

PIMag® High-Load Linear Actuator

Voice Coil Drive for High Velocity



V-277

- Force up to 20 N
- Velocity to 750 mm/s
- Integrated linear encoder with 0.01 µm resolution
- Weight force compensation
- Optional force sensor with 1 mN resolution
- PIMag® voice coil motor developed by PI

PIMag® voice coil motor

Voice coil motors are direct drives. In direct drives, the force of the drive element is transmitted directly to the load to be moved without the use of mechanical transmission elements such as coupling, drive screw, or gearhead. Voice coil drives consist of a permanent magnet and a winding body that are located in the air gap of the magnetic field. When current flows through the winding body, it moves in the magnetic field of the permanent magnet. Thanks to their low weight and friction-free drive principle, voice coil drives are particularly suitable for applications that require high dynamics and high velocities at limited travel ranges. High scan frequencies and precision positioning are also possible with these drives, because they are free of the effects of hysteresis.

PIMag®

PI develops proprietary magnetic motors if positioning systems need to achieve specific performance characteristics that cannot be reached by using drive components currently available on the market, for example, to achieve a high force density or a compact design. The motors developed in-house are identified by the PIMag® brand name.

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.

Application fields

OEM drives in automation. For fast handling tasks and precision positioning in the micrometer range, micromanipulation. Testing of force-sensitive switches and surfaces

Motion	Unit	Tolerance	V-277.630	V-277.631
Active axes			Z	Z
Travel range in Z	mm		15	15
Maximum velocity in Z, unloaded	mm/s		750	750
Linearity error in Z	%	Typ.	1	1
Straightness (Linear cross-talk in Y with motion in Z)	μm	Typ.	± 5	± 5

Positioning	Unit	Tolerance	V-277.630	V-277.631
Integrated sensor			Incremental linear encoder	Incremental linear encoder
System resolution in Z	nm		10	10
Bidirectional repeatability in Z	μm	Typ.	± 0.5	± 0.5
Minimum incremental motion in Z	μm	Typ.	0.1	0.1
Sensor signal			Sin/cos, 1 V peak-peak	Sin/cos, 1 V peak-peak
Sensor resolution	nm		10	10
Smallest force step	mN	Typ.		5
Reference switch			Optical, direction sensing (reference edge track), 5 V, TTL	Optical, direction sensing (reference edge track), 5 V, TTL
Force sensor resolution	mN	Max.		1

Drive Properties	Unit	Tolerance	V-277.630	V-277.631
Drive type			Voice coil	Voice coil
Nominal voltage	V		24	24
Peak voltage	V		48	48
Nominal current, RMS	A	Typ.	0.74	0.74
Peak current, RMS	A	Typ.	1.5	1.5
Drive force in negative direction of motion in Z	N	Typ.	10	10
Drive force in positive direction of motion in Z	N	Typ.	10	10
Peak force in negative direction of motion in Z	N		20	10
Peak force in positive direction of motion in Z	N		20	10
Force constant	N/A		13.5	13.5
Motor constant	N/VW	Typ.	5.6	5.6
Time constant	ms		0.43	0.43
Resistance phase-phase	Ω	Typ.	6.3	6.3
Inductance phase-phase	mH		2.7	2.7
Back EMF	V·s/m	Max.	14	14
Permissible maximum temperature for positioner components	°C		60	60

Mechanical Properties	Unit		V-277.630	V-277.631
Guide			Recirculating ball bearing guide	Recirculating ball bearing guide
Holding force in Z, passive	N		3	3
Moved mass in Z, unloaded	g		190	190
Overall mass	g		1850	1850
Material			Aluminum	Aluminum

Miscellaneous	Unit	V-277.630	V-277.631
Connector		D-sub 9-pin (m)	D-sub 9-pin (m)
Sensor connector		D-sub 25 (m)	D-sub 25 (m)
Recommended controllers / drivers		C-413.1G	C-413.1G
Cable length	m	1.5	1.5
Operating temperature range	°C	10 to 60	10 to 60

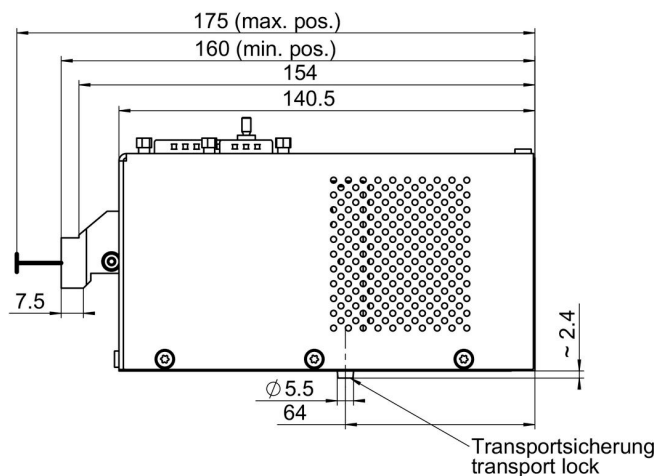
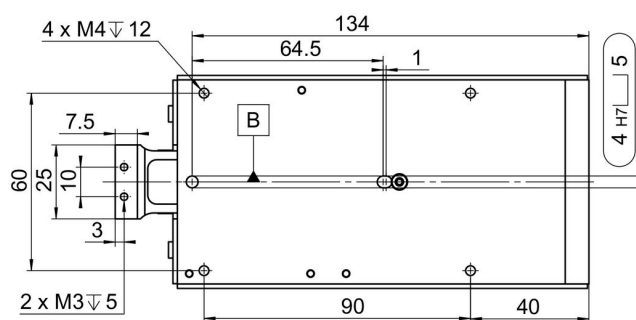
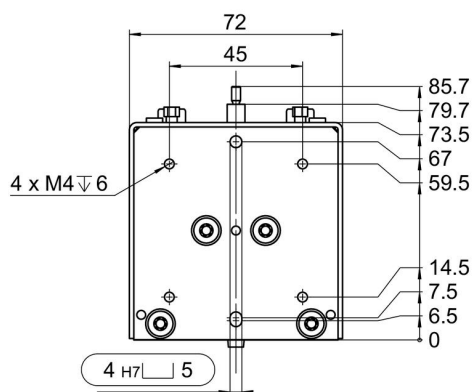
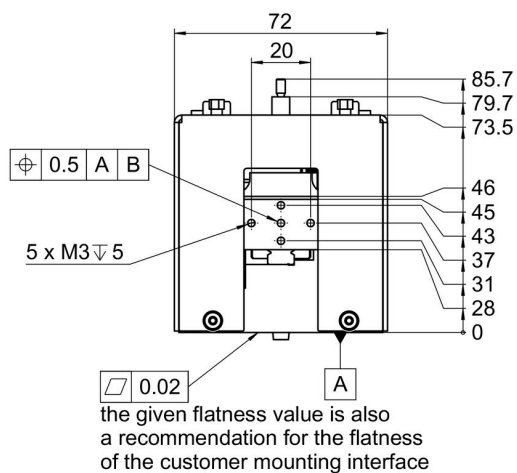
Note on sensor resolution: With C-413 controller

Note on nominal current: Do not exceed for continuous operation.

The specifications apply to room temperature (22 °C ±3 °C) and may deviate outside of this range.

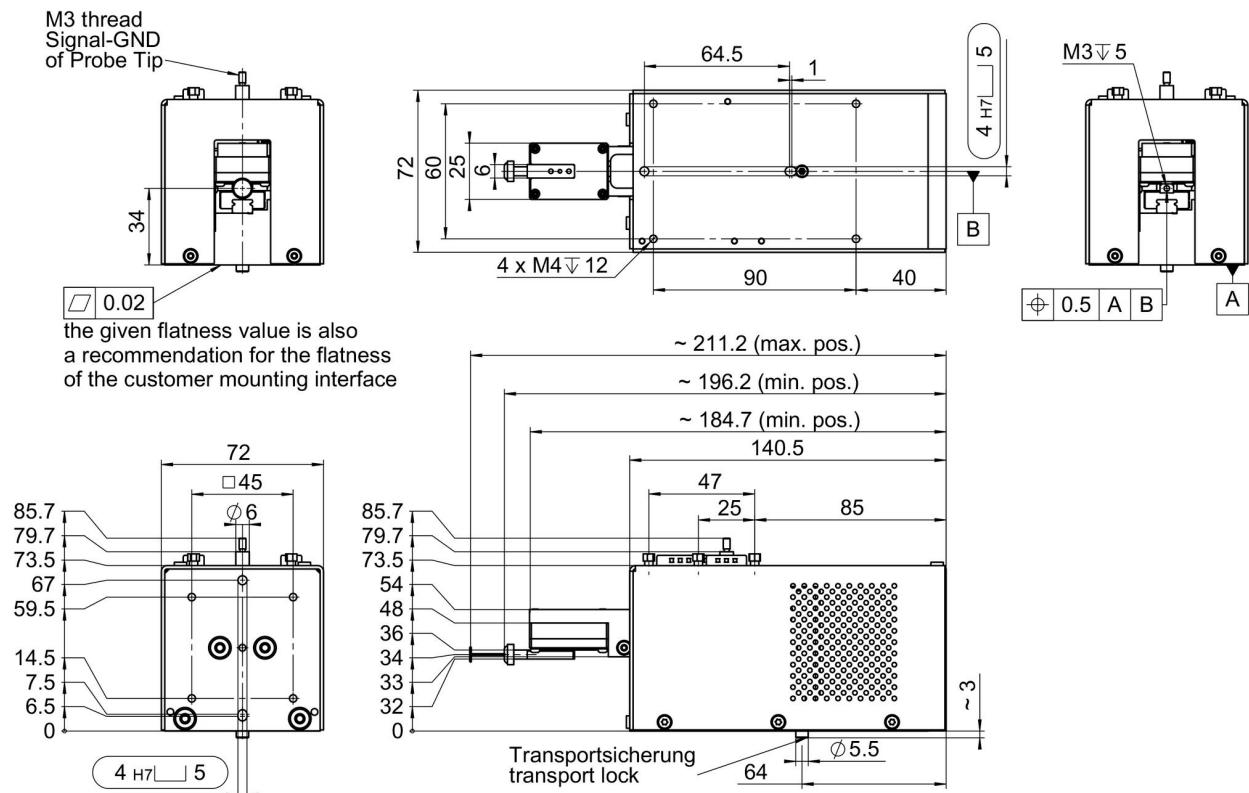
Connecting cables are not included in the scope of delivery and must be ordered separately.

Drawings / Images



V-277.630, dimensions in mm

Drawings / Images



V-277.631, dimensions in mm

Order Information

V-277.630

PIMag® high-load linear actuator; voice coil; 15 mm travel range; 10 N feed force; 750 mm/s maximum velocity; incremental linear encoder, 10 nm sensor resolution, sin/cos, 1 V peak-peak; 1.5 m cable length

V-277.631

PIMag® high-load linear actuator; voice coil; 15 mm travel range; 10 N feed force; 750 mm/s maximum velocity; incremental linear encoder, 10 nm sensor resolution, sin/cos, 1 V peak-peak; 1 mN resolution of the force sensor; 1.5 m cable length