EPOS3 Positioning Control Unit
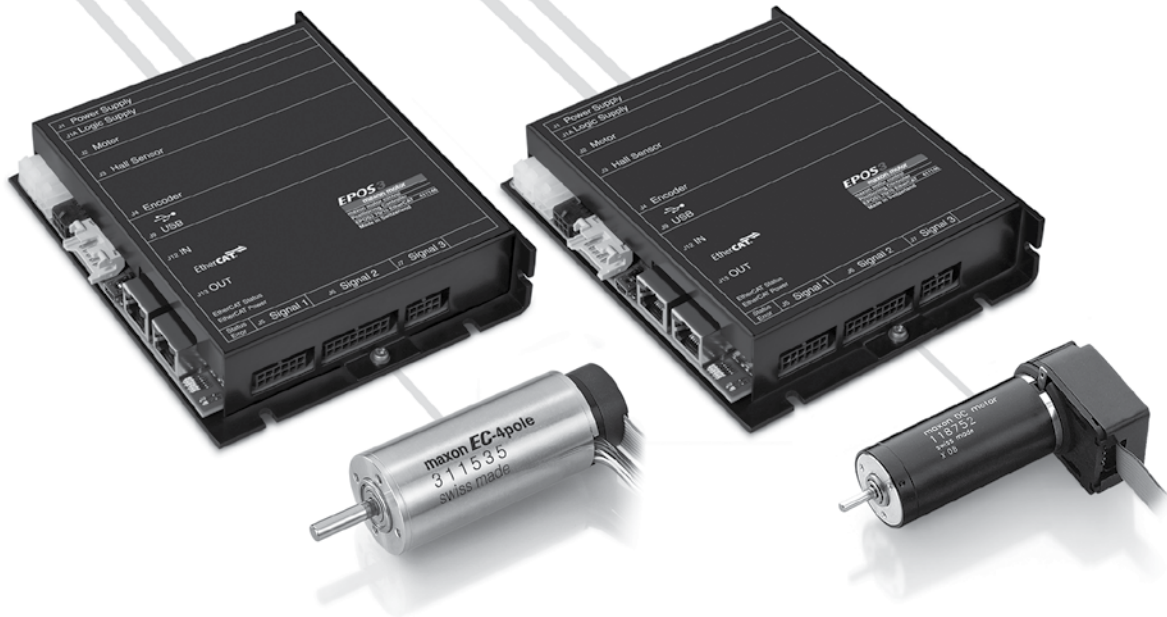
EPOS3 70/10 EtherCAT Slave

The EPOS3 70/10 EtherCAT positioning controller receives motion and I/O commands from a superordinate EtherCAT-Master, which operates as sequence control system. The EPOS3 70/10 EtherCAT supports CoE (CAN application layer over EtherCAT).

The EPOS3 70/10 EtherCAT is a modular, digital positioning controller and suits DC and EC motors with incremental encoder in the range up to 700 Watt.

A wide range of operating modes allows flexible use in a variety of fields in drive systems, automation, and mechatronics.

Cyclic Synchronous Position (CSP)

The EtherCAT master executes the path planning and sends the target position cyclically and synchronously via the EtherCAT network to the EPOS3.

The position control loop runs in the EPOS3. The EPOS3 delivers the measured actual position, speed and current values to the EtherCAT master.

Cyclic Synchronous Velocity (CSV)

The EtherCAT master executes the path planning and sends the target speed cyclically and synchronously via the EtherCAT network to the EPOS3. The speed control loop runs in the EPOS3. The EPOS3 delivers the measured actual position, speed and current values to the EtherCAT master. If the position control loop is closed via the EtherCAT master, CSV mode is often used.

Cyclic Synchronous Torque (CST)

The EtherCAT master executes the path planning and sends the target torque cyclically and synchronously via the EtherCAT network to the EPOS3. The torque (current) control loop runs in the EPOS3. The EPOS3 delivers the measured actual position, speed and current values to the EtherCAT master. If the PID position control loop is closed via the EtherCAT master, CST mode is often used.
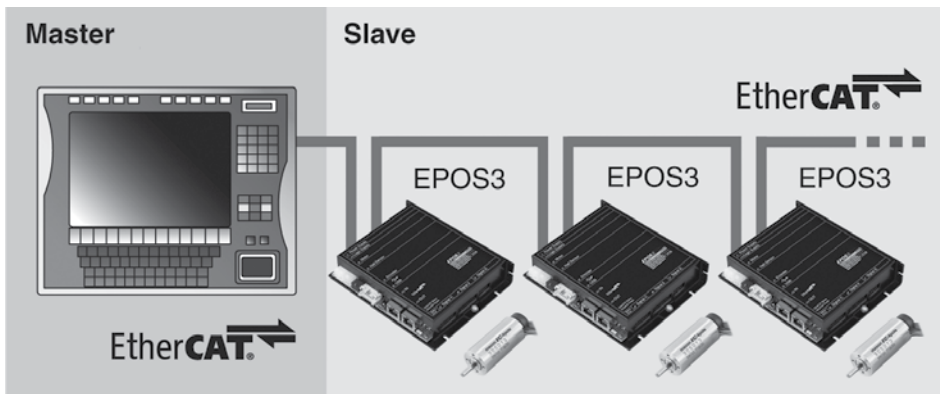
Point to point
The "Profile Position Mode" move the position of the motor axis from point A to point B. Positioning is in relation to the axis Home position (absolute) or the actual axis position (relative).

Interpolated Position Mode (PVT)
Thanks to Interpolated Position Mode, the EPOS3 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. EPOS3 supports feed forward acceleration and speed control.

Speed control
In "Profile Velocity Mode", the motor axis is moved with a set speed. The motor axis retains speed until a new speed is set.

Homing
The "Homing Mode" is for referencing to a special mechanical position. There are more than 30 methods available for finding the reference position.

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).

Control of Holding Brakes
Control of the holding brake can be integrated in the device status management. Thereby the delay times can be individually configured for switching on and off.

Additional information for technical data of page 337

Standardized
EtherCAT Slave: CoE (CAN application layer over EtherCAT) according to CANopen standard DSP-402 Device Profile Drives and Motion Control. Easy integration into existing EtherCAT systems. Can be networked with additional EtherCAT units. Alternatively configurable via serial interface (USB 2.0).

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.

EtherCAT Master (Beckhoff TwinCAT®): Integration made easy
Easy integration of the position controller EPOS3 70/10 EtherCAT into the Beckhoff-TwinCAT SoftPLC thanks to existing device description file (ESI file) and device-specific configuration instructions.

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

EPOS3 70/10 EtherCAT
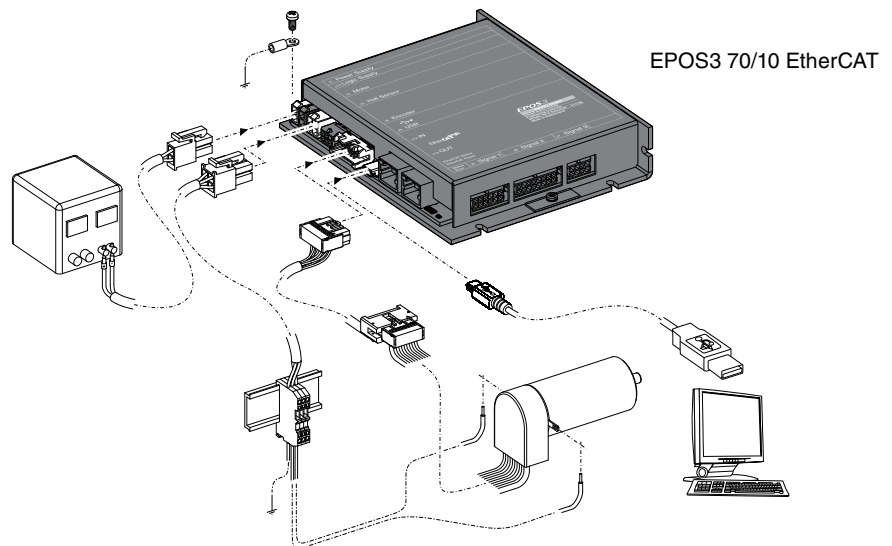
Operating modes
Cyclic Synchronuous Position (CSP), Cyclic Synchronuous Velocity (CSV), Cyclic Synchronuous Torque (CST)

Profile Position-, Profile Velocity- and Homing Mode

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 EtherCAT

Configuration
Configuration via EtherCAT or USB 2.0

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

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.

EPOS3 Positioning controller Data

EtherCAT   USB   GUI

EPOS3 70/10 EtherCAT
Matched with DC brush motors with encoder
or brushless EC motors with Hall sensors or
encoder to 700 watts.

Controller versions	
	EtherCAT Slave
Electrical Data	
Operating voltage V_{CC}	11 - 70 VDC
Logic supply voltage V_C (optional)	11 - 70 VDC
Max. output voltage	0.9 x V_{CC}
Max. output current I_{max} (<1 s)	25 A
Continuous output current I_{cont}	10 A
Switching frequency of power stage	50 kHz
Sample rate of PI - current controller	10 kHz
Sample rate of PI - speed controller	1 kHz
Sample rate of PID - positioning control	1 kHz
Max. speed (1 pole pair)	25 000 rpm (sinusoidal); 100 000 rpm (block)
Built-in motor choke per phase	22 µH / 10 A
Input	
Hall sensor signals	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 5 MHz)
Digital inputs	11 (7 optically isolated, 4 differential)
Analog inputs	2 (differential) 12-bit resolution, ±10 V
Output	
Digital outputs	5 (4 optically isolated, 1 differential)
Analog outputs	1 (12-bit resolution, 0…10 V)
Encoder voltage output	+5 VDC, max. 100 mA
Hall sensor voltage output	+5 VDC, max. 30 mA
Auxiliary voltage output	+5 VDC, max. 150 mA
Interface	
EtherCAT	IEEE 802.3 100 Base Tx (100 Mbit/s, Full Duplex)
USB 2.0	Data+; Data- (max.12 Mbit/s)
Indicator	
Device	green LED, red LED
EtherCAT	green LED, red LED
EtherCAT Port	green LED, yellow LED
Ambient temperature and humidity range	
Operation	-10…+45°C
Storage	-40…+85°C
No condensation	20…80%
Mechanical data	
Weight	Approx. 442 g
Dimensions (L x W x H)	150 x 120 x 29 mm
Mounting threads	Flange for M3-screws
Part Numbers	
	411146 EPOS3 70/10 EtherCAT
Accessories	
	235811 DSR 70/30 Shunt regulator
	Order accessories separately, see page 339