AMKmotion
Device Description
Additional Capacity AE-ZK 6

Version: 2023/26
Part no.: 204382
Translation of the "Original Dokumentation"

AMKmotion
MEMBER OF THE ARBURG FAMILY

Imprint

Name: PDK_204382_AE-ZK6

Version:

Version	Changes	Initials
2023/26	AMKmotion Design	LeS

Previous version: 2019/04

Product version:

Product	Firmware version (Part no.)	Hardware Version (Part no.)
AF-ZK6	--	1.02 (47091)

Reservation: We reserve the right to modify the content of the documentation as well as the delivery options for the product.

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For fast and reliable troubleshooting, you can help us by informing our Customer Service about the following:

- Type plate data for each unit
- Software version
- Device configuration and application
- Type of fault/problem and suspected cause
- Diagnostic messages (error messages)

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Content

1 About this documentation

1.1 Keeping this document

This document must permanently be available and readable at the place where the product is in use. If the product is used at another place or changed the owner, the document must be passed on.

1.2 Target group

Any person who is entitled and intends to carry out one of the following works must read, understand, and observe this documentation.

- Unpacking and installation
- Connection
- Testing and maintenance
- Service and repair
- Decommissioning and disposal

1.3 Purpose

This documentation is addressed to any person who handles the product. It gives information about the following topics.

- Safety messages which are absolutely necessary to take care of during handling the product.
- Product identification
- Technical data and conformity with standards
- Installation
- Electrical connections
- Maintenance, repair, and exchange
- Disposal

1.4 Display conventions

Display	Meaning
	This text passage requires your undivided attention!
0x	0x followed by a hexadecimal number, e.g. 0x500A
'Name' 'Parameter' 'Diagnostic message'	E.g.: Call up the 'PLC clear program' function. ID1234 'Parameter text' 1234 'Diagnostic message'
'bold'	Menu items and buttons in software or a control unit, e.g.: Click the **'OK"** button in the **'Options'** menu to call up the 'PLC clear program' function
>Input_variable<	Wildcard, variable e.g. IP address of the control unit: >192.168.0.1<
->	Process of an input / operating sequence, e. g. **'Start'** -> **'All Programs'** -> **'Accessories'** -> **'Editor'**
See 'Chapter' on page x	Link within the PDF document

1.5 Appendant documents

Device descriptions

AMK part no.	Title
28932	Servo drives KE/KW
200043	Liquid-cooled cold plate KW-CP

2 For your safety

2.1 Configuration of safety informations

Any safety information is configured as follows:

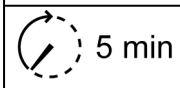
⚠ SIGNAL WORD	
 Symbol	**Type and source of risk** Consequence(s) of non-observance **Steps to prevent:** • ...

2.2 Classes of hazard

Safety and warning messages are graduated into classes of hazard (according to ANSI Z535). The class of hazard defines the potential risk of harm and is described by a single word, if the safety information is ignored. The signal word is followed by a safety alert symbol (ISO 3864, DIN EN ISO 7010). In accordance with ANSI Z535, the following signal words are used to define the class of hazard.

Safety alert symbol and signal word	Class of hazard and its meaning
⚠ DANGER	DANGER indicates a hazardous situation which, if not avoided, **will** result in death or serious injury
⚠ WARNING	WARNING indicates a hazardous situation which, if not avoided, **could** result in death or serious injury
⚠ CAUTION	CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, **could** result in minor or moderate injury
NOTICE	NOTICE is used to address preventions to avoid material damage, but not related to personal injury.

2.3 Used safety symbols

Safety symbol	Meaning
	Warning of a danger!
	Warning against dangerous electrical voltage!
 5 min	Warning against dangerous electrical voltage! It will last up to 5 minutes until the energy storage is discharged after it has been electrically disconnected.

2.4 General safety instructions

- The electricity, mechanical movements and high temperatures in electrical drive systems present hazards that can result in fatal injuries and material damage. These hazards are present while starting up and operating the unit, and also during servicing or maintenance work.
- Personnel must have read and understood the safety instructions before installing and operating the unit. In the documentation included with the product, the usage warnings pertain to direct hazards and must therefore be followed directly when operating or handling the unit by the operator.

- Do not start the system in which the AMK products are installed (begin of intended use) until you can determine that all relevant standards, laws and directives have been complied with.

2.5 Intended use

In applications with frequent speed changes, energy can be buffered in an additional capacity

The AE-ZK 6 is approved for the use at the intermediate circuit (connecting terminals UZP, UZN) of an AMK compact power supply KE / KEN / KES ≥ 10 kW.

The additional capacity is intended for installation in a closed, adequately dimensioned switch cabinet which provides protection from direct contact in accordance with EN 50178.

2.6 CE mark

AMKmotion products have been constructed using the "State of the Art" and are safe to operate. AMKmotion issues an EU declaration of conformity for each of its products in which the standards and guidelines relevant for the product are listed. AMKmotion also designates the products with the CE mark which signifies conformity to the standards. Since these standards are listed in the Official Journal of the EU, it can be assumed through their application that the product meets the basic safety and health requirements of the harmonization regulation, the so-called presumption of conformity applies.

2.7 Requirements for the personnel and their qualification

Only authorised and qualified personnel may work on and with the AMKmotion drive systems.

Specialised personnel must:

- Perform mechanical and electrical work that is described in this documentation, such as mounting and connecting
- Observe all information in the documentation accompanying the product in order to work with the product safely and in an error-free manner
- Understand and know hazards that occur when handling the product
- Know connections and functions of the system
- Be familiar with the control concept in order to operate the drive system
- Be authorised to switch circuits and devices on and off, earth and label them
- Observe local specific safety requirements

2.8 Safety rules

In particular on drive systems, the instructions pertaining to safety and the following five safety rules have to be kept in the specified sequence:

1. Switch off electrical circuits (also electronic and auxiliary circuits).
2. Secure against being switched on again.
3. Determine that there is no voltage.
4. Ground and short circuit.
5. Cover or close off neighboring parts that are under voltage.

Reverse the measures taken in reverse order after completing the work.

2.9 Warranty

- All information in the documents accompanying the product must be complied with for a safe and trouble-free operation.
- The assertion of warranty claims is excluded if the information in the documents is not observed completely.
- Hardware and firmware may not be modified except by personnel authorized by AMKmotion and after consultation with AMKmotion.
- The company AMKmotion GmbH + Co KG is not liable for damages from unintended use, incorrect installation or operation, exceeding rated values and non-observance with the environmental conditions.

3 Product overview

3.1 Delivery

Please check whether the delivered parts correspond with the delivery note. If the delivery is incomplete, please contact your nearest AMKmotion representative.

Check the components for signs of transport damage after their arrival. Do not install and operate any damaged components.

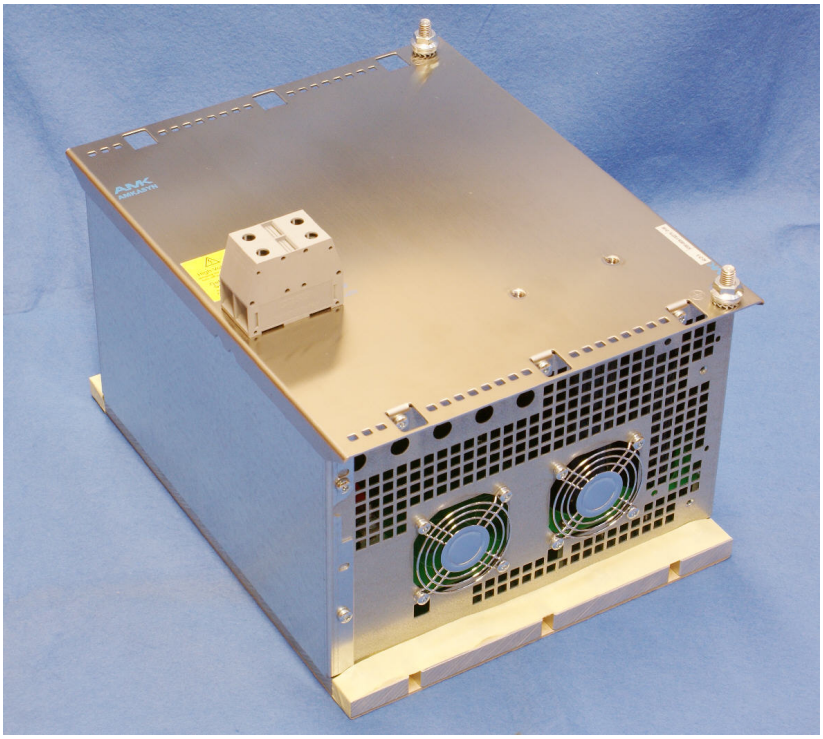
If there is any transport damage, immediately inform the delivering freight carrier and inform your AMKmotion representative.

3.2 Ordering data

Product name	Order number
AE-ZK 6	O830

3.3 Product view

AE-ZK 6



3.4 Technical data

	AE-ZK 6
Capacity / mF	6
Input voltage / VDC	0 - 800
Reverse polarity protection	yes
Cooling	no cooling necessary
Protection class	IP 20
Dimensions / mm B x T (incl. terminals) x H	255 x 180 (225) x 320
Weight / kg	9.9

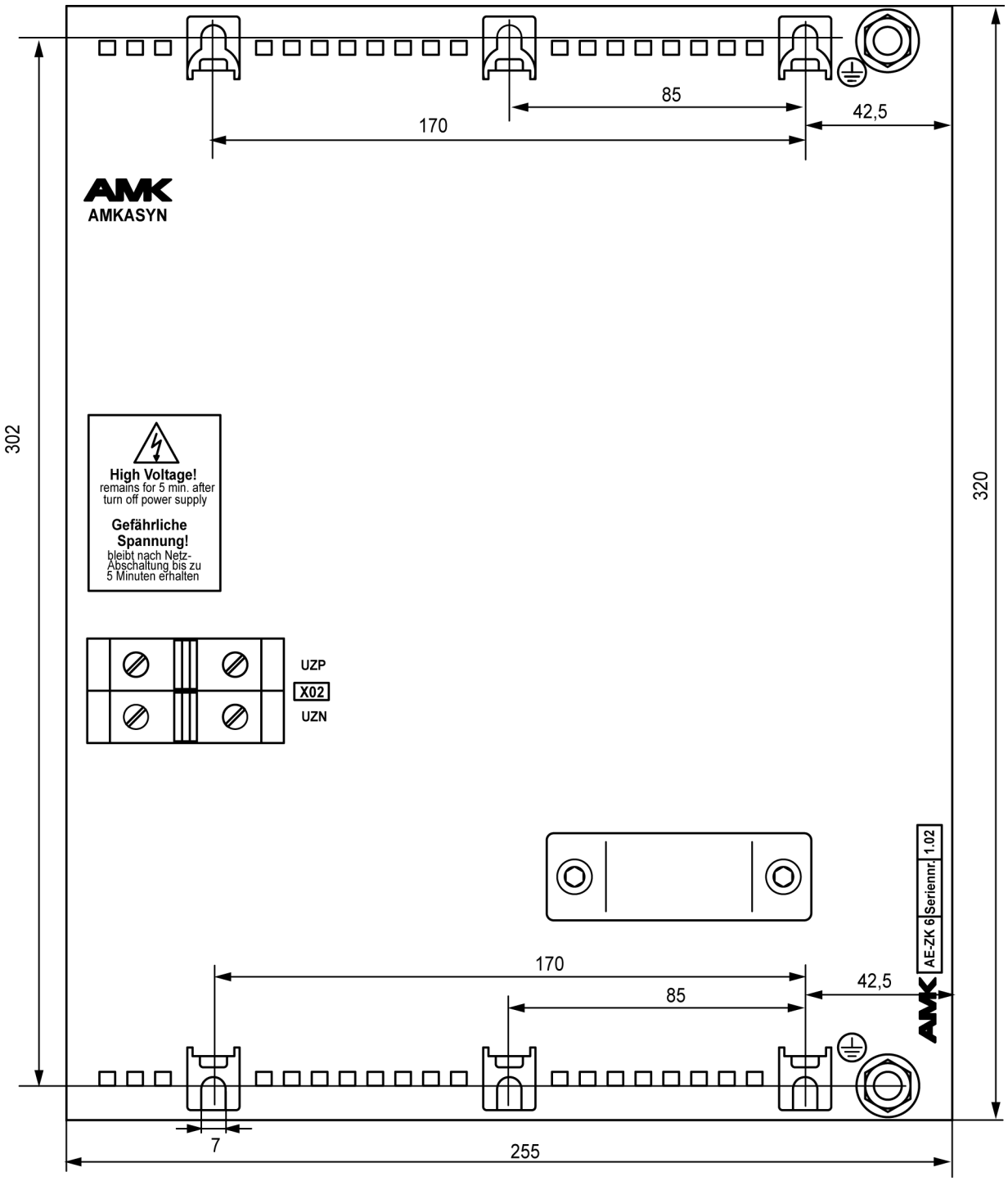
3.5 Environmental conditions

The same environmental conditions are valid as specified for the KE/KW modules.

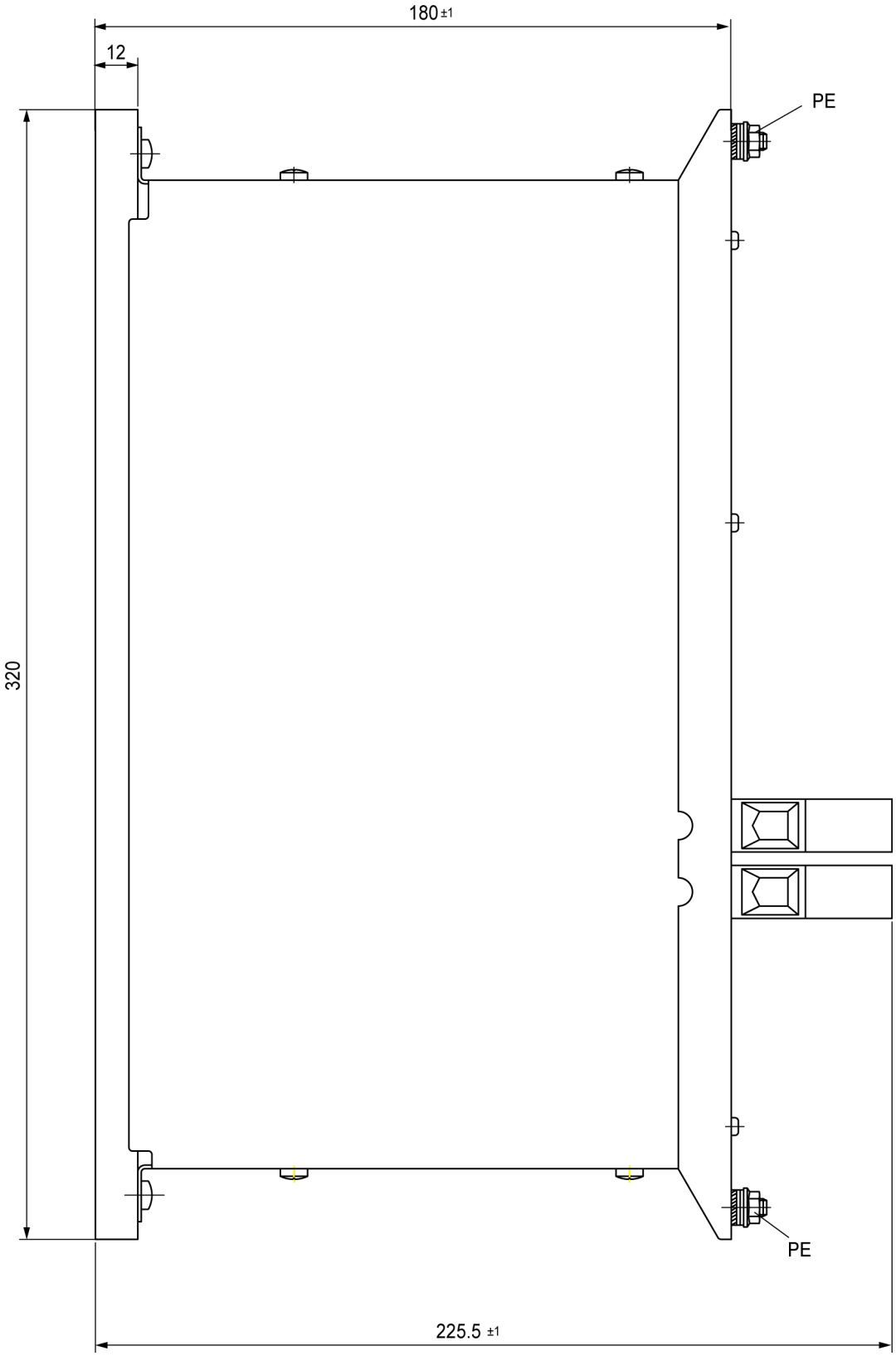
See device description 'Servo drives KE/KW', AMK part no. 28932.

3.6 Dimensional drawings

Front view



Side view



4 Assembly and connection

4.1 For Your safety

⚠ DANGER	
	**Danger to life from touching electrical connections!** Electrical terminals and connectors carry voltages that may cause death or serious injury upon contact. When the LEDs on the front panels of the compact power supply are OFF, this does not indicate that the electrical terminals have been de-energized. **Steps to prevent:** • Prior to any work on the device: Observe the 5 safety rules. • Measure the terminal voltages. There may be no voltage present. • Plug and pull connections only when there is no voltage. • For devices that are connected to a DC bus, or generate it yourself, you need to consider the discharge times of the dc bus capacitors mentioned in the converter documentation • Before commencing work, the connections must be isolated from the voltage supply at both ends! (both ends mean: AC and DC bus supply side)

⚠ DANGER	
	**Danger to life from electric shock!** After switching off the mains, the buffer capacitors for the DC bus can still have a charge and lead to a life-threatening DC voltage. **Steps to prevent:** • After switching off, expect a discharge time of at least 5 minutes. • Measure the voltage in the DC bus between the UZP / UZN terminals to ensure that the terminals are voltage-free. • Caution: A voltage-free state is not signalled!

⚠ DANGER	
	**Risk of injury from crushing, cutting and hitting.** When transporting and mounting sharp-edged and / or heavy components, there is a risk of crushing, cutting and bruising of the persons involved. Suspended loads can fall down and people suffer fatal injuries. **Steps to prevent:** • Utilize suitable assembly and transport equipment, such as hoists and carriages. • Wear protective clothing, e.g. safety gloves and boots, during the assembly. • Use only appropriate tools during the assembly. • Make sure that there are no persons or body parts located under suspended loads during the transport or assembly. • Prevent catching and crushing by mechanical devices.

4.2 Avoiding material damage

NOTICE	
Material Damage!	**Short circuit due to penetrating foreign objects or water** Foreign objects such as metal shavings, screws, etc. cause short circuits. In particular it needs to be prevented that water, e.g. condensation water, seeps in through the cooling units. A temporary forming of dew may only occur as long as the devices are out of operation. **Steps to prevent:** • The modules need to be protected against penetrating foreign objects or water. • When applying mains voltage, no dew may be present any longer.

NOTICE	
Material Damage!	**Observe the tightening torques.** Note the tightening torques specified in the documentation for screw connections and screw terminals, otherwise the conductivity and the security of the connection are not ensured.

4.3 Installation

The additional capacity AE-ZK6 is integrated in the direct voltage DC bus (siehe 'Connection' auf Seite 11).
As the additional capacity needs not necessarily to be cooled via the rear wall, an attachment to the mounting panel of the switch cabinet is possible. Even so, the line between the compact power supply and the additional capacity must be kept as short as possible.
The additional capacity can also be fitted next to the compact power supply on the cold plate.

4.3.1 Attachment on the rear mounting panel

If the additional capacity is to be attached to the rear mounting panel of the switch cabinet, the distance to the compact power supply is to be kept as short as possible. However, there should also be clearance above and below the KE/KW modules of 100 mm in each case. The additional capacity can be attached directly to the sides.
In accordance with the dimensional drawing, the bore holes are to have an M6 internal thread.
The additional capacity is attached with M6 x 20 mm screws which are tightened with 9.6 Nm.

4.3.2 Attachment on a cold plate KW-CPxx

The additional capacity is assembled directly on the cooling system without thermal conductance paste.

Take the following into account during the assembly process:

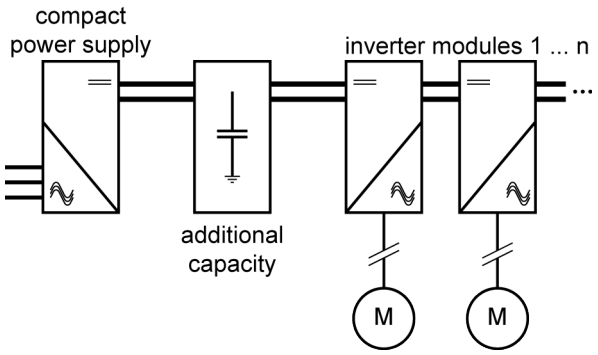
- the protective cardboard on the contact surface (cold plate) of the additional capacity must be removed.
- The assembly surfaces of the additional capacity and cold plate must be clean and scratch-free.
- For the attachment of the additional capacity, the cold plate has a T slot in accordance with DIN 508 at both the top and bottom. Appropriate slot nuts (AMK part no. 18139) must be used in these with an internal thread of M6 for attachment screws M6 x 20 mm.
- The attachment screws are tightened with 8 Nm (Tool: Allen size 5).

(See also device description 'Liquid-cooled cold plate KW-CP', AMK part no. 200043)

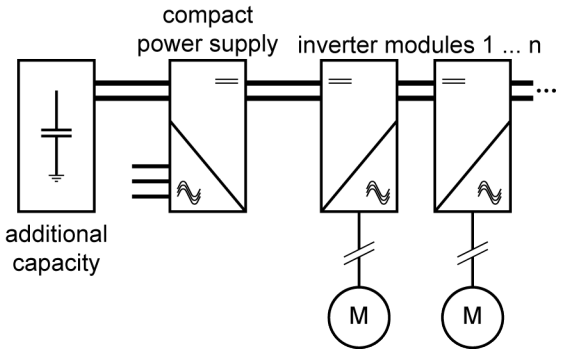
4.4 Connection

The additional capacity AE-ZK6 is integrated in the direct voltage DC bus. Depending on the power of the supply module, the capacity is installed between power supply and the first inverter or before the power supply.

Arrangement of the additional capacity with a compact power supply KE / KEN / KES of max. 60 kW:



Arrangement of the additional capacity with a compact power supply KE / KEN / KES with at least 60 kW:



4.4.1 PE connection

DANGER

Danger to life from electrical shock!

In the event of an interruption to the PE connection, avoid touching the casing because life-threatening levels of voltage may be present!

Steps to prevent:

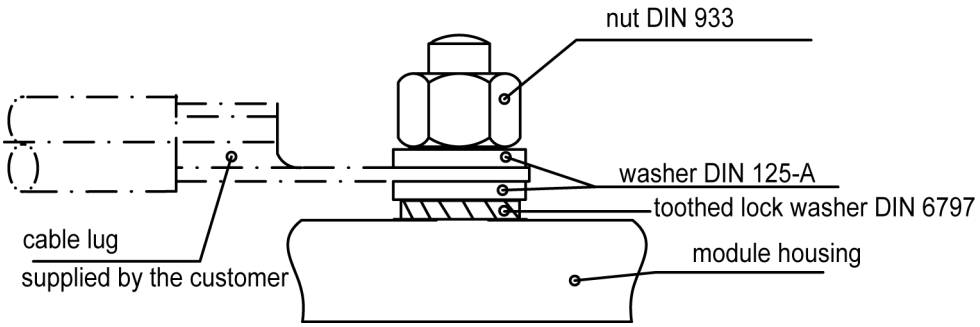
- EN 61800-5-1 requires that the devices be firmly connected on the power side.
- The PE conductor must have a cross-section of at least 10 mm^2 or must have a second PE connection with a cross-section at least equal to the mains feeder (cf. EN 61800-5-1).

Cross-section AC wire	Cross-section PE wire
≤ 10 mm^2	= 10 mm^2
10 ... 16 mm^2	= Cross-section AC wire
16 ... 35 mm^2	= 16 mm^2
≥ 35 mm2	≈ 1/2 x Cross-section AC wire

Description:

The PE connection is a screw bolt on the module casing (see front view) for attaching PE lines and cable shields.

Configure as follows:



Connection:

Recommended cable type	1-wire, unshielded
Cable assembly	Ring cable lug
Recommended wire cross-sections	25 mm^2 AWG 2
Tightening torque	15 Nm
Note	The casing of the additional capacity must be connected to earth (central PE bus bar in switch cabinet) directly and on the most direct means possible. Throughout the entire system, the earthing must be installed in a star-shaped configuration, extending from the central earthing point.

4.4.2 [X02] DC bus

⚠ DANGER

Danger to life from electric shock!

After switching off the mains, the buffer capacitors for the DC bus can still have a charge and lead to a life-threatening DC voltage.

Steps to prevent:

- After switching off, expect a discharge time of at least 5 minutes.
- Measure the voltage in the DC bus between the UZP / UZN terminals to ensure that the terminals are voltage-free.
- Caution: A voltage-free state is not signalled!

Description:

The DC bus voltage supplies the compact inverters connected.

Technical Data:

Siehe 'Technical data' auf Seite 7.

Version:

Type	Pins
Screw terminal	2

Module name	Connection
UZP	DC bus voltage (+)
UZN	DC bus voltage (-)

Connection:

Recommended cable type	2 x 1 wire, unshielded Use only AMK DC bus UZ cable sets. (Siehe 'DC bus cable set' auf Seite 16.)
Cable assembly	Wire end ferrule with plastic sheath
Shield connection	If available, attach on both sides
Cross-section min./max.	4 mm² / 25 mm² AWG 10 / AWG 3
Recommended wire cross-sections	25 mm^2 / AWG 3
Cable stripping length	19 mm
Tightening torque	4.0 - 4.5 Nm
Terminal	HDFKV25TWIN[1)]

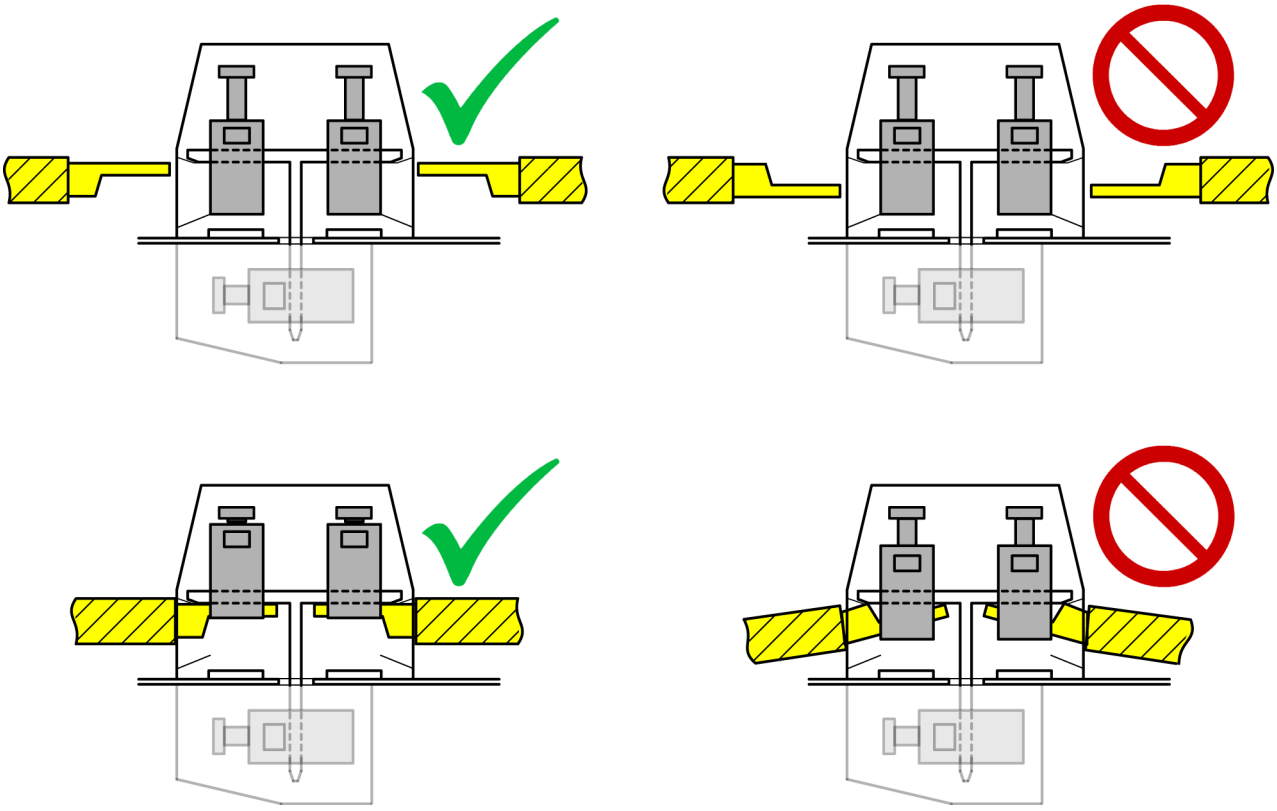
Note	1) When using pin cable lug: Siehe 'Terminal connection technology' auf Seite 14.

4.4.3 Terminal connection technology

When using pin cable lugs please note!

Terminal HDFKVxx - TWIN

Connection	Description
[X02]	DC bus



5 Disposal

Clarify with your local waste disposal company which materials and chemicals need to be separated and how to dispose of them. Observe the local regulations for disposal.

Examples of materials to be disposed of separately:

Components

- Electronic scrap, e. g., encoder electronics
- Iron scrap
- Aluminium
- Non-ferrous metal, e. g., motor windings
- Insulating materials

Chemicals

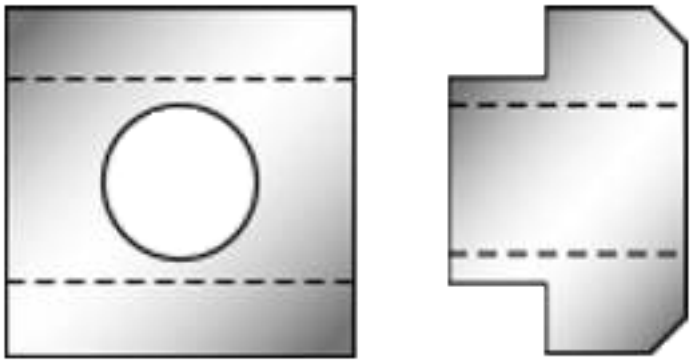
- Oils (disposal as hazardous waste, in acc. with the pertinent legislation; in Germany, the Waste Oil Ordinance (AltölV) applies)
- Grease
- Solvents
- Paint residue
- Coolant

6 Accessories

6.1 Slot nut

Name	AMK part no.	Description
Slot nut D508	18139	Single slot nut acc. DIN 508 for mounting of coldplate modules onto the cooling panel
Mounting set KE/KW	49994	20 slot nuts and 20 cylinder screws M6 x 20

The slot nuts contain an inside thread M6 for tightening screw M6 x 20.



6.2 DC bus cable set

Name	AMK part no.	Description
KE-UZ 255	46975	Wire cross-section 25 mm^2, continuous power max. 60 kW

Glossary

A

AWG
American Wire Gauge (Coding of wire diameter)

G

GND
Ground potential

K

KE
AMKASYN compact power supply with recovery

KE/KW
Modular AMK drive system (contains compact power supply KE, compact inverter KW with controller card and applicable option card)

KEN
AMKASYN compact power supply without recovery

KES
AMKASYN compact power supply with sinusoidal voltage and current

KW
AMKASYN compact inverter

N

NHN
Heights measured above the base height levelReference plane for heights over the sea level for Germany since 1992. The reference plane is located in Germany on the church in Wallenhorst.

P

PDK_xxxxxx_abcdefgh
Product documentation; xxxxxx - AMK part no. , abcdefgh - name

U

UZ
DC bus (voltage)

UZN
DC bus voltage pole negative

UZP
DC bus voltage pole positive

Your opinion is important!

With our documentation we want to offer you the highest quality support in handling the AMKmotion products.
That is why we are now working on optimizing our documentation.
Your comments or suggestions are always of interest to us.
We would be grateful if you take a bit of time and answer our questions. Please return a copy of this page to us.

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Thank you for your assistance.
Your AMKmotion documentation team

1. How would you rate the layout of our AMKmotion documentation?

   (1) very good (2) good (3) satisfactory (4) less than satisfactory (5) poor

2. Is the content structured well?

   (1) very good (2) good (3) moderate (4) hardly (5) not at all

3. How easy is it to understand the documentation?

   (1) very easy (2) easy (3) moderately easy (4) difficult (5) extremely difficult

4. Did you miss any topics in the documentation?

   (1) no (2) if yes, which ones:

5. How would you rate the overall service at AMKmotion?

   (1) very good (2) good (3) satisfactory (4) less than satisfactory (5) poor

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