

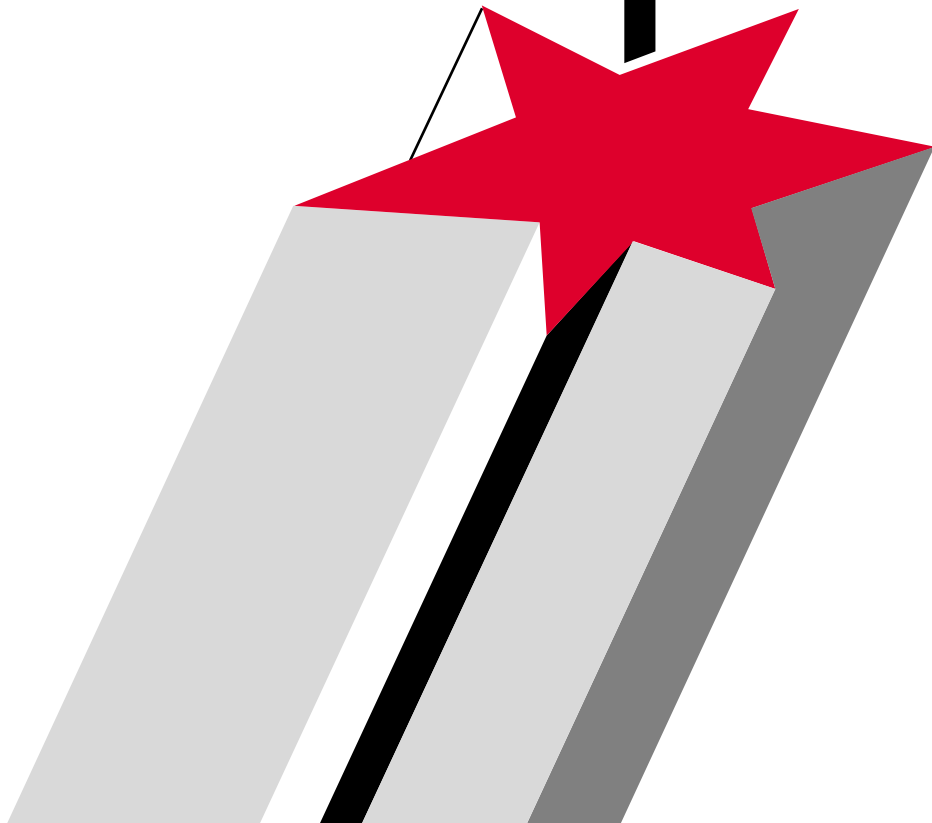
# Operating Instructions

Stud Welder

BMS-10N

BMS-10NV

**soyer**®





# Operating Instructions



## Stud Welder BMS-10N BMS-10NV

☐

Serial number\*

Stud welder BMS-10N

148-\_\_\_\_\_

☐

Serial number\*

Stud welder BMS-10NV

148-\_\_\_\_\_

\* Please mark your type of stud welder with a cross and enter the serial number, so that these data are available if you need service support.

Heinz Soyer Bolzenschweißtechnik GmbH  
Etterschlag  
Inninger Straße 14  
D-82237 Wörthsee

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[export@soyer.de](mailto:export@soyer.de)



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We have verified that the contents of this pamphlet correspond to the hard- and software described. Deviations, however, cannot be excluded so that we cannot warrant for absolute compliance. The data in this documentation, however, have been verified regularly and necessary corrections will be incorporated in future impressions. We appreciate any suggestions for improvement.

Date of issue: 01.12.1995

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Subject to technical changes

Printed in the Federal Republic of Germany



## EC Conformity Declaration

in compliance with EC Directive on Machinery 89/392/EEC, appendix IIA

Producer: **Heinz Soyer Bolzenschweißtechnik GmbH**  
**Etterschlag**  
**Inninger Straße 14**  
**D-82237 Wörthsee**

Declaration: We herewith declare that the machines described in the following and the versions available on the market correspond in their design and construction to the fundamental safety and health requirements stipulated by EC Directive on Machinery. Any modification of this machine without confirmation shall automatically annul this declaration.

Designation of machines: **Stud Welders with tip ignition**

Machine type: **BMS-10N**  
**BMS-10NV**

Machine no.: 148-\_\_\_\_\_

Applicable EC directives: EC Directive on Machinery (89/392/EEC) in the version 91/368/EEC  
EC Directive on Low Voltage (73/23/EEC)  
EC Directive on Electromagnetic Compatibility (89/336/EEC)  
in the version 93/31 EEC

Applied harmonised standards, in particular: EN 292-1 and EN 292-2, EN 60 204-1  
EN 60 974-1

Applied national standards and technical specifications, in particular: VBG 1, VBG 5,  
VDE 0544

Date: January 1, 1995

Producer's signature:

Signer's function:

Technical Mana

# CERTIFICATE



**DVS ZERT® e.V.**

Aachener Str. 172, D - 40223 Düsseldorf

This is to certify that the company

**soyer.**



**Heinz Soyer**

**Bolzenschweißtechnik GmbH**

**Inninger Straße 14**

**D - 82237 Wörthsee-Etterschlag**

has implemented a quality system in the following areas of application.

**Development, Production and Sales of Stud Welding Equipment**

**Production of Welding Studs**

By way of a quality audit it was proved that this quality system has been put into service and fulfils the requirements of the Standard

**DIN EN ISO 9001:2000**

Registration No.: DE-1996-001-2

Valid until: 09.19.2005


Lead Quality Auditor

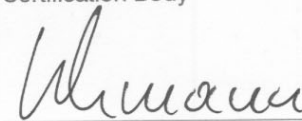
First Certification: 02.12.1996

Düsseldorf: 09.19.2002

Certification Body



  
Ing. W. Pupp

  
Dipl.-Ing. M. Lehmann

## EG-KONFORMITÄTSBESTÄTIGUNG

über die elektromagnetische Verträglichkeit  
im Rahmen der unten aufgeführten Normen

Zertifikat-Nr.

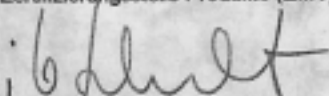
EMA-298/2202

Prüfstelle:	EMV-Prüfzentrum der LGA Tillystr. 2 D - 90431 Nürnberg
Inhaber der Bestätigung:	Heinz Soyer Bolzenschweißtechnik GmbH Inninger Str. 14 D - 82237 Wörthsee-Etterschlag
Hersteller:	dto.
Prüfbericht:	vom 24.09.1996 Auftr.-Nr. 426 1270 / 426 1271 / 426 1274
Objektbezeichnung:	Bolzenschweißer, Universalschüttler Typ BMS-8H, BMS-10NV, UVR-250S
Prüfbeschreibung:	EMV-Prüfungen
Prüfstandards:	prEN 50 199, EN 60 555-2, EN 60 555-3

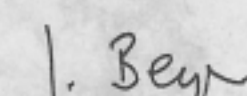
Diese Konformitätsbestätigung wurde gemäß Artikel 10, Abs. 1 der Richtlinie des Rates vom 03. Mai 1989 zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten über die elektromagnetische Verträglichkeit (89/336/EWG) vom EMV-Prüfzentrum der LGA erstellt. Die Bestätigung macht keine Aussagen in bezug auf die Schutzanforderungen zur elektromagnetischen Verträglichkeit nach anderen Rechtsvorschriften, die der Umsetzung anderer Richtlinien der Europäischen Union als der EMV-Richtlinie dienen. Diese Bestätigung bezieht sich auf das geprüfte Muster.

Datum der Bestätigung: 24.09.1996

LGA  
Zertifizierungsstelle Produkte (EMV)

  
Dr.-Ing. W. Schubert

EMV-Fachzertifizierer

  
Dipl.-Ing. (FH) G. Beyer

# Zertifikat Certificate



**TÜV Rheinland**

Sicherheit und Umweltschutz GmbH  
 Am Grauen Stein, D-51105 Köln

Zertifikat Nr. Certificate No. Blatt Page

9510356

01

Ihr Zeichen Client Reference

Herr Helbig

Unser Zeichen Our Reference

00941-Sche

E9510427E01

Ausstellungsdatum Date of Issue

07.03.95

(day/mo/yr)

Genehmigungsinhaber License Holder

Heinz Soyer  
 Bolzenschweißtechnik GmbH  
 Inninger Straße 14  
 D 82237 Wörthsee-Etterschlag

Fertigungsstätte Manufacturing Plant

Heinz Soyer  
 Bolzenschweißtechnik GmbH  
 Inninger Straße 14  
 D 82237 Wörthsee-Etterschlag

Prüfzeichen Test Mark



erfüllt §3 Absch. 1.GSG  
 acc. to §3 Art. 1.GSG

Geprüft nach Tested acc. to

DIN VDE 0544 Teil 1/10.91  
 EN 60974-1/05.90

Zertifiziertes Produkt (Geräteidentifikation)  
 Certified Product (Product Identification)

LICHTBOGENSCHWEIßGERÄT (Bolzenschweißer)

Bezeichnung: Serie BMS..

BMS-4D, -4AD, -6I, -6H, -8H, -10N

Nennspannung: AC 230 V, 50-60 Hz

Schutzart: IP 21

Lizenzentgelte - Einheit  
 License Fee - Unit

8

8

ANLAGE: 1



Zertifizierungs- und Prüfstelle  
 für Gerätesicherheit  
 Produktzertifizierung

Der Stellvertreter

Dipl.-Ing. F. Althoff

Dem Zertifikat liegt die Prüf- und Zertifizierungsordnung  
 d. Zertifizierungs- und Prüfstelle zugrunde.  
 The Test Mark Regulation is an integral part of this certificate.



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# 1 General

## 1.1 The following should be principally observed ...

With this stud welder you have purchased a product which

- is state-of-the-art technology
- fully complies with the current safety requirements and
- enables successful working.

Before installing the stud welder, always observe the following:

- Store the operating instructions in a place accessible to every operator
- Ensure that the respective operator has read and understood the operating instructions prior to installation. Each operator should confirm this per signature.
- Prevent the stud welder being operated by unauthorized personnel
- Only trained personnel may operate the stud welder



### MORTAL DANGER

Persons with pacemakers must not operate the stud welder and must not stay in the vicinity of the stud welder while it is running.  
Ensure that the stud welder is not operated near electronically sensitive life-supporting equipment, such as in intensive care units in hospitals.

### WARNING

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

- Moreover, observe the safety instructions in chapter 3.
- Call a doctor in case of an accident.



### MORTAL DANGER

The S-symbol is the symbol for welding current sources permitted for operation with increased electric danger. The S-symbol on our stud welders refers exclusively to the welding current circuit and not to the complete stud welder.



## 1.2 Application

The SOYER® stud welder BMS-10N with tip ignition allows you to weld pins and threaded studs ranging from M3 - M8 or Ø 2 - 8 mm made of steel and stainless steel and M3 - M8 or Ø 2 - 8 mm made of aluminium and brass (depending on requirements), as well as a great number of various welding fasteners (see chapter 2.4, Technical Data). It is also possible to weld welding fasteners made of aluminium and brass.

The stud welder BMS-10NV with a charging capacity of 132,000 µF enables you to weld steel studs up to M10.

The visual side of the workpiece is spared to a large extent from pressure marks or deformations, so that even thin sheet metals under 1 mm sheet thickness retain their decorative appearance.

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

## 1.3 Information on the product

Manufacturer	Heinz Soyer Bolzenschweißtechnik GmbH Etterschlag Inninger Straße 14 D-82237 Wörthsee Phone: ++49-(0) 81 53 / 8 85-0 Fax: ++49-(0) 81 53 / 80 30 E-Mail: <a href="mailto:verkauf@soyer.de">verkauf@soyer.de</a> <a href="mailto:export@soyer.de">export@soyer.de</a>
Product designation	Stud welder BMS-10N Stud welder BMS-10NV
Country of origin	Germany

## 1.4 Type plate

The type plate is located on the rear side of the stud welder. It contains the following information:

- Manufacturer's name
- Manufacturer's address
- Country of origin
- Product designation
- Method of welding
- Date of construction
- Production number
- Performance data
- Mains connection values

## 1.5 Information on the documentation

The following operating instructions come with the BMS-10N and BMS-10NV stud welders:

- Operating instructions for stud welder BMS-10N, BMS-10NV  
Order no.: P00191

For repeat-orders please contact:

Heinz Soyer Bolzenschweißtechnik GmbH  
Ettersschlag  
Inninger Straße 14  
D-82237 Wörthsee  
Phone: ++49-(0) 81 53 / 8 85-0  
Fax: ++49-(0) 81 53 / 80 30  
E-Mail: [verkauf@soyer.de](mailto:verkauf@soyer.de)  
[export@soyer.de](mailto:export@soyer.de)

### 1.5.1 Chapters of operating instructions

The operating instructions describe the installation and operation of the stud welder under normal conditions and comprise the following chapters in detail:

- Chapter 1 "General"  
Information on application and product, as well as supplementary information
- Chapter 2 "Description of stud welder"  
Description of tip ignition technology and of the stud welder
- Chapter 3 "Safety instructions"  
All safety regulations which are relevant with regard to installation and operation of the stud welding system
- Chapter 4 "Installation of stud welder"
- Chapter 5 "Initiation"
- Chapter 6 "Operation"
- Chapter 7 "Quality control"
- Chapter 8 "Maintenance"  
Maintenance measures
- Chapter 9 "Troubleshooting"  
Errors, possible causes and remedies
- Chapter 10 "Transport and storage"
- Chapter 11 "List of standards and guidelines"
- Chapter 12 "Terms of warranty"
- Chapter 13 "Spare parts"

## 1.5.2 Information on operating instructions

### *Legal relationship*

We draw your attention to the fact that the contents of these operating instructions are neither part of any former or existing arrangement, pledge or legal relationship nor are designed for modifying the latter. All obligations of Heinz Soyer Bolzenschweißtechnik GmbH result from the respective contract of purchase which also comprises the complete and generally valid warranties. These contractual warranty terms are neither extended nor restricted by the implementation of these operating instructions.

#### **WARNING**

Do not carry out any actions on the stud welder without specifically knowing the operating instructions or the respective part. Ensure that only qualified personnel familiar with the operating instructions and the necessary technical activities (training!) operate the system.

## 1.5.3 Conduct in the case of malfunctions

If malfunctions occur, first try to detect and eliminate the causes according to the list in chapter 9 "Troubleshooting" of our operating instructions. In all other cases, contact our service department.

### *Important information if service is required*

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

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

This information will help us both to save time and unnecessary costs, e.g. caused by delivering the wrong spare parts.

## 1.6 Contacts and service address

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

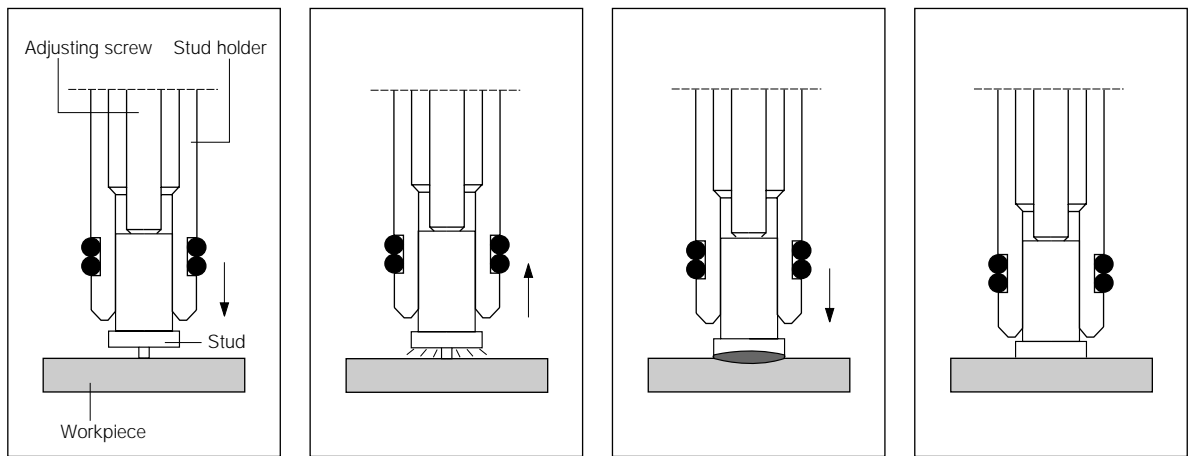
Heinz Soyer Bolzenschweißtechnik GmbH  
Etterschlag  
Inninger Straße 14  
D-82237 Würthsee  
Phone: ++49-(0) 81 53 / 8 85-0  
Fax: ++49-(0) 81 53 / 80 30  
E-Mail: [verkauf@soyer.de](mailto:verkauf@soyer.de)  
[export@soyer.de](mailto:export@soyer.de)

## 2 Description of stud welder

### 2.1 Tip ignition technology

The SOYER stud welding systems run according to the principle of capacitor discharge with tip ignition as defined in DVS Leaflet 0903 (German Welding Society).

This system uses the abrupt discharge of a capacitor battery to generate electric arc energy.



SZ.0001.E

The electric arc is initiated via the calibrated and close fit ignition tip on the welding studs and elements. The stud weld base and the opposite surface of the workpiece are melted on. The stud is then automatically dipped in the thin fusion zone or liquid weld pool. After the immediate solidification of the material, an homogeneous high-strength joint is produced in an extremely short welding time of only 1 - 3 milliseconds (0.001 - 0.003 sec.).

### 2.2 Stud welder set-up

The standard pistol to be connected to the stud welders BMS-10N and BMS-10NV is the stud welding pistol PS-3 with control cable. The stud welders are optionally equipped with an automatic module for the connection of the universal feeder UVR-250S and for fully automatic stud feed. It is necessary to use the stud welding pistol PS-3A or the welding head SK-5A when welding with automatic operation.

Optionally it is possible to connect the stud welding pistols PS-1, PS-1K, PS-OK and PS-3 as well as the welding head SK-5A. These operating instructions exclusively describe the stud welders BMS-10N and BMS-10NV.

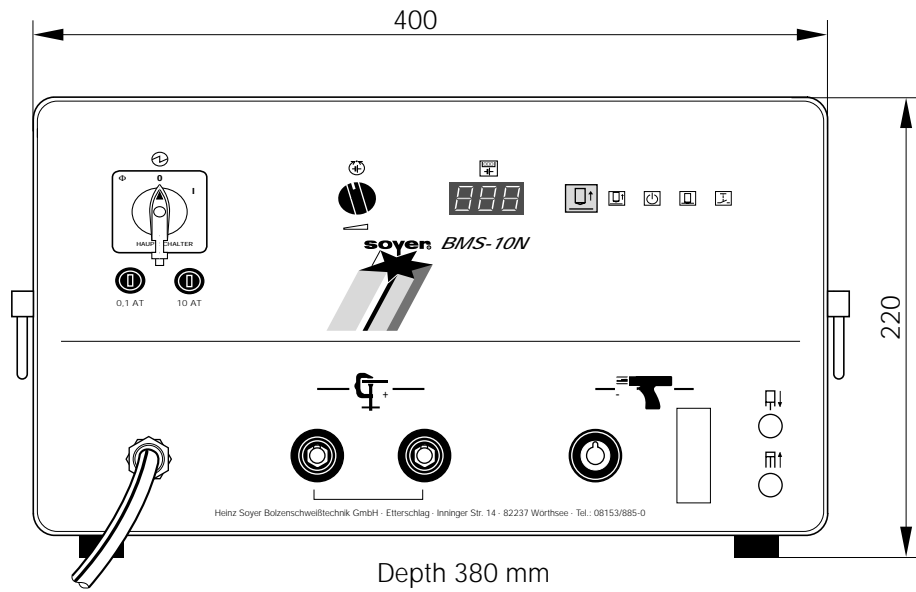
For information regarding the stud welding pistols to be used as well as their adjustment and the universal vibrator UVR-250S, please refer to the respective operating instructions of the stud welding pistols or the universal vibrator UVR-250S.



## Description of stud welder

### 2.3 Dimension

The stud welders BMS-10N and BMS-10NV have a robust, handy and compact design and identical dimensions.



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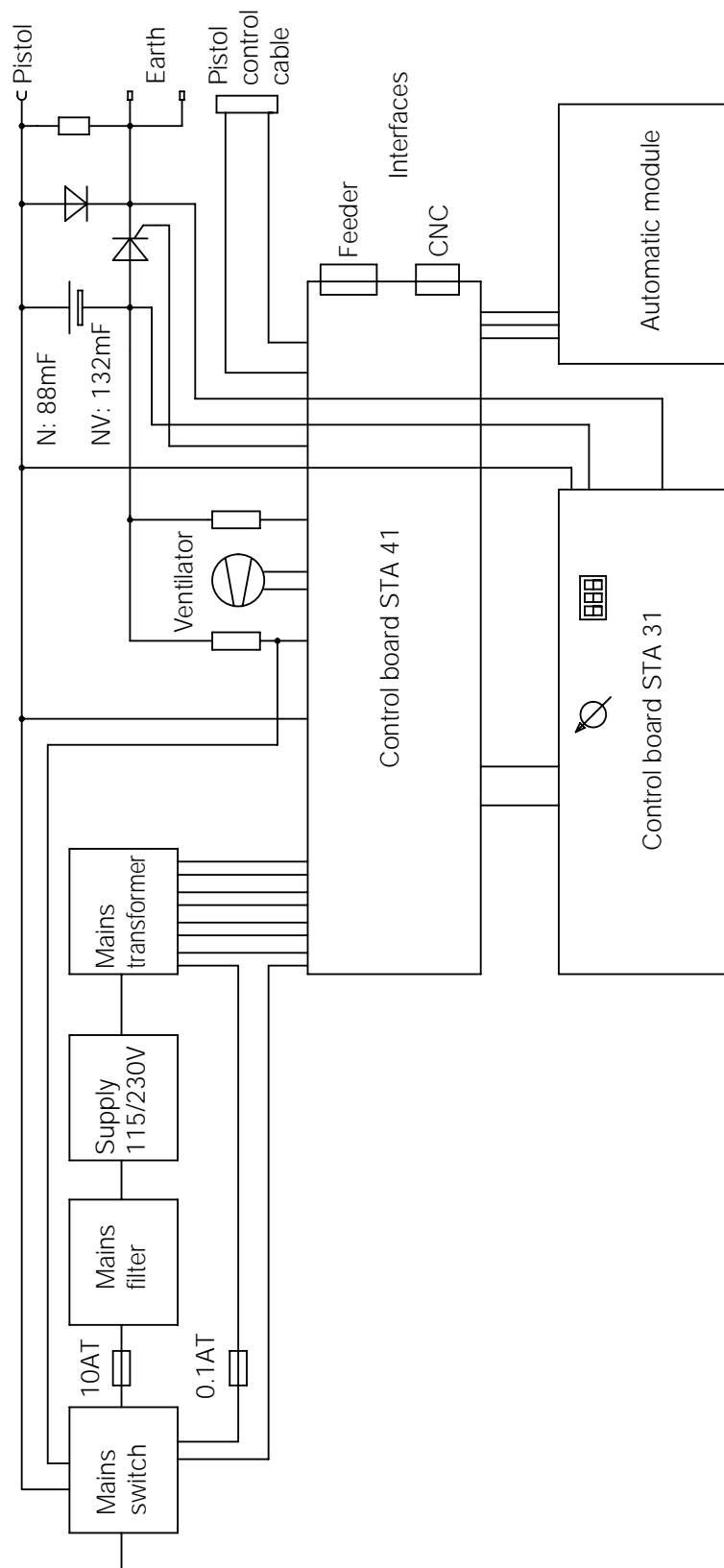
## 2.4 Technical data

Designation	BMS-10N	BMS-10NV
Welding range	M3 - M8 or Ø 2 - 8 mm with steel and stainless steel, M3 - M8 or Ø 2 - 8 mm with aluminium and brass, depending on requirements	Like stud welder BMS-10N but steel studs up to M10
Welding process	Tip ignition as per DVS Leaflet 0903 with gap and contact welding	
Standard pistol	Stud welding pistol PS-3	
Current source	Capacitor battery	
Charging capacity	88,000 µF	132,000 µF
Charging voltage	50 - 200 V infinitely variable up/down	
Welding time	0.001 - 0.003 sec.	
Welding sequence	up to 20 studs/min, depending on stud diameter	
Power supply	220/230 V, 50/60 Hz, 10 AT, +/- 10 % (special voltage on request)	
Fuse element at front panel	0.1 AT for main switch 10 AT for control transformer	
Welding cable	3 m highly flexible	
Earth cable	2 x 3 m highly flexible	
Weight *	19.5 kg	20.5 kg
Colour	RAL 5009 azure	
Subject to technical changes		

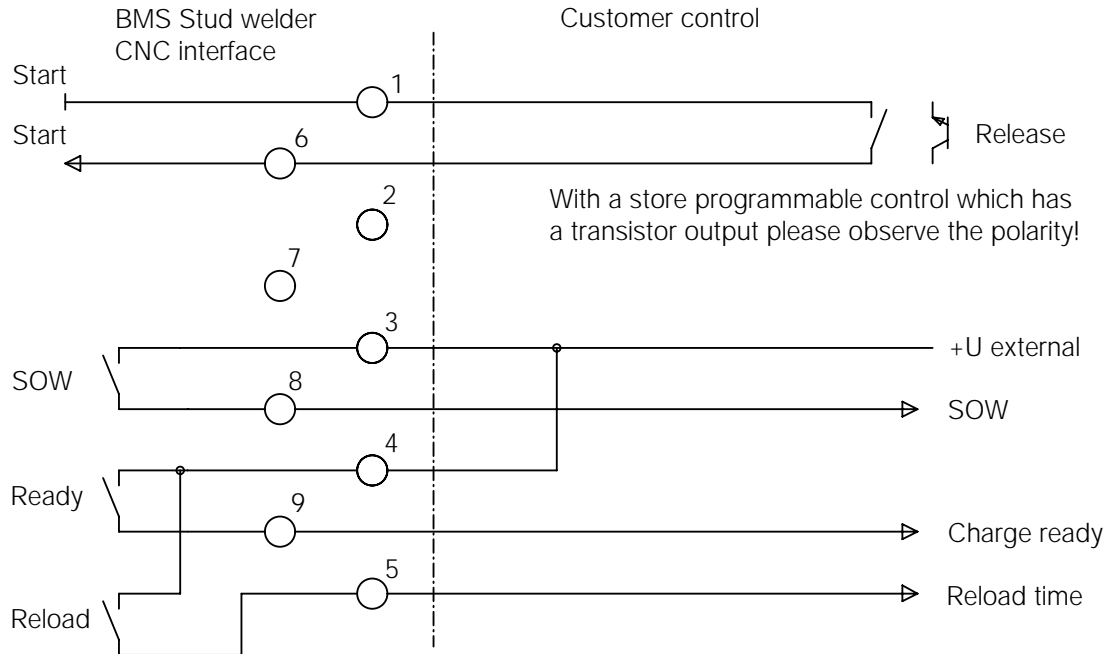
\*Slight deviations are possible depending on accessories (e.g. automatic set)

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## 2.5 Block diagram



## 2.6 Interface



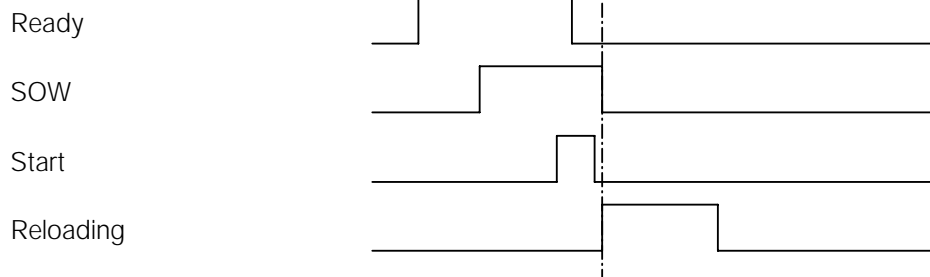
9 pole D-Sub socket terminal strip

Contact load: max. 24V, 200mA

Terminology:

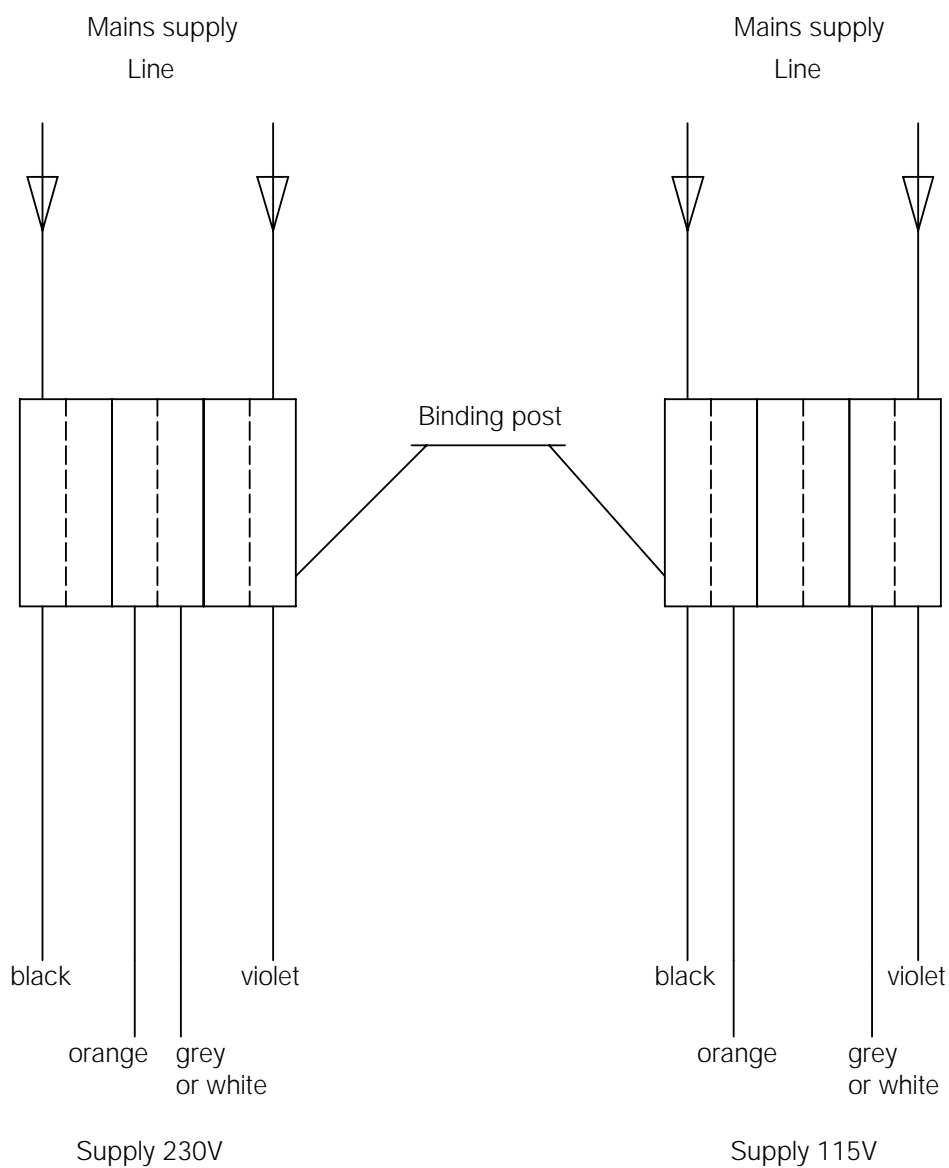
- Start:** Contact releases the welding process
- SOW:** Stud on workpiece  
Is only required when stud welder is operated via a superior control.  
Contact is made when stud touches the workpiece (e.g. head in fore position).
- Ready:** Contact is made after the set charging voltage has been reached.
- Reload:** Contact remains closed during the reload time of the stud  
(after removal of the head from the welded stud).

Operational sequence:



Reloading is triggered when the head is removed from the stud. It is recommended to set a waiting period of about 500 ms after the stud has been positioned on the workpiece (SOW) and after the welding has been completed. This ensures a stabilization of the welding head is achieved prior to the welding and that the welded area can settle down after the welding.

## 2.7 Alteration of supply voltage



### 3 Safety instructions

These operating instructions contain basic instructions which have to be complied with during installation and/or operation. It is therefore absolutely necessary that these operating instructions are read by the operator and responsible specialist staff prior to assembly and initiation. They must always be available at the installation site.

Not only the general "safety instructions" listed under this main item, but also the special safety instructions e.g. for high temperatures, voltages, etc. listed under the other main items have to be complied with.

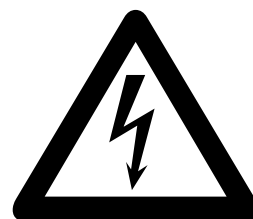
#### 3.1 Description of reference signs in the operating instructions

The non-observance of safety instructions can cause damage to persons. The safety instructions of this manual are marked with the general symbol for danger



safety symbol in compliance with DIN 4844 - W9

Warning of electric voltage is specially marked with the



safety symbol in compliance with DIN 4844 - W8.

In addition to these symbols, the words "**DANGER TO HEALTH**" or "**MORTAL DANGER**" refer to the degree of a possible danger.

Safety instructions the non-observance of which may endanger the machine and its functions are marked with the terms "**CAUTION**" or "**WARNING**".

General instructions are marked with the hand symbol.



### 3.2 Staff qualification and training

The staff responsible for operation, maintenance, inspection and assembly must have the respective qualification for carrying out these works. Field of responsibility, competence and the supervision of staff has to be exactly regulated by the operator. If your personnel do not have the necessary knowledge, they have to be trained and instructed. If necessary, this can be done by the manufacturer/supplier on behalf of the operator. Furthermore, the operator must ensure that the contents of the operating instructions are fully understood by the staff.

The training and testing institute of welding in Munich (SLV: Schweißtechnische Lehr- und Versuchsanstalt) offers the appropriate training courses for your personnel.

### 3.3 Dangers in the case of non-compliance with safety instructions

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

Non-compliance with safety instructions may have the following consequences:

- Failure of important system functions
- Failure of prescribed methods for maintenance
- Danger to persons through electric, mechanic, thermal and acoustic influences

### 3.4 Safety-conscious working

The safety instructions listed in this manual, existing national accident prevention regulations and possible international working, operating and safety regulations of the operator must be complied with.

### 3.5 Safety instructions for the operator/user

When stud welding, danger may result from

- electric current
- optical radiation
- harmful substances (smoke)
- acoustic shock
- spraying sparks

You are therefore obliged to restrict the dangers to an inevitable degree and to point these dangers out to the operator and other persons involved.

**MORTAL DANGER**

Persons with pacemakers must neither operate the stud welder nor stay near it.

### 3.6 The following should be observed before starting the system...

Before starting the system, pay attention to the following information:

- Juveniles under the age of 16 years must not operate the stud welding system.
- Read all of the operating instructions before starting the system.
- Only qualified personnel are allowed to operate the system.
- Prevent unauthorized use of the system by children or unqualified personnel.
- Wear non-combustible, closed working clothes.
- Wear a leather apron to protect your clothes from welding spatters that are generated during the welding process.
- Wear a head protection when carrying out welding works above your head.

**MORTAL DANGER**

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

- Wear gauntlet gloves made of leather.
- Wear neither rings, watches nor electrically conductive jewellery.
- Wear protective goggles with eye-protecting lens of shade number 2 (DIN 58211, Part 6) to protect your eyes from welding spatters and flashes of light that are generated during the process.
- Wear side-shielded glasses when knocking off ceramic ferrules.
- Wear ear protection. Capacitor discharge generates a loud bang.



### 3.7 Before starting welding ...

- Check the state of all cables before starting to weld.
- Immediately replace defective cables and cable connections.
- Ensure that the air apertures of the housing are not covered. Heat accumulation may damage the stud welder.

### 3.8 Safety precautions at installation site

- When placing the stud welder on tables or similar workshop furniture, ensure that the stud welding system stands firmly and that the table can bear its weight.
- Make sure mains socket and stud welder are properly earthed.
- Comply with fire prevention regulations and do not weld in hazardous locations.
- Make sure room is well ventilated or extract welding fumes, if necessary.



#### **DANGER TO HEALTH**

When welding, fumes and suspended matters may be generated. Beware of fumes detrimental to health, particularly when using surface-treated materials. If possible, only weld in rooms which are higher than 3 m. As per VBG 15, special regulations are applicable for narrow rooms.

### 3.9 Working with the stud welder

- Comply with all accident prevention regulations which apply to the operation of your stud welder



One of the accident prevention regulations applicable for stud welders is VBG 15 "Welding, cutting and similar working methods". For more information, contact the Employer's Liability Insurance Association.



#### **MORTAL DANGER**

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



If an accident happens,

- switch off the stud welder and disconnect it from the mains supply
- call a doctor.

### **3.10 Safety instructions for maintenance, inspection and assembly works**

*Only carry out maintenance works when stud welder has been switched off*

The operator must ensure that all maintenance, inspection and assembly works are only carried out by authorized and qualified technical personnel.

Generally, only work at the system when it has been switched off and after having it disconnected from the mains supply. It is indispensable to comply with the procedure for stopping the stud welding system described in the operating instructions (chapter 3.13).

Immediately after having completed your work, re-install and activate all safety and protective devices.

### **3.11 Unauthorized retrofit and spare parts production**

The system may only be retrofitted and modified after consultation with the manufacturer. Original spare parts and accessories authorized by the manufacturer guarantee safety. The use of other parts may result in the cancellation of warranty for any consequences thus caused.

### **3.12 Inadmissible operating methods**

*Limit values*

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

### **3.13 Stopping the stud welding system**

#### **3.13.1 Stopping the stud welder when welding with normal operation**

- Switch off the mains switch (item 2, chapter 5.1) of the stud welder.
- Disconnect the mains plug from the socket.
- Disconnect
  - the earth cables (item 12, chapter 5.1)
  - the control cable (item 10, chapter 5.1)
  - the welding cable (item 11, chapter 5.1) from the stud welder.
- Roll up the cables without buckling them.



The tool and gear wagon GW-1 is the optimum solution for installing SOYER stud welders and for properly storing welding pistols, cables, studs, retrofit kits etc.

- Make sure stud welder cannot be used by unauthorized personnel.
- Turn energy range controller (item 4, chapter 5.1) to the left till stop (smallest energy value).
- Check welding cable and connections of the stud welder for damages such as burn-off, mechanical wear etc. and have damaged parts replaced by SOYER customer service.

### 3.13.2 Stopping the stud welder when welding with optional automatic operation

- Close the shut-off valve of the compressed air supply.
- Activate the pistol switch several times until the pressure in the lines drops completely.
- Disconnect the compressed air supply connections at the rear side (item 18 and 19, chapter 5.1) and at the front side (item 8 and 9, chapter 5.1).
- Disconnect the interface plug from the connecting socket (item 14, chapter 5.1) at the rear side of the stud welder.
- Disconnect the plug of the universal feeder from the connecting socket at the rear side of the stud welder (item 15, chapter 5.1).
- Continue as described in chapter 3.13.1.

## 3.14 The "S" symbol

The "S" symbol is the symbol for welding current sources permitted for operation with increased electric danger. The "S" symbol on our stud welders refers exclusively to the welding current circuit and not to the complete stud welder.

## 4 Installation of the stud welder

The sides of the stud welders BMS-10N and BMS-10NV are equipped with two plastic handles.



These carrying handles are intended for transport by hand only. Never pull ropes through these handles to lift the system by crane to the installation site. The system would become unstable and might tilt from its original position. As a result the handles could rip and the system fall on the ground.

- Only place the stud welder on an even surface. Four anti-vibration pads located on the bottom of the system guarantee its anti-skid position and serve as vibration dampers.
- Although the stud welder is resistant to environmental influences, it should be protected against dampness and dust. This is easily achieved by placing the welding system on a workbench.
- Please pay particular attention to the bearing strength of the workshop furniture and a safe and stable position.
- Make sure there is sufficient free space around the air apertures.
- Install the stud welder close to the welding location.
- Observe the correct connected loads for electrical connections.
- The electrical connecting cable is of adequate length. Additional extension cables cause a voltage drop, possibly leading to unit disturbances.
- Ensure sufficient ventilation of the working room when operating the system.

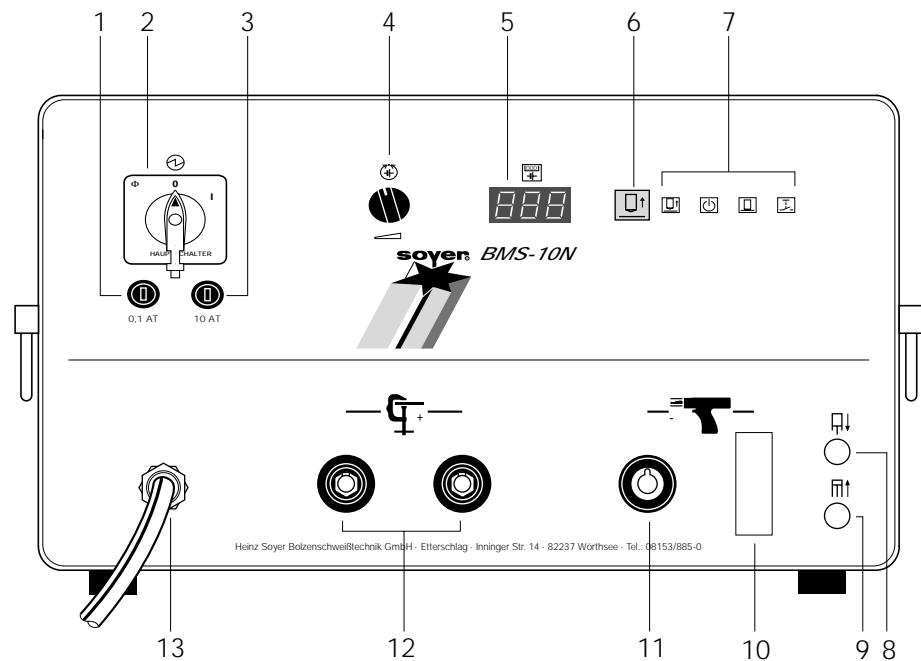


The housing of the stud welders BMS-10N and BMS-10NV corresponds to safety class IP 21. Please observe that this system of protection is e.g. not suitable for being operated or transported in the rain.

## 5. Initiation

### 5.1 Front and rear view

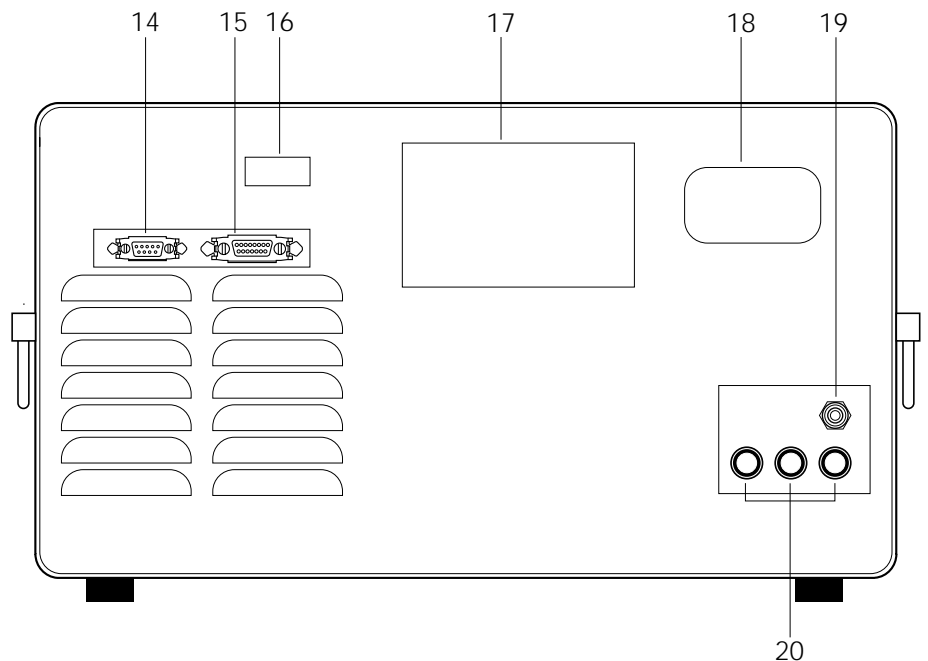
Both stud welders BMS-10N and BMS-10NV have identical front and rear views.



Front view

- |                                  |                                      |
|----------------------------------|--------------------------------------|
| 1 Fuse element with fuse 0.1 AT  | 8 Air function "forward" (optional)  |
| 2 Main switch                    | 9 Air function "backward" (optional) |
| 3 Fuse element with fuse 10 AT   | 10 Control cable socket              |
| 4 Energy range controller        | 11 Welding cable socket              |
| 5 Charging voltage display       | 12 Earth cable connectors            |
| 6 Function key "Lift adjustment" | 13 Mains cable                       |
| 7 LED displays                   |                                      |

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Rear view

- |                                                                                 |                                                                           |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 14 9 pole connecting socket for controlling the stud welder via a CNC interface | 17 Type plate                                                             |
| 15 15 pole connection socket for controlling the feeder                         | 18 Test label                                                             |
| 16 Welding counter                                                              | 19 Compressed air supply connection for feeder control (optional)         |
|                                                                                 | 20 Connection sockets for compressed air control of the feeder (optional) |

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## 5.2 General description

The SOYER stud welders BMS-10N and BMS-10NV are universally applicable for both manual and automatic operation. They offer optional simple and low-cost retrofitting of an automatic module for semi- and fully automatic stud feed. Operation is very simple because of the infinitely variable bidirectional regulation of the charging voltage. The performance values can be taken from the precise digital display located on the clearly arranged raised front panel. All functions can be monitored via clearly visible pilot lamps.

The stud welders BMS-10N and BMS-10NV allow you to carry out function tests without welding current for welding pistols and heads (lift test) and to adjust the lift. At the rear side of the stud welder a welding quantity counter is installed to record the welding quantities. The standard CNC interface allows a problem-free connection of the stud welder to bench welders.

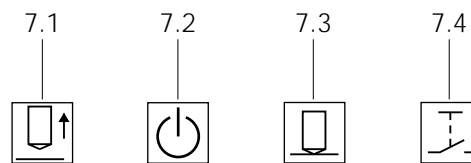
Short charging cycles and high reserve capacities guarantee the readiness for operating at short intervals and enable short welding sequences.

### 5.2.1 Operating elements

- **Main switch (item 2, chapter 5.1)**  
The main switch is used to switch the stud welder on and off.
- **Energy range controller (item 4, chapter 5.1)**  
The energy range controller enables infinitely variable energy adjustment for weldable stud diameters.
- **Function key for adjusting the lift (item 6, chapter 5.1)**  
For carrying out the lift test on the welding pistol or welding head, the charging voltage has to be set to "0" by pressing the function key "Lift adjustment" (6).

### 5.2.2 Display elements

- **Charging voltage display (item 5, chapter 5.1)**  
The digital display shows the adjusted energy value (charging voltage in volts).
- **LED displays (item 7, chapter 5.1)**  
The LEDs show the respective operational states.



- 7.1 LED "Lift"  
7.2 LED "Ready"  
7.3 LED "Stud on Workpiece"  
7.4 LED "Release"

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### 5.2.3 Connecting elements

- **Mains connecting cable (item 13, chapter 5.1)**  
Use the mains connecting cable to connect the stud welder to the power supply.
- **Earth cable connectors (item 12, chapter 5.1)**  
The earth cable connectors allow the earth terminals to be connected to the stud welder.
- **Control cable connection (item 9, chapter 5.1) and welding cable socket (item 10, chapter 5.1)**  
The control cable connection and the welding cable socket serve to connect the stud welding pistol or the welding head to the stud welder.

- **Air function "forward" (item 8, chapter 5.1, optional)**  
Connection for welding pistols or heads with automatic stud feed.
- **Air function "backward" (item 9, chapter 5.1, optional)**  
Connection for welding pistols or heads with automatic stud feed.

#### 5.2.4 Fuse

- **Fuse (item 1 and 3, chapter 5.1)**  
The stud welder is protected by two fuses:  
0.1 AT and 10 AT.
















#### WARNING

If you have to replace fuses, only use those with specified electrical values. Oversized fuses could either cause defects to the electrical system or a fire.



Disconnect the mains plug from the power supply when replacing fuses!

### 5.2.5 Symbols

Symbol	Designation	Function
	Electrical energy	Mains switch for switching stud welder on and off.
	Energy range control	Potentiometer for controlling the energy range.
	Alteration of a quantity	Modifying the necessary energy value for the respective stud diameter.
	Digital measured value display	Digital display of charging voltage in volt.
	Function key "Lift adjustment"	Adjustment of charging voltage to "0" to carry out the lift test.
	LED "Lift"	LED lights up when lifting magnet of welding pistol is activated.
	LED "Ready"	LED lights up when stud welder is ready for operation.
	LED "Stud on Workpiece"	LED lights up when earth pole is connected and the stud touches the workpiece.
	LED "Release"	LED lights up when trigger switch of welding pistol or head is pressed.
	Air function "forward"	Air connection of stud welding pistol/welding head with automatic operation.
	Air function "backward"	Air connection of stud welding pistol/welding head with automatic operation.
	Earth	Marks earth cable connectors to be connected with earth cables.
	Pistol	Marks control and welding cable sockets to be connected with pistol.

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## 5.3 Preparation for initiation



### MORTAL DANGER

Please observe the safety instructions in chapter 3. Do not yet connect the stud welder to the mains supply.

Connect the stud welding pistol and earth cables to the stud welder prior to initiation.

### 5.3.1 Earth connection

- Attach earth cable to earth cable connector (item 12, section 5.1) and lock by turning to the right until stop.
- Attach earth clamps to workpiece.



Ensure optimum contact with workpiece.

Due to the high welding current, an unbalanced current distribution may cause a magnetic blow effect on the arc, i.e. the arc for welding the stud is asymmetrical. This is shown by an irregular course of the weld upset on the side of the stud. The welding results are unsatisfactory and not reproducible.

For this reason, you should attach the earth clamps to the workpiece in such a manner that the welding pistol is positioned as close as possible to the centre of the connecting route of both earth clamps. This guarantees a current distribution around the stud that is balanced to the largest possible extent and satisfactory welding results.

Difficult areas are welds on the edge of the workpiece or greater non-homogeneities in material thickness, i.e. the sheet thickness varies by a few millimeters or additional material is welded or riveted to the metal. This also includes stud welding on profile sections.

To ensure good welding results, carry out several test welds under different conditions. For example, simply change the position of the earth clamps or turn the welding pistol.



Please ensure that the contact areas of the earth clamps are always kept clean and do not oxidize, otherwise high transition resistances could occur that may result in a considerable reduction of the rated welding current.

In addition, make sure that the earth clamps are clamped securely to the workpiece and the earth cables as well as the pistol cable are securely connected to the stud welder. This prevents high transition resistances and arc losses on the clamps or plug-in connections which in turn would result in poor welding results.

### 5.3.2 Connection of stud welding pistol

- Connect welding cable of welding pistol or welding head to the welding cable socket (item 11, chapter 5.1) and lock by turning to the right until stop.
- Insert control cable into control cable socket (item 10, chapter 5.1) and secure by locking the spring bands.
- Please observe the connecting instructions given in the operating instructions for the welding pistols.

### 5.3.3 Mains supply

- Connect mains cable to power supply.



**MORTAL DANGER**

Only connect stud welder to authorized earthed sockets.

## 5.4 Adjustment of lift



The adjustment of lift is only possible for stud welding pistols or welding heads with magnet (e.g. PS-3, PS-3A).

The lift on the stud welding pistol or welding head is adjusted as follows:

- Switch on main switch (item 2, chapter 5.1).
- Press function key "Lift adjustment" (item 6, chapter 5.1).  
The LED "Lift" (item 7.1, chapter 5.2.2) lights up. Charging voltage returns to "0".
- Position pistol on workpiece.
- Press pistol switch. Stud holder lifts off the workpiece and lift can be adjusted. To protect the magnet, the lift test is only carried out for 1.5 secs.

The measure of the lift adjustment must be determined in welding tests. The welding pistol has then to be adjusted accordingly. For further information please refer to the respective operating instructions of the welding pistol or welding head.

The function "Lift adjustment" is terminated by pressing once again the function key "Lift adjustment" (item 6, chapter 5.1).

## 5.5 Welding parameters



### IMPORTANT

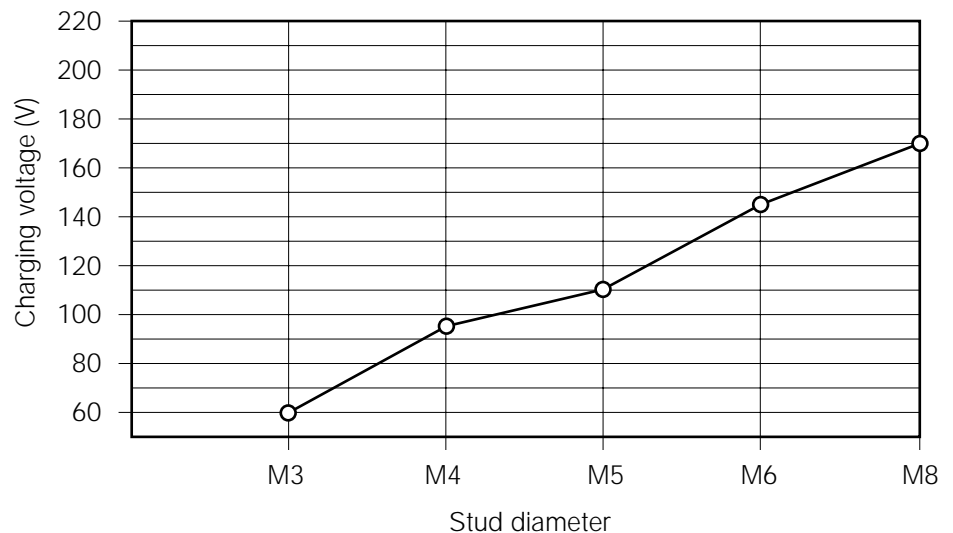
The set welding parameters influence the reproducibility and quality of the welding results to a large extent. The parameters depend on the size of the studs and the material properties. The values indicated in the table are standard values which are exclusively valid for studs supplied by SOYER. They may vary depending on the type of workpiece, the workpiece thickness, the surface condition and on environmental conditions (e.g. low outdoor temperatures). The settings of the welding pistol or welding head also influence the welding parameters (if e.g. the lift is increased, normally the charging voltage has to be increased too).

Random samples should be taken during any production process to ensure constantly good welding results (see DVS Guideline, Part 1, "Quality assurance of stud welding joints").

The welding parameters were determined with the stud welder BMS-10N and the stud welding pistol PS-3 using a lift adjustment of about 2.5 mm. A steel plate with a thickness of 2 mm served as base metal for welding copper-plated capacitor studs made of ST 37-3, as per DIN 32501.

The values for the charging voltage are possibly somewhat lower when using the amplified stud welder BMS-10NV.

*The charging voltages shown in the diagram on the right are standard values. They vary from the stated setting depending on the material type, workpiece thickness and surface condition of the workpiece.*



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## 5.6 Material combinations

Base material	Stud material					
	St 36-2	Ws 1.4303 (stainless or similar)	CuZn 37 (Ms63)	AlMg 3	AlSi 12	Al 99,5
Steel up to C 0.30 %	1	2	1	0	0	0
Steel up to C 0.60 %	0	2	0	0	0	0
Steel plate leaded, solder-coated or galvanized max. 30 µ	2	2	1	0	0	0
CrNi steels, austenitic	2	1	2	0	0	0
CuZn 37-CuZn 30 (Ms 63-70) without lead	2	2	1	0	0	0
Copper	2	2	1	0	0	0
Al 99-99,5	0	0	0	1	1	1
AlMg 3, AlMg 5, AlMgMn	0	0	0	1	1	1
AlMgSi 0.5, AlMgSi 1, AlSi 5	0	0	0	2	1	1
1 = well suited, 2 = sufficiently suited, depending on requirements, 0 = not suited						

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## 6 Operation

The measures mentioned in the "Initiation of stud welder" chapter have already been performed.



The applicable accident prevention and safety regulations in chapter 3 have to be complied with when operating the stud welder.



### **MORTAL DANGER**

Never touch the stud or stud holder during the welding process. These components are current-carrying !

- Select the energy range according to stud diameters and welding parameters (chapter 5.5) by using the energy range controller (item 4, chapter 5.1). LED "Ready" lights up (item 7.2, chapter 5.2.2).
- Position pistol with welding stud on the workpiece.  
Besides LED "Ready" (item 7.2, chapter 5.2.2) LED "Stud on Workpiece" lights up (item 7.3, chapter 5.2.2) when earth has been properly connected to the workpiece. Electric circuit is completed.
- Activate pistol switch.  
LED "Release" (item 7.4, chapter 5.2.2) lights up and welding process is started. Charging voltage returns to "0". LED "Stud on workpiece" (item 7.3, chapter 5.2.2) lights up. LED "Ready" (item 7.2, chapter 5.2.2) goes out. Stud welder is not ready for welding.
- Remove pistol from the workpiece.  
All LEDs go out and the stud welder is charged to the set value. After the value has been obtained, LED "Ready" (item 7.2, chapter 5.2.2) lights up and the stud welder is ready for the next welding process. In the case of automatic operation, one stud is reloaded.

Hold the pistol still during the welding process and wait until the welding process has been completed before removing it vertically from the welded stud. Please also refer to the respective chapters in the operating instructions of the stud welding pistols.

Adjustment and installation of the stud holder into the welding pistol as well as adjustment of the welding pistol are described in the operating instructions of the stud welding pistol.

## **7 Quality control**

### **7.1 General**

The 0905 DVS Guideline, part 2, of April 1979 is applicable with regard to quality assurance of stud weld joints. The tests described in this section are written in simplified terms, following above regulation. They refer to work tests that are carried out and supervised by the user prior to and during welding.

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

### **7.2 Demands on the company**

The company must employ a technical supervisor responsible for welding matters, as well as qualified operating personnel for stud welding (see DVS Guideline 0905, part 2, section 4).

### **7.3 Proof of qualification**

In the case of components which documentation must be provided for, or stud welding works which as per DIN 4100, DIN 4113 are subject to acceptance, the processing company must submit a certificate of competence or a proof of qualification for working with stud welding equipment (see DVS Guideline 0905, part 2, sections 4.1 and 4.2). The proof of qualification applies in particular to the fastening of structures that are relevant in terms of safety regulations. When being used in the building industry, only approved base and stud materials may be used (for example, see DIN 4100, section 2.1, certificate of approval for stainless steel ifBT; DIN 4113, part 2).

### **7.4 Type and scope of test**

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

- Standard work test (see DVS Guideline 0905, part 2, section 5.1.2)
- Simplified work test (see DVS Guideline 0905, part 2, section 5.1.2)

#### **7.4.1 Standard work test**

Generally, standard work tests have to be carried out and supervised by the user before welding at a structure and after a certain number of welds has been made. The number of welds after which a standard work test is required is agreed upon with the customer.

The standard work test is restricted to the stud diameter, base material and type of equipment used. It comprises the following tests:

- Visual inspection (all samples)
- Tensile test (at least 3 samples )
- Bend test (at least 3 samples)

In case of doubt, the test scope should be extended in compliance with DVS Guideline 0905, part 2, section 5.1.1.

## **7.4.2 Simplified work test**

Simplified work tests serve to check the correct setting and function of the equipment. They are carried out at the beginning of every working shift and after several hours of interruption.

Simplified work tests include:

- Visual inspection (all samples)
- Bend test (all samples)

## **7.5 Test execution**

### **7.5.1 Production of samples**

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

### **7.5.2 Visual inspection**

The visual inspection serves as a rough check for major defects. The uniformity of the weld is assessed. When in doubt, tensile and bend tests should be carried out.

### **7.5.3 Tensile test**

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

If the stud breaks outside the welding zone, the test is regarded as successful. If it breaks within the welding zone, however, the fractured surface must be examined. The unwelded surface may not exceed a maximum of 20 % of the welding surface. When in doubt, the breaking load in accordance with DIN 267, part 3, should be determined.



If the quantity of defective studs in one random test exceeds the acceptance number specified in DIN 267, part 5, as per AQL 4, it is necessary to find out the reason for the faults. The setting values must be modified and the test repeated.

#### **7.5.4 Bend test**

The bend test is a simple work test which serves to roughly check the setting values selected. The welding zone is subjected to undefined tension, pressure and bending. A minimum of 3 studs is welded and bent to an angle of  $30^\circ$  by means of a tube that is slipped over the stud. The test is considered as successful, if no superficial fissure or fracture is detected in the welding zone. The acceptance number in accordance with DIN 267, part 5, as per AQL 4 must be complied with. If the quantity of defective parts in one inspection lot exceeds the acceptance number AQL 4 (see DIN 267), the cause of trouble must be determined and the test repeated again.



## 8 Maintenance

### 8.1 Stud welder

The stud welders are constructed in such a way that only a minimum of maintenance is required. The interior of the stud welders should, however, be cleaned by a specialist at regular intervals depending on the environmental conditions at the location of use. Any defects of the system's control part can easily be eliminated by replacing the printed circuit and/or the clearly arranged fuses.



#### **MORTAL DANGER**

Before replacing any components, disconnect the mains cable from the mains supply. Electric and electronic components may only be replaced by a specialist. Contact the SOYER® service department, if necessary.



#### **DANGER TO HEALTH**

Before starting repair works, disconnect the mains cable from the power supply and the compressed-air supply from the stud welder connections.

- Unscrew recessed-head screws at both side parts. Remove upper part of the housing by lifting it vertically from the unit (please pay attention to the earth connection).
- Blow through the interior of the stud welder using clean, dry and filtered compressed air with a pressure of about 2 bar. If no compressed air is available, a vacuum cleaner may be used instead. Ensure, however, that no components are damaged by the nozzle.
- Replace the cover and secure it using the recessed-head screws (please pay attention to the earth connection).

### 8.2 Replacement of components

Defective components may only be replaced by trained SOYER servicemen. Perfect function of your stud welder can only be guaranteed if original SOYER spare parts are used.



#### **MORTAL DANGER**

Ensure that the mains plug has been disconnected and the capacitors are discharged before opening the housing to replace components.

## 9 Troubleshooting

The following list of errors, their causes and remedies is designed to help you eliminate any trouble immediately on the spot. If it is difficult or impossible to eliminate the trouble, please contact the SOYER customer service responsible for your area or Heinz Soyer Bolzenschweißtechnik GmbH.  
For address and telecommunication data, please refer to chapter 1.6, page 1-4.



### **MORTAL DANGER**

Always disconnect the connecting plug from the socket before opening the housing of the stud welder. Only trained and appropriately qualified personnel are allowed to open the housing and to carry out works on the electric power supply and stud welder.



### **DANGER OF ACCIDENTS**

Only trained and appropriately qualified personnel are allowed to replace components of the stud welding system.



### **MORTAL DANGER**

Before replacing any components, make sure that the capacitors are discharged.



Error	Cause → Elimination
System does not weld, no or only poor sparking	System is not switched on → Switch on system, digital display lights up
	Welding or control cable are not connected properly or damaged → Connect cables properly, and/or check for damages. Replace if necessary
	Both earth cables are not or not properly connected and/or earth clamps are not attached to the workpiece → Connect earth cables, attach earth clamps to the workpiece
	Welding points and/or earth connection points at the workpiece are not metallic blank → Prepare workpiece and/or studs
There is no arc even though system is ready for operation	Stud without ignition tip or centre mark too deep for the ignition tip → Use stud with ignition tip or reduce centre mark
	Control of stud welder or welding pistol is defective → Contact SOYER customer service
	Stud is too loose in stud holder → Press stud holder together or tighten it
Stud thread is scorched	Stud holder is worn → Replace stud holder
Varying welding results	Welding energy not correctly set → Set welding energy
	Cable connections are too loose. Transition resistances are generated → Check all cable connections and earth clamps for tight fit
	Stud too loose or not fully inserted into stud holder until stop → Insert stud into stud holder until stop. If necessary, replace stud holder
	Magnetic blowing action. Arc is forced into a certain direction → Alter earth clamp fixture, place iron parts on the edges and/or rotate welding pistol
	Irregular operation of stud welding pistol or welding head → Contact SOYER customer service
Intensive sparking, stud flange, almost melted away	Welding energy is set too high → Reset welding energy using energy range controller



## Troubleshooting

Error	Cause → Elimination
Stud not welded with total flange surface, deficient weld joint strength	Welding energy set too low → Reset welding energy by means of the energy range controller
	Poor earth connection → Check earth cable and earth clamps for tight fit, tighten if necessary
	Surface too soiled → Clean workpiece surface
	Stud weld base deformed → Use new welding studs
	Stud projection over stud holder incorrectly set → Set projection to 2-3 mm (set distance between stud holder and stud weld base)
	Spring pressure incorrectly set → Set spring pressure
	Welding pistol in tilted position → Ensure that all 3 pistol legs are simultaneously and evenly positioned on the workpiece
Stud welder switches itself off	There are mains voltage fluctuations → Connect stud welder directly to the current distribution
	Control of stud welder, stud welding pistol or welding head is defective → Contact SOYER customer service

## 10 Transport and storage

The stud welder has a robust metal housing. Owing to the electronic components it should be ensured, however, that transport is free from vibrations.

The stud welders BMS-10N and BMS-10NV have two handles at the side for transport and mobile use within short distances.



These carrying handles are intended for transport by hand only. Never pull ropes through these handles to lift the system by crane to the installation site. The system would become unstable and might tilt from its original position. As a result the handles could rip and the system fall on the ground.



### **DANGER TO HEALTH**

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



After long system standstill, we recommend having the stud welder checked by a SOYER® serviceman prior to initiation.

## 11 List of standards and guidelines

- |                                       |                                                                                                              |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------|
| • 91/368/EEC<br>(formerly 89/392 EEC) | EC Directive on Machinery                                                                                    |
| • 73/23/EEC                           | EC Directive on Low Voltage                                                                                  |
| • 93/31/EEC<br>(formerly 89/336/EEC)  | EC Directive on Electromagnetic Compatibility                                                                |
| • EN 292 - 1                          | Safety of machinery, basic terms, general principles of construction, basic terminology, systems engineering |
| • EN 292 - 2                          | Technical principles, specifications                                                                         |
| • EN 60204 -1<br>(formerly VDE 0113)  | Electric equipment of machinery, general requirements                                                        |
| • EN 60974 - 1                        | Safety requirements for arc welding equipment, part 1, welding current sources                               |
| • EN 292-2                            | Working instructions                                                                                         |
| • VDE 0544                            | Safety requirements for arc welding equipment                                                                |
| • VGB 1                               | General instructions<br>(instructions for accident prevention)                                               |
| • VBG 5                               | Power-operated substances<br>(instructions for accident prevention)                                          |
| • DIN 4100                            | Welded steel structures with predominantly dead load                                                         |
| • DIN 267, part 5                     | Screws, nuts and the like, technical terms of delivery, testing and acceptance                               |
| • DIN 17100                           | Constructional steels - general types, quality standard                                                      |
| • DIN 8563, part 10                   | Quality assurance of welding works                                                                           |
| • DIN 32500, part 3                   | Studs for stud welding with retract ignition                                                                 |
| • DIN 50049                           | Certificate on material tests                                                                                |
| • DIN 50125                           | Testing of metallic materials, tensile tests, guidelines for production                                      |
| • DIN 54111, part 1                   | Non-destructive method of testing                                                                            |
| • DVS Leaflet 0902                    | Arc welding with retract ignition                                                                            |
| • DVS Guideline 0905, part 1          | Quality assurance of stud welding joints                                                                     |



## 12 Terms of warranty

We warrant for this equipment for a period of 6 months in accordance with our conditions of sale and delivery.

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

We cannot guarantee the quality of welded joints if welding studs acquired from another company are used.



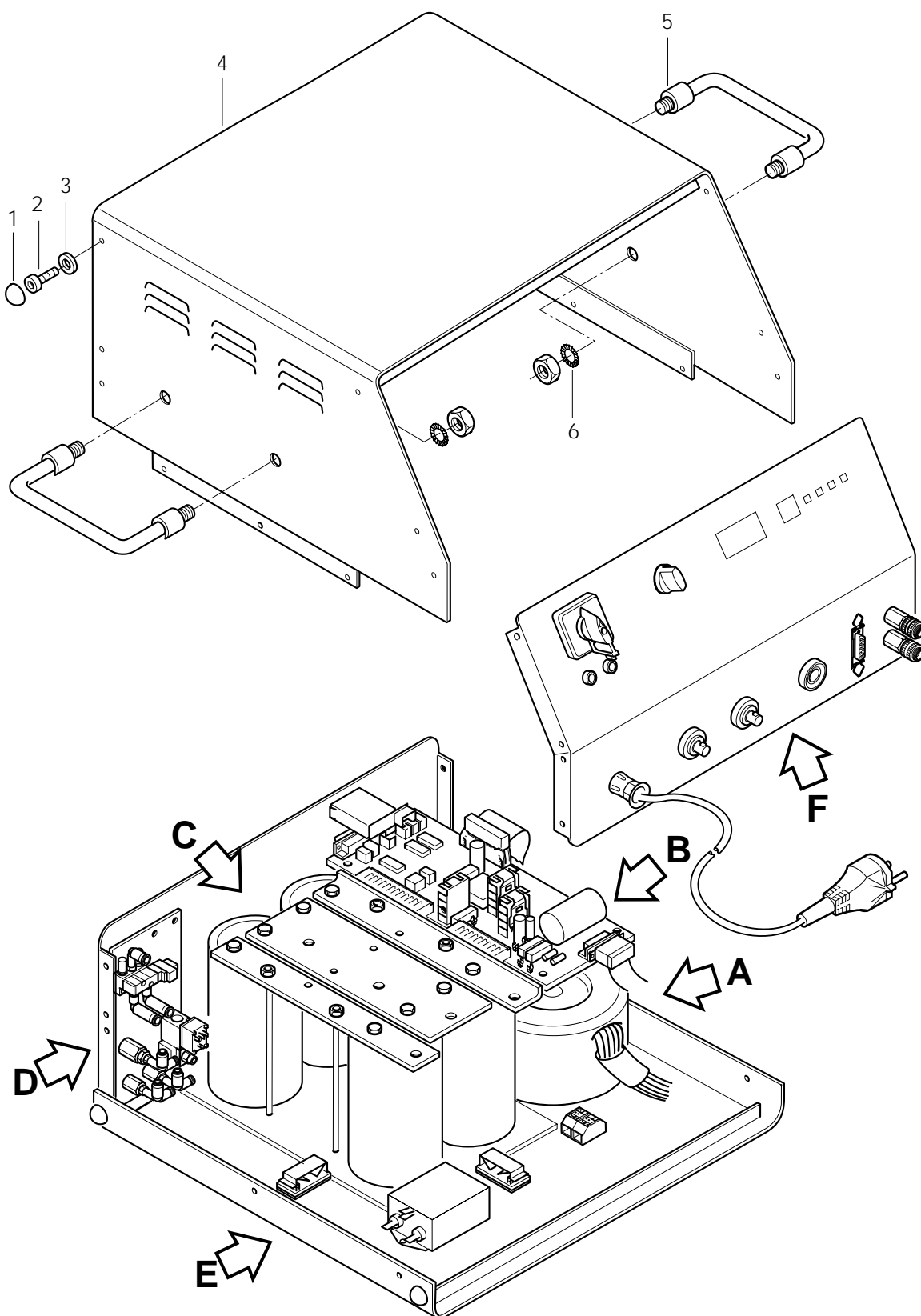
## 13 Spare parts

### 13.1 Spare parts list for BMS-10N stud welder - Overview

Item No.	Quantity	Description	Order No.
1	22	Cap PVC, grey	M01251
2	22	Fillister head screw M4x10	M01254
3	22	U-washer M4, nylon	M01251/01
4	1	Upper part of housing of BMS-10N	F03598
5	2	Handle	M01240
6	4	Tooth lock washer M8	M01224



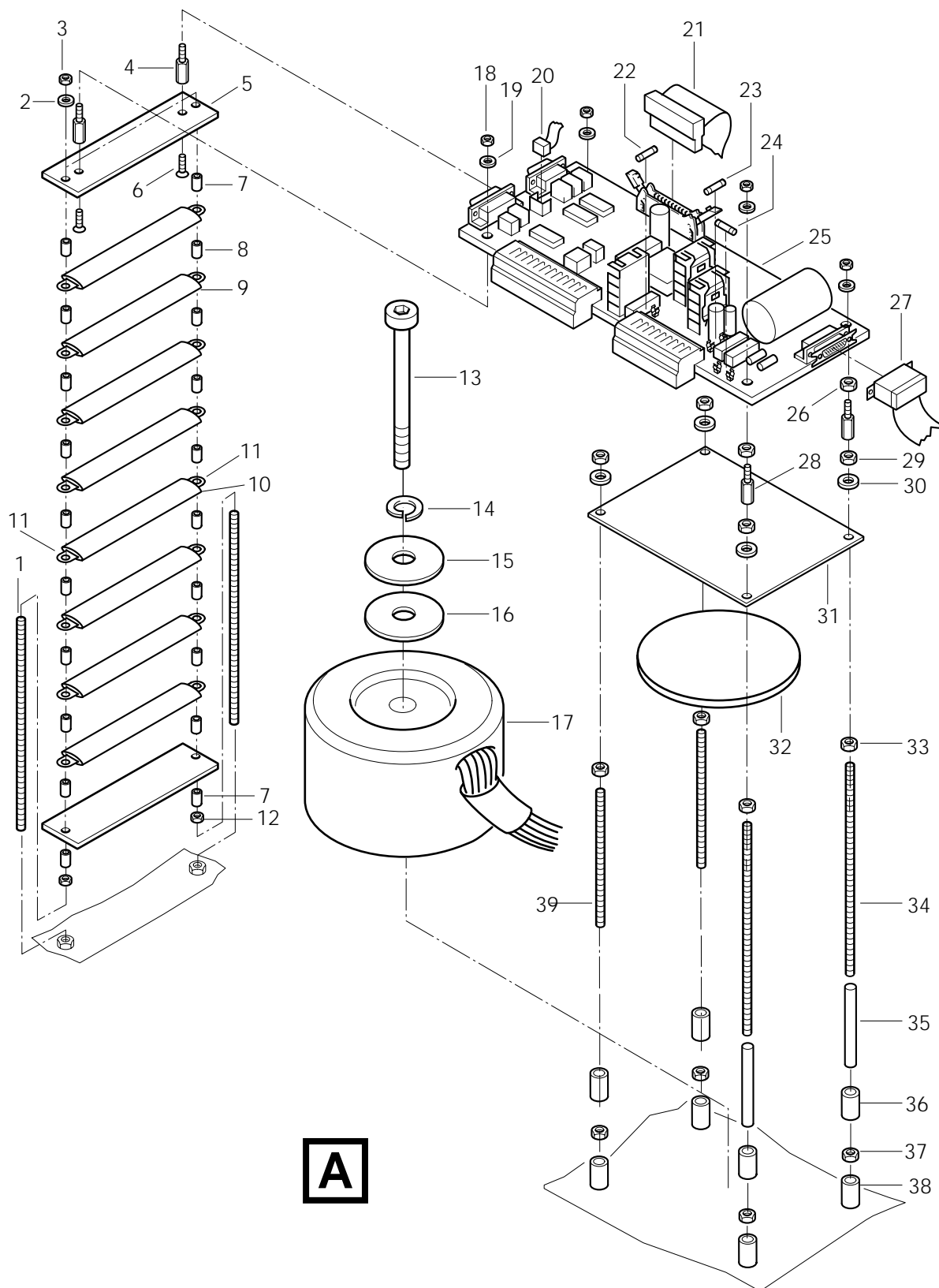
## 13.2 Exploded view of BMS-10N stud welder - Overview



### 13.3 Spare parts list for BMS-10N stud welder - View A

Item No.	Quantity	Description	Order No.
1	2	Threaded rod M4x140mm	M01242
2	2	Spring ring M4	M01074
3	2	Hexagon nut M4	M01012
4	2	Spacing bolt M4x10	M01047
5	2	Resistor covering plate	F03601
6	2	Flat-head screw M4x8	M01351
7	4	Distance sleeve Ø7x15	M01262
8	16	Distance sleeve Ø7x10	M01261
9	3	Wire resistor 7.5R/100W	E02089
10	5	Wire resistor 15R/100W	E01986
11	16	Resistor mounting plate	F01296
12	2	Hexagon nut M4	M01012
13	1	Cheese-head screw M5x50	M01178
14	1	Spring ring M5	M01075
15	1	Washer M5	M01063
16	1	Washer, special size M6	M01707
17	1	Toroidal mains transformer BV 47718	E03537
18	4	Hexagon nut M4	M01012
19	4	Spring ring M4	M01074
20	1	Connecting cable for pulse counter	F03707/FA-E
21	1	Complete flat cable, 26-pole	F03617/FA-E
22	1	Fine-wire fuse 10AT	E01898
23	1	Fine-wire fuse 1.6AT	E03608
24	1	Fine-wire fuse 3.15 AT	E01895
25	1	PC Board STA-41	F03630/FA
26	2	Hexagon nut M4	M01012
27	1	Complete flat cable	F03636/FA-E
28	2	Spacing bolt M4 x 15	M01031
29	4	Hexagon nut M4	M01012
30	4	Spring ring M4	M 1074
31	1	Transformer mounting plate	F03750
32	1	Insulating disk for transformer	E02222
33	4	Hexagon nut M4	M01012
34	2	Threaded rod M4x140mm	M01242
35	4	Insulating plastic tube 65mm	M01246
36	4	PVC hose, black	M01310
37	4	Hexagon nut M4	M01012
38	1	Lower part of housing	F03596
39	2	Threaded rod M4x85mm	M01244

## 13.4 Exploded view of BMS-10N stud welder - View A



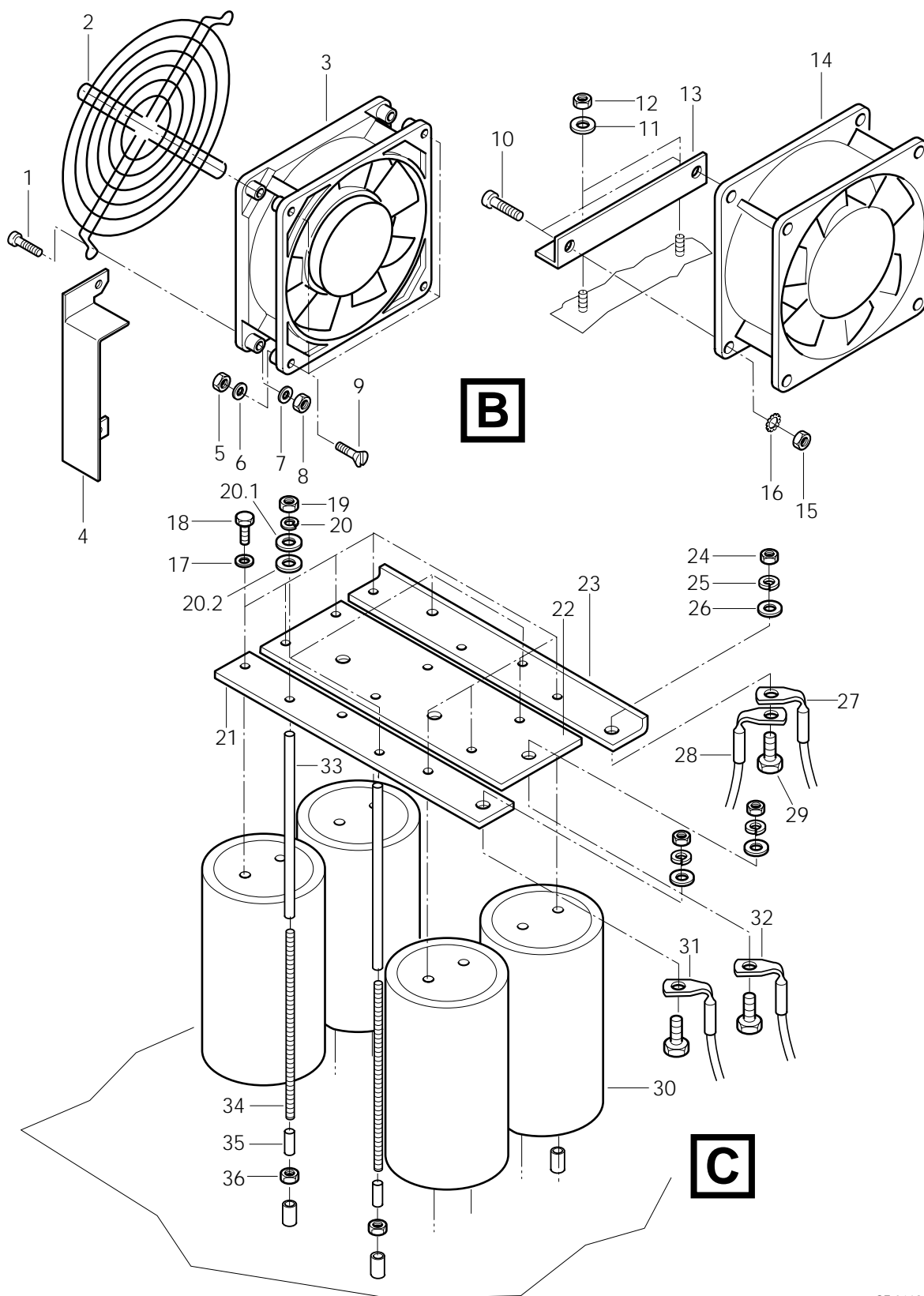
SZ.0167.X



### 13.5 Spare parts list for BMS-10N stud welder - View B and C

Item No.	Quantity	Description	Order No.
1	4	Cheese-head screw M4x16	M01089
2	1	Protective grating	E02224
3	3	Fan 220/230 volt	E02083
4	1	Covering plate for fan	F03789
5	4	Hexagon nut M4	M01012
6	4	Spring ring M4	M01074
7	4	Spring ring M4	M01074
8	4	Hexagon nut M4	M01012
9	4	Flat-head screw M4x16	M01354
10	2	Cheese-head screw M4x12	M01152
11	2	Spring ring M6	M01076
12	2	Hexagon nut M6	M01014
13	1	Fan elbow	F01298
14	1	Fan 24V TYPE 4715KL	E03514
15	2	Hexagon nut M4	M01012
16	2	Spring ring M4	M01074
17	8	Spring ring M5	M01075
18	8	Hexagon head cap screw M5x12	M01117
19	4	Hexagon nut M4	M01012
20	4	Spring ring M4	M01074
20.1	4	Nylon washer	E03728
20.2	4	Insulating disk	E02037
21	1	Busbar, left	F01299
22	1	Busbar, middle	F01301
23	1	Busbar, right	F01300
24	3	Hexagon nut M8	M01015
25	3	Spring ring M8	M01077
26	3	Washer M8	M01065
27	1	Connecting cable	F03627/FA-E
28	1	Connecting cable	F03628/FA-E
29	3	Hexagon head cap screw M8x16	M01129
30	4	Aluminium capacitor 22000µF	E01199
31	1	Connecting cable	F03627/FA-E
32	1	Connecting cable	F03628/FA-E
33	4	Insulating plastic tube 175mm	M01246
34	4	Threaded rod M4x185mm	M03516
35	4	PVC hose, black	M01310
36	4	Hexagon nut M4	M01012

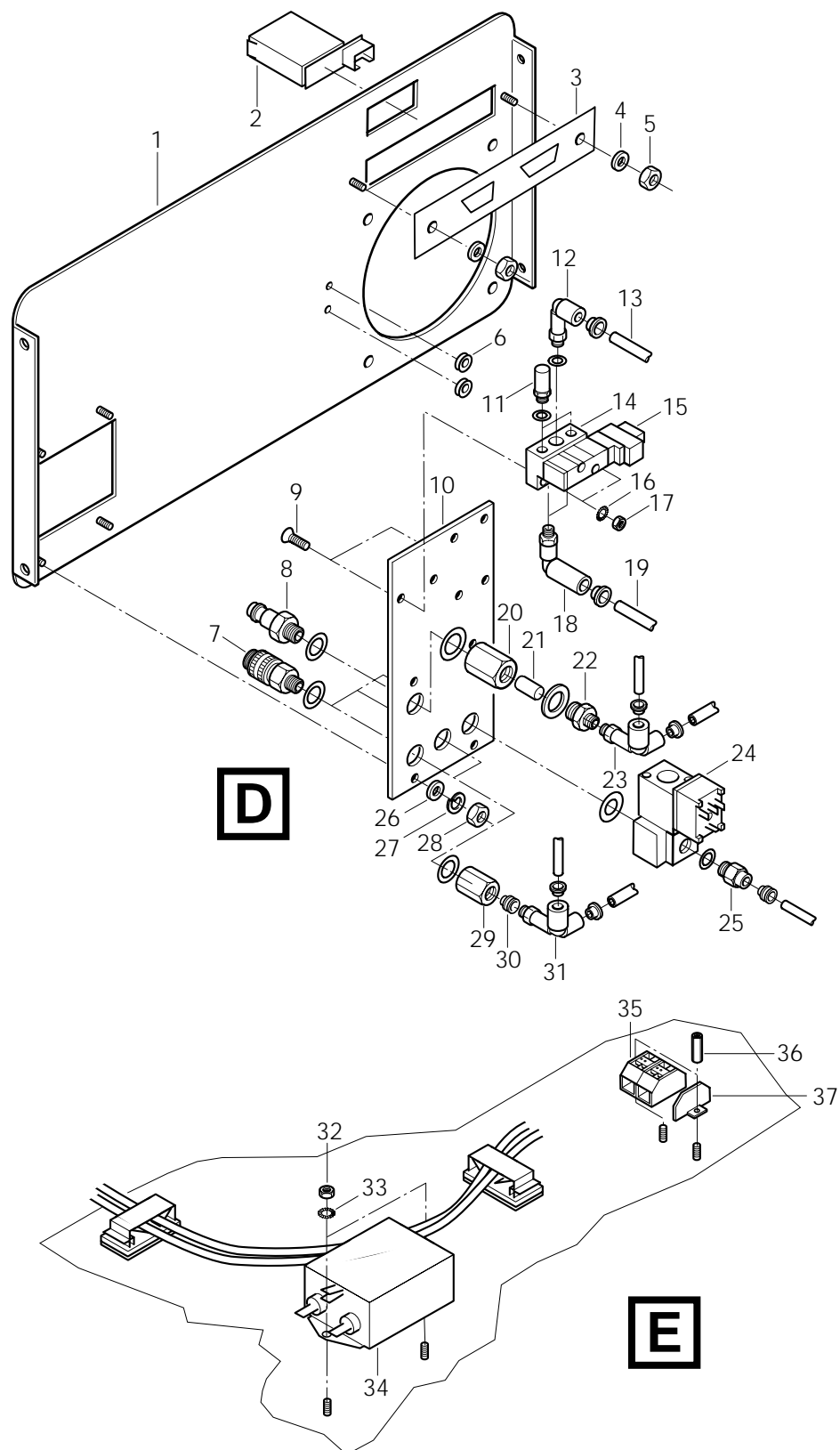
## 13.6 Exploded view of BMS-10N stud welder - View B and C



### 13.7 Spare parts list for BMS-10N stud welder - View D and E

Item No.	Quantity	Description	Order No.
1	1	Back panel	F03599
2	1	Complete pulse counter	F03708/FA
3	1	STA-41 PCB mounting plate	F03600
4	2	Spring ring M4	M01074
5	2	Hexagon nut M4	M01012
6	2	Grommet	E03619
7	3	Coupler socket KD-1/8	M01299
8	1	Coupler plug KS-1/4	M01302
9	2	Flat-head screw M3x16	M01349
10	1	Mounting plate	F02992
11	2	Sound absorber U-M5	M01284
12	1	Angular joining piece M5/PU-4	M02068
13	0.25m	Pneumatic hose PU-4	M01306
14	1	Connection board	M02101
15	1	Pneumatic valve	M02099
16	2	Tooth lock washer M3	M01318
17	2	Hexagon nut M3	M01011
18	2	Angular joining piece M5/PU-3	M01056
19	2m	Pneumatic hose SMC4	M01067
20	1	Joining piece QM-1/4	M01290
21	1	Sound absorber U-1/8	M01285
22	1	Reducer	M01538
23	1	Elbow PU-4	M03518
24	1	Pneumatic valve	M02098
25	1	Pin-and-socket connector, straight KQH-06	M02095
26	4	Washer M4	M01062
27	4	Spring ring M4	M01074
28	4	Hexagon nut M4	M01012
29	2	Joining piece QM-1/8	M01289
30	2	Pin-and-socket connector, straight	M01060
31	2	Angular joining piece 1/8-PU-3	M01058
32	2	Hexagon nut M4	M01012
33	2	Spring ring M4	M01074
34	1	Mains filter	E03541
35	3	Binder with flange	E02651
36	2	Spacing bolt M3x18	M01705
37	1	Covering plate	E02659

## 13.8 Exploded view of BMS-10N stud welder - View D and E





### 13.9 Spare parts list for BMS-10N stud welder - View F

Item No.	Quantity	Description	Order No.
1	4	Hexagon nut M4	M01012
2	4	Spring ring M4	M01074
3	1	PC Board STA-31	F03616/FA
4	4	Distance sleeve 7x1.4x10mm	M01261
5	4	Distance sleeve 7x1.4x7mm	M01260
8	1	Mounting plate	E01524
9	1	Fastening set	M03576
10	1	Complete flat cable (see item 27/A)	F03636/FA-E
11	1	Toroidal core	E03607
12	1	Mounting base, self-adhesive	E01726
13	4	Hexagon nut M4	M01012
14	4	Spring ring M4	M01074
15	4	Washer M4	M01062
16	1	Front panel with foil	F03614/FA
17	1	Mounting base, self-adhesive	E01726
18	1	Main switch	E03512
19	4	Flat-head screw M4x16	M01354
20	1	Complete turning knob comprising:	
	1	Turning knob	E01900
	1	Nut cover	E01902
	1	Front cap	E01904
21	2	Earth connector	E01964
22	1	Earth socket	E01958
23	2	Pin-and-socket connector, straight	M01060
24	1	Fine-wire fuse 0.1AT	E03504
25	1	Fine-wire fuse 10AT	E01898
26	2	Locking screw	E01891
27	2	Coupler socket KD-1/8	M01299
28	1	Copper plate	F03529
29	2	Hexagon nut M8	M01015
30	2	Spring ring M8	M01077
31	2	Washer M8	M01065
32	1	Connecting cable	F03628/FA-E
33	2	Thyristor clamping cap	E01987
34	1	Thyristor SAE4A (not illustrated)	E01361
34.1	1	Diode 470 POA40 (not illustrated)	E01817
35	2	Hexagon head cap screw M8x16	M01129
36	1	Mains cable	E01985
37	8	Washer M5	M01063
38	8	Spring ring M5	M01075
39	8	Hexagon nut M5	M01013
40	1	Hardboard	F03527
41	1	Cable gland PG11	E01969
42	1	Lock nut PG11	E01970
43	1	Connecting cable	F03619/FA-E
44	1	Crimp lug 8 x 6 mm <sup>2</sup>	E02046



This exploded view diagram illustrates the assembly of a microwave oven. The components are numbered as follows:

- 1, 2:** Screws for the top panel.
- 3:** Top panel with control buttons.
- 4, 5:** Mounting brackets for the top panel.
- 6:** Screws for the side panel.
- 7:** Side panel.
- 8:** Mounting bracket for the side panel.
- 9:** Screws for the side panel.
- 10:** Mounting bracket for the side panel.
- 11:** Mounting bracket for the side panel.
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- 36:** Mounting bracket for the side panel.
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- 39:** Mounting bracket for the side panel.
- 40:** Mounting bracket for the side panel.
- 41:** Mounting bracket for the side panel.
- 42:** Mounting bracket for the side panel.
- 43:** Mounting bracket for the side panel.
- 44:** Mounting bracket for the side panel.





Spare parts

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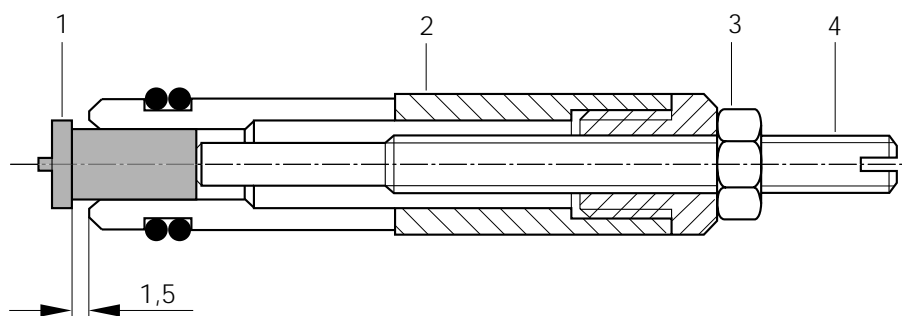
# 1 Adjustment of stud welding pistol

## 1.1 Adjustment of stud holder

The stud holders of welding pistols PS-1, PS-3K, PS-0K and PS-1K are all of the same type. When using large studs with short type welding pistols PS-0K and PS-1K, however, it is necessary to shorten the stop screw (4) of such welding pistols accordingly.



For pistols PS-1, PS-3K, PS-0K and PS-1K, use the standard stud holder with adjusting screw, having a length of 40 mm! Ensure that the maximum stud length does not exceed 35 mm.



SZ06.0593.012.X

- |               |              |
|---------------|--------------|
| 1 Stud        | 3 Counternut |
| 2 Stud holder | 4 Stop screw |

For different stud diameters, different stud holders are required.

Adjust stud holder as follows:

- Loosen counternut (3)
- Insert stud (1) into stud holder.  
The top edge of the stud flange must project for about 1.5 mm from the front edge of the stud holder.

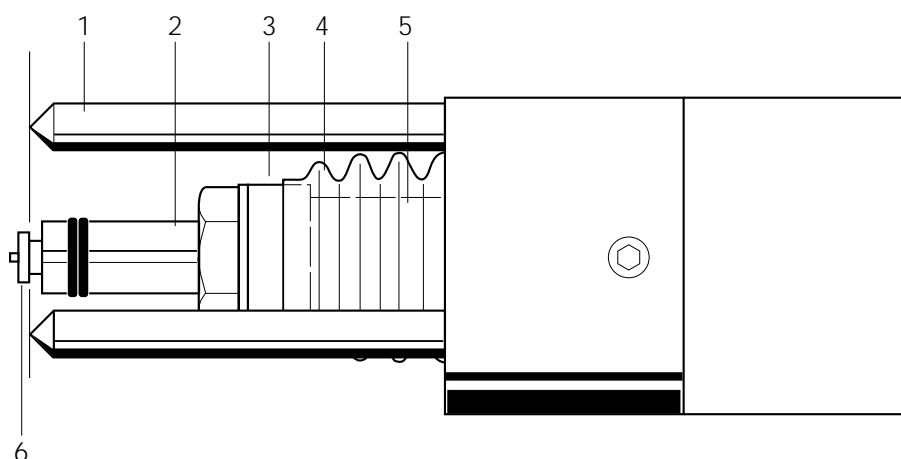


The stud must make contact with the stop screw (4).

- Adjust stop screw (4) in the stud holder by turning it until the distance from the top edge of the stud flange to the front edge of the stud holder equals 1.5 mm.
- Lock stop screw (4) by means of counternut (3).

## 1.2 Installation of stud holder into stud welding pistol

The illustration below shows how to install the stud holder into the stud welding pistols PS-1, PS-3 and PS-3K. Stud welding pistols PS-0K and PS-1K are provided with a support tube instead of pistol legs (1).



SZ05.0693.010.X

- |               |                 |
|---------------|-----------------|
| 1 Pistol leg  | 4 Bellows       |
| 2 Stud holder | 5 Spring piston |
| 3 Sleeve nut  | 6 Stud flange   |

- Loosen sleeve nut (3) at stud welding pistol PS-1, PS-3 and PS-3K by means of socket wrench SW 17, those at stud welding pistols PS-0K and PS-1K by means of socket wrench SW 14
- Insert stud holder (2) into spring piston (5) until stop
- Tighten stud holder (2) with sleeve nut (3)



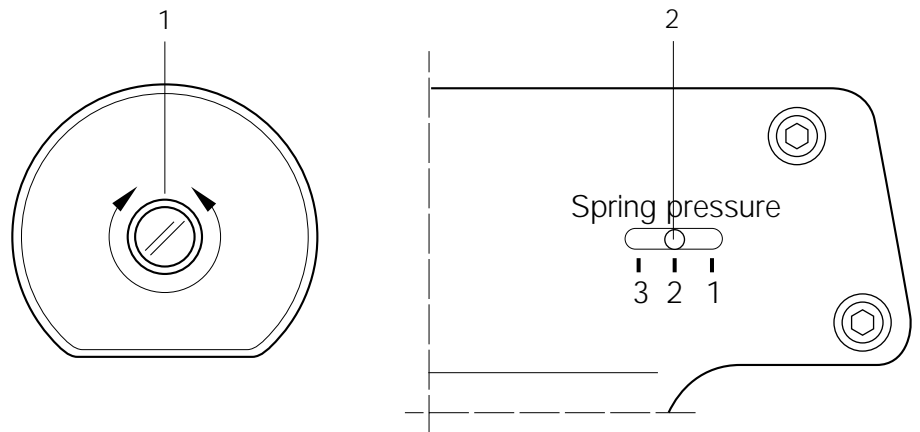
The stud flange must project from the top of the pistol legs or the support tube for the thickness of the flange. If this is not the case, remove stud holder and correct the projection by means of stop screw.

### 1.3 Adjustment of spring pressure

(does not apply to stud welding pistol PS-3)

When using the stud welding pistol PS-3, adjust the lift instead of the spring pressure. In this case please leave out chapter 1.3 and refer to chapter 1.4 of Appendix A "Adjustment of stud welding pistols - Capacitor Discharge". The pressure with which the stud is pressed against the workpiece during the welding process is called spring pressure.

The following illustration shows how to adjust the spring pressure of stud welding pistol PS-1 which is equipped with a spring pressure indicator. Stud welding pistol PS-3K is provided with a similar spring pressure indicator. For stud welding pistols PS-0K and PS-1K, there is no spring pressure indicator.



SZ.0041.E

- 1 Adjusting screw
- 2 Spring pressure indicator

For all stud welding pistols described here, the spring pressure is adjusted by means of the adjusting screw (1). The adjusted pressure is indicated at the spring pressure scale (2). Adjust spring pressure as follows:

- Turn adjusting screw (1) to the left until stop  
Indicator position 1 = low pressure
- Turn adjusting screw (1) 3.5 turns to the right  
Indicator position 2 = medium pressure
- Turn adjusting screw (1) to the right until stop  
Indicator position 3 = high pressure

The spring pressure to be adjusted depends on the material of both welding stud and workpiece.

Before starting the work, carry out some experimental weldings and test them to find out the optimum adjustment.

Samples have to be taken during production to ensure constantly good welding results (see DVS Guideline 0905, Part 2, "Quality assurance of stud welding joints").



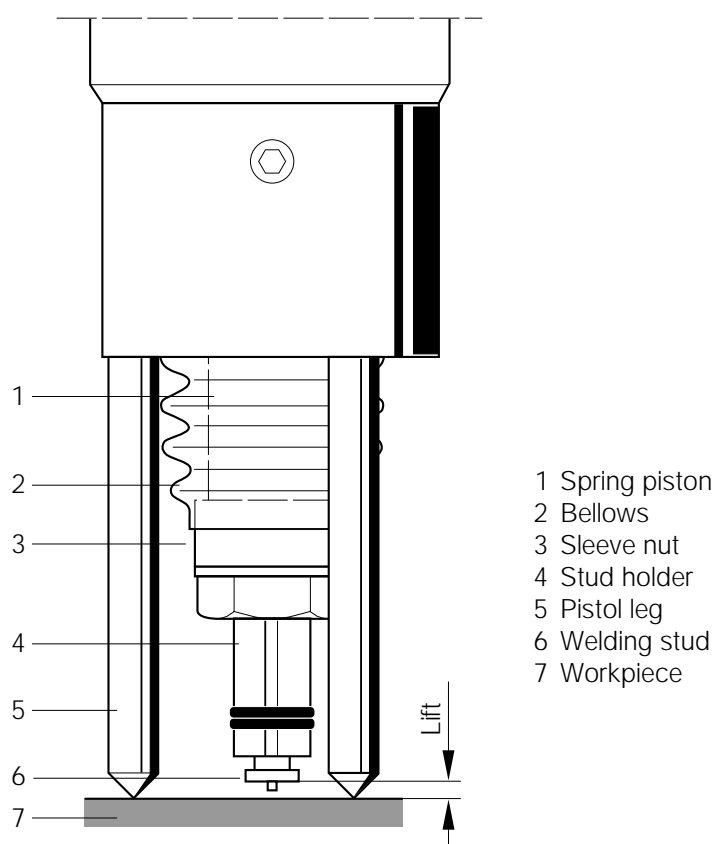
## 1.4 Lift (stud welding pistol PS-3)

Lift is the distance the stud is lifted off the workpiece during the welding process.



The adjustment of lift is only possible with stud welding pistol PS-3 combined with stud welder BMS-10N or BMS-10NV.

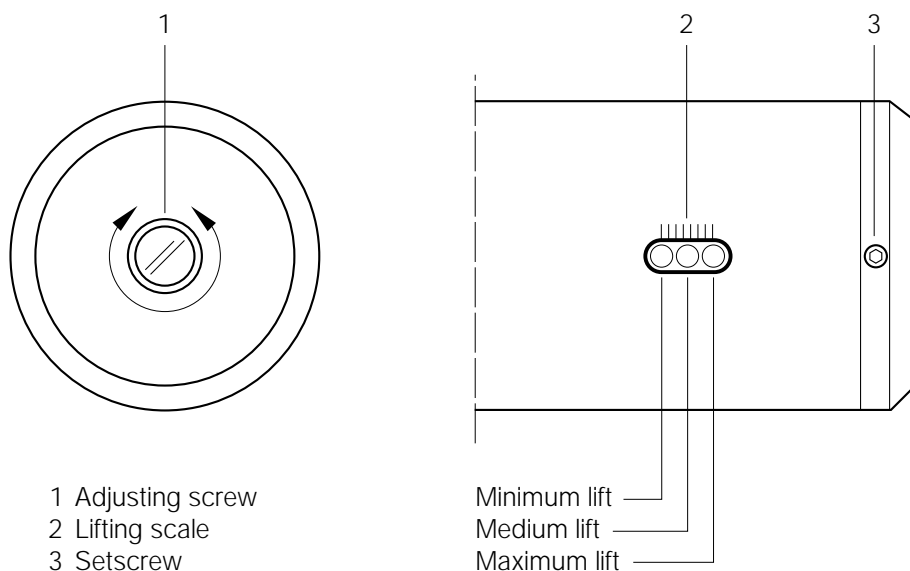
### 1.4.1 Determining the lift



SZ.0050.E

- Switch on stud welder
- Set function "Lift test" at the stud welder
- Position welding pistol with welding stud (chapter 1.4.1, item 6) on workpiece (chapter 1.4.1, item 7)
- Press pistol switch. Stud holder (chapter 1.4.1, item 4) with welding stud (chapter 1.4.1, item 6) is lifted off workpiece (chapter 1.4.1, item 7). Depending on the respective welding task the stud should lift off the workpiece for 2.5 - 4 mm

### 1.4.2 Adjusting the lift



SZ.0051.E

- Loosen setscrew by turning it anticlockwise using Allen key SW 2.
- Insert screw driver into the groove of the adjusting screw (chapter 1.4.2, item 1) located at the rear of the stud welding pistol and adjust by turning to the left or right till the required lift is obtained. Turning to the left increases the height of lift, turning to the right decreases it. After adjusting, check the lift and correct it if necessary.



After having adjusted the lift, fix it by means of the setscrew (3).

- Tighten setscrew (3) by turning it clockwise using Allen key SW 2.

Terminate the function "Lift test" after having successfully adjusted the lift.

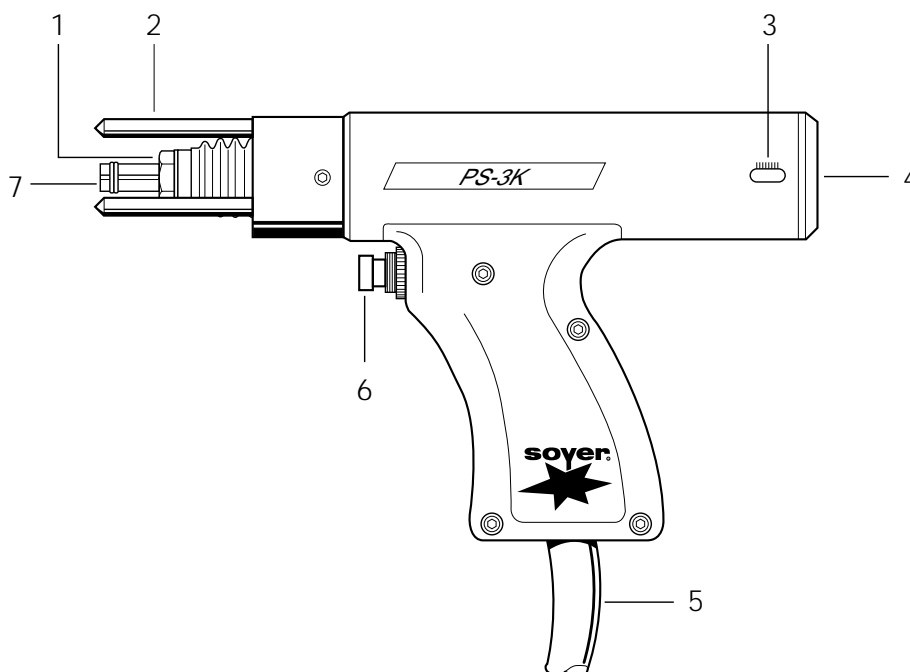


## 2 Initiation

### 2.1 Total view

The illustration below shows stud welding pistol PS-3K. The indicated components are only slightly different from those of stud welding pistols PS-1, PS-3, PS-0K and PS-1K.

- Stud welding pistols PS-0K and PS-1K are provided with support tubes instead of pistol legs (2)
- Stud welding pistols PS-0K and PS-1K are not equipped with a spring pressure indicator
- Stud welding pistol PS-3 is equipped with a lift indicator and adjusting screw for lift instead of the spring pressure indicator (chapter 2.1, item 3) and adjusting screw for spring pressure (chapter 2.1, item 4)



SZ05.0594.016.X

- |                                                                          |                                                                          |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------|
| 1 Sleeve nut                                                             | 4 Adjusting screw for spring pressure or lift (stud welding pistol PS-3) |
| 2 Pistol leg                                                             | 5 Connecting cable                                                       |
| 3 Spring pressure indicator or lift indicator (stud welding pistol PS-3) | 6 Trigger switch                                                         |
|                                                                          | 7 Stud holder                                                            |





## **2.2 Connecting stud welding pistols to stud welder**

The stud welding pistols are connected to the stud welder by means of pistol and control cables.

## **2.3 Operation**

- Connect stud welder to earth
- Connect stud welding pistol as described in chapter 5
- Adjust stud welding pistol as described in Appendix A, Chapter 1
- Connect stud welder to the mains supply
- Adjust stud welder for the welding studs to be used
- Insert welding studs into stud holder
- Place stud welding pistol upon workpiece and press trigger switch



### **3 Spare parts**

#### **3.1 Spare parts list for PS-3 stud welding pistol**

Spare parts list in preparation



### **3.2 Exploded view of PS-3 stud welding pistol**

Spare parts list in preparation



## Appendix A/PS-3 - Spare parts - Capacitor Discharge

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