6-Axis Hexapod

Economical, Precise, and Fast

H-840

- CIPA certified

- Load capacity to 40 kg

- Travel ranges to ±50 mm / ±30°

- Repeatability to ±0.1 µm

- BLDC motors and variants with absolute encoders

- Works in any orientation

The H-840 hexapod series is the universal choice for tasks that demand precision positioning in multiple degrees of freedom. Variants range for those optimized for high dynamics, for example applications like motion simulators, or designs with advanced gearhead support for providing higher load capability.

The parallel-kinematic design for six degrees of freedom is significantly more compact and stiff than comparable serial-kinematic i.e., stacked, systems. Other advantages are that they provide improved motion tracking and repeatability. In addition, the moved mass is lower, enabling better dynamic performance, which is the same for all motion axes. Moreover, cable management is no longer an issue, because cables are not moved.

Use of brushless DC motor (BLDC)

Brushless DC motors are particularly suitable for high rotational speeds. They can be controlled very accurately and ensure high precision. Because they dispense with mechanical electrical contacts, they run smoothly, are wear-free and achieve a long lifetime.

Use of absolute encoder

Absolute encoders supply explicit position information that enables immediate determination of the position. This means that referencing is not required during switch-on, which increases efficiency and safety during operation.

PI hexapod simulation tool

The simulation software simulates the limits of the workspace and load capacity of a hexapod. Therefore, even before making a purchase, you can check whether a particular hexapod model can handle the loads, forces, and torques occurring in an application. For this purpose, the simulation tool takes into account the position and motion of the hexapod as well as the pivot point and several reference coordinate systems.

Fields of application

Research and industry. For motion simulation (CIPA certified), tool inspection, life science, micromanufacturing. Micro-manipulation of parts, industrial alignment systems.

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Specifications

Motion and positioning	H-840.G2A	H-840.G2I	H-840.D2A	H-840.D2I	Unit	Tolerance
	BLDC gear motor with absolute encoder	BLDC gear motor with incremental rotary encoder	BLDC motor with absolute encoder	BLDC motor with incremental rotary encoder		
Active axes	X, Y, Z, θ_X, θ_Y, θ_Z	X, Y, Z, θX, θY, θZ	X, Y, Z, θX, θY, θZ	X, Y, Z, θ_X, θ_Y, θ_Z		
Travel range* X, Y	±50	±50	±50	±50	mm	
Travel range* Z	±25	±25	±25	±25	mm	
Travel range* θ_X, θ_Y	±15	±15	±15	±15	°	
Travel range* θ_Z	±30	±30	±30	±30	°	
Minimum incremental motion X, Y	0.3	0.25	1.5	0.5	µm	Typ.
Minimum incremental motion Z	0.2	0.15	1	0.25	µm	Typ.
Minimum incremental motion θ_X, θ_Y	2	2	10	3	µrad	Typ.
Minimum incremental motion θ_Z	4	4	2	5	µrad	Typ.
Backlash in X, Y	2	2	1.5	1.5	µm	Typ.
Backlash in Z	0.3	0.3	0.2	0.2	µm	Typ.
Backlash in θ_X, θ_Y	5	5	4	4	µrad	Typ.
Backlash in θ_Z	10	10	8	8	µrad	Typ.
Repeatability X, Y	±0.3	±0.3	±0.3	±0.3	µm	Typ.
Repeatability in Z	±0.1	±0.1	±0.1	±0.1	µm	Typ.
Repeatability in θ_X, θ_Y	±2.5	±2.5	±1.5	±1.5	µrad	Typ.
Repeatability in θ_Z	±3	±3	±3	±3	µrad	Typ.

Dynamic properties	H-840.G2A	H-840.G2I	H-840.D2A	H-840.D2I	Unit	Tolerance
Max. velocity in X, Y, Z	2.5	2.5	60	60	mm/s	
Max. velocity in θ_X, θ_Y, θ_Z	30	30	700	700	mrad/s	
Typ. Velocity in X, Y, Z	2	2	40	40	mm/s	
Typ. Velocity in θ_X, θ_Y, θ_Z	25	25	480	480	mrad/s	
Max. frequency	-	-	30	30	Hz	
Amplitude-frequency product in X, Y	-	-	23.6	23.6	mm·Hz	
Amplitude-frequency product in Z	-	-	8	8	mm·Hz	
Amplitude-frequency product in θ_X, θ_Y	-	-	5.1	5.1	°·Hz	
Amplitude-frequency product in θ_Z	-	-	14	14	°·Hz	
Amplitude-frequency^2 product in X, Y	-	-	65.9	65.9	mm·Hz^2	
Amplitude-frequency^2 product in Z	-	-	22.5	22.5	mm·Hz^2	
Amplitude-frequency^2 product in θ_X, θ_Y	-	-	14.7	14.7	°·Hz^2	
Amplitude-frequency^2 product in θ_Z	-	-	41	41	°·Hz^2	

Amplitude error	-	-	10	10	%	Max.
Phase error	-	-	60	60	°	Max.

Mechanical properties	H-840.G2A	H-840.G2I	H-840.D2A	H-840.D2I	Unit	Tolerance
Load capacity (horizontal base plate / any orientation)	40 / 15	40 / 15	10 / 3	10 / 3	kg	Max.
Holding force, power off (horizontal base plate / any orientation)	100 / 25	100 / 25	15 / 5	15 / 5	N	Max.

Miscellaneous	H-840.G2A	H-840.G2I	H-840.D2A	H-840.D2I	Unit	Tolerance
Operating temperature range	-10 to 50	-10 to 50	-10 to 50	-10 to 50	°C	
Material	Aluminum / steel	Aluminum / steel	Aluminum / steel	Aluminum / steel		
Mass	12	12	12	12	kg	±10 %
Cable length	3	3	3	3	m	±10 mm

Technical data specified at 20±3 °C.

* The 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.

Ask about customized versions.

Drawings / Images

H-840.x2A/x2I, dimensions in mm

Certificate of approval for vibration equipment
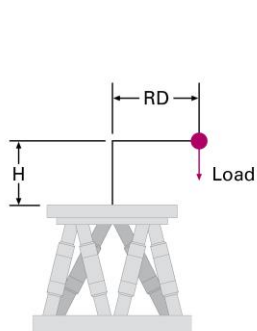
H-840.G2x
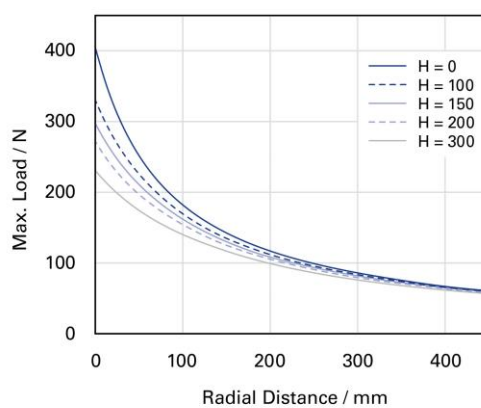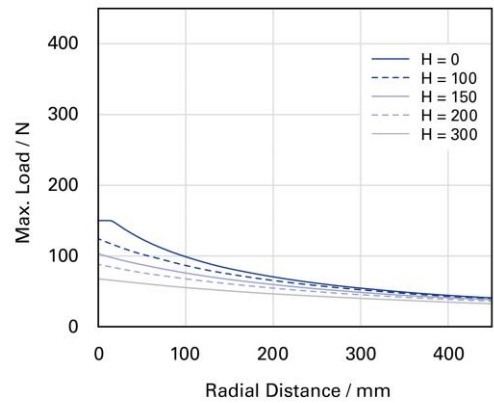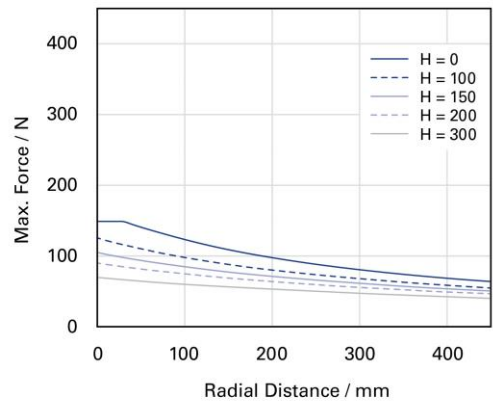
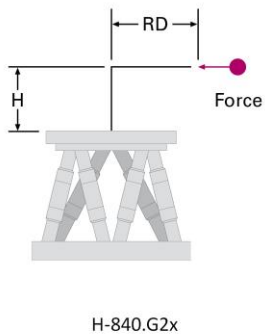*Load limits of the H-840.G2x for horizontal mounting*
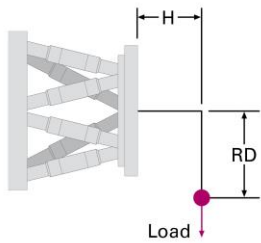
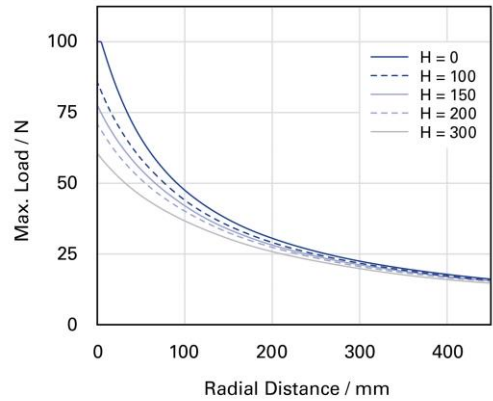H-840.G2x
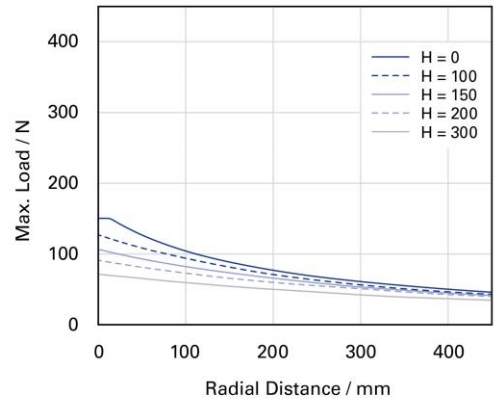
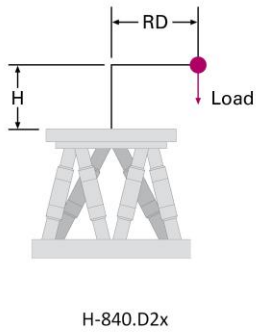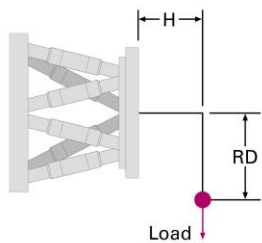*Load limits of the H-840.G2x for vertical mounting*
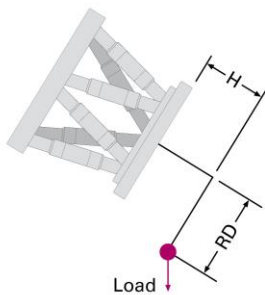
H-840.G2x

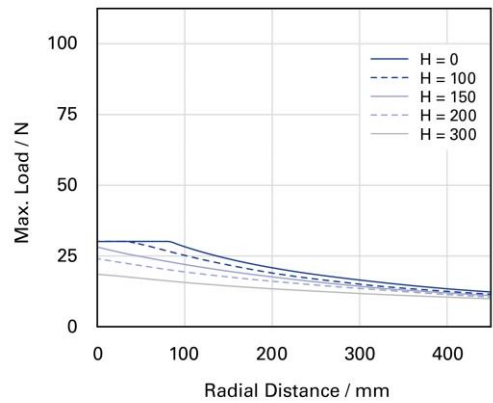*Load limits of the H-840.G2x for mounting at the most unfavorable angle*

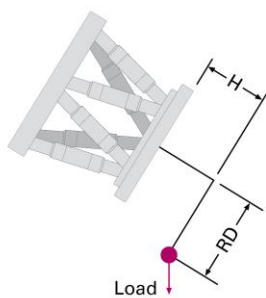*Maximum admissible force on the H-840.G2x with horizontal mounting*

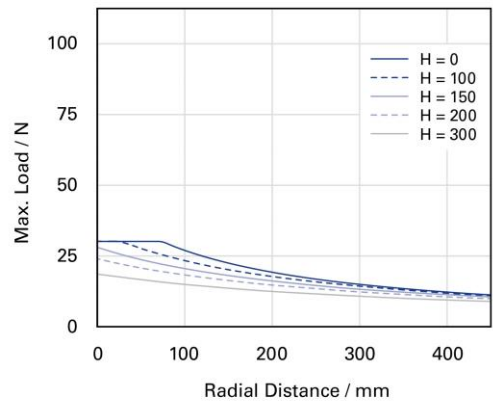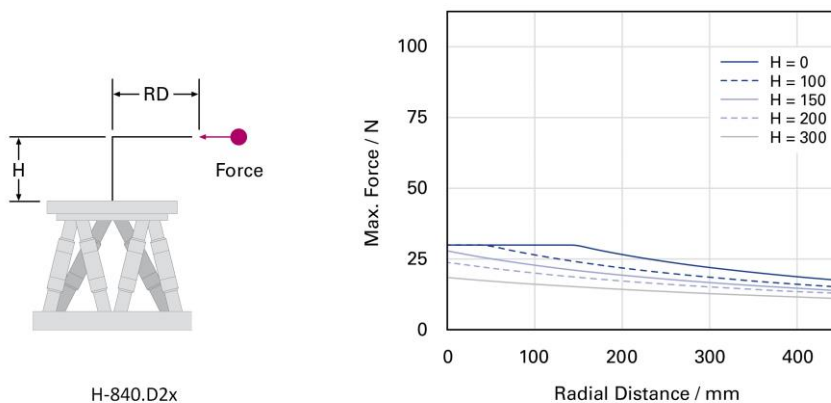*Load limits of the H-840.D2x for horizontal mounting*

H-840.D2x

Load limits of the H-840.D2x for vertical mounting

H-840.D2x

Load limits of the H-840.D2x for mounting at the most unfavorable angle

H-840.D2x

Maximum admissible force on the H-840.D2x with horizontal mounting

Ordering Information

H-840.G2A
Precision hexapod microrobot, brushless DC gear motor, absolute encoder, 40 kg load capacity, 2.5 mm/s velocity, including 3 m cable

H-840.G2I
Precision hexapod microrobot, brushless DC gear motor, incremental rotary encoder, 40 kg load capacity, 2.5 mm/s velocity, including 3 m cable

H-840.D2A
Motion hexapod microrobot, brushless DC motor, absolute encoder, 10 kg load capacity, 60 mm/s velocity, including 3 m cable

H-840.D2I
Motion hexapod microrobot, brushless DC motor, incremental rotary encoder, 10 kg load capacity, 60 mm/s velocity, including 3 m cable