

# EPOS2 Positioning Controllers Summary

Online commanded



## EPOS2 24/2

- Several device variations allows the operation of various maxon DC and EC micromotors up to 48 watts
- Point to point control (1 axis)
- Interpolated Position Mode (PVT)
- Combination of several drives via CAN Bus
- CANopen
- 6 digital inputs
- 2 digital outputs
- 2 analog inputs
- Miniaturized design

Details pages 432–434

Slave version (online commanded) using CAN Master (EPOS2 P, PC, PLC, SoftPLC, etc.) or PC via USB or RS232 interface

Typical applications:

- Small apparatus/appliances
- System automation tasks
- Drive technology

### Part Numbers

EPOS2 24/2      **380264, 390003**  
**390438, 530239**

Online commanded



## EPOS2 Module 36/2

- DC and EC motors up to 72 W
- Point to point control unit (1 axis)
- Interpolated Position Mode (PVT)
- Combination of several drives via CAN Bus
- CANopen
- 6 digital inputs
- 3 digital outputs
- 2 analog inputs
- Miniaturized open electronics board (OEM)

Details pages 432–434

Slave version (online commanding) using CAN Master (EPOS2 P, PC, PLC, SoftPLC,  $\mu$ -Processor, etc.) or PC via USB <sup>1</sup> or RS232 interface <sup>1</sup>requires external transceiver

Typical applications:

- Small apparatus/appliances
- System automation tasks
- OEM customers

### Part Number

EPOS2 Module 36/2      **360665**

Online commanded



## EPOS2 24/5

- DC and EC motors up to 120 W
- Point to point control unit (1 axis)
- Interpolated Position Mode (PVT)
- Combination of several drives via CAN Bus
- CANopen
- 6 digital inputs
- 4 digital outputs
- 2 analog inputs
- Compact design

Details pages 432–435

Slave version (online commanding) using CAN Master (EPOS2 P, PC, PLC, SoftPLC, etc.) or PC via USB or RS232 interface

Typical applications:

- Tool building
- Production equipment
- System automation tasks

### Part Number

EPOS2 24/5      **367676**

Online commanded



## EPOS2 50/5

- DC and EC motors up to 250 W
- Point to point control unit (1 axis)
- Interpolated Position Mode (PVT)
- Combination of several drives via CAN Bus
- CANopen
- 11 digital inputs
- 5 digital outputs
- 2 analog inputs
- 1 analog output
- Compact design

Details pages 432–435

Slave version (online commanding) using CAN Master (EPOS2 P, PC, PLC, SoftPLC, etc.) or PC via USB or RS232 interface

Typical applications:

- Tool building
- Production equipment
- System automation tasks

### Part Number

EPOS2 50/5      **347717**

Online commanded



## EPOS2 70/10

- DC and EC motors up to 700 W
- Point to point control unit (1 axis)
- Interpolated Position Mode (PVT)
- Combination of several drives via CAN Bus
- CANopen
- 10 digital inputs
- 5 digital outputs
- 2 analog inputs
- Robust design

Details pages 432–435

Slave version (online commanding) using CAN Master (EPOS2 P, PC, PLC, SoftPLC, etc.) or PC via USB or RS232 interface

Typical applications:

- Production equipment
- System automation tasks
- Plant construction

### Part Number

EPOS2 70/10      **375711**

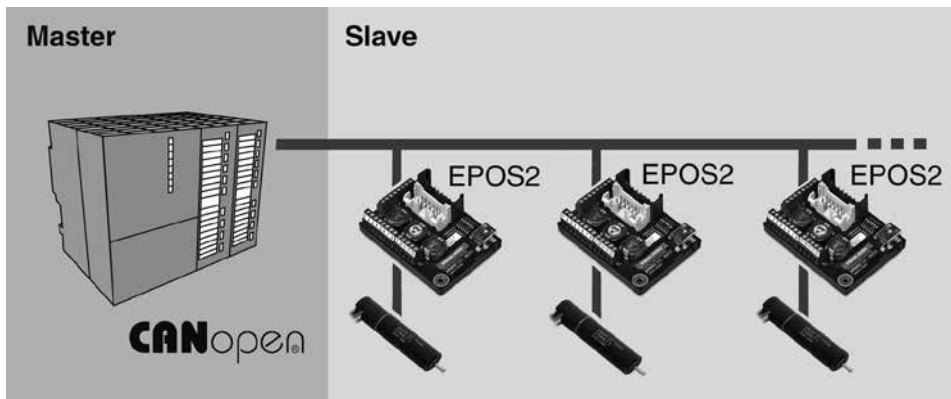
# EPOS2 Positioning Controllers



### CANopen Slave (online commanded)

Single motion and I/O commands from the process control are transmitted to the positioning control unit by a superior system (Master). For that purpose product specific commands are available.

EPOS2 is a modular constructed digital positioning controller. It is suitable for DC and EC motors with incremental encoder with a power range from 1 to 700 watts continuous power. A number of operating modes provides flexible application in a wide range of drive systems in automation technology and mechatronics.



### Point to point

The “CANopen Profile Position Mode” moves the position of the motor axis from point A to point B. Positioning is in relation to the axis Home position (absolute) or the actual axis position (relative).

### Interpolated Position Mode (PVT)

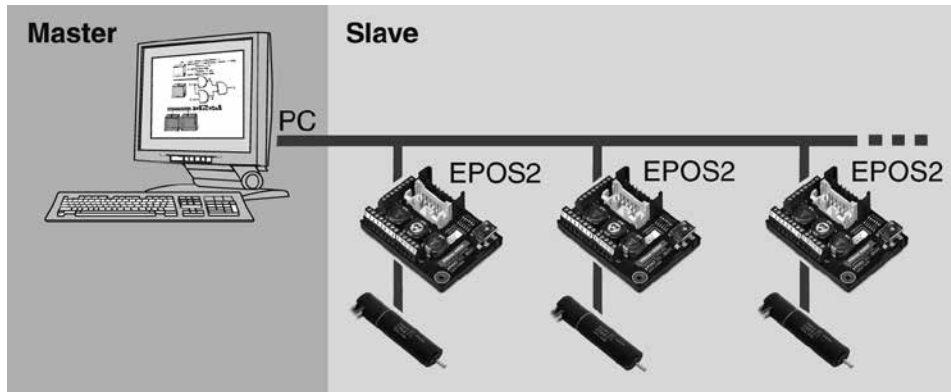
Thanks to Interpolated Position Mode, the EPOS2 is able to synchronously run a path specified by interpolating points. With a suitable master, coordinated multi-axis movements as well as any profile in a 1-axis system can be carried out. (PVT = Position and Velocity versus Time)

### Position and Speed control with Feed Forward

The combination of feedback and feed forward control provides ideal motion behavior. Feed forward control reduces control error. EPOS2 supports feed forward acceleration and speed control.

### Speed control

In “CANopen Profile Velocity Mode”, the motor axis is moved with a set speed. The motor axis retains speed until a new speed is set.



**Torque control**

In “Current Mode”, a controlled torque can be produced on the motor shaft. The sinusoidal commutation used produces minimum torque ripple.

**Homing**

The “CANopen Homing Mode” is for referencing to a special mechanical position. There is a wide variety of methods for referencing.

**Electronic gearhead**

In “Master Encoder Mode”, the motor follows a reference input produced by an external encoder. A gearing factor can also be defined using software parameters. Two motors can be very easily synchronized using this method.

**Step/Direction**

In “Step/Direction Mode” the motor axis follows a digital signal step-by-step. This mode can replace stepper motors. It can also be used to control the EPOS2 by a PLC without CAN interface.

**Analog Commands**

In the position, speed and current mode it is possible to give commands via an external analog set value. This function offers further possibilities to operate the EPOS2 without serial on-line commanding.

**Capture inputs (Position Marker)**

Digital inputs can be configured so that the actual position value is saved when a positive and/or negative edge of an input appears.

**Trigger output (Position Compare)**

Digital outputs can be configured so that a digital signal is emitted at a set position value.

**Dual-loop position and speed control**

With an additional sensor the load can be controlled directly and with high precision; the motor control is subordinated. The mechanical backlash and the elasticity can be compensated.

Wide range of sensors can be handled: digital incremental encoder, SSI absolute encoder, analog incremental encoder (sin/cos). (Only in use with EPOS2 50/5 and EPOS2 70/10.)

**Control of holding brakes**

The control of the holding brake can be implemented in the device state management. The delay times can be individually configured for switching on and off.

Additional information for technical data of page 434/435

**Standardized, extendable**

CANopen standard CiA 301, 402 and 305. Can easily be integrated into existing CANopen systems. Networks with other CANopen modules. Alternatively controllable by serial interface (USB and RS232).

**Flexible, modular**

The same technology for DC and EC motors. Configurable inputs and outputs for limit switches, reference switches, brakes and for other sensors and indicators near the drive.

**Easy start-up procedure**

Graphic user interface with many functions and wizards for start-up procedure, automatic control settings, I/O configuration, tests.

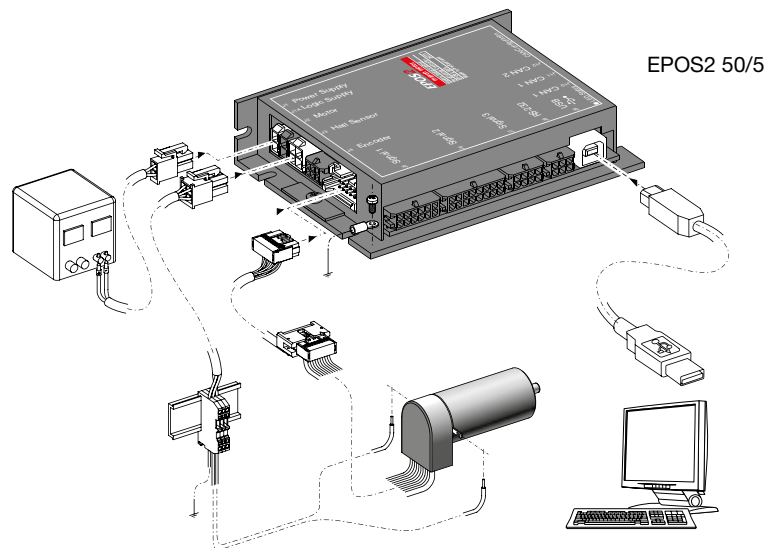
**Easy programming**

IEC 61131-3 libraries for CAN master units from industry leading manufacturers (Beckhoff, Siemens/Helmholz, VIPA) as well as 32/64-bit Windows DLLs for PC master units (IXXAT, Vector, National Instruments and Kvaser) are available. Programming examples for MS Visual C#, MS Visual C++, MS Visual Basic, Borland C++, Borland Delphi, National Instruments LabVIEW and National Instruments LabWindows/CVI are available at no charge.

Also available: The 32/64-bit Linux Shared Object Library with programming examples for Eclipse C++/QT as well as ARMv7 support for a wide variety of platforms (Raspberry Pi, BeagleBone). In addition, the maxon library for NI SoftMotion makes integration of EPOS2 in the National Instruments Compact Rio system easy.

**State-of-the-art**

Digital position, speed and current/torque control. Sinusoidal commutation for smooth operation of EC motors.



**Operating modes**

CANopen Profile Position-, Profile Velocity- and Homing Mode

Position, Velocity and Current Mode

Alternative set value setting via Step/Direction, Master Encoder or external analog commanding

Path generating with trapezoidal or sinusoidal profiles

Feed forward for velocity and acceleration

Interpolated Position Mode (PVT)

Sinusoidal or block commutation for EC motors

Dual loop position and speed controller

**Communication**

Communication via CANopen and/or USB 2.0/3.0 and/or RS232

Gateway function USB-to-CAN and RS232-to-CAN

**Inputs/Outputs**

Free configurable digital inputs e.g. for limit switches and reference switches

Free configurable digital outputs e.g. for holding brakes

Free analog inputs

**Available software**

EPOS Studio

Windows DLL/Linux Shared Object Library

IEC 61131-3 Libraries

Firmware

**Available documentation**

Feature Chart

Getting Started

Cable Starting Set

Hardware Reference

Firmware Specification

Communication Guide

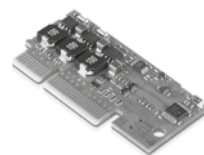
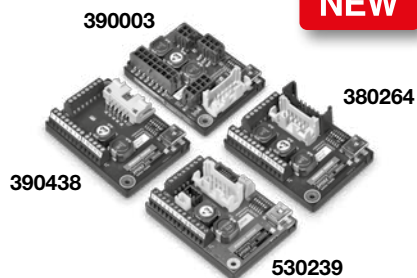
Application Notes

**Cable**

A comprehensive range of cables is available as an option. Details can be found on page 449.

# EPOS2 Positioning Controllers Data

**NEW**



### EPOS2 24/2

Matched with DC brush motors with encoder or brushless EC motors with Hall sensors and encoder up to 48/96 watts.

### EPOS2 Module 36/2

The EPOS2 is an OEM positioning controller plug-in module for brushed DC motors with encoder or brushless EC motors with Hall sensors and encoder up to 72/144 watts.

Controller versions	CANopen Slave	CANopen Slave
<b>Electrical data</b>		
Operating voltage $V_{CC}$	9 - 24 VDC	11 - 36 VDC (optional 0 - 36 VDC)
Logic supply voltage $V_C$ (optional)		11 - 36 VDC (optional 5.0 VDC)
Max. output voltage	$0.9 \times V_{CC}$	$0.9 \times V_{CC}$
Max. output current $I_{max}$ (<1 s)	4 A	4 A
Continuous output current $I_{cont}$	2 A	2 A
Switching frequency of power stage	100 kHz	50 kHz
Sample rate of PI - current controller	10 kHz	10 kHz
Sample rate of PI - speed controller	1 kHz	1 kHz
Sample rate of PID - positioning control	1 kHz	1 kHz
Max. speed (1 pole pair)	25000 rpm (sinusoidal); 100000 rpm (block)	25000 rpm (sinusoidal); 100000 rpm (block)
Built-in motor choke per phase	47 $\mu$ H / 2 A	10 $\mu$ H / 2 A
<b>Input</b>		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A', B, B', I, I' (max. 5 MHz)	A, A', B, B', I, I' (max. 5 MHz)
Digital inputs	6 (TTL level)	6 (TTL level)
Analog inputs	2 (12-bit resolution, 0...+5 V)	2 (11-bit resolution, 0...+5 V)
CAN-ID (CAN node identification)	configurable with DIP switch 1...4	set by external wiring
<b>Output</b>		
Digital outputs	2	3
Analog outputs		
Encoder voltage output	+5 VDC, max. 100 mA	+5 VDC, max. 100 mA
Hall sensor voltage output	+5 VDC, max. 30 mA	+5 VDC, max. 30 mA
Auxiliary voltage output	+5 VDC, max. 10 mA	
<b>Interface</b>		
RS232	RxD; TxD (max. 115 200 bit/s)	RxD; TxD (max. 115 200 bit/s)
CAN	high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)
USB 2.0/3.0	Data+; Data- (full speed)	external USB transceiver required
<b>Indicator</b>		
LED green = READY, red = ERROR	green LED, red LED	green LED, red LED
<b>Environmental conditions</b>		
Temperature – Operation	-10...+55°C	-10...+45°C
Temperature – Extended range	+55...+74°C; Derating: -0.105 A/°C	+45...+75°C; Derating: -0.067 A/°C
Temperature – Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
<b>Mechanical data</b>		
Weight	Approx. 30 g	Approx. 10 g
Dimensions (L x W x H)	55 x 40 x 19.6 mm	54.5 x 28.2 x 9 mm
Mounting	Flange for M2.5-screws	PCB edge connector with locking mechanism
<b>Part numbers</b>		
	<b>390438</b> EPOS2 24/2 for DC motors	<b>360665</b> EPOS2 Module 36/2
	<b>380264</b> EPOS2 24/2 for EC motors	
	<b>390003</b> EPOS2 24/2 for DC/EC motors	
	<b>530239</b> EPOS2 24/2 for DC(X) motors	
<b>Accessories</b>		
	<b>309687</b> DSR 50/5 Shunt regulator	<b>363407</b> EPOS2 Module Starter-Kit
	Order accessories separately, see page 449	Order accessories separately, see page 449