Ensemble™ Linear Series

Networked, Panel-Mount Drives – Linear

- Network drives through a high-speed serial interface to coordinate up to ten axes of motion
- Coordinate motion using up to five independent tasks
- Drive and control linear or rotary brushless, DC brush servo, and micro-stepping motors
- Command various motion types including: point-to-point, linear and circular interpolation, electronic gearing, and velocity profiling
- Program in AeroBasic™, Microsoft .NET (C#, VB.NET, C, and C++/CLI), LabVIEW®, and MATLAB®
- Remotely command drives over Ethernet, USB, or RS-232 with an ASCII interface available for both Windows® and non-Windows® programs (including Linux)
- Diagnose, tune, and program through an advanced Windows-based interface
- CE approved and NRTL safety certification; follows the 2011/65/EU RoHS 2 Directive.
- Fully compatible with EPICS set of software tools and applications, making Ensemble ideal for use in synchrotron and general laboratory facilities
- Allen-Bradley EtherNet/IP™ interface provides full integration with the Ensemble; program the Ensemble directly from RSLogix™ 5000
- Output power range of 10 or 20 A peak with ±10 to ±80 VDC bus

Ensemble HLe

Ensemble ML

The Ensemble™ is Aerotech's next-generation, multi-axis controller for moderate- to high-performance applications. Versatility, power, and affordability make the Ensemble ideal for applications from basic laboratory experimentation and general-purpose positioning to advanced OEM systems.

Versatile, Flexible, Stand-Alone Multi-Axis Control

Network multiple Ensemble HLe/ML combination controllers/drives for up to ten axes of coordinated motion, and seamlessly mix and match amplifiers (linear and PWM) and motor types (brush, brushless, and stepper) within the same positioning system using a common programming and control platform. High-accuracy linear motor air-bearing stages or lower precision stages with servo or stepper motors can be controlled from the linear Ensemble series. Each controller/drive can be reconfigured to accept different motors and feedback devices, allowing customers to adapt to changing system needs. Optional on-board encoder interpolation provides programmable axis resolution, including the ability to change interpolation (multiplication) values through software.

Powerful and Intuitive Programming

Monitor and control all aspects of the positioning system, no matter how complex, through the Ensemble GUI Integrated Development Environment software. An Autotuning utility minimizes 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.

Ensemble HLe/ML DESCRIPTION

Advanced DSP Control

The processing power of a 225 MHz double precision, floating-point DSP supplies exceptional performance in a variety of applications including point-to-point motion, linear and circular interpolation, multi-axis error correction, 2D error mapping, direct commutation of linear and rotary brushless servomotors, and on-board servo autotuning. High-speed interrupts and data logging capabilities provide a real-time link to external systems. The Ensemble HLe/ML controller/drive combination also offers high-speed position latching capability and single-, dual-, or triple-axis PSO (Position Synchronized Output), depending on model. 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 operations.

Enhancing a Legacy of Success

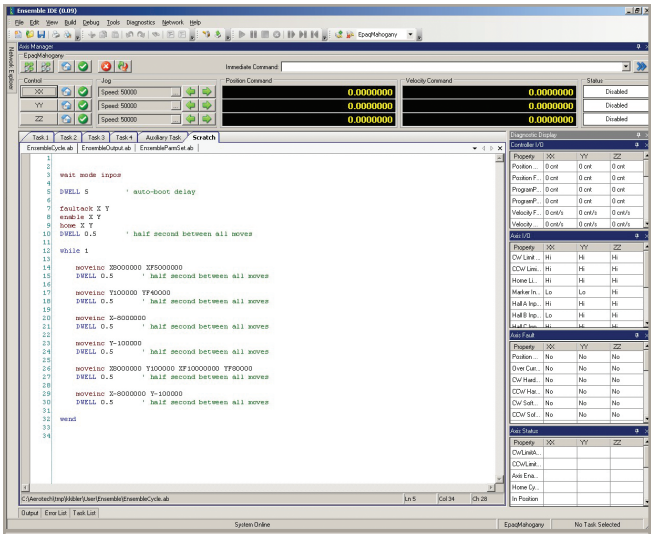
Ensemble carries forward a legacy of success that originated in Aerotech's A3200 and Soloist™ controllers. Enhanced capabilities make it an obvious choice for aggressive motion control applications. The Ensemble motion control architecture builds upon the Soloist™ intuitive graphical user interface, while improving multi-axis control through advanced features.

Allen-Bradley Interface

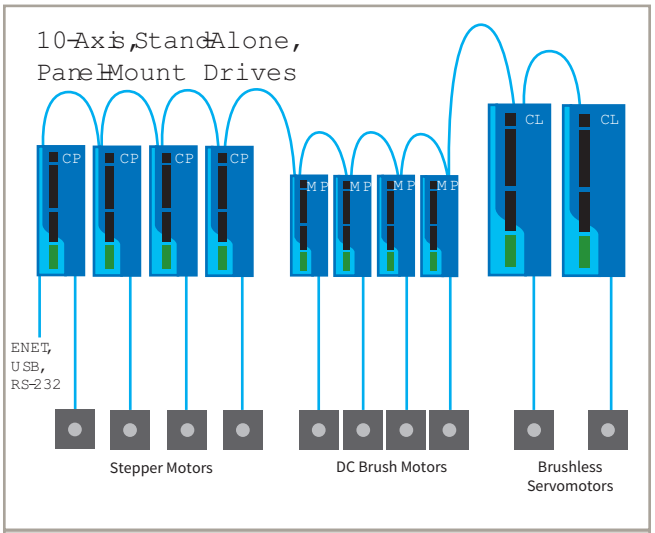
Combine proven PLC with proven motion control for easier integration, startup, and maintenance of medium- and high-end automation projects. The Aerotech EtherNet/IP™ interface enables AB PLCs (MicroLogix, CompactLogix™, or ControlLogix) to be integrated directly with the Ensemble. Motion can be directly programmed in the RSLogix 5000 environment or separate programs can be written on the controller and triggered from the AB PLC. Aerotech has two interfaces: ASCII and Register. Choose the PLC, motion controller, and interface that best fits your application needs.

EPICS Drivers

Each Ensemble installation includes full compatibility with the EPICS open source distributed control system. EPICS is used worldwide at leading light source (synchrotron) facilities and other government laboratories, allowing Ensemble to seamlessly integrate into applications at all major research institutions.



Ensemble IDE.



Ensemble drives shown in a ten-axis configuration.

Ensemble HPe/HLe/CP/MP COMPARISON

Ensemble HLe
Width: 206.9 mm
Height: 234.3 mm

Ensemble ML
Width: 41.1 mm
Height: 141.2 mm

Ensemble Comparison Chart	Ensemble HLe	Ensemble ML
PC Interface	Ethernet TCP/IP or USB	Enternet TCP/IP
Current Output, Peak(1)	10-20 A(2)	10 A(2)
Current Output, Continuous(1)	5-10 A(2)	5 A(2)
Bus Voltage	±40-80 VDC(3)	±40 VDC(3)
Amplifier Type	Linear	Linear
Motor Supply Voltage	2 Phase AC	DC
Standard I/O(5)	4-DO/6-DI 1-AO/1-AI	1-AI
Expansion I/O(5) **(Additional to Base I/O)**	16-DO/16-DI 3-AO/3-AI	8-DO/8-DI 1-AO/1-AI
Single Axis PSO(6)	Yes	Yes
Dual Axis PSO(6)	Yes	No
Triple Axis PSO(6)	Yes	No
Ethernet Capable for Third-Party I/O	Yes	No

Notes:
1. Peak value of the sine wave; rms current for AC motors is 0.707 * Apk.
2. Load dependent.
3. Output voltage is load dependent.
4. External transformer required.
5. DO = Digital Output; DI = Digital Input; AO = Analog Output; AI = Analog Input.
6. PSO not available on Ensemble ML when using integral MXU.

Ensemble HLe SPECIFICATIONS

Ensemble HLe	Units	10-40	20-40	10-80
Motor Style		Brush, Brushless, Stepper, Voice Coil		
Motor Supply	VAC	115/230; 50/60 Hz; Factory Configured		
Control Supply(1)	VAC	85-240; 50/60 Hz		
Bus Voltage(2)	VDC	±40	±40	±80
Peak Output Current (1 sec)(3,4)	A_{pk}	10	20	10
Continuous Output Current(3,4)	A_{pk}	5	10	5
Digital Inputs	—	6 Optically-Isolated (2 High Speed)		
Digital Outputs	—	4 Optically-Isolated		
Analog Inputs	—	One 16-bit Differential; ±10 V		
Analog Outputs	—	One 16-bit Single-Ended		
Dedicated Axis I/O on Feedback Connector		Three Limit Inputs (CW, CCW, Home); Three Hall Effect Inputs (A, B, C); Three High-Speed differential Inputs (sin, cos, mkr for encoder); Motor Over-Temperature Input		
Dedicated I/O on Auxiliary Feedback Connector		sin, cos, mkr for Aux Enc; Aux Enc can be used for PSO Output		
I/O Expansion Board(5)	—	16/16 Digital Opto-Isolated; 3 Analog In (±10 V, 16-bit Differential); 3 Analog Out (±10 V, 16-bit)		
High Speed Data Capture		Yes (50 ns Latency)		
Automatic Brake Control	—	Standard; 24 V @ 1 A		
Emergency Stop Sense Input (ESTOP)(6)	—	Standard; 24 V Opto-Isolated		
Position Synchronized Output (PSO)	—	Single Axis Standard, Two/Three Axis Optional		
Can Output Multiplied Encoder		Yes		
Can Output Square Wave Encoder		Yes		
Primary Encoder Input Frequency		32 MHz Square Wave Standard; 500 kHz Sine Wave (MXH)		
Secondary Encoder Input Frequency		32 MHz Square Wave		
Encoder Multiplication	—	Up to x65536 with Quadrature Output (MXH)		
Absolute Encoder		Renishaw Resolute BiSS; EnDat 2.1; EnDat 2.2		
Resolver Interface	—	Optional; 1 or 2 Channel; 16-bit		
Internal Shunt Resistor		N/A		
External Shunt		N/A		
Ethernet	—	Yes		
USB		Yes		
RS-232		Yes		
FireWire		No		
Fieldbus		Modbus TCP; Ethernet/IP		
Current Loop Update Rate	kHz	20		
Servo Loop Update Rate	kHz	10		
Power Amplifier Bandwidth	kHz	Selectable Through Software		
Minimum Load Inductance	mH	0		
Operating Temperature	°C	0 to 50		
Storage Temperature	°C	-30 to 85		
Weight	kg (lb)	10.36 (22.8)		
Standards		CE approved, NRTL safety certification, EU 2015/863 RoHS 3 directive		

Notes:
1. “Keep Alive” supply.
2. Output voltage is load dependent.
3. Peak value of the sine wave; rms current for AC motors is 0.707 * A_{pk}.
4. Load dependent.
5. Requires IO option.
6. Requires external relay to remove motor supply power.

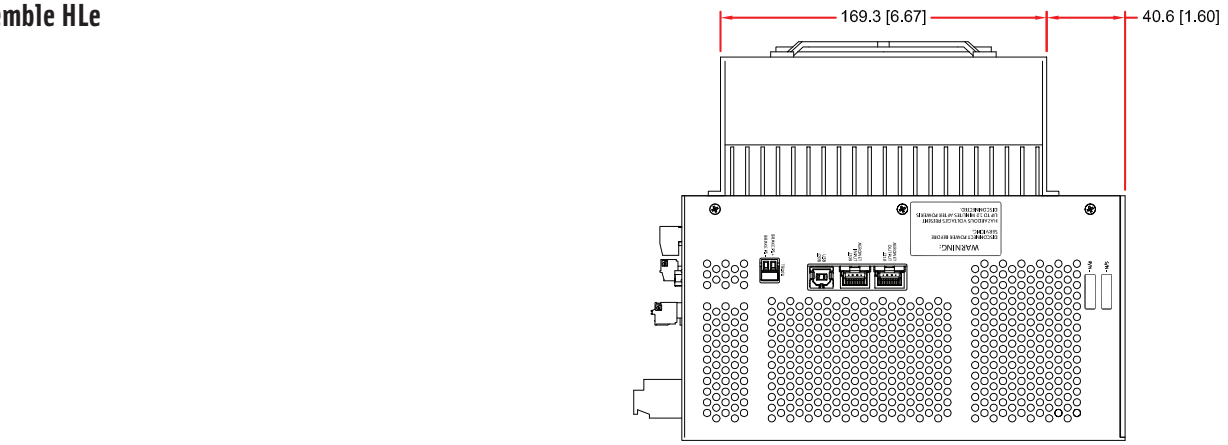
Ensemble ML SPECIFICATIONS

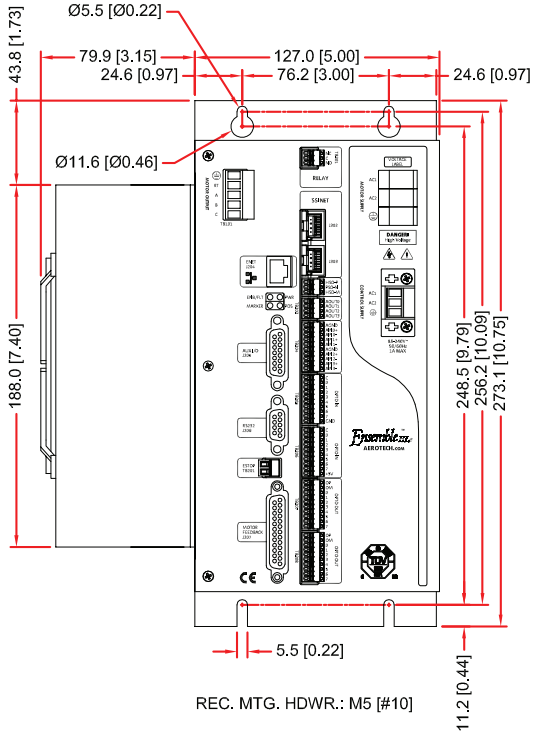
Ensemble ML	Units	
Motor Style		Brush, Brushless, Stepper, Voice Coil
Motor Supply	VDC	±40 max
Control Supply(1)	VDC	18-36 VDC
Bus Voltage(2)	VDC	±40
Peak Output Current (1 sec)(3,4)	A_{pk}	10
Continuous Output Current(3,4)	A_{pk}	5
Digital Inputs	—	N/A
Digital Outputs	—	N/A
Analog Inputs	—	One 16-bit Differential; ±10 V
Analog Outputs	—	N/A
Dedicated Axis I/O on Feedback Connector		Three Limit Inputs (CW, CCW, Home); Three Hall Effect Inputs (A, B, C); Three High-Speed differential Inputs (sin, cos, mkr for encoder); Motor Over-Temperature Input
Dedicated I/O on Auxiliary Feedback Connector		sin, cos, mkr for Aux Enc; Aux Enc can be used for PSO Output
I/O Expansion Board(5)	—	8/8 Digital Opto-Isolated; 1 Analog In (±10 V, 16-bit Differential); 1 Analog Out (±5 V, 16-bit)
High Speed Data Capture		Yes (50 ns Latency)
Automatic Brake Control	—	Optional
Emergency Stop Sense Input (ESTOP)(6)	—	Standard; 24 V Opto-Isolated
Position Synchronized Output (PSO)	—	Single Axis Only
Can Output Multiplied Encoder		Yes (MXH Only)
Can Output Square Wave Encoder		Yes
Primary Encoder Input Frequency		32 MHz Square Wave Standard; 2 MHz Sine Wave (MXU or MXH)
Secondary Encoder Input Frequency		32 MHz Square Wave
Encoder Multiplication	—	Up to x4096 (MXU); Up to x65536 with Quadrature Output (MXH)
Resolver Interface	—	N/A
Internal Shunt Resistor		N/A
External Shunt		N/A
Ethernet	—	N/A
USB		No
RS-232		Yes
FireWire		No
Fieldbus		Modbus TCP; Ethernet/IP
Current Loop Update Rate	kHz	20
Servo Loop Update Rate	kHz	10
Power Amplifier Bandwidth	kHz	Selectable Through Software
Minimum Load Inductance	mH	0
Operating Temperature	°C	0 to 50
Storage Temperature	°C	-30 to 85
Weight	kg (lb)	0.45 (1.0)
Standards		CE approved, NRTL safety certification, EU 2015/863 RoHS 3 directive

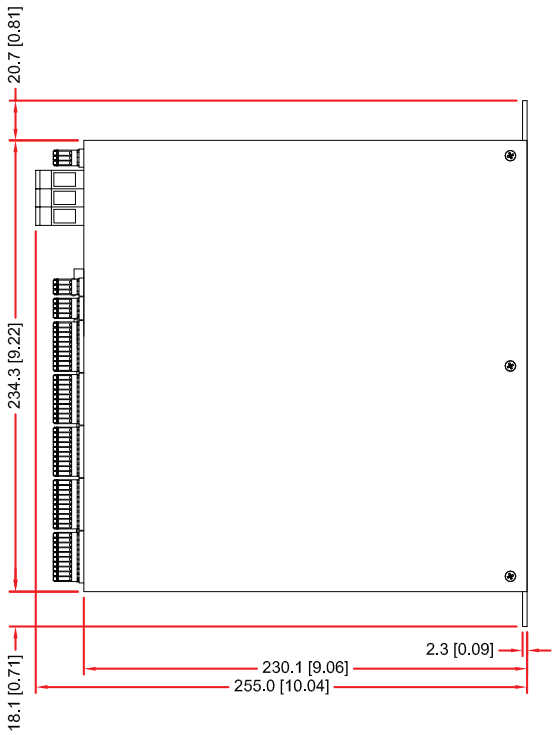
Notes:
1. "Keep Alive" supply.
2. Output voltage is load dependent.
3. Peak value of the sine wave; rms current for AC motors is 0.707 * A_{pk}.
4. Load dependent.
5. Requires IO option.
6. Requires external relay to remove motor supply power.

Ensemble HLe DIMENSIONS

Ensemble HLe

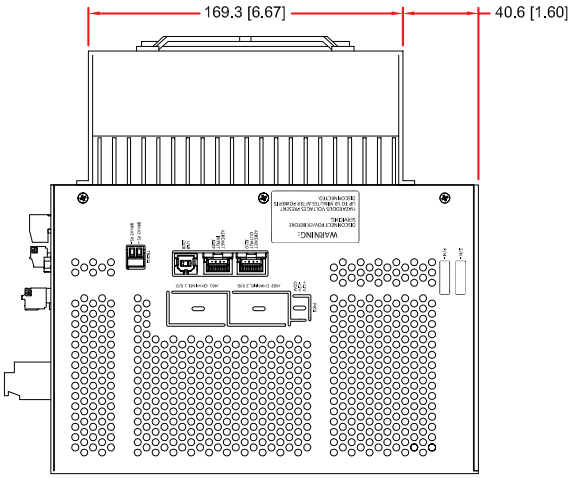


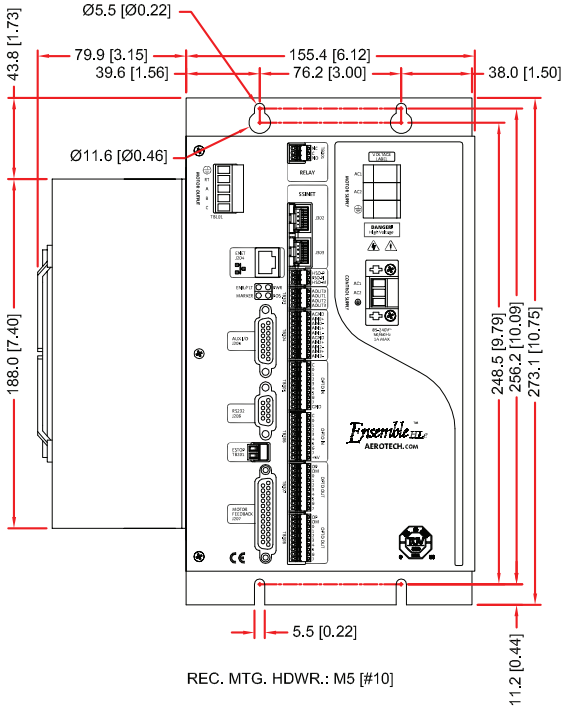


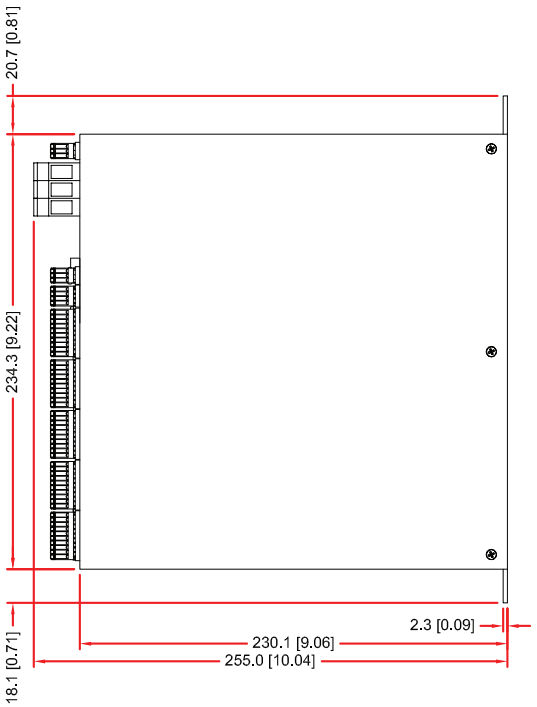


Ensemble HLe DIMENSIONS

Ensemble HLe with Additional I/O and Resolver

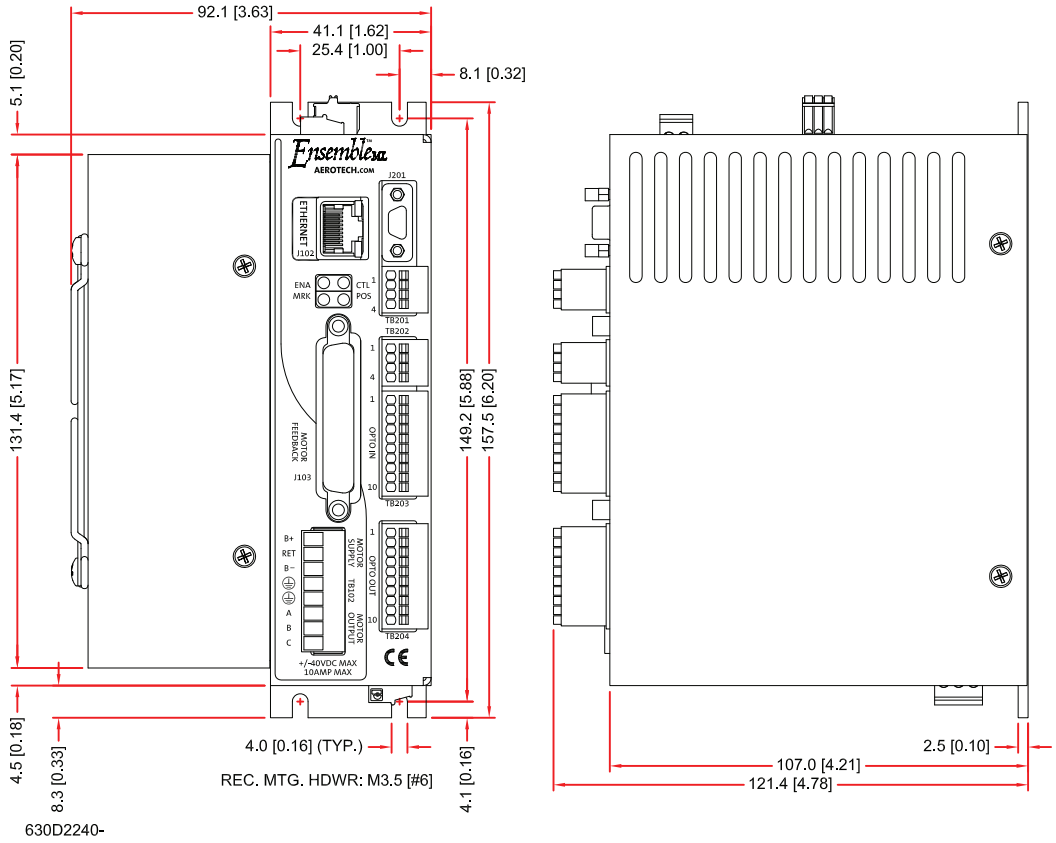






Ensemble ML DIMENSIONS

Ensemble ML with additional I/O



Ensemble Ordering Information

Visit Aerotech's website for complete ordering information.