Overview
The A-81x motion controller series from PI offers a fully integrated electronics solution with controller, drives, and power supplies in a compact 19-inch rack unit. The A-81x controllers are designed and optimized for PIglide air bearing stages that are equipped with direct drive linear and rotation servo motors, and high-resolution encoders. Standard options include inputs for incremental sine/cosine and absolute encoders that use the BiSS-C data protocol. Support for sine/cosine encoders has an integrated interpolation factor of 16384x. All controllers feature integrated flash memory for stored motion programs and parameters.

The A-81x controllers can be operated in stand-alone mode running stored programs, or controlled via an external PC. A PC is required for programming and startup. All software is supplied with the controller.

If the controller is purchased together with a PIglide air bearing stage or positioning system, PI will perform the servo tuning, startup of the controller, and error calibration, and supply a complete ready-to-use positioning system.

The A-81x motion controller features the state of the art ACS SPiiPlusEC motion controller and EtherCAT® master.

Options and Upgrades
- Absolute encoders or incremental encoders (can be combined individually according to customer specifications for all axes of the controller)
- G-Code programming
- Input shaping
- ServoBoost™ upgrade. Provides better, more consistent servo performance that is insensitive to noise or changes in the system.
- ServoBoost™ PLUS upgrade. Provides a higher position stability and velocity constancy.
- Additional control axes for external drives via EtherCAT®
- Alternative customized packaging for OEM setups

A-81x
- 1, 2, & 4 motion axes
- Fully integrated closed-loop servo control, amplifier module, and power supplies
- For voice coil drives, DC motors and brushless 3-phase motors
- Quiet PWM drives
- Encoder inputs support sine/cosine and BiSS-C
- 5 A continuous current/10 A peak output current per axis
## Specifications

<table>
<thead>
<tr>
<th>Features</th>
<th>A-811.21x00</th>
<th>A-812.21x00</th>
<th>A-814.21x00</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of axes</strong></td>
<td>1</td>
<td>2</td>
<td>4</td>
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<tr>
<td><strong>Controller type</strong></td>
<td>Closed-loop servo control (PID), parameter changing during operation</td>
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<tr>
<td><strong>Servo-frequency position control</strong></td>
<td>10 kHz</td>
<td>10 kHz</td>
<td>10 kHz</td>
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<tr>
<td><strong>Servo frequency current control</strong></td>
<td>20 kHz</td>
<td>20 kHz</td>
<td>20 kHz</td>
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<tr>
<td><strong>Trajectory profiles</strong></td>
<td>Point-to-point, jog, s-curve</td>
<td>Point-to-point, jog, s-curve, interpolated coordinated multi-axis profiles</td>
<td>Point-to-point, jog, s-curve, interpolated coordinated multi-axis profiles</td>
</tr>
<tr>
<td><strong>Cooling</strong></td>
<td>Fan on the side (continuous operation, constant speed)</td>
<td>Fan on the side (continuous operation, constant speed)</td>
<td>Fan on the side (continuous operation, constant speed)</td>
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<tr>
<td><strong>Drive type</strong></td>
<td>PWM</td>
<td>PWM</td>
<td>PWM</td>
</tr>
<tr>
<td><strong>Motor types</strong></td>
<td>Voice coil</td>
<td>Voice coil</td>
<td>Voice coil</td>
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<tr>
<td></td>
<td>Brushed DC motor</td>
<td>Brushed DC motor</td>
<td>Brushed DC motor</td>
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<tr>
<td></td>
<td>Brushless 3-phase motor with sine commutation</td>
<td>Brushless 3-phase motor with sine commutation</td>
<td>Brushless 3-phase motor with sine commutation</td>
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<tr>
<td><strong>Encoder options (factory default)</strong></td>
<td>Incremental sine/cosine (1 Vpp) A/B quadrature (RS-422) (on request), Absolute encoder BiSS-C</td>
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</tr>
<tr>
<td><strong>Output current (per axis)</strong></td>
<td>5 A continuous operation, 10 A peak</td>
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<td>5 A continuous operation, 10 A peak</td>
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<tr>
<td><strong>Interfaces</strong></td>
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<tr>
<td><strong>Communication</strong></td>
<td>Ethernet: TCP/IP, 100/1000 Mbps Ethernet/IP Modbus</td>
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<tr>
<td><strong>User I/O (without reference and limit switch)</strong></td>
<td>2x digital input, 24 V DC, sink 2x digital output, 24 V DC, source 1x analog input, differential, 12 bit 1x analog output, differential, 10 bit 1x RS-422 high-speed output for position trigger (PEG)</td>
<td>2x digital input, 24 V DC, sink 2x digital output, 24 V DC, source 1x analog input, differential, 12 bit 1x analog output, differential, 10 bit 2x RS-422 high-speed output for position trigger (PEG)</td>
<td>4x digital input, 24 V DC, sink 4x digital output, 24 V DC, source 2x analog input, differential, 12 bit 2x analog output, differential, 10 bit 4x RS-422 high-speed output for position trigger (PEG)</td>
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<tr>
<td><strong>Interlock / motion-stop</strong></td>
<td>1x 24 V DC sink</td>
<td>1x 24 V DC sink</td>
<td>1x 24 V DC sink</td>
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<tr>
<td><strong>Connector interface</strong></td>
<td>Rear panel connectors Sub-D for motor and signal connections IEC 60320 type C14 for power supply</td>
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<tr>
<td><strong>Miscellaneous</strong></td>
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<td></td>
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<tr>
<td><strong>Power supply</strong></td>
<td>120 - 240 V AC, single phase, 50-60 Hz (factory default), 600 W</td>
<td>120 - 240 V AC, single phase, 50-60 Hz (factory default), 600 W</td>
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<tr>
<td><strong>Mass (approx.)</strong></td>
<td>8.5 kg</td>
<td>8.5 kg</td>
<td>9.3 kg</td>
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Drawings / Images

A-81x, dimensions in mm

Ordering Information

One axis

A-811.21A00
Plglide motion controller, 19" rack unit, one axis, TCP/IP, encoder with sin/cos signal transmission

A-811.21B00
Plglide motion controller, 19" rack unit, one axis, TCP/IP, absolute encoder

Two axes

A-812.21A00
Plglide motion controller, 19" rack unit, two axes, TCP/IP, encoder with sin/cos signal transmission
A-812.21B00
Pilglide motion controller, 19" rack unit, two axes, TCP/IP, absolute encoder

**Four axes**

A-814.21A00
Pilglide motion controller, 19" rack unit, four axes, TCP/IP, encoder with sin/cos signal transmission

A-814.21B00
Pilglide motion controller, 19" rack unit, four axes, TCP/IP, absolute encoder

**Optional**

A-810.SHP1
Factory option input shaping

A-810.GCD1
Factory option G-Code programming

A-810.SB1
Factory option ServoBoost™ upgrade for ACS-based controllers (4 axes)

A-810.SBP1
Factory option ServoBoost™ PLUS upgrade for ACS-based controllers (4 axes), includes ServoBoost™ upgrade

A-810.P4AX
Factory option 4 additional axes for SPiiPlus ACS controllers (no additional hardware, no additional drives)

A-810.UPGD
Further factory default options (additional axes, customized programming, ...). Contact PI for further information.