

# MACS5-AMP3

## Multi-axis control unit with integrated Servo Amplifiers

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

The **MACS5-AMP3** is a multi-axis motion control solution specially designed for direct integration in small devices and tools. It combines a programmable control unit and three servo amplifiers in a compact housing.

The **MACS5-AMP3** and its internal servo amplifiers (max. 48 V, 4 A continuous, 10 A peak current) can position and synchronize up to three motors directly.

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** can be used stand-alone (without the need for a PLC or PC). It is free programmable and even complex control tasks can be processed on its own. As well, USB and CAN interfaces enable a fast and easy data exchange with PCs and PLCs, if required. One or more **MACS5-AMP3** can be also part of a PLC network and act as an "intelligent" DS402 multi-axis slave devices.

### 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



### 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
- ◆ CAN and USB interfaces for data exchange with a PLC, a PC host, or a visualization system
- ◆ The **MACS5-AMP3** 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

### 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	Closed loop control
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)	4 A continuous current / 8 A peak current (max. 10 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.  
 Speed, position and CAM profiling synchronization with or without master / slave correction.  
 Optional "DS402 Multi-Axis Drive" functionality for the integration of a MACS5-AMP3 as a CANopen or EtherCAT slave of a PLC.

### Encoder Inputs and Outputs

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, outputs)	Increment. 5V, max.32MHz	SSI max.32Bit, 39kHz-5MHz	
Encoder 4 ... 6 (inputs)	Increment. 5V, max.32MHz	SinCos 1 Vpp, max.150 kHz	Resolution: 1 Sinus = 256 qc max. 400 kHz at 25% resolution
Output supply voltage (for encoders)	5 V DC, max. 200 mA each Encoder, max. 1 A total		
Other feedback devices	CANopen encoders	max. 1 Mbaud	

### Digital Inputs & Outputs

Digital inputs 1–8 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	CAN master/slave functionality
Serial interface	USB		Data exchange & visualization
Additional bus systems	On request from 500 pcs. onwards: Ethernet, EtherCAT, Profibus, Profinet, POWERLINK, Modbus, Sercos		

### 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 107 (113) x 65 mm
Weight	0.95 kg
Connector types	DSUB, RJ45, Molex
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
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### Product names and Part number

MACS5-AMP3	No.: 001462
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member of maxon motor group

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