High-Precision XY Stage

High Travel Accuracy and Stability, Linear Motor

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

Linear motors
Linear motors are electromagnetic direct drives. They dispense with mechanical components in the drivetrain and transfer the drive force directly and friction-free to the motion platform. 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 linear encoder
Noncontact optical linear encoders measure the position directly at the platform with the greatest accuracy. Nonlinearity, mechanical play or elastic deformation have no influence on the measurement. More travel ranges on request.

Application fields
Medical industry. Laser cutting. Scanning. Biotechnology. Measuring technology. AOI (Automatic Optical Inspection). Laser inscription.

Motion	Unit	Tolerance	V-731.096111
Active axes			X | Y
Travel range in X	mm		205
Travel range in Y	mm		205
Acceleration in X, unloaded	m/s²	Max.	5
Acceleration in Y, unloaded	m/s²	Max.	15
Maximum velocity in X, unloaded	mm/s		200
Maximum velocity in Y, unloaded	mm/s		200
Orthogonality	µrad	Typ.	±96.96
Straightness error E_XY (straightness)	µm	Typ.	±2
Straightness error E_YX (straightness)	µm	Typ.	±2
Straightness error E_ZX (flatness)	µm	Typ.	±2
Straightness error E_ZY (flatness)	µm	Typ.	±2
Angular error E_AY (pitch)	µrad	Typ.	±75
Angular error E_BX (pitch)	µrad	Typ.	±75
Angular error E_CX (yaw)	µrad	Typ.	±30
Angular error E_CY (yaw)	µrad	Typ.	±30

Positioning	Unit	Tolerance	V-731.096111
Minimum incremental motion in X	µm	Typ.	0.02
Minimum incremental motion in Y	µm	Typ.	0.02
Unidirectional repeatability in X	µm	Typ.	±0.05
Unidirectional repeatability in Y	µm	Typ.	±0.05
Bidirectional repeatability in X	µm	Typ.	0.5
Bidirectional repeatability in Y	µm	Typ.	0.5
Reference switch			Forked photoelectric sensor, N/C contact, 5 V, NPN
Limit switches			Forked photoelectric sensor, N/C contact, 5 V, NPN
Integrated sensor			Incremental linear encoder
Sensor signal			Sin/cos, 1 V peak-peak
Sensor signal period	µm		20
System resolution in X	nm		1
System resolution in Y	nm		1

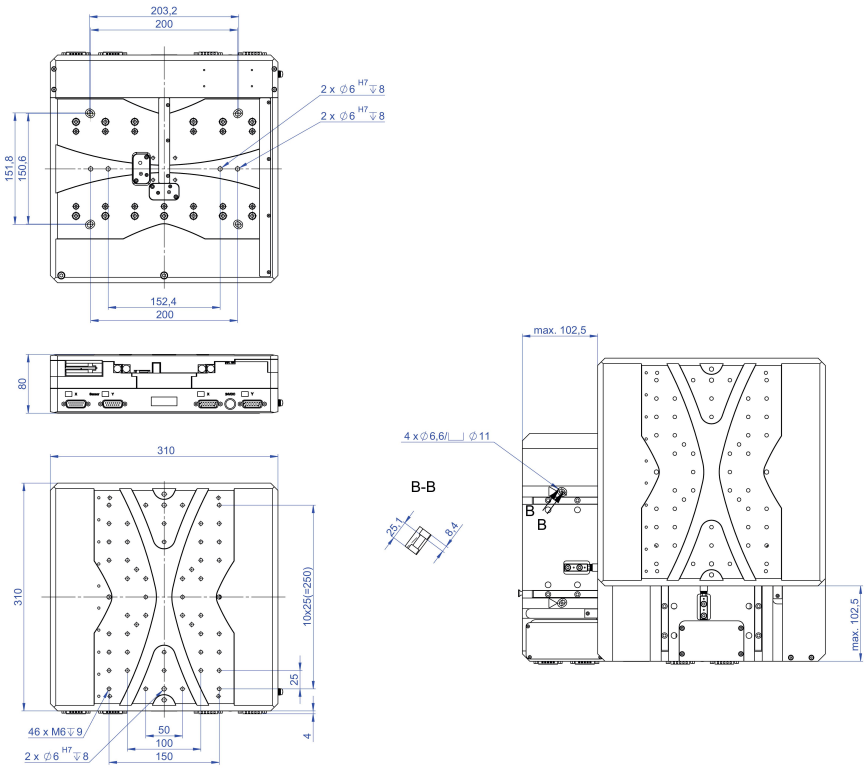
Drive Properties	Unit	Tolerance	V-731.096111
Drive type			Ironless 3-phase linear motor
Operating voltage	V		48
Nominal voltage	V		—
Peak voltage	V		—
Nominal current, RMS	A	Typ.	1.5
Peak current, RMS	A	Typ.	5
Drive force in X	N	Typ.	29
Drive force in Y	N	Typ.	29
Peak force in X	N		80
Peak force in Y	N		80
Force constant	N/A		19.9
Motor constant	N/√W	Typ.	4.89
Time constant	ms		0.4
Resistance phase-phase	Ω	Typ.	11
Inductance phase-phase	mH		3.6
Back EMF phase-phase	V·s/m	Max.	16
Pole pitch N-N	mm		30

Mechanical Properties	Unit	Tolerance	V-731.096111
Permissible push force in Z	N	Max.	50
Permissible torque in θX	N·m	Max.	125
Permissible torque in θY	N·m	Max.	125
Permissible torque in θZ	N·m	Max.	125
Moved mass in X, unloaded	g		15400
Moved mass in Y, unloaded	g		5600
Guide			Crossed roller guide
Overall mass	g		19400
Material			Aluminum, black anodized

Miscellaneous	Unit		V-731.096111
Operating temperature range	°C		5 to 40
Connector			2 × HD D-sub 26 (m)
Sensor connector			2 × D-sub 15 (f)
Recommended controllers / drivers			G-901.R319 C-891.130300 C-885 with C-891.11C885 ACS modular controller

At PI, technical data is specified at 22 ±3 °C. Unless otherwise stated, the values are for unloaded conditions. Some properties are interdependent. The designation "typ." indicates a statistical average for a property; it does not indicate a guaranteed value for every product supplied. During the final inspection of a product, only selected properties are analyzed, not all. Please note that some product characteristics may deteriorate with increasing operating time.

Drawings / Images



V-731, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

Order Information

V-731.096111
High-precision XY stage, ironless 3-phase linear motor; 205 mm x 205 mm travel range (X × Y); 50 N load capacity; 200 mm/s × 200 mm/s maximum velocity; incremental linear encoder, 20 µm sensor signal period, sin/cos, 1 V peak-peak