

## PIMag® Voice Coil Linear Actuator

High Dynamics and Inexpensive



### V-273

- Travel ranges to 20 mm
- Velocity to 100 mm/s
- Integrated linear encoder with 0.01  $\mu\text{m}$  resolution
- Optional force sensor with 1 mN resolution
- PIMag® voice coil motor developed by PI

#### PIMag® voice coil motor

Voice coil motors are electromagnetic 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-273.440	V-273.441
Active axes			X	X
Travel range in X	mm		20	20
Maximum velocity in X, unloaded	mm/s		100	100
Linearity error in X	%	Typ.	1	1
Straightness (Linear crosstalk in Y with motion in X)	$\mu\text{m}$	Typ.	$\pm 20$	$\pm 20$

Positioning	Unit	Tolerance	V-273.440	V-273.441
Minimum incremental motion in X	µm	Typ.	0.1	0.1
Bidirectional repeatability in X	µm	Typ.	0.5	0.5
Reference switch			Optical, direction sensing (reference edge track), 5 V, TTL	Optical, direction sensing (reference edge track), 5 V, TTL
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		10	10
Force sensor resolution	mN	Max.		1
Smallest force step	mN	Typ.		5

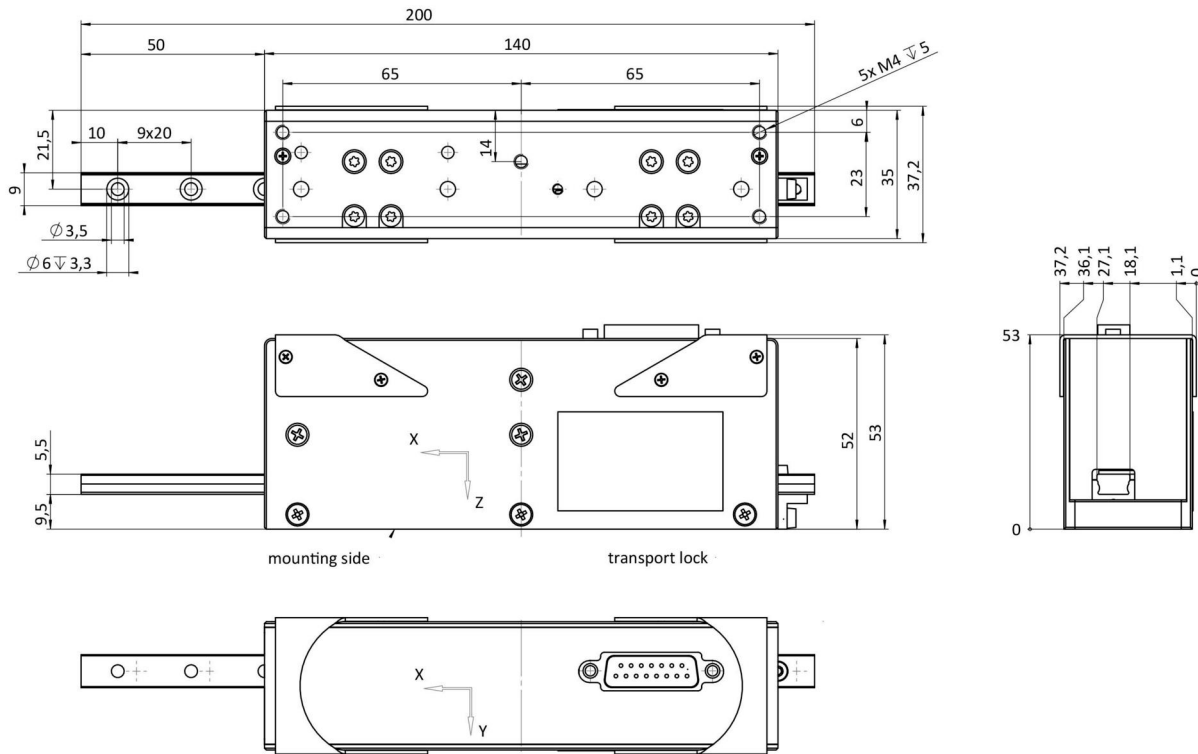
Drive Properties	Unit	Tolerance	V-273.440	V-273.441
Drive type			Electric motor/Magnetic direct drive/Voice coil	Electric motor/Magnetic direct drive/Voice coil
Nominal voltage	V		24	24
Nominal current, RMS	A	Typ.	0.375	0.375
Peak current, RMS	A	Typ.	0.8	0.8
Drive force in X	N	Typ.	3	3
Peak force in X	N		6	6
Force constant	N/A		8	8
Motor constant	N/VW	Typ.	2	2
Time constant	ms		0.38	0.38
Resistance phase-phase	Ω	Typ.	16	16
Inductance phase-phase	mH		6	6
Back EMF	V·s/m	Max.	8	8
Permissible maximum temperature for positioner components	°C		60	60
Power dissipation of the coil with 100 % duty cycle	W		2.25	2.25

Mechanical Properties	Unit		V-273.440	V-273.441
Moved mass in X, unloaded	g		100	230
Guide			Rolling element guide/Recirculating ball bearing guide	Rolling element guide/Recirculating ball bearing guide
Overall mass	g		660	790
Material			Aluminum	Aluminum

Miscellaneous	Unit		V-273.440	V-273.441
Operating temperature range	°C		10 to 60	10 to 60
Connector			D-sub 15-pin (m)	D-sub 15-pin (m)
Sensor connector				D-sub 15-pin (m)
Cable length	m			1
Recommended controllers / drivers			C-413.2x	C-413.2x

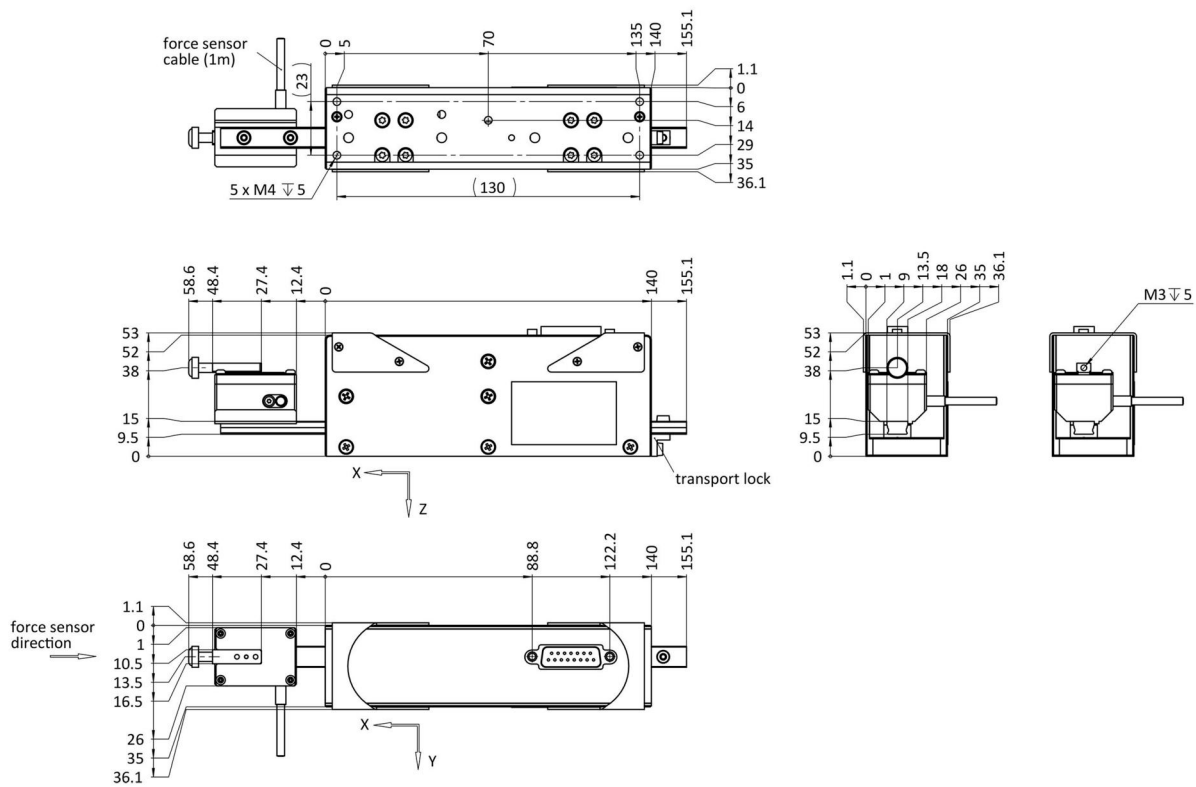
Note on sensor resolution: With C-413 controller  
Note on nominal current: Do not exceed for continuous operation.  
The specifications apply to room temperature (22 °C ± 3 °C) and can deviate outside of this range.  
Connecting cables are not included in the scope of delivery and must be ordered separately.

# Drawings / Images



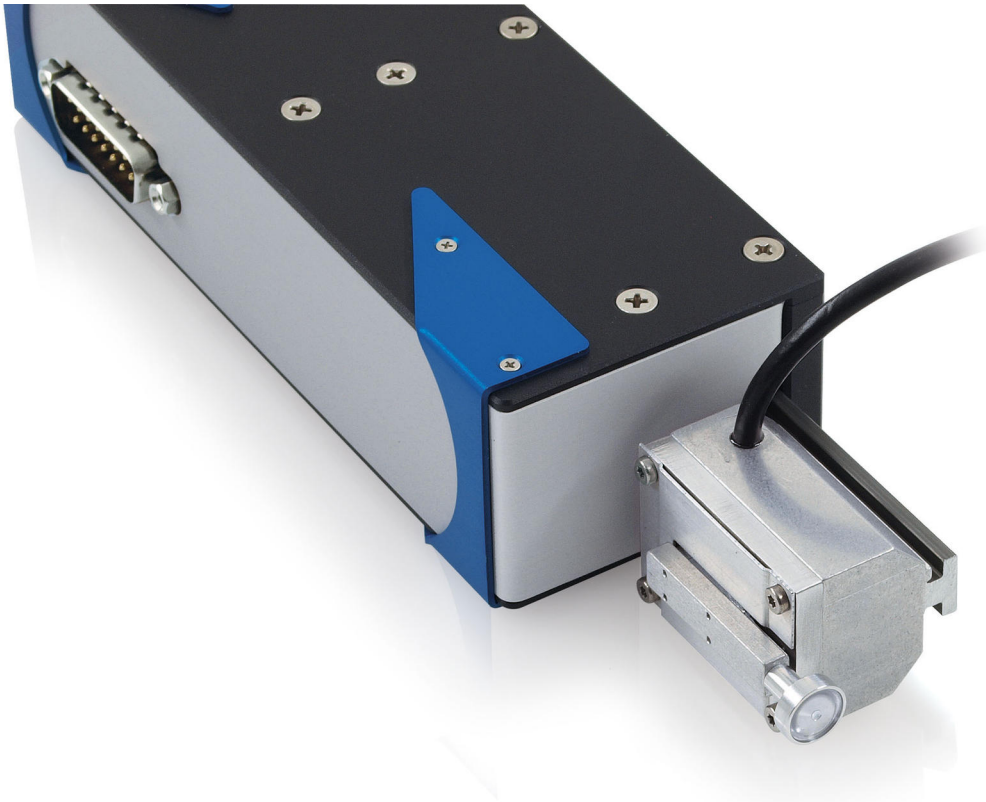
V-273.440, dimensions in mm

## Drawings / Images



V-273.441, dimensions in mm

## Drawings / Images



V-273.441 with force sensor

## Order Information

### **V-273.440**

PIMag® voice coil linear actuator; 20 mm travel range; 6 N drive force; 100 mm/s maximum velocity; incremental linear encoder, 10 nm sensor resolution, sin/cos, 1 V peak-peak

### **V-273.441**

PIMag® voice coil linear actuator; 20 mm travel range; 6 N drive force; 100 mm/s maximum velocity; incremental linear encoder, 10 nm sensor resolution, sin/cos, 1 V peak-peak; 1 mN force sensor resolution; force sensor