



INDUSTRIAL EQUIPMENTS PVT. LTD.

UltraFlex 520

Bandsaw Blade Butt Welder

Bimetal and carbon steel blades up to 52 mm | Welding, annealing and grinding in one machine



INSTRUCTION MANUAL

Please read this manual carefully before working and keep it for future reference.

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

Contents

1	Safety precautions	2
2	General description	3
3	Technical specifications	4
4	Machine overview	5
5	Installation	6
6	Operation	7
7	Maintenance	10
8	Troubleshooting	11
9	Electrical circuit diagram	12
10	Warranty	13

This manual contains the safety, installation, operation and maintenance instructions for the Cruxweld UltraFlex 520 bandsaw blade butt welder.

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	A serious hazard which may cause death, serious injury or major damage if it is not observed.
▲ WARNING	A hazard which may cause injury or damage to property if it is not observed.
▲ ATTENTION	A risk which may cause a fault in, or damage to, the machine or the blade if it is not observed.
Note	Useful information for correct operation.

1 Safety precautions

The UltraFlex 520 works with a high welding current, produces sparks and hot metal during flash butt welding, and has a rotating grinding wheel. Read this chapter before using the machine and make sure every operator follows it.

1.1 Electrical safety

- The machine **must be earthed** before use. Connect it only to a supply with a proper protective earth.
- The machine must not be exposed to moisture, rain or dripping water. Never operate it with wet hands or in a wet area.
- Before any maintenance, cleaning or opening of the front cover, **switch off the mains isolator (B1)** and make sure the supply is cut off.
- Installation and electrical repairs must be carried out only by a qualified electrician.
- Do not use damaged supply cables. Keep all covers closed during operation.

1.2 Sparks, hot metal and burns

- During welding the blade ends flash and molten metal is expelled. Always wear **safety glasses or a face shield**, leather gloves and protective clothing.
- Stand to the side of the clamps during welding, never directly in line with the joint.
- Keep flammable materials away from the machine. Keep a fire extinguisher nearby.
- The weld joint, the copper jaws and the blade remain hot after welding and annealing. Do not touch them with bare hands.

1.3 Crushing and cutting hazards

- Keep fingers away from the clamping jaws while tightening the clamping handles and while operating the upset lever.
- Bandsaw blades have sharp teeth. Handle blades with gloves and carry long blades coiled.

1.4 Grinding wheel

- Never use the grinder without its guard. Wear safety glasses when grinding.
- Check the grinding wheel for cracks before use. Replace a damaged wheel immediately and use only a wheel of the correct size and speed rating.
- Hold the blade firmly and grind with light pressure. Keep loose clothing, hair and gloves away from the rotating wheel.

1.5 Operator

- Only trained persons may operate the machine. Keep unauthorised persons away from the work area.
- Persons with a cardiac pacemaker must not operate the machine or stand close to it during welding.

2 General description

The Cruxweld UltraFlex 520 is a bench-type bandsaw blade butt welder for joining the ends of bimetal and carbon steel bandsaw blades up to **52 mm** wide into endless loops. It works on the **flash butt welding** principle: the two blade ends are clamped in copper jaws, heated by a high welding current until they flash and melt, and then pressed together (upset) so that the joint fuses into a single piece.

After welding, the built-in **annealing (tempering) function** heat-treats the weld zone to restore its strength and elasticity, so that the blade is ready for use without further treatment. The **grinding attachment**, started with a foot switch, is used to grind the weld seam flush with the blade.



Finished weld joint



Endless bandsaw blade loop



Ground seam

2.1 Advanced features

Versatile welding range	Welds bimetal and carbon steel bandsaw blades up to 52 mm wide, covering a wide range of cutting applications.
Integrated annealing	The annealing function improves the strength and elasticity of the weld zone. Blades are ready for use immediately after the process.
Precision grinding	The grinding attachment finishes the weld seam. It is started with a foot switch for hands-free, safe operation.
Foot switch control	Hands-free control of the grinder improves precision, safety and productivity.
Robust design	A sturdy cabinet and table give a stable platform for precise, consistent welding.
Dual copper jaw clamps	Two high-conductivity copper jaws hold the blade securely and transfer the welding current evenly for uniform, high-quality welds.

2.2 Applications

Making and repairing bandsaw blades in workshops, tool rooms, blade service shops and industries that use horizontal and vertical bandsaw machines for metal, wood and other materials.

3 Technical specifications

Model	UltraFlex 520
Nominal capacity	12 kVA
Saw blade width capacity	7 to 52 mm
Input supply	400 V $\pm$ 15 %
Rated voltage	380 V
Input current	40 A
Secondary voltage	6 steps
Upset pressure	200 N
Clamping width	60 mm
Clamping thickness range	0.4 – 2.0 mm
Welding material suitability	Bimetal, carbon steel
Clamping system	Dual copper jaw clamps
Annealing capability	Available (pulse annealing)
Grinding function	Enabled
Foot switch operation	Enabled
Rated duty cycle	20 %
Dimensions (L x W x H)	800 x 810 x 870 mm
Gross weight	110 kg

Specifications may change without notice as a result of continuous improvement.

4 Machine overview

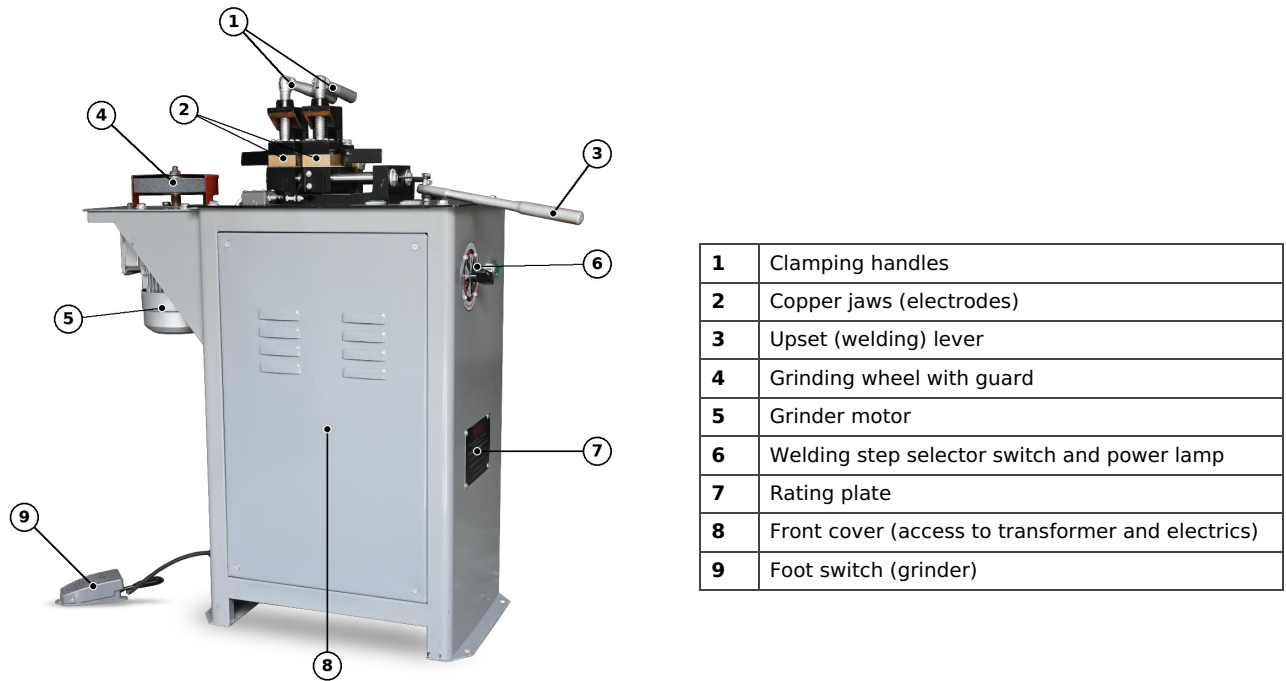


Fig. 4.1 UltraFlex 520 - general view

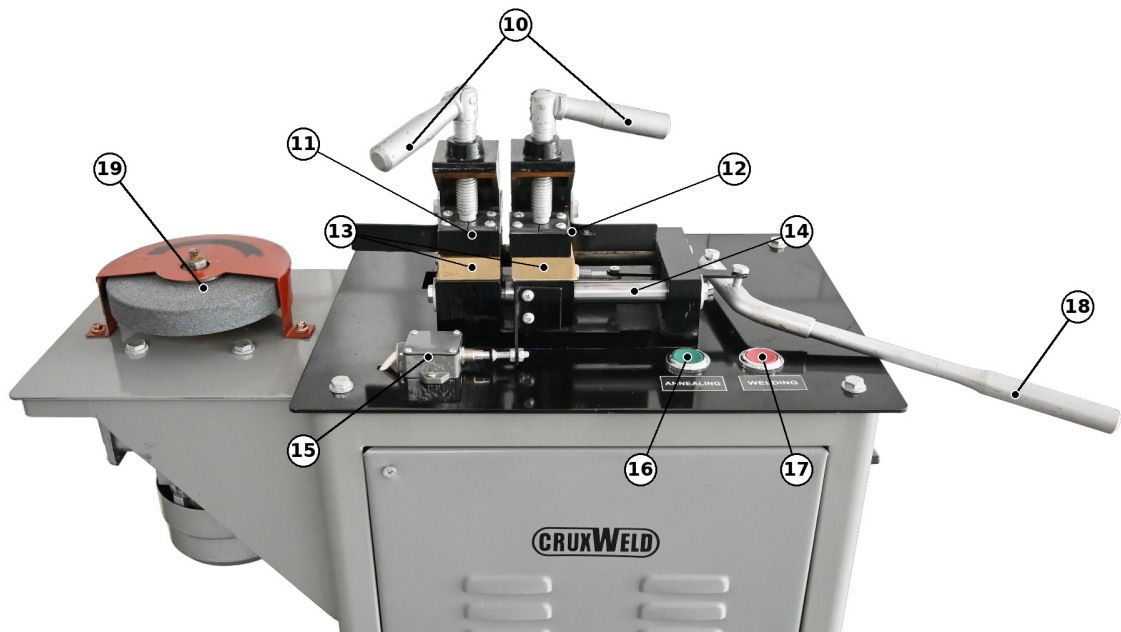


Fig. 4.2 Welding table - controls and clamping unit

10	Clamping handles (screw clamps)	15	Limit switch - automatic cut-off of the welding current
11	Fixed clamp	16	ANNEALING push button (green)
12	Moving clamp	17	WELDING push button (red)
13	Copper jaws (electrodes)	18	Upset (welding) lever
14	Slide guide of the moving clamp	19	Grinding wheel with guard

5 Installation

5.1 Unpacking and location

- Check the machine for transport damage. Report any damage to the transporter and to Cruxweld immediately.
- Lift the machine (about 110 kg) with suitable lifting equipment. Do not lift it by the levers, handles or the grinder.
- Install the machine indoors on a firm, level floor, in a dry, well-ventilated place. Bolt the base to the floor if required.
- Leave at least 0.8 m of free space around the machine for the operator, for long blades and for maintenance.
- Ambient temperature: 0 – 40 °C; relative humidity below 90 %, without condensation. Keep the machine away from water and corrosive gases.

5.2 Electrical connection

▲ DANGER

The electrical connection must be made by a qualified electrician with the supply switched off.

1. Check that the supply matches the rating plate: **380 / 400 V ±15 %**, 50 Hz.
2. Install a mains isolator (**B1**) with suitable fuses or a circuit breaker for the rated input current (40 A) near the machine.
3. Connect the supply cable to the input terminals of the machine through the isolator. Use a cable of adequate cross-section (at least 6 mm² copper) and keep it as short as possible.
4. Connect the **protective earth** conductor to the earth terminal of the machine. The machine must never be operated without earth.
5. Connect the foot switch to the machine.
6. Switch on the isolator. The power lamp lights. Press the foot switch briefly and check that the grinding wheel turns in the direction marked on the guard.

Note: A low or unstable supply voltage causes weak welds. Supply the machine from a dedicated line if possible, and do not run other heavy loads on the same line during welding.

6 Operation

6.1 Working sequence



Fig. 6.1 Working sequence of the UltraFlex 520

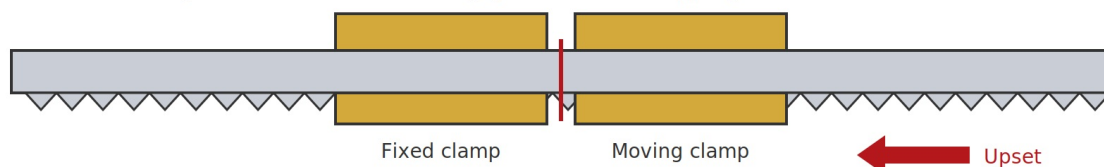
6.2 Preparing the blade

1. Cut both ends of the saw blade (or steel strip) to be welded square and straight, at 90° to the back of the blade. Both ends must be cut so that the tooth pitch continues correctly across the joint.
2. Remove burrs, paint, oil and rust from the ends and from the areas that will be clamped. Clean contact gives a good weld.
3. Set the **welding step selector** according to the blade width (see Table 6.1).

6.3 Clamping and aligning

A Welding position

Blade ends butt together in the centre of the gap between the copper jaws.



B Annealing position

Jaws opened about 25 mm apart, weld joint in the middle between the jaws.

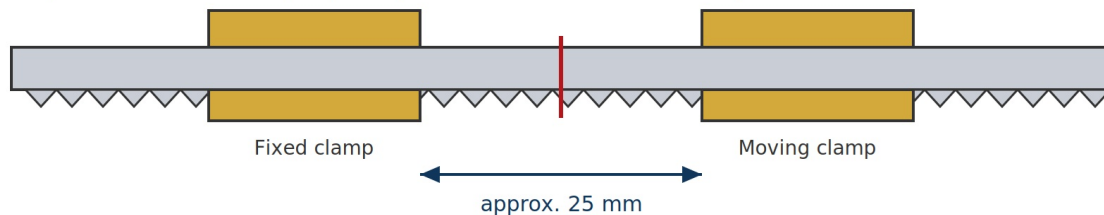


Fig. 6.2 Blade position in the jaws for welding (A) and annealing (B)

1. Place the blade ends into the two copper jaws (electrode pressure plates) with the teeth facing the operator and the back of the blade against the stop.
2. Align the two ends so that they touch in the middle of the gap between the jaws, straight and without overlap.
3. Tighten the **clamping handles** firmly on both clamps so that the blade cannot slip.

▲ ATTENTION

The blade ends must be correctly aligned in height and in line. Misalignment gives a stepped, weak joint which may break in use.

6.4 Welding

1. Hold the **upset (welding) lever** and keep the blade ends lightly in contact.
2. Press the **WELDING button (red)**. The transformer is switched on and the blade ends begin to flash and melt.
3. When the flash has heated the ends to the correct temperature, move the upset lever quickly and firmly: the moving clamp accelerates and presses the blade ends together with great pressure.
4. At the end of the upset stroke the **limit switch** cuts off the welding current automatically. The joint surfaces fuse and crystallise, and the weld is complete.
5. Wait a few seconds for the joint to cool, then release the clamps.

▲ WARNING

Sparks and molten metal are expelled during welding. Wear eye protection and stand to the side of the clamps.

6.5 Annealing (tempering)

Annealing is essential. A weld which is not annealed is hard and brittle and will break when the blade runs.

1. After welding, release the clamping device and move the two clamps apart by about **25 mm**, so that the weld joint is in the middle between the two jaws (Fig. 6.2 B). Tighten the clamps again.
2. Press the **ANNEALING button (green)** in **pulses**: press and release immediately, and repeat continuously and intermittently. This machine uses pulse annealing.
3. Watch the colour of the weld joint. When it turns **dark brown** (about 580 – 680 °C), stop annealing.
4. Let the joint cool slowly in air. Do not quench it in water or oil.

Colour of the joint	Approx. temperature	Result
Dark brown	580 – 680 °C	Correct - stop annealing
Cherry red	above 700 °C	Too hot – the joint becomes hard again
Bright red	above 800 °C	Far too hot – see the warning below

▲ ATTENTION

During annealing the blade must never turn bright red. Bright red means the temperature is too high. In that case let the blade cool down completely before a second annealing, otherwise the blade cannot be used.

6.6 Grinding the weld seam

1. Release the blade from the clamps.
2. Press the **foot switch** to start the grinding wheel.
3. Hold the blade flat and firmly on the grinding table and grind away the weld bead (upset burr) on both sides of the blade and on the back, until the joint has the same thickness as the blade.
4. Grind lightly and move the blade constantly, so that the joint does not overheat and turn blue. Do not grind the teeth.
5. Release the foot switch to stop the grinder.

6.7 Inspection

- The joint must be straight, in line with the blade, and of the same thickness as the blade, without cracks or holes.
- Bend the blade gently around the joint: it must bend evenly without cracking.
- Check that the tooth pitch continues correctly across the joint.

6.8 Reference settings

Blade width (mm)	Blade thickness (mm)	Welding step
7 - 13	0.4 - 0.65	1 - 2
13 - 20	0.6 - 0.9	2 - 3
20 - 27	0.9 - 1.0	3 - 4
27 - 41	0.9 - 1.3	4 - 5
41 - 52	1.3 - 1.6	5 - 6

Table 6.1 Starting values for the welding step

These values are a guide only. The correct setting depends on the blade material and the supply voltage. Make a trial weld on an offcut of the same blade and adjust: increase the step if the ends do not flash enough or the joint is weak; reduce it if the ends burn away or the weld has holes.

6.9 Important notes

- After welding, remove all debris and metal splashes. Keep the copper jaws and conductive blocks smooth and clean - dirty jaws cause poor contact, burn marks and weak welds.
- Do not exceed the rated duty cycle. Allow the machine to cool between welds during continuous work.

7 Maintenance

▲ DANGER

Maintenance of the welding machine is necessary. Before any maintenance, switch off the mains isolator **B1** and make sure the supply is cut off.

7.1 After every weld / daily

- Remove all debris, flash and metal splashes from the jaws, the clamps and the table.
- Keep the copper jaws (electrodes) and conductive blocks smooth and clean. Remove spatter with a fine file or fine emery cloth.
- Check that the clamping handles and the upset lever move freely.

7.2 Weekly

- Lightly oil the slide guide of the moving clamp and the clamping screws. Wipe off excess oil – no oil may reach the copper jaws.
- Check the grinding wheel for wear and cracks, and the guard for tightness.
- Check the operation of the limit switch.

7.3 Monthly

- Open the front cover and blow out dust from the inside with dry, low-pressure compressed air.
- Check that all electrical connections, the transformer connections and the secondary (copper) connections are tight and not overheated.
- Check the supply cable, the earth connection and the foot switch cable.

7.4 Wear parts

Replace the copper jaws when they are worn, grooved or no longer hold the blade straight. Replace the grinding wheel when it is worn or damaged. Use only original Cruxweld spare parts.

8 Troubleshooting

Problem	Possible cause	Remedy
Machine does not start; power lamp off	No supply; isolator B1 off; fuse blown.	Check the supply, switch on B1, replace the fuse.
No flash when the WELDING button is pressed	Blade ends not touching. Dirty jaws or blade ends. Limit switch actuated or faulty. Contactor (CJ) faulty.	Bring the ends into contact. Clean jaws and blade. Return the lever; check the limit switch. Have the contactor checked.
Blade ends burn away, holes in the weld	Welding step too high. Upset too slow.	Reduce the step. Upset quickly and firmly.
Weak joint, breaks on bending	Welding step too low. Upset too early or too weak. Not annealed or over-annealed.	Increase the step. Upset only after proper flashing. Anneal to dark brown only.
Joint stepped or not straight	Ends not cut square. Blade not aligned or slipping in the jaws. Worn jaws.	Cut the ends square. Align and tighten the clamps. Replace the jaws.
Joint turns bright red during annealing	Button pressed too long.	Let the blade cool completely, then anneal again in short pulses.
Burn marks on the blade at the jaws	Dirty jaws or blade; clamps loose.	Clean jaws and blade; tighten the clamps.
Grinder does not run	Foot switch or its cable faulty; motor fault.	Check the foot switch and cable; have the motor checked.
Transformer overheats	Duty cycle exceeded; ventilation blocked.	Allow pauses; clean the ventilation openings.

If a fault cannot be corrected, contact Cruxweld service.

9 Electrical circuit diagram

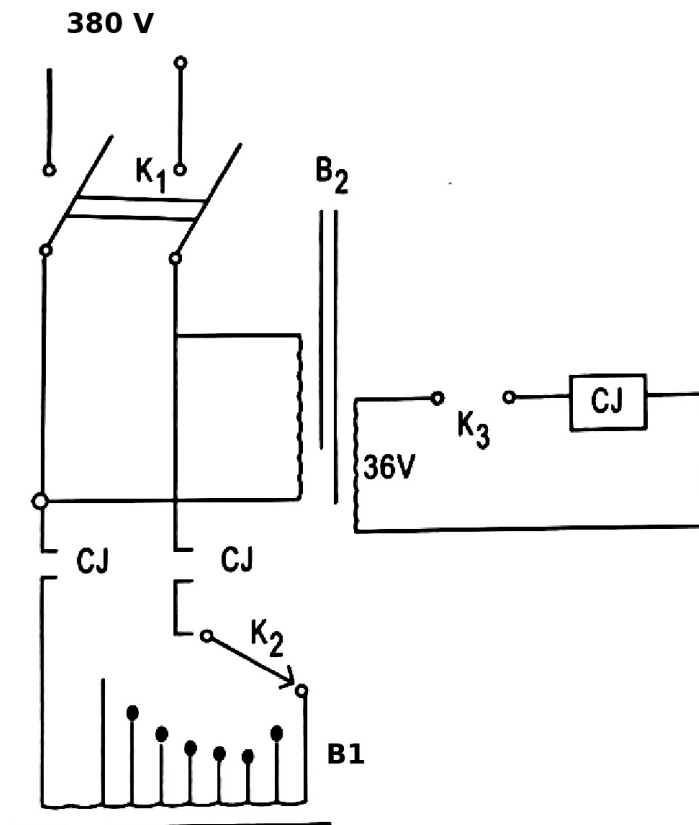


Fig. 9.1 Electrical circuit diagram

Symbol	Description
380 V	Mains supply, two lines
K1	Main switch
B1	Main welding transformer with tapped primary
K2	Welding step selector (transformer taps)
CJ	Welding contactor (coil and main contacts)
B2	Control transformer, 36 V secondary
K3	Welding / annealing push button and limit switch in the 36 V control circuit

When K3 is closed, the 36 V control circuit energises contactor CJ, which connects the main transformer to the supply through the tap selected with K2.

▲ DANGER

Only qualified personnel may open the machine and work on the electrical circuit, after switching off and isolating the supply (B1).

10 Warranty

Cruxweld warrants the UltraFlex 520 against defects in material and workmanship for the period stated in the sales contract, from the date of invoice. The warranty does not cover wear parts (copper jaws, grinding wheel, fuses) or damage caused by incorrect supply voltage, missing earth, moisture, overload, lack of maintenance, misuse or repair by unauthorised persons.

Model	UltraFlex 520
Serial number	
Invoice no. / date	
Customer	
Dealer stamp	

For service, spare parts and accessories please contact:

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