

PIMag® Voice Coil Linear Actuator

High Dynamics, with Optional Force Control



V-275

- Push force up to 10 N
- Velocity to 600 mm/s
- Integrated linear encoder, 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 by PI are identified by the PIMag® brand name.

Highly accurate position measuring with incremental linear 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.

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.

Specifications

Motion and positioning	V-275.430 / V-275.431	Unit	Tolerance
Active axes	Z		
Travel range	10	mm	
Integrated sensor	Optical linear encoder		
Sensor resolution	10 ⁽¹⁾	nm	Max.
Minimum incremental motion	100	nm	Typ.
Linearity error, closed loop	1	%	Typ.
Repeatability	±0.5	µm	Typ.
Velocity	600	mm/s	Max.
Force sensor resolution (optional)	1	mN	Max.
Smallest force step (optional)	5	mN	Typ.

Mechanical properties	V-275.430 / V-275.431	Unit	Tolerance
Bearing / guide	Linear recirculating ball bearing guide		
Motion straightness	±5	µm	±5 %
Moved mass without load	150	g	Typ.

Drive properties	V-275.430 / V-275.431	Unit	Tolerance
Motor type	PIMag® voice coil drive, moving coil		
Coil resistance	5.7	Ω	Typ., at 20 °C
Coil inductance	3.75	mH	Typ., at 1 kHz
Time constant	0.65	ms	
Back EMF	10	V·s/m	
Force constant	10	N/A	Typ.
Motor constant	4.2	N/(√W)	
Current constant	0.1	A/N	Typ.
Nominal current	700 ⁽²⁾	mA	Max.
Peak current (max. 3 s)	1500	mA	
Average push/pull force	7	N	Nominal
Power dissipation of the coil with 100 % duty cycle	4	W	
Maximum push/pull force	15	N	Max.
Permitted temperature for actuator components	60	°C	Max.

Miscellaneous	V-275.430 / V-275.431	Unit	Tolerance
Operating temperature range	10 to 60	°C	
Material	Aluminum		
Mass	800	g	±5 %
Motor connector	D-sub 9 (m)		
Sensor connector	D-sub 25 (m)		
Lifetime	>10 ⁷	cycles	Min.
Recommended controller	C-413.1x		

(1) With C-413 controller.

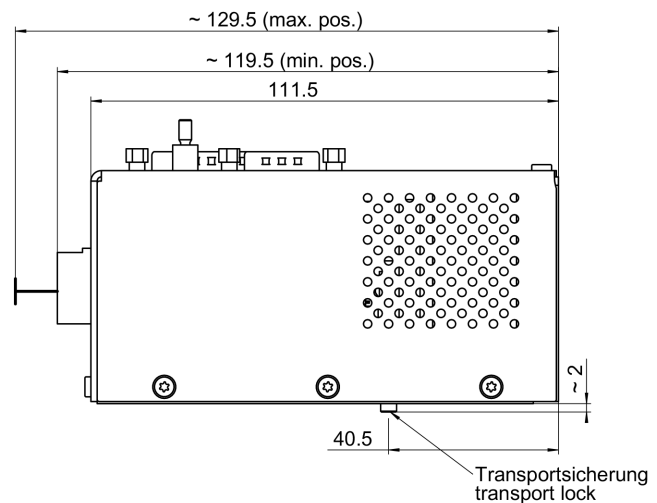
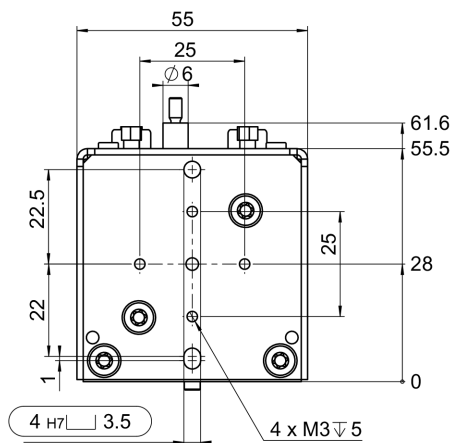
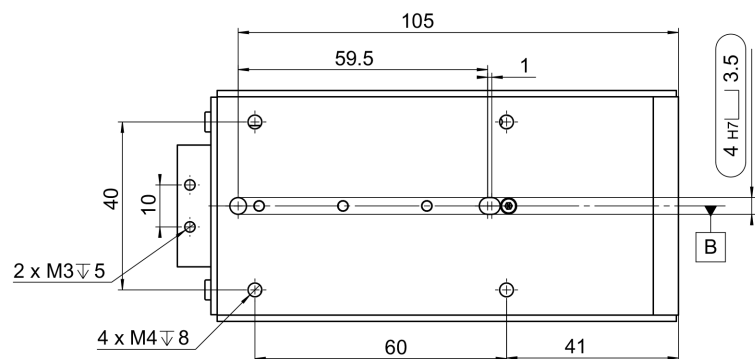
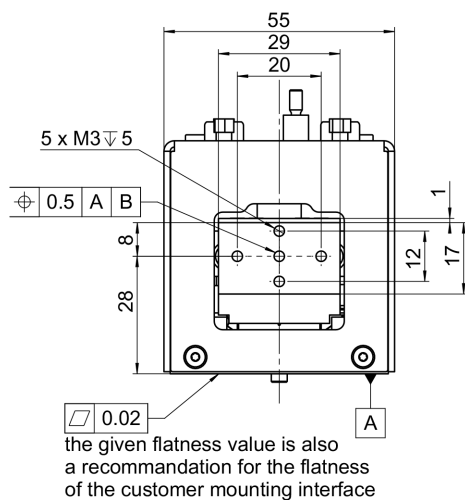
(2) Do not exceed for continuous operation.

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

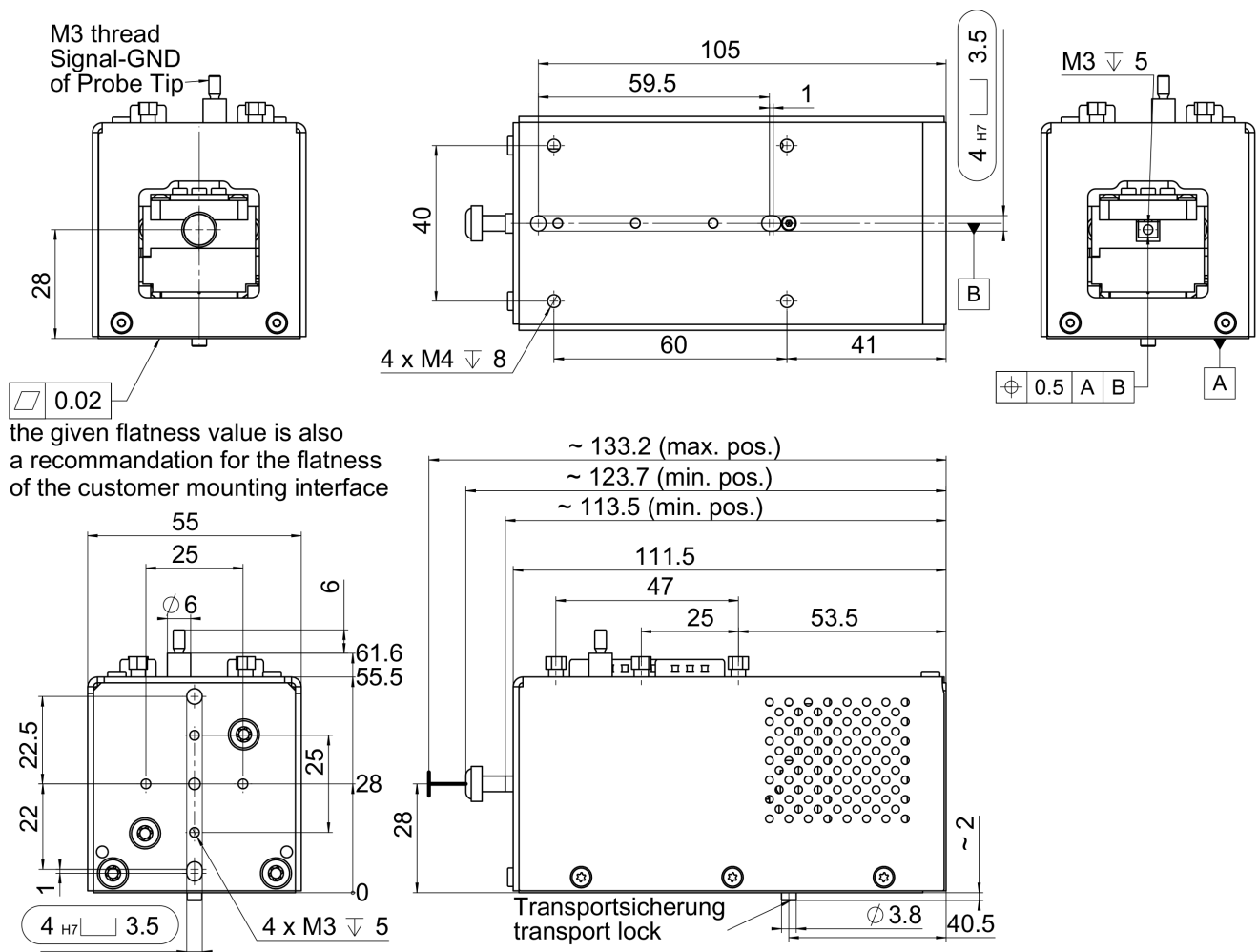
Connecting cables are not in the scope of delivery and must be ordered separately.

Ask about customized versions.

Drawings / Images



V-275.430, dimensions in mm



V-27.431, dimensions in mm

Ordering Information

V-275.430

PIMag® Voice coil linear actuator, 10 mm travel range, 15 N drive force, 10 nm resolution

V-275.431

PIMag® Voice coil linear actuator, 10 mm travel range, 15 N drive force, 10 nm resolution, force sensor