

Ndrive QL and QLe

Digital Panel-Mount Piezo Drive

Real-time distributed control architecture allows synchronized motion control on up to 32 axes of piezo and/or servo motor stages

Deterministic FireWire (IEEE-1394) high-speed serial communication protocol

Single or multi-axis Position Synchronized Output (PSO) for real-time triggering of events

Available with high-precision (to 20-bit) sensor resolution for capacitive sensor feedback

Configurable analog input (to 18-bit) for external feedback sensor integration or command generation

Advanced control features such as Learning Control, Harmonic Cancellation, and Command Shaping improve tracking error and overall process throughput

Comprehensive software tools for diagnostics, tuning, and programming

Program in RS-274 G-code, AeroBasic™ using Aerotech's IDE or create custom interfaces with Microsoft .NET including C#, VB.NET®, Managed C++, or LabVIEW®

The Ndrive QL/QLe is a family of panel-mount nanopositioning piezo drives designed to be used with the Automation 3200 (A3200) motion controller. The A3200 is the controller of choice in many markets such as semiconductor, data storage, medical device manufacturing, laser processing, and metrology. The Ndrive QL and Ndrive QLe drives enable coordinated motion between piezo stages and servo axes at much higher rates than other controller/drive products.

Featuring a dual-core 456 MHz, double-precision, floating-point DSP, the QL/QLe drives provide extreme processing



The Ndrive QL and QLe provide multi-axis functionality in a discrete single-axis, panel-mount package.

power in a wide variety of applications including point-to-point motion, linear and circular interpolation, multi-axis error correction, and autofocusing. High-speed interrupts and data logging capabilities provide a real-time link to external systems. The QL/QLe also offers high-speed positioning latching capability and single-axis (QL) or multi-axis (QLe) position synchronized output (PSO) for generation of pulses based on actual position feedback for applications ranging from laser firing to data acquisition system triggering.

Ultra-Precision Feedback Options

Using the latest technology and high-resolution A/D and D/A converters, the QLe enables sub-nanometer positioning resolution at high bandwidths. The QLe capacitive sensor feedback circuitry provides ultra-low noise performance over the full travel range. In applications that do not require extreme positioning resolution, the QL drive offers lower-resolution ADCs and DACs providing the benefits of high-speed feedback and command generation at a more economical price point. In closed-loop mode, linearity better than 0.01% over the full travel range is achieved with both the QL and QLe.

I/O Options

In addition to the four optically-isolated digital inputs, two high-speed digital inputs, and four optically-isolated digital outputs, both the Ndrive QL and QLe are equipped with two analog inputs and two analog outputs. For ultra-precise applications, the QLe offers an 18-bit analog input that can be programmatically configured to accept an external feedback sensor or position command. This analog input also allows the high-voltage power amplifier to be

Ndrive QL and QLe DESCRIPTION

controlled directly by an external low-level analog input. Also, the QLe has one 20-bit analog output that can be programmatically configured for position or voltage monitoring at very high resolutions. The QL drive offers the same analog input/output functionality at 16-bit resolutions.

Advanced Software and Control Features

The A3200 software uses PID servo loops with advanced feedforward and multiple integrators coupled with eight programmable filters to supply the user with all necessary tools needed to optimize motion performance. Additional software options such as the Dynamic Controls Toolbox and Motion Designer packages make available a host of advanced, yet easy-to-use, tools such as Learning Control, Harmonic Cancellation, Command Shaping, and Cross-Axis Feedforward to improve tracking errors and provide faster step-and-settle times.

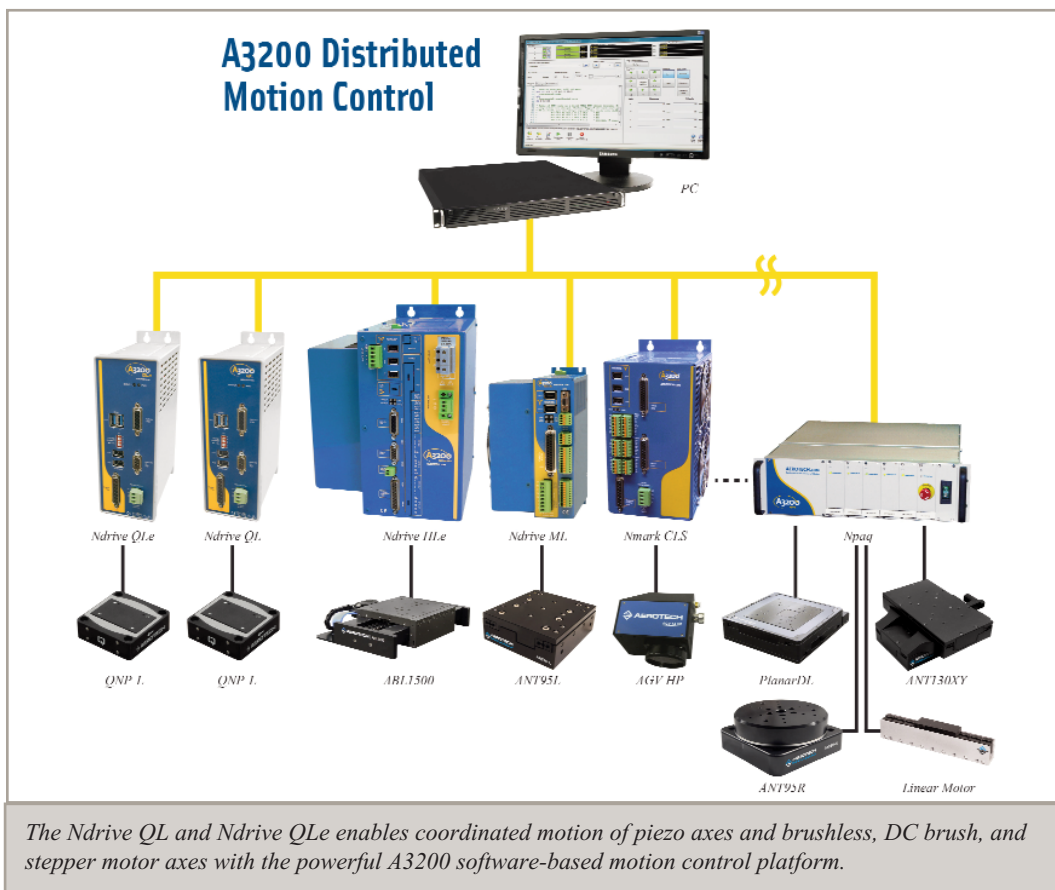
Powerful Programming Environment

Aerotech's A3200 focuses on ease of use for the programmer, shortens development times compared with other tools, and provides the flexibility to use the tools or controller most familiar to programmers. A complete

Integrated Development Environment and a comprehensive .NET motion library provide classes for motion, I/O, status, and diagnostic information. Program in Visual Studio and use the .NET library, or use the Motion Composer (IDE) to develop code with Aerobasic™ commands or G code. A LabVIEW® VI library is available for NI users, while a complete C library is available for those using Visual Basic, C++, or C.

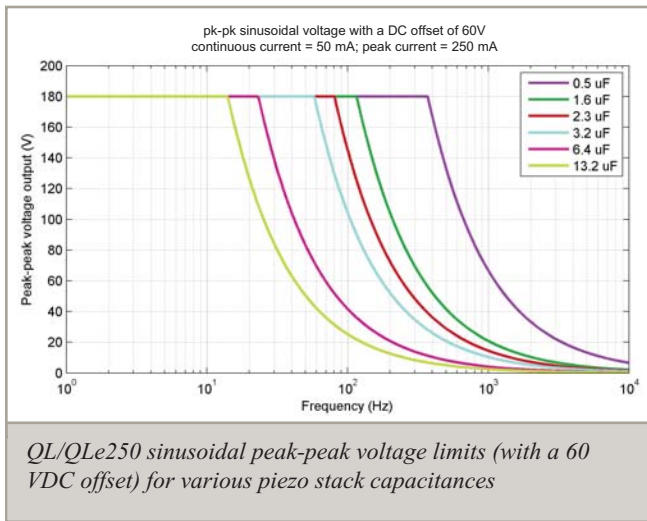
Automatic Parameter Configuration

Aerotech's piezo stages all include a "FlashConfig" feature that stores all of the parametric information required to operate the stage. The stage is automatically identified and all operational parameters including axis calibration data are uploaded into the Ndrive QL/QLe, ensuring safe, accurate, and true "plug-and-play" operation.



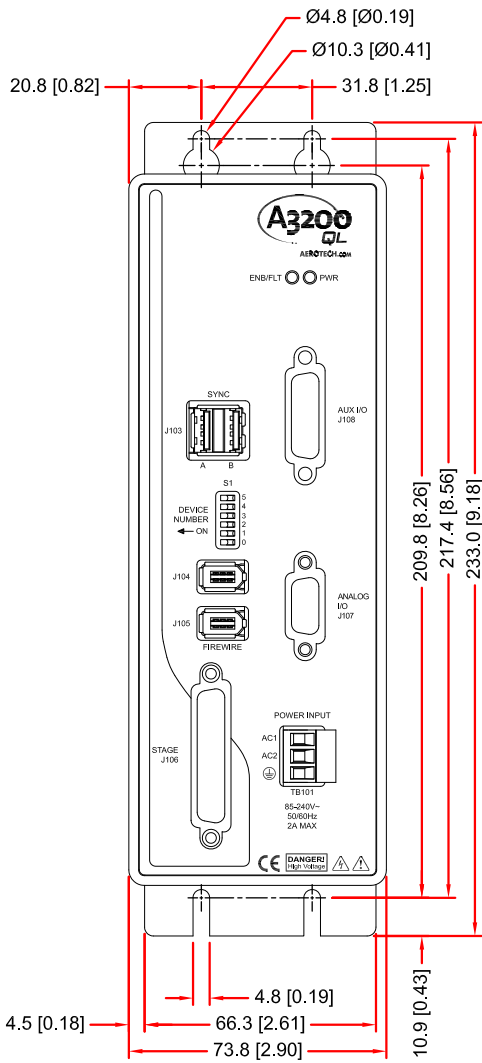
Ndrive QL and QLe SPECIFICATIONS

Feature	QL250	QLe250
Package Type	Panel-Mount	
Processor	Dual-Core 456 MHz, Double-Precision, Floating Point DSP	
Power Supply	100-240 VAC; 50/60 Hz	
Voltage Output	-30 to +150 V	
Sensor Type	Capacitive Sensor	
Sensor Resolution	17-bit	20-bit
Voltage Resolution	18-bit	20-bit
Cont. Power Output	10 Watts	
Peak Current Output	250 mA	
Cont. Current Output	50 mA	
Digital Inputs	(4) Optically Isolated, (2) High Speed, and (1) ESTOP	
Digital Outputs	(4) Optically Isolated	
Analog Inputs	2 Total, 16-bit ± 10 V Differential, (1) Configurable for External Feedback or External Command Input	2 total, ± 10 V Differential (1) 16-bit General Purpose, (1) 18-bit High-Resolution Configurable for External Feedback or External Command Input
Analog Outputs	2 Total, 16-bit ± 10 V Single-Ended, (1) Configurable for Position or Voltage Monitoring	2 Total, ± 10 V Single-Ended (1) 16-bit General Purpose, (1) 20-bit High-Resolution Configurable for Position or Voltage Monitoring
High-Speed Data Capture	Yes (50 ns latency)	
Position Synchronized Output (PSO)	Single-Axis	Three-Axis
Cap Sensor Synchronization	Yes	
Communication Interfaces	Firewire (IEEE-1394)	
Servo Loop Update	24 kHz	
Programming Environment	Multi-Tasking AeroBasic, G-Code/RS274	
Weight	1.4 kg (3.0 lbs)	1.4 kg (3.0 lbs)



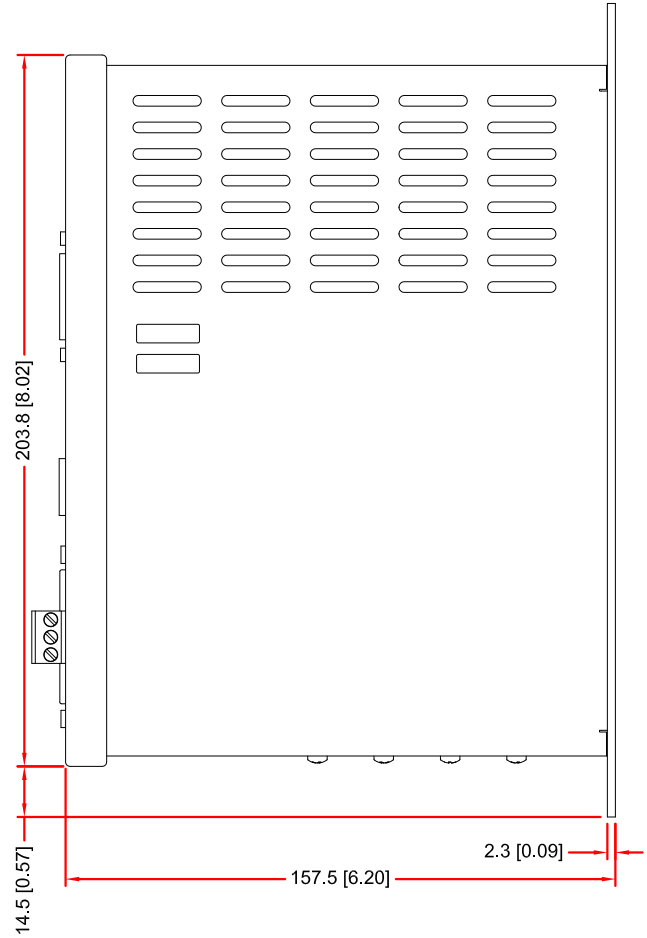
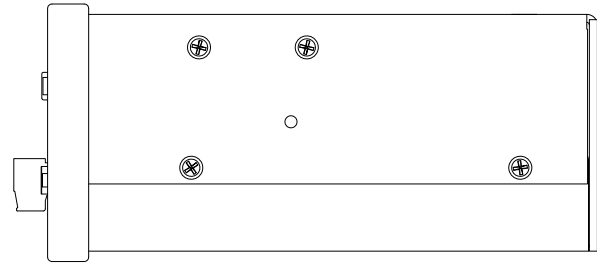
Ndrive QL250 DIMENSIONS

Ndrive QL250



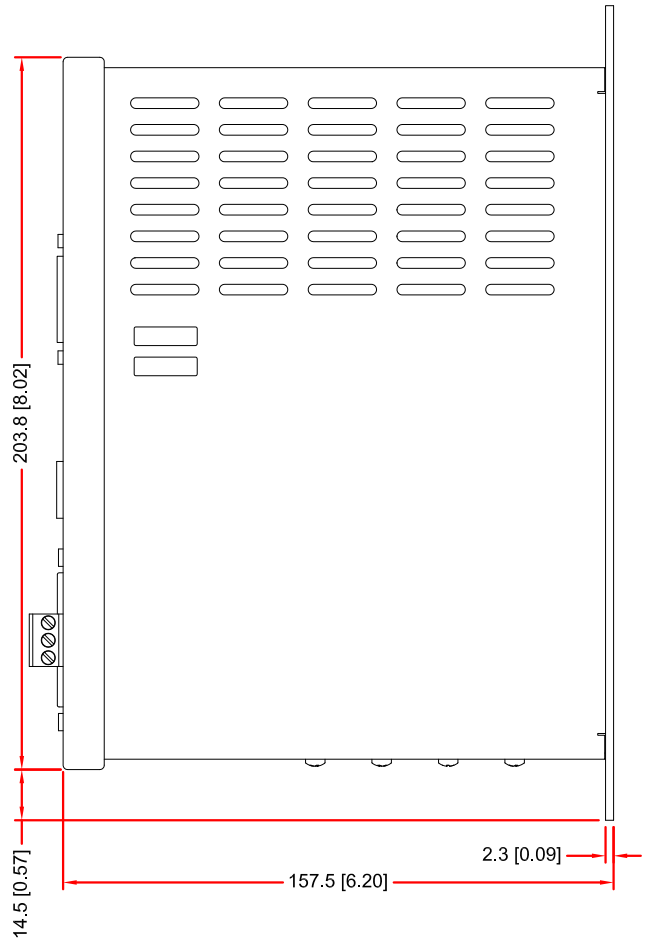
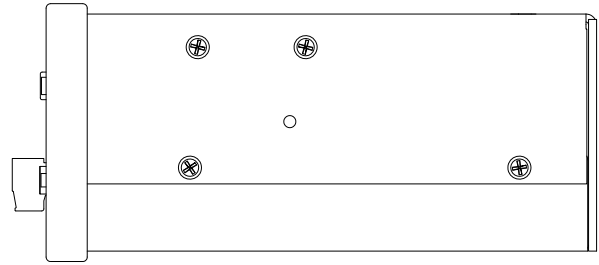
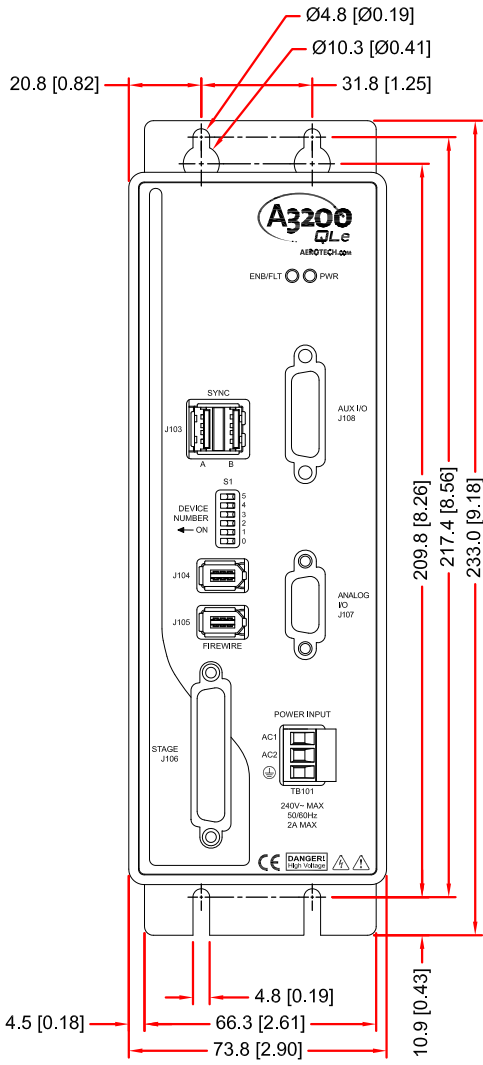
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Ndrive QLe250 DIMENSIONS

Ndrive QLe250



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Ndrive QL and QLe ORDERING INFORMATION

Ndrive QL and QLe Panel-Mount Piezo Drive

Ndrive QL250-C	<p>Cost-effective, discrete panel-mount piezo drive with capacitive sensor feedback, 250 mA peak current, 50 mA continuous current, -30 to +150 V output. Features include:</p> <ul style="list-style-type: none"> • Configurable input/outputs; 4 opto-isolated inputs, two high-speed digital inputs, 4 opto-isolated outputs, two 16-bit analog inputs, and two 16-bit analog outputs. • Single-axis Position Synchronized Output (PSO) standard
Ndrive QLe250-C	<p>High-performance, discrete panel-mount piezo drive with capacitive sensor feedback, 250 mA peak current, 50 mA continuous current, -30 to +150 V output. Features include:</p> <ul style="list-style-type: none"> • High-precision 20-bit sensor resolution for cap sensor feedback in closed-loop. • Configurable input/outputs; 4 opto-isolated inputs, two high-speed digital inputs, 4 opto-isolated outputs, two analog inputs (1 18-bit, 1 16-bit), and two analog outputs (1 20-bit, 1 16-bit). • 3-axis Position Synchronized Output (PSO) standard

A3200 Software Options

-DYNAMIC CONTROLS TOOLBOX	The Dynamic Controls Toolbox provides control algorithms that increase system performance such as settle time, accuracy, in-position stability and/or velocity stability.
-MOTION DESIGNER	Motion Designer is used to graphically generate and edit motion profiles that execute on the controller, providing the ability to import, run and evaluate motion profiles (trajectories). Included in the Motion Designer software is learning control that reduces tracking errors by as much as 1000 times.
-LABVIEW	LabVIEW® VI samples
-MATLAB	Includes MATLAB® library for motion, parameters, and data collection.