

6-Axis Hexapod

Inexpensive, Precise, and Fast



H-840

- CIPA certified
- Load capacity to 40 kg
- Travel ranges to ± 50 mm / $\pm 30^\circ$
- Repeatability to ± 0.1 μ m
- BLDC motors and variants with absolute encoders
- Works in any orientation

The H-840 hexapod series is universally applicable for tasks in precision positioning. Some variants are optimized for high dynamics and can for example, be used for simulating motion whereas models with gearhead support are suitable for heavier loads. The parallel-kinematic design for six degrees of freedom makes it significantly more compact and stiffer than comparable serial kinematic systems. The advantages over serial, i.e., stacked systems, are mainly the much better path accuracy and repeatability. In addition, the moved mass is lower and allows improved dynamics which is the same for all motion axes. Cable management is not a problem because cables are not moved.

Use of brushless DC motors (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 sliding contacts, they run smoothly, are wear-free and therefore achieve a long lifetime.

Variants with absolute encoder

Absolute encoders supply explicit position information that enables immediate determination of the position. Therefore, no referencing is necessary when switching on and this 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 purchasing, 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 the position and motion of the hexapod as well as the pivot point and several reference coordinate systems into account.

Application fields

Industry and research. For motion simulation (CIPA certified), tool inspection, life science, micromanufacturing, micromanipulation, industrial alignment systems.

Motion	Unit	Tolerance	H-840.D2A	H-840.D2I	H-840.G2A	H-840.G2I
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
Travel range in X	mm		±50	±50	±50	±50
Travel range in Y	mm		±50	±50	±50	±50
Travel range in Z	mm		±25	±25	±25	±25
Rotation range in θ X	°		±15	±15	±15	±15
Rotation range in θ Y	°		±15	±15	±15	±15
Rotation range in θ Z	°		±30	±30	±30	±30
Maximum velocity in X	mm/s		60	60	2.5	2.5
Maximum velocity in Y	mm/s		60	60	2.5	2.5
Maximum velocity in Z	mm/s		60	60	2.5	2.5
Maximum angular velocity in θ X	mrads		700	700	30	30
Maximum angular velocity in θ Y	mrads		700	700	30	30
Maximum angular velocity in θ Z	mrads		700	700	30	30
Typical velocity in X	mm/s		40	40	2	2
Typical velocity in Y	mm/s		40	40	2	2
Typical velocity in Z	mm/s		40	40	2	2
Typical angular velocity in θ X	mrads		480	480	25	25
Typical angular velocity in θ Y	mrads		480	480	25	25
Typical angular velocity in θ Z	mrads		480	480	25	25
Amplitude-frequency product in X	mm·Hz		23.6	23.6		
Amplitude-frequency product in Y	mm·Hz		23.6	23.6		
Amplitude-frequency product in Z	mm·Hz		8	8		
Amplitude-frequency product in θ X	°·Hz		5.1	5.1		
Amplitude-frequency product in θ Y	°·Hz		5.1	5.1		
Amplitude-frequency product in θ Z	°·Hz		14	14		
Amplitude-frequency ² product in X	mm·Hz ²		65.9	65.9		
Amplitude-frequency ² product in Y	mm·Hz ²		65.9	65.9		
Amplitude-frequency ² product in Z	mm·Hz ²		22.5	22.5		
Amplitude-frequency ² product in θ X	°·Hz ²		14.7	14.7		
Amplitude-frequency ² product in θ Y	°·Hz ²		14.7	14.7		
Amplitude-frequency ² product in θ Z	°·Hz ²		41	41		
Amplitude error	%	Max.	10	10		
Phase error	°	Max.	60	60		
Maximum frequency	Hz		30	30		

Positioning	Unit	Tolerance	H-840.D2A	H-840.D2I	H-840.G2A	H-840.G2I
Integrated sensor			Absolute rotary encoder, multi-turn	Incremental rotary encoder	Absolute rotary encoder, multi-turn	Incremental rotary encoder
Unidirectional repeatability in X	μm	Typ.	±0.3	±0.3	±0.3	±0.3
Unidirectional repeatability in Y	μm	Typ.	±0.3	±0.3	±0.3	±0.3
Unidirectional repeatability in Z	μm	Typ.	±0.1	±0.1	±0.1	±0.1
Unidirectional repeatability in θX	μrad	Typ.	±1.5	±1.5	±2.5	±2.5
Unidirectional repeatability in θY	μrad	Typ.	±1.5	±1.5	±2.5	±2.5
Unidirectional repeatability in θZ	μrad	Typ.	±3	±3	±3	±3
Minimum incremental motion in X	μm	Typ.	1.5	0.5	0.3	0.25
Minimum incremental motion in Y	μm	Typ.	1.5	0.5	0.3	0.25
Minimum incremental motion in Z	μm	Typ.	1	0.25	0.2	0.15
Minimum incremental motion in θX	μrad	Typ.	10	3	2	2
Minimum incremental motion in θY	μrad	Typ.	10	3	2	2
Minimum incremental motion in θZ	μrad	Typ.	2	5	4	4
Backlash in X	μm	Typ.	1.5	1.5	2	2
Backlash in Y	μm	Typ.	1.5	1.5	2	2
Backlash in Z	μm	Typ.	0.2	0.25	0.3	0.3
Backlash in θX	μrad	Typ.	4	4	5	5
Backlash in θY	μrad	Typ.	4	4	5	5
Backlash in θZ	μrad	Typ.	8	8	10	10

Drive Properties			H-840.D2A	H-840.D2I	H-840.G2A	H-840.G2I
Drive type			Brushless DC motor	Brushless DC motor	Brushless DC gear motor	Brushless DC gear motor

Mechanical Properties	Unit		H-840.D2A	H-840.D2I	H-840.G2A	H-840.G2I
Maximum holding force, base plate in any orientation	N		5	5	25	25
Maximum holding force, base plate horizontal	N		15	15	100	100
Maximum load capacity, base plate in any orientation	kg		3	3	15	15
Maximum load capacity, base plate horizontal	kg		10	10	40	40
Overall mass	kg		12	12	12	12
Material			Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel

Miscellaneous	Unit		H-840.D2A	H-840.D2I	H-840.G2A	H-840.G2I
Connector for supply voltage			M12 4-pin (m)	M12 4-pin (m)	M12 4-pin (m)	M12 4-pin (m)
Recommended controllers / drivers			C-887.5xx	C-887.5xx	C-887.5xx	C-887.5xx
Operating temperature range	°C		-10 to 50	-10 to 50	-10 to 50	-10 to 50
Connector for data transmission			HD D-sub 78-pin (m)	HD D-sub 78-pin (m)	HD D-sub 78-pin (m)	HD D-sub 78-pin (m)

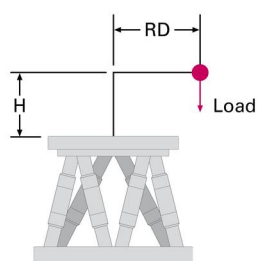
Technical data specified at 22±3 °C.

The maximum travel ranges of the individual coordinates (X, Y, Z, θ_X , θ_Y , θ_Z) are interdependent. The data for each axis shows its maximum travel range when all other axes are in the zero position of the nominal travel range and the default coordinate system is in use, or rather when the pivot point is set to 0,0,0.

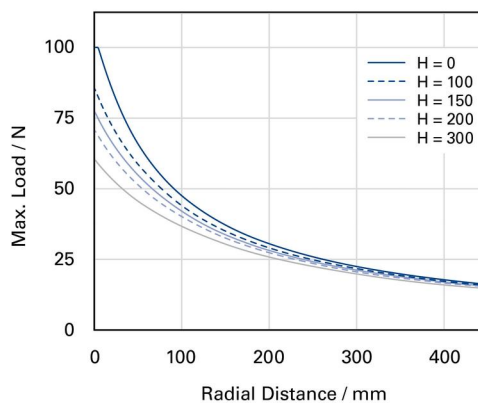
Connecting cables are not included in the scope of delivery and must be ordered separately.

Ask about customized versions.

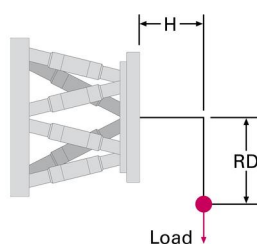
Drawings / Images



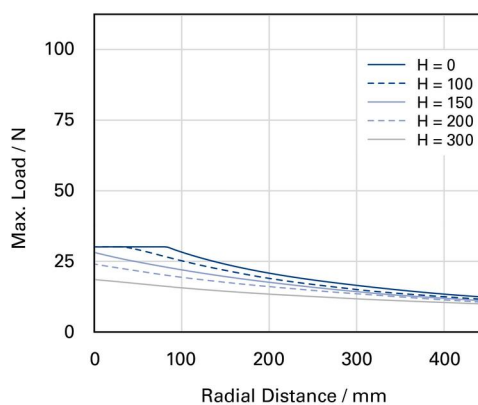
H-840.D2x



Maximum loads on the H-840.D2x when mounted horizontally

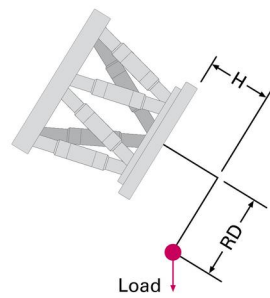


H-840.D2x

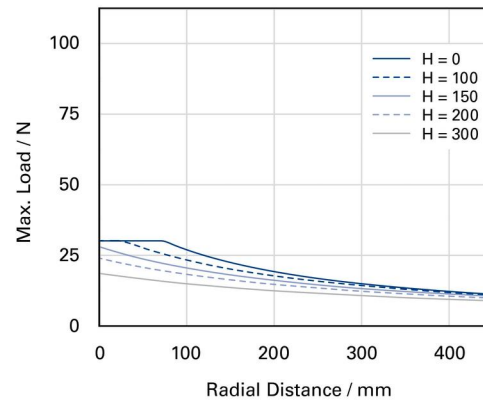


Maximum loads on the H-840.D2x when mounted vertically

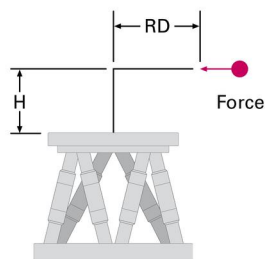
Drawings / Images



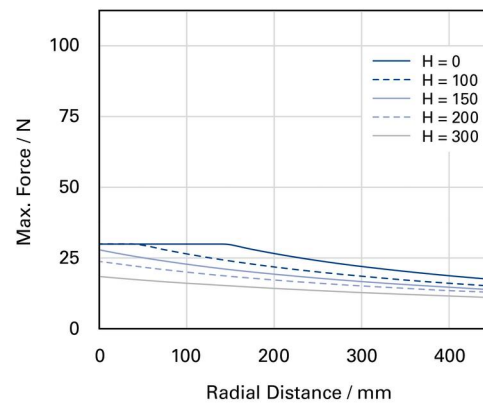
H-840.D2x



Maximum loads on the H-840.D2x when mounted at the most unfavorable angle

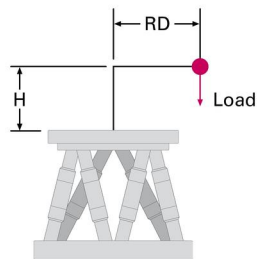


H-840.D2x

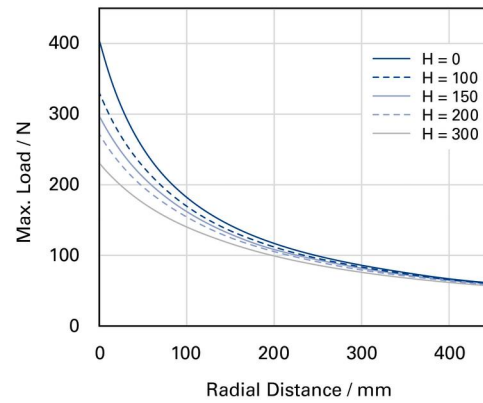


Maximum permissible force acting on the H-840.D2x when mounted horizontally

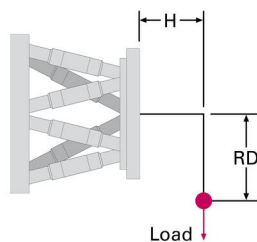
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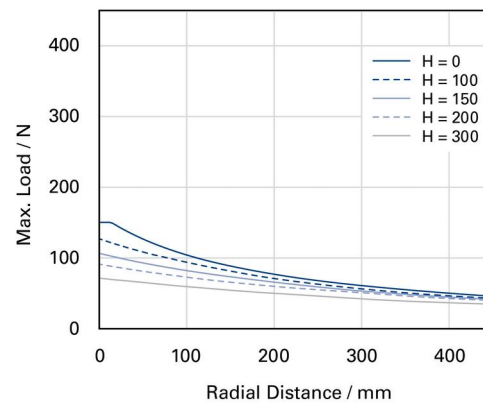
H-840.G2x



Maximum loads on the H-840.G2x when mounted horizontally

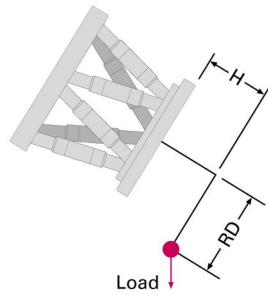


H-840.G2x

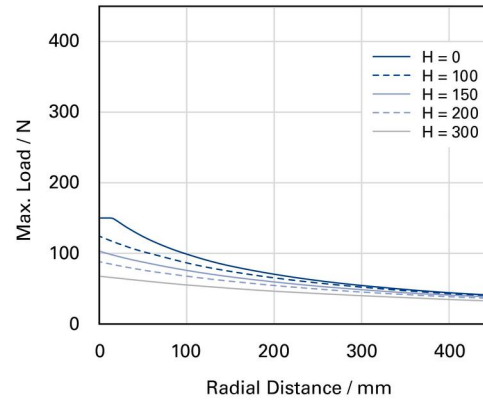


Maximum loads on the H-840.G2x when mounted vertically

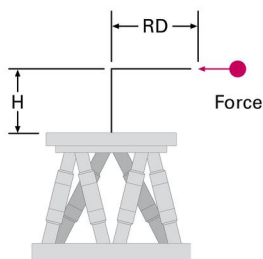
Drawings / Images



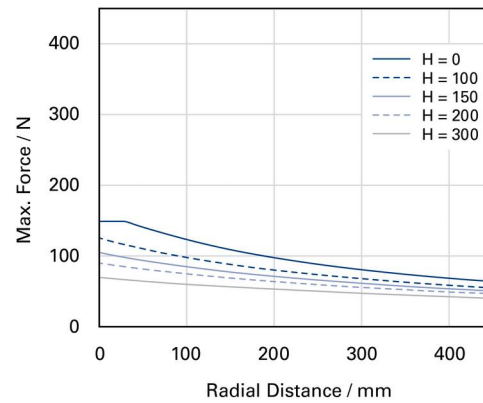
H-840.G2x



Maximum loads on the H-840.G2x when mounted at the most unfavorable angle

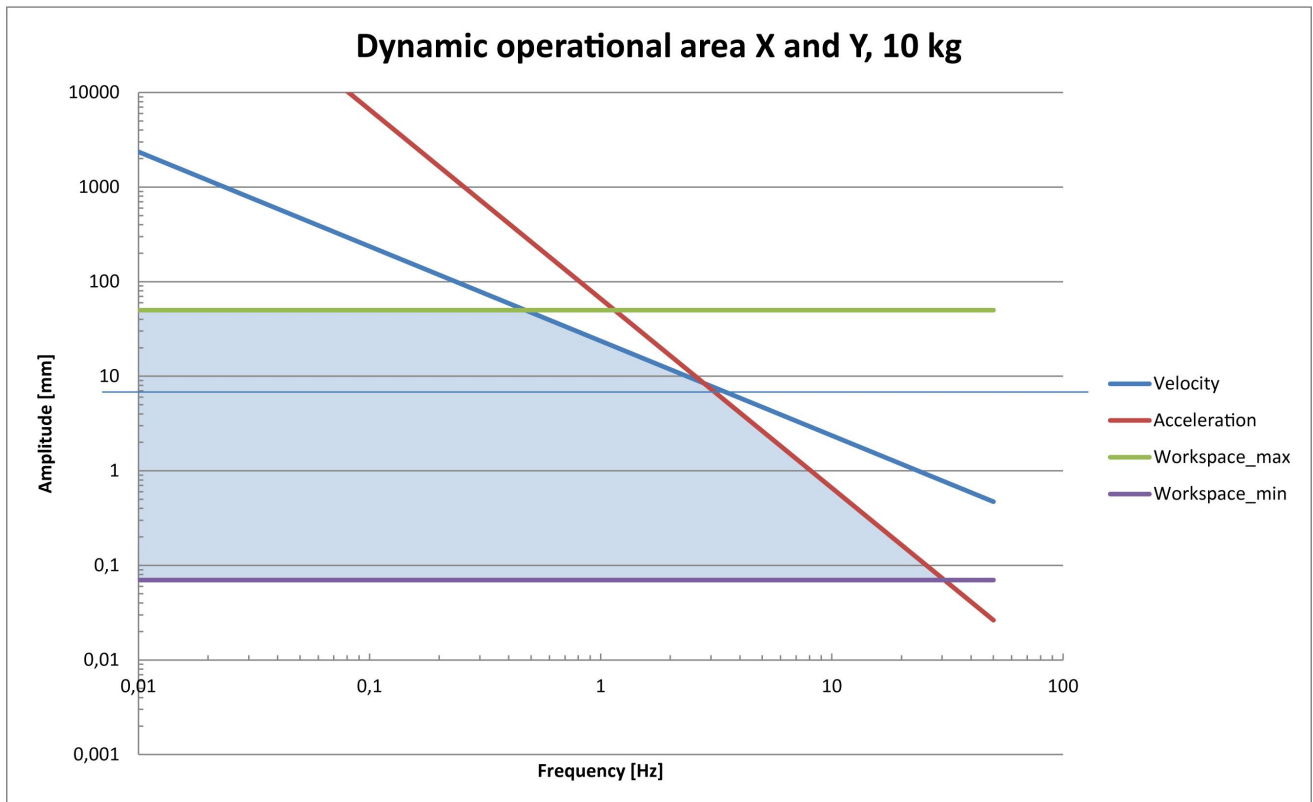


H-840.G2x



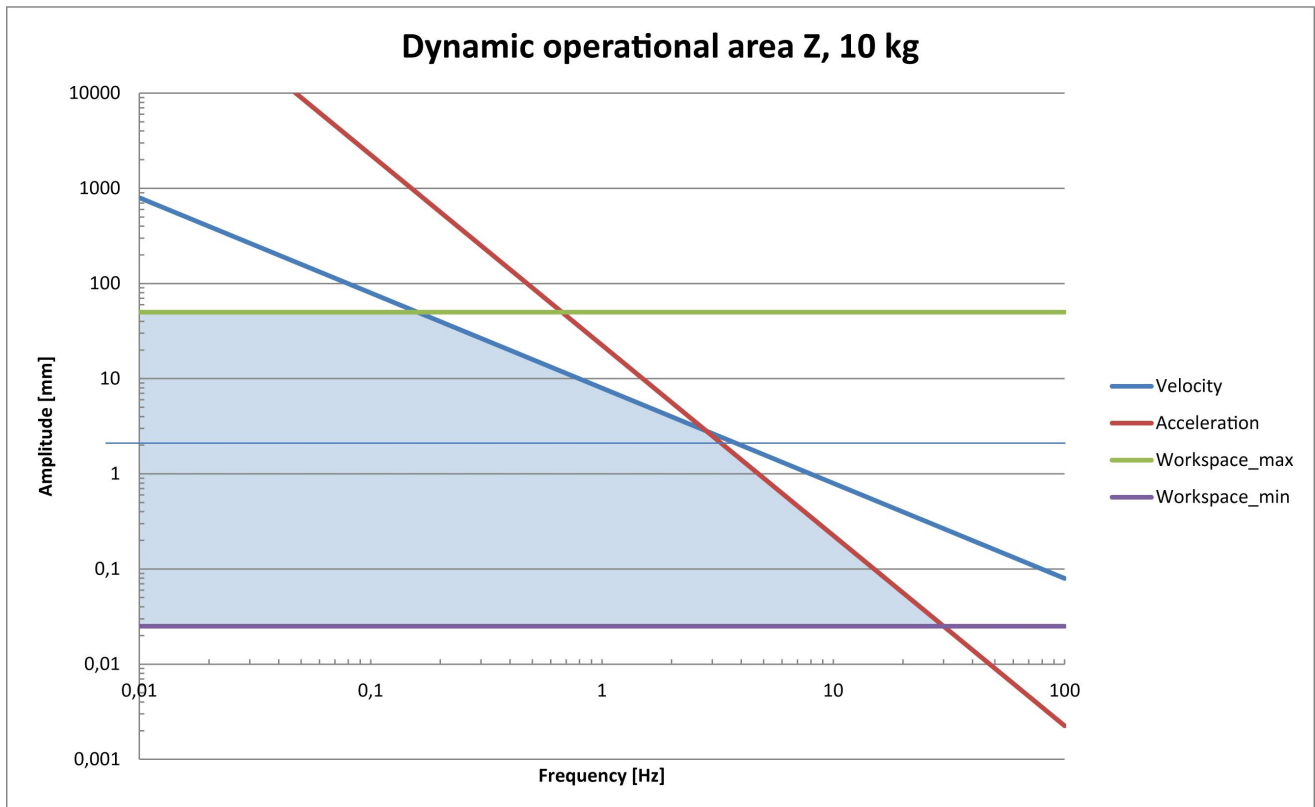
Maximum permissible force acting on the H-840.G2x when mounted horizontally

Drawings / Images



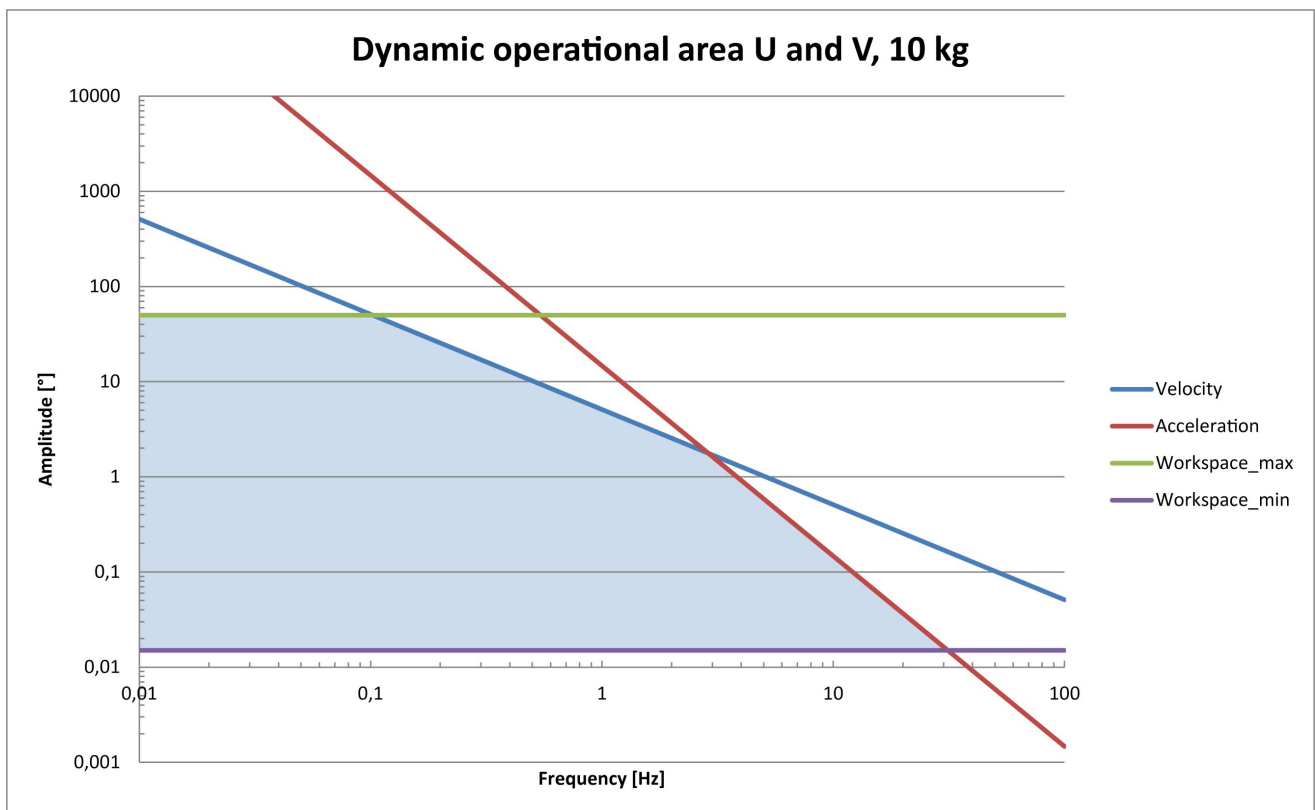
Dynamic working range of the H-840.D2x, X and Y, 10 kg

Drawings / Images



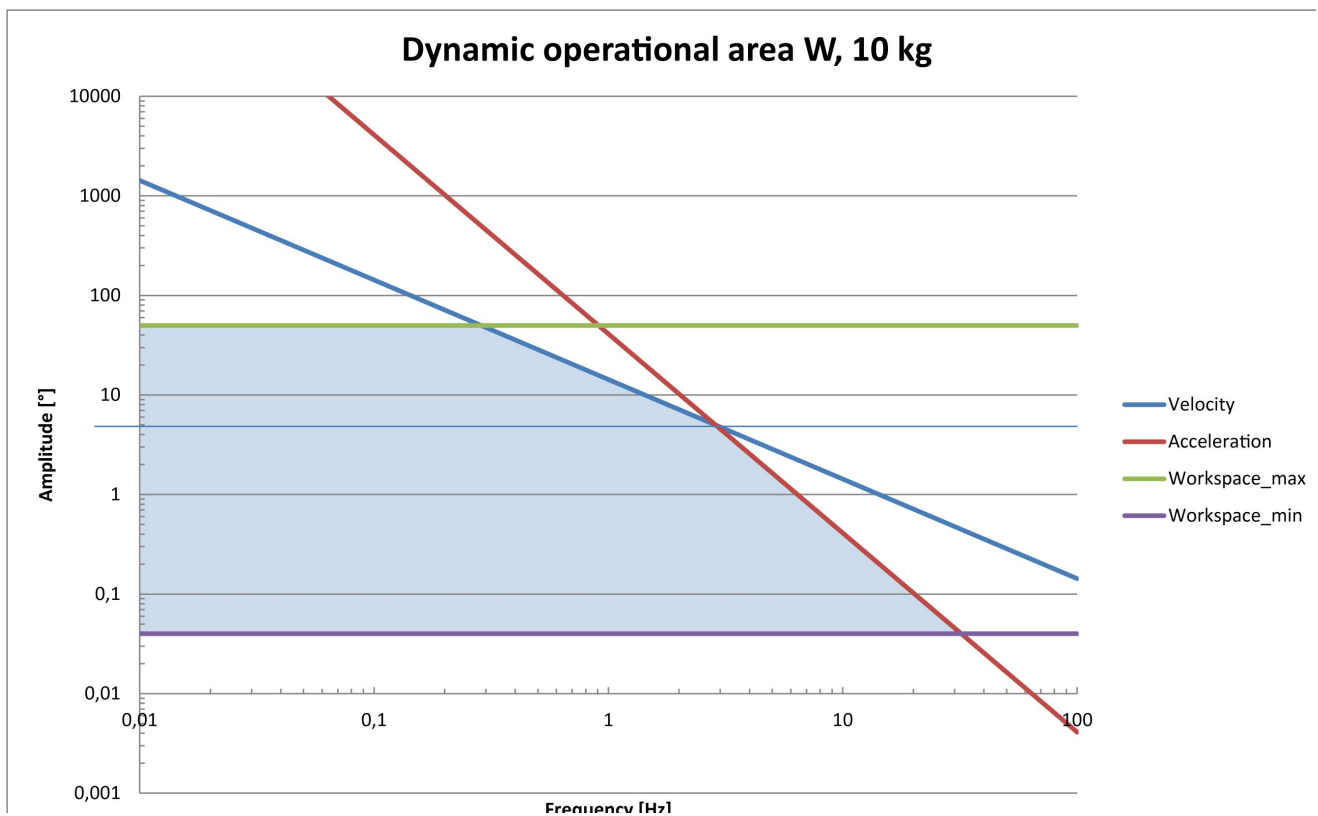
Dynamic working range of the H-840.D2x, Z, 10 kg

Drawings / Images

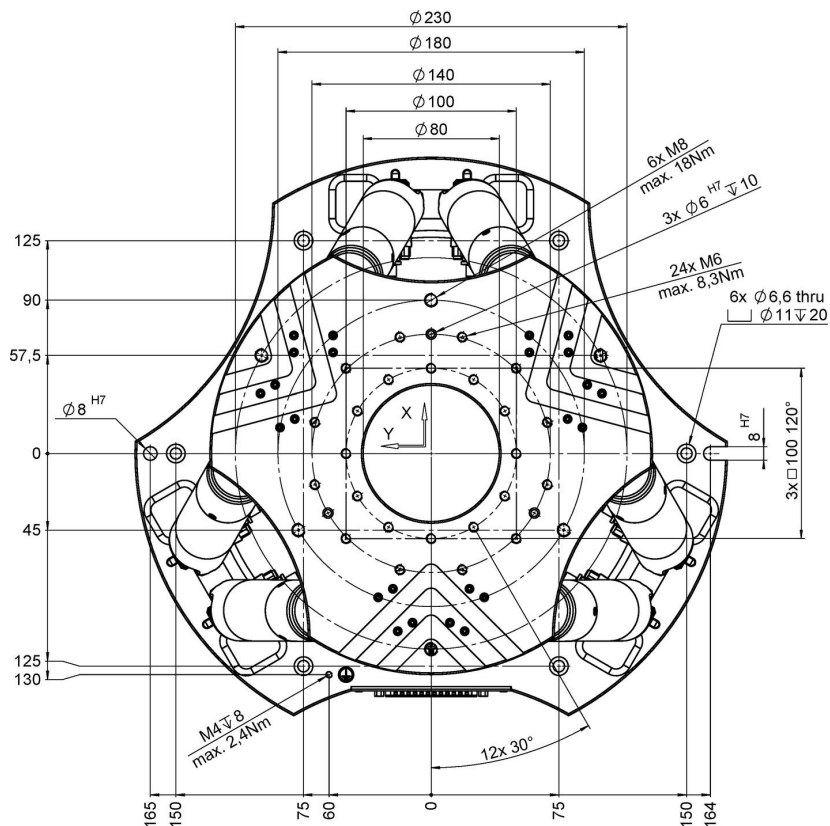
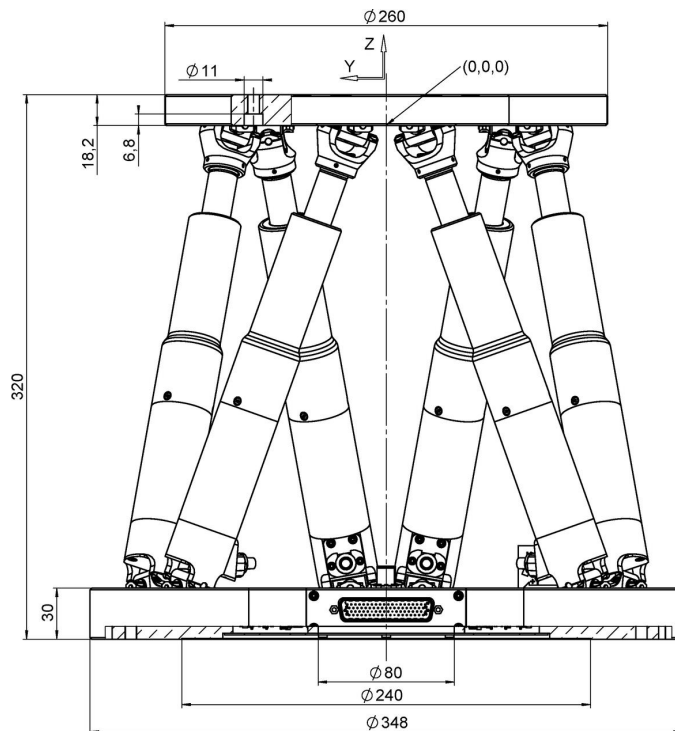


Dynamic working range of the H-840.D2x, U and V, 10 kg

Drawings / Images



Dynamic working range of the H-840.D2x, W, 10 kg



H-840.X2X, dimensions in mm, at zero position of nominal travel range



Order Information

H-840.D2A

Motion hexapod microrobot, brushless DC motor, absolute encoder, 10 kg load capacity, 60 mm/s velocity. Connecting cables are not included in the scope of delivery and must be ordered separately.

H-840.D2I

Motion hexapod microrobot, brushless DC motor, incremental rotary encoder, 10 kg load capacity, 60 mm/s velocity. Connecting cables are not included in the scope of delivery and must be ordered separately.

H-840.G2A

Precision hexapod microrobot, brushless DC gear motor, absolute encoder, 40 kg load capacity, 2.5 mm/s velocity. Connecting cables are not included in the scope of delivery and must be ordered separately.

H-840.G2I

Precision hexapod microrobot, brushless DC gear motor, incremental rotary encoder, 40 kg load capacity, 2.5 mm/s velocity. Connecting cables are not included in the scope of delivery and must be ordered separately.