

# MACS<sub>4</sub>-DSP

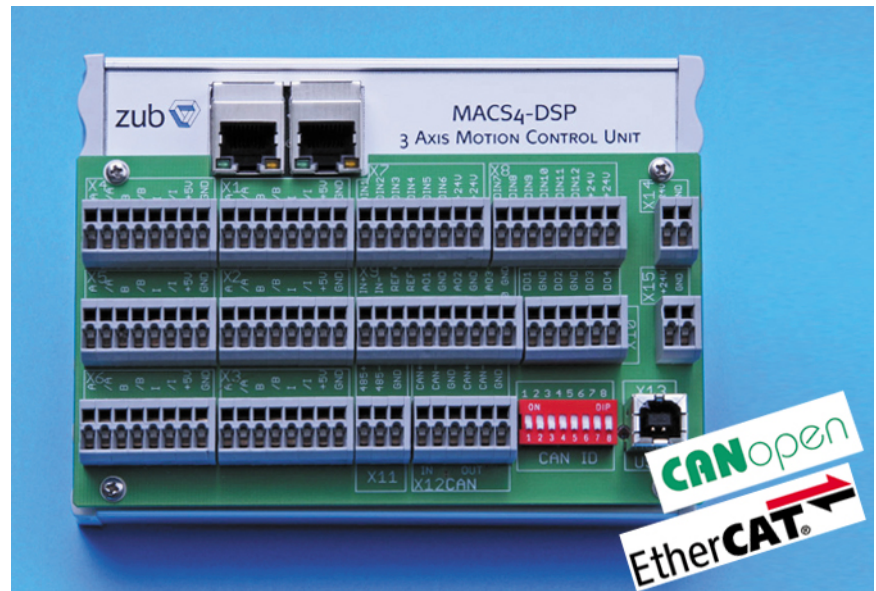
## 1-, 2- AND 3-AXIS COMPACT CONTROL UNIT

### for Positioning and Synchronization without License Fees

The **MACS<sub>4</sub>-DSP<sub>3</sub>** is a compact single and multi-axis control unit used in plant and manufacturing industry.

Standard interfaces, like EtherCAT, CANopen, USB, and RS485 are included to link to a supervisor (PLC or PC), as well as to subordinated units like servo amplifiers and frequency converters.

The **MACS<sub>4</sub>-DSP** is the most competitive and high-performance link in between your process control and drive units. Thanks to a number of integrated encoder inputs and the license free, highly sophisticated motion control functions the **MACS<sub>4</sub>-DSP** reduces your hardware and software expenses and unloads your supervisor PLC.



#### Your Prospects

- ◆ Unloading the PLC  
=> Downsizing of PLC hardware
- ◆ NO additional or hidden costs for ...  
... motion control libraries  
... external encoder interfaces  
... bus converters

#### Your Advantage

- ◆ Reduce your total system costs!

#### Application Range

- ◆ Positioning
- ◆ Storage / Cart positioning
- ◆ Feeding / Synchronous feeding
- ◆ Winding / Position synchronization
- ◆ Labeling / Marker synchronization

Did we miss your application?  
Please, call us!

zub machine control AG will offer you  
an appropriate solution for that as well.

#### 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

#### CAM Functions

- ◆ Interactive graphical CAM editor with position, velocity and acceleration diagram
- ◆ Definition of curve points by data input or drag and drop
- ◆ Calculation of minima / maxima

#### 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.

#### Bus and Control Functions

- ◆ CANopen master-/slave functionality
- ◆ EtherCAT® slave functionality
- ◆ RS485 data exchange with Danfoss frequency converters
- ◆ Interrupts reacting on inputs, position data, bus bits, timer, etc.
- ◆ Arithmetic and bit handling
- ◆ Conditional branches and loops

#### Debugging & Optimization

Performance optimization of your machine and process task is assisted by the development environment with an integrated curve editor and a smart oscilloscope tool.

#### Conclusion

**MACS<sub>4</sub>-DSP** is the most competitive multi-axis control without license fees.

#### P.S.

The **MACS<sub>4</sub>-DSP** can also be used standalone for devices without a supervisor system.

**Electrical Data**

Supply voltage, Current consumption	24 V DC $\pm$ 25 %	200 mA	without I/O-load
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**CPU & Memory**

Microprocessor	DSP TI2812	150 MHz	
Workspace & program memory	1 Mbyte SRAM	512 kbytes Flash	Application & data

**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 ... 6	Incremental encoder or SSI encoder or Sin/Cos encoder	5 V, max. 32 MHz max. 32 Bit, 39 kHz...5 MHz 1Vpp, max. 150 kHz	Encoder 1 - 6 / Enc. 4: 5 MHz only Encoders 1 - 3 only Encoders 4 - 6
Enc. 1 ... 6 configurable as slave (☞ positioning) or master inputs (☞ synchronization) Enc. 4 configurable as a virtual master output (0.037 Hz ... 625 kHz) or as SSI clock			
Encoder power supply output: 5 V DC, max. 200 mA per encoder, total: max. 1A			
Additional supported encoder types: CANopen absolute encoder (max. 1 Mbaud)			

**Digital Inputs / Outputs**

Digital Inputs	12	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	4	24 V, 100 mA, 300 kHz	24V enc. simulation configurable

**Analog Inputs/Outputs** ☞ Only for MACS4-...-ANA versions

e.g. analog command output (+/- 10V or bipolar + direction) for external servo amplifiers or frequency converters

Analog Inputs	1	$\pm$ 10V, 12 Bit, max. 5 kHz	
Analog Outputs	3	$\pm$ 10V, 12 Bit, 20 mA, 10 kHz	e.g. analog command output
Reference voltage (output)	$\pm$ 10 V DC	max. 20 mA	

**Interfaces**

CAN interface	ISO/DIS 11898	max. 1 Mbaud	CAN master / slave functionality
Serial interface 1	USB		Development & visualization
Serial interface 2	RS485	max. 10 Mbaud	e.g. for Danfoss frequency converter
EtherCAT®	☞ Only for MACS4-...-EtherCAT versions		
Profibus, ProfiNet, PowerLink	☞ Only for OEM products (starting at 500 units) on request		

**Integrated Power Amplifiers** ☞ Only for MACS4-DC6-... or MACS4-DC3 or OEM-versions (min. 1'000 units)

	MACS4-DC6-...	MACS4-DC3	
No. of 4Q-PWM power stages	6 x DC	3 x DC or 2 x EC	
Supply voltage	12 ... 48 V DC	24 ... 48 V DC	
Continuous / peak output current	1.5 A / 3.8 A	3 A / 7 A	per amplifier
Speed / current control frequency	1 kHz / 4 kHz	2.5 kHz / 5 kHz	

**LEDs**

Inputs / Outputs / Status / USB	12 / 4 / 3 / 2
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**Mechanical Data**

Type of housing, mounting	Alurail compact housing	Top hat rail mounting	
Length x Width x Height / Weight	approx. 145 x 105 x 45 mm	approx. 0.4 kg	MACS4-DSP
Length x Width x Height / Weight	approx. 185 x 130 x 70 mm	approx. 0.5 kg	MACS4-DC6
Connector type	Tension spring clamp	pluggable connector board	other connector types on request

**Temperature Range**

Operation / Storage	0...+40 C / -20...+85 C	20...80 % humidity	non condensing
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**Product Types and Ordering Codes**

Base Version	plus EtherCAT®	plus Analog-I/O	plus EtherCAT and Analog
MACS4-DSP Order-No. 001134	MACS4-DSP-EtherCAT Order-No. 001242	MACS4-DSP-ANA Order-No. 001174	MACS4-DSP-EtherCAT-ANA Order-No. 001183
MACS4-DC6 Order-No. 001244	MACS4-DC6-EtherCAT Order-No. 001245	MACS4-DC6-ANA Order-No. 001247	MACS4-DC6-EtherCAT-ANA Order-No. 001246
MACS4-DC3 Order-No. 001166			

**Customized connector boards, power stages, and functionality on request!**

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