BECKHOFF New Automation Technology

Operating instructions | EN

AS2000

Stepper motors

2023-10-20 | Version 2.6.1

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All components in this product as described in the operating instructions are delivered in a specific configuration of hardware and software, depending on the application regulations. Modifications and changes to the hardware or software configuration that go beyond the documented options are prohibited and nullify the liability of Beckhoff Automation GmbH & Co. KG.

The following is excluded from the liability:

- Failure to observe these operating instructions
- Improper use
- Use of untrained personnel
- Use of unauthorized spare parts

Copyright

Version numbers

Provision of revision levels
On request, you can obtain a list of revision levels for changes in the operating instructions.

- Send your request to: motion-documentation@beckhoff.de

Origin of the document
These operating instructions were originally written in German. All other languages are derived from the German original.

Product features
Only the product properties specified in the current operating instructions are valid. Further information given on the product pages of the Beckhoff homepage, in emails or in other publications is not authoritative.

Scope of the documentation

Apart from these operating instructions, the following documents are part of the overall documentation:

AS2000	Definition
Short information	Document with instructions for handling the motors

Staff qualification

These operating instructions are intended for trained control and automation specialists with knowledge of the applicable and required standards and directives.

Specialists must have knowledge of drive technology and electrical equipment as well as knowledge of safe working on electrical systems and machines. This includes knowledge of proper setup and preparation of the workplace as well as securing the working environment for other persons.

The operating instructions published at the respective time of each installation and commissioning is to be used. The products must be used in compliance with all safety requirements, including all applicable laws, regulations, provisions and standards.

Instructed person

Instructed persons have a clearly defined task area and have been informed about the work to be carried out. Instructed persons are familiar with:

- the necessary protective measures and protective devices
- the intended use and risks that can arise from use other than for the intended purpose

Trained person

Trained persons meet the requirements for instructed persons. Trained persons have additionally received training from the machine builder or vendor:

- machine-specific or
- plant-specific

Trained specialists

Trained specialists have received specific technical training and have specific technical knowledge and experience. Trained specialists can:

- apply relevant standards and directives
- assess tasks that they have been assigned
- recognize possible hazards
- prepare and set up workplaces

Qualified electricians

Qualified electricians have comprehensive technical knowledge gained from a course of study, an apprenticeship or technical training. They have an understanding of control technology and automation. They are familiar with relevant standards and directives. Qualified electricians can:

- independently recognize, avoid and eliminate sources of danger
- implement specifications from the accident prevention regulations
- assess the work environment
- independently optimize and carry out their work

Safety and instruction

Read the contents that refer to the activities you have to perform with the product. Always read the chapter For your safety in the operating instructions. Observe the warnings in the chapters so that you can handle and work with the product as intended and safely.

Explanation of symbols

Various symbols are used for a clear arrangement:

- ► The triangle indicates instructions that you should execute.
- • The bullet point indicates an enumeration.
- […] The square brackets indicate cross-references to other text passages in the document.
- [1] The number in the square brackets refers to the position in the adjacent figure.
- [+] The plus sign in square brackets indicates ordering options and accessories.

In order to make it easier for you to find text passages, pictograms and signal words are used in warning notices:

⚠ DANGER

Failure to observe will result in serious or fatal injuries.

⚠ WARNING

Failure to observe may result in serious or fatal injuries.

⚠ CAUTION

Failure to observe may result in minor or moderate injuries.

Notes are used for important information on the product. The possible consequences of failure to observe these include:

- Malfunctions of the product
- Damage to the product
- Damage to the environment

Information
This sign indicates information, tips and notes for dealing with the product or the software.

Examples
This symbol shows examples of how to use the product or software.

QR-Codes
This symbol shows a QR code, via which you can watch videos or animations. Internet access is required in order to use it.

You can read the QR code, for example, with the camera of your smartphone or tablet. If your camera doesn't support this function you can download a free QR code reader app for your smartphone. Use the Appstore for Apple operating systems or the Google Play Store for Android operating systems.

If you cannot read the QR code on paper, make sure that the lighting is adequate and reduce the distance between the reading device and the paper. In the case of documentation on a monitor screen, use the zoom function to enlarge the QR code and reduce the distance.

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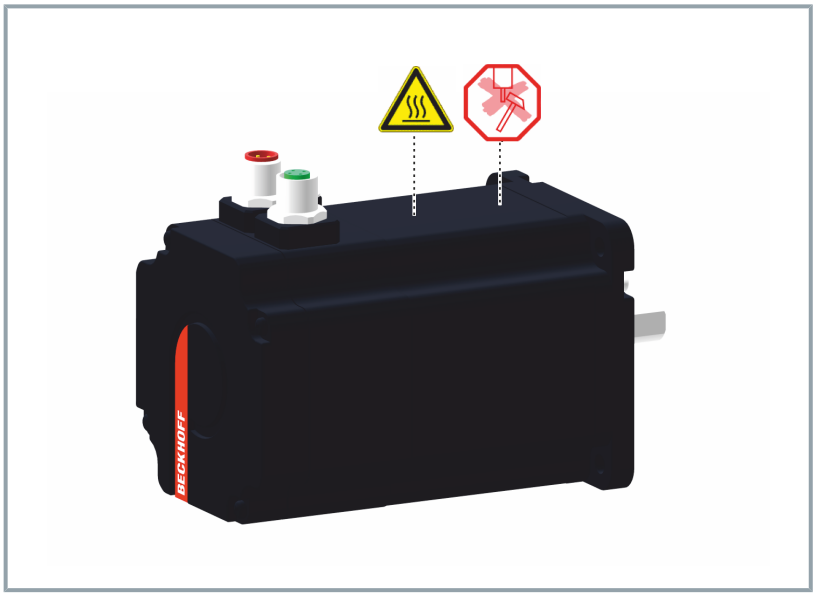
www.beckhoff.com/documentations

Read this chapter containing general safety information. The chapters in these operating instructions also contain warning notices. Always observe the safety instructions for your own safety, the safety of other persons and the safety of the product.

When working with control and automation products, many dangers can result from careless or incorrect use. Work particularly thoroughly, not under time pressure and responsibly towards other people.

Safety pictograms

On Beckhoff products you will find attached or lasered safety pictograms, which vary depending on the product. They serve to protect people and to prevent damage to the products. Safety pictograms must not be removed and must be legible for the user.



Warning of a hot surface
During and after operation there is a risk of burns at the motor housing due to hot surfaces over 60 °C. Allow the motor housing to cool down for the specified time, at least 15 minutes.

Avoid shocks to the shaft
on the shaft may cause the maximum permissible axial and radial values to be exceeded. Optical encoder systems can thus be destroyed.

General safety instructions

In this chapter you will find notes on safety when handling the motors. They cannot run independently. The motors are therefore regarded as incomplete machines. They must be installed in a machine / plant by the machine manufacturer. The documentation created by the machine manufacturer must be read.

Before operation

Protective equipment
Do not remove or bypass any protective devices. Check all protective devices before operation. Make sure that all emergency switches are present at all times and can be reached by you and other people. People could be seriously or fatally injured by unprotected machine parts.

Shut down and secure the machine or plant
Shut down the machine or plant. Secure the machine or plant against being inadvertently started up.

Correctly ground electrical components or modules
Avoid electric shocks due to improper grounding of electrical components or modules. Ground all conductive components according to the specifications in the chapters "Electrical Installation" and "Mechanical Installation".

Keep the immediate environment clean
Keep your workplace and the surrounding area clean. Ensure safe working.

Check safety pictograms
Check whether the designated pictograms are on the product. Replace missing or illegible stickers.

Observe tightening torques
Mount and repeatedly check connections and components, complying with the prescribed tightening torques.

Use the original packaging only
When shipping, transporting, storing and packing, use the original packaging or non-conductive materials.

During operation

Do not work on live electrical parts

Never carry out any work on the motor or motor cable when they are live. Measure the voltage on the DC link test contacts DC+ und DC-. Only work on the motor when the voltage has dropped to < 50 V. Ensure that the protective conductor is connected properly. Never loosen electrical connections when live. Disconnect all components from the mains and secure them against being switched on again.

Do not touch hot surfaces

Check the cooling of the surfaces with a thermometer. Do not touch the components during and immediately after operation. Allow the components to cool sufficiently after switching off.

Avoid overheating

Operate the motor according to the technical specifications. Refer here to the chapter: "Technical data". Activate and monitor the temperature contact of the motor. Provide for sufficient cooling. Switch off the motor immediately if the temperature is too high.

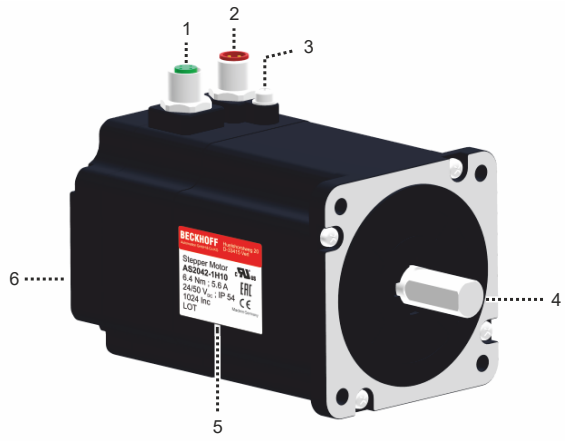
Do not touch any moving or rotating components

Do not touch any moving or rotating components. Fasten all parts or components on the machine or plant.

After operation

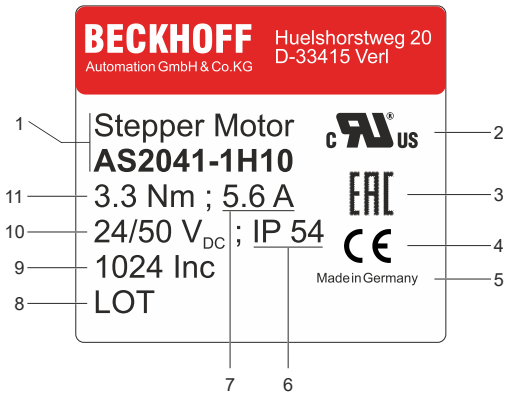
De-energize and switch off components before working on them

Check the functionality of all safety-relevant devices. Secure the working environment. Secure the machine or plant against being inadvertently started up. Observe the chapter: "Decommissioning".



Item number	Explanation
1	Feedback connection
2	Power connection
3	Ground connection
4	Motor shaft
5	Name plate
6	Motor housing

Name plate



Item number	Explanation
1	Article description
2	UL conformity, as cURus component, in preparation
3	EAC conformity
4	CE conformity
5	Country of manufacture
6	Protection class
7	Standstill current
8	LOT number of the motor for product identification
9	Resolution of the feedback
10	Nominal supply voltage
11	Holding torque

Type key

AS 20 uv – w x y z	Explanation
AS	Product area Stepper motors
20	Series AS2000
u	Flange size 2 = N2, 56 mm 4 = N3, 86 mm
v	Overall length 1 = one stack 2 = two stacks 3 = three stacks
w	Shaft versions 0 = smooth shaft, only for AS202x 1 = shaft with feather key, only for AS204x
x	Winding type D = 2 A H = 5 A … 6 A J = < 8 A
y	Feedback system 0 = no encoder 1 = encoder 24 V_{DC}, 1,024 increments
z	Holding brake 0 = no holding brake

Product characteristics

Standardized NEMA flange sizes

Adaptation to international standards through flange sizes N2, NEMA23 and N3, NEMA34.

Step angle and power range

The power gap to the AM8000 synchronous servomotor is considerably reduced through a step angle of 1.8°.

High protection class

The IP54 protection class protects the stepper motors against splash water, contact and dust.

Extended features

- Integrated M12 power connector and feedback socket
- Integrated torsion-proof encoder, 1024 inc/rev, for closed-loop control

By means of the field-oriented control, resonances are significantly decreased and the development of heat and noise is reduced.

Stepper motor terminals and stepper motor modules

All motors of the AS2000 series can be commissioned with the Beckhoff stepper motor terminals and stepper motor modules. For further details, please refer to the chapter "Electrical installation", [Page 62].

Ordering options and accessories

Flange size	Product characteristic
2 = N2	Smooth shaft
4 = N3	Shaft with feather key

Preassembled cables for power and feedback are available as accessories.

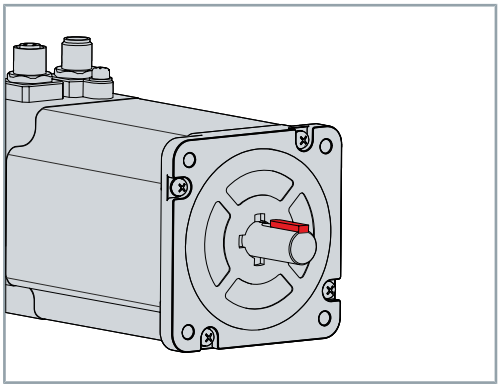
Further accessories:

- Low-backlash planetary gear from the AG2250 series
- Elastomer couplings of the AX2090-+ECxx series

Ordering options

Ordering options are defined via the type key and must be ordered separately. The listed components cannot be retrofitted.

Feather key



A feather key transmits torque to an output element.

The stepper motors of flange size N3 are equipped with feather key groove and inserted feather key according to DIN6885. The rotor is balanced with half a feather key according to DIN ISO 21940-32:2012-08.

Intended use

Stepper motors from the AS2000 series are specially designed for use as actuators in handling devices, textile machines, machine tools, packaging machines and similar machines. They are intended to be controlled and operated in terms of speed and position by Beckhoff stepper motor output stages.

The stepper motors from the AS2000 series may be operated exclusively for the activities foreseen and defined in this documentation, taking into account the prescribed environmental conditions.

The components are to be installed in electrical systems or machines and only put into operation as integrated components of the system or machine.

Read the entire drive system documentation:

- This translation of the original instructions
- Translation of the original instructions for the stepper motor terminals and stepper motor modules
- Complete machine documentation provided by the machine manufacturer

Improper use

Any use exceeding the permissible values specified in the Technical data is considered improper and therefore prohibited.

Beckhoff stepper motors from the AS2000 series are not suitable for use in the following areas:

- ATEX zones without suitable housing
- Areas with aggressive environments, for example aggressive gases or chemicals

The relevant standards and directives for EMC interference emissions must be complied with in residential areas.

Below you will find definitions of terms, environmental conditions, operating details and technical data for the motors.

Definitions

Characteristic torque and speed curves
Detailed information on characteristic curves can be found under:
www.beckhoff.de -> Beckhoff motor curves
www.beckhoff.de -> TC Motion Designer

All data, with the exception of the voltage constant, are based on 40 °C ambient temperature and 100 K overtemperature of the winding. The data can have a tolerance of +/-10 %.
If a gear unit is attached the power may be reduced by up to 20 %.

The A-side motor flange is intended for heat dissipation. If a gearbox is attached, the heat dissipation is interrupted and reduces the power of the motor.

By default, the engine heat via the A-flange is dissipated into the machine bed. Due to heating of the gearbox, this is not possible for thermal reasons. This configuration leads to a reduction of the nominal output.

Technical terms

This chapter provides information on various technical terms and their meaning.

Holding torque M_H [Nm]
The holding torque states the torque that the energized motor can hold at standstill without causing continuous rotation of the rotor.

Winding inductance L [mH]
Indication of the motor inductance. It is the average value for one motor revolution, with two energized phases, at 1 kHz. Saturation of the motor must be taken into account.

Data for operation and environment

Operate the motor only under the specified conditions
Operate motors only under the operating and environmental conditions specified in this chapter. This ensures a long service life and proper operation.

The stepper motor can be damaged at temperatures above 40 °C and encapsulated installation.

Beckhoff products are designed for operation under certain environmental conditions, which vary depending on the product. The following specifications must be observed for operation and environment in order to achieve the optimum service life of the products.

Environmental requirements	
Climate category	3K3 according to EN 60721
Ambient temperature during operation	-10 °C to +40 °C, with power derating up to +50 °C
Ambient temperature for transport and storage	Maximum fluctuation 20 K/hour: -20 °C to +60 °C
Permissible humidity in operation	20 % to 90 % relative humidity, no condensation
Permissible humidity during transport and storage	90 % relative humidity, no condensation

Specifications for intended use	
Insulation material class	B; 130 °C according to IEC 60085
Protection class *does not apply to the shaft feed through*	Listed in the technical data of the motors
Installation position	See chapter: "Technical description", [Page 55]
Ventilation	Adequate self surface cooling is to be ensured.
Insulation resistance	≥ 100 MΩ
Degree of pollution	2 according to EN 60204 / EN 50178
Permissible operating altitude	1000 m above sea level
Maximum cable length	10 m
Corrosion protection	The manufacturer must be consulted with regard to special measures for operation under extremely corrosive conditions. These measures must be implemented immediately by the user.
Special operating conditions	The application and use of the motor are to be determined and assessed in the individual case. Please consult the vendor in the case of harsher environmental and operating conditions.
Approvals	CE, EAC, UL in preparation

Step mode and limit speeds

The Beckhoff stepper motor terminals can output approx. 125,000 steps per second and have a step angle of 1.8° or 200 steps/revolution.

Step mode	Limit speed [rpm]
Full step	theoretically 37,500
1/2	theoretically 18,750
1/4	theoretically 9,375
1/8	theoretically 4,688
1/16	2,344
1/32	1,171
1/64	585

Further information on the limit speeds can be found in the chapters "AS202x Curves for torques and speeds", [Page 27] and "AS204x Curves for torques and speeds", [Page 37] in each case at the end of the technical data.

Maximum speed of the Beckhoff AS2000 stepper motor

The maximum speed is 3,600 rpm if using a Beckhoff stepper motor from the AS2000 series with incremental encoder. In practice the maximum speed is limited by the design of the stepper motor.

Beckhoff stepper motors from the AS2000 series are usually used only for applications with nominal speeds of well below 1,000 rpm.

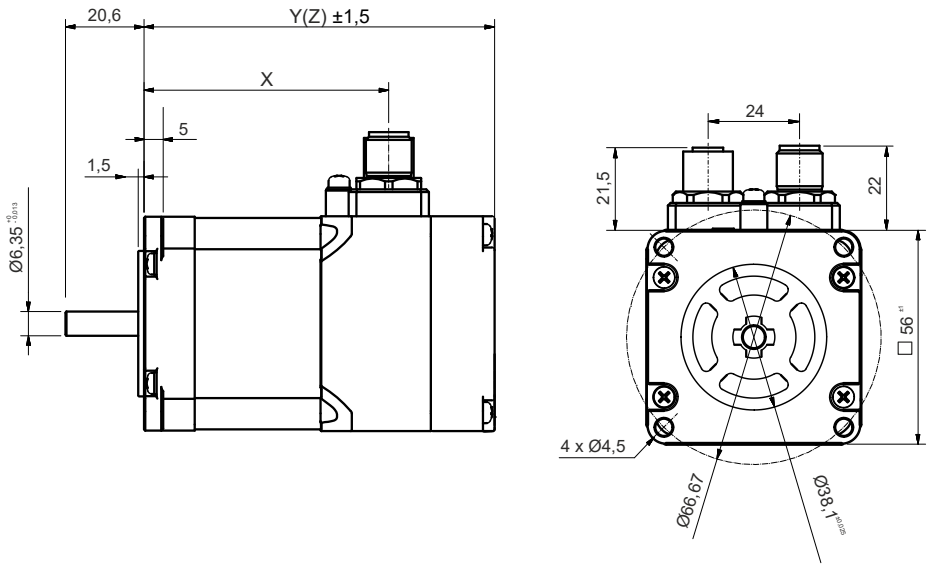
AS202x

Electrical data	AS2021	AS2022	AS2023-H	AS2023-J
Holding torque M_H [Nm]	0.83	1.53	1.80	2.30
Breakdown torque M_p [Nm]	0.63	1.17	1.45	1.90
Supply voltage [V_{DC}]	24 to 50			
Nominal current [A]	2.0	5.6		6.4
Winding resistance Ph-Ph R_{25} [Ω]	0.80	0.24	0.32	0.32
Winding inductance Ph-Ph L [mH]	3.8	0.90	0.97	0.97
Motor EMF [mV/rad/s]	239	156	185	185
EtherCAT plug-in module	EJ7047			
EtherCAT Terminal	EL7037 / EL7031	EL7047 / EL7041-1000		
EtherCAT Box	EP7041-1002	EP7041-3002		
Bus Terminal	KL2531	KL2541		
Resolution [steps]	1.8° / 200 full steps			
Motor connector	Round connector M12 high power, M12 feedback			

Mechanical data	AS2021	AS2022	AS2023
Axial load [N]	15	15	15
Radial load 0 mm from shaft end [N]	63	50	43
Rotor moment of inertia [kg cm²]	0.210	0.360	0.490
Weight without encoder [kg]	0.8	1.1	1.4
Weight with encoder [kg]	0.9	1.2	1.5
Maximum winding temperature [°C]	120		
Flange size	N2, NEMA 23/56 mm		
Protection class	IP 54		
Paint finishes			
Properties	powder coated		
Color	jet black / RAL 9005		

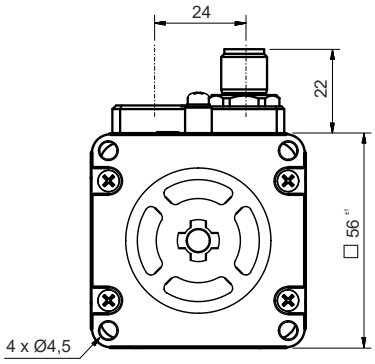
Dimensional drawing

- All figures in millimeters



Motor	X	Y	Z - encoder
AS2021	64.10 mm	81.10 mm	91.80 mm
AS2022	86.20 mm	103.10 mm	113.90 mm
AS2023	105.10 mm	122.10 mm	132.80 mm

View without encoder

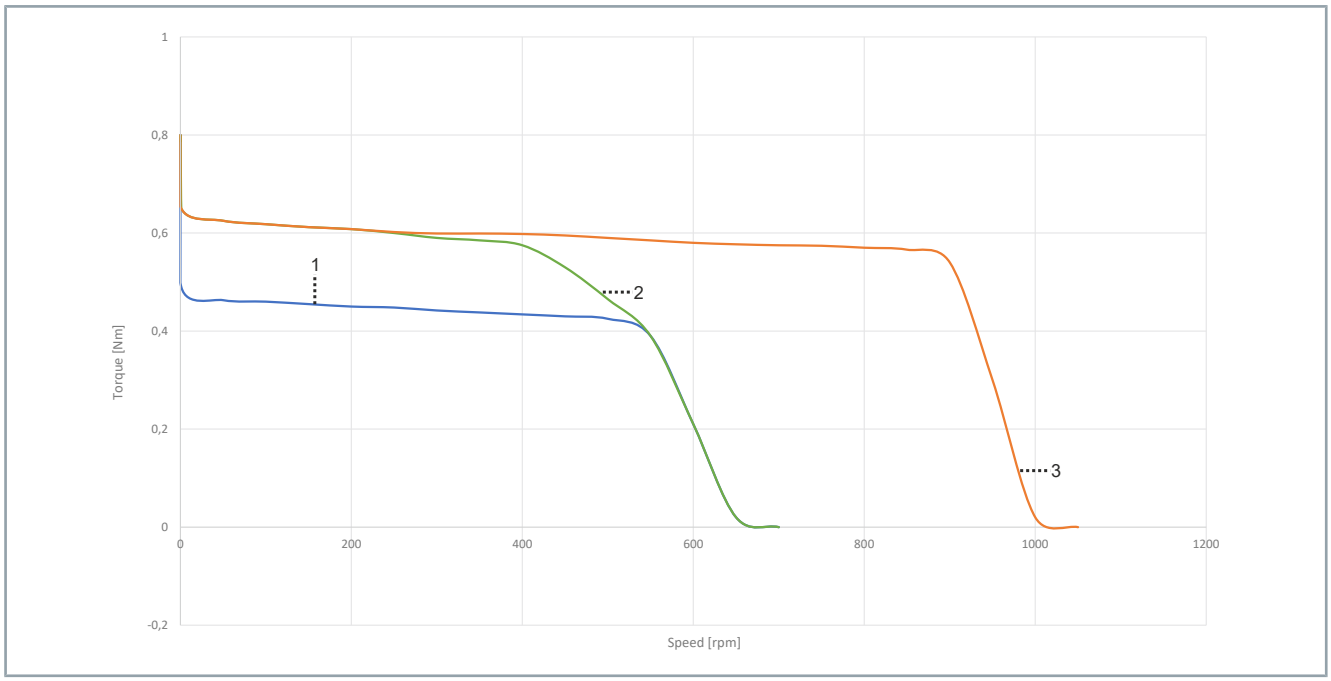


Characteristic torque and speed curves

AS2021-0D00

For the design of your application. The curves were recorded with "open loop" controlled operation and "vector control" field-oriented control.

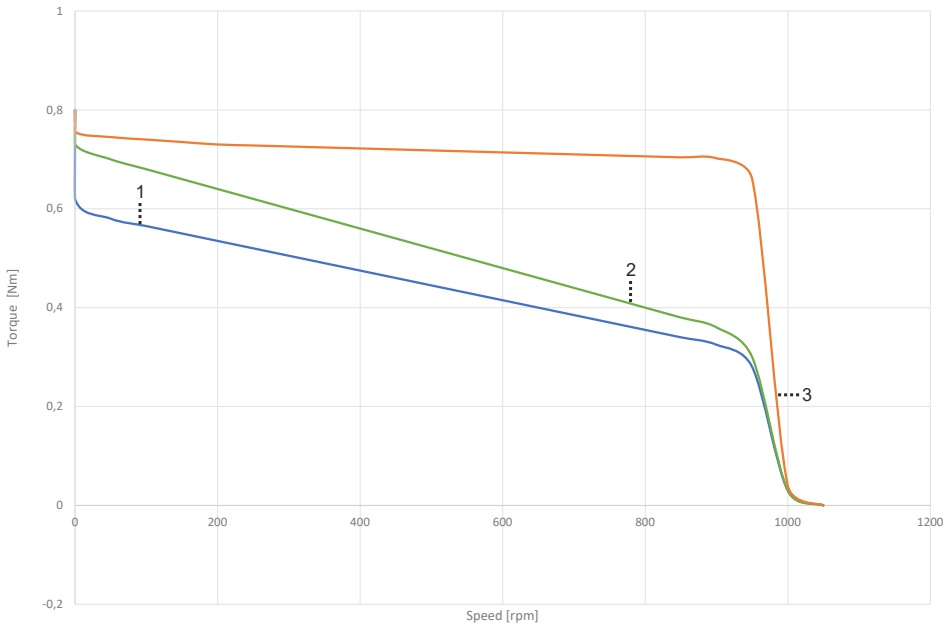
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2021-0D00	24 V_{DC} 1.5 A	EL7037
2	AS2021-0D00	24 V_{DC} 2 A	EL7047
3	AS2021-0D00	48 V_{DC} 2 A	EL7047

AS2021-0D10

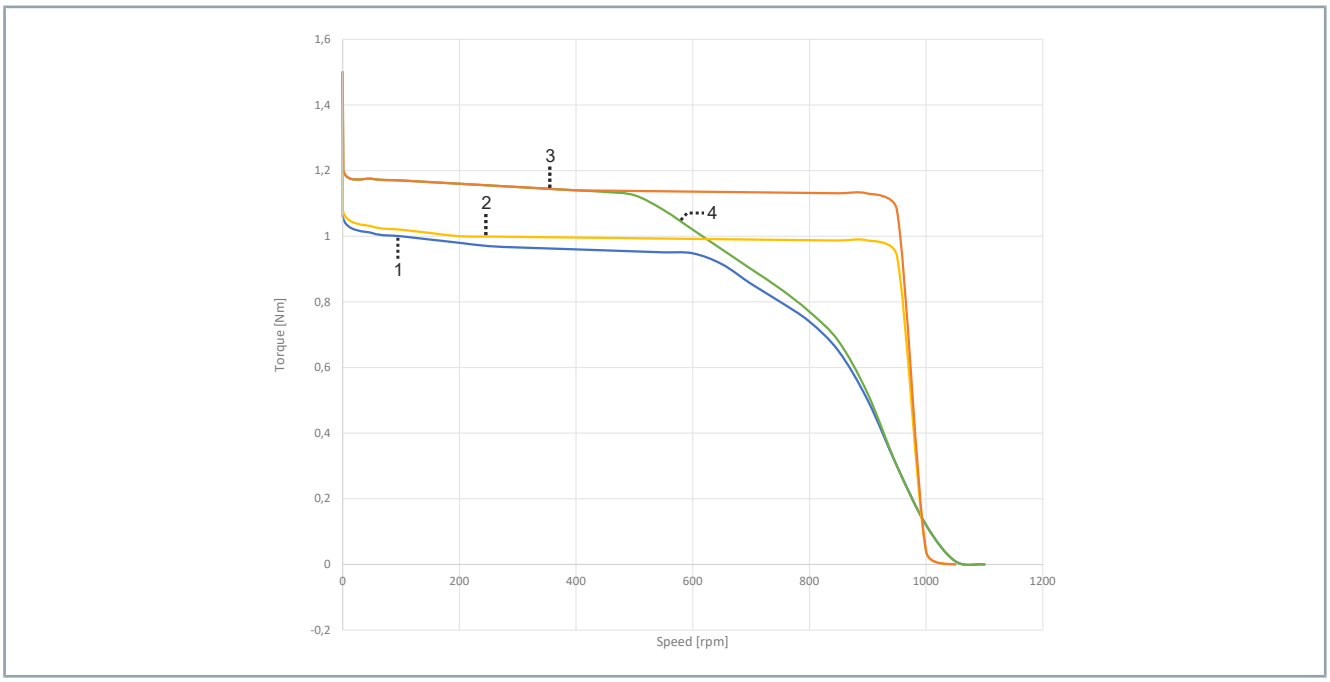
- "Vector control" field-oriented control



Curve	Motor type	Recording	
1	AS2021-0D10	24 V_{DC} 1.5 A	EL7037
2	AS2021-0D10	24 V_{DC} 2 A	EL7047
3	AS2021-0D10	48 V_{DC} 2 A	EL7047

AS2022-0H00

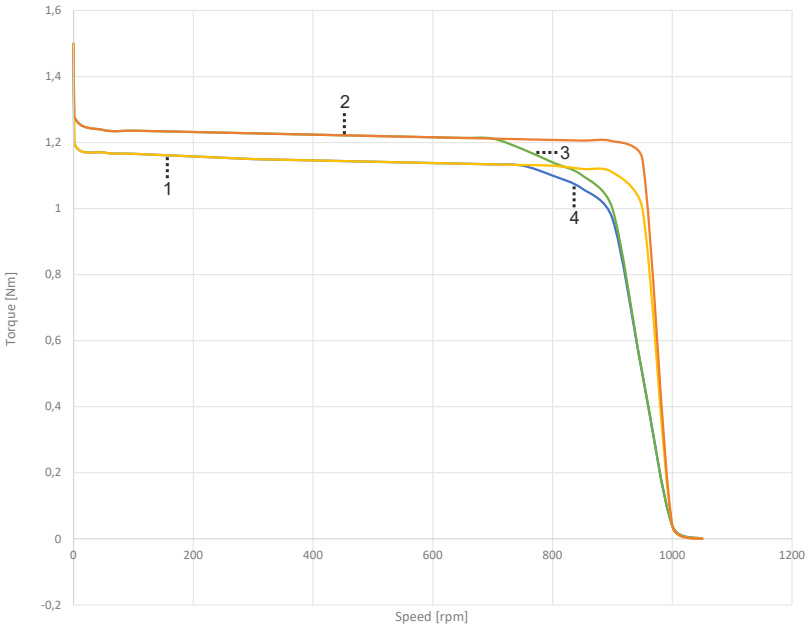
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2022-0H00	24 V_{DC} 5.0 A	EL7047
2	AS2022-0H00	48 V_{DC} 5.0 A	EL7047
3	AS2022-0H00	48 V_{DC} 5.6 A	EL7047+ZB8610
4	AS2022-0H00	24 V_{DC} 5.6 A	EL7047+ZB8610

AS2022-0H10

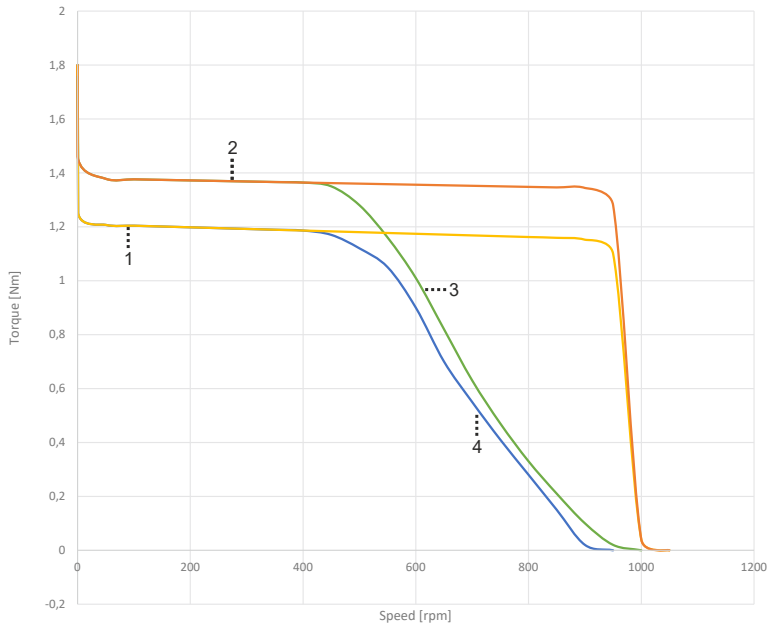
- "Vector control" field-oriented control



Curve	Motor type	Recording	
1	AS2022-0H10	48 V_{DC} 5.0 A	EL7047
2	AS2022-0H10	48 V_{DC} 5.6 A	EL7047+ZB8610
3	AS2022-0H10	24 V_{DC} 5.6 A	EL7047+ZB8610
4	AS2022-0H10	24 V_{DC} 5.0 A	EL7047

AS2023-0H00

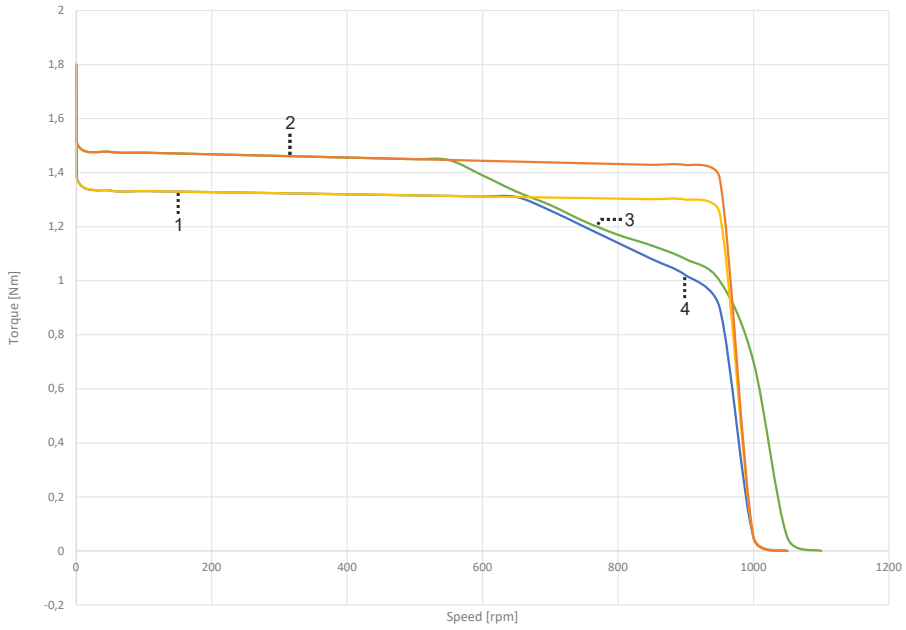
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2023-0H00	48 V_{DC} 5.0 A	EL7047
2	AS2023-0H00	48 V_{DC} 5.6 A	EL7047+ZB8610
3	AS2023-0H00	24 V_{DC} 5.6 A	EL7047+ZB8610
4	AS2023-0H00	24 V_{DC} 5.0 A	EL7047

AS2023-0H10

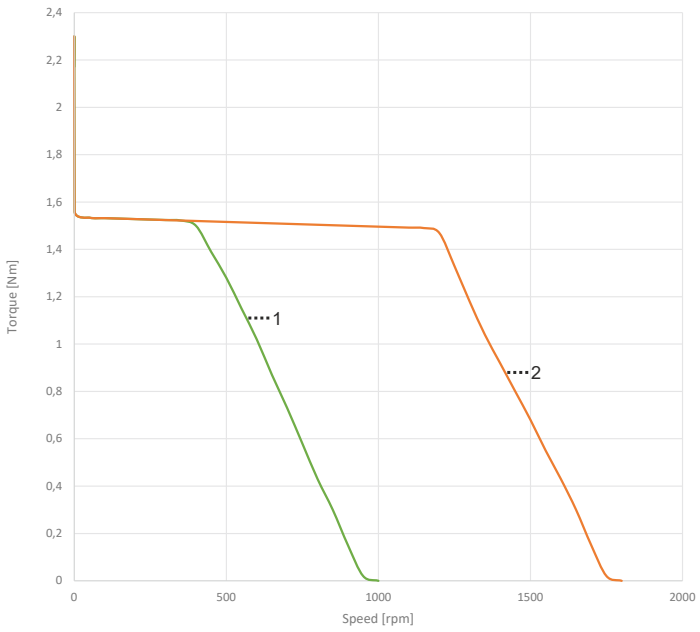
- "Vector control" field-oriented control



Curve	Motor type	Recording	
1	AS2023-0H10	48 V_{DC} 5.0 A	EL7047
2	AS2023-0H10	48 V_{DC} 5.6 A	EL7047+ZB8610
3	AS2023-0H10	24 V_{DC} 5.6 A	EL7047+ZB8610
4	AS2023-0H10	24 V_{DC} 5.0 A	EL7047

AS2023-0J00

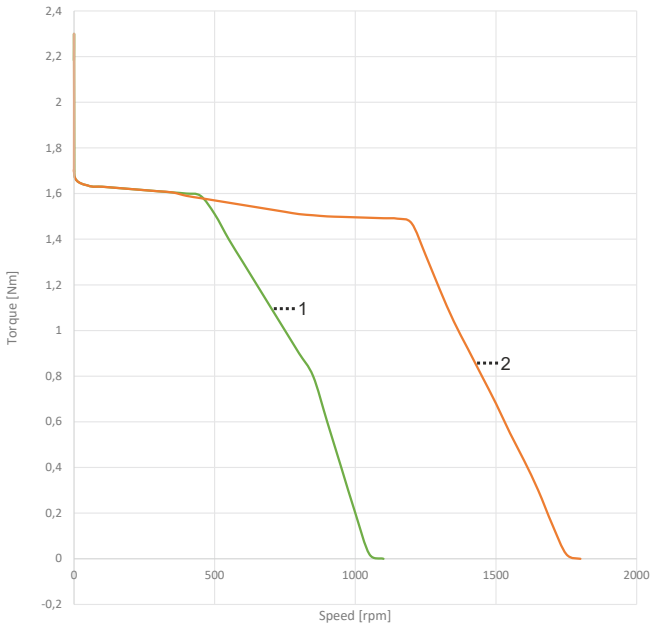
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2023-0J00	24 V_{DC} 6.4 A	EL7047+ZB8610
2	AS2023-0J00	48 V_{DC} 6.4 A	EL7047+ZB8610

AS2023-0J10

- "Vector control" field-oriented control



Curve	Motor type	Recording	
1	AS2023-0J10	24 V_{DC} 6.4 A	EL7047+ZB8610
2	AS2023-0J10	48 V_{DC} 6.4 A	EL7047+ZB8610

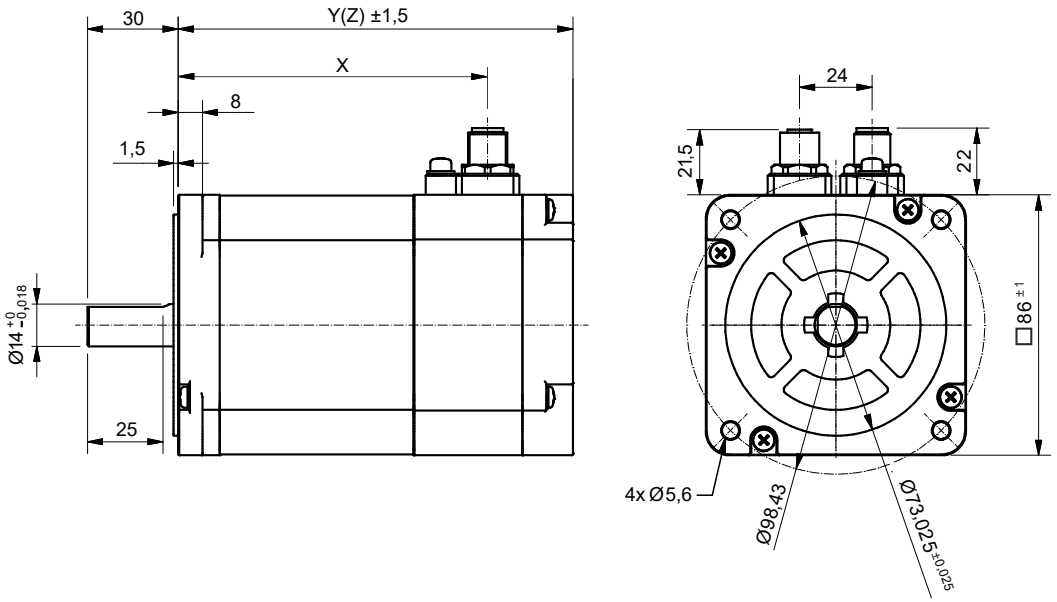
AS204x

Electrical data	AS2041	AS2042	AS2043
Holding torque M_H [Nm]	3.3	6.4	8.0
Breakdown torque M_p [Nm]	2.2	4.2	5.5
Supply voltage [V_{DC}]	24 to 50		
Nominal current [A]	5.6		6.5
Winding resistance Ph-Ph R_{25} [Ω]	0.30	0.41	0.38
Winding inductance Ph-Ph L [mH]	2.0	3.4	3.0
Motor EMF [mV/rad/s]	340	658	710
EtherCAT plug-in module	EJ7047		
EtherCAT Terminal	EL7047 / EL7041-1000		
EtherCAT Box	EP7041-3002		
Bus Terminal	KL2541		
Resolution [steps]	1.8° / 200 full steps		
Motor connector	Round connector M12 high power, M12 feedback		

Mechanical data	AS2041	AS2042	AS2043
Axial load [N]	60	60	60
Radial load 0 mm from shaft end [N]	200	176	129
Rotor moment of inertia [kg cm²]	1.48	3.00	4.50
Weight without encoder [kg]	1.9	3.0	4.1
Weight with encoder [kg]	2.0	3.1	4.2
Maximum winding temperature [°C]	120		
Flange size	N3, NEMA 34/86 mm		
Protection class	IP 54		
Paint finishes			
Properties	powder coated		
Color	jet black / RAL 9005		

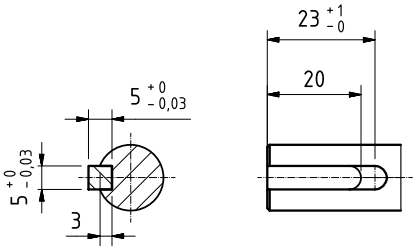
Dimensional drawing

- All figures in millimeters

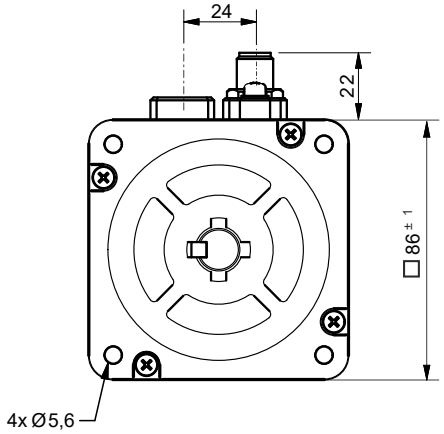


Motor	X	Y	Z - encoder
AS2041	71.80 mm	89.30 mm	100.00 mm
AS2042	102.25 mm	119.75 mm	130.45 mm
AS2043	132.7 mm	150.20 mm	160.90 mm

Feather key



View without encoder

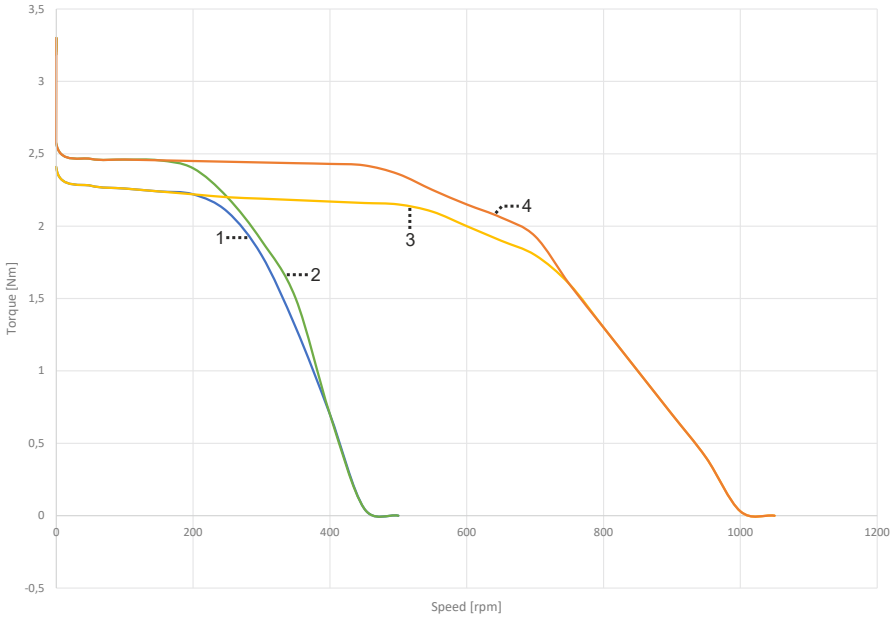


Characteristic torque and speed curves

AS2041-1H00

For the design of your application. The curves were recorded with "open loop" controlled operation and "vector control" field-oriented control.

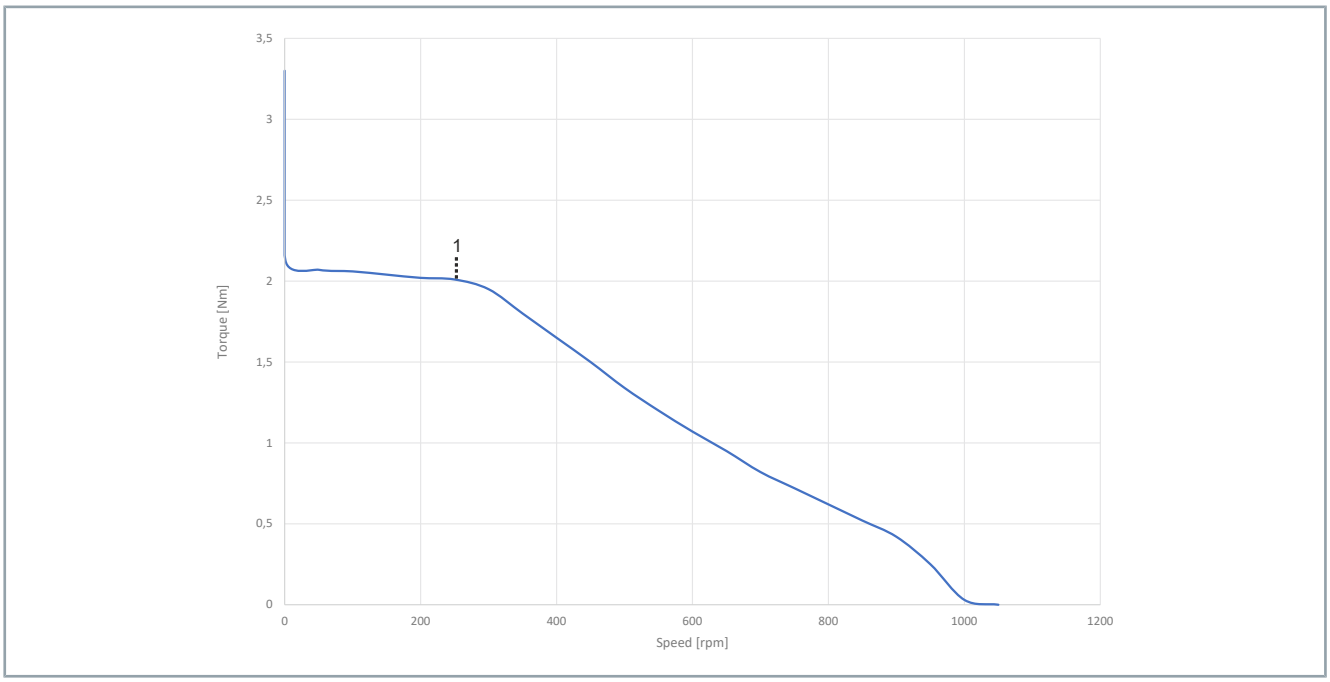
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2041-1H00	24 V_{DC} 5.0 A	EL7047
2	AS2041-1H00	24 V_{DC} 5.6 A	EL7047+ZB8610
3	AS2041-1H00	48 V_{DC} 5.0 A	EL7047
4	AS2041-1H00	48 V_{DC} 5.6 A	EL7047+ZB8610

AS2041-1H10

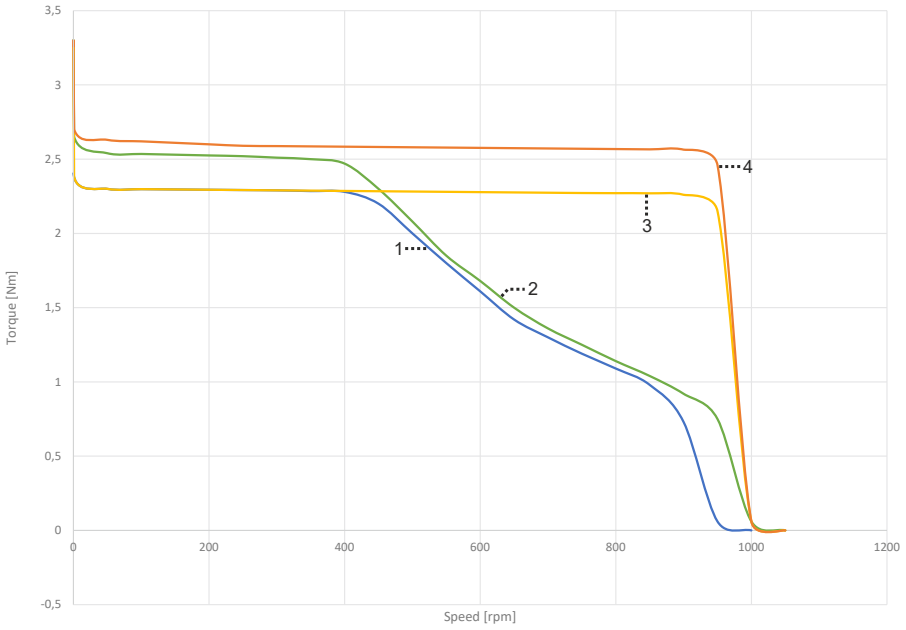
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2041-1H10	24 V_{DC} 5.0 A	EL7041-1000

AS2041-1H10

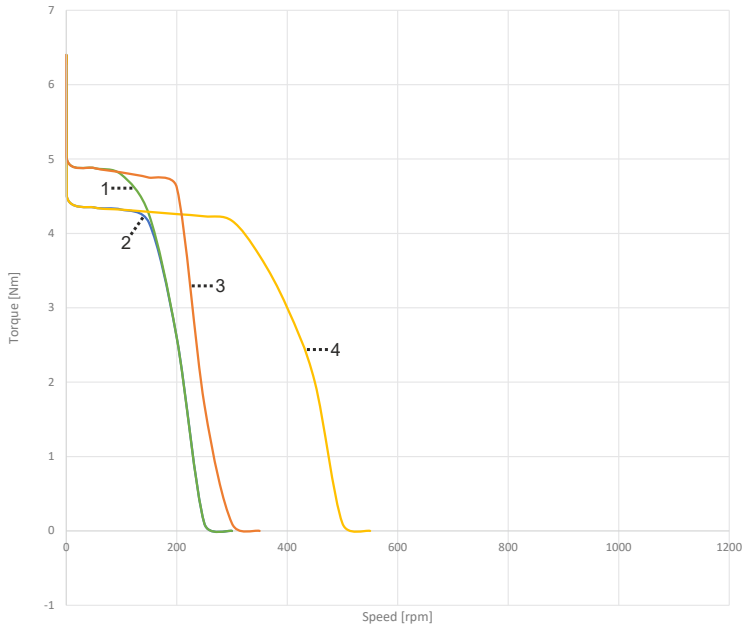
- "Vector control" field-oriented control



Curve	Motor type	Recording	
1	AS2041-1H10	24 V_{DC} 5.0 A	EL7047
2	AS2041-1H10	24 V_{DC} 5.6 A	EL7047+ZB8610
3	AS2041-1H10	48 V_{DC} 5.0 A	EL7047
4	AS2041-1H10	48 V_{DC} 5.6 A	EL7047+ZB8610

AS2042-1H00

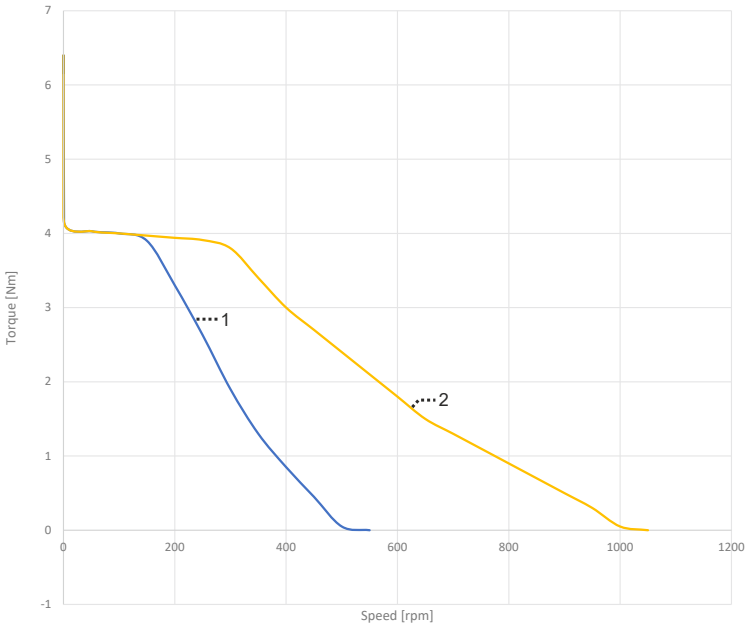
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2042-1H00	24 V_{DC} 5.6 A	EL7047+ZB8610
2	AS2042-1H00	24 V_{DC} 5.0 A	EL7047
3	AS2042-1H00	48 V_{DC} 5.6 A	EL7047+ZB8610
4	AS2042-1H00	48 V_{DC} 5.0 A	EL7047

AS2042-1H10

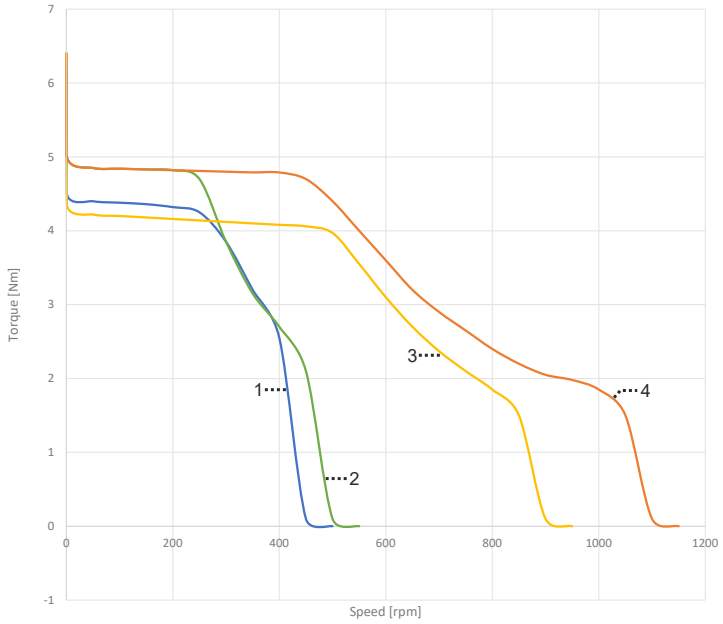
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2042-1H10	24 V_{DC} 5.0 A	EL7041-1000
2	AS2042-1H10	48 V_{DC} 5.0 A	EL7041-1000

AS2042-1H10

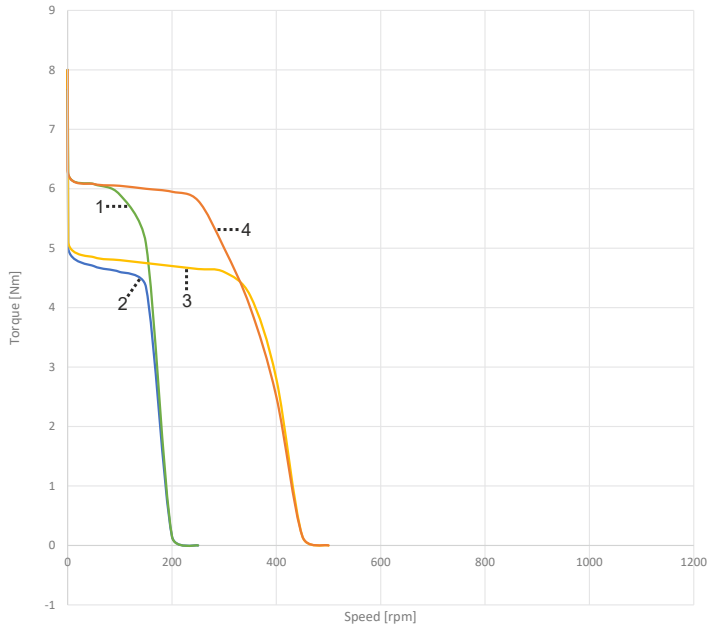
- "Vector control" field-oriented control



Curve	Motor type	Recording	
1	AS2042-1H10	24 V_{DC} 5.0 A	EL7047
2	AS2042-1H10	24 V_{DC} 5.6 A	EL7047+ZB8610
3	AS2042-1H10	48 V_{DC} 5.0 A	EL7047
4	AS2042-1H10	48 V_{DC} 5.6 A	EL7047+ZB8610

AS2043-1J00

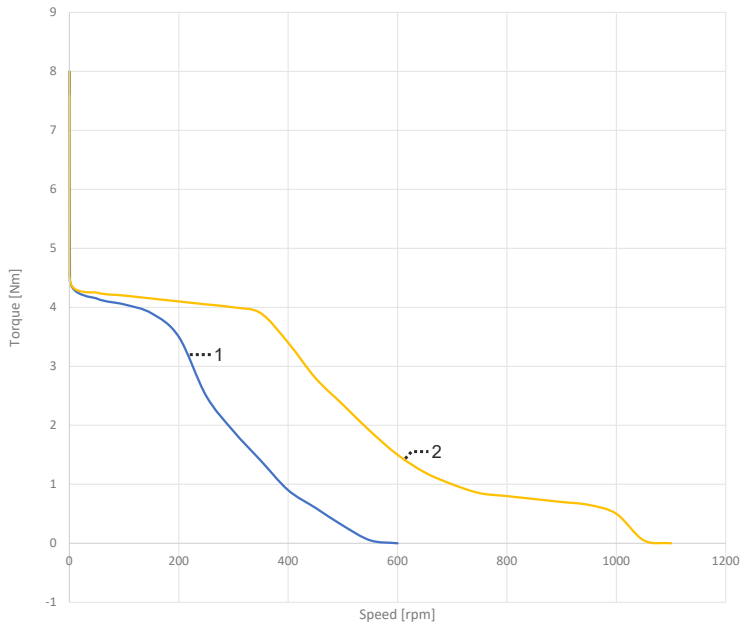
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2043-1J00	24 V_{DC} 6.5 A	EL7047+ZB8610
2	AS2043-1J00	24 V_{DC} 5.0 A	EL7047
3	AS2043-1J00	48 V_{DC} 5.0 A	EL7047
4	AS2043-1J00	48 V_{DC} 6.5 A	EL7047+ZB8610

AS2043-1J10

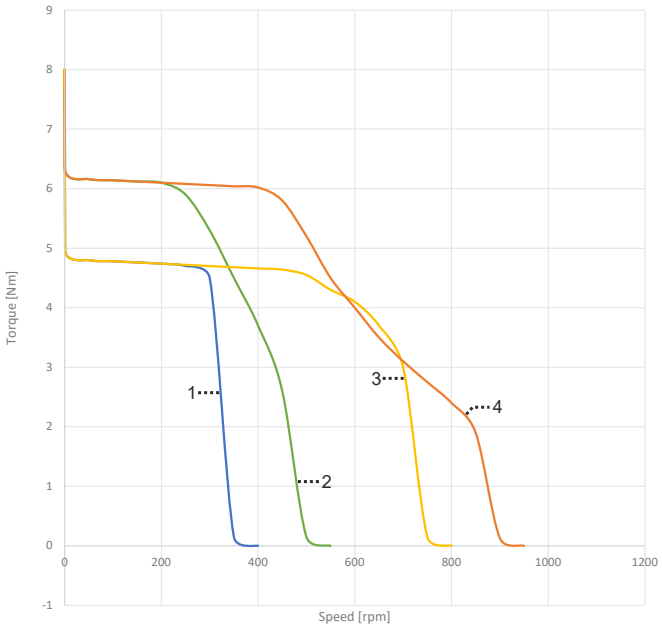
- "Open loop" controlled operation



Curve	Motor type	Recording	
1	AS2043-1J10	24 V_{DC} 5.0 A	EL7041-1000
2	AS2043-1J10	48 V_{DC} 5.0 A	EL7041-1000

AS2043-1J10

- "Vector control" field-oriented control



Curve	Motor type	Recording	
1	AS2043-1J10	24 V_{DC} 5.0 A	EL7047
2	AS2043-1J10	24 V_{DC} 6.5 A	EL7047+ZB8610
3	AS2043-1J10	48 V_{DC} 5.0 A	EL7047
4	AS2043-1J10	48 V_{DC} 6.5 A	EL7047+ZB8610

Elastomer coupling [+]

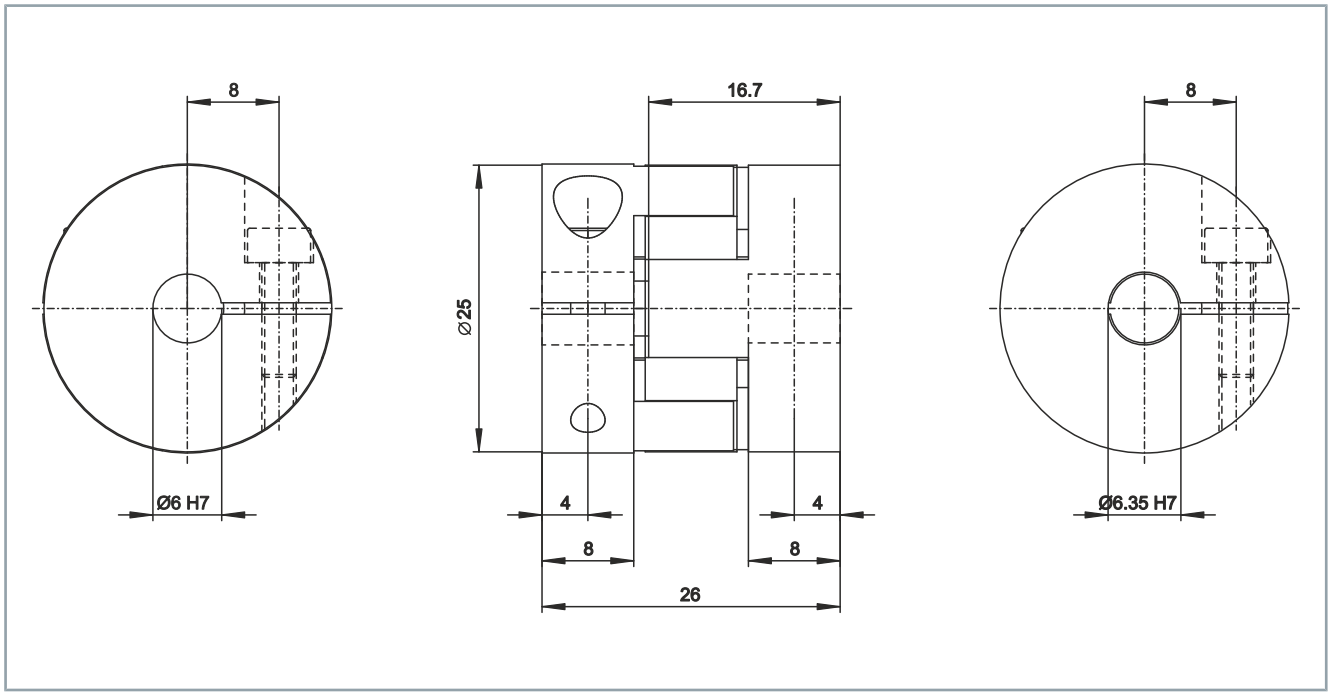
AX2090-+EC05

Mechanical data	AX2090-+EC05-c/d		
	Motor shaft diameter c / output shaft diameter d		
	6.35 / 6.00	6.35 / 6.35	6.35 / 8.0
Shore hardness of elastomer ring [Sh]	98		
Proportionate attenuation [ψ]	0.4 to 0.5		
Nominal torque T_{KN} [Nm]	9		
Max. torque T_{KMAX} [Nm]	18		
Spacing distance A [mm]	9		
Fit length C [mm]	8		
Outer diameter B [mm]	25		
Outer diameter of screw head B_S [mm]	25		
Moment of inertia per hub J_1/J_2 [kg cm^2]	0.02 / 0.02		
Approx. mass [kg]	0.02		
Center-to-center distance F [mm]	8		
Distance F [mm]	4		
Standard speed [rpm]	15000		
Hub length H [mm]	16.7		
Installation length A [mm]	26		
Maximum inner diameter of elastomer ring D_E [mm]	10.2		
Offset			
Lateral [mm]	0.08		
Angular [degrees]	1		
Axial [mm]	±1		
Screws			
Thread E	M3		
Tightening torque E [Nm]	2		
Fit	H7		

Dimensional drawing

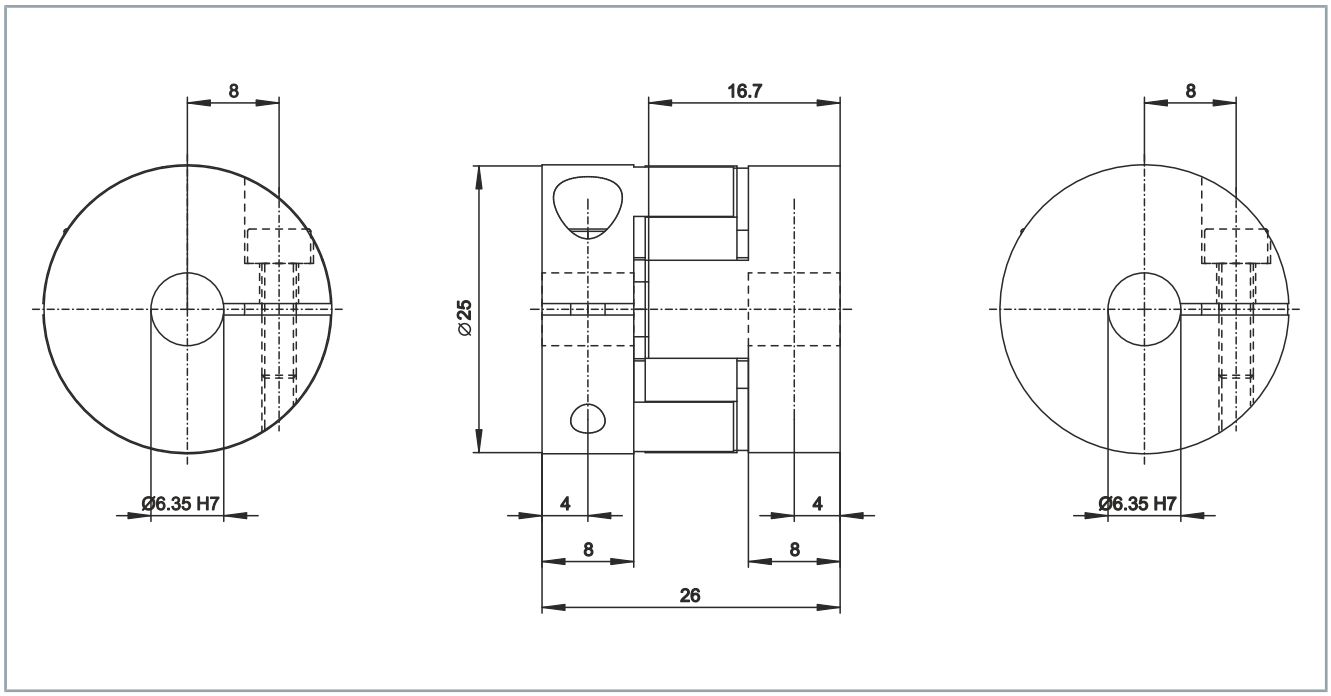
- All figures in millimeters
- Motor shaft diameter / output shaft diameter

6.35 / 6.00



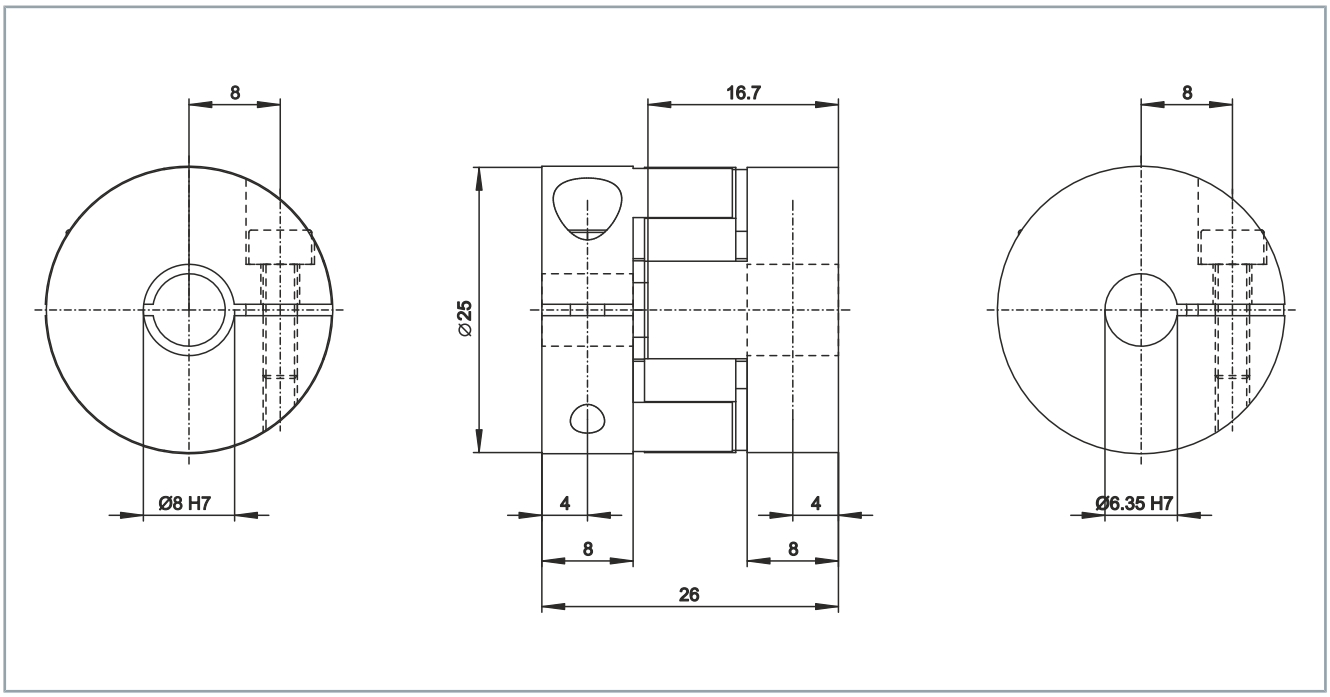
6.35 / 6.35

- Motor shaft diameter / output shaft diameter



6.35 / 8.00

- Motor shaft diameter / output shaft diameter



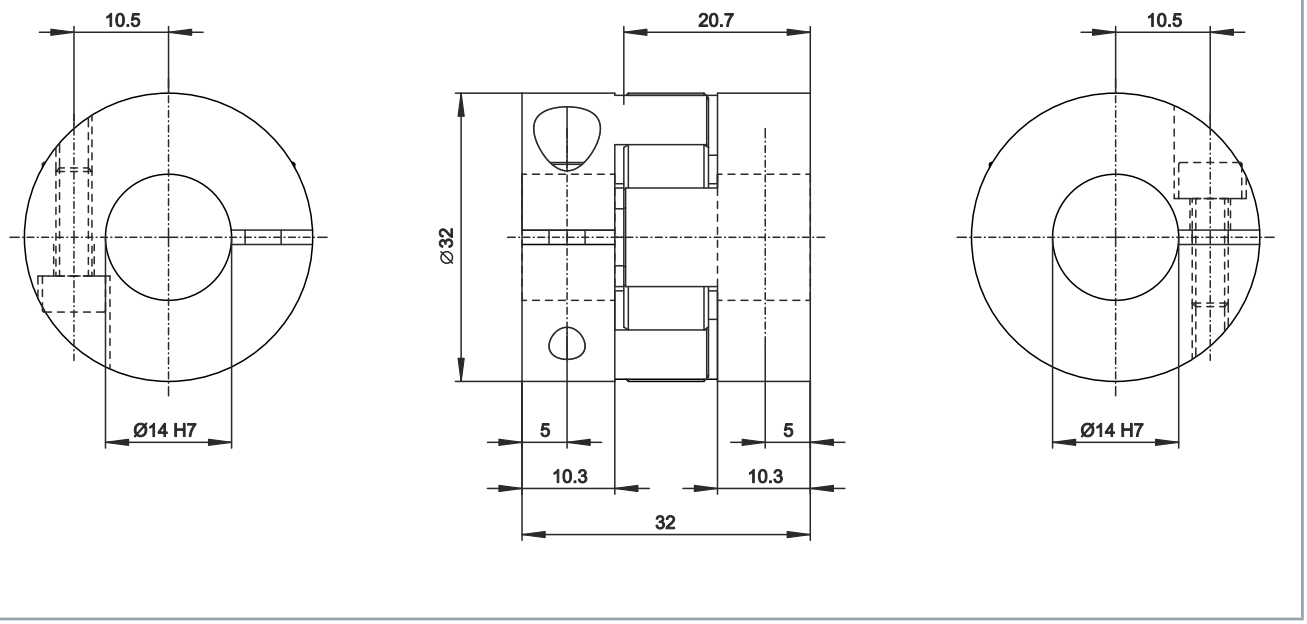
AX2090-+EC10

Mechanical data	AX2090-+EC10-c/d	
	Motor shaft diameter c / output shaft diameter d	
	14.00 / 14.00	14.00 / 16.00
Shore hardness of elastomer ring [Sh]	98	
Proportionate attenuation [ψ]	0.4 to 0.5	
Nominal torque T_{KN} [Nm]	12.5	
Max. torque T_{KMAX} [Nm]	25	
Spacing distance A [mm]	11.5	
Fit length C [mm]	10.3	
Outer diameter B [mm]	32	
Outer diameter of screw head B_S [mm]	32	
Moment of inertia per hub J_1/J_2 [kg cm^2]	0.03 / 0.03	
Approx. mass [kg]	0.05	
Center-to-center distance F [mm]	10.5	
Distance F [mm]	5	
Standard speed [rpm]	13000	
Hub length H [mm]	20.7	
Installation length A [mm]	32	
Maximum inner diameter of elastomer ring D_E [mm]	14.2	
Offset		
Lateral [mm]	0.1	
Angular [degrees]	1	
Axial [mm]	±1	
Screws		
Thread	M4	
Tightening torque [Nm]	4	
Fit	H7	

Dimensional drawing

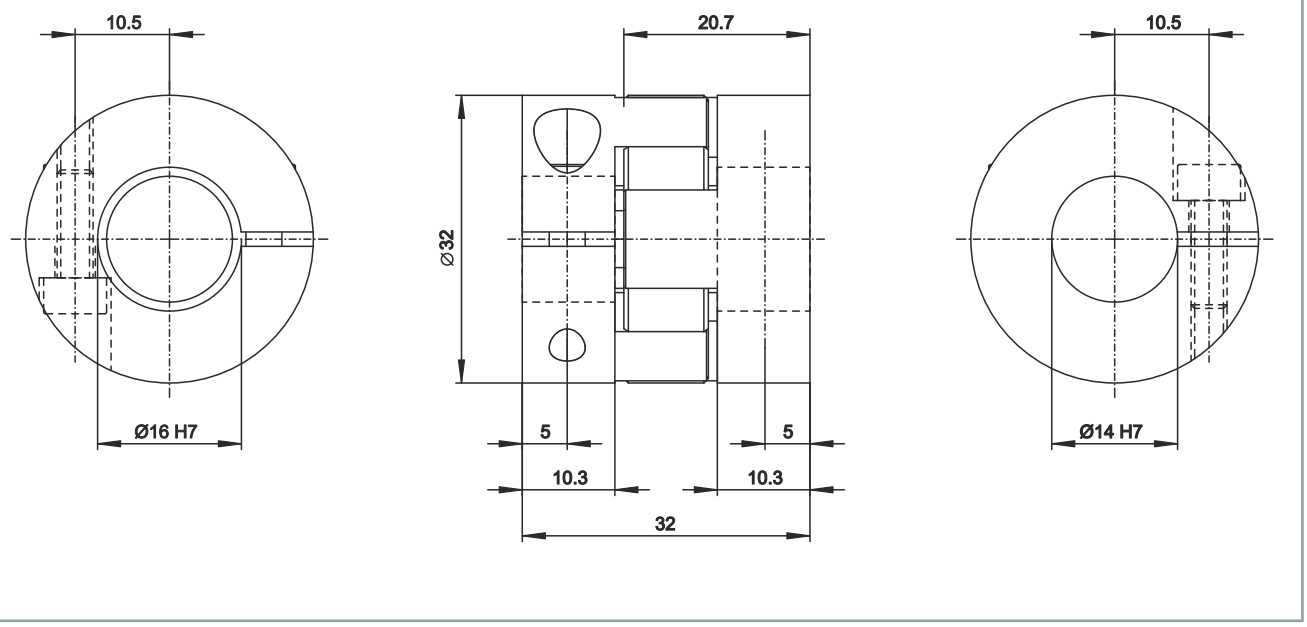
- All figures in millimeters
- Motor shaft diameter / output shaft diameter

14.00 / 14.00



14.00 / 16.00

- Motor shaft diameter / output shaft diameter



Check missing or damaged parts
Check your delivery for completeness. If any parts are missing or became damaged during transport, contact the carrier, vendor or our service department immediately.

Please check that the delivery includes the following items:

- Motor from the AS2000 series
- Instruction leaflet; short info

Packaging

Instructions for handling are printed on the packaging:

Symbol	Explanation
	This is the correct position for the packaging.
	Treat the contents of the packaging with care.
	The outer packaging can be disposed of as cardboard.
	The contents are fragile.

Avoid damage to the motors and resulting loss of warranty
Observe the conditions and the following chapters on transport and storage.
Failure to observe the conditions may result in damage to the motors and void the warranty.

Conditions

During transport and storage ensure that the motors and individual components are not damaged. Observe the specifications in the following chapters and comply with the following conditions:

- Climate category: 2K3 according to EN 60721
- Temperature: -25 °C to +65 °C, maximum fluctuation 20 K per hour
- Humidity: relative humidity 5 % to 95 %, no condensation
- Use of suitable means of transport
- The device should be transported and stored in a horizontal position
- Use of the vendor's original packaging

The table shows the maximum stacking height at which you may store and transport the motors on a pallet in the original packaging:

Motor	Stacking height of the original packaging [qty]
AS2021	5
AS2022	5
AS2023	5
AS2041	3
AS2042	3
AS2043	3

Motor and gear unit AG2250	Stacking height of the original packaging [qty]
AS2021 with PLE60/WPLE60	3
AS2022 with PLE60/WPLE60	3
AS2023 with PLE60/WPLE60	2
AS2041 with PLE80/WPLE80	2
AS2042 with PLE80/WPLE80	2
AS2043 with PLE80/WPLE80	2

Transport

⚠ WARNING

Do not enter the area below suspended motors
Use suitable means of transport and secure the motor against falling.
If the motor falls down, this can lead to serious or even fatal accidents.

Avoid hard impacts on the motor
Use suitable means of transport and secure the motor against falling.
Falling and hard impacts will damage the motor and motor components.

AS202x to AS204x

Transport of the series AS202x to AS204x without aids.

Long-term storage

Observe the maximum storage time
Do not exceed the maximum storage time of two years.
Exceeding the specified maximum storage time can lead to changes in the properties of the lubricant used and damage the motor during subsequent operation.

Perform recurring inspections
Check the motor for proper condition every six months.
Damage to the motor or maintenance work not carried out will affect the service life of the installed components and parts.

Prevent the formation of condensation
Keep the ambient temperature constant. Avoid solar radiation and high humidity.
Condensation water can lead to damage during subsequent operation or to rust formation.

The motors can be stored for shorter or longer periods. For storage we always recommend the original packaging. Adhere to the conditions specified in the chapter: Transport and storage.

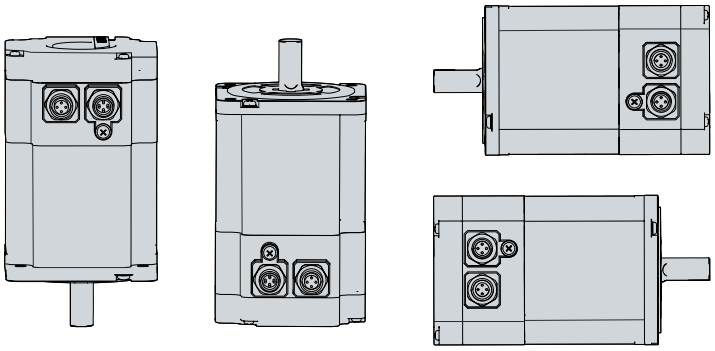
The motors are protected against chemical and aggressive substances, class 1C2, chemical substances and 1B2, biological conditions.

Ensure the storage space is vibration-free.

Mounting position

Observe the maintenance intervals and installation positions
Carry out maintenance at regular intervals. In the vertical mounting position IM V3, liquid which has been left on the flange for a longer period can penetrate the motor through capillary action. In mounting position IM V1 liquid can escape.
If you do not observe the maintenance intervals, the motor may overheat depending on the mounting position. Ingress and leakage of liquids may damage the motor.

The standard installation position of the motors is the design IM B5 according to DIN 60034-7.



IM V1 (V1)
IM V18 (V18)

IM V3 (V3)
IM V19 (V19)

IM B5 (B5)
IM B14 (B14)

Feedback

The following tables provide information about the resolution of the motor feedback systems:

Feedback system	Resolution	Comment
Incremental encoders	1,024 increments	AS20xx

Shaft end A

The A-side is used for force transmission via a backlash-free and frictional connection. This is achieved by means of a coupling and a cylindrical shaft end according to DIN 748-3 with a center bore at the front according to DIN 332-2. Alternatively, forces can be transmitted via a frictional connection and a feather key groove according to DIN 6885/ISO 2491.

Radial forces

- Motors driven via pinion/toothed belt
- Permissible values depend on the speed

Axial forces

- Pinion or pulley mounted on the shaft
- For example, when operating right-angle gear units

Perform all work with the greatest care and without hurrying.

Flange mounting

The following table provides information on components for mounting the motor on the machine / system:

Cheese-head screw DIN EN ISO 4762, 8.8			
Motor	Bore dia. [mm]	Thread	Tightening torque [Nm]
AS202x	4.5	M4	3
AS204x	5.6	M5	6

Output elements

⚠ WARNING

Secure moving parts against ejection
Make sure there are no moving parts on or in the machine during operation. Feather keys [+] are only secured during transport.
Unsecured parts can be ejected from the machine during operation and cause serious or fatal injuries.

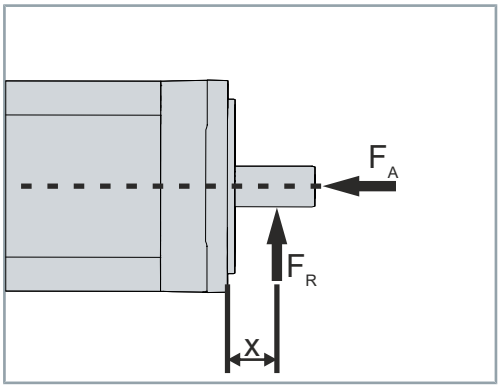
Protect the motor from inadmissible load
Avoid bending components during transport or handling and do not change any insulation distances. Avoid hard shocks to the shaft end, the ball bearings or the feedback system. Furthermore, note vibration qualities and vibration resistance. If necessary, provide additional support for the motor.
An impermissible load on the components can have a negative effect on the performance of the motor. Impacts on the motor shaft impair the concentricity of the motor.

Ensure adequate grounding via the protective conductor
The thermal connection of the motor flange determines the power dissipation.
Ensure adequate grounding via the protective conductor or the motor flange.

Clamping sets are used to fasten pulleys, gears or couplings to the motor shaft. The outer cone and the inner cone are axially displaced against each other. This process reduces the inner diameter of the bore and increases the outer diameter.

Bearing load during installation

Avoid mechanically overdetermined support of the motor shaft through rigid coupling and additional external support.



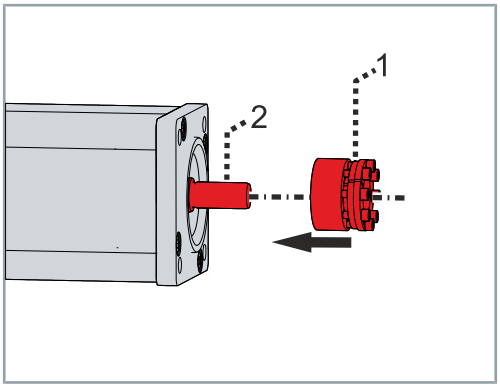
When assembling output elements, care must be taken to minimize the load on the shafts and bearing due to shear forces such as radial force F_R and axial force F_A.

Special features when using toothed belt drives:
The radial loads on the shaft must not be exceeded when using a toothed belt drive. The motor shaft may suffer a fatigue fracture due to excessive alternating loads. Be sure to read the chapter "Technical data", [Page 22].

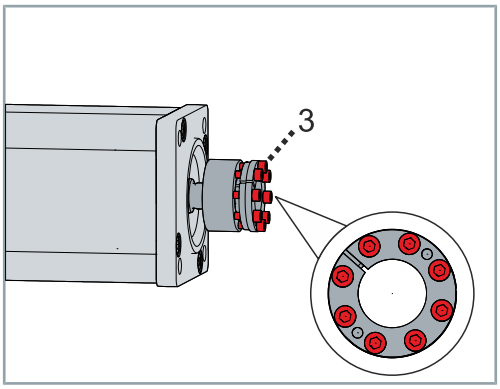
Mounting

Do not mount the clamping set offset
Place clamping set centered and straight on motor shaft.
An offset will cause unacceptable vibration and the destruction of the ball bearings and the coupling.

► Degrease and clean the motor shaft



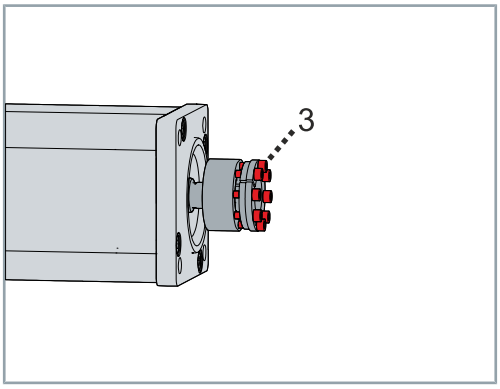
► Place clamping set 1 centered and straight on motor shaft 2



► Tighten screws 3 in the clamping set crosswise. The clamping set is clamped in this way.

Dismantling

► Degrease the motor shaft



► Loosen screws 3 in the clamping set. The clamping set is relaxed in this way.

Elastomer coupling [+]

Operating Instructions Beckhoff Elastomer coupling
The following chapter contains the most important information for the mechanical installation of the Beckhoff elastomer coupling. For further information, read the entire operating instructions for the elastomer coupling.

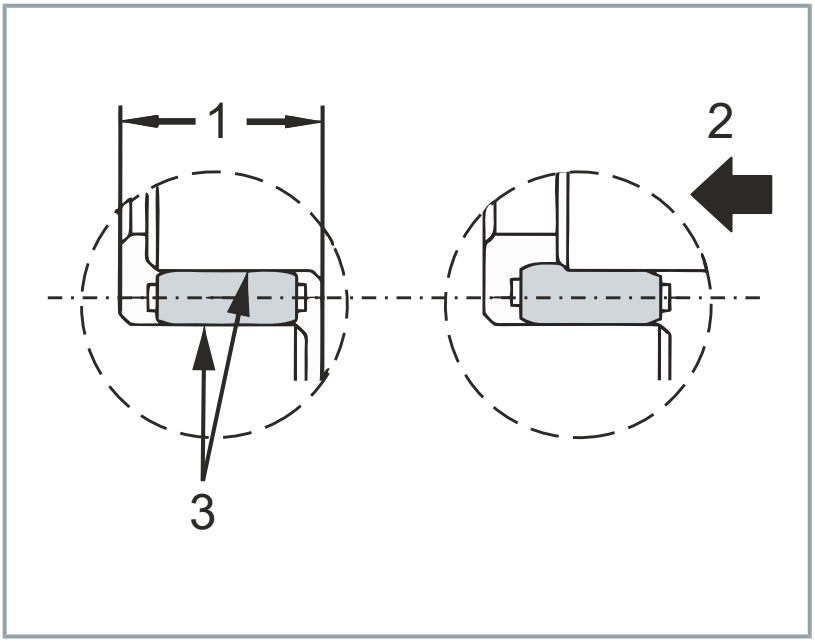
Preparation

Use TPU-compatible lubricants
Do not use lubricating pastes, other high-pressure additives or oils and greases containing molybdenum disulphide. Use Vaseline, for example.
The use of unsuitable lubricants can lead to incompatibility with the elastomer ring and impair the functionality.

Facilitated assembly
The bores in the coupling hub have an H7 fit.
Beckhoff recommends play of 0.1 – 0.5 mm between the coupling hub and the shaft.
The fitting tolerance and the oiling of the shaft journals simplify the assembly and disassembly of the coupling.

Check the shaft connection dimensions and the tolerances. Make sure that the shafts to be connected and bores in the hub are clean and free from burrs. Adhere to the fitting tolerance and oil the shaft journals prior to assembly.

When pushing the coupling hubs together, the compressive pre-stressing of the elastomer ring requires an axial mounting force. The axial force can be reduced after cleaning the elastomer ring and by lightly oiling the contact surfaces.



Item number	Meaning
1	Spacing distance, see Technical data
2	Axial mounting force
3	Contact surfaces

Machining of pre-drilled coupling hubs

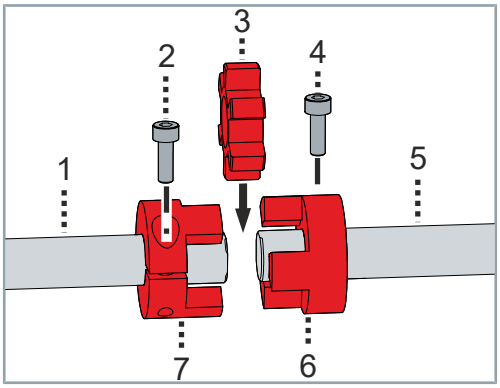
⚠ WARNING

Do not exceed the permissible bore diameter
Do not exceed the maximum permissible bore diameters specified in the Technical data.
If you exceed the maximum values, the coupling may break and parts may be ejected. Flying parts can lead to serious or even fatal injuries.

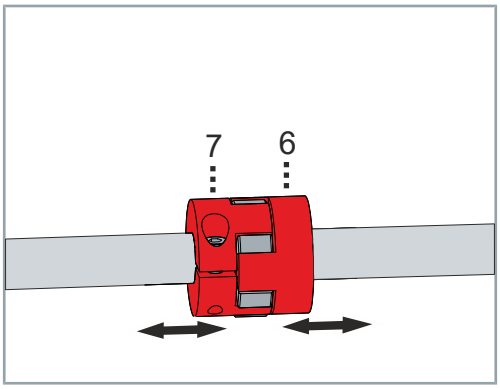
Adhere to the concentricity and axial run-out accuracies and do not clamp to the hub bridges.

For customer-specific special solutions and changes to the coupling hubs, contact our Applications Department. Beckhoff GmbH & Co. KG accepts no liability for unapproved, unauthorized conversions and modifications of the components.

Mounting



- ► Mount the coupling hubs 6 and 7 on the shafts 1 and 5
- ► Insert screws 2 and 4
- ► Position the elastomer ring 3



- ► Push coupling hubs 6 and 7 together and align
- ► Make sure that you adhere to the distance dimensions between the coupling hubs as specified in the Technical data
- ► Tighten the screws to the torque specified in the Technical data

Connection technology

An overview of the cables and connectors can be found below.

The motors are equipped with permanently mounted power boxes for the power supply and feedback signals .

Beckhoff supplies prefabricated power and feedback cables. Mating connectors are not included in the scope of supply. For the selection of the necessary cables, refer to the Beckhoff documentation for the connecting cables [+]. In the documentation you will find a complete overview of the available cables and information on the technical data.

Cables

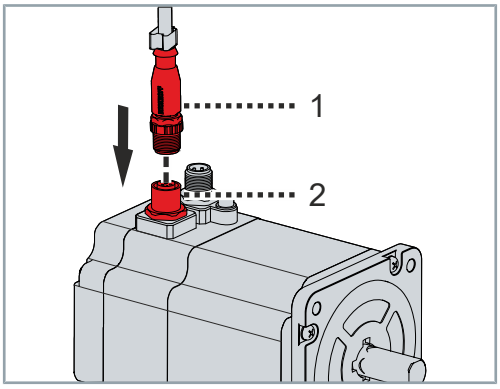
Avoid soiling and damage
When connecting the socket and connector, make sure that the poles and the inside of the component are not soiled or damaged.
Failure to do so may adversely affect the function of the connections.

For proper application and assembly we recommend:
- Wiring in accordance with applicable regulations and standards
- Pre-assembled and shielded Beckhoff cables

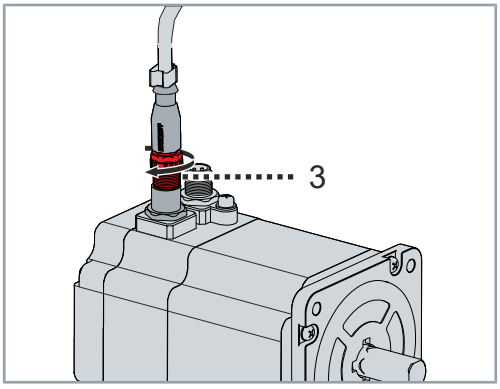
Beckhoff offers pre-assembled cables for faster and flawless installation of the motors. These cables are tested with regard to the material used, shielding and connection type. Perfect functioning and compliance with legal regulations, such as EMC and UL, are guaranteed. The use of other cables can cause unexpected malfunctions and result in exclusion of warranty.

Rotary joints

Feedback

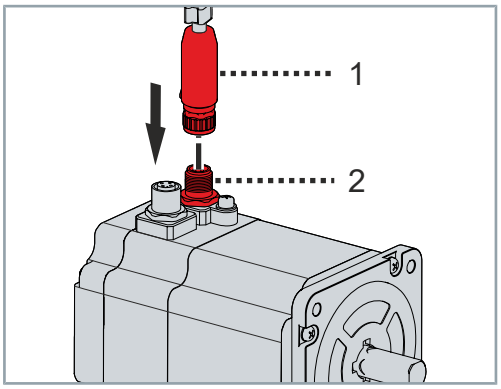


- ► Make sure that the poles and the interior of the socket as well as the threads on the connector are not dirty or damaged
- ► Push connector 1 straight onto socket 2 on the motor

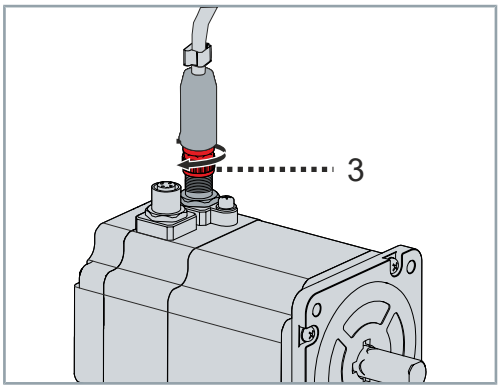


- ► Screw thread 3 into the socket

Power



- ► Make sure that the poles and the interior of the socket as well as the threads on the connector are not dirty or damaged
- ► Push connector 1 straight onto socket 2 on the motor

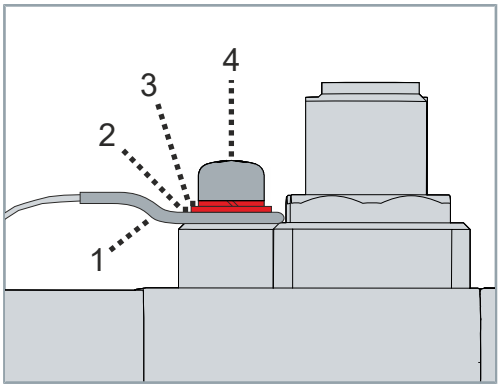


- ► Screw thread 3 into the socket

Connection of the protective earth

The stepper motors are marked on the housing with the symbol for protective earth.

Establish an electrically conductive bond with a large area
Ensure that there is an electrically conductive bond with a large area between the stepper motor and the mounting plate in the control cabinet.
Ground connections dissipate HF interference and form a protective measure according to EN60204.

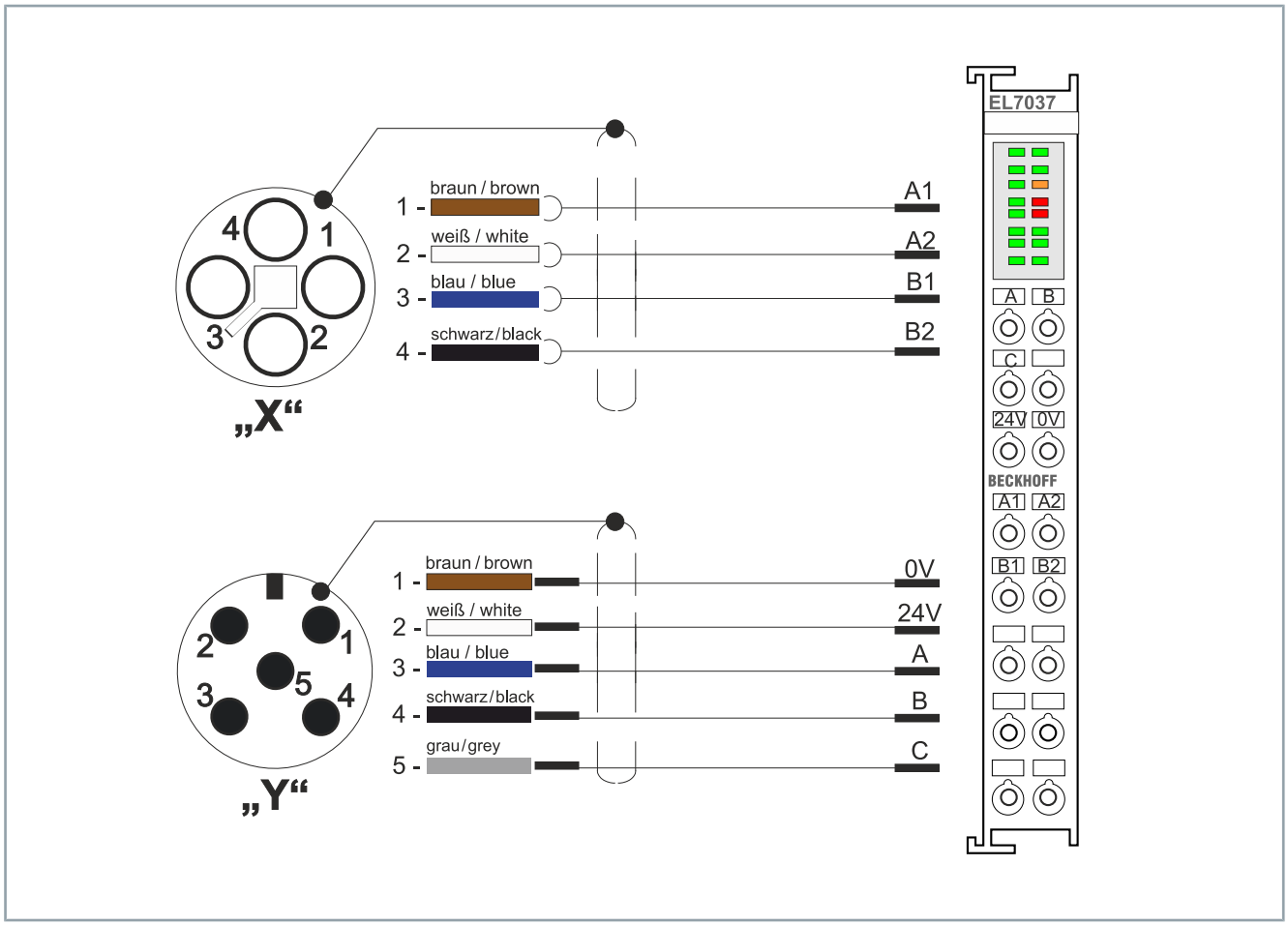


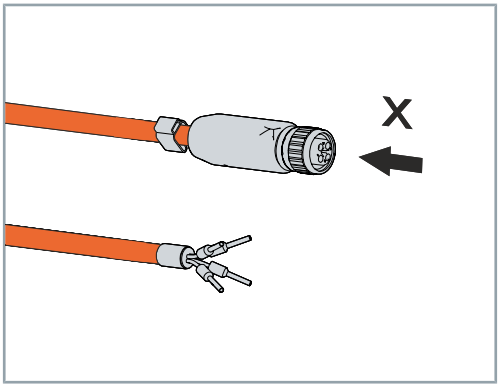
- ► Place ring cable lug 1 on unpainted surface
- ► Place washer 2 and spring washer 3 on screw 4
- ► Turn screw 4 into the threaded hole provided to fasten the ring cable lug 1
- ► Observe the tightening torque:

Screw	Tightening torque [Nm]
M4	3, strength class 8.8

EL7037 terminal

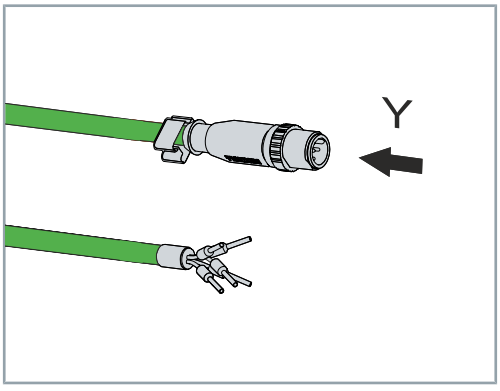
- For AS2021-0Dy0 with encoder for field-oriented control
- ZB8610 fan cartridge required to achieve full rated motor power





Motor cable

- Order key: ZK4000-7700-xxxx
- Preassembled at both ends and shielded: 4 x 0.75 mm²

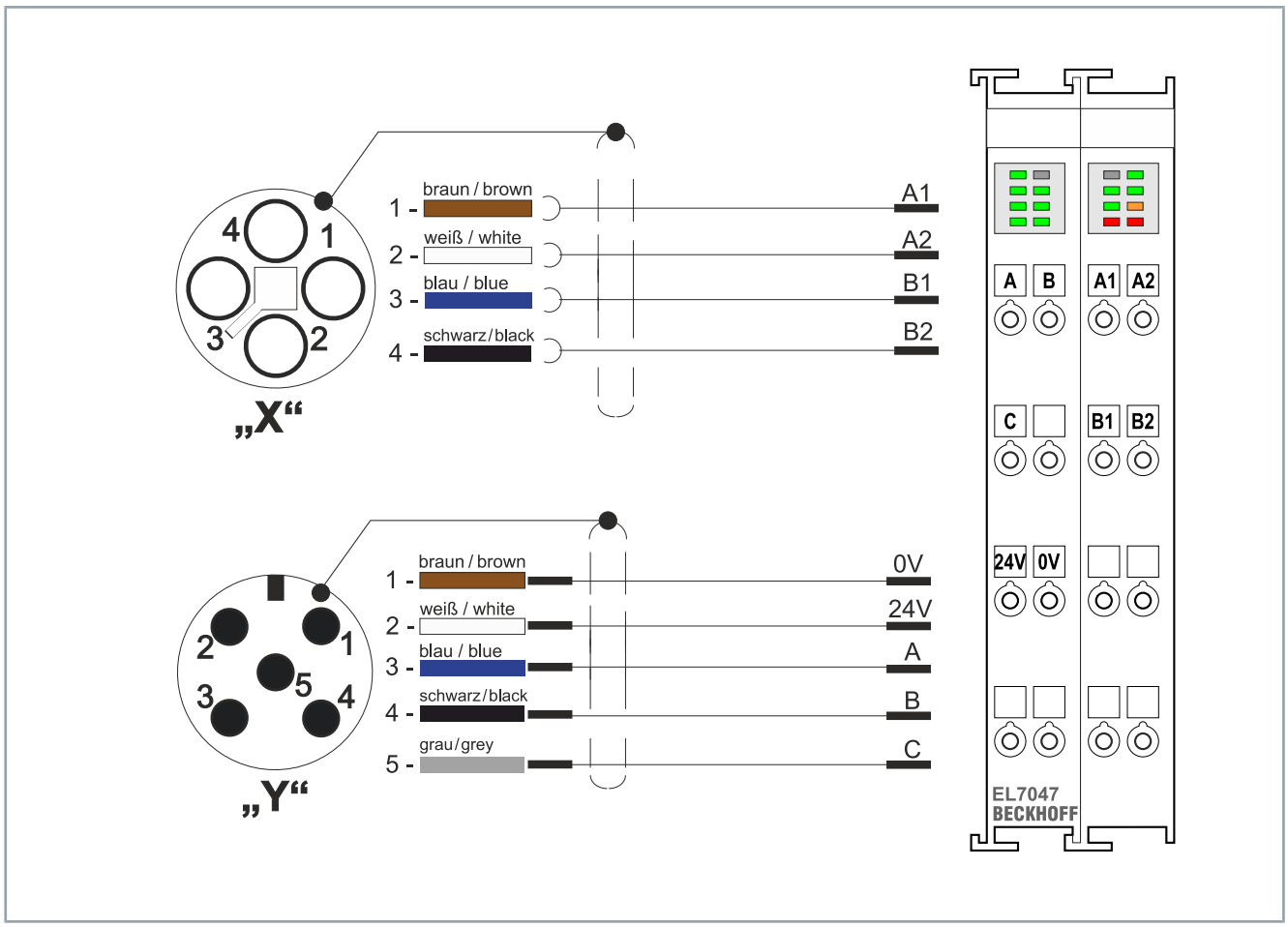


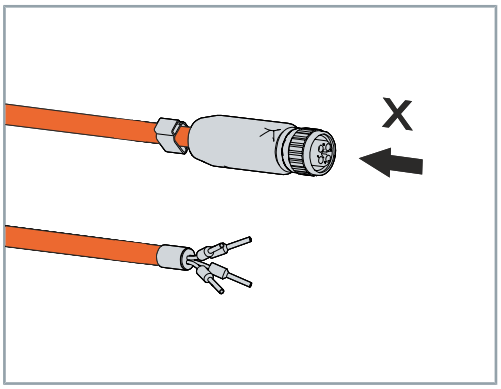
Encoder cable

- Order key: ZK4000-5100-2xxx
- Preassembled at both ends and shielded: 5 x 0.25 mm²

EL7047 terminal

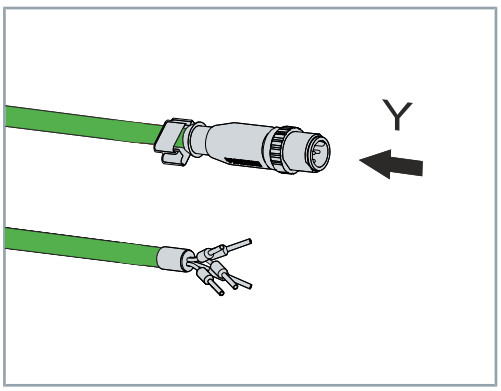
- For AS2022-0Hy0, AS2023-0Hy0, AS2041-1Hy0, AS20421Hy0 and AS2043-1Jy0 with encoder for field-oriented control; ZB8610 fan cartridge required to achieve full rated motor power





Motor cable

- Order key: ZK4000-7700-xxxx
- Preassembled at both ends and shielded: 4 x 0.75 mm²

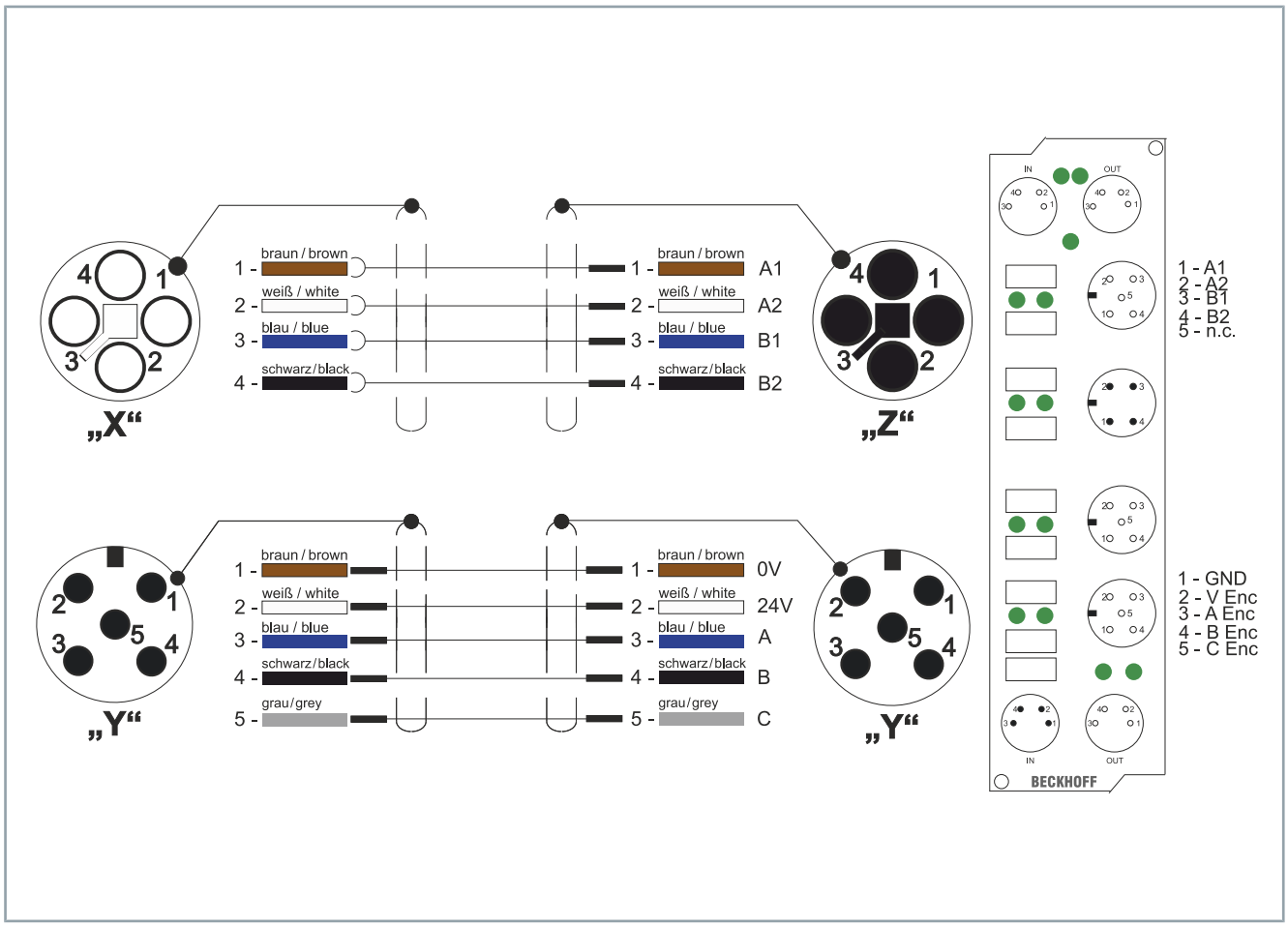


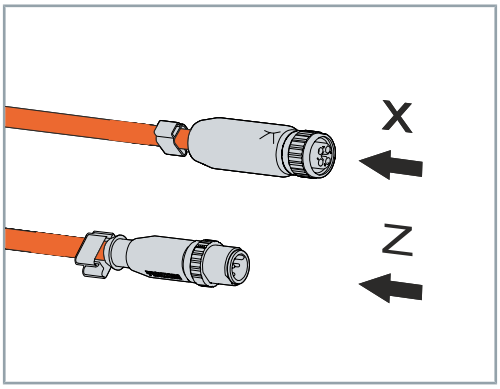
Encoder cable

- Order key: ZK4000-5100-2xxx
- Preassembled at both ends and shielded: 5 x 0.25 mm²

EP7041 stepper motor module

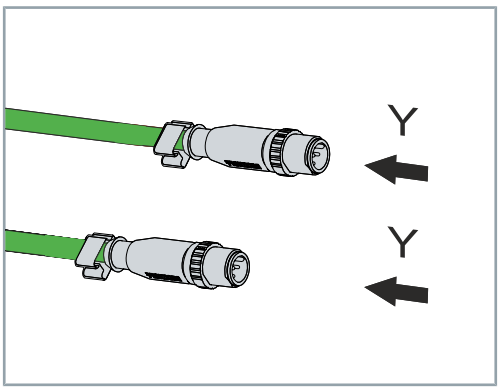
- For AS2021-0Dy0 with encoder for high-speed applications





Motor cable

- Order key: ZK4000-6877-xxxx
- Preassembled at both ends and shielded: 4 x 0.75 mm²



Encoder cable

- Order key: ZK4000-5151-0xxx
- Preassembled at both ends and shielded: 5 x 0.35 mm²

Observe the operating instructions for the stepper motor terminals and stepper motor modules
For commissioning, read the operating instructions for the stepper motor terminals and stepper motor modules. Carry out the steps according to the commissioning instructions.

Exemplary commissioning
The procedure for commissioning is described as an example. A different method may be appropriate or necessary, depending on the application of the components.

Before commissioning

- Check drive for damage
- Check mounting and alignment
- Tighten screw connections correctly
- Installing mechanical, thermal and electrical protective devices
- Check the wiring, connection and proper grounding of the drive and stepper motor terminal
- Check emergency stop functions

During commissioning

- Make sure that all fittings were checked for function and adjustment
- Observe information for environment and operation
- Check protective measures against live parts

Configuration
Carry out the handling instructions in the operating instructions for stepper motor terminals and stepper motor modules:

- Build Project and Choose Target System
- Implement devices by scanning or manually
- Configure devices, determine and set motor type
- Create axis configuration
- Set scaling factor and speeds
- Check status and activate control system

Prerequisites during operation

- Pay attention to atypical noise development
- Pay attention to smoke development
- Always check drive surfaces and lines for dirt, leakages, moisture or dust
- Check temperature development
- Check for lubricant leakage
- Observe recommended maintenance intervals
- Check function of safety devices

After operation

⚠ WARNING

Ensure safe state of the machine / system
Make sure that the rotor comes to a complete stop.
Rotating components can lead to serious injuries.

⚠ WARNING

Ensure safe condition for cleaning work
Basically, electronic devices are not fail-safe. The condition is always safe when the unit is switched off and not energized. For cleaning work, bring the connected motors and the machine into a safe state.
Carrying cleaning work during operation can lead to serious or fatal injuries.

Do not submerge or spray the motor
Only wipe the motor with a cleaner and a cloth.
Cleaning by immersion may result in surface and motor damage and leakage problems as a result of impermissible solutions.

Contamination, dust or chips can have a negative effect on the function of the components. In the worst case, contamination can lead to failure. Therefore, clean and service the components at regular intervals.

Cleaning materials

Carefully clean the components with a damp cloth or brush.

For cleaning, we provide an overview of cleaning agents to which the motors may be exposed up to a maximum concentration of 3%. You will also receive information about non-approved cleaning agents.

Approved

Cleaning agents	Chemical formula
Acetyl chloride	CH_3COCl
Aluminum chloride	$AlCl_3$-$6H_2O$
Ammonium chloride	NH_4Cl
Antimony trichloride	$SbCl_3$
Barium chloride	$BaCl_2$-$2H_2O$
Chlorine; also chlorine water, chlorinated lime and chloroben-zene	Cl_2
Chlorosulfuric acid	HSO_3Cl
Hydrogen chloride gas	HCl
Chromic acid	CrO_3
Iron(III) chloride	$FeCl_3$
Hydrogen fluoride	HF
Carnallite	$KClMgCl_2$-$6H_2O$
Aqua regia	HCL + HNO_3
Magnesium chloride	$MgCl_2$-$6H_2O$
Monochloroacetic acid	CH2ClCOOH
Sodium chloride; common salt	NaCl
Sodium hydroxide	NaOH
Sodium peroxide	Na_2O_2
Sulfuric acid	H_2SO_4
Tartaric acid	COOH; $CHOH_2$ COOH
Tin-II IV-chloride	$SnCl_2$-$2H_2O$ $SnCl_4$

Not applicable

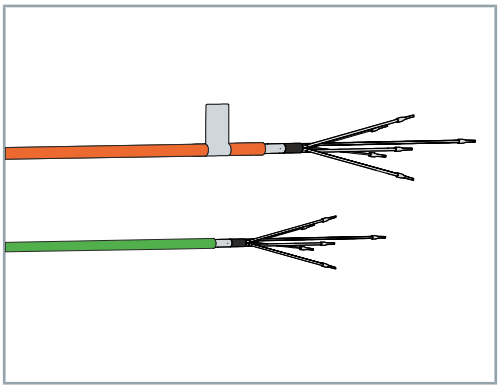
Cleaning agents	Chemical formula
Aniline hydrochloride	$C_6H_5NH_2HCl$
Bromine	Br_2
Sodium hypochlorite; bleaching solution	NaClO
Mercury (II) chloride	$HgCl_2$
Hydrochloric acid	HCl

Intervals

Under nominal conditions, the motor components have different operating hours. We have provided you with a list of maintenance work and intervals for the associated components below:

Component	Interval	Maintenance
Ball bearing	30000 operating hours	Replace bearing
Motor	2500 operating hours/annually	Check motor for bearing noises **If noises are detected:** do not continue to operate motor; replace bearing
Shaft sealing ring	5000 operating hours	Perform visual inspection Lubricate the shaft sealing ring **Recommended lubricants:** "MobilgreaseTM FM22" from Mobil **In case of damage and pressure drop:** Replace shaft sealing ring
Cables	Regular intervals	Perform visual inspection and check for damage **As required**: Replace cables
	5 million bending cycles	Replace cables
Fan cover [+]	half-yearly	Perform visual inspection and check for damage **In the event of unbalance:** Clean fan Contact Beckhoff Service **In case of damage:** Contact Beckhoff Service
Power box	500 mating cycles	**In case of damage:** Contact Beckhoff Service
Connector	10 turning cycles	**In case of damage:** Contact Beckhoff Service

Connection cables

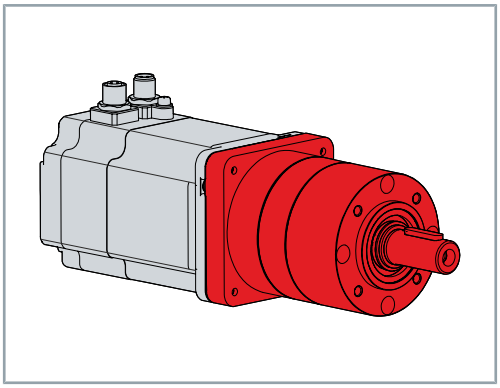


Orange power cables and green feedback cables are available for the connection between motor and stepper motor terminal or the stepper motor module.

Information on the connection of a motor to a stepper motor terminal or the stepper motor module can be found in the chapter: Electrical Installation.

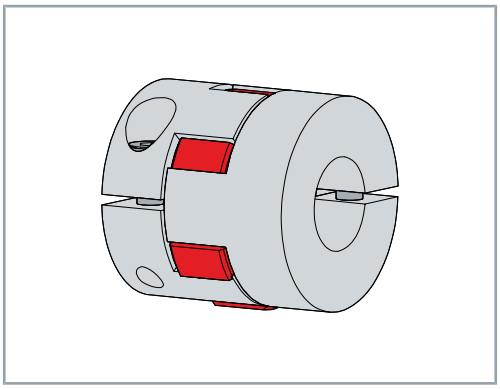
Gear unit

Axial loading due to thermal elongation of the motor shaft
Use the couplings as length compensators to avoid the shifting of the motor shaft at high temperatures.
Directly mounted bevel gears or helical gear wheels can exceed the axial load of the floating bearing on the shaft end A.



A gear unit serves to transmit a moment of force or a torque and is used on the motor as an output element. Information on flange sizes for motor and gear unit combinations can be found in section: "Type key", [Page 18].

Elastomer coupling



You have the possibility to use the Beckhoff elastomer coupling for applications that are susceptible to vibrations and impacts. The elastomer ring between the coupling hubs has damping properties.
Lateral, axial and angular shaft offsets can be compensated with the elastomer coupling.

The following table describes only a selection of faults. There can be a large number of different reasons for a fault, depending on the particular conditions in your system. The fault causes described below are mostly those which directly influence the motor.
Our applications department can give you further help with your problems.

Error	Cause														
Motor standstill, no starting	1	2		4											
Motor runs sluggishly	1		3	4	5										
No brake effect				4	5										
Noises when starting up			3	4	5				9						
Noises during operation	1		3	4	5				9						
High temperature at idling speed						6									
High temperature under load	1		3			6	7								
Uneven running behavior								8	9						
Grinding noises										10					
Output stage fault				4							11	12			
Feedback error													13	14	

Number	Cause	Solution
1	Stepper motor terminal or stepper motor module not enabled	Set ENABLE signal and enable stepper motor terminal or stepper motor module
	Motor overload	Check load and reduce if necessary, then restart and enable the stepper motor terminal or the stepper motor module; set ENABLE signal
2	Phase interruption in the power supply or reversed motor phases	Check stepper motor terminal or stepper motor module and supply lines, power and feedback, and replace defective cables
3	Phase interruption after power supply; switching on	Check stepper motor terminal or stepper motor module and supply lines, power and feedback, and replace defective cables
	Feedback cable or motor cable with defective shield	Check ground connection and shielding
4	Short circuit or earth leakage in the motor cable	Replace defective motor cable, then measure and check
5	Power connector not fitted correctly	Check the connectors on the power connector and on the motor
	Interruption in the feedback or motor cable	Check cables for broken wire or crushing. Replace defective cables, then measure and check

Number	Cause	Solution
6	Heat dissipation via flange connection too low	Dimension the flange according to the technical data in the operating instructions
7	Motor too small	Check motor design and adapt to the application. If necessary, select a larger series and replace the motor.
8	Shield of feedback or motor cable defective or inadequate	Check ground connection and shielding
9	Gain of stepper motor terminal or stepper motor module set too high	Reconfigure the parameters of the stepper motor terminal or stepper motor module and adjust them if necessary
10	Contamination or foreign bodies inside the motor	Send in motor. The repair is carried out by the vendor.
	Rotating parts chafing on the housing or motor components	Inspect chafing parts and readjust if necessary.
	Defective bearings; irreparable bearing damage	Send in motor. The repair is carried out by the vendor.
11	Short circuit or earth leakage in the motor	Replace defective motor, then measure and check
12	Insufficient power supply	Check the settings in the configuration and read out the electronic identification plate of the motor again
13	Interruption or crushing in the feedback cable	Check cables for broken wire or crushing. Replace defective cables, then measure and check.
14	Feedback connector not fitted correctly	Check the position of the feedback connector
	Loose fit of the feedback connector or no contact of the plug contacts with the power socket of the motor.	Check the connector assembly. Contact Beckhoff Service if necessary

Disassembly may only be carried out by qualified and trained personnel.

Read the chapter Documentation notes.

When disposing of electronic waste, make sure that you dispose of it in accordance with the regulations applicable in your country. Read and follow the instructions for proper disposal.

Disassembly

⚠ WARNING

Risk of injury from leaking oil
Prevent oil from leaking. Let it cool down before starting work. Soak up any leaked oil with approved binding agents. Mark the danger spot.
Leaking oil can cause slips and falls, resulting in serious or fatal injury. Hot oil can cause severe burns.

Do not remove components from the products
Only
Beckhoff Automation GmbH & Co. KG is permitted to remove components.
Contact Beckhoff Service for further information.

Removal of the motor from the machine

- Remove cables and electrical connections
- Cool and drain liquids, then remove
- Remove supply lines and water hoses
- Loosen and remove the fixing screws of the motor
- Transport the motor to the work area or store it

Disposal

Depending on your application and the products used, ensure the professional disposal of the respective components:

Cast iron and metal
Dispose of cast and metal parts as scrap metal for recycling.

Cardboard, wood and foam polystyrene
Dispose of packaging materials made of cardboard, wood or foam polystyrene in accordance with the regulations.

Plastics and hard plastics
You can recycle parts made of plastic and hard plastic via the recycling depot or re-use them depending on the component designations and markings.

Oils and lubricants
Dispose of oils and lubricants in separate containers. Hand over the containers at the used oil collection station.

Batteries and rechargeable batteries
Batteries and rechargeable batteries may also be marked with the crossed-out trash can symbol. You must separate these components from the waste and are legally obliged to return used batteries and rechargeable batteries within the EU. Observe the relevant provisions outside the area of validity of the EU Directive 2006/66/EC.

Electronic components
Products marked with a crossed-out waste bin must not be disposed of with general waste. Electronic components and device are considered as waste electrical and electronic equipment for disposal. Observe the national regulations for the disposal of old electrical and electronic equipment.

Returning to the vendor

In accordance with the WEEE-2012/19/EU directives, you can return used devices and accessories for professional disposal. The transport costs are borne by the sender.

Send the used devices with the note "For disposal" to:

Beckhoff Automation GmbH & Co. KG
"Service" Building
Stahlstrasse 31
D-33415 Verl

In addition, you have the option to contact a local certified specialist company for the disposal of used electrical and electronic appliances. Dispose of the old components in accordance with the regulations applicable in your country.

Test procedures and certifications vary by product. Beckhoff products are certified and tested according to the following directives and standards.

Standards

- Product standard EN 61800-3:2004+A1:2012
  "Adjustable speed electrical drives. EMC requirements and specific test methods".
- RoHS: EN 50581:2012"
  Technical documentation regulating electrical and electronic equipment with regard to the restriction of hazardous substances".

Guidelines

- EMC Directive 2014/30/EU
- RoHS Directive 2011/65/EU

Test centers

CE	The motors do not fall within the scope of the Machinery Directive. However, Beckhoff products are designed and evaluated in full compliance with all relevant regulations for personal safety and use in a machine or system.
EAC	The motors meet all the requirements of the Eurasian Economic Union. These include Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan. The EAC logo can be found on the "name plate", [Page 17].

EU conformity

Provision
Beckhoff Automation GmbH & Co KG will be pleased to provide you with EU declarations of conformity and manufacturer's declarations for all products on request.
Please send your request to: info@beckhoff.com

More Information:
www.beckhoff.com/as2000

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