



INDUSTRIAL EQUIPMENTS PVT. LTD.

iTIG200DC | iTIG251DC iTIG301DC | CWTIG400ij

Inverter DC TIG / MMA Welding Machines

HF arc start | 200 A – 400 A | Single-phase and three-phase models



iTIG200DC



iTIG251DC



iTIG301DC



CWTIG400ij

INSTRUCTION MANUAL

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▲ Safety attention

General safety attention

- Pay full attention to the following items and comply with them; otherwise accidents may happen.
- The design and construction of the power supply, the selection of the installation site and the use of high-pressure gas must comply with the relevant standards and regulations.
- Persons not engaged in welding must not enter the workplace.
- Installation, overhaul, maintenance and operation must be carried out by qualified personnel.
- Do not use the welder for purposes other than welding, such as battery charging or heating.
- On uneven ground, take care that the welder cannot tip over.

Prevent electric shock or burns

- Do not touch live parts.
- Have a qualified electrician earth the welder with copper wire of the specified cross-section.
- Have a qualified electrician connect the welder to the power supply with copper wire of the specified cross-section, and make sure the insulation sheath is not damaged.
- In damp places or confined spaces, make sure you are insulated from the workpiece and the base metal.
- Use a safety net when working at height.
- Switch off the input power supply when the machine is not in use.

Avoid harm from welding fumes

- Use suitable exhaust equipment to avoid accidents such as gas poisoning or suffocation.
- When welding at the bottom of a vessel, shielding gas collects in the surroundings and may cause suffocation – always ensure ventilation.

Avoid hazards from the welding arc, spatter and slag

- Wear a welding helmet or protective glasses with a filter of sufficient shade: the arc can cause eye inflammation, and spatter and slag can burn the eyes.
- Wear protective equipment such as welding gloves, long-sleeved clothing, cap, foot covers and apron, so that the skin is not burned by arc radiation, spatter or slag.

Prevent fire, explosion and bursting

- Keep combustible material away from the welding area – spatter can start a fire.
- Connect the welding cable and the base metal tightly, otherwise a poor joint can overheat and cause a fire.
- Do not weld in combustible gases or on vessels that contain combustible material – risk of explosion.
- Do not weld closed containers – risk of bursting.
- Keep a fire extinguisher ready.

Avoid injury from rotating or moving parts

- Keep fingers, hair and clothing away from rotating parts such as the cooling fan.

Prevent the gas cylinder from tipping and the regulator from bursting

- Secure the gas cylinder firmly so that it cannot tip over and injure anyone.
- Do not keep the gas cylinder in high temperatures or direct sunlight.
- Keep your face away from the gas outlet when opening the cylinder valve.
- Use the gas regulator supplied or recommended by Cruxweld and follow its instructions.

Avoid injury when moving the welder

- When the welder is lifted by forklift or crane, nobody may stand below it or in its path.
- Lifting slings must be strong enough for the load; the angle of the slings at the hook must not exceed 30°.

Product description

The Cruxweld **iTIG200DC** and **iTIG251DC** are single-phase inverter DC TIG welding machines for a 220–230 V supply. The **iTIG301DC** and **CWTIG400iJ** are three-phase machines for a 415 V supply. All four models also weld with covered electrodes (MMA / stick).

The TIG machine has a constant-current characteristic: the welding current does not change with the arc length, so the current is very steady. When the electrode is short-circuited to the work, the current is automatically reduced to zero to limit tungsten burn-off and contamination of the workpiece. The arc is started by high frequency (HF) without touching the work.

Technical data

Model	iTIG200DC	iTIG251DC	iTIG301DC	CWTIG400iJ
Input voltage	AC 230 V $\pm$ 10% 1 phase	AC 220 V $\pm$ 15% 1 phase	AC 415 V $\pm$ 15% 3 phase	AC 415 V $\pm$ 15% 3 phase
Frequency (Hz)	50/60	50/60	50/60	50/60
Rated input capacity (kVA)	5.2	6.8	7.5	16.5
Open-circuit voltage (V)	75	78	70	70
Current range, TIG (A)	10 – 200	5 – 250	5 – 300	10 – 400
Current range, MMA (A)	20 – 200	10 – 250	20 – 280	20 – 400
Rated output voltage, TIG (V)	18	20	22	26
Rated duty cycle	60 %	250 A @ 60 % 195 A @ 100 %	300 A @ 60 % 230 A @ 100 %	60 %
Arc start	HF	HF	HF	HF (soft)
Suitable welding thickness (mm)	0.5 – 6	0.5 – 10	0.5 – 12	0.5 – 20
Efficiency (%)	85	85	85	85
Power factor (cos ϕ)	0.93	0.93	0.93	0.93
Protection class	IP23	IP23S	IP23S	IP23
Insulation class	H	H	H	H
Cooling	Forced air	Forced air	Forced air	Forced air; air- or water-cooled torch
Dimensions (mm)	420 x 160 x 310	480 x 204 x 303	505 x 203 x 375	675 x 385 x 630
Weight (kg)	8	9.5	12	38

The rating plate on the machine is binding. Duty cycle refers to a 10-minute cycle at 40 °C ambient.



TIG torch with gas hose and control cable

Installation

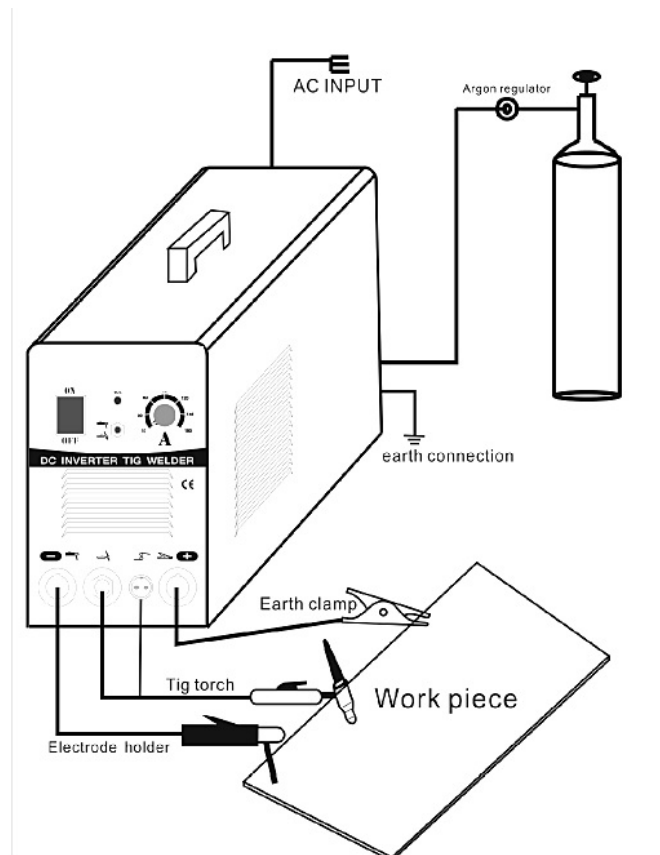
When a longer output cable is needed, choose a cable with a larger cross-section to limit the voltage drop. A welding torch cable that is too long has a strong influence on the arc and on the performance of the system – for example, HF arc starting becomes weak and the system may not work normally. Use the recommended cable lengths.

A. Connection of the input line

Each machine is supplied with a power cable. Connect it to a supply of the correct voltage for the machine (see the technical data) – do not make a wrong connection. If a single-phase 230 V machine is plugged into a 415 V supply, the machine goes into its protection state: switch off the power, connect the cable to the correct 230 V supply and restart the machine; it will then work normally again.

B. Connection of the output line

- Gas supply:** connect the argon hose to the brass gas connector at the back of the machine. The gas supply consists of the gas cylinder, the argon regulator with flow meter and the gas hose. Secure the hose connections with hose clamps to prevent leakage and air entry, which would affect the weld.
- Earth:** connect a cable of at least 6 mm² cross-section from the earth screw on the back of the welder (marked with the earth symbol) to earth, to prevent static charge and leakage current.
- Welding torch:** connect the gas / power connector of the TIG torch to the matching connector on the front panel and connect the torch control plug to the aviation (control) socket, then tighten them.
- Work return cable:** insert the work return cable into the output socket marked '+' and tighten it clockwise; clamp the earth clamp at the other end firmly to the workpiece.



Machine wiring diagram (typical front panel shown)

Precautions

A. Environment

- a. Weld in a relatively dry environment; air humidity must not exceed 90 %.
- b. Ambient temperature must be between $-10\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$.
- c. Avoid welding in direct sunlight or in the rain; do not let water get into the welder.
- d. Avoid gas-shielded welding in strong air currents.

B. Safety points

The welder has over-current and over-temperature protection circuits: it stops automatically when the mains voltage, the output current or the machine temperature exceeds the set limits. Excessive use (for example, too high a supply voltage) can still damage the welder, so pay attention to the following:

- a. Keep the machine well ventilated.** While welding, a large current flows through the machine and natural ventilation is not enough; the built-in fans cool the welder and keep it working steadily. Make sure the ventilation openings are not covered or blocked, keep the machine at least 0.3 m away from other objects and keep good ventilation at all times. This is very important for correct operation and long service life.
- b. Do not overload.** Always observe the maximum permitted load current for the selected duty cycle. Overloading shortens the service life of the welder and may even burn it.
- c. Do not use too high a supply voltage.** For the supply voltage see the technical data. The automatic voltage compensation keeps the welding current within its normal range, but the machine will be damaged if the supply voltage exceeds the permitted value. Take suitable precautions if the supply is unstable.
- d. Earth the machine.** Every welder has an earth screw on the back, marked with the earth symbol. Before use, connect it to earth with a cable of more than 6 mm^2 cross-section to discharge static and prevent leakage current and accidents.
- e. Automatic thermal protection.** If the machine is used beyond its rated duty cycle, it can suddenly enter the protection state and stop welding: the over-temperature switch has operated and the yellow indicator lamp on the front panel lights up. In this case do not unplug the machine – leave it switched on so that the fan keeps running. When the yellow lamp goes out and the temperature has fallen to the normal range, you can weld again.

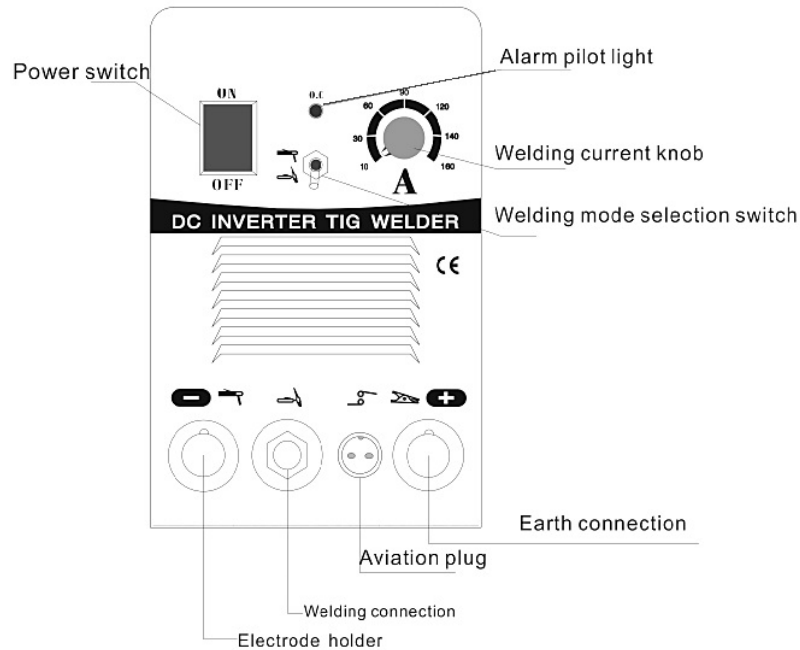
Maintenance

- A. Blow the dust out of the machine regularly with dry compressed air. If the welder is used in dense smoke or heavily polluted air, clean it every day.
- B. Use moderate air pressure to avoid damaging small components inside the welder.
- C. Check the internal connections regularly and make sure all connectors are locked in place (especially plug-in connectors and components). If contacts are rusty or loose, polish off the rust or oxide film with abrasive paper, reconnect and tighten.
- D. Prevent water or steam from entering the welder. If it has become wet, dry it first, then measure the insulation of the welder (between terminals, and between terminals and the housing) with an insulation tester. Weld again only if the result is normal.
- E. If the welder will not be used for a long time, put it back in its original packing and store it in a dry place.

Operation

- A. Turn the power switch to the "ON" position: the power indicator lights and the fan starts.
- B. Open the valve of the argon cylinder and set the flow meter to the required flow.
- C. Press the switch on the welding torch: you can hear the high-frequency spark discharge inside the machine, and argon flows from the torch nozzle.
- D. Set the welding current according to the thickness of the workpiece.
- E. Hold the tungsten electrode 2 – 4 mm from the workpiece and press the torch switch: the arc starts, the HF spark discharge inside the machine stops immediately and the yellow O.C. indicator lamp goes out. You can now start welding.

Functional indicator diagram

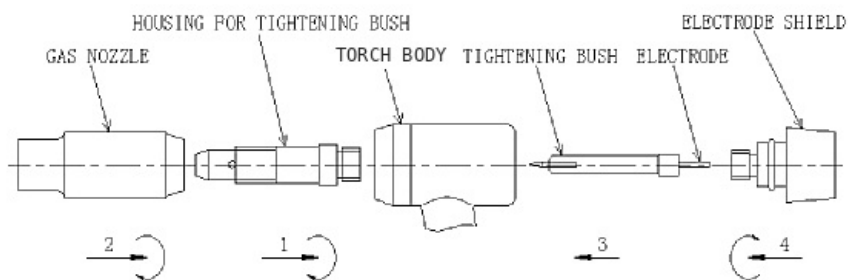


Controls and connections (typical front panel; the layout differs slightly between models - the larger models have a digital current meter and additional controls)

▲ WARNING

Never plug in or pull out any cable connector while welding. This endangers the operator and can seriously damage the equipment.

Assembly of the TIG torch consumables



Assembly of consumables for the TIG torch head (1 - 4: order of assembly)

Malfunction

The following phenomena may also be related to spare parts, gas, environmental factors or the power supply. Try to improve these conditions to prevent them.

A. The weld turns black

The weld has not been properly shielded and has oxidised. Check the following:

1. Make sure the argon cylinder valve is open and the cylinder has enough pressure. If the cylinder pressure is below 0.5 MPa, the cylinder should be refilled.
2. Check that the argon flow is switched on and sufficient. To save gas you can choose the flow according to the welding current, but too small a flow cannot cover the whole weld pool. We recommend a flow of never less than 5 L/min.
3. The simplest check: feel with your hand whether gas flows from the torch nozzle, and check whether the gas path in the welding torch is open.
4. Leaks in the gas path or gas of insufficient purity cause poor weld quality.
5. Strong air currents in the environment affect the weld quality.
6. The gas flow rate is set too low.

B. Difficulty in striking the arc

1. Make sure the tungsten electrode is of good quality; an electrode of poor quality may not give reliable arc starting.
2. If the tungsten electrode has not been ground to a sharp point, the arc is also unstable.

C. The current is unstable during welding

1. The mains voltage may have changed.
2. There is severe interference from the mains or from other electrical equipment.

Tungsten electrode preparation: grind the electrode lengthwise (grinding marks parallel to the electrode) to a point with a taper length of about 2 – 3 times the electrode diameter. A blunt or contaminated tip gives a wandering arc.

Troubleshooting

Only qualified technicians may open the machine. Switch off and unplug the machine and wait a few minutes before opening the housing.

Trouble		Possible cause	Remedy
Fan does not work after switching on the power switch		No input power	Check the input power
		Power switch is broken	Replace the power switch
		Disconnection inside the machine	Check the internal connections
		Fan is broken	Replace the fan
Trouble with arc starting	No sound of HF discharge inside the machine	Torch switch or “arc control” socket is broken or badly connected	Check the switch or socket and its connection
		220 V / 125 V transformer is disconnected or broken	Check the transformer and its connections
		HF relay on the control board cannot close	Check / replace the relay
		High-voltage unit or capacitor is broken	Check the high-voltage unit or capacitor
	Sound of HF discharge inside the machine	Overheat protection or over-current protection has operated	Switch the machine off for a few minutes and retry
		Tungsten electrode is too far from the workpiece	Keep a distance of 2 - 3 mm between tungsten electrode and workpiece
		Tungsten electrode is not sharp or is broken	Sharpen the tungsten electrode
		Tungsten electrode is badly fixed or of poor quality	Refit, or replace with a good tungsten electrode
		Welding current too low, or workpiece too dirty	Increase the current or clean the workpiece
		Spark gap of the arc ignition unit is dirty	Clean the spark gap with fine abrasive paper or alcohol
		Output fast-recovery diode is broken	Replace the diode
HF cannot be switched off		Torch switch or arc control wire is short-circuited	Check the switch and socket
		HF relay on the control board is broken	Replace the relay
		Comparator IC on the main control board is broken	Replace the IC or the control board

Troubleshooting (continued)

Trouble	Possible cause	Remedy
No argon flows after pressing the torch switch	Argon cylinder valve or flow meter is not open	Open both valves
	Gas hose is blocked or broken	Check the hose
	Gas solenoid valve is broken	Replace the valve
	Gas relay on the control board cannot close	Replace the relay or the control board
Welding current cannot be adjusted	Current potentiometer is broken or its wire is disconnected	Replace the potentiometer or reconnect the wire
Rated output current is not reached	Input voltage is too low	Ensure the normal supply voltage
	Input cable is too thin	Replace with a supply cable of adequate cross-section
	Capacity of the power supply is not sufficient	Make sure the supply capacity is greater than the maximum input power of the machine
Output rectifier diode is broken	Long periods at high current, or high ambient temperature	Replace the broken diode and improve the working conditions
	Frequent diode failure caused by too large a spark gap in the arc ignition unit	Adjust the spark gap to 1.0 – 1.2 mm

If a fault cannot be cleared with the checks above, contact Cruxweld service with the model, serial number and a description of the fault. Do not attempt to repair the power board or control board yourself.

Warranty

The power source is guaranteed against defects in material and workmanship for the period stated in the sales contract from the date of invoice. Consumables (tungsten electrodes, collets, nozzles, torch parts, fuses) and damage caused by misuse, wrong supply voltage, lack of maintenance or unauthorised repair are not covered. For service please contact support@cruxweld.com or +91 8800 882 983.



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Cruxweld improves its products continuously. The technical data in this manual may change without notice.