Electronics in Drive Technology

maxon motor control

EDITION 08/2010

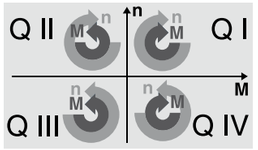
maxon motor
driven by precision

4-Q-DC Servoamplifier

4-quadrant DC amplifiers accelerate and decelerate brushed DC motors in both rotating directions. The power stages are controlled on a linear or pulsed basis.

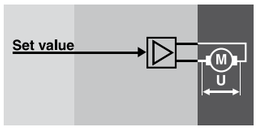
4-Quadrant operation

Controlled acceleration and braking operation in both rotating directions (all 4 quadrants)

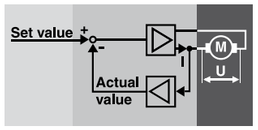


Operating modes

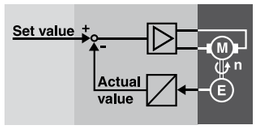
Voltage regulator
The motor is fed with a controlled voltage proportional to the set speed value. Load changes are not compensated.



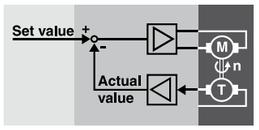
IxR compensation
As with voltage regulator however, load changes are additionally compensated. Suitable for average speed constancy demands.



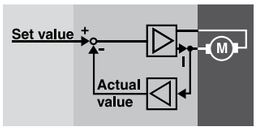
Encoder – Speed control
The speed controller compares the digital speed signal with the set value and adjusts the speed dynamically if there is a difference. Excellent control with long service life.



DC tacho – Speed control
Classical speed control using analogue actual value measurement. High speed dynamic possible.



Current control
The current controller keeps the motor current (torque) at the predetermined set value. Suitable for applications with a superior position controller.



Details on controllers can be found in the catalogue and under shop.maxonmotor.com

LSC 30/2

4-Q-DC Servoamplifier

The LSC 30/2 (Linear Servo Controller) is a linear 4-Quadrant Servoamplifier used to control permanent magnet activated DC motors up to approx. 50 watts.

4-Q operation
Controlled operation for acceleration and braking in both directions.

Linear power stage
Ideally suited for small outputs power, low electromagnetic emission, no motor choke required.

Operating modes
IxR compensation, voltage regulation, encoder speed control, DC tacho speed control or current control selectable with a switch from outside.

Design
Robust metal housing with variable installation options on assembly plate or 19“ rack.

Set value input
Via external potentiometer, external set value voltage or using internal potentiometer.

Easy start-up procedure
Pluggable screw type terminal block, simple set-up with potentiometer, robust designed PI controller.

Excellent price / performance ratio
Good value 4-Q-DC servoamplifier matched with small permanent magnet activated DC motors.

Electrical Data	LSC 30/2
Operating voltage V_{CC}	12 – 30 VDC
Max. output voltage	V_{CC} – 5 V
Max. output current I_{max}	2 A
Continuous output current I_{cont}	2 A
Mechanical Data	
Weight	approx. 330 g
Dimensions (L x W x H)	103 x 100 x 34 mm
Mounting	Flange for M4-screws
Order Number	

250521 LSC 30/2 4-Q-DC Servoamplifier in module housing

ADS 50/5, ADS 50/10

4-Q-DC Servoamplifier

145391 **201583**

The ADS (Analogue DC Servoamplifier) is a powerful pulse-width modulated (PWM) Servoamplifier for controlling permanent magnet activated DC motors of 10 – 500 watts. Available in modular housing as Standard and Power Version.

Pulsed output stage
Suitable for controlling low and high output power. 95% efficiency thanks to state-of-the-art MOSFET technology.

Operating modes
IxR compensation, encoder speed control, DC tacho speed control or current control selectable with a switch from outside.

Design
Robust metal housing in module form offers several mounting options.

Excellent control characteristics
Stable speed behaviour when set value and disturbance variable change, fast current controller.

Protection circuit
Protected against overcurrent, thermal overload and short-circuit of motor cable.

Set value input
External potentiometer or external set value voltage.

Electrical Data	ADS 50/5	ADS 50/10
Operating voltage V_{CC}	12 – 50 VDC	12 – 50 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	10 A	20 A
Continuous output current I_{cont}	5 A	10 A
Mechanical Data		
Weight (approx.)	400 g	400 g
Dimensions (LxWxH)	180x103x26 mm	180x103x26 mm
Mounting	Flange for M4-screws	
Order Numbers		

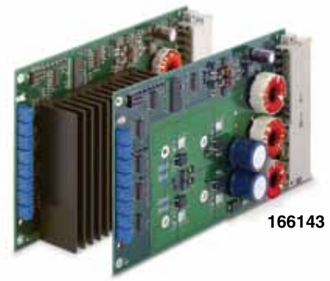
145391 ADS 50/5 4-Q-DC Servoamplifier Standard Version in module housing
201583 ADS 50/10 4-Q-DC Servoamplifier Power Version in module housing

Accessories

235811 DSR 70/30 Shunt regulator

ADS_E 50/5, ADS_E 50/10

4-Q-DC Servoamplifier



168049 **166143**

The ADS_E (Analogue DC Servoamplifier) is a powerful pulse-width modulated (PWM) Servoamplifier for controlling permanent magnet activated DC motors of 10 – 500 watts. Available in Eurocard format as Standard and Power Version.

Pulsed output stage
Suitable for controlling low and high output power. 95% efficiency thanks to state-of-the-art MOSFET technology.

Operating modes
IxR compensation, encoder speed control, DC tacho speed control or current control selectable with a switch from outside.

Design
Standardized Eurocard version (with accessories) for the installation in a 19“-Rack or in a plug-in card system.

Excellent control characteristics
Stable speed behaviour when set value and disturbance variable change, fast current controller.

Protection circuit
Protected against overcurrent, thermal overload and short-circuit of motor cable.

Set value input
External potentiometer or external set value voltage.

Electrical Data	ADS_E 50/5	ADS_E 50/10
Operating voltage V_{CC}	12 – 50 VDC	12 – 50 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	10 A	20 A
Continuous output current I_{cont}	5 A	10 A
Mechanical Data		
Weight (approx.)	175 g	410 g
Dimensions (LxWxH)	160x100x16 mm	160x100x30.5 mm
Mounting		Rack-Installation
Order Numbers		

166143 ADS_E 50/5 4-Q-DC Servoamplifier Standard Version in Eurocard format
168049 ADS_E 50/10 4-Q-DC Servoamplifier Power Version in Eurocard format

Accessories

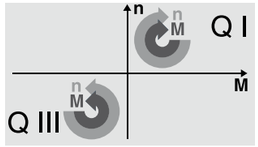
167850 Front panel 3HE, 5TE to ADS_E 50/5
168910 Front panel 3HE, 7TE to ADS_E 50/10
166873 Backplane with screw type terminal block

1-Quadrant EC Amplifier
sensorless EC motors

1-quadrant EC amplifiers are used to control electronically commutated (brushless) DC motors. With sensorless variants, the current rotor position is evaluated using the motor's back-EMF, making rotor position sensors (Hall sensors) redundant.

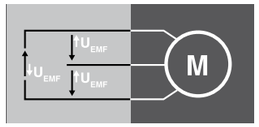
1-Quadrant operation

– Only motor operation (quadrants I and III)
– Reversal of rotation direction through digital signal



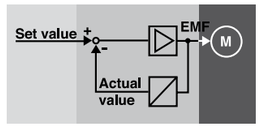
Back-EMF

The rotor position is determined using the progression of the induced voltage. The electronics evaluate the zero crossing of the induced voltage (EMF) and commutate the motor current after a speed-dependent pause. However, for lower speeds and more precise controls amplifiers with Hall sensor evaluation are preferable.



Operating mode

Speed controller
The speed controller compares the present commutation frequency with the set value and adjusts the speed if there is a difference. Good control above a minimum speed.



Details on controllers can be found in the catalogue and under shop.maxonmotor.com

DECS 50/5
1-Q-EC Amplifier, sensorless

The DECS (Digital EC Controller Sensorless) is a 1-quadrant amplifier for the control of sensorless EC motors with a maximum output of 250 watts.

Controlling sensorless EC motors
The actual rotor position is evaluated by using the Back-EMF sensing technique. Different start sequences with varying start-up procedures can be easy selected.

Operating mode
Digital speed control with selectable regulation gain.

Flexible
Large supply voltage range 10–50 VDC. Pluggable screw type terminal block and a flexprint connector compatible with maxon flat motors.

Small design
Open and compact electronics board. Easy mounting with hexagonal distance pins with inside thread.

All-round functionality
Direction can be predetermined using a logic signal. The motor shaft can be disabled or braked, as required. Speed can be monitored through the speed monitor output. Different protective functions safeguard the motor and amplifier. Status indicator with green and red LED.

Flexible set value input
Set value input either by internal potentiometer or external analogue voltage. Different speed ranges can be selected using DIP switches.

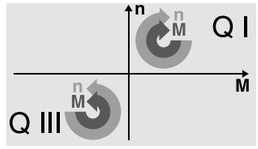
Electrical Data	DECS 50/5
Operating voltage V_{CC}	10–50 VDC
Max. output voltage	0.8 x V_{CC}
Max. output current I_{max}	8 A
Continuous output current I_{cont}	5 A
Mechanical Data	
Weight	approx. 40 g
Dimensions (L x W x H)	73.4 x 50.8 x 21 mm
Mounting	4 Hexagonal distance pins with M3 inner thread
Order Number	
343253	DECS 50/5 1-Q-EC Amplifier, sensorless
Accessories	
309687	DSR 50/5 Shunt regulator

1-Quadrant EC Amplifier
EC motors with Hall sensors

1-quadrant EC amplifiers are used to control electronically commutated (brushless) DC motors. EC motors with rotor position sensors (Hall sensors) are required to evaluate rotor position.

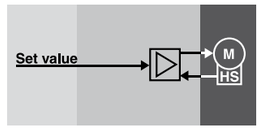
1-Quadrant operation

— Only motor operation (quadrants I and III)
— Reversal of rotation direction through digital signal

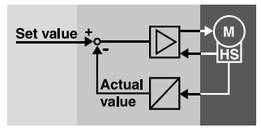


Operating modes

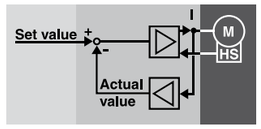
Speed control (open loop)
The motor is fed with a voltage proportional to the set speed value. Load changes are not compensated.



Hall sensor speed control
The speed controller compares the Hall sensors' digital speed signal with the set value and adjusts the speed if there is a difference. Good control above a minimum speed.



Current control
The current controller keeps the motor current (torque) at the predetermined set value. For applications with average dynamic requirements.



Details on controllers can be found in the catalogue and under shop.maxonmotor.com

DEC 24/1
1-Q-EC Amplifier

The DEC 24/1 (Digital EC Controller) is a 1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 24 watts.

Operating modes
Digital speed control or open loop speed control operation can be selected with a built-in jumper.

Flexible
Wide supply voltage range 5–24 VDC. A range of adapter boards allows the use of different maxon micro motors.

Small design
Open and compact electronics board. Easy mounting with hexagonal distance pins with inside thread.

All-round functionality
Direction can be predetermined with a logic signal. Motor shaft can be disabled or slowed down as required. Adjustable maximum current limitation. Status indicator with green LED.

Flexible set value input
Set value input either by internal potentiometer or external analogue voltage. Different speed ranges can be selected using built-in jumpers.

318305 **381510** **249630** **249631** **249632**

Electrical Data	DEC 24/1
Operating voltage V_{CC}	5–24 VDC
Max. output voltage	V_{CC}
Max. output current I_{max}	2 A
Continuous output current I_{cont}	1 A
Mechanical Data	
Weight	approx. 20 g
Dimensions (L x W x H)	57 x 36 x 24 mm
Mounting	4 Hexagonal distance pins with M3 inner thread
Order Numbers	
318305	DEC 24/1 1-Q-EC Amplifier with FPC pitch 0.5 mm
381510	DEC 24/1 1-Q-EC Amplifier with FPC pitch 0.5 mm
249630	DEC 24/1 1-Q-EC Amplifier with FPC pitch 1.0 mm
249631	DEC 24/1 1-Q-EC Amplifier with pin connector pitch 2.5 mm
249632	DEC 24/1 1-Q-EC Amplifier with screw type terminal block pitch 2.54 mm

DEC Module 24/2
1-Q-EC Amplifier

The DEC Module 24/2 (Digital EC Controller) is a 1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 48 watts.

Operating modes
Digital speed control or open loop speed control operation can be preset by a digital signal.

Excellent price/performance ratio
Reasonably priced 1-Q-EC amplifier optimised for OEM applications in small appliances.

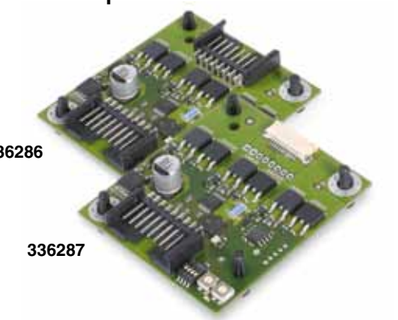
OEM Module
Miniaturized open electronics board. Two connector arrays arranged in a 2.54 mm (0.1“) pattern support easy connectivity and integration into the motherboard.

Functionality
Direction of rotation preset by a digital signal. The motor shaft can be enabled or disabled. Adjustable maximum current limitation. Set value input through external analogue voltage.

Protection circuit
The power amplifier is protected against thermal overload and the control inputs against overvoltage.

Electrical Data	DEC Module 24/2
Operating voltage V_{CC}	8–24 VDC
Max. output voltage	V_{CC}
Max. output current I_{max}	3 A
Continuous output current I_{cont}	2 A
Mechanical Data	
Weight	approx. 4 g
Dimensions (L x W x H)	24.2 x 20.38 x 12 mm
Mounting	mountable on socket terminal strips pitch 2.54 mm
Order Numbers	
367661 DEC Module 24/2 1-Q-EC Amplifier	
Accessories	
370652 DEC Module Eva-Board	

DEC 24/3
1-Q-EC Amplifier



336286

336287

The DEC 24/3 (Digital EC Controller) is a 1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 72 watts.

Operating modes
Digital speed control or open loop speed control operation can be selected with a DIP switch.

Flexibel
Wide supply voltage range 5–24 VDC.
Two variants for direct connection of different maxon EC motors.

Small design
Open and compact electronics board. Easy mounting with hexagonal distance pins with inside thread.

All-round functionality
Direction can be predetermined with a logic signal. Motor shaft can be disabled or slowed down as required. Adjustable maximum current limitation. Status indicator with green LED.

Flexible set value input
Set value input either through internal potentiometer or external analogue voltage. Different speed ranges can be selected using built-in DIP switches.

Electrical Data	DEC 24/3
Operating voltage V_{CC}	5–24 VDC
Max. output voltage	V_{CC}
Max. output current I_{max}	6 A
Continuous output current I_{cont}	3 A
Mechanical Data	
Weight	approx. 28 g
Dimensions (L x W x H)	65 x 58 x 18 mm
Mounting	4 Hexagonal distance pins with M3 inner thread
Order Numbers	
336286 DEC 24/3 1-Q-EC Amplifier with pin connector pitch 2.5 mm	
336287 DEC 24/3 1-Q-EC Amplifier with FPC pitch 1.0 mm	

DEC Module 50/5
1-Q-EC Amplifier

The DEC Module 50/5 (Digital EC Controller) is a 1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 250 watts.

Operating modes
Digital speed control or open loop speed control operation can be preset by a digital signal.

Excellent price/performance ratio
Reasonably priced 1-Q-EC amplifier optimised for OEM applications in small appliances.

OEM Module
Miniaturized open electronics board. Connector arrays arranged in a 2.54 mm (0.1“) pattern support easy connectivity and integration into the motherboard.

Functionality
Direction of rotation preset by a digital signal. The motor shaft can be enabled or disabled. Adjustable maximum current limitation. Set value speed input through external analogue voltage. Speed can be monitored through the speed monitor output. Status indicator with «Ready»-Output.

Protection circuit
The power amplifier is protected against thermal overload and the control inputs against overvoltage.

Electrical Data	DEC Module 50/5
Operating voltage V_{CC}	6–50 VDC
Max. output voltage	0.95 x V_{CC}
Max. output current I_{max}	10 A
Continuous output current I_{cont}	5 A
Mechanical Data	
Weight	approx. 9 g
Dimensions (L x W x H)	43.18 x 27.94 x 12.7 mm
Mounting	mountable on socket terminal strips pitch 2.54 mm
Order Number	
380200 DEC Module 50/5 1-Q-EC Amplifier	
Accessories	
370652 DEC Module Eva-Board	

DEC 50/5
1-Q-EC Amplifier

The DEC 50/5 (Digital EC Controller) is a 1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 250 watts.

Operating modes
Digital speed control, open loop speed control or current control can be selected with a DIP switch.

Small design
Robust and compact modular metallic housing offers various mounting options.

Easy start-up procedure
Pluggable screw type terminal block, no extensive adjustment necessary.

All-round functionality
The motor‘s rotating direction, disabling of motor winding and braking of motor shaft can be set. Adjustable maximum current limitation. Operating status display with red and green LED.

Flexible set value input
Set value input by internal or external potentiometer by analogue voltage. Two pre-set speeds switchable. Speed ramp can be adjusted.

Protection circuit
The power stage is protected against thermal overload and control inputs against overvoltage.

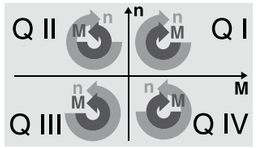
Electrical Data	DEC 50/5
Operating voltage V_{CC}	10–50 VDC
Max. output voltage	0.95 x V_{CC}
Max. output current I_{max}	10 A
Continuous output current I_{cont}	5 A
Mechanical Data	
Weight	approx. 155 g
Dimensions (L x W x H)	95 x 75 x 24 mm
Mounting	Flange for M3-screws
Order Number	
230572 DEC 50/5 1-Q-EC Amplifier	

4-Quadrant EC Amplifier

The combination of EC motors and 4-quadrant amplifiers offers highly dynamic drive systems. The maxon amplifiers additional functions help create flexible controls that keep the motor shaft under control in every situation.

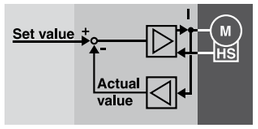
4-Quadrant operation

Controlled acceleration and braking operation in both rotating directions (all 4 quadrants)

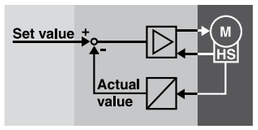


EC motors with Hall sensors: Operating modes

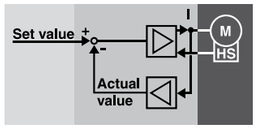
Voltage regulator with IxR compensation
The motor is fed with a voltage proportional to the set speed value. Load changes are compensated. Suitable for average speed constancy demands.



Hall sensor speed control
The speed controller compares the digital speed signal of the Hall sensors with the set value and adjusts the speed if there is a difference. Good control above a minimum speed.

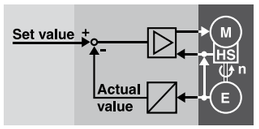


Current control
The current controller keeps the motor current (torque) at the predetermined set value. Suitable for applications with a superior position controller.

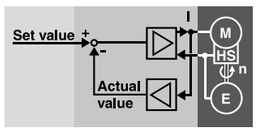


EC motors with Hall sensors and encoder: Operating modes

Encoder speed control
The speed controller compares the digital speed signal of the encoder with the set value and adjusts the speed dynamically if there is a difference. Excellent control even at low speeds.



Current control
The current controller keeps the motor current (torque) at the predetermined set value. Suitable for applications with a superior position controller.



Details on controllers can be found in the catalogue and under shop.maxonmotor.com

DECV 50/5

4-Q-EC Amplifier

The DECV 50/5 (Digital EC Controller Voltage regulated) is a small-sized 4-quadrant digital speed controller for brushless EC motors up to 250 watts. The brushless EC motor must be only equipped with Hall sensors.

Operating modes
Speed controller for speeds from 1000 rpm (not suitable for positioning tasks). Controlled acceleration and braking operation.

Easy start-up procedure
Pluggable screw type terminal block, simple adjustment using DIP switch. Stable speed behaviour when set value and disturbance variable change.

Reduced motor heating
Internally controlled DC link voltage reduces motor current ripple (lower self-heating of motor), particularly suitable for low-impedance motors. No additional motor chokes required.

Flexible
Robust and compact modular metallic housing offers various mounting options. Wide supply voltage range 12–50 VDC.

Protection circuit
Protected against overcurrent, overvoltage, undervoltage, short-circuit of motor cables against each other and thermal overload.

Electrical Data	DECV 50/5
Operating voltage V_{CC}	12–50 VDC
Max. output voltage	0.95 x V_{CC}
Max. output current I_{max}	10 A
Continuous output current I_{cont}	5 A
Mechanical Data	
Weight	approx. 180 g
Dimensions (L x W x H)	95 x 75.5 x 24 mm
Mounting	Flange for M4-screws
Order Number	
305259 DECV 50/5 4-Q-EC Amplifier in module housing	
Accessories	
309687 DSR 50/5 Shunt regulator	

DEC 70/10

4-Q-EC Amplifier

The DEC 70/10 (Digital EC Controller) is a small 4-quadrant digital controller of EC motors up to 700 watts. The brushless EC motor must be only equipped with Hall sensors.

Operating modes
Digital speed controller for speeds from 1000 rpm, voltage regulator with IxR compensation or current controller (suitable for positioning tasks) can be adjusted with DIP switch.

Optimised design
Robust and compact modular metallic housing offers various mounting options.

Easy start-up procedure
Pluggable screw type terminal block, no extensive adjustment necessary.

All-round functionality
Disabling of motor winding and braking of motor shaft can be set. Adjustable maximum current and speed limitation. Operating status display with red and green LED.

Flexible set value input
Set value input by internal or external potentiometer or by analogue voltage. Various pre-set speed ranges can be selected using built-in DIP switches. Speed ramp can be adjusted.

Protection circuit
Protected against overcurrent, overvoltage, undervoltage, short-circuit of motor cables against each other and thermal overload.

Electrical Data	DEC 70/10
Operating voltage V_{CC}	10–70 VDC
Max. output voltage	0.9 x V_{CC}
Max. output current I_{max}	20 A
Continuous output current I_{cont}	10 A
Mechanical Data	
Weight	approx. 400 g
Dimensions (L x W x H)	120 x 103 x 27 mm
Mounting	Flange for M3-screws
Order Numbers	
306089 DEC 70/10 4-Q-EC Amplifier in module housing	
Accessories	
235811 DSR 70/30 Shunt regulator	

DES 50/5, DES 70/10

4-Q-EC Servoamplifier

CAN RS232 GUI

205679 228597

The DES (Digital EC Servoamplifier) is a very powerful digital servoamplifier with sinusoidal commutation for perfectly controlling EC motors up to 700 watts. The motor used must be fitted with Hall sensors and a 3-channel encoder.

Operating modes
Digital speed controller and current controller (torque controller), suitable for positioning tasks.

Digital
The digital signal processor (DSP) allows fast digital controlling. Parameters can be set digitally in a reproducible way.

Easy start-up procedure
Simple connection, compatible with maxon EC motors. Easy adjustment using few potentiometers or alternatively configurable and commanding by serial interface (RS232 or CAN).

Protection circuit
Monitoring of overcurrent, short-circuiting of motor cables and overvoltage.

PC based commanding
Support by graphical user interface (GUI), Windows DLL for RS232 with several programming examples.

Electrical Data	DES 50/5	DES 70/10
Operating voltage V_{CC}	12–50 VDC	24–70 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	15 A	30 A
Continuous output current I_{cont}	5 A	10 A
Mechanical Data		
Weight	approx. 430 g	approx. 400 g
Dimensions (LxWxH)	180x103x26 mm	180x103x29 mm
Mounting	Flange for M4-screws	
Order Numbers		
205679 DES 50/5 digital 4-Q-EC Servoamplifier in module housing		
228597 DES 70/10 digital 4-Q-EC Servoamplifier in module housing		
Accessories		
235811 DSR 70/30 Shunt regulator		
223774 Encoder adapter according to DIN 41651 screw type terminal block		
347919 Choke module 3 x 0.1 mH, 10 A		

EPOS2 positioning control

If a drive system's control requirements go beyond just speed and torque controls and if repeated positioning processes are required in complex paths of motion, positioning controls can be used. The EPOS2 (Easy to use Positioning System) provides a modular product range for DC and EC motors.

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.

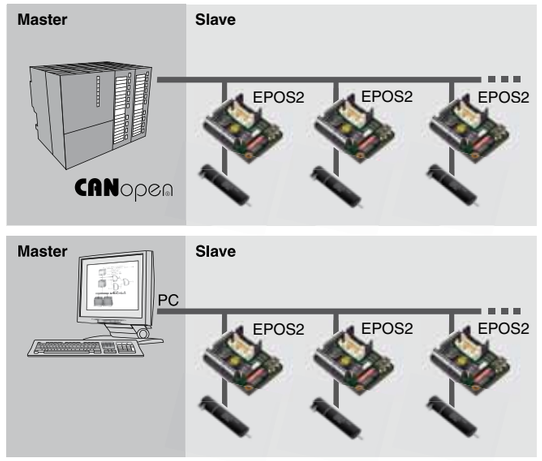
Easy start-up procedure using EPOS Studio
Graphic user interface with many functions and wizards for start-up procedure, automatic control settings, I/O configuration, tests.

Easy programming
Numerous IEC 61131-3 libraries free available for CAN-Master units of several PLC manufacturers providers (Beckhoff, Siemens/Helmholz, VIPA) and 32-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.

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

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 operating modes

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.

Analogue Commands
In the position, speed and current mode it is possible to give commands via an external analogue 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.

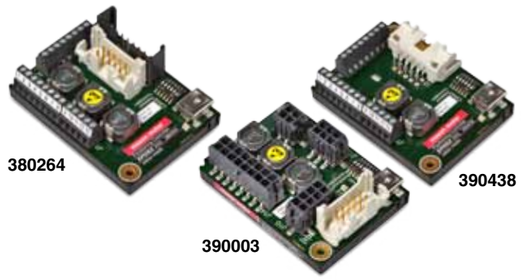
Dual Loop Position and Speed Control
With an additional sensor the load can be controlled directly and with high precision; the motor control is subordinated. The mechanical play and the elasticity can be compensated. Wide range of sensors can be handled: digital incremental encoder, SSI absolute encoder, 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 time delay for switching on and off can be configured individually.

EPOS2 24/2

Slave-Version

USB CANopen RS232 GUI



The EPOS2 24/2 is a digital positioning controller. It is suitable for DC and EC motors with incremental encoder with a power range up to 48 watts. The EPOS2 24/2 is available in different versions for direct connection to various motor types.

Characteristics
- Several device variations allows the operation of various maxon DC and EC micromotors of 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 (TTL level)
- 2 digital outputs
- 2 analogue inputs (12-bit ADC)
- Miniaturised module design

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

Electrical Data	EPOS2 24/2
Operating voltage V_{CC}	9–24 VDC
Max. output voltage	0.9 x V_{CC}
Max. output current I_{max}	4 A
Continuous output current I_{cont}	2 A
Mechanical Data	
Weight	approx. 30 g
Dimensions (LxBxH)	55 x 40 x 17 mm
Mounting	Mounting holes for for M2.5-screws

Order Numbers

390438 EPOS2 24/2 for DC motors
380264 EPOS2 24/2 for EC 16 / EC 22 motors
390003 EPOS2 24/2 for DC / EC motors

Accessories

309687 DSR 50/5 Shunt regulator

EPOS2 Module 36/2

Slave-Version

USB*) CANopen RS232 GUI

The EPOS2 Module 36/2 is an OEM positioning controller module and is matched with DC brush motors with encoder or brushless EC motors with Hall sensors and encoder, up to 72 watts.

Characteristics
- DC and EC motors up to 72 watts
- Point to point control unit (1 axis)
- Interpolated position mode (PVT)
- Combination of several drives via CAN Bus
- CANopen
- 6 digital inputs (TTL level)
- 3 digital outputs
- 2 analogue inputs (11-bit ADC)
- Miniaturised open electronics board (OEM)

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

*) External tranceiver required

Typical applications
- Small apparatus/appliances
- System automation tasks
- OEM operation

Electrical Data	EPOS2 Module 36/2
Operating voltage V_{CC}	11–36 VDC
Max. output voltage	0.9 x V_{CC}
Max. output current I_{max}	4 A
Continuous output current I_{cont}	2 A
Mechanical Data	
Weight	approx. 10 g
Dimensions (L x B x H)	54.5 x 28.2 x 9 mm
Mounting	PCB edge connector with locking mechanism

Order Number

360665 EPOS2 Module 36/2

Accessories

363407 EPOS2 Module Starter-Kit

EPOS2 24/5

Slave-Version

USB CANopen RS232 GUI

Matched with DC brush motors with encoder or brushless EC motors with Hall sensors or encoder up to 120 watts.

Characteristics
- DC and EC motors up to 120 watts
- Point to point control unit (1 axis)
- Interpolated position mode (PVT)
- Combination of several drives via CAN Bus
- CANopen
- 6 digital inputs (TTL and PLC level)
- 4 digital outputs
- 2 analogue inputs (12-bit ADC)
- Compact module design

Slave version (online commanded) 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

Electrical Data	EPOS2 24/5
Operating voltage V_{CC}	11 – 24 VDC
Max. output voltage	0.9 x V_{CC}
Max. output current I_{max}	10 A
Continuous output current I_{cont}	5 A
Mechanical Data	
Weight	approx. 170 g
Dimensions (L x B x H)	105 x 83 x 24 mm
Mounting	Flange for M3-screws
Order Number	
367676 EPOS2 24/5	
Accessories	
309687 DSR 50/5 Shunt regulator	

EPOS2 50/5, EPOS2 70/10

Slave-Version

USB CANopen RS232 GUI

347717 375711

Matched with DC brush motors with encoder or brushless EC motors with Hall sensors or encoder up to 700 watts.

Characteristics
- DC and EC motors up to 700 watts
- Point to point control unit (1 axis)
- Interpolated position mode (PVT)
- Combination of several drives via CAN Bus
- CANopen
- EPOS2 50/5 11 digital inputs (optically isolated)
  5 digital outputs and 1 analogue output
- EPOS2 70/10 7 digital inputs (optically isolated)
  3 digital inputs (differential)
  3 digital outputs (optically isolated)
  1 digital output (differential)
  1 digital output
- 2 analogue inputs (12-bit ADC, differential)
- Compact module design

Slave version (online commanded) 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
- Plant construction

Electrical Data	EPOS2 50/5	EPOS2 70/10
Operating voltage V_{CC}	11 – 50 VDC	11 – 70 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	10 A	25 A
Continuous output current I_{cont}	5 A	10 A
Mechanical Data		
Weight	approx. 240 g	approx. 330 g
Dimensions (LxBxH) in mm	120x93.5x27	150x93x27
Mounting	Flange for M3-screws	
Order Numbers		
347717 EPOS2 50/5		
375711 EPOS2 70/10		
Accessories		
309687 DSR 50/5 Shunt regulator to EPOS2 50/5		
235811 DSR 70/30 Shunt regulator to EPOS2 70/10		

EPOS2 P programmable positioning controller

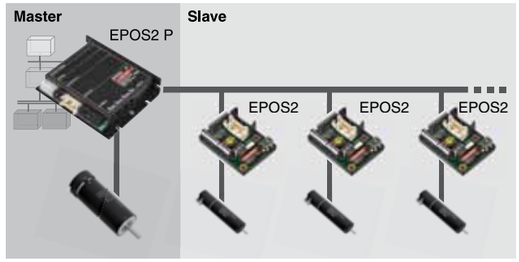
Drive systems that have to fulfil complex positioning controls without computer support require controls with corresponding intelligence. The EPOS2 P can be programmed so that one or several axes are driven independently.

Master version (programmable)

Independent control unit without superior system.
The control sequence must be pre-programmed in the control unit.

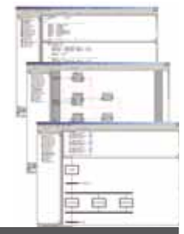
Standalone – single axis system

Standalone – multi-axis system



EPOS Studio

Editors (ST, IL, FBD, LD, SFC) of the powerful “EPOS Studio” tool are available for programming according to IEC 61131-3. The integrated project browser shows all network resources. Complex programs with a large number of decentralized controls can be optimally managed with it. Drive systems are configured and networked quickly using intelligent step-by-step wizards.



Motion Control Library

The complexity and development costs of drive systems are substantially reduced. The Motion Firmware Library was implemented according to the widly-used Motion Control Standard. Standardized function blocks make implementation easy.

Cable / accessories

There is a wide range of cables and accessories available for all EPOS2 P.

Details on controllers can be found in the catalogue and under shop.maxonmotor.com

EPOS2 P 24/5

Master-Version

USB CANopen RS232 GUI

EPOS2 P is a freely programmable positioning controller with an integrated power stage, based on the EPOS2 slave version. It is suitable for brushless and brush DC motors up to 120 watts output.

Standalone drive system
With self-compiled programs, the standalone version of EPOS2 can autonomously control single and multiple axis systems dispensing with the need for a superior intelligent control unit. Via the CAN Bus all axes can be coordinated simultaneously. The combination with maxon motors produces drive systems for highly dynamic movements.

Technology
The programming of applications complies with IEC 61131-3 standard. A non-volatile flash memory is used for saving. The three-stage code optimization produces IEC 61131-3 programs adjusted for the application‘s needs; optimized by memory, performance or a combination of both.

maxon utility library
Thanks to the additional maxon user library, the programming of recurring motion control tasks is simplified. By means of the «Best Practice» programs and the numerous applications examples, purposeful IEC 61131-3 application programs can be compiled.

Performance features
- 32 bit host processor, 60 MHz
- 1 MB memory, with 768 KB free user program memory
- typicaly 2.5 ms / 5000 lines IL
- 4 KB non-volatile memory
- Digital motion control signal processor

Electrical Data	EPOS2 P 24/5
Operating voltage V_{CC}	11 – 24 VDC
Max. output voltage	0.9 x V_{CC}
Max. output current I_{max}	10 A
Continuous output current I_{cont}	5 A
Mechanical Data	
Weight	approx. 180 g
Dimensions (L x W x H)	105 x 83 x 24 mm
Mounting	Flange for M3-screws
Order Number	
378308 EPOS2 P 24/5	
Accessories	
309687 DSR 50/5 Shunt regulator	

Special designs for electronics

Perfectly fitting drive electronics directly from the motor supplier

Individual electronics for creative ideas

Our expertise in drive technology and electronics is also illustrated by the production of customer-specific designs.

We develop special designs in line with your specifications and supply electronics suitable for maxon motors at competitive prices, from the prototype to the series.

We base our designs and production on the latest industry standards and use state-of-the-art technologies.

Design

Development tools
- PCB layouts, circuit diagrams
- Simulation software

Efficient project planning

Comprehensive engineering know-how

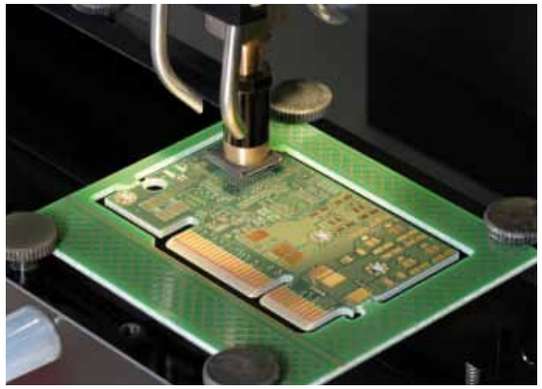
Hardware development

Embedded software development

Development of application software

Mechatronic system design

Technologies



Electronics (analogue and digital)

8 and 32 bit microprocessor

16 and 32 bit digital signal processor

Mixed-signal ASIC

SMD, fine pitch, ball grid array, chip on board (wire bonding and flip chip)

Rigid printed circuit (RPC), rigid-flex (RFPC) and flex substrates (FPC)

Special thermal designs

Production and test

Production of prototypes in-house

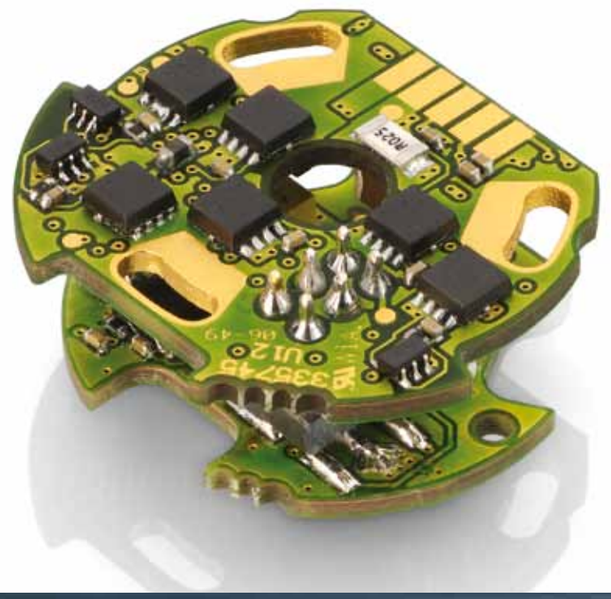
Modern production facilities for producing samples

Quick sample delivery

Most advanced and appropriate qualification equipment

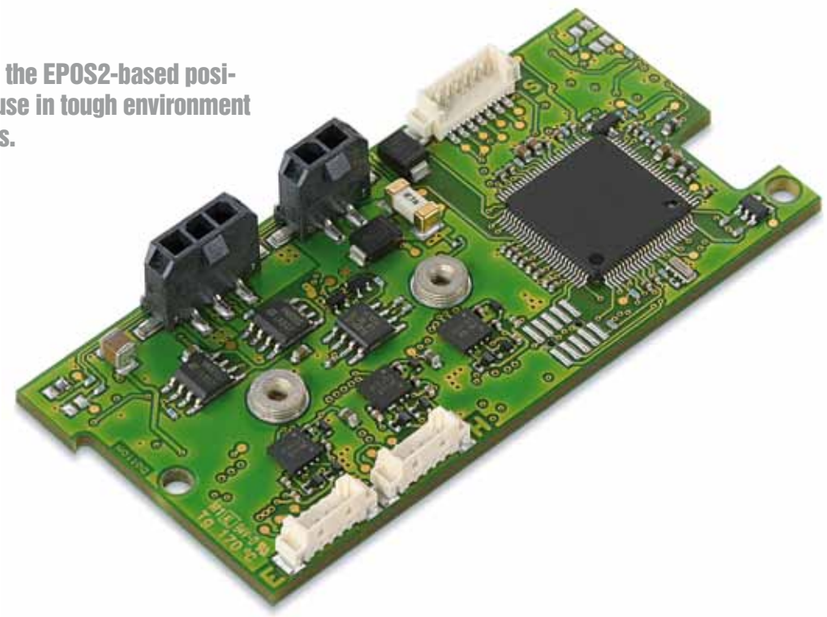
In-house test equipment manufacturing

Qualified suppliers for low and high volumes



The motor's built-in EC-amplifier combines rotor position evaluation and block commutation of the motor phases in a minute space. Minimum cabling included.

Thanks to high power density, the EPOS2-based positioning controller is ideal for use in tough environment of industrial robot applications.



maxon motor at a glance.

maxon DC motor
maxon A-max
maxon RE-max
DC motors with moving coil rotor and strong permanent magnets:
Ø6 – 65 mm,
0.3 – 250 watts.

maxon EC motor
maxon EC-max
maxon EC-4pole
Brushless DC motors with maximum service life; autoclavable versions available:
Ø6 – 60 mm,
1.2 – 400 watts.

maxon motor control
Control electronics for DC and EC motors, servoamplifiers and positioning control units.

maxon compact drive
Intelligent compact drives with a maximum 60 watts output. maxon's compact drives feature controllers, sensors and motors in a modern aluminium casing.

maxon sensor
High-resolution digital encoders, DC tachos and resolvers.

maxon flat motor
Brushless DC motors in a flat design with outer or inner rotor:
Ø9.2 – 90 mm,
0.2 – 90 watts.

maxon gear
Customized special gears as well as standard spur and planetary gearheads.

maxon micro drive
DC and brushless DC micro drives with diameters < 10 mm:
Ø6 – 9.2 mm,
0.2 – 2 watts.

maxon spindle drive
Compact, easy to configure spindle drives as complete systems.

maxon ceramic
Innovative, customer-specific ceramic and metal injection moulding components. For drive technology – and many other applications.

www.maxonmotor.com

maxon motor
driven by precision