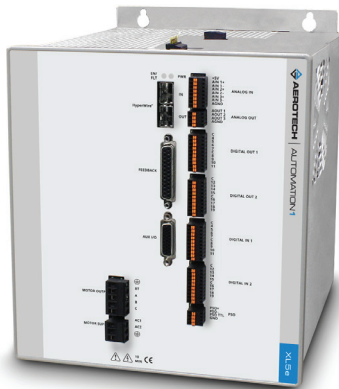


# LINEAR SERVO MOTOR DRIVE AUTOMATION1 XL5e



Aerotech's Automation1-XL5e panel-mount servo motor drive with high-speed optical HyperWire communication bus.

## High-Powered Linear Amplifier Performance.

Part of the Automation1 precision motion control platform, the XL5e is Aerotech's highest performance single-axis linear servo motor drive.

The XL5e enables low noise and high-precision motion control for the world's most demanding precision motion applications, including eddy current inspection, sensor testing and high-precision position and velocity tracking.

## Top Performance, Thoughtfully Packaged.

The XL5e's superior performance and thoughtful design set it apart from other linear amplifiers.

A highly integrated design means you have control and bus power supplies, servo and current controllers, linear power amplifiers, cooling fans and heatsinks in a single package.

The XL5e's performance is driven by high-end components that enable zero amplifier "dead time" and high-resolution, low-noise current sensing. As a result, you'll see more accurate position tracking, more precise in-position stability and smaller minimum step sizes.

- Supports Automation1, the most user-friendly platform available for precision motion control
- Controls brushless AC motors
- Generates significantly less EMI noise
- Connects through the HyperWire® fiber-optic bus, which has 20 times the bandwidth of 100BASE-T Ethernet buses
- Produces up to 600W power output from integral power supply
- Includes safe torque off (STO) safety circuit
- Features data array with over 67 MB of memory
- Offers many optional features, including:
  - Multi-axis Position Synchronized Output (PSO)
  - I/O expansion board
  - 65K encoder multiplier for amplified sine wave encoders up to 2 MHz
- Holds Nationally Recognized Testing Lab (NRTL) safety certification and CE approval; follows the EU 2015/863 RoHS 3 directive

## PACKED WITH FEATURES.

Standard features for the Automation1 XL5e include safe torque off (STO), a data array with more than 67 MB of memory, digital and analog I/O, Position Synchronized Output (PSO), dedicated home and end-of-travel limit inputs and an enhanced current sense device.

## FEEDBACK FLEXIBILITY.

The standard XL5e accepts square-wave and absolute encoder feedback signals. With the optional encoder multiplier feature, sine-wave encoders can be multiplied by up to 65,536, making XL5e our highest-resolution position feedback drive. Dual-multiplied and dual-absolute encoder feedback is supported.

## CONTROL YOUR PROCESS.

The XL5e is more than a motion control device. It also includes many process control features. Empowered with Aerotech's PSO functionality, a single-axis XL5e can track up to three encoders in real time to trigger a process tool like an industrial laser or camera.

Each XL5e can be configured with an optional I/O expansion board, greatly increasing the number of I/O points. The I/O board includes a dedicated PSO output, and PSO can be used with a synchronization input to synchronize process control with an external mode-locked frequency input.

## LOW NOISE OPERATION.

Linear amplifiers are characterized by low noise operation, and the XL5e is no different. This is because linear amplifiers do not incorporate on-off pulse width modulation (PWM) switching to control motor currents.

## READY TO CONNECT.

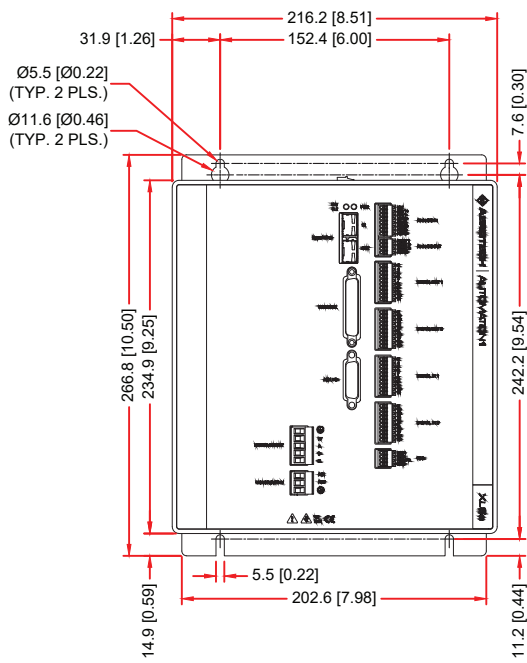
Two HyperWire connections make it simple to connect the XL5e with other Automation1 drive hardware in a multi-axis configuration. A 24-volt, one amp brake output is included. The device is CE approved, NRTL safety certified and EU 2015/863 RoHS 3 directive certified. The power amplifier bandwidth is software selectable.

Category	Specification
Position Synchronized Output (PSO)	<p><b>Standard:</b> One-axis PSO (includes one-axis part-speed PSO)</p> <p><b>Optional:</b> Two-axis PSO (includes two-axis part-speed PSO) Three-axis PSO (includes three-axis part-speed PSO) Two-axis part-speed PSO only Three-axis part-speed PSO only</p>
25-Pin Motor Feedback Connector	<p>High-speed differential inputs (encoder sin, cos and marker) CW and CCW limits Hall effect sensor inputs (A, B and C) Analog motor temperature input (accepts digital) Brake output</p>
26-Pin Auxiliary Feedback Connector	<p>High-speed differential inputs (encoder sin, cos and marker)* 4x optically isolated digital inputs 4x optically isolated digital outputs 1x 16-bit differential <math>\pm 10</math> V analog input 1x 16-bit single-ended <math>\pm 10</math> V analog output 2x optically isolated high-speed inputs *This channel is bidirectional and can be used to echo out encoder signals.</p>
Multiplier Options	<p><b>MX0 option:</b> Primary encoder: 40 million counts per second square-wave input Auxiliary encoder: 40 million counts per second square-wave input</p> <p><b>MX2 option:</b> Primary encoder: 2 MHz/450 kHz (bandwidth selectable) sine-wave input, encoder multiplier up to 65,536 Auxiliary encoder: 40 million counts per second square-wave input</p> <p><b>MX3 option:</b> Primary encoder: 2 MHz/450 kHz (bandwidth selectable) sine-wave input, encoder multiplier up to 65,536 Auxiliary encoder: 160 kHz sine-wave input, encoder multiplier up to x16,384* *Encoders multiplied with this input cannot be echoed out.</p>
I/O Expansion Board (-EB1)	<p>1x additional PSO connection point 16x digital inputs, optically isolated 16x digital outputs, optically isolated 3x analog inputs, 16-bit, differential, <math>\pm 10</math> V 3x analog outputs, 16-bit, single-ended, <math>\pm 10</math> V</p>
Drive Array Memory	67.1 MB (16,777,216 32-bit elements)
High Speed Data Capture	Yes (50 ns latency)
Safe Torque Off (STO)	Yes, SIL3/PLe/Cat 4
HyperWire Connections	2x HyperWire small form-factor pluggable (SFP) ports
Automatic Brake Control	Standard; 24 V at 1 A
Absolute Encoder	BiSS C Unidirectional; EnDat 2.1; EnDat 2.2
Current Loop Update Rate	20 kHz
Servo Loop Update Rate	20 kHz
Operating Temperature	0 to 50 °C
Storage Temperature	-30 to 85 °C
Weight	11.31 kg (24.93 lb)
Compliance	CE approved, NRTL safety certification, EU 2015/863 RoHS 3 directive

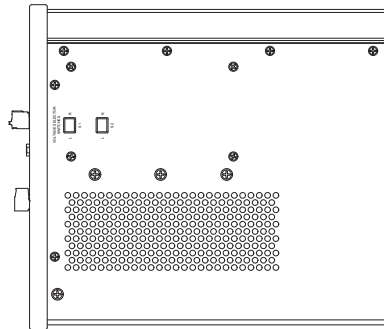
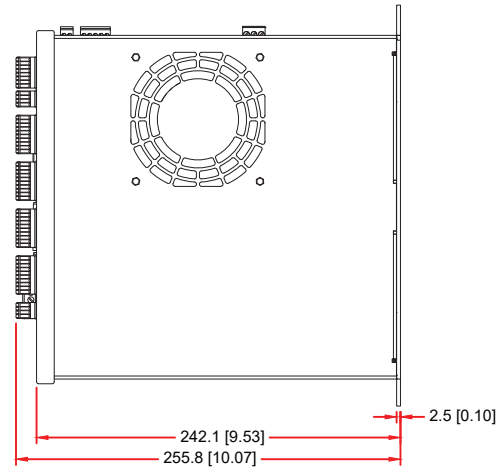
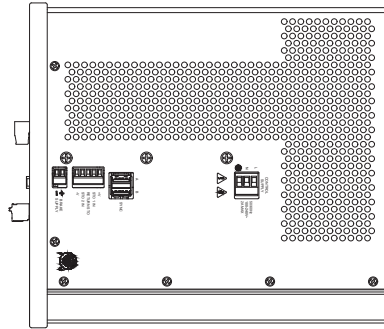
Category		XL5e-10-VB4	XL5e-20-VB4	XL5e-10-VB5	XL5e-10-VB6
Nominal Motor Bus Voltage		±40 V	±40 V	±60 V	±80 V
Peak Output Current		10 A <sub>pk</sub>	20 A <sub>pk</sub>	10 A <sub>pk</sub>	10 A <sub>pk</sub>
Continuous Output Current @ 25°C <sup>(1)(2)</sup>		5 A <sub>pk</sub> / 5 A <sub>pk</sub>	5 A <sub>pk</sub> / 9 A <sub>pk</sub>	3.2 A <sub>pk</sub> / 6 A <sub>pk</sub>	2.5 A <sub>pk</sub> / 4.5 A <sub>pk</sub>
Continuous Output Current @ 35°C <sup>(1)(2)</sup>		4 A <sub>pk</sub> / 5 A <sub>pk</sub>	4 A <sub>pk</sub> / 8 A <sub>pk</sub>	2 A <sub>pk</sub> / 5.5 A <sub>pk</sub>	2 A <sub>pk</sub> / 4 A <sub>pk</sub>
Maximum Continuous Total Power Dissipation <sup>(2)(3)(4)</sup>		340 W / 585 W			
Peak Amplifier Power Dissipation per Phase <sup>(5)</sup>		1200 W			
Effective Heatsink Thermal Resistance <sup>(2)</sup>		.15°C/W / .085°C/W			
Maximum Transistor Temperature		75°C			
Time to Reach Maximum Temperature at Maximum Continuous Power		10 minutes			
Motor Supply	Input Frequency	50-60 Hz			
	Inrush Current	34 Apk @ 120 V / 68 Apk @ 240 V			
	AC Line Voltage	AC input (switch selectable): 100 VAC (90 - 112 VAC) 120 VAC (103 - 127 VAC) 200 VAC (180 - 224 VAC) 240 VAC (207 - 254 VAC)			
	Input Current (Maximum, Continuous)	7 Arms @ 120 V / 3.5 Arms @ 240 V			
Control Supply	Input Frequency	50-60 Hz			
	Inrush Current	16 A <sub>pk</sub>			
	Input Current (Maximum, Continuous)	0.25 Arms			
Current Loop Bandwidth		2500 Hz (software selectable)			
Minimum Load Resistance		0 Ω			
Minimum Load Inductance		0 H			
Modes of Operation		Brushless, brush, stepper			
Protection Features		Peak current limit, over temperature, RMS current limit, dynamic power limit (SOA)			
Encoder Supply		5V @ 500 mA			

1. AC or DC motor type with a 0 Ω winding resistance assumed.
2. The first value is for a stationary AC or DC motor. The second value is for a moving AC motor.
3. Derate at temperatures above 25°C ambient.
4. Amplifier power dissipation is calculated as (V<sub>bus</sub> - V<sub>out</sub>) · I<sub>out</sub> for each phase. A 40B configuration that drives 1 A into 0 Ω results in 40 W of power dissipation in the amplifier.
5. The XL5e amplifier has peak power-limiting circuitry to protect itself from damage. The power limiting bit in the drive status word indicates if this has occurred.

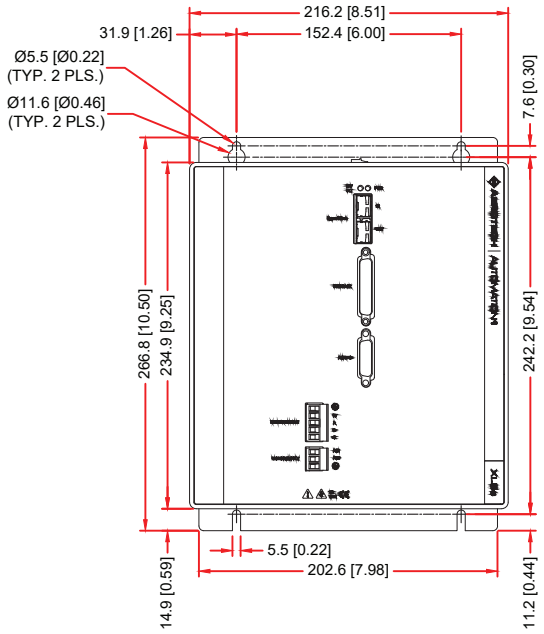
Automation1 XL5e, -EB0 Option



AUTOMATION1-XL5e

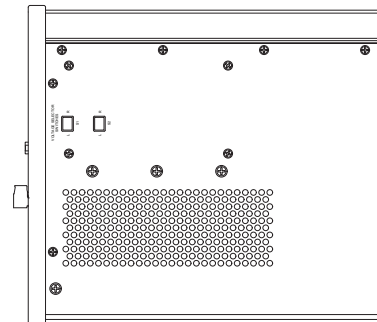
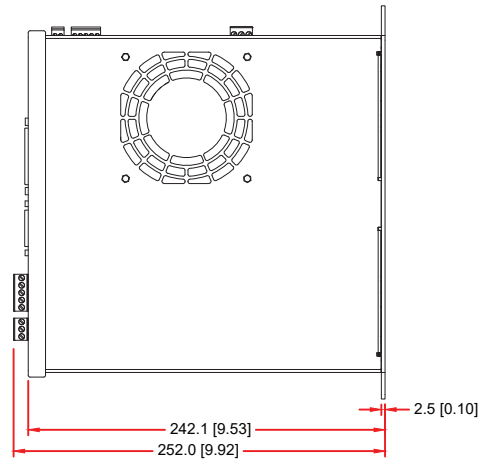
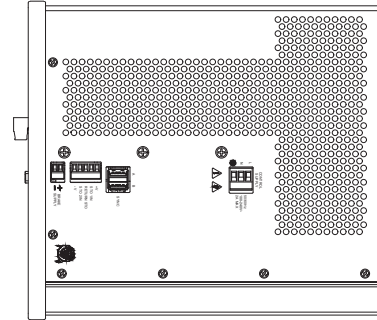


Automation1 XC2e, -EB1 Option



REC. MTG. HDWR: M5 [#10]

AUTOMATION1-XL5e



## Automation1-XL5e

Automation1-XL5e      Automation1-XL5e High-Performance Linear Servo Motor Drive

### Peak Current

-10	10 A Peak Current (Default)
-20	20 A Peak Current

### Bus Voltage

-VB4	± 40 VDC (600 W Power Supply)
-VB5*	± 60 VDC (600 W Power Supply)
-VB6*	± 80 VDC (600 W Power Supply)

### Input Line Voltage

-VL1	120 VAC Input Line Voltage
-VL2	240 VAC Input Line Voltage
-VL3	100 VAC Input Line Voltage
-VL4	200 VAC Input Line Voltage

### Expansion Board

-EB0	No Expansion Board (Default)
-EB1	I/O Expansion Board

### Multiplier

-MX0	No Encoder Multiplier (Default)
-MX2	2 MHz/450 kHz x65536 Multiplier (Primary), No Multiplier (Auxiliary)
-MX3	2 MHz/450 kHz x65536 Multiplier (Primary), 160 kHz x16384 Multiplier (Auxiliary)

### PSO

-PSO1	One-Axis PSO (includes One-Axis Part-Speed PSO) (Default)
-PSO2	Two-Axis PSO (includes Two-Axis Part-Speed PSO)
-PSO3	Three-Axis PSO (includes Three-Axis Part-Speed PSO)
-PSO5	Two-Axis Part-Speed PSO
-PSO6	Three-Axis Part-Speed PSO

\*Only available with -10 Peak Current option.