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Arc 900

Operating Instructions

Sunbelt Stud Welding, Inc. is here for you if you need us!

In addition to these operating instructions, you can be assured that our experienced stud welding personnel are here to assist you with your entire stud welding needs. So if you have any question that can't be solved by these instructions, just call us.

You can contact us at:

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If you unfold the last page you will find an overview of the equipment.

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Introductory information

Target group of these operating instructions

Safety information

Before putting the equipment into operation acquaint yourself with the contents of these operating instructions. Thus you will achieve the best welding results and you will work safely.

These instructions are intended for operators and supervisors of the stud welding equipment.

For the operator
Knowledge and experience in the field of welding are necessary to:

- judge the place of work
- set-up the equipment
- choose the weld stud

In addition knowledge of the handling of stud welding equipment is required. This kowledge is either given by the manufacturer or by a trained operator.

For the operating staff
Only people over 18 are allowed to weld. Knowledge in this line of work is required.

For the employer
The staff have to be instructed regularly but at least once a year according to the regulations of the safety-laws of your country.

Untrained or unauthorized staff are not allowed to use the stud welding equipment.

Special qualifications and regulations

Normally there is no particular examination necessary. For the sector of planning controls according to DIN 18 800 or Eurocode 4 (a field laid down by law) there are special requirements for the executing factory.

Examination

For stud welding in the sector of planning controls there is an examination necessary according to DIN 8563, part 10 – securing the quality of welding works – or DIN EN ISO 14 555.

According to DIN EN ISO 14 555 – securing the quality of welding works, stud welding of metal materials – the operating staff have to be examined according to EN 1418.

The welding supervision is responsible for the production and the security of the quality.

Quality assurance

In order to secure the quality DIN EN 729 – general welding technical requirements – is applied.

Introductory information

Meaning of symbols

To shape the text clearly we have used different symbols. They are explained as follows:

- • A dot is used with enumerations.
- — A dash announces works you have to carry out.
- → Cross-references to other passages in the text are provided with an arrow.

The little welder has three different functions depending on what he is holding in his hand.

The stud marks tips and hints regarding the operation.

The spanner announces tips regarding adjustments.

The warning triangle refers to important safety precautions.

Field of use of the stud welding equipment

The stud welding equipment is designed for the welding of studs using the arc pressure welding process. The equipment only works when a welding gun is fitted.

With the welding gun welding elements can be welded on to suitable parent metals according to EN 13 918 – studs for arc welding. For further use consult your country representative or BTH.

Features of the stud welding equipment

- **Ease of operation**
  The stud welding equipment is easy to operate and demands no special exam for welders – except for the sector of planning controls. By means of the partial mechanization of the welding process high-quality weldings can be achieved after a short training period.

- **Safety**
  In order to work as safely as possible with the equipment we have constructed it according to the regulations of the EU and the national German regulations. Working under increased electric danger is permitted. The equipment meets the demands of the protection category I, IP23 and has the "S" as well as the "CE"-sign.

- **Long life**
  The transformers, rectifiers and electronics are especially robust and guarantee - together with the modern sheet steel case - a long life of the equipment.

Safety information

In this chapter you will find general advice on safety precautions. In addition the single chapters of these operating instructions refer to safety precautions which are not described here.

Please observe the following pieces of advice for interest of your own safety, your colleagues' safety and to ensure the safety of the equipment.

When welding with power a number of dangers can result from undisciplined conduct. Therefore you should work especially carefully and not under pressure. Accidents cannot be undone.

Stud welding requires the usual safety precautions applied to arc welding. The safety precautions are described in the German UVV 26.0 – welding, cutting and related processes.

For the employer
Inform those people working with the equipment regularly about these safety precautions and in accordance with the legal regulations.

For the operating staff
Operators have got experience with the stud welding equipment and are able to realize and to avert dangers of electric welding.
The operating staff may only work with the equipment after release and instruction by an authorized trainer.
People working with the equipment must be over 18.

No unauthorized persons!
Make sure that unauthorized, untrained staff or especially children do not use the equipment.

Do not work unobserved
Weld only within sight of other persons who can help you in an emergency.

Working surroundings

Mains connection

The mains connection socket has to be checked by a qualified employee in the field of electrical equipment. This is also true for, e.g. mobile connections on construction sites.
The mains voltage and the safeguarding have to meet the values of the technical data.

Danger of fire and explosion

Sparks can unintentionally cause fires. Therefore remove all inflammable things from the working area or take appropriate protective measures.
There is increased danger in flammable areas as well as in or at containers filled with dangerous substances. In such areas you are only permitted to weld after receipt of the official release by the works manager.

Restricted areas

In cramped rooms with conductive walls welding current sources are not permitted to be installed.

Ventilation or suction

At fixed welding places or when welding objects that are leaded, galvanized, cadmium-plated or painted with leaded colours and in cramped rooms appropriate ventilation is necessary. Health damaging smoke and gas can develop.

Magnetic fields

Pacemakers or implants

Due to the design high magnetic fields develop for a short time. Persons with magnetically influenceable pacemakers or metal implants may not approach the equipment. If necessary signs have to be put up.

Staying away from electric equipments

A sufficient safe gap must be kept between electric and electronic equipments that can be disrupted or destroyed by magnetic fields.

Magnetic stores

All magnetic stores near the equipment or the cables can be destroyed, such as floppy discs, magnetic tapes or magnetic cards (telephone- and cheque cards).

Safety information

Personal protective equipment

Stud welding in accordance with the regulations causes fewer damages by radiation, welding splashes or smoke than ordinary arc welding. However, the following notes have to be observed.

Eye protection

It is necessary to wear safety glasses with transparent eye protective lenses and radiation protection filters which can be turned down. Thus you protect yourself against heat radiation, blinding and splashing work pieces. There is increased danger when the hot ceramic ferrule is knocked off the stud.

Workwear

The work wear must not be made of flammable material, it should be tight-fitting and dry. It has to cover your body sufficiently and should not be dirtied by flammable substances. Leather gloves, leather apron and insulating shoes are recommended.

Protective clothing

In some cases it can be necessary to wear protective clothing such as:

- feet protection against down falling hot or heavy parts of material, leather gaiters for root penetration engineering
- welding apron and leather protection gloves against contact with hot work pieces
- protection hood for overhead works
- ear protection against noise over 90 dB(A) or if you are especially sensitive to noise

Respiratory equipment

Respiratory equipment is required if damaging gas, fume, fog or smoke develop which cannot be sucked away.

Insulating jacket

The welder should be insulated by appropriate shoes or by a rubber pad or insulating jacket on the floor.

Before starting to work

Checking equipment and cables
Before connecting the equipment do a visual inspection of the cables and the equipment. Neither of them may be damaged in any way, and you have to check if the cable connections are properly fastened.

Observe temperature of surroundings
Stud welding should not be carried out with surrounding temperatures below 5 °C. Under such circumstances a perfect and resitent connection between studs and base material cannot be guaranteed.

At work

Work piece must not be earthed
Take care that the work piece is not earthed into sensitive systems. Fault currents and stray currents can result; except work pieces which are inevitably connected with the earth, such as in the ship building industry.

Distance between the two earth points
The two earths must be fastened equally far from the welding joint to obtain even welds. For more detailed information see chapter "Tips for stud welding".

Thickness of the work piece
Work pieces, such as sheet metals may not be thinner than 1/4 of the stud's diameter due to the danger of burning through.

Danger of burning and fire
Due to heat conduction there is the danger of burning even at work pieces which look "cold" or which are further away from the welding joint. Before leaving, secure your working place against unintentional touch by third party if there is the danger of burning.
The heat conduction can cause dangers of fire even in places which are further away from the working place. Please, keep that in mind when judging the working place. Keep a fire extinguisher nearby which works with dry powder (not with water).

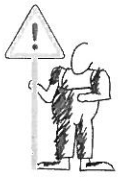
Protecting other persons
Point possible dangers out to persons nearby or to helpers and equip them with the necessary protection.

No conductive objects
Do not put any conductive objects into the ventilation slots such as wires.

Installing and connecting

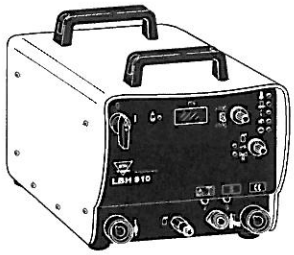
Checking scope of delivery

Only if you receive a packed equipment:



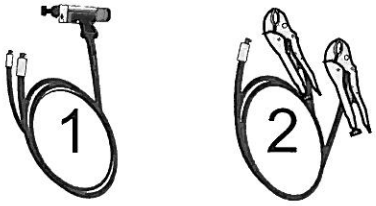
Caution! The straps stretched around the package are under extreme tensile stress. Therefore cut the straps with a side cutter. While cutting:

- Stand away from the "flight path" of the two straps.
- Do not hold on to the straps under any circumstances. You might seriously hurt yourself.



Check if the delivery is complete. Apart from the stud welding equipment the delivery comprises the following items:

- 1 – a welding gun PHM10 or PHM12 (without epuipment) with cable. In addition a shielding gas jig for the welding gun if you have ordered one.
- 2 – an earth cable with two earth pliers



Please, report immediately to the BTH-after-sales service about missing parts or parts damaged in transit.
Adress → see overleaf of these operating instructions.

Choosing place of installation

Make sure that

- you have got a good firm working surface,
- there is sufficient protection against rain and dampness,
- the room as well as the equipment are sufficiently ventilated,
- there is a checked CEE-socket.

Transport

There is a carrying handle for the transport. In transit take care to secure the mains cable. Connected earth- or welding gun cables should be removed prior to transport.

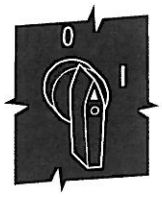
Securing equipment
After putting down the equipment secure it against unintentional turning over.

Installing and connecting

Connection

- Place cables without loops. Otherwise they can severely heat.
- Before connecting check if any of the cables are damaged.

The equipment may only be connected to a checked CEE-sokket with the necessary connected loads → chapter »Technical data«.



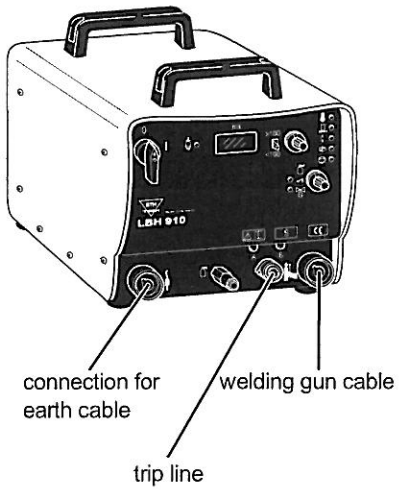
— Turn on/off switch to "0".

— Check if cables, socket and plug are damaged.

— Connect equipment to the a.c.mains and secure plug.

Connecting welding gun and earth cables

We recommend to connect only licensed welding guns by BTH to the equipment. Welding guns by other manufacturers can have a different allocation or polarity and thus can destroy the equipment. If you connect welding guns by other manufacturers we do not guarantee the security and the proper performance of the stud welding equipment.



The following items must be connected to the equipment:

- The earth cable with two earth pliers
- Welding gun cable with control cable

The welding gun is connected with a control cable and a thicker cable for the welding current. Both cables have to be connected to the equipment.

The plugs of the welding cables have got metal tappets. After plugging secure the plug-in-connection by turning.

— Connect and secure welding gun cable with control cable and earth cable.

Only when extending the welding gun cable

— Connect and secure welding gun cable with control cable to the equipment.

— Connect welding gun cable with control cable to the extension cable. Secure plug-in-connection by turning.

Setting-up equipment and welding gun

Before starting to weld do as follows:

- Connect earth cables to the work piece
- Set-up welding gun
- Switch on equipment

Connecting earth cables to work piece

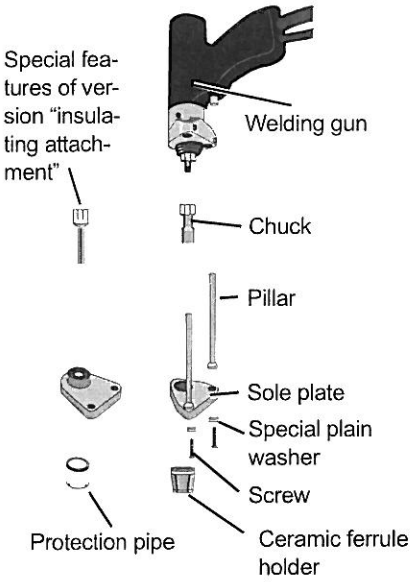
To achieve the best welding results it is very important to connect the earth cables correctly.

Rule of thumb:
The two earth cables should be equally far from the welding spot.

Unfortunately there are exceptions to this rule. Should faulty weld joints occur, please, read chapter »Tips for stud welding« for more details.

Thickness of the work piece
The work piece must have a minimum thickness of 1/4 of the stud's diameter. The "burning through" of the melting mass can cause dangerous explosive sparks.

Setting-up welding gun



Here we describe how to set-up the welding gun for welding with ceramic ferrules. Setting-up the welding gun for welding with insulating attachment is very similar, the special features have been marked.

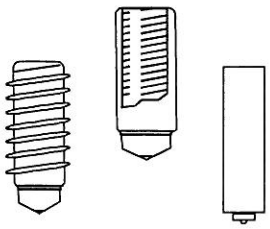
You should be introduced to setting-up the welding gun by your country representative or by a trained operator in your company.

After a short time the setting-up will be a routine for you. In this paragraph we will show you step by step how to set-up the welding gun.

These are the steps you have to take:

- 1. Choosing
- 2. Installing
- 3. Setting-up
- 4. Adjusting

Setting-up equipment and welding gun



Different types of studs

1. Choosing

Welding elements
With the welding gun various welding elements from 3 - 25 mm (MRN 10) in diameter can be processed.

- According to DIN EN ISO 13 918
- Special studs of various dimensions

Depending on the welding element choose the fitting:

- Pillars
- Chucks
- Sole plate
- (Only when using ceramic ferrules) Ceramic ferrules
- (Only when using ceramic ferrules) Ceramic ferrule holders

Pillars
The length of the pillars can be exactly adjusted later on. The pillars ought to be at least 10 cm longer than the welding element.

Chucks
The stud must be seated firmly in the chuck because high welding currents flow when welding. Non-fitting chucks cause poor welding results. Therefore use only fitting chucks.

Sole plate
The appearance of the sole plate depends on the field of application.

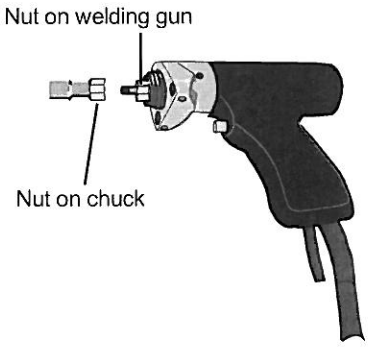
Only if ceramic ferrules are used:

Ceramic ferrule holders
The ceramic ferrule holder keeps hold of the ceramic ferrule. You need a different holder for each type of ceramic ferrule.

Ceramic ferrules
A ceramic ferrule keeps the influence of the atmosphere away, centres the electric arc, shapes the welding bead evenly and protects the welder against welding splashes. Diameter and cross section must fit the stud.

2. Installation

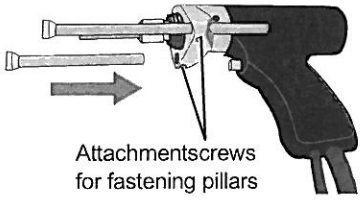
Caution! The stud welding equipment must be switched off when doing the following works. Check the position of the ON/OFF switch: OFF = "0".



Installing chuck

— Screw chuck on to welding gun.
While doing so keep hold of the nut of the welding gun and screw up tightly to the chuck with fitting ring spanner.

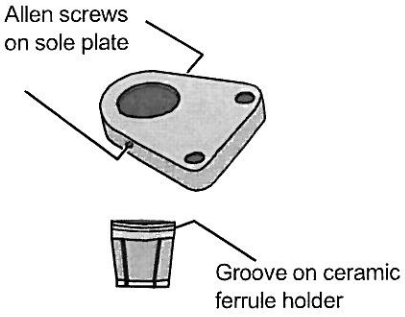
Take care that the chuck is firmly seated. A chuck which is not properly tightened can destroy the welding gun while welding.



Installing pillars

— Insert both pillars into the openings on the welding gun.

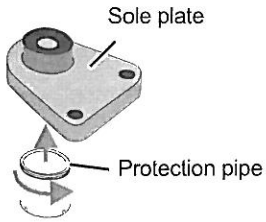
— Screw attachment screw slightly on with Allan key 4 mm.
The pillars are exactly adjusted later on.



Screwing ceramic ferrule holder on to sole plate

— Insert ceramic ferrule holder from down below into the sole plate.

— Drive both screws home with Allan key 2,5 mm. The screws must grip into the groove on the ceramic ferrule holder.

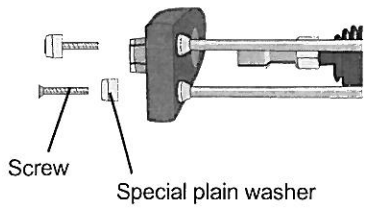


Only for weldings with insulating attachment

Screwing protection pipe on to sole plate

— Screw protection pipe down

Setting-up equipment and welding gun



Installing sole plate to the pillars

— Put on special plain washers to screws.

— Put screws through sole plate and tighten slightly. The sole plate is exactly adjusted later on.

Inserting stud

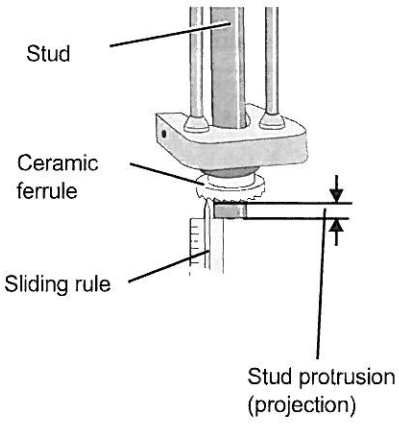
— Insert stud into chuck. Take care that the stud is seated firmly and straightly.

Inserting ceramic ferrule

— Pull ceramic ferrule over the stud and insert it into ceramic ferrule holder.

3. Setting-up

Setting-up stud protrusion (projecting)
This measurement determines how far the stud dips into the melting when welding.



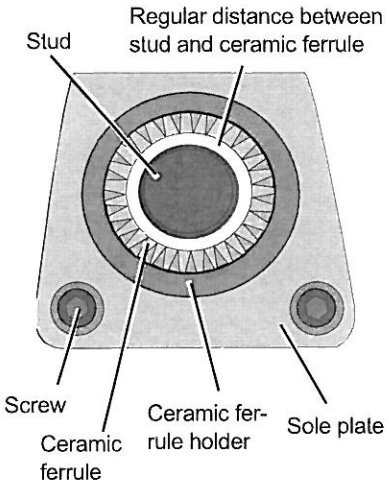
If you do not know the stud protrusion for the type of stud, please read chapter »Tips for stud welding«. There you are explained how to determine this setting.

— Slightly loosen attachment screw to fasten pillars to the welding gun.

— Move pillars so that the stud protrudes up above the upper edge of the ceramic ferrule by this measurement.
Only for weldings with insulating attachment: Shift pillars so that the stud projects the upper edge of the protection pipe by the stud protrusion.

— Tighten attachment screw and check protrusion.

The stud protrusion can be easily measured with a sliding rule.



Setting-up sole plate

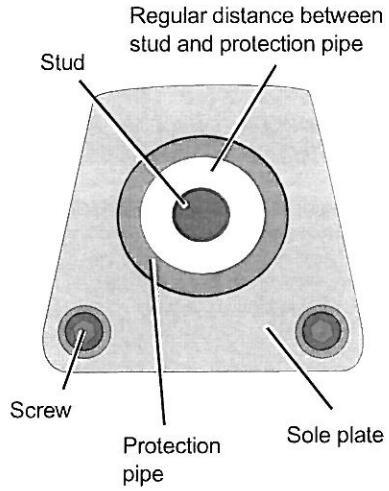
Adjust the sole plate so that there is a regular distance between ceramic ferrule and stud. Otherwise the stud is hindered when dipping into the melting.

— Slightly loosen screws connecting sole plate and pillars.

— Shift sole plate until there is a regular distance between stud and ceramic ferrule.

— Tighten screws and check distance once again.

— Also check the stud protrusion. If necessary adjust again.



Only for weldings with insulating attachment:

Setting-up sole plate

Adjust the sole plate so that there is a regular distance between ceramic ferrule and stud (centre). Otherwise the stud is hindered when dipping into the melting.

— Slightly loosen screws connecting sole plate and pillars.

— Shift sole plate until there is a regular distance between protection pipe and stud.

— Tighten screws and check distance once again.

— Also check the stud protrusion. If necessary adjust again.

Setting-up equipment and welding gun

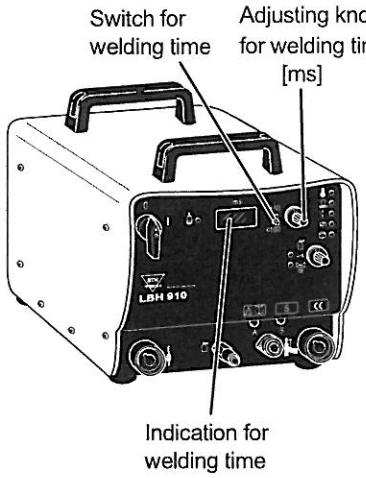
Adjusting equipment

4. Adjusting

At the display you only have to do the following adjustment:

- ms (welding time in milliseconds)

If you do not know the values for ms and A for the type of stud , please read the chapter »Tips for stud welding«. There you are explained how to determine the two values.

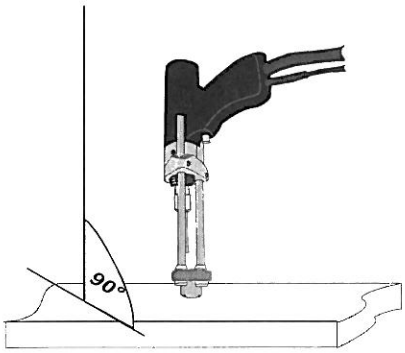


— Adjust switch for welding time in accordance with the values shown in the chart for welding time → chapter »Tips for stud welding«.
for welding times over 100 ms turn to " >100"
for welding times below 100 ms turn to "< 100"

— Adjust ms (milliseconds).
Turn adjusting knob for [ms].You can read the value in the indication.

— Switch equipment on. Turn ON/OFF-switch to "I".

Including these adjustments all the preparations are finished and you are ready to weld as described in the following chapter.



Putting welding gun on work piece by the square.

- Do not touch welding gun near the stud. While welding high temperatures develop which can cause serious burns. Take hold of the welding gun only on and above the handle with your two hands.
- To control the adjustments do always test weldings and readjust if the welding results are poor.
- Take care that the work piece is thick enough (at least 1/4 of the stud's diameter).

— Put welding gun on the work piece in vertical/horizontal position. The contact lamp on the operating panel lights up.

— Press trigger button and keep welding gun in the right position. On the operating panel the release-, control- and contact lamps light up.

The equipment welds automatically. The stud is lifted and the electric arc melts the material. After the adjusted time the stud dips into the melting by the adjusted stud protrusion. During this time and shortly after that do not move the welding gun and the work piece.

Provided the weld has cooled down as far as necessary (approx. 1 second) the welding gun can be removed.

— After a short period of cooling remove welding gun vertically.

Attention! After welding the ceramic ferrule is very hot. Wear eye protection. Parts of the ceramic ferrule can fly some metres when being knocked off.

— Knock off ceramic ferrule with a welder's hammer.

— Check weld as instructed. Do a visual inspection in any case.→ Chapter »Tips for stud welding«.

Tips for stud welding

In this chapter we have summarized the most important tips for stud welding. But it does not replace the instruction by the manufacturer or a trained operator. It only intends to support your memory.

Studs, chucks and ceramic ferrules

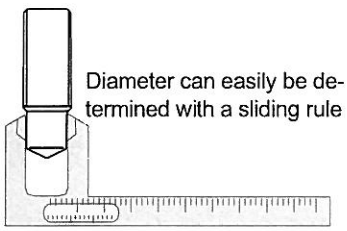
Studs, chucks and ceramic ferrules must be matched to one another. For each type of stud BTH offers you the fitting chucks and ceramic ferrules. You can either order per catalogue or contact your country representative directly. We would like to give you advice.

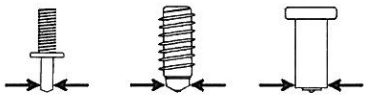
Adjustments

The values for

- stud protrusion (see instructions for welding gun)
- lift (see instructions for welding gun)
- milliseconds [ms]

depend on the diameter and the shape of the stud. The diameter of the stud is determined in the place which is dipped into the melting bath when welding, and it can differ from the nominal diameter. In case of the latter the stud is measured where it is broadest. This value is often given on the stud itself. However, you need to know the diameter of the stud in the "dip in place".





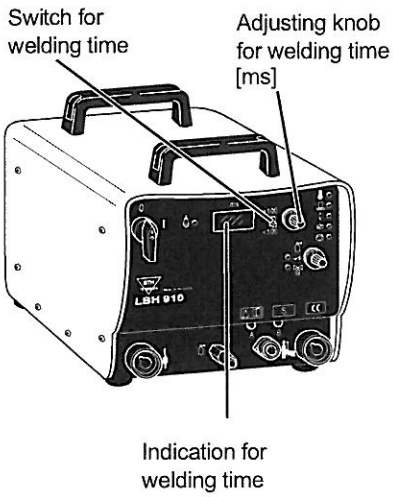
Measuring diameter of weld flange

The values that you take from the welding chart are reference values. The exact adjustments can only be determined by means of test weldings in the welding place itself.

According to the type of stud (MD or MR) please, use the correct welding chart.

Tips for stud welding

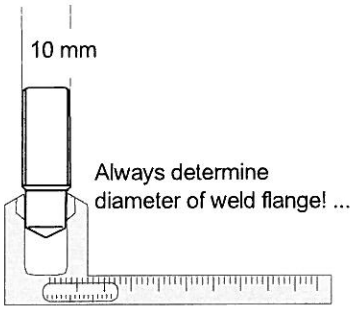
Welding chart



Type of stud	Diameter (ø) [mm]	Welding time in milliseconds [ms]	Stud protrusi [mm]
Stud bolt	ø3	15-20	3,0-4,0
	ø4	20-25	3,0-4,0
	ø5	30-40	3,0-4,0
Gudgeon MR	M6	30-35	≈ 3,0
	M8	65-85	≈ 3,5
	M10	145-190	≈ 4,0
	M12	215-260	≈ 4,0
	M14	300-350	≈ 2,5
Gudgeon MD	M6	45-55	≈ 2,5
	M8	90-115	≈ 2,5
	M10	200-230	≈ 2,5
	M12	290-330	≈ 2,5

You also see that there is a certain amount of play for each value. The value for the welding time for gudgeon 10 can range from 145 to 190 milliseconds, e.g. The bigger the diameter of the stud, the bigger the play for each value. You can find out the exact combination and precise adjustment by means of test weldings at the place of work. To make test weldings is most important.

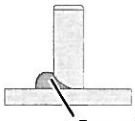
Example for the difference between nominal diameter and diameter at weld flange: This Stud with MR 10 nominal diameter...



... only has a 8 mm flange.

Tips for stud welding

Avoiding magnetic blowing action

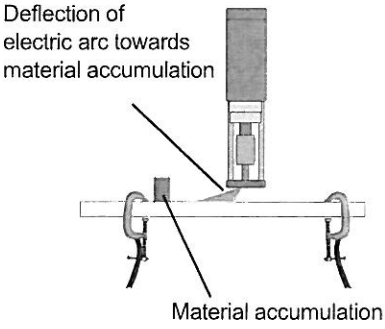


Magnetic blowing action develops if the current distribution in the work piece is not regular. You can recognize magnetic blowing action by a welding bead which is strengthened and raised on one side. The bigger the diameter of the stud, the more clearly this effect occurs. Please, pay attention to the notes in the German DVS instructions 902, DIN 8563 T.10 and DIN EN ISO 14555. If you have difficulties with arc blowing action you cannot solve yourself, please contact your country representative or BTH:

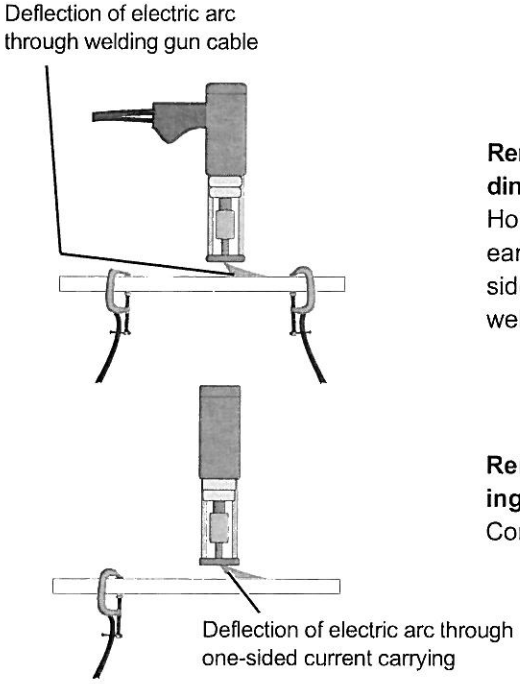
Generally: install the two connections to earth equally far from the welding point. But:

- material accumulations on one side of the connections to earth
- false alignment of the welding gun cable
- one-sided current carrying

can generate magnetic blowing action.



Remedial measures against material accumulation:
Remove earth cables opposite the material accumulation or install them further away from the welding point.

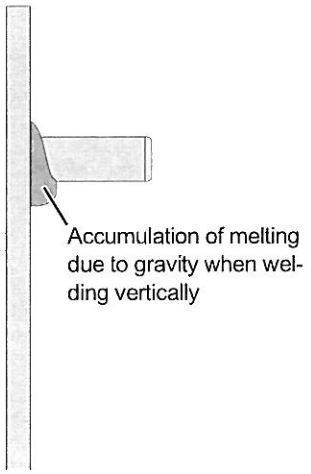


Remedial measures against false alignment of the welding gun cable:
Hold welding gun cable parallel to the connections to earth. If this is impossible install earth cables on the other side of the welding gun cable further away from the welding point.

Remedial measures against one-sided current carrying:
Connect second earth cable.

Vertical weldings

Due to gravity an accumulation of melting material at the bottom of the stud can occur when welding vertical work pieces.



Remedial measures against accumulation of melting material

- Install earth cables only underneath the welding point. Due to the blowing action – desired in this case – the melting is kept at the top.
- Reduce stud protrusion. A reduced stud protrusion causes less molten material.

Tips for stud welding

Checking weld joints

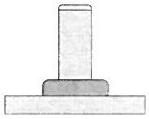
The check is based on test weldings. The test weldings have to be repeated with the values that are adjusted later on. For the simplified shop test there are two possible procedures:

- visual inspection
- impact bending test

Visual inspection

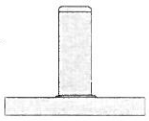
A purely visual inspection is only permitted if you have weld joints which are not subject to increased pressure. As a principle it should be done in any case.

OK



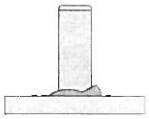
Good welding
The bead is accurate, even and closed.
With St 37 (mild steel) the surface is smooth and shining blue.

Correct stud protrusion, increase welding time



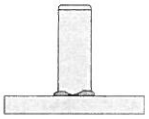
Dip measure or welding current too low, lift too small
The bead is flat or incomplete.
The tip of the stud is only just melted on.

Correct welding time



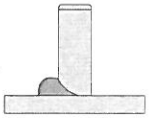
Welding time too long or welding current too high
The bead is flat and inaccurate. There are splashes around the bead and on the stud.

Correct welding time



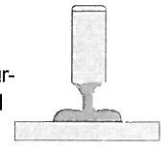
Welding time too short or welding current too low
The bead is flat, uneven, shows hardly any visible pores and is dull.

→ Paragraph "Avoiding magnetic blowing action"



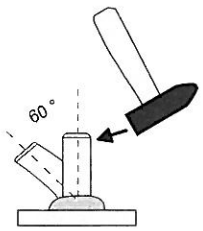
Blowing action
The bead is one-sided and not closed.

Adjust sole plate/ceramic ferrule, reduce welding current, increase stud protrusion



Stud hang-up
Heavy undercut or contraction in the welding area.

Impact bending test



This test implies that the stud is bent to an angle of at least 60° or until breakage occurs. This is done by means of hammer blows or a bending pipe.

The stud

- must break in the shank, not in the welding area
- or when welding sheet steels it must come off the sheet steel, bending a piece of sheet steel at right angles (pull a weld nugget).

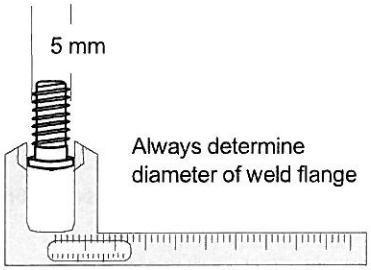
The weld must not show any superficial fissures.

When using alloyed steel and special shapes of studs different test conditions apply.

For further information see DIN EN ISO 14 555 or DVS instructions 902.

Short-cycle-process

Example: This stud (SC-Z) with 5 mm nominal diameter...



... has a 6 mm flange

For the Short-cycle process measure the overlap from the rim of the supporting pipe to the point of stud.

The equipment is also designed for the Short-cycle-process in which studs up to 5 mm are processed without ceramic ferrules using short welding times but high welding currents.

This process requires special equipment for the welding gun. As there are different modifications necessary, depending on the respective use, please contact BTH.

The values that you take from the table are reference values. The exact adjustments and combination can only be determined by means of test weldings in the welding place itself.

Diameter of weld flange	Time [ms]	Protrusion [mm]	Overlap [mm]
ø3	5-7	1,0-1,5	≈ 3,0
ø4	7-10	1,0-1,5	≈ 3,0
ø5	10-20	1,0-1,5	≈ 3,0
ø6	20-30	1,0-1,5	≈ 3,0
ø8	35-50	1,0-1,5	≈ 3,0

— Turn the switch for welding time to "< 100" (below 100).

— Adjust the desired value for [ms] on the adjusting knob. You can read the values in the indication.

Gas shielded arc welding (LBH 910 G only)

Shielding gas prevents oxygen from getting into contact with the welding spot and thus avoids unintentional oxidation.

- **Before connecting switch equipment off**
  Turn ON/Off switch to "0" .
- **Installing special chucks**
  Gas shielded arc welding requires longer chucks than welding without shielding gas.
- **Use shielding gas only**
  Take care of the contents of the gas cylinder. Only grey gas cylinders filled with shielding gas are allowed. If you connect gas cylinders other than these you can be mortally injured.
- **Use only shielding gas cylinders with pressure regulator and gas flow meter**
  Use exclusively shielding gas cylinders with pressure regulator. The pressure regulator must be equipped with a pressure gauge and a gas flow meter.
- **Stow shielding gas cylinder safely**
  Stow the shielding gas cylinder in the work zone so that it cannot heat unintentionally or drop to the ground. The lead hose must be placed without tensile load.

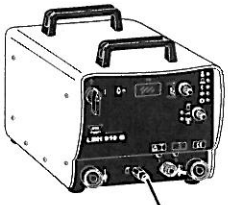
Please, observe also the safety information in the chapter in the paragraph »Special features of gas shielded arc welding«.

Connecting shielding gas cylinder

On the rear of the stud welding equipment there is a connecting piece for shielding gas.

— Connect lead to pressure regulator of the shielding gas cylinder and to the stud welding equipment. Connect socket to the plug until the socket is noticeably locked.

Connecting shielding gas hose of the welding gun



Connection piece for shielding gas hose to the welding gun

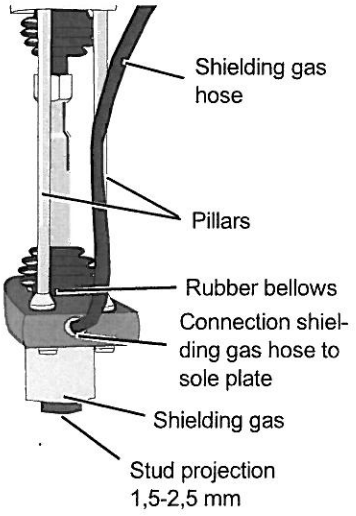
The connecting piece for the shielding gas hose fitting to the welding gun is on the front of the stud welding equipment.

— Connect lead to the equipment. Connect socket with the plug until the socket is noticeably locked.

(LBH 910 G only) Gas shielded arc welding

Setting-up welding gun for shielding gas

For gas shielded arc welding only welding guns especially designed for that may be employed. You will find the values for lift, ms und A in the chapter »Tips for stud welding« in the paragraph "Special features of gas shielded arc welding".

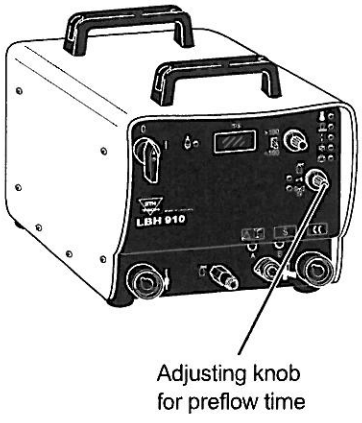


— Install chuck and pillars.
— Insert shielding gas tube into the sole plate and screw down.
— Put rubber bellows over the shielding gas tube.
— Attach sole plate to the pillars.
— Connect shielding gas hose to the sole plate.
— Insert stud into the chuck.
— Adjust sole plate and set pillars as described in the chapter »Setting-up equipment and welding gun«. The stud ought to project about 1,5 bis 2,5 mm beyond the edge of the shielding gas tube.

You can find the values for milliseconds [ms] for different types of studs in the chapter »Tips for stud welding « in the paragraph »Special features of gas shielded arc welding«.

Shielding gas: Mixture and consumption

We recommend a mixture of 82 % argon and 18 % CO_2. Good results were also achieved with 97,5 % argon and 2,5 % CO_2.



— Adjust consumption on the gas flow meter between 4 and 6 l/min.

Too high a consumption can result in defective weldings and the electric arc can be "blown out".

Now the welding gun is ready for gas shielded arc welding.

— Adjust the preflow time on the equipment.

We recommend to choose a value from 3 to 5. You can find out the exact value by means of test weldings.The weldings must not show any pores.

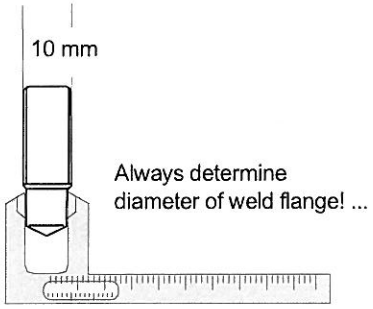
Gas shielded arc welding (LBH 910 G only)

Special features for gas shielded arc welding

Gas shielded arc weldings are high-quality weldings. For gas shielded arc welding the welding gun has to be prepared accordingly. Welding values other than those for welding without shielding gas have to be applied.

- **Do not use aluminium solder**
  Studs with aluminium solder must not be employed for gas shielded arc welding. This can cause defective weldings with reduced carrying force. Under protective atmosphere the aluminium cannot fulfill its deoxidizing effect. Thus aluminium striae can show in the texture and reduce the stability.
- **Weld in horizontal position only**
  Gas shielded arc weldings may only be carried out in flat position (Weld in horizontal position only).
- **Weld on clean surfaces only**
  The surface of the work pieces must be properly cleaned.

Example: This stud with MR 10 nominal diameter...



... has a 8 mm diameter of weld flange

For gas shielded arc welding measure the overlap from the rim of the shielding gas tube to the point of stud.

Reference values for gas shielded arc welding			
Stud	**Diameter of weld flange [mm]**	**Time [ms]**	**Protrusion [mm]**
Stud bolt	ø3	7-10	3,0-4,0
	ø4	14-20	3,0-4,0
	ø5	20-25	3,0-4,0
Gudgeon MR	M6	20-25	≈ 3,0
	M8	35-40	≈ 3,5
	M10	90-120	≈ 4,0
	M12	140-180	≈ 4,0
Gudgeon MD	M6	30-35	≈ 2,5
	M8	50-70	≈ 2,5
	M10	140-180	≈ 2,5
	M12	190-220	≈ 2,5

Cleaning and attendance

The equipment is easy to clean and to attend to.

- Do not clean unless the equipment is disconneted from the mains.
- Neither clean dripping wet nor employ a high-pressure cleaning apparatus.
- Do not use burning, etching or scratching cleaning agents or scouring powders so that the surface is not damaged.
- **No conductive objects**
  Do not put any conductive objects into the ventilation slots such as wires.

Cleaning agents

Cleaning equipment
For normal cleaning it is enough to rub off the surface of the equipment with a damp well-wrung cloth. You can add some hand washing agent to the cleaning water.

Cleaning cables
Clean cables with a damp cloth only.

Maintenance

Regular maintenance increases the life of your stud welding equipment. As it is designed for low-maintenance minimum work is required.

- **Work with care**
  Do not work in a hurry but with concentration. Injuries and accidents cannot be undone.
- **Attention! Disconnect mains plug**
  Before starting any maintenance works disconnect mains plug. If the case is open deathly electric shocks can result from unintentional contact with current-carrying components . Make sure that nobody connects the equipment to the mains while the equipment is open.
- **No conductive objects**
  Do not put any conductive objects into the ventilation slots such as wires.

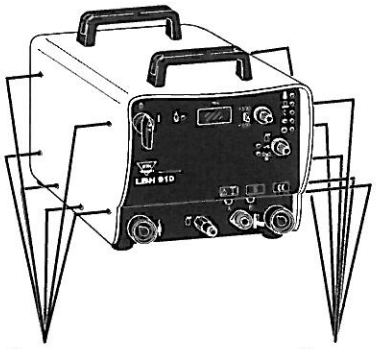
Blowing out interior of equipment

In time dust collects on important components in the interior of the equipment. Depending on the place of use and the dust nuisance earlier cleaning can be necessary. For normal duty we recommend to clean the interior once a year.

— Disconnect mains plug.

— Loosen screws on the case. Do not unscrew handle.

— Put off case cover with handle and put it aside.



Screws Screws

Wear dust screen and eye protection
Blowing out can cause high dust nuisance. Therefore provide for good ventilation and wear a dust screen and eye protection. If unhealthy dust has collected wear a breathing filter with full mask.

— Blow out interior space with compressed air.

— Reinstall case cover.

Checking plugs and cables

For safe and high quality weldings faultless cables are very important. Damaged cables have to be exchanged at once.

Caution! Damaged cables or plugs can cause serious or even deadly accidents. Therefore check the cables and plugs carefully.

— Check connection- and control cable daily.

— Check welding- and earth cable weekly.

Eliminating faults

Generally minor faults can be easily and quickly eliminated. Before enlisting the after-sales-service, please check by means of the table if you can eliminate the fault yourself. If you do not manage our after-sales-service is at your disposal. You will find the address and telephone number on the last page of these instructions. Keep these instructions and the invoice for the complete life of the equipment in order to facilitate and to speed up any outside support you might need.

Fault	Possible cause	Remedial measures
Equipment does not work.	No electric power supply. Phases are missing.	Check mains fuse. Have mains supply checked.
L1 lamp (green) does not light up.	One phase is missing. Fuse F4 defect.	Check mains supply. Exchange fuse.
Time indicator shows "000" or is dark, ON/OFF-switch jumps to "0".	One phase is missing. Fuse F4 defective. PC-board defective.	Check mains supply. Exchange fuse. Contact after-sales service.
ON/OFF-switch jumps to "0".	Mains fuse too poor. Mains voltage does not suffice.	Compare mains fuse and connected loads with values in chapter "Technical data".
ON/OFF-switch jumps to "0"while welding.	Cross section of extension cable is too small.	Choose correct cross section for extension cable.
Lamps "Magnet" or "Start" do not light up.	Control cable defective, gun is not properly connected. Fuse F5 defective.	Check control cable. Check connections. Contact after-sales service.
Gun does not lift After activating lamps "Magnet", "Start" and "Kontakt" light up correctly but there is no welding done and the lamp "Sperrung" lights up.	Lift too low or lift too big.	Check lift and adjust correctly as described in chapter "Preparing equipment".
Gun does not lift and lamp "Magnet" does not light up.	Protection switch is activated. control- or extension cable or welding gun defective. Fuse F5 defective.	Switch equipment off and on again. If LED 6 still lights up the control- or extension cable or the welding gun are defective. Check fuse F5.

Technical data

Feature	LBH 910 (G)
Welding range	3-13 mm (MR14)
Welding current	900 A
Welding time adjustment continuous	5-100 ms / 100-980 ms
Studs per minute	10 studs MR 10
Connected load	T32 A
A.C. voltage	400 V
Standard frequency	50/60 Hz
Mains plug	CEE 32 A
Mains fuse	T 35 A
Protective system	IP 23
Cooling system	AF
Depth	275 mm
Height	250 (295) mm
Length	450 mm
Weight	38 kg

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Guarantee

The guarantee certifies the quality and the highest quality finish of the product. Within the term of guarantee laid down by law BTH commit themselves to repair any production fault of new products free of charge in accordance with the BTH guarantee conditions. Excluded from the guarantee are maintenance works for which our servicemen are called within the term of guarantee. Spare parts are only replaced free of charge if the defective parts are returned free to our factory.

Excluded from the guarantee are:

- faults caused by damaging (even by water and dust), improper connection or wrong handling,
- damages caused by force majeure, e.g. lightning,
- defects caused by wear of mechanical or electrical components,
- replacement of components which are subject to wear, such as ceramic ferrules, ceramic ferrule holders, sole plates or chucks,
- damage resulting from use of the equipment other than set forth in these operating instructions,
- damage resulting from inexpert repair works,
- damage resulting from the removal of safety devices or other manipulations and the results thereof,
- damage caused by inexpert cleaning.

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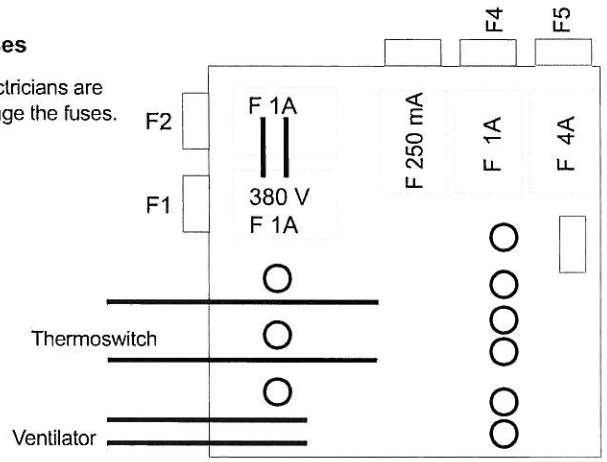
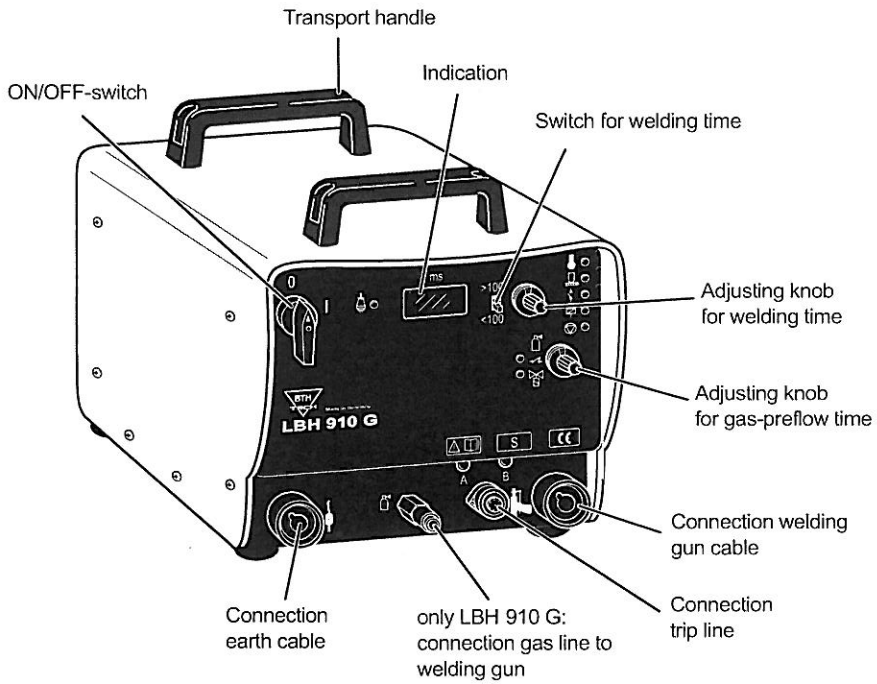
PC-board with position of fuses

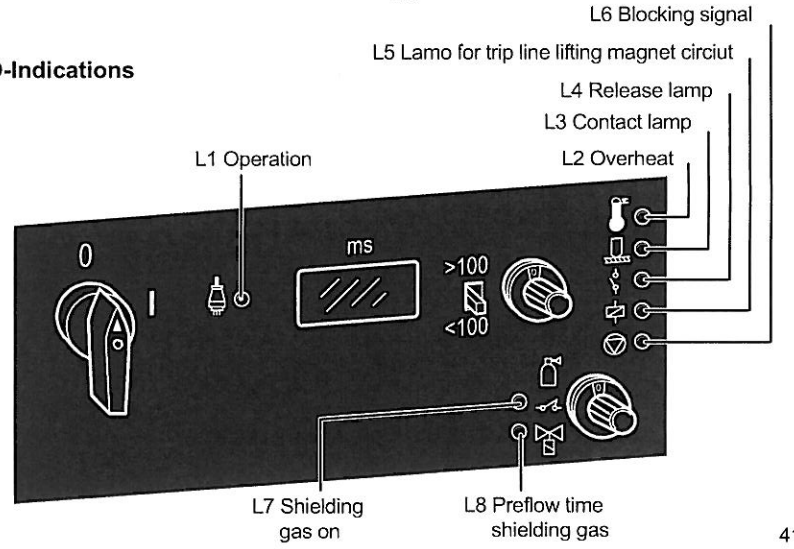
Only qualified electricians are allowed to exchange the fuses.



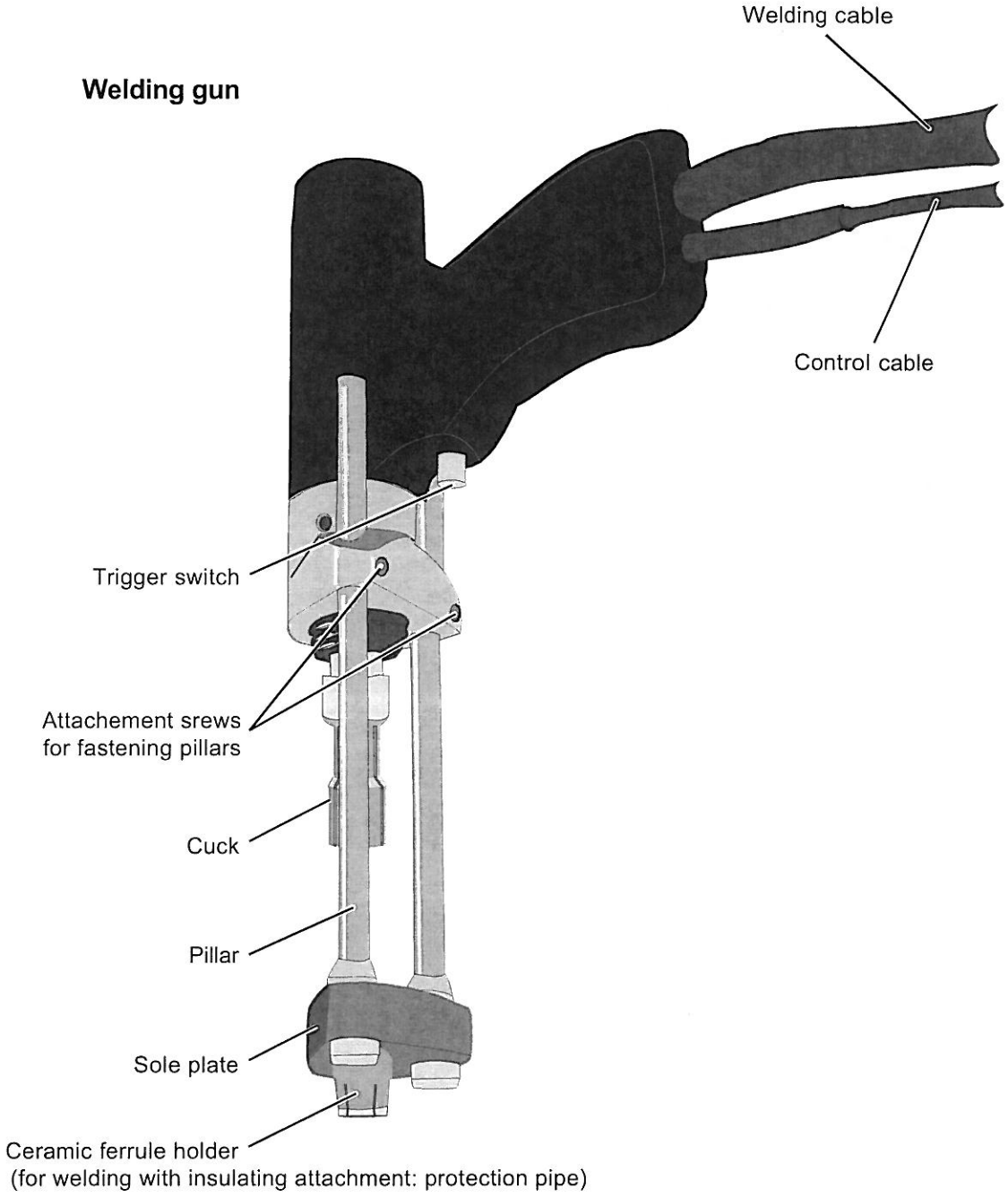
LED	lights up if
Operation L1 (green)	the equipment is connected to the mains and switched on, voltage supply is O.K.
Overheat L2 (yellow)	the equipment is overheated. The eqipment does not weld anymore (equipment switched on cause of cooling through blower).
Contact L3 (yellow)	the stud has contact to the work piece.
Activation L4 (green)	all cables are connected properly and the trigger switch on the welding gun is activated.
Trip line for lifting magnet circiut L5 (yellow)	trip line and lifting magnet are O.K.
Blocking L6 (red)	the welding gun was not pulled off the stud after welding.
Gas on L7 (yellow)	gas shielded arc welding is switched on.
Gas time L8 (green)	the gas magnet valve is selected.



LED-Indications



Welding gun


Welding cable
Control cable
Trigger switch
Attachement srews
for fastening pillars
Cuck
Pillar
Sole plate
Ceramic ferrule holder
(for welding with insulating attachment: protection pipe)

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