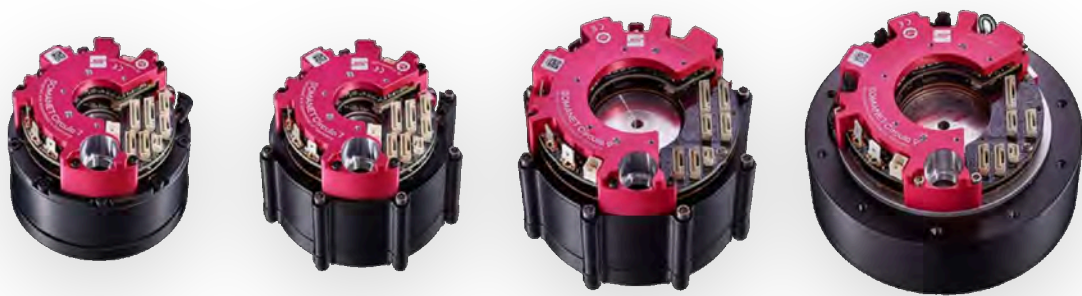


# ACTILINK-JD **DYNAMIC ACTUATOR**

**QDD** DESIGN WITH SINGLE-STAGE PLANETARY GEARBOX  
AND HIGH-TORQUE MOTORS, FULL ETHERCAT & FSOE SUPPORT



- 
- **Cost-efficient robot actuators** for humanoid robots and robot dogs
- 
- **Four frame sizes** – 08 / 09 / 10 / 12
- 
- **Quality motor & gear design** – coaxial single-level layout, low cogging
- 
- **Quasi-direct-drive** – superior dynamics and backdriveability
- 
- **SOMANET™ Motion Drive** – EtherCAT, high-performance motion control, high efficiency
- 
- **Functional safety** – STO + SBC standard, Safe Motion via FSoE option (SIL 3, PL e, Cat. 3)
-



# OVERVIEW

The ACTILINK-JD series combines a compact coaxial design, high torque density, and precise low-backlash performance for modular robotics. A single-stage planetary gearbox paired with a high-torque motor and an integrated SOMANET™ Circulo drive delivers outstanding dynamics, backdriveability, and reliability under mechanical load – ideal for humanoid robots, robot dogs, and exoskeletons.

	ACTILINK-JD08	ACTILINK-JD09 ▲	ACTILINK-JD10	ACTILINK-JD12
Product variant	AJD-08-20-400	AJD-09-30-500	AJD-10-60-200	AJD-12-120-200
Supply voltage	24–48 V, 48 V nominal, 60 V peak			
Torque density (peak)	33.3 Nm/kg	44.1 Nm/kg	64.8 Nm/kg	64.6 Nm/kg
Peak power	397 W	696 W	624 W	1036 W
Max. acceleration torque	17 Nm	30 Nm	68 Nm	102 Nm
No-load speed	400 rpm	470 rpm	210 rpm	200 rpm
Continuous torque	7 Nm	11 Nm	21 Nm	29 Nm
Rated speed	250 rpm	250 rpm	100 rpm	100 rpm
Outer diameter	78.5 mm	88 mm	106 mm	120 mm
Length *	65.5 mm	70.29 mm	72.8 mm	72.8 mm
Weight *	510 g	680 g	1050 g	1580 g
Gear type	Single-stage planetary			
Reduction ratio	7.75 : 1	9 : 1	9 : 1	9 : 1
Integrated drive	Circulo 7	Circulo 7	Circulo 9	Circulo 9
Motor encoder	19 bit abs. MT	19 bit abs. MT	20 bit abs. MT	20 bit abs. MT
Output encoder	20 bit absolute on gear output (D2 option)			
Communication	EtherCAT (DS402)			
Safety functions	STO-SBC / Safe Motion via FSoE (SIL 3, PL e, Cat. 3)			

▲ ACTILINK-JD09 is a sample-stage product. \* Outer diameter, length and weight are for the ECS1SS single-encoder build; ECD2 dual-encoder builds add the output encoder (see per-variant pages).

## MANUFACTURER PART NUMBER (MPN)

AJD	08-20-300	EC	D2	SM	S	00	XXXX
PRODUCT FAMILY	OUTER Ø & TORQUE / SPEED CLASS	FIELDBUS	FEEDBACK ENCODER	SAFETY	BRAKE	VERSIONING	CUSTOMIZATION
<b>AJD</b> Actilink Joint Dynamic	<b>08-20-300</b> Ø 78.5 mm · ≈20 Nm · 7.75:1	<b>EC</b> EtherCAT	<b>S1</b> Single internal encoder for motor	<b>SS</b> STO / SBC via IO	<b>N</b> No brake	<b>00</b> Default version	<b>blank</b> Standard
	<b>09-30-500</b> Ø 88 mm · ≈30 Nm · 9:1		<b>D2</b> Dual encoders, internal for motor, external for output	<b>SM</b> Safe Motion (SIL 3, PL e, Cat. 3)	<b>S</b> Spring-applied friction brake		
	<b>10-60-200</b> Ø 106 mm · ≈60 Nm · 9:1		<b>D3</b> Other encoder combinations	<b>P</b> Permanent-magnet friction brake			
	<b>12-120-200</b> Ø 120 mm · ≈120 Nm · 9:1				<b>M</b> Synapticon Microcoil (Solenoid Pin)		
	<b>10-40-500</b> Ø 106 mm · ≈40 Nm · 9:1						

Standard option  
  Sample available  
  Possible custom option

Standard configurations are listed per variant on the following pages. Contact Synapticon for custom configurations, lead times, and MoQs.

# ACTILINK-JD08

ACTILINK-JD · AJD-08-20-400



## ESSENTIAL SPECIFICATIONS

Performance @ 48 V	
Continuous torque	7 Nm
Max. acceleration torque	17 Nm
Peak power	397 W
Rated speed	250 rpm
No-load speed	400 rpm
Torque density (peak)	33.3 Nm/kg
Emergency-stop operation	
Emergency-stop torque	30 Nm
Emergency-stop deceleration	6000 rad/s <sup>2</sup>
Drivetrain & electronics	
Motor	14 pole-pairs (28 poles)
Torque constant	156.4 mNm/A <sub>rms</sub>
Phase resistance	270 mΩ
Phase inductance	167 μH @ 1 kHz
Integrated drive	SOMANET™ Circulo 7 (CR7-48-24)
Supply voltage	24–48 V, 60 V peak

## STANDARD CONFIGURATIONS

**AJD-08...** Motor encoder, STO-SBC  
**ECS1SS**

**AJD-08...** + output encoder, STO-SBC  
**ECD2SS**

**AJD-08...** + output encoder, Safe Motion  
**ECD2SM**

† ECS1SS build (Ø 78.5 mm); ECD2 builds Ø 80 mm — 620 g / 73 mm (D2SS), 640 g / 73 mm (D2SM). ‡ Permissible load uses constant K — K = 1 at rated speed and 10 000 h lifetime;  $K = (10000 \cdot \text{rated-speed} / t / v)^{1/3}$  for speed v rpm and lifetime t hours.

Mechanical	
Weight †	510 g
Outer diameter †	78.5 mm
Length †	65.5 mm
Rotary inertia (after reduction)	0.0042 kg·m <sup>2</sup>
Gear type	Single-stage planetary
Reduction ratio	7.75 : 1
Backlash	< 22 arcmin
Permissible load †	
Tilting moment	K · 3.4 Nm
Radial load	K · 167.4 N
Axial load	K · 107.2 N
K for static load	2.21
Feedback & safety	
Motor encoder	19 bit absolute, MT (battery)
Output encoder (option)	20 bit absolute on gear output
Communication	EtherCAT (DS402)
Safety functions	STO-SBC / Safe Motion via FSoE (SIL 3, PL e, Cat. 3)

## ENVIRONMENTAL

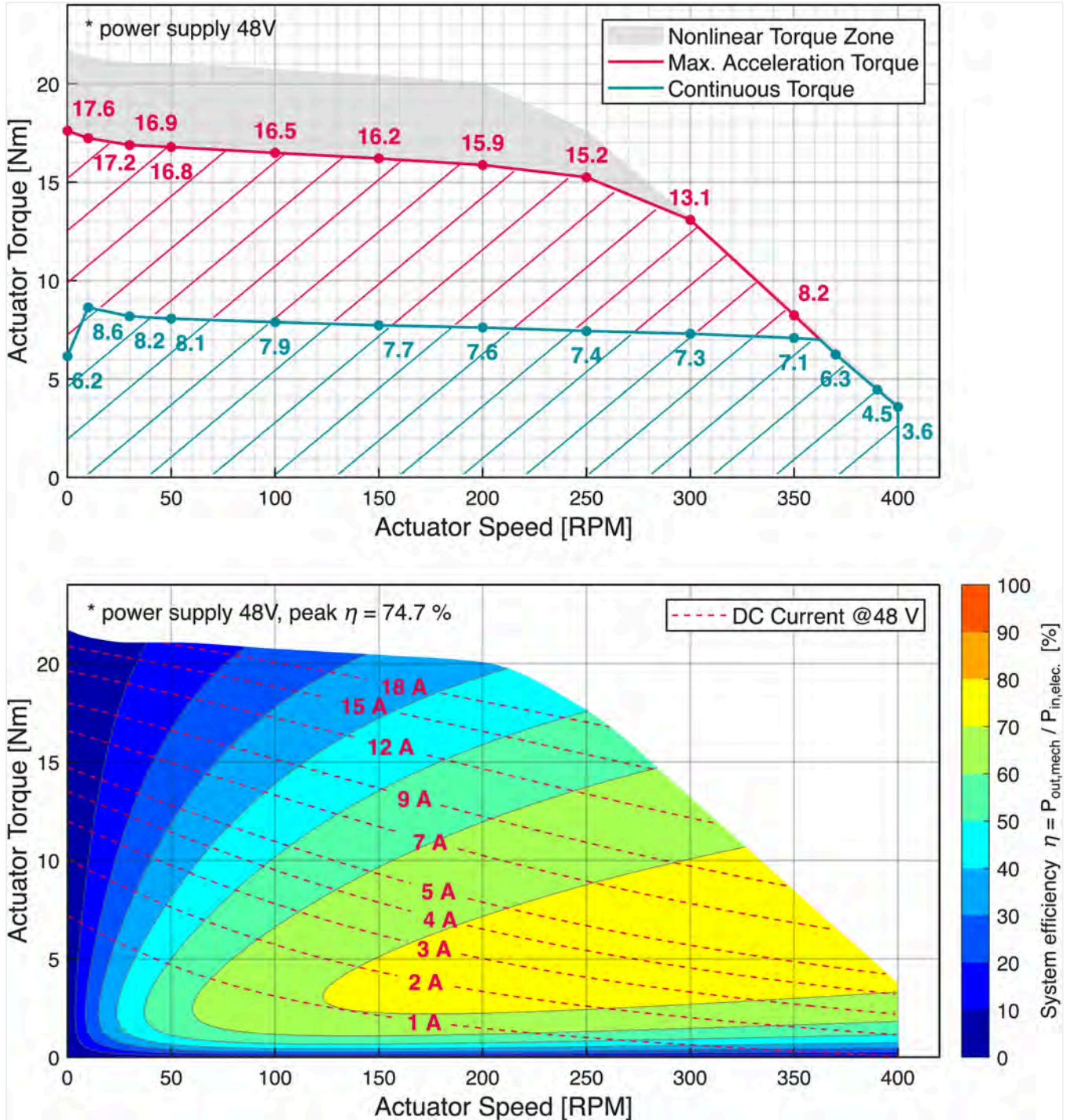
Operating temperature 0–50 °C (ambient air).  
Storage temperature –30–70 °C.

# ACTILINK-JD08

## TORQUE-SPEED CAPABILITY & POWER EFFICIENCY



Three curves are shown: continuous torque (limit without overheating at 25 °C ambient), max. acceleration torque (max torque with permissible current-torque linearity), and the nonlinear torque zone (usable with robust controllers). The lower chart maps system efficiency and DC current at 48 V. The nonlinear zone requires additional drive configuration and should be used only when current-torque nonlinearity and heating are carefully accounted for in the control policy.

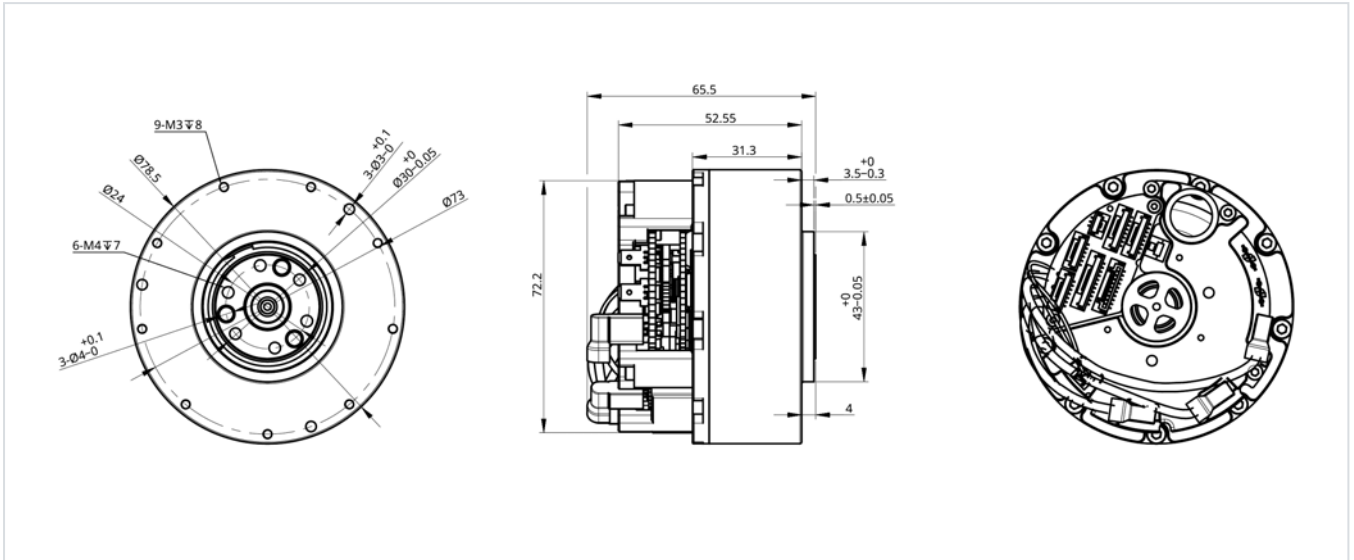


# ACTILINK-JD08

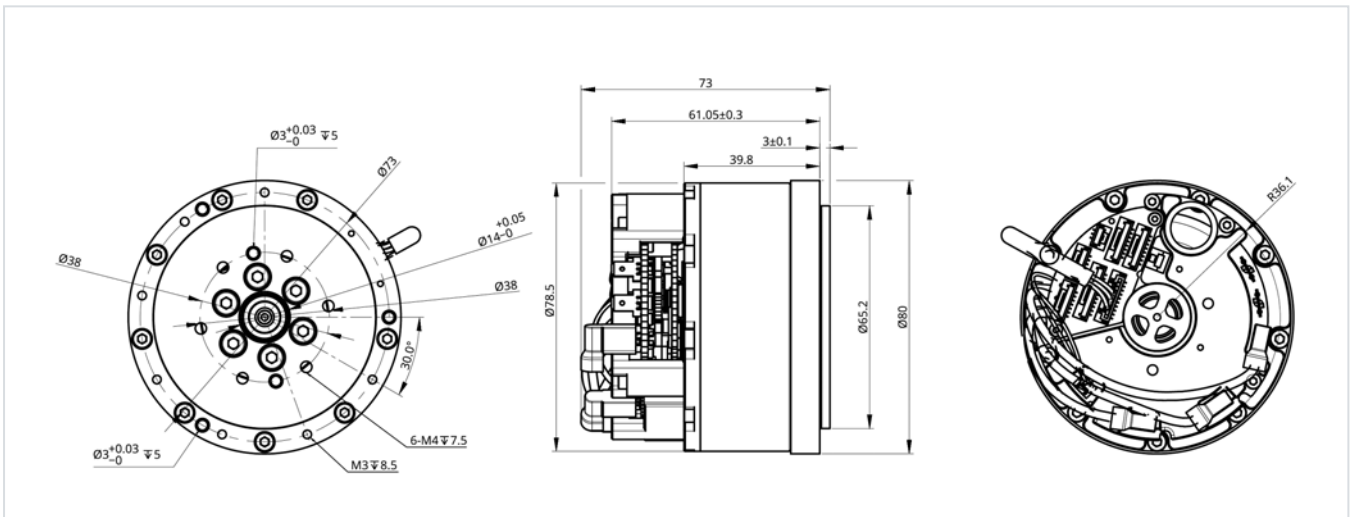
## DIMENSIONS — 2D DRAWINGS



### ECS1 — single integrated encoder



### ECD2 — dual encoder (motor + output)



All dimensions in mm.

[LINK TO THE ONLINE PUBLICATION OF 2D/3D DRAWINGS ↗](#)

# ACTILINK-JD09 SAMPLE

ACTILINK-JD · AJD-09-30-500



## ESSENTIAL SPECIFICATIONS

### Performance @ 48 V

Continuous torque	11 Nm
Max. acceleration torque	30 Nm
Peak power	696 W
Rated speed	250 rpm
No-load speed	470 rpm
Torque density (peak)	44.1 Nm/kg

### Emergency-stop operation

Emergency-stop torque	TBD
Emergency-stop deceleration	TBD

### Drivetrain & electronics

Motor	14 pole-pairs (28 poles)
Torque constant	122.2 mNm/A <sub>rms</sub>
Phase resistance	110 mΩ
Phase inductance	72 μH @ 1 kHz
Integrated drive	SOMANET™ Circulo 7 (CR7-48-24)
Supply voltage	24–48 V, 60 V peak

## STANDARD CONFIGURATIONS

**AJD-09...** Motor encoder, STO-SBC  
**ECS1SS**

**AJD-09...** + output encoder, STO-SBC  
**ECD2SS**

**AJD-09...** + output encoder, Safe Motion  
**ECD2SM**

### Mechanical

Weight †	680 g
Outer diameter	88 mm
Length †	70.29 mm
Rotary inertia (after reduction)	0.0086 kg·m <sup>2</sup>
Gear type	Single-stage planetary
Reduction ratio	9 : 1
Backlash	< 15 arcmin

### Permissible load \*

Tilting moment	<b>K</b> · 12.5 Nm
Radial load	<b>K</b> · 595.9 N
Axial load	<b>K</b> · 446.9 N
K for static load	1.78

### Feedback & safety

Motor encoder	19 bit absolute, MT (battery)
Output encoder (option)	20 bit absolute on gear output
Communication	EtherCAT (DS402)
Safety functions	STO-SBC / Safe Motion via FSoE (SIL 3, PL e, Cat. 3)

## ENVIRONMENTAL

Operating temperature 0–50 °C (ambient air).  
Storage temperature –30–70 °C. ACTILINK-JD09 is a sample-stage product; selected values are TBD.

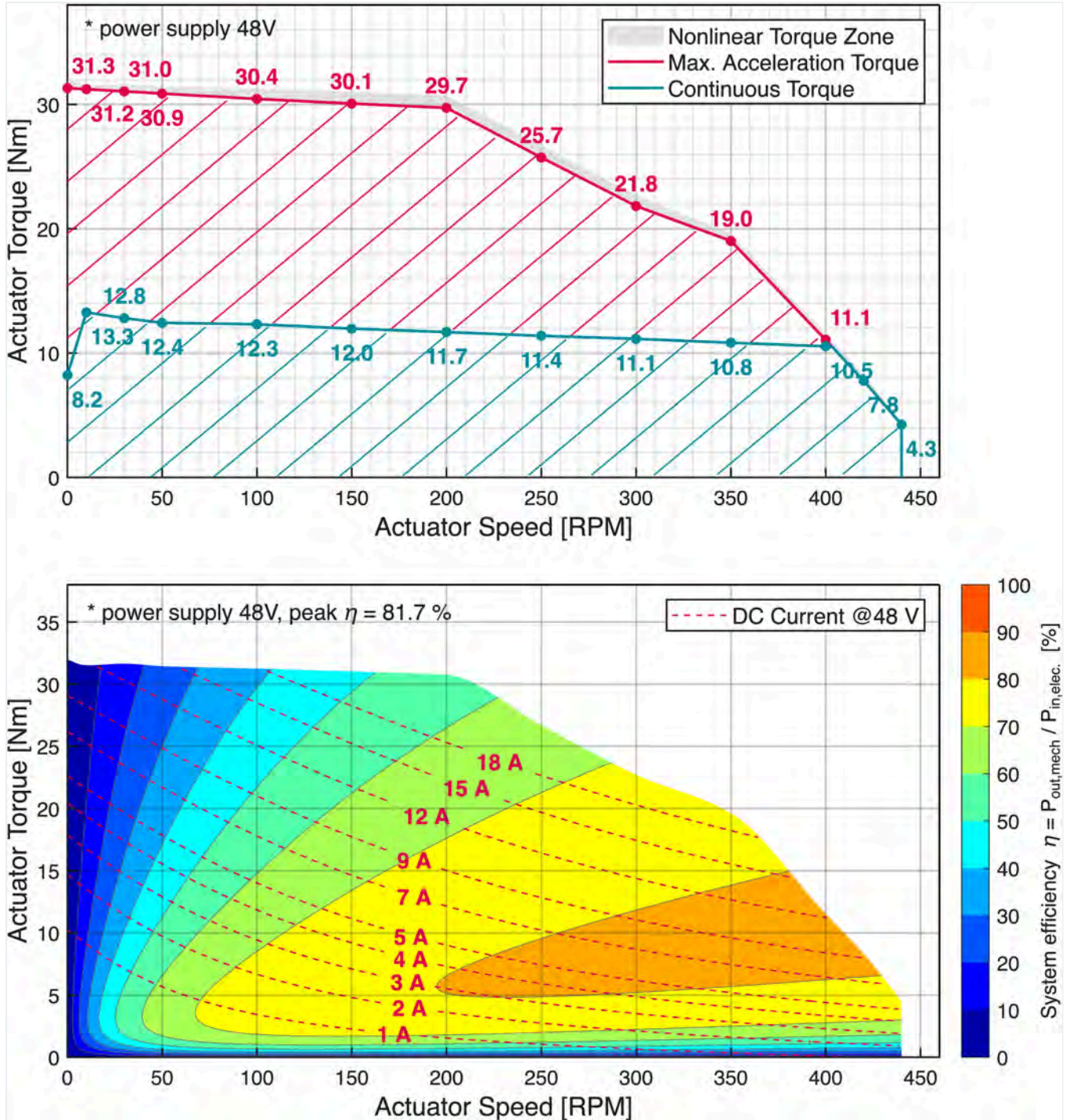
† ECS1SS build; ECD2SS 800 g / 79.29 mm, ECD2SM 820 g / 79.29 mm. ‡ Permissible load uses constant K — K = 1 at rated speed and 10 000 h lifetime;  $K = (10000 \cdot \text{rated-speed} / t / v)^{1/3}$  for speed v rpm and lifetime t hours.

# ACTILINK-JD09 SAMPLE



## TORQUE-SPEED CAPABILITY & POWER EFFICIENCY

Three curves are shown: continuous torque (limit without overheating at 25 °C ambient), max. acceleration torque (max torque with permissible current-torque linearity), and the nonlinear torque zone (usable with robust controllers). The lower chart maps system efficiency and DC current at 48 V. The nonlinear zone requires additional drive configuration and should be used only when current-torque nonlinearity and heating are carefully accounted for in the control policy.

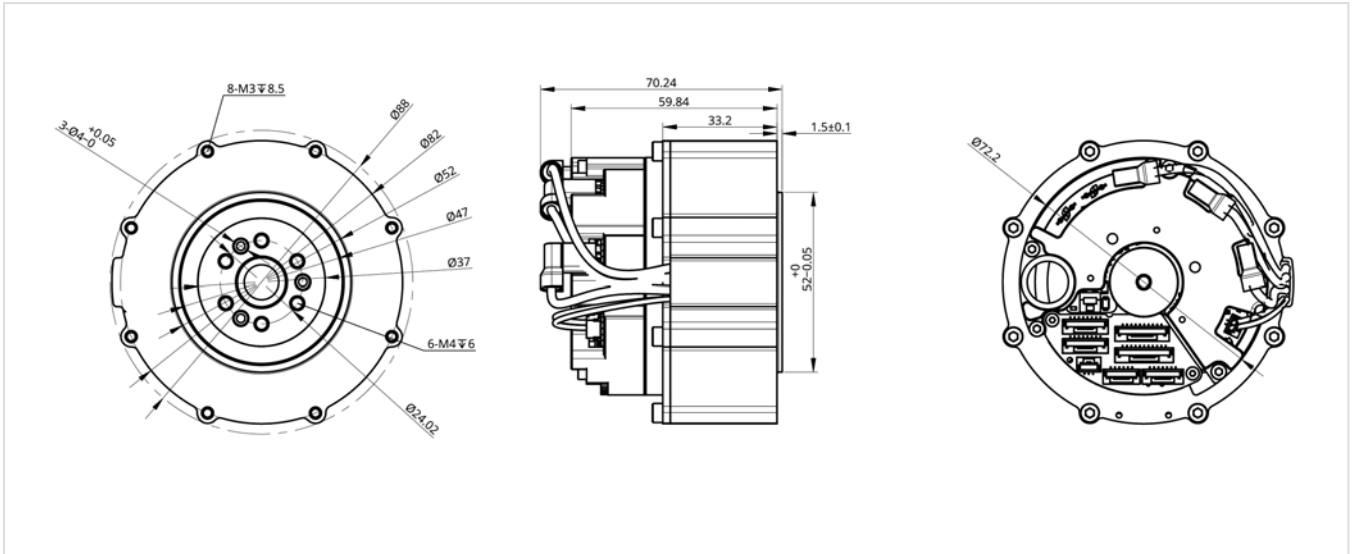


# ACTILINK-JD09 SAMPLE

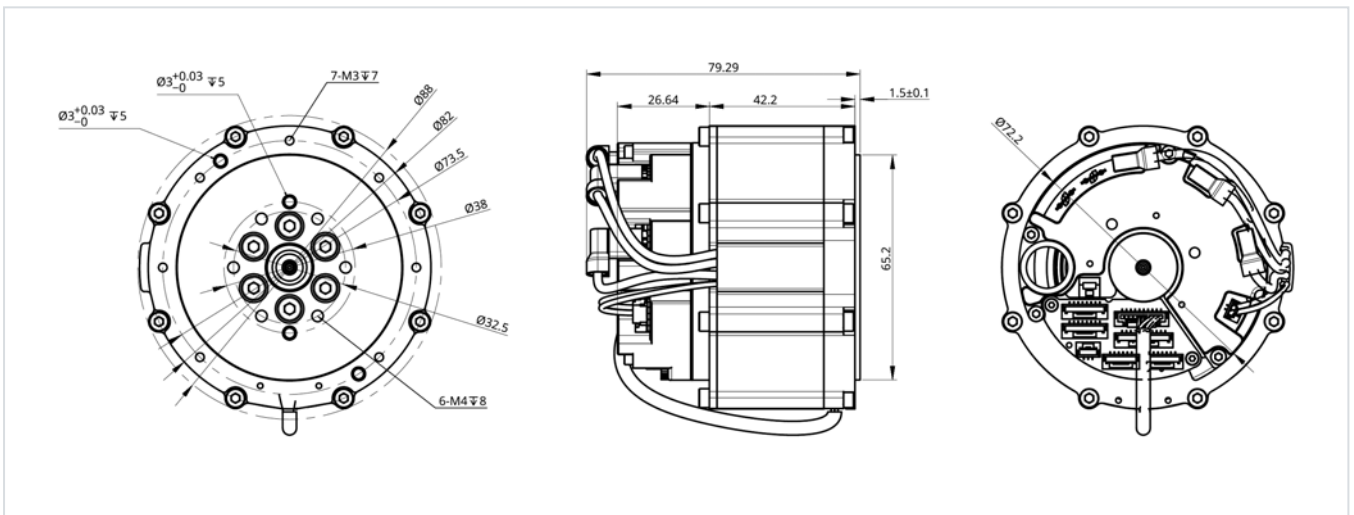
## DIMENSIONS — 2D DRAWINGS



### ECS1 — single integrated encoder



### ECD2 — dual encoder (motor + output)



All dimensions in mm.

[LINK TO THE ONLINE PUBLICATION OF 2D/3D DRAWINGS ↗](#)

# ACTILINK-JD10

ACTILINK-JD · AJD-10-60-200



## ESSENTIAL SPECIFICATIONS

Performance @ 48 V		Mechanical	
Continuous torque	21 Nm	Weight †	1050 g
Max. acceleration torque	68 Nm	Outer diameter	106 mm
Peak power	624 W	Length †	72.8 mm
Rated speed	100 rpm	Rotary inertia (after reduction)	0.02 kg·m <sup>2</sup>
No-load speed	210 rpm	Gear type	Single-stage planetary
Torque density (peak)	64.8 Nm/kg	Reduction ratio	9 : 1
Emergency-stop operation		Backlash	< 13 arcmin
Emergency-stop torque	105 Nm	Permissible load ‡	
Emergency-stop deceleration	4200 rad/s <sup>2</sup>	Tilting moment	K · 24.5 Nm
Drivetrain & electronics		Radial load	K · 1021.7 N
Motor	20 pole-pairs (40 poles)	Axial load	K · 766.3 N
Torque constant	241.7 mNm/A <sub>rms</sub>	K for static load	1.92
Phase resistance	195 mΩ	Feedback & safety	
Phase inductance	110 μH @ 1 kHz	Motor encoder	20 bit absolute, MT (battery)
Integrated drive	SOMANET™ Circulo 9 (CR9-48-60)	Output encoder (option)	20 bit absolute on gear output
Supply voltage	24–48 V, 60 V peak	Communication	EtherCAT (DS402)
		Safety functions	STO-SBC / Safe Motion via FSoE (SIL 3, PL e, Cat. 3)

## STANDARD CONFIGURATIONS

AJD-10... Motor encoder, STO-SBC  
ECS1SS

AJD-10... + output encoder, STO-SBC  
ECD2SS

AJD-10... + output encoder, Safe Motion  
ECD2SM

## ENVIRONMENTAL

Operating temperature 0–50 °C (ambient air).  
Storage temperature –30–70 °C.

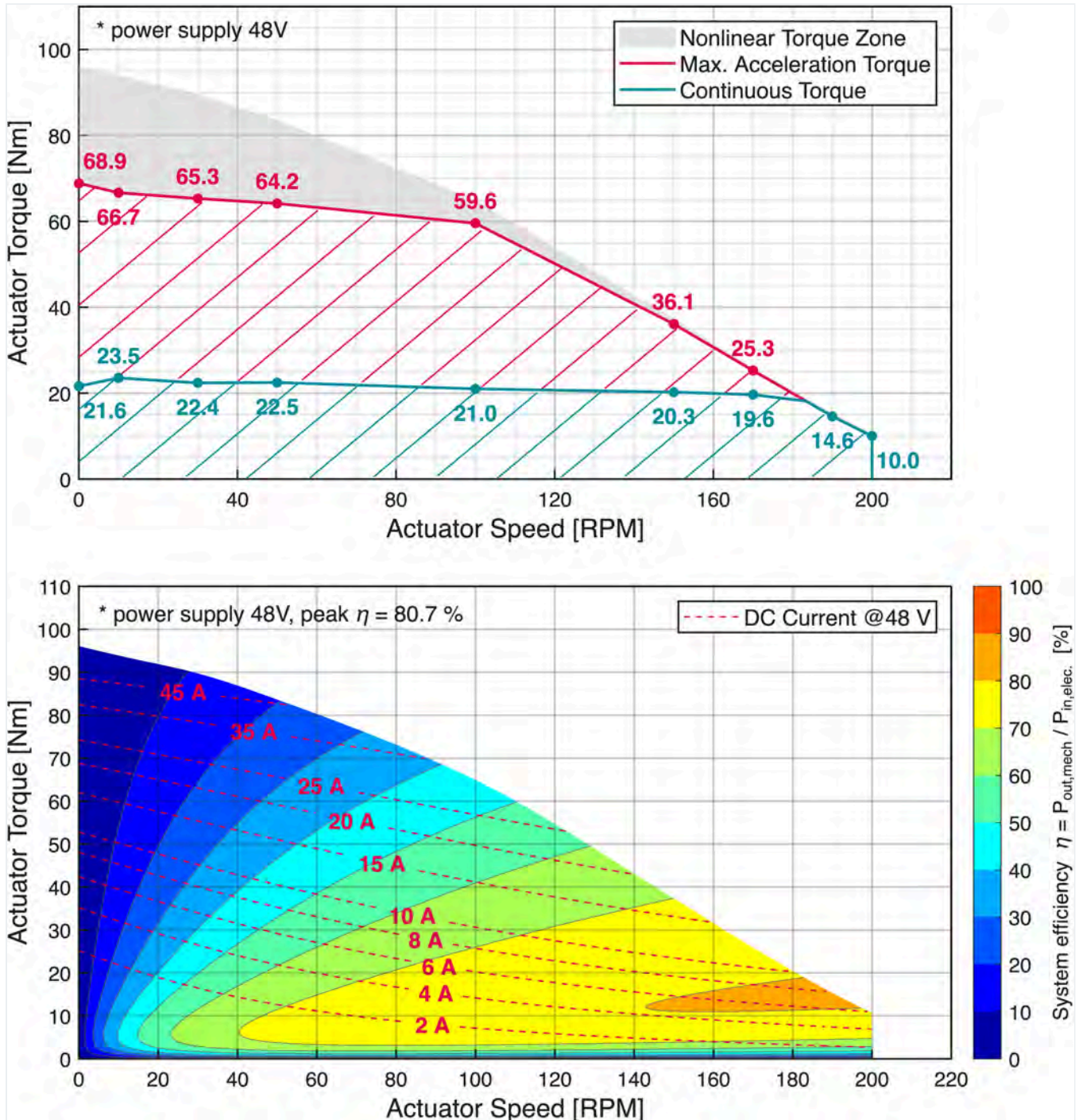
† ECS1SS build; ECD2SS 1230 g / 86.3 mm, ECD2SM 1255 g / 86.3 mm. ‡ Permissible load uses constant K — K = 1 at rated speed and 10 000 h lifetime;  $K = (10000 \cdot \text{rated-speed} / t / v)^{1/3}$  for speed v rpm and lifetime t hours.

# ACTILINK-JD10

## TORQUE-SPEED CAPABILITY & POWER EFFICIENCY



Three curves are shown: continuous torque (limit without overheating at 25 °C ambient), max. acceleration torque (max torque with permissible current-torque linearity), and the nonlinear torque zone (usable with robust controllers). The lower chart maps system efficiency and DC current at 48 V. The nonlinear zone requires additional drive configuration and should be used only when current-torque nonlinearity and heating are carefully accounted for in the control policy.

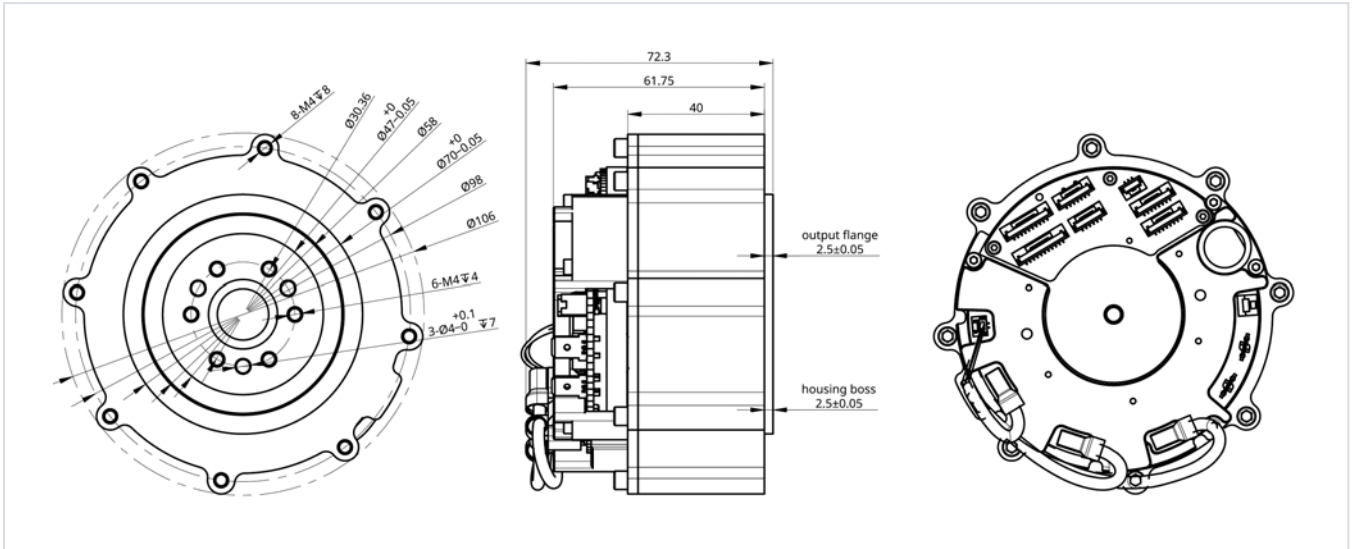


# ACTILINK-JD10

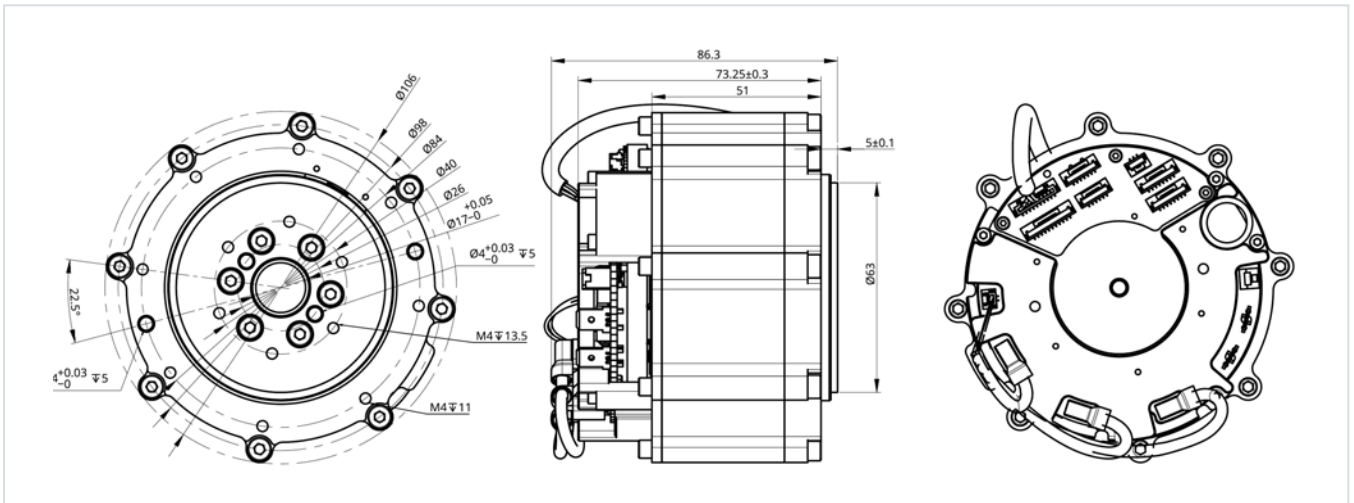
## DIMENSIONS — 2D DRAWINGS



### ECS1 — single integrated encoder



### ECD2 — dual encoder (motor + output)



All dimensions in mm.

[LINK TO THE ONLINE PUBLICATION OF 2D/3D DRAWINGS ↗](#)

# ACTILINK-JD12

ACTILINK-JD · AJD-12-120-200



## ESSENTIAL SPECIFICATIONS

Performance @ 48 V		Mechanical	
Continuous torque	29 Nm	Weight †	1580 g
Max. acceleration torque	102 Nm	Outer diameter	120 mm
Peak power	1036 W	Length †	72.8 mm
Rated speed	100 rpm	Rotary inertia (after reduction)	0.04 kg·m <sup>2</sup>
No-load speed	200 rpm	Gear type	Single-stage planetary
Torque density (peak)	64.6 Nm/kg	Reduction ratio	9 : 1
Emergency-stop operation		Backlash	< 11 arcmin
Emergency-stop torque	210 Nm	Permissible load *	
Emergency-stop deceleration	4200 rad/s <sup>2</sup>	Tilting moment	K · 30.6 Nm
Drivetrain & electronics		Radial load	K · 1331.0 N
Motor	21 pole-pairs (42 poles)	Axial load	K · 900.4 N
Torque constant	233.9 mNm/A <sub>rms</sub>	K for static load	1.72
Phase resistance	85 mΩ	Feedback & safety	
Phase inductance	90 μH @ 1 kHz	Motor encoder	20 bit absolute, MT (battery)
Integrated drive	SOMANET™ Circulo 9 (CR9-48-60)	Output encoder (option)	20 bit absolute on gear output
Supply voltage	24–48 V, 60 V peak	Communication	EtherCAT (DS402)
		Safety functions	STO-SBC / Safe Motion via FSoE (SIL 3, PL e, Cat. 3)

## STANDARD CONFIGURATIONS

AJD-12... Motor encoder, STO-SBC  
ECS1SS

AJD-12... + output encoder, STO-SBC  
ECD2SS

AJD-12... + output encoder, Safe Motion  
ECD2SM

## ENVIRONMENTAL

Operating temperature 0–50 °C (ambient air).  
Storage temperature –30–70 °C.

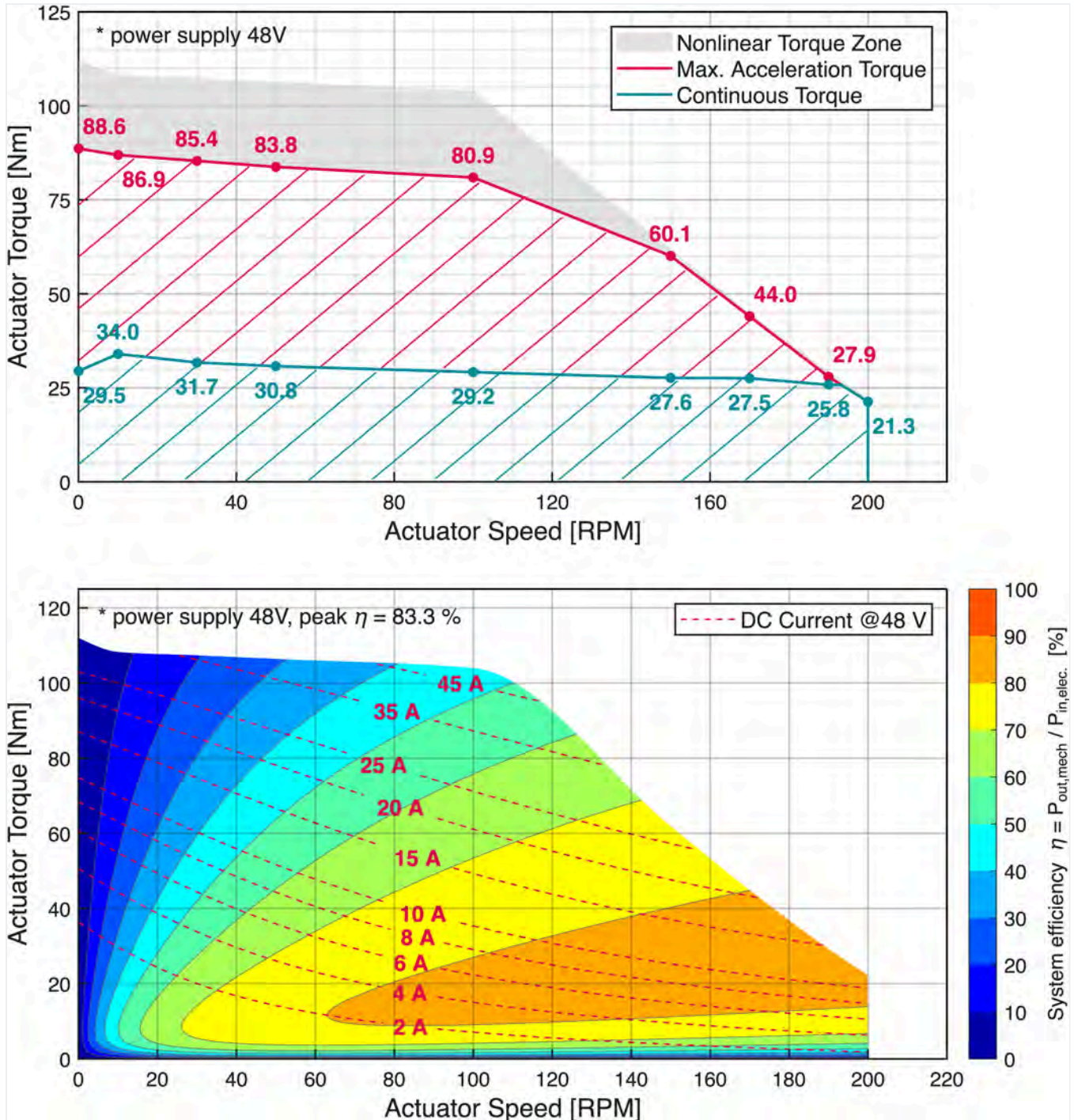
† ECS1SS build; ECD2SS 1845 g / 85.5 mm, ECD2SM 1870 g / 85.5 mm. \* Permissible load uses constant K — K = 1 at rated speed and 10 000 h lifetime;  $K = (10000 \cdot \text{rated-speed} / t / v)^{1/3}$  for speed v rpm and lifetime t hours.

# ACTILINK-JD12

## TORQUE-SPEED CAPABILITY & POWER EFFICIENCY



Three curves are shown: continuous torque (limit without overheating at 25 °C ambient), max. acceleration torque (max torque with permissible current-torque linearity), and the nonlinear torque zone (usable with robust controllers). The lower chart maps system efficiency and DC current at 48 V. The nonlinear zone requires additional drive configuration and should be used only when current-torque nonlinearity and heating are carefully accounted for in the control policy.

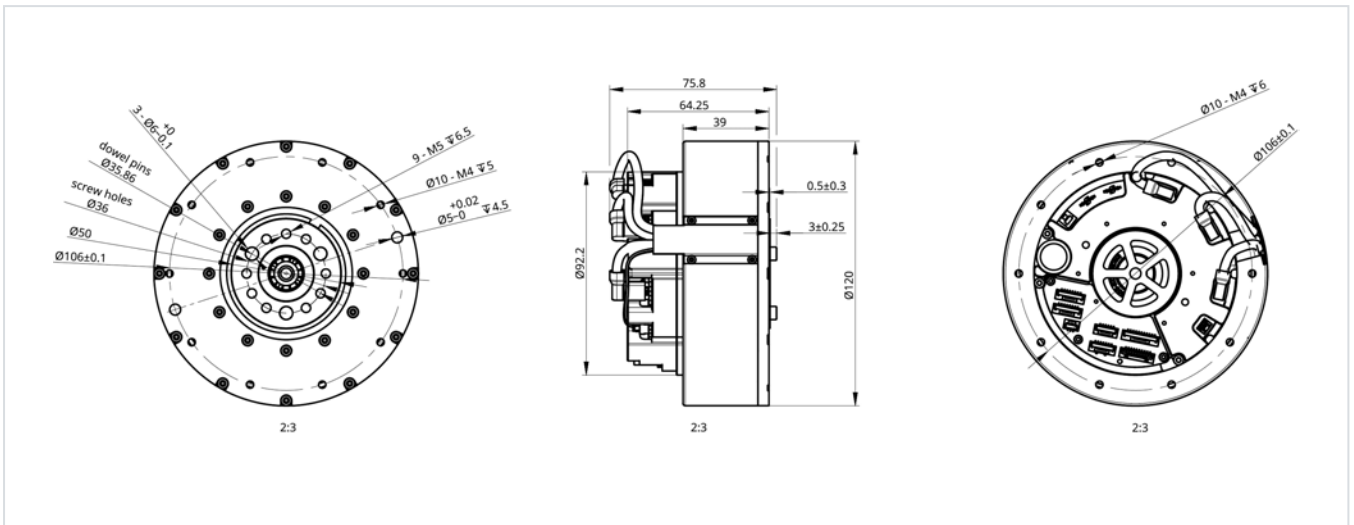


# ACTILINK-JD12

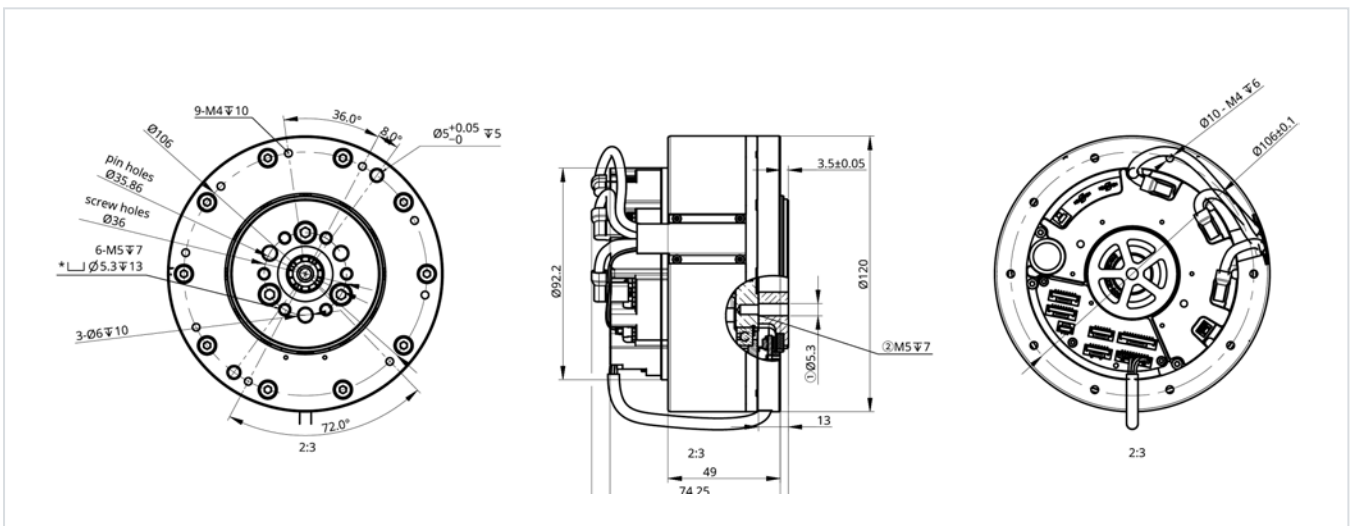
## DIMENSIONS — 2D DRAWINGS



### ECS1 — single integrated encoder



### ECD2 — dual encoder (motor + output)



All dimensions in mm.

[LINK TO THE ONLINE PUBLICATION OF 2D/3D DRAWINGS ↗](#)

# DESIGNED FOR DYNAMIC ROBOTICS



ACTILINK-JD actuators are ideal for dynamic applications — humanoid robots, robot dogs, and exoskeletons — where high torque density, low backlash, and backdriveability are decisive.



HUMANOID ROBOTS



QUADRUPED ROBOTS

**4**  
frame sizes  
**08 / 09 / 10 / 12**

**17–102** Nm  
peak torque  
**RANGE**

**Universal**  
SOMANET™ platform  
**PLUG & USE · HIGH  
PERFORMANCE FOR THE LAST  
STRENGTH BLOCK**

## FULL-STACK ROBOTICS SERVICE

Beyond the mechanics, Synapticon delivers drives, control and sensing through to whole-system control and safety — concepts, designs, feasibility and integration across the complete robot system.

## CUSTOM OPTIONS

- Brake — friction brake or Synapticon Microcoil
- Integration-oriented mechanical design / interface
- Motor & gear selection (ratio, torque/speed class)
- Additional sensors — torque sensing, IMU
- Bearing & load-bearing structural design
- Thermal, e-stop and service-life tuning

Upon request; NRE fees may apply.



Specifications subject to change without notice.  
© Synapticon GmbH · Home of Integrated Motion