Q-Motion® Precision Linear Stage

High Forces and Small Design Due to Piezo Motors

Q-545

- Only 45 mm in width
- Drive force 7 N
- Incremental sensors with nanometer position resolution
- XY combinations without adapter plate possible

Piezoelectric inertia drive
Piezo inertia drives are space-saving and affordable piezo-based drives with relatively high holding forces and a virtually unlimited travel range. The inertia drive principle is based on a single piezoelectric actuator that is controlled with a modified sawtooth voltage provided by special driver electronics. The actuator expands slowly and moves the runner. Due to its inertia, the runner is unable to follow the subsequent fast contraction of the actuator and remains at its position. With an operating frequency of up to 20 kHz, the drives acting directly on the runner and achieve velocities of max. 8 mm/s.

Direct-measuring principle
The linear stages are equipped with a noncontact measuring optical linear encoder and a reference switch. Resolution 1 nm.

Application fields
Microassembly. Photonics. Optical alignment. Microscopy. Beamline instrumentation. Semiconductor technology. Testing.

Motion	Unit		Q-545.140	Q-545.240
Active axes			X	X
Travel range in X	mm		13	26
Maximum velocity in X, unloaded	mm/s		8	8
Linearity in X	µm		2	2

Positioning	Unit	Tolerance	Q-545.140	Q-545.240
Minimum incremental motion in X	µm	Typ.	0.006	0.006
Reference switch			Optical	Optical
Integrated sensor			Incremental linear encoder	Incremental linear encoder
Sensor signal			Sin/cos, 1 V peak-peak	Sin/cos, 1 V peak-peak
Sensor resolution	nm		1	1

Drive Properties	Unit	Tolerance	Q-545.140	Q-545.240
Drive type			Q-Motion® piezo motor	Q-Motion® piezo motor
Drive force in positive direction of motion in X	N	Typ.	7	7
Drive force in negative direction of motion in X	N	Typ.	7	7

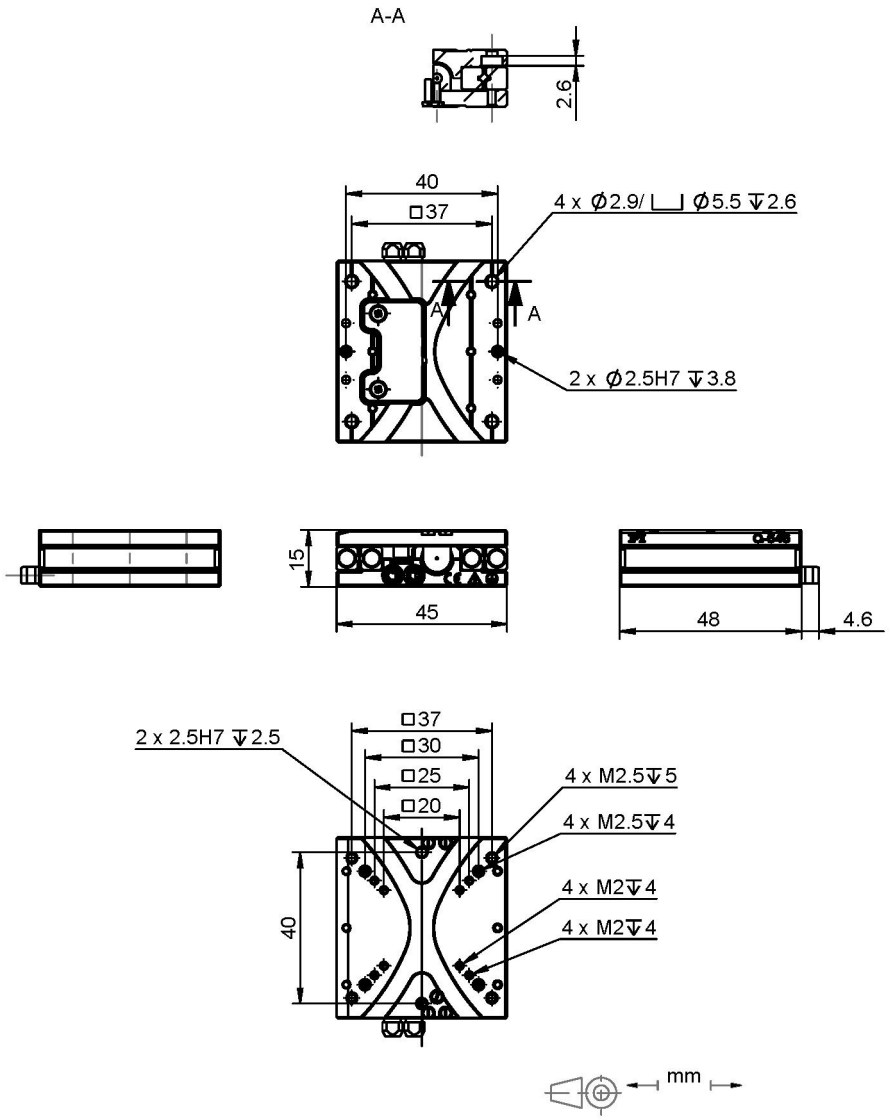
Mechanical Properties	Unit	Tolerance	Q-545.140	Q-545.240
Stiffness in X	N/µm	±10%	1.5	1.5
Stiffness in Y	N/µm	±10%	9	10
Holding force in X, passive	N	Min.	8	8
Maximum load capacity, base plate in any orientation	kg		0.1	0.1
Maximum load capacity, base plate horizontal	kg		0.5	0.5
Guide			Crossed roller guide	Crossed roller guide
Overall mass	g		216	245
Mass without cable	g		105	135
Material			Aluminum	Aluminum

Miscellaneous	Unit		Q-545.140	Q-545.240
Operating temperature range	°C		0 to 50	0 to 50
Connector			D-sub 15 (m)	D-sub 15 (m)
Cable length	m		2	2
Recommended controllers / drivers			E-873.1AT,E-873.10C885	E-873.1AT,E-873.10C885

Specifications tested with E-873.1AT

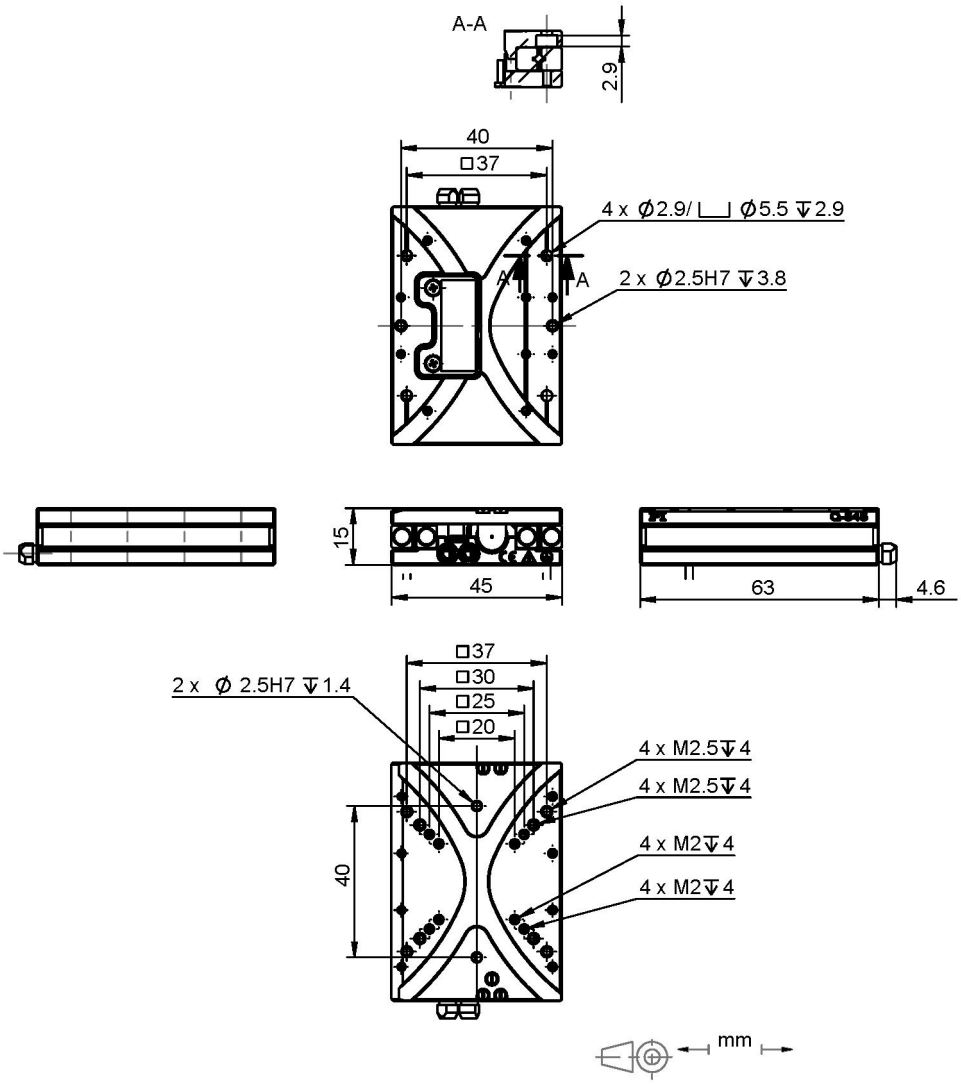
At PI, technical data is specified at 22 ±3 °C. Unless otherwise stated, the values are for unloaded conditions. Some properties are interdependent. The designation "typ." indicates a statistical average for a property; it does not indicate a guaranteed value for every product supplied. During the final 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



Q-545.140, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

Drawings / Images



Q-545.240, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

Order Information

Q-545.140
Q-Motion® linear stage, piezoelectric inertia drive, 13 mm travel range, linear encoder, 1 nm resolution, 7 N drive force, dimensions 45 × 48 × 15 mm (W × L × H)

Q-545.240
Q-Motion® linear stage, piezoelectric inertia drive, 26 mm travel range, linear encoder, 1 nm resolution, 7 N drive force, dimensions 45 × 63 × 15 mm (W × L × H)