

Operating Instructions BMH-22i Stud Welder







Operating Instructions

BMH-22i Stud Welder

Serial number*

BMH-22i stud welder _____

Please enter the serial number here to have it immediately available if you need service support.

Order No.	Code designation	Note
P01345	BMH-22i	Standard device (mains connection 3 x 400 V)
P0XXXX	BMH-22i A	Standard device (mains connection 3 x 400 V) with automatic set for stud reload



Congratulations on purchasing the BMH-22i SOYER stud welder. You have made an excellent choice. Your BMH-22i SOYER stud welder was specially developed for the high-speed fastening of SOYER welding studs in compliance with **DIN EN ISO 13 918** on metallic, weldable workpieces.

Our devices have been tested with regard to safety requirements and correspond to the currently valid European and national guidelines. Proof of conformity has been established and the manufacturer is in possession of the corresponding documents.



FOR YOUR SAFETY

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

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particularly in the case of a patent grant or a GM registration. We have verified that the contents of this pamphlet correspond to the hard- and

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 illustrations contained in this instruction manual may vary in some details from your product. This, however, has no influence on the handling of the machine.

The data in this documentation have been verified regularly and necessary corrections will be incorporated in future impressions. Any suggestions for improvement will be appreciated.

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Appendix A /

Adjustment of short-cycle drawn arc welding guns

Appendix A



1 Safety precautions

These safety precautions are for <u>your</u> safety.

	General safety instructions Become trained and read and follow all safety precautions listed below as well as all chapters of this manual <u>before starting to weld</u> . Non-compliance with the safety precautions can result in personal injuries or death.
	Only qualified persons are allowed to install, operate and maintain the equipment.
	Keep away children and juveniles under the age of 16 years from the equipment.
\bigcirc	WARNING <u>It is prohibited to open the stud welder.</u> The service personnel are required to meet special qualifications. Our after-sales service has adequately trained personnel, suitable service equipment and the means to carry out all necessary works.
	Warning of electromagnetic fields
	Keep sufficient distance from electronic devices. When stud welding, highly intensive electromagnetic fields are created which may permanently damage these devices (e.g. television sets, airbags).
	Ensure that the welding equipment is not operated near electronically sensitive life- supporting equipment, such as in intensive care units in hospitals.
	Persons with pacemakers must neither operate the stud welding equipment nor stay near it while it is running.
	Electric shock can cause death Prevent electric shock by insulating your body from work and ground. Stand on dry insulating material such as rubber mats and wear rubber soled shoes.
	Be sure power source is properly connected to the ground system of the power supply. Inspect all cables including power cord for damage or bare wiring. Immediately replace damaged or worn cables.
	Always ensure the correct supply voltage in accordance with the data plate. <u>Never</u> connect the stud welder to a power supply network with incorrect supply voltage.
	<u>Always</u> disconnect the mains cable from the mains supply before starting any cleaning works. Only trained and appropriately qualified personnel are allowed to carry out works at the electric mains supply and welding system.
	Do not touch live electrical parts with bare hand. Wear dry, hole-free insulating gloves.
	Do not wear rings, watches or electrically conductive jewellery.
	Keep the work area, studs, stud holders, guns, cables, power source as well as your clothes dry.





Moving parts can cause injury Beware of moving parts such as fans. Keep hair, hands, loose clothing and any tools away from the air apertures.



1.1 Description of reference signs in the operating instructions

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

Safety instructions

\bigcirc	Danger!	Immediate hazards which could result in serious personal injuries or loss of life.				
	Warning!	Potential hazards which could result in serious personal injuries or loss life.				
	Caution!	Potential hazards which could result in minor personal injuries.				
	Caution!	Warning of damage				
	Note!	Potential detrimental situation which may cause damage to the product or to an object surrounding it.				
	Important!	Instructions for application and other useful information facilitating the proper use of the product.				

Safety symbols

The following pictographs for warnings, bans and decrees are used in this manual:

Ban for persons with pacemakers	Ban (only in combination with an additional safety symbol)	Do not touch Housing is current- carrying	Fire extinguisher	
	, , , , , , , , , , , , , , , , , , ,	can jing		
Warning of a danger spot	Warning of dangerous electric voltage	Warning of electromagnetic field	Warning of moving parts	
General ban (only in combination with an additional safety symbol)	Warning of inflammable substances	Warning of explosive substances		
\bigcirc	R	\bigcirc		
Eye protection required	Protective clothing required	Ear protection required	Protective gloves required	
General instru	uctions are marked with the	hand symbol.		



1.2 Staff qualification and training

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

The society of welding institutes (GSI: Gesellschaft der Schweißtechnischen Institute mbH) offers the appropriate training courses for your personnel.

For information on branches, please refer to website <u>http://www.dvs-ev.de</u>.

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

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

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

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

1.4 Before starting to weld...

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

1.5 Working with the stud welding equipment

• Comply with all accident prevention regulations which apply to the operation of your stud welding device.

If an accident happens,

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

1.6 Inadmissible operating methods

Limit values

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

1.7 Stopping the stud welder

- Press the red OFF button "0".
- Disconnect the mains plug from the socket.
- Disconnect
- the control cable
- the welding cable
- the earth cables
- possibly existing gas supply and compressed-air supply

from the stud welder.

- Roll up the cables without buckling them.
- Prevent the stud welder being operated by unauthorized personnel.



• Check welding cable and connections of the stud welder for damage such as burn-off, mechanical wear etc. and have damaged parts replaced by the SOYER customer service.

2 General

2.1 The following should be principally observed...

With 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, please observe the following:

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

2.2 Intended purpose

The BMH-22i SOYER stud welder for drawn arc welding allows SOYER threaded studs as per **DIN EN ISO 13918** and ranging from M8 – M24 RD (MR) or \emptyset 8 – 22 mm (studs, shear connectors, concrete anchors) made of plain, stainless and heat-resistant steel to be welded on different workpieces (sheets, tubes, steel girders etc.).

Usually round pins with or without thread are welded. You may also weld fasteners with different cross-sectional shapes. For this purpose, however, special stud holders and ceramic ferrules or gas shrouds are required.

With the BMH-22i SOYER stud welder it is also possible to weld studs of other metallic materials than steel. It is, however, necessary to first carry out experimental welds and to inspect them.

Manual electric welding (electrode welding) and TIG welding are also possible to a limited extent.

2.3 Marketing and service

If you have any questions regarding the operation of the BMH-22i stud welder, retrofits for special applications 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 Wörthsee Telephone +49 8153-885-0 Telefax +49 8153-8030

www.soyer.de

info@soyer.de



2.4 Information on the documentation

The following operating instructions are supplied with the BMH-22i stud welder:

Operating instructions for BMH-22i stud welder

Order no. P00233

2.4.1 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.



CAUTION

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

2.4.2 Conduct in the case of malfunctions

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

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

Customer number

Product designation / options

- Serial number
- Stud and workpiece material
- Year of construction
- Stud dimensions

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



3 Description of stud welder

3.1 Drawn arc stud welding technology



Illustration 1: Drawn arc stud welding technology

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The BMH-22i SOYER stud welder runs according to the principle of drawn arc stud welding. A D.C. power supply with inverter technology provides the welding current. For detailed information, please refer to the following regulations:

• DIN EN ISO 14555, "Arc welding of metallic materials"

• DVS Information Sheet 0902, "Drawn arc stud welding"

- 1. When welding, the stud is positioned on the workpiece.
- 2. The preweld current is ignited and the stud is lifted off the workpiece.
- 3. The subsequent ignition of the main current creates a molten pool between stud and workpiece.
- 4. The stud immerses in the liquid molten pool and the material solidifies.

This method allows manual, semi-automatic and fully automatic inseparable welding of threaded studs, pins, tapped studs, insulating pins, special studs and many other fasteners made of steel, CrNi steel, heat-and acid-resisting steel with the workpieces. Conditionally it is also possible to weld nickel and titanium depending on the respective requirements. Standard studs for drawn arc and capacitor discharge welding in compliance with DIN EN ISO 13918 can be welded without requiring any auxiliary aids. The application of shielding gas or ceramic ferrules is recommended for studs with a diameter of more than 6 mm to prevent pore formation and to optimise the formation of bulges.

The standard BMH-22i stud welder is suitable for operation with shielding gas and ceramic ferrules. A D.C. power supply with inverter technology provides the welding current.



IMPORTANT INFORMATION

Ensure that the surface is electroconductive. Grind hot galvanized parts.

The following welding methods are possible when using the BMH-22i SOYER stud welder:

- · Short-cycle drawn arc stud welding without shielding gas and ceramic ferrules
- Drawn arc stud welding using ceramic ferrules as auxiliary aid
- Drawn arc stud welding using shielding gas as auxiliary aid
- Manual electric welding (electrode welding)
- TIG welding



3.2 Stud welding

The PH-5L stud welding gun with control cable and shielding gas equipment is the standard gun to be connected to the BMH-22i stud welder. These operating instructions <u>only</u> refer to the BMH-22i stud welder.

For information regarding the stud welding guns to be used and their setting, please refer to the respective operating instructions.

3.2.1 Drawn arc welding with shielding gas

With this method, a gas mixture containing 82% of Argon and 18% of CO_2 (e.g. Corgon®18*) is used as auxiliary aid.

This shielding gas protects the welding point from the atmosphere and simultaneously supports the weld pool. Moreover, it ensures a concave fillet weld upset formation with a blank metallic surface, thus reducing the risk of corrosion and obtaining an improved dynamic behaviour of the welded joint.

An accurate bulging, to scale or in a calibrated or reproducible type, is not possible when welding with shielding gas without using any auxiliary aid. Stud welding with shielding gas can be carried out at much shorter intervals as no ceramic ferrules have to be fitted and removed in each welding process.

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

3.2.2 Drawn arc welding with ceramic ferrules

The ceramic ferrule fulfils the following functions:

- It centres the electric arc.
- It protects the welding point from the atmosphere.
- It ensures the exact formation of the weld upset.
- It prevents too rapid cooling of the weld pool.
- It partially protects against spraying sparks.

To ensure a perfect and accurate weld upset, each stud requires a ceramic ferrule matching its diameter and shape. After every welding process, the ceramic ferrule must be knocked down and replaced by a new one.

Usually this method allows you to weld in any position.



IMPORTANT INFORMATION

Ensure ceramic ferrules are absolutely dry.

3.3 Manual electric welding / TIG welding

Instructions on application:

These operating instructions only describe the function "stud welding".

Instructions on manual electric welding / TIG welding can be obtained from the respective manufacturers of the necessary accessories.



Table for electrical characteristic values as per DIN EN 60974-1

6)	8)	10)		
		40 A / 21.6 V up to 300 A / 32 V		
		11)	11b)	11c)
		Х	60 %	100 %
7)	9)	12)	12b)	12c)
0		2	300 A	200 A
S	U₀ = 85 V	13)	13b)	13)
U		U 2	32 V	28 V

Field 6	Graphical symbol for the welding process "Covered-Electrode Manual Arc Welding"
Field 7	Symbol for welding current sources which are suitable for welding in an environment
	of increased electrical danger

- Field 8 Symbol for direct current
- Field 9 Rated value of open-circuit voltage in volt
- Field 10 Lowest and highest power range
- Field 11 Symbol for operating time
- Field 12 Symbol for rated value of welding current
- Field 13 Symbol for standardized working voltage
- Field 11b,c Value of operating time in %
- Field 12b,c Rated value of welding current in ampere
- Field 13b,c Value of standardized working voltage in volt

3.3.1 Manual electric welding (electrode welding)

"Electrode welding" allows simple welding works with covered electrodes (electrode holders are not included in delivery)

Please pay attention to the following:

Stud welding technology necessitates that the electrode holder is connected to the negative pole. Polarity may, however, be reversed by changing the plug-in connection of the earth and welding cables. Two adapter cables are necessary for doing so (special accessories).

The welding current is adjustable from 80A up to 300A in 20A steps.

The welding current has to be set depending on the electrode diameter and the welding task. Approx. 40A for each mm diameter of the electrode may serve as a standard value for the current adjustment.



CAUTION

During electrode welding, the connecting socket "welding cable" and the connecting plug "earth cable" are always live.

The open-circuit voltage has <u>always</u> a direct voltage of approx. 85 V!

3.3.2 TIG welding

TIG welding allows simple welding works using a TIG welding torch (welding torch is not included in delivery).

Please pay attention to the following:

Stud welding technology necessitates that the electrode holder is connected to the negative pole. Polarity may, however, be reversed by changing the plug-in connection of the earth and welding cables. Two adapter cables are necessary for doing so (special accessories).

Only direct voltage (DC operation) is available as welding current. It is not possible to change over to alternating voltage.

The current may be adjusted between 80A and 200A in 20A steps.



Gas and welding current are switched on by pressing the switch of the torch. Keep pressing the switch during the welding process. Gas and current are switched off when you stop pressing the switch.



NOTE Do not press the switch of the torch too long. There is <u>no</u> optional torch cooling available.

3.4 Construction of the BMH-22i stud welder

The BMH-22i stud welder has a handy, compact and robust design.

The carrying handles on the top of the housing allow easy transport so that the stud welder can be used at different work places.



3.5 Technical data

Designation	BMH-22i
Welding process	Drawn arc stud welding (DS) Electrode welding rectifier
Welding range	SOYER threaded studs, DIN EN ISO 13918 from $M8 - M24 RD (MR) \text{ or } \emptyset 8 - 22 \text{ mm}$
Material	Steel, stainless steel and heat-resistant steel
Power source	Inverter technology
Welding current	300 up to 2000 A (stud welding) 80 up to 300 A (electrode welding) 80 up to 200 A (TIG welding)
Welding time	3 up to 1000 ms (only with operation mode "stud welding")
Welding sequence	up to 50 studs/min. depending on the respective stud diameter
Standard gun	PH-5L stud welding gun
Power supply	CEE 63 A (3P + protective earth conductor) 3 x 400 V 50/60 Hz +10% -15%
E-continuous current	2 A / phase
E-continuous power	1400 VA
E-maximum current	180A / phase with 3 x 400 V (short-time operation)
Open-circuit voltage	85 V / DC (direct voltage)
System of protection	IP21
Interfaces (optional automatic set)	Feeder interface: 15-pole socket (option) CNC interface: 9-pole socket (option)
	RS 232 interface: 9-pin plug (option)
Compressed air supply	RS 232 interface: 9-pin plug (option) max. 6 bar (compressed air only with optional automatic set)
Compressed air supply Shielding gas supply	RS 232 interface: 9-pin plug (option) max. 6 bar (compressed air only with optional automatic set) max. 4 – 5 l/min.
Compressed air supply Shielding gas supply Dimensions	RS 232 interface: 9-pin plug (option) max. 6 bar (compressed air only with optional automatic set) max. 4 – 5 l/min. 560 x 420x 650 (w x h x d)
Compressed air supply Shielding gas supply Dimensions Weight*	RS 232 interface: 9-pin plug (option) max. 6 bar (compressed air only with optional automatic set) max. 4 – 5 l/min. 560 x 420x 650 (w x h x d) 70 kg
Compressed air supply Shielding gas supply Dimensions Weight* Colour	RS 232 interface: 9-pin plug (option) max. 6 bar (compressed air only with optional automatic set) max. 4 – 5 l/min. 560 x 420x 650 (w x h x d) 70 kg RAL 5009 azure

*Slight deviations are possible depending on accessories.



WARNING

The "S" symbol is the symbol for welding current sources permitted for operation with increased electrical 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 stud welder

The top of the BMH-22i stud welder is equipped with two carrying handles.



CAUTION

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

- Only install the stud welder on an even surface. The anti-vibration pads located on the bottom of the welding equipment 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.
- Please pay particular attention to the bearing strength of the workshop furniture and ensure a safe and stable position of the welding equipment.
- Make sure there is sufficient free space around the air apertures, otherwise the excess temperature safety mechanism will respond and interrupt the welding process. This state, represented as "Stud welder not operative", is shown alternately with the current operation mode on the display.

Stud welder not operative

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Only when this information is no longer shown on the display, is it possible to continue the welding operation.

- Install the stud welder close to the welding location.
- Ensure correct connected loads for electrical connections (see type plate).

The stud welder has a four-core connecting cable: 3 phases + protective earth conductor. Please also refer to chapter 3.5, Technical Data. Make sure mains socket and welding system are properly grounded.

- Please observe that additional extension cables cause a voltage drop, possibly leading to system disturbances.
- Ensure sufficient ventilation of the working room when operating the welding system.



NOTE The housing of BMH-22i stud welder corresponds to safety class IP 21. Please observe that this system of protection is not suitable for being operated or transported in the rain.



CAUTION

When welding with shielding gas, make sure that the gas cylinder is installed safely and vertically in its admissible, accident-proof installation device. It must not be installed in a horizontal position since the gas cylinder connection and/or manometer could be easily damaged.



5 Start-up





Front view of BMH-22i stud welder

- OFF switch to turn the stud welder off
- 2 Signal lamp (operation mode)
- **3** ON switch to turn the stud welder on
- 4 LCD display
- 5 LED displays for function control
- 6 Function keys for setting the welding parameters
- 7 Air function "forward" (option)
- 8 Air function "backward" (option)
 - Connection for welding guns or heads with automatic stud feed
- 9 Control cable connection
- 10 Welding cable socket The control cable connection and the welding cable socket serve to connect the stud welding guns or heads to the stud welder.
- Gas connection socket Before welding with shielding gas, connect the gas hose of the welding gun or head to the gas connection socket.
- Earth cable connectors The earth cable connectors serve to connect the earth clamps to the stud welder.





Rear view of BMH-22i stud welder

- **13 9-pole connection for external program selection (option)** This interface serves to be connected with an external control system for controlling the welding parameters.
- 14 Danger sign
- 15 15-pole connecting socket / Feeder interface (option)
- The feeder interface serves to connect the feeder control to the stud welding device.
 9-pole connecting socket / CNC interface (option)
- The CNC interface serves to be connected with an external control system for controlling the stud welding process.
- **9-pin connector, interface RS 232 (option)** This interface serves to be connected with an external control system.
- 18 Safety label
- 19 Type plate
- 20 Connection for STG-1 control device (option)

This connection serves to connect the STG-1 control device to the stud welder. **21** Shielding gas connector

- This connection serves to supply the stud welder with gas by means of a pressure regulator. The admissible gas flow value ranges between a maximum of 4 and 5 l/min.
- 22 Compressed-air supply connection (option) This connection serves to supply the stud welder with compressed air and to connect the compressed air leads of the feeder control to the stud welder. The admissible supply pressure amounts to a maximum of 7bar.

23 Mains cable

The mains cable is a four-core (3P + PE), highly flexible connecting cable for connecting the stud welder to the mains supply.



5.1.1 Operating elements

On/Off switch

Turn on/off switch to the "I" position to switch the stud welder on. The signal lamp shows that the stud welder is operative.

Turn on/off switch to the "0" position to switch the stud welder off.

Function keys for setting the welding parameters



• Function keys "arrow up/down"

Modification of selected parameters (flashing symbol in display)

• Function keys "arrow left/right"

Selection of parameters to be modified (shifting of the flashing symbol to the left or right).

5.1.2 Display elements

• LED displays

6.1

6.2



5.1.3 • LED display

The first line of the display shows the designation of the parameters to be set. The second line shows the set value. When the parameter designation is flashing, you may change its value by using the keyboard.

MODE	PG	MC	мст	PCT	GPT	RLT
OP	1	300	3	40	0	0
						100.000

HZ. 2013.E



• MODE

Operation mode set. It is possible to set six different operation modes:

- 1- OP = Operating state which must be set for normal welding operation.
- 2- PRE = Preweld current test
- 3- LIFT = Lift test
- 4- GAS = Gas test
- **5-** ELECTRODE WELDING
- 6- TIG WELDING

Explanation of displayed parameters:

• PG (program)

The programs 1 - 30 are available for the user. The welding parameters for the respective welding task can be determined and saved as user program in the programs 1 - 30.

• MC

Main current. Value set between 300 and 2000 ampere (operation mode "Stud Welding").

• MCT

Main current time. Period of time set between 3 and 1000 milliseconds.

• PCT

Preweld current time. Period of time set between 40 and 1000 milliseconds.

• GPT

Gas preflow time. Period of time set between 0 and 9900 milliseconds during which the shielding gas valve is open before welding and remains open after welding. Set "0" when welding without shielding gas.

• RLT

Reload time. Period of time set between 0 and 9900 milliseconds during which the blow air valve remains open to allow stud feed from the universal feeder to the welding gun/welding head. Set "0" to switch off the automatic reload.



5.1.4 Symbols

Symbol	Designation	Function
	Electrical energy	On/Off switch for turning the stud welder on and off.
	LED "Stud on Workpiece"	LED lights up when earth terminal of stud welder is connected and stud touches the workpiece.
F-≯	LED "Release"	LED lights up when pressing release switch of welding gun or welding head.
	LED "Gas valve open"	LED lights up with shielding gas valve being open.
	LED "Lift"	LED lights up with lifting magnet of welding gun being activated.
4	LED "Main current"	LED lights up when main current is supplied.
	LED "Final contact"	LED lights up after welding, with release switch being pressed.
EXT	LED "External"	LED lights up when stud welder is operated by remote control via the serial interface (RS232) (not yet in use).
	Function key "Arrow up"	Upward alteration of the operation mode and the parameters selected (represented blinking in the display)
$\mathbf{\downarrow}$	Function key "Arrow down"	Downward alteration of the operation mode and the parameters selected (represented blinking in the display)
•	Function key "Arrow left"	Selection of parameters to be changed (relocation of blinking symbol to the left)
-	Function key "Arrow right"	Selection of parameters to be changed (relocation of blinking symbol to the right)
₽↓	Air function "forward"	Air supply for stud welding gun/welding head with automatic operation (optional equipment).
₽	Air function "backward"	Air supply for stud welding gun/welding head with automatic operation (optional equipment).
	Gas supply	Gas supply for welding gun/welding head, coupler socket KD - 1/4.
Ğ	Earth	Marks earth cable connector to be connected with earth cable.
	Gun	Marks control and welding cable sockets to be connected with welding gun.



5.2 Preparation for start-up

Connect the stud welding gun and earth cables to the stud welder prior to start-up.

5.2.1 Earth connection

Attach earth cable to earth cable connectors and lock by turning to the right until stop.Attach earth clamps to workpiece.



For this reason, you should attach the earth clamps to the workpiece in such a manner that the welding gun 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 considerable differences in material thickness, i.e. the material thickness varies by a few millimetres 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 gun.

You may determine the symmetry and quality of the arc during the preweld current test and then optimise them by combining earth connection and gun position accordingly.

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 gun 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 welds.



Examples for various earth connections and possible effects:



5.2.2 Connection of stud welding gun

- Connect welding cable of welding gun to the welding cable socket and lock it by turning to the right until stop.
- Insert control cable into control cable connection and tighten with sleeve nut.
- Please refer to the information given in the operating instructions for the welding guns.

5.2.3 Gas supply

When welding with shielding gas, provide the following connections:

- Insert gas supply hose's coupler plug of the welding gun into the gas supply socket of the stud welder.
- Connect the gas hose of the pressure reducing valve (pressure reducing valve not included in delivery) to the shielding gas connector at the rear side of the stud welder.



5.2.4 Power supply

• Compare the power data (supply voltage / current consumption) on the type plate with the data (supply voltage / fuse protection) of your power supply network.



Always ensure the correct supply voltage in accordance with the type plate. <u>Never</u> connect the stud welding device to a power supply network with incorrect supply voltage.

· Connect mains cable to power supply using the CEE plug:



DANGER

Only connect stud welder to approved CEE sockets. Standard connection = $3 \times 400 \text{ V}$ + protective earth conductor, 63A-CEE. If need be, have an expert in electrics check if the socket is earthed.

5.3 Adjustment of operation modes

5.3.1 Starting the stud welder

After switching the stud welder on, the 8 LED lamps light up for a short period. The stud welder carries out a self test which is shown on the LED display.



The stud welder is locked during the self test and it is impossible to operate it or to enter data. After the self test has been carried out successfully, the stud welder automatically sets the parameters which were last set.

5.3.2 Operation modes / parameters

Press the function key "arrow right" or "arrow left" (3 or 4) to select the parameters. Only the parameter designation which is flashing on the display can be set by means of the function keys (1 or 2).



The different operation modes possible have already been briefly described.



5.3.2.1 Operation mode "OP" (operating state)

The operation mode "OP" allows normal welding operation with the welding parameters set.

• Use the function key "arrow up" or "arrow down" (1 or 2) to set operation mode "OP".

MODE	PG	MC	MCT	PCT	GPT	RLT
OP	1	300	3	40	0	0
		1 or				HZ 2007.E

5.3.2.2 Operation mode "PRE" (preweld current test)

The adjustment "PRE" (preweld current test) enables you to carry out welds by means of the set parameters without application of main current and serves to control the gun or head adjustment and to test performance. During this operation mode, an arc is generated with low current when the gun or welding head is positioned on the closed circuit (workpiece connected with earth) and the gun switch is pressed (or when a signal is given via the interface). This is helpful to check the symmetry of the arc or whether preweld current is flowing.



CAUTION Protective goggles are required to carry out this test. Please also refer to the safety instructions.

• Use the function key "arrow up" or "arrow down" (1 or 2) to set operation mode "PRE".



5.3.2.3 Operation mode "LIFT" (lift test)

This operation mode enables you to adjust and check the lift of the gun or welding head. For further information, please refer to the operating instructions of the welding gun or welding head.

• Use the function key "arrow up" or "arrow down" (1 or 2) to set operation mode "LIFT".



-MOPÉ	Test lift with trigge	er
LIFT	Drop time:	mS



KZ.2008.E

- Insert a stud into the gun or welding head.
- Check the immersion depth of the stud and/or set it according to the operating instructions of the welding gun or welding head.



CAUTION Ensure once again that the operation mode is set to "LIFT" and comply with the safety instructions.

• Position gun or welding head on workpiece. The LED "Stud on workpiece" lights up.

凍	Ţ		4		EXT	
					к	Z.0024.X

• Actuate the trigger of the gun or the welding head or give a triggering signal via the CNC interface. The stud is lifted off the workpiece as long as the triggering signal is there. After a maximum of 4 seconds, however, the lift test will be interrupted to protect the magnet. There is no welding current during this period of time.



KZ.2043.X

If necessary, check and correct the height of lift according to the prescribed standard values for the welding gun or welding head (please refer to the table for welding parameters in chapter 6.1.2).

If the lift test is carried out on a workpiece which is connected to the earth connection of the stud welder, the drop time will be shown in milliseconds on the display. If the workpiece is not connected to the earth connection, "no ground" appears on the display.

ŅŅŅĖ: LIFT	Test lift with trigger Drop time: no ground	
		KZ.2009.

Do not activate the release too often in short intervals, as this would cause the thermo safety mechanism protecting the lifting magnet to react and the current supply for the magnet to be interrupted. This condition is displayed as follows:

(F



Lift test carried out too long! 1 minute to cool lifting magnet

KZ.0026.E

5.3.2.4 Operation mode "GAS" (gas test)

This operation mode checks whether the shielding gas flows through the gas shroud of the welding gun or welding head. As long as a triggering signal is there, shielding gas flows out of the gas shroud on the welding gun or welding head. This enables you to rinse the gas lines with shielding gas before starting to weld.

• Select the operation mode "GAS" with the function key "arrow up" or "arrow down" (1 or 2).



In the operation mode "Electrode welding" the stud welder works like a welding rectifier.

CAUTION In this operation mode, an open-circuit voltage of about 80V (DC voltage) is always applied to the terminals!

• Use the function key "arrow up" or "arrow down" (1 or 2) to set operation mode "ELECTRODE WELDING".





Use the function key "arrow right" (4) to set the welding current.



• Use the function key "arrow up" or "arrow down" (1 or 2) to set the desired current intensity.

5.3.2.6 Operation mode "TIG WELDING"

In this operation mode the stud welder works as a TIG welding device. Gas and welding current flow when pressing the key on the burner.

• Use the function key "arrow up" or "arrow down" (1 or 2) to set operation mode "TIG WELDING".



Use the function key "arrow right" (4) to set the welding current.



• Use the function key "arrow up" or "arrow down" (1 or 2) to set the desired current intensity.

5.4 Special functions

With the stud welder BMH-22i you can call additional special functions:

Start dealing with the special functions when you are familiar with the basic functions of the stud welder.

The stud welder must be turned off when calling special functions. In order to call the respective special function you have to press certain function key combinations and keep them pressed when starting the stud welder. Turn off the stud welder by means of the on/off switch to terminate the special functions.



After this, the stud welder can be restarted.

5.4.1 Special function "Erasing the working storage"

This special function serves as "RESET function" e.g. for eliminating troubles or starting the stud welder the first time.



NOTE The entire data of your working storage are erased when using this function. Your personal settings such as welding parameters, language selection and other special functions are reset to the basic setting.

To erase the working storage, please proceed as follows:

- Simultaneously press "arrow up", "arrow down", "arrow right" and "arrow left" keys and keep them pressed.
- Turn on/off switch to the "I" position to switch the stud welder on.
- Follow the instructions on the display.



5.4.2 Special function "Display of operating counter"

- Simultaneously press "arrow up" and "arrow down" keys and keep them pressed.
- Turn on/off switch to the "I" position to switch the stud welder on.
- Follow the instructions on the display.



5.4.3 Special function "Selection of language / Display of software version number"

This special function serves to select different languages and to display the version number of the software. The languages available are indicated on the display. For calling this function, please proceed as follows:

- Simultaneously press "arrow up" and "arrow right" keys and keep them pressed.
- Turn on/off switch to the "I" position to switch the stud welder on and stop pressing the function keys.
- Follow the instructions on the display.



Select language: arrow up/down OK unit off English V.2.0

5.4.4 Special function "Setting the type of feeder and its functions" (option)

With automatic operation, this special function serves to adapt the control to the feeder (parameter 1-4, only with BMK feeder). The type of feeder connected can be set by means of parameter 5.

To call this special function, please proceed as follows:

- Simultaneously press "arrow right" and "arrow left" keys and keep them pressed.
- Turn on/off switch to the "I" position to switch the stud welder on.



The parameters "Piston", "Ready", "Cont." and "BlAir" may be selected in 100 ms-steps. The parameters may be horizontally selected by using the function keys "arrow left" and "arrow right".



Explanation of parameters

Piston

This parameter serves to adjust the post-blow time of the stud feed blow air beyond the standard measure when the pushing piston in the welding gun/welding head has moved forward to press the stud out of the stud holder. A longer time setting is required when welding e.g. above the head to achieve a trouble-free stud reload. The post-blow time can be set between 100ms and 2000 ms.

• Ready (only possible with "Feeder BMK" function in conjunction with a BMK feeder)

- With UVR-300 feeder: This parameter serves to adjust the waiting period of the hexagonal barrel in the feeding position with simultaneous post-vibration of studs.
 Depending on the type of feeder, a basic setting between 500ms and 1000ms is recommended.
- With UVR-250 feeder: This parameter serves to adjust the after-run period of the feeder when the light barrier has detected a stud in the stud escapement.

• Cont. (only possible with "Feeder BMK" function in conjunction with a BMK feeder) This parameter serves to adjust the post-vibration period of the feeder to fill the outlet rail when a stud has been brought in blow-off position. Depending on the type of stud, a basic setting between 500ms and 1000ms is recommended.

• BIAir

This parameter serves to adjust the delay time of the stud feed blow air after the injection piston in the welding gun/welding head has moved back. After the set delay time, the stud feed blow air is activated. This is necessary e.g. in the case of a short stud feed hose. **The delay time can be set between 100ms and 2000ms.**

• Feeder (RUT)

This parameter serves to adjust the feeder type connected. UVRBMS and UVRBMK can be set as feeder types.

5.4.5 Special function "Setting the feeder operation" (option)

This special function serves as a help for setting the feeder operation when the stud welder is equipped with an optional automatic set.

For calling this special function, please proceed as follows:

- Simultaneously press "arrow down" and "arrow left" keys and keep them pressed.
- Turn on/off switch to the "I" position to switch the stud welder on and stop pressing the function keys.



Display when setting feeder type "BMS"

or





Display when setting feeder type "BMK"

By using the function keys "arrow left" or "arrow right" you can move the slider in the feeder's stud escapement to the left or right end position and thereby check the setting. During this process, the operating states of possible existing sensors are displayed as "on" or "off". For further information, please refer to the operating instructions of your universal feeder.



6 Operation

NOTE



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

6.1.1 Setting welding parameters for standard welding operation

• Turn on/off switch to the "I" position to switch the stud welder on.

The stud welder carries out a self test. After the self test has been carried out successfully, the display shows the setting last used.

MODE	PG	MC	МСТ	PCT	GPT	RLT
OP	1	300	3	40	0	0
						HZ.2013.E

• Set the necessary parameters for your welding task. For doing so, please refer to the standard values indicated in the table "Welding parameters".

6.1.1.1 PG (program)

Press function key "arrow right" to set the welding program identification character "PG". "PG" is represented blinking in the display.



An upward setting of the welding programs 1 - 30 is possible when pressing function key "arrow up". A downward setting of the welding programs 1 - 30 is possible when pressing function key "arrow down".

6.1.1.2 MC (main current in ampere)

- Select function "MC" by pressing either function key "arrow left" (3) or "arrow right" (4).
- Select the corresponding value for the main current from 300 to 1000 ampere in 20 A-steps by pressing function key "arrow up" (1) or "arrow down" (2).





The setting values for the most important stud dimensions are represented in tabular form on the front panel of the stud welder.

6.1.1.3 MCT (main current time in milliseconds)

- Select function "MCT" by pressing either function key "arrow left" (3) or "arrow right" (4).
- Select the corresponding value for the main current time from 3 1000 ms in 1 ms-steps by pressing function key "arrow up" (1) or "arrow down" (2).

MODE	PG	MC	-MCT-	PCT	GPT	RLT
OP	1	300	3	40	0	0



HZ.2015.E

The main current times for the most important stud dimensions are represented in tabular form in chapter 6.1.2 "Welding parameters for welding operation".

6.1.1.4 PCT (preweld current time in milliseconds)

- Select function "PCT" by pressing either function key "arrow left" (3) or "arrow right" (4).
- Select the corresponding value for the preweld current time from 40 1000 ms in 20 ms-steps by pressing either function key "arrow up" (1) or "arrow down" (2).

MODE	PG	MC	MCT	÷₽¢†÷	GPT	RLT
OP	1	300	З	40	0	O
		1 or				HZ 2016.E

6.1.1.5 GPT (Gas preflow time in milliseconds)

The gas preflow time is the period of time during which the shielding gas valve is open before starting the welding process and remains open after the welding process has been completed. Set value "0" when welding without shielding gas.

- Select function "GPT" by pressing either function key "arrow left" (3) or "arrow right" (4).
- Select the corresponding value for the gas preflow time from 0 9900 ms in 100 ms-steps by pressing function key "arrow up" (1) or "arrow down" (2).





6.1.1.6 RLT (reload time in milliseconds)

1

The reload time is the period of time the blow air valve requires for transporting the stud from the universal feeder to the welding gun or welding head. The longer the blow air hose is, the higher you have to set the reload time correspondingly. If automatic reload is not required, set value "0". The reload time can only be used in connection with optional "automatic operation" (feeder connection).

- Select function "RLT" by pressing either function key "arrow left" (3) or "arrow right" (4).
- Select the corresponding value for the reload time from 0 9900 ms in 100 ms-steps by either pressing function key "arrow up" (1) or "arrow down" (2).

MODE	PG	MC	МСТ	PCT	GPT	湖长
OP	1	300	3	40	0	0
		↑	↓ ←	>		H7 SYMR F
		1 or	2 3	or 4		114.45710.4



6.1.2 Welding parameters for welding operation

NOTE

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 tables are <u>standard values</u> which are exclusively valid for studs supplied by SOYER. They may vary depending on the type of workpiece, the workpiece thickness, the surface condition of the workpiece and on environmental conditions (e.g. low outdoor temperatures). The settings of the welding gun or welding head also influence the welding parameters.

Random samples should be taken during any production process to ensure constantly good welding results (see DIN EN ISO 14 555, "Arc welding of metallic materials").

			For studs as per DIN EN ISO 13 918																
<u>mm</u> ,		6	6 8		3	10		1	12		14		6	19		20		22	
T T T T T T T T T T T T T T T T T T T		2,5	3	2,7	3,5	2,8	4	3	4,2	3,2	4,5	3,4	5	3,5	5,5	3,6	5,5	4	6
	mm ↓ +	1,5	1	1,6	1,2	2	1,3	2,3	1,5	2,6	1,8	3	2	3,5	2,3	3,7	2,6	4	3
		15	0	25	50	3!	50	4	50	-	-			-	-	-	-	I	-
Time -me		20	0	25	50	3!	50	50	00	5	50	65	0	80	00	85	50	95	50
nme =ms			_																
4		45	0	60	00	80	00	10	00	-	-		•	-	-	-	-	-	-
Energy=A	En la	35	350		00	70	00	90	00	11	00	130	1300 1600		00	1700		1950	

The welding parameters were determined with the BMH-22i stud welder.

When using stud diameters exceeding 6 mm, we recommend the application of shielding gas or ceramic ferrules in order to prevent pore formation and to optimise bulging.

6.1.3 Minimum sheet thickness when welding with drawn arc operation

Observance of the minimum sheet thickness prevents the plate from being burnt through during the welding process.

Method	Weld time	Stud dia.	Welding current in ampere	Weld pool protection	Minimum sheet thickness
Drawn arc stud welding with ceramic ferrule or shielding	> 100 ms	3 up to 25 mm	300 up to 3000	CF	¼d but 1 mm minimum
gas	> 100 ms	3 up to 16mm	300 up to 3000	SG	⅓d but 1 mm minimum
Short-cycle drawn arc stud welding	≤ 100 ms	3 up to 12 mm	up to 1500	NP, SG, CF	¹ ∕₃d but 0.6 mm minimum
Capacitor discharge drawn arc stud welding	< 10 ms	3 up to 10 mm	up to 3000	NP, SG	1/10d but 0.5 mm minimum

CF = ceramic ferrule, SG = shielding gas, NP = no weld pool protection



Important information for standard welding operation (stud welding)

The measures mentioned in the "Start-up of stud welder" chapter have already been performed.



NOTE

The applicable accident prevention and safety regulations must be complied with when operating the stud welder.



DANGER

Persons with pacemakers must not operate the stud welding equipment. They must not stay in the vicinity of the stud welder being operated.



DANGER

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

- Position the welding gun or welding head on the workpiece and actuate the trigger. The welding process will be started with the parameters set. The LED "Final contact" indicates the end of the welding process.
- Do not move the welding gun or welding head during welding. Wait until the welding process has been completed before removing the welding gun or head vertically from the welded stud. For further information, please also refer to the operating instructions of your welding gun or welding head.
- After completion of the welding process, the welding gun or welding head should be held in position for about 5 seconds to allow solidification of the molten metal.

6.2 Welding operation with shielding gas

The measures mentioned in the "Start-up of stud welder" chapter have already been performed.



NOTE The applicable accident prevention and safety regulations must be complied with when operating the stud welder.



6.2.1 Preparation of gas supply



Example for gas supply. Deviations are possible depending on the manufacturer

- 1 Gas cylinder
- 2 Hand wheel (left = open, right = closed)
- 3 Manometer for indicating the gas cylinder's
- pressure
- 4 Flow meter

5 Shut-off valve6 Gas supply hose7 Control cock for gas flow rateScrewing in increases the flowScrewing out decreases the flow

- Connect gas supply hose and gas hose of pressure reducing valve (pressure reducing valve not included in delivery) to the stud welder.
- Open hand wheel (item 2) of gas cylinder.
- Open shut-off valve (item 5).
- Use control cock (item 7) to set shielding gas flow rate to a maximum of 4 5 I/min.

6.2.2 Instructions for welding with shielding gas

- Set the parameters required for your welding task according to the table.
- 1 Foot plate 2 Gas shroud 3 Welding stud



Illustration: Stud welding with shielding gas



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Set gas flow rate to a value between 4 and 5 l/min. If the value is too high, the arc is extinguished, if the value is too low, the protective function of the gas is reduced. Welding results are poor in both cases.

• Insert a stud into the welding gun or welding head.



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

- Position welding gun or welding head vertically on the workpiece when welding.
- Actuate the trigger.
- When welding with shielding gas, the welding point is rinsed during the welding process as well as before and after welding for the period adjusted.

The LED "Gas valve open" indicates that the gas valve is activated.

The LED "Final contact" indicates that the welding process is completed.

6.3 Welding operation with ceramic ferrules

The measures mentioned in the "Start-up of stud welder" chapter have already been performed.

- 1 Foot plate
- 2 Ceramic ferrule
- 3 Welding stud



Illustration: Stud welding with ceramic ferrule

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Welding operation with ceramic ferrules is only possible when using SOYER drawn arc welding studs, types PD, MD, RD, UD and SD, similar to DIN EN ISO 13 918.

6.3.1 Instructions for welding with ceramic ferrules

- Start the stud welder as described in chapter 5.
- Only use ceramic ferrules which are absolutely dry and do not show any flaws.
- Only use ceramic ferrules which match the type and size of the studs.
- Start by carrying out test welds in order to achieve optimum welding results. If necessary, modify the prescribed welding parameters.
- Insert stud into stud holder until stop.
- Make sure stud is centred in the ceramic ferrule holder.



- Place ceramic ferrule on ceramic ferrule holder.
- Position the welding gun in such a way that the centre of the stud points exactly toward the marked welding point.
- Make sure that the gun does not tilt, i.e. that the ceramic ferrule is positioned evenly on the workpiece.
- Start welding process. The LED "Final contact" lights up after completion.
- After completion of the welding process, the welding gun or welding head should be held in position for about 5 seconds to allow solidification of the molten metal.
- Remove gun vertically to prevent widening and damaging of the stud holder.
- Knock off ceramic ferrule from the welded area.



7 Quality control (stud welding)

7.1 General

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:

•Visual inspection •Bend test

Please also refer to the following standard

DIN EN ISO 14555 Arc welding of metallic materials

or DVS information sheets

- DVS 0902 Drawn arc stud welding
- DVS 0904 Practical information Arc stud welding

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.

7.3 Test execution

7.3.1 Production of samples

The dimensions of the test piece must be sufficient to carry out all tests. The thickness of the test piece must be the same as used in later production. 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.

Comply with the minimum sheet thickness as per DIN EN ISO 14 555.



7.3.2 Visual inspection

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

Good weld quality. Optimum setting.
Regular, bright and complete collar.
Poor weld quality e.g. caused by excessive welding energy or insufficient plunge or lift.
Reduced diameter weld. Partial weld.
Poor weld quality e.g. caused by insufficient welding energy or humid ceramic ferrules.
Reduced and irregular collar.
Poor weld quality, e.g. caused by arc blow, tilted or unsteady welding position of welding gun.
Stud flange is not completely welded and shows visual defects. Weld undercuts are visible.



7.3.3 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 by means of a tube that is slipped over the stud. The test is successful when no superficial fissure or fracture is detected in the welding zone.

In drawn arc and short-cycle drawn arc operation with ceramic ferrule or shielding gas, the stud should be bent 60° from its axis.



Bend test with tube placed upon the stud

7.3.4 Tensile test

The tensile test serves to test the metallic bond of the stud with the base metal. At least 3 studs are welded and then axially loaded by means of an appropriate tension device until they break. If the customer 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.

Bend test with hammer

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

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

Note

Numerous special accessories are optionally available for perfectly testing stud welded joints:

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

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

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



8 Maintenance

8.1 Important instructions

The stud welder is constructed in such a way that only a minimum of maintenance is required. The interior of the stud welder should, however, be cleaned by a specialist at regular intervals depending on the environmental conditions at the location of use.



WARNING

It is prohibited to open the stud welder.

Due to the inverter technology, the service personnel are required to meet special requirements.

Our after-sales service has adequately trained personnel, suitable service equipment and the means to carry out all necessary works.

8.2 Important instructions for all service works



DANGER

NOTE

<u>Always</u> disconnect the mains cable from the mains supply before starting any repair, maintenance or cleaning works.

<u>Always</u> disconnect the connecting plug from the mains supply socket before opening the housing of the stud welder. Only trained and appropriately qualified personnel are allowed to carry out works at the electric mains supply and welding system.



Only use original SOYER [®]spare parts.

8.3 Cleaning

Cleaning should be carried out once a week depending on how soiled the stud welder is. Please pay particular attention to foreign substances in and around the air apertures in the housing.

8.3.1 Detergents for cleaning the housing

Almost every detergent without corrosive or acidic substances is suitable for cleaning purposes. However, please observe the manufacturer's specifications on the detergent you intend to use.

8.4 Replacement of components

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



CAUTION

Disconnect the mains cable from the mains supply and disconnect the shielding gas and compressed-air supplies before replacing any components. Electric and electronic components may only be replaced by the SOYER [®] customer service or by trained and appropriately qualified personnel.





Disconnect the mains plug from the mains supply when replacing fuses.

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.



DANGER

<u>Always</u> disconnect the mains cable from the socket and the shielding gas and compressed-air supplies from the connections of the stud welder before starting any repair, maintenance or cleaning works.



CAUTION

Electric and electronic components may only be replaced by the SOYER [®] customer service or by trained and appropriately qualified personnel.



9.1 Malfunctions

Error	Cause → Elimination
Stud welder cannot be	One or several phases have failed.
switched on.	\rightarrow Check mains supply fuses.
There is no arc even	Stud is too loose in stud holder
though system is ready for	\rightarrow Press stud holder together or tighten it
operation.	
•	
Custom doog not wold no	Custom is not switched on or not connected to mains swelly
System does not weld, no	System is not switched on of not connected to mains supply.
or only poor sparking.	System on the LEDs shortly light up
	Operating mode is set to PRE LIET GAS
	\rightarrow Set operating mode to "OP"
	Welding cable control cable or gas hose are not connected properly or
	are damaged
	\rightarrow Connect cables properly or check for damage. Replace if necessary.
	Connecting plug or socket of stud welder is burnt down.
	\rightarrow Have plug or socket replaced by SOYER customer service.
	Both earth cables are not properly connected or not connected at all, or
	earth clamps are not attached to the workpiece.
	\rightarrow Connect earth cables; attach earth clamps to the workpiece.
	Welding points and/or earth connection points at the workpiece are not
	blank.
	\rightarrow Prepare workpiece and studs accordingly.
	Height of lift and/or depth of immersion are not adjusted correctly.
	Are relief to the operating instructions of the weiging gun to set the height
	Gas flow rate is set too high i.e. higher than 5 l/min (arc is extinguished)
	Set gas flow rate to the maximum value of 4-5 l/min.
	Stud is tilted in ceramic ferrule and does not lift.
	\rightarrow Ensure gun is vertically positioned on workpiece. Centre ceramic
	ferrule and stud holder.
	Control of stud welder or welding gun is defective.
	→ Contact SOYER customer service.
Stud thread scorched.	Stud holder worn
	→ Replace stud holder.
No objecting goe flow	Cap pulinder is not ar not properly connected to the system and/or value
during welding process	or shut off valve are not open
during weiding process.	\rightarrow Connect das cylinder and/or open valve or shut-off valve
	Time for gas flow duration is set to "0"
	\rightarrow Set gas flow duration to the desired preflow time.
	Gas flow rate is set too low.
	\rightarrow Set gas flow rate to 4-5 l/min by means of the control cock.
	Solenoid valve in stud welder is soiled or defective.
	\rightarrow Deaerate solenoid valve, clean it and/or have it replaced by SOYER
	customer service.
Stud does not lift, neither	Height of lift is not correctly set.
preweid current nor main	\rightarrow Set neight of lift in accordance with the operating instructions of your
current arc is generated,	I stud weiding gun.



even though LED "Stud on workpiece" lights up.	Control of stud welder or welding gun is defective. (Stud does not lift, even though height of lift is correctly set). → Contact SOYER customer service.
Stud lifts, preweld current is initiated, but main current	Operating mode is set to position "PRE". → Set operating mode to position "OP".
is not ignited.	Preweld current arc breaks. → Clean or grind workpiece surface.
	Lift is too high. \rightarrow Set lift in accordance with the operating instructions for your welding gun or welding head.
	Gas pressure is too high. → Set gas pressure to the prescribed value.
Varying welding results.	Welding energy not correctly adjusted. → Adjust welding energy.
	Cable connections too loose. Transition resistances are generated. \rightarrow 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. Replace stud holder, if necessary.
	Magnetic blowing action. Arc is forced into a certain direction. → Alter fixture of earth clamps, place iron parts on the edges and/or rotate welding gun.
	Height of lift and/or depth of immersion are incorrectly set. → Refer to the operating instructions of your welding gun to set the height of lift or depth of immersion correctly.
	You have used low-quality studs with inaccurate dimensions or poor surface finish. Only use SOYER [®] welding studs as per DIN EN ISO 13 918.
	Welding time and/or gas flow incorrectly set. \rightarrow Reset welding time and/or gas flow.
	Parent metal not suitable for welding. → Use suitable material combinations.
Single-fillet bulging at equal points.	Bulging is caused by magnetic blow effect. The arc is forced into a certain direction.
	→ Alter fixture of earth clamps, place iron parts on the edges and/or rotate welding gun.
Intensive sparking, stud	Time too long. \rightarrow Readjust time for main current duration according to the table
	 → Readjust welding current.
Stud not welded with total flange surface, deficient	Time too short. \rightarrow Readjust time for main current duration according to the table.
weld joint strength.	Poor earth connection \rightarrow Check earth cables and earth clamps for tight fit, tighten if necessary.
	Workpiece surface too soiled. → Clean workpiece surface.
	Stud face deformed. → Use new welding studs.
	Stud projection over stud holder incorrectly set. \rightarrow Set distance between stud holder and stud face to 2-3 mm



	 Welding gun in tilted position. → Ensure that all three gun legs are simultaneously and evenly positioned on the workpiece. Lift not correctly set. → Set lift correctly.
Stud welder switches off.	 Stud lift not correctly set. → Set stud lift in accordance with the operating instructions of the welding gun. Switch stud welder on. You have removed the welding gun from the workpiece while main current has been flowing. → Switch stud welder on again.
	Arc breaks as gas pressure is too high. \rightarrow Set gas pressure to the prescribed value
	Workpiece surface is poorly electroconductive - arc breaks. \rightarrow Grind surface area.
	Mains supply is defective. → Check fuses of mains supply.
	Fuse of stud welder is defective. \rightarrow Contact customer service.
LED "Stud welder not operative" lights up.	There is not enough free space around the stud welder. \rightarrow Make space available to eliminate heat accumulation.
	 Excessive welding sequence. → Please observe the admissible welding sequence.
LED "Lift test carried out too long" lights up.	You have activated the lifting magnet too long or too often when testing the lift. →Wait until the coil in the welding gun has cooled down.



10 Transport and storage

The stud welder is robustly designed and has a two-piece metal housing with front and rear panel. Owing to electronic components it should be ensured, however, that transport is free from vibrations.

The BMH-22i stud welder has two carrying handles on its top for easy transport and mobile use within short distances.

CAUTION The carrying handles are intended for transport by hand only. Never pull ropes through these handles to lift the stud welder by means of a crane to the installation site. The welding unit would become instable and might tilt from its original position. As a result the handles could rip and the system would fall on the ground.
NOTE Prevent unauthorized use of the stud welding system by children and unqualified personnel. After long system standstill, we recommend having the stud welding system checked by

After long system standstill, we recommend having the stud welding system checked by SOYER[®] customer servicemen prior to start-up.

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The housing of the BMH-22i stud welder corresponds to safety class IP 21. Please observe that this system of protection is not suitable for being operated or transported in the rain.

11 Terms of warranty

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

Any claim to a warranty will be forfeited if damage is 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 perfect function of the stud welder and the quality of welded joints if welding studs acquired from another company are used.



12 List of standards and guidelines

• 91/368/EEC (formerly 89/392 EEC)	EC Directive on Machinery
• 73/23/EEC	EC Directive on Low-Voltage
89/336/EEC	EC Directive on Electromagnetic Compatibility
• DIN EN 292 – 1	Safety of machinery; basic terms, general principles of construction; Part 1: basic terminology, systems engineering
•DIN EN 292 – 2	Safety of machinery; basic terms, general principles of construction; Part 2: technical principles, specifications
• EN 60204 –1 (formerly VDE 0113)	Electric equipment of machinery, general requirements
• EN 60974 – 1 (DIN VDE 0544-1)	Safety requirements for arc welding equipment, part 1 welding current sources
• VBG 1	General instructions (instructions for accident prevention)
• DIN EN ISO 14555	Arc welding of metallic materials
• DIN EN ISO 13918	Studs and ceramic ferrules for arc welding
• DIN 50049	Certificate on material tests
• DIN 50125	Testing of metallic materials, tensile tests, guidelines for production
DVS Information Sheet 0902	Drawn arc stud welding
DVS Information Sheet 0903	Capacitor discharge stud welding with tip ignition
DVS Information Sheet 0904	Practical information – Arc stud welding

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