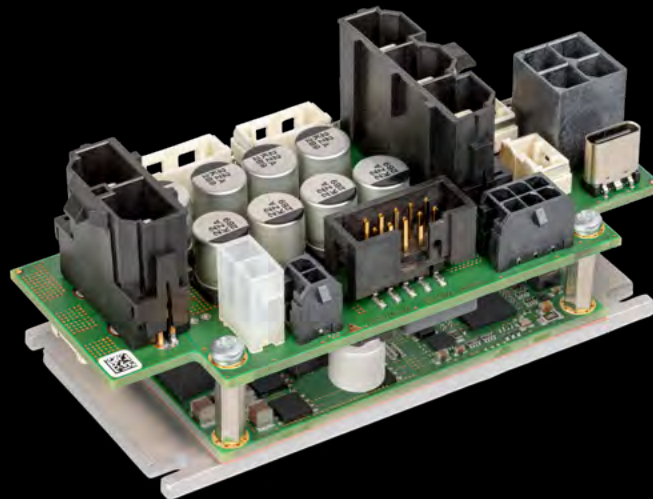


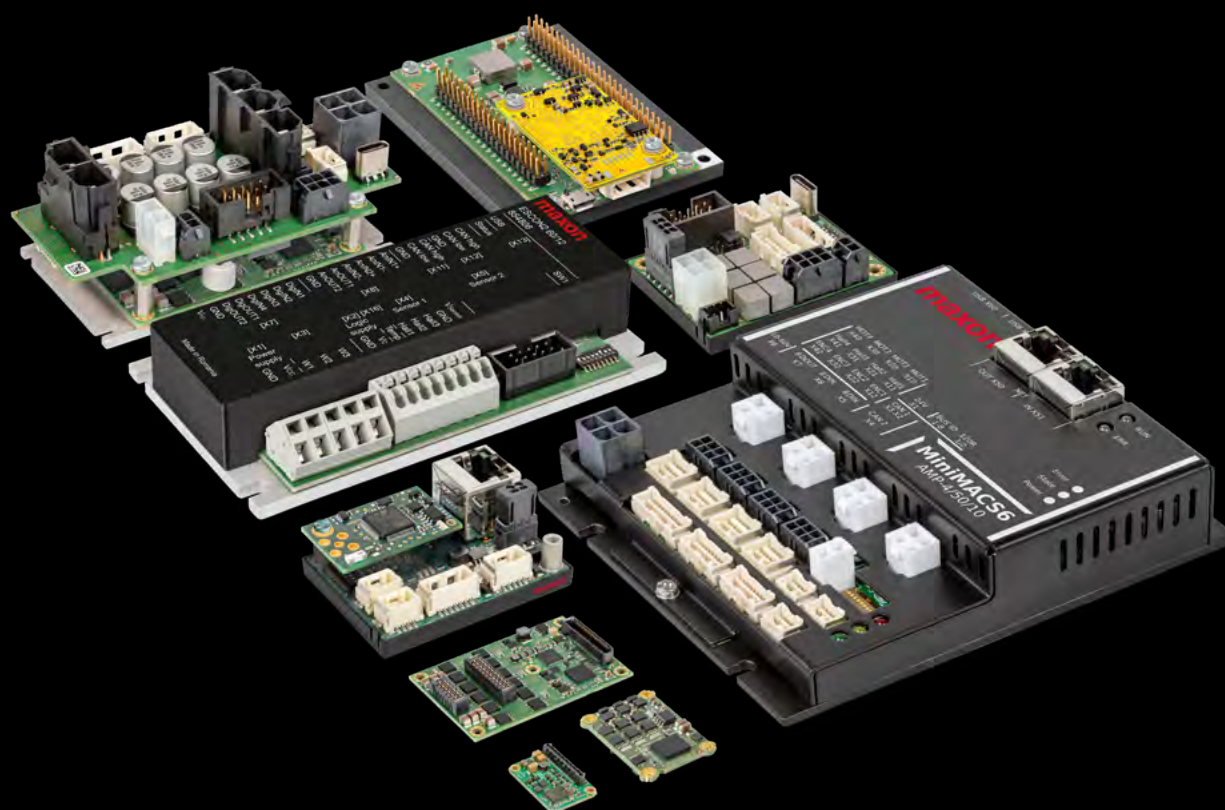
Control Electronics

The control electronics connect the drive, sensing, and firmware into an intelligent system. They determine the accuracy, safety, and performance of every movement. Our system approach ranges from integration into existing architectures to functional safety and customer-specific adaptations in hardware, firmware, and software. It includes servo controllers for precise control of individual axes as well as motion controllers for coordinated control of multiple axes. All controllers can be integrated flexibly and configured, commissioned, and analyzed with powerful software tools. This creates solutions that not only operate reliably but deliver their performance repeatably—thousands of times. For maximum control and safety in every movement.



Control Electronics

1-Q-EC servoamplifier	442-443
ESCON2 servo controllers	NEW 444-449
Positioning control units EPOS4	NEW 451-463
MACS Multi-Axis Motion Controller	464-469
Summary servo drives	471
Summary servo drives accessories	472-473
Summary motion controller	474



Various 4-quadrant PWM servo controllers for permanent magnet-activated brushed DC motors and brushless EC motors meet all requirements in terms of performance and functionality. Thanks to the fast current controller and dynamic speed controller, outstanding control characteristics are achieved. Combined with maxon high-dynamic motors and Master Controllers, the positioning controllers constitute complete solutions for highly demanding Motion Control applications.

1-Q-EC Amplifier Summary

The basic function of EC motors electronics is the electronic commutation of the motor winding.

Simple speed controls are possible with Hall sensors. A further distinction is made between open or closed loop speed control.

1-Q amplifier functions in motor operation. Direction reverse via digital signal.

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.

Technical data page 547.

DEC Module 24/2

Connections

Male header 8 + 9 = 17 poles
Pitch 2.54 mm

DEC Module 24/2 **367661**

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 optimized for OEM applications in small appliances.

OEM Module

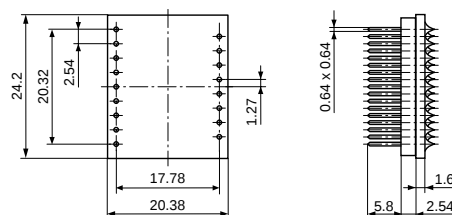
Miniaturized open electronics board. Two connector arrays arranged in a 2.54 mm (0.1") pattern support easy connectivity and integration into the motherboard.

Functionality

Direction of rotation preset by a digital signal. The motor shaft can be enabled or disabled. Adjustable maximum current limitation. Set value speed input through external analog voltage. Status indicator with "Ready"-Output.

Protection circuit

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



Dimensions in [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.

Technical data page 547.

DEC Module 50/5

Connections

Male header 1 2 rows, 2 x 9 poles
Male header 2 1 row, 8 poles
Pitch 2.54 mm

DEC Module 50/5 **380200**

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 optimized for OEM applications in small appliances.

OEM Module

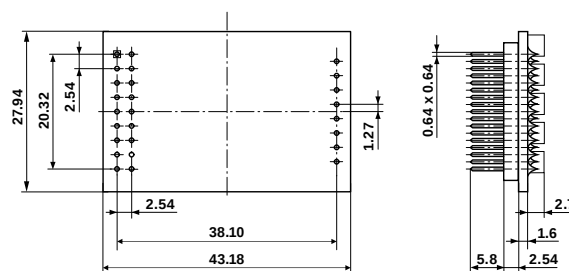
Miniaturized open electronics board. Connector arrays arranged in a 2.54 mm (0.1") pattern support easy connectivity and integration into the motherboard.

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 analog 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.



Dimensions in [mm]

1-Q-EC Amplifier Data



DEC Module 24/2 1-Q-EC Amplifier
1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 48 watts.

DEC Module 50/5 1-Q-EC Amplifier
1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 250 watts.

	DEC Module 24/2	DEC Module 50/5
EC motors up to (continuous / maximum)	48 W / 72 W	250 W / 500 W
Sensors	Digital Hall Sensors	Digital Hall Sensors
Operating mode	Speed controller (closed and open loop)	Speed controller (closed and open loop)
Electrical data		
Operating voltage V_{CC}	8 - 24 VDC (optional 5.0 VDC)	6 - 50 VDC (optional 5.0 VDC)
Max. output voltage	V_{CC}	$0.95 \times V_{CC}$
Max. output current I_{max}	3 A	10 A
Continuous output current I_{cont}	2 A	5 A
Switching frequency of power stage	46.8 kHz	46.8 kHz
Max. speed (1 pole pair)	80 000 rpm	80 000 rpm
Input		
Set value	"Speed" 0...5 V (1024 steps)	"Speed" 0...5 V (1024 steps)
Current limit	"Current Limit" external resistor against GND	"Current Limit" external resistor against GND
Enable	"Enable" 2.4...24 V	"Enable" 2.4...50 V
Direction	"Direction" 2.4...24 V	"Direction" 2.4...50 V
Output		
Monitor		"Monitor n", digital (5 V)
Status reading "Ready"	"Ready", digital (5 V)	"Ready", digital (5 V)
Voltage outputs		
Hall sensors supply voltage V_{CC} Hall	5 VDC, max. 35 mA	5 VDC, max. 35 mA
Possible adjustments	Input "Mode 0" and "Mode 1"	Input "Mode 0" and "Mode 1"
Protective functions		
Blockage protection	Motor current limitation if motor shaft is blocked for longer than 1.5 s	Motor current limitation if motor shaft is blocked for longer than 1.5 s
Thermal protection of power stage	$T > 95^{\circ}\text{C}$	$T > 100^{\circ}\text{C}$
Under- / Overvoltage protection	Switches off when $V_{CC} < 6.5 \text{ V}$ or $V_{CC} > 30 \text{ V}$	Switches off when $V_{CC} < 6 \text{ V}$ or $V_{CC} > 56 \text{ V}$
Ambient temperature and humidity range		
Operation	-10...+45°C	-10...+45°C
Storage	-40...+85°C	-40...+85°C
No condensation	20...80%	20...80%
Mechanical data		
Weight	Approx. 4 g	Approx. 9 g
Dimensions (L x W x H)	24.2 x 20.38 x 12.7 mm (see page 546)	43.18 x 27.94 x 12.7 mm (see page 546)
Mounting	mountable on socket terminal strips pitch 2.54 mm	mountable on socket terminal strips pitch 2.54 mm
Connections	See page 546	See page 546
Part numbers	367661 DEC Module 24/2 1-Q-EC Amplifier	380200 DEC Module 50/5 1-Q-EC Amplifier

Accessories	370652 DEC Module Eva-Board	370652 DEC Module Eva-Board
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ESCON2 servo controller Overview

Modules

Nano

ESCON2 Nano 24/2
809635



Micro

ESCON2 Micro 60/5
809631



Modules

ESCON2 Module 60/12
854796



ESCON2 Module 60/30
783722



Ready-to-connect units

Compacts

NEW ESCON2 Compact 60/2
903540



NEW ESCON2 Compact 60/5
903533



ESCON2 Compact 60/12
854801



ESCON2 Compact 60/30
783734



Encased housing

ESCON2 60/12 **NEW**
854806



Easy-to-use



Efficient



Powerful



Graphical User Interface

The ESCON2 product line from maxon consists of compact, powerful 4-quadrant PWM servo controllers. Their high power density provides flexibility for use with brushed DC motors and brushless EC motors (BLDC) up to 1,800 W continuous power with various feedback options, such as Hall sensors, incremental encoders, and absolute encoders in a variety of drive applications. The ESCON2 servo controllers are specially designed for commanding and controlling on the basis of analog and digital set values and for use as slave nodes in a CANopen network. They also boast extensive analog and digital I/O functionality. The latest technologies, such as field-oriented control (FOC) and feed-forward acceleration/velocity control in combination with the highest cycle rates, enable sophisti-

cated yet user-friendly motion control, even if the position sensor resolution is limited. The Motion Studio graphical user interface, available free of charge, enables fast configuration, convenient monitoring and analysis, and automated tuning of all drive systems.

Modules

Robotic, analysis, and handling systems require compact integration of a large number of energy-efficient drives, combined with highly dynamic controllers and a linked bus system. With the ESCON2 Modules, Micro and Nano, modular multi-axis systems can be set-up using CANopen without needing high investment in development.

Ready-to-connect units

A variety of ready-to-connect controllers in various power classes and designs of the ESCON2 product line provide attractive economical options for easy integration in mechanical and equipment engineering.

Motion Studio software

The Motion Studio software is available free of charge and provides intuitive tools and wizards that make commissioning easy. It provides a basic overview of the functionality of ESCON2 servo controllers and offers a wide range of configuration and command options. The package is rounded out by analysis tools, such as Data Recorder or I/O Monitor.

ESCON2 features

- Very high power density
- Optimized efficiency
- Extensive I/O functionality
- Field-oriented control (FOC)
- Hall, incremental, SSI, and BiSS-C sensor feedback
- Current and velocity controller with high performance even if the position sensor

- resolution is limited
- Configurable protective functions for controller and drive
- I/O standalone mode or CANopen slave in accordance with CiA 301, 402, 305; alternatively, can be configured and receive commands via USB or serial interface (RS232)

- Easy to configure and commission with Motion Studio GUI
- All software components are available for free
- Full documentation and outstanding support



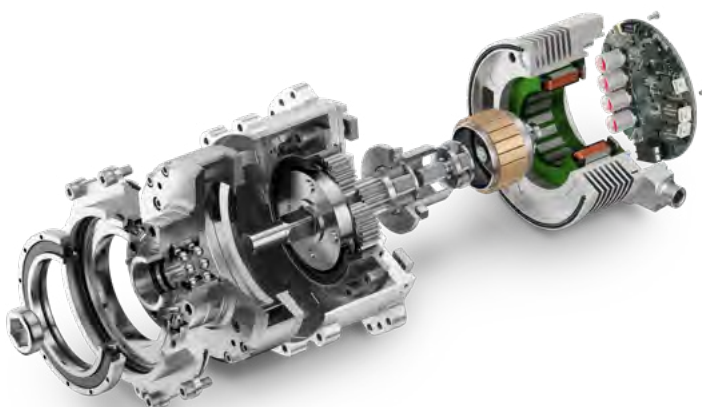
maxon 445

ESCON2 Application

- Intuitive configuration and commissioning
- Auto tuning and system optimization
- Monitoring and analysis
- Help

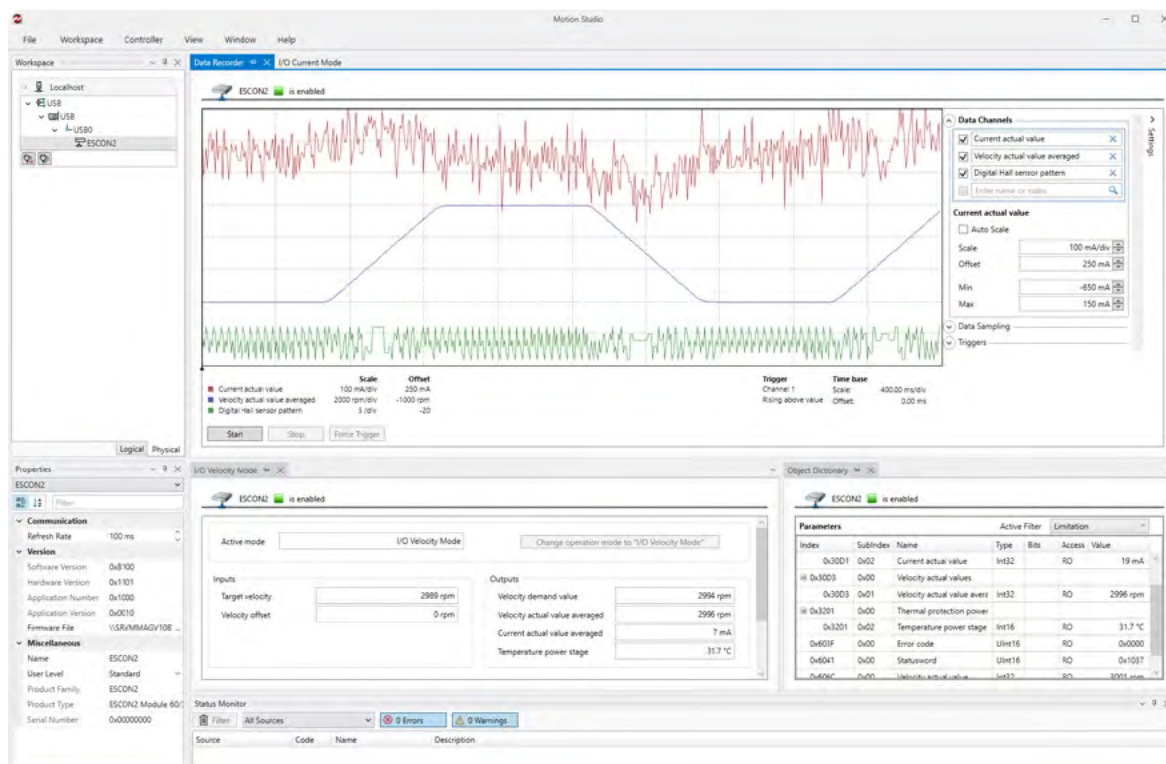


Motion Studio



Precision Drive Systems

maxon





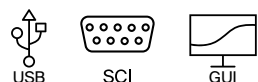
ESCON2 Nano 24/2

ESCON2 Micro 60/5

Controller version	Commands via I/O or CANopen Slave	Commands via I/O or CANopen Slave
Electrical data		
Operating voltage V_{cc}	5 - 24 VDC	10 - 60 VDC
Logic supply voltage V_c (optional)	–	10 - 60 VDC
Max. output voltage	$0.9 \times V_{cc}$	$0.95 \times V_{cc}$
Max. output current I_{max}	6 A (<6.5 s)	15 A (<4 s)
Continuous output current I_{cont}	2 A	5 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	50 kHz (20 μ s)	50 kHz (20 μ s)
Sampling rate of PI speed controller	10 kHz (100 μ s)	10 kHz (100 μ s)
Max. speed (1 pole pair)	120 000 rpm (sinusoidal)	120 000 rpm (sinusoidal)
Built-in motor choke per phase	–	–
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, B (max. 6.25 MHz)	A, A', B, B' (max. 6.67 MHz)
Sensor signals	Clock, Data	Clock, Data
Digital inputs	4	4
Digital inputs "High-speed"	4	4
Analog inputs	2 (12-bit resolution, 0...+5 V)	2 (12-bit resolution, -10...+10 V)
CAN ID	configurable with external wiring	configurable with external wiring
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1	1
Analog outputs	2 (12-bit resolution, 0...+3.3 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Hall sensor voltage output		
Auxiliary voltage output	3.3 VDC, max. 20 mA	3.3 VDC, max. 20 mA
Communication interfaces		
CAN	yes (ext. transceiver)	yes
SCI (RS232 ext. transceiver)	yes	yes
USB	yes	yes
Indicator		
LED green = READY, red = ERROR	External LEDs required	External LEDs required
Environmental conditions		
Temperature – Operation	-30...+45 °C	-30...+50 °C
Temperature – Extended Range	45...70 °C; Derating: -0.077 A/°C	50...70 °C; Derating: -0.227 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 2.5 g	approx. 6 g
Dimensions (L×W×H)	23.0×16.0×4.5 mm	36.8×23.8×6.5 mm
Mounting	Pluggable and M2 screws	Pluggable and M2 screws
Part numbers		
	809635 ESCON2 Nano 24/2	809631 ESCON2 Micro 60/5
Accessories		
	309687 DSR 50/5 Shunt regulator	235811 DSR 70/30 Shunt regulator
	Order accessories separately, see page 445	Order accessories separately, see page 445

ESCON2 Data

CANopen I/O ↔



ESCON2 Module 60/12



ESCON2 Module 60/30

Controller version	Commands via I/O or CANopen Slave	Commands via I/O or CANopen Slave
Electrical data		
Operating voltage V_{cc}	10 - 60 VDC	10 - 60 VDC
Logic supply voltage V_e (optional)	10 - 60 VDC	10 - 60 VDC
Max. output voltage	$0.90 \times V_{cc}$	$0.95 \times V_{cc}$
Max. output current I_{max}	24 A (<5 s)	60 A (<4 s)
Continuous output current I_{cont}	12 A	30 A
Switching frequency of power stage	100 kHz	50 kHz
Sampling rate of PI current controller	50 kHz (20 μ s)	50 kHz (20 μ s)
Sampling rate of PI speed controller	10 kHz (100 μ s)	10 kHz (100 μ s)
Max. speed (1 pole pair)	120 000 rpm (sinusoidal)	120 000 rpm (sinusoidal)
Built-in motor choke per phase	–	–
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\ (max. 6.67 MHz)	A, A\, B, B\ (max. 6.67 MHz)
Sensor signals	Clock, Data	Clock, Data
Digital inputs	4	4
Digital inputs "High-speed"	4	4
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID	configurable with external wiring	configurable with external wiring
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1	1
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Hall sensor voltage output		
Auxiliary voltage output	3.3 VDC, max. 20 mA	3.3 VDC, max. 20 mA
Communication interfaces		
CAN	yes	yes
SCI (RS232 ext. transceiver)	yes	yes
USB	yes	yes
Indicator		
LED green = READY, red = ERROR	External LEDs required	External LEDs required
Environmental conditions		
Temperature – Operation	-30...+50 °C	-30...+25 °C
Temperature – Extended Range	50...80 °C; Derating: -0.4 A/°C	25...75 °C; Derating: -0.506 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 12 g	approx. 19 g
Dimensions (L×W×H)	49.5×31×12.4 mm	67.0×43.0×7.8 mm
Mounting	Pluggable and M2.5 screws	Pluggable and M2.5 screws
Part numbers		
	854796 ESCON2 Module 60/12	783722 ESCON2 Module 60/30
Accessories		
	235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator
	Order accessories separately, see page 445	Order accessories separately, see page 445

NEW



ESCON2 Compact 60/2

NEW



ESCON2 Compact 60/5



ESCON2 Compact 60/12

Commands via I/O or CANopen Slave	Commands via I/O or CANopen Slave	Commands via I/O or CANopen Slave
10 - 60 VDC	10 - 60 VDC	10 - 60 VDC
10 - 60 VDC	10 - 60 VDC	10 - 60 VDC
$0.90 \times V_{cc}$	$0.90 \times V_{cc}$	$0.90 \times V_{cc}$
6 A (<2 s)	15 A (<5 s)	24 A (<5 s)
2 A	5 A	12 A
100 kHz	100 kHz	100 kHz
50 kHz (20 μ s)	50 kHz (20 μ s)	50 kHz (20 μ s)
10 kHz (100 μ s)	10 kHz (100 μ s)	10 kHz (100 μ s)
120 000 rpm (sinusoidal)	120 000 rpm (sinusoidal)	120 000 rpm (sinusoidal)
44 μ H / 5 A	13.6 μ H / 9 A	4.7 μ H / 12 A
H1, H2, H3	H1, H2, H3	H1, H2, H3
A, A\, B, B\ (max. 6.67 MHz)	A, A\, B, B\ (max. 6.67 MHz)	A, A\, B, B\ (max. 6.67 MHz)
Clock, Data	Clock, Data	Clock, Data
4	4	4
4	4	4
2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
configurable with DIP switch 1...5	configurable with DIP switch 1...5	configurable with DIP switch 1...5
2	2	2
1	1	1
2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 145 mA	5 VDC, max. 145 mA	5 VDC, max. 145 mA
-	-	-
yes	yes	yes
-	-	-
yes	yes	yes
yes	yes	yes
-30...+60 °C	-30...+35 °C	-30...+50 °C
60...65 °C; Derating: -0.235 A/°C	35...65 °C; Derating: -0.164 A/°C	50...80 °C; Derating: -0.4 A/°C
-40...+85 °C	-40...+85 °C	-40...+85 °C
5...90%	5...90%	5...90%
approx. 32 g	approx. 32 g	approx. 90 g
55×40×22.8 mm	55×40×22.8 mm	81×41×33.5 mm
M2.5 screws	M2.5 screws	M3 screws
903540 ESCON2 Compact 60/2	903533 ESCON2 Compact 60/5	854801 ESCON2 Compact 60/12
235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 445	Order accessories separately, see page 445	Order accessories separately, see page 445

ESCON2 Data

CANopen I/O ↔



ESCON2 Compact 60/30



ESCON2 60/12

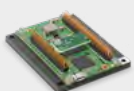
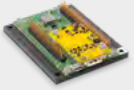
NEW

Controller version	Commands via I/O or CANopen Slave	Commands via I/O or CANopen Slave
Electrical data		
Operating voltage V_{cc}	10 - 60 VDC	10 - 60 VDC
Logic supply voltage V_e (optional)	10 - 60 VDC	10 - 60 VDC
Max. output voltage	$0.95 \times V_{cc}$	$0.90 \times V_{cc}$
Max. output current I_{max}	60 A (<4 s)	24 A (<5 s)
Continuous output current I_{cont}	30 A	12 A
Switching frequency of power stage	50 kHz	100 kHz
Sampling rate of PI current controller	50 kHz (20 μ s)	50 kHz (20 μ s)
Sampling rate of PI speed controller	10 kHz (100 μ s)	10 kHz (100 μ s)
Max. speed (1 pole pair)	120 000 rpm (sinusoidal)	120 000 rpm (sinusoidal)
Built-in motor choke per phase	0.47 μ H / 30 A	22 μ H / 12 A
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\ (max. 6.67 MHz)	A, A\, B, B\ (max. 6.67 MHz)
Sensor signals	Clock, Data	Clock, Data
Digital inputs	4	4
Digital inputs "High-speed"	4	4
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1	1
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Hall sensor voltage output	–	–
Auxiliary voltage output	–	–
Communication interfaces		
CAN	yes	yes
SCI (RS232 ext. transceiver)	–	–
USB	yes	yes
Indicator		
LED green = READY, red = ERROR	yes	yes
Environmental conditions		
Temperature – Operation	-30...+25 °C	-30...+45 °C
Temperature – Extended Range	25...75 °C; Derating: -0.506 A/°C	45...85 °C; Derating: -0.3 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 128 g	approx. 182 g
Dimensions (L×W×H)	93.5×46.0×41.0 mm	116×67×24 mm
Mounting	M3 screws	M3 screws
Part numbers		
	783734 ESCON2 Compact 60/30	854806 ESCON2 Compact 60/12
Accessories		
	235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator
	Order accessories separately, see page 445	Order accessories separately, see page 445

EPOS4 Positioning Controllers Overview

Modules

Ready-to-connect units

Micro	Modules	Compact CAN	Compact EtherCAT	Encased housing / Disk
EPOS4 Micro 24/5 CAN 638328 	EPOS4 Module 24/1.5 536630 	EPOS4 Compact 24/1.5 CAN 546714 	EPOS4 Compact 24/1.5 EtherCAT 628092 	EPOS4 50/5 546047 
EPOS4 Micro 24/5 EtherCAT 654731 	EPOS4 Module 50/5 534130 	EPOS4 Compact 50/5 CAN 541718 	EPOS4 Compact 50/5 EtherCAT 628094 	EPOS4 70/15 594385 
	EPOS4 Module 50/8 504384 	EPOS4 Compact 50/8 CAN 520885 	EPOS4 Compact 50/8 EtherCAT 605298 	EPOS4 Disk 60/8 CAN 688770 
	EPOS4 Module 50/15 504383 	EPOS4 Compact 50/15 CAN 520886 	EPOS4 Compact 50/15 EtherCAT 605299 	EPOS4 Disk 60/8 EtherCAT 688772 
	NEW EPOS4 Module 60/20 833716 	NEW EPOS4 Compact 60/20 CAN 894250 	EPOS4 Compact 24/5 EtherCAT 3-axes 684519 	EPOS4 Disk 60/12 CAN 688775 
	NEW EPOS4 Module 60/20 STO 894249 	NEW EPOS4 Compact 60/20 CAN STO 833726 		EPOS4 Disk 60/12 EtherCAT 688777 

maxon EPOS4 products are small, completely digital, intelligent positioning controllers. Their high power density provides high flexibility for use with brushed DC and brushless EC (BLDC) motors up to approx. 1200 W with various feedback options such as Hall sensors, incremental encoders and absolute encoders, in a variety of drive applications.

Modules

Robotic, analysis and handling systems require compact integration of a large number of energy-efficient drives, combined with highly dynamic controllers and a linked bus system.

With the established EPOS4 Module and Micro, modular multi-axis systems can be set up using CANopen or EtherCAT, without needing high investment in development.

Ready-to-connect units

For prototypes and small batches, the large variety of ready-to-connect controllers, available in various power classes and designs, provide attractive, economical options for using EPOS4 products in your application.

EPOS Studio

The EPOS Studio software, which is available free of charge, includes intuitive tools and wizards that make commissioning easy. It provides a basic overview of the EPOS4 functions

and a command option. Analysis tools such as the Data Recorder or Command Analyzer supplement the features in Motion Studio.

CANopen / EtherCAT

As a standardized motion control slave, EPOS4 can easily be integrated into the system manager tools and motion libraries of various PLC manufacturers. The data exchange and command functions make use of the CiA® 402 protocol (Device Profile for Drives and Motion Control).

Cyclic Synchronous Position (CSP)

The master executes the path planning and sends the target position cyclically and synchronously to the EPOS4 via the network. The position control loop runs on the EPOS4. The EPOS4 sends the measured actual position, speed and current values to the master.

Cyclic Synchronous Velocity (CSV)

The master executes the path planning and sends the target speed cyclically and synchronously to the EPOS4 via the network. The speed control loop runs on the EPOS4. The EPOS4 sends the measured actual position, speed and current values to the master. The CSV mode is commonly used if a PI position control loop is closed via the master.

Cyclic Synchronous Torque (CST)

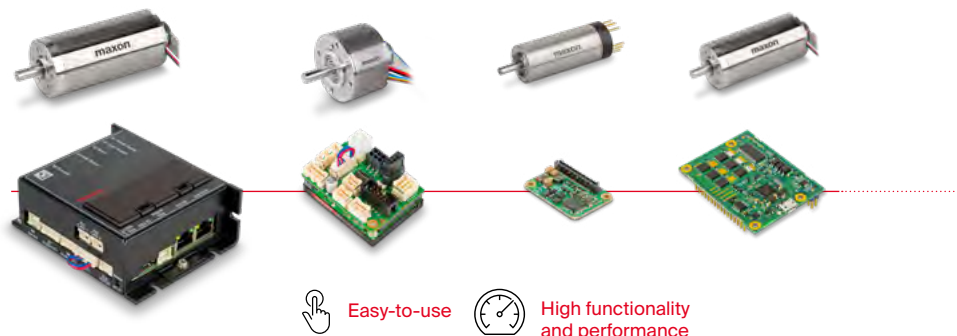
The master executes the path planning and sends the target torque cyclically and synchronously to the EPOS4 via the network. The torque (current) control loop runs on the EPOS4. The EPOS4 sends the measured actual position, speed and current values to the master. The CST mode is commonly used if a PID position control loop is closed via the master.

Point-to-point

The "Profile Position Mode" moves 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).

Position and velocity control with feed forward

The combination of feedback and feed forward control provides ideal motion behavior. Feed forward control reduces control error. EPOS4 supports feed forward acceleration and speed control.



Speed control

In the Profile Velocity Mode, the motor axis is moved with a defined set speed. The motor axis keeps the speed constant until a new speed set value is given.

Homing

The Homing Mode is used for referencing to a specific mechanical position. There is a wide variety of methods available.

Feedback options and dual loop

Two different encoder signals can be evaluated simultaneously. This allows dual-loop control, which can be tuned automatically to compensate for mechanical backlash and elasticity. A wide range of sensors is permitted: digital incremental encoders, analog incremental encoders (sin/cos), and SSI absolute encoders.

Protection

The positioning controller has protective circuits against overcurrent, excess temperature, under- and overvoltage, voltage transients, short-circuits in the motor cable, and against feedback signal loss. An adjustable current limitation protects the motor and load.

Safe Torque Off (STO)*

The new EPOS4 Module/Compact CAN STO products feature integrated Safe Torque Off (STO) functionality, certified in accordance with the DIN EN 61800-5-2 and DIN EN ISO 13849 standards. They provide reliable protection in safety-critical applications up to SIL 3 and PL e, Category 3.

Capture Inputs (Touch Probe)

The digital inputs can be configured so that the actual position value is stored whenever a positive or negative edge occurs at an input.

Control of Holding Brakes

Control of holding brakes can be integrated in the device status management. The delay times can be individually configured for switching on and off.

Supplementary information for technical data page 454–460.

Operating modes/Control

Cyclic Synchronous Position (CSP)
Cyclic Synchronous Velocity (CSV)
Cyclic Synchronous Torque (CST)
Profile Position, Profile Velocity and Homing Mode
Speed and Acceleration Feed Forward
Sinusoidal or Block Commutation for EC motors
Alternative set value input via analog commands
Dual-loop Position and Speed Control

Communication/Configuration

Communication via CANopen and/or USB 2.0/3.0 and/or RS232
EtherCAT (CoE)
USB to CAN and RS232 to CAN gateway

Inputs/Outputs

Safe Torque Off (STO)*
Free digital inputs, configurable e.g. for limit/reference switches
Free digital outputs, configurable e.g. for brake
Free analog inputs, configurable
Free analog outputs, configurable

Available software

EPOS Studio
Windows DLL (32-/64-bit) with programming examples
Linux shared object library (X86 32-/64-bit, ARMv6/v7/v8 32-bit, ARMv8 64-bit for Raspberry Pi and BeagleBone) with programming examples

Available documentation

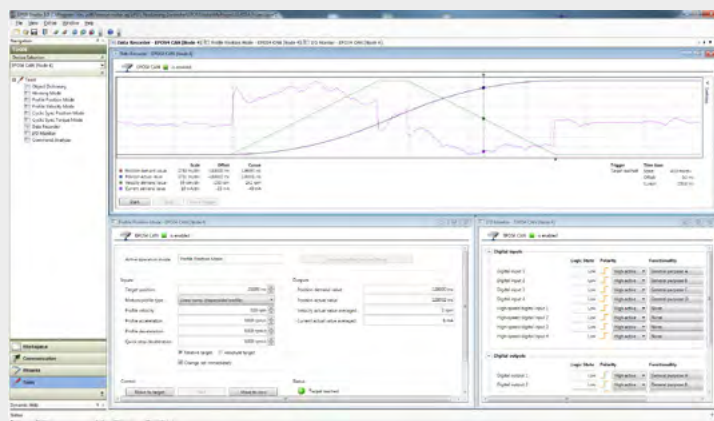
Feature Chart
Hardware Reference
Firmware Specification
Communication Guide
Application Notes

*Applies only to versions equipped with the STO Safety Card, which is built into the EPOS4 Module/Compact 60/20 CAN STO variants. For all other EPOS4 versions, the STO functionality is not certified.

EPOS4 performance characteristics

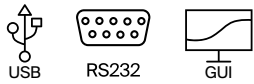
- Maximum power density.
- Convincing control performance even with highly dynamic motors.
- Comprehensive feedback options.
- Diverse I/O connection options for peripherals.
- Uncompromising protective features for controller and drive.
- Configuration and communication via CANopen (CiA 301, 402, 305), RS232, USB, or EtherCAT. IEC 61158 type 12 EtherCAT slave: CoE (CAN application layer over EtherCAT) compliant with IEC 61800-7 profile type 1 (CiA 402). Easy integration into existing EtherCAT systems. Can be connected to a network of other EtherCAT units.
- Easy commissioning via EPOS Studio GUI and intuitive tools.
- Libraries and programming examples for efficient integration in a wide variety of systems.
- All software components are freely available at any time.
- Full documentation and outstanding support.

The complete package for your motion control solution with added value.



EPOS4 Positioning Controllers Overview

EtherCAT[®] CANopen



Module + Connector Board = Compact



Accessories EPOS4 Module & Micro (not included in delivery)									
403968	USB Type A - micro B Cable								
536997	EPOS4 CB 24/1.5 CAN								
620048	EPOS4 CB 24/1.5 EtherCAT								
534133	EPOS4 CB 50/5 CAN								
620044	EPOS4 CB 50/5 EtherCAT								
833713	EPOS4 CB 60/20 CAN								
520884	EPOS4 CB Power CAN								
604594	EPOS4 CB Power EtherCAT								
581245	EPOS4 EtherCAT Card								
638677	EPOS4 EB Micro	✓							
659508	EPOS4 MB Micro EtherCAT 3-axes		✓						
590738	EPOS4 Module SMT socket 2x23 poles			✓					
677324	EPOS4 Micro SMT socket 2x40 poles	✓	✓						
908604	Signal Cable 6core								✓

(a) with matching motherboard

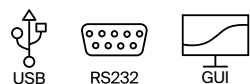
Accessories EPOS4 Compact & Encased housing (not included in delivery)									
520858	CAN-CAN Cable								
520857	CAN-COM Cable								
275934	Encoder Cable								
520859	EPOS4 Connector Set								
581245	EPOS4 EtherCAT Card								
691408	EPOS4 MB 3-axes Conn. Set	✓							
422827	Ethernet Cable	✓							
275878	Hall Sensor Cable	✓							
275851	Motor Cable	✓							
520851	Motor Cable High Current								
275829	Power Cable	✓(b)							
520850	Power Cable High Current	✓(c)							
520856	RS232-COM Cable								
520852	Sensor Cable 5x2core	✓							
520854	Signal Cable 7core	✓							
520853	Signal Cable 8core	✓							
520860	STO Idle Connector X9		✓(i)	✓(i)	✓(i)	✓(i)	✓(i)	✓(i)	✓(i)
403968	USB Type A - micro B Cable	✓	✓	✓	✓	✓	✓	✓	✓
908604	Signal Cable 6core								

(b) optional for separate logic supply (c) mandatory for supply of power stage (i) included

Accessories EPOS4 Disk (not included in delivery)									
710928	Brake Cable								
710931	CAN-CAN Cable								
710932	CAN-COM Cable								
751388	CAN ix Industrial Type B Plug								
696285	Encoder Cable								
710926	EPOS4 Disk Connector Set								
710934	EtherCAT-COM Cable								
710933	EtherCAT-EtherCAT Cable								
748166	EtherCAT ix Industrial Type A Plug								
275878	Hall Sensor Cable								
696284	Hall Sensor Cable	✓							
710930	Motor Cable High Current								
696283	Power & Motor Cable	✓							
710929	Power Cable High Current								
696286	Sensor Cable 3x2core	✓							
520852	Sensor Cable 5x2core								
696288	Signal Cable 7core	✓							
696287	Signal Cable 8core	✓							
696289	USB Type A - Micro-Lock Cable	✓							

EPOS4 Positioning Controllers Data

EtherCAT  CANopen 



EPOS4 Micro 24/5 CAN

Miniaturized OEM positioning controller module, designed for use with brushed DC motors with encoders and brushless EC motors (BLDC) with Hall sensors and encoders up to 120 W/360 W.

EPOS4 Micro 24/5 EtherCAT

Miniaturized OEM positioning controller module, designed for use with brushed DC motors with encoders and brushless EC motors (BLDC) with Hall sensors and encoders up to 120 W/360 W.

Controller version	CANopen Slave	EtherCAT Slave
Electrical data		
Operating voltage V_{cc}	10 - 24 VDC	10 - 24 VDC
Logic supply voltage V_e (optional)	10 - 24 VDC	10 - 24 VDC
Max. output voltage	$0.9 \times V_{cc}$	$0.9 \times V_{cc}$
Max. output current I_{max}	15 A (<10 s)	15 A (<10 s)
Continuous output current I_{cont}	5 A	5 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 μ s)	25 kHz (40 μ s)
Sampling rate of PI speed controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Sampling rate of PID position controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	–	–
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A $\bar$, B, B $\bar$, I, I $\bar$ (max. 6.25 MHz)	A, A $\bar$, B, B $\bar$, I, I $\bar$ (max. 6.25 MHz)
Sensor signals	Clock, Data	Clock, Data
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs "High-speed"	1	1
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with external wiring	–
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1	1
Analog outputs	1 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 115 mA	5 VDC, max. 115 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	–	–
Communication interfaces		
CAN	high; low (max. 1 Mbit/s)	–
EtherCAT	–	100 Mbit/s (Full Duplex)
RS232	RxD; TxD (max. 115 200 bit/s)	–
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red = ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature – Operation	-30...+45 °C	-30...+40 °C
Temperature – Extended Range	45...70 °C; Derating: -0.200 A/°C	40...60 °C; Derating: -0.25 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 6 g	approx. 7 g
Dimensions (L×W×H)	32.0×22.0×7.0 mm	36.5×27.0×7.0 mm
Mounting	M2 screws	M2 screws
Part numbers		
	638328 EPOS4 Micro 24/5 CAN	654731 EPOS4 Micro 24/5 EtherCAT
Accessories		
	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 453	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 453

EPOS4 Positioning Controllers Data



EPOS4 Module 24/1.5

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 36/108 Watt.

EPOS4 Module 50/5

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.

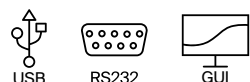
EPOS4 Module 50/8

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 400/1500 Watt.

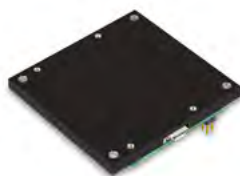
Controller version		
CANopen Slave with EtherCAT option	CANopen Slave with EtherCAT option	CANopen Slave with EtherCAT option
Electrical data		
10 - 24 VDC	10 - 50 VDC	10 - 50 VDC
10 - 24 VDC	10 - 50 VDC	10 - 50 VDC
$0.9 \times V_{cc}$	$0.9 \times V_{cc}$	$0.9 \times V_{cc}$
4.5 A (<30 s)	15 A (<3 s)	30 A (<5 s)
1.5 A	5 A	8 A
100 kHz	50 kHz	50 kHz
25 kHz (40 μ s)	25 kHz (40 μ s)	25 kHz (40 μ s)
2.5 kHz (400 μ s)	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
2.5 kHz (400 μ s)	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
-	-	-
Inputs		
H1, H2, H3	H1, H2, H3	H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (logic level)	4 (logic level)	4 (logic level)
4, differential	4, differential	4, differential
2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
configurable with external wiring	configurable with external wiring	configurable with external wiring
Outputs		
2	2	2
1, differential	1, differential	1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA	5 VDC, max. 70 mA	5 VDC, max. 70 mA
5 VDC, max. 30 mA	5 VDC, max. 30 mA	5 VDC, max. 30 mA
5 VDC, max. 145 mA	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)
Optional 581245 EPOS4 EtherCAT Card available	Optional 581245 EPOS4 EtherCAT Card available	Optional 581245 EPOS4 EtherCAT Card available
RxD; TxD (max. 115 200 bit/s)	RxD; TxD (max. 115 200 bit/s)	RxD; TxD (max. 115 200 bit/s)
Data+; Data- (Full Speed)	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
Green LED, red LED	Green LED, red LED	Green LED, red LED
Environmental conditions		
-30...+60 °C	-30...+45 °C	-30...+45 °C
60...73 °C; Derating: -0.115 A/°C	45...75 °C; Derating: -0.167 A/°C	45...77 °C; Derating: -0.250 A/°C
-40...+85 °C	-40...+85 °C	-40...+85 °C
5...90%	5...90%	5...90%
Mechanical data		
approx. 17 g	approx. 17 g	approx. 23 g
53.8×38.8×11.1 mm	53.8×38.8×11.1 mm	59.5×46.0×14.1 mm
Socket header 1.27 mm or M2.5 screws	Socket header 1.27 mm or M2.5 screws	Socket header 2.54 mm or M2.5 screws
Part numbers		
536630 EPOS4 Module 24/1.5	534130 EPOS4 Module 50/5	504384 EPOS4 Module 50/8
Accessories		
309687 DSR 50/5 Shunt regulator	309687 DSR 50/5 Shunt regulator	235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453	Order accessories separately, see page 453	Order accessories separately, see page 453

EPOS4 Positioning Controllers Data

EtherCAT  CANopen



NEW



EPOS4 Module 50/15

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 750/1500 Watt.



EPOS4 Module 60/20

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 1200/2400 Watt.

Controller version	CANopen Slave with EtherCAT option	CANopen Slave
Electrical data		
Operating voltage V_{cc}	10 - 50 VDC	10 - 60 VDC
Logic supply voltage V_e (optional)	10 - 50 VDC	10 - 60 VDC
Max. output voltage	$0.9 \times V_{cc}$	$0.9 \times V_{cc}$
Max. output current I_{max}	30 A (<60 s)	40 A (<15 s)
Continuous output current I_{cont}	15 A	20 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 μ s)	25 kHz (40 μ s)
Sampling rate of PI speed controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Sampling rate of PID position controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	-	-
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A', B, B', I, I' (max. 6.25 MHz)	A, A', B, B', I, I' (max. 6.25 MHz)
Sensor signals	A, A', B, B', I, I', Clock, Clock', Data, Data'	A, A', B, B', I, I', Clock, Clock', Data, Data'
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs "High-speed"	4, differential	4, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with external wiring	configurable with external wiring
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 70 mA	5 VDC, max. 70 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
CAN	high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)
EtherCAT	Optional 581245 EPOS4 EtherCAT Card available	-
RS232	RxD; TxD (max. 115 200 bit/s)	RxD; TxD (max. 115 200 bit/s)
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red = ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature - Operation	-30...+25°C	-30...+30°C
Temperature - Extended Range	25...77°C; Derating: -0.288 A/°C	30...72°C; Derating: -0.488 A/°C
Temperature - Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 70 g	approx. 96 g
Dimensions (L×W×H)	59.5×62.0×16.4 mm	80×64×17.9 mm
Mounting	Socket header 2.54 mm or M2.5 screws	Socket header 2.54 mm or M3 screws

Part numbers

504383 EPOS4 Module 50/15

833716 EPOS4 Module 60/20

Accessories

235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453

235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453

EPOS4 Positioning Controllers Data



NEW



EPOS4 Module 60/20 STO

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 1200/2400 Watt.

EPOS4 Compact 24/5 EtherCAT 3-axes

Ready-to-install 3-axis compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 120/360 W per axis.

EPOS4 Compact 24/1.5 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 36/108 Watt.

Controller version

CANopen Slave with STO

Electrical data

10 - 60 VDC
10 - 60 VDC
0.9×V_{cc}
40 A (<15 s)
20 A
50 kHz
25 kHz (40 μs)
2.5 kHz (400 μs)
2.5 kHz (400 μs)
50 000 rpm (sinusoidal), 100 000 rpm (block)
–

Inputs

H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (logic level)
4, differential
2 (12-bit resolution, -10...+10 V)
configurable with external wiring

Outputs

2
1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA
5 VDC, max. 30 mA
5 VDC, max. 145 mA

Communication interfaces

high; low (max. 1 Mbit/s)
–

RxD; TxD (max. 115 200 bit/s)
Data+; Data- (Full Speed)

Indicator

Green LED, red LED

Environmental conditions

-30...+25 °C
30...77 °C; Derating: -0.288 A/°C
-40...+85 °C
5...90%

Mechanical data

approx. 96 g
80×64×17.9 mm
Socket header 2.54 mm or M2.5 screws

Part numbers

894249 EPOS4 Module 60/20 STO

Accessories

235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453

EtherCAT Slave

10 - 24 VDC
10 - 24 VDC
0.9×V_{cc}
15 A (<10 s) per axis
5 A per axis
50 kHz
25 kHz (40 μs)
2.5 kHz (400 μs)
2.5 kHz (400 μs)
50 000 rpm (sinusoidal), 100 000 rpm (block)
–

H1, H2, H3 per axis

A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
per axis

4 (level switchable: logic/PLC) per axis
–
2 (12-bit resolution, -10...+10 V) per axis
–

2 per axis

–
1 (12-bit resolution, -4...+4 V, max. 1 mA) per axis
5 VDC, max. 100 mA per axis
5 VDC, max. 30 mA per axis

–
100 Mbit/s (Full Duplex)

–
Data+; Data- (Full Speed) per axis

Green LED, red LED

-30...+25 °C
25...50 °C; Derating: -0.200 A/°C
-40...+85 °C
5...90%

approx. 85 g
90.0×56.0×29.0 mm
M2.5 screws

684519 EPOS4 Compact 24/5 EtherCAT
3-axes

235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453

CANopen Slave

10 - 60 VDC
10 - 60 VDC
0.9×V_{cc}
4.5 A (<30 s)
1.5 A
100 kHz
25 kHz (40 μs)
2.5 kHz (400 μs)
2.5 kHz (400 μs)
50 000 rpm (sinusoidal), 100 000 rpm (block)
94 μH / 1.5 A

H1, H2, H3

A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (level switchable: logic/PLC)
4, differential
2 (12-bit resolution, -10...+10 V)
configurable with DIP switch 1...5

2

1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA
5 VDC, max. 30 mA
5 VDC, max. 145 mA

high; low (max. 1 Mbit/s)
–

RxD; TxD (max. 115 200 bit/s)
Data+; Data- (Full Speed)

Green LED, red LED

-30...+45 °C
45...70 °C; Derating: -0.060 A/°C
-40...+85 °C
5...90%

approx. 58 g
55.0×40.0×31.1 mm
M2.5 screws

546714 EPOS4 Compact 24/1.5 CAN

309687 DSR 50/5 Shunt regulator
Order accessories separately, see page 453

EPOS4 Positioning Controllers Data



EPOS4 Compact 24/1.5 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 36/108 Watt.



EPOS4 Compact 50/5 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.

Controller version	EtherCAT Slave	CANopen Slave
Electrical data		
Operating voltage V_{cc}	10 - 24 VDC	10 - 50 VDC
Logic supply voltage V_e (optional)	10 - 24 VDC	10 - 50 VDC
Max. output voltage	$0.9 \times V_{cc}$	$0.9 \times V_{cc}$
Max. output current I_{max}	4.5 A (<30 s)	15 A (<3 s)
Continuous output current I_{cont}	1.5 A	5 A
Switching frequency of power stage	100 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 μ s)	25 kHz (40 μ s)
Sampling rate of PI speed controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Sampling rate of PID position controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	100 μ H / 1.5 A	9.4 μ H / 5 A
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A', B, B', I, I' (max. 6.25 MHz)	A, A', B, B', I, I' (max. 6.25 MHz)
Sensor signals	A, A', B, B', I, I', Clock, Clock', Data, Data'	A, A', B, B', I, I', Clock, Clock', Data, Data'
Digital inputs	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
Digital inputs "High-speed"	4, differential	4, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 70 mA	5 VDC, max. 70 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
CAN	-	high; low (max. 1 Mbit/s)
EtherCAT	100 Mbit/s (Full Duplex)	-
RS232	-	RxD; TxD (max. 115 200 bit/s)
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red = ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature - Operation	-30...+45 °C	-30...+25 °C
Temperature - Extended Range	45...70 °C; Derating: -0.060 A/°C	25...70 °C; Derating: -0.111 A/°C
Temperature - Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 78 g	approx. 58 g
Dimensions (L×W×H)	55.0×56.5×31.7 mm	55.0×40.0×31.1 mm
Mounting	M2.5 screws	M2.5 screws
Part numbers		
	628092 EPOS4 Compact 24/1.5 EtherCAT	541718 EPOS4 Compact 50/5 CAN
Accessories		
	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 453	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 453

EPOS4 Positioning Controllers Data



EPOS4 Compact 50/5 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.

EPOS4 Compact 50/8 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 400/1500 Watt.

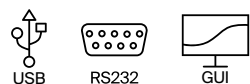
EPOS4 Compact 50/8 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 400/1500 Watt.

Controller version		
EtherCAT Slave	CANopen Slave	EtherCAT Slave
Electrical data		
10 - 50 VDC	10 - 50 VDC	10 - 50 VDC
10 - 50 VDC	10 - 50 VDC	10 - 50 VDC
$0.9 \times V_{cc}$	$0.9 \times V_{cc}$	$0.9 \times V_{cc}$
15 A (<3 s)	30 A (<5 s)	30 A (<5 s)
5 A	8 A	8 A
50 kHz	50 kHz	50 kHz
25 kHz (40 µs)	25 kHz (40 µs)	25 kHz (40 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
10 µH / 5 A	2.2 µH / 15 A	2.2 µH / 15 A
Inputs		
H1, H2, H3	H1, H2, H3	H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
4, differential	4, differential	4, differential
2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
configurable with DIP switch 1...5	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
2	2	2
1, differential	1, differential	1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA	5 VDC, max. 70 mA	5 VDC, max. 70 mA
5 VDC, max. 30 mA	5 VDC, max. 30 mA	5 VDC, max. 30 mA
5 VDC, max. 145 mA	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
-	high; low (max. 1 Mbit/s)	-
100 Mbit/s (Full Duplex)	-	100 Mbit/s (Full Duplex)
-	RxD; TxD (max. 115 200 bit/s)	-
Data+; Data- (Full Speed)	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
Green LED, red LED	Green LED, red LED	Green LED, red LED
Environmental conditions		
-30...+25 °C	-30...+45 °C	-30...+45 °C
25...70 °C; Derating: -0.111 A/°C	45...77 °C; Derating: -0.250 A/°C	45...77 °C; Derating: -0.250 A/°C
-40...+85 °C	-40...+85 °C	-40...+85 °C
5...90%	5...90%	5...90%
Mechanical data		
approx. 76 g	approx. 86 g	approx. 100 g
55.0×56.5×31.7 mm	59.5×58.5×33.0 mm	59.5×79.5×35.7 mm
M2.5 screws	M2.5 screws	M2.5 screws
Part numbers		
628094 EPOS4 Compact 50/5 EtherCAT	520885 EPOS4 Compact 50/8 CAN	605298 EPOS4 Compact 50/8 EtherCAT
Accessories		
309687 DSR 50/5 Shunt regulator	235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453	Order accessories separately, see page 453	Order accessories separately, see page 453

EPOS4 Positioning Controllers Data

EtherCAT  CANopen



EPOS4 Compact 50/15 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 750/1500 Watt.

EPOS4 Compact 50/15 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 750/1500 Watt.

Controller version	CANopen Slave	EtherCAT Slave
Electrical data		
Operating voltage V_{cc}	10 - 50 VDC	10 - 50 VDC
Logic supply voltage V_e (optional)	10 - 50 VDC	10 - 50 VDC
Max. output voltage	$0.9 \times V_{cc}$	$0.9 \times V_{cc}$
Max. output current I_{max}	30 A (<60 s)	30 A (<60 s)
Continuous output current I_{cont}	15 A	15 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 μ s)	25 kHz (40 μ s)
Sampling rate of PI speed controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Sampling rate of PID position controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	2.2 μ H / 15 A	2.2 μ H / 15 A
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A', B, B', I, I' (max. 6.25 MHz)	A, A', B, B', I, I' (max. 6.25 MHz)
Sensor signals	A, A', B, B', I, I', Clock, Clock', Data, Data'	A, A', B, B', I, I', Clock, Clock', Data, Data'
Digital inputs	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
Digital inputs "High-speed"	4, differential	4, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 70 mA	5 VDC, max. 70 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
CAN	high; low (max. 1 Mbit/s)	-
EtherCAT	-	100 Mbit/s (Full Duplex)
RS232	RxD; TxD (max. 115 200 bit/s)	-
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red = ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature - Operation	-30...+25 °C	-30...+25 °C
Temperature - Extended Range	25...77 °C; Derating: -0.288 A/°C	25...77 °C; Derating: -0.288 A/°C
Temperature - Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 126 g	approx. 140 g
Dimensions (L×W×H)	59.5×65.5×35.1 mm	59.5×79.5×37.8 mm
Mounting	M3 screws	M3 screws
Part numbers		
	520886 EPOS4 Compact 50/15 CAN	605299 EPOS4 Compact 50/15 EtherCAT
Accessories		
	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 453	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 453

EPOS4 Positioning Controllers Data



NEW



NEW



EPOS4 Compact 60/20 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 1200/2400 Watt.

EPOS4 Compact 60/20 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 1200/2400 Watt.

EPOS4 50/5

Positioning controller in a robust housing, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.

Controller version

CANopen Slave

Electrical data

10 - 60 VDC
10 - 60 VDC
0.9×V_{cc}
40 A (<15 s)
20 A
50 kHz
25 kHz (40 μs)
2.5 kHz (400 μs)
2.5 kHz (400 μs)
50 000 rpm (sinusoidal), 100 000 rpm (block)
1 μH / 20 A

Inputs

H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (level switchable: logic/PLC)
4, differential
2 (12-bit resolution, -10...+10 V)
configurable with DIP switch 1...5

Outputs

2
1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA
5 VDC, max. 30 mA
5 VDC, max. 145 mA

Communication interfaces

high; low (max. 1 Mbit/s)
-
RxD; TxD (max. 115 200 bit/s)
Data+; Data- (Full Speed)

Indicator

Green LED, red LED

Environmental conditions

-30...+25 °C
25...77 °C; Derating: -0.288 A/°C
-40...+85 °C
5...90%

Mechanical data

approx. 171 g
80×69×35 mm
M3 screws

Part numbers

894250 EPOS4 Compact 60/20 CAN

Accessories

235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453

CANopen Slave

10 - 60 VDC
10 - 60 VDC
0.9×V_{cc}
40 A (<15 s)
20 A
50 kHz
25 kHz (40 μs)
2.5 kHz (400 μs)
2.5 kHz (400 μs)
50 000 rpm (sinusoidal), 100 000 rpm (block)
1 μH / 20 A

H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (level switchable: logic/PLC)
4, differential
2 (12-bit resolution, -10...+10 V)
configurable with DIP switch 1...5

2
1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA
5 VDC, max. 30 mA
5 VDC, max. 145 mA

high; low (max. 1 Mbit/s)
-
RxD; TxD (max. 115 200 bit/s)
Data+; Data- (Full Speed)

Green LED, red LED

-30...+25 °C
25...77 °C; Derating: -0.288 A/°C
-40...+85 °C
5...90%

approx. 171 g
80×69×35 mm
M3 screws

833726 EPOS4 Compact 60/20 CAN STO

Accessories

235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453

CANopen Slave with EtherCAT option

10 - 50 VDC
10 - 50 VDC
0.9×V_{cc}
15 A (<15 s)
5 A
50 kHz
25 kHz (40 μs)
2.5 kHz (400 μs)
2.5 kHz (400 μs)
50 000 rpm (sinusoidal), 100 000 rpm (block)
15 μH / 5 A

H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (level switchable: logic/PLC)
4, differential
2 (12-bit resolution, -10...+10 V)
configurable with DIP switch 1...5

2
1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA
5 VDC, max. 30 mA
5 VDC, max. 145 mA

high; low (max. 1 Mbit/s)
Optional **581245** EPOS4 EtherCAT Card available
RxD; TxD (max. 115 200 bit/s)
Data+; Data- (Full Speed)

Green LED, red LED

-30...+50 °C
50...80 °C; Derating: -0.167 A/°C
-40...+85 °C
5...90%

approx. 206 g
105.0×83.0×38.7 mm
Flange for M4-screws

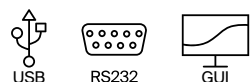
546047 EPOS4 50/5

Accessories

309687 DSR 50/5 Shunt regulator
Order accessories separately, see page 453

EPOS4 Positioning Controllers Data

EtherCAT  CANopen



EPOS4 70/15

Positioning controller in a robust housing, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 1050/2100 Watt.



EPOS4 Disk 60/8 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 480/1440 Watt.

Controller version	CANopen Slave with EtherCAT option	CANopen Slave
Electrical data		
Operating voltage V_{cc}	10 - 70 VDC	12 - 60 VDC
Logic supply voltage V_e (optional)	10 - 70 VDC	12 - 60 VDC
Max. output voltage	$0.9 \times V_{cc}$	$0.9 \times V_{cc}$
Max. output current I_{max}	30 A (<60 s)	24 A (<10 s)
Continuous output current I_{cont}	15 A	8 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 μ s)	25 kHz (40 μ s)
Sampling rate of PI speed controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Sampling rate of PID position controller	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	15 μ H / 15 A	-
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	Clock, Clock\, Data, Data\
Digital inputs	4 (level switchable: logic/PLC)	4 (logic level)
Digital inputs "High-speed"	4, differential	1, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with DIP switch 1...5	Configurable with DIP switch 1...4
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 70 mA	5 VDC, max. 70 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
CAN	high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)
EtherCAT	Optional 581245 EPOS4 EtherCAT Card available	-
RS232	RxD; TxD (max. 115 200 bit/s)	-
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red = ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature - Operation	-30...+50 °C	-30...+45 °C
Temperature - Extended Range	50...85 °C; Derating: -0.429 A/°C	45...75 °C; Derating: -0.267 A/°C
Temperature - Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 372 g	approx. 24 g
Dimensions (L×W×H)	125.0×94.5×38.7 mm	60.0×60.0×22.0 mm
Mounting	Flange for M4-screws	M2 screws
Part numbers		
	594385 EPOS4 70/15	688770 EPOS4 Disk 60/8 CAN

Accessories

235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453

235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 453

EPOS4 Positioning Controllers Data



EPOS4 Disk 60/8 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 480/1440 Watt.

EPOS4 Disk 60/12 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 720/2160 Watt.

EPOS4 Disk 60/12 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 720/2160 Watt.

Controller version		
EtherCAT Slave	CANopen Slave	EtherCAT Slave
Electrical data		
12 - 60 VDC	12 - 60 VDC	12 - 60 VDC
12 - 60 VDC	12 - 60 VDC	12 - 60 VDC
$0.9 \times V_{cc}$	$0.9 \times V_{cc}$	$0.9 \times V_{cc}$
24 A (<10 s)	36 A (<5 s)	36 A (<5 s)
8 A	12 A	12 A
50 kHz	50 kHz	50 kHz
25 kHz (40 μ s)	25 kHz (40 μ s)	25 kHz (40 μ s)
2.5 kHz (400 μ s)	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
2.5 kHz (400 μ s)	2.5 kHz (400 μ s)	2.5 kHz (400 μ s)
50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
-	-	-
Inputs		
H1, H2, H3	H1, H2, H3	H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Clock, Clock\, Data, Data\	Clock, Clock\, Data, Data\	Clock, Clock\, Data, Data\
4 (logic level)	4 (logic level)	4 (logic level)
1, differential	1, differential	1, differential
2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
Configurable with DIP switch 1...4	Configurable with DIP switch 1...4	Configurable with DIP switch 1...4
Outputs		
2	2	2
1, differential	1, differential	1, differential
1 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA	5 VDC, max. 70 mA	5 VDC, max. 70 mA
5 VDC, max. 30 mA	5 VDC, max. 30 mA	5 VDC, max. 30 mA
5 VDC, max. 145 mA	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
-	high; low (max. 1 Mbit/s)	-
100 Mbit/s (Full Duplex)	-	100 Mbit/s (Full Duplex)
-	-	-
Data+; Data- (Full Speed)	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
Green LED, red LED	Green LED, red LED	Green LED, red LED
Environmental conditions		
-30...+35 °C	-30...+50 °C	-30...+45 °C
35...65 °C; Derating: -0.267 A/°C	50...75 °C; Derating: -0.480 A/°C	45...70 °C; Derating: -0.480 A/°C
-40...+85 °C	-40...+85 °C	-40...+85 °C
5...90%	5...90%	5...90%
Mechanical data		
approx. 26 g	approx. 43 g	approx. 45 g
60.0×60.0×22.0 mm	90.0×90.0×27.6 mm	90.0×90.0×27.6 mm
M2 screws	M3 screws	M3 screws
Part numbers		
688772 EPOS4 Disk 60/8 EtherCAT	688775 EPOS4 60/12 CAN 709859 EPOS4 60/12 CAN SSC	688777 Disk 60/12 EtherCAT 709862 Disk 60/12 EtherCAT SSC
Accessories		
235811 DSR 70/30 Shunt regulator Order accessories separately, see page 453	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 453	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 453

Multi-Axis Motion Controller Summary



MicroMACS6
Module



MiniMACS6-
AMP4 OEM



MiniMACS6-
AMP4

NEW



MiniMACS6-
AMP4-IF1

NEW



MicroMACS6



MasterMACS

Fully programmable	✓	✓	✓	✓	✓	✓
Integrated power stage	No	✓	✓	✓	✓	No
Number of axes	6	6 (4)	6 (4)	6 (4)	6 (4)	32
CANopen	✓	✓	✓	✓	✓	✓
Ethernet interfaces	✓	No	No	✓	✓	✓
EtherCat slave	No	No	No	✓	✓	✓
EtherCat master	No	No	No	No	No	✓
PROFINET	No	No	No	✓	✓	No
Bluetooth	No	No	No	No	No	No

Solutions optimized for less complex or cost-sensitive applications:

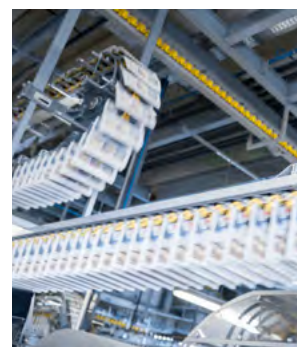
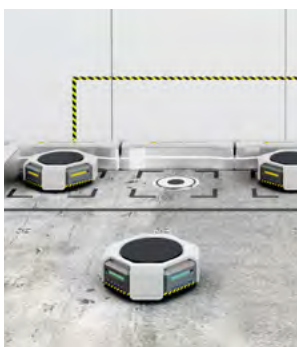
- MicroMACS6
- MicroMACS6 Module
- MiniMACS6-AMP-4/50/10

Solutions for high flexibility:

- MiniMACS6-AMP-4/50/10-IF1
- Variants with integrated amplifiers (50 V/up to 10 A/30 A) and various encoder inputs (also absolute)

Solutions for highest performance:

- MasterMACS
- Most powerful Motion Controller
- Synchronization of up to 32 axes
- Various fieldbus interfaces



MiniMACS6-AMP-4/50/10-IF1 Data

Programmable Motion Controller



MiniMACS6-AMP-4/50/10 OEM

Freely programmable, compact multi-axis motion controller with integrated high-performance power stages, without housing.

MiniMACS6-AMP-4/50/10

Freely programmable, compact multi-axis motion controller with integrated high-performance power stages.

MiniMACS6-AMP-4/50/10-IF1

Freely programmable, compact multi-axis motion controller with integrated high-performance power stages and a network option card (Ethernet/EtherCAT/PROFINET in planning).

Controller versions	
	CANopen Master/Slave, EtherCAT Slave optional, Ethernet optional, Standalone with APOSS® win
Features	
Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	1 kHz (1 ms)
Maximum number of axes	6
Web server (visualization)	optional
Expandable memory	yes (datalogging on USB stick)
Electrical data	
Logic supply voltage V_C	18 - 30 VDC
Inputs	
Digital inputs	16 (PLC level, 4 latch capable)
Analog inputs	2 (12-bit resolution, 0...10 V)
Hall sensor signals	4 x (H1, H2, H3)
CAN-ID (CAN node identification)	configurable with DIP switch
Output	
Digital output	8 (max. 100 mA per output)
Analog output	-
Encoder voltage output	5 VDC, max. 200 mA per output, total 1 A
Interfaces	
PROFINET	PROFINET
CAN	2 (max. 1 Mbit/s)
RS232 / RS485	-
EtherCAT-Slave	1
Ethernet	1
USB 2.0	1 Data+; Data- (High Speed)
Encoder inputs	
Digital incremental	4 (differential, max. 6.25 MHz)
SSI absolute	4 (39 kHz...5 MHz)
Analog incremental (sin/cos)	4 (differential, max. 150 kHz)
Hiperface/EnDat	-
Encoder outputs	
Encoder TTL outputs	-
Indicator	
LEDs	3 (status) / EtherCAT
Display	-
Environmental conditions	
Temperature - Operation	-30...+70 °C
Temperature - Storage	-30...+85 °C
Humidity (condensation not permitted)	5...90%
Mechanical data	
Weight	ca. 600 g
Dimensions (L x W x H)	141 x 110 x 34 mm
Mounting	Metal compact housing / OEM without housing
Ordering Information: Please contact your maxon sales engineer	

Amplifier	
Operating voltage V_{CC} :	12 - 60 VDC
6 DC / 4 EC (BLDC) / 3 stepper motors / Twin Mode / Chopper	
Max. output voltage:	$0.9 \times V_{CC}$
Max. output current (per axis)	
$I_{cont.}$:	10 A
$I_{max.}$:	30 A
Switching frequency of power stage:	48 kHz
Sampling rate of PI current controller:	24 kHz (41 μ s)
Sampling rate of PI speed controller:	8 kHz (125 μ s)
Sampling rate of PID positioning controller:	1 kHz (1 ms)
Product variants	
Order no. 001755	MiniMACS6-AMP-4/50/10
Order no. 001756	MiniMACS6-AMP-4/50/10 OEM
Order no. 001757	MiniMACS6-AMP-4/50/10-IF1 EtherCAT
Order no. 001784	MiniMACS6-AMP-4/50/10-IF1 Ethernet
Order no. 001824	NEW MiniMACS6-AMP-4/50/4-IF1 Ethernet
Order no. 001825	NEW MiniMACS6-AMP-4/50/4-IF1 EtherCAT
Order no. 001826	NEW MiniMACS6-AMP-4/50/4-IF1 PROFINET
Order no. 001827	NEW MiniMACS6-AMP-4/50/10-IF1 PROFINET

MicroMACS6 Data

Programmable Motion Controller



MicroMACS6

Compact, freely programmable multi-axis controller with optional BLE (Bluetooth Low Energy) interface.

Controller versions

CANopen Master/Slave, Ethernet, Standalone with APOSS® win

Features

Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	-
Maximum number of axes	6
Web server (visualization)	-
Expandable memory	-

Electrical data

Logic supply voltage V_c	8 - 28 VDC
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Inputs

Digital inputs	6 (PLC 9...30 VDC or Logic 2...30 VDC)
Analog inputs	2 (12-bit resolution, 0...10 V, 1 kHz)
Hall sensor signals	-
CAN-ID (CAN node identification)	configurable with DIP switch

Output

Digital output	4 (24 VDC, 100 mA, max. 25 kHz PWM)
Analog output	-
Encoder voltage output	-

Interfaces

Profinet	-
CAN	2 (max. 1 Mbit/s)
BLE (Bluetooth Low Energy)	optional
EtherCAT-Master / EtherCAT-Slave	-
Ethernet	1 (TCP/IP, max. 100 Mbit/s)
USB 2.0	1

Encoder inputs

Digital incremental	-
SSI absolute	-
Analog incremental (sin/cos)	-
Hiperface/EnDat	-

Encoder outputs

Encoder TTL outputs	-
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Indicator

LEDs	3 (status) / Ethernet
Display	-

Environmental conditions

Temperature - Operation	-30...+55 °C
Temperature - Storage	-40...+85 °C
Humidity (condensation not permitted)	5...90%

Mechanical data

Weight	ca. 80 g
Dimensions (L x W x H)	55 x 40 x 21 mm
Mounting	M2.5 screws

Ordering Information: Please contact your maxon sales engineer

001794 MicroMACS6

MicroMACS6

Compact and powerful

The MicroMACS6 is a high-performance, ultra-compact, freely programmable multi-axis controller without power output stages.

One Ethernet and two independent CAN interfaces are available for commanding up to 6 power stages. The axes can be set up individually or as a kinematics group. Four PWM outputs are available for use with ESCON controllers.

An optional BLE (Bluetooth Low Energy) board expands the controller, making it possible to communicate with the controller via a smartphone app. Note: BLE option on request.

MicroMACS6 Module Data

Programmable Motion Controller



MicroMACS6 Module

Compact, programmable multi-axis controller as plug-in option for integration into custom motherboards.

Controller versions

CANopen Master/Slave, Ethernet, Standalone with APOSS® win

Features

Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	-
Maximum number of axes	6
Web server (visualization)	-
Expandable memory	-

Electrical data

Logic supply voltage V_c	8 - 28 VDC
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Inputs

Digital inputs	6 (PLC 9...30 VDC or Logic 2...30 VDC)
Analog inputs	2 (12-bit resolution, 0...10 V, 1 kHz)
Hall sensor signals	-
CAN-ID (CAN node identification)	configurable

Output

Digital output	4 (24 VDC, 100 mA, max. 25 kHz PWM)
Analog output	-
Encoder voltage output	-

Interfaces

Profinet	-
CAN	2 (max. 1 Mbit/s)
BLE (Bluetooth Low Energy)	optional
EtherCAT-Master / EtherCAT-Slave	-
Ethernet	1 (TCP/IP, max. 100 Mbit/s)
USB 2.0	1

Encoder inputs

Digital incremental	-
SSI absolute	-
Analog incremental (sin/cos)	-
Hiperface/EnDat	-

Encoder outputs

Encoder TTL outputs	-
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Indicator

LEDs	3 (status) / Ethernet
Display	-

Environmental conditions

Temperature - Operation	-30...+55 °C
Temperature - Storage	-40...+85 °C
Humidity (condensation not permitted)	5...90%

Mechanical data

Weight	ca. 9 g
Dimensions (L x W x H)	45 x 30 x 9.8 mm
Mounting	M2 screws

Ordering Information: Please contact your maxon sales engineer

001822 MicroMACS6 Module

MicroMACS6 Module

Flexible and compact

The MicroMACS6 Module is designed for flexibility and can be integrated into custom motherboards. The MicroMACS6 Module, with its small size and focused functions (similar to the MicroMACS6), is an excellent choice for users looking for a more affordable alternative to high-performance master motion controllers. For initial commissioning, the MicroMACS6 with identical functionality can be used as a fully integrated and ready-to-use solution. This simplifies the setup process.

MasterMACS Data

Programmable Motion Controller



MasterMACS

Rounds off the Motion Controller portfolio with the highest computing power and multiple integrated bus interfaces as standard.

Controller versions

CANopen Master/Slave, EtherCAT Master, EtherCAT Slave, Ethernet, Standalone with APOSS® win

Features

Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	1 kHz (1 ms)
Maximum number of axes	32
Web server (visualization)	yes
Expandable memory	SD-Card

Electrical data

Logic supply voltage V_C 18 - 30 VDC

Inputs

Digital inputs	10 (PLC level)
Analog inputs	-
Hall sensor signals	-
CAN-ID (CAN node identification)	configurable with DIP switch

Output

Digital output	4 (max. 100 mA per output)
Analog output	-
Encoder voltage output	5 VDC, max. 200 mA
Profinet	on request

Interfaces

CAN	2 high; low (max. 1 Mbit/s)
RS232 / RS485	1 x Rx/D; Tx/D / 1 x Data+; Data-
EtherCAT-Master / EtherCAT-Slave	1 / 1
Ethernet	1
USB 2.0	1 Data+; Data- (Full Speed)

Encoder inputs

Digital incremental	1 (differential, max. 5 MHz)
Hiperface/EnDat	-

Encoder outputs

Encoder TTL outputs -

Indicator

LEDs	10 (status, USB, EtherCAT)
Display	Option

Environmental conditions

Temperature - Operation	0...40 °C
Temperature - Storage	-20...+85 °C
Humidity (condensation not permitted)	20...80%

Mechanical data

Weight	500 / 300 g (DIN/compact housing)
Dimensions (L x W x H)	108 x 108 x 67 / 125 (108) x 98 x 42 mm
Mounting	DIN mounting / compact housing

Ordering Information: Please contact your maxon sales engineer

001725 MasterMACS DIN 32 ax

001728 MasterMACS compact housing 32ax

Data logger/web server

For development and analysis purposes, it is frequently helpful to collect, prepare and output data on drive systems.

Our MACS controllers provide easy options for high-performance data storage, be it on an internal SD card or via a connected PC tool. Relevant data can be recorded on a per-event basis or for long-term observation.

This data can be read out and analyzed at a later time. This flexibility makes it possible to use the MasterMACS purely as data collectors. An integrated web server provides the option of performing analysis and configuration via remote diagnostics.

Programmable Motion Controllers

Application development

APOSS® win

APOSS® enables simplified implementation of complex motion control applications. The programming is performed in the high-level languages C, which has been supplemented with very powerful, specific motion control commands.

```

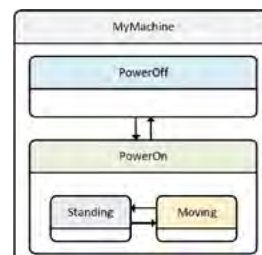
47 // *****
48 ** Event Definitions
49 *****
50 OnEvent SIG_POWER_ON ()
51 OnEvent SIG_POWER_OFF ()
52 OnEvent SIG_TARGET_REACHED ()
53 OnEvent SIG_START_POS ()
54
55 // *****
56 ** State Definitions
57 *****
58 = State MyMachine {
59     SIG_INIT = {
60         OnInput(I_POWER_INPUT, IM_INPUT_RISING, id, SIG_POWER_ON);
61         OnInput(I_POWER_INPUT, IM_INPUT_FALLING, id, SIG_POWER_OFF);
62         OnInput(I_START_INPUT, IM_INPUT_RISING, id, SIG_START_POS);
63         OnParam(ARM_PROCESS_THICK, (id-1), FFS_FLAGS, IM_STAT_POSREACHED, IM_PARAM_RISING, id, SIG_TARGET_REACHED);
64         return(OnTrans(~PowerOff));
65     }
66
67     = State PowerOff {
68         SIG_ENTRY = {
69             print("Enter Power Off State");
70         }
71         SIG_POWER_ON = OnTrans(PowerOn~Standing);
72     }
73
74     = State PowerOn {
75         SIG_ENTRY = {
76             AxisControl(id.ON);
77             DigOutput(O_BRAKE_OUTPUT,C_RELEASE_BRAKE);
78             print("Switch Power ON");
79         }
80         SIG_EXIT = {
81             AxisControl(id.OFF);
82             DigOutput(O_BRAKE_OUTPUT,C_ENABLE_BRAKE);
83             print("Switch Power OFF");
84         }
85         SIG_POWER_OFF = OnTrans(PowerOff);
86     }
87
88     = State Moving {
89         SIG_ENTRY = { print("State -> Moving"); }
90         SIG_TARGET_REACHED = {
91             print("Target reached, position : ",Gpos[id]);
92             return(OnTrans(Standing));
93         }
94     } // Moving
95
96     = State Standing {
97         SIG_ENTRY = { print("State -> Standing"); }
98         SIG_START_POS = MoveNextPosition;
99     }
100     } // Standing
101     } // PowerOn
102 } // MyStateMachine

```

APOSS® IDE – Application Engineering

State machines

The development of extensive software systems requires a structured and modular procedure. It is essential to have an appropriate system architecture, including its components and the interfaces to the subsystems and system environment.

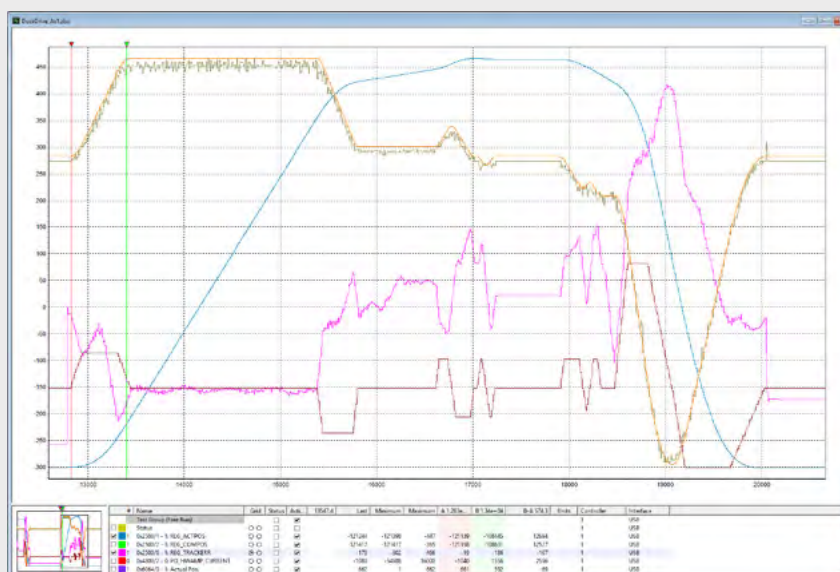


APOSS® makes it possible to create programs by means of hierarchical state machines. Thus comprehensive applications can be structured and developed in a transparent and serviceable way. Several state machines can be called up and processed in parallel.

Motion control functions

Comprehensive positioning and synchronization tasks are initiated with APOSS® using simple commands [e.g. AxisPosAbsStart(); AxisPosRelStart(); SyncPos(); SyncVel();] and processed independently in the background.

- **Jerk-limited positioning**
Profile motion with limited jerking. Jerk limiting can be individually defined for all four acceleration phases. Jerk-limited motion can be changed dynamically during the motion.
- **CAM profiles**
Each axis can travel along an own CAM profile. CAM profiles can be combined in any way desired and dynamically calculated. CAM segments can be splines, polynomials up to the fifth order or straight lines.
- **Path motion**
Path motion can be performed with constant or with maximum path speed, for any number of axes.
- **Synchronization tasks**
Axis motion synchronized with a master axis, position synchronization, speed synchronization or position synchronization with marker correction. Each axis can be synchronized with another master.
- **Kinematics**
Synchronization of several axes in a 2- or 3-dimensional Cartesian coordinate system. Various kinematic models are available, for example a SCARA or DELTA model.



APOSS® Oscilloscope

Summary servo drives

4-Q Servocontroller				Page
ESCON	NRND	466023	ESCON Module 24/2, for DC/EC motors, speed control (open loop/closed loop), current control, 2/6 A, 10–24 VDC	
	NRND	403112	ESCON 36/2 DC, for DC motors, speed control (open loop/closed loop), current control, 2/4 A, 10–36 VDC	
	NRND	414533	ESCON 36/3 EC, for EC motors, speed control (open loop/closed loop), current control, 2.7/9 A, 10–36 VDC	
		446925	ESCON Module 50/4 EC-S, for sensorless EC motors, speed control (open loop/closed loop), 4/12 A, 10–50 VDC	
	NRND	438725	ESCON Module 50/5, for DC/EC motors, speed control (open loop/closed loop), current control, 5/15 A, 10–50 VDC	
	NRND	532872	ESCON Module 50/8, for DC/EC motors, speed control (open loop/closed loop), current control, 8/15 A, 10–50 VDC	
	NRND	586137	ESCON Module 50/8 HE, for DC/EC motors, speed control (open loop/closed loop), current control, 8/15 A, 10–50 VDC	
	NRND	409510	ESCON 50/5, for DC/EC motors, speed control (open loop/closed loop), current control, 5/15 A, 10–50 VDC	
	NRND	422969	ESCON 70/10, for DC/EC motors, speed control (open loop/closed loop), current control, 10/30 A, 10–70 VDC	
ESCON2		809635	ESCON2 Nano 24/2, for DC/EC motors, servo controller, 2/6 A, 5–24 VDC	447
		809631	ESCON2 Micro 60/5, for DC/EC motors, servo controller, 5/15 A, 10–60 VDC	447
		854796	ESCON2 Module 60/12, for DC/EC motors, servo controller, 12/24 A, 1060 VDC	448
		783722	ESCON2 Module 60/30, for DC/EC motors, servo controller, 30/60 A, 10–60 VDC	448
	NEW	903540	ESCON2 Compact 60/2, for DC/EC motors, servo controller, 2/6 A, 10–60 VDC	449
	NEW	903533	ESCON2 Compact 60/5, for DC/EC motors, servo controller, 5/15 A, 10–60 VDC	449
		854801	ESCON2 Compact 60/12, for DC/EC motors, servo controller, 12/24 A, 10–60 VDC	449
		783734	ESCON2 Compact 60/30, for DC/EC motors, servo controller, 30/60 A, 10–60 VDC	450
	NEW	854806	ESCON2 60/12, for DC/EC motors, servo controller, 12/24 A, 10–60 VDC	450
4-Q-DC Servoamplifier				
LSC	NRND	250521	LSC 30/2, linear 4-Q-Servoamplifier 30 V/2 A in module housing	
1-Q-EC Amplifier				
DEC		367661	DEC Module 24/2, digital 1-Q-EC Amplifier 24 V/2 A, speed control, OEM module	443
		380200	DEC Module 50/5, digital 1-Q-EC Amplifier 50 V/5 A, speed control, OEM module	443
	NRND	230572	DEC 50/5, digital 1-Q-EC Amplifier 50 V/5 A, speed control, current control, PWM operation	
4-Q-EC Servoamplifier				
DES	NRND	205679	DES 50/5, digital 4-Q-EC Servoamplifier 50 V/5 A, sinusoidal commutation	
Positioning control units				
EPOS4		638328	EPOS4 Micro 24/5 CAN, digital positioning controller, 5 A, 10–24 VDC	454
		654731	EPOS4 Micro 24/5 EtherCAT, digital positioning controller, 5 A, 10–24 VDC	454
		536630	EPOS4 Module 24/1.5, digital positioning controller, 1.5 A, 10–24 VDC	455
		534130	EPOS4 Module 50/5, digital positioning controller, 5 A, 10–50 VDC	455
		504384	EPOS4 Module 50/8, digital positioning controller, 8 A, 10–50 VDC	455
		504383	EPOS4 Module 50/15, digital positioning controller, 15 A, 10–50 VDC	456
	NEW	833716	EPOS4 Module 60/20, digital positioning controller, 20 A, 10–60 VDC	456
	NEW	894249	EPOS4 Module 60/20 STO, digital positioning controller, 20 A, 10–60 VDC	457
		684519	EPOS4 Compact 24/5 EtherCAT 3-axes, digital positioning controller, 3×5 A, 10–24 VDC	457
		546714	EPOS4 Compact 24/1.5 CAN, digital positioning controller, 1.5 A, 10–24 VDC	457
		628092	EPOS4 Compact 24/1.5 EtherCAT, digital positioning controller, 1.5 A, 10–24 VDC	458
		541718	EPOS4 Compact 50/5 CAN, digital positioning controller, 5 A, 10–50 VDC	458
		628094	EPOS4 Compact 50/5 EtherCAT, digital positioning controller, 5 A, 10–50 VDC	459
		520885	EPOS4 Compact 50/8 CAN, digital positioning controller, 8 A, 10–50 VDC	459
		605298	EPOS4 Compact 50/8 EtherCAT, digital positioning controller, 8 A, 10–50 VDC	459
		520886	EPOS4 Compact 50/15 CAN, digital positioning controller, 15 A, 10–50 VDC	460
		605299	EPOS4 Compact 50/15 EtherCAT, digital positioning controller, 15 A, 10–50 VDC	460
	NEW	894250	EPOS4 Compact 60/20 CAN, digital positioning controller, 20 A, 10–60 VDC	461
	NEW	833726	EPOS4 Compact 60/20 CAN STO, digital positioning controller, 20 A, 10–60 VDC	461
		546047	EPOS4 50/5, digital positioning controller, 5 A, 10–50 VDC	461
		594385	EPOS4 70/15, digital positioning controller, 15 A, 10–70 VDC	462
		688770	EPOS4 Disk 60/8 CAN, digital positioning controller, 8 A, 12–60 VDC	462
		688772	EPOS4 Disk 60/8 EtherCAT, digital positioning controller, 8 A, 12–60 VDC	463
		688775	EPOS4 Disk 60/12 CAN, digital positioning controller, 12 A, 12–60 VDC	463
		709859	EPOS4 Disk 60/12 CAN SSC, digital positioning controller, 12 A, 12–60 VDC	463
		688777	EPOS4 Disk 60/12 EtherCAT, digital positioning controller, 12 A, 12–60 VDC	463
		709862	EPOS4 Disk 60/12 EtherCAT SSC, digital positioning controller, 12 A, 12–60 VDC	463
EPOS2	NRND	380264	EPOS2 24/2 for EC motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	390003	EPOS2 24/2 for DC/EC motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	390438	EPOS2 24/2 for DC motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	530239	EPOS2 24/2 for DC(X) motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	360665	EPOS2 Module 36/2 OEM positioning controller plug-in module, 2 A, 11–36 VDC	
	NRND	392159	EPOS2 Module 24/3 OEM positioning controller plug-in module, 3 A, 11–24 VDC	
	NRND	367676	EPOS2 24/5, digital positioning controller, 5 A, 11–24 VDC	
	NRND	347717	EPOS2 50/5, digital positioning controller, 5 A, 11–50 VDC	
	NRND	375711	EPOS2 70/10, digital positioning controller, 10 A, 11–70 VDC	
MAXPOS	NRND	447293	MAXPOS 50/5, digital positioning controller, 5 A, 10–50 VDC	

Summary servo drives accessories

Cable		
NRND	710928	Brake Cable (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	354045	Cable with Connector (length 0.5 m)
	275926	CAN-CAN Cable (length 3 m) to 347717, 361435, 367676, 375711, 390003
	520858	CAN-CAN Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
NRND	710931	CAN-CAN Cable (length 3 m) to 688770, 688775, 709859
	275908	CAN-COM Cable (length 3 m) to 347717, 361435, 367676, 375711, 390003
	520857	CAN-COM Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
NRND	710932	CAN-COM Cable (length 3 m) to 688770, 688775, 709859
	319471	CAN-Y Cable (length 3 m) to 390003
NRND	403962	DC Motor Cable (length 1.5 m) to 403112
	303490	DC Motor Cable (length 3 m) to 390003
	275934	Encoder Cable (length 3 m) to 347717, 361435, 367676, 375711, 380264, 390003, 390438, 403112, 409510, 422969, 438779, 447293, 486400, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 783734
	696285	Encoder Cable (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	710934	EtherCAT-COM Cable (length 3 m) to 688772, 688777, 709862
	710933	EtherCAT-EtherCAT Cable (length 3 m) to 688772, 688777, 709862
	422827	Ethernet Cable (length 2 m) to 001755, 001756, 001757, 001784, 447293, 546047, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
	275878	Hall Sensor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 447293, 520884, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519, 688775, 709859, 688777, 709862, 783734
	696284	Hall Sensor Cable (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	403965	I/O Cable 6core (length 1.5 m) for digital I/Os to 403112, 414533
	403964	I/O Cable 7core (length 1.5 m) for analog I/Os to 403112, 414533
	931651	Motor Cable (length 3 m) to 903504
NEW	275851	Motor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 447293, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519
	520851	Motor Cable High Current (length 3 m) to 520884, 520886, 594385, 604594, 605299, 783734
	710930	Motor Cable High Current (length 3 m) to 688775, 709859, 688777, 709862
	838460	Motor Cable Highest Current (length 3 m) to 783734
NRND	302948	Motor/Hall Sensor Cable (length 3 m) to 390003
	847301	NTC Cable (length 3 m) to 783734
	696283	Power & Motor Cable (length 3 m) to 688770, 688772
	403957	Power Cable (length 1.5 m) to 403112, 414533
	275829	Power Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 447293, 520884, 520885, 520886, 546047, 594385, 604594, 605298, 605299, 684519, 783734
	520850	Power Cable High Current (length 3 m) to 520884, 520885, 520886, 594385, 604594, 605298, 605299, 684519
	710929	Power Cable High Current (length 3 m) to 688775, 709859, 688777, 709862
	838459	Power Cable Highest Current (length 3 m) to 783734
	354046	Ribbon Cable with Connector (length 0.5 m)
	275900	RS232-COM Cable (length 3 m) to 347717, 361435, 367676, 375711, 390003
NRND	520856	RS232-COM Cable (length 3 m) to 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
	696286	Sensor Cable 3x2core (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	451290	Sensor Cable 5x2core (length 3 m) to 447293
NEW	520852	Sensor Cable 5x2core (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536907, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 688775, 709859, 688777, 709862, 783734
	908604	Signal Cable 6core (Länge 3 m), zu 833720, 833726, 894249
NRND	451291	Signal Cable 12core (length 3 m) to 447293
NRND	275932	Signal Cable 16core (length 3 m) to 347717, 361435, 367676, 375711, 390003
NRND	378173	Signal Cable 3x2core (length 3m) to 375711
NRND	350390	Signal Cable 4x2core (length 3 m) to 347717
NRND	300586	Signal Cable 6x2core (length 3 m) to 347717, 375711
	520854	Signal Cable 7core (length 3 m) for analog I/Os with 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 783734
	696288	Signal Cable 7core (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	520853	Signal Cable 8core (length 3 m) for digital I/Os and STO with 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 783734
	451292	Signal Cable 8core (length 3 m) to 447293
NRND	696287	Signal Cable 8core (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
NRND	350392	USB Type A - B Cable (length 3 m) to 347717, 361435
	403968	USB Type A - micro B Cable (length 1.5 m) to 001755, 001756, 001757, 001784, 403112, 409510, 414533, 422969, 438725, 446925, 447293, 466023, 504383, 504384, 520885, 520886, 534130, 536630, 541718, 546047, 546714, 594385, 605298, 605299, 628092, 628094, 684519
	696289	USB Type A - Micro-Lock Cable (length 1.5 m) to 688770, 688772, 688775, 709859, 688777, 709862
NRND	370513	USB Type A - mini B Cable (length 3 m) to 367676, 375711, 390438, 380264, 390003
	838461	USB Type A - Type C Cable (length 1.5 m) to 783734
	845854	USB Type C - Type C Cable (length 1.5 m) to 783734

Motor choke		
	347919	Choke module, 3x0.1 mH, 10.0 A, LxWxH (90x70x49.7 mm) with screw type terminal block

Connector Set		
NRND	303807	EPOS2 24/2 Connector Set to 390003
	384915	EPOS2 24/5 Connector Set to 367676
	351061	EPOS2 50/5 Connector Set to 347717
	381405	EPOS2 70/10 Connector Set to 375711
	520859	EPOS4 Connector Set to 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094
	710926	EPOS4 Disk Connector Set to 688770, 688772, 688775, 709859, 688777, 709862
	691408	EPOS4 MB Micro EtherCAT 3-axes Connector Set to 659508, 684519
	404404	ESCON 36/2 DC Connector Set to 403112
	425255	ESCON 36/3 EC Connector Set to 414533
	451746	MAXPOS 50/5 Connector Set to 447293
NRND	846644	Motion Connector Set to 809646, 834838, 854801
	846645	Motion Connector Set Highest Current to 783734, 783729
Adapter		
NEW	220310	Adapter 4-pole flexprint connector to 4-pole screw terminal, for use with EC micro motors without Hall sensors
	473103	Adapter 6-pole flexprint connector to 6-pole screw terminal, for use with encoder 8 OPT
	425931	Adapter 8-pole flexprint connector to 8-pole screw terminal, for use with motors ECX 6, ECX 8, EC 9.2 flat
	506579	Adapter 10-pole flexprint connector to pin header (DIN 41651), for use with ENX 10 EASY with FFC cable
	262359	Adapter 10-pole pin header (DIN 41651) to 10-pole screw terminal
	223774	Adapter 10-pole spring contact strip (DIN 41651) to 8-pole screw terminal
	220300	Adapter 11-pole flexprint connector to 8-pole screw terminal, for use with motors EC 10/13, ECX 10, EC 20/32/45 flat
	804420	Adapter 24-pole flexprint connector to screw terminal, for use with encoder ENX 10 MAG INT
	418719	Adapter BLACK FPC11poles, for use with motors ECX 10, EC 10/13, EC 20/32/45 flat with 380264 and 414533
	418723	Adapter BLUE FPC8poles, for use with motors ECX 6, ECX 8, EC 9.2 flat with 380264 and 414533
	693573	Adapter Cable encoder CLIK-Mate to DIN 41651 for use with 659508, 684519
	488167	Adapter EASY Absolute to 6-pole screw terminal for use with encoder ENX 10/16 EASY Absolute
	459875	Adapter encoder connector 2.54 mm pitch to 2.54 mm pitch (DIN 41651) with spring terminal for motor connections
	405120	Adapter encoder connector 1.27 mm pitch to 2.54 mm pitch (DIN 41651) with spring terminal for motor connections
	549609	Adapter encoder connector 1.27 mm pitch to 2.54 mm pitch (DIN 41651)
	894401	Adapter encoder DIN41651 to CLIK-Mate
	498157	Adapter Micromotor for use with motors DCX 6/8 and ECX 4/6/8 with encoder (flexprint connector) or cable version
Accessories		
NEW	833718	Bypass Card STO
	751388	EPOS4 Disk CAN ix Industrial Type B plug, for use with 688770, 688775, 709859
	748166	EPOS4 Disk EtherCAT ix Industrial Type A plug, for use with 688772, 688777, 709862
	581245	EPOS4 EtherCAT Card for use with 536630, 546047, 534130, 504384, 504383, 594385
	677324	EPOS4 Micro SMT socket 2x40 poles, matching connector for PCB designs suitable for 638328, 654731
	590738	EPOS4 Module SMT socket 2x23 poles, matching connector for PCB designs suitable for 536630, 534130
	586142	ESCON Module 50/8 Thermal Pad
	841890	ESCON2 Micro 60/5 Thermal Accessory Kit
	902315	ESCON2 Module 60/12 Heat Spreader
	902308	ESCON2 Module 60/12 Thermal Accessory Kit
	802201	ESCON2 Module 60/30 Heat Spreader
	802197	ESCON2 Module 60/30 Thermal Pad
	876085	ESCON2 Nano 24/2 Thermal Accessory Kit
	590736	Power & Logic Supply Connector X1/X2, for use with 546714, 628092, 903533, 903540
	833720	Safety Card STO
	946670	SMT header 2x25 poles, matching connector for PCB designs suitable for 854796
	946662	SMT socket 2x12 poles, matching connector for PCB designs suitable for 854796
	946601	SMT socket 2x30 poles, matching connector for PCB designs suitable for 809635
Shunt regulators		
	309687	DSR 50/5, shunt regulator 27 VDC and 56 VDC (selectable), P_{max} 300 W, P_{cont} 10 W
	235811	DSR 70/30, shunt regulator 12–75 VDC (adjustable), P_{max} 475 W, P_{cont} 25 W, module housing 180x103x26 mm
Starter kits, Eva boards, motherboards, Connector boards		
DEC		370652 DEC Module Evaluation Board, with switch, LED, potentiometer etc., for use with 367661 and 380200
ESCON	NRND	486400 ESCON Module 24/2 Motherboard with pluggable screw terminal block, for use with 466023
	NRND	438779 ESCON Module Motherboard with pluggable screw terminal block, for use with 438725
	NRND	586048 ESCON Module 50/8 Motherboard with pluggable screw terminal block, for use with 532872, 586137
	NRND	450237 ESCON Module Motherboard Sensorless with pluggable screw terminal block, for use with 446925
ESCON2		854800 ESCON2 CB 60/12, connector board compatible with 854796
		783729 ESCON2 CB 60/30, connector board compatible with 783722
		809646 ESCON2 EB Micro, evaluation board compatible with 809631
		834838 ESCON2 EB Nano, evaluation board compatible with 809635
EPOS2	NRND	363407 EPOS2 Module 36/2 Starter Kit, consisting of 361435, 360665, 275829, 275851, 275878, 275934, 275932, 350392
	NRND	361435 EPOS2 Module Evaluation Board, 1-axis (with switch, LED, potentiometer and connector) for use with 360665
EPOS4		536997 EPOS4 CB 24/1.5 CAN, connector board including STO Idle Connector, compatible with 536630
		620048 EPOS4 CB 24/1.5 EtherCAT, connector board including STO Idle Connector, compatible with 536630
		534133 EPOS4 CB 50/5 CAN, connector board including STO Idle Connector, compatible with 534130
		620044 EPOS4 CB 50/5 EtherCAT, connector board including STO Idle Connector, compatible with 534130
NEW		833713 EPOS4 CB 60/20 CAN, connector board compatible with 833716 and 894249
		520884 EPOS4 CB Power CAN, connector board including STO Idle Connector, compatible with 504383 and 504384
		604594 EPOS4 CB Power EtherCAT, connector board including STO Idle Connector, compatible with 504383 and 504384
		638677 EPOS4 EB Micro, evaluation board compatible with 638328, 654731
		659508 EPOS4 MB Micro EtherCAT 3-axes, Motherboard compatible with 654731

Summary motion controller

Multi-Axis Motion Controller		
MasterMACS	001563	MasterMACS DIN 4ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001716	MasterMACS DIN 10ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001724	MasterMACS DIN 20ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001725	MasterMACS DIN 32ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001565	MasterMACS compact housing 4ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001726	MasterMACS compact housing 10ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001727	MasterMACS compact housing 20ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001728	MasterMACS compact housing 32ax for high-precision synchronization of several axes, 200 mA, 24 VDC
MiniMACS6-AMP-4/50/		
NEW	001824	MiniMACS6-AMP-4/50/4-IF1 Ethernet motion controller with integrated high-power amplifiers, 12...60 VDC, 4x10 Arms
NEW	001825	MiniMACS6-AMP-4/50/4-IF1 EtherCAT motion controller with integrated high-power amplifiers, 12...60 VDC, 4x10 Arms
NEW	001826	MiniMACS6-AMP-4/50/4-IF1 PROFINET motion controller with integrated high-power amplifiers, 12...60 VDC, 4x10 Arms
	001755	MiniMACS6-AMP-4/50/10 motion controller with integrated high-power amplifiers, 12...60 VDC, 4x10 Arms
	001756	MiniMACS6-AMP-4/50/10 OEM motion controller with integrated high-power amplifiers, 12...60 VDC, 4x10 Arms
	001757	MiniMACS6-AMP-4/50/10-IF1 EtherCAT motion controller with integrated high-power amplifiers, 12...60 VDC, 4x10 Arms
	001784	MiniMACS6-AMP-4/50/10-IF1 Ethernet motion controller with integrated high-power amplifiers, 12...60 VDC, 4x10 Arms
NEW	001827	MiniMACS6-AMP-4/50/10-IF1 PROFINET motion controller with integrated high-power amplifiers, 12...60 VDC, 4x10 Arms
MicroMACS6	001794	MicroMACS6 freely programmable and ultra-compact motion controller, 8–28 VDC
	001809	MicroMACS6 freely programmable and ultra-compact motion controller with BLE interface, 8–28 VDC
	001822	MicroMACS6 Module: freely programmable and compact motion controller as plug-in option for integration into motherboards
Accessories		
	001610	MasterMACS connector set for 001563, 001716, 001724, 001725, 001565, 001726, 001727, 001728
	786794	MicroMACS6 connector set for 001794, 001809
	001611	MiniMACS connector set for 001607, 001586
	001772	MiniMACS6-AMP-4/50/10 connector set for 001755, 001756, 001757, 001784
Cable		
	275829	Power Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 407582, 447293, 520884, 520885, 520886, 546047, 594385, 604594, 605298, 605299, 684519, 783734
	520857	CAN-COM Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
	520858	CAN-CAN Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
	786774	Signal cable, 5core, for 001794, 001809
	520853	Signal Cable 8core (length 3 m) for digital I/Os and STO with 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 783734
	696837	Signal cable, 10core, for 001755, 001756, 001757, 001784
	699485	Power cable, high current, for 001755, 001756, 001757, 001784
	275851	Motor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 407582, 447293, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519
	275878	Hall Sensor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 407582, 447293, 520884, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519, 688775, 709859, 688777, 709862, 783734
	520852	Sensor Cable 5x2core (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536907, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 688775, 709859, 688777, 709862, 783734
	422827	Ethernet Cable (length 2 m) to 001755, 001756, 001757, 001784, 447293, 546047, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
	403968	USB Type A - micro B Cable (length 1.5 m) to 001755, 001756, 001757, 001784, 403112, 409510, 414533, 422969, 438725, 446925, 447293, 466023, 504383, 504384, 520885, 520886, 534130, 536630, 541718, 546047, 546714, 594385, 605298, 605299, 628092, 628094, 684519

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