



- **Nanometer resolution**
- **Closed loop regulation**
- **Open loop mode**
- **General I/O**

The PMD206 is a 6-axis driver for use with Piezo LEGS motors from PiezoMotor. The 200-series drivers are the most advanced in the product range, giving Piezo LEGS resolution down in the sub-nanometer/sub-microradian range. Driving the motors in closed loop is possible when reading back position from positional sensors. PMD206 supports quadrature encoders and serial SSI sensors. Issuing a single command will guide the motor to the exact encoder count, taking into account the parameter settings for ramping behavior.

## Functional principle

The driver controls the Piezo LEGS motor by feeding waveform signals which elongates and bends each of the piezo drive legs. The waveforms are specially designed to make the drive legs perform a precise walking motion. The motion of the drive legs is transferred via friction contact to a linear rod or to a rotary disc.

For each waveform cycle the Piezo LEGS motor will take one full step, by definition called a *waveform-step* (wfm-step). The wfm-step length is load dependant but in the range of a few micrometers for a linear Piezo LEGS motor. The rotary Piezo LEGS motors have their drive legs working on the perimeter of a drive disc. The wfm-step angle depends on the diameter of the rotary motor but is usually less than one milliradian.

The generated signal waveform is made up of a large number of voltage target points in time. Each small voltage change will move the motor only by a fraction of a wfm-step, defined as a *microstep*. The PMD206 driver gives a maximum resolution of 8192 microsteps per full wfm-step. One microstep with highest resolution settings equals  $\sim 0.6$  nanometer ( $0.0006 \mu\text{m}$ ) of linear motion, or  $\sim 0.1$  microradian of angular motion.

## Working with the driver

The PMD206 communicates with the host (PC) via TCP/IP or by serial 4-wire RS485. Communication with the driver is through a protocol language (ASCII commands). The user can run in closed loop target mode, or in open loop mode, with full access to set resolution, step frequency (speed) etc. Positional sensors are used to keep track of the precise position of the Piezo LEGS motors. The driver can read limit switches and reset at index. Ramping parameters are set to prevent overshooting when closing in on target in closed loop operation. The PMD206 is a full featured driver for demanding applications.

## Ordering information

### Driver

PMD206	6-axis microstep driver for Piezo LEGS motors
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Technical Specification		
Type	PMD206	Note
Number of Axis	6	
Electrical Phases per Axis	4	
Signal Voltage Range	0-45 V	
Max Resolution	8192 $\mu$ steps / wfm-step	example LT20 linear motor at no load: one wfm-step $\approx$ 5 $\mu$ m one $\mu$ step $\approx$ 0.6 nm
Open Loop Operation	Yes	
Closed Loop Operation	Yes	
Number of Sensor Axis	6	
Supported Sensors	Quadrature Serial	with index (ABZ) SSi
Quadrature Counting Frequency	20 MHz	
General I/O	3 out, 4 in	on each sensor axis
Host Communication	RS485 TCP/IP	commands are sent in plain ASCII format
Host Connector	1 x D-sub 9M (COM1) 1 x RJ45 (TCP/IP)	
Motor Connector	6 x D-sub 9F (M1-M6)	
Sensor and I/O Connector	6 x D-sub HD 15F (S1-S6)	
External Sensor	1 x D-sub 9M (COM2) 1 x RJ45 (TCP/IP)	
Power Supply	110-230 V AC, 50/60 Hz	
Dimensions	328 x 298 x 83 mm	

**Note:** All specifications are subject to change without notice.

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