

EPOS4

Feature Chart






maxon motor control's EPOS4 products are small-sized, full digital, smart positioning control units. Their high power density allows flexible use for brushed DC and brushless EC (BLDC) motors up to approximately 750 Watts with various feedback options, such as Hall sensors, incremental encoders as well as absolute sensors in a multitude of drive applications.

EPOS4 controllers are specially designed to be commanded and controlled as a slave node in the CANopen network. In addition, the units can be operated via any USB or RS232 communication port of a Windows or Linux workstation. Moreover, the integrated extension interface allows optional communication interfaces, such as EtherCAT or other additional functionalities.

Latest technology, such as field-oriented control (FOC) and acceleration/velocity feed forward in combination with highest control cycle rates allow sophisticated, ease-of-use motion control.



Legend: ✓ = included / nnnnnn = order number / ** = available shortly

	EPOS4 Module 50/8 (504384)	EPOS4 Compact 50/8 CAN (520885)	EPOS4 Module 50/15 (504383)	EPOS4 Compact 50/15 CAN (520886)
 US Half Dollar coin (Ø30.6 mm) for comparison purposes				
Communication Interfaces				
CANopen Slave	max. 1 Mbit/s			
CANopen Application Layer and Communication Profile	CiA 301			
CANopen Layer Setting Services and Protocol (LSS)	CiA 305**			
CANopen Device Profile Drives and Motion Control	CiA 402			
USB 2.0 / USB 3.0	Full speed			
Gateway function USB-to-CAN	✓			
RS232	max. 115 kbit/s			
Gateway function RS232-to-CAN	✓**			
EtherCAT Slave (IEC 61158)	with optional extension module**			
Motors				
Brushed DC motors up to (continuous / max.)	400 W / 1'500 W	400 W / 1'500 W	750 W / 1'500 W	750 W / 1'500 W
Brushless EC motors (BLDC) up to (continuous / max.)	400 W / 1'500 W	400 W / 1'500 W	750 W / 1'500 W	750 W / 1'500 W

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Sensors (Feedback)				
Digital Hall sensors (EC motors)			✓	
Digital incremental encoder (2-/3-channel, single-ended or differential)			✓	
Analog incremental encoder (3-channel, sin/cos, differential)			✓**	
SSI absolute encoder (configurable)			✓**	
BiSS C absolute encoder (configurable)			with optional extension module**	
EnDat 2.2 absolute encoder (configurable)			with optional extension module**	
Commutation				
Digital Hall sensors			✓	
Digital Hall sensors + digital incremental encoder			✓	
Digital Hall sensors + analog incremental encoder			✓**	
Digital Hall sensors + absolute encoder			✓**	
Absolute encoder			✓**	
Electrical Data				
Nominal power supply voltage (+V _{CC})	10...50 VDC			
Nominal logic supply voltage (+V _C)	10...50 VDC			
Absolute supply voltage limits (+V _{min} / +V _{max})	8 VDC / 56 VDC			
Output voltage (max.)	0.9 x +V _{CC}			
Output current (I _{cont} / I _{max})	8 A / 30 A (<TBD s)	8 A / 30 A (<TBD s)	15 A / 30 A (<TBD s)	15 A / 30 A (<TBD s)
Pulse width modulation frequency	50 kHz			
Sampling rate PI current controller	25 kHz			
Sampling rate PID speed controller	2.5 kHz			
Sampling rate PID positioning controller	2.5 kHz			
Max. efficiency	98%			
Max. speed DC motor	limited by max. permissible speed (motor)			
Max. speed EC motor, block commutation	100'000 rpm (1 pole pair)			
Max. speed EC motor, sinusoidal commutation	50'000 rpm (1 pole pair)			
Built-in motor choke	—	3 x 2.2 μH; 15 A	—	3 x 2.2 μH; 15 A

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Inputs / Outputs				
Digital Hall sensor signals	H1, H2, H3 (+2...+24 VDC, internal pull-up)			
Digital incremental encoder signals	A, A\, B, B\, I, I\ (EIA RS422, 5 MHz)			
Digital inputs	4 (+2.1...+36 VDC)	4; selectable by DIP switch (Logic level: +2.0...+24 VDC) (PLC level: +9.0...+24 VDC)	4 (+2.1...+36 VDC)	4; selectable by DIP switch (Logic level: +2.0...+24 VDC) (PLC level: +9.0...+24 VDC)
Digital outputs	2 (open collector, max. 36 VDC / 500 mA, internal pull-up)			
High-speed digital inputs	3 (EIA RS422, 5 MHz)			
High-speed digital outputs	1 (EIA RS422, 5 MHz)			
Analog inputs	2 (resolution 12-bit, -10...+10 V, 10 kHz, differential)			
Analog outputs	2 (resolution 12-bit, -4...+4 V, 25 kHz)			
STO inputs	2 (+3.0...+24 VDC, optically isolated)			
STO outputs	1 (max. 30 VDC / 20 mA, optically isolated with self-resetting overcurrent protection)			
Sensor supply voltage	+5 VDC ($I_L \leq 100$ mA)			
Auxiliary output voltage	+5 VDC ($I_L \leq 150$ mA)			
Status indicators	Operation: green LED / Error: red LED			
Connections				
X1 Power Supply	Pin header (2.54 mm), 2x16 poles	Molex Mega-Fit, 2 poles	Pin header (2.54 mm), 2x16 poles	Molex Mega-Fit, 2 poles
X2 Logic Supply		Molex Mini-Fit Jr., 2 poles		Molex Mini-Fit Jr., 2 poles
X3a Motor ($I_{cont} \leq 11$ A)		Molex Mini-Fit Jr., 4 poles		Molex Mini-Fit Jr., 4 poles
X3b Motor ($I_{cont} \leq 15$ A)		—		Molex Mega-Fit, 4 poles
X4 Hall Sensor		Molex Micro-Fit 3.0, 6 poles		Molex Micro-Fit 3.0, 6 poles
X5 Encoder		Pin header 2.54 mm, 2x5 poles		Pin header 2.54 mm, 2x5 poles
X6 Sensor	Pin header (2.54 mm), 2x23 poles	Molex CLIK-Mate, 2x5 poles	Pin header (2.54 mm), 2x23 poles	Molex CLIK-Mate, 2x5 poles
X7 Digital I/O		Molex CLIK-Mate, 8 poles		Molex CLIK-Mate, 8 poles
X8 Analog I/O		Molex CLIK-Mate, 7 poles		Molex CLIK-Mate, 7 poles
X9 STO		Molex CLIK-Mate, 8 poles		Molex CLIK-Mate, 8 poles
X10 RS232		Molex CLIK-Mate, 5 poles		Molex CLIK-Mate, 5 poles
X11 CAN 1		Molex CLIK-Mate, 4 poles		Molex CLIK-Mate, 4 poles
X12 CAN 2		Molex CLIK-Mate, 4 poles		Molex CLIK-Mate, 4 poles
X13 USB		Molex CLIK-Mate, 4 poles		Molex CLIK-Mate, 4 poles
USB Type micro B, female				

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X14 Extension COM IN	—	—	—	—
X15 Extension COM OUT	—	—	—	—
X16 Extension Signal	—	—	—	—
Mechanical Data				
Weight (approximate)	TBD	TBD	TBD	TBD
Dimensions (L x W x H)	59.5 x 46 x 14.1 mm	59.5 x 58.5 x 33 mm	59.5 x 62 x 16.4 mm	59.5 x 65.5 x 35.1 mm
Mounting	Pluggable (female headers 2.54 mm) or M2.5 screws	M2.5 screws	Pluggable (female headers 2.54 mm) or M3 screws	M3 screws
Environmental Conditions				
Temperature – Operation	-30...+45 °C		-30...+25 °C	
Temperature – Extended range	TBD		TBD	
Temperature – Storage	-40...+85 °C			
Altitude – Operation	0...6'000 m MSL			
Altitude – Extended range	6'000...10'000 m MSL (for derating see Hardware Reference)			
Humidity (condensation not permitted)	5...90%			
Directives & Standards				
Generic	IEC/EN 61000-6-2; IEC/EN 61000-6-3			
Applied	IEC/EN 55022 (CISPR22); IEC/EN 61000-4-3; IEC/EN 61000-4-4; IEC/EN 61000-4-6			
Environment	IEC/EN 60068-2-6; MIL-STD-810F			
Safety	UL File Number TBD; unassembled PCB	UL File Number TBD; unassembled PCB	UL File Number TBD; unassembled PCB	UL File Number TBD; unassembled PCB
Reliability	MIL-HDBK-217F (MTBF TBD hours)	MIL-HDBK-217F (MTBF TBD hours)	MIL-HDBK-217F (MTBF TBD hours)	MIL-HDBK-217F (MTBF TBD hours)

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Functionality				
<i>Operating Modes</i>				
CST	Cyclic Synchronous Torque Mode			✓
CSV	Cyclic Synchronous Velocity Mode			✓**
CSP	Cyclic Synchronous Position Mode			✓**
PVM	Profile Velocity Mode			✓
PPM	Profile Position Mode			✓
IPM	Interpolated Position Mode			✓**
HMM	Homing Mode			✓
	Master Encoder Functionality			✓**
	Step/Direction Functionality			✓**
	Analog Set Value Functionality			✓**
<i>Features</i>				
	Feed forward (acceleration/velocity for inertia and friction compensation)			✓
	Field-oriented Control (FOC)			✓
	Standalone programmability			✓**
	Advanced automatic control settings (Auto Tuning)			✓
	Safe Torque Off (based on IEC/EN 61800-5-2, certification pending)			✓
<i>Digital I/O Functionality</i>				
	Inputs (configurable)			✓
	Touch Probe			✓**
	Reference switches			✓
	Limit switches			✓
	Quickstop			✓**
	Drive Enable			✓**
	General purpose			✓

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Outputs (configurable)			✓	
Position Compare			✓**	
Holding Brake			✓**	
Ready/Fault			✓**	
General purpose			✓	
Analog I/O Functionality				
Inputs (configurable)			✓	
Analog set value			✓**	
General purpose			✓	
Outputs (configurable)			✓	
Current monitor			✓**	
Velocity monitor			✓**	
Position monitor			✓**	
Temperature monitor			✓**	
General purpose			✓	
Built-in Protection				
Current limiter (adjustable)			✓	
Overcurrent			✓	
Thermal motor protection			✓	
Thermal controller protection			✓	
Overvoltage			✓	
Undervoltage			✓	
Voltage transients			✓	
Short-circuit of motor winding			✓	
Loss of feedback signal			✓	
Following error			✓	
Status reporting			✓	
Firmware error handling			✓	

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Software				
Installation Program	EPOS Setup			
Graphical User Interface	EPOS Studio			
Startup	✓			
Regulation Tuning	✓			
Diagnostics	✓**			
Firmware Update	✓			
Motion Commander	✓			
I/O Monitor	✓			
Parameters	✓			
Data Recording	✓			
Online Help	✓			
Language	English			
Operating System	Windows 10, 8, 7, XP SP3			
Windows DLL for PC	32-bit / 64-bit			
PC master	IXXAT, National Instruments, NI-XNET, Kvaser, Vector			
Programming examples	Microsoft Visual Basic, Visual Basic.NET, Visual C#, Visual C++ Borland C++, Delphi National Instruments LabView, LabWindows/CVI			
Linux Shard Object Library	X86 32-Bit/64-Bit**, ARMv6/v7**			
Programming examples	Eclipse C++/QT**			
IEC 61131-3 library for CAN master	Beckhoff, Siemens/Helmholz, VIPA			
maxon library for NI SoftMotion	National Instruments Compact Rio			

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Accessories (not included in delivery)				
520858 CAN-CAN Cable	—	✓	—	✓
520857 CAN-COM Cable	—	✓	—	✓
275934 Encoder Cable	—	✓	—	✓
275878 Hall Sensor Cable	—	✓	—	✓
520854 I/O Cable 7core	—	✓	—	✓
520853 I/O Cable 8core	—	✓	—	✓
275851 Motor Cable	—	✓	—	✓
520851 Motor Cable High Current	—	—	—	✓
275829 Power Cable	—	✓	—	✓
520856 RS232-COM Cable	—	✓	—	✓
520852 Sensor Cable 5x2core	—	✓	—	✓
520860 STO Idle Connector X9	—	✓ (included)	—	✓ (included)
403968 USB Type A - micro B Cable	✓	✓	✓	✓
520884 EPOS4 CB Power CAN	✓	—	✓	—
520859 EPOS4 Connector Set	—	✓	—	✓

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