

Heavy-Duty Hexapod

Position up to 1 Ton with Micrometer Precision



H-845

- Load capacity to 800 kg
- Velocity to 25 mm/s
- Repeatability to $\pm 0.5 \mu\text{m}$
- Travel ranges to 340 mm / 60°
- Scalable design: Dimensions, travel ranges, and loads
- Drive: brushless motors with brake

Product overview

Parallel-kinematic design for six degrees of freedom making it significantly more compact and stiff than serial-kinematic systems, higher dynamic range, no moved cables: Higher reliability, reduced friction. Large aperture. Brushless DC motors with brake.

Rapid implementation of customer requests

The high-load hexapod has a modular structure and uses a set of different modules for drive units and joints. The platforms can be adapted to the customer's application. This allows for rapid implementation of special customer requirements.

High-performance digital controller, open software architecture

6-DOF controller for hexapods, incl. control of two additional axes. Freely programmable stable pivot point. Positions commanded in Cartesian coordinates. Macro programming. Open-source NI LabVIEW driver and libraries. Workspace simulation. Virtual machine for hexapod emulation. Optional: Software for avoiding collisions in restricted workspace.

Fields of application

Research and industry. For precision assembly, astronomy, aerospace.

Motion	Unit		H-845.D11	H-845.D21	H-845.D31	H-845.D41	H-845.D51	H-845.D61
Active axes			X Y Z θ X θ Y θ Z	X Y Z θ X θ Y θ Z	X Y Z θ X θ Y θ Z	X Y Z θ X θ Y θ Z	X Y Z θ X θ Y θ Z	X Y Z θ X θ Y θ Z
Travel range in X	mm		± 110	± 170	± 110	± 170	± 110	± 170
Travel range in Y	mm		± 110	± 170	± 110	± 170	± 110	± 170
Travel range in Z	mm		± 50	± 105	± 50	± 105	± 50	± 105
Rotation range in θ X	°		± 15	± 20	± 15	± 20	± 15	± 20
Rotation range in θ Y	°		± 15	± 20	± 15	± 20	± 15	± 20
Rotation range in θ Z	°		± 30	± 30	± 30	± 30	± 30	± 30
Maximum velocity in X, unloaded	mm/s		10	10	20	20	25	25
Maximum velocity in Y, unloaded	mm/s		10	10	20	20	25	25
Maximum velocity in Z, unloaded	mm/s		10	10	20	20	25	25
Maximum angular velocity in θ X, unloaded	mrads		25	25	50	50	60	60
Maximum angular velocity in θ Y, unloaded	mrads		25	25	50	50	60	60
Maximum angular velocity in θ Z, unloaded	mrads		25	25	50	50	60	60
Typical velocity in X, unloaded	mm/s		5	5	10	10	12.5	12.5
Typical velocity in Y, unloaded	mm/s		5	5	10	10	12.5	12.5
Typical velocity in Z, unloaded	mm/s		5	5	10	10	12.5	12.5
Typical angular velocity in θ X, unloaded	mrads		10	10	20	20	25	25
Typical angular velocity in θ Y, unloaded	mrads		10	10	20	20	25	25
Typical angular velocity in θ Z, unloaded	mrads		10	10	20	20	25	25

Positioning	Unit	Tolerance	H-845.D11	H-845.D21	H-845.D31	H-845.D41	H-845.D51	H-845.D61
System resolution in X	nm							
System resolution in Y	nm							
System resolution in Z	nm							
System resolution in θX	μrad							
System resolution in θY	μrad							
System resolution in θZ	μrad							
Unidirectional repeatability in X	μm	Typ.	± 2	± 2	± 4	± 4	± 5	± 5
Unidirectional repeatability in Y	μm	Typ.	± 2	± 2	± 4	± 4	± 5	± 5
Unidirectional repeatability in Z	μm	Typ.	± 0.5	± 0.5	± 1	± 1	± 2	± 2
Unidirectional repeatability in θX	μrad	Typ.	± 10	± 10	± 20	± 20	± 25	± 25
Unidirectional repeatability in θY	μrad	Typ.	± 10	± 10	± 20	± 20	± 25	± 25
Unidirectional repeatability in θZ	μrad	Typ.	± 10	± 10	± 20	± 20	± 25	± 25
Bidirectional repeatability in X	μm	Typ.						
Bidirectional repeatability in Y	μm	Typ.						
Bidirectional repeatability in Z	μm	Typ.						
Bidirectional repeatability in θX	μrad	Typ.						
Bidirectional repeatability in θY	μrad	Typ.						
Bidirectional repeatability in θZ	μrad	Typ.						
Minimum incremental motion in X	μm	Typ.	1	1	2	2	2.5	2.5
Minimum incremental motion in Y	μm	Typ.	1	1	2	2	2.5	2.5
Minimum incremental motion in Z	μm	Typ.	0.5	0.5	1	1	1	1
Minimum incremental motion in θX	μrad	Typ.	15	15	30	30	30	30
Minimum incremental motion in θY	μrad	Typ.	15	15	30	30	30	30
Minimum incremental motion in θZ	μrad	Typ.	15	15	30	30	30	30
Backlash in X	μm	Typ.	5	5	10	10	10	10
Backlash in Y	μm	Typ.	5	5	10	10	10	10
Backlash in Z	μm	Typ.	1	1	2	2	2	2
Backlash in θX	μrad	Typ.	15	15	30	30	30	30
Backlash in θY	μrad	Typ.	15	15	30	30	30	30
Backlash in θZ	μrad	Typ.	30	30	60	60	60	60
Integrated sensor			Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder
Motor encoder								

Drive Properties			H-845.D11	H-845.D21	H-845.D31	H-845.D41	H-845.D51	H-845.D61
Drive type			Electric motor/ Rotating electric motor/Brushless DC motor	Electric motor/ Rotating electric motor/Brushless DC motor	Electric motor/ Rotating electric motor/Brushless DC motor	Electric motor/ Rotating electric motor/Brushless DC motor	Electric motor/ Rotating electric motor/Brushless DC motor	Electric motor/ Rotating electric motor/Brushless DC motor

Mechanical Properties	Unit		H-845.D11	H-845.D21	H-845.D31	H-845.D41	H-845.D51	H-845.D61
Drive screw type			Ball screw	Ball screw	Ball screw	Ball screw	Ball screw	Ball screw
Drive screw pitch	mm							
Gear ratio i								
Stiffness in X	N/ μ m	$\pm 20\%$						
Stiffness in Y	N/ μ m	$\pm 20\%$						
Stiffness in Z	N/ μ m	$\pm 20\%$						
Holding brake			Electromagnetic safety brake	Electromagnetic safety brake	Electromagnetic safety brake	Electromagnetic safety brake	Electromagnetic safety brake	Electromagnetic safety brake
Maximum holding force, base plate in any orientation	N							
Maximum holding force, base plate horizontal	N							
Permissible push force in X	N	Max.						
Permissible push force in Y	N	Max.						
Permissible push force in Z	N	Max.						
Maximum load capacity, base plate in any orientation	kg		240	240	120	120	96	96
Maximum load capacity, base plate horizontal	kg		800	800	400	400	320	320
Overall mass	kg		120	193	120	193	120	193
Material			Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum

Miscellaneous	Unit		H-845.D11	H-845.D21	H-845.D31	H-845.D41	H-845.D51	H-845.D61
Vacuum class	hPa							
Cable length	m		9	9	9	9	9	9
Operating temperature range	$^{\circ}\text{C}$		-10 to 50	-10 to 50	-10 to 50	-10 to 50	-10 to 50	-10 to 50

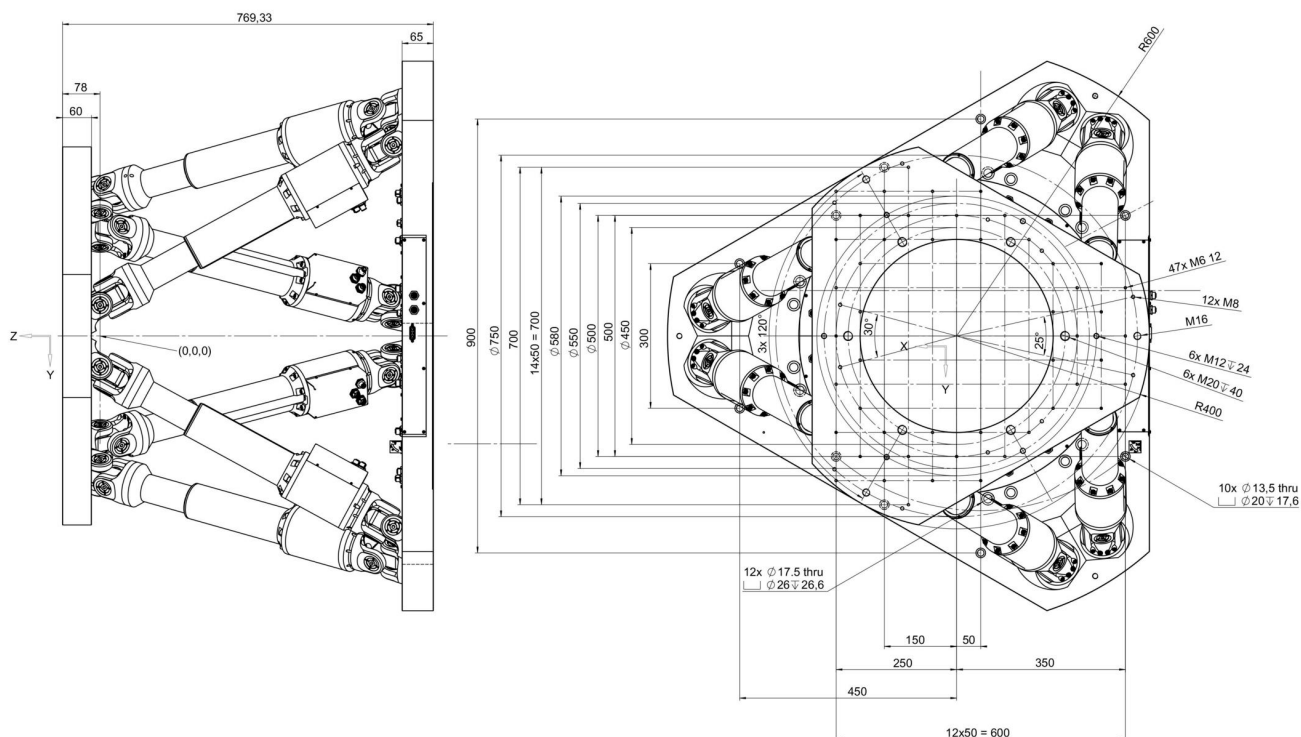
Technical data specified at $22 \pm 3^{\circ}\text{C}$.

The maximum travel ranges of the individual coordinates (X, Y, Z, θ_X , θ_Y , θ_Z) are interdependent. The data for each axis in this table shows its maximum travel range, where all other axes and the pivot point are at the reference position.

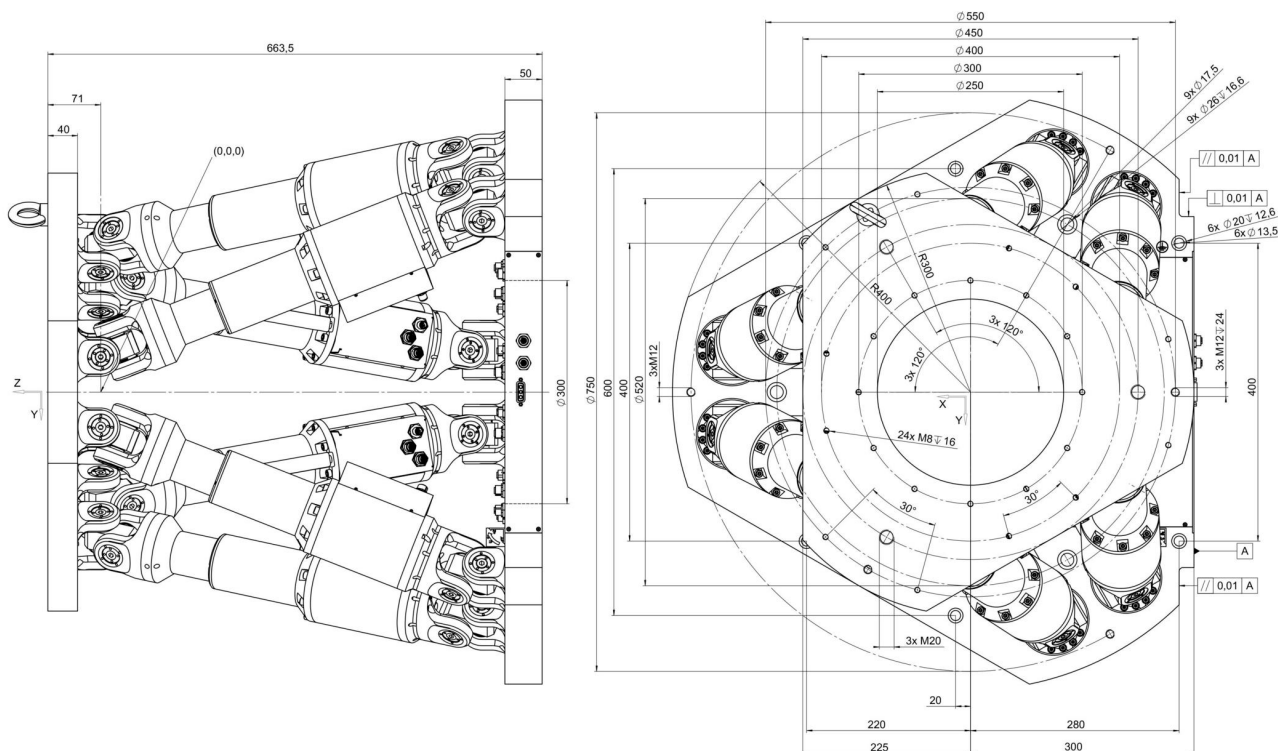
Connecting cables are not included in the scope of delivery and must be ordered separately.

Ask about customized versions.

Drawings / Images



H-845.D21, .D41, and .D61, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.



H-845.D11, .D31, and .D51, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

Order information

H-845.D11

Heavy-duty hexapod for 800 kg load, travel ranges ± 110 mm (X, Y), ± 50 mm (Z), max. velocity 10 mm/s. cable set 9 m, with 6-DOF controller for hexapods, incl. control of two additional axes, TCP/IP and RS-232 interface

H-845.D21

Heavy-duty hexapod for 800 kg load, travel ranges ± 170 mm (X, Y), ± 105 mm (Z), max. velocity 10 mm/s. cable set 9 m, with 6-DOF controller for hexapods, incl. control of two additional axes, TCP/IP and RS-232 interface

H-845.D31

Heavy-duty hexapod for 400 kg load, travel ranges ± 110 mm (X, Y), ± 50 mm (Z), max. velocity 20 mm/s. cable set 9 m, with 6-DOF controller for hexapods, incl. control of two additional axes, TCP/IP and RS-232 interface

H-845.D41

Heavy-duty hexapod for 400 kg load, travel ranges ± 170 mm (X, Y), ± 105 mm (Z), max. velocity 20 mm/s. cable set 9 m, with 6-DOF controller for hexapods, incl. control of two additional axes, TCP/IP and RS-232 interface

H-845.D51

Heavy-duty hexapod for 320 kg load, travel ranges ± 110 mm (X, Y), ± 50 mm (Z), max. velocity 25 mm/s. cable set 9 m, with 6-DOF controller for hexapods, incl. control of two additional axes, TCP/IP and RS-232 interface

H-845.D61

Heavy-duty hexapod for 320 kg load, travel ranges ± 170 mm (X, Y), ± 105 mm (Z), max. velocity 25 mm/s. cable set 9 m, with 6-DOF controller for hexapods, incl. control of two additional axes, TCP/IP and RS-232 interface