

# AEROTECH AUTOMATION1

Distributed Amplifier Multi-Axis Servo Control  
System for Custom Engineered Motion Systems

## Automation1 FLEX

### Control Without Compromise

Simplify cable management and reduce control cabinet electronics for your Aerotech custom-engineered motion system with Automation1 FLEX. FLEX includes a central controller with up to four field-mounted axis modules. Each axis module includes a power amplifier and low-latency feedback signal serialization. The power amplifiers share a common power supply, and the serialized feedback signal is transported over the glass optical fiber HyperWire FLEX network.

This distributed approach means fewer electronics in your control cabinet and less point-to-point wiring in your cable management system—eliminating failure points and reducing the burden of bulky cable carriers. FLEX's fast proprietary protocol can use the serialized encoder signals in our Position Synchronized Output (PSO) feature. For cleanroom designs, FLEX reduces overall particulate generation.

### Automation1

FLEX 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:

- ◆ Daisy-chain signals to **MINIMIZE CABLE MANAGEMENT**
- ◆ Field-mounted axes modules **REDUCE CABINET SPACE**
- ◆ Centralized **FLEX CONTROLLER** connects to 4 axis modules
- ◆ **AXES MODULES** include power amplifiers & feedback signal processing
- ◆ **LOW-LATENCY** serialized axis feedback
- ◆ High-flex **GLASS OPTICAL FIBER** cables
- ◆ Works with encoder-based **POSITION SYNCHRONIZED OUTPUT (PSO)**

**AUTOMATION1 FLEX CONTROLLER GENERAL SPECIFICATIONS**

<b>CATEGORY</b>	<b>SPECIFICATION</b>
<b>Maximum Supported Number of Axis Modules</b>	4
<b>Control Supply</b>	24 VDC
<b>Motor Supply<sup>(1)</sup></b>	Single-phase 0-240 VAC; 50/60 Hz
<b>Bus Supply Voltage<sup>(1)</sup></b>	0-340 VDC
<b>Position Synchronized Output (PSO)</b>	Standard: <ul style="list-style-type: none"> <li>• One-axis PSO (includes one-axis Part-Speed PSO)</li> </ul> Optional: <ul style="list-style-type: none"> <li>• Two-axis PSO (includes two-axis Part-Speed PSO)</li> <li>• Three-axis PSO (includes three-axis Part-Speed PSO)</li> <li>• Two-axis Part-Speed PSO only (includes one-axis PSO)</li> <li>• Three-axis Part-Speed PSO (includes one-axis PSO)</li> </ul>
<b>HyperWire FLEX Connections</b>	1x HyperWire FLEX port
<b>HyperWire Connections</b>	2x HyperWire small form-factor pluggable (SFP) ports
<b>Sync Ports</b>	2x Sync ports
<b>I/O Expansion Board (Optional)</b>	<ul style="list-style-type: none"> <li>• 1x additional PSO connection point</li> <li>• 16x digital inputs, optically isolated</li> <li>• 16x digital outputs, optically isolated</li> <li>• 3x analog inputs, 16-bit, differential, ±10 V</li> <li>• 3x analog outputs, 16-bit, single-ended, ±10 V</li> </ul>
<b>Internal Motor Supply Capacitance</b>	2400 µf
<b>Maximum Motor Supply External Breaker</b>	20 Amp (Type-D)
<b>Automatic Brake Control</b>	With Automation1 Studio, a discrete digital output must be configured as the automatic brake control output. This requires the -EB1 expansion board on the FLEX Controller. You must wire the axis brake directly from the FLEX Controller (an additional device may be required).
<b>Drive Array Memory</b>	67.1 MB (16,777,216 32-bit elements)
<b>High-Speed Data Capture</b>	Yes (Limitations apply. See controller help files for more information.)
<b>Safe Torque Off (STO)</b>	Please contact Aerotech.
<b>Current Loop Update Rate</b>	20 kHz
<b>Servo Loop Update Rate</b>	10 kHz
<b>Operating Temperature</b>	0 to 40 °C
<b>Storage Temperature</b>	-30 to 85 °C
<b>Weight</b>	1.18 kg (2.60 lb)
<b>Compliance</b>	CE approved, UKCA approved, NRTL safety certification, EU 2015/863 RoHS 3 directive

1. The Automation1 FLEX controller is available with and without an internal Axis Module amplifier power supply. The internal power supply may not provide enough power for your full system. Please consult with Aerotech to see if you need an external power supply for your axis modules.

**AUTOMATION1 FLEX AXIS MODULE GENERAL SPECIFICATIONS**

CATEGORY		-10	-25
<b>Motor Style</b>		Brushless, brush, voice coil, stepper <sup>(1)</sup>	
<b>FLEX Controller-Side Connections</b>	<b>Control Supply</b>	24 VDC	
	<b>Bus Supply<sup>(2)</sup></b>	0-340 VDC	
	<b>HyperWire FLEX Connections</b>	2x HyperWire FLEX ports	
<b>Axis-Side Connections</b>	<b>Motor Supply</b>	0-340 VDC, 4-pin high-powered D-sub connector	
	<b>25-Pin Motor Feedback Connector</b>	<ul style="list-style-type: none"> <li>• Primary encoder inputs</li> <li>• Auxiliary encoder inputs</li> <li>• Hall effect sensor inputs (A, B and C)</li> <li>• Thermistor motor temperature input (accepts digital)</li> <li>• Encoder fault input</li> <li>• CW and CCW limits</li> </ul>	
<b>Motor Supply Input Current at Full Output Power</b>		5 A	10 A
<b>Peak Output Current (1 sec)<sup>(3,4)</sup></b>		10 A	25 A
<b>Continuous Output Current<sup>(3,4,5)</sup></b>		3.5 A <sub>RMS</sub>	5.3 A <sub>RMS</sub>
<b>I/O Port</b>		Not yet available. Provisions exist to add I/O on a FLEX axis module. Please contact Aerotech for more information.	
<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: 450 kHz 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: 450 kHz 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>Absolute Encoder</b>		BiSS C Unidirectional; EnDat 2.1; EnDat 2.2; SSI	
<b>Automatic Brake Control</b>		See FLEX Controller specifications.	
<b>Operating Temperature</b>		0 to 40 °C	
<b>Typical Total Power Dissipated by Axis Module<sup>(6)</sup></b>		25W @ 160 VDC 35W @ 320 VDC	
<b>Storage Temperature</b>		-30 to 85 °C	
<b>Weight</b>		0.5 kg( x lb)	
<b>Aerotech Stage Integration</b>		<p>Based on size and thermal considerations, the FLEX axis can be installed on the following Aerotech semi-standard gantry designs: AGS1000, AGS1500, AGS10000, AGS15000.</p> <p>Based on size and thermal considerations, the FLEX axis can be installed on the following Aerotech PRO stages: PRO225, PRO280, PRO560.</p> <p>For other (specifically smaller) stages, the FLEX axis module heat dissipation may be of greater concern. Please consult with Aerotech for design considerations.</p>	
<b>Compliance</b>		CE approved, UKCA approved, NRTL safety certification, EU 2015/863 RoHS 3 directive	

*continued on next page*

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. Bus supply voltage depends upon the FLEX controller motor supply voltage or upon the user supply bus supply voltage.
3. Peak value of the sine wave; rms current for AC motors is  $0.707 A_{pk}$ .
4. There are three motor output phases from the drive.
5. These values are under full output power. Under a lighter load, the continuous output current capability will be higher.
6. Estimated value of heat generated by the FLEX axis module. Actual value will vary based on the application.

### HYPERWIRE FLEX COMMUNICATION

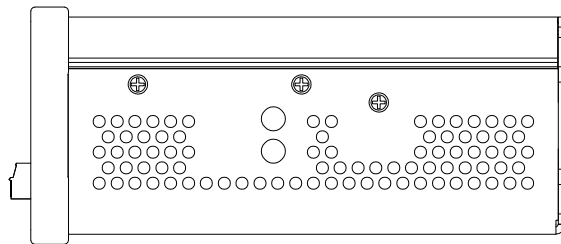
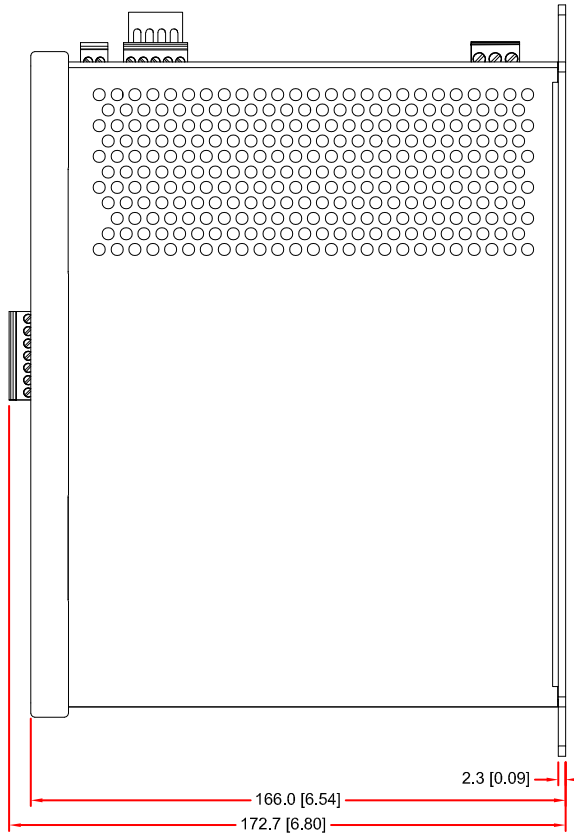
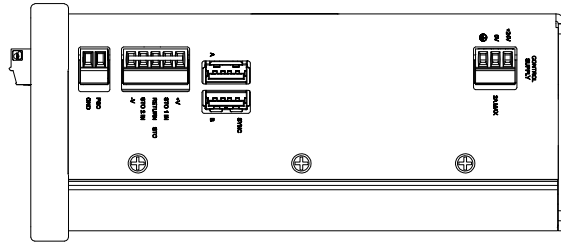
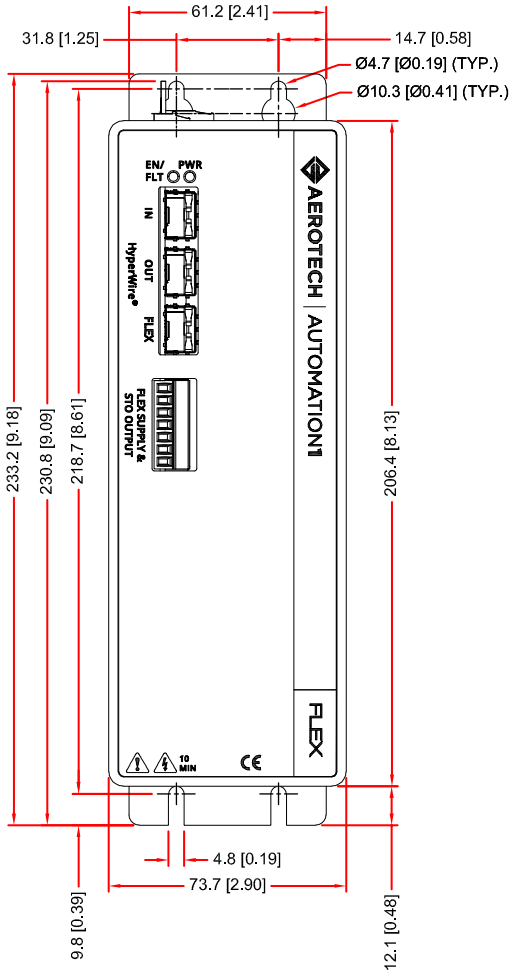
CATEGORY		
Physical Layer <sup>(1)</sup>	Cable Type	High-flex glass optical fiber
	Cable Bend Radius	30mm
	Connectors	Small form-factor pluggable
High-Speed Encoder Feedback Latency		1.6 $\mu$ s

1. HyperWire FLEX cables are typically assembled high-flex fiber glass optic cables. For guidance on manufacturing the required cable and connector scheme, please contact Aerotech.



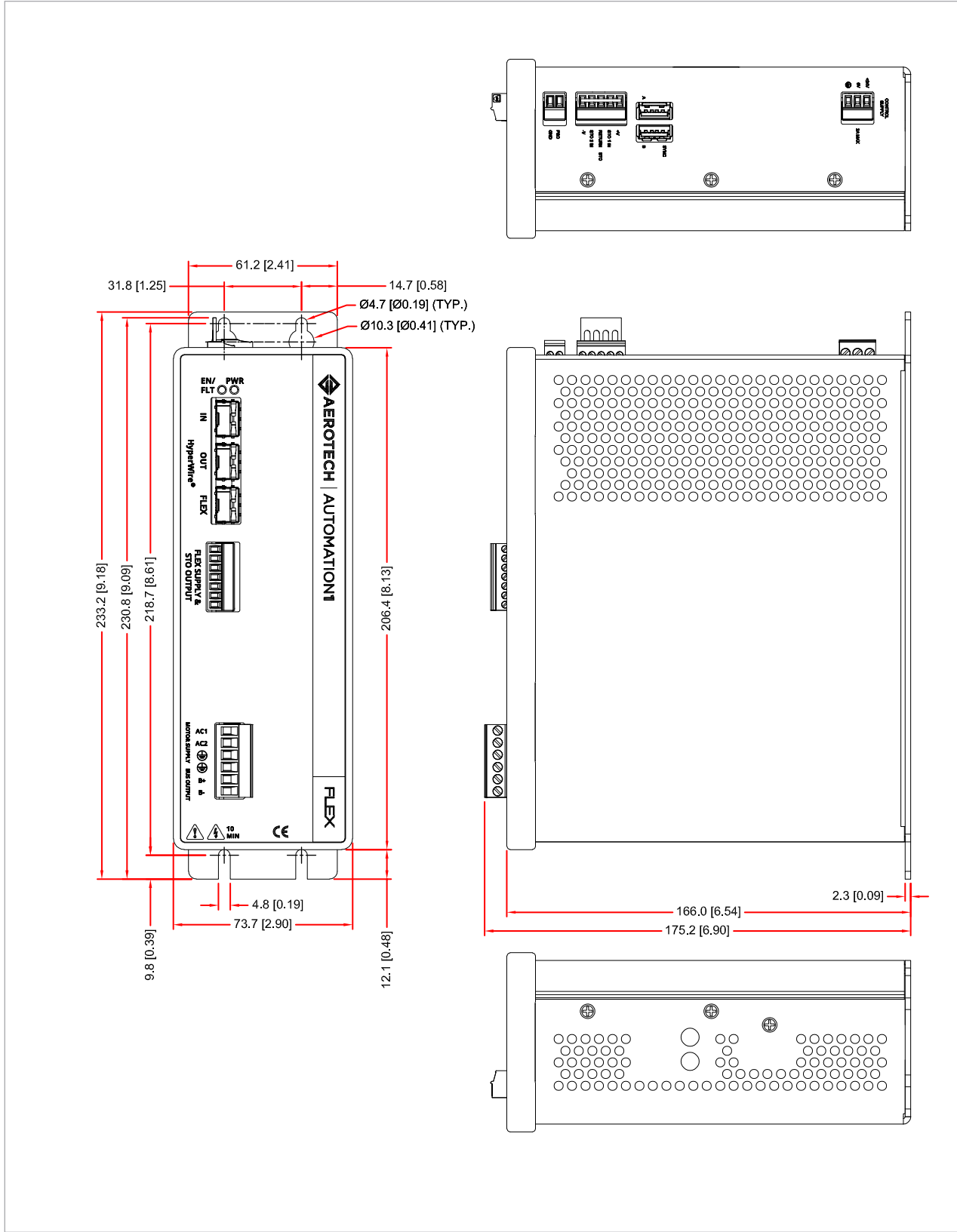
# AUTOMATION1 FLEX DIMENSIONS

AUTOMATION1 FLEX CONTROLLER WITHOUT MOTOR POWER SUPPLY OR EXPANSION I/O



## AUTOMATION1 FLEX DIMENSIONS

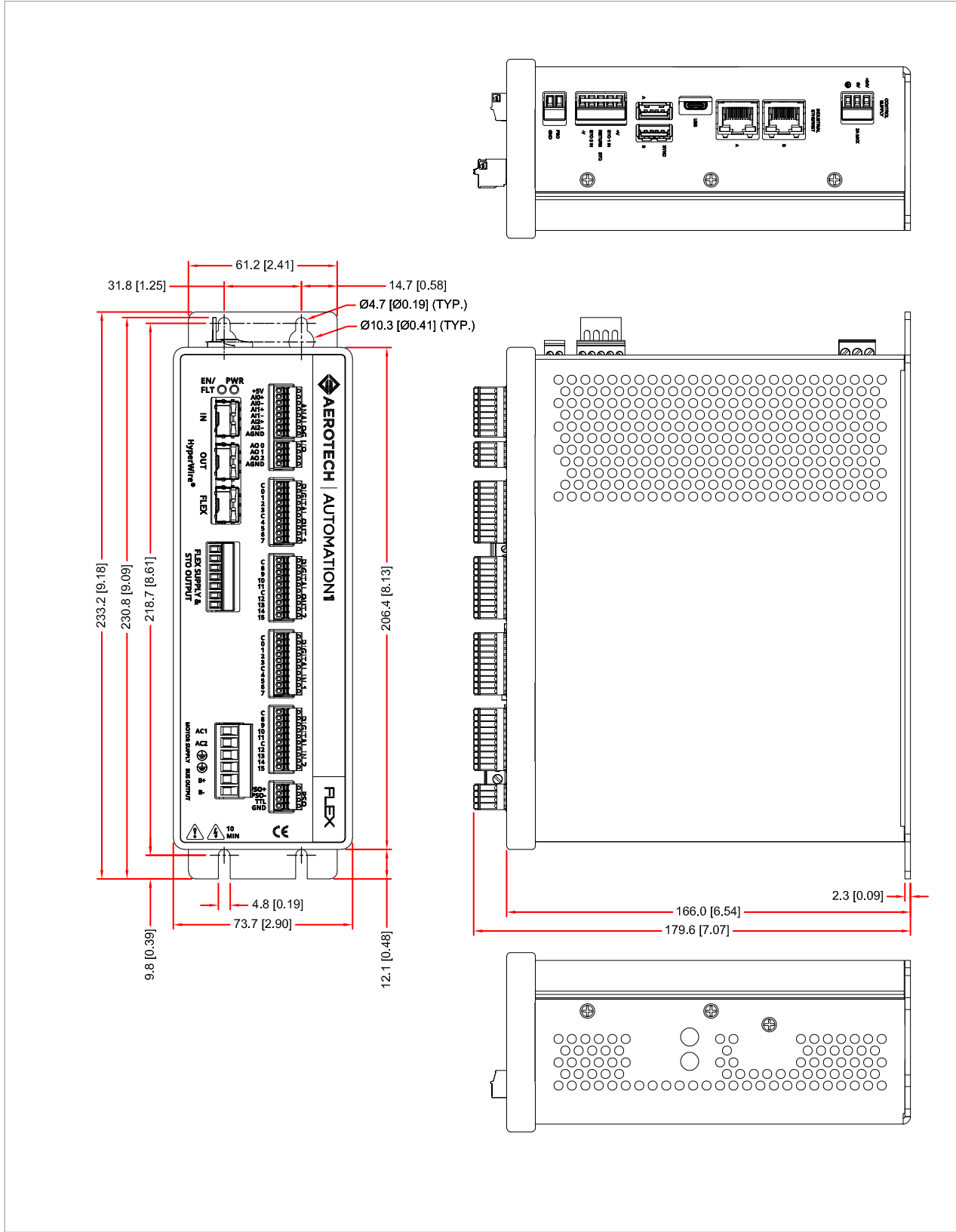
### AUTOMATION1 FLEX CONTROLLER WITH MOTOR POWER SUPPLY AND WITHOUT EXPANSION I/O





# AUTOMATION1 FLEX DIMENSIONS

## AUTOMATION1 FLEX CONTROLLER WITH MOTOR POWER SUPPLY AND WITH EXPANSION I/O





# AUTOMATION1 FLEX DIMENSIONS

## AUTOMATION1 FLEX AXIS MODULE

