

Ensemble® LAB

Stand-Alone, Multi-Axis Motion Controller

Up to 4 axes of brush, stepper, or brushless servomotors

Aerotech's FlashConfig feature automatically configures axis parameters based on the connected stage type

Touch screen with intuitive menu-driven interface for quick and easy access to system functionality

Joystick input for manual control of motor positions

Ethernet and USB 2.0 communication interfaces

ASCII-based command protocol for Windows® or Linux remote control

Advanced Windows®-based remote diagnostics, tuning and programming interface software

Program in AeroBasic™ using Aerotech's IDE or create custom remote interfaces with Microsoft .NET including C#, VB.NET, C++/CLI, LabVIEW®, and MATLAB®

Standard quadrature or optional analog sin/cos encoder feedback with up to 65,536x interpolation

CE approved and NRTL safety certification; follows the 2011/65/EU RoHS 2 Directive

Programmable micro-step resolution of up to 20,000x for smooth low-speed operation

Linear and arc motion with constant velocity or point-to-point interpolation



Ensemble LAB controls up to 4 axes of brush, stepper, or brushless servomotors.

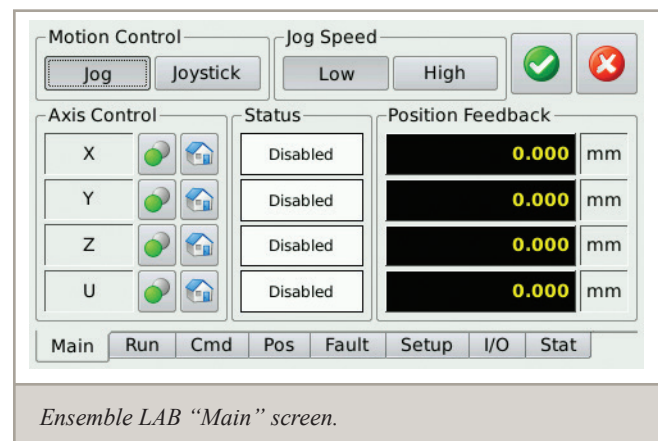
Ensemble® Lab is designed for applications where ease of operation is desired without sacrificing overall system capability. The front-panel interface allows an operator to quickly execute simple operations such as jogging, homing, and moving to fixed positions. For more complex operations the Ensemble LAB has onboard memory for storing programs that can be accessed from the front panel or through remote control.

Touch Screen Interface

In addition to the front key-panel the Ensemble LAB comes equipped with a full color, touch-enabled LCD display. An intuitive tabbed interface provides single press access to all setup and operation screens.

Powerful Programming Functionality

Unlike most competitive products that use cryptic two-letter mnemonics, the Ensemble LAB is programmed in an easily readable BASIC-like syntax. The Ensemble LAB is programmed off-line with a graphical user interface in Windows®, featuring an intuitive Program Editor, Variable Output window, Compiler Output window, and Task State monitor. After the programs are developed and tested they can be downloaded and stored on the controller for future use. 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.



Ensemble LAB "Main" screen.

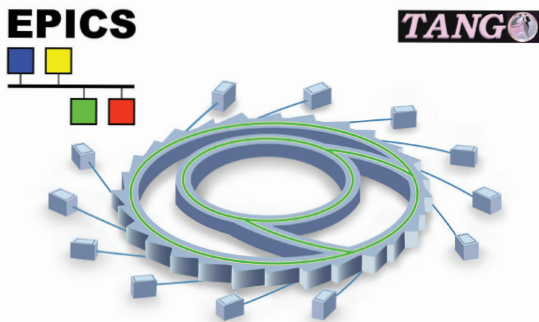
Ensemble LAB DESCRIPTION

Automatic Parameter Configuration

Aerotech's MPS series of stages includes Aerotech's "FlashConfig" feature that stores all of the parametric information required to operate the stage on the stage itself. The stage is automatically identified and all operational parameters including axis calibration data are uploaded into the Ensemble LAB, ensuring safe, accurate operation and true "plug-and-play" operation. FlashConfig provides maximum flexibility for laboratory environments where systems are often reconfigured to meet changing application requirements.

Multitasking Capability

Up to 4 programs can run simultaneously on the Ensemble LAB allowing for easy partitioning of complex operations. One task could be used for motion while the remaining tasks are used for process control, or the controller could be configured to operate four separate programs controlling four motors.



Ensemble LAB is compatible with both EPICS and TANGO for synchrotron and research lab applications.



Aerotech's FlashConfig feature allows for true plug-and-play capability by identifying the connected stages and configuring all operational parameters including axis calibration information.

Advanced DSP Control

The Ensemble LAB uses the processing power of a 64-bit, double precision, floating-point DSP to offer exceptional performance in a variety of applications including point-to-point motion, linear and circular interpolation, single- and multi-axis error correction, direct commutation of linear and rotary brushless servomotors, and servo autotuning. High-speed interrupts and data logging capabilities provide a real-time link to external systems. The Ensemble LAB also offers high-speed position latching capability and optional single-axis PSO (Position Synchronized Output). Whether the requirement is simple point-to-point motion or complex velocity profiled contours with output on the fly, Ensemble ensures peak performance for critical applications.

EPICS and TANGO Drivers

The Ensemble LAB includes full compatibility with both EPICS and TANGO distributed control protocols. Both interfaces are used at leading light source (synchrotron) facilities and other government laboratories, allowing the Ensemble LAB to seamlessly integrate into applications at all major research institutions.

Versatile, Multi-Axis Control

The Ensemble LAB utilizes low-noise linear power stage technology capable of controlling brush, brushless, and stepper motors. Configuration flexibility allows users to seamlessly choose the appropriate motor technology to address a wide range of application requirements.

Digital Inputs				Digital Outputs						
0	<input type="radio"/>	OFF	4	<input type="radio"/>	OFF	0	<input type="radio"/>	OFF	<input type="button" value="↑"/>	<input type="button" value="↓"/>
1	<input type="radio"/>	OFF	5	<input type="radio"/>	OFF	1	<input type="radio"/>	OFF	<input type="button" value="↑"/>	<input type="button" value="↓"/>
2	<input type="radio"/>	OFF				2	<input type="radio"/>	OFF	<input type="button" value="↑"/>	<input type="button" value="↓"/>
3	<input type="radio"/>	OFF				3	<input type="radio"/>	OFF	<input type="button" value="↑"/>	<input type="button" value="↓"/>

Analog Input		Analog Output	
-0.0194 V		0.0000 V	
		0.0000	<input type="button" value="Set"/>

Main	Run	Cmd	Pos	Fault	Setup	I/O	Stat
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Ensemble LAB "I/O" screen.

X (mm)	Y (mm)
0.000	0.000

Z (mm)	U (mm)
0.000	0.000

Main	Run	Cmd	Pos	Fault	Setup	I/O	Stat
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Ensemble LAB "Position" screen.

Ensemble LAB SPECIFICATIONS

Feature	Description
Number of Axes	4 Maximum
Encoder Inputs	4
Power Supply	100-230 VAC; 50/60 Hz Factory Configured
Bus Voltage	±24 VDC
Peak Current	5 A
Continuous Current	Varies with Motor Type
Amplifier Type	Linear
Digital Inputs	Four Optically Isolated; Two High Speed; One ESTOP
Digital Outputs	Four Optically Isolated
Analog Inputs	One 16-Bit
Analog Outputs	One 16-Bit
Dedicated Axis I/O	Two Limits Inputs (CW, CCW); Three Hall Effect Inputs
Feedback Type (Standard)	10 MHz Square Wave / 40 MHz Count Rate
Feedback Type (Optional)	Interpolated (65536 Max) Sin/Cos; 200 kHz Max Input Frequency
Communication Interfaces	10/100 Base T Ethernet; USB 2.0
Expansion Interface	USB 1.1
Servo Loop Update	10 kHz Maximum
Current Loop Update	20 kHz
Programming Environment	Multi-Tasking AeroBasic
Operating System Requirements for Remote Programming and Diagnostic Tools	Windows 7
Standards	CE approved, NRTL safety certification, EU 2015/863 RoHS 3 directive

Ensemble LAB "Jog Setup" screen.

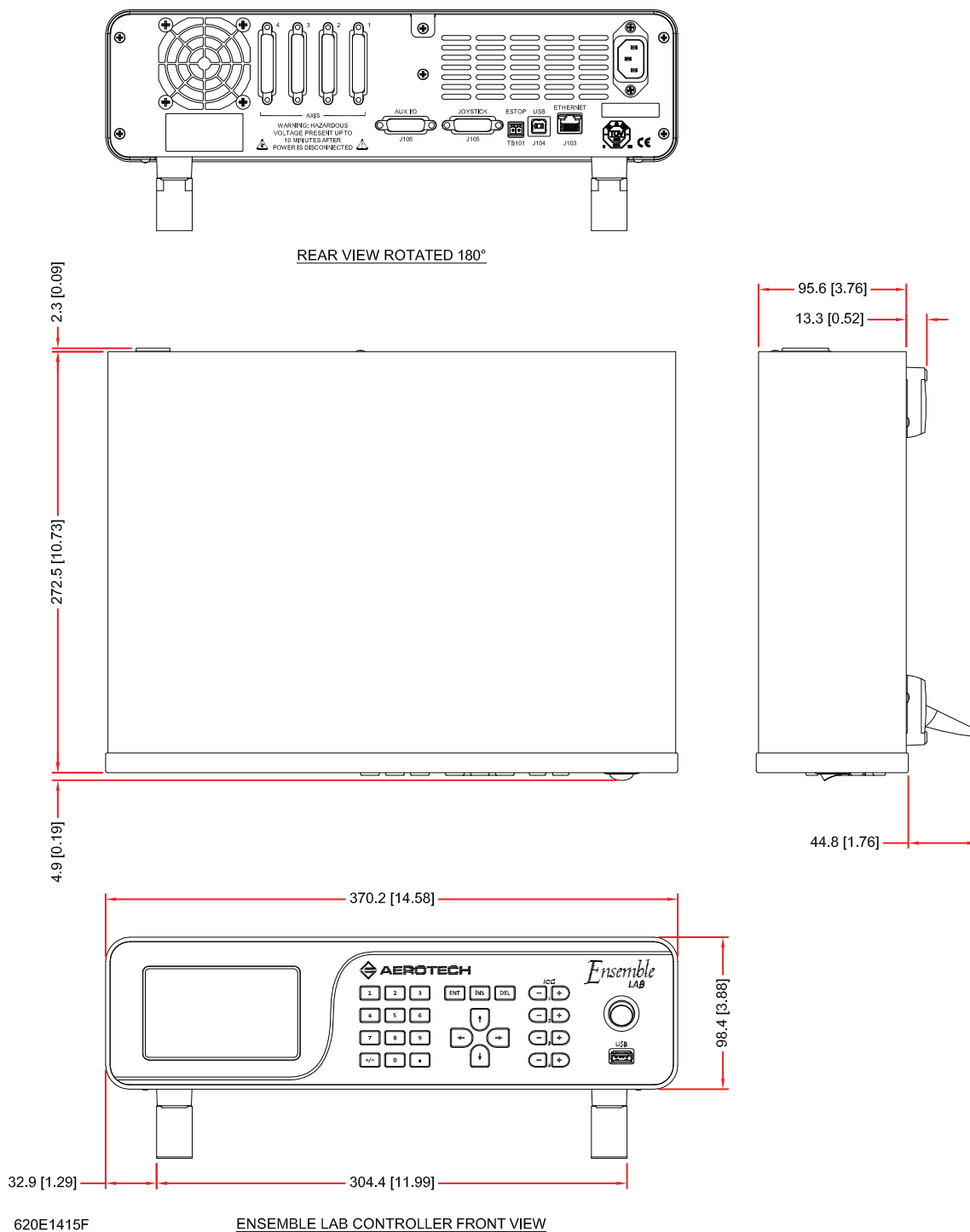
Ensemble LAB "Command" screen.

	X	Y	Z	U
Enabled	No	No	No	No
Homed	No	No	No	No
Cw End Of Travel Limit Input	Yes	Yes	Yes	Yes
Ccw End Of Travel Limit Input	Yes	Yes	Yes	Yes
Marker Input	No	No	No	No
Hall A Input	Yes	Yes	Yes	Yes
Hall B Input	Yes	Yes	Yes	Yes
Hall C Input	No	No	Yes	Yes

Ensemble LAB "Status" screen.

Ensemble LAB "Joystick Setup" screen.

Ensemble LAB DIMENSIONS



Ensemble LAB ORDERING INFORMATION

ENSEMBLELAB	-1	-A	-DCT	-2DS	-MXU1		-US115VAC
Series	Factory Op- tion	Line Volt- age	Controller Options	Number of Axes	Feedback Type	PSO Out- put	Line Cord
	-1	-A -B -C -D	-DCT -ETM -ETC -LCK	-2DS -3DS -4DS -2DSA -3DSA -4DSA	-MXU1 -MXU2 -MXU3 -MXU4 -MXR1 -MXR2 -MXR3 -MXR4	-PSO	-ENGLAND -GERMANY -ISRAEL -INDIA -AUSTRALIA -US115VAC -US230VAC -NOLINECORD

Ensemble LAB Motion Controller

ENSEMBLELAB 2 to 4 axis desktop, stand-alone motion controller with integrated power supplies and the following key features:

- Supports DC brush and stepper motors; optional support for brushless motors
- Independent or coordinated motion with linear and circular interpolation; velocity profiled, point-to point, continuous and geared motion; backlash compensation and 1D or 2D axis calibration
- 10 kHz (max) digital servo loop update rate for all axes
- 10/100 base T Ethernet port; 1 USB 2.0 port; 1 USB 1.1 port
- Dedicated I/O per axis: CW and CCW limits, marker and Hall effect sensor inputs
- User defined I/O: four opto-isolated inputs, two high-speed inputs, four opto-isolated outputs, one 16-bit analog input, one 16-bit analog output, joystick port, ESTOP sense input
- ultra-quiet linear amplifiers for noise-sensitive applications

Factory Option

-1 Standard version

Line Voltage (required)

-A 115 VAC input
 -B 230 VAC input
 -C 100 VAC input
 -D 200/208 VAC input

Controller Options

-DCT Enable the Dynamic Controls Toolbox on the master drive; ENSEMBLE-MC software must be configured with the DYNAMIC CONTROLS TOOLBOX option

-ETM Enable the Enhanced Throughput Module on the master drive; ENSEMBLE-MC software must be configured with the ENHANCED THROUGHPUT MODULE option

-ETC Enhanced Tracking Control for reduced dynamic following error and settling times; effectiveness may be limited for low-resolution axes

-LCK Locked drive; firmware and calibration data on the drive cannot be modified by the user after the product leaves Aerotech; the drive must be returned to Aerotech if firmware/calibration updates are required; read/write access to parameters and programs is supported

Number of Axes (required)

-2DS Configured for 2 axes of DC brush or stepper motor operation

-3DS Configured for 3 axes of DC brush or stepper motor operation

-4DS Configured for 4 axes of DC brush or stepper motor operation

-2DSA Configured for 2 axes of DC brush, stepper, or AC brushless motor operation

-3DSA Configured for 3 axes of DC brush, stepper, or AC brushless motor operation

-4DSA Configured for 4 axes of DC brush, stepper, or AC brushless motor operation

Ensemble LAB ORDERING INFORMATION

Feedback Type (optional)

-MXU1	Programmable encoder multiplier on encoder input channel 1, up to x8192 (after quadrature); no real-time output or PSO support
-MXU2	Programmable encoder multiplier on encoder input channel 2, up to x8192 (after quadrature); no real-time output or PSO support
-MXU3	Programmable encoder multiplier on encoder input channel 3, up to x8192 (after quadrature); no real-time output or PSO support
-MXU4	Programmable encoder multiplier on encoder input channel 4, up to x8192 (after quadrature); no real-time output or PSO support
-MXR1	Programmable encoder multiplier on encoder input channel 1, up to x65536 (after quadrature); real-time output with full single-axis PSO support
-MXR2	Programmable encoder multiplier on encoder input channels 1 and 2, up to x65536 (after quadrature); real-time output with full single-axis PSO support
-MXR3	Programmable encoder multiplier on encoder input channels 1, 2, and 3, up to x65536 (after quadrature); real-time output with full single-axis PSO support
-MXR4	Programmable encoder multiplier on encoder input channels 1, 2, 3, and 4, up to x65536 (after quadrature); real-time output with full single-axis PSO support

PSO Output (optional)

-PSO	Single-axis Position Synchronized Output; can be configured to track quadrature or MXR input encoder channels
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Line Cord (required)

-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

Integration (Required)

Aerotech offers both standard and custom integration services to help you get your system fully operational as quickly as possible. The following standard integration options are available for this system. Please consult Aerotech if you are unsure what level of integration is required, or if you desire custom integration support with your system.

-TAS	Integration - Test as system Testing, integration, and documentation of a group of components as a complete system that will be used together (ex: drive, controller, and stage). This includes parameter file generation, system tuning, and documentation of the system configuration.
-TAC	Integration - Test as components Testing and integration of individual items as discrete components that ship together. This is typically used for spare parts, replacement parts, or items that will not be used together. These components may or may not be part of a larger system.