

## MACS5-AMP3-Lite Multi-axis control unit with integrated Servo Amplifiers

**For highly accurate positioning with incremental encoders & glass scales**

The **MACS5-AMP3-Lite** is a cost-optimized OEM multi-axis motion controller specially designed for use in special machine engineering. A programmable controller is combined with integrated servo amplifiers in the compact housing.

The **MACS5-AMP3-Lite** can control, position, and synchronize up to three servo drives as well as execute autonomously entire process steps.

It is possible to use different feedback signals simultaneously for each axis to achieve the most accurate positioning with automated slip compensation. There are direct encoder inputs for incremental encoders, SSI encoders, and Heidenhain glass scales.

The **MACS5-AMP3-Lite** can be used as device control stand-alone or using one of the interfaces in combination with a PLC. It is free programmable and even complex control tasks can be processed on its own. Each of the interfaces with its corresponding Windows DLL is available for controlling or visualization in PC systems.

### Application Range

- ◆ X/Y/Z positioning in measuring systems, robots, analysis and handling devices.
- ◆ Synchronization of highly dynamic drives, e.g. in labeling machines or feeding systems
- ◆ Standalone control of devices and simple machines



### 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** by the extensive automation software APOSS®-win and license free Motion Control Library.
- ◆ **Interactive graphic editors** like CAM-, Array- and Path-Editor.
- ◆ **Debugging & Optimization:** Smart-Oscilloscope and integrated graphic CAM-Editor.
- ◆ **State-Machine Support:** APOSS® supports the automatic execution of hierarchic State Machines.

### Advantages at a glance

- ◆ Compact and complete solution including internal power stages
- ◆ Highly accurate multi-axis position control without any license fees
- ◆ Free programmable motion and process control unit
- ◆ Direct encoder interfaces for incremental encoders and Heidenhain glass scales
- ◆ Ethernet and USB interfaces for data exchange with a PLC, a PC host, or a visualization system
- ◆ The **MACS5-AMP3-Lite** is an optimized solution for direct integration into devices due to its very compact size and its economical wiring. It adds motion control functionality and motor power stages to each PC and PLC based system or can even be used standalone.

## MACS5-AMP3-Lite

### Electrical Data

Control unit: Supply voltage	24 V DC $\pm$ 25 %	200 mA	without I/O load
Amplifiers: Supply voltage	12 - 50 V DC	Current requirement depending on requested motor power	

### CPU & Memory

Microprocessor	DSP TI C28346	300 MHz	
Workspace and program memory	1 Mbyte SRAM	4 Mbyte Flash	Application & data

### Closed loop Controls

Number of drives and control type	3	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 $\mu$ s cycle time	PI control plus current limitation

### Internal Servo Amplifiers

Quantity and type of motors	3 x brush-type or 2 x brushless or 1 stepper or mixed operation		
Amplifier type and chopping frequency	4Q-PWM / 24 kHz		
Max. output current (configurable)	3.2 A continuous current / 7 A peak current (max. 5 seconds) per amplifier / motor		
Option High Power (.... -HP)	4 A continuous current / 8 A peak current (max. 5 seconds) per amplifier / motor		

### Motion Control Functions

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.

Speed, position and CAM profiling synchronization with or without master / slave correction.

### Encoder Connections

All encoder inputs are configurable as feedback signal inputs of the motor control or as master signal inputs for drive synchronization.

Encoder 1 ... 3 (inputs)	Sin/Cos encoder	1 Vpp, max. 150 kHz	
Encoder 4 ... 6 (inputs, outputs)	Incremental encoder	5 V, max. 32 MHz	Configurable as virtual master output (0,037 Hz ... 625 kHz)
Output supply voltage	5 V DC, max. 200 mA per encoder, max. 1A total		

### Digital Inputs & Outputs

Digital inputs 1 - 4 can be configured as marker input signal for real-time encoder position latching.

Digital inputs	8	Low < 4.6 V / High > 18 V	max. 45 V, max. 200 kHz
Digital outputs	4	24 V, 100 mA, 300 kHz	

### Interfaces

CAN interface	ISO/DIS 11898	max. 1 Mbaud	Debugging feature
Serial interface	USB, Ethernet	Data exchange & visualization	
Additional bus systems	On request: e.g. EtherCAT, Profinet/-bus, POWERLINK, Modbus, Sercos, CAN master/slave, etc.		

### LEDs

Status	4
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### Mechanical Data

Type of housing and mounting	Compact metal housing		
Length x Width (incl. plugs) x Height	approx. 180 x $\leq$ 107 (113) x $\leq$ 65 mm		
Weight	0.95 kg	MACS5-AMP3-Lite	
	0.95 kg	MACS5-AMP3-Lite-HP	
Connector types	DSUB, RJ45, Molex		
Customer specific connector types and housing designs, amplifier design			

### Temperature Range

Operation / storage	0...+40° C / -20...+85° C	20...80 % humidity	non-condensing
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### Product names and Part number

Part number	001708: MACS5-AMP3-Lite
	001712: MACS5-AMP3-Lite-HP

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