

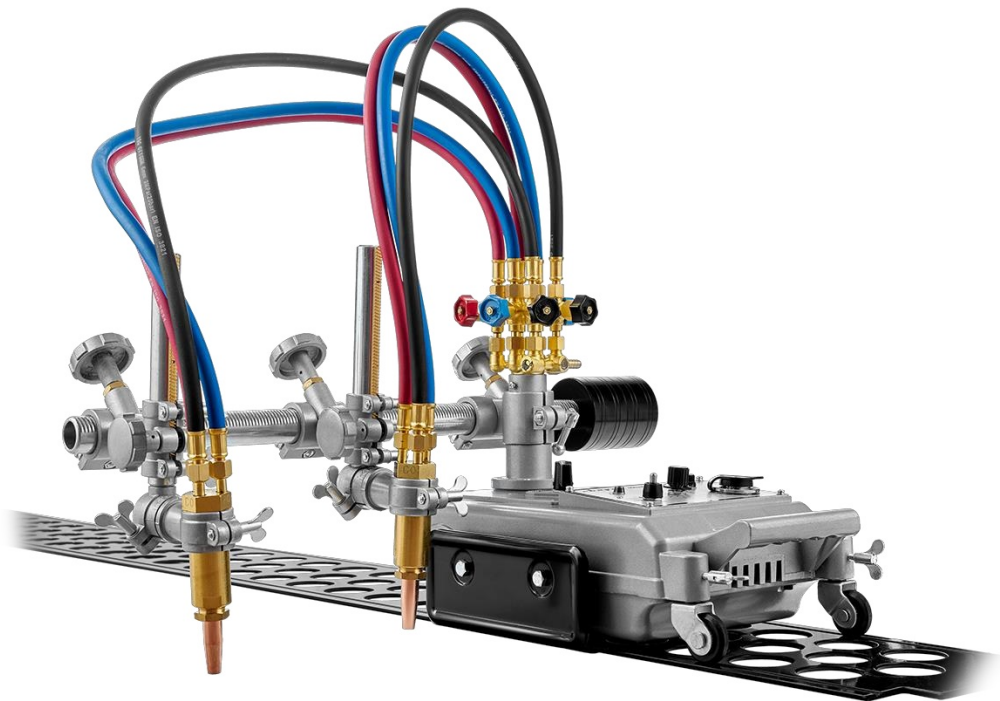


INDUSTRIAL EQUIPMENTS PVT. LTD.

DualFire DX-300

Portable Multi-Purpose Cutting Carriage

Dual torch | Oxy-fuel and plasma cutting | Straight, bevel and circle cutting | Welding ready



INSTRUCTION MANUAL

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

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This manual contains the description, installation, operation and maintenance instructions for the Cruxweld DualFire DX-300 portable cutting carriage.

For safety, the machine must be set up, maintained, checked and repaired only by persons who know it well. Read and understand this manual completely before operating the machine.

Cruxweld provides a warranty for this machine from the date of purchase, as stated in Chapter 12. 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 if it is not observed.
Note	Useful information for correct operation.

1 Safety precautions

1.1 Gases, fire and explosion

- Never use the machine in places with flammable or explosive materials or atmospheres.
- Handle and store oxygen and fuel gas cylinders (acetylene, propane / LPG) according to the applicable rules. Keep them upright, secured and away from heat and sparks.
- Before every lighting, check the hoses, hose connections, valves and torches for leaks with soapy water. Never test for leaks with a flame.
- Light the gas immediately after opening the fuel gas valve, so that unburnt gas does not escape or enter the carriage body.
- Keep oxygen equipment free of oil and grease. Use regulators with flashback arrestors.
- Keep a fire extinguisher at the workplace and remove flammable materials from the cutting area.

1.2 Electrical safety

- Connect the carriage only to an earthed single-phase socket. The carriage body must be earthed – a wrong earth connection or a plug forced in the wrong way can make the body live and cause electric shock.
- Never use the machine in the rain or in wet open-air places, to avoid electric shock or short circuit.
- Switch off the power when you take a break or leave the machine, to prevent the motor from overheating.
- Operate the direction switch only when the travel is stopped; switching direction while running can damage the motor and blow the fuse.

1.3 Personal protection

- Wear cutting goggles with the correct filter shade, leather gloves, flame-resistant clothing and safety shoes. For plasma cutting use the filter shade recommended for the plasma current.
- Protect other people from sparks, slag and light with screens.
- The torches, nozzles, cut edges and slag are very hot. Do not touch them with bare hands.
- Cut only in a well-ventilated area; use fume extraction when cutting coated or painted plate.

1.4 Operator

The machine must be used, maintained and serviced by trained persons and checked regularly. Do not modify the machine.

2 General description

The Cruxweld DualFire DX-300 is a portable, multi-purpose, self-propelled cutting carriage with **two torches**. It travels on an aluminium track and cuts steel plate with oxy-fuel (acetylene or propane / LPG) or with a plasma torch. With two torches it makes two cuts at the same time – for example two parallel strips, or both edges of a V-groove – doubling productivity. It is also used for straight-line butt welding when a welding torch is mounted.

Oxygen cutting is widely used because the equipment is simple, economical and easy to operate. It is the main method for cutting carbon steel and low-alloy steel plate, especially of medium and heavy thickness. The cut surface is normally smooth enough that no further machining is needed.

The carriage body is die-cast from high-strength aluminium alloy – light, strong and corrosion resistant. A 24 V DC motor with encoder gives precise, stable travel speed, shown on a digital display, even with supply voltage variations.

2.1 Applications

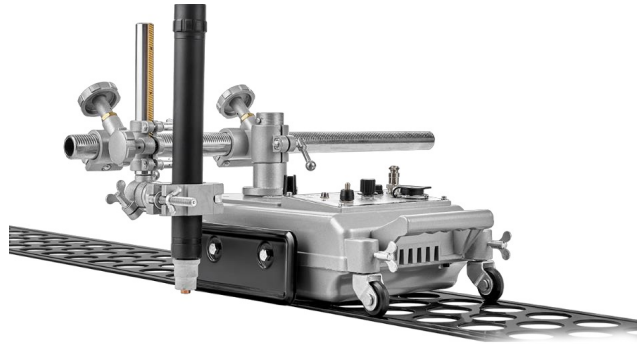
Ship building, boilers, power equipment, bridges, heavy machinery, chemical equipment and general steel fabrication – straight cuts, bevels, V-grooves, strips, circles and flanges.

2.2 Features

- **Dual torch:** two cuts simultaneously for higher cutting speed and efficiency.
- **Oxy-fuel and plasma:** two cutting processes on one machine; plasma arc interlocking start.
- **Welding ready:** straight-line butt welding with a mounted welding torch.
- **Precise speed control:** encoder motor, travel speed 40 – 2400 mm/min with digital readout for repeatable settings.
- **Durable:** works reliably in high temperatures, harsh conditions and with voltage variations.
- **Versatile:** straight and circle cutting ($\varnothing$ 200 – 2000 mm), bevel 0 – 45°, torch rotation $\pm 45^\circ$.
- **Portable:** carriage weight 18 kg, carries up to 50 kg; 1.8 m track, extendable.



Dual torch oxy-fuel cutting



Plasma torch fitted on the carriage

3 Technical specifications

Model	DualFire DX-300
Power source	100 – 240 V AC ± 10 %, single phase
Frequency	50 / 60 Hz
Number of cutters	2
Cutting type	Straight lines, bevels and circles
Plasma cutting	Plasma arc interlocking start
Welding	Straight-line butt welding
Travelling speed	40 – 2400 mm/min (digital display)
Cutting speed	50 – 850 mm/min
Welding speed	50 – 750 mm/min
Maximum cutting thickness	150 mm
Groove (bevel) angle	0 – 45°
Torch rotation angle	$\pm 45^\circ$
Circle cutting diameter	$\varnothing$ 200 – 2000 mm
Motor	24 V DC with encoder, 23 W, 5600 r/min
Transmission	Variable speed, set by dial
Drive	Electric
Maximum loaded weight	50 kg
Track length	1800 mm (extendable)
Carriage dimensions	470 x 230 x 250 mm
Carriage weight	18 kg

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

3.1 Scope of supply

- Self-propelled carriage; gas manifold with 6 valves; two cutter support assemblies; two cutters (torches).
- Two sets of hoses (L = 600 mm, 3 pcs each); guide track (L = 1800 mm); circle cutting (radius) device.
- Two sets of propane gas-mixing nozzles (No. 2RM and No. 3RM); nozzle cleaning kit.
- Hex key, screwdriver for assembly, power cable (L = 5000 mm); instruction manual and test certificate.



Power cable and nozzles



Radius bar with centre pin

4 Machine overview and controls

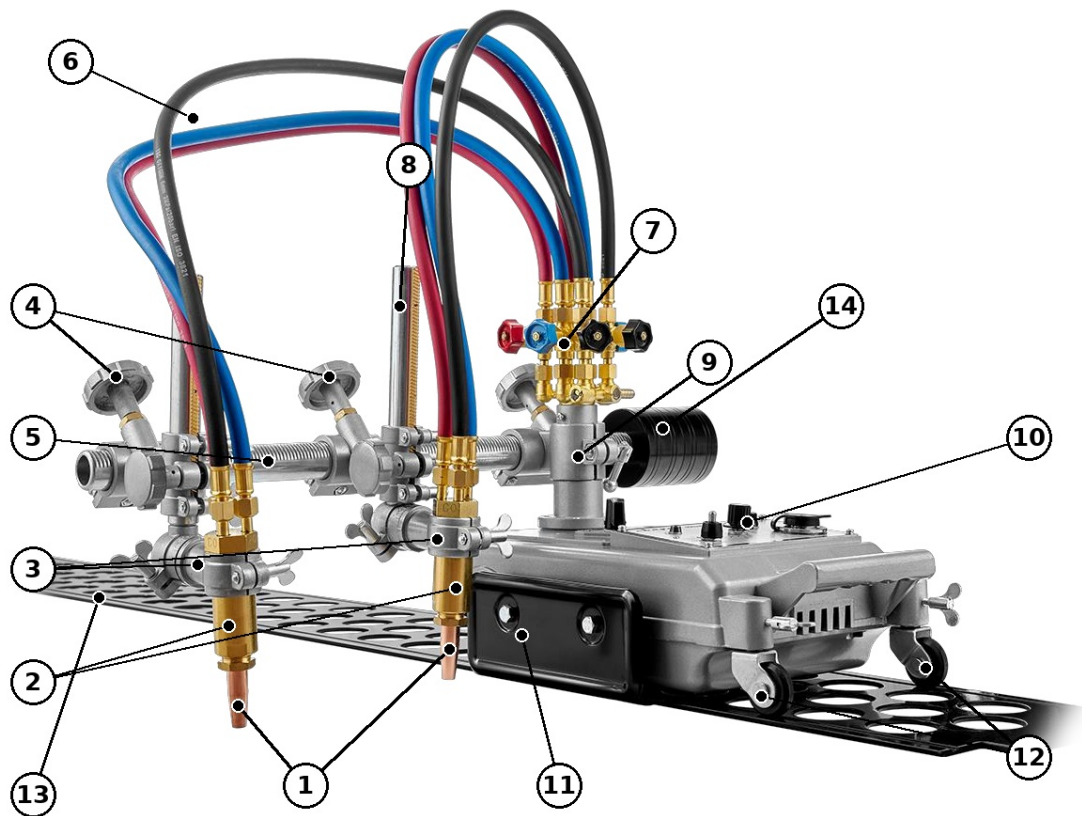


Fig. 4.1 Main parts of the DualFire DX-300

1	Cutting nozzles	8	Torch lifting racks
2	Cutting torches (cutters)	9	Support column with clamp
3	Torch holders (clamps)	10	Control panel
4	Handwheels – torch up / down and cross movement	11	Heat shield
5	Cross bar with rack (horizontal torch movement)	12	Swivel (castor) wheels
6	Gas hoses (oxygen and fuel gas)	13	Guide track
7	Gas manifold with valves	14	Balance weight

4.1 Construction

- **Carriage:** die-cast aluminium body containing the reduction gearbox and the electrical control. The 24 V DC encoder motor drives the rollers on the track through a worm gear reduction and a clutch.
- **Torch system:** torches, nozzles, hoses, gas manifold, horizontal cross bar, vertical lifting bars, holders and handwheels. Rack-and-pinion drives adjust the torches up / down and left / right; each torch can be tilted $\pm 45^\circ$ for bevels and V-grooves.
- **Track:** 1.8 m track with joints at the ends; tracks can be connected for longer cuts.
- **Radius bar:** mounted on the carriage for cutting circles and arcs.

4.2 Control panel

Control	Function
Power switch	Switches the carriage drive on and off (start / stop travel).
Power indicator lamp	Lights when the carriage is connected to the supply.
Direction switch (forward / reverse)	Selects the direction of travel. Change only with the travel stopped.
Speed knob and digital display	Sets the travel speed continuously from 40 to 2400 mm/min; the speed is shown on the display.
Clutch handle	Engages the drive (automatic travel) or disengages it so that the carriage can be pushed by hand for positioning.
Power socket	Connection of the power cable.
Plasma interlock socket	Connection to the plasma cutter for plasma arc interlocking start (see Chapter 8).

Note: The exact layout of the panel depends on the version supplied – refer to the labels on the panel.

4.3 Gas manifold

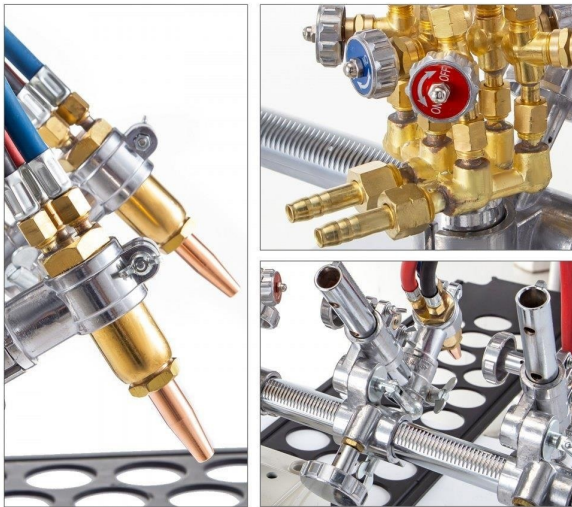


Fig. 4.2 Torches, manifold and cross bar

The 6-valve manifold supplies both torches. For each torch there are:

- **Fuel gas valve** – controls the fuel gas flow, i.e. the power of the heating flame.
- **Preheating oxygen valve** – controls the oxygen for the heating flame.
- **Cutting oxygen valve** – controls the cutting oxygen jet which burns the steel and blows away the slag.

The oxygen and fuel gas inlets are at the manifold. The fuel gas connection has a left-hand thread (nut with a groove / 60° chamfer).

5 Installation and setting up

5.1 Carriage and torches

After unpacking, check the carriage for damage and for loose or missing fasteners. Then assemble it as shown in Fig. 4.1:

1. Fix the cross bar in the mounting seat of the carriage. Fit the lifting bars and torch holders on the cross bar, and the balance weight on the opposite end.
2. Place the gas manifold in its seat and tighten the screws.
3. Insert the nozzles into the torches, align them and tighten the nozzle nuts; check for gas leaks. Fix the torches in the holders.

▲ ATTENTION

Before fitting a nozzle, check that the torch is free from dirt and heavy copper oxide and that the cone surface of the nozzle is undamaged. If the cone seats of torch and nozzle do not fit well, gas leaks and the cutting capacity drops. Use only genuine Cruxweld nozzles.

5.2 Gas connection

1. Connect the hoses from the oxygen cylinder and the fuel gas cylinder to the oxygen and fuel gas inlets of the manifold. The fuel gas inlet has a left-hand thread.
2. Before connecting, make sure the hoses and fittings are free from dirt or foreign matter – this would seriously reduce the cutting capacity.
3. Make sure the oxygen and fuel gas hoses are not interchanged and that the connections do not leak.

5.3 Electrical connection

1. Insert one plug of the power cable in the socket of the carriage (align the key of the plug with the socket – do not force it).
2. Insert the other plug in an earthed single-phase socket (100 – 240 V). The indicator lamp lights.
3. Switch on and operate the direction switch: the carriage must travel forward and backward, and the body must not be live.

5.4 Track

- Check the track for transport damage and straighten it if necessary.
- Place the track on the plate or on the floor with a slope of not more than 3°. Align it parallel to the cutting line.
- A bent or steeply inclined track, or dirt on the track surfaces, makes the travel uneven and reduces the cut quality.

6 Cutting

6.1 Setting the cutting parameters

1. **Nozzle:** select the nozzle number for the plate thickness from Chapter 9. Only the correct nozzle gives the best result.
2. **Torch angle:** for normal cutting, set the torch perpendicular to the plate. For bevel cutting, tilt the torch left or right to the required angle (0 – 45°). For a V-groove, use both torches tilted in opposite directions.
3. **Nozzle height:** set the distance between the nozzle tip and the plate to about 10 – 15 mm for standard nozzles, or 5 – 10 mm for high-speed nozzles.
4. **Preheating flame:** use a neutral flame; increase its power with the plate thickness.
5. **Cutting oxygen pressure:** the pressure is correct when the cutting oxygen stream is at its longest and clearest.
6. **Cutting speed:** depends on the plate thickness, flame power and required quality. The speed is correct when the sparks leave vertically or slightly forward.
7. **Plate surface:** level the plate and remove scale, rust and paint along the cutting line before cutting.

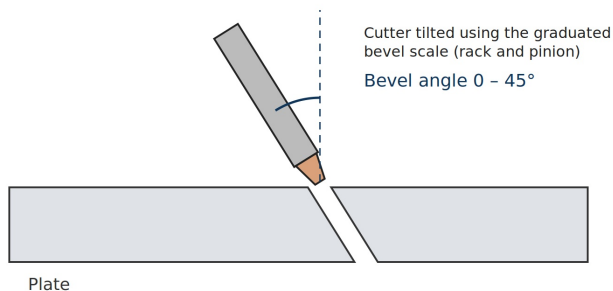


Fig. 6.1 Bevel cutting

Two torches: set both torches in the same way (nozzle, height, flame). For two parallel strips, set the distance between the torches on the cross bar. For a V-groove, tilt the torches symmetrically.

6.2 Cutting procedure

1. Switch on the travel and check that the nozzle follows the cutting line; if not, adjust the track or the plate. Switch off again.
2. Open the fuel gas valve and light the gas **immediately**; then open the preheating oxygen valve and adjust the flame.
3. Heat the starting point to about 970 °C (bright red), then open the cutting oxygen valve and set the pressure.
4. Switch on the travel (or engage the clutch) – the carriage cuts the plate.
5. At the end of the cut, close in this order: cutting oxygen valve, preheating oxygen valve, fuel gas valve; then switch off the travel or disengage the clutch.

▲ WARNING

Open the fuel gas valve only when you are ready to light the flame, to prevent flammable gas from escaping or entering the carriage.

7 Circle cutting

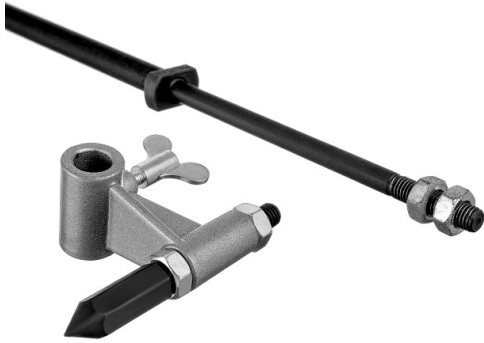


Fig. 7.1 Radius bar and centre pin

1. Make a 60° centre-punch hole in the plate at the centre of the circle.
2. Mount the radius bar on the carriage. Place the centre pin in the centre hole and set the position of the pin holder to the required radius. Tighten the clamping screw.
3. Turn the centre pin to raise the radius bar so that the wheel on the same side as the pin lifts off the plate; lock the pin height with the nut.
4. For small radii, fit the radius bar on the same side as the torch; for large circles, on the opposite side.
5. Loosen the fixing screw of the swivel wheel on the radius bar side, as required.
6. If the cut does not start from the plate edge, drill a starting hole so that the plate near the start is not damaged.
7. Switch on: the carriage travels around the centre and cuts the circle or arc.

Circle diameter: Ø 200 – 2000 mm. The circle attachment can be used for oxy-fuel and plasma cutting.

8 Plasma cutting and welding

8.1 Plasma cutting

1. Mount a straight machine plasma torch in a torch holder and set it perpendicular to the plate (or at the bevel angle).
2. Connect the plasma cutter according to its own manual. Connect the interlock cable between the carriage and the plasma cutter, if used.
3. Set the torch stand-off according to the plasma cutter's cutting chart.
4. Set the travel speed according to the plasma cutter's cutting chart for the plate thickness and current.
5. Start the plasma arc. With the arc interlock, the carriage starts when the cutting arc is established and stops when the arc goes out.

▲ WARNING

For plasma cutting follow all the safety instructions of the plasma cutter. Use eye protection of the correct shade and keep the plasma torch cable away from the carriage wheels.

8.2 Straight-line welding

1. Mount the welding torch (e.g. MIG / MAG torch) in a torch holder at the required angle and stick-out.
2. Align the track parallel to the joint.
3. Set the welding speed (50 – 750 mm/min) according to the welding procedure.
4. Start the welding power source and the carriage travel together; stop them together at the end of the weld.

9 Cutting data

Table 9.1 gives typical values for oxy-acetylene cutting of mild steel with equal-pressure nozzles. For propane / LPG, use the propane gas-mixing nozzles (RM type) supplied. High-speed nozzles can increase the cutting speed by 20 – 30 %.

Nozzle no.	Plate thickness (mm)	Oxygen pressure (MPa)	Acetylene pressure (MPa)	Cutting speed (mm/min)
00	5 – 10	0.20 – 0.30	> 0.03	450 – 600
0	10 – 20	0.20 – 0.30	> 0.03	380 – 480
1	20 – 30	0.25 – 0.35	> 0.03	320 – 400
2	30 – 50	0.25 – 0.35	> 0.03	280 – 350
3	50 – 70	0.30 – 0.40	> 0.04	240 – 300
4	70 – 90	0.30 – 0.40	> 0.04	200 – 260
5	90 – 120	0.40 – 0.60	> 0.04	170 – 210
6	120 – 150	0.50 – 0.80	> 0.05	140 – 180

Table 9.1 Typical cutting data, mild steel, oxy-acetylene

Values are a guide only; the actual settings depend on the steel grade, surface condition and gas purity. Maximum cutting thickness of the DX-300: 150 mm.

9.1 Cut quality guide

Observation	Correction
Top edge melted and rounded	Speed too low or preheat flame too strong – increase speed, reduce preheat, raise the nozzle.
Heavy slag on the bottom edge	Speed too high or oxygen pressure too low – reduce speed, check pressure and nozzle size.
Cut does not go through	See Chapter 11.
Irregular, gouged cut face	Dirty or damaged nozzle, uneven travel – clean or replace the nozzle; clean and align the track.

10 Maintenance

▲ DANGER

Close the gas supply and disconnect the power cable before any maintenance.

- Before every lighting, check hoses, fittings, valves and torches for leaks.
- Keep the nozzles clean; clean the cutting oxygen bore with the nozzle cleaning needles. Replace damaged nozzles.
- Clean the track and the carriage rollers; remove slag and spatter.
- Keep the rack-and-pinion drives of the cross bar and lifting bars clean and lightly oiled (never oil near the oxygen parts).
- Lubricate the reduction gearbox once a year.
- Switch off the power when not in use, to prevent motor overheating.
- The machine should be used and maintained by trained persons and inspected regularly.
- Store the machine in a dry room free from corrosive gases; protect it from moisture.
- Handle the aluminium carriage with care – avoid dropping it and avoid hard knocks.

11 Troubleshooting

Problem	Possible cause	Remedy
No power after switching on	No power at the socket; fuse blown; loose wire in plug, socket or switch.	Check the supply; replace the fuse; repair the wiring.
Power OK but motor does not run	Poor contact at the motor plug or broken wire; clutch disengaged; motor fault.	Repair the connection; engage the clutch; replace the motor.
Speed cannot be adjusted	Poor contact in the speed potentiometer; control board fault.	Repair or replace the potentiometer; contact service.
Gas leaks and burns between torch and nozzle	Nozzle nut loose; copper oxide or dirt on the outer cone of the torch; dirt or damage on the large cone of the nozzle.	Tighten the nut; lap the torch cone lightly with fine emery paper; clean the nozzle cone; replace the nozzle if deeply damaged.
Flame goes out when the cutting oxygen is opened	Cutting oxygen leaking into the preheat area: copper oxide or dirt on the inner cone of the torch, or dirt / damage on the small cone of the nozzle.	Lap the inner cone of the torch lightly with fine emery paper; clean or replace the nozzle.
Plate is not cut through	Nozzle too small; flame too weak; cutting oxygen pressure too low; cutting oxygen bore blocked; oxygen purity too low; cutting oxygen leaking into preheat channel.	Select the nozzle for the thickness; increase flame power; increase oxygen pressure; clean the bore; use oxygen of more than 95 % purity; clean and lap the cones or replace the nozzle.
Straight cut is not straight	Plate not flat; cutting stream not straight; track not straight; torch not fixed firmly.	Level the plate; set the torch vertical and clean the nozzle; straighten the track; tighten the wing screws of the cross bar, lifting bar and holder.

If a fault cannot be corrected, contact Cruxweld service.

12 Warranty

Cruxweld warrants the DualFire DX-300 against defects in material and workmanship for the period stated in the sales contract, from the date of invoice. Faults caused by manufacturing defects will be repaired or the parts replaced by Cruxweld. The warranty does not cover nozzles, hoses and other wear parts, or damage caused by improper transport or storage, operation not in accordance with this manual, backfire or flashback, or dismantling by unqualified persons.

Model	DualFire DX-300
Serial number	
Invoice no. / date	
Customer	
Dealer stamp	

For service, spare parts, nozzles and accessories please contact:

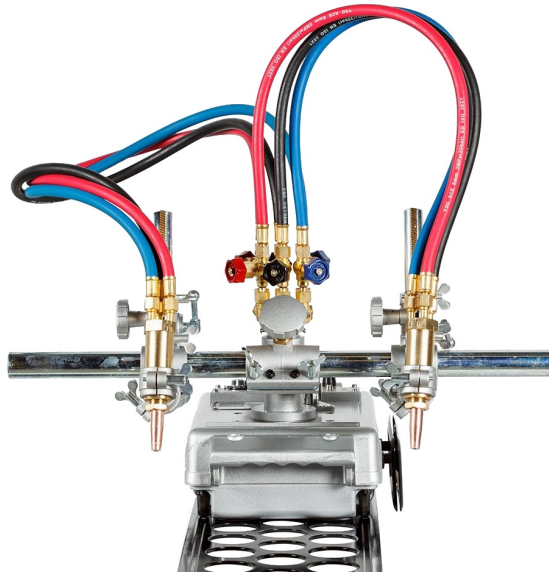
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