

# AEROTECH AUTOMATION1

## Drive-Based Motion Controller **Automation1 iXC4e**

### Motion. Control. Together.

The iXC4e enhanced PWM servo drive with motion controller is the right choice for your precision machine or system. It includes the Automation1 iSMC motion controller, which contains technology once reserved for high-end PC-based architectures. That means it can run your entire machine's control, act as a servo drive for a single axis and control up to 11 added axes of motion over the fiber-optic HyperWire motion bus. Other automation devices can connect to the iXC4e via EtherCAT, Modbus TCP/IP or a TCP Socket interface. Combining all of this technology on a single hardware device lowers machine costs, reduces machine size and increases reliability.

The iSMC, which runs on the iXC4e, is programmable in AeroScript from the Automation1 Studio application and several available APIs.

### Automation1

The iXC4e 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:

- ◆ Unlock the full **MOTION CONTROL** power of our Automation1-iSMC intelligent software-based motion controller
- ◆ Features **COMPLETE CONFIGURATION & PERFORMANCE** capability of XC4e servo motor drive
- ◆ **CONNECT TO THE CONTROLLER** using EtherCAT, Modbus or a Socket interface.
- ◆ Enjoy up to **12 AXES OF CONTROL** by connecting more Automation1 drives over the HyperWire fiber-optic bus
- ◆ **EXPAND YOUR I/O** by adding expansion board to the iXC4e or other connected drives

## AUTOMATION1 iXC4e CONTROLLER SPECIFICATIONS

SPECIFICATION	DESCRIPTION		
<b>Motion Controller<sup>(1)</sup></b>	Aerotech's <a href="#">Automation1-iSMC</a> Intelligent Software-Based Motion Controller (version 2.00 and above)		
<b>Maximum Axes of Control<sup>(1)</sup></b>	Up to 12 axes		
<b>I/O Points<sup>(1)</sup></b>	See "26-Pin Auxiliary Feedback Connector" & "I/O Expansion Board (-EB1)" 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>• Instrument Driver for LabVIEW</li> <li>• EPICS (cross-platform Linux support) see <a href="#">EPICS &amp; TANGO Drivers – Aerotech US</a></li> <li>• TANGO; see <a href="#">EPICS &amp; TANGO Drivers – Aerotech US</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>	<table style="width: 100%; border: none;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Linear motion</li> <li>• Clockwise &amp; counterclockwise</li> <li>• Jogging</li> <li>• Homing</li> </ul> </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Rapid</li> <li>• Freerun</li> <li>• Many more</li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li>• Linear motion</li> <li>• Clockwise &amp; counterclockwise</li> <li>• Jogging</li> <li>• Homing</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid</li> <li>• Freerun</li> <li>• Many more</li> </ul>
<ul style="list-style-type: none"> <li>• Linear motion</li> <li>• Clockwise &amp; counterclockwise</li> <li>• Jogging</li> <li>• Homing</li> </ul>	<ul style="list-style-type: none"> <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(2)</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(2)</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>
<ul style="list-style-type: none"> <li>• Corner rounding</li> <li>• Tool normalcy control</li> <li>• Cutter compensation</li> <li>• Programmable fixture offsets(2)</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>		
<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>
<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>		
<b>Industrial Ethernet Communication<sup>(5)</sup></b>	EtherCAT (optional, requires Automation1-iSMC, -IE2 option) Modbus (standard, 1 server, 1 client connection; optional, up to 16 client connections with Automation1-iSMC, -CP1 option)		
<b>Ethernet Communication<sup>(6)</sup></b>	Socket (standard, TCP client and TCP server)		
<b>Communication/Configuration Connection</b>	<ul style="list-style-type: none"> <li>• Ethernet</li> <li>• USB</li> </ul>		

Notes:

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. See the <a href="#">Automation1-iSMC</a> controller page for more information.</li> <li>2. May require advanced programming.</li> <li>3. Contains I/O on base drive.</li> <li>4. Drive I/O expansion board option available.</li> </ol> | <ol style="list-style-type: none"> <li>5. Modbus and EtherCAT cannot be used concurrently.</li> <li>6. Socket interface can be used concurrently with industrial ethernet.</li> </ol> |
|---|---|

## AUTOMATION1 iXC4e DEVICE SPECIFICATIONS

SPECIFICATION	DESCRIPTION
<b>Motor Style</b>	Brush, brushless, voice coil, stepper <sup>(1)</sup>
<b>Motor Supply</b>	Single-phase 0-240 VAC; 50/60 Hz
<b>Control Supply</b>	100-240 VAC; 50/60 Hz
<b>Bus Voltage<sup>(2)</sup></b>	0-340 VDC
<b>Peak Output Current (1 sec)<sup>(3)</sup></b>	10 A <sub>pk</sub>   20 A <sub>pk</sub>   30 A <sub>pk</sub>
<b>Continuous Output Current<sup>(3)</sup></b>	5 A <sub>pk</sub>   10 A <sub>pk</sub>   10 A <sub>pk</sub>
<b>Position Synchronized Output (PSO)</b>	<p>Standard:</p> <p>One-axis PSO (includes one-axis Part-Speed PSO)</p> <p>Optional:</p> <p>Two-axis PSO (includes two-axis Part-Speed PSO)</p> <p>Three-axis PSO (includes three-axis Part-Speed PSO)</p> <p>Two-axis Part-Speed PSO only</p> <p>Three-axis Part-Speed PSO only</p>
<b>25-Pin Motor Feedback Connector</b>	<p>High-speed differential inputs (encoder sin, cos and marker)</p> <p>CW and CCW limits</p> <p>Hall effect sensor inputs (A, B, and C)</p> <p>Analog motor temperature input (accepts digital)</p> <p>Brake output</p>
<b>26-Pin Auxiliary Feedback Connector</b>	<p>High-speed differential inputs (encoder sin, cos and marker)*</p> <p>4x optically isolated digital inputs</p> <p>4x optically isolated digital outputs</p> <p>1x 16-bit differential ±10 V analog input</p> <p>1x 16-bit single-ended ±10 V analog output</p> <p>2x optically isolated high-speed inputs</p> <p>*This channel is bidirectional and can be used to echo out encoder signal</p>
<b>Multiplier Options</b>	<p>MX0 Option:</p> <p>Primary Encoder: 40 million counts-per-second square-wave input</p> <p>Auxiliary Encoder: 40 million counts-per-second square-wave input</p> <p>MX2 Option:</p> <p>Primary Encoder: 2 MHz / 450 kHz (bandwidth selectable) sine-wave input, encoder multiplier up to 65,536</p> <p>Auxiliary Encoder: 40 million counts per second square-wave input</p> <p>MX3 Option:</p> <p>Primary Encoder: 2 MHz / 450 kHz (bandwidth selectable) sine-wave input, encoder multiplier up to 65,536</p> <p>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>

*chart continued on next page*

## AUTOMATION1 iXC4e DEVICE SPECIFICATIONS

SPECIFICATION	DESCRIPTION
<b>I/O Expansion Board (-EB1)</b>	1x additional PSO connection point 1x PSO synchronization input 16x digital inputs, optically isolated 16x digital outputs, optically isolated 3x analog inputs, 16-bit, differential, $\pm 10$ V 3x analog outputs, 16-bit, single-ended, $\pm 10$ V
<b>Drive Array Memory</b>	16,777,216 32-bit elements (67 MB)
<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>	Renishaw resolute BiSS; EnDat 2.1; and EnDat 2.2
<b>Current Loop Update Rate</b>	20 kHz
<b>Servo Loop Update Rate</b>	20 kHz
<b>Power Amplifier Bandwidth</b>	Selectable through software (85-95% efficiency)
<b>Minimum Load Inductance</b>	0.1 mH
<b>Operating Temperature</b>	0 to 40°C
<b>Storage Temperature</b>	-30 to 85°C
<b>Weight</b>	2.36 kg (5.20 lb)
<b>Compliance</b>	CE approved, NRTL safety certification, EU 2015/863 RoHS 3 directive

Note:

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. Output voltage depends on input voltage.
3. Peak value of the sine wave; rms current for AC motors is  $0.707 * A_{pk}$ .



## AUTOMATION1 iXC4e ORDERING OPTIONS

### Controller Configuration

---

To configure and load the motion controller on the iXC4e drive, please configure and order an Automation1-iSMC intelligent controller with your iXC4e drive. The Automation1-iSMC configuration should include the iXC4e as the “hardware platform.”

### Automation1-iXC4e

---

**Automation1-iXC4e**      Enhanced PWM Servo Drive with Motion Controller

### Peak Current

---

-10	10 A peak, 5 A cont. current (default)
-20	20 A peak, 10 A cont. current
-30	30 A peak, 10 A cont. current

### Expansion Board

---

-EB0	No expansion board (default)
-EB1	IO expansion board

### Multiplier

---

-MX0	No encoder multiplier (default)
-MX2	2 MHz x65536 multiplier (primary), no multiplier (auxiliary)
-MX3	2 MHz x65536 multiplier (primary), 450 kHz x16384 multiplier (auxiliary)

### PSO

---

-PSO1	One-axis PSO (default)
-PSO2	Two-axis PSO
-PSO3	Three-axis PSO
-PSO5	Two-axis Part-Speed PSO
-PSO6	Three-axis Part-Speed PSO

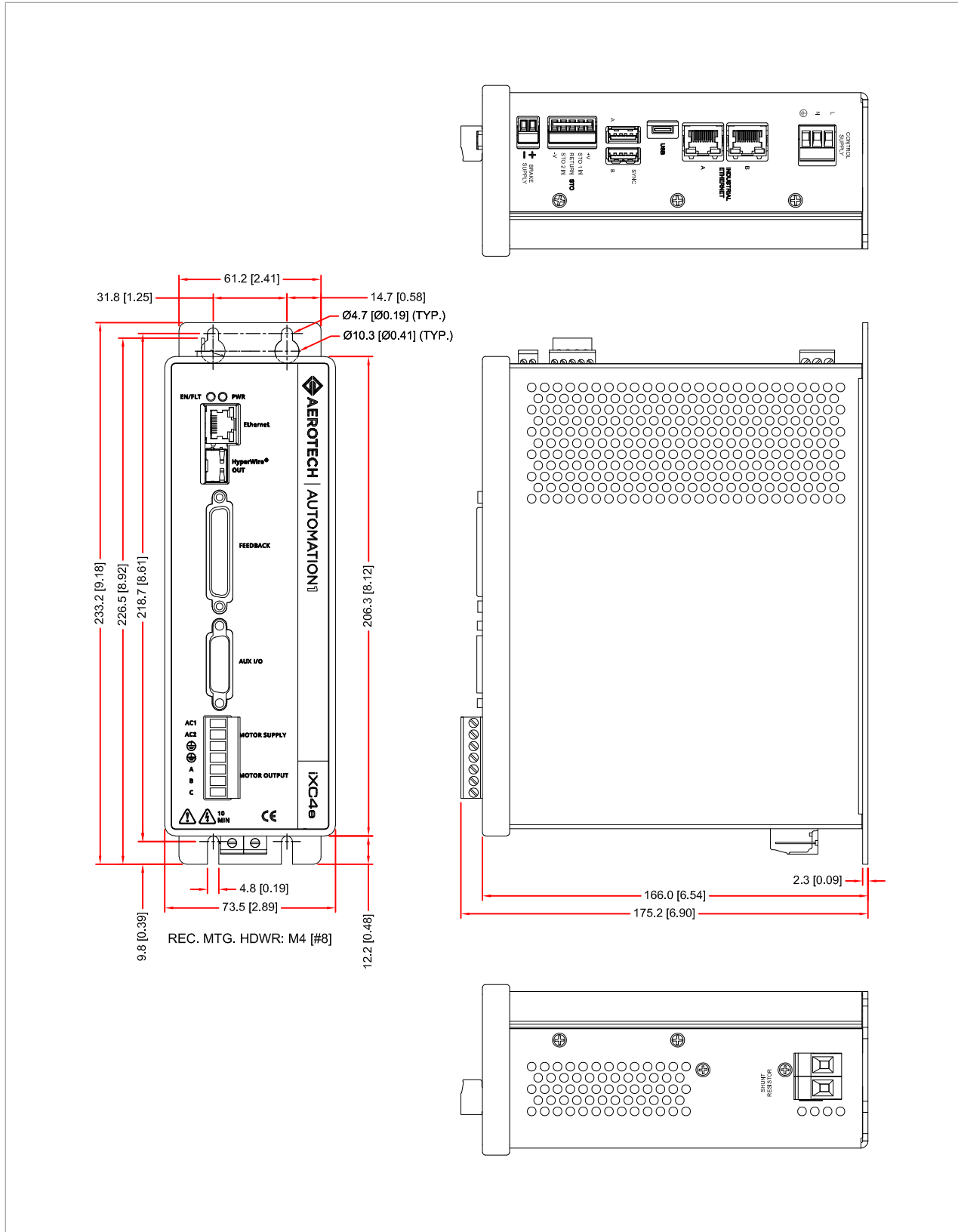
### External Shunt

---

-SX0	No 2-pin connector for external shunt (default)
-SX1	2-pin connector for external shunt

# AUTOMATION1 iXC4e DIMENSIONS

## AUTOMATION1-iXC4e WITH -EBO (NO EXPANSION BOARD) OPTION



# AUTOMATION1 iXC4e DIMENSIONS

## AUTOMATION1-iXC4e WITH -EB1 (EXPANSION BOARD) OPTION

