

CO₂ Gas-Shielded Automatic Welding Trolley

DynaFlex 100S

Soft-rail (flexible track) welding trolley

Operator's Guide



Read this operating manual carefully before using the gas-shielded automatic welding trolley, and keep it at hand so that you can refer to it at any time for the best performance of the machine.

This manual explains the functions of the machine and how to use it. Read it carefully before using the machine and keep it at hand for easy reference at any time. Feel free to contact us at any time.

To ensure safe operation, be sure to follow the instructions below.



Warning: be careful to avoid serious personal accidents

● **Clothing and safety equipment**

To prevent eye inflammation and skin burns, be sure to follow the labour safety and hygiene rules and wear the appropriate protective equipment.

● **Precautions for ventilation**

To prevent poisoning and suffocation from harmful gases (welding fumes and gases are harmful to health), comply with the applicable rules on dust and fume hazards, install local exhaust devices or use effective respiratory protective equipment.



Note: prevent machine burnout and fire accidents

● **Prevent fire and machine burnout caused by overheating**

Keep flammable items at least 50 cm away.

● **Prevent fire accidents and machine damage caused by sparks**

Do not let sparks (splashes and flashes) reach flammable materials.

● **Prevent impact damage caused by the machine falling**

When installing the machine on the rail, make sure it is secure so that it cannot slip off.

● **The operating manual must be read**

Read this manual carefully before using the machine.

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1. Summary

The Cruxweld **DynaFlex 100S** CO₂ automatic welding trolley is widely used in industries such as shipbuilding, bridges, locomotives, steel structures and petrochemicals. It is suitable for welding a wide variety of structures, such as stiffened plates, ribbed plates, intersections and box girders. Its main advantages are:

- It reduces labour intensity and improves the working environment.
- It increases working efficiency to about 1.5 times that of manual welding.
- It avoids the poor weld quality caused by human factors. The defect rate of manual operation is generally around 20%, whereas there is practically no such defect rate with the automatic welding trolley. As a result, the overall benefit is nearly 200% higher than with manual welding.
- The high degree of automation ensures the stability of welding quality.
- No highly skilled technical workers are required.

Soft-rail welding trolleys are preferred for pipe welding and curved-surface welding, and the machine moves automatically along the curvature of the flexible track.

2. Features

1. Soft-rail (flexible track) welding trolley.
2. It carries the welding torch to weld workpieces with a minimum diameter of 1000 mm.
3. Flux-cored wire or solid wire can be used.
4. It is easy to move and operate, even for unskilled workers.

3. Main composition description

The main body consists of the welding torch fixture, the swing head, the clutch device, the welding torch handle, the fine-tuning slider and the control box.

1. **Drive part:** it consists of the device that drives the trolley, the track, the bevel gear, the travelling device, the sprocket, the clutch and the travelling motor.
2. **Fine-tuning slider:** a device that adjusts the position of the welding torch, allowing fine tuning up and down and left and right during welding.
3. **Welding torch fixture:** a device that holds the welding torch in place. It allows the torch to be removed during maintenance and adjustment, and the angle of the welding torch can be adjusted.
4. **Clutch devices:** they make the installation and movement of the trolley easier.
5. **Control box:** all movements of the trolley are adjusted from here, and both welding torches are controlled by this control box. For details, see "Control panel instructions".

4. Control panel instructions



DynaFlex 100S control panel

1. **“Welding / Non-welding” switch:** the machine enters the welding readiness state when the “welding” position is selected; press the “Start” switch to weld. When the “Non-welding” position is selected and the “Start” switch is pressed, the trolley only moves and does not weld.
2. **“Start” switch:** when the switch is turned on, the trolley begins to move. If the “Welding / Non-welding” selector is in the “welding” position at that time, welding begins; if it is in the “Non-welding” position, only the trolley moves and no welding takes place.
3. **“Stop” switch:** if the stop switch is pressed while the trolley is moving, the trolley stops all actions.
4. **Travel direction selection switch:** the direction of travel can be selected as up or down.

5. **Walking speed:** the speed value is shown on the digital display, with a maximum travel speed of 1040 mm/min and a maximum displayed value of 999.
6. **Swing speed adjustment knob:** turning clockwise increases the swing speed to a maximum of 1520 mm/min. It is indicated by the scale, with a maximum scale value of 10.
7. **Swing amplitude adjustment knob:** turning clockwise increases the swing amplitude to a maximum of 20 mm. It is indicated by the scale, with a maximum scale value of 10.
8. **Left stop time adjustment knob:** the adjustment range is 0 to 2 seconds, increasing clockwise.
9. **Right stop time adjustment knob:** the adjustment range is 0 to 2 seconds, increasing clockwise.
10. **Centre movement adjustment knob:** turning clockwise moves the centre to the right; turning anticlockwise moves it to the left. The maximum range of movement is ± 5 mm.
11. **Swing mode selection knob:** use this knob to select the swing mode. The trolley has five swing modes; apart from the first, which is the non-swing mode, they are as follows:



5. Main technical parameters

5.1 Main parameters of the oscillator

Linear oscillator	
Power supply	AC 220 – 250 V, 50 Hz, 1 phase
Control box (W × L × H)	120 × 175 × 75 mm
Weight	2.9 kg
Drive mode	Rack and pinion drive
Speed	0 – 2300 mm/min
Centre shift	± 5 mm
Swing amplitude	± 15 mm
Stop left and right	0 – 2 s

5.2 Main parameters of the trolley

	Item	Content	Notes
Trolley	Power supply	220 V	AC
	External dimensions	270 × 340 × 300 mm	W × L × H
	Weight	13 kg	
	Movement	Gear drive	
	Walking speed	0 – 600 mm/min	
	Torch adjustment — up and down	55 mm	
	Torch adjustment — front and back	55 mm	
	Working angle adjustment range	±15°	
	Travel angle adjustment range	±45°	
Torch	Welding torch spacing	80 – 120 mm	Two torches
Control	Operating functions	Power light, start / stop of travel, travel direction, travel speed, welding / non-welding selection for torches (1) and (2)	

6. Installation

(1) Tools required for welding

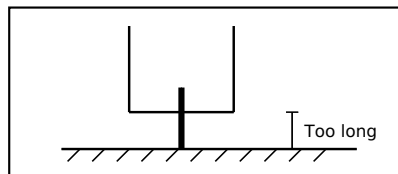
1. The necessary equipment for welding is the welding power source and the wire feeder.
2. Solid wire or flux-cored wire can be used. If both are used, solid wire should be used for the front torch and flux-cored wire for the rear torch.
3. A control power supply (AC 220 V) for the travel of the DynaFlex 100S is required.
4. A CO₂ gas cylinder for welding is required.
5. One welding torch for automatic CO₂ welding.
6. Other necessary tools.

(2) Trolley connection method

1. The welding torch port is connected to the wire feeder.
2. The welding torch switches coming out of the welding torches are connected to the 2P ports on the control panel of the trolley.
3. The control power cord is connected to the 3P port on the control panel of the trolley.
4. The control power connection line is connected to AC 220 V.

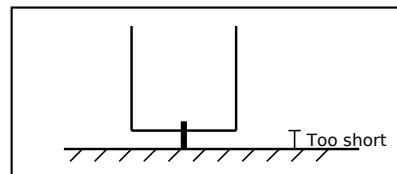
7. Operation

- Turn ON the power distribution board switch.
- Turn ON the two welding power switches (the self-protection circuit switch of the welder is OFF).
- Open the valves of the two CO₂ cylinders, set the pressure to 2 – 3 kg/cm² and adjust the flow with the gas switch in the “Check” position.
- Manually feed the wire to the front end of the welding torch and fit the contact tip that matches the wire diameter.
- Confirm the overhang (stick-out) length of the wire.



Effect:

- porosity is generated
- poor arc starting, unstable arc
- shallow penetration



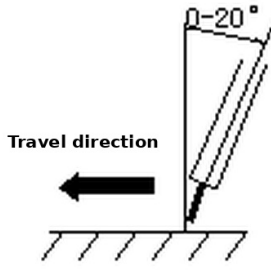
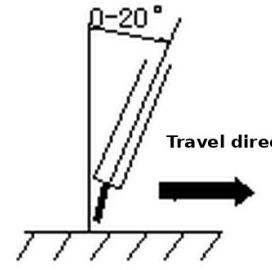
Effect:

- the nozzle is easily blocked by spatter
- the weld line cannot be seen clearly
- penetration becomes too deep

Effect of an excessive (left) and an insufficient (right) nozzle-to-workpiece distance

- Place the trolley at the weld start point and adjust the overhang lengths of the left and right guide rods. For fillet welding, in the weld direction, the overhang length of the front guide rod should be slightly shorter than that of the rear guide rod.
- Clip each welding torch into its torch clamp and use the special wrench to adjust the operating and travel angles of the torch.

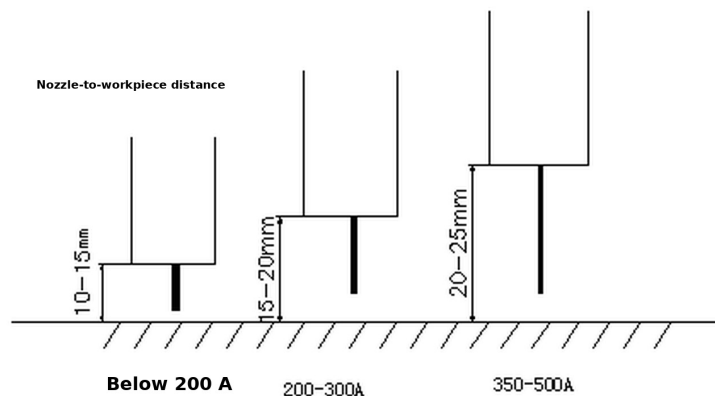
CO₂ welding generally uses the forehand (leftward) technique, which makes it easier to observe the weld line, the bead shape and the gas protection effect.

Angle	Forehand welding	Backhand welding
Travel direction angle of the torch		
Weld cross-section		

Forehand and backhand welding — travel angle and resulting bead shape

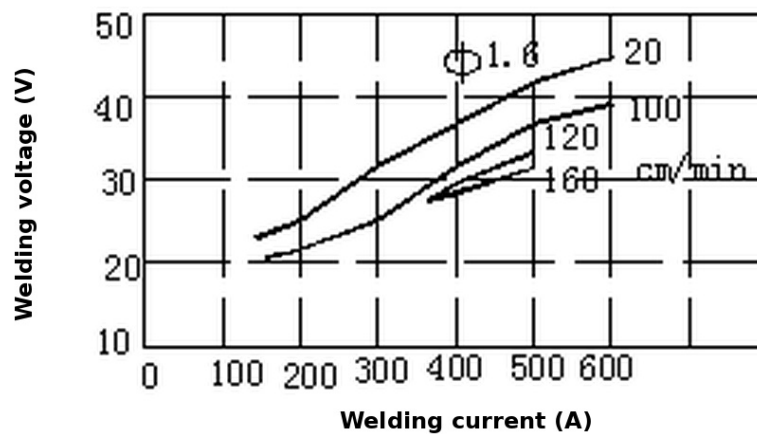
- Adjust each X-Y slider separately to set the position of the welding torch and the distance between the nozzle and the workpiece.

If the nozzle-to-workpiece distance is too large, defects (porosity, pits, etc.) are likely. Keep the spacing as shown below.

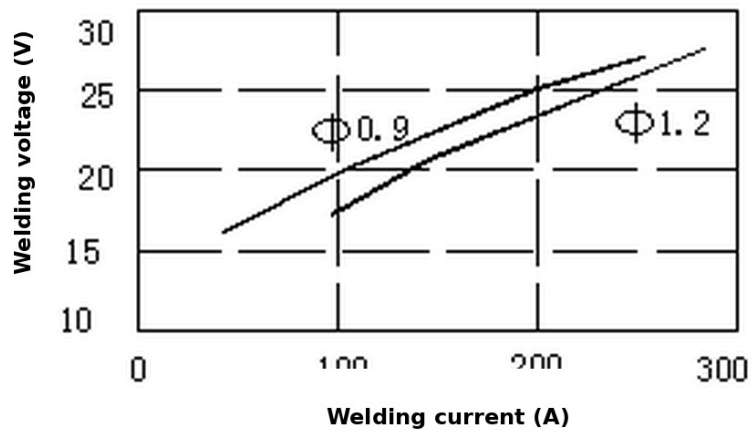


Recommended nozzle-to-workpiece distance for different welding currents

- Make the initial adjustment of the process parameters (current and voltage).



Welding current and the corresponding voltage — $\phi 1.6$ mm wire



Welding current and the corresponding voltage — $\phi 0.9$ and $\phi 1.2$ mm wire

- Confirm the flow rate of the two CO₂ cylinders and the protective effect on the molten pool.
- Start welding, observe the arc and adjust the welding speed. (Set the welding selector switch on the control panel to the welding position and press the start switch to begin welding.)
- Press the stop switch after the workpiece has been welded.

8. Welding process parameters

Welding parameters / wire diameter	φ1.2 mm	φ1.4 mm	φ1.6 mm
Current (A)	120 – 280	150 – 320	180 – 380
Voltage (U)	① $U = 14 + 0.05 I$ ② below 300 A: $U = 0.04 I + 16 \pm 1.5$ above 300 A: $U = 0.04 I + 20 \pm 2.0$		
Distance (H) between the nozzle and the workpiece	Below 200 A: $H = 10 - 15$ mm 200 – 350 A: $H = 15 - 20$ mm 350 – 500 A: $H = 20 - 25$ mm		
Wire overhang length (L)	Generally about 10 times the wire diameter, that is $L = 10 d$		

Note: the DynaFlex 100S welding trolley uses two welding torches. Generally, along the welding direction, the first torch uses solid-core welding wire and the second torch can use either solid-core or flux-cored welding wire.

(1) Horizontal fillet welding

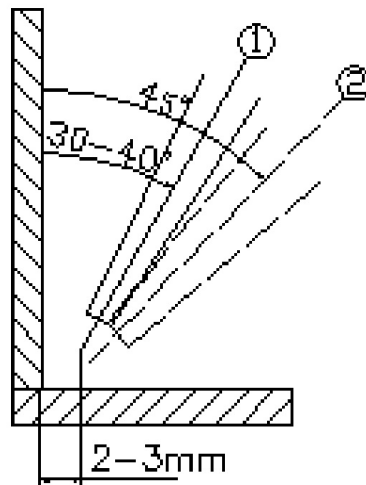
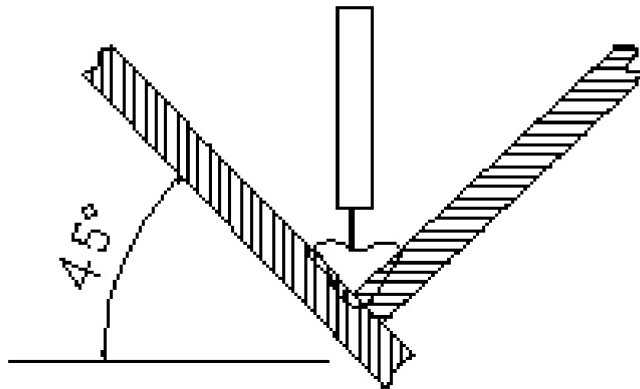


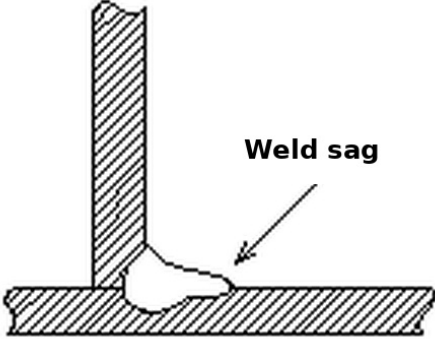
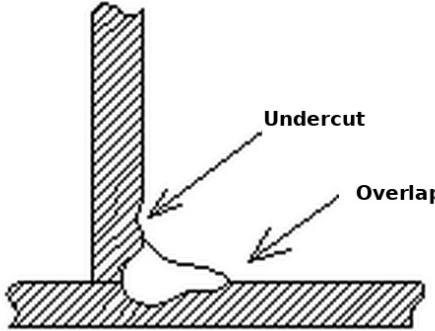
Plate thickness δ (mm)	Weld leg length k (mm)	Wire diameter d (mm)	Current I (A)	Voltage U (V)	Speed V (cm/min)	Nozzle-to-workpiece spacing (mm)	Torch position	Gas flow rate (L/min)
8	5.0 – 6.0	1.2	270 – 300	28 – 31	55 – 60	13 – 18	①	20 – 25
	7.0 – 8.0	1.2	260 – 300	26 – 32	25 – 35	15 – 20	②	20 – 25
	6.5 – 7.0	1.2	300 – 330	30 – 34	30 – 35	15 – 20	②	20 – 25
12	7.0 – 8.0	1.2	260 – 300	26 – 32	25 – 35	15 – 20	②	20 – 25
16	6	1.2	300 – 350	30 – 36	40 – 45	15 – 20	①	20 – 25
	8 – 9	1.6	430 – 480	38 – 42	40 – 45	15 – 20	②	20 – 25
	12 – 13	1.6	450 – 480	39 – 42	40 – 45	20 – 25	③	20 – 25

(2) Boat-shaped welding

Boat-shaped welding

Plate thickness δ (mm)	Weld leg length k (mm)	Wire diameter (mm)	Current I (A)	Voltage U (V)	Speed (cm/min)	Nozzle-to-workpiece distance (mm)	Gas flow rate (L/min)
8	6	1.2	300 - 350	30 - 36	40 - 45	15 - 20	20
	8 - 9	1.6	430 - 480	38 - 42	40 - 45	15 - 20	20
12	10	1.6	430 - 480	38 - 42	30 - 40	15 - 20	20
	12 - 13	1.6	450 - 480	39 - 42	25 - 30	20 - 25	20
16	6	1.2	300 - 350	30 - 36	40 - 45	15 - 20	20
	8 - 9	1.6	430 - 480	38 - 42	40 - 45	15 - 20	20
	12 - 13	1.6	450 - 480	39 - 42	40 - 45	20 - 25	20

9. Welding defects and their causes

Welding position	Defect	Causes
Flat fillet welding	1. Weld sag (drooping bead) 	1. The welding current is too high 2. The arc voltage is too low 3. The welding speed is too slow 4. The welding torch is poorly aimed
	2. Undercut and weld overlap 	1. The base material is too hot 2. Welding too fast 3. The arc starting voltage is too high 4. The welding torch is aimed at the wrong position 5. The arc length is too long and the starting voltage is too high

10. Inspection and maintenance

For the long-term safe use of the CO₂ trolley, regular and periodic inspection and maintenance must be carried out.

1. **Is there any dust?**
 - The control box and the torch position adjustment switches must be kept clean and wiped frequently; there should be no dust on them.
2. **Is there any accumulation of dirt?**
 - Deposits at the contact tip, the torch head, the guide wheel and the slider must be removed, as they affect the safe operation of the trolley.
3. **Are any joints, connecting wires, hoses or welding torches broken or damaged?**
 - Check whether the joints are loose and whether the connecting wires, hoses and welding torches are broken or damaged.
4. **Is there any abnormal noise or overheating?**
 - Regularly check components such as the guide wheels, the motors and the welding torches for abnormalities.
5. **Is the slider difficult to adjust?**
 - The slider should be lubricated frequently.
6. **Is the fuse blown?**
 - Check the fuse first if the power light does not come on after the machine has been wired up.

11. Faults and countermeasures

1) The power light of the control box is not on

Cause	Repair measure
Poor connection of the control connecting wires	Replace the connecting wire
The fuse in the control box is blown	Replace the fuse
The 220 V supply is connected but there is no current	Check and confirm the power supply

2) The welding / non-welding selector switch is not working

Cause	Repair measure
There is a problem with the switch or the wiring	Inspect and replace the switch, or inspect and repair the wiring

3) The welding start switch is not functioning

Cause	Repair measure
Faulty drive unit	Check and repair the drive motor
The weld / non-weld selector switch is faulty	Inspect and replace the switch, or inspect the wiring
Poor wire contact	Remove the slag

4) The weld point of the welding torch does not match the target position

Cause	Repair measure
The welding torch fixing frame is loose	Tighten the fixing frame

5) The slider adjustment is not flexible

Cause	Repair measure
There is sediment in the slider area	Remove the deposits or add lubricating oil

6) The welding stop switch is pressed and the arc is not extinguished

Cause	Repair measure
The welding stop switch has malfunctioned	Inspect and replace the switch
The self-protection circuit switch (arc stop switch) is in the "on" position	Set the self-protection circuit switch (arc stop switch) to the "none" position
The welding torch fixture is loose	Tighten the fixture

If a fault persists, or is not listed above, stop work immediately and contact Cruxweld service.



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The specifications and technical content of this product are subject to change without notice.