

MACS₄-DC₃

MULTI-AXIS-CONTROL UNIT WITH INTEGR. SERVO-AMPLIFIERS

for highly accurate positioning with incremental encoders & glass scales

The **MACS₄-DC₃** is the optimized solution for all kind of devices requiring a highly accurate positioning linked to incremental or glass scale feedback signals.

The **MACS₄-DC₃** offers the interface for the direct connection of Heidenhain glass scales without expensive signal converters and adapters. Absolute positioning in the range of μm without homing in advance becomes affordable and easy to handle. The incremental encoders mounted on the motor shaft are used to guarantee a stable position regulation without the influence of gearbox backlash. The highly accurate target position is adjusted by the glass scale information. Jerk limited curve profiles provide a smooth movement for sophisticated positioning tasks.

The **MACS₄-DC₃** combines low-cost connector types, a compact housing, high-end motion control functionality and the most common interfaces to link it to a PLC or PC system.

Your Chances / Your Benefit

- ◆ Compact and complete solution, including internal power stages and different encoder interfaces
- ◆ Highly accurate multi-axis positioning control without any library license fees
- ◆ Free programmable process control unit
- ◆ Direct encoder interfaces for Heidenhain glass scales
- ◆ CAN and USB interfaces for data exchange with PLC and PC hosts



Application area

- ◆ X/Y/Z positioning of measuring equipment
- ◆ Multi-axis position control of small robots
- ◆ Motion control of handling devices

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
- ◆ 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

MACS₄-DC₃ = Maximum position accuracy for up to 3 drives at minimum costs.

P.S.

The **MACS₄-DC₃** 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	24 V DC \pm 25 %	200 mA	without I/O-load
Power Stage: Supply voltage	24 - 48V DC		

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	3	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 μ s cycle time	PI control plus current limitation

Internal Power Stages (configurable for brush-type or brushless motors)

Quantity	3 x brush-type motors	2 x brushless motors	alternatively configurable
Amplifier type & chopping frequency	4Q-PWM	24 kHz	
Max. output current (configurable)	3 A continuous	7 A peak (brush-type motors) 3.8 A peak (brushless motors)	per powerstage / motor. Period of time of peak current depends on cooling and ambient temperature, typically 60 sec.

Motion-Control Functionality

Free programmable velocity, position, synchronisation and process control.

Highly accurate position control by single or duplex evaluation of encoders mounted on the motor shaft and moved load.

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

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

Enc. 1 ... 6 configurable as slave (☞ positioning) or master inputs (☞ synchronization)

Encoder 1 ... 3	Incremental encoder	5 V, max. 32 MHz	TTL or differential (RS422)
Encoder 4 ... 6	SinCos encoder / glass scale	1 Vpp, max. 150 kHz	Resolution: 1 sinus = 256 qc max. 400 kHz at 25% resolution

Additional Encoder types CANopen absolute encoders (max. 1 Mbaud)

Hall Sensors H1, H2, H3 for 2 motors 5 V

Encoder / Hall sensors Supply

Internal Power Supply 5 V DC max. 1A (totally)

Digital Inputs / Outputs

Inputs 1 - 4 can be configured as marker inputs for hardware encoder position latching

Digital Inputs	4	Low: < 4.6 V / High: > 18 V	max. 45 V, max. 200 kHz
Digital Outputs	2	24 V, 100 mA, 300 kHz	

Interfaces

CAN interface	ISO/DIS 11898	max. 1 Mbaud	CAN master / slave functionality
Serial interface	USB		Development & visualization

LEDs

Status 4

Mechanical Data

Type of housing / Mounting	Compact metal housing		
Length x Width x Height / Weight	approx. 180 x 105 x 65 mm	approx. 0.5 kg	
Connector type	DSUB, RJ45, Molex		

Temperature Range

Operation / Storage 0...+40 C / -20...+85 C 20...80 % humidity non condensing

Product Types and Ordering Codes

MACS4-DC3 Order-No. 001166

Customized connectors, housings, power stage design, and firmware functionality on request!