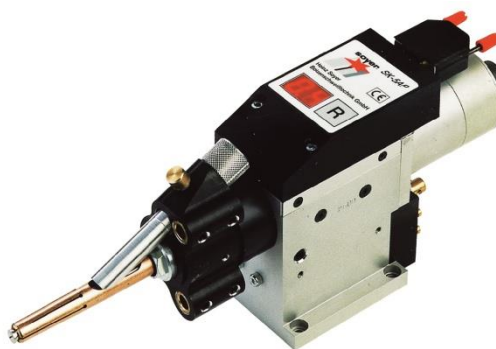
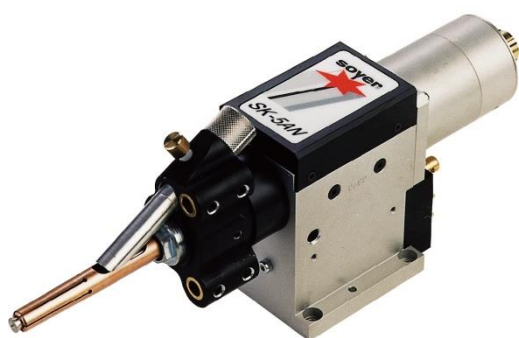


Welding Head SK-5AN SK-5AP

Operating Instructions



GB: English Version

Read these operating instructions before starting any work!



CE



Operating Instructions

SK-5AN SK-5AP Welding Head

Serial number*
SK-5AN Welding Head _____

Serial number*
SK-5AP Welding Head _____

* Please enter the serial number here, so that the data is immediately available if you need service support.



Thank you!

We congratulate you on purchasing your SOYER stud welding head. You have made an excellent choice. Your SOYER stud welding head was especially developed for fastening SOYER welding studs as per **DIN EN ISO 13918** on metallic workpieces at lightning speed.

Our devices have been tested and proven according to current European and national guidelines on health and safety. Proof of conformity has been established and the manufacturer is in possession of the corresponding documents.

	FOR YOUR SAFETY
Read all of these operating instructions <u>prior to start-up</u> . Please follow all safety precautions as well as all chapters of these operating instructions before starting to weld. Non-compliance with the safety precautions can result in serious personal injuries or death.	

SOYER® is a registered trade mark of Heinz Soyer Bolzenschweißtechnik GmbH.

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We have verified that the contents of this pamphlet correspond to the hard- and software described. Deviations, however, cannot be excluded so that we cannot warrant for absolute compliance.

The data in this documentation is verified regularly and any necessary corrections incorporated in future impressions. Any suggestions for improvement are appreciated.

Date of issue: May 01, 2013

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Printed in the Federal Republic of Germany





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1 Safety instructions

These safety precautions are for your safety.

	<p>General safety instructions Take part in a training programme. Read and follow all safety precautions listed below and all chapters of this manual before starting to weld.</p>
	<p>Non-compliance with the safety precautions can result in personal injuries or death. Only qualified persons are allowed to install, operate and maintain the equipment. Children and juveniles under the age of 16 years must be kept away from the equipment.</p>

	<p>WARNING It is prohibited to open the stud welding equipment. The service personnel are required to meet special qualifications. Our after-sales service has adequately trained personnel, suitable service equipment and the means to carry out all necessary works.</p>
---	---

	<p>Warning of electromagnetic fields Keep sufficient distance from electronic devices. When stud welding, highly intensive electromagnetic fields are created which may permanently damage these devices (e.g. television sets, airbags).</p>
	<p>Ensure that the welding equipment is not operated near electronically sensitive life-support equipment, such as in intensive care units in hospitals. Persons with pacemakers may neither operate the stud welding equipment nor stay in the immediate vicinity while it is running.</p>

	<p>Electric shock can cause death Prevent electric shock by insulating your body from the working area and the ground. Inspect all cables including power cord for damage, wear or bare wiring. Immediately replace damaged or worn cables.</p>
	<p>Always ensure the correct supply voltage in accordance with the data plate. Never connect the welding equipment to a power supply network with incorrect supply voltage. <u>Always</u> disconnect the welding equipment from the mains supply before starting any cleaning works. Only trained and appropriately qualified personnel are allowed to carry out works at the electric mains supply and welding system. Do not touch live electrical parts with bare hand. Wear dry, hole-free insulating gloves. Do not wear rings, watches or electrically conductive jewellery. Keep the work area, studs, guns, cables, energy source as well as your clothes dry.</p>



Fumes and gases can cause damage to your health

Fumes and suspended/floating particles may be generated during welding. Beware of fumes detrimental to health, particularly when using surface treated materials. Please also observe the safety regulations applicable for your country.

Do not inhale fumes and gases. Use adequate ventilation in the work area to remove fumes and gases.



Welding can cause fire and explosions

Welding sparks and heat from flames and arcs can cause fires. Keep a portable fire extinguisher within reach for immediate use. Be sure you are trained to use it.

When welding, do not wear clothes soiled with easily combustible substances such as oil, grease and paraffin oil etc.



Comply with the fire regulations and do not weld, for instance, in hazardous locations.



Pay attention to flammable objects at the welding place. All flammable materials and liquids, such as oil, fuel, etc. must be removed prior to the start of work.

Electronic equipment (e.g. airbags) and the use of explosive substances for fuel supply require further safety precautions when carrying out welding operations on cars. Appropriate information can be obtained from the trade associations or the car manufacturers.



Skin and eye protection

Arc rays and welding spatters can injure eyes and skin.

Wear safety glasses with side shields and protective goggles with correct shade of filter to protect your eyes from welding spatters and flashes of light that are generated during the welding process.



Wear gauntlet gloves made of leather as well as non-combustible closed working clothes such as heavy long-sleeve shirts, cuffless pants and safety shoes.



Wear a leather apron to protect your clothes from welding spatters. Keep sleeves and collars buttoned and remove open pockets from the front side of your clothing.



We recommend using ear protection. Some welding and working processes may generate loud noises.

1.1 Description of reference signs in the operating instructions

The non-observance of safety instructions such as pictographs and warning words can cause damage to persons. The safety instructions of this operating manual describe the following:

Safety instructions



Danger!	Immediate hazards which could result in serious personal injuries or loss of life.
Warning!	Potential hazards which could result in serious personal injuries or loss of life.



















Caution!	Potential hazards which could result in minor personal injuries.
Caution!	Warning of damage.



Note!	Potential detrimental situation which may cause damage to the product or to an object surrounding it.
Important!	Instructions for application and other useful information facilitating the proper use of the product.

Safety symbols

The following pictographs for warnings, prohibitions and regulations are used in this manual:

 Prohibited for persons with pacemakers	 Prohibited (only in combination with an additional safety symbol)	 Do not touch. Housing is current-carrying	 Fire extinguisher
 Warning of a danger spot	 Warning of dangerous electric voltage	 Warning of electromagnetic field	 Warning of moving parts
 General prohibition (only in combination with an additional safety symbol)	 Warning of inflammable substances	 Warning of explosive substances	
 Eye protection required	 Protective clothing required	 Ear protection required	 Protective gloves required
	General instructions are marked with the hand symbol.		

1.2 Staff qualification and training

The staff responsible for operation, maintenance, inspection and assembly must have the respective qualification for carrying out these works. Field of responsibility, competence and the supervision of staff must be carefully regulated by the user. If your personnel do not have the necessary knowledge, they must be trained and instructed. If necessary, this can be done by the manufacturer/supplier on behalf of the user. Furthermore, the user must ensure that the contents of the operating instructions have been fully understood by the staff. The society of welding institutes (GSI: Gesellschaft der Schweißtechnischen Institute mbH) offers the appropriate training courses for your personnel. For information on branches, please refer to website <http://www.dvs-ev.de>.

1.3 Dangers in the case of non-compliance with safety instructions

The non-compliance with safety instructions may not only endanger persons, but also the equipment and its environment. Any non-compliance with safety instructions may result in a complete loss of damage claims.

The following dangers may result if the safety instructions are not complied with:

- Failure of important system functions
- Failure of prescribed methods for maintenance
- Danger to persons through electrical, mechanical, thermal and/or acoustic influences

1.4 Before starting to weld...

- Check the state of all cables and cable connections before starting to weld
- Immediately replace defective cables and cable connections

1.5 Working with the stud welding equipment

Comply with all accident prevention regulations applicable to the operation of your welding device. If an accident happens,

- switch off the welding device and disconnect it from the mains supply and
- call a doctor

1.6 Inadmissible operating methods

Limit values

The working safety of the supplied stud welding equipment is only guaranteed if the system is used in accordance with its purpose. The limit values indicated in the chapter "Technical data" must never be exceeded.

1.7 Stopping the stud welding equipment

- Turn off the mains switch of the stud welding equipment
- Disconnect the mains plug from the mains socket
- Disconnect the earth cable, control cable and welding cable from the stud welding equipment
- Roll up the cables without buckling them
- Prevent the stud welding equipment being operated by unauthorized personnel
- Check welding cable and connections of the stud welding equipment for damage such as burn-off, mechanical wear etc. and have damaged parts replaced by the SOYER customer service


2 General


2.1 *The following should be principally observed...*

With the SK-5AN/5AP welding head you have purchased a product which

- is state-of-the-art technology
- fully complies with the current safety requirements and
- ensures high performance.

- Before installing the welding head, please observe the following:
 - Store the operating instructions in a place accessible to every operator.
 - Ensure that the respective operator has read and understood the operating instructions prior to start-up. Each operator should confirm this per signature.
 - Prevent the stud welding equipment being operated by unauthorized personnel.
 - Only trained personnel may operate the welding head.

	<p>DANGER</p> <p>Persons with pacemakers must not operate the stud welding system and must not stay near it while it is running. Ensure that the stud welding system is not operated near electronically sensitive life-supporting equipment, such as in intensive care units in hospitals.</p>
---	--

	<p>WARNING</p> <p>Keep sufficient distance from electronic devices. When stud welding, highly intensive electromagnetic fields are created which may permanently damage these devices (e.g. television sets).</p>
---	--

2.2 *Intended use*

The SK-5AN/SK-5AP SOYER® welding head allows you to weld pins and threaded studs from 3 – 8 mm in diameter and 6 – 35 mm in length and many other types of cylindrical fastening elements manufactured of steel and stainless steel.

If you need consultation or assistance in solving problems, please contact either our parent company or our field engineers.

2.3 *Marketing and service*

If you have any questions regarding the operation of the welding equipment, retrofits for special applications or if you require service, please contact your responsible service office or the following address:

Heinz Soyer Bolzenschweißtechnik GmbH

Inninger Straße 14
 D-82237 Wörthsee
 Telephone +49 (0) 8153 8850
 Telefax +49 (0) 8153 8030
www.soyer.de
export@soyer.de

2.4 *Information on the documentation*

The following operating instructions are supplied with the SK-5AN/SK-5AP welding head:

- Operating instructions for SK-5AN /SK-5AP welding head **Order no.: P00251**

2.4.1 Information on operating instructions

Legal relationship

We point out that the contents of these operating instructions are neither part of any former or existing arrangement, pledge or legal relationship nor have they been designed to modify the latter. All obligations of Heinz Soyer Bolzenschweißtechnik GmbH result from the respective contract of purchase. This contract also contains the complete and universally valid warranties. These contractual warranty terms are neither extended nor restricted by the implementation of these operating instructions.



CAUTION

Do not carry out any actions on the stud welding equipment without specifically knowing the operating instructions or the respective part. Ensure that only qualified and trained personnel familiar with the operating instructions operate the system.

2.4.2 Conduct in the case of malfunctions

If malfunctions occur, first try to detect and eliminate the causes according to the list in chapter 8 "Troubleshooting" of these operating instructions. In all other cases, contact our service department.

If you require our service, please make sure that you supply us with the following information:

- Customer number
- Product designation / options
- Serial number
- Year of construction
- Material of stud and workpiece
- Stud dimensions

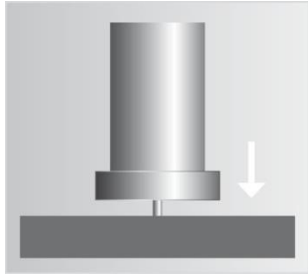
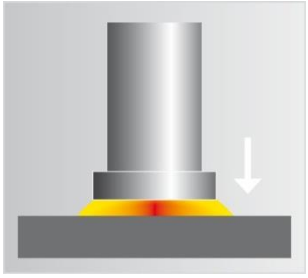
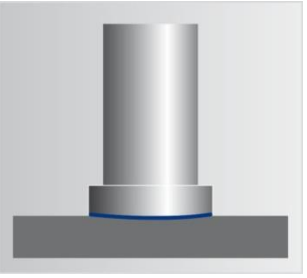
This information helps us save time and unnecessary costs, e.g. incurred by delivering the wrong spare parts.

3 Description of welding head

3.1 Welding process

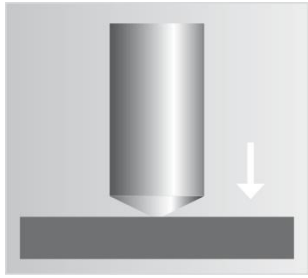
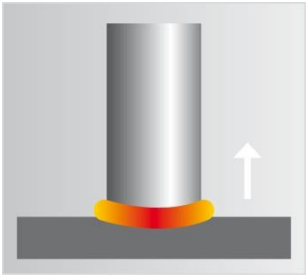
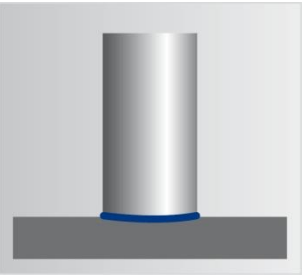
3.1.1 Capacitor discharge

Capacitor discharge welding allows threaded studs, pins, internally tapped bosses, insulating nails, flat plugs, special studs and special welding elements from 2 – 8 mm in diameter (in special cases up to Ø 10 mm) made of steel and CrNi steel to be welded on metallic workpieces. Conditionally it is also possible to weld aluminium and brass depending on the respective requirements. The inseparable weld joint is either carried out semi-automatically or fully automatically. In the welding process, the welding energy stored in a capacitor bank is discharged through the ignition tip of the welding stud within the extremely short time of 1 – 3 ms (0.001 – 0.003 sec.). Additional aids such as protective gas or ceramic ferrules are not required.

		
<p>The stud tip is placed into contact with the sheet.</p>	<p>Ignited electric arc generates a thin fusion zone on stud and workpiece.</p>	<p>The stud is immersed in the molten pool. Material solidifies and stud is welded.</p>

3.1.2 Drawn arc

Drawn arc stud welding serves to predominantly weld pin-shaped elements on metallic workpieces. This method allows semi- and fully automatic inseparable welding of threaded studs, pins, shear connectors, flat pins, internally tapped bosses, insulating pins and special studs from 3 – 22 mm in diameter made of steel, CrNi steel, heat-resistant steel, as well as in special cases aluminium, brass and titanium. A welding rectifier serves as a source of energy which provides continuous welding power and can be regulated in weld time and power. Weld time is 0.1 – 2.0 sec. Shielding gas or ceramic ferrules are usually used as auxiliary aids.

		
<p>The stud is placed on the plate.</p>	<p>The stud lifts to a preset height. The arc is ignited.</p>	<p>The stud is immersed in the molten pool. Material solidifies and stud is welded.</p>



IMPORTANT

Ensure that the surface is electroconductive, e.g. grind coated parts.

3.2 Different welding methods

The following welding methods are possible with the SK-5AN and SK-5AP SOYER welding heads:

- Capacitor discharge stud welding
- Drawn arc stud welding using shielding gas
- Short-cycle drawn arc welding using shielding gas

3.2.1 Stud welding with shielding gas

With this method, Corgon18* is used as auxiliary aid. This shielding gas protects the welding point from the atmosphere and simultaneously supports the weld pool. Moreover, it ensures a concave fillet weld bead formation with a blank metallic surface; this reduces the risk of corrosion and leads to an improved dynamic performance of the welded joint.

* Corgon 18 is a product designation of Linde AG. (Process gas as per DIN EN ISO 14175:M21 - ArC - 18) Gas mixture containing 82% Argon (Ar) and 18% carbon dioxide (CO₂)

3.3 SK-5AN/SK-5AP welding head

The SK-5AN and SK-5AP welding heads are suitable for being operated with capacitor discharge, drawn arc and short-cycle drawn arc.

The compact and lightweight SOYER welding heads have a patented semi- and fully automatic stud feed system (Pat. no. 0406 459). The welding heads can be easily and rapidly converted to other stud dimensions. Possible jams caused by studs are immediately detectable and can be easily resolved due to free accessibility. All connections are made with plug-in connectors to facilitate quick and easy start-up and maintenance.

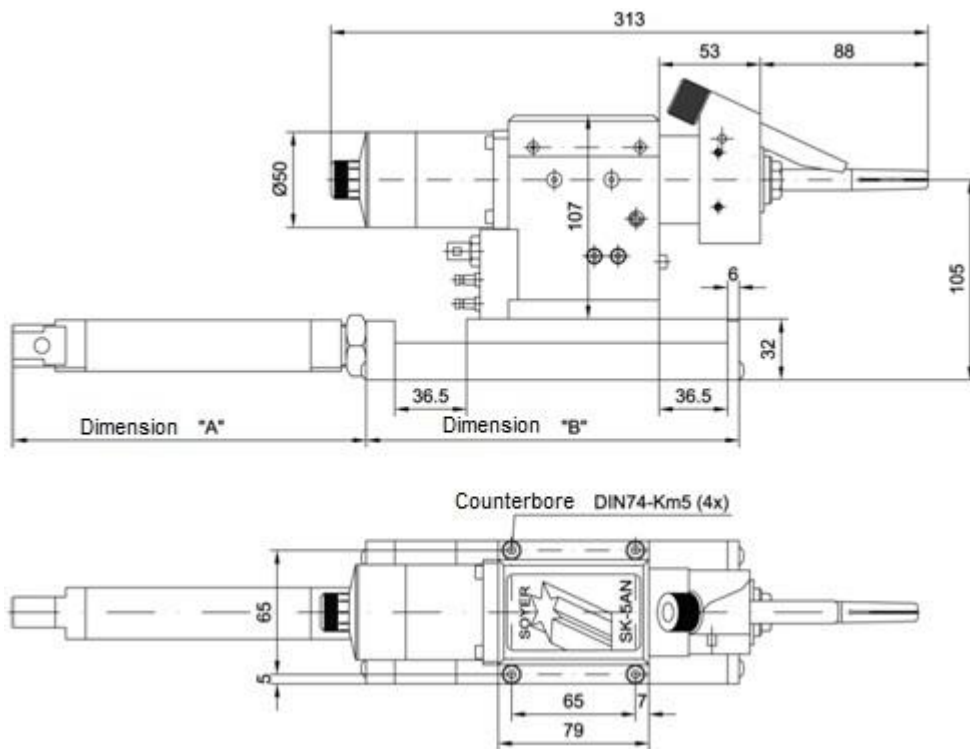
The SK-5AN and SK-5AP welding heads are ideally suited for connecting to stationary machining centres, CNC controlled machines, robots and handling systems etc.

For information regarding the stud welders to be used, please refer to the corresponding operating instructions of the stud welders.

3.4 Dimensions

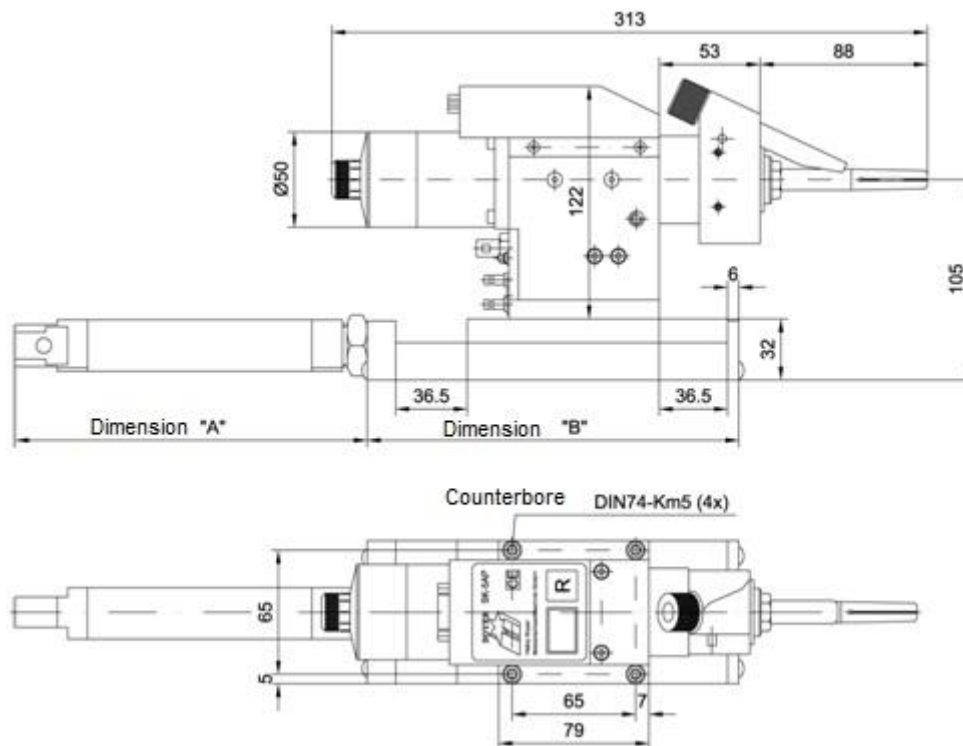
The SK-5AN and SK-5AP welding heads are designed in a handy and robust way and are easy to service. The illustrations below show the welding heads.

SK-5AN welding head



	Dimension "A"	Dimension "B"
Slide, 75 mm lift	185 mm	195.5 mm
Slide, 126 mm lift	225.5 mm	299 mm

SK-5AP welding head



	Dimension "A"	Dimension "B"
Slide, 75 mm lift	185 mm	195.5 mm
Slide, 126 mm lift	225.5 mm	299 mm

3.5 Technical data

	SK-5AN/SK-5AP welding head
Welding range - Studs and pins	Ø 3 – 8 mm and 6 – 35 mm in length
Range of application	Steel, stainless steel - conditionally aluminium and brass, depending on the respective requirements
Welding process	Capacitor discharge, drawn arc and short-cycle drawn arc
Welding sequence	up to max. 30 studs/min., depending on dimensions
Weight	4.5 kg with slide (lift 75 mm) 5.7 kg with slide (lift 126 mm)
Air connection	Operating pressure 6 bar minimum, 7 bar maximum Power density for lifting movement and plunger movement is 70 l/sec.
Subject to technical changes without prior notice	

4 Adjustment of welding head

The welding head allows studs to be automatically fed through a stud feed tube directly into the stud chuck. The plunger in combination with a selection of distance sleeves serves as a limit stop for welding studs of different lengths.

The welding head with pneumatic slide is usually supplied in operative condition together with a mounting device or a CNC bench welding machine.

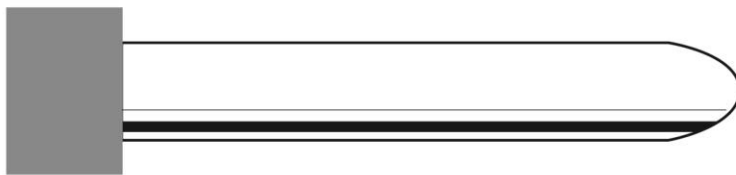
Prior to start-up you should ensure, however, that a conversion kit is installed which is appropriate for the stud to be welded. If need be, replace the conversion kit.

To do this, disconnect the air connections located at the front side of the stud welder. Make sure that the stud welder is switched off!

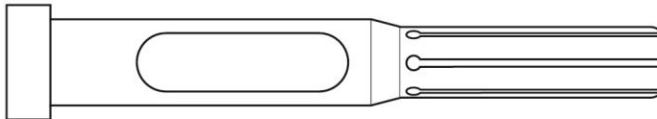
In order to change the stud chuck, please remove the stud feed tube (item 2, chapter 4.2) from the welding head and loosen the sleeve nut (item 3, chapter. 4.2) by means of a socket wrench SW 17.

The conversion kit allows the welding head to be set to different stud diameters and lengths. It consists of the following components:

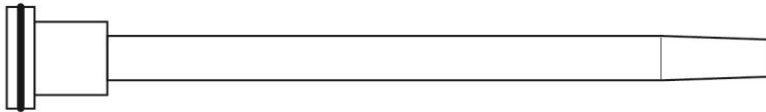
(1)



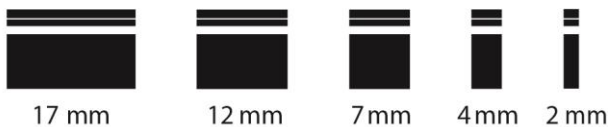
(2)



(3)



(4)

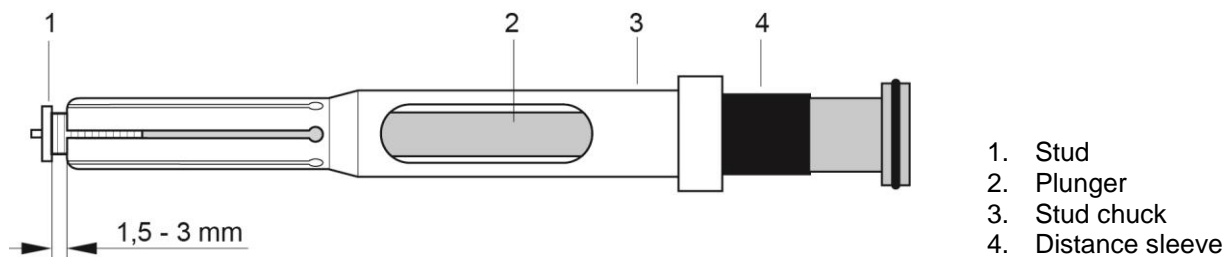


HZ.0070.X.NEU

1. Stud feed tube
2. Stud chuck
3. Plunger
4. Distance sleeves

4.1 Adjustment of stud chuck

- Choose the appropriate conversion kit for the respective stud diameter.
- Insert weld stud into the opening of the stud chuck (ignition tip or stud flange must point in the direction of the collet chucks of the stud chuck).
- Insert plunger in the stud chuck and press stud flange through the collet chucks until a distance of 1.5 - 3 mm between the front edge of the stud chuck and stud flange is reached.



- Insert a single distance sleeve or distance piece combination between plunger and stud chuck.

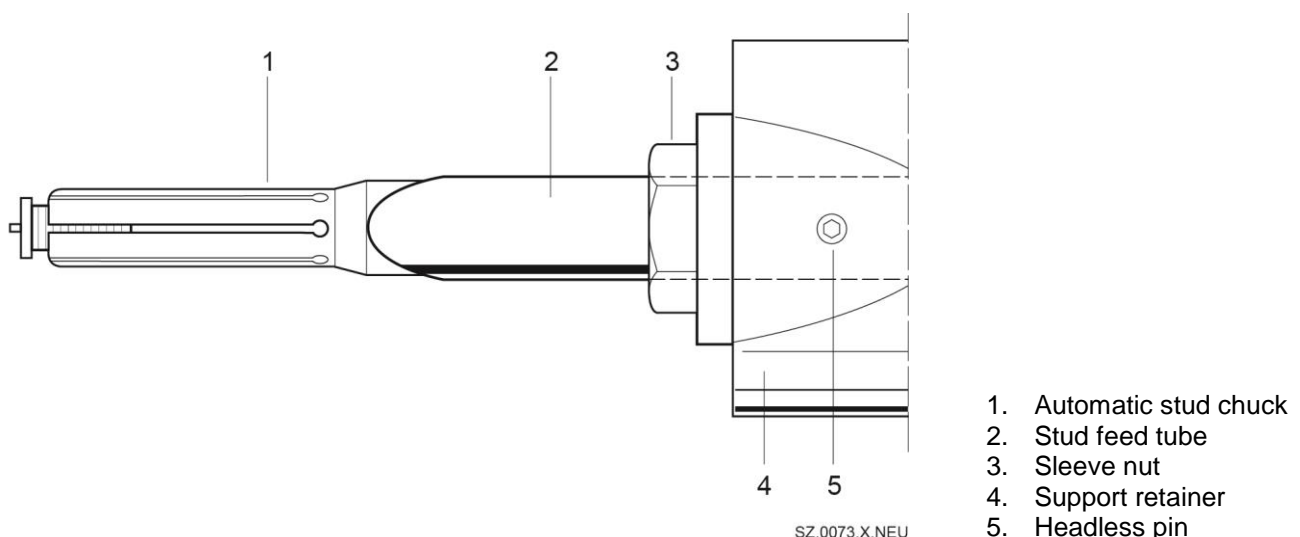


Stud (item 1) must make contact with the front end of the plunger (item 2).

Automatic stud feeding is possible up to a maximum stud length of 35 mm. Different stud diameters require corresponding stud chucks, plungers, distance sleeves, feed tubes and stud feed hoses.

Range of application for automatic stud chucks (thread diameter x length) M3 x 6-35 mm, M4 x 8-35 mm, M5 x 8-35 mm, M6 x 10-35 mm, Ø 7.1 x 10-35 mm, M8 x 10-35 mm.


4.2 Installation of stud chuck into welding head




- Loosen sleeve nut (item 3, chapter 4.2) by means of socket wrench SW 17.
- Insert stud chuck (item 1, chapter 4.2) with plunger into spring piston. Ensure correct fitting position while doing so.
- Tighten stud chuck (item 1, chapter 4.2) by means of sleeve nut (item 3, chapter 4.2). Hand-tighten sleeve nut by means of socket wrench SW 17.

- Push stud feed tube (item 2, chapter 4.2) through the support retainer (item 4, chapter 4.2). Ensure correct positioning while doing so.

4.3 *Adjusting the depth of immersion*

	<p>MORTAL DANGER The stud welder must be switched off before adjusting the depth of immersion.</p>
---	---

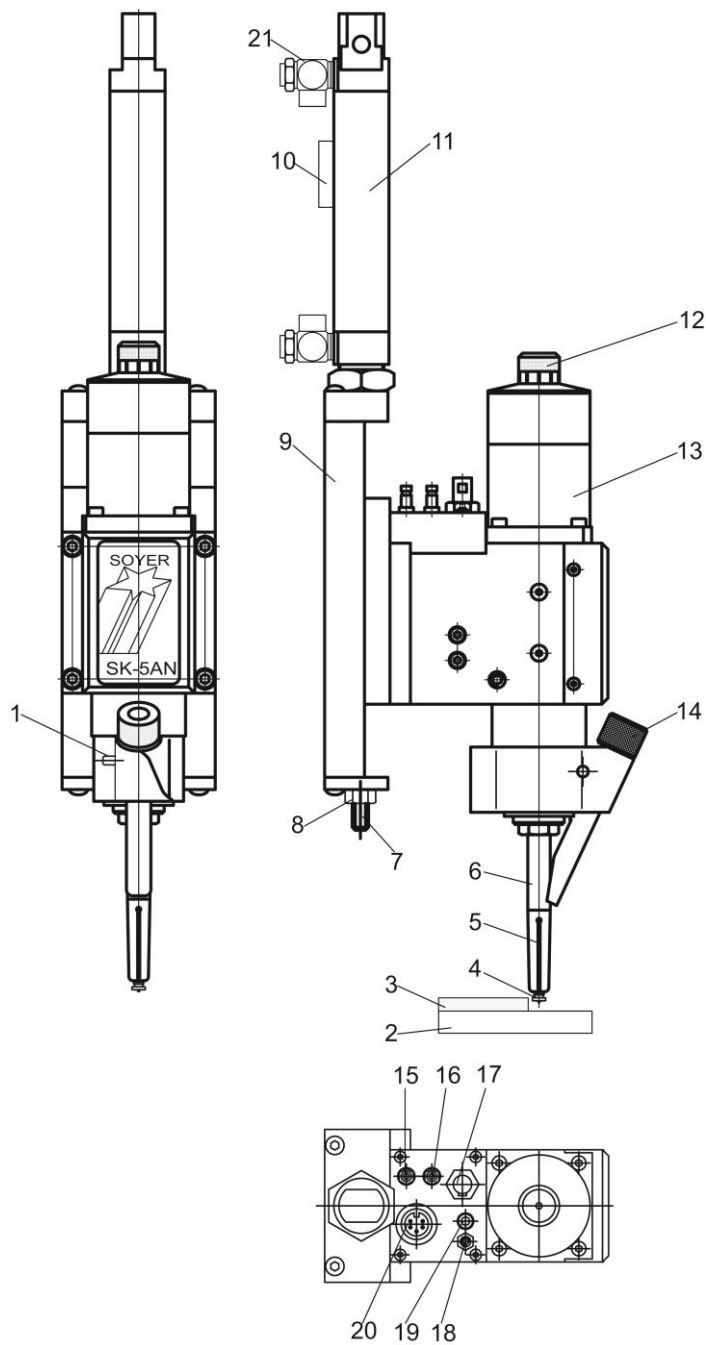
	<p>Compressed air must be supplied and the stud must make contact with the front end of the plunger.</p>
---	--

The depth of immersion is the distance the stud immerses in the liquid molten pool on the workpiece during the welding process. When positioning the welding head on the workpiece the weld stud is pushed back this distance.

When correctly using a support tube, ceramic ferrule or a gas shroud, the stud must project correspondingly in order to ensure a sufficient depth of immersion. The procedure for setting the depth of immersion is always the same even when using a support tube, ceramic ferrule or a gas shroud. The depth of immersion always depends on the respective stud diameter and welding task. An immersion depth of approximately 2 mm serves as the standard value for all welding procedures.

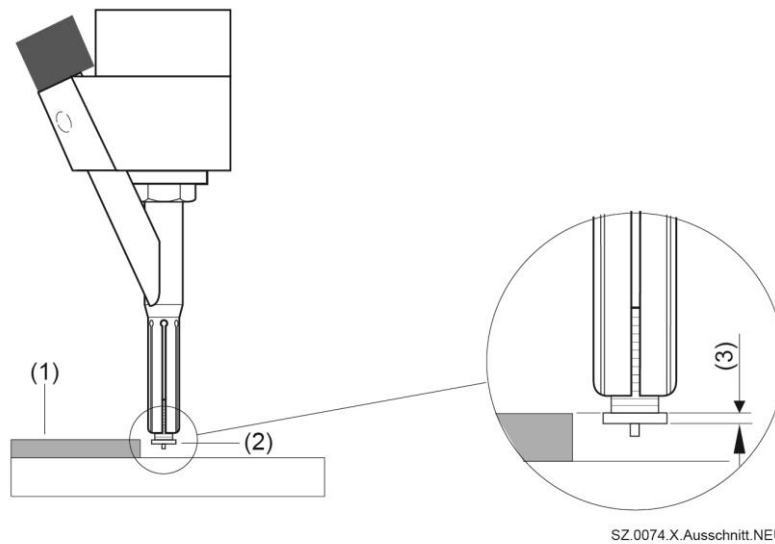
Set the depth of immersion in such a way that the stud chuck cannot touch the workpiece when no stud is inserted, otherwise the stud chuck will be welded with the workpiece.

4.3.1 Adjustment of immersion depth for SK-5AN welding head



- | | | |
|--------------------------------------|------------------------|-----------------------------------|
| 1. Locking device for stud feed tube | 8. Counternut | 15. Air connection "forward" |
| 2. Workpiece retainer | 9. Precision slide | 16. Air connection "backward" |
| 3. Workpiece | 10. Proximity switch | 17. Welding cable connection |
| 4. Weld stud | 11. Lifting cylinder | 18. Release switch |
| 5. Plunger | 12. Set screw for lift | 19. Connection for measuring lead |
| 6. Stud chuck | 13. Welding head | 20. Control cable connection |
| 7. Adjusting screw | 14. Stud feed tube | 21. Choker valve |

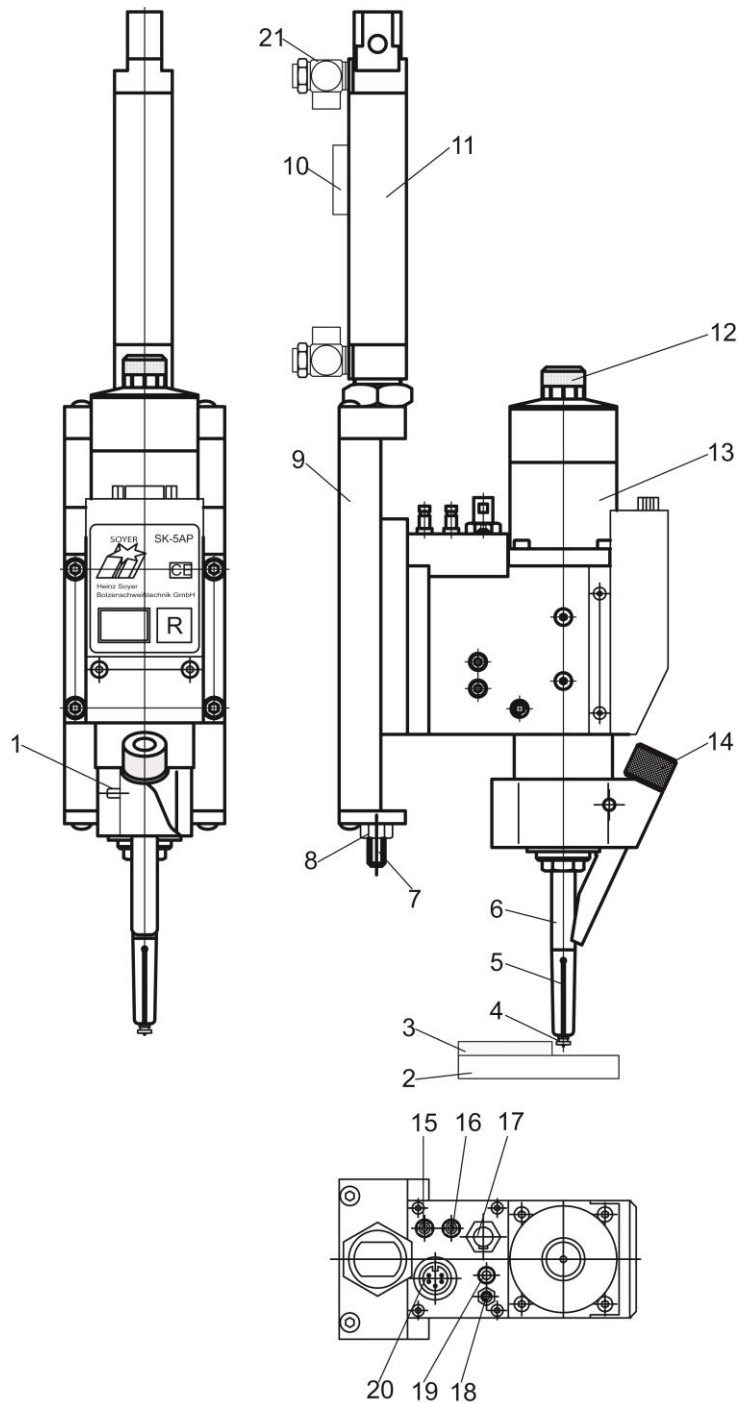
- Position welding head (item 13, chapter 4.3.1) with stud chuck (item 6, chapter 4.3.1) and weld stud (item 4, chapter 4.3.1) on the workpiece retainer (item 2, chapter 4.3.1). Move workpiece (item 3, chapter 4.3.1) sideways towards the weld stud (item 4, chapter 4.3.1).
- Accurately set the depth of immersion by means of the adjusting screw (item 7, chapter 4.3.1). Stud flange should immerse in the workpiece.
- Fasten adjustment of immersion depth by means of the counternut (item 8, chapter 4.3.1).



1. Workpiece
2. Welding stud
3. Depth of immersion

Top edge of stud flange = Top edge of workpiece

4.3.2 Adjustment of immersion depth for SK-5AP welding head

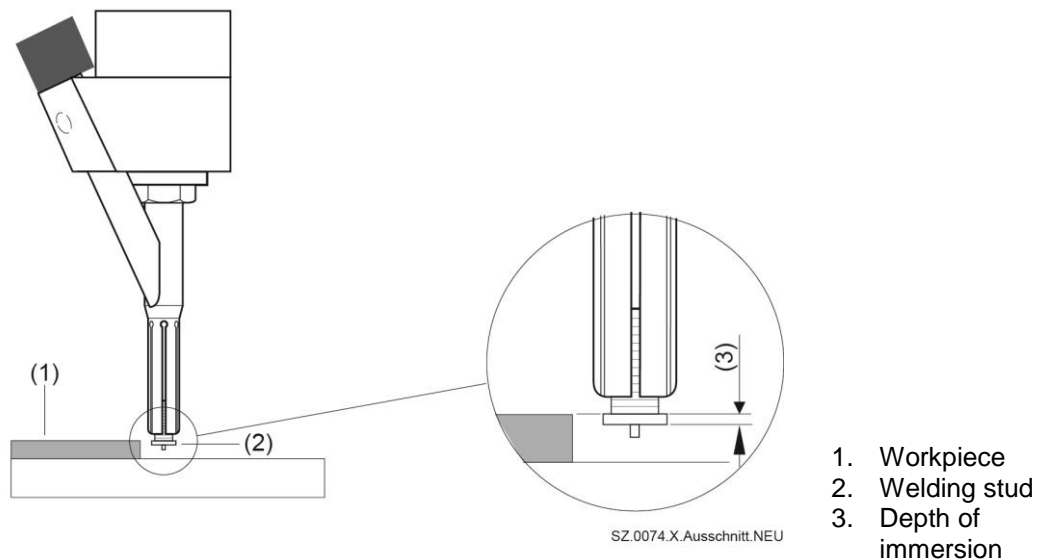


1. Locking device for feed tube
2. Workpiece retainer
3. Workpiece
4. Welding stud
5. Plunger
6. Stud chuck
7. Adjusting screw

8. Counternut
9. Precision slide
10. Proximity switch
11. Lifting cylinder
12. Set screw for lift
13. Welding head
14. Stud feed tube

15. Air connection "forward"
16. Air connection "backward"
17. Welding cable connection
18. Release switch
19. Connection for measuring lead
20. Control cable socket
21. Chocker valve

- Connect SK-5AP welding head to power supply unit.
- Connect power-supply unit to a 230 V socket.
- Switch on power-supply unit of digital display.
- Roughly set final limit stop by means of the adjusting screw (item 7, chapter 4.3.1). The welding head (item 13, chapter 4.3.1) should not touch the workpiece retainer or table top when moving downwards.
- Digital display shows 0.0. When -- is displayed, please press the "R" key.
- Press welding stud (item 4, chapter 4.3.2) manually against the plunger (item 5, chapter 4.3.2).
- Position welding head with stud chuck (item 6, chapter 4.3.2) and welding stud (item 4, chapter 4.3.2) on the workpiece (item 3, chapter 4.3.2).
- Set depth of immersion to a value of 2.0 (= 2 mm) by turning the adjusting screw (item 7, chapter 4.3.2). Stud flange should immerse in the workpiece.
- Fasten the setting for the immersion depth by means of the counternut (item 8, chapter 4.3.2).



Top edge of stud flange = Top edge of workpiece

4.4 Adjustment of the proximity switch

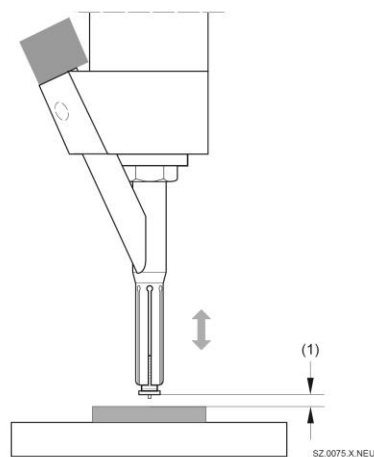
- Switch on stud welder.
- Set function "Lift test" at the stud welder.
- Loosen proximity switch (item 10, chapter 4.3.1) and push it down to the very end of the lifting cylinder (item 11, chapter 4.3.1).
- Move welding head (item 13, chapter 4.3.1) to the welding position.
- Slowly shift proximity switch (item 10, chapter 4.3.1) from bottom to top until "Release" at the stud welder or LED display at the proximity switch lights up and/or stud chuck (item 6, chapter 4.3.1) lifts off the workpiece (item 3, chapter 4.3.1).
- Tighten proximity switch (item 10, chapter 4.3.1) by means of the clamping ring.
- Move welding head (item 13, chapter 4.3.1) 2 - 3 times from top to bottom to check the setting. When welding head is in welding operation, the display "Release" at the stud welder or the LED display at the proximity switch lights up and/or stud chuck (item 6, chapter 4.3.1) lifts off the workpiece.

4.5 Adjusting the height of lift

The height of lift is the distance the stud is lifted from the workpiece during the welding process and which is required to ignite the arc. The height of lift always depends on the respective stud dimension and welding task.

To set the lift, switch on the stud welder.

- Connect compressed air.
- Stud must be in the stud chuck. You may reload a stud by pressing the release switch (item 18, chapter 4.3.1) at the welding head. It is not possible to reload studs when lift test/control is switched on.
- Set function "Lift test" at the stud welder.
- Position welding head (item 13, chapter 4.3.1) with weld stud (item 4, chapter 4.3.1) and stud chuck (item 6, chapter 4.3.1) on the workpiece.
- When the welding head rests on the adjusting screw (item 7, chapter 4.3.1), the proximity switch (item 10, chapter 4.3.1) triggers and the stud chuck lifts off the workpiece. With drawn arc and short-cycle drawn arc operation the weld stud should lift for 1 - 2 mm and with capacitor discharge operation for 2 - 4 mm from the surface to be welded.
- The digital display of the SK-5AP welding head allows you to read the values measured for the height of lift.



1. Height of lift

- Turn adjusting screw for lift (item 12, chapter 4.3.1) clockwise to reduce the lift.
- Turn adjusting screw for lift (item 12, chapter 4.3.1) anticlockwise to increase the lift.



There is no lift when the set screw for the lift (item 12, chapter 4.3.1) is at the right or left limit stop.

- Set stud welder to welding operation.



Depending on the type of stud welder, the stud welder can be set to welding operation by either pressing function key "lift test" again or by setting the operating mode switch to "welding operation". For further information, please refer to the operating instructions of your stud welder.

- Stud welding equipment is now ready for operation.



4.6 *Adjusting the speed of the lifting cylinder*

If the welding head touches the workpiece with too much force when moving down, the ignition tip, especially in case of aluminium studs, may become deformed, thus negatively impairing the welding result.

Two choker valves are mounted to the air connections of the lifting cylinder (item 11, chapter 4.3.1) to control the speed when the welding head is moving vertically.

The lower choke controls the speed of the downward movement. Turn the choke screw clockwise to reduce the speed and anticlockwise to increase it.

The upper choke controls the speed of the upward movement. Turn the choke screw clockwise to reduce the speed and anticlockwise to increase it.

Set the damping for the final position by means of an adjusting screw in the lifting cylinder (item 11, chapter 4.3.1) to prevent the welding head from touching the workpiece with too much force.

5 Start-up

5.1 Installation of welding head into mounting device

The welding head with pneumatic slide is usually supplied in operative condition together with a mounting device or a CNC bench welding machine.

5.2 Connection of welding head to stud welder

- Insert welding cable plug of welding head into the welding cable socket of the stud welder.
- Insert control cable plug of welding head into the control cable socket of the stud welder.

Before installing the "V - forward" and "Z - backward" air supplies, install the stud chuck (see chapter 4.2). Shut off the air supplies at the stud welder prior to dismantling the stud chuck.

Connect compressed air supply plugs of the welding head to the air connections at the stud welder and latch them:



Connect "V" air connector plug of welding head to "forward" air connection at the stud welder.



Connect "Z" air connector plug of welding head to "backward" air connection at the stud welder.

- Insert gas connector plug of welding head into the connecting socket of the stud welder and latch it (only applies to welding head with optional "Gas" equipment).
- Connect earth cable to earth cable connector of the stud welder and lock by turning it to the right until stop.
- Firmly attach earth cable to the workpiece.



Ensure optimum contact with the workpiece.

- Connect compressed air (6 - 7 bar) to main connection at the rear of the stud welder.
- Connect mains cable of stud welder to power supply.



For further information regarding the start-up of the welding head with your stud welding equipment, please refer to the operating instructions of the respective stud welder.



5.3 Operation

The welding head enables

- semi-automatic operation by manually feeding weld studs into the stud feed tube.
- fully automatic operation by automatically feeding weld studs from the universal feeder into the stud feed tube.



With semi- and fully automatic operation, only a single stud may be in the stud feed tube and stud chuck. Malfunctions may be caused if more studs are simultaneously fed via the stud feed tube.

- Connect stud welder to earth.
- Connect welding head as described in chapter 4 and 5.
- Connect stud welder and universal feeder (if available) to the mains supply.
- Adjust setting parameters at stud welder.
- With semi-automatic operation, insert a welding stud into the stud feed tube.
- With automatic operation, connect universal feeder.
- Press release button (item 18, chapter 4.3.1). Stud is reloaded.
- Move welding head into welding position by supplying the air cylinder with compressed air. With SOYER bench welding machines this can be done by operating the two-hand release or with SOYER CNC bench welding machines by calling the welding program.



With automatic operation, ensure tight fit of the stud feed hose.

For further information regarding connection, operation and welding parameters to be set, please refer to the operating instructions of your stud welder.

6 Quality control (stud welding)

6.1 *General*

Provided that the SOYER stud welding system is properly used and the materials are appropriately selected, the strength of the welded joint (weld zone) will always be stronger than that of the stud or base material. The following tests are carried out in general practice:

- Visual inspection
- Bend test

Please also refer to the following DVS information sheets:

- DVS 0903 Capacitor discharge stud welding
- DVS 0904 Practical information – Arc stud welding

or standards

- DIN EN ISO 14555 Arc welding of metallic materials
- DIN EN ISO 13918 Studs and ceramic ferrules for arc welding

Heinz Soyer Bolzenschweißtechnik GmbH is a member of the German Welding Society (DVS = Deutscher Verband für Schweißtechnik e.V), Munich.

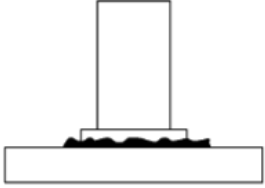
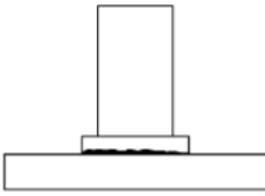
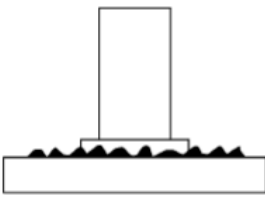
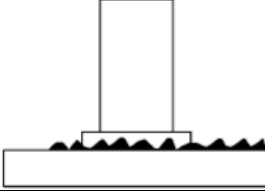
6.2 *Demands on the company*

The company must employ a technical supervisor responsible for welding matters, as well as qualified operating personnel for stud welding.

6.3 Test execution

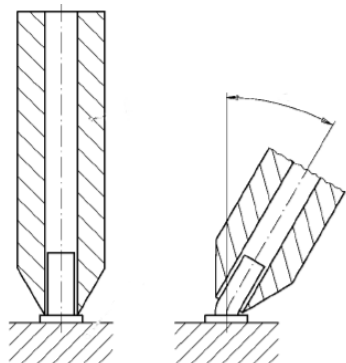
6.3.1 Visual inspection

The visual inspection serves as a rough check for major defects. The uniformity of the weld is assessed.

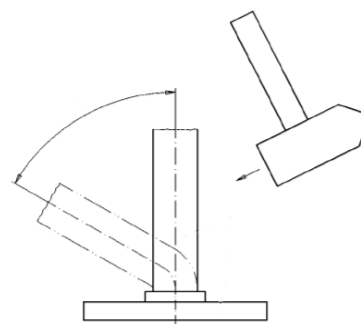
	<p>Good welded joint. Optimum setting.</p> <p>Collar spattered for about 1 – 1.5 mm around the flange. Stud flange is completely welded. No visual defects.</p>
	<p>Poor-quality welded joint e.g. caused by insufficient welding energy.</p> <p>No or only small weld spatter around joint. Stud flange is not completely welded.</p>
	<p>Poor-quality welded joint e.g. caused by excessive welding energy.</p> <p>Considerable spatter around stud flange. Stud flange scorched.</p>
	<p>Poor-quality welded joint, e.g. caused by arc blow, tilted welding position of welding stud.</p> <p>Weld spatter to one side only. Stud flange not completely welded. Visual defects.</p>

6.3.2 Bend test

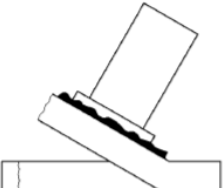

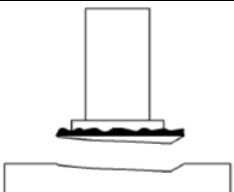
The bend test is a simple work test which serves to roughly check the setting values selected. The welding zone is subjected to undefined tension, pressure and bending. A minimum of 3 studs are welded and bent by 30° using a tube slipped over the stud. The test is successful when no superficial fissure or fracture is detected in the welding zone.



Bend test with tube placed upon the stud



Bend test with hammer

	<p>Good welded joint. Optimum setting.</p> <p>Tearing of parent metal.</p>
	<p>Good welded joint. Optimum setting.</p> <p>Fracture above stud flange.</p>
	<p>Poor-quality welded joint.</p> <p>Fracture in the weld seam.</p>



6.3.3 Production of samples

The studs for the work tests are welded on a sheet metal the minimum size of which is 700 mm x 200 mm. Use the same welding positions and edge distances as on the component to be welded later. If possible use parts that are identical to those used in later production.

6.3.4 Tensile test

The tensile test serves to test the metallic bond of the stud with the base metal. At least 3 studs are welded and then axially loaded by means of an appropriate tension device until they break. If the customer requires that a certain percentage of the welded studs should be tested with a specific test load in production, a tension device with load indicator should be used.

If the stud breaks outside the welding zone, the test is successful.

If it breaks within the welding zone, an examination of the fractured surface helps to find out the appropriate changes of the welding conditions. The setting values must be modified and the test repeated.

Note

Numerous special accessories are available for optimally testing stud welded joints.

BP-1 SOYER Bend Testing Device for non-destructive stud testing to support quality assurance procedures

DMS-1 SOYER Torque Wrench for non-destructive stud testing to support quality assurance procedures

For further information, please contact our parent company or the customer service responsible for your area or visit our website at www.soyer.de.

7 Maintenance

The welding heads are constructed in such a way that only a minimum of maintenance is required. Parts, however, which are exposed to damage by welding spatters, should be kept clean. Wear and tear parts such as stud chuck, gas shroud, support tube, ceramic ferrule holder, plunger and stud feed tube must be replaced when worn out.







- When welding aluminium studs, the stud chuck must be cleaned after carrying out approx. 1000 welds.

The slide guides must be cleaned and lubricated at regular intervals. It must be possible to easily move the slide in the slide guiding device without using compressed air.

If there is too much slack in the slide guide, the sliding rail must be set by means of the adjusting screw located at the bottom of the slide's inner part.






After carrying out the adjustment works, check the mobility of the slide in the slide guide without using compressed air.

Please note: A special wrench is needed to perform work.

 	<p>CAUTION Disconnect the mains cable from the mains supply before replacing any components. Electric and electronic components may only be replaced by the SOYER[®] customer service or by trained specialised personnel.</p>
	<p>DANGER TO HEALTH Before starting maintenance works, disconnect the shielding gas supply and compressed-air supply from the connections of the stud welding equipment.</p>
	<p>NOTE Only use original SOYER[®] spare parts.</p>
 	<p>MORTAL DANGER Ensure that the mains plug has been disconnected and that the capacitors have been discharged before opening the housing to replace components.</p>

8 Troubleshooting

The following list of errors, their causes and countermeasures is to help you deal with any immediate on-the-spot problems. If you still cannot eliminate the problem, please contact the SOYER customer service responsible for your area or Heinz Soyer Bolzenschweißtechnik GmbH.

 	<p>MORTAL DANGER Always disconnect all connecting plugs from the sockets before opening the housing of the stud welding equipment. Only trained and appropriately qualified personnel are allowed to carry out works at the electric power supply and welding system.</p>
	<p>DANGER TO HEALTH Only trained and appropriately qualified personnel are allowed to replace components of the stud welding equipment.</p>
	<p>MORTAL DANGER Before replacing any components, make sure that the capacitors of the stud welder have been discharged.</p>
	<p>DANGER TO HEALTH Before starting repair works, disconnect the shielding gas supply and compressed-air supply from the connections at the front side of the stud welding equipment.</p>

Error	Cause → Elimination
System does not weld, no sparking or only slight sparking.	<p>Welding cable and/or control cable are not connected properly. → Check all cables to ensure tight fit. Ensure that the cables are not damaged and replace them if necessary.</p> <p>Connector plug or connector socket of stud welder is burnt down. → Have connector plug or connector socket replaced by SOYER customer service.</p> <p>Earth clamps are not attached to the workpiece. → Attach earth clamps.</p> <p>Welding points and/or earth connection points at the workpiece are not metallicly blank. → Clean welding point or earth connection points and remove oxide films.</p> <p>Height of lift and/or depth of immersion are incorrectly set. → Set the height of lift and/or depth of immersion according to the operating instructions of your welding head.</p> <p>Gas flow rate is higher than 5 l/min. Arc is extinguished. → Set gas flow rate to 4-5 l/min.</p>
Stud does not lift.	<p>Height of lift is not set correctly or knurled screw is at the left or right limit stop. → Set height of lift of your welding head according to the operating instructions of your welding head.</p> <p>Control of stud welder or welding head is defective. → Contact SOYER customer service.</p> <p>Proximity switch is not set correctly. → Set proximity switch according to chapter 4.4.</p>
Stud thread is scorched.	<p>Studs are too loose in stud chuck. → Insert a new stud chuck.</p> <p>Stud chuck is worn. → Replace stud chuck.</p>

Please also observe the instructions given in the "Troubleshooting" chapter of your stud welder.

Error	Cause → Elimination
Various welding results	<p>Height of lift and/or depth of immersion are incorrectly set. → Refer to the operating instructions of your welding head to set the height of lift and/or depth of immersion correctly.</p> <p>You have used low-quality studs with inaccurate dimensions or poor surface finish. → Only use SOYER welding studs.</p> <p>Welding energy, welding time and/or gas flow are not set correctly. → Set welding energy and/or gas flow according to the operating instructions of your stud welder.</p> <p>Cable connections and/or earth clamps are too loose. Transition resistances are generated. → Check all cable connections and earth clamps for tight fit. Tighten connections if necessary. Ensure good earth connection.</p> <p>Stud too loose or not fully inserted until stop at the plunger. → Insert stud into stud chuck until stop. Replace stud chuck if necessary.</p> <p>Workpiece springs back during welding process. → Ensure good and stable support of workpiece. → Use stand with support tube. Optional accessories (order no.: P05540).</p>
Formation of bead to one side only, at equal points.	<p>Magnetic blowing effect during welding results in a formation of beads. Arc is forced into a certain direction. → Alter earth clamp fixture, place iron parts on the edges.</p>

9 Transport and storage

The welding head with pneumatic slide is robustly designed. Please ensure, however, that transport is free from vibrations.



DANGER TO HEALTH

Prevent unauthorized use of the stud welding equipment by children and unqualified personnel.

The **stud feed tube**, **stud chuck** and **plunger** need to be dismantled prior to transportation to prevent damage to the welding head.

10 List of standards and guidelines

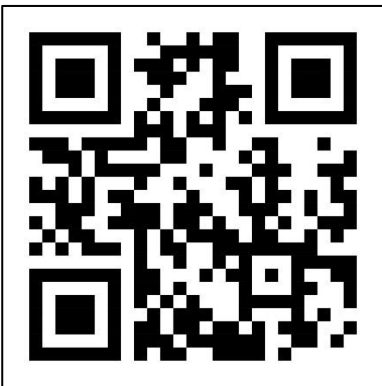
- 2006/42/EC EC Directive on Machinery
- 2006/95/EC EC Directive on Low-Voltage
- 2004/108/EC EC Directive on Electromagnetic Compatibility
- DIN EN ISO 12100 – 1 Safety of machinery; basic terms, general principles of construction; Part 1: basic terminology, systems engineering
- DIN EN ISO12100 – 2 Safety of machinery; basic terms, general principles of construction; Part 2: technical principles, specifications
- EN 60204 –1
(formerly VDE 0113) Electric equipment of machinery, general requirements
- EN 60974 – 1
(DIN VDE 0544-1) Safety requirements for arc welding equipment part 1: welding current sources
- BGV A1, BGV A2,
BGV A3, BGV 5 General instructions
(instructions for accident prevention)
- DIN EN ISO 14555 Arc welding of metallic materials
- DIN EN ISO 13918 Studs and ceramic ferrules for arc welding
- DVS Information Sheet 0903 Capacitor discharge stud welding with tip ignition
- DVS Information Sheet 0904 Practical information – Arc stud welding

11 Terms of warranty

We warrant for this equipment for a period of 12 months in the case of commercial, professional or equivalent use. When repairs are necessary, we guarantee to undertake them in our factory in Ettersschlag. Parts subject to wear and tear are excluded.

Any claim to a warranty will be forfeited if damage is caused by improper operation, when repairs or interferences have been made by unauthorized personnel, or whenever accessories and spare parts have been used which do not match our equipment.

We cannot guarantee the perfect function of the stud welding system and the quality of welded joints when non-Soyer welding studs are used.



Heinz Soyer Bolzenschweißtechnik GmbH

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