SEALEY POWER WELDERS

INSTRUCTIONS FOR:

TIG INVERTER

MODEL No: **TIG175HF**

Original Language Version

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MODEL No: **TIG 175HF**

Thank you for purchasing a Sealey Welder. Manufactured to a high standard this product will, if used according to these instructions and properly maintained, give you years of trouble free performance.

⚠ ***IMPORTANT*: BEFORE USING THIS PRODUCT, PLEASE READ THE INSTRUCTIONS CAREFULLY. MAKE CAREFUL NOTE OF SAFETY INSTRUCTIONS, WARNINGS AND CAUTIONS. THIS PRODUCT SHOULD ONLY BE USED FOR ITS INTENDED PURPOSE. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY. RETAIN THESE INSTRUCTIONS FOR FUTURE USE.**

1. SAFETY INSTRUCTIONS

1.1 ELECTRICAL SAFETY.

❒ **WARNING! It is the user's responsibility to check the following:** ***You must*** check all electrical equipment and appliances to ensure they are safe before using. ***You must*** inspect power supply leads, plugs and all electrical connections for wear and damage. ***You must*** ensure the risk of electric shock is minimised by the installation of appropriate safety devices. An RCCB (Residual Current Circuit Breaker) should be incorporated in the main distribution board. We recommend that an RCD (Residual Current Device) is used with all electrical products. It is particularly important to use an RCD together with portable products that are plugged into an electrical supply not protected by an RCCB. If in doubt consult a qualified electrician. You may obtain a Residual Current Device by contacting your Sealey dealer. ***You must*** also read and understand the following instructions concerning electrical safety.

1.1.1. The *Electricity At Work Act 1989* requires all portable electrical appliances, *if used on business premises,* to be tested by a qualified person at least once a year by using a Portable Appliance Tester (PAT).

1.1.2. The *Health & Safety at Work Act 1974* makes owners of electrical appliances responsible for the safe condition of the appliance, and the safety of the appliance operator. ***If in any doubt about electrical safety, contact a qualified electrician.***

1.1.3. Ensure the insulation on all cables and product itself is safe before connecting to mains power supply. See 1.1.1. use a (PAT).

1.1.4. Ensure that cables are always protected against short circuit and overload.

1.1.5. Regularly check power supply, leads, plugs and all electrical connections for wear or damage, especially power connections to ensure none is loose.

1.1.6. Check the voltage marked on the product is the same as the electrical power supply to be used. Check fused plugs are fitted with correct capacity fuse.

1.1.7. DO NOT pull or carry the powered appliance by its power supply lead. Products such as inverters must not be pulled or carried by their output cables.

1.1.8. DO NOT pull power plugs from sockets by the power cable.

1.1.9. DO NOT use worn or damage leads, plugs or connections. Immediately replace or have repaired by qualified persons. In case of damage, cut off and fit a new plug according to the following instructions.

1.1.10 NO plug is fitted to this machine. Whilst it is possible to perform TIG welding at lower power settings using a 13amp mains source, ordinary ARC welding (without gas) and TIG welding at higher power settings will require the machine to be connected to a 30amp supply either by direct wiring into your mains circuit or by fitting an industrial round pin plug & socket for more flexible usage. In either case we recommend you contact a qualified electrician to assess your existing wiring installation and follow his recommendations in full. Particular attention should be paid to the provision of adequate fuses on the mains circuit and to the earthing of the machine.

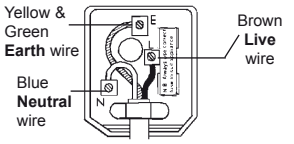
If a 13amp power source is used wire the plug as shown to the right.

a) ❒ WARNING! Ensure the unit is correctly earthed via a three-pin plug.

b) Connect the Yellow/Green earth wire to the earth terminal 'E'.

c) Connect the Brown live wire to live terminal 'L'.

d) Connect the Blue neutral wire to the neutral terminal 'N'.



FUSE RATING 13AMP BUT TO GAIN MAXIMUM OUTPUT THE INVERTER MUST BE CONNECTED TO A 30AMP SUPPLY (see 1.1.10)

❒ **WARNING! Be very cautious if using a generator to power the Inverter. The generator must be self regulating and stable with regard to voltage, waveform and frequency. The output must be greater than the power consumption of the Inverter. If any of these requirements is not met the electronics within the Inverter may be affected.**
NOTE:The use of an unregulated generator may be dangerous and will invalidate the warranty on the Inverter.

❒ **WARNING! The Inverter may produce voltage surges in the mains supply which can damage other sensitive equipment (e.g. computers). To avoid this happening it is recommended that the Inverter is connected to a power supply that does not feed any sensitive equipment.**

1.2 GENERAL SAFETY

▲ ***DANGER! Unplug the inverter from the mains power supply before connecting or disconnecting cables or performing maintenance or service. Direct contact with the inverter circuit is dangerous.***

✓ Keep the inverter and cables in good working order and condition. *(Take immediate action to repair or replace damaged parts).*

✓ Use genuine parts and accessories only. *(Non recommended parts may be dangerous and will invalidate the warranty).*

✓ Locate inverter in an adequate working area for its function. Ensure area has adequate ventilation as welding fumes are harmful.

❒ **WARNING! If it is necessary for you to assemble the work clamp cable, ensure that sufficient copper strands are exposed and turned back to make full contact within the dinse plug to ensure a good electrical contact. Loose connection will cause overheating, rapid deterioration and loss in efficiency.**

✓ Ensure there is no obstruction to the flow of clean cool air through the ventilation apertures and ensure there are no conductive dusts, corrosive vapours or humidity which could enter the inverter and cause serious damage.

✓ Keep working area clean and tidy and free from unrelated materials. Also ensure the working area has adequate lighting.

❒ **WARNING! Use welding head shield to protect eyes and avoid exposing skin to ultraviolet rays given off by electric arc. Wear safety welding gauntlets.**

✓ Remove ill fitting clothing, remove ties, watches, rings, and other loose jewellery, and contain long hair.

✓ Ensure the workpiece is correctly secured before operating the inverter.

✓ Avoid unintentional contact with workpiece. Accidental or uncontrolled switching on of the torch may be dangerous and will cause the nozzle to wear.

✓ Keep unauthorised persons away from the working area, and any persons working within the area must wear the same protective items as the user.

✓ Operators must receive adequate training before using the inverter. The inverter must only be operated under supervision.

✓ Stand correctly keeping a good footing and balance, ensure the floor is not slippery, and wear non-slip shoes.

❒ **WARNING! When unit is switched off wait for 15 seconds whilst capacitors discharge before opening the case.**

✓ Turn voltage switch to "0" (off) when not in use.

✗ DO NOT operate the inverter if it or its cables are damaged.

✗ DO NOT use welding cables over 10m in length. (Cables should be as short as possible.)

✗ DO NOT attempt to fit any non genuine torches, components, or parts to the inverter unit. To do so may cause damage and will invalidate your warranty.

✗ DO NOT use any metallic structure which is not part of the work piece as a substitute for the return cable. This may jeopardise results and may be dangerous. *Exception:* Metallic work bench, but connect as near to weld as possible.

✗ DO NOT hit the electrode on the workpiece, this may damage the electrode and make strike-up difficult.

✗ DO NOT get inverter wet or use in damp or wet locations or areas where there is condensation.

▲ ***DANGER! DO NOT weld near inflammable materials, solids, liquids, or gases.***

✗ DO NOT weld containers or pipes which have held flammable materials or gases, liquids or solids. Avoid operating on materials cleaned with chlorinated solvents or near such solvents.

✗ DO NOT pull the inverter by the cable, or the torch, and DO NOT bend or strain cables, protect from sharp or abrasive items, and DO NOT stand on cables or leads. Protect from heat. Long lengths of slack must be gathered & neatly coiled. DO NOT place cables where they may endanger others.

✗ DO NOT touch the workpiece close to the weld as it will be very hot. Allow to cool.

✗ DO NOT touch the torch immediately after use. Allow the torch to cool.

✗ DO NOT operate inverter while under the influence of drugs, alcohol or intoxicating medication, or if fatigued.

✓ When not in use store the inverter in a safe, dry, childproof area.

2. DESCRIPTION & SPECIFICATIONS

2.1 DESCRIPTION

Fan cooled AC/DC power supply suitable for TIG and ARC welding applications. Suitable for welding a wide range of materials including steel, stainless steel, titanium, aluminium, copper, bronze and their alloys. LED power read-out with push button programming in conjunction with an encoder knob.The unit features regulation of post-gas and current down-slope time as well as control of AC balance and arc force. When TIG welding the welding current can also be set to vary from one preset value to another using the torch button. Includes burst HF start device and 'lift start' feature which reduces HF emissions. Includes remote control connector for foot pedal or hand controller.

2.2 SPECIFICATION

Power Output: . . . . . 5-160 A
Duty Cycle:. . . . . 60% @ 90 A
Electrode Capacity: . . . . . .Ø1.6 - 4.0 mm
Maximum absorbed power: . . . . . 4.5 KW
Mains Voltage: . . . . . 230V -1ph

Insulation Class:. . . . . H
Protection: IP23
Dimensions: . . . . . L430 x W170 x H340
Weight: . . . . . 12.8 kg
TIG Accessory Ref: INV/TIG/3
ARC Accessory Ref:. . . . . (optional) INV/25

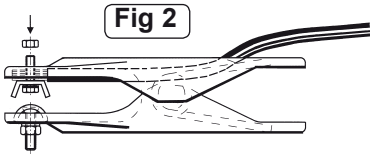
3. PREPARING INVERTER FOR USE

3.1 **CONNECTION TO MAINS:**

3.1.1 **Whilst welding at low power levels is possible on a 13amp supply the Inverter will normally be connected to a 30amp supply in order to TIG weld at higher power levels and in order to perform ordinary ARC welding. See section 1, item 1.1.10**

3.2 **WELDING CABLE CONNECTION.**

3.2.1 The torch cable is supplied ready assembled but it may be necessary for you to assemble the work clamp cable. Attach the work clamp to one end of the cable as shown in fig.2. To connect the Dinse Plug as shown in fig.3 first thread the cable through the outer cover of the plug (see fig.3 - 4). Now remove 20mm of insulation sheath from the end of the cable and fold back the copper wire all around the outside of the sheath (1). Push the cable end into the copper sleeve (2) so that the folded back wire makes good contact with the inside of the sleeve. Push the copper sleeve into the brass plug body (3) and tighten the large grub screw until the cable is firmly held. Now slide the outer plug cover up the cable and press the brass body into it as shown in fig.3.



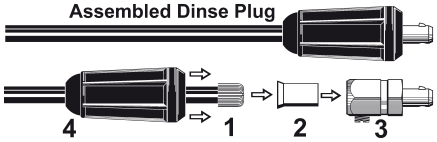
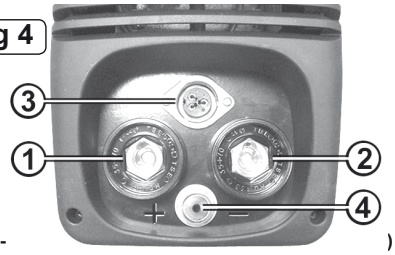


Fig 3



3.2.3 **TIG CONNECTIONS:**

"TIG" TORCH CABLE. Dinse plug at end of the torch cable will be connected to the **negative socket (-)** on lower front panel see fig.4 item **2**).
3 pin torch plug at end of torch cable will be connected to circular 3 pin socket on the lower front panel. (see fig.4 item **3**)
Black gas pipe with brass fitting at end of torch cable will be screwed to brass fitting on lower front panel. (see fig.4 item **4**)

WORK CLAMP CABLE. Dinse plug at end of the clamp cable will be connected to the **positive socket (+)** on lower front panel (see fig.4 item **1**).

3.2.4 ***(*) Please note that the way the welding cables are connected to the inverter for ordinary ARC welding may be different to the way the cables are connected for standard TIG welding. Whilst most stick electrodes are connected to the positive terminal certain types need to be connected to the negative terminal. It is therefore essential that the user refers to the manufacturer's instructions for the electrodes to ensure that the correct polarity is selected.***

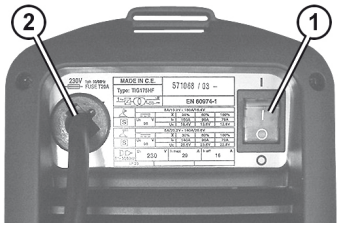
3.2.5 **ARC CONNECTIONS:** (You will need optional ARC Accessory Kit INV/25)

ELECTRODE HOLDER Plug at the end of electrode cable **will normally (*)** be connected to the **positive socket (+)** on the front panel (see fig.4 item **1**).
WORK CLAMP CABLE. Plug at the end of the clamp cable **will normally (*)** be connected to the **negative socket (-)** on the front panel (see fig.4 item **2**).

3.3 **REAR PANEL LAYOUT (refer to Figs 5 & 5A).**

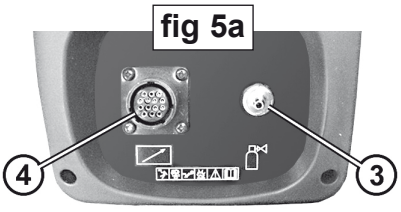
1. **ON/OFF SWITCH**: O = Off, I = On.
2. **MAINS CABLE**
3. **GAS INLET FITTING.** For connecting the gas cylinder to the welder using clear tubing provided.
4. **REMOTE CONTROL CONNECTOR.** For the connection of the **optional** remote controls shown below.

Fig 5



3.4 **REMOTE CONTROLS (Optional.)** Two types of remote control can be connected to the machine via the 14 pin connector situated on the back panel (See fig.5a-4). The device will be automatically recognised. The encoder knob on the main control panel will become inoperative for those functions taken over by the remote control.

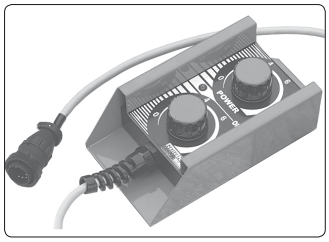
fig 5a



3.4.1 **Remote control pedal**. **(Model No. INV/TIG/5)** When activated the pedal will control the main welding current. Also in 2 step TIG welding mode the first movement of the pedal will initiate the striking of the arc in place of the torch button.

3.4.2 **Remote control with two potentiometers. (Model No. INV/TIG/7)** The knob furthest away from the cable entry, controls the main welding current. The second knob will control one other parameter depending on the active welding mode. (See table below.) The rotation of the second knob automatically selects the appropriate parameter and brings it up on the display.

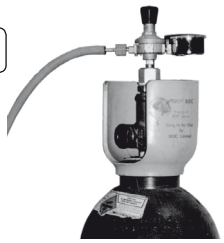
3.4.3 **Welding mode set up.** **Parameter for second Knob.**
ARC welding with stick electrode . . . . . Arc force. (Not displayed)
TIG DC, HF or LIFT, 2 or 4 steps, ... Post Gas
TIG AC , 2 or 4 steps . . . . . Post Gas



3.5 CONNECTING THE GAS

3.5.1 When using Argon gas fit the Bull Nose Adaptor supplied, to the cylinder with a spanner.
3.5.2. Fit the gas regulator onto the Bull Nose Adaptor. (see fig.6)
3.5.3 Using the clear tubing supplied connect the regulator to the gas inlet on the back of the inverter (see fig.5a - 3). Hold the tubing securely in place on each connector by using the worm drive clamps supplied.
3.5.4 Open the regulator before opening the cylinder valve. Test for leaks.
3.5.5. Set the gas flow to suit the welding parameters required. See WELDING PARAMETER TABLES below for general guidance.
3.5.6 If necessary the gas flow can be adjusted during welding using the regulator knob.

fig 6



3.6 **PREPARATION AND CHOICE OF ELECTRODE .** In order to produce a good weld it is important to choose an electrode of the correct diameter for the current to be used. For a general guide to the settings to be used with particular diameters of electrodes please refer to the adjacent tables. The electrode will normally protrude from the ceramic nozzle by 2 to 3mm but in order to gain access to inaccessible areas such as internal corners the electrode can be made to protrude by up to 6mm. The chosen electrode should be sharpened axially on a grinding wheel as indicated in the diagram below. The tip should be perfectly concentric in order to avoid arc deviations. The condition of the electrode should be regularly inspected to maintain it in peak condition.

3.7 **PREPARATION OF THE WORKPIECE.** For a good weld it is important that the workpiece is thoroughly cleaned so that no oxides, oil, grease or solvents remain on the surface of the material.

fig 8

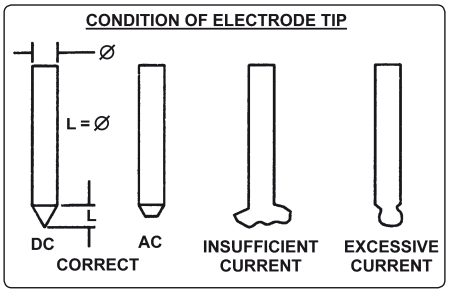


fig 7

TIG WELDING PARAMETERS FOR DEOXIDATED COPPER (DC)

Thickness (mm)	Current (A)	Electrode (diam mm)	Nozzle (diam mm)	Argon (L/min)	Filler Rod (diam mm)
0.3 - 0.8	15 - 60	0.5 - 1	6.5	4	---
1	50 - 100	1.0	9.5	6	1.5
1.5	30 - 60	1.6	9.5	8	1.5
2.0	70 - 100	1.6	9.5	8	1.5

TIG WELDING PARAMETERS FOR ALUMINIUM (AC)

Thickness (mm)	Current (A)	Electrode (diam mm)	Nozzle (diam mm)	Argon (L/min)	Filler Rod (diam mm)
1	30 - 40	1 - 1.6	6.5	4 - 6	1.2 - 2
1.5	60 - 85	1.6	9.5	4 - 6	2
2	70 - 90	1.6	9.5	4 - 6	2
3	110 - 160	2.4	11	5 - 6	2

TIG WELDING PARAMETERS FOR STAINLESS STEEL (DC)

Thickness (mm)	Current (A)	Electrode (diam mm)	Nozzle (diam mm)	Argon (L/min)	Filler Rod (diam mm)
0.3 - 0.5	5 - 20	0.5	6.5	3	---
0.5 - 0.8	15 - 30	1	6.5	3	---
1	30 - 60	1	6.5	3 - 4	1
1.5	70 -100	1.6	9.5	3 - 4	1.5
2	90 - 110	1.6	9.5	4	1.5 - 2.0
3	120 - 150	2.4	9.5	6	2 - 3
4	140 - 190	2.4	9.5 - 11	5 - 6	3.0

4. CONTROL PANEL

4.0 The TIG175/HF is microprocessor controlled allowing the setting of a high number of parameters enabling the operator to make an optimal weld under most conditions and with most materials. When the machine is switched off the last active parameters are retained and recalled when the machine is switched on again.

4.1 SELECTION OF WELDING PARAMETERS.

4.1.1 The 6 main welding parameters are grouped above the main LED display and each symbol has an associated single LED. Use the parameter selection button to the right of the knob to step through the parameters until you reach the one you wish to adjust. The parameter is active when the LED below the symbol is illuminated. The value to be adjusted will appear in the main display. Adjust the value by using the rotary encoder knob to the right of the display.

CURRENT DOWN SLOPE This setting reduces the current gradually at the end of welding and can be varied from 0.1 to 10 seconds. (See section 5.3)

POST GAS TIME Sets post gas time from 0.1 to 25 secs. See section 5.2

ARC FORCE Regulates the value of the arc force current and only applies to ARC welding with a stick electrode. Arc force is expressed as a percentage of the welding current. See section 7.6

MAIN CURRENT This setting is measured in AMPS and can vary from 5 to 140 for ARC welding and 5 to 160 in TIG DC or TIG AC. The value represents the average welding current for DC and the effective welding current for AC

BALANCE Sets a percentage ratio in TIG AC modes between the time that the current is EN (electrode negative) and the period of the square waveform in AC operation. Setting can vary between 20% and 90%. (See section 5.7.1 and also fig.10)

BI-LEVEL WELDING Adjusts the level of the base current in relation to the main current that has been set. Works only in TIG 4 step weld cycle. Varies from a maximum value equal to the main current to a minimum value equal to 30% of the main current To switch off the bi-level function turn the encoder knob anticlockwise until the display shows 'off'. See section 5.6.3

POWER SUPPLY VOLTAGE (Green LED)

OUTPUT VOLTAGE (Green LED)

ALARM CONDITION (Yellow LED) See main display for two types of alarm as described below.
"AL.1" Fault in primary power supply; power supply voltage is outside the required range.
"AL.2" One of the safety thermostats has cut in due to the machine overheating. The machine will return to normal operation automatically when it has cooled down.

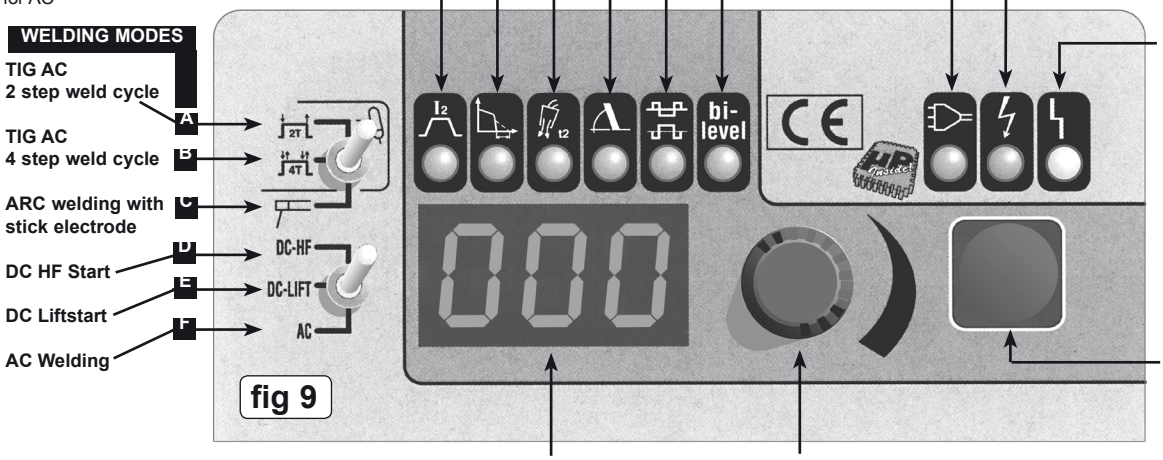


fig 9

PARAMETER SELECTION BUTTON Steps through the available parameters. Single illuminated LEDs indicate the selected parameter.

MAIN DISPLAY shows selected parameter values and alarm conditions

ENCODER KNOB for setting parameter values

4.2 SELECTION OF WELDING MODES. Use the two miniature toggle switches on the left hand side of the control panel to select the required welding mode.

A TIGAC 2 step weld cycle . . . . . see section 5.6.1
B TIGAC 4 step weld cycle . . . . . see section 5.6.2
C ARC welding with stick electrode . . . . . see section 7.0
D DC HF start . . . . . see section 6.7
E DC Lift start. . . . . see section 6.8
F AC Welding . . . . . see section 5.9

5. TIG WELDING PRINCIPLES & FEATURES

5.0 If you have no welding experience we recommend that you seek training from an expert source before using this equipment. Good TIG welding may only be achieved with continued supervised practice. *Before commencing welding read the safety instructions in Section 1.*

5.1 **TIG WELDING - GENERAL PRINCIPLES OF OPERATION.** (For a concise explanation of the facilities of the TIG175/HF refer to Section 4. Control Panel) The TIG welding procedure uses the heat produced by an electric arc, struck and maintained between a Tungsten electrode and a workpiece to soften and fuse the workpiece metal, usually in conjunction with a suitable filler rod. The electrode is held in an insulated torch which transmits the welding current to the electrode. The torch also has a gas connection which allows inert Argon gas to be dispensed from a ceramic nozzle surrounding the electrode. This produces a shroud of gas around the welding process which protects the electrode and molten weld pool from oxidation.

5.2 POST GAS TIMING FACILITY. A 'post - gas' time can be set from 0.1 to 25 seconds to allow the protective Argon gas to continue to flow after the arc is extinguished to protect the finished weld whilst it is cooling.

5.3 CURRENT DOWN SLOPE FACILITY. A time can be set to reduce the current gradually at the end of a weld process and can be varied from 0.1 to 10 seconds.

5.4 On thin pre-prepared material (up to 1mm) welding can be achieved without a filler rod by fusing the edges of the metal together. Most welding however will be done using a filler rod to complete a joint. This rod is melted in the weld pool but should not make contact directly with the electrode. *It is essential that operators wear adequately insulated gloves to protect themselves from the heat of the welding process, metal spatter and any direct contact with the electrode.*

5.5 The tungsten electrode will be consumed during the welding process but at a very slow rate. The tip of the electrode must be periodically inspected and re-ground if necessary to ensure continued efficient welding. See fig.7 'Condition of electrode tip'.

5.6 **TORCH PUSH BUTTON CONTROL FUNCTIONS.** The torch push button can be used to control the welding current in a number of ways depending on your welding requirements. (Select one of the following options from the control panel.)

5.6.1 **Two step weld cycle.** In this mode the push button is pressed and held down to strike the arc and to continue welding. When the end of the weld is reached the push button is released and the arc is switched off. The 'post-gas' facility can be used in this mode if required.

5.6.2 **Four step weld cycle.** This mode allows you to complete long welds without having to continuously hold down the torch button. The push button is first held down which strikes the arc and then provides a current with a value which is 25% of the main current setting as long as the button continues to be held down. Once the push button is released the current rises to the welding current previously set and stays at this level even though the push button has been released. If the button is then pressed and held down again the current will decrease according to the current down slope setting until it is once again 25% of the preset current and remain there whilst the button is held. When the button is released the current is turned off and the post gas time begins. (If initiated.)

5.6.3 **Four step weld cycle with bi-level function.** This function is available in four step mode only and allows the welding current to be changed from one presettable value to another using the torch button while the arc remains struck. To use this function select the bi-level parameter and set the desired value as a percentage of the main current. (This can vary from a maximum value equal to the main current setting to a minimum value equal to 30% of the main current.) Initiate the welding process for the four step weld cycle as described above. During the course of welding at the main current you have set (with the torch button released) the current can be made to dip down towards the set base current and back again by momentarily pressing and releasing the torch button.This function can be used as a sequence of rapid presses which can help to control heat and penetration during difficult welds. At the end of a rapid sequence of presses when the button is released, the current will remain at the main weld current set and the welder will continue to function as previously described in four touch mode.

5.7 **ALTERNATING CURRENT TIG WELDING MODE.** This type of welding is particularly suited to welding metals such as aluminium and magnesium which form a protective and isolating oxide coating on their surfaces. By inverting the polarity of the welding current, it is possible to 'break' the superficial oxide layer by means of a mechanism called "ionic sandblasting". The voltage of the tungsten electrode alternates between positive (EP) and negative (EN). During the time the electrode is positive the oxide is removed from the surface by a cleaning/pickling action thereby allowing puddle formation. During the time the electrode is negative the maximum heat is applied to the workpiece to allow welding to take place. This feature is controlled by the 'balance' parameter.

5.7.1 BALANCE is represented as a percentage and can be set from 20% to 90%. (See fig.10)
Greater values of balance will result in faster welding, deeper penetration, more concentrated arc, narrower weld pool and limited heating on the electrode. Smaller values will allow a better cleaning of the part. Too small a value of balance will result in an enlargement of both the arc and the deoxidated area, plus overheating of the electrode leading to the formation of a ball on its face and consequent difficulty in striking the arc and indiscriminate arc direction. Too large a value of balance will result in a 'dirty' weld pool with dark inclusions.

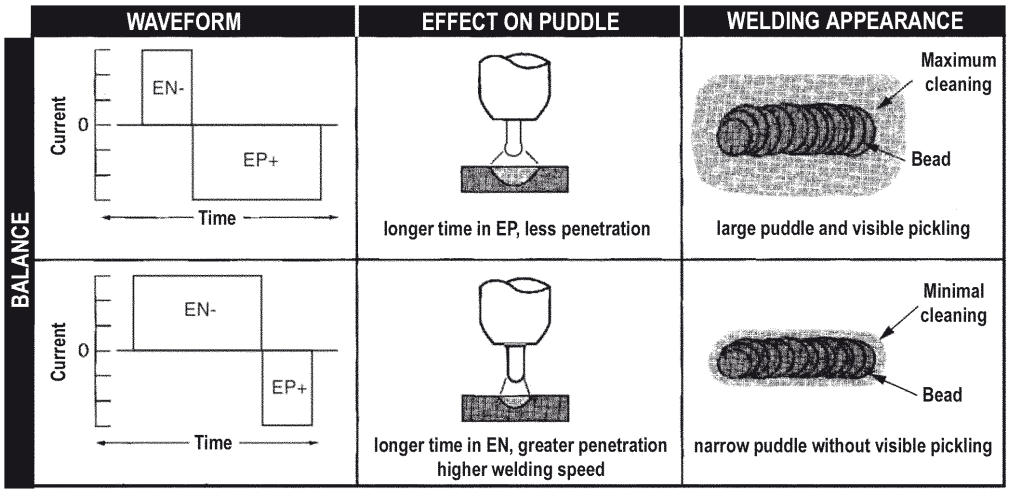


fig 10

5.7.2 The various settings described in TIG DC operations are also possible in AC mode. (i.e. HF or LIFT start, 2 or 4 Step torch operation.) The welding procedures described for DC TIG are also valid for AC TIG.

5.7.3 Refer to fig.8 for relevant data regarding welding aluminium. It is recommended that a pure tungsten electrode is used for aluminium (coded green).

6. TIG WELDING PROCEDURE

❒ **WARNING: use welding head shield to protect eyes and avoid exposing skin to ultraviolet rays given off by electric arc. Wear safety welding gauntlets.** *If difficult welds are to be performed and the welding parameters are unknown, it is advisable to carry out several trial runs on test pieces in order to determine the right welding current and gas flow.*

6.1 **SWITCH ON** the welder only when you are satisfied that the welder is correctly connected and the work to be done is fully prepared.
Setting the controls. (Select the welding mode and adjust the appropriate parameters for the intended welding task.)

6.2 Set the required gas flow using the knob on the gas regulator.

6.3 Select either the 'two step welding mode' or the 'four step welding mode' using the miniature toggle switch on the left of the front panel.

6.4 Set the 'post gas' time if required.

6.5 Set the 'current down slope' if required.

6.6 Set the welding current required.

6.7 **Striking the arc. (HF facility)** Press and hold the torch button bringing the electrode tip to within 2 - 3mm of the workpiece. The arc will be struck by high frequency impulses. When the arc is established, form a molten pool on the workpiece, introduce the filler rod and proceed along the joint. When the arc is difficult to strike, despite the presence of gas and visible high frequency discharges it is not advisable to carry on for any length of time. Before continuing, check the integrity of the electrode surface and tip and if necessary regrind the tip.

6.8 **Striking the arc. (LIFT facility)** Lightly touch the workpiece with the electrode tip. Push the torch button fully and lift the electrode with a delayed action thereby obtaining the striking of the arc with the same value as that previously set. Proceed to weld as described above.

6.9 To cease welding release the torch button.

6.10 **SWITCH OFF** the welder and turn off the gas at the cylinder valve.

7. ARC WELDING PROCEDURE

7.1 The TIG175HF will also perform ordinary ARC welding (without gas) using coated electrodes.(You will need optional ARC Accessory Kit INV/25)

7.2 ***Please note that the way the welding cables are connected to the inverter for ordinary ARC welding may be different to the way the cables are connected for standard TIG welding. Whilst most stick electrodes are connected to the positive terminal certain types need to be connected to the negative terminal. It is therefore essential that the user refers to the electrode manufacturers instructions to ensure that the correct polarity is selected.*** (Refer to section.3.2 regarding cable connection.)

7.3 The mechanical characteristics of the weld will be determined not only by the current used but also by other factors such as the diameter and quality of the electrode itself as well as the arc length, the speed of welding and the orientation of the electrode to the work surface. Unused electrodes should also be protected from moisture as a damp electrode will affect the quality of the weld.

7.4 The table to the right gives a general guide to the minimum and maximum welding currents to be used with the different diameter electrodes.

Electrode diameter (mm)	Welding current Min.	-	Max.
1.6	25	-	50
2	40	-	80
2.5	60	-	110
3.2	80	-	140
4	120	-	200

7.5 Depending on the diameter of the electrode the current used will have to be varied depending on the orientation of the workpiece itself. Higher current values will be used for flat welding whereas the current will have to be reduced for vertical or overhead welding.

7.6 ARC FORCE. When using the optional remote control with two potentiometers (See INV/TIG/7 in section 3.4.2 on remote controls.) an additional parameter of 'arc force' becomes available. Arc force relates to the dynamic behaviour of the machine. Higher values of arc force result in higher penetration and enable welding in any position using basic electrodes. By contrast, lower values of arc force result in a softer arc without sparks using rutile electrodes.

❒ **WARNING: Use welding head shield to protect eyes and avoid exposing skin to ultraviolet rays given off by electric arc. Wear safety welding gauntlets.**
If difficult welds are to be performed and the welding parameters are unknown, it is advisable to carry out several trial runs on test pieces in order to determine the right welding current.

7.7 **SWITCH ON** the welder only when you are satisfied that the welder is correctly connected and the work to be done is fully prepared.
Setting the controls.

7.8 Select the arc welding mode using the upper miniature toggle switch on the left of the front panel.

7.9 Select the welding current parameter and set it to the required value by rotating the encoder knob until the display shows the correct value.

7.10 **Striking the arc.** Strike the electrode tip on the workpiece as if you were striking a match. (Do not hit the electrode on the work piece as this could damage the electrode and make strike up difficult.)

7.11 **Welding.** As soon as the arc is ignited try to maintain a distance from the workpiece equal to the diameter of the electrode in use and maintain this distance throughout the duration of the weld. Remember that the angle of the electrode as it advances should be 20 to 30° from a vertical line over the workpiece. (See guide to weld bead characteristics in Section 10, Troubleshooting.)

7.12 At the end of the weld bead, move the electrode backwards in order to fill the weld crater and then quickly lift the electrode from the weld pool in order to extinguish the arc.

7.13 **SWITCH OFF** the welder after use.

8. MAINTENANCE

▲ ***DANGER! Unplug the inverter from the mains power supply before connecting or disconnecting cables or performing maintenance or service. Direct contact with the inverter circuit is dangerous.***

8.1 To avoid a build up of dust inside the machine which may block or restrict the ventilation system, periodically remove the covers and remove the dust with a low pressure air jet or vacuum cleaner. Replace covers immediately. Under no circumstances should the machine be operated with the covers removed.

8.2 TORCH. Avoid resting the the torch and its associated cable on any hot surfaces. If the insulation is damaged in any way the torch must not be used.

8.3 Periodically check the condition of the gas tubing and the connections.

8.4 In the event of any problems of unsatisfactory weld performance please first go through the troubleshooting procedure shown below. If this does not solve the problem the Inverter must be taken to a qualified and authorised service agent for repair. Contact your local Sealey dealer for service.

9. TROUBLESHOOTING

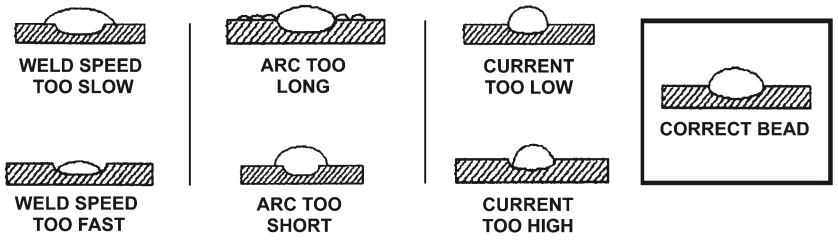
9.1 **Yellow fault indicator is illuminated.** When this LED illuminates the machine will be 'blocked' and one of three alarm conditions will appear on the display.

"AL 1" **Failure in the primary power supply.** If the supply voltage drops below 190V AC or rises above 260V AC the machine is turned off. *Reconnect the inverter to a more stable supply of 230V AC. (Mains voltages over 280V AC will damage the inverter.)*
Short circuit has occurred. If a short circuit has occurred lasting more than 1.5 seconds (e.g. during the striking of the arc) the inverter is switched off. *In this case, wait for the inverter to restart automatically.*

"AL 2" **Inverter has overheated.** One of the safety thermostats has triggered due to the machine overheating. Leave the machine to cool to normal temperature at which point it will reset itself automatically. Do not restart the inverter until the reason for overheating has been understood and solved. (see below)

9.2 **Overheating.** This may occur for one of the following reasons : -
a) Inverter casing is full of dust making cooling system inefficient. *Clean as described in section 8.1.*
b) Fan not working. *Have fan renewed by authorised service agent.*
c) Electrode does not match the collet and collet body fitted within the torch. *Obtain and fit the correct size of torch components for the electrode selected.*
d) Bad connection in welding cable and/or work clamp has made poor connection with workpiece. *Check and clean all connections..*

9.3 **Poor weld quality.**
a) Refer to arc weld bead diagrams to the right and also to AC welding parameters in fig.10.
b) Check condition of electrode. It should be ground to the correct shape as seen in fig.7 and should be symmetrically conical.
c) Check that correct gas flow is being used.
d) Check that correct ceramic nozzle is fitted to torch.



9.4 **Difficulty in striking an arc.**
This is usually due to the electrode not being in good condition. Grind to correct shape or replace.

9.5 **Incompatible settings.** In some instances the machine will not work due to the fact that a combination of settings has been chosen that are electrically incompatible. In such instances no damage can be caused to the machine but it will be necessary to review and alter the settings to a more appropriate combination.

ARC WELDING

9.6 **Burning through thin metal:** On very thin sheet, e.g. car body work, the lowest amperage setting may be too fierce. In this case revert to TIG welding.

9.7 **Machine cuts out:** Refer to fault indicator information above.

9.8 **Difficulty in striking an arc:** a). The electrode is damp. Heat it up to 60º - 70º before using. b). Wrong type of rod.

10. ELECTROMAGNETIC COMPATIBILITY

10.1 THIS EQUIPMENT IS IN CONFORMITY WITH THE EUROPEAN STANDARD EN 50199 : - ELECTROMAGNETIC COMPATIBILITY OF ARC WELDING EQUIPMENT AND SIMILAR PROCESSES (e.g. ARC AND PLASMA CUTTING)

10.2 **Protection against interference. (E.M.C.)** The emission limits in this standard may not, however, provide full protection against interference to radio and television reception when the welding equipment is used closer than 30m to the receiving antenna . In special cases, when highly susceptible apparatus is being used in close proximity, additional mitigation measures may have to be employed in order to reduce the electromagnetic emissions. At the same time there could occur some potential difficulties in having electromagnetic compatibility in a non-industrial environment. (.eg. in residential areas.) Therefore it is most important that the welding equipment is used and installed according to the following instructions.

10.3 **Installation and use.** The user is responsible for installing and using the welding equipment according to these instructions. If electromagnetic disturbances are detected, then it shall be the responsabillity of the user of the welding equipment to resolve the situation with the technical assistance of the supplier. In some cases this remedial action may be as simple as earthing the circuit (see Note *). In other cases it could involve constructing an electromagnetic screen enclosing the welding power source and the work complete with associated input filters. In all cases the electromagnetic disturbances shall be reduced to the point where they are no longer troublesome.

Note * : The welding circuit may or may not be earthed for safety reasons. Changing the earthing arrangements should only be authorised by a person who is competent to assess whether the changes will increase the risk of injury, e.g. by allowing parallel welding circuit return paths which may damage the earth circuits of other equipment. Further guidance is given in IEC 974-13,'Arc welding equipment - Installation and use.' (Under preparation)

10.4 **Assessment of area.** Before installing welding equipment the user shall make an assessment of potential electromechanical problems in the surrounding area. The following shall be taken into account :

a) Other supply cables, control cables, signalling and telephone cables, above, below and adjacent to the welding equipment.
b) Radio and television transmitters and receivers.
c) Computer and other control equipment.
d) Safety critical equipment,e.g. Security monitoring of industrial equipment.
e) The health of people in the vicinity, e.g. Persons fitted with a pacemaker or hearing aid.
f) Equipment used for calibration or measurement.
g) The immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protective measures.
h) The time of day that welding and other activities are to be carried out.
The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

10.5 **Mains supply.** The Inverter should be connected to the mains supply according to these instructions. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should also be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. This shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

10.6 **Maintenance of the welding equipment.** The welding equipment should be routinely maintained according to these instructions. All access and service door covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in these instructions. In particular, the spark gaps of arc striking and stabilising devices should be adjusted and maintained according to these instructions

10.7 **Welding cables.** The welding cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.

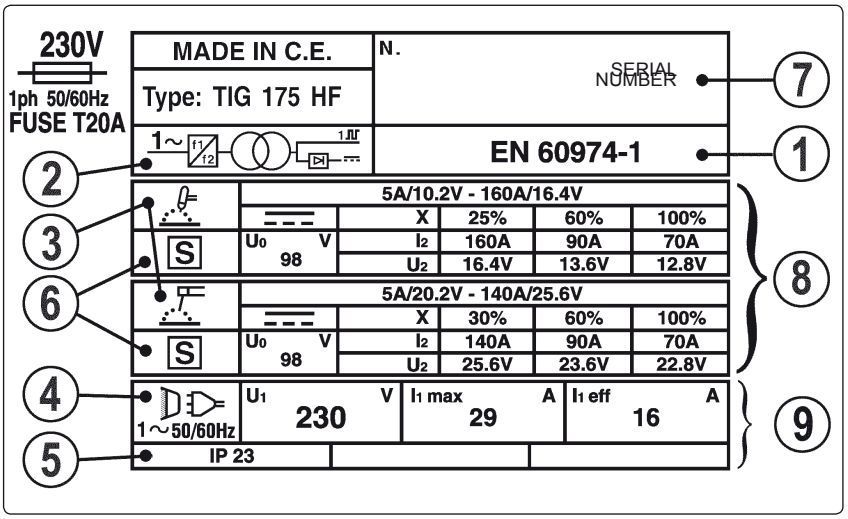
10.8 **Equipotential bonding.** Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the workpiece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

10.9 **Earthing of the workpiece.** Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, e.g. ship's hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to others or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by a suitable capacitance, selected according to national regulations.

10.10 **Screening and shielding.** Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.

11. RATINGS PLATE SYMBOLS

Detailed technical data relative to the performance of the machine is located on the back panel plate. **Please note** that the ratings plate shown below is an example only intended to assist with the explanations of symbols. To determine the correct technical values of the machine in your possession, you must refer to the data plate.



(1) The EUROPEAN standard regarding safety and the construction of arc welding machines.

(2) Symbol for the main internal parts of the welder : i.e. frequency converter (inverter) - transformer - rectifier.

(3) Symbols for the welding process chosen : i.e. TIG and manual arc welding with stick electrode.

(4) Symbol for mains supply : alternating current, single phase and frequency.

(5) Case protection grade: IP23. Standard governing the required protection from water ingress and isolation of internal parts from persons and objects.

(6) Symbol S: Indicates that welding operations may be carried out in areas with greater risk of electric shock (e.g. close to metal masses).

(7) Serial Number : Refer to your particular machine

(8) PERFORMANCE OF THE WELDING CIRCUIT:

UO : Maximum voltage with no-load peak (welding circuit open)

12 /U2 : Current and corresponding voltage are normal [U2=(20+0.04 I2) V] and may be supplied from the machine during welding.

X : Intermittent welding ratio: Indicates time during which machine can supply the corresponding current (same column). This is expressed in % on the basis of a 10min. cycle (e.g. 60% = 6 min of work, 4 min. break and so on).

A/V-A/V : Indicates the regulation range of the welding current (maximum - minimum) at the corresponding arc voltage.

(9) DATA REGARDING THE MAINS.

U1 : Alternate current and supply frequency of the machine allowed limits (+ 10-15%).

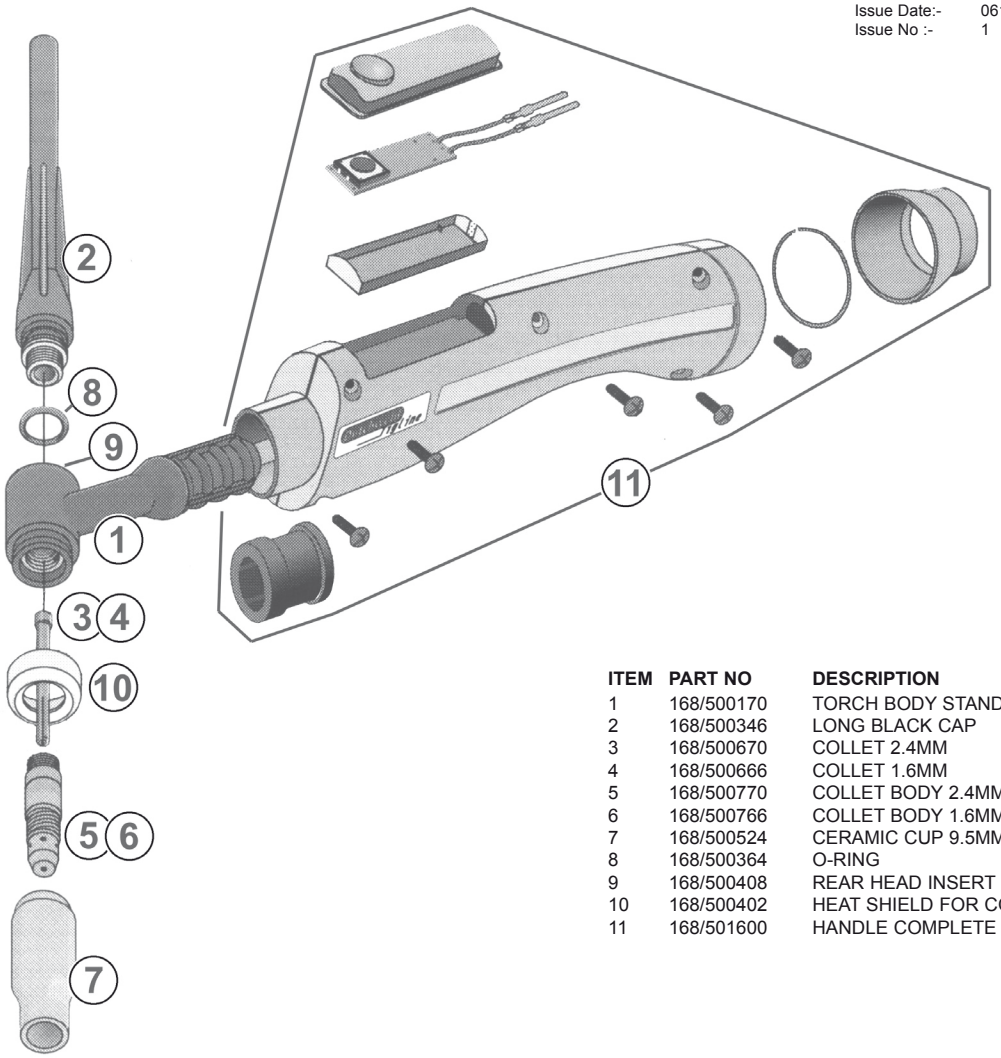
Value of delayed fuses for mains protection.

I1 : current absorbed by mains at the corresponding current, welding voltage and relative intermittent ratio.

PARTS LISTING FOR : TIG TORCH

MODEL : **168/700201611**

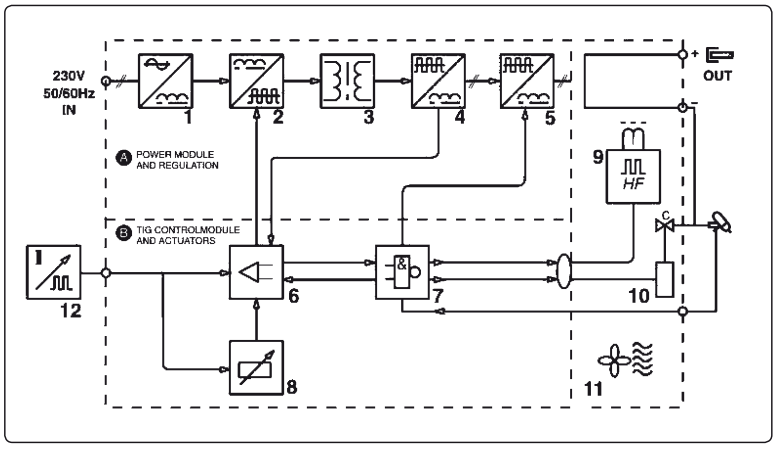
Issue Date:- 061003
Issue No :- 1



ITEM	PART NO	DESCRIPTION
1	168/500170	TORCH BODY STANDARD
2	168/500346	LONG BLACK CAP
3	168/500670	COLLET 2.4MM
4	168/500666	COLLET 1.6MM
5	168/500770	COLLET BODY 2.4MM
6	168/500766	COLLET BODY 1.6MM
7	168/500524	CERAMIC CUP 9.5MM (10N48)
8	168/500364	O-RING
9	168/500408	REAR HEAD INSERT
10	168/500402	HEAT SHIELD FOR COLLET BODY
11	168/501600	HANDLE COMPLETE SB

12. CIRCUIT SCHEMATIC

1. Mains input (single phase), rectifier unit and condenser.
2. Transistors and drivers switching bridge (IGBT). Turns the mains rectified voltage into high frequency alternating voltage (60khz) and permits power regulation according to the current / Voltage of weld to be done.
3. High frequency transformer: The primary windings are fed by the voltage converted by Block 2, it has the function of adapting voltage and current to values required by the ARC welding procedure and, simultaneously, isolates the welding circuit from mains.
4. Secondary rectifier bridge with inductance. Changes the alternating voltage/current supplied by secondary windings into continuous current/voltage at a low wavelength.
5. Controlled diode bridge (SCR) and drivers. It transforms the output current to the secondary circuit from DC to AC for AC TIG welding.
6. Regulation and control electronics. Controls instantly the value of welding current transistors and compares it with the value set by the operator and modulates the drive impulses of the IGTSs' drivers which execute the regulation.
7. Machine operation control logic. Sets up the welding cycles, controls the actuators and monitors the safety systems
8. Display, parameter setting and running modes panel.
9. HF striking generator.
10. Electrovalve for gas protection. 11. Machine intelligent cooling fan. 12. Remote regulation.

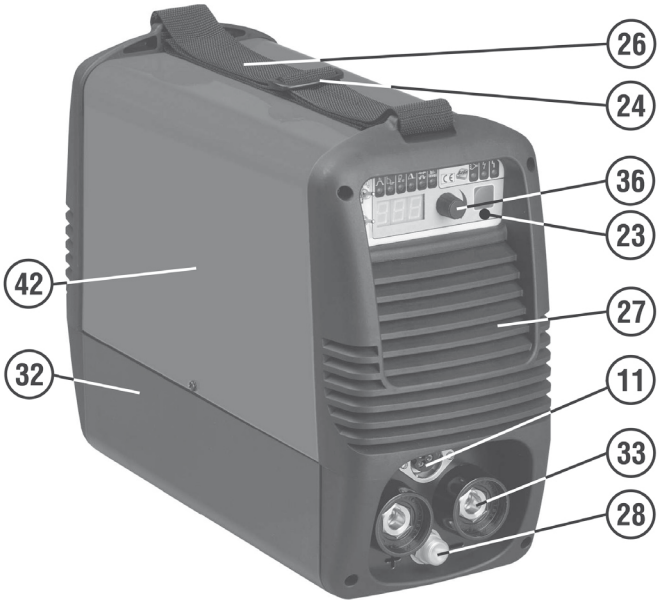


PARTS LISTING FOR : INVERTER

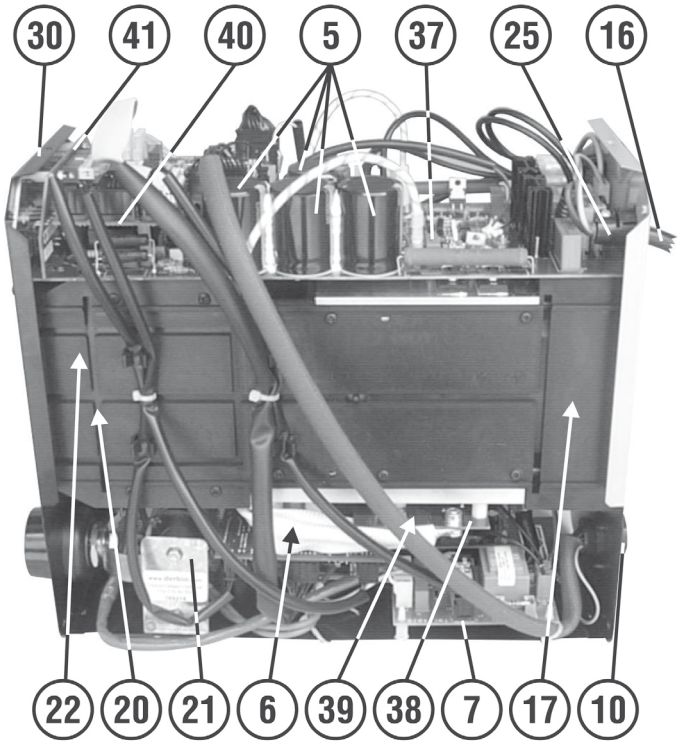
MODEL : **TIG175HF**

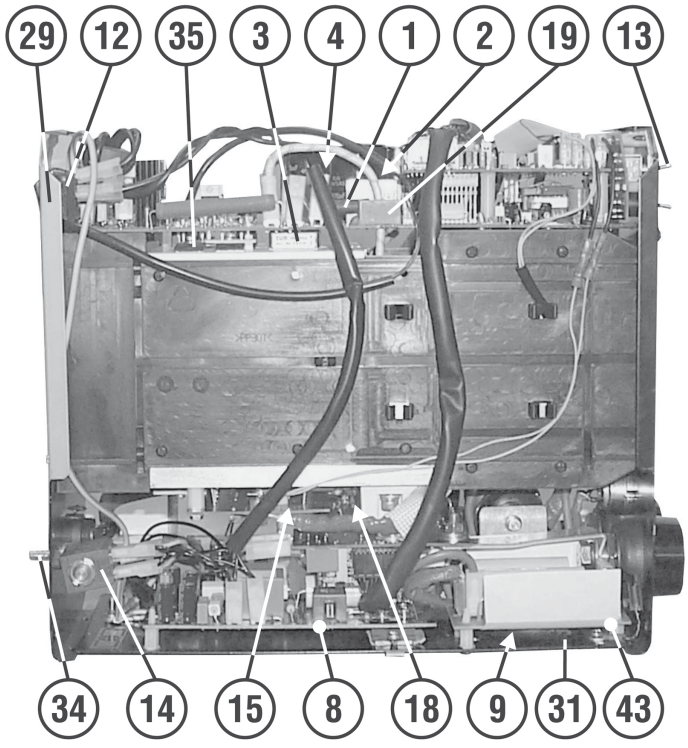
Issue Date:- 061003
Issue No :- 1

ITEM	PART NO	DESCRIPTION
1	120/112048	RESISTOR
2	120/112342	RELAY
3	120/112357	RECTIFIER
4	120/112513	VARISTOR
5	120/112514	CAPACITOR
6	120/113585	SCR
7	120/114028	TORCH PUSHBUTTON CARD
8	120.114381	H.F. CARD
9	120/120176	CAPACITOR
10	120.120513	CONTROL CABLE
11	120.120514	SOCKET CABLE
12	120/121007	SWITCH
13	120.121104	SWITCH
14	120/122035	ELECTROVALVE
15	120.121128	THERMOSTAT
16	120/132158	MAINS CABLE
17	120/152214	FAN
18	120/152219	SHUNT
19	120/152230	TRANSFORMER
20	120.169213	POWER TRANSFORMER
21	120.169215	HF TRANSFORMER
22	120.169227	INDUCTANCE
23	120.313768	FRONT PANEL
24	120/322065	BUCKLE
25	120/322112	BUSHING, CABLE
26	120/322408	BELT
27	120.322508	FRAME
28	120/602052	FITTING, EXT GAS PIPE
29	120.638620	BACK PANEL
30	120.644884	FRONT PANEL
31	120.644885	BOTTOM
31	120.644886	BOTTOM
33	120/712036	DINSE SOCKET
34	120/990120	COUPLER, GAS HOSE
35	120.990641	KIT DIODES - IGBT - RESISTANCE
36	120.990661	KIT KNOB
37	120.990727	PRIMARY KIT
38	120.990728	SECONDARY KIT
39	120.990729	KIT DIODES - IGBT
40	120.990730	CONTROL BOARD KIT
41	120.990731	PANEL KIT
42	120.990826	COVER KIT
43	120.990764	KIT SUPPORT CONTROL PCB
N/S	INV/TIG/3	TIG WELDING ACCESSORY KIT



ITEM	PART NO	DESCRIPTION
N/S	090123	ELECTRODE TUNGSTEN 1.6 GREEN
N/S	090133	ELECTRODE TUNGS/THOR 1.6 RED
N/S	090124	ELECTRODE TUNGS/THOR 2.4 RED
N/S	090163	ELECTRODE TUNGS/ZIRC 1.6 WHITE
N/S	090164	ELECTRODE TUNGS/ZIRC 2.4 WHITE
N/S	090193	ELECTRODE TUNGS/CER 1.6 GREY
N/S	090194	ELECTRODE TUNGS/CER 2.4 GREY





SEALEY POWER WELDERS

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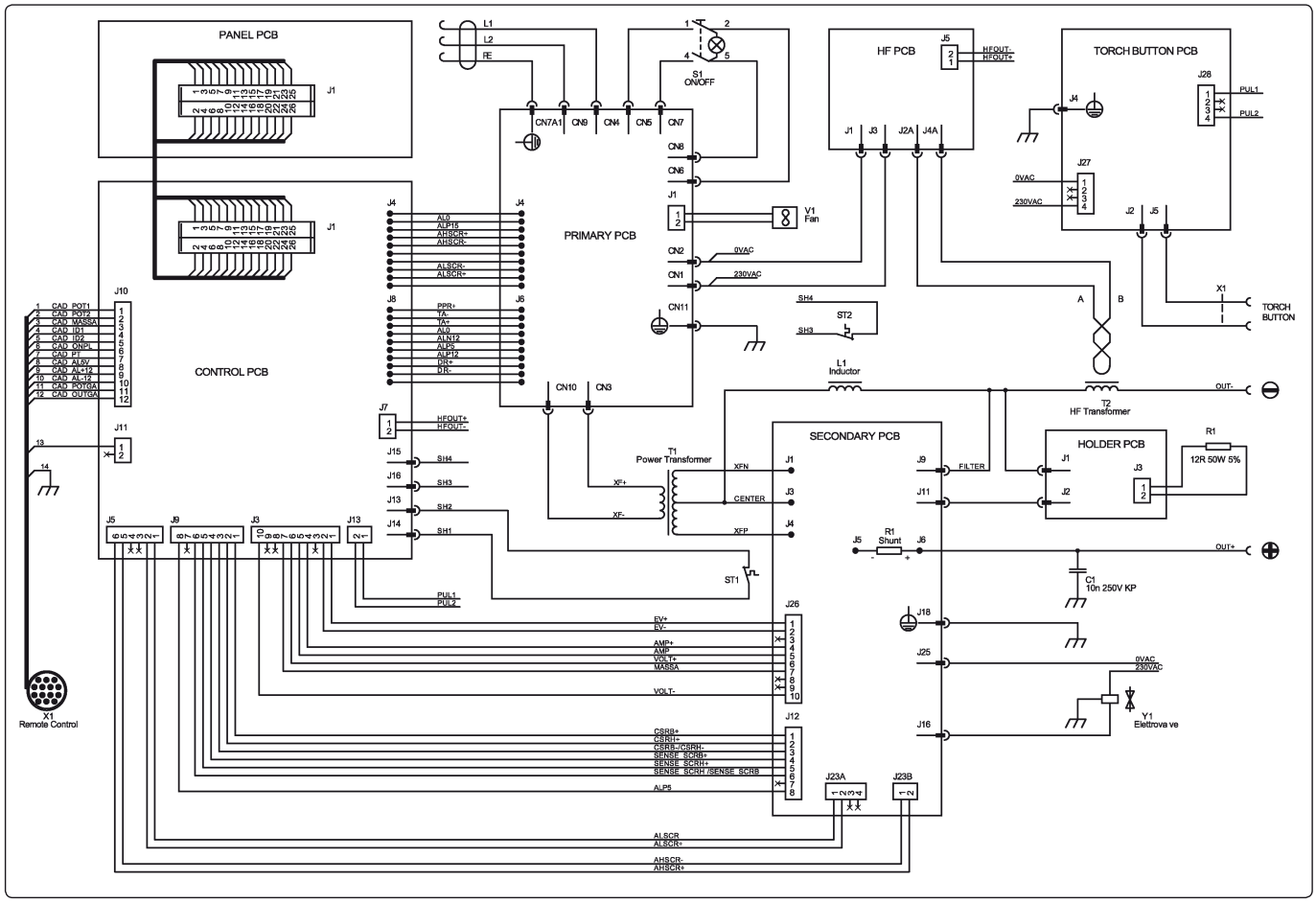
13. TIG175HF WIRING DIAGRAM



NOTE: *It is our policy to continually improve products and as such we reserve the right to alter data, specifications and component parts without prior notice.*
IMPORTANT: No liability is accepted for incorrect use of this product.
WARRANTY: Guarantee is 12 months from purchase date, proof of which will be required for any claim.
INFORMATION: For a copy of our latest catalogue and promotions call us on 01284 757525 and leave your full name and address, including postcode.

SEALEY POWER WELDERS

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