

Operating instructions | EN

# AMP8000

Distributed servo drives







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# 1 Documentation notes

## 1.1 Disclaimer

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### 1.1.1 Trademarks

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EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH.

### 1.1.2 Limitation of liability

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

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- Improper use
- Use of untrained personnel
- Use of unauthorized spare parts

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## 1.2 Version numbers

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

✉ [motion-documentation@beckhoff.com](mailto:motion-documentation@beckhoff.com)

### Origin of the document

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

### Product features

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

## 1.3 Scope of the documentation

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

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

## 1.4 Staff qualification

This documentation is aimed at trained specialists working in control technology and automation who have knowledge of the applicable and required standards and directives.

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

The documentation published at the time must be used for each installation and commissioning. The products must be used in compliance with all safety requirements, including all applicable laws, regulations, provisions and standards.

### Instructed person

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

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

### Trained person

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

- machine-specific or
- plant-specific

### Trained specialists

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

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

### Electricians

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

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

## 1.5 Safety and instruction

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

### 1.5.1 Notes on information security

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

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

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## 1.6 Explanation of symbols

Various symbols are used for a clear arrangement:

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

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

#### **DANGER**

Failure to comply will result in serious or fatal injuries.

#### **WARNING**

Failure to comply may result in serious or fatal injuries.



**⚠ CAUTION**

Failure to comply may result in minor or moderate injuries.

**NOTICE**

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

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

**Information**

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

**Examples**

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

**Required tool**

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

**Required accessories [ + ]**

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

**Assembly material required**


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

**QR codes**

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

## 1.7 Beckhoff Services

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


 [www.beckhoff.com/en-en/support/global-availability/](http://www.beckhoff.com/en-en/support/global-availability/)

### 1.7.1 Support services

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


 +49 5246 963-157

 [support@beckhoff.com](mailto:support@beckhoff.com)

 [www.beckhoff.com/en-en/support/our-support-services/](http://www.beckhoff.com/en-en/support/our-support-services/)

### 1.7.2 Training offerings

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


 +49 5246 963-5000

 [training@beckhoff.com](mailto:training@beckhoff.com)

 [www.beckhoff.com/en-en/support/training-offerings/](http://www.beckhoff.com/en-en/support/training-offerings/)

### 1.7.3 Service offerings

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 [service@beckhoff.com](mailto:service@beckhoff.com)

 [www.beckhoff.com/en-en/support/our-service-offerings/](http://www.beckhoff.com/en-en/support/our-service-offerings/)

## 1.7.4 Headquarters Germany

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☎ +49 5246 963-0

✉ [info@beckhoff.com](mailto:info@beckhoff.com)

🌐 [www.beckhoff.com/en-en/](http://www.beckhoff.com/en-en/)

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

🌐 [www.beckhoff.com/en-en/company/global-presence/](http://www.beckhoff.com/en-en/company/global-presence/)

## 1.7.5 Downloadfinder

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

🌐 [www.beckhoff.com/documentations](http://www.beckhoff.com/documentations)

## 2 For your safety

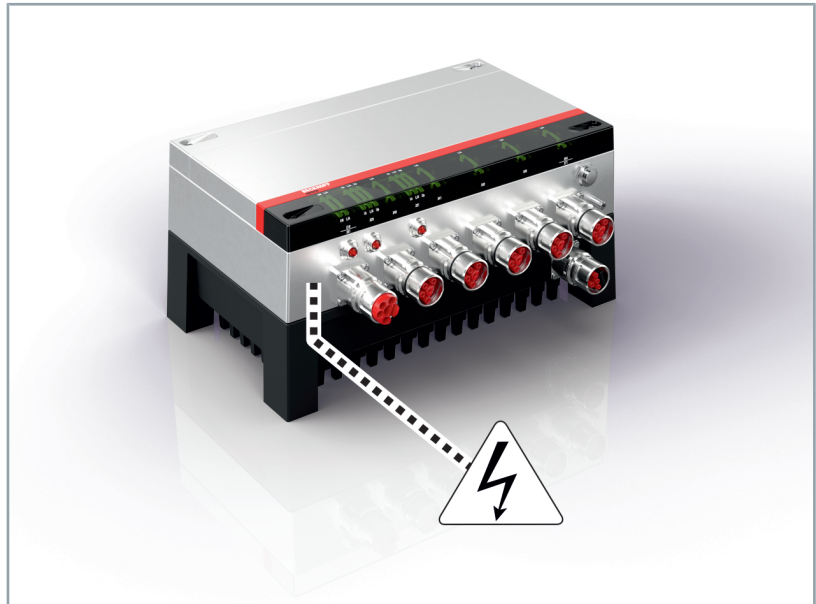
Read this chapter containing general safety information. Furthermore, the chapters in this documentation contain warning notices. Always observe the safety instructions for your own safety, the safety of other persons and the safety of the product.

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

### 2.1 Safety pictograms

You will find safety symbols on Beckhoff products and packaging. The symbols may be glued, printed, or lasered on and may vary depending on the product. They serve to protect people and to prevent damage to the products. Safety pictograms may not be removed and must be legible for the user.

#### 2.1.1 AMP8620 power supply module



**Warning: High voltage!**

The DC link on the modules can have a life-threatening voltage of over 848 VDC.

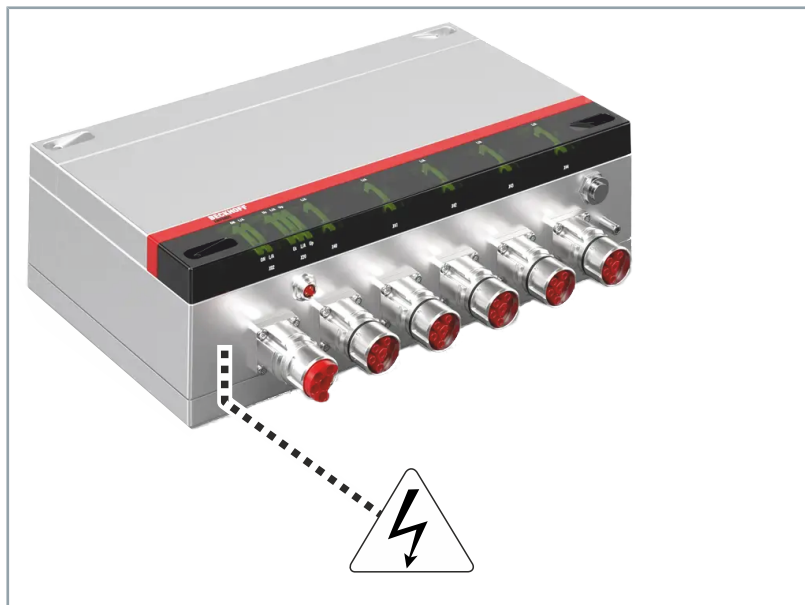


**Warning: Hot surface**

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



## 2.1.2 AMP8805 distribution module



### **Warning: High voltage!**

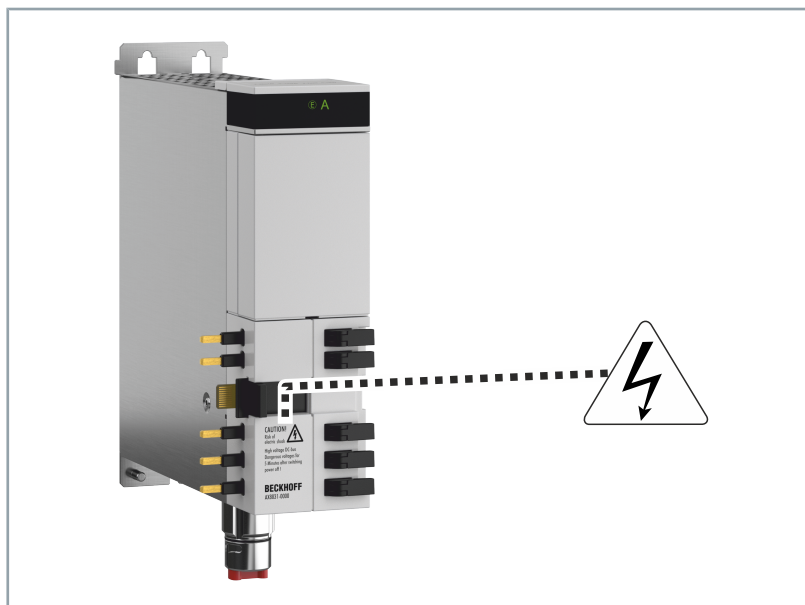
The DC link on the modules can have a life-threatening voltage of over 848 VDC.



### **Warning: Hot surface**

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

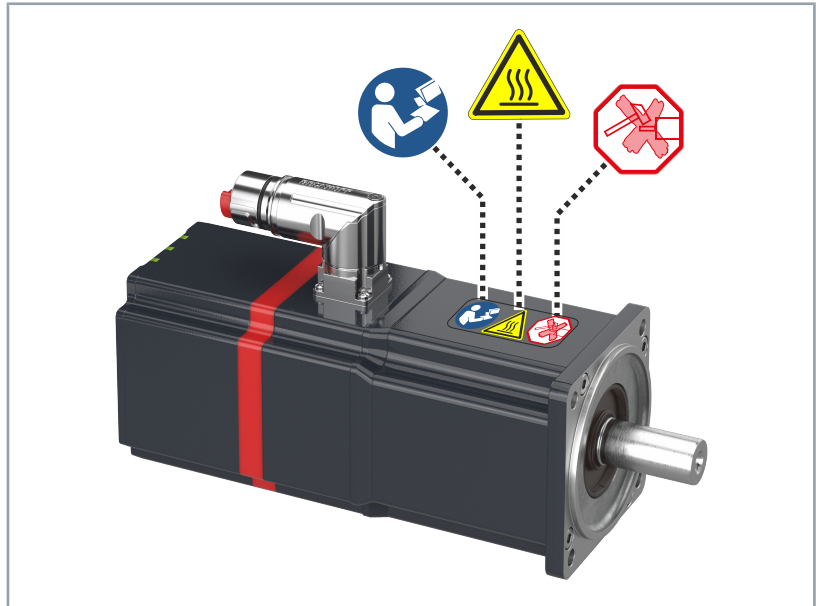
## 2.1.3 AX883x coupling module



### **Warning of high voltage!**

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

## 2.1.4 AMP80xx, AMP85xx distributed servo drive



### **Read original operating instructions**

Read the operating instructions carefully before putting the product into operation.



### **Warning of hot surface**

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



### **Avoid shocks to the shaft**

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

## 2.2 General safety instructions

This chapter provides you with instructions on safety when handling the product. This product is not capable of stand-alone operation and is therefore categorized as an incomplete machine. The product must be installed in a machine or plant by the machine manufacturer. Read the documentation prepared by the machine manufacturer.

### 2.2.1 Before operation

#### **Protective equipment**

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

#### **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.

## 2.2.2 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.

## 2.2.3 After operation

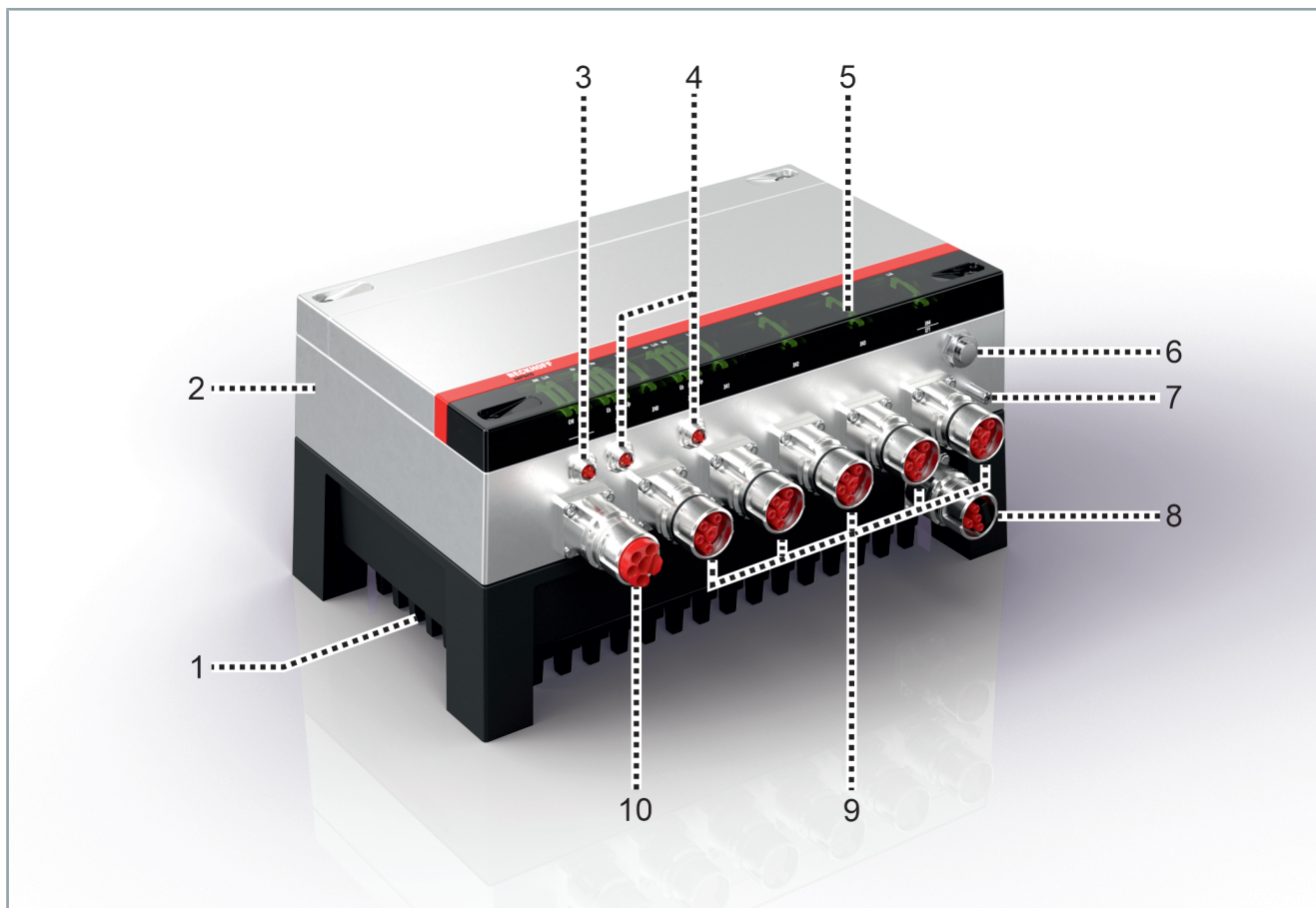
### **De-energize and switch off components before working on them**

Check the functionality of all safety-relevant devices. Secure the working environment. Secure the machine or plant against being inadvertently started up. Observe and comply with the chapter: "De-commissioning", [Page 117].



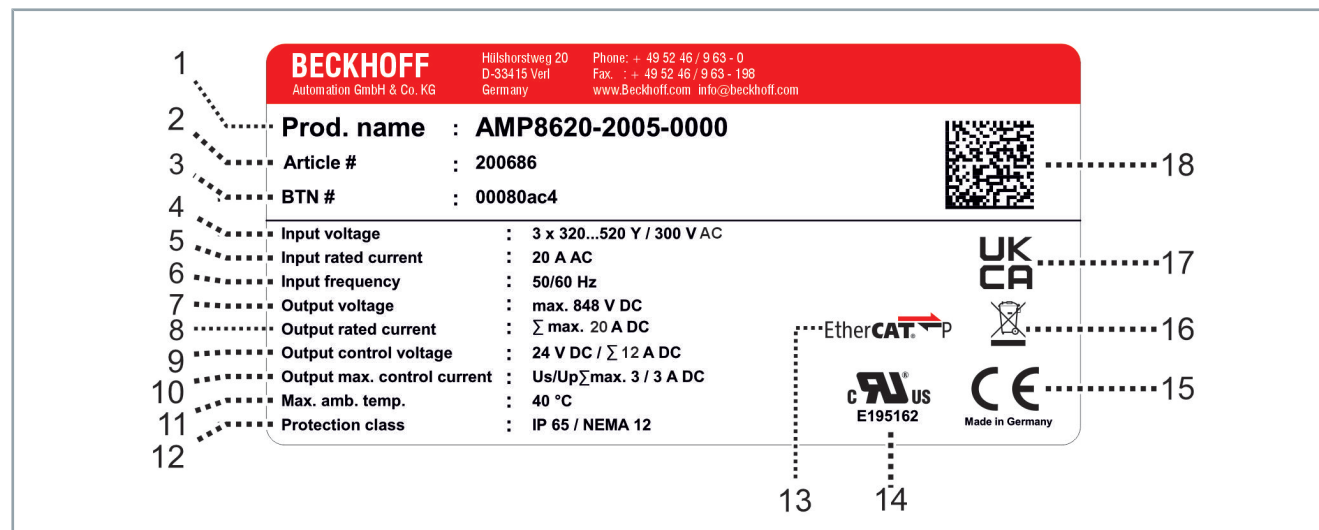
### 3 Product overview

#### 3.1 AMP8620 power supply module



Item number	Explanation
1	Heat sink
2	Housing
3	X10: fieldbus input for EtherCAT; 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	Only for AMP8620-2005-02x0 [+]: X71: connection for external braking resistor
9	X40 to X44: AMP8000 system output B23
10	X01: connection of the supply network

## 3.1.1 Name plate AMP8620

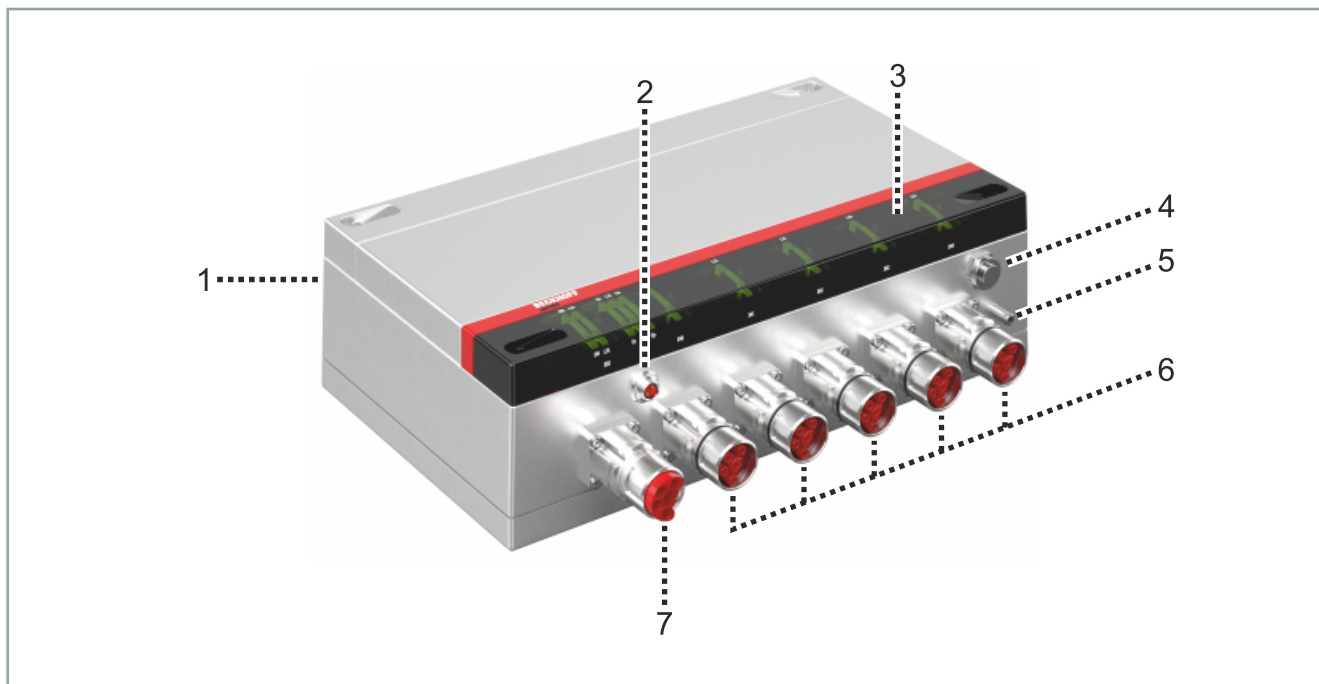


Item number	Explanation
1	Product name
2	Order number
3	Beckhoff Traceability Number, BTN
4	Input voltage
5	Input rated current
6	Input frequency
7	Output voltage
8	Output rated current
9	Output control voltage
10	Maximum output control current
11	Maximum ambient temperature
12	Protection class
13	EtherCAT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

## 3.1.2 Type key AMP8620

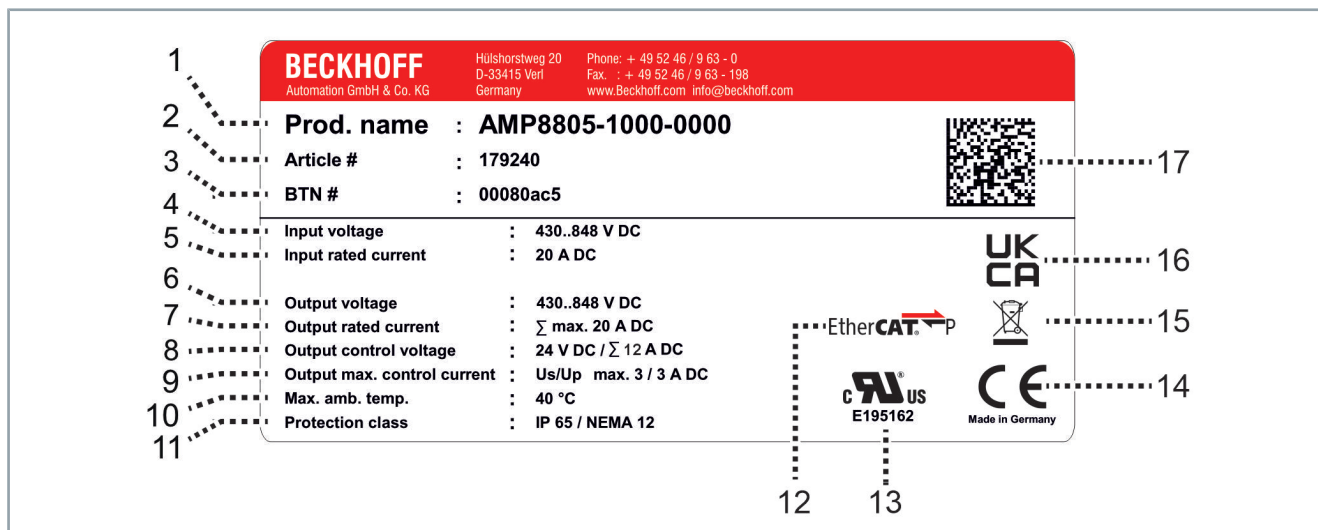
AMP8 6 ab - c d ef - g h i j	Explanation
AMP8	<i>Product area</i> • Distributed Drive Technology
6	<i>Product</i> • Power supply module
ab	<i>DC output current</i> 20 = • 4 A <sub>DC</sub> – single-phase supply (120 <sub>-8%</sub> ... 120 <sup>+45%</sup> V <sub>AC</sub> ) • 8 A <sub>DC</sub> – single-phase supply (220 <sub>-20%</sub> ... 240 <sup>+20%</sup> V <sub>AC</sub> ) • 20 A <sub>DC</sub> – three-phase supply (230 <sub>-20%</sub> ... 480 <sup>+8%</sup> V <sub>AC</sub> )
c	<i>Number of M8-EtherCAT P outputs</i> • 2 = 2 outputs
d	<i>Not defined</i>
ef	<i>Number of AMP8yxx system outputs B23</i> • 05 = 5 outputs
g	<i>Version</i> • 0 = Standard
h	<i>Braking resistor</i> • 0 = no braking resistor • 1 = mounted braking resistor • 2 = external braking resistor
i	<i>Input voltage range</i> • 0 = three-phase 400 <sub>-20%</sub> ...480 <sup>+8%</sup> V <sub>AC</sub> • 1 = single-phase 120 <sub>-8%</sub> ...240 <sup>+20%</sup> V <sub>AC</sub> or three-phase 230 <sub>-20%</sub> ...480 <sup>+8%</sup> V <sub>AC</sub>
j	<i>Not defined</i>

## 3.2 AMP8805 distribution module



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

## 3.2.1 Name plate AMP8805

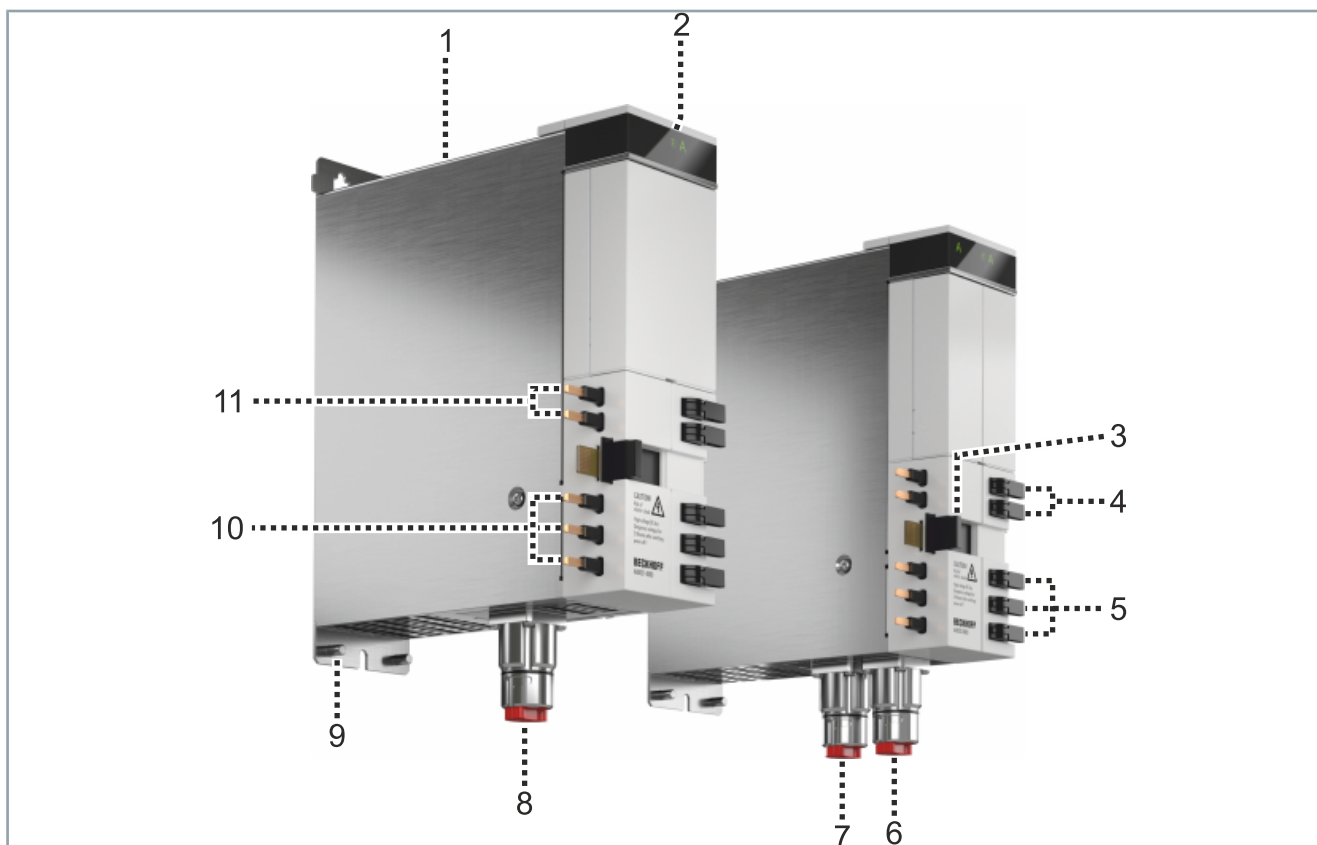


Item number	Explanation
1	Product name
2	Order number
3	Beckhoff Traceability Number; BTN
4	Input voltage
5	Input rated current
6	Output voltage
7	Output rated current
8	Output control voltage
9	Maximum output control current
10	Maximum ambient temperature
11	Protection class
12	EtherCAT P logo
13	cURus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

## 3.2.2 Type key AMP8805

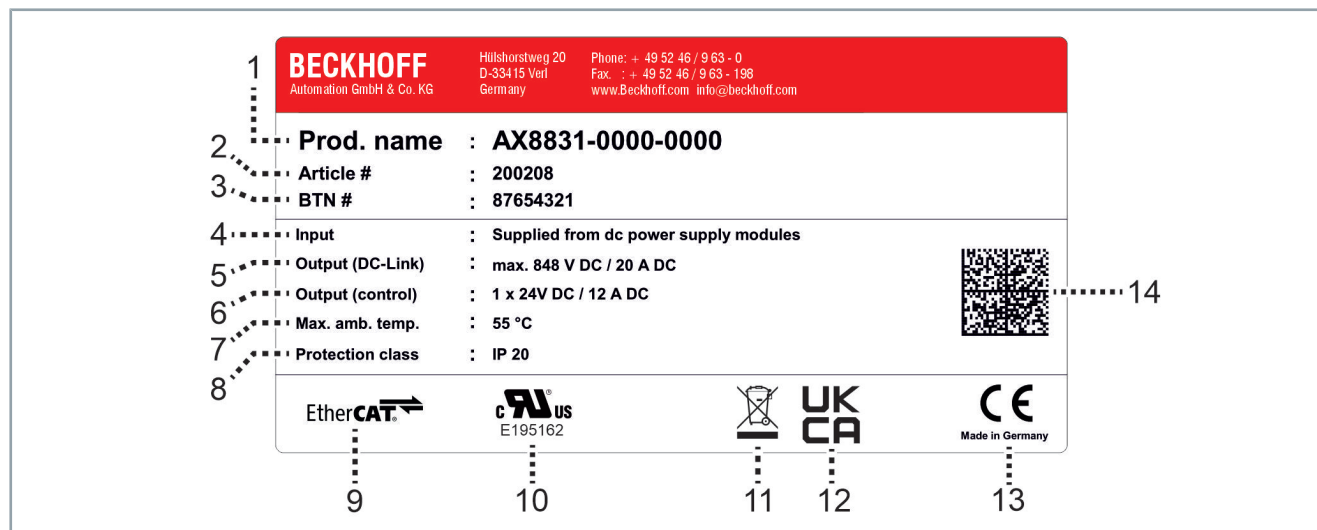
AMP8 8 ab – c d e f – g h i j	Explanation
AMP8	<i>Product area</i> • Distributed Drive Technology
8	<i>Product</i> • Distribution module
ab	<i>Number of AMP8yxx system outputs B23</i> • 05 = 5 outputs
c	<i>Number of M8-EtherCAT P outputs</i> • 1 = 1 output
d	<i>Not defined</i>
e	<i>DC link voltage</i> • 0 = 430...848 V <sub>DC</sub> • 1 = 155...848 V <sub>DC</sub>
f	<i>Not defined</i>
g	<i>Version</i> • 0 = standard
h	<i>Nominal input current</i> • 0 = 20 A <sub>DC</sub>
i	<i>Not defined</i>
j	<i>Not defined</i>

### 3.3 AX883x coupling module



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>

## 3.3.1 Name plate AX883x



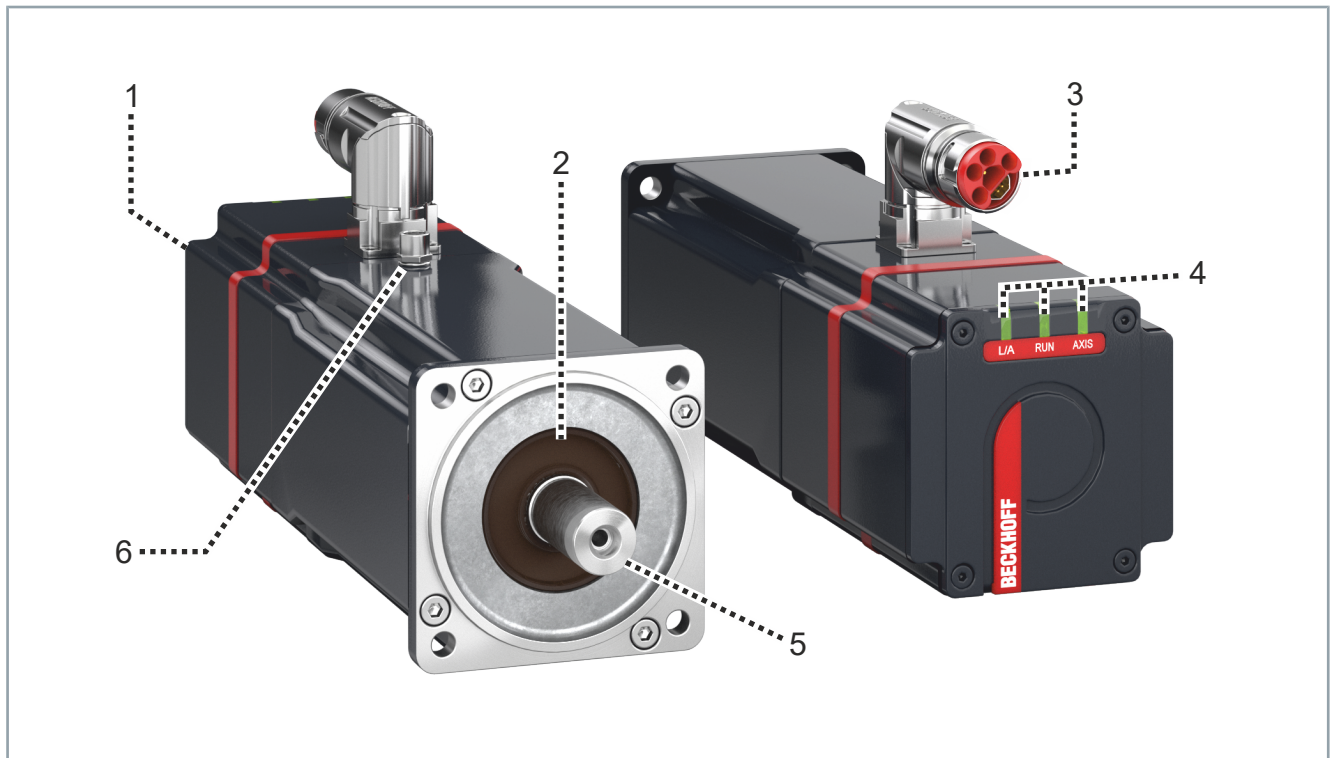
Item number	Explanation
1	Product name
2	Order number
3	Beckhoff Traceability Number; BTN
4	Input supply
5	Maximum DC link voltage / nominal output current
6	Output control voltage / output control current
7	Maximum ambient temperature
8	Protection class
9	EtherCAT conformity
10	cURus approval
11	Disposal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

## 3.3.2 Type key AX883x

AX883x - 0 0 0 0 - 0 0 0 0	Explanation
AX883	Coupling module for AX8000
x	Channels <ul style="list-style-type: none"> <li>• 1 = 1-channel</li> <li>• 2 = 2-channel</li> </ul>

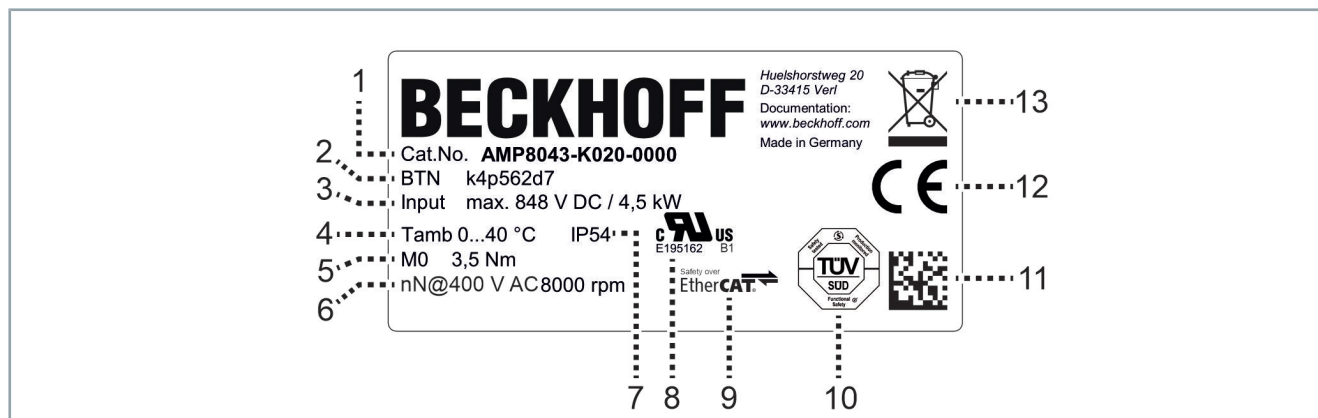


### 3.4 AMP80xx, AMP85xx distributed servo drive



Item number	Explanation
1	Housing
2	Radial shaft-sealing ring [+]
3	X02: AMP8000 system input B23
4	Status LEDs: Link/Activity, Run, AXIS
5	Motor shaft
6	AMP80xx-xxx2 and AMP85xx-xxx2: X14: AMP8000 M8 connection for manual brake release

## 3.4.1 Name plate AMP80xx, AMP85xx



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

### 3.4.2 Type key AMP80xx, AMP85xx

AMP8 a b c – d e f g	Explanation
AMP8	<i>Distributed Servo Drive</i>
a	<i>Series</i> <ul style="list-style-type: none"> <li>• 0 = standard</li> <li>• 5 = increased mass moment of inertia</li> </ul>
b	<i>Flange size F</i> <ul style="list-style-type: none"> <li>• 3 = F3</li> <li>• 4 = F4</li> <li>• 5 = F5</li> </ul>
c	<i>Overall length</i> <ul style="list-style-type: none"> <li>• 1</li> <li>• 2</li> <li>• 3</li> <li>• 4</li> </ul>
d	<i>Winding code</i> A to Z <ul style="list-style-type: none"> <li>• S = special winding</li> </ul>
e	<i>Shaft version</i> <ul style="list-style-type: none"> <li>• 0 = smooth shaft</li> <li>• 1 = shaft with groove and parallel key according to DIN 6885</li> <li>• 2 = shaft with radial shaft sealing ring IP65 and smooth shaft</li> <li>• 3 = shaft with groove and parallel key according to DIN 6885</li> <li>• 4 = shaft with radial shaft sealing ring IP65, smooth shaft and sealing air connection</li> <li>• 5 = shaft with radial shaft sealing ring IP65, groove, parallel key and sealing air connection</li> </ul>
f	<i>Feedback system</i> <ul style="list-style-type: none"> <li>• 1 = single-turn absolute encoder, resolution 24-bit, TwinSAFE STO/SS1</li> <li>• 2 = multi-turn absolute encoder, resolution 24-bit, TwinSAFE STO/SS1</li> <li>• 3 = single-turn absolute encoder, resolution 24-bit, TwinSAFE Safe Motion</li> <li>• 4 = multi-turn absolute encoder, resolution 24-bit, TwinSAFE Safe Motion</li> </ul>
g	<i>Holding brake</i> <ul style="list-style-type: none"> <li>• 0 = without holding brake</li> <li>• 1 = with holding brake</li> <li>• 2 = with holding brake and M8 plug for manual brake release</li> </ul>

## 3.5 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 weight counterbalance

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.

## 3.6 Ordering options

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

### 3.6.1 Drive-integrated safety technology

The distributed servo drives are equipped with integrated safety functions by default. 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.



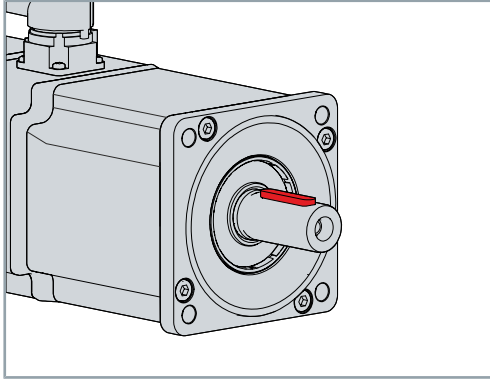
#### Information on commissioning and device replacement

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> <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> <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> </table> <table> <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> </table> <table> <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> </table> <table> <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> </table> <table> <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
<b>STO</b>	Safe torque off																																						
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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

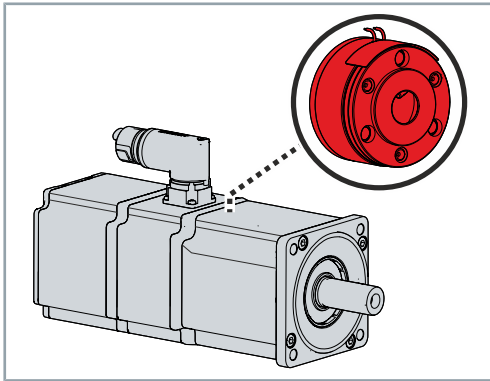
## 3.6.2 Feather key



A parallel key transmits torque to an output element.

The motors are available with parallel key groove and inserted parallel key in accordance with DIN 6885/ISO 2491. The rotor is balanced with a half parallel key in accordance with DIN ISO 21940-32:2012-08.

## 3.6.3 Holding brake

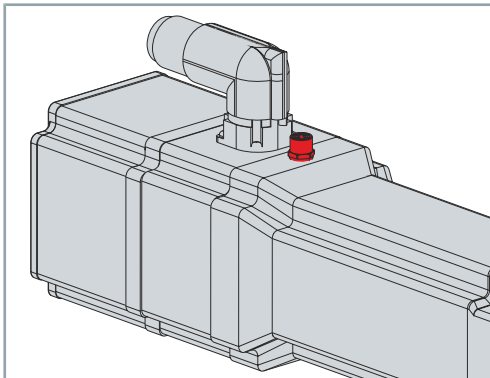


A holding brake blocks the rotor in the de-energized state. The holding brake works according to the quiescent current principle and opens at a voltage of 24 V DC +6 / -10 %. The holding brake increases the motor length and the rotor moment of inertia.

### AMP8abc-defg

Ordering information	Description
g =	Holding brake
0	without holding brake
1	with holding brake

## 3.6.4 Connection for manual release of the holding brake



The holding brake can be released for service purposes via the holding brake manual control connection. The AMP8000 motor has an additional M8 connection which is connected to an upstream 24 V DC power supply via the corresponding service.

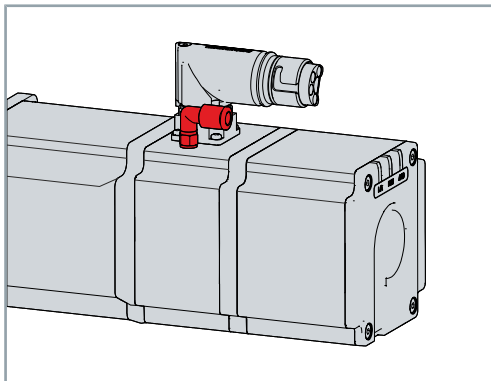
The connection for manual release of the holding brake is for service purposes only. Use is not permitted during operation of a system.

### AMP8abc-defg

Ordering information	Description
g =	Holding brake
2	with holding brake and M8 plug for manual brake release



### 3.6.5 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 via a 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 vertical 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

## 3.7 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

### 3.7.1 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.

## 3.8 Dual Use

According to the published EU Dual Use Regulation [Regulation (EU) No. 2021/821], commercially available frequency inverters are categorized as dual-use items. This means that the Beckhoff AMP8000 distributed servo drive system belongs to the category of goods that could be included in a dual-use listing.

The goods list, Annex 1 of the Dual Use Regulation No. 2021/821, has been amended accordingly:

- Frequency inverters (listed in goods list position 3A225) with a rotary field frequency of  $\geq 600$  Hz are subject to export control.
- Frequency inverters (listed in goods list position 3A225) with a rotary field frequency of  $\leq 599$  Hz are not subject to export control.

The AMP8000 distributed servo drive system is delivered with a maximum rotary field frequency of 599 Hz according to the current state of production and is therefore not subject to export control. This rotary field frequency limited at a maximum of 599 Hz is sufficient to operate all distributed servo drives in the AMP8000 series at full power.

## 4 Technical data

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

### 4.1 Definitions



#### Characteristic torque and speed curves

Detailed information on characteristic curves can be found under:



[TE5910 | TwinCAT 3 Motion Designer](#)

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

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

#### 4.1.1 Technical terms

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

##### 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 of  $n < 100$  rpm 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 S1 continuous operation for an unlimited period of time.

##### Voltage constant $K_{E_{rms}}$ [mV/min]

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

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

Measurement 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:

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

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 for the holding brake  $t_{BRH}$  [ms]/ $t_{BRL}$**   
[ms]

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

## 4.2 Data for operation and environment

### NOTICE

#### 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 for 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 a maximum of 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, AMP80xx, AMP85xx

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	5 g, 150 Hz according to EN 60068-2-6
Shock resistance	25 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", [Page 119]

## 4.3 AMP8620 power supply modules

### AMP8620 power supply module

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 IN		
Number of outputs	5 x Power OUT 2 x EtherCAT P OUT		
Maximum cascading with distribution modules	3		
Mains supply			
Input voltage [V <sub>AC</sub> ]	3 x 400 <sub>-20 %</sub> ...480 <sup>+8 %</sup>		
Frequency [Hz]	50/60		
Mains filter	Integrated, category C2		
SCCR value [kA]	5		
DC link			
Voltage [V <sub>DC</sub> ]	430...848		
Capacitance [μF]	940		
Output current [A <sub>DC</sub> ]	Σ max. 20		
Peak output current [A <sub>DC</sub> ] for maximum 5 seconds	Σ max. 40		
Integrated power supply			
Output voltage [V <sub>DC</sub> ]	24 (-12% / +15%)		
Output current [A <sub>DC,24V</sub> ] <sup>1)</sup>	max. 12		
EtherCAT P Us - output current [A <sub>DC,Us</sub> ]	Σ max. 3		
EtherCAT P Up - output current [A <sub>DC,Up</sub> ]	Σ max. 3		
Braking resistor			
Installation	---	integrated	external
Continuous braking power [W]	---	50	1600

<sup>1)</sup> The output current of the integrated power supply is divided between the power outputs and the EtherCAT P outputs.

Mechanical data	AMP8620		
	-2005-0000	-2005-0100	-2005-0200
Weight [kg]	7	8.70	7
Protection rating	IP65		
Protection rating conforms to UL	NEMA 12		

## AMP8620 power supply module with wide voltage range

Performance data	AMP8620		
	-2005-0010	-2005-0110	-2005-0210
Function	Power supply module with wide voltage range		
Number of inputs	1 x Power IN 1 x EtherCAT P / EtherCAT IN		
Number of outputs	5 x Power OUT 2 x EtherCAT P OUT		
Maximum cascading with distribution modules	3		
Mains supply			
Input voltage [V <sub>AC</sub> ]	3 x 230 <sub>-20 %</sub> ...480 <sup>+8 %</sup> 1 x 220 <sub>-20 %</sub> ...240 <sup>+20 %</sup> 1 x 120 <sub>-8 %</sub> ...120 <sup>+45 %</sup>		
Frequency [Hz]	50/60		
Mains filter	Integrated, category C2		
SCCR value [kA]	5		
DC link			
Voltage [V <sub>DC</sub> ]	155...848		
Capacitance [μF]	940		
Output current [A <sub>DC</sub> ]	Σ max. 20 at 3 x 230 <sub>-20 %</sub> ...480 <sup>+8 %</sup> V <sub>AC</sub> Σ max. 8 at 1 x 220 <sub>-20 %</sub> ...240 <sup>+20 %</sup> V <sub>AC</sub> Σ max. 4 at 1 x 120 <sub>-8 %</sub> ...120 <sup>+45 %</sup> V <sub>AC</sub>		
Peak output current [A <sub>DC</sub> ] for maximum 5 seconds	Σ max. 40 at 3 x 230 <sub>-20 %</sub> ...480 <sup>+8 %</sup> V <sub>AC</sub> Σ max.16 at 1 x 220 <sub>-20 %</sub> ...240 <sup>+20 %</sup> V <sub>AC</sub> Σ max. 8 at 1 x 120 <sub>-8 %</sub> ...120 <sup>+45 %</sup> V <sub>AC</sub>		
Integrated power supply			
Output voltage [V <sub>DC</sub> ]	24 (-12% / +15%)		
Output current [A <sub>DC,24V</sub> ] <sup>1)</sup>	max. 12 at 3 x 230 <sub>-20 %</sub> ...480 <sup>+8 %</sup> V <sub>AC</sub> 1 x 220 <sub>-20 %</sub> ...240 <sup>+20 %</sup> V <sub>AC</sub>  max. 8 at 1 x 120 <sub>-8 %</sub> ...120 <sup>+45 %</sup> V <sub>AC</sub>		
EtherCAT P Us - output current [A <sub>DC,Us</sub> ]	Σ max. 3		
EtherCAT P Up - output current [A <sub>DC,Up</sub> ]	Σ max. 3		
Braking resistor			
Installation	---	integrated	external
Continuous braking power [W]	---	50	1600

<sup>1)</sup> The output current of the integrated power supply is divided between the power outputs and the EtherCAT P outputs.

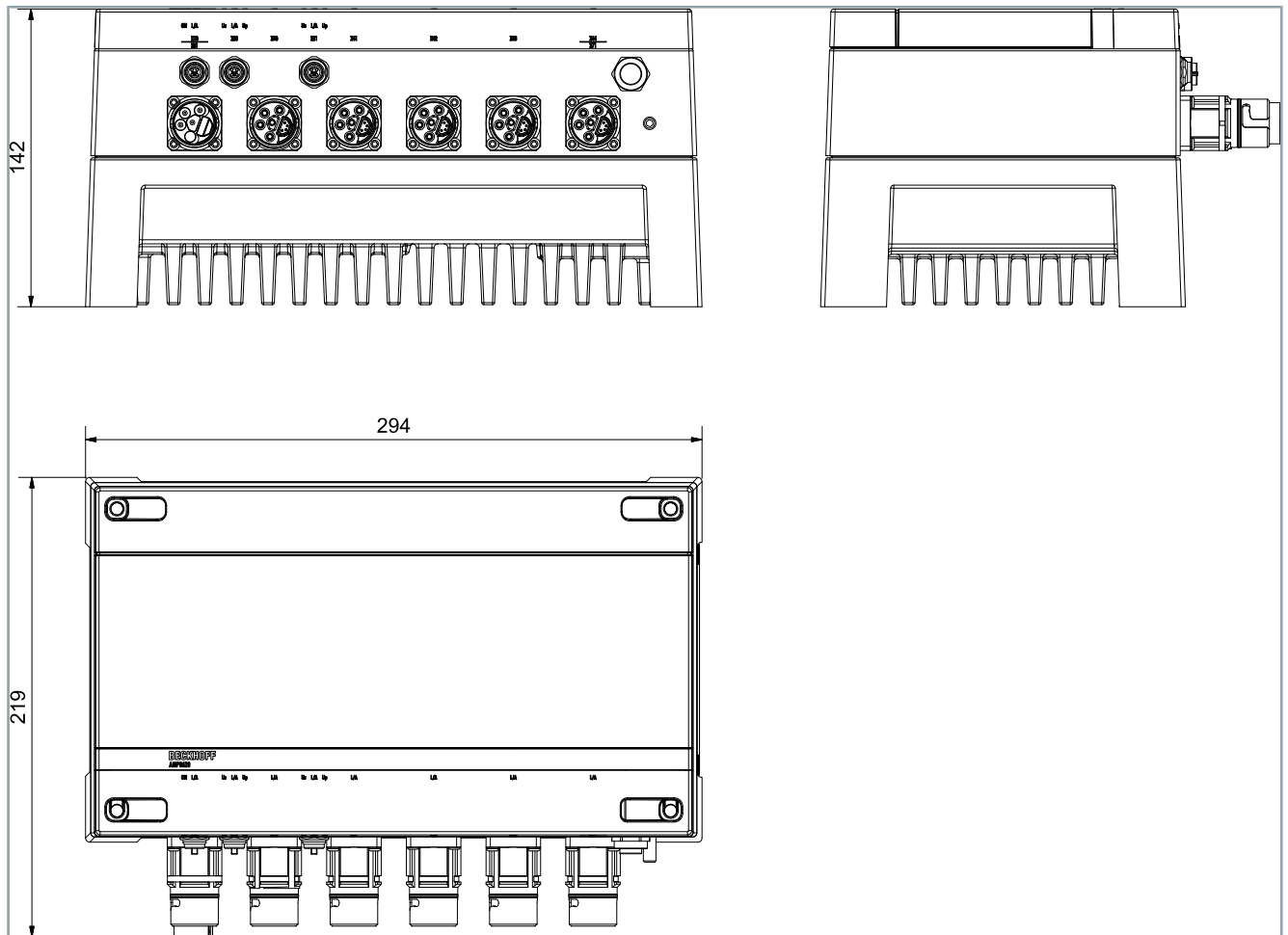


Mechanical data	AMP8620		
	-2005-0010	-2005-0110	-2005-0210
Weight [kg]	7	8.70	7
Protection rating	IP65		
Protection rating conforms to UL	NEMA 12		

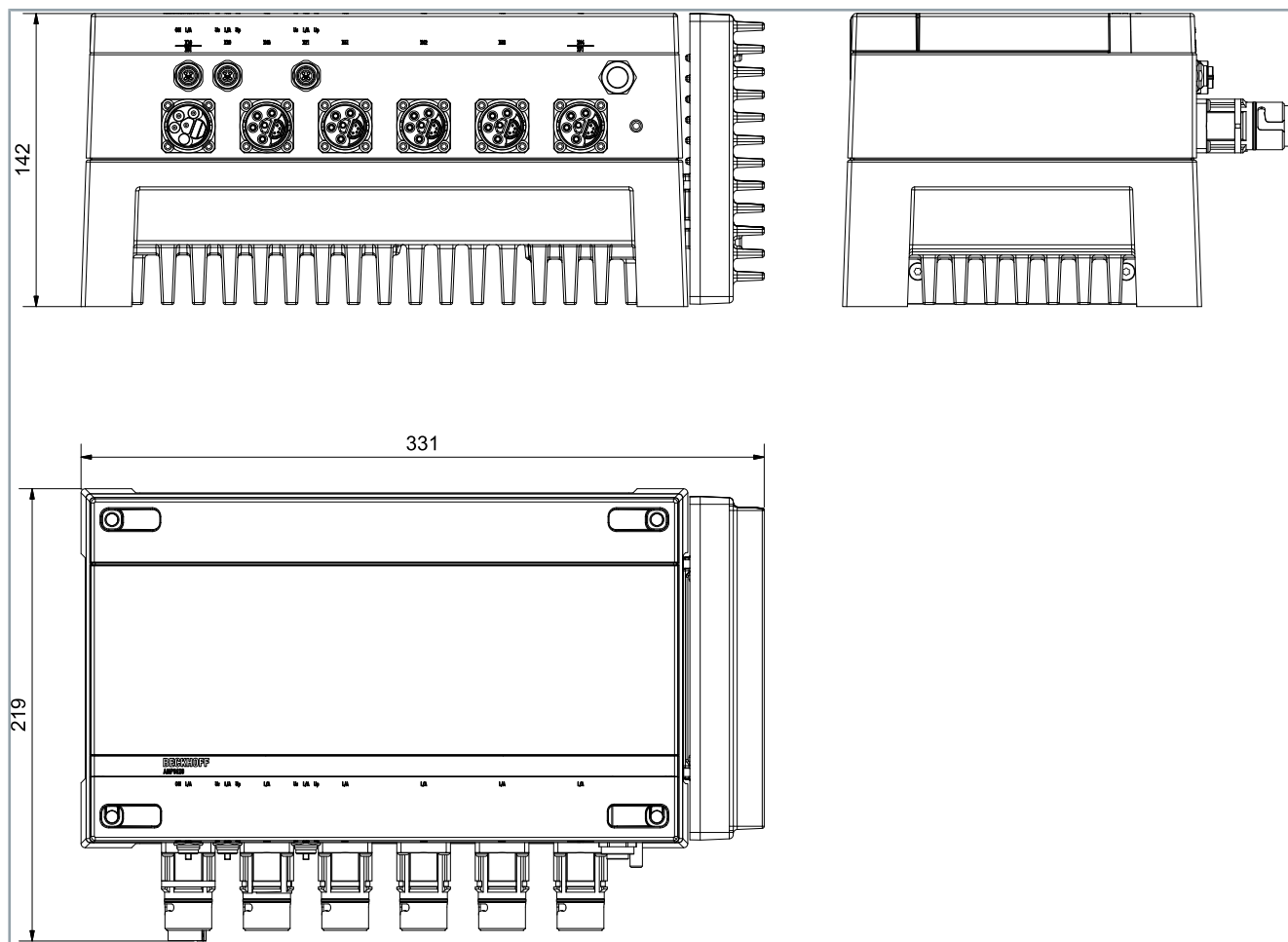
### 4.3.1 Dimensional drawing AMP8620

- All figures in millimeters

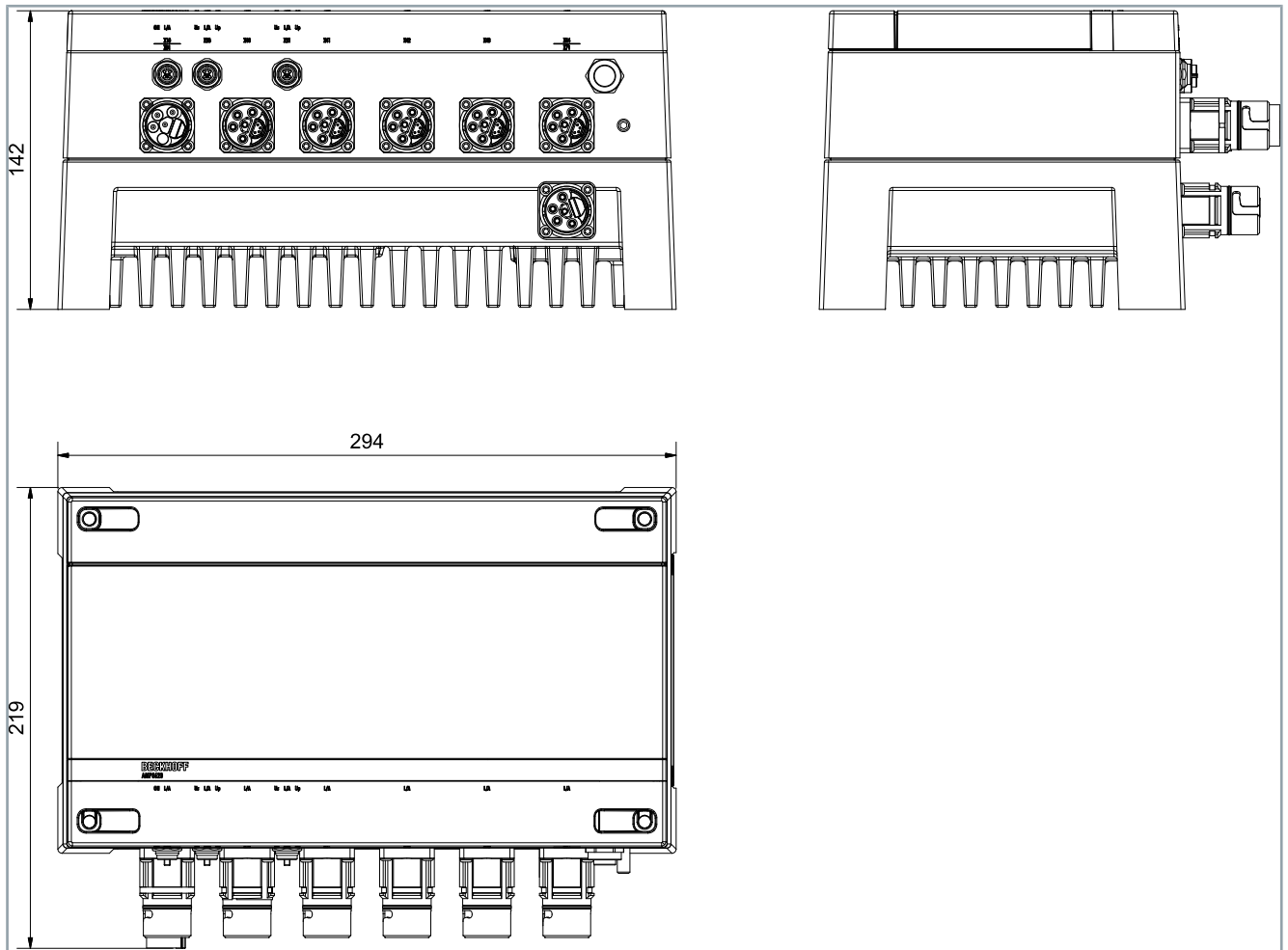
#### 4.3.1.1 AMP8620-2005-00x0



## 4.3.1.2 AMP8620-2005-01x0



#### 4.3.1.3 AMP8620-2005-02x0



## 4.4 AMP8805 distribution modules

### AMP8805 distribution module

Performance data	AMP8805-1000-0000
Function	Distribution module
Number of inputs	1 x Power IN
Number of outputs	5 x Power OUT 1 x EtherCAT P OUT
<b>Supply</b>	
Input voltage [ $V_{DC}$ ]	430...848
Input current [ $A_{DC}$ ]	max. 20
<b>DC link</b>	
Voltage [ $V_{DC}$ ]	430...848
Capacitance [ $\mu F$ ]	940
Output current [ $A_{DC}$ ]	$\Sigma$ max. 20
<b>Integrated power supply</b>	
Output voltage [ $V_{DC}$ ]	24 (-12% / +15%)
Output current [ $A_{DC,24V}$ ] <sup>1)</sup>	max. 12
EtherCAT P $U_s$ – output current [ $A_{DC,U_s}$ ]	$\Sigma$ max. 3
EtherCAT P $U_p$ – output current [ $A_{DC,U_p}$ ]	$\Sigma$ max. 3

<sup>1)</sup> The output current of the integrated power supply is divided between the power outputs and the EtherCAT P output.

Mechanical data	AMP8805-1000-0000
Weight [kg]	4.50
Protection rating	IP65
Protection rating conforms to UL	NEMA 12

## AMP8805 distribution module with extended voltage range

Performance data	AMP8805-1010-0000
Function	Distribution module with extended voltage range
Number of inputs	1 x Power IN
Number of outputs	5 x Power OUT 1 x EtherCAT P OUT
<b>Supply</b>	
Input voltage [V <sub>DC</sub> ]	155...848
Input current [A <sub>DC</sub> ]	max. 20
<b>DC link</b>	
Voltage [V <sub>DC</sub> ]	155...848
Capacitance [μF]	940
Output current [A <sub>DC</sub> ]	<p>Σ max. 20 with three-phase input voltage 3 x 230<sub>-20%</sub>...480<sup>+8%</sup> V<sub>AC</sub> from AMP8620 or AX8620+AX883x</p> <p>Σ max. 8 with single-phase input voltage 1 x 220<sub>-20%</sub>...240<sup>+20%</sup> V<sub>AC</sub> from AMP8620 or AX8620+AX883x</p> <p>Σ max. 4 with single-phase input voltage 1 x 120<sub>-8%</sub>...120<sup>+45%</sup> V<sub>AC</sub> from AMP8620 or AX8620+AX883x</p>
<b>Integrated power supply</b>	
Output voltage [V <sub>DC</sub> ]	24 (-12% / +15%)
Output current [A <sub>DC,24V</sub> ] <sup>1)</sup>	<p>max. 12 with DC link voltage (260 V<sub>DC</sub>...848 V<sub>DC</sub>)</p> <p>max. 8 with DC link voltage (155 V<sub>DC</sub>...260 V<sub>DC</sub>)</p>
EtherCAT P U <sub>s</sub> – output current [A <sub>DC,U<sub>s</sub></sub> ]	Σ max. 3
EtherCAT P U <sub>p</sub> – output current [A <sub>DC,U<sub>p</sub></sub> ]	Σ max. 3

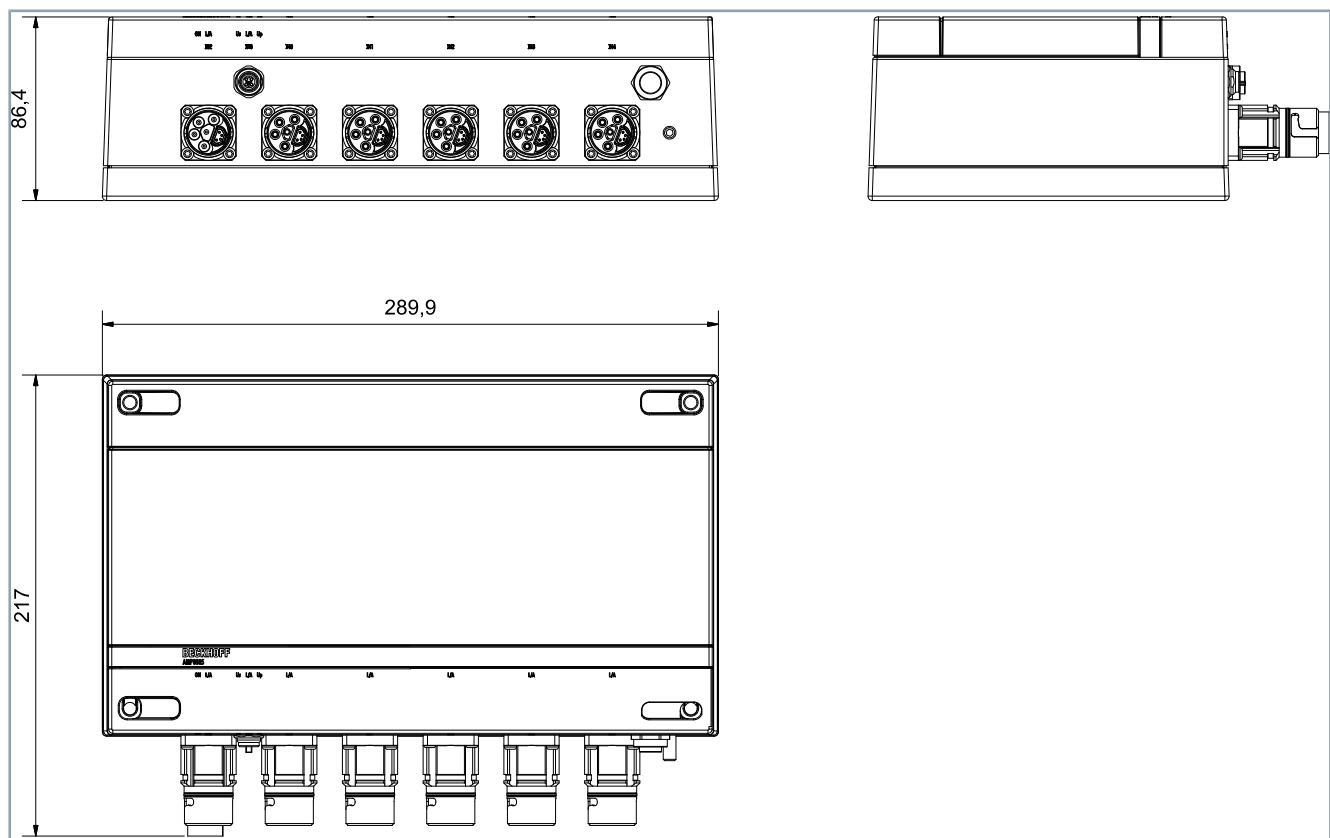
<sup>1)</sup> The output current of the integrated power supply is divided between the power outputs and the EtherCAT P output.

Mechanical data	AMP8805-1010-0000
Weight [kg]	4.50
Protection rating	IP65
Protection rating conforms to UL	NEMA 12

## 4.4.1 Dimensional drawing AMP8805

- All figures in millimeters

### 4.4.1.1 AMP8805-1000-0000



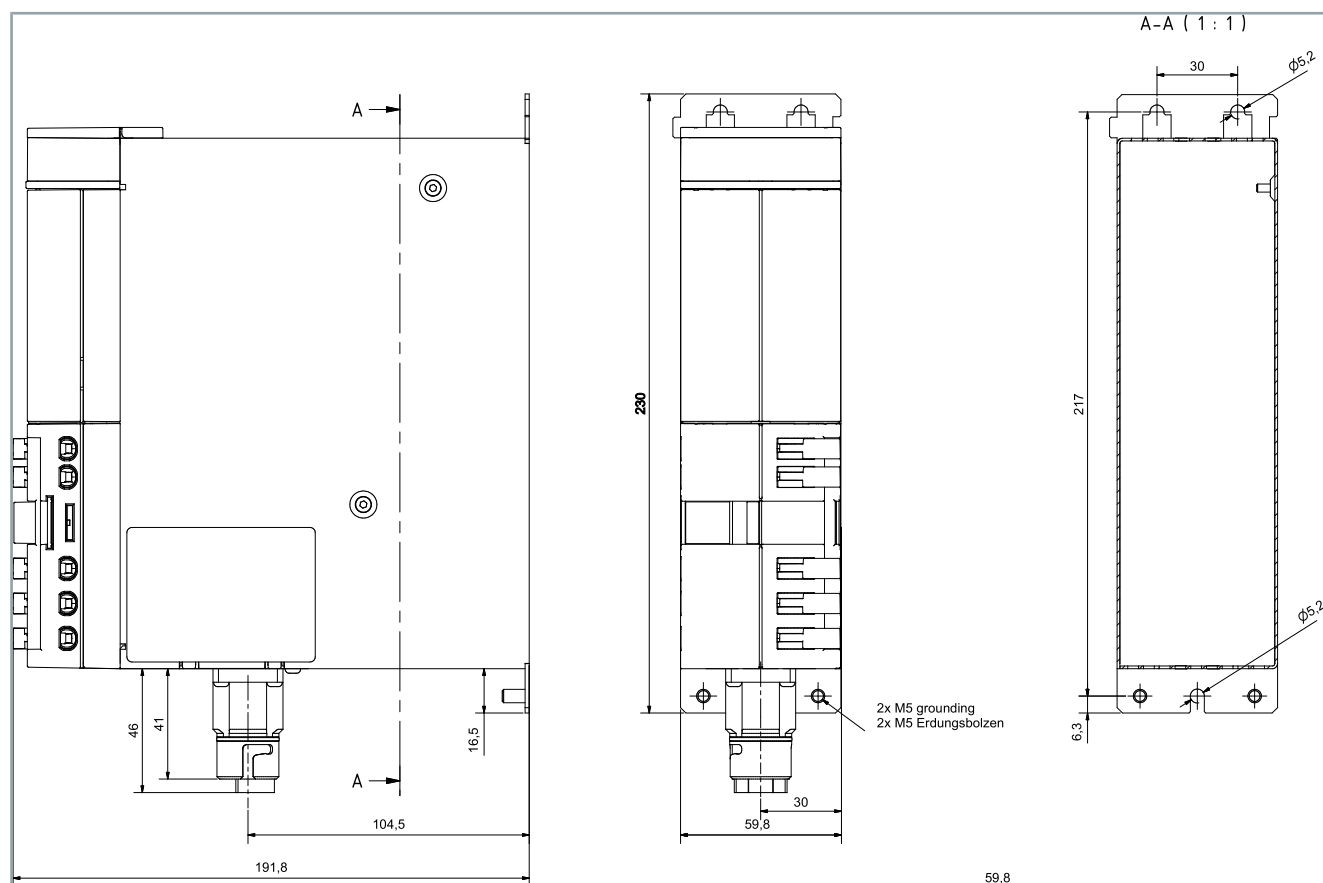
## 4.5 AX883x coupling module

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 V DC [ $A_{DC}$ ]	12	2 x 12
DC link voltage [ $V_{DC}$ ]	max. 848	
Mechanical data	AX8831	AX8832
Weight [kg]	1.80	1.90
Protection rating	IP20	IP20

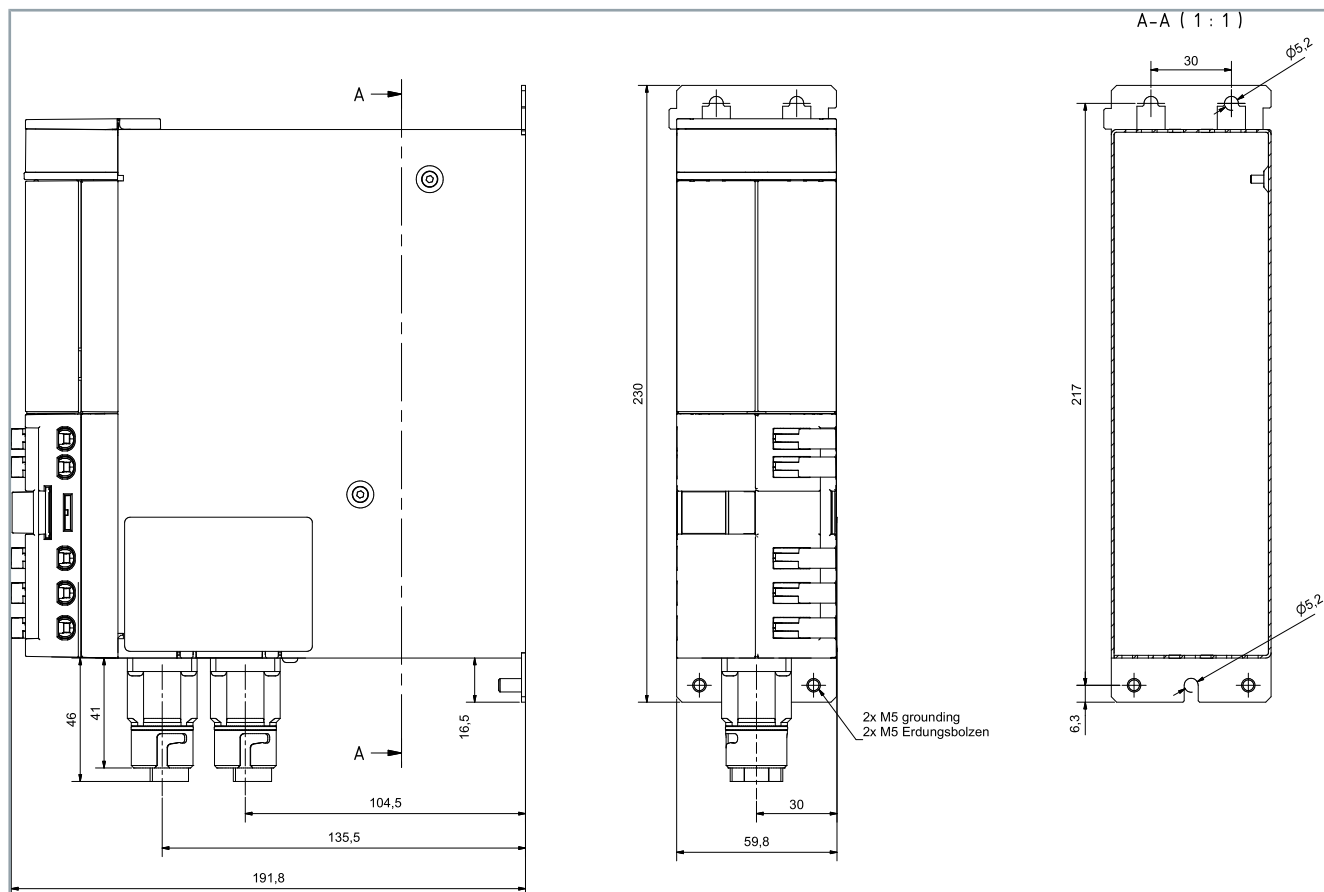
### 4.5.1 Dimensional drawing AX883x

- All figures in millimeters

#### 4.5.1.1 AX8831-0000-0000



## 4.5.1.2 AX8832-0000-0000





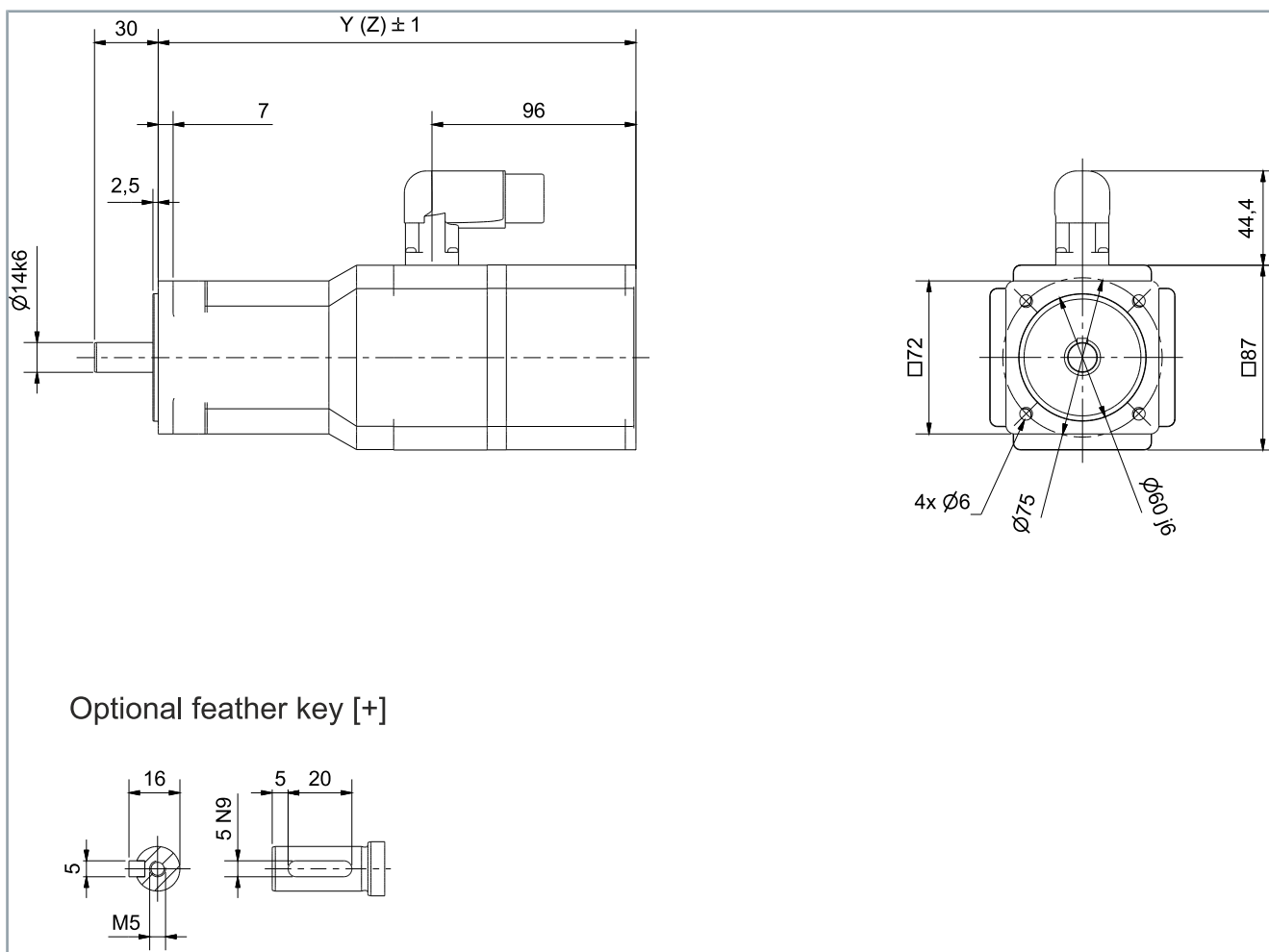
## 4.6 AMP803x, AMP853x distributed servo drive

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 <sub>0</sub> [Nm]	1.38	1.38	1.36	2.37	2.37	2.35	3.15	3.15	3.10
Standstill current I <sub>0</sub> [A]	1	1.95	3.10	1.69	2.95	5.06	2.07	4	6.54
Maximum mechanical speed N <sub>max</sub> [min <sup>-1</sup> ]	10000								
DC link voltage [V <sub>DC</sub> ]	0...848								
Peak current I <sub>max</sub> [A]	5.50	10.7	17.6	9.60	17.2	18	12.90	18	18
Peak torque M <sub>max</sub> [Nm]	6.10	6.07	6.07	11.7	11.7	8.27	17.20	14.36	9.37
Torque constant K <sub>T</sub> [Nm/A]	1.37	0.71	0.44	1.40	0.80	0.46	1.52	0.79	0.47
Voltage constant K <sub>E</sub> [mV/min]	99	50	30	100	56	32	106	57	34
Winding resistance Ph-Ph R <sub>20</sub> [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
Power supply U <sub>N</sub> = 230 V									
Nominal speed N <sub>n</sub> [min <sup>-1</sup> ]	1400	3300	6000	1500	3200	6000	1500	3200	5900
Nominal torque M <sub>n</sub> [Nm]	1.37	1.37	1.33	2.33	2.27	1.5	3.09	2.9	1.46
Nominal output P <sub>n</sub> [kW]	0.201	0.47	0.836	0.366	0.761	0.942	0.485	0.972	0.902
Power supply U <sub>N</sub> = 400 V									
Nominal speed N <sub>n</sub> [min <sup>-1</sup> ]	3000	6000	9000	3000	6000	9000	3000	6000	8000
Nominal torque M <sub>n</sub> [Nm]	1.36	1.34	1.30	2.27	2.05	0.80	2.95	2.55	0.50
Nominal output P <sub>n</sub> [kW]	0.43	0.84	1.23	0.71	1.29	0.75	0.93	1.60	0.42
Nominal current I <sub>n</sub> [A]	0.99	1.90	3	1.62	2.57	1.72	1.95	3.25	1.05
Power supply U <sub>N</sub> = 480 V									
Nominal speed N <sub>n</sub> [min <sup>-1</sup> ]	3400	6800	9000	3400	6800	9000	3400	6800	9000
Nominal torque M <sub>n</sub> [Nm]	1.35	1.32	1.30	2.22	1.95	0.80	2.91	2.45	0.50
Nominal output P <sub>n</sub> [kW]	0.48	0.94	1.23	0.79	1.39	0.75	1.04	1.74	0.42
Connection technology	ECP-B23 round connector, rotatable, angled								
System bus	EtherCAT								
Drive profile	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 [kgcm²]	0.47	0.85	1.23	1.67	2.05	2.44
Rotor moment of inertia with brake J [kgcm²]	0.55	0.93	1.46	1.76	2.15	2.67
Static friction torque M <sub>R</sub> [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
Flange according to IEC DIN 42955						
Fit	j6					
Tolerance class	N					
Protection rating						
Standard housing version	IP65					
Standard shaft feedthrough version	IP54 / IP20 in mounting position V3					
Shaft feedthrough with radial shaft-sealing ring	IP65					
Protection rating conforms to UL	NEMA 12					
Paint finishes						
Properties	Acrylic powder-coated					
Color	Anthracite gray; RAL 7016					
Material	Aluminum					
Ball bearing service life	≥ 30,000 operating hours					
Cooling	Convection					
Thermal class	Th-CI F; according to EN 60034-1					
Temperature sensor	Integrated temperature sensor in stator winding					
Optional holding brake [+]	AMP80xx			AMP85xx		
	31	32	33	31	32	33
Holding torque at 120 °C M <sub>BR</sub> [Nm]	2		3.5	2		3.5
Release delay time t <sub>BRH</sub> [ms]	25		35	25		35
Application delay time t <sub>BRL</sub> [ms]	8		15	8		15
Control voltage						
Without holding brake						
Control voltage input [V <sub>DC</sub> ]	18 to 31					
Current consumption of the control voltage [A <sub>DC</sub> ]	0.19					
With holding brake						
Control voltage input [V <sub>DC</sub> ]	21.6 to 25.4					
Current consumption of the control voltage [A <sub>DC</sub> ]	0.52		0.55	0.52		0.55

## 4.6.1 Dimensional drawing AMP803x, AMP853x

- 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

## 4.7 AMP804x, AMP854x distributed servo drive

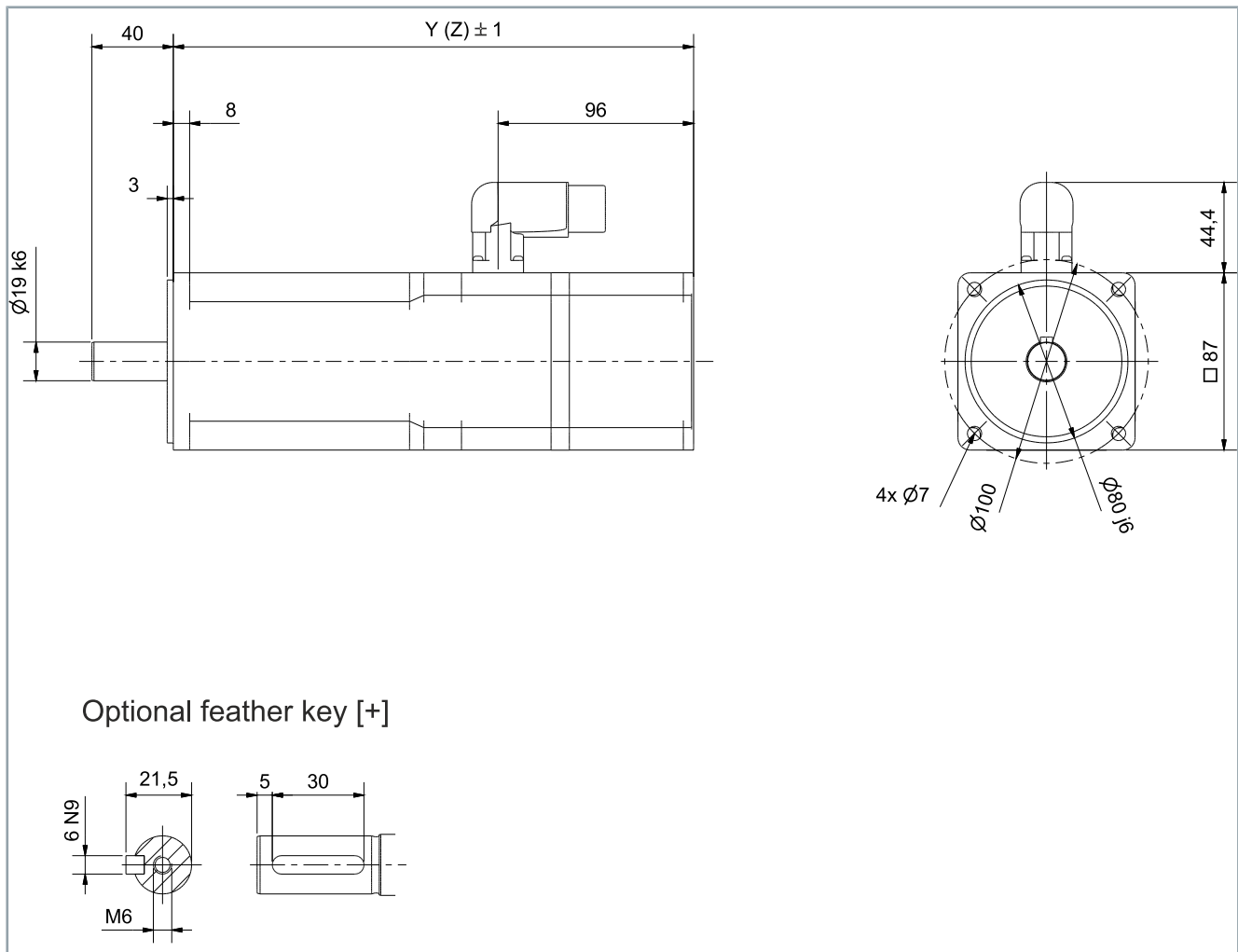
Performance data	AMP80xx and AMP85xx								
	41-D	41-E	41-H	42-E	42-F	42-J	43-E	43-H	43-K
Standstill torque $M_0$ [Nm]	2.40	2.40	2.35	4.10	4.05	3.84	5.40	5.30	4.70
Standstill current $I_0$ [A]	1.67	2.93	5.11	2.16	4.05	6.40	2.77	5.05	7.83
Maximum mechanical speed $N_{\max}$ [min <sup>-1</sup> ]	9000								
DC link voltage $V_{DC}$	0...848								
Peak current $I_{\max}$ [A]	8.30	13.60	18	11.80	18	18	16.60	18	18
Peak torque $M_{\max}$ [Nm]	9.67	9.14	7.76	18.90	16.20	11.10	29.30	19.20	11.80
Torque constant $K_T$ [Nm/A]	1.44	0.82	0.46	1.90	1	0.60	1.95	1.05	0.60
Voltage constant $K_E$ [mVmin]	101	56	33	128	68	41	131	73	42
Winding resistance Ph-Ph $R_{20}$ [Ω]	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
Power supply $U_N = 230\text{ V}$									
Nominal speed $N_n$ [min <sup>-1</sup> ]	1500	3000	6000	1200	2800	5000	1200	2700	5000
Nominal torque $M_n$ [Nm]	2.39	2.3	2	3.94	3.63	2.3	5.3	4.6	2.8
Nominal output $P_n$ [kW]	0.375	0.723	1.26	0.495	1.06	1.2	0.666	1.3	1.47
Power supply $U_N = 400\text{ V}$									
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
Power supply $U_N = 480\text{ V}$									
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
Connection technology	ECP-B23 round connector, rotatable, angled								
System bus	EtherCAT								
Drive profile	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 [kgcm²]	1.09	1.98	2.87	4.62	5.51	6.41
Rotor moment of inertia with brake J [kgcm²]	1.73	2.63	3.52	5.27	6.17	7.06
Static friction torque M <sub>R</sub> [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
Flange according to IEC DIN 42955						
Fit	j6					
Tolerance class	N					
Protection rating						
Standard housing version	IP65					
Standard shaft feedthrough version	IP54 / IP20 in mounting position V3					
Shaft feedthrough with radial shaft-sealing ring	IP65					
Protection rating conforms to UL	NEMA 12					
Paint finishes						
Properties	Acrylic powder-coated					
Color	Anthracite gray; RAL 7016					
Material	Aluminum					
Ball bearing service life	≥ 30,000 operating hours					
Cooling	Convection					
Thermal class	Th-CI F; according to EN 60034-1					
Temperature sensor	Integrated temperature sensor in stator winding					

Optional holding brake [+]	AMP80xx			AMP85xx		
	41	42	43	41	42	43
Holding torque at 120 °C M <sub>BR</sub> [Nm]	9					
Release delay time t <sub>BRH</sub> [ms]	40					
Application delay time t <sub>BRL</sub> [ms]	20					
Control voltage						
Without holding brake						
Control voltage input [V <sub>DC</sub> ]	18 to 31					
Current consumption of the control voltage [A <sub>DC</sub> ]	0.19					
With holding brake						
Control voltage input [V <sub>DC</sub> ]	21.6 to 25.4					
Current consumption of the control voltage [A <sub>DC</sub> ]	0.73					

## 4.7.1 Dimensional drawing AMP804x, AMP854x

- 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

## 4.8 AMP805x, AMP855x distributed servo drive

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 $I_0$ [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 $V_{DC}$	0...848									
Peak current $I_{\max}$ [A]	12.10	18	18	17.90	18	18	18	18	18	18
Peak torque $M_{\max}$ [Nm]	17.70	16.40	10.70	35.30	23.40	14.20	41.60	31.10	24.90	42.80
Torque constant $K_T$ [Nm/A]	1.77	1.03	0.55	2.48	1.30	0.70	2.42	1.65	1.20	2.38
Voltage constant $K_E$ [mVmin]	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
Power supply $U_N = 230$ V										
Nominal speed $N_n$ [min <sup>-1</sup> ]	1400	2700	5000	1100	2200	4000	1100	1500	2200	1000
Nominal torque $M_n$ [Nm]	4.54	4.3	3.46	7.3	6.9	4.2	9.1	8.7	8	10.1
Nominal output $P_n$ [kW]	0.666	1.22	1.81	0.841	1.59	1.76	1.05	1.37	1.84	1.06
Power supply $U_N = 400$ V										
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
Power supply $U_N = 480$ V										
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
Connection technology	ECP-B23 round connector, rotatable, angled									
System bus	EtherCAT									
Drive profile	CiA402 conforms to IEC 61800-7-201; CoE									
Reference flange aluminum 305 mm x 305 mm x 10 mm										

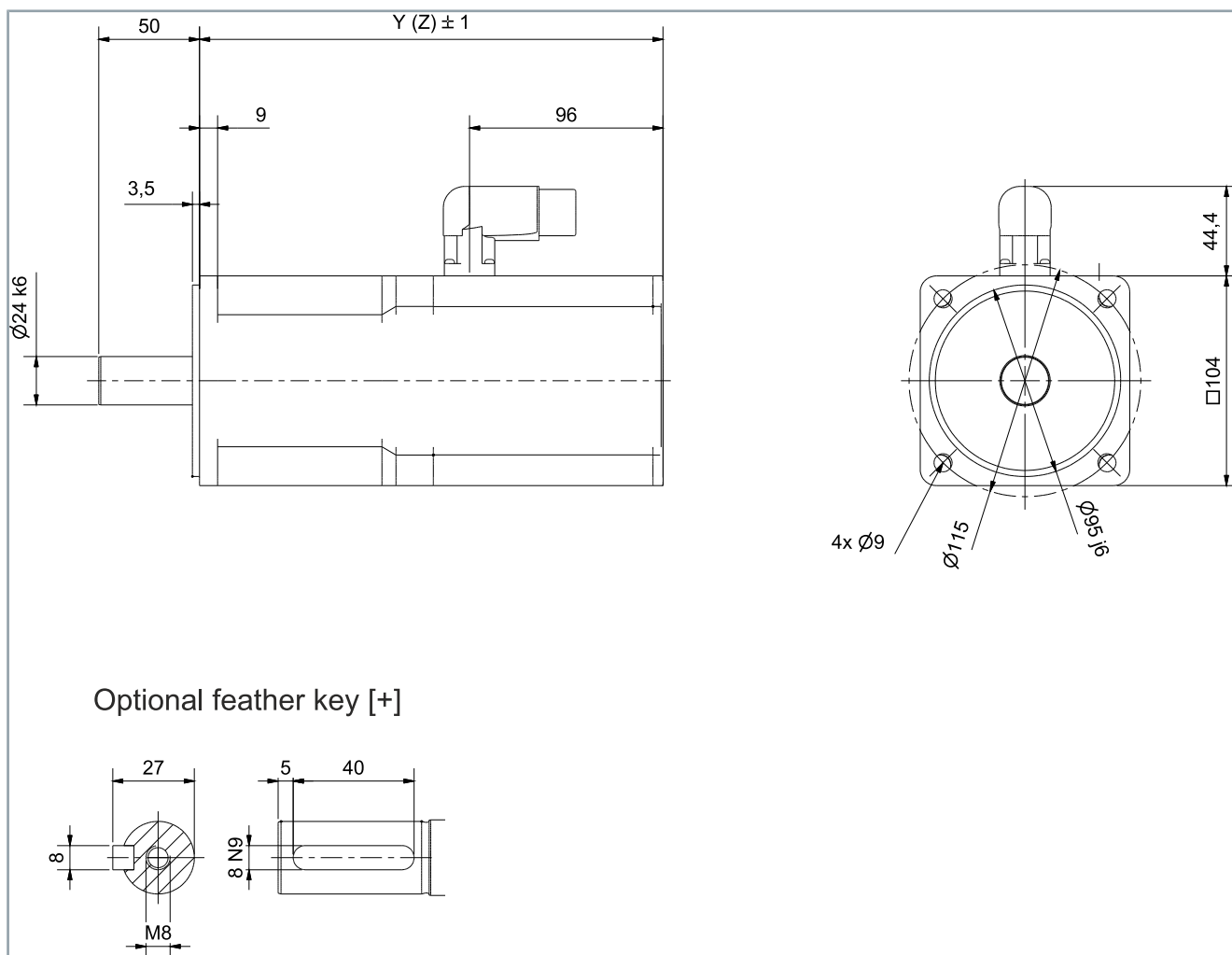
Mechanical data	AMP80xx				AMP85xx		
	51	52	53	54	51	52	53
Rotor moment of inertia without brake J [kgcm²]	2.24	4.08	5.92	7.90	8.75	10.60	12.40
Rotor moment of inertia with brake J [kgcm²]	2.90	4.74	7.04	9.66	9.41	11.30	13.51
Static friction torque M <sub>R</sub> [Nm]	0.02	0.036	0.05	0.065	0.02	0.03	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
Flange according to IEC DIN 42955							
Fit	j6						
Tolerance class	N						
Protection rating							
Standard housing version	IP65						
Standard shaft feedthrough version	IP54 / IP20 in mounting position V3						
Shaft feedthrough with radial shaft-sealing ring	IP65						
Protection rating conforms to UL	NEMA 12						
Paint finishes							
Properties	Acrylic powder-coated						
Color	Anthracite gray; RAL 7016						
Material	Aluminum						
Ball bearing service life	≥ 30,000 operating hours						
Cooling	Convection						
Thermal class	Th-CI F; according to EN 60034-1						
Temperature sensor	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 t <sub>BRH</sub> [ms]	40		45	110	40	
Application delay time t <sub>BRL</sub> [ms]	20		20	40	20	
Control voltage						
Without holding brake						
Control voltage input [V <sub>DC</sub> ]	18 to 31					
Current consumption of the control voltage [A <sub>DC</sub> ]	0.19					
With holding brake						
Control voltage input [V <sub>DC</sub> ]	21.60 to 25.40					
Current consumption of the control voltage [A <sub>DC</sub> ]	0.73		0.70	1.19	0.73	



## 4.8.1 Dimensional drawing AMP805x, AMP855x

- 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

## 5 Scope of supply



### 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:

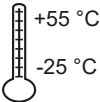



Translation of the original instructions	Short information
AMP8620 and AX883x	AMP8805 and AMP8000

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

Components	Connector
AMP8620-2005-02x0	X71 <ul style="list-style-type: none"><li>• Mating connector including crimp contacts</li><li>• Connection for external brake resistor</li></ul>

## 5.1 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.

### Packaging A

**Size of packaging A: 490 x 385 x 290 (h x w x d in mm)**

The following products are supplied in packaging size A:

- AMP8620
- AMP8805

### Packaging B

**Size of packaging B: 370 x 275 x 130 (h x w x d in mm)**

The following products are supplied in packaging size B:

- AX8831
- AX8832

### Packaging C

**Size of packaging C: 177 x 155 x 370 (h x w x d in mm)**

The following products are supplied in packaging size C:

- AMP8031-xxx0, AMP8031-xxx1, AMP8031-xxx2
- AMP8032-xxx0
- AMP8531-xxxx
- AMP8041-xxx0
- AMP8042-xxx0

### Packaging D

**Size of packaging D: 195 x 190 x 430 (h x w x d in mm)**

The following products are supplied in packaging size D:

- AMP8033-xxx0
- AMP8032-xxx1, AMP8032-xxx2
- AMP8532-xxx0
- AMP8041-xxx1, AMP8041-xxx2
- AMP8541-xxx0
- AMP8051-xxx0
- AMP8052-xxx0

## Packaging E

### **Size of packaging E: 300 x 300 x 750 (h x w x d in mm)**

The following products are supplied in packaging size E:

- AMP8033-xxx1, AMP8033-xxx2
- AMP8532-xxx1, AMP8532-xxx2
- AMP8533-xxx0
- AMP8541-xxx1, AMP8541-xxx2
- AMP8042-xxx1, AMP8042-xxx2
- AMP8542-xxx0, AMP8542-xxx1, AMP8542-xxx2
- AMP8043-xxx0, AMP8043-xxx1, AMP8043-xxx2
- AMP8543-xxx0, AMP8543-xxx1, AMP8543-xxx2
- AMP8051-xxx1, AMP8051-xxx2
- AMP8551-xxx0, AMP8551-xxx1, AMP8551-xxx2
- AMP8052-xxx1, AMP8052-xxx2
- AMP8552-xxx0, AMP8552-xxx1, AMP8552-xxx2
- AMP8053-xxx0, AMP8053-xxx1, AMP8053-xxx2
- AMP8553-xxx0, AMP8553-xxx1, AMP8553-xxx2
- AMP8054-xxx0, AMP8054-xxx1, AMP8054-xxx2

## 6 Transport and storage

### ⚠ 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.*

### NOTICE

#### 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.*

### NOTICE

#### 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.*

### NOTICE

#### Damage due to removal of the protective cap

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

- Do not remove the yellow protective cap on the drive shaft

## 6.1 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	
AMP883x	
AMP8031-xxxx	14 per layer; 7 layers per pallet
AMP8032-xxx0	
AMP8531-xxxx	
AMP8041-xxx0	
AMP8042-xxx0	
AMP8033-xxx0	9 per layer; 6 layers per pallet
AMP8032-xxx1, AMP8032-xxx2	
AMP8532-xxx0	
AMP8041-xxx1, AMP8041-xxx2	
AMP8541-xxx0	
AMP8051-xxx0	
AMP8052-xxx0	
AMP8033-xxx1, AMP8033-xxx2	4 per layer; 4 layers per pallet
AMP8532-xxx1, AMP8532-xxx2	
AMP8533-xxx0	
AMP8541-xxx1, AMP8541-xxx2	
AMP8042-xxx1, AMP8042-xxx2	
AMP8542-xxxx	
AMP8043-xxxx	
AMP8543-xxxx	
AMP8051-xxx1, AMP8051-xxx2	
AMP8551-xxxx	
AMP8052-xxx1, AMP8052-xxx2	
AMP8552-xxxx	
AMP8053-xxxx	
AMP8553-xxxx	
AMP8054-xxxx	

## 6.2 Transport

### **WARNING**

#### **Serious to fatal accidents caused by suspended loads**

A falling distributed servo drive system can lead to serious or even fatal accidents.

- Use suitable means of transport
- Secure distributed servo drive system against falling down
- Do not move under suspended loads

### **NOTICE**

#### **Damage to the distributed servo drive system due to mechanical loads**

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

- Use suitable means of transport
- Secure distributed servo drive system against high mechanical loads



#### **Legal regulations for the lifting of loads**

When transporting distributed servo drive systems, comply with the legal regulations on lifting loads for employees.

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

## 6.3 Long-term storage

### NOTICE

#### Product damage due to storage

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.

- Observe the maximum storage time.
- Keep the storage room vibration-free.
- Check components for proper condition every six months.

### NOTICE

#### Product damage due to condensation

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

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

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 63].

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. Damage to the drive or maintenance work not carried out will affect the service life of the installed components and parts. Condensation can lead to damage during subsequent operation or to rust formation. Prevent the formation of condensation.

#### AMP80xx, AMP85xx

maximum storage time: 2 years

Exceeding the specified maximum storage time can lead to a change in the properties of the lubricant used and may damage the drive during operation.

#### AMP8620, AMP8805, AX883x

### NOTICE

#### Limited functionality due to unformed capacitors

The dielectric in the DC link capacitors decreases over a very long storage period and the capacitors lose their forming. This can lead to considerable functional restrictions and even a shortened service life of the device.

- If the storage period exceeds 5 years, "reform the capacitors", [Page 74]

maximum storage time: 5 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.



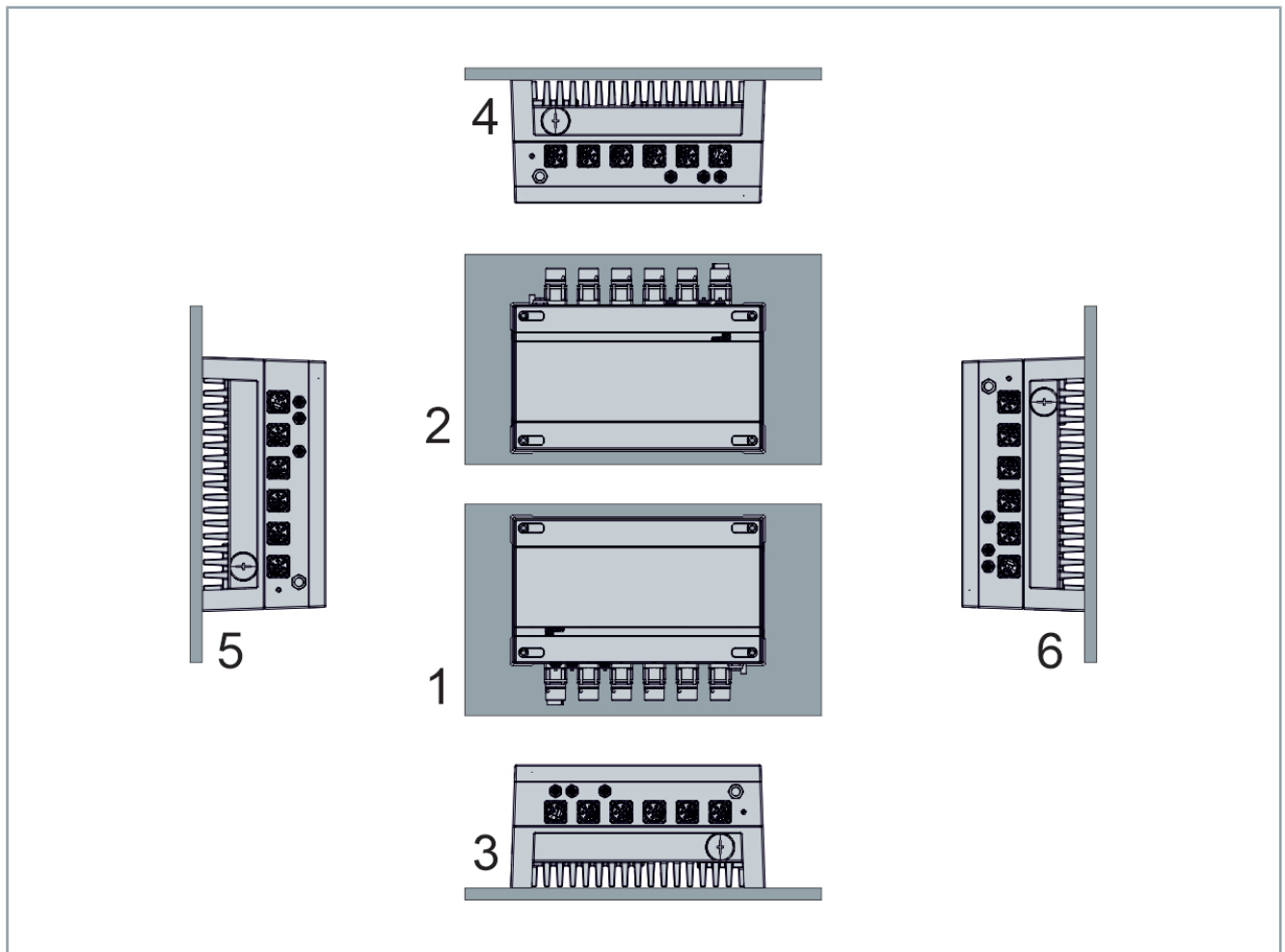
## 7 Technical description

### 7.1 Installation position AMP8620, AMP8805, AX883x modules

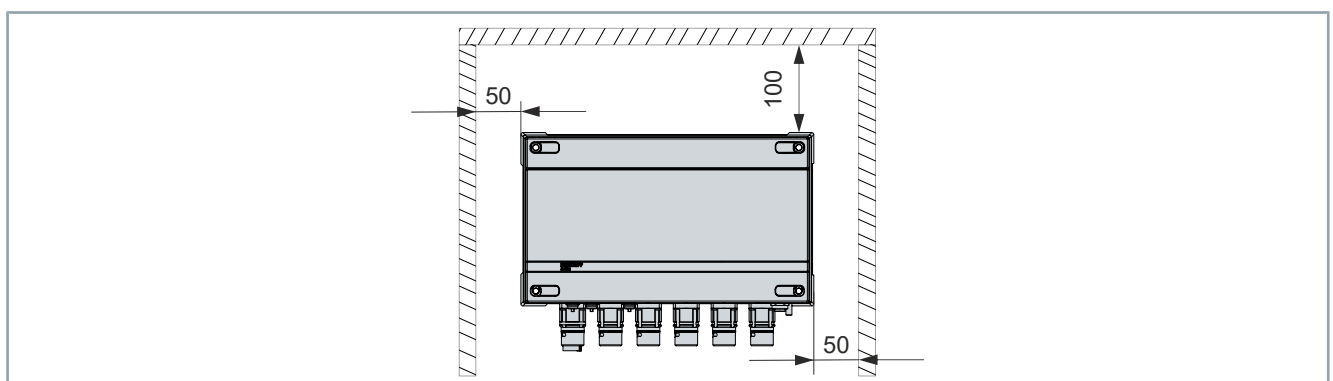
The standard installation position of the modules in the machine or in the control cabinet is the vertical installation position with the connections facing downwards.

#### AMP8620-2005-00x0 and AMP8620-2005-02x0

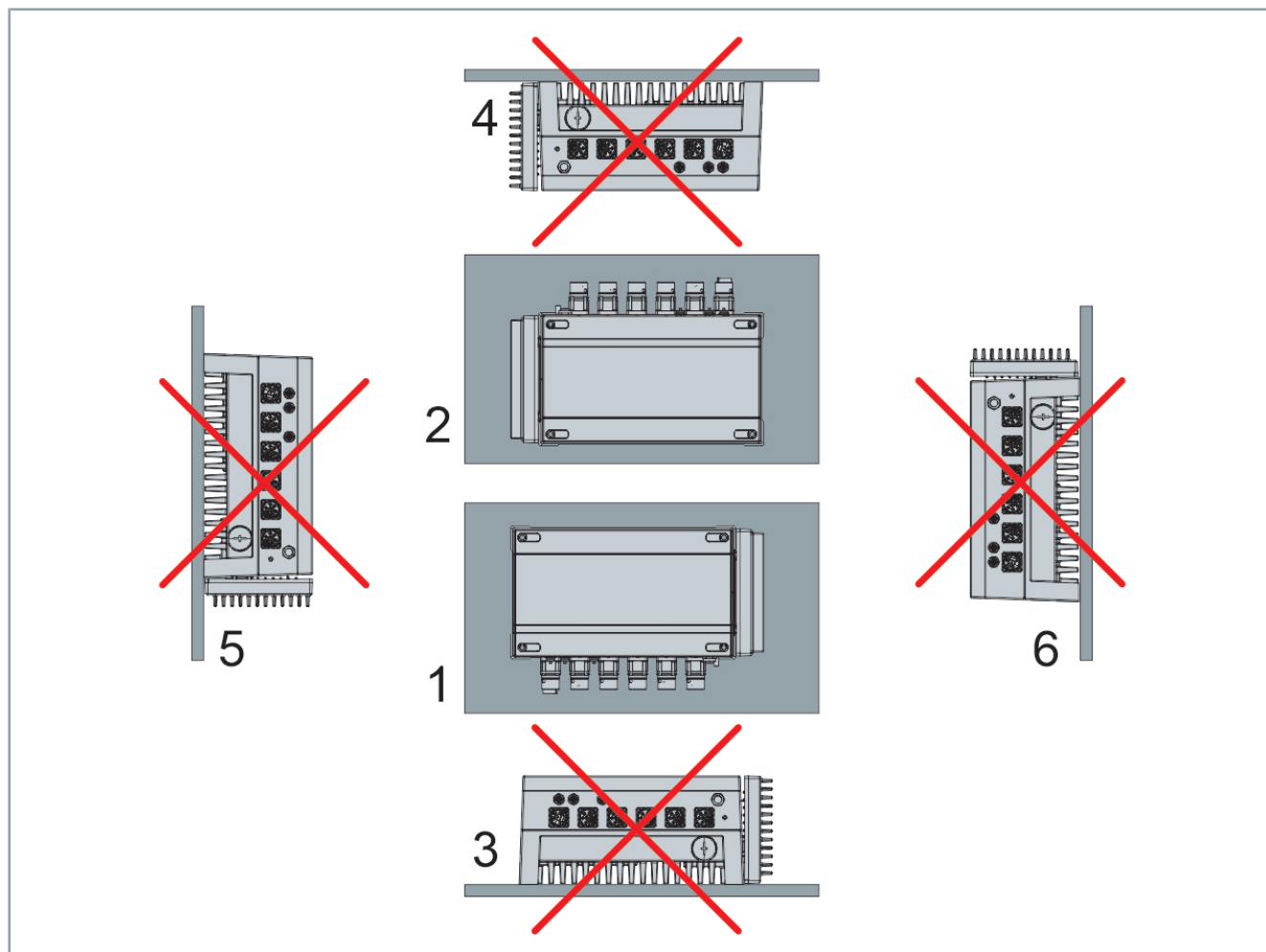
- No derating due to installation position



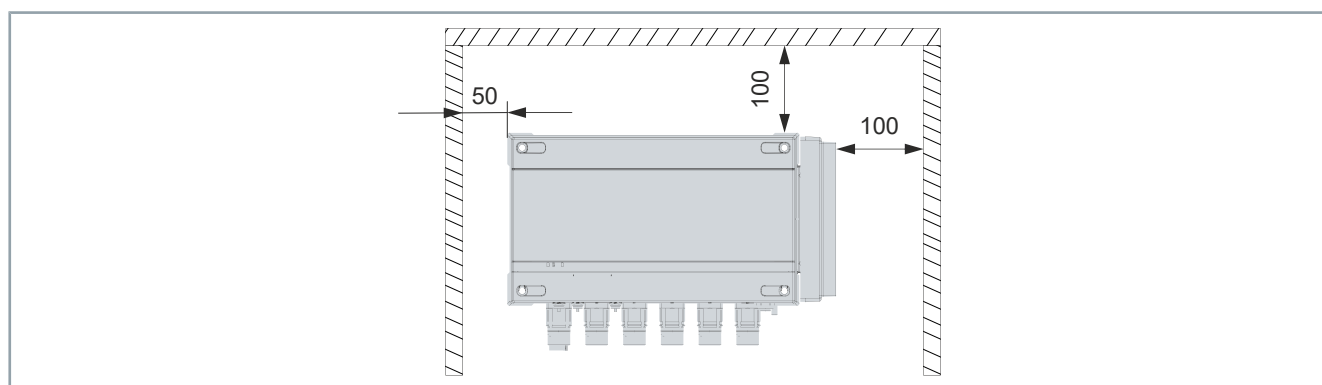
- All figures in millimeters



- No derating due to installation position

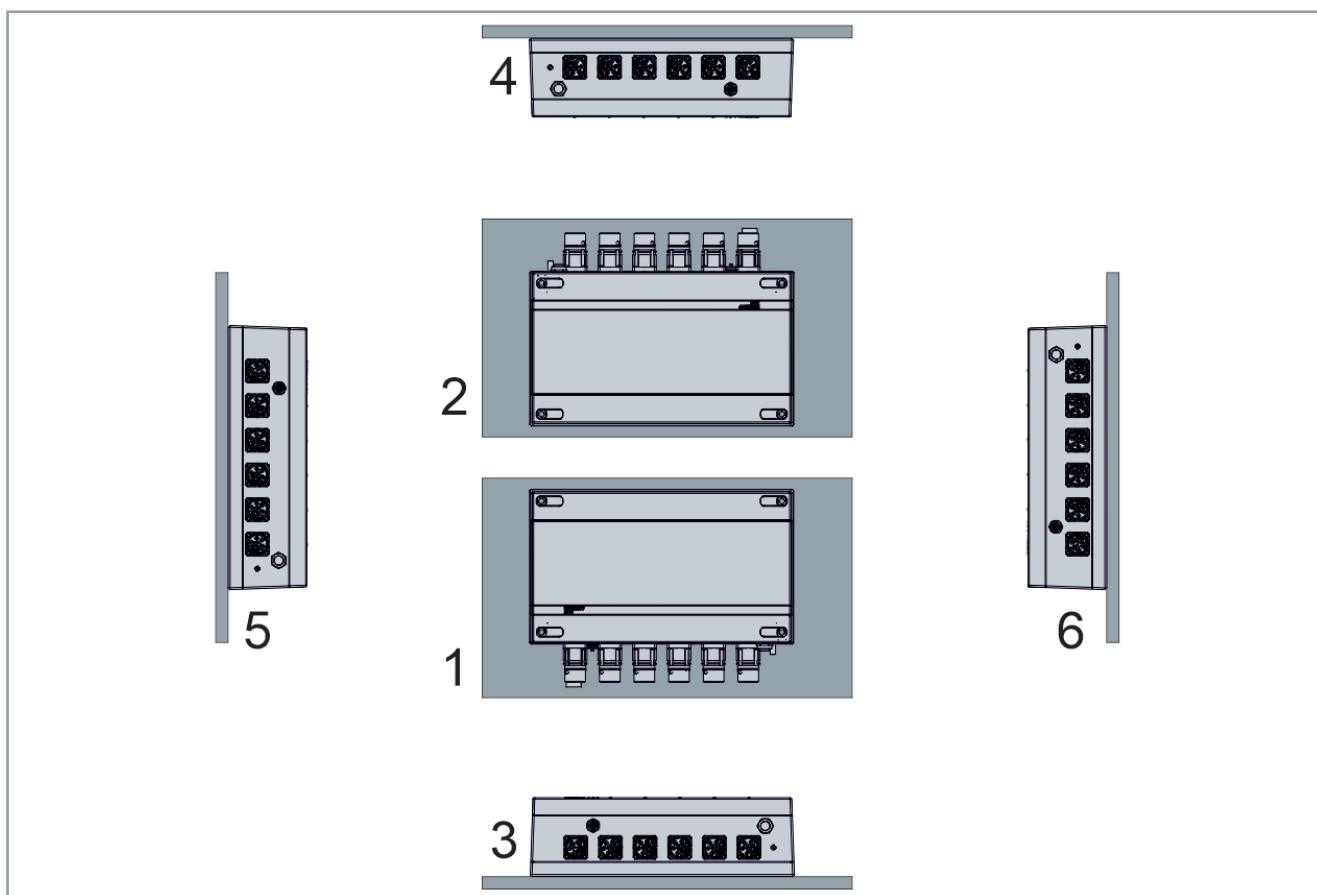


- All figures in millimeters

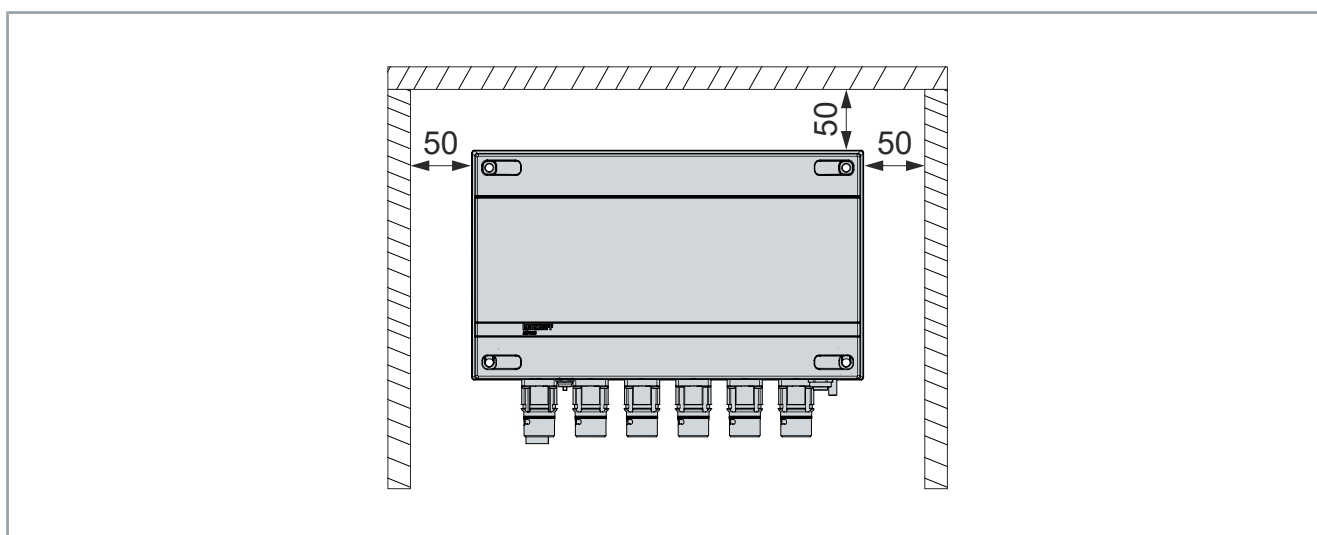


## AMP8805

- No derating due to installation position

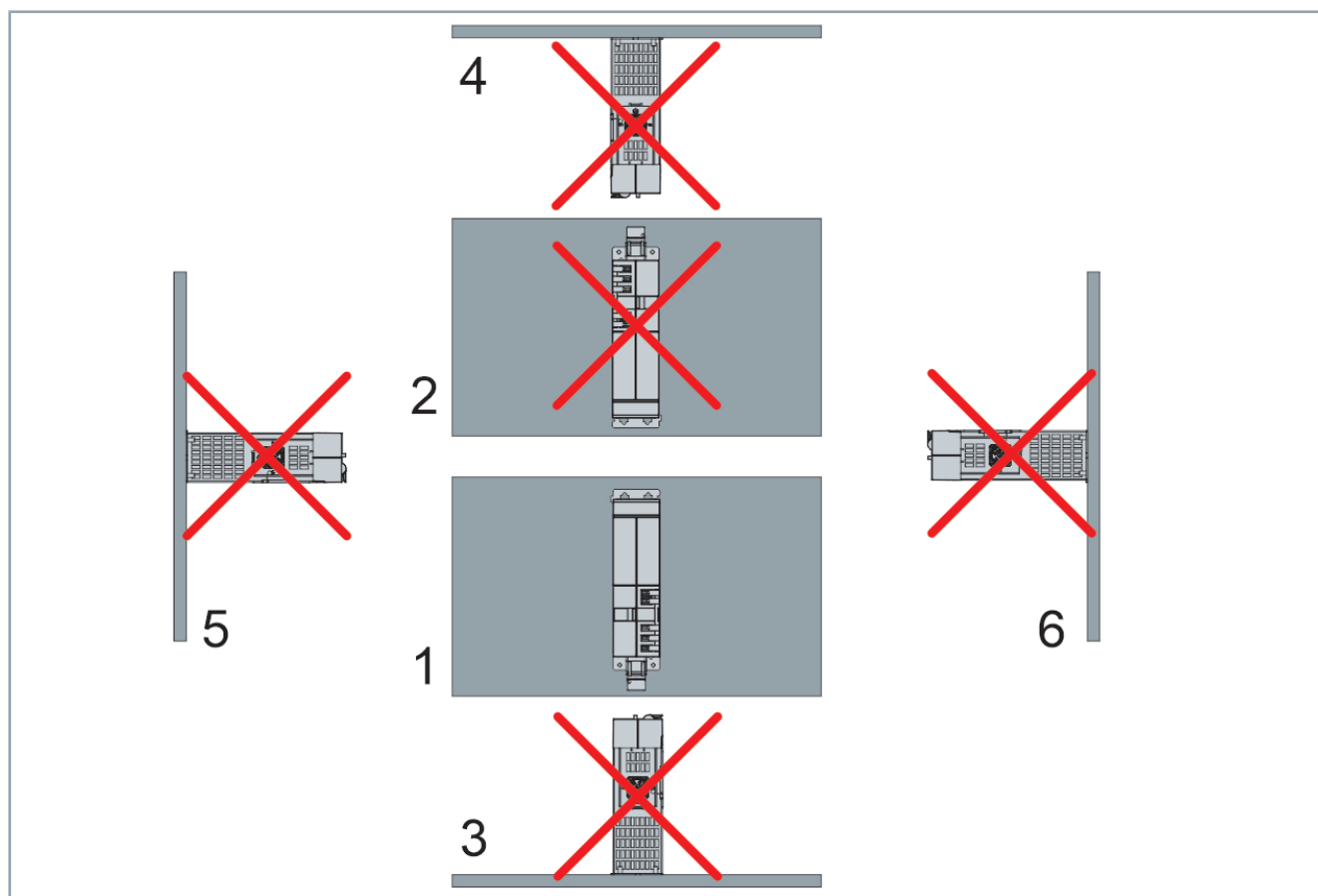


- All figures in millimeters



## AX883x

- No derating due to installation position



## 7.2 Installation position AMP80xx, AMP85xx distributed servo drive

### NOTICE

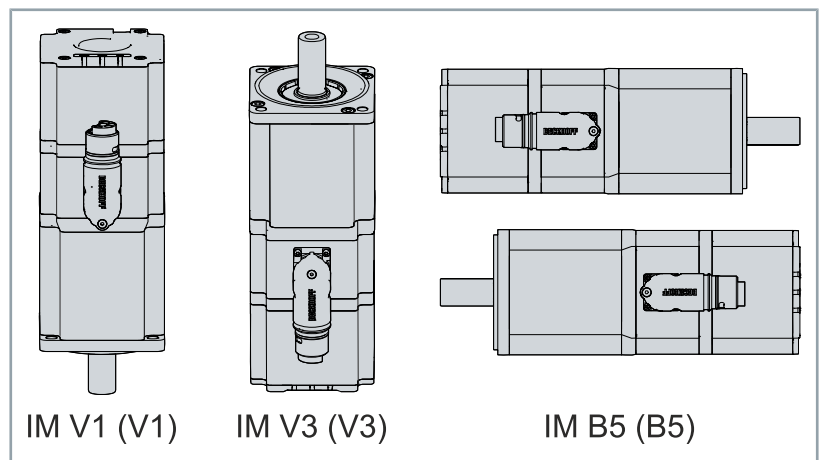
#### Observe the maintenance intervals and installation positions

Carry out maintenance at regular intervals.

In the vertical 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.



## 7.3 Dimensioning

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

### 7.3.1 Cable lengths

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

Module combination	Maximum cable length [m]
AMP8620 with AMP8805	75
AMP8805 with AMP8805	75
AX883x with AMP8805	75
AMP8620 with AMP80xx, AMP85xx	30
AMP8805 with AMP80xx, AMP85xx	30
AX883x with AMP80xx, AMP85xx	30

## 7.4 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 single-phase and three-phase supply networks:

### AMP8620-2005-0x00

- 3 x 400<sub>-20%</sub> V<sub>AC</sub> to 3 x 480<sup>+8%</sup> V<sub>AC</sub>

### AMP8620-2005-0x10

- 3 x 230<sub>-20%</sub> V<sub>AC</sub> to 3 x 480<sup>+8%</sup> V<sub>AC</sub>
- 1 x 120<sub>-8%</sub> V<sub>AC</sub> to 1 x 240<sup>+20%</sup> V<sub>AC</sub>



### Supply networks

Further information on all supply networks in the chapter:  
→ "Electrical installation, supply networks", [Page 95]



### 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>

## 7.5 DC link capacitance



### Observe the maximum chargeable DC link capacitance

The maximum chargeable DC link capacitance must be considered when designing the machine or plant.

The power supply modules charge the entire DC link when the mains supply is first switched on.

The capacitances can be taken from the table below.

Product	Maximum chargeable external DC link capacitance [μF]
AMP8620	2820
AX8831	2820
AX8832	2820 per outlet

## 7.6 Forming the capacitors

If the storage period exceeds 5 years, the installed DC link capacitors must be reformed. The following steps must be carried out:

- ▶ Connect mains voltage to the servo drive system
- ▶ Leave the servo drive system connected to the mains voltage for 60 minutes and do not operate under load

The device can then be used as usual.

## 7.7 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.

### 7.7.1 AMP8620 power supply module

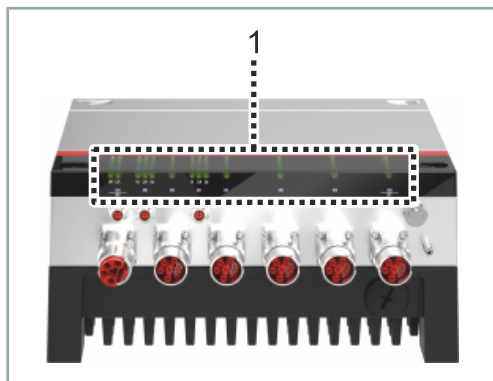


Illustration: LED display [1] on the power supply module

#### 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



### 7.7.2 AMP8805 distribution module

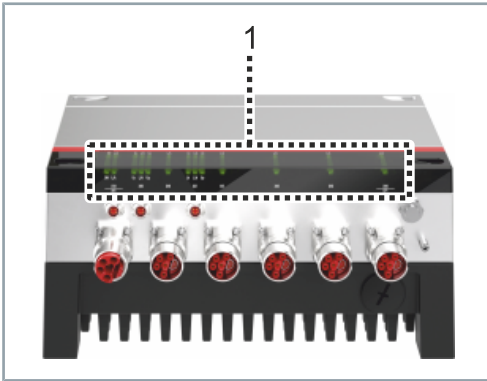


Illustration: LED display [1] on the distribution module

#### ON = status display of the power supply

LED	Status
Lit	The device is in operation. Connection X20 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 output X20
Off	No 24 V power supply at output X20

#### 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

### 7.7.3 AX883x coupling module

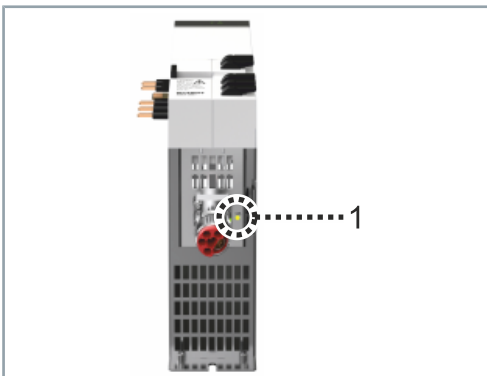


Illustration: LED display [1] on the coupling module

#### 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

## 7.7.4 AMP80xx, AMP85xx distributed servo drive

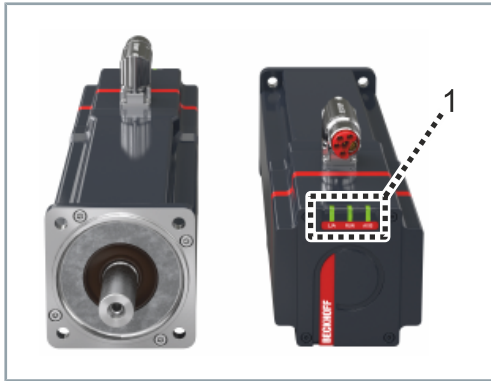


Illustration: LED display [1] on the distributed servo drive

### 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

## 8 Mechanical installation

### 8.1 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.*

#### NOTICE

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

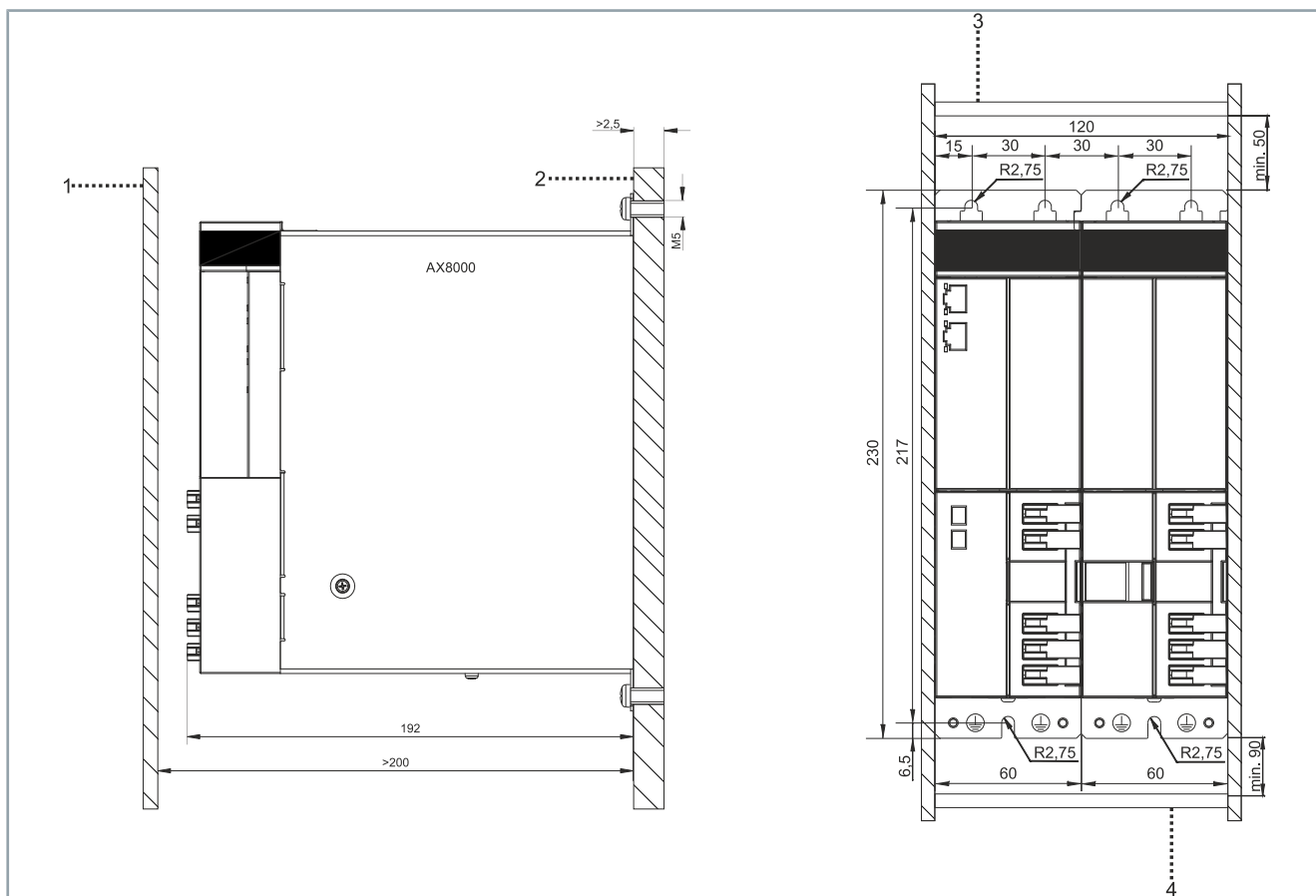
Observe the permissible data for operation and environment as well as the notes in this chapter.

*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.

## Mechanical installation

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



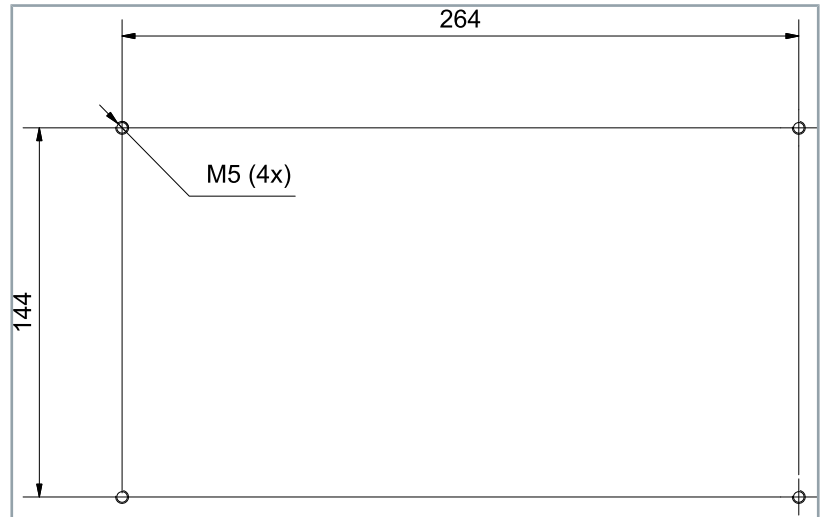
Item number	Explanation
1	Machine or plant
2	Conductive and galvanized mounting plate
3	Cable channel
4	Cable channel

## 8.1.1 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.

### 8.1.1.1 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.

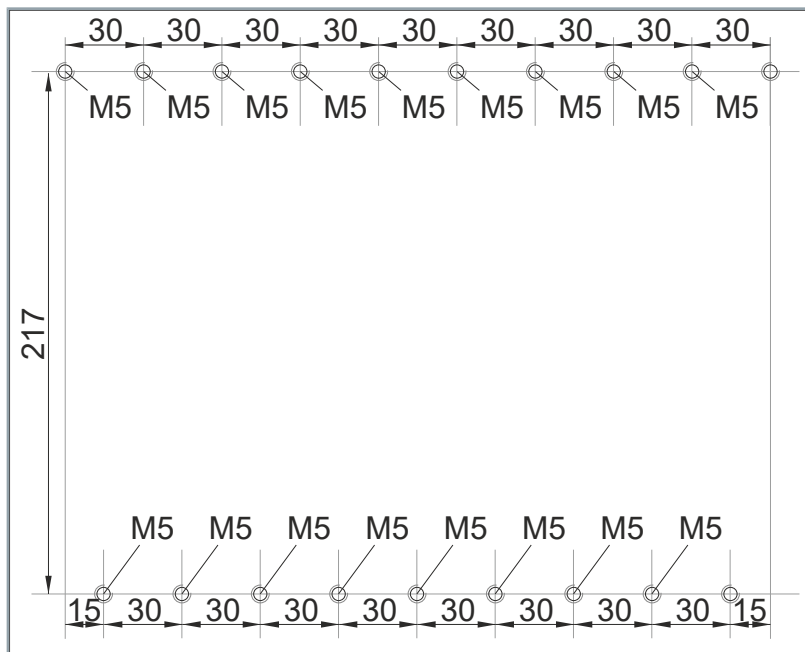




### Beckhoff universal drilling pattern

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.



## 8.2 Modules

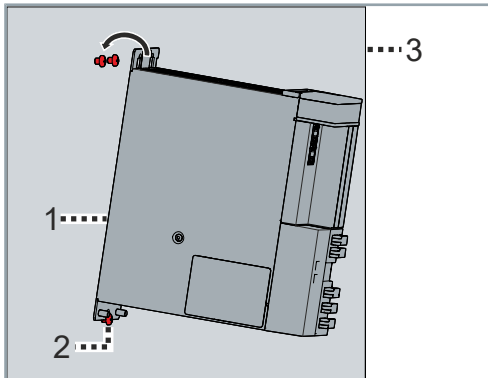


### Mounting example

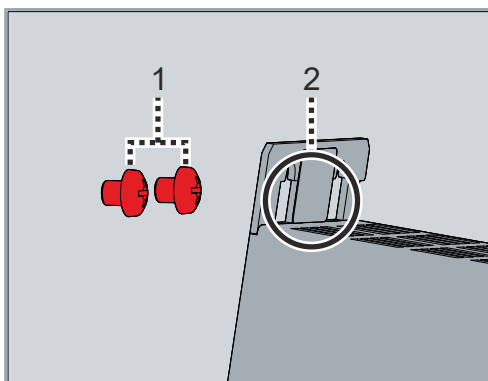
This chapter provides information on the mounting of power supply modules and coupling modules. A power supply module and other modules are bayed as an example.

### 8.2.1 Power supply modules and coupling modules

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

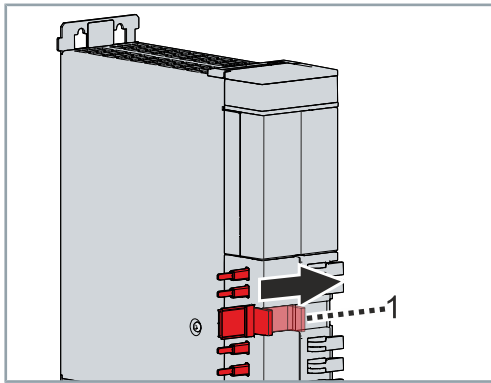


- Place the power supply module [1] onto the screw [2] and carefully press against the mounting plate [3]



- 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:

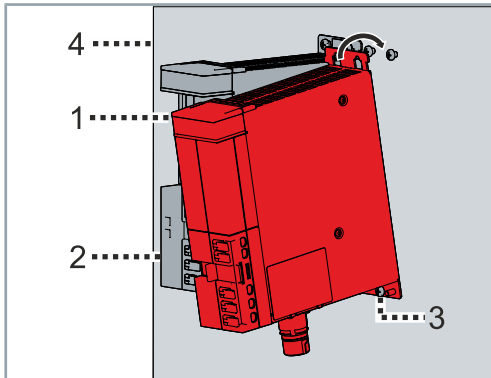
Components	Tightening torque [Nm]
Screws M5 x 5 Strength class 8.8	6



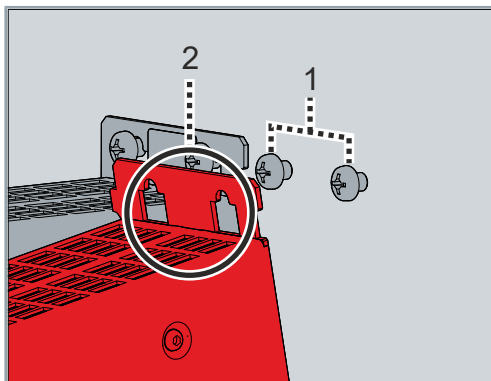
- On all relevant modules, slide the bar for the AX bridge [1] to the right

The contacts can then no longer be seen.

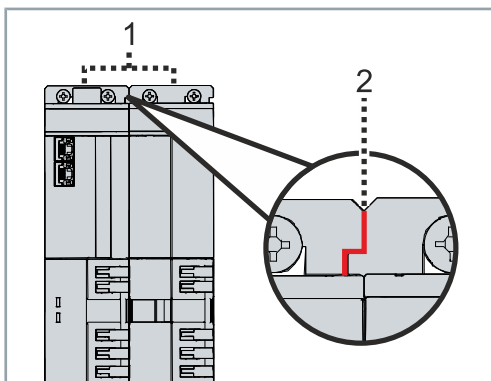
- Screw the screws back into the mounting plate of the machine or plant as shown in the drilling pattern



- 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]



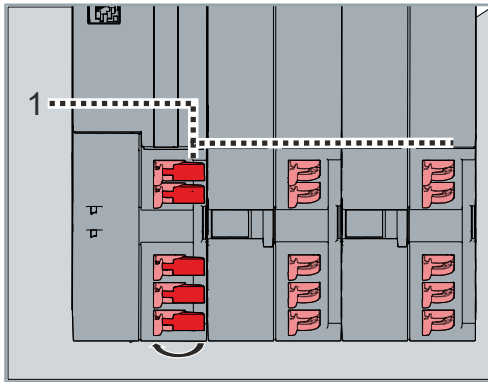
- Once again, guide the screws [1] through the rectangular cut-outs in the module housing [2]



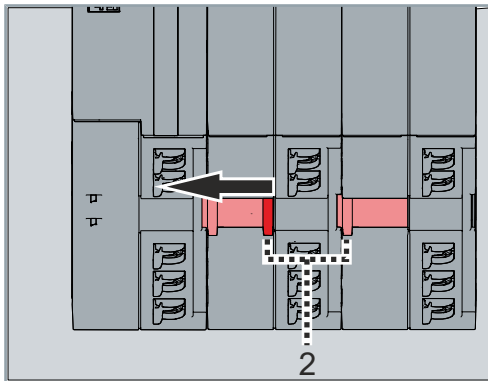
- Make sure that the plates of the rear panel of Module [1] are not overlapping and that the modules are sitting flush in cut-out [2]
- Bay further modules and screw all remaining screws tight on the module housings
- Observe tightening torques:

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





- 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.

## 8.2.2 Power supply module and distribution module

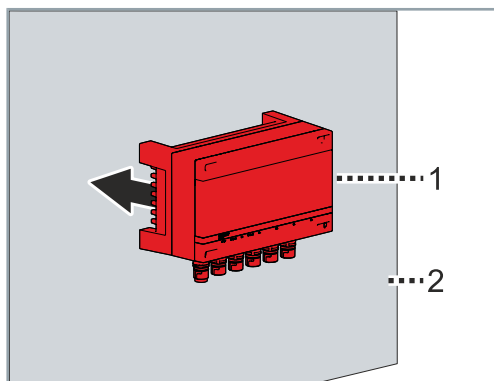


### Selection of the correct screws

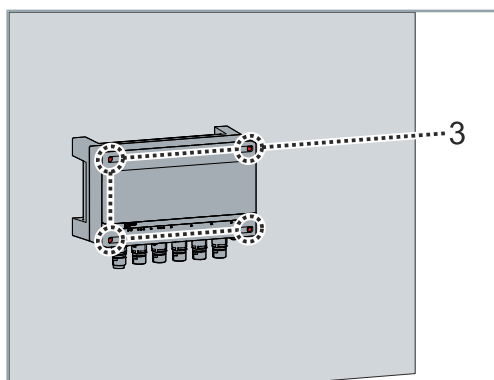
Screws for mounting the power supply modules or distribution modules are not included in the scope of supply. For proper installation, we recommend at least the following screw size:

- 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]

## 8.3 Drives

### 8.3.1 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

### 8.3.2 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.*

#### NOTICE

##### Protect distributed servo drive from impermissible stresses

Do not bend components during transport or handling and do not change any insulation distances. Avoid hard shocks to the shaft end, the ball bearings or the feedback system. Furthermore, note vibration qualities and vibration resistance. 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.*

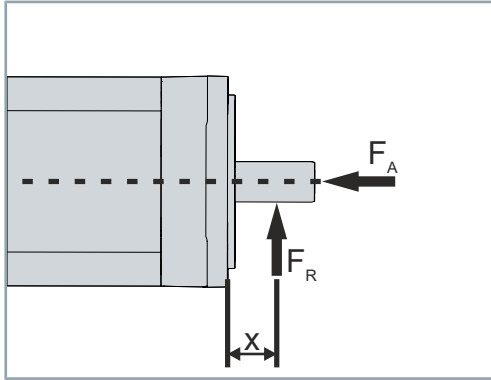
#### NOTICE

##### Overheating hazard

The thermal connection of the motor flange determines the power loss. An inadequate thermal connection can lead to the motor overheating, which can have a detrimental effect on the operational safety and service life of the motor.

- Check that the motor flange has been connected correctly
- Carry out regular maintenance in order to ensure that no dirt or damage impedes heat dissipation

## 8.3.2.1 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 38].

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

## 8.3.2.2 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.

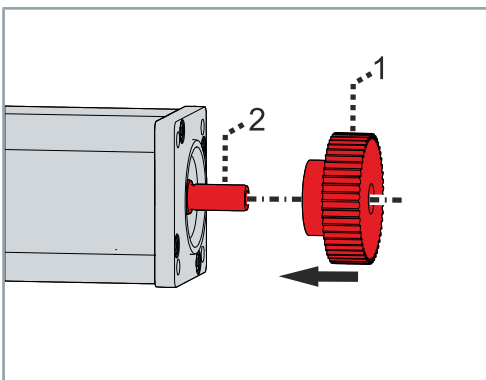
*Hot components can cause severe burns to body parts and limbs.*

### NOTICE

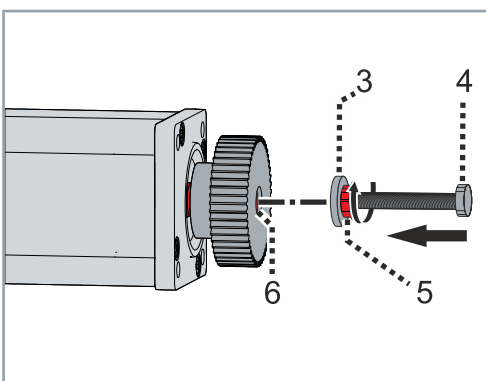
#### **Do not mount the drive element offset**

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]



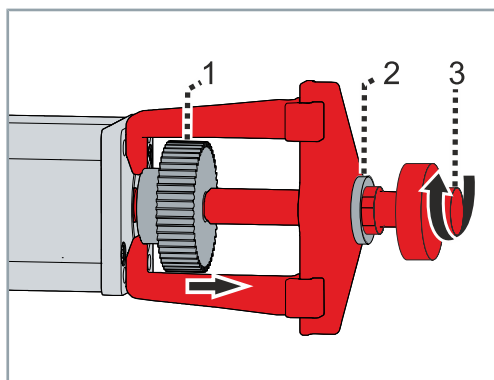
- ▶ Insert washer [3] with screw [4] of strength class 8.8 and nut [5] into the locking thread [6] of the motor shaft
- ▶ Tighten nut [5]

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

## 8.3.2.3 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

## 9 Electrical installation

### ⚠ 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.*

### ⚠ WARNING

#### **Danger due to insufficient earthing**

Inadequate earthing can lead to electric shocks, malfunctioning, or even fires and therefore represents a significant safety risk.

- The protective conductor must be properly connected and fixed to earth
- Only use standardized and tested ground cables and ground connections
- Carry out regular inspections of the earthing connection to ensure that there is no corrosion, damage, or loosening

### NOTICE

#### **Electromagnetic compatibility**

Establish conductive connection of all components. For 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.*

## 9.1 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.

### 9.1.1 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 limit value of the wide range 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 braking resistor. In the case of already existing drive systems, you can determine the utilization rate of the braking 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.



#### **Download TE5910 setup**

You can find the current setup file on the product website



[TE5910 | TwinCAT 3 Motion Designer](#)

### 9.1.2 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.



#### **Download TE5910 setup**

You can find the current setup file on the product website



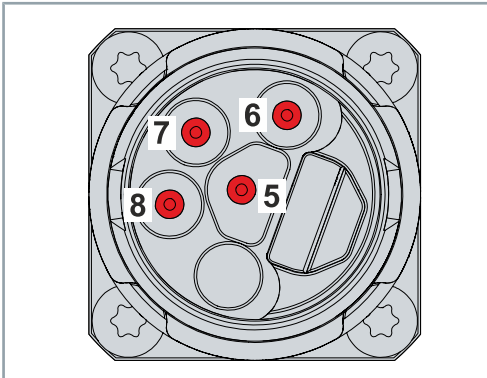
[TE5910 | TwinCAT 3 Motion Designer](#)



## 9.2 Connection technology

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

### 9.2.1 Pin assignment Power IN B23

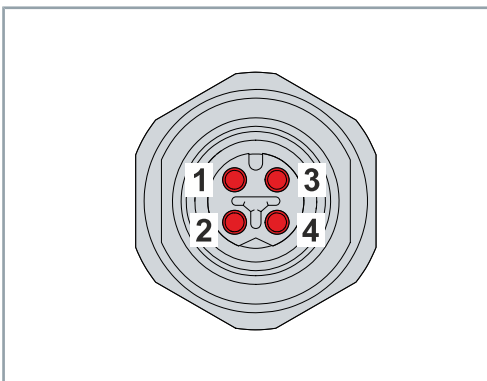


#### AMP8620 power supply module

- Connection of the supply network B23: X01
  - Coding 3

Terminal point	Connection
5	PE
6	L1
7	L2
8	L3/N

### 9.2.2 Pin assignment M8-EtherCAT P IN/M8-EtherCAT P OUT



#### AMP8620 power supply module

- Fieldbus input M8: X10
  - P-coded
- Fieldbus output M8: X20, X21
  - P-coded

#### AMP8805 distribution module

- Fieldbus output M8: X20, X21
  - P-coded

Connection	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>

### 9.2.3 Pin assignment Power OUT B23

#### AMP8620 power supply module

- AMP8000 system output B23: X40, X41, X42, X43, X44
  - Coding 3

#### AMP8805 distribution module

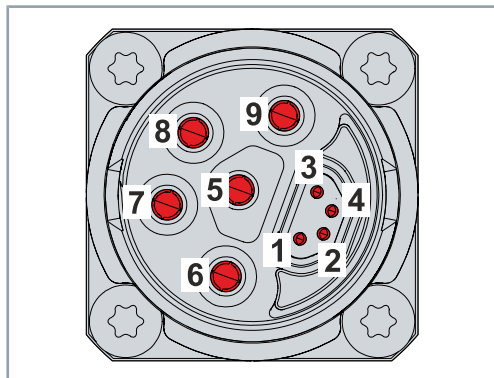
- AMP8000 system output B23: X40, X41, X42, X43, X44
  - Coding 3

#### AX8831 coupling module

- AMP8000 system output B23: X01
  - Coding 3

## AX8832 coupling module

- AMP8000 system output B23: X01, X02
  - Coding 3



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>

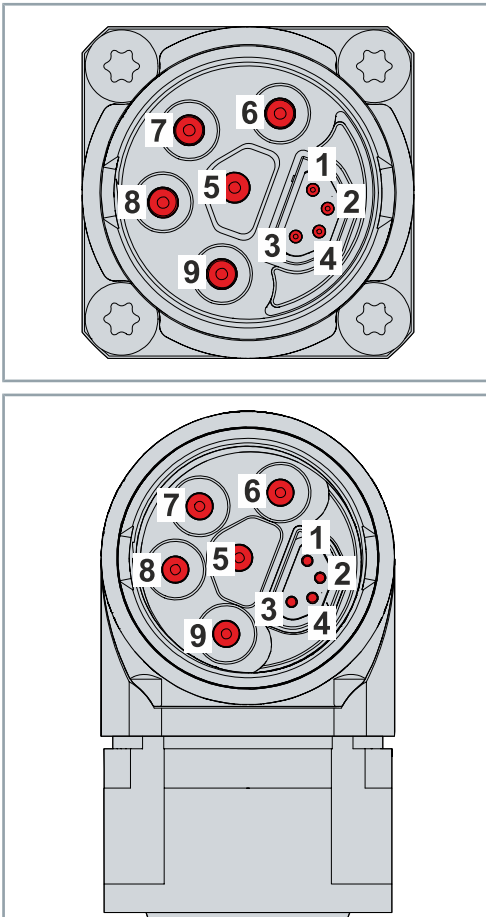
## 9.2.4 Pin assignment system input B23

### AMP8805 distribution module

- AMP8000 system input B23: X02
  - Coding 3

### AMP80xx, AMP85xx

- AMP8000 system input B23: motor socket
  - Coding 3

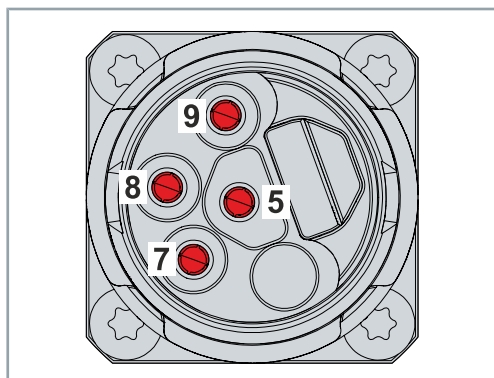


Terminal point	Connection
1	TX+; GND <sub>s</sub>
2	RX+; GND <sub>p</sub>
3	RX-; U <sub>p</sub>
4	TX-; U <sub>s</sub>
5	PE
6	24 V <sub>DC</sub>
7	-DC Link
8	+DC Link
9	GND; 24V <sub>DC</sub>

## 9.2.5 Pin assignment of external braking resistor B23

### AMP8620-2005-02x0 power supply module

- Connection for an external braking resistor B23: X71
  - Coding 2

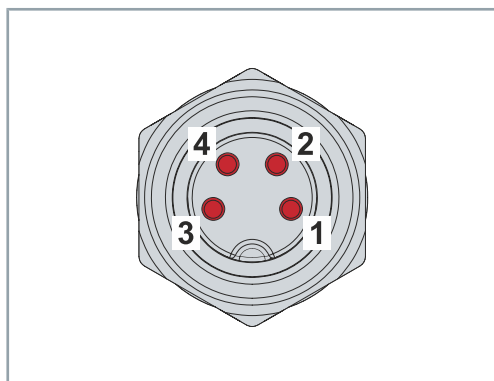


Terminal point	Connection
5	PE
7	-DC Link
8	$R_{B+}$ / +DC Link
9	$R_{B-}$

## 9.2.6 Pin assignment for manual brake connection M8

### Distributed servo drives AMP80xx-xxx2 or AMP85xx-xxx2

- Connection for manual control of the holding brake M8



Contact	Function
1	---
2	+24 V <sub>DC</sub>
3	---
4	GND; 24 V <sub>DC</sub>

## 9.3 Leakage currents

During the operation of servo drives, leakage currents with different frequencies occur due to pulse modulation. Classic ground fault circuit interrupters or RCDs of type A or AC can hardly or not at all detect leakage currents greater than 50 Hz, so that no tripping results despite a high leakage current. For this reason, the legal regulations in various countries stipulate that all-current sensitive RCDs must be used for three-phase applications. These should have a rated residual current of  $\leq 300$  mA.

The determination of the leakage current depends on various factors, such as the cable length, the supply voltage and the load on the motors during operation. Consequently, it is difficult to calculate an exact value for an AMP8000 system. However, it can be assumed that the leakage current will be above 30 mA.

## 9.4 Supply networks

The AMP8000 distributed servo drive system is suitable for operation on single-phase or 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:

### AMP8620-2005-0x00

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

### AMP8620-2005-0x10

- $3 \times 230_{-20\%} V_{AC}$  to  $3 \times 480^{+8\%} V_{AC}$
- $1 \times 220_{-20\%} V_{AC}$  to  $1 \times 240^{+20\%} V_{AC}$
- $1 \times 120_{-8\%} V_{AC}$  to  $1 \times 120^{+45\%} V_{AC}$



## 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

### 9.4.1 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.

#### Single-phase supply

Module	Nominal input current [A]	Isolating transformer	Nominal output current [A]
AMP8620	10	AX2090-TT80-0003; 230 V, 16 kVA	10

#### Three-phase supply

Module	Nominal input current [A]	Isolating transformer	Nominal output current [A]
AMP8620	23	AX2090-TT80-0016; 400 V, 16 kVA	23.1

## 9.5 Fuse protection

### NOTICE

#### 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.*

### 9.5.1 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

### 9.5.2 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



## 9.6 Activation of the holding brake for service purposes

### NOTICE

#### Sequence for activating the holding brake for service purposes

For service purposes, manually connect the holding brake to the control voltage in order to release the brake. To prevent damage to the motor, follow the procedure below to connect the motor to the power supply.

- Remove the M8 jumper plug
- Connect the service cable to the motor
- Connect the service cable to the power supply

### NOTICE

#### Removal of the service cable after completion of the case of service

The M8 connection of the motor is used exclusively to release the holding brake in the case of service. The use of the M8 connection is prohibited when a system is in operation.

- Only use the manual control of the holding brake for service purposes
- Make sure that the service cable is always removed as soon as the case of service is finished

The holding brake of the AMP8000 works according to the quiescent current principle and opens at a voltage of 24 V DC +6/-10 %. It can be activated manually via the M8 connection for service purposes. The matching ZK2020-3100-9001 service cable for connecting the motor and power supply is assembled with an M8 connector for the brake connection and two cores with ferrules for connecting the 24 V DC power supply.



#### Proper installation of the tamper protection after completion of the case of service

After completing the case of service, remove the service cable and install the M8 jumper plug. The supplied tamper protection must then be fitted to protect the M8 connection from unauthorized access.



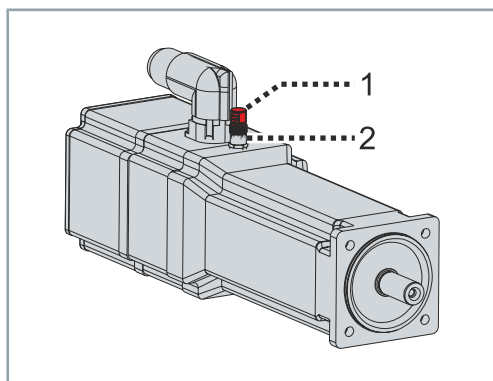
#### Safety-related initial commissioning

During safety-related initial commissioning, it is essential that authorized and trained persons check that the tamper protection has been fitted correctly.

#### Connecting the service cable to the power supply

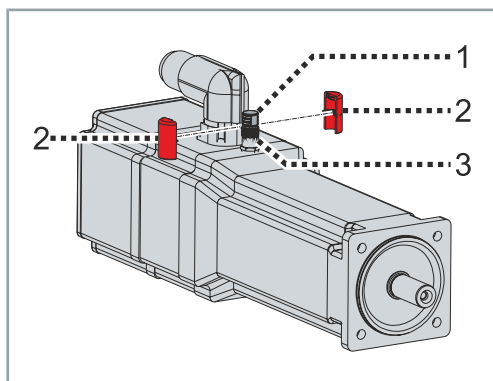
- Connect open cable contacts to the 24 V DC power supply according to the table:

Wire color	connect to
White	24 V DC system and peripheral voltage
Black	GND



## Connecting the service cable to the motor

- ▶ Remove M8 jumper plug [1]
- ▶ Plug the service cable onto the M8 connection [2] of the motor and screw it in place



## Removing the service cable from the motor

- ▶ Disconnect and remove the service cable from the M8 connection [3] of the motor
- ▶ Plug the M8 jumper plug [1] onto the M8 connection [3] of the motor and screw it on with 0.4 Nm
- ▶ Attach tamper protection [2] via the M8 connection [3] and M8 jumper plug [1]



The tamper protection is intended for single use only.

## 10 Commissioning



### Exemplary commissioning

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

### 10.1 Before commissioning

#### NOTICE

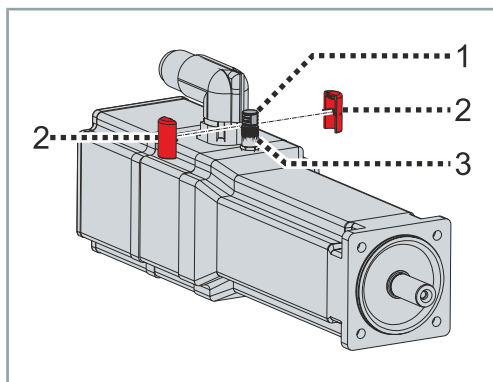
##### Limited functionality due to unformed capacitors

The dielectric in the DC link capacitors decreases over a very long storage period and the capacitors lose their forming. This can lead to considerable functional restrictions and even a shortened service life of the device.

- If the storage period exceeds 5 years, "reform the capacitors", [Page 74]

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



#### Installing the M8 jumper plug on the AMP8xxx-xxx2

Before commissioning, the supplied M8 jumper plug [3] must be installed on the M8 connection [1] with 0.4 Nm to establish the electrical connection between the motor electronics and the holding brake.

Also make sure to use the tamper protection [2] according to the chapter "Activation of the holding brake for service purposes", [Page 99].

### 10.2 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

## 10.2.1 Configuration in TwinCAT

### Requirements

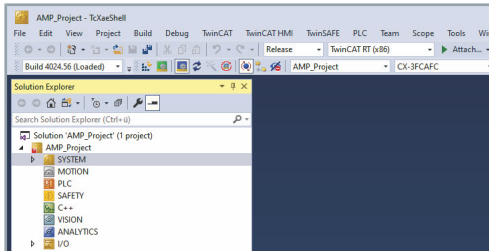


#### Installing and updating software

- For the TwinCAT configuration of the AMP8000 system, install the latest TE5950 TC3 Drive Manager 2.

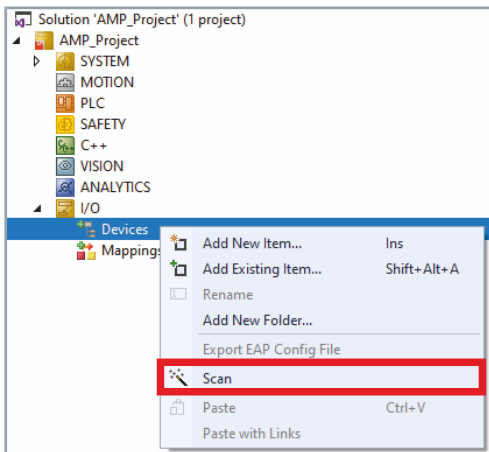
<https://www.beckhoff.com/te5950>

### Online configuration

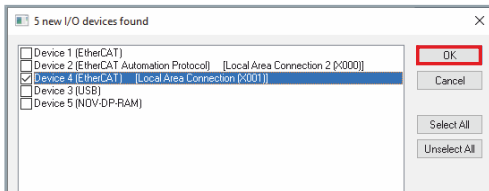


- ▶ Create TwinCAT project
- ▶ Connecting the target system

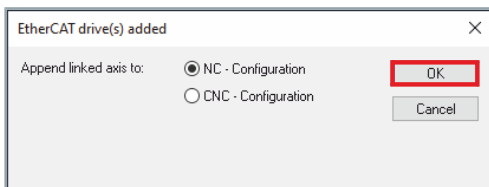
- ▶ Switching the target system to *Config Mode*



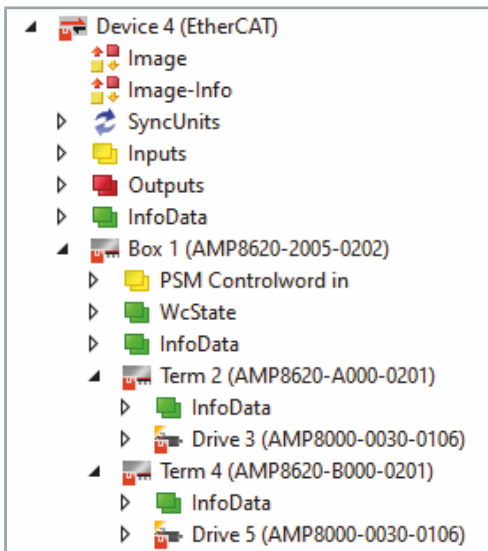
- ▶ Click on **Scan** to find I/O devices



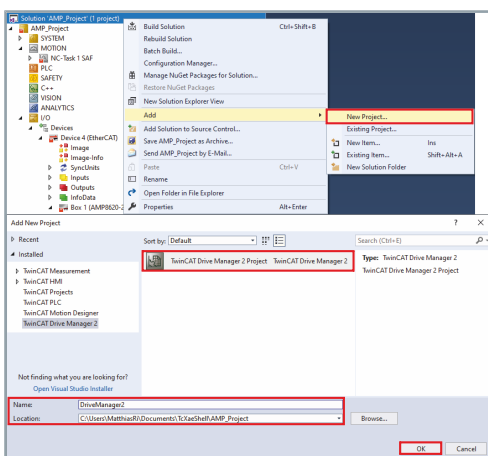
- ▶ Select the devices to be used and confirm the selection with **Ok**
- ▶ Click on the **Yes** button to search for boxes



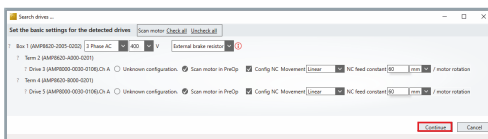
- ▶ Select whether an NC or CNC configuration is to be created for the EtherCAT drive(s) found and confirm the selection with **Ok**
- ▶ Click **Yes** to confirm that you want to enable FreeRun



The devices scanned in TwinCAT are now displayed in the I/O level with the inputs and outputs



- Add a TC3 Drive Manager 2 project for the configuration of the AMP8000 system

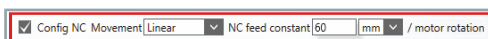
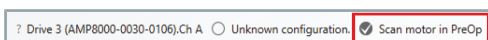


In the *Search drives...* dialog box, connected components of the AMP8000 system and other Beckhoff drive technology components can be configured and basic settings made.



- Selection of power supply on the AMP8620 power supply module

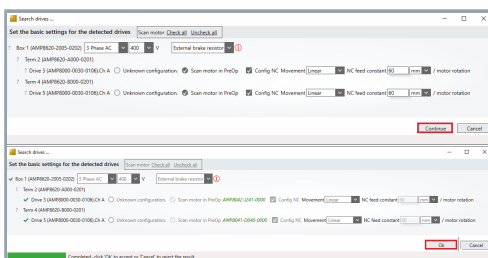
- If there is no supply voltage, the default settings are used. If a braking resistor is used, this can be selected in advance.
- The AMP8000 motors have an electronic nameplate that can be scanned automatically. Select *Scan motor in PreOp* to scan the motor and its parameters.
- The basic NC scaling settings can be made via the *Config NC* selection options



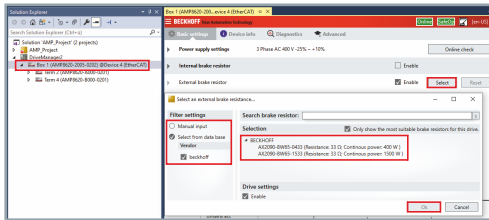
- Confirm settings by clicking on **Continue**

The electronic nameplate of the AMP8000 motors is now scanned. The read motor parameters are automatically transferred to the configuration. The scanned AMP8000 motors are displayed in green.

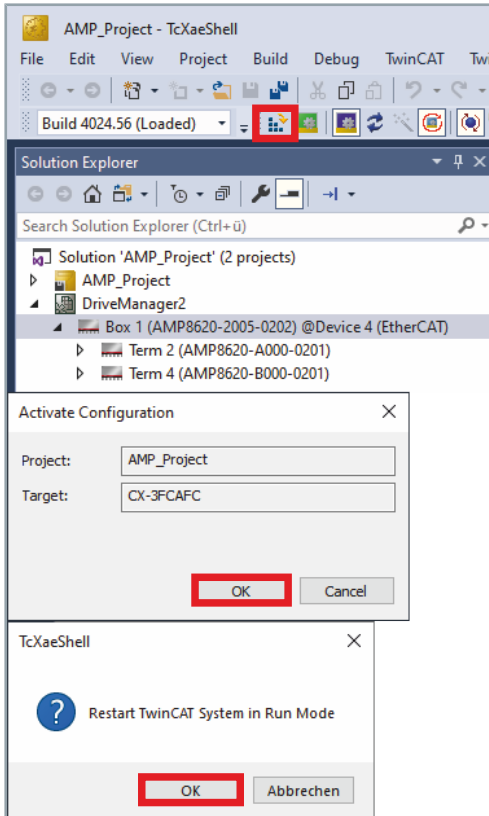
- Complete the configuration by clicking on **Ok**



# Commissioning



- If an *External braking resistor* was selected in the previous step, the braking resistor must be configured under the *Basic Settings* of the AMP8620 power supply module



- Activate the configuration

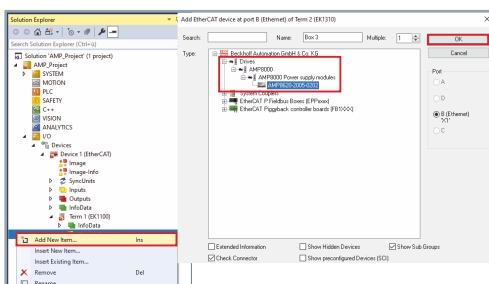
The selected settings take effect when the configuration is activated. The safety configuration must be carried out to operate the AMP8000 motors.

For commissioning and device replacement, the instructions in the Operating instructions AMP8911 - TwinSAFE card must be observed.

Further information on safety commissioning can be found in the webinars on the Beckhoff homepage:

🌐 <https://www.beckhoff.com/webinars>

## Offline configuration

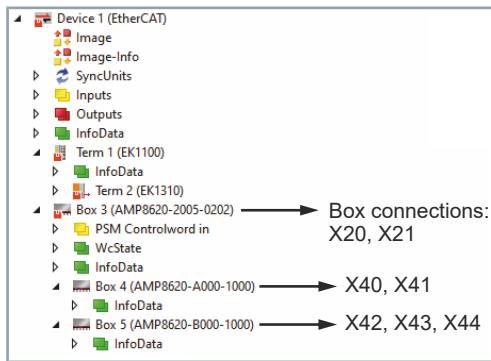


### Adding the AMP8620 power supply module

The EtherCAT P interface is required to add the AMP8620 power supply module at I/O level, e.g. by linking an EPP1322 box or an EtherCAT P coupler.

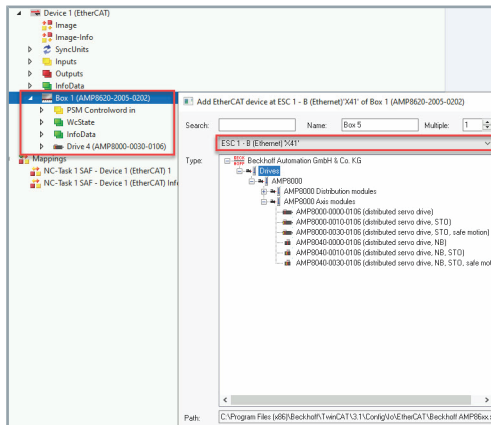


If there is no EtherCAT P interface, the AMP8620 power supply module is not found when it is added manually. To do this, deactivate the *Check Connector* checkbox.

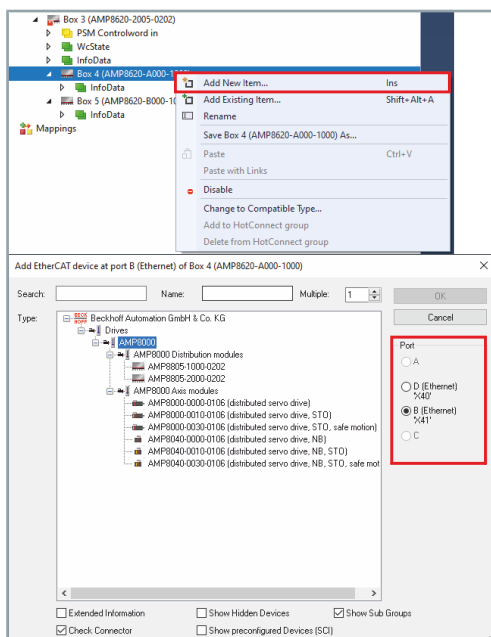


The AMP8620 power supply module has three boxes at I/O level, one main box and two sub-boxes.

- The M8 EtherCAT P outputs (X20 and X21) can be connected to other devices via the main box.
- The sub-box (AMP8620-A000-1000) serves the power outputs X40 - X41 for connecting AMP8000 motors or other AMP8805 distribution modules.
- The sub-box (AMP8620-B000-1000) serves the power outputs X42 - X44 for connecting AMP8000 motors or other AMP8805 distribution modules.



With TwinCAT version 4026.x, the sub-boxes are no longer displayed in the System Manager. AMP8000 motors or AMP8805 distribution modules can be added via the main box.

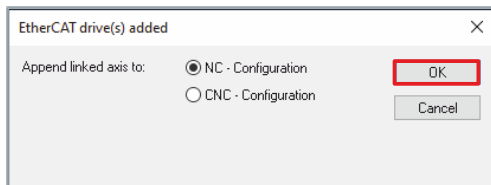


## Adding AMP8000 motors or AMP8805 distribution modules

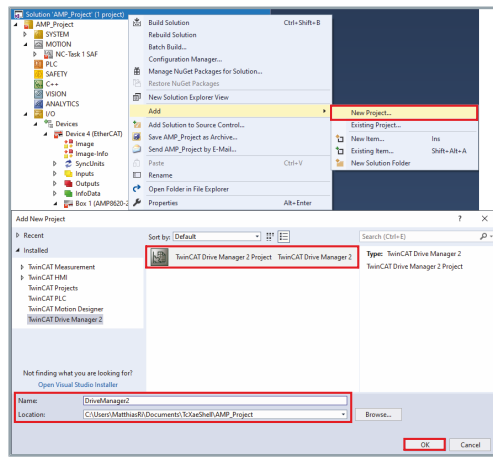
The AMP8000 motors differ at I/O level in terms of their safety design.

- **AMP8000-0010-010x:**  
AMP8000 motor in STO version  
(for order code: AMP80xx-xx1x and AMP80xx-xx2x)
- **AMP8000-0030-010x:**  
AMP8000 motor in STO/SafeMotion version  
(for order code: AMP80xx-xx3x and AMP80xx-xx4x)

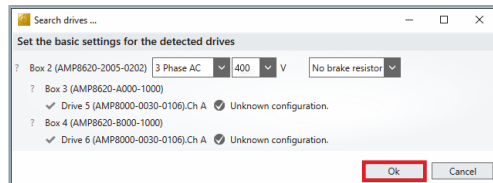
By adding another AMP8805 distribution module, a main box and two sub-boxes are added, as with the AMP8620 power supply module. The configuration at I/O level is identical to that of the AMP8620 power supply module.



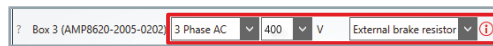
- Select whether an NC or CNC configuration is to be created for the added EtherCAT drive(s) and confirm the selection with **Ok**



- Add a TC3 Drive Manager 2 project for the configuration of the AMP8000 system



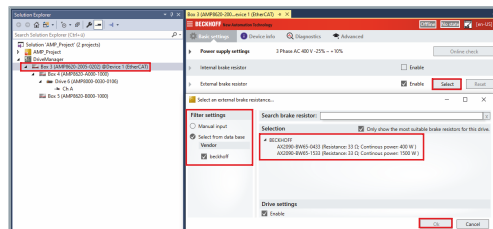
In the *Search drives...* dialog box, connected components of the AMP8000 system and other Beckhoff drive technology components can be configured and basic settings made.



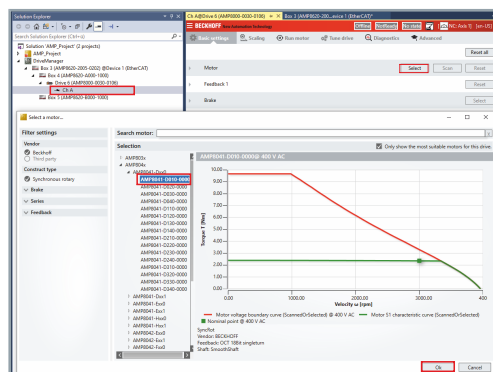
- Selection of power supply on the AMP8620 power supply module

- If there is no supply voltage, the default settings are used. If a braking resistor is used, this can be selected in advance.
- The motor configuration is adopted with its default values during offline configuration. The basic settings can be changed later in the project.

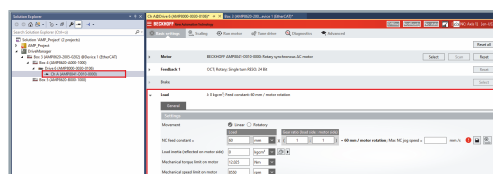
- Complete the configuration by clicking on **Ok**



- If an *External braking resistor* was selected in the previous step, the braking resistor must be configured under the *Basic Settings* of the AMP8620 power supply module



- In the *Basic settings* tab, select the AMP8000 motor used via the associated axis channel.  
This procedure must also be carried out for the other AMP8000 motors in the project



For the scaling definition between drive and logical NC axis, the *NC Feed constant* can be entered via the *Load* menu item.

- Transfer values to the NC by clicking the **Save icon**

It is also possible to define additional load parameters such as:

- Load inertia
- Mechanical motor torque limit
- Mechanical motor speed limit



The initial configuration of the AMP8000 system is complete.

The safety configuration must be carried out to operate the AMP8000 motors. For commissioning and device replacement, the instructions in the Operating instructions AMP8911 - TwinSAFE card must be observed.

Further information on safety commissioning can be found in the webinars on the Beckhoff homepage:

 <https://www.beckhoff.com/webinars>

## 10.3 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

## 10.4 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.*

## 11 Maintenance and cleaning

### ⚠ 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.*

### NOTICE

#### 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.

### 11.1 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	$\text{C}_6\text{H}_5\text{NH}_2\text{HCl}$
Bromine	$\text{Br}_2$
Sodium hypochlorite; bleaching solution	$\text{NaClO}$
Mercury (II) chloride	$\text{HgCl}_2$
Hydrochloric acid	$\text{HCl}$

## 12 Accessories

### Choose accessories



The integrated parts list generator also lists the required accessory components such as motor cables, chokes, and mounting material.

 [TE5910 | TwinCAT 3 Motion Designer](#)



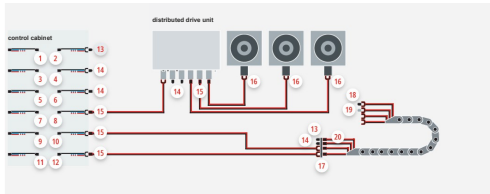
### Use accessories with UL approval

Accessories with UL approval are required for operation of the AMP8000 distributed drive system in the USA or Canada.

### Accessories overview

Further and more detailed information on the accessories for the AMP8000 distributed servo drive system can be found on the

 [Beckhoff website](#)



## 12.1 Cables



### Selecting the motor cables

The cable selection wizard of the TwinCAT 3 Motion Designer for drive design displays the suitable cables for the set components of the axis.

 [TE5910 | TwinCAT 3 Motion Designer](#)

### 12.1.1 ZK7A26-3031-0xxx pre-assembled system cable



The ZK7A26-3031-0xxx pre-assembled EtherCAT P cable is used for connections between the system components. The B23 EtherCAT P connector is suitable for:

- AX883x
- AMP8620
- AMP8805
- AMP80xx, AMP85xx

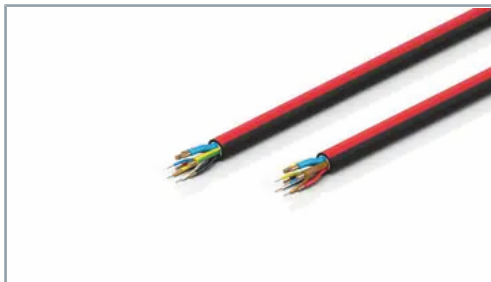
*B23, ECP cable, PUR, 3 G 2.5 mm<sup>2</sup> + 2 x 1.5 mm<sup>2</sup> (1 x 4 x AWG22), drag-chain suitable, key 3 (user-defined voltage)*

### Configuration

EtherCAT P cable, ECP, PUR, drag-chain suitable with  
Head A = B23, plug, straight, pin+pin, 5+4 pin, P-coded and  
Head B = B23, plug, straight, socket+socket, 5+4 pin, P-coded

## 12.1.2 Field-configurable cable, connector, and accessories

### ZB7306-xxxx cable



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

*EtherCAT P cable, no overall shield, PUR, drag-chain suitable, 3G 2.5 mm<sup>2</sup> + 2 x 1.5 mm (1 x 4 x AWG22), black with red stripe, OD = 11.9 mm (±0.4 mm)*

### ZK7A33-3100-0xxx cable

The pre-assembled ZK7A33-3100-0xxx power cables are used to connect the AMP8620 to the supply voltage.

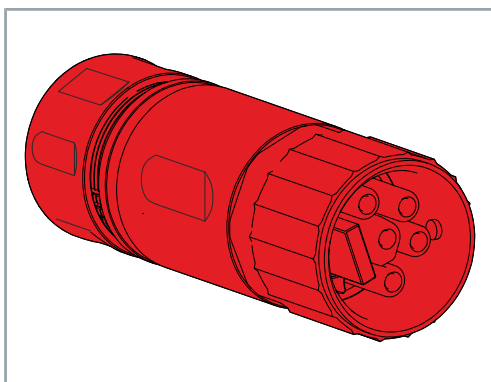
### ZK7000-0101-0xxx cable



The pre-assembled ZK7000-0101 EtherCAT P cable is used for the connection of the AMP8000 system components AMP8620 and AMP8805 with other EtherCAT P devices.

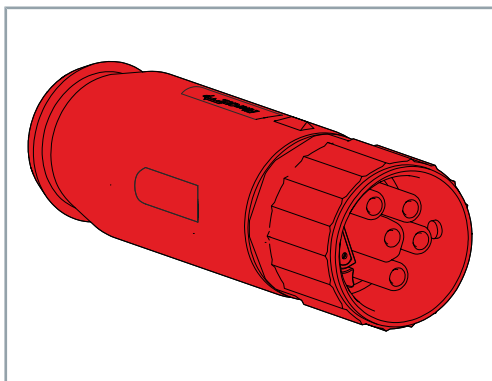
### B23 connector

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

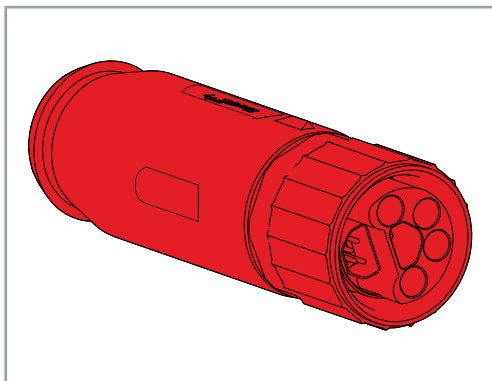


The **ZS7300-0027** connector for field assembly is used to connect the mains supply cable to X01 of the AMP8620 power supply module.

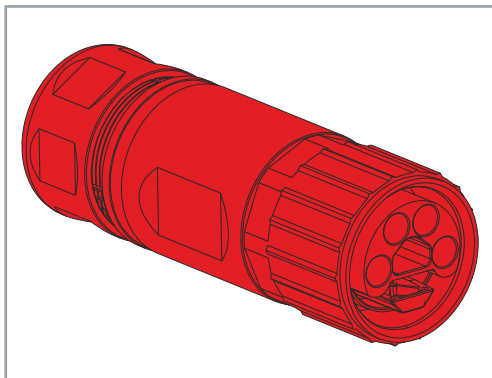
Mechanical coding 3 of the connector must be provided for this purpose.



The **ZS7300-0002** connector for field assembly is used to connect the system input or motor input to the ZB7306-xxxx EtherCAT P cable. Mechanical coding 3 of the connector must be provided for this purpose.

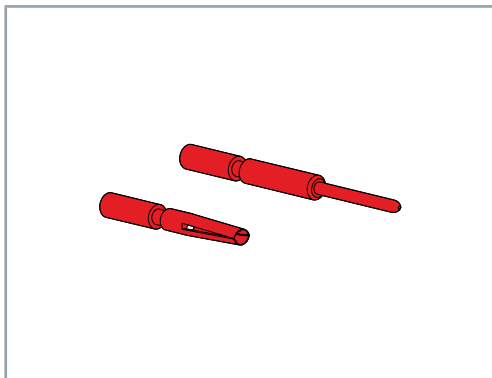


The **ZS7300-0001** connector for field assembly is used to connect the system output to the ZB7306-xxxx EtherCAT P cable. Mechanical coding 3 of the connector must be provided for this purpose.



The **ZS7300-0022** connector for field assembly is used to connect the braking resistor to X71 of the AMP8620 power supply module. Mechanical coding 2 must be provided for this purpose.

## Crimp contacts



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

Ordering information	Description
ZS7000-C001	Ethernet element, male, AWG22/0.34 mm <sup>2</sup>
ZS7000-C002	Ethernet element, female, AWG22/0.34 mm <sup>2</sup>
ZS7000-C010	B23, female, 4 mm <sup>2</sup> , for AMP8620 X01
ZS7000-C015	B23, male, 1.5 mm <sup>2</sup>
ZS7000-C016	B23, female, 1.5 mm <sup>2</sup>
ZS7000-C017	B23, male, 2.5 mm <sup>2</sup>
ZS7000-C018	B23, female, 2.5 mm <sup>2</sup>

## 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

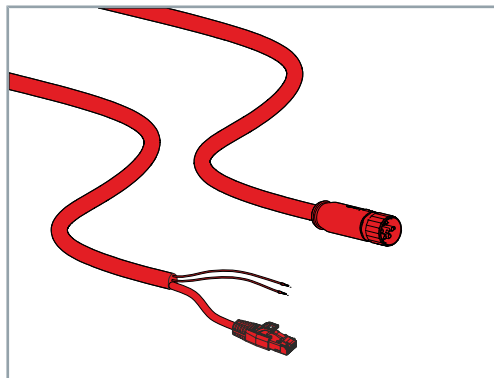


The **ZB8810-0002** crimping insert and locator is suitable for:

- Ethernet elements
- M8 contacts
- B23 contacts

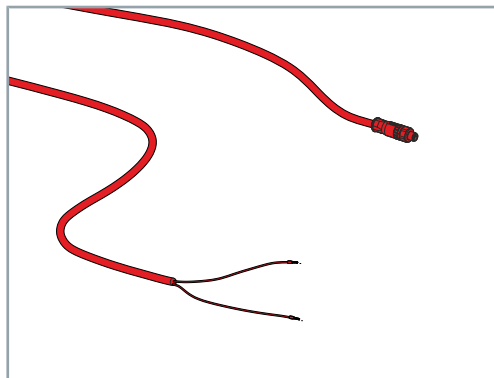
## 12.1.3 Special cables

### ZK7A02-3199-xxxx support connection cable



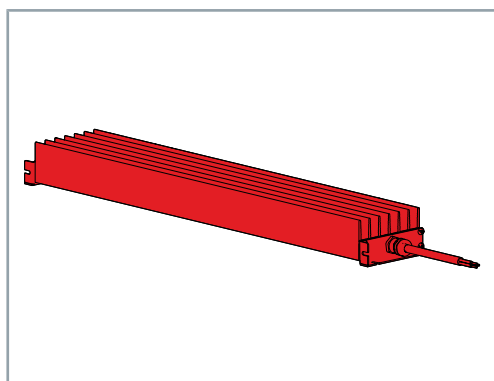
The ZK7A02-3199-xxxx support cable is used to connect the AMP8000 motor to an EtherCAT-capable engineering device outside a machine. This can be used to configure and parameterize the AMP8000 motor before it is used in a machine.

### Service cable for manual brake control ZK7A4-3184-8050



The pre-assembled cable is used to manually control the holding brake in case of service. The M8 connector is connected on the motor side. The two wires with pre-assembled ferrules are used to connect to the 24 V DC power supply.

## 12.2 Brake resistors IP65

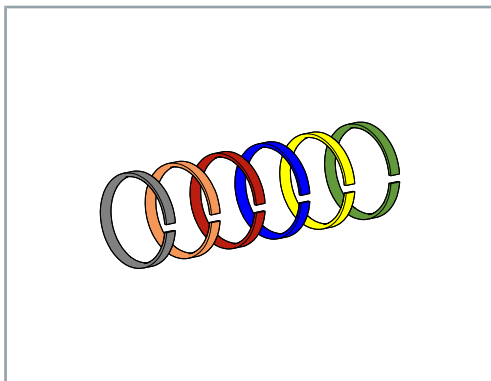


When braking a distributed servo drive, the energy generated is converted into heat by the brake resistors from the AX2090-BW65 series.

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



## 12.3 Color coding



The ZS7300-B0xx color coding is available in the following variants for a connector or square flange:

ZS7300-B0xx	Color
xx = 05	Red
xx = 06	Yellow
xx = 07	Blue
xx = 08	Green
xx = 15	Orange
xx = 16	Gray

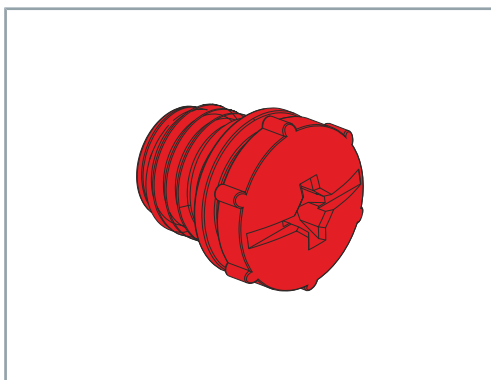
## 12.4 Protective caps B23



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

Ordering information	Description
ZS7300-B001	B23 protection cap, socket/flange, plastic, IP67, packaging unit = 10 pieces
ZS7300-B002	B23 protection cap, socket/flange, metal, IP67, packaging unit = 5 pieces

## 12.5 Cover plug M8



The cover plug protects the M8 sockets on the motor as well as the M8 sockets on the AMP8620 and AMP8805 from external influences.

Ordering information	Description
ZS5000-0012	Cover plugs, plastic (IP67) for M8 sockets, PU = 50 pieces

## 12.6 Assembly tool AF27



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

## 12.7 Cable adapter



The ZS7000-0005 cable adapter provides an M8 socket with EtherCAT P input to an M8 socket with EtherCAT output.

## 13 Decommissioning

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.

### 13.1 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

## 13.2 Disposal

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

### **Cast iron and metal**

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

### **Cardboard, wood and foam polystyrene**

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

### **Plastics and hard plastics**

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

### **Oils and lubricants**

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

### **Batteries and rechargeable batteries**

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



### **Electronic components**

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

## 14 Guidelines and Standards

### 14.1 Standards

**Product standard EN IEC 61800-3**

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

**EN IEC 61800-5-1**

*"Adjustable speed electrical power drive systems"*

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

**IEC 61800-5-2**

*"Adjustable speed electrical power drive systems"*

Part 5-2: 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"*

### 14.2 Guidelines

**2014/35/EU**

Low Voltage Directive

**2011/65/EU**

RoHS Directive

**2014/30/EU**

EMC Directive

**Regulation (EU) 2021/821**

Dual-use regulation

#### 14.2.1 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.

## 14.3 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)

## 14.4 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.

## 14.5 UL certification

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

### 14.5.1 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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## **Trademark statements**

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