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EPOS2 Feature Chart

maxon's EPOS2 are small-sized, full digital, smart positioning control units. Due to their flexible and high efficient power stage, the EPOS2 motion controllers drive brushed DC motors with digital encoder as well as brushless EC motors with digital Hall sensors and encoder.

The sinusoidal current commutation by space vector control drives brushless EC motors with minimal torque ripple and low noise. The integrated position, velocity and current control functionality allows sophisticated positioning applications. EPOS2 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 from Windows and Linux work stations.

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Feature	EPOS2 24/2 DC (390438)	EPOS2 24/2 EC (380264)	EPOS2 24/2 DC/EC (390003)	EPOS2 24/2 DCX (530239)	EPOS2 24/5 (367676)	EPOS2 Module 36/2 (360665)	EPOS2 50/5 (347717)	EPOS2 70/10 (375711)
Product image								
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	✓							

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RS232	max. 115 kbit/s							
Gateway function RS232-to-CAN	✓							
Motors								
Brushed DC motors up to (continuous / max.)	48 W / 96 W	—	48 W / 96 W	48 W / 96 W	120 W / 240 W	72 W / 144 W	250 W / 500 W	700 W / 1'750 W
Brushless EC motors (BLDC) up to (continuous / max.)	—	48 W / 96 W	48 W / 96 W	—	120 W / 240 W	72 W / 144 W	250 W / 500 W	700 W / 1'750 W
Sensors (Feedback)								
Digital Hall sensors (EC motors)	—	✓	✓	—	✓	✓	✓	✓
Digital incremental encoder (2-/3-channel with Line Driver)	✓							
Digital incremental encoder 2 (2-/3-channel with Line Driver)	—	—	—	—	—	(✓) 2-channel encoder, only	✓	✓
Analog incremental encoder (sin/cos, differential, 2-channel without index)	—	—	—	—	—	—	✓	✓
SSI absolute encoder (single/multi-turn configurable, gray/binary coded)	—	—	—	—	—	—	✓	✓

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Electrical Data								
Nominal power supply voltage ($+V_{CC}$)	9…24 VDC	9…24 VDC	9…24 VDC	9…24 VDC	11…24 VDC	11…36 VDC	11…50 VDC	11…70 VDC
Nominal logic supply voltage ($+V_C$)	—	—	—	—	11…24 VDC	11…36 VDC (optional 5.0 VDC)	11…50 VDC	11…70 VDC
Absolute supply voltage limits ($+V_{min}$ / $+V_{max}$)	8 VDC / 28 VDC	8 VDC / 28 VDC	8 VDC / 28 VDC	8 VDC / 28 VDC	10 VDC / 28 VDC	10 VDC / 40 VDC	10 VDC / 54 VDC	10 VDC / 75 VDC
Output voltage (max.)	0.90 x $+V_{cc}$							
Output current (I_{cont} / I_{max} <1 s)	2 A / 4 A	2 A / 4 A	2 A / 4 A	2 A / 4 A	5 A / 10 A	2 A / 4 A	5 A / 10 A	10 A / 25 A
Pulse width modulation frequency	100 kHz	100 kHz	100 kHz	100 kHz	50 kHz	50 kHz	50 kHz	50 kHz
Sampling rate PI current controller	10 kHz (100 µs)							
Sampling rate PID speed controller	1 kHz (1 ms)							
Sampling rate PID positioning contr.	1 kHz (1 ms)							
Max. efficiency	90%	90%	90%	90%	92%	93%	94%	94%
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	25'000 rpm (1 pole pair)							
Built-in motor choke	2 x 47 µH; 2 A	3 x 47 µH; 2 A	3 x 47 µH; 2 A	2 x 47 µH; 2 A	3 x 15 µH; 5 A	3 x 10 µH; 2 A	3 x 22 µH; 5 A	3 x 25 µH; 10 A

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Inputs / Outputs								
Digital Hall sensor signals	—	H1, H2, H3	H1, H2, H3	—	H1, H2, H3	H1, H2, H3	H1, H2, H3	H1, H2, H3
Digital incremental encoder signals	A, A\, B, B\, I, I\ (EIA RS422, 5 MHz)							
Digital inputs (thereof “high speed” up to 5 MHz)	6	6	6	6	6	6 (2)	11 (4)	10 (3)
Digital outputs (thereof “high speed” up to 5 MHz)	2	2	2	2	4	3 (1)	5 (1)	5 (1)
Analog inputs	2							
Resolution	12-bit	12-bit	12-bit	12-bit	12-bit	11-bit	12-bit	12-bit
Range	0…+5 V	0…+5 V	0…+5 V	0…+5 V	0…+5 V	0…+5 V	−10…+10 V	0…+5 V
CAN ID	1…15 (up to 127 by software setting)	1…15 (up to 127 by software setting)	1…15 (up to 127 by software setting)	1…15 (up to 127 by software setting)	1…127	1…127	1…127	1…127
Analog outputs	—	—	—	—	—	—	1 (resolution 12-bit, 0…+10 V)	—
Encoder supply voltage	+5VDC@100 mA							
Hall sensor supply voltage	—	+5VDC@30 mA	+5VDC@30 mA	—	+5VDC@30 mA	+5VDC@30 mA	+5VDC@30 mA	+5VDC@30 mA
Auxiliary output voltage	+5 VDC@10 mA	+5 VDC@10 mA	+5 VDC@10 mA	+5 VDC@10 mA	$+V_{cc}$@1300 mA	—	+5 VDC@150 mA	+5 VDC@150 mA
Reference output voltage	—	—	—	—	—	—	—	+5 VDC (R_i = 1kΩ)
Status indicators	Operation: green LED / Error: red LED							
Mechanical Data								
Weight (approximate)	27 g	30 g	28 g	27 g	170 g	10 g	240 g	330 g
Dimensions (L x W x H)	55 x 40 x 15.6 mm	55 x 40 x 19.6 mm	55 x 40 x 18.2 mm	55 x 40 x 18.2 mm	105 x 83 x 24 mm	54.5 x 28.2 x 9 mm	120 x 93.5 x 27 mm	150 x 93 x 27 mm
Mounting	M2.5 screws	M2.5 screws	M2.5 screws	M2.5 screws	M3 screws	Card edge connector	M3 screws	M3 screws

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Environmental Conditions								
Temperature – Operation	−10…+55 °C	−10…+55 °C	−10…+55 °C	−10…+55 °C	−10…+55 °C	−10…+45 °C	−10…+45 °C	−10…+45 °C
Temperature – Extended range (Derating)	+55…+74 °C; (−0.105 A/°C)	+55…+74 °C; (−0.105 A/°C)	+55…+74 °C; (−0.105 A/°C)	+55…+74 °C; (−0.105 A/°C)	+55…+83 °C; (−0.179 A/°C)	+45…+75 °C; (−0.067 A/°C)	+45…+80 °C; (−0.143 A/°C)	+45…+85 °C; (−0.250 A/°C)
Temperature – Storage	−40…+85 °C							
Altitude – Operation	0…10'000 m MSL	0…10'000 m MSL	0…10'000 m MSL	0…10'000 m MSL	0…10'000 m MSL	0…6'000 m MSL	0…10'000 m MSL	0…10'000 m MSL
Altitude – Extended range (Derating see Hardware Reference)	—	—	—	—	—	6'000…10'000 m MSL	—	—
Humidity (condensation not permitted)	5…90%							
Directives & Standards								
Generic	IEC/EN 61000-6-2 IEC/EN 61000-6-3	IEC/EN 61000-6-2 IEC/EN 61000-6-3	IEC/EN 61000-6-2 IEC/EN 61000-6-3	IEC/EN 61000-6-2 IEC/EN 61000-6-3	IEC/EN 61000-6-2 IEC/EN 61000-6-3	IEC/EN 61000-6-2 IEC/EN 61000-6-3	IEC/EN 61000-6-2 IEC/EN 61000-6-3	IEC/EN 61000-6-2 IEC/EN 61000-6-4
Applied	IEC/EN 61000-4-3 IEC/EN 61000-4-4 IEC/EN 61000-4-6 IEC/EN 61000-4-8 IEC/EN 61000-6-3 IEC/EN 55022 (CISPR22)	IEC/EN 61000-4-3 IEC/EN 61000-4-4 IEC/EN 61000-4-6 IEC/EN 61000-4-8 IEC/EN 61000-6-3 IEC/EN 55022 (CISPR22)	IEC/EN 61000-4-3 IEC/EN 61000-4-4 IEC/EN 61000-4-6 IEC/EN 61000-4-8 IEC/EN 61000-6-3 IEC/EN 55022 (CISPR22)	IEC/EN 61000-4-3 IEC/EN 61000-4-4 IEC/EN 61000-4-6 IEC/EN 61000-4-8 IEC/EN 61000-6-3 IEC/EN 55022 (CISPR22)	IEC/EN 61000-4-2 IEC/EN 61000-4-3 IEC/EN 61000-4-4 IEC/EN 61000-4-6 IEC/EN 61000-4-8 IEC/EN 61000-6-3 IEC/EN 55022 (CISPR22)	IEC/EN 61000-4-3 IEC/EN 61000-4-4 IEC/EN 61000-4-6 IEC/EN 61000-4-8 IEC/EN 61000-6-3 IEC/EN 55022 (CISPR22)	IEC/EN 61000-4-2 IEC/EN 61000-4-3 IEC/EN 61000-4-4 IEC/EN 61000-4-6 IEC/EN 61000-4-8 IEC/EN 61000-6-3 IEC/EN 55022 (CISPR22)	IEC/EN 61000-4-2 IEC/EN 61000-4-3 IEC/EN 61000-4-4 IEC/EN 61000-4-6 IEC/EN 61000-6-4 IEC/EN 55022 (CISPR22)
Environment	IEC/EN 60068-2-6 MIL-STD-810F							
Safety	UL File Number E76332; unassembled PCB	UL File Number E76332; unassembled PCB	UL File Number E76332; unassembled PCB	UL File Number E174311; unassembled PCB	UL File Number E172472 or E92481; unassembled PCB	UL File Number E172472 or E92481; unassembled PCB	UL File Number E172472 or E92481; unassembled PCB	UL File Number E187447; unassembled PCB

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Reliability	MIL-HDBK-217F (MTBF 912'810 hours)	MIL-HDBK-217F (MTBF 750'015 hours)	MIL-HDBK-217F (MTBF 751'966 hours)	MIL-HDBK-217F (MTBF 912'810 hours)	MIL-HDBK-217F (MTBF 501'641 hours)	MIL-HDBK-217F (MTBF 610'435 hours)	MIL-HDBK-217F (MTBF 282'013 hours)	MIL-HDBK-217F (MTBF 291'170 hours)
Functionality								
Operating Modes								
CUM Current (Torque) Mode	✓							
VEM Velocity Mode	✓							
POM Position Mode	✓							
PVM Profile Velocity Mode	✓							
PPM Profile Position Mode, point-to-point	✓							
IPM Interpolated Position Mode	✓							
HMM Homing Mode	✓							
Master Encoder Functionality	✓							
Step/Direction Functionality	✓							
Features								
Feed forward (acceleration/velocity for inertia and friction compensation)	✓							
Dual Loop Speed Control	—	—	—	—	—	✓	✓	✓
Dual Loop Position Control	—	—	—	—	—	✓	✓	✓
Advanced automatic control settings	✓							
Path generator with sinusoidal/trapezoidal profiles	✓							

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Digital I/O Functionality								
Inputs (configurable)	✓							
Position Marker	✓							
Reference switches	✓							
Limit switches	✓							
Quickstop	✓							
Drive Enable	✓							
General purpose	✓							
Outputs (configurable)	✓							
Position Compare	✓							
Holding Brake	✓							
Ready/Fault	✓							
General purpose	✓							
Analog I/O Functionality								
Inputs (configurable)	✓							
Analog set value commands (CUM, VEM, POM)	✓							
General purpose	✓							
Outputs (configurable)	✓							
General purpose	✓							

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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							
Language	English							
Operating system	Windows 10, 8, 7							
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, ARMv7							
Programming examples	C++ (Eclipse Project)							
IEC 61131-3 library for CAN master	Beckhof, Siemens/Helmholz, VIPA							
maxon library for NI SoftMotion	National Instruments Compact Rio							

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Accessories (not included in delivery)								
275926 CAN-CAN Cable	—	—	✓	—	✓	(✓)A	✓	✓
275908 CAN-COM Cable	—	—	✓	—	✓	(✓)A	✓	✓
319471 CAN-Y Cable	—	—	✓	—	—	—	—	—
303490 DC Motor Cable	—	—	✓	—	—	—	—	—
275934 Encoder Cable	✓	✓	✓	✓	✓	(✓)A	✓	✓
275878 Hall Sensor Cable	—	—	—	—	✓	(✓)A	✓	✓
275851 Motor Cable	—	—	—	—	✓	(✓)A	✓	✓
302948 Motor/Hall Sensor Cable	—	—	✓	—	—	—	—	—
275829 Power Cable	—	—	—	—	✓	(✓)A	✓	✓
275900 RS232-COM Cable	—	—	✓	—	✓	(✓)A	✓	✓
275932 Signal Cable 16core	—	—	✓	—	✓	(✓)A	✓	✓
378173 Signal Cable 3x2core	—	—	—	—	—	—	—	✓
350390 Signal Cable 4x2core	—	—	—	—	—	—	✓	—
300586 Signal Cable 6x2core	—	—	—	—	—	—	✓	✓
350392 USB Type A - B Cable	—	—	—	—	—	(✓)A	✓	—
370513 USB Type A - mini B Cable	✓	✓	✓	✓	✓	—	—	✓
303807 EPOS2 24/2 Connector Set	—	—	✓	—	—	—	—	—
384915 EPOS2 24/5 Connector Set	—	—	—	—	✓	—	—	—
351061 EPOS2 50/5 Connector Set	—	—	—	—	—	—	✓	—
381405 EPOS2 70/10 Connector Set	—	—	—	—	—	—	—	✓

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361435	EPOS2 Module Evaluation Board	—	—	—	—	—	✓	—	—
407582	EPOS2 Module Motherboard	—	—	—	—	—	✓	—	—
363407	EPOS2 Module Starter Kit	—	—	—	—	—	✓	—	—
309687	DSR 50/5 Shunt Regulator	✓	✓	✓	✓	✓	✓	✓	—
235811	DSR 70/30 Shunt Regulator	—	—	—	—	—	—	—	✓

(✓)A in conjunction with EPOS2 Module Evaluation Board