

Operating instructions | EN

# AMP8000 and AMP8500

Distributed servo drives





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- EP1789857
- EP1456722
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- DE102015105702



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## 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](mailto: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:

Documentation	Definition
Short information AMP8000	Accompanying document with general notes on handling the distributed servo drive system. Included with each product.

## 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](http://www.beckhoff.com/documentations)

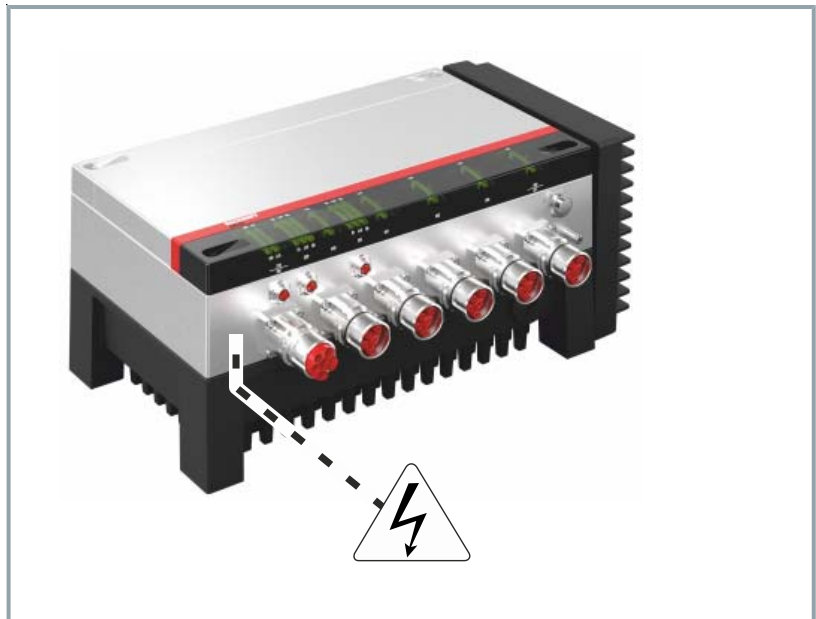
Read the general safety instructions in this chapter. Observe the warnings in these operating instructions for your own safety, the safety of others and the safety of the product.

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.

## Power supply module



### Warning of high voltage!

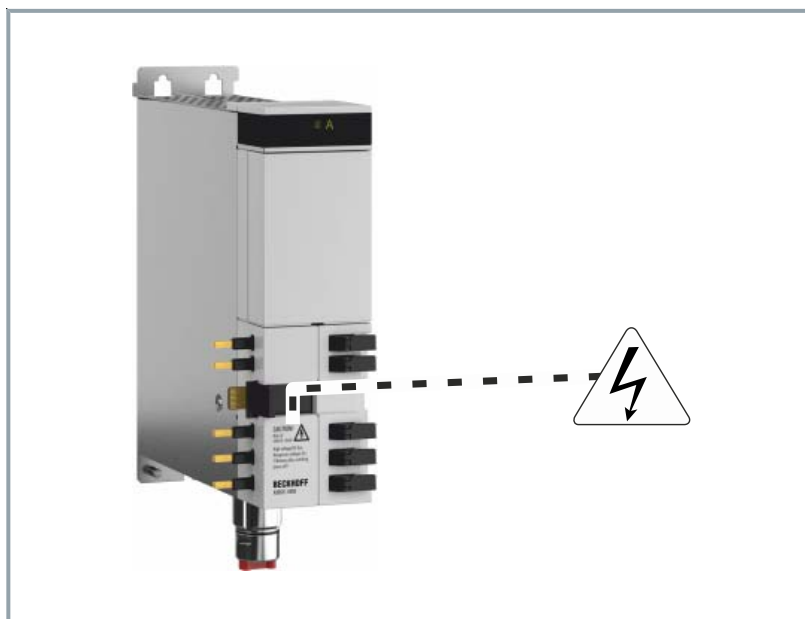
The DC link on the modules can carry a life-threatening voltage of over 848 V<sub>DC</sub>.



### Warning of a hot surface

During and after operation there is a risk of burns at the power supply module due to hot surfaces over 60 °C. Allow the housing of the power supply module to cool down for at least 15 minutes.

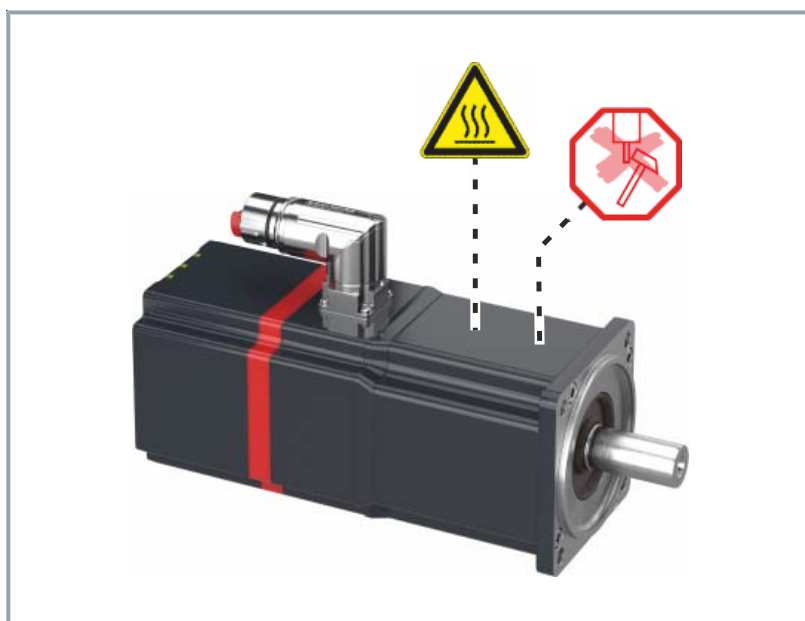
## Coupling module



### Warning of high voltage!

The DC link on the coupling modules can carry a life-threatening voltage of over 848 V<sub>DC</sub>.

## Distributed Servo Drive



### 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 for 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.

## General safety instructions

In this chapter you will find information on safety for handling the distributed servo drive system. This is not independently executable. The distributed servo drive system is therefore considered to be an incomplete machine. They must be installed in a machine or plant by the machine builder. The documentation created by the machine builder 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.

### **Switch off the mains voltage and secure it against being switched on again**

When working on machines or systems, switch off the mains voltage and secure it against being switched on again.

### **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**

Use the original packaging for dispatch, transportation, storage and packing.



## During operation

### Observe the discharge times of the capacitors

Observe the following delay times after disconnecting from the mains supply:

AMP8yxx	<b>30 minutes</b>
AX883x	<b>30 minutes</b>

### Do not work on live electrical parts

Only work on the distributed servo drive system when the voltage has dropped to  $< 50$  V. Measure the voltage and observe the waiting times. 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 components according to the technical specifications. Refer here to the chapter: "Technical data". Provide for sufficient cooling. Switch the components off immediately if the temperature is too high.

### Do not touch any moving or rotating components

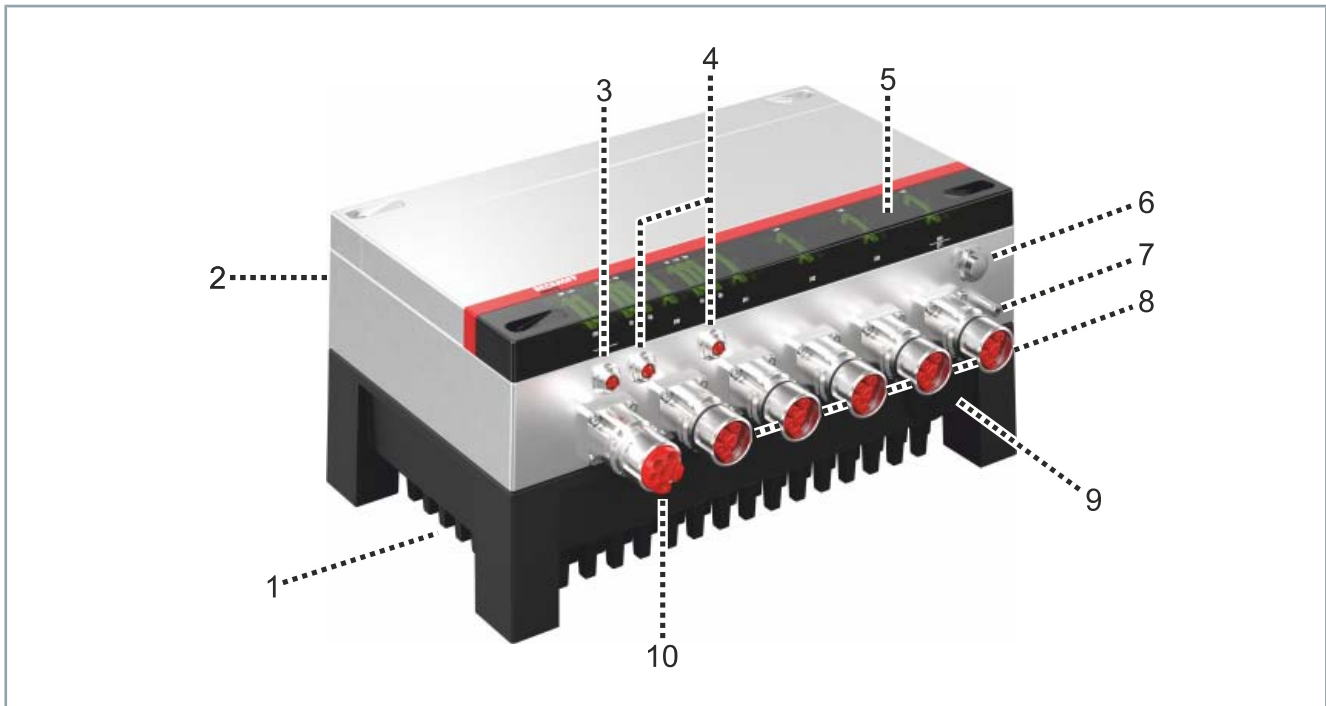
Do not touch any moving or rotating components. Fasten all parts or components on the machine or plant.

## After operation

### De-energize and switch off components before working on them

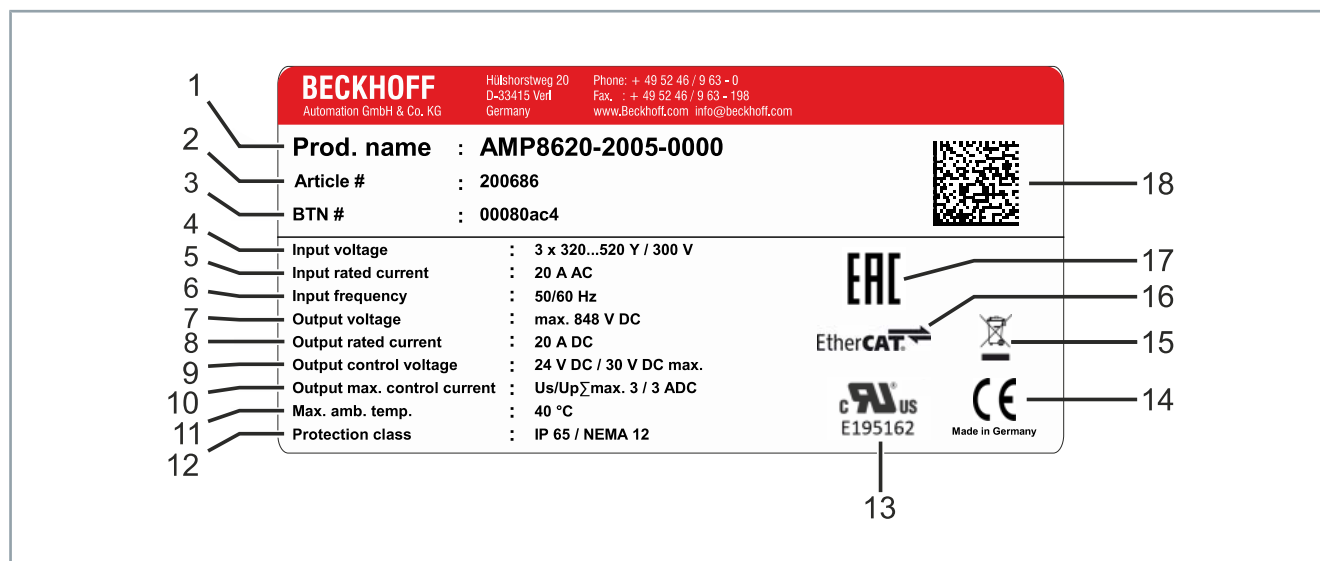
Check the functionality of all safety-relevant devices. Secure the working environment. Secure the machine or plant against being inadvertently started up. Observe the chapter: "Decommissioning".

## AMP8620



Item number	Explanation
1	Heat sink
2	Housing
3	X10: fieldbus input for EtherCAT P; M8
4	X20 and X21: fieldbus output for EtherCAT P; M8
5	Display of the status LEDs
6	Pressure compensation element
7	Ground connection
8	X40 to X44: AMP8000 system output B23
9	Only for AMP8620-2005-0200 [+]: X71: connection for external brake resistor
10	X01: connection of the supply network

## Name plate

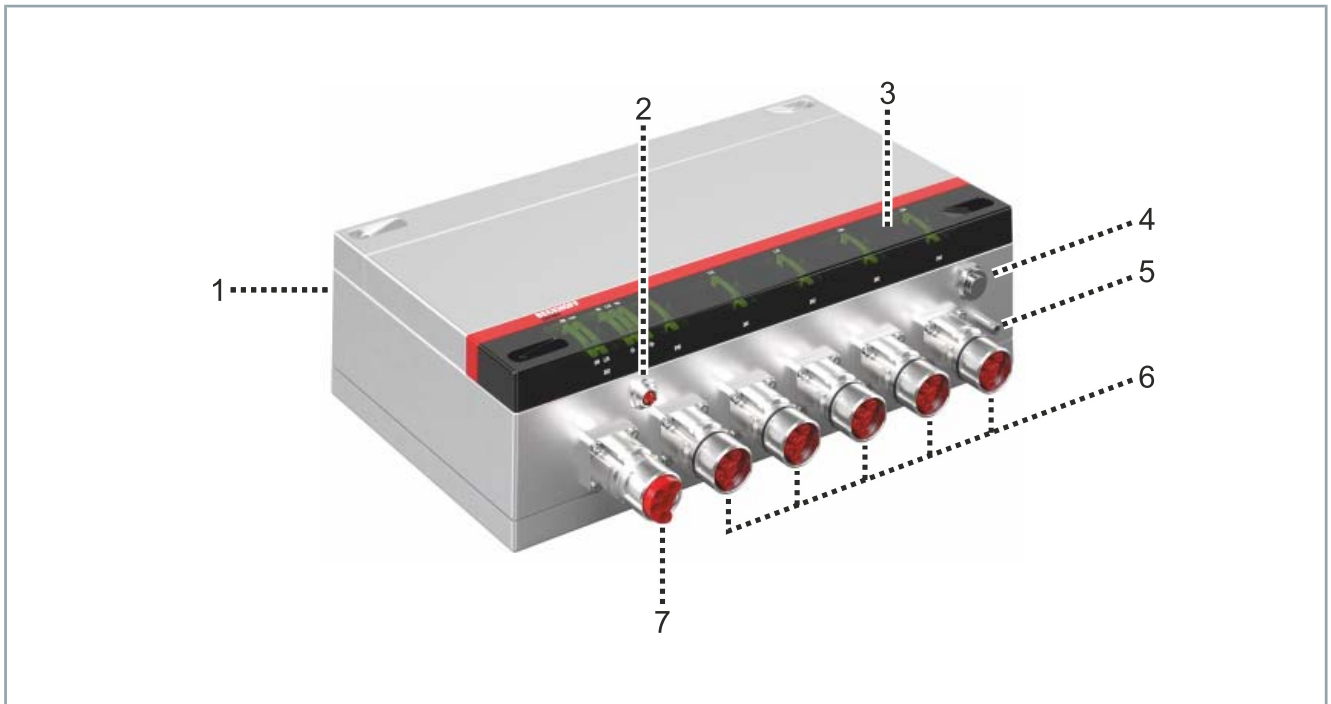


Item number	Explanation
1	Product name
2	Order number
3	Beckhoff Traceability Number, BTN
4	Input voltage
5	Nominal input current
6	Input frequency
7	Nominal output voltage
8	Nominal output current
9	Output control voltage
10	Maximum output control current
11	Maximum ambient temperature
12	Protection rating
13	cURus approval
14	CE approval
15	Disposal according to WEEE directive
16	EtherCAT logo
17	EAC approval
18	DataMatrix code

## Type key

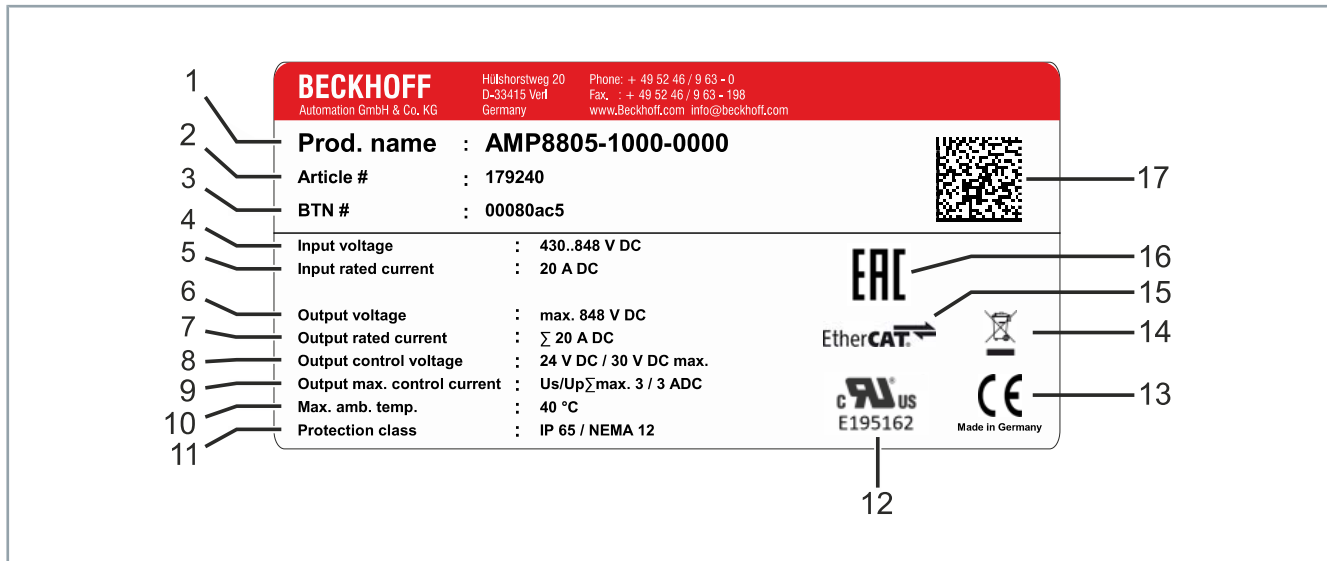
AMP8 6 ab - c d ef - g h i j	Explanation
AMP8	Product area Distributed Drive Technology
6	Product Power supply module
ab	DC output current 20 = 20 A <sub>DC</sub>
c	Number of M8-EtherCAT P outputs 2 = 2 outputs
d	Not defined
ef	Number of AMP8yxx system outputs B23 05 = 5 outputs
g	Version 0 = standard
h	Braking resistor 0 = no brake resistor 1 = mounted brake resistor 2 = external brake resistor
i	Input voltage range 0 = 3 x 400...480 V <sub>AC</sub>
j	Not defined

AMP8805



Item number	Explanation
1	Housing
2	X20: fieldbus output EtherCAT P; M8
3	Status LEDs
4	Pressure compensation elements
5	Ground connection
6	X40 to X44: AMP8000 system output B23
7	X02: AMP8000 system input B23

## Name plate

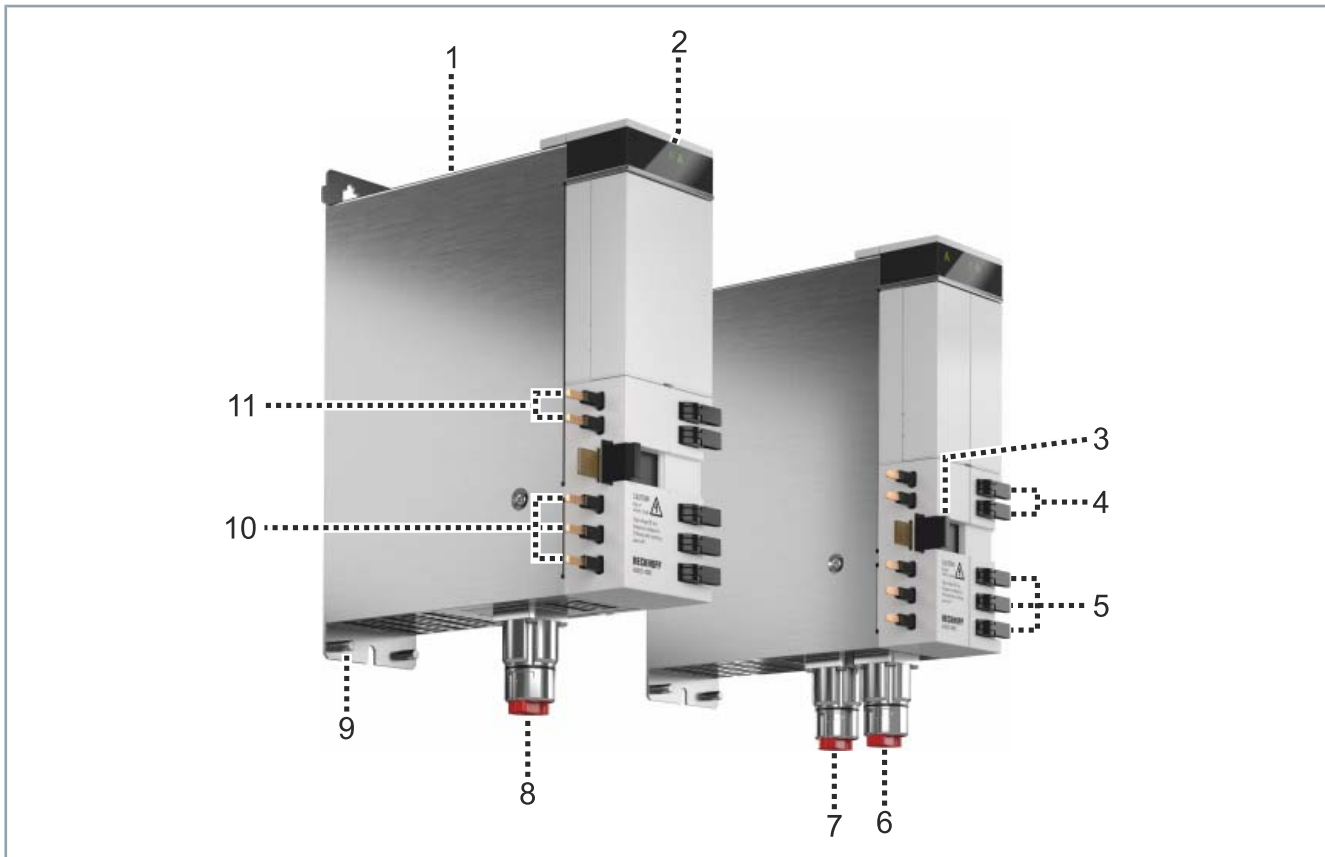


Item number	Explanation
1	Product name
2	Order number
3	Beckhoff Traceability Number; BTN
4	Input voltage
5	Nominal input current
6	Nominal output voltage
7	Nominal output current
8	Output control voltage
9	Maximum output control current
10	Maximum ambient temperature
11	Protection rating
12	cURus approval
13	CE conformity
14	Disposal according to WEEE directive
15	EtherCAT logo
16	EAC approval
17	DataMatrix code

## Type key

AMP8 8 ab – c d e f – g h i j	Explanation
AMP8	Product area Distributed Drive Technology
8	Product Distribution module
ab	Number of AMP8yxx system outputs B23 05 = 5 outputs
c	Number of M8-EtherCAT P outputs 1 = 1 output
d	Not defined
e	DC link voltage 0 = 430...848 V <sub>DC</sub>
f	Not defined
g	Version 0 = standard
h	Nominal input current 0 = 20 A <sub>DC</sub>
i	Not defined
j	Not defined

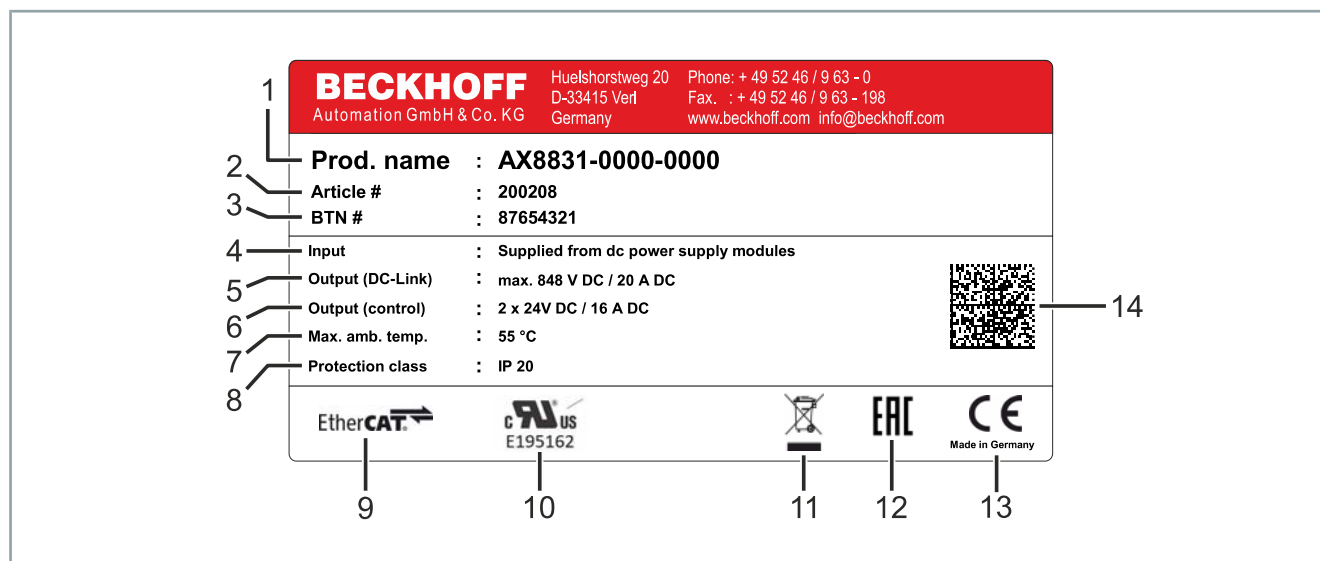
## AX883x



Item number	Explanation
1	Housing
2	Display
3	EtherCAT connection
4	AX bridge: quick coupling 24 V <sub>DC</sub>
5	AX-Bridge: quick coupling of the DC link and the functional earth
6	AX8832: X02: AMP8000 system output; L/A LED
7	AX8832: X01: AMP8000 system output; L/A LED
8	AX8831: X01: AMP8000 system output; L/A LED
9	Grounding bolt
10	AX bridge: DC link; FE
11	AX bridge: 24 V <sub>DC</sub>



## Name plate

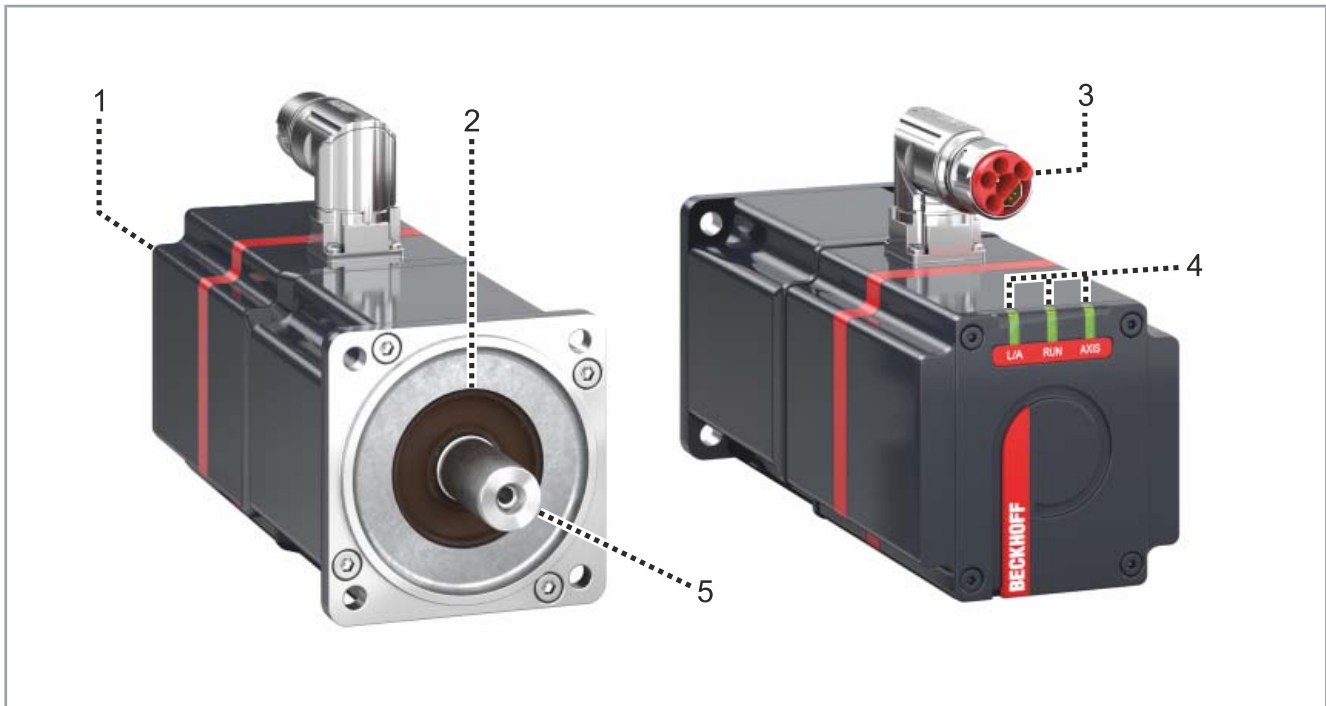


Item number	Explanation
1	Product name
2	Order number
3	Beckhoff Traceability Number; BTN
4	Input supply
5	Maximum DC link voltage / nominal output current
6	Nominal control voltage / nominal output voltage
7	Maximum ambient temperature
8	Protection rating
9	EtherCAT conformity
10	cURus approval
11	Disposal according to WEEE directive
12	EAC approval
13	CE conformity
14	DataMatrix code

## Type key

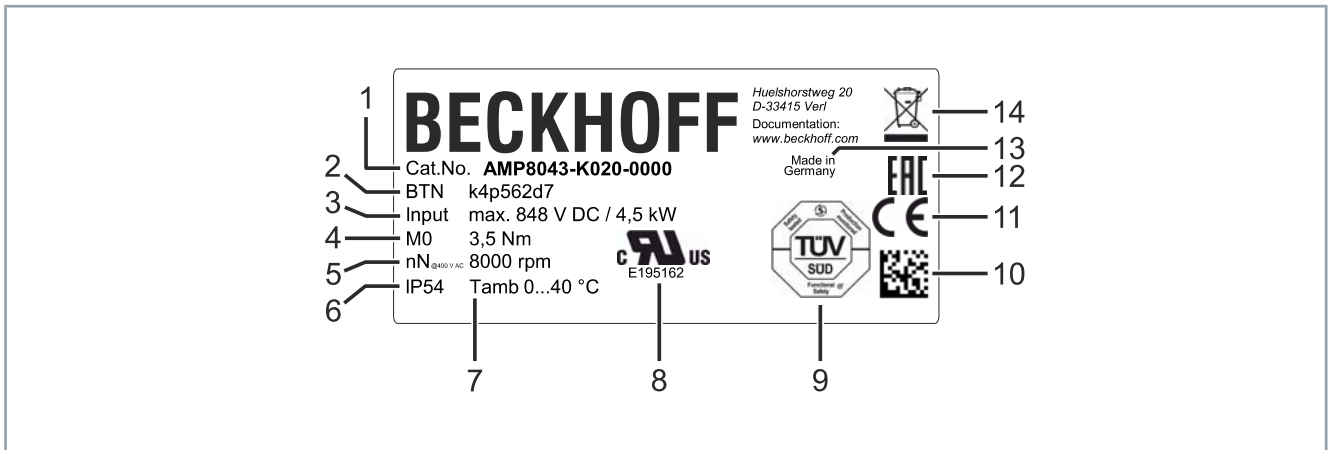
AX883x - 0 0 0 0 - 0 0 0 0	Explanation
AX883	Coupling module for AX8000
x	Channels 1 = 1-channel 2 = 2-channel

## AMP80xx



Item number	Explanation
1	Housing
2	Radial shaft-sealing ring [+]
3	AMP8000 system input B23
4	Status LEDs: Link/Activity, Run, AXIS
5	Motor shaft

Name plate



Item number	Explanation
1	Servo drive type
2	Beckhoff Traceability Number, BTN
3	Maximum input voltage and power
4	Standstill torque
5	Nominal speed at 400 V AC supply voltage
6	Protection rating
7	Ambient temperature
8	cURus approval
9	TÜV test mark
10	DataMatrix code with Beckhoff TN
11	CE conformity
12	EAC approval
13	Country of manufacture
14	Disposal according to WEEE directive

## Type key

<b>AMP8 a b c – d e f g</b>	<b>Explanation</b>
AMP8	Distributed Servo Drive
a	Series 0 = standard 5 = increased mass moment of inertia
b	Flange size F 3 4 5
c	Overall length 1 2 3 4
d	Winding code A to Z S = special winding
e	Shaft version 0 = smooth shaft 1 = shaft with groove and feather key according to DIN 6885 2 = shaft with radial shaft-sealing ring IP 65 and smooth shaft 3 = shaft with groove and feather key according to DIN 6885 4 = shaft with radial shaft-sealing ring IP 65, smooth shaft and sealing air connection 5 = shaft with radial shaft-sealing ring IP 65, groove, feather key and sealing air connection
f	Feedback system 1 = Single-turn absolute encoder, resolution 24-bit, STO, SS1 2 = Multi-turn absolute encoder, resolution 24-bit, STO, SS1 3 = Single-turn absolute encoder, resolution 24-bit, extended safety functions 4 = Multi-turn absolute encoder, resolution 24-bit, extended safety functions
g	Holding brake 0 = without holding brake 1 = with holding brake

## Product characteristics

### No modification of the machine design

The AMP8000 can be mounted instead of a standard servomotor of the AM8000 and AM8500 series without modifying the machine design, since only the overall length has been changed. All other dimensions remain unchanged.

### Coupling module

Coupling modules are available for the AX8000 EtherCAT-based servo drive system for connecting the distributed servo drives to the PC-based control technology. With the 1-channel and 2-channel coupling modules as the only component in the control cabinet, you can establish the connection of the DC link, the 24 V<sub>DC</sub> supply and the EtherCAT communication.

### Reduced cable lengths and wiring work

Due to the high IP65 protection rating, you can integrate the distribution module directly into the machine layout. Only one cable must be routed from the control cabinet or power supply module to the distribution module.

### Minimal floor space and cabling effort

You can connect the power supply module directly to the supply network. Mains filter, rectifier and charging circuit for the integrated DC link capacitors are provided in the power supply module.

### EtherCAT P

Via the EtherCAT P M8 outputs at the power supply module and distribution module you can either supply EtherCAT P modules or connect further power supply modules for system extension.

### Holding brake [+]

The motors can be equipped as an option with permanent magnet holding brakes. These operate according to the quiescent current principle and open at a voltage of 24 V<sub>DC</sub> +6/-10 % with > 10,000,000 switching cycles.

The installed holding brake is not suitable for service braking, since there is no monitoring for wear and functionality by the servo drive and the configuration. This applies in particular to vertical axes.



### Safety measures for vertical axes must be applied

When operating vertical axes, appropriate additional measures must be taken; for example, including but not only:

- additional redundant brake units
- mechanical safeguards or interlocks
- attachment of a balancing weight

Permanent magnet holding brakes alone are not approved for the protection of persons. Taking ISO 13849-1 and 13849-2 into account, additional precautions must be taken for personal protection.

In the event of voltage interruptions due to emergency stop or power failure, the holding brake is permissible as a service brake to a limited extent. You can perform a maximum of 2000 emergency stops from a maximum of 3000 rpm with a maximum of three times the intrinsic inertia of the motor. These maximum values may vary due to increased load inertia.

The function check of the holding brake can be performed with a torque wrench or with TwinCAT Scope.

## Ordering options

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

## Drive-integrated safety technology

The distributed servo drives are optionally available with integrated safety functions. These conform to IEC 61800-5-2 and fulfill the following safety standards:

- EN ISO 13849-1:2015, up to Cat 4, PL e
- EN 61508:2010, up to SIL 3
- EN 62061:2005 + A1:2013/A2:2015 up to SILCL3

Communication takes place via the Safety over EtherCAT (FSoE) protocol according to IEC 61784-3-12.



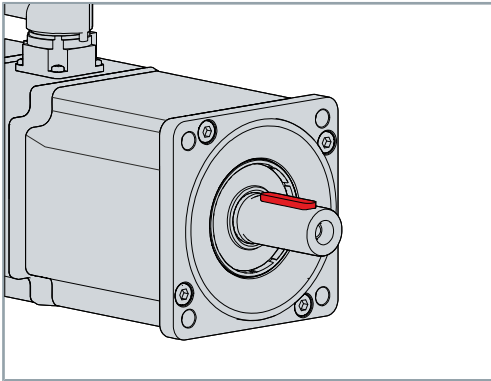
### Information on commissioning and device replacement

For commissioning and device replacement, follow the instructions in the operating manual AMP8911 – TwinSAFE card for the AMP8000 distributed servo drive.

Order identifier	Safety functions																																						
AMP80xx-xx1x	<b>Stop functions</b>																																						
AMP80xx-xx2x	<table border="1"> <tr> <td><b>STO</b></td> <td>Safe torque off</td> </tr> <tr> <td><b>SS1</b></td> <td>Safe stop 1</td> </tr> </table>	<b>STO</b>	Safe torque off	<b>SS1</b>	Safe stop 1																																		
<b>STO</b>	Safe torque off																																						
<b>SS1</b>	Safe stop 1																																						
AMP80xx-xx30	<b>Stop functions</b>																																						
AMP80xx-xx40	<table border="1"> <tr> <td><b>STO</b></td> <td>Safe torque off</td> </tr> <tr> <td><b>SOS</b></td> <td>Safe operating stop</td> </tr> <tr> <td><b>SS1</b></td> <td>Safe stop 1</td> </tr> <tr> <td><b>SS2</b></td> <td>Safe stop 2</td> </tr> <tr> <td colspan="2"><b>Speed functions</b></td> </tr> <tr> <td><b>SLS</b></td> <td>Safely-limited speed</td> </tr> <tr> <td><b>SSM</b></td> <td>Safe speed monitor</td> </tr> <tr> <td><b>SSR</b></td> <td>Safe speed range</td> </tr> <tr> <td><b>SMS</b></td> <td>Safe maximum speed</td> </tr> <tr> <td colspan="2"><b>Position functions</b></td> </tr> <tr> <td><b>SLP</b></td> <td>Safely-limited position</td> </tr> <tr> <td><b>SCA</b></td> <td>Safe cam</td> </tr> <tr> <td><b>SLI</b></td> <td>Safely-limited increment</td> </tr> <tr> <td colspan="2"><b>Acceleration functions</b></td> </tr> <tr> <td><b>SAR</b></td> <td>Safe acceleration range</td> </tr> <tr> <td><b>SMA</b></td> <td>Safe maximum acceleration</td> </tr> <tr> <td colspan="2"><b>Direction of rotation functions</b></td> </tr> <tr> <td><b>SDIp</b></td> <td>Safe direction positive</td> </tr> <tr> <td><b>SDIn</b></td> <td>Safe direction negative</td> </tr> </table>	<b>STO</b>	Safe torque off	<b>SOS</b>	Safe operating stop	<b>SS1</b>	Safe stop 1	<b>SS2</b>	Safe stop 2	<b>Speed functions</b>		<b>SLS</b>	Safely-limited speed	<b>SSM</b>	Safe speed monitor	<b>SSR</b>	Safe speed range	<b>SMS</b>	Safe maximum speed	<b>Position functions</b>		<b>SLP</b>	Safely-limited position	<b>SCA</b>	Safe cam	<b>SLI</b>	Safely-limited increment	<b>Acceleration functions</b>		<b>SAR</b>	Safe acceleration range	<b>SMA</b>	Safe maximum acceleration	<b>Direction of rotation functions</b>		<b>SDIp</b>	Safe direction positive	<b>SDIn</b>	Safe direction negative
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<b>SDIn</b>	Safe direction negative																																						

Order identifier	Safety functions	
AMP80xx-xx31	<b>Stop functions</b>	
AMP80xx-xx41	<b>STO</b>	Safe torque off
	<b>SOS</b>	Safe operating stop
	<b>SS1</b>	Safe stop 1
	<b>SS2</b>	Safe stop 2
	<b>Speed functions</b>	
	<b>SLS</b>	Safely-limited speed
	<b>SSM</b>	Safe speed monitor
	<b>SSR</b>	Safe speed range
	<b>SMS</b>	Safe maximum speed
	<b>Position functions</b>	
	<b>SLP</b>	Safely-limited position
	<b>SCA</b>	Safe cam
	<b>SLI</b>	Safely-limited increment
	<b>Acceleration functions</b>	
	<b>SAR</b>	Safe acceleration range
	<b>SMA</b>	Safe maximum acceleration
	<b>Direction of rotation functions</b>	
	<b>SDIp</b>	Safe direction positive
	<b>SDIn</b>	Safe direction negative
	<b>Brake functions</b>	
	<b>SBC</b>	Safe brake control
	<b>SBT</b>	Safe brake test

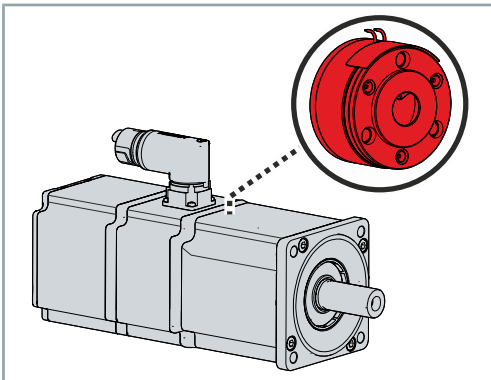
## Feather key



A feather key transmits torque to an output element.

The motors are available with feather key groove and fitted feather key according to DIN6885. The rotor is balanced with half a feather key according to DIN ISO 21940-32:2012-08.

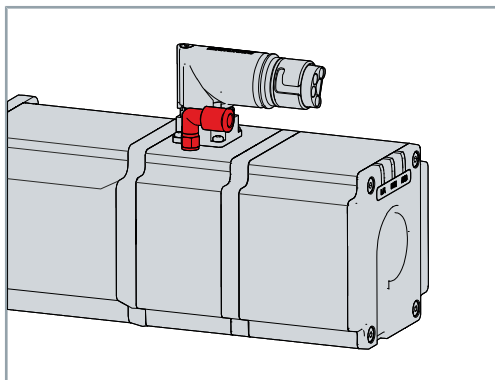
## Holding brake



A holding brake blocks the rotor in the de-energized state. The holding brake increases the motor length and the rotor moment of inertia.



## Sealing air connection



Ingress of fluids or dust at different temperature ranges can be prevented by a separate sealing air connection with a defined overpressure. The overpressure is achieved by connection to a regulated compressed air system. It is installed together with an radial shaft-sealing ring.

A sealing air connection is recommended for:

- Critical installation locations with extreme dust exposure
- Motors with permanent and direct fluid contact

### Important

In the horizontal installation position IM V3, liquid can accumulate permanently on the motor flange and penetrate into the motor. Even a sealing air connection cannot completely prevent the liquid from entering.

An air hose provided by the customer must be connected to a suitable regulated pressure reducer. The compressed air must be free of oil and dust.

Minimum requirements and technical data:	
Compressed air requirement	according to DIN ISO 8573-1 Class 3:2010 [A:B:C]
Operating pressure	0.1 ± 0.05 bar
Maximum pressure	0.3 bar
Air connection	Quick-release coupling
Required air line	e.g. PA hose 6 mm x 4 mm

## Intended use

The AMP8000 distributed servo drive system may only be operated in the intended ambient conditions and environmental conditions defined in this documentation.

The components are installed in the closed control cabinet on electrical systems or machines. Stand-alone operation of the components is not permitted.



### **Read the entire drive system documentation:**

- This translation of the original instructions
- Machine manufacturer's complete documentation for the machine

## Improper use

Any type of use that exceeds the permissible values from the technical data is regarded as inappropriate and is thus prohibited.

The distributed servo drive system of the AMP8000 series is not suitable for use in the following areas:

- Potentially explosive atmospheres without a suitable housing
- Areas with aggressive environments, for example aggressive gases or chemicals
- Areas with ionizing radiation and nuclear plants
- Aerospace industry
- Product areas that are not protected from abrasion

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

## Dual Use

According to the published EU Regulation 1382/2014, commercially available frequency converters are categorized as products with a double purpose of use. This makes the Beckhoff AMP8000 distributed servo drive system one of the dual-use products.

The goods list, Annex 1 of the Dual Use directive 428/2009 has been amended accordingly:

- Frequency converters (listed in goods list position 3A225)  $\geq 600$  Hz are subject to export control
- Frequency converters, such as the AMP8000 distributed servo drive system, with a rotary field frequency of 599 Hz are not subject to export controls

The AMP8000 distributed servo drive system is delivered with a maximum rotary field frequency of 599 Hz according to the current state of production. This is sufficient to operate all distributed servo drives of the AMP8000 series at full power.

Below you will find definitions of terms, environmental conditions, operating details and technical data for the distributed servo drive system.

## Definitions



### Characteristic torque and speed curves

Detailed information on characteristic curves can be found in the TC3 Motion Designer under:  
TE5910 | TC3 Motion Designer

All data, with the exception of the voltage constant and the resistance ph-ph, 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 of the distributed servo drive is used for heat dissipation. If a gear unit is attached, the heat dissipation is interrupted and reduces the power of the motor.

By default, the motor heat via the A-flange is dissipated into the machine bed. Due to heating of the gear unit, 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.

### Standstill torque $M_0$ [Nm]

Torque, also referred to as starting torque, that the motor can generate at standstill. It can be maintained indefinitely at a speed  $n < 100 \text{ min}^{-1}$  and nominal ambient conditions.

### Nominal torque $M_n$ [Nm]

The torque that the motor delivers when it is operated at nominal speed and nominal current. Can be output in continuous operation S1 for an unlimited period of time.

### Voltage constant $K_{E_{rms}}$ [mVmin]

Indication of the induced motor EMF at 20 °C, based on 1000 rpm. This is specified as the sine RMS value between two terminals.

**Rotor moment of inertia J [kgcm<sup>2</sup>]**

Measure of the acceleration capacity of the motor. For example, at  $J_0$  the acceleration time  $t_b$  from 0 to 3000 rpm can be calculated based on the following formula:

$$t_b[S] = \frac{3000 \cdot 2 \pi}{M_0 \cdot 60 s} \cdot \frac{m^2}{10^4 cm^2} \cdot J$$

with  $M_0$  in Nm and J in kgcm<sup>2</sup>

**Thermal time constant  $t_{TH}$  [min]**

Specification of the heating time of the cold motor under load with  $I_0$  until an overtemperature of  $0.63 \times 100$  Kelvin is reached. This temperature rise happens in a much shorter time when the motor is loaded with the peak current.

**Release delay time / application delay time of the holding brake  $t_{BRH}$  [ms]/ $t_{BRL}$  [ms]**

Specification of the response times of the holding brake [+] when operated with the nominal voltage

## Data for operation and environment



### Only operate the AMP8000 distributed servo drive system under specified conditions

Operate the AMP8000 distributed servo drive system only in accordance with the specifications for operation and the environment listed in this chapter. This ensures a long service life and proper operation.

*Temperatures above 40 °C and encapsulated installation can shorten the service life of the AMP8000 distributed servo drive system.*

Beckhoff products are designed for operation under certain environmental conditions, which vary according to 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	
Ambient temperature during operation	0 °C to +40 °C
Ambient temperature during transport	-25 °C to +70 °C, maximum fluctuation 20 K per hour
Ambient temperature during storage	-25 °C to +55 °C, maximum fluctuation 20 K per hour
Power derating	No power derating up to 1000 m above sea level Power derating of 1 % / 100 m from 1000 m up to maximally 2000 m above sea level
Installation altitude	max. 2000 m
Permissible humidity in operation	95 % relative humidity, no condensation
Permissible humidity during transport and storage	15 % to 95 % relative humidity, no condensation
Corrosion protection	Not required: Special measures are to be taken in consultation with the vendor if the environmental conditions are extreme or if they differ from those described in this chapter.
Degree of pollution	2 for AX883x 3 for AMP8620, AMP8805 and AMP80xx
Specifications for intended use	
Cooling	Convection
Insulation material class	F according to IEC 60085 and UL1446 class F
Protection rating	Housing: IP65 Shaft feedthrough: IP54 / IP20 in mounting position V3 Shaft feedthrough with shaft sealing ring: IP65
Vibration resistance	1 G, 150 Hz according to EN 60068-2-6
Shock resistance	5 G, 30 ms according to EN 60068-2-27
EMC requirements	conforms to EN 61800-3
Approvals	CE EAC cURus See chapter: Guidelines and Standards

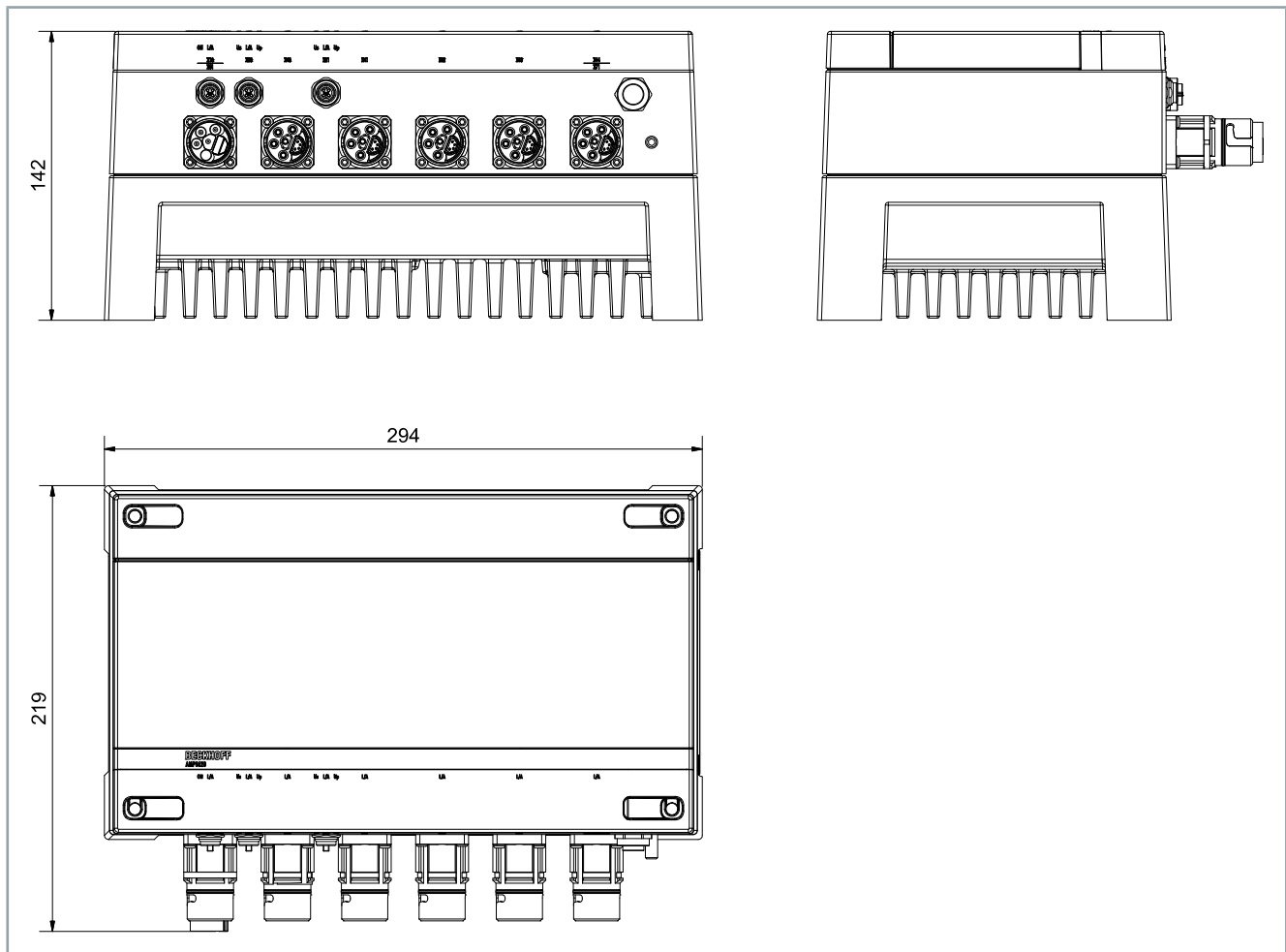
## AMP8620

Performance data	AMP8620		
	-2005-0000	-2005-0100	-2005-0200
Function	Power supply module		
Number of inputs	1 x Power IN 1 x EtherCAT P / EtherCAT		
Number of outputs	5 x Power OUT 2 x EtherCAT P OUT $U_s/U_p \sum \max. 3 A_{DC}$		
Maximum number of connected distribution modules	3		
<b>Mains supply</b>			
Input voltage [V <sub>AC</sub> ]	3 x 400 <sub>-20%...480<sup>+8%</sup></sub>		
Frequency [Hz]	50/60		
Mains filter	Integrated, category C2		
SCCR value [kA]	5		
<b>DC link</b>			
Voltage [V <sub>DC</sub> ]	430...848		
Capacitance [μF]	940		
Output current [A <sub>DC</sub> ]	$\sum \max. 20$		
<b>Braking resistor</b>			
Installation	---	integrated	external
Continuous braking power [W]	---	50	1600
<b>Mechanical data</b>			
	AMP8620		
	-2005-0000	-2005-0100	-2005-0200
Weight [kg]	7	8.70	7
Protection rating	IP 65		
Protection rating conforms to UL	NEMA 12		

## Dimensional drawing

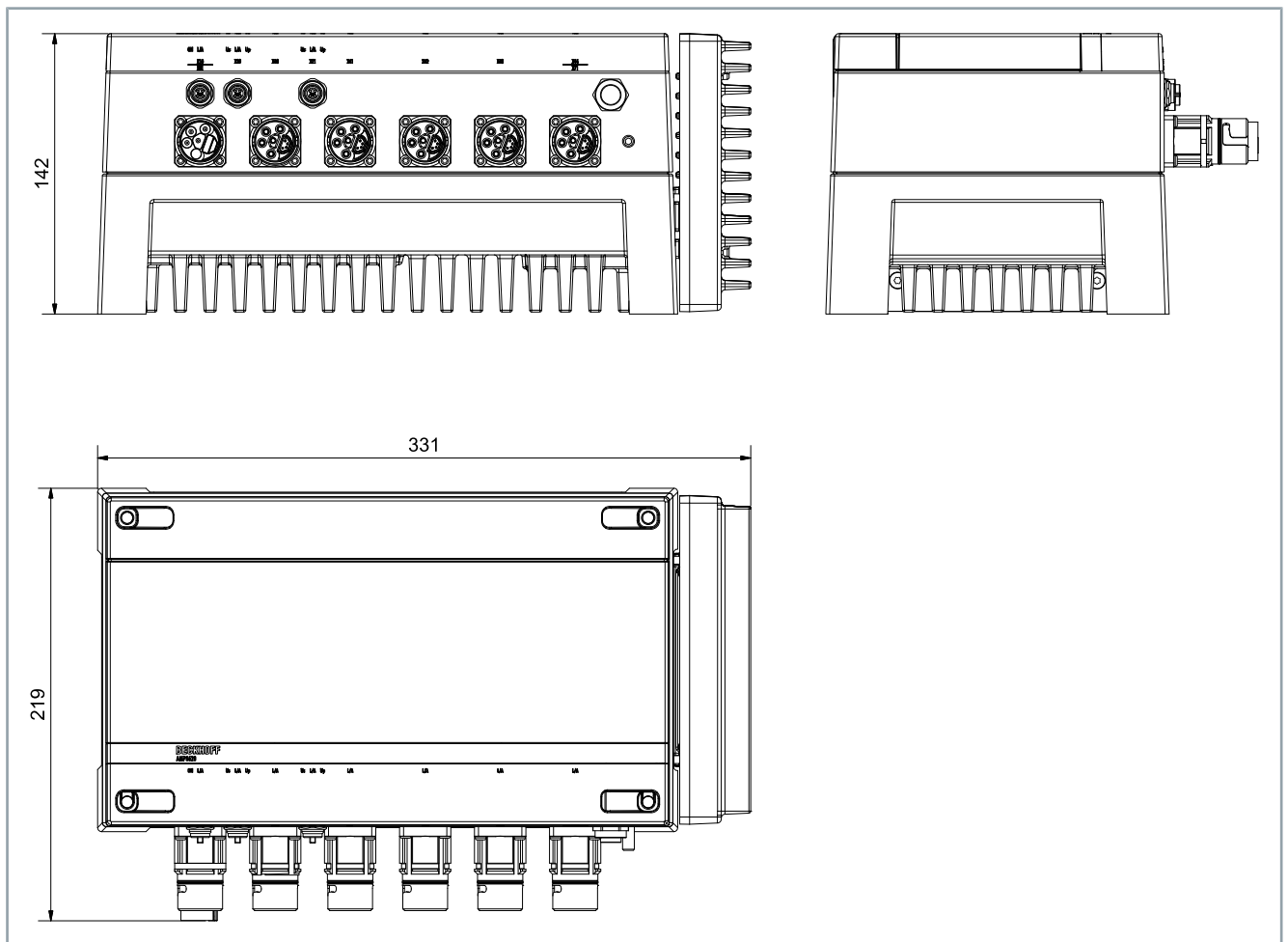
- All figures in millimeters

AMP8620-2005-0000

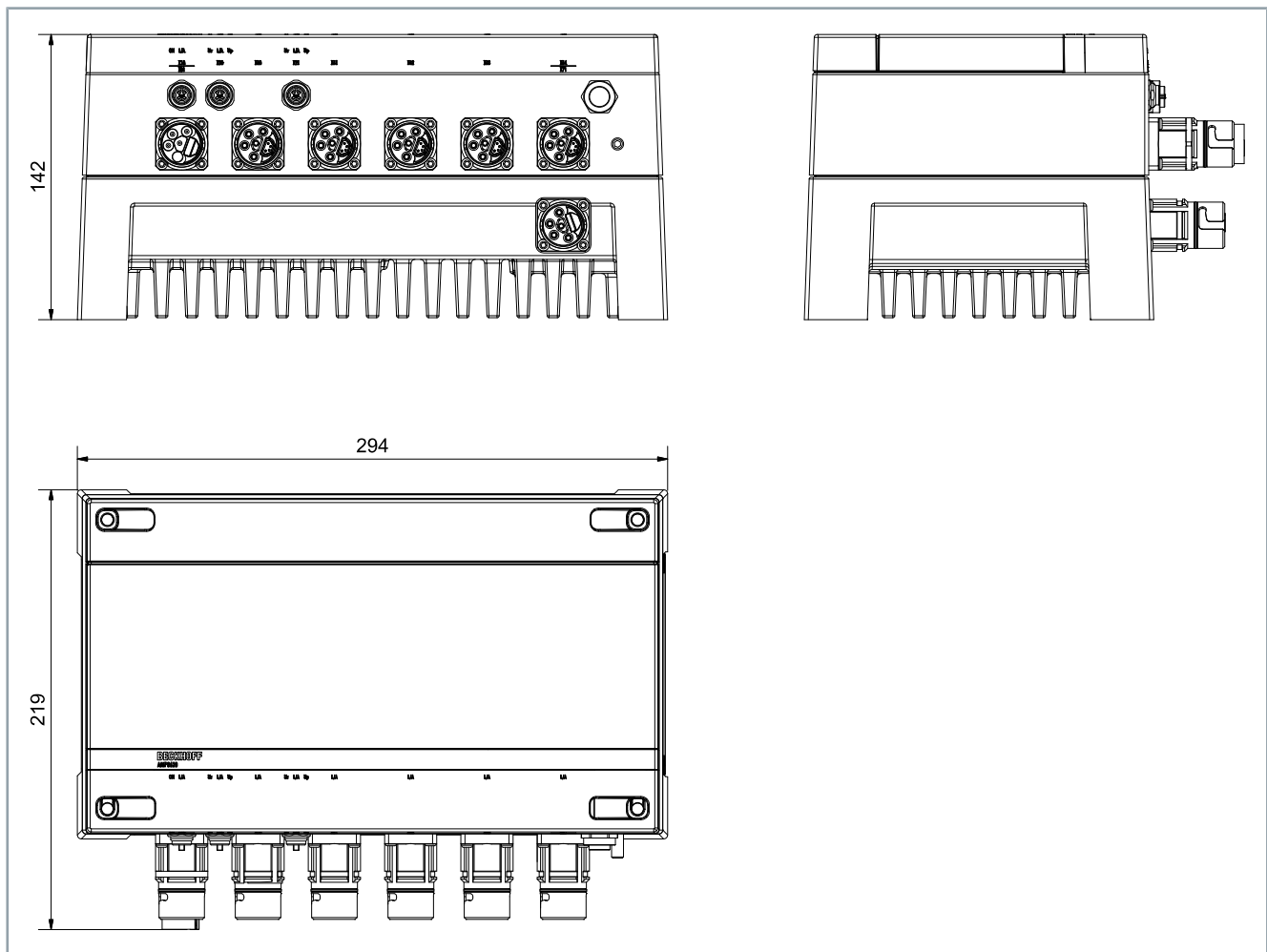




AMP8620-2005-0100



## AMP8620-2005-0200



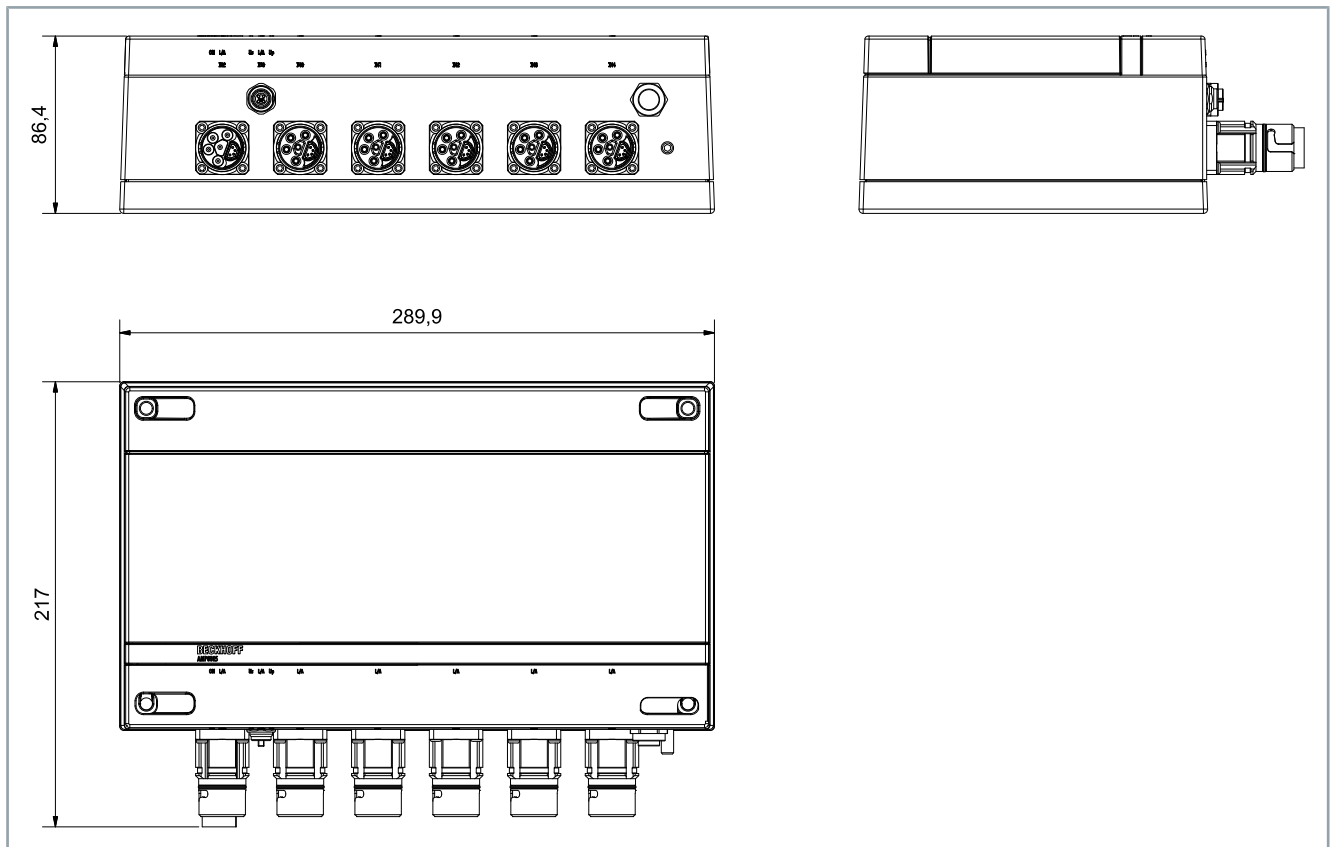
## AMP8805

Performance data	AMP8805-1000-0000
Function	Distribution module
Number of inputs	1 x Power IN 430...848 V <sub>DC</sub> ; maximum 20 A <sub>DC</sub>
Number of outputs	5 x Power OUT 1 x EtherCAT P OUT U <sub>s</sub> /U <sub>p</sub> ; maximum 3 A <sub>DC</sub>
DC link	
Voltage [V <sub>DC</sub> ]	430...848
Capacitance [μF]	940
Output current [A <sub>DC</sub> ]	∑ max. 20
Mechanical data	AMP8805-1000-0000
Weight [kg]	4.50
Protection rating	IP 65
Protection rating conforms to UL	NEMA 12

## Dimensional drawing

- All figures in millimeters

### AMP8805-1000-0000



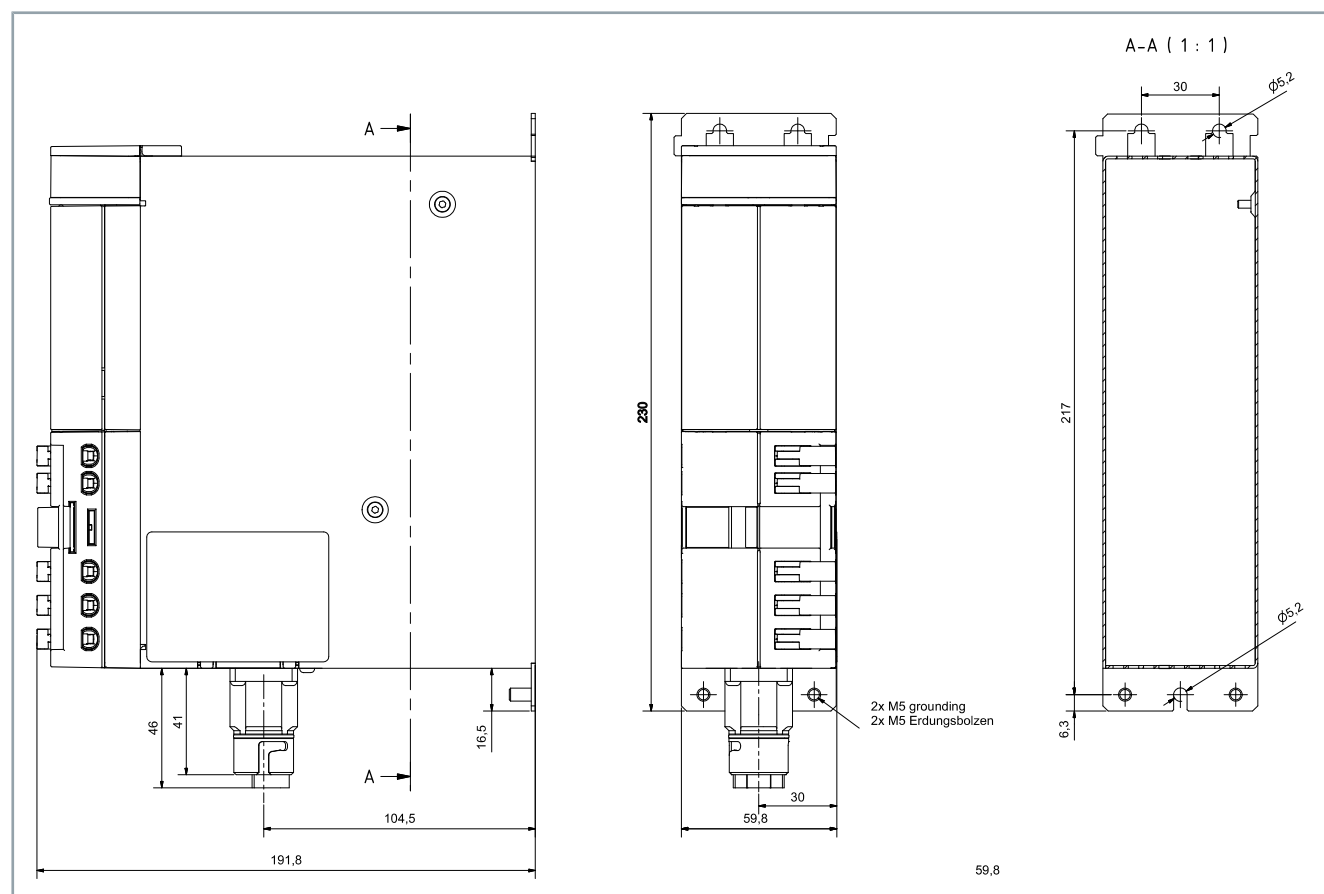
## AX883x

Performance data	AX8831-0000-0000	AX8832-0000-0000
Function	Coupling module	
Number of channels	1	2
Nominal output current DC – Link [ $A_{DC}$ ]	20	2 x 20
Nominal output current 24 VDC [ $A_{DC}$ ]	10	2 x 10
DC link voltage [ $V_{DC}$ ]	430...848	
Mechanical data	AX8831	AX8832
Weight [kg]	1.80	1.90
Protection rating	IP20	IP20

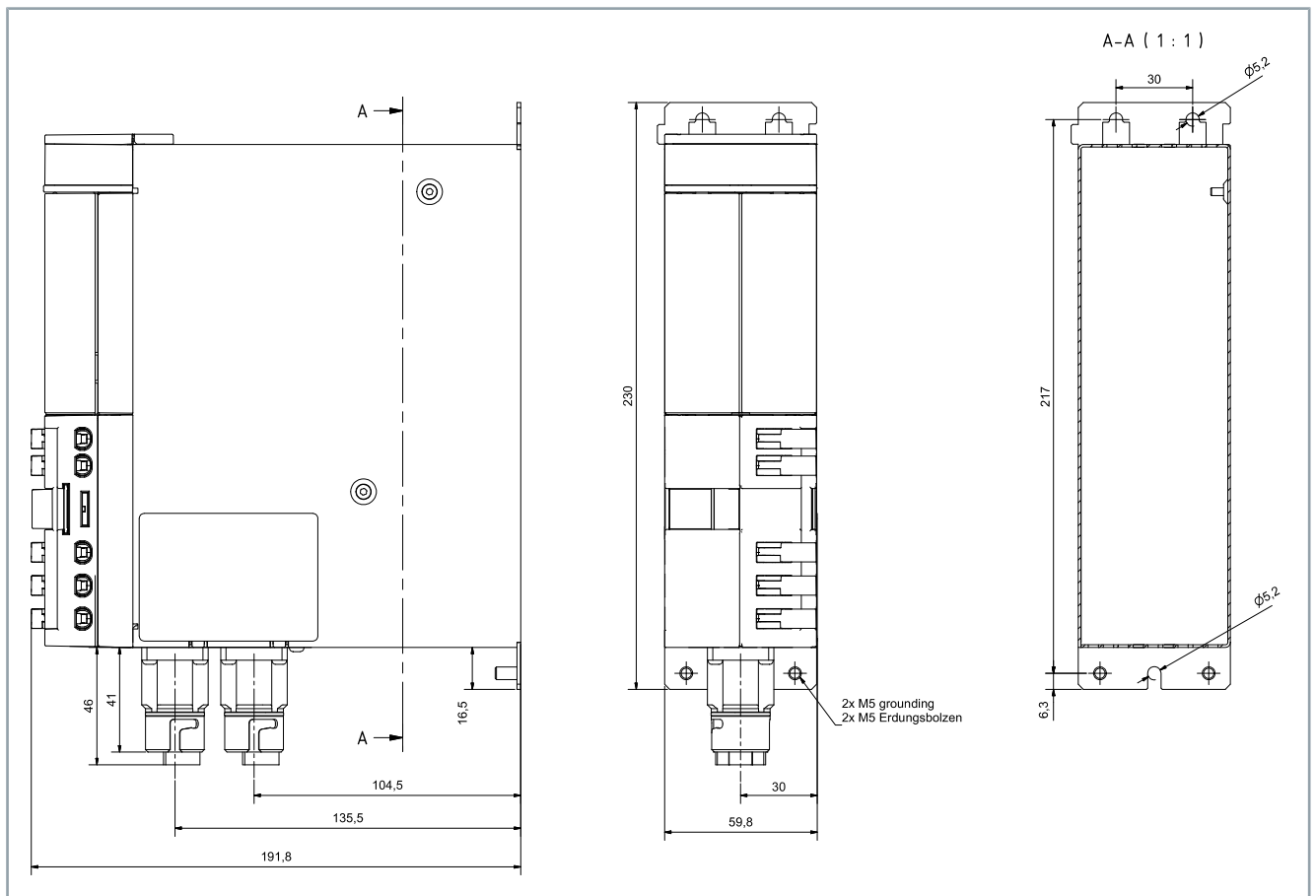
## Dimensional drawing

- All figures in millimeters

### AX8831-0000-0000



AX8832-0000-0000



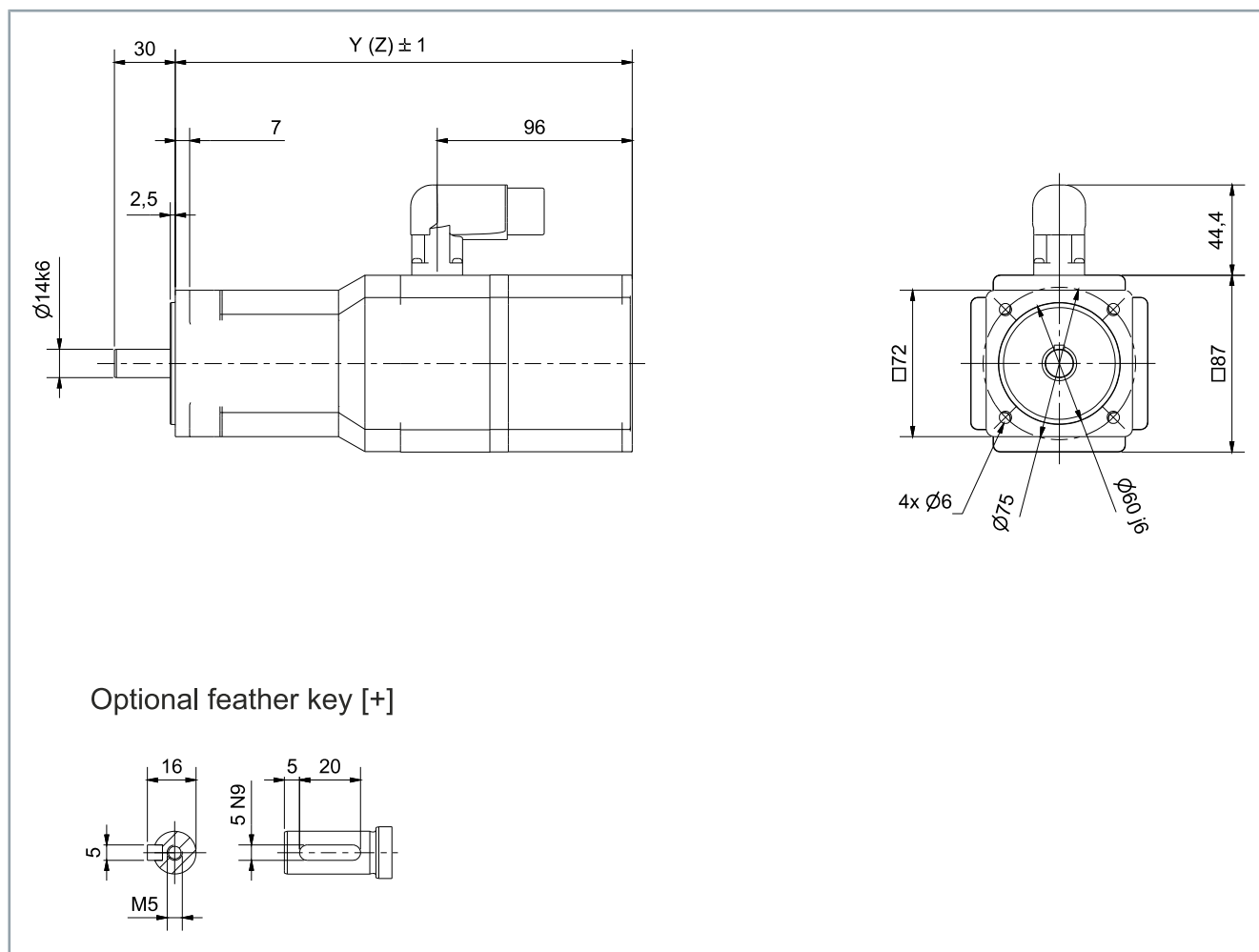
## AMP803x and AMP853x

Performance data	AMP80xx and AMP85xx								
	31-C	31-D	31-F	32-D	32-E	32-H	33-E	33-F	33-J
Standstill torque $M_0$ [Nm]	1.38	1.38	1.36	2.37	2.37	2.35	3.15	3.15	3.10
Standstill current $I_{0rms}$ [A]	1	1.95	3.10	1.69	2.95	5.06	2.07	4	6.54
Maximum mechanical speed $N_{max}$ [min <sup>-1</sup> ]	10000								
DC link voltage $[V_{DC}]$	0...848								
Peak current $I_{0max}$ [A]	5.50	10.7	17.6	9.60	17.2	18	12.90	18	18
Peak torque $M_{0max}$ [Nm]	6.10	6.07	6.07	11.7	11.7	8.27	17.20	14.36	9.37
Torque constant $K_{Trms}$ [Nm/A]	1.37	0.71	0.44	1.40	0.80	0.46	1.52	0.79	0.47
Voltage constant $K_{Erms}$ [mV/min]	99	50	30	100	56	32	106	57	34
Winding resistance Ph-Ph $R_{20}$ [Ω]	51	12.60	5	21	6.5	2.2	13.20	3.9	1.35
Winding inductance Ph-Ph, measured at 1 kHz $L$ [mH]	134	36	13.30	71.90	22.60	7.70	46.30	14	4.90
<b>Power supply UN = 400 V</b>									
Nominal speed $N_n$ [min <sup>-1</sup> ]	3000	6000	9000	3000	6000	9000	3000	6000	8000
Nominal torque $M_n$ [Nm]	1.36	1.34	1.30	2.27	2.05	0.80	2.95	2.55	0.50
Nominal output $P_n$ [kW]	0.43	0.84	1.23	0.71	1.29	0.75	0.93	1.60	0.42
Nominal current $I_n$ [A]	0.99	1.90	3	1.62	2.57	1.72	1.95	3.25	1.05
<b>Power supply UN = 480 V</b>									
Nominal speed $N_n$ [min <sup>-1</sup> ]	3400	6800	9000	3400	6800	9000	3400	6800	9000
Nominal torque $M_n$ [Nm]	1.35	1.32	1.30	2.22	1.95	0.80	2.91	2.45	0.50
Nominal output $P_n$ [kW]	0.48	0.94	1.23	0.79	1.39	0.75	1.04	1.74	0.42
Nominal current $I_n$ [A]	0.99	1.87	3	1.59	2.44	1.72	1.91	3.12	1.05
<b>Connection technology</b>	ECP-B23 round connector, rotatable, angled								
<b>System bus</b>	EtherCAT								
<b>Drive profile</b>	CiA402 conforms to IEC 61800-7-201; CoE								
Reference flange aluminum 230 mm x 130 mm x 10 mm									
Mechanical data	AMP80xx			AMP85xx					
	31	32	33	31	32	33			
Rotor moment of inertia without brake $J$ [kgcm <sup>2</sup> ]	0.47	0.85	1.23	1.67	2.05	2.44			
Rotor moment of inertia with brake $J$ [kgcm <sup>2</sup> ]	0.55	0.93	1.46	1.76	2.15	2,67			
Static friction torque $M_R$ [Nm]	0.01	0.02	0.02	0.01	0.02	0.02			
Weight without brake [kg]	3.40	4.0	4.60	4.0	4.6	5.2			
Weight with brake [kg]	3.80	4.40	5.20	4.2	4.9	5,8			
<b>Flange according to IEC DIN 42955</b>									
Fit	j6								
Tolerance class	N								
<b>Protection rating</b>									
Standard housing version	IP65								
Standard shaft feedthrough version	IP54 / IP20 in mounting position V3								
Shaft feedthrough with radial shaft-sealing ring	IP65								

Performance data		AMP80xx and AMP85xx							
		31-C	31-D	31-F	32-D	32-E	32-H	33-E	33-F
Protection rating conforms to UL	NEMA 12								
<b>Paint finishes</b>									
Properties	Acrylic powder-coated								
Color	Anthracite gray; RAL 7016								
<b>Material</b>	Aluminum								
<b>Ball bearing service life</b>	≥ 30,000 operating hours								
<b>Cooling</b>	Convection								
<b>Thermal class</b>	Th-CI F; according to EN 60034-1								
<b>Temperature sensor</b>	Integrated temperature sensor in stator winding								
Optional holding brake [+]	AMP80xx			AMP85xx					
	31	32	33	31	32				
Holding torque at 120 °C $M_{BR}$ [Nm]	2		3.5	2					
Supply voltage $U_{BR}$ [V <sub>DC</sub> ]	24; +6 % to -10 %								
Electrical power $P_{BR}$ [W]	11		12	11					
Current $I_{on}$ [A]	0.33		0.36	0.33					
Release delay time $t_{BRH}$ [ms]	25		35	25					
Application delay time $t_{BRL}$ [ms]	8		15	8					

## Dimensional drawing

- All figures in millimeters



Motor type	Y	Z with holding brake
AMP8031-xxxx-1001	225.0 mm	264.5 mm
AMP8032-xxxx-1001	250.5 mm	290.0 mm
AMP8033-xxxx-1001	276.0 mm	325.0 mm
AMP8531-xxxx-1001	264.5 mm	290.0 mm
AMP8532-xxxx-1001	290.0 mm	325.0 mm
AMP8533-xxxx-1001	325.0 mm	360.0 mm



## AMP804x and AMP854x

Performance data	AMP80xx and AMP85xx								
	41-D	41-E	41-H	42-E	42-F	42-J	43-E	43-H	43-K
Standstill torque $M_0$ [Nm]	2.40	2.40	2.35	4.10	4.05	3.84	5.40	5.30	4.70
Standstill current $I_{0rms}$ [A]	1.67	2.93	5.11	2.16	4.05	6.40	2.77	5.05	7.83
Maximum mechanical speed $N_{max}$ [min <sup>-1</sup> ]	9000								
DC link voltage $V_{DC}$	0...848								
Peak current $I_{0max}$ [A]	8.30	13.60	18	11.80	18	18	16.60	18	18
Peak torque $M_{0max}$ [Nm]	9.67	9.14	7.76	18.90	16.20	11.10	29.30	19.20	11.80
Torque constant $K_{Trms}$ [Nm/A]	1.44	0.82	0.46	1.90	1	0.60	1.95	1.05	0.60
Voltage constant $K_{Ems}$ [mV/min]	101	56	33	128	68	41	131	73	42
Winding resistance Ph-Ph $R_{20}$ [ $\Omega$ ]	22.50	6.10	2.21	14.20	3.70	1.40	8.20	2.40	0.83
Winding inductance Ph-Ph, measured at 1 kHz L [mH]	83.10	25	8.50	64.90	17.40	6.30	42	11.70	3.90
<b>Power supply UN = 400 V</b>									
Nominal speed $N_n$ [min <sup>-1</sup> ]	3000	6000	8000	2500	5000	7000	2500	5000	7000
Nominal torque $M_n$ [Nm]	2.37	2.20	1.80	3.70	3.15	1	5.15	3.40	0.50
Nominal output $P_n$ [kW]	0.74	1.38	1.51	0.97	1.65	0.73	1.35	1.78	0.37
Nominal current $I_n$ [A]	1.65	2.70	3.91	1.95	3.15	1.67	2.64	3.24	0.83
<b>Power supply UN = 480 V</b>									
Nominal speed $N_n$ [min <sup>-1</sup> ]	3400	6800	8000	2800	5700	7000	2800	5700	7000
Nominal torque $M_n$ [Nm]	2.34	2.10	1.80	3.63	2.90	1	5	3.05	0.50
Nominal output $P_n$ [kW]	0.83	1.50	1.51	1.06	1.73	0.73	1.47	1.82	0.37
Nominal current $I_n$ [A]	1.63	2.65	3.91	1.91	2.90	1.67	2.57	2.91	0.83
<b>Connection technology</b>	ECP-B23 round connector, rotatable, angled								
<b>System bus</b>	EtherCAT								
<b>Drive profile</b>	CiA402 conforms to IEC 61800-7-201; CoE								
Reference flange aluminum 230 mm x 130 mm x 10 mm									
Mechanical data	AMP80xx			AMP85xx					
	41	42	43	41	42	43			
Rotor moment of inertia without brake J [kgcm <sup>2</sup> ]	1.09	1.98	2.87	4.62	5.51	6.41			
Rotor moment of inertia with brake J [kgcm <sup>2</sup> ]	1.73	2.63	3.52	5.27	6.17	7.06			
Static friction torque $M_R$ [Nm]	0.02	0.027	0.035	0.02	0.02	0.03			
Weight without brake [kg]	4.10	5.10	6.20	5.1	6.2	7.3			
Weight with brake [kg]	4.90	6	7.10	5.8	7.0	8.2			
<b>Flange according to IEC DIN 42955</b>									
Fit	j6								
Tolerance class	N								
<b>Protection rating</b>									
Standard housing version	IP65								
Standard shaft feedthrough version	IP54 / IP20 in mounting position V3								

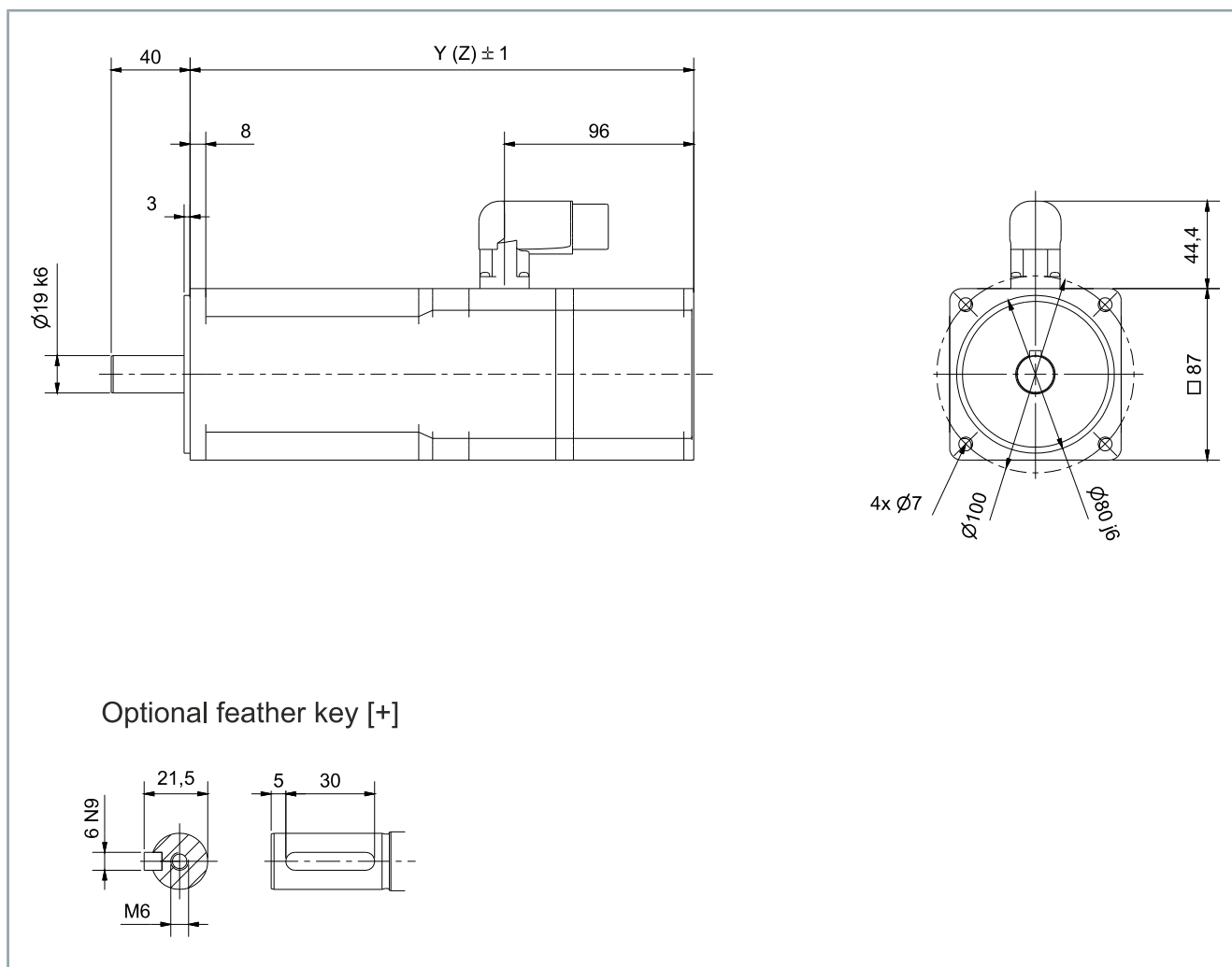
# Technical data

Performance data		AMP80xx and AMP85xx							
		41-D	41-E	41-H	42-E	42-F	42-J	43-E	43-H
Shaft feedthrough with radial shaft-sealing ring	IP65								
Protection rating conforms to UL	NEMA 12								
<b>Paint finishes</b>									
Properties	Acrylic powder-coated								
Color	Anthracite gray; RAL 7016								
<b>Material</b>	Aluminum								
<b>Ball bearing service life</b>	≥ 30,000 operating hours								
<b>Cooling</b>	Convection								
<b>Thermal class</b>	Th-CI F; according to EN 60034-1								
<b>Temperature sensor</b>	Integrated temperature sensor in stator winding								

Optional holding brake [+]	AMP80xx			AMP85xx		
	41	42	43	41	42	43
Holding torque at 120 °C $M_{BR}$ [Nm]	9					
Release delay time $t_{BRH}$ [ms]	40					
Application delay time $t_{BRL}$ [ms]	20					
Control voltage						
<b>Without holding brake</b>						
Control voltage input $[V_{DC}]$	18 to 31					
Current consumption of the control voltage $[A_{DC}]$	0.19					
<b>With holding brake</b>						
Control voltage input $[V_{DC}]$	21.6 to 25.4					
Current consumption of the control voltage $[A_{DC}]$	0.99					

Dimensional drawing

• All figures in millimeters



Motor type	Y	Z with holding brake
AMP8041	225.5 mm	273.0 mm
AMP8042	255.5 mm	303.0 mm
AMP8043	285.5 mm	333.0 mm
AMP8541	273.0 mm	303.0 mm
AMP8542	303.0 mm	333.0 mm
AMP8543	333.0 mm	363.0 mm

## AMP805x & AMP855x

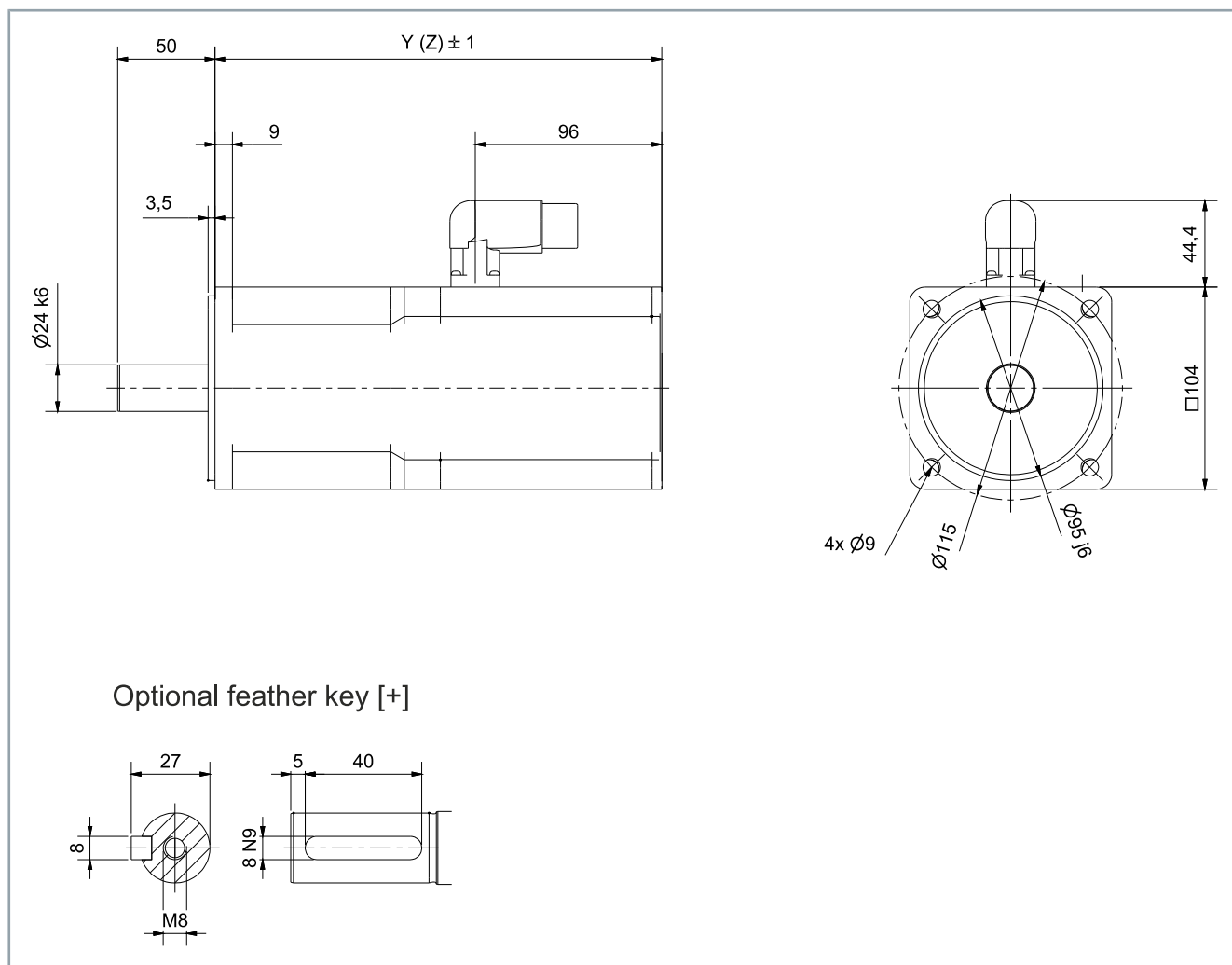
Performance data	AMP80xx and AMP85xx										
	51-E	51-G	51-K	52-F	52-J	52-L	53-G	53-J	53-K	54-J	
Standstill torque $M_0$ [Nm]	4.60	4.60	4.40	7.60	7.60	5.60	10.20	10.20	9.60	11.80	
Standstill current $I_{0rms}$ [A]	2.60	4.50	8	3.10	5.90	8	4.20	6.20	8	5	
Maximum mechanical speed $N_{max}$ [min <sup>-1</sup> ]	9000										
DC link voltage [V <sub>DC</sub> ]	0...848										
Peak current $I_{0max}$ [A]	12.10	18	18	17.90	18	18	18	18	18	18	
Peak torque $M_{0max}$ [Nm]	17.70	16.40	10.70	35.30	23.40	14.20	41.60	31.10	24.90	42.80	
Torque constant $K_{Trms}$ [Nm/A]	1.77	1.03	0.55	2.48	1.30	0.70	2.42	1.65	1.20	2.38	
Voltage constant $K_{Erms}$ [mV/min]	125	73	40	167	89	49	168	115	89	160	
Winding resistance Ph-Ph $R_{20}$ [Ω]	11.40	3.60	1.14	8.50	2.30	0.70	5.10	2.45	1.40	3.44	
Winding inductance Ph-Ph, measured at 1 kHz L [mH]	42.70	14.40	4.60	36.90	10.50	3.20	23.70	11.10	6.60	16	
<b>Power supply UN = 400 V</b>											
Nominal speed $N_n$ [min <sup>-1</sup> ]	2500	5000	8000	2000	4000	7300	2000	3000	4000	2000	
Nominal torque $M_n$ [Nm]	4.50	3.90	2.50	7	6.20	3.10	8.20	7	6	9.50	
Nominal output $P_n$ [kW]	1.18	2.04	2.09	1.47	2.60	2.37	1.72	2.20	2.51	1.99	
Nominal current $I_n$ [A]	2.55	3.80	4.50	2.80	4.80	4.30	3.40	4.20	5	4	
<b>Power supply UN = 480 V</b>											
Nominal speed $N_n$ [min <sup>-1</sup> ]	3000	5700	8000	2300	4500	7500	2400	3500	4500	2200	
Nominal torque $M_n$ [Nm]	4.48	3.70	2.50	6.80	5.90	2.60	7.60	6.40	5.40	9.20	
Nominal output $P_n$ [kW]	1.41	2.21	2.09	1.64	2.78	2.04	1.91	2.35	2.54	2.12	
Nominal current $I_n$ [A]	2.50	3.70	4.50	2.70	4.60	3.60	3.20	3.90	4.90	3.90	
<b>Connection technology</b>	ECP-B23 round connector, rotatable, angled										
<b>System bus</b>	EtherCAT										
<b>Drive profile</b>	CiA402 conforms to IEC 61800-7-201; CoE										
Reference flange aluminum 305 mm x 305 mm x 10 mm											
Mechanical data	AMP80xx				AMP85xx						
	51	52	53	54	51	52	53				
Rotor moment of inertia without brake J [kgcm <sup>2</sup> ]	2.24	4.08	5.92	7.90	8.75	10.60	12.40				
Rotor moment of inertia with brake J [kgcm <sup>2</sup> ]	2.90	4.74	7.04	9.66	9.41	11.30	13.51				
Static friction torque $M_R$ [Nm]	0.02	0.036	0.05	0.065	0.02	0.03	0.05				
Weight without brake [kg]	5.50	7.10	8.80	10.50	6.9	8.5	10.2				
Weight with brake [kg]	6.30	8	9.80	11.50	7.7	9.3	11.2				
<b>Flange according to IEC DIN 42955</b>											
Fit	j6										
Tolerance class	N										
<b>Protection rating</b>											
Standard housing version	IP65										
Standard shaft feedthrough version	IP54 / IP20 in mounting position V3										

Performance data		AMP80xx and AMP85xx									
		51-E	51-G	51-K	52-F	52-J	52-L	53-G	53-J	53-K	54-J
Shaft feedthrough with radial shaft-sealing ring	IP65										
Protection rating conforms to UL	NEMA 12										
<b>Paint finishes</b>											
Properties	Acrylic powder-coated										
Color	Anthracite gray; RAL 7016										
<b>Material</b>	Aluminum										
<b>Ball bearing service life</b>	≥ 30,000 operating hours										
<b>Cooling</b>	Convection										
<b>Thermal class</b>	Th-CI F; according to EN 60034-1										
<b>Temperature sensor</b>	Integrated temperature sensor in stator winding										

Optional holding brake [+]	AMP80xx				AMP85xx	
	51	52	53	54	51	52
Holding torque at 120 °C MBR [Nm]	9		13	20	9	
Release delay time tBRH [ms]	40		45	110	40	
Application delay time tBRL [ms]	20		20	40	20	
Control voltage						
<b>Without holding brake</b>						
Control voltage input [V <sub>DC</sub> ]	18 to 31					
Current consumption of the control voltage [A <sub>DC</sub> ]	0.19					
<b>With holding brake</b>						
Control voltage input [V <sub>DC</sub> ]	21.60 to 25.40					
Current consumption of the control voltage [A <sub>DC</sub> ]	0.99					

## Dimensional drawing

- All figures in millimeters



Motor type	Y	Z with holding brake
AMP8051	230.0 mm	277.0 mm
AMP8052	263.0 mm	310.0 mm
AMP8053	296.0 mm	345.0 mm
AMP8054	329.0 mm	378.0 mm
AMP8551	277.0 mm	310.0 mm
AMP8552	310.0 mm	345.0 mm
AMP8553	345.0 mm	378.0 mm



## Check the scope of supply for 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.

The scope of delivery always includes the following documents:

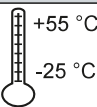



Translation of the original instructions	Short information
AMP8620 and AX883x	AMP8805 and AMP8000

Depending on the application, the scope of delivery may consist of different components. Please check the delivery:

Components	Connector
AMP8620-2005-0200	X71 Mating connector including crimp contacts Connection for external brake resistor

## Packaging

Instructions for handling are printed on the packaging:

Symbol	Explanation
	That is the highest and lowest temperature at which you may store.
	This is the correct position for the packaging.
	The packaging must be protected from moisture.
	The contents are fragile.

The tables below show the dimensions of the packages:

Module			
Dimension	AMP8620	AMP8805	AX883x
Height [mm]	490	490	370
Width [mm]	385	385	275
Depth [mm]	290	290	130

AMP (without brake)								
Dimension	803x-xxx0	804x-xxx0	805x-xxx0	853x-xxx0	8533-xxx0	8541-xxx0	854x-xxx0	855x-xxx0
Height [mm]	177	177	195	177	195	177	195	195
Width [mm]	155	155	190	155	190	155	190	190
Depth [mm]	370	370	430	370	430	370	430	430

AMP (with brake)											
Dimension	803x-xxx1	8033-xxx1	8041-xxx1	804x-xxx1	805x-xxx1	8054-xxx1	8531-xxx1	853x-xxx1	584x-xxx1	855x-xxx1	8553-xxx1
Height [mm]	177	195	177	195	195	270	177	195	195	195	270
Width [mm]	155	190	155	190	190	256	155	190	190	190	256
Depth [mm]	370	430	370	430	430	695	370	430	430	430	695



## **WARNING**

### **Protect AMP8000 from damage**

During transport and storage, protect the distributed servo drive system from damage and observe the conditions.

*Damage may result in hazardous voltages being present on the housing or exposed components and can lead to serious or even fatal injuries.*



### **Avoid damage 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 distributed servo drive system and void the warranty.*



### **Avoid short circuit due to moisture**

Condensed water can form during transport in cold weather or in case of extreme temperature differences. Make sure that no moisture collects in the distributed servo drive system. Equalize room temperatures slowly. Switch the components and modules on only when they are dry.

*If the distributed servo drive system is not completely dry, condensation can cause a short circuit when switching on and damage the components and modules.*



### **Do not remove the yellow protective cap**

Do not remove the yellow protective cap on the drive shaft of the distributed servo drive.

*The protective cap protects against mechanical damage and environmental influences. If you remove the protective cap, the shaft may be damaged.*

## Conditions

Care must be taken that the distributed servo drive system and individual components are not damaged during transport and storage. Observe the specifications in the following chapters and comply with the following conditions:

- Avoid electrostatic charging
- Avoid contact with highly insulating materials
- Temperature: -25 °C to +55 °C, maximum fluctuation 20 K per hour
- Air humidity: relative humidity max. 95 %, non-condensing
- Use of suitable means of transport
- Use of the vendor's original packaging

The table shows the maximum stacking height in which you may store and transport the distributed servo drive system in its original packaging on a pallet:

AMP component	Stacking height [pieces]
AMP8620	8
AMP8805	8
AMP883x	8
AMP803x-xxxx	14 per layer; 7 layers per pallet
AMP804x-xxxx	
AMP853x-xxxx	
AMP8531-xxx1	
AMP8541-xxx0	
AMP8033-xxx1	9 per layer; 6 layers per pallet
AMP804x-xxx1	
AMP805x-xxxx	
AMP8533-xxx0	
AMP853x-xxx1	
AMP854x-xxx0	
AMP854x-xxx1	
AMP8054-xxx1	
AMP8553-xxx1	

## Transport

### **WARNING**

#### **Do not move under suspended loads**

Use suitable means of transport and secure components of the distributed servo drive system against falling down.

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



#### **Avoid high mechanical stresses**

Use suitable means of transport and secure components of the distributed servo drive system against high mechanical stress.

*High mechanical stresses will damage the distributed servo drive system and individual components.*

## AMP8000

Transport of the components of the distributed servo drive system of the AMP8000 series without aids.

## Long-term storage

You have the possibility to store the components of the distributed servo drive system over a short or long period. For storage we always recommend the original packaging. Adhere to the conditions specified in the chapter: "Transport and storage", [Page 57].

Ensure the storage space is vibration-free.

## Important notes

Observe the following instructions for the various components:

### AX883x, AMP8620, AMP8805



#### Observe the maximum storage time

Do not exceed a maximum storage time of five years.

*Exceeding the specified maximum storage time can lead to a change in the properties of the components used in the distributed servo drive system and may damage them during operation.*

### AMP80xx



#### 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

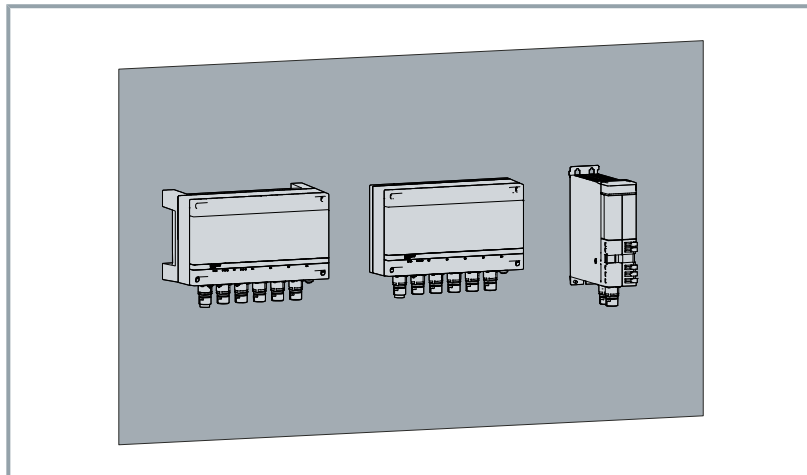
Keep the ambient temperature constant. Avoid solar radiation and high air humidity.

*Condensation water can lead to damage during subsequent operation or to rust formation.*

## Installation position

### Modules

The standard installation position of the modules in the machine or in the control cabinet is the vertical installation position with the connections facing downwards.



### Motors



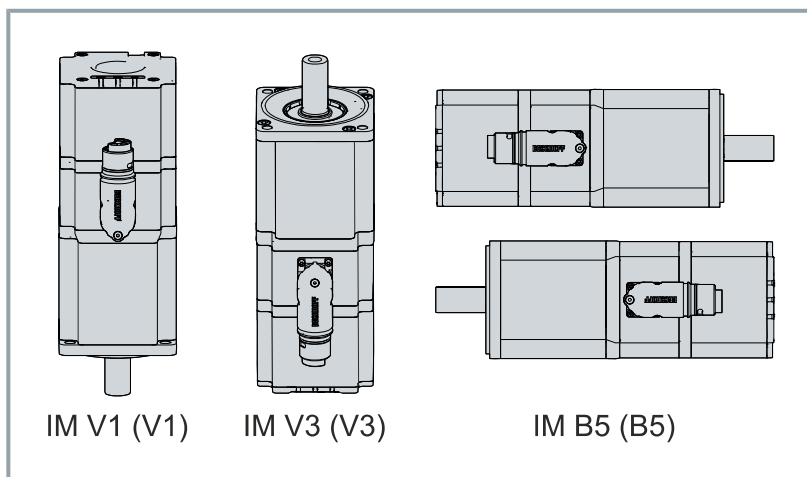
#### Observe the maintenance intervals and installation positions

Carry out maintenance at regular intervals.

In the horizontal installation position IM V3, liquid which has been left on the flange for a longer period can penetrate the motor through 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.*

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



## Dimensioning

In the following you will find important information about the cable lengths.

## Cable lengths

Various cable lengths apply to the AMP8000 distributed servo drive system.

<b>Module combination</b>	<b>Maximum cable length [m]</b>
AMP8620 with AMP8805	75
AMP8805 with AMP8805	75
AX883x with AMP8805	75
AMP8620 with AMP80xx	30
AMP8805 with AMP80xx	30
AX883x with AMP80xx	30
AMP8620 with AMP85xx	30
AMP8805 with AMP85xx	30
AX883x with AMP85xx	30

## Wide voltage range

You have the option of operating the AMP8000 distributed servo drive system worldwide on different voltage systems thanks to the wide voltage range of the AMP8620 power supply modules.

All networks with a grounded center point are permitted; TT / TN.

Data are given below for the wide voltage range of the power supply modules for the three-phase supply networks:

- $3 \times 400_{-20\%} V_{AC}$  to  $3 \times 480^{+8\%} V_{AC}$



### Supply networks

Further information on all supply networks in the chapter:  
→ "Electrical installation, supply networks", [Page 86]



### Country-specific examples

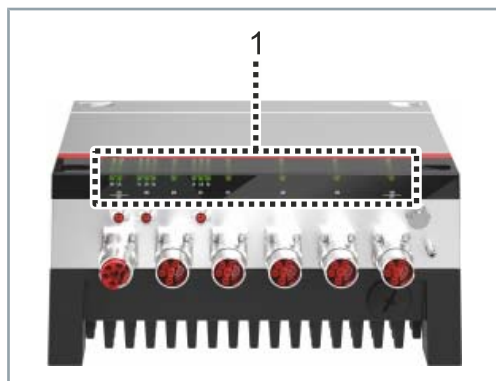
The following table contains examples of different network systems in various countries:

Country	Single-phase supply networks	Three-phase supply networks
Japan	1 x 100 V <sub>AC</sub>	3 x 200 V <sub>AC</sub>
North America	1 x 115 V <sub>AC</sub>	3 x 480 V <sub>AC</sub>
Europe	1 x 230 V <sub>AC</sub>	3 x 400 V <sub>AC</sub>

## Display

The LEDs of the AMP8000 distributed servo drive system provide information on the operating state. There are different light sequences for each operating state. The following section provides information on the meaning of the various status LEDs on the components of the AMP8000 distributed servo drive system.

## Power supply modules and distribution modules



The following tables provide information about the LED displays [1] on power supply modules and distribution modules.

### AMP8620

ON = status display of the power supply	
LED	Status
lit	The device is in operation. Connection X10 is available for communication via EtherCAT P
Flashes	LED flashes for two seconds when starting the device
off	No or too low mains voltage or DC link voltage

Us/Up = status display of the power supply	
LED	Status
lit	24 V power supply at outputs X20/X21
off	No 24 V power supply at outputs X20/X21

L/A = Link/Activity to display the communication state	
LED	Status
lit	LINK: connection to the connected EtherCAT module
Flashes	ACT: communication with connected EtherCAT module
off	No connection to the connected EtherCAT module

### AMP8805

ON = status display of the power supply	
LED	Status
lit	The device is in operation. Connection X20 is available for communication via EtherCAT P.

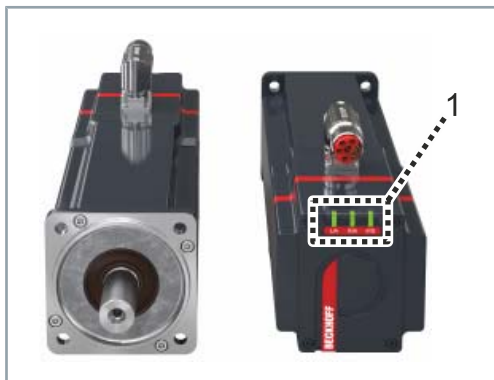


<b>ON = status display of the power supply</b>	
<b>LED</b>	<b>Status</b>
Flashes	LED flashes for two seconds when starting the device
off	No or too low mains voltage or DC link voltage

<b>Us/Up = status display of the power supply</b>	
<b>LED</b>	<b>Status</b>
lit	24 V power supply at output X20
off	No 24 V power supply at output X20

<b>L/A = Link/Activity to display the communication state</b>	
<b>LED</b>	<b>Status</b>
lit	LINK: connection to the connected EtherCAT module
Flashes	ACT: communication with connected EtherCAT module
off	No connection to the connected EtherCAT module

## Drives



The following tables provide information on the LED displays [1] on the actuators.

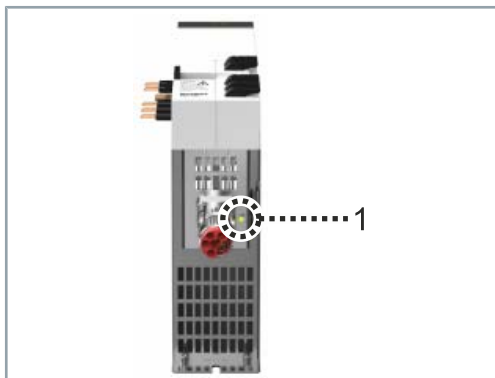
### AMP80xx and AMP85xx

L/A = Link/Activity to display the communication state	
LED	Status
lit	LINK: connection to the connected EtherCAT module
Flashes	ACT: communication with connected EtherCAT module
Off	No connection to the connected EtherCAT module

RUN = display of the EtherCAT operating states	
LED	Status
lit	Operational
Flashes uniformly	Pre-Operational
Flashes irregularly	Safe-Operational
Off	INIT

AXIS = status display of the servomotor	
LED	Status
lit	The axis is released and error-free
Flashes quickly	The axis is disabled and is being initialized
Flashes slowly	The axis is disabled and error-free
Off	No 24 V connection or the axis is in the EtherCAT operating state INIT or Error

## Coupling modules



The following tables provide information about the LED displays [1] on coupling modules.

AX883x

L/A = Link/Activity to display the communication state	
LED	Status
lit	LINK: connection to the connected EtherCAT module
Flashes	ACT: communication with connected EtherCAT module
Off	No connection to the connected EtherCAT module

## Preparation

### **WARNING**

#### **Establish the voltage-free and de-energized condition**

Remove all fuses in the supply network and turn off the main switch on the control cabinet. Secure the control cabinet against being switched on again.

*Although a distributed servo drive is no longer rotating, voltage on the control and power connections or a residual voltage in the capacitors of the coupling modules can lead to serious injuries.*



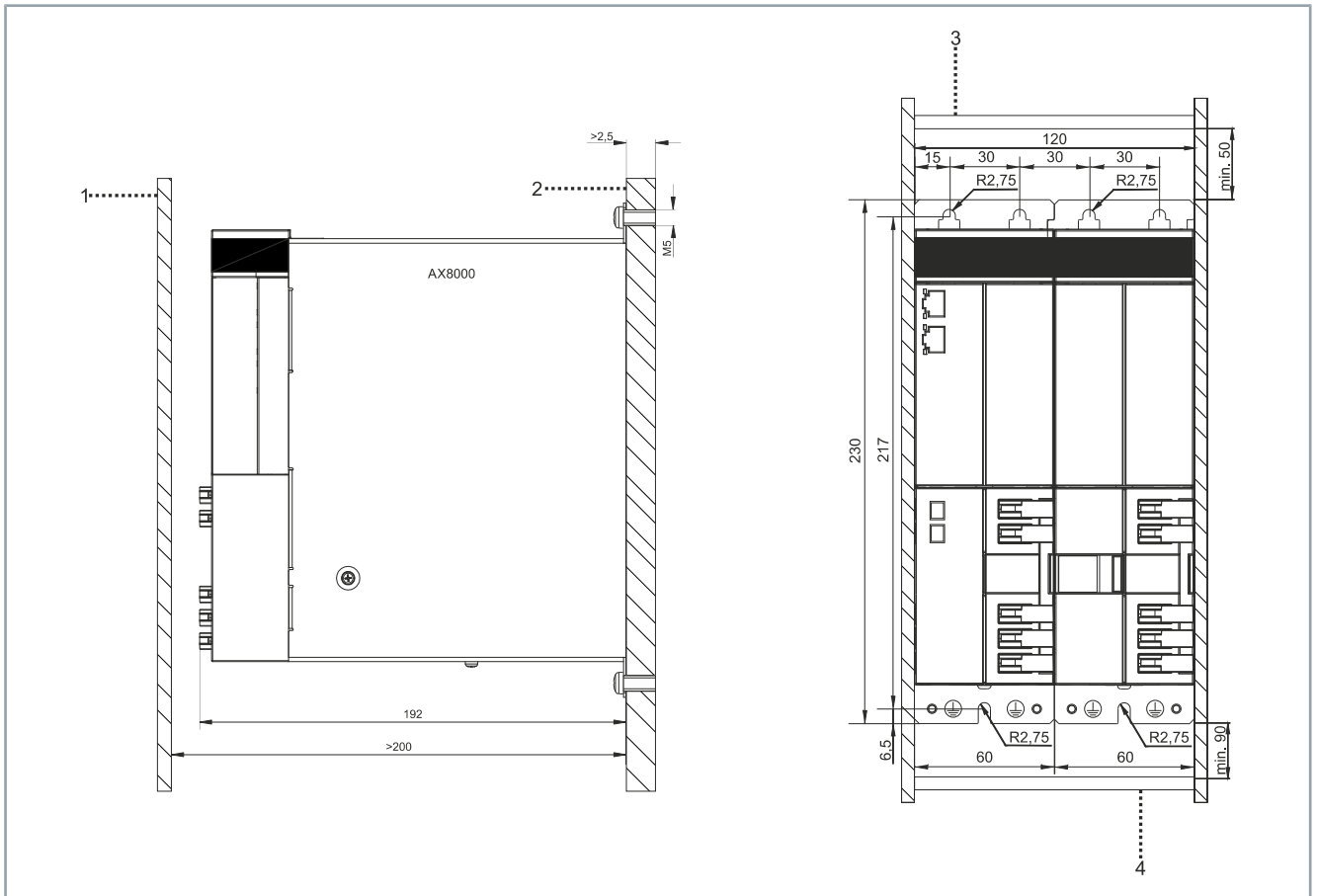
#### **Mount the coupling modules vertically and with sufficient ventilation**

Observe the permissible data for operation and environment as well as the notes in this chapter.

*Inadequate ventilation and incorrect installation can lead to damage to the coupling module and its components due to heat development.*

Note that when dimensioning you may have to mount input filters, mains chokes and brake resistors for your application. Appropriate space should be provided for these components, so that adequate ventilation is ensured.

The following figure shows recommended dimensions that you should observe when mounting the coupling module on the machine or plant:



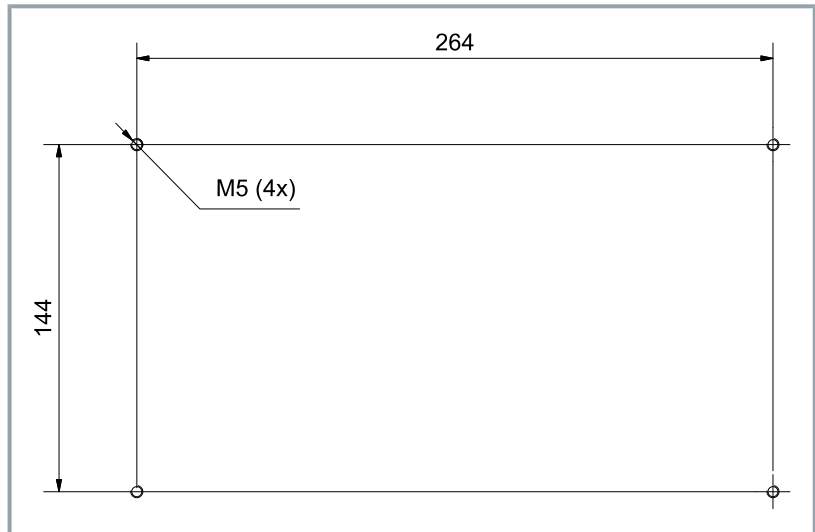
Item number	Explanation
1	Machine or plant
2	Conductive and galvanized mounting plate
3	Cable channel
4	Cable channel

## Drilling pattern

If you would like to plan the installation and the exact position of the modules in your system, the following drilling patterns are available.

### Power supply modules and distribution modules

Information is given in the figure below on how to make tapped holes in accordance with the drilling pattern.



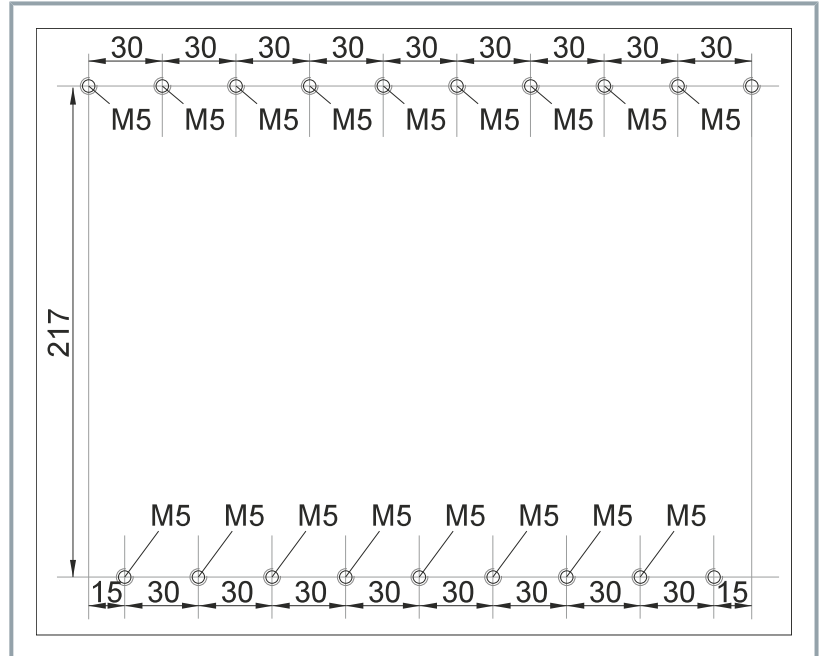
## Coupling modules



### Beckhoff universal drilling pattern

You have the possibility – at any time and without having to drill new holes – to change the configuration of the coupling modules if you provide the mounting plate with the universal drilling pattern.

Information is given in the illustration below on how to make tapped holes in the mounting plate in accordance with the drilling pattern.



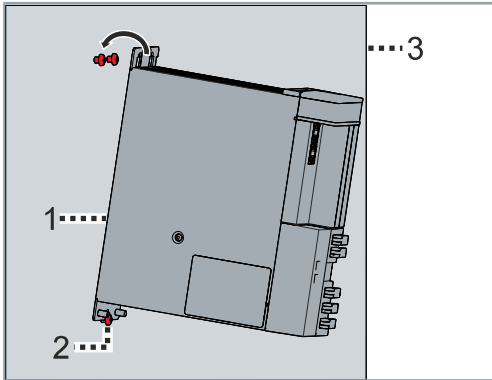
## Modules



### Mounting example

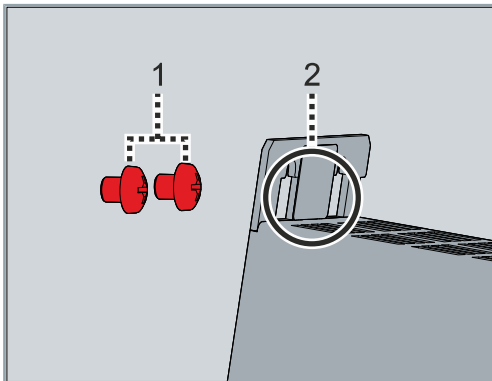
This chapter provides information on the mounting of power supply modules and coupling modules. A power supply module and other modules are bayed as an example.

## Power supply modules and coupling modules



- ▶ Screw the screws into the mounting plate on the machine or plant as shown in the drilling pattern

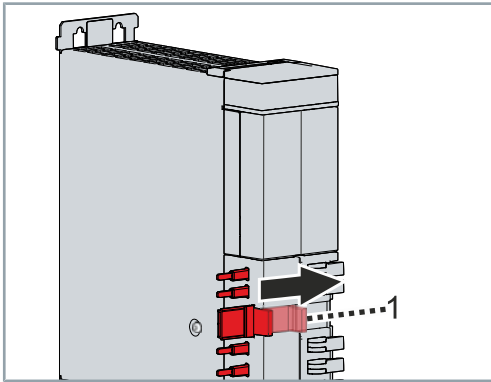
- ▶ Place the power supply module [1] onto the screw [2] and carefully press against the mounting plate [3]



- ▶ Guide the screws [1] through the rectangular cut-outs in the module housing [2]
- ▶ Screw all the screws tight in the elongated holes in the module housing
- ▶ Observe tightening torques:

Components	Tightening torque [Nm]
Screws M5 x 5 Strength class 8.8	6

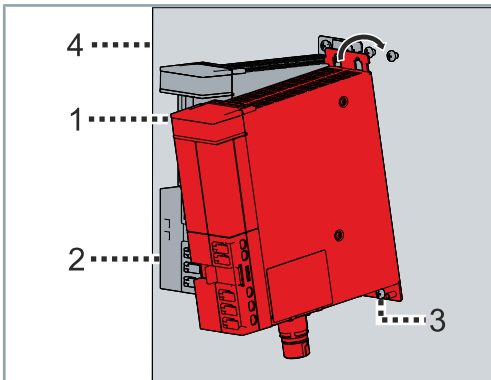




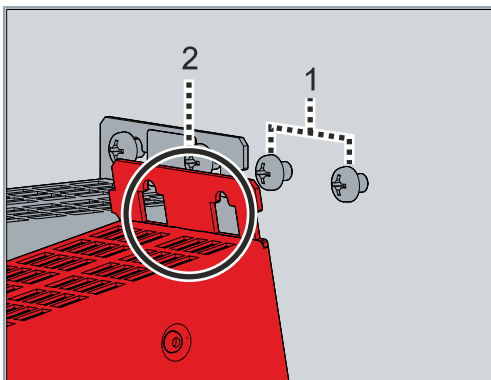
- ▶ On all relevant modules, slide the bar for the AX bridge [1] to the right

The contacts can then no longer be seen.

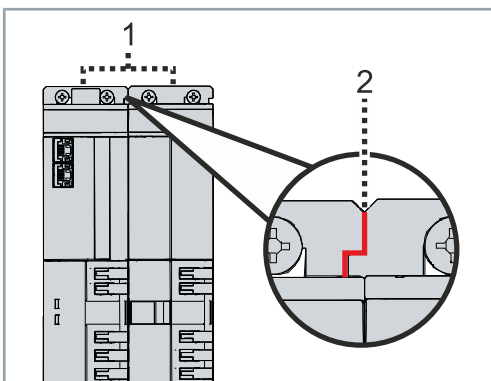
- ▶ Screw the screws back into the mounting plate of the machine or plant as shown in the drilling pattern



- ▶ Place the coupling module [1] at the right side of the coupling module [2] onto the screw [3] and carefully press against the mounting plate [4]



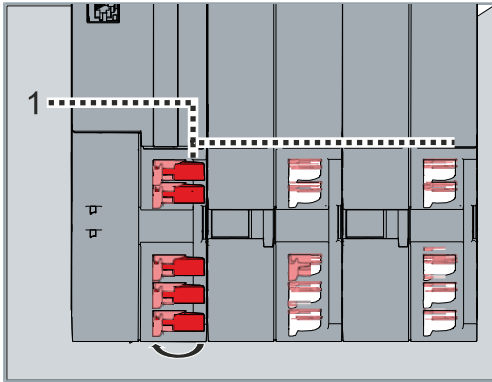
- ▶ Once again, guide the screws [1] through the rectangular cut-outs in the module housing [2]



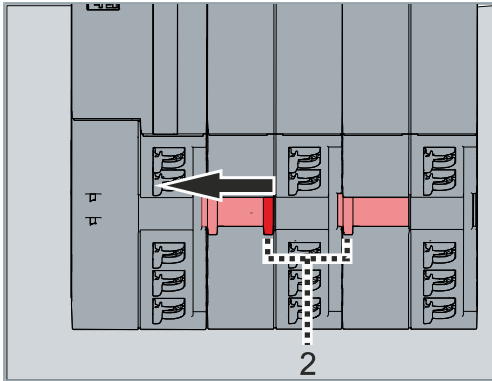
- ▶ Make sure that the plates of the rear panel of Module [1] are not overlapping and that the modules are sitting flush in cut-out [2]
- ▶ Buy further modules and screw all remaining screws tight on the module housings
- ▶ Observe tightening torques:

Components	Tightening torque [Nm]
Screws M5 x 5 Strength class 8.8	6

# Mechanical installation



- ▶ On all modules that you wish to connect, open the quick connectors [1] and place them in the 90° position



- ▶ Slide all bars [2] for the AX bridge to the left
  - ▶ Close all quick connectors again
- The modules are now connected to one another.

## Power supply module and distribution module



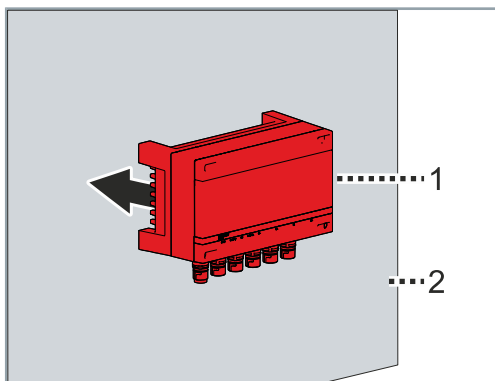
### Selection of the correct screws

Screws for mounting the power supply modules or distribution modules are not included in the scope of supply. For proper installation, we recommend at least the following screw size:

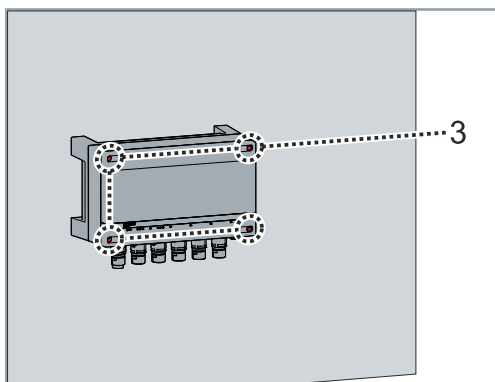
- AMP8620: M5 x 145 mm
- AMP8805: M5 x 85 mm

► Prepare support with drilling pattern

► Place the module [1] on the respective support [2] according to the drilling pattern



► Insert and tighten the screws [3]



## Drives

### Flange mounting

The following table provides information on components for mounting the distributed servo drive on the machine or plant:

Quality of the cheese-head screw DIN EN ISO 4762 = 8.8				
Motor	Bore diameter [mm]	Screw size	Tightening torque [Nm]	Washer DIN EN ISO 7089
AMP8x3x	6	M5 x 16	5.5	5.3; DIN 7980
AMP8x4x	7	M6 x 20	10	6.4
AMP8x5x	9	M8 x 25	25	8.4

### 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 distributed servo drive from impermissible stresses**

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 distributed servo drive.  
*An impermissible load on the components can have a negative effect on the performance of the distributed servo drive. Impacts on the motor shaft impair the concentricity of the distributed servo drive.*

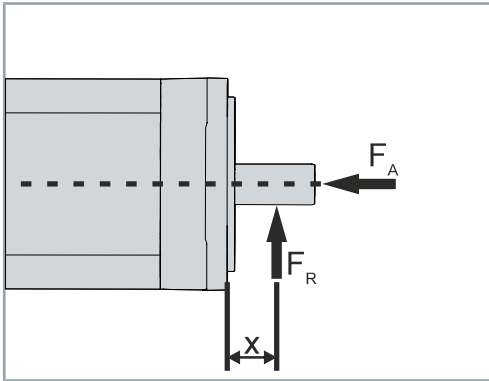


##### **Ensure adequate grounding via the protective conductor**

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

## Bearing load

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  $F_A$ . Axial loads shorten the service life and can lead to malfunctions of the holding brake [+].

### Special features when using toothed belt drives:

When using a toothed belt drive, the radial and axial loads on the shaft must not be exceeded. Excessive load can lead to fatigue fracture of the motor shaft. Be sure to read the chapter "Technical data", [Page 36].

The distributed servo drives are equipped with sealed grooved ball bearings. The fixed bearing is on the B side of the distributed servo drive and the floating bearing is on the A side; shaft output side of the distributed servo drive. Oscillatory bearing movements  $< 180^\circ$  shaft rotation are not permissible. Use the Beckhoff load/force calculator for a detailed calculation of the bearing forces on the motor shaft.

Distributed Servo Drive	A-bearing sizes	B-bearing sizes
AMP8x3x	6203	6201
AMP8x4x	6204	6203
AMP8x5x	6205	6203

## Mounting

### ⚠ WARNING

#### Do not touch hot output elements without personal protective equipment

Only handle hot output elements, such as couplings or pulleys, with special thermal gloves. Avoid prolonged contact with hot components.

*Hot components can cause severe burns to body parts and limbs.*

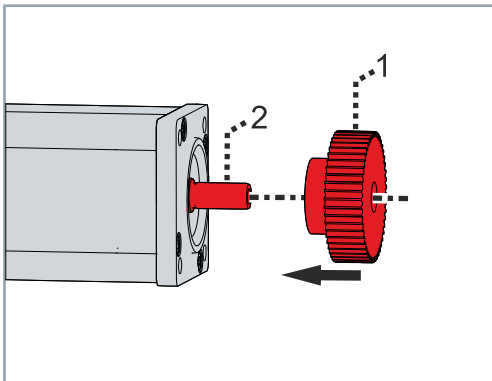


#### Do not mount the drive element offset

Place the drive element centered and straight on the motor shaft.

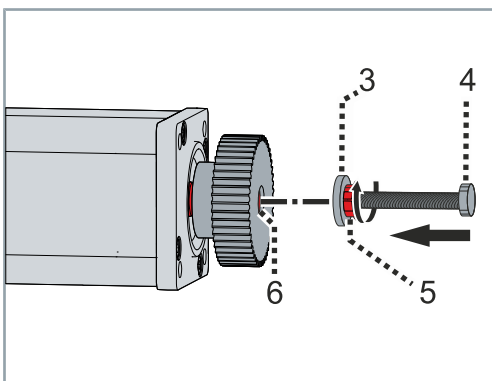
*An offset will cause unacceptable vibration and the destruction of the ball bearings and the coupling.*

- ▶ Warm up the output elements according to manufacturer's instructions
- ▶ Remove the protective cap
- ▶ Degrease and clean the motor shaft
- ▶ Remove the output element from the oven and transport it to the workstation
- ▶ Place output element [1] centered and straight on the motor shaft [2]



- ▶ Insert washer [3] with screw [4] of strength class 8.8 and nut [5] into the locking thread [6] of the motor shaft
- ▶ Tighten nut [5]

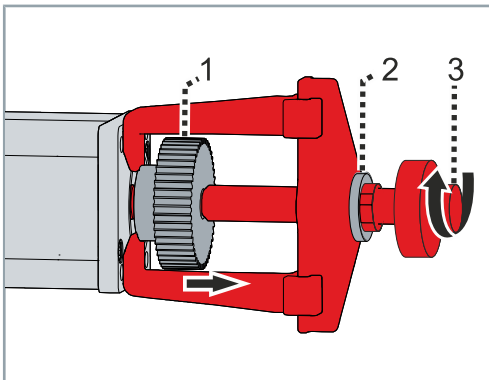
The output element is pulled onto the motor shaft by the nut.



## Dismantling

Use only backlash-free and friction-locked collets, gear pullers or suitable couplings to dismantle the output elements.

- ▶ Degrease the motor shaft
- ▶ Screw puller [3] and intermediate disc [2] into the locking thread of the motor shaft
- ▶ Place the puller fully on the drive element [1]
- ▶ Pull the output element [1] with the puller [3] from the motor shaft



## ⚠ WARNING

### Do not work on live electrical components

Only work on the distributed servo drive system when the voltage has dropped to  $< 50\text{ V}$ . 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.

*There is still a life-threatening voltage of  $> 875\text{ V}_{\text{DC}}$  on the capacitors after disconnection from the supply network. Serious or even fatal injuries may result if this is ignored.*

## ⚠ WARNING

### Observe the discharge times of the capacitors

Observe the following delay times after disconnecting from the mains supply:

- 30 minutes at AMP8yxx
- 30 minutes for AX883x

*There is still a life-threatening voltage of  $> 875\text{ V}_{\text{DC}}$  on the capacitors after disconnection from the supply network. Serious or even fatal injuries may result if this is ignored.*



### Electromagnetic compatibility

Establish conductive connection of all components. In the case of larger applications, implement the potential equalization via PE rails.

*Improper grounding or faulty contacting can lead to damage to the distributed servo drive system or to EMC interference emissions. The minimum cross-sections of separate protective conductors can be found in EN 61439-1.*

## Project planning

The project planning is the detailed planning of your drivetrain. Taking into account various views, you can design your drive system with the help of the following information. Please note that this support is only an example.



## Energy management

If the supply network is impaired due to high voltage fluctuations, you must consider the specifications of the distributed servo drive system and the speed range of the distributed servo drive. Observe the upper limit value of the wide voltage input on the AMP8000.

Check whether the lowering of the speed due to lacking voltage is permissible.

If the supply network does not correspond to the specification for the operation of the distributed servo drive system, then isolating transformers, mains chokes, mains filters or other measures must be added.

This system operates in a drive system with a common DC link and a commonly used internal or external brake resistor. In the case of already existing drive systems, you can determine the utilization rate of the brake resistor with the aid of the diagnostic system and transfer the values. The Beckhoff software "TE5910 | TwinCAT 3 Motion Designer" is available for energy management purposes.

## Drivetrain

The application, distributed servo drive system, distributed servo drives and gear units must be matched to one another so that sufficient safety is ensured for all components. Mechanical stiffness can occur after a while due to wear.

Make sure that the components in the working area of the system have adequate reserves so that the service life is not impaired and the necessary control quality can be maintained.

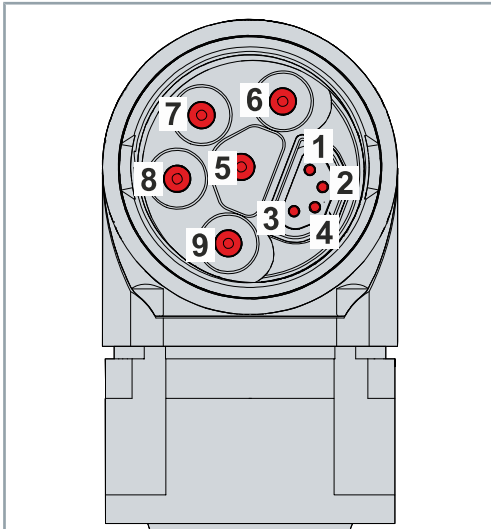
The Beckhoff software "TE5910 | TwinCAT 3 Motion Designer" is available for configuration of the drivetrain and selection of suitable components.

## Connection

Beckhoff offers various power connectors. All plugs are IP65 rated. A protective conductor connection according to VDE 0627 is provided on the housing.

### B23

The following tables show the pin assignment of the input connector on the motor side:

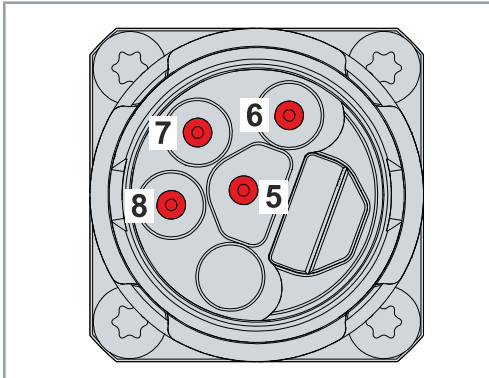


Contact	Function
1	TX+; GND <sub>s</sub>
2	RX+; GND <sub>p</sub>
3	RX-; U <sub>p</sub>
4	TX-; U <sub>s</sub>
5	PE
6	24 V <sub>DC</sub>
7	-DC Link
8	+DC Link
9	GND 24 V <sub>DC</sub>

## Power supply

For the power supply, the connection X01 is available on the AMP8620 power supply module.

### X01



- X01 connection on the AMP8620 power supply module

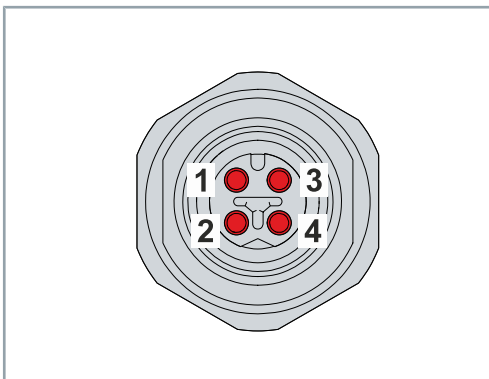
Terminal point	Connection
5	PE
6	L1
7	L2
8	L3

## Fieldbus system

The EtherCAT P M8 real-time Ethernet fieldbus is available in the AMP8000 distributed servo drive system.

### EtherCAT P

- X10 connection for fieldbus input on AMP8620 power supply module
- X20 and X21 connection for fieldbus output on AMP8620 power supply module and AMP8805 distribution module

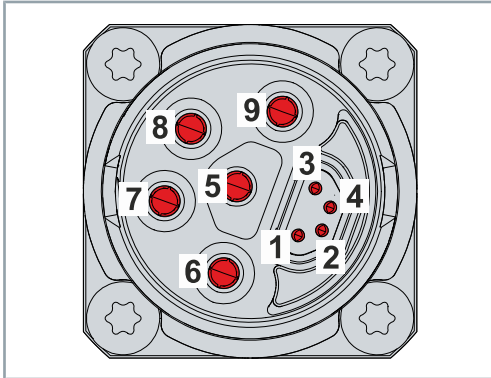


Assignment	Connection
1	TX+; GND <sub>s</sub>
2	RX+; GND <sub>p</sub>
3	RX-; U <sub>p</sub>
4	TX-; U <sub>s</sub>

## System output

Connections X40 to X44 are available for the AMP8000 system output on the AMP8620 power supply module and the AMP8805 distribution module.

B23



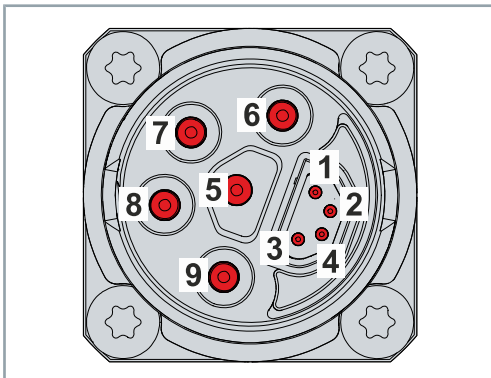
- X40 to X44 connection on the AMP8620 power supply module and the AMP8805 distribution module

Terminal point	Connection
1	TX+; GND <sub>s</sub>
2	RX+; GND <sub>p</sub>
3	RX-; U <sub>p</sub>
4	TX-; U <sub>s</sub>
5	PE
6	24 V <sub>DC</sub>
7	-DC Link
8	+DC Link
9	GND; 24V <sub>DC</sub>

## System input

For the AMP8000 system input, connection X02 is available on the AMP8805 distribution module.

B23



- X02 connection on the AMP8805 distribution module

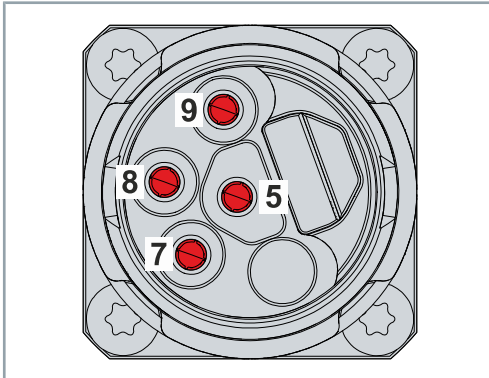
Terminal point	Connection
1	TX+; GND <sub>s</sub>
2	RX+; GND <sub>p</sub>
3	RX-; U <sub>p</sub>
4	TX-; U <sub>s</sub>
5	PE
6	24 V <sub>DC</sub>
7	-DC Link
8	+DC Link
9	GND; 24V <sub>DC</sub>

## External brake resistor

For the connection of an external brake resistor, the optional connection X71 is available for the AMP8620 power supply module.

### B23

- X71 connection on the AMP8620 power supply module



Terminal point	Connection
5	PE
7	-DC Link
8	R <sub>B+</sub> / +DC Link
9	R <sub>B-</sub>

## Supply networks

The AMP8000 distributed servo drive system is suitable for operation on three-phase networks. The respective network configurations differ by the type of ground connection. For a better understanding, the table below contains examples with the associated meaning:

Network configuration	French term	Meaning
TN	Terre Neutre	Neutral grounding of a point
TT	Terre Terre	Direct grounding of a point
TN-C	Terre Neutre Combiné	Combined neutral grounding: Neutral conductor and protective conductor combined to form PEN conductor
TN-S	Terre Neutre Combiné Séparé	Separate neutral grounding: Separate neutral conductor and protective conductor
IT	Isolé Terre	Isolation of all active parts from ground

Connection to TN or TT networks is possible without further measures.

For all other networks, operation is only possible on isolating transformers. An isolating transformer is a mains transformer that transfers the mains voltage to the secondary winding via an electrical isolation. A star point grounded network is made available with the help of this protective isolation.

The AMP8620 power supply modules are equipped with a wide-range voltage input and can be connected to the following voltage systems:

- Three-phase  $3 \times 400_{-20\%} V_{AC}$  to  $480^{+8\%} V_{AC}$



### Installation with protective conductor connection

When installing electrical systems and components, the protective conductors must be connected first. They must be disconnected last when uninstalling.

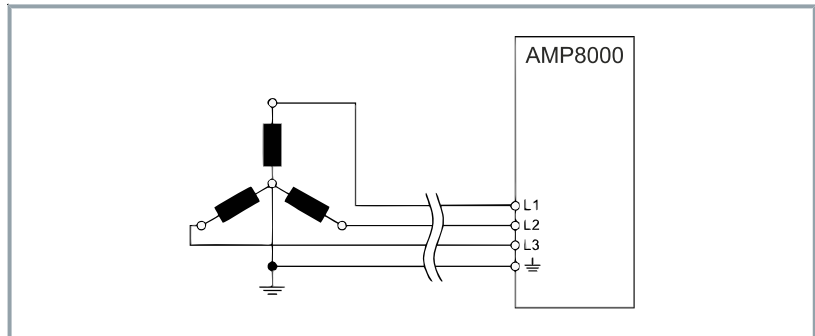
Depending on the magnitude of the leakage currents, observe the following regulations for the implementation of the protective conductor connection:

- Minimum requirement for protective conductor: KU value of 4.5
- The minimum requirement for leakage currents:  $I_L < 10 \text{ mA}$ ;  $KU = 6$  for  $I_L > 10 \text{ mA}$

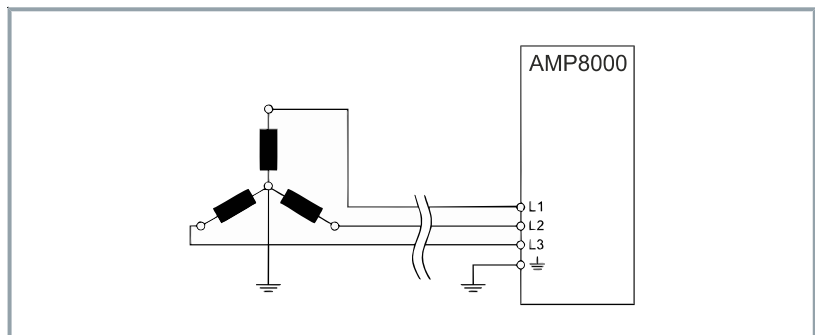
Value	Explanation
KU	Variable for the classification of safety-related types of failure for protection against dangerous shock current and excessive heating
KU = 4.5	Achieved in relation to interruption: With permanently connected protective conductor connection $\geq 1.5 \text{ mm}^2$ With protective conductor connections $\geq 2.5 \text{ mm}^2$ via connector for industrial plants according to IEC 60309-2
KU = 6	Achieved in relation to interruption: With permanently connected conductors $\geq 10 \text{ mm}^2$ ; the type of connection and routing must comply with the standards applicable to PE conductors

## Three-phase connection

.TN network



.TT network



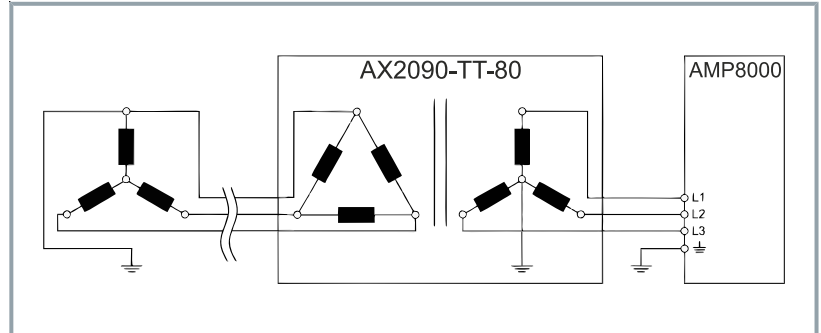




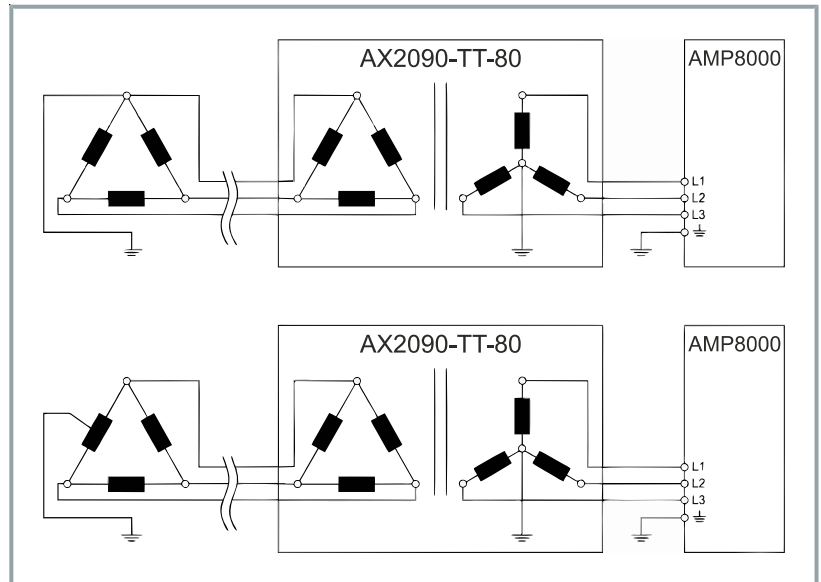
**Connection only with upstream isolating transformer**

Use an upstream isolating transformer with the following networks.  
*The AMP8000 distributed servo drive system and the components can be damaged if this is ignored.*

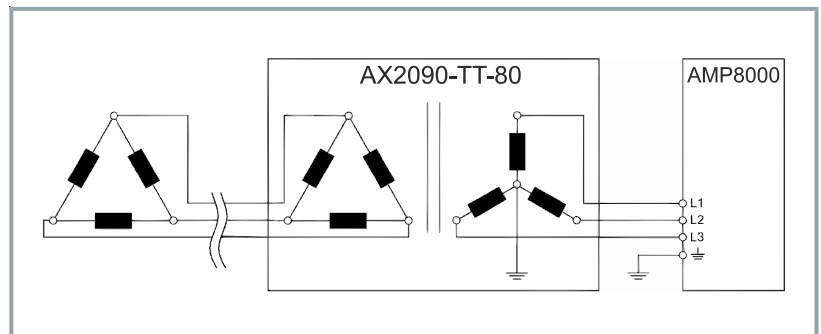
Asymmetrically grounded network with star point



Asymmetrically grounded delta network



IT delta network



## Isolating transformers

Special network configurations require an upstream isolating transformer. Like the AMP8620 power supply modules, this supplies a short-term peak current of 100%. Full input power is not required for many applications. If this is the case, isolating transformers with a lower power rating can also be used.



### Checking the isolating transformer power rating with the TwinCAT 3 Motion Designer

Check the isolating transformer power rating with the design software TwinCAT 3 Motion Designer.

This can be found on the Beckhoff homepage:

- TE5910 | TwinCAT 3 Motion Designer

The power supply modules are assigned to the isolating transformers in the following tables.

### Three-phase supply

Module	Nominal current [A]	Isolating transformer	Nominal current [A]
AMP8620	17.5	AX2090-TT80-0016; 400 V, 16 kVA	23.1

## Fuse protection



### Observe fuses and data for operation and environment

The servo drives are equipped with integrated self-protection. The recommended fuses are used for line protection. Adhere to the dimensioning according to the prescribed data for operation and environment.

*The system may be damaged if this is ignored.*

## CE conform

Use mains fuses of the operating class "gG(A)" according to IEC60269 or automatic circuit-breakers with the characteristic "C".

### External fuse protection

Fuse protection	AMP8620
Maximum AC supply	25 A

## UL-compliant



### Circuit breakers are not permitted

Circuit breakers are not permitted for external fusing of the UL network.

*Use exclusively the UL mains fuses specified in this chapter.*

### Fuse holders with UL approval

Before implementing a UL configuration, it is mandatory that you contact your UL certificate authority and discuss the necessary boundary conditions. When using fuse holders, care must be taken that they have also been tested and manufactured in accordance with the applicable standards of the UL certificate authority.

The integrated protection against short circuit is no substitute for the external mains protection. The fusing must comply with the manufacturer's data as well as the national and international regulations and laws.

Use UL mains fuses of the class "J".

For alternatives to the UL fuses of the class "J", be sure to refer to the UL standard "UL 508A, chapter SB4.2.3, exception no.1".

### External fuse protection

Fuse protection	AMP8620
Maximum AC supply	25 A



## **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**

Pay attention to the following points before commissioning:

- Make sure that an emergency stop switch complying with the valid regulations is fitted to the control station
- Check components for damage
- Check mounting and alignment
- Check correct seating of the modules in the control cabinet and on the machine
- Tighten screw connections correctly
- Mount mechanical and electrical protective devices
- Check the wiring, connection and proper grounding

## **During commissioning**

Pay attention to the following points during commissioning:

- Check function and adjustment of attachments
- Observe information for environment and operation
- Check protective measures against moving and live parts

### **Configuration**

Beckhoff recommends the use of the latest TwinCAT version and the TwinCAT Drive Manager 2 for the configuration of new projects.

- Create a new TwinCAT project and select the target system
- Add modules to the I/O devices via the Scan function
- Create a TwinCAT Drive Manager 2 project
- Scan components or manually insert a configuration
- Configure components inserted in the I/O devices
- Check the state and activate TwinCAT

## Prerequisites during operation

Pay attention to the following points during operation:

- Pay attention to unusual noise developments
- Check for unusual smoke formation
- Always check surfaces and cables for dirt or dust
- Check temperature development
- Observe recommended maintenance intervals
- Check function of safety devices

## After operation

### **WARNING**

#### **Place the machine or plant in a safe state**

Make sure that all moving parts on the machine or plant come completely to a standstill.

*After switching off the power supply, the components of the distributed servo drive system may perform uncontrolled movements and cause 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 components and the machine into a safe state.

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



### Do not immerse or spray components

Only wipe the components of the distributed servo drive system with cleaner and a cloth.

*Cleaning by immersion into non-permissible solutions may cause damage to the surfaces of the components.*

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 agents

Clean the components carefully with a damp cloth or a brush.

Use grease-dissolving and non-aggressive cleaning agents such as isopropanol for cleaning.

## Not applicable

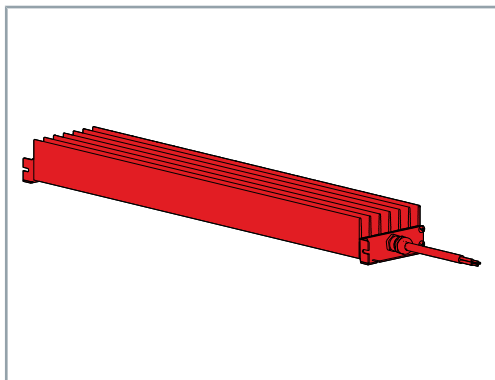
Cleaning agents	Chemical formula
Aniline hydrochloride	$C_6H_5NH_2HCl$
Bromine	$Br_2$
Sodium hypochlorite; bleaching solution	$NaClO$
Mercury (II) chloride	$HgCl_2$
Hydrochloric acid	$HCl$

**Use accessories with UL approval**

UL approval is required for operation of the AMP8000 distributed servo drive system in the USA or Canada.

Further and more detailed information on accessories can be found on the Beckhoff homepage.

## Brake resistors IP65

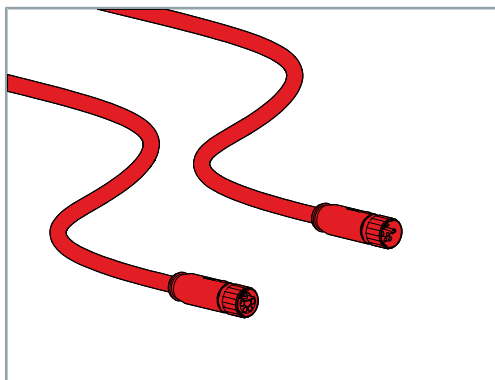


When braking a distributed servo drive, the energy generated is converted into heat by the brake resistors from the AX2090-BW65 series.

For further information on the brake resistor, read the translation of the original instructions for the brake resistors of the AX2090-BW65-xxxx series.

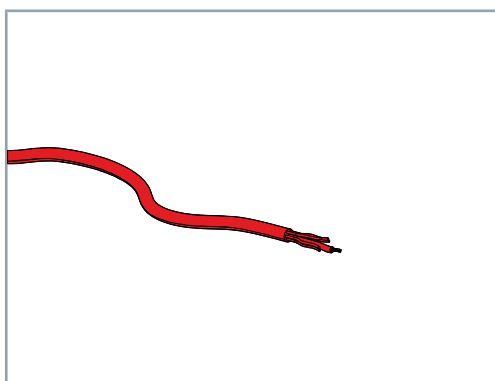
## EtherCAT P cable B23

### Pre-assembled cable



The pre-assembled system cable ZK7A26-3031-0xxx is used for connecting the AMP8000 system components AX883x, AMP8620, AMP8805 and AMP8yxx

### Configurable cable

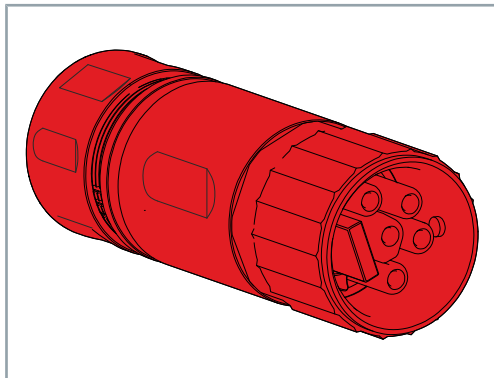


The ZB7306-xxxx system cable is used to connect the AMP8000 system components AX883x, AMP8620, AMP8805 and AMP8yxx

## Connectors B23

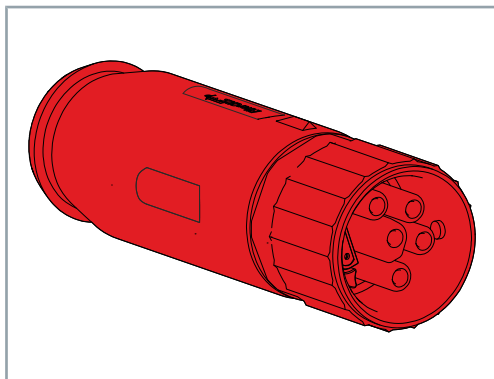
In the following you will find an overview of which connectors are available.

### Power



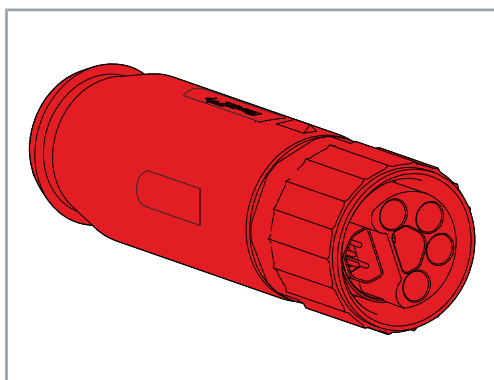
The ZS7300-0023 connector for field assembly is used to connect the power supply cable to X01 of the AMP8620 power supply module.

### EtherCAT P socket



The ZS7300-0002 connector for field assembly is used to connect the system input or motor input to the ZB7306-xxxx EtherCAT P cable.

### EtherCAT P pin



The ZS7300-0001 connector for field assembly is used to connect the system output to the ZB7306-xxxx EtherCAT P cable.



## Crimping tool



With the ZB8810-0000 crimping tool, you can crimp the following components, for example:

- Ethernet elements
- M8 contacts
- B12 contacts
- B17 contacts
- B23 contacts

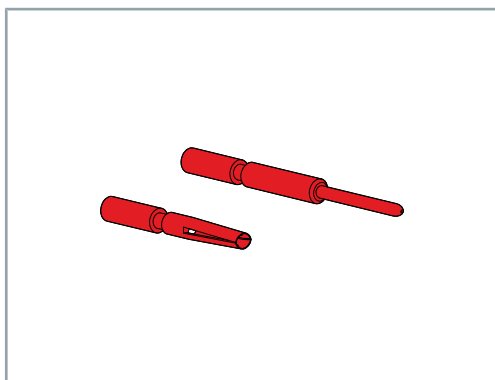
## Crimping insert



The ZB8810-0002 crimping insert and locator is suitable for:

- Ethernet elements
- M8 contacts
- B23 contacts

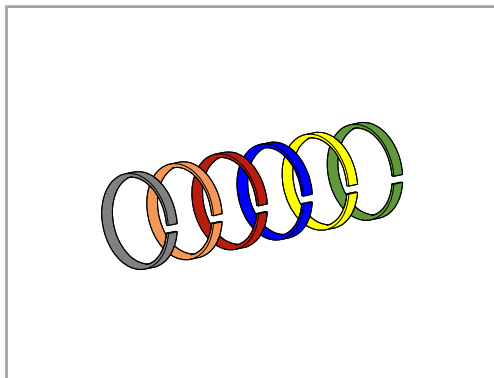
## Crimp contacts



The crimp contacts are available as pins and sockets in various designs:

Designation	Crimp contact version
ZS7000-C001	Ethernet element, pin, AWG22/0.34 mm <sup>2</sup>
ZS7000-C002	Ethernet element, socket, AWG22/0.34 mm <sup>2</sup>
ZS7000-C010	B23, socket, 4 mm <sup>2</sup> , for AMP8620 X01
ZS7000-C015	B23, pin, 1.5 mm <sup>2</sup>
ZS7000-C016	B23, socket, 1.5 mm <sup>2</sup>
ZS7000-C017	B23, pin, 2.5 mm <sup>2</sup>
ZS7000-C018	B23, socket, 2.5 mm <sup>2</sup>

## Color coding



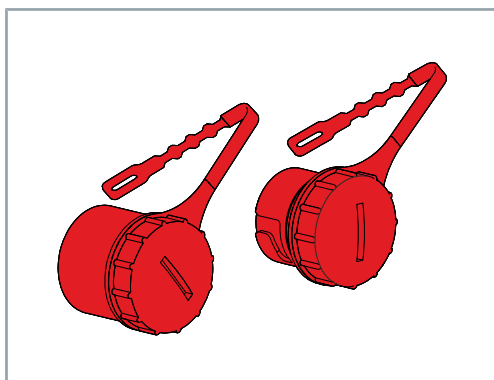
The ZS7300-B00x color coding is available in the following variants for a connector or square flange:

x	Color
5	Red
6	Yellow
7	Blue
8	Green
15	Orange
16	Gray

## Protective caps B23

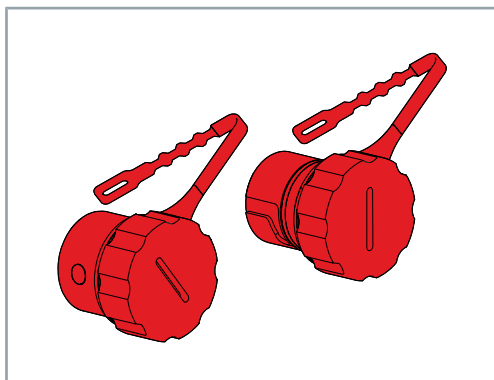
The protective caps protect flanges or couplings from dirt, for example.

### Plastic IP67



You have the possibility to purchase the protective caps ZS7300-B001 made of plastic.

### Metal IP67



You have the possibility to purchase the protective caps ZS7300-B002 made of metal.

## Assembly tool AF27



The ZB8802-0003 assembly tool is used for convenient locking of the bayonet lock of the B23 connectors.

Disassembly may only be carried out by qualified and trained technical personnel. Refer to 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. 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.*



#### **Impermissible removal of gear unit components**

These components may only be dismantled by Beckhoff Automation GmbH & Co. KG.

*Contact Beckhoff Service for further information.*

#### **Removal of the components from the control cabinet and the machine or plant**

- Remove necessary lines and connections
- Allow components to cool
- Loosen and remove the screws of the components
- Transport the components to the workplace or put them into storage

## 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.

## Standards

### **Product standard EN IEC 61800-3**

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

### **IEC / EN 61800-5-1**

*"Adjustable speed electrical power drive systems"*

Part 5-1: Safety requirements - Electrical, thermal and energy

### **IEC / EN 61800-5-2**

*"Adjustable speed electrical power drive systems"*

Part 5-1: Safety requirements – Functional

### **RoHS: EN IEC 63000**

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

## Guidelines

**2014/35/EU**  
Low Voltage Directive

**2011/65/EU**  
RoHS Directive

**2014/30/EU**  
EMC Directive

## Electrical isolation

The power section, consisting of motor connection, DC link connection and mains connection, as well as the control unit are to be double-insulated against each other. This guarantees secure shock protection on all terminals in the control unit, even without further measures. The air gaps and creepage distances conform to EN 50178 / VDE 0160.

## 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](mailto:info@beckhoff.com)

## CCC conformity



### **Export to Chinese Economic Area**

Beckhoff servo drives of the AMP804x and AMP805x series are not subject to the **China Compulsory Certificate (CCC)**. The products are exempt from this certification and can be exported to the Chinese economic area.



## UL certification

The modules may be used as components in a system with a UL-Listing test mark.

## USA and Canada



### **The English translation is binding**

Note that all statements made in this chapter on UL certification are binding only in the English version.

*The German version of this chapter is purely informative.*

A UL certificate is necessary for operation of the AMP8000 distributed servo drive system in the economic area of the USA or Canada. The devices have been certified according to the standards of the UL test laboratory and are permitted to bear the cULus logo on the name plate. The test number is: E195162.

Suitable For Use On A Circuit Capable Of Delivering Not More Than 5000 rms Symmetrical Amperes, 480 Volts Maximum When Protected by Class J Fuses, rated 25 A maximum.

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes or the equivalent.

## Specifications

- The AX883x coupling module may be used in an environment with non-conductive dirt. This corresponds to the degree of pollution 2.
- The wiring must be done using copper conductors with a thermal conductivity of at least 60 to 75 °C.

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More Information:

[www.beckhoff.com/amp8000](http://www.beckhoff.com/amp8000)

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