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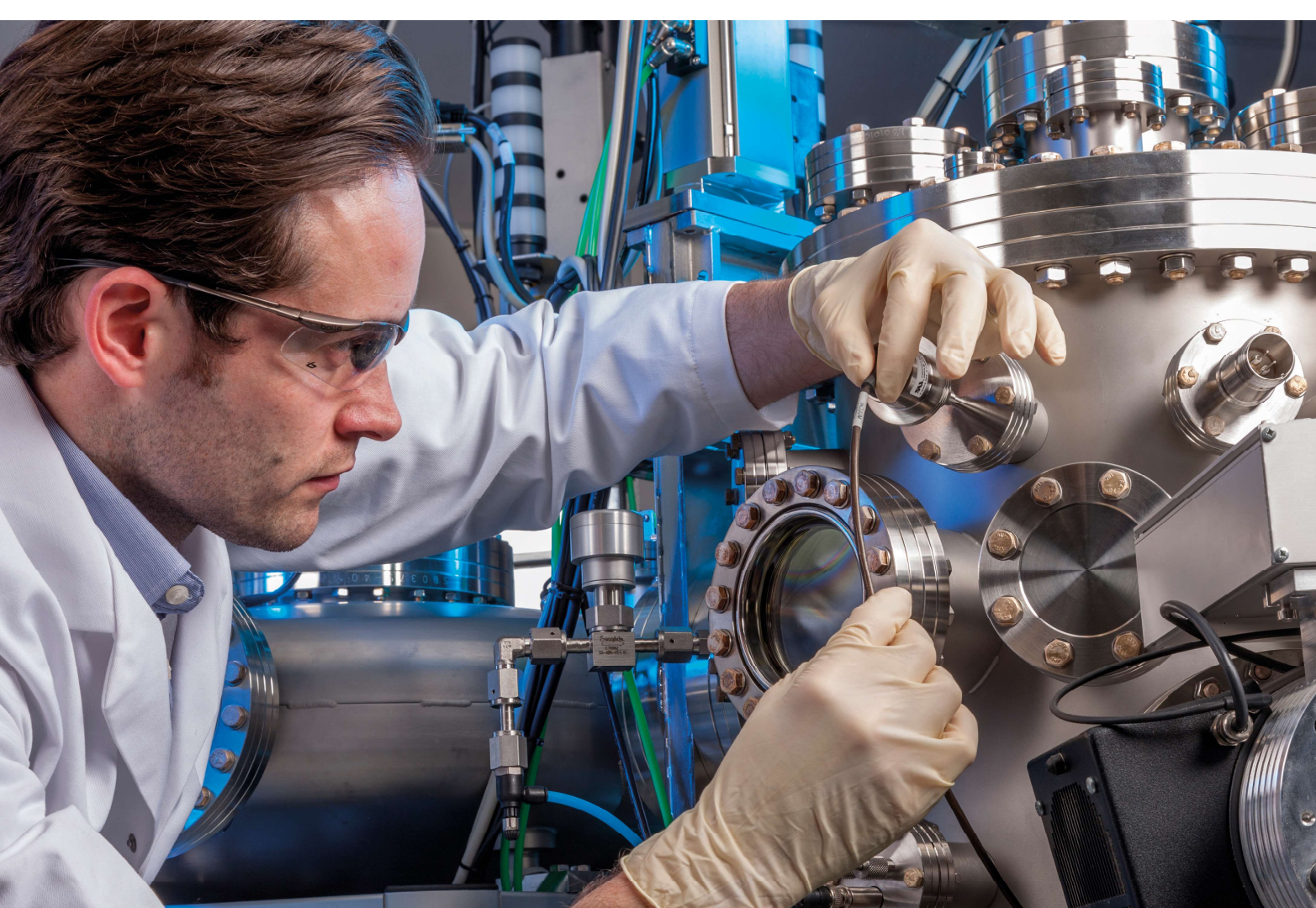
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About Us

Since 1963 VACGEN Limited have been working closely with the research community in supplying and developing specialised vacuum equipment providing high quality products giving scientists state of the art, highly flexible tools for research.

All our components are produced and tested using VACGEN's stringent ultra-high vacuum standards combined with accredited quality control providing complete confidence in the final product.

With our long history of designing and developing core UHV technologies, we have been the partners of leading edge technology over the last fifty years.

We develop and supply the complete spectrum of UHV components, from the most basic gaskets and flanges through to complex turn-key assemblies. As a UHV 'single source', the depth of knowledge and experience within our company ensures that our energy and passion can focus on the challenges of your project - safe in the knowledge that the UHV content will just work - and keep on working.

Because we develop our own designs, control methods and content from raw materials right through to finished UHV components entirely in-house, we have complete ownership of the product lifecycle.

The Importance of Quality

Our UK high technology manufacturing base has the most experienced design team and has one of the largest cleanroom assembly areas in the sector, letting us deliver and support your projects where others may struggle. We have the agility and resources to align our manufacturing with your timescale and deliver at a time or rate that suits you.

CUSTOMER ORIENTATION

Our customers, their needs and expectations, are the starting point for all we do. Our task is to create satisfied customers by delivering products and services within the areas of surface physics, atomic physics and UHV technology that will exceed our customers' expectations.

RESULTS

In order to ensure that we at, a minimum, meet the requirements of customers and constantly make improvements, we have developed a quality management system in accordance with international quality standards and best practice manufacturing techniques. Our management system is certified in accordance with ISO 9001 by the British Standards Institution (BSI).

QUALITY STRUCTURE

In order to assure ourselves that all the business requirements have been fulfilled, we have established a system of quality management that involves all our processes, and that is a tool for continuous development of processes, staff, products and the company.

ATTITUDES

Our attitudes towards each other, to the work we do and not least our approach to customers, is of decisive importance for the quality of the products and services we supply, which is vital to our success as a company.

BUILD STANDARDS

This equipment is designed, built and supplied ensuring the highest quality and adopting the following standards:

ISO 9001:2015

RoHS

BS EN 60204 (Safety of Machinery)

BS EN 61000 (EMC)

ISO 13849-1 (Machine Safety Design)

Certified Weld and leak detection operatives



Flanges - Contents

Fixed Blank CF Flanges

Rotatable Blank CF Flanges

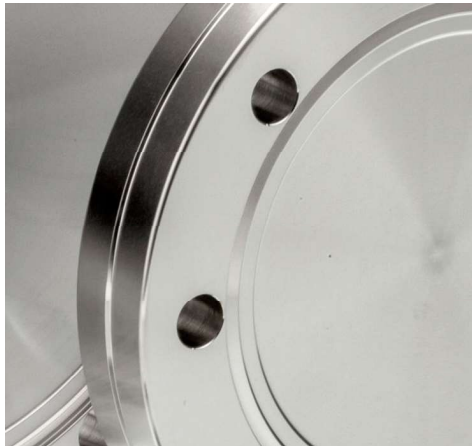
Fixed Bored CF Flanges

Rotatable Bored CF Flanges

Zero Length CF Adaptor

Fixed Blank CF Flanges

Fixed blank Conflat flanges (CF) are available in the full range of sizes. Fixed blank flanges are used to blank chamber ports for leak-tight assembly, also allowing machining for non standard tube sizes or components. VACGEN flanges are assembly or weld ready.



Product Overview

- Made to international flange standards. Ensuring compatibility with existing flange dimensions
- Two materials available from stock, 304L and 316L (316LN ESR Tri forge on request)
- Controlled material hardness for longer life
- 304L Suitable for 950°C vacuum stove.
- 304L and 316L suitable for 450°C Bake.
- 316L Suitable for 1050°C vacuum stove
- Wide pressure range 1 bar to 10^{-12} mbar.
- Low outgassing rates $< 1^{-13}$ mbar $\text{ls}^{-1} \text{cm}^{-2}$

316LN ESR (Material)

- Very low magnetic permeability, $\mu=1.005$ for 316LN ESR material
- Also suitable for use in high magnetic field applications
- Harder material (added N_2) prolongs lifetime of knife edge and allows H_2 degassing
- Low carbon content reduces possibility of corrosion and chromium migration at welds
- 316LN Capable of vacuum firing for removal of H_2
- Full material traceability available when requested at time of order.

Fixed Blank CF Flanges

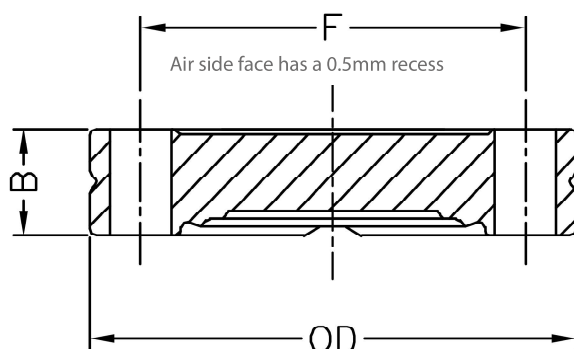
304 L Fixed Blank CF Flanges

DN Number	OD		Mounting holes	Flange Thickness B	Bolt Hole PCD F	Bolt Hole Diameter (or thread)	No. Of Bolt Holes	Shipping Weight	Previous VG Code	Order Code
	mm	Inch		mm	mm			kg		
DN16	34	1.33	Clear	7.6	27	4.3	6	0.1	ZFC90	CF34
DN16	34	1.33	Tapped	7.6	27	(M4)	6	0.1	ZFC90T	CF34T
DN40	70	2.75	Clear	13	58.7	6.8	6	0.4	ZFC2	CF70
DN40	70	2.75	Tapped	13	58.7	(M6)	6	0.4	ZFC2T	CF70T
DN63	114	4.50	Clear	17.5	92.1	8.4	8	1.3	ZFC4	CF114
DN63	114	4.50	Tapped	17.5	92.1	(M8)	8	1.3	ZFC4T	CF114T
DN100	152	6.00	Clear	20	130.2	8.4	16	3.0	ZFC6	CF152
DN100	152	6.00	Tapped	20	130.2	(M8)	16	3.0	ZFC6T	CF152T
DN160	203	8.00	Clear	22	181.2	8.4	20	5.5	ZFC8	CF203
DN160	203	8.00	Tapped	22	181.2	(M8)	20	5.5	ZFC8T	CF203T
DN200	254	10.00	Clear	24.5	231.8	8.4	24	9.7	ZFC10	CF254
DN200	254	10.00	Tapped	24.5	231.8	(M8)	24	9.7	ZFC10T	CF254T

Air side face has a 0.5mm recess as standard

316 L (2D Forged) Fixed Blank CF Flanges

DN Number	OD		Mounting holes	Flange Thickness B	Bolt Hole PCD F	Bolt Hole Diameter (or thread)	No. Of Bolt Holes	Shipping Weight	Previous VG Code	Order Code 316LN
	mm	Inch		mm	mm			kg		
DN16	34	1.33	Clear	7.6	27	4.3	6	0.1	ZFCL90	CF34-LN
DN16	34	1.33	Tapped	7.6	27	(M4)	6	0.1	ZFCL90T	CF34T-LN
DN40	70	2.75	Clear	13	58.7	6.8	6	0.4	ZFCL2	CF70-LN
DN40	70	2.75	Tapped	13	58.7	(M6)	6	0.4	ZFCL2T	CF70T-LN
DN63	114	4.50	Clear	17.5	92.1	8.4	8	1.3	ZFCL4	CF114-LN
DN63	114	4.50	Tapped	17.5	92.1	(M8)	8	1.3	ZFCL4T	CF114T-LN
DN100	152	6.00	Clear	20	130.2	8.4	16	3.0	ZFCL6	CF152-LN
DN100	152	6.00	Tapped	20	130.2	(M8)	16	3.0	ZFCL6T	CF152T-LN
DN160	203	8.00	Clear	22	181.2	8.4	20	5.5	ZFCL8	CF203-LN
DN160	203	8.00	Tapped	22	181.2	(M8)	20	5.5	ZFCL8T	CF203T-LN
DN200	254	10.00	Clear	24.5	231.8	8.4	24	9.7	ZFCL10	CF254-LN
DN200	254	10.00	Tapped	24.5	231.8	(M8)	24	9.7	ZFCL10T	CF254T-LN



Rotatable Blank CF Flanges

The rotatable Conflat flange (CF) consists of two parts, the inner knife edge detail and the outer bolt hole retaining ring which rotates around the inner part. This allows the bolt holes to align to mating flanges in any orientation.

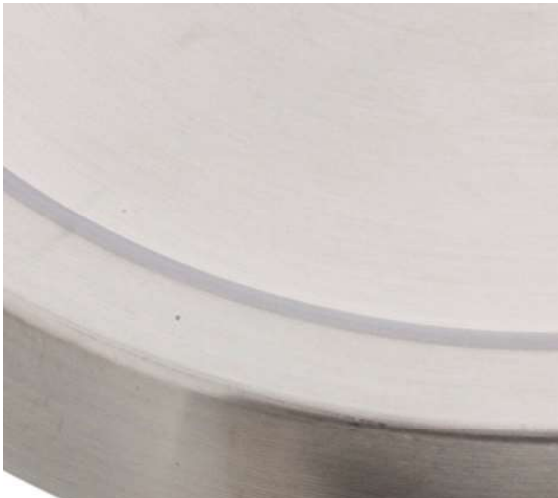


Product Overview

- Made to international flange standards. Ensuring compatibility with existing flange dimensions
- Two materials available from stock, 304L and 316L (316LN ESR Tri forge on request)
- Controlled material hardness for longer life
- 304L Suitable for 950°C vacuum stove.
- 304L and 316L suitable for 450°C Bake.
- 316L Suitable for 1050°C vacuum stove
- Wide pressure range 1 bar to 10^{-12} mbar.
- Low outgassing rates $<1^{-13}$ mbar $\text{ls}^{-1} \text{cm}^{-2}$

316LN ESR (Material)

- Very low magnetic permeability, $\mu=1.005$ for 316LN ESR material
- Also suitable for use in high magnetic field applications
- Harder material (added N_2) prolongs lifetime of knife edge and allows H_2 degassing
- Low carbon content reduces possibility of corrosion and chromium migration at welds
- 316LN Capable of vacuum firing for removal of H_2
- Full material traceability available when requested at time of order.



Rotatable Blank CF Flanges

304L Rotatable Blank CF Flanges (CFR Series)

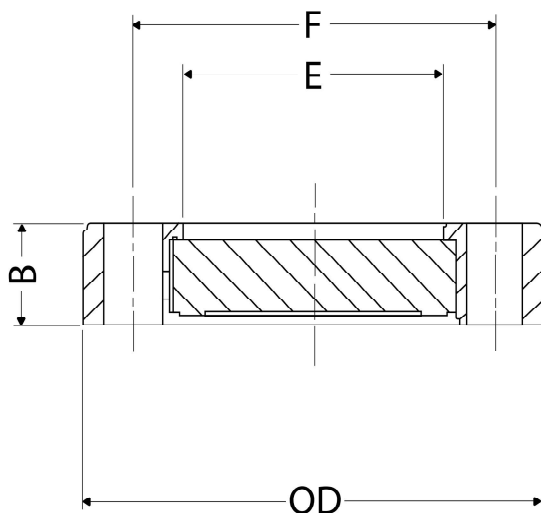
DN Number	OD		Mounting Holes	Flange Thickness B	Rotatable Tube Bore E	Bolt Hole PCD F	Bolt Hole Diameter (or thread)	Number of Bolt Holes	Weight	Previous VG code	Order Code 304L
	mm	Inch		mm	mm	mm			kg		
DN16	34	1.33	Clear	7.6	19.3	27	4.3	6	0.1	ZFCR90	CFR34
DN40	70	2.75	Clear	13	41.9	58.7	6.8	6	0.4	ZFCR2	CFR70
DN63	114	4.50	Clear	17.5	68	92.1	8.4	8	1.3	ZFCR4	CFR114
DN100	152	6.00	Clear	20	104.9	130.2	8.4	16	3.0	ZFCR6	CFR152
DN160	203	8.00	Clear	22	155.7	181.2	8.4	20	5.5	ZFCR8	CFR203
DN200	254	10.00	Clear	24.5	206.4	231.8	8.4	24	9.7	ZFCR10	CFR254

All dimensions are in mm unless otherwise stated

316L (2D Forged) Rotatable Blank CF Flanges (CFR Series)

DN Number	OD		Mounting Holes	Flange Thickness B	Rotatable Tube Bore E	Bolt Hole PCD F	Bolt Hole Diameter (or thread)	Number of Bolt Holes	Weight	Previous VG code	Order Code 316LN
	mm	Inch		mm	mm	mm			kg		
DN16	34	1.33	Clear	7.6	19.3	27	4.3	6	0.1	ZFCRL90	CFR34-LN
DN40	70	2.75	Clear	13	41.9	58.7	6.8	6	0.4	ZFCRL2	CFR70-LN
DN63	114	4.50	Clear	17.5	68	92.1	8.4	8	1.3	ZFCRL4	CFR114-LN
DN100	152	6.00	Clear	20	104.9	130.2	8.4	16	3.0	ZFCRL6	CFR152-LN
DN160	203	8.00	Clear	22	155.7	181.2	8.4	20	5.5	ZFCRL8	CFR203-LN

All dimensions are in mm unless otherwise stated



Fixed Bored CF Flanges

Fixed bored flanges are available in the full range of sizes. The smaller sizes of flange can accept a number of different standard tube sizes. A flange is ready for assembly or welding, welded onto chamber tubulations or certain specific sized components, providing consistent weld quality.



Product Overview

- Made to international flange standards. Ensuring compatibility with existing flange dimensions
- Two materials available from stock, 304L and 316L (316LN ESR Tri forge on request)
- Controlled material hardness for longer life
- 304L Suitable for 950°C vacuum stove.
- 304L and 316L suitable for 450°C Bake.
- 316L Suitable for 1050°C vacuum stove
- Wide pressure range 1 bar to 10^{-12} mbar.
- Low outgassing rates $<1^{-13}$ mbar $\text{ls}^{-1} \text{cm}^{-2}$

316LN ESR (Material)

- Very low magnetic permeability, $\mu=1.005$ for 316LN ESR material
- Also suitable for use in high magnetic field applications
- Harder material (added N_2) prolongs lifetime of knife edge and allows H_2 degassing
- Low carbon content reduces possibility of corrosion and chromium migration at welds
- 316LN Capable of vacuum firing for removal of H_2
- Full material traceability available when requested at time of order.

Fixed Bored CF Flanges

304L Fixed Bored CF Flanges

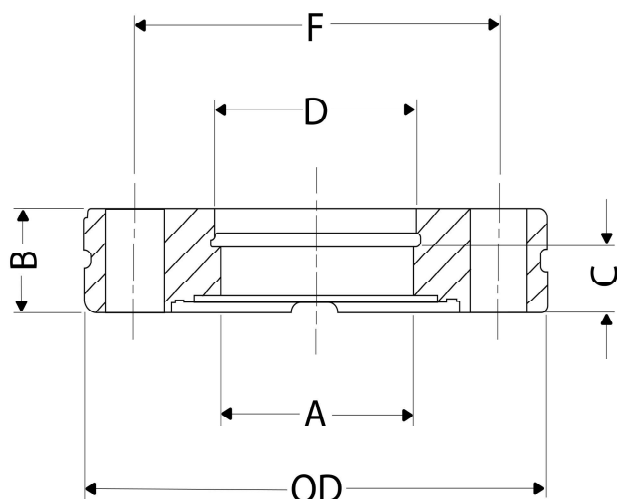
DN Number	OD		Mounting holes	Clear Bore A	Flange Thickness B	Land Thickness C	Tube Counter Bore D	Bolt Hole PCD F	Bolt Hole Diameter or thread	No. of Bolt Holes	Weight	Previous VG code	Order Code 304L
	mm	Inch		mm	mm	mm	mm	mm			kg		
DN16	34	1.33	Clear	16.6	7.6	4.7	19.1	27	4.3	6	0.1	ZFC19N	CF34-19
DN16	34	1.33	Tapped	16.6	7.6	4.7	19.1	27	(M4)	6	0.1	ZFC19NST	CF34T-19
DN40	70	2.75	Clear	40	13	4.8	41.3	58.7	6.8	6	0.3	ZFC41	CF70-41
DN40	70	2.75	Tapped	40	13	4.8	41.3	58.7	(M6)	6	0.3	ZFC41T	CF70T-41
DN63	63	-	Tapped	-	-	-	-	-	-	-	-	ZFC64T	CF114T-64
DN63	114	4.50	Clear	68	17.5	8	70	92.1	8.4	8	0.9	ZFC70	CF114-70
DN63	114	4.50	Tapped	68	17.5	8	70	92.1	(M8)	8	0.9	ZFC70T	CF114T-70
DN100	152	6.00	Clear	99.4	20	9.5	101.9	130.2	8.4	16	1.7	ZFC100	CF152-102
DN100	152	6.00	Tapped	99.4	20	9.5	101.9	130.2	(M8)	16	1.7	ZFC100T	CF152T-102
DN160	203	8.00	Clear	149.7	22	9.5	152.6	181	8.4	20	2.6	ZFC150	CF203-153
DN160	203	8.00	Tapped	149.7	22	9.5	152.6	181	(M8)	20	2.6	ZFC150T	CF203T-153
DN200	254	10.00	Clear	200.4	24.5	9.5	203.5	231.8	8.4	24	3.7	ZFC200	CF254-203
DN200	254	10.00	Tapped	200.4	24.5	9.5	203.5	231.8	(M8)	24	3.7	ZFC200T	CF254T-203

All dimensions are in mm unless otherwise stated

316L (2D Forged) Fixed Bored CF Flanges

DN Number	OD mm		Mounting holes	Clear Bore A	Flange Thickness B	Land Thickness C	Tube Counter Bore D	Bolt Hole PCD F	Bolt Hole Diameter or thread	No. of Bolt Holes	Weight	Previous VG code	Order Code 316LN
	mm	Inch		mm	mm	mm	mm	mm			kg		
DN16	34	1.33	Clear	16.6	7.6	4.7	19.1	27	4.3	6	0.1	ZFCL19NS	CF34-19-LN
DN16	34	1.33	Tapped	16.6	7.6	4.7	19.1	27	(M4)	6	0.1	ZFCL19NT	CF34T-19-LN
DN40	70	2.75	Clear	40	13	4.8	41.3	58.7	6.8	6	0.3	ZFCL41	CF70-41-LN
DN40	70	2.75	Tapped	40	13	4.8	41.3	58.7	(M6)	6	0.3	ZFCL41T	CF70T-41-LN
DN63	114	4.50	Clear	68	17.5	8	70	92.1	8.4	8	1.0	ZFCL70	CF114-70-LN
DN63	114	4.50	Tapped	68	17.5	8	70	92.1	(M8)	8	1.0	ZFCL70T	CF114T-70-LN
DN100	152	6.00	Clear	99.4	20	9.5	101.9	130.2	8.4	16	1.7	ZFCL100	CF152-102-LN
DN100	152	6.00	Tapped	99.4	20	9.5	101.9	130.2	(M8)	16	1.7	ZFCL100T	CF152T-102-LN
DN160	203	8.00	Clear	149.7	22	9.5	152.6	181	8.4	20	2.6	ZFCL150	CF203-153-LN
DN160	203	8.00	Tapped	149.7	22	9.5	152.6	181	(M8)	20	2.6	ZFCL150T	CF203T-153-LN
DN200	254	10.00	Clear	200.4	24.5	9.5	203.5	231.8	8.4	24	3.7	ZFCL200	CF254-203-LN
DN200	254	10.00	Tapped	200.4	24.5	9.5	203.5	231.8	(M8)	24	3.7	ZFCL200T	CF254T-203

All dimensions are in mm unless otherwise stated



Rotatable Bored CF Flanges

Rotatable bored Conflat Flat (CF) flanges are welded onto chamber tubulations or vacuum components. Smaller sizes of flange can accept a number of different standard tube sizes. The rotatable CF flange consists of two parts, the inner knife edge detail and the outer bolt hole retaining ring which rotates around the inner part, this allows the bolt holes to align to mating flanges in any orientation.



Product Overview

- Made to international flange standards. Ensuring compatibility with existing flange dimensions
- Two materials available from stock, 304L and 316L (316LN ESR Tri forge on request)
- Controlled material hardness for longer life
- 304L Suitable for 950°C vacuum stove.
- 304L and 316L suitable for 450°C Bake.
- 316L Suitable for 1050°C vacuum stove
- Wide pressure range 1 bar to 10^{-12} mbar.
- Low outgassing rates $< 1^{-13}$ mbar $\text{ls}^{-1} \text{cm}^{-2}$

316LN ESR (Material)

- Very low magnetic permeability, $\mu=1.005$ for 316LN ESR material
- Also suitable for use in high magnetic field applications
- Harder material (added N_2) prolongs lifetime of knife edge and allows H_2 degassing
- Low carbon content reduces possibility of corrosion and chromium migration at welds
- 316LN Capable of vacuum firing for removal of H_2
- Full material traceability available when requested at time of order.



Rotatable Bored CF Flanges

304L Rotatable Bored CF Flanges (CFRL Series)

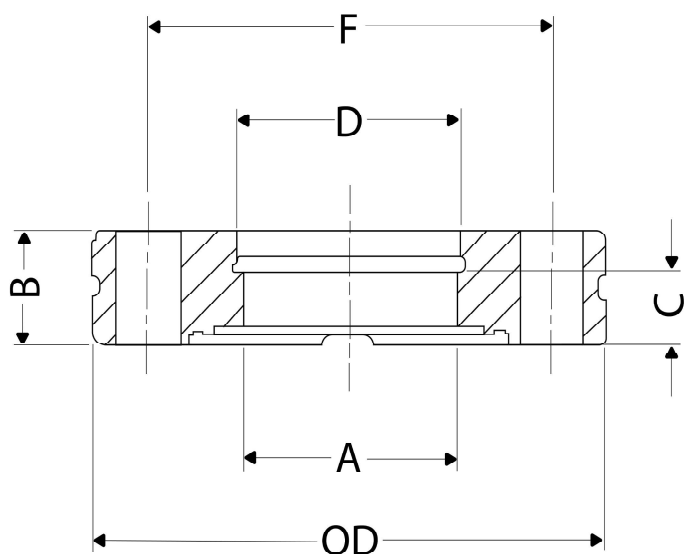
DN Number	OD		Mounting holes	Clear Bore A	Flange Thickness B	Land Thickness C	Tube Counter Bore D	Rotatable Tube Bore E	Bolt Hole PCD F	Bolt Hole Diameter (or thread)	No. Of Bolt Holes	Tube Size to fit Flange Bore	Weight	Previous VG Code	Order Code
	mm	Inch		mm	mm	mm	mm	mm	mm			mm	kg		
DN16	34	1.33	Clear	6.4	7.6	N/A	6.4	19.3	27	4.3	6	6.35	0.1	ZFCR97	CFR34-6
DN40	70	2.75	Clear	40	13	4.8	41.3	41.9	58.7	6.8	6	41.27	0.3	ZFCR41	CFR70-41
DN40	70	2.75	Tapped	40	13	4.8	41.3	41.9	58.7	(M6)	6	41.27	0.3	ZFCR41T	CFR70T-41
DN63	114	4.50	Clear	68	17.5	8	70	71	92.1	8.4	8	69.8	0.9	ZFCR70	CFR114-70
DN63	114	4.50	Tapped	68	17.5	8	70	71	92.1	(M8)	8	69.8	0.9	ZFCR70T	CFR114T-70
DN100	152	6.00	Clear	99.4	20	9.5	101.9	104.9	130.2	8.4	16	101.6	1.7	ZFCR100	CFR152-102
DN100	152	6.00	Tapped	99.4	20	9.5	101.9	104	130.2	(M8)	16	101.6	1.7	ZFCR100T	CFR152T-102
DN160	203	8.00	Clear	149.7	22	9.5	152.6	155.7	181	8.4	20	152.4	2.6	ZFCR150	CFR203-153
DN160	203	8.00	Tapped	149.7	22	9.5	152.6	155.7	181	(M8)	20	152.4	2.6	ZFCR150T	CFR203T-153
DN200	254	10.00	Clear	200.4	24.5	9.5	203.5	206.4	231.8	8.4	24	203.2	3.7	ZFCR200	CFR254-206

All dimensions are in mm unless otherwise stated

316L (2D Forged) Rotatable Bored CF Flanges (CFRL Series)

DN Number	OD		Mounting holes	Clear Bore A	Flange Thickness B	Land Thickness C	Tube Counter Bore D	Rotatable Tube Bore E	Bolt Hole PCD F	Bolt Hole Diameter (or thread)	No. Of Bolt Holes	Tube Size to Fit Flange Bore	Weight	Previous VG Code	Order Code 316LN
	mm	Inch		mm	mm	mm	mm	mm	mm			mm	kg		
DN16	34	1.33	Clear	6.4	7.6	N/A	6.4	19.3	27	4.3	6	6.35	0.1	ZFCRL97	CFR34-6-LN
DN40	70	2.75	Clear	40	13	4.8	41.3	41.9	58.7	6.8	6	41.27	0.3	ZFCRL14	CFR70-41-LN
DN100	152	6.00	Clear	99.4	20	9.5	101.9	104.9	130.2	8.4	16	101.6	1.7	ZFCRL100	CFR152-102-LN
DN160	203	8.00	Clear	149.7	22	9.5	152.6	155.7	181	8.4	20	152.4	2.6	ZFCRL150	CFR203-153-LN

All dimensions are in mm unless otherwise stated



Zero Length CF Adaptor

This conflat (CF) flange is used to adapt from one flange size to another. The larger flange OD has through bolt holes enabling ordinary nut and bolt kits to be used. The smaller flange OD has tapped holes. This connects different sizes of flanges where there is limited space.

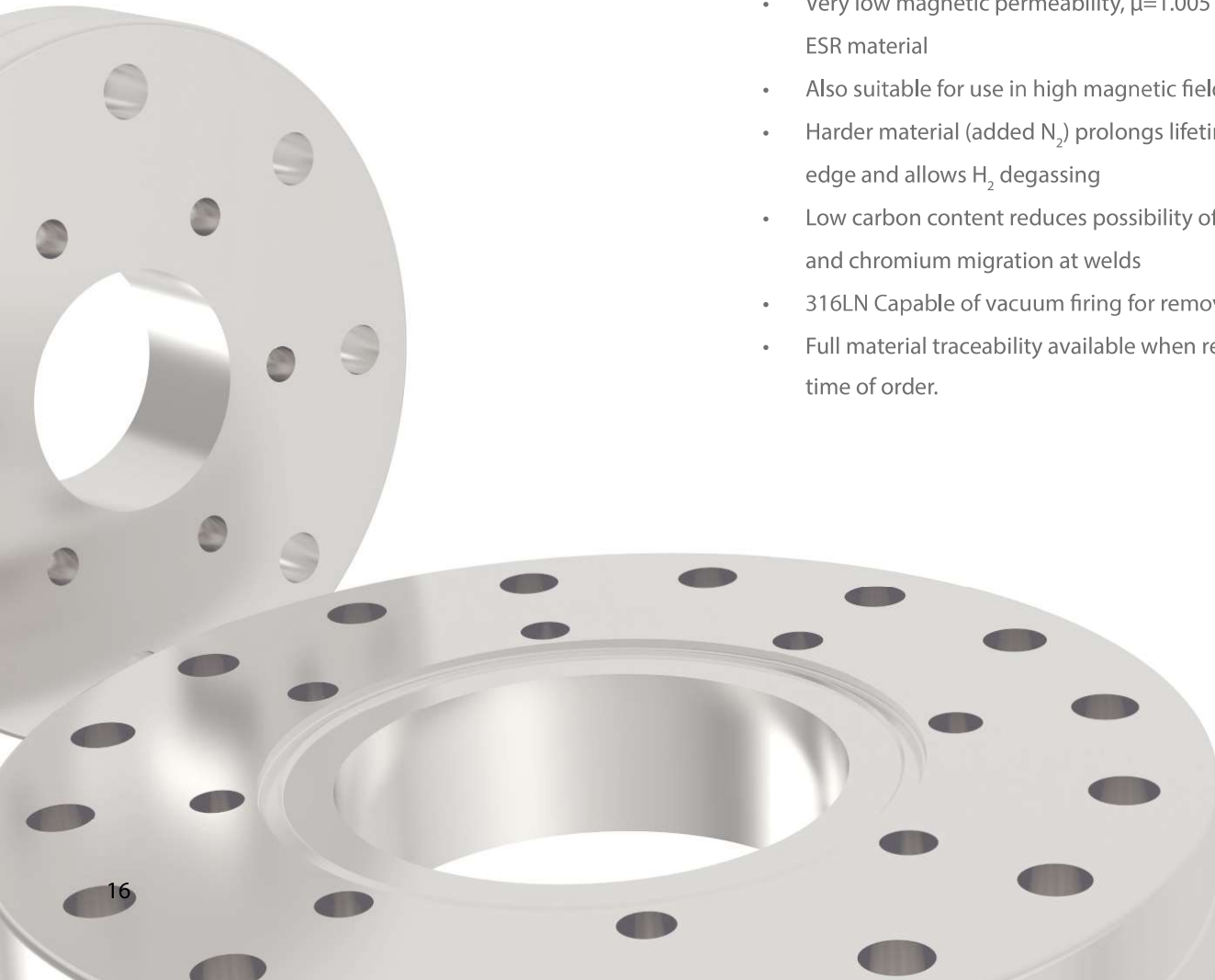


Product Overview

- Made to international flange standards. Ensuring compatibility with existing flange dimensions
- Two materials available from stock, 304L and 316L (316LN ESR Tri forge on request)
- Controlled material hardness for longer life
- High temperature range 304L. Suitable for use from liquid nitrogen temperatures to 450°C, 316LN to 1050°C vacuum bake
- Wide pressure range 1 bar to 10^{-12} mbar.
- Low outgassing rates $<1^{-13}$ mbar $\text{ls}^{-1} \text{cm}^{-2}$

316LN ESR (Material)

- Very low magnetic permeability, $\mu=1.005$ for 316LN ESR material
- Also suitable for use in high magnetic field applications
- Harder material (added N_2) prolongs lifetime of knife edge and allows H_2 degassing
- Low carbon content reduces possibility of corrosion and chromium migration at welds
- 316LN Capable of vacuum firing for removal of H_2
- Full material traceability available when requested at time of order.



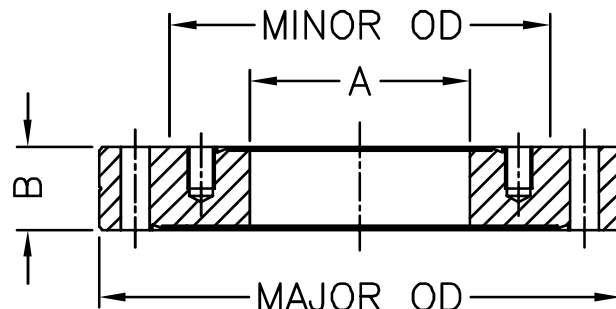
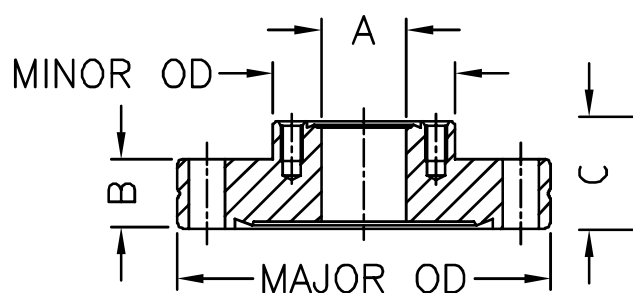
Zero Length CF Adaptor

Zero Length Adaptor CF Flanges 304L												
Major OD DN Number	Flange 1 Major OD	Bolt Holes	To	Flange 2 DN Number	Flange 2 Minor OD	Bolt Holes	Clear Bore A	Thickness B	Overall Thickness C	Weight	Previous VG Code	Order Code
	mm	mm			mm		mm	mm	mm	kg		
DN40*	70	Clear 6.8	To	DN16	34	Tapped M4	16	20.0	20	0.4	ZAZ3470	CFZL70-34
DN63	114	Clear 8.4	To	DN16	34	Tapped M4	16	17.5	-	1.3	ZAZ34114	CFZL114-34
DN63	114	Clear 8.4	To	DN40	70	Tapped M6	38	24	-	1.6	ZAZ70114	CFZL114-70
DN100	152	Clear 8.4	To	DN40	70	Tapped M6	38	24	-	3.0	ZAZ7015	CFZL152-70
DN150	203	Clear 8.4	To	DN40	70	Tapped M6	38	24	-	5.5	ZAZ7020	CFZL203-70
DN200	254	Clear 8.4	To	DN40	70	Tapped M6	38	24	-	8.8	ZAZ7025	CFZL254-70
DN100	152	Clear 8.4	To	DN63	114	Tapped M8	63.7	24	-	2.6	ZAZ11415	CFZL152-114
DN150	203	Clear 8.4	To	DN63	114	Tapped M8	63.7	24	-	5.2	ZAZ11420	CFZL203-114
DN200	254	Clear 8.4	To	DN63	114	Tapped M8	63.7	24	-	8.4	ZAZ11425	CFZL254-114
DN150	203	Clear 8.4	To	DN100	152	Tapped M8	101.8	24	-	4.2	ZAZ15020	CFZL203-152
DN200	254	Clear 8.4	To	DN100	152	Tapped M8	101.8	24	-	7.5	ZAZ15025	CFZL254-152
DN200	254	Clear 8.4	To	DN160	203	Tapped M8	152.6	24	-	5.6	ZAZ20025	CFZL254-203

All dimensions are in mm unless otherwise stated

Zero Length Adaptor CF Flanges 316L												
Major OD DN Number	Flange 1 Major OD	Bolt Holes	To	Flange 2 DN Number	Flange 2 Minor OD	Bolt Holes	Clear Bore A	Thickness B	Overall Thickness C	Weight	Previous VG Code	Order Code
	mm	mm			mm		mm	mm	mm	kg		
DN40*	70	Clear 6.8	To	DN16	34	Tapped M4	16	-	20	0.4	ZAZL3470	CFZL70-34-LN
DN63	114	Clear 8.4	To	DN40	70	Tapped M6	38	24	-	1.6	ZAZL7014	CFZL114-70-LN
DN100	152	Clear 8.4	To	DN40	70	Tapped M6	38	24	-	3.0	ZAZL7015	CFZL152-70-LN

*34mm to 74mm only



*All other adaptors

Gaskets - Contents

Commercial Grade Copper Gaskets (CUC)

High Quality Surface Etched Copper Gaskets (CU)

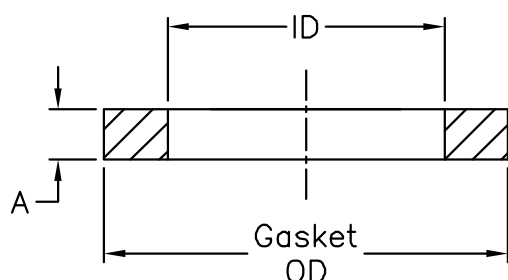
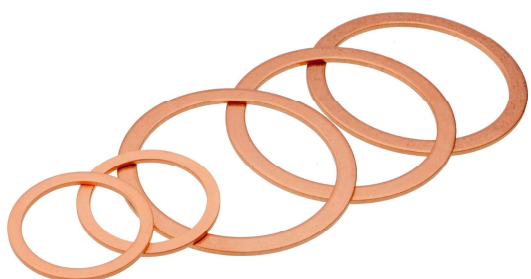
High Quality Annealed UHV Copper Gaskets (CUA)

High Quality Silver Plated Nickel Free Gaskets (CUSP)

High Vacuum Viton® Gaskets (VIT Series)

Commercial Grade Copper Gaskets (CUC)

High quality oxygen-free copper gaskets for commercial use. Designed for UHV applications. These can be purchased in bulk packs.



Product Overview

- Oxygen free copper
- Designed for Conflat flanges
- Available in bulk packs up to DN160
- Low outgassing
- Bakeable to 450°C
- Hardness 60-82.5 VPN
- Unetched Surface

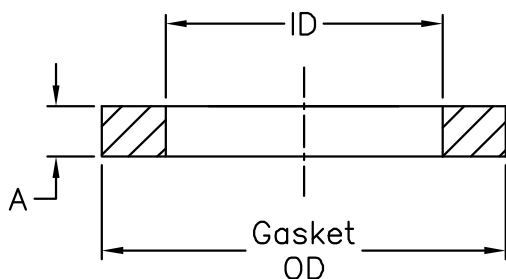
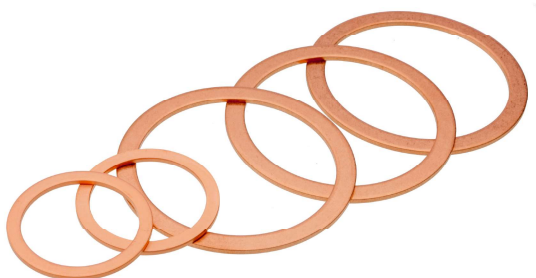
VACGEN's gaskets are manufactured from precision sheet material (to guarantee a consistent gasket thickness) and then inspected, cleaned and packed.

Commercial grade Copper Gaskets (CUC Series)								
DN Type	Flange Size OD		Gasket OD	Gasket ID	Thickness A	Qty per Pack	Weight	Order Code
	mm	Inch						
DN16	34	1.33	21.3	16	2	50	0.5	ZCUC19
DN40	70	2.75	48.1	39	2	50	1.0	ZCUC38
DN63	114	4.50	82.4	67.3	2	50	2.6	ZCUC68
DN100	152	6.00	120.5	101.6	2	50	4.5	ZCUC100
DN160	203	8.00	171.3	152.6	2	50	6.6	ZCUC150
DN200	250	10.00	220.1	203.4	2	5	0.7	ZCUC200
DN250	300	12.00	270.1	254	2	5	0.8	ZCUC250
DN300	362	14.25	321.1	305	2	5	0.9	ZCUC300

All dimensions are nominal and subject to manufacturing tolerances

High Quality Surface Etched Copper Gaskets (CU)

High quality oxygen free surface etched copper gaskets for use in UHV applications. Available in small pack sizes.



Product Overview

- Oxygen free copper
- Designed for Conflat Flanges
- Small pack sizes
- Individually packed
- Low outgassing
- Bakeable to 450°C
- Super Clean Quality Etched Surface
- Hardness 60-82.5 VPN

VACGEN's gaskets are manufactured from precision sheet material (to guarantee a consistent gasket thickness) and then inspected, cleaned and packed.

Copper Gaskets (CU Series)

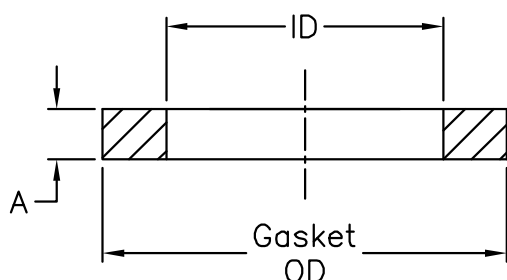
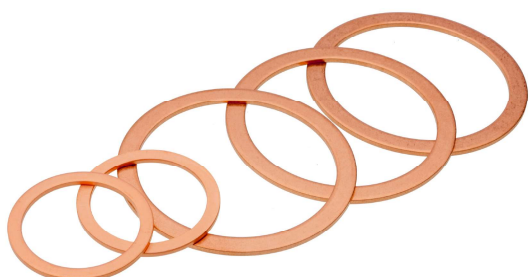
DN Type	Flange Size OD		Gasket OD	Gasket ID	Thickness A	Qty per pack	Weight	Order Code
	mm	Inch	mm	mm	mm		kg	
DN16	34	1.33	21.3	16	2	10	0.1	ZCU19
DN40	70	2.75	48.1	39	2	10	0.2	ZCU38
DN63	114	4.50	82.4	64	2	10	0.5	ZCU64
DN63	114	4.50	82.4	68.5	2	10	0.6	ZCU68
DN100	152	6.00	120.5	101.8	2	10	0.8	ZCU100
DN160	203	8.00	171.3	152.6	2	5	0.6	ZCU150
DN200	254	10.00	220.1	203.4	2	5	0.7	ZCU200
DN250	305	12.00	270.1	254	2	5	0.8	ZCU250
DN250	305	12.00	272.7	254.2	2	5	0.8	ZCU250M
DN276	336	13.2	294	276	2	5	1.0	ZCU13
DN295	355	13.9	313.6	294.6	2	5	1.0	ZCU14
DN300	362	14.2	321.1	305	2	1	0.2	ZCU300S
DN300	362	14.2	321.1	305	2	5	0.8	ZCU300

All dimensions are nominal and subject to manufacturing tolerances

High Quality Annealed UHV Copper Gaskets (CUA)

High quality oxygen free annealed copper gaskets require lower tightening torque to make a leak tight seal.

Recommended for use with items such as zero length viewports, gauge heads, and fragile ceramic feedthroughs.



Product Overview

- Oxygen free copper
- Designed for CF Flanges
- Super Clean Quality Etched Surface
- Particulate free
- Individually packed
- Low tightening torque required
- Bakeable to 450°C
- Hardness 50 ± 5 VPN

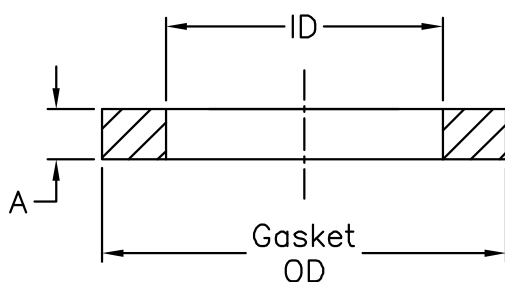
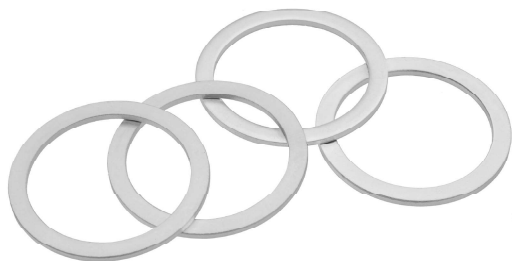
VACGEN's gaskets are manufactured from precision sheet material (to guarantee a consistent gasket thickness) and then inspected, cleaned and packed.

Annealed UHV Copper Gaskets (CUA Series)								
DN Type	Flange Size OD		Gasket OD	Gasket ID	Thickness A	Qty per Pack	Weight	Order Code
	mm	Inch					kg	
DN16	34	1.33	21.3	16	2	5	0.1	ZCUA19
DN40	70	2.75	48.1	39	2	5	0.1	ZCUA38
DN63	114	4.50	114.0	63.6	2	5	0.8	ZCUA64
DN63	114	4.50	82.4	68.5	2	5	0.8	ZCUA68
DN100	152	6.00	120.5	101.8	2	5	0.8	ZCUA100
DN160	203	8.00	171.3	152.6	2	5	0.7	ZCUA150
DN200	254	10.0	220.1	203.4	2	5	0.8	ZCUA200
DN250	305	12.0	270.1	254	2	5	0.8	ZCUA250
DN300	355.3	13.9	313.6	294.6	2	5	1.0	ZCUA14

All dimensions are nominal and subject to manufacturing tolerances

High Quality Silver Plated Nickel Free Gaskets (CUSP)

High quality oxygen free Silver plated gasket plating eliminates any “flaking” of the silver coating during use. Completely free from nickel, these gaskets avoid any possibility of magnetic disturbance.



Product Overview

- Oxygen free high conductivity copper raw material
- Conforms to standard Conflat CF Flange sizes.
- Non-magnetic
- For applications where low magnetic permeability is required
- Individually packed, ready for use
- Bakeable to 450°C
- Hardness 60-82.5 VPN
- Super Clean Etched Surface prior to plating

VACGEN's gaskets are manufactured from precision sheet material (to guarantee a consistent gasket thickness) and then inspected, cleaned and packed.

High Quality Silver Plated Copper Gaskets (CUSP Series)

DN Type	Flange Size OD		Gasket OD	Gasket A	Thickness A	Qty per Pack	Weight	Order Code
	mm	Inch					kg	
DN16	34	1.33	21.3	16	2	10	0.1	ZCUSP19
DN40	70	2.75	48.1	39	2	10	0.1	ZCUSP38
DN63	114	4.50	82.4	68.5	2	10	0.2	ZCUSP68
DN100	152	6.00	120.5	101.8	2	10	0.8	ZCUSP100
DN160	203	8.00	171.3	152.6	2	5	0.6	ZCUSP150
DN200	254	10.00	220.1	203.4	2	5	0.7	ZCUSP200
DN250	305	12.00	270.1	254	2	5	0.8	ZCUSP250
DN250	305	12.00	272.7	254.2	2	5	0.8	ZCUSP25M
DN279	336.5	13.20	294	276	2	5	1.0	ZCUSP13
DN295	355.3	13.90	313.6	294.6	2	5	1.0	ZCUSP14
DN300	362	14.20	321.1	305	2	5	0.8	ZCUSP300

All dimensions are nominal and subject to manufacturing tolerances

High Vacuum Viton® Gaskets (VIT Series)

Viton® gaskets are used in HV applications with low bakeout temperatures (<150°C) or where flanges are repeatedly removed and refitted. They are designed to suit up to 250 mm OD conflat flange sizes.



Product Overview

- Easy to use for HV application
- Reusable
- Unique self-retaining profile
- To suit common conflat flange sizes
- Bake temperature 150°C

VACGEN's Viton® formed gaskets can be used as an alternative to standard copper gaskets. Their unique self retaining profile allows the user to secure the gasket in place, locking over the knife edge, stopping the gasket from being pulled into the system and enabling easy installation at any angle.

All Viton® gaskets are fully UHV conditioned, cleaned, and packed ready for use.

High Vacuum Viton® Gaskets (VIT Series)								
DN Type	Flange Size OD		Approximate Gasket OD	Approximate Gasket ID	Thickness A	Qty per Pack	Weight	Order Code
	mm	Inch	mm	mm	mm		kg	
DN16	34	1.33	21	16.5	3	2	0.1	ZVIT19
DN40	70	2.75	48	36.4	3	2	0.2	ZVIT38
DN63	114	4.50	82	70.7	3	2	0.3	ZVIT64
DN100	150	6.00	121	108.8	3	2	0.4	ZVIT100
DN150	200	8.00	171	159	3	2	0.5	ZVIT150
DN200	250	10.00	220	209	3	2	0.5	ZVIT200

Fittings - Contents

Tubulated Flanges (BFT Series)

Straight Connectors (BS Series)

Tee Pieces (BT Series)

Four Way Crosses (BX4 Series)

Six Way Crosses (BX6 Series)

90° Radius Elbows (BE Series)

Flexible Connectors (FX Series)

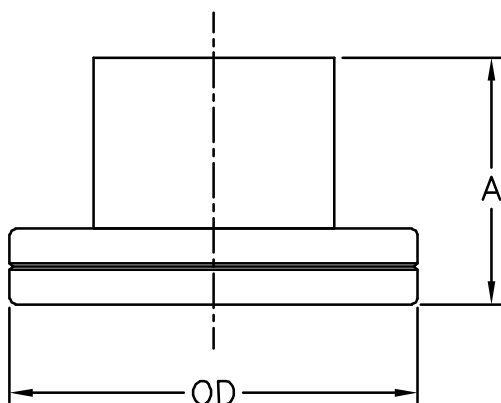
Tubulated Flanges (BFT Series)

Flange with tubulation enabling welding without risking conflat knife edge damage. Specifically designed and manufactured for vacuum system designers and manufacturers of vacuum components.



Product Overview

- Manufactured to ISO standards
- UHV Clean
- HV and UHV compatible
- All 304L stainless steel construction
- All tubulations are fully UHV compatible and bakeable to 450°C



All VACGEN's components allow quick, easy and repeatable leak free joints and are designed for complete modularity for building simple high vacuum backing or pumping lines.

UHV Tubulated Flanges (BFT Series)									
DN Type	OD		Dimension A	Tube OD	Wall Thickness	Minimum Bore	Flange Alignment & number	Weight	Order Code
	mm	Inch						kg	
DN19	34	1.33	38	19.1	1.22	15.7	1 Fixed	0.5	ZBFT19
DN19	34	1.33	38	19.1	1.22	15.7	1 Rotatable	0.5	ZBFT19R
DN40	70	2.75	63	41.3	1.63	36.9	1 Fixed	0.8	ZBFT41
DN40	70	2.75	63	41.3	1.63	36.9	1 Rotatable	0.8	ZBFT41R
DN63	114	4.50	105	63.5	1.63	58.9	1 Fixed	2.2	ZBFT64
DN63	114	4.50	105	63.5	1.63	58.9	1 Rotatable	2.2	ZBFT64R
DN100	152	6.00	135	101.6	1.63	95.7	1 Fixed	5.0	ZBFT10
DN100	152	6.00	135	101.6	1.63	95.7	1 Rotatable	5.0	ZBFT10R
DN150	203	8.00	167	152.4	1.63	146.5	1 Fixed	8.0	ZBFT15
DN150	203		167	152.4	1.63	146.5	1 Rotatable	8.0	ZBFT15R

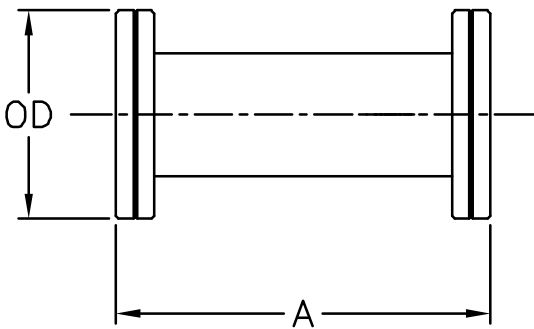
Straight Connectors (BS Series)

Fixed and rotatable flange enabling the connection and orientation of vacuum equipment.



Product Overview

- Manufactured to ISO standards
- UHV Clean
- HV and UHV compatible
- All 304L stainless steel construction
- All tubulations are fully UHV compatible
- Bakeable to 450°C



All VACGEN's components allow quick, easy and repeatable leak free joints and are designed for complete modularity for building simple high vacuum backing or pumping lines.

UHV Straight Connectors (BS Series)

DN Type	OD		Dimension A	Tube OD	Wall Thickness	Minimum Bore	Flange Alignment & number	Weight	Order Code
	mm	Inch						kg	
DN19	34	1.33	76	19.1	1.22	15.7	1 Fixed & 1 Rotatable	0.7	ZBS19
DN40	70	2.75	126	41.3	1.63	36.9	1 Fixed & 1 Rotatable	0.9	ZBS41
DN63	114	4.50	210	63.5	1.63	58.9	1 Fixed & 1 Rotatable	3.6	ZBS64
DN100	152	8.00	270	101.6	1.63	95.7	1 Fixed & 1 Rotatable	7.0	ZBS10
DN150	203	10.00	333	152.4	1.63	146.5	1 Fixed & 1 Rotatable	11.0	ZBS15

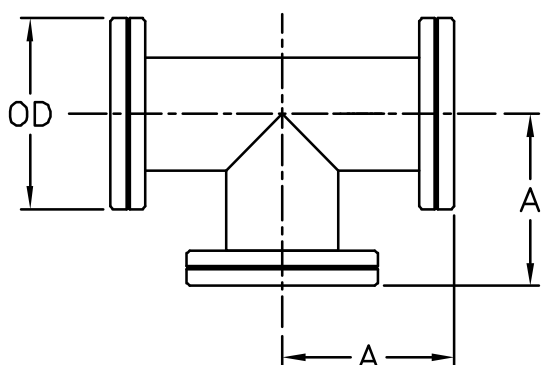
Tee Pieces (BT Series)

T-shape formed of three equally spaced flanges at 90° intervals. Two of these three flanges are rotatable enabling preferred orientation of vacuum equipment.



Product Overview

- Manufactured to ISO standards
- UHV Clean
- HV and UHV compatible
- All 304L stainless steel construction
- All tubulations are fully UHV compatible and bakeable to 450°C



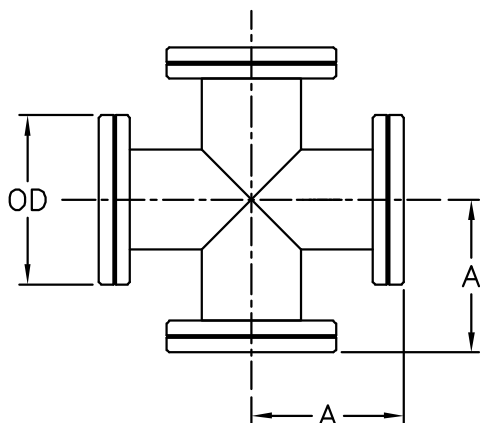
All VACGEN's components allow quick, easy and repeatable leak free joints and are designed for complete modularity for building simple high vacuum backing or pumping lines.

UHV Tees (BT Series)

DN Type	OD		Dimension A	Minimum Bore	Number of Rotatable Flanges	Alignment & Number of Fixed Flanges	Weight	Order Code
	mm	Inch					kg	
DN19	34	1.33	38	15.7	2	1 Inline	0.8	ZBT19RI
DN19	34	1.33	38	15.7	2	1 Straddled	0.8	ZBT19RS
DN40	70	2.75	63	36.9	2	1 Inline	1.4	ZBT41RI
DN40	70	2.75	63	36.9	2	1 Straddled	1.4	ZBT41RS
DN63	114	4.50	105	58.9	2	1 Inline	4.0	ZBT64RI
DN63	114	4.50	105	58.9	2	1 Straddled	4.0	ZBT64RS
DN100	152	6.00	135	95.7	2	1 Inline	8.5	ZBT10RI
DN100	152	6.00	135	95.7	2	1 Straddled	8.5	ZBT10RS
DN150	203	8.00	167	146.5	2	1 Inline	3.0	ZBT15RI
DN150	203	8.00	167	146.5	2	1 Straddled	3.0	ZBT15RS

Four Way Crosses (BX4 Series)

A four way cross with flanges equally spaced at 90° to each other. On each axis, one of the flanges is fixed and the other is rotatable. The fixed flange can be welded with its bolt holes in an inline or straddled configuration.



Product Overview

- Manufactured to ISO standards
- UHV Clean
- HV and UHV compatible
- All 304L stainless steel construction
- All tubulations are fully UHV compatible and bakeable to 450°C
- The four way cross has one rotatable and one fixed flanges per axis, enabling flexibility for multiple product connection and orientation.

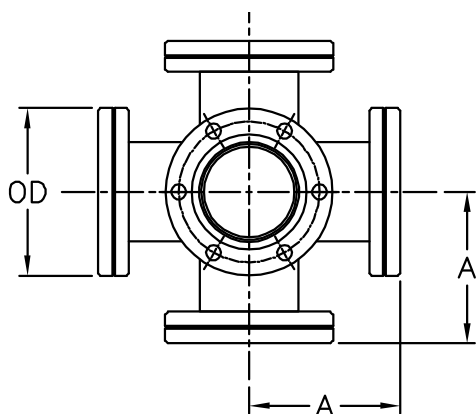
All VACGEN's components allow quick, easy and repeatable leak free joints and are designed for complete modularity for building simple high vacuum backing or pumping lines.

UHV Four Way Crosses (BX4 Series)

DN Type	OD		Dimension A	Minimum Bore	Number of Rotatable Flanges	Alignment and number of Fixed Flanges	Weight	Order Code
	mm	inch					kg	
DN19	34	1.33	38	15.7	2	2 Inline	0.9	ZBX419RI
DN19	34	1.33	38	15.7	2	2 Straddled	0.9	ZBX419RS
DN40	70	2.75	63	36.9	2	2 Inline	1.8	ZBX441RI
DN40	70	2.75	63	36.9	2	2 Straddled	1.8	ZBX441RS
DN63	114	4.50	105	58.9	2	2 Inline	5.0	ZBX464RI
DN63	114	4.50	105	58.9	2	2 Straddled	5.0	ZBX464RS
DN100	152	6.00	135	95.7	2	2 Inline	10.1	ZBX410RI
DN100	152	6.00	135	95.7	2	2 Straddled	10.1	ZBX410RS
DN150	203	8.00	167	146.5	2	2 Inline	15.0	ZBX415RI
DN150	203	8.00	167	146.5	2	2 Straddled	15.0	ZBX415RS

Six Way Crosses (BX6 Series)

Six way flanged connector. A six way cross with ports equally spaced at 90° to each other. On each axis, one of the flanges is fixed and the other is rotatable.



*Drawing shows straddled flange

Product Overview

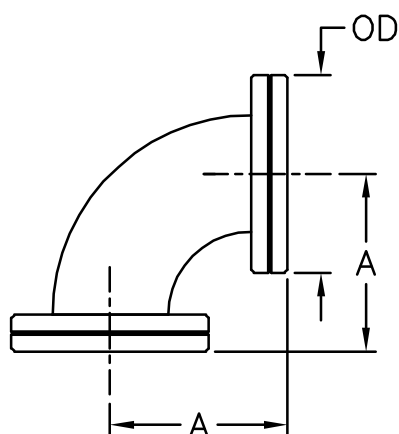
- Manufactured to ISO standards
- UHV Clean
- HV and UHV compatible
- All 304L stainless steel construction
- Internal TIG welded (where possible)
- All tubulations are fully UHV compatible and bakeable to 450°C
- The six way cross has one rotatable and one fixed flanges per axis, enabling flexibility for multiple product connection and orientation.
- The fixed flange can be welded with its bolt holes in an in-line or straddled configuration.

All VACGEN's components allow quick, easy and repeatable leak free joints and are designed for complete modularity for building simple high vacuum backing or pumping lines.

UHV Six Way Crosses (BX6 Series)								
DN Type	OD		Dimension A	Minimum Bore	Number of Rotatable Flanges	Alignment and number of Fixed Flanges	Weight	Order Code
	mm	Inch					kg	
DN19	34	1.33	38	15.7	3	3 Inline	0.9	ZBX619RI
DN19	34	1.33	38	15.7	3	3 Straddled	0.9	ZBX619RS
DN40	70	2.75	63	36.9	3	3 Inline	1.8	ZBX641RI
DN40	70	2.75	63	36.9	3	3 Straddled	1.8	ZBX641RS
DN63	114	4.50	105	58.9	3	3 Inline	5.0	ZBX664RI
DN63	114	4.50	105	58.9	3	3 Straddled	5.0	ZBX664RS
DN100	152	6.00	135	95.7	3	3 Inline	10.1	ZBX610RI
DN100	152	6.00	135	95.7	3	3 Straddled	10.1	ZBX610RS
DN150	203	8.00	167	146.5	3	3 Inline	15.0	ZBX615RI
DN150	203	8.00	167	146.5	3	3 Straddled	15.0	ZBX615RS

90° Radius Elbows (BE Series)

Conflat flanged 90° Radius elbows.



Product Overview

- Manufactured to ISO standards
- UHV Clean
- HV and UHV compatible
- All 304L stainless steel construction
- All tubulations are fully UHV compatible and bakeable to 450°C
- 90° elbow
- Curved elbows have a higher conductance and fewer internal welds when compared to the mitred versions.
- Either one flange is fixed and the other is rotatable or both are rotatable. The fixed flange can be welded in place with its bolt holes in an inline or straddled orientation.

All VACGEN's components allow quick, easy and repeatable leak free joints and are designed for complete modularity for building simple high vacuum backing or pumping lines.

UHV 90° Radius Elbows (BE Series)							
DN Type	OD		Dimension A	Minimum Bore	Flange Alignment and number	Weight	Order Code
	mm	Inch				kg	
DN19	34	1.33	38	15.7	1 Fixed Inline & 1 Rotatable	0.7	ZBE19RI
DN19	34	1.33	38	15.7	1 Fixed Straddled & 1 Rotatable	0.7	ZBE19RS
DN40	70	2.75	63	33.7	2 Rotatable	0.9	ZBE38R
DN63	114	4.50	105	58.9	2 Rotatable	3.6	ZBE64R
DN100	152	6.00	184	95.7	1 Fixed Straddled & 1 Rotatable	7.0	ZBE10HRS

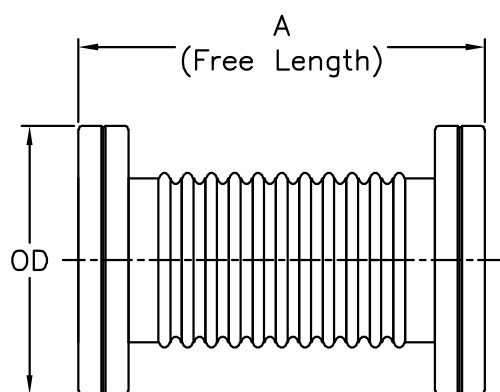
Flexible Connectors (FX Series)

Flexible connectors are used to compensate for any misalignment between flanges that have to be linked together.



Product Overview

- Manufactured to ISO standards
- UHV Clean
- HV and UHV compatible
- All 304L stainless steel construction
- All tubulations are fully UHV compatible and bakeable to 450°C
- Hydroformed Bellows
- The MF series are supplied with one fixed and one rotatable flange.



All VACGEN's components allow quick, easy and repeatable leak free joints and are designed for complete modularity for building simple high vacuum backing or pumping lines.

UHV Flexible Bellows Connectors (FX Series)							
DN Type	OD		Free Length A	Flange Alignment and number	Maximum Bakeout Temperature °C	Weight	Order Code
	mm	Inch				kg	
DN19	34	1.33	180	1 Fixed & 1 Rotatable	450	0.1	ZFX19F
DN19	34	1.33	500	1 Fixed & 1 Rotatable	450	0.2	ZFX19F5
DN19	34	1.33	1000	1 Fixed & 1 Rotatable	450	0.4	ZFX19F10
DN40	70	2.75	460	1 Fixed & 1 Rotatable	450	0.9	ZFX25F
DN40	70	2.75	750	1 Fixed & 1 Rotatable	450	1.0	ZFX25F7
DN40	70	2.75	1000	1 Fixed & 1 Rotatable	450	1.1	ZFX25F10
DN40	70	2.75	460	1 Fixed & 1 Rotatable	450	0.9	ZFX38F
DN40	70	2.75	1000	1 Fixed & 1 Rotatable	450	1.1	ZFX38F10

Viewports - Contents

Kodial® Viewports

Fused Silica Quartz Viewports

Lead Glass Disks

Calcium Fluoride Zero Length Viewports

Sapphire Viewports

Viewport Shutters

Fast Entry Air Lock Doors

Port Aligners

Kodial® Viewports

Zero length viewports provide a wide angle viewing window for your vacuum chamber. Manufactured using glass bonded sealing technology and completely adhesive free, they offer a stable platform for the addition of a viewport shutter, used to reduce the deposition on the window in vacuum coating systems.



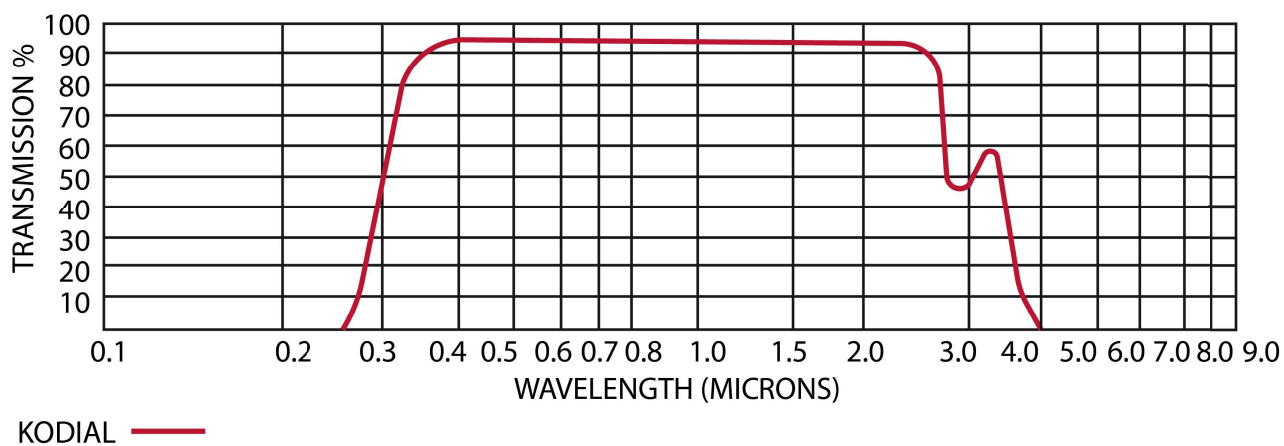
Product Overview

- Glass sealing by induction heating process
- No adhesives used during manufacture
- HV and UHV compatible
- Low profile
- Fully bakeable 350°C
- Pressure range 1 bar to 1×10^{-11} mbar



Kodial viewports are offered in CF flange styles. The viewports comprise a borosilicate glass optic which is sealed to a Kovar weld ring using an induction heater process. The optic assemblies are helium leak tested and cleaned for ultra high vacuum (UHV) conditions.

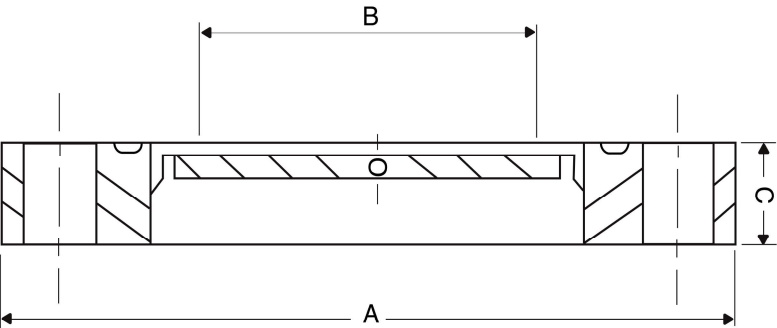
Transmission Curve



Kodial® Viewports

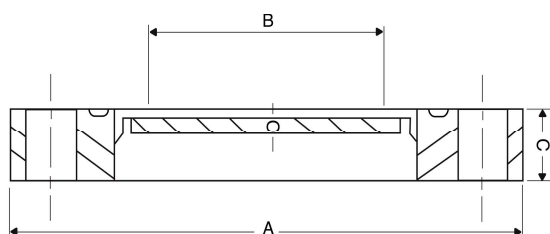
Zero Length 304L UHV Kodial® Viewports								
DN Type	OD A		Viewing Diameter B	Dimension C	Dimension O	Max Bake °C	Weight	Order Code
	mm	Inch					kg	
DN19	34	1.33	15.8	8	1	350	0.3	ZVPZ16
DN40	70	2.75	38	13	2.5	350	0.5	ZVPZ38
DN63	114	4.50	63.6	17.5	3	350	1.5	ZVPZ64
DN100	152	6.00	89.2	20	3	350	3.0	ZVPZ100
DN150	203	8.00	137	22	4	350	4.0	ZVPZ150

Zero Length 316LN UHV Kodial® Viewports								
DN Type	OD A		Viewing Diameter B	Dimension C	Dimension O	Max Bake °C	Weight	Order Code
	mm	Inch					kg	
DN19	34	1.33	15.8	8	1	350	0.3	ZVPZL16
DN40	70	2.75	38	13	2.5	350	0.5	ZVPZL38
DN63	114	4.50	63.6	17.5	3	350	1.5	ZVPZL64
DN100	152	6.00	89.2	20	3	350	3.0	ZVPZL100
DN150	203	8.00	137	22	4	350	4.0	ZVPZL150



Fused Silica Quartz Viewports

A zero length viewport has a thickness no larger than that of its mounting flange. It provides a wide angle viewing window for your vacuum chamber as there are no tubulation to restrict observation. Manufactured using high purity fused silica quartz.

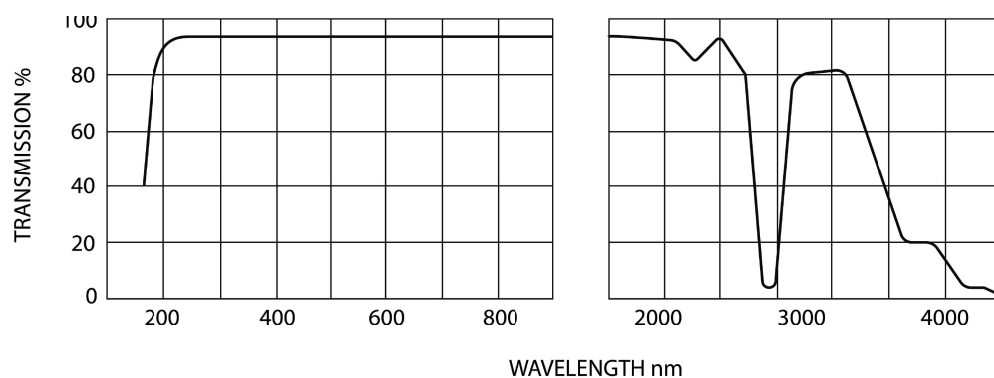


Product Overview

- HV and UHV compatible
- Maximum Temperature 200°C
- Minimum Temperature minus 20°C
- Maximum Rate of Temperature Change 3°C per minute
- Leak Rate $<1 \times 10^{-10}$ mbar ls⁻¹
- Pressure Range 1 bar to 1×10^{-11} mbar

Fused silica viewports are offered in CF flange styles. The viewports comprise a high purity laser quality fused silica optic with precise flatness, parallelism, scratch and dig specifications. The ultra high vacuum (UHV) CF versions are offered using high grade 304L stainless steel flanges.

Transmission Curve

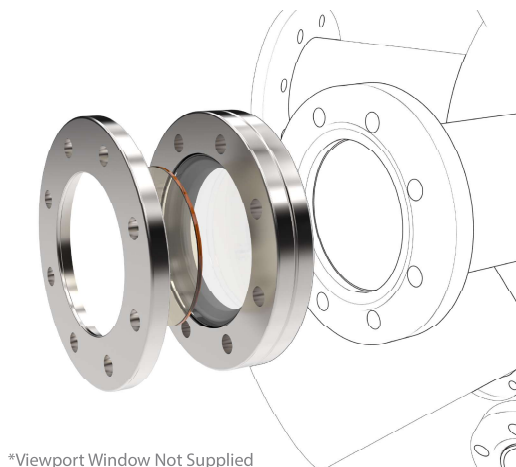


Fused Silica Quartz Viewports							
DN Type	OD Dimension A		Viewing Diameter B	Dimension C	Dimension O	Max Bake °C	Order Code
	mm	Inch	mm	mm	mm		
DN19	34	1.33	16	12.7	1.5	200	ZVPFSQ16
DN40	70	2.75	32	12.7	3	200	ZVPFSQ38
DN40	70	2.75	38	12.7	3	200	ZVPFSQ38W*
DN63	114	4.50	63	17.4	4.5	200	ZVPFSQ64
DN100	152	6.00	89	19.9	6	200	ZVPFSQ100

* Wide version

Lead Glass Disks

Lead Glass Disks are used in applications where there is a risk of X-ray exposure through an unshielded viewport. The lead glass disk is attached to the air side face of UHV viewports via a fixing ring which is bolted directly to the viewport.



Product Overview

- Kodial® Viewports supplied with fixing ring and lead glass disk.
- Lead glass disk cannot be removed without breaking vacuum for added health and safety.
- The lead glass disks are 6mm thick and have a lead thickness equivalent of 1.5mm for X-ray sources up to 150 kV.
- Maximum bake temperature 450 °c

Lead Glass Disk with Fixing Ring	
DN Type	Order Code
DN16CF	VPZ16LGDR
DN38CF	VPZ38LGDR
DN64CF	VPZ64LGDR
DN100CF	VPZ100LGDR
DN150CF	VPZ150LGDR

(1) Lead thickness equivalent for X-ray sources with voltages up to 150 kV.

It is the responsibility of the user to check for radiation leakage from the system when using viewports fitted with lead glass disks.



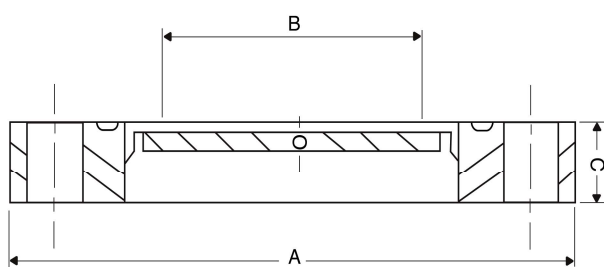
Image shows compact assembly



*Viewport Window Not Supplied

Calcium Fluoride Zero Length Viewports

Calcium fluoride viewports are offered in CF flange styles. The UHV CF versions are offered using 304L stainless steel flanges.



Product Overview

- HV and UHV compatible
- Maximum Temperature 120°C
- Minimum Temperature minus 20°C
- Maximum Rate of Temperature Change 3°C per minute
- Leak Rate $<1 \times 10^{-10}$ atm-cc/sec (He)
- Pressure Range 1 bar to 1×10^{-11} mbar
- Surface Quality 60/40 scratch/dig
- Flatness $\lambda/4$
- Bond seal type

The rugged, bonded construction of the calcium fluoride viewports allows bake-out to a maximum of 120°C with ultra high vacuum (UHV) performance whilst the window offers extended broadband optical transmission from deep UV to the infra-red.

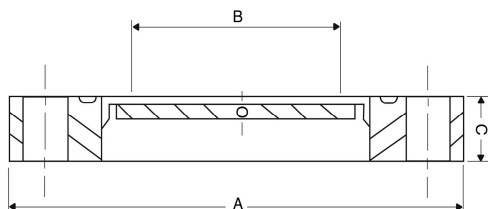
Calcium Fluoride Zero Length Viewports							
DN Type	OD Dimension A		Dimension B	Dimension C	Dimension O	Max Bake °C	Order Code
	mm	Inch					
DN19	34	1.33	15	12.7	1.5	120	ZVPCF16
DN40	70	2.75	32	12.7	3	120	ZVPCF38
DN40	70	2.75	38	12.7	3	120	ZVPCF38W*
DN63	114	4.50	63	17.4	5	120	ZVPCF64
DN100	152	6.00	89	19.9	7	120	ZVPCF100

* Wide angle view version

Sapphire Viewports

A zero length viewport has a thickness no larger than that of its mounting flange. It provides a wide angle viewing window for your vacuum chamber as there are no tubulation walls to restrict observation. Manufactured using Sapphire, these viewports are used in high temperature high transmission applications.

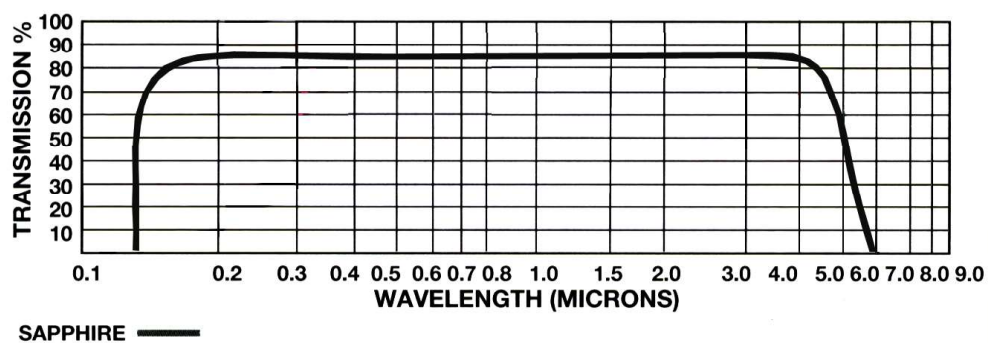
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Product Overview

- HV and UHV compatible
- Maximum Bake Temperature 450°C
- Minimum Temperature minus 20°C
- Maximum Rate of Temperature Change 3°C per minute
- Leak Rate $<1 \times 10^{-10}$ atm-cc/sec (He)
- Pressure Range 1 bar to 1×10^{-11} mbar
- Surface Quality 60/40 scratch/dig
- Flatness $\lambda/4$
- Bond seal type

Transmission Curve



Sapphire Viewports							
DN Type	OD Dimension A		Dimension B	Dimension C	Dimension O	Max Bake °C	Order Code
	mm	Inch	mm	mm	mm		
DN19	34	1.33	15	12.7	1.5	450	ZVPSA16
DN40	70	2.75	32	12.7	1.5	450	ZVPSA38
DN40	70	2.75	38	12.7	1.5	450	ZVPSA38W*
DN63	114	4.50	63	17.7	2	450	ZVPSA64
DN100	152	6.0	89	19.9	2.5	450	ZVPSA100

* Wide angle view version

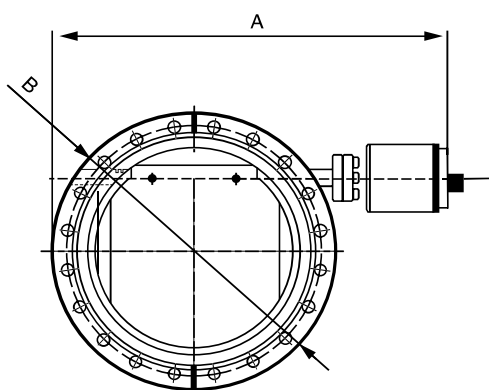
Viewpoint Shutters

Viewpoint shutters are used to protect the internal surface of a viewport from build-up of deposition material during thin film processing of substrates. The shutter design is built to allow the widest possible viewing angle, and the maximum level of protection of the viewing area.



Product Overview

- UHV rotary drive with integrated stop position
- Formed internal shield to allow maximum viewing angle and internal surface protection
- Easy installation mounted beneath a standard VACGEN viewport



Technical Data for Viewport Shutter	
Shutter	Stainless steel
Mounting seal	OFHC gasket (Both side)
Operate pressure range	1×10^{-10} Torr, 1,000 mbar
Leak rate	1×10^{-10} Torr L/s
Operational temperature Range	0°C - 200°C
Bake Temperature	250°C
Body material	304L
Feedthrough	UHV Rotary Drive
Mounting position	Any

Viewpoint Shutter					
DN Type	Flange OD		Length A	Flange OD B	Order Code
	mm	Inch			
DN63	114	4.50	197	114	ZVPS63
DN100	152	6.00	235	152	ZVPS100
DN150	203	8.00	285	202	ZVPS150

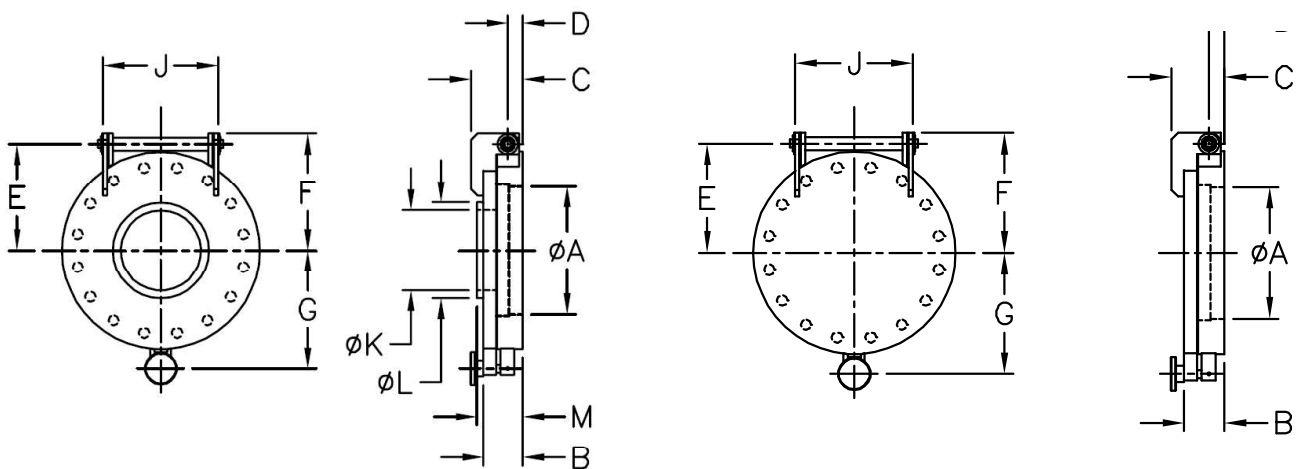
Fast Entry Air Lock Doors

The HD range of fast entry lock doors can be used to load items into a prep chamber. The door is sealed by a reuseable Viton® O-ring. This is an ideal solution for a load lock to keep the main system under UHV conditions.



Product Overview

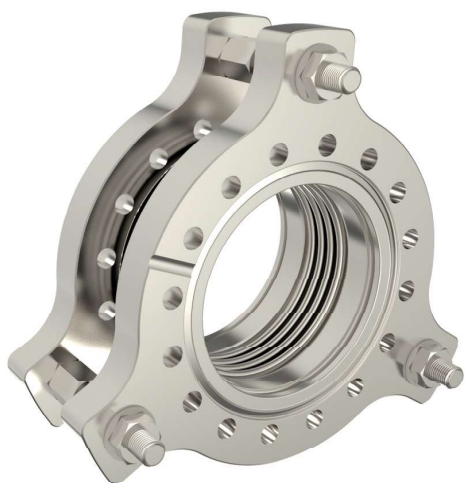
- Bakeout 150°C
- 304L material
- Viton® O-ring
- M8 Tapped mounting flange



Fast Entry Air Lock Door										
Mounting flange		Dimension A	Dimension B	Dimension C	Dimension D	Dimension E	Dimension F	Dimension G	Dimension J	Order Code
mm	Inch	mm	mm	mm	mm	mm	mm	mm	mm	
HD Plain Door Style										
114	4.50	61.2	28.5	37	8.5	65.8	73.5	71.9	69	ZHD64
152	6.00	99.4	30.5	40	11.5	82.3	90.3	91.3	88.5	ZHD100
203	8.00	149.7	32.5	47.5	13.5	112.5	120.5	116.8	121.8	ZHD150
HDV Viewport Door Style										
114	4.50	61.2	28.5	37	8.5	65.8	73.5	71.9	69	ZHD64V
152	6.00	99.4	30.5	40	11.5	82.3	90.3	91.3	88.5	ZHD100V
203	8.00	149.7	32.5	47.5	13.5	112.5	120.5	116.8	121.8	ZHD150V
HDV Window Dimensions										
Dimension K				Dimension L			Dimension M			Order Code
38				64			27.9			ZHD64V
64				76			35.4			ZHD100V
90				107.5			39.5			ZHD150V

Port Aligners

Allows the precise mechanical alignment of transfer and sample docking systems with linear and rotary transfer devices i.e. MLRV and RLRP.



Product Overview

- UHV construction: Stainless steel
- Fully bakeable to 250°C
- Angular movement around mounting axis ($\pm 3.5^\circ$) in any orientation
- Easily locked in position
- Leak rate $< 1 \times 10^{-10}$ mbar ls⁻¹
- Pressure range 1 bar- 10^{-11} mbar

Cost effective method of aligning vacuum components such as the MLRV and RLRP. These devices can provide accurate alignment during system installation where sample transfer tools are being set up for the first time.

Port Aligners - PA Series					
Flange OD mm	Bore Size mm	Angular movement	Linear movement mm	Axial Load kg	Order Code
70	35	$\pm 3.5^\circ$	5	20	ZPA40CF
114	60	$\pm 3.5^\circ$	8	20	ZPA63CF

Valves

CONTENTS

VR Elastomer Seal Valves

CR & CRD All Metal Right Angled Valves

All Metal Right Angled Leak Valves (LVM Seires)

All Metal Right Angled Leak Valves (MD5 Seires)

Elastomer Sealed Valves (VR)

The VR valves are right angled general purpose UHV valves with a cycle usage minimum of 100,000 activations. The bonnet (top) seal of the valve is welded (VR series).



Product Overview

- All metal welded construction VR
- Viton® face seal
- 100,000 cycle service life
- Rising stem
- Rotatable CF flanges
- Bakeable to 200°C open or 150°C closed
- Leak rate $< 10^{-9}$ mbar ls⁻¹
- Pressure range from 1×10^{-9} mbar to 4 bar
- Hydrofrmed bellows sealed actuation

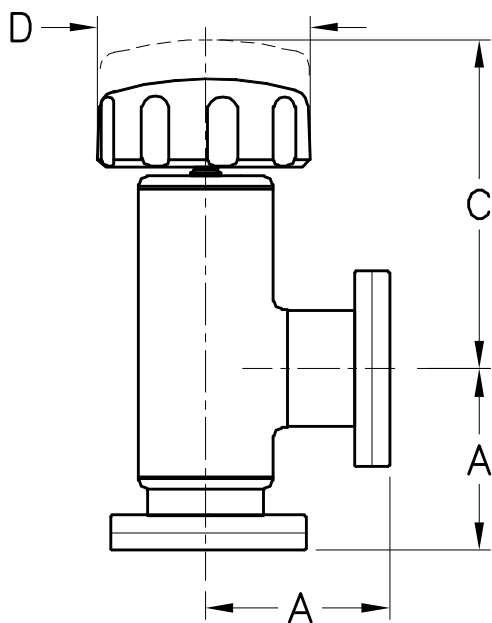
The VR valve uses a replaceable elastomer seal. Rotatable flanges are used on both valve axis allowing for complete valve alignment in any mounting situation.



Elastomer Sealed Valves (VR)

Viton® Valve Range-Manual (VR and VRD Series)									
DN Type	OD Flange	Tube OD	Construction	Dimension A	Dimension C	Dimension D	Conductance l/s	Weight	Order Code
	mm	mm		mm	mm	mm		kg	
DN40	Rotatable 70	41.3	Welded	63	116	76	34	2.2	ZVR40R
DN63	Rotatable 114	63.5	Welded	105	172	114	100	6.4	ZVR60R

ZVR Series



All Metal Right Angled Valves (CR and CRD)

This range of valves are of right angled configuration, with a good conductance. The CR series comes with two body types, fully welded CR series or demountable CRD series.



Product Overview

- Fully bakeable up to 450°C open & 300°C closed
- Good conductance
- Leak rate $< 10^{-11}$ mbar ls⁻¹
- Pressure range from 10^{-12} mbar to 4 bar
- 10,000 cycles to first service
- Bellows sealed actuation
- Copper pad sealing

Both the CR and CRD valves can be shut off with a torque bar or by aligning the indicator marks on the body and the top nut. A separate operating handle is included with the valve. Rotatable flanges are used on both valve axis.

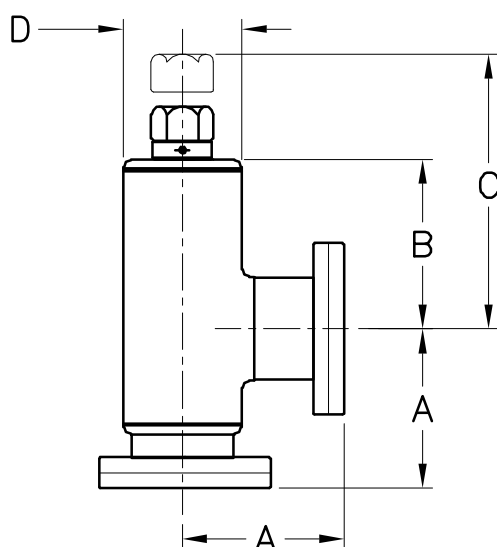


All Metal Right Angled Valves (CR and CRD)

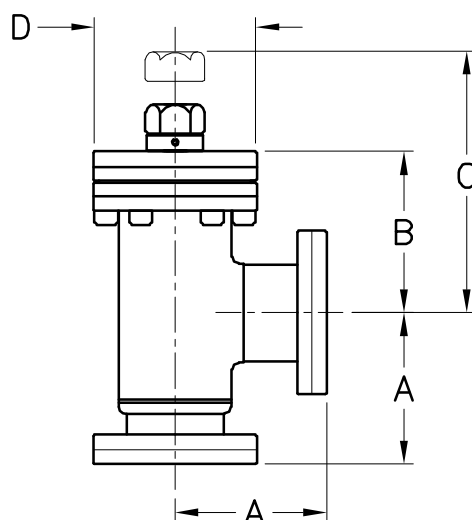
All Metal Right Angled Valves (CR and CRD Series)

DN Type	Flange OD		Type	Tube OD	Conductance	Construction	Flange Material	A	B	C	D	Bakeout Temp °C Open	Bakeout Temp °C Closed	Weight	Order Code
	mm	Inch						mm	mm	mm	mm			kg	
DN19	34	1.33	Rotatable	19.1	5	Welded	304L	38	59	86	22	450	300	1.0	ZCR20R
DN19	34	1.33	Rotatable	19.1	5	Demountable	304L	38	59	86	34	450	300	1.0	ZCRD20R
DN40	70	2.75	Rotatable	41.3	34	Welded	304L	63	69	109	49	450	300	2.0	ZCR40R
DN40	70	2.75	Rotatable	41.3	34	Welded	316LN	63	69	109	49	450	300	2.0	ZCR40RL
DN40	70	2.75	Rotatable	41.3	34	Demountable	304L	63	69	109	70	450	300	2.0	ZCRD40R
DN63	114	4.50	Rotatable	63.6	100	Welded	304L	105	106	156	76	450	300	6.0	ZCR60R
DN63	114	4.50	Rotatable	63.6	100	Demountable	304L	105	106	156	114	450	300	6.0	ZCRD60R

CR Series



CRD Series



All Metal Valve Spares

Description	Order Code
CR20 Series Spare Pad	ZCR20C
CR40 Series Spare Pad	ZCR40C
CR60 Series Spare Pad	ZCR60C

Closure Torques for All Metal Valves

Valve Type	Drive Nut Size	Torque Nm
ZCR20 and ZCRD20 Series	13mm	2.4 to 3.7
ZCR40 and ZCRD40 Series	22mm	7.7 to 12.1
ZCR60 and ZCRD60 Series	22mm	19.0 to 29.9

Valve Volumes

Valve Type	Radial Port	Axial Port
ZCR20 and ZCRD20 Series	12ml	5ml
ZCR40 and ZCRD40 Series	94ml	36ml

All Metal Right Angled Leak Valves (LVM Series)

Leak valves are used for the precise control of the flow of gas into a vacuum system from an external source which is extremely repeatable. This range of Leak valve is the preferred choice for system builders who need a cost effective fine and ultra-fine gas inlet control.



Product Overview

- Inlet pressure up to 10 bar to give high stability control
- Fine control mechanism with minimum backlash
- Adjustable graduated index ring
- Wide dynamic range
- Available DN19 & DN34 mounting flanges
- User serviceable kits available
- 304L Stainless steel body and molly 328 sealing pad
- Operating pressure range from 10^{-11} mbar to 100 mbar
- Bakeable to 250°C closed
- 450°C open under vacuum

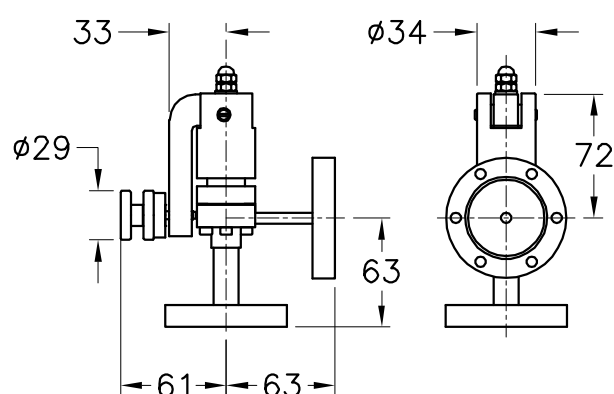
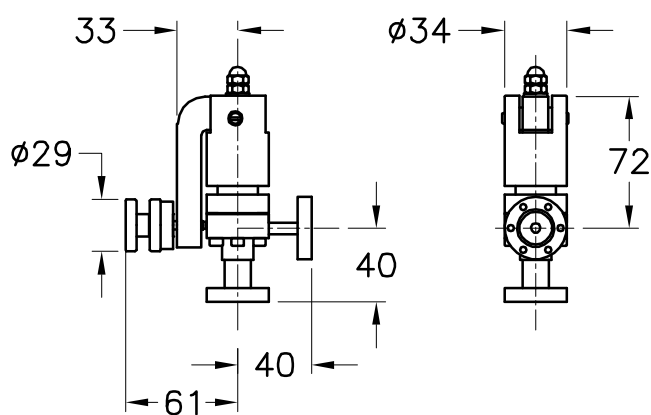
The LVM range offers excellent response and repeatability over a wide dynamic range. The design virtually eliminates hysteresis and has low internal volume to allow rapid clean up. The ultra fine control actuator fitted to the LVM valve enhances the performance to provide high sensitivity.

All Metal Right Angled Leak Valves (LVM Series)

All Metal Right Angled Leak Valves (LVM Series)												
DN Type	Axial/Radial flange	Tube OD Inlet	Tube OD Outlet	Max Inlet Pressure bar	Max Operating Range	Min Operating Range	Open Conductance	Leak Rate Closed mbar.	Bakeout Temp Open	Bakeout Temp Closed	Weight kg	Order Code
	mm	mm	mm		mbar	mbar						
DN19	Rotatable 34	6.4	14	10	100	1×10^{-11}	0.1	1×10^{-12}	450*	250*	2.6	ZLVM940R
DN34	Rotatable 70	6.4	14	10	100	1×10^{-11}	0.1	1×10^{-12}	450*	250*	2.6	ZLVM263R

ZLVM940R

ZLVM263R



All Metal Right Angled Leak Valve Spares	
Description	Order Code
LVM Pad with Gold Seal	ZLVMPSK
LVM Diaphragm Core, Pad and Gold Seal	ZLVMSDK

(1) ZLVMPSK - For valves which are becoming hard to control

(2) ZLVMSDK - For valves which have failed after a series of bakes

All Metal Right Angled Leak Valves (MD95 Series)

VACGEN MD95 series leak valves are used for precise control of a flow of gas into a vacuum system from an external source and operates in a high vacuum range.

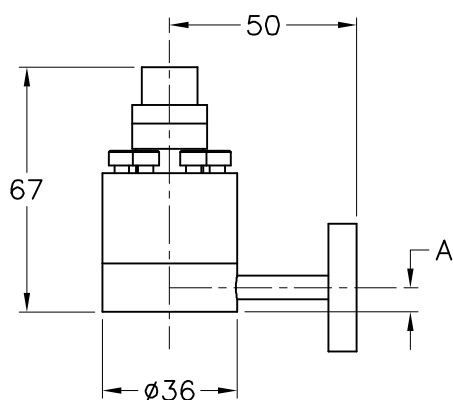
The MD5 Series uses a stellite-faced knife edge and nickel diaphragm to make the UHV seal.



Product Overview

- Valve can withstand hot or corrosive gases
- High inlet pressure (up to 10 bar)
- Low internal volume
- User serviceable kits available
- Operating pressure range from 1 bar to 10^{-7} mbar
- Bakeable to 300°C
- UHV compatible
- 304L stainless steel body with nickel sealing disc

MD Schematic



All Metal Right Angled Leak Valves (MD5 Series)

DN Type	OD Flange Axial mm	OD Flange Radial mm	Max Inlet Pressure	Operating Pressure Max bar	Operating Pressure Min mbar	Open Conductance ls^{-1}	Closed Leak Rate mbar.l.s^{-1}	Bakeout Temp °C Open	Bakeout Temp °C Closed	A offset mm	Weight kg	Order Code
DN19	34 (Tapped base flange)	34	10 bar	1	10^{-7}	0.1	1×10^{-12}	450*	250*	6.5	1.0	ZMD95

*When all ports of the valve are under vacuum

All Metal Right Angled Leak Valves (MD5 Series)

Description	Order Code
Sealing Kit	ZMD5SK

Rotary Feedthroughs

CONTENTS

25mm Bore DPRF Rotary Feedthrough

55mm Bore DPRF Rotary Feedthrough

100mm Bore RP Rotating Platforms

25mm Bore Differentially Pumped Rotary Feedthrough (DPRF)

The VACGEN rotating feedthrough provides the means of translating rotation through a vessel wall without losing vacuum integrity, enabling probes or assemblies to be inserted and turned continuous if required.

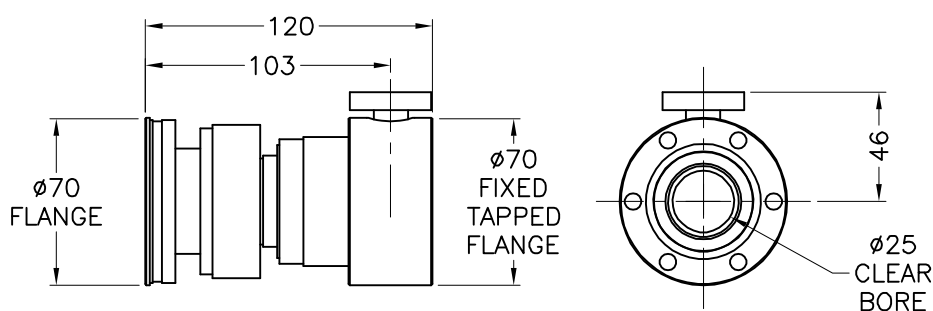


Product Overview

- Continuous rotation
- 25 mm clear bore on 70 mm OD Conflat flanges
- M6 Tapped base flange
- Top flange M6 clear bolt hole flange
- Interspace pumping to 10^{-2} mbar via 34 mm OD Conflat flange (separate pump required)
- Coarse or High Precision versions
- Replaceable PTFE seals
- Fully bakeable to 230°C with motor removed
- Manual and motorisation options with encoder.
- Axial load 800 N
- Radial load 9 Nm

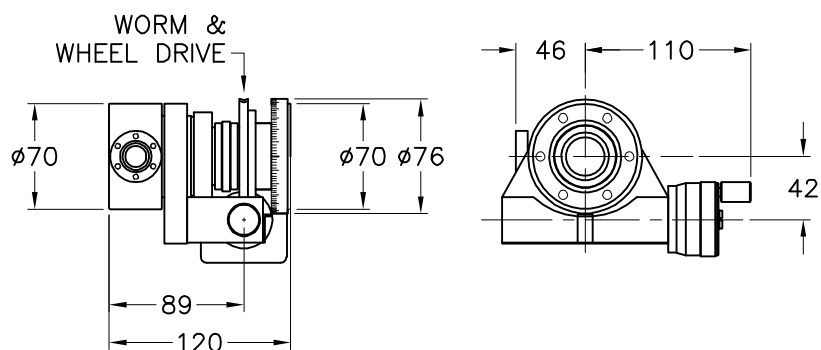
To maintain the rotary seal, a vacuum port is mounted to the side of the assembly allowing connection to a stand alone appropriate pump. DPRF should be pumped all the time the system is being pumped.

DPRF25 Manual Rotary Feedthrough

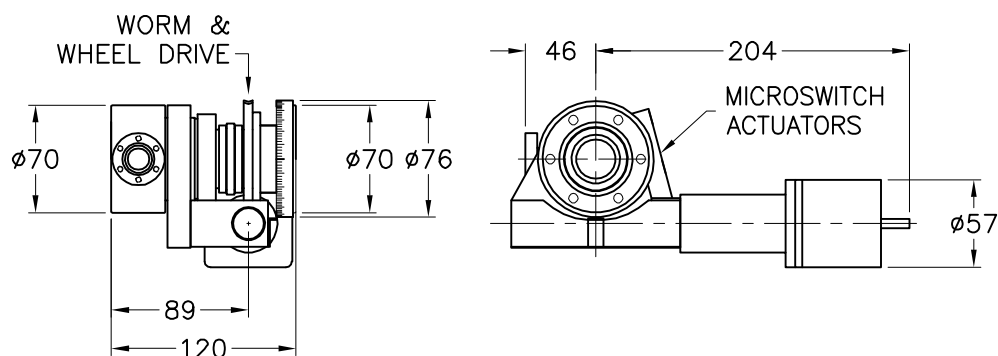


25mm Bore Differentially Pumped Rotary Feedthrough (DPRF)

DPRF25H High Precision Manual Handwheel drive



DPRF25W High Precision Stepper Motor Wheel



DPRF25 Series Rotary Feedthrough

DN Type	OD		Rot. Flange Holes	Fixed Flange Holes	Actuation	Resolution Degrees	Max Rotation Speed	Torque to Rotate	Maximum Load Axial	Maximum Load Radial	Bakeout Temp	Weight	Order Code
	mm	Inch					rpm	Nm	kg	Nm	°C	kg	
DN38	70	2.75	Clear	Tapped M6	Manual*	2	-	4	80	9	230	3.5	ZDPRF25
DN38	70	2.75	Clear	Tapped M6	High Precision	0.05	1.5	0.2	80	9	230	4.0	ZDPRF25H
DN38	70	2.75	Clear	Tapped M6	Stepper Motor	0.01	3.0	-	80	9	230*	5.5	ZDPRF25W
DN38	70	2.75	Clear	Tapped M6	Stepper Motor with encoder	0.01	3.0	-	80	9	230*	7.0	ZDPRF25E

*supplied with tommy bar to rotate

DPRF25 Series Spares

Description	Order Code
Seal Kit (2 seals)	ZXSMS07

55mm Bore Differentially Pumped Rotary Feedthrough (DPRF)

The VACGEN rotating platform provides the means of translating rotation through a vessel wall without losing vacuum integrity, enabling probes or assemblies to be inserted without effecting the chamber pressure.



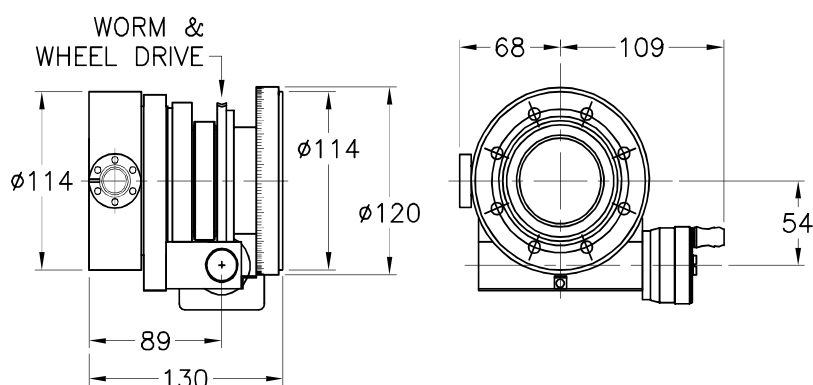
Product Overview

- Continuous rotation
- 55 mm clear bore versions on 114 mm OD Conflat flanges
- M8 Tapped base flange
- M8 clear top flange
- Interspace pumping to 10^{-2} mbar via 34 mm OD Conflat flange (separate pump required)
- Coarse or High Precision versions
- Replaceable PTFE seals
- Fully bakeable to 230°C with motor removed
- Manual and motorisation options with encoder
- Optional double differentially pumped version
- Axial load 1300 N
- Radial load 10 Nm
- 55 Single pumped interspace
- 552 Double pumped interspace

To maintain the rotary seal, a vacuum port is mounted to the side of the assembly allowing connection to a stand alone appropriate pump. DPRF should be pumped all the time the system is being pumped.

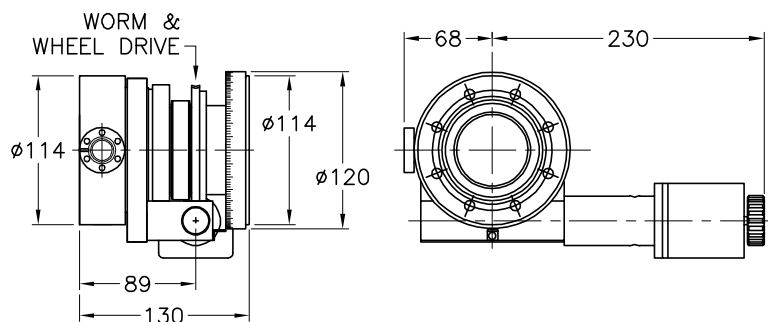
Series Spares	
Description	Order Code
Seal Kit (2 seals) for the 55 version	ZXSMS03
Seal Kit (3 seals) for the 552 version	ZXSMS03-3

DPRF55H High Precision Manual Handwheel drive



55mm Bore Differentially Pumped Rotary Feedthrough (DPRF)

DPRF55W High Precision Stepper Motor Wheel



DPRF55 Series Rotary Feedthrough (Single Stage Pumping)

DN Type	OD		Rotatable Flange Holes	Fixed Flange Holes	Type	Resolution Degrees	Max Rotation Speed	Torque to Rotate	Maximum Load Axial	Maximum Load Radial	Bakeout Temp*	Weight	Order Code
	mm	Inch					rpm	Nm	kg	Nm	°C	kg	
DN63	114	4.50	Clear	Tapped M8	Manual coarse single stage pumping	2	-	8	130	10	230	4.5	ZDPRF55
DN63	114	4.50	Clear	Tapped M8	High Precision single stage pumping	0.05	1.0	0.2	130	10	230	6.0	ZDPRF55H
DN63	114	4.50	Clear	Tapped M8	Stepper Motor single stage pumping	0.0075 per half step	2.0	-	130	10	230*	6.5	ZDPRF55W

* With motor and encoder removed

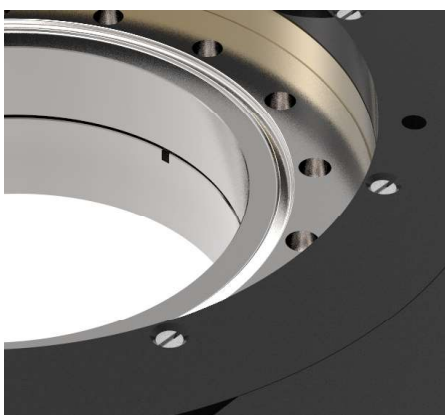
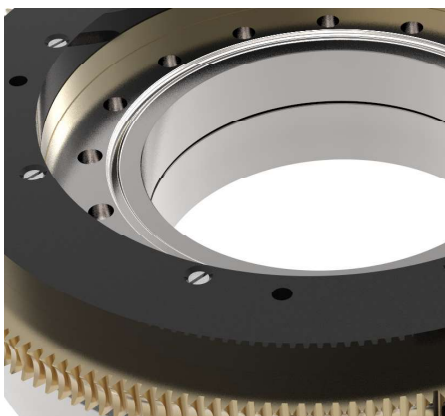
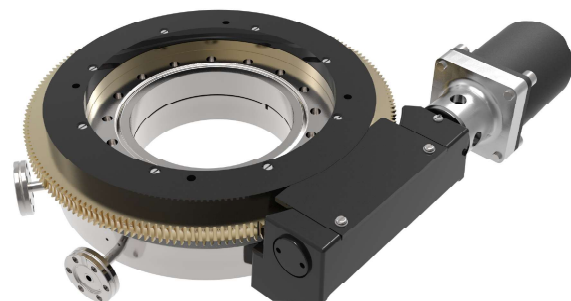
DPRF552 Series Rotary Feedthrough (Two Stage Pumping)

DN Type	OD		Rotatable Flange Holes	Fixed Flange Holes	Type	Resolution Degrees	Max Rotation Speed	Torque to Rotate	Maximum Load Axial	Maximum Load Radial	Bakeout Temp	Weight	Order Code
	mm	Inch					rpm	Nm	kg	Nm	°C	kg	
DN63	114	4.50	Clear	Tapped M8	Manual coarse two stage pumping	2	-	8	130	10	230	3.5	ZDPRF552
DN63	114	4.50	Clear	Tapped M8	High Precision two stage pumping	0.05	1.0	0.2	130	10	230	4.0	ZDPRF552H
DN63	114	4.50	Clear	Tapped M8	Stepper Motor two stage pumping	0.0075 per half step	2.0	-	130	10	230*	5.5	ZDPRF552W
DN63	114	4.50	Clear	Tapped M8	Stepper Motor with encoder two stage pumping	0.0075 per half step	2.0	-	130	10	230*	7.0	ZDPRF552ME

Drawing available on request for DPRF552 - Two Stage Pumping

100 mm Bore Rotating Platform (RP)

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



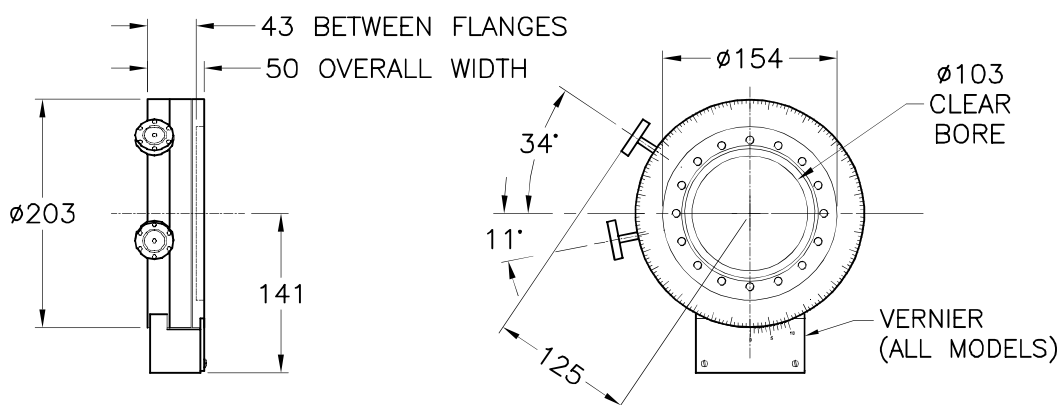
Product Overview

- Continuous rotation
- 102.5 mm clear bore versions on 152 mm OD Conflat flanges
- M8 Tapped base and top flange
- Double interspace pumping to 10^{-2} mbar via two 34 mm OD Conflat flange (separate pump required)
- Coarse or High Precision versions
- Replaceable PTFE seals
- Fully bakeable to 150°C with motor removed
- Manual and motorisation options with encoder
- Payload Limits Vertical - 80 kg at 20 mm polar offset or 120 kg with centralised load
- Horizontal - 20 kg at 100 mm flange offset and 20mm polar offset
- Inverted - 60 kg at 20 mm polar offset or 90 kg with centralised load
- Single 4 point contact bearing
- 1 Turn of the Handwheel = 2°

To maintain the rotary seal, two vacuum ports are mounted to the side of the assembly allowing connection to one or two stand alone appropriate pump. RP100 should be pumped all the time the system is being pumped.

RP Series Rotating Platforms	
Description	Order Code
Straight adaptor flange 90 mm long with clearance holes (for mounting an Omniax manipulator)	ZBS1090
Seal Kit for all versions (3 seals)	ZXSMSRP

100 mm Bore Rotating Platforms (RP)



RP100 Rotary Platform

DN Type	Flange OD		Fixed and Rotating Flange Holes	Actuation	Gearing	Resolution Degrees	Max Rotation Speed	Torque to Rotate	Bakeout Temp	Order Code
	mm	Inch					rpm	Nm	°C	
DN100	152	6.00	Tapped M8	Manual coarse two stage pumping		Coarse	-	8	150	ZRP100C
DN100	152	6.00	Tapped M8	High Precision two stage pumping	1 turn = 2 degrees rotation	0.05	1.0	0.3	150	ZRP100H
DN100	152	6.00	Tapped M8	Stepper Motor two stage pumping	1 turn = 2 degrees rotation	0.005 per half step	2.0	-	150*	ZRP100W
DN100	152	6.00	Tapped M8	Stepper Motor with encoder two stage pumping	1 turn = 2 degrees rotation	0.005 per half step	2.0	-	150*	ZRP100E

* With motor and encoder removed

Rotating Platforms (RP)

Bore	102.5 mm (4.03")
Flanges	DN100 (152mm flange OD), both with tapped holes
Distance Between Flanges	42.6 mm (all models)
Drive Options	Coarse - pin spanner (provided)
Differential Pumping	High Precision - worm and wormwheel
Interspace Pressure	Motorised - stepper motor
Payload Limits	Vertical - 80 kg at 20 mm polar offset or 120kg with centralised load
	Horizontal - 20 kg at 100 mm flange offset and 20mm polar offset
	Inverted - 60 kg at 20 mm polar offset or 90kg with centralised load
Seals	Spring energised with long-life PTFE compound

Rotating Platforms (RP)

Bearing type	4 point contact single bellows
Rotation Resolution	0.05° divisions with Vernier (0 to 360°)
Worm and Wormwheel Gearing	1 turn = 2° 180 turns per 360°
Operating Pressure Range	Atmosphere to 10 ⁻¹¹ mbar
Bakeout Temperature	150°C*

* With motor and encoder removed

Rotary Drives

CONTENTS

RD1 Primary Rotary Drive

RD6 RD7 Primary Rotary Drives

RD91 Primary Rotary Drive

RD2 Primary & Secondary Rotary Drive

RD93 Manual Rotary Drive

RD94 Manual Rotary Drive

MRD91 Magnetically Coupled Rotary Drive

MRD93 Magnetically Coupled Rotary Drive

MRD6 Magnetically Coupled Rotary Drive

Primary Rotary Drive (RD1)

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.



Product Overview

- Low backlash
- Continuous rotation to 500 rpm
- 70 mm OD flange
- Graduated handwheel with Vernier scale
- Motorisation is available to give 0.01° resolution
- Axial load: rotary shaft 40 N
- Bakeable to 230°C (motors removed)
- Stepper motor kits with optional encoders
- Suitable for VACGEN sample handling
- 9.52mm diameter shaft
- Bearing housing can be fitted to for longer shaft lengths

The RD1 is a low backlash, high precision hydroformed bellows drive providing continuous primary rotation with a 9.52 mm diameter shaft.



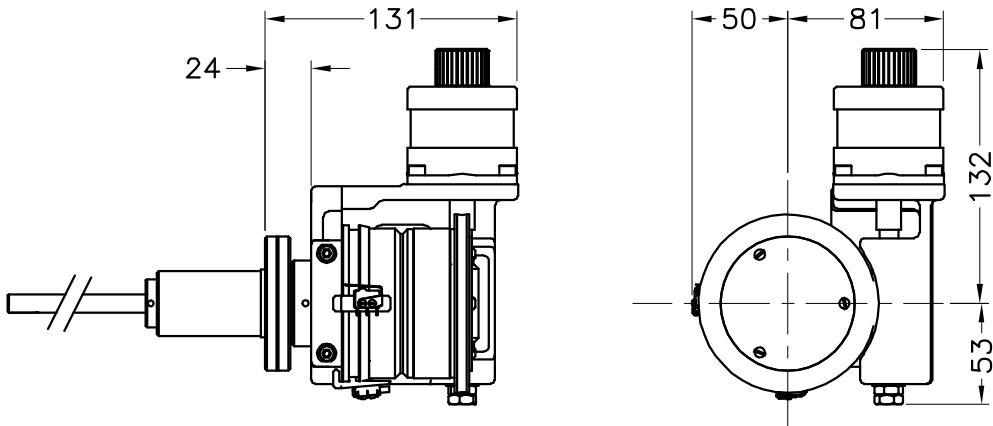
Primary Rotary Drive (RD1)

Primary Series Rotary Drive and Motorisation (RD1)						
Flange OD		Rotation Range Degrees	Resolution Degrees	Torque Nm	Torque Nm 10 rpm	Order Code
mm	Inch			100rpm	10rpm	
70	2.75	360*	0.1	0.5	5	ZRD1
Stepper Motor Kit		+/- 168**	0.01	4 at 16 rpm max	4 at 16 rpm max	ZRDPMKW
Stepper motor with encoder		+/- 168**	0.01	4 at 16 rpm max	4 at 16 rpm max	ZRDPMKE

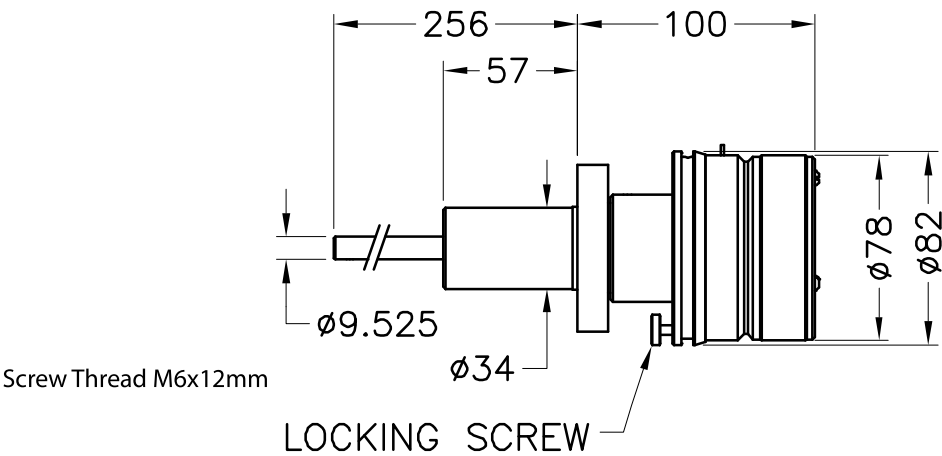
* Continuous rotation where wiring and/or cooling is not fitted

** Microswitches fitted

RD1 Fitted with RDPMK Stepper Motor Kit



RD1 Manual Rotary Drive



Primary Rotary Drives (RD6 & RD7)

The RD6 is a manual or motorised rotary drive with an ungraduated handwheel which includes a position lock and a V groove for motorisation with a 100mm shaft length. The RD7 has a graduation handwheel with a 265mm shaft.

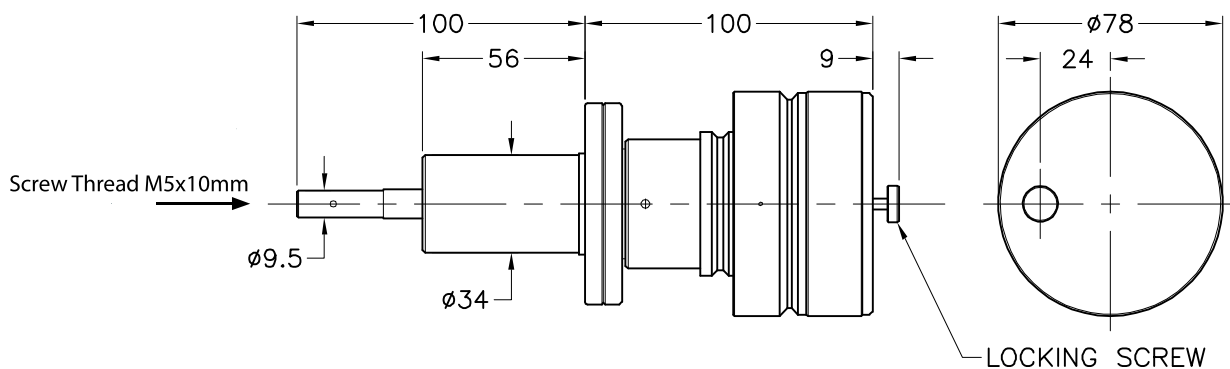


Product Overview

- Continuous rotation
- Angular repeatability of 0.5°
- High speed 300 rpm/medium torque 10 nm
- Rotation lock
- Bakeable to 230°C (motor and gearbox removed), and to 400°C (partially dismantled)
- Axial load 40 N
- RD6 shaft 9.52 mm diameter, 100 mm length
- RD7 shaft 9.52 mm diameter, 256 mm length
- Motorisation options
- Encoder options available

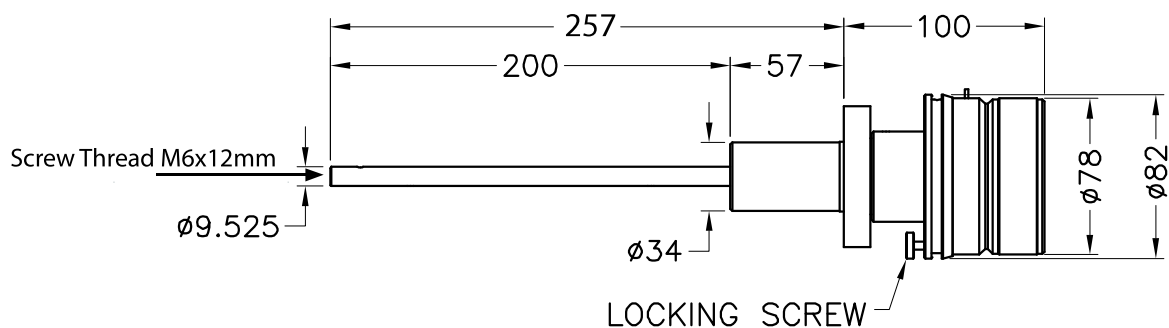
Only the RD7 has a graduated handwheel with 1.0° graduations, a 256 mm rotational shaft and hand wheel with position lock.

RD6 precision manual rotary drive

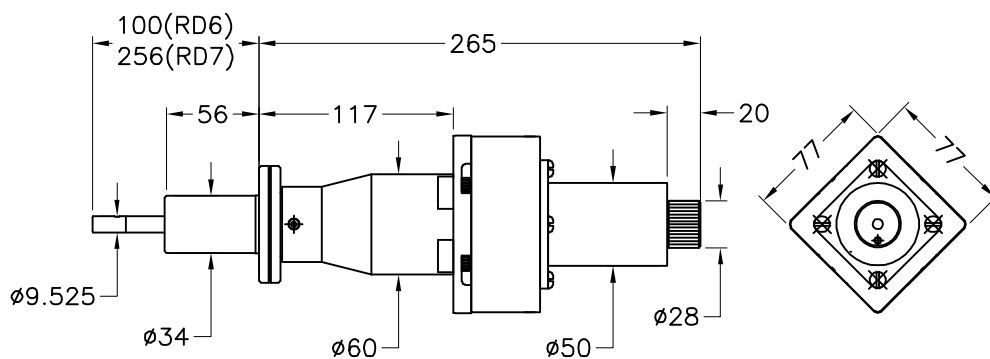


Primary Rotary Drives (RD6 & RD7)

RD7 precision manual rotary drive



RD7 precision motorised gear box rotary drive



Primary Rotary Drives (RD6)								
Flange OD		Type of Rotation	Resolution Degrees	Torque Nm 300 rpm	Torque Nm10 rpm	Gear Ratio	Shipping Weight	Order Code
mm	Inch						kg	
70	2.75	Manual	-	0.8	5	-	2.3	ZRD6
70	2.75	Stepper Motor	0.9	0.38	0.43	1:01	4.0	ZRD6MIW
70	2.75	Stepper Motor with Gearbox	0.1	0.8	2	9:01	4.0	ZRD6MGIW

Primary Rotary Drives (RD7)								
Flange OD		Type of Rotation	Resolution Degrees	Torque Nm 300 rpm	Torque Nm10 rpm	Gear Ratio	Shipping Weight	Order Code
mm	Inch						kg	
70	2.75	Manual	1	0.8	5	-	2.6	ZRD7
70	2.75	Stepper Motor	0.9	0.38	0.43	1:01	3.7	ZRD7MIW
70	2.75	Stepper Motor with Gearbox	0.1	0.8	2	9:01	4.0	ZRD7MGIW

Primary Rotary Drive (RD91)

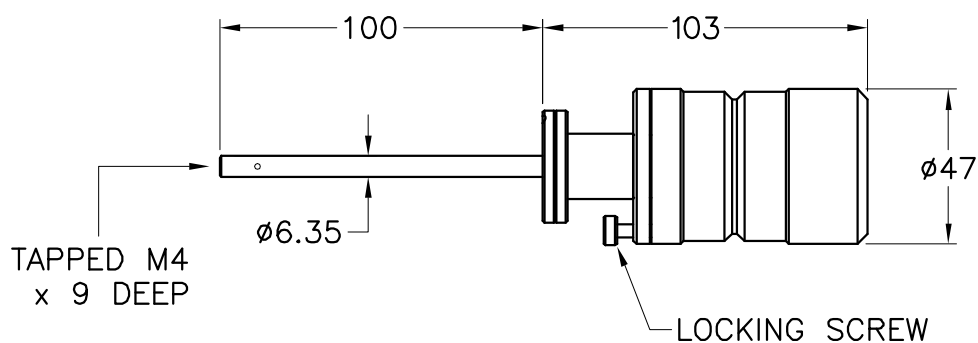
The VACGEN RD91 is a 34mm OD mini high precision rotary drive with a graduated handwheel and locking screw with an inline motorisation option.



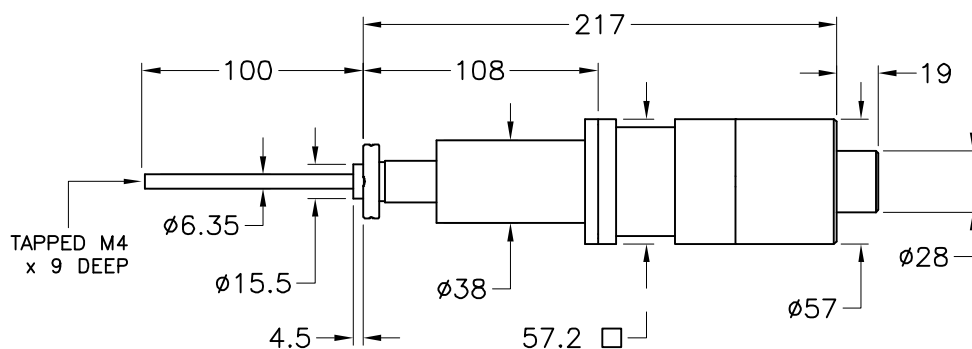
Product Overview

- Mounting flange 34 mm OD
- Up to 500 rpm
- High precision
- Continuous rotation
- High speed, low torque
- Angular resolution 1°
- VACGEN stepper driven angular resolution 0.9° direct drive, 1/2 Step
- Direct drive with 5:1 gearbox
- Bakeable to 250°C with motor removed

RD91 manual operation

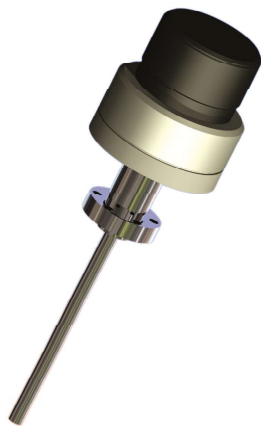


RD91MG In line Stepper Motor



Miniature Rotary Drives (RD91)							
Flange OD mm	Type of Operation	Resolution Degrees	Torque Nm 500 rpm	Torque Nm 10 rpm	Load N	Gear Ratio	Order Code
34	Manual	1	0.1	0.5	10	-	ZRD91
34	Stepper Motorised	0.9	0.1	0.3	10	1:1	ZRD91W
34	Stepper Motorised	0.18	0.3 (at 300rpm)	0.5	10	5:1	ZRD91MG

Rotary Drive Slipping Brake Accessory For RD91



Product Overview

- Easy fitted to RD91
- Torque adjusted to 0-0.5 Nm (Allen key)
- Fully bakeable to 250°C
- Essential for stopping drive rotating with off axis loads (ideal for RLRP)

Miniature Rotary Drives (RD91)	
Description	Order Code
RD91 Rotary Drive Slipping Brake	ZRD91SB

Primary & Secondary Rotary Drive (RD2)

Primary rotation with secondary linear movement (12 mm and 24 mm versions). The RD2 and RD224 ranges are low backlash, high precision drives providing continuous primary rotation and secondary linear axis movement.



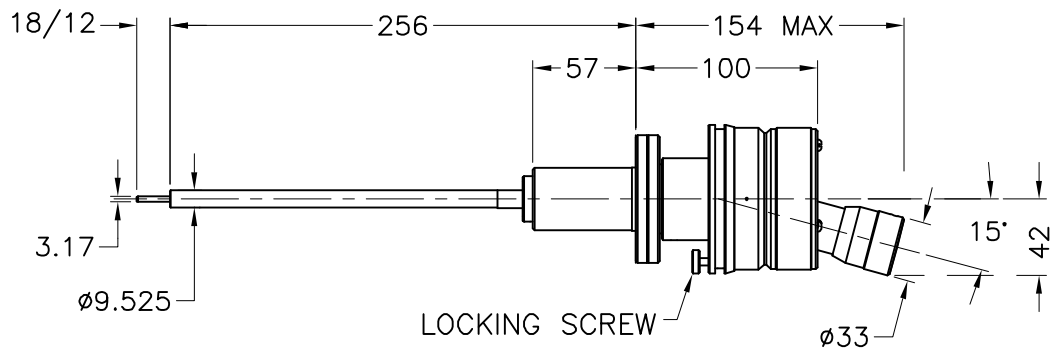
Product Overview

- Low backlash
- Continuous rotation to 500 rpm
- 70 mm OD flange
- Graduated handwheel with Vernier scale
- Axial Load: rotary shaft 40 N
- Linear shaft movements of 12 and 24 mm
- Long life bellows
- Bakeable to 230°C (motors removed)
- Stepper motor kits
- Encoder options
- 9.52 diameter shaft
- For primary motor rotation $1r = 4^\circ$ shaft rotation
- For secondary motor rotation $1r = 0.022$ mm linear movement

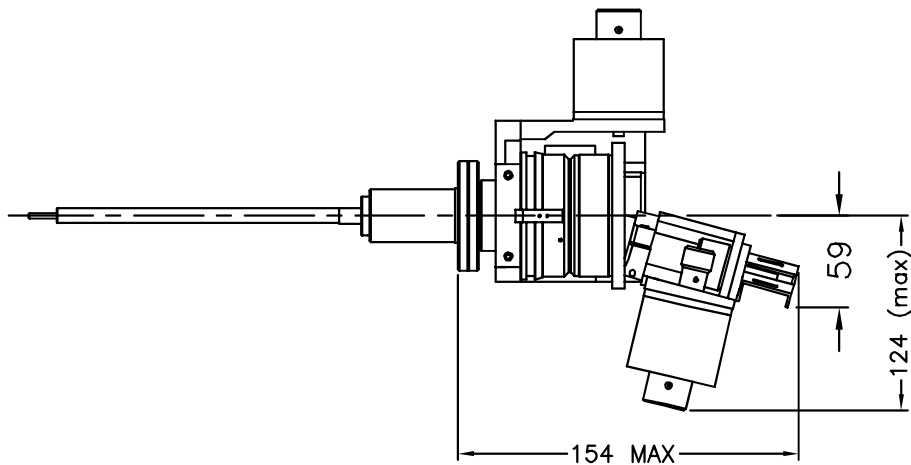
The RD2 uses the same primary axis movement as the RD1 and has the full RD1 options of extended shafts and motorisation. In addition, the RD2 is fitted with a high resolution actuator to give 12mm or 24mm linear movement. This operates the azimuthal (R2) or tilt (R3) movements of this standard VACGEN SH series sample holders. The standard linear resolution is 0.02mm, but angular graduations can be supplied. The secondary axis can be motorised to give 5 microns resolution in half step mode. Adjustable microswitches are included with the R2 motor kit.

Primary & Secondary Rotary Drive (RD2)

RD2 manual primary and secondary rotary drive



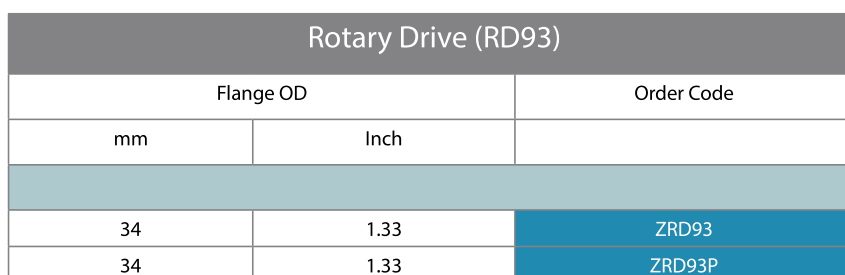
RD2 with both primary and secondary drive axis fitted with stepper motors



Primary and Secondary Rotary Drive (RD2)								
Flange OD mm	Primary Rotation	Resolution Primary Degrees	Resolution Secondary mm	Linear Secondary Motion mm	Torque Primary rpm	Gear box ratio	1 Motor rotation	Order Code
70	Continuous*	0.1	0.02	12	5 Nm at 10	-	-	ZRD2
70	Continuous*	0.1	0.02	24	5 Nm at 10	-	-	ZRD224
Stepper Motor Kit Primary (R1)	Continuous*	0.01	-	-	4 Nm at 16 max	45:1	4° shaft rotation	ZRDPMKW
Stepper Motor Kit Primary + encoder Kit (R1)	Continuous*	1.01	-	-	4 Nm at 16 max	45:1	4° shaft rotation	ZRDPMKE

*with cooling or wiring fitted $\pm 180^\circ\text{C}$ and microswitches $\pm 168\text{mm}$

- Torque 0.1 Nm hand turned
- Torque 0.01 Nm at 300 rpm
- Range of HV and UHV flanges
- Fully bakeable to 250°C without dismantling
- Dimensionally compatible to other miniature drives
- Thrust 16 N



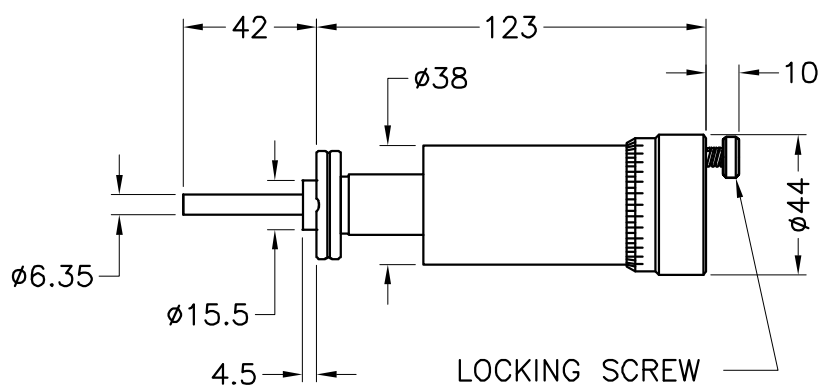
Manual Rotary Drive (RD94)

A positional rotary drive with graduated handwheel and excellent torque characteristics.



Product Overview

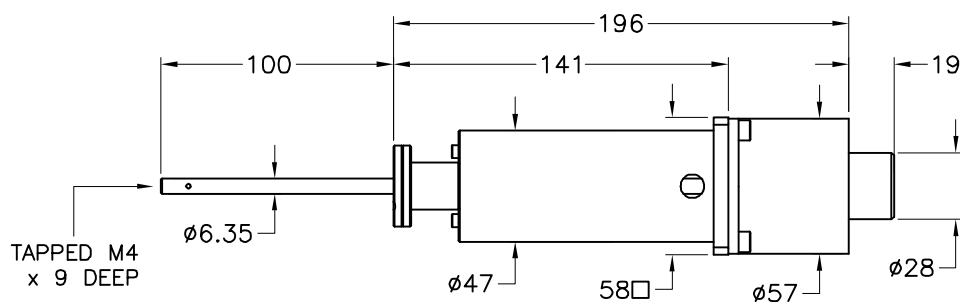
- Top cap graduated in 5° intervals
- Low angular backlash of $\pm 1^\circ$
- Position lock
- Fully bakeable to 250°C without dismantling
- Solid 6.35 mm shaft
- 42 mm internal shaft length
- Flange options: KF25 34 mm and 70 mm conflat
- Torque characteristics: 0.4 Nm @ 10 rpm, 0.08 Nm @ 400 rpm (maximum speed)



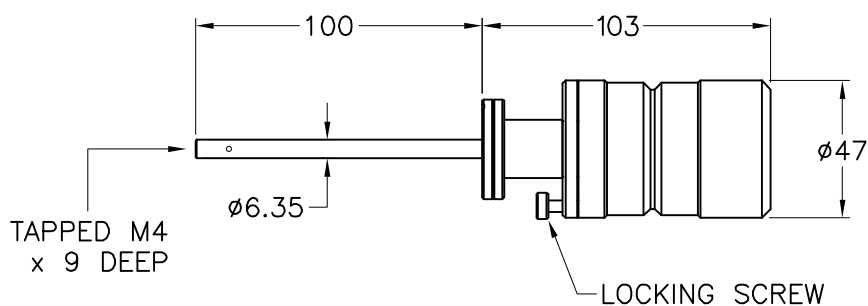
Rotary Drive (RD94)				
Flange OD		Torque Nm 10 rpm	Torque Nm 400 rpm	Order Code
mm	Inch			
34	1.33	0.4	0.08	ZRD94

Magnetically Coupled Rotary Drive (MRD91)

MRD91 In line Stepper Motor Option



MRD91 Manual Rotary Drive



Magnetically Coupled Rotary Drives (MRD91)

DN Type	Flange OD mm		Type of Operation	Breakaway Torque	Thrust	Max rotation	Life	Shipping weight kg	Order Code
	mm	Inch		Nm	N	RPM			
DN19	34	1.33	Manual	0.5	10	1000	Standard	0.7	ZMRD91
DN19	34	1.33	Encoded Stepper ⁽¹⁾	0.5	10	1000	Standard	1	ZMRD91 ME

(1) Wired to suit SIMSTEP controller

Technical Data: MRD91

Leak Rate	$<1 \times 10^{-10}$ mbar l.s ⁻¹
Pressure Range	1×10^{-10} mbar ⁻² bar absolute
Temperature Range	250°C standard UHV drives (with motor/gearbox removed)
	200°C Extended UHV drives (with motor/gearbox removed)
Materials	Body – 316 stainless steel
	Mechanical parts – aluminium alloy – grade 6082
	Bearings – stainless steel
	Magnets – sintered rare-earth
Lubrication	Dry film molybdenum disulphide (standard UHV drives)
	UHV compatible lubricant (extended life drives)

Magnetically Coupled Rotary Drive (MRD93)

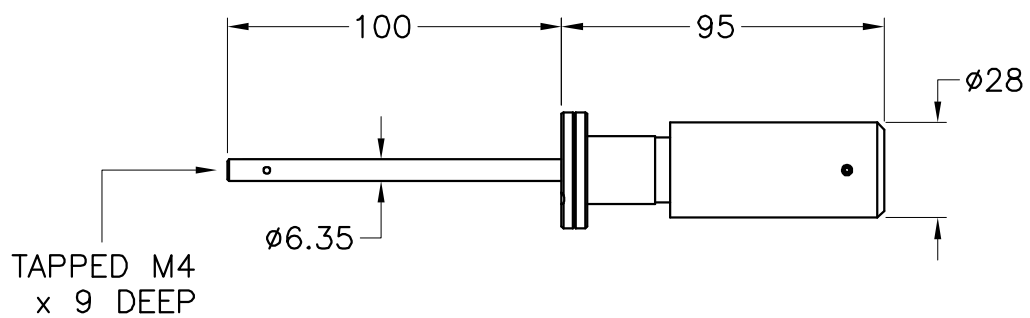
The MRD series magnetic rotary drive uses a high strength magnetic coupling to transfer rotational forces into the vacuum envelope. This is achieved without any dynamic seals or bellows making these devices exceptionally robust.



Product Overview

- Vacuum enclosure machined from single piece of 316 stainless steel
- No vacuum seals or bellows - no risk of leaks to atmosphere
- Exceptional torsional rigidity
- Zero angular backlash under low load/acceleration
- Cannot be damaged by application of excessive torque
- Long service life
- Bakeable to 250°C (standard UHV drive)

MRD93 Manual Magnetically Coupled Rotary Drive



Magnetically Coupled Rotary Drive (MRD93)

Magnetically Coupled Rotary Drive (MRD93)								
DN Type	Flange OD		Type of Operation	Breakaway Torque	Thrust	Max Rotation	Weight	Order Code
	mm	Inch		Nm	N	rpm	kg	
DN19	34	1.33	Manual	0.5	10	1000	0.3	ZMRD93

Technical Data MRD93	
Leak Rate	$<1 \times 10^{-10} \text{ mbar l.s}^{-1}$
Pressure Range	$1 \times 10^{-10} \text{ mbar}^{-2} \text{ bar absolute}$
Temperature Range	250 °C standard UHV drives 200 °C Extended UHV drives
Materials	Body – 316 stainless steel Mechanical parts – aluminium alloy – grade 6082 Bearings – stainless steel Magnets – sintered rare-earth
Lubrication	Dry film molybdenum disulphide (standard UHV drives) UHV compatible lubricant (extended life drives)
Actuation	Manual

Magnetically coupled rotary drive (MRD6)

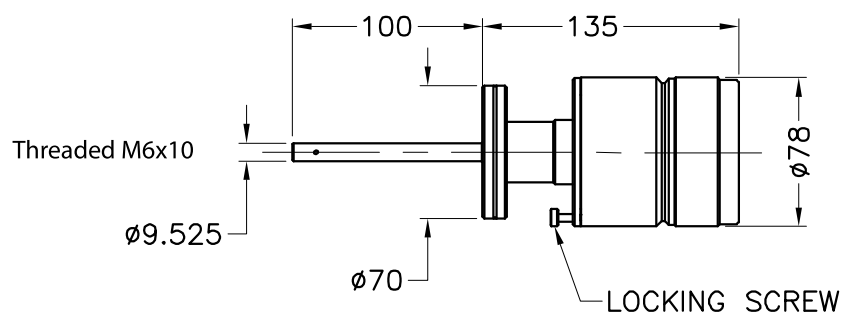
The MRD series magnetic rotary drive uses a high strength magnetic coupling to transfer rotational forces into the vacuum envelope. This is achieved without any dynamic seals or bellows, making these devices exceptionally robust.



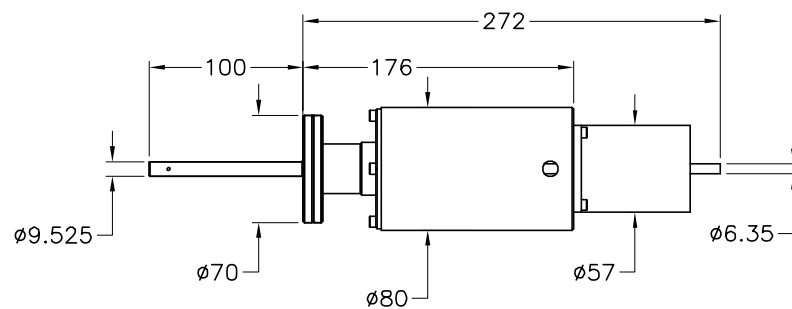
Product Overview

- Vacuum enclosure machined from single piece of 316 stainless steel
- No vacuum seals or bellows - no risk of leaks to atmosphere
- Exceptional torsional rigidity
- Zero angular backlash under low load/acceleration
- Cannot be damaged by application of excessive torque
- Long service life
- Bakeable to 250°C (standard UHV drive)
- Motor can be fitted/removed in minutes
- Manual drive has V-groove in drive knob for alternative motorisation

MRD6 Manual Rotary Drive



MRD6 In line Stepper Motor Drive



Magnetically coupled rotary drive (MRD6)

Magnetically coupled Rotary Drives (MRD6)									
DN Type	Flange OD		Type of Operation	Breakaway Torque	Thrust	Max Rotation	Life	Shipping Weight	Order Code
	mm	Inch		Nm	N	rpm		kg	
DN40	70	2.75	Manual	4	10	500	Standard	2	ZMRD6
DN40	70	2.75	Stepper Motor	4	1	500	Standard	2.3	ZMDR6MW

Technical Data - MRD6	
Leak Rate	$<1 \times 10^{-10}$ mbar l.s ⁻¹
Pressure Range	1×10^{-10} mbar – 1 bar absolute
Temperature Range	250°C standard UHV drives (with motor / gearbox removed)
	250°C extended UHV drives (with motor / gearbox removed)
Materials	Body - 316 stainless steel
	Mechanical parts - aluminium alloy - grade 6082
	Bearings - stainless steel
	Magnets - sintered rare-earth
Lubrication	Dry film molybdenum disulphide (standard UHV drives)
	UHV compatible lubricant (extended life drives)
Actuation	Manual, Stepper Motor, Encoder

Linear Drives

CONTENTS

LDM Micrometer Linear Drive

LDP Push and Pull Drives

LDS Screw Drives

Micrometer Linear Drive (LDM)

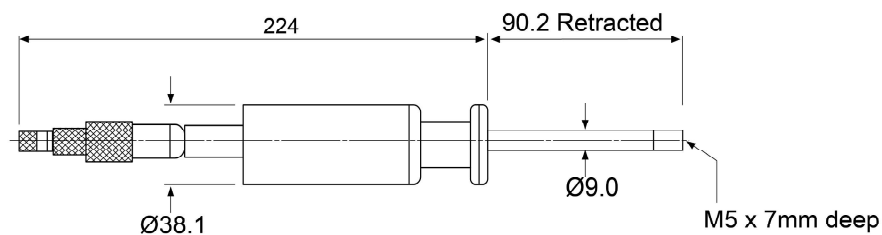
Micrometer screwed drives provide linear movement inside a vacuum envelope, with the actuation via a micrometer, which rotates to give controlled linear movement to a resolution of 5 microns. The micrometer drive products can be used in applications where a sample or internal device movement is required with fine control of linear displacement.



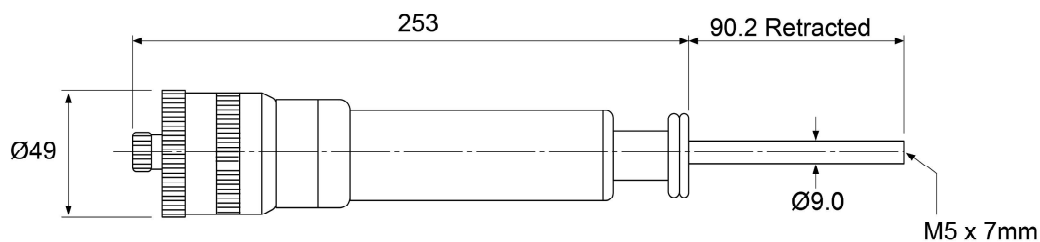
Product Overview

- MITUTOYO® Micrometer driven drives
- 230°C bakeout assembled
- Axial load 25 N
- Available in 25 mm or 50 mm stroke
- 70 mm OD flange with 33 mm OD travelling mount
- 34 mm OD flange with 9 mm travelling shaft

LDM 925

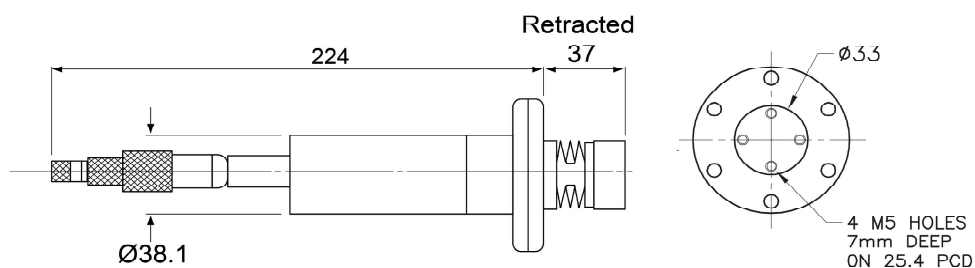


LDM 950

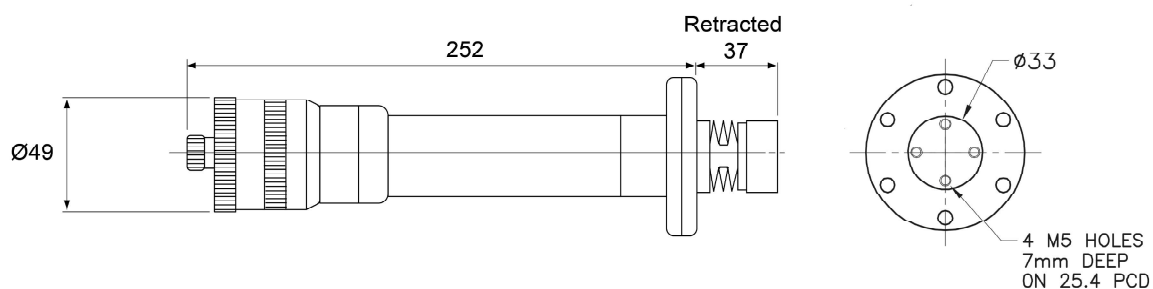


Micrometer Linear Drive (LDM)

LDM 225



LDM 250



Micrometer Series (LDM)							
DN Type	Flange OD		Travel	Operation	Micrometer Resolution	Weight	Order Code
	mm	Inch	mm			kg	
DN16	34	1.33	25	Micrometer	0.01	3.0	ZLDM925
DN16	34	1.33	50	Micrometer	0.005	3.5	ZLDM950
DN40	70	2.75	25	Micrometer	0.01	4.0	ZLDM225
DN40	70	2.75	50	Micrometer	0.005	4.5	ZLDM250

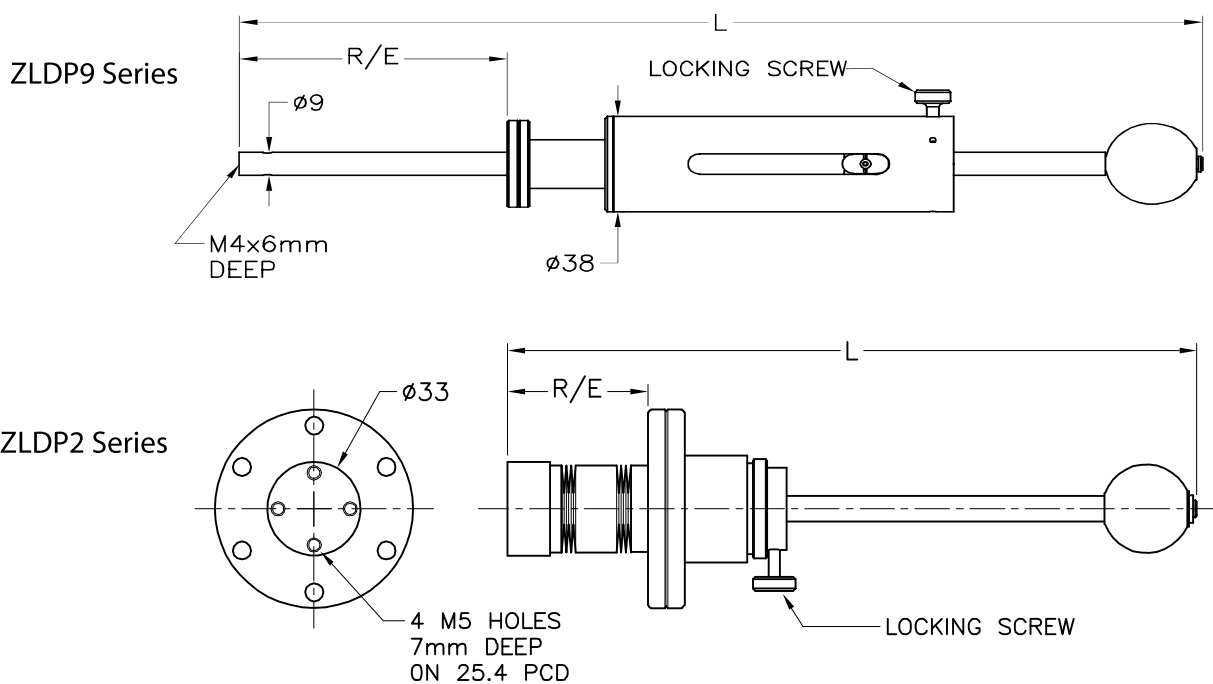
Push and Pull Drives (LDP)

The devices in the LDP series are linear motion probes that can be moved in relation to its mounting flange from 25 mm to 150mm with a smooth and reliable operation. With a complete range of flanges and probe ends, the push pull products can be used in almost all applications where a sample or internal device movement is required.



Product Overview

- Fully bakeable to 250°C
- Leak rate 1×10^{-10} mbar ls⁻¹
- 1×10^{-11} mbar to 1 bar pressure range
- Push/pull types
- Position lock



Push Pull Drives (LDP)

DN Type	Flange OD		Travel mm	Operation	Position Scale	Dimension L mm	Dimension R mm	Dimension E mm	Weight kg	Order Code
	mm	inch								
DN16	34	1.33	25	Manual	YES	264	90	116	2.0	ZLDP925
DN16	34	1.33	50	Manual	YES	323	90	141	2.5	ZLDP950
DN16	34	1.33	100	Manual	YES	441	90	192	3.0	ZLDP910
DN16	34	1.33	150	Manual	YES	559	90	242	3.5	ZLDP915
DN40	70	2.75	25	Manual	NO	140	33	58	2.0	ZLDP225
DN40	70	2.75	50	Manual	NO	174	41	92	3.0	ZLDP250
DN40	70	2.75	100	Manual	NO	241	58	160	3.5	ZLDP210
DN40	70	2.75	150	Manual	NO	308	74	226	4.0	ZLDP215

Push and Pull Drives (LDP---P)

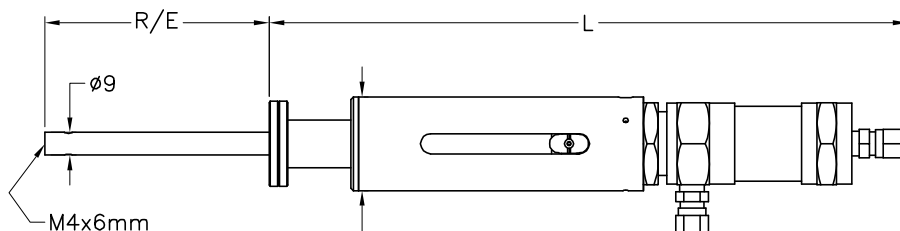
The devices in the LDP---P series are linear motion probes that can be moved in relation to its mounting flange from 25 mm to 150mm with a smooth and reliable pneumatic operation. With a complete range of flanges and probe ends, the pneumatic products can be used in almost all applications where an automated internal device movement is required.



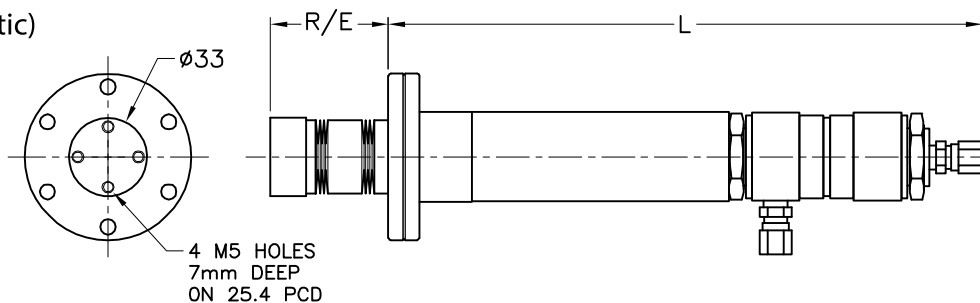
Product Overview

- Fully bakeable to 250°C
- Leak rate 1×10^{-10} mbar ls^{-1}
- 1×10^{-11} mbar to 1 bar pressure range
- Pneumatic operation

LDPG Series (Pneumatic)



LDP2 Series (Pneumatic)



Push Pull Drives (LDP)										
DN Type	Flange OD		Travel	Operation	Position Scale	Dimension L	Dimension R	Dimension E	Weight	Order Code
	mm	inch								
DN16	34	1.33	25	Pneumatic*	NO	269	90	116	3.0	ZLDP925P
DN16	34	1.33	50	Pneumatic*	NO	327	90	141	3.5	ZLDP950P
DN16	34	1.33	100 max	Pneumatic*	NO	445	90	192	4.0	ZLDP910P
DN40	70	2.75	25	Pneumatic*	NO	268	33	58	3.5	ZLDP225P
DN40	70	2.75	50	Pneumatic*	NO	326	41	92	4.0	ZLDP250P
DN40	70	2.75	100 max	Pneumatic*	NO	444	58	160	4.5	ZLDP210P
* Optional Limit Switch kit containing 2 Reed switches ZLDPRSK2										ZLDPRSK2

Screw Drives (LDS)

These linear drives can be used in applications where sample or internal device movement is required with incremental displacement. Manually or motorised drives enables positive linear travel in vacuum.



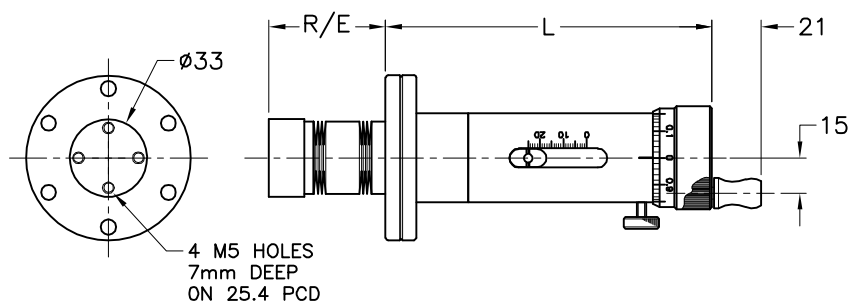
Product Overview

- Linear non-rotating probe
- 34 mm OD conflat flange with 9 mm shaft
- 70 mm OD conflat version with 33 mm travelling mount
- Resolution of 0.02 mm
- Manual hand wheel or motorised actuator
- Position lock (manual)
- Manual versions bakeable to 250°C standard
- Stepper motor driven versions available
- Motorised versions bakeable to 230°C with motor removed
- Microswitch upgrade kits are available for the stepper motor drive options. See table.

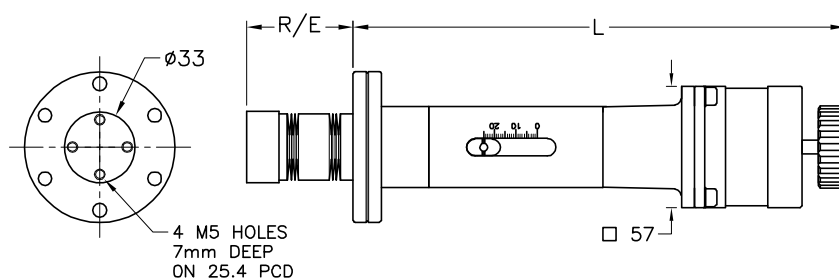


Screw Drives (LDS)

ZLDS2 Series Manual (70 mm)



ZLDS2 Series Stepper Motor Drive (70 mm)



Screw Drives on 70 mm OD Flange (LDS2)

DN Type	Flange OD		Travel mm	Actuation	Dim L	Dim R	Dim E	Weight	Order Code
	mm	inch			mm	mm	mm	kg	
DN40	70	2.75	25	Manual	139	33	58	2.5	ZLDS225
DN40	70	2.75	50	Manual	172	41	92	3.0	ZLDS250
DN40	70	2.75	100	Manual	240	58	160	3.5	ZLDS210
DN40	70	2.75	150	Manual	307	74	226	4.0	ZLDS215
DN40	70	2.75	25	Stepper Motor*	234	33	58	3.5	ZLDS225W
DN40	70	2.75	50	Stepper Motor*	267	41	92	4.0	ZLDS250W
DN40	70	2.75	100	Stepper Motor*	334	58	160	4.5	ZLDS210W
DN40	70	2.75	150	Stepper Motor*	401	74	226	5.0	ZLDS215W
DN40	70	2.75	25	Stepper Motor with encoder*	234	33	58	3.5	ZLDS250E
DN40	70	2.75	50	Stepper Motor with encoder*	267	41	92	4.0	ZLDS225E
DN40	70	2.75	100	Stepper Motor with encoder*	334	58	160	4.5	ZLDS210E
DN40	70	2.75	150	Stepper Motor with encoder*	401	74	226	5.0	ZLDS215E
DN40	70	2.75	25	Stepper Motor with limits*	233	33	58	3.5	ZLD250MM
DN40	70	2.75	50	Stepper Motor with limits*	267	41	92	4.0	ZLD225MM
DN40	70	2.75	100	Stepper Motor with limits*	334	58	160	4.5	ZLD210MM
DN40	70	2.75	150	Stepper Motor with limits*	401	74	226	5.0	ZLD215MM
DN40	70	2.75	25	Stepper Motor with encoder and limit switches	234	33	58	3.5	ZLD225MME
DN40	70	2.75	50	Stepper Motor with encoder and limit switches	267	41	92	4.0	ZLD250MME
DN40	70	2.75	100	Stepper Motor with encoder and limit switches	334	58	160	4.5	ZLD210MME
DN40	70	2.75	150	Stepper Motor with encoder and limit switches	399	74	226	5.0	ZLD215MME

*VACGEN controllers required

Transfer Devices

CONTENTS

MLRV High Power Magnetic Linear & Rotary Drives

MLRD Dual Axis Linear Transfer Probes

Linear Rack & Pinion Drives LRP2 & RLRP2

MH Wobble Sticks Mechanical Hand Series

WH Hollow Wobble Sticks

WS Conventional Wobble Sticks

WS20 Conventional Wobble Sticks

Omicron Style Pincer Grip Wobble Sticks

High Power Magnetic Linear and Rotary Drives (MLRV)

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



Product Overview

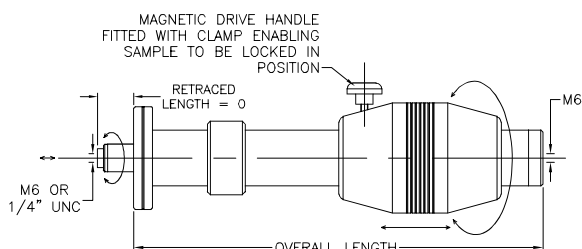
- Magnetically coupled linear and rotary motion
- High powered magnets allows drives to be horizontally or vertically mounted
- Tactile control of sample transfer
- Bakeable internal and external magnets
- Complete drive bakeable to +250°C (max operating temperature 120°C)
- Leak rate $< 1 \times 10^{-11}$ mbar ls⁻¹
- Pressure range 1 bar to 10^{-11} mbar
- Continuous rotation
- Position lock

70mm OD conflat flange

- 305 mm to 914 mm travel
- 19mm diameter probe supplied with M6 or 1/4 inch threaded end adapters

114 mm OD conflat flange

- 610 mm to 1450 mm travel
- 25.4mm diameter probe supplied with M6 or 1/4 inch threaded end



High Power Magnetic Drives (MLRV)									
DN Type OD	Flange Travel		Linear Travel	Probe Diameter	External Length	Max Load Capacity Vertical	Max Load Capacity Horiz	Weight	Order Code
	mm	inch							
DN40	70	2.75	305	19	514	5.0	2.0	3.6	ZMLRV203
DN40	70	2.75	460	19	692	5.0	1.7	3.8	ZMLRV204
DN40	70	2.75	610	19	870	5.0	1.5	4.0	ZMLRV206
DN40	70	2.75	914	19	1225	5.0	1.2	4.4	ZMLRV209
DN63	114	4.5	610	25.4	870	4.0	2.2	4.0	ZMLRV406
DN63	114	4.5	914	25.4	1225	4.0	2.2	4.4	ZMLRV409
DN63	114	4.5	1250	25.4	1603	4.0	2.1	5.8	ZMLRV412
DN63	114	4.5	1450	25.4	1845	4.0	5.8	5.8	ZMLRV414

All dimensions are in mm unless otherwise stated

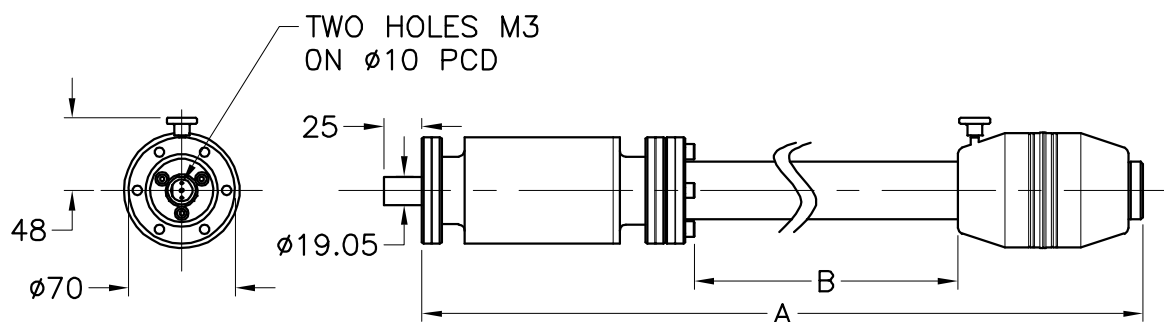
Magnetic Linear Drives (MLD)

All metal linear motion transfer probe are magnetically coupled. Front bearing housing included for high accuracy, high repeatability tasks.



Product Overview

- Linear motion drive
- High powered magnets allow drives to be horizontally or vertically mounted
- Tactile control of sample transfer
- Bakeable internal and external magnets
- Complete drive bakeable to +250°C (max operating temp 120°C)
- Leak rate $< 1 \times 10^{-10}$ mbar ls⁻¹
- Pressure range 1 bar to 10^{-11} mbar
- Position lock
- 70mm OD conflat mounting flange
- 305mm to 914mm travel
- 19mm diameter probe



Magnetic Linear Transfer Probes (MLD)

DN Type	Flange OD		Linear Travel	Dim A	Dim B	Load Capacity	Weight	Order Code
	mm	Inch						
DN40	70	2.75	305	626	311	0.3	4.8	ZMLD203
DN40	70	2.75	460	781	486	0.3	5.0	ZMLD204
DN40	70	2.75	610	931	636	0.3	5.2	ZMLD206
DN40	70	2.75	914	1324	940	0.3	5.4	ZMLD209

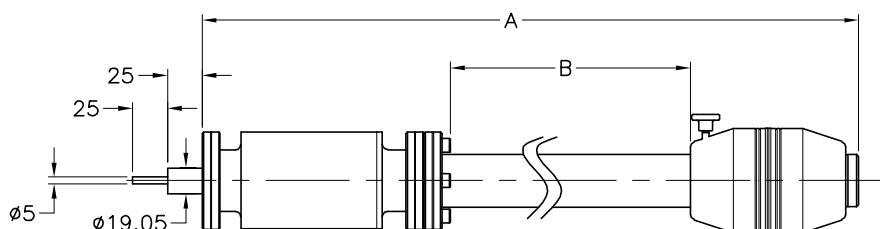
Dual Axis Magnetic Linear Transfer Probes (MLRD)

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.



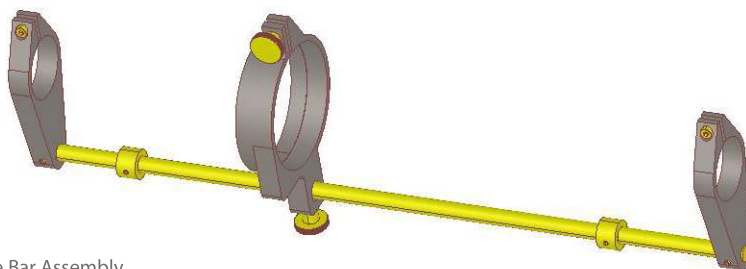
Product Overview

- Magnetically coupled dual linear and rotary motion shafts
- Linear shaft 19 mm diameter
- Rotating shaft 5 mm diameter, continuous rotation possible
- High powered magnets allow drives to be horizontally or vertically mounted
- Complete drive bakeable to +250°C
- Leak rate $< 1 \times 10^{-10}$ mbar ls⁻¹
- Position lock
- 70 mm OD conflat mounting flange
- 305 mm to 914 mm travel)

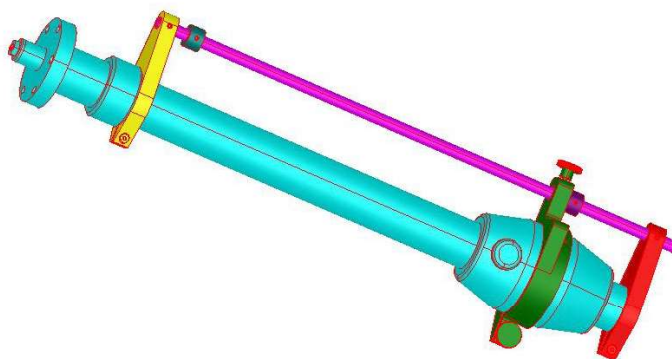


Magnetic Linear Transfer Probes (MLRD)								
DN Type OD	Flange OD		Linear Travel	Dim A	Dim B	Load Capacity	Weight	Order Code
	mm	Inch	mm	mm	mm	kg	kg	
DN40	70	2.75	305	626	311	0.3	5.0	ZMLRD203
DN40	70	2.75	460	781	486	0.3	5.5	ZMLRD204
DN40	70	2.75	610	931	636	0.3	6.0	ZMLRD206
DN40	70	2.75	914	1324	940	0.3	7.0	ZMLRD209

Dual Axis Magnetic Linear Transfer Probe Guide Bar



ZMLRRG Guide Bar Assembly



ZMLRRG Guide Bar Assembly

MLRD Accessories		
MLRD Order Code	Description	Order Code
ZMLRD203	Extension Handle	ZMLRMEH1
ZMLRD203	Guide Bar	ZMLRRG03
ZMLRD204	Guide Bar	ZMLRRG04
ZMLRD206	Guide Bar	ZMLRRG06
ZMLRD209	Guide Bar	ZMLRRG09

Linear Rack & Pinion Drives (LRP2 & RLRP2)

The rack and pinion design provides an accurate means of linear travel with option of rotation. These devices provide magnet free sample transfer for applications requiring low magnetic permeability.



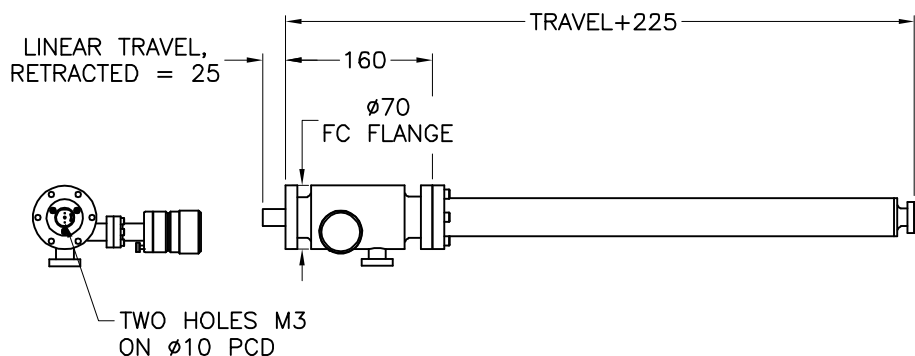
Product Overview

- Non-magnetic and precise movement
- Wide range of linear travels with option of continuous 360° rotation
- Low sample deflection at full extended travel
- Bakeable to 250°C
- Leak rate $< 1 \times 10^{-10}$ mbar ls⁻¹
- Pressure range 1 bar to 10^{-11} mbar
- Motorisation options available on request
- 70 mm OD conflat mounting flange
- Fitted with optional differential pumping port

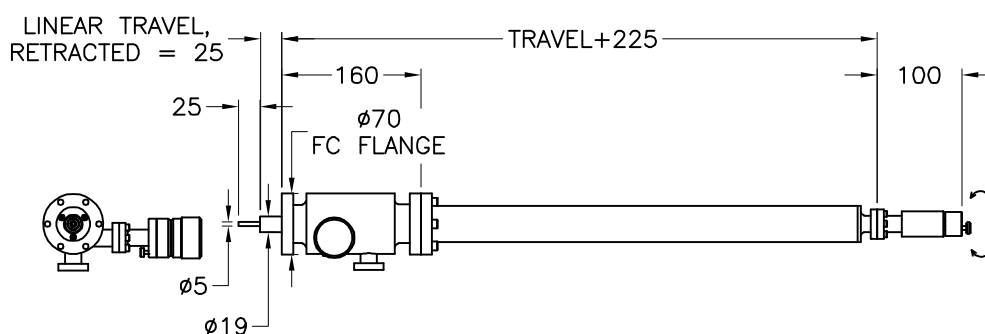


Linear Rack & Pinion Drives (LRP2 & RLRP2)

Linear Rack and Pinion Drives (LRP2 Series)



Linear Rack and Pinion Drives with centre rotating shaft (RLRP2 Series)



Linear Rack and Pinions (LRP2 and RLRP2)									
DN Type OD	Flange OD		Linear Travel	Rotation	Probe Diameter	Max Load Capacity	External Length	Weight	Order Code
	mm	Inch							
DN40	70	2.75	305	No	19	0.3	530	5.0	ZLRP203
DN40	70	2.75	460	No	19	0.3	685	6.0	ZLRP204
DN40	70	2.75	610	No	19	0.3	835	7.0	ZLRP206
DN40	70	2.75	914	No	19	0.3	1139	8.0	ZLRP209
DN40	70	2.75	305	Yes	19	0.3	630	5.0	ZRLRP203
DN40	70	2.75	460	Yes	19	0.3	785	6.0	ZRLRP204
DN40	70	2.75	610	Yes	19	0.3	935	7.0	ZRLRP206
DN40	70	2.75	914	Yes	19	0.3	1239	8.0	ZRLRP209

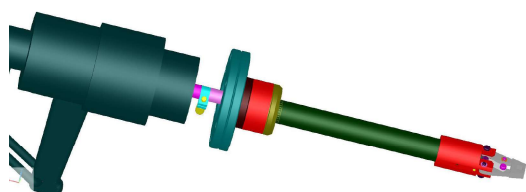
All dimensions are in mm unless otherwise stated

Accessory for 2 series Linear Drive	
Description	Order Code
Slipping brake (see page 65 for more details)	ZRD91SB

For XL25 sample handling see page 194

Wobble Sticks - Mechanical Hand Series (MH)

The mechanical hand used for gripping linear and rotary movement. Tactile operation to give the user a true 'feeling' of position inside the vacuum chamber. The mechanical hand can be used for the movement, re-arrangement and transfer of samples, STM tip changes, or as an in-vacuum screwdriver.



Product Overview

- Linear travels from 80 mm to 280 mm available
- +/- 22° of angular movement
- Dual edge welded bellows.
- 70 mm OD conflat mounting flange.
- Leak rate < 1×10^{-10} mbar ls^{-1}
- Pressure range 1 bar to 10^{-11} mbar
- All stainless steel, in vacuum, construction
- Rotation and linear locks
- Spring loaded jaws (normally closed)
- On-axis symmetric jaw operation (74° max opening angle)
- Perpendicular jaw operation, 10 mm opening.
- Jaws to customer specifications available

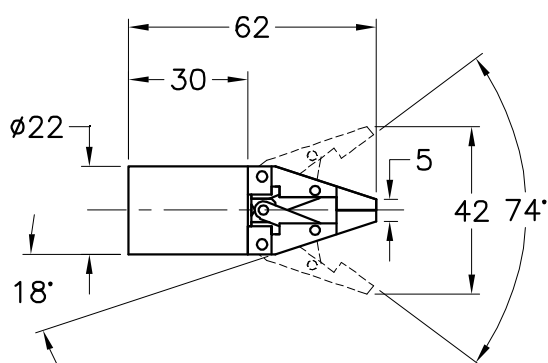
Technical Data - MH Series

Mounting Flange	70 mm OD
Orientation	Any
Construction	Stainless steel, bellows sealed actuation
Articulation	$\pm 22.5^\circ$ tilt
Z Travel Range	80, 151, 237, 280 mm
Rotation	360° continuous
Azimuthal Force	10 N Maximum rotational
Torque	0.3 Nm

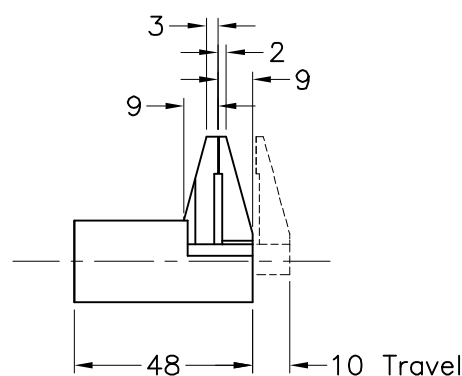
Technical Data - MH Series

Torque Limiting Mechanism	Yes, extends bellows lifetime
Rotation Lock	Yes
Linear Lock/Clamp	Yes
Bake out temperature	250 °C
Jaw/Pincer Options	1: Perpendicular parallel acting pincer (10N max force, 10 mm opening, sprung closed) 2: Symmetrical double acting in-line pincer (3N max force, 74° max opening, sprung closed)

ZJAWSY Inline Jaw
ADDS 47 mm to MH to D/B Length

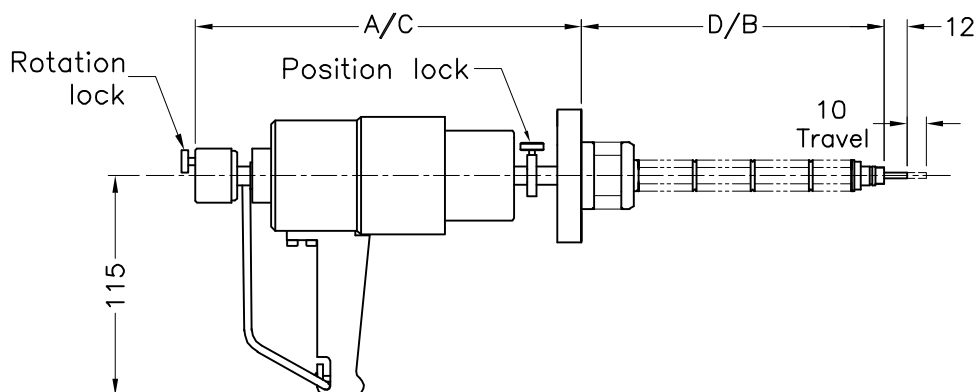


ZJAWPE Perpendicular Jaw
ADDS 33 mm to MH to D/B Length



Wobble Sticks - Mechanical Hand Series (MH)

MH Without Jaws

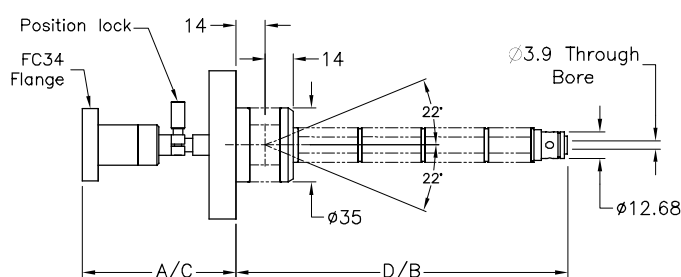


Mechanical Hand - MH Series									
DN Type	Flange OD		Linear Travel	Retracted A	Extended B	Extended C	Retracted D	Description	Order Code
	mm	Inch							
DN40	70	2.75	80	285	159	205	79	No Jaw	ZMH075
DN40	70	2.75	151	356	259	205	108	No Jaw	ZMH150
DN40	70	2.75	237	442	381	205	144	No Jaw	ZMH225
DN40	70	2.75	280	485	442	205	162	No Jaw	ZMH275
DN40	70	2.75	80	285	159 + 47	205	79 + 47	Inline Jaw	ZMH075S*
DN40	70	2.75	151	356	259 + 47	205	108 + 47	Inline Jaw	ZMH150S*
DN40	70	2.75	237	442	381 + 47	205	144 + 47	Inline Jaw	ZMH225S*
DN40	70	2.75	280	485	442 + 47	205	162 + 47	Inline Jaw	ZMH275S*
DN40	70	2.75	80	285	159 + 33	205	79 + 33	Perpendicular Jaw	ZMH075P*
DN40	70	2.75	151	356	259 + 33	205	108 + 33	Perpendicular Jaw	ZMH150P*
DN40	70	2.75	237	442	381 + 33	205	144 + 33	Perpendicular Jaw	ZMH225P*
DN40	70	2.75	280	485	442 + 33	205	162 + 33	Perpendicular Jaw	ZMH275P*
DN40	70	2.75	80	285	159 + 47	205	79 + 47	Inline Flag Jaw	ZMH075FL*
DN40	70	2.75	151	356	259 + 47	205	108 + 47	Inline Flag Jaw	ZMH150FL*
DN40	70	2.75	237	442	381 + 47	205	144 + 47	Inline Flag Jaw	ZMH225FL*
DN40	70	2.75	280	485	442 + 47	205	162 + 47	Inline Flag Jaw	ZMH275FL*
Jaw Options								Inline Jaw	ZJAWSY
								Perpendicular Jaw	ZJAWPE

*The plus represents the end of the jaws when extended and retracted

Hollow Wobble Sticks (WH)

The WH hollow Wobble stick utilises a flexible edge welded bellows to enable effective manually operated movements to be transmitted through the wall of a vacuum vessel. A hollow wobble stick manipulator enabling small tools or vacuum instruments to be inserted directly into the vacuum envelope. Tactile operation to give the user a true 'feeling' of position inside the vacuum chamber.



Product Overview

- Linear travels from 80 mm to 280 mm
- +/- 22° of angular movement
- Dual edge welded bellows.
- 70 mm OD conflat mounting flange.
- Leak rate < 1×10^{-10} mbar l.s⁻¹
- Pressure range 1 bar to 10^{-11} mbar
- All stainless steel construction
- 34 mm OD travelling flange with clear bore of 3.9 mm suitable for rotary drive units

Hollow Wobble Stick (WH)	
Pressure Range	UHV to 1 bar
Leak Rate	1×10^{-1} mbar.l.s ⁻¹
Service Intervals	100,000 cycles
Bakeout Temperature	250 °C
Construction	Mechanism: stainless steel, aluminum and bronze
Seals	Stainless steel bellows
Mounting Position	Any
Linear Lock/Clamp	Yes

Hollow Wobble Sticks (WH)												
DN Type	Flange OD		Tool Mounting Flange	Linear Travel	Angular Range Degrees	Retracted A	Extended B	Extended C	Retracted D	Hole Dia	Weight	Order Code
	mm	Inch				mm	mm	mm	mm		kg	
DN40	70	2.75	34	80	±22.0	139	159	74	79	3.6	1.0	ZWS75H
DN40	70	2.75	34	151	±22.0	210	259	74	108	3.6	1.0	ZWS150H
DN40	70	2.75	34	237	±22.0	296	381	74	144	3.6	1.0	ZWS225H
DN40	70	2.75	34	280	±22.0	339	442	74	162	3.6	1.0	ZWS275H

All dimensions in mm unless otherwise stated.

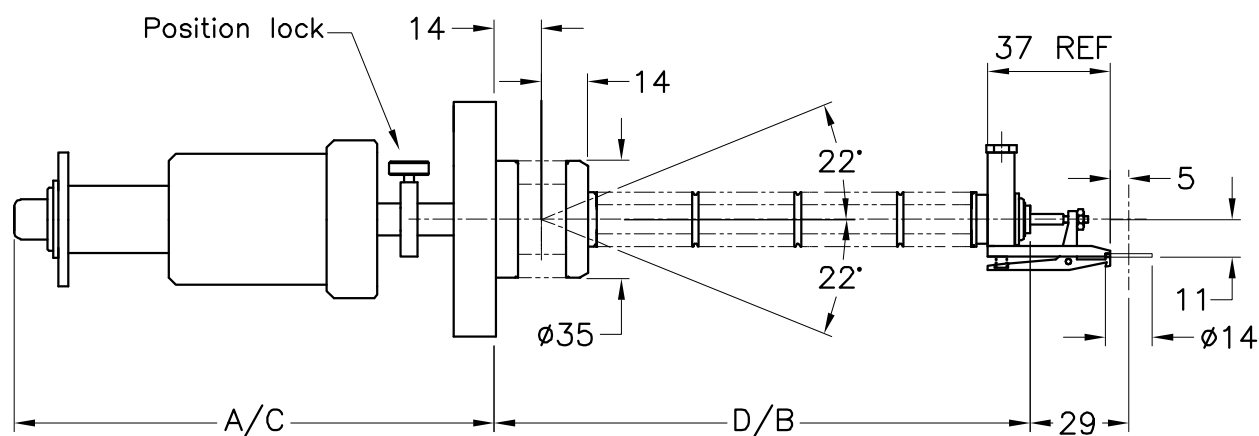
Pincer Grip Wobble Sticks

The Pincer Grip Wobble stick utilises a flexible edge welded bellows to enable effective manually operated movements to be transmitted through the wall of a vacuum vessel. A Pincer Grip allows small samples to be transferred inside the vacuum envelope. Tactile operation to give the user a true 'feeling' of position inside the vacuum chamber.



Product Overview

- Linear travels from 80 mm to 280 mm
- +/- 22° of angular movement
- Dual edge welded bellows.
- 70 mm OD conflat mounting flange.
- Leak rate < 1×10^{-10} mbar ls⁻¹
- Pressure range 1 bar to 10^{-11} mbar
- All stainless steel construction
- Bakeable to 250°C
- Pincer grip to take 14 mm disc
- Pincer head 4 position



Pincer Grip Wobble Stick (WS-PG)

DN Type	Flange OD		Linear Travel	Angular Range Degrees	Retracted A	Extended B	Extended C	Retracted D	Weight	Order Code
	mm	Inch			mm	mm	mm	mm		
DN40	70	2.75	80	±22.0	224	159	144	79	1.0	ZWS075PG
DN40	70	2.75	151	±22.0	295	259	144	108	1.0	ZWS150PG
DN40	70	2.75	237	±22.0	381	381	144	144	1.0	ZWS225PG
DN40	70	2.75	280	±22.0	424	442	144	162	1.0	ZWS275PG

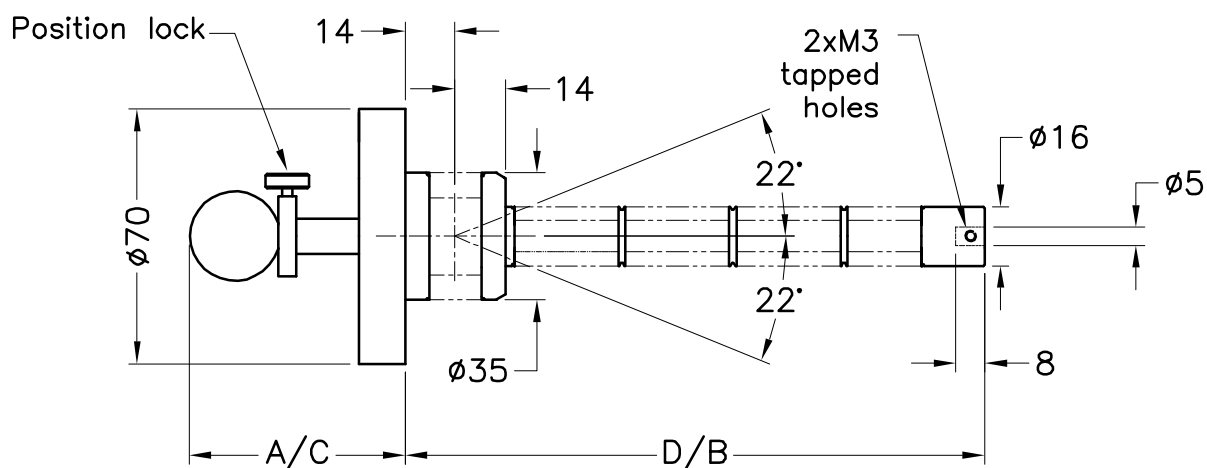
Conventional Wobble Sticks (WS)

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.



Product Overview

- Linear travels from 80 mm to 280 mm
- +/- 22° of angular movement
- Dual edge welded bellows.
- Bakeable to 250°C
- 70mm OD conflat mounting flange.
- Leak rate < 1×10^{-10} mbar ls⁻¹
- Pressure range 1 bar to 10^{-11} mbar
- All stainless steel construction



Universal Wobble sticks (WS)

DN Type	Flange OD		Tool Mounting Flange mm	Linear Travel mm	Angular Range Degrees	Retracted A	Extended B	Extended C	Retracted D	Hole Dia mm	Weight kg	Order Code
	mm	Inch				mm	mm	mm	mm		kg	
DN40	70	2.75	34	80	±22.0	139	159	59	79	3.6	1.0	ZWS075
DN40	70	2.75	34	151	±22.0	210	259	59	108	3.6	1.0	ZWS150
DN40	70	2.75	34	237	±22.0	296	381	59	144	3.6	1.0	ZWS225
DN40	70	2.75	34	280	±22.0	339	442	59	162	3.6	1.0	ZWS275

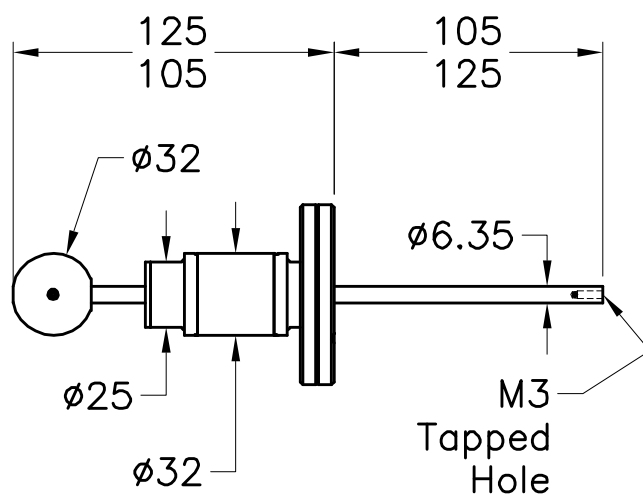
Wobble Sticks (WS20)

The WS20 wobble stick allows limited linear and angular movement. A cost efficient manually operated manipulator, translating linear hand movement into the vacuum envelope with 15° of angular movement. Tactile operation to give the user a true 'feeling' of position inside the vacuum chamber.



Product Overview

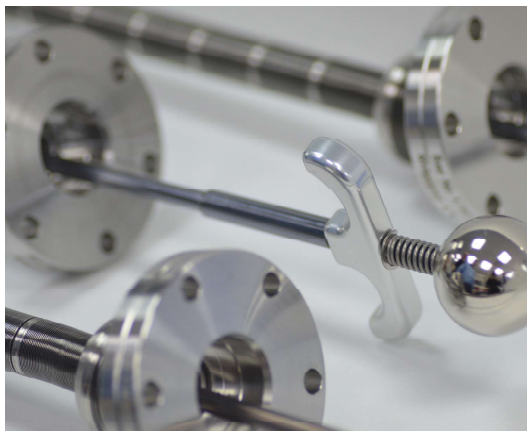
- 20 mm linear movement
- +/- 7.5° of angular movement
- Bakeable to 250°C
- 6.35 mm dia shaft with M3 tapped hole
- All stainless steel construction
- leakrate < 1x10⁻¹⁰ mbar ls⁻¹
- Pressure range 1 bar to 10⁻¹¹ mbar.



Wobble Stick (WS20)										
DN Type	Flange OD		Linear Travel	Angular range Degrees	Air Side Retracted	Air Side Extended	Vacuum Side Retracted	Vacuum Side Extended	Weight	Order Code
	mm	Inch			mm	mm	mm	mm	kg	
DN40	70	2.75	20	±7.5	125	105	105	125	1.0	ZWS20

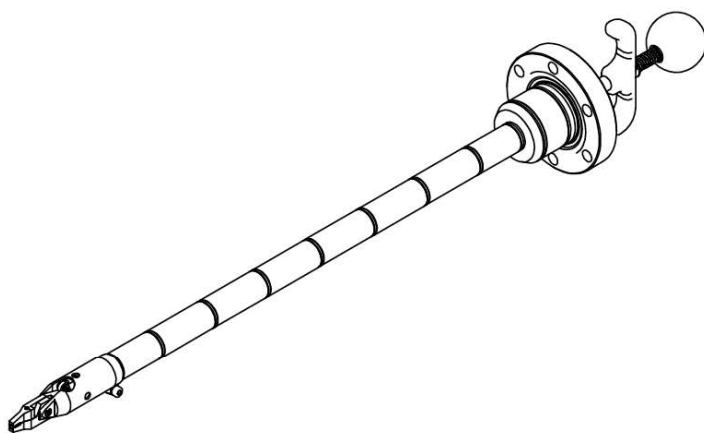
Omicron Style Pincer Grip Wobble Sticks

The Omicron style pincer grip wobble stick wobble stick allows for sample and tip / cantilever transfer.



Product Overview

- For Sample / Cantilever Transfer
- Requires Extended ID for 2^{3/4} (70mm) OD Port
- Various lengths available - See table for more information
- Bakeable to 250°C
- Convenient handling



Omicron Style Pincer Grip Wobble Stick										
Flange OD		Travel	Extended ID mm (for Angular movement)	Off Axis Pincer Action	Pincer Action	In Vacuum	Ex Vacuum	Total Length	Travel	Order Code
mm	Inch					mm	mm	mm	mm	
70	2.75	120	70	Perpendicular		134 ⁽¹⁾	227 ⁽¹⁾	361 ⁽¹⁾	120 ⁽¹⁾	WS120
70	2.75	180	70	Perpendicular		177 ⁽¹⁾	287 ⁽¹⁾	464 ⁽¹⁾	180 ⁽¹⁾	WS180
70	2.75	270	70	Perpendicular		229 ⁽¹⁾	377 ⁽¹⁾	580 ⁽¹⁾	270 ⁽¹⁾	WS270
70	2.75	120	70		Inline	182 ⁽²⁾	227 ⁽²⁾	409 ⁽²⁾	120 ⁽²⁾	WS120IL
70	2.75	180	70		Inline	225 ⁽²⁾	287 ⁽²⁾	512 ⁽²⁾	180 ⁽²⁾	WS180IL
70	2.75	270	70		Inline	277 ⁽²⁾	377 ⁽²⁾	654 ⁽²⁾	270 ⁽²⁾	WS270IL

(1) Fixed with 90° Pincer Grip. The measured distances are from mounting flange sealing side in the fully retracted position.

(2) Straight pincer grips are removable. The measured distances are from mounting flange sealing side in the fully retracted position.

Pressure Measurement

CONTENTS

Pressure Measurement Overview

Ion Gauges

Spares and Accessories

Pirani Gauges

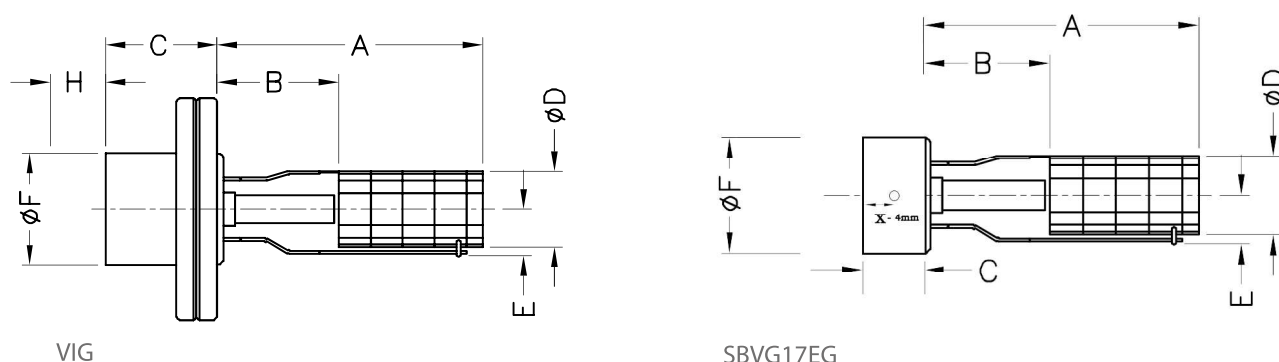
Ion Gauge Controller IGC5

Pressure Measurement

Vacuum pressure measurement is divided into high and low vacuum. Different techniques used to measure have an overlap in the pressure range and therefore by combining different types of gauge it is possible to measure pressure from 10 mbar down to 10^{-11} mbar. Pirani gauges measure in a low vacuum range of (atmosphere to 10^{-3} mbar) Ion gauges measure pressures (10^{-3} mbar to 10^{-11} mbar).

VACGEN offers both types of gauges with different options, along with a high performance gauge controller. However, for the user who requires a more basic configuration, a low cost alternative gauge and controller is available. This offers vacuum pressure measurement in the range atmosphere to 10^{-10} mbar.

Ion Gauges



When operating below the Pirani gauge range (10^{-3} mbar), an ion gauge can be used to measure pressure.

VACGEN Ion Gauge heads are designed to provide the most accurate reading for this style of component.

Ion Gauges (VIG)																
Flange Size OD		Bakeout Temp °C	Bakeout Temp (with leads) °C	Filament Materials (1)	Sensitivity	Gauge Pressure Range	X-ray Limit	Dim A	Dim B	Dim C	Dim D	Dim E	Dim F	Dim G	Dim H	Order Code
mm	inch					mbar	mbar	mm	mm	mm	mm	mm	mm	mm	mm	
70	2.75	400	250	2 x W	19	10 ⁻³ to 10 ⁻¹¹	3 x 10 ⁻¹¹	83	28	35	24	16	34	70	34	ZVIG17 ⁽²⁾
70	2.75	400	250	2 x Th Ir	19	10 ⁻³ to 10 ⁻¹¹	3 x 10 ⁻¹¹	83	28	35	24	16	34	70	34	ZVIG18
70	2.75	400	250	2 x W	17	10 ⁻³ to 10 ⁻¹⁰	3 x 10 ⁻¹⁰	72	28	35	21	14	34	70	34	ZVIG22 ⁽²⁾
70	2.75	400	250	2 x Th Ir	17	10 ⁻³ to 10 ⁻¹⁰	3 x 10 ⁻¹⁰	72	28	35	21	14	34	70	34	ZVIG24
-	-	-	250	2 x Th Ir	19	10 ⁻³ to 10 ⁻¹¹	3 x 10 ⁻¹¹	80.5	36.5	12.5	24	16	34.7	-	-	SBVG17EG

Notes

(1) W = tungsten, Th Ir = thoriated iridium

(2) Cannot be used with the IGC5

Ion Gauge Heads - Spares and Accessories

There are two kinds of filament material that VACGEN use: tungsten and thoriated iridium. They both have different properties that make them useful as filament materials.



IMPORTANT HEALTH AND SAFETY PRODUCT INFORMATION

Thoria dust must not be inhaled as it is carcinogenic.

Thoriated Iridium Filaments (For IGC5 Controller)

Thoriated iridium filaments are based on an iridium wire coated with a thin thoria coating. This lowers the work function (it is very efficient at releasing electrons by thermionic emission), which means that it runs at a lower temperature than tungsten to release the same number of ionising electrons. This means that less CO and CO₂ is produced, less molecular cracking takes place, and the filament can survive exposure to air whilst hot (for a short period).

Tungsten Filaments (Only for use with older units and not compatible IGC5 Controller)

Tungsten has the disadvantage of becoming very brittle (due to crystal growth) when it is heated, which means that it is easily broken by vibration. In addition it will instantly oxidise if let up to air whilst hot. The hot filament also generates CO and CO₂ inside the vacuum system and causes larger gas molecules to be split into fragments. Tungsten uses 4 times the power into the filament and very high temperatures, all leading to greater degassing of the gauge environment.

Ion Gauge Heads - Spare Filaments			
Gauge Head	Material	Pack Quantity	Order Code
ZVIG17 ⁽¹⁾	W	2	ZWW17
ZVIG18	Th Ir	1	ZTIR23
ZVIG22 ⁽¹⁾	W	2	ZWW17
ZVIG24	Th Ir	1	ZTIR23

Notes

(1) Cannot be used with the IGC5

Pirani Gauges

Pirani Gauge IGC5 only				
Gauge Head	Bakeout	Connector Detail	Pressure mbar	Cable Length
ZPVG521	50°C	DIN	atm to 1x10 ⁻³	3m
Optoinal Extension Lead				
ZPVGEC - Extension Lead	50°C	DIN	N/A	2m



Pirani Gauge designed to be used with the VACGEN IGC5 Ion Gauge Controller.

Ion Gauge Controller (IGC5)

The VACGEN IGC5 ion gauge-based process vacuum controller combines the functionality of several vacuum system controllers into a single easy to use unit, reducing hardware, wiring and cost.



Ion Gauge	
Ion Gauge	1x Dual Filament, Thoria or Yttria Coated Iridium Filaments
Duo Ion Gauge	2x Dual Filament, Runs 2 Gauges Simultaneously - Thoria or Yttria Coated Iridium Filaments
Filament Drive	Constant Current DC (4A/10V)
Emission Control	Processor Controlled Precision PID control
Manual Emission	User selections: 0.05, 0.1, 0.15, 0.25, 0.4, 0.6, 1, 1.5, 2.5, 4, 6, 10mA
Auto-Emission	Emission is automatically adjusted for optimum performance at measured pressure
Interlock Hub	7 trips and 4 digital inputs / 2 analogue outputs

Ion Gauge Controller	
Emission features	Soft-start. Optional "new filament" setting to permit gentle heating. User-definable min & max emission
Degas	Ramped low/mid/high power
Degas Features	User-defined ramp/soak periods. User-defined pressure suspend to allow vacuum recovery
Degas Pressure	Continuous measurement during degas
Degas on/off	No interruption to pressure measurement during degas start/stop
Electrometer	New high stability electrometer which is temperature controlled for long term stability
Sensitivity	1.0 to 99.9 (resolution 0.1)
Pump-down	User-defined auto pump-down: backing gauge dependent ion gauge start-up pressure; trip allocation for external events (valves...), delay time, restart time etc

Secondary Gauge Pirani	
Built in	Supports a Single ZPVG521 - With the option of adding a Second
Number of Modules	1 module - with optional second module to run two ZPVG521

Bake-out control	
Built in	Type K thermocouple. Standard mini-thermocouple connector
Range	Room temperature to 500°C (16 bit resolution)
Bake-out Functions	Precision CJC
	Reproducibility $<\pm 0.2^{\circ}\text{C}$. Absolute $<\pm 2^{\circ}\text{C}$. User calibration available
	6x ramp/soak steps, each up to 99.9 hours duration
	Individual trip allocation for power switching
	User-defined pressure interlocking (ramp suspend/time suspend/abort)
	User-defined temperature hysteresis
	Optional auto-degas at end of bake-out

Ion Gauge Controller (IGC5)

Interlock Hub	
Trips	7 (4x SPCO relays 1A24Vdc/ 0.5A125Vac + 3x NPN open collector 100mA/12Vdc)
Trip Assignments	Individually assignable: external interlock to any ion or backing gauge, ion gauge status (on, off, degas), bake-out power switching, pump down external drive
Digital Inputs	2x opto-isolated inputs. 3-30Vdc; 2.4kΩ input resistance
Digital Input Assignment	External interlock as trip for ion gauge; control over ion gauge on/off and degas either via input state or toggle state, bake-out trip, pump-down trip, backing gauge operation
Interlock Response Times	0.2 sec max. Typically <0.1sec

Analogue Output	
Output	Full scale range: -0.2V to 10.2V (12 bit resolution). User-definable min and max
Accuracy and reproducibility	Precision reference-based: <±0.2%
Assignment	Ion gauge (emission and sensitivity corrected), any secondary gauge, gauge combinations, bake-out temperature
Functionality	User-defined voltage range, assigned pressure/temperature range, lin or log relationship

General	
Dimensions	19" rack mounting: WxHxD: 484x44x260mm
Weight	5.5kg
Electrical	115/230Vac. Live and Neutral fused: 2A for 230Vac, 3.15A for 115V
Power Consumption	4W (ion gauge off); max: 40W (high degas); typical: 4-10W (ion gauge on)
Display	Dual gold OLED display

IGC5 Controllers		
Product	Attributes	Order Code
110V Controller	IGC5 with Single Ion Gauge and Pirani Card with 10m K type Thermocouple Lead	ZIGC5SET-110V
240V Controller	IGC5 with Single Ion Gauge and Pirani Card with 10m K type Thermocouple Lead	ZIGC5SET-240V
110V Controller	IGC5 with Dual Ion Gauge and Pirani Card with 10m K type Thermocouple Lead	ZIGC5-2SET-110V
240V Controller	IGC5 with Dual Ion Gauge and Pirani Card with 10m K type Thermocouple Lead	ZIGC5-2SET-240V

Compatible components for use with IGC5

IGC5 Accessories		
Product	Attributes	Order Code
5 m Ion Gauge Lead	Fully Bakeable 200°C	ZIPGB5U
10 m Ion Gauge Lead	Fully Bakeable 200°C	ZIPGB10U
Ion Gauge	Closed Grid / Twin Iridium Filament	ZVIG18
Ion Gauge	Open Grid / Twin Iridium Filament	ZVIG24
Ion Gauge	Unflanged Closed Grid / Twin Iridium Filament	SBVG17EG
Pirani Gauge	3m Lead KF10 Flange Bakeable to 50°C (ZIGC5 only)	ZPVG521
Pirani Lead	2m Extension Lead	ZPVGEC
VIG	Gauge Head Connector	ZVIGSK
VIG Connector	Replacement Pins (20 Pins)	ZEFT95C
Thermocouple Lead	10m K Type	ZIGTCC10

Feedthroughs

CONTENTS

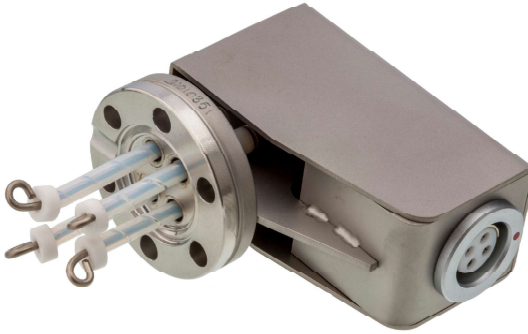
Instrumentation Feedthroughs

Power Feedthroughs

Liquid Feedthroughs

Instrumentation Feedthroughs

Instrumentation feedthroughs are used to carry electrical signals (including thermocouples) which are normally low current and/or voltage. These feedthroughs are available in multiple pin variations on a range of flange sizes. 34 mm OD and 70 mm OD.



Product Overview

- Variety of electrical feedthroughs with a range of electrical ratings.
- Voltage ratings are conservative DC flashover with clean ceramics
- Power transfer up to 5 Amps

VACGEN supplies a variety of conductor materials primarily nickel and stainless steel. Thermocouple feedthroughs use either the same metal or a special compensation material that mimics the thermocouple electrical circuit. The standard thermocouple material is type K using a Chromel/Alumel material construction. N type thermocouple with Nicrosil/Nisil material is available for the EFT 924 feedthrough.

Instrumentation Feedthroughs

Instrumentation Feedthrough data table											
DN Number	Flange OD		Type	Max Current per pin	Max voltage V	Number and OD of conductors	Internal External	External	Bakeout Temp °C with connector	Bakeout Temp °C without connector	Order code
	mm	mm				mm					
DN16	34	1.33	BNC	1A	50	1 x 2.3	2.3mm pin	BNC (MHV)	175	400	ZEFT920 ⁽¹⁾
DN16	34	1.33	Power/TC	3A (Power only)	2000	4 x 1.2	Direct to wire	Direct to wire	N/A	400	ZEFT922 ⁽²⁾
DN16	34	1.33	Power/TCN	3A (Power only)	2000	4 x 1.2	Direct to wire	Direct to wire	N/A	400	ZEFT922N ⁽²⁾
DN16	34	1.33	Power/TC	3A (Power Only)	50	4 x 1.2	Wire loop & BC	Inline	200	400	ZEFT922I ⁽³⁾
DN16	34	1.33	Power/TC	3A (Power only)	50	4 x 1.2	Wire loop & BC	R/angle connector	200	400	ZEFT922S ⁽³⁾
DN16	34	1.33	Power/TC	3A (Power only)	50	4 x 1.2	Wire loop & BC	R/angle connector	200	400	ZEFT922T ⁽³⁾
DN16	34	1.33	Power/TC	3A (Power only)	50	4 x 1.2	Wire loop & BC	R/angle connector	200	400	ZEFT922X ⁽³⁾
DN16	34	1.33	Power/TC	3A (Power only)	50	4 x 1.2	Wire loop & BC	Inline	200	400	ZEFT92NI ⁽³⁾
DN16	34	1.33	Power/TC	3A (Power only)	50	4 x 1.2	Wire loop & BC	R/angle connector	200	400	ZEFT92NS ⁽³⁾
DN16	34	1.33	Power/TC	3A (Power only)	50	4 x 1.2	Wire loop & BC	R/angle connector	200	400	ZEFT92NT ⁽³⁾
DN16	34	1.33	Power/TC	3A (Power only)	50	4 x 1.2	Wire loop & BC	R/angle connector	200	400	ZEFT92NX ⁽³⁾
DN16	34	1.33	Twin TC	Type K TC	-	4 x 1.2	Direct to wire	Direct to wire	N/A	400	ZEFT924 ⁽⁴⁾
DN16	34	1.33	Twin TC	Type K TC	-	4 x 1.2	Direct to wire	Direct to wire	N/A	400	ZEFT924N ⁽⁴⁾
DN16	34	1.33	Twin TC	Type K TC	-	4 x 1.2	Wire Loop	Inline	200	400	ZEFT924I ⁽⁴⁾
DN16	34	1.33	Twin TC	Type K TC	-	4 x 1.2	Wire loop	R/angle connector	200	400	ZEFT924S ⁽⁴⁾
DN16	34	1.33	Twin TC	Type K TC	-	4 x 1.2	Wire loop	R/angle connector	200	400	ZEFT924T ⁽⁴⁾
DN16	34	1.33	Twin TC	Type K TC	-	4 x 1.2	Wire loop	R/angle connector	200	400	ZEFT924X ⁽⁴⁾
DN16	34	1.33	Twin TC	Type K TC	-	4 x 1.2	Wire loop	Inline	200	400	ZEFT94NI ⁽⁴⁾
DN16	34	1.33	Twin TC	Type N TC	-	4 x 1.2	Wire loop	R/angle connector	200	400	ZEFT94NS ⁽⁴⁾
DN16	34	1.33	Twin TC	Type N TC	-	4 x 1.2	Wire loop	R/angle connector	200	400	ZEFT94NT ⁽⁴⁾
DN16	34	1.33	Twin TC	Type N TC	-	4 x 1.2	Wire loop	R/angle connector	200	400	ZEFT94NX ⁽⁴⁾
DN16	34	1.33	Twin Power	5A (per pair)	2000	4 x 1.2	Direct to wire	Direct to wire	N/A	400	ZEFT940 ⁽²⁾
DN16	34	1.33	Twin Power	5A (per pair)	1000	4 x 1.2	Barrell Connectors	Inline	200	400	ZEFT9H4I ⁽³⁾
DN16	34	1.33	Twin Power	5A (per pair)	1000	4 x 1.2	Barrel Connectors	R/angle connector	200	400	ZEFT9H4S ⁽³⁾
DN16	34	1.33	Twin Power	5A (per pair)	1000	4 x 1.2	Barrel Connectors	R/angle connector	200	400	ZEFT9H4T ⁽³⁾
DN16	34	1.33	Twin Power	5A (per pair)	1000	4 x 1.2	Barrel Connectors	R/angle connector	200	400	ZEFT9H4X ⁽³⁾
DN40	70	2.75	Multi-pin	5A	1000	11 x 1.0	Direct to wire	Optional connector	250	350	ZEFT16 ⁽²⁾
DN40	70	2.75	Multi-pin	5A	1000	11 x 1.0	Direct to wire	Optional connector	250	350	ZEFT17 ⁽²⁾

(1) BNC Plug

(2) No Plug

(3) Fisher®

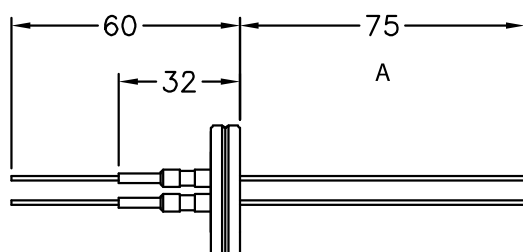
(4) Lemo®

Instrumentation Feedthroughs

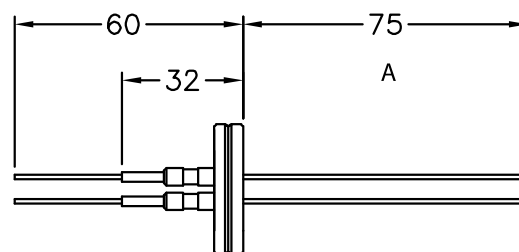
Instrumentation Power / Feedthrough (ZEFT922)					
Type	A mm	Power Nickel Wire Ø mm	Thermocouple Wire Ø mm	Thermocouple material	Order Code
Power / Thermocouple	75	1.2	1.2	1x Chromel 1x Alumel	ZEFT922

Instrumentation Feedthrough (ZEFT940)			
Type	A mm	Nickel Wire Ø	Order Code
Twin Power	75	4 x 1.2mm	ZEFT940

ZEFT922 Power and thermocouple



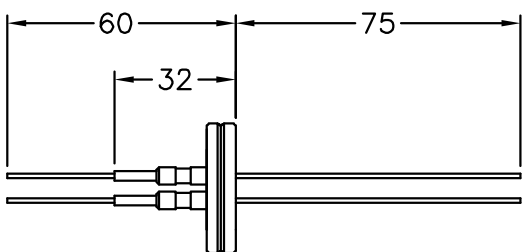
ZEFT940 Twin power



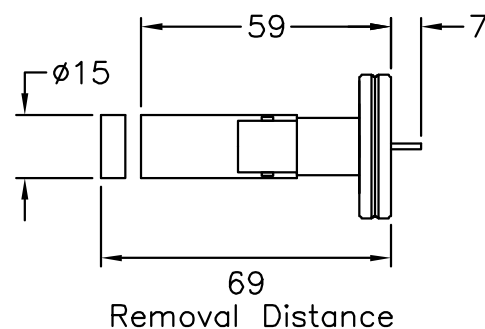
Instrumentation Feedthrough (ZEFT924)				
Type	A mm	Wire Ø mm	Thermocouple material	Order Code
K Type	75	1.2	2x Chromel 2x Alumel	ZEFT924
N Type	75	1.2	2 x Nicrosil 2 x Nisil	ZEFT924N

Coaxial Feedthrough (ZEFT920)				
Type	A mm	Pin Ø mm	Feedthrough Pin Material	Order Code
MHV Coaxial	7	2.3	Stainless steel silver plated	ZEFT920

ZEFT924 and ZEFT924N Twin Thermocouple



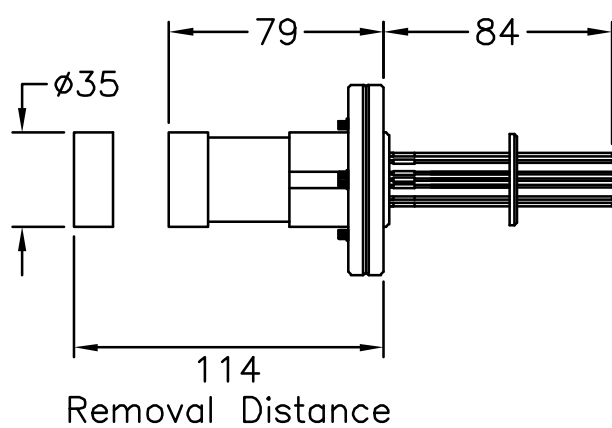
ZEFT920



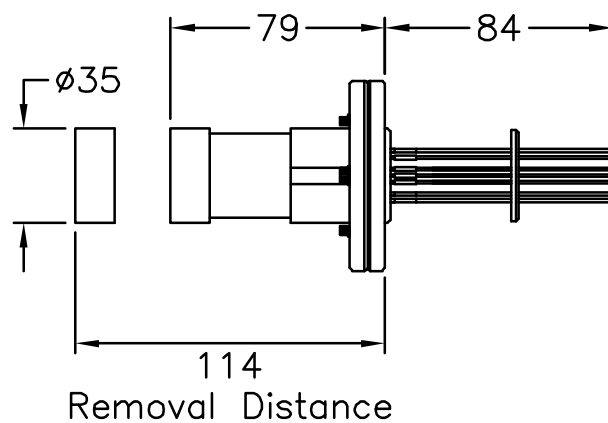
Instrumentation Feedthroughs

Feedthrough (ZEFT16 & ZEFT17)				
Type	A mm	Pin Ø mm	Pin Type	Order Code
Multipin	84	11 x 1 Nickel	Standard	ZEFT16
Multipin	84	11 x 1	Resistivity > 10 ¹⁵ Ωm	ZEFT17
Connector				
Air side connector for above feed throughs				ZEFT17SK
Pins for above connector (Pk 20)				ZEFT95C

ZEFT16 Feedthrough



ZEFT17 Feedthrough

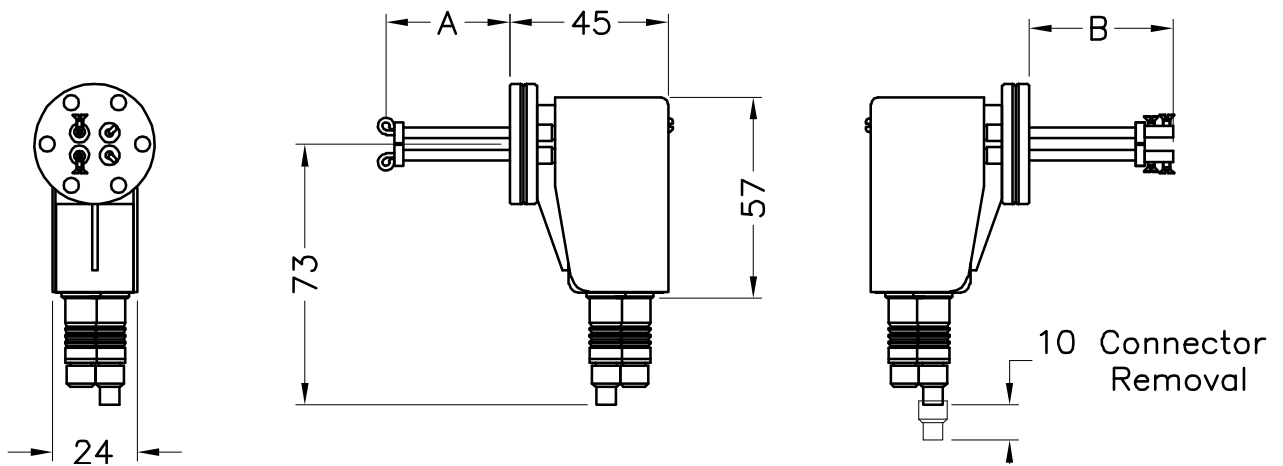


Instrumentation Feedthroughs

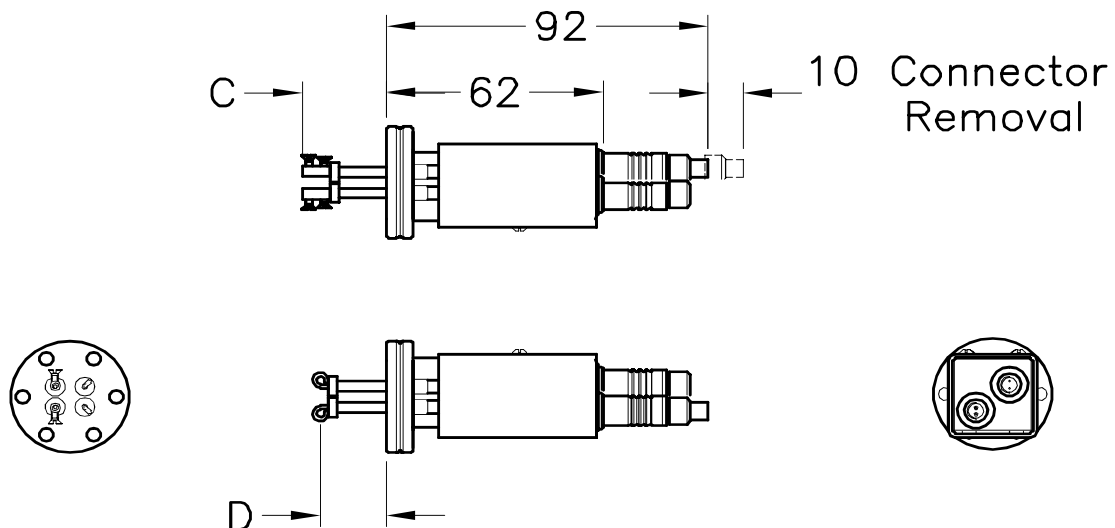
Instrumentation Feedthrough (ZEFT 922)					
Type	A mm	B mm	C mm	D mm	Order Code
Inline	-	-	24	19	ZEFT922I
R/Angle	75	80	-	-	ZEFT922S
R/Angle	35	40	-	-	ZEFT922T

Instrumentation Feedthrough (ZEFT 92)					
Type	A mm	B mm	C mm	D mm	Order Code
Inline	-	-	24	19	ZEFT92NI
R/Angle	75	80	-	-	ZEFT92NS
R/Angle	35	40	-	-	ZEFT92NT
R/Angle	19	24	-	-	ZEFT92NX

Right Angle



In line



Instrumentation Feedthroughs

Type Thermocouple Series Feedthrough (ZEFT924) K

Type	A mm	B mm	Order Code
Inline	-	22	ZEFT924I
R/Angle	75	-	ZEFT924S
R/Angle	40	-	ZEFT924T
R/Angle	22	-	ZEFT924X

Type Thermocouple Series Feedthrough (ZEFT94 N)

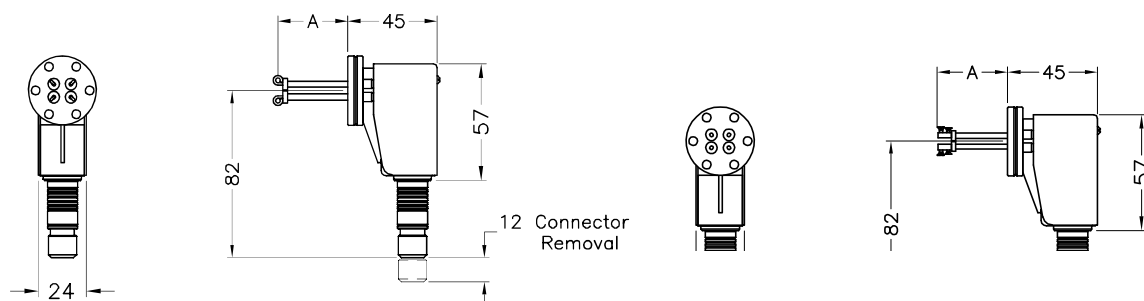
Type	A mm	B mm	Order Code
Inline	-	22	ZEFT94NI
R/Angle	75	-	ZEFT94NS
R/Angle	40	-	ZEFT94NT
R/Angle	22	-	ZEFT94NX

Feedthrough Material Information

Type	Material	Leg	Colour
K Type	T1 Cromel	+	Green
K Type	T2 Alumel	-	White
N type	N1 Nicrossi	+	Pink
N type	N2 Nisil	-	White

Right Angle

In line

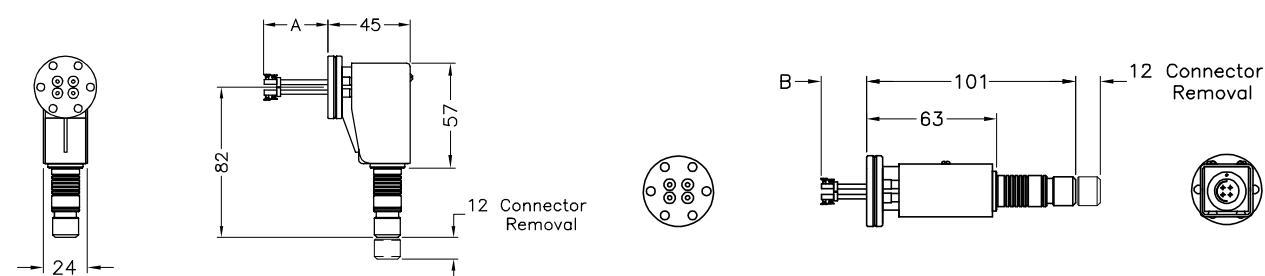


Series Power Feedthrough (ZEFT 9H4)

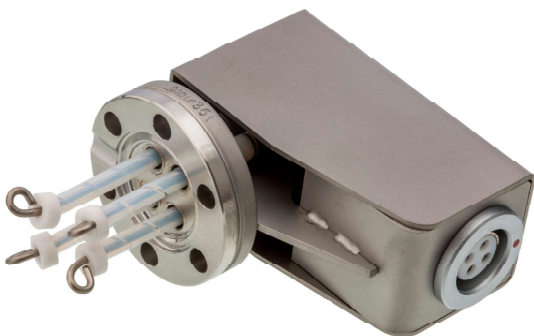
Type	A mm	B mm	Order Code
Inline	-	22	ZEFT9H4I
R/Angle	75	-	ZEFT9H4S
R/Angle	40	-	ZEFT9H4T
R/Angle	22	-	ZEFT9H4X

Right Angle

In line



Power Feedthrough Dedicated Sets for Manipulation



Product Overview

- Sets of 2 right angled feedthroughs with connectors
- Supplied with power wiring and 2 thermocouple pairs
- Internal wire legs the correct length for the manipulator
- Correct power feedthrough setup for heater i.e pin 4 for the EBH heater is grounded for the interlock
- Resistive version covers the PBN element heater and the Tungsten wire heaters

Dedicated Feedthrough Sets Power and Thermocouple			
Manipulator	Heater Version	K Type	N Type
Omni-ax	Resistive	MFEEDKR	MFEEDNR
Omni-ax	Electron Beam	MFEEDKE	MFEEDNE
Transax	Resistive	HFEEDKR	HFEEDNR
Transax	Electron Beam	HFEEDKE	HFEEDNE
HPT-WX & RX	Resistive	HFEEDKR	HFEEDNR
HPT-WX & RX	Electron Beam	HFEEDKE	HFEEDNE
Mini-ax	Resistive	HFEEDKR	HFEEDNR
Mini-ax	Electron Beam	HFEEDKE	HFEEDNE

Note

Thermocouple wiring:

Wiring is 3 m long pair covered with PTFE sleeve

Hot Junction end 210 mm of ceramics to protect PTFE coating from heater

Heater wiring:

1.5 m length of 0.9 mm single stranded OF copper wire silver coated with PTFE sleeving

Resisted supplied with red and black wire

EBH supplied with red, black and green

Dedicated Feedthrough Set - Thermocouple only		
Manipulator	K Type	N Type
Omni-ax	MFEEDK	MFEEDN
Transax	HFEEDK	HFEEDN
HPT-WX	HFEEDK	HFEEDN
Mini-ax	HFEEDK	HFEEDN

Note

Wiring is 3 m long pair covered with PTFE sleeve

Hot Junction end 210 mm of ceramics to protect PTFE coating from heater

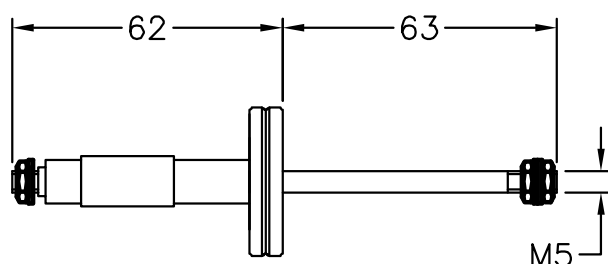
Power Feedthroughs

Power feedthroughs are used to carry either high current, or high voltage, or both into the vacuum envelope. Their robust design allows for currents up to 100 Amps per pin and are bakeable to 400°C.

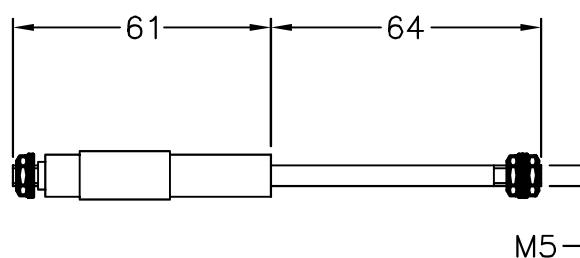
- Voltage ratings are conservative DC flashover with clean ceramics

Power Feedthrough									
DN Number	Flange mm	Max Current per pin A	Max voltage V	Number and OD of conductors mm	Conductor Material	Internal	External	Bakeout Temp °C without connector	Order code
DN16	34	40	15	1 x 5.0	Stainless steel	MS Thread	MS Thread	400	ZEFT91A
DN16	34	100	3	1 x 6.35	OFHC copper	Direct to	Direct to	400	ZEFT911
DN16	70	40	15	4 x 5.0	Stainless steel	MS Thread	MS Thread	400	ZEFT34A
DN16	70	40	15	3 x 5.0	Stainless steel	MS Thread	MS Thread	400	ZEFT3A
Weld fitting		40	15	1 x 5.0	Stainless Steel	MS Thread	MS Thread	400	ZEFTIAN

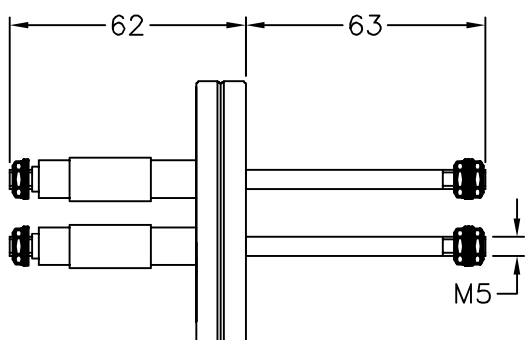
ZEFT91A - Conductor 1 x 5 mm dia Stainless Steel



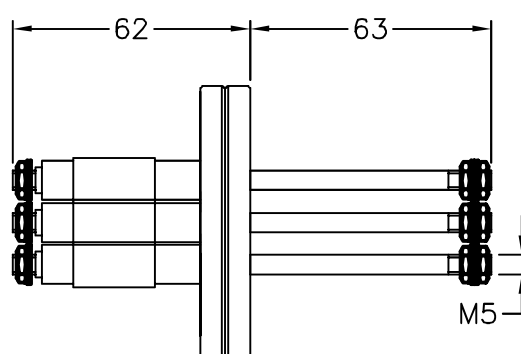
ZEFTIAN - Conductor: 1 x 5 mm dia stainless steel



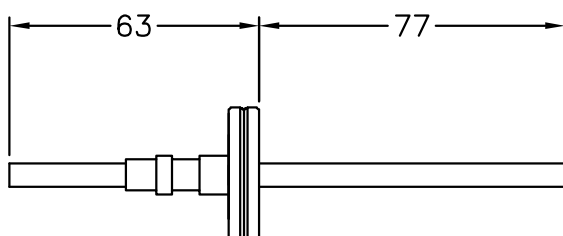
ZEFT34A - Conductor: 4 x 5 mm dia Stainless Steel on 25mm PCD



ZEFT3A - Conductor: 3 x 5 mm dia stainless steel on 25mm PCD

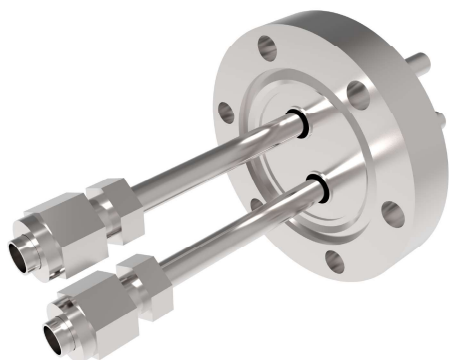


ZEFT911 - Conductor: 1 x 6.35 mm dia OFHC Copper



Liquid Feedthroughs

The LFT series of feedthroughs are used for the transfer of fluids (or gases) through a Conflat flange into, or out of, a vacuum system. The LFT feedthroughs comprise one or two separate stainless steel tubes, each terminating in a UHV leak tight connection on the vacuum side of the LFT.



Product Overview

- All stainless steel construction
- Special internal UHV connections
- Copper gasket seal
- UHV compatible
- Bakeable to +450°C
- 1 bar to 10^{-11} mbar

All of the LFT's have been designed with a thermal break on the atmospheric side of the tube. This comes into action when using liquid nitrogen as it forms a long heat path between the tube and the mounting flange.

Liquid Feedthrough						
DN Number	Flange OD		Number of tubes	Tube OD	Internal Connector	Order code
	mm	Inch		mm		
DN16	34	1.33	1	6.35	Demountable weld nipple	ZLFT97
DN40	70	2.75	2	6.35	Demountable weld nipple	ZLFT27

Sublimation Pump

CONTENTS

Sublimation Pump

Sublimation Pump Controller

Sublimation Pump

The ST22 is used to enhance the performance of secondary pump units giving the ability to increase pump speed for active gases to give true UHV conditions in the 10^{-11} to 10^{-12} mbar regions.



Product Overview

- Triple filament
- 70 mm OD conflat mounting flange
- Titanium molybdenum alloy filaments 2mm diameter
- 1.5m bakeable interface and cable connections available
- Typically $> 4 \text{ ls}^{-1} \text{ cm}^{-2}$ pump speed for N_2 at room temperature
- Operable pressure range 1×10^{-4} mbar to 1×10^{-12} mbar

Gas species	H ₂	N ₂	O ₂	CO	CO ₂	H ₂ O	CH ₄	Inerts
+20°C	3	4	9	9	8	3	0	0
-196°C	10	10	11	11	9	14	0	0

Temperature is that of the condensing wall and shows resultant pumping speed of the titanium film

Pump Head	Order code
Sublimation Pump Head	ZST22
Power supplies and Lead assemblies	
60 A Power supply and Controller, 220 VAC	ZSPC8
60 A Power supply and Controller, 110 VAC	ZSPC8L
5 m Non-bakeable Lead Assembly ⁽¹⁾	ZSPCCAB
1.5 m Bakeable Lead and Interface box	ZSPCIB
Spare Parts	Pack Size
Spare 2.0 mm Filaments	30
Spare filament clamp set ⁽²⁾	3
Spare insulator bushes	3
Spare clamp screws	3

(1) From the ZSPC8 controller to the ST22 pump head (2) Contains 1 inner and 3 outer clamps plus a set of screws

The SPC8 is a cost-effective controller which provides all the features necessary for successful sublimation pump operation. It provides manual or automatic control for the ST22 sublimation pump, with bakeable or ambient operation leads available. Units are available for 220 V or 110 V operation.



Product Overview

- Digital timer
- On, off and remaining time displayed on controller
- Manual or automatic operation
- Drives up to 4 filaments
- Interface for automatic control
- Soft start current control

Heater Controllers

CONTENTS

Resistive Heater Controller

Electron Beam Heater Controller

Resistive Heater Controllers



Product Overview

- Switchable for the PBN (60V) element and Tungsten (30V) wire filaments and optional 15V
- COMMS Options RS232 or RS485
- N or K type thermocouple options
- Sensor range K type -200°C to +1372°C
- Sensor range N type -250°C to +1300°C
- 240 V or 110 V
- Power consumption 350 VA
- Temperature controller Eurotherm 2408
- 19" full rack mounting 3U High
- Weight 10 kg
- Can be used to monitor and control positive and negative temperature when combined with a liquid nitrogen module

Resistive Heater Controller with 6 m Lead

Voltage	Thermocouple	No COMMS	RS232	RS485
110	K	ZRHCL	ZRHCL-110-RS232	ZRHCL-110-RS485
110	N	ZRHCNL	ZRHCNL-110-RS232	ZRHCNL-110-RS485
240	K	ZRHC	ZRHC-240-RS232	ZRHC-240-RS485
240	N	ZRHCN	ZRHCN-240-RS232	ZRHCN-240-RS485

Electron Beam Heater Controllers



Product Overview

- For the Thoriated Iridium filament
- COMMS Options RS232 or RS485
- N or K type thermocouple options
- Sensor range K type -200°C to +1200°C
- Sensor range N type -250°C to +1200°C
- 240 V or 110 V
- Power consumption 250 VA
- Emission power 650 Vdc- 100 VA max.
- Outputs 30 Vac at 2.5 Amps max.
- Temperature controller Eurotherm 2408
- 19" full rack mounting 3U High
- Weight 15 kg
- Can be used to monitor and control postive and negative temperatures.

Electron Beam Heater Controller with 6 m Lead

Voltage	Thermocouple	No COMMS	RS232	RS485
110	K	ZEBHL	ZEBHL-110-RS232	ZEBHL-110-RS485
110	N	ZEBHNL	ZEBHNL-110-RS232	ZEBHNL-110-RS485
240	K	ZEBH	ZEBH-240-RS232	ZEBH-240-RS485
240	N	ZEBHN	ZEBHN-240-RS232	ZEBHN-240-RS485

Motorisation

CONTENTS

Glossary of Motion Control Terms

Stepper Controller Options

Stepper Motor Controllers

Motor Controller

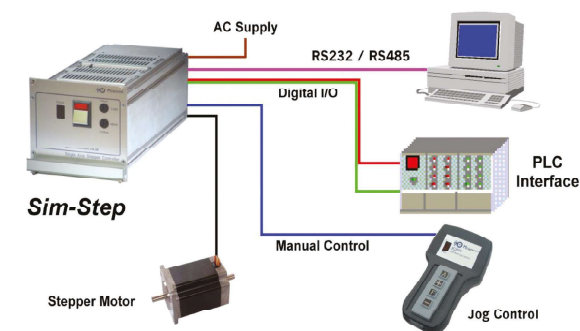
Stepper motors can be fitted to most VACGEN manipulation equipment. Motors allow remote and fast operation and, when combined with our high performance drive control units, these systems provide higher resolution than is possible with manual control.



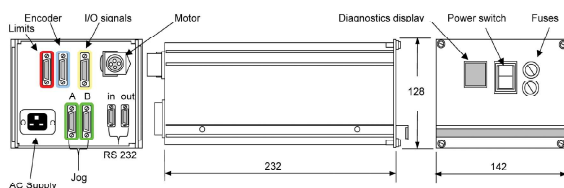
Product Overview

- Motors are 4 phase, 8 lead hybrid stepper motors.
- Plug-and-play package if ordered with manipulation
- The torque-speed characteristic is an important measure of stepper motor performance. High torque reduces the risk of motor stall which is a major problem with low performance motorisation.
- Phase Switching. This determines the sequence in which the four motor phases are energised. Our controllers use 'bi-polar chopped' phase switching, which utilises all phases at the same time for maximum efficiency
- Each unit can be configured to either open or closed loop for use with encoders
- VACGEN controllers all use half stepping sequencing giving 400 half steps per revolution (0.9° per half step) .
- The controllers are housed in screened enclosures that resist electro-magnetic radiation and conform with the latest European Safety Directives
- Three control levels are available: simple push button or joystick control, programmable open-loop control and programmable closed-loop control
- Programmable via RS232 interface Pre-configured for either 110 VAC or 240 VAC operation, adjustable if necessary
- 3U High 3rd Rack Width

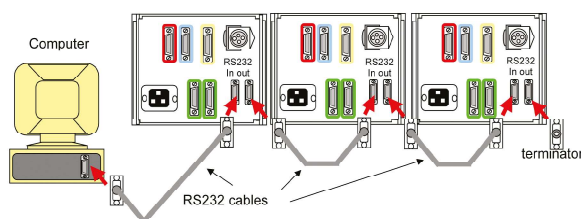
Single axis controller module



General control system set-up



Controller dimensions.



Multiaxis controller

Stepper Motor Controller Options

The unit can be used by itself to control a single motor, or can be connected to other ZSIM units to create a twin or multi-axis control system by daisy-chaining the PC interface signals.

The controller can be used to build up a sophisticated motion control system by making use of input and output channels to provide enabling signals or drive status feedback.

Plug and Play Cables

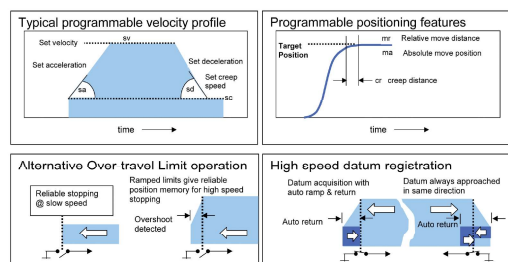
The connectors on the rear panel of the controller are colour coded to match the standard range of cables. The range includes motor cables, limits/datum cables and encoder cables. VACGEN offer a wide range of standard cable lengths; custom lengths up to 30 m can be supplied on request.

Rack Mounting

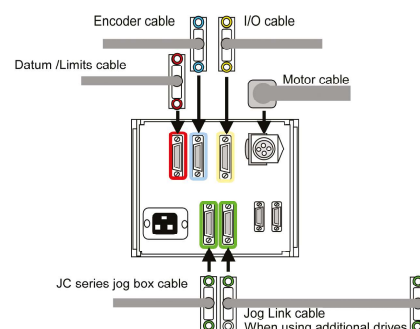
A full range of accessories is also available for mounting up to three ZSIM controllers in a standard 3U Eurocrate 19 inch rack configuration (ZSIMBOX). Blanking panels are available to complete the rack mounting installation (ZSIMBLAN).

Jog Boxes

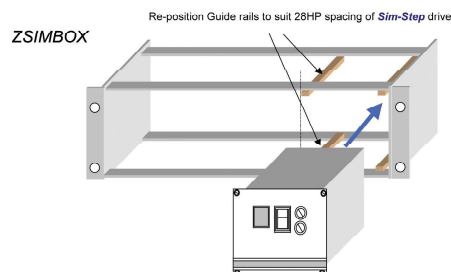
A two axis jog box (ZSIMJOG2) is available to allow switching between two axes. Multi-axis jog control is provided by means of the ZSIMJOGM jog box, allowing installations of up to 15 axes to be controlled.



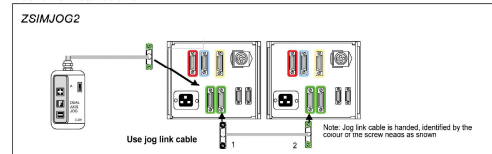
Operational modes.



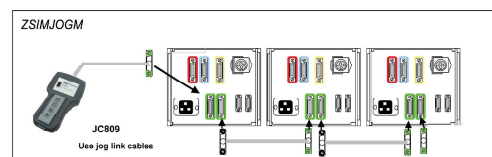
Plug and play cable connections.



Dual axis installations



3-15 axis installations



Stepper Motor Controllers

SIMSTEP Sets		
Set	Voltage	Order Code
Controller with 5 m Lead Set	240 V	SIMSET 1
Controller with 5 m Lead Set	110 V	SIMSET 2

SIMSTEP and Accessories			
Description	Dimensions	Comments	Part Code
SIMSET Controller	240 V	3U Unit x 3rd Width	ZSIM240
SIMSET Controller	110 V	3U Unit x 3rd Width	ZSIM110
Eurocrate to fit up to 3 SIMSTEP		To Fit 1, 2 or 3 SIMSTEP	ZSIMBOX
Eurocrate blanking panels		To Fill Unpopulated Slot	ZSIMBLAN
Motor Cable	3 m	Parallel	ZMOTPL03
Motor Cable	5 m	Parallel	ZMOTPL05
Motor Cable	10 m	Parallel	ZMOTPL10
Motor Cable	3 m	Series ⁽¹⁾	ZMOTSL03
Motor Cable	5 m	Series ⁽¹⁾	ZMOTSL05
Motor Cable	10 m	Series ⁽¹⁾	ZMOTSL10
Limit Cable	3 m	For Microswitch Option	ZMOTLD03
Limit Cable	5 m	For Microswitch Option	ZMOTLD05
Limit Cable	10 m	For Microswitch Option	ZMOTLD10
Encoder Cable	3 m	For Encoder Motors Only	ZMOTEN03
Encoder Cable	5 m	For Encoder Motors Only	ZMOTEN05
Encoder Cable	10 m	For Encoder Motors Only	ZMOTEN10
USB to RS232 Cable		Interface	ZSIMUSB
JOGBOX 1 / 2 axis		Up to 2 Axis	ZSIMJOG2
JOGBOX Link cables for 1 / 2 Axis		1 required per 2 controllers	ZJOGLINK
JOGBOX Multiaxis		Up to 99 Axis	ZSIMJOGM
JOGBOX Link cables for Multiaxis		1 required per 2 controllers	ZJOGMULT
Mating Connector for Motor Lead		Where SIMSTEP is Not Supplied	ZSIMSMOT
Mating Connector for Encoder Lead		Where SIMSTEP is Not Supplied	ZSIMSENC
Mating Connector for Limit Lead		Where SIMSTEP is Not Supplied	ZSIMPDIN

(1) Required for HPT Z Motors only

Z Axis Translators

CONTENTS

Z-Axis Linear Transfer Mechanism (LTM)

Wide Bore Z-Axis Linear Transfer Mechanism (LTM)

Z-Axis Translator (TR)

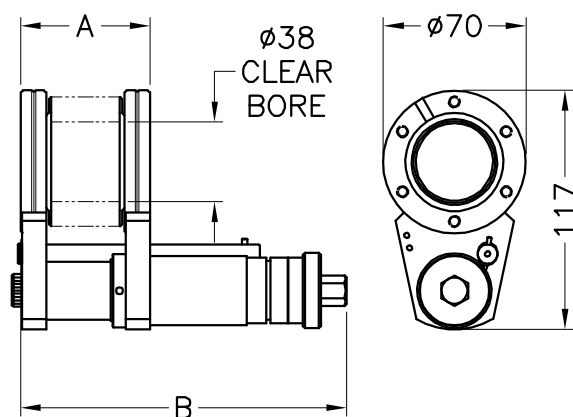
Z-Axis Linear Transfer Mechanism (LTM)

A compact Z-Axis bellows sealed transfer mechanism with 38 mm clear bore. The LTM is a manual or motor driven Z-axis transfer device providing controlled Z-axis motion, allowing samples and probes to be inserted with high accuracy and stability into a vacuum envelope.



Product Overview

- 38 mm Clear bore edge welded bellows
- Range of travel 25 mm to 150 mm
- Graduated scale in 1 mm increments
- Positive stops at extremes of movement
- Motorised resolution is 2.5 microns per half step
- Concentricity of flange bore within 0.5 mm
- Gear box version ratio 10:1



Technical Data Table (LTM)

Flange Size	DN40, M6 tapped
Bore	38 mm Clear Bore
Travel Range	25 mm to 150 mm
Motion Control	Manual, Stepper Motor, Encoded Stepper Motor, DC Motor
Operating Pressure Range	1 bar to 10^{-11} mbar
Leak Rate	1×10^{-10} mbar ls^{-1}
Operating Temperature Range	-20°C to +200°C
Baking Temperature	250°C after removing motors, if fitted
Torque Required to Elevate	1.2 Nm
Maximum Axial Load	200 N
Maximum Radial Load	50 N
Parallelism of flange faces	<0.04 mm

Z-Axis Linear Transfer Mechanism (LTM)

Linear Transfer Mechanism (LTM)									
DN Type	Flange OD mm	Travel mm	Operation	A Extended mm	A Compressed mm	B Extended mm	B Compressed mm	Bake temp °C	Order Code
DN40	70 Tapped	25	Manual	63	38	159	134	250	ZLTM25
DN40	70 Tapped	50	Manual	92	42	215	165	250	ZLTM50
DN40	70 Tapped	75	Manual	125	50	258	183	250	ZLTM75
DN40	70 Tapped	100	Manual	163	63	310	210	250	ZLTM100
DN40	70 Tapped	150	Manual	215	65	434	284	250	ZLTM150
DN40	70 Tapped	25	Stepper motor ⁽¹⁾	63	38	162	137	250*	ZLTM25W
DN40	70 Tapped	50	Stepper motor ⁽¹⁾	92	42	218	168	250*	ZLTM50W
DN40	70 Tapped	75	Stepper motor ⁽¹⁾	125	50	261	186	250*	ZLTM75W
DN40	70 Tapped	100	Stepper motor ⁽¹⁾	163	63	313	213	250*	ZLTM100W
DN40	70 Tapped	150	Stepper motor ⁽¹⁾	215	65	437	287	250*	ZLTM150W
DN40	70 Tapped	25	Stepper with encoder ⁽¹⁾	63	38	162	137	250*	ZLTM25ME
DN40	70 Tapped	50	Stepper with encoder ⁽¹⁾	92	42	218	168	250*	ZLTM50ME
DN40	70 Tapped	75	Stepper with encoder ⁽¹⁾	125	50	261	186	250*	ZLTM75ME
DN40	70 Tapped	100	Stepper with encoder ⁽¹⁾	163	63	313	213	250*	ZLTM100ME
DN40	70 Tapped	150	Stepper with encoder ⁽¹⁾	215	65	437	287	250*	ZLTM150ME
*With motor and encoder removed									

(1) For VACGEN controller

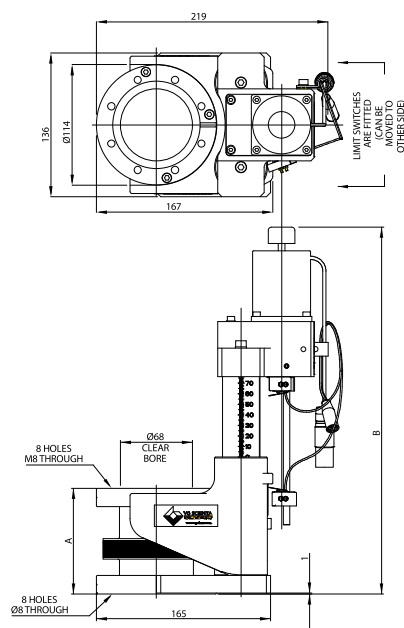
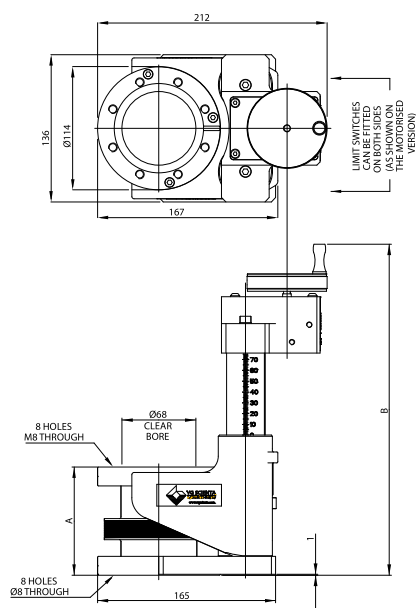
Wide Bore Z-Axis Linear Transfer Mechanism (LTMW)

Z-Axis transfer mechanism, with edge welded bellows providing a 68mm clear bore. High accuracy and stability. Actuation options: manual or motor driven providing controlled motion. Can be mounted in any orientation.



Product Overview

- 68 mm clear bore edge welded bellows
- Range of travel 25 to 150 mm
- High precision and accuracy
- Smooth operating
- Graduated scale in 1 mm increments
- 0.026 degrees maximum deflection under vacuum (measured on 150 mm travel model)
- Positive stops at extremes of movement
- Gear Box ratio 3.438:1
- Lead screw pitch 4 mm



Technical Data Table (LTM Wide Bore)

Flange Size	DN63, Top flange is M8 tapped, lower flange is clear bore
Bore	68 mm Clear Bore
Travel Range	25 mm to 150 mm
Motion Control	Manual, Stepper Motor, Encoded Stepper Motor, DC Motor
Operating Pressure Range	1 bar to 10^{-11} mbar
Leak Rate	1×10^{-10} mbar ls ⁻¹
Operating Temperature Range	-20°C to +200°C
Baking Temperature	+250°C after removing motors, if fitted
Torque required to Elevate	1 Nm
Maximum Axial Load	300 N
Travelling flange (Motor or Handwheel)	1.164 mm of Z travel

Wide Bore Z-Axis Linear Transfer Mechanism (LTMW)

Z-Axis Manipulators (LTM Wide Bore)									
DN Type	Flange OD mm	Travel mm	Operation	A Extended mm	A Compressed mm	Overall Height mm	Shipping Weight kg	Bake temp °C	Order Code
DN63	114	26	Manual	126	100	256	10	250	ZLTM11425HW
DN63	114	51	Manual	151	100	281	10.5	250	ZLTM11450HW
DN63	114	76	Manual	176	100	306	11	250	ZLTM11475HW
DN63	114	101	Manual	201	100	331	11.5	250	ZLTM114100HW
DN63	114	151	Manual	251	100	381	12.5	250	ZLTM114150HW
DN63	114	26	Stepper motor ⁽¹⁾	126	100	297	11	250*	ZLTM11425SMS
DN63	114	51	Stepper motor ⁽¹⁾	151	100	322	11.5	250*	ZLTM11450SMS
DN63	114	76	Stepper motor ⁽¹⁾	176	100	347	12	250*	ZLTM11475SMS
DN63	114	101	Stepper motor ⁽¹⁾	201	100	372	12.5	250*	ZLTM114100SMS
DN63	114	151	Stepper motor ⁽¹⁾	251	100	422	13.5	250*	ZLTM114150SMS
DN63	114	26	Stepper with encoder ⁽¹⁾	126	100	297	11	250*	ZLTM11425SMSE
DN63	114	51	Stepper with encoder ⁽¹⁾	151	100	322	11.5	250*	ZLTM11450SMSE
DN63	114	76	Stepper with encoder ⁽¹⁾	176	100	347	12	250*	ZLTM11475SMSE
DN63	114	101	Stepper with encoder ⁽¹⁾	201	100	372	12.5	250*	ZLTM114100SMSE
DN63	114	151	Stepper with encoder ⁽¹⁾	251	100	422	13.5	250*	ZLTM114150SMSE

(1) For VACGEN controller

*With motor and encoder removed

Gasket required for Wide Bore LTM	
Wide Bore copper Gasket	ZCU68 or ZCUC68

Z-Axis Translator (TR)

The TR is a long stroke Z-axis translator with 33 mm clear bore, manual or motor driven options. The support frame and guide bars ensure movement is stable and rotation free. The design offers a 33 mm clear bore on the moving flange to accommodate a feedthrough chamber and bellows support tube when required. Enables stable vertical or horizontal mounting. This offers greater stability over the LTM series.



Product Overview

- Z travel ranges are 150, 300, 450 and 600 mm
- Clear bore of 33 mm (without support tube) for larger bore Z only translations
- Screw drive for all Z ranges (optional worm drive for longer travels, recommended for 450 and 600 mm translators)
- Z resolution 0.01 mm manual, 0.005 mm motorised
- Linear motion per turn is 2 mm (wormwheel drive 4 turns)
- Any mounting orientation

TR Series Technical Data Table

Flange Size	DN40, M6 clear flanges
Bore	33 mm Clear Bore
Travel range	150 mm to 600 mm
Motion control	Manual, Stepper Motor, Encoded Stepper Motor
Operating Pressure Range	1 bar to 10^{-11} mbar
Leak rate	1×10^{-10} mbar ls ⁻¹
Operating Temperature Range	-20°C to +200°C
Baking Temperature	230°C after removing motors, if fitted
Maximum Stage load	20 kg (manual operation / motorised operation connected to 3.5 A @ 2400 1/2 steps/sec) 16 kg (motorised operation connected to 4.5 A @ 1600 1/2 steps/sec)

Z-Axis Translator (TR)

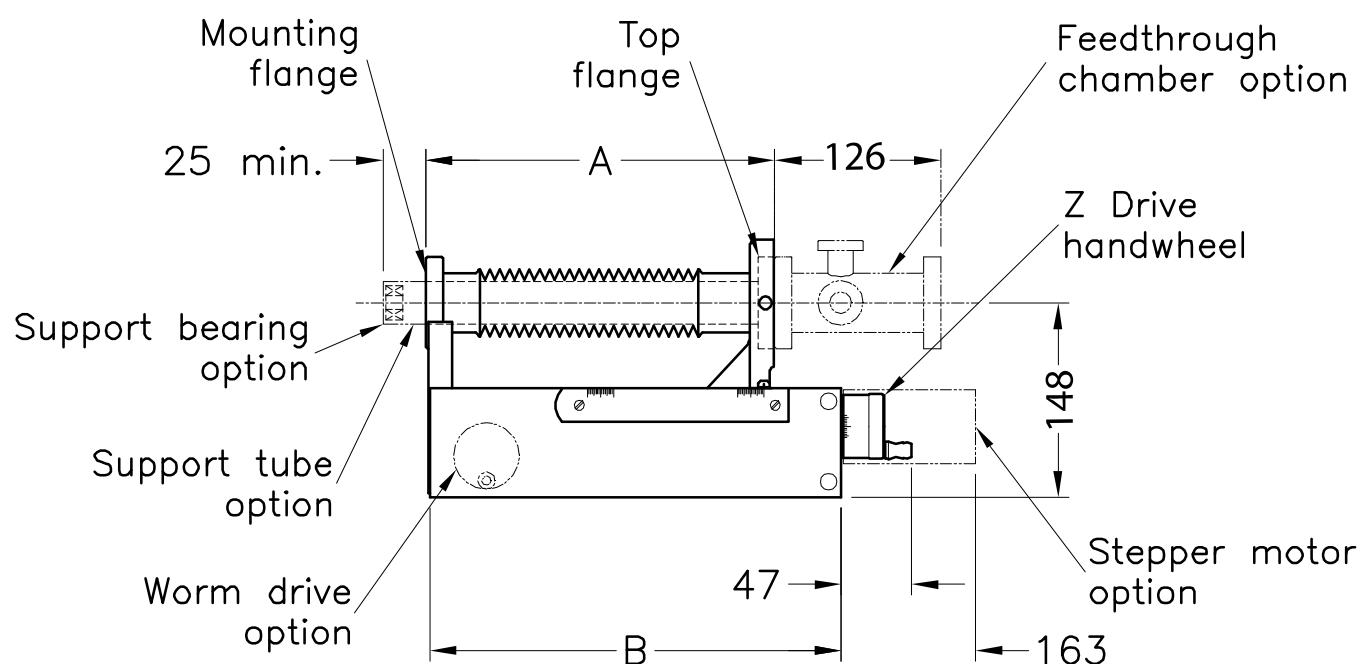
Z-Axis Translator (TR)									
DN Type	Flange OD mm	Z Travel mm	A Extended mm	A Retracted mm	B mm	Actuation	Resolution mm	Bake temp °C	Order Code
DN40	70 Tapped	150	279	129	314	Manual	0.01	230	ZTR1570
DN40	70 Tapped	300	466	166	499	Manual	0.01	230	ZTR3070
DN40	70 Tapped	450	652	202	685	Manual	0.01	230	ZTR4570
DN40	70 Tapped	600	815	215	849	Manual	0.01	230	ZTR6070
DN40	70 Tapped	150	279	129	314	Stepper motor	0.005	230*	ZTR1570W ⁽¹⁾
DN40	70 Tapped	300	466	166	499	Stepper motor	0.005	230*	ZTR3070W ⁽¹⁾
DN40	70 Tapped	450	652	202	685	Stepper motor	0.005	230*	ZTR4570W ⁽¹⁾
DN40	70 Tapped	600	815	215	849	Stepper motor	0.005	230*	ZTR6070W ⁽¹⁾
DN40	70 Tapped	150	279	129	314	Stepper with encoder	0.005	230*	ZTR1570E ⁽¹⁾
DN40	70 Tapped	300	466	166	499	Stepper with encoder	0.005	230*	ZTR3070E ⁽¹⁾
DN40	70 Tapped	450	652	202	685	Stepper with encoder	0.005	230*	ZTR4570E ⁽¹⁾
DN40	70 Tapped	600	815	215	849	Stepper with encoder	0.005	230*	ZTR6070E ⁽¹⁾

(1) For use with VACGEN controller

Z-Axis Translator - Options and Accessories	
Description	Order Code ⁽¹⁾
Feedthrough Chamber with 3 mini ports	ZTRFC
Support Tube	ZTRST
Support Tube Bearing	ZTRRB
Support Stand for Horizontal Mounting	ZTRS
Worm Drive Kit	ZTRWD
Stepper Motor Kit for Retro fitting with Encoder	ZTRSMKE ⁽²⁾
Stepper Motor Kit for Retro fitting	ZTRSMKW ⁽¹⁾

(1) If ordered together, the different items will be supplied fully configured

(2) For use with VACGEN controller

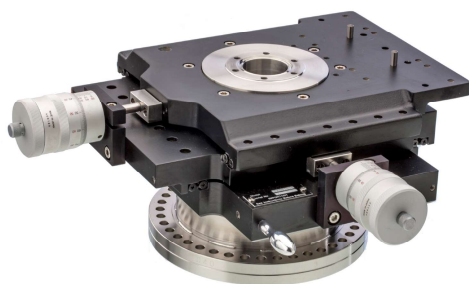


XY Tables

CONTENTS

XY Tables

XY Tables



Product Overview

The range of XY tables is based on the XY stages used for manipulators, but modified for stand-alone applications.

- Cross roller bearings for high load capacity and precise operation
- UHV compatible
- Bakeable to 230°C
- All micrometers are the large barrel type that are preferred for ease of use.
- When ordering an XY module you must also select a drive option as shown in the table below
- XY offset movement is either ± 12.5 mm or ± 25.0 mm, this will be determined by the drive option
- The travel limitation is the vectorial sum of the X and Y motions
- The base flange double bolt hole
- Stepper motor upgrade options available
- These XY tables can be used in any orientation. If more than 5 kg is applied to horizontally mounted units, we recommend that horizontal gravity compensation is fitted

XY Module						
Base flange	Top Flange	Travel Range	A2 mm	Bellows Bore mm	Probe Size mm	Order code
DN100 (152 mm)	DN64 (114 mm)	± 12.5 mm or ± 25.0 mm Stage	175	108	58	MT211B6
DN150 (203 mm)	DN64 (114 mm)	± 12.5 mm or ± 25.0 mm Stage	175	108	58	MT211B8
DN100 (152 mm)	DN40 (70 mm)	± 12.5 mm or ± 25.0 mm Stage	167	85	35	MT208A6
XY Drive Options must be selected with one of the above modules ⁽²⁾ (This will determine travel range)						
± 12.5 mm Micrometer						MX12
± 25 mm Micrometer						MX25
XY Axis Stepper Motor ⁽¹⁾						MXYSM
XY Axis Encoder ⁽¹⁾						MXYSME

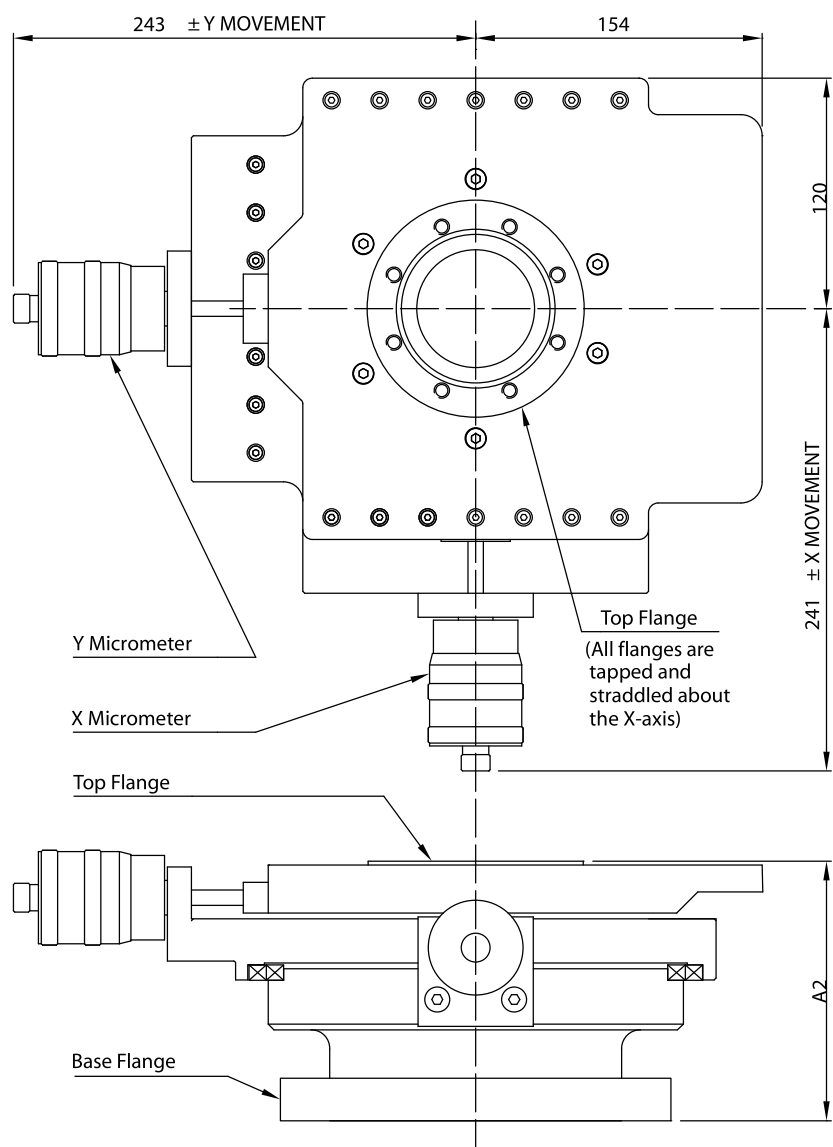
XY Module Wide Bore						
Base flange	Top Flange	Travel Range	A2 (mm)	Bellows Bore	Probe Size	Order code
DN100 (152 mm)	DN100 (150 mm)	± 12.5 mm or ± 25.0 mm Stage	175	108	58	MMWT256E
DN150 (203 mm)	DN100 (150 mm)	± 12.5 mm or ± 25.0 mm Stage	175	108	58	MMWT258E
XY MODULE Drive Options ⁽²⁾						
± 25 mm Micrometer						MX25
XY Axis Stepper Motor ⁽¹⁾						MXYSM
XY Axis Encoder ⁽¹⁾						MXYSME

(1) Stepper motor 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

T208 & T211 XY - Technical Data	
Parameters	Specification
Resolution - Manual	5 µm
Resolution - Motorised ⁽¹⁾	0.5 µm
Repeatability - Manual	5 µm
Repeatability - Motorised ⁽¹⁾	1 µm
Maximum speed - Motorised ⁽¹⁾	4 mm.s ⁻¹

(1) Specification assumes the use of VACGEN's motor control system.



T208 and T211 Series

Modular Manipulator Components

Contents

Manipulator Introduction Overview

Manipulator Introduction

Omniax Modular Overview

Omniax Modular Module Dimensions

Omniax Z Slide

Omniax XY Table Module

Omniax Rotary Drive Module

Omniax Support Stand Module

Omniax Sample Holder

Wide Bore Omniax

Transax Modular Overview

Transax Modular Z & XY Slide

Transax Modular Rotary Drive

Transax Sample Holder

HPT WX Modular Overview

HPT WX Modular Z Slide

HPT WX Modular XY Slide

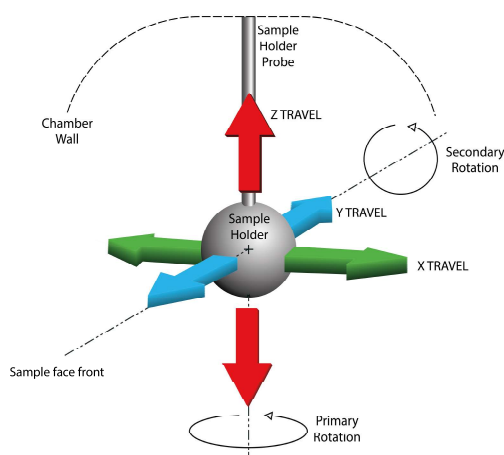
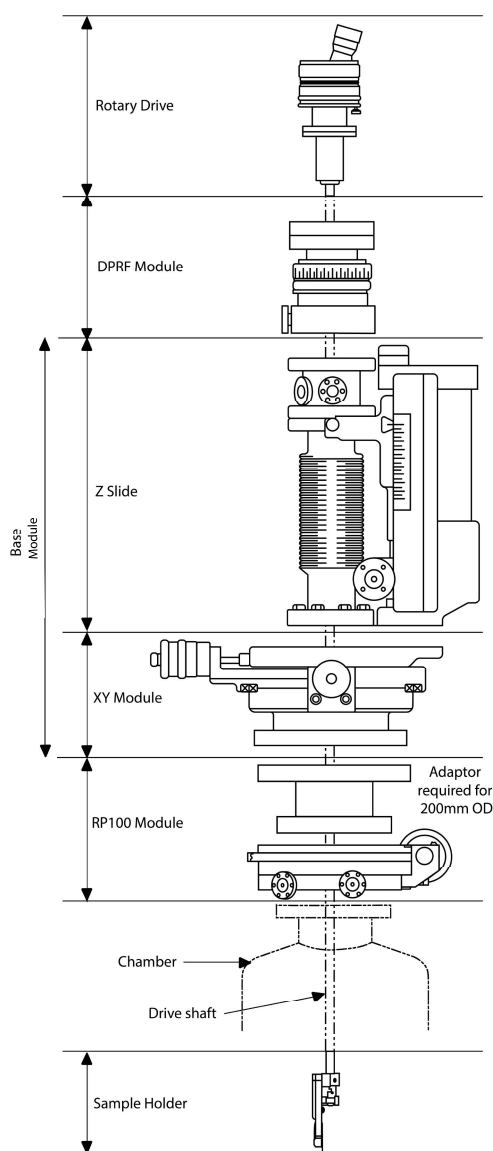
HPT WX Modular Rotary Drive

HPT WX Sample Holder

Miniax Modular Overview and XYZ Slide

Manipulator Overview

Precision movement, stability and positioning of samples and substrates within a vacuum envelope is an essential process in material analysis. Each VACGEN manipulator family offers unique characteristics to offer the user the widest possible range of stability, cost and testing conditions.



Rotary Drives

The rotary drive enables you to rotate the sample holder in primary and secondary (azimuthal). Primary rotation rotates the sample holder about its axis. Secondary rotation rotates the sample plate perpendicular to the primary axis.

DPRF Rotary Module

The DPRF is an optional module which is used as an alternative to a rotary drive where the whole probe is rotated in a primary rotation axis without the risk of wiring from heaters and coolers getting wrapped around the probe. (e.g where a cryogenic probe is installed)

Base Module

The base module is the starting point for all manipulator construction. The base module component is split into a Z module and XY module for manipulation.

In order to move the sample holder further into the vacuum envelope a Z slide module is needed. The bellows of the Z slide module expand and contract to house the length of the shaft as it is pushed and pulled in and out of the chamber.

A XY module allows the sample holder to move in the XY plane within the vacuum envelope providing sample positioning.

RP100 Rotation Module

The RP100 is an optional module which is used as an alternative to a rotary drive where the whole manipulator is rotated giving a planetary rotation relative to the sample holder. This option is used where arc scanning of the sample is required.

Sample Holder

The holder is required for mounting samples, e.g a substrate. A range of sample holders are available. Dependent of selection movement within the axis of freedom shown are available.

Heaters and Cooling

To heat and cool the sample within the vacuum envelope a range of heater and cooling accessories can be added.

Modular Manipulators



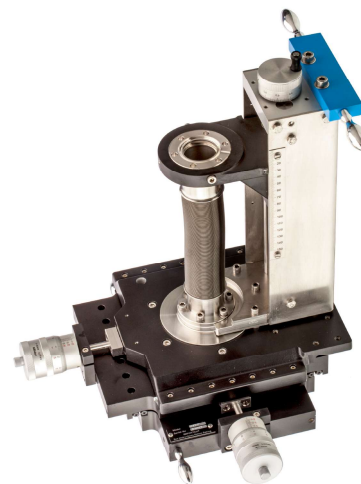
Wide Bore Omniax

Highly stable double bellows manipulator with a 100mm clear bore. Fully configured with a wide range of options.



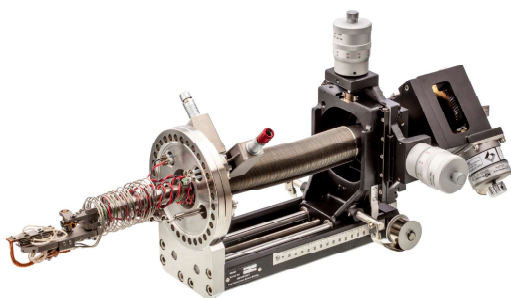
Omniax

Highly stable double bellows manipulator with 32mm or 54mm probe size. Fully configured with a wide range of options.



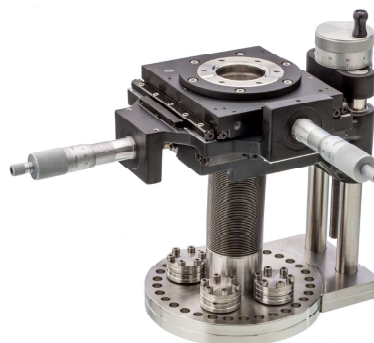
Transax

Double bellows manipulator with good stability and a wide range of travel options. 32mm probe size.



HPT-WX

Precision single bellows manipulator with full range of motors and sample handling.



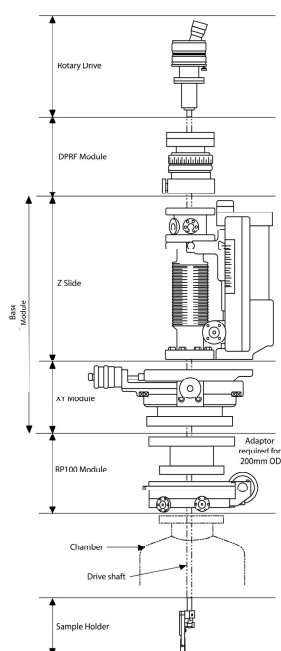
Miniax

Low cost single bellows manipulator for XY and Z travel. Not suitable for motorised movement.

Modular Manipulators

Omni-ax Manipulator Overview

The OMNIAX manipulator is a fully UHV compatible double bellows manipulator with large probe capacity. It uses the unique VACGEN hinged flange and guided support tube to eliminate deflection due to vacuum loading providing extreme stability. It's rigidity makes it ideal for long travels, multiple rotations, specimen security and capacity for feedthroughs.



Product Overview

- Supports all standard sample holder configurations
- Support tube is 5x more rigid than the Transax and 25x more rigid than HPT WX
- Large load carrying capacity 20kg vertical & horizontal
- Two support tube sizes, clear bore size 50mm and 28mm
- Probes up to 54mm diameter with a full ± 25 mm XY travel
- Design eliminates bi-metal deformation after repeated bakeouts to 230°C
- All axes can be manual or motor operated
- X-axis actuator can be mounted on opposite sides
- Easily removable motors for bake out
- Versatile range of XY and Z modules for bake out
- Stability and versatility due to double bellows design
- Z travels from 100 mm to 1000 mm
- Operating pressure 1 bar to 10^{-11} mbar
- Leak rate $< 1 \times 10^{-10}$ mbar l/s
- Base flange options 152 mm OD tapped or 203 mm OD clear
- Rotating support tube option with rotary feedthrough (DPRF)
- Standard feedthrough chamber included with three radial mini ports, tapped M4 and one special cooling port
- Cooling options
- Can be mounted in any orientation (support stand required for horizontal)
- Clearance required underneath the OMNIAX to mount support stand on horizontal versions only
- A removable index pin through the XY stage indicates the central position and acts as a transit lock. It must be removed before use

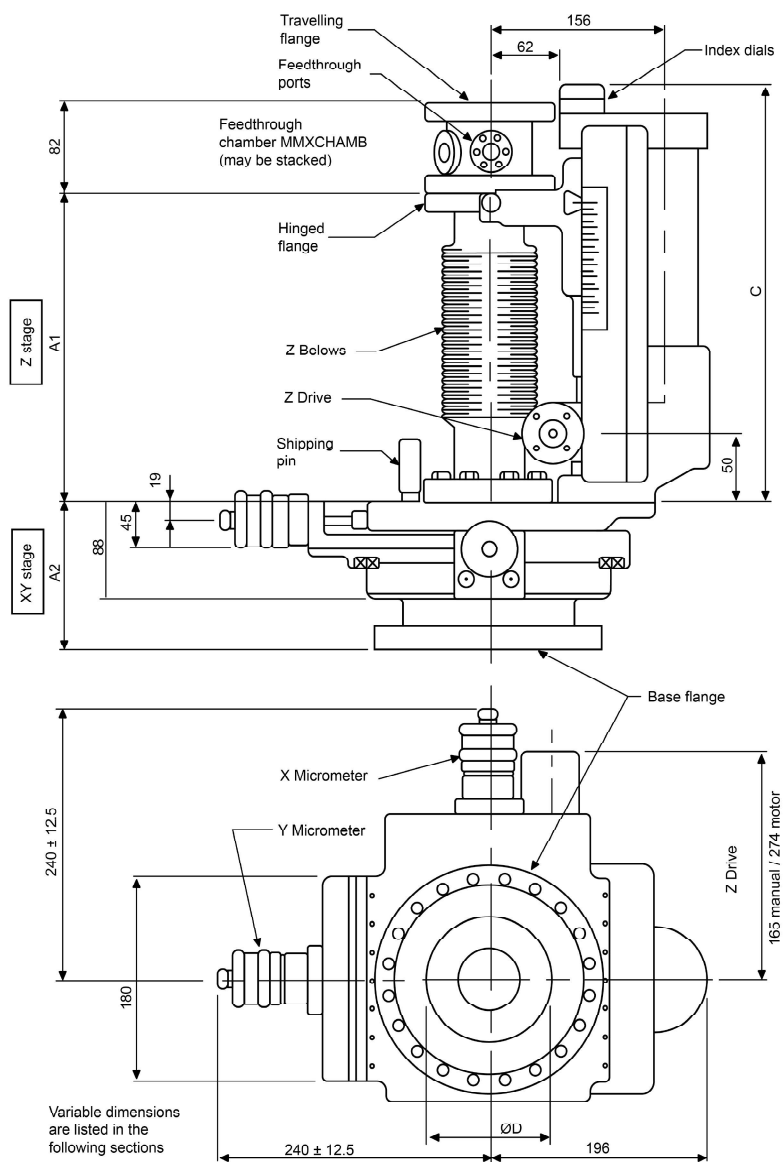
Construction advantages

- All metal re-circulating linear bearings for Z axis
- All metal v slides for the X & Y table
- Extremely robust construction

Modular Manipulators

Omniax Manipulator Module Dimensions

The user can select from a range of X,Y,Z axis movement.



Omniax Z slide - Basic Dimensions

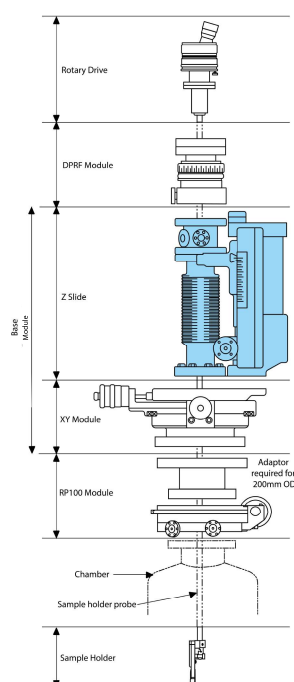
Z travel	A1 mm	C mm	Weight ⁽¹⁾ kg
100	185 to 285	374	40
200	188 to 388	477	42
300	188 to 488	577	44
400	188 to 588	677	46
500	210 to 710	799	49
600	231 to 831	920	52
800	273 to 1073	1164	56
1000	319 to 1319	1408	61

Omniax XY Module - Basic Dimensions

XY travel mm	Basic Code of XY stage	A2 mm	Bellows Bore ØD mm
±0	T000	80	95
±12.5	T211	175	108
±25.0	T211	175	108

Modular Manipulators

Omni-ax Manipulator Z Slide Modules

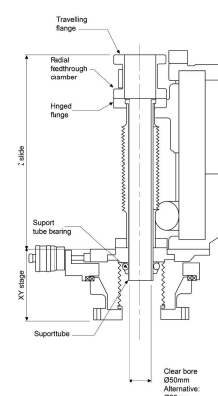


Product Overview

- Z travels from 100 mm to 1000 mm
- Rotating support tube option with rotary feedthrough (DPRF)
- Standard feedthrough chamber included with three radial mini ports, tapped M4 and one cooling port
- Worm and wheel 10:1
- Motor speed 0-200 54 sec (400,000 Steps)
- Bellows 10,000 cycles
- 1 turn = 0.2 mm
- Limit switches provided with motor options.
- All metal recirculating bearings

Omni-ax Z slide - Technical Data	
Parameters	Specification
Resolution - Manual	10 μm
Resolution - Motorised ⁽¹⁾	0.5 μm
Repeatability - Manual	10 μm
Repeatability - Motorised ⁽¹⁾	1 μm
Maximum speed - Motorised ⁽¹⁾	4 mm.s ⁻¹

(1) Specification assumes the use of VACGEN's motor control system.



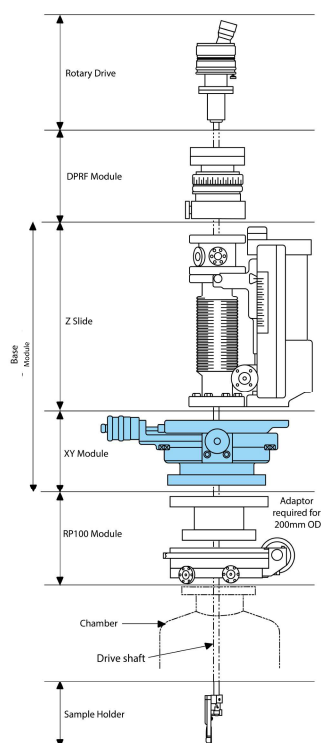
Omni-ax Z slide Modules		
Travel Range mm	Order code for 32 mm OD tube with 28 mm clear bore	Order code for 54 mm OD tube with 50 mm clear bore
100	MXZ10032	MXZ10054
200	MXZ20032	MXZ20054
300	MXZ30032	MXZ30054
400	MXZ40032	MXZ40054
500	MXZ50032	MXZ50054
600	MXZ60032	MXZ60054
800	MXZ80032	MXZ80054
1000	MXZ100032	MXZ100054
Z slide Motorisation		
Z axis Stepper Motor Upgrade ⁽¹⁾	MZSM	MZSM
Z axis Encoder Motor Upgrade ⁽¹⁾	MZSME	MZSME
Z axis DC Motor Upgrade ⁽²⁾	MZDC	MZDC

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

(2) DC motor assembled to the drive is supplied complete with power supply and control unit.

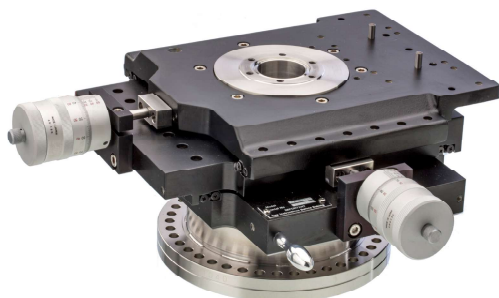
Modular Manipulators

Omniax Manipulator XY Table Modules



Product Overview

- XY module bolts direct to Z module
- Options: Z-only adaptor (± 0 mm), ± 12.5 mm or ± 25.0 mm precision movement with the 32mm or 54mm support tube
- Micrometers have 5 micron graduations and can be upgraded with motors
- Motor and encoder options wired with plug to suit VACGEN controllers
- Limit switches provided with motor options
- Motorised 1 turn = 0.2 mm (Ratio 5:1)
- All metal V slides



Omniax XY - Technical Data

Parameters	Specification
Resolution - Manual	10 μ m
Resolution - Motorised ⁽¹⁾	0.5 μ m
Repeatability - Manual	10 μ m
Repeatability - Motorised ⁽¹⁾	1 μ m
Maximum speed - Motorised ⁽¹⁾	4 mm.s ⁻¹

(1) Specification assumes the use of VACGEN's motor control system.

Omniax XY Table Module

Base flange	Travel Range	Order code
DN100 (152 mm)	Z-only ± 0 mm	MT000B6
DN100 (152 mm)	± 12.5 mm or ± 25.0 mm Stage	MT211B6
DN150 (203 mm)	Z-only ± 0 mm	MT000B8
DN150 (203 mm)	± 12.5 mm or ± 25.0 mm Stage	MT211B8
XY Module Drive Options ⁽²⁾		
± 12.5 mm Micrometer		MX12
± 25 mm Micrometer		MX25
XY Axis Stepper Motor Upgrade ⁽¹⁾		MXYSM

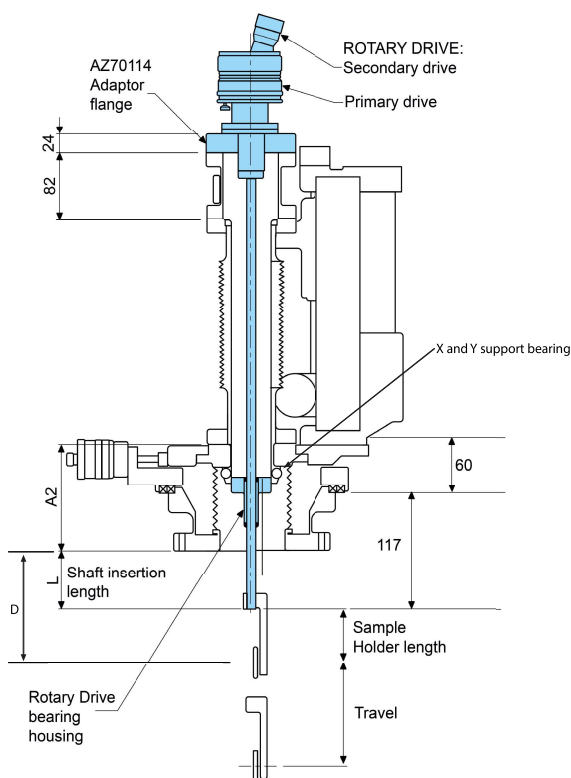
(1) Drive is assembled to stepper motor and is supplied with a wired connector to suit VACGEN stepper motor control system. A separate mating connector is available

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

Modular Manipulators

Omniax Manipulator Rotary Drive Module

Sample rotation modules for primary and secondary axis rotation. Rotation can be manual or motorised dependent on requirements.



L = Rotation up to base flange

D = Sample centre to base flange

Product Overview

- Adaptor flange must be fitted for rotary drive
- Drives are based on the RD1 for primary rotation (R1) only, or RD2 for primary rotation (R1) and secondary (R2) movement (Azimuthal)
- Supplied with support bearing assembly for the support tube in the X and Y stage
- All sample services pass through the support tube assembly securing all electrical wires and cooling tubes rotary drive bearing housing
- A minimum of 0 mm retracted 'L' dimension, as seen in table below
- Motor and encoder options wired with plug to suit VACGEN controllers
- Limit switches provided with motor options

L Dimension Limitations with Cooling Accessory Fitted			
XY stage module	Travel mm	A2 mm	L dimension minimum mm
MT000B ⁽¹⁾	±0	80	96
MT211B6	±12.5 or ±25.0	175	0
MT211B8	±12.5 or ±25.0	175	0

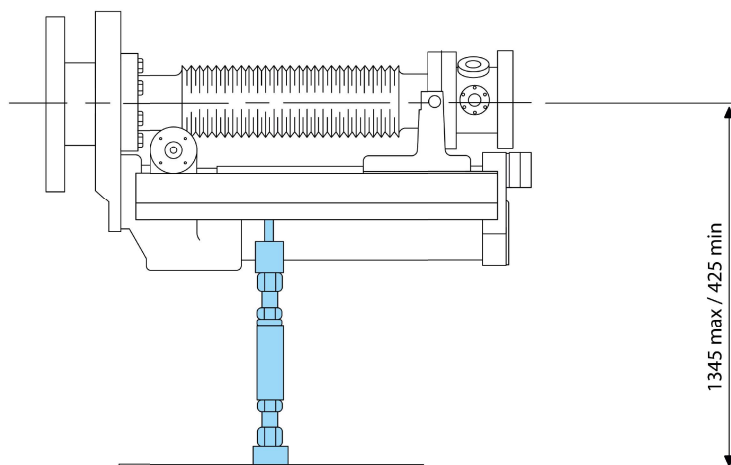
Omniax Rotary Modules			
Rotary drive module		Order code for 32 mm OD tube with 28 mm clear bore	Order code for 54 mm OD tube with 50 mm clear bore
Variable length rotary drive	R1 only	MRD132	MRD154
Variable length rotary drive	R1 + secondary ±90°	MRD232	MRD254
Variable length rotary drive	R1 + secondary ±180°	MRD22432	MRD22454
Rotary Drive Motorisation			
Stepper motor upgrade for primary axis	R1	MRDPMS	
Stepper motor upgrade for secondary axis	R2	MRDSMS	
Encoder motor upgrade for primary axis	R1	MRDPME	
Encoder motor upgrade for secondary axis	R2	MRDSME	

Modular Manipulators

Omni-ax Manipulator Support Stand Module

All horizontally mounted Omni-ax manipulators must be fitted with a support stand to prevent damage to the chamber and manipulator. The stand allows the Z slide to move freely in the XY plane and limits stresses on chamber port, bearings and drive components.

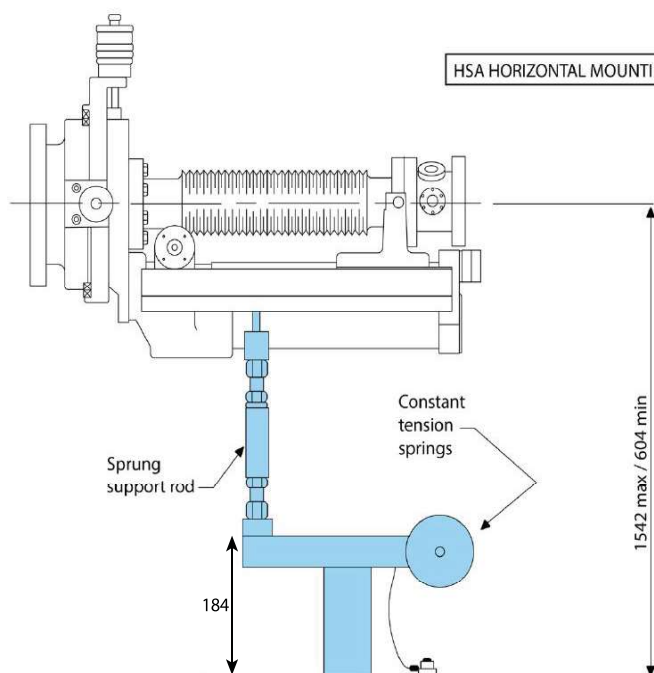
HSC HORIZONTAL MOUNTING STAND



MHSC Stand
Z only travel 100 mm to 1000 mm
Fixed support rod is mounted at the centre of gravity.

MHSC Stand	
Z length mm	Order code
100 to 1000	MHSC

HSA HORIZONTAL MOUNTING STAND

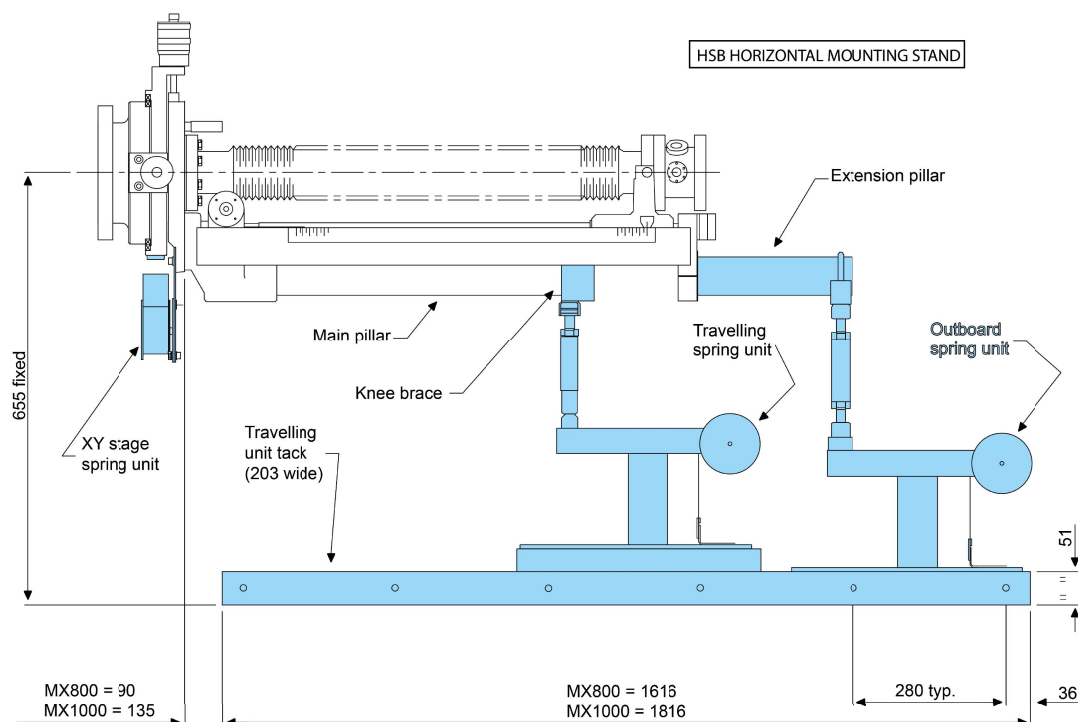


MHSA Stand
XYZ travel ranging from 100 mm to 600 mm
Sprung support rod mounted at the centre of gravity.

MHSA Stand	
Z length mm	Order code
100	MHSA01
200, 300 and 400	MHSA0234
500 and 600	MHSA056

Modular Manipulators

Omni-ax Manipulator Support Stand Modules



MHSB Stand

XYZ travel 800 mm to 1000 mm

Comprised of three elements:

- (1) Sprung support rod, fitted to the Omni-ax knee, and travelling on a guide track to support the moving mass;
- (2) Static sprung support rod to take the outboard mass of the manipulator,
- (3) Spring arrangement that transfers the inboard mass of the manipulator to the system flange.

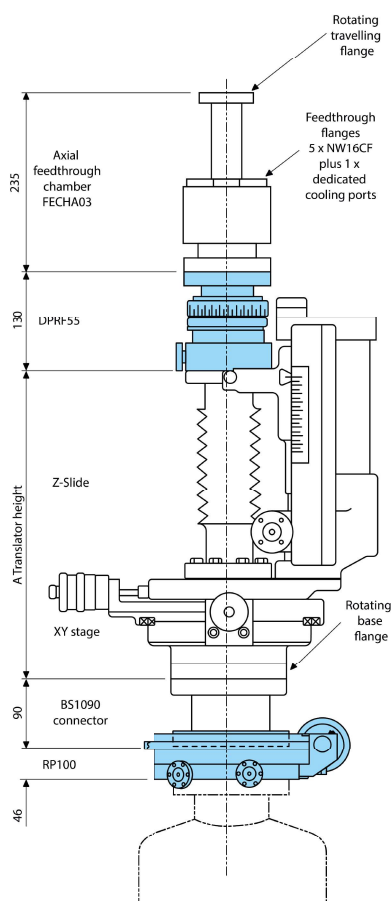
MHSB Stand	
Z length mm	Order code
800	MHSB08
1000	MHSB10

Note: Clearance required underneath the Omni-ax to mount the support stand. Also note that the stand requires the chamber to support a large proportion of the translation.

Modular Manipulators

Omniax Manipulator DPRF552 and RP100 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

DPRF can be fitted to the top flange to provide rotation for components such as a cryostat.

- DPRF has dual pumped interspaces
- Can be mounted to the top flange and the support tube is connected to the rotating flange of the DPRF552 if required
- If the instrumentation services are to rotate, an axial feedthrough chamber (FECHA03) must be fitted to the rotating flange of the DPRF552. This replaces the standard radial feedthrough chamber and includes a central port suitable for mounting a rotary drive etc. and five 34mm OD mini ports for feedthroughs and cooling.

RP100 fitted to the base flange to give planetary rotation.

- Vertically mounted Omniax manipulators can be rotated by fitting an RP100 between the Omniax 6" OD base flange and the chamber. A ZBS1090 straight connector is required for mounting to the CF100 (6" OD) tapped base flange of the XY stage.

Omniax Differentially Dual Pumped Rotary Modules and Accessories

DPRF Module	Order code
DPRF552 with Coarse manual actuator	ZDPRF552
DPRF552 with Precision manual actuator	ZDPRF552H
DPRF552 with Stepper motor ⁽¹⁾	ZDPRF552W
DPRF552 with Stepped motor and encoder ⁽¹⁾	ZDPRF552E
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 ⁽¹⁾	ZRP100E
Accessories	
Axial Feedthrough chamber	ZFECHA03
Straight connector for RP100 mounting	ZBS1090

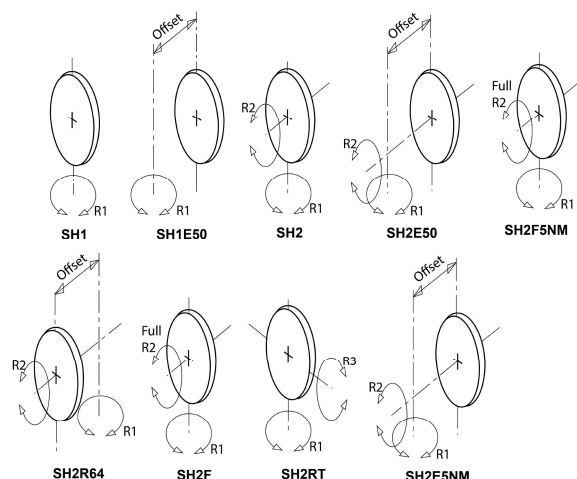
(1) Supplied with a wired connector to suit VACGEN stepper motor control system. A separate mating connector is available

Omni-ax Manipulator Sample Holder Selection Modular

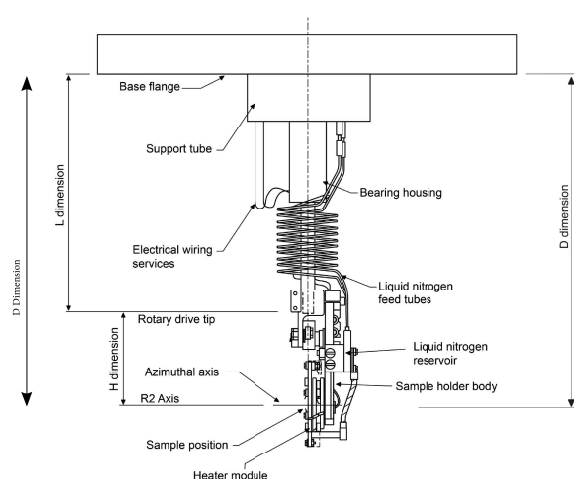
Sample Holders - Basic Specifications									
Part code	SH1	SH1E50	SH2	SH2E50	SH2F	SH2RT	SH2E5NM	SH2R64	SH2F5NM
Rotary Drive Required	RD1	RD1	RD2	RD2	RD224	RD2	RD2	RD2	RD224
Primary (R1) Rotation									
No services	360°	360°	360°	360°	360°	360°	360°	360°	360°
With services fitted	±180°	±180°	±180°	±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



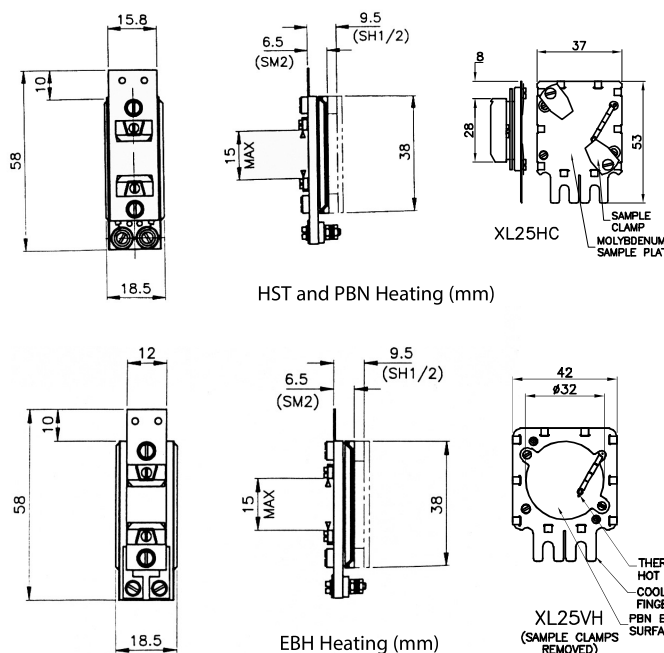
Offset refers to E Offset



Modular Manipulators

Sample Heating

Resistive and electron beam heaters can be fitted to all sample holders.



Product Overview

- HST (Resistive) is a cost effective heater which uses a tungsten wire filament max temp 950°C
- PBN (Resistive) is a long life heater which uses Pyrolytic Boron Nitride element max temp 950°C
- EBH (Electron Beam) is a rapid, high temperature heater which uses a Thoriated Iridium filament- max temp 1200°C
- XL25 HC (Resistive) PBN heater version - max temp 1000°C for samples up to 25 mm
- XL25 VH (Resistive) PBN heater version- max temp 1200°C for samples up to 25 mm
- Recommended for heating above 900°C for maximum 1 minute only

Heaters and Accessories

Heater and Accessories	Order Code
Omicron Fork with EBH Heater (<1200°C)	ZOMEBHHF
Omicron Pincer with EBH Heater (<1200°C)	ZOMEBHHP
Omicron Fork with PBN Heater (<1000°C)	ZOMPBNHF
Omicron Pincer with PBN Heater (<1000°C)	ZOMPBNHP
Plain Carrier for 14 mm x 14 mm Samples	ZSPA14
Plain Carrier for 25 mm x 25 mm Samples	ZSPA25
Standard 14 mm HST	ZHSTSHLM
Standard 14 mm EBH	ZEBHSMNM
Standard 14 mm PBN	ZPBNSHNM
XL25 with VH Heater (-80°C < +1200°C)	ZXL25VH
XL25 with HC Heater (-140°C < +1000°C)	ZXL25HC
XL25 with Plain carrier	ZXL25P
XL Receiver only	ZLREC

Dedicated Feedthrough Sets Power, Thermocouple and Bias

Manipulator	Heater Version	K Type	N Type
Omniax	Resistive	MFEEDKR	MFEEDNR
Omniax	Electron Beam	MFEEDKE	MFEEDNE
Omniax	Resistive or Electron Beam Bias Kit	ZMXBIAS	ZMXBIAS

Thermocouple wiring

Wiring is 3 m long pair covered with PTFE sleeve

Hot Junction end 210 mm of ceramics to protect PTFE coating from heater

Heater wiring

1.5 m length of 0.9 mm single stranded OF copper wire silver coated with PTFE sleeving

Resisted supplied with red and black wire

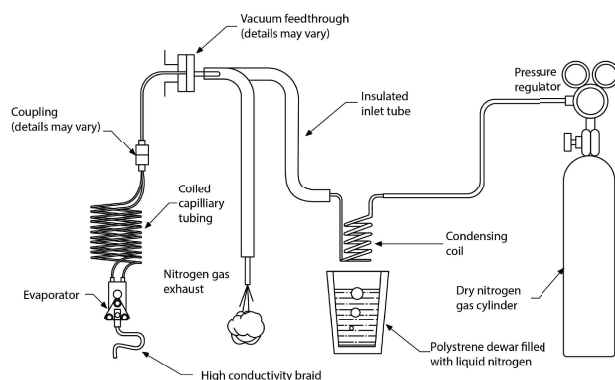
EBH supplied with red, black and green

Supplied with necessary fixings

Modular Manipulators

Liquid Nitrogen Cooling

Liquid nitrogen cooling module (ZLN) can be fitted to all SH sample holders and all standard manipulators.



LIQUID NITROGEN COOLING SCHEMATIC

Product Overview

- Using a cooling on a SH sample holder allows both primary and secondary sample rotations and can achieve temperatures below - 165°C (113 K) measured on the substrate mounting plate without a sample
 - The LN cooling module can be combined with the resistive or the electron bombardment heating modules.
 - The heater controllers can monitor liquid nitrogen temperatures
 - To operate the LN cooling module efficiently and safely, the LNHX accessory kit is recommended. This allows dry nitrogen gas from a pressurised gas bottle through a condensing coil inside a liquid nitrogen dewar. The LNHX kit includes a condensing coil and polystyrene dewar with insulated connecting tubes
- Normal running pressure 0.5 - 1 bar

Dedicated LN Cooling Kit and Accessories			
Manipulator	Cooling Option	Cooling Accessory Kit	Spare Cooling Coupling Seal Gaskets
Omniac	MXCOOL ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾

(1) These are generic part codes and we will require more detail to build the correct cooling to fit the manipulator

(2) Two gaskets per cooling required as spares only (this pack contains 5)

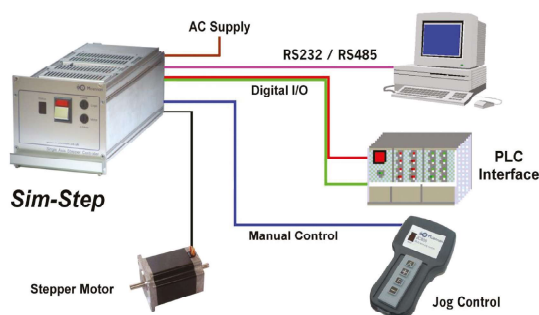
Dedicated Feedthrough Set - Thermocouple only		
Manipulator	K Type	N Type
Omniac	MFEEDK	MFEEDN

Note

Wiring is 3 m long pair covered with PTFE sleeve

Hot Junction end 210mm of ceramics to protect PTFE coating from heater

Stepper Motor Controllers



Product Overview

- Single axis stepper motor controller
- Plug and play
- Link up to 99 units
- Rail voltage uses 36 V rail
- 400 half steps (0.9° per half step)
- 110 Vac or 240 Vac
- Open or closed loop as standard option
- Encoder lead required for closed loop option

Preconfigured SIMSTEP Sets

Set	Voltage	Order Code
Controller with 5m Lead Set	240 V	SIMSET 1
Controller with 5m Lead Set	110 V	SIMSET 2

SIMSTEP and Accessories Customer Options

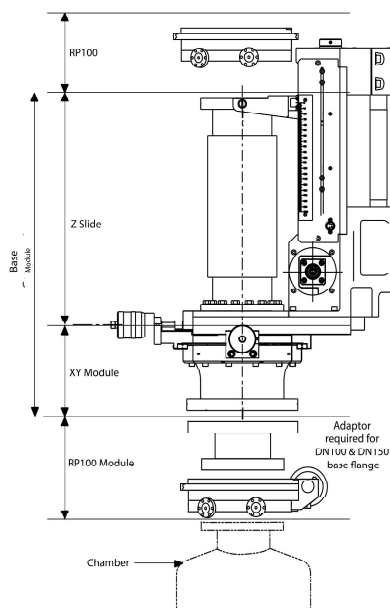
Description	Dimensions	Comments	Part Code
SIMSET Controller	240 V	3U Unit x 3rd Width	ZSIM240
SIMSET Controller	110 V	3U Unit x 3rd Width	ZSIM110
Eurocrate to fit up to 3 SIMSTEP		To Fit 1, 2 or 3 SIMSTEP	ZSIMBOX
Eurocrate blanking panels		To Fill Unpopulated Slot	ZSIMBLAN
Motor Cable	3 m	Parallel	ZMOTPL03
Motor Cable	5 m	Parallel	ZMOTPL05
Motor Cable	10 m	Parallel	ZMOTPL10
Limit Cable	3 m	For Microswitch Option	ZMOTLD03
Limit Cable	5 m	For Microswitch Option	ZMOTLD05
Limit Cable	10 m	For Microswitch Option	ZMOTLD10
Encoder Cable	3 m	For Encoder Motors Only	ZMOTEN03
Encoder Cable	5 m	For Encoder Motors Only	ZMOTEN05
Encoder Cable	10 m	For Encoder Motors Only	ZMOTEN10
USB to RS232 Cable		Interface	ZSIMUSB
JOGBOX 1 / 2 axis		Up to 2 Axis	ZSIMJOG2
JOGBOX Link cables for 1 / 2 Axis		1 required per 2 controllers	ZJOGLINK
JOGBOX Multiaxis		Up to 99 Axis	ZSIMJOGM
JOGBOX Link cables for Multiaxis		1 required per 2 controllers	ZJOGMULT
Mating Connector for Motor Lead		Where SIMSTEP is Not Supplied	ZSIMSMOT
Mating Connector for Encoder Lead		Where SIMSTEP is Not Supplied	ZSIMSENC
Mating Connector for Limit Lead		Where SIMSTEP is Not Supplied	ZSIMPDIN

Modular Manipulators

Omniax Wide Bore - Overview

The Wide Bore Omniax was designed to be used with large cryostat cold fingers on DN100 flange.

The larger top section of the in vacuum part of the cryostat cold finger fits into the 100 mm Clear Bore Z bellows. The X and Y table is designed to take a cryostat which normally would have its own support tube of no more than 54 mm. This gives you the maximum of ± 25 mm of travel.



Product Overview

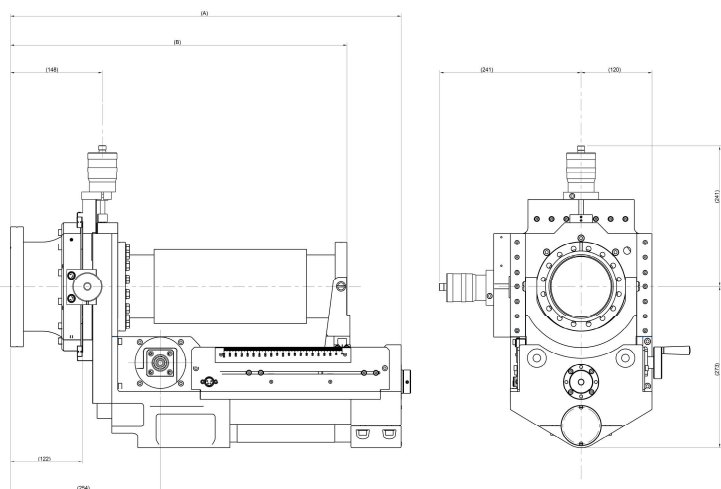
- Designed primarily for the cryostat market
- Maximum probe size that can pass through X / Y of a Wide Bore Omniax to obtain the full X / Y travel of ± 25 is 54 mm OD.
- Z bellows 100 mm Clear Bore
- Load capacity 30 kg
- Rotary Platform (RP100) can be fitted to the travelling flange for primary rotation
- Rotary Platform (RP100) can be fitted to the base flange for planetary rotation
- Motorised or manual options
- Base flange 6" or 8"
- Can be mounted horizontal, contact VACGEN for further details



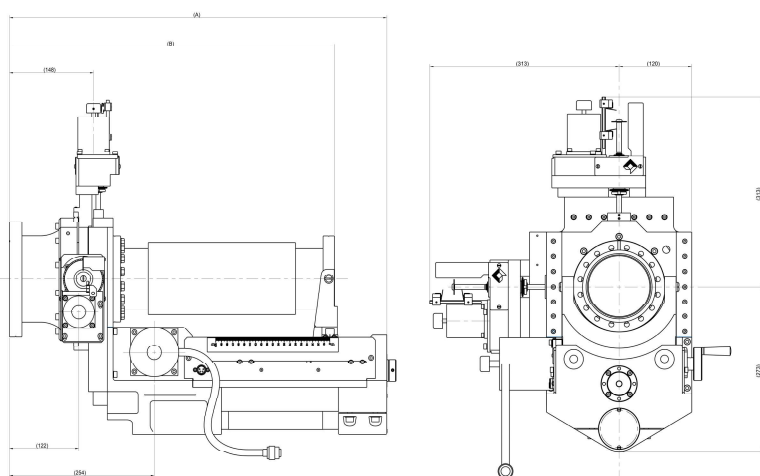
Modular Manipulators

Omniax Wide Bore - Dimensions

Omniax Wide Bore with Micrometer - Manual



Omniax Wide Bore - Motorised



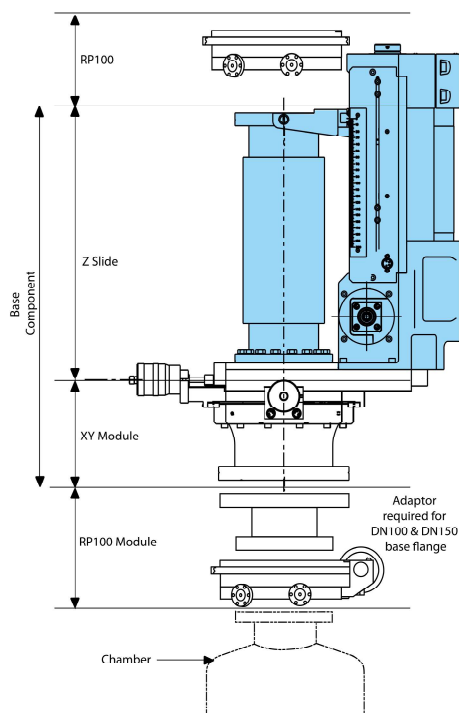
8" base flange shown in above drawings; the 6" base flange has the same overall dimension size.

Omniax Z slide - Basic Dimensions

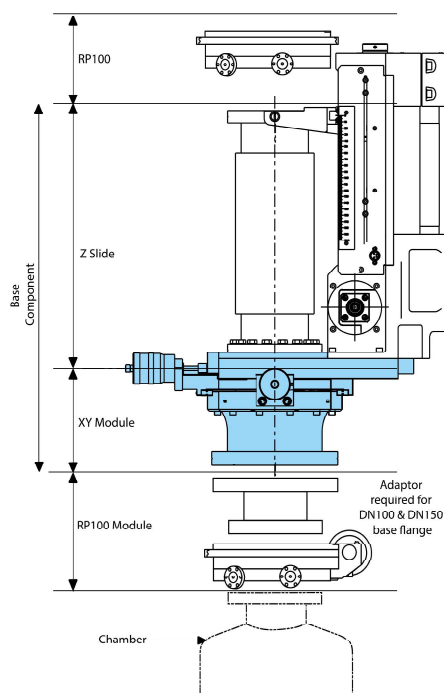
Z travel mm	A mm	B mm	C mm	Part Code
100	537	345 - 445	553	MMWZ010E
200	662	370 - 570	678	MMWZ020E
300	792	400 - 700	808	MMWZ030E
400	917	425 - 825	933	MMWZ040E
500	1077	485 - 985	1093	MMWZ050E
600	1177	485 - 1085	1193	MMWZ060E
800	1433	541 - 1341	1449	MMWZ080E
1000	1691	599 - 1599	1707	MMWZ100E

Modular Manipulators

Omniax Wide Bore - XYZ Modules



- Z travels from 100 mm to 1000 mm
- DN100 top flange
- Motorised or Manual



- ± 12.5 mm or ± 25 mm
- 6" or 8" Flange
- Motorised or Manual

WB Omniax Z slide - Technical Data

Parameters	Specification
Resolution- Manual	10 μ m
Resolution - Motorised ⁽¹⁾	0.5 μ m
Repeatability - Manual	10 μ m
Repeatability - Motorised ⁽¹⁾	1 μ m

WB Omniax Z slide Modules

Travel Range mm	Order code
100	MMWZ010E
200	MMWZ020E
300	MMWZ030E
400	MMWZ040E
500	MMWZ050E
600	MMWZ060E
800	MMWZ080E
1000	MMWZ100E
Z slide Motorisation	
Z axis Stepper Motor Upgrade ⁽¹⁾	MMWM0TZW
Z axis Encoder Motor Upgrade ⁽¹⁾	MMWM0TZE
Z axis DC Motor Upgrade ⁽²⁾	MMWM0TZDC

WB Omniax XY - Technical Data

Parameters	Specification
Resolution - Manual	10 μ m
Resolution - Motorised ⁽¹⁾	0.5 μ m
Repeatability - Manual	10 μ m
Repeatability - Motorised ⁽¹⁾	1 μ m

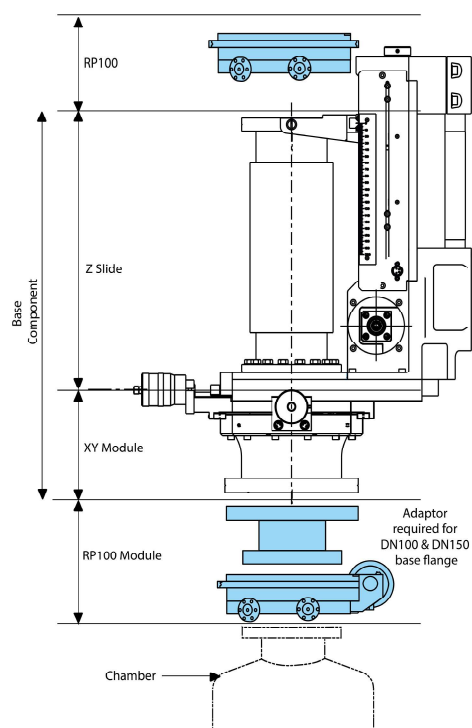
WB Omniax XY stage Module

Base flange	Travel Range	Order code
DN100 (152 mm)	Z-only ± 0 mm	MMWT006E
DN100 (152 mm)	± 12.5 mm or ± 25.0 mm Stage	MMWT256E
DN150 (203 mm)	Z-only ± 0 mm	MMWT008E
DN150 (203 mm)	± 12.5 mm or ± 25.0 mm Stage	MMWT258E
XY MODULE Drive Options ⁽²⁾		
± 25 mm Micrometer	MXY25	
XY Axis Stepper Motor ⁽¹⁾	MXYSM	
XY Axis Encoder ⁽¹⁾	MXYSME	

(1) Drive is assembled to stepper motor 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

Omniax Wide Bore RP100 Modules



Product Overview

- The RP100 can be mounted to the top flange for rotation about the centre line of the bore.
- Vertically mounted Wide Bore Omniax manipulators can also be rotated by fitting a RP100 between the base flange and chamber using a straight connector. This will give you a planetary rotation.
- Manual, motorised or encoded versions

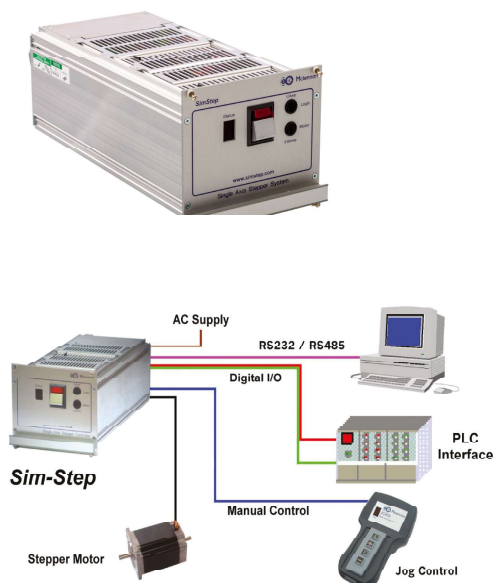
Omniax differentially pumped rotary modules and accessories

RP100 Module	Order Code
RP100 with Coarse manual actuator	ZRP100C
RP100 with Precision manual actuator	ZRP100H
RP100 with Stepper motor ⁽¹⁾	ZRP100W
RP100 with encoder	ZRP100E
Accessories	
Straight connector for RP100 mounting on DN100 base flange	ZBS1090
Straight connector 90mm Length Fixed 100CF too 150CF	ZBS101590

(1) Supplied with a wired connector to suit VACGEN stepper motor control system. A separate mating connector is available

Stepper Motor Controllers

Product Overview



- Single axis stepper motor controller
- Plug and play
- Link up to 99 units
- Rail voltage uses 36 V rail
- 400 half steps (0.9° per half step)
- 110 Vac or 240 Vac
- Open or closed loop as standard option
- Encoder lead required for closed loop

Preconfigured SIMSTEP Sets

Set	Voltage	Order Code
Controller with 5 m Lead Set	240 V	SIMSET 1
Controller with 5 m Lead Set	110 V	SIMSET 2

SIMSTEP and Accessories Customer Options

Description	Dimensions	Comments	Part Code
SIMSET Controller	240 V	3U Unit x 3rd Width	ZSIM240
SIMSET Controller	110 V	3U Unit x 3rd Width	ZSIM110
Eurocrate to fit up to 3 SIMSTEP		To Fit 1, 2 or 3 SIMSTEP	ZSIMBOX
Eurocrate blanking panels		To Fill Unpopulated Slot	ZSIMBLAN
Motor Cable	3 m	Parallel	ZMOTPL03
Motor Cable	5 m	Parallel	ZMOTPL05
Motor Cable	10 m	Parallel	ZMOTPL10
Limit Cable	3 m	For Microswitch Option	ZMOTLD03
Limit Cable	5 m	For Microswitch Option	ZMOTLD05
Limit Cable	10 m	For Microswitch Option	ZMOTLD10
Encoder Cable	3 m	For Encoder Motors Only	ZMOTEN03
Encoder Cable	5 m	For Encoder Motors Only	ZMOTEN05
Encoder Cable	10 m	For Encoder Motors Only	ZMOTEN10
USB to RS232 Cable		Interface	ZSIMUSB
JOGBOX 1 / 2 axis		Up to 2 Axis	ZSIMJOG2
JOGBOX Link cables for 1 / 2 Axis		1 required per 2 controllers	ZJOLINK
JOGBOX Multiaxis		Up to 99 Axis	ZSIMJOGM
JOGBOX Link cables for Multiaxis		1 required per 2 controllers	ZJOGMULT
Mating Connector for Motor Lead		Where SIMSTEP is Not Supplied	ZSIMSMOT
Mating Connector for Encoder Lead		Where SIMSTEP is Not Supplied	ZSIMSENC
Mating Connector for Limit Lead		Where SIMSTEP is Not Supplied	ZSIMPDIN

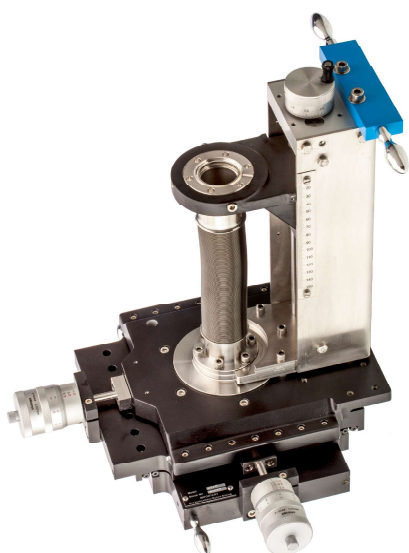
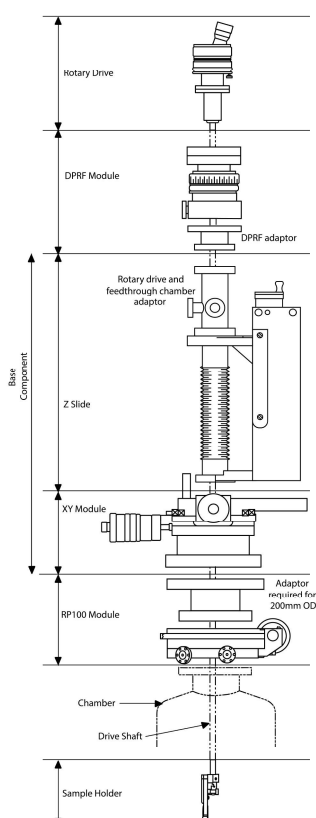
Modular Manipulators

Transax Manipulator Overview

The Transax is a fully UHV compatible double bellows manipulator, which is stable and versatile. It has a long travel range and is compatible with standard VACGEN sample handling equipment and rotary drive modules. Combines linear Z slide with an XY table bolted together to give a rigid interface for sample handling.



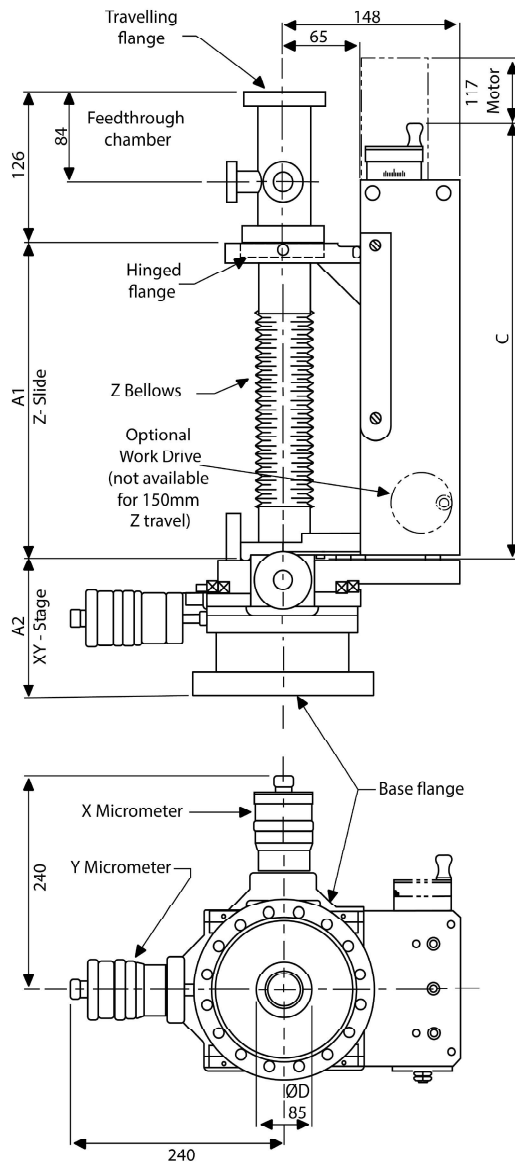
Product Overview



- Probe capacity of 32 mm clear bore diameter (28 mm OD with support tube)
- Support tube with secondary support bearing in X/Y
- Improve sample stability by more than 5 times that of a cantilevered support tube
- Z travels of 150 mm, 300 mm, 450 mm and 600 mm
- XY vectorial travel up to ± 25 mm with 32mm OD support tube
- Eliminates bi-metal deformation even after repeated bakeouts to 230°C
- Manual or motor (stepper) operated
- Motors are simple to remove for bakeout
- Interchangeable modules for upgrading
- Mounting in any orientation (support stand required for horizontal mounting)
- More cost effective solution than the OMNIAX where extreme rigidity is not needed
- If required the support tube can be rotated using a DPRF
- Optional cooling
- Clearance required underneath the Transax to mount
- Support stand on horizontal versions only
- Base flange has clearance double bolt holes
- Micrometers have 5 micron graduations
- Micrometers interchangeable with the motor modules
- Max Load 10kg
- A removable index pin through the XY stage indicates the central position and acts as a transit lock. It must be removed before use

Modular Manipulators

Transax Manipulator Modules



Transax Z slide - Basic Dimensions

Z travel mm	A1 mm	C mm	Weight ⁽¹⁾ kg
150	129 to 279	360	22
300	166 to 466	545	24
450	202 to 652	731	25
600	215 to 815	871	27

Transax Z slide - Technical Data

Parameters	Specification
Resolution- Manual	10 μm
Resolution- Motorised ⁽¹⁾	5 μm
Repeatability- Manual	10 μm
Repeatability- Motorised ⁽¹⁾	5 μm
Maximum speed- Motorised ⁽¹⁾	10 mm.s ⁻¹

Transax XY Module - Basic Dimensions

XY travel	Basic Code of XY stage mm	A2 mm	Bellows Bore \varnothing D mm
± 0	Z only	80	95
± 12.5 or ± 25.0	X + Y Table	167	85

Transax XY - Technical Data

Parameters	Specification
Resolution- Manual	5 μm
Resolution- Motorised ⁽¹⁾	0.5 μm
Repeatability- Manual	5 μm
Repeatability- Motorised ⁽¹⁾	5 μm 1 μm 1 μm

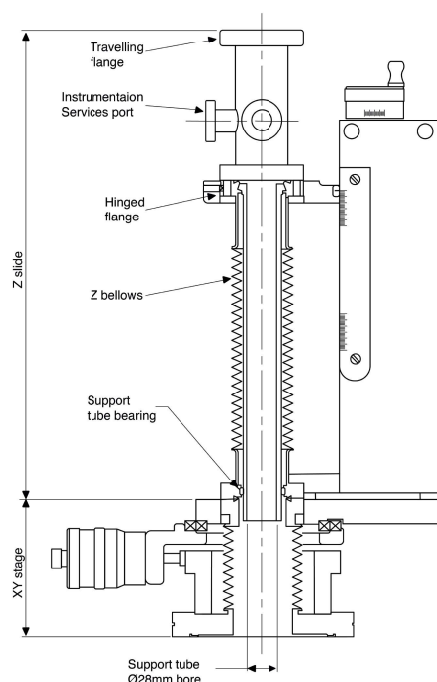
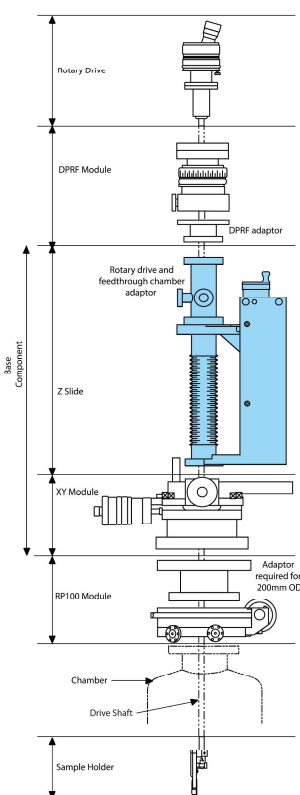
Modular Manipulators

Transax Manipulator Z Slide Modules



Product Overview

- Included feedthrough chamber has 3 radial mini ports
- If cooling is required, one port is used as a liquid nitrogen feedthrough.
- Rotary drives require a feedthrough chamber.
- Manual Z drive included has a rapid action of 2mm linear travel per turn of the handwheel.
- Long travel Transax manipulators (above 150 mm) can have a worm drive option fitted to bring the handwheel position close to the base flange. This option gives 0.5 mm travel per turn
- Motor and encoder options wired with plug to suit all VACGEN controllers
- Limit switches and mounting hardware provided with motor option.
- Top flange has clearance bolt holes



Transax Z slide Modules and Accessories

Travel Range	Order code
150 + XY Table ⁽²⁾	MTXYZ1506
300 + XY Table ⁽²⁾	MTXYZ3006
450 + XY Table ⁽²⁾	MTXYZ4506
600 + XY Table ⁽²⁾	MTXYZ6006
Z axis Stepper Motor Upgrade ⁽¹⁾	MTRSMKW
Z axis Encoder Motor Upgrade ⁽¹⁾	MTRSMKE
Worm Drive Upgrade (Not for 150 mm travel)	MTRWD

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

(2) ±12.5 or ±25.0 options available

Transax XYZ stage module accessories

XY Travel Option	Order code
Z Axis Stepper motor	MZSM
Z Axis Stepper motor Encoder	MZSME
X Axis Stepper Motor ⁽¹⁾	MXYSM
Y Axis Stepper Motor ⁽¹⁾	MXYSM
X Axis Stepper Motor Encoder ⁽¹⁾	MXYSME
Y Axis Stepper Motor Encoder ⁽¹⁾	MXYSME
X Axis Micrometer +/- 12.5 mm ⁽¹⁾	MXY12
Y Axis Micrometer +/- 25 mm ⁽¹⁾	MXY25

All dimensions in mm unless otherwise stated.

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

Modular Manipulators

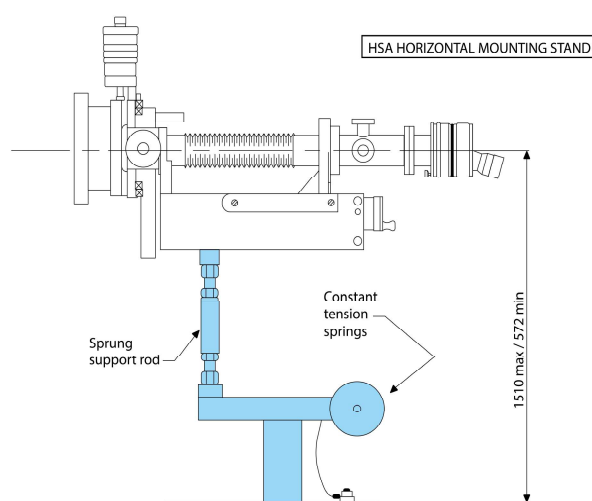
Transax Manipulator Mounting Stand Modules

All horizontally mounted Transax manipulators require a support stand to prevent damage to the chamber and translator. The stand allows the Z Slide to move freely in the XY plane and limits stresses on the chamber port, bearings and drive components.



Product Overview

- MHSA Stand is required for all horizontally mounted Transax manipulators. This reduces load on the micrometers and translator components, but allows free movement of the X and Y axes.
- Clearance required underneath the Transax to mount this support stand.



Transax Support Stand	
Travel Range (mm)	Part Code
150 - 300 - 450	MHSA06
600	MHSA07

Modular Manipulators

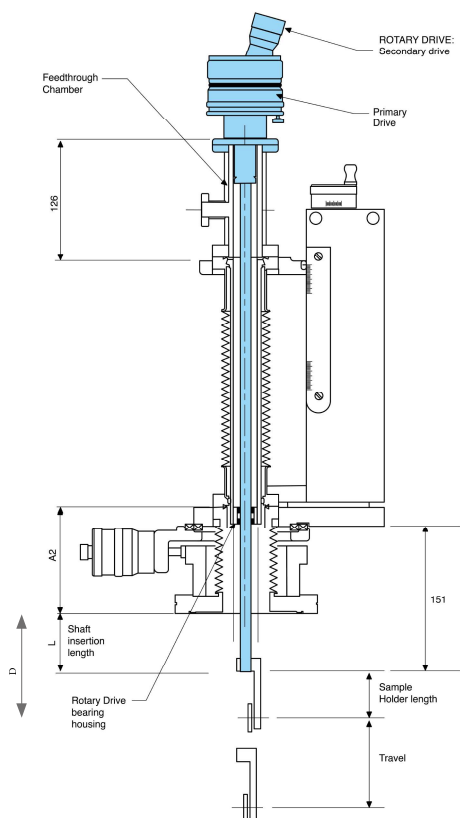
Transax Manipulator Rotary Drive Modules

Sample rotation modules for primary and secondary axis rotation. Rotation can be manual or motorised dependent on application.



Product Overview

- Drives are based on the RD1 for primary rotation (R1) only, or RD2 for primary rotation (R1) and secondary (R2) movement (Azimuthal)
- Feedthrough chamber must be fitted to mount rotary drive
- Rotary drive shaft insertion length options, L or D can be made to suit customer requirements
- All sample services pass through support tube securing all electrical wires and cooling tubes
- VACGEN stepper motors are compatible with SIMSTEP motor controllers.
- Motor and encoder options wired with plug to suit VACGEN controllers
- Limit switches provided with motor option



Transax XY Stage Modules and Accessories

Rotary drive module		Order code
Variable length rotary drive	R1 only	MR1T
Variable length rotary drive	R1 + secondary $\pm 90^\circ$	MR2T
Variable length rotary drive	R1 + secondary $\pm 180^\circ$	MR224T
Rotary drive motorisation		
Stepper motor upgrade for primary axis ⁽¹⁾	R1 Rotation	MRDPMS
Stepper motor upgrade for secondary axis ⁽¹⁾	R2 Rotation	MRDSMS
Encoder motor upgrade for primary axis ⁽¹⁾	R1 Rotation	MRDPME
Encoder motor upgrade for secondary axis ⁽¹⁾	R2 Rotation	MRDSME

L Dimension Limitations with Cooling Accessory Fitted

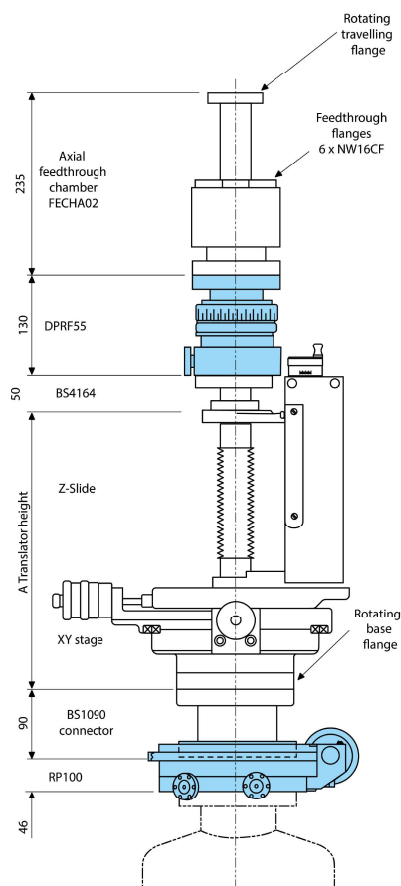
XY stage module	Travel mm	A2 mm	L dimension minimum mm
T208	± 25.0	167	10

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

Modular Manipulators

Transax Manipulator DPRF552 and RP100 Rotary Feedthrough 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. The DPRF552 range is dual differentially pumped.



Product Overview

DPRF can be fitted to the top flange to provide rotation for such components like the cold finger

- To allow the support tube to rotate, the support tube is connected to the rotating flange of the DPRF552. The DPRF552 can be mounted, via a tubulated adaptor, to the hinged flange.
- If the instrumentation services are to rotate, this requires axial feedthrough chamber (ZFECHA02) to be fitted to the rotating flange of the DPRF552. This replaces the standard radial feedthrough chamber and includes a central port suitable for mounting a rotary drive
- RP100 fitted to the base flange to give planetary rotation.
- Vertically mounted Transax manipulators can be rotated by fitting an RP100 between the Transax base flange and chamber using a ZBS1090 straight connector to give planetary rotation.
- Note the RP100 has tapped NW100CF (152 mm OD) flanges both sides. A BS1090 straight connector is therefore required when mounting to the base flange of the T208 XY stages.

Transax Dual Differentially Pumped Rotary Modules and Accessories

DPRF Module	Order code
DPRF552 with Coarse manual actuator	ZDPRF552
DPRF552 with Precision manual actuator	ZDPRF552H
DPRF552 with Stepper motor ⁽¹⁾	ZDPRF552W
DPRF552 with encoder	ZDPRF552E
RP100 Module	
RP100 with Coarse manual actuator	ZRP100C
RP100 with Precision manual actuator	ZRP100H
RP100 with Stepper motor ⁽¹⁾	ZRP100W
RP100 with encoder	ZRP100E
Accessories	
Axial Feedthrough chamber	ZFECHA02
Straight connector of RP100 mounting	ZBS1090
Straight connector of DPRF mounting	ZBS4164

(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

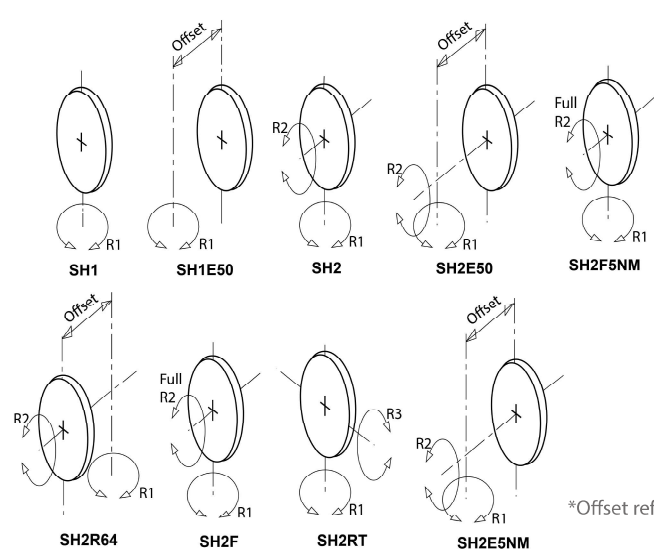
Transax Manipulator Sample Handling Equipment Modules

Sample Holders - Basic Specifications

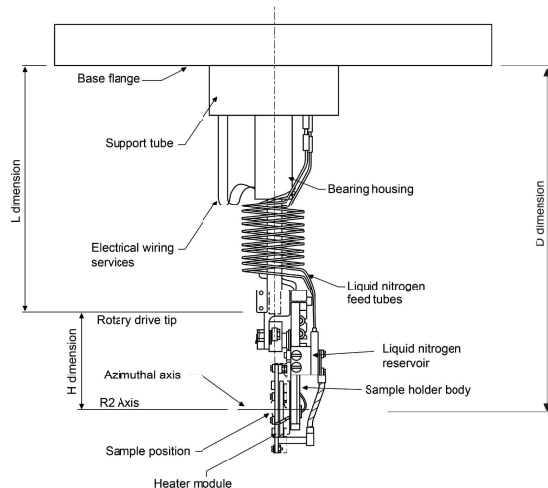
Part code	SH1	SH1E50	SH2	SH2E50	SH2F	SH2RT	SH2E5NM	SH2R64	SH2F5NM
Rotary Drive Required	RD1	RD1	RD2	RD2	RD224	RD2	RD2	RD2	RD224
Primary (R1) Rotation									
No services	360°	360°	360°	360°	360°	360°	360°	360°	360°
With services fitted	±180°	±180°	±180°	±180°	±180°	±180°	±180°	±180°	±180°
Azimuthal (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



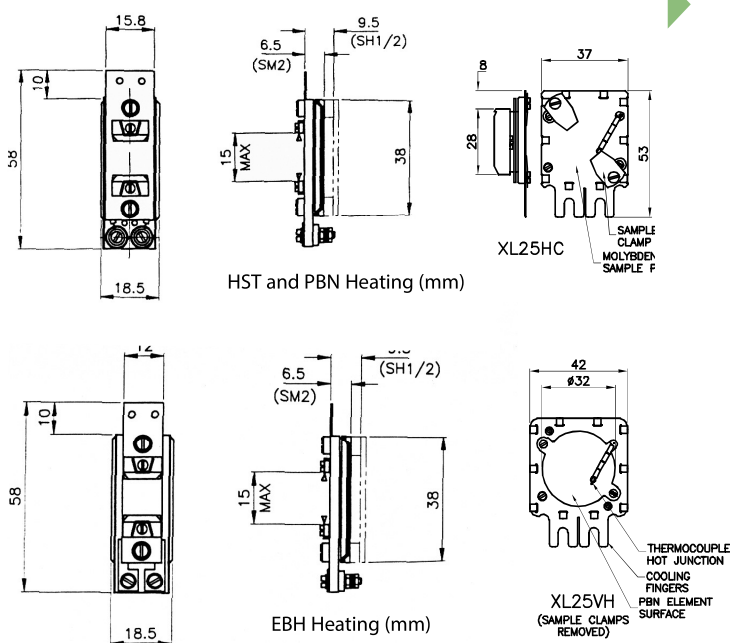
*Offset refers to E Offset



Modular Manipulators

Sample Heating

Resistive and electron beam heaters can be fitted to all sample holders.



Product Overview

- HST (Resistive) is a cost effective heater which uses a tungsten wire filament - max temp 950°C
- PBN (Resistive) is a long life heater which uses Pyrolytic Boron Nitride element - max temp 950°C
- EBH (Electron Beam) is a rapid, high temperature heater which uses a Thoriated Iridium filament - max temp 1200°C
- XL25 HC (Resistive) PBN heater version max temp 1000°C for samples up to 25 mm
- XL25 VH (Resistive) PBN heater version max temp 1200°C for samples up to 25mm
- Recommended for heating above 900°C for maximum 1 minute only

Heaters and Accessories

Heater and Accessories	Order Code
Omicron Fork with EBH Heater (<1200°C)	Z0MEBHFF
Omicron Pincer with EBH Heater (<1200°C)	Z0MEBHHP
Omicron Fork with PBN Heater (<1000°C)	Z0MPBNHF
Omicron Pincer with PBN Heater (<1000°C)	Z0MPBNHP
Plain Carrier for 14 mm x 14 mm Samples	ZSPA14
Plain Carrier for 25 mm x 25 mm Samples	ZSPA25
Standard 14 mm HST	ZHSTSHLM
Standard 14 mm EBH	ZEBHSMNM
Standard 14 mm PBN	ZPBNSHLM
XL25 with VH Heater (-80°C < +1200°C)	ZXL25VH
XL25 with HC Heater (-140°C < +1000°C)	ZXL25HC
XL25 with Plain carrier	ZXL25P
XL Receiver only	ZLREC

Dedicated Feedthrough Sets Power, Thermocouple and Bias

Manipulator	Heater Version	K Type	N Type
Transax	Resistive	HFEEDKR	HFEEDNR
Transax	Electron Beam	HFEEDKE	HFEEDNE
Transax	Resistive or Electron Beam Bias Kit	ZMXBIAS	ZMXBIAS

Thermocouple wiring

Wiring is 3m long pair covered with PTFE sleeve

Hot Junction end 210mm of ceramics to protect PTFE coating from heater

Heater wiring

1.5m length of 0.9mm single stranded OFC copper wire silver coated with PTFE sleeving

Resistive supplied with red and black wire

EBH supplied with red, black and green

Supplied with necessary fixings

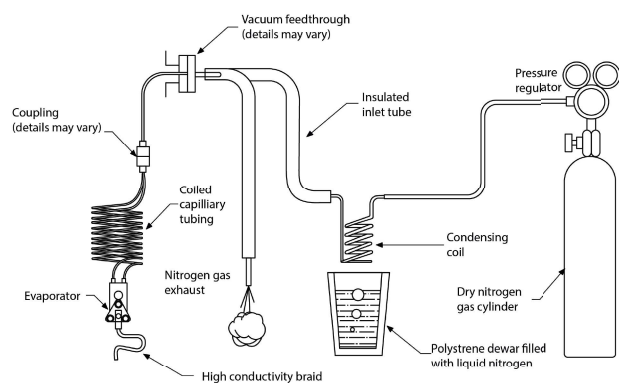
Modular Manipulators

Liquid Nitrogen Cooling

Liquid nitrogen cooling module (ZLN) can be fitted to all SH sample holders and all standard manipulators.



Product Overview



LIQUID NITROGEN COOLING SCHEMATIC

- Using the cooling on an SH sample holder allows both primary and secondary sample rotations and can achieve temperatures below -165°C (113 K) measured on the sample mounting plate
 - The LN cooling module can be combined with the resistive or the electron bombardment heating modules.
 - The heater controllers can monitor liquid nitrogen temperatures
 - To operate the LN cooling module efficiently and safely, the LNHX accessory kit is recommended. This allows dry nitrogen gas from a pressurised gas bottle through a condensing coil inside liquid nitrogen dewar. The LNHX kit includes a condensing coil and polystyrene dewar with insulated connecting tubes
- Normal running pressure 0.5 - 1 bar

Dedicated LN Cooling Kit and Accessories

Manipulator	Cooling Option	Cooling Accessory Kit	Spare Cooling Coupling Seal Gaskets
Transax	TXCOOL ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾

(1) These are generic part codes and we will require more detail to build the correct cooling to fit the manipulator

(2) Two gaskets per cooling required as spares only (this pack contains 5)

Dedicated Feedthrough Set - Thermocouple only

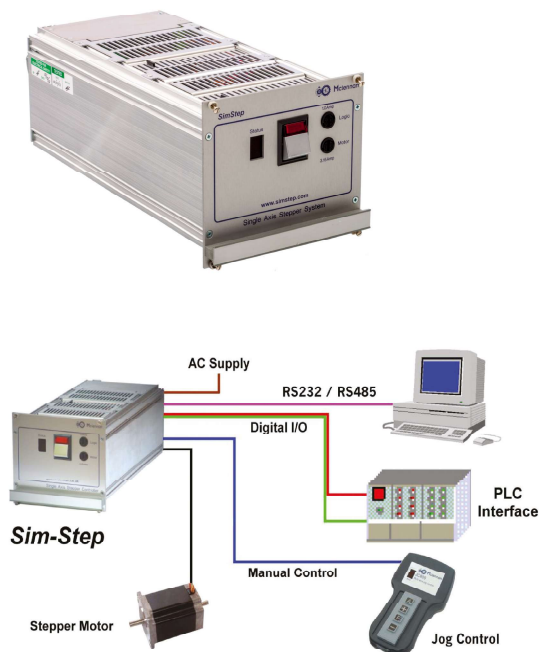
Manipulator	K Type	N Type
Transax	HFEEDK	HFEEDN

Note

Wiring is 3m long pair covered with PTFE sleeve

Hot Junction end 210mm of ceramics to protect PTFE coating from heater

Stepper Motor Controllers



Product Overview

- Single axis stepper motor controller
- Plug and play
- Link up to 99 units
- Rail voltage uses 36 V rail
- 400 half steps (0.9° per half step)
- 110Vac or 240Vac
- Open or closed loop as standard options
- Encoder lead required for closed loop option

Preconfigured SIMSTEP Sets

Set	Voltage	Order Code
Controller with 5m Lead Set	240V	SIMSET 1
Controller with 5m Lead Set	110V	SIMSET 2

SIMSTEP and Accessories Customer Options

Description	Dimensions	Comments	Part Code
SIMSET Controller	240 V	3U Unit x 3rd Width	ZSIM240
SIMSET Controller	110 V	3U Unit x 3rd Width	ZSIM110
Eurocrate to fit up to 3 SIMSTEP		To Fit 1, 2 or 3 SIMSTEP	ZSIMBOX
Eurocrate blanking panels		To Fill Unpopulated Slot	ZSIMBLAN
Motor Cable	3 m	Parallel	ZMOTPL03
Motor Cable	5 m	Parallel	ZMOTPL05
Motor Cable	10 m	Parallel	ZMOTPL10
Limit Cable	3 m	For Microswitch Option	ZMOTLD03
Limit Cable	5 m	For Microswitch Option	ZMOTLD05
Limit Cable	10 m	For Microswitch Option	ZMOTLD10
Encoder Cable	3 m	For Encoder Motors Only	ZMOTEN03
Encoder Cable	5 m	For Encoder Motors Only	ZMOTEN05
Encoder Cable	10 m	For Encoder Motors Only	ZMOTEN10
USB to RS232 Cable		Interface	ZSIMUSB
JOGBOX 1 / 2 axis		Up to 2 Axis	ZSIMJOG2
JOGBOX Link cables for 1 / 2 Axis		1 required per 2 controllers	ZJOGLINK
JOGBOX Multiaxis		Up to 99 Axis	ZSIMJOGM
JOGBOX Link cables for Multiaxis		1 required per 2 controllers	ZJOGMULT
Mating Connector for Motor Lead		Where SIMSTEP is Not Supplied	ZSIMSMOT
Mating Connector for Encoder Lead		Where SIMSTEP is Not Supplied	ZSIMSENC
Mating Connector for Limit Lead		Where SIMSTEP is Not Supplied	ZSIMPDIN

Modular Manipulators

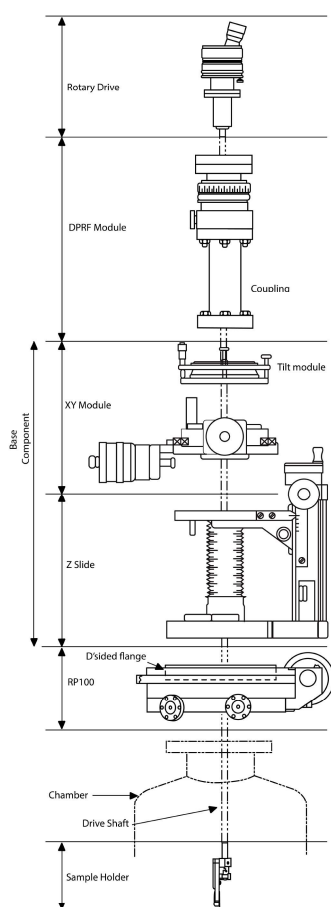
HPT WX Manipulator Modules

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 $\pm 12.5\text{mm}$ and can be fully motorised.

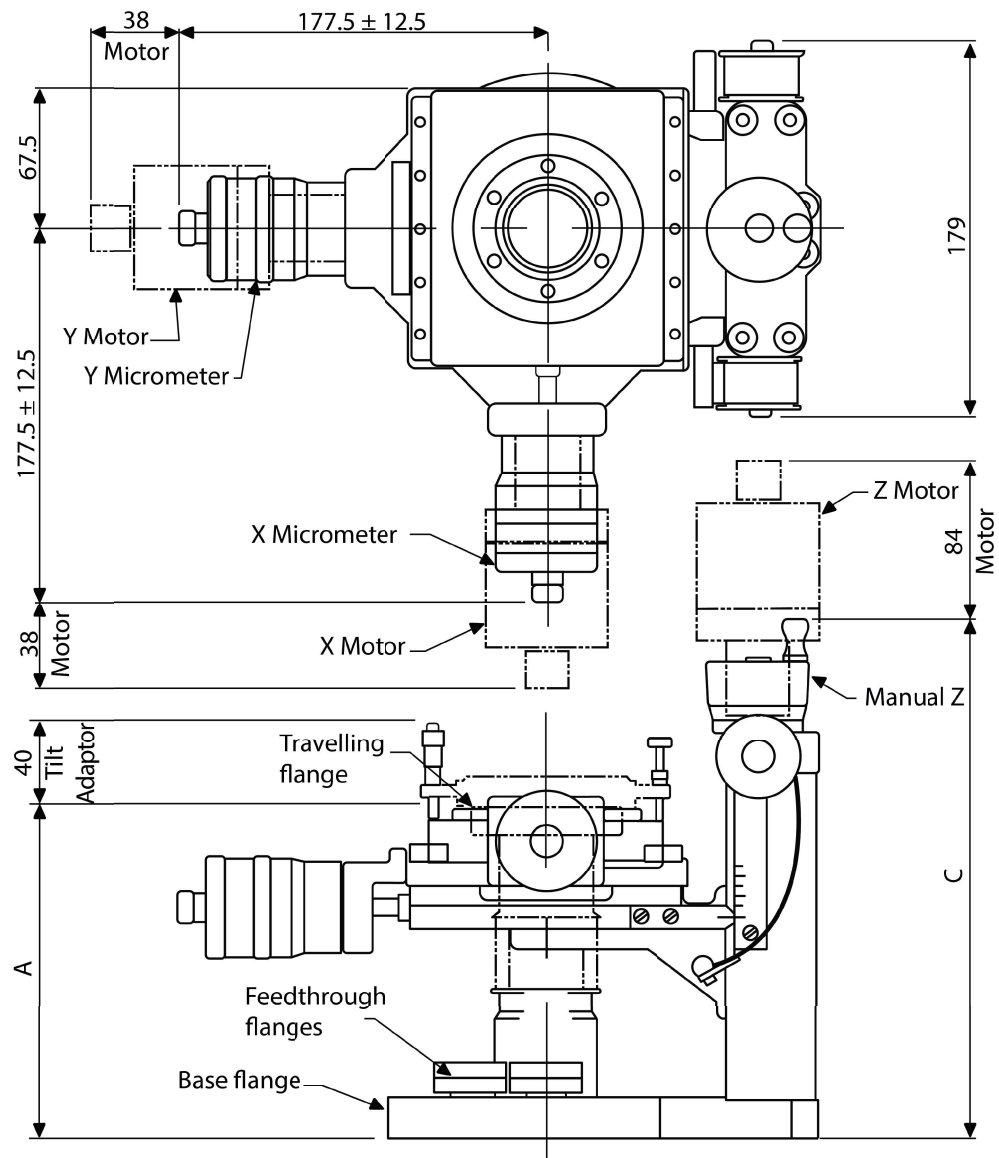


Product Overview

- 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 miniports for sample services
- 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 $\pm 12.5\text{mm}$
- X, Y and Z axes can be motorised
- Precision tilt adaptor option available
- XY stage uses all metal roller bearing V 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

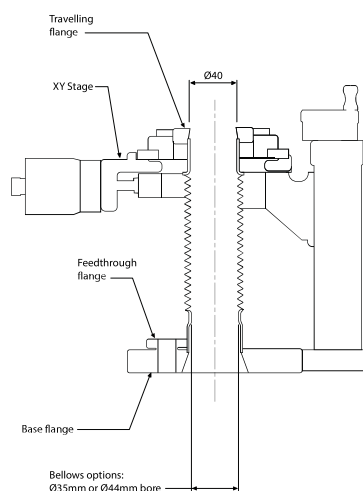
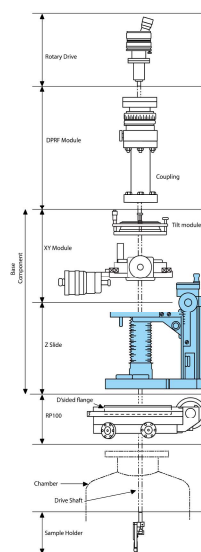


XYZ Modules, based on the HPT-WX dimensional reference

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

Modular Manipulators

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 (NW35CF). The holes are tapped M6 and straddled about the Y axis
- A manual Z-drive is included in the Z Slide module
- Motor and encoder options wired with plug to suit the VACGEN controller
- Limit switches 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

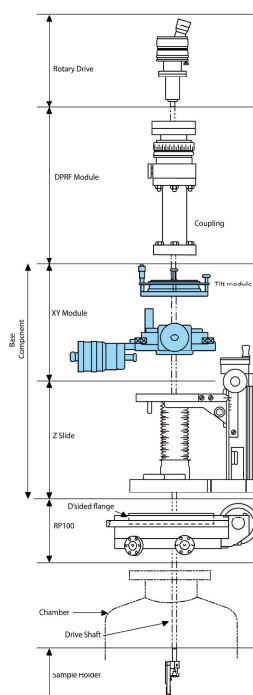
HPT Translators- HPT-WX Series

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.

Modular Manipulators

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 are easy 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 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

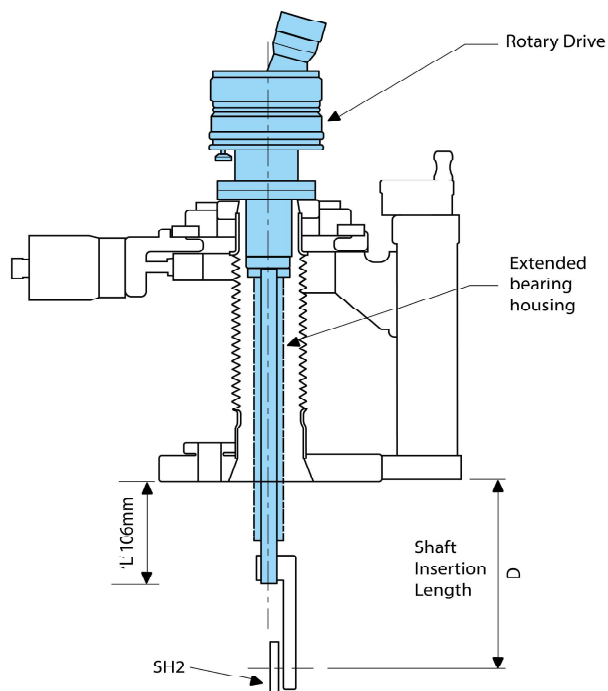
(1) Stepper motor is assembled to drive and is supplied with a wired connector to suit VACGEN stepper motor control system. A separate mating connector is available.

(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 (R1) and secondary (R2) 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

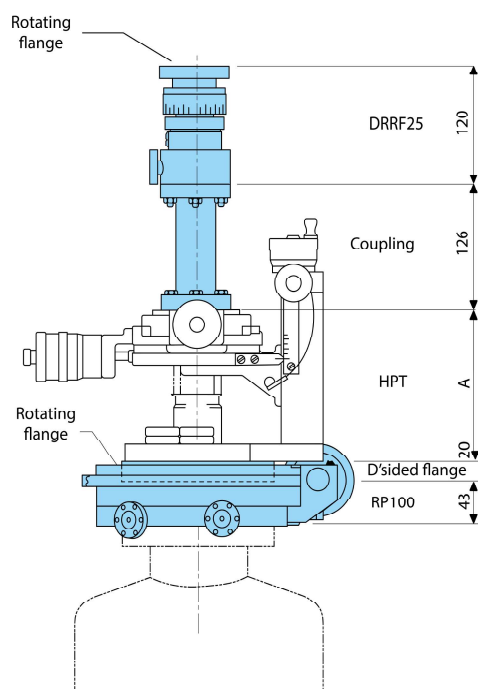
(1) Stepper motor option is supplied with a wired connector to suit SIMSTEP motor control system. A separate mating connector is available.

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

Modular Manipulators

HPT Manipulator DPRF 25 & RP100 Rotary Feedthrough Mod-

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.



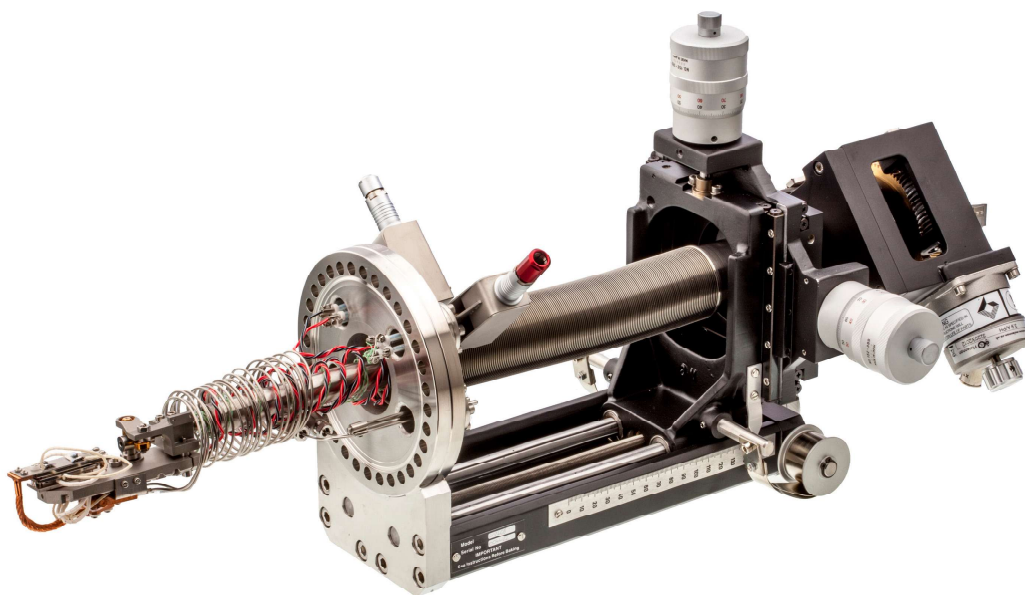
Product Overview

- 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. This will give planetary movement.

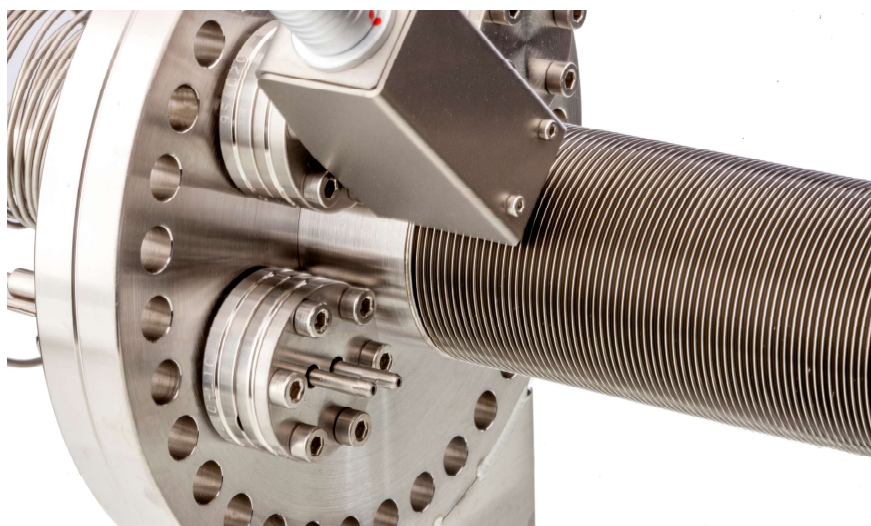
HPT Differentially Pumped Rotary modules and accessories

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



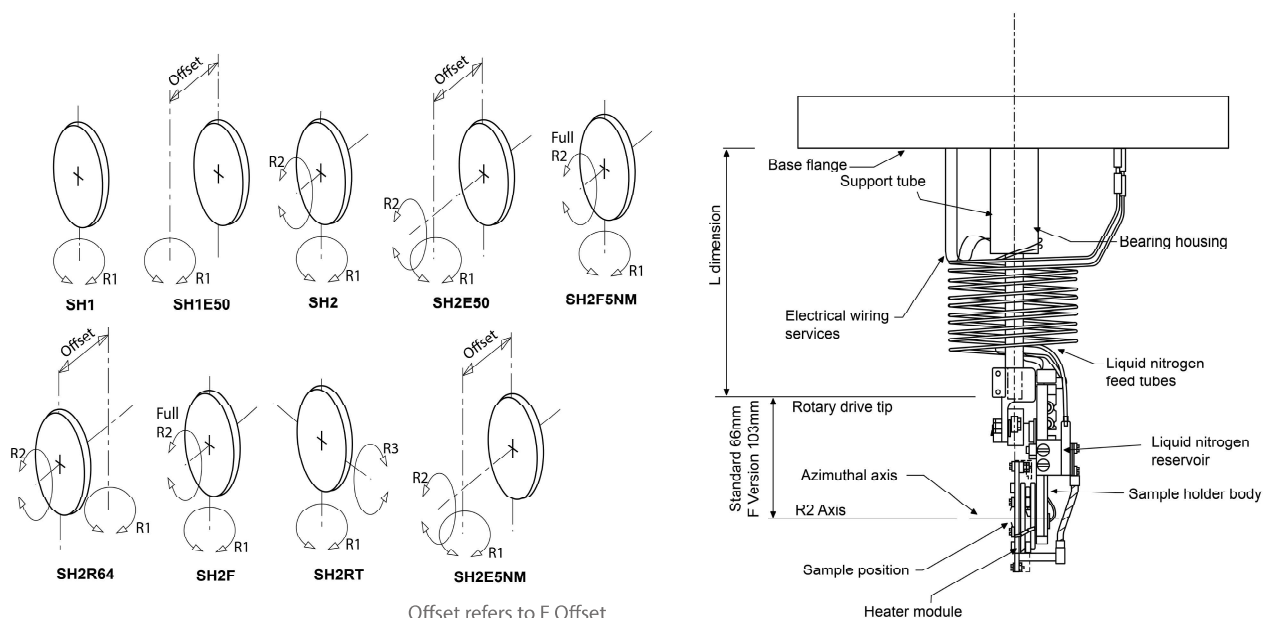
Heating and cooling services

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

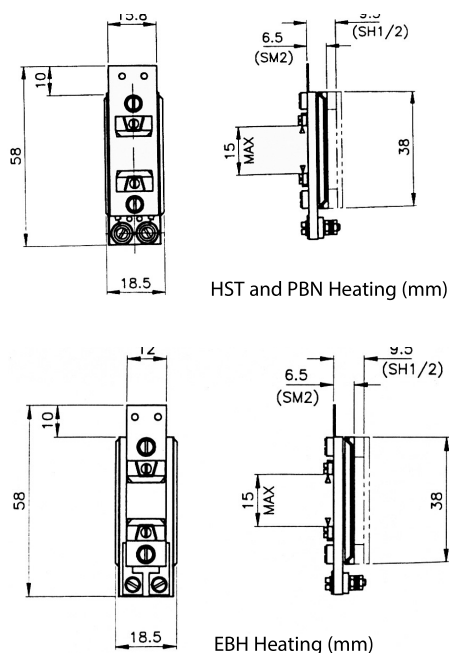
** E Offset: This is the distance between the centre line of the R1 rotation axis and the backplate of the sample mount or substrate face



Modular Manipulators

Sample Heating

Resistive and electron beam heaters can be fitted to all sample holders.



Product Overview

- HST (Resistive) is a cost effective heater which uses a tungsten wire filament- max temp 950°C
- PBN (Resistive) is a long life heater which uses Pyrolytic Boron Nitride element- max temp 950°C
- EBH (Electron Beam) is a rapid, high temperature heater which uses a Thoriated Iridium filament - max temp 1200°C
- Recommended for heating above 900°C for maximum of 1 minute.

Heaters and Accessories

Heater and Accessories	Order Code
Omicron Fork with EBH Heater (<1200°C)	ZOMEBHHF
Omicron Pincer with EBH Heater (<1200°C)	ZOMEBHHP
Omicron Fork with PBN Heater (<1000°C)	ZOMPNHMF
Omicron Pincer with PBN Heater (<1000°C)	ZOMPNHNP
Plain Carrier for 14 mm x 14 mm Samples	ZSPA14
Plain Carrier for 25 mm x 2.5 mm Samples	ZSPA25
Standard 14mm HST	ZHSTSHLM
Standard 14mm EBH	ZEBHSMNM
Standard 14mm PBN	ZPBNSHLM

Dedicated Feedthrough Sets Power, Thermocouple and Bias

Manipulator	Heater Version	K Type	N Type
HPT-WX	Resistive	HFEEDKR	HFEEDNR
HPT-WX	Electron Beam	HFEEDKE	HFEEDNE
HPT-WX	Resistive or Electron Beam Bias Kit	ZMXBIAS	ZMXBIAS

Thermocouple wiring

Wiring is 3m long pair covered with PTFE sleeve

Hot Junction end 210 mm of ceramics to protect PTFE coating from heater

Heater wiring

1.5m length of 0.9mm single stranded OFC copper wire silver coated with PTFE sleeving

Resistive supplied with red and black wire

EBH supplied with red, black and green

Supplied with necessary fixings

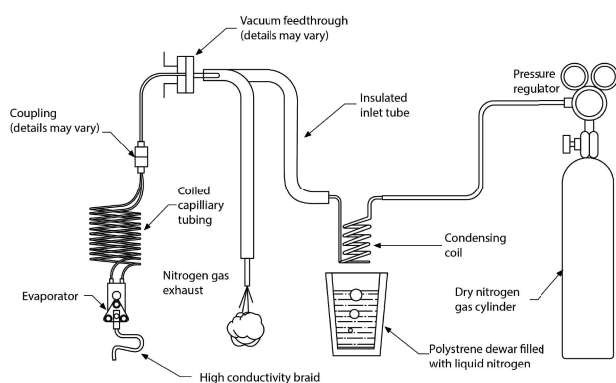
Modular Manipulators

Liquid Nitrogen Cooling

Liquid nitrogen cooling module (ZLN) can be fitted to all SH sample holders and all standard manipulators.



Product Overview



LIQUID NITROGEN COOLING SCHEMATIC

- Using the cooling on an SH sample holder allows both primary and secondary sample rotations and can achieve temperatures below -165°C (113 K) measured on the substrate mounting plate without sample fitted
 - The LN cooling module can be combined with the resistive or the electron bombardment heating modules.
 - The heater controllers can monitor liquid nitrogen temperatures
 - To operate the LN cooling module efficiently and safely, the LNHX accessory kit is recommended. This allows dry nitrogen gas from a pressurised gas bottle through a condensing coil inside a liquid nitrogen dewar. The LNHX kit includes a condensing coil and polystyrene dewar with insulated connecting tubes
- Normal running pressure 0.5 - 1 bar

Dedicated LN Cooling Kit and Accessories			
Manipulator	Cooling Option	Cooling Accessory Kit	Spare Cooling Coupling Seal Gaskets
HPT-WX / Miniax 50 mm	RXCOOL050 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾
HPT-WX / Miniax 100 mm	RXCOOL100 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾
HPT-WX 150 mm	RXCOOL150 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾
HPT-WX 250 mm	RXCOOL250 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾

(1) These are generic part codes and we will require more detail to build the correct cooling to fit the manipulator

(2) Two gaskets per cooling required as spares only (this pack contains 5)

Dedicated Feedthrough Set - Thermocouple only		
Manipulator	K Type	N Type
HPT-WX	HFEEDK	HFEEDN

Note

Wiring is 3 m long pair covered with PTFE sleeve

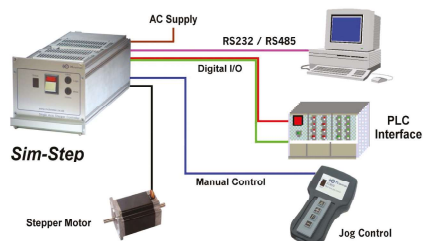
Hot Junction end 210 mm of ceramics to protect PTFE coating from heater

Stepper Motor Controllers



Product Overview

- Single axis stepper motor controller
- Plug and play
- Link up to 99 units
- Rail voltage uses 36 V rail
- 400 half steps (0.9° per half step)
- 110 Vac or 240 Vac
- Open or closed loop as standard option
- Encoder lead required for closed loop option



Preconfigured SIMSTEP Sets

Set	Voltage	Order Code
Controller with 5m Lead Set	240V	SIMSET 1

SIMSTEP and Accessories Customer Options

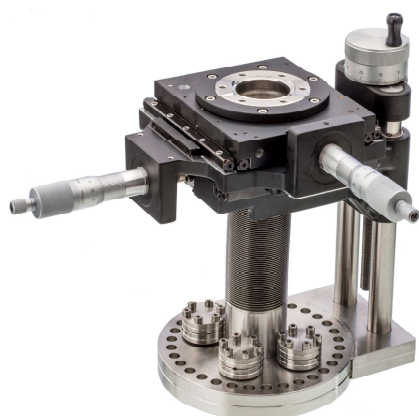
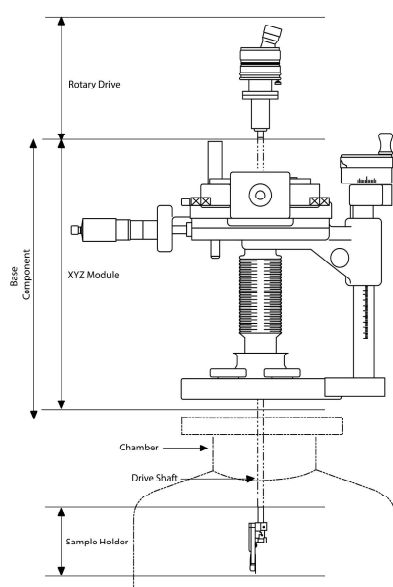
Description	Dimensions	Comments	Part Code
SIMSET Controller	240 V	3U Unit x 3rd Width	ZSIM240
SIMSET Controller	110 V	3U Unit x 3rd Width	ZSIM110
Eurocrate to fit up to 3 SIMSTEP		To Fit 1, 2 or 3 SIMSTEP	ZSIMBOX
Eurocrate blanking panels		To Fill Unpopulated Slot	ZSIMBLAN
Motor Cable	3 m	Parallel	ZMOTPL03
Motor Cable	5 m	Parallel	ZMOTPL05
Motor Cable	10 m	Parallel	ZMOTPL10
Motor Cable	3 m	Series ¹	ZMOTSL03
Motor Cable	5 m	Series ¹	ZMOTSL05
Motor Cable	10 m	Series ¹	ZMOTSL10
Limit Cable	3 m	For Microswitch Option	ZMOTLD03
Limit Cable	5 m	For Microswitch Option	ZMOTLD05
Limit Cable	10 m	For Microswitch Option	ZMOTLD10
Encoder Cable	3 m	For Encoder Motors Only	ZMOTEN03
Encoder Cable	5 m	For Encoder Motors Only	ZMOTEN05
Encoder Cable	10 m	For Encoder Motors Only	ZMOTEN10
USB to RS232 Cable		Interface	ZSIMUSB
JOGBOX 1 / 2 axis		Up to 2 Axis	ZSIMJOG2
JOGBOX Link cables for 1 / 2 Axis		1 required per 2 controllers	ZJOGLINK
JOGBOX Multiaxis		Up to 99 Axis	ZSIMJOGM
JOGBOX Link cables for Multiaxis		1 required per 2 controllers	ZJOGMULT
Mating Connector for Motor Lead		Where SIMSTEP is Not Supplied	ZSIMSMOT
Mating Connector for Encoder Lead		Where SIMSTEP is Not Supplied	ZSIMSENC
Mating Connector for Limit Lead		Where SIMSTEP is Not Supplied	ZSIMPDIN

(1) For Z Motor Only

Modular Manipulators

Miniax Modules

The Miniax XYZ manipulator offers a source of simple, low cost, manually driven manipulation. The single bellows construction makes it easy to use in any orientation. Despite the simple construction of the manipulator, the Miniax has good precision and is fully UHV compatible.



Product Overview

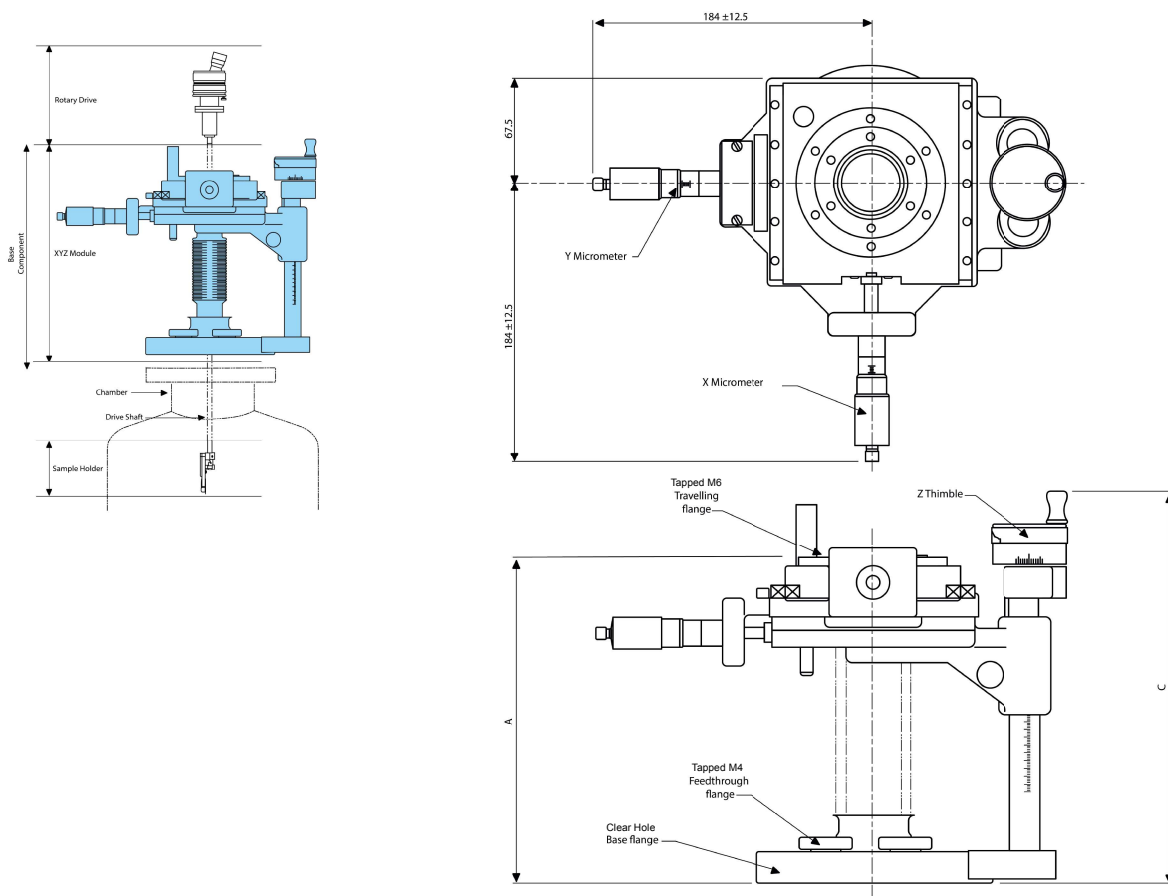
- Single edge - welded bellows for X, Y and Z movements
- All metal cross roller bearings for XY movements with plain bushings guiding the Z slide.
- Mounting in any orientation
- Bakeable to 180°C including micrometers
- Compatible with VACGEN sample handling and accessories, rotary drives and sample services
- Z travel options of 50 mm or 100 mm
- XY travel of ± 12.5 mm
- Standard base flange is 152 mm OD with double bolt hole clearance holes for mounting the translator. Four mini ports, tapped M4, are provided for service feedthroughs and cooling
- An optional 70 mm OD base flange is available. Note that this has no service ports. The flange has clearance holes straddled about the Y axis
- The travelling flange is 70 mm OD with straddled M6 tapped holes

Miniax Technical Data

X and Y Axes	Resolution	1 μ m
	Repeatability	5 μ m
Z Axis	Resolution	5 μ m
	Repeatability	10 μ m

Modular Manipulators

Miniax Modules



Basic XYZ Manipulation

Base flange OD		Z Travel	A	C	Order code
mm	Inch				
DN40 70 ⁽¹⁾	2.75	50	160 to 210	250	ZXYZ0570
DN40 70 ⁽¹⁾	2.75	100	160 to 260	301	ZXYZ1070
DN100 152	6.0	50	160 to 210	250	ZXYZ0515
DN100 152	6.0	100	160 to 260	301	ZXYZ1015

Modular Manipulators

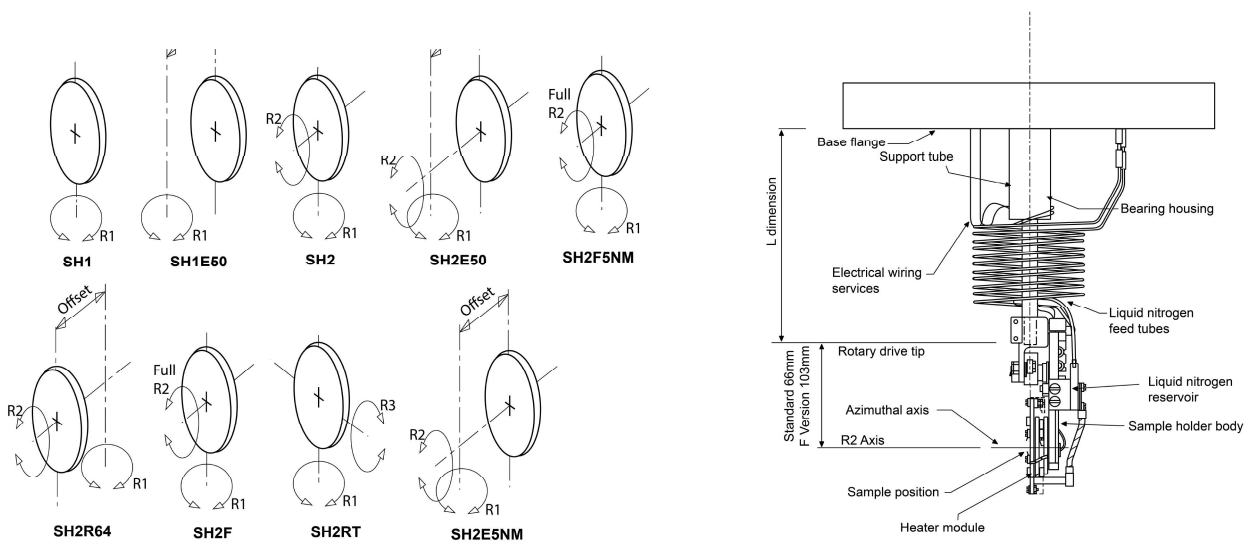
Miniax Modular

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

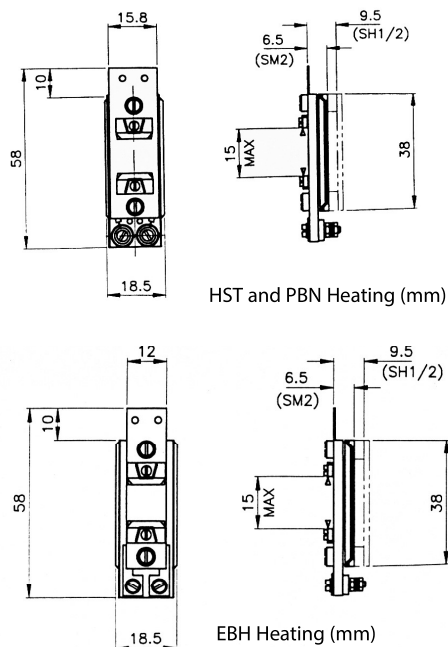


Offset refers to E Offset

Modular Manipulators

Sample Heating

Resistive and electron beam heaters can be fitted to all sample holders.



Product Overview

- HST (Resistive) is a cost effective heater which uses a tungsten wire filament- max temp 950°C
- PBN (Resistive) is a long life heater which uses Pyrolytic Boron Nitride element- max temp 950°C
- EBH (Electron Beam) is a rapid, high temperature heater which uses a Thoriated Iridium filament- max temp 1200°C
- Recommended for heating above 900°C for 1 minute only

Heaters and Accessories

Heater and Accessories	Order Code
Omicron Fork with EBH Heater (<1200°C)	ZOMEBHHF
Omicron Pincer with EBH Heater (<1200°C)	ZOMEBHHP
Omicron Fork with PBN Heater (<1000°C)	ZOMPBNHF
Omicron Pincer with PBN Heater (<1000°C)	ZOMPBNHP
Plain Carrier for 14mmx14mm Samples	ZSPA14
Plain Carrier for 25mmx25mm Samples	ZSPA25
Standard 14mm HST	ZHSTSHLM
Standard 14mm EBH	ZEBHSMNM
Standard 14mm PBN	ZPBNSHLM

Dedicated Feedthrough Sets Power, Thermocouple and Bias

Manipulator	Heater Version	K Type	N Type
Miniax	Resistive	HFEEDKR	HFEEDNR
Miniax	Electron Beam	HFEEDKE	HFEEDNE
Miniax	Resistive or Electron Beam Bias Kit	ZMXBIAS	ZMXBIAS

Thermocouple wiring

Wiring is 3m long pair covered with PTFE sleeve

Hot Junction end 210mm of ceramics to protect PTFE coating from heater

Heater wiring

1.5m length of 0.9mm single stranded OFC copper wire silver coated with PTFE sleeving

Resisted supplied with red and black wire

EBH supplied with red, black and green

Supplied with necessary fixings

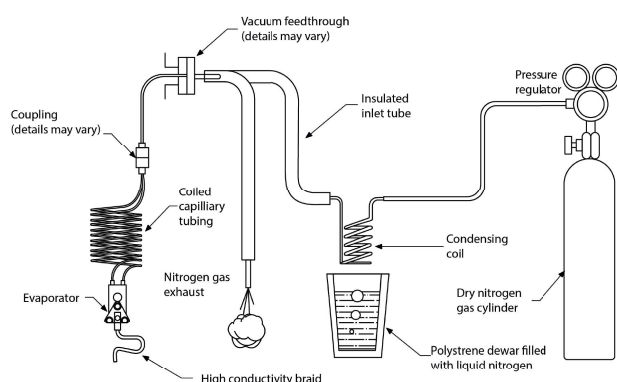
Modular Manipulators

Liquid Nitrogen Cooling

Liquid nitrogen cooling module (ZLN) can be fitted to all SH sample holders and all standard manipulators.



Product Overview



LIQUID NITROGEN COOLING SCHEMATIC

- Using the cooling on an SH sample holder allows both primary and secondary sample rotations and can achieve temperatures below -165°C (113 K) measured on the substrate mounting plate without a sample
 - The LN cooling module can be combined with the resistive or the electron bombardment heating modules.
 - The heater controllers can monitor liquid nitrogen temperatures
 - To operate the LN cooling module efficiently and safely, the LNHX accessory kit is recommended. This allows dry nitrogen gas from a pressurised gas bottle through a condensing coil inside a liquid nitrogen dewar. The LNHX kit includes a condensing coil and polystyrene dewar with insulated connecting tubes
- Normal running pressure 0.5 - 1 bar

Dedicated LN Cooling Kit and Accessories

Manipulator	Cooling Option	Cooling Accessory Kit	Spare Cooling Coupling Seal Gaskets
HPT-WX / MiniAx 50mm	RXCOOL050 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾
HPT-WX / MiniAx 100mm	RXCOOL100 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾

(1) These are generic part codes and we will require more detail to build the correct cooling to fit the manipulator

(2) Two gaskets per cooling required as spares only (this pack contains 5)

Dedicated Feedthrough Set - Thermocouple only

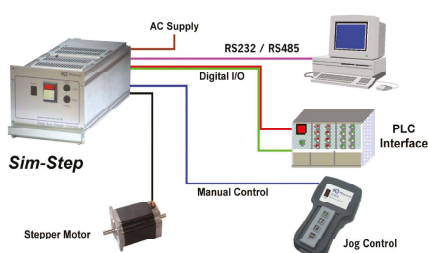
Manipulator	K Type	N Type
MiniAx	HFEEDK	HFEEDN

Note

Wiring is 3m long pair covered with PTFE sleeve

Hot Junction end 210mm of ceramics to protect PTFE coating from heater

Stepper Motor Controllers



Product Overview

- Single axis stepper motor controller
- Plug and play
- Link up to 99 units
- Rail voltage uses 36 V rail
- 400 half steps (0.9° per half step)
- 110 Vac or 240 Vac
- Open or closed loop as standard option
- Encoder lead required for closed loop option

Preconfigured SIMSTEP Sets

Set	Voltage	Order Code
Controller with 5m Lead Set	240 V	SIMSET 1
Controller with 5m Lead Set	110 V	SIMSET 2

SIMSTEP and Accessories Customer Options

Description	Dimensions	Comments	Part Code
SIMSET Controller	240 V	3U Unit x 3rd Width	ZSIM240
SIMSET Controller	110 V	3U Unit x 3rd Width	ZSIM110
Eurocrate to fit up to 3 SIMSTEP		To Fit 1, 2 or 3 SIMSTEP	ZSIMBOX
Eurocrate blanking panels		To Fill Unpopulated Slot	ZSIMBLAN
Motor Cable	3 m	Parallel	ZMOTPL03
Motor Cable	5 m	Parallel	ZMOTPL05
Motor Cable	10 m	Parallel	ZMOTPL10
Limit Cable	3 m	For Microswitch Option	ZMOTLD03
Limit Cable	5 m	For Microswitch Option	ZMOTLD05
Limit Cable	10 m	For Microswitch Option	ZMOTLD10
Encoder Cable	3 m	For Encoder Motors Only	ZMOTEN03
Encoder Cable	5 m	For Encoder Motors Only	ZMOTEN05
Encoder Cable	10 m	For Encoder Motors Only	ZMOTEN10
USB to RS232 Cable		Interface	ZSIMUSB
JOGBOX 1 / 2 axis		Up to 2 Axis	ZSIMJOG2
JOGBOX Link cables for 1 / 2 Axis		1 required per 2 controllers	ZJOGLINK
JOGBOX Multiaxis		Up to 99 Axis	ZSIMJOGM
JOGBOX Link cables for Multiaxis		1 required per 2 controllers	ZJOGMULT
Mating Connector for Motor Lead		Where SIMSTEP is Not Supplied	ZSIMSMOT
Mating Connector for Encoder Lead		Where SIMSTEP is Not Supplied	ZSIMSENC
Mating Connector for Limit Lead		Where SIMSTEP is Not Supplied	ZSIMPDIN

Sample Holder and Accessories

CONTENTS

SH1

SH2

Resistive Heating

Electron Bombardment (EB) Heating

Liquid Nitrogen Cooling

Plain Sample Accessories

XL25 Sample Holder

Motorisation

Glossary of Motion Control

Stepper Motor Controllers

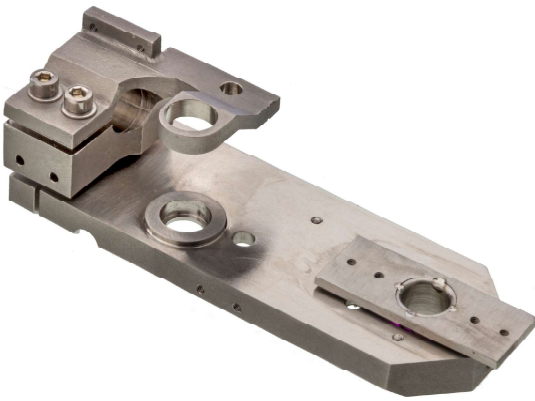
SH1 Sample Holders

The sample holder are the interface between the sample and the movements of the manipulator. They are attached to the tip of the rotary drive shaft and providing primary rotation (R1) to the sample holder and the connection for sample services such as heating or cooling.

The drive shaft passes through the bore of the manipulator to the end users specified length, inside the vacuum chamber allowing sample positioning in the retracted/extended position.

SH1 is used for primary rotation about the centre axis of the manipulator. For this range of sample holders, the primary rotation (R1) is actuated via the primary rotary drive mounted on top of the manipulators.

Back plate can be prepositioned in any orientation and locked in place to suit application.

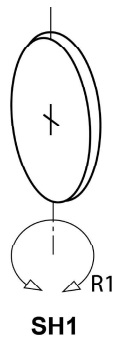


Product Overview

- Relative permeability is <1.005
- Samples of varying thickness can be rotated on axis by adjusting the sample holder offset (E)
- Standard Sample Offset, 9 to 12 mm (without heater)
- Sample offset with SH1E50 option 9 to 50 mm (without heater)
- Primary (R1) Rotation without services 360° continuous
- Primary (R1) Rotation With services i.e. heating and cooling $\pm 180^\circ$
- Swept Radius with no services 25 mm
- Shaft mounting hole size 9.5mm

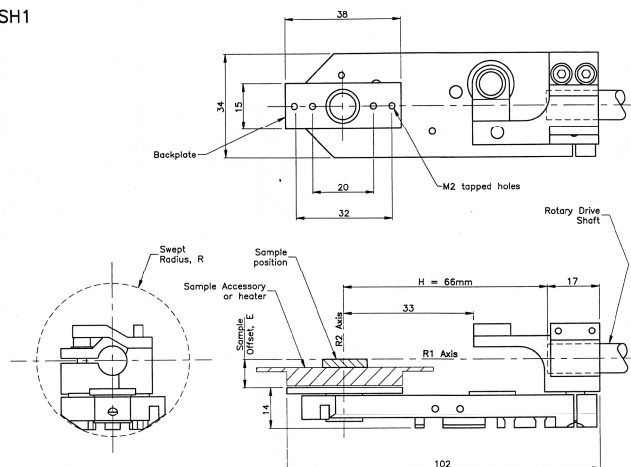
Accepts the following options

- PBN Resistive heater 950°C option
- HST Resistive heater 950°C option
- EBH heater 1200°C option
- LN Cooling -160°C option
- Heater version XL25, 18mm flag or 14mm disk
- 14 mm plain accessory where heating/cooling is not required
- 25 mm plain accessory where heating/cooling is not required



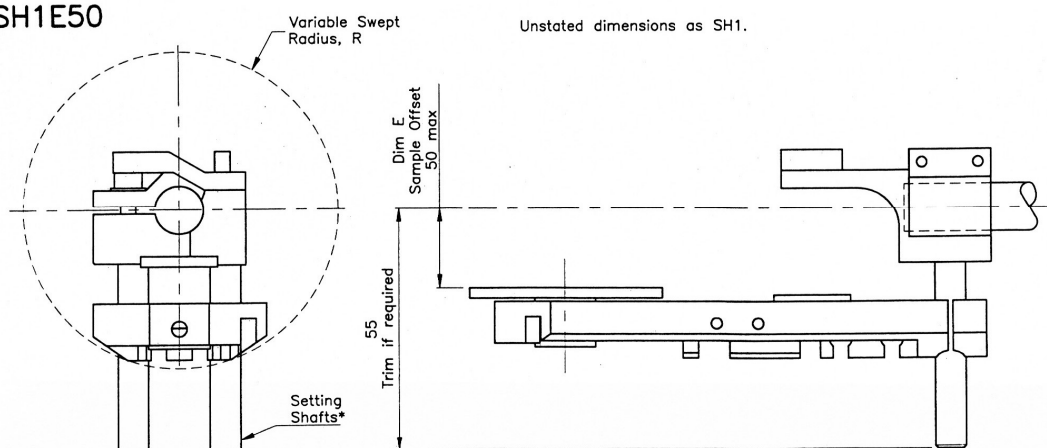
SH1 Sample Holders

SH1



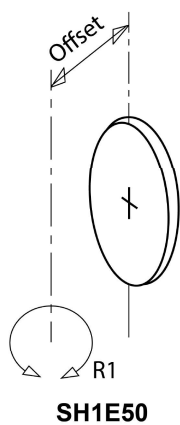
SH1 Sample Holder

SH1E50



*Shafts should be shortened to minimise Swept Radius.

Picture showing: SH1E50 Sample holder

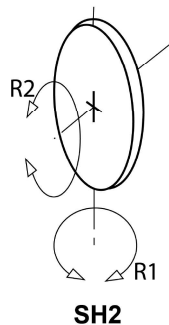
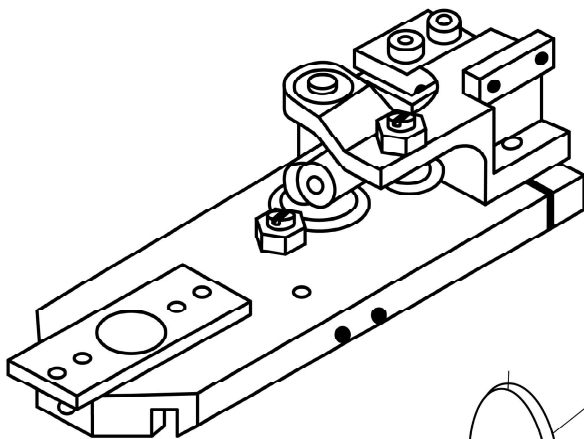
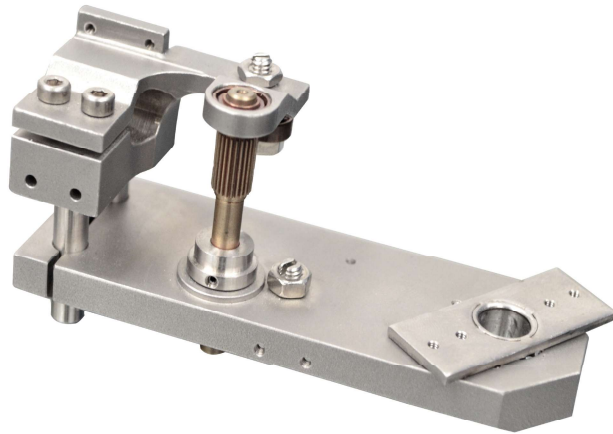


SH2 Sample Holders

The sample holder are the interface between the sample and the movements of the manipulator. They are attached to the tip of the rotary drive shaft and provide rotation for the sample holder (R1) and connection for sample services such as heating or cooling.

The SH2 has a dual drive for rotation (R1) about the centre line of the manipulator, and a push rod which drives the Azimuthal rotation (R2), perpendicular to the centre line of rotation.

The drive shaft passes through the bore of the manipulator to the correct length inside the vacuum chamber allowing sample positioning.



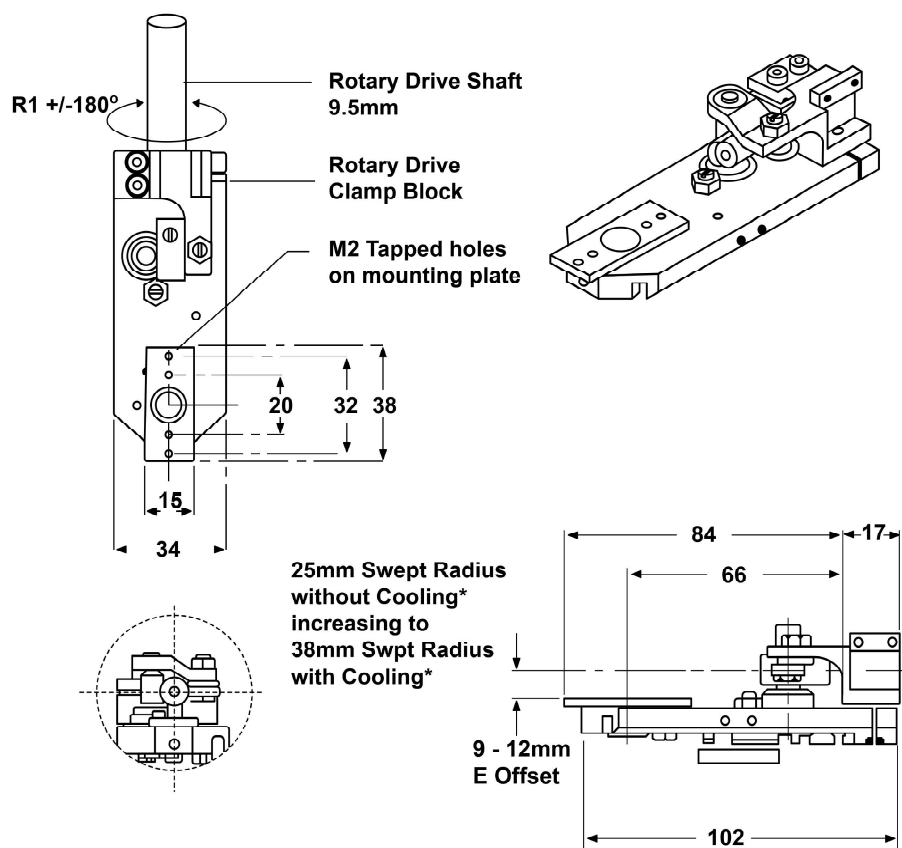
Product Overview

- Relative permeability is <1.005
- Samples of varying thickness can be rotated on axis by adjusting the sample holder offset (E)
- Standard Sample axial Offset, 9 to 12 mm (without heater)
- Sample axial offset with SH2E50 option 9 to 50mm (without heater)
- Primary (R1) Rotation without services 360° continuous
- Primary (R1) Rotation with services i.e. heating and cooling $\pm 180^\circ$
- Swept Radius with no services 25 mm
- Azimuthal (R2) rotation $\pm 110^\circ$ SH2 versions
- Azimuthal (R2) rotation $\pm 180^\circ$ SH2F versions (NOTE: $\pm 110^\circ$ with cooling)
- Shaft mounting hole size 9.5mm

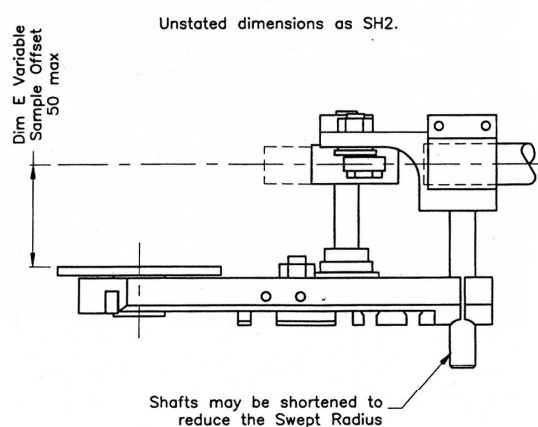
Accepts the following options

- PBN Resistive heater 950°C option
- HST Resistive heater 950°C option
- EBH heater 1200°C option
- LN Cooling -160°C option
- Heater version XL25, 18 mm flag or 14 mm disk
- 14 mm plain accessory where heating/cooling is not required
- 25 mm plain accessory where heating/cooling is not required

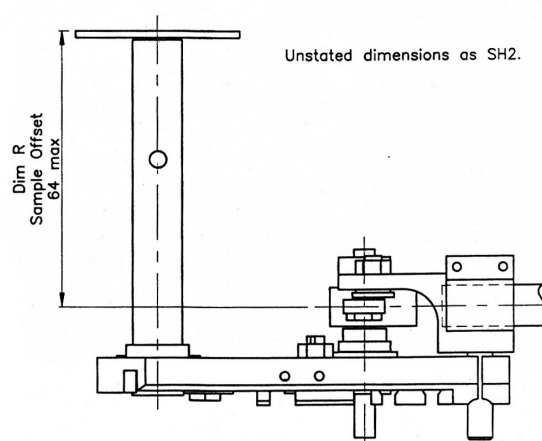
SH2 Sample Holders



SH2E50



SH2R64



Two different offset positions available as shown above;

- The SH2E50 will move the sample away from the centre axis,
- The SH2R64 moves the sample position 64mm above the central axis.

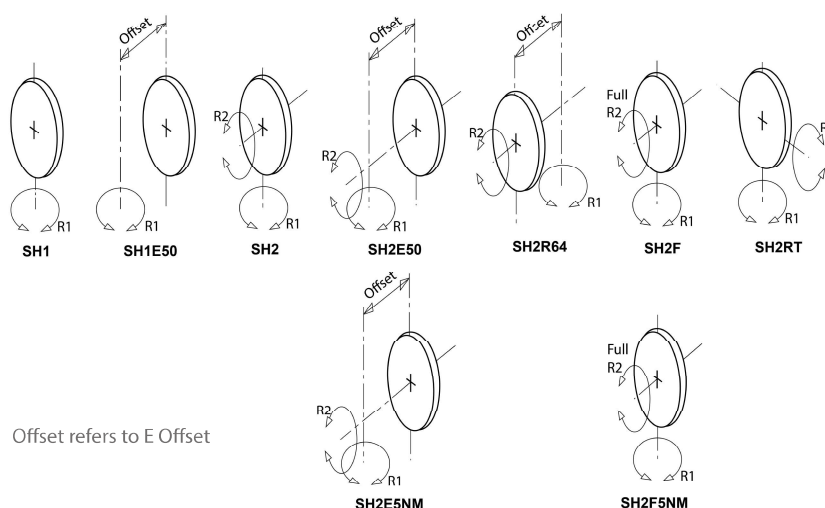
As with all the manipulation range, this module is fully compatible for both the heating and cooling modules making it the perfect multidiscipline two axis sample mounting module.

Sample Heating

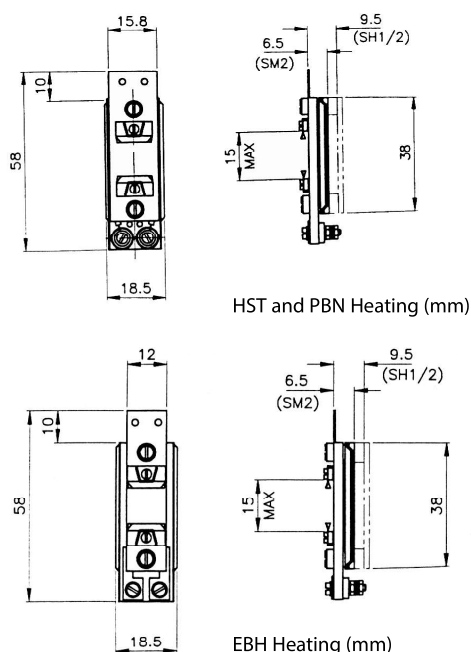
Sample Holders - Basic Specifications									
Part code	SH1	SH1E50	SH2	SH2E50	SH2F	SH2RT	SH2E5NM	SH2R64	SH2F5NM
Rotary Drive Required	RD1	RD1	RD2	RD2	RD224	RD2	RD2	RD2	RD224
Primary (R1) Rotation									
No services	360°	360°	360°	360°	360°	360°	360°	360°	360°
With services fitted	±180°	±180°	±180°	±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°				

* 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

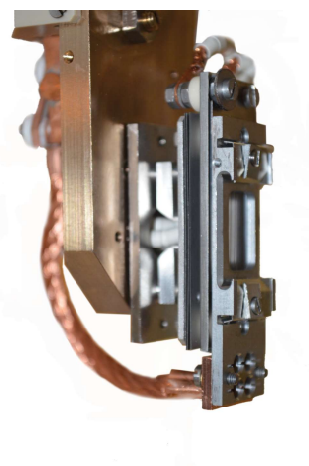


Sample Heating



Product Overview

- HST (Resistive) is a cost effective heater which uses a tungsten wire filament - max temp 950°C
- PBN (Resistive) is a long life heater which uses Pyrolytic Boron Nitride element - max temp 950°C
- EBH (Electron Beam) is a rapid, high temperature heater which uses a Thoriated Iridium filament- max temp 1200°C
- Recommended for heating above 900°C for only 1 minute.



Flag Style Heater Z0MPBNHF on SH2 Sample Holder

Heater and Accessories

Heater and Accessories	Order Code
Omicron Fork with EBH Heater (<1200°C)	Z0MEBHFF
Omicron Pincer with EBH Heater (<1200°C)	Z0MEBHHP
Omicron Fork with PBN Heater (<1000°C)	Z0MPBNHF
Omicron Pincer with PBN Heater (<1000°C)	Z0MPBNHP
Plain Carrier for 14mmx14mm Samples	ZSPA14
Plain Carrier for 25mmx25mm Samples	ZSPA25
Standard 14mm HST	ZHSTSHLM
Standard 14mm EBH	ZEBHSMNM
Standard 14mm PBN	ZPBNSHLM

Dedicated Feedthrough Sets Power and Thermocouple

Manipulator	Heater Version	K Type	N Type
Omni-ax	Resistive	MFEEDKR	MFEEDNR
Omni-ax	Electron Beam	MFEEDKE	MFEEDNE
Transax	Resistive	HFEEDKR	HFEEDNR
Transax	Electron Beam	HFEEDKE	HFEEDNE
HPT-WX	Resistive	HFEEDKR	HFEEDNR
HPT-WX	Electron Beam	HFEEDKE	HFEEDNE
Mini-ax	Resistive	HFEEDKR	HFEEDNR
Mini-ax	Electron Beam	HFEEDKE	HFEEDNE

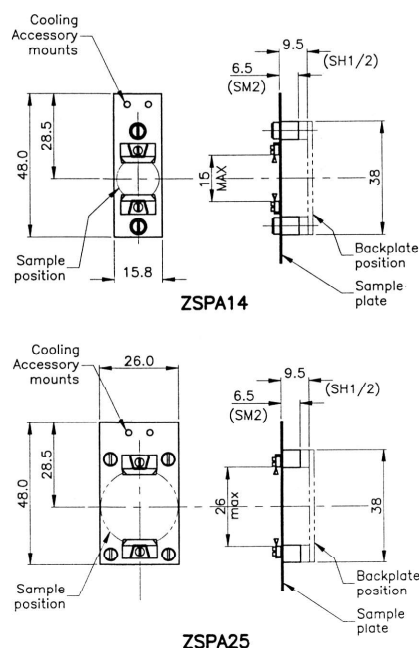
Heater wiring

1.5m length of 0.9mm single stranded OFC copper wire silver coated with PTFE sleeving
 Resisteds supplied with red and black wire
 EBH supplied with red, black and green
 Supplied with necessary fixings

Thermocouple wiring

Wiring is 3m long pair covered with PTFE sleeve
 Hot Junction end 210mm of ceramics to protect PTFE coating from heater

Plain Sample Accessories



Product Overview

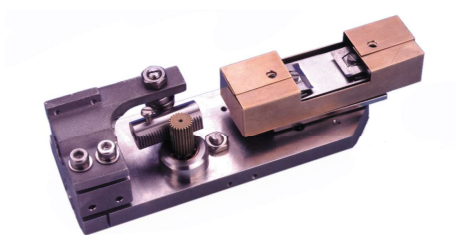
- Can be fitted to all SH sample holders and consists of a molybdenum sample mounting plate and attachment clips. Low magnetic permeability with molybdenum fixings.
- The plain module height is the same as the heater modules, with similar attachment to the sample holder
- These plain accessories are required with liquid nitrogen cooling when heating is not used. This is necessary for sample and cooling braid attachment to the sample holder
- Two options are available for attaching samples of either 14 x 14 mm or 25 x 25 mm

Plain Sample Accessories

	Order Code
Plain Accessory: 14 x 14mm	ZSPA14
Low Magnetic Version of ZSPA14	ZSPA14NM
Plain Accessory: 25 x 25mm	ZSPA25
Low Magnetic Version of ZSPA25	ZSPA25NM

Electrostatic Shielding Kit

Product Overview



- Two versions of shield available will only fit EBH or HST version heaters on SH1 or SH2 sample holders
- Not recommended for the Flag Style
- A shielding kit is available for attachment to all standard SH series sample holders
- The non-magnetic shield surrounds the heater module to reduce the effects of electrostatic charging of ceramic isolators
- Access to the sample is possible through the cut-out which allows for pincer grip transfer
- The shields allow the use of heating, cooling and thermocouple services

Electrostatic Shielding Kits

	Order Code
Electrostatic Shielding Kit HST and EBH (Retro fit)	ZSHESSK
Electrostatic Shielding Kit HST and EBH (Factory fit)	ZSHESSKE

Please note retro-fit variant (ZSHESSK) is only available as an after sale modification. ZSHESSKE is the factory default version

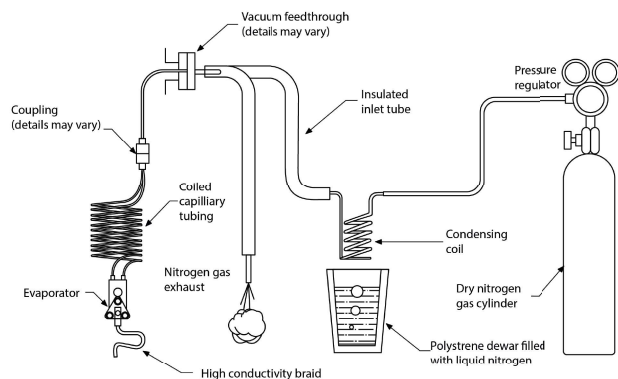
Liquid Nitrogen Cooling

Liquid nitrogen cooling module (ZLN) can be fitted to all SH sample holders and all standard manipulators.



Product Overview

- Using the cooling on an SH sample holder allows both primary and secondary sample rotations and can achieve temperatures below -165°C (113 K) measured on the sample mounting plate without sample
 - The LN cooling module can be combined with the resistive or the electron bombardment heating modules.
 - The heater controllers can monitor liquid nitrogen temperatures
 - To operate the LN cooling module efficiently and safely, the LNHX accessory kit is recommended. This allows dry nitrogen gas from a pressurised gas bottle through a condensing coil inside a liquid nitrogen dewar. The LNHX kit includes a condensing coil and polystyrene dewar with insulated connecting tubes
- Normal running pressure 0.5 - 1 bar



LIQUID NITROGEN COOLING SCHEMATIC

Dedicated LN Cooling Kit and Accessories

Manipulator	Cooling Option	Cooling Accessory Kit	Spare Cooling Coupling Seal Gaskets
Omni-ax	MXCOOL ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾
Transax	TXCOOL ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾
HPT-WX / Mini-ax 50 mm	RXCOOL050 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾
HPT-WX / Mini-ax 100 mm	RXCOOL100 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾
HPT-WX 150 mm	RXCOOL150 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾
HPT-WX 250 mm	RXCOOL250 ⁽¹⁾	ZLNHX	ZLNCU ⁽²⁾

(1) These are generic part codes and we will require more detail to build the correct cooling to fit the manipulator

(2) Two gaskets per cooling required as spares only (this pack contains 5)

Dewar Spares

Manipulator	n tYPE
Polystyrene Dewar	ZMS100D

Dedicated Feedthrough Set - Thermocouple only

Manipulator	K Type	N Type
Omni-ax	MFEEDK	MFEEDN
Transax	HFEEDK	HFEEDN
HPT-WX	HFEEDK	HFEEDN
Mini-ax	HFEEDK	HFEEDN

Note: Wiring is 3m long pair covered with PTFE sleeve. Hot Junction end 210mm of ceramics to protect PTFE coating from heater

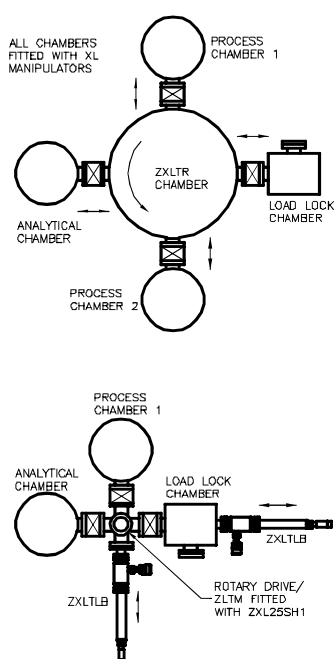
XL25 Sample Handling

The XL25 is a range of high specification modules for sample transfer, manipulation, conditioning and monitoring. It can be used with samples up to 25.4 mm diameter and is suitable for low energy electron spectroscopy.

The sample is mounted onto a sample carrier and then transferred onto a receiver included with the sample holder. The receiver grips the carrier securely during manipulation by the sample holder. Electrical and cooling services are associated with the sample holder. The XL25 components are selected for extreme UHV conditions and low magnetic properties to allow use with low energy electron analytical techniques such as UPS or ARUPS.



Product Overview

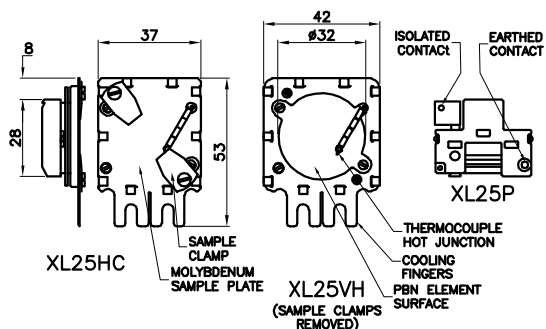


- Component based modules for easy custom building by select the interchangeable modules from the range of sample carriers, sample holders, sample services and transfer arms
- Sample size up to 25.4 mm (1") diameter
- Secure transfer through 38 mm bore ports
- Sample manipulation in primary (R1) and azimuthal (R2) rotations
- Designed for use with Omniax and Transax
- Not recommended for HPT or Miniax
- Sample conditioning services include heating to 1200 °C and cooling down to -140 °C (>500°C for 1 minute only)
- Monitoring services include an N-type thermocouple as standard and the sample current or bias connection options
- The sample carrier includes the sample heater and thermocouple for positive thermal contact and accurate temperature monitoring
- Both the sample carrier and holder use low magnetic components
- The isolators are shielded to reduce electrostatic charge build-up
- The unique sample transfer method means that the sample is exposed at all times for monitoring and conditioning
- The compact size and low swept volume, even with all conditioning and monitoring services attached, allows the XL25 to be used in crowded multi-technique analysis chambers

XL25 Sample Handling

Product Overview

The three main XL25 sample carriers (also called 'blocks') described below are interchangeable as the receiver mounting is common.



XL25HC 'Hot and Cold' Carriers

- Enclosed PBN Element
- Range -140 °C to 1000 °C flash
- Maximum continuous temperature is >500°C for one minute only
- Transfers through 38 mm ID port
- On-board PBN heater element and N-type thermocouple
- Low magnetic materials. Residual induction is 5 milli-Gauss maximum at sample centre
- Isolators are electrostatically shielded
- Shallow grazing incidence is possible

XL25VH 'Very Hot' Carriers

- Exposed PBN element for direct sample contact
- Range -80 °C to 1200 °C flash
- Maximum continuous temperature is >500 °C for one minute only
- Transfers through 38 mm ID port
- On-board PBN heater element and N-type thermocouple
- Low magnetic materials. Residual induction is 5 milli-Gauss maximum at sample centre
- Sample mounts directly on PBN element
- Shallow grazing incidence is possible

XL25P 'Plain' Carriers

- Used for custom builds and set-up
- This is a bare body used on the other carriers
- No heating, no thermocouple
- Maximum continuous current is 1.2 A
- Maximum flash current is 5 A

XL25 Sample Carriers		
Sample Carrier	Main Features	Order Code
Hot and Cold Carrier	-140°C to 1000°C flash ⁽¹⁾	ZXL25HC
Very Hot Carrier	-80°C to 1200°C flash ⁽¹⁾	ZXL25VH
Plain Carrier	5 Amps flash current	ZXL25P

(1) The appropriate sample services must be installed for heating and cooling. These are described on the following page.

(2) Maximum temperature above 500°C is 1 minute

XL25 Sample Handling - Sample Holders

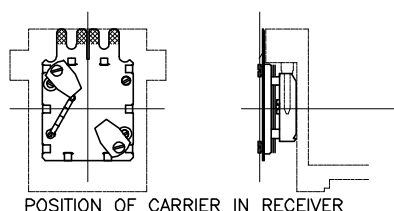
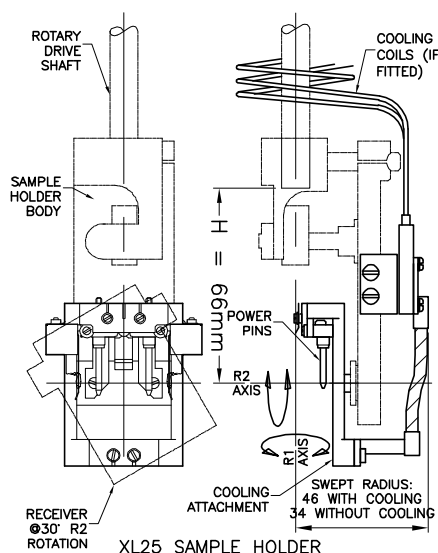
The two XL25 sample holders are based on the standard SH1 and SH2 sample holders. They serve three functions:

1. Sample carrier receiving (or docking)
2. Sample rotation: up to $\pm 180^\circ$ in R1 and $\pm 110^\circ$ in R2
3. Attachment of the sample services



Product Overview

- Both sample holders have the XL25 receiver fitted which accepts all sample carriers in the XL25 range
- The sample holder mounts to the shaft of the RD1 or RD2 rotary drive. Note: The XL25 transfer forces require an extended bearing housing to support the shaft of the rotary drive, such as the Omniax or Transax. Not recommended for single bellows manipulators such as the HPT and MiniAx.
- The sample holder encloses and contains the service wires to reduce the effective swept volume of the sample holder. This also reduces electrostatic charge build up
- The sample holder is constructed from low magnetic materials and N-type thermocouple
- Non-magnetic version available



XL25 Sample Holder Services

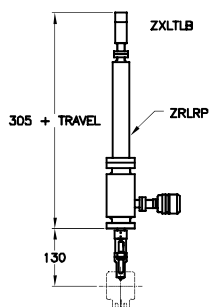
- Options include power connections for the on-board PBN heater, liquid nitrogen cooling, N-type thermocouple pick-ups for the on-board thermocouple and a sample bias connection
- All services are independent but they can be combined and do not affect other specifications or sample transfer
- All services include the appropriate feedthroughs
- Compatible with external cooling accessory (LNHX) and RHC controller

XL25 Sample Holders and Services

Sample Carrier	Order Code
Primary (R1) only rotation sample holder	ZXL25SH1
Primary (R1) and azimuthal (R2) rotation sample holder	ZXL25SH2
Primary (R1) and azimuthal (R2) rotation sample holder- non-magnetic	ZXL25SHN
Power kit for sample heating	MXLHEAT
N-type thermocouple kit	MXLTCTN
Sample bias kit to 500V, 0.5A	MXLBIA5
Liquid nitrogen cooling kit	MXLCOOL
External cooling accessory	ZLNHX
Temperature controller	ZRHC

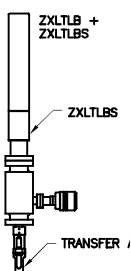
XL25 Sample Handling - Sample Transfer Device

ZXLTLB WITH ROTATION SLEEVE OPTIONS



XLTL series

- The XLTL series of linear transfer devices are rack and pinion drives based on the RLRP transfer arm
- NW35CF (70 mm OD) mounting flange
- Travels from 305 mm to 914 mm.
- Secondary motion of the RLRP is used to disengage the carrier from the transfer arm.



XLTLB

- The basic transfer arm, the XLTLB, is supplied with an extension sleeve to bring the secondary movement close to the mounting port. This is recommended for long travels.
- Spring release extension sleeve with limit stops can be supplied for additional security.



XLRD series

- The XLRD series of linear transfer devices are magnetically coupled and based on our MLRD range of drives.
- Secondary motion of the RLRP is used to disengage the carrier from the transfer arm.
- Lower cost option than the XLTL version but does not offer the same sample security as the XLTLxxx and XLTLSS combination.

XL25 Sample Handling		
	Main Features	Order Code
Linear Transfer Arms	310 mm travel	ZXLTLB3
	460 mm travel	ZXLTLB4
	609 mm travel	ZXLTLB6
	909 mm travel	ZXLTLB9
Transfer Arm Accessories	Plain extension sleeve	ZXLTLBS
	Spring return extension sleeve	ZXLTLSS
Magnetic Linear Transfer	305 mm travel	ZXLRD203
	460 mm travel	ZXLRD204
	610 mm travel	ZXLRD206
	914 mm travel	ZXLRD209

Valves - Spare Parts

Item Name	Catalogue Part	Description	Assembly Guide No.
ZCRD20	ZCU19	CRD20 Demountable Bonnet Gasket (Pk 10)	AS0024
ZCR20	ZCR20C	CR20 Pad	AS0024
ZCRD40	ZCU38	CRD40 Demountable Bonnet Gasket (Pk 10)	AS0024
ZCR40	ZCR40C	CR40 Pad	AS0024
ZCR60	ZCR60C	CR60 Pad	AS0024
ZVRD40 / ZVR40	ZVR40VS	VR40 Valve Viton® Sealed Right Angled Non Demountable DN38CF	AS0025
ZVRD60 / ZVR60	ZVR60VS	VR60 Valve Viton® Sealed Right Angled Non Demountable DN64CF	AS0025
LVM	ZLVMP5K	LVM Pad Service Kit	AS0026
LVM	ZLVMD5K	LVM Diaphragm & Pad Service Kit	AS0027
LVM	ZLVMARMKT	LVM Replacement Control Arm Assembly	AS0028
MD5	ZMD55K	MD5 Diaphragm Service Kit	AS0029
GV28	GV28BA	GV28 Bellows Assembly 30 Convolutions	AS0030
GV50	GV50BA	GV50 Bellows Assembly 50 Convolutions	AS0030

Rotary / Linear - Spare Parts

Item Name	Catalogue Part	Description	Assembly Guide No.
ZDPRF25	ZXSMS07	DPRF25 Seal Set Replacement Seal Kit (Post 1990) 2 seals	AS002
ZDPRF25	ZDPRF25B	DPRF25 Bearing Replacement Set (Post 1990) 2 seals	AS002
ZDPRF55	ZXSMS03	DPRF55 Seal Set All 2 Seal Versions	AS002
ZDPRF55/552	ZDPRF55B	DPRF55 Bearing Set All Versions	AS002
ZDPRF552	ZXSMS03-3	DPRF552 Seal Kit All 3 Seal Versions	AS002
ZRP100	ZXSMSRP	RP100 Seal Set All Versions	AS003
ZRD1/6/7	RD1BEL	ZRD1/6/7 Bellows Assembly	AS004
ZRD2	RD2BEL	RD2 Bellows Assembly	AS005
ZRD1/2/6/7	RD2BS	RD1/2/6/7 Bearing Set for RD1 and RD2	AS004 AS005
ZRD91 / ZRD94	RD9BEL	RD91/ZRD94 Bellows Assembly	AS006
ZRD94	RD94BS	RD94 Bearing Set All Versions	AS006
ZRD93	RD93BS	RD93 Bearing Set All Versions	AS007
ZRD91	RD91BS	RD91 Bearing Set All Versions	AS006
MLRV2 Series	MLRMBRK	MLRV2 Series Bearing Front/Rear Set	AS0033
MLRV4 Series	MLRMBRK4	MLRV4 Series Bearing Front/Rear Set	AS0033
RLP/RLRP MLD/MLRD	MLDBS	RL/ML Series Front Bearing Housing Set	AS0032 AS0031

Manipulation			
Omniax Tables			
Item Name	Catalogue Part	Description	Assembly Guide No.
T211 Omniax Table	T211B8BA	X&Y Bellows Assembly 8" For ZT211B8S	AS0017
T211 Omniax Table	T211B6BA	X&Y Bellows Assembly 6" For ZT211B6S	AS0017
T208 Omniax Table	T208B8BA	X&Y Bellows Assembly 8" For ZT208B8S	AS0017
T208 Omniax Table	T208B6BA	X&Y Bellows Assembly 6" For ZT208B6S	AS0017
T108 Omniax Table	T108B6BA	X&Y Bellows Assembly 6" FOR ZT108B6S	AS0017
T108 Omniax Table	T108B8BA	X&Y Bellows Assembly 8" FOR ZT108B8S	AS0017
Micrometer			
Item Name	Catalogue Part	Description	Assembly Guide No.
Micrometer	MRXMIC05	±12.5mm all Models	AS0011
Micrometer	MRCMIC25	±25mm Omniax and Transax	AS0012
Omniax Z Bellows			
Item Name	Catalogue Part	Description	Assembly Guide No.
Omniax Z Bellows	OM1003254	MX100 54mm / 32mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM2003254	MX200 54mm / 32mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM3003254	MX300 54mm / 32mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM40054	MX400 54mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM50054	MX500 54mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM60054	MX600 54mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM80054	MX800 54mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM100054	MX1000 54mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM40032	MX400 32mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM50032	MX500 32mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM60032	MX600 32mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM80032	MX800 32mm BELLOWS ASSY	AS0021
Omniax Z Bellows	OM100032	MX1000 32mm BELLOWS ASSY	AS0021
Omniax Z Drive			
Item Name	Catalogue Part	Description	Assembly Guide No.
Omniax Z Drive	ZMXNUTK	OMNIAX Safety Drive Nit Kit	AS0046
Omniax Worm and wheel			
Item Name	Catalogue Part	Description	Assembly Guide No.
Omniax Z Worm and Wheel	OMWW	Worm and Wheel	AS0019
Transax Tables			
Item Name	Catalogue Part	Description	Assembly Guide No.
T108 Transax Table	T108A6BA	Bellows Assembly 6" for ZT108A6S	AS0018
T208 Transax Table	T208A6BA	Bellows Assembly 6" for ZT208A6S	AS0018

Transax Z Bellows			
Item Name	Catalogue Part	Description	Assembly Guide No.
Transax Z Bellows	TR150BA	TRANSAX Z Bellows 150mm	AS0015
Transax Z Bellows	TR300BA	TRANSAX Z Bellows 300mm	AS0015
Transax Z Bellows	TR450BA	TRANSAX Z Bellows 450mm	AS0015
Transax Z Bellows	TR600BA	TRANSAX Z Bellows 600mm	AS0015
Transax Drive Nut Kits			
Item Name	Catalogue Part	Description	Assembly Guide No.
Transax	TRNUT150K	Transax 150mm - Replacement Drive Nut Kit	AS0016
Transax	TRNUT300K	Transax 300mm - Replacement Drive Nut Kit	AS0016
Transax	TRNUT450K	Transax 450mm - Replacement Drive Nut Kit	AS0016
Transax	TRNUT600K	Transax 600mm - Replacement Drive Nut Kit	AS0016
HPT Drive Nut Kit			
Item Name	Catalogue Part	Description	Assembly Guide No.
HPT / HPT-WX	RXNUTK	HPT - Replacement Drive Nut Kit	AS0014
HPT Bellows 6" OD Base Flange			
Item Name	Catalogue Part	Description	Assembly Guide No.
HPT-RX Bellows	HPT50BA	FLANGE/BELLOWS ASSY RX050	AS0013
HPT-RX Bellows	HPT100BA	FLANGE/BELLOWS ASSY RX100	AS0013
HPT-RX Bellows	HPT150BA	FLANGE/BELLOWS ASSY RX150	AS0013
HPT-RX Bellows	HPT250BA	FLANGE/BELLOWS ASSY RX250	AS0013
HPT-WX Bellows	HPTW50BA	FLANGE/BELLOWS ASSY WX050	AS0013
HPT-WX Bellows	HPTW100BA	FLANGE/BELLOWS ASSY WX100	AS0013
HPT-WX Bellows	HPTW150BA	FLANGE/BELLOWS ASSY WX150	AS0013
HPT-WX Bellows	HPTW250BA	FLANGE/BELLOWS ASSY WX250	AS0013
Sample Holders SH1 / SH2 Spares			
Item Name	Catalogue Part	Description	Assembly Guide No.
SH2	SH2BCBK	BeCu Bearing Kit	AS0035
SH2	SH2CP	Ceramic Pinion Pulley	AS0035
SH1/2	SH2SBK	Sapphire Bearing Kit	AS0035
SH1/2	SH2SBPK	Spindle Back Plate Assembly with Ceramic Pulley	AS0035
SH1/2	SH2WK	Power Wiring Kit	AS0035
SH2	ZSH2WDB	Sample Holder Wire Drive Belt x 3 SH2 ± 110°	AS0035
SH2F	ZSH2FWDB	Sample Holder Wire Drive Belt x 3 SH2F ± 180° Rotation	AS0035
Sample Holder Thermocouples - Spares			
Item Name	Catalogue Part	Description	Assembly Guide No.
Thermocouple	ZDTC1K	SINGLE TC "K" TYPE	AS001
Thermocouple	ZDTC1N	SINGLE TC "N" TYPE	AS001
Thermocouple	ZDTC1E	SINGLE TC "E" TYPE	AS001

Sample Holder - Power - Spares			
Item Name	Catalogue Part	Description	Assembly Guide No.
Power	CABG10	CABLE 1/0.9 PTFE GN/W (10M)	
Power	CABR10	CABLE 1/0.9 PTFE RD/W (10M)	
Power	CABB10	CABLE 1/0.9 PTFE BK/W (10M)	
Heaters			
Item Name	Catalogue Part	Description	Assembly Guide No.
HST Old Style	ZHSTCSSK	Ceramic kit with Sapphire Ball Support HST	AS0037
EBH Old Style	ZEBHCSSK	Ceramic kit with Sapphire Ball Support EBH	AS0036
PBN/HST/EBH New Style	HEATCSSK	Ceramic kit with Ceramic Support PBN/HST/EBH	AS0037
HST	ZHSTFIL	Wire Filament HST	AS0037
EBH	ZEBHRF	Filament EBH	AS0036
PBN New Style	PBNE	PBN Heater Element VG Heater	AS0037
HST / EBH	HeatClip	Sample Clip (TZM material) Not Flag heater	
XL25	XL25HCTKT	XL25 Heater Support Ceramic Kit XL25 Carrier	AS0034
XL25	XL25CSKT	XL25 Screw Kit Complete XL25 Carrier	AS0034
XL25	XL25SCKT	XL25 Sample Clip and Screws (Pair)	AS0034
XL25	XL25CTKT	XL25 Ceramic Kit & Thermocouple for XL25 Carrier Complete	AS0034
XL25	XL25HEATE	XL25 Heater Element & Support Ceramics	AS0034
Cooling			
Item Name	Catalogue Part	Description	Assembly Guide No.
LN Cooling	ZLNCU	Cajon Cooling Coupling Gaskets (Pk size 5)	AS0041
LN Cooling	ZLN2CU6	Old Style Co-Axial inlet Cooling Gasket (Pk size 5)	AS0040
LN Cooling	ZLNPSET	External Pipe with Insulation	AS0022
LN Cooling	ZMS100D	Dewar Polystyrene For LN ² Cooling	AS0022
LN Cooling	ZLRROPEK	Cooling Rope Assembly	AS0023
LN Cooling	OMCOOLBL	Omniax Special Cooling Blank	AS0020
LN Cooling	ZCOOLISOK	Cooling Isolation Plate and Ceramics	AS0023
Sub Pumps			
Item Name	Catalogue Part	Description	Assembly Guide No.
Sublimation Pump	ZST22CS	Replacement Filament Clamp Screws Pk of 3	AS0038
Sublimation Pump	ZST22F	Replacement Filaments 2.0 mm OD Pk of 30	AS0038
Sublimation Pump	ZST22FC	Replacement Filament Clamps Set	AS0038
Sublimation Pump	ZST22IB	Replacement Insulator Bushes Pk of 3	AS0038
Gauges			
Item Name	Catalogue Part	Description	Assembly Guide No.
ZVIG18/24	ZTIR23	Gauge Twin Filament “ir”Thoria Coated Iridium VIG18/24	AS008
ZVIG17/22	ZWW17	Gauge Twin Filament “w”Tungsten ZVIG17/22 (Two Sets)	AS009
ZVIG17/18/22/23	ZEFTBC	Connector Barrel For 1.2mm OD Leedthroughs (1 Barrel Set)	AS008 AS009
VIG/EFT	ZEFT95C	Connector Crimp For up to 1.2mm Diameter Wires (PKT 20)	
VIG	SBGRID	GRID ASSY FOR VIG17/18	AS0010
VIG	SBGRID2	GRID ASSY FOR VIG22/24	AS0010
VIG	ZVIGSK	Connector for VIG Gauge Lead	
Controllers	ZIGMACC	IGC5 Series Assesory Pack	

Hinged door

Item Name	Catalogue Part	Description	Assembly Guide No.
Hinded Door	HD64VS	HD64 / 64V Door "O" Ring	AS0039
Hinded Door	HD100VS	HD100 / 100V Door "O" Ring	AS0039
Hinded Door	HD150VS	HD150 / 150V Door "O" Ring	AS0039

Lubrication

Item Name	Catalogue Part	Description	Assembly Guide No.
Lubrication	ZLUBEK	Lubrication	AS0043

Rotary Drives

Item Name	Catalogue Part	Description	Assembly Guide No.
RD2	DH60333B	Azimuthal Barrel Replacement	AS0044

LTM

Item Name	Catalogue Part	Description	Assembly Guide No.
	ZLTM150DS	Drive Screw Assembly for LTM150	AS0045
	ZLTM100DS	Drive Screw Assembly for LTM100	AS0045
	ZLTM75DS	Drive Screw Assembly for LTM75	AS0045
	ZLTM50DS	Drive Screw Assembly for LTM50	AS0045
	ZLTM25DS	Drive Screw Assembly for LTM25	AS0045