

Panel Repair Welder - Steel

Supplied with slide hammer & pull triangles,
suitable for dent removal
on vehicle bodywork.

Instructions



Panel Repair Welder
- Steel

Introduction:

A compact panel repair welder supplied with slide hammer and copper coated pull-triangles (also known as 3-point electrodes), suitable for dent removal on vehicle bodywork. Connect the slide hammer to the welder (which is used to hold and weld the copper coated pull triangles to the panel); the slide hammer is then used to pull out the damage. It is designed for use with a 230V single-phase power supply, comes fitted with a 3-pin British Standard plug, and features an integral carry handle for portability.

Supplied with: Manual pistol/gun with trigger. Spot-earth with cable. Slide hammer included, with consumable triangular copper-coated electrodes.

Can also be used with Power-TEC squiggly-wire electrode, Part No **91246**, available separately.

Specifications:

Power supply:	230V single-phase 13A, unit fitted with a 3-pin BS plug
Peak spot-welding current:	2600A
Max absorbed power:	7kw
Welding wire diameter:	0.6 - 1.2mm
Size:	390 x 260 x 225mm
Weight:	16kg

Warning & Precaution Symbols used in this document:



Danger of electric shock



Danger of welding fumes



Danger of explosion



Must wear protective clothing



Must wear protective gloves



Danger of ultra-violet radiation from welding



Danger of fire



Danger of burns



Danger of non-ionising radiation



General hazard



Do not use the handle to suspend the welding machine



WARNING: moving parts



Mind your hands: moving parts



Eye protection must be worn



NO ENTRY for unauthorised personnel



DO NOT clean machine with power washer



DO NOT clean machine with water



DO NOT use vehicles to tow machine



Wear protective mask



Wear ear protection



Users of vital electronic apparatus must not use the machine



Users of metal prostheses must not use the machine



Do not wear or carry metal objects, watches or magnetised cards



Not to be used by unauthorised personnel



Dispose of according to local authority guidelines

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APPLIANCE FOR RESISTANCE WELDING FOR INDUSTRIAL AND PROFESSIONAL USE

Note: In the following text the term "spot welder" will be used.

1. GENERAL SAFETY RULES FOR RESISTANCE WELDING

The operator should be properly trained to use the spot welder safely and should be informed of the risks connected with resistance welding procedures, of related protection measures and of emergency procedures. (Only for pneumatic cylinder-operated versions) The spot welder is provided with a main switch with emergency functions, fitted with a padlock for locking it in the "O" (open) position.

The padlock key should be handed over only and exclusively to an expert operator or to an operator who has been trained for the tasks assigned to him and has been warned of the possible hazards arising from this welding procedure and from neglectful use of the spot welder.

When the operator is absent the switch should be set to the "O" position, the padlock should be closed and the key removed.



- Electrical installation should be carried out following accident-prevention legislation and standards.
- The spot welder should be connected only and exclusively to a power supply with the neutral conductor connected to earth.
- Make sure the power supply outlet is correctly connected to the earth protection.
- Do not use cables with worn or damaged insulation or with loosened connections.
- Use the spot welder in an ambient air temperature ranging from 5°C to 40°C, with relative humidity equal to 50% up to a temperature of 40°C, and 90% for temperatures up to 20°C.
- Do not use the spot welder in damp or wet environments or in the rain.
- The connection of the welding cables and any routine maintenance operations on the arms and/or electrodes must be carried out with the spot welder switched off and disconnected from the electric and pneumatic (if present) power supply networks. Pneumatic cylinder-operated spot welders should be locked with the main switch in the "O" position and the padlock closed.
- The same procedure should be followed when making connections to the water supply or to a closed circuit cooling unit (water-cooled spot welders) and whenever repairs are made (extraordinary maintenance).
- When using spot welders operated with pneumatic cylinder, the main switch must be locked at "O" using the supplied lock.
- The same procedure must be respected when connecting to the hydraulic network or a closed circuit cooling unit (water cooled spot welders) and whenever repairs (extraordinary maintenance) are carried out.
- It is forbidden to use the equipment in environments comprising areas classed as being at risk of explosion because of the presence of gas, dust or mist.



- Do not weld on containers, receptacles or piping that contain or have contained flammable liquid or gas products.
- Do not operate on materials cleaned with chlorinated solvents or near such substances.
- Do not weld on pressurised containers.
- Remove all flammable substances from the work area (e.g. wood, paper, rags etc.).
- Allow newly-welded pieces to cool! Do not leave the piece near flammable substances.
- Make sure there is sufficient ventilation or provide means for removing welding fumes near the electrodes; a systematic approach is necessary to evaluate limits of exposure to the welding fumes depending on their composition and concentration and on the length of exposure.



- Always protect the eyes with suitable eye protectors.
- Wear protective gloves and clothing suitable for resistance welding work.
- Noise levels: If the personal daily exposure level (LEPd) is found to be greater than 85db(A) due to particularly intensive welding operations, wearing personal protection devices is compulsory.



- The flowing of spot welding currents generates electromagnetic fields (EMF) around the spot welding circuit.

Electromagnetic fields can interfere with certain medical equipment (e.g. Pace-makers, respiratory equipment, metallic prostheses etc.).

Adequate protective measures must be adopted for persons with these types of medical apparatus. For example, they must be forbidden access to the area in which spot welding machines are in operation.

This spot welder conforms to technical product standards for exclusive use in an industrial environment for professional purposes. It does not assure compliance with the basic limits relative to human exposure to electromagnetic fields in the domestic environment.

The operator must adopt the following procedures in order to reduce exposure to electromagnetic fields:

- Fasten the two spot welding cables (if present) as close together as possible.
- Keep head and trunk as far away as possible from the spot welding circuit.
- Never wind spot welding cables around the body.
- Avoid spot welding with the body within the spot welding circuit. Keep both cables on the same side of the body.
- Connect the spot welding current return cable to the piece being spot welded, as close as possible to the welding joint.
- Do not spot weld while close to, sitting on or leaning against the spot welder (keep at least 50 cm away from it).
- Do not leave objects in ferromagnetic material in proximity of the spot welding circuit.
- Minimum safe distance (refer to Figs E, F, G and H):
 - d= 3cm, f= 50cm (Fig. E);
 - d= 3cm, f= 50cm (Fig. F);
 - d= 30cm (Fig. G);
 - d= 20cm (Fig. H) Studer.



- Class A equipment:

This spot welder conforms to technical product standards for exclusive use in an industrial environment and for professional purposes. It does not assure compliance with electromagnetic compatibility in domestic dwellings and in premises directly connected to a low-voltage power supply system feeding buildings for domestic use.

INTENDED USE

The system was designed to be used only and exclusively in body shops to repair vehicles: it must be used for spot welding one or more steel plates with a low carbon content, having a shape and size that vary according to the work to be carried out.



The operating functions of the spot welding machine do not foresee a push-button to start the welding operation, but simply the contact of the gun electrode with the machined piece connected to the earth: there is the risk of starting the welding process by inadvertently placing the gun electrode on the earth or parts connected to the same!

When the work has been completed, place the gun on an insulating surface and switch off the machine!

- RISK OF BURNS
Some parts of the spot welder (electrodes arms and nearby areas) may reach temperatures of over 65°C: suitable protective clothing must be worn. Allow newly-welded pieces to cool before touching them.

- RISK OF TIPPING AND FALLING
- Place the spot welder on a level horizontal surface that is able to support its weight; confine the spot welder to the support surface (when required in the "INSTALLATION" section of this manual). Otherwise with inclined or uneven floors or moveable supporting surfaces there is the danger of tipping.
- Never lift the spot welder unless explicitly required by the "INSTALLATION" section of this handbook.
- When using machines on wheels: disconnect the spot welder from the electric and pneumatic (if present) power supplies before moving the unit to another

work area. Pay attention to obstacles and unevenness on the ground (for example cables and piping).

- **UNINTENDED USE**
It is dangerous to use the spot welder for any purpose other than that for which it is intended (see INTENDED USE).

STORAGE

- Place the machine and its accessories (with or without packaging) in a secure area.
- The relative humidity of the air must not exceed 80%.
- The environmental temperature must be between -15°C and 45°C.

If the machine has a water cooling unit and the environmental temperature is lower than 0°C, add the indicated antifreeze liquid, or completely empty the hydraulic circuit and the water tank.

Always use suitable measures for protecting the machine from humidity, dirt and corrosion.

2. INTRODUCTION AND GENERAL DESCRIPTION

2.1 INTRODUCTION

Mobile resistance-welding system (spot-welding machine). The system can perform numerous hot and spot-welding operations on the sheet metal that are specific to the automobile body shop sector and those with similar processing of sheet metal.

Their main characteristics are:

- rapid and intuitive selection of the spot welding program using a potentiometer;
 - limitation of line overcurrent at insertion (insertion cosφ check);
- The spot-welding machine can work on sheet metal (steel with low carbon content) or on zinc-plated steel sheet.

2.2 STANDARD ACCESSORIES

- Studder gun with trigger.
- Earth cable with earth to spot weld.
- Extractor with blowback.
- Electrode for star washers.
- Star washers for traction.

For further details please consult the latest catalogue.

2.3 OPTIONAL ACCESSORIES

- Consumables box.
- Trolley.
- Various tools for traction.

For other accessories please consult the latest catalogue.

3. TECHNICAL DATA

3.1 RATING PLATE (Fig. A)

The main data relating to use and performance of the spot-welder are summarised on the rating plate and have the following meanings:

- 1- Number of phases and frequency of power supply.
- 2- Power supply voltage.
- 3- Rated mains power with 50% duty cycle.
- 4- Mains power with permanent running (100%).
- 5- Maximum loadless voltage over electrodes.
- 6- Maximum current when electrodes are shorted.
- 7- Safety symbols, the meaning of which is given in chapter 1 "General safety rules for resistance welding".
- 8- Current to secondary when running permanently (100%).

Note: The rating plate shown is an example to show the meaning of the symbols and numbers; the exact values of the technical properties of your spot-welder can be found on the rating plate of the spot-welder itself.

3.2 OTHER TECHNICAL DATA

General specifications

- (*)Power supply voltage and frequency:	230V ~ 1ph-50/60 Hz
or:	
or:	
- Electrical protection class:	I
- Insulation class:	H
- Enclosure protection rating:	IP 22
- Weight:	16kg
Input	
- Max spot welding power (S max):	10kVA
- Power factor at Smax (cosφ):	0.8
- Delayed mains fuses:	16A (230V)
- Automatic mains switch:	16A (230V)
- Power cable (L≤3m):	3G x 1.5mm ²
Output	
- Secondary voltage no load (U _s max):	5.6V
- Max spot welding current (I _s max):	1.8kA
- Spot welding capacity (steel with low carbon content):	max 1.2mm

4. DESCRIPTION OF THE SPOT WELDING MACHINE

4.1 SPOT WELDING MACHINE AND MAIN COMPONENTS GROUP (Fig. B)

At the front:

- 1 - Control panel;
- 2 - Studder gun cable with trigger;
- 3 - Earth cable.

At the back:

- 4 - Power cable input.

4.2 CONTROL AND ADJUSTMENT DEVICES

4.2.1 Control panel (Fig. C)

1. POTENTIOMETER:

It allows you to select the welding program based on the tool used.

2. YELLOW LED:

It signals intervention of a thermostatic safeguard.

3. GREEN LED:

It signals the machine is powered.

4.3 SAFETY FUNCTIONS AND INTERLOCK

4.3.1 Protection and alarms

a) Thermal protection:

This is triggered by overheating of the spot welding machine due to low capacity or total

lack of cooling fluid, or by a work cycle that exceeds the allowed threshold permitted. The intervention is signalled by a YELLOW LED switching on (Fig. C-2).

5. INSTALLATION



ATTENTION! THE SPOT WELDING MACHINE MUST BE TURNED OFF AND DISCONNECTED FROM THE MAINS BEFORE COMMENCING ANY INSTALLATION AND ELECTRICAL AND PNEUMATIC CONNECTION OPERATIONS. THE ELECTRICAL AND PNEUMATIC CONNECTIONS MUST ONLY BE CARRIED OUT BY EXPERT OR QUALIFIED TECHNICIANS.

5.1 SET-UP

Unpack the spot welding machine and assemble the separate parts included in the package (if present).

5.2 LIFTING THE SPOT-WELDER

WARNING: None of the spot-welders described in this handbook have lifting devices.

5.3 POSITION

Reserve a space in the installation area that is large enough and without obstacles for guaranteeing access to the control panel, the main switch and the work area in complete safety.

Make sure there are no obstacles near the areas where the cooling air enters and exits, ensuring that conductive power, corrosive vapour, humidity, etc, cannot be sucked in. Place the spot welding machine on a stable surface that is flat and compact, and suitable for supporting the weight (see "technical data") to prevent the danger of toppling or dangerous movements.

5.4 CONNECTION TO THE POWER NETWORK

5.4.1 Warnings

Before making any electrical connection, make sure the spot welding machine plate data corresponds with the mains voltage and frequency available in the installation area.

The spot welding machine must only be connected to a power supply system with neutral conductor connected to earth.

To guarantee protection against indirect contact, use residual-current devices of the following type:

- Type A () for single-phase machines;

- Type B () for three-phase machines.

- The spot welding machine does not meet the requirements of the IEC/EN 61000-3-12 directive.

If it is connected to a public power grid, the installer or user must make sure that the welding machine can be connected (if necessary consult the utility company).

5.4.2 Plug and mains socket

- Version 230V:

The power supply cable is supplied with a British Standard (2 poles + earth) plug already assembled.

- Mains socket

Prepare a mains socket protected with fuses or an automatic circuit breaker switch; the specific earth lug must be connected to the earth conductor (yellow-green) of the power supply line.

The capacity and characteristics of fuse and circuit breaker switch intervention are outlined in the "TECHNICAL DATA" paragraph.

If multiple spot welding machines are used, distribute the power supply cyclically between the three phases to create a more balanced load; for example:

spot welding machine 1: power supply L1-L2;

spot welding machine 2: power supply L2-L3;

spot welding machine 3: power supply L3-L1.



ATTENTION! Failure to comply with the above rules renders the safety system (class I) ineffective, with resulting serious risks for people (e.g. electric shock) and for property (e.g. fire).

6. WELDING (Spot welding)

6.1 PRELIMINARY OPERATIONS

Before commencing any spot welding operations, check (with the power cable disconnected from the mains), that the electrical connections are in accordance with the instructions above.



- **ATTENTION!**
- **WHEN NOT IN USE, AVOID RESTING THE TOOL ON THE VEHICLE OR PANEL!**
- **WHEN NOT IN USE, PLACE THE TOOL ON A STABLE NON-CONDUCTIVE SURFACE.**

6.2 PARAMETERS ADJUSTMENT (in spot welding)

The parameters that determine the diameter (section) and the mechanical seal of the spot are:

- Force exercised by the electrode.
- Spot welding current.
- Spot welding time.

If lacking specific experience, some spot welding tests should be carried out using sheet metal thicknesses of the same quality and thickness of the work to carry out.

The current and time parameters of spot welding are adjusted using the potentiometer (Fig. C-1):

- turn the knob according to the tool you intend using;
- turning clockwise, you obtain longer spot welding times;
- the longer cycle is obtained for the "sheet metal recalculation" tool  : rotation beyond this symbol is necessary for the exclusive use of the "sheet metal heating" graphite electrode  with continuous spot welding time and current limitation.

6.3 PROCEDURE

6.3.1 FASTENING THE EARTH CABLE TO THE SHEET METAL

- a) Connect the power cable to the electrical mains to power the machine: the GREEN LED (Fig. C-3) switches on.
- b) Use the potentiometer (Fig. C-1) to select the symbol of the earth to spot weld (Fig. D-26).

- c) Bare the sheet metal, as near as possible to the point where you intend to work, for a surface shape and size corresponding to the contact surface of the earth nut.
- d) Connect the head of the earth electrode to the eyelet of the earth cable (Fig. I).
- e) Rest the tip of the earth electrode (Fig. D-25) on the bare sheet metal previously prepared and close the circuit resting the tip of the studder gun on the bare sheet metal, then press the trigger.
- f) Check the welding seal of the earth electrode by exerting light traction of the electrode in an diagonal direction compared to the surface on which it is welded and then fasten the earth nut against the sheet metal (Fig. L).

Note: if the earth electrode easily detachs during checking, try to increase the welding time by rotating the potentiometer clockwise.

6.3.2 SPOT WELDING WITH GUN

Spot welding takes place simply by resting the tool connected to the gun on the part to weld and pressing the trigger.



ATTENTION!

- **To fasten or dismantle the accessories from the chuck of the gun, use two fixed hex keys to prevent rotation of the chuck.**
- **If working on doors or bonnets, it is required to connect the earth bar on these parts to prevent passage of current through the hinges, and near the zone to spot weld (long current paths reduce the efficiency of the spot).**
- **DO NOT PLACE THE STUDDER ON THE PIECE IF YOU DON'T INTEND TO START WELDING!**

Washer spot welding for earth terminal fastening

(fastening the alternative earth to that of the earth nut)

Select the icon of the washer using the potentiometer.

On the chuck of the gun, assemble the specific electrode (POS. 9, Fig. D) and insert the washer (POS. 13, Fig. D).

Rest the washer in the chosen zone. Place in contact, in the same zone, the earth terminal; press the gun button to weld the washer on. Fastening should be carried out using the specific stand (see accessories catalogue, on request).

Slotted washers spot welding

Select the icon of the slotted washer using the potentiometer.

This function is executed by assembling and tightening the electrode holder (POS. 28, Fig. D) of the gun. Insert the slotted washer (POS. 27, Fig. D) in the electrode holder and spot weld as previously described.

Spot welding and simultaneous traction of the special washers

Select the icon of the washer using the potentiometer.

This function should be carried out assembling and fully tightening the chuck (POS. 4, Fig. D) on the body of the extractor (POS. 1, Fig. D), couple and tighten the other terminal of the extractor on the gun. Insert the special washer (POS. 14, Fig. D) on the chuck (POS. 4, Fig. I), fastening it with the specific screw (Fig. D). Spot weld the relevant zone, adjusting the spot welding machine as for spot welding the washers and start traction (pulling).

When complete, turn the extractor 90° to detach the washer, which can be spot welded again in a new position.

Sheet metal heating

Select the icon of the electrode in carbon using the potentiometer.

In this operating mode, the spot welding time is continuous.

Operation duration is therefore manual, being determined by the time for which the gun trigger is kept pressed.

The intensity of the current is automatically adjusted based on the position of the potentiometer chosen (current increasing clockwise).

Assemble the carbon electrode (POS. 12, Fig. D) on the gun chuck and block in place with the ring nut. Touch the area, that was previously bared, with the carbon tip. Work from the outside to the inside, using a circular movement to heat the sheet which undergoes work hardening and returns to its original position.

To prevent the sheet from drawing too much, treat small areas and immediately after wipe using a damp cloth to cool the treated part.

Sheet metal shrinking

Select the icon of the electrode for recalculation (POS. 7, Fig. D) using the potentiometer. This function is executed by assembling and tightening the specific electrode (POS.28, Fig. D) of the gun.

In this position, working with the specific electrode, you can flatten the sheet metal that underwent localised deformation.

Use the extractor supplied (POS. 1, Fig. D)

Washer coupling and traction

Select the icon of the washer using the potentiometer.

This function is carried out by assembling and tightening the chuck (POS. 3, Fig. D) on the body of the electrode (POS. 1, Fig. D). Couple the washer (POS. 13, Fig. D), spot welded as previously described, and start traction. In the end, rotate the extractor 90° to detach the washer.



ATTENTION!

When the work has been completed, place the tools on a non-conducting surface and switch off the machine!

7. MAINTENANCE



WARNING! BEFORE CARRYING OUT MAINTENANCE, MAKE SURE THE MACHINE IS OFF AND DISCONNECTED FROM THE MAINS.

7.1 ROUTINE MAINTENANCE

ROUTINE MAINTENANCE CAN BE CARRIED OUT BY THE OPERATOR.

- adaptation/restoration of the diameter and profile of the electrode tip;
- replacement of the electrodes;
- check the integrity of the power cable;
- check the integrity of the gun and output cables.

7.2 SPECIAL MAINTENANCE

SPECIAL MAINTENANCE MUST ONLY BE CARRIED OUT BY TECHNICIANS WHO ARE EXPERT OR QUALIFIED IN AN ELECTRIC-MECHANICAL AMBIT.



WARNING! BEFORE REMOVING THE SPOT WELDING MACHINE OR GUN PANELS AND ACCESSING THE UNIT, MAKE SURE THE SPOT WELDING MACHINE IS

SWITCHED OFF AND DISCONNECTED FROM THE MAIN POWER AND PNEUMATIC SUPPLIES (if present).

Carrying out checks while the inside of the spot welder is live can cause serious electric shock due to direct contact with live parts and/or injury due to direct contact with moving parts.

Periodically and as frequently as required by the use and environmental conditions, inspect inside the spot welder and clamp and remove the dust and metal particles that have deposited on the transformer, diode module, power terminal board, etc. using a blast of dry compressed air (max. 5 bar).

Do not direct the jet of compressed air onto the electronic circuit board; if necessary clean with a very soft brush or suitable solvents.

At the same time:

- Make sure the wiring does not show signs of insulation damage or loose-oxidised connections.
- Make sure the screws that connect the transformer secondary with the output bars / wires are tight and that there are no signs of oxidation or overheating.

8. TROUBLESHOOTING

SHOULD THE MACHINE OPERATION NOT BE SATISFACTORY, AND BEFORE CARRYING OUT MORE SYSTEMATIC CHECKS OR CONTACTING YOUR TECHNICAL ASSISTANCE CENTRE, MAKE SURE THAT:

- With the power cable connected to the mains, the GREEN LED is on; if this is not the case, the problem is in the power line (cables, plug and socket, fuses, excessive voltage drop etc.).
 - The YELLOW LED is off: — wait a few minutes for cooling and to reset functionality of the machine;
 - The elements that are part of the secondary circuit (gun - cables) do not have poor connections because of loose screws or oxidation.
 - The welding parameters are suitable for the work to be carried out.
 - After having carried out maintenance or repairs, restore the connections and wiring as they were before, making sure they do not come into contact with moving parts or parts that can reach high temperatures. Band all the wires as they were before, being careful to keep the primary high voltage connections separate from the secondary low voltage ones.
- Use all the original washers and screws when re-closing the access panel(s).

FIG. A

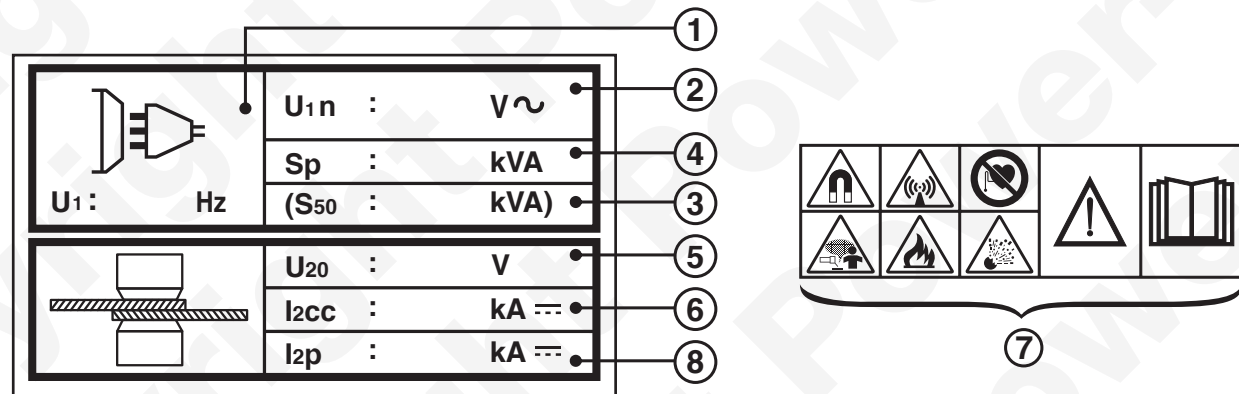


FIG. B

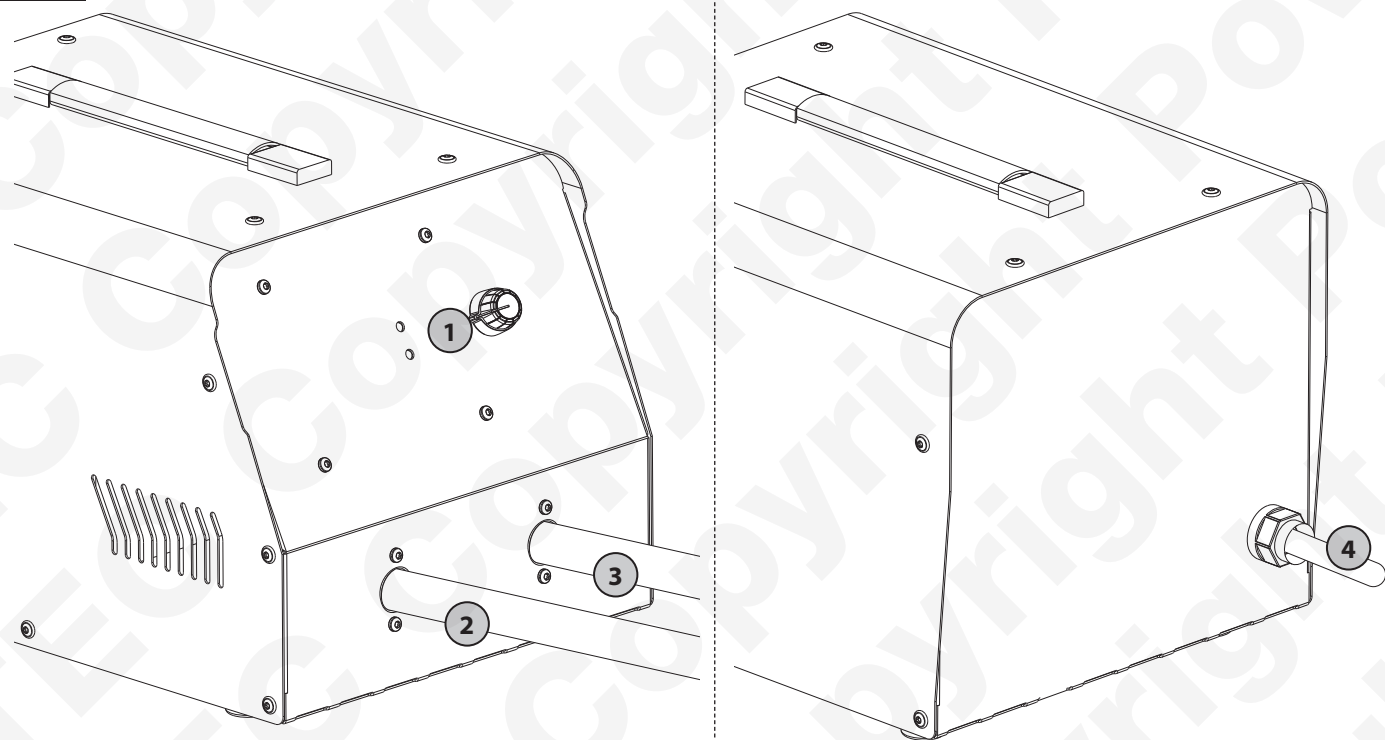


FIG. C

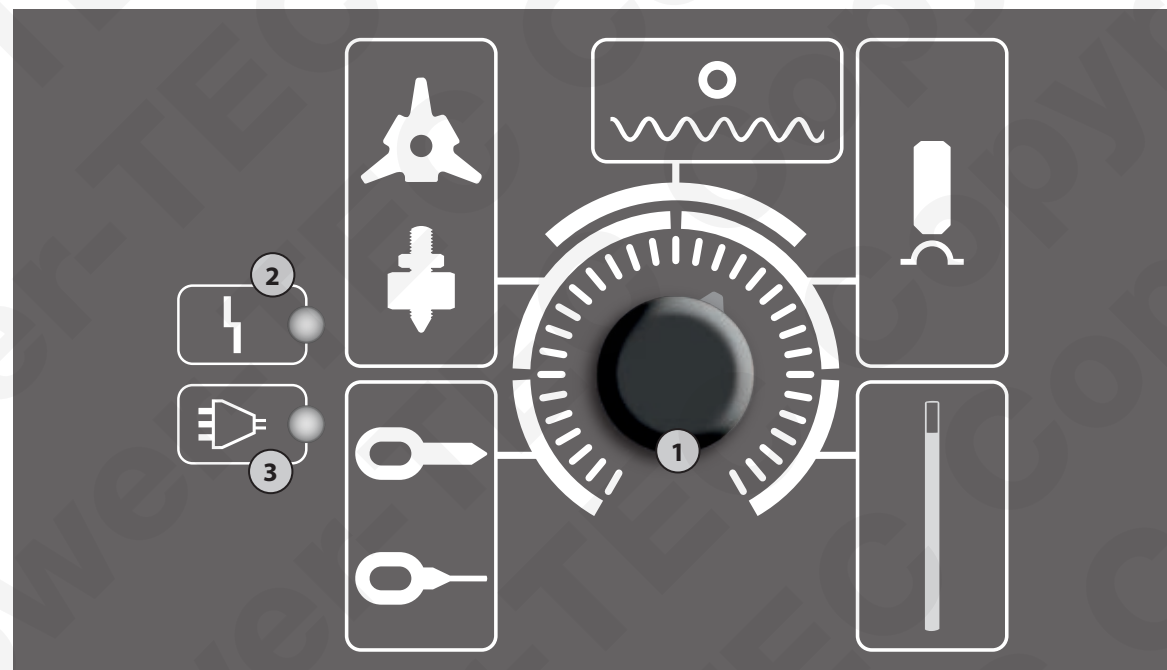
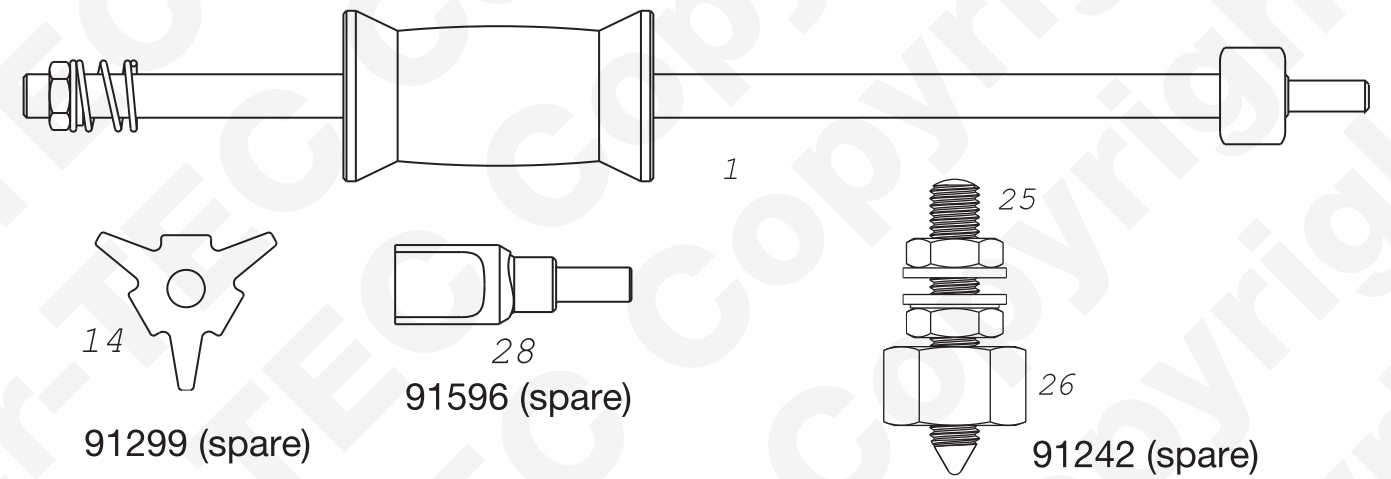


FIG. D

INCLUDED:



AVAILABLE:

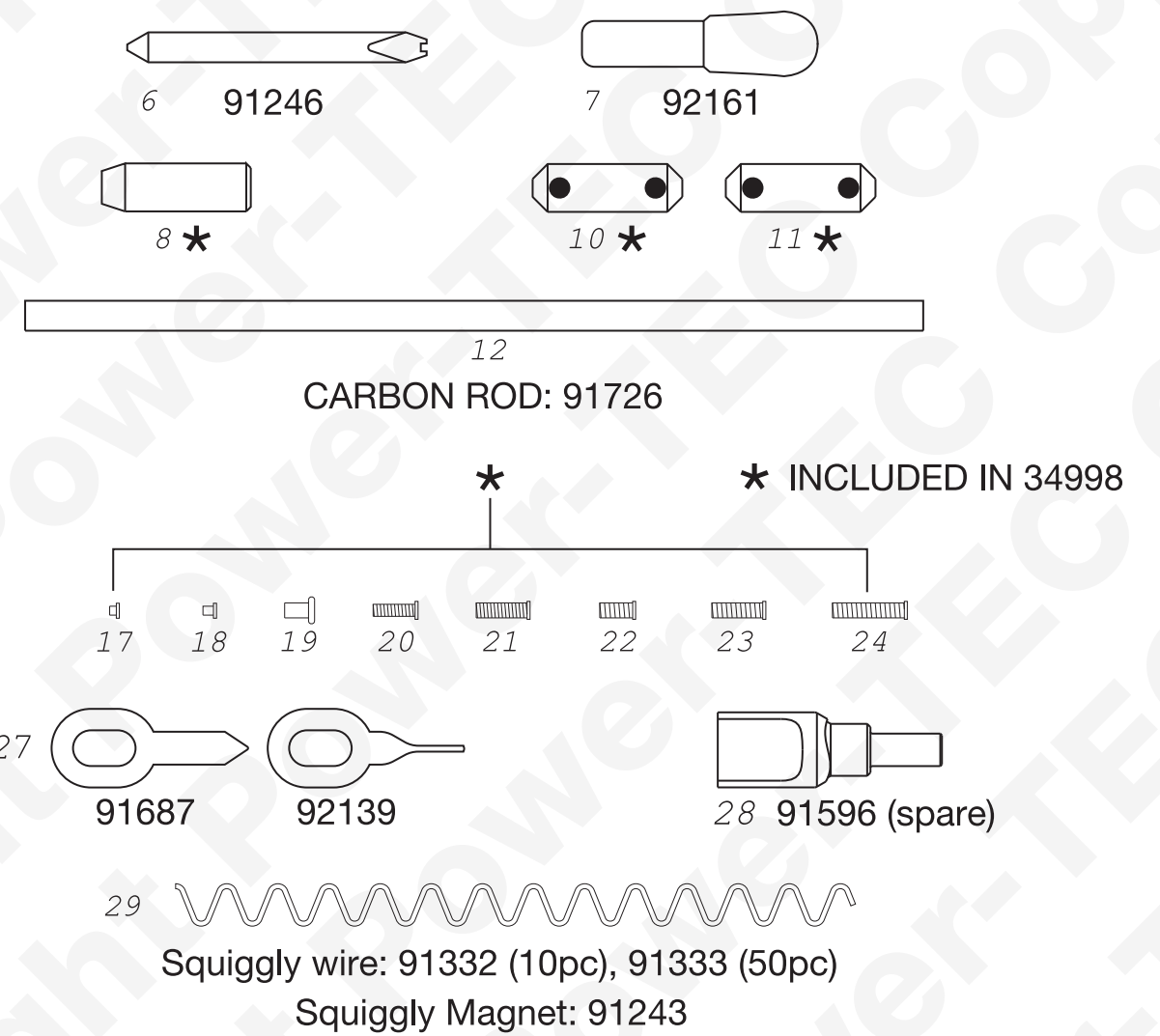


FIG. E

OPERATOR
MINIMUM
SAFE
DISTANCE

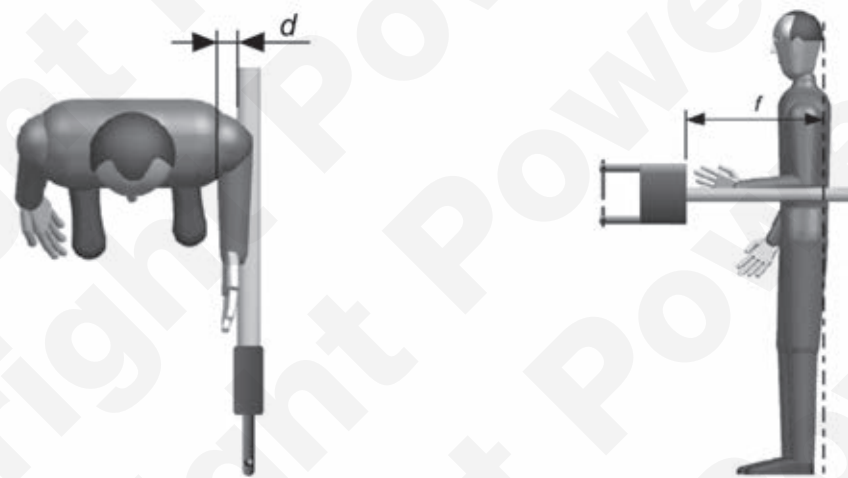


FIG. F

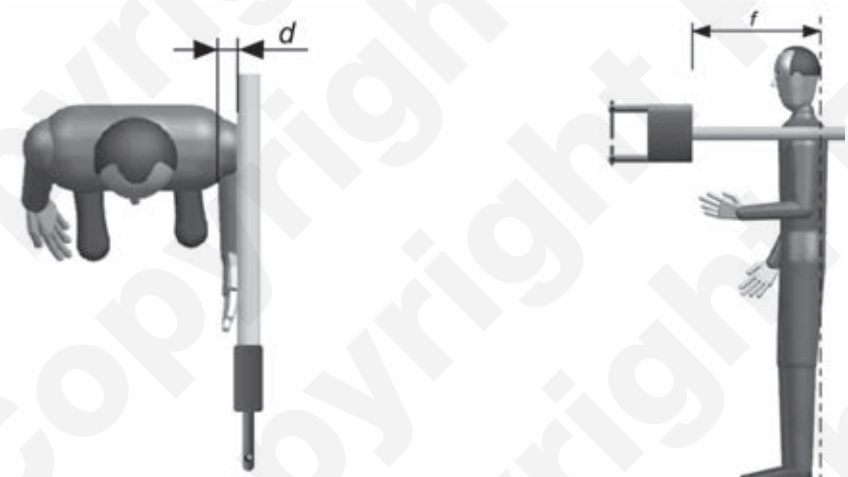


FIG. G



FIG. H

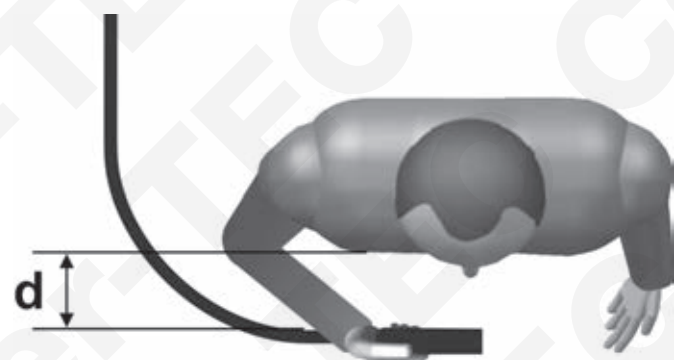


FIG. I

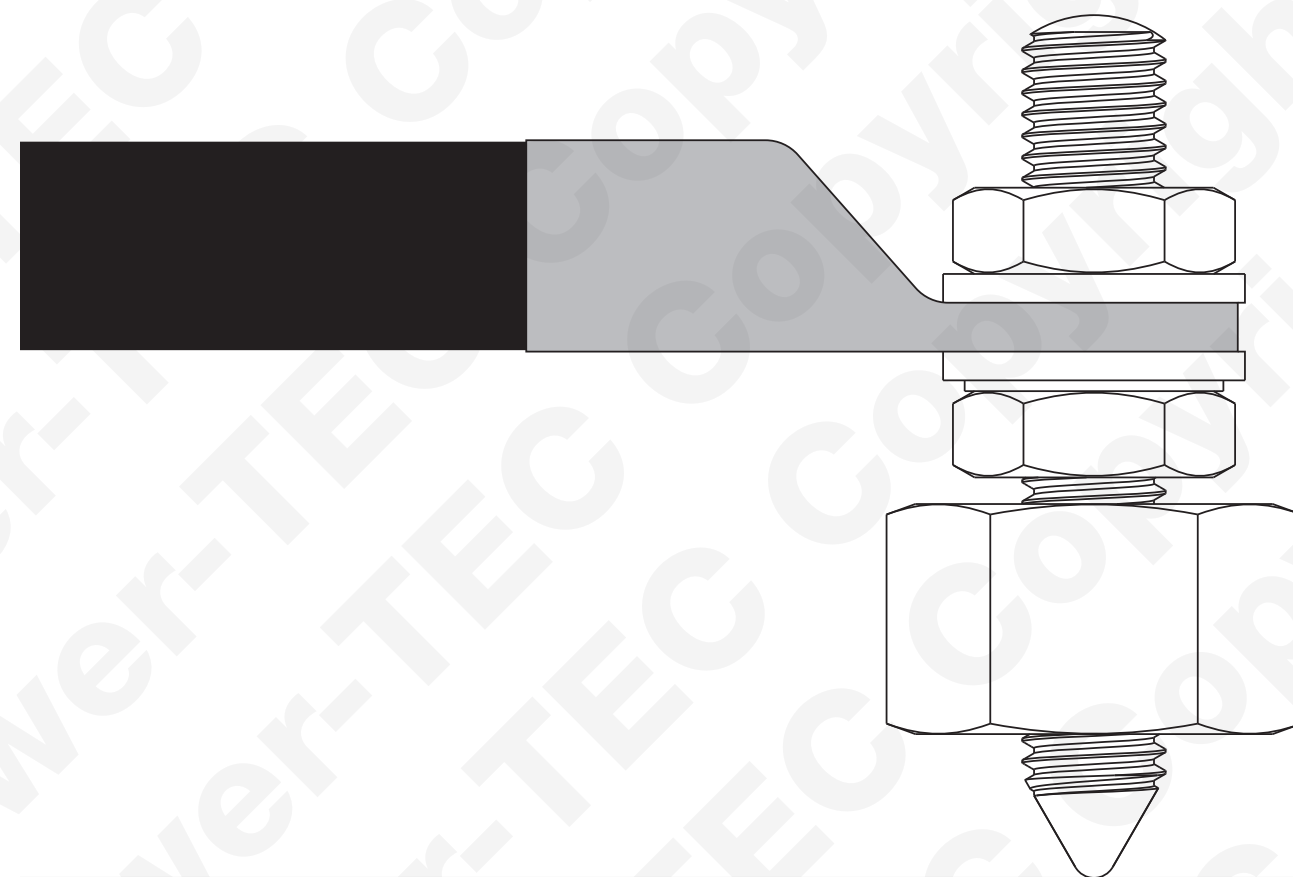
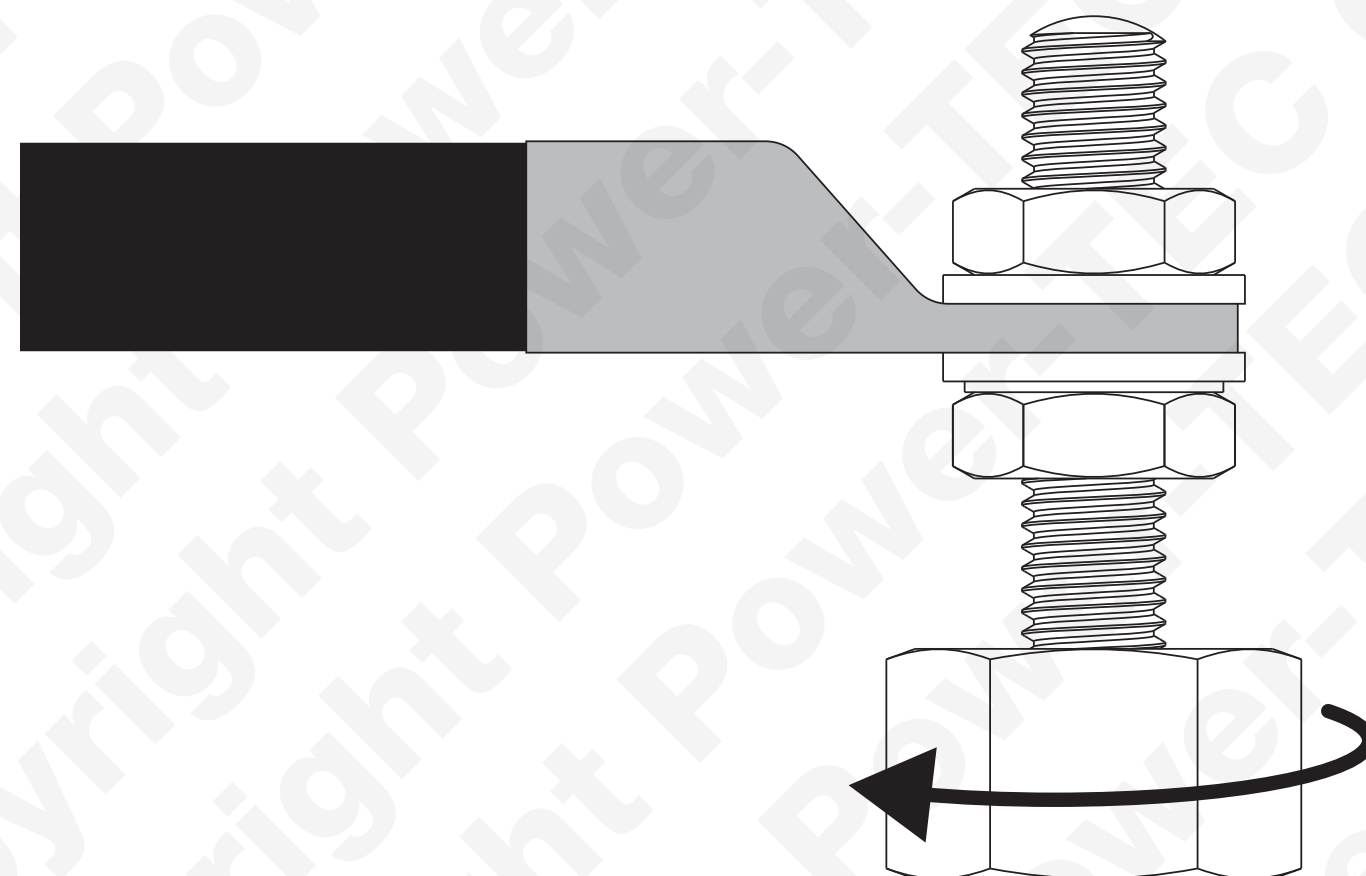


FIG. L



Spares Parts & Consumables also available:

Part No.	Description
91299	Panel Pull-Triangle - 20pc
91596	Miracle Bit Electrode & Shroud
91242	Spot-Earth
91246	Squiggly-Wire Electrode
91332	Squiggly Wire - 10pc
91333	Squiggly Wire - 50pc
91243	Squiggly Magnet (holds wire in place)
92161	Shrink Tip
91687	Miracle Straight Bits - 100pc
92139	Miracle Twisted Bits - 100pc
34998	Assorted Welding Accessory Kit - 294pc

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Safety First. Be Protected.

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Guarantee

If this product fails through faulty materials or workmanship, contact our service department direct on: **+44 (0) 1926 818186**. Normal wear & tear are excluded as are consumable items & abuse.



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