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ESCON2 Feature Chart

The ESCON2 line of products from maxon are small, powerful 4-quadrant PWM servo controllers. Their high power density allows flexible use for brushed DC motors and brushless EC (BLDC) motors up to 1,800 Watts with various feedback options, such as Hall sensors, incremental encoders, and absolute sensors in many drive applications. The devices are designed to be controlled by analog and digital set values or as a slave node in a CANopen network. You can also operate them via any USB or RS232 port on a Windows or Linux workstation. They feature extensive analog and digital I/O functions. They use the latest technology, such as field-oriented control (FOC) and acceleration/velocity feed forward, with high control cycle rates for easy and advanced motion control. The free Graphic User Interface (GUI) "Motion Studio" enables convenient configuration, quick monitoring and diagnostics, and automated tuning of all drive systems.

CANopen I/O

escon.maxongroup.com

Modules

Nano

ESCON2 Nano 24/2
(P/N 809635)

Micro

ESCON2 Micro 60/5
(P/N 809631)

Module

ESCON2 Module 60/12
(P/N 854796)

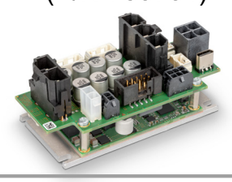
ESCON2 Module 60/30
(P/N 783722)

Ready-to-connect Units

Compact

ESCON2 Compact 60/12
(P/N 854801)

ESCON2 Compact 60/30
(P/N 783734)



Encased Housing

ESCON2 60/12
(P/N 854806)

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Feature	Modules				Ready-to-connect Units		
	ESCON2 Nano 24/2 (P/N 809635)	ESCON2 Micro 60/5 (P/N 809631)	ESCON2 Module 60/12 (P/N 854796)	ESCON2 Module 60/30 (P/N 783722)	ESCON2 Compact 60/12 (P/N 854801)	ESCON2 Compact 60/30 (P/N 783734)	ESCON2 60/12 (P/N 854806)
Product image							
Communication interfaces							
CANopen slave	max. 1 Mbit/s (external CAN-transceiver required)	max. 1 Mbit/s	max. 1 Mbit/s	max. 1 Mbit/s	max. 1 Mbit/s	max. 1 Mbit/s	max. 1 Mbit/s
CANopen Application Layer and Communication Profile	CiA 301						
CANopen Layer Setting Services (LSS) and Protocol	CiA 305						
CANopen Device Profile for Drives and Motion Control	CiA 402						
Serial communication interface (RS232)	max. 115'200 bit/s (external RS232-transceiver required)	max. 115'200 bit/s (external RS232-transceiver required)	max. 115'200 bit/s (external RS232-transceiver required)	max. 115'200 bit/s (external RS232-transceiver required)	-	-	-
Gateway function RS232-to-CAN	✓	✓	✓	✓	-	-	-
USB	Full Speed						
Gateway function USB-to-CAN	✓						
Motors							
Brushed DC motor up to (cont. / max.)	48 W / 144 W	300 W / 900 W	720 W / 1'440 W	1'800 W / 3'600 W	720 W / 1'440 W	1'800 W / 3'600 W	720 W / 1'440 W
Brushless EC motor (BLDC) up to (cont. / max.)							
Sensors (feedback)							
Without sensor (DC motor)	Current mode only (IOCM)						
DC tacho (DC motor)	✓						
Digital Hall sensors (EC motor)	✓						
Digital incremental encoder	✓						
SSI absolute encoder	✓						
BiSS C unidirectional absolute encoder	✓						
Commutation							
Digital Hall sensors (FOC)	✓						
Digital Hall sensors + digital incremental encoder (FOC)	✓						
Digital Hall sensors + absolute encoder (FOC)	✓						
Absolute encoder (FOC)	✓						

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Feature	Modules				Ready-to-connect Units		
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Electrical data							
Nominal power supply voltage V_{CC}	5…24 VDC 6…24 VDC [a]	10…60 VDC	10…60 VDC	10…60 VDC	10…60 VDC	10…60 VDC	10…60 VDC
Nominal logic supply voltage V_C	-	10…60 VDC	10…60 VDC	10…60 VDC	10…60 VDC	10…60 VDC	10…60 VDC
Absolute supply voltage limits V_{min} / V_{max}	4.75 VDC / 28 VDC 5.8 VDC / 28 VDC [a]	8 VDC / 62 VDC	8 VDC / 62 VDC	8 VDC / 62 VDC	8 VDC / 62 VDC	8 VDC / 62 VDC	8 VDC / 62 VDC
Output voltage (max.)	0.90 × V_{CC}	0.95 × V_{CC}	0.90 × V_{CC}	0.95 × V_{CC}	0.90 × V_{CC}	0.95 × V_{CC}	0.90 × V_{CC}
Output current I_{cont} / I_{max}	2 A / 6 A (< 6.5 s)	5 A / 15 A (< 4 s)	12 A / 24 A (< 5 s)	30 A / 60 A (< 4 s)	12 A / 24 A (< 5 s)	30 A / 60 A (< 4 s)	12 A / 24 A (< 5 s)
Pulse width modulation (PWM) frequency	50 kHz	50 kHz	100 kHz	50 kHz	100 kHz	50 kHz	100 kHz
Sampling rate PI current controller	50 kHz						
Sampling rate PI speed controller	10 kHz						
Sampling rate analog input	50 kHz						
Max. efficiency	93 %	97.5 %	97.7 %	98.5 %	97.7 %	98.5 %	97.5 %
Max. speed DC motor	Limited by max. permissible motor speed						
Max. speed EC motor (FOC)	120'000 rpm (1 pole pair)						
Built-in motor choke per phase	-	-	-	-	4.7 µH / 12 A	470 µH / 30 A	22 µH / 12 A
Inputs & outputs							
Sensor 1 Digital Hall sensor	H1, H2, H3 (0…24 VDC, internal pull-up)						
Sensor 2 (choice between multiple functions)							
Digital incremental encoder	2-channel (single-ended, 0...12 VDC, max. 6.25 MHz)	2-channel (EIA/RS422, max. 6.67 MHz)	2-channel (EIA/RS422, max. 6.67 MHz)	2-channel (EIA/RS422, max. 6.67 MHz)	2-channel (EIA/RS422, max. 6.67 MHz)	2-channel (EIA/RS422, max. 6.67 MHz)	2-channel (EIA/RS422, max. 6.67 MHz)
SSI absolute encoder	Configurable (single-ended, 0...12 VDC, 0.1…2 MHz)						
BiSS C unidirectional absolute encoder	Configurable (single-ended, 0...12 VDC, 0.1…4 MHz)						
High-speed digital inputs 1…2	0…12 VDC, max. 6.25 MHz	EIA/RS422, max. 6.67 MHz	EIA/RS422, max. 6.67 MHz	EIA/RS422, max. 6.67 MHz	EIA/RS422, max. 6.67 MHz	EIA/RS422, max. 6.67 MHz	EIA/RS422, max. 6.67 MHz
High-speed digital inputs 3…4	0…12 VDC, max. 6.25 MHz						
High-speed digital output 1	3.3 VDC / R_i = 270 Ω	3.3 VDC / R_i = 270 Ω	3.3 VDC / R_i = 270 Ω	3.3 VDC / R_i = 270 Ω	3.3 VDC / I_L ≤ 24 mA / R_i = 75 Ω	3.3 VDC / I_L ≤ 24 mA / R_i = 75 Ω	3.3 VDC / I_L ≤ 24 mA / R_i = 75 Ω
Digital inputs 1…4	0…25 VDC, inputs 1…2 PWM capable 10 kHz						
Digital outputs 1…2	3.3 VDC / R_i = 270 Ω, PWM capable 25 kHz	3.3 VDC / R_i = 270 Ω, PWM capable 25 kHz	3.3 VDC / R_i = 270 Ω, PWM capable 25 kHz	3.3 VDC / R_i = 270 Ω, PWM capable 25 kHz	Open drain, max. 36 VDC / I_L ≤ 500 mA, internal pull-up, PWM capable 25 kHz	Open drain, max. 36 VDC / I_L ≤ 500 mA, internal pull-up, PWM capable 25 kHz	Open drain, max. 36 VDC / I_L ≤ 500 mA, internal pull-up, PWM capable 25 kHz
Analog inputs 1…2	Resolution 12-bit, 0…5 VDC (referenced to GND), 10 kHz	Resolution 12-bit, ± 10 VDC (differential), 10 kHz	Resolution 12-bit, ± 10 VDC (differential), 10 kHz	Resolution 12-bit, ± 10 VDC (differential), 10 kHz	Resolution 12-bit, ± 10 VDC (differential), 10 kHz	Resolution 12-bit, ± 10 VDC (differential), 10 kHz	Resolution 12-bit, ± 10 VDC (differential), 10 kHz
Analog outputs 1…2	Resolution 12-bit, 0…3.3 VDC (referenced to GND), 25 kHz	Resolution 12-bit, ± 4 VDC (referenced to GND), 25 kHz	Resolution 12-bit, ± 4 VDC (referenced to GND), 25 kHz	Resolution 12-bit, ± 4 VDC (referenced to GND), 25 kHz	Resolution 12-bit, ± 4 VDC (referenced to GND), 25 kHz	Resolution 12-bit, ± 4 VDC (referenced to GND), 25 kHz	Resolution 12-bit, ± 4 VDC (referenced to GND), 25 kHz
Motor temperature sensor	Resolution 12-bit, 0...3.3 VDC (internal pull-up)						
Sensor supply voltage V_{Sensor}	5 VDC / I_L ≤ 145 mA						
Peripheral supply voltage $V_{Peripheral}$	3.3 VDC / I_L ≤ 20 mA	3.3 VDC / I_L ≤ 20 mA	3.3 VDC / I_L ≤ 20 mA	3.3 VDC / I_L ≤ 20 mA	-	-	-
Status indicators (LEDs)	- (external LEDs required)	- (external LEDs required)	- (external LEDs required)	- (external LEDs required)	Green (operation) / red (warning/error)	Green (operation) / red (warning/error)	Green (operation) / red (warning/error)

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Feature		Modules				Ready-to-connect Units		
		ESCON2 Nano 24/2 (P/N 809635)	ESCON2 Micro 60/5 (P/N 809631)	ESCON2 Module 60/12 (P/N 854796)	ESCON2 Module 60/30 (P/N 783722)	ESCON2 Compact 60/12 (P/N 854801)	ESCON2 Compact 60/30 (P/N 783734)	ESCON2 60/12 (P/N 854806)
Connections								
X1	Power supply	Header 2×30 poles 0.40 mm (Pins A1…A60) Panasonic P4SP	Header 2×40 poles 0.40 mm (Pins A1…A80) Samtec ST4	Socket 24 poles 2.54 mm (Pins A1...A24) Samtec SSM	Socket 6 poles 2.00 mm (Pins A1…A6) Samtec UMPS	Header 2 poles 4.20 mm, Molex Mini-Fit Jr.	Header 2 poles 10.00 mm, Molex Mini-Fit Sr.	Spring clamp 5 mm, Dinkle terminal block
X2	Logic supply			Socket 2×25 poles 0.8 mm (Pin B1) Samtec ERF8	Socket 2×25 poles 0.80 mm (Pin C1) Samtec ERF8	Header 2 poles 4.20 mm, Molex Mini-Fit Jr.	Header 2 poles 4.20 mm, Molex Mini-Fit Jr.	Push-in design 3.5 mm, Dinkle terminal block
X3a	Motor			Socket 24 poles 2.54 mm (Pins A1...A24) Samtec SSM	Socket 10 poles 2.00 mm (Pins B1…B10) Samtec UMPS	Header 2×2 poles 4.20 mm, Molex Mini-Fit Jr.	Header 3 poles 10.00 mm, Molex Mini-Fit Sr.	Spring clamp 5 mm, Dinkle terminal block
X3b	Motor						Header 2×2 poles 5.70 mm, Molex Mega-Fit	
X4	Hall sensor (Sensor 1)			Socket 2×25 poles 0.80 mm (Pins B2...B50) Samtec ERF8	Socket 2×25 poles 0.80 mm (Pins C2…C50) Samtec ERF8	Header 2×3 poles 3.00 mm, Molex Micro-Fit 3.0	Header 2×3 poles 3.00 mm, Molex Micro-Fit 3.0	Push-in design 3.5 mm, Dinkle terminal block
X5	Sensor (Sensor 2)					Header 2×5 poles 2.54 mm, DIN 41651	Header 2×5 poles 2.54 mm, DIN 41651	Header 2×5 poles 2.54 mm, DIN 41651
X7	Digital I/Os					Receptacle 8 poles 1.50 mm, Molex CLIK-Mate	Receptacle 8 poles 1.50 mm, Molex CLIK-Mate	Push-in design 3.5 mm, Dinkle terminal block
X8	Analog I/Os					Receptacle 7 poles 1.50 mm, Molex CLIK-Mate	Receptacle 7 poles 1.50 mm, Molex CLIK-Mate	
X10	SCI (RS232)					-	-	-
X11	CAN 1					Receptacle 4 poles 1.50 mm, Molex CLIK-Mate	Receptacle 4 poles 1.50 mm, Molex CLIK-Mate	Push-in design 3.5 mm, Dinkle terminal block
X12	CAN 2					Receptacle 4 poles 1.50 mm, Molex CLIK-Mate	Receptacle 4 poles 1.50 mm, Molex CLIK-Mate	
X13	USB					USB Type C	USB Type C	USB Type C
X16	Motor temperature sensor					Header 2 poles 3.00 mm, Molex Micro-Fit 3.0	Header 2 poles 3.00 mm, Molex Micro-Fit 3.0	-
Mechanical data								
Dimensions (L × W × H)		23 × 16 × 4.5 mm	36.8 × 23.8 × 6.5 mm	49.5 × 31 × 12.4 mm	67 × 43 × 7.8 mm	81 × 41 × 33.5 mm	93.5 × 46 × 41 mm	116 × 67 × 24 mm
Weight (approx.)		2.5 g	6 g	12 g	19 g	90 g	128 g	182 g
Mounting		Pluggable (using header) and M2 screws	Pluggable (using header) and M2 screws	Pluggable (using sockets) and M2.5 screws	Pluggable (using sockets) and M2.5 screws	M3 screws	M3 screws	M3 screws
Environmental conditions								
Temperature [b]								
	Operation	-30 °C…+45 °C	-30 °C…+50 °C	-30 °C…+50 °C	-30 °C…+25 °C	-30 °C…+50 °C	-30 °C…+25 °C	-30 °C…+45 °C
	Extended range and derating	45 °C…70 °C (for derating check «Hardware Reference»)	50 °C…70 °C (for derating check «Hardware Reference»)	50 °C...80 °C (for derating check «Hardware Reference»)	25 °C...75 °C (for derating check «Hardware Reference»)	50 °C...80 °C (for derating check «Hardware Reference»)	25 °C...75 °C (for derating check «Hardware Reference»)	45 °C...85 °C (for derating check «Hardware Reference»)
	Storage	-40…+85 °C						
Altitude [b]								
	Operation	0...500 m MSL						
	Extended range	500…10'000 m MSL (for derating check «Hardware Reference»)						
Humidity		5…90 % (condensation not permitted)						

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Directives & standards							
EMC Generic	IEC/EN 61000-6-2; IEC/EN 61000-6-3						
EMC Applied	IEC/EN 55032 (CISPR32); IEC/EN 61000-4-3; IEC/EN 61000-4-4; IEC/EN 61000-4-6						
Environment	IEC/EN 60068-2-6; MIL-STD-810F						
Safety (UL 94 V-0, unassembled PCB)	✓						
Reliability (MIL-HDBK-217F, MTBF)	988'899 hours	347'202 hours	on request	317'416 hours	on request	225'850 hours	on request
Operating modes							
IOCM I/O current mode (analog & digital commanding)	✓						
IOVM I/O velocity mode open loop with IxR compensation (analog & digital commanding)	✓						
IOVM I/O velocity mode closed loop (analog & digital commanding)	✓						
CST Cyclic Synchronous Torque Mode	✓						
CSV Cyclic Synchronous Velocity Mode	✓						
PVM Profile Velocity Mode	✓						
Features							
Advanced automatic control settings (Auto Tuning)	✓						
Custom persistent memory	✓						
Feed forward (acceleration/velocity for inertia and friction compensation)	✓						
Field-oriented Control (FOC) sinusoidal commutation	✓						
Digital I/O functionalities							
Inputs (configurable)	✓						
Direction	✓						
Drive enable	✓						
Enable CW / CCW	✓						
General purpose	✓						
Limit switch	✓						
Mode switch (between IOCM & IOVM)	✓						
PWM current limit	✓						
PWM set value	✓						
PWM set value offset	✓						
PWM velocity limit	✓						
PWM velocity ramp	✓						
Quick stop	✓						
RC servo current limit	✓						
RC servo set value	✓						
RC servo set value offset	✓						
RC servo velocity limit	✓						
RC servo velocity ramp	✓						
Set value switch (between up to 4 fixed set values)	✓						

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Outputs (configurable)				✓			
Current compare				✓			
Fault				✓			
General purpose				✓			
Hall sensor frequency (commutation / rotation)				✓			
Holding brake				✓			
Limitation				✓			
Set brake				✓			
Velocity compare				✓			
Analog I/O functionalities							
Inputs (configurable)				✓			
Analog current limit				✓			
Analog set value				✓			
Analog set value offset				✓			
Analog velocity limit				✓			
Analog velocity ramp				✓			
General purpose				✓			
Outputs (configurable)				✓			
Current monitor				✓			
General purpose				✓			
Temperature monitor				✓			
Velocity monitor				✓			
Built-in limitations & protections							
Current limiter (adjustable)				✓			
Overcurrent				✓			
Short-circuit of motor winding				✓			
Thermal motor protection with sensor (adjustable)				✓			
Thermal motor protection model based (adjustable)				✓			
Thermal controller protection logic & power stage (adjustable)				✓			
Overvoltage (adjustable)				✓			
Undervoltage (adjustable)				✓			
Voltage transients				✓			
Velocity limiter (adjustable)				✓			
Loss of feedback signal				✓			
System monitoring				✓			
Error & warning behavior management				✓			

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Software (en)								
Installation program		Motion Installer						
Graphical user interface		Motion Studio						
Startup		✓						
Regulation tuning		✓						
Firmware update		✓						
Parameter upload / download		✓						
Motion commander		✓						
I/O monitor		✓						
Parameters (Object dictionary)		✓						
Status monitor		✓						
Data recorder		✓						
Command analyzer		✓						
CANopen wizard		✓						
Online help		✓						
Operating system		Windows 11, 10						
Windows DLL for PC		✓						
Linux shared object library		✓						
CAN interfaces		IXXAT | National Instruments | KVaser | Vector						
Accessories (not included in delivery)								
854800	ESCON2 CB 60/12	-	-	✓	-	-	-	-
783729	ESCON2 CB 60/30	-	-	-	✓	-	-	-
809646	ESCON2 EB Micro	-	✓	-	-	-	-	-
834838	ESCON2 EB Nano	✓	-	-	-	-	-	-
841890	ESCON2 Micro 60/5 Thermal Accessory Kit	-	✓	-	-	-	-	-
902315	ESCON2 Module 60/12 Heat Spreader	-	-	✓	-	-	-	-
902308	ESCON2 Module 60/12 Thermal Accessory Kit	-	-	✓	-	-	-	-
816161	ESCON2 Module 60/30 Heat Spreader	-	-	-	✓	-	-	-
802197	ESCON2 Module 60/30 Thermal Pad	-	-	-	✓	-	-	-
876085	ESCON2 Nano 24/2 Thermal Accessory Kit	✓	-	-	-	-	-	-
520858	CAN-CAN Cable	-	-	-	-	✓	✓	-
520857	CAN-COM Cable	-	-	-	-	✓	✓	-
275934	Encoder Cable	-	-	-	-	✓	✓	✓
275878	Hall Sensor Cable	-	-	-	-	✓	✓	-
846644	Motion Connector Set	-	-	-	-	✓	-	-
846645	Motion Connector Set Highest Current	-	-	-	-	-	✓	-
520851	Motor Cable High Current	-	-	-	-	-	✓	-
710930	Motor Cable High Current	-	-	-	-	✓	-	-
838460	Motor Cable Highest Current	-	-	-	-	-	✓	-
847301	NTC Cable	-	-	-	-	✓	✓	-
275829	Power Cable	-	-	-	-	✓	✓	-
710929	Power Cable High Current	-	-	-	-	✓	-	-

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838459	Power Cable Highest Current	-	-	-	-	-	✓	-
520854	Signal Cable 7core	-	-	-	-	✓	✓	-
520853	Signal Cable 8core	-	-	-	-	✓	✓	-
262359 & 354046	Terminal Adapter and Ribbon Cable	-	-	-	-	✓	✓	✓
838461	USB Type A–Type C cable	-	-	-	-	✓	✓	✓
845854	USB Type C–Type C cable	-	-	-	-	✓	✓	✓

Legend

Features in gray will follow in an upcoming release.

[a] = With use of sensor supply voltage output.

[b] = For the Modules, the data was measured with the controller configured to reflect a typical customer application. For more details, check the corresponding «Hardware Reference».

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