



# **Operating Instructions**

Stud welding device SRM® technology BMK-8i ACCU

Stud welding gun

**PH-9 SRM**<sup>12</sup>

PH-9 SRM<sup>12</sup>+G

PH-3N SRM







#### **Device numbers**

We recommend to enter the device numbers in the list so that they can be accessed quickly if servicing is required.

Device	Туре	Serial number
Stud welding device	BMK-8i ACCU	
Stud welding gun	PH-9 SRM <sup>12</sup>	
	PH-9 SRM <sup>12</sup> +G	
	PH-3N SRM	

#### **Operating Instructions**

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(English: P00263)

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### **Revision status**

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# **1. General information**

These operating instructions contain important information and rules for the operation of the devices. Keep these operating instructions in a readily accessible location close to the devices.

In these operating instructions, the term "devices" refers to the stud welding device and the stud welding gun.

Carefully read the operating instructions and any other documents contained in the technical documentation. Pay particular attention to the safety instructions which are intended to help you recognise any possible residual risks and prevent hazards.

The drawings and illustrations in these operating instructions are for illustrative purposes and may vary slightly from the actual equipment.

The manufacturer reserves the right to make technical changes.

### 1.1 Validity of the operating instructions

These operating instructions apply to the following devices:

Stud welding device	BMK-8i ACCU
Stud welding guns	PH-9 SRM <sup>12</sup>
	PH-9 SRM <sup>12</sup> +G
	PH-3N SRM

### 1.2 Registered trademarks

The following terms in these instructions are used with registered trademarks:

- SRM®: SRM corresponds to magnetic field stud welding and stands for stud welding in a radially symmetric magnetic field [in German: *Schweißen im radialsymmetrischen Magnetfeld*].
- SOYER®: Developments/technologies of Soyer GmbH.



### **1.3 Abbreviations and definitions**

Abbreviations or designations worth knowing that are used in these instructions:

HZ-1 threaded stud:	SOYER® universal stud with centring tip.
MF threaded stud:	SOYER® threaded stud with a reduced flange diameter ("MF" stands for "mini flange").

## 1.4 Declarations of conformity

The devices are designed and constructed in accordance with the general accepted codes of practice.

Please note that significant changes to the device will cause the declaration of conformity to become void.

Furthermore, the manufacturer's warranty may be rendered invalid.



### Stud welding device

Heinz Soyer Bolzenschweißtechnik GmbH Inninger Straße 14 82237 Wörthsee			
	CE Declaration of Conformity		
We herewith declare that the design and construction of the machine described below as well as in the version marketed by us meet the safety and health requirements of the stated directives and standards. Any modification of this machine without our confirmation shall automatically annul this declaration.			
Designation of the machine	:	Stud welding device	
Machine type	:	BMK-8i ACCU	
Machine no.	:		
Applicable EU directives	:	RoHS directive (2011/65/EU) Low-voltage directive (2014/35/EU) EMC directive (2014/30/EU)	
Harmonised standards applied, in particular	:	EN 60974-1:2012 EN 60974-10:2008	
National regulations applied	:	DGUV directive 1	
Date	:	11/04/2019	
Manufacturer - signature	:	Hermine G.	
Position of the signatory	:	CEO	



### 1.5 Manufacturer

The manufacturer of the devices is: Heinz Soyer Bolzenschweißtechnik GmbH Inninger Straße 14 82237 Wörthsee Phone: 0049-8153-885-0 Fax: 0049-8153-8030 Email: info@soyer.de Web: www.soyer.de, www.soyer.com

### 1.6 Instruction, training

Soyer offers optional and individual instruction in the operation of the devices.

Moreover, Soyer offers training for customer-specific use of the devices.

Information on the scope and costs of instruction and training can be obtained from Soyer GmbH.

### 1.7 Standards and directives

The following standards, inter alia, must be observed for carrying out stud welding work and for the qualification of personnel:

- · DIN EN ISO 14555 Welding Arc stud welding of metallic materials
- DIN EN ISO 14732 Welding personnel Qualification testing of welding operators and weld setters for mechanised and automatic welding of metallic materials
- DIN EN 60974-9 Arc welding equipment Installation and use
- Technical Bulletin DVS 0904 Instruction for practice Arc stud welding



# 2. Important safety instructions

Read the following chapters carefully and follow the safety instructions. Please contact the manufacturer if you are uncertain or an instruction cannot be followed.

The devices have been constructed in accordance with the generally accepted codes of practice and established and usual safety requirements were observed and applied. In order to reach maximum safety, it is absolutely necessary to follow and observe all safety instructions specified in these operating instructions.

### 2.1 Warning signs used

Warning signs are used in this document, depending on the potential danger of the situation.

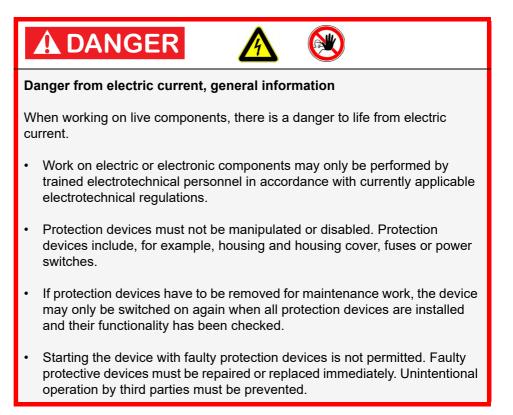
Safety and ir	Safety and information symbols used in this manual	
	This warning sign indicates imminent danger lead- ing to severe injuries or death.	
AWARNING	This warning sign indicates a potentially dangerous situation that may lead to severe injuries or death.	
CAUTION	This warning sign indicates a potentially dangerous situation that may lead to minor injuries.	
	Without the warning triangle, this warning sign is also used in the event of danger of material damage.	
	Additional sign indicating danger from electric cur- rent. The additional sign is used in connection with a warning.	
	Additional sign indicating the danger of burns. The additional sign is used in connection with a warn-ing.	
	Do not touch the surface or the housing: Shock hazard.	
	Do not touch or open, danger to unauthorised per- sons.	
	Danger to persons with medical implants such as pacemakers.	
0	The information sign is not a warning sign. It indi- cates important and useful information on the sub- ject.	



Safety instructions on the device As an additional warning of danger, warning labels can be found on the devices. Warning labels are affixed by the manufacturer and must not be removed. If a warning label is damaged and thus illegible, a new warning label must be affixed immediately.

Warning labels must be obtained from the manufacturer.

### 2.2 General safety instructions









#### Danger from electric current during maintenance and repair work

When working on live components, there is a danger to life from electric current.

- Work on electric or electronic components may only be performed by trained electrotechnical personnel of Soyer Bolzenschweißtechnik.
- Before performing any work on the stud welding device, the mains switch of the device must be turned off and the mains plug must be disconnected.
- Before performing any work on the stud welding gun, the supply cables to the stud welding device must be disconnected.
- If protection devices have to be removed for maintenance work, the device may only be switched on again when all protection devices are installed and their functionality has been checked.

# 

Danger of explosion from inappropriate operation sites in explosive areas

The device is not designed for use in explosive areas.

The device must not be installed and operated in explosive areas.

# CAUTION



#### Danger of burns from hot surfaces

During the welding process, the workpieces and some parts of the welding gun get so hot that touching them may cause burns.

- · Always use personal protective equipment.
- Before working on hot parts of the device, check if they have cooled down.
- Do not hold the gun in the welding area.





### Danger of burns from hot welding spatters

During the welding process, dangerous welding spatters may occur.

• Always use personal protective equipment.





#### Danger of fire from hot welding spatters

Welding spatters or hot workpieces occurring during the welding process may cause danger of fire.

• Do not store combustible or highly flammable materials in the welding area.



### 2.3 Safety instructions regarding the working method

# WARNING

#### Hazards due to wrong working method

Not working according to the proper working method may lead to hazards for the operating personnel and third parties.

- Ensure that the installation location for the stud welding device is adequately stable and dry.
- Make sure that you do not upset the stud welding device or pull it down from its position with the gun's cables/lines.
- During mobile use in particular, make sure that you are standing in a stable position during the welding process.
- Do not hold the workpiece to be welded in your hands during the welding process. The workpiece must be securely fastened during the welding process.
- Never wrap the gun's cables/lines around any part of your body (e.g. arm), as electric fields might be generated.
- Incorrect positioning or misadjustments of the gun may cause flashes of light to be generated during the welding process. Do not look directly into the flash of light.
- The gun carries out lifting movements during the welding process. Do not hold the gun in the area of moving parts.



### 2.4 Electromagnetic fields - implants



• Please observe the following instructions from the DIN EN IEC 60974-9:2019-03 standard.

# Instructions for operating companies of stud welding devices in accordance with DIN EN IEC 60974-9:2019-03 (extract):

Electric current flowing through a conductor causes locally limited electric and magnetic fields (EMFs). All welders should apply the following procedures to minimise the hazards which are related to the exposure to electric and magnetic fields from the welding current circuit:

- Bundle the welding cables; if possible, secure them with a strap;
- Keep your body away from the welding current circuit as far as possible;
- Never wrap the welding cables around your body;
- Do not bring your body between the welding cables; keep both welding cables on one side of your body; connect the return circuit to the workpiece as closely as possible in the area in which the welding work is carried out;
- Do not work, sit or lean against something next to the welding power source;
- Do not weld when carrying the welding power source or wire feeder.

Electric and magnetic fields may interfere with portable medical devices and implants. For people with portable medical devices and implants, protective measures must be taken. These include, for example, access restrictions for passers-by or individual risk assessments for welders. Risk assessments and recommendations for people with medical devices and implants must be carried out by a doctor.



### 2.5 Personal protective equipment

It is recommended to wear personal protective equipment when working with the stud welding device.

# WARNING

#### Danger from missing or incorrect personal protective equipment

Stud welding may lead to danger of burns, especially due to hot welding spatters. Danger of blinding may also arise due to the occurrence of strong arcs.

- Always wear suitable and closed protective clothing.
- Type and extent of the required protective equipment depend on the respective occurrence and the intensity of welding spatters, arcs and/or noise. This varies depending on the basic material, stud material, stud size and the required welding performance.
- Please observe the following instructions for protective equipment.

Recommended personal protective equipment		
	Safety goggles	
	Welding spatters and a flash occur during the welding process. In order to protect your eyes, wear appropriate safety goggles with side protection and a filter protector, if necessary.	
, Mh	Protective gloves	
	During the welding process, the workpieces and compo- nents of the welding gun get hot and welding spatters occur. Wear appropriate, incombustible, heat-resistant protective gloves.	
Ŷ	Protective clothing	
	Welding spatters occur during the welding process. Wear appropriate, incombustible and, if necessary, heat-resistant protective clothing.	
	Safety footwear	
	Welding spatters occur during the welding process. Wear appropriate, incombustible, heat-resistant safety footwear.	
	Hearing protection	
	Relatively loud welding noises may occur, depending on the welding device and the welding application. In that case, wear appropriate hearing protection.	



### 2.6 Intended use of the stud welding device

With the SOYER® BMK-8i ACCU stud welding device, pins and threaded studs from M3 to M8 (preferably M6 and M8) made of steel or stainless steel can be welded.

Special studs or diameters upon request.

The stud welding device can only be operated with the welding guns described in chapter "7.4 Technical data of the BMK-8i ACCU stud welding device" on page 31.

The stud welding device must be operated within the scope of technical data.

Only welding studs from Soyer (HZ-1 and MF types) may be welded.

The stud welding device supports the following welding procedures:

- SRM® welding (stud welding in a radially symmetric magnetic field)
- · Drawn arc stud welding using shielding gas

#### 2.6.1 Incorrect use

Any use of the device deviating from the intended use is considered as not intended.

Not intended use, unauthorised modification or manipulation of the device will void the declaration of conformity and warranty claims against the manufacturer.

### 2.7 Intended use of the stud welding guns

With the SOYER® stud welding guns described in these operating instructions, pins and threaded studs from M3 to M12 as well as many different weld fasteners made of steel, stainless steel, aluminium and brass can be welded in accordance with DIN EN ISO 13918.



The maximum diameter and type of the weldable studs may be restricted by the capacity of the stud welding device at which the gun is operated.

Special studs or diameters upon request.

The welding guns can only be operated with the stud welding devices described in the technical data of the gun.

The stud welding gun can only be operated within the scope of technical data.



#### 2.7.1 Incorrect use

Every use of the welding gun deviating from the intended use is considered as not intended.

Not intended use, unauthorised modification or manipulation of the device will void the declaration of conformity and warranty claims against the manufacturer.

Misusing the gun as a tool, e.g. as a striking tool for checking the welding quality, is not permitted.

### 2.8 Operating company prerequisites

The operating company of the device must ensure that the prerequisites described in these operating instructions for a safe operation of the device are met.

These include, for example, conditions at the installation location, regulatory requirements on a safe workplace, instruction of operating personnel and qualified personnel in using the device, if applicable, compliance with required maintenance work as well as monitoring the intended use of the device.

These operating instructions must be stored in the vicinity of the device.

The operating company of the device must ensure that all protective devices are present, active and intact before the device is used.

#### 2.8.1 Prerequisites for personnel

Operating personnel Persons authorised to operate the device must be familiar with the device and trained accordingly. They must have read and understood these operating instructions. When working on the device, they must also be able to avert possible residual danger to themselves or third parties or minimise them as far as possible.

To retain this qualification, safety training must be carried out at least once a year. If necessary, specially trained personnel or the manufacturer must be consulted in case of failure or for maintenance work.

Operators of stud welding devices must have technical expertise for operating and adjusting the device properly as well as for properly carrying out weldings.

If welding personnel has to be qualified for certification of welding, the standards DIN EN ISO 14555 and DIN EN ISO 14732 are to be observed.



Trained electrotechnical personnel

#### In general:

Works on live elements may only be performed by authorised electricians. This work must be performed in accordance with the applicable technical rules for electrotechnical devices.



All devices of Soyer Bolzenschweißtechnik GmbH must only be opened by personnel of Soyer or personnel authorised by Soyer.



# 3. Important safety instructions for battery operation

These operating instructions describe the operation of a stud welding device which is operated by a lithium-based high-performance battery.

The battery consists of several connected individual cells.

Due to the very high energy density and the technical design of these batteries, the batteries must be handled very carefully.

# **A**WARNING

#### Hazards due to improper battery handling

Improper handling and use of a battery may lead to electric shocks, skin irritations, chemical burns, fire or explosion.

• For safe handling and operation, the following instructions and recommendations must be strictly observed.

#### General safety information

- Do not disassemble, open or shred batteries.
- Store batteries out of the reach of children and unauthorised persons.
- Do not expose batteries to heat or fire. Avoid storage in direct sunlight.
- · Do not short-circuit batteries.
- Do not store batteries in a hazardous manner in a box or drawer where they can short-circuit each other or can be short-circuited by other conductive materials.
- Do not expose batteries to mechanical impact.
- Only remove the battery from its original packaging right before it is used.
- If a cell is leaking, the fluid must not come into contact with the skin or the eyes. If contact has occurred, please rinse the affected area with plenty of water and consult a physician.
- Only use chargers which are especially designed for this type of battery.
- Always observe the polarity labels plus (+) and minus (-) on the batteries and devices. Proper use must be ensured.
- Do not use rechargeable batteries, cells or other batteries which are not designed for the use in combination with the device.
- If the connections of batteries are soiled, clean them using a dry, clean cloth.
- · Keep batteries clean and dry at all times.
- Batteries must be charged before use. Always use the proper charger and observe the manufacturer's instructions for correct charging.
- Do not charge batteries for an extended period if they are not used.
- Do not charge batteries at temperatures below 0 °C.
- The batteries may only be used in the SOYER® devices for which they are intended.



- If possible due to the design, batteries should be removed from devices, if the devices are not in use for several weeks.
- Never use or store batteries and devices with inserted battery in an explosive environment or in an environment with highly flammable substances.
- Ambient temperature during operation of the device: -20 °C to +50 °C.

#### Maintenance

- Only if stored separately: Regularly check whether the battery is in clean and dry condition.
- Use a clean and dry cloth to remove dirt.

#### Safe storage

- Always store batteries in a clean and dry place. Ideally store the batteries at room temperature as a maximum or in colder environments (e. g. fridge).
- Admissible temperature during storage: -20 °C to +60 °C (recommended: 0 °C to +20 °C).
- Do not store batteries in discharged condition. The residual capacity should be at least 50 80%.
- Check stored batteries every 2 3 months and charge them, if required, to prevent deep discharge which results in the destruction of the battery.

#### Handling of defective batteries and disposal

- Always dispose of batteries in an environmentally compatible way in accordance with applicable local provisions. Consult the local waste disposal company.
- Never dispose of batteries in household waste.
- Do not dispatch batteries. If a battery is defective, please contact Soyer.
- Do not touch any leaking fluid with bare hands. Collect the fluid and dispose of it in the correct manner. Wear goggles and protective gloves.

#### **Dealing with battery malfunctions**

Abnormal battery performance such as incorrect charging or unusually long charging times, noticeable sudden power loss, unusual LED messages or leaking fluids can indicate a battery defect.

• In case of obvious or suspected battery malfunctions, please consult the service of Soyer.



#### Measures in case of battery fire

- In case of battery fire, remove all flammable objects around the burning battery and call the fire brigade, if required.
- Ensure sufficient ventilation to ensure that hazardous and explosive vapours can escape.
- In case of significant smoke development, please leave the room immediately.
- In case of respiratory tract irritation, consult a physician.
- Fight battery fires with water only. Powder extinguishers and fire blankets only serve to extinguish surrounding fires but are not an effective method to fight the battery fire.
- Do not touch the burning battery, not even with protective gloves. A burning battery is extremely hot due to plasma formation!



# 4. Transport

When transporting the device, make sure that it cannot be damaged. Appropriate packaging can protect the device against weathering effects, especially moisture.



Do not dispatch the battery. For the dispatch of the battery or the entire device, please contact your Soyer service technician. Please observe chapter "3. Important safety instructions for battery operation" on page 20.

# 5. Storage, shutdown

During storage or shutdown, make sure to protect the device against dirt and humidity.

Protect the device against unauthorised access by third parties.



For the storage of the battery, please observe chapter "3. Important safety instructions for battery operation" on page 20.

# 6. Disposal

Local environmental directives must be observed when disposing of the device.

Water-endangering as well as environmentally hazardous substances are to be disposed of in accordance with legal regulations.

If applicable, materials must be separated according to regulations.



For the disposal of the battery, please observe chapter "3. Important safety instructions for battery operation" on page 20.



# 7. Description of the BMK-8i ACCU stud welding device



The main elements of the stud welding device and its features are described in the following.

### 7.1 Type designation

Designation Order number	Feature
BMK-8i ACCU P01364	Wide-range power supply 110 - 230 V, 50/60 Hz

### 7.2 Working method

With the SOYER® BMK-8i ACCU stud welding device, pins and threaded studs from M3 to M8 (preferably M6 and M8) made of steel or stainless steel can be welded.

Only welding studs from Soyer (HZ-1 and MF types) may be welded.

The BMK-8i ACCU operating with SRM® technology was specifically developed for mobile use. Thanks to SRM®, the mobile BMK-8i ACCU welding device enables problem-free welding, even under difficult conditions.

The BMK-8i ACCU operates on the basis of a compact inverter power source and provides constant welding currents up to 300 A with extremely short welding times. Via an inverter, the energy from the battery is converted into high-frequency voltage with a frequency of 75 kHz. The energy is transmitted to the welding circuit via a high-frequency choke. As a result of the high control rate in connection with the integrated SRM® welding procedure of the BMK-8i ACCU, the reproducibility of the welds is increased and the quality of the welds considerably improved.



The PH-9 SRM<sup>12</sup> and PH-9 SRM<sup>12</sup>+G stud welding guns can be connected to the BMK-8i ACCU stud welding device as standard guns. Using an adapter, the PH-3 SRM stud welding gun can also be connected to it.

#### 7.2.1 Stud welding with SRM® technology

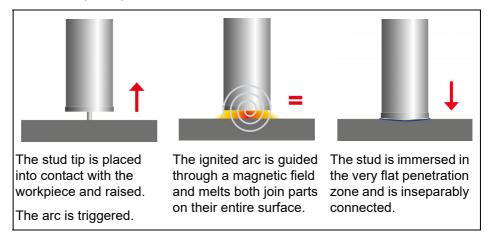
The welding procedure recommended by SOYER® for operating the BMK-8i ACCU is the patented SRM® welding procedure (patent no.: 10 2004 051 389) in conjunction with the also newly developed HZ-1 universal stud with a plane end face and centring tip (patent no.: 10 2006 016 553).

SRM® stands for stud welding in a radially symmetric magnetic field.

This innovative welding technology allows for welding in a ratio of 1:10 of the sheet metal thickness to the stud diameter (up to now 1:4) with the use of ceramic rings being no longer needed.

The various advantages of the SRM® procedure open up completely new possible applications in the entire stud welding area (for additional information, please visit: www.srm-technology.de).

#### **Functional principle**



The advantages of the SRM® welding procedure are as follows:

- No annoying welding beads
- · Welding under difficult conditions, now also without ceramic rings
- · Reduced penetration in the sheet metal
- Less energy consumption and shorter welding time
- No welding spatters



For more information on this subject, please visit: www.soyer.com.



#### 7.2.2 Drawn arc stud welding technology using shielding gas

For drawn arc stud welding using shielding gas, a mixed gas with 82% argon and, for example,  $18\% \text{ CO}_2$  (e.g. Corgon®18\*) is used as an aid.

This shielding gas shields the welding point from the atmosphere and also performs the weld pool backing. Furthermore, it produces a welding bead shaped as a concave fillet weld with a metallically bright surface, reducing the risk of corrosion and achieving a better dynamic behaviour of the welding joint.

When welding using shielding gas without other aids, it is not possible to produce an exact bead in a dimensionally stable calibrated and reproducible manner. Stud welding using shielding gas can be carried out at much shorter intervals, as it is not necessary to insert and remove the ceramic rings for each welding operation.

\*) Corgon®18 is a gas mixture of Linde AG in D-82049 Höllriegelskreuth



For more information on this subject, please visit: www.soyer.com.



## 7.3 Overview of the controls

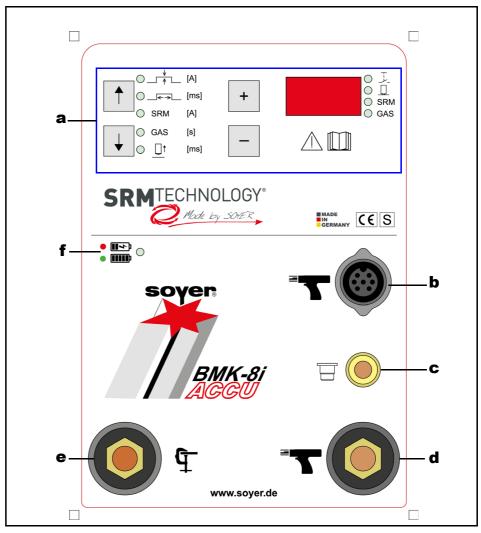


Figure 1: Overview of the front panel

Item	Designation
а	Selection and display range with display and function keys (see chapter "7.3.1 Display and setting range" on page 29)
b	Control cable connection of the gun
с	Shielding gas connection of the gun, KD 1/4 coupling socket
d	Welding cable connection of the gun
е	Connection of the earth cable
f	Charging status indicator of the battery



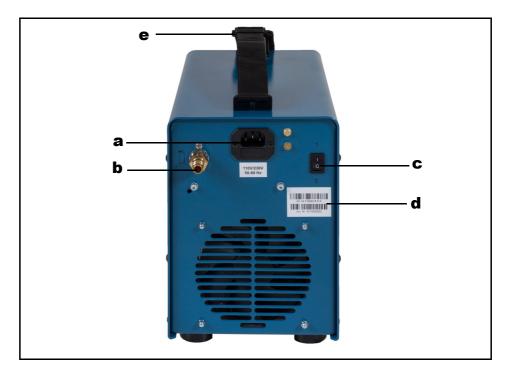


Figure 2: Overview of the back panel

Item	Designation
а	Mains connection line
b	Gas connection
с	Mains switch for turning the device on/off
d	Type designation and serial number
е	Carrying strap



### 7.3.1 Display and setting range

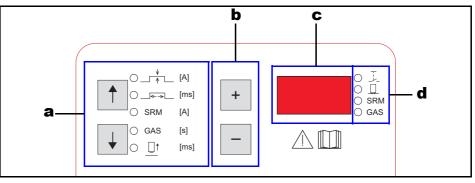


Figure 3: Display and setting range

Item	Designation			
а	Function selection			
	Using the arrow keys, the following functions can be selected: <ul> <li>Welding current</li> </ul>			
	Welding time			
	<ul> <li>SRM® current (deactivated at a value of 0 A, activated at a value &gt;0 A)</li> </ul>			
	<ul> <li>Gas pre-flow time (deactivated at a value of 0 s, activated at a value &gt;0 s)</li> </ul>			
	<ul> <li>Lift test (see chapter "13.1.5 Adjusting the lift time (height of lift) in the setting mode" on page 69)</li> </ul>			
	The LED next to the selected function lights up.			
	Please note: When the device is in the standby mode, the menu LED selected last flashes.			
b	+/- keys			
	These keys are used to adjust the value of the function selection shown on the display.			
с	Display			
	The display shows the set values of the respectively selected function.			
d	Display of the operating status			
	The following operating states are displayed during the welding process:			
	Release button of the gun is pressed			
	Gun is positioned on the workpiece and ready for welding			
	SRM® is active			
	Gas pre-flow is active			
	The LED lights up next to the respectively active operating status.			

Please also observe chapter "7.4.1 Maximum settings" on page 33.



#### 7.3.2 Battery charging and status indicators

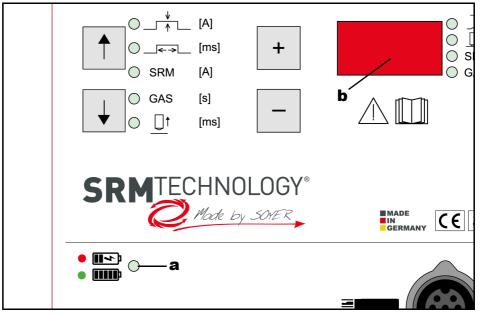


Figure 4: Battery charging and status indicators

ltem	Designation
а	LED lights up red: The battery is being charged.
	LED lights up green: The battery is charged.
b	Charging status indicator on the display:
	The charging status is displayed by pressing the release button of the welding gun.
	If the device is not operated for ten (10) seconds, it switches to the standby mode. If any button is pressed afterwards, "bAt" is shown on the display and immediately thereafter the current charging status in [%].

# 7.4 Technical data of the BMK-8i ACCU stud welding device

# Stud welding device:

Designation	BMK-8i ACCU stud welding device	
Welding procedure	Drawn arc stud welding (DS)	
Standard gun	PH-9 SRM <sup>12</sup> stud welding gun	
	and PH-9 SRM <sup>12</sup> +G stud welding gun	
Welding area	SOYER® threaded stud, from M3 - M8 (preferably M6 and M8) HZ-1 and MF types	
	or Ø 2 - 4 mm nails (optional)	
Power source	Inverter technology	
Welding current	100 - 300 A	
Welding time	10 to 500 ms	
Welding sequence	Ø 6 mm up to 6 studs/min	
	Ø 8 mm up to 3 studs/min	
Mains connection	Wide-range power supply 110 - 230 volt, 50/60 Hz	
	16AT or 16AC characteristics	
Electric charging capacity	130 VA	
Open-circuit voltage	< 30 V / DC (direct current voltage)	
Protection class	IP 21	
Shielding gas connection	max. 12 l/min	
Dimensions	190 x 300 x 450 mm (w x h x d)	
Weight approx.	8 kg	
Colour	Blue	
Subject to technical changes		



### Battery:

Designation	Battery for BMK-8i ACCU stud welding device	
Туре	Lithium-ion	
Rated voltage	48 V	
Rated capacity	6.5 Ah	
Energy	312 Wh	
Subject to technical changes		



#### 7.4.1 Maximum settings

The following table indicates the maximum welding time that can be achieved with the corresponding welding current. Impermissibly high combinations are prevented by the device electronics and cannot be set. The table is thus provided for information purposes only.

	]
Welding current	Welding time
100 A	500 ms
110 A	500 ms
120 A	500 ms
130 A	500 ms
140 A	500 ms
150 A	500 ms
160 A	500 ms
170 A	500 ms
180 A	480 ms
190 A	460 ms
200 A	440 ms
210 A	420 ms
220 A	400 ms
230 A	380 ms
240 A	360 ms
250 A	340 ms
260 A	320 ms
270 A	300 ms
280 A	280 ms
290 A	260 ms
300 A	250 ms
L	

#### Information table showing possible maximum setting combinations



### 7.5 Permitted stud welding guns

# WARNING

#### Hazards due to wrong gun

Hazards for the operator may occur when a wrong welding gun is used.

Only use welding guns hereinafter permitted by Soyer.

# 0

The use of other guns or guns from another manufacturer will invalidate the declarations of conformity and warranties of Soyer.

#### Overview of permitted stud welding guns

Gun	Remark
PH-9 SRM <sup>12</sup>	Standard gun
PH-9 SRM <sup>12</sup> +G	Standard gun
PH-3N SRM	Connection adapter required (1)

(1): Possible with optional adapter plug and adapter cable.

Adapter plug for gas connection:	F06695/FA
Adapter cable for control cable:	F06694/FA



## 7.6 Cleaning the stud welding device

# **A** DANGER

#### Dangers during cleaning

Improper cleaning of the stud welding device can endanger personnel.

- The device may only be cleaned by trained specialists.
- Before any cleaning work is done, the stud welding device must be disconnected from the main power supply and secured against accidental switchon.
- Work on electrical devices and components may only be performed by skilled electricians in accordance with electrotechnical regulations.
- Make sure that no liquids get into the device.

Do not use aggressive detergents for cleaning the device.

Please make sure that any cleaning waste is disposed of in an environmentally safe manner. Please observe the instructions of the detergent manufacturer.

# CAUTION

Damage to the device due to incorrect cleaning

Incorrect cleaning may cause damage to the device.

- Make sure that no liquids get into the device.
- Do not use aggressive detergents for cleaning the device.

The frequency of cleaning depends on the operating conditions of the stud welding device.



# 8. Description of the SRM® stud chuck



In principle, every welding gun is provided with a stud chuck that matches the welding stud. For the SRM® welding procedure, the following stud chucks are available:

#### Adjustable stud chucks:

- SRM® stud chuck M6 F05307
- SRM® stud chuck M8 F05215
- SRM® stud chuck M10 F05217\*
- SRM® stud chuck M12 F05219\*
- \* When using stud chucks with BMK-12i or BMK-16i devices.

Corresponding to the stud diameter, stud chucks must be installed/changed in the gun.

Adjustable stud chucks must be set to the stud length.

### 8.1 Adjusting SRM® stud chucks

SRM® stud chucks must be adjusted to the length of the welding stud and, if necessary, to the gun size.

The standard stud chuck can hold studs with a length of up to 60 mm.



For different stud diameters, different stud chucks are required.

When using studs with a length > 45 mm, the stop screw must be shortened.



#### Adjusting stud chucks

# Adjusting SRM® stud chucks

Step 1:	Select the stud chuck according to the required stud diameter.
Step 2:	Insert the stud into the stud chuck.
Step 3:	Adjust the stop screw so that the top of the flange of the stud sits between 3 mm and 5 mm above the stud chuck when it touches the screw.
Step 4:	Fix the stop screw with the lock nut. At a stud projection of more than 5 mm, the required trans- verse magnetic field is deflected laterally, which may result in uncontrolled SRM® welding.
The adjustm	nent is complete.



# **9. Description of the PH-9 SRM**<sup>12</sup> stud welding gun

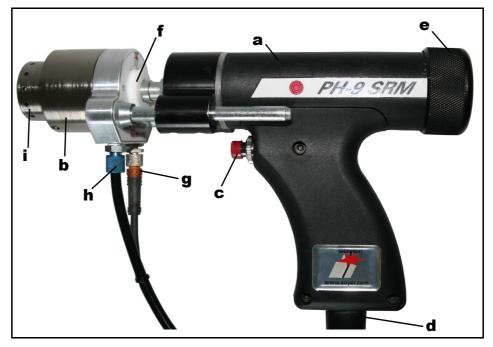


Figure 5: PH-9 SRM<sup>12</sup> stud welding gun

Item	Designation
а	PH-9 SRM <sup>12</sup> stud welding gun with lifting magnet
b	Shielding gas shroud with SRM® technology
с	Release button
d	Power and control cable for connection with the stud welding device
е	Dial for adjusting the height of lift/lift time
f	Gas insert for SRM <sup>12</sup> shielding gas shroud
g	SRM® supply for connection with the stud welding device
h	Gas supply for connection with the stud welding device
i	SRM <sup>12</sup> support tube insert

The gun is equipped with a lifting magnet. The stud is lifted by the lifting magnet before the welding process and lowered automatically for welding.

The height of the lift is also decisive for the welding result.

The lift height can be determined via the lift time using the stud welding device. See chapter "13.1.5 Adjusting the lift time (height of lift) in the setting mode" on page 69.

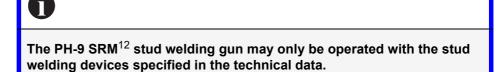


The height of lift is adjusted using the dial on the gun (see Figure 5: "PH-9 SRM<sup>12</sup> stud welding gun").

The PH-9 SRM<sup>12</sup> stud welding gun has a gas insert for each stud chuck diameter:

- M6: F06738
- M8: F06739
- M10: F06740
- M12: F06741

The gas insert is used to optimise the gas flow and to insulate the stud chuck against the shielding gas shroud.



# 9.1 Technical data of the PH-9 SRM<sup>12</sup> stud welding gun

Designation	PH-9 SRM <sup>12</sup> stud welding gun	
Item no.	P02276	
Welding procedure	Drawn arc stud welding	
	SRM® welding procedure	
Stud diameter	M3 - M12 (depending on the stud welding device)	
Stud chuck	SRM® stud chuck	
Stud length	Standard up to 60 mm, special lengths on request and possible with optional accessory	
Stud welding devices	The gun is approved for operation on the following SOYER® stud welding devices:	
	• BMK-8i, BMK-8i ACCU, BMK-10i	
	• BMK-12i	
	BMK-16i when using the following adapters:	
	Control cable adapter: F06770/FA	
	Earth cable adapter: F06771/FA	
	Gas adapter: F06772/FA	
Weight	3.7 kg	
Subject to technical changes		

# Technical data of the PH-9 SRM<sup>12</sup> stud welding gun



# 9.2 Installing the SRM $^{ m R}$ stud chuck in PH-9 SRM $^{ m 12}$

Step 1:		
	AWARNING	ice when the own ic
	Switch off the stud welding dev connected to it.	ice when the gun is
Step 2:	Set the stud chuck to the desired stu- ing SRM® stud chucks" on page 36).	
Step 3:	Undo the union nut.	
Step 4:	If there is still a stud chuck in the gun, remove it. It is easier to remove it if you use pliers as an aid.	
Step 5:	Remove the support with the shielding gas shroud. To this end, loosen the four Allen screws.	PH-9 SRI
Step 6:	Change the gas insert according to the desired stud. Gas inserts: Item no.: M6 = F06738 Item no.: M8 = F06739 Item no.: M10 = F06740 Item no.: M12 = F06741	



Step 7:	Slide the support with the shielding gas shroud onto the gun.
Step 8:	Slide the stud chuck up to the stop into the spring piston of the gun.
Step 9:	Hand-tighten the union nut.
Step 10:	Insert a stud and check the stud protrusion. The stud/stud flange must protrude 1 - 1.5 mm from the shielding gas shroud. If applicable, correct the settings of the stud chuck by moving the support.
Step 11:	Tighten the four Allen screws.
The assemb	bly is complete.



# 9.3 Replacing the SRM<sup>12</sup> support tube insert of PH-9 SRM<sup>12</sup>

In case of heavy wear or heavy contamination, it may be necessary to replace the support tube insert.

Item number of the support tube insert: F06748

Use original spare parts only.

# **Replacing the SRM**<sup>12</sup> **support tube insert.**

Step 1:	<b>AWARNING</b> Switch off the stud welding device when the gun is connected to it.	
Step 2:	Loosen the two threaded pins on the support housing.	
Step 3:	Remove the old support tube insert and replace it with a new one.	
	Slide the new support ring up to the stop into the holder.	
	When inserting it, make sure that the support tube insert and the holder surface are clean.	
Step 4:	Tighten the two threaded pins on the support housing hand-tight.	
The assembly is complete.		



### 9.4 Cleaning of the stud welding gun

On a regular basis, remove slag and welding spatters from the gun and the shielding gas shroud using a suitable tool.

The frequency of cleaning depends on the operating conditions of the stud welding gun.

CAUTION
---------

#### Risk of injury during cleaning

Welding spatters and slag can be sharp-edged.

• Wear protective gloves when cleaning.



We recommend the use of SOYER® separating spray in order to prevent impurities from welding spatters and slag and to simplify the cleaning process (order number M01464 ).



# **10. Description of the PH-9 SRM**<sup>12</sup>+G stud welding gun

PH-9 SRM<sup>12</sup>+G stud welding gun with integrated earth attachment (+G).

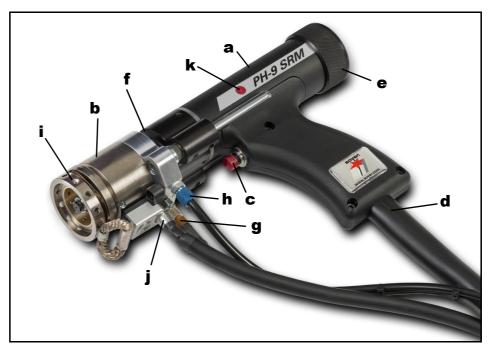


Figure 6: PH-9 SRM<sup>12</sup>+G stud welding gun

Item	Designation
а	PH-9 SRM <sup>12</sup> +G stud welding gun with lifting magnet
b	Shielding gas shroud with SRM® technology
С	Release button
d	Power and control cable for connection with the stud welding device
е	Dial for adjusting the height of lift/lift time
f	Gas insert for SRM <sup>12</sup> +G shielding gas shroud (between the shielding gas shroud and gun)
g	SRM® supply for connection with the stud welding device
h	Gas supply for connection with the stud welding device
i	SRM <sup>12</sup> +G support tube insert, with earth attachment
j	Earth connection
k	Button for two-hand release (red point on the gun's label)



With this stud welding gun, the earth connection is integrated into the gun in front of the support tube insert. A separate earth connection on the workpiece is not required.

The gun is equipped with a lifting magnet. The stud is lifted by the lifting magnet before the welding process and lowered automatically for welding.

The height of the lift is also decisive for the welding result.

The lift height can be determined via the lift time using the stud welding device. See chapter "13.1.5 Adjusting the lift time (height of lift) in the setting mode" on page 69.

The height of lift is adjusted using the dial on the gun (see Figure 6: "PH-9 SRM<sup>12</sup>+G stud welding gun").

The PH-9 SRM<sup>12</sup>+G stud welding gun has a gas insert for each stud chuck diameter:

- M6: F06738
- M8: F06739
- M10: F06740
- M12: F06741

The gas insert is used to optimise the gas flow and to insulate the stud chuck against the shielding gas shroud.

# 0

The PH-9 SRM<sup>12</sup>+G stud welding gun may only be operated with the stud welding devices specified in the technical data.

# 10.1 Technical data of the PH-9 SRM<sup>12</sup>+G stud welding gun

#### Technical data of the PH-9 SRM<sup>12</sup>+G stud welding gun

Designation	PH-9 SRM <sup>12</sup> +G stud welding gun with integrated earth connection
Item no.	P02277
Welding procedure	<ul><li>Drawn arc stud welding</li><li>SRM® welding procedure</li></ul>
Stud diameter	M3 - M12 (depending on the stud welding device)
Stud chuck	SRM® stud chuck
Stud length	Standard up to 60 mm, special lengths on request and possible with optional accessory



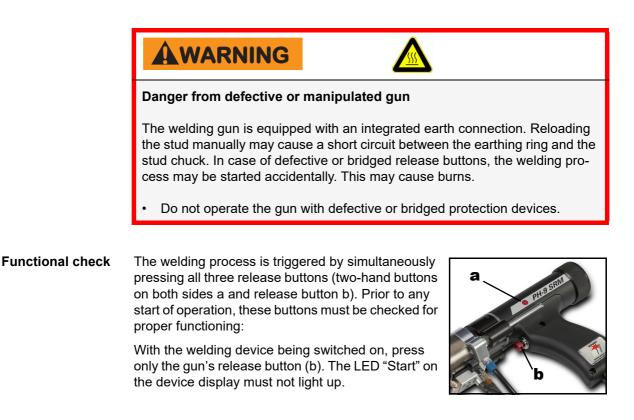
Stud welding devices	The gun is approved for operation on the following SOYER® stud welding devices:	
	• BMK-8i, BMK-8i ACCU, BMK-10i	
	• BMK-12i	
	BMK-16i when using the following adapters:	
	Control cable adapter: F06770/FA	
	Earth cable adapter: F06771/FA	
	Gas adapter: F06772/FA	
Weight	5.4 kg	
Subject to technical changes		

#### Technical data of the PH-9 SRM<sup>12</sup>+G stud welding gun

# 10.2 Operation of the PH-9 SRM<sup>12</sup>+G

Due to the integrated earth connection, operation and safety check differ from that of conventional welding guns.

#### 10.2.1 Safety check



Then press all three release buttons (a and b). The LED "Start" on the device display must now light up.

### 10.2.2 Welding with the PH-9 SRM<sup>12</sup>+G

The earthing contact required for welding is made via the earthing attachment on the gun's tip. Always make sure that the contact to the workpiece is clean and that the earthing attachment rests fully on the workpiece.

To trigger the welding process, all three release buttons must always be pressed.

# 10.3 Installing the SRM® stud chuck in PH-9 SRM<sup>12</sup>+G

Step 1:	<b>AWARNING</b> Switch off the stud welding device when the gun is connected to it.
Step 2:	Set the stud chuck to the desired stud (see chapter "8.1 Adjust- ing SRM® stud chucks" on page 36).
Step 3:	Undo the union nut.









Step 4:	If there is still a stud chuck in the gun, remove it. It is easier to remove it if you use pliers as an aid.	
Step 5:	Remove the support with the shielding gas shroud. To this end, loosen the four Allen screws.	
Step 6:	Change the gas insert according to the desired stud. Gas inserts: Item no.: M6 = F06738 Item no.: M8 = F06739 Item no.: M10 = F06740 Item no.: M12 = F06741	
Step 7:	Slide the support with the shielding gas shroud onto the gun.	
Step 8:	Slide the stud chuck up to the stop into the spring piston of the gun.	
Step 9:	Hand-tighten the union nut.	



Step 10:	Insert a stud and check the stud protrusion.	
	The stud/stud flange must protrude 1 - 1.5 mm from the shielding gas shroud.	
	If applicable, correct the settings of the stud chuck by moving the support.	1 - 1.5 mm
Step 11:	Tighten the four Allen screws.	
The assemb	bly is complete.	



# 10.4 Replacing the SRM<sup>12</sup> support tube insert of PH-9 SRM<sup>12</sup>+G

In case of heavy wear or heavy contamination, it may be necessary to replace the support tube insert.

Item number of the support tube insert: F06748

Use original spare parts only.

# **Replacing the SRM**<sup>12</sup> **support tube insert.**

Step 1:	<b>AWARNING</b> Switch off the stud welding device connected to it.	ce when the gun is
Step 2:	Loosen the Allen screw of the earth connection.	
Step 3:	Loosen the two threaded pins on the support housing.	
Step 4:	Remove the old support tube insert.	



Step 5:	Assemble the new support tube insert. Ensure correct order (from left to right at the bottom) and orientation.
Step 6:	Slide the new support ring up to the stop into the holder. When inserting it, make sure that the support tube insert and the holder surface are clean.
Step 7:	Tighten the two threaded pins on the support housing hand-tight.
Step 8:	Tighten the Allen screw of the earth connection with a tightening torque of 2.5 - 3 Nm.
The assem	bly is complete.

# Replacing the SRM<sup>12</sup> support tube insert.



### 10.5 Cleaning of the stud welding gun

On a regular basis, remove slag and welding spatters from the gun and the shielding gas shroud using a suitable tool.

The frequency of cleaning depends on the operating conditions of the stud welding gun.

CAUTION
---------

#### Risk of injury during cleaning

Welding spatters and slag can be sharp-edged.

• Wear protective gloves when cleaning.



We recommend the use of SOYER® separating spray in order to prevent impurities from welding spatters and slag and to simplify the cleaning process (order number M01464 ).



# **11. Description of the PH-3N SRM stud welding gun**



Figure 7: PH-3N SRM stud welding gun

Item	Designation
а	PH-3N SRM stud welding gun, gap welding gun with lifting magnet
b	Shielding gas shroud with SRM® technology
с	Release button
d	Power and control cable for connection with the stud welding device
е	Dial for adjusting the height of lift/lift time
f	SRM® supply for connection with the stud welding device
g	Gas supply for connection with the stud welding device

The gun is equipped with a lifting magnet. The stud is lifted by a magnet before the welding process and lowered automatically for welding.

The height of the lift is also decisive for the welding result.

The lift height can be determined via the lift time using the stud welding device. See chapter "13.1.5 Adjusting the lift time (height of lift) in the setting mode" on page 69.

The height of lift is adjusted using the dial on the gun.





The PH-3N SRM stud welding gun may only be operated with the stud welding devices specified in the technical data.

# 11.1 Technical data of the PH-3N SRM stud welding gun

Designation	PH-3N SRM stud welding gun		
Item no.	P02245		
Welding procedure	Drawn arc stud welding		
	SRM® welding procedure		
Stud diameter	M3 - M12 (depending on the stud welding device)		
Stud chuck	SRM® stud chuck and SRM® nut holder		
Stud length	Standard up to 60 mm, special lengths on request and possible with optional accessory		
Stud welding devices	The gun is approved for operation on the following SOYER® stud welding devices:		
	• BMK-8i, BMK-8i ACCU, BMK-10i (*)		
	• BMK-12i (*)		
	• BMK-16i		
Weight	4.6 kg		
Subject to technical changes			

#### Technical data of the PH-3N SRM stud welding gun

(\*) With adapter plug, see technical data on the stud welding device.



# 11.2 Installing the SRM® stud chuck in PH-3N SRM

Step 1:	<b>AWARNING</b> Switch off the stud welding device when the gun is connected to it.				
Step 2:	Set the stud chuck to the desired stud (see chapter "8.1 Adjust- ing SRM® stud chucks" on page 36).				
Step 3:	Remove the support with the shielding gas shroud. To this end, loosen the four Allen screws.				
Step 4:	Undo the union nut.				
Step 5:	If there is still a stud chuck in the gun, remove it.				
Step 6:	Slide the stud chuck up to the stop into the spring piston of the gun.				
Step 7:	Hand-tighten the union nut.				



Step 8:	Insert a stud and check the stud protrusion.
	The stud/stud flange must protrude 1 - 1.5 mm from the shielding gas shroud.
	If applicable, correct the settings of the stud chuck by moving the support.
Step 9:	Fasten the support with the shielding gas shroud to the gun.
The assemb	bly is complete.



### 11.3 Cleaning of the stud welding gun

On a regular basis, remove slag and welding spatters from the gun and the shielding gas shroud using a suitable tool.

The frequency of cleaning depends on the operating conditions of the stud welding gun.

CAUTION
---------

#### Risk of injury during cleaning

Welding spatters and slag can be sharp-edged.

• Wear protective gloves when cleaning.



We recommend the use of SOYER® separating spray in order to prevent impurities from welding spatters and slag and to simplify the cleaning process (order number M01464).



# **12. Setup and connection**

#### 12.1 Requirements for the installation location

The installation location for the stud welding device must be clean and dry. Ensure that ventilation for the stud welding device is sufficient. Do not install the stud welding device in an unventilated room. There is a danger of overheating.

Ensure that the installation surface is flat, clean and stable.

The installation location and workplace must comply with legal requirements.

Ensure that the installation location has a good accessibility for maintenance work.

Make sure that the stud welding device cannot be soiled by dust (especially metal dust or chips) caused by work in the immediate surroundings (e.g. grinding work).

<b>A</b> DANGER		8		
Danger from humid operation site				
There is a danger of electropytion when energing the stud welding device in a				

There is a danger of electrocution when operating the stud welding device in a humid environment.

• The stud welding device should only be operated in a dry environment.



#### Danger from welding vapours

Vapours that are dangerous to health may occur, depending on the material of the workpiece and/or the welding stud.

· Ensure suitable suction of welding vapours, if necessary.



## 12.2 Connection of the stud welding device and the stud welding guns

#### 12.2.1 Mains connection

After installation, connect the stud welding device to power supply using the mains plug. See chapter "7.4 Technical data of the BMK-8i ACCU stud welding device" on page 31.



When switching on the device, all LEDs on the front panel light up briefly.

#### 12.2.2 Connecting the earth cable

A secure earth connection must be established between the workpiece onto which the studs are welded and the stud welding device.

Insert the earth cable into the socket and turn the plug to the right up to the stop.

Then connect the earth cable to the workpiece (ensure a conductive connection).





When establishing the connection, observe the colour marking of the cables.



#### 12.2.3 Connecting the stud welding gun

Only use the welding guns approved by the manufacturer. See chapter "7.5 Permitted stud welding guns" on page 34.

Plug the welding cable into the socket (a) and turn the plug to the right up to the stop.

Plug the control cable into the control cable socket (b) and tighten the union nut.



Make sure to check if special adapters may be required to connect the gun (see chapter "7.5 Permitted stud welding guns" on page 34).

#### 12.2.4 Connecting the shielding gas supply

i

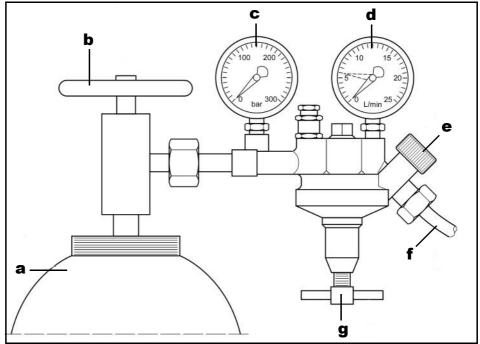
Prior to any welding using shielding gas, an adequate gas supply connection must be established.

The gas connection on the back panel is used to supply the stud welding device with gas via a pressure reducer (pressure reducing valve not included in the scope of delivery).



The maximum permissible operating value for the shielding gas quantity is 12 l/min.





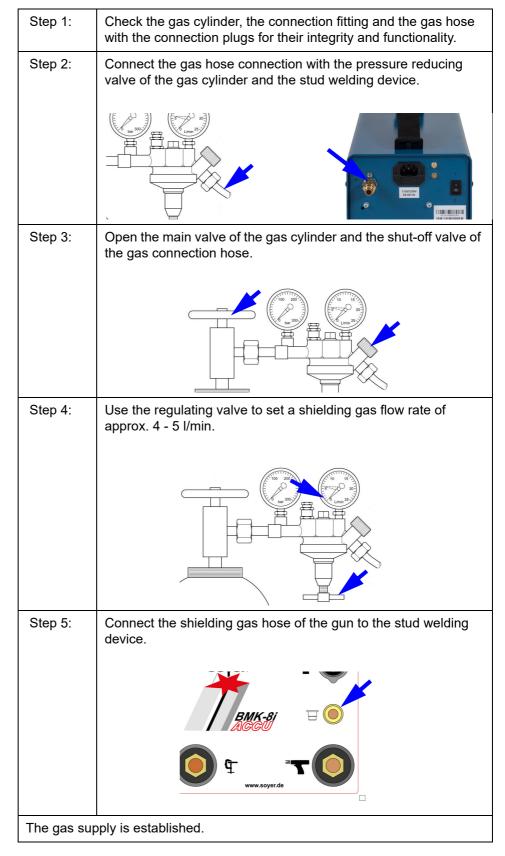
# Example of a shield gas cylinder with connection fitting (not included in the scope of delivery).

Figure 8: Example of gas supply

Item	Designation		
а	Gas cylinder with shielding gas (for recommended mixtures, see page 63)		
b	Main shut-off valve		
с	Manometer for displaying the gas pressure in the gas cylinder [bar]		
d	Gas flow meter [l/min] (pressure reducing valve)		
е	Shut-off valve for the gas connection hose of the stud welding device		
f	Gas connection hose of the stud welding device		
g	Valve for regulating the gas flow rate (maximum permissible gas quantity: 12 l/min)		



#### Establishing the gas supply





# **A**WARNING

#### Danger from leaking gas

Leaking gas can lead to many dangers, such as oxygen deprivation or cables/ lines/gas cylinders whipping around wildly.

- Make sure that the gas cylinder is adequately secured against falling over and being damaged.
- Ensure that gas cylinder, fittings and cables/lines are always in perfect condition.
- Ensure adequate supply of fresh air when using, storing and transporting the gas cylinder.
- Follow the instructions and stipulations of the gas/gas cylinder manufacturer.
- Carry out all required and mandatory tests of the gas cylinder and fittings and cables.
- Protect the gas supply against access by unauthorised persons.

# 0

The following shielding gas mixtures are recommended:

- 82% argon and 18% CO<sub>2</sub> (preferably)
- 90% argon and 10% CO<sub>2</sub>
- 85% argon and 15% CO<sub>2</sub>



# **13. Settings**

The stud welding device and the stud welding gun must be matched and adjusted for the respective work.

### 13.1 Adjusting the welding parameters

In the following, it is described how the welding parameters

- Welding current
- Welding time
- SRM® current
- · Gas pre-flow time and
- · Lift time/height of lift

are adjusted.

In order to achieve an optimal stud welding result, carrying out some test welds with different settings is necessary.

The parameters to be set on the stud welding device depend, among others, on the following influencing factors:

- · Material of the workpiece
- Thickness of the workpiece
- · Material of the welding stud
- Diameter of the welding stud



#### 13.1.1 Support tables for device settings

The values stated in the following table may be useful reference values for a first test weld.

How to adjust the respective settings is explained in the following chapters.

# Welding parameter adjustment aid for BMK-8i SRM PH-9 SRM<sup>12</sup> gun

Stud material	Steel 4.8	A2-50	Steel 5.8	Steel 8.8	A2-50
Stud thread - type	M6-MF	M6-MF	M8-HZ-1	M8-HZ-1	M8-HZ-1
General welding parameters					
Welding current approx. [A]         200         200         270         270         270					
Welding time approx. [ms]	250	250	300	300	300
SRM® current approx. [A]	0.30	0.30	0.30	0.30	0.50
Gas pre-flow time approx. [s]	1.0	1.0	1.0	1.0	1.0
Lift time/height of lift					
Required height of lift approx.: 1 - 1.5 mm					
Lift time approx. [ms] 13.5 13.5 13.5 13.5 13.5					13.5

The values were determined on a metal sheet with a thickness of 2 mm.

# Welding parameter adjustment aid for BMK-8i SRM PH-3N SRM gun

Stud material	Steel 4.8	A2-50	Steel 5.8	Steel 8.8	A2-50
Stud thread - type	M6-MF	M6-MF	M8-HZ-1	M8-HZ-1	M8-HZ-1
	General welding parameters				
Welding current approx. [A]	200	200	270	270	270
Welding time approx. [ms]	250	250	250	250	250
SRM® current [A]	0.20	0.20	0.30	0.30	0.50
Gas pre-flow time [s]	1.0	1.0	1.0	1.0	1.0
Lift time/height of lift					
Required height of lift approx.: 1 - 1.5 mm					
Lift time approx. [ms]	12.5	10.0	8.5	8.5	8.5

The values were determined on a metal sheet with a thickness of 2 mm.



#### 13.1.2 Adjusting welding current and welding time

If no values have been specified, the table in chapter "13.1.1 Support tables for device settings" on page 65 may help you to adjust the basic settings.

Adjusting welding current and welding time

Step 1:	Connect the device as described in chapter "12.2 Connection of the stud welding device and the stud welding guns" on page 59.		
Step 2:	Use the arrow keys ↑↓ to select the position for the welding current setting. If selected correctly, the LED lights up.	(A) $(A)$ $(B)$	
Step 3:	Use the +/- keys to set the desired value for the welding current on the display.	+ 0 5RM 0 GAS	
The welding	current is adjusted.		
Step 4:	Use the arrow keys ↑↓ to select the position for the welding time setting. If selected correctly, the LED lights up.	(A) $(A)$ $(B)$	
Step 5:	Use the +/- keys to set the desired value for the welding time on the display.	+	
The welding	time is adjusted.		



#### 13.1.3 Adjusting/deactivating SRM® current

If no values have been specified, the table in chapter "13.1.1 Support tables for device settings" on page 65 may help you to adjust the basic settings.

As soon as you have set an SRM® current value >0 A, SRM® is activated automatically when welding with the current value set. When 0 A has been set, SRM® is deactivated.

Step 1:	Connect the device as described in chapter "12.2 Connection of the stud welding device and the stud welding guns" on page 59.
Step 2:	Use the arrow keys ↑↓ to select the position for the SRM® current setting. If selected correctly, the LED lights up.
Step 3:	Use the +/- keys to set the desired value for the SRM® current on the display. The SRM® current can be adjusted from 0 - 1500 mA (displayed in A) in increments of 50 mA (0.05 A). When "0" has been set, SRM® is deactivated.
The SRM®	current is adjusted.

#### Adjusting/deactivating SRM® current



#### 13.1.4 Adjusting the gas pre-flow time

If no values have been specified, the table in chapter "13.1.1 Support tables for device settings" on page 65 may help you to adjust the basic settings.

In the gas test mode, it can be checked whether the shielding gas flows through the gun's shielding gas shroud. As soon as the release button on the gun is pressed, shielding gas flows out of the gun's shielding gas shroud for the time set in seconds. It is thus also possible to flush the gas lines with shielding gas before starting work.

#### Adjusting the gas pre-flow time

Step 1:	Connect the device as described in chapter "12.2 Connection of the stud welding device and the stud welding guns" on page 59.	
Step 2:	Use the arrow keys ↑↓ to select the position for the gas pre-flow time. If selected correctly, the LED lights up.	
Step 3:	Use the +/- keys to set the desired value (1-5 s) for the gas pre-flow time on the display.	
The gas pre-flow time is adjusted.		



#### 13.1.5 Adjusting the lift time (height of lift) in the setting mode

For guns with drawn arc ignition, the stud is lifted by a defined height/for a defined time directly before the welding process and lowered automatically during the welding process.

As it is difficult to measure the height to which the stud is lifted, the equivalent "lift time" is displayed on the stud welding device.

When adjusting the lift time in the following, the welding process is simulated in the setting mode. The stud is lifted and lowered as in the welding process, however, only the welding current is not activated.

#### **Operating modes**

- Setting mode: When simulating a welding process, no welding is carried out.
- Operating mode (normal operation): Welding is carried out.



#### Danger from wrong operating mode

If the following adjustments are not made in the setting mode, but in the operating mode, welding is carried out when pressing the release button on the gun.

• Make sure that the setting mode is activated for the lift test.

#### Adjusting the lift time/height of lift with the stud welding device

Step 1:	Connect the device as described in chapter "12.2 Connection of the stud welding device and the stud welding guns" on page 59.	
	Switch on the device.	
Step 2:	Equip the gun with a welding stud.	
Step 3:	Use the arrow keys ↑↓ to select the position for the lift test. If selected correctly, the LED lights up.	



### Adjusting the lift time/height of lift with the stud welding device

Step 4:	Position the gun on the workpiece and press the release button on the gun for the welding. $\bigcirc$	
	The currently set value for the lift time is shown in [ms] on the display. The longer the lift time, the higher the height of the lift. Experience and a few attempts are needed to determine the	
	correct lift time. For reference values for the correct lift time, see chapter "13.1.1 Support tables for device settings" on page 65.	
	Changing the lift time:	
You can cha	nge the lift time using the adjusting ring on	
	gun for the height of lift of the stud. Pull out	
the adjusting	ring and turn it to make the adjustment.	
Press the adjusting ring back in to fix it in place after		
you have made the adjustment.		
Please observe chapter " Notes on the PH-9		
SRM <sup>12</sup> +0	G welding gun" on page 71.	
Step 5:	Ensure that the device is in the operating mode by selecting one of the upper three functions (green LEDs).	

#### Notes on the setting mode

• The adjustment can be repeated as often as needed. To prevent the magnetic coil from overheating, however, it is necessary to wait for approx. one second between two test lifts.



# Notes on the PH-9 SRM<sup>12</sup>+G welding gun

When using and adjusting the PH-9 SRM<sup>12</sup>+G welding gun (welding gun with integrated earth connection), the following aspects must be considered:

• To be able to test the lift, the gun must rest flush on the workpiece.

• To release the gun, two-hand operation must be activated. To this end, all three release buttons must be pressed.





# **14. Welding operation**

In the following, it is described how weldings are carried out and how possible welding errors can be avoided.

### 14.1 Carrying out welding

In the following, it is described how weldings are carried out with a stud welding gun.

Da	inger from incorrect operation
	rring stud welding, incorrect operation of the devices may cause many ngers.
•	Before using the stud welding device, see chapter "2. Important safety instructions" on page 10.
•	If you have any problems understanding the operating instructions, contact the manufacturer, Soyer.
•	Before each use, check that the devices and the cables/lines with the plugs are undamaged.

#### Carrying out welding

Step 1:	Before welding, see chapter "2. Important safety instructions" on page 10.
Step 2:	Connect the gun to the stud welding device (see chapter "12.2 Connection of the stud welding device and the stud welding guns" on page 59). Check if a connection adapter may be required.
Step 3:	Insert the appropriate stud chuck and a welding stud (see chap- ter "8. Description of the SRM® stud chuck" on page 36).
	Only use SOYER® welding studs.
Step 4:	To check the battery charging status, press the release button of the welding gun.
Step 5:	Check the welding parameters (see chapter "13. Settings" on page 64).



# Carrying out welding

Step 6:	Ensure that the device is in the operating mode by selecting one of the upper three functions.	
Step 7:	Ensure that the welding points on the stud and workpiece are metallically bright.	
Step 8:	Press the gun onto the workpiece at an angle of 90 degrees.	
	Image: state of the contact to the workpiece and the earth connection are	
	correct, the LED lights up red.	
Step 9:	<ul> <li>Push the release button of the gun.</li> <li>Welding is carried out. During the welding process, the LEDs also briefly light up red.</li> <li>During the welding process, hold the gun steadily and only remove it vertically from the welded stud after the welding process is finished. By doing so, widening or damaging the stud chuck is avoided.</li> <li>For welding with the PH-9 SRM<sup>12</sup>+G gun, please observe</li> </ul>	
	chapter "10.2 Operation of the PH-9 SRM <sup>12</sup> +G" on page 46.	
The welding	process is finished.	



#### 14.2 Notes on checking the quality of the weld

If the SOYER® stud welding equipment is handled correctly and the correct materials are selected, the strength of the welding joint (welding zone) is always higher than the strength of the stud or the base material.

In practice, the following production control tests have proved successful:

- Visual inspection
- Bend test

For further information, see standard:

DIN EN ISO 14555 Arc stud welding of metallic materials or Technical Bulletin DVS 0904 Instruction for practice - Arc stud welding.

#### 14.2.1 Visual inspection

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

The following table serves as an aid for the assessment of the welding result:

Welding image	Note
	Good welding joint. Optimum setting. Even, bright and closed small welding bead.
	Poor welding joint, e.g. because the welding energy is too high or the immersion distance / lift is too small. The stud is constricted to the welding joint. The stud is only partially welded.
	Poor welding joint, e.g. because the welding energy is too low or the lift is too short. The welding bead is weak and unevenly formed.

#### **Visual inspection**

#### **Visual inspection**

Welding image	Note
	Poor welding joint, e.g. due to a blow effect or a welding gun that was shaken or applied at a slant. The stud flange is not welded completely and has visible imperfections. Undercuts are visible.

# 14.3 Switching off the device

Switch off the stud welding device at the mains switch.

The connected welding gun is switched off automatically.

Ensure that the stud welding device cannot be switched on and used by unauthorised persons.

Close the valves at the gas supply.



# 14.4 Welding defects and their causes

In the following, the most common welding errors, possible causes and troubleshooting are described.

Please contact Heinz Soyer Bolzenschweißtechnik GmbH if a problem cannot be solved.

Error	Possible cause and troubleshooting
The device cannot be switched on.	Check the charging status of the battery.
The device does not	The battery is not sufficiently charged.
weld, no or only very little sparking.	<ul> <li>Connect the device to the main power supply and charge the battery. The green LED display for the charging status must light up.</li> </ul>
	The welding cable, control cable or gas hose are not connected properly or they are damaged.
	<ul> <li>Connect the cables or gas hose properly or check them for damage. Replace them if necessary.</li> </ul>
	The connection plug or the connection socket of the device are damaged.
	Have the plug or socket replaced by the SOYER® customer service.
	Both earth cables are not or not properly connected or the earth clamps are not attached to the workpiece.
	Connect the earth cables, attach the earth clamps to the workpiece.
	The welding points or earth connection points on the workpiece are not metallically bright.
	Prepare the workpiece or stud.
	The height of lift or the immersion depth are set incorrectly.
	<ul> <li>Adjust the height of lift or the immersion depth correctly according to the operating instructions for the stud welding gun.</li> </ul>
	The gas flow rate is set too high, i.e. higher than 12 l/min (the arc is blown out).
	Adjust the gas flow rate to a lower value.
	The stud is too loose in the stud chuck.
	Press or retighten the stud chuck.
	Defective control or welding gun.
	Contact the SOYER® customer service.



Error	Possible cause and troubleshooting
No flow of shielding gas during the welding process.	The gas cylinder is not or not correctly connected to the device or the valve or the shut-off valve are not open.
	Connect the gas cylinder or open the valve or shut-off valve.
	The time for the gas pre-flow time is set to "0".
	<ul> <li>Adjust the gas pre-flow time to the desired pre-flow time.</li> </ul>
	The gas flow rate is set too low.
	• Use the regulating valve to adjust the gas flow rate to 4 - 5 l/min.
	The solenoid valve in the device is contaminated or defective.
	Contact the customer service and have it replaced.
The stud does not lift, no main current arc is generated, even though the LED "Stud on workpiece" lights up.	The height of lift is set incorrectly.
	<ul> <li>Adjust the height of lift according to the operating instructions for the stud welding gun.</li> </ul>
	The control of the device or of the welding gun is defective. (The stud does not lift, even though the height of lift is set correctly.)
	Contact the SOYER® customer service.
The stud lifts, but the main current is not ignited.	The lift is too high.
	<ul> <li>Adjust the lift according to the operating instructions for the stud welding gun.</li> </ul>
	The gas pressure is too high.
	Set the gas pressure to the specified value.



Error	Possible cause and troubleshooting
Varying welding results	The SRM® current shows "0" or is set too low.
	Increase the SRM® current parameter in increments and check if the results improve.
	The welding energy is not set correctly.
	Adjust the welding energy.
	The cable connections are too loose, resulting in contact resistances.
	Check that all cable connections and earth clamps are mechanically secured.
	The stud is too loose or not fully inserted into the stud chuck.
	• Push in the stud up to the stop. Replace the stud chuck if necessary.
	There is a magnetic blow effect. The arc is forced into a certain direction.
	• Change the earth clamp fixture, place iron parts on the edges or rotate the welding gun.
	The height of lift and/or the immersion depth are not set correctly.
	<ul> <li>Adjust the height of lift and/or the immersion depth according to the operating instructions for your welding gun.</li> </ul>
	You have used low-quality studs with inaccurate dimensions or a poor surface finish.
	Only use SOYER® welding studs.
	The welding time and/or the gas flow are not set correctly.
	Readjust the welding time and/or the gas flow.
	The basic material is not suitable for welding.
	Use suitable material combinations.
There is one-sided beading at the same positions.	The beading is caused by the magnetic blow effect. The arc is forced into a certain direction.
	Change the earth clamp fixture, place iron parts on the edges or rotate the welding gun.
	The SRM® current shows "0" or is set too low.
	Increase the SRM® current parameter in increments and check if the results improve.
Intensive sparking, the stud flange has almost melted away.	The main current duration is set too high.
	• Readjust the time for the main current duration according to the table.
	The welding current is set too high.
	Readjust the welding current.



Error	Possible cause and troubleshooting
The stud is not welded to the whole flange surface, the strength of the weld- ing is insufficient.	The main current duration is set too short.
	Readjust the time for the main current duration according to the table.
	The earth connection is poor.
	<ul> <li>Check that the earth cables and earth clamps are mechanically secured. Tighten them if necessary.</li> </ul>
	The contamination on the surface of the workpiece is too heavy.
	Clean the workpiece surface.
	The end face of the welding stud is deformed.
	Use new welding studs.
	The stud protrusion to the stud chuck is set incorrectly.
	<ul> <li>Adjust the stud protrusion to 3 - 5 mm (distance between stud chuck and stud end face).</li> </ul>
	The welding gun is placed in a tilted position.
	<ul> <li>Press the gun onto the workpiece at an angle of 90 degrees.</li> </ul>
	The lift is set incorrectly.
	Adjust the lift.
The device switches	The stud lift is set incorrectly.
itself off.	<ul> <li>Adjust the stud lift according to the operating instructions of the welding gun and switch on the device.</li> </ul>
	You have removed the welding gun from the workpiece while the main current was flowing.
	Switch on the device again.
	The arc breaks, as the gas pressure is too high.
	Set the gas pressure to the specified value.
	The workpiece surface has poor electrical conductance – the arc breaks.
	Grind the surface.
	The battery charging status is too low.
	Check the battery charging status.
	Fuse in the device defective.
	Contact the customer service.
Stud thread scorched.	Stud chuck worn.
	Exchange stud chuck.



# **15. Maintenance and repair**

Maintenance and repair of the stud welding device and the stud welding guns should only be performed by Heinz Soyer Bolzenschweißtechnik GmbH or authorised specialists.

# 16. Service

If servicing is required, please contact:

Heinz Soyer Bolzenschweißtechnik GmbH

Inninger Straße 14

82237 Wörthsee

Phone: 0049-8153-885-0

Fax: 0049-8153-8030

Email: info@soyer.de

Please have the serial number ready during service requests.

Alternatively, you can also contact your respective Soyer agent. Contact information can be found on our website at

www.soyer.de or

www.soyer.com (English)

# **17. Warranty conditions**

The warranty period for commercial or equal use is 12 months. If repair is required, we guarantee the correction of the defects at the Etterschlag plant. Wearing parts are excluded.

The warranty claim shall expire if damage is caused through improper operation, repairs or interventions are undertaken by unauthorised persons and accessories and spare parts are used that are not intended for our system.

When using welding studs from external manufacturers, we do not assume any warranty for proper function of the stud welder and the quality of the welding joint.





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