

Data Sheet

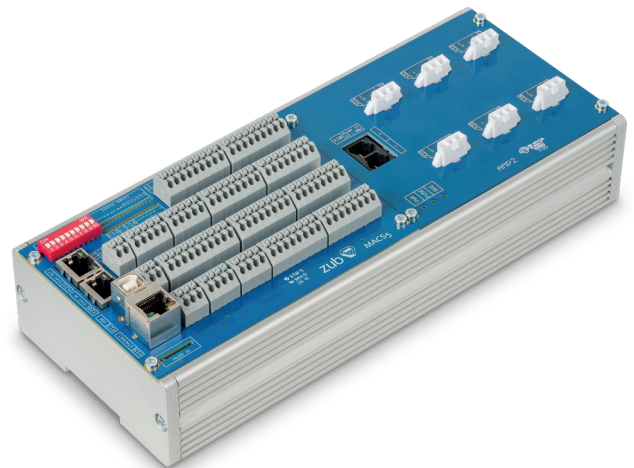
MACS5-AMP2

Motion Control Unit with integrated High Power Amplifiers

Everything included: Control unit + 6 amplifiers, each 1.5 kW peak

The MACS5-AMP2 combines a modern motion control unit with high power amplifiers in a compact housing. Each of the internal amplifiers offers 400 W continuous and 1500 W peak for direct control of powerful drives.

The MACS5-AMP2 is the economic solution to move up to six brush-type or up to four brushless motors in the most dynamic and accurate way. Position feedback or master signals are processed by encoder inputs for direct connection of incremental and absolute encoders, and glass scales. A variety of digital and analog inputs and outputs process sensor signals and commands actuators are integrated. Bus interfaces like EtherCAT, CAN, Ethernet, USB, and RS232 enable an open and efficient data exchange with PCs and PLCs. The MACS5-AMP2 can be integrated in PLC networks as a DS402 multi axis slave. An easy but very efficient programming language combined with powerful motion control commands is the key for stand-alone control of simple machines and devices (without the need of a PC or PLC at all).



zub Standards

- **Control functions:** Interrupts reacting on inputs, position data, bus bits, timer, etc.; arithmetic and bit handling; conditional branches and loops
- **Closed loop control:** Position and speed control, current control and current limitation
- **Positioning functions:** Absolute and relative positioning, configurable homing, configurable speed profiles
- **Synchronization Functions:** Velocity synchronization, position / angle synchronization, Synchronization including correction depending on slave / master marker
- **Free programmability** on C basis with powerful Motion control commands, support of hierarchical State machines by means of license-free automation software ApossIDE®
- **Interactive graphic editors** like CAM-, Array- and Path-Editor
- **Debugging & Optimization:** Smart-Oscilloscope and integrated graphic CAM-Editor
- **State-Machine Support:** ApossIDE® supports the automatic execution of hierarchic State Machines

Bus Functions

CANopen master slave functionality, EtherCAT slave, and optional EtherCAT master functionality.

Application Range

- Fast and accurate positioning or synchronization of highly dynamic drives, e.g. in labeling machines or feeding systems
- Automation of adjustable mechanical stops in all types of machines
- Work piece and tool positioning, e.g. in a revolving transfer machine
- Standalone control of devices and simple machines

Overview of advantages

Compact multi-axis solution with integrated power amplifiers.

Configurable for brush-type and brushless motors up to 400 W continuous power and up to 1500 W peak power.

MACS5-AMP2 can serve as a stand-alone control unit.

MACS5-AMP2 can be integrated into CANopen and EtherCAT networks as a fully featured DS402 multi axis slave device.

No hidden additional costs: All motion control features, servo amplifiers, encoder inputs, bus interfaces and development tools are included.

MACS5-AMP2

Electrical Data			
Control Unit: Supply voltage / Current	24 V DC ±25 %	200 mA	without I/O load
Amplifiers: Supply voltage / Fuse	12 - 50 V DC	90 A (internal SMD fuse)	
Memory			
Workspace and program memory	1 MByte SRAM	4 MByte Flash	Application & data
Closed loop Controls			
Number of drives and control type	6	Position, Speed, Current	
Position control	1 kHz	1 ms cycle time	PID control plus feed forward
Speed control	1 kHz	1 ms cycle time	PI control
Current / torque control	8 kHz	125 µs cycle time	PI control plus current limitation
Internal Servo Amplifiers			
Quantity and type of motors	6 x brush-type or 4 x brushless or 3 steppers or mixed operation		
Amplifier type and chopping frequency	4Q-PWM / 24 kHz		
Max. output current (configurable)	10 A continuous current / 30 A peak current (max. 5 seconds) per servo amplifier		
Motion Control Features			
Free programmable velocity, position, synchronization and process control.			
Highly accurate position control by single or duplex evaluation of encoders mounted on the motor shaft and moved load.			
Optional "DS402 Multi-Axis Drive" functionality for the integration of a MACS5-AMP2 as a CANopen or EtherCAT slave of a PLC.			
Encoder Inputs and Outputs			
All encoder inputs configurable as feedback signal inputs of the motor control or as master signal inputs for drive synchronization			
Encoder 1 ... 3 (inputs only)	Increment. 5V, max.32MHz	SinCos 1Vpp, max. 150kHz	Resolution: 1 Sinus = 256 qc max. 400 kHz at 25% resolution
Encoder 4 ... 6 (inputs or outputs)	Increment. 5 V, max.32 MHz	SSI max.32Bit, 39kHz-5 MHz	SSI passive or active
Output supply voltage (for encoders)	5 V DC, max. 200 mA pro Encoder, max. 1A total		
Other feedback devices	CANopen encoders (max. 1 Mbaud), Analog feedback devices (e.g. linear potentiometer)		
Digital Inputs / Outputs			
Digital inputs 1 - 8 can be configured as marker input signal for real-time encoder position latching			
Digital inputs	16	Low < 4,6 V / High > 18 V	max. 45 V, max. 200 kHz
Digital outputs	8	24 V, 100 mA, 300 kHz	
Analog Inputs / Outputs			
Analog Inputs (standard configuration)	6	0-10 V, 12 Bit, max. 1 kHz	Not available, if analog opt. in use
Alternatively it is possible to mount internally one of two analog option modules (replacing the standard analog inputs using X9)			
Analog option 1 (...-IO1-...)	1 analog Input	±10 V, 12 Bit, max. 1 kHz	±10 V Reference voltage (max. 20 mA)
	3 analog Outputs	±10 V, 12 Bit, 20 mA, 1 kHz	
Analog option2 (...-IO2-...)	6 analog Input	0-10 V, 13 Bit, max. 1 kHz	±10 V Reference voltage (nom. 7 mA, max. 35 mA)
Interfaces			
USB			Data exchange & visualization
Ethernet	Ethernet TCP/IP	max. 100 MBaud	Data exchange & visualization
RS232	Special protocols on request		RS485 on request
CAN-Bus 1 (e.g. CANopen slave)	ISO/DIS 11898	max. 1 MBaud	2 separate CAN interfaces each with CANopen master / slave functionality
CAN-Bus 2 (e.g. CANopen master)		(bus termination on/off switch)	
EtherCAT Slave	HW-Option ...-IF1-...	max. 100 MBaud	Optional internal module required
EtherCAT Master	SW-Option statt Ethernet	max. 100 MBaud	Just for control of external power stages and I/Os
Other industrial fieldbus systems like Profinet, PowerLink and Profibus can be offered on request			
Displays / LEDs			
Control unit: 16 input / 8 output / 3 status / 2 USB / 3 EtherCAT Power stage: 1 power / 1 fuse / 1 over current			
Mechanical Data			
Type of housing and mounting	Alurail compact housing with top hat rail mounting		
Dimension (H x W x D) / Weight	55 x 260 x 108 mm / 1450 g / Total height depends of connectors in use		
Connector types	Tension spring clamps with grid 3.5 (control unit) and high power connectors (power stages)		
OEM versions with customized housings or connector types on request			
Temperature Range			
Operation / Storage	0...+40° C / -20...+85° C	20...80% humidity	non-condensing
Typical Product Versions			
Part number / product name	001451 MACS5-AMP2	001454 MACS5-AMP2-IF1	001503 MACS5-AMP2-IO2