

# AEROTECH AUTOMATION1



## Enhanced Linear Servo Drive with Motion Controller **Automation1 iXL5e**

### Powerful Linear Drive & A Full Motion Controller

Our high-performance Automation1 iXL5e linear servo motor drive with integrated motion controller is the one-stop-shop for high-powered, high-performance precision motion control applications. The iXL5e drive enables low noise and high precision motor control and also controls your entire machine or motion system. The high, continuous output power of the iXL5e's linear power amplifiers enables reliable operation for the world's most demanding precision motion applications. The absence of PWM switching noise greatly reduces electromagnetic interference (EMI) noise, making the iXL5e an ideal choice for applications such as eddy current inspection, sensor testing and high-precision position and velocity tracking.

### Automation1

The iXL5e is a part of the user-friendly Automation1 motion control platform, which includes the following:

- ◆ **Development Software**
- ◆ **Controls**
- ◆ **Motor Drives**
- ◆ **Fiber-Optic HyperWire® Communication Bus**

### KEY FEATURES:

- ◆ Unlocks the full **MOTION CONTROL** power of our Automation1-iSMC intelligent software-based motion controller
- ◆ Provides **SUB-NANOMETER POSITIONING** capability
- ◆ Features **COMPLETE CONFIGURATION & PERFORMANCE** capability of the XL5e enhanced linear servo drive
- ◆ **ELIMINATES THE PC** from your control scheme
- ◆ Allows for up to **12 AXES OF CONTROL** when more Automation1 drives are connected over the HyperWire fiber-optic bus
- ◆ Includes **SAFE TORQUE OFF (STO)** functional safety
- ◆ **EXPANDS YOUR I/O** when an expansion board is added to the iXC4e or other connected drives

## AUTOMATION1 iXL5e CONTROLLER SPECIFICATIONS

SPECIFICATION	DESCRIPTION		
<b>Motion Controller<sup>(1)</sup></b>	Aerotech's <a href="#">Automation1-iSMC</a> Intelligent Software-Based Motion Controller (version 2.2 and above)		
<b>Maximum Axes of Control<sup>(1)</sup></b>	Up to 12 axes		
<b>I/O Points<sup>(1)</sup></b>	See "general specifications" below. Note: Controller can control I/O from connected devices.		
<b>Programming Language<sup>(1)</sup></b>	AeroScript, RS-274 G-code		
<b>APIs<sup>(1)</sup></b>	<ul style="list-style-type: none"> <li>• .NET (cross-platform Linux support)</li> <li>• C (cross-platform Linux support)</li> <li>• Python (cross-platform Linux support)</li> <li>• EPICS (cross-platform Linux support) see <a href="http://EPICS.anl.gov">EPICS.anl.gov</a></li> </ul>		
<b>Programming Tasks<sup>(1)</sup></b>	4 user tasks (standard) / 9 user tasks (optional) 1 reserved task		
<b>Position Modes</b>	Absolute, incremental, dynamic trajectory correction		
<b>Motion Types<sup>(1)</sup></b>	<ul style="list-style-type: none"> <li>• Linear motion</li> <li>• Clockwise &amp; counterclockwise</li> <li>• Jogging</li> <li>• Homing</li> <li>• Rapid</li> <li>• Freerun</li> <li>• Many more</li> </ul>		
<b>Acceleration Profiles</b>	<ul style="list-style-type: none"> <li>• Linear (time &amp; rate based)</li> <li>• Sine (time &amp; rate based)</li> <li>• S-curve (time &amp; rate based)</li> </ul>		
<b>Velocity Profiling<sup>(1)</sup></b>	Yes		
<b>Safe Zones<sup>(1)</sup></b>	Yes		
<b>Advanced Features<sup>(1)</sup></b>	<table style="width: 100%; border: none;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Corner rounding</li> <li>• Tool normalcy control</li> <li>• Cutter compensation</li> <li>• Programmable fixture offsets<sup>(2)</sup></li> <li>• Rotation, mirroring &amp; translation transformations</li> <li>• Part profile scaling</li> <li>• Polar &amp; cylindrical transformations<sup>(2)</sup></li> </ul> </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Orthogonality correction</li> <li>• Electronic gearing</li> <li>• EasyTune® &amp; classical tuning</li> <li>• Backlash compensation</li> <li>• Spindle motion</li> <li>• High-speed registration</li> <li>• Multi-dimensional error mapping</li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li>• Corner rounding</li> <li>• Tool normalcy control</li> <li>• Cutter compensation</li> <li>• Programmable fixture offsets<sup>(2)</sup></li> <li>• Rotation, mirroring &amp; translation transformations</li> <li>• Part profile scaling</li> <li>• Polar &amp; cylindrical transformations<sup>(2)</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Orthogonality correction</li> <li>• Electronic gearing</li> <li>• EasyTune® &amp; classical tuning</li> <li>• Backlash compensation</li> <li>• Spindle motion</li> <li>• High-speed registration</li> <li>• Multi-dimensional error mapping</li> </ul>
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<b>Access Control</b>	No		
<b>Controller File System</b>	Yes (5 GB)		
<b>Supported HyperWire Drives</b>	<table style="width: 100%; border: none;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Automation1-XC6e<sup>(3)(4)</sup></li> <li>• Automation1-XC4e<sup>(3)(4)</sup></li> <li>• Automation1-XC2e<sup>(3)(4)</sup></li> <li>• Automation1-XC4<sup>(3)(4)</sup></li> <li>• Automation1-XC2<sup>(3)(4)</sup></li> </ul> </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Automation1-XR3<sup>(3)</sup></li> <li>• Automation1-XL5e<sup>(3)(4)</sup></li> <li>• Automation1-XL2e<sup>(3)(4)</sup></li> <li>• Automation1-SI4<sup>(3)</sup></li> <li>• Automation1-XI4<sup>(3)</sup></li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li>• Automation1-XC6e<sup>(3)(4)</sup></li> <li>• Automation1-XC4e<sup>(3)(4)</sup></li> <li>• Automation1-XC2e<sup>(3)(4)</sup></li> <li>• Automation1-XC4<sup>(3)(4)</sup></li> <li>• Automation1-XC2<sup>(3)(4)</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Automation1-XR3<sup>(3)</sup></li> <li>• Automation1-XL5e<sup>(3)(4)</sup></li> <li>• Automation1-XL2e<sup>(3)(4)</sup></li> <li>• Automation1-SI4<sup>(3)</sup></li> <li>• Automation1-XI4<sup>(3)</sup></li> </ul>
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<b>Industrial Ethernet Communication</b>	EtherCAT (optional)		
<b>Communication/Configuration Connection</b>	<ul style="list-style-type: none"> <li>• Ethernet</li> <li>• USB</li> </ul>		

Note:

1. See the Automation1-iSMC controller page for more information.
2. May require advanced programming.
3. Contains I/O on base drive.
4. Drive I/O expansion board option available.

## AUTOMATION1 iXL5e GENERAL SPECIFICATIONS

CATEGORY	SPECIFICATION
<b>Position Synchronized Output (PSO)</b>	<p>Standard: One-axis PSO (includes one-axis Part-Speed PSO)</p> <p>Optional: 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>
<b>25-Pin Motor Feedback Connector</b>	<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>
<b>26-Pin Auxiliary Feedback Connector</b>	<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</p> <p>*This channel is bidirectional and can be used to echo out encoder signals.</p>
<b>Multiplier Options</b>	<p>MX0 option: Primary encoder: 40 million counts per second square-wave input Auxiliary encoder: 40 million counts per second square-wave input</p> <p>MX2 option: 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>MX3 option: Primary encoder: 2 MHz/450 kHz (bandwidth selectable) sine-wave input, encoder multiplier up to 65,536 Auxiliary encoder: 450 kHz sine-wave input, encoder multiplier up to x16,384*</p> <p>*Encoders multiplied with this input cannot be echoed out.</p>
<b>I/O Expansion Board (-EB1)</b>	<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>
<b>Drive Array Memory</b>	67.1 MB (16,777,216 32-bit elements)
<b>High Speed Data Capture</b>	Yes (50 ns latency)
<b>Safe Torque Off (STO)</b>	Yes, SIL3/PLe/Cat 4
<b>HyperWire Connections</b>	1x HyperWire small form-factor pluggable (SFP) ports
<b>Automatic Brake Control</b>	Standard; 24 V at 1 A
<b>Absolute Encoder</b>	BiSS C Unidirectional; EnDat 2.1; EnDat 2.2
<b>Current Loop Update Rate</b>	20 kHz
<b>Servo Loop Update Rate</b>	20 kHz
<b>Operating Temperature</b>	0 to 50 °C
<b>Storage Temperature</b>	-30 to 85 °C
<b>Weight</b>	11.31 kg (24.93 lb)
<b>Compliance</b>	CE approved, NRTL safety certification, EU 2015/863 RoHS 3 directive

**AUTOMATION1 iXL5e LINEAR AMPLIFIER SPECIFICATIONS**

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 Apk			
	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, voice coil			
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. De-rate at temperatures above 25°C ambient.
4. Amplifier power dissipation is calculated as  $(V_{bus} - V_{out}) \cdot I_{out}$  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 iXL5e ORDERING OPTIONS

### Automation1-iXL5e

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**Automation1-iXL5e** Automation1-XL5e High-Performance Linear Servo Motor Drive with Motion Controller

#### Peak Current

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-10	10 A peak, 5 A cont. current (default)
-20	20 A peak current

#### Bus Voltage

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-VB4	+/- 40 VDC (585 W Power Supply)
-VB5	+/- 60 VDC (585 W Power Supply)
-VB6	+/- 80 VDC (585 W Power Supply)

#### Input Line Voltage

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-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

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-EB0	No Expansion Board (Default)
-EB1	IO Expansion Board

#### Multiplier

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

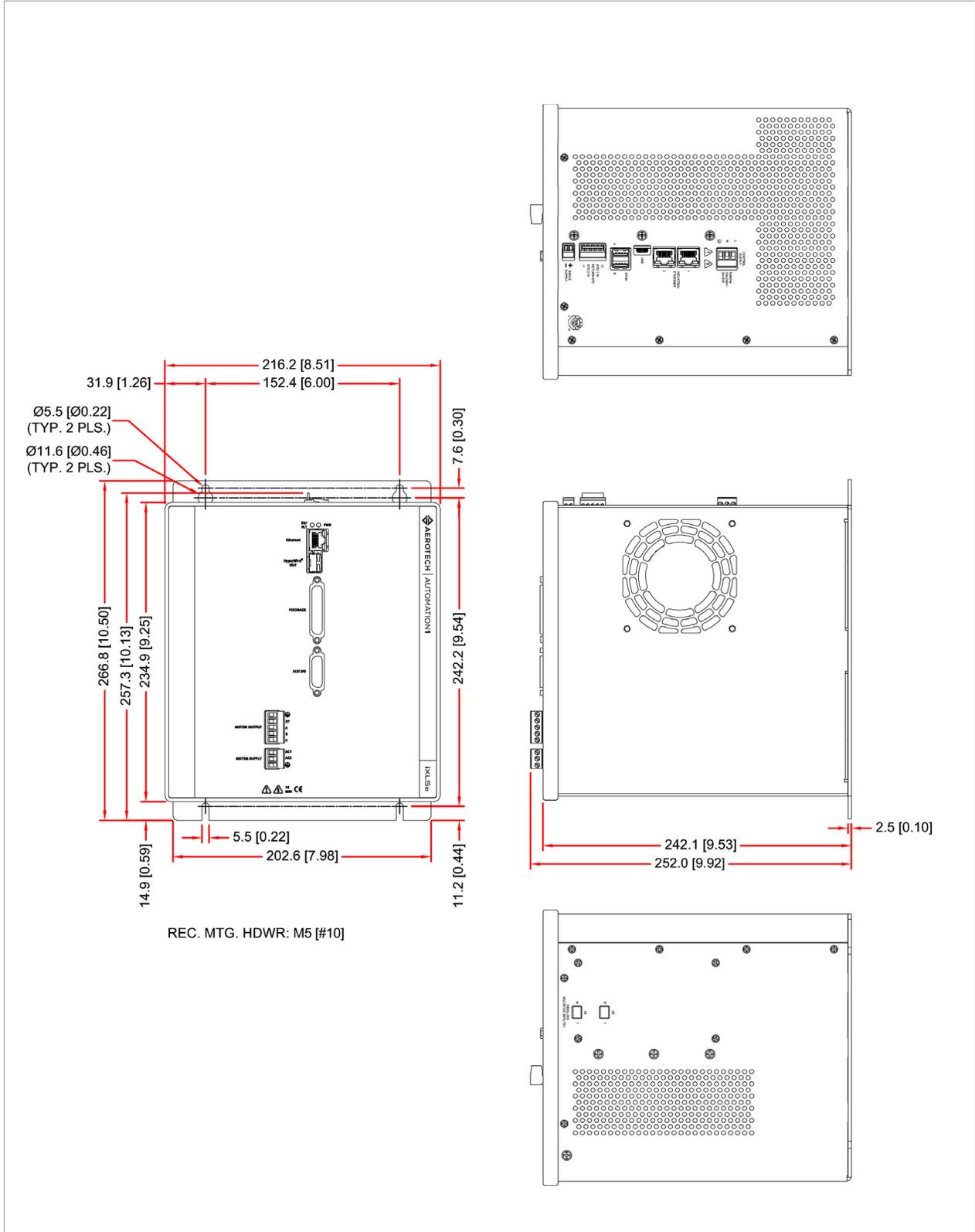
#### Multiplier (Auxiliary)

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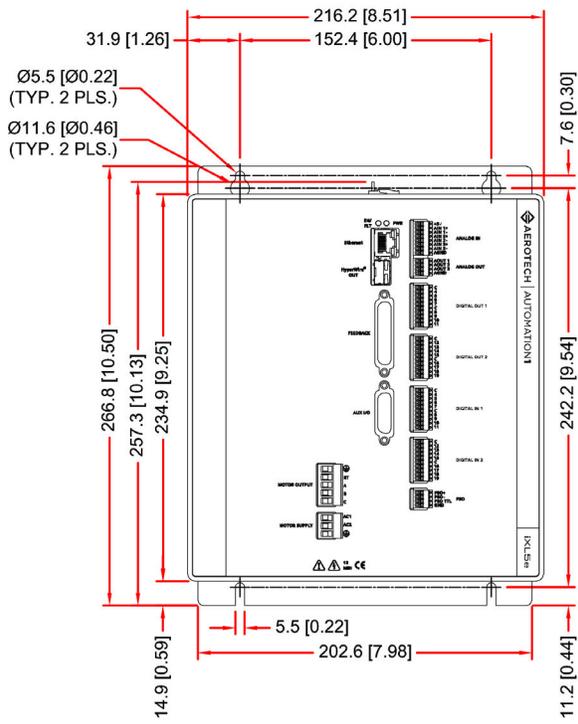
-PSO1	One-Axis PSO (includes One-axis Part-Speed PSO) (Default)
-PSO2	Two-Axis PSO (includes Two-Axis Part-Speed PSO)
-PSO3	Three-Axis PSO (includes Three-Axis Part-Speed PSO)
-PSO5	Two-Axis Part-Speed PSO
-PSO6	Three-Axis Part-Speed PSO

# AUTOMATION1 iXL5e DIMENSIONS

## AUTOMATION1 iXL5e, -EB0 OPTION



**AUTOMATION1 iXL5e DIMENSIONS**  
 AUTOMATION1 iXL5e, -EB1 OPTION



REC. MTG. HDWR: M5 [#10]

