Section 06

ROTARY TELESCOPIC TRANSFER ARM

Introduction to RTTA
- 2-Axis RTTA
- 3-Axis RTTA
Radial systems require the precise transfer of samples between multiple chambers for preparation and analysis. This is handled from the central radial distribution chamber (as shown on previous page).

The Radial Telescopic Transfer Arm (RTTA) represents a step-change advance in radial distribution technology, offering unrivalled performance over conventional designs at a comparable cost. The RTTA uses a high torque magnetically-coupled MagiDrive (see catalogue Section 1) to provide extremely stiff coupling for radial motion. This radial motion is used to align the transfer arm with the desired chamber port achieving angular reproducibility of <0.2mm. A second MagiDrive is used to drive the innovative telescopic mechanism which provides an arm extension of 760mm (2.5x that of conventional designs) to transport the sample in and out of the desired satellite chamber. The precision slide mechanism achieves linear reproducibility of <0.2mm with <1mm deflection at full extension with a 10N load.

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

The RTTA is available in 2-axis and 3-axis versions. The 2-axis RTTA provides rotation for port alignment and arm extension for sample transfer. The 3-axis RTTA also includes the ability to lift and lower the sample arm for gravity-based hand off typically used on our MBE, sputtering and CVD sample manipulators and heating stages.

THE RTTA ENABLES YOU TO:

1. Reach further
2. Use a smaller chamber for the same stroke
3. Gain access to valuable chamber ‘real estate’

2-Axis RTTA

Retracted position

Fully extended

3-Axis RTTA

Axis 1 - Arm Rotation

Axis 2 - Arm Extension

Axis 3 - Arm Lift/Lower

Conventional Design Limit

Additional source may be installed on the chamber
Radial Distribution Chamber Solutions

Rotary Telescopic Transfer Arm

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

The Radial Telescopic Transfer Arm is actuated by the MD64LB and MD35 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 MD35 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

An issue with many radial distribution chambers system designs is 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 MD64 arm to the motor mounting of the smaller MD35, mechanically unwinding the undesired motion, without the need for complex software.

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

Specification Table

<table>
<thead>
<tr>
<th>MODEL</th>
<th>RTTA 2-Axis</th>
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<tbody>
<tr>
<td>Mounting Flange</td>
<td>CF100 152mm (6”) OD CF</td>
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<tr>
<td>Min radial port flange size for arm</td>
<td>CF100 152mm (6”) OD CF</td>
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<tr>
<td>Min radial port size and clear bore required for assembly installation</td>
<td>CF150 203mm (8”) OD CF and 150mm bore</td>
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<tr>
<td>Rotation motion</td>
<td>Unlimited manual and +/-180° motorised</td>
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<tr>
<td>Minimum chamber ID</td>
<td>640mm</td>
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<td>Minimum chamber free height</td>
<td>102mm</td>
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<tr>
<td>Arm extension</td>
<td>760mm</td>
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<td>Arm extension from port of 640mm ID chamber</td>
<td>678mm*</td>
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<td>Arm stiffness at full extension</td>
<td>Typically &lt;1mm deflection for 10N load</td>
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<tr>
<td>Rotational reproducibility</td>
<td>0.2mm at full extension</td>
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<tr>
<td>Bakeout temperature</td>
<td>250°C (with motors removed)</td>
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</tbody>
</table>

* Contact us for detailed drawings, STEP files and installation guidance.

RTTA Part Codes

<table>
<thead>
<tr>
<th>RTTA</th>
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<tbody>
<tr>
<td>RTTA 2-AXIS</td>
<td>Manual</td>
<td>RTTA-ZN-RH-EH-760</td>
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<tr>
<td></td>
<td>Stepper motorised</td>
<td>RTTA-ZN-RS-ES-760</td>
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<tr>
<td></td>
<td>SMART DC motorised</td>
<td>RTTA-ZN-RSM-ESM-760</td>
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<td></td>
<td>Configured for motorisation (customer to fit own NEMA23 frame motor)</td>
<td>RTTA-ZN-RNM-ENM-760</td>
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</table>

Magnetically-coupled MagiDrive provides arm extension
Innovative user-friendly arm alignment system.
Patent pending mechanism provides 760mm arm extension
High torque magnetically-coupled MagiDrive provides arm rotation
Axis 1 - Arm Rotation
Axis 2 - Arm Extension

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.
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
- 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

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