



# Operating Manual Stud Welding Device BMK-10i



**GB:** English version

Read these operating manual before starting any work!





We recommend registering the device numbers here so they can be quickly accessed if service is needed.

| Device              | Type                      | Serial number |
|---------------------|---------------------------|---------------|
| Stud welding device | BMK-10i                   |               |
|                     |                           |               |
| Stud welding gun    | PH-9 SRM <sup>12</sup>    |               |
| Stud welding gun    | PH-9 SRM <sup>12</sup> +G |               |
| Stud welding gun    | PH-3N SRM                 |               |

#### Operating manual

**Document no.:** P00259, 08-2017, translation of the original German manual (P00159)

All information in this document is the property of Heinz Soyer Bolzenschweißtechnik GmbH.

#### Revision status

| Document | Created / modified | Editor | Date    |
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|          |                    |        |         |



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## 1 General information

This operating manual contains important information and requirements for operating the devices. Keep the operating manual in a readily accessible location close to the devices.

The term 'Devices' in the operating manual refers to the stud welding device and the stud welding gun.

Carefully read through the operating manual and the other documents contained in the technical documentation. In particular, comply with the safety instructions which are intended to help you recognise any residual risks and prevent hazards.

The drawings and diagrams in this operating manual help illustrate the content and may vary slightly from the actual equipment.

The manufacturer reserves the right to make technical changes.

### 1.1 Validity of the operating manual

This operating manual applies to the following devices:

|                     |                           |
|---------------------|---------------------------|
| Stud welding device | BMK-10i                   |
| 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 this manual are marked with registered trademarks:

SRM®: SRM stands for magnetic field stud welding and refers to stud welding in a radially symmetrical magnetic field.

SOYER®: Developments/technologies of Soyer GmbH.

### 1.3 Abbreviations and definitions

Essential abbreviations or designations in this manual:

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

### 1.4 Declarations of conformity

The devices are built according to the generally accepted codes of practice.



**Please note that significant modifications to the device can void the declaration of conformity.**

**In addition, the manufacturer warranty coverage 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 machine described in the following and the version available on the market correspond in design and construction to the safety and health requirements of the listed guidelines and standards. Any unauthorised modification to this machine automatically annuls this declaration.

|   |   |   |
|---|---|---|
| Designation of machine                      | : | <b><u>Stud welding device</u></b>   |
| Machine type                                | : | <b><u>BMK-10i</u></b>   |
| Machine no.                                 | : | _____   |
| Applicable EU directives                    | : | RoHS Directive (2011/65/EU)<br>Low Voltage Directive (2014/35/EU)<br>EMC Directive (2014/30/EU) |
| Applied harmonised standards, in particular | : | EN 60 974-1:2012<br>EN 60 974-10:2008   |
| Applied national standards                  | : | DGUV Regulation 1   |
| Date  | : | 21 July 2017  |
| Producer's signature                        | : | _____   |
| Signer's function                           | : | Managing Director   |



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## 1.5 Manufacturer

The manufacturer of the devices is:  
Heinz Soyer Bolzenschweißtechnik GmbH  
Inninger Straße 14  
82237 Wörthsee  
Tel.: 0049-8153-885-0  
Fax: 0049-8153-8030  
Mail: [info@soyer.de](mailto:info@soyer.de)  
Web: [www.soyer.de](http://www.soyer.de), [www.soyer.com](http://www.soyer.com)

## 1.6 Instruction, training

Soyer offers optional and individual instruction in the operation of the devices.  
Soyer also offers training for customer-specific use of the devices.

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

## 1.7 Standards and directives

The following standards (among others) 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 mechanized and automatic welding of metallic materials
- DIN EN 60974-9 Arc welding equipment - Installation and use
- DVS data sheet 0904 Practical tips - Arc stud welding










## 2 Important safety instructions

Read the following chapter carefully and follow the safety instructions. If you are uncertain or an instruction cannot be followed, please contact the manufacturer.

The devices have been built according to the generally accepted codes of practice and in compliance with, and application of, the usual and established safety requirements. To achieve the maximum possible safety, it is essential that all of the safety instructions in this operating manual are heeded and followed.

### 2.1 Safety alerts used

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


| Safety and information symbols used in this manual                                  |   |
|---|---|
|    | This safety alert indicates an imminently hazardous situation which will result in serious injury or death.   |
|   | This safety alert indicates a potentially dangerous situation which could result in serious physical injury or death.   |
|  | This safety alert indicates a potentially hazardous situation which could result in minor or moderate injury. This alert, without the triangle, is also used for potentially hazardous situations which will result in property damage. |
|  | Additional information indicating danger from electric current. The additional information is used in conjunction with a warning sign.  |
|  | Additional information on the risk of burns. The additional information is used in conjunction with a warning sign.   |
|  | Do not touch the surface of the housing, danger of electrocution.   |
|  | Do not touch or open, danger for unauthorised persons.  |
|  | Danger for persons with a heart pacemaker or other medical implants.  |
|  | The info sign is not a safety alert. It indicates important and useful information on the subject.  |



## Safety instructions on the device

There may be warning stickers on the devices as additional warnings of danger. The warning stickers are affixed by the manufacturer and must not be removed. If a warning sticker is damaged and thus illegible, a new warning sticker must be affixed immediately.

The warning stickers must be obtained from the manufacturer.

## 2.2 General safety instructions

 **DANGER**



**Danger due to electric current, general information**

When working on current-carrying components, there is a danger to life from

- Work on electrical or electronic modules may only be carried out by electrotechnically qualified personnel and carried out in line with the currently applicable electrotechnical regulations.
- Protection equipment must not be manipulated or disabled. Protection equipment includes, for example, the housing and housing cover, fuses and device switches.
- If protection devices have to be removed for maintenance work, the device must only be switched on again when all protection devices are mounted again and their functionality has been checked.
- Starting the device with defective protection equipment is not allowed. Repair or replace faulty protective equipment immediately. Unwanted operation by a third party must be prevented.

**! DANGER**



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

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

- Work on electrical or electronic components must only be carried out by electrical specialists from Soyer Bolzenschweißtechnik.
- Before working on the stud welding device, the mains switch of the device must be switched off and the mains plug of the stud welding device disconnected.
- Before working on the stud welding gun, the supply cable to the stud welding device must be disconnected.
- If protection devices have to be removed for maintenance work, the device must only be switched on again when all protection devices are mounted again and their functionality has been checked.

**! DANGER**



#### **Danger from magnetic fields**

Strong magnetic fields occur in the area of the device, which may affect the operation of medical aids, causing a danger to life.

- Persons with electrical medical aids (such as pacemakers) must keep away from the devices.
- The operating personnel must ensure that persons with medical aids keep away from the devices.

**! DANGER**

#### **Danger of explosion from an inappropriate installation location in explosive atmospheres**

The device is not designed for use in explosive zones.

- The device may not be installed and operated in explosive atmospheres.

**CAUTION**  

**Danger of burns due to hot surfaces**

Through the welding process, the workpieces and some parts of the welding gun become so hot that touching them can lead to burns.

- Always use personal protective equipment.
- Before beginning work on hot parts of the device, check that they have cooled down.
- Do not hold the gun tight in the welding area.

**WARNING**  

**Danger of burns from hot welding spatter**

Dangerous welding spatter can occur during the welding process.

- Always use personal protective equipment.

**WARNING**  

**Fire hazards from hot welding spatter**

Welding spatter or hot workpieces occurring due to the welding process can result in fire hazards.

- Do not store any inflammable and combustible materials in the welding area.

## 2.3 Safety instructions for the working method

### **WARNING**

#### **Hazards due to incorrect working method**

Hazards for operators and third parties can arise due to an incorrect working method.

- Ensure sufficient stability and a dry installation location for the stud welding device.
- Make sure you do not knock over the stud welding device or pull it down from its position with the gun cables.
- Make sure, especially with mobile use, of your own good stability during welding.
- Do not hold the workpiece in your hands during welding. The workpiece must be securely fixed during the welding process.
- Never wrap the gun lines around parts of your body (e.g. arm) as electric fields can occur.
- If the gun is not put on properly or the gun settings are incorrect, a flash can occur during welding. Do not look directly into the flash.
- The gun carries out lifting movements during the welding process. Do not hold the gun tight in the area of moving parts.

## 2.4 Personal protection equipment






The wearing of personal protective equipment is recommended when working with the stud welding device.



### Danger due to missing or incorrect personal protection kit

There is a danger of burns during stud welding, especially due to hot welding spatter. A danger of blinding can also arise due to the occurrence of strong arcs.

- Always wear suitable, closed protective clothing.
- The extent of the protective equipment depends on the respective occurrence and intensity of the welding spatter, arcs and/or noise. This varies according to the basic material, stud material, stud size and required welding power.
- Heed the instructions concerning protective equipment in the following overview.

| Recommended personal protection equipment   |   |
|---|---|
|  | <p>Protective goggles</p> <p>During welding, welding spatter and a flash occur. Wear suitable safety goggles with side protection and protect your eyes with filter protection if necessary.</p>        |
|  | <p>Protective gloves</p> <p>During welding, the workpieces and parts of the welding gun become hot and welding spatter can occur. Wear suitable, non-combustible, heat-resistant protective gloves.</p> |
|  | <p>Protective clothing</p> <p>Welding spatter occurs during welding. Wear suitable, non-combustible and, if necessary, heat-resistant, protective clothing.</p>   |
|  | <p>Safety shoes</p> <p>Welding spatter occurs during welding. Wear suitable, non-combustible, heat-resistant safety shoes.</p>  |
|  | <p>Hearing protection</p> <p>Depending on the welding device and the welding application, relatively loud welding noises can occur. Wear suitable hearing protection.</p>                               |

## 2.5 Intended use of the stud welding device

Pins and threaded studs from M3 – M10 and M12 HZ-1R (M6 to M10 preferred) made of steel and stainless steel can be welded using the SOYER BMK-10i stud welding device.

Special studs or diameters on request.

The stud welding device must only be operated with the welding guns described in chapter “6.5 Permitted stud welding guns” on page 27.

The stud welding device must be operated within the technical specifications. Only welding studs from Soyer (HZ-1 and MF types) must be welded.

The stud welding device supports the following welding processes:

- SRM welding (stud welding in a radially symmetrical magnetic field)
- Drawn arc stud welding with shielding gas

### 2.5.1 Incorrect use

Any use other than the intended use of the device is deemed to be non-intended. Any use other than intended use, unauthorised modification or manipulation of the device will void the declaration of conformity as well as all warranty claims against the manufacturer.

## 2.6 Intended use of the stud welding guns

Pins and threaded studs from M3 to M12 and numerous different weld fasteners according to DIN EN ISO 13918, made of steel, stainless steel, aluminium and brass, can be welded with the SOYER stud welding guns described in this operating manual.



**The maximum diameter and type of weldable studs can be limited by the performance capacity of the stud welding device on which the gun is operated.**

Special studs or diameters on request.

The operation of welding guns is only permitted with the stud welding devices described in the technical data of the gun.

The stud welding gun must be operated within the technical specifications.



### **2.6.1 Incorrect use**

Any use other than the intended use of the welding gun is deemed to be contrary to the intended use.

Use other than the intended use, unauthorised modification or manipulation of the device will void the declaration of conformity as well as all warranty claims against the manufacturer.

Misuse of the welding gun as a tool, e.g. as a hammer for checking the weld quality, is not permitted.

## **2.7 Operating company prerequisites**

The operator of the device must ensure that the preconditions in this operating manual are fulfilled for safe operation.

These include, for example, the conditions at the installation site, the official regulations on requirements for a safe workplace, the training of the operating personnel and qualified personnel in handling the device if necessary, fulfilment of the prescribed maintenance work, and monitoring that the device is used in conformity with intended use.

The operating manual must be stored in the vicinity of the device. The device operating company must ensure that the device is only used when all protective equipment is present, active and undamaged.

### **2.7.1 Prerequisites for personnel**

#### **Operating personnel**

The personnel responsible for operating the device in normal operation must be familiar with the device and trained accordingly. They must have read and understood the operating manual. In addition, they must be capable of eliminating (or minimising as far as possible) any possible remaining danger to themselves and third parties when working with the device.

To retain this qualification, the safety training must be repeated annually. In the event of a fault or if maintenance becomes necessary, consult specially trained qualified personnel or the manufacturer.

Operators of stud welding equipment must have the expert knowledge for operating, correctly setting the equipment and for properly carrying out the welding.

If the welders have to be qualified for certification of welding, the DIN EN ISO 14555 and DIN EN ISO 14732 standards must be observed.

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### **Electrical and electronic specialists**

The following basically applies: Work on current-carrying elements may only be performed by qualified electricians. The work must be carried out in line with the applicable technical rules for electrotechnical devices.



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

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### **3 Transport**

When transporting the device, make sure it cannot be damaged. It must be protected against the effects of weather, especially moisture, through suitable packaging.

### **4 Storage, shutdown**

Protect the device against dirt and humidity during storage or shutdown.  
Protect the device against unauthorised access by third parties.

### **5 Disposal**

Local environmental guidelines for disposal must be complied with.  
Substances that are hazardous to water and the environment must be disposed of in accordance with legal regulations.

Materials must be separated according to regulations where applicable.

## 6 Description of the BMK-10i stud welding device



The main elements of the stud welding device and their function are shown and described in the following.

### 6.1 Type designation

| Designation<br>Order number | Feature                                       |
|-----------------------------|---|
| BMK-10i<br>PO1366           | Mains voltage :<br>3 x 400 V, 50/60 Hz, 16 AT |

### 6.2 Working method

Pins and threaded studs from M3 – M10 and M12 HZ-1R (M6 to M10 preferred) made of steel and stainless steel can be welded using the SOYER BMK-10i stud welding device.

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

The BMK-10i working with SRM technology was specially developed for mobile use. Thanks to SRM, the BMK-10i mobile welding device enables problem-free welding, even in constrained positions.

The BMK-10i works on the basis of a compact inverter current source and delivers a constant welding current up to 600 A with extremely short welding times. The rectified mains voltage is converted into a high frequency voltage with a frequency of 75 kHz by an Insulated Gate Bipolar Transistor-based (IGBT-based) inverter. The energy is transferred by a high frequency transformer and rectified on the output side. As a result of the high control speed in combination with the integrated SRM welding process of the BMK-10i, the reproducibility of the welds is increased and the quality of the welding significantly improved.

The PH-9 SRM<sup>12</sup> and PH-9 SRM<sup>12</sup>+G stud welding guns or the PH-3 SRM stud welding gun, with an adapter, can be connected as standard guns to the BMK-10i stud welding device.

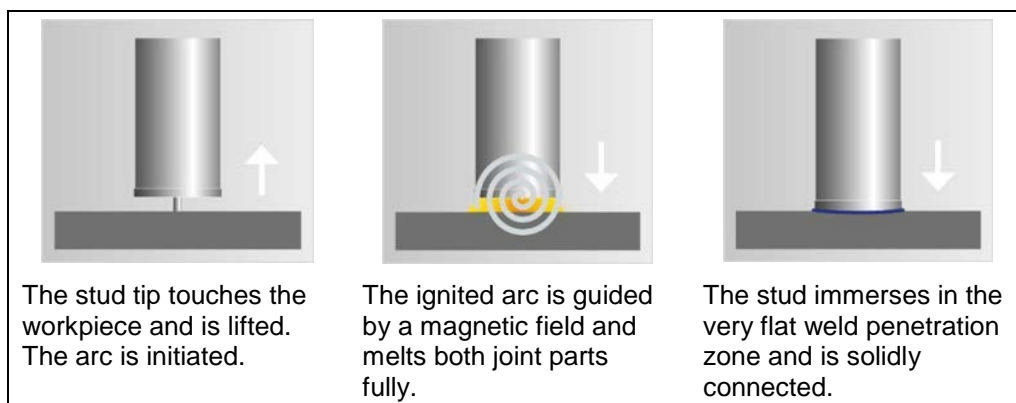
### 6.2.1 Stud welding with SRM technology

The welding process recommended by Soyer for operating the BMK-10i is the patented SRM welding process (patent no.: 10 2004 051 389) in conjunction with the also newly developed HZ-1 universal studs with flat front face and centring tip (patent no.: 10 2006 016 553).

SRM means stud welding in a radially symmetrical magnetic field. This innovative weld technology allows welds in a ratio of 1:10 of the sheet thickness to the stud diameter (previously 1:4) where the use of ceramic rings can be dispensed with.

The versatile advantages of the SRM process provides completely new application options in the entire stud welding sector (additional information available at [www.srm-technology.de](http://www.srm-technology.de)).

#### Functional principle



The advantages of the SRM welding process are:

- No bothersome weld bead
- Welding from constrained positions now also without ceramic ring
- Reduced weld penetration in the plate
- Lower energy consumption and reduced welding time
- No welding spatter



Further information on this subject can be found at [www.soyer.com](http://www.soyer.com).

### 6.2.2 Drawn arc stud welding technology with shielding gas

For drawn arc stud welding with shielding gas, a gas mixture is used as an aid.



**The following shielding gas mixtures are recommended:**

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

This shielding gas shields the weld point from the atmosphere and takes over the weld pool backing at the same time. Moreover, it ensures a concave fillet weld bead formation with a blank metallic surface, which reduces the risk of corrosion and achieves better dynamic characteristics of the weld joint.

When welding with shielding gas without any further aids, the formation of an exact bead in an accurately calibrated and reproducible version is not possible. Stud welding with shielding gas can be carried out at considerably shorter distances as there is no need to install and remove the ceramic rings for each welding process.



**Further information on this subject can be found at [www.soyer.com](http://www.soyer.com).**

### 6.3 Overview of the controls

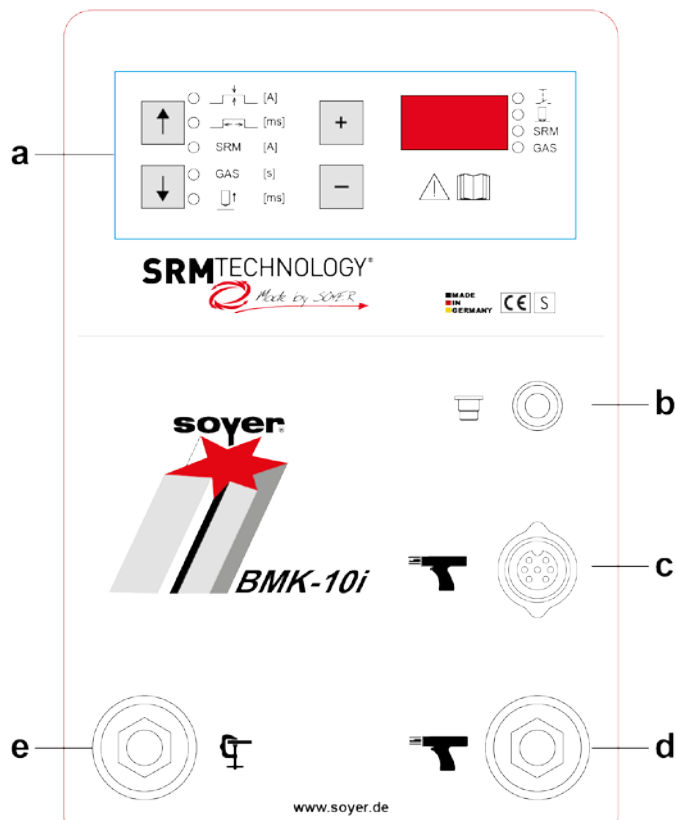


Figure 1: Overview of the device front

| Item | Designation   |
|------|---|
| a    | Selection and display area with display and function keys (see chapter 6.3.1 "Display and setting area" on page 25) |
| b    | Shielding gas connection of the gun, coupling socket KD 1/4   |
| c    | Control cable connection of the gun   |
| d    | Welding cable connection of the gun   |
| e    | Connection of the earth cable   |

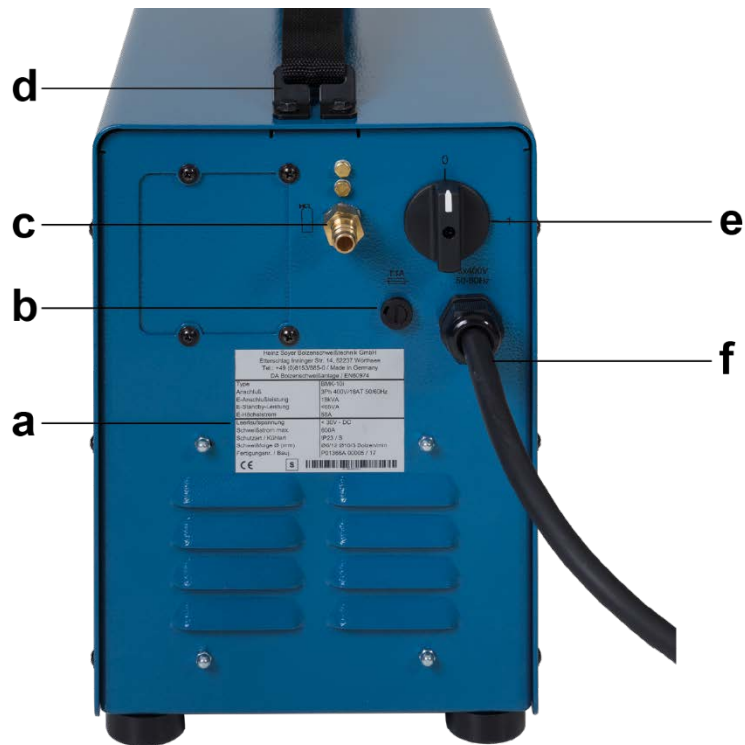


Figure 2: Overview of the back of the device

| Item | Designation                                  |
|------|--|
| a    | Type plate                                   |
| b    | Fuse element with fuse 1 AT                  |
| c    | Gas connection                               |
| d    | Carrying belt                                |
| e    | Mains switch for switching the device on/off |
| f    | Mains connection cable                       |



### 6.3.1 Display and setting area

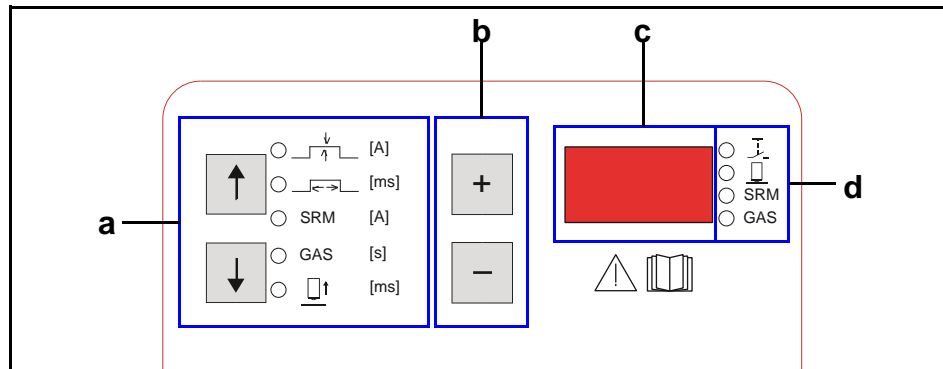


Figure 3: Display and setting area

| Item | Designation  |
|------|--|
| a    | <p><b>Function selection</b></p> <p>The following functions can be selected using the arrow keys:</p> <ul style="list-style-type: none"> <li>• Welding current</li> <li>• Welding time</li> <li>• SRM current (deactivated at value 0 A, activated at value &gt; 0 A)</li> <li>• Gas preflow time (deactivated at value 0 s, activated at value &gt; 0 s)</li> <li>• Lift test (see chapter "12.1.5 Setting the lift time (height of lift) in the "Setup" mode" on page 62)</li> </ul> <p>The LED next to the selected function lights up.</p> |
| b    | <p><b>+/- keys</b></p> <p>For setting the value of the selected function shown on the display.</p>   |
| c    | <p><b>Display</b></p> <p>The set values of the selected function are shown on the display.</p>   |
| d    | <p><b>Display of the operating state</b></p> <p>The following operating states are displayed during welding operation:</p> <ul style="list-style-type: none"> <li>• Trigger button of the gun is pressed</li> <li>• Gun is placed on the workpiece and ready for welding</li> <li>• SRM is active</li> <li>• Gas preflow is active</li> </ul> <p>The LED next to the active operating state lights up.</p>   |



#### 6.4 Technical data of the BMK-10i stud welding device

|                                |   |
|--------------------------------|---|
| Designation                    | BMK-10i stud welding device   |
| Welding process                | Drawn arc stud welding (DA)   |
| Standard gun                   | PH-9 SRM <sup>12</sup> stud welding gun and PH-9 SRM <sup>12</sup> +G   |
| Welding area                   | SOYER threaded studs from M3 - M10 and M12 HZ-1R (M6 to M10 preferred) HZ-1 and MF types or nails Ø 2 - 4 mm (optional) |
| Current source                 | Inverter technology   |
| Welding current                | 100 - 600 A stud welding  |
| Welding time                   | 20 up to 500 ms   |
| Welding sequence               | Ø 3 mm up to 12 studs/min   Ø 8 mm up to 3 studs/min  |
| Mains connection               | 3 x 400 volt (+10% -15%), 16AT, 50/60 Hz  |
| E-continuous current (standby) | < 0.1 A / phase   |
| E-continuous power (standby)   | 30 VA   |
| E-maximum current              | 58 A / phase (short-time duty)  |
| No-load voltage                | < 30 V / DC (direct current)  |
| Protection class               | IP 23   |
| Shielding gas connection       | max. 12 l/min   |
| Dimensions                     | approx. 220 x 355 x 545 mm (W x H x D)  |
| Weight approx.                 | Approx. 16.5 kg (with cable)  |
| Colour                         | Blue  |
| Subject to technical changes   |   |

## 6.5 Permitted stud welding guns

WARNING

**Hazards due to wrong gun**

Hazards for the operator can arise if the wrong welding gun is used.

- Only use the welding guns from Soyer permitted in the following.

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

### Overview of permitted stud welding guns

| Gun                       | Comments                        |
|---------------------------|---------------------------------|
| 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 the gas connection: | F06695/FA |
| Adapter cable for the control cable: | F06694/FA |

## 6.6 Cleaning the stud welding device

### **DANGER**

#### **Hazards during cleaning**

Improper cleaning of the stud welding device can endanger personnel.

- The device may only be cleaned by trained and qualified technicians.
- Prior to starting work, the stud welding device must be disconnected from the mains and secured against being switched back on again.
- Work on electrical devices and modules may only be carried out by qualified electricians in accordance with the electrotechnical codes of practice.
- Cleaning agents must not get into the device.

Do not use aggressive cleaning agents for cleaning the device.

Make sure that cleaning waste is disposed of in an environmentally compatible manner. Comply with the instructions of the cleaning agent manufacturer.

### **CAUTION**

#### **Device damage due to incorrect cleaning**

Improper cleaning can lead to damage of the device.

- Cleaning agents must not get into the device.
- Do not use aggressive agents for cleaning.

The frequency of cleaning depends on the conditions in which the stud welding device is used.

## 7 Description of the SRM stud chuck



Each welding gun is provided with a stud chuck that matches the welding stud. For the SRM welding process, there are:

### Adjustable stud chucks:

- SRM stud chuck M6 - F05307
- SRM stud chuck M8 - F05215
- SRM stud chuck M10 - F05217
- SRM stud chuck M12 - F05219

The stud chuck in the gun must be installed/changed in accordance with the stud diameter.

Adjustable stud chucks must be set to the stud length.

### 7.1 Setting the SRM stud chuck

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


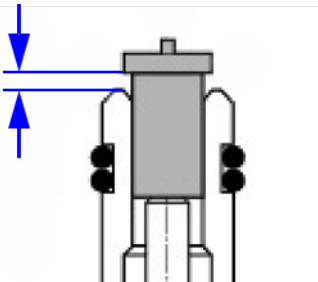


The standard stud chuck can hold studs up to a length of 60 mm.



**Different stud diameters require different stud chucks.**

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

### Setting the SRM stud chuck

|                          |   |   |
|--------------------------|---|---|
| Step 1:                  | Switch the stud welding device off if the gun is connected. Select the stud chuck according to the required stud diameter.  |   |
| Step 2:                  | Insert the stud into the stud chuck.  |    |
| Step 3:                  | <p>Set the end stop screw so that the top edge of the stud flange, when it is sitting on the screw, sits between 3 mm and 5 mm above the stud chuck.</p>  |   |
| Step 4:                  | <p>Fix the end screw with the locknut.</p> <p><b>i</b></p> <p>If the stud protrusion is more than 5 mm, the required transverse magnetic field is deflected sideways which can lead to uncontrolled SRM welding.</p>                        |  |
| The setting is complete. |   |   |

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

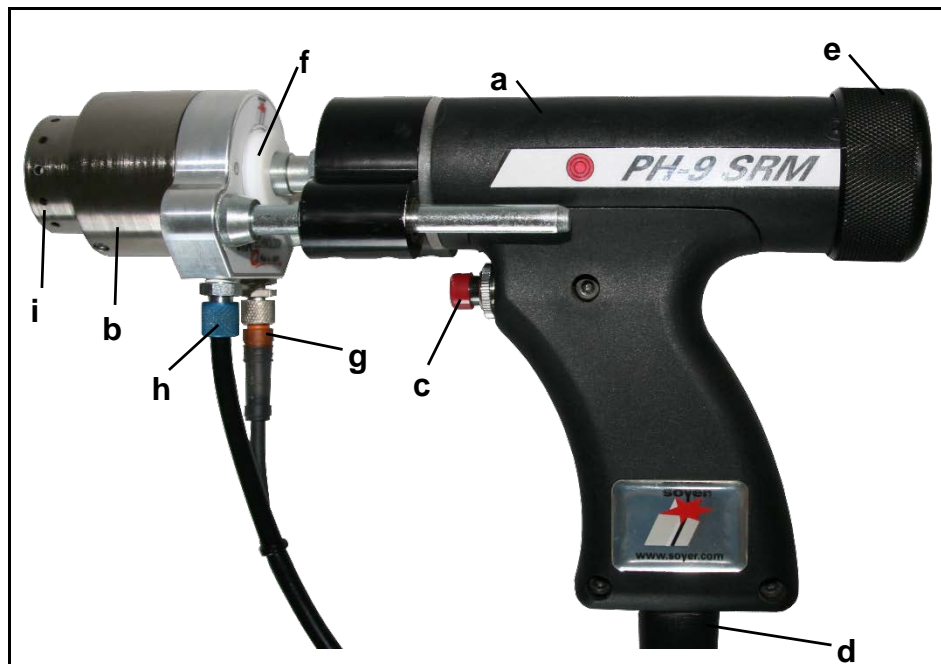


Figure 4: PH-9 SRM<sup>12</sup> stud welding gun

| Item | Designation  |
|------|--|
| a    | PH-9 SRM <sup>12</sup> stud welding gun, with lift magnet            |
| b    | Shielding gas cap with SRM technology                                |
| c    | Trigger button   |
| d    | Current and control cables for connecting to the stud welding device |
| e    | Adjustment wheel for setting the height of lift/lift time            |
| f    | Gas insert for shielding gas cap SRM <sup>12</sup>                   |
| g    | SRM supply for connecting to the stud welding device                 |
| h    | Gas supply for connecting to the stud welding device                 |
| i    | Support tube insert SRM <sup>12</sup>                                |

The gun has a lift magnet. Before welding, the stud is lifted by the lift magnet and automatically lowered again for welding.

The height of the lift is also crucial for the weld result.

The lift height can be determined using the lift time with the aid of the stud welding device. To do so, observe chapter "12.1.5 Setting the lift time (height of lift) in the "Setup" mode" on page 62.

The height of lift is set using the adjusting wheel on the gun (see "Figure 4: 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 diameter of the stud chuck:

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

The gas insert serves to optimise the gas flow and insulate the stud chuck from the shielding gas cap.



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






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



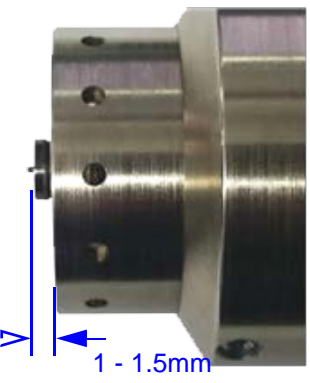

|                              |  |
|------------------------------|--|
| Designation                  | PH-9 SRM <sup>12</sup> stud welding gun  |
| Item no.                     | P02276   |
| Welding process              | <ul style="list-style-type: none"> <li>• Drawn arc stud welding (DA)</li> <li>• SRM welding process</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 possible on request and with special accessories   |
| Stud welding devices         | <p>The gun is approved for operation on the following Soyer stud welding devices:</p> <ul style="list-style-type: none"> <li>• BMK-8i</li> <li>• BMK-10i</li> <li>• BMK-12i</li> <li>• BMK-16i when using an adapter:</li> </ul> <p>Control cable adapter: F06770/FA<br/>           Earth cable adapter: F06771/FA<br/>           Gas adapter: F06772/FA</p> |
| Weight                       | 1.3 kg without cable   |
| Subject to technical changes |  |



## 8.2 Installing the SRM stud chuck in PH-9 SRM<sup>12</sup>

### Installing the SRM stud chuck

|         |  |   |
|---------|--|---|
| Step 1: | <p><b>⚠ WARNING</b></p> <p>Switch off the stud welding device if the gun is connected to the stud welding device.</p>  |   |
| Step 2: | Set the stud chuck to the required stud (see chapter “7.1 Setting the SRM” on page 29).  |   |
| Step 3: | Undo the union nut.  |    |
| Step 4: | <p>If there is still a stud chuck in the gun, remove it.</p> <p><b>i</b></p> <p>Using pliers as an aid makes removal easier.</p>   |   |
| Step 5: | <p>Remove the tripod with the shielding gas cap.</p> <p>Undo the four socket head screws.</p>  |  |
| Step 6: | <p>Change the gas insert according to the required stud).</p> <p>Gas inserts:</p> <ul style="list-style-type: none"> <li>• Item no.: M6 = F06738</li> <li>• Item no.: M8 = F06739</li> <li>• Item no.: M10 = F06740</li> <li>• Item no.: M12 = F06741</li> </ul> |  |
| Step 7: | Slide the tripod with the shielding gas cap onto the gun.  |  |

|                              |   |   |
|------------------------------|---|---|
| <p>Step 8:</p>               | <p>Slide the stud chuck to the end stop in the spring piston of the gun.</p>  |    |
| <p>Step 9:</p>               | <p>Hand-tighten the union nut.</p>  |    |
| <p>Step 10:</p>              | <p>Insert a stud and check the stud protrusion.</p> <p>The stud/stud flange must protrude 1 - 1.5 mm out of the shielding gas cap.</p> <p>If necessary, correct the setting of the stud chuck by shifting the tripod.</p> |   |
| <p>Step 11:</p>              | <p>Tighten the four socket head screws.</p>   |  |
| <p>Assembly is complete.</p> |   |   |




### 8.3 Replacing the SRM<sup>12</sup> support tube insert with PH-9 SRM<sup>12</sup>

It may be necessary to replace the support tube insert due to heavy wear or impurity.

Item number for support tube insert: F06748

Use original spare parts only.

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

|                       |   |   |
|-----------------------|---|---|
| Step 1:               | <p><b>⚠ WARNING</b><br/>Switch off the stud welding device if the gun is connected to the stud welding device.</p>  |   |
| Step 2:               | Undo the two threaded pins on the tripod housing.   |    |
| Step 3:               | <p>Remove the old support tube insert and install a new one.<br/>Slide the new support ring up to the end stop in the mounting.</p> <p><b>i</b></p> <p><b>When installing, make sure that the support tube insert and the mounting surface are clean.</b></p> |   |
| Step 4:               | Hand-tighten the two threaded pins on the tripod housing.   |  |
| Assembly is complete. |   |   |

#### 8.4 Cleaning the welding gun

Regularly free the gun and shielding gas cap of slag and welding spatter using a suitable tool.

The frequency of cleaning depends on conditions under which the stud welding gun is used.

### CAUTION

#### Danger of injury when cleaning

Welding spatter and slag can have sharp edges.

- Wear protective gloves when cleaning.



To prevent impurities from welding spatter and slag and to simplify cleaning, we recommend using Soyer release spray (order number M01464).

## 9 Description of the PH-9 SRM<sup>12</sup>+G weld gun

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

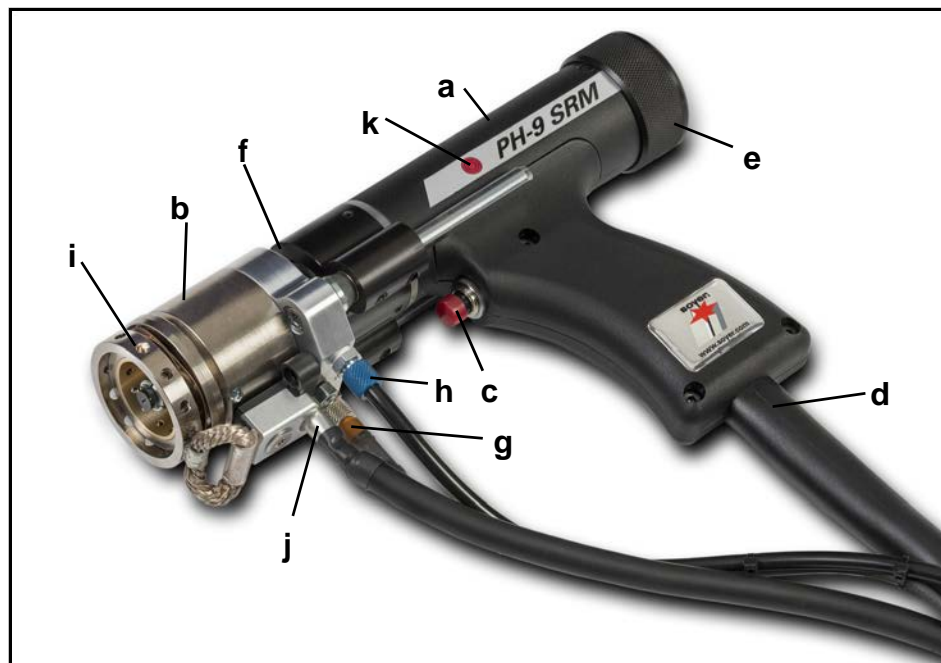


Figure 5: PH-9 SRM<sup>12</sup>+G stud welding gun

| Item | Designation   |
|------|---|
| a    | PH-9 SRM <sup>12</sup> +G stud welding gun, with lift magnet                              |
| b    | Shielding gas cap with SRM technology   |
| c    | Trigger button  |
| d    | Current and control cables for connecting to the stud welding device                      |
| e    | Adjustment wheel for setting the height of lift/lift time                                 |
| f    | Gas insert for SRM <sup>12</sup> +G shielding gas cap (between shielding gas cap and gun) |
| g    | SRM supply for connecting to the stud welding device                                      |
| h    | Gas supply for connecting to the stud welding device                                      |
| i    | SRM <sup>12</sup> +G support tube insert, with earth attachment                           |
| j    | Earth connection  |
| k    | Button for the two-hand triggering (red point on the gun sticker)                         |

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

The gun has a lift magnet. Before welding, the stud is lifted by the lift magnet and automatically lowered again for welding.

The height of the lift is also crucial for the weld result.

The lift height can be determined using the lift time with the aid of the stud welding device. To do so, observe chapter "12.1.5 Setting the lift time (height of lift) in the "Setup" mode" on page 62.

The height of lift is set using the adjusting wheel on the gun (see "Figure 5: 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 diameter of the stud chuck:

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

The gas insert serves to optimise the gas flow and insulate the stud chuck from the shielding gas cap.



**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.**



## 9.1 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  |
| Item no.                     | P02277  |
| Welding process              | <ul style="list-style-type: none"> <li>• Drawn arc stud welding</li> <li>• SRM welding process</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 possible on request and with special accessories  |
| Stud welding devices         | <p>The gun is approved for operation on the following Soyer stud welding devices:</p> <ul style="list-style-type: none"> <li>• BMK-8i</li> <li>• BMK-10i</li> <li>• BMK-12i</li> <li>• BMK-16i when using the adapter:</li> </ul> <p>Control cable adapter: F06770/FA<br/>           Earth cable adapter: F06771/FA<br/>           Gas adapter: F06772/FA</p> |
| Weight                       | 1.3 kg without cable  |
| Subject to technical changes |   |

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

The integrated earth connection makes the operation and safety check different to that of conventional welding guns.

### 9.2.1 Safety check

|   |   |
|---|---|
|  <b>WARNING</b>  |  |
| <p><b>Danger from a faulty or manipulated gun</b></p> <p>The welding gun has an integrated earth connection. A short-circuit may be caused between the earth ring and stud chuck when the stud is reloaded manually. The welding process may be started unintentionally if the trigger buttons are faulty or bridged. This may cause burns.</p> <ul style="list-style-type: none"> <li>• Do not operate the gun with faulty or bridged protection equipment.</li> </ul> |   |

## Functional check

The welding process is triggered by simultaneously pressing all three trigger buttons (two-hand button **a** on both sides and trigger button **b**). These buttons must be checked for correct operation every time before starting operation:

With the welding device switched on, press only the trigger button (**b**) on the gun. The "Start" LED on the device display must not light up.



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



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

The earth connection needed for welding is established by the earth attachment on the gun tip. Always make sure that contact to the workpiece is clean and that the attachment is fully seated on the workpiece.







All three trigger buttons must always be pressed simultaneously to trigger the welding process.



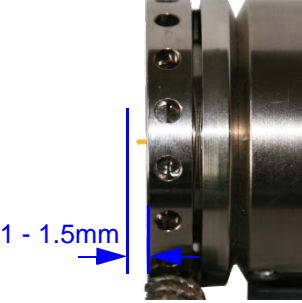





### 9.3 Installing the SRM stud chuck for the PH-9 SRM<sup>12</sup>+G

#### Installing the SRM stud chuck

|         |   |   |
|---------|---|---|
| Step 1: |  <b>WARNING</b><br><br><b>Switch off the stud welding device if the gun is connected to the stud welding device.</b> |   |
| Step 2: | Set the stud chuck to the required stud (see chapter "7.1 Setting the SRM" on page 29).   |   |
| Step 3: | Undo the union nut.   |    |
| Step 4: | If there is still a stud chuck in the gun, remove it.<br><br><b>Using pliers as an aid makes removal easier.</b>  |  |
| Step 5: | Remove the tripod with the shielding gas cap.<br><br>Undo the four socket head screws.  |  |
| Step 6: | Change the gas insert according to the required stud.<br><br>Gas inserts<br>•Item no.: M6 = F06738<br>•Item no.: M8 = F06739<br>•Item no.: M10 = F06740<br>•Item no.: M12 = F06741                    |  |
| Step 7: | Slide the tripod with the shielding gas cap onto the gun.   |  |

|                              |  |   |
|------------------------------|--|---|
| <p>Step 8:</p>               | <p>Slide the stud chuck to the end stop in the spring piston of the gun.</p>   |    |
| <p>Step 9:</p>               | <p>Hand-tighten the union nut.</p>   |    |
| <p>Step 10:</p>              | <p>Insert a stud and check the stud protrusion.<br/>The stud/stud flange must protrude 1 - 1.5 mm out of the shielding gas cap.<br/><br/>If necessary, correct the setting of the stud chuck by shifting the tripod.</p> |   |
| <p>Step 11:</p>              | <p>Tighten the four socket head screws.</p>  |  |
| <p>Assembly is complete.</p> |  |   |





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

It may be necessary to replace the support tube insert due to heavy wear or impurity.





Item number for support tube insert: F06748

Use original spare parts only.

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

|         |   |   |
|---------|---|---|
| Step 1: |  <p><b>WARNING</b></p> <p>Switch off the stud welding device if the gun is connected to the stud welding device.</p> |   |
| Step 2: | Undo the earth connection socket head screw.  |   |
| Step 3: | Undo the two threaded pins on the tripod housing.   |  |
| Step 4: | Remove the old support tube insert.   |  |

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

|                              |   |
|------------------------------|---|
| <p>Step 5:</p>               | <p>Assemble the new support tube insert. Make sure the sequence (bottom from the left to right) and orientation are correct.</p>  |
|                              |    |
| <p>Step 6:</p>               | <p>Slide the new support ring up to the end stop in the mounting.</p> <p><b>i</b></p> <p><b>When installing, make sure that the support tube insert and the mounting surface are clean.</b></p>  |
| <p>Step 7:</p>               | <p>Hand-tighten the two threaded pins on the tripod housing</p>    |
| <p>Step 8:</p>               | <p>Tighten the earth connection socket head screw with a tightening torque of 250 - 300 cN.</p>    |
| <p>Assembly is complete.</p> |   |

## 9.5 Cleaning the stud welding gun

Regularly free the gun and shielding gas cap of slag and welding spatter using a suitable tool.

The frequency of cleaning depends on conditions under which the stud welding gun is used.

### **CAUTION**

#### **Danger of injury when cleaning**

Welding spatter and slag can have sharp edges.

- Wear protective gloves when cleaning.



**To prevent impurities from welding spatter and slag and to simplify cleaning, we recommend using Soyer release spray (order number M01464).**

## 10 Description of the PH-3N SRM stud welding gun

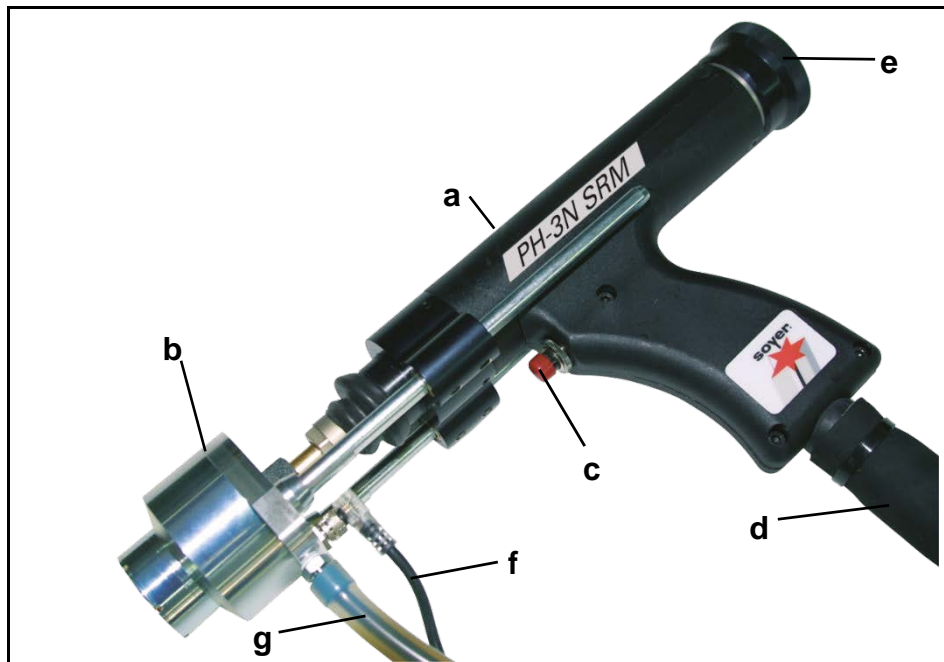


Figure 6: PH-3N SRM stud welding gun

| Item | Designation  |
|------|--|
| a    | PH-3N SRM stud welding gun, gap welding gun with lifting magnet      |
| b    | Shielding gas cap with SRM technology                                |
| c    | Trigger button   |
| d    | Current and control cables for connecting to the stud welding device |
| e    | Adjustment wheel for setting the height of lift/lift time            |
| f    | SRM supply for connecting to the stud welding device                 |
| g    | Gas supply for connecting to the stud welding device                 |

The gun has a lift magnet. Before welding, the stud is lifted by a magnet and automatically lowered again for welding.

The height of the lift is also crucial for the weld result.

The lift height can be determined using the lift time with the aid of the stud welding device. To do so, observe chapter "12.1.5 Setting the lift time (height of lift) in the "Setup" mode" on page 62.

The height of lift is set using the adjusting wheel on the gun.



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







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

|                              |  |
|------------------------------|--|
| Designation                  | PH-3N SRM stud welding gun   |
| Item no.                     | P02245   |
| Welding process              | <ul style="list-style-type: none"> <li>• Drawn arc stud welding</li> <li>• SRM welding process</li> </ul>  |
| Stud diameter                | M3 - M12 (depending on the stud welding device)  |
| Stud chuck                   | SRM stud chuck and SRM nut holder  |
| Stud length                  | Standard to 60 mm, special lengths possible on request and with special accessories  |
| Stud welding devices         | <p>The gun is approved for operation on the following Soyer stud welding devices:</p> <ul style="list-style-type: none"> <li>• BMK-8i (*)</li> <li>• BMK-12i (*)</li> <li>• BMK-16i</li> </ul> |
| Weight                       | 1.3 kg without cable   |
| Subject to technical changes |  |

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

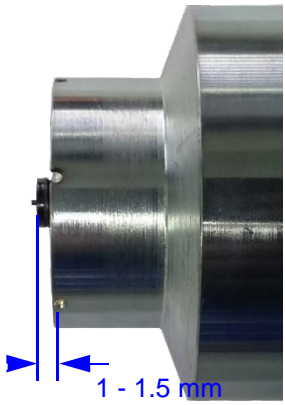

## 10.2 Installing the SRM stud chuck with PH-3N SRM

### Installing the SRM stud chuck

|         |  |   |
|---------|--|---|
| Step 1: |  <p><b>Switch off the stud welding device if the gun is connected to the stud welding device.</b></p>   |   |
| Step 2: | Set the stud chuck to the required stud (see chapter “7.1 Setting the Setting the SRM” on page 29).  |   |
| Step 3: | <p>Remove the tripod with the shielding gas cap. To do so, undo the four socket head screws.</p>  <p><b>It is not essential to remove the tripod with the shielding gas cap, but it makes the job easier.</b></p> |    |
| 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 to the end stop in the spring piston of the gun.  |  |
| Step 7: | Hand-tighten the union nut.  |  |



*Installing the SRM stud chuck*

|                              |   |  |
|------------------------------|---|--|
| <p>Step 8:</p>               | <p>Insert a stud and check the stud protrusion.</p> <p>The stud/stud flange must protrude 1 - 1.5 mm out of the shielding gas cap.</p> <p>If necessary, correct the setting of the stud chuck by shifting the tripod.</p> |   |
| <p>Step 9:</p>               | <p>Fasten the tripod with the shielding gas cap onto the gun.</p>   |  |
| <p>Assembly is complete.</p> |   |  |

### 10.3 Cleaning the welding gun

Regularly free the gun and shielding gas cap of slag and welding spatter using a suitable tool.

The frequency of cleaning depends on conditions under which the stud welding gun is used.

#### **CAUTION**

##### **Danger of injury when cleaning**

Welding spatter and slag can have sharp edges.

- Wear protective gloves when cleaning.



**To prevent impurities from welding spatter and slag and to simplify cleaning, we recommend using Soyer release spray (order number M01464).**

## 11 Setup and connection




### 11.1 Requirements for the installation location



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

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

The installation location and workplace must comply with the legal requirements. Ensure that the installation location has good accessibility all round for maintenance work.

Make sure that the stud welding device is not soiled by work causing dust (especially metal dust or swarf) in the immediate vicinity (e.g. from grinding work).

|   |
|---|
|               |
| <b>Danger from humid installation location</b><br>There is a danger of electrocution if the stud welding device is operated in a humid environment. <ul style="list-style-type: none"><li>• The stud welding device must only be operated in dry rooms.</li></ul> |

|  |
|--|
|    |
| <b>Danger from welding vapours</b><br>Health threatening vapours can occur depending on the material of the workpiece and/or welding stud. <ul style="list-style-type: none"><li>• Where necessary, ensure suitable extraction of the welding vapours.</li></ul> |

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

### 11.2.1 Mains connection

After installation, connect the stud welding device to the power supply using the mains plug. To do so, observe chapter “6.4 Technical data of the BMK-10i stud welding device” on page 26.



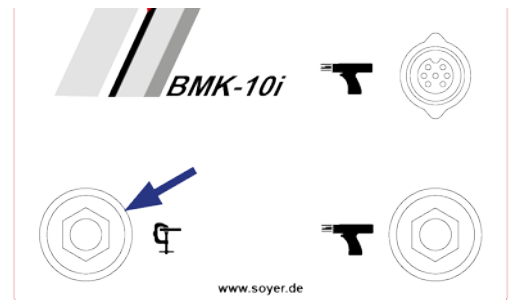
**When switching on the device, all LEDs on the front of the device light up briefly.**

### 11.2.2 Connecting the earth cable

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

To do so, plug the earth cable into the socket and turn the plug to the right up to the end stop.

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



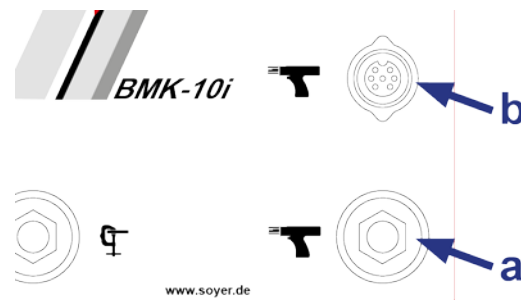
**Make sure the cable colour coding is correct when you establish the connection.**

### 11.2.3 Connecting the stud welding gun

Only use the welding guns approved by the manufacturer. To do so, observe chapter “6.5 Permitted stud welding guns” on page 27.

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

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



**Check whether the connection of the gun requires any special adapters (see chapter “6.5 Permitted stud welding guns” on page 27).**

### 11.2.4 Connecting the shielding gas supply

Prior to welding with shielding gas, a suitable gas supply must be established.

The gas connection on the back of the device is used for supplying gas to the stud welding device via a pressure reducer (pressure reduction valve not included in the scope of delivery).



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

Example of a shielding gas cylinder with connection fittings (not included in the scope of delivery).

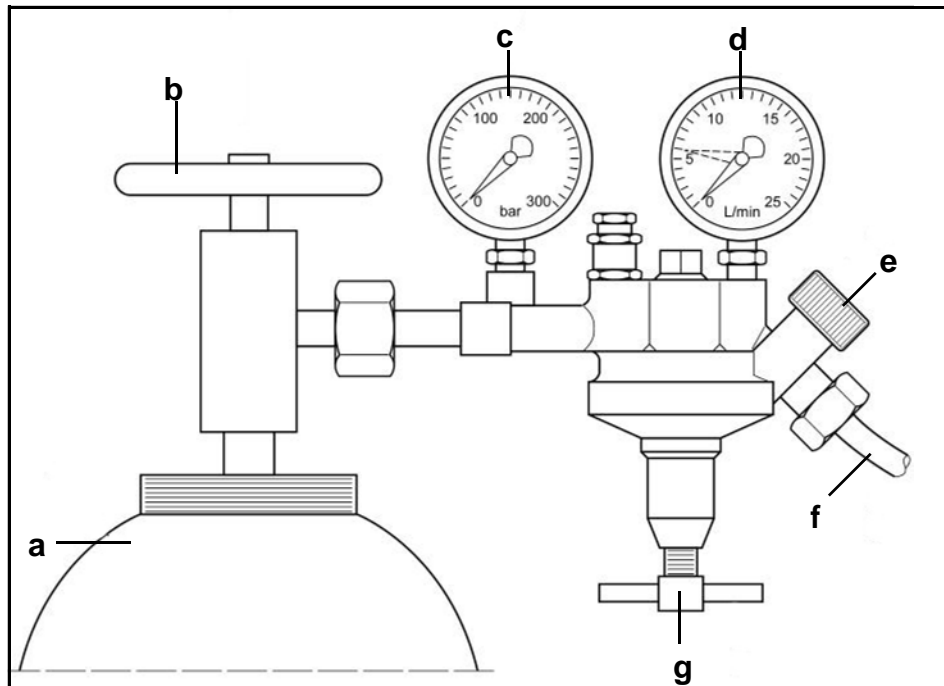


Figure 7: Example of a gas supply


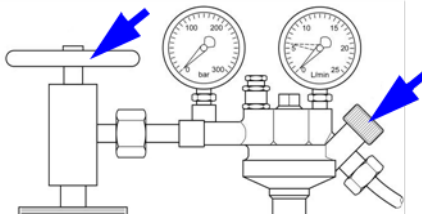
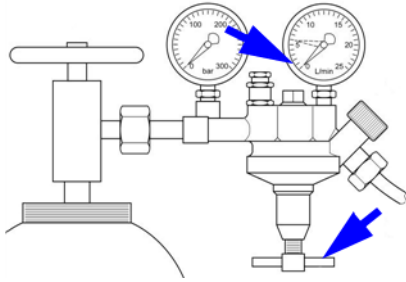
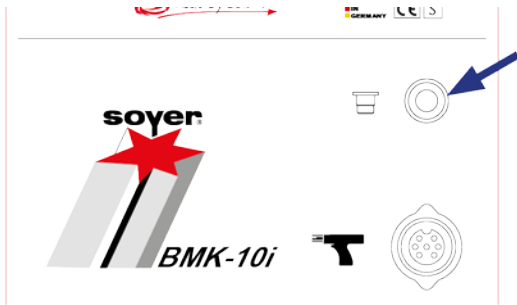
| Item | Designation   |
|------|---|
| a    | Gas cylinder with shielding gas (for recommended mixtures, see below)             |
| b    | Main shut-off valve   |
| c    | Pressure gauge for indicating the gas pressure in the gas cylinder [bar]          |
| d    | Gas flow rate meter [l/min] (pressure reduction valve)                            |
| e    | 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 amount: 12 l/min) |



**The following shielding gas mixtures are recommended:**

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

*Establishing the gas supply*

|                                       |  |
|---------------------------------------|--|
| <p>Step 1:</p>                        | <p>Check the gas cylinder, the connection fittings and the gas hose with the connecting plugs for integrity and functionality.</p>   |
| <p>Step 2:</p>                        | <p>Connect the gas connection hose to the pressure reduction valve of the gas cylinder and the stud welding device.</p>  |
| <p>Step 3:</p>                        | <p>Open the main valve of the gas cylinder and the shut-off valve of the gas connection hose.</p>                       |
| <p>Step 4:</p>                        | <p>Use the regulating valve to set a shielding gas flow rate of approx. 4 - 5 l/min.</p>                               |
| <p>Step 5:</p>                        | <p>Plug the shielding gas hose of the gun into the stud welding device.</p>    |
| <p>The gas supply is established.</p> |  |

## **WARNING**

### **Danger from escaping gas**

Numerous dangers can occur due to escaping gas, such as oxygen deprivation or line/gas cylinder whipping around.

- Make sure the gas cylinder is adequately secured against falling over and damage.
- Make sure the gas cylinder, fittings and lines are always in a good condition.
- Make sure there is an adequate supply of fresh air when using, storing or transporting the gas cylinder.
- Comply with the instructions of the gas/gas cylinder manufacturer.
- Carry out all necessary, prescribed checks of the gas cylinder, fittings and lines.
- Safeguard the gas supply against unauthorised access.



### **The following shielding gas mixtures are recommended:**

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



---

## 12 Settings

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

### 12.1 Setting the welding parameters

How to set the welding parameters of the

- Welding current
- Welding time
- SRM current
- Gas preflow time and
- Lift time/Height of lift

is explained in the following.

To achieve an optimum stud welding result, it is necessary to carry out some sample welds with different settings.

The parameters to be set on the stud welding device also depend on the following influencing factors:

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

### 12.1.1 Help tables for device setting

The values given in the table on the next page can be useful as guide values for an initial sample weld.

How the respective settings are made is explained in later chapters.

#### **BMK-10i SRM welding parameters setting aid PH-9 SRM<sup>12</sup> and PH-9 SRM<sup>12</sup> +G welding guns**

| No. | Welding element | Material       | MC [A] | MCT [ms] | SRM [A] |
|-----|-----------------|----------------|--------|----------|---------|
|     | M6 MF           | Steel 4.8      | 250    | 200      | 0.3     |
|     | M6 MF           | A2-50          | 250    | 190      | 0.3     |
|     | M8 HZ-1         | Steel 5.8      | 270    | 350      | 0.3     |
|     | M8 HZ-1         | A2-50          | 270    | 300      | 0.4     |
|     | M8 HZ-1         | Steel 8.8      | 270    | 400      | 0.4     |
|     | M10 HZ-1        | Steel 5.8      | 600    | 220      | 0.3     |
|     | M10 HZ-1        | A2-50<br>A5-50 | 600    | 200      | 0.5     |
|     | M10 HZ-1        | Steel 8.8      | 600    | 350      | 0.15    |
|     |                 |                |        |          |         |

#### **Fixed values (standard setting)**

|                             |                                    |
|-----------------------------|------------------------------------|
| Preweld current (PC) = 80 A | Preweld current time (PCT) = 20 ms |
| Gas preflow time = 1 s      | Drop time, approx. = 12-14 ms      |



**The values were determined using a 5 mm thick plate.**

**Applied gas: 82%AR 18%CO<sub>2</sub>. Gas flow rate: 10-12 l/min.**

#### Abbreviations and definitions

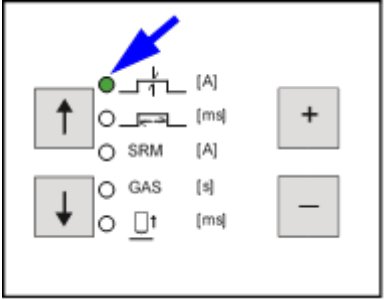
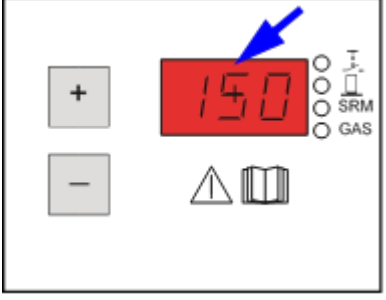
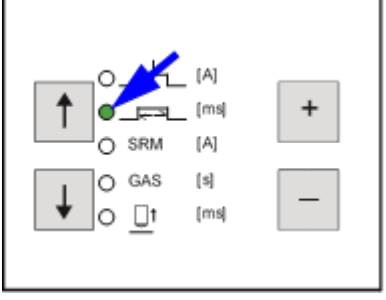
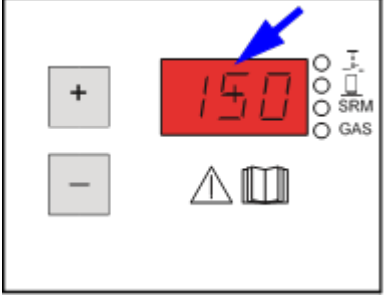
HZ-1: SOYER universal studs with centring tip

MF: SOYER threaded studs with a reduced flange diameter (MF stands for mini flange).

### 12.1.2 Setting the welding current and the welding time

If you do not have specified values, the table in chapter “12.1.1 Help tables for device setting” on page 58 can be used as an aid for a basic setting.

#### Setting the welding current and the welding time

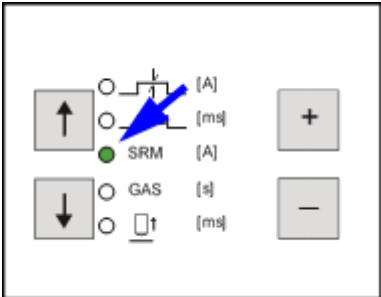

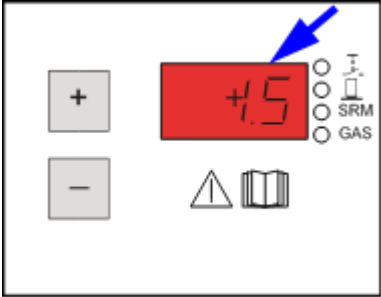
|                                   |   |   |
|-----------------------------------|---|---|
| Step 1:                           | Connect the device as described in chapter “11.2 Connection of the stud welding device and the stud welding guns” on page 52.       |   |
| Step 2:                           | Use the ↑↓ arrow keys to select the position for the welding current setting.<br><br>The LED lights up if the selection is correct. |    |
| Step 3:                           | Use the +/- keys to set the required value for the welding current on the display.  |   |
| The welding current has been set. |   |   |
| Step 4:                           | Use the ↑↓ arrow keys to select the position for the welding time setting.<br><br>The LED lights up if the selection is correct.    |  |
| Step 5:                           | Use the +/- keys to set the required value for the welding time on the display.   |  |
| The welding time has been set.    |   |   |

### 12.1.3 Setting/deactivating the SRM current

If you do not have specified values, the table in chapter “12.1.1 Help tables for device setting” on page 58 can be used as an aid for a basic setting.

If an SRM current value  $> 0$  A is set, SRM is automatically activated during welding with the set current value. If the setting is 0 A, SRM is deactivated.

#### Setting/deactivating the SRM current

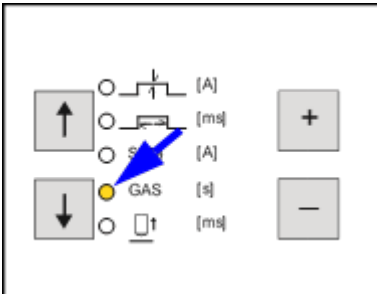
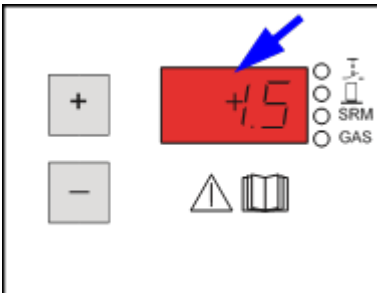
|                               |   |   |
|-------------------------------|---|---|
| Step 1:                       | Connect the device as described in chapter “11.2 Connection of the stud welding device and the stud welding guns” on page 52.   |   |
| Step 2:                       | <p>Use the <math>\uparrow\downarrow</math> arrow keys to select the position for the SRM current setting.</p> <p>The LED lights up if the selection is correct.</p>   |    |
| Step 3:                       | <p>Use the +/- keys to set the required value for the SRM current on the display.</p> <p>The SRM current is adjustable from 0 - 1500 mA (display in A) in 50 mA steps (0.05 A).</p> <p></p> <p><b>If the setting is "0", SRM is deactivated.</b></p> |  |
| The SRM current has been set. |   |   |

### 12.1.4 Setting the gas preflow time

If you do not have specified values, the table in chapter “12.1.1 Help tables for device setting” on page 58 can be used as an aid for a basic setting.

The "Gas test" mode can be used to check that the shielding gas flows through the shielding gas cap of the gun. As soon as the release knob on the gun is pressed, shielding gas flows out of the shielding gas cap of the gun for the time set in seconds. This means the gas lines can also be purged with shielding gas before starting work.

#### Setting the preflow time

|                                    |   |   |
|------------------------------------|---|---|
| Step 1:                            | Connect the device as described in chapter “11.2 Connection of the stud welding device and the stud welding guns” on page 52.               |   |
| Step 2:                            | <p>Use the ↑↓ arrow keys to select the position for the gas preflow time setting.</p> <p>The LED lights up if the selection is correct.</p> |   |
| Step 3:                            | <p>Use the +/- keys to set the required value (1-5 s) for the gas preflow time on the display.</p>  |  |
| The gas preflow time has been set. |   |   |

### 12.1.5 Setting the lift time (height of lift) in the "Setup" mode

For drawn arc welding guns, the stud is lifted for a defined height/time just before the welding process and automatically lowered again during the welding process.

As the height of lift of the stud is difficult to measure, the equivalent lift time is specified on the stud welding device.

In the following setting of the lift time, the welding process is simulated in the "Setup" mode. The lifting and lowering of the stud is the same as during welding, only the welding current is not activated.

#### Operating modes

- Setup mode: No welding is carried out when simulating a welding process.
- Operating mode (normal mode): Welding is carried out.

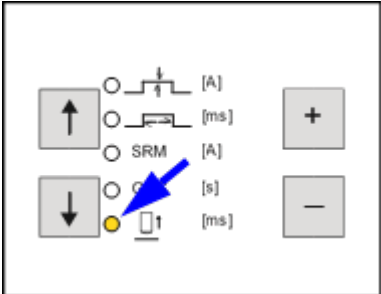
## ⚠ WARNING

#### Danger from incorrect operating mode



If the following adjustment work is not carried out in the setup mode but in the operating mode, pressing the trigger button on the gun causes a weld to be carried out.

- Make sure that the "Setup" mode is activated for the lift test.

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

|         |   |   |
|---------|---|---|
| Step 1: | Connect the device as described in chapter "11.2 Connection of the stud welding device and the stud welding guns" on page 52.<br><br><b>Switch on the device.</b> |   |
| Step 2: | Fit the gun with a welding stud.  |   |
| Step 3: | Use the ↑↓ arrow keys to select the position for the lift test.<br><br>The LED lights up if the selection is correct.   |  |

*Setting the lift time/height of lift with the stud welding device*

|  |  |
|--|--|
| <p>Step 4: Set the gun on the workpiece and press the trigger button on the gun for the weld.</p> <p>The currently set value for the lift time in [ms] appears on the display. The longer the lift time, the higher the height of lift.</p> <p>Determining the correct lift time requires experience and some trials. Guide values for the correct lift time can be found in chapter "12.1.1 Help tables for device setting" on page 58.</p> |                           |
| <p><b>Changing the lift time:</b></p> <p>The lift time is changed using the adjustment ring on the welding gun for the height of lift of the stud. Pull out the adjustment ring and turn it to change the setting.</p> <p>After you have changed the setting, push the adjustment ring back in.</p> <p><b>i</b></p> <p><b>For details, please see chapter "Notes on the PH-9 SRM<sup>12</sup>+G welding gun" on page 64.</b></p>             |                          |
| <p>Step 5:</p>   | <p>Make sure the device is in operating mode by selecting one of the three functions above (green LEDs).</p> |

**Notes on "Setup" mode**

The setup process can be repeated as often as required. However, to avoid the magnetic coil overheating, maintain a waiting time of approx. one second between test strokes.

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

Pay attention to the points below when using and changing the setting for the PH-9 SRM<sup>12</sup>+G welding gun (welding gun with integrated earth connection):

|   |  |
|---|--|
| <ul style="list-style-type: none"><li>• The lift can only be tested when the gun is positioned flush on the workpiece.</li></ul>                                    |   |
| <ul style="list-style-type: none"><li>• Two-hand operation must be activated to trigger the gun. All three trigger buttons have to be pressed to do this.</li></ul> |  |




## 13 Welding operation

How welds are carried out and how any weld defects can be avoided are described in the following.

### 13.1 Carrying out welding

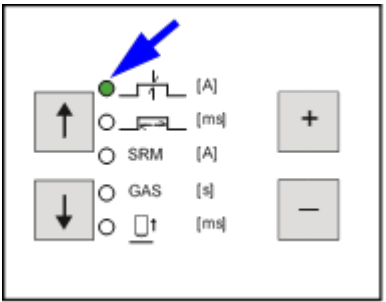
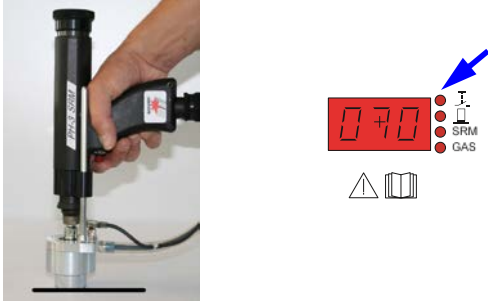
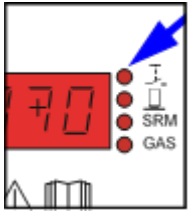
How a weld is carried out with the stud welding gun is described in the following.

|  |
|--|
|   |
| <p><b>Danger from incorrect operation</b></p> <p>During stud welding, many hazards can arise if the devices are not operated correctly.</p> <ul style="list-style-type: none"> <li>• Before operating the stud welding device, observe chapter “2. Important safety instructions” on page 10.</li> <li>• If you have any problems understanding the operating manual, please contact the manufacturer, Soyer.</li> <li>• Before each use, check that the devices and the lines with the plugs are intact.</li> </ul> |

#### *Carrying out welding*

|         |  |
|---------|--|
| Step 1: | Before welding, observe chapter “2 Important safety instructions” on page 10.  |
| Step 2: | Connect the gun to the stud welding device (see chapter “11.2 Connection of the stud welding device and the stud welding guns” on page 52).<br><br>Pay attention to any necessary connection adapters. |
| Step 3: | Insert the matching stud chuck and a welding stud (see chapter “7 Description of the SRM on page 29).<br><br>Only use Soyer welding studs.   |
| Step 4: | Check the welding parameters (see chapter “12. Settings” on page 57).  |

### Carrying out welding

|   |   |   |
|---|---|---|
| <p>Step 5:</p>                              | <p>Make sure the device is in operating mode by selecting one of the three above functions.</p>   |  |
| <p>Step 6:</p>                              | <p>Check that the welding points on the stud and workpiece are bare metal.</p>  |   |
| <p>Step 7:</p>                              | <p>Press the gun onto the workpiece at an angle of 90°.</p>  <p>The LEDs light up red when the contact to the workpiece and earth connection are correct.</p>  |   |
| <p>Step 8:</p>                              | <p>Press the gun trigger button.</p> <p>Welding is carried out. The LEDs also briefly light up red during welding.</p>  <p><b>i</b></p> <p><b>During the welding process, hold the gun still and only pull the gun vertically away from the welded stud after completing the welding process. This prevents the stud chuck widening and becoming damaged.</b></p> <p><b>i</b></p> <p><b>For welding with the PH-9 SRM<sup>12</sup>+G gun, please consult chapter “9.2 Operation of the PH-9 SRM12+G” on page 39.</b></p> |   |
| <p>The welding process is now complete.</p> |   |   |

## 13.2 Notes on checking the quality of the weld

If the SOYER stud welding system is used properly and the correct materials are chosen, the strength of the weld joint (weld zone) is always higher than that of the stud or the basic material.

The following production weld tests have been proven in practice:

- Visual inspection
- Bend test

Further information is given in the standard:

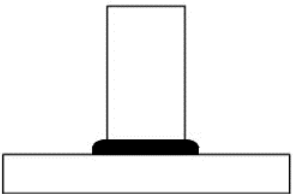
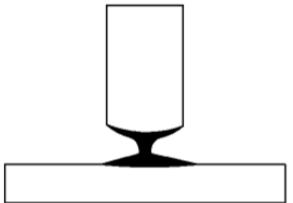
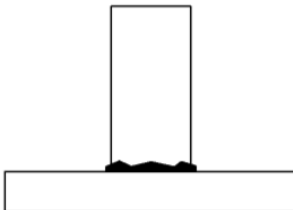
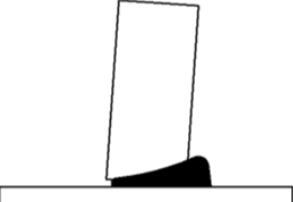
DIN EN ISO 14555 Welding - Arc welding of metallic materials or in the DVS data sheets DVS 0904 Instructions for practice - Arc stud welding.

### 13.2.1 Visual inspection

Visual inspection is used for a rough check for major defects. The uniformity of the weld is assessed here.

The following table serves as an aid for assessing a weld result.

Visual inspection

| Welding image   | Note   |
|---|--|
|  | <p>Good weld joint.<br/>Optimum setting.</p> <p>Small weld bead, uniform, shiny and closed.</p>  |
|  | <p>Poor weld joint, e.g. due to excessive welding energy or immersion distance/lift too low.</p> <p>The stud is constricted at the weld joint. The stud is only partly welded.</p>         |
|  | <p>Poor weld joint, e.g. due to insufficient welding energy or immersion distance/lift too low.</p> <p>The weld bead is weak and unevenly formed.</p>                                      |
|  | <p>Poor weld joint, e.g. through arc blow effect, welding gun shaken or applied at a slant.</p> <p>The stud flange is not fully welded and has visible defects. Undercuts are visible.</p> |



### **13.3 Switching off the device**

Switch off the stud welding device at the mains switch.

This also automatically switches off the connected welding gun.  
Make sure that the stud welding device cannot be switched on and used by unauthorized persons.

Close the shut-off valves to the gas supply.

### 13.4 Weld defects and their causes

The most common weld defects, their possible causes and how to troubleshoot them are described in the following.

If the fault cannot be remedied as described, please contact Heinz Soyer Bolzenschweißtechnik GmbH.

| Faults  | Possible cause and troubleshooting  |
|---|---|
| Device cannot be switched on.                                       | <ul style="list-style-type: none"> <li>• Check the mains supply fuses.</li> </ul>   |
| Device does not weld, there is no (or very little) spark formation. | Device is not connected to the mains or not switched on. <ul style="list-style-type: none"> <li>• Connect the device to the mains supply and switch it on. The LED displays light up briefly when switching on.</li> </ul>            |
|   | Welding cable, control cable or gas hose are not correctly connected or damaged. <ul style="list-style-type: none"> <li>• Connect the cables or gas hose correctly or examine for damage, replace if necessary.</li> </ul>            |
|   | Connection plugs or sockets of the device are damaged. <ul style="list-style-type: none"> <li>• Have the plugs or sockets replaced by SOYER Customer Service.</li> </ul>  |
|   | Both earth cables are not (or not correctly) connected, or earth clamps are not fastened to the workpiece. <ul style="list-style-type: none"> <li>• Connect the earth cable, fasten the earth clamps to the workpiece.</li> </ul>     |
|   | Weld points or earth connection points on the workpiece are not bare metal. <ul style="list-style-type: none"> <li>• Prepare the workpiece or studs.</li> </ul>   |
|   | Height of lift or immersion depth is not set correctly. <ul style="list-style-type: none"> <li>• Set the height of lift or the immersion depth correctly in accordance with the operating manual for the stud welding gun.</li> </ul> |
|   | Gas flow rate is set too high, i.e. greater than 12 l/min (the arc is blown out). <ul style="list-style-type: none"> <li>• Set the gas flow rate to a lower value.</li> </ul>   |
|   | Stud sits too loose in the stud chuck. <ul style="list-style-type: none"> <li>• Press the stud chuck together or reclamp.</li> </ul>  |
|   | Defect on the controller or on the welding gun. <ul style="list-style-type: none"> <li>• Notify SOYER Customer Service.</li> </ul>  |



| Faults   | Possible cause and troubleshooting   |
|--|--|
| Shielding gas does not flow during the welding process.                                      | Gas cylinder is not (or is not correctly) connected to the device or valve, or shut-off valve is not open. <ul style="list-style-type: none"> <li>• Connect the gas cylinder or open the valve or the shut-off valve.</li> </ul> |
|  | Time for gas preflow time is set to "0". <ul style="list-style-type: none"> <li>• Set the gas preflow time to the required preflow time.</li> </ul>  |
|  | Gas flow rate is set too low. <ul style="list-style-type: none"> <li>• Set the gas flow rate to 4 - 5 l/min with the regulating ball valve.</li> </ul>   |
|  | Solenoid valve in the device is soiled or defective. <ul style="list-style-type: none"> <li>• Contact Customer Service and have it replaced.</li> </ul>  |
| Stud does not lift, there is no main current arc although "Stud on workpiece" LED lights up. | Height of lift is not set correctly. <ul style="list-style-type: none"> <li>• Set the height of lift in accordance with the operating manual for the stud welding gun.</li> </ul>  |
|  | Controller of the device or welding gun is defective. (Stud does not lift despite correctly set height of lift). <ul style="list-style-type: none"> <li>• Notify SOYER Customer Service.</li> </ul>                              |
| Stud lifts but main current is not ignited.  | Lift is too large. <ul style="list-style-type: none"> <li>• Set the lift in accordance with the operating manual for your welding gun.</li> </ul>  |
|  | Gas pressure is too high. <ul style="list-style-type: none"> <li>• Set the gas pressure to the specified value.</li> </ul>   |

| Faults  | Possible cause and troubleshooting   |
|---|--|
| Different weld results                                      | SRM current not set correctly. <ul style="list-style-type: none"> <li>• Increase the SRM current parameter in steps and check if there is any improvement.</li> </ul>  |
|   | Welding energy not set correctly. <ul style="list-style-type: none"> <li>• Adjust the welding energy.</li> </ul>   |
|   | Cable connections are too loose, there are transfer resistances. <ul style="list-style-type: none"> <li>• Check the proper seating of all cable connections and earth clamps.</li> </ul>   |
|   | Stud is too loose or not up to the end stop in the stud chuck. <ul style="list-style-type: none"> <li>• Press the stud up to the end stop, replace the stud chuck if necessary.</li> </ul>   |
|   | There is a magnetic arc blow effect. The arc is pushed in a specific direction. <ul style="list-style-type: none"> <li>• Change the fastening of the earth clamps, place pieces of iron on the edges or turn the welding gun.</li> </ul>                           |
|   | Height of lift and/or immersion depth are/is not set correctly. <ul style="list-style-type: none"> <li>• Set the height of lift and/or the immersion depth in accordance with the operating manual for your welding gun.</li> </ul>                                |
|   | Low quality studs with imprecise dimensions or poor surface quality have been used. <ul style="list-style-type: none"> <li>• Only use SOYER welding studs.</li> </ul>  |
|   | Welding time and/or gas flow rate are/is not set correctly. <ul style="list-style-type: none"> <li>• Set the welding time and/or the gas flow rate again.</li> </ul>   |
|   | Basic material is not suitable for welding. <ul style="list-style-type: none"> <li>• Use suitable material combinations.</li> </ul>  |
| One-sided beads are formed at the same points.              | The formation of a bead is caused by magnetic arc blow effect. The arc is pushed in a specific direction. <ul style="list-style-type: none"> <li>• Change the fastening of the earth clamps, place pieces of iron on the edges or turn the welding gun.</li> </ul> |
|   | SRM current is set to 0 or is set too low. <ul style="list-style-type: none"> <li>• Increase the SRM current parameter in steps and check if there is any improvement.</li> </ul>  |
| Very heavy spark formation, stud flange almost melted away. | Main current duration set too long. <ul style="list-style-type: none"> <li>• Re-adjust the time for the main current duration according to the table.</li> </ul>   |
|   | Welding current set too high. <ul style="list-style-type: none"> <li>• Re-adjust the welding current.</li> </ul>   |



| Faults  | Possible cause and troubleshooting   |
|---|--|
| Stud does not weld with the entire flange area, the strength of the weld is insufficient. | Main current duration set too short. <ul style="list-style-type: none"> <li>• Re-adjust the time for the main current duration according to the table.</li> </ul>  |
|   | Faulty earth connection. <ul style="list-style-type: none"> <li>• Check proper seating of the earth cable and earth clamps, tighten if necessary.</li> </ul>   |
|   | Excessive soiling of the workpiece surface. <ul style="list-style-type: none"> <li>• Clean the workpiece surface.</li> </ul>   |
|   | Front surface of the welding stud deformed. <ul style="list-style-type: none"> <li>• Use a new welding stud.</li> </ul>  |
|   | Stud protrusion for the stud chuck not set correctly. <ul style="list-style-type: none"> <li>• Set the stud protrusion to 3 - 5 mm (distance between the stud chuck and the front surface of the stud).</li> </ul> |
|   | Welding gun applied at a slant. <ul style="list-style-type: none"> <li>• Press the gun onto the workpiece at an angle of 90°.</li> </ul>   |
|   | Lift not correctly set. <ul style="list-style-type: none"> <li>• Adjust the lift.</li> </ul>   |
| The device switches itself off.   | Stud lift not set correctly. <ul style="list-style-type: none"> <li>• Set the stud lift in accordance with the operating manual for the welding gun and switch on the device.</li> </ul>                           |
|   | Welding gun has been pulled off the workpiece during the main current. <ul style="list-style-type: none"> <li>• Switch the device on again.</li> </ul>   |
|   | Arc breaks off because the gas pressure is too high. <ul style="list-style-type: none"> <li>• Set the gas pressure to the specified value.</li> </ul>  |
|   | Surface of the workpiece has poor electrical conductance –arc breaks off. <ul style="list-style-type: none"> <li>• Grind off the surface.</li> </ul>   |
|   | Faulty mains supply. <ul style="list-style-type: none"> <li>• Check the mains supply fuses.</li> </ul>   |
|   | Fuse in the device is defective. <ul style="list-style-type: none"> <li>• Notify Customer Service.</li> </ul>  |
| Welding stud thread is burned.  | Stud chuck is worn out. <ul style="list-style-type: none"> <li>• Replace the stud chuck.</li> </ul>  |



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## 14 Maintenance and repair

The stud welding device and the stud welding guns must only be maintained and repaired by Heinz Soyer Bolzenschweißtechnik GmbH or its authorised specialists.

## 15 Service

In the event of service, please contact:  
Heinz Soyer Bolzenschweißtechnik GmbH  
Inninger Straße 14  
82237 Wörthsee  
Tel.: 0049-8153-885-0  
Fax: 0049-8153-8030  
Mail: [info@soyer.de](mailto:info@soyer.de)

Please have the serial number at hand during service requests.

Alternatively, you can contact your respective Soyer representative. The contact data is available on our web site at  
[www.soyer.de](http://www.soyer.de) or  
[www.soyer.com](http://www.soyer.com) (English)

## 16 Warranty conditions

The warranty period for commercial use or corresponding use is 12 months. In the event of repair, we guarantee the elimination of deficiencies at the Etersschlag factory. Wear parts are excluded.

The warranty claim expires if damage occurs through improper operation, repairs or interventions by unauthorised persons as well as due to the use of accessories and spare parts not intended for our system.

If third party welding studs are used, we accept no responsibility for the proper functioning of the stud welder and the quality of the weld joint.



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**Heinz Soyer Bolzenschweißtechnik GmbH**

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