



INDUSTRIAL EQUIPMENTS PVT. LTD.

CWMIG500P

MIG 500 Water Cooled Welding System

IGBT inverter | MIG/GMAW · FCAW · MMA | 3 phase 400 V | 50 – 500 A



INSTRUCTION MANUAL

Please read this manual carefully before installing and using the machine.

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This manual contains the description, installation, operation, safety and maintenance instructions for the Cruxweld CWMIG500P MIG 500 water cooled welding system.

Please read and understand this manual before installing and operating the machine, and keep it near the machine for future reference.

Cruxweld provides a warranty for this machine from the date of purchase, as stated in Chapter 10.

Cruxweld improves its products continuously. The contents of this manual may be revised without prior notice.

Signs used in this manual

▲ DANGER	Immediate danger which will cause death or serious injury if it is not avoided.
▲ WARNING	A potential hazard which may cause death or serious injury if it is not avoided.
▲ CAUTION	A hazard which may cause injury or damage to the machine if it is not avoided.
Note	Useful information for correct operation.

The machine is designed and built for industrial and professional use in accordance with the IEC 60974 series of standards for arc welding equipment.

1 Safety precautions

Arc welding can be dangerous to the operator and to people in or near the work area. Read this chapter carefully and follow all safety rules. Installation, operation, inspection and maintenance must be carried out only by trained and qualified persons. The machine must not be used for any purpose other than welding.

1.1 Electric shock can kill

- Connect the earth (ground) terminal of the machine to a reliable earth according to the local electrical regulations.
- Never touch live parts, the welding wire, the contact tip or the electrode with bare skin or wet gloves. Wear dry, undamaged insulating gloves and clothing.
- Keep your body insulated from the workpiece and from the ground. In confined or damp places stand on a dry insulating mat and wear rubber-soled shoes.
- Switch off and isolate the mains supply before connecting cables, opening covers or carrying out any maintenance. The internal voltage of the machine can be as high as about **600 V**.
- Do not use cables with damaged insulation, loose connections or undersized conductors. Replace damaged cables immediately.
- Never use the machine in the rain, in wet areas or with wet hands.

1.2 Arc rays and spatter

- Always use a welding helmet or face shield with the correct shade of filter glass (shade 11 – 14 depending on current) to protect the eyes and face.
- Wear flame-resistant protective clothing, leather gloves, an apron and safety shoes. Keep collars, cuffs and pockets closed.
- Use non-flammable screens to protect other people from arc rays. Warn bystanders not to look at the arc.

1.3 Fumes and gases

- Welding produces fumes and gases that are hazardous to health. Keep your head out of the fumes and do not breathe them.
- Provide good natural ventilation or local fume extraction, especially in confined spaces. Use a respirator where ventilation is poor.
- Shielding gases (CO₂, argon and mixtures) can displace air and cause suffocation in confined spaces.
- Do not weld near degreasing, cleaning or spraying operations – the arc can form toxic gases.

1.4 Fire and explosion

- Sparks and spatter can cause fire. Remove all flammable material (wood, paper, cloth, oil, fuel) from the work area, or cover it with fire-resistant covers.
- Never weld on closed containers, tanks or drums, or on pipes that have held flammable material, unless they have been properly cleaned and made safe.
- Keep a fire extinguisher near the work area. Check the area for smouldering fires after welding.

1.5 Gas cylinders

- Shielding gas cylinders contain gas under high pressure. Handle them carefully and always secure the cylinder with the chain on the trolley so that it cannot fall.
- Keep cylinders away from heat, sparks, flames and electrical circuits. Never strike an arc on a cylinder.
- Use only a regulator that is suitable for the gas used. Open the cylinder valve slowly, standing to one side of the regulator.
- Close the cylinder valve when the machine is not in use.

1.6 Noise

- The noise produced by some welding and cutting operations can damage hearing. Wear ear protection where the noise level is high.

1.7 Electromagnetic fields

- Welding current produces electromagnetic fields. Persons with a cardiac pacemaker or other implanted medical device must consult their doctor before welding or going near welding operations.
- Keep the torch cable and work cable together, never coil cables around the body, and connect the work clamp as close to the weld as possible.

1.8 Moving parts and hot parts

- Keep hands, hair, loose clothing and tools away from the wire feed rolls, the fan and other moving parts.
- Never point the torch at yourself or at other people while feeding wire – the wire can cause injury.
- The torch nozzle, contact tip, workpiece and electrode stubs become very hot. Allow them to cool before handling.

1.9 Machine malfunction

- If the machine does not work normally, stop using it at once. Consult this manual or contact Cruxweld service.
- Only qualified persons may repair the machine. Do not modify the machine.

▲ WARNING

Never operate the machine with its covers removed. Do not insert anything into the ventilation openings. Do not use the machine to thaw frozen pipes.

2 General description

The Cruxweld CWMIG500P is a heavy duty, IGBT inverter based MIG 500 welding system for continuous industrial use. The complete system is mounted on one mobile trolley and includes:

- the **MIG power source** (50 – 500 A) with dual digital displays;
- the **built-in water cooling unit** for the torch;
- a **4-roll wire feeder** for spools of up to 18 kg, with its own current and voltage controls;
- a **water-cooled MIG torch** and a torch holder;
- a **trolley** with wheels and castors that holds a full-size gas cylinder.

The machine is suitable for MIG/MAG (GMAW) welding with solid wire and shielding gas, for flux-cored arc welding (FCAW, with or without gas depending on the wire), and for manual metal arc (MMA / stick) welding. It is used in steel fabrication, structural work, shipbuilding, heavy engineering, pressure vessels, oil and gas and repair workshops, for mild steel, low-alloy steel and stainless steel, and for aluminium with suitable wire and gas.

2.1 Features

- IGBT inverter technology – stable arc, high efficiency (91 %) and high power factor (0.93).
- Low spatter, good weld appearance and deep penetration with CO₂ or mixed gas.
- Reliable arc striking and an anti-stick / ball-elimination function at the end of the weld, for clean restarts.
- 2T / 4T torch trigger modes; crater (end) current and voltage control in 4T mode.
- Adjustable inductance for a soft or hard arc; arc force control in MMA mode.
- Integrated water cooling keeps the torch cool during long welding at high current.
- 4-roll wire drive for smooth, steady feeding of solid and flux-cored wire from 1.0 to 1.6 mm.
- Gas check and wire check (inching) functions for easy setting up.
- Automatic overload / over-temperature protection with a warning lamp.
- Supply socket (AC 36 V) for a heated CO₂ regulator.
- Compatible with a spool gun (optional) for aluminium and soft wires.

2.2 Working principle

The three-phase 400 V, 50 / 60 Hz supply is rectified and filtered to DC. An IGBT full-bridge inverter switches this DC at a high frequency (about 20 kHz). The high-frequency AC is stepped down by the main transformer, rectified by fast recovery diodes and smoothed by the output reactor to give the DC welding output.

The control circuit compares the actual welding current and voltage with the set values and adjusts the pulse width of the inverter, so that the output stays stable even when the supply voltage or the arc length changes. The control circuit also operates the wire feeder, the gas valve and the protection functions.

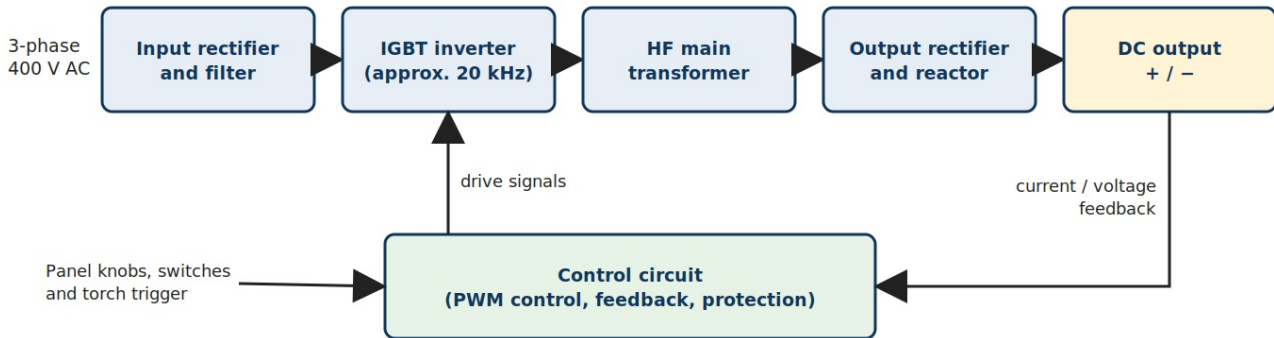


Fig. 2.1 Block diagram of the CWMIG500P power source

2.3 Main components of the power source

Component	Function
Input rectifier bridge	Converts the 3-phase AC supply into DC.
IGBT inverter	Full-bridge inverter that converts the DC into high-frequency AC (about 20 kHz).
Main transformer	High-frequency transformer that reduces the voltage to the welding level.
Output rectifier and reactor	Fast diodes and inductance that give a smooth DC welding current.
Control board	Controls the output, the wire feeder, the gas valve, the displays and the protection.
Control transformer	Supplies the control board and the auxiliary circuits.
Cooling fan	Cools the power components. It runs whenever the machine is switched on.
Housing	Sheet-steel housing with plastic front and rear frames; protection class IP21S.

2.4 Output characteristic

In MIG mode the power source has a constant-voltage (flat) output characteristic. The standard conventional load line is $U_2 = 14 + 0.05 \times I_2$ (V), for example 39 V at 500 A. In MMA mode the machine works with a constant-current characteristic with adjustable arc force.

3 Technical specifications

Specification	CWMIG500P
Mains voltage	3 phase ~ 400 V ±15 %
Frequency	50 / 60 Hz
Rated input power	24.2 kVA
Rated input current	37 A
Welding processes	MIG/MAG (GMAW), FCAW, MMA
Output current range - MIG	50 - 500 A
Output current range - MMA	30 - 500 A
Welding voltage adjustment range	15.5 - 50 V
Open-circuit (no-load) voltage	70 - 80 V
Rated duty cycle	100 % (see 3.1)
Efficiency	91 %
Power factor	0.93
Wire diameter (solid and flux-cored)	1.0 - 1.6 mm
Wire feeder	4-roll drive
Wire feed speed	1.5 - 22 m/min
Wire spool capacity	up to 18 kg
Shielding gases	CO ₂ , argon, argon mixtures
Torch cooling	Water, integrated cooling unit
Display	Dual digital displays (V and A)
Trigger modes	2T / 4T
Overload protection	Automatic shutdown
Heated regulator socket	AC 36 V, 3.5 A
Insulation class	H
Protection class	IP21S
Dimensions (L x W x H), complete system	1040 x 515 x 1415 mm
Weight (approx.)	110 kg

Specifications may change without notice as a result of continuous improvement. The values on the rating plate of the machine apply.

3.1 Duty cycle

The duty cycle is the percentage of a 10-minute period during which the machine can weld at a given current without overheating. For example, at 60 % duty cycle the machine can weld for 6 minutes and must then rest for 4 minutes.

- Always check the rated duty cycle on the rating plate and work within it.
- If the duty cycle is exceeded, the over-temperature protection switches off the output and the **protection lamp** lights. The fan keeps running. Do not switch the machine off – wait until the lamp goes out, then continue welding at a lower current or with longer rest periods.
- Frequent tripping shortens the life of the machine. Reduce the current or the welding time.

Higher ambient temperature, poor ventilation, a low coolant level or long, undersized cables reduce the available duty cycle.

3.2 Rating plate symbols

U₀	Open-circuit (no-load) voltage, V	U₁	Rated supply voltage, V
X	Rated duty cycle, %	I_{1max}	Maximum input current, A
I₂	Welding current, A	I_{1eff}	Effective input current, A
U₂	Conventional welding voltage, V	IP21S	Degree of protection of the enclosure
3~ 50/60 Hz	3-phase supply, line frequency	S	Suitable for use in environments with increased risk of electric shock

3.3 Operating conditions

Ambient temperature during welding	–10 °C to +40 °C
Temperature during transport and storage	–25 °C to +55 °C
Relative humidity	not more than 50 % at 40 °C; not more than 90 % at 20 °C
Wind speed at the arc	not more than 1 m/s (use wind screens outdoors)
Floor slope	not more than 10°
Supply voltage waveform	sine wave, 400 V ±15 %, frequency within ±1 %
Air quality	no dust, acid, corrosive gases or conductive particles beyond normal levels

▲ CAUTION

If the machine is used or stored at temperatures below 0 °C, the coolant must contain antifreeze (see 5.5). Frozen coolant damages the pump, the radiator and the torch.

4 Machine overview and controls



Fig. 4.1 Main parts of the CWMIG500P welding system

1	Wire spool housing (spool cover)	8	Output terminals (+ / -) and wire feeder control socket
2	Wire feeder (4-roll drive)	9	Water cooling unit
3	Wire feeder controls (current and voltage knobs)	10	Coolant tank with filler cap
4	Torch connector (central adaptor)	11	Rear wheels
5	Coolant quick couplings (red / blue) and cable connections	12	Front swivel castors
6	MIG power source	13	Water-cooled MIG torch
7	Front control panel		

The gas cylinder is placed on the platform at the rear of the trolley and secured with the chain. Hang the torch on the torch holder when it is not in use.

4.1 Front panel of the power source



Fig. 4.2 Front panel

No.	Item	Function
1	Voltmeter display (V)	Shows the welding voltage. Before welding it shows the preset voltage.
2	Ammeter display (A)	Shows the welding current. Before welding it shows the preset current.
3	Power indicator	Lights when the machine is switched on.
4	Protection indicator	Lights when the machine is overheated or overloaded, or in case of an abnormal supply. The output is switched off until the fault clears.
5	Crater voltage / Welding current knob	MIG, 4T: sets the crater (end) voltage. MMA: sets the welding current.
6	Crater current / Arc force knob	MIG, 4T: sets the crater (end) current, used to fill the crater at the end of the weld. MMA: sets the arc force – higher values give a harder, more penetrating arc and prevent electrode sticking.
7	Inductance knob	Adjusts the dynamic characteristic of the arc in MIG mode. Lower inductance: harder, more concentrated arc, suited to thin plate and short-circuit transfer. Higher inductance: softer arc, wetter bead and less spatter at higher currents.
8	2T / 4T switch	Selects the torch trigger mode (see 6.3).
9	MIG / MMA switch	Selects MIG (GMAW / FCAW) or MMA (stick) welding.
10	Gas check / Wire check switch	Gas check: opens the gas valve to purge the hose and set the gas flow. Wire check: feeds the wire without welding voltage, for threading the wire through the torch. Return the switch to the centre (welding) position after use.
11	Output terminal (+)	Positive output. MIG: connection of the wire feeder power cable. MMA: normally the electrode holder cable.
12	Wire feeder control socket	Connection of the control cable of the wire feeder.
13	Output terminal (–)	Negative output. MIG: connection of the work (earth) cable. MMA: normally the work cable.

4.2 Rear panel of the power source

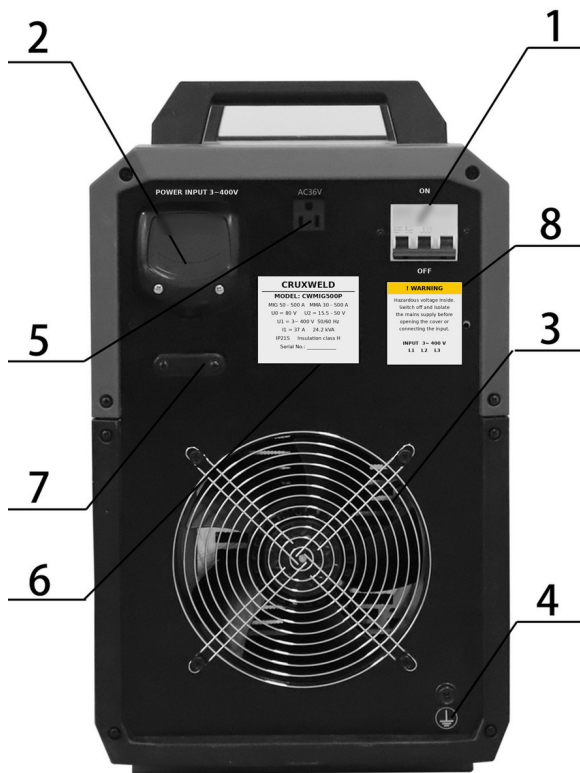


Fig. 4.3 Rear panel

No.	Item and function
1	Circuit breaker (ON / OFF). Protective 3-pole breaker for the power source. It trips automatically in case of overload or a short circuit. Switch it ON before welding. It is a protective device, not an operating switch – do not use it to switch the machine on and off frequently.
2	Power input. Entry of the 3-phase supply cable.
3	Cooling fan. Keep free from obstruction.
4	Earth (ground) bolt. Connect to a reliable protective earth.
5	Heater socket AC 36 V, 3.5 A. Supply for the heater of a CO ₂ gas regulator. Do not connect any other load.
6	Rating plate. Model, serial number and rated data.
7	Cable clamp. Strain relief for the supply cable.
8	Warning label. Electric shock warning.

4.3 Wire feeder

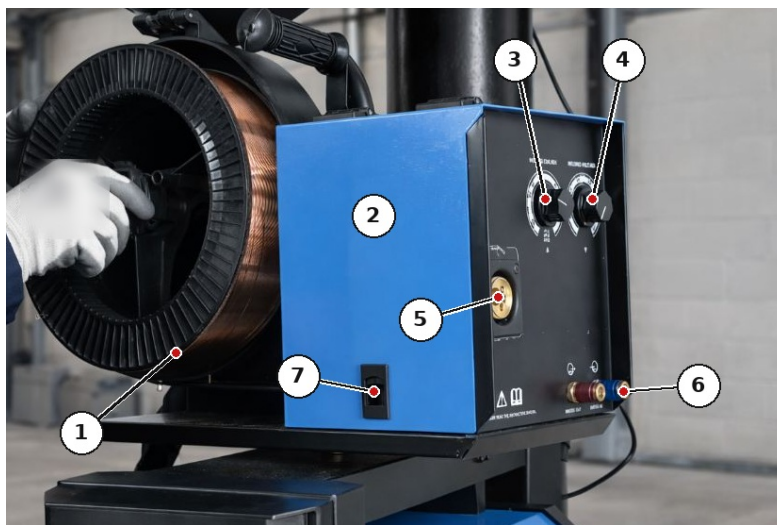


Fig. 4.4 Wire feeder, front view

1	Wire spool on the spool holder (up to 18 kg)	5	Torch connector (central adaptor)
2	Side cover of the wire drive compartment	6	Coolant quick couplings for the torch hoses
3	Welding current knob – sets the wire feed speed and therefore the welding current	7	Cover latch
4	Welding voltage knob – sets the welding (arc) voltage		

The current and voltage for MIG welding are set on the wire feeder, so the welder can adjust them close to the job. The preset values are shown on the displays of the power source.

5 Installation

5.1 Unpacking and location

- Check the machine and accessories for transport damage. Report any damage to the transporter and to Cruxweld immediately.
- Place the machine on a firm, level floor (inclination not more than 10 – 15°) and lock the castors.
- Leave at least **50 cm** of free space in front of and behind the machine and at least **20 cm** at the sides for cooling air.
- Protect the machine from rain, direct sunlight, dripping water, dust, metal chips and corrosive gases. Do not place it where grinding dust can be drawn in by the fan.
- Do not place the machine on a surface that is inclined or unstable. The complete system weighs about 110 kg without gas cylinder – move it only on its wheels.

▲ WARNING

Do not lift the machine with a crane by the wire feeder or by the gas cylinder. Remove the gas cylinder before moving the machine over uneven ground or lifting it.

5.2 Mains connection

▲ DANGER

The mains connection must be made by a qualified electrician, with the supply switched off and isolated.

1. Check that the supply matches the rating plate: **3 phase, 400 V ±15 %, 50 / 60 Hz**. The rated input current is 37 A (24.2 kVA).
2. Provide a separate 3-pole isolator with fuses or a circuit breaker of suitable rating (recommended **63 A**) near the machine.
3. Use a 4-core copper supply cable (3 phases + earth) of at least **6 mm²**; use a larger size for long cables.
4. Connect the three phases to the power input on the rear panel and the earth conductor to the earth. Fix the cable in the cable clamp.
5. Connect the **earth bolt** (rear panel, lower right) to a reliable protective earth. **The machine must always be earthed.**

Do not connect the machine to a supply with a missing phase or a voltage outside the rated range. An engine generator must be of adequate capacity and must have a stable voltage.

5.3 Connecting the welding system

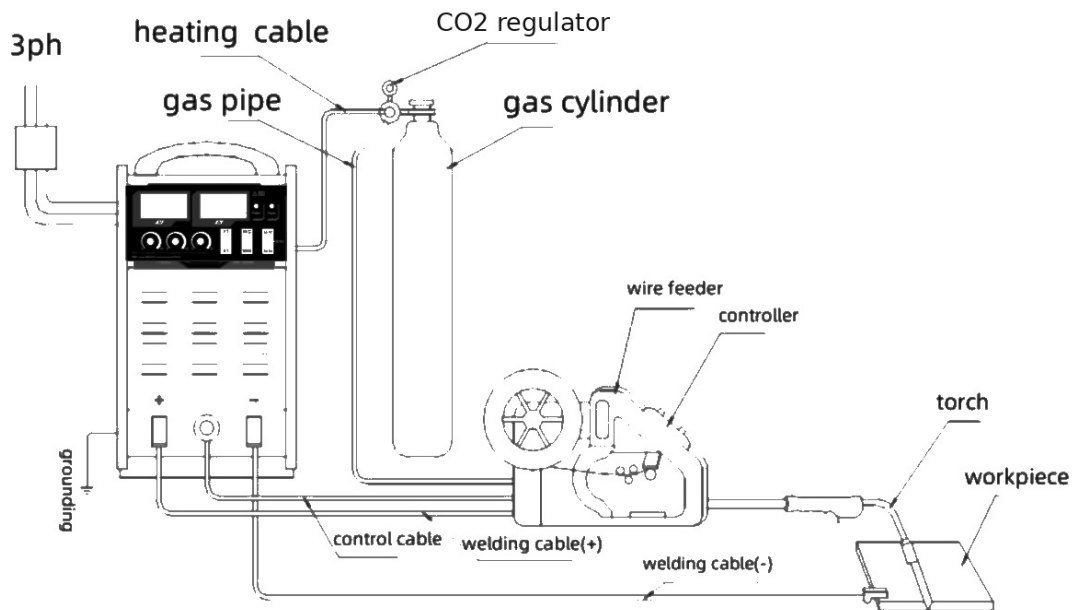


Fig. 5.1 Connection diagram (schematic)

1. Connect the **work (earth) cable** to the **(-)** output terminal and turn the plug clockwise to lock it. Fix the work clamp to the workpiece.
2. Connect the **power cable of the wire feeder** to the **(+)** output terminal and lock it.
3. Connect the **control cable of the wire feeder** to the control socket on the front panel and tighten the ring nut.
4. Connect the **cooling water hoses** of the interconnection cable between the cooling unit and the wire feeder (colour to colour).
5. Insert the **water-cooled torch** into the torch connector of the wire feeder and tighten the nut firmly by hand. Connect the torch water hoses to the quick couplings on the wire feeder, **blue to blue and red to red**.
6. Place the **gas cylinder** on the trolley and secure it with the chain. Fit the regulator and connect the gas hose from the regulator to the gas inlet of the wire feeder.
7. If a heated CO₂ regulator is used, connect its heater cable to the **36 V heater socket** on the rear panel.
8. Have the **3-phase supply cable and the earth** connected (5.2).
9. Fill the cooling unit with coolant (5.5) and fit the wire (5.6), then switch on the **circuit breaker** on the rear panel.



Fig. 5.2 Connecting a cable to the output terminal

▲ CAUTION

Tighten all output plugs firmly. Loose connections overheat and damage the terminals. Keep the welding cables as short as possible and do not coil them.

5.4 Polarity

Process	(+) terminal	(-) terminal
MIG/MAG with solid wire and gas	Wire feeder (torch)	Work cable
FCAW, gas-shielded flux-cored wire	Wire feeder (torch)	Work cable
FCAW, self-shielded (gasless) wire	Work cable *	Wire feeder (torch) *
MMA, most electrodes (DCEP)	Electrode holder	Work cable
MMA, rutile electrodes on thin sheet (DCEN)	Work cable	Electrode holder

* Most self-shielded flux-cored wires require negative polarity. Always follow the polarity recommended by the wire or electrode manufacturer.

5.5 Water cooling unit



Fig. 5.3 Filling the coolant tank

1. Open the filler cap of the coolant tank at the front of the cooling unit.
2. Fill the tank with clean **distilled or de-ionised water**, or with a ready-mixed welding coolant, up to the maximum mark.
3. Where the temperature can fall below 0 °C, use a mixture of water and ethylene-glycol antifreeze suitable for the lowest expected temperature.
4. Close the cap. After switching on, check that coolant returns from the torch and top up the tank if the level drops.

▲ CAUTION

Never weld with the water-cooled torch when the cooling unit is empty or the torch hoses are not connected – the torch will be destroyed within seconds. Do not use tap water with high mineral content, oil or automotive antifreeze with additives, as these block and corrode the cooling circuit.

5.6 Fitting the wire spool and drive rolls

1. Open the spool cover and the side cover of the wire feeder.
2. Place the spool on the spool holder so that the wire unwinds from the bottom towards the drive rolls, and lock it with the spool nut. Adjust the spool brake so that the spool does not overrun when feeding stops.
3. Check that the drive rolls and the wire guides match the wire diameter and type (V-groove for solid steel wire, knurled groove for flux-cored wire, U-groove for aluminium wire).
4. Cut off the bent end of the wire, straighten about 20 cm and pass it through the inlet guide, over the rolls and into the torch connector.
5. Close the pressure arms and set the pressure: just enough to feed the wire without slipping. Too much pressure deforms the wire.



Fig. 5.4 4-roll wire drive with pressure arms

6. Remove the gas nozzle and the contact tip from the torch. Lay the torch cable out as straight as possible.
7. Switch on the machine. Set the **Gas check / Wire check** switch to **Wire check** (or press the torch trigger) until the wire comes out of the torch neck.
8. Fit a contact tip of the correct size and the gas nozzle. Cut the wire to a stick-out of about 10 – 15 mm.
9. Close the side cover and the spool cover.

▲ WARNING

Do not point the torch at yourself or others while threading the wire. Keep fingers away from the drive rolls.

5.7 Shielding gas

1. Open the cylinder valve slowly.
2. Set the **Gas check / Wire check** switch to **Gas check** and adjust the flow on the regulator. Return the switch to the welding position.
3. Typical gas flow: **15 - 20 L/min** up to 250 A and **20 - 25 L/min** above 250 A. Increase the flow when welding in a draught.

Gas	Typical use
100 % CO ₂	Mild steel; deep penetration, economical; more spatter.
Argon + 15 - 25 % CO ₂	Mild and low-alloy steel; smooth arc, less spatter, better bead appearance.
Argon + 2 % O ₂ or 2 - 3 % CO ₂	Stainless steel.
100 % argon	Aluminium and its alloys (with aluminium wire and U-groove rolls or a spool gun).

6 Operation

6.1 Checks before switching on

- The machine is correctly connected to the 3-phase supply and to earth, and all covers are closed.
- The output cables, control cable, torch and work clamp are firmly connected with the correct polarity.
- The coolant tank is filled and the torch hoses are connected.
- The drive rolls, liner and contact tip match the wire. The gas cylinder is secured and the valve is open.
- The operator wears the correct protective equipment, and there is no flammable material nearby.

6.2 MIG / MAG and FCAW welding

1. Switch on the mains isolator and the **circuit breaker** on the rear panel. The power indicator lights, and the fan and the cooling unit start.
2. Set the **MIG / MMA** switch to **MIG** and select **2T** or **4T**.
3. Set the **welding current** (wire speed) and **welding voltage** with the knobs on the wire feeder (see Table 6.1).
4. Set the **inductance** knob; start from the middle position.
5. In 4T mode, set the **crater current** and **crater voltage** knobs (normally lower than the welding values).
6. Hold the torch at the start of the joint with a stick-out of about $10 \times$ the wire diameter and press the trigger. The wire feeds, the gas flows and the arc starts.
7. Readjust the current and the voltage for a stable arc with a steady crackling sound and little spatter. Raise the voltage if the wire stubs into the plate; lower it if the arc is long and droplets are large.
8. After welding, release the trigger (2T) or press and release it again (4T). The gas continues to flow briefly to protect the weld.

6.3 2T and 4T trigger modes

Mode	Operation	Recommended for
2T	Press and hold the trigger: gas flows, wire feeds and the arc starts. Release the trigger: the arc stops. The crater knobs have no effect.	Short welds and tack welds.
4T	1st press: arc starts, welding at the set values; release: welding continues (self-locking). 2nd press: the output changes to the crater current and voltage to fill the end crater; release: the arc stops.	Long welds, to reduce operator fatigue; crater filling.

6.4 MIG / MAG welding parameters

Welding current (A)	Welding voltage (V)	Wire diameter (mm)
60 - 80	17 - 18	0.8 *
80 - 130	18 - 21	0.8 * / 1.0
130 - 200	20 - 24	1.0
200 - 250	24 - 27	1.0 / 1.2
250 - 350	26 - 32	1.2 / 1.6
350 - 500	31 - 39	1.2 / 1.6

Table 6.1 Guide values for CO₂ / mixed gas welding of mild steel

* 0.8 mm wire requires 0.8 mm drive rolls, liner and contact tips. The standard wire range of the CWMIG500P is 1.0 - 1.6 mm. The values are only a guide; the best setting depends on the joint, position, gas and wire, and must be found by a trial weld.

6.5 MMA (stick) welding

1. Disconnect the wire feeder power cable from the output terminals. Connect the electrode holder cable and the work cable with the polarity recommended for the electrode (see 5.4).
2. Switch on the machine and set the **MIG / MMA** switch to **MMA**. Open-circuit voltage is present at the output terminals.
3. Set the **welding current** with knob 5 and the **arc force** with knob 6 (see Table 6.2).
4. Insert the electrode, strike the arc and weld. Remove the slag after each pass.

Plate thickness (mm)	Electrode diameter (mm)	Welding current (A)
up to 1	1.5	20 - 40
1 - 2	2.0	40 - 50
2 - 3	3.2	90 - 120
4 - 5	3.2 - 4.0	90 - 130
6 - 12	4.0 - 5.0	160 - 250
13 and above	5.0 - 6.0	250 and above

Table 6.2 Guide values for MMA welding of mild steel

▲ WARNING

In MMA mode the electrode holder is live as soon as the machine is switched on. Do not touch the electrode, and place the holder on an insulated surface when not welding.

6.6 Finishing work

1. Stop welding and hang the torch on the torch holder.
2. Close the gas cylinder valve.
3. Let the machine run for a few minutes without welding so that the fan and the cooling unit cool the machine and the torch.
4. Switch off the circuit breaker on the rear panel and the mains isolator.

6.7 Precautions during operation

- **Work within the duty cycle.** If the protection lamp lights, stop welding and let the machine cool with the fan running.
- **Never exceed the supply voltage range.** A supply voltage that is too high or unstable can damage the machine.
- **Always earth the machine** and keep the work connection firm and close to the weld.
- **Do not touch the output terminals** while the machine is switched on.
- **Avoid sudden stops and restarts** of the circuit breaker. Wait at least 10 seconds before switching on again.
- **Protect the machine from moisture, dust and metal chips.** Do not weld with metal debris near the fan intake.
- **Check the coolant level daily** and never weld with the water-cooled torch without coolant flow.
- **Do not pull the torch or cables** to move the trolley.

6.8 Using a spool gun (optional)

The CWMIG500P can be used with a compatible spool gun for aluminium and other soft wires, which are difficult to feed through a long torch cable. Connect the spool gun according to the instructions supplied with it, use 100 % argon for aluminium, and set the current and voltage by a trial weld.

7 Welding guide

7.1 Torch handling

- **Stick-out** (contact tip to work distance): about 10 – 15 mm for solid wire, 15 – 25 mm for flux-cored wire. Keep it constant.
- **Torch angle:** tilt the torch 10 – 20° from the vertical. Push the torch (forehand) for a flatter bead and less penetration; drag it (backhand) for deeper penetration and with flux-cored wire.
- For fillet welds hold the torch at about 45° between the two plates.
- Travel at a uniform speed. Too fast gives a narrow, convex bead with poor fusion; too slow gives a wide bead and burn-through on thin plate.
- Clean the joint of rust, scale, paint, oil and moisture before welding.

7.2 Weld defects and remedies

Defect	Possible cause	Remedy
Porosity	No gas or too little gas; draught; gas hose leaking; dirty, oily or rusty plate; nozzle blocked with spatter.	Check the cylinder and flow; use wind screens; repair leaks; clean the joint; clean the nozzle.
Excessive spatter	Voltage too high or too low for the current; inductance too low; long stick-out; wrong polarity.	Correct the voltage; increase inductance; shorten the stick-out; check polarity.
Irregular wire feed, unstable arc	Worn contact tip; dirty or worn liner; wrong or worn drive rolls; wrong roll pressure; spool brake too tight.	Replace the tip; clean or replace the liner; fit correct rolls; adjust pressure and brake.
Wire stubs into the plate	Voltage too low; wire speed too high.	Increase the voltage or reduce the current.
Wire burns back to the tip	Voltage too high; stick-out too short; wire speed too low.	Reduce the voltage; hold a longer stick-out; increase the wire speed.
Poor penetration	Current too low; travel too fast; torch angle wrong.	Increase current; travel slower; correct the angle.
Undercut	Voltage too high; travel too fast; wrong torch angle.	Reduce voltage; travel slower; correct the angle.
Burn-through	Current too high; travel too slow; gap too wide.	Reduce current; travel faster; reduce the gap.
Crater cracks	Crater not filled at the end of the weld.	Use 4T with crater current and voltage.

7.3 Consumables

Use contact tips, nozzles, liners and drive rolls that match the wire diameter and material. Keep the wire dry and clean, and cover the spool when not in use. Store flux-cored wire in a dry place.

8 Maintenance

▲ WARNING

Before any maintenance, switch off the circuit breaker and isolate the mains supply. Wait at least 5 minutes for the internal capacitors to discharge. Maintenance inside the machine must be done only by qualified persons.

8.1 Maintenance schedule

Interval	Work
Daily	Check the supply cable, welding cables, torch and work clamp for damage and loose connections. Check that the fan runs. Check the coolant level and the coolant return. Clean spatter from the gas nozzle and check the contact tip.
Weekly	Clean the drive rolls and wire guides; check roll wear and pressure. Blow out the torch liner with dry compressed air. Check the gas hoses and connections for leaks.
Every 3 – 6 months	Remove the covers and blow dust out of the power source, the wire feeder and the radiator of the cooling unit with dry, low-pressure compressed air (more often in dusty workshops). Check that the knobs, switches and terminals are secure.
Every year	Replace the coolant. Have the insulation, the earth connection and the internal connections checked by a qualified electrician.

8.2 Torch

- Replace the contact tip when its bore is worn oval or damaged by spatter. Use a tip of the correct size.
- Keep the gas nozzle clean; spatter in the nozzle disturbs the gas shield. Use anti-spatter spray or paste.
- Clean or replace the liner when the wire feed becomes irregular. Use the correct liner size and type for the wire.
- Check the torch water hoses for leaks, kinks and damage.

8.3 Water cooling unit

- Keep the coolant level between the minimum and maximum marks. Use only distilled water or proper welding coolant (with antifreeze when required).
- Keep the radiator clean so that air flows freely. If the coolant becomes dirty, drain the circuit, flush it with clean water and refill.

8.4 Wire feeder

- Keep the wire drive compartment free from copper dust and wire chips. Replace worn drive rolls and inlet guides.
- Close the side cover and spool cover during welding to keep out dust and spatter.

9 Troubleshooting

▲ WARNING

Switch off the circuit breaker and isolate the supply before checking the machine. Repairs inside the machine must be carried out only by qualified persons. The internal voltage can be as high as about 600 V.

Fault	Possible cause	Remedy
Power indicator does not light; fan does not run	No supply or a phase missing. Circuit breaker off or faulty.	Check the 3-phase supply and mains fuses. Switch on / replace the breaker.
Circuit breaker trips immediately when switched on	Breaker faulty. IGBT or IGBT drive board damaged. Input rectifier bridge damaged. Varistor damaged. Control board faulty.	Contact Cruxweld service. The faulty part must be checked and replaced by a qualified technician.
Circuit breaker trips during welding	Machine overloaded (duty cycle exceeded). Breaker faulty.	Reduce the current or welding time. Replace the breaker.
Protection lamp lights; no output	Overheating (duty cycle exceeded, blocked air flow, fan fault). Supply voltage too high or too low.	Let the machine cool with the fan running; clear the air openings. Check the supply voltage.
Welding current cannot be adjusted	Control cable of the wire feeder faulty. Control board faulty. Hall sensor wiring loose or damaged.	Check the control cable and plug. Contact service to check the control board and sensor wiring.
Unstable arc, heavy spatter	Settings not suitable for the wire and gas. Contact tip worn or wrong size. Poor work connection.	Correct the current, voltage and inductance. Replace the contact tip. Clean and tighten the work clamp.
CO ₂ regulator does not heat up	Regulator heater faulty. Heater cable damaged. Heater thermistor faulty.	Replace the regulator. Replace the cable. Replace the thermistor.
Wire feeds but no gas flows	Cylinder empty or valve closed. Gas hose blocked or kinked. Solenoid valve faulty. Control board faulty.	Replace the cylinder / open the valve. Check the hose. Replace the valve. Contact service.
Torch trigger pressed: no wire feed and no output voltage	Torch trigger or its cable faulty. Wire feeder control cable faulty or loose. Control board faulty.	Repair or replace the torch. Check / reconnect the control cable. Contact service.
Wire slips or feeds irregularly	Wrong or worn drive rolls; wrong roll pressure; liner blocked; spool brake too tight.	Fit correct rolls; adjust pressure; clean or replace the liner; loosen the brake.
Torch becomes very hot; little or no coolant return	Coolant level low. Hoses not connected, reversed, kinked or leaking. Pump or radiator blocked.	Top up the coolant. Check the hose connections (blue to blue, red to red). Flush the circuit; contact service.

If a fault cannot be corrected with the help of this table, contact Cruxweld service and state the model and serial number from the rating plate.

10 Warranty

Cruxweld warrants the CWMIG500P against defects in material and workmanship for the period stated in the sales contract, from the date of invoice. During the warranty period, Cruxweld will repair or replace, free of charge, parts that are found to be defective due to faulty material or workmanship.

The warranty does not cover:

- consumable and wearing parts such as contact tips, nozzles, liners, drive rolls, torch parts, cables, work clamp and electrode holder;
- damage caused by incorrect supply voltage, a missing phase, missing earth, overload or operation beyond the duty cycle;
- damage caused by operating the water-cooled torch without coolant, by frozen coolant or by unsuitable coolant;
- damage caused by dust, moisture, blocked ventilation, falls, transport, lack of maintenance, misuse, or repair or modification by unauthorised persons.

Model	CWMIG500P
Serial number	
Invoice no. / date	
Customer	
Dealer stamp	

For service and spare parts please contact:

Cruxweld Industrial Equipments Pvt. Ltd.

5, Sector 29, Faridabad - 121008 (Haryana), India

Phone: +91 8800 882 983 | +91 (129) 489 2868

Email: sales@cruxweld.com | Service: support@cruxweld.com

www.cruxweld.com

When ordering spare parts, always state the model and serial number from the rating plate.



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