



VACGEN

UHV Manipulation

Product Overview



Manipulation

Introduction

Vacgen supplies a market leading range of UHV manipulators for high precision surface analysis and surface deposition. This brochure briefly outlines some of the products offered for manipulation applications. If you require further information on any of the products, please visit www.vacgen.com.

Our manipulation devices can be used for a range of materials creation and analysis applications including:

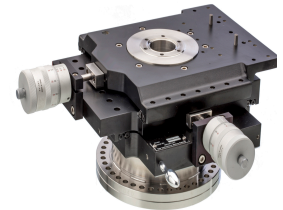
Application		Suitable Product
<u>Synchrotrons:</u>	High accuracy and Repeatability High Reliability Beam Lines - Beam conditioning End stations - XPS, UPS, ARUPS & HAXPES	<u>Manipulators</u> - Omniax, Transax, HPT <u>Transfer Devices</u> - Miniax, LTM, Wide Bore LTM, LDS, MLRV, MLRD <u>Drives</u> - RD1 & RD2, RP100, DPRF
<u>Material Deposition:</u> (i.e. MBE)	Medium accuracy and Repeatability High Reliability Wafer Heating & Cooling Wafer Transfer	
<u>Surface Science:</u>	Medium accuracy and Repeatability High Reliability ESCA, XPS, UPS, ARUPS & HAXPES	<u>Sample Holders</u>

Manipulation Manipulators

VACGEN's manipulation components are fully modular to allow flexibility when designing your system. These include Multi Axis Manipulators, Z-Axis Manipulators, XY Tables, Rotating Platforms, Sample Transfer Mechanisms and Sample Holders.



Rotary Platforms



XY Tables



Linear Transfer

Manipulator	Description	Axis	Bore Size
Miniax	Low cost single bellows translator for XY and Z movement. Supplied as an un-configured unit.	3-4 Axis	35mm
HPT	Precision single bellows translator with full range of motors and sample handling. Supplied fully configured.	3-5 Axis	44mm
Transax	Double bellows translator with good stability and a wide range of travel options. Supplied fully configured. Motor options available.	3-6 Axis	28mm with support tube, 33mm without
Omniax	Highly stable double bellows translator with a large probe size. Fully configured with a wide range of options. Motor options available.	3-6 Axis	54mm
Omniax Wide Bore	Large clear bore manipulator designed primarily for the cryostat applications	3-6 Axis	100mm
Cryostats	Choose from four liquid nitrogen and helium cryostats to provide temperatures down to 4.2K. Manipulation in up to five axis. Open or closed cycle operation.	3-6 Axis	N/A

ISO 9001:2015 Quality System



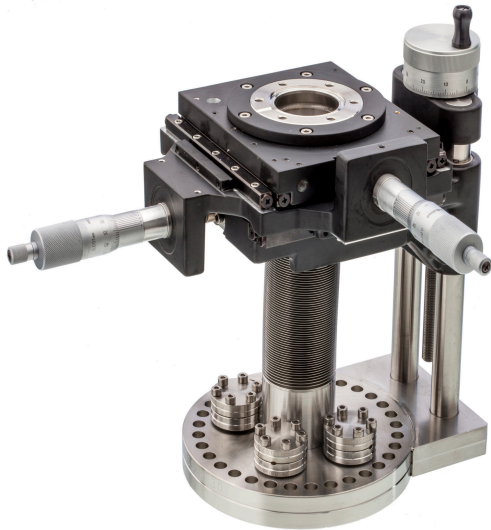
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Manipulation

Single Bellows Manipulation

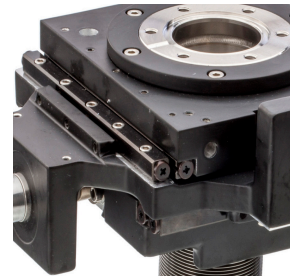
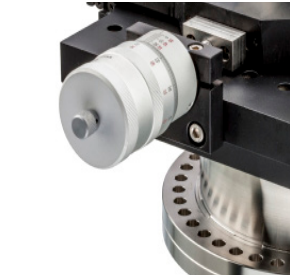
Single bellows manipulation are translators which use a single edged welded bellow for X,Y, Z movement. Single bellows manipulation can provide up to $\pm 12.5\text{mm}$ XY movement and Z travel options from 50mm to 250mm.



One of the options for single bellows manipulation, the Mini-XYZ translator offers a source of simple, cost effective, manipulation. The single bellows construction makes it easy to use in any orientation. The micrometers are preconditioned and do not need to be removed for bakeout.

Mini-XYZ

3-4 axis manipulation
Bakeable up to 200°C
Z travel options 50-100mm
 ± 12.5 mm XY movement



Manipulation

Single Bellows Manipulation

The HPT High Precision Translator is a simple, cost effective, single bellows, translator designed as a small compact and light manipulator platform. The wide bore of the HPT allows probe diameters of up to 19mm with full vectorial movement of $\pm 12.5\text{mm}$. These manipulators can be fully motorised.

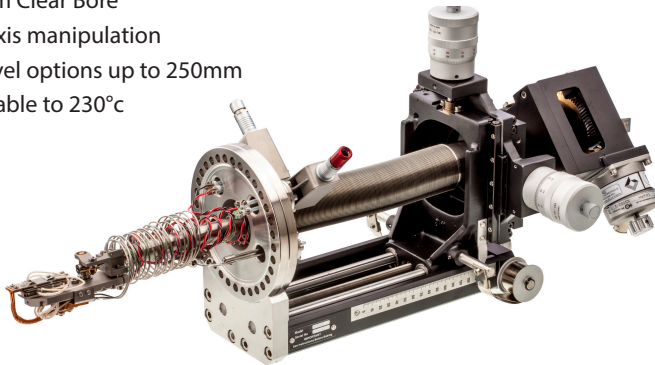
HPT

44mm Clear Bore

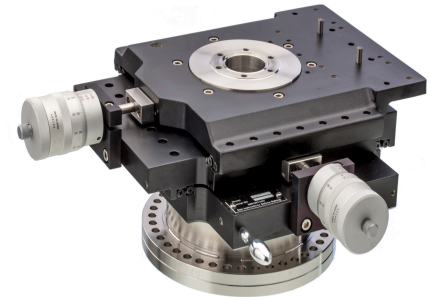
3-5 axis manipulation

Z travel options up to 250mm

Bakeable to 230°C



XY modules designed as standalone single edge welded bellows tables which are compatible with the Transax, Omniax range of linear shift mechanisms (Z axis) and Rotating platforms such as the RP100, allowing a complete sample manipulator to be created by adding these sections together.



XY Table

Travel options ± 12.5 or 25mm

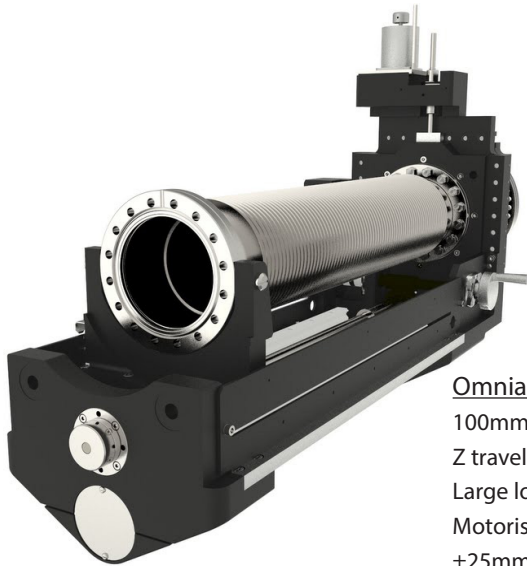
Controlled via micrometers

Motorisation optional

Manipulation

Dual Bellow Manipulators

VACGEN offer a range of options for XYZ precise manipulation with well tested dual bellows products such as Omniax, Transax and Omniax Wide Bore. Dual bellows manipulators consist of two independent bellows, one for X & Y and the second for Z travel. XY options up to $\pm 25\text{mm}$ and Z travel from 100mm to 1000mm.



Omniax Wide Bore

100mm clear bore
Z travels 100mm to 1000mm
Large load capacity
Motorisation options
 $\pm 25\text{mm}$ XY travel



Transax

$\pm 25\text{ mm}$ XY travel
3-6 axis manipulation
Up to 450mm Z travel
Bakeable up to 230°C

Manipulation

Omni-ax Manipulator

The VACGEN Omni-ax manipulator is a robust fully UHV compatible Dual Bellows translator. It features a unique hinge and bush arrangement to provide class leading stability and vacuum load compensation. The Omni-ax is particularly suited to applications that require high repeatability and accuracy combined with heating and cooling of the sample.

The Omni-ax manipulator is perfect for use in synchrotron end stations. An ultra stable, 54mm bore, dual bellows manipulator suitable for vertical or horizontal mount. A modular XYZ manipulator with NW63CF(114mm OD) conflat flange travelling, with Z travel options from 100mm to 1000mm and ± 25 mm XY travel.



Omni-ax

Z travel 100mm to 1000mm

3-6 axis manipulation

± 25 mm XY travel

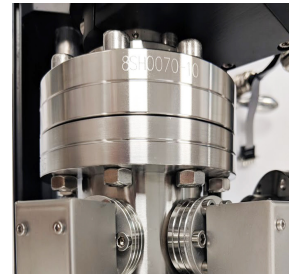
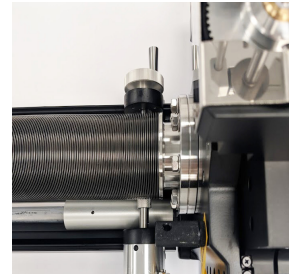
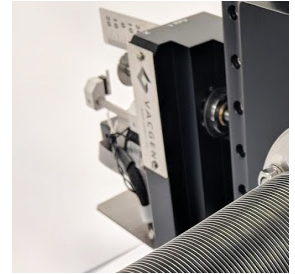
54mm clear bore

Leak rate $< 1 \times 10^{-10}$ mbar l-s

Operating pressure 1 bar to 10^{-11} mbar

Manual and motorisation options

Also available in Wide Bore



Manipulation

Wafer Manipulator

VACGEN can provide a wide range of UHV manipulation for surface analysis or surface deposition. This unique manipulator design can translate with varying degrees of freedom including X,Y, Z Primary (R1) rotation and Secondary (R2) rotation or R3 tilt. Other versions are available and can be tailored to your specific application - enquire with one of our engineers today.



Tilt Manipulator

Manipulator: for 50mm / 100mm Substrate

900°C Heating

Cooling to -150°C on the substrate

Substrate tilt of 15° (R3)

Substrate Rotation $\pm 180^\circ$

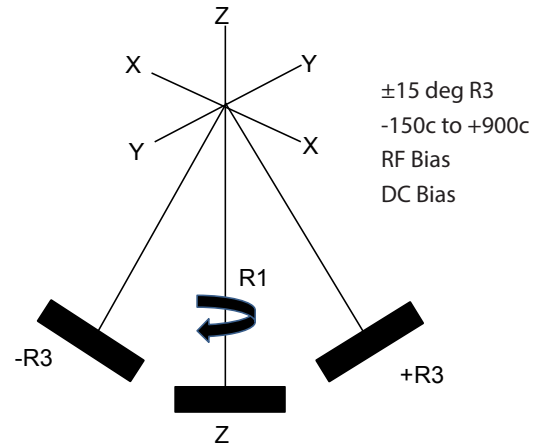
RF and DC Bias options for reactive sputtering

Integrated gas ring

Sample pick up 50mm movement

Substrate height adjustment 100mm

Fully Automated within LabView software



Manipulation

Z-Axis Manipulators

Z-Axis manipulators provide a controlled motion, allowing samples and probes to be inserted with high accuracy and stability into a vacuum envelope. They can be used as an individual component, or as part of a larger manipulation array.



LTM Wide Bore

68mm clear bore

25mm - 150mm Z travel



LTM Series

38mm clear bore

25mm - 150mm Z travel



TR Series

33mm clear bore

Up to 600mm Z travel

Manipulation

Rotating Platforms

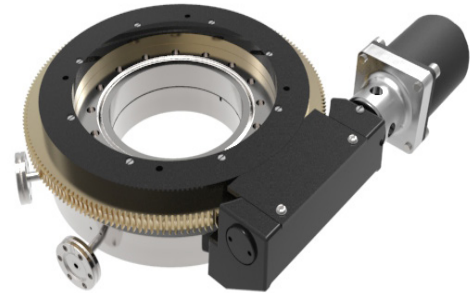
Differentially pumped rotary feedthroughs (DPRF) allow the airside flange to continuously rotate, whilst the mounting flange is attached to the chamber. The vacuum seal is maintained by the secondary vacuum pumped interspace. Three versions of DPRF are available coarse, manual and high precision.



DPRF

25mm or 55mm clear bore
Continuous rotation
Available in coarse or high precision

VACGEN's rotating platform RP100 provides the means of translating rotation through a vessel wall without losing vacuum integrity. Thus enabling probes or assemblies to be inserted without effect on the chamber pressure.



RP100

100mm clear bore
Available in coarse or high precision
Continuous Rotation

Manipulation

Rotary Drives

The RD1 is a manual or motorised High precision rotary drive. A position lock is fitted. The main shaft can be extended to suit custom requirements. The RD1 is a low backlash, high precision edge welded bellows drive providing continuous primary rotation to a 9.52 mm diameter shaft.



RD1

Low Backlash

Bakeable to 230°C

Graduated handwheel with Vernier scale

Rotary drives are required for manipulator sample holders to be mounted. Primary rotation with secondary linear movement 12mm and 24mm versions. The RD2 is a low backlash, high precision drive providing continuous primary rotation and secondary linear axis movement.



RD2

Primary (R1) and secondary (R2) rotation

Long life bellows

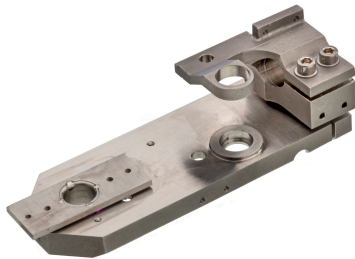
Bakeable to 230°C

Graduated Handwheel with Vernier Scale

Manipulation

Manipulator Sample Holders

Our range of sample holder mounts and sample holders attach to the end of rotary and linear drives. Sample holders facilitate both primary and azimuthal rotation whilst allowing connection for sample services such as electrical, heating and cooling. The sample holders are adjustable to suit varying thickness of sample.



SH1

Relative permeability <1.005

Low swept radius volume

Primary (R1) rotation with no services 360°
or with services (i.e heating/cooling) $\pm 180^\circ$

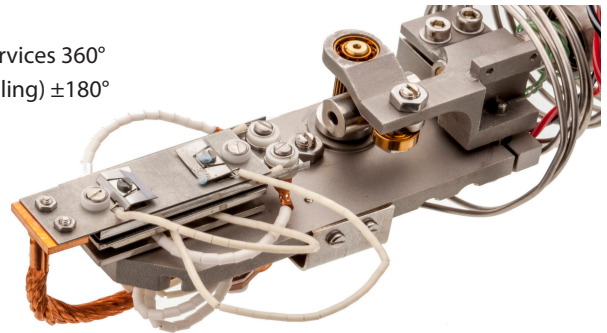


SH2

Relative permeability <1.005

Low swept radius volume

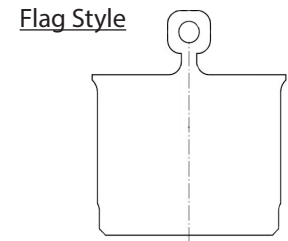
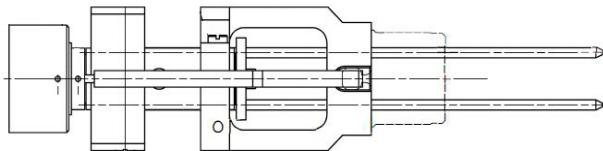
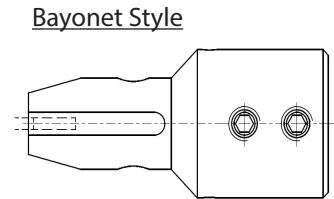
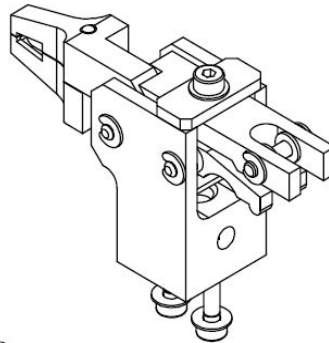
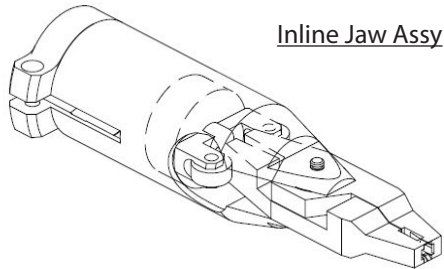
Primary (R1) rotation with no services 360°
Azimuthal (R2) rotation $\pm 110^\circ$ ($\pm 180^\circ$ SH2F)
Tilt (R3) rotation $\pm 110^\circ$



Manipulation

Transfer Heads

Transfer heads come in a range of different styles and can be used in combination with any of the wobblesticks from our catalogue. If you require another method of transfer, please contact one of our engineers or sales team at sales@vacgen.com.



Manipulation

Wobble Sticks

The WS Wobble stick manipulator utilises a flexible edge welded bellows to enable effective manually operated movements to be transmitted through the wall of a vacuum vessel. Multi functional tool for the hands on approach of sample handling. Tactile operation to give the user a true 'feeling' of position inside the vacuum chamber.



Available with a range of end styles including Bayonet, Fork Style Transfer Head and Pincer Grip

Linear travels from 80mm to 280mm
 $\pm 22^\circ$ of angular movement
Dual edged welded bellows
Bakeable to 230°C

Manipulation

Transfer Devices

For applications that require combined rotary and linear movement, magnetic linear and rotary motion sample transfer devices can be used. These devices use a magnetic coupling to impart both linear and rotary movement to the shaft, without the need for bellows.



MLRV

MLRV high power magnetically coupled linear and rotary transfer device providing smooth sample movement within the vacuum chamber.

MLRD

The MLRD range of dual axis/shaft sample transfer probes offer separate linear and rotary motions. The MLRD device has an independent shaft for the rotary motion and this, together with the bearing arrangement, gives precise, concentric, 360° continuous rotation of the secondary shaft.



Helping you make the next leap forward

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