

# MACS<sub>4</sub>-DC6

## 6-AXIS COMPACT CONTROL UNIT WITH INTEGRATED AMPLIFIERS

### Low cost Control for Positioning Tasks of small DC drives of 1 - 100W

The **MACS<sub>4</sub>-DC6** is the first compact 6-axis control unit offering you a low cost solution for simple positioning tasks. Typical applications are found in machines and factory equipment of the paper, printing, wood-working and analytic industry. The **MACS<sub>4</sub>-DC6** controls the accurate and fast adjustment of mechanical stops as well as the multi-axis positioning of small robots in material or probe handling.

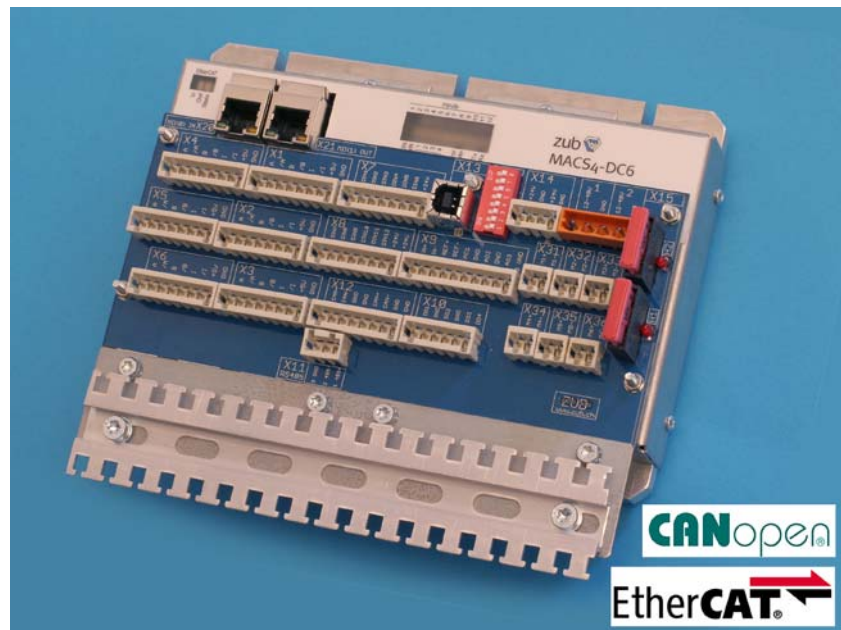
The **MACS<sub>4</sub>-DC6** integrates a freely programmable logic and position control unit with six encoder inputs and six DC servo amplifiers. The state-of-the-art integrated development environment is free of charge. There are no expensive add-on libraries necessary to gain full motion-control functionality. Modern interfaces like EtherCAT, CAN, and USB are your link to PLCs and PCs.

#### Your Chances / Your Benefit

- ◆ Compact low cost solution, including servos and encoder inputs.
- ◆ Brush-type motors from 1 - 100 W can be used in any combination.
- ◆ For integration as a fully featured DS402 CANopen- or EtherCAT-slave unit in a PLC environment.
- ◆ Stand-alone control functionality for small devices and systems.
- ◆ No hidden costs for ...
  - ... motion control libraries
  - ... external encoder inputs
  - ... bus converters

#### The benefit of your Costumer

- ◆ Flexible utilizable machines
- ◆ Position adjustment on a keypress
- ◆ Easy handling of multi-axis tasks in cost-sensitive small robots



#### Application area

- ◆ Position controlled, motor-driven adjustment of mechanical stops in all kind of machines
- ◆ Multi-axis positioning of small robots and handling devices
- ◆ Speed and flow control of small pump systems

#### Closed loop Control

- ◆ Position control
- ◆ Speed control
- ◆ Current control & limitation

#### Positioning Functions

- ◆ Configurable homing
- ◆ Absolute & relative positioning
- ◆ Configurable velocity profiles

#### I/O-Functions

- ◆ Set / reset of outputs
- ◆ Read & interrupt control of inputs
- ◆ Support of CANopen-I/O modules

#### Bus & Control Functions

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

#### Debugging & Optimization

Performance optimization and testing is assisted by the development tool including a smart oscilloscope.

#### Conclusion

**MACS<sub>4</sub>-DC6** =

Control and power for up to 6 drives in its most compact version.

#### P.S.

The **MACS<sub>4</sub>-DC6** can be used as a DS402 multi-axis-slave in a PLC-system or it can be programmed freely and run stand-alone as a fully featured motor control unit.

**Electrical Data**

Control Unit: Supply voltage / Current	24 V DC $\pm$ 25 %	200 mA	without I/O-load
The supply circuits of the power stages are grouped. The power stage 1 - 4 have one common supply. The power stages 5 - 6 have another common supply. The supplies of both groups are completely independent and have each pluggable 4A fuses (ex factory). If the maximum motor power is required, the standard fuses have to be replaced by ones with higher current ratings.			
Power Stage 1 - 4: Supply voltage / Fuse	12 - 48 V DC	4 A (ex factory) / max. 15 A	depending on motor power
Power Stage 5 - 6: Supply voltage / Fuse	12 - 48 V DC	4 A (ex factory) / max. 7.5 A	depending on motor power

**CPU & Memory**

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

**Closed loop Controls**

Number of drives and control type	6	Position, Speed, Current	Closed loop Control
Position control	1 kHz	1 ms cycle time	PID control plus feedforward
Speed control	1 kHz	1 ms cycle time	PI control
Current control	8 kHz	125 $\mu$ s cycle time	PI control plus current limitation

**Internal Power Stages**

Quantity	6		for brush-type DC motors
Amplifier type & chopping frequency	4Q-PWM	24 kHz	
Max. output current (configurable)	1.5 A continuous	3.8 A peak (min. 60 sec.)	per amplifier, Period of time of peak current depends on cooling

**Motion-Control Functionality**

Free programmable velocity, position, synchronization and process control or usage of the standard application "DS402 Multi-Axis Drive" to integrate the MACS4 as a CANopen or EtherCAT slave into a PLC system.

**Encoder Inputs**

All encoder inputs are configurable for the use of incremental (5V) or SSI absolute encoders			
Encoder 1 ... 6	- Incremental encoder - SSI encoder	5 V, max. 32 MHz max. 32 Bit, 39 kHz...5 MHz	TTL or differential (RS422) One common SSI clock or passive mode
Additional supported encoder types	CANopen absolute encoder (max. 1 Mbaud)		
Encoder power supply output	5 V DC, max. 200 mA per encoder, total: max. 1A		

**Digital Inputs / Outputs**

Inputs 1 - 8 can be configured as marker inputs for hardware encoder position latching			
Digital Inputs	12	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** ☞ Only for MACS4-DC6-...-ANA versions

e.g. analog command output ( $\pm$ 10 V or unipolar + direction) for external servo amplifiers or frequency converters			
Analog Inputs	1	$\pm$ 10 V, 12 Bit, max. 5 kHz	
Analog Outputs	3	$\pm$ 10 V, 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-DC6-EtherCAT-... versions		
Other bus interfaces	☞ Only on request (starting at 500 units), e.g. Ethernet, Profibus, Profinet, Powerlink, Modbus		

**LEDs**

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

Type of housing / Mounting	Compact metal housing		
Full size (H x B x D) / Weight	80 x 185 x 165 mm	incl. connector and shielding	approx. 1.4 kg
Dimension of mounting base (B x D)	185 x 135 mm		
Connector type:	Pluggable tension spring clamps RM3.5 and RM5.08 (power stage supply)		
The MACS4-DC6 is delivered with all counter plugs! The connector board is pluggable and locked by six screws.			

**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-DC6 Order-No. 001244	MACS4-DC6-EtherCAT Order-No. 001245	MACS4-DC6-ANA Order-No. 001247	MACS4-DC6-EtherCAT-ANA Order-No. 001246

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

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