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Find the *Aerotech Ensemble CP* at our website: ***Click HERE***

Ensemble® HPe/CP/MP

Networked, Panel-Mount Drives – PWM

- 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



Ensemble HPe



Ensemble CP



Ensemble MP

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 HPe/CP/MP combination controllers/drives for up to ten axes of coordinated motion, and seamlessly mix and match amplifiers (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 can be controlled along with lower precision stages with servo or stepper motors. 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

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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.

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 HPe/CP/MP 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

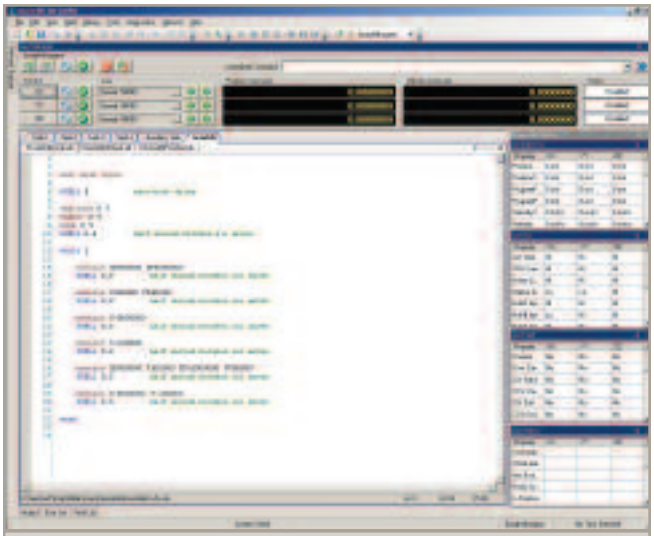
Ensemble carries forward a legacy of success that originated in Aerotech's A3200 and Soloist™ controllers. Enhanced capabilities make it an obvious choice for aggressive motion control applications. The Ensemble motion control architecture builds upon the Soloist™ intuitive graphical user interface,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

Allen-Bradley Interface

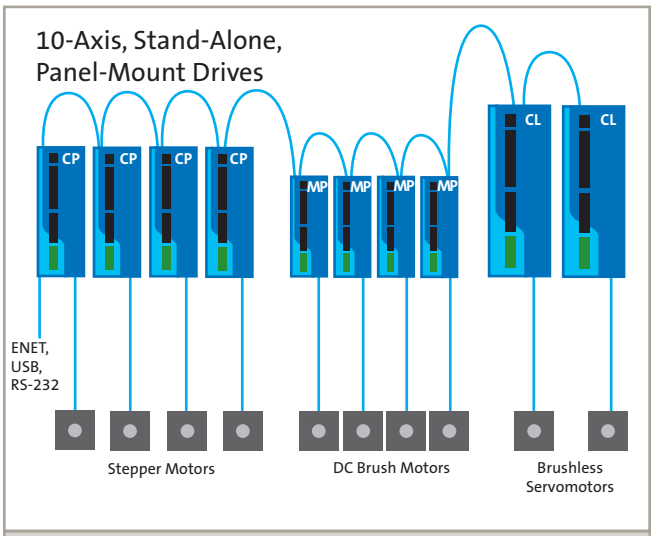
Combine proven PLC with proven motion control for easier integration, startup, and maintenance of medium- and high-end automation projects. The Aerotech EtherNet/IP™ interface enables AB PLCs (MicroLogix, CompactLogix™, or ControlLogix) to be integrated directly with the Ensemble. Motion can be directly 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.

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Ensemble HPe/CP/MP COMPARISON



Ensemble HPe
Width: 99 mm
Height: 232.4 mm



Ensemble CP
Width: 63.5 mm
Height: 198.2 mm



Ensemble MP
Width: 41.1 mm
Height: 141.2 mm

Ensemble Comparison Chart	Ensemble HPe	Ensemble CP	Ensemble MP
PC Interface	Ethernet or USB	Ethernet or USB	Ethernet
Current Output, Peak[1]	10-150 A	10-30 A	10 A
Current Output, Continuous[1]	5-75 A	5-10 A	5 A
Bus Voltage	±10-320 VDC	±10-320 VDC	±40 VDC
Amplifier Type	PWM	PWM	PWM
Motor Supply Voltage	2 or 3 Phase AC	2 Phase AC	DC
Standard I/O[2]	4-DO/6-DI 1-AO/1-AI	4-DO/6-DI 1-AO/1-A	1-AI
Expansion I/O[2] **(Additional to Base I/O)**	16-DO/16-DI 3-AO/3-AI	16-DO/16-DI 1-AO/1-AI	8-DO/8-DI 1-AO/1-AI
Single Axis PSO[3]	Yes	Yes	Yes
Dual Axis PSO[3]	Yes	No	No
Triple Axis PSO[3]	Yes	No	No
Ethernet Capable for Third-Party I/O	Yes	Yes	Yes

Note:
1. Peak value of the sine wave; rms current for AC motors is 0.707 * Apk.
2. DO = Digital Output; DI = Digital Input; AO = Analog Output; AI = Analog Input
3. PSO not available on Ensemble CP/MP when using integral MXU.

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Ensemble HPe SPECIFICATIONS

Ensemble HPe	Units	10	20	30	50	75	100	150	200
Motor Style		Brush, Brushless, Stepper[1]							
Motor Supply	VAC	Single-Phase 7-240 V; 50/60 Hz			Single- or Three-Phase 115 or 230 V; 50/60 Hz				
Control Supply[2]	VAC	85-240 VAC; 50/60 Hz							
Bus Voltage[3]	VDC	10-320[3]							
Peak Output Current (1 sec)[4]	A_{pk}	10	20	30	50	75	100	150	200
Continuous Output Current[4]	A_{pk}	5	10	10	25	37	50	75	75
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; ±10 V							
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 at 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		500 kHz Amplified Sine Wave Standard (for onboard multiplier); 40 MHz TTL Square Wave							
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		40 W Continuous; 400 W Peak (5 seconds)			440 W Continuous				
External Shunt		Optional							
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	1 to 20							
Power Amplifier Bandwidth	kHz	Selectable Through Software							
Minimum Load Inductance	mH	0.1 @ 160 VDC (1.0 mH @ 320 VDC)							
Operating Temperature	°C	0 to 50							
Storage Temperature	°C	-30 to 85							
Weight	kg (lb)	2.36 (5.2)			6.64 (14.6)			11.06 (24.4)	
Standards		CE approved, NRTL safety certification, 2011/65/EU RoHS 2 Directive							

Notes:
1. For stepper motors only, one-half of bus voltage is applied across the motor (e.g., 80 VDC supply results in 40 VDC across stepper motor).
2. "Keep Alive" supply.
3. Output voltage dependent upon input voltage.
4. Peak value of the sine wave; rms current for AC motors is 0.707 * A_{pk}.
5. Requires IO option.
6. Requires external relay to remove motor supply power.

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Ensemble CP SPECIFICATIONS

Ensemble CP	Units	10	20	30
Motor Style		Brush, Brushless, Stepper[1]		
Motor Supply	VAC	Single-Phase 7-240 VAC; 50/60 Hz		
Control Supply[2]	VAC	85-240 VAC; 50/60 Hz		
Bus Voltage[3]	VDC	20-340[3]		
Peak Output Current (1 sec)[4]	A_{pk}	10	10	30
Continuous Output Current[4]	A_{pk}	5	10	10
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; ±10 V		
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; 1 Analog In (±10 V, 12-bit Differential); 1 Analog Out (±10 V, 16-		
High Speed Data Capture		Yes (50 ns Latency)		
Automatic Brake Control	—	Standard; 24 V at 1 A		
Emergency Stop Sense Input (ESTOP)[6]	—	Standard; 24 V Opto-Isolated		
Position Synchronized Output (PSO)	—	Single Axis Only		
Can Output Multiplied Encoder		No		
Can Output Square Wave Encoder		Yes		
Primary Encoder Input Frequency		200 kHz Amplified Sine Wave Standard (for onboard multiplier); 40 MHz TTL Square Wave		
Secondary Encoder Input Frequency		32 MHz Square Wave		
Encoder Multiplication	—	Up to x4096 (MXU)		
Absolute Encoder		Renishaw Resolute BiSS, EnDat 2.1, EnDat 2.2		
Resolver Interface	—	N/A		
Internal Shunt Resistor		40 W Continuous; 400 W Peak (5 seconds)		
External Shunt		Optional		
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	1 to 20		
Power Amplifier Bandwidth	kHz	Selectable Through Software		
Minimum Load Inductance	mH	0.1 @ 160 VDC (1.0 mH @ 320 VDC)		
Operating Temperature	°C	0 to 50		
Storage Temperature	°C	-30 to 85		
Weight	kg (lb)	1.6 (3.6)		
Standards		CE approved, NRTL safety certification, 2011/65/EU RoHS 2 Directive		

Notes:
1. For stepper motors only, one-half of bus voltage is applied across the motor (e.g., 80 VDC supply results in 40 VDC across stepper motor).
2. "Keep Alive" supply.
3. Output voltage dependent upon input voltage.
4. Peak value of the sine wave; rms current for AC motors is 0.707 * A_{pk}.
5. Requires IO option.
6. Requires external relay to remove motor supply power.

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Ensemble MP SPECIFICATIONS

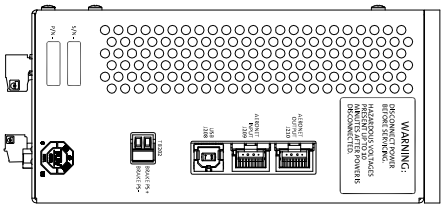
Ensemble MP	Units	
Motor Style		Brush, Brushless, Stepper[1]
Motor Supply	VDC	10-80
Control Supply[2]	VDC	24-80
Bus Voltage[3]	VDC	10-80
Peak Output Current (1 sec)[4]	A_{pk}	10
Continuous Output Current[4]	A_{pk}	5
Digital Inputs	—	N/A
Digital Outputs	—	N/A
Analog Inputs	—	One 16-bit Differential; ±10 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		N/A
I/O Expansion Board[5]	—	8/8 Digital Opto-Isolated; 1 Analog In (±10 V, 12-bit Differential); 1 Analog Out (±5 V, 16-bit); sin, cos, mkr for Aux Enc; Aux Enc can be used for PSO Output
High Speed Data Capture		Yes (50 ns Latency)
Automatic Brake Control	—	Optional[6]
Emergency Stop Sense Input (ESTOP)[6]	—	Standard; 24 V Opto-Isolated
Position Synchronized Output (PSO)	—	Optional[5]
Can Output Multiplied Encoder		No
Can Output Square Wave Encoder		Yes
Primary Encoder Input Frequency		200 kHz Amplified Sine Wave Standard (for onboard multiplier); 40 MHz TTL Square Wave
Secondary Encoder Input Frequency		32 MHz Square Wave
Encoder Multiplication	—	Up to x4096 (MXU)
Resolver Interface	—	N/A
Internal Shunt Resistor		N/A
External Shunt		N/A
Ethernet	—	Yes
USB		No
RS-232		Yes
FireWire		No
Fieldbus		Modbus TCP; Ethernet/IP
Current Loop Update Rate	kHz	20
Servo Loop Update Rate	kHz	1 to 20
Power Amplifier Bandwidth	kHz	Selectable Through Software
Minimum Load Inductance	mH	0.1 @ 80 VDC
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, 2011/65/EU RoHS 2 Directive

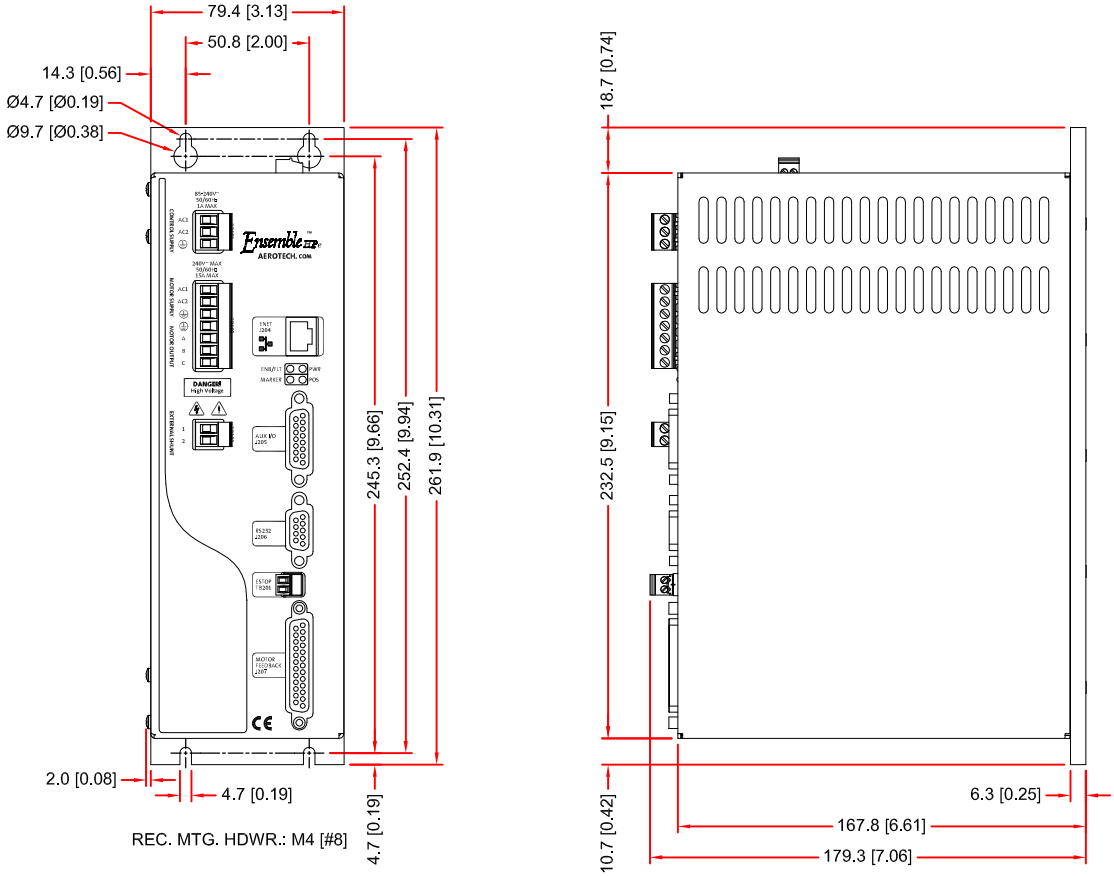
Notes:
1. For stepper motors only, one-half of bus voltage is applied across the motor (e.g., 80 VDC supply results in 40 VDC across stepper motor).
2. "Keep Alive" supply.
3. Output voltage dependent upon input voltage.
4. Peak value of the sine wave; rms current for AC motors is 0.707 * A_{pk}.
5. Requires IO option.
6. Requires external relay to remove motor supply power.

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Ensemble HPe DIMENSIONS

Ensemble HPe10/20/30

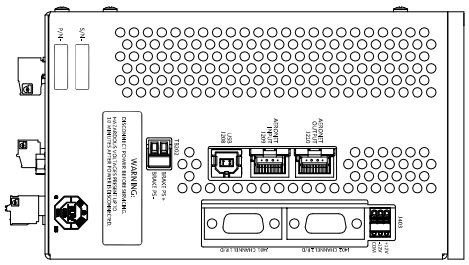


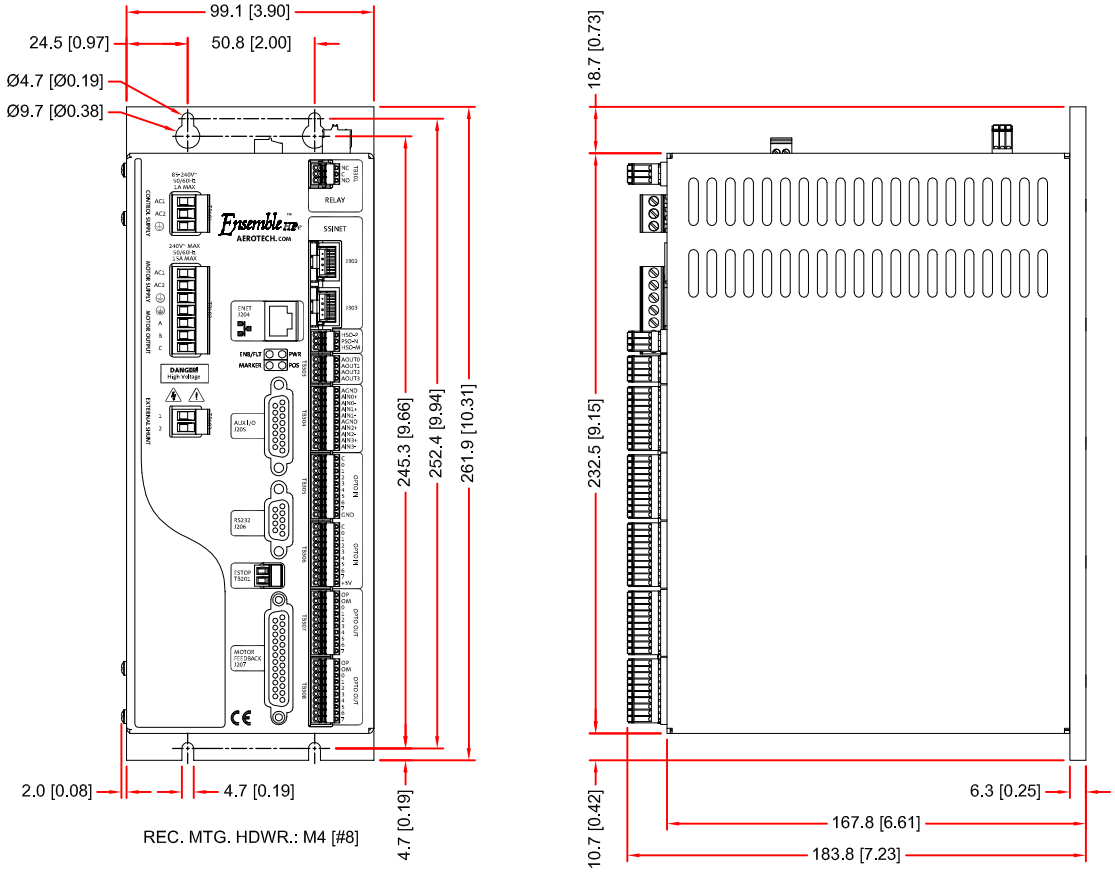


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Ensemble HPe DIMENSIONS

Ensemble HPe with additional I/O

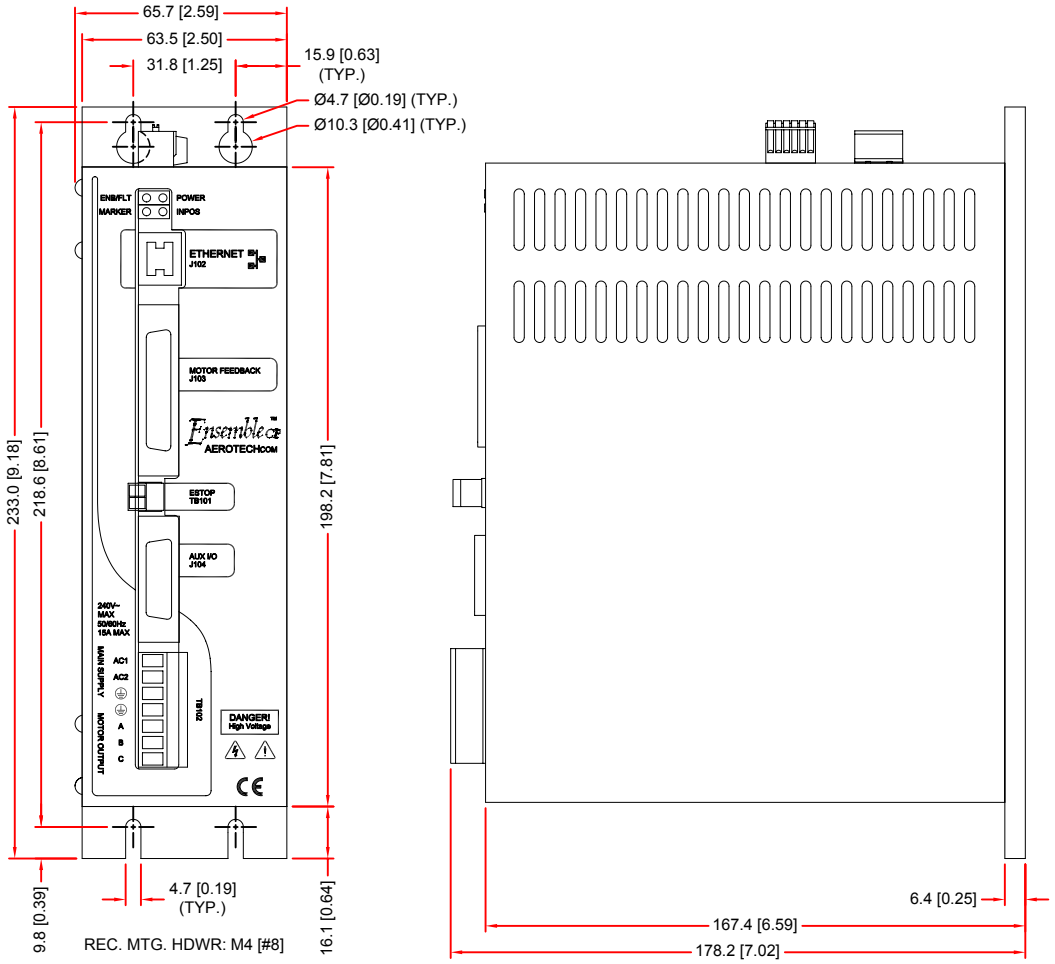




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Ensemble CP DIMENSIONS

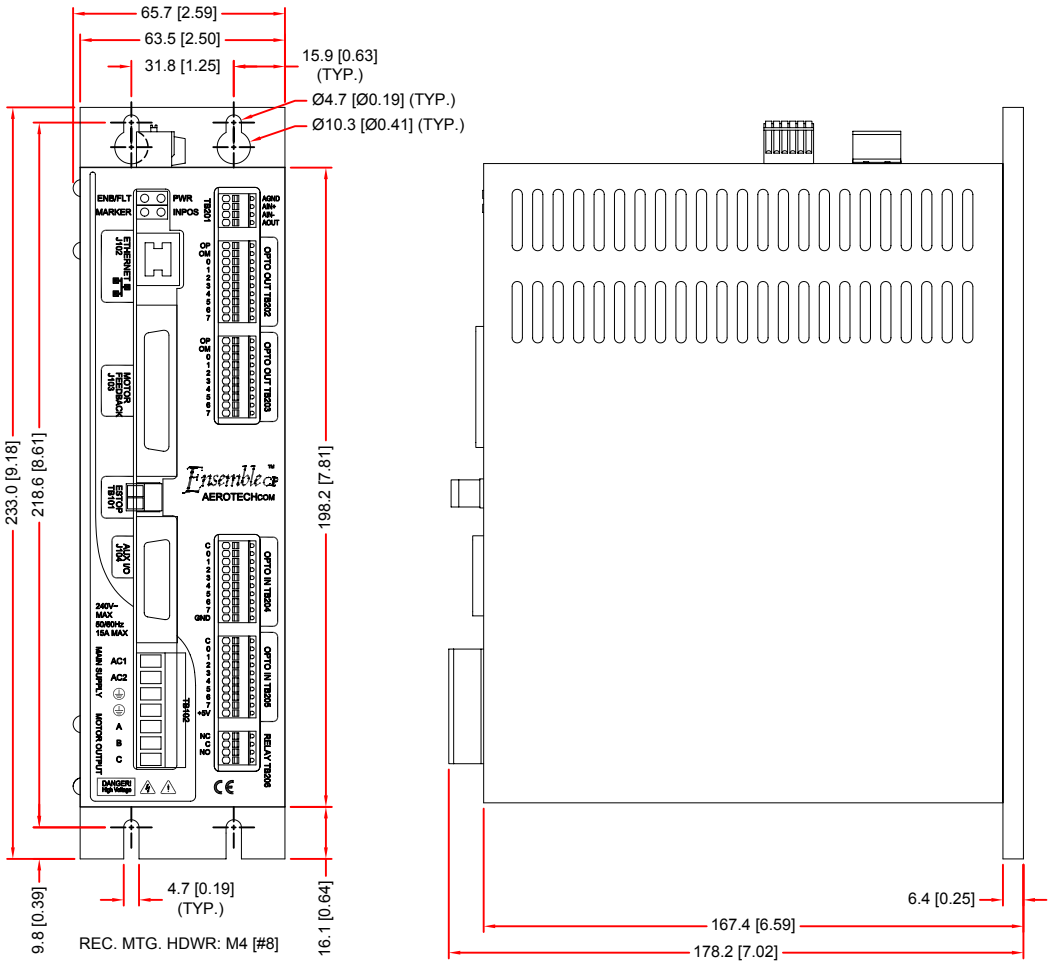
Ensemble CP



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Ensemble CP DIMENSIONS

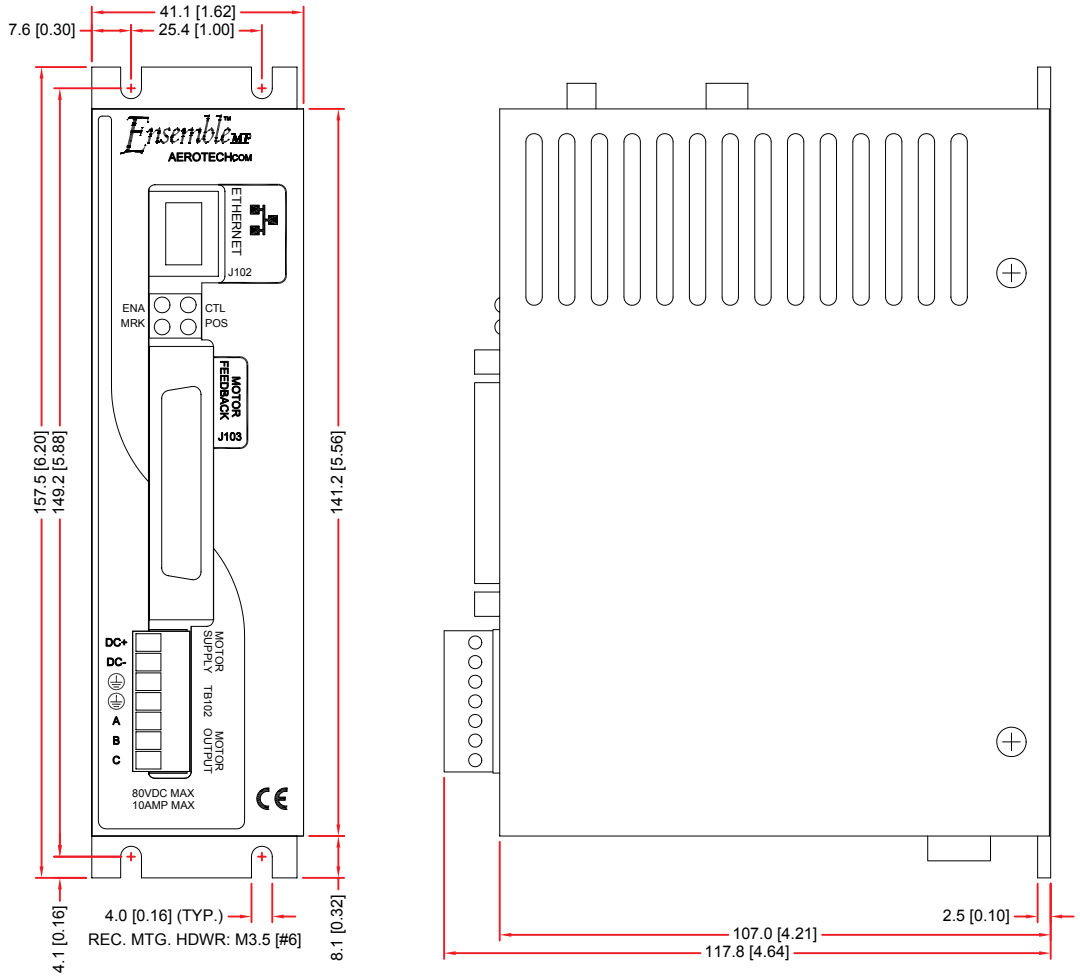
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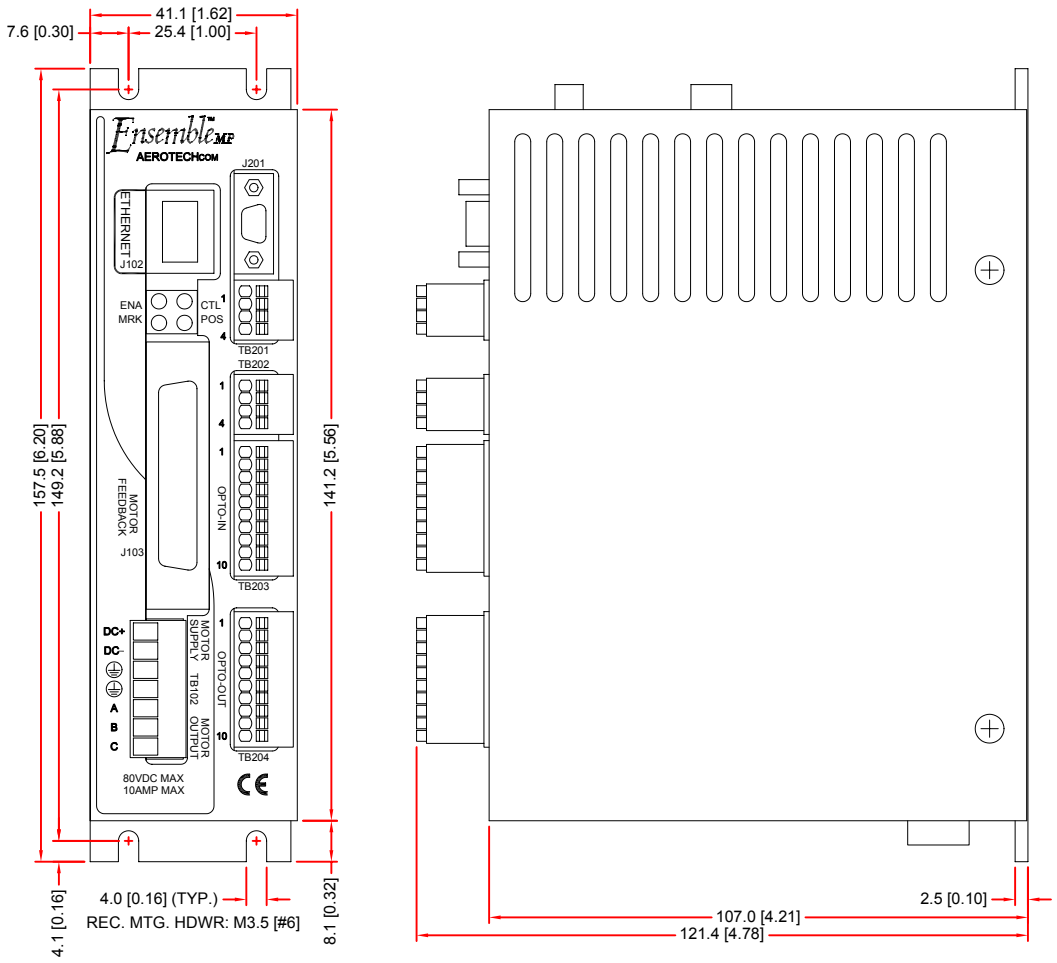
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