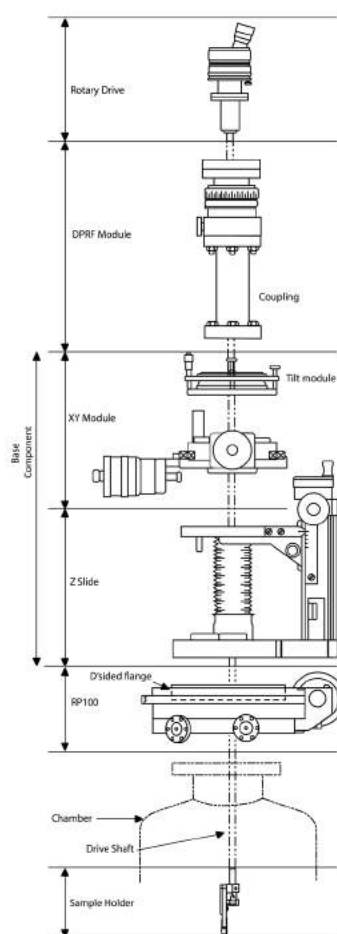


Modular Manipulators

HPT WX Manipulator Modules

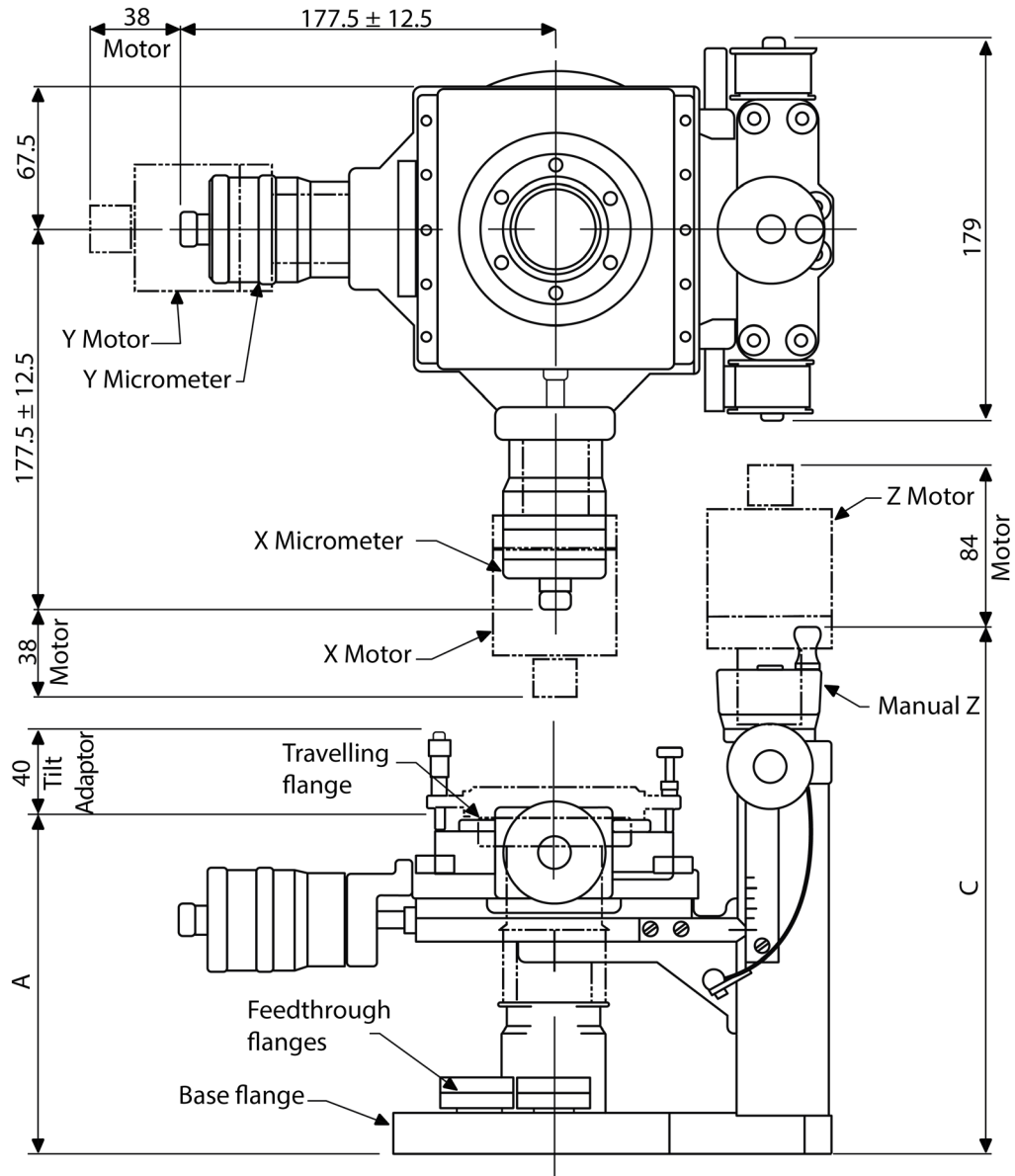
The HPT High Precision manipulator is a simple, cost effective, single bellows, translator designed as a small compact and light manipulator platform. The wide bore of the HPT allows probe diameters of up to 19mm with full vectorial movement of +/- 12.5mm and can be fully motorised.



Product Overview

- Full UHV specification
- Bakeable to 230°C
- Compatible with the full range of VACGEN sample handling accessories
- Base mounting flange options: 152 mm OD double bolt hole (NW100CF) with 4 feedthrough ports for sample services, or 70 mm OD (NW35CF) base flange without feedthrough ports
- The travelling flange is 70 mm Tapped OD straddled (NW35CF)
- Bellows clear bore 44 mm.
- Z travel ranges: 50 mm, 100 mm, 150 mm or 250 mm
- XY travel up to ± 12.5 mm
- X, Y and Z axes can be motorised
- Precision tilt adaptor option available
- XY stage uses cross all metal roller bearing slides
- Z slide uses re-circulating all metal ball guides
- Z slide has vacuum compensation springs to increase drive screw life.
- Precision micrometers actuate the X and Y manual movement.
- Motor and encoder options wired with plug to suit VACGEN controllers
- Limit Switch and mounting hardware option.
- Cooling option
- Mounted in any orientation

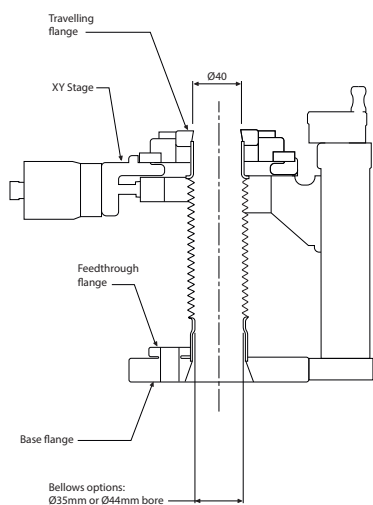
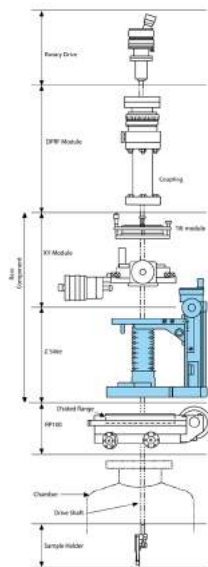
HPT WX Manipulator Modules



XYZ Modules, based on the HPT-WX dimensional reference

HPT Translators - Basic Dimensions		
Z travel	HPT-WX Bellows bore of Ø44 A mm	C mm
50	210 to 260	294
100	210 to 310	344
150	275 to 425	459
250	226 to 476	510

HPT WX Manipulator Z Slide Modules



Product Overview

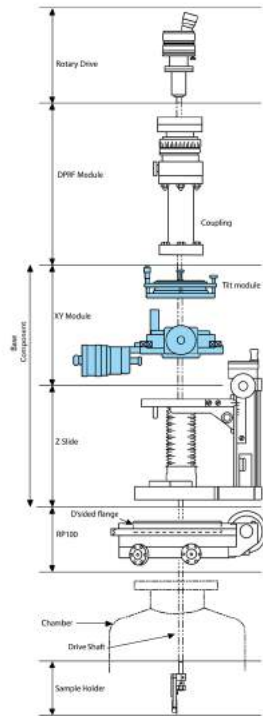
- Standard travel options are 50 mm, 100 mm, 150 mm and 250 mm
- Base flange is 152 mm OD double bolt hole (NW100CF) with 4 mini ports tapped M4 for service feedthroughs.
- The travelling flange is 70 mm OD straddled (NW35CF). The holes are tapped M6 and straddled about the Y axis
- The manual Z-drive is included in the Z Slide module
- The stepper motor option is compatible with all VACGEN motor drive-controllers
- Motor and encoder options wired with plug to suit all VACGEN controllers
- Limit switches and mounting hardware provided with a motor option.

HPT Series - Z slide - Technical Data	
Parameters	Specification
Resolution- Manual	5 microns
Resolution- Motorised ⁽¹⁾	2.5 microns
Repeatability	10 microns
Maximum speed- Motorised	2.5 mm.s ⁻¹

HPT Translators- HPT-WX Series			
Base flange OD		Travel XYZ mm	HPT-WX (44mm Bore) Order code
mm	Inch		
DN100 (152)	6.0	50 Z +/- 12.5 XY	MWXYZ05150
DN100 (152)	6.0	100 Z +/- 12.5 XY	MWXYZ10150
DN100 (152)	6.0	150 Z +/- 12.5 XY	MWXYZ15150
DN100 (152)	6.0	250 Z +/- 12.5 XY	MWXYZ25150
Z Axis Stepper Motor Upgrade Kit ⁽¹⁾			MRXMTZW
Z Axis Encoder Motor Upgrade ⁽¹⁾			MRXMTZE

(1) Drive assembled to stepper motor wired with plug to suit VACGEN controllers. A separate mating connector is available.

HPT WX Manipulator XY Stage Modules



Product Overview

- All HPT manipulators require an XY module. This is a precision stage that has a travel of $\pm 12.5\text{mm}$ in X and Y for a maximum vectorial offset.
- The large barrel micrometer is easiest to read and has 5 micron graduations,
- Micrometers are interchangeable with the motor modules
- A tilt adaptor is available to incline the travelling flange by up to 7° with respect to the primary axis. Maximum tilt angle is limited by the position of the Z slide and by the probe diameter
- Can be used with any orientation
- A removable index pin through the XY stage indicates the central position and acts as a transit lock. It must be removed before use
- Motor and encoder options wired with plug to suit all VACGEN controllers
- Limit switches and mounting hardware provided with a motor option.

IMPORTANT PRODUCT INFORMATION

Micrometers or motor kits are required, one for the X axis and one for the Y axis.

HPT WX Series XY Stage - Technical Data		
XY Drive	Parameters	Specification
Large barrel Micrometers	Resolution Repeatability	5 Microns 5 Microns
Motors	Resolution ⁽¹⁾ Repeatability ⁽¹⁾ Maximum speed	2.5 microns ⁽¹⁾ 5 microns ⁽¹⁾ 2.5 mm/s motorised ⁽¹⁾

(1) Note that the XY travel will be restricted if the probe diameter is greater than 19.4 mm for the 44 mm bellows,

HPT WX Translators - XY stage Module Accessories	
XY Module or Accessory	Order code
Large barrel X or Y Axis Micrometer (each) ⁽²⁾	MRXMIC05
X Axis Stepper motor kit (each) ^{(1) (2)}	MRXMTXYW
Y Axis Stepper motor kit (each) ^{(1) (2)}	MRXMTXYW
X Axis Encoder ⁽²⁾	MRXMTXYE
Y Axis Encoder ⁽²⁾	MRXMTXYE
Tilt adaptor	MRXTAA

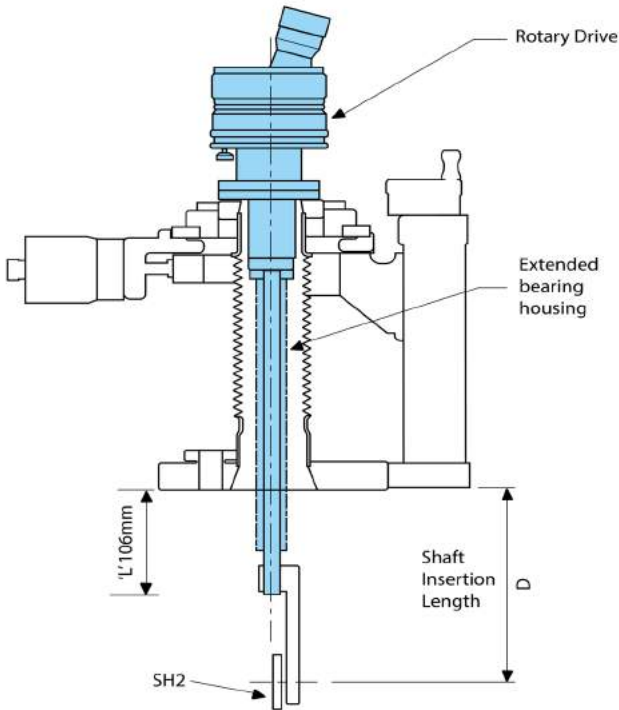
(1) Stepper motor is assembled to drive and is supplied with a wired connector to suit VACGEN stepper motor control system. A separate mating connector is available.

(2) When ordering you need to pick two drive options of any variation to drive the X and Y axis

HPT WX Manipulator Rotary Drive Modules



Product Overview



- Drives are based on the RD1 for primary rotation (R1) only, or RD2 for primary rotation with a secondary movement (Azimuthal)
- The rotary drive shaft insertion length, L or D can be made to suit most requirements. The retracted L or D dimension will be stated by the end user when ordering the rotary drive module
- Limits apply to the retracted L dimension when the cooling accessory is fitted (see table below)
- Rotary drives with an M prefix (MR1R and MR2R) are fitted with an extended bearing housing to increase rigidity.
- The vectorial movement of the 44mm bore bellows is not affected by the 19mm diameter tube.

L Dimension Limitations with Cooling Accessory Fitted

HPT Travel Range mm	L Minimum mm	L Maximum mm
50	46	195
100	61	210
150	76	225
250	106	225

HPT WX Translators - Rotary Drive Module

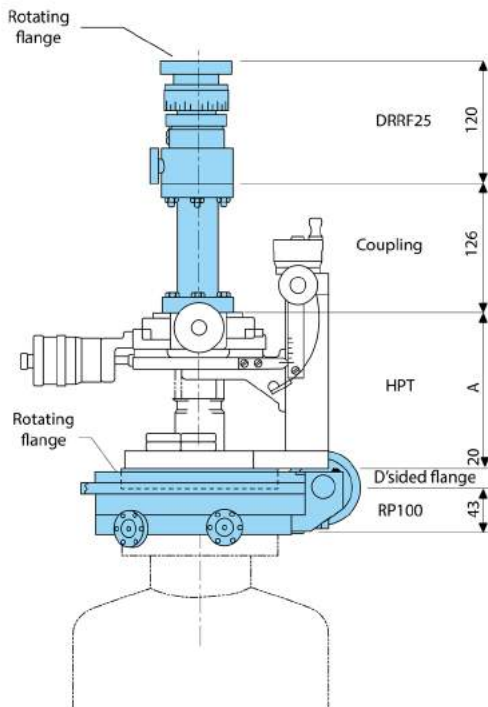
Rotary drive options	Notes	Order code
Variable length rotary drive:R1 Only Variable length rotary drive:R1 Only + Secondary	M-coded drives have extended bearing housings. Note restriction ²	MR1R MR2R
Stepper motor upgrade for primary axis ⁽¹⁾		MRDPMS
Stepper motor upgrade for secondary axis ⁽¹⁾		MRDSMS
Encoder motor upgrade for primary axis ⁽¹⁾		MRDPME
Encoder motor upgrade for secondary axis ⁽¹⁾		MRDSME

(1) Stepper motor option is supplied with a wired connector to suit SIMSTEP motor control system. A separate mating connector is available.

(2) The travel limitation is the vectorial sum of the X and Y motions

HPT Manipulator Probe Rotation Modules

For rotation of the complete, inserted, probe assembly, a VACGEN DPRF unit can be fitted. This removes the risk of internal wiring becoming entangled or damaged.



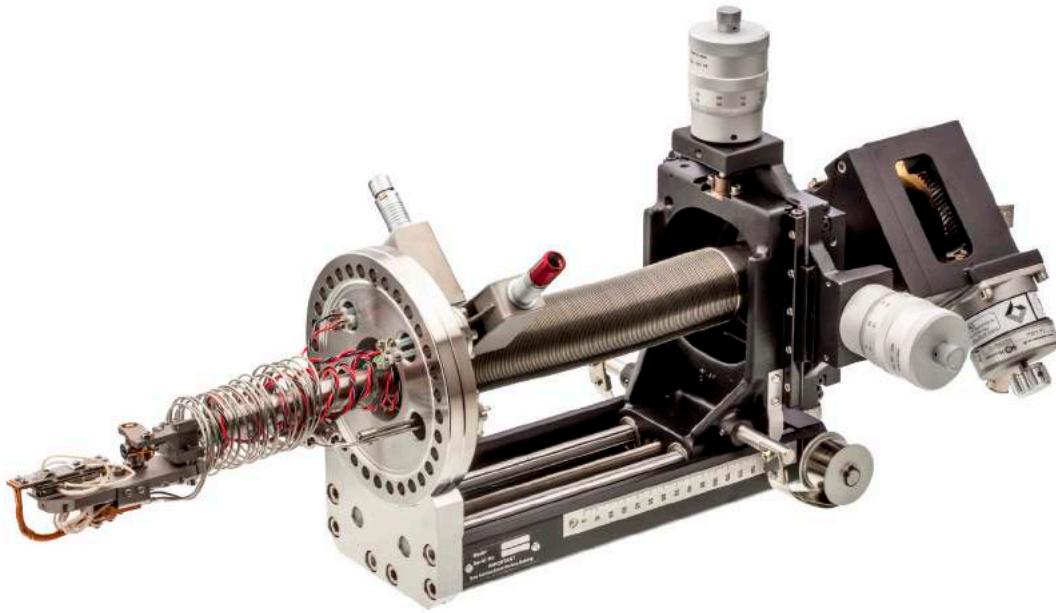
Product Overview

- For alternative rotations of the sample or the manipulator itself, differentially pumped rotary drives are available. Two types can be used with the HPT; the DPRF25 or the RP100.
- The DPRF25 rotary feedthrough has a clear bore of 25 mm diameter and is fitted to the travelling flange. A tubulated coupling is required as the mating flanges are both tapped.
- The RP100 rotating platform rotates the manipulator about the axis of the chamber mounting flange, independent of XY movement. The RP100 is fitted between the HPT base flange and the chamber. A double-sided flange is required to avoid clashing with the HPT base plate.

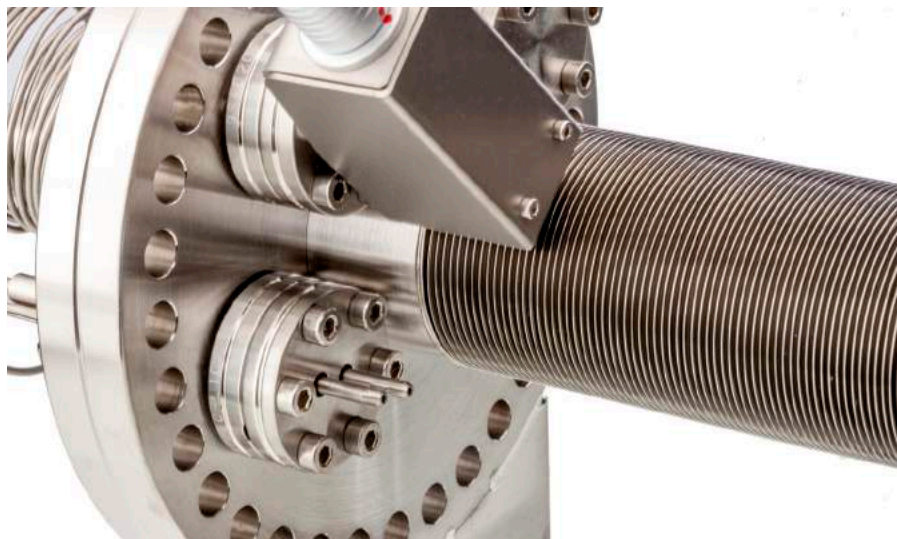
HPT Differentially Pumped Rotary modules and accessories

DPRF Module	Order code
DPRF25 with Coarse manual actuator	ZDPRF25
DPRF25 with Precision manual actuator	ZDPRF25H
DPRF25 with Stepper motor ⁽¹⁾	ZDPR25W
DPRF25 with Stepper motor and encoder	ZDPR25E
RP100 Module	
RP100 with Coarse manual actuator	ZRP100C
RP100 with Precision manual actuator	ZRP100H
RP100 with Stepper motor ⁽¹⁾	ZRP100W
RP100 with Stepper motor and encoder	ZRP100E
Accessories	
Tubulated coupling for DPRF25 mounting	ZBS41
Double-sided flange for RP100 mounting	ZFC100D

(1) Drive is assembled to stepper motor and is supplied with a wired connector to suit VACGEN's stepper motor control system. A separate mating connector is available



Fully configured manipulator



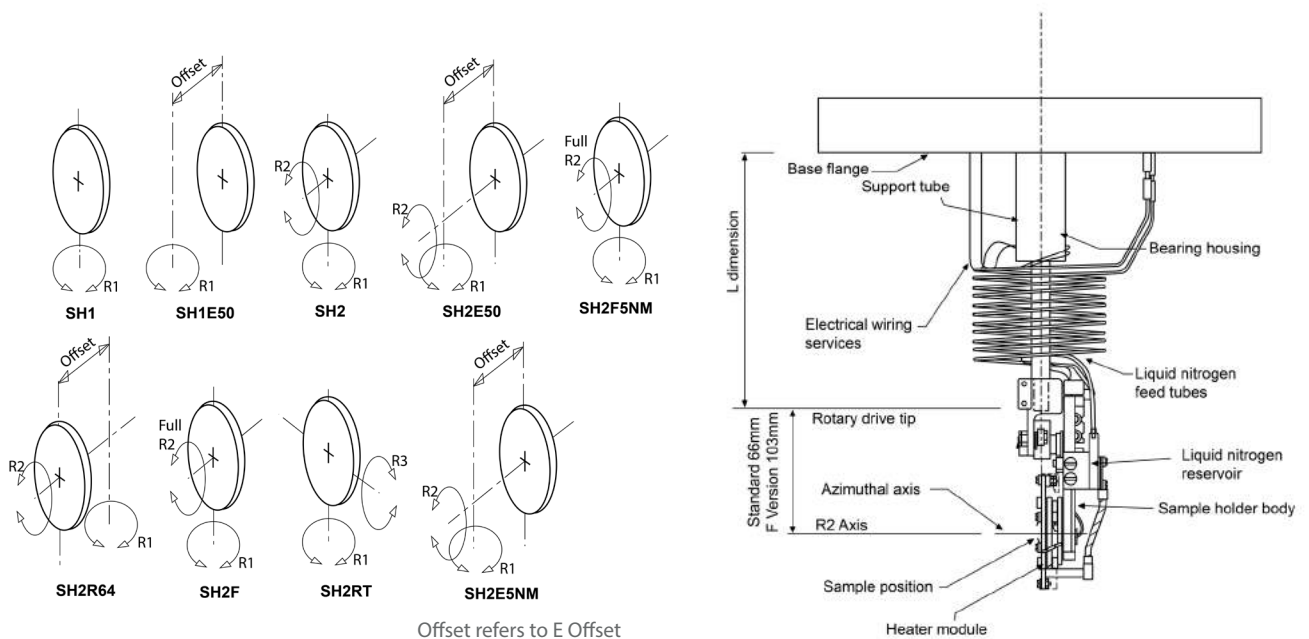
Heating and cooling services

HPT Manipulator Sample Holder Selection Modules

Sample Holders - Basic Specifications									
Part code	SH1	SH1E50	SH2	SH2E50	SH2F	SH2RT	SH2E5NM	SH2R64	SH2F5NM
Rotary Drive Required	RD1	RD1	RD2	RD2	RD224	RD2	RD2	RD2	RD224
Primary (R1) Rotation									
No services	360°	360°	360°	360°	360°	360°	360°	360°	360°
With services fitted	±180°	±180°	±180°	±180°	±180°	±180°	±180°	±180°	±180°
Azimuthal (R2) Rotation									
Preset (SH1)	±180°	±180°	-	-	-	-	-	-	-
No services	-	-	±180°	±180°	±180°	-	±180°	±180°	±180°
With cooling fitted*	±110°	±110°	±110°	±110°	±110°	-	±110°	±110°	±110°
Sample Offset E									
Bare backplate (mm)**	9 to 12	9 to 50	9 to 12	9 to 50	9 to 12	5.5 to 9.5	9 to 50	54 to 64	9 to 12
Plain or heater unit (mm)**	0 to 3	0 to 41	0 to 3	0 to 41	0 to 3	0 to 2.5	0 to 41	60 to 66	0 to 3
Tilt (R3) Rotation									
Tilt (R3)	-	-	-	-	-	±110°	-	-	-
Swept Radius									
No services (mm)	25	≥ 25	25	≥ 25	25	31	≥ 25	54 to 64	25
With all services (mm)	38	≥ 38	38	≥ 38	38	44	≥ 38	54 to 64	38
Magnetic Permeability	Low	Low	Low	Low	Low	Low	None Mag	Low	None Mag
'H' dimension (mm)	66	66	66	66	103	66	66	66	103
Heaters									
Resistive heater (HST or PBN)	950°C	950°C	950°C	950°C	950°C	950°C	950°C	950°C	950°C
EB heater (EBH)	1200°C	1200°C	1200°C	1200°C	1200°C	1200°C	1200°C	1200°C	1200°C
Cooling (LN)	-160°C	-160°C	-160°C	-160°C	-160°C	-160°C	-160°C	-140°C	-160°C
Drives									
R1 rotation (stepper)	0.01°	0.01°	0.01°	0.01°	0.01°	0.01°	0.01°	0.01°	0.01°
R2 rotation (stepper)	-	-	0.001°	0.001°	0.001°	0.001°	0.001°	0.001°	0.001°

* Important Note: Owing to the cooling post this restricts the full travel of the Azimuthal

** E Offset: This is the distance between the centre line of the R1 rotation axis and the backplate of the sample mount or substrate face



Offset refers to E Offset