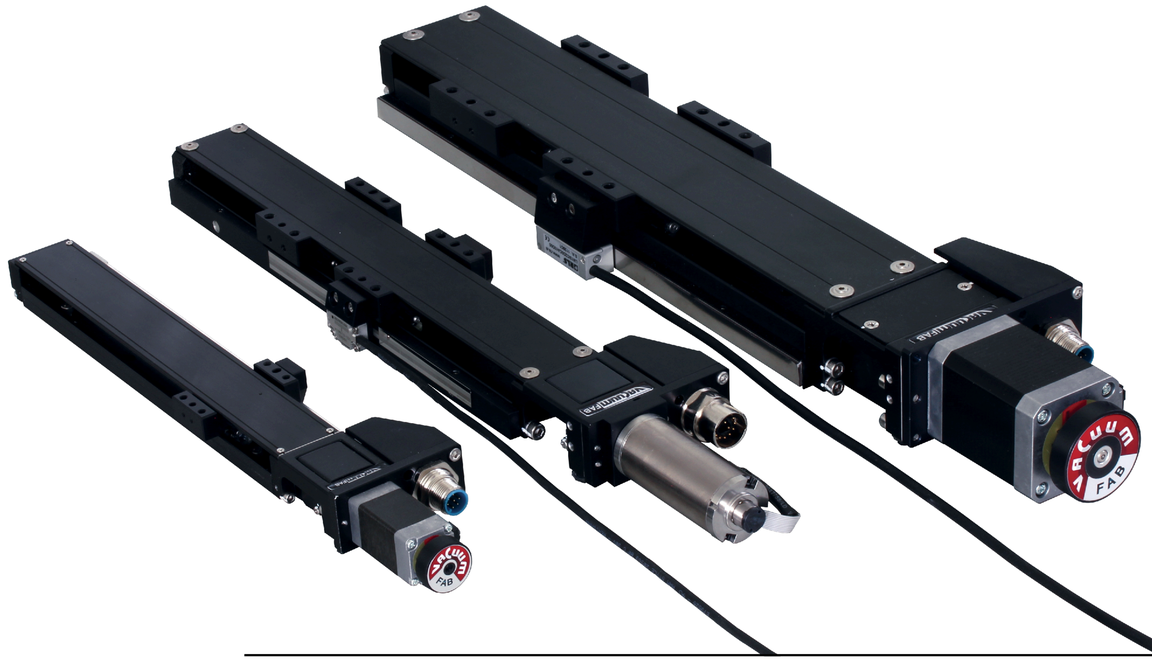
Hercules HLS



This High-Precision class of stages is designed to guarantee accurate positioning with high loads under Heavy Duty in demanding applications. An industrial class robust mechanics with integrated metrology sensors matches precision performance and long durability. Available in three sizes (S, M and L) and 21 different strokes from 25mm to 500mm with sub-micron resolution and repeatability. Available with all accessories for multi-axes simple and pre-aligned XY as well as XYZ assemblies.

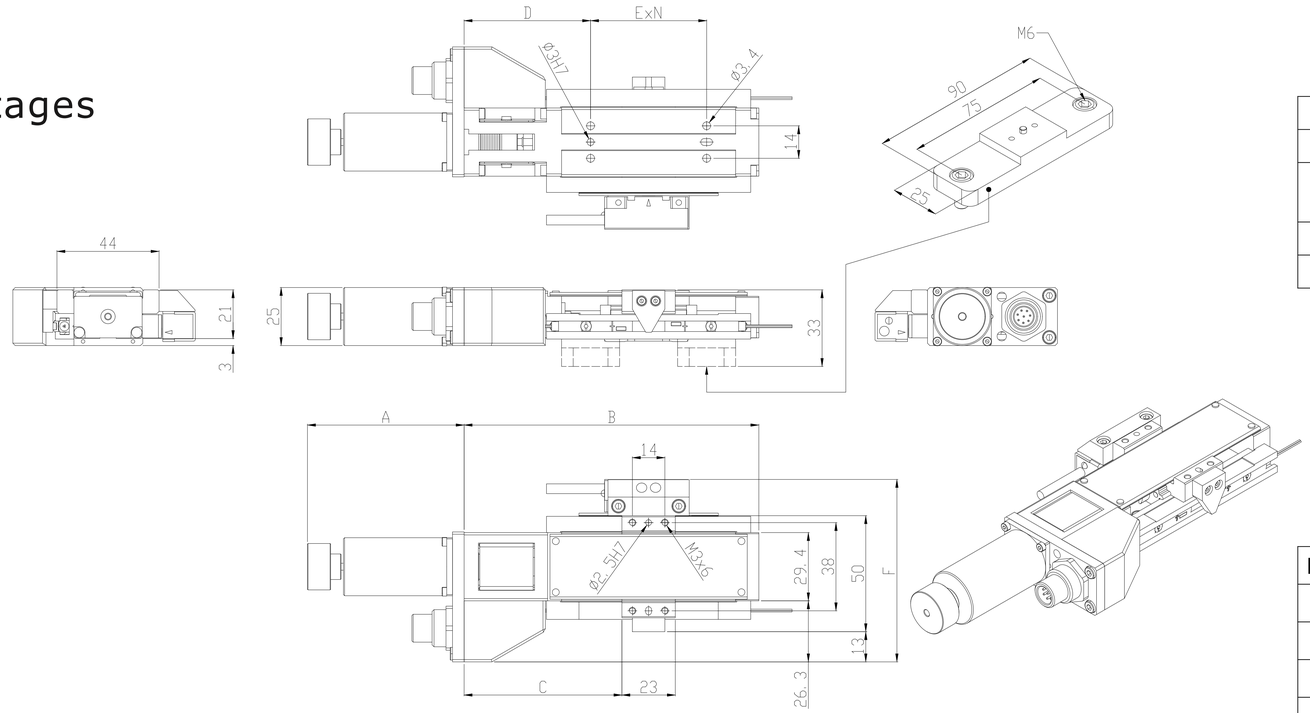
Hercules
Motorized linear stages

- Stiff steel body with linear guides
- Recirculating ball bearings
- Narrow profile
- Stepper or servo motors
- Rotary or linear encoders
- Incremental or absolute scale
- Adjustable contactless end of run
- Modular upgradable design

HLS-S series

Hercules Small size linear stages

Stroke	B	C	D	E	N
25	127	68	54,5	50	1
50	152	80,5	67	50	1
75	177	93	54,5	50	2
100	202	105,5	67	50	2
125	227	118	54,5	50	3
150	252	130,5	67	50	3



Motor type	A
Stepper	44,5
Low inductance stepper	60,5
DC	74,3
Brushless DC	65,5

Linear encoder type	F
LM 13	78,5
LA11	81,5
Atom - 1Vpp	71,5
Atom - RS422	74,5

Technical note
Linear encoders can be easily added to an open loop stage as a retrofit option.

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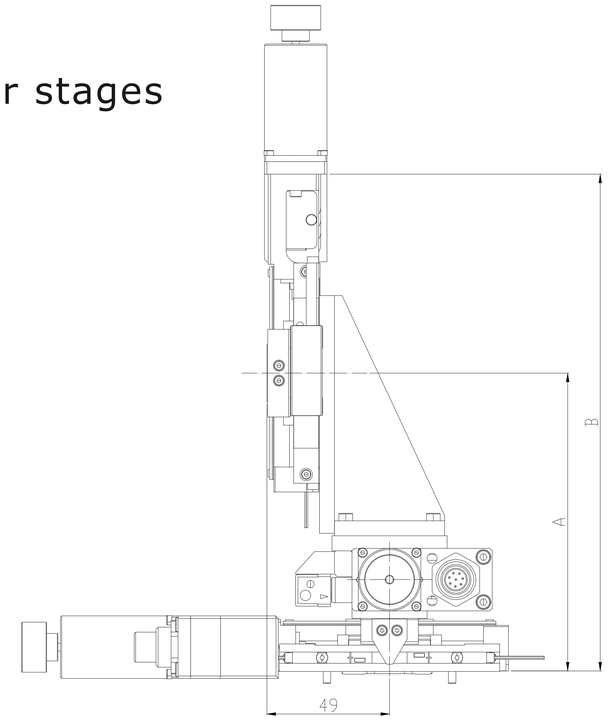
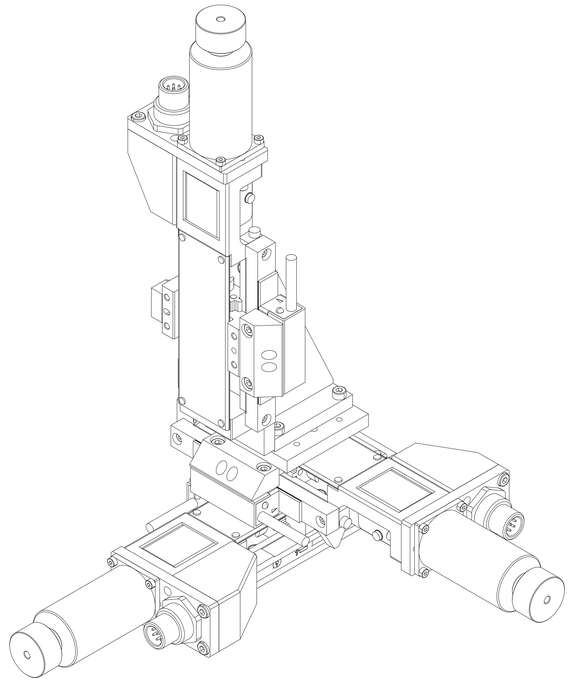
HLS-S Series

Hercules Small size linear stages





Z axis stroke	A	B
25	119	198,5
50	119	211
75	144	248,5
100	144	261
125	169	298,5
150	169	311

Hercules Stages Small size ordering information

Stage code matrix							
	Size	Carrier N.	Stroke	Screw pitch	Motor type	Linear encoder type	Encoder signal
HLS	S	1	25	2	S Stepper	Magnetic LM13	1Vpp
			50				RS422
			75		LIS Low inductance Stepper	Optical Atom RTLF	1Vpp
			100				RS422
			125		DC	Magnetic LA11	BiSS-C
			150		BDC Brushless DC		SSI

Mounting accessories code matrix				
HLS	S	XZ or Z	25	Some examples: HLS-S-1-50-2-S = Hercules stage size S with 1 carrier, 50mm stroke, 2mm pitch, Stepper motor open loop, 2x tunable REED end of run sensors. HLS-S-1-125-2-BDC-LA11-BiSS-C = Hercules stage size S with 1 carrier, 50mm stroke, 2mm pitch, Brushless DC motor with 1024 pulses encoder, absolute linear encoder LA11 with BiSS-C protocol , 2x tunable REED end of run sensors. HLS-S-XY-150 = XY mounting interface for upper stage with 150mm stroke. HLS-S-Z-35 = Z axis mounting interface for upper stage with 35mm stroke.
			50	
			75	
			100	
			125	
			150	
		TFP	Tabletop Feet Pair compatible with M6x25mm hole pattern	

Wiring

Hercules stages integrate high quality industrial round connectors for motor, limit switches and encoder signal. We can supply motor cables upon request.

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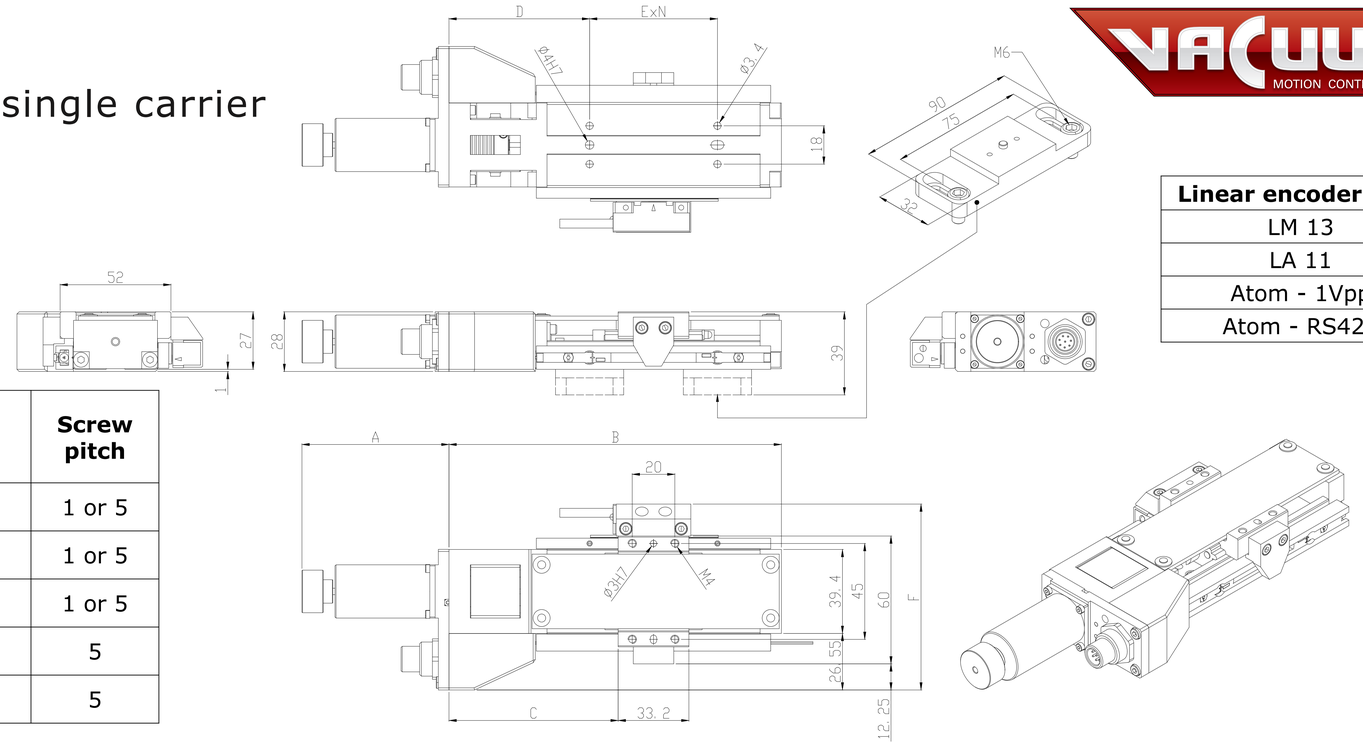
HLS-M1 series

Hercules Medium size stages with single carrier

Motor type	A
Stepper	56,5
Low inductance stepper	60,5
DC	74,3
Brushless DC	77,5

Linear encoder type	F
LM 13	87
LA 11	90
Atom - 1Vpp	81
Atom - RS422	84

Stroke	B	C	D	E	N	Screw pitch
35	156	79,5	66	60	1	1 or 5
85	206	104,5	61	60	2	1 or 5
135	256	129,5	86	60	2	1 or 5
185	306	154,5	81	60	3	5
235	356	179,5	76	60	4	5



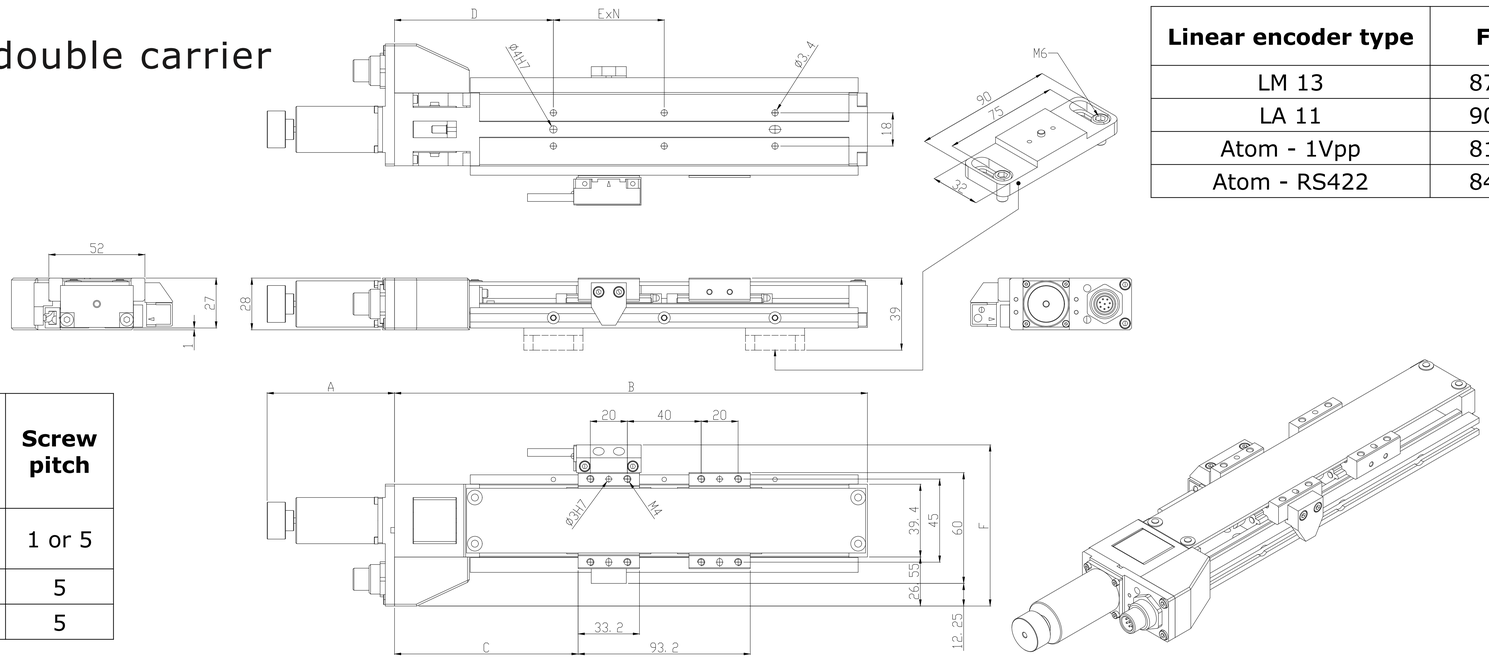
HLS-M2 series

Hercules Medium size stages with double carrier

Motor type	A
Stepper	56,5
Low inductance stepper	60,5
DC	74,3
Brushless DC	77,5

Linear encoder type	F
LM 13	87
LA 11	90
Atom - 1Vpp	81
Atom - RS422	84

Max Stroke	B	C	D	E	N	Screw pitch
75	256	99,5	86	60	2	1 or 5
125	306	124,5	81	60	3	5
175	356	149,5	76	60	4	5



Technical note

The second carrier is free: the maximum stroke is meant with two carriers in contact, if you decide to dispose them more distant in order to get a higher moment capacity or a larger moving platform then the actual travel range will be shortened accordingly.

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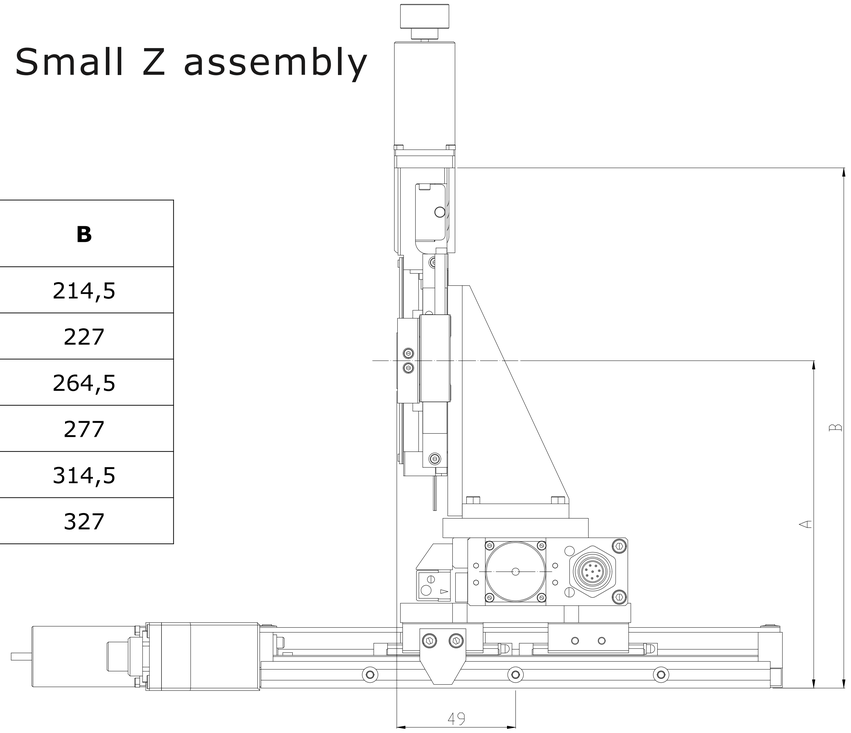
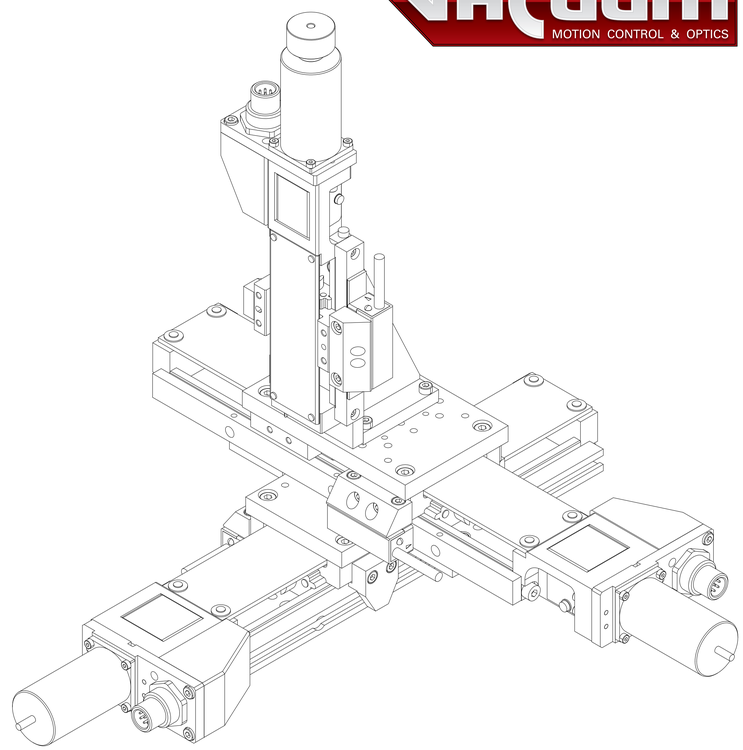
HLS-M series

Hercules Medium XY and Small Z assembly

Z axis stroke	A	B
25	135	214,5
50	135	227
75	160	264,5
100	160	277
125	185	314,5
150	185	327

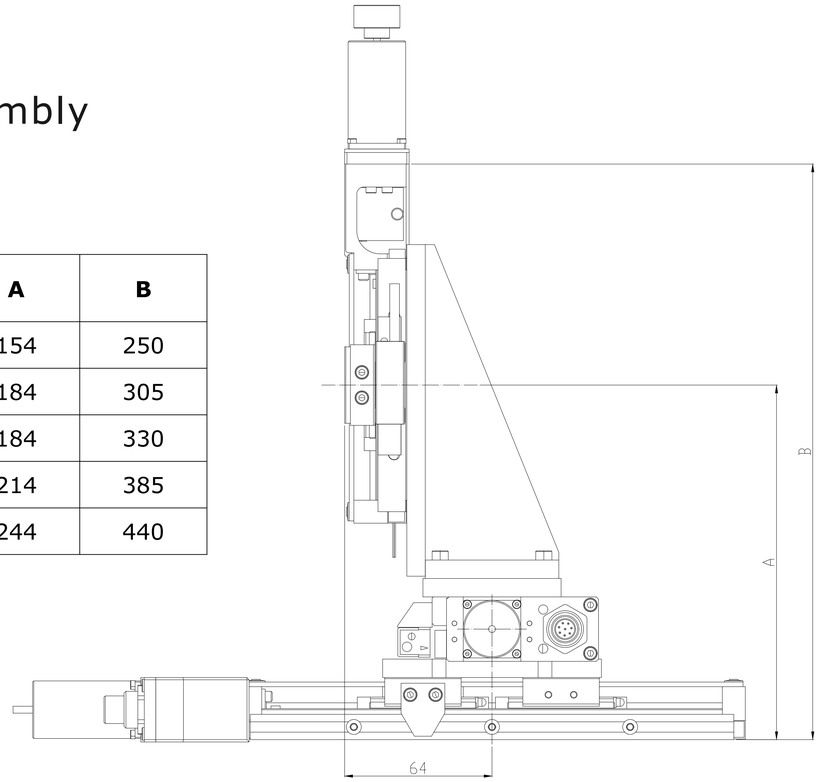


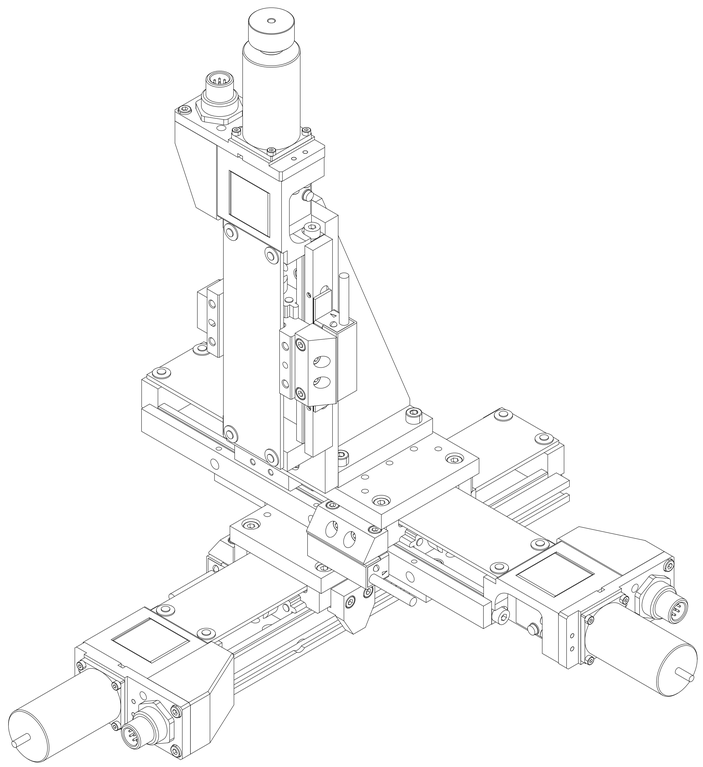


HLS-M series

Hercules Medium XYZ assembly

Z axis stroke 1 carrier	Z axis stroke 2 carriers	A	B
35	-	154	250
85	-	184	305
135	75	184	330
850	125	214	385
235	175	244	440





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Hercules stages Medium size ordering information

Stage code matrix

	Size	Carrier N.	Stroke	Screw pitch*	Motor type	Linear encoder type	Encoder signal
HLS	**M**	1	35	1 or 5	**S** Stepper	incremental	
			85	1 or 5		Magnetic **LM13**	1Vpp
			135	1 or 5	**LIS** Low inductance Stepper		RS422
			185	5		Optical **Atom** RTLF	1Vpp
			235	5	**DC**		RS422
		2	75	1 or 5		absolute	
			125	5	**BDC** Brushless DC	Magnetic **LA11**	BiSS-C
			175	5			SSI

Some examples and explanations

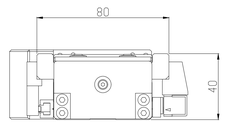
HLS-L-1-35-1-LIS = Hercules stage size L with 1 carrier, 35mm stroke, 1mm pitch ballscrew, Low inductance Stepper motor open loop, 2x tunable REED end of run sensors.
HLS-L-2-175-5-DC-Atom-1Vpp = Hercules stage size L with 2 carriers, 175mm stroke, 5mm pitch ballscrew, DC motor with 1024 pulses encoder, RTLF40 incremental linear encoder and Atom readhead with 1Vpp signal , 2x tunable REED end of run sensors.
HLS-LL-XY-135 = XY mounting interface for lower stage L size and upper stage L size with 135mm stroke.
HLS-LM-Z-25 = Z axis mounting interface for lower stage L size and upper stage M size ith 25mm stroke.
HLS-LL-Z-85 = Z axis mounting interface for lower stage L size and upper stage L size with 85mm stroke.

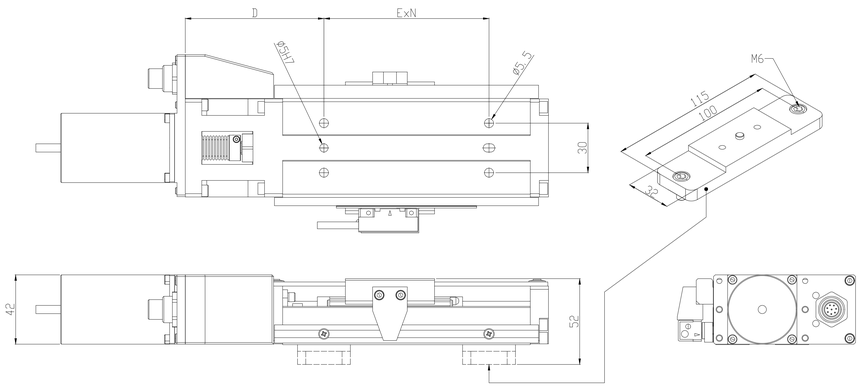
Mounting accessories code matrix			
	Size	**Configuration**	**Stroke**
HLS	**MM**	**XY or Z**	35
			85
			135
			185
			235
			75/2C
			125/2C
			175/2C
HLS	**MS**	**Z**	25
			50
			75
			100
			125
			150
	M	**TFP**	Tabletop Feet Pair

HLS-L1 series

Hercules Large size stages with single carrier

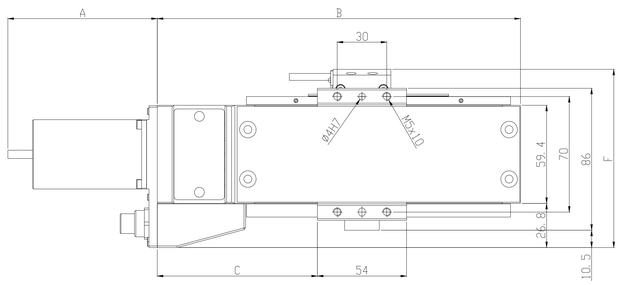
Motor type	A
Stepper	67,8
Low inductance stepper	100,5
DC	87,6
Brushless DC	69,5

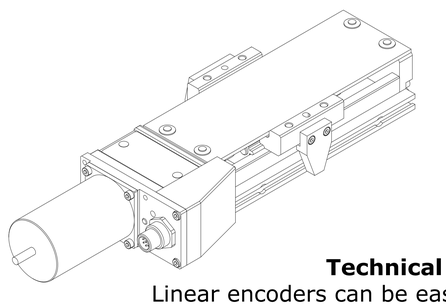




Linear encoder type	F
LM 13	108
LA 11	111
Atom - 1Vpp	103
Atom - RS422	106

Stroke	B	C	D	E	N
50	220	97	84	100	1
100	270	122	109	100	1
200	370	172	109	100	2
300	470	222	109	100	3
400	570	272	109	100	4
500	670	322	109	100	5





Technical note
Linear encoders can be easily added to an open loop stage as a retrofit option.

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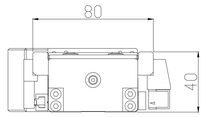
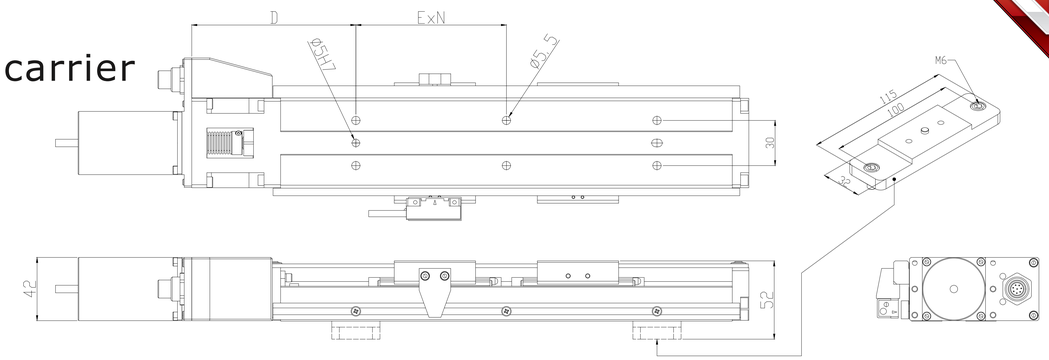
HLS-L2 series

Hercules Large size stages with double carrier

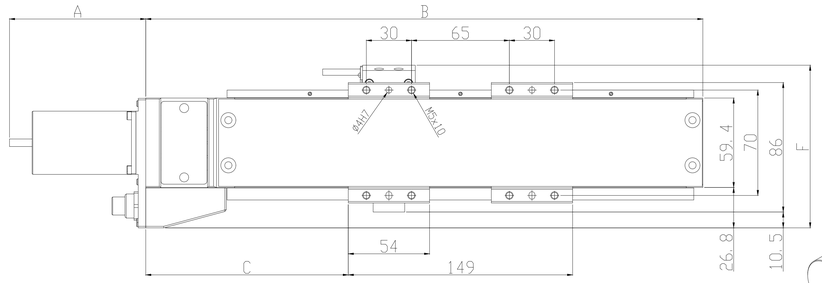
Linear encoder type	F
LM 13	108
LA 11	111
Atom - 1Vpp	103
Atom - RS422	106

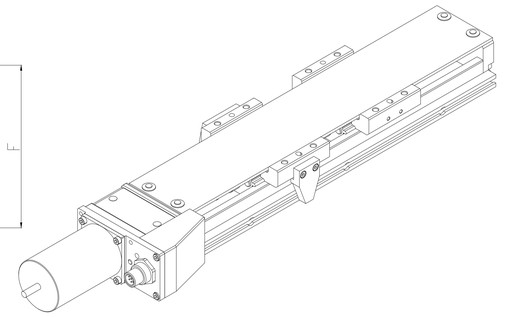




Linear encoder type	F
LM 13	108
LA 11	111
Atom - 1Vpp	103
Atom - RS422	106

Stroke	B	C	D	E	N
105	370	134,5	109	100	2
205	470	184,5	109	100	3
305	570	234,5	109	100	4
405	670	284,5	109	100	5

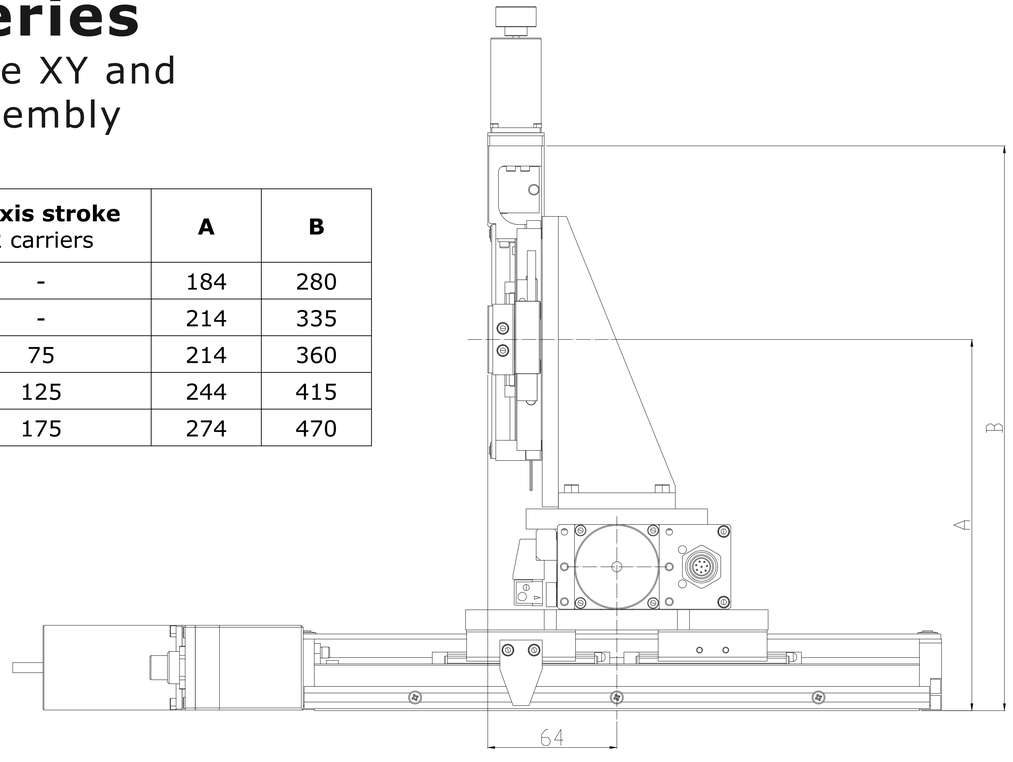


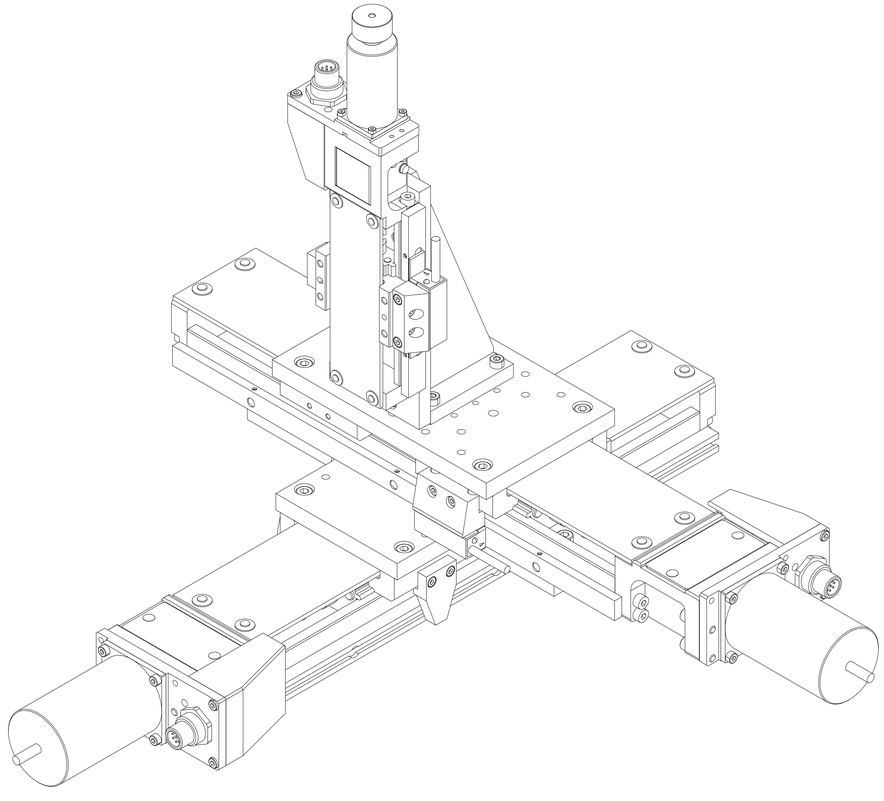


HLS-L series

Hercules Large XY and Medium Z assembly

Z axis stroke 1 carrier	Z axis stroke 2 carriers	A	B
35	-	184	280
85	-	214	335
135	75	214	360
185	125	244	415
235	175	274	470





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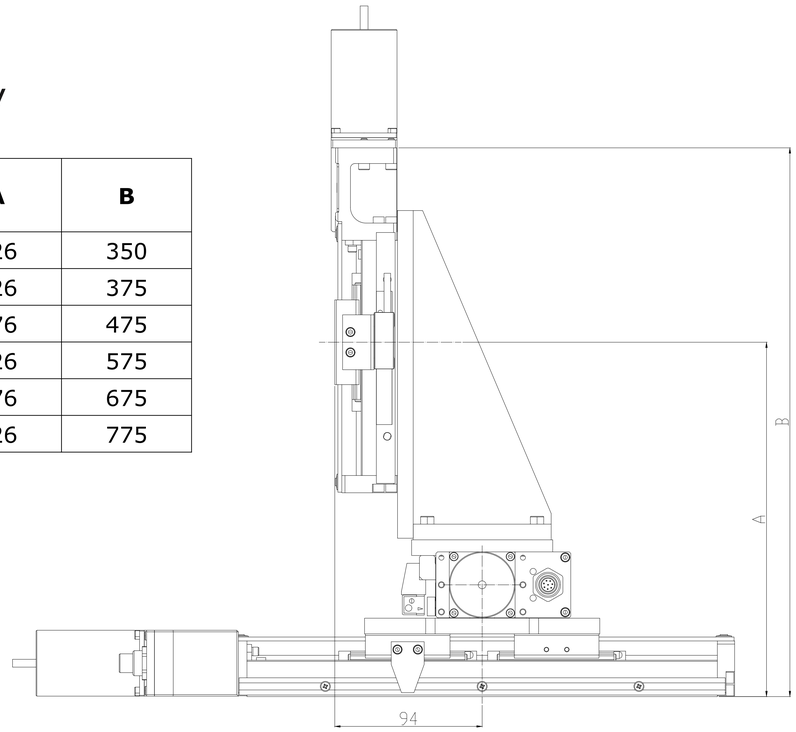
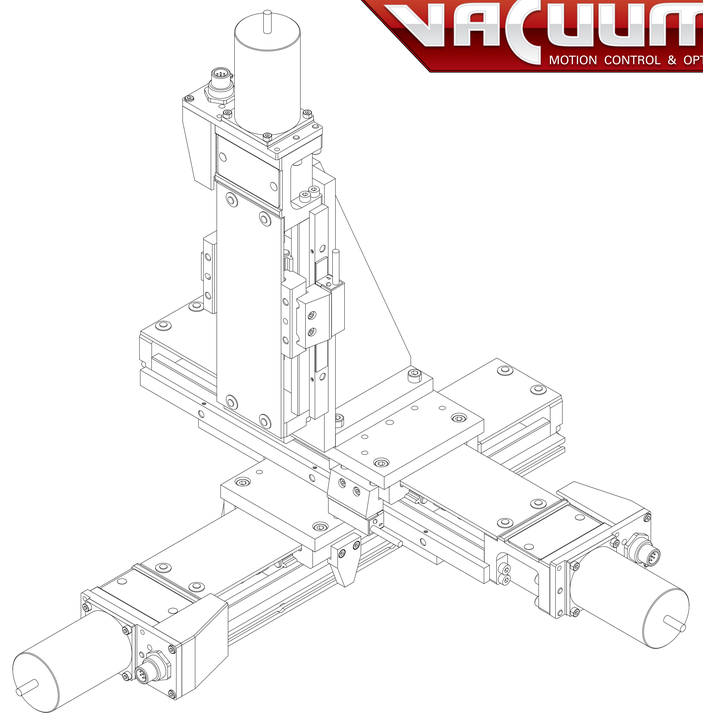
HLS-L series

Hercules Large XYZ assembly

Z axis stroke 1 carrier	**Z axis stroke** 2 carriers	**A**	**B**
50	-	226	350
100	-	226	375
200	105	276	475
300	205	326	575
400	305	376	675
500	405	426	775





Hercules stages Large size ordering information

Stage code matrix

Size	**Carrier N.**	**Stroke**	**Screw pitch***	**Motor type**	**Linear encoder type**	**Encoder signal**
HLS	**L**	1	50	**5** **or** **10**	**S** Stepper	incremental	
			100			Magnetic **LM13**	1Vpp
			200		**LIS** Low inductance Stepper		RS422
			300			Optical **Atom** RTLF	1Vpp
			400				
			500		**DC**		RS422
		2	105			absolute	
			205		**BDC** Brushless DC	Magnetic **LA11**	BiSS-C
			305				
			405				SSI

Some examples and explanations

HLS-L-1-35-1-LIS = Hercules stage size L with 1 carrier, 35mm stroke, 1mm pitch ballscrew, Low inductance Stepper motor open loop, 2x tunable REED end of run sensors.
HLS-L-2-175-5-DC-Atom-1Vpp = Hercules stage size L with 2 carriers, 175mm stroke, 5mm pitch ballscrew, DC motor with 1024 pulses encoder, RTLF40 incremental linear encoder and Atom readhead with 1Vpp signal , 2x tunable REED end of run sensors.
HLS-LL-XY-135 = XY mounting interface for lower stage L size and upper stage L size with 135mm stroke.
HLS-LM-Z-25 = Z axis mounting interface for lower stage L size and upper stage M size with 25mm stroke.
HLS-LL-Z-85 = Z axis mounting interface for lower stage L size and upper stage L size with 85mm stroke.

Mounting accessories code matrix

Size	**Configuration**	**Stroke**
HLS	**LL**	**XY** **or** **Z**	50
			100
			200
			300
			400
			500
			75/2C
			125/2C
			175/2C
	LM	**Z**	35
			85
			135
			235
			185
			75/2C
			125/2C
			175/2C
	L	**TFP**	Tabletop Feet Pair

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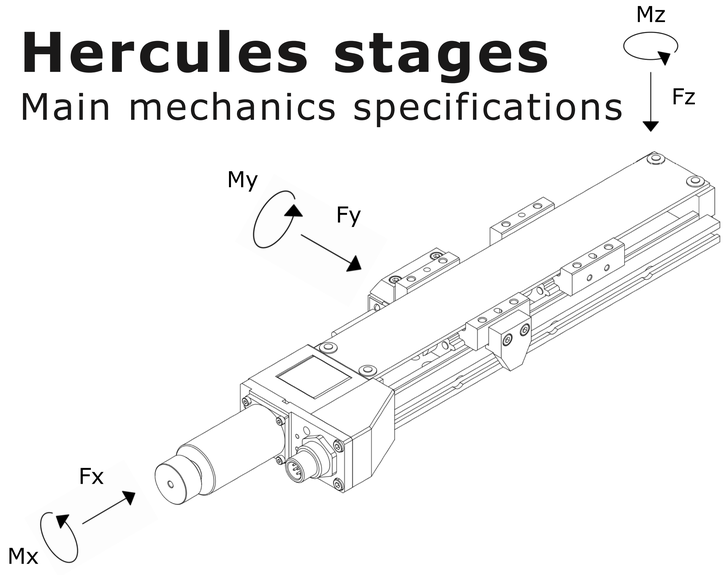
Hercules stages

Main mechanics specifications



Size	Linear recirculating ball bearing: Fz=Fy (N) dynamic	Linear recirculating ball bearing: Fz=Fy (N) static	Linear recirculating ball bearing: Radial play (µm)	Ball-screw: Shaft diameter (mm)	Ball-screw: Pitch (mm)	Ball-screw: Lower diameter (mm)	Ball-screw: Ball axis diameter (mm)	Axial ball-screw bearing: Fx (N) dynamic	Axial ball-screw bearing: Fx (N) static
S	1657	2960	-3-0	5	2	4.534	5.15	542	332
M	2621	4959	-3-0	6	1	5.3	6.15	584	369
					5	4.918	6.3		
L	7785	13774	-4-0	10	5	8.2	10.3	2162	1758
			-4-0		10	8.2	10.3		

Highlights

- With gothic arch design the load capacity is independent from the vector direction
- Double carrier option fo stronger load capacity and moment
- Pre loaded precision machined ball -screw guides for high axial stiffness and dynamics

Hercules stages of sizes M and L are available with one or two carriers: the 2nd carrier option increases the stages' strength and stiffness as well as the pitch, yaw, roll, straightness and flatness. We recommend this choice for multi-axes assembly or off axis load mounting.

Hercules stages Main positioning performances small sizes

HLS-S series Hercules Small size stages typical specifications

	Motor	Screw pitch	Full step or encoder count	Minimum incremental motion	Unidirectional repeatability	Bidirectional repeatability	Max speed unloaded	Fx axial load
Open Loop	Stepper	2	10 µm	0.2 µm	+/- 1 µm	+/- 3 µm	30mm/s	50 N
	Low inductance Stepper		10 µm	0.2 µm	+/- 1 µm	+/- 3 µm	50mm/s	
Servo	DC		0.49 µm	1 µm	+/- 1 µm	+/- 3 µm	100mm/s	
	Brushless DC		0.49 µm	1 µm	+/- 1 µm	+/- 3 µm	100mm/s	

	Measurement system	Signal	Resolution	Minimum incremental motion	Repeatability	Reference repeatability	Accuracy
Closed Loop	LM13 - magnetic incremental	TTL differential quadrature- RS422	0.244 µm	+/- 0.5 µm	+/- 0.5 µm	+/- 0.5 µm	+/- 10 µm/m
		1Vpp - 2mm pitch	depending on controller interpolation factor				
	LA11 - Magnetic absolute	BiSS-C (SSi upon request)	0.244 µm	+/- 0.5 µm	+/- 0.5 µm	-	+/- 40 µm/m (+/- 10 µm/10 mm)
	Atom RTLF40 - Optical incremental	1Vpp - 40 µm pitch	depending on controller interpolation factor				+/- 5 µm/m
		TTL differential quadrature- RS422	0.04 µm	+/- 0.1 µm	+/- 0.1 µm	+/- 0.1 µm	

Technical notes

The controller choice influences much the stage performances; please consult us for a complete solution analysis and quotation. Accessories such as other kind of encoders, motor brake or more are available upon request.
Actual resolution, repeatability, accuracy, pitch and yaw of each stage can be measured with laser interferometer and electronic autocollimator.
We can simulate real working conditions in our measurement laboratory and provide a calibration chart of the mechanics upon request.

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Hercules stages Main performances positioning Medium Size

HLS-M series Hercules Medium size stages typical specifications

	Motor	Screw pitch	Full step or encoder count	Minimum incremental motion	Unidirectional repeatability	Bidirectional repeatability	Max speed unloaded	Fx axial load
Open Loop	Stepper	1	5µm	0.1 µm	+/- 1 µm	+/- 3 µm	10 mm/s	100 N
	Low inductance Stepper		5µm	0.1 µm	+/- 1 µm	+/- 3 µm	20 mm/s	
	Stepper	5	25µm	0.3 µm	+/- 1 µm	+/- 3 µm	50 mm/s	
	Low inductance Stepper		25µm	0.3 µm	+/- 1 µm	+/- 3 µm	100 mm/s	
Servo	DC	1	0.244 µm	+/- 0.244 µm	+/- 0.244 µm	+/- 3 µm	50 mm/s	
	Brushless DC		0.244 µm	+/- 0.244 µm	+/- 0.244 µm	+/- 3 µm	50 mm/s	
	DC	5	1.22 µm	+/- 1.22 µm	+/- 1.22 µm	+/- 3 µm	200 mm/s	
	Brushless DC		1.22 µm	+/- 1.22 µm	+/- 1.22 µm	+/- 3 µm	200 mm/s	

	Measurement system	Signal	Resolution	Minimum incremental motion	Repeatability	Reference repeatability	Accuracy
Closed Loop	LM13 - magnetic incremental	TTL differential quadrature RS422	0.244 µm	+/- 0.5 µm	+/- 0.5 µm	+/- 0.5 µm	+/- 10 µm/m
		1Vpp - 2mm pitch	depending on controller interpolation factor				
	LA11 - Magnetic absolute	BiSS-C (SSi upon request)	0.244 µm	+/- 0.5 µm	+/- 0.5 µm	-	+/- 40 µm/m (+/- 10 µm/10 mm)
	Atom RTLF40 - Optical incremental	TTL differential quadrature RS422	0.04 µm	+/- 0.1 µm	+/- 0.1 µm	+/- 0.1 µm	+/- 5 µm/m
		1Vpp - 40 µm pitch	depending on controller interpolation factor				

Technical note

The controller choice influences much the stage performances, please consult us for a complete solution analysis and quotation. Accessories such as other kind of encoders, motor brake or more are available upon request.

Hercules stages Main mechanics specifications Large Size

HLS-L series Hercules Large size stages typical specifications

	Motor	Screw pitch	Full step or encoder count	Minimum incremental motion	Unidirectional repeatability	Bidirectional repeatability	Max speed unloaded	Fx axial load
Open Loop	Stepper	5	25µm	0.3 µm	+/- 1 µm	+/- 3 µm	50 mm/s	200 N
	Low inductance Stepper		25µm	0.3 µm	+/- 1 µm	+/- 3 µm	100 mm/s	
	Stepper	10	50µm	1 µm	+/- 1µm	+/- 3 µm	100 mm/s	
	Low inductance Stepper		50µm	1 µm	+/- 1 µm	+/- 3 µm	200 mm/s	
Servo	DC	5	1.22 µm	+/- 1.22 µm	+/- 1.22 µm	+/- 3 µm	200 mm/s	
	Brushless DC		1.22 µm	+/- 1.22 µm	+/- 1.22 µm	+/- 3 µm	200 mm/s	
	DC	10	2.44 µm	+/- 2.44 µm	+/- 2.44 µm	+/- 3 µm	300 mm/s	
	Brushless DC		2.44 µm	+/- 2.44 µm	+/- 2.44 µm	+/- 3 µm	300 mm/s	

	Measurement system	Signal	Resolution	Minimum incremental motion	Repeatability	Reference repeatability	Accuracy
Closed Loop	LM13 - magnetic incremental	TTL differential quadrature RS422	0.244 µm	+/- 0.5 µm	+/- 0.5 µm	+/- 0.5 µm	+/- 10 µm/m
		1Vpp - 2mm pitch	depending on controller interpolation factor				
	LA11 - Magnetic absolute	BiSS-C (SSi upon request)	0.244 µm	+/- 0.5 µm	+/- 0.5 µm	-	+/- 40 µm/m (+/- 10 µm/10 mm)
	Atom RTLF40 - Optical incremental	TTL differential quadrature RS422	0.04 µm	+/- 0.1 µm	+/- 0.1 µm	+/- 0.1 µm	+/- 5 µm/m
		1Vpp - 40 µm pitch	depending on controller interpolation factor				

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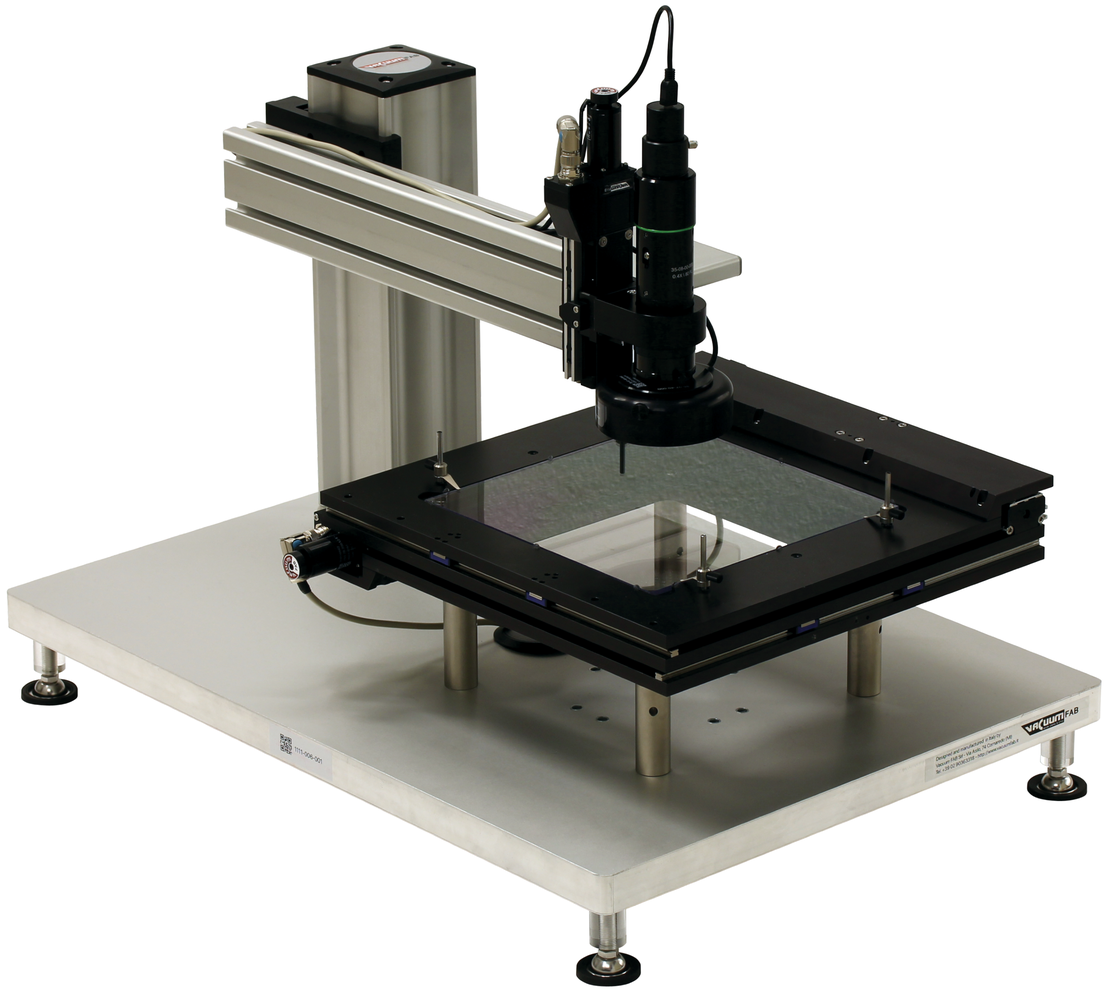
Hercules stages

OEM oriented design



Motorized Videomicoscope based on HLS-M stages

Application:automated visual inspection

Specification :

- 230x230 mm open frame scanning area
- 35mm focusing travel rage
- 50 mm/s speed
- 1 µm resolution/ repeatability

Narrow profile, accuracy, robustness and wide range of configurations make Hecules stages a suitable choice for system integration in high end industrial applications.

When required, Vacuum FAB can support you in the design of application oriented solutions like in the example on the left: the customization based on standard components reduces the non recurrent costs, shortens the time to market and makes it competitive to produce small batches.

We support our OEM customers with a progressive discount policy related to the purchase volumes.

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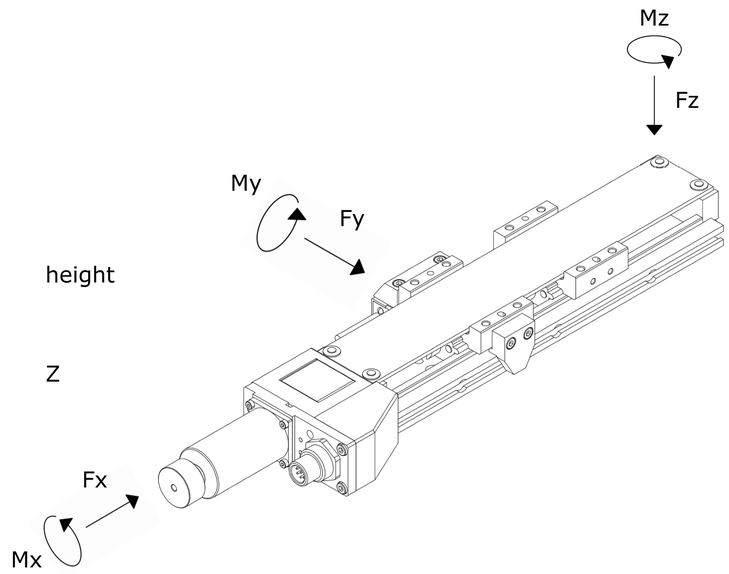
Questionnaire

Fill in this questionnaire and mail it to ufficiovendite@vacuumfab.it to get our consultancy for the positioning system design, free of charges:



CUSTOMER'S REFERENCE

Name, surname:
Institute/company:
Phone Number:
Email:

WEIGHT/SPECIMEN INFORMATION

Dimensions (mm): lenght width height
Shape: (description or better attach drawing)
Weight (g):
Center of gravity coordinates from the center of the carrier (mm): X Y Z

Notes:

POSITIONING REQUIREMENT

Travel range required (mm):
Positioning resolution required (µm):
Repeatability required (µm): ☐ uni-directional ☐ bi-directional
Applied force (N): Fx Fy Fz
Applied Moment (Nm): Mx My Mz
Speed required (mm/s):
Acceleration required (mm/s²):
Duty Cycle:
Other degrees of freedom required: please specify and possibly add a sketch and a description f the application

WIRING REQUIREMENT

Cable lenght in air from the mechanics to the controller (m):

CONTROLLER REQUIREMENT

Motion control type: ☐ point to point ☐ linear interpolation ☐ contouring
Positioning application type: ☐ high resolution ☐ high repeatability
Computer connection port: ☐ Ethernet ☐ USB ☐ other (specify)
Software compatibility: ☐ DLL ☐ LabVIEW ☐ EPICS ☐ TANGO

Notes:

Date and signature:

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