



maxon motor control

These control electronics are optimized for use with maxon motors. Various 4-quadrant servo-amplifiers meet your needs regarding performance and speed accuracy with maxon DC motors. The most sophisticated electronic commutation is available with maxon EC motors. Together with maxon motors, the positioning control represents a complete solution for precise positioning with controlled rotation.

4-Q-DC Servoamplifier	280 - 284
1-Q-EC Amplifier	285 - 291
4-Q-EC Amplifier	292 - 298
EPOS Positioning controller	299 - 303
EPOS P Positioning controller	304 - 306
Summary and accessories	307 - 308

4-Q-DC Servoamplifier Summary

0 - 30 Watt



4-Q-DC Servoamplifier LSC

- Five operating modes: IxR compensation, voltage regulation, encoder speed control, DC tacho speed control, current control
- No motor choke necessary
- Thanks to linear power stage, practically no electrical interference
- Stand alone – easy start-up procedure
- Operating voltage V_{CC} 12 - 30 VDC
- Max. output current I_{max} 2 A, $I_{cont} = I_{max}$

10 - 250 Watt



4-Q-DC Servoamplifier ADS Standard

- Four operating modes: IxR compensation, encoder speed control, DC tacho speed control, current control
- Pulse width modulated power stage
- Built-in motor choke
- Module housing with screw type terminal block or eurocard format
- Operating voltage V_{CC} 12 - 50 VDC
- Max. output current I_{max} up to 10 A
- Continuous output current I_{cont} up to 5 A

80 - 500 Watt



4-Q-DC Servoamplifier ADS Power

- Four operating modes: IxR compensation, encoder speed control, DC tacho speed control, current control
- Pulse width modulated power stage
- Built-in motor choke
- Module housing with screw type terminal block or eurocard format
- Operating voltage V_{CC} 12 - 50 VDC
- Max. output current I_{max} up to 20 A
- Continuous output current I_{cont} up to 10 A

Choosing the servoamplifier

Basically the final stages are controlled linearly (0 - 30 watts) or pulsed (10 - 500 watts). The arguments for one or the other technology are shown on page 34 / 35.

Choice of motor type

Select the motor or motor-gear type according to the required power output. See "Selection guide" and possibly items page 202.

Choice of motor winding

Every controller has an optimal operating range as well as absolute limits. The motor winding should be selected such that the controller is not operated continuously at the limits of its capability.

1. Take the **voltage drop** through the servoamplifier into consideration. (5 Volt for LSC, 2 Volt for ADS)
2. To be sure calculate the **load torque** 10 % higher.
3. Calculate the theoretical **speed constant** $k_{n,th}$.

$$k_{n,th} = \frac{1}{U} \cdot \left(n_L + \frac{\Delta n}{\Delta M} \cdot M_L \right)$$

- $k_{n,th}$ = Theoretical speed constant
 - k_n = Speed constant [rpm/V] (line 13)
 - n_L = Output speed, loaded [rpm]
 - $\Delta n / \Delta M$ = Speed / torque gradient [rpm/mNm] (line 14)
 - M_L = Required output torque [mNm]
 - U = Max. voltage supplied by the maxon motor control [V]
4. Choose the winding with $k_n > k_{n,th}$ (see motor data, pages 48 - 138, line 13)

Choice of power supply unit

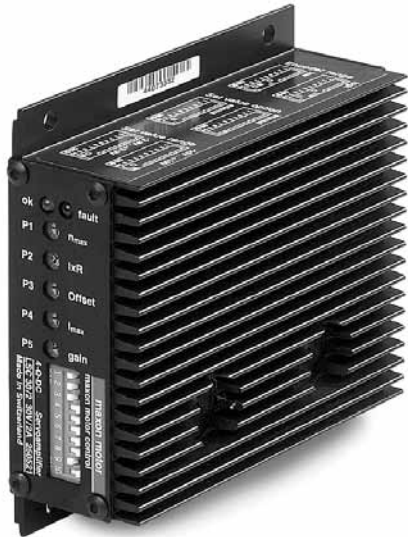
Any power supply, which fulfills the requests of the servoamplifiers, can be used:

- Output voltage $V_{CCmin} ; V_{CCmax}$
- Remaining ripple $\leq 5\%$
- Output current continuous I_{cont} max. I_{max} (0.1 s)

Consider

- Voltage and current must correspond to the desired operating point of the motor.
- The power supply must be able to buffer the back-fed energy from brake operation e.g. in a condenser. With electronically stabilized power supply units it is to ensure that the overcurrent protection responds in no operating condition.

LSC 4-Q-DC Servoamplifier

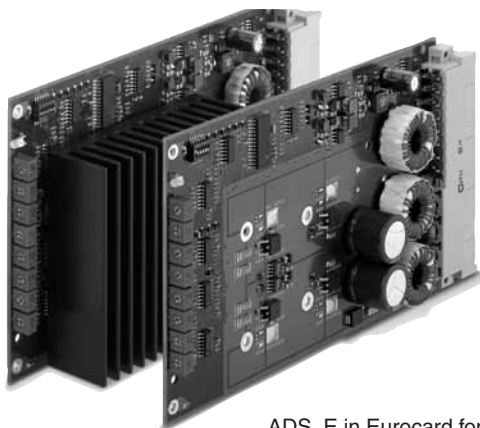


The LSC 30/2 (Linear Servo Controller) is a linear 4-quadrant Servo-amplifier used to control permanent magnet activated DC motors up to approx. 50 watts.

ADS 4-Q-DC Servoamplifier



ADS in module housing



ADS_E in Eurocard format

The ADS (Analogue DC Servoamplifier) is a powerful pulse-width modulated (PWM) servoamplifier for controlling permanent magnet activated DC motors. Standard Version from 10 - 250 watts and Power Version from 80 - 500 watts output power. Available in robust metallic housing and as Eurocard version for installation into a 19" rack.

Technical data page 282 / 283
Dimensions and connections page 284

4-Q operation

Controlled operation for acceleration and braking in both directions.

Linear power stage

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

Operating modes

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

Design

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

Set value input

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

Easy start-up procedure

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

Excellent price / performance ratio

Good value 4-Q-DC servoamplifier matched with small permanent magnet activated DC motors.

Technical data page 282
Dimensions and connections page 284

Pulsed output stage

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

Operating modes

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

Design versions

Robust metal housing in module form offers several mounting options. Standardized Eurocard version (with accessories) for the installation in a 19"-Rack or in a plug-in card system.

Excellent control characteristics

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

Protection circuit

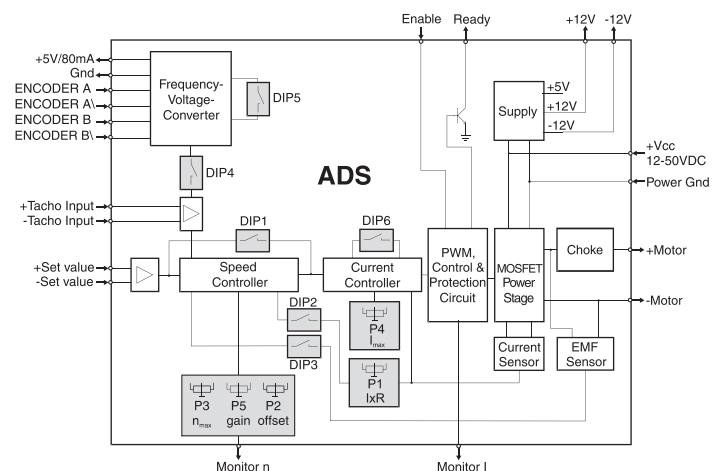
Protected against overcurrent, thermal overload and short-circuit of motor cable.

Set value input

External potentiometer or external set value voltage.

Excellent price / performance ratio

Modern servoamplifier with many technical features, suitable for permanent magnet activated DC motors up to 500 watts.



4-Q-DC Servoamplifier Data



LSC 30/2 4-Q-DC Servoamplifier
Linear 4-quadrant servoamplifier for permanent magnet activated DC motors up to approx. 50 watts.

ADS 50/5 4-Q-DC Servoamplifier
Powerful PWM servoamplifier for permanent magnet activated DC motors from 10 to approx. 250 watts output power. Available as Standard Version in module housing.

Operating modes

IxR compensation, voltage regulator, encoder speed control, DC tacho speed control, current control

IxR compensation, encoder speed control, DC tacho speed control, current control

Electrical Data

Operating voltage V_{CC}	12 - 30 VDC	12 - 50 VDC
Max. output voltage	$V_{CC} - 5 V$	$0.9 \times V_{CC}$
Max. output current I_{max}	2 A	10 A
Continuous output current I_{cont}	2 A	5 A
Switching frequency of power stage		50 kHz
Max. efficiency		95 %
Built-in motor choke		150 μH / 5 A
Input		
Set value	Configurable, -10 ... +10 V, -3.9 ... +3.9 V	-10 ... +10 V
Enable	«Disable» Disable min. $V_{CC} - 1 V$, Enable max. GND + 1 V	«Enable» +4 ... +50 V
DC tacho	min. 2 VDC, max. 50 VDC	min. 2 VDC, max. 50 VDC
Encoder signals	Channel A and channel B, max. 100 kHz, TTL	Channel A, A\, B, B\, max. 100 kHz, TTL
Output		
Status reading «Ready»	Open collector, max. 30 VDC ($I_L < 20 mA$)	Open collector max. 30 VDC ($I_L < 20 mA$)
Monitor current «Monitor I»		-10 ... +10 VDC (short circuit protected)
Monitor speed «Monitor n»		-10 ... +10 VDC (short circuit protected)
Voltage outputs		
Auxiliary voltages	+3.9 VDC, -3.9 VDC, max. 2 mA	+12/-12 VDC, max. 12 mA (short circuit protected)
Encoder supply voltage	+5 VDC, max. 80 mA	+5 VDC, max. 80 mA
Trim potentiometer		
	IxR compensation, Offset, n_{max} , I_{max} , gain	IxR compensation, Offset, n_{max} , I_{max} , gain
Protective functions		
	Heat monitoring of power stage	Protected against thermal overload, overcurrent and short-circuit of motor cables
Indicator		
	Green LED = READY, red LED = ERROR	Bi-colour LED, green = READY, red = ERROR
Ambient temperature / Humidity range		
Operation	0 ... +45°C	-10 ... +45°C
Storage	-40 ... +85°C	-40 ... +85°C
No condensation	20 ... 80 %	20 ... 80 %
Mechanical Data		
Weight	Approx. 330 g	Approx. 400 g
Dimensions (L x W x H)	103 x 100 x 34 mm (see page 284)	180 x 103 x 26 mm (see page 284)
Mounting threads	Flange for M4-screws	Flange for M4-screws
Connections	See page 284	See page 284

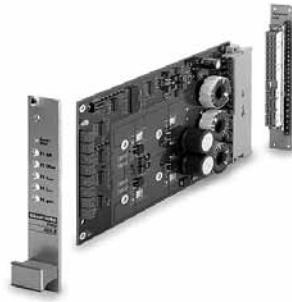
Order Number

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

145391 ADS 50/5, 4-Q-DC Servoamplifier Standard Version in module housing

Accessories

235811 DSR 70/30 Shunt regulator



ADS 50/10 4-Q-DC Servoamplifier
Powerful PWM servoamplifier for permanent magnet activated DC motors from 80 to approx. 500 watts output power. Available as Power Version in module housing.

ADS_E 50/5 4-Q-DC Servoamplifier
Powerful PWM servoamplifier for permanent magnet activated DC motors from 10 to approx. 250 watts output power. Available as Standard Version in Eurocard format.

ADS_E 50/10 4-Q-DC Servoamplifier
Powerful PWM servoamplifier for permanent magnet activated DC motors from 80 to approx. 500 watts output power. Available as Power Version in Eurocard format.

Operating modes

IxR compensation, encoder speed control, DC tacho speed control, current control	IxR compensation, encoder speed control, DC tacho speed control, current control	IxR compensation, encoder speed control, DC tacho speed control, current control
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Electrical Data

12 - 50 VDC	12 - 50 VDC	12 - 50 VDC
0.9 x V _{CC}	0.9 x V _{CC}	0.9 x V _{CC}
20 A	10 A	20 A
10 A	5 A	10 A
50 kHz	50 kHz	50 kHz
95 %	95 %	95 %
75 µH / 10 A	150 µH / 5 A	75 µH / 10 A

Input

-10 ... +10 V	-10 ... +10 V	-10 ... +10 V
«Enable»	«Enable»	«Enable»
+4 ... +50 V	+4 ... +50 V	+4 ... +50 V
min. 2 VDC, max. 50 VDC	min. 2 VDC, max. 50 VDC	min. 2 VDC, max. 50 VDC
Channel A, A\, B, B\, max. 100 kHz, TTL	Channel A, A\, B, B\, max. 100 kHz, TTL	Channel A, A\, B, B\, max. 100 kHz, TTL

Output

Open collector, max. 30 VDC (I _L < 20 mA)	Open collector max. 30 VDC (I _L < 20 mA)	Open collector max. 30 VDC (I _L < 20 mA)
-10 ... +10 VDC (short circuit protected)	-10 ... +10 VDC (short circuit protected)	-10 ... +10 VDC (short circuit protected)
-10 ... +10 VDC (short circuit protected)	-10 ... +10 VDC (short circuit protected)	-10 ... +10 VDC (short circuit protected)

Voltage outputs

+/-12 VDC, max. 12 mA (short circuit protected)	+/-12 VDC, max. 12 mA (short circuit protected)	+/-12 VDC, max. 12 mA (short circuit protected)
+5 VDC, max. 80 mA	+5 VDC, max. 80 mA	+5 VDC, max. 80 mA

IxR compensation, Offset, n _{max} , I _{max} , gain	IxR compensation, Offset, n _{max} , I _{max} , gain	IxR compensation, Offset, n _{max} , I _{max} , gain
Protected against thermal overload, overcurrent and short-circuit of motor cables	Protected against thermal overload, overcurrent and short-circuit of motor cables	Protected against thermal overload, overcurrent and short-circuit of motor cables
Bi-colour LED, green = READY, red = ERROR	Bi-colour LED, green = READY, red = ERROR	Bi-colour LED, green = READY, red = ERROR

Ambient temperature / Humidity range

-10 ... +45°C	-10 ... +45°C	-10 ... +45°C
-40 ... +85°C	-40 ... +85°C	-40 ... +85°C
20 ... 80 %	20 ... 80 %	20 ... 80 %

Mechanical Data

Approx. 400 g	Approx. 175 g	Approx. 410 g
180 x 103 x 26 mm (see page 284)	160 x 100 x 16 mm (see page 284)	160 x 100 x 30.5 mm (see page 284)
Flange for M4-screws	Rack-Installation	Rack-Installation
See page 284	See page 284	See page 284

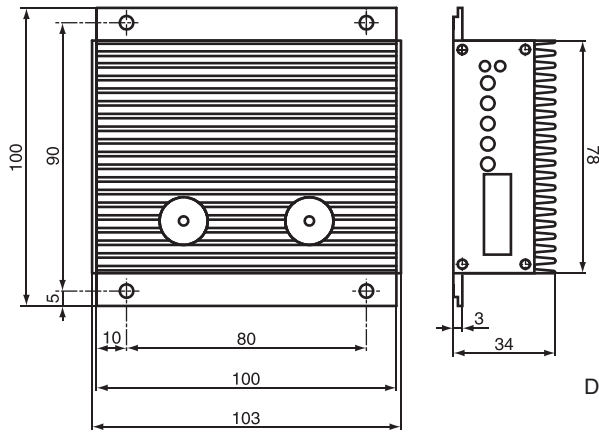
Order Number

201583 ADS 50/10 4-Q-DC Servoamplifier Power Version in module housing	166143 ADS_E 50/5 4-Q-DC Servoamplifier Standard Version in Eurocard format	168049 ADS_E 50/10 4-Q-DC Servoamplifier Power Version in Eurocard format
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Accessories

235811 DSR 70/30 Shunt regulator	167850 Front panel 3HE, 5TE 166873 Backplane with screw type terminal block	168910 Front panel 3HE, 7TE 166873 Backplane with screw type terminal block
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4-Q-DC Servoamplifier Dimensions and connections



Dimensions in [mm]

LSC 30/2

Connections

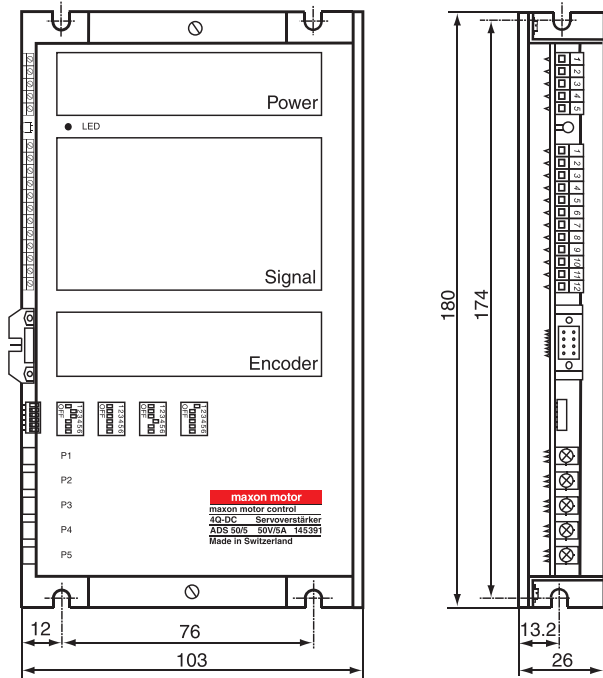
Pluggable screw type terminal block 16 poles
 Pitch 3.5 mm
 Suitable for wire cross section AWG 26 - 16
 0.14 ... 1.0 mm² multiple-stranded
 0.14 ... 1.4 mm² single wire

Note

It is advisable to consider mounting on a heat sinking surface if ambient temperature is high and there is high power loss in the LSC!

LSC 30/2

250521



Dimensions in [mm]

ADS in module housing

Connections Power

Screw type terminal block 5 poles
 Pitch 3.81 mm
 Suitable for wire cross section AWG 26 - 16
 0.14 ... 1.0 mm² multiple-stranded
 0.14 ... 1.5 mm² single wire

Connections Signal

Screw type terminal block 12 poles
 Pitch 3.81 mm
 Suitable for wire cross section AWG 26 - 16
 0.14 ... 1.0 mm² multiple-stranded
 0.14 ... 1.5 mm² single wire

Connection Encoder

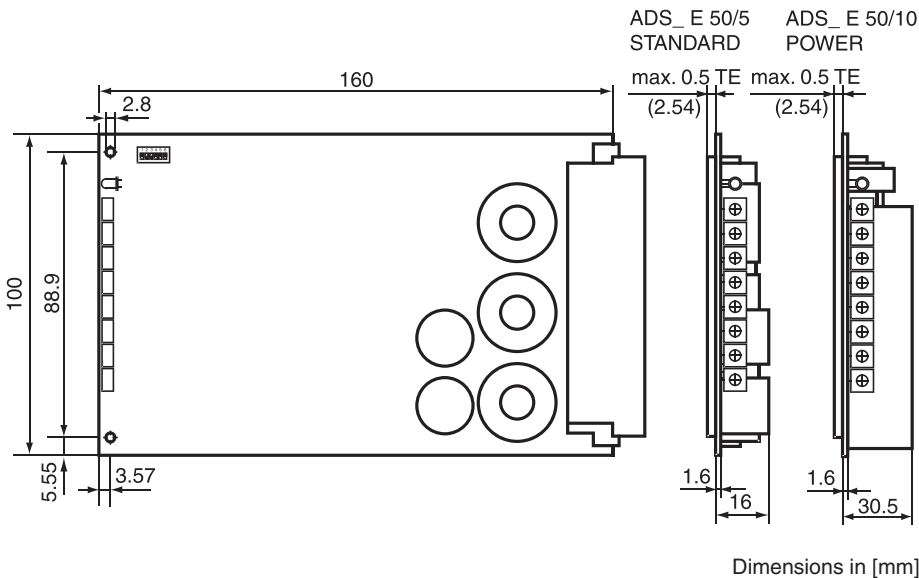
Plug (DIN41651) 10 poles
 Pitch 1.27 mm
 Flat band cable, suitable for wire cross section AWG 28

ADS 50/5 Standard

145391

ADS 50/10 Power

201583



Dimensions in [mm]

ADS_E in Eurocard format

Connections

Contact strip DIN 41612
 Version H7/F24

ADS_E 50/5 Standard

166143

ADS_E 50/10 Power

168049