

MACS5-AMP3X

Multi-axis control measurement during path control

For highly accurate positioning with incremental encoders & glass scales

The standard equipment of the multi-axis controller **MACS5-AMP3X** in this **extended** version already includes an Ethernet interface as well as six analogue inputs, for example for the evaluation of analogue sensors.

The programmable control and its internal servo amplifiers 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-AMP3X 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, Ethernet, and CAN interfaces enable a fast and easy data exchange with PCs and PLCs, if required. One or more MACS5-AMP3X can be also part of a PLC network and act as an "intelligent" DS402 multi-axis slave devices.

During path control the new controllers can latch the positions for a digital signal in real time with 3 axes (cascadable up to 9 axes) without stopping the control system. This allows high-precision measurements during path control.

Application Range

- ◆ X/Y/Z-positioning in measurement systems, robots, analysis and handling devices.
- ◆ Synchronization of highly dynamic drives, e.g. in labeling machines or feeding systems.
- ◆ Control of small devices.
- ◆ Measurement during path control.



Multi-axis controller for up to 3 axes, cascadable up to 9 axes – developed, among other things, for measurement machines, measurement and test devices

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
- ◆ Digital and analog inputs and outputs
- ◆ The MACS5-AMP3X 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-AMP3X

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 μ 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 & 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-AMP3X 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)	Increm. 5V, max.32MHz	SSI max.32Bit, 39kHz-5MHz	
Encoder 4 ... 6 (inputs)	Increm. 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	

Analog Inputs/Outputs

Analog inputs	6 analog inputs	0-10 V, 12 Bit, max. 5 kHz	(not available, if analog opt. module in use)
Alternatively it is possible to mount internally one of 2 analog option modules (replacing the standard analog inputs using the X9 connector):			
Analog option 1 can be used to control up to three external servo amplifiers or frequency converters by a \pm 10 V command signal.			
Analog option 2 can be used to read in potentiometric position scales more precisely (i.e. 13 bit) than by the standard analog inputs.			
Analog option 1 (...-IO1-...)	1 analog input	\pm 10 V, 12 Bit, max. 5 kHz	\pm 10 V reference voltage
	3 analog outputs	\pm 10 V, 12 Bit, 20 mA, 10 kHz	(max. 20 mA)
Analog option 2 (...-IO2-...)	6 analog inputs	0-10 V, 13 Bit, max. 5kHz	+10 V reference voltage (nominal 7 mA, max. 35 mA)

Interfaces

CAN interface	ISO/DIS 11898	max. 1 Mbaud	CAN master/slave functionality
Ethernet	10 BASE-T/100 BASE-TX IEEE 802.3 10/100 Mbps		
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		
Size (W x H x D) / weight	180 x 80 x 108 mm	1.06 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-AMP3X	No.: 001486
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