Pro-Tech TOOLS

200 A MMA/TIG AC/DC inverter welder



User Manual

Translation of the original manual

ARC WELDING AND TIG WELDING CAN BE DANGEROUS. PROTECT YOURSELF AND THOSE AROUND YOU FROM POTENTIALLY SERIOUS INJURY OR
DEATH. KEEP CHILDREN AT A SAFE DISTANCE. PEOPLE WITH PACEMAKERS SHOULD CONSULT THEIR DOCTOR BEFORE USE.

Read and understand the following important safety instructions.

ENSURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE CARRIED OUT ONLY BY QUALIFIED PERSONS.

ELECTRIC AND MAGNETIC FIELDS

1.a. Electric current flowing through any conductor creates localised electric and magnetic fields (EMFs). Welding current generates EMF fields around welding cables and welding machines.
1.b. Electromagnetic fields may interfere with the operation of some pacemakers, and welders with pacemakers should consult their doctor before welding.
1.c. Exposure to electromagnetic fields during welding may also have other health effects that are not currently known.
1.d. All welders should follow the procedures below to minimise exposure to electromagnetic fields from the welding circuit:
1.d.1. Keep the electrode and work cables together – secure them with tape where possible.
1.d.2. Never wrap the electrode cable around your body.
1.d.3. Do not stand between the electrode and the work cables. If the electrode cable is on your right-hand side, the work cable should also be on your right-hand side.
1.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.
1.d.5. Do not work near the welding power source.

ELECTRIC SHOCK

2.a. When the welder is switched on, the electrode and work (or earth) circuits are live. Do not touch these parts with bare skin or wet clothing. Wear dry, hole-free gloves to insulate your hands.
2.b. Insulate yourself from the material being welded and the ground using a dry insulating mat. Ensure that the insulating mat is large enough to cover the entire area of your physical contact with the material being welded and the ground.

In addition to standard safety precautions, if welding must be carried out in conditions involving an electrical hazard (in damp areas, or whilst wearing wet clothing; on metal structures such as floors, gratings or scaffolding; in confined positions such as sitting, kneeling or lying down, where there is a high risk of necessary or accidental contact with the workpiece or the ground), use the following equipment:

. Semi-automatic direct current welding machine with constant voltage (wire-fed).

. Manual DC welding machine (electrode type).

. An alternating current (AC) welder with reduced voltage control.

2.c. During semi-automatic or automatic wire welding, the electrode, wire reel, welding head, nozzle or semi-automatic welding gun are also electrically ‘live’.
2.d. Always ensure that the working cable has a good electrical connection to the metal being welded. The connection should be as close as possible to the welding area.
2.e. Earth the workpiece or metal to a good electrical (earthing) earth.
2.f. Keep the electrode holder, work clamp, welding cable and welding machine in good and safe working order. Replace any damaged insulation.
2.g. Never immerse the electrode in water to cool it.
2.h. Never touch live parts of electrode holders connected to two welders at the same time, as the voltage between them may be the sum of the open-circuit voltages of both welders.
2.i. When working above floor level, wear a safety harness to protect yourself from falling in the event of an electric shock.

ARC RAYS

3.a. When welding, or when observing open-arc welding, use a welding shield fitted with a suitable filter and cover lenses to protect your eyes from sparks and arc rays.
3.b. To protect your skin and that of your assistants from arc rays, wear suitable clothing made of durable, non-flammable material.
3.c. Protect other personnel in the vicinity with a suitable non-flammable screen, or warn them not to look at the arc or expose themselves to the arc rays, hot spatter or molten metal.

SMOKE AND GASES

4.a. Welding may produce fumes and gases that are hazardous to health. Avoid inhaling these fumes and gases. Keep your head out of the way of the fumes whilst welding. Ensure adequate ventilation or extraction at the welding site to prevent fumes and gases from entering the breathing zone. When welding

with electrodes that require special ventilation, such as when welding stainless steel, applying hard coatings, or welding steel clad with lead or cadmium and other metals or coatings that produce highly toxic fumes, keep exposure to the lowest possible level and below the threshold limit values (TLVs) by using local exhaust ventilation or mechanical ventilation. In confined spaces, or in certain circumstances even outdoors, a respirator may be required. Further safety precautions are also necessary when welding on galvanised steel.
4.b. Do not weld in the vicinity of chlorinated hydrocarbon vapours arising from degreasing, cleaning or spraying. The heat and arc light may react with solvent vapours to form phosgene, a highly toxic gas, and other irritants.
4.c. Shielding gases used in arc welding can displace air and cause injury or death. Always ensure adequate ventilation, particularly in confined spaces, to ensure that the breathing air is safe.
4.d. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS), and follow your employer's safety procedures. Safety Data Sheets (SDS) are available from your welding equipment distributor or the manufacturer.

WELDING SPARKS

5.a. Remove anything that poses a fire hazard from the welding area. If this is not possible, cover these items so that welding sparks cannot cause a fire. Bear in mind that welding sparks and hot materials produced during welding can easily pass through small cracks and openings into adjacent areas. Avoid welding near hydraulic pipes. Keep a fire extinguisher to hand.
5.b. If compressed gases are used in the workplace, specific safety precautions must be followed to prevent hazardous situations.
5.c. When not welding, ensure that no part of the electrode circuit is in contact with the workpiece or the earth. Accidental contact may cause overheating and create a fire hazard.
5.d. Do not heat or weld tanks, drums or containers until appropriate measures have been taken to ensure that such operations do not cause the release of flammable or toxic vapours from the substances inside. These vapours may cause an explosion, even if the containers have been 'cleaned'.
5.e. Sparks and spatter fly from the welding arc. Wear oil-free protective clothing, such as leather gloves, a thick shirt, trousers without cuffs, high-top boots and a hairnet. When welding in awkward positions or in confined spaces, wear earplugs. In the welding area, always wear safety goggles with side shields.
5.f. Connect the working cable to the workpiece as close to the welding zone as is practically possible. Work cables connected to the building structure or at other points distant from the welding zone increase the likelihood that the welding current will flow through lifting chains, crane ropes or other alternative circuits. This may pose a fire hazard or cause the lifting chains or ropes to overheat to the point of failure.

CYLINDER

6.a. Use only compressed gas cylinders containing the correct shielding gas for the process in question and properly functioning regulators designed for the gas and pressure being used. All hoses, fittings, etc. must be suitable for the application and kept in good condition.
6.b. Always store cylinders in an upright position and securely lashed to the chassis or a fixed support structure.
6.c. Cylinders should be located:
. Away from areas where they could be struck or exposed to physical damage.
. At a safe distance from arc welding or arc cutting and any other source of heat, sparks or flame.
6.d. Never allow the electrode, electrode holder or any other live electrical parts to come into contact with the bottle.
6.e. When opening the cylinder valve, keep your head and face away from the valve outlet.
6.f. Valve caps should always be fitted and hand-tightened, except when the cylinder is in use or connected for use.

Please read this user manual thoroughly before using this equipment. Keep this manual in a safe place and have it to hand for quick reference. Pay particular attention to the safety instructions we have provided for your protection.

INSTALLATION

CHOOSE A SUITABLE LOCATION FOR THE INVERTER

The welder will operate in demanding conditions. Nevertheless, it is important to follow simple precautions to ensure a long service life and reliable operation.
. The unit must be placed in a location with free circulation of clean air, so that airflow from the rear and out of the front is not restricted.
. The amount of dirt and dust that can be drawn into the equipment should be kept to a minimum. Failure to observe these preventative measures may lead to an excessive rise in operating temperatures and to unwanted downtime.

STACKING
The welder must not be stacked.

TILTING

Place the machine directly on a firm and level surface. Failure to do so may cause the machine to tip over.

ENVIRONMENT

Keep the machine dry. Do not place it on wet ground or in puddles.

CONNECTIONS

Ensure that the voltage, phase and frequency of the mains supply correspond to the specifications on the rating plate located on the rear panel of the unit.

CONNECTION PROCEDURE

The welder must be connected to a 230 V supply.

Protect the input circuit with time-delay fuses or type D circuit breakers with time delay. Using fuses or circuit breakers with a lower rating than recommended may lead to 'unwanted' tripping caused by the welder's inrush currents, even when welding is not being carried out at high currents.

It is recommended that the welder be used on a separate branch circuit.

INPUT 230 V

The unit is supplied with a 3-metre 230 V cable.

The device's rated output is available when connected to a 30 A branch circuit. When connected to a branch circuit with a lower rated current, a lower welding current and duty cycle must be used. An overview of the output values is given below. The values shown are approximate and must be reduced in the event of a fuse or circuit breaker tripping. The available output is also affected by other loads on the circuit and
the characteristics of the fuse/circuit breaker. Do not exceed the following welding conditions:

15 A branch circuit, 10 % duty cycle: electrode welding: 75 A; TIG: 105 A 20 A

branch circuit, 10 % duty cycle: electrode welding: 90 A; TIG: 130 A

Failure to follow the wiring instructions may result in personal injury or damage to the equipment. Installation or inspection must only be carried out by an electrician or a qualified person.

In all cases, the green or green-and-yellow earth wire must be connected to the earth pin of the plug, which is usually marked with a green screw.

OUTPUT AND GAS CONNECTIONS FOR TIG WELDING

The TIG torch and work cable connectors are supplied with the welder. Before connecting the cables, switch the main switch to the 'OFF' position. Plug the torch cable into the DC(-) socket for the electrode/gas output on the front of the welder and turn it clockwise until it is securely in place (do not overtighten it). This is a quick-connect fitting, which also serves to connect the shielding gas to the torch.

CONNECTING THE WORKING CABLE

Next, connect the working cable to the '+' output terminal in the same way.

This unit is fitted with a TIG torch. Any similar TIG torch can be used with this unit. To connect the connector to the torch, screw the terminal on the torch cable firmly into the brass connector.

OUTPUT CONNECTION FOR ELECTRODE WELDING

First, determine the correct polarity of the electrode you wish to use. You will find this information in the electrode specifications. Then connect the output cables to the output terminals corresponding to this polarity. For example, when welding with direct current (+), connect the electrode cable (which is connected to the electrode holder) to the '+' output terminal and the work cable (which is connected to the work terminal block) to the '-' output terminal. Insert the connector so that the protrusion aligns with the groove and turn it clockwise until the connection is secure. Do not overtighten.

CONNECTING THE SHIELDING GAS

Ensure you have the required inert shielding gas. Connect the gas cylinder to the pressure regulator and flow meter. Fit a gas hose between the regulator and the gas inlet (located on the rear of the welder).

The CYLINDER may explode if damaged.

. Keep the cylinder in an upright position and secure it to a support with a chain.
. Store the cylinder away from areas where it could be damaged.
. Never allow the torch or welding electrode to come into contact with the cylinder.

. Keep the cylinder away from live electrical circuits.

OPERATION

This equipment must only be operated by qualified personnel. Follow all safety instructions set out in this manual.

GENERAL DESCRIPTION OF THE EQUIPMENT

Welding machines are industrial power sources for arc welding with a constant current output. The welding characteristics of this machine have been
optimised for stick welding (SMAW) and TIG welding (GTAW). This unit is ideal for industrial applications where portability is important.

The WSE-200 welding machine is a power source capable of performing the following types of welding with excellent results: TIG (high-frequency) and electrode welding.

. TIG AC with rectangular waveforms
. TIG DC
. STICK AC with rectangular waveforms
. STICK DC

The WSE-200 welder has a rated output of 200 amps and 18 volts at a 60 per cent duty cycle. At lower output currents, it is capable of achieving higher duty cycles. At a 100 per cent duty cycle, it achieves 155 amps and 16.3 volts.

The duty cycle is the percentage of a 10-minute period during which the machine can weld at rated load without overheating.

If the duty cycle is exceeded, the O.C. indicator light will illuminate and the thermal fuse will cut off the output until the machine has cooled down. Wait fifteen minutes for the machine to cool down or until the O.C. indicator light goes out. Before welding again, reduce the current or the duty cycle.

Exceeding the duty cycle may damage the unit.

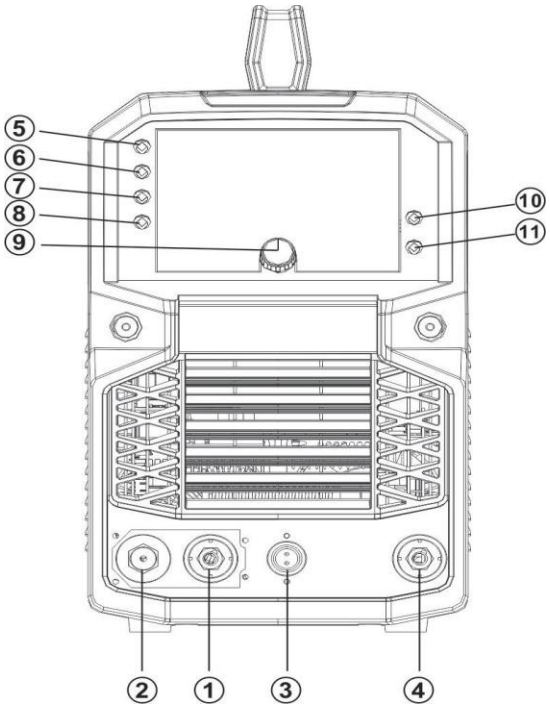
LIMITATIONS

The WSE-200 model is not recommended for defrosting pipes.

REAR CONTROL PANEL

The welder remains connected to the mains even when the main switch is in the ‘OFF’ position; therefore, there are live parts inside the power supply unit. Strictly follow the instructions in this manual.

FRONT CONTROL PANEL



1) Negative output terminal (-)
2) Negative TIG terminal with integrated gas inlet (-)
3) Torch/foot pedal control connector
4) Positive output terminal (+)
5) SAVE
6) CALL
7) PULSE / CLEAN
8) FUNCTION
9) Rotary control for setting welding current / parameters
10) AC / DC switch
11) 2-stroke / 4-stroke switch

1. Negative output terminal (-)

Quick-connect coupler for connecting the welding cable according to the selected mode and polarity.

2. Negative TIG terminal with integrated gas supply (-)

TIG torch connection, through which both the electrical contact and the shielding gas pass.

3. Torch control / foot pedal connector

Connector for the TIG torch trigger or remote current control via a foot pedal.

4. Positive output terminal (+)

Quick-connect coupler for connecting the working cable or electrode holder according to polarity.

5. SAVE

Saves the set parameters.

6. CALL

Recall saved settings.

7. PULSE / CLEAN

Selects or sets the pulse mode or the cleaning function for AC TIG.

8. FUNCTION

Selects the function or parameter to be set on the control panel.

9. Rotary control for setting the welding current / parameters

Used to change the welding current or the value of the currently selected parameter.

10. AC/DC switch

Selects between AC and DC welding output.

11. 2T / 4T switch

Selects the TIG torch control mode: two-stroke or four-stroke mode.

OUTPUT CURRENT LIMITS

The maximum output current specified in the installation section of this manual is reduced when welding with an electrode.

Model	AC TIG and DC TIG welding	AC electrode welding and DC electrode welding
WSE-200	max. 200 A	max. 180 A

DC TIG WELDING

The TIG (Tungsten Inert Gas) welding process is based on the formation of an electric arc between a non-consumable electrode (pure or alloyed tungsten with an approximate melting point of 1370 °C) and the workpiece. The weld pool is shielded by an inert gas atmosphere (usually argon).

To prevent tungsten from entering the joint, the electrode should not touch the workpiece. For this reason, the arc is struck using a high-frequency generator.

To improve the quality of the weld at the end of the welding process, it is important to carefully control the current decay and ensure sufficient gas coverage of the weld.

WELDING WITH POLARITY

DC electrode with negative polarity (DC polarity)

During welding, there is a continuous flow of electrons from the electrode to the workpiece.

This is the most commonly used polarity, which ensures limited electrode wear, as most of the heat is concentrated on the anode (workpiece). This polarity is used to achieve narrow and deep welds.

This polarity is used to weld most materials, with the exception of aluminium and magnesium.

Direct current with positive electrode polarity. (Direct current with reverse polarity)

In this case, there is a continuous flow of electrons from the workpiece to the electrode. Reverse polarity is used for welding alloys coated with a layer of refractory oxide.

With this polarity, the electrode acts as an anode and is subjected to high heat; the workpiece is bombarded by positive ions emitted from the electrode, which break down the surface oxide.

With positive electrode polarity, high currents cannot be used as they would cause excessive wear on the electrode.

A.C. (Alternating Current)

AC welding is typically used for welding aluminium (and its alloys) or magnesium using the TIG method. The polarity alternates between positive electrode and negative electrode (EN). During the positive half-cycle, the oxide layer is broken down. During the negative half-cycle, the electrode cools, the workpiece melts and penetration occurs.

Changing the wave balance alters the ratio between the cleaning and

penetration currents. Higher % EN = GREATER PENETRATION
Lower % EN = GREATER CLEANING

TIG WELDING OF STEEL

The TIG process is highly effective for welding both carbon and alloy steels, particularly in applications requiring precise results. Negative electrode polarity is required when using direct current. As this process does not involve the removal of impurities, the edges must be properly cleaned and prepared.

TIG WELDING OF COPPER

As TIG welding is a process characterised by a high concentration of heat, it is particularly suitable for welding materials with high thermal conductivity, such as copper. As with steel, direct current with negative electrode polarity is used, along with argon as the shielding gas. Given the fluidity of molten copper, the use of a backing plate may prove useful.

FILLER MATERIAL:

To prevent oxidation of the molten material, filler metals containing phosphorus, silicon or other deoxidising agents are usually used. Mechanical properties can also be improved by using silver.

SHIELDING GAS

Both argon and helium can be used when welding aluminium. Argon is preferred due to its lower cost and lower consumption. This gas also tends to stabilise the arc, making the work easier. For some applications, however, the use of helium or mixtures of argon and helium is recommended due to better weld penetration and a higher feed rate. Helium is particularly suitable for welding thick workpieces. The recommended gas flow rates are given in the table.

Current (A)	Helium cfh (l/min)
50	29–(14)
100	29-(14)
150	42-(20)
200	42-(20)
250	53-(25)
300	53-(25)

MAINTENANCE

SAFETY PRECAUTIONS AGAINST ELECTRIC SHOCK

ELECTRIC SHOCK can be fatal.

. Have this equipment installed and serviced by a qualified electrician.
. Before working inside this equipment, switch off the power supply at the fuse box, disconnect or unplug the power cables, and allow the equipment to stand for at least five minutes to allow the power capacitors to discharge.
. Do not touch live parts.

Prevent the accumulation of metal powder near and above the cooling fins. Carry out the following regular checks on the power supply:

. Clean the inside of the power supply using low-pressure compressed air.

. Check the electrical connections and all connecting cables.
. Always wear gloves in accordance with safety standards.

TROUBLESHOOTING

Follow all safety instructions set out in this manual

PROBLEMS WITH TIG WELDING

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS INCORRECT SETTINGS	RECOMMENDED PROCEDURE
Oxidation	1. Insufficient gas supply. 2. Protective cover missing from the rear.	If you have checked all the recommended areas for possible incorrect settings and the problem persists, contact the service department.
Internal defects in the tungsten	1. Incorrect electrode sharpening. 2. Electrode too small. 3. Operational fault (tip contact with the workpiece).	
Porosity	1. Impurities on the edges. 2. Contaminants on the filler material. 3. Feed rate too high. 4. Current intensity too low.	
Temperature-induced cracks	1 Unsuitable filler material. 2. High heat input. 3. Contaminated materials.	

ELECTRICAL FAULTS

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF INCORRECT SETTINGS	RECOMMENDED PROCEDURE
The machine will not switch on (The power indicator light is not lit)	1. No mains voltage. 2. Faulty plug or cable. 3. The internal fuse has blown.	If you have checked all the recommended areas where an incorrect setting may have occurred and the problem persists, contact the service department.
Incorrect output power (Power indicator light is on)	Low mains voltage.	
No output current (power indicator light is on)	1. An immediate fault relating to the input voltage or output current. 2. The unit has overheated. Allow the machine to cool down. The power should remain switched on so that the fan can maintain airflow and cool the machine. 3. The input voltage is too high or too low.	

PROBLEMS WITH ELECTRODE WELDING

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS INCORRECT SETTINGS	RECOMMENDED PROCEDURE
Excessive spatter	1. Long arc length 2. High current	If you have checked all
Craters	1. Rapid movement of the electrode away from the workpiece.	

Internal defects	1. Insufficient cleanliness or distribution of weld passes. 2. Incorrect electrode movement.	Recommended areas where incorrect settings may be present; if the problem persists, contact the service department.
Insufficient penetration	1. High travel speed. 2. Welding current too low. 3. Narrow edge overlap.	
Sticking	1. The arc is too short. 2. Current is too low.	
Porosity	1. Moisture in the electrode. 2. Long arc.	
Cracks	1. The current is too high. 2. Contaminated materials. 3. Hydrogen in the weld (present on the electrode coating).	

TECHNICAL SPECIFICATIONS

Product code: PT42015
Model: WSE-200
Voltage/Frequency: 220–240 V / 50 Hz TIG
output current: 200 A
MMA output current: 180 A
Protection class: IP21S
Insulation class: F