

MACS₄-60-20

OEM 1-AXIS COMPACT CONTROL UNIT

Including an Integrated Servo Amplifier

The **MACS₄-60-20** is a compact high-power OEM control unit for positioning and synchronization tasks of brush and brushless servo motors.

The **MACS₄-60-20** combines a high-level program language, full digital position, velocity and current control as well as a high-output power stage in a compact OEM module. It is designed for integration in series-produced machines and devices.

An RS232, RS485 and CAN interface allow commanding and data exchange with PLCs, PC or terminals.

Application Range

- ◆ **Pumps**
Speed and volume control
- ◆ **Electric Screwdrivers**
Torque control
- ◆ **Conveyers**
Velocity control
- ◆ **Storage**
Cart positioning
- ◆ **Rigging**
Mechanical stop adjustment
- ◆ **Feeding**
Synchronous component feeding
- ◆ **Winding**
Electronic servo traversing gear
- ◆ **Dosing**
Injection plunger control
- ◆ **Labeling**
Synchronous label ejection

Did we miss your application?
Please, call us!

zub machine control AG will offer you a complete solution at optimal cost.

Positioning Functions

The **MACS₄-60-20** offers everything needed for positioning tasks:

- ◆ Configurable homing
- ◆ Absolute and relative positioning
- ◆ Marker-related positioning
- ◆ Programmable velocity profiles

Synchronization Functions

The **MACS₄-60-20** handles all kinds of synchronization of the slave axis depending on an independent master axis:

- ◆ Velocity synchronization
- ◆ Position / angle synchronization
- ◆ Synchronization including master or slave marker correction

CAM Functions

High-level tools for CAM profiling are part of the development environment:

- ◆ Interactive, graphical CAM editor with position, velocity and acceleration diagrams
- ◆ 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:

- ◆ On-the-fly switch around between synchronous, positioning or velocity control mode
- ◆ On-the fly modification of target position, velocity, acceleration / deceleration or synchronization factors



Bus and Control Functions

The programming language of the **MACS₄-60-20** offers powerful, but easy-to-use, commands for process control, communication and code structuring:

- ◆ Querying and commanding of external CANopen inputs and outputs
- ◆ CAN-Master functionality and data exchange by SDOs and PDOs
- ◆ Interrupts reacting on inputs, position data, bus bits, timer, etc.
- ◆ Arithmetic and bit handling
- ◆ Conditional branching, different types of loop constructions and subprogram technology

Debugging & Optimization

The development environment offers efficient tools for debugging and process optimization to get the most out of the **MACS₄-60-20** and the mechanics:

- ◆ Recording of motion profiles
- ◆ Configurable recording of process, system and motion data at runtime
- ◆ Online access to program variables and internal system data

Electrical Data

Supply voltage: Logic & I/O	Vcc	24 V DC \pm 25 %	
Supply voltage: Power stage	Vb	11 ... 60 V DC	
Continuous output current	Icont	20 A	depending on the heat sink
Peak output current	I _{max}	30 A	depending on the heat sink
Peak current period		approx. 1 sec	depending on the heat sink
PWM frequency		50 kHz	
Efficiency		95 %	
Min. required inductance	L _{motor}	200 μ H (50 kHz)	
Supported motor technology	brush brushless		DC Servomotor 2-, 4-, 8-pole motors Y- or delta connection 60 / 120 hall sensors

CPU

Microprocessor	CPU	DSP TI2812, 150 MHz	
Workspace memory	SRAM	1 Mbyte	
Persistent program memory	Flash EPROM	512 kbyte	Application programs and persistent data

Timing of Control Loops

Current control frequency	kHz	5 kHz	= 200 μ s cycle time
Velocity control frequency	kHz	2.5 kHz	= 400 μ s cycle time
Position control frequency	kHz	1 kHz	= 1 ms, configurable

Encoder Inputs

Encoder 1	Master		Master of synchronization
Encoder 2	Slave		Regulated axis
Supported encoder types	Incremental CANopen absolute encoders	5 V, 220 kHz	5V differential, RS422

Digital / Analogue Inputs

Digital 1 ... 10	13...30 VDC (high)		R _i = 4.7 k Ω
Analogue 1	-10 ... +10V	12 Bit	R _i = 115 k Ω versus GND

Digital / Analogue Outputs

Digital 1 ... 6	Vcc - 1 V	I _L < 500 mA	Short-circuit proof, 24 V
Analogue 1 ... 2	-10 ... +10V	12 Bit, 5 mA	Short-circuit proof

LEDs

Inputs / Outputs / Status	10 / 6 / 8
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Auxiliary Supplies

Encoder / hall power supply	+5 V DC	max. 150 mA
Reference voltage analogue I/Os	\pm 10 V DC	max. 5 mA

Interfaces

CAN interface	ISO/DIS 11898	
Serial interface 1	RS232	max. 115 kBaud
Serial interface 2	RS485	max. 115 kBaud

Mechanical Data

Type of housing	Open Frame	OEM without heat sink
Size	150 x 125 x 40 mm	without heat sink
Weight	t.b.d.	depending on heat sink
Connector type	Molex	male for crimp connectors

Temperature Range

Operation / Storage	0 ... +40 C / -20 ... +85 C
Humidity (not condensing)	20 ... 80 %

Modes of Operation

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

PRELIMINARY DATA SHEET

No responsibility is taken for the correctness of the given information