Ndrive Series

Digital Servo Amplifiers – PWM

- Wide output power range from 10 A peak to 200 A peak at 320 VDC
- 2- or 3-phase AC line input or DC input
- CE approved and NRTL safety certification; follows the 2011/65/EU RoHS 2 Directive
- PWM power stages
- Digital current, velocity, and position loops for improved motion stability
- Optional integrated encoder multiplier for higher throughput and reduced wiring
- Flexible design provides ability to drive brushless and DC brush-type servomotors as well as stepping motors
- Encoder or resolver feedback

Ndrive HPe

Ndrive CP

Ndrive MP

The Ndrive® family of digital servo amplifiers are high performance discrete drives used with the Automation 3200 motion controller. These drives are capable of controlling brushless, DC brush, and stepper motors over a wide range of operating voltages and currents. Based on a common architecture, Ndrive amplifiers perform both current- and position-loop closures digitally.

The use of high-performance double-precision processors allows these drives to generate ultra-smooth motion profiles. Servo system response is optimized with the use of up to eight second-order loop-shaping filters, precise time-aligned feed-forward and other proprietary techniques with loop closure rates up to 20 kHz.

The Ndrive family is offered in a number of highly efficient PWM versions. The Ndrive MP is a low power, small footprint PWM drive ideal for space-sensitive applications. The Ndrive CP is a medium-power PWM drive capable of running directly from AC mains voltage and is optimized for cost-sensitive applications. The Ndrive HPe is the highest performance PWM drive providing a host of features not available on the other PWM drives, and is available in output current ranges from 10 A to 200 A peak.

Options for the Ndrive family include integral encoder interpolation, one- to three-axis position synchronized output (PSO), automatic brake control, digital and analog I/O expansion, absolute encoder interface, and one- or two-channel resolver interfaces. An optional dedicated ethernet port is available on the HPe drives for connection to third-party I/O expansion devices. This provides the potential to connect to a large number of I/O points typically required for PLC-type applications.

Any combination of Ndrive amplifiers may be connected to the Automation 3200 FireWire® network, allowing the system to be customized as needed.

Ndrive Series COMPARISON

Ndrive HPe
Width: 99 mm
Height: 232.4 mm

Ndrive CP
Width: 63.5 mm
Height: 198.2 mm

Ndrive MP
Width: 41.1 mm
Height: 141.2 mm

Ndrive Comparison Chart	Ndrive HPe	Ndrive CP	Ndrive MP
PC Interface	FireWire®	FireWire®	FireWire®
Current Output, Peak[1]	150-200 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-AI	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	No	No

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

Ndrive HPe Series SPECIFICATIONS

Ndrive 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		Optional							
USB		No							
RS-232		No							
FireWire		Yes							
Fieldbus		Modbus TCP on PC							
Current Loop Update Rate	**kHz**	20							
Servo Loop Update Rate	**kHz**	8							
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 * Apk.
5. Requires IO option.
6. Requires external relay to remove motor supply power.

Ndrive CP Series SPECIFICATIONS

Ndrive 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	10-320[3]		
Peak Output Current (1 sec)[4]	A_{pk}	10	20	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-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 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		40 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	—	N/A		
USB		No		
RS-232		No		
FireWire		Yes		
Fieldbus		Modbus on PC		
Current Loop Update Rate	kHz	20		
Servo Loop Update Rate	kHz	8		
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)	1.64 (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.

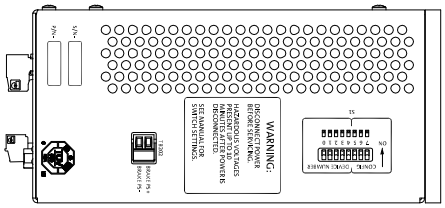
Ndrive MP Series SPECIFICATIONS

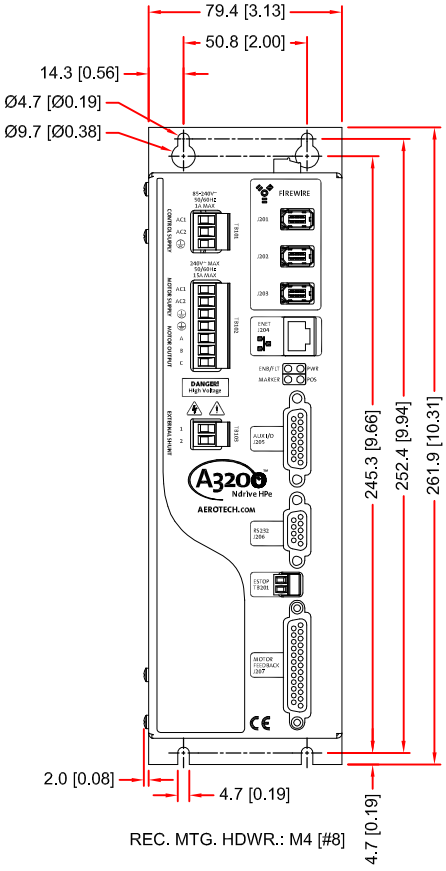
Ndrive MP	Units	
Motor Style		Brush, Brushless, Stepper[1]
Motor Supply	VDC	10-80
Control Supply[2]	VDC	24-80
Bus Voltage[3]	VDC	10-80
Peak Output Current (1 sec)[4]	A_{pk}	10
Continuous Output Current[4]	A_{pk}	5
Digital Inputs	—	N/A
Digital Outputs	—	N/A
Analog Inputs	—	One 12-bit Differential; ±10 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, mrk 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		No
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 x1024 (MXU)
Resolver Interface	—	N/A
Internal Shunt Resistor		N/A
External Shunt		N/A
Ethernet	—	N/A
USB		No
RS-232		No
FireWire		Yes
Fieldbus		Modbus TCP on PC
Current Loop Update Rate	kHz	20
Servo Loop Update Rate	kHz	8
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

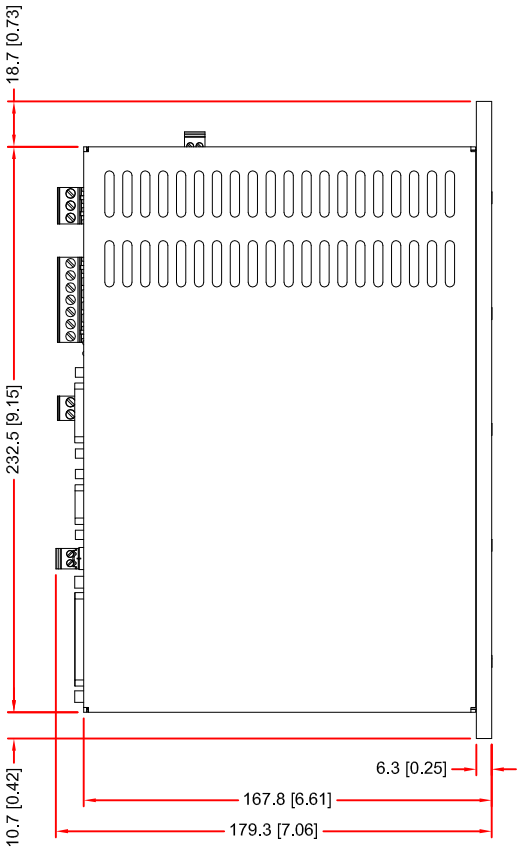
Notes:
1. For stepper motors only, one-half of bus voltage is applied across the motor (e.g., 80 VDC supply results in 40 VDC across stepper motor).
2. "Keep Alive" supply.
3. Output voltage dependent upon input voltage.
4. Peak value of the sine wave; rms current for AC motors is 0.707 * A_{pk}.
5.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

Ndrive HPe10/20/30 DIMENSIONS

Ndrive HPe10/20/30

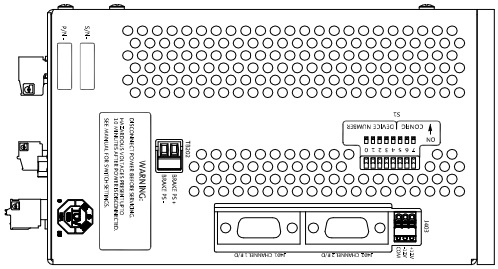


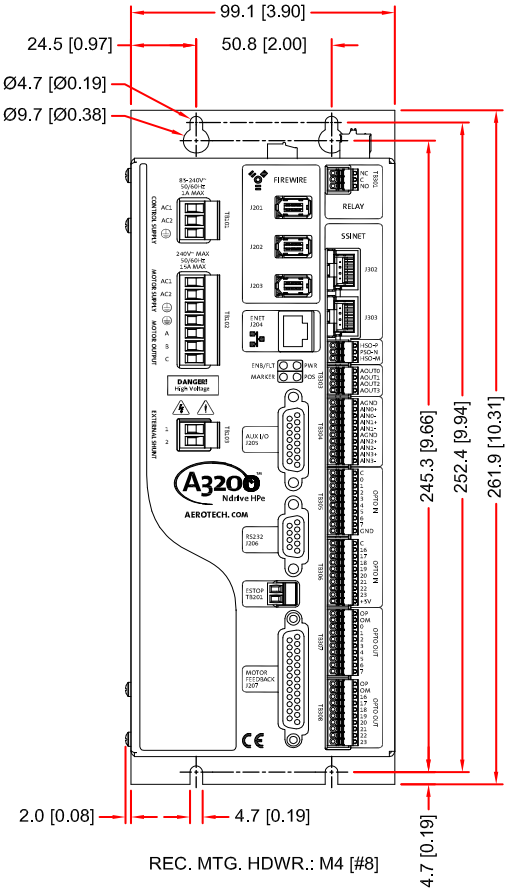


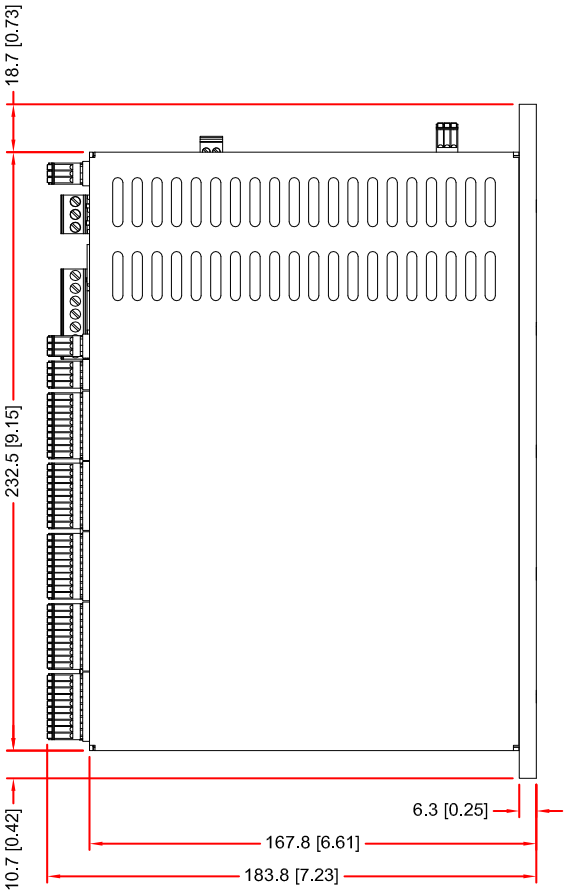


Ndrive HPe10/20/30 DIMENSIONS

Ndrive HPe10/20/30 with Optional I/O



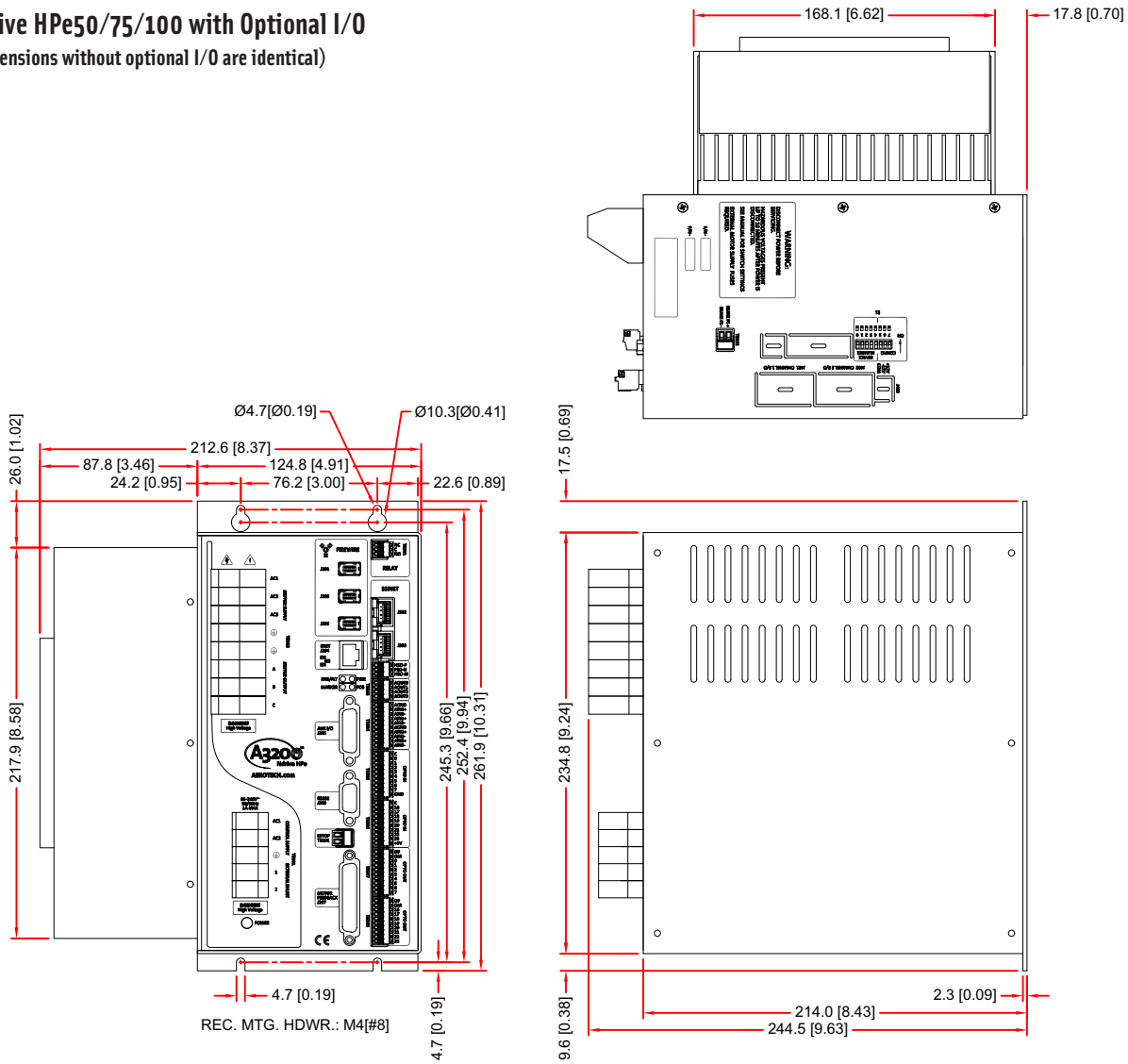




Ndrive HPe50/75/100 DIMENSIONS

Ndrive HPe50/75/100 with Optional I/O

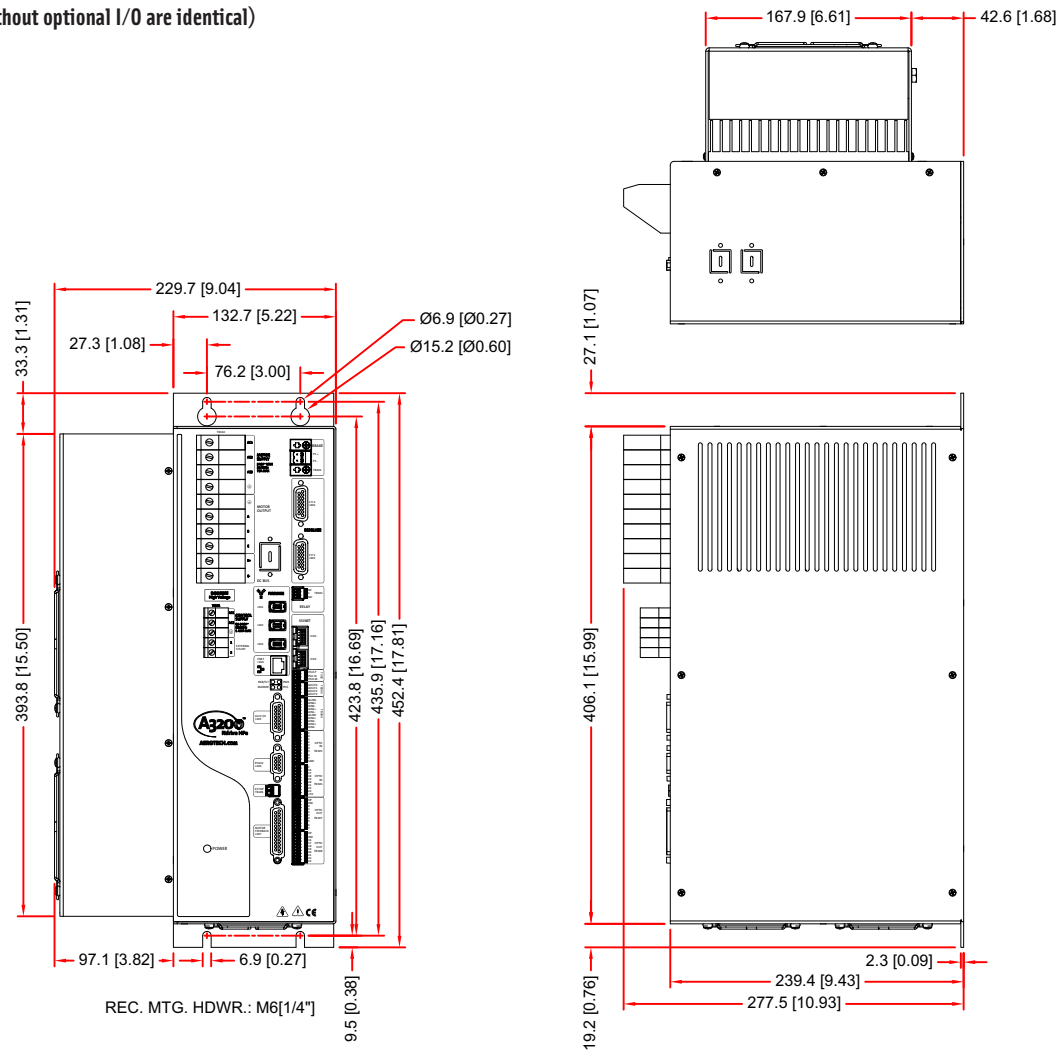
(Dimensions without optional I/O are identical)



Ndrive HPe150/200 DIMENSIONS

Ndrive HPe150/200 with Optional I/O

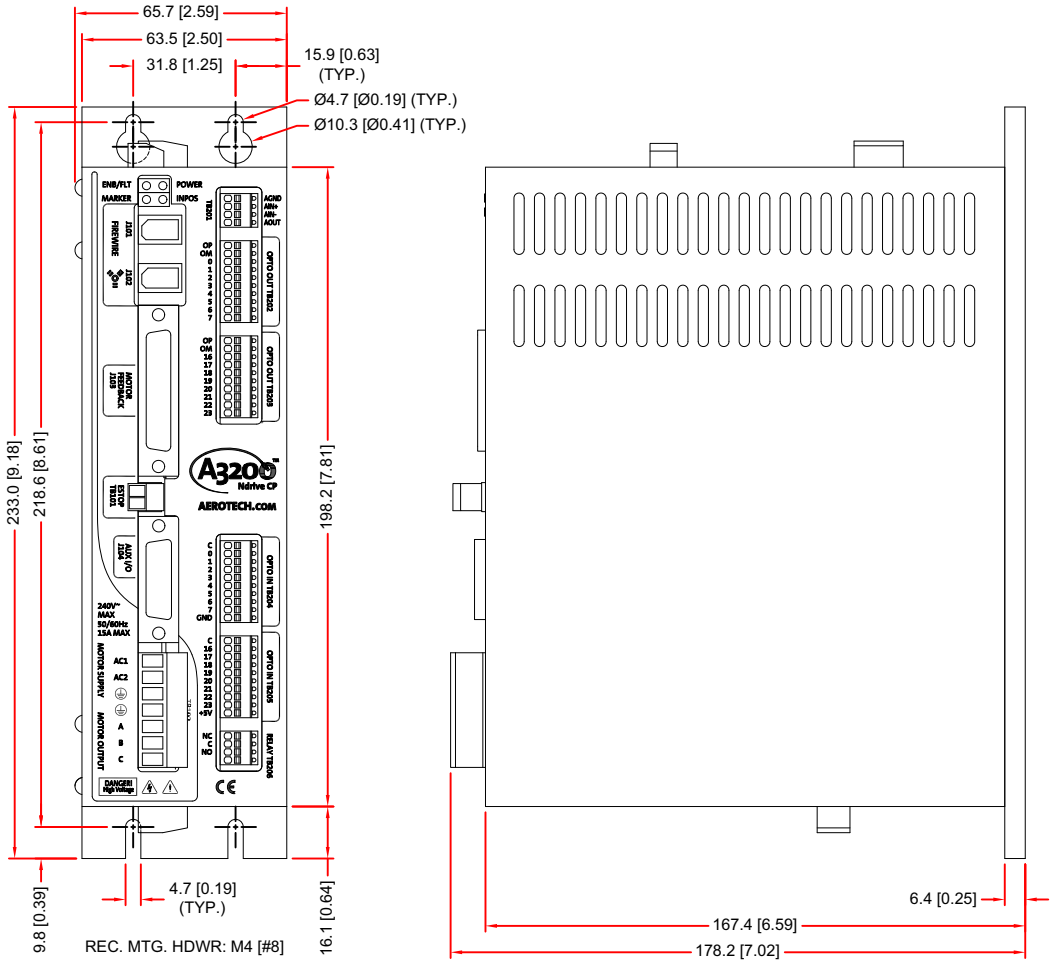
(Dimensions without optional I/O are identical)



Ndrive CP DIMENSIONS

Ndrive CP with Optional I/O

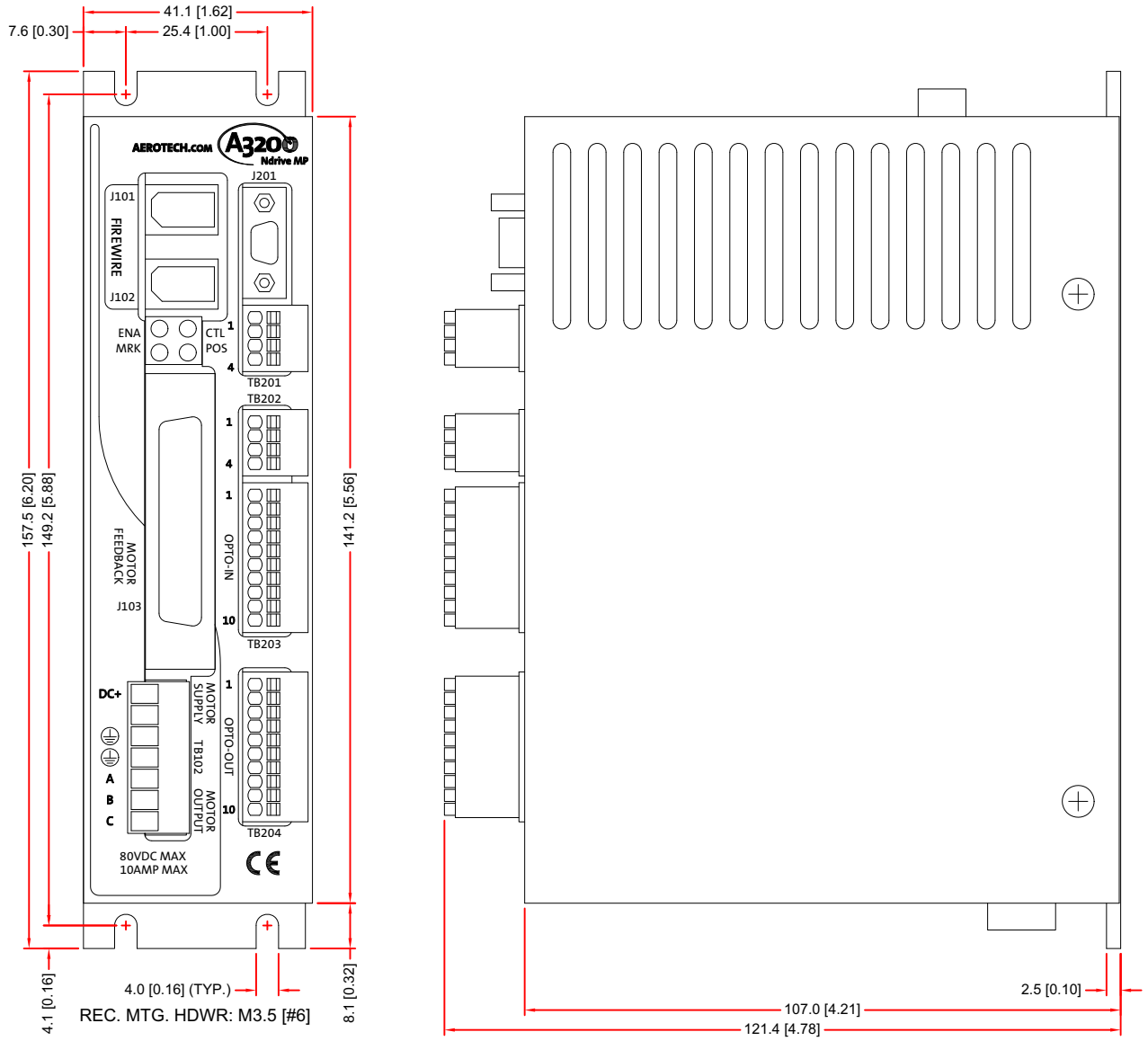
(Dimensions without optional I/O are identical)



Ndrive MP DIMENSIONS

Ndrive MP with Optional I/O

(Dimensions without optional I/O are identical)



Ndrive Ordering Information

Visit Aerotech's website for complete ordering information.