

# EPOS2 Positioning Control Units

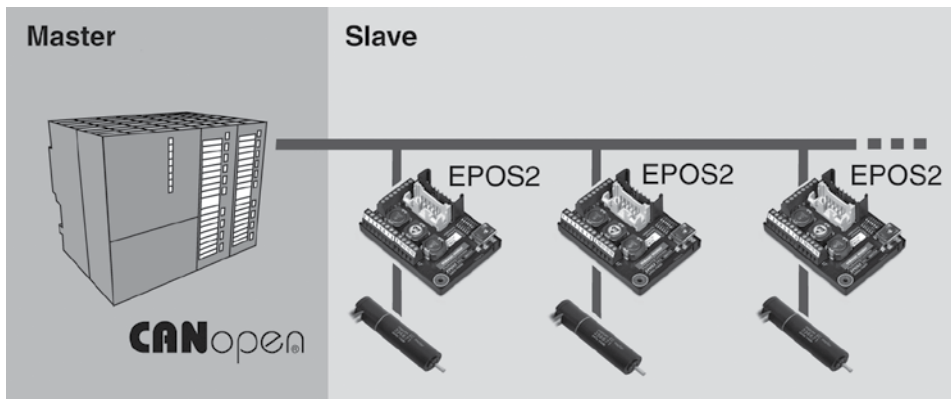


### Slave version (online commanded)

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 - 700 watts.

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" move 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)

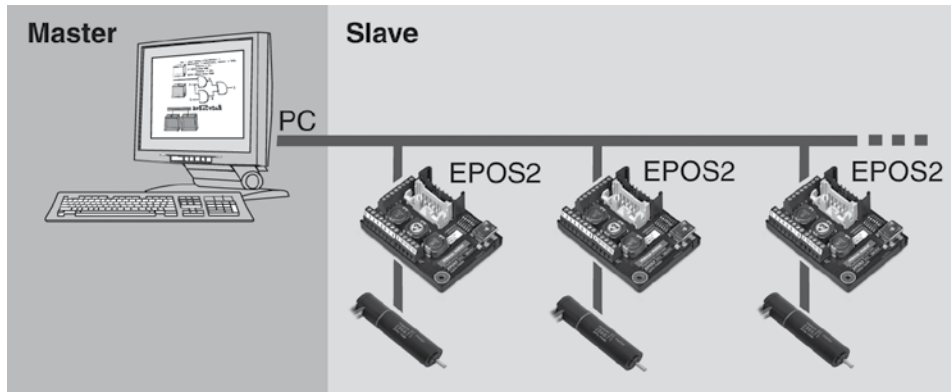
Thanks to Interpolated Position Mode, the EPOS2 is able to synchronously run a path specified by interpolating points. With a suitable master, coordinated multi-axis movements as well as any profile in a 1-axis system can be carried out. (PVT = Position and Velocity versus Time)

### Position and Speed control with Feed Forward

The combination of feedback and feed forward control provides ideal motion behaviour. 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 are more than 30 methods available for finding the reference position.

**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 synchronised 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 play 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. There the delay times can be individually configured for switching on and off.

Additional information for technical data of page 330/331

**Standardised, extendable**

CANopen standard CiA DS-301, DSP-402 and DSP-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.

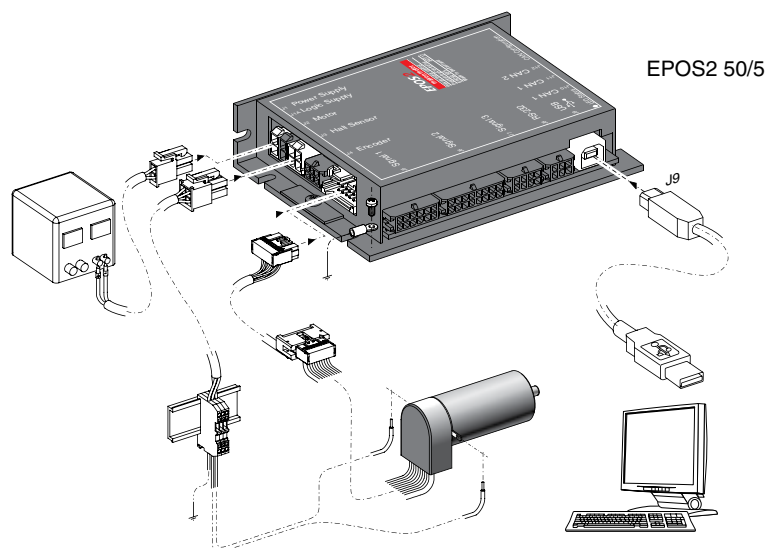
**Easy programming**

Numerous IEC 61131-3 libraries free available for CAN-Master units of several PLC manufacturers providers (Beckhoff, Siemens/Helmholz, VIPA) and 32-/64-bit Windows-DLLs for PC Master (IXXAT, Vector and National Instruments). Various programming examples free available for MS Visual C#, MS Visual C++, MS Visual Basic, Borland C++, Borland Delphi, National Instruments LabVIEW and National Instruments LabWindows/CVI.

Also available is the 32-bit Linux Shared Object Library with the programming example for Eclipse C++/QT. In addition, the integration of the EPOS2 into the National Instruments Compact Rio System is easy to handle thanks to the available maxon library for NI SoftMotion.

**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 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

IEC 61131-3 Libraries

Firmware

**Available documentation**

Getting Started

Cable Starting Set

Hardware Reference

Firmware Specification

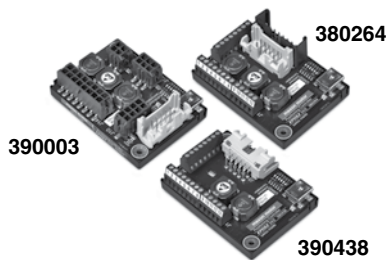
Communication Guide

Application Notes

**Cable**

A comprehensive range of cables is available as an option. Details can be found on page 339.

# EPOS2 Positioning control unit Data



### EPOS2 24/2

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

Controller versions	Slave version	Slave version
<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)	25 000 rpm (sinusoidal); 100 000 rpm (block)	25 000 rpm (sinusoidal); 100 000 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	Data+; Data- (max. 12 Mbit/s)	external USB transceiver required
<b>Indicator</b>		
LED green = READY, red = ERROR	green LED, red LED	green LED, red LED
<b>Ambient temperature and humidity range</b>		
Operation	-10...+45°C	-10...+45°C
Storage	-40...+85°C	-40...+85°C
No condensation	20...80%	20...80%
<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 threads	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>Accessories</b>		
	<b>309687</b> DSR 50/5 Shunt regulator	<b>363407</b> EPOS2 Module Starter-Kit
	Order accessories separately, see page 339	Order accessories separately, see page 339