Motion Controller for Low Power Requirement

Integrated Driver for up to 2 Axes, EtherCAT Master for Synchronizing up to 4 Axes

G-910.RC02

- ACS motion controller with integrated ACS driver module

- Upgradable to up to 4 axes with the G-910.RC01 driver module

- Directly compatible with positioners from PI

- For AC servo motors / brushless DC motors, brushed DC motors, voice coil motors, stepper motors

- Output power 120 W at 24 V or 280 W at 48 V

- Many options for trajectory planning

Overview

The G-910 motion controller offers a fully integrated electronics solution with controller and driver module in a compact housing. The G-910.RC02 motion controller features the state-of-the-art ACS SPiiPlusEC motion controller and EtherCAT master. Integrated driver module for 2 axes, upgradable via EtherCAT to up to 4 synchronized axes. Upgrade option to up to 64 axes (separate licenses necessary). EtherCAT cycle and generation rate of the motion profile 2 kHz. Ethernet velocity of up to 1 GbE. Servo algorithms for advanced gantry and dual-loop control.

Encoder inputs

2 encoder inputs for incremental encoders (sine/cosine or RS-422) or absolute encoders (EnDat 2.2 & 2.1, Smart-Abs, Panasonic, BiSS A/B/C (SSI)). Depending on the application, the encoders can respectively be led to the motor interface or the separate sensor interface.

Inputs and outputs

4 digital inputs, 2 digital outputs. For the evaluation of reference switches, two of the digital inputs can alternatively be led to the motor connectors. Depending on the application, the inputs for the limit and reference switches can be configured for 5 V or 24 V as well as PNP or NPN inputs. The digital outputs at the I/O connector simultaneously switch the brake drivers at the motor connectors. 2 differential outputs for position trigger (PEG - Position Event Generator), 2 differential analog inputs, 1 differential analog output.

Communication, software support

The motion controller acts as EtherCAT master for the integrated driver module and for additional, optional driver modules. Open network architecture, the integration of components from other manufacturers is possible. For communication with a PC, the motion controller is equipped with an Ethernet TCP/IP and a RS-232 interface. Modern user software with tools for tuning and visualizing: ACS SPiiPlus MMI Application Studio. Program libraries for C/C++, COM, .NET, MATLAB available.

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Configuration

If the types of positioner are specified when ordering, the G-910.RC02 is preconfigured at delivery and can, therefore, be used straight away. The default configuration, without positioner-specific adjustments, is detailed in the specifications. For subsequent adjustments, please contact our service department.

Specifications

	G-910.RC0242100 / G-910.RC0242200
Function	ACS SPiiPlusEC controller with the ACS UDMnt driver module, benchtop device, with connectors for positioners from PI
Motor types	2 and 3-phase AC servo motors / brushless DC motors, brushed DC motors, voice coil motors, stepper motors
Number of drive axes	2 Upgradable via EtherCAT with additional driver module to up to 4 synchronized axes.

Motion and control	G-910.RC0242100 / G-910.RC0242200
Controller type	Cascading PIV controller structure with velocity and acceleration feed-forward control
Sampling rate current control	20 kHz
Control algorithms	Gantry control, dual-loop control
Motion profiles/trajectory planning	Multi-axis point-to-point, jog, tracking and sequential multi-point motion Multi-axis segmented motion with look-ahead Arbitrary path with PVT cubic interpolation Third order profiles (S-Curve) Smooth on-the-fly change of target position or velocity Inverse/Forward kinematics and coordinate transformations (at application level) Master-slave with position and velocity locking (electronic gear/cam)
Encoder	1 × per integrated axis, supported types: Incremental: $1V_{ss}$, RS-422 Absolute: EnDat 2.2 & 2.1, Smart-Abs, Panasonic, BiSS-A/B/C (SSI)
Limit switches	2 × per integrated axis Default: 5 V sinking (NPN) Optional configuration: 24 V; sourcing (PNP)
Reference switch	Default: 1 × per integrated axis, 5 V sinking (NPN) Optional configuration: 24 V; sourcing (PNP); use as digital multipurpose inputs on HD-D-sub 15 (f)
Motor brake	1 × per integrated axis Integrated PWM brake driver with current reduction for a reduced heating up of the brake

Electrical properties	G-910.RC0242100	G-910.RC0242200
Output voltage (intermediate circuit)*	24 V	48 V
Max. output power (intermediate circuit)*	120 W per axis	280 W per axis
Current limitation per motor phase (peak value for 1 s max.)	5 A* / 9.5 A peak**	5 A* / 9.5 A peak**

| Interfaces and operation	G-910.RC0242100 / G-910.RC0242200
Motor connector	2 × HD D-sub 26 (f)
Sensor connector	2 × D-sub 15 (m) or 2 × via the motor connectors Default: Digital incremental encoder (RS-422) or absolute encoder on motor connector Incremental encoder 1 V_{ss} on D-sub 15 (m) Optional configuration: Digital incremental encoder (RS-422) or absolute encoder on D-sub 15 (m)
Digital I/O lines	HD D-sub 15 (f) and motor connectors: 2 × outputs PNP 24 V source; also control the brake drivers at the motor connectors Default for inputs: 2 × PNP 24 V source on HD D-Sub 15 (f); in addition 2 × NPN 5 V sinking for reference switches at the motor connectors Optional configuration for inputs: 4 × PNP 24 V source on HD D-sub 15 (f)
Analog I/O lines	HD D-sub 15 (m): 2 differential analog inputs: ±10 V, 12 bit 1 differential analog output: ±10 V, 10 bit
Outputs for position event trigger (PEG)	Parallel on HD D-sub 15 (m) and HD D-sub 15 (f): 2 differential outputs (RS-422) for pulses at programmable positions, pulse width 26 ns to 1.75 ms, max. 10 MHz; only possible with incremental encoder
EtherCAT network	Up to 4 axes. Upgrade option to up to 64 axes (separate licenses necessary).
Control rate and EtherCAT clock rate	Default: 2 kHz Optional configuration: 1 kHz
Communication interfaces	EtherCAT: IN and OUT Ethernet (TCP/IP, Modbus/TCP, EtherNet/IP): RJ-45 RS-232: D-sub 9 (m)
User software	ACS SPiiPlus MMI Application Studio
Application programming interfaces	Programming libraries for C/C++, COM, .NET, MATLAB available
Programming	ACSPL+ real-time scripting language: Up to 10 simultaneously running programs
Supported options***	G-Code for programming CNC controls ServoBoost[TM] for increasing robustness with changing mechanical conditions NetworkBoost[TM] for identifying network errors in an EtherCAT ring topology without a break in operation Input shaping for reducing vibrations in computer-controlled machines

Miscellaneous	G-910.RC0242100	G-910.RC0242200
Operating voltage intermediate circuit	24 V DC from external power adapter, power adapter with 24 V DC (120 W) included in the scope of delivery	48 V DC from external power adapter, power adapter with 48 V DC (280 W) included in the scope of delivery
Operating voltage logic	24 V DC from external power adapter, power adapter with 24 V DC (120 W) included in the scope of delivery	24 V DC from external power adapter, power adapter with 24 V DC (120 W) included in the scope of delivery
Max. current consumption intermediate circuit*	5 A	5 A
Max. current consumption logic	1.7 A	1.7 A
Operating temperature range	5 to 40 °C (temperature protection switches off at excessively high temperatures)	5 to 40 °C (temperature protection switches off at excessively high temperatures)
Mass	2.85 kg	2.85 kg
Dimensions	187.3 mm × 121 mm × 294.1 mm	187.3 mm × 121 mm × 294.1 mm

* Depending on the power adapter used
** Permissible maximum value is not reached with the supplied power adapter
*** Options to be separately acquired from ACS

Drawings / Images
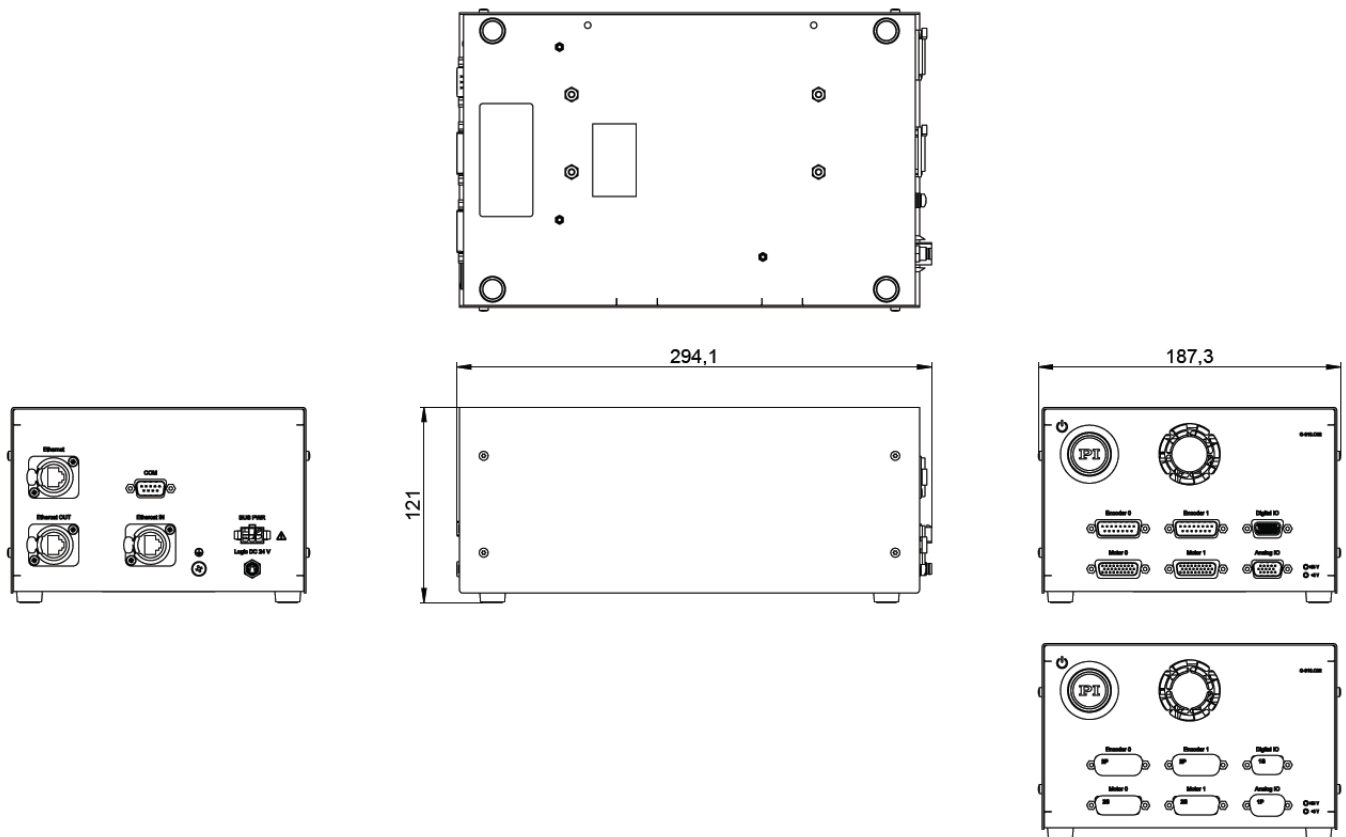
G-910.RC0242x00, dimensions in mm

Stacked system with G-910.RC02 motion controller (top) and G-910.RC01 driver module (bottom)

Ordering Information

G-910.RC0242100

ACS controller with ACS driver module, 2 axes, benchtop device, integrated ACS SP+EC-04040432NNNDNDNN motion controller + EtherCAT master, integrated ACS UDMNT2B220U2N power amplifier, logic voltage 24 V DC, intermediate circuit voltage 24 V DC, EtherCAT, Ethernet, and RS-232 interfaces

G-910.RC0242200

ACS controller with ACS driver module, 2 axes, benchtop device, integrated ACS SP+EC-04040432NNNDNDNN motion controller + EtherCAT master, integrated ACS UDMNT2B220U2N power amplifier, logic voltage 24 V DC, intermediate circuit voltage 48 V DC, EtherCAT, Ethernet, and RS-232 interfaces

Add-on modules for driving additional axes (please order separately)

G-910.RC0102100

ACS driver module, 2 axes, benchtop device, integrated ACS UDMnt2B220U2N power amplifier, logic voltage 24 V DC, intermediate circuit voltage 24 V DC

G-910.RC0102200

ACS driver module, 2 axes, benchtop device, integrated ACS UDMnt2B220U2N power amplifier, logic voltage 24 V DC, intermediate circuit voltage 48 V DC