

Ndrive Linear Series

Digital Servo Amplifiers – Linear

Output power range of 10 or 20 A peak with ± 10 to ± 80 VDC bus

2- or 3-phase AC line input or DC input

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

Linear 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 HLe

Ndrive ML

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 includes several versions of low noise, ultra-high-performance linear drives. The Ndrive series provides high bandwidth and superb linearity required for the ultimate in velocity regulation as well as positional stability. The HLe offers the ability to use resolver or

inductosyn sensors and provides the highest level of encoder interpolation. For low-power, high precision systems use the Ndrive ML.

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 HLe 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 HLe
Width: 206.9 mm
Height: 234.3 mm



Ndrive ML
Width: 92.1 mm
Height: 141.0 mm

Ndrive Comparison Chart	Ndrive HLe	Ndrive ML
PC Interface	FireWire®	FireWire®
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 $0.707 \cdot A_{pk}$.
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 Ndrive ML when using integral MXU.

Ndrive HLe SPECIFICATIONS

Ndrive HLe	Units	10-40	20-40	10-60	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	±60	±80
Peak Output Current (1 sec) ^(3,4)	A _{pk}	10	20	10	10
Continuous Output Current ^(3,4)	A _{pk}	5	10	5	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 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		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		Optional			
USB		No			
RS-232		No			
FireWire		Yes			
Fieldbus		Modbus TCP; Ethernet/IP			
Current Loop Update Rate	kHz	20			
Servo Loop Update Rate	kHz	8			
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, 2011/65/EU RoHS 2 Directive			

Notes:

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

Ndrive ML SPECIFICATIONS

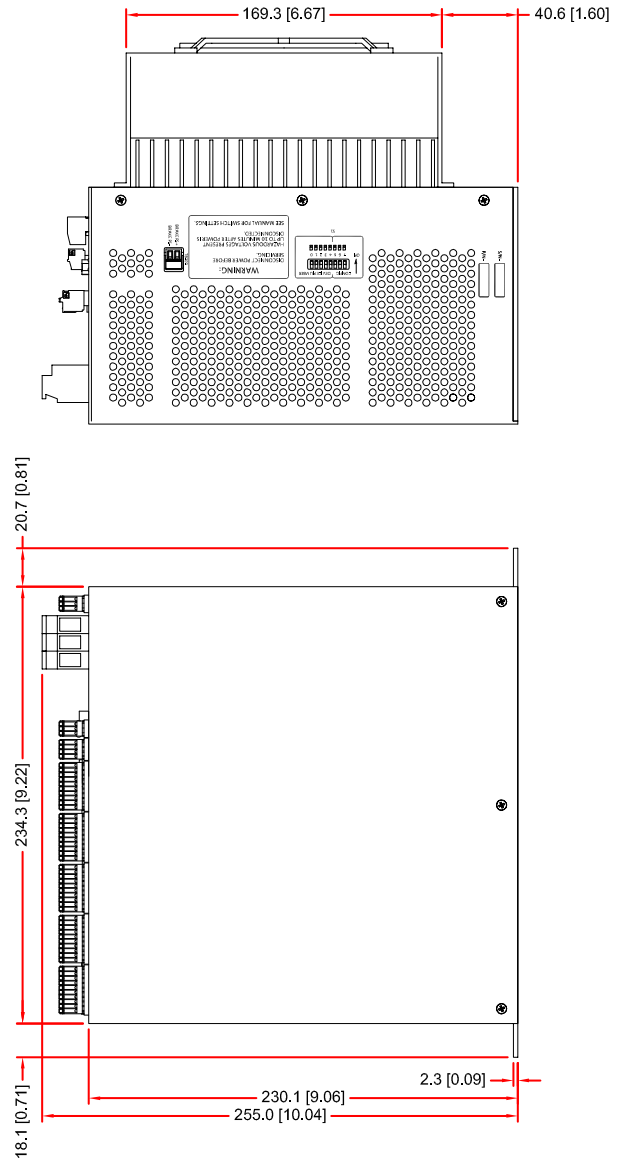
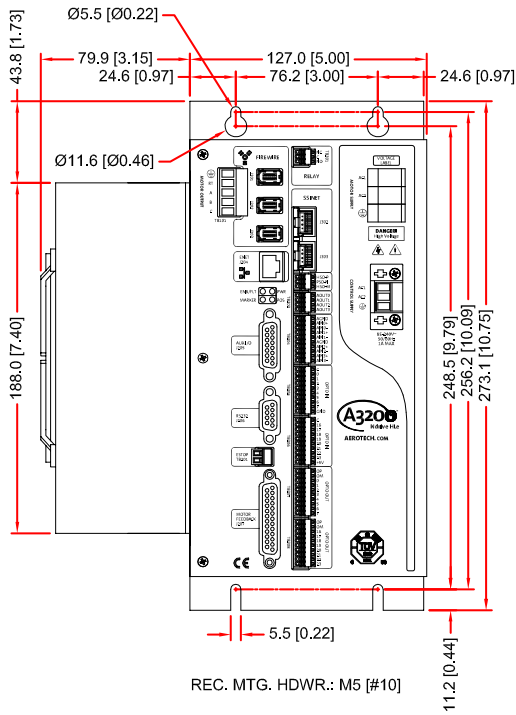
Ndrive ML	Units	
Motor Style		Brush, Brushless, Stepper, Voice Coil
Motor Supply	VDC	±40 max
Control Supply ⁽¹⁾	VDC	18-36 VDC
Bus Voltage ⁽²⁾	VDC	±40
Peak Output Current (1 sec) ^(3,4)	A _{pk}	10
Continuous Output Current ^(3,4)	A _{pk}	5
Digital Inputs		N/A
Digital Outputs		N/A
Analog Inputs		One 16-bit 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		N/A
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); 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
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		No
FireWire		Yes
Fieldbus		Modbus TCP; Ethernet/IP
Current Loop Update Rate	kHz	20
Servo Loop Update Rate	kHz	8
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	1.0
Standards		CE approved, NRTL safety certification, 2011/65/EU RoHS 2 Directive

Notes:

1. "Keep Alive" supply.
2. Output voltage dependent upon input voltage.
3. Peak value of the sine wave; rms current for AC motors is $0.707 \cdot A_{pk}$.
4. Load dependent.
5. Requires I/O option.
6. Requires external relay to remove motor supply power.

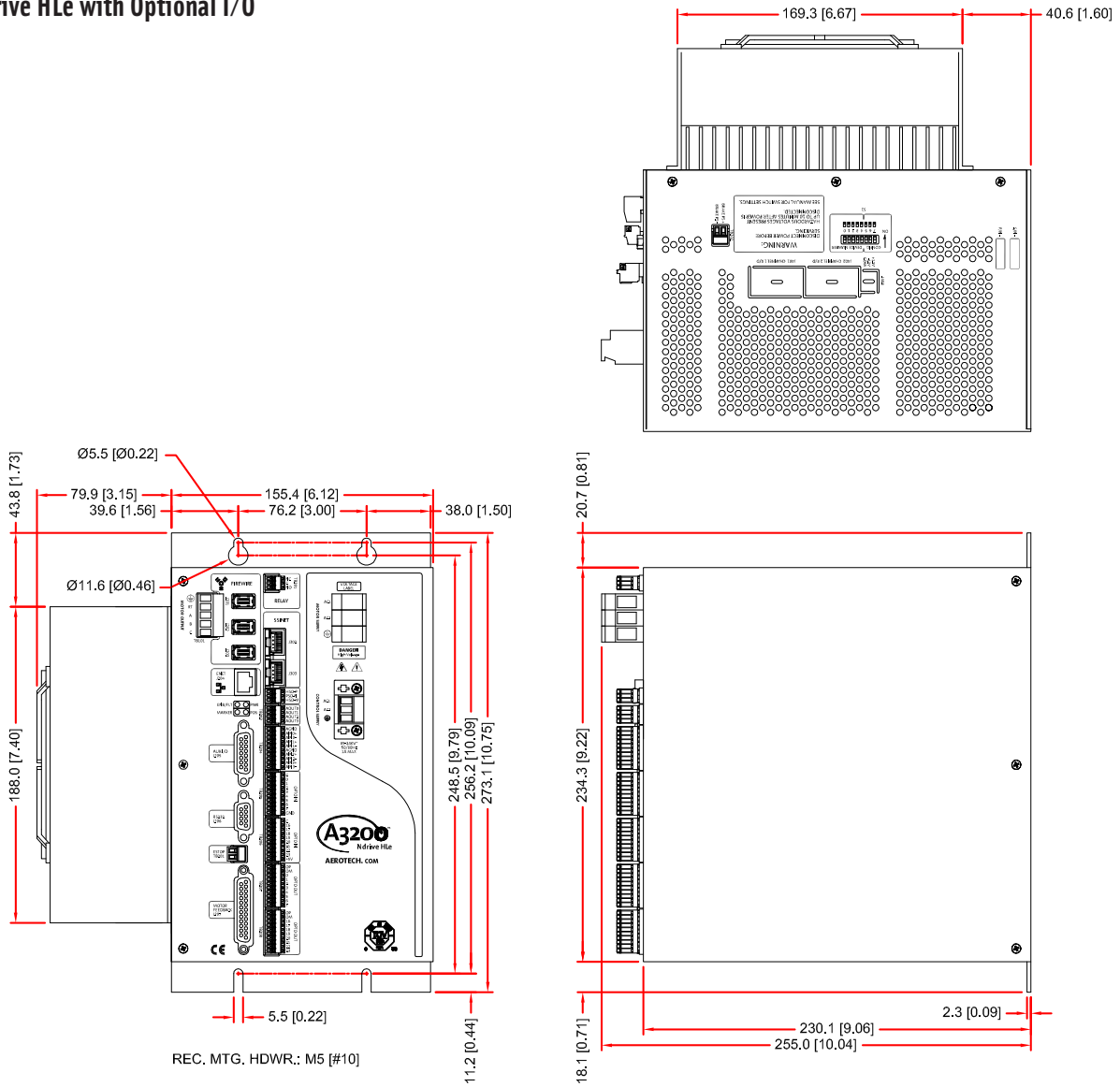
Ndrive HLe DIMENSIONS

Ndrive HLe



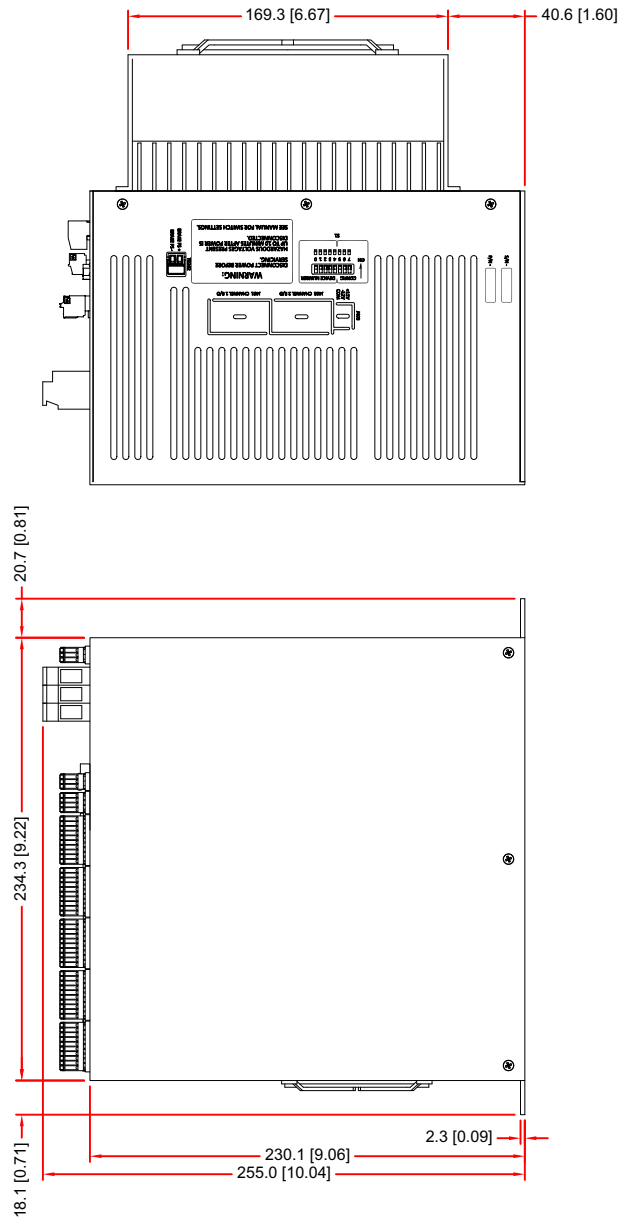
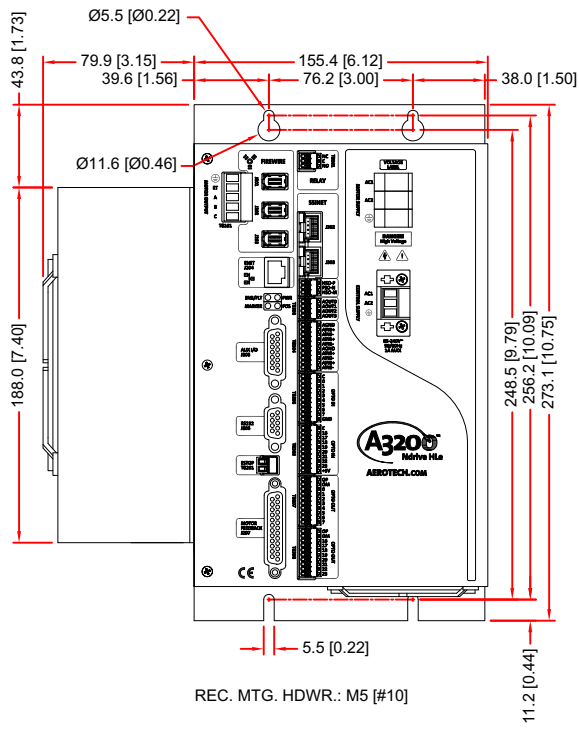
Ndrive HLe DIMENSIONS

Ndrive HLe with Optional I/O



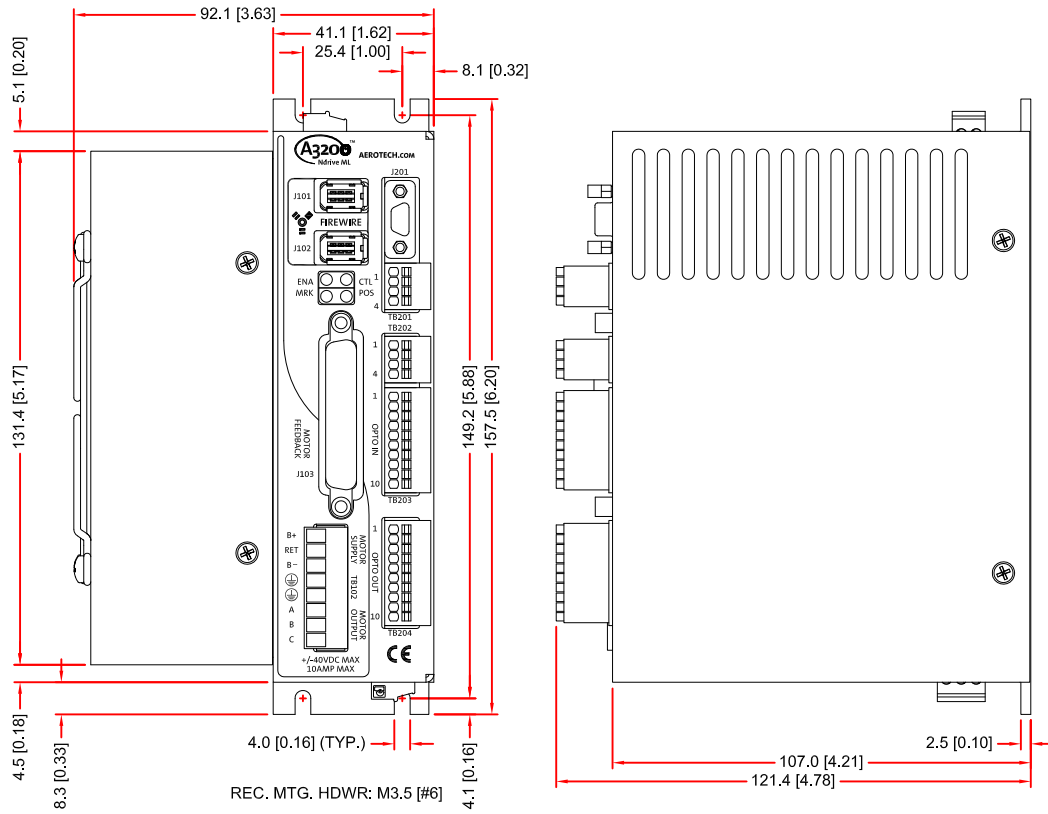
Ndrive HLe DIMENSIONS

Ndrive HLe with Optional I/O and Resolver



Ndrive ML DIMENSIONS

Ndrive ML with Optional I/O
 (Dimensions without optional I/O are identical)



Ndrive Ordering Information

Visit Aerotech's website for complete ordering information.