power-probe>

Selectable products: 1

LPP40-304-H

ORDERNO Order number	LPP40-304-H	
SR Series	LPP	
FS Flange size	CF40	
S Axial stroke	304.000	mm
POS Position	0	304 mm
AO Actuation options	Manual Thimble	
W Weight	3.2	kg

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# PowerProbe (PP Series)

## Linear & Rotary

High performance magnetically-coupled combined linear/rotary devices, designed for sample transfer. Both linear and rotary motion of the sample achieved via a single actuator with stroke length from 304mm to 1524mm.

### PP KEY ADVANTAGES

- » Unrivalled axial coupling strength
- » 4x torque compared to conventional devices
- » Exceptional axial stiffness
- » Zero backlash under low load
- » Bakeable to 250°C without removing any components

The PP series of PowerProbes provides both linear and rotary motion of the sample, via a single actuator.

The PowerProbe's powerful magnetic coupling technology provides performance far in advance of conventional probes on the market avoiding magnetic hysteresis and de-coupling issues suffered by traditional designs.

Combined with a high thrust linear coupling, this ensures optimum drive performance on both axes. Therefore, actuation of the thimble in either axis will result in the precise transmission of this motion to the sample.

The PP series can be fitted with a bakeable limit switch for the retracted position, to interface to system interlocks.

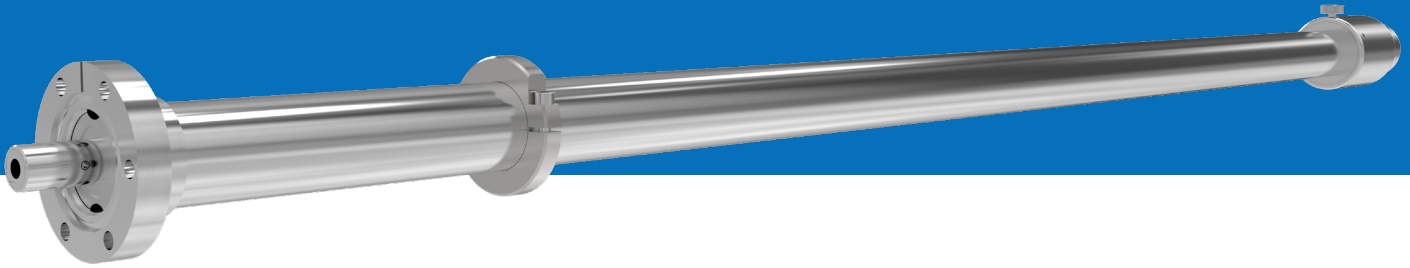
For demanding UHV applications, we recommend using the 'XPP' series with rolling metal & ceramic bearings for smooth low friction actuation with minimal outgassing.

### Specification Table

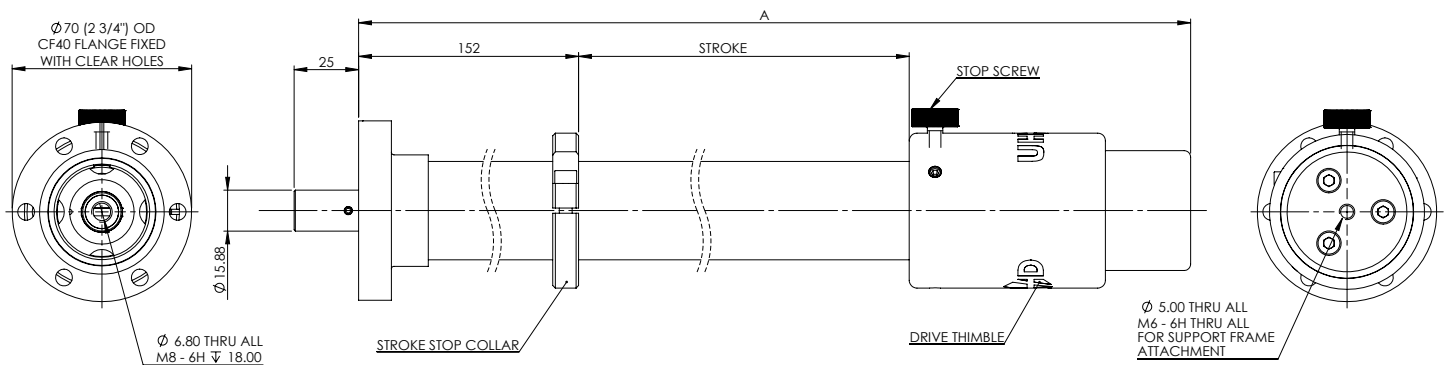
LINEAR & ROTARY (PP)	STANDARD	
Mounting flange size	CF40 70mm (2.75") OD CF	CF63 114mm (4.5") OD CF
Linear axial coupling break-away force	140 N (31.5 lbf)	
Rotary coupling break-away torque	4 Nm (35 in-lbs)	
Sample weight / load capacity	Maximum recommended internal load-carrying capacity will be a function of probe extension, but we recommend not to exceed a moment of 20 Nm (177 in-lbs).	
Maximum recommended internally applied load when vertically installed	This is a function of the load acceleration. In a static case the load may approach the coupling break-away force, however, it would be wise to apply a sensible safety factor.	
Bakeout temperature	PowerProbes are bakeable to 250°C without the removal of any components.	
Position locking	Thumbscrew	
Axial & Torsional Stiffness	Refer to graphs on page 4	

# Sample Transfer Arms

Magnetically-coupled



## Base Probe Dimensions



Stroke (mm)	304	457	609	914	1219	1524
A	514	692	870	1225	1530	1843

## Part Number & 3D models

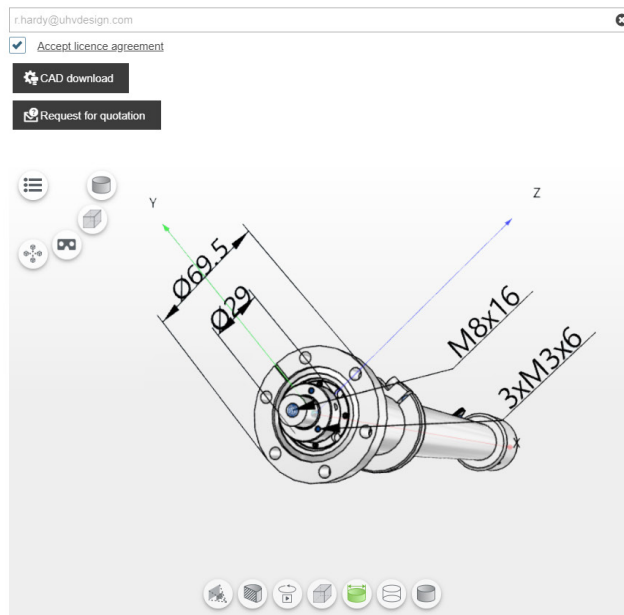
View, configure and download the complete LPP series using our interactive Product Configurator at:

<http://www.uhvdesign.com/products/sample-transfer-arms/powerprobe>

Selectable products: 1

PP40-304-H

ORDERNO Order number	PP40-304-H		
SR Series	PP		
FS Flange Size	CF40		
S Axial Stroke	304.000	mm	
POS Position	0	mm	
ROT Rotation	0	°	
AO Actuation Options	Manual Thimble		
W Weight	3.2	kg	



# Elevating PowerProbe (EPP Series)

## Linear & Elevation

Complete sampling-handling system providing linear motion and up to 50mm of lift in the Y-axis for sample hand-off. Stroke lengths from 304mm to 1219mm and motorisation options available.

### EPP KEY ADVANTAGES

- » Up to 50mm of lift in the Y-axis
- » Unrivalled axial coupling strength
- » Exceptional axial stiffness
- » Zero backlash under low load
- » Bakeable to 250°C without removing any components

The Elevating PowerProbe transforms conventional approaches to sample transfer. In addition to its internally-guided linear motion, the probe has the ability to elevate its end-effector throughout its stroke, providing 12.7mm of lift as standard (with 25mm and 50mm options) in the Y axis for sample hand-off.

This PowerProbe variant greatly simplifies sample transfer techniques, providing a single device to provide both linear motion for sample introduction and the lift/lower motion to collect or hand-off the sample.

With a range of industry-standard effectors, the Elevating PowerProbe provides a complete sample-handling system in its own right removing the need for secondary motion tools. This reduces cost and simplifies the transfer process.

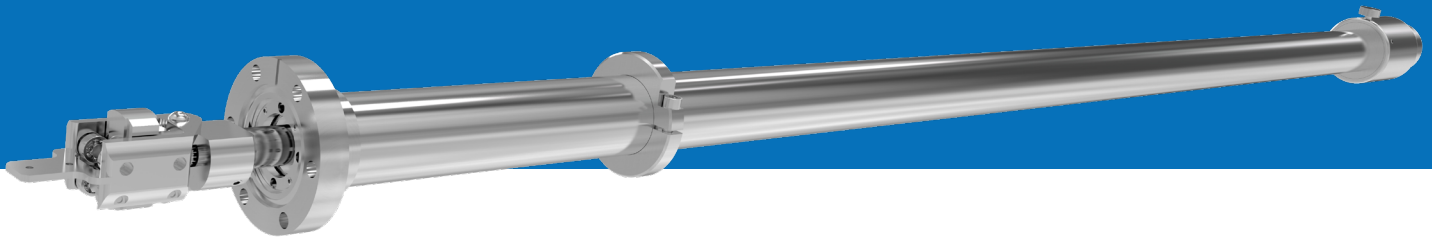
For demanding UHV applications, we recommend choosing the 'XEPP' series with rolling metal & ceramic bearings for smooth low friction actuation with minimal outgassing.

### Specification table

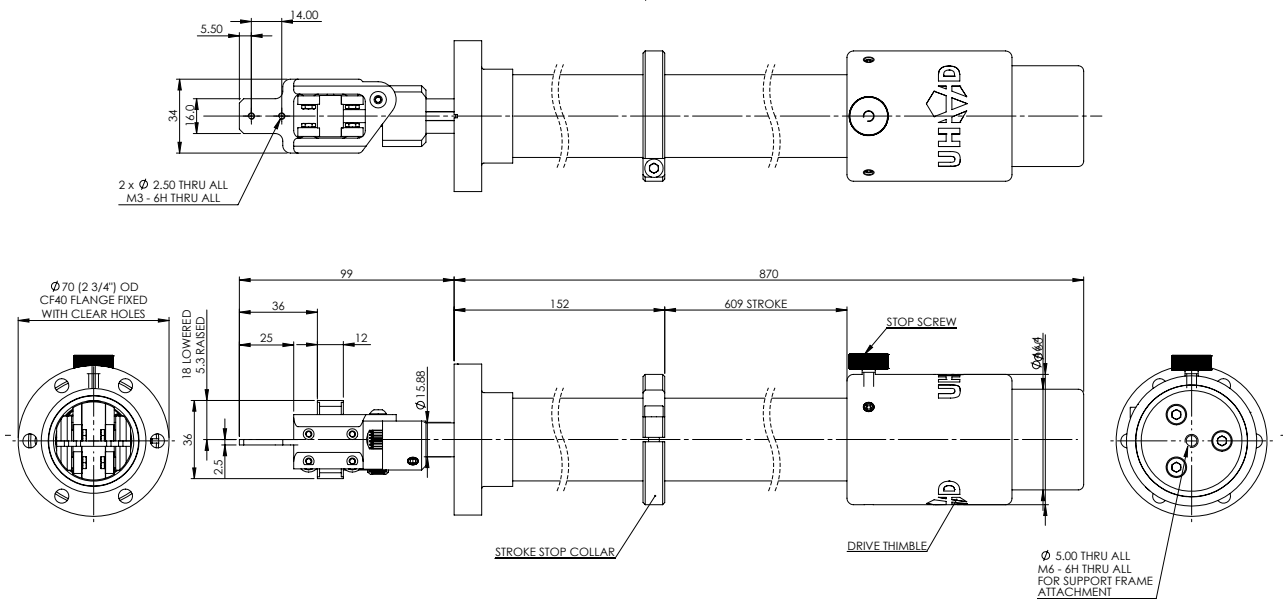
ELEVATING POWERPROBE	STANDARD
Mounting flange	CF40 70mm (2.75") OD or CF63 114mm (4.5") OD
Elevating (lift/lower) motion	12.7mm (0.5"), 25.4mm (1.0") or 50mm (2.0")
Linear coupling break-away force	140 N (31.5 lbf)
Sample weight / load capacity	Maximum recommended internal load-carrying capacity will be a function of probe extension, but we recommend not to exceed a moment of 20 Nm (177 in-lbs) and 1.5 Nm (13 in-lbs) on elevating plate.
Bakeout temperature	PowerProbes are bakeable to 250°C without the removal of any components (except for motors).
Position locking	Thumbscrew (manual only)
Axial & Torsional Stiffness	Refer to graphs on page 4

# Sample Transfer Arms

Magnetically-coupled



## Base Probe Dimensions



Stroke (mm)	304	457	609	914	1219
A	514	692	870	1225	1530

## Part Number & 3D models

View, configure and download the complete LPP series using our interactive Product Configurator at:

<http://www.uhvdesign.com/products/sample-transfer-arms/elevating-powerprobe>

Selectable products: 1

EPP40-304-H-12.7

ORDERNO Order number	EPP40-304-H-12.7	
SR Series	EPP	
FS Flange size	CF40	
S Axial stroke	304.000	mm
POS Position	0	304 mm
AO Actuation options	Manual Thimble	
EO Elevation option	12.700	
L Lift	0	12.7 mm
W Weight	4.0	kg

Accept licence agreement

CAD download

Request for quotation

3D model view showing dimensions: Ø69.5, Ø36, Z, X, EPP40-304-H\_BASE



# Dual Axis PowerProbe (DAPP Series)

## Linear With Rotatable Inner Shaft

High performance magnetically-coupled devices designed for sample transfer with outer shaft linear motion and independent rotary motion of the inner shaft. Ideal for systems where a secondary motion is required to actuate an end-effector mechanism.

The range includes end-effectors to transfer industry-standard flag and puck sample holders.

### DAPP KEY ADVANTAGES

- » Independent linear & rotary motion
- » Unrivalled axial coupling strength
- » 4x torque compared to conventional devices
- » Exceptional axial stiffness
- » Zero backlash under low load
- » Bakeable to 250°C without removing any components

The Dual Axis PowerProbe (DAPP) has two concentric output shafts providing independent axes of motion. The outer tubular shaft has linear only motion provided by the linear PowerProbe magnetic coupling. The inner shaft has independent rotary motion provided by the PowerProbe rotary magnetic coupling. The DAPP has a single driving thimble allowing simultaneous actuation of both the linear and rotary axes.

This PowerProbe variant is ideally suited to system designers who wish to employ a secondary motion to actuate an end-effector mechanism, such as a sample locking system, for example.

### Standard End-effectors

Two standard end-effectors are offered to grip and safely transfer industry-standard surface analysis flag and puck sample holders.

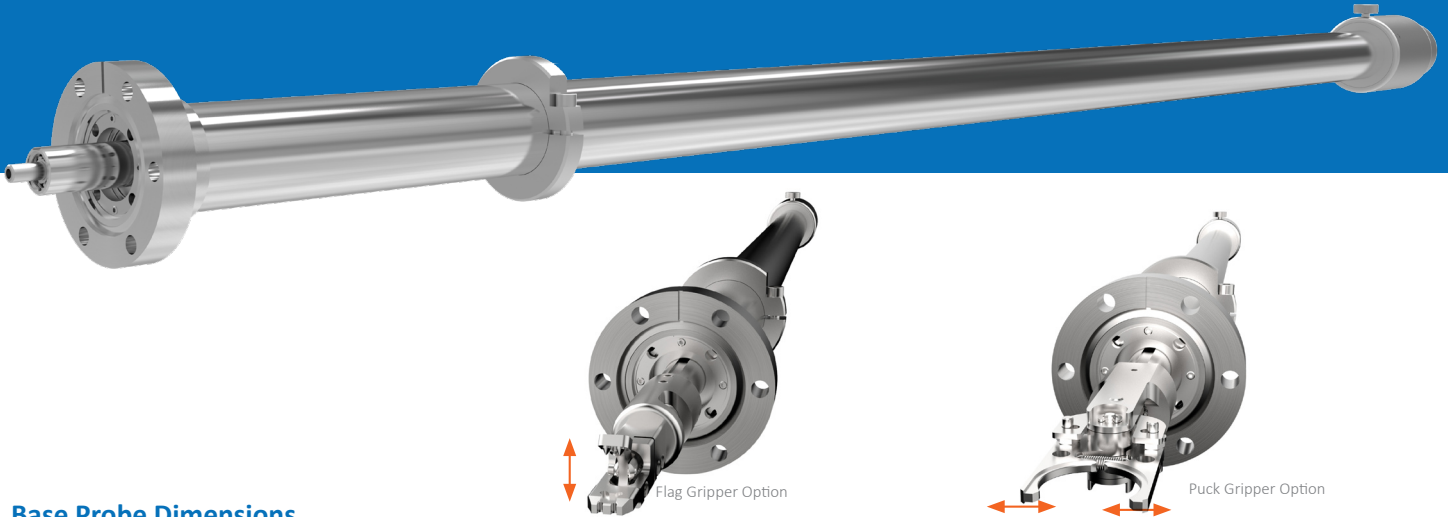
For demanding UHV applications, we recommend choosing the 'XDAPP' series with rolling metal & ceramic bearings for smooth low friction actuation with minimal outgassing.

### Specification Table

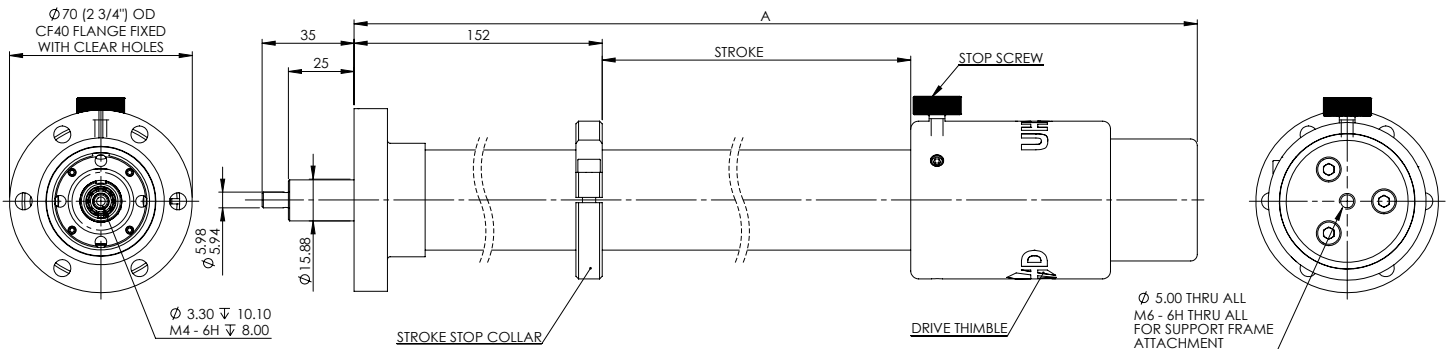
DUAL AXIS POWERPROBE	STANDARD
Mounting flange	CF40 70mm (2.75") OD
Linear coupling break-away force	140 N (31.5 lbf)
Rotary coupling break-away torque (second shaft)	4 Nm (35 in-lbs)
Sample weight / load capacity	Maximum recommended internal load-carrying capacity will be a function of probe extension, but we recommend not to exceed a moment of 20 Nm (177 in-lbs).
Bakeout temperature	PowerProbes are bakeable to 250°C without the removal of any components.
Position locking	Thumbscrew.
Axial & Torsional Stiffness	Refer to graphs on page 4

# Sample Transfer Arms

Magnetically-coupled



## Base Probe Dimensions



Stroke (mm)	304	457	609	914	1219
A	514	692	870	1225	1530

## Part Number & 3D models

View, configure and download the complete LPP series using our interactive Product Configurator at:  
<http://www.uhvdesign.com/products/sample-transfer-arms/dual-axis-powerprobe>

Selectable products: 1

DAPP40-304-H

ORDERNO	DAPP40-304-H		
Order number			
SR	DAPP		
Series			
FS			
Flange Size			
S	304.000	mm	
Axial Stroke			
POS	0	304	
Position			
EF	none		
End Effector option			
AO	Manual Thimble		
Actuation option			
W	3.7	kg	
Weight			

3D model view showing dimensions: Ø 69.5, M4x8.

Buttons: CAD download, Request for quotation.



# Triple Axis PowerProbe (TAPP Series)

## Rotary Inner Shaft with Trigger Mechanism

Magnetically-coupled triple axis transfer arm, providing linear and rotary motion with a unique sample gripping mechanism allowing samples to be locked on and off the probe. Linear and rotary motion of the sample is achieved via a single actuator with stroke length from 304mm to 1219mm. Unique lock/unlock mechanism then activates an independent shaft to provide gripper activation.

### TAPP KEY ADVANTAGES

- » Independent linear & rotary motion with unique sample gripping system
- » End-effectors for flag & puck systems
- » Unrivalled axial coupling strength
- » 10x thrust and 4x torque compared to conventional devices
- » Exceptional axial stiffness
- » Zero backlash under low load

The Triple Axis PowerProbe (TAPP) has two concentric output shafts providing two independent axes of motion. Linear and rotary motion of the outer shaft is provided through a high power magnetic coupling, driven by the thimble.

Compared with conventional devices the Triple Axis PowerProbe provides more than 10 times the thrust and 4 times the torque with exceptional axial stiffness.



Unique Lock/unlock mechanism

In addition to linear and rotary

motion the thimble incorporates a unique secondary linear motion that can be used to lock/unlock samples held by a gripping end-effector.

This PowerProbe variant is ideally suited to system designers who need linear and rotary motion with an independent end-effector mechanism. When ordered with an end-effector the Triple Axis PowerProbe provides the ultimate in secure sample transfer.

### Standard End-effectors

Two standard end-effectors are offered to grip and safely transfer industry-standard surface analysis flag and puck sample holders.

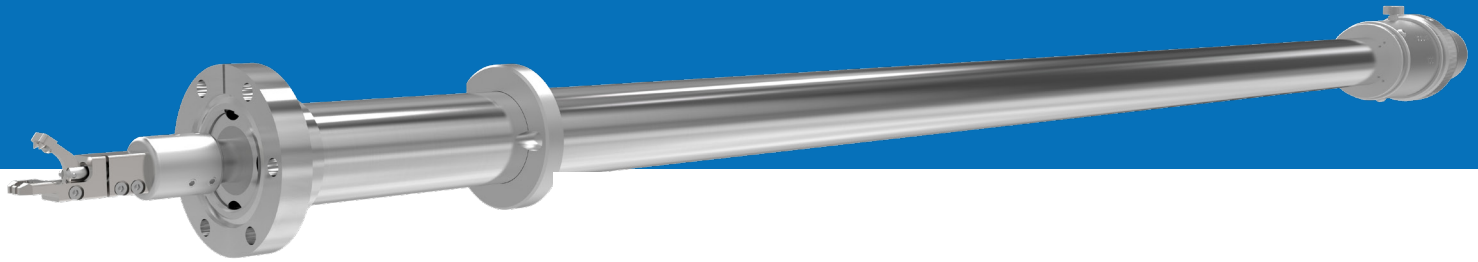
### Specification Table

TRIPLE AXIS POWERPROBE	STANDARD
Mounting flange	CF38 70mm (2.75") OD
Linear coupling break-away force	180 N (40.5 lbf)
Rotary coupling break-away torque	4 Nm (35 in-lbs)
Sample weight / load capacity	Maximum recommended internal load-carrying capacity will be a function of probe extension, but we recommend not to exceed a moment of 20 Nm (177 in-lbs).
Bakeout temperature	PowerProbes are bakeable to 250°C without the removal of any components.
Position locking	Thumbscrew.
Axial & Torsional Stiffness	Refer to graphs on page 4

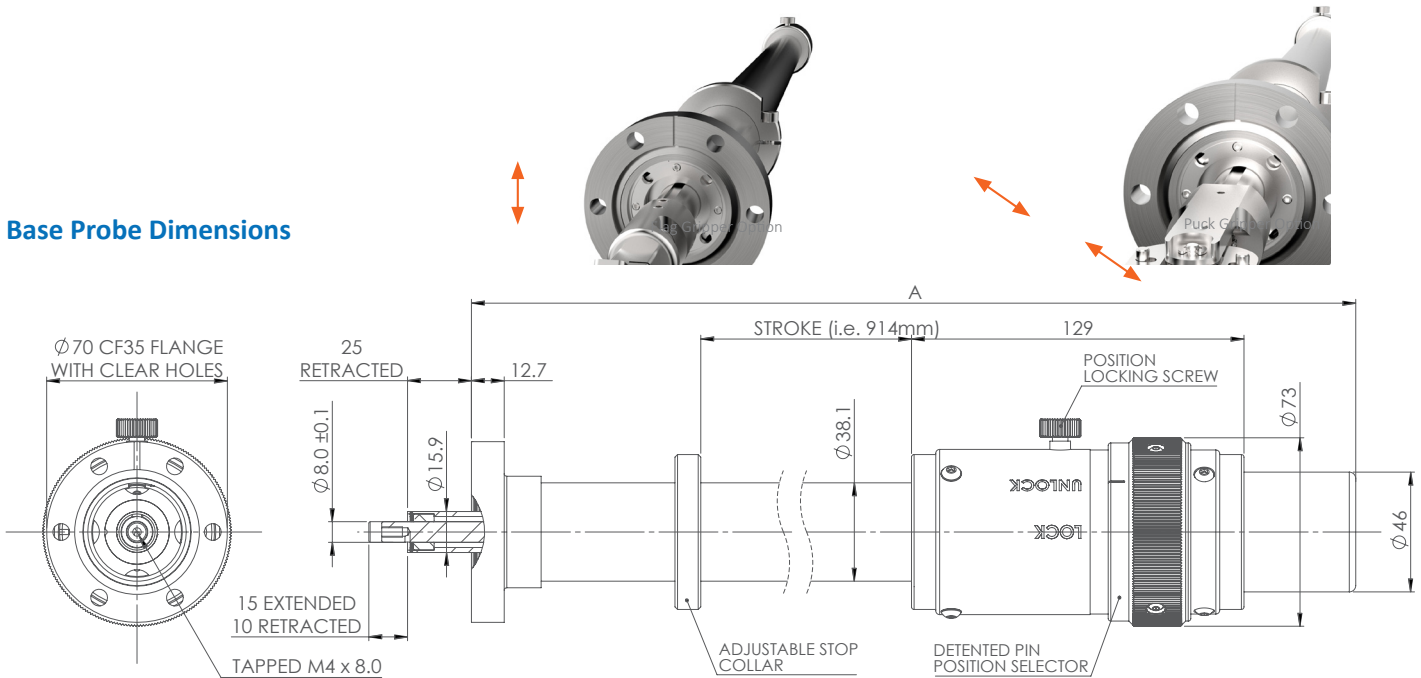


# Sample Transfer Arms

Magnetically-coupled



## Base Probe Dimensions



Stroke (mm)	304	457	609	914	1219
A	515	692	870	1225	1530

## Part Number & 3D models

View, configure and download the complete LPP series using our interactive Product Configurator at:

<http://www.uhvdesign.com/products/sample-transfer-arms/triple-axis-powerprobe>

Selectable products: 1

TAPP35-304-H-F

ORDERNO Order number	TAPP35-304-H-F	
SR Series	TAPP	
FS Flange Size	CF35	
S Axial Stroke	304.000	mm
POS Position	0	304 mm
LPOS Locking Position	Unlock	
ROT Rotation	0	360 °
AO Actuation Options	Manual Thimble	
EF End-effector option	Flag	
W Weight	3.2	kg

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# Linear Telescopic Transfer Arm (LTTA)

## Linear transfer arm with ultra-compact footprint

Telescopic transfer arm with 914mm travel, specifically designed for use in situations where installation space is a limiting factor or a compact system footprint is desired.

Available with options for 20mm of arm lift/lower, motorised actuation and choice of Fast Entry Loadlock.

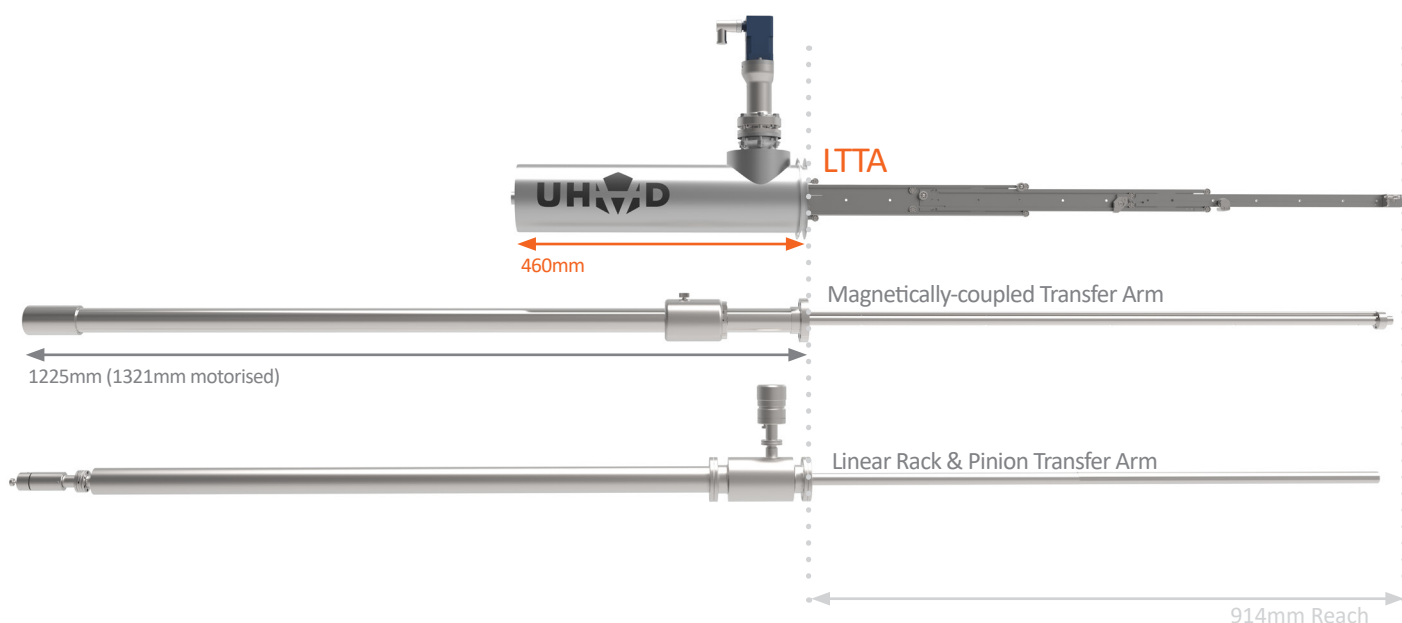
### LTTA KEY ADVANTAGES

- » Ultra-compact footprint
- » Up to 914mm extension
- » Fast Entry Loadlock options
- » 20mm lift/lower option
- » Low vertical deflection under load

The Linear Telescopic Transfer Arm (LTTA) utilises an innovative wire driven telescopic arm mechanism to provide up to 914mm of linear travel within the smallest possible footprint. Available with manual or motorised actuation and additional 20mm arm lift/lower option to facilitate sample hand-off. With less than 3.0mm vertical deflection under a 5.0N load the LTTA is a compact alternative to conventional magnetically-coupled transfer arms.

The LTTA can be supplied complete with a Fast Entry Lock (FEL) for convenience.

### Footprint Comparison

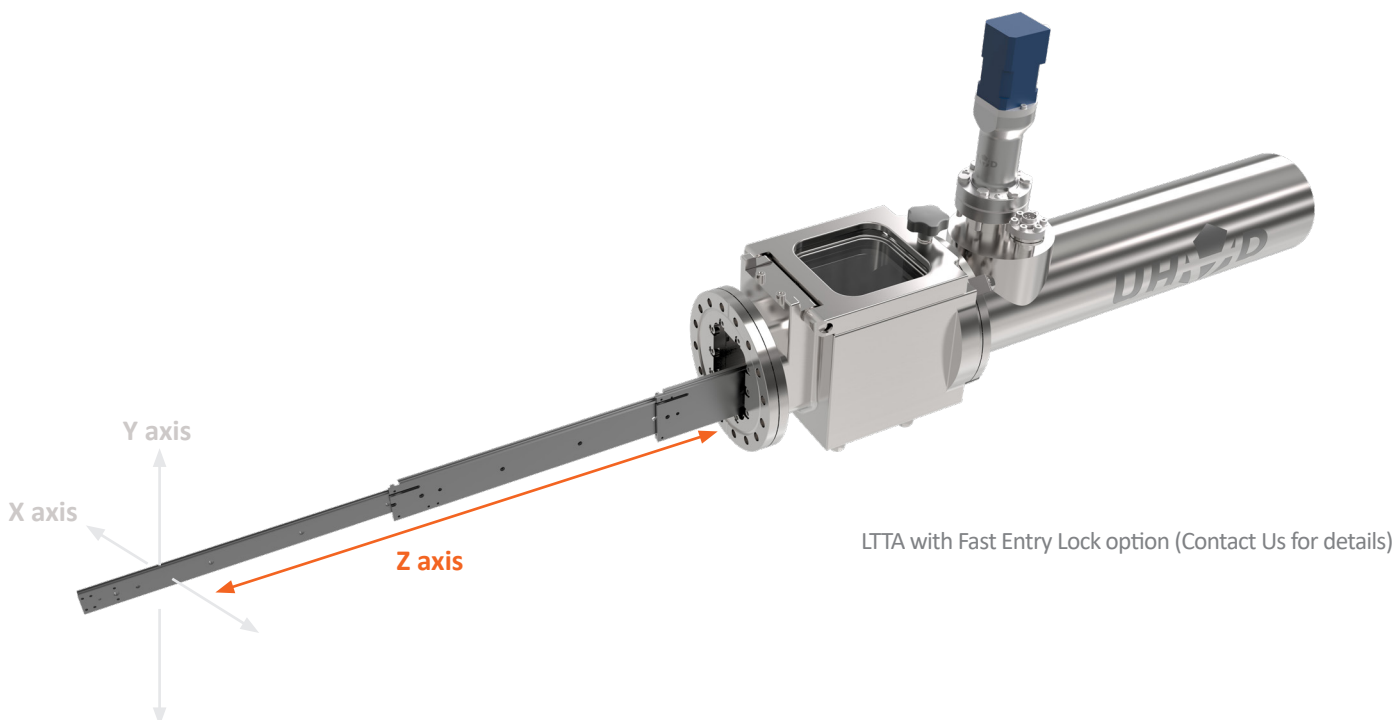


# Sample Transfer Arms

Linear Telescopic



LTTA TECHNICAL DATA	
Mounting flange options - LTTA only	CF100, ISO-K 100, CF150, ISO-K 160
Mounting flange options - LTTA + Fast Entry Lock chamber	Contact Us for Details
LTTA arm extension	914mm
Lift/Lower option	20mm
Linear positional repeatability (Z Axis)	<+/-0.5mm at 914mm extension
Arm repeatability in X & Y planes at full extension	<+/-0.5mm at 914mm extension
Vertical deflection (absolute)	
5.0N load	<3.0mm variance during 914mm extension
Horizontal deflection (absolute)	
5.0N load	<4.0mm variance during 914mm extension
Arm extension actuation options	Manual, Stepper Motor or SMART (DC) Motor, Limit Switches
Arm Lift/Lower actuation options	Manual, Stepper Motor or SMART (DC) Motor, Limit Switches
Maximum recommended transfer speed	<85mm/s
Recommended transfer speed	30mm/s
Maximum Load on arm	0.5Kg
Magnetic field	~400mGauss (earths ambient field) >50mm from rotary drive
Maximum Bakeout Temperature	200°C



# Rotary Telescopic Transfer Arm (RTTA)

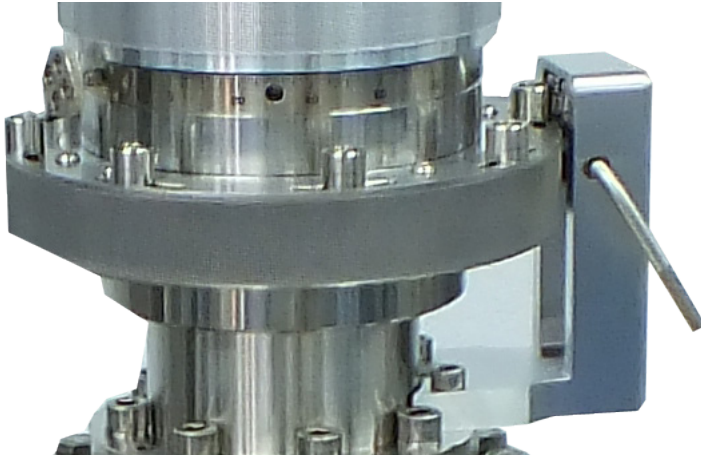
## Transfer Arm for Radial Distribution Chambers



### RTTA KEY ADVANTAGES

- » 2.5x the reach of conventional systems
- » Typically <1mm deflection at full extension with 10N load
- » Excellent substrate position reproducibility: <0.2mm laterally & axially
- » 2 and 3-Axis variants
- » True UHV performance

2-Axis RTTA installed on radial distribution chamber. Chamber not supplied with RTTA as standard.



## True UHV rotation with no oil, slip rings, bellows or differential pumping

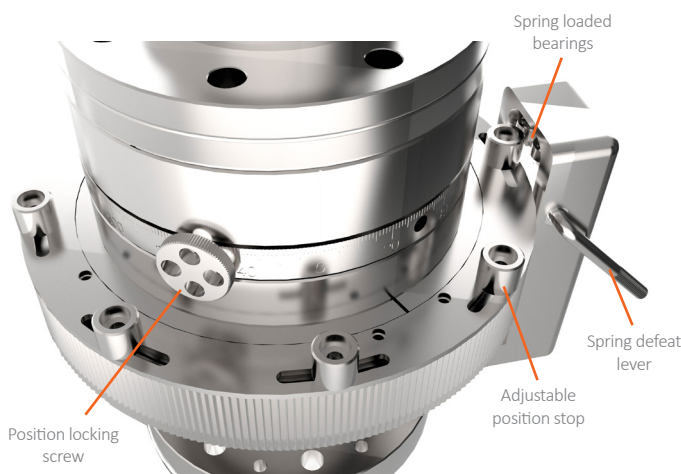
The Radial Telescopic Transfer Arm is actuated by the MD64LB and MD40 magnetically-coupled MagiDrive rotary feedthroughs. They provide true UHV performance, without any bellows, oil, slip rings or differential pumping. The larger MD64LB has a break-away torque of ~40Nm, providing an extremely stiff coupling, ideal for rotating the arm assembly. The smaller MD40 actuates the mechanisms to drive the arm in and out.

## User-friendly Manual Arm Alignment

The RTTA is offered in manual or motorised versions.

The manual version of the RTTA is supplied with an innovative, user-friendly system to align the arm with the desired ports.

Fitted to the top of the thimble ring are a number of adjustable position stops. These engage with a pair of spring-loaded bearings that can be withdrawn while the drive is rotated into position then re-engaged to hold the drive firmly in position by using a simple lever. Each stop can be individually aligned with a port axis to define default angular positions which are very reproducible.



## Motorised 'Talk Free' Concept

Many radial distribution transfer solutions face the issue of the rotating arm motion causing the arm extension assembly to move (often described as the axis cross-talk). Therefore, rotation of the arm also causes the sample to be driven in and out, losing its position. To overcome this, complex software programming is required to unwind the secondary drive during rotation of the arm. UHV Design recognises this to be an unwanted feature and has, therefore, removed this as an issue through a unique mechanical design used on many other UHV Design manipulators over the years. In brief, this links the rotary motion of the MD64LB arm to the motor mounting of the smaller MD40, mechanically unwinding the undesired motion, without the need for complex software.



# 2-AXIS RTTA

## Rotary & Telescopic Arm Extension

The 2-axis RTTA provides 360° rotation and 760mm linear extension within an ultra-compact footprint. Typically <1mm deflection at full arm extension with 10N load, linear reproducibility of <0.2mm and rotational reproducibility of <0.2mm. Motorisation options available.

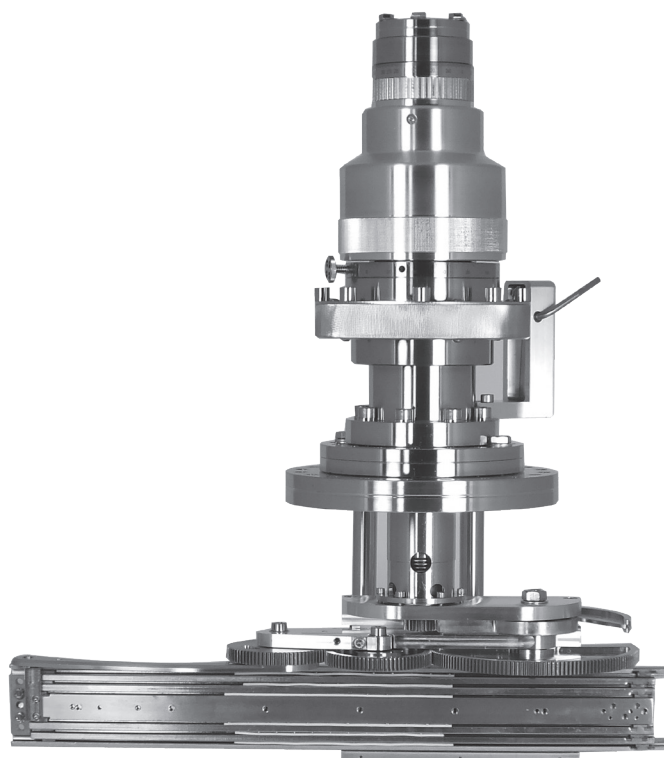
### RTTA 2-AXIS KEY ADVANTAGES

- » 760mm extension
- » Typically <1mm deflection at full extension under 10N load
- » Rotational reproducibility <0.2mm
- » Linear reproducibility <0.2mm
- » Clean, UHV performance
- » Competitively priced compared to conventional designs

The 2-axis RTTA provides a cost-effective solution for radial distribution sample transfer applications providing arm rotation and arm extension.

A high torque magnetically-coupled MagiDrive precisely rotates the transfer arm to align with the desired chamber port. A second MagiDrive is used to drive the innovative telescopic mechanism to provide an arm extension of 760mm to transport the sample in and out of the desired satellite chamber.

The 2-axis RTTA can be motorised using stepper or SMART motors. Alternatively the RTTA can be configured to accept any standard NEMA23 motor.



## 3-AXIS RTTA

### Rotary & Telescopic Arm Extension with lift/lower

The 3-axis RTTA provides 360° rotation, 760mm linear extension and 50mm Z motion to provide arm lift and lower to aid sample transfer. Typically <1mm deflection at full arm extension with 10N load. Linear reproducibility of <0.2mm and rotational reproducibility of <0.2mm. Motorisation options available.

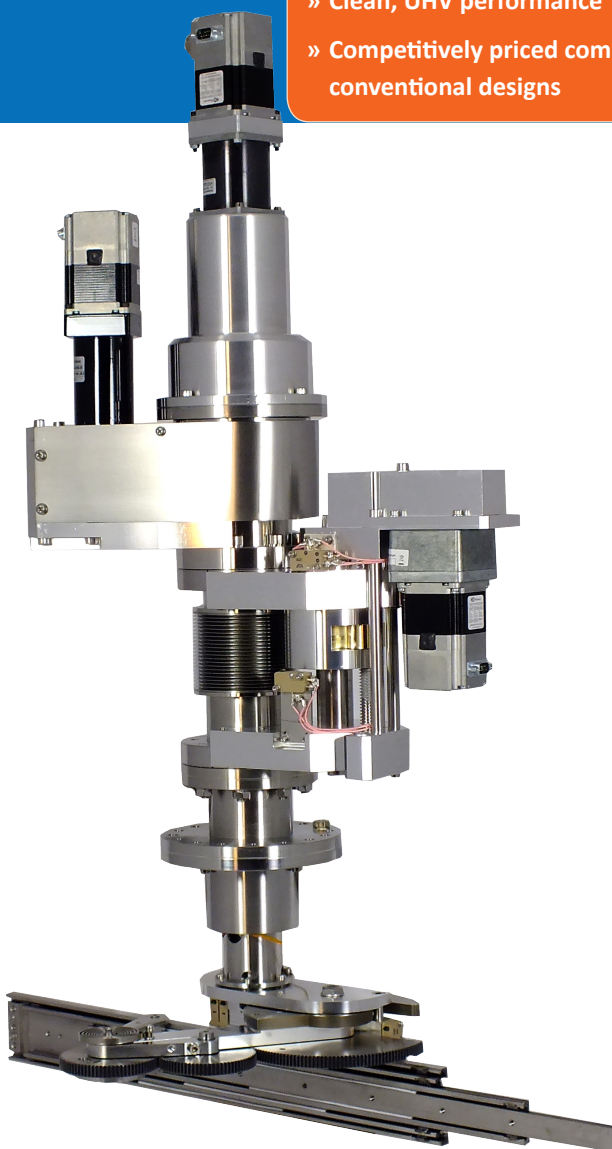
#### RTTA 3-AXIS KEY ADVANTAGES

- » 760mm extension & 50mm lift/lower
- » Typically <1mm deflection at full extension under 10N load
- » Rotational reproducibility <0.2mm
- » Linear reproducibility <0.2mm
- » Clean, UHV performance
- » Competitively priced compared to conventional designs

In addition to rotation and arm extension, the 3-axis RTTA provides 50mm of arm lift and lower for sample transfer.

A high torque magnetically-coupled MagiDrive provides arm rotation to align with the desired chamber port. A second MagiDrive is used to drive the innovative telescopic mechanism to provide an arm extension of 760mm to transport the sample in and out of the desired satellite chamber. A linear shift mechanism is used to provide 50mm lift/lower of the sample arm for gravity based sample hand off, typically used on our MBE, sputtering and CVD sample manipulators and heating stages.

The 3-axis RTTA can be fully motorised using stepper or SMART motors. Alternatively the RTTA can be configured to accept any standard NEMA23 frame motor.





For more information:

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