Operating Manual and List of Accessories

KÖCO Stud Welding Guns

CLASSIC

SK 14 from no. 10000

SK 14-ISO from no. 17200

SK 14 short

SK 15

K 22

K 22-D

K 24

K 26 from no. 400130

This operating manual has the part-no. 399-0350-000. It is a translation of the original document.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

UKCA-Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the

manufacturer: Köster & Co. GmbH
Spreeler Weg 32
58256 Ennepetal
Germany, North Rhine Westphalia

Product Type: **stud welding gun**
Product Model: **CLASSIC SK14 SK15 K22 K24 K26 KE22 KE24 KE26**

The object of the declaration described above is in conformity with the essential requirements and other relevant requirements of the:

Supply of Machinery (Safety) Regulations 2008 (S.I. 2008/1597)

Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091)

Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012/3032)

Standards applied:

EN 60204-1 „Safety of machinery - Electrical equipment of machines - Part 1: General requirements”
EN IEC 60974-1 „Arc welding equipment - Part 1: Welding power sources”
EN 60974-10 „Arc welding equipment - Part 10: Electromagnetic compatibility (EMC)“

This declaration of conformity loses its validity if the product is converted or modified without consent.

Authorized person for compiling the relevant technical documentation
Köster & Co. GmbH
Development, Mr. Enno Putzer
Spreeler Weg 32
58256 Ennepetal
Germany, North Rhine Westphalia

Signed for and on behalf of: Köster & Co. GmbH, 58256 Ennepetal

Ennepetal, 01.01.2023 Dr. Torben Schmitz, Managing Director

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

Original-EG-Konformitätserklärung

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der

Hersteller: Köster & Co. GmbH
Spreeler Weg 32
D-58256 Ennepetal

Bezeichnung: **Bolzenschweißpistole**
Serien- / Typenbezeichnung: **CLASSIC SK14 SK15 K22 K24 K26 KE22 KE24 KE26**

Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:

2006/42/EG	Maschinenrichtlinie
2014/30/EU	Elektromagnetische Verträglichkeit (EMV-Richtlinie)
2011/65/EU	Beschränkung der Verwendung bestimmter gefährlicher Stoffe (RoHS-Richtlinie)

Harmonisierte Normen, die zugrunde gelegt wurden:
EN 60 204-1 „Elektrische Ausrüstung von Maschinen“
EN 60 974-1 „Sicherheitsanforderungen für Einrichtungen zum Lichtbogenschweißen
EN 60 974-10 „Elektromagnetische Verträglichkeit (EMV), Produktnorm für Lichtbogenschweißeinrichtungen“

Sonstige technische Spezifikationen, die angewendet wurden:
DGUV Vorschrift 1

Diese Konformitätserklärung verliert ihre Gültigkeit, wenn das Produkt ohne Zustimmung umgebaut oder verändert wird.

Bevollmächtigter für die Zusammenstellung der relevanten technischen Unterlagen
Köster & Co. GmbH
Entwicklung, Hr. Enno Putzer
Spreeler Weg 32
D-58256 Ennepetal

Unterzeichnet für und im Namen von: Köster & Co. GmbH, 58256 Ennepetal

Ennepetal, 01.01.2023 Dr. Torben Schmitz, Geschäftsführer

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

Table of Contents

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

1 Introduction

Dear User,

With the KÖCO stud welding gun CLASSIC you have purchased an appliance of superior quality. It has been constructed according to latest technical principles and complies with all technical regulations and requirements in force at the time of delivery. To achieve trouble-free operation at all times we recommend that you observe the following instructions:

- Before starting-up carefully read through the complete manual and make sure that anyone on your staff handling or operating the welding gun has also read and understood the instructions.
- The safety instructions must be followed at all times.
- Store this manual in a safe place, with easy access for anyone operating the appliance.
- The welding gun may only be operated by sufficiently qualified personnel.
- Secure the welding gun against use by unauthorized persons.
- if any malfunctions occur which you cannot remedy yourself, call our after-sales service.
- In case of accidents call for proper medical help, and if necessary, notify accident insurers and/or local trade supervision authorities.

1.1 Information for the User

The manual for your KÖCO stud welding gun CLASSIC contains any necessary instruction to the equipment, for safe carrying-out of stud welding operations and their assessment. All information supplied is given to the best of our knowledge, but without accepting any liability on our part.

We shall be glad to assist you with any questions you may have concerning particular applications or remedies for malfunctions. Any suggestions on your part towards improving this operating manual will also be welcome.

1.2 Safety Instructions

The stud welding gun CLASSIC is designed for use in drawn-arc stud welding only. It must not be used for any other purpose. In particular, welding under water is strictly prohibited.

1.2.1 Personal Safety

Stud welding guns CLASSIC are approved for welding under increased electrically hazardous conditions, according to EN 60974-1. For his own safety, the operator must wear protective clothing during welding, which includes the following:

- Dry, insulating shoes
- Non-flammable, dry, close-fitting working clothes (leather apron)
- Leather gloves
- Safety goggles with an adequate degree of protection
- A special helmet with neck protection while engaged in overhead welding
- No metallic jewellery (rings, chains, etc.) nor watches may be worn during welding.
- During the welding process, persons wearing heart pace-makers must be kept at a safe distance from the appliance and the welding cables, because the strong magnetic fields could endanger their lives.
- In addition to the above, all normal accident prevention regulations must be observed.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

2 Drawn Arc Stud Welding

2.1 The Welding Gun

In drawn-arc stud welding the welding gun is used to generate the arc between stud and workpiece, and to unite the two welding pools at the end of welding time.

There is a choice of two different concepts. The guns **K 22 to K 26** have an automatic length adjustment facility, i.e. maintenance of the pre-selected lift is guaranteed independent of protrusion, variation of stud lengths within normal tolerance and minor deviations from the vertical position of studs in relation to the workpiece. However in case of very short welding cycles (below 100 ms) the necessary coupling does not react fast enough. Therefore we recommend the **SK 14** gun without length adjustment especially for short-cycle stud welding. It should be used for studs with only very minor variations in length and when constant conditions for the positioning of the welding gun apply.

The gun SK 14-ISO is different from the gun SK 14 as there is no adjustable lift stop. That is why the total piston stroke of app. 4 mm is permanently available. The gun SK 14-ISO is recommended for welding insulation pins (see figure 29). The gun SK 14 short features short length for use under cramped working conditions.

In stud welding, lift (arc length) and protrusion are important parameters. In most cases they can be selected to fit stud diameters, according to figure 1. The position of the weld or the kind of surface on the workpiece may necessitate some adjustments. In such cases, optimal settings should be obtained through test welds.

The length of lift is the vital factor in determining the form of metal melting at the tip of the stud. In case of major deviation from optimal values, cavities may form in the welding pool. Moreover, if the lift is too small, an increase in the number of droplet short circuits will destabilize the welding process. The protrusion (see figure 3) will determine the form of the welding collar around the welded stud. In some cases, especially when welding onto a vertical wall, settings other than those listed may be selected. If the protrusion is too shallow, this will lead to pores and undercuts in the weld zone. If it is too deep, the welding pool will splash out to the side or upwards with the risk of blockage to the downward movement of the stud. The setting of protrusion is described in section 2.4.9.

For studs above 14 mm diameter the plunging movement should be damped. This is achieved through adjustable plunge damping. (For settings refer to section 2.4.12).

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

2.2 Technical Data on KÖCO Stud Welding Guns

Technical Data	SK 14 (short)	SK 14-ISO	SK 15	K 22	K 22-D	K 24	K 26
Stud welding with ceramic ferrule Weldable stud range Ø (mm) [1)]	4 - 12	4 - 12	4 - 12	4 - 14	4 – 19	13 - 22	13 - 25
Short cycle stud welding Weldable stud range Ø (mm)	3 - 12	3 - 12	3 - 12	6 - 12	○	–	–
Stud welding with shielding gas Weldable stud range Ø (mm)	3 - 12	3 - 12	3 - 12	3 - 16	○	–	–
Adjustable hydraulic damping of piston, for studs from abt. 14 mm Ø	-	–	–	○	●	●	●
Lifting ring system with length adjustment	-	–	–	●	●	●	●
Adjustment of stud length variations up to ... (mm)	-	–	–	8	8	8	8
Standard support by ... legs	2	2	2	2	2	2	3
Lifting range from...to (mm)	0 - 4	-	-	1 – 4.5	1 – 4.5	2.5 - 6	2.5 - 6
Input voltage of lifting coil (V=)	60 - 90	60 - 90	60 - 90	60 - 90	75 - 90	75 -90	75 - 90
Duty cycle lifting coil (%)	3	3	5	5	5	5	8
Welding cable (m/mm²)	5/35	5/35	5/35	2/50	2/50	2/95	2/120
Welding cable plug (mm²)	35	35	35	50/70	50/70	95	120
Control cable plug 4-pole	●	●	●	●	●	●	●
Control cable (m/mm²)	5/4x1.0	5/4x1.0	5/4x1.0	2/4x1.0	2/4x1.0	2/4x1.0	2/4x1.0
Length (excluding chuck) (mm)	190 (165)	190	205	175	175	250	300
Body diam. app. (mm)	50	50	50	60	60	60	63
Height (including handle) (mm)	150	150	150	165	165	220	240
Weight (excluding connection cables) app. (kg)	0.9	0.9	1.0	1.3	1.3	1.4	2.6

● = Standard ○ = optional – = not available

1) For very high performance welding and large stud diameters we recommend a larger type of gun. In case of doubt please consult the maker or a sales representative for details.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

2.3 Setting Guidelines for welding with ceramic ferrule or shielding gas

The settings given in figure 1 have been tested for welds on **clean metallic surfaces** and standard type studs **in downhand position.** The decisive parameter is the actual diameter at the welding end of the stud, not the nominal diameter. Under different conditions (other welding position, or oily, scaly or primer-coated surfaces) the optimal settings must be determined by test welds. With difficult surfaces, it may be necessary to considerably increase lift and welding time, and to reduce the welding current. When welding in a horizontal position, it is recommended to select higher current and protrusion than the given settings, and at the same time reduce welding time and lift. Please note that at the lower end of the welding range of large appliances it may be necessary to select values higher than those listed in the chart. This is caused by the relatively long phase for building up the current, which means that for a considerable part of the welding cycle the peak current is not yet reached. This must be compensated by lengthening the welding cycle or selecting a higher current.

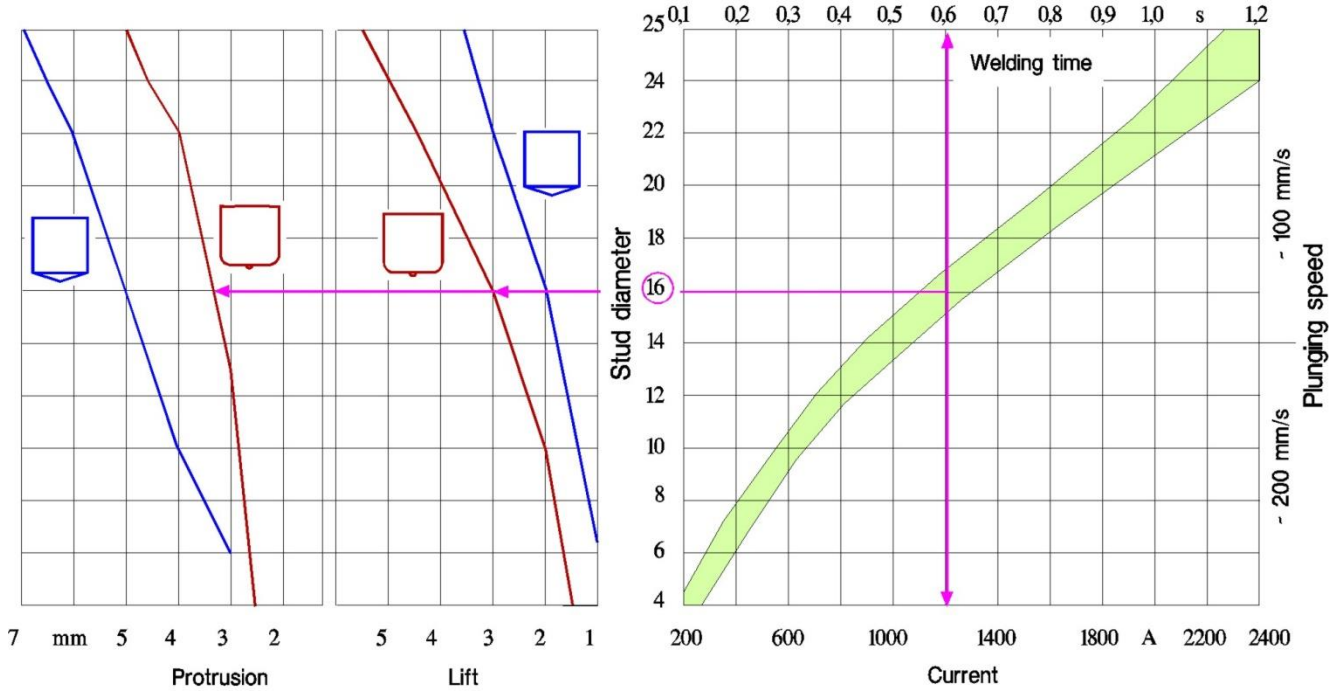


Figure 1: Parameters for current, time, lift, protrusion and damping (example stud 16 mm diameter with flat tip)

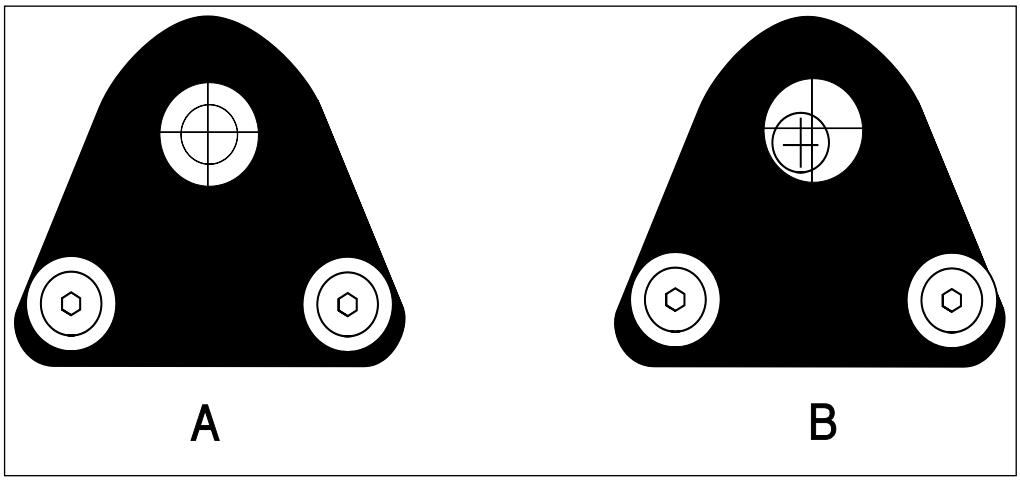
The plunge speed is adjusted by setting the damping of the piston. In case of studs with less than app. 10 mm diameter guns without damper (SK 14 or K 22) should be used, or the damper should be removed (refer to 2.4.13). If the correct damper setting is selected, only very few splashes will occur during plunge, and an even welding collar without undercuts will be formed.

Before starting a series of welds, test welds according to EN ISO 14555 should be carried out. For details refer to DVS-Technical bulletins 0902 and 0904.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

2.4 Starting-up of the welding gun

1. While setting up or adjusting the welding gun, unintentional triggering of the gun pushbutton must be avoided, either by turning off the power switch or by disconnecting the control cable plug from the flange socket on the power source.
2. Screw the desired chuck on to the adapter screw of the gun, slightly tightening it with an allan key
3. Using the counter-sink screws and washers supplied, attach the two legs to the desired footplate. Initially, do not tighten the screws.
4. Insert the desired ceramic ferrule grip (when welding with a ceramic ferrule) or the supporting tube (in case of short cycle welding or welding with shielding gas) into the footpiece, pushing it to the stop. Secure the ceramic ferrule grip or the supporting tube with the screws at the sides of the footplate.
5. Insert a suitable stud into the chuck, pushing it up to the stop.
6. Slide the footplate with the legs in the damping guides of the gun, so that the tip of the stud reaches approximately the same height as the ceramic ferrule grip or the supporting tube.
7. Move the footpiece until the stud is centrally seated in the bore of the ceramic ferrule grip or the supporting tube (see figure 2).Then tighten the counter-sink screws of the footplate.



Explanation:

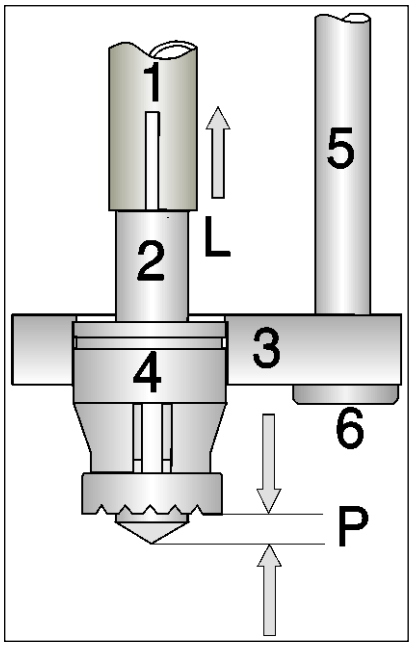
A: Correct centering of the footplate

B: Inaccurate centering of the footplate will cause blockage of the plunging movement of the stud.

Figure 2: Centering of the footplate

8. **Only when welding with a ceramic ferrule:** Place a suitable ceramic ferrule into its grip. Check the centering of the footpiece by manually pulling back the piston of the gun and then slowly releasing it again. The stud should then move forward without pushing the ceramic ferrule out of its guide. If the ceramic ferrule is pushed out, loosen the footpiece and improve its centering.
9. Slide the footpiece with the legs in the damping guides until the correct protrusion is reached, see figure 1. Figure 3 shows a diagram of the supporting device.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net



Explanation:

1: Chuck
2: Stud
3: Footplate
4: Ferrule grip
5: Leg
6: Screw
L: Lift
P: Protrusion

Figure 3: Diagram of the gun setup

10. **Setting of the lift (except SK 14, SK 14 short und SK 15):** Open the rear cap of the gun. Behind it there is an adapter screw for adjusting the lift in steps of 0.5 mm (figure 4). **Do not set any in-between values**! Select lift settings according to figure 1.

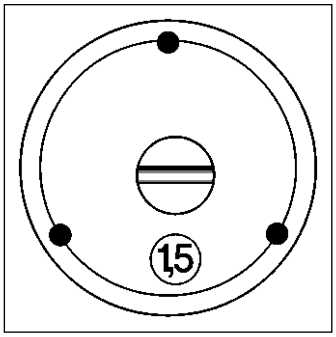


Figure 4: Selecting the lift (except series SK 14 and SK 15)

11. **Setting of the lift (only SK 14, SK 14 short and SK 15):** A set screw with a view box is mounted on the rear of the gun (fig. 5). The figure displayed in the view box is a measuring quantity for calculating the piston stroke. The piston stroke is always 1 mm more than the figure displayed. This ensures that even if the minimum of 1 mm is set, a lift can still be carried out as long as the protrusion is not set too high. The SK 14 gun has a rigid piston; therefore the figure shown in the view box is equal to the lift only if the protrusion is set at exactly 1 mm. The actual lift (length of the drawn arc) must therefore be calculated as follows:

Lift = value displayed + 1 mm – protrusion

Figure 5: Setting of the lift (series SK 14 and SK 15)

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

The lift can only be adjusted in 0.5 mm steps. **Do not try to set any intermediate values**! Follow the instructions according to figure 1 when setting the lift.

12. **Selection of damping (K 22-D, K 24 and K 26 guns only):** The damping adjustment screw is situated between the two legs at the front of the gun. In general, damping is only used with studs from 14 mm in diameter, to prevent splashing of the welding pool while the stud plunges. The required plunging speed is about 120 mm/s. If the plunging speed is set too low (damping force too high), this can lead to a "cold plunge" of the stud and consequently cause lack of fusion. The values given in table 2 apply to medium-weight studs and welding in a downhand position (PA position).Preferably set damping too low rather than too high! Carry out test welds prior to starting series production!

    In the **Version A** damper, adjust the setting disc with a screwdriver until the notch is placed approximately midway between the numbers 1 and 2 on the circumference of the case of the damper (Fig 7 A).

    Version B dampers are delivered preset by the manufacturer to fit each gun under normal working conditions. Adjustment of the setting is generally not necessary. If the setting is adjusted, the cable arch of the welding cable must be removed from the adapter screw of K 24 and K 26 guns. Then use the Allen key included in the delivery to loosen the set screw so that the setting disc can be moved. To adjust the setting, turn the setting disc until the screw is positioned opposite the desired figure (Fig. 7 B). Make sure that the screw is fastened again afterwards!
13. The damper can be completely removed, if necessary, and the drill hole where it is inserted closed with a locking screw (see Fig. 12). When the damper is screwed back in, it is important to set the distance L between the installation plate and the upper edge of the damper according to table 2 (Fig.7). The damper must be fastened in this position using the counter nut included in the delivery.

Fig. 7 A: version A

Fig. 7 B: version B

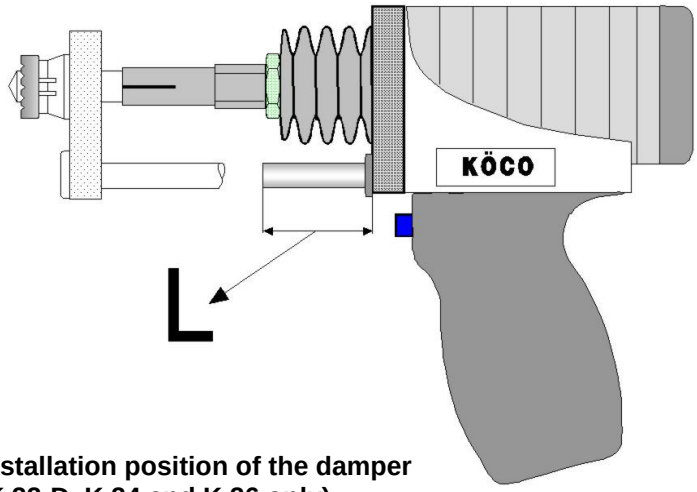


Fig. 7: Installation position of the damper (K 22-D, K 24 and K 26 only)

Gun	K 22-D	K 24	K 26
Installation length L (mm) for version A dampers	55		40
Recommended damper setting	1.5		
Installation length L (mm) for version B dampers	64		51
Damper pre-setting ex works by manufacturer	0.5	3	3.4

Table 2: damper installation length and settings

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

2.5 Welding

Place the prepared gun on the workpiece so that the whole basis of the ceramic ferrule or supporting tube touches the surface of the workpiece. In so doing, the piston is pushed back by the length of the protrusion, and the tension spring is tightened.

Now press the trigger, holding the gun completely still during welding until the welding pool has cooled down.

Then lift off the gun from the welded stud, keeping it straight (i.e. in the axial direction of the stud) and by turning it clockwise. If it is not lifted off straight, this may open out the gripping jaws of the chuck and prevent a sufficiently tight grip on the next stud to be welded or the chuck can get loose from the adaptor screw.

Next, check the weld (by visual test and possibly other tests according to EN ISO 14555) and adjust the settings if necessary.

Test welds should always be carried out prior to starting a series of welds.

2.6 Weld Testing

For testing a stud weld, there are several different methods available:

1. Visual test: A good weld will have an closed even weld collar with a shiny blue-gray surface, not dull or porous. The welded stud will have its nominal length ± 1 mm.

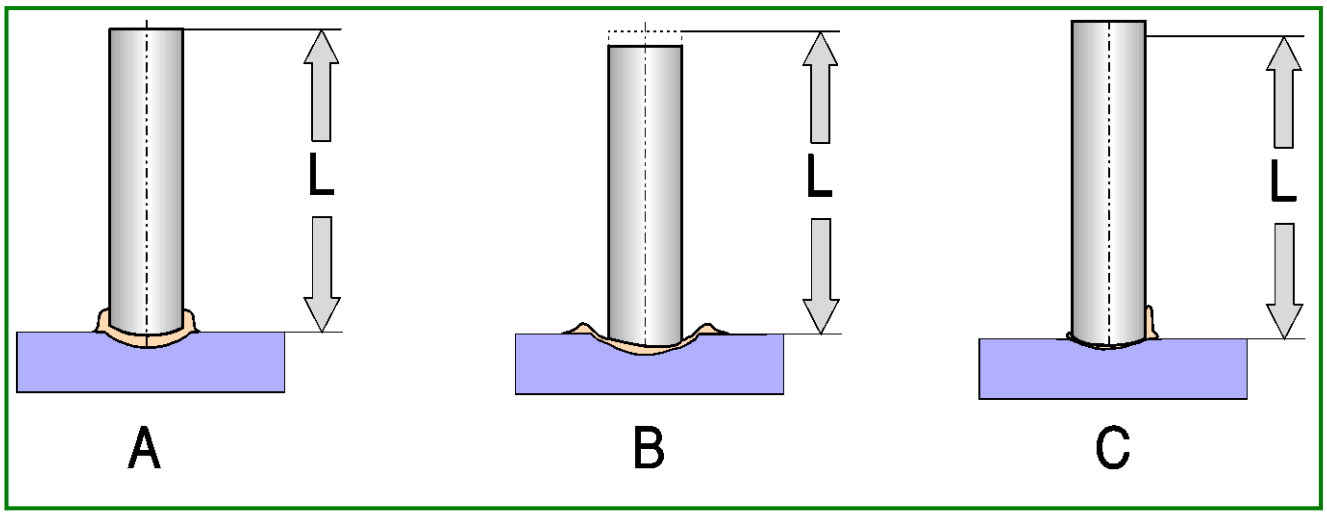


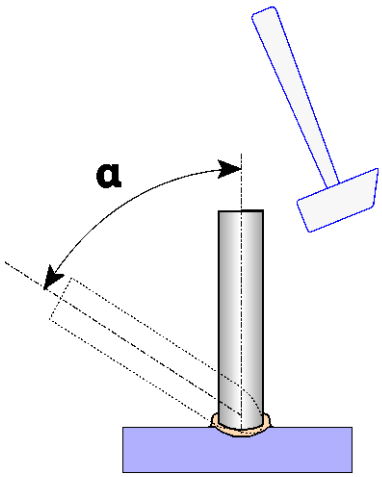
Figure 7: Assessment of visual examination

Explanantion: Nominal length of stud
A: Good weld
B: Energy too high
C: Energy too low

A frequent fault is a so-called plunging impediment. It occurs whenever the plunging movement of the stud is cut short and the stud comes to a halt above the welding pool (see chart 2, figure 4). In case of only a minor impediment the plunging of the stud may not be stopped, but delayed. In this case a “cold weld“ with an incomplete connection may result, without any faults showing on the outside (see chart 2, figure 5). Therefore the final assessment of a weld should never be made on the basis of visual tests alone, without mechanical tests being carried out as well.

2. Bend test: A flawless weld will withstand bending by an angle of up to 60° without any cracks in the welding zone. This does not apply for studs designed for heat transfer (made from heat-resistant steel) and for studs with non-uniform cross section. The bend test is carried out to check the suitability of both the selected settings and the combination of materials welded together.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

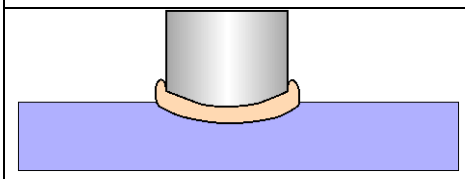
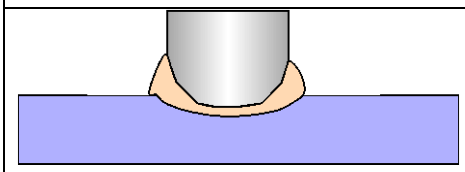
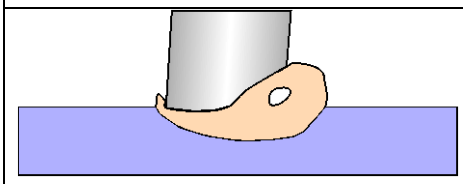
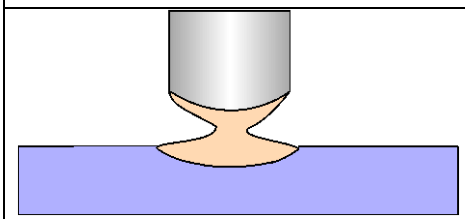
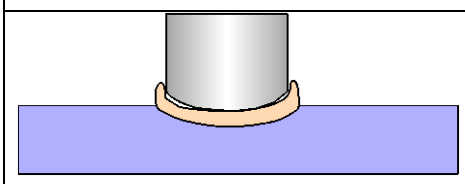


Bending by α = 60° with a hammer or an affixed pipe (for leverage). Result satisfactory, if the welding zone or the heat affected zone shows no cracks or breakages.

Figure 8: Carrying out a bend test

Chart 2 illustrates the assessment of welding results.

Chart 2: Assessment of stud welds

Appearance	Remarks
	Good weld with ceramic ferrule
	Good weld with shielding gas
	Lopsided melting because of arc-blow effect. This can be remedied by adjusting the earth clamps, by providing compensating masses at the rim, or by turning the gun (if the welding cable is on the outside). A large lift and welding without ceramic ferrule will increase the blowing effect.
	Impediment to the plunging of the stud. Possible causes: 1. Friction between stud and ceramic ferrule due to inaccurate centering of the footplate or welding splashes (energy too high) 2. Droplet short-circuits between the stud and the workpiece due to too low lift setting 3. Defective gun or damping set too high.
	Impediment to the plunging of the stud (cold plunging). The fault can only be recognized by mechanical testing; if bent only by a small angle, the stud will break off at the welding zone. At the edge of the stud and the welding zone blank spots are visible (lack of fusion). Possible causes: As given above
Further details about testing and assessment of stud welds are available from Literature (chapter 6).	

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

2.7 Maintenance of the Welding Gun

The welding gun is an electrical tool which must be kept perfectly insulated. In case of any damage to its body or cables, welding must be discontinued at once. Do not use water jets or solvents for cleaning. Protect the gun against moisture. Should it ever become wet, it must be well dried before being used again.

Chucks, ceramic ferrule grips, footpieces, etc. are subject to wearing out and must be replaced after high melting loss (scorching). For optimal current transmission the chuck must have sufficient gripping strength. If, in spite of being tightened, the jaws no longer have sufficient grip, the chuck must be replaced. Scorching marks on the thread tips in threaded studs are a sign of insufficient gripping strength.

The rear cap of the gun may only be removed for setting the lift. Especially welding must never take place without the rear cap.

Keep in mind that the stud, chuck and adapter screw are all subject to high voltage in relation to the workpiece. Therefore, during the entire welding process, keep a safe distance from parts of the workpiece where no welding is intended, and from studs already welded.

2.8 Waste Disposal

Your KÖCO stud welding equipment contains valuable materials and must therefore not be disposed of together with household waste or by any other uncontrolled method.

We are registered with the “Stiftung Elektro-Altgeräte Register ® (EAR)” (Registry of Disused Electrical Appliances Foundation) under the registration number

WEEE-Reg.-Nr. DE 70903619

and will take back any appliance delivered by us from 2005 onwards free of charge for correct disposal in compliance with the relevant legislation, if such appliances are delivered to us carriage free.

2.9 Malfunctions

In the following chart, some malfunctions are described which can be recognized and remedied by qualified personnel with relative ease. In case you cannot solve these problems yourself, please contact our agent in your neighbourhood or our customer service department. It is important that you give us details of type and series number of your appliance, as well as an exact description of the malfunction.

Malfunction	Cause	Remedy
Piston of the gun does not react to triggering.	Disconnection in the control cable to the gun	First connect the gun directly to the power source and trigger it once more. If the malfunction does not occur again, the fault is in the control cable extension. If the malfunction occurs again: Check the gun with an Ohm-Meter. Normal resistance of the coil is app. 20 Ω (SK 14 app. 38 Ω). The magnet is connected to points 1 and 2, the trigger to 3 and 4 (standard) or to 2 and 3 (special model). If the fault is still not remedied, the plug and socket connections should be checked next..
	The piston of the gun has got stuck.	Try to move the piston by hand. There must not be any unusual friction. In the K 22 to K 26 guns the total range of piston movement is app. 15 mm, in the SK 14 app. 5 mm

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

Malfunction	Cause	Remedy
	Magnetic coil under continuous current	Turn off the power source, then switch it back on, watching the piston of the gun (Do not trigger it). The piston must remain unmoved. If the magnet attracts it immediately, there is a defect in the control. Note: the magnetic coil will burn out if kept continuously under current even for a short time!
Faulty welding result in spite of correctly set welding parameters	Surface of the workpiece oily, greasy, rusty, zinc-coated or painted, etc.	Clean the surface of the workpiece in the welding area and at the ground connection points. The best results are obtained on bright metal surfaces. On zinc-coated parts, only welding without ceramic ferrule (short cycle stud welding) will produce satisfactory results.
	Mains or welding circuit voltage too low.	Make sure that permissible cable length and correct diameter are chosen.
Welding results unreliable (sometimes good, sometimes bad)	Function of gun irregular	After operating the gun for a longer period, deviations in the lift will increase. Generally, it will be below the selected setting. This means an increase in the number of droplet short-circuits and splashes. Because of the lower voltage in the arc, the energy remains below the desired level. Have the gun repaired by our customer service.
	Blowing effect through difficult shape of the workpiece	For details about measures to reduce the blowing effect refer to section 6 (Literature).
	Lift (arc length) too small	Increase lift (arc length) to obtain less droplet short circuits and smoother welding process.
Welding time is cut short when the trigger button is released during welding.	When connecting the control cable, the positions of two lines (No. 2 and No. 3) were reversed.	Connect cables correctly. Please note: When the trigger button is held down throughout welding time, this malfunction will not occur, however the trigger will be subjected to considerable electrical strain. If the trigger button is released during welding, this will immediately interrupt the welding process. When cables are correctly connected, the welding process will not be influenced by how long the trigger is held (provided it is held for at least app. 0.5 sec.)
Ignition failure during piston lift-off	Interruption of the pilot arc through inadequate contact with the tip of the stud	Make sure that the tip of the stud is in direct contact with the workpiece. This kind of malfunction frequently occurs during welding of headed studs to prick punch marks, whenever there is insufficient contact between the aluminium tip and the workpiece.
Unusually strong heating up at some points of the welding circuit	Reduction of cross-section through partial wire breakage, scorching at loose connections	Stop welding immediately! Replace cables! Tighten all connections within the welding circuit!

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

3 Pictures of Stud Welding Guns CLASSIC

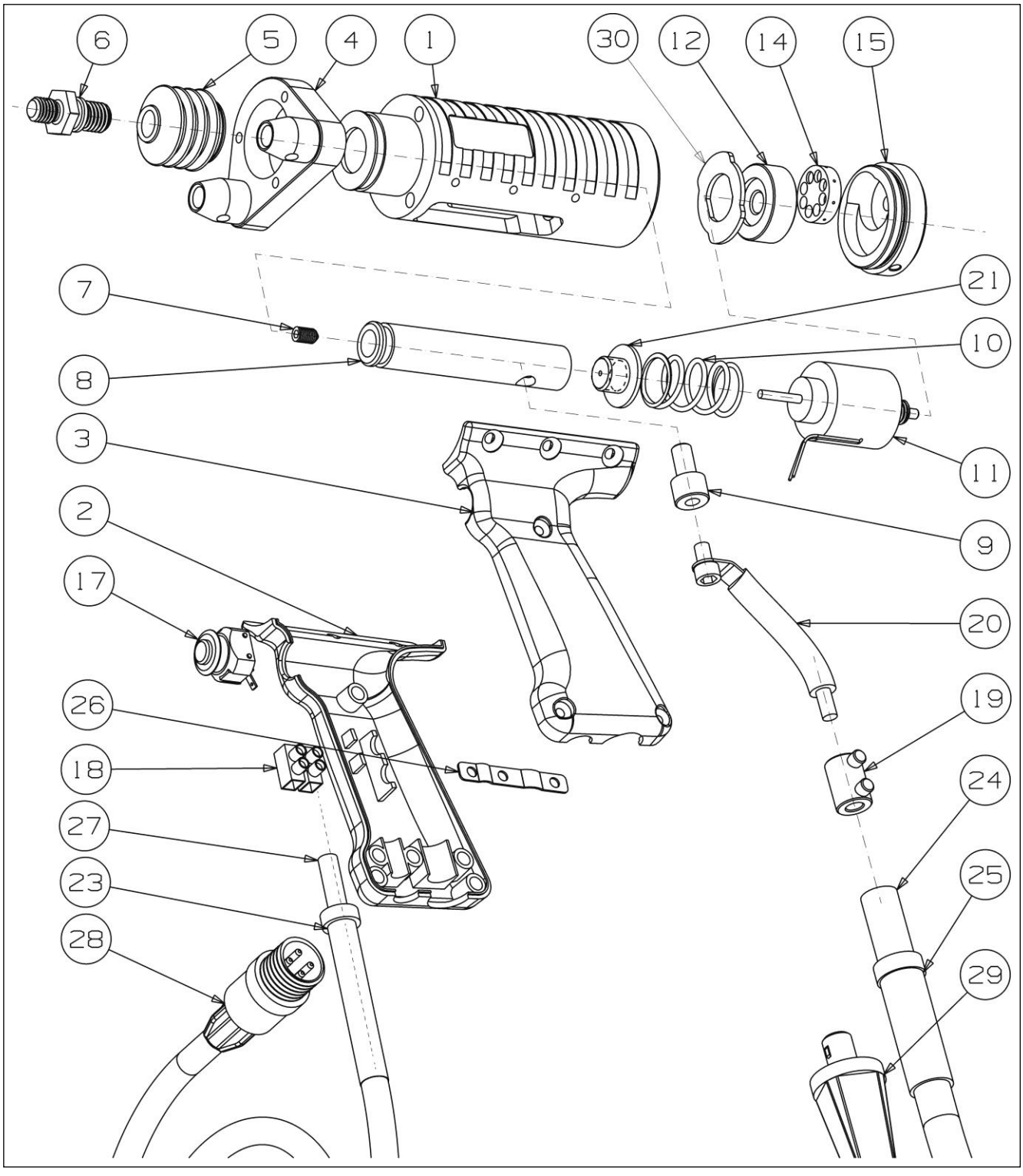


Figure 9: Exploded view of gun SK 14

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

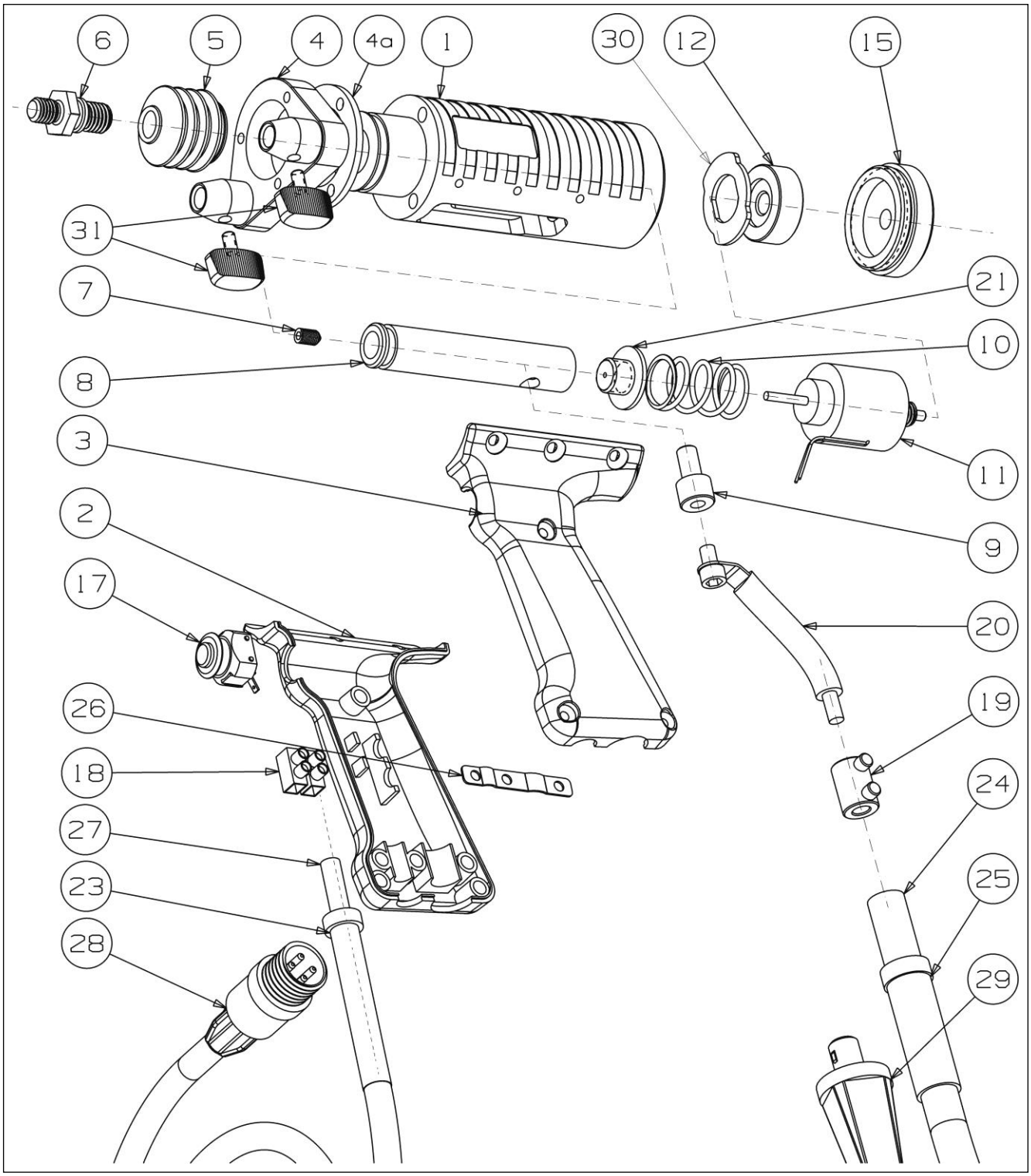


Figure 10: Exploded view of gun SK 14 ISO

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

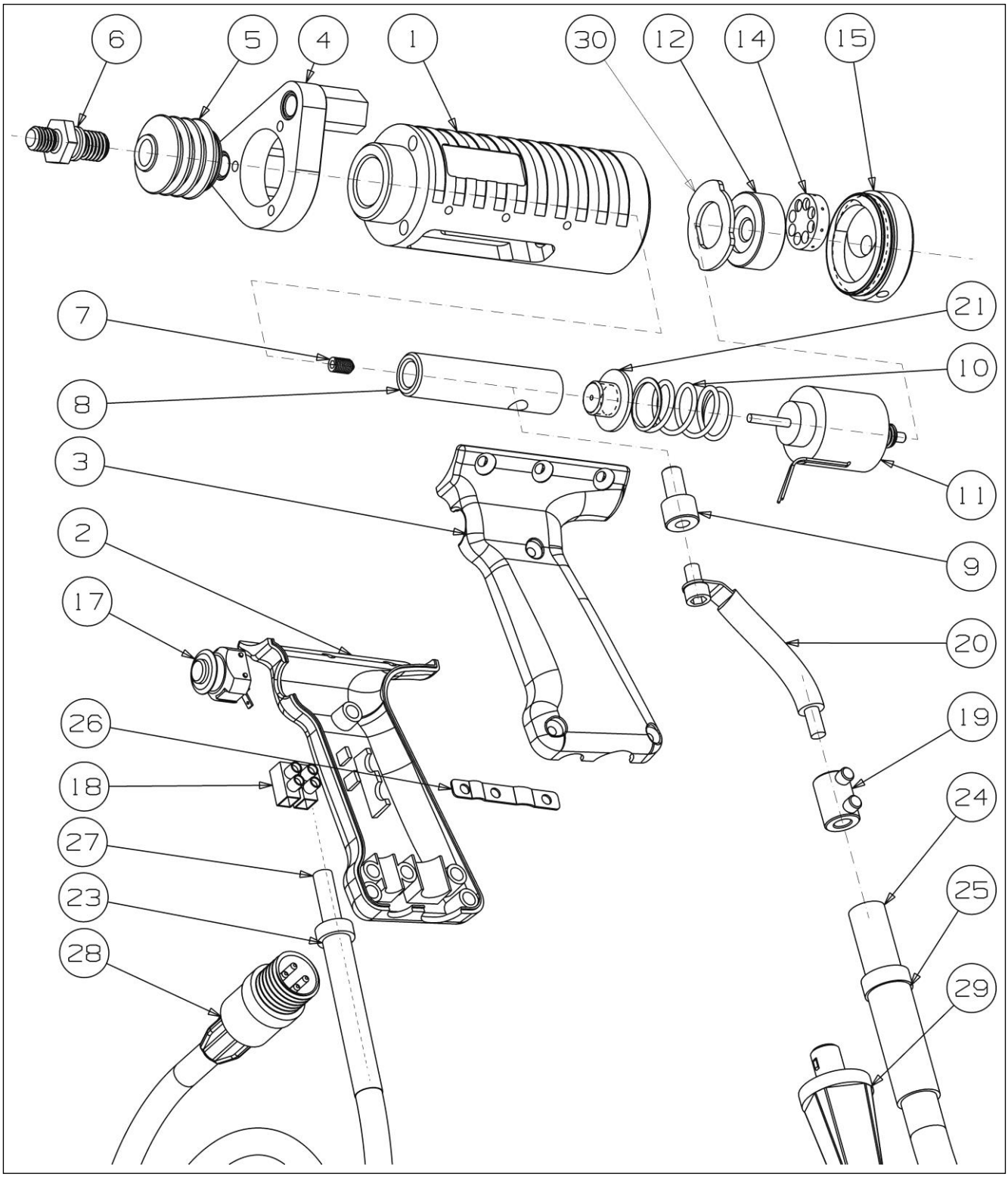


Figure 11: Exploded view of gun SK 14 short

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

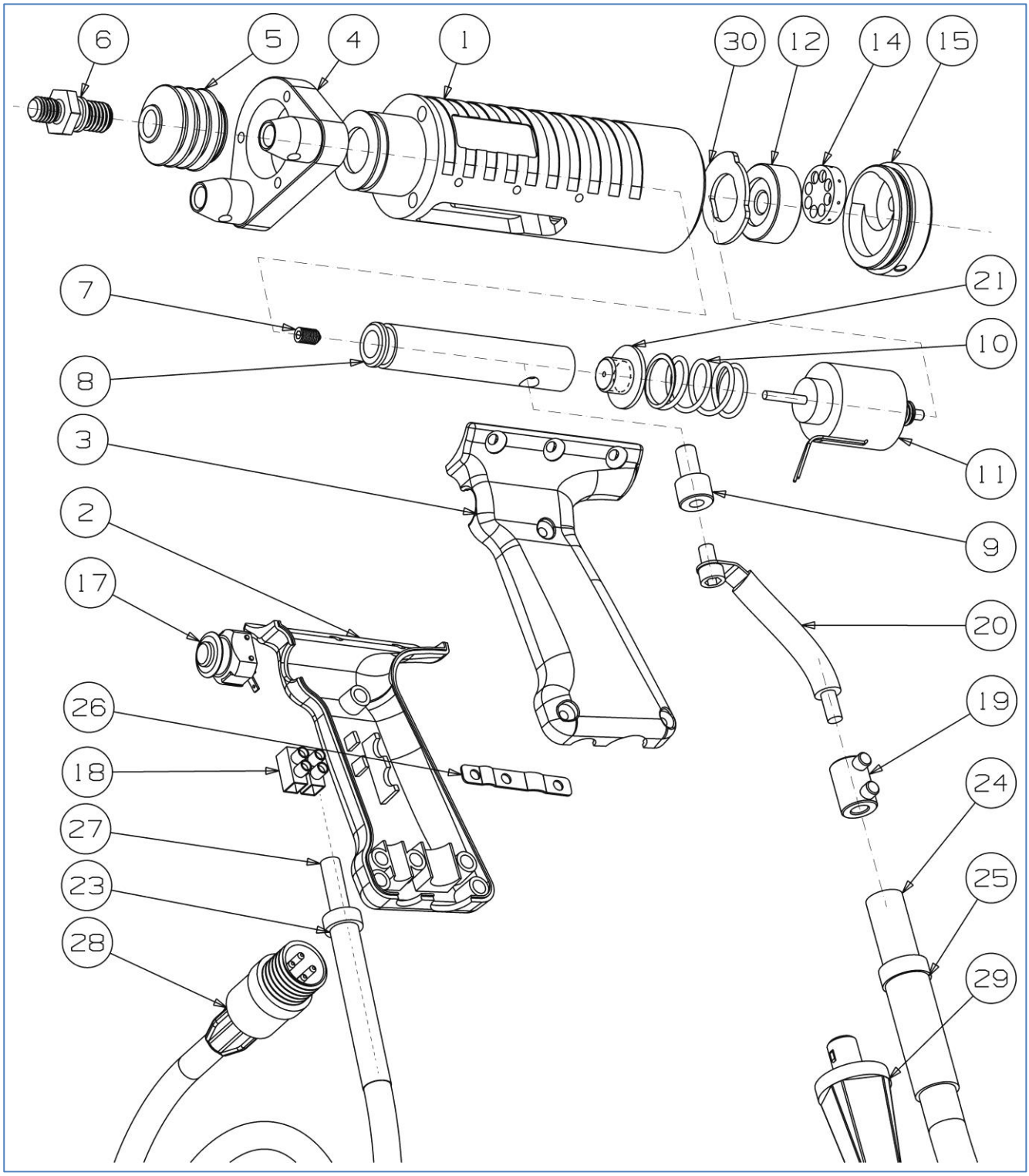


Figure 12: Exploded view of gun SK 15

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

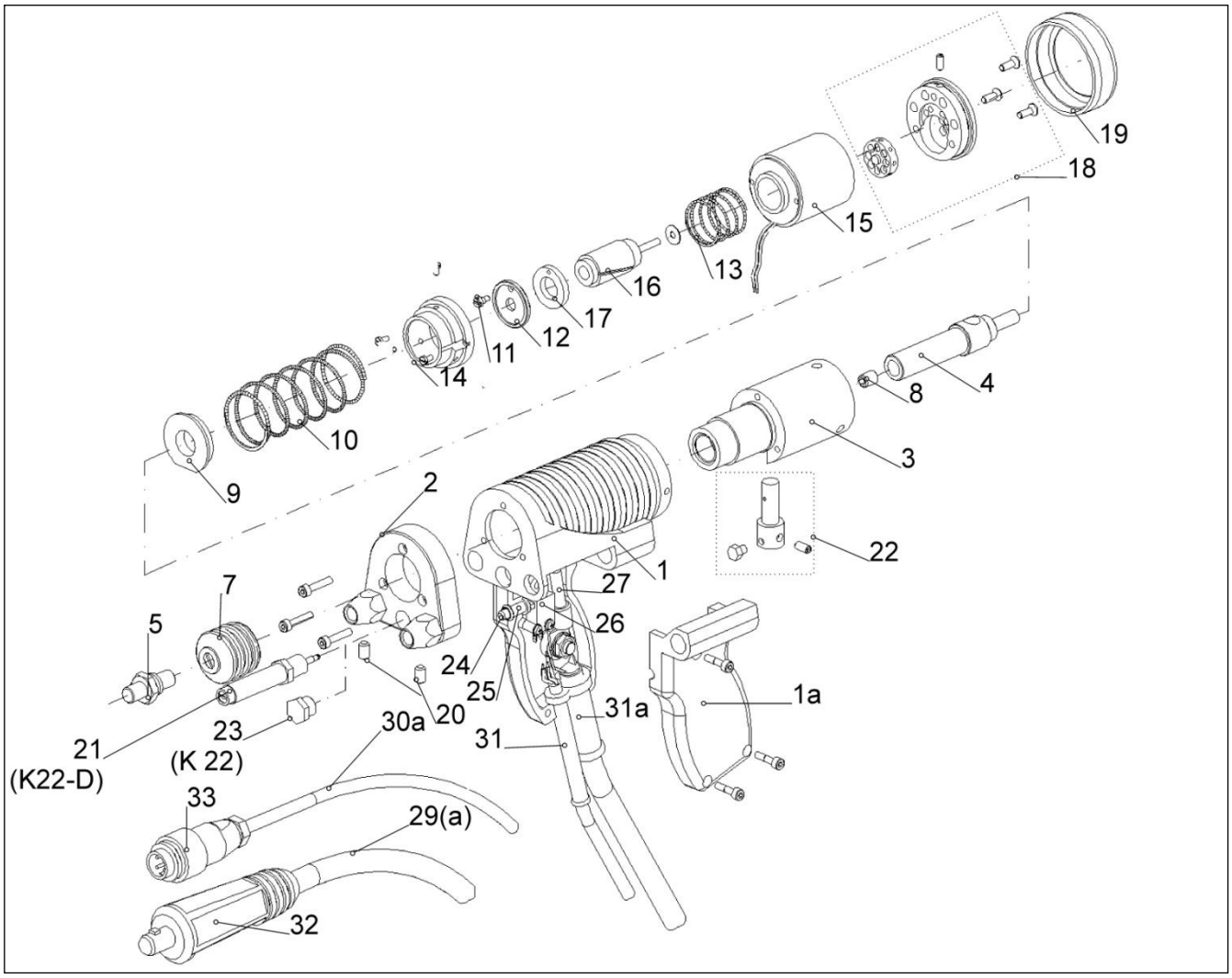


Figure 13: Exploded view of gun K 22 with option K 22-D

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

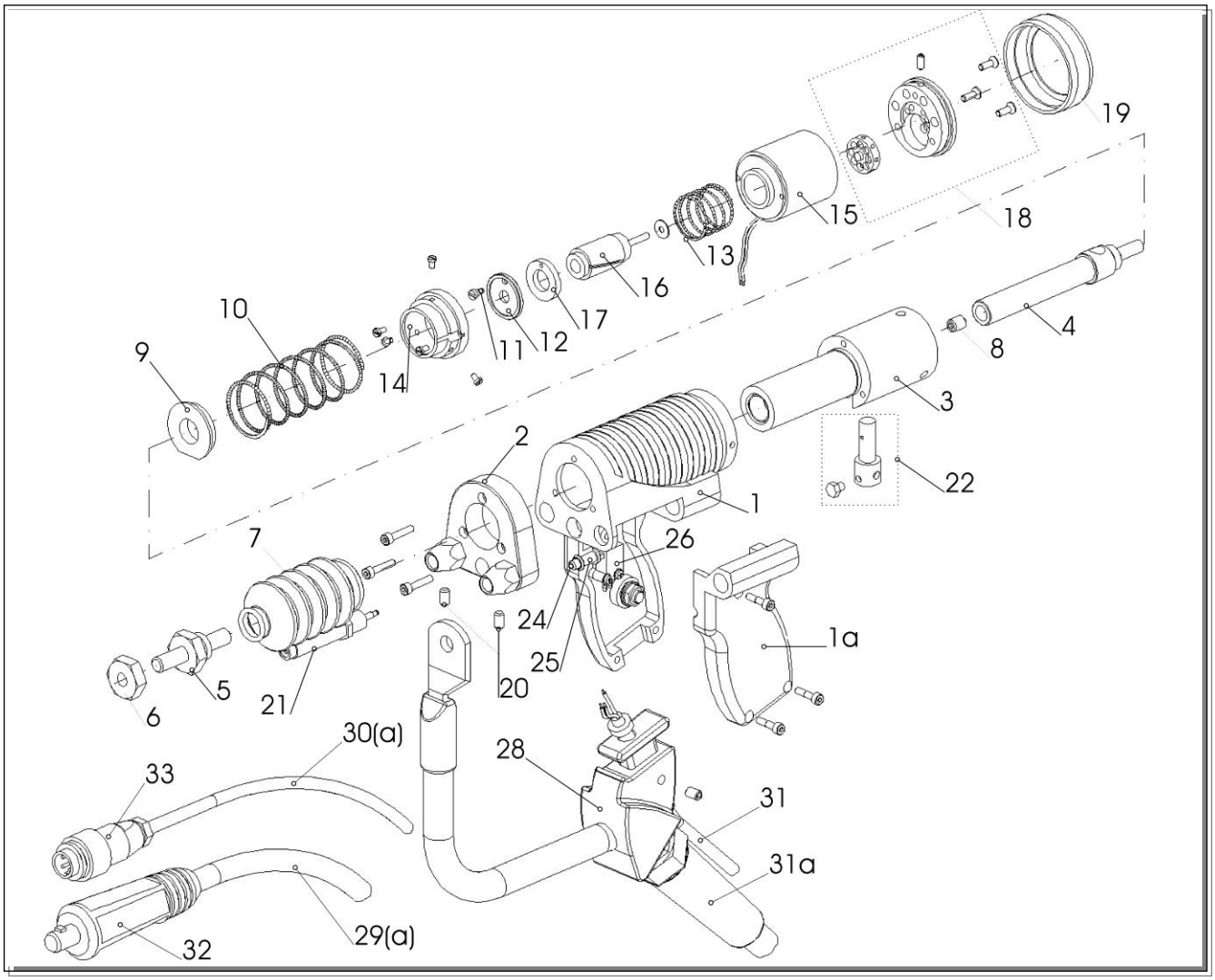


Figure 14: Exploded view of gun K 24

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

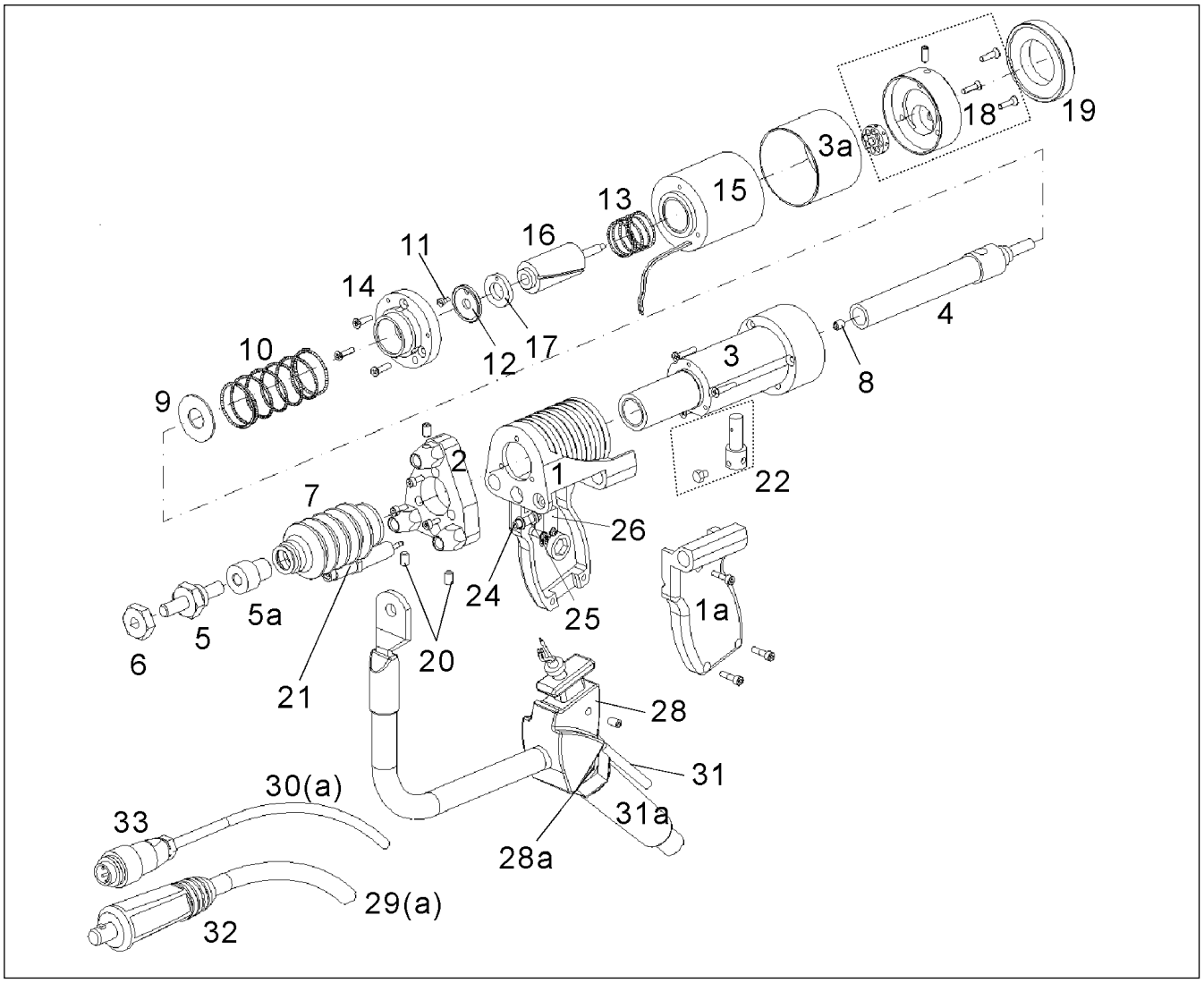


Figure 15: Exploded view of gun K 26

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

4 Spare Parts for Stud Welding Guns CLASSIC

4.1 Spare parts list gun series SK 14 and SK 15

Item	Description	Part-no.			
		SK 14	SK 14-ISO	SK 14 short	SK 15
1	welding gun body	322-0601-000	322-0601-000	322-0604-000	322-0605-000
2	lower gun handle [1]	322-0597-000	322-0597-000	322-0597-000	322-0597-000
3	upper gun handle [2]	322-0596-000	322-0596-000	322-0596-000	322-0596-000
4	flange plate	322-6106-000	322-6109-000	322-6113-000	322-6106-000
4a	spacer ring		322-0554-000		
5	bellows	322-0098-000	322-0098-000	322-0098-000	322-0098-000
6	adaptor screw	322-0113-000	322-0113-000	322-0113-000	322-5127-000
7	setscrew M 6 x 8	322-0220-000	322-0220-000	322-0220-000	322-0220-000
8	piston for chuck M 12 x 1	322-0576-000	322-0576-000	322-0603-000	322-0603-000
9	coupling bolt	329-0050-000	329-0050-000	329-0050-000	329-0050-000
10	compression spring	322-0594-000	322-0594-000	322-0594-000	322-0609-000
11	magnet	329-0022-000	329-0022-000	329-0022-000	329-0080-000
12	spacer sleeve	322-0598-000	322-0598-000	322-0598-000	322-0598-000
14	stop disc	322-0120-000		322-0120-000	322-0120-000
15 [2]	rear cap		322-0086-000		
15 [3]	lift adjustment case	322-0579-000		322-0579-000	322-0579-000
17	push button	329-0031-000	329-0031-000	329-0031-000	329-0031-000
18	lustre terminal	325-0655-000	325-0655-000	325-0655-000	325-0655-000
19	cable connector	329-0025-000	329-0025-000	329-0025-000	329-0025-000
20	welding cord	317-5113-000	317-5113-000	317-5113-000	317-5113-000
21	screwed flange	322-0097-000	322-0097-000	322-0097-000	322-0643-000
23	connection gland for control cable	325-0261-000	325-0261-000	325-0261-000	325-0261-000
24	welding cable 35 mm², 5 m, without plug	317-0067-000	317-0067-000	317-0067-000	317-0067-000
25	connection gland for welding cable	325-0567-000	325-0567-000	325-0567-000	325-0567-000
26	double clamp hose	325-0681-000	325-0681-000	325-0681-000	325-0681-000
27	control cable, 4 x 1 mm², 5,2 m, without plug	329-5233-000	329-5233-000	329-5233-000	329-5233-000
28	control plug, 4-pole	325-0240-000	325-0240-000	325-0240-000	325-0240-000
29	welding cable plug, 35 mm²	325-0236-000	325-0236-000	325-0236-000	325-0236-000
23 – 25, 27 – 29	cable connection set 5 m, 35 mm²	329-5243-000	329-5243-000	329-5243-000	
30	anti twist device	322-0599-000	322-0599-000	322-0599-000	322-0640-000

[1] Viewed from the assembling or disassembling position

[2] Applies to SK 14-ISO

[3] Applies to SK 14

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

Item	Description	Part-no.			
		SK 14	SK 14-ISO	SK 14 short	SK 15
31	wing screw		322-0631-000		

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

4.2 Spare parts list guns K 22, K 22-D, K 24, K 26

Pos.	Designation	Part Number			
		K 22	K 22-D	K 24	K 26
1	Gun body	322-6051-000	322-6051-000	322-6050-000	322-6096-000
1a	Handle cover	322-0075-000	322-0075-000	322-0074-000	322-0074-000
2	Mounting plate with guide bushes	322-6045-000	322-6045-000	322-6045-000	370-6022-000
3	Piston cylinder	322-6085-000	322-6085-000	322-6086-000	322-6097-000
3a	Sleeve for solenoid				322-0210-000
4	Piston	322-0109-000	322-0109-000	322-0112-000	322-0214-000
5	Adapter screw	329-0026-000	329-0026-000	329-0123-000	322-0212-000
5a	Insulating adapter bushing				322-0213-000
6	Locking nut			322-0150-000	322-0150-000
7	Bellows	322-0098-000	322-0098-000	322-0092-000	322-0092-000
8	Threaded bolt	322-0108-000	322-0108-000	322-0220-000	322-0220-000
9	Spring guide	322-0125-000	322-0125-000	322-0125-000	322-0125-000
10	Main tension spring	322-0083-000	322-0083-000	322-0083-000	322-0341-000
11	Lifting ring pin	322-0200-000	322-0200-000	322-0200-000	322-0200-000
12	Lifting ring	322-0201-000	322-0201-000	322-0201-000	322-0201-000
13	Tension spring	322-0202-000	322-0202-000	322-0202-000	322-0202-000
14	Lifting ring housing	322-0203-000	322-0203-000	322-0203-000	322-0217-000
15	Magnetic coil	329-0033-000	329-0033-000	329-0033-000	329-0036-000
16	Magnet core	329-0034-000	329-0034-000	329-0038-000	329-0037-000
17	Anchoring disk	322-0204-000	322-0204-000	322-0204-000	322-0204-000
18	Lift setting system	322-6088-000	322-6088-000	322-6089-000	322-6087-000
19	Rear cap	322-0079-000	322-0079-000	322-0079-000	
20	Setscrew M 6 x 8	322-0206-000	322-0206-000	322-0206-000	322-0206-000
21	Damper		322-0131-000	322-0132-000	322-0133-000
22	Damper stop	322-0118-000	322-0118-000	322-0124-000	322-0124-000
23	Locking screw	322-0040-000			
24	Switch pins	322-0103-000	322-0103-000	322-0103-000	322-0103-000
25	Switch pin bearing	322-0104-000	322-0104-000	322-0104-000	322-0104-000
26	Trigger	329-0030-000	329-0030-000	329-0030-000	329-0030-000
27	Welding cord	329-5220-000	329-5220-000		
28	Cable holder			322-0392-000	322-0392-000
28a	Pressing clamp			322-0404-000	322-0404-000
29	Welding cable, 2 m, 50 mm² with protective conduit	329-5216-000	329-5216-000		
29	Welding cable 2 m, 95 mm² without plug, with protective conduit			329-5223-000	

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

Pos.	Designation	Part Number			
		K 22	K 22-D	K 24	K 26
29	Welding cable 2 m, 120 mm² without plug, with protective conduit				329-5225-000
29a	Welding cable 2 m, 50 mm² with plug and protective conduit	329-5217-000	329-5217-000		
29a	Welding cable 2 m, 95 mm² with plug and protective conduit			329-5224-000	
29a	Welding cable 2 m, 120 mm² with plug and protective conduit				329-5226-000
30	Ready-to-connect control cable, 2,3 m, 4 x 1 mm²	329-5218-000	329-5218-000	329-5218-000	329-5218-000
30a	Ready-to-connect control cable, 2,3 m, 4 x 1 mm² with plug	329-5219-000	329-5219-000	329-5219-000	329-5219-000
31	Bending protector for control cable	325-0261-000	325-0261-000	325-0261-000	325-0261-000
31a	Bending protector for welding cable	325-0567-000	325-0567-000	322-0393-000	322-0393-000
32	Welding cable plug 35/50 mm²	325-0234-000	325-0234-000		
32	Welding cable plug 70/95 mm²			325-0239-000	
32	Welding cable plug 120 mm²				325-0251-000
33	Control cable plug 4-pole	325-0240-000	325-0240-000	325-0240-000	325-0240-000
	Complete connection cable set 2 m, 50 mm²	329-5214-000	329-5214-000		
	Complete connection cable set 2 m, 95 mm²			329-5215-000	
	Complete connection cable set 2 m, 120 mm²				329-5227-000
	Complete connection cable set 5 m, 50 mm²	329-5201-000	329-5201-000		
	Complete connection cable set 7.5 m, 50 mm²	329-5202-000	329-5202-000		

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

5 Accessories

5.1 Gun accessories for guns K 22 to K 26

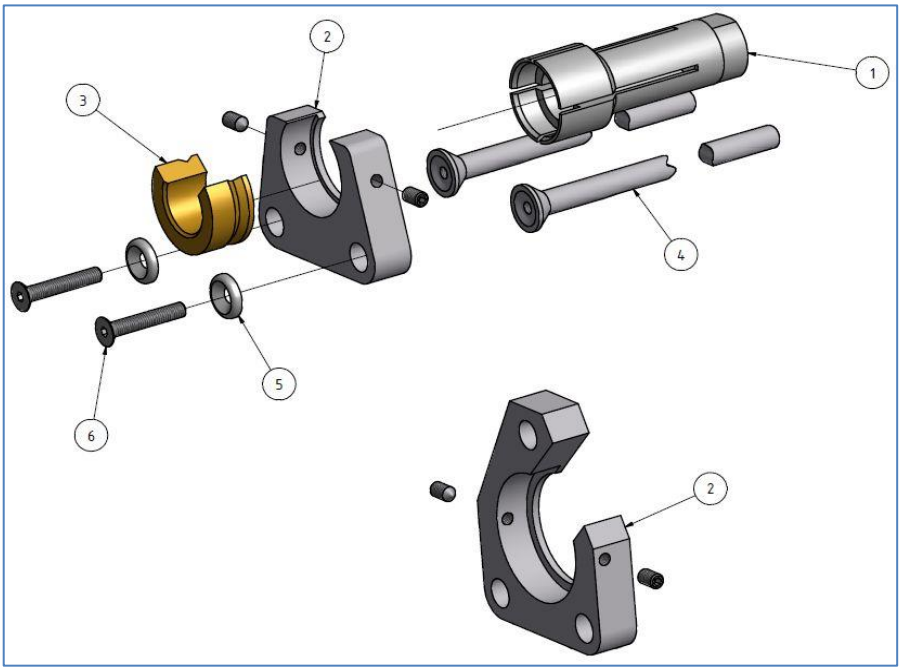


Figure 16: Gun accessories for shear connectors from 50 mm length

Stud diameter	Chuck pos. 1	Foot plate pos. 2	Ferrule grip pos. 3
6	350-0056-000	360-0116-000	355-0031-000
10	350-0164-000	360-0117-000	355-0033-000
13	350-0059-000	360-0118-000	355-0035-000
16	350-0060-000	360-0119-000 (version for 2 legs)	355-0036-000
19	350-0060-000		355-0036-000
22	350-0061-000		355-0037-000
25	350-0062-000		355-0038-000
Recommendation for studs longer than 200 mm:		360-0149-000 (version for 3 legs)	

Stud length up to (mm)			Required length of legs (mm)	Part-No. pos. 4
K 22 and K 22-D	K 24	K 26		
140	90	70	240	370-0240-000
200	150	130	300	370-0300-000
300	250	230	400	370-0400-000
400	350	330	500	370-0500-000
500	450	430	600	370-0322-000
600	550	530	700	370-0323-000
Washer pos. 5		370-0055-000		
Screw with hexagon socket pos. 6		322-0372-000		

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

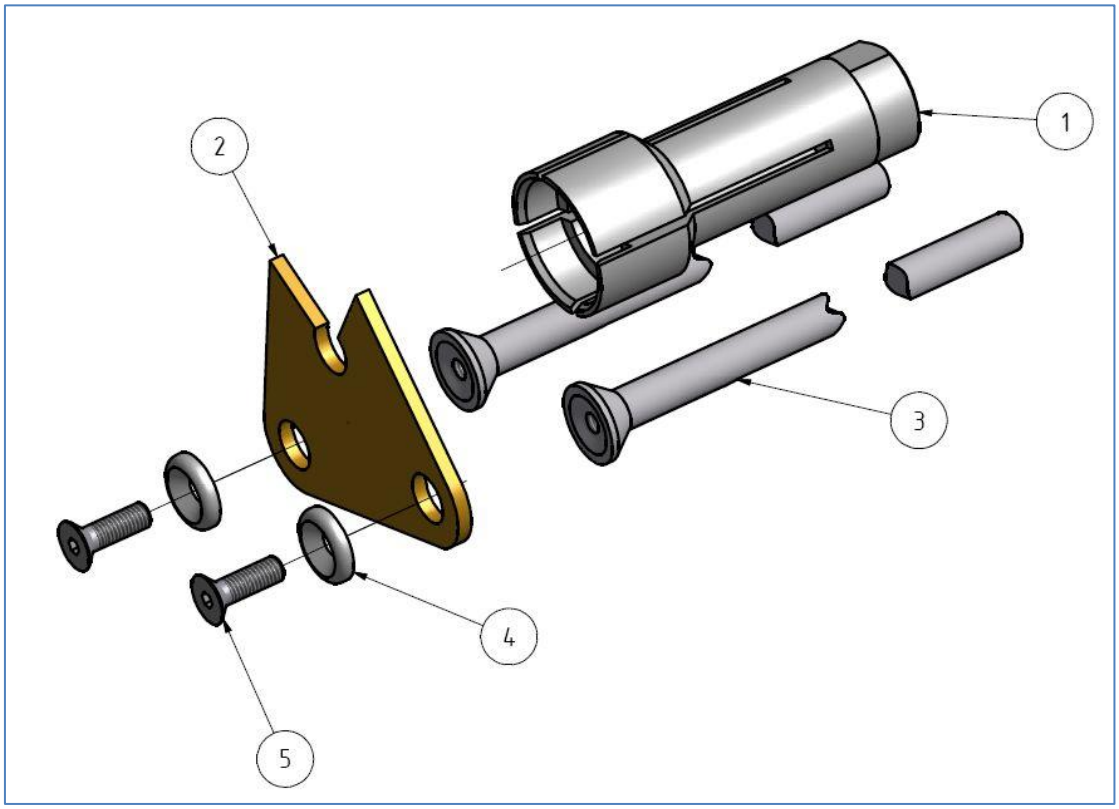


Figure 17: Gun accessories for shear connectors up to 50 mm length

Stud diameter	Chuck pos. 1	Foot plate/ ferrule holder pos. 2	Leg pos. 3	Washer pos. 4	Screw with hexagon socket pos. 5
10	350-0058-000	360-0164-000	370-0240-000	370-0055-000	322-0379-000
12	350-0059-000	360-0085-000			
13	350-0059-000	360-0086-000			
16	350-0060-000	360-0087-000			
19	350-0060-000	360-0087-000			
22	350-0061-000	360-0088-000			

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

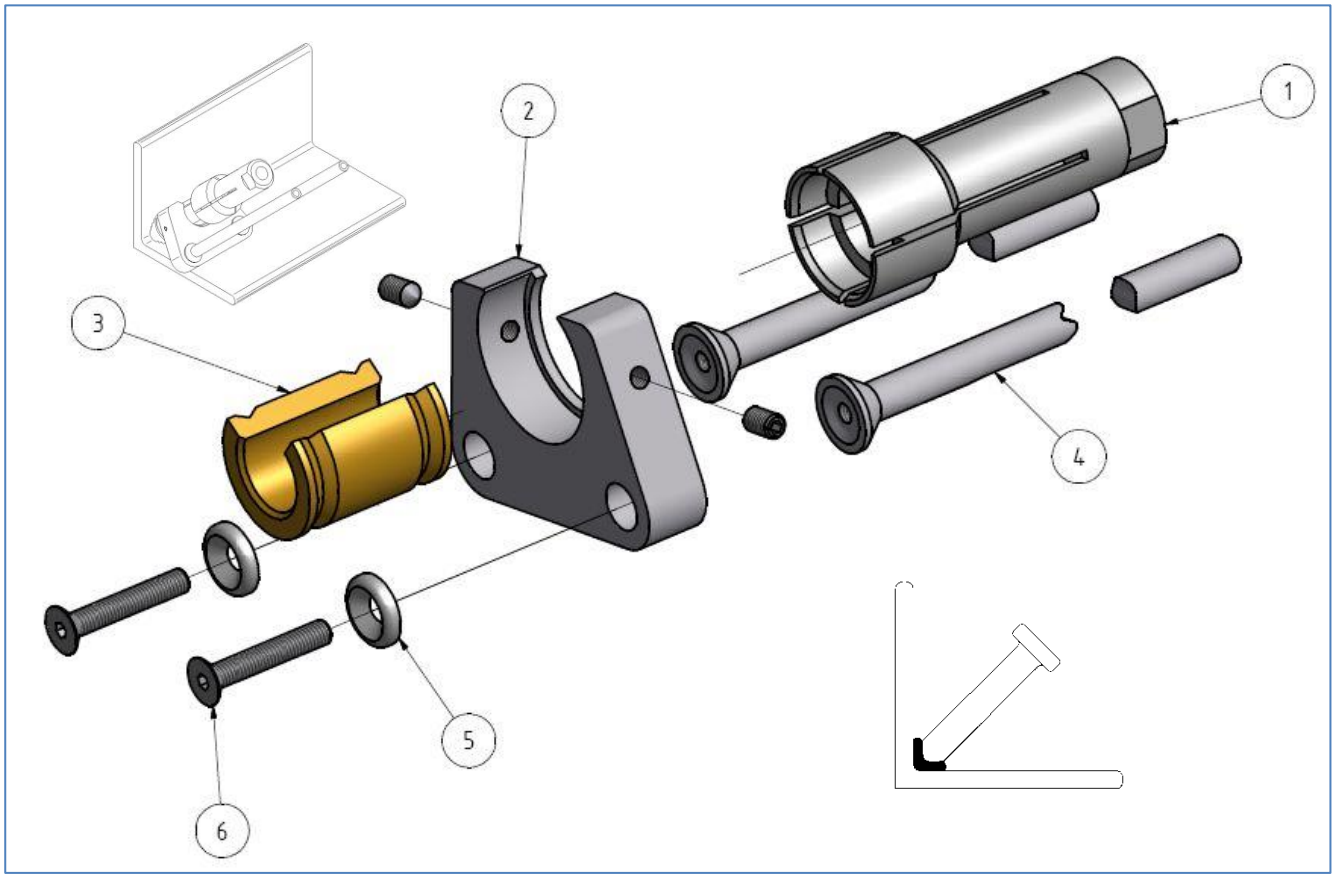


Figure 18: Gun accessories for shear connectors in an interior angle

Stud diameter	Chuck pos. 1	Foot plate pos. 2	Ferrule grip pos. 3
6	350-0056-000	360-0116-000	355-0263-000*
10	350-0164-000	360-0117-000	355-0043-000
13	350-0059-000	360-0118-000	355-0044-000
16	350-0060-000	360-0119-000	355-0268-000*
For pos. 4, 5 and 6 see figure 15. * Discontinued types, not for new projects			

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

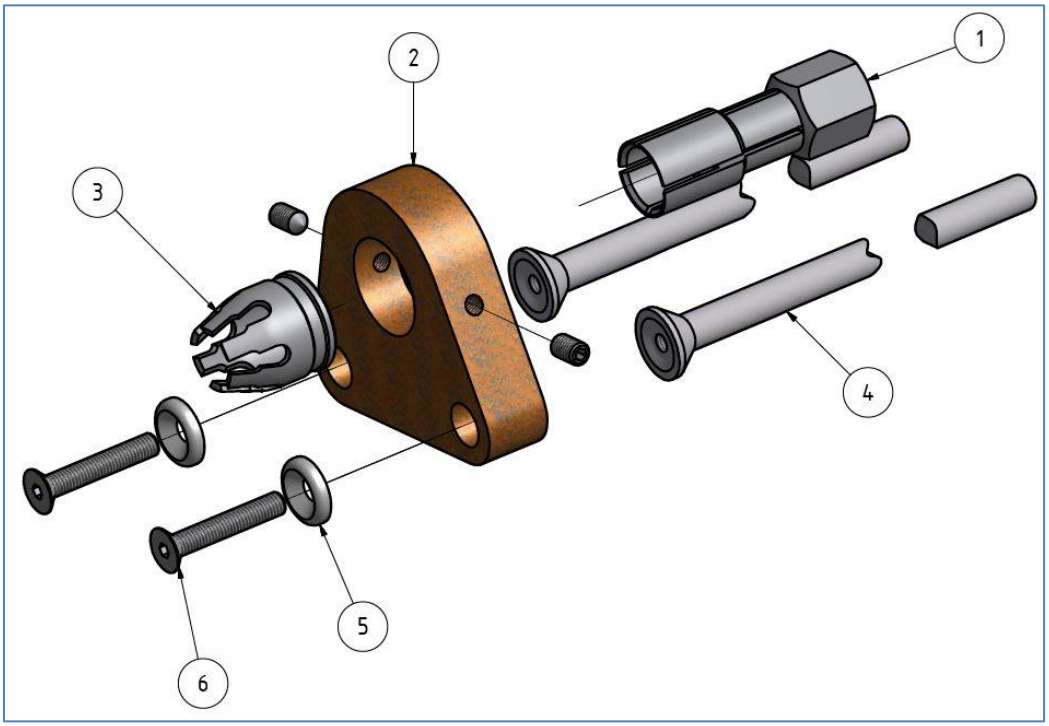


Figure 19: Gun accessories for threaded studs, tapped studs and plain pins

Type PD	Type DD	Type RD	Chuck pos. 1	Ferrule grip pos. 3	Foot plate pos. 2
M 4 x > 20	M 4 x > 20		350-0002-000	355-0001-000	360-0101-000
M 5 x > 20	M 5 x > 20		350-0003-000	355-0002-000	
M 6 x > 16	M 6 x > 16	M 6 x > 16	350-0004-000	355-0002-000	
M 6 x > 20	M 6 x > 20	M 6 x > 20	350-0005-000	355-0002-000	
M 8 x > 16	M 8 x > 16	M 8 x > 16	350-0006-000	355-0003-000	
M 8 x > 20	M 8 x > 20	M 8 x > 20	350-0007-000	355-0003-000	
M 10 x > 16	M 10 x > 20	M 10 x > 20	350-0008-000	355-0004-000	
M 10 x > 20	M 10 x > 25	M 10 x > 25	350-0009-000	355-0004-000	
M 12 x > 16	M 12 x > 20	M 12 x > 20	350-0010-000	355-0005-000	
M 12 x > 25	M 12 x > 25	M 12 x > 30	350-0011-000	355-0005-000	
M 16 x > 20			350-0015-000	355-0006-000	360-0102-000
	M 16 x > 25	M 16 x > 20	350-0015-000	355-0007-000	360-0103-000
M 16 x > 30			350-0016-000	355-0006-000	360-0102-000
	M 16 x > 30	M 16 x > 25	350-0016-000	355-0007-000	360-0103-000
	M 20 x > 25	M 20 x > 20	350-0018-000	355-0007-000	
M 20 x > 25			350-0018-000	355-0008-000	
	M 20 x > 30	M 20 x > 25	350-0019-000	355-0007-000	
M 20 x > 30			350-0019-000	355-0008-000	
M 24 x > 35		M 24 x > 30	350-0023-000	355-0008-000	

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

Stud length up to (mm)			Required length of legs (mm)	Part No. pos. 4
K 22 and K 22-D	**K 24**	**K 26**		
140	90	70	240	370-0240-000
200	150	130	300	370-0300-000
300	250	230	400	370-0400-000
400	350	330	500	370-0500-000
500	450	430	600	370-0322-000
600	550	530	700	370-0323-000
Washer pos. 5		370-0055-000		
Screw with hexagon socket pos. 6		322-0372-000		

For studs below 12 mm diameter and lengths L > app. 6 x diam. chucks with deeper grip length are recommended. Further information upon request.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

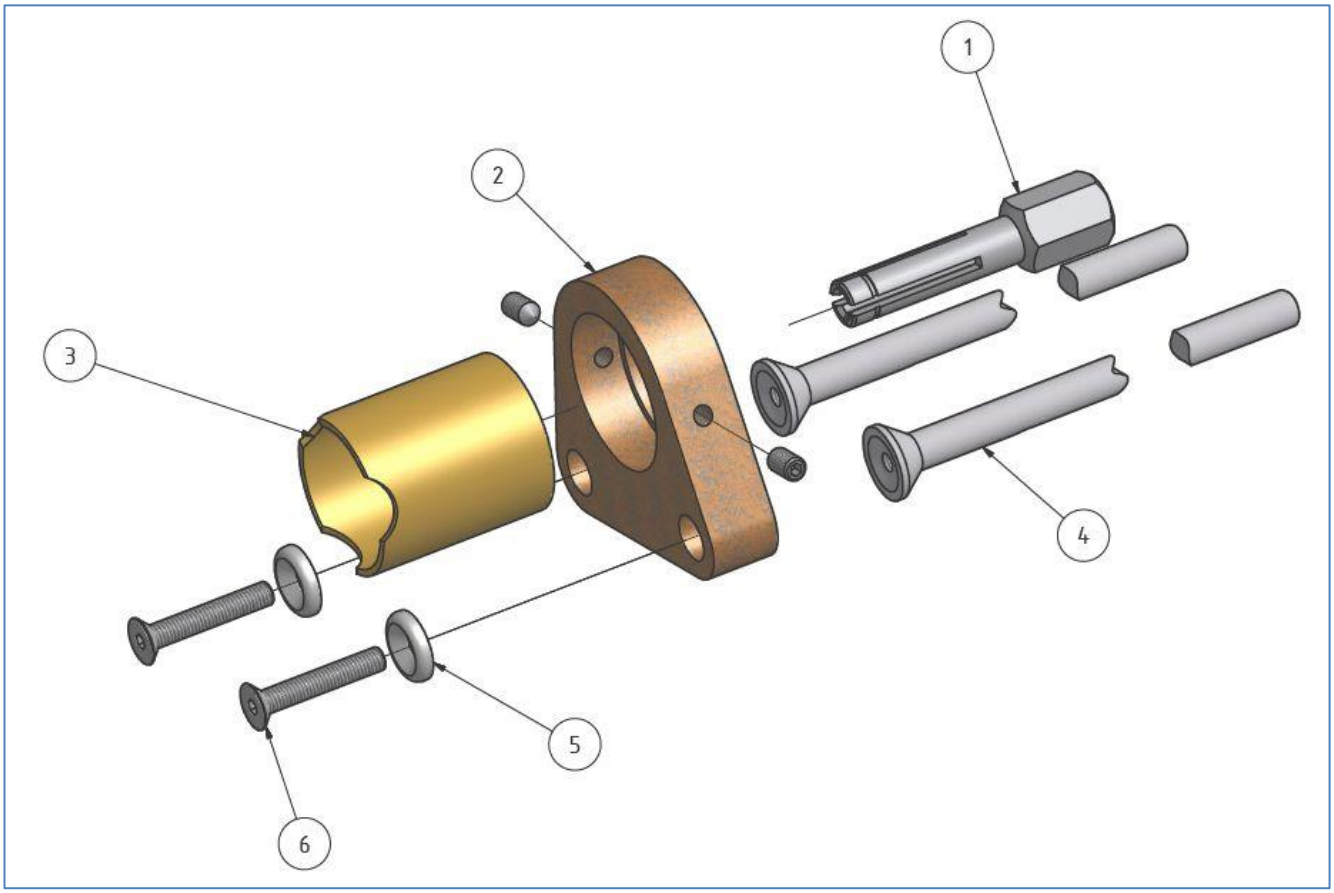


Figure 20: Gun accessories for Insulation pins

Stud dimension	**Chuck pos. 1**	**Foot plate pos. 2**	**Supporting tube pos. 3**
from 3 x 35	350-0086-000 (steel) 350-0087-000 (copper)	370-0103-000	370-0167-000
from 4 x 35	350-0088-000 (steel)		
from 5 x 35	350-0089-000 (steel)		
Stud length up to (mm)	**Required length of legs (mm)**	**Part-No. pos. 4**	
Gun K 22			
140	240	370-0240-000	
200	300	370-0300-000	
300	400	370-0400-000	
400	500	370-0500-000	
500	600	370-0322-000	
600	700	370-0323-000	
Washer pos. 5		370-0055-000	
Screw with hexagon socket pos. 6		322-0372-000	

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

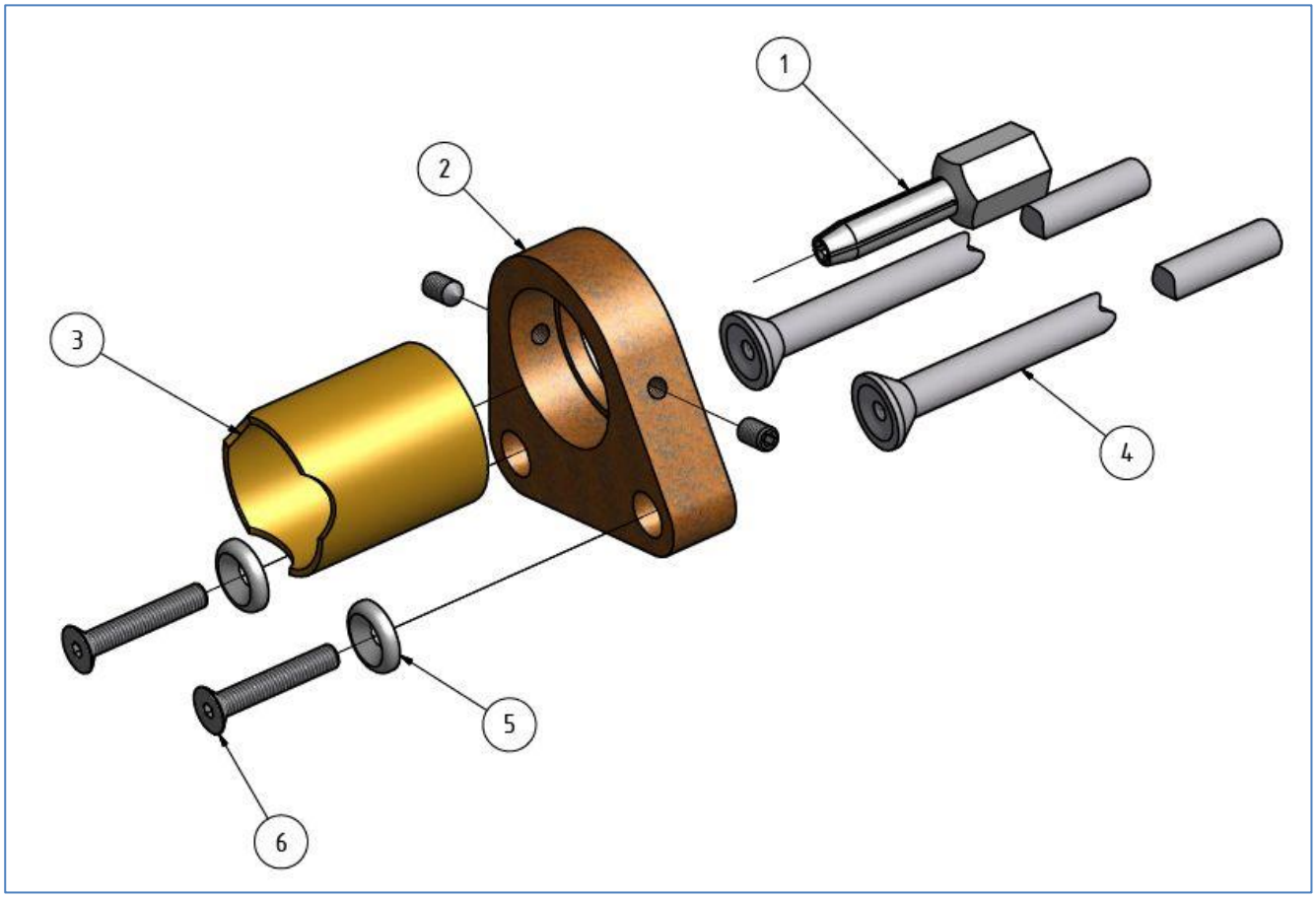


Figure 21: Gun accessories for short cycle stud welding without shielding gas

Stud diameter d	Chuck pos. 1	Foot plate pos. 2	Leg pos. 4	Supporting tube pos. 3
3	350-0001-000	360-0103-000	370-0240-000	370-0167-000
4	350-0002-000			
5	350-0003-000			
6	350-0005-000			
8	350-0007-000			
10	350-0009-000			
Washer pos. 5			370-0055-000	
Screw with hexagon socket pos. 6			322-0372-000	

For studs with lengths L > app. 6d chucks with deeper grip length are recommended. Further information upon request.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

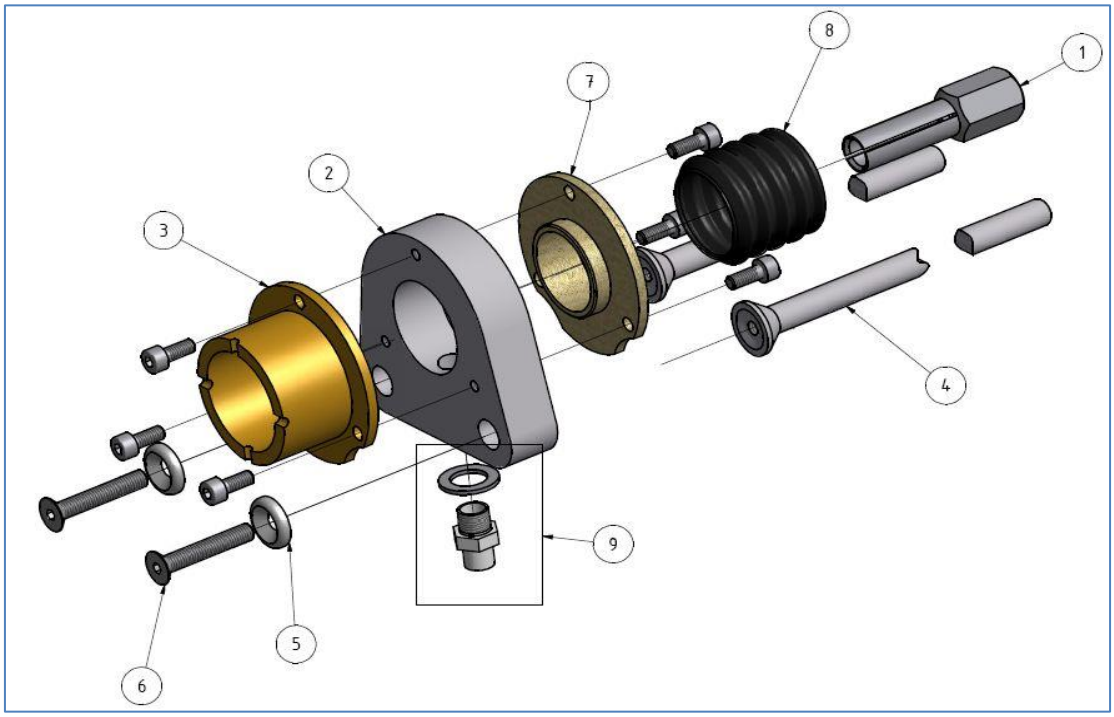


Figure 22: Gun accessories for stud welding with shielding gas

Stud diameter d	Chuck pos. 1	Foot plate with 3 socket head cap screws M 4 x 10 pos. 2	Leg pos. 4	Supporting tube with 3 socket head cap screws M 4 x 10 pos. 3
5	350-0003-000	322-0011-000	370-0240-000	322-0225-000
6	350-0005-000			
8	350-0007-000			
10	350-0009-000			
12	350-0011-000			
Washer pos. 5			370-0055-000	
Screw with hexagon socket pos. 6			322-0372-000	
Circlip ring with 3 socket head cap screw M 4 x 10 pos. 7			324-0042-000	
Bellows pos. 8			322-0098-000	
Gas plug with seal pos. 9			323-0017-000	
Set of shielding gas hoses, completely assembled, 7 m with clip-on connectors at both sides and 3 m with clip-on connector at one side, other side open (for hooking up to exit of pressure reducer)			323-6012-000	
See above, but 12 m and 3 m			323-6013-000	
Shielding gas equipment complete (pos. 2 to pos. 9)			324-6024-000	

Other lengths of shielding gas hoses upon request. For studs with lengths L > app. 6d chucks with deeper grip length are recommended. Further information upon request.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

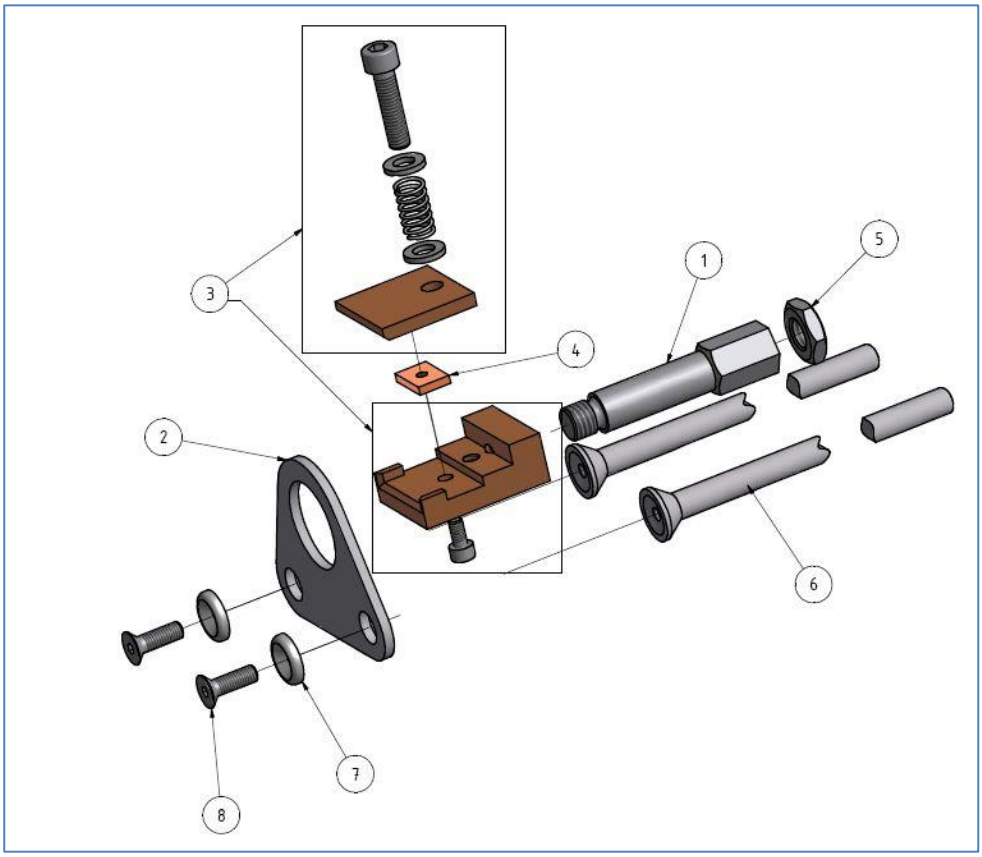


Figure 23: Gun accessories for flat anchors

W x T x L (Width x thickness x length)	Foot plate pos. 2	Chuck pos. 3	Stopping piece pos. 4
15 x 3 x > 25	360-0096-000	350-6045-000	350-0324-000
15 x 3 x > 35	360-0096-000	350-6045-000	-
20 x 3 x > 25	360-0088-000	350-6043-000	350-0324-000
20 x 3 x > 40	360-0088-000	350-6043-000	-
25 x 3 x > 25	360-0088-000	350-6044-000	350-0324-000
25 x 3 x > 40	360-0088-000	350-6043-000	-
15 x 5 x > 25	360-0096-000	350-6050-000	350-0225-000
15 x 5 x > 40	360-0096-000	350-6050-000	-
20 x 5 x > 25	360-0088-000	350-6049-000	350-0225-000
20 x 5 x > 40	360-0088-000	350-6050-000	-
25 x 5 x > 25	360-0088-000	350-6048-000	350-0225-000
25 x 5 x > 40	360-0088-000	350-6050-000	-
Chuck extension pos. 1		350-0075-000	
Leg pos. 6		370-0240-000	
Washer pos. 7		370-0055-000	
Screw with hexagon socket pos. 8		322-0379-000	
Counter nut pos. 9 (M 10 flat)		322-0378-000	

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

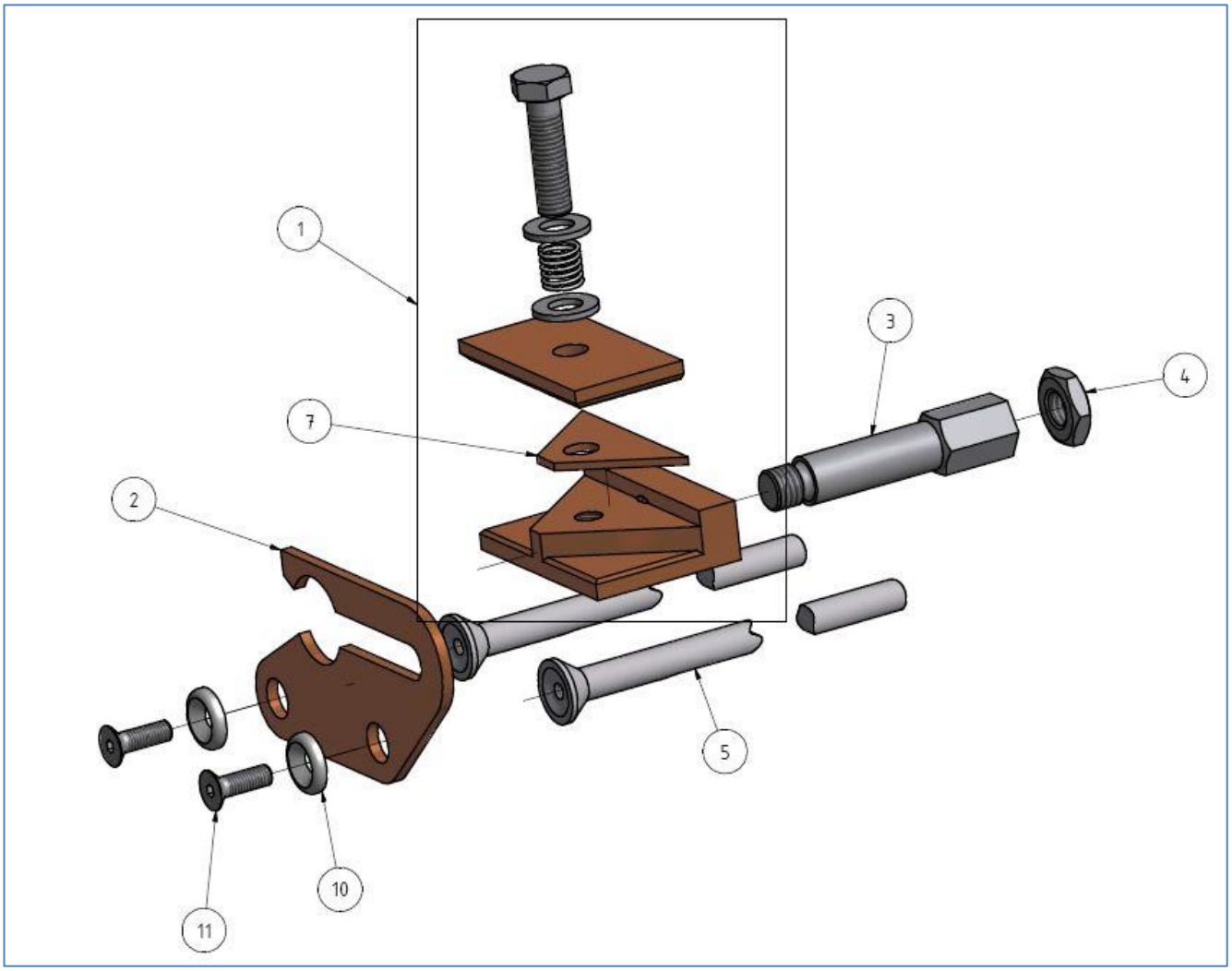


Figure 24: Gun accessories for Y-anchors

Dimension	Chuck pos. 1	Foot plate pos. 2	Chuck extension pos. 3	Counter nut pos. 4 (M 10 flat)	Compensation piece pos. 7
6 x 80°	350-6121-000	360-0122-000	350-0075-000	322-0378-000	-
8 x 80°		360-0123-000			350-0327-000

Leg pos. 5
370-0240-000
Washer pos. 10
370-0055-000
Screw with hexagon socket pos. 11
322-0379-000

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

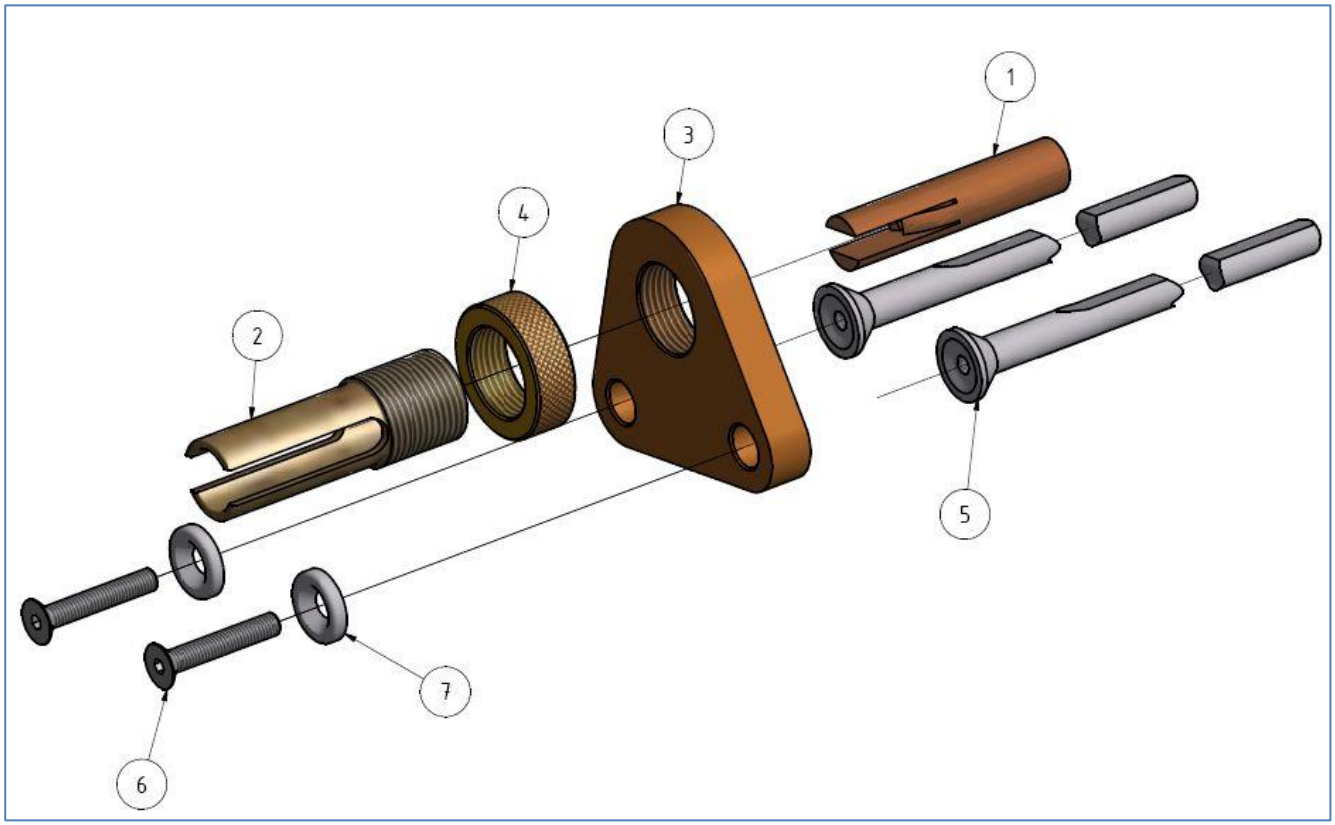


Figure 25: Gun accessories for reduced Y-anchors

Chuck pos. 1	**Ferrule holder pos. 2**	**Foot plate pos. 3**	**Knurled nut pos. 4**
350-0365-000	355-0272-000	360-0108-000	355-0250-000
Leg pos. 5	**Screw with hexagon socket pos. 6**	**Washer pos. 7**	
370-0240-000	322-0372-000	370-0055-000	

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

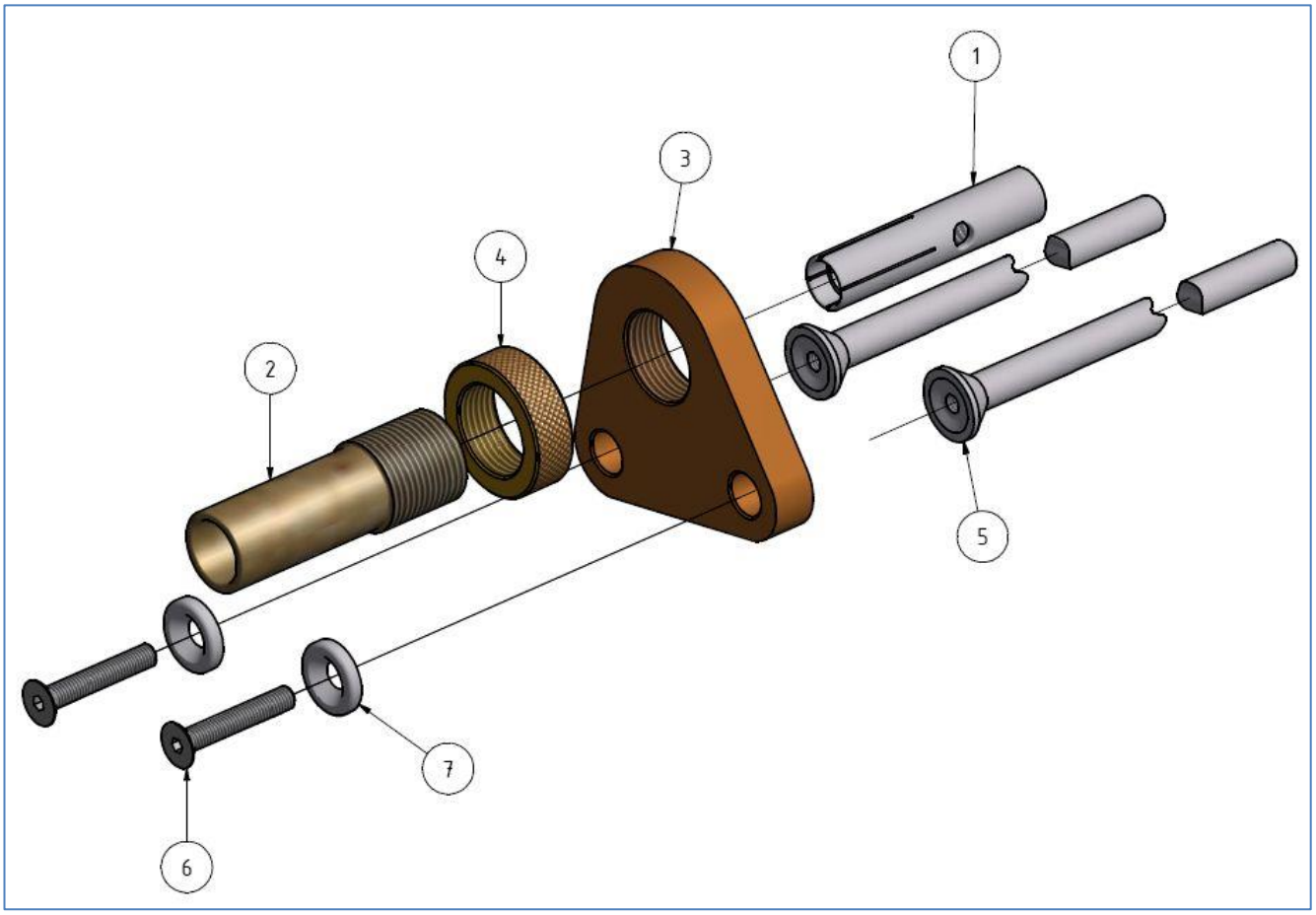


Figure 26: Gun accessories for boiler pins

Stud dimension	Chuck pos. 1	Ferrule holder pos. 2	Fußplatte Pos. 3	Knurled nut pos. 4
6 x 14 - 20	350-0071-000	355-0151-000	360-0108-000	355-0250-000
8 x 14 - 20	350-0072-000	355-0151-000		
10 x 14 - 20	350-0073-000	355-0152-000		
12 x 14 - 20	350-0074-000	355-0153-000		

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

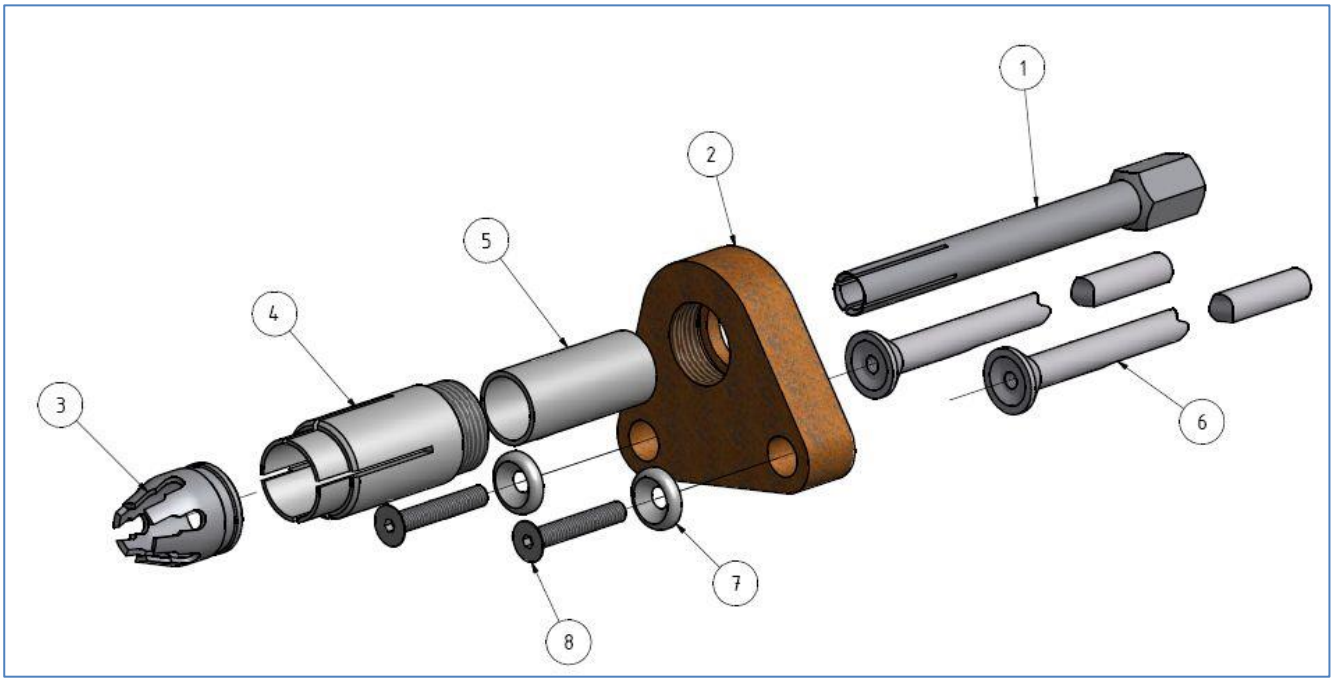


Figure 27: Gun accessories for grid fastening

Dimension	Chuck pos. 1	Ferrule grip pos. 3	Supporting tube pos. 4	Insulating tube pos. 5	Foot plate pos. 2
M 6 x > 20	350-0033-000	355-0002-000	370-0158-000	370-0159-000	360-0110-000
M 6 x > 60	350-0005-000				
M 8 x > 20	350-0034-000	355-0003-000			
M 8 x > 60	350-0007-000				
M 10 x > 25	350-0035-000	355-0004-000			
M 10 x > 60	350-0009-000				
M 12 x > 30	350-0036-000	355-0005-000			
M 12 x > 60	350-0011-000				
Washer pos. 7			370-0055-000		
Screw with hexagon socket pos. 8			322-0372-000		
Leg 240 mm pos. 6 (max. stud length 150 mm)			370-0240-000		

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

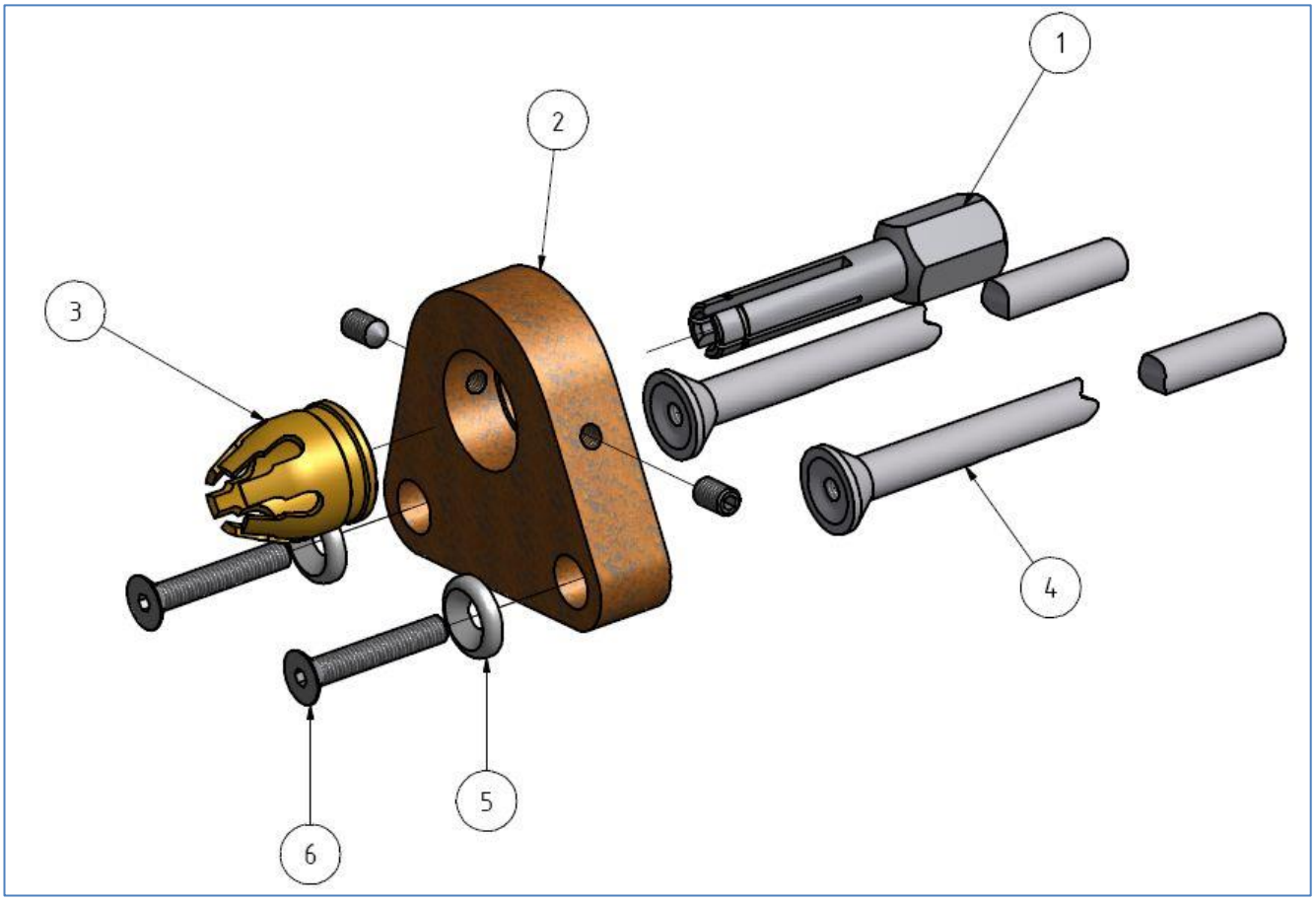


Figure 28: Gun accessories for welding of Fibrefix-pins Ø 5, Length L

Chuck pos. 1	**Foot plate pos. 2**	**Ferule grip pos. 3**	**Leg pos. 4**	
350-0100-000	360-0101-000	355-0002-000	370-0240-000 370-0300-000 370-0400-000 370-0500-000	up to L = 160 mm up to L = 220 mm up to L = 320 mm up to L = 420 mm
Washer pos. 5			370-0055-000	
Screw with hexagon socket pos. 6			322-0372-000	

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

5.2 Gun accessories for Gun series SK 14 and SK 15

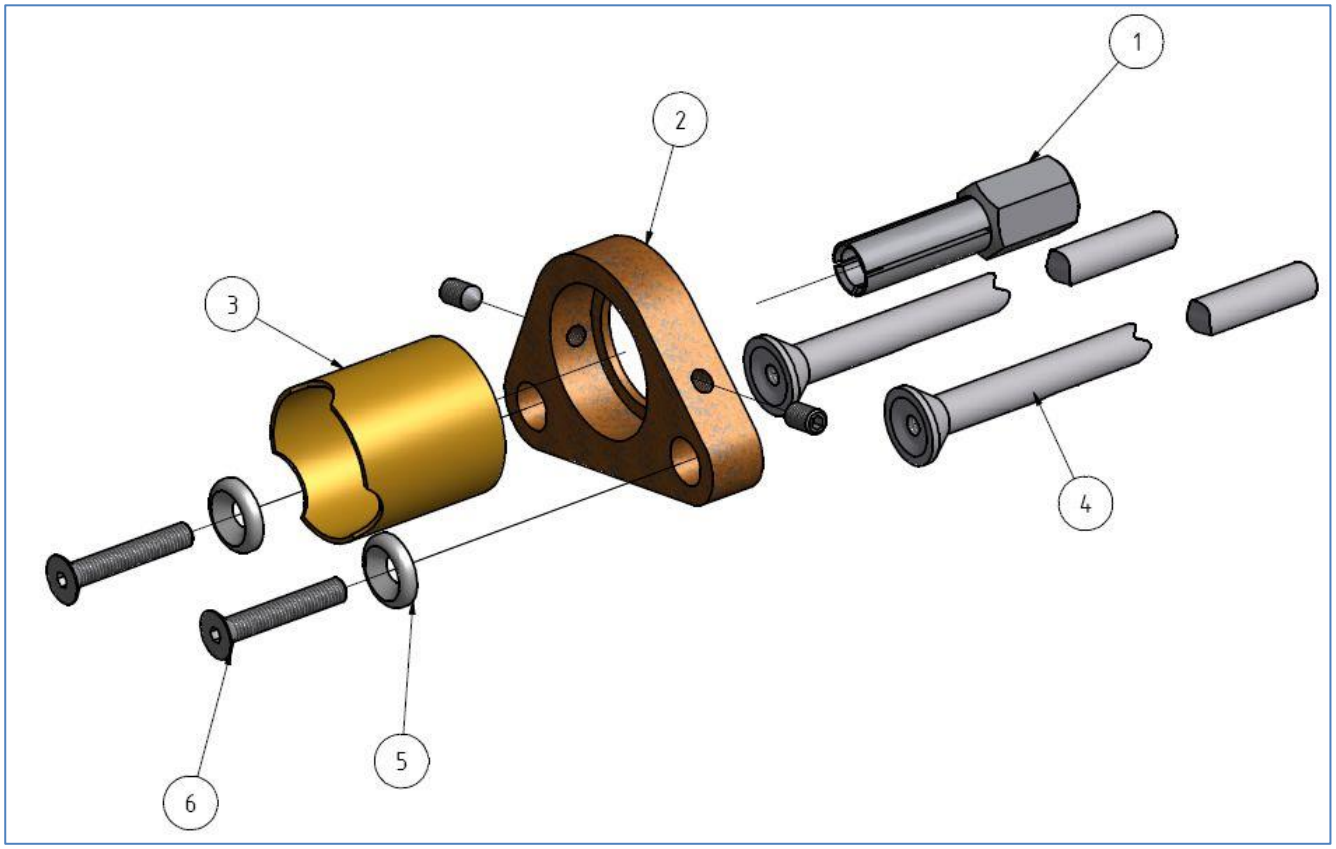


Figure 29: Gun accessories for short-cycle stud welding without shielding gas (gun SK 14)

Stud dimension (D x L)	Chuck pos. 1	Foot plate pos. 2	Leg pos. 4	Supporting tube pos. 3
Ø 3 x > 8	350-0001-000	360-0012-000	370-0240-000	360-0335-000
Ø 4 x > 8	350-0002-000			
Ø 5 x > 10	350-0003-000			
Ø 6 x > 10	350-0005-000			
Ø 8 x > 10	350-0006-000			
Ø 8 x > 15	350-0007-000			
Ø 10 x > 10	350-0008-000			
Ø 10 x > 15	350-0009-000			
Ø 12 x > 10	350-0010-000			
Ø 12 x > 16	350-0011-000			
Washer pos. 5		370-0055-000		
Screw with hexagon socket pos. 6		322-0372-000		

For studs with lengths L > app. 6d chucks with deeper grip length are recommended. Further information upon request.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

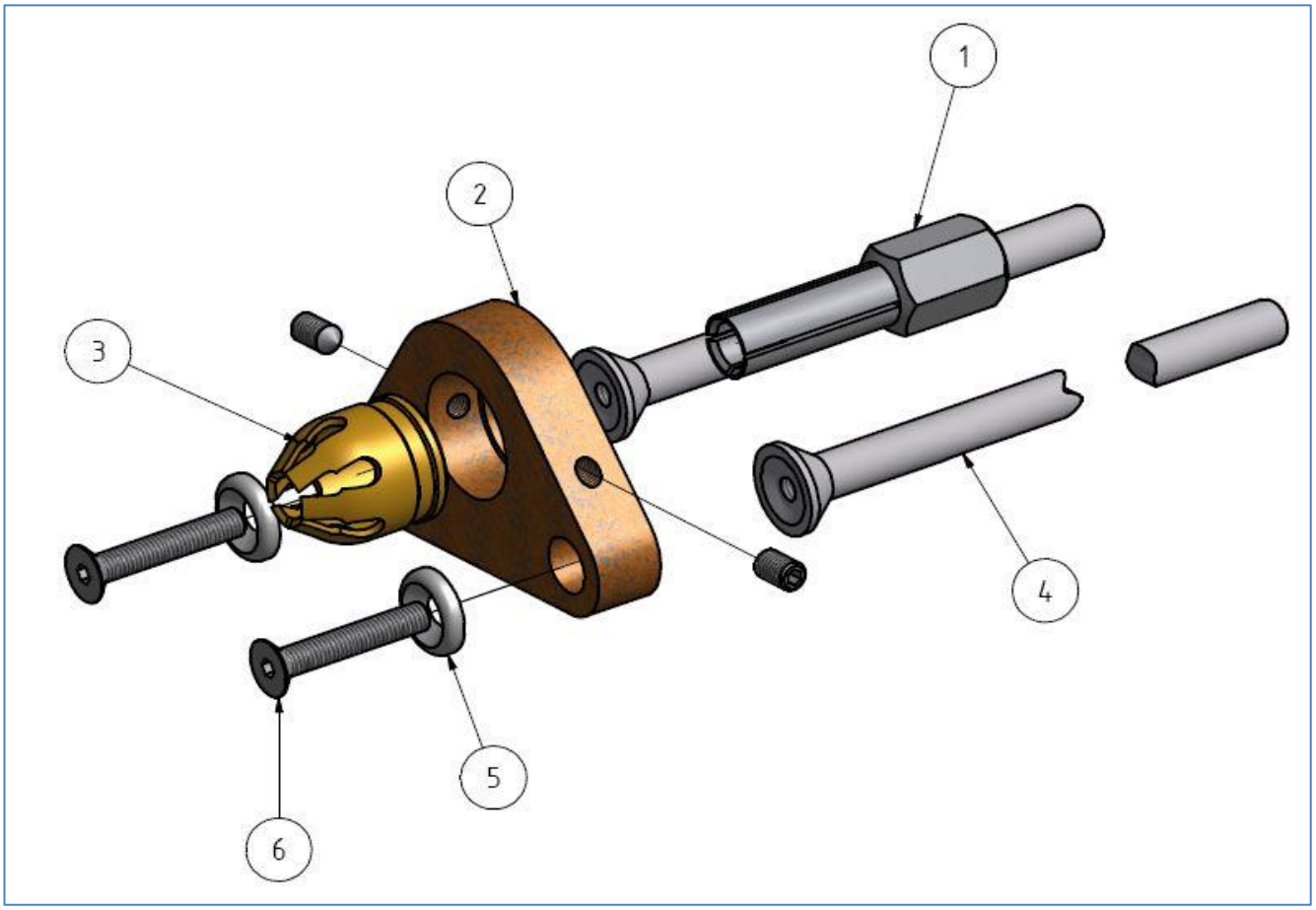


Figure 30: Gun accessories for threaded studs and plain pins

Type PD	Type DD	Type RD	Chuck pos. 1	Ferrule grip pos. 3	Foot plate pos. 2
M 4 x > 16	M 4 x > 16		350-0002-000	355-0001-000	360-0013-000
M 5 x > 16	M 5 x > 16		350-0003-000	355-0002-000	
M 6 x > 16	M 6 x > 16	M 6 x > 16	350-0004-000	355-0002-000	
M 6 x > 20	M 6 x > 20	M 6 x > 20	350-0005-000	355-0002-000	
M 8 x > 16	M 8 x > 16	M 8 x > 16	350-0006-000	355-0003-000	
M 8 x > 20	M 8 x > 20	M 8 x > 20	350-0007-000	355-0003-000	
M 10 x > 16	M 10 x > 20	M 10 x > 20	350-0008-000	355-0004-000	
M 10 x > 20	M 10 x > 25	M 10 x > 25	350-0009-000	355-0004-000	
M 12 x > 16	M 12 x > 20	M 12 x > 20	350-0010-000	355-0005-000	
M 12 x > 25	M 12 x > 25	M 12 x > 30	350-0011-000	355-0005-000	
Leg pos. 4		370-0240-000			
Washer pos. 5		370-0055-000			
Screw with hexagon socket pos. 6		322-0372-000			

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

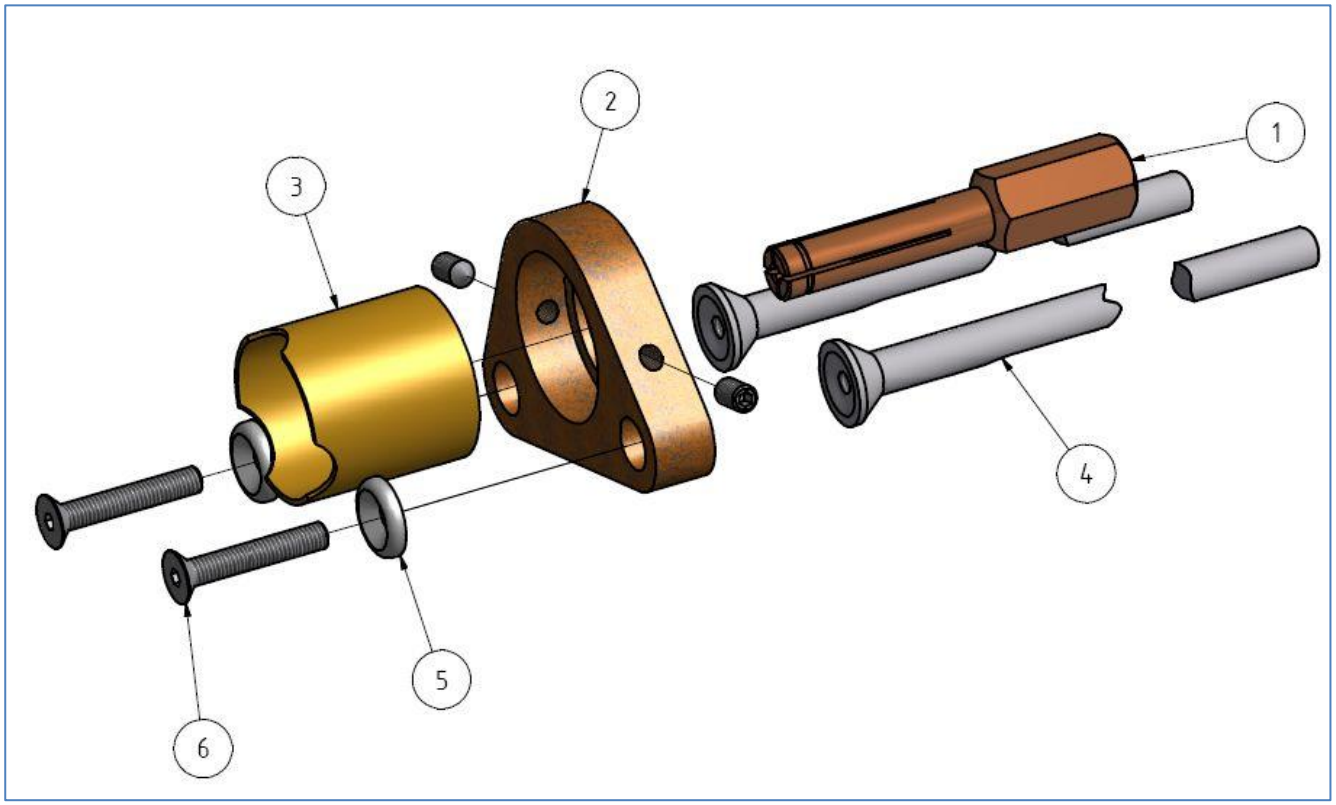


Figure 31: Gun accessories for insulation pins

Stud dimension	**Chuck pos. 1**	**Foot plate pos. 2**	**Supporting tube pos. 3**
from 3 x 35	350-0086-000 (Steel) 350-0087-000 (Copper)	360-0012-000	360-0335-000
from 4 x 35	350-0088-000 (Steel)		
from 5 x 35	350-0089-000 (Steel)		
Stud length up to (mm)	**Required length of legs (mm)**	**Leg pos. 4**	
140	240	370-0240-000	
200	300	370-0300-000	
300	400	370-0400-000	
400	500	370-0500-000	
500	600	370-0322-000	
600	700	370-0323-000	
Washer pos. 5		370-0055-000	
Screw with hexagon socket pos. 6		322-0372-000	

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

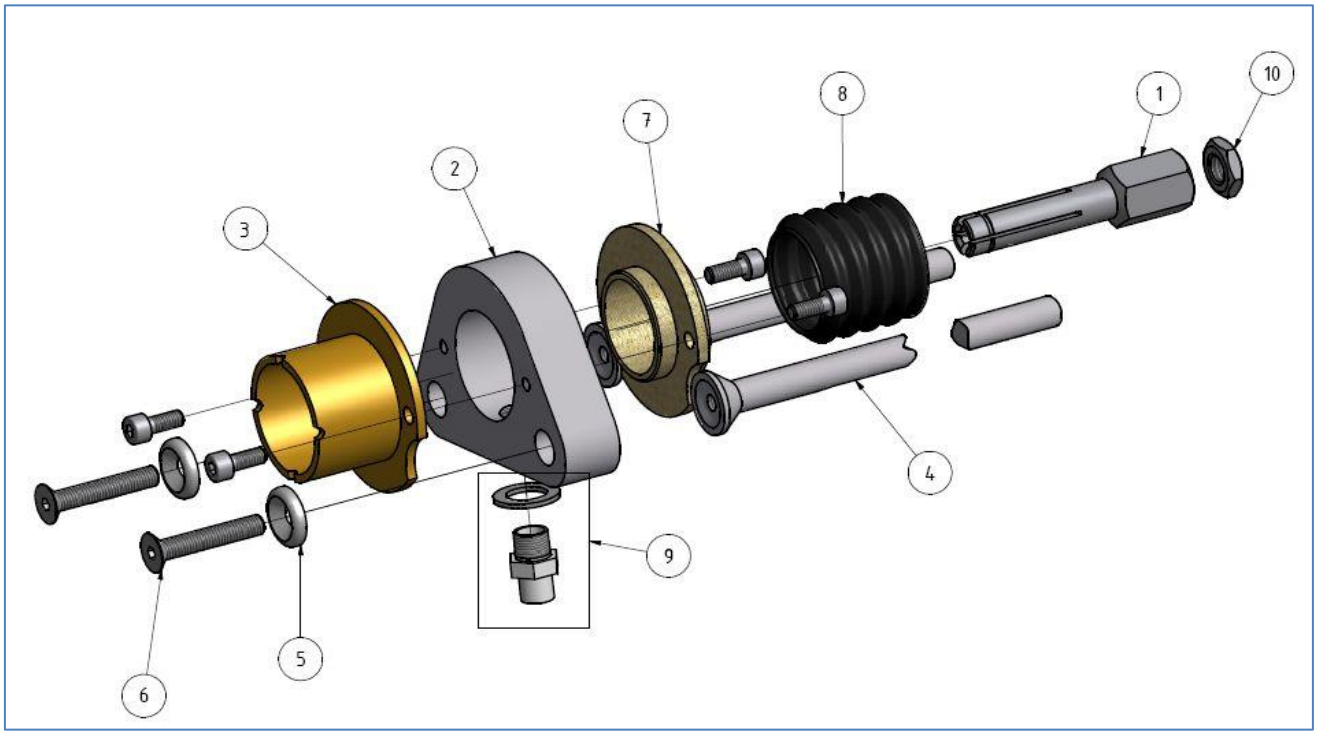


Figure 32: Gun accessories for stud welding with shielding gas

Stud diameter d	Chuck pos. 1	Foot plate with 2 socket head cap screws M 4 x 10 pos. 2	Leg pos. 4	Supporting tube with 2 socket head cap screws M 4 x 10 pos. 3
5	350-0003-000	324-0048-000	370-0240-000	324-0049-000
6	350-0005-000			
8	350-0007-000			
10	350-0009-000			
12	350-0011-000			
Washer pos. 5			370-0055-000	
Screw with hexagon socket pos. 6			322-0372-000	
Circlip ring with 2 socket head cap screws M 4 x 10 pos. 7			324-0047-000	
Bellows pos. 8			322-0098-000	
Gas plug with seal pos. 9			323-0017-000	
Counter nut pos. 10 (M 10 flat) (required for stud length < 16 mm)			322-0378-000	
Set of shielding gas hoses, completely assembled, 5 m with clip-on connectors at both sides and 3 m with clip-on connector at one side, other side open (for hooking up to exit of pressure reducer)			323-6011-000	
Shielding gas equipment complete (Pos. 2 to Pos. 9)			324-6025-000	

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

Other lengths of shielding gas hoses upon request. For studs with lengths L > app. 6d chucks with deeper grip length are recommended. Further information upon request.

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net

6 Literature

EN ISO 14555 “Drawn arc stud welding of metallic materials“

EN ISO 13918 “Studs and Ceramic Ferrules for Drawn Arc Stud Welding“

DVS-Technical bulletin 0901 “Stud Welding Procedures for Metals – Overview“

DVS-Technical bulletin 0902 “Drawn Arc Stud Welding"

DVS-Technical bulletin 0903 “Stud Welding with Tip Ignition“

DVS-Technical bulletin “Drawn Arc Stud Welding – Practical hints“

Trillmich, R. and Welz, W.: “Stud Welding – Principles and Applications”, DVS-Media, english edition, vol. 12, Düsseldorf 2016

Köster & Co. GmbH • D-58256 Ennepetal • Spreeler Weg 32 • Tel. +49 2333 8306-0 • Fax +49 2333 8306-38
Internet: http://www.koeco.net • E-Mail: koeco@koeco.net