

Motion Controller

For Electromagnetic Motors



SMC Hydra

- 2-D vector motion with linear interpolation, independent single-axis motion
- Digital inputs and outputs
- Optional: Encoder-based trigger output
- Optional: Position capture input: Position detection in real time via digital input
- Optional: Dynamic position correction
- Joystick operation via CAN bus

Universal digital motion controller

For DC servo and brushless DC motors (BLDC), linear and torque motors (2 / 3 phases), 2-phase stepper motors. 24 V / 48 V DC output voltage, up to 200 W power per channel. Maximum output current 10 A per phase (effective). Sine-commutated operation. Servo frequency 4 kHz.

Extensive functions, software support

Automatic detection of the motor phase. PID controller for position and velocity. Extensive software support, e.g., for LabVIEW, dynamic libraries for Windows and Linux.

Interfaces

Commanding via TCP/IP, RS-232. RM version only: USB as well. Manual operation with joystick via CAN bus (accessory). Digital inputs and outputs for automation. Optodecoupled inputs, 4 analog outputs.

Factory default options

- DeltaStar und DeltaStar Eco encoder interface modules
Required for control of closed-loop drives (rotation or linear encoder). Differential signal transmission for digital (A/B) or analog (sin/cos) encoder signals, inputs for limit switch signals. Please specify when ordering.
Trigger options with DeltaStar: Trigger outputs, position capture input (position detection in real time via digital input)
Trigger options with DeltaStar Eco: Trigger outputs
- Dynamic position correction
Position deviations for a selected configuration of linear or rotation stages are determined with a highly accurate measuring system and saved in a table of corrections in the controller. Correction is also dynamic. Single-axis mapping, only available as factory default in conjunction with a PI positioning system. Please specify when ordering.

Specifications

	SMC Hydra
Function	Motion controller for electromagnetic motors Hydra TT: Benchtop device with integrated power adapter Hydra CM: Compact device Hydra RM: 19" rack unit with integrated power adapter
Axes	Hydra TT / Hydra CM: 2 Hydra RM: 2 / 4
Sensor channels	Hydra TT / Hydra CM: 2 Hydra RM: 2 / 4
Supported functions	Linear vector motion, independent point-to-point motion. Automatic detection of the motor phase.
Safety features	Switch-off via external switch. Overload protection of the motor driver. Overheat protection of the motor (I^2t). Overcurrent protection of the system.

Motion and control	SMC Hydra
Controller type	PID controller, also adaptive for position and velocity as well as velocity and acceleration feed-forward, parameter changing during operation
Servo frequency	4 kHz
Profile generator	Trapezoidal velocity profile, setting of maximum velocity and acceleration 2-D vector control with linear interpolation
Encoder input	Analog signals (sin/cos) max. 150 kHz (line count) Digital signals (A/B differential via RS-422) max. 4 MHz (line count) Positioning range: $\pm 4.3 \cdot 10^{12}$ mm / deg
Stall detection	Position error, peak current, I^2t limit
Microsteps per full step	3000
Limit switches	2 per channel, 5 to 24 V (programmable polarity) N/O contact / N/C contact; NPN / PNP
Reference point switch	Index signal of the encoder
Motor brake	1x per channel, TTL, configurable via software

Electrical properties	SMC Hydra
Maximum output voltage	24 V / 48 V
Maximum output power per channel	200 W
Maximum output current per channel	10 A _{rms}

Interfaces and operation	SMC Hydra
Communication interfaces	TCP/IP: 10/100 Mbit; RS-232: Sub-D 9 (m), 9.6 to 115.2 kBaud Hydra RM: USB as well
Motor connection per channel	Sub-D 15 (f)
Sensor connection per channel	Sub-D 15 (f)
I/O lines	6 inputs, optodecoupled, 5-24 V (2 each reserved per channel for limit switch) Input for motor switch-off on all axes, optodecoupled Open drain output (100 mA) 2 TTL outputs 4 analog outputs, 10-bit resolution, 0 to 3.3 V (not for Hydra TT) With DeltaStar interface as factory default option: Fast trigger output, max. 400 kHz, equidistant or from freely definable table (max. 3000 axis positions)

Interfaces and operation	SMC Hydra
	Position capture input, max. 4 kHz (> 3,000,000 axis positions) With the factory default DeltaStar Eco interface option: Trigger output, 2 kHz, equidistant, jitter 10-30 µs
Command set	Venus-3 ASCII interpreter Dynamic library for PI General Command Set (GCS)
User software	Venus-3 demo program LabVIEW (source code & executable) Terminal program (Venus-3 DLL) PIMikroMove via dynamic libraries for Windows
Software drivers	LabVIEW drivers, dynamic libraries for Windows and Linux (GCS) GCS2 DLL 32/64-bit Venus3 DLL 32/64-bit / .net wrapper DLL incl. example source code
Manual operation	Joystick via CAN bus (accessory)
Miscellaneous	SMC Hydra
Operating voltage	Hydra TT: 90 - 260 V, integrated wide input range power supply Hydra CM: 24 V / 48 V, external power adapter (not in scope of delivery) Hydra RM: 90 - 260 V, integrated wide input range power supply
Max. power consumption	Hydra TT: 300 W Hydra CM: 120 W Hydra RM: 1000 W
Max. current consumption	11 A
Operating temperature range	10 to 40 °C
Weight	Hydra TT: 2.65 kg Hydra CM: 0.45 kg Hydra RM: 6 kg
Dimensions	Hydra TT: 225 mm x 515 mm x 56 mm Hydra CM: 76 mm x 156 mm x 56 mm Hydra RM: 84 HP, 2 RU, 310 mm depth

Drawings / Images



SMC Hydra TT, rear panel



SMC Hydra CM, 2-axis motion controller

Ordering Information

71609601

SMC Hydra TT Motion controller, 24 V, TCP/IP, RS-232, 2 axes, benchtop device

71609602

SMC Hydra TT Motion controller, 48 V, TCP/IP, RS-232, 2 axes, benchtop device

71609604

SMC Hydra RM Motion controller, 24 V, TCP/IP, RS-232, USB, 4 axes, 19" controller

71609605

SMC Hydra RM Motion controller, 48 V, TCP/IP, RS-232, USB, 4 axes, 19" controller

71609638

SMC Hydra RM Motion controller, 48 V, TCP/IP, RS-232, USB, 2 axes, 19" controller

71609600

SMC Hydra CM Motion controller, 24 V, TCP/IP, RS-232, 2 axes, compact device

71609603

SMC Hydra CM Motion controller, 48 V, TCP/IP, RS-232, 2 axes, compact device

Power adapters

71609626

Power adapter for SMC Hydra CM, 24V, 120 W

71609625

Power adapter for SMC Hydra CM, 48V, 120 W

Factory default options, please specify when ordering

71609632

SMC Hydra DeltaStar Eco encoder interface module

71609631

SMC Hydra DeltaStar encoder interface module

71609644-0000

SMC Hydra dynamic position correction for linear stages incl. axis measurement and measurement log (laser interferometer)

71609644-0001

SMC Hydra dynamic position correction for rotation stages incl. axis measurement and measurement log (Heidenhain RON-905 master encoder)

Accessories

71609633

Joystick for SMC Hydra, 2 axes

71609634

Trigger cable for SMC Hydra DeltaStar, mini HDMI to Sub-D 9 (f)

71609635

Trigger cable for SMC Hydra DeltaStar, mini HDMI to BNC