

MACS5-Compact: Multi-Axis Controller for Positioning and Synchronization of up to 3 axes

Open Interfaces: CANopen, EtherCAT (opt.), Ethernet, USB

The **MACS5-Compact** replaces the successful **MACS3**: the same width and identical plugs allow easy replacement in the control cabinet, and all applications can – as they are backwards compatible – be adapted and continue to operate. Of course the **MACS5-Compact** is faster than the **MACS3**. With Ethernet, USB and optional EtherCAT, it has more interfaces, additional analogue inputs as well as an extra encoder.

Every **MACS5-Compact** module offers full featured functionality positioning and synchronization for up to 3 axes of servo and asynchronous motors. Interfaces for incremental, SinCos, and SSI encoders, as well as high-speed latching inputs are onboard.

Free programmability makes it possible to adapt the functionality exactly to the machine or device requirements and enable you even to enhance the DS402 features.

A single **MACS5-Compact** module can be used for autarkic control of small devices.

Applications

For example synchronization tasks in following machines and devices:

- ◆ Flying saw
- ◆ Belt synchronization, conveyor belts
- ◆ Winding application
- ◆ Printing machines
- ◆ X/Y tables
- ◆ Electronic gear
- ◆ Palletizing, packaging
- ◆ Synchronous feeding

Multiple Bus Interfaces

- ◆ USB and Ethernet for PC, PLC or visualization
- ◆ CANopen, EtherCAT®, POWERLINK to integrate MACS5 modules as “intelligent” slaves into any kind of PLC systems
- ◆ EtherCAT® and CANopen master functionality for drives and I/Os



zub Standards

- ◆ **Control Functions:** Interrupts reacting on inputs, position data, bus bits, timer, etc.; arithmetic and bit handling; conditional branches and loops.
- ◆ **Positioning Functions:** Configurable homing, absolute and relative positioning, programmable velocity 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.
- ◆ **On-the-fly Flexibility:** The entire set of motion or regulation parameters and the mode of operation can be altered on the fly with automatic recalculation of the motion profile.
- ◆ **Analog Options**
The analog option 1 can be used to control up to three external servo amplifiers or frequency converters by a ± 10 V command signal.
Analog option 2 can be used to read in potentiometric position scales in a more accurate way (i.e. 13 bit) than by the standard analog inputs.
- ◆ **Interfaces**
Alternatively or additionally further interfaces are possible as option e.g. EtherCAT slave or for OEM products on request e.g. POWERLINK.

Electrical Data

Supply voltage, current cons.	24 V DC ±25 %	200 mA	current consumption without I/O-load
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CPU & Memory

Microprocessor	DSP TI C28346	300 MHz	
Workspace & program memory	1 Mbyte SRAM	4 Mbyte Flash	firmware, application, and data
Micro SD memory card	up to 1 Gbyte		e.g. for SW update or data recording

Control Characteristic

Axis control: number and type	1...3	PID with feed forward	number depends on configuration
Position control frequency	1 kHz	1 ms cycle time	configurable

Motion-Control Functionality combined with Programmability

Velocity and position control with linear, S-profile or jerk limited ramps

Velocity and position / angle synchronization with or without master / slave marker correction, CAM profile synchronization

Encoder Terminals

Encoder 1 ... 3	Incremental encoder or SSI encoder or Sin/Cos encoder	5 V, max. 5 MHz max. 32 Bit, 39 kHz... 5 MHz 1 Vpp, max. 150 kHz	NOTE: Encoder 3 has no index signal
Encoder power supply output	Configurable as slave (positioning) or master inputs (synchronization) or as a virtual master output (0,037 Hz... 625 kHz)		
Encoder power supply output	5 V DC, max. 200 mA pro encoder, max. 1 A total		
Additional supported encoder	CANopen absolute encoder (max. 1 Mbaud); on request Hiperface or EnDat encoder.		

Digital Inputs / Outputs

Digital Inputs	10	Low: < 4.6 V / High: > 18 V	max. 45 V, max. 200 kHz
	Inputs 1 - 8 can be configured as marker inputs for hardware encoder position latching.		
Digital Outputs	6	24 V, 100 mA, 300 kHz	24 V encoder simulation configurable

Analog Inputs/Outputs

Analog inputs	6 analog inputs	0-10 V, 10 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 ±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 3 analog outputs	±10 V, 12 Bit, max. 5 kHz ±10 V, 12 Bit, 20 mA, 10 kHz	±10 V reference voltage, (max. 20 mA)
Analog option 2 (...-IO2-...)	6 analog inputs	0-10 V, 13 Bit, max. 5 kHz	+10 V ref. 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. CAN slave)	ISO/DIS 11898	max. 1 Mbaud	2 independent CAN interfaces offering master and slave functionality
CAN bus 2 (e.g. CAN master)		(switchable bus termination)	
EtherCAT® Slave	HW option: ...-IF1-...	max. 100 Mbaud	internally mounted option module
EtherCAT® Master (alternatively in place of Ethernet)	SW option specific only for drives & I/Os	max. 100 Mbaud	Optimized EtherCAT® Master, e.g. for sub- networks with servo drives and FCs and for I/O-extension modules.
PowerLink, Profibus, ProfiNet	On request for OEM products (min. 500 pcs.).		

Displays / LEDs

10 inputs / 6 outputs / 3 status

Powerdown Save

User-defined data can be saved automatically at power-down (e.g. in case of mains failure).

Mechanical Data

Type of housing, mounting	Alurail compact housing with top hat rail or wall mounting		
Dimension and weight	124 x 69.5 x 112 mm (HxWxD), 0.8 kg; (without connecting; effective height depends from the type of used connector boards)		
Connector type	Pluggable tension spring clamps RM3.5		
OEM versions with customized housings or connector types on request			

Temperature Range

Operation / storage	0...+40° C / -20...+85° C	20...80 % humidity, not condensing
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Typical product types

Part numbers	001691: MACS5-Compact	001690: MACS5-Compact -IO1
	001689: MACS5-Compact-IF1	001700: MACS5-Compact-IF1-IO1