

## Data Sheet

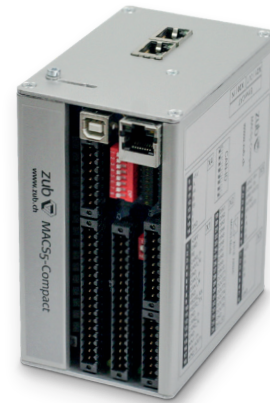
## MACS5-Compact

## for Positioning and Synchronization of up to 3 axes

The MACS5-Compact replaces the successful MACS5: 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.



## 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** 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
- **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

## Multiple Bus Interfaces

USB and Ethernet for PC, PLC or visualization, CANopen, EtherCAT, POWERLINK to integrate MACS, modules as "intelligent" slaves into any kind of PLC systems, EtherCAT and CANopen master functionality for drives and I/Os.

## Application Range

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

## Options

**Analog Options:** The 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 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.

## MACS5-Compact

<b>Electrical Data</b>			
Supply voltage, current cons.	24 V DC $\pm$ 25 %	200 mA	current consumption without I/O-loadt
<b>Memory</b>			
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
<b>Control Characteristic</b>			
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
<b>Motion-Control Functionality</b>			
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			
<b>Encoder Terminals</b>			
Encoder 1 ... 3	Incremental encoder or SSI encoder or Sin/Cos encoder	5 V, max. 5 MHz max. 32 Bit, 39 kHz... 5MHz 1 Vpp, max. 150 kHz	NOTE: Encoder 3 has no index signal
Configurable as slave (positioning) or master inputs (synchronization)			
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		
<b>Digital Inputs / Outputs</b>			
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
<b>Analog Inputs / Outputs</b>			
Analog inputs	6 analog inputs	0-10V, 10 Bit, max. 1 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. 1 kHz	$\pm$ 10 V reference voltage, (max. 20 mA)
3 analog outputs			
Analog option 2 (...-IO2-...)	6 analog input	0-10 V, 13 Bit, max. 1 kHz	$\pm$ 10 V voltage; (nom. 7 mA, max. 35 mA)
<b>Interfaces</b>			
USB			data exchange & visualization
Ethernet	Ethernet TCP/IP	max. 100 MBaud	data exchange & visualizationg
RS232	Special protocols on request		
RS485	On request		
CAN-Bus 1 (e. g. CAN slave)	ISO/DIS 11898	max. 1 MBaud (switchable bus termination)	2 independent CAN interfaces offering master and slave functionality
CAN-Bus 2 (e. g. CAN master)			
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 subnetworks with servo drives and FCs and for I/O-extension modules
Other industrial fieldbus systems like Profinet, PowerLink and Profibus can be offered on request.			
<b>Displays / LEDs</b>			
10 inputs / 6 outputs / 3 status			
<b>Powerdown Save</b>			
User-defined data can be saved automatically at power-down (e.g. in case of mains failure)			
<b>Mechanical Data</b>			
Type of housing, mounting	Alurail compact housing with top hat rail or wall mounting		
DDimension (H x W x D) / Weight	124 x 69,5 x 112 mm / 800 g; (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			
<b>Temperature Range</b>			
Operation / storage	0...+40° C / -20...+85° C	20...80 % humidity	not condensing
<b>Typical product types</b>			
Part numbers	001691 MACS5-Compact	001690 MACS5-Compact -IO1	
	001689 MACS5-Compact-IF1	001700 MACS5-Compact-IF1-IO1	