maxon motor

ESCON

Feature Comparison Chart

The ESCON servo controllers are small-sized, powerful 4-quadrant PWM servo controller for the highly efficient control of permanent magnet-activated DC motors.

The featured operating modes – speed control (closed loop), speed control (open loop), and current control – meet the highest requirements. The ESCON servo controllers are designed being commanded by an analog set value and features extensive analog and digital I/O functionality and are being configured via USB interface using the graphical user interface «ESCON Studio» for Windows PCs.

Legend: (✔)* = only in use with DC Tacho or Encoder / nnnnnn = order number / ** = details refer to the pin header allocation

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Feature	ESCON Module 24/2 (466023)	ESCON 36/2 DC (403112)	ESCON 36/3 EC (414533)	ESCON Module 50/4 EC-S (446925)	ESCON 50/5 (409510)	ESCON Module 50/5 (438725)	ESCON 70/10 (422969)
Product image							
Motors							
DC motors up to	48 W / 144 W	72 W / 144 W	—	—	250 W / 750 W	250 W / 750 W	700 W / 2'100 W
EC motors up to	48 W / 144 W	—	97 W / 324 W	200 W / 600 W	250 W / 750 W	250 W / 750 W	700 W / 2'100 W
Sensors							
Digital Incremental Encoder (2 channel with or without Line Driver)	✔	✔	—	—	✔	✔	✔
DC Tacho	✔	✔	—	—	✔	✔	✔
Without sensor (DC motors)	✔	✔	—	—	✔	✔	✔
Without sensor (EC motors, sensorless)	—	—	—	✔	—	—	—
Digital Hall Sensors (EC motors)	✔	—	✔	—	✔	✔	✔
Electrical Data							
Nominal operating voltage +V_{CC}	10…24 VDC	10…36 VDC	10…36 VDC	10…50 VDC	10…50 VDC	10…50 VDC	10…70 VDC
Max. output voltage	0.98 x +V_{CC}	0.98 x +V_{CC}	0.98 x +V_{CC}	0.96 x +V_{CC}	0.98 x +V_{CC}	0.98 x +V_{CC}	0.95 x +V_{CC}
Max. output current	6 A (<4 s)	4 A (<60 s)	9 A (<4 s)	12 A (<30 s)	15 A (<20 s)	15 A (<20 s)	30 A (<20 s)
Continuous output current	2 A	2 A	2.7 A	4 A	5 A	5 A	10 A

maxon motor control
ESCON Servo Controllers
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1

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Pulse Width Modulation frequency	53.6 kHz						
Sampling rate PI current controller	53.6 kHz	53.6 kHz	53.6 kHz	—	53.6 kHz	53.6 kHz	53.6 kHz
Sampling rate PI speed controller	5.36 kHz						
Max. efficiency	92%	95%	95%	97%	95%	98%	98%
Max. speed (DC)	limited by max. permissible speed (motor) and max. output voltage (controller)	limited by max. permissible speed (motor) and max. output voltage (controller)	—	—	limited by max. permissible speed (motor) and max. output voltage (controller)	limited by max. permissible speed (motor) and max. output voltage (controller)	limited by max. permissible speed (motor) and max. output voltage (controller)
Max. speed (EC; 1 pole pair)	150'000 rpm	—	150'000 rpm	120'000 rpm	150'000 rpm	150'000 rpm	150'000 rpm
Built-in motor choke	—	300 µH; 2 A	3 x 47 µH; 2.7 A	—	3 x 30 µH; 5 A	—	3 x 15 µH; 10 A
Inputs / Outputs							
Hall sensor signals	H1, H2, H3	—	H1, H2, H3	—	H1, H2, H3	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\	A, A\, B, B\	—	—	A, A\, B, B\	A, A\, B, B\	A, A\, B, B\
Max. encoder input frequency differential (single-ended)	1 MHz (100 kHz)	1 MHz (100 kHz)	—	—	1 MHz (100 kHz)	1 MHz (100 kHz)	1 MHz (100 kHz)
Back-EMF signals	—	—	—	BEMF-W1, BEMF-W2, BEMF-W3	—	—	—
Potentiometers	—	1	1	1	2	1	2
Digital inputs	2						
Digital inputs/outputs	2						
Analog inputs	2						
Resolution	12-bit						
Range	−10…+10 V						
Circuit	differential						
Analog outputs	2						
Resolution	12-bit						
Range	−4…+4 V						
Auxiliary voltage output	+5 VDC (IL ≤10 mA)	+5 VDC (IL ≤40 mA)	+5 VDC (IL ≤80 mA)	+5 VDC (IL ≤110 mA)	+5 VDC (IL ≤10 mA)	+5 VDC (IL ≤10 mA)	+5 VDC (IL ≤10 mA)
Hall sensor supply voltage	+5 VDC (IL ≤30 mA)	—	+5 VDC (IL ≤30 mA)	—	+5 VDC (IL ≤30 mA)	+5 VDC (IL ≤30 mA)	+5 VDC (IL ≤30 mA)
Encoder supply voltage	+5 VDC (IL ≤70 mA)	+5 VDC (IL ≤70 mA)	—	—	+5 VDC (IL ≤70 mA)	+5 VDC (IL ≤70 mA)	+5 VDC (IL ≤70 mA)
Status Indicators	Operation: green LED / Error: red LED						

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ESCON Servo Controllers
Feature Comparison Chart

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2

Feature		ESCON Module 24/2 (466023)	ESCON 36/2 DC (403112)	ESCON 36/3 EC (414533)	ESCON Module 50/4 EC-S (446925)	ESCON 50/5 (409510)	ESCON Module 50/5 (438725)	ESCON 70/10 (422969)
Connections								
J1	Power	Pin header (2.54 mm), 2 poles**	Pin header (2 mm), 2 poles	Pin header (2 mm), 2 poles	Pin header (2.54 mm), 4 poles**	Pluggable screw-type terminal block (3.5 mm), 2 poles	Pin header (2.54 mm), 4 poles**	Pluggable screw-type terminal block (5.0 mm), 2 poles
J2	Motor Motor / Hall sensors Motor / BEMF signals	Pin header (2.54 mm), 3 poles**	Pin header (2 mm), 3 poles	Mini module pin header, 8 poles	Pin header (2.54 mm), 9 poles**	Pluggable screw-type terminal block (3.5 mm), 4 poles	Pin header (2.54 mm), 6 poles**	Pluggable screw-type terminal block (5.0 mm), 4 poles
J2A	Motor Motor / Hall sensors	—	Spring-loaded contacts, 2 poles	Spring-loaded contacts, 8 poles	—	—	—	—
J3	Hall sensors	Pin header (2.54 mm), 5 poles**	—	—	—	Pluggable screw-type terminal block (3.5 mm), 5 poles	Pin header (2.54 mm), 5 poles**	Pluggable screw-type terminal block (3.5 mm), 5 poles
J4	Encoder	Pin header (2.54 mm), 4 poles**	Pin header (2.54 mm), 5 x 2 poles	—	—	Pin header (2.54 mm), 5 x 2 poles	Pin header (2.54 mm), 4 poles**	Pin header (2.54 mm), 5 x 2 poles
J4A	Encoder	—	Pin header (1.27 mm), 5 x 2 poles	—	—	—	—	—
J5	Digital I/O	Pin header (2.54 mm), 5 poles**	Pin header (2 mm), 6 poles	Pin header (2 mm), 6 poles	Pin header (2.54 mm), 5 poles**	Pluggable screw-type terminal block (3.5 mm), 6 poles	Pin header (2.54 mm), 5 poles**	Pluggable screw-type terminal block (3.5 mm), 6 poles
J6	Analog I/O	Pin header (2.54 mm), 6 poles**	Pin header (2 mm), 7 poles	Pin header (2 mm), 7 poles	Pin header (2.54 mm), 6 poles**	Pluggable screw-type terminal block (3.5 mm), 7 poles	Pin header (2.54 mm), 6 poles**	Pluggable screw-type terminal block (3.5 mm), 7 poles
J7	USB	USB Type micro B female						
Mechanical Data								
Weight (approximate)		7 g	30 g	36 g	11 g	204 g	12 g	259 g
Dimensions (L x W x H)		35.6 x 26.7 x 12.7 mm	55 x 40 x 16.1 mm	55 x 40 x 19.8 mm	43.2 x 31.8 x 12.7 mm	115 x 75.5 x 24 mm	43.2 x 31.8 x 12.7 mm	125 x 78.5 x 27 mm
Mounting		Pluggable (female headers RM 2.54 mm)	M2.5 screws	M2.5 screws	Pluggable (female headers RM 2.54 mm)	M4 screws	Pluggable (female headers RM 2.54 mm)	M4 screws

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ESCON Servo Controllers
Feature Comparison Chart

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3

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Feature	ESCON Module 24/2 (466023)	ESCON 36/2 DC (403112)	ESCON 36/3 EC (414533)	ESCON Module 50/4 EC-S (446925)	ESCON 50/5 (409510)	ESCON Module 50/5 (438725)	ESCON 70/10 (422969)
Environmental Conditions							
Temperature – Operation	−30…+60 °C	−30…+45 °C	−30…+45 °C	−30…+45 °C	−30…+45 °C	−30…+45 °C	−30…+45 °C
Temperature – Extended range	+60…+80 °C; Derating: −0.1 A/°C	+45…+81 °C; Derating: −0.056 A/°C	+45…+78 °C; Derating: −0.082 A/°C	+45…+65 °C; Derating: −0.2 A/°C	+45…+85 °C; Derating: −0.111 A/°C	+45…+75 °C; Derating: −0.167 A/°C	+45…+82 °C; Derating: −0.270 A/°C
Temperature – Storage	−40…+85 °C						
Altitude – Operation	0…6'000 m MSL	0…6'000 m MSL	0…6'000 m MSL	0…6'000 m MSL	0…10'000 m MSL	0…6'000 m MSL	0…10'000 m MSL
Altitude – Extended range (Derating: see Hardware Reference)	6'000…10'000 m MSL	6'000…10'000 m MSL	6'000…10'000 m MSL	6'000…10'000 m MSL	—	6'000…10'000 m MSL	—
Humidity (condensation not permitted)	5…90%						
Functionality							
Operating Mode							
Current controller (torque control)	✔	✔	✔	—	✔	✔	✔
Speed controller (closed loop)	✔	✔	✔	✔	✔	✔	✔
with encoder feedback	✔	✔	—	—	✔	✔	✔
with DC Tacho feedback	✔	✔	—	—	✔	✔	✔
with Hall sensor feedback	✔	—	✔	—	✔	✔	✔
with BEMF feedback	—	—	—	✔	—	—	—
Speed controller (open loop)	✔	✔	✔	✔	✔	✔	✔
with static IxR Compensation	✔	✔	✔	✔	✔	✔	✔
with adaptive IxR Compensation	✔	(✔)*	✔	✔	✔	✔	✔
Set Value							
Analog set value	✔						
PWM set value	✔						
RC Servo set value	✔						
Fixed set value	✔						
2 fixed set values	✔						

maxon motor control
ESCON Servo Controllers
Feature Comparison Chart

Document ID: rel5459
Edition: November 2015
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4

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Digital I/O Functionality							
Enable	✔	✔	✔	✔	✔	✔	✔
Enable CW	✔	✔	✔	✔	✔	✔	✔
Enable CCW	✔	✔	✔	✔	✔	✔	✔
Enable CW + CCW	✔	✔	✔	✔	✔	✔	✔
Enable + Direction	✔	✔	✔	✔	✔	✔	✔
Stop	✔	✔	✔	✔	✔	✔	✔
Ready	✔	✔	✔	✔	✔	✔	✔
Speed Comparator	✔	✔	✔	✔	✔	✔	✔
Current Comparator	✔	✔	✔	✔	✔	✔	✔
Commutation frequency	✔	—	✔	✔	✔	✔	✔
Monitoring Outputs							
Monitor Current	✔	✔	✔	✔	✔	✔	✔
Monitor Speed	✔	✔	✔	✔	✔	✔	✔
Analog Settings							
Set value	✔	✔	✔	✔	✔	✔	✔
Current limit	✔	✔	✔	✔	✔	✔	✔
Offset adjust set value	✔	✔	✔	✔	✔	✔	✔
Speed ramp	✔	✔	✔	✔	✔	✔	✔
Current gain (using potentiometer)	—	✔	✔	—	✔	✔	✔
Speed gain (using potentiometer)	—	✔	✔	✔	✔	✔	✔
IxR Factor (using potentiometer)	—	✔	✔	✔	✔	✔	✔
Protection							
Overcurrent	✔	✔	✔	✔	✔	✔	✔
Current limiter (adjustable)	✔	✔	✔	✔	✔	✔	✔
Thermal overload	✔	✔	✔	✔	✔	✔	✔
Undervoltage	✔	✔	✔	✔	✔	✔	✔
Overvoltage	✔	✔	✔	✔	✔	✔	✔
Voltage transients	✔	✔	✔	✔	✔	✔	✔
Short-circuit of motor winding	✔	✔	✔	✔	✔	✔	✔

maxon motor control
ESCON Servo Controllers
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5

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Software							
Installation Program	ESCON Setup						
Graphical User Interface	ESCON Studio						
Startup Wizard	✔						
Regulation Tuning	✔						
Diagnostics	✔						
Firmware Update	✔						
Controller Monitor	✔						
Parameters	✔						
Data Recording	✔						
Online Help	✔						
Language	German, English, French, Italian, Spanish, Japanese, Chinese						
Operating System	Windows 10, 8, 7, XP SP3						
Communication interface	USB 2.0 / USB 3.0 (full speed)						

maxon motor control
ESCON Servo Controllers
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6

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Accessories (not included in delivery)								
418719	Adapter BLACK FPC11poles	—	—	✔	—	—	—	—
418723	Adapter BLUE FPC8poles	—	—	✔	—	—	—	—
418721	Adapter GREEN FPC8poles	—	—	✔	—	—	—	—
403962	DC Motor Cable	—	✔	—	—	—	—	—
275934	Encoder Cable	—	✔	—	—	✔	—	✔
404404	ESCON 36/2 DC Connector Set	—	✔	—	—	—	—	—
425255	ESCON 36/3 EC Connector Set	—	—	✔	—	—	—	—
486400	ESCON Module 24/2 Motherboard	✔	—	—	—	—	—	—
438779	ESCON Module Motherboard	—	—	—	—	—	✔	—
450237	ESCON Module Motherboard Sensorless	—	—	—	✔	—	—	—
409286	ESCON USB Stick	✔	✔	✔	✔	✔	✔	✔
403965	I/O Cable 6core (Digital I/Os)	—	✔	✔	—	—	—	—
403964	I/O Cable 7core (Analog I/Os)	—	✔	✔	—	—	—	—
403957	Power Cable	—	✔	✔	—	—	—	—
403968	USB Type A - micro B Cable	✔	✔	✔	✔	✔	✔	✔

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ESCON Servo Controllers
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7