

Operating instructions | EN

AS2000

Stepper motors



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1 Documentation notes

1.1 Disclaimer

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All components of this product described in the original operating instructions are delivered in a hardware and software configuration, depending on the application requirements. 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.

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- Improper use
- Use of untrained personnel
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1.1.4 Third-party brands

Third-party trademarks and wordmarks are used in this documentation. The corresponding trademark endorsements can be found at



www.beckhoff.com/trademarks

1.2 Version numbers

On request we can send you a list of revision levels for changes to the documentation. Please send your request to:

✉ support@beckhoff.com

Origin of the document

This documentation was originally written in German. All other languages are derived from the German original.

Product features

The valid product features are always those specified in the current documentation. Further information given on the product pages of the Beckhoff homepage, in emails or in other publications is not authoritative.

1.3 Scope of the documentation

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

Documentation	Definition
Short information	Accompanying document with general notes on handling the product

1.4 Staff qualification

This documentation is aimed at trained specialists working in control technology and automation who have 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 documentation published at the time must be used for each installation and commissioning. 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

Electricians

Electricians have extensive technical knowledge from their studies, apprenticeships, or specialist training. They have an understanding of control technology and automation. They are familiar with relevant standards and directives. 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

1.5 Safety and instruction

Read the contents that are related to the activities you will perform with the product. Always read the "For your safety", [Page 13] chapter in the documentation. Observe the warning notes in the chapters so that you can handle the product and work with it properly and safely.

1.5.1 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

In addition, the recommendations from Beckhoff regarding appropriate protective measures should be observed. Further information regarding information security and industrial security can be found in our <https://www.beckhoff.com/secguide>.

Beckhoff products and solutions undergo continuous further development. This also applies to security functions. In light of this continuous further development, Beckhoff expressly recommends that the products are kept up to date at all times and that updates are installed for the products once they have been made available. Using outdated or unsupported product versions can increase the risk of cyber threats.

To stay informed about information security for Beckhoff products, subscribe to the RSS feed at <https://www.beckhoff.com/secinfo>.

1.6 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 comply will result in serious or fatal injuries.

WARNING

Failure to comply may result in serious or fatal injuries.

CAUTION

Failure to comply may result in minor or moderate injuries.

NOTICE

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

- product malfunctions
- damage to the product
- damage to the environment



Information

This symbol indicates information, tips, and notes for handling the product or the software.



Examples

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



Required tool

This symbol indicates a tool that is required for the following steps.



Required accessories [+]

This symbol shows the accessories required for the following steps. The accessories are not included in the scope of delivery and can be ordered from Beckhoff.



Assembly material required

This symbol shows the assembly material required for the following steps. The assembly material is not included in the scope of delivery and must be purchased separately.



Permitted cleaning agents

This symbol indicates the permitted cleaning agents that the components may be cleaned with. The permitted cleaning agents are not included in the scope of delivery and must be purchased separately.



QR codes

This symbol shows a QR code that you can scan to watch videos or animations. Internet access is required in order to use it.

1.7 Beckhoff Services

Beckhoff and its international partner companies offer comprehensive support and service.

 www.beckhoff.com/en-en/support/global-availability/

1.7.1 Support services

The Beckhoff Support offers technical advice on the use of individual Beckhoff products and system planning. The support engineers offer you competent assistance, for comprehension questions as well as for commissioning.

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 support@beckhoff.com

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1.7.2 Training offerings

Training in Germany takes place at the Beckhoff branches or, after consultation, at the customer's premises. Beckhoff offers both face-to-face and online training courses.

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1.7.3 Service offerings

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1.7.4 Headquarters Germany

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A detailed overview of the Beckhoff locations worldwide can be found at:

 www.beckhoff.com/en-en/company/global-presence/

1.7.5 Downloadfinder

In the Download finder you will find configuration files, technical documentation and application reports to download.

 www.beckhoff.com/documentations

2 For your safety

Read this chapter containing general safety information. Furthermore the chapters in these operating instructions contain warning notices. In all cases 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.

2.1 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 may not be removed and must be legible for the user.



Warning: Hot surface

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



Avoid shocks to the shaft

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

2.2 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.

2.2.1 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

Prevent electric shocks due to incorrect grounding of electrical components or modules. Ground all conductive components according to the specifications in the chapter "Electrical installation", [Page 45].

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.

2.2.2 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 temperature 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", [Page 21]. 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

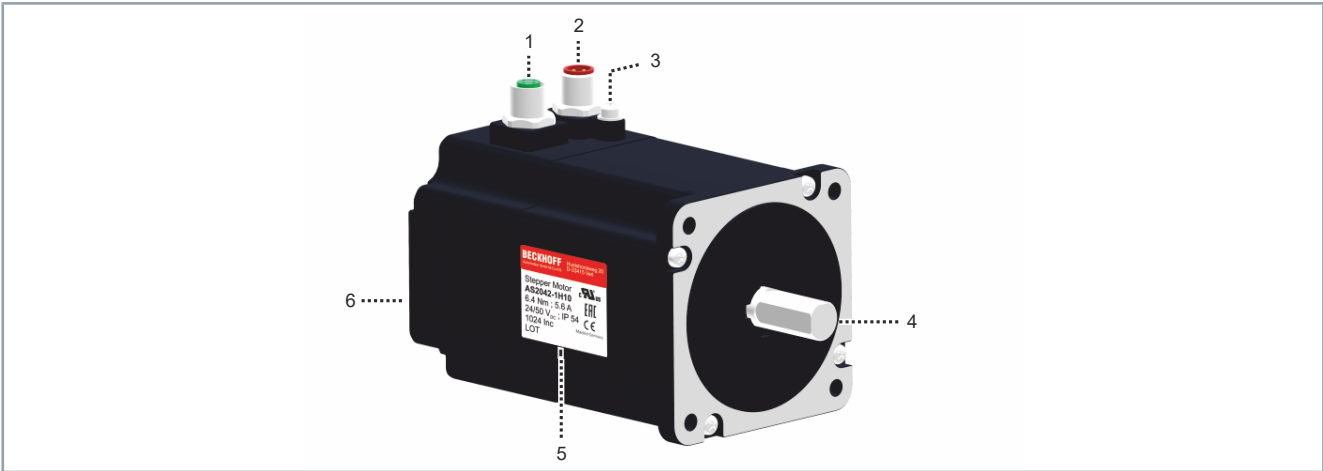
Do not touch any moving or rotating components. Fasten all parts or components on the machine or plant.

2.2.3 After operation

De-energize and switch off components before working on them

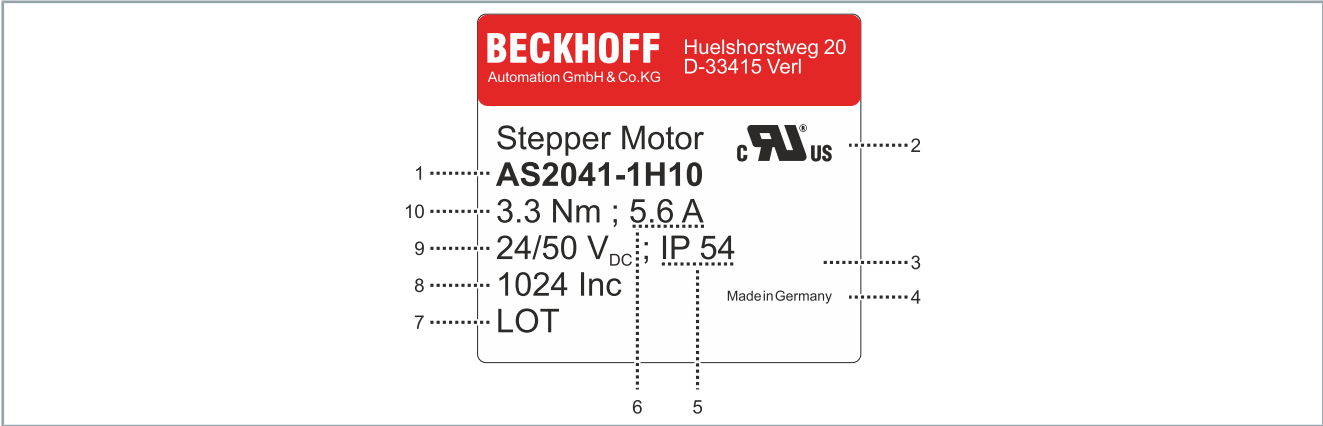
Check the functionality of all safety-relevant devices. Secure the working environment. Secure the machine or plant against being inadvertently started up. Observe the chapter "Decommissioning", [Page 60].

3 Product overview



Item number	Explanation
1	Feedback connection, M12 socket, A-coded
2	Power connection, high-power M12 socket, T-coded
3	Ground connection
4	Motor shaft
5	Name plate
6	Motor housing

3.1 Name plate



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

3.2 Type key

AS 20 uv – w x y z	Explanation
AS	<i>Product area</i> • Stepper motors
20	<i>Series</i> • AS2000
u	<i>Flange size</i> • 2 = N2, 56 mm • 4 = N3, 86 mm
v	<i>Overall length</i> • 1 • 2 • 3
w	<i>Shaft versions</i> • 0 = smooth shaft (only for AS202x) • 1 = shaft with keyway and feather key according to DIN 6885 (only for AS204x)
x	<i>Winding type</i> • D = 2 A • H = 5...6 A • J = <8 A
y	<i>Feedback system</i> • 0 = no encoder • 1 = encoder 24 V _{DC} , 1024 increments • 2 = Encoder 5 V _{DC} , DIFF RS422, TTL), 1024 increments
z	<i>Holding brake</i> • 0 = no holding brake

3.3 Product characteristics

Standardized NEMA flange sizes

Adaptation to international standards through flange sizes N1 = NEMA17, N2 = NEMA23 and N3 =NEMA34.

Step angle

A small step angle of 1.8° enables high precision and accurate movements.

High protection rating

The IP54 protection rating protects the stepper motors against splashing 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 45].

Coordinated accessories

- Pre-assembled cables for power and feedback in different lengths
- Low-backlash planetary gear units from the AG2250 series

3.4 Ordering options

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

3.4.1 Shaft versions

Smooth shaft

A smooth shaft is suitable for mounting output elements. The stepper motors of flange size N2 are available with a smooth shaft.

Valid for the following products:

- AS2021-0xxx
- AS2022-0xxx
- AS2023-0xxx

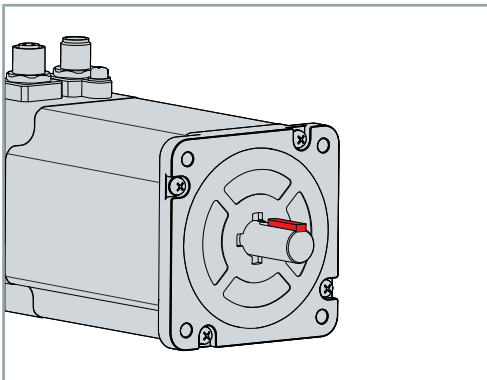
Shaft with keyway and feather key

A feather key transmits torque to an output element.

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

Valid for the following products:

- AS2041-1xxx
- AS2042-1xxx
- AS2043-1xxx



3.4.2 Feedback system

AS20uv-xx0x

Stepper motor without encoder

No encoder for position feedback.

AS20uv-xx1x

Integrated 24 V DC encoder

Stepper motor with 24 V DC encoder with 1024 increments for position feedback.

AS20uv-xx2x

Integrated 5 V DC encoder

Stepper motor with encoder 5 V DC (DIFF RS422, TTL) with 1024 increments for position feedback.

3.5 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:

- These operating instructions
- Translation of the original operating instructions for the stepper motor terminals and stepper motor modules
- The machine manufacturer's complete documentation for the machine

3.5.1 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.

4 Technical data

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

4.1 Definitions



Characteristic torque and speed curves

Detailed information on characteristic curves can be found under:



[TE5910 | TwinCAT 3 Motion Designer](#)

All data, with the exception of the voltage constant and the ph-ph resistance, are based on an ambient temperature of 40 °C and a 100 K overtemperature of the winding. The data may have a tolerance of $\pm 10\%$.

If a gear unit is attached to the A-side motor flange, the power may be reduced.

4.1.1 Technical terms

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

Holding torque T_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 mean value for one motor revolution, with two energized phases, at 1 kHz. Saturation of the motor must be taken into account.

4.2 Data for operation and environment

NOTICE

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 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 rating <i>does not apply to the shaft feedthrough</i>	Listed in the technical data of the motors
Installation position	See chapter: "Technical description", [Page 40]
Ventilation	Adequate self-surface cooling is to be ensured.
Insulation resistance	≥ 100 MΩ
Pollution degree	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 manufacturer in the case of harsher environmental and operating conditions.
Approvals	CE, EAC, UL in preparation

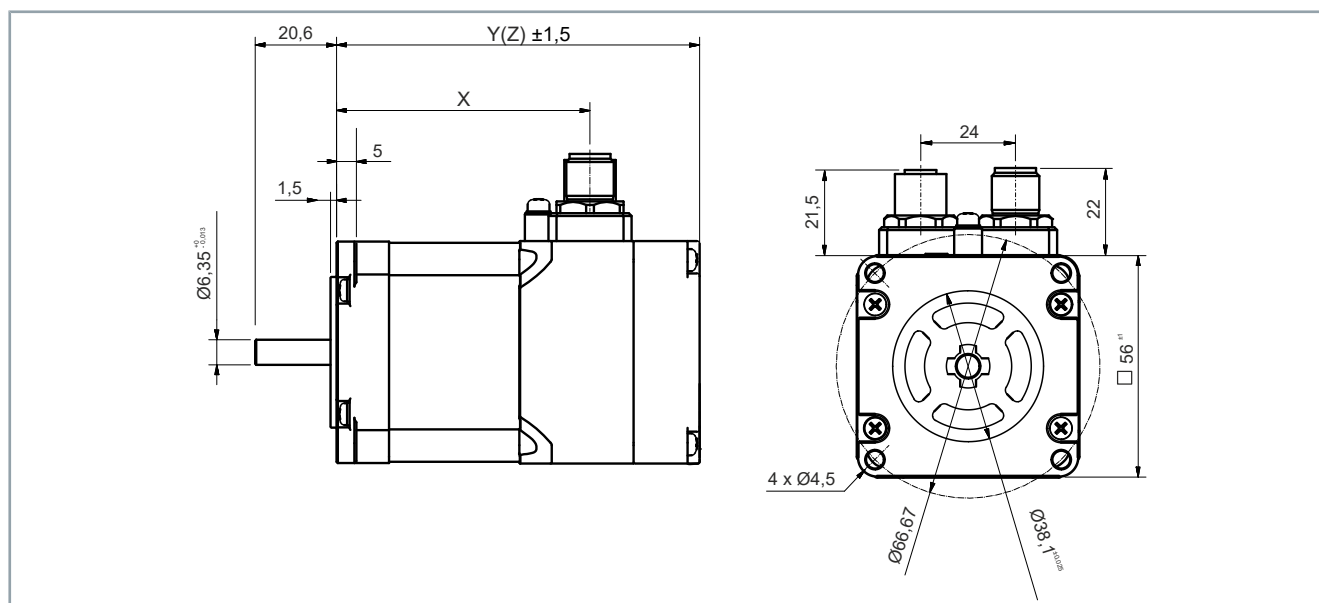
4.3 AS202x

Electrical data	AS2021	AS2022	AS2023-H	AS2023-J
Holding torque T _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			
Rated current [A]	2.0	5.6		6.4
Winding resistance per phase R ₂₅ [Ω]	0.80	0.24	0.32	0.32
Winding inductance per phase 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 rating	IP54		
Paint finishes			
Properties	powder coated		
Color	jet black / RAL 9005		

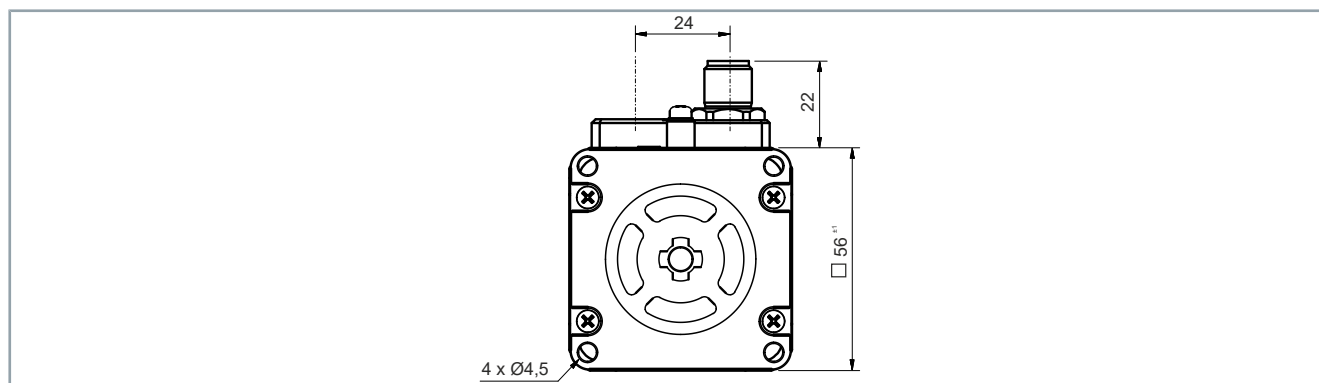
4.3.1 Dimensional drawing

- 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

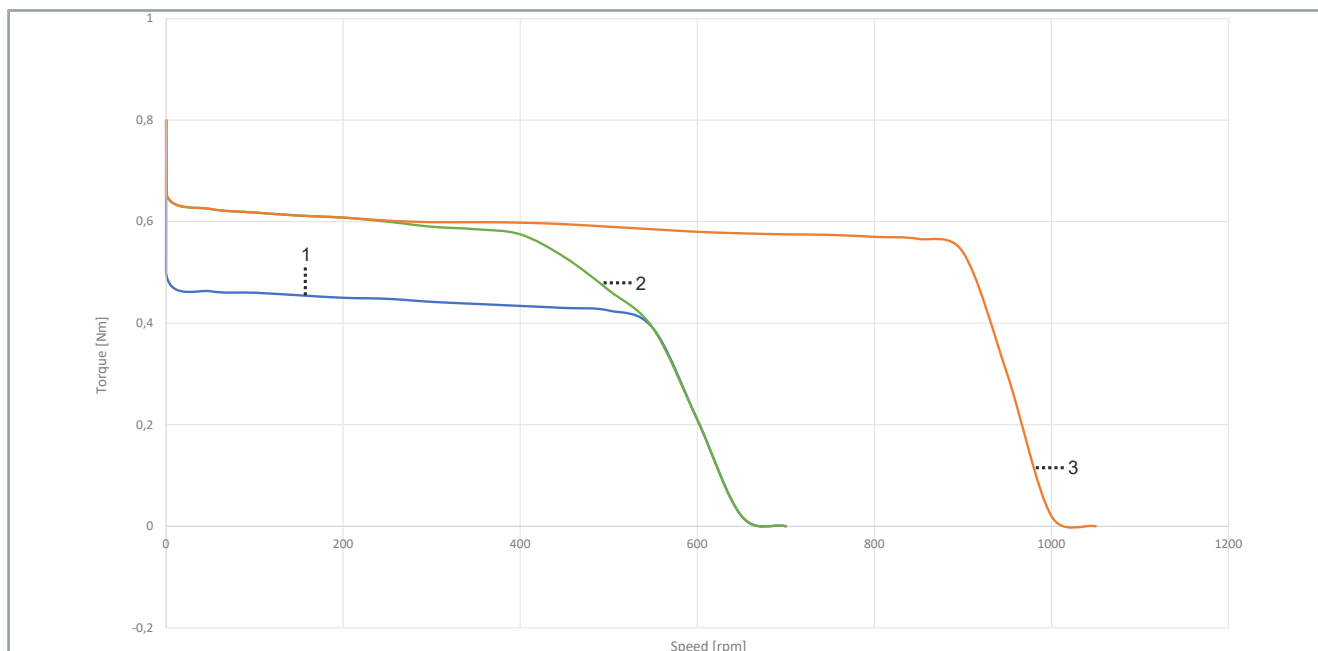


4.3.2 Characteristic torque and speed curves

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

AS2021-0D00

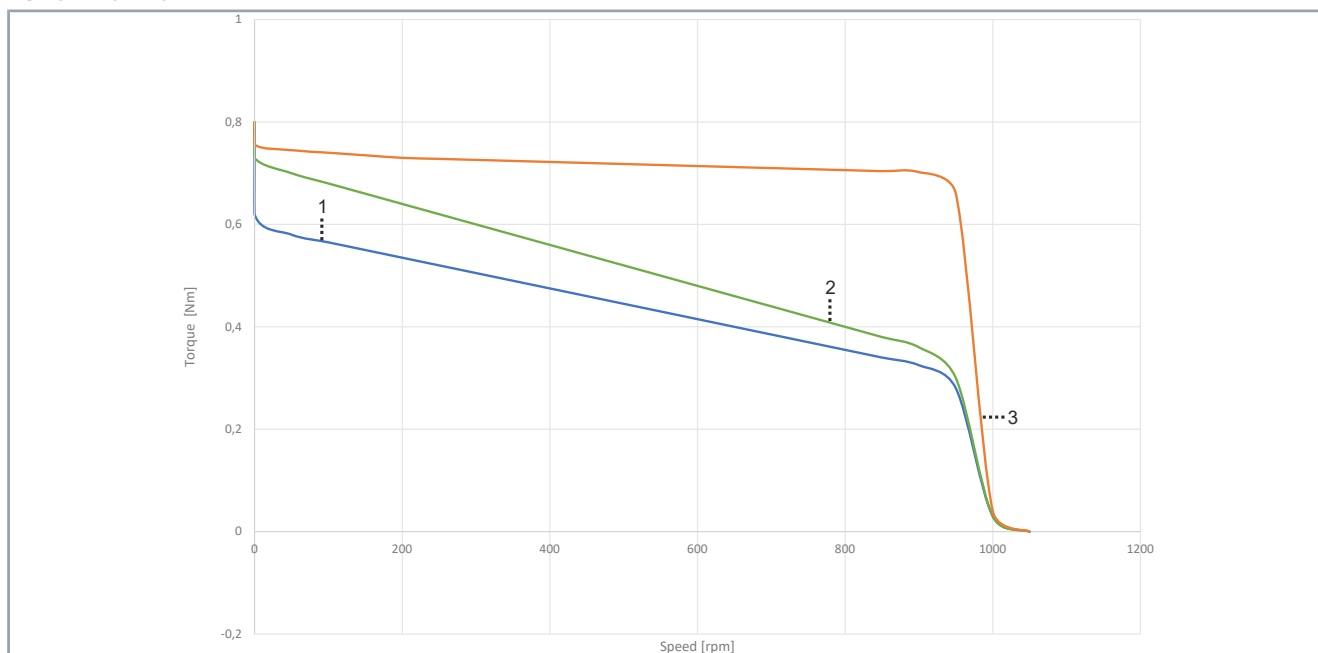
- Open-loop operation



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

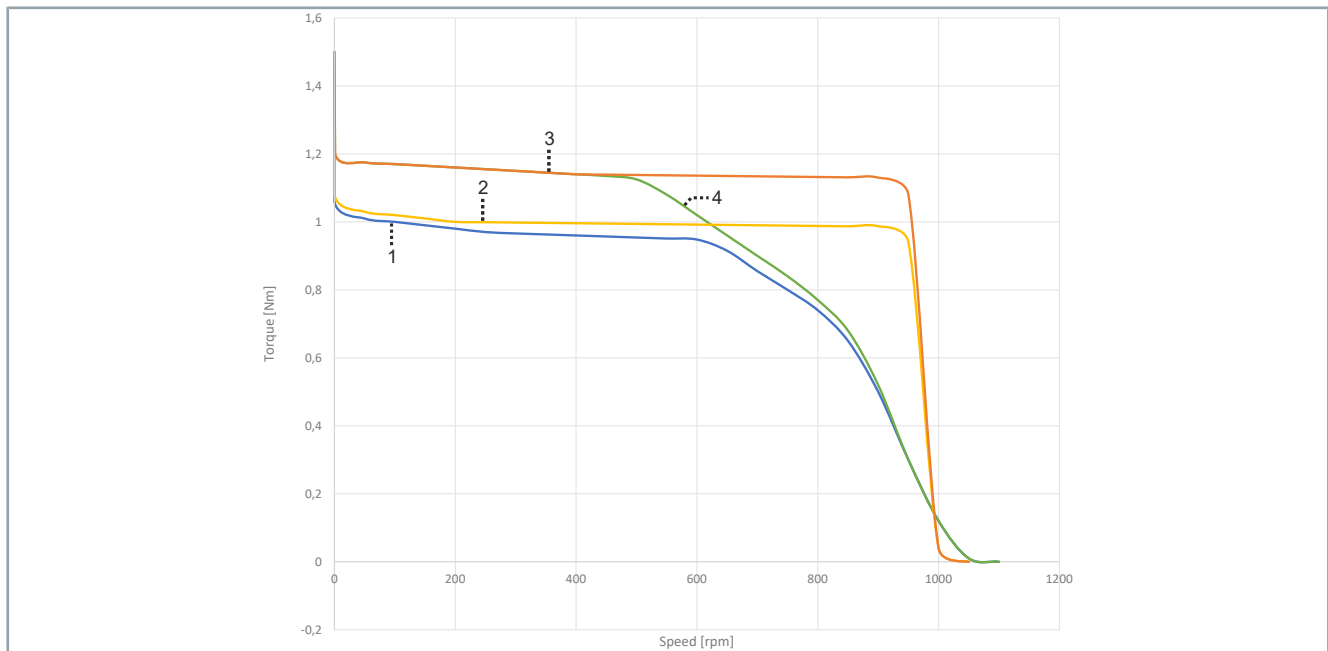
- “Vector control” field-oriented control



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

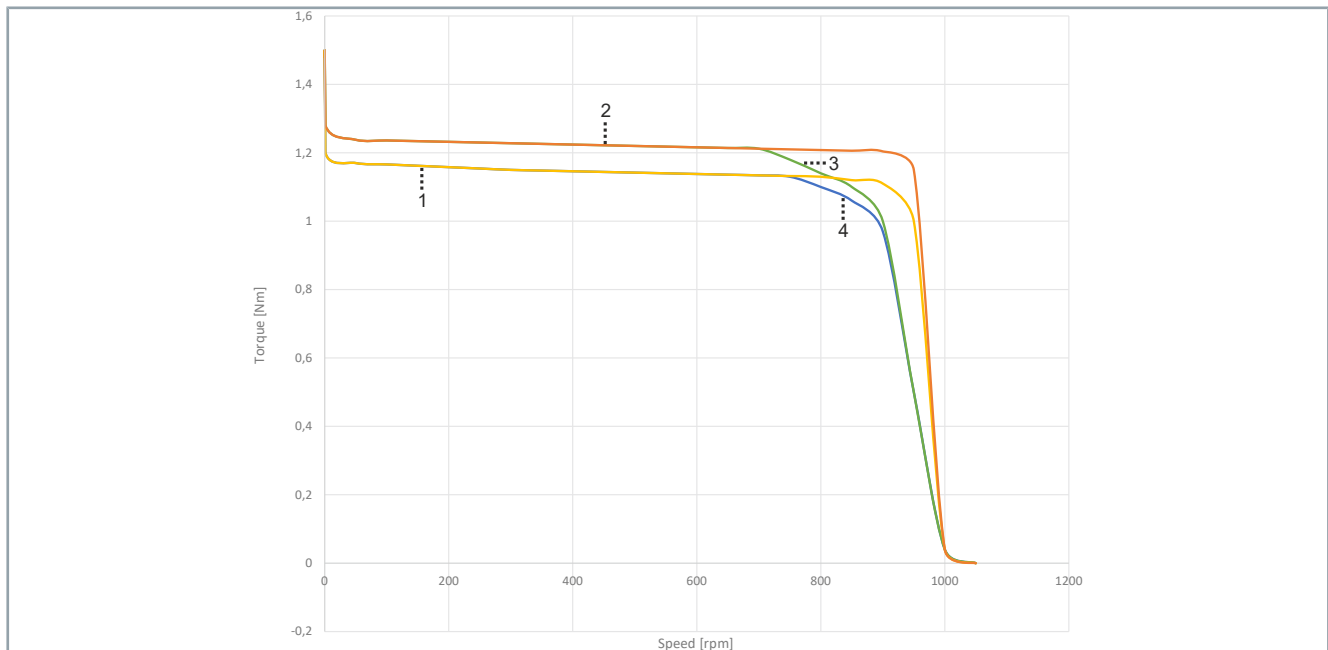
- Open-loop operation



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

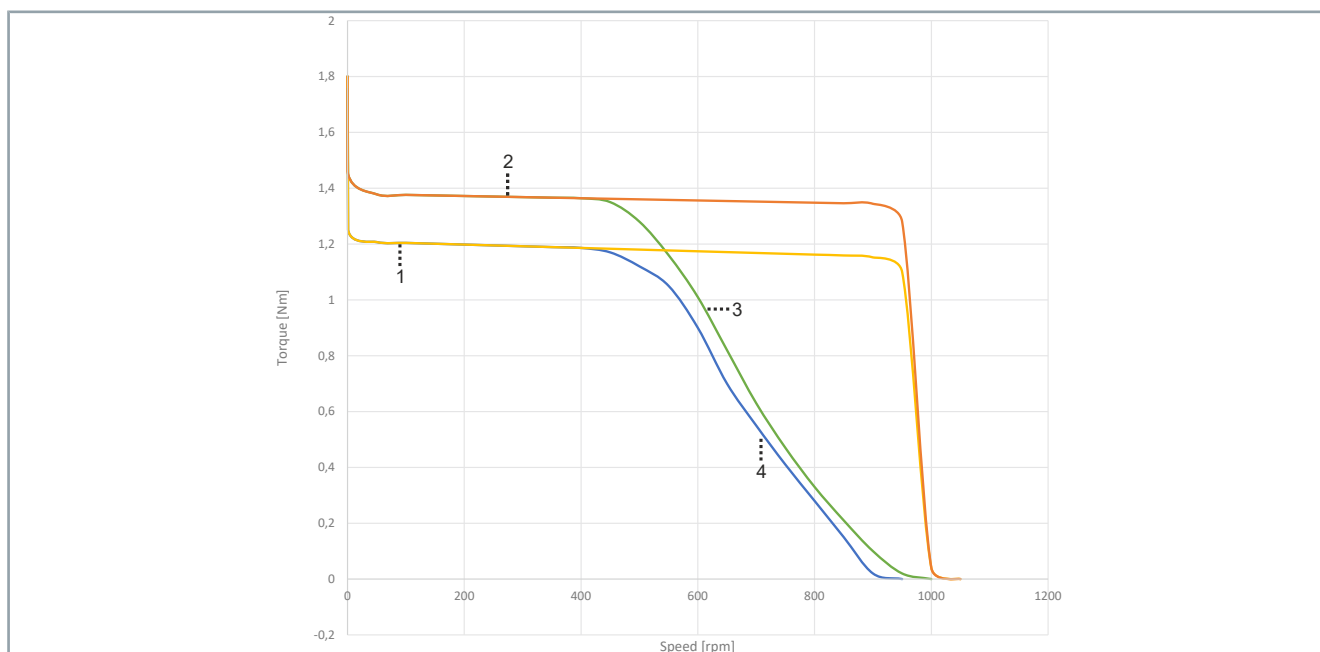
- “Vector control” field-oriented control



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

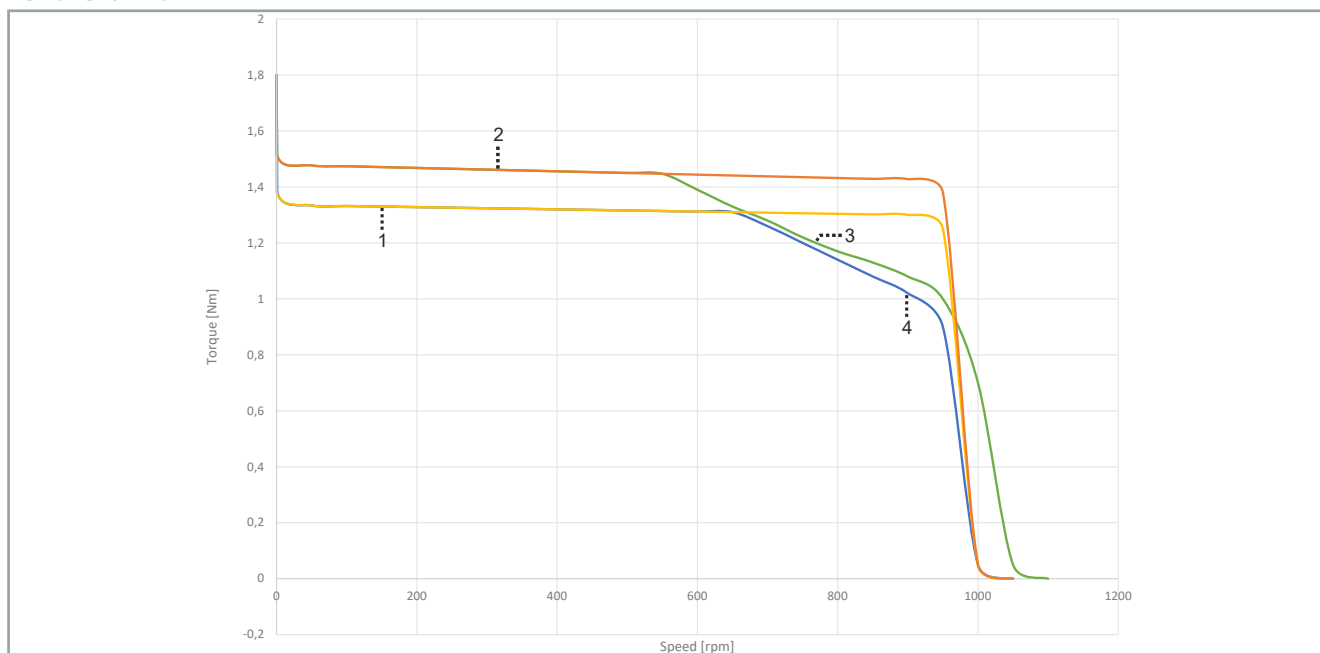
- Open-loop operation



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

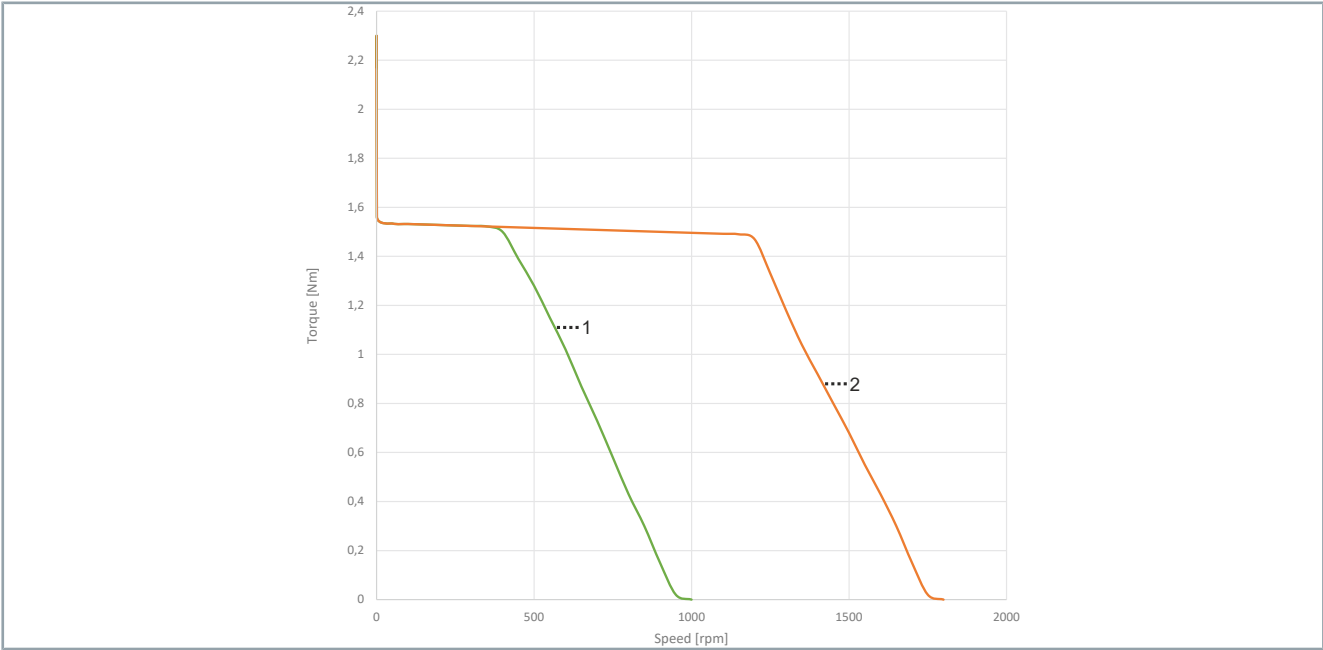
- “Vector control” field-oriented control



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

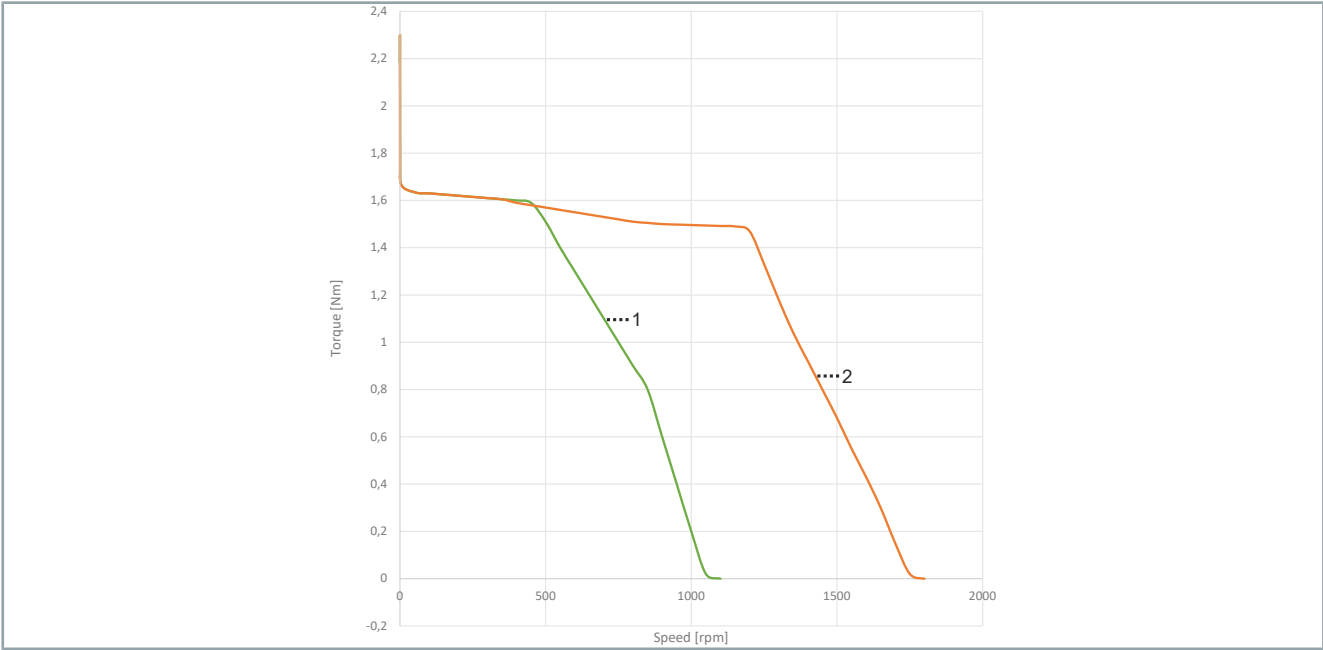
- Open-loop operation



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



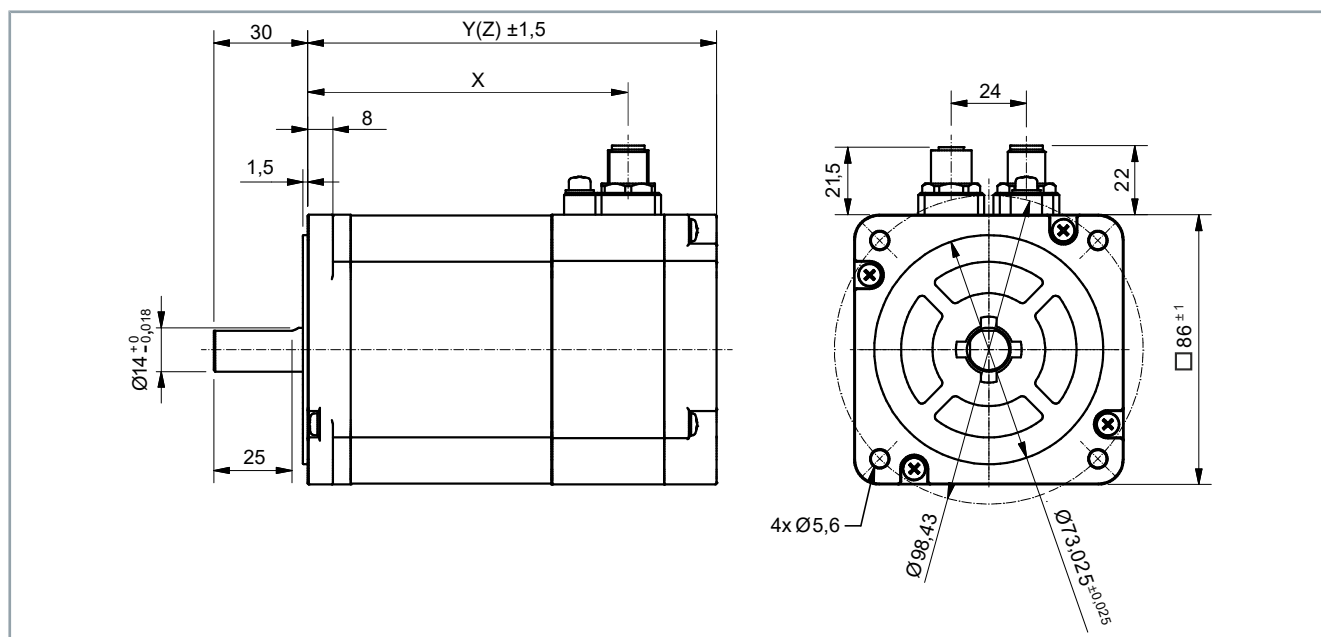
Curve	Motor type	Recording	
1	AS2023-0J10	24 V _{DC} 6.4 A	EL7047+ZB8610
2	AS2023-0J10	48 V _{DC} 6.4 A	EL7047+ZB8610

4.4 AS204x

Electrical data	AS2041	AS2042	AS2043
Holding torque T_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		
Rated current [A]	5.6		6.5
Winding resistance per phase R_{25} [Ω]	0.30	0.41	0.38
Winding inductance per phase 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 cm ²]	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 rating	IP54		
Paint finishes			
Properties	powder coated		
Color	jet black / RAL 9005		

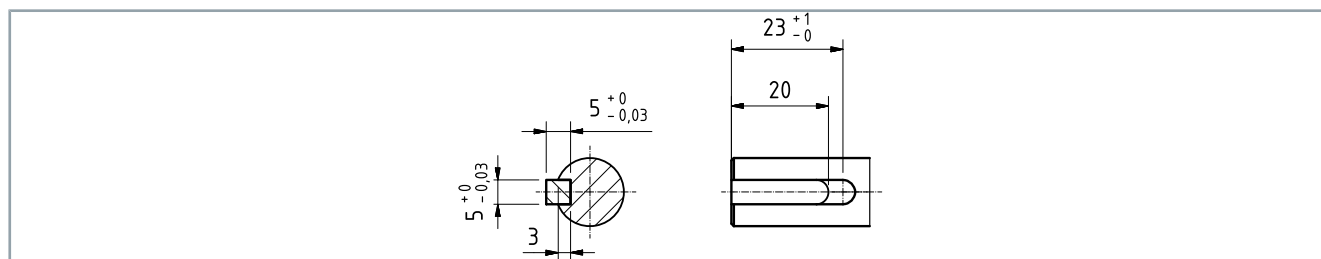
4.4.1 Dimensional drawing

- All figures in millimeters

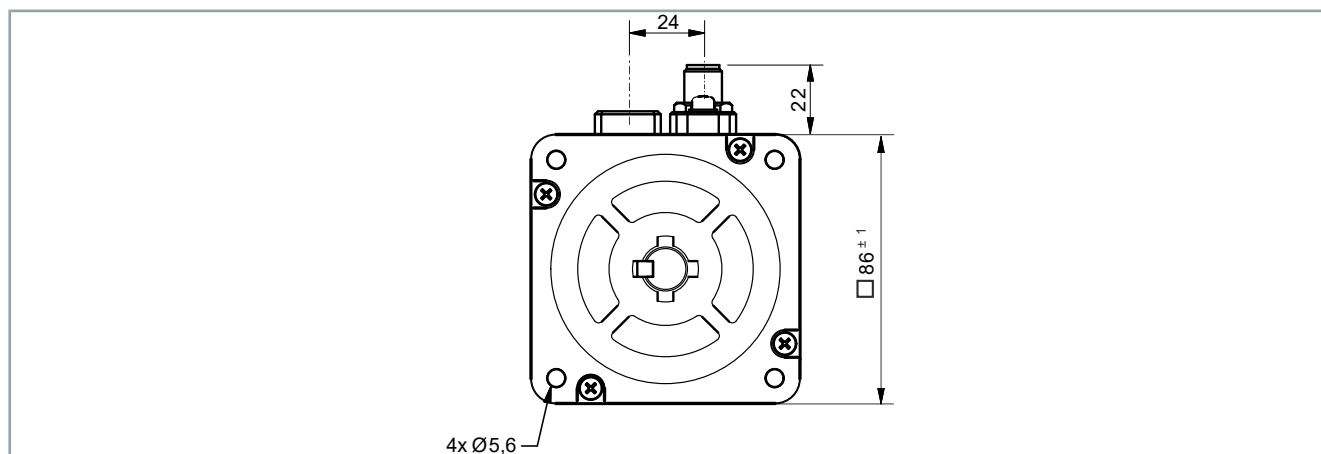


Motor	X	Y	Z - encoder
AS2041	71.80 mm	89.30 mm	100.00 mm
AS2042	102.25 mm	119.75 mm	130.45 mm
AS2043	132.7 mm	150.20 mm	160.90 mm

Feather key



View without encoder

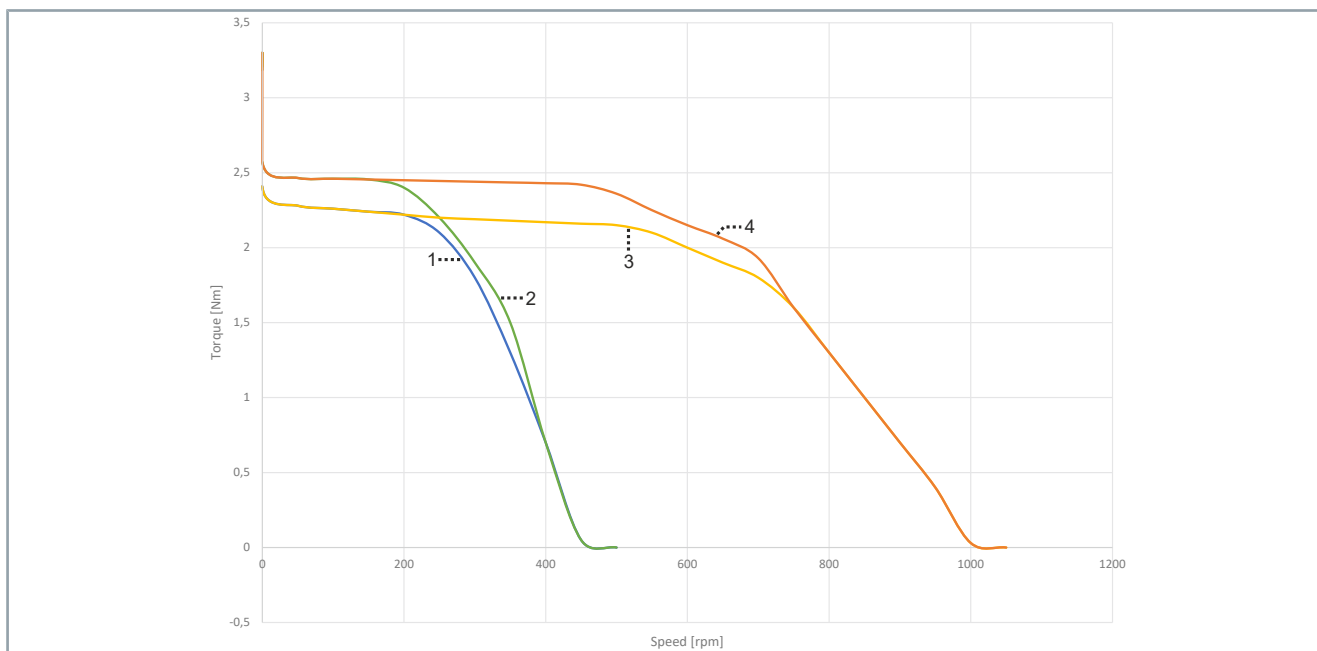


4.4.2 Characteristic torque and speed curves

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

AS2041-1H00

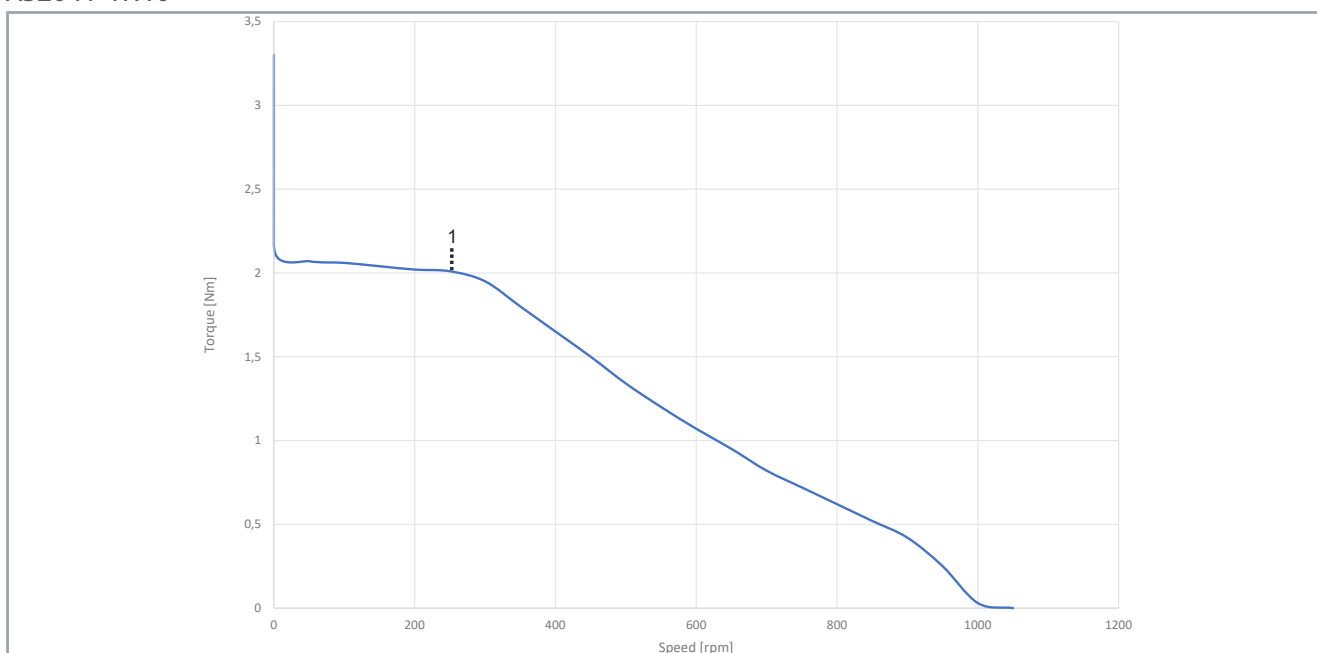
- Open-loop operation



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

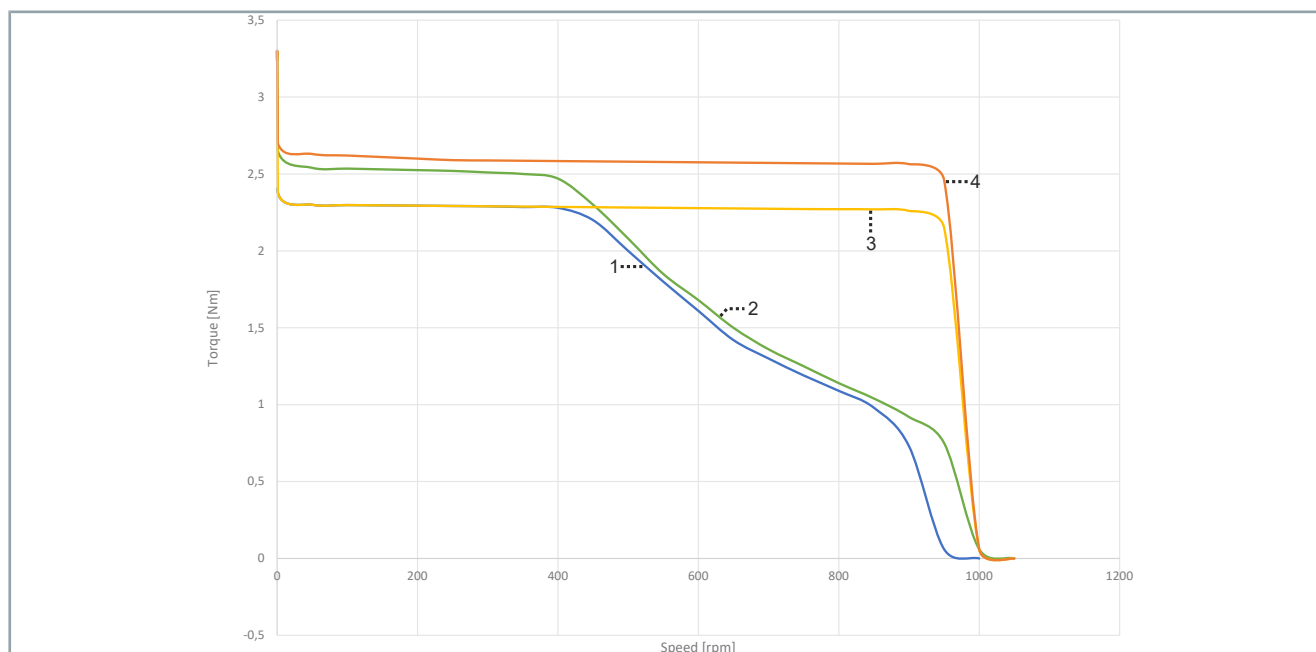
- Open-loop operation



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

AS2041-1H10

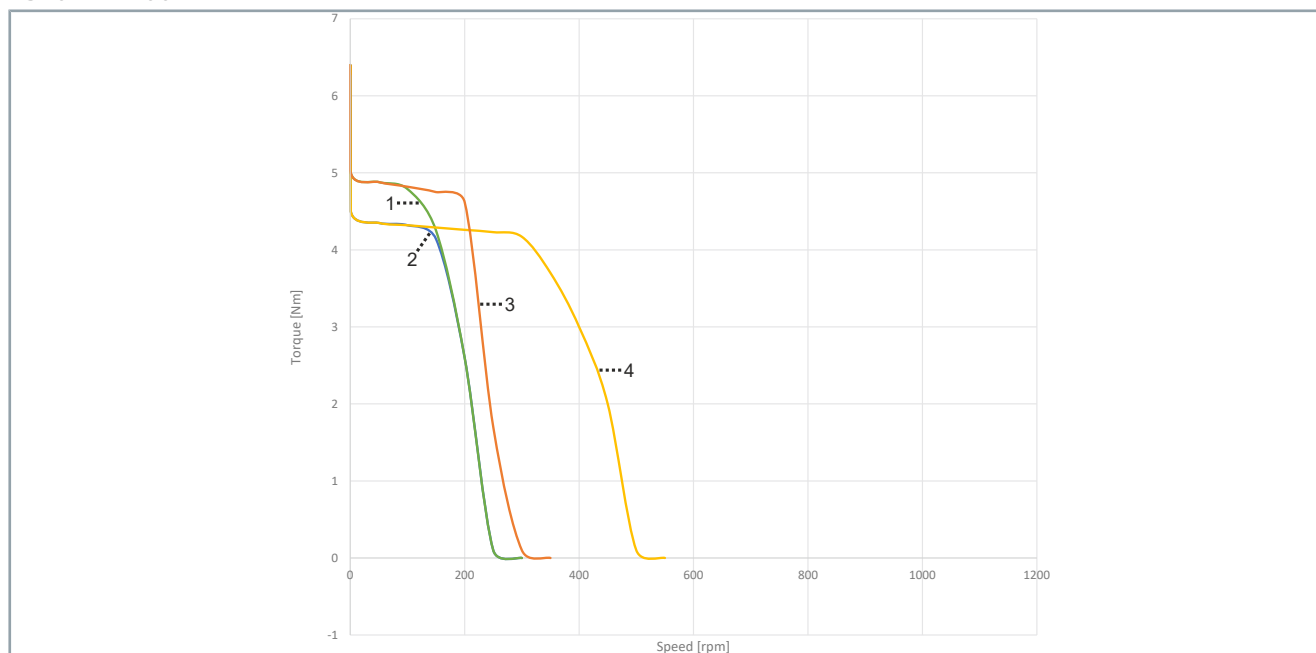
- “Vector control” field-oriented control



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

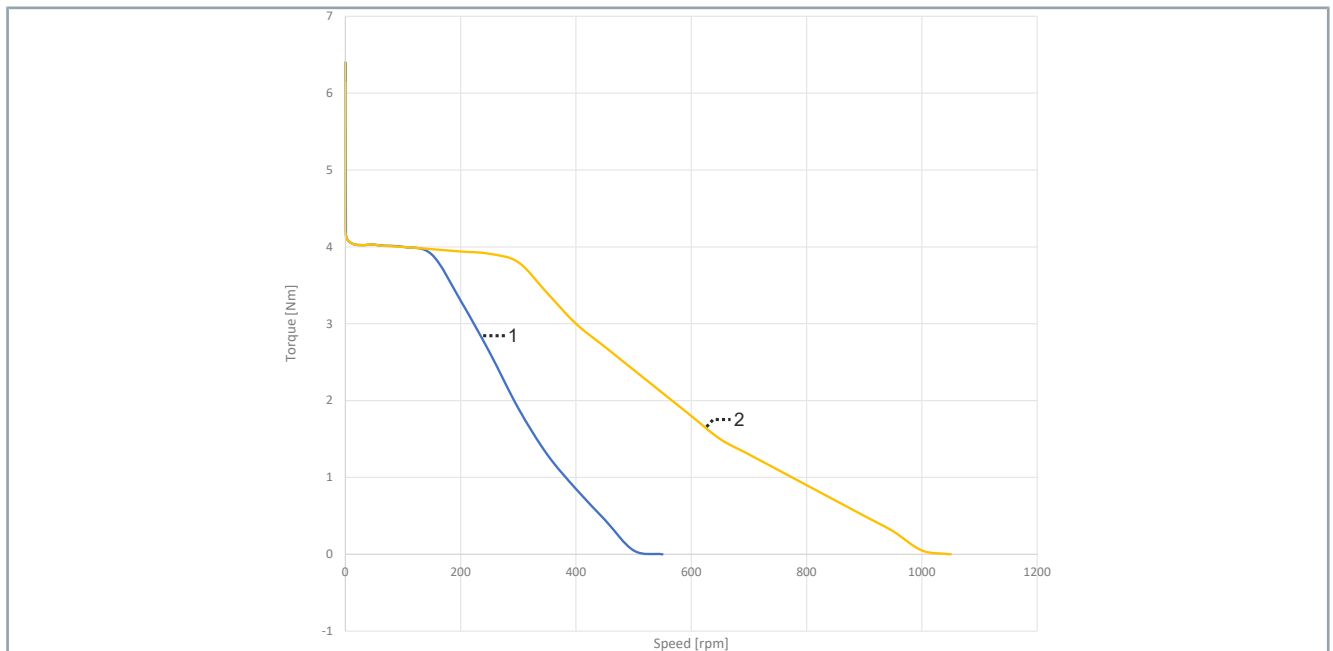
- Open-loop operation



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

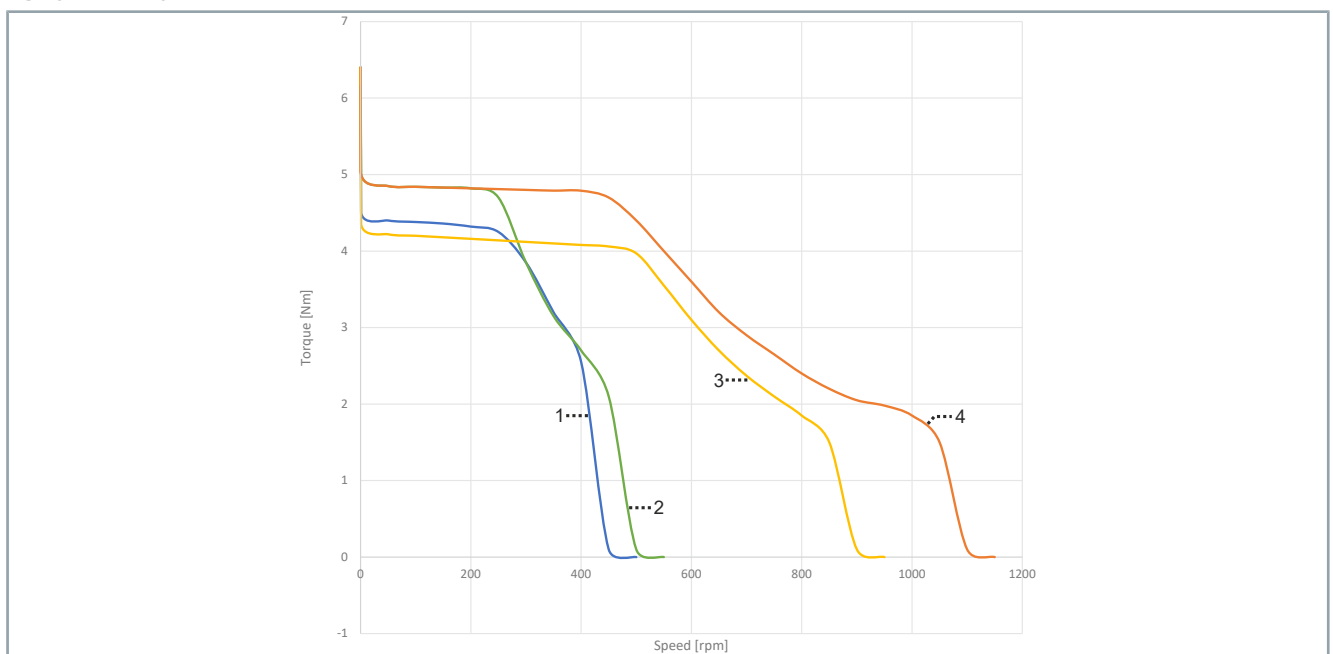
- Open-loop operation



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

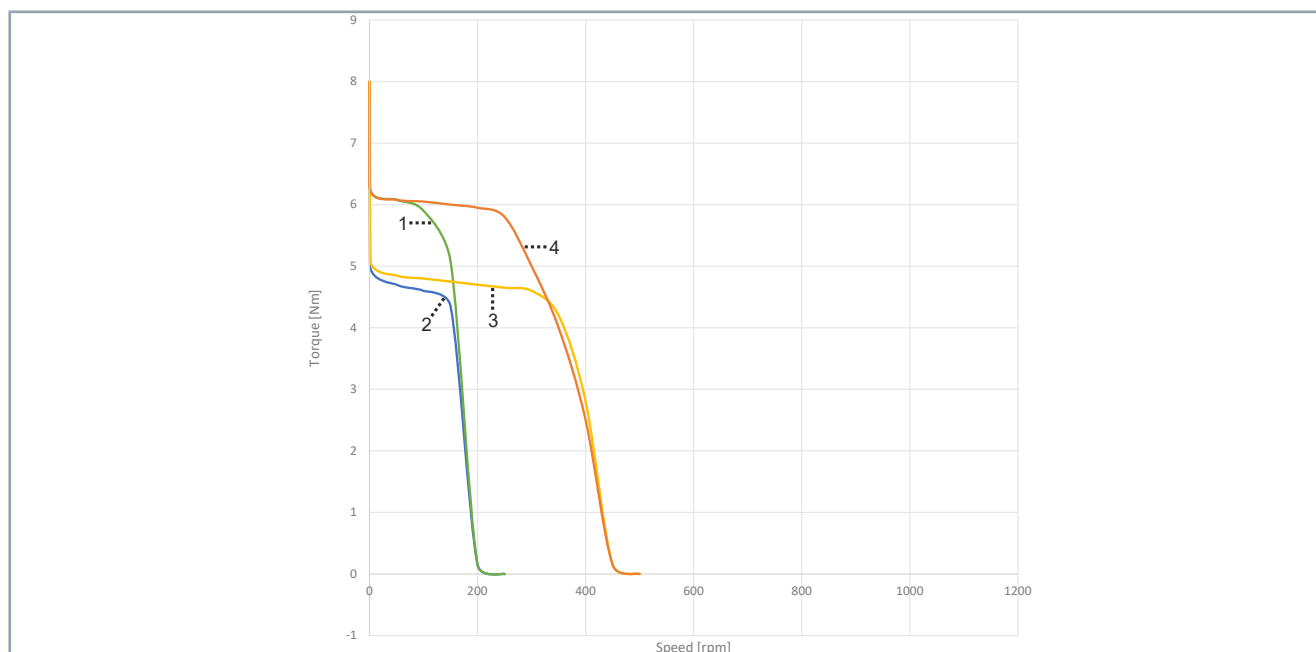
- “Vector control” field-oriented control



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

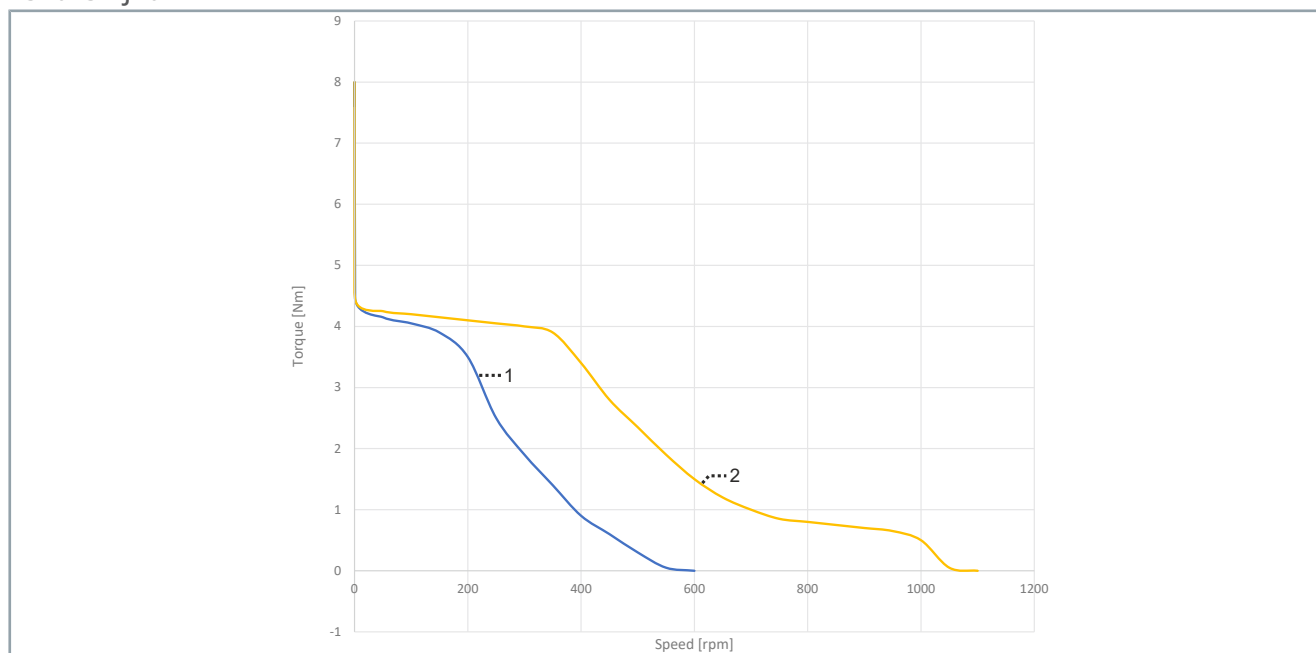
- Open-loop operation



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

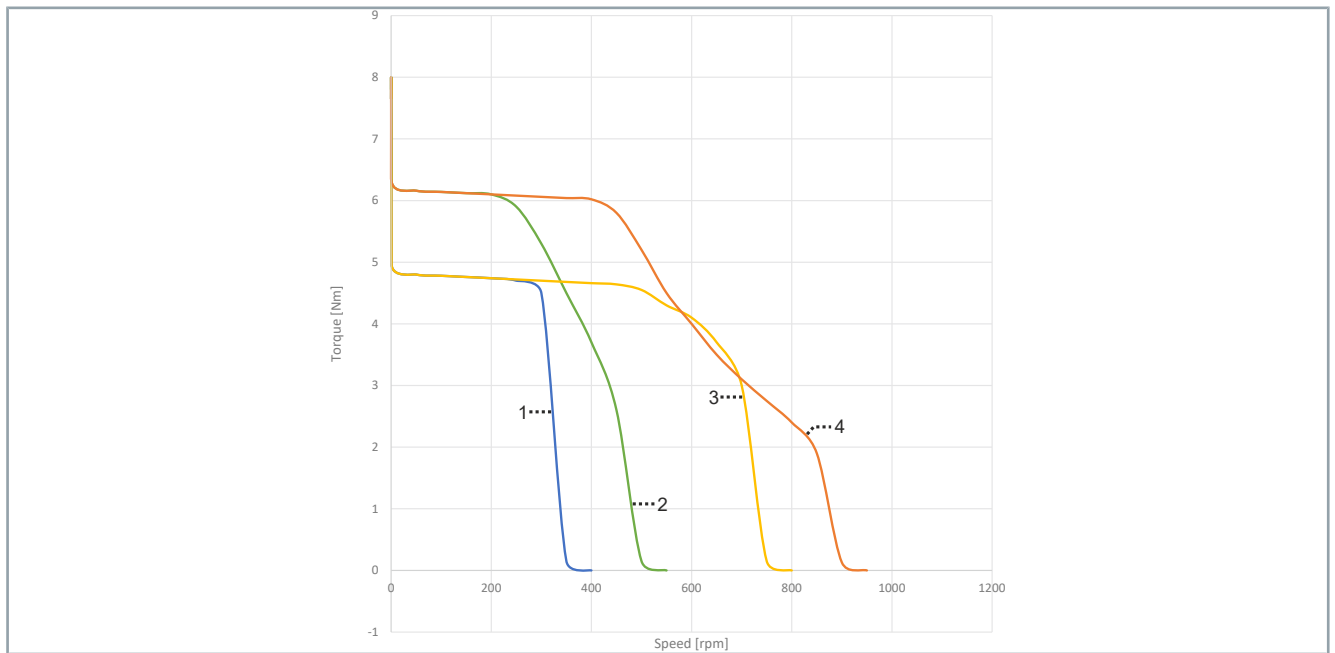
- Open-loop operation



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

5 Scope of supply



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

5.1 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.

6 Transport and storage

NOTICE

Loss of warranty due to non-compliance with transport and storage conditions

Failure to observe the conditions for transportation and storage may result in damage of the stepper motor and invalidate the warranty.

- Observe the conditions and the following chapters on transport and storage

6.1 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

6.2 Transport

⚠ WARNING

Risk of injury due to suspended loads

If the motor falls down, this can lead to serious or even fatal accidents.

- Use suitable means of transport
- Secure the motor against falling
- Do not move under suspended loads

NOTICE

Damage to the motor due to hard impacts

Falling and hard impacts will damage the motor and motor components.

- Avoid hard impacts on the motor
- Use suitable means of transport
- Secure the motor against falling

6.2.1 AS202x to AS204x

Transport of the series AS202x to AS204x without aids.

6.3 Long-term storage

NOTICE

Changed lubrication properties due to long storage time

Exceeding the specified maximum storage time can lead to changes in the properties of the lubricant used and damage the motor during subsequent operation.

- Do not exceed the maximum storage time of two years

NOTICE

Reduced service life due to lack of controls

Damage to the motor or maintenance work not carried out will affect the service life of the installed components and parts.

- Check the motor for proper condition every six months

NOTICE

Damage due to condensed water

Condensation can lead to damage during subsequent operation.

- Keep the ambient temperature constant
- Avoid solar radiation
- Avoid high air humidity

You have the option of storing motors for either a short or a longer period. For storage we always recommend the original packaging. Adhere to the conditions specified in the chapter: "Transport and storage", [Page 37].

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

Ensure the storage space is vibration-free.

7 Technical description

7.1 Mounting position

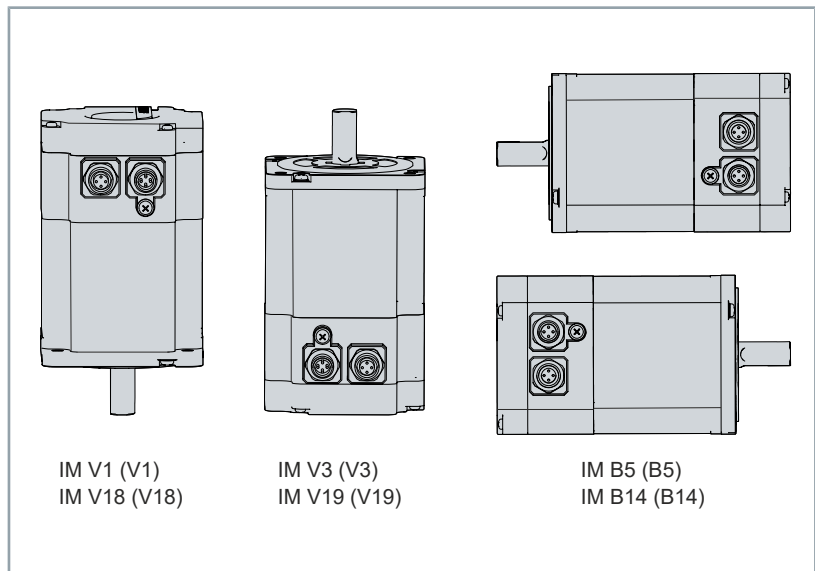
NOTICE

Damage to the motor due to ingress of liquids

In the vertical installation position IM V3, liquid that remains on the flange for a prolonged period may enter the motor via capillary action. In installation position IM V1 liquid can escape. If you do not observe the maintenance intervals, the motor may overheat depending on the installation position. Ingress and leakage of liquids may damage the motor.

- Carry out maintenance at regular intervals

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



7.2 Feedback

The following table provides information about the resolution of the motor feedback systems:

Feedback system	Resolution	Product
Incremental encoder 24 V DC (HTL)	1024 increments	AS20uv-wx1z
Incremental encoder 5 V DC (DIFF RS422, TTL)	1024 increments	AS20uv-wx2z

7.3 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

7.4 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 Characteristic Curves for torques and speeds", [Page 25] and "AS204x Curves for torques and speeds", [Page 31] in each case at the end of the "technical data", [Page 21].

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 rated speeds of well below 1,000 rpm.

8 Mechanical installation

All work should be carried out with great care and without time pressure.

8.1 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

8.2 Output elements

⚠ WARNING

Risk of injury due to unsecured moving parts

Unsecured parts can be ejected from the machine during operation and cause serious or fatal injuries.

- Make sure there are no moving parts on or in the machine during operation
- Feather keys [+] are only secured during transport

NOTICE

Motor damage due to excessive mechanical stress

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.

- Do not bend 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
- Provide additional support for the motor if necessary

NOTICE

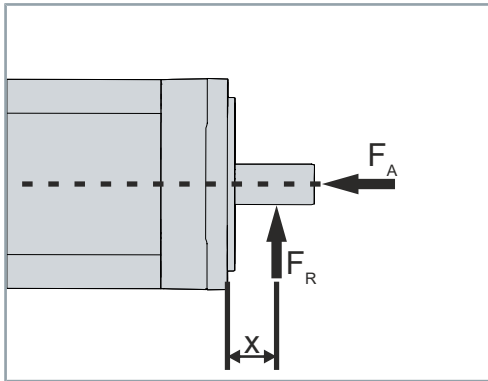
Interference to the encoder signals due to insufficient grounding

Insufficient or missing grounding of the motor can lead to interference of the encoder signals. The thermal connection of the motor flange determines the power loss.

- *Ensure adequate grounding via the protective conductor or the motor flange*
- *Ensure sufficient grounding via the mechanical integration of the motor to the application*

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.

8.2.1 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 21].

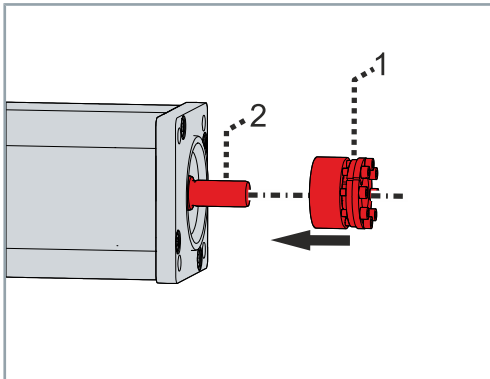
8.2.2 Mounting

NOTICE

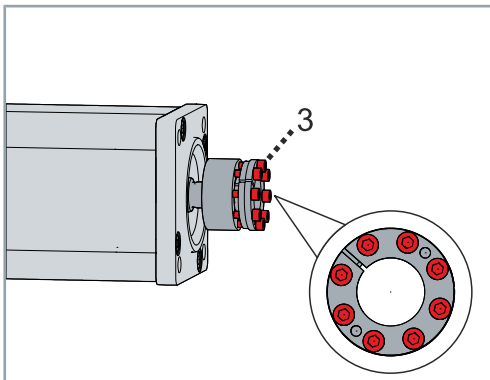
Damage due to offset mounting

An offset of the clamping set will cause unacceptable vibration and the destruction of the ball bearings and the coupling.

- Place clamping set centered and straight on motor shaft

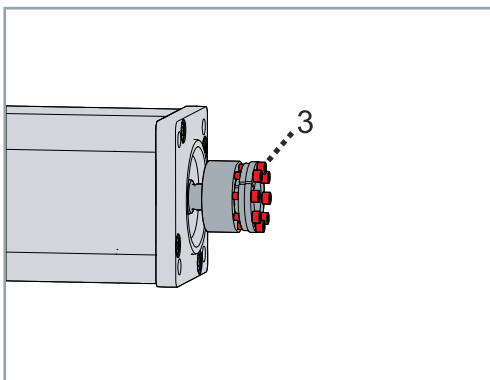


- Degrease and clean the motor shaft [2]
- Place clamping set [1] centered and straight on motor shaft [2]



- Tighten screws [3] in the clamping set crosswise. The clamping set is clamped in this way.

8.2.3 Dismantling



- Degrease the motor shaft
- Loosen screws [3] in the clamping set. The clamping set is relaxed in this way.

9 Electrical installation

9.1 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.

9.1.1 Cables

NOTICE

Malfunctions due to soiling

Contamination of the inside of the component and the Poles of the socket and plug can impair the function of the connection.

- When connecting the socket and connector, make sure that the poles and the inside of the component are not soiled or damaged



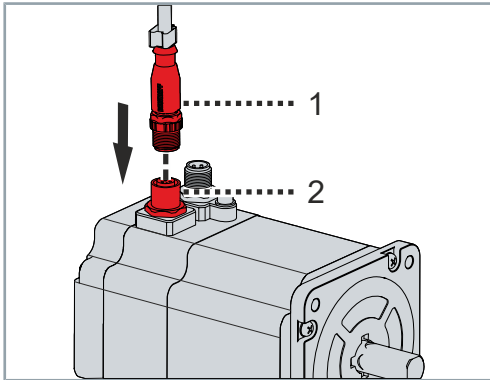
For proper application and assembly we recommend:

- Wiring in accordance with applicable regulations and standards
- Pre-assembled and shielded Beckhoff cables

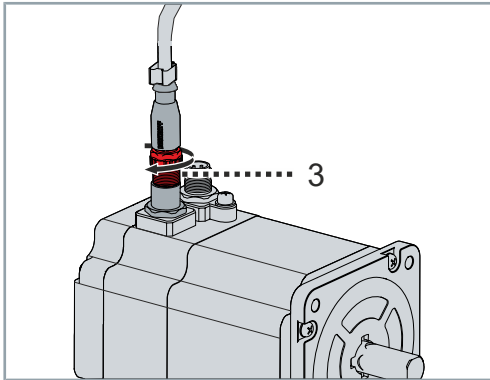
Beckhoff offers pre-assembled cables for faster and flawless installation of the motors. These cables are tested with regard to the material used, shielding and connection technology. Perfect functioning and compliance with legal regulations, such as EMC and UL, are guaranteed. The use of other cables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

9.1.2 Rotary joints

Feedback

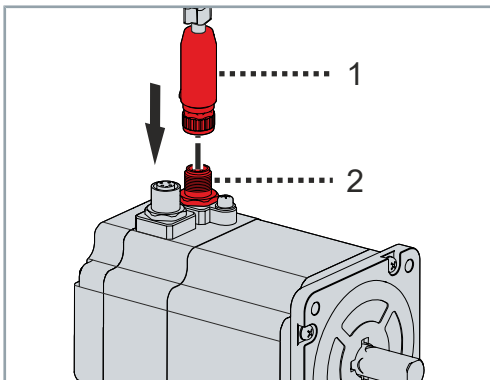


- Make sure that the poles and the interior of the socket as well as the threads on the connector are not dirty or damaged
- Push connector [1] straight onto socket [2] on the motor

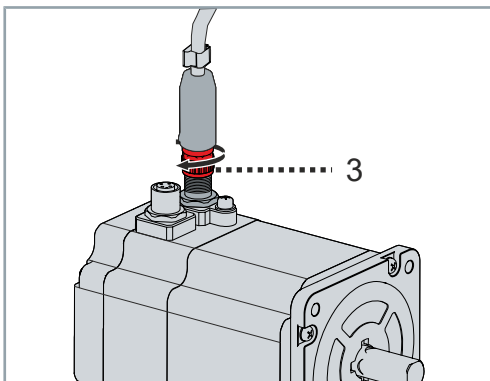


- Screw thread [3] into the socket

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

9.1.3 Connection of the protective earth

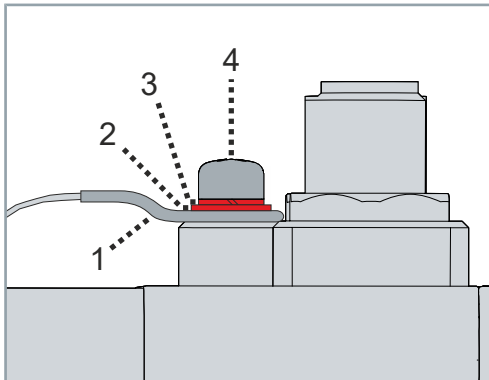
The stepper motors are marked on the housing with the symbol for protective earth.



Establish an electrically conductive connection with a large area

Ensure that there is an electrically conductive connection 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 EN 60204.

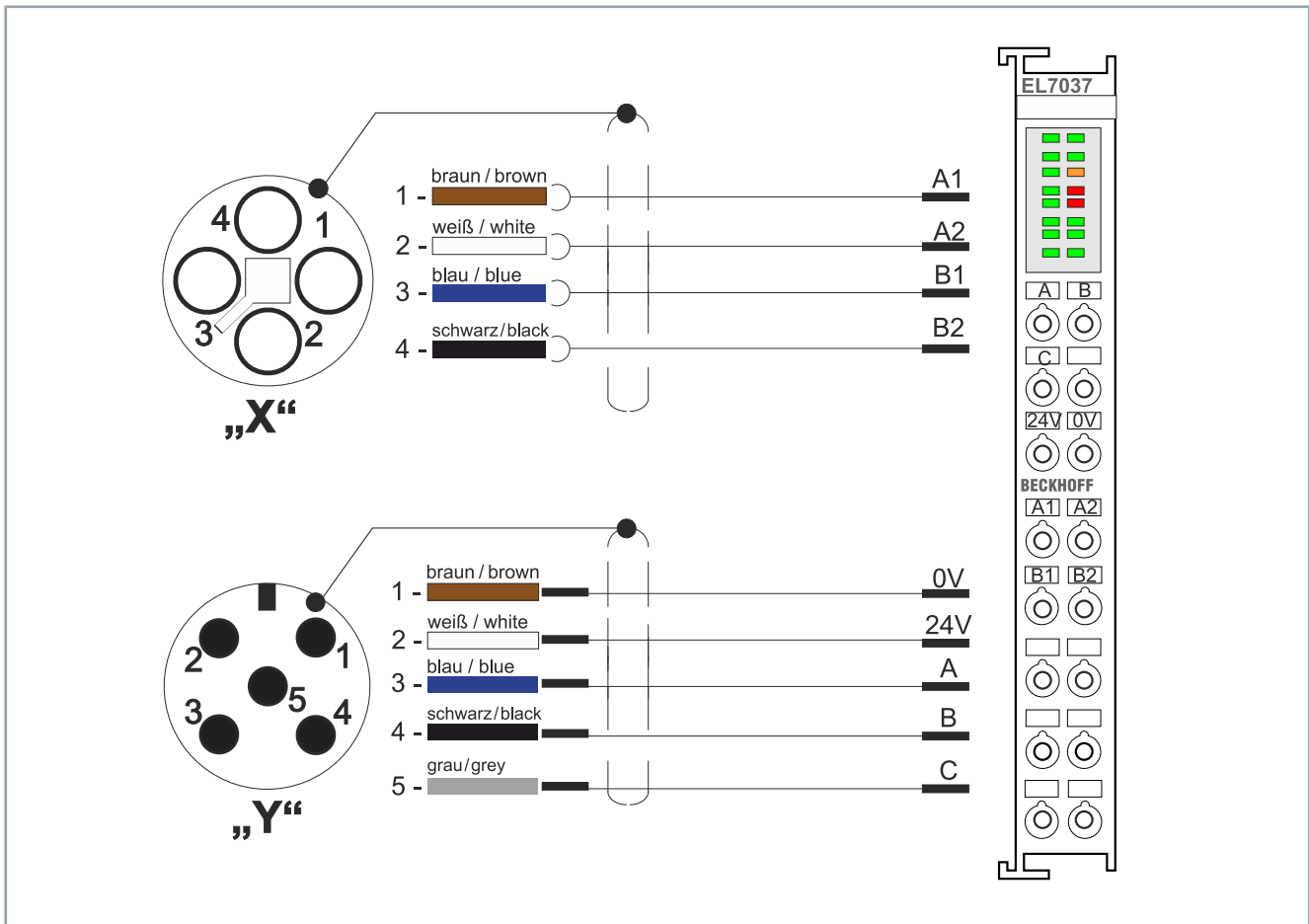
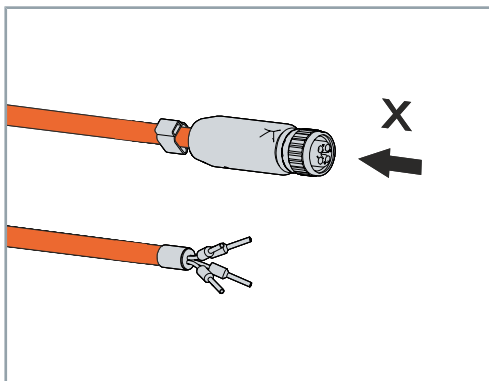


- ▶ Place ring cable lug [1] on unpainted surface
- ▶ Place washer [2] and spring washer [3] on screw [4]
- ▶ Turn screw [4] into the threaded hole provided to fasten the ring cable lug [1]
- ▶ Observe the tightening torque:

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

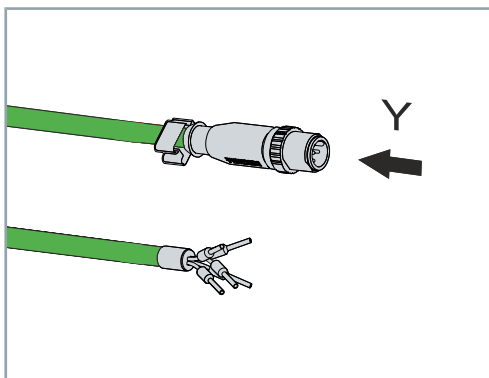
9.1.4 EL7037 stepper motor terminal

- 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

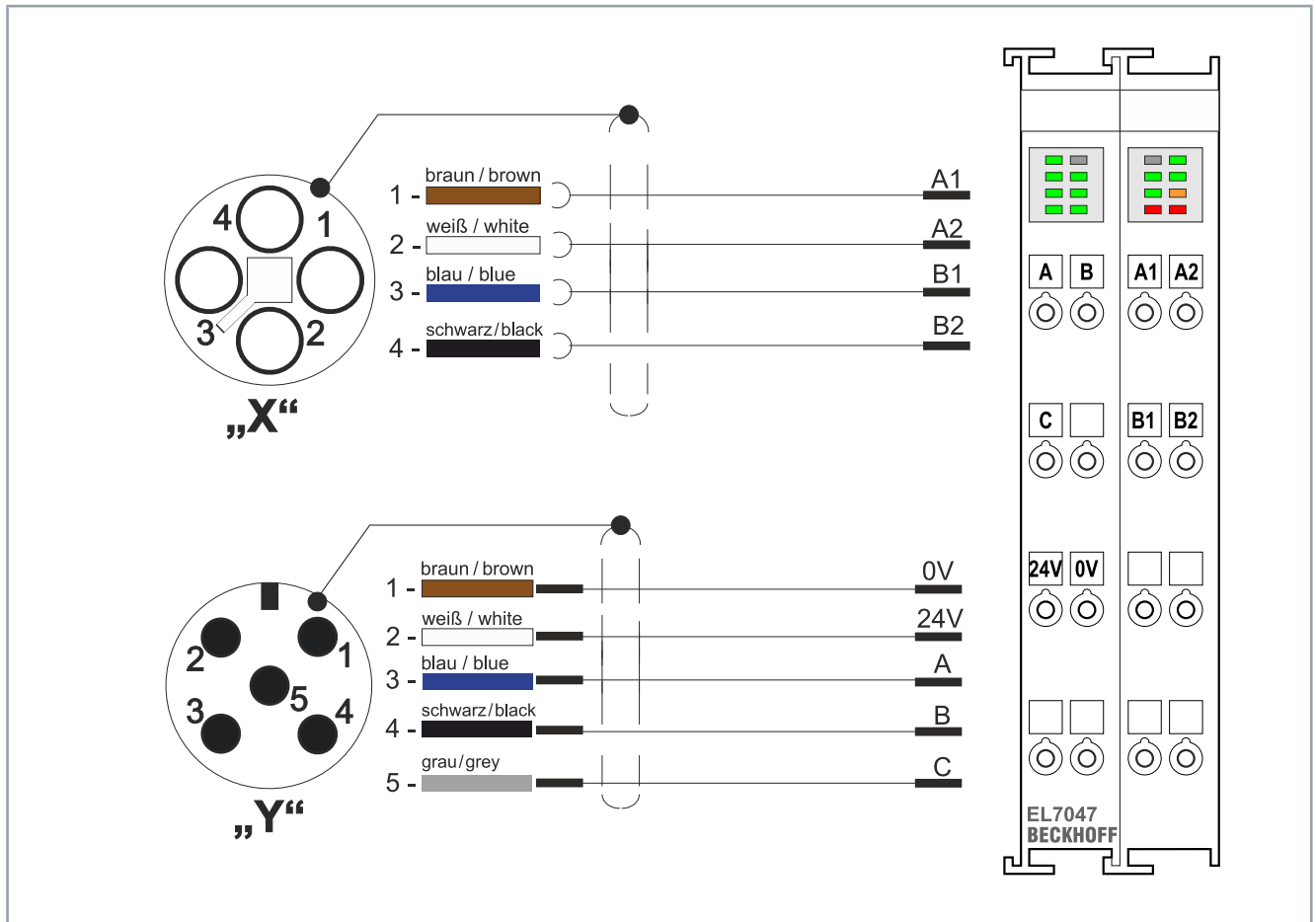
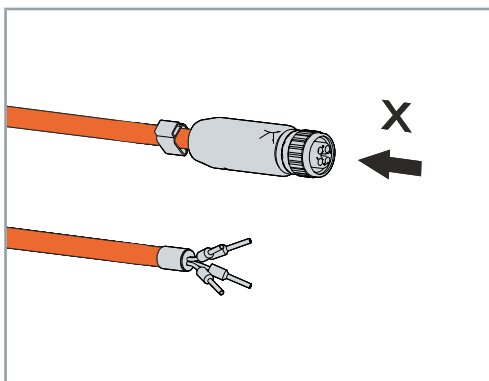


Encoder cable

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

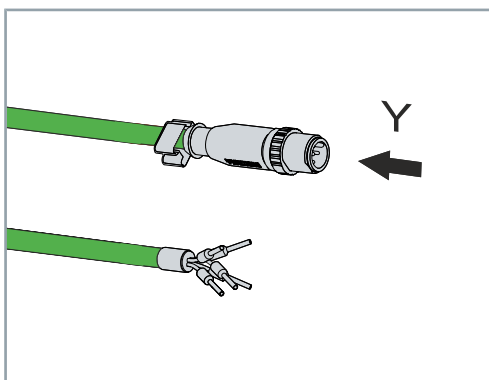
9.1.5 EL7047 stepper motor terminal

- 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

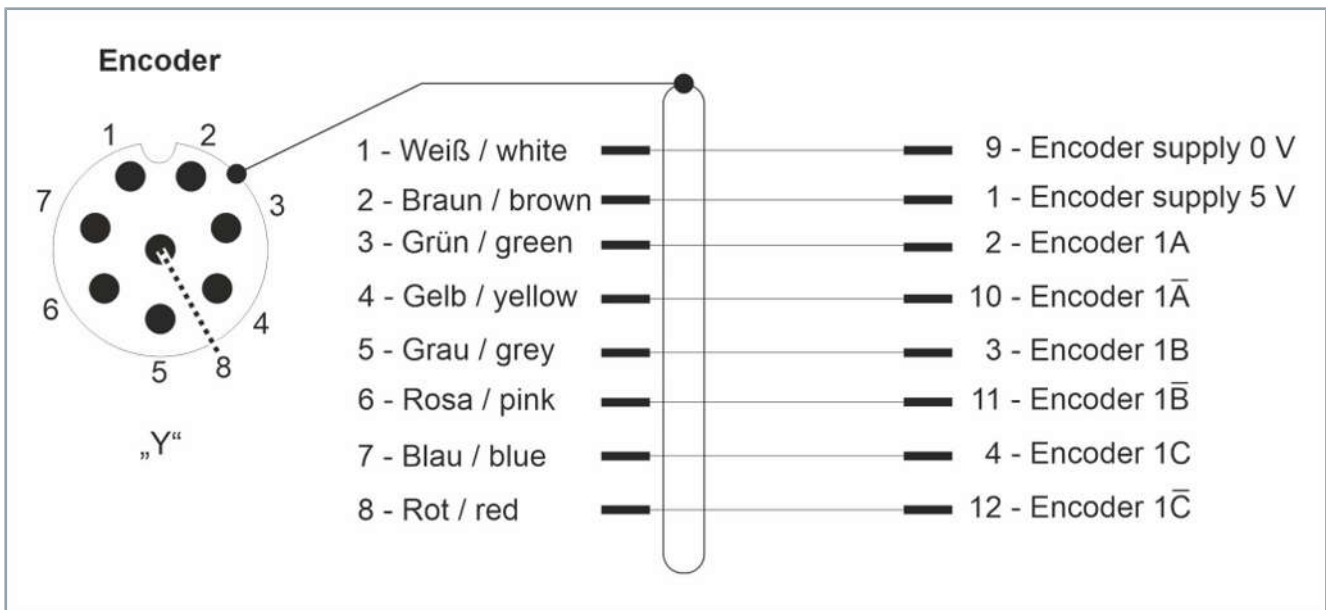


Encoder cable

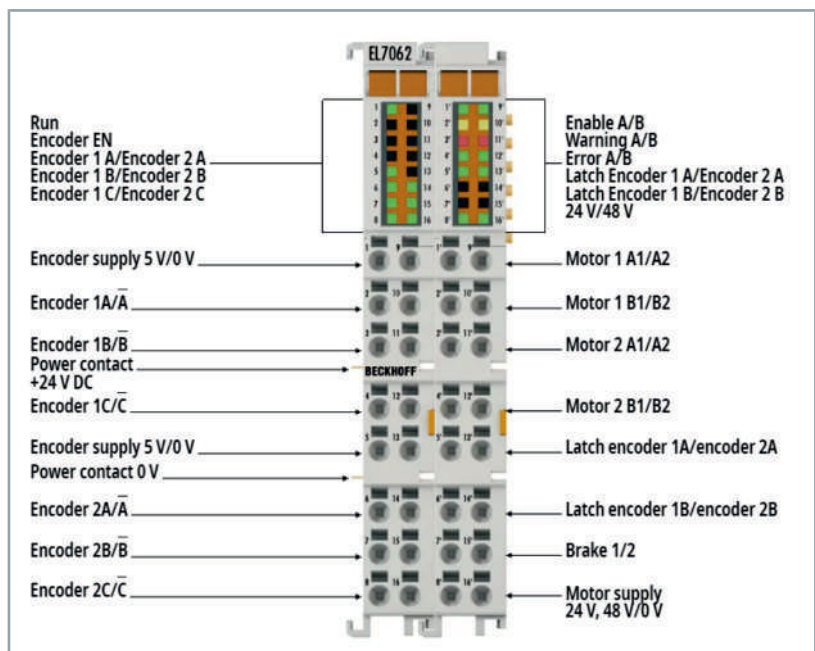
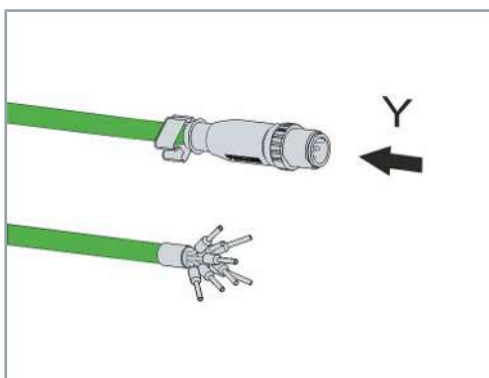
- Order key: ZK4000-5100-2xxx
- Preassembled at both ends and shielded: 5 x 0.25 mm²

9.1.6 EL7062 stepper motor terminal

Encoder cable ZK4000-8200-2xxx to EtherCAT Terminal EL7062



Pin assignment EtherCAT Terminal EL7062

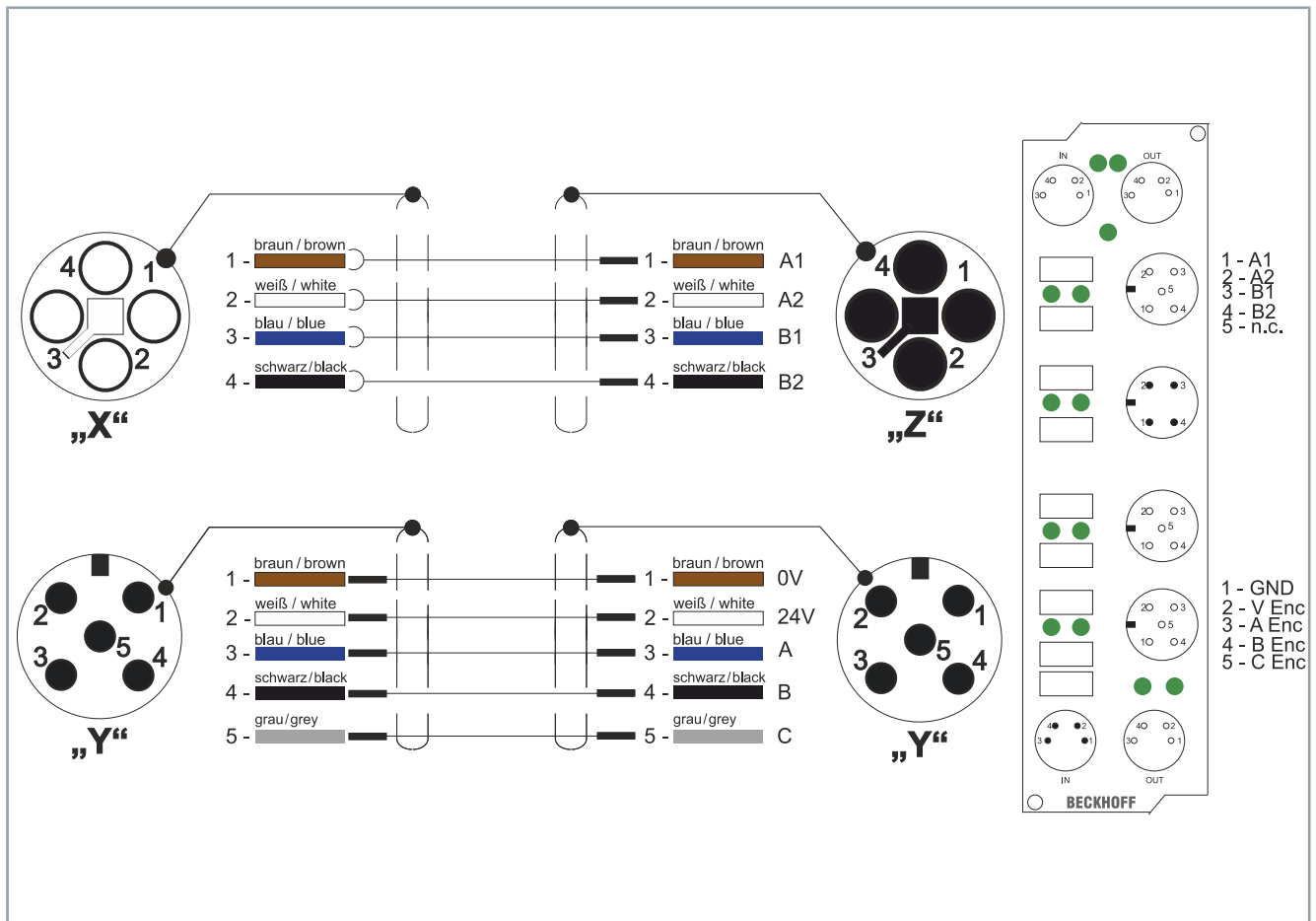
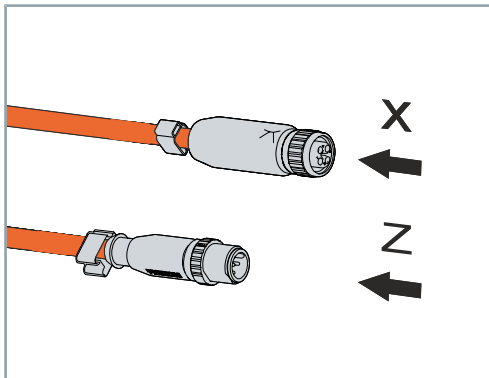


Encoder cable

- Order key: ZK4000-8200-2xxx
- Preassembled at both ends and shielded: 4 x 2 x 0.25 mm²

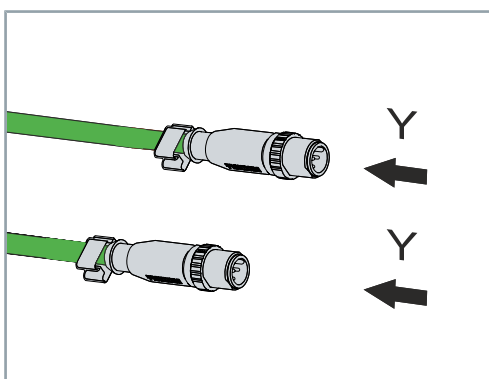
9.1.7 EP7041 stepper motor module

- 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

10 Commissioning



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.

10.1 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

10.2 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

10.3 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

10.4 After operation

WARNING

Serious injury due to rotating components

Rotating components can lead to serious injuries.

- Ensure safe state of the machine / system
- Make sure that the rotor comes to a complete stop

11 Maintenance and cleaning

WARNING

Serious injuries due to cleaning work during operation

Carrying out cleaning work during operation can lead to serious or fatal injuries.

- Bring the connected motors and the machine into a safe state for cleaning work
- De-energize connected motors and the machine
- Secure connected motors and the machine to prevent unauthorized restarting

NOTICE

Damage to the motor due to liquid

Cleaning fluid entering the motor can cause damage to the motor.

- Wipe the motor with cleaning agent and a cloth only
- Do not immerse motor

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.

11.1 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.

11.1.1 Approved

Cleaning agents	Chemical formula
Acetyl chloride	CH_3COCl
Aluminum chloride	$\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$
Ammonium chloride	NH_4Cl
Antimony trichloride	SbCl_3
Barium chloride	$\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$
Chlorine; also chlorine water, chlorinated lime and chlorobenzene	Cl_2
Chlorosulfuric acid	HSO_3Cl
Hydrogen chloride gas	HCl
Chromic acid	CrO_3
Iron(III) chloride	FeCl_3
Hydrogen fluoride	HF
Carnallite	$\text{KClMgCl}_2 \cdot 6\text{H}_2\text{O}$
Aqua regia	$\text{HCl} + \text{HNO}_3$
Magnesium chloride	$\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$
Monochloroacetic acid	CH_2ClCOOH
Sodium chloride; common salt	NaCl
Sodium hydroxide	NaOH
Sodium peroxide	Na_2O_2
Sulfuric acid	H_2SO_4
Tartaric acid	COOH ; CHOH_2COOH
Tin-IV chloride	$\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ SnCl_4

11.1.2 Not applicable

Cleaning agents	Chemical formula
Aniline hydrochloride	$\text{C}_6\text{H}_5\text{NH}_2\text{HCl}$
Bromine	Br_2
Sodium hypochlorite; bleaching solution	NaClO
Mercury (II) chloride	HgCl_2
Hydrochloric acid	HCl

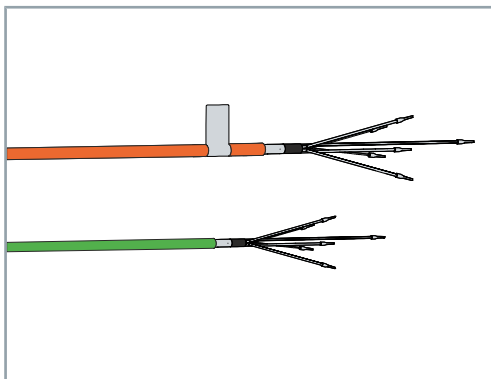
11.2 Intervals

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	10000 operating hours	Replace bearing
Motor	2500 operating hours/annually	Check motor for bearing noises If noises are detected: <ul style="list-style-type: none">• Do not continue to operate motor; replace bearing
Cables	Regular intervals	Perform visual inspection and check for damage If required: <ul style="list-style-type: none">• Replace cables
	5 million bending cycles	Replace cables
Power box	500 mating cycles	In case of damage: <ul style="list-style-type: none">• Contact Beckhoff Service

12 Accessories

12.1 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", [Page 45].

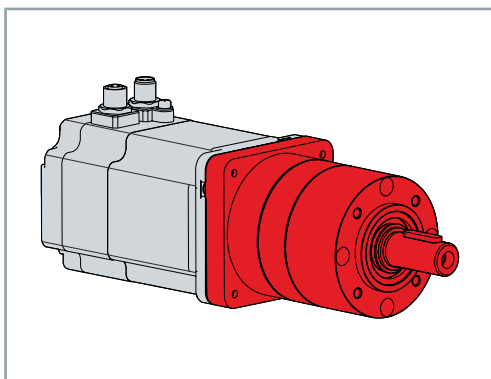
12.2 Gear unit

NOTICE

Displacement of the motor shaft due to thermal expansion

Directly mounted bevel gears or helical gear wheels can exceed the axial load of the floating bearing on the shaft end A. At high temperatures, the motor shaft may be displaced.

- Use couplings as length compensation



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 combinations of motor and gear unit can be found in the chapter: "Type key", [Page 17].

13 Fault correction

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

14 Decommissioning

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

Refer to chapter "Documentation notes", [Page 5].

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 professional disposal.

14.1 Disassembly

WARNING

Risk of injury from leaking oil

Leaking oil can cause slips and falls, resulting in serious or fatal injury. Hot oil can cause severe burns.

- Prevent oil from leaking
- Allow the oil to cool down before starting work
- Soak up any leaked oil with approved binding agents
- Mark the danger spot



Do not remove components from the products

Only

Beckhoff Automation GmbH & Co. KG is permitted to remove components.

Contact "Beckhoff Service", [Page 11] 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

14.2 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 devices are considered as waste electrical and electronic equipment for disposal. Observe the national regulations for the disposal of old electrical and electronic equipment.

15 Guidelines and Standards

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

15.1 Standards

Product standard EN IEC 61800-3

"Adjustable speed electrical power drive systems. EMC requirements and specific test methods"

EN IEC 63000

"Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances"

15.2 Guidelines

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

15.3 Test centers



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.

15.4 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. Send your request to:

✉ info@beckhoff.com

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