

# PIMag<sup>®</sup> Motion Controller

Control of Force, Position, and Velocity



## C-413

- 1 or 2 motor channels
- Up to 4 sensor channels for 2 force and 2 position sensors each
- Depending on version, TCP/IP or USB interface for configuration and commanding
- Depending on version, real-time SPI interface for sending commands
- Digital inputs and outputs, optional analog inputs and outputs
- Autozero function for holding current

### Digital motion controller for PIMag<sup>®</sup> voice coil drives

C-413.1: 1 motor channel, 2 sensor channels, for the V-275 and V-277 linear actuators; C-413.2: 2 motor channels, 4 sensor channels. PID controller for force, position, velocity. Servo update rate selectable between 5 to 10 kHz

### Force control

The force control allows operation of PIMag<sup>®</sup> drives and stages with a defined holding or feed force. The force and position sensors can be read simultaneously and the values processed. In addition to pure force control, subordinate position and velocity control is also an option. PI offers PIMag<sup>®</sup> actuators with a force sensor. The C-413.20A / .2GA models allow external force sensors to be read via analog inputs

### Extensive functionality

Data recorder: Recording of operating data such as motor current, velocity, position or position error. Wave generator: Saves and outputs periodic motion profiles. Autozero function defines the holding current, at which the drive outputs a force of 0 N in open-loop operation, e.g., for compensating the weight force. ID chip support: Detects the stages connected and simplifies configuration and exchangeability. Supports direction-sensing reference point switches. Extensive software support, e.g., for LabVIEW, dynamic libraries for Windows and Linux.

### Interfaces

Depending on the version, commanding via TCP/IP, USB 2.0, SPI. Digital inputs and outputs for automation. Optional analog inputs and outputs, e.g., for sensors, commanding or position feedback

## Specifications

	C-413.1G	C-413.20/.20A, C-413.2G/.2GA
Function	PIMag® motion controller for voice coil drives, 1 channel, housed device	PIMag® motion controller for voice coil drives, 2 channels C-413.20/.20A: OEM board C-413.2G/.2GA: Housed device
Motor channels	1	2
Sensor channels	2	4
<b>Motion and control</b>		
Controller type	PID controller for force, position and velocity; parameter changing during operation	PID controller for force, position and velocity; parameter changing during operation
Servo cycle time	100 µs to 200 µs, selectable in 4 steps	100 µs to 200 µs, selectable in 4 steps
Profile generator	Trapezoidal velocity profile, specification of the maximum velocity and acceleration	Trapezoidal velocity profile, specification of the maximum velocity and acceleration
Encoder input	SPI sensor interface	SPI sensor interface
Reference point switch	2 × TTL, direction-sensing	4 × TTL, direction-sensing
<b>Electrical properties</b>		
Max. output voltage	24 V	24 V
Max. output current	±1.5 A (regulated)	±1.5 A (regulated)
<b>Interfaces and operation</b>		
Communication interfaces	TCP/IP	USB 2.0, real time SPI
Motor / sensor connection	Sub-D 9 (f) for motor, Sub-D 25 (f) for sensor	Sub-D 15 (f) combined for motor and sensor
I/O port	2 × analog output, -10 to 10 V, 17 bit, 1 kHz 4 × digital input, 24 V 6 × digital output, 24 V	2 × analog input, -10 to 10 V, 16 bit, 1 kHz (only .20A and .2GA) 2 × analog output, -10 to 10 V, 17 bit, 1 kHz (only .20A and .2GA) 6 × digital outputs (open collector, voltage range 5 V to 24 V, 33 kΩ internal pull-up to 5 V) 4 × digital input (5 V TTL level, to 24 V max. input voltage, 10 kΩ input resistance)
Command set	PI General Command Set (GCS)	PI General Command Set (GCS)
User software	PIMikroMove	PIMikroMove
Application programming interfaces	API for C / C++ / C# / VB.NET / MATLAB / Python, drivers for LabVIEW	API for C / C++ / C# / VB.NET / MATLAB / Python, drivers for LabVIEW
Supported functions	Point-to-point motion. Data recorder. Wave generator. Autozero.ID chip detection.	Point-to-point motion. Data recorder. Wave generator. Autozero. ID chip detection.
<b>Miscellaneous</b>		
Operating voltage	24 V DC from external power adapter (included in the scope of delivery)	24 V DC from external power adapter (included in the scope of delivery for C-413.2G and .2GA)
Max. current consumption	2 A	2 A
Operating temperature range	5 to 50 °C	5 to 50 °C
Mass	0.3 kg	0.3 kg
Dimensions	210 mm × 28 mm × 105 mm	189 mm × 28 mm × 105 mm (.2G/.2GA) 160 mm × 18 mm × 100 mm (.20/.20A)

Ask about custom designs!

## Ordering Information

### **C-413.1G**

PIMag® motion controller, 1 channel, benchtop device, TCP/IP interface, force control option

### **C-413.20**

PIMag® motion controller, 2 channels, OEM board, USB and SPI interface, force control option

### **C-413.20A**

PIMag® motion controller, 2 channels, OEM board, USB and SPI interface, analog inputs, force control option

### **C-413.2G**

PIMag® motion controller, 2 channels, benchtop device, USB and SPI interface, force control option

### **C-413.2GA**

PIMag® motion controller, 2 channels, benchtop device, USB and SPI interface, analog inputs, force control option