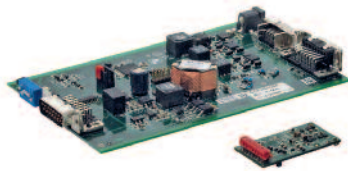
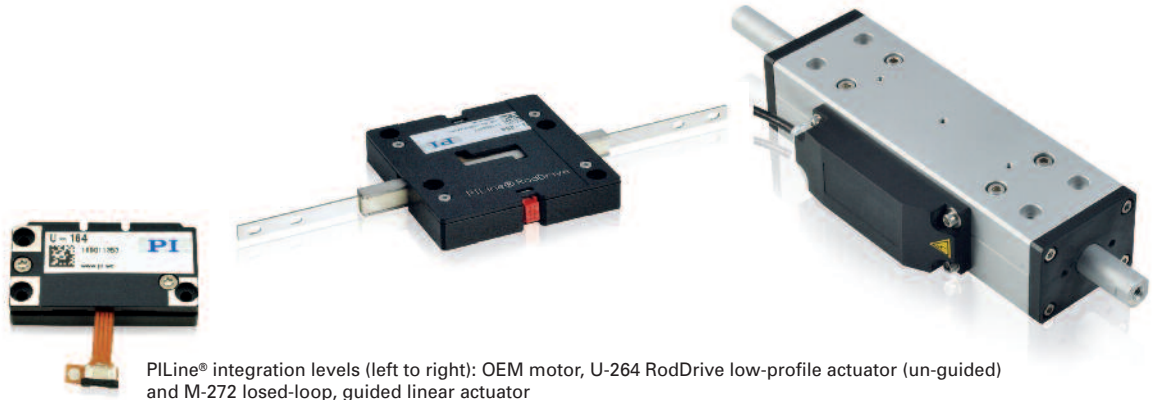


PILine® Ultrasonic Piezo Motors

OEM MOTORS, TECHNICAL DATA



Drive electronics create the ultrasonic oscillations in the piezo-ceramic actuator of the PILine® drive. PI offers universal drives for all actuator sizes – as well as specialized, compact boards

Different integration levels offer flexibility

PILine® allow the design of positioning systems with higher dynamics and smaller dimensions. PI offers various integration levels of PILine® drives for easier integration into customer designs:

- Complete positioning stages with integrated PILine® motors are available in custom designs for OEMs,
- Linear actuators move the load via a guided rod. Position feedback is available as an option,

- RodDrives are unguided and open-loop linear drives that replace motor-leadscrew combinations. They can easily be coupled to a guided positioning platform,
- The integration of OEM motors requires more experience and technical knowledge because the optimal preload between runner and actuator has to be set-up by the customer.

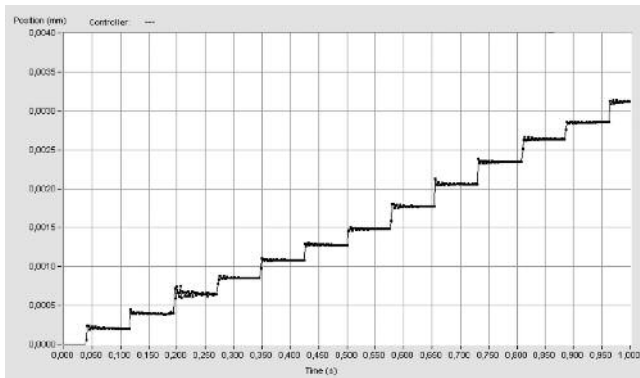
Drive electronics

To produce the ultrasonic oscillations in the piezo actuator, special drive electronics are required that are also provided by PI. These range from OEM boards to integrated servo controllers for closed-loop systems.

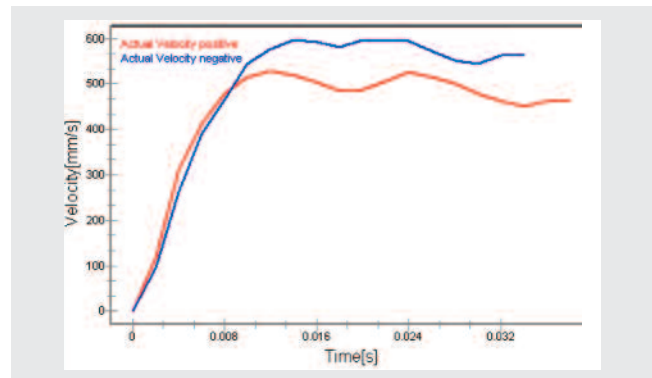
PILine® Piezo Linear Drive	P-661	U-164	Unit	Tolerance
Motion and positioning				
Travel range*	No limit	No limit	mm	
Min. incremental motion, open-loop**	0.05	0.05	µm	typ.
Open-loop velocity	500	500	mm/s	max.
Mechanical properties				
Stiffness, de-energized	0.7	3	N/µm	±10 %
Holding force, de-energized	1.5	3	N	max.
Push / pull force	2	4	N	max.
Optimum preload on runner	9	18	N	±10 %
Drive properties				
Resonant frequency	210	155	kHz	±2 kHz
Motor voltage	42 V _{rms} (120 V _{pp})	60 V _{rms} (170 V _{pp})		
Miscellaneous				
Operating temperature range	-20 to +50	-20 to +50	°C	
Casing material	Al (black anodized)	Al (black anodized)		
Mass	10	20	g	±5 %

* The travel range of piezo linear motors is practically unlimited and it only depends on the length of the runner

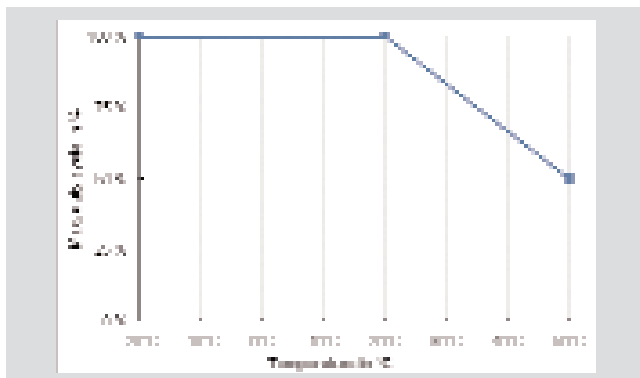
** The minimum incremental motion is a typical value which can be reached in open-loop operation. However, it is important to follow the installation guidelines for the motors



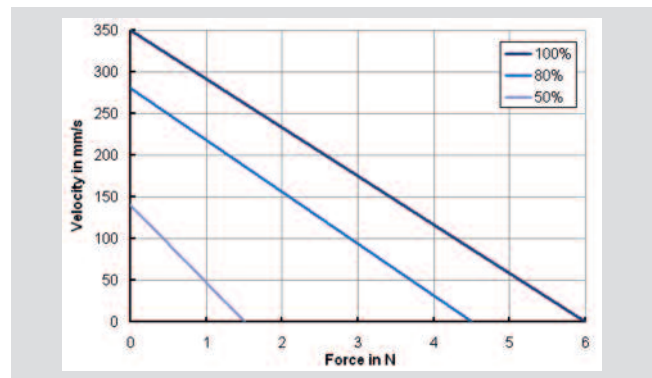
Open-loop step sequence of a PLine® based translation stage. Steps of approx. 300 nm shown. For repeatable increments closed-loop operation is recommended, because the step size depends on the force applied from outside



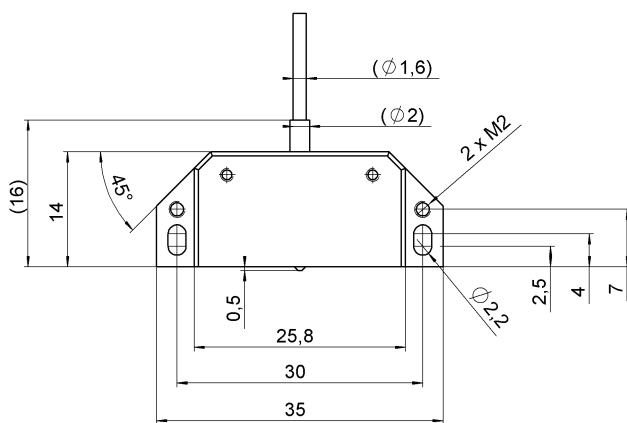
PLine® ultrasonic linear motors provide excellent dynamic properties. They provide acceleration to several g and can achieve step and settle of a few 10 msecs for small distances



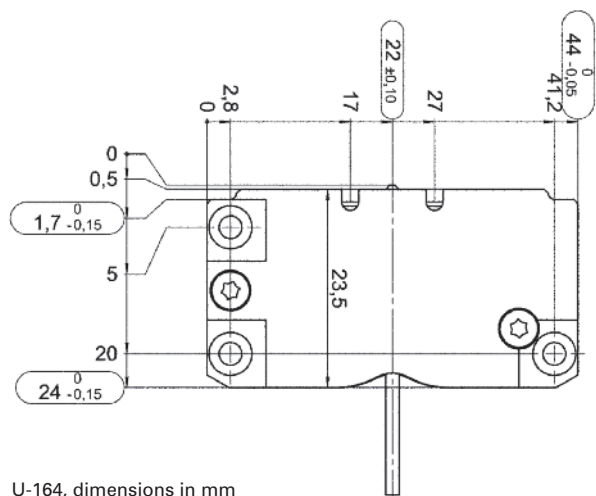
Maximum duty cycle depending on the ambient temperature with a control signal level of 100 %



Force / velocity motor characteristic of a U-164 PLine® motor. The percentages refer to the control signal level, which denotes the coupling of the electric power of the actuator



P-661, dimensions in mm



U-164, dimensions in mm