PIMag® High-Precision XY Stage

High Travel Accuracy and Stability, Magnetic Direct Drive

V-731

- Travel range 205 mm × 205 mm (8")
- Unidirectional repeatability to 0.1 µm
- Ironless 3-phase linear motor
- Velocity to 200 mm/s
- Incremental linear encoder with 1 nm resolution
- Crossed roller guides

PIMag® magnetic direct drive

3-phase magnetic direct drives do not use mechanical components in the drivetrain, they transmit the drive force to the motion platform directly and without friction. The drives reach high velocities and accelerations. Ironless motors are particularly suitable for positioning tasks with the highest demands on precision because there is no undesirable interaction with the permanent magnets. This allows smooth running even at the lowest velocities and at the same time, there is no vibration at high velocities. Nonlinearity in control behavior is avoided and any position can be controlled easily. The drive force can be set freely.

Crossed roller guide

With crossed roller guides, the point contact of the balls in ball guides is replaced by line contact of the hardened rollers. Consequently, they are considerably stiffer and need less preload, which reduces friction and allows smoother running. Crossed roller guides are also distinguished by high guiding accuracy and load capacity. Force-guided rolling element cages prevent cage creep.

Highly accurate position measuring with incremental encoder

Noncontact optical encoders measure the position directly at the platform with the greatest accuracy. Nonlinearity, mechanical play or elastic deformation have no influence on the measurement.
Other travel ranges on request.

Fields of application

Medical industry. Laser cutting. Scanning. Biotechnology. Metrology. AOI (Automatic Optical Inspection). Laser marking.

Specifications

Motion and positioning	V-731.096111	Unit	Tolerance
Active axes	X, Y		
Travel range	205 × 205	mm	
Integrated sensor	Incremental linear encoder		
Design resolution	0.001	µm	
Sensor signal	Sin/cos, 1 V peak-peak, 20 µm signal period		
Minimum incremental motion	0.02	µm	typ.
Unidirectional repeatability	0.1	µm	typ.
Bidirectional repeatability	±0.25	µm	typ.
Angular error xry (pitch)	±50	µrad	typ.
Angular error xrz (yaw)	±30	µrad	typ.
Angular error yrx (pitch)	±40	µrad	typ.
Angular error yrz (yaw)	±30	µrad	typ.
Orthogonality	±96.963	µrad	typ.
Straightness / flatness	±2	µm	typ.
Velocity	200	mm/s	max.
Acceleration in X, without load	5	m/s²	max.
Acceleration in Y, without load	15	m/s²	max.
Reference and limit switches	Optical		

Mechanical properties	V-731.096111	Unit	Tolerance
Load capacity	50	N	max.
Permissible torque in θ_X, θ_Y	125	N·m	max.
Permissible torque in θ_Z	125	N·m	max.
Guide	Crossed roller guide with anti-creep system		

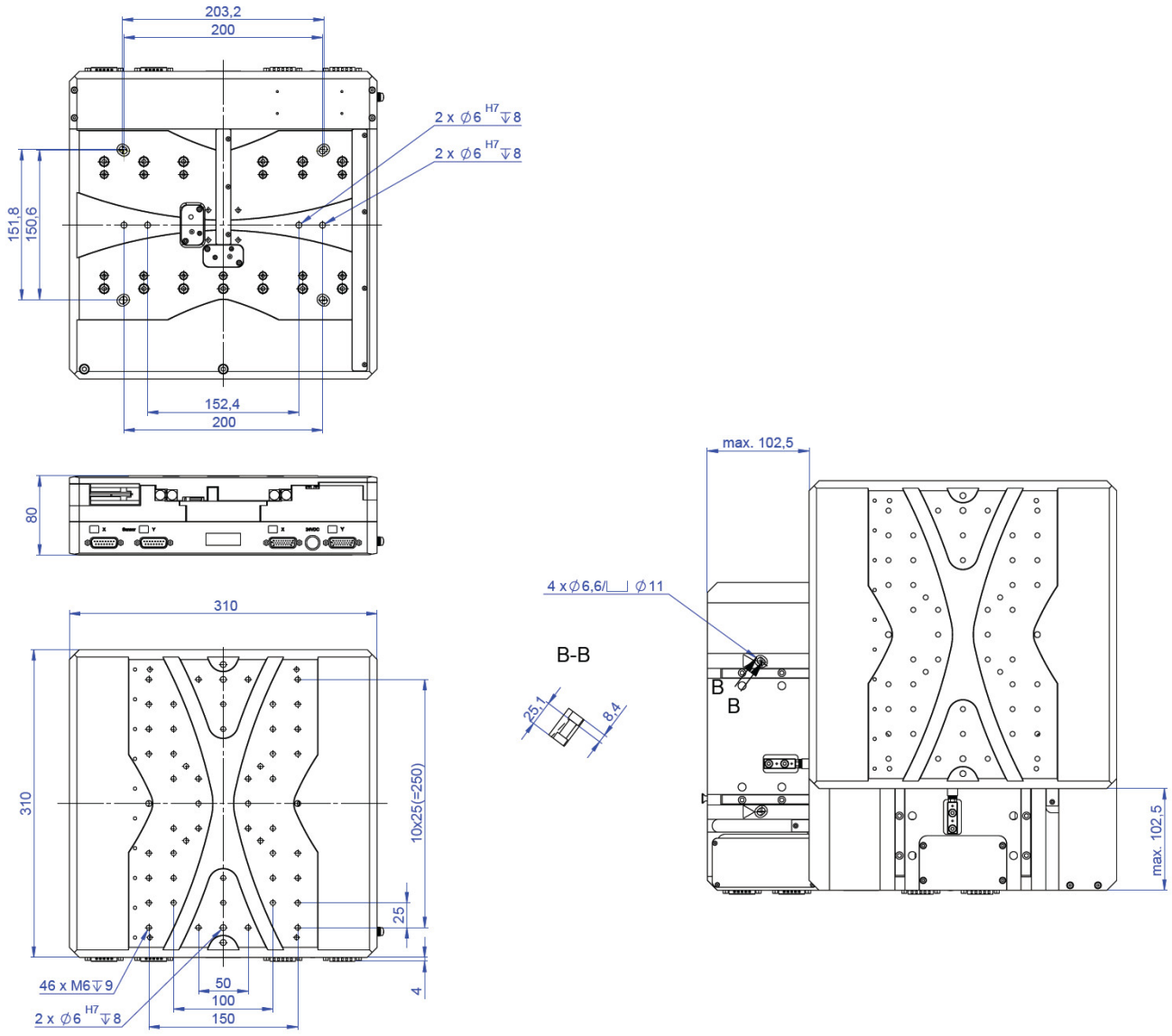
Drive properties	V-731.096111	Unit	Tolerance
Motor type	Ironless 3-phase linear motor		
Operating voltage, nominal	48	V	nom.
Operating voltage, max.	48	V	max.
Peak force	80	N	max.
Nominal force	29	N	typ.
Peak current, RMS	5	A	typ.
Nominal current, RMS	1.5	A	typ.
Force constant, RMS	19.9	N/A	typ.
Motor constant	4.89	N/√W	typ.
Electrical time constant	0.4	ms	
Resistance phase-phase	11	Ω	typ.
Inductance phase-phase	3.6	mH	typ.

Drive properties	V-731.096111	Unit	Tolerance
Back EMF phase-phase	16	V·s/m	max.
Pole pitch N-N	30	mm	

Miscellaneous	V-731.096111	Unit	Tolerance
Operating temperature range	5 to 40	°C	
Material	Aluminum, black anodized		
Moved mass in X	15.4	kg	±5 %
Moved mass in Y	5.6	kg	±5 %
Overall mass	19.4	kg	±5 %
MTBF	20000	h	
Connector	2 × HD D-sub 26 (m) (motor) 2 × D-sub 15 (f) (sensor)		
Recommended controller	SMC Hydra (double axis) C-891 (single axis) C-885 with C-891.11C885 (up to 20 axes) ACS modular controller		

All cables required for operation with the recommended controller are included in the scope of delivery. The cable length is 3 m. Cable for connecting to other controllers can be ordered as accessory.
Ask about customized versions.

Drawings / Images



V-731, dimensions in mm

Ordering Information

V-731.096111
High-precision XY stage, 310 mm × 310 mm width, 205 mm × 205 mm travel range, linear motor, linear encoder with sin/cos signal transmission, 20 µm sensor signal period, including 3 m cable set