Ensemble® QDe

High-Performance, Networked, Desktop Piezo Drive

- Networkable with any Ensemble drive to control up to ten axes of piezo and/or servomotor stages
- Multi-axis Position Synchronized Output (PSO) for real-time triggering of events
- High-precision 20-bit sensor resolution for capacitive sensor feedback
- Thermally-stable feedback circuit design
- Configurable, 18-bit analog input 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
- Ethernet and USB 2.0 communication interfaces
- Advanced Windows®-based remote diagnostics, tuning, and programming interface software
- CE approved; follows the 2011/65/EU RoHS 2 Directive
- Program in AeroBasic™ using Aerotech's IDE or create custom remote interfaces with Microsoft .NET including C#, VB.NET, C++/CLI, LabVIEW®, EPICS, MATLAB®, and TANGO
- OEM versions available

The Ensemble QDe™ is a high-performance desktop nanopositioning piezo drive designed for seamless use with the Ensemble family of drives and controllers. The QDe connects to any Ensemble controller network enabling coordinated motion between piezo stages and servo axes at much higher rates than other controller or drive products.

The Ensemble QDe provides multi-axis functionality in a discrete single-axis, desktop package.

This power and versatility make the Ensemble QDe ideal for single or multi-axis applications ranging from fundamental scientific research to advanced OEM machine systems.

Featuring a dual-core 456 MHz, double-precision, floating-point DSP, the QDe provides extreme processing power over 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 QDe also features high-speed position latching capability and multi-axis position synchronized output (PSO) for generation of pulses based on actual position feedback in applications ranging from laser firing to acquisition system triggering.

High-Resolution and Ultra-Precise Feedback

Using the latest technology and high-resolution A/D and D/A converters, the QDe enables sub-nanometer positioning resolution at high bandwidths. The QDe capacitive sensor feedback circuitry results in exceptionally low noise levels over the full travel range. An Aerotech developed linearization method achieves linearity better than 0.01% over the full travel range in closed-loop mode. The QDe employs a proprietary capacitive sensor feedback circuit resulting in industry-leading thermal stability and exceptional long-term holding stability.

Precision I/O

In addition to the four optically-isolated digital inputs, two high-speed digital inputs and four optically-isolated digital outputs, the Ensemble QDe possesses two analog inputs and two analog outputs. One analog input, an 18-bit precision A/D, can be programmatically configured to accept an external feedback sensor or position command. This analog input also allows direct control of the high-voltage power amplifier by an external low-level analog input. Also, one 20-bit D/A analog output can be programmatically

configured for position or voltage monitoring at very high resolutions.

Advanced Software and Control Features

The Ensemble QDe 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.

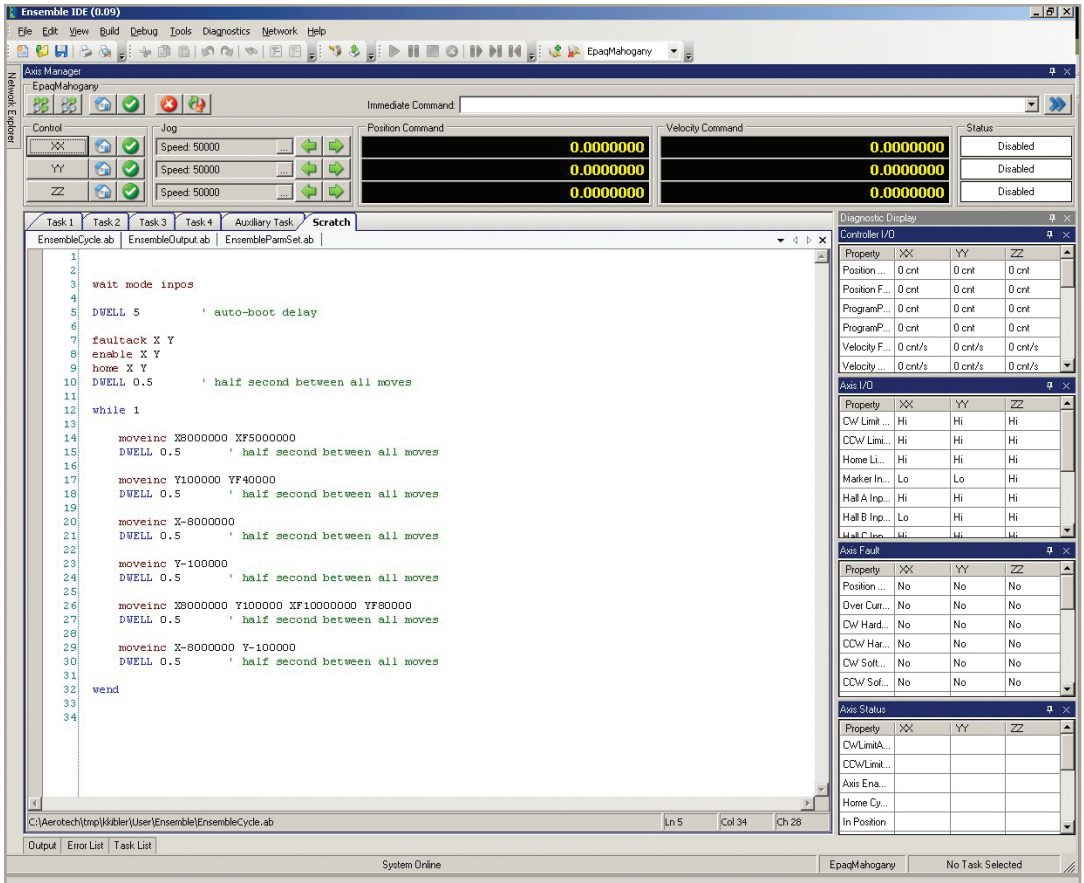
Powerful Programming and Software Drivers

Monitor and control all aspects of the positioning system, no matter how complex, through the Ensemble GUI Integrated Development Environment software. Advanced tuning utilities minimize startup time by allowing easy optimization of motion axes. Functional programs that can be modified and used in customer applications are included in the online Help. Pre-coded LabVIEW® VIs, AeroBasic™ programming functionality, MATLAB® library, .NET tools for C#, VB.NET and C++/CLI or C make the Ensemble even easier to use. See the Ensemble Control home page for detailed information on software capabilities and ordering options.

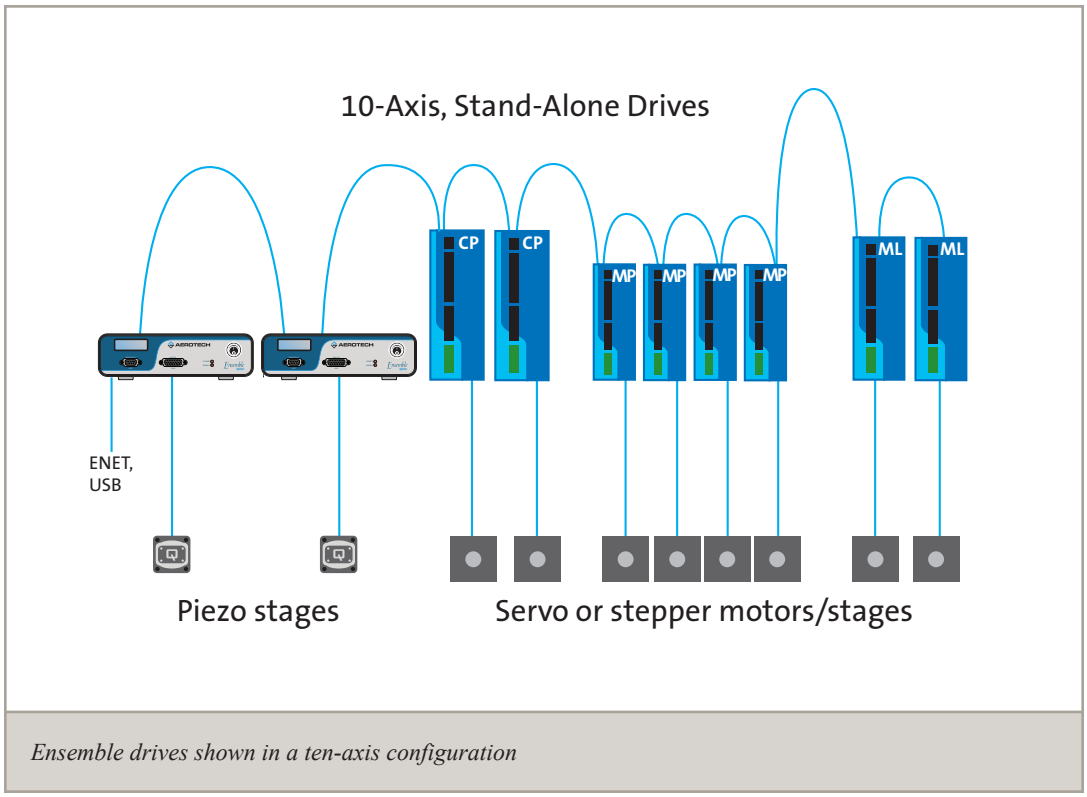
Automatic Parameter Configuration

Aerotech's piezo stages include our time-saving "FlashConfig" feature that stores all of the parametric information required to operate the stage. Upon plug-in, the QDe automatically identifies the connected stage. All operation parameters, including axis calibration data and software parameters, are uploaded into the Ensemble QDe. This ensures faster setup and avoids errors that can result in substandard performance. "FlashConfig" provides true "plug and play" operation of your Aerotech stage.

QDe DESCRIPTION



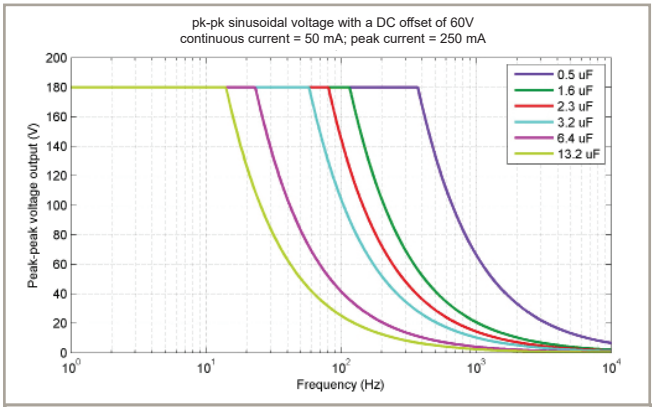
Ensemble IDE.



Ensemble drives shown in a ten-axis configuration

Ensemble QDe SPECIFICATIONS

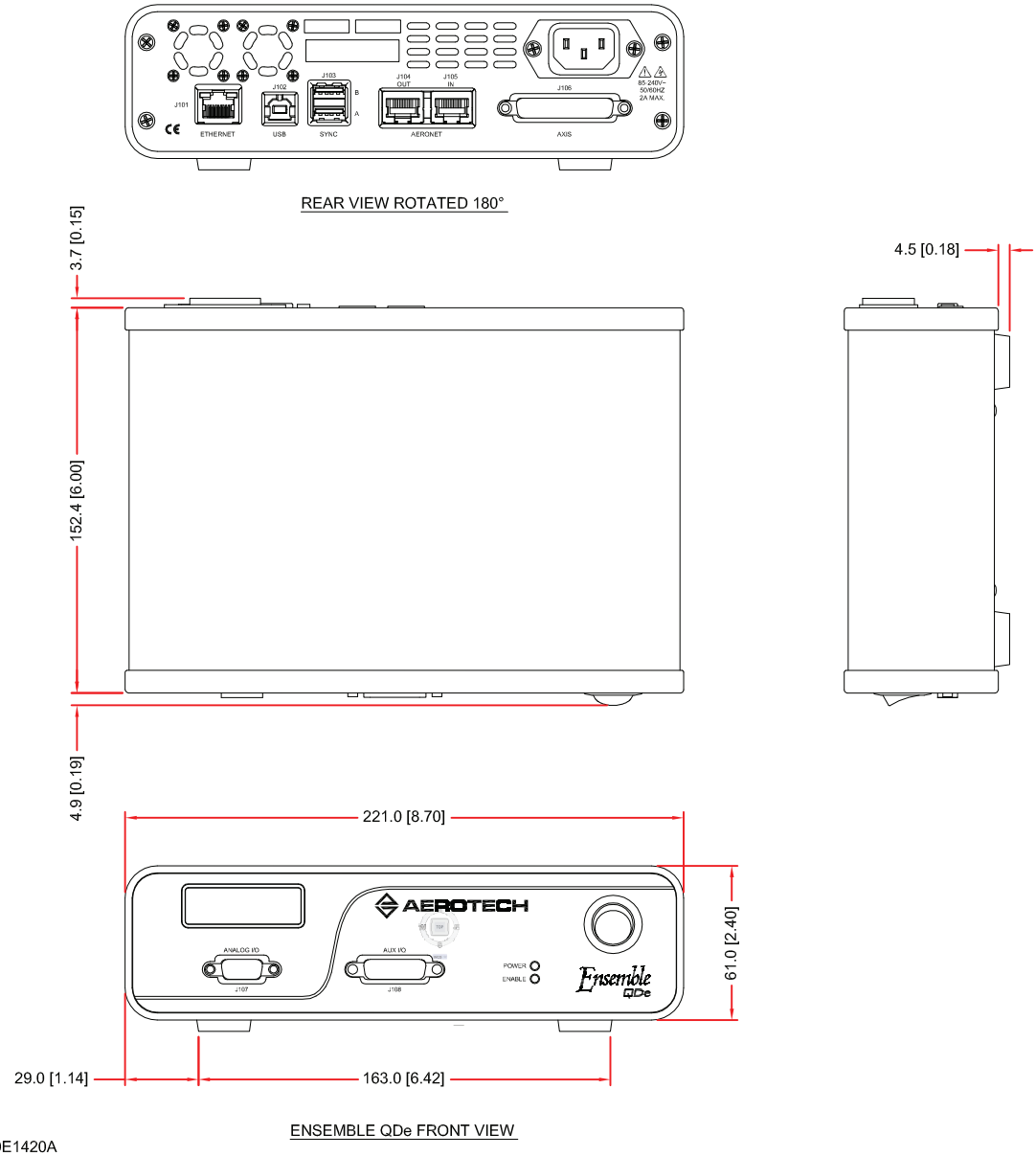
Feature	QDe250
Package Type	Desktop
Processor	Dual-Core 456 MHz, Double-Precision, Floating Point DSP
Power Supply	100-240 VAC; 50/60 Hz
Voltage Output	-30 to +150 V
Sensor Type	Capacitive Sensor
Sensor Resolution	20-bit
Voltage Resolution	20-bit
Continuous Power Output	10 Watts
Peak Current Output	250 mA
Continuous Current Output	50 mA
Digital Inputs	(4) Optically Isolated, (2) High Speed, and (1) ESTOP
Digital Outputs	(4) Optically Isolated
Analog Inputs	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, ± 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)	Two-Axis
Communication Interfaces	10/100 Base T Ethernet, USB 2.0
Servo Loop Update	20 kHz
Programming Environment	Multi-Tasking AeroBasic
Weight	1.4 kg (3.0 lbs)
Standards	CE approved, NRTL safety certification, EU 2015/863 RoHS 3 directive



QDe sinusoidal peak-peak voltage limits (with a 60 VDC offset) for various piezo stack capacitances.

Ensemble QDe DIMENSIONS

Ensemble QDe250-C



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Ensemble QDe ORDERING INFORMATION

Ensemble QDe High-Performance Panel-Mount Piezo Drive

Ensemble QDe250-C	High-performance networkable, standalone desktop piezo drive with capacitive sensor feedback, 250 mA peak current, 50 mA continuous current, -30 to +150 V output. Features include: • 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). • 2-axis Position Synchronized Output (PSO) standard • 10/100 base T Ethernet port; 1 USB 2.0 port • Motion Designer software - 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.

Line Cord

-ENGLAND	UK compatible line cord
-GERMANY	German compatible line cord
-ISRAEL	Israel compatible line cord
-INDIA	India compatible line cord
-AUSTRALIA	Australia compatible line cord
-US115VAC	US 115 VAC line cord
-US230VAC	US 230 VAC line cord
-NOLINECORD	No line cord

Ensemble 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.
-LABVIEW	LabVIEW® VI samples
-MATLAB	Includes MATLAB® library for motion, parameters, and data collection.