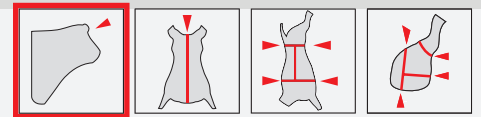


OPERATING MANUAL STUN TONGS

Translation of original manual

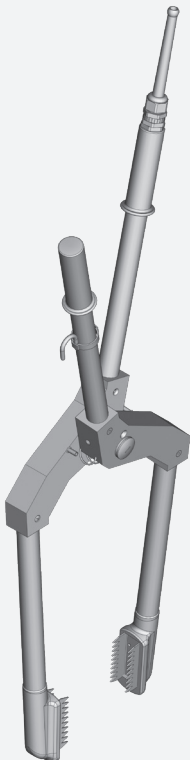


STUN TONGS

- ZK Series Design Plastic

STUN FORKS

- GK Series Rigid tong



Imprint

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Technical changes reserved

This operating manual was compiled with the greatest care. However if you notice incompleteness and/or mistakes, please inform us.

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1 About this Manual

The stun tongs and stun forks are also referred to as machines in this operating manual.

This operating manual was prepared to enable you to work quickly and safely with your machine.

The operating manual is a component of the machine and contains important recommendations, instructions and information

- to enable safe and proper installation of the machine.
- to enable safe operation of the machine.
- to enable you to rectify simple faults yourself.
- for maintenance and cleaning.

Before you start operating the machine, read this entire operating manual thoroughly and carefully. It is imperative that you adhere to all written safety and warning information.

1.1 Target group

This operating manual is intended for site operators of slaughtering facilities and for the staff employed there, for veterinarians and for persons carrying out emergency slaughtering as well as for butchers and small businesses and their trainees.

The operating manual is intended in particular for qualified personnel for assembly, installation, maintenance and servicing and for the cleaning staff.

The target group must have basic technical knowledge of how to handle the machine described herein.

1.2 Liability and warranty

All information and instructions regarding the operation and maintenance of the machine contained in this manual are provided to the best of our knowledge, taking into account our experience and know-how.

We will accept no liability for claims that extend beyond the scope of the warranty agreed in the main contract.

The original version of this operating manual was written in German. The translation was created with the best care and knowledge, but we assume no liability for translation errors. In case of doubt, the original German version always applies.

Exclusion of
liability

We assume no liability and warranty:

- for wearing parts.
- for damage that occurs during slaughtering.

Furthermore, we expressly point out that we do not assume any liability for damages attributable to the following causes:

- Non-compliance or insufficient compliance with the information provided in this operating manual
- Non-intended use
- Unsuitable or improper handling
- Use of spare parts or parts not approved by FREUND Maschinenfabrik GmbH & Co. KG
- Unauthorised modifications to the functions or materials on the machine
- Incorrect operation or operation by unqualified personnel
- Removal or manipulation of the safety devices
- Incorrect or unprofessional cleaning
- Chemical or mechanical overloads
- Maintenance and repair work not being carried out according to instructions or maintenance intervals not being adhered to

Modifications and/or adjustments to the machine are possible in certain cases. In such cases, prior written approval must be obtained from FREUND Maschinenfabrik GmbH & Co. KG.

1.3 Other applicable documents

This operating manual only describes the stun tongs and stun forks. Observe the operating manual for the stunning transformer in addition to this operating manual.

1.4 Storing the operating manual

This operating manual is part of the machine and must be accessible at all times to the operating, maintenance and cleaning staff during the entire service life of the machine.

Therefore, always keep the operating manual near the machine's place of use.

1.5 FREUND Assistance



With the purchase of a FREUND product, you get access to our online customer portal, the FREUND Assistance (FA). In the FA, the available spare parts for your product are displayed for you, and you also have the possibility to immediately send an order request to our sales department. The required assembly instructions (MTA) for the safe assembly of your FREUND spare parts are also provided for you in the FA. In addition, the CE declarations for series machines are provided for you in the FA.

1.6 Symbols and layout elements

1.6.1 Layout elements

- Enumerations
 - Individual, independent instruction step
Result arising from the instruction step
 - 1. Step-by-step sequences in a specific order
 - 2. The numbers indicate that the instruction steps follow each other
 - 3. *Result arising from the instruction steps*
- References to another chapter



Important additional information or special details regarding the use of the machine



Embedded warning note - shows type and source of the danger and the measure to avoid the danger

1.6.2 Safety signs

Warning signs



Warning of a danger point

Caution! At this point there is an increased danger to your safety.



Warning of dangerous electrical voltage

Danger to life from electric shocks to the body.



Warning of sharp-edged machine parts

Danger to the fingers and hands from cutting and striking.

Danger to limbs from cutting or severing and injuries to the body.



Warning of hand injuries

Danger to the hands and fingers from crushing due to the falling or downward movements of machine parts.



Warning of substances harmful to health and irritants

The information on the packaging and containers must be observed. Keep separate from food.

Prohibition Signs



General prohibition sign

This sign is only used in connection with an additional sign or text, which describes the prohibition in greater detail.



High-pressure cleaners prohibited

Do not use high-pressure cleaners to clean the machine.
Parts of the machine could be damaged.

Mandatory signs



Wear protective gloves

Protect the hands against friction, abrasions and cuts:

- during cleaning,
- when touching hot surfaces.



Wear safety spectacles

protect the eyes against flying parts, fragments and squirting liquids



Wear safety shoes or rubber boots

protect the feet against crushing, falling objects and guarantee secure support



Wear a protective apron

protects the body against humidity, blood and other fluids.



Pull out the power plug

Disconnect the machine from the stunning transformer before all servicing, maintenance and cleaning work.

1.6.3 Symbols



Piglet



Cattle



Pig (≤ 150 kg)



Small animals (e.g. poultry)



Pig (> 150 kg)



Head stunning



Sow/boar



Heart stunning



Lamb



Killing, disease outbreak



Sheep



Contact position



Comply with the operating manual

Be sure to observe the information and notes in the operating manual.



Separate spare parts list available

There is a separate spare parts list for this spare part.



Assembly manual available There is an extra assembly manual for this spare part. In the assembly manual, work steps and required tools are shown.



Available as a set

The symbol indicates an article in a set. In a set, multiple related spare parts are available together. A plate clarifies which parts are included.



Tool set available

To install this spare part, a special tool is required which can be ordered from us.

2 **The order of the work steps is marked with numbers in the grey field.**



Lubrication

Information about the amount and properties of the lubricant can be found in the operating manual.



No lubrication



Glue

Parts must be glued; information about the type and properties of the glue can be found in the operating manual.



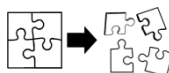
Cleaning

Instruction for an additional cleaning step.

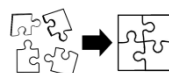


Power plug

symbolises the connection of the machine to the power network.



Disassembly of the machine or component



Assembly of the machine or component

symbolises the assembly of the machine after prior disassembly, carry out work steps in the reverse order.

2 For your Safety

This chapter describes the safety measures and safety devices. It serves for your orientation regarding safety questions about the use of the machine.

Safety instructions are intended to provide occupational safety and prevent accidents. Observe all the safety instructions provided here and at the beginning of each chapter.

Be sure to read the following chapter on safety and the safety instructions contained within carefully before commissioning and using the machine.

2.1 Warnings

While you are using the machine, dangers may occur in certain situations or as a result of certain behaviours.

In this operating manual, warning information is given at the start of the respective chapter or life phase that involves danger of personal injury or property damage. They relate to all following actions of the chapter or life phase.

The precautions described must be observed to avoid the danger.

Structure of a warning



Signal word!

Type and source of the imminent danger.

Possible consequences of the danger if the warning is disregarded.

➤ Instructions for averting the danger.

Signal word	Meaning
DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
Caution	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
Attention	Indicates a potentially hazardous situation which, if not avoided, could result in damage to the machine or the environment.

2.2 Obligations of the site operator

The site operator is obliged to comply with the respective country-specific laws, guidelines, ordinances and regulations.

With regard to site operators in the Federal Republic of Germany, this includes compliance with the following regulations:

- BetrSichV (Betriebssicherheitsverordnung/German Regulation on Safety and Health):
Regulation on safety and health protection when using work equipment
- Regulations of the employer's liability insurance association:
BGV A1 (DGUV Regulation 1), Principles of prevention
BGR 229 (DGUV Regulation 110-008), Working in the meat industry
- Regulation (EC) No 1099/2009
Regulation on the protection of animals at the time of killing
- German Animal Protection Slaughter Regulation (TierSchlV)
Regulation on the protection of animals at the time of slaughter or killing and on the implementation of Council Regulation (EC) No 1099/2009

Operating staff	<p>The site operator, as a higher level legal person, is responsible that the machine is used in accordance with its intended use and is responsible for training and for assigning authorized and qualified operating, maintenance and cleaning staff.</p> <p>The site operator is obliged to ensure that each employee is properly trained in the operation of the machine.</p> <p>Staff undergoing training may only work at the machine under the supervision of properly qualified staff.</p>
Competent personnel	<p>Only persons possessing the necessary knowledge and skills (expertise) may look after, restrain, stun, slaughter or kill animals.</p> <p>The site operator ensures that the activities within the framework of slaughtering are only carried out by persons possessing a relevant certificate of expertise.</p>
Back-up equipment	<p>The site operator shall ensure that during stunning operations appropriate back-up equipment is immediately available on the slaughtering point and is used in the case of failure of the stunning equipment initially used. The back-up method may differ from that first used.</p>
Instruction of staff	<p>The operator is obliged to instruct employees regularly and in light of certain events (e.g. if an accident has occurred) in safe work procedures and occupational safety and health. We recommend that the instruction and the content covered should be documented by the employee's signature.</p>
Workplace	<p>The workplace must comply with the national and regional hygiene and workplace regulations.</p>
Cleaning	<p>The operator must ensure that machine and working equipment can be cleaned easily and without any risk. The operator must provide suitable detergents and define suitable cleaning procedures.</p>

- Safety of the machine** The site operator must ensure that the machine is only operated and used in perfect and functional condition.
- The site operator must ensure that safety devices are regularly serviced and checked for proper function.
- Escape routes** The operator must ensure that sufficient escape routes are available for the staff and that these are clearly marked. The operator must ensure that escape routes are not obstructed and that their function is not impaired (e.g. that doors open towards the escape route).

2.3 Employee responsibilities

- Operating staff** The operating staff must be properly instructed and trained by the operator. Staff who have read and understood the safety information and have been properly familiarised themselves with the operation of the machine can be regarded as instructed.
- Operating staff must be familiar with the operating manual and the applicable OHS and accident prevention regulations.
- Qualified personnel** A technical expert is a person who, due to technical training and experience, possesses sufficient skills and knowledge.
- The technical expert must be familiar with the operating manual and the applicable OHS and accident prevention regulations, as well as the applicable animal welfare laws.
- Competent personnel** Competent personnel are such persons who, due to technical training and experience, possess sufficient skills and knowledge.
- The technical expert must be familiar with the operating manual and the applicable OHS and accident prevention regulations as well as with the latest regulations of the protection of animals.
- Machine safety** Before starting any work, carefully check the machine for proper function in accordance with the intended use.
- Do not put the machine into operation if it does not work correctly.
- Disconnect the machine from the stunning transformer immediately if it no longer works correctly.
- Have defective safety devices, switches or other defective machine parts repaired.
- Notify the site operator or his authorised representative of any changes to the machine which may affect your safety.
- Safety at the workplace** Maintain a stable upright position and keep your balance. Avoid awkward postures.
- Keep your workplace clean and tidy. Untidy workplaces can cause accidents.
- Always wear the personal protective equipment provided.
- Keep children, young persons and untrained staff away from the machine.

Emergency procedures In the case of an accident, administer first aid and call a doctor and emergency medical services.
Notify the operator or his authorised representative of every accident.

2.4 Inspection in accordance with the German Animal Protection Slaughter Regulation (TierSchlV)

All stun tongs and stun forks of the KARL SCHERMER brand are tested prior to initial commissioning in accordance with the applicable German Animal Protection Slaughter Regulation (TierSchlV) and the EC Regulation 1099/2009, and are delivered with sharpened electrode teeth.

Testing in accordance with the German Animal Protection Slaughter Regulation (TierSchlV)

- Functional test: on every working day, at least once when starting work
- Cleaning: depending on the level of soiling - several times a day

Maintenance and inspection as per Regulation (EC) 1099/2009

- Maintenance and inspection measures as per manufacturer's specifications: every 2 years
- Retention period for the maintenance and inspection record: at least 1 year

2.5 Electrical safety in accordance with DIN VDE 0701-0702/EN60204-1

All of our electrical machinery is tested for electrical safety prior to initial commissioning and following modification or repair in our factory by a qualified electrician in accordance with the electrical engineering rules as per DIN VDE 0701-0702/EN60204-1.

The inspection interval for electrical machinery and equipment is six months (→ *Electrical periodic inspection*).

2.6 Residual risks

The stun device was built according to the current state of the art before being placed on the market and complies with the basic safety and health requirements of the European Union.

The machine is operationally safe, assuming compliance with the operating manual, the company-specific instructions and the accident prevention regulations.

However, there are still dangers involved which cannot be eliminated by design measures. These include:

- danger to life from live machine parts in electrical stunning device
- danger of injury to fingers and hands.

- risk of injury from negligent handling of personal safety equipment while operating the stunning device, during maintenance and repair work and during cleaning and disinfection

2.7 Intended use

The stun tongs and stun forks of the KARL SCHERMER brand may only be operated with the designated safety devices, which must be fully functional.

The stun tongs and stun forks of the KARL SCHERMER brand

- are intended for stunning and, in case of disease, for killing piglets, pigs, sheep, lambs and cattle in stunning pens, restrainers and individual traps.
- can be operated with the following stunning transformers:
 - Stunning transformers of the KARL SCHERMER brand
 - Stunning transformers of the FREUND Maschinenfabrik GmbH & Co. KG brand (after exchanging the plug)
 - Common stunning transformers of other manufacturers (after exchanging the connection socket)



As of 04/2022, stunning transformers of the KARL SCHERMER brand will **no longer** be distributed by FREUND Maschinenfabrik GmbH & Co. KG.

Design:
without
pushbuttons

The stun tongs of type

- ZK-1 is intended for head and heart stunning as well as the killing of pigs (> 150 kg) and the killing of cattle.
- ZK-2 is intended for head and heart stunning as well as the killing of pigs (\leq 150 kg) and sheep.
- ZK-3 is intended for head and heart stunning as well as the killing of sows and boars.
- ZK-4 is intended for stunning as well as the killing of piglets and lambs.

Design:
with pushbuttons

The stun tongs of type

- ZK-2 is intended for head and heart stunning as well as the killing of pigs (> 150 kg) and the killing of cattle.
- ZK-4 is intended for stunning as well as the killing of small animals (e.g. poultry).

Rigid design The stun fork of type

- GK-1 (narrow design) is intended for head stunning of pigs (≤ 150 kg).
- GK-2 (broad design) is intended for head stunning of pigs (> 150 kg) and sows.



As of 04/2022, the stun forks will **no longer** be distributed by FREUND Maschinenfabrik GmbH & Co. KG.

General Intended use also includes:

- compliance with the safety information and the safety requirements,
- proper execution of repairs and maintenance jobs,
- regular cleaning.

Any other use is deemed non-intended use and poses risks to the safety of the operating personnel.

Exclusion of liability

FREUND Maschinenfabrik shall not accept any liability for damage resulting from non-intended use.

2.8 Improper use

Every use other than those described as → chapter *Intended use* is deemed to be non-intended and is thus inadmissible.

The operator is solely responsible for risks in the case of improper use. Consult the manufacturer in case of doubt.

The following are also deemed as improper use:

- the use of the machine to human beings.
- the use to tranquilize the animals prior to slaughter.
- the use of the machine without functional safety devices.
- the extension of the cables and connecting lines attached to the machine.

3 Technical Description

3.1 Minimum currents and stunning times

Country-specific legal regulations

The respective national regulations on the protection of animals apply at the time of slaughter/killing.

If necessary, adjust the stunning parameters (e.g. minimum currents and stunning times) according to the animal protection provisions in your country.



Adjusting the parameters:

→ Operating manual for the stunning transformer used

Minimum currents/minimum stunning times

In the Federal Republic of Germany, the German Animal Protection Slaughter Regulation [implementation of Regulation (EC) No 1099/2009] applies in this regard.

Minimum currents/minimum stunning times:

Animal species	Minimum electric current	Minimum stunning time
Piglet	1.3 A	4 s
Pigs (≤ 150 kg)	1.3 A	4 s
Pigs (> 150 kg)	1.8 A	4 s
Cattle < 6 months old	1.25 A	4 s
Cattle > 6 months old	2.5 A	4 s
Sheep, lambs, goats	1.0 A	4 s
Poultry:	0.24 – 0.6 A	4 s
Fowl	0.24 A	4 s
Geese	0.3 A	4 s
Turkey	0.4 A	4 s
Ostriches	0.5 A	4 s
Ducks	0.6 A	4 s

3.2 Function description of electric stunning

A stunning system consists of a stunning transformer and stun tongs or stun fork.

For electric stunning or killing, the current must flow through the brain of the animal first or at least at the same time as it flows through the body. The minimum current must be reached in the first second and be maintained for a certain amount of time.

Requisite stunning parameters:

→ national legislation in your country

Body resistance:
animal

Stunning transformers of the KARL SCHERMER brand

- LC-1, LC-1-USB, EC-2-1, ST-EC-2-2 work according to the constant current measuring method.
- CS-1 works according to the constant current measuring method.

The stunning transformers of FREUND Maschinenfabrik GmbH & Co. KG

- STUN-E4, STUN-E6, STUN-E8 work according to the constant current measuring method.

The body resistance of the animal is thus continuously measured at short intervals and analysed based on the resistance measurement principle. If the measured value is within the preset range of up to 1400 ohms, the stunning voltage (constant current measuring method) or the stunning current (constant voltage measuring method) is adjusted automatically.

Body resistance:
head

The body resistance of humans is significantly higher than the body resistance of the slaughter animal. If the preset resistance of 1400 ohms is exceeded, the stunning transformer switches off the stunning voltage to protect personnel. Danger to persons is averted due to the large difference in switch-on value.

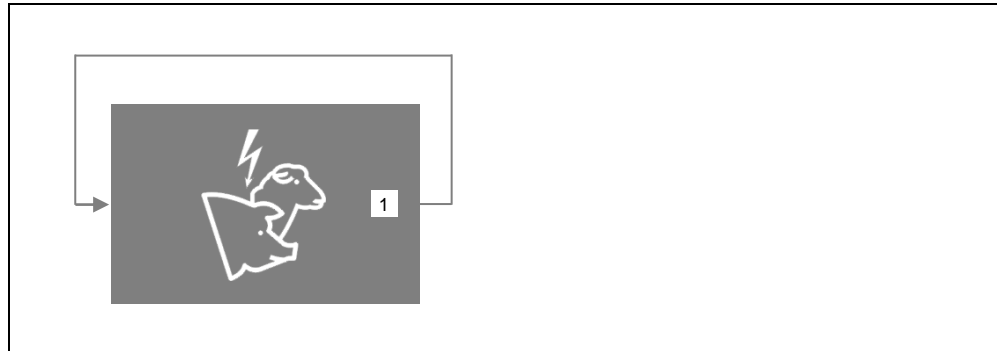
Uncontrolled conditions and defects in the stunning circuit are indicated to the user by a fault lamp.



Uncontrolled states and defects in the stunning circuit are indicated to the user (→ operating manual for the stunning transformer used).

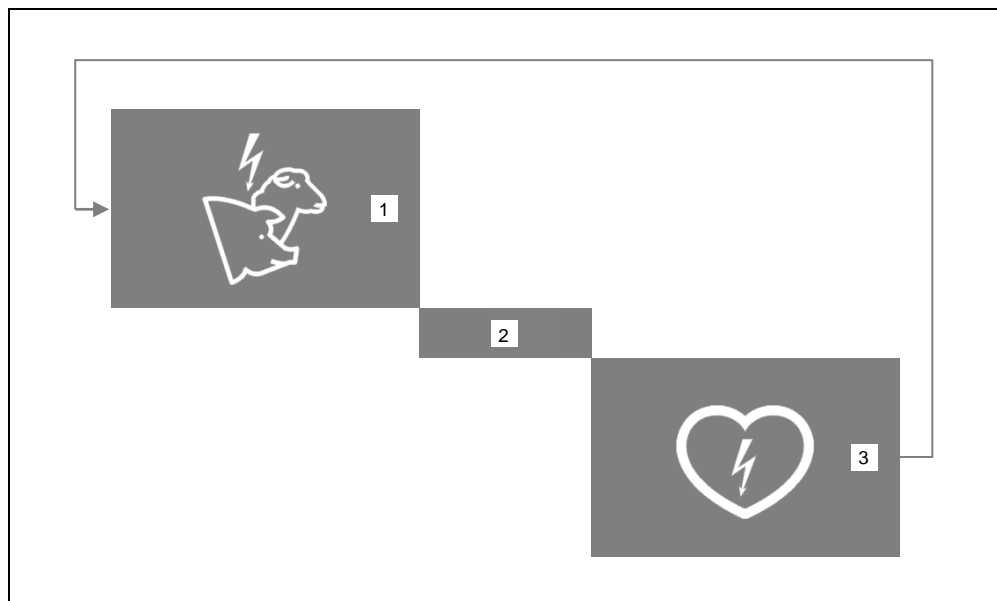
3.3 Stunning types

3.3.1 Head stunning



No .	Phase	Parameter
1	Head stunning	→ Operating manual for the stunning transformer

3.3.2 Head and heart stunning



No .	Phase	Parameter
1	Head stunning	→ Operating manual for the stunning transformer
2	Repositioning	Reposition time
3	Heart stunning	→ Operating manual for the stunning transformer

3.4 Stun tongs and stun forks

The stung tongs/stun forks of the KARL SCHERMER brand

- were built in accordance with DIN EN 60335-2-87 and tested according to quality standards.
- comply with the provisions of the German Animal Protection Slaughter Regulation of 1 January 2013 and Regulation (EC) No 1099/2009.

Features

- Types ZK-1, ZK-2, ZK-3, ZK-4:
 - Plastic side piece
 - Spiral cable
 - Standard electrodes, optional: Electrodes with tips (other electrodes are possible)
 - without pushbuttons

Type ZK-2S:

- Plastic side piece
- Spiral cable
- with 2 pushbuttons
- Standard electrodes, optional: Electrodes with tips (other electrodes are possible)

Type Z-KT:




















- Plastic side piece
- Spiral cable
- with 2 pushbuttons
- Standard electrodes, optional: Electrodes with tips (other electrodes are possible)

- Types GK-1, GK-2 (for use in restrainers, stunning cage):
 - Rigid plastic side piece
 - Spiral cable
 - Switchless operation













The following table provides an overview of the uses of the stun tongs and stun forks in relation to

- Animal species,
- Stunning method,
- Device type of the stunning transformer:
 - Device types of the KARL SCHERMER brand
 - Device types of FREUND Maschinenfabrik GmbH & Co. KG





Stun tongs of the ZK series Animal species/stunning method

Animal species	ZK-1			ZK-2 / ZK-2S			ZK-3			ZK-4		
												
	-	-	-	-	-	-	-	-	-	•	•	•
	•	•	•	•	•	•	-	-	-	-	-	-
	•	•	•	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	•	•	•	-	-	-
	-	-	-	•	•	•	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	•	•	•
	-	-	-	-	-	•	-	-	-	-	-	-




Stun tongs of the ZK series Device type/stunning type

Device type	ZK-1			ZK-2 /ZK-2S			ZK-3			ZK-4		
												
LC-1 LC-1-USB	•	•	-	•	•	-	•	•	-	•	•	-
CS-1	•	•	-	•	•	-	•	•	-	•	•	-
EC-2-1	•	•	-	•	•	-	•	•	-	•	•	-
ST-EC-2-1	-	-	•	-	-	•	-	-	•	-	-	•
STUN- E4, E6, E8	•	•	•	•	•	•	•	•	•	•	•	•










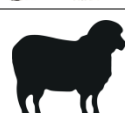
Z-KT stun tongs: Animal species/stunning method

Animal species	Z-KT		
			
	•	-	•







Z-KT stun tongs: Device type/stunning type

Device type	Z-KT		
			
LC-1 LC-1-USB	•	•	-
CS-1	•	•	-
EC-2-1	•	•	-
ST-EC-2-1	-	-	•
STUN- E4, E6, E8	•	•	•

Stun forks of the GK series: Animal species/stunning method

Animal species	GK-1			GK-2		
						
	•	-	-	-	-	-
	-	-	-	•	-	-
	-	-	-	•	-	-
	•	-	-	-	-	-

Stun forks of the GK series: Device type/stunning type

Device type	GK-1			GK-2		
						
LC-1	•	-	-	•	-	-
LC-1-USB	•	-	-	•	-	-
CS-1	•	-	-	•	-	-
EC-2-1	•	-	-	•	-	-
ST-EC-2-1	-	-	-	-	-	-
STUN-E4, E6, E8	•	-	-	•	-	-

3.4.1 Stun tongs of the ZK series

Functional
elements

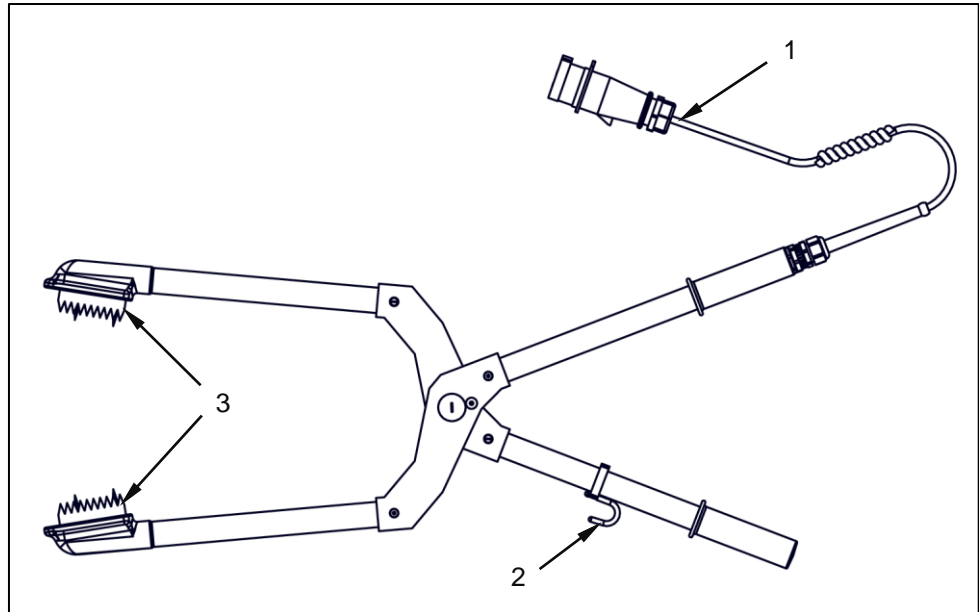


Fig. 3-1 Stun tongs of the ZK series with spiral cable

Pos.	Description
1	Connection cable with plug <ul style="list-style-type: none"> • Stunning: 18A plug • Killing: CEE plug
2	Hook (fixture for hanging up the stun tongs)
3	Electrodes

3.4.2 ZK-2S stun tongs

Functional
elements

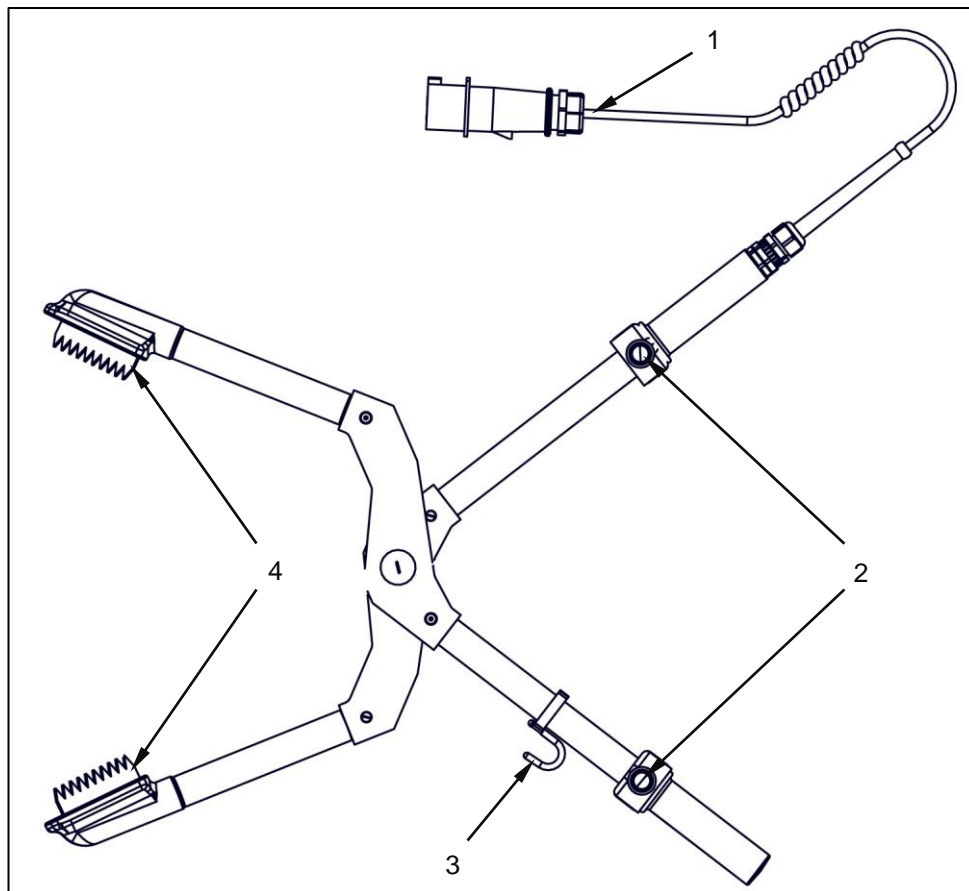


Fig. 3-2 Stun tongs of the ZK-2S series with spiral cable

Pos.	Description
1	Connection cable with plug (stunning: 18A plug)
2	Pushbuttons (need to be pressed during the entire stunning)
3	Hook (fixture for hanging up the stun tongs)
4	Electrodes

3.4.3 Z-KT stun tongs

Functional
elements

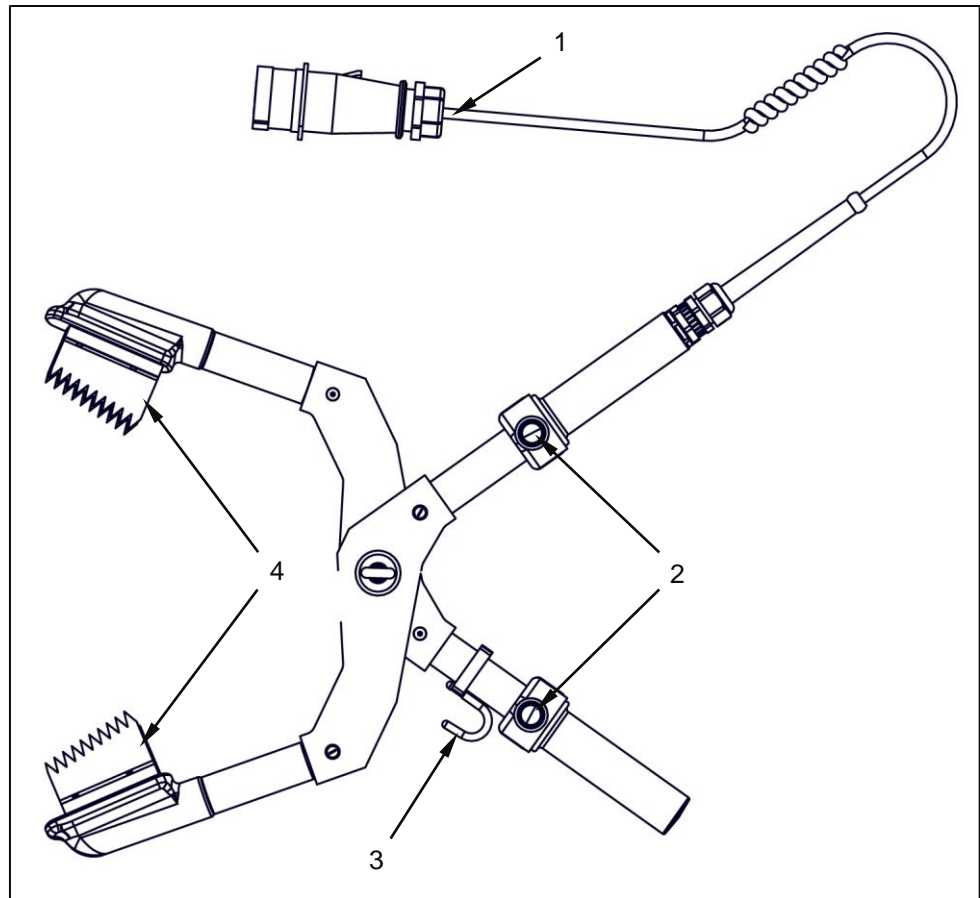


Fig. 3-3 Z-KT stun tongs with spiral cable

Pos.	Description
1	Connection cable with plug (stunning: 18A plug)
2	Pushbuttons (need to be pressed during the entire stunning)
3	Hook (fixture for hanging up the stun tongs)
4	Electrodes

3.4.4 Stun forks of the GK series

Functional
elements

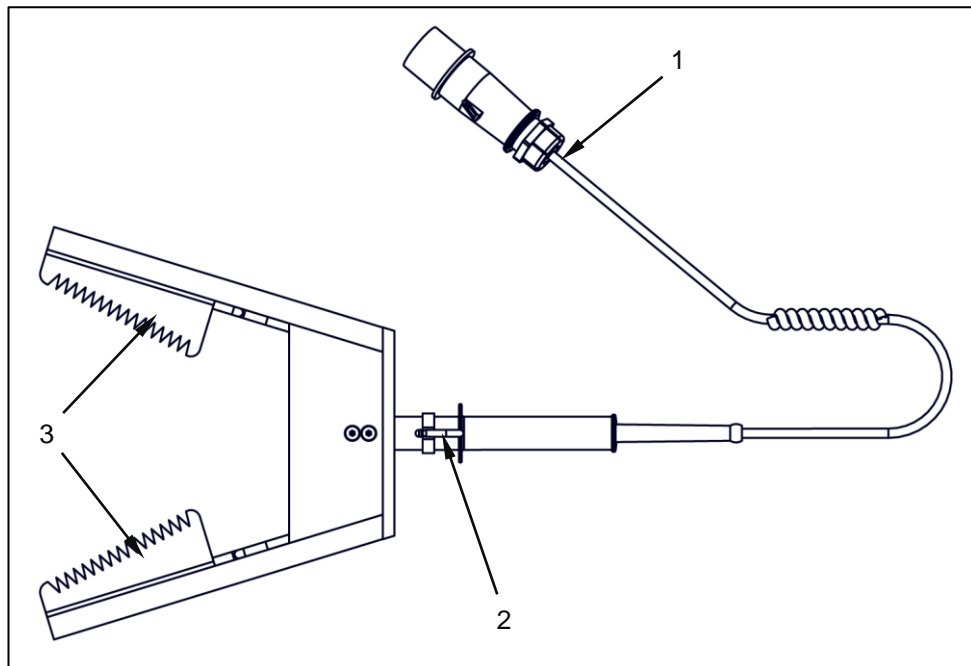


Fig. 3-4 Stun tongs of the GK series with spiral cable

Pos.	Description
1	Connection cable with plug (18A plug)
2	Hook (fixture for hanging up the stun tongs)
3	Electrodes

3.4.5 Rating plate/type engraving

ZK series The rating plate is located near the hinge on stun tongs of the ZK series, of type ZK-2S and type Z-KT.
ZK-2S
Z-KT

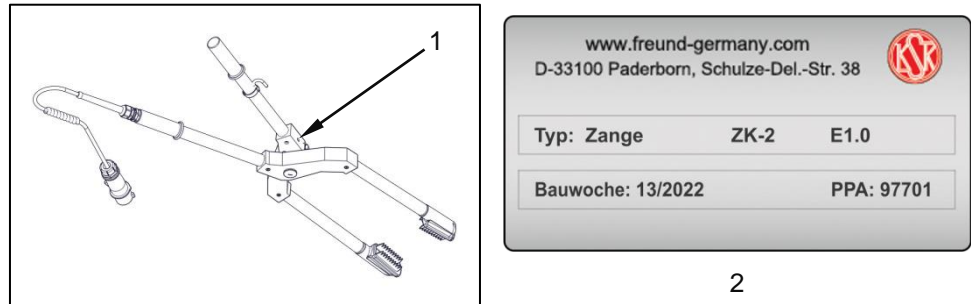


Fig. 3-5 Position and information of the rating plate (example)

Pos.	Description	Pos.	Rating plate information
1	Position of the rating plate	2	Company address
			Machine type/designation
			Electrode type
			Week of construction:
			Production number

GK series The rating plate is located near the fork spread on stun forks of the GK series.

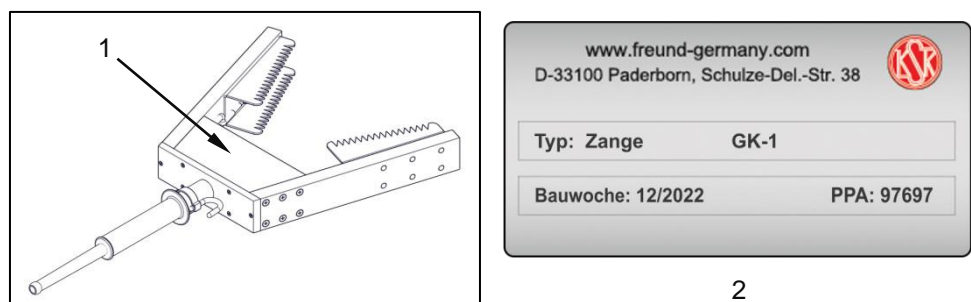


Fig. 3-6 Position and information of the rating plate (example)

Pos.	Description	Pos.	Rating plate information
1	Position of the rating plate	2	Company address
			Machine type/designation
			Week of construction:
			Production number

4 Transport and storage

The machines of the KARL SCHERMER brand are intended for shipment by truck, train, aircraft or ship. Secure shipment is carried out in individual packaging or multi-packs.

Inspection by the manufacturer

The machines have been carefully inspected prior to shipment. The inspection ensures that the machines exhibit the specified data and are working correctly.

Despite all due care, there is a possibility that the machines may get damaged during transport. For this reason, check the machines for potential transport damage when you unpack them.

4.1 Unpacking the machines/devices

After being unpacked, the machines are ready for immediate use.

Reuse

FREUND Maschinenfabrik GmbH & Co.KG recommends that the original packaging be used for transport (e.g. if the machine is shipped as part of the repeat inspection).

Recycling and disposal

The original packaging consists of recyclable materials and can be disposed of according to the recyclables collection scheme in place.

Instructions for recycling and disposing of the packaging can be found in chapter *Disposal and recycling* on page 46.

- Remove all packing materials and dispose of them properly and in an environmentally sound manner.
- Remove any accumulated condensate.
- Check the machines for possible transport damage.
- Observe the machines during the first hours of operation in order to identify potential malfunctions.

4.2 Storing the machines

It is imperative that you adhere to the following instructions regarding safe storage of the machines:

- Only store the machines in locations that are protected from moisture, frost and heat.
- When storing the machines for a longer period, make sure they are dry.
- Store the machines in such a way that damage to the machines is excluded.
- Protect the machines against corrosion.

5 Installing and commissioning

The site operator is responsible for connecting the machine to the stunning transformer.

FREUND Maschinenfabrik GmbH & Co. KG will not be liable for damage resulting from incorrect connection or improper handling.

5.1 Safety information



DANGER!

Live machine parts.

Danger to life.

- Before beginning any installation, maintenance or repair work, place the machine on a non-conductive surface.
- Before beginning any installation, maintenance or repair work, disconnect the stunning transformer from the mains.
- Secure the stunning transformer to prevent it being switched on accidentally.
- Disconnect the machine from the stunning transformer before beginning any installation, maintenance or repair work.



WARNING!

Risk of accident caused by insufficiently qualified personnel

Danger to Life and most severe injuries are possible.

- The machine may only be commissioned by instructed and authorized personnel.
- All works to live components may only be performed by approved electricians.



WARNING!

Sharp-edged electrodes.

Risk of cutting on sharp-edged electrodes.

- Wear protective gloves when performing any installation, maintenance or repair work.

5.2 Personal protective equipment



5.3 Changing the plug on the stun tongs

If you operate stun tongs of the KARL SCHERMER brand with a stunner from FREUND Maschinenfabrik GmbH & Co. KG, the plug of the stun tongs needs to be changed.

The relevant manual can be found in the appendix under the heading **TIN-013309**.

5.4 Installing and commissioning the stunning transformer



Stunning transformers of the KARL SCHERMER brand and FREUND Maschinenfabrik GmbH & Co. KG

Information relating to installation and commissioning of the stunning transformer can be found in the relevant operating manual for the stunning transformer.

Stunning transformers of other manufacturers

In order to operate stun tongs/stun forks with stunning transformers of other manufacturers, the connection socket on the stunning transformer needs to be replaced.

To this end, please contact FREUND Maschinenfabrik GmbH & Co. KG. Information relating to installation and commissioning of the stunning transformer can be found in the relevant operating manual for the stunning transformer.

Measuring/recording device and data collection

Information relating to setting up the measuring/recording device and data collection can be found in the relevant operating manual for the stunning transformer.

5.5 Connecting the stun tongs/stun fork

The relevant manual can be found in the appendix under the heading **TIN-013687**.

Connection
sockets

Stunning transformers of the KARL SCHERMER brand and FREUND Maschinenfabrik GmbH & Co. KG

The connection sockets are located on the narrow side of the device on devices of the Karl Schermer brand and FREUND Maschinenfabrik GmbH & Co. KG.

Length of the
connecting lines

The connecting lines of the stun tongs/stun forks are 6 m long, allowing you to position the stunning transformer and the stun tongs/stun fork at a safe distance from the work area.



Do **not** extend the power cable included in the delivery. Longer power cables can cause intermittent contacts during the stunning process.

- For heart stunning with a heart electrode:
Insert the plug of the heart electrode into the connection socket on the stunning transformer.

6 Operation and Stunning

When operating stunning plants the relevant provisions of the trade association are to be observed. Moreover the provisions of the veterinary offices, the EU and the animal welfare apply.

The following stunning methods are generally available for selection:

- Head stunning
- Head and heart stunning
- Stunning in restrainers and in individual cages
- Killing

6.1 Safety information



WARNING!

Risk of accident caused by insufficiently qualified personnel.

Danger to Life and most severe injuries are possible.

- The machine may only be operated by instructed and authorized personnel.
- The machine may only be operated by personnel, who possessing the necessary knowledge and skills (expertise) to look after, restrain, stun, slaughter or kill animals.

6.2 Personal protective equipment



Use special electric rubber gloves according to EN 60903.

Only use foot protection with insulating soles, e.g. rubber boots.

6.3 Animal welfare

The harmonised laws of the EU and the German Animal Protection Slaughter Regulation (TierSchlV) require careful treatment that prevents pain, suffering or injury of the slaughter animals as the top priority.

- Avoid causing the slaughter animals any excitement, pain or suffering when driving, loading and stalling the animals.
Do not use electric stunners to herd animals.
- Avoid causing stress to the slaughter animals prior to stunning so that the level of excitement or injury is kept the absolute minimum.

- Only use electric animal drover with healthy and uninjured over one year old cattle and over four month old pigs.
- Moisten only the areas on the slaughter animals where the electrodes of the stun tongs are to be applied.
Use warm water (approx. 40 °C) if possible.
- Avoid pain and suffering by attempting to apply contact pressure in a manner conducive to the well-being of the animal.
- Stun the animals so that they are quickly and painlessly rendered unconscious and insensitive right up to the point of death.

6.4 Daily safety inspection

Before starting work, carefully check the machine and the stunning transformer for flawless and intended operation.

Only use technically sound and functioning machines.

- Check
 - the machine and all electrical connections and connection lines for external damage.
 - the functionality of the entire stunning system.
 - the safety devices for correct operation.
 - the electrodes for tight seating and burnt-out tips.
 - Never use a machine with defective safety devices, switches or other defective machine parts.
 - Have defective safety devices, switches or other machine parts repaired, and notify your employer.

6.5 Preparatory measures

Stunning transformer

- Perform the following preparatory measures on the stunning transformer:
 - Ensure that the stunning transformer is connected to the power supply at the installation location.
 - Ensure that the measuring/recording device and data collection are set up.
 - Ensure that the data connection is **not** interrupted during stunning.

6.6 Carrying out stunning



Stunning times and minimum currents

The respective national regulations on the protection of animals at the time of slaughter/killing in your country apply in relation to stunning times and minimum currents.

- Adapt the stunning time to the regulations in your country.

Legislation of the Federal Republic of Germany:

The pre-set stunning time is a specification based on the current German Animal Protection Slaughter Regulation of 1 January 2013 (BGBl I S. 2982) and Regulation (EC) No. 1099/2009.

The minimum current must be reached in the first second and be held for at least 4 seconds.

The minimum currents and current flow times refer to the stunning transformer's sinusoidal alternating current.



- Switch on the stunning transformer and select the relevant stunning program (→ operating manual for the stunning transformer).

Contact positions

Contact position
for head stunning
(example): Pig

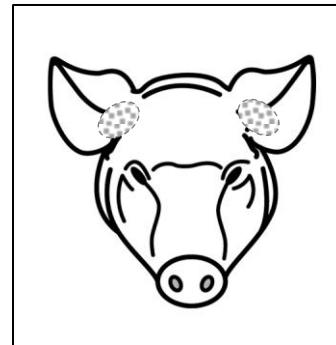
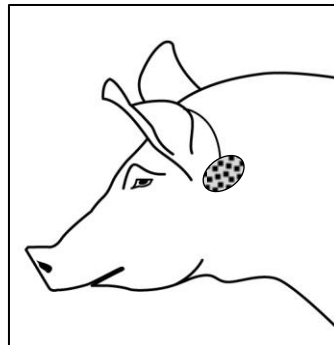


Fig. 6-1 Ideal electrode contact position (side and frontal view)

Contact position
for heart stunning
(example): Pig

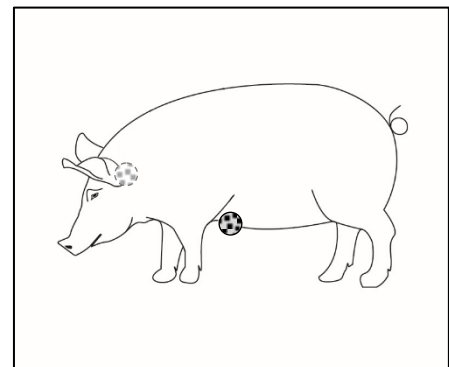
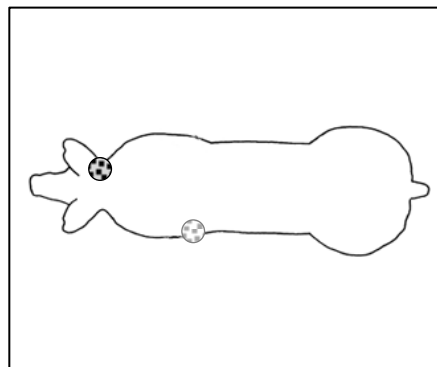


Fig. 6-2 Ideal electrode contact positions (plan and side view)

Contact position
for head stunning
(example): Sheep

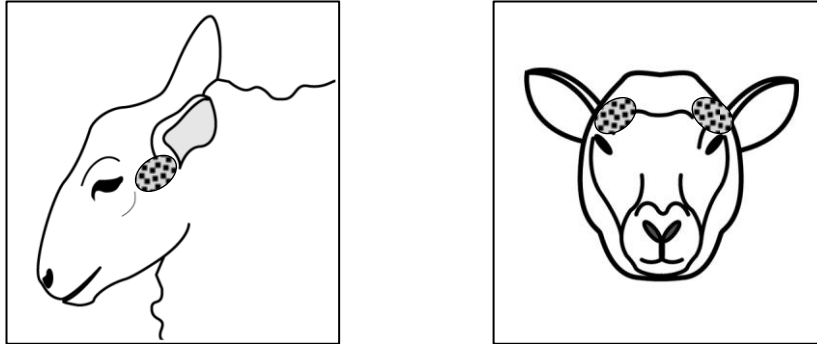


Fig. 6-3 Ideal electrode contact position (side and frontal view)

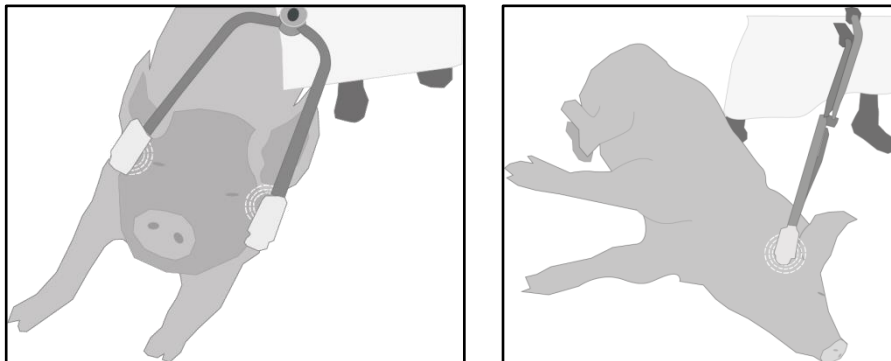
6.6.1 Carrying out head stunning (restrainer and individual stun trap)

Stunning on the head of the animal is carried out in one step. The stunning effect lasts for no more than 30 seconds.

When the electrodes are in contact with the skin of the animal, the stunning voltage is triggered automatically.



Information relating to signalling and display during head stunning can be found in the operating manual for the relevant stunning transformer.



Avoid bone fractures due to deeper probing with the stun tongs/stun fork.

1. Apply the electrodes of the stun tongs/stun fork on both sides of the animal's head.

The stunning program runs automatically.

2. Open the stun tongs or remove the stun fork from the head of the animal.

Depending on the stunning transformer used, the stunning current is shut down and stunning is concluded.

The stunning transformer switches back to the start of the program.

3. Ensure quick draining of the blood after completion of stunning to ensure that the animal bleeds out immediately in a controlled manner.

- No later than 10 seconds* (ideally 5 seconds) if blood is drained in lying position.
- No later than 20 seconds* (ideally 10 to 15 seconds) if blood is drained in hanging position.

* Specifications as per TierSchlV (German Animal Protection Slaughter Regulation) of 01/01/2013

End of stunning

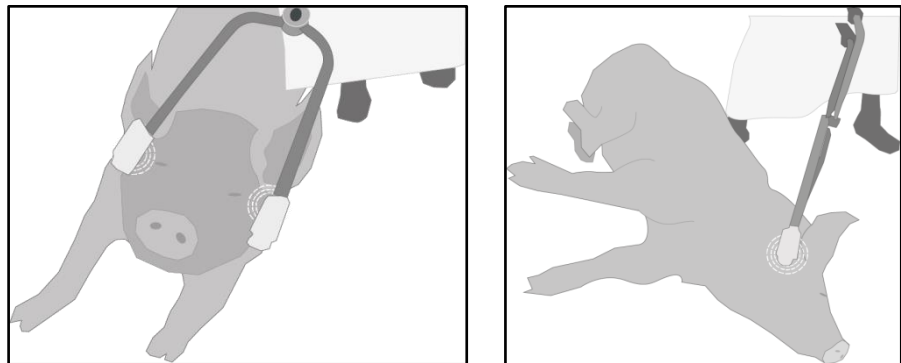
- Data recording ➤ Ensure that all stunning data is transferred after the last stunning (→ operating manual for the stunning transformer/data recording device).

6.6.2 Carrying out head and heart stunning

Head and heart stunning is carried out in two steps.

Generally, this stunning method results in an optimum stunning effect and a better meat quality.

Head stunning phase



Avoid bone fractures due to deeper probing with the stun tongs.

1. Apply the electrodes of the stun tongs on both sides of the animal's head.

The stunning program for head stunning runs automatically.

2. Open the stun tongs.

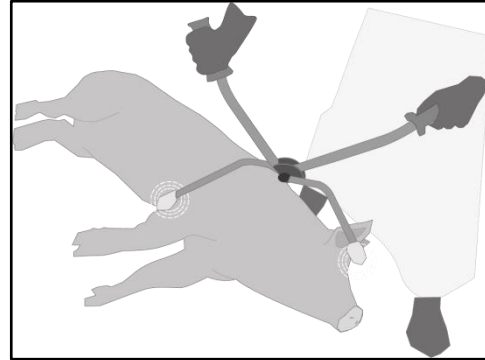
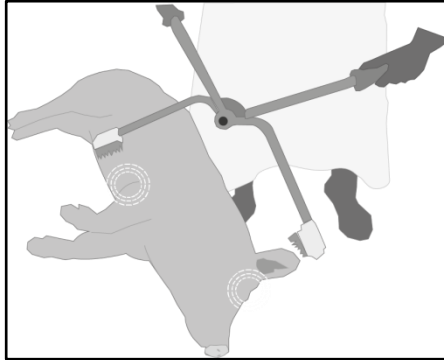
Depending on the stunning transformer used, the stunning current for head stunning is shut down and the stunning program for heart stunning is run.

Repositioning phase



The stun tongs must be repositioned within the set repositioning time as otherwise the stunning process is aborted and the stunning process will need to be repeated, starting once more with head stunning (repositioning time: → operating manual for the stunning transformer).

**Heart stunning
phase**



3. Immediately apply the electrodes of the stun tongs to the heart and the base of the ear of the animal lying on the ground:
1 electrode on the heart, 1 electrode on the head.
4. Open the stun tongs.
Depending on the stunning transformer used, the stunning current is shut down and stunning is concluded.
The stunning transformer switches back to the start of the program.
5. Ensure quick draining of the blood after completion of stunning to ensure that the animal bleeds out immediately in a controlled manner.
 - No later than 10 seconds* (ideally 5 seconds) if blood is drained in lying position.
 - No later than 20 seconds* (ideally 10 to 15 seconds) if blood is drained in hanging position.

* Specifications as per TierSchlV (German Animal Protection Slaughter Regulation) of 01/01/2013

End of stunning

- Data recording ➤ Ensure that all stunning data is transferred after the last stunning (→ operating manual for the stunning transformer/data recording device).

6.7 Setting the parameters of the stunning programs

Parameter settings may only be made by trained qualified personnel.



Parameter settings: (→ operating manual for the stunning transformer).

6.8 Stunning error

6.8.1 Stunning errors during head stunning

Fault	Possible cause
Stunning transformer resets to the start position.	Carcass's resistance exceeds 1,400 ohms.
Stunning transformer switches off and starts the pause phase.	Carcass's resistance exceeds 1,400 ohms.
	Head stunning current is intermittently interrupted or not reached after starting.
Stunning process stops prematurely.	Minimum head current is temporarily or permanently interrupted.
Stunning process can be restarted afterwards.	Minimum head current is interrupted or not reached before the specified head minimum time.

6.8.2 Stunning errors during heart stunning

Fault	Possible cause
Stunning transformer starts the reset time.	Carcass's resistance exceeds 1,400 ohms.
Stunning transformer switches off and starts the pause phase.	Carcass's resistance exceeds 1,400 ohms.
Stunning process stops prematurely. Stunning process can be restarted afterwards.	Heart minimum current is temporarily or permanently interrupted
	Heart minimum current is interrupted or not reached before specified heart minimum time has elapsed

7 Cleaning and disinfection

Cleaning is carried out in order to remove dirt, meat and fat particles as well as dried-on blood from the machine. All surfaces must be visually clean after cleaning.

For hygienic reasons, the machines must be thoroughly cleaned at least once a day after each shift, and during the shift if there is heavy soiling.



Always take note of the safety information in the product data sheets issued for the relevant cleaning agent or disinfectant.

7.1 Safety information



DANGER!

Live machine parts.

Danger to life.

- Before beginning any installation, maintenance or repair work, place the machine on a non-conductive surface.
- Before beginning any installation, maintenance or repair work, disconnect the stunning transformer from the mains.
- Secure the stunning transformer to prevent it being switched on accidentally.
- Disconnect the machine from the stunning transformer before beginning any installation, maintenance or repair work.



WARNING!

Risk of accident caused by insufficiently qualified personnel

Danger to Life and most severe injuries are possible.

- The machine may only be maintained, repaired and cleaned by qualified personnel.
- All works to live components may only be performed by approved electricians.



WARNING!

Highly irritant or corrosive detergents and disinfectants.

Breathing difficulties and other health damage is possible.

- Always take note of the hazardous substance symbols and the safety data sheets issued for the relevant detergent or disinfectants.
- Wear the personal protective equipment specified by the manufacturer of the detergents and disinfectants.

7.2 Personal protective equipment



7.3 Daily cleaning

Cleaning may only be performed by hand using cleaning agents and disinfectants suitable for the food industry.



- Disconnect the stunning transformer from the power supply.
- Disconnect the connected machine from the stunning transformer.



- Do **not** use any high-pressure cleaners.
- Clean dirty electrodes with a wire brush.

8 Maintenance and servicing

To ensure as long a service life as possible for the machines and ensure low wear, the machines must be inspected and serviced regularly.

The work area around the workbench must be clean and free of foreign objects for maintenance and disassembly.

Repairs and maintenance may be performed only by qualified and authorised specialists.

Warranty If errors or defects occur in the machines within the statutory warranty period, please contact our sales department. Please refer to the imprint at the front of this manual for the address and telephone number.



Use only original replacement parts or the replacement parts recommended by FREUND Maschinenfabrik GmbH & Co. KG.

For maintenance and repairs, use only measuring instruments with protective insulation. The internal resistance of the connected measuring instrument must be at least 100 kOhm.

8.1 Safety information



DANGER!

Live machine parts.

Danger to life.

- Before beginning any installation, maintenance or repair work, place the machine on a non-conductive surface.
- Before beginning any installation, maintenance or repair work, disconnect the stunning transformer from the mains.
- Secure the stunning transformer to prevent it being switched on accidentally.
- Disconnect the machine from the stunning transformer before beginning any installation, maintenance or repair work.



WARNING!

Risk of accident caused by insufficiently qualified personnel.

Danger to life and risk of very serious injuries.

- The machine may only be connected to the stunning transformer and commissioned by instructed and authorised personnel.
- Maintenance work on live components may only be performed by trained electricians.



WARNING!

Sharp-edged electrodes.

Risk of cutting on sharp-edged electrodes.

- Wear protective gloves when performing any installation, maintenance or repair work.

8.2 Personal protective equipment



8.3 Electrical periodic inspection

The periodic inspections of portable electric machines and systems must be performed every six months in accordance with DIN VDE 0701-0702/EN 60204-1.

The electrical inspection must be performed by an electrician as defined by the Accident Prevention Regulation (UVV) *Electrical installations and equipment* or by a person trained in electrical engineering.

You may have the periodic inspection conducted at the FREUND Maschinenfabrik GmbH & Co. KG factory. FREUND Maschinenfabrik GmbH & Co. KG offers you a complete inspection of the electrical system and test sticker for the periodic inspection.

8.4 Stun tongs

Changing the electrodes

Dirty and burnt-out electrodes result in insufficient skin contact and no longer ensure optimal stunning.

Burnt-out electrodes can be identified by the round electrode tips.

Replace worn and burnt-out electrodes of the stun tongs/stun forks in good time in order to prevent downtimes.

Always replace both electrodes at the same time.

The relevant manual can be found in the appendix under the heading **TIN-013688**

9 Troubleshooting and fault rectification

If errors or faults occur during operation, this chapter provides information to help you find and remedy the possible causes.



Errors or faults that are due to malfunctions of the stunning transformer are **not** listed in this chapter (→ *Operating manual for the stunning transformer*).

9.1 Safety information



DANGER!

Live machine parts.

Danger to life.

- Before beginning any installation, maintenance or repair work, place the machine on a non-conductive surface.
- Before beginning any installation, maintenance or repair work, disconnect the stunning transformer from the mains.
- Secure the stunning transformer to prevent it being switched on accidentally.
- Disconnect the machine from the stunning transformer before beginning any installation, maintenance or repair work.



WARNING!

Risk of accident caused by insufficiently qualified personnel.

Danger to life and risk of very serious injuries.

- The machine may only be connected to the stunning transformer and commissioned by instructed and authorised personnel.
- Maintenance work on live components may only be performed by trained electricians.



WARNING!

Sharp-edged electrodes.

Risk of cutting on sharp-edged electrodes.

- Wear protective gloves when performing any installation, maintenance or repair work.

9.2 Personal protective equipment



9.3 Overview of possible faults

9.3.1 Stun tongs/stun forks

Fault	Possible cause	Remedy
<p>Current strength set is not reached.</p> <p>The stunning process does not start.</p>	Electrodes are soiled.	Clean the electrodes using a wire brush.
	Electrodes are burnt through.	Replace both electrodes → Separate installation manual (enclosed with the operating manual).
	The electrodes do not have any contact with the skin of the animal (e.g. due to thick fur).	Exchange the electrodes for electrodes with tips → Separate installation manual (enclosed with the operating manual).
	Water ingress near the electrodes.	Disassemble the electrodes. Allow the water to drain. Leave the stun tongs/stun fork to air until they are completely dry. Install the electrodes. → Separate installation manual (enclosed with the operating manual).
	Cable break	Have the cable replaced. To this end, please contact FREUND Maschinenfabrik GmbH & Co. KG.

10 Disposal and recycling

The stun tongs/stun fork must be disposed of in accordance with the applicable statutory provisions in the respective countries.

More information For more information about the materials we use and disposal thereof, please contact our sales staff. Please refer to the imprint at the front of this manual for the address and telephone number.

10.1 Disassembling and disposing of the stun tongs/stun fork



All stun tongs/stun forks contain recoverable materials which you can return for recycling.

It is imperative that the regional and local environmental regulations be adhered to in the course of disposal.

1. Disconnect all connections and supply lines from the stun tongs/stun fork.
2. Completely disassemble the stun tongs/stun fork.
3. Separate all recyclable materials by type.
4. Dispose of waste oil and components and materials soiled with oil in accordance with the applicable environmental regulations.
5. Sort the individual recyclable materials and send them for recycling and disposal.
6. Send hazardous waste to a local hazardous waste site.

10.2 Disposing of packaging materials



All packaging materials used by FREUND Maschinenfabrik GmbH & Co. KG are environmentally friendly and can be reused.

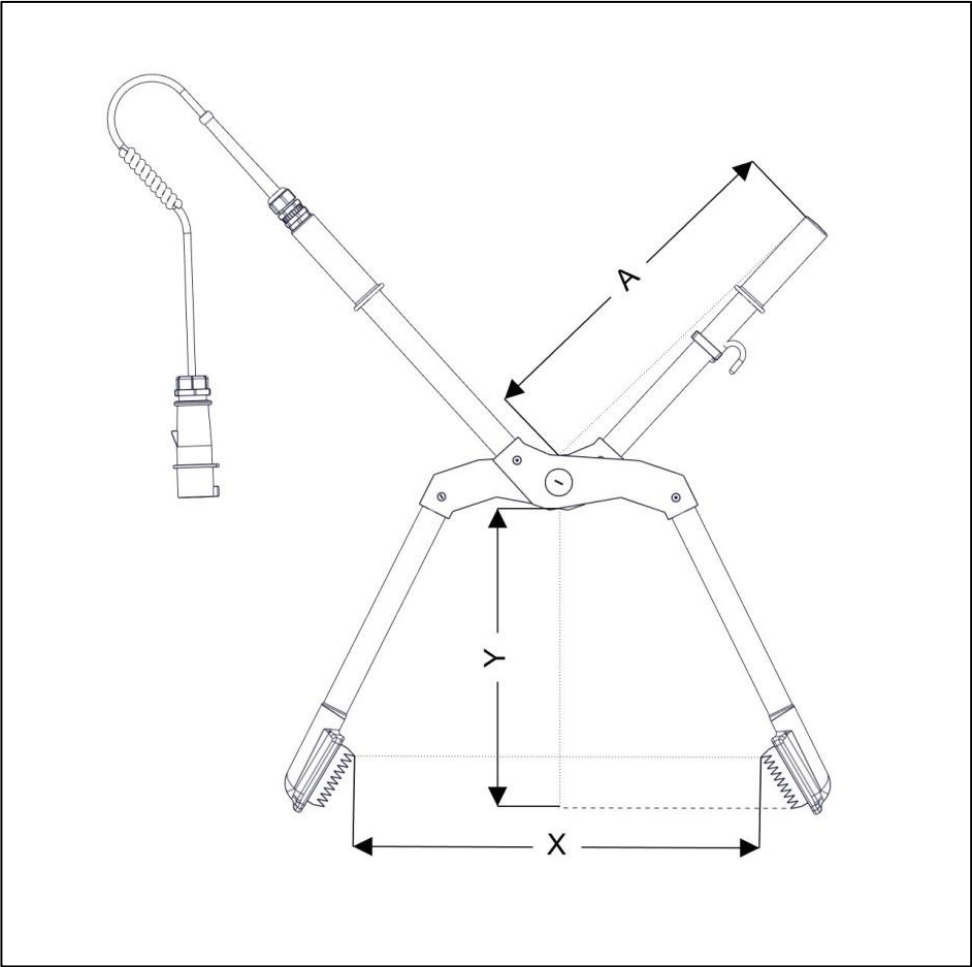
You can safely dispose of the packaging materials through your local waste collection systems or return them for recycling.

11 Technical Data

11.1 Stun tongs

11.1.1 ZK series

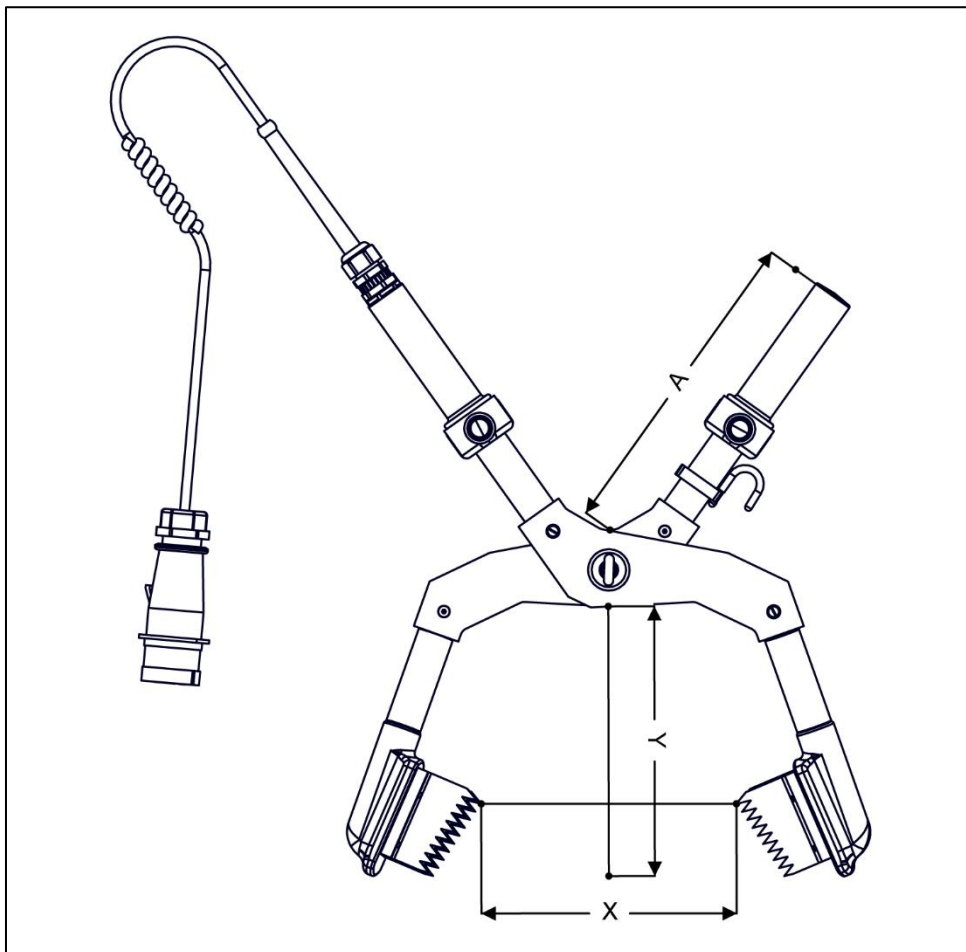
Dimensions/weights



Stun tongs		ZK-1	ZK-2/ZK-2S	ZK-3	ZK-4
	Weight [kg]	3.8	3.6	4.0	4.0
	Dimension A [mm]	420	420	420	520
	Dimension X [mm] (max.)	630	500	825	315
	Dimension Y [mm]	285-440	205-340	395-565	305
Standard electrodes	Type of electrode*	E 1.1	E 1.0	E 1.1	E 2.0
		*) A customised combination of "stun tongs/electrode" is possible to some extent and optional (→ chapter <i>Electrodes for stun tongs</i>)			
IP protection class	Protection class	IP44			

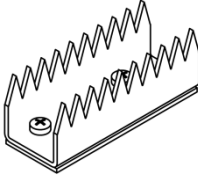
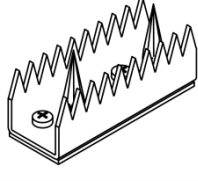
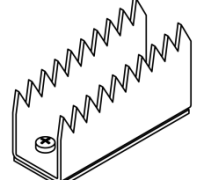
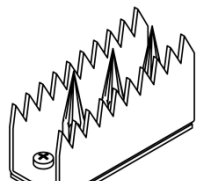
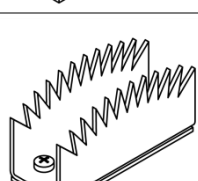
11.1.2 Z-KT

Dimensions/weights



Stun tongs		Z-KT
	Weight [kg]	4.1
	Dimension A [mm]	280
	Dimension X [mm] (max.)	250
Standard electrode	Dimension Y [mm]	215
	Type of electrode*	E 1.0
		*) A customised combination of "stun tongs/electrode" is possible to some extent and optional (→ chapter <i>Electrodes for stun tongs</i>)
IP protection class	Protection class	IP44

11.1.3 Electrodes for stun tongs

Electrodes	Type	Electrode shape	Tips	Application	Part-No.
E 1.0			-	Head/heart stunning	010-440010
				Disease/killin g	
E 1.1			2 tips/"standard" design	Head/heart stunning	010-440011
				Disease/killin g	
E 2.0			-	Head/heart stunning	010-440020
				Disease/killin g	
E 2.1			3 tips/"long" design	Head stunning	010-440021
				Disease/killin g	
E 3.0			-	Disease/killin g	010-440030

11.1.4 Plugs for stun tongs

Plug	Type	Stun tongs	Use	Part-No.
	18A plug	ZK-1, ZK-2, ZK-3, ZK-4, ZK-2S, Z-KT	Stunning	010-240182
	CEE plug*	ZK-1, ZK-2, ZK-3, ZK-4, ZK-2S, Z-KT	Killing*	010-240180
* The stunning transformer must be designed for "killing" use based on the increased power consumption.				

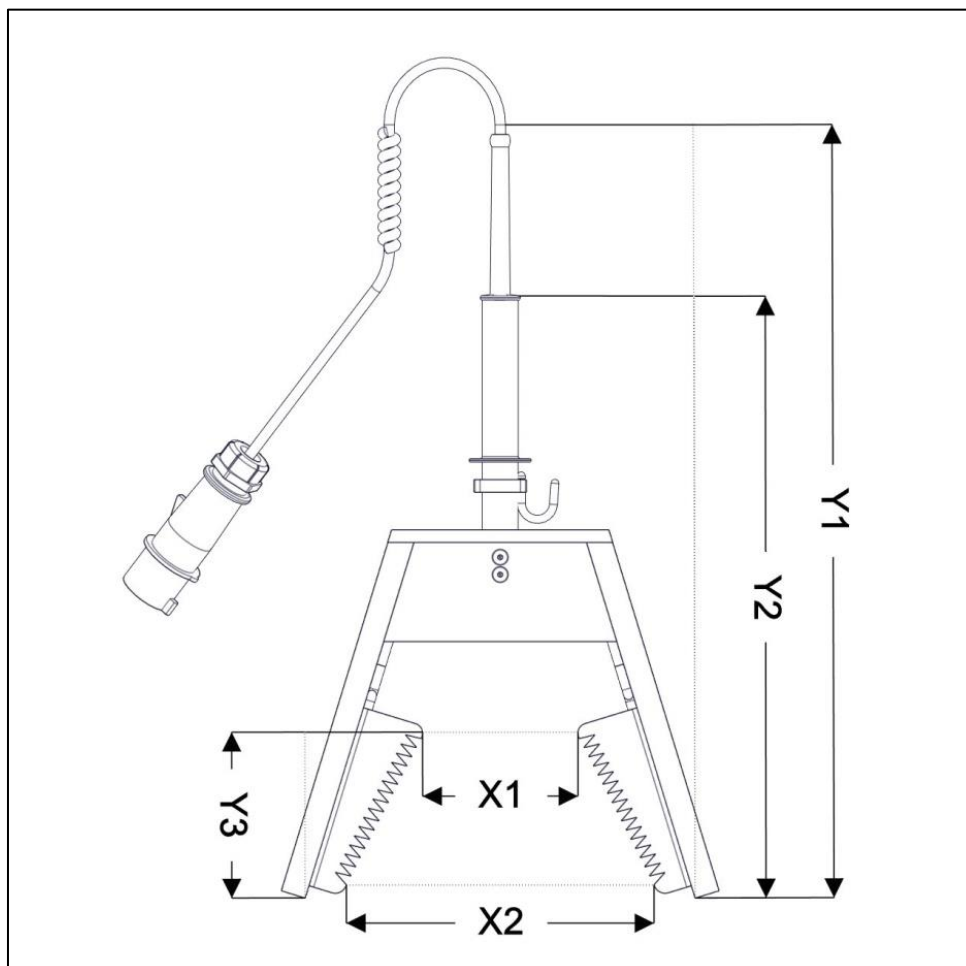
11.2 Stun forks



As of 04/2022, the stun forks will **no longer** be distributed by FREUND Maschinenfabrik GmbH & Co. KG.

11.2.1 GK series

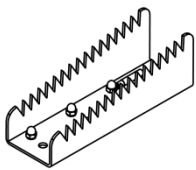
Dimensions/weights



Stun forks

	GK-1	GK-2
Weight [kg]	2.4	3.7
Dimension X1 [mm]	37	130
Dimension X2 [mm]	165	265
Dimension Y1 [mm]	570	625
Dimension Y2 [mm]	430	480
Dimension Y3 [mm]	135	135
IP protection class	Protection class	IP44

11.2.2 Electrodes for stun forks

Electrodes	Electrode shape	Stun fork	Application	Part-No.
		GK-1, GK-2	Head stunning	010-344010

11.2.3 Plugs for stun forks

Plug	Type	Stun fork	Use	Part-No.
	18A plug	GK-1, GK-2	Head stunning	010-240182

12 Appendix



EG-Konformitätserklärung • EC-Declaration of Conformity • Declaración CE de conformidad • Déclaration CE conformité

im Sinne der EG-Richtlinie Niederspannung 2014/35/EU und der EG-Richtlinie EMV 2014/30/EU
content according to Low Voltage Directive 2014/35/EC and EMC Directive 2014/30/EC
 contenido según Directiva de Baja Tensión 2014/35/CE y Directiva de EMC 2014/30/CE
contenu conforme à la Directive Basse Tension 2014/35/CE et la Directive CEM 2014/30/CE

Hersteller • *Manufacturer* •
 Constructor • *Constructeur*

FREUND Maschinenfabrik GmbH & Co. KG
Schulze-Delitzsch-Str. 38
D-33100 Paderborn
Germany

Hiermit erklären wir, dass das **elektrische Betriebsmittel** • *We hereby declare that the electrical equipment* •
 Por la presente declaramos que **el equipo eléctrico** • *Nous déclarons par les présentes que le matériel électrique*

Typ • *Model* • *Modelo* • *Type*

Serien-Nummer • *Serial-Number* •
 Número de série • *N° de série*

mit allen einschlägigen Bestimmungen der EG-Richtlinien 2014/35/EU und 2014/30/EU übereinstimmt.
fulfils all relevant provisions of EC Directive 2014/35/EC and 2014/30/EC.
 con acuerdo con todas las disposiciones de la Directiva 2014/35/CE y 2014/30/CE.
satisfait à la ensemble des dispositions pertinentes de la Directive 2014/35/CE et 2014/30/CE.

Folgende harmonisierte Normen (oder Teile dieser Normen) wurden angewendet:

The following harmonised standards (or parts thereof) were applied:
 Se aplicaron las siguientes normas armonizadas (o partes de estas normas):
Les norms harmonisées suivantes (ou parties de ces normes) ont été utilisées:

**DIN EN ISO 12100, EN 60204-1, DIN EN 60335-2-87, EN 55011,
 EN 55022, EN 1672-2, EN 55081-1/-2, EN 50082-1**

Das Gerät stimmt auch mit allen einschlägigen Bestimmungen der folgenden EG Richtlinien überein:

The equipment is also in compliance with all relevant provisions of the following EC-directives:
 El equipo eléctrico también corresponde a las siguientes directivas de la CE:
Cette matériel satisfait également à toutes les dispositions pertinentes des directives CE suivantes:

Tierschutz-Schlachtverordnung (TierSchlV)
EG VO 1099/2009

Wird dieses Produkt in eine Anlage integriert oder mit anderen Komponenten (z.B. Steuerungen) ergänzt und betrieben, so ist der Hersteller oder Betreiber der Gesamtanlage für die Einhaltung der EG-Richtlinie 2014/30/EU und/oder der EG Richtlinie 2006/42/EG verantwortlich.

If the product is integrated in a system or combined with other components (e.g. controllers), the system manufacturer is responsible for compliance with EC Directive 2014/30/EC and/or 2006/42/EC for the complete system.

Si este producto se integra en otros sistemas o combinado con otros componentes (p.e. maniobras), es responsable el fabricante o usuario del conjunto de cumplir con la 2014/30/CE y/o la Normativa 2006/42/CE.

Si le produit est intégré à un système ou combiné avec d'autres composants (par exemple, les contrôleurs), le fabricant du système est responsable de la conformité, suivant la directive européenne 2014/30/CE et/ou la directive 2006/42/CE pour le système complet.

Name und Unterschrift
Name and Signature
 Nombre y firma
Nom et signature



Robert Freund

Geschäftsführer • *Managing Director* • *Director gerente* • *Directeur*

www.freund-germany.com

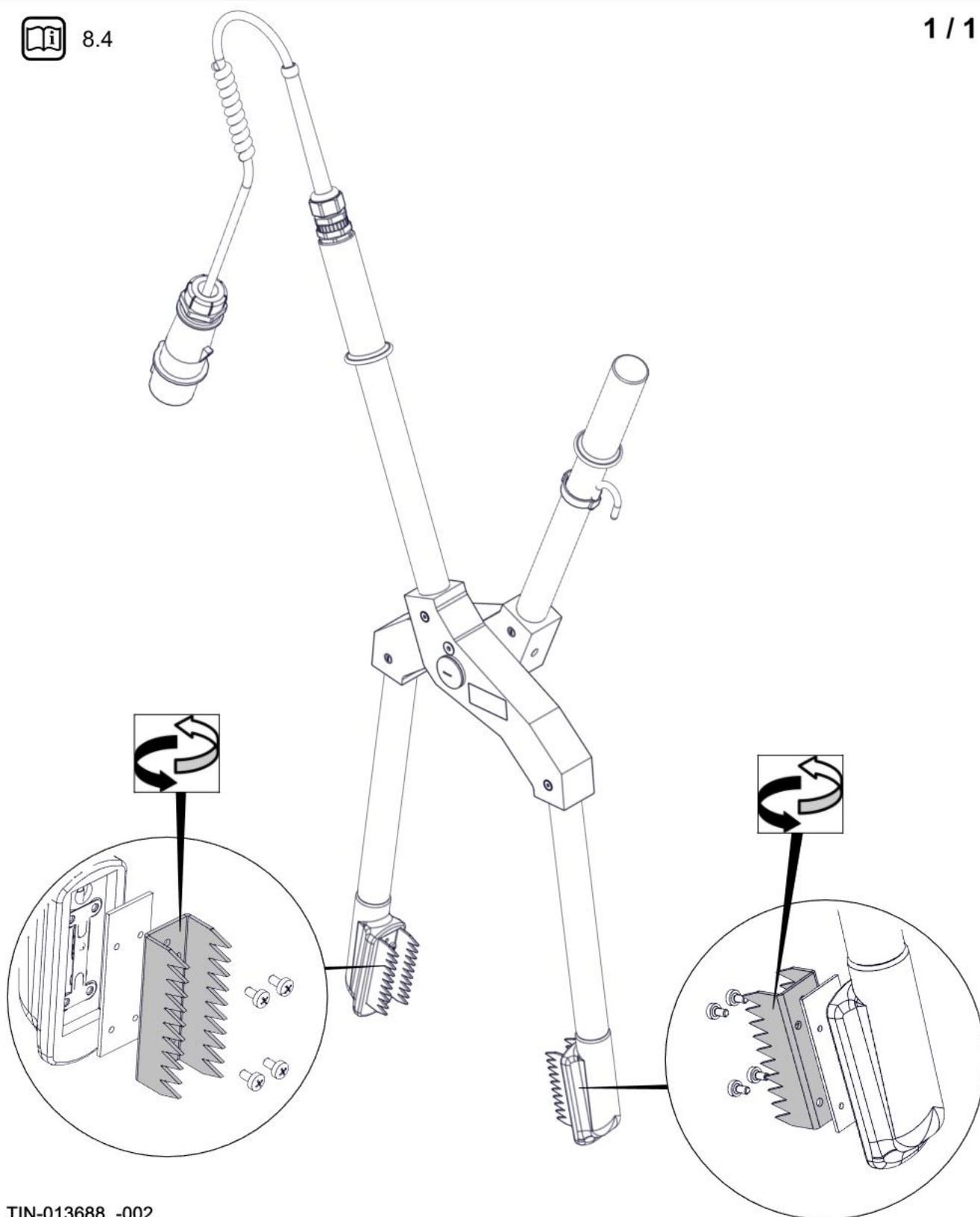


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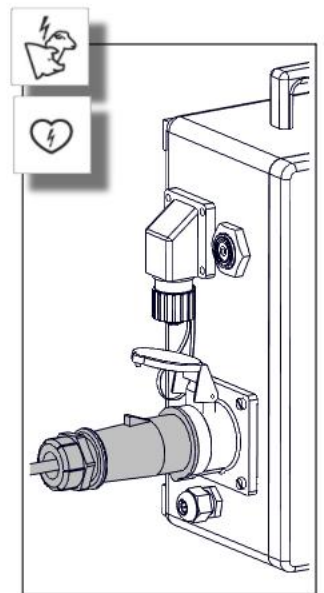
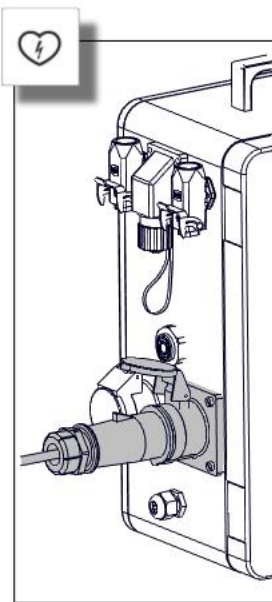
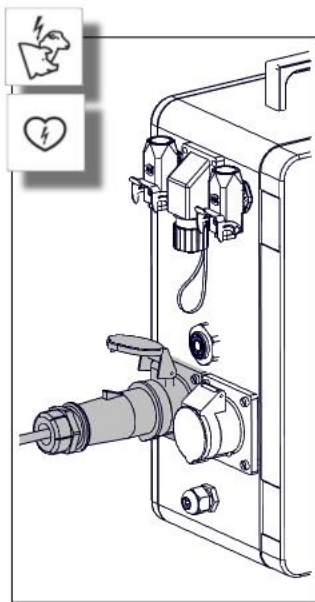
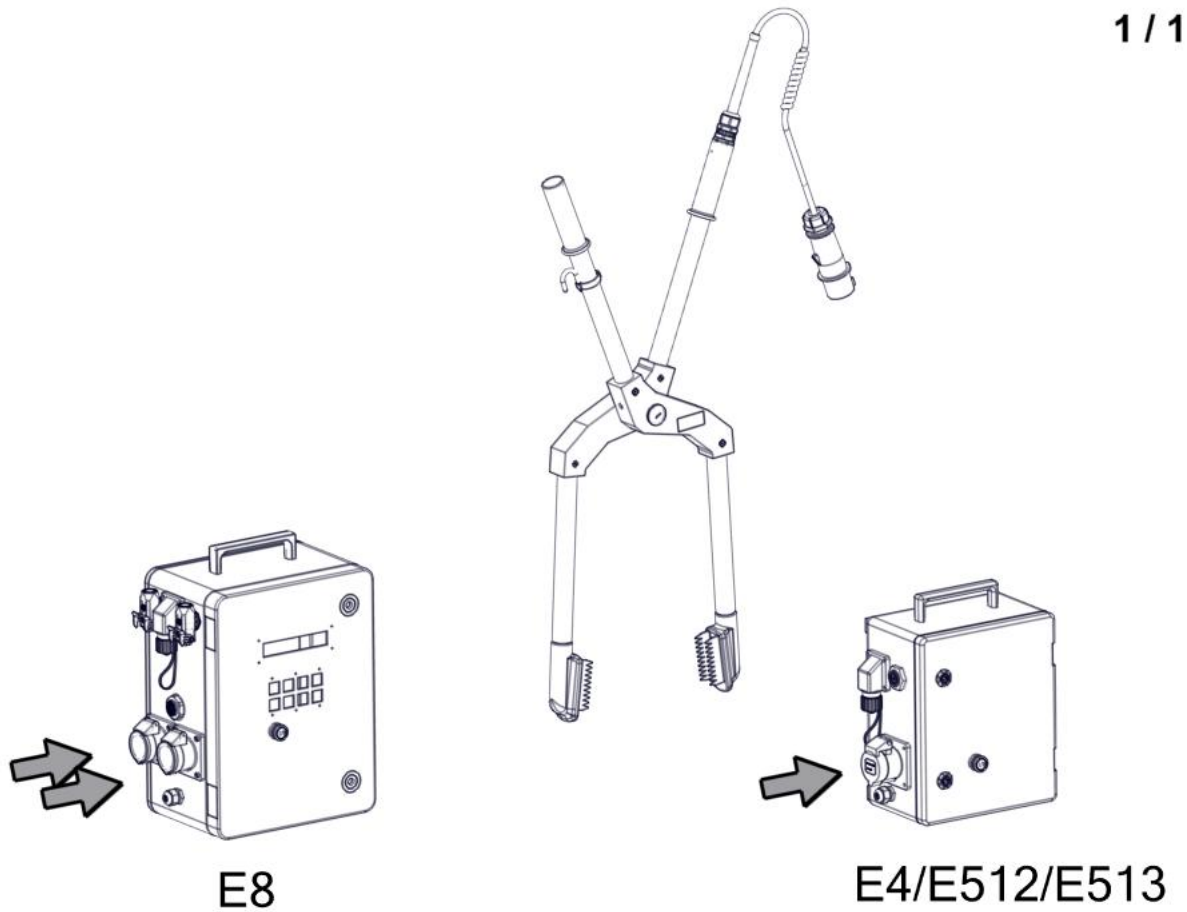


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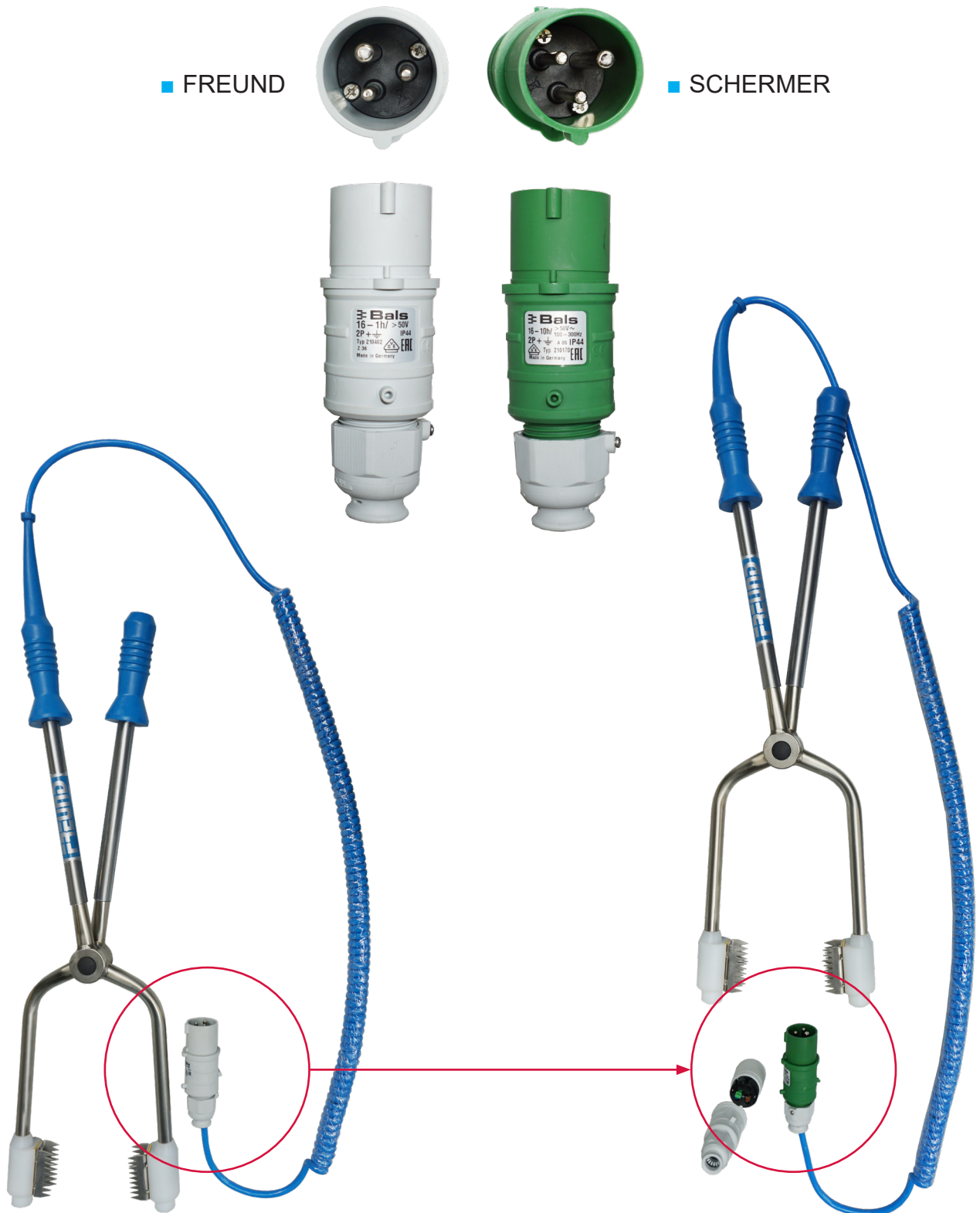


5.3

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■ FREUND

■ SCHERMER





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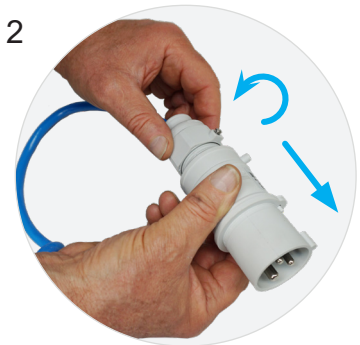
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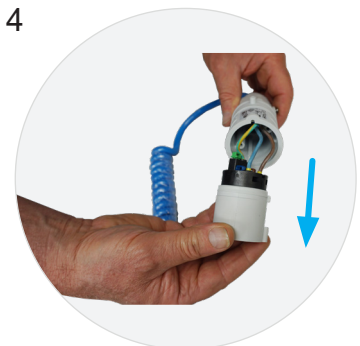
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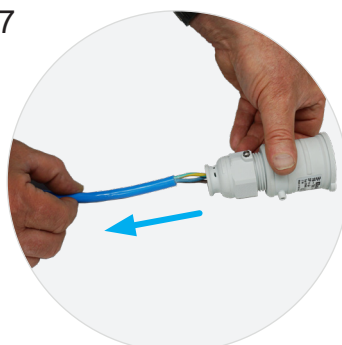
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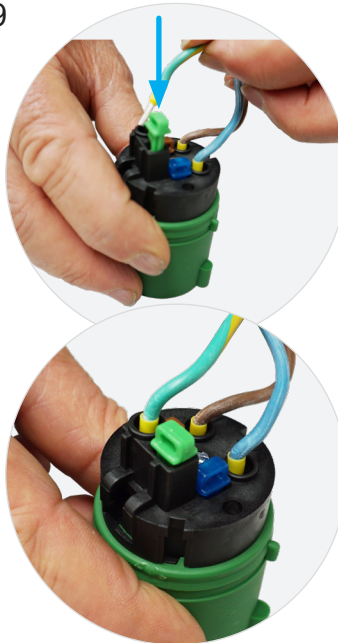
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■ 11



■ 12

