

OWNER'S MANUAL

MODEL:CT520D
IGBT INVERTER PLASMA CUTTER

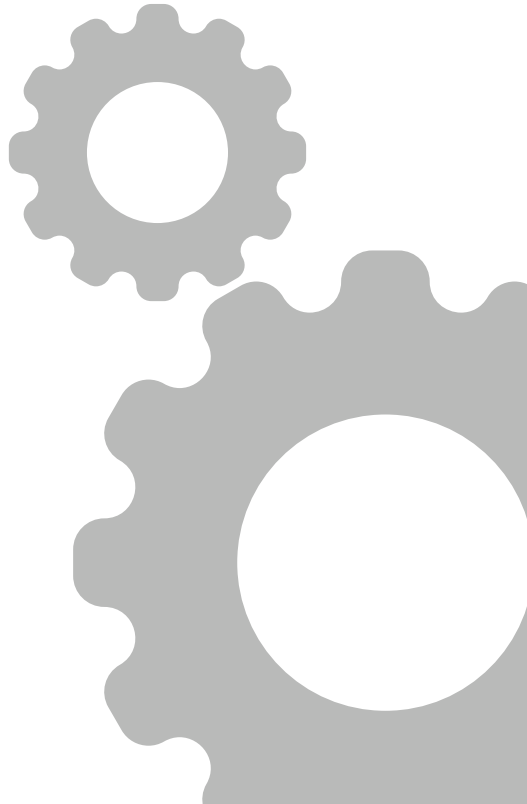
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EC DECLARATION OF CONFORMITY

We hereby declare that our machines for industrial and professional use as stated below.

Model: CT520D.

Conforms with EMC Directives:

73/23/EEC and 89/336/EEC

European Standard: EN/IEC60974

Please read and understand this instruction manual carefully before the installation and operation of this equipment.




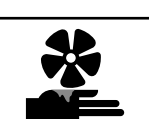

The contents of this manual may be revised without prior notice and without obligation.

This instruction manual is issued on 20 July 2020.

SAFETY

WARNING

Welding and cutting is dangerous to the operator, people in or near the working and surrounding areas, if the equipment is not operated correctly. Therefore the performance of welding/cutting must only be under the strict and comprehensive observance of all relevant safety regulations.

Symbol	Description
	Electric Shock: Maybe fetal <ul style="list-style-type: none">• Avoid all contact with live components of the welding circuit, Electrodes and Wires with bare bands. Wear dry gloves before start welding task.• Wires with bare bands Keep operator insurance from welding metal and welding pieces.
	Smoke and gas generated while welding or cutting Harmful to health of people <ul style="list-style-type: none">• Keep head distance away from gas.• Avoid breathing the smoke and gas of welding or cutting.• Keep the working area in good ventilation.
	Fire Hazard <ul style="list-style-type: none">• Welding sparks, Power cable leakage both can cause the fire.• Please do not welding in inflammable, it's can cause explode.• Sparks may cause fire, Remove flammable material from the work place.• Keep fire extinguisher nearby and have a trained fire person ready to use it.
	ARC light-emission: Harmful to the eyes & skin of people <ul style="list-style-type: none">• Wear a welding helmet, Anti-radiation glass and work clothes while the welding Operation is performed.• Keep working area in ventilation.
	CYLINDER may explode if damaged. <ul style="list-style-type: none">• Always keep cylinders in an upright position securely chained to an Undercarriage or fixed support.• Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.• Keep your face and head away from the cylinder valve outlet when it to be opening.
	Engine fan can hurt the hands <ul style="list-style-type: none">• Do not put your hands near the engine fan.• Do not attempt to override the governor or idler by pushing on the throttle Control rods while the engine is running.
	ELECTRIC SHOCK can kill. <ul style="list-style-type: none">• Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical.• Ground the work or metal to be welded to a good electrical ground.• Never dip the electrode in water for cooling.• Turn off input power using the disconnect switch at the fuse box before working on the equipment.• Install equipment in accordance with electric standard code.

1. Working Environment.

- 1.1 The environment in which this welding equipment is installed must be free of grinding dust, corrosive chemicals, flammable gas or materials etc, and at no more than maximum of 80% humidity.
- 1.2 When using the machine outdoors protect the machine from direct sun light, rain water and snow etc; the temperature of working environment should be maintained within -14°F to $+104^{\circ}\text{F}$.
- 1.3 Keep this equipment distant from the wall.
- 1.4 Ensure the working environment is well ventilated.

2. Safety Tips.

2.1 Ventilation

This equipment is small-sized, compact in structure, and of excellent performance in amperage output. The fan is used to dissipate heat generated by this equipment during the welding operation. Important: Maintain good ventilation of the louvers of this equipment. The minimum distance between this equipment and any other objects in or near the working area should be 1ft. Good ventilation is of critical importance for the normal performance and service life of this equipment.

2.2 Thermal Overload protection.

Should the machine be used to an excessive level, or in high temperature environment, poorly ventilated area or if the fan malfunctions the Thermal Overload Switch will be activated and the machine will cease to operate. Under this circumstance, leave the machine switched on to keep the built-in fan working to bring down the temperature inside the equipment. The machine will be ready for use again when the internal temperature reaches safe level.

2.3 Over-Voltage Supply

Regarding the power supply voltage range of the machine, please refer to "Main parameter" table. This equipment is of automatic voltage compensation, which enables the maintaining of the voltage range within the given range. In case that the voltage of input power supply amperage exceeds the stipulated value, it is possible to cause damage to the components of this equipment. Please ensure your primary power supply is correct.

- 2.4 Do not come into contact with the output terminals while the machine is in operation. An electric shock may possibly occur.

Maintenance

Exposure to extremely dusty, damp, or corrosive air is damaging to the welding machine. In order to prevent any possible failure or fault of this welding equipment, clean the dust at regular intervals with clean and dry compressed air of required pressure.

Please note that: lack of maintenance can result in the cancellation of the guarantee; the guarantee of this welding equipment will be void if the machine has been modified, attempt to take apart the machine or open the factory-made sealing of the machine without the consent of an authorized representative of the manufacturer.

Trouble shooting

Caution: Only qualified technicians are authorized to undertake the repair of this Plasma cutter equipment. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed in this manual.

Note:

- Our equipment as described in this manual conforms to all applicable rules and regulations of the 'Low Voltage Directive' (European Council Directive 73/23/EEC) as set out and amended by Council Directive 93/68/EEC) and to the National legislation for the enforcement of this Directive.
- Our equipment as described in this manual conforms to all applicable rules and regulations of the European Council Directive 89/336/EEC, (EMC Directive) and to the National legislation for the enforcement of this Directive.

Aip plasma cutting technology

Plasma cutters work by passing an electric arc through a gas that is passing through a constricted opening. The gas can be air, nitrogen, argon, oxygen, etc. The electric arc elevates the temperature of the gas to the point that it enters a 4th state of matter. We all are familiar with the first three: i.e., Solid, liquid, and gas. Scientists call this additional state plasma. As the metal being cut is part of the circuit, the electrical conductivity of the plasma causes the arc to transfer to the work. The restricted opening (nozzle) the gas passes through causes it to squeeze by at a high speed, like air passing through a venturi in a carburettor. This high speed gas cuts through the molten metal.

Plasma cutting was invented as the result of trying to develop a better welding process. Many improvements then led to making this technology what it is today. Plasma cutters provide the best combination of accuracy, speed, and afford ability for producing a variety of flat metal shapes. They can cut much finer, and faster than oxy-acetylene torches.

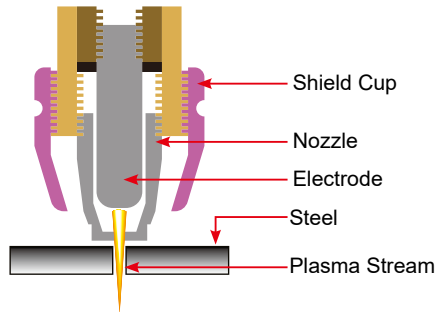
SAFETY

How a plasma cutter works

Basic plasma cutters use electricity to superheat air into plasma (the 4th state of matter), which is then blown through the metal to be cut. Plasma cutters require a compressed air supply and AC power to operate.

Operation

1. When the trigger is squeezed, DC current flows through the torch lead into the nozzle.
2. Next, compressed air flows through the torch head, through the air diffuser that spirals the air flow around the electrode and through the hole of the cutting nozzle.
3. A fixed gap is established between the electrode and the nozzle. (The power supply increases voltage in order to maintain a constant current through the joint.) Electrons arc across the gap, ionizing and super heating the air creating a plasma stream.
4. Finally, the regulated DC current is switched so that it no longer flows to the nozzle but instead flows from the electrode to the work piece. Current and airflow continue until cutting is stopped.



Notes:

The nozzle and electrode require periodic replacement. The electrode has an insert of tough high conductive material such as hafnium and cerium. This insert erodes with use, also the nozzle orifice will erode with use.

Quality of the air used is paramount to longer life of electrodes and nozzles, in short clean dry air gives longer parts life, the cleaner and dryer the better. We recommend use of a Plasma Air Filter.

SAFETY

What kinds of materials can the plasma cut?

Virtually any metal can be plasma cut including steel, stainless steel, aluminium, brass, copper, etc. Any thickness from 30 gauge through 13/16" can be cut, depending on the power of the plasma cutter used.

How Does Plasma Cutting Compare to Oxy-fuel (gas) cutting?

Plasma cutting can be performed on any type of conductive metal - mild steel, aluminium and stainless are some examples. With mild steel, operators will experience faster, thicker cuts than with alloys. Oxy-fuel cuts by burning, or oxidizing the metal it is severing. It is therefore limited to steel and other ferrous metals which support the oxidizing process. Metals like aluminium and stainless steel form an oxide that inhibits further oxidization, making conventional oxy-fuel cutting impossible. Plasma cutting however does not rely on oxidation to work and thus it can cut aluminium, stainless and any other conductive material. While different gasses can be used for plasma cutting, most people today use compressed air for the plasma gas. In most shops, compressed air is readily available, and thus plasma does not require fuel gas and compressed oxygen for operation. Plasma cutting is typically easier for the novice to master, and on thinner materials, plasma cutting is much faster than oxy-fuel cutting. However, for heavy sections of steel (1" and greater), oxy-fuel is still preferred since oxy-fuel is typically faster and, for heavier plate applications high powered plasma machines are required for plasma cutting applications

What are the limitations to Plasma Cutting? Where is Oxyfuel preferred?

The plasma cutting machines are typically more expensive than oxy/acetylene. Also, oxy/acetylene does not require access to electrical power or compressed air which may make it a more convenient method for some users. Oxyfuel can generally cut thicker sections (>63/64 inch) of steel more quickly than plasma.

PARAMETER

INPUT/OUTPUT SPECIFICATIONS

IGBT Inverter Type:	IGBT
Voltage/phase:	Dual Voltage 120/240 1 Phase
TIG output type:	DC only
TIG Start Type:	High Frequency Only
Pulse:	No
Plasma Cutter Arc Start Type:	High Frequency
PilotArc:	No
OK-to-Cut Indicator/Low Air pressure safety:	No
OCV:	<ul style="list-style-type: none">• TIG: 70 V• Stick: 70 V• Plasma: 220V
Max Inrush (I1MAX) Amps:	<ul style="list-style-type: none">• @ 110V: 31A• @ 220V: 27A
Maximum Rated (I1EFF) Input Amps:	<ul style="list-style-type: none">• @110V: 19A• @220V: 17A
TIG Output Amps/Volts @ Rated Duty Cycle:	<p>120V:</p> <ul style="list-style-type: none">• 120A/14.8V @ 35% Duty Cycle• 93A/13.7V @ 60% Duty Cycle• 72A/12/9V @ 100% Duty Cycle <p>240V:</p> <ul style="list-style-type: none">• 200A/18V @ 35% Duty Cycle• 160A/16.4V @ 60% Duty Cycle• 130A/15.2V @ 100% Duty Cycle
Stick Output Amps/Volts @ Rated Duty Cycle:	<p>F120V:</p> <ul style="list-style-type: none">• 120A/24.8V @ 35% Duty Cycle• 93A/23.7V @ 60% Duty Cycle• 72A/22.9V @ 100% Duty Cycle <p>240V:</p> <ul style="list-style-type: none">• 160A/26.4V @ 35% Duty Cycle• 130A/25.2V @ 60% Duty Cycle• 100A/24V @ 100% Duty Cycle
Plasma Output Amps/Volts @ Rated Duty Cycle:	<p>120V:</p> <ul style="list-style-type: none">• 27A/90.8V @ 60% Duty Cycle• 21A/88.4V @ 100% Duty Cycle <p>240V:</p> <ul style="list-style-type: none">• 50A/100V @ 35% Duty Cycle• 40A/96V @ 60% Duty Cycle• 30A/92V @ 100% Duty Cycle
TIG DC Amp/Volt Range:	<ul style="list-style-type: none">• 120V: 10A-120A, 10.4V-14.8V• 240V: 10A-200A, 10.4V-18V
Stick Amp/Volt Range:	<ul style="list-style-type: none">• 120V: 10A-120A, 20.4V-24.8V• 240V: 10A-160A, 20.4V-26.4V
Plasma Amp/Volt Range:	<ul style="list-style-type: none">• 120V: 10A-27A, 84V-94V• 240V: 10A-50A, 84V-100V
Preflow time:	Fixed
Post Flow Time:	Fixed
OverCurrent Protection:	Yes

LAYOUT

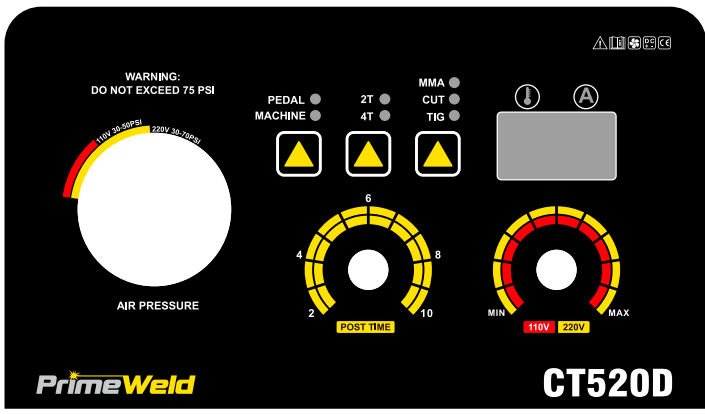
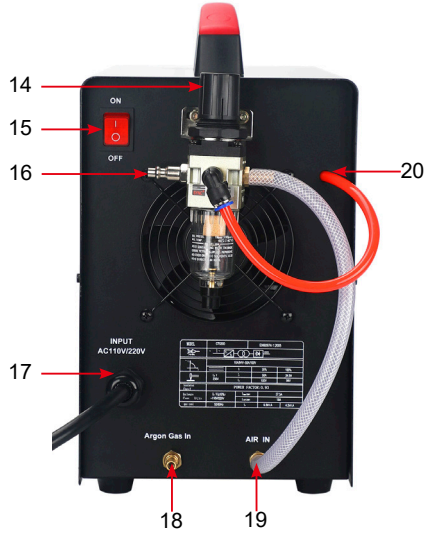
Duty Cycle Protection:	Yes
Air Pressure OK Safety Indicator:	No
Stick Arc Force Control:	Auto-Adaptive
Torch Type:	t AG-60 High Frequency
Recommended Cutting Air Pressure:	55-60 psi

Front & rear panel layout










Front Panel



Rear Panel



LAYOUT

1		Overheating indicator, It illuminates when the working temperature of the IGBT is overly high. Meanwhile, The machine stop working.
2		It is current indicator, Lighting when machine power on
3		LED Current Display.
4		Amperage Control Knob.
5		Time adjument for post air
6		Air Pressure Gauge. Suggest Air Range: 45-70PSI
7		Machine indicator, Current knob can use in this selection, can not use pedal.
		Pedal: current knob on machine can not be used in this selection, Can use the pedal adjust the current
8		4T is selected press and release trigger Arc starts, press and release trigger Arc stops.
		2T is selected press trigger Arc starts, release trigger Arc stops.
9		TIG function please select it before using machine
		Cutting function please select it before using machine
		Stick function please select it before using machine
10		Stick connector
11		TIG and Cutting torch connector
12		Switch connector for TIG and Cutting torch
13		Earth clamp connector
14		Air regulator
15		Power switch
16		Quick air connector
17		Power cable Input Voltage 110/220v, Voltage Automatic Identification, no need hand switch
18		Argon Gas in
19		Air in
20		To Air Meter

LAYOUT

Set up procedure for plasma cutting machine

1. Connect the AG60/AG60P Plasma Torch to the machine. Insert the torch connection into the torch connection receptacle at the front of the machine and screw up hand tight. Caution: Be careful not to bend the pins located inside the torch connector.
2. Connect the earth lead to the output terminal of the machine and tighten.
3. Connect the air supply to the air connection located at the rear of the machine. Turn on the air supply.
4. Connect the machine to the correct power supply and switch on the machine using the on/off switch located at the rear of the machine.
5. Select 2T / 4T operation
Operating procedure using the 2T / 4T Function with AG60/AG60P torch. Set torch operation 2T / 4T.
 - When 2T operation is selected press trigger Arc starts, release trigger Arc stops.
 - When 4T operation is selected press and release trigger Arc starts, press and release trigger Arc stops.
6. Set amperage dial.

How to begin use this machine

Before use this machine, you need to read the blow information carefully, Put the accessories ready before operate this unit.

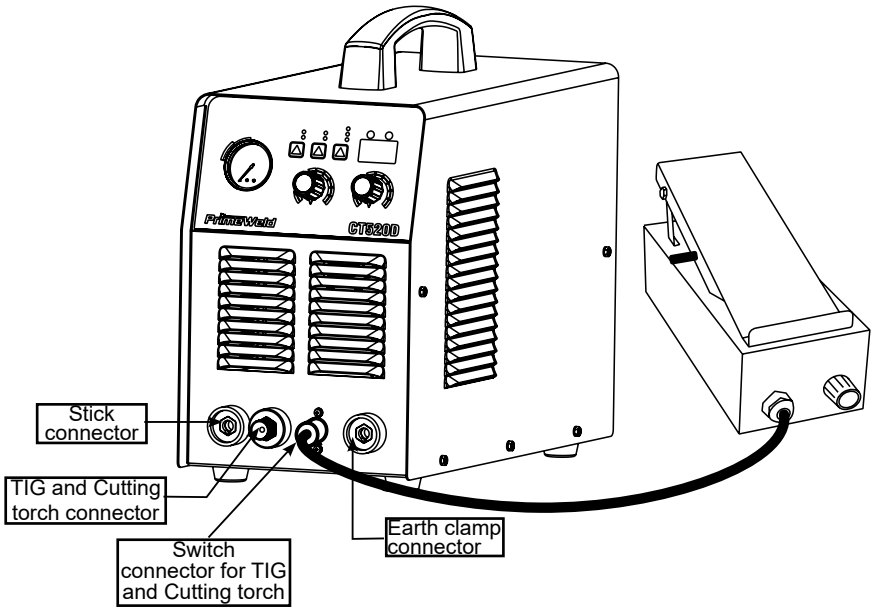


Connect the Plasma cutting torch to the machine set the torch connection into the torch connection Receptacle at the front of the machine and Screw up hand tight.

Connect the earth lead to the output terminal Of the machine and tight

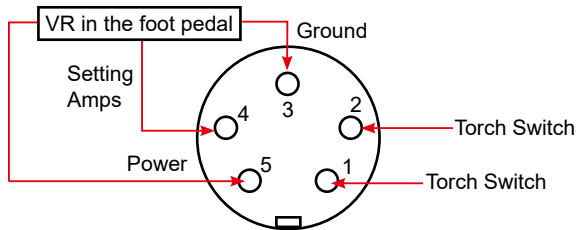
LAYOUT

CONNECTION



Before use pedal, please switch function "Machine" to "Pedal " please connect torch and ground clamp well, leave torch switch free (do not plug it to TIG torch switch port), Connect foot pedal to panel of machine.

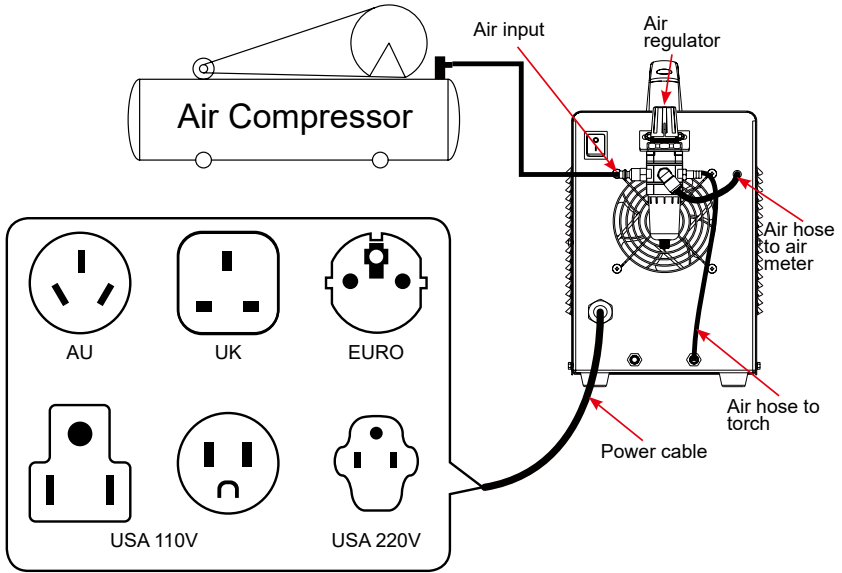
5 PIN CONNECTOR FOR FOOT PEDAL



FOOT PEDAL

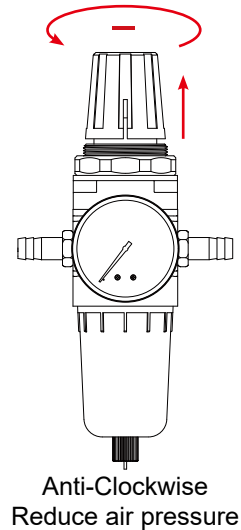
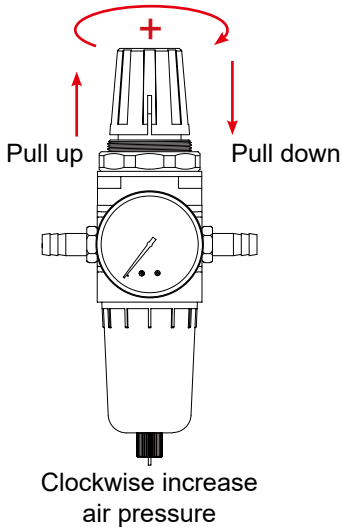
LAYOUT

Connection



How to use air regulator

Air Pressure range: 40-70 PSI



LAYOUT

Function & Install instruction

HOW TO USE MMA(Stick)

Select MMA mode, Stick holder connect to left socket, same time connect earth clamp to the right socket.



HOW TO USE CUT

Before start use cutting function, need to select cut mode, then connect torch and switch and pilot arc wire also earth clamp to panel of machine. start cutting after all connecting.

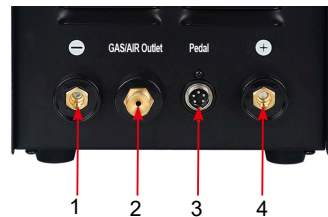


HOW TO USE TIG

Select TIG mode, connect torch, switch and earth clamp to panel of machine. start TIG welding after finish all connecting.

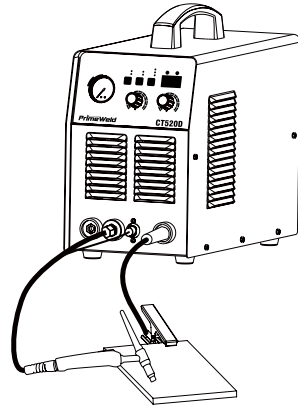


1. For connect stick holder
2. GAS/AIR OUTLET
3. PEAL/ Torch switch
4. For connect earth clamp



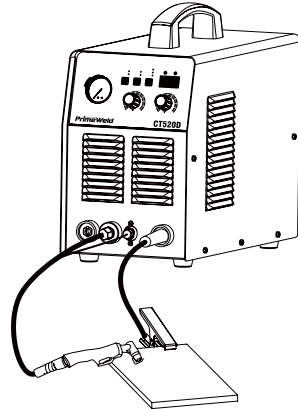
How to connect wire for TIG welding.

1. Connect the TIG torch & switch to panel of machine
2. connect the plug of earth clamp to the machine socket.



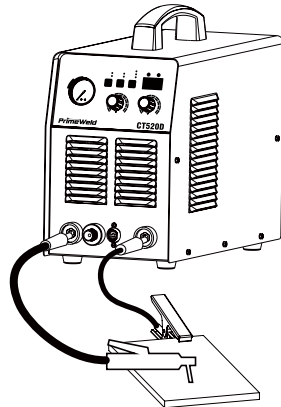
How to connect wire for cutting function

1. connect the plasma torch & switch to socket of panel, (also need to connect the pilot arc wire if machine with pilot arc function)
2. connect the earth clamp to socket on panel of machine



How to connect wire for stick welding

1. connect the plug on wire of stick holder to panel of machine (there is symbol mark on machine)
2. connect the plug on wire of earth clamp to panel of machine.



LAYOUT

Cutting Thickness Chart

Need to adjust the current and air pressure properly under metal thickness to get best cutting surface

1	CT520 (220V)	20Amps	30Amps	40Amps	50Amps
	Thickness (mm)	4mm	6mm	10mm	14mm
	Air Pressure (psi)	40psi	50psi	60psi	70psi
	Tip size	ϕ 0.8- ϕ 0.9	ϕ 0.8- ϕ 0.9	ϕ 0.9- ϕ 1.0	ϕ 0.9- ϕ 1.0
2	CT520 (110V)	25Amps	35Amps		
	Thickness (mm)	4mm	6mm		
	Air Pressure (psi)	40psi	50psi		
	Tip size	ϕ 0.8- ϕ 0.9	ϕ 0.8- ϕ 0.9		

Accessories

Following accessories come with machine

1. machine x 1
2. plasma cutting torch x 1
3. earth clamp with cable x 1
4. air hose x 1
5. cutting torch tip x 2
6. cutting torch electrode x 2
7. Air regulator x 1
8. Power plug wire adaptor x 1
9. TIG torch * 1
10. Arc holder with cable *1



OPERATION



1. place and hold the torch vertical At the edge of the plate.



2. Pull the trigger to energise the pilot arc. The cutting arc will start when the nozzle is moved closer to the edge of the work piece. When the cutting arc has cut through the edge of the plate start moving evenly in the direction you wish to cut.



3. Correct amperage and travel speed are important and relevant to material thickness and are correct when sparks are exiting from the work piece. If sparks are spraying up from the work piece there is insufficient amps selected or the travel speed is too fast.



4. To finish the cutting release the torch switch. The air flow will continue for 20 seconds to cool the torch head.

Cut Quality

A clean cut depends on several factors:

- amperage
- travel speed
- tip height & position
- tip and electrode quality
- air pressure and quality
- technique

The best quality cut will be produced when all these variables are set correctly for the material thickness and type of material being cut.

Poor quality cut



Good quality cut



OPERATION

Amperage

Standard rule of thumb is the thicker the material the more amperage required. On thick material, set the machine to full output and vary your travel speed. On thinner material, you need to turn down the amperage and change to a lower-amperage tip to maintain a narrow kerf. The kerf is the width of the cut material that is removed during cutting.

Speed

Amperage and speed are critical to producing a good quality cut. The faster you move (especially on aluminium), the cleaner your cut will be. To determine if you're going too fast or too slow, visually follow the arc that is coming from the bottom of the cut. The arc should exit the material at a slight angle away from the direction of travel. If it's going straight down, that means you're going too slow, and you'll have an unnecessary buildup of dross or slag. If you go too fast, it will start spraying back onto the surface of the material without cutting all the way through. Because the arc trails at an angle, at the end of a cut, slow your cutting speed and angle the torch in to cut through the last bit of metal.

Direction

It is easier to pull the torch towards you than push it. The plasma stream swirls as it exits the tip, biting one side and finishing off on the other leaving a bevelled edge and a straight edge. The bevel cut effect is more noticeable on thicker material and needs to be taken into consideration before starting your cut as you want the straight side of the cut to be on the finished piece you keep.

Torch tip height & position

The distance and position of the plasma torch cutting tip has an affect on the quality of the cut and the extent of the bevel of the cut. The easiest way to reduce bevel is by cutting at the proper speed and height for the material and amperage that is being cut.



Correct torch height and
Square to the material
Minimum bevel & equal bevel
Longest consumable life



Torch angled to the material
unequal bevel, one side may
be excessively beveled.

OPERATION



Torch height too high
excessive bevel, plasma
Stream may not cut all the
way through the material



Torch height too low
Reverse bevel. Tip may
contact the work piece and
short out or damage the tip.

Tip size and condition

The tip orifices focus the plasma stream to the work piece. It is important to use the correct size tip for the amperage being used, for example a tip with a 3/64" orifice is good for 0-40 amps whereas a 1/16" orifice is better for 40-80 amps.

The low-amp tip has a smaller orifice which maintains a narrow plasma stream at lower settings for use on thin-gauge material. Using a 25 amp tip at an 60 amp setting will blow out and distort the tip orifice and require replacement. Conversely, using an 80-amp tip on the lower settings will not allow you to focus the plasma stream as well and creates a wide kerf. The condition of the tip orifice is critical to the quality of the cut result, a worn or damaged tip orifice will produce a distorted plasma stream resulting in a poor cut quality.

Electrode condition

A fixed gap is established between the electrode and the inside of the cutting tip.

Electrons arc across the gap, ionizing and super heating the air creating the plasma stream. The electrode contains an insert in the end made of a highly conductive material called hafnium. This insert erodes with use and develops a pit in the end of the electrode, when the pit becomes too much poor quality cuts will result and necessitate replacement of the electrode.

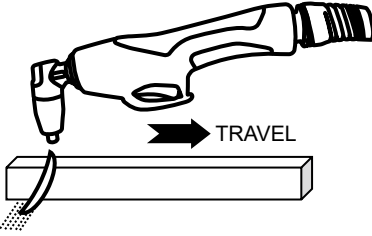
Air pressure and volume

Air pressure, flow rate and air quality are critical to quality plasma cutting and consumable life span. The required air pressure and volume can vary from model to model and the manufacturer will provide the specs. The air pressure is pre-set at 4.5 psi and requires a flow rate of 6.0 CF/M. The volume capacity of your compressor is important, if you have a small compressor with exactly the same l/min rating as the plasma, then the compressor will run continuously when you are plasma cutting, a compressor with a l/min rating slightly higher than the plasma would be more adequate. If you are doing a lot of cutting, cutting thick plate (same air consumption but slower cut speeds = longer cut time) then choose a compressor at 1.5 to 2 times the plasma system requirement.

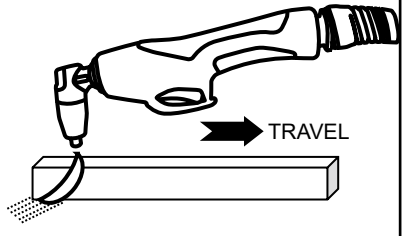
OPERATION

TIP: For longer consumable life do not use the pilot arc unnecessarily. Rapid wear will occur if the pilot arc stays engaged more than 3 seconds at a time.

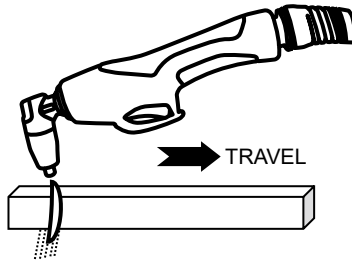
FLAME AT NORMAL TRAVEL SPEED



FLAME AT FAST TRAVEL SPEED



FLAME AT SLOW TRAVEL SPEED



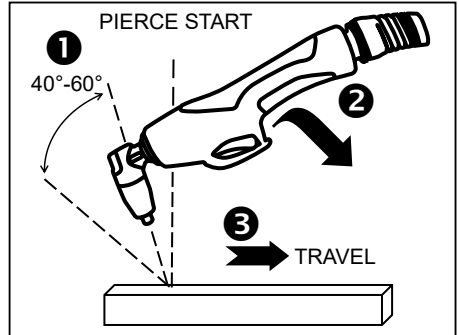
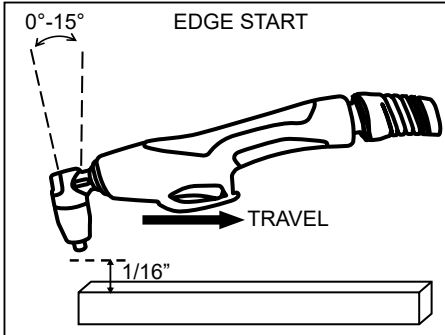
NOTE: When stepping down amps to cut thinner material, or using on 120V, you must change to smaller orifice nozzle for the best cutting results. Too large of an orifice diameter will result in arc instability and a rough cut. Lowering the air pressure below 50 psi to try to get the torch to cut will only result in a lazy, wandering arc or an arc that sputters on and off continuously.

TIP

⚠ IMPORTANT: Check consumables regularly for wear and change them out before they are completely worn. Allowing the consumables to wear until they quit working may damage related torch components, creating a more costly repair.

OPERATION

Helpful Hint: If difficulty is observed in starting the arc, it may be time to readjust the point gap setting found inside. The HF points tend to wear and get dirty over time. This is a normal maintenance item and not something for warranty consideration. Proper point gap adjustment is .035 "to .045". Before attempting to adjust the point gap, be sure to unplug the unit for 15 minutes before removing the rear plastic panel, and the steel case to access the points located near the front of the unit. Do not remove the front panel! Use a feeler gauge to adjust the points to the proper setting. Another possibility is that the air pressure is too low or too high. Worn/loose consumables may cause this as well.



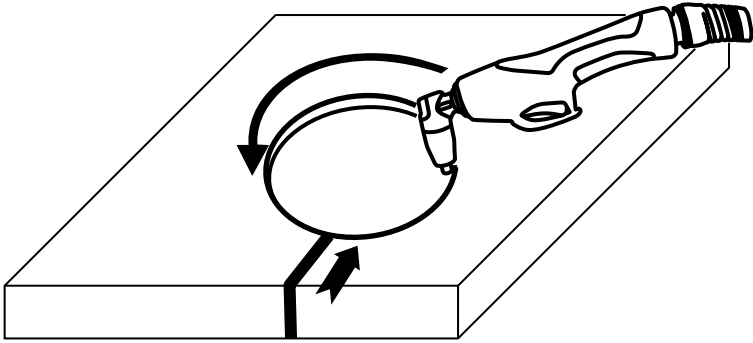
Edge Starts are the best type of start if possible to promote consumable and torch life. This reduces blow back of molten material and allows a smooth gradual start of the cut. 1. Line up the hole on the tip of the electrode on the edge of the cut. Hold torch perpendicular to the cut initially, about 1/16" off the metal. 2. Once the arc starts, wait for the arc to penetrate all the way through the metal. 3. As the torch penetrates its flame all the way through the metal, tilt the torch so there is a slight lead in the flame if metal is thin. If it is thick, keep holding torch in a nearly vertical position. 4. Begin moving the torch in the direction of the cut. Maintain 1/16" standoff height. 5. Move the torch fast enough so the sparks and flame trail from the bottom edge at an angle of no more than 30° and no less than 10° from perpendicular to the metal. Excess angle of sparks/flame indicate too fast of travel speed or practical cut capacity has been reached. Little or no angle indicates too slow of travel speed. **IMPORTANT**

Piercing starts often result in rapid consumable wear and excess blow back of molten metal deposited onto torch and consumables. This should be done only as necessary. 1. Tilt the torch in the direction of travel or toward the side of the metal to be discarded or wasted at a 40° to 60° angle. Slide the yellow safety lock and squeeze the trigger. 2. Once the arc starts, wait for the arc to transfer from pilot arc to the cutting arc. 3. As the torch penetrates it flame at an angle rotate the torch slowly to the vertical position, as the arc penetrates the metal. Tilt the torch from 0°-15° for thin metal cuts, or hold it nearly perpendicular for thicker metal cuts. 4. Begin moving the torch in the direction of the cut. Maintain 1/16" standoff height. 5. Move the torch fast enough so the sparks and flame trail from the bottom edge at an angle of no more than 30° and no less than 10° from perpendicular to the metal. Excess angle of sparks/flame indicate too fast of travel speed or practical cut capacity has been reached. Little or no angle indicates too slow of travel speed. **Helpful**

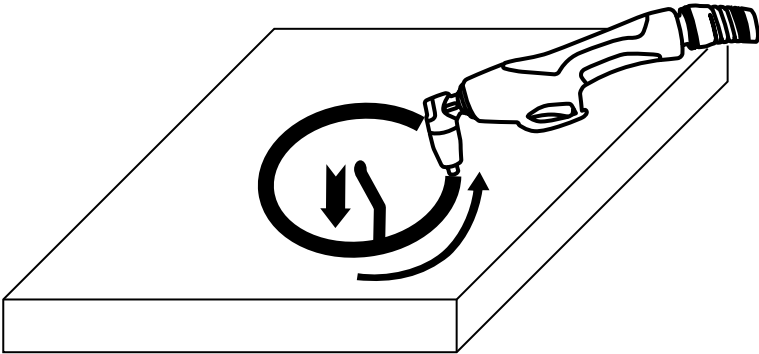
IMPORTANT: If you use a standoff guide with the torch, it must be adjusted or bent to provide no more than 1/8" standoff, less if possible. Long standoff heights reduce cut capacity and quality. It also promotes rapid consumable wear and can prevent the pilot arc from transferring.

OPERATION

AN EXAMPLE OF CUTTING A LEAD-IN WHEN CUTTING OUT A DISK SHAPED OBJECT



AN EXAMPLE OF CUTTING A LEAD-IN WHEN CUTTING HOLE IN AN OBJECT

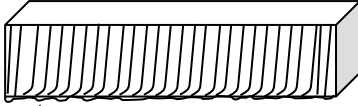


When cutting an object, particularly a pattern shape, where the torch must pierce or re-fire in-line at an intersection of a cut, a lead-in cut should be employed. A lead-in is a cut that is made in the disposable part (also known as a drop) of the object to “lead” into the main part of the cut so that the destructive force of the arc is not directed into the desirable side of the cut itself. Also, all plasma cutters exhibit some angularity or bevel in the cut which is greater on one side than the other. Keep this in mind when cutting an object to size so that too much metal is not accidentally removed.

OPERATION

RESULTS OF CUT AT CORRECT SPEED, AIR PRESSURE AND TORCH ANGLE

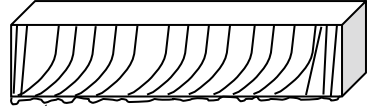
SMOOTH, EVEN CUT LINES WITH A S REARWARD SWEEP



MINIMAL EASY TO CLEAN DROSS

RESULTS OF CUT AT FAST SPEED

ROUGH, DISTINCT CUT LINES SPACED FAR APART



NOTICEABLE SMALL, HARD DROSS

RESULTS OF CUT AT SLOW SPEED

VERTICAL CUT LINES



SIGNIFICANT SOFT, POROUS DROSS

RESULTS OF TOO MUCH CURRENT OR TOO MUCH STAND OFF HEIGHT (SIDE VIEW)

MELTED TOP EDGE



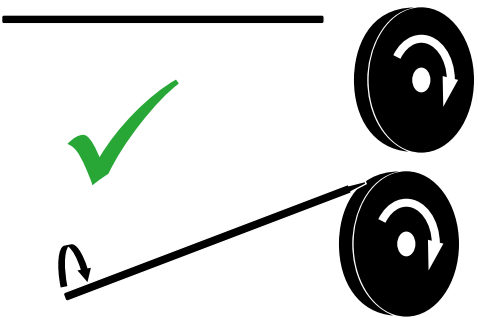
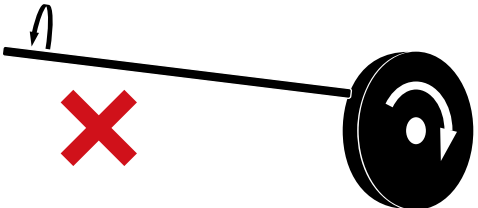
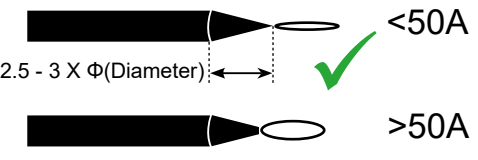
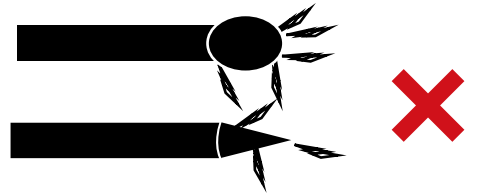
RESULTS OF WORN CONSUMABLE OR LOW AIR PRESSURE (SIDE VIEW)

SEVERLY ANGLED CUT AT TOP



OPERATION

TUNGSTEN PREPARATION

	<ol style="list-style-type: none">1. Use a dedicated grinding wheel or contamination may result. Do not breath grinding dust! Wear eye protection and gloves.2. Hold Tungsten firmly.3. Grind perpendicular to grinding wheel face. Allow tungsten to grind away slowly, creating point.4. Rotate tungsten quickly as it is being ground to keep point even and symmetrical.
	<p>DO NOT GRIND TUNGSTEN PARALLEL TO WHEEL FACE OR AN UNSTABLE ARC WILL RESULT.</p>
	<p>Use a point for low amp use to help control arc. Create a slight truncation on the tip for higher amp use for best arc stability. Grind the tip so that it is 2.5-3 times longer than the tungsten is wide (Diameter).</p>
	<p>DO NOT BALL TUNGSTEN. An ERRATIC ARC MAY RESULT. MAKE SURE GRINDING MARKS RUN PARALLEL AND IN LINE WITH THE TIP. CONCENTRIC MARKS WILL CAUSE AN ERRATIC ARC.</p>

OPERATION

Be sure to select the best Tungsten for your application. Low amp starts are difficult if too large of Tungsten is used. Use only lanthanated, ceriated or thoriated Tungsten. Do not use pure Tungsten (marked with green tip).

GENERAL POLARITY RECOMMENDATIONS*

*Follow manufacturer of stick electrode for complete polarity recommendations

PROCESS	TORCH POLARITY	WORK POLARITY
TIG (GTAW)	-	+
STICK (SMAW)	+	-

TIG (GTAW) OPERATION GUIDE FOR STEEL (ALUMINUM)*

*As a general rule, set amperage using 1 amp for every .001" of metal thickness for aluminum. Less is required for DC.

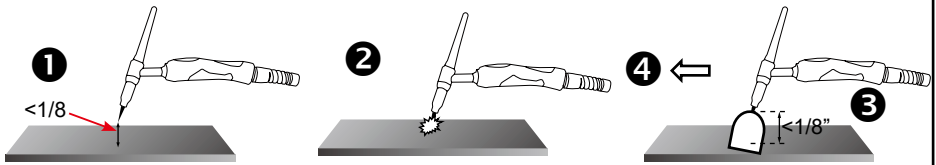
METAL THICKNESS	WELDING AMPS (A)	TUNGSTEN DIA.	Ar FLOW RATE
1-3 mm/.040"-1/8"	40-80 (60-125)	.040"-3/32"	8-15 CFH
3-6 mm/ 1/8"-1/4"	80-200 (125-200)	3/32"-1/8"	15-25 CFH
6-10 mm 1/4"-3/8"	150-200 (200-250)	1/8"-1/4"	20+ CFH

TUNGSTEN SELECTION GUIDE FOR AN INVERTER

TYPE	PERCENT	COLOR	PROCESS	RECOMMENDATION
Pure	100% Tungsten	Green	AC	NOT RECOMMENDED! Do not use in an inverter.
Thoriated (slightly radioactive)	2% Thorium	Red	AC/DC	YES. Great for all purpose welding. Most economical.
Ceriated	2% Ceria	Orange	AC/DC	YES. Good for low amp use.
Lanthanated	1.5% Lanthanum	Gold	AC/DC	YES. Best alternative to 2% Thoriated. Tough performer.
Lanthanated	2% Lanthanum	Blue	AC/DC	YES. Slight advantage over 1.5% Lanthanated.
Zirconiated	1% Zirconia	Brown	AC	NOT RECOMMENDED! Do not use in an inverter.

OPERATION

HIGH FREQUENCY START TIG OPERATION

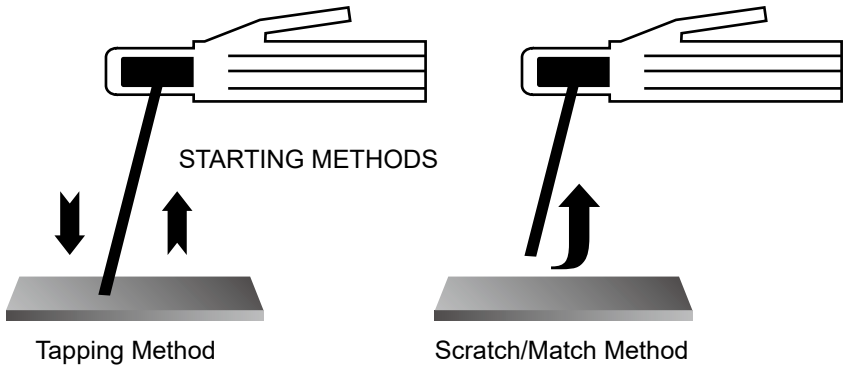


1. Position the point of the sharpened tungsten about $1/8''$ or less above the metal.
2. Press the torch trigger or press the foot pedal to initiate the arc. The HF arc will be initiated. It may appear briefly as a blue spark.
3. An arc should form almost immediately. If arc does not start, and the HF is creating a spark, then check the work clamp connectivity to the work piece. Grind a clean spot to attach the clamp if necessary. Connect the work clamp directly to the object being welded. Move the tungsten closer to the work. Also check polarity if arc does not start or tungsten balls, or burns quickly. Repeat steps 1 and 2.
4. Leave $1/8''$ or less gap between the tungsten tip and the metal and proceed with welding, leaving the torch inclined at a maximum 15° angle.

General TIG Arc Starting Steps

1. Turn the unit on, allow time for power up cycle to complete its start up process.
2. Select TIG mode with TIG /CUT/Stick selector button.
3. Plug in the TIG Torch with either the torch switch or foot pedal connected. Then select panel mode or pedal mode with the selector button depending upon whether the foot pedal (pedal mode) or torch switch (panel mode) was chosen for use.
4. Adjust to the desired Post Flow time by rotating the knob to increase/decrease. (Usually .5 to 1 second per 10 amps)
5. Select maximum amps with amp control knob.
6. Start arc as depicted above by either pressing and holding the torch switch or by stepping down slightly on the pedal.
7. If you are using the panel mode, continue to hold the torch switch until you are ready to stop welding. Release the switch. The welding arc will then cease. If you are using the foot pedal raise your foot completely off the pedal and arc will stop automatically.

STICK OPERATION



1. Turn on the power switch on the rear of the unit. Allow unit to cycle through its start up program.
2. Select the Stick mode with the TIG/Cut/Stick selector switch.
3. Make sure electrode holder is connected to the positive connector and the work clamp is connected to the negative connector. Remember, this is the opposite connection required for TIG and plasma.
4. Select the desired amperage. Use the electrode diameter selection chart in this manual to determine the approximate range of amps suitable for the rod size selected. Consult the welding electrode manufacturer's recommendation for proper amperage range. Each manufacturer has specific recommendations for its electrodes. Ultimately Amperage is determined by the electrode thickness and the thickness of the metal.
5. Strike the arc with either the tapping method or the match strike method. Beginners usually find that the match strike method yields best results. Professionals tend to gravitate toward the tapping method because of its placement accuracy which helps prevent arc striking outside of the weld zone.

! IMPORTANT: Do not weld in the TIG mode with the stick electrode holder still attached.

FRONT PANEL FEATURES AND CONTROLS CONTINUED

FEATURES	PARAMETERS	PURPOSE
1. Amp Display	N/A	Indicates actual amp output while welding. While adjusting or while not welding, the function of the display changes to display the selected amperage.
2. On/Temp/ Duty Cycle	On/Off	The On indicator should always be lit while the unit is plugged in and the power switch is switched on. If the Overcurrent light is lit, turn the unit off and check for possible causes including undersized cables, poor connections and overheating cables. If the Duty cycle is lit, do not turn off the unit until it has had sufficient time to cool (10-15 minutes). Cycle the power switch to reset the machine only after the machine has had time to cool. The duty cycle and overcurrent warning lights should go off after cycling the power switch on the machine. If it does not, contact.
3. Panel/Pedal Switch	N/A	This switch determines which mode controls the unit, the torch switch (Panel) or the pedal. Using either one will determine how the unit reads and sets the maximum output of the machine.
4. TIG/CUT/ STICK	N/A	This switch selects processes. Do not switch this switch while welding or cutting. Do not switch it with the wrong torch connected or immediate failure of the unit may result. Improper polarity can contribute to torch failure as well. Make sure all connections are installed properly before cutting or welding.
5. Amp Control	N/A	Controls amperage while welding or cutting by using the knob to preset maximum amperage.
6. Post Flow Control	2-8 Seconds	Sets the post flow time of the shielding gas while welding in TIG mode. While in plasma (cut) mode, it sets the post flow time of the air. Time is an approximation only and can vary a little from the setting posted on the dial. The air or shielding gas may stop flowing before full maximum time is reached. Consider the maximum setting mark a reference guide only.
7. Pilot Arc	N/A	This connection is only used with the plasma cutting torch. The small ringed wire connects here. Unscrew the plastic thumb nut and attach the wire to the post. Reinstall the thumb nut over the wire with finger pressure only. Do not overtighten
8. Negative Connector	DINSE 25	Location of the negative terminal connection. Dinse-style. For Stick: Work Clamp Connection. For TIG: Torch Connection. For Plasma: Torch Connection.
9. Quick Connect Gas Outlet	9mm	Connects the shielding gas to the TIG torch. To connect: Push the torch fitting into the connector until the collar slides forward with a click. To Release: Slide the collar back and it will automatically release. Do not turn or twist the connector.
10. Control Connector	5 Pins	Connect the foot pedal or torch switch to this socket to control the welder. Only the foot pedal or torch control connector can be plugged in at one time. If the torch has a torch switch feature, tie the loose connector back and leave it disconnected while using the pedal.

OPERATION

11. Positive Connector (Work Piece on some models)	DINSE 25	DINSE 25 Location of the positive terminal connection. Dinse-style connector. For Stick: Torch connection. For TIG, Plasma: Work Clamp Connection.
12. Air Pressure Gauge.	75 psi max supply 55-65 psi operating	Use the air pressure to measure air supply pressure for the plasma cutting process only. The pressure is irrelevant while being used for TIG welding, although some pressure may register while the gas is actively flowing. Supply air pressure should not exceed 85 psi from the air compressor or internal leaks may develop. Adjust the operating pressure while air is flowing. Adjust the air pressure to 55-65 psi and increase or decrease pressure from there to achieve optimum cutting results while air is actively flowing. To adjust air pressure with torch, briefly fire torch with post flow set to maximum. Adjust air flow while the air is still flowing. Use air only for cutting. If a large differential in air pressure is observed (more than 10-12 psi), check for restrictions, kinks or blown connections. If all checks out ok, you may need to use a larger diameter supply hose or compressor.

Air quality

Good air quality is essential to quality plasma cutting and consumable life span. Compressors take in air at atmospheric pressure and increase the pressure and store it in a tank. Humidity in the air is condensed in the tank and in the airlines producing water, more so in humid environments. Moisture that forms in air lines has a tendency to condense into larger drops when the air pressure decreases as it is entering the plasma torch. When these droplets enter into the high temperatures (as much as 19832°F) in the plenum of the torch, they immediately break down into oxygen and hydrogen, which alters the normal chemical content of air in the torch. These elements will then dramatically change the plasma arc which causes the torch consumable parts to wear very quickly, alters the shape of the nozzle orifice, dramatically affecting cut quality in terms of edge squareness, dross formation, and edge smoothness. Minimising the moisture in the air supply is absolutely critical to quality plasma cuts and longevity of consumable parts. As a minimum be sure to drain the receiver (tank) on the air compressor at least daily. Most air plasma systems from reputable manufacturers have an on board particulate filter and or a coalescing filter with an auto drain that will remove some moisture from the air supply. For home workshop and light industrial users the on board air filter is adequate. Most situations however will require additional filtration to prevent moisture from affecting the quality of the plasma cutter and in most cases it is recommended to install a sub micron particulate filter that is designed to trap water through absorption. This style of filter has a replaceable filter cartridge that absorbs water and must be changed after it is near saturation, it should be installed close as possible to the air intake of the plasma cutter.

Technique Tips

- It is easier to pull the torch through the cut than to push it.
- To cut thin material reduce the amperage until you get the best quality cut.
- Use the correct size tip orifice for the amperage being used.
- For Straight cuts use a straight edge or cutting buggy as a guide. For circles, use a template or circle cutting attachment.
- Check that the front end consumable parts of the plasma cutting torch are in good condition.

OPERATION

Safety Trigger Operation

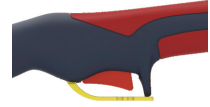
The AG60 torch supplied with the CT520D machine has a new design of safety trigger. Just pull back on the trigger whilst increasing your grip and you will feel the trigger move to the on position. When you release the pressure it will return to the off position.



OFF

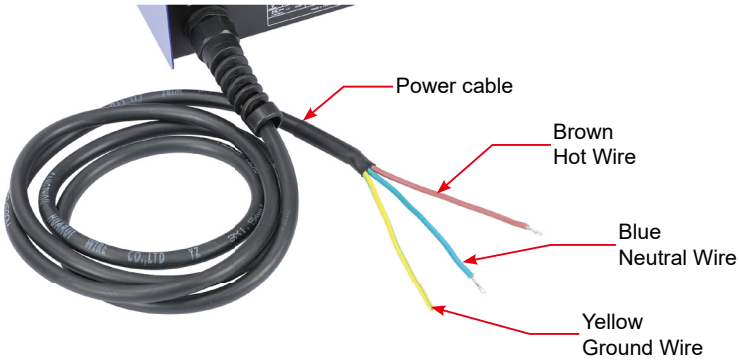


ON



OFF

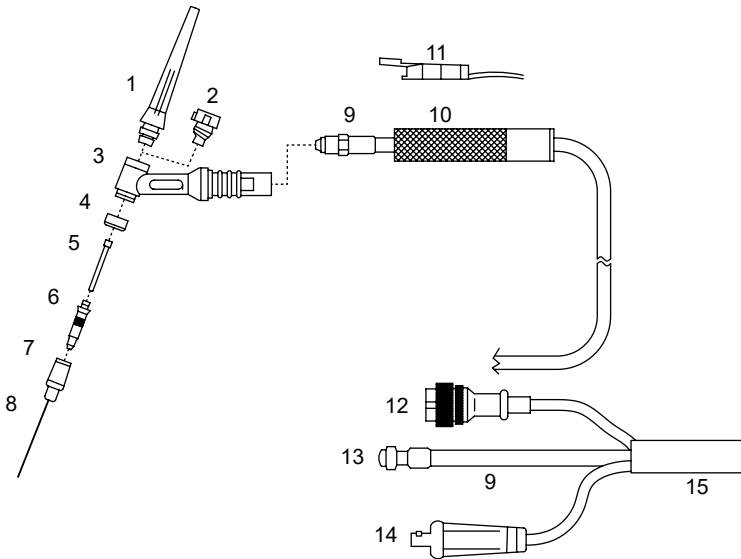
Power cable connection



ACCESSORIES

EXPANDED VIEW OF TIG TORCH

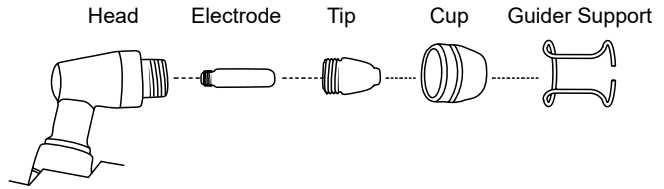
(Actual appearance may vary slightly from what is listed.)



NO.	Parts for Standard 26 Series Torch (18 series uses same consumables and basic design is similar, except water cooler line plumbing)	QTY.
1	Long Back Cap with O-Ring	1
2	Short Back Cap	Opt.
3	Torch Head	1
4	Insulator	1
5	Collet 1/16 or 3/32	1
6	Collet Holder	1
7	Ceramic Cup #5,6, or 7	1
8	Tungsten (customer supplied)	1
9	Torch Cable	1
10	Torch Handle (Blue ergo handle std, not pictured)	1
11	Torch Switch (Built into ergo handle, separate on straight handle)	1
12	Torch Switch Connector	1
13	9mm (1/8") b quick connect coupling (male)	1
14	Power Connector	1
15	Protective Synthetic Rubber Cover	1

ACCESSORIES

AG60 Torch Parts



Electrodes

Part #	Description	QTY
AG60/SG55-01	Electrodes	2/Pack



Tip

Part #	Description	QTY
AG60/SG55-02	Tip	2/Pack



Shield Cup

Part #	Description	QTY
AG60/SG55-03	Shield Cup	1



Stand off

Part #	Description	QTY
AG60/SG55-04	Stand off for pilot arc model only	1

⚠️ STAND OFF FOR PILOT ARC MODEL ONLY

TROUBLE SHOOTING

Problems	Analysis	Solution
The light not working after power on, there is no any working voice inside of machine when press torch trigger.	<ul style="list-style-type: none"> •No power. •The cable connecting not well. •Power wire loosen. •Other wires loosen inside of machine. •Bottom board ab-41failed. 	<ul style="list-style-type: none"> •Check the input power Ac220v or Ac110v. •Check the power wire. •Check power switch and wire connecting. •Check wires inside of machine. •Change board ab-41.
Lighting up after power on, fan works, machine not working after press torch.	<ul style="list-style-type: none"> •Torch problem or switch wire loosen in machine. •Connector problem on panel of machine. •Switch wires inside of machine loosen. •Other wires loosen inside of machine. 	<ul style="list-style-type: none"> •Check torch wries. •Check the problem if needed. •Check it. •Check the wires.
Lighting up after power on, hf works after press torch switch but no air blow out of torch head (or the air keep blowing out), electric valve not working.	<ul style="list-style-type: none"> •Electric valve damaged(it is Dc24v). •Air hose stroke. •Circuit problem for electric valve. 	<ul style="list-style-type: none"> •Check it or replace. •Check it. •Replace board.
Lighting up after power on, o.C not lighting up, air blowing out while pressing torch switch(electric valve works) hf not working, but can see a blue arc when torch touch the metal.	<ul style="list-style-type: none"> •Arc coil not fix well. •Hf capacitor 102-10kv problem. •Hf coil ftb-08 problem. 	<ul style="list-style-type: none"> •Check wires. •Replace capacitor. •Replace hf coil.
Lighting up after power on, air can blow out after press torch switch, o.C lighting up while pressing torch switch.	<ul style="list-style-type: none"> •Diode problem. •Igbt problem. 	<ul style="list-style-type: none"> •Check each diode and change it. •Check each igbt, resistor, diode repair or replace it.
Not able to adjust the cutting current.	<ul style="list-style-type: none"> •Potentiometer or wires problem. •Setting circuit problem. •Machine/pedal in right selection. 	<ul style="list-style-type: none"> •Check potentiometer is there 0-5v voltage between middle wire to ground, check it and replace. •Check wires from panel board to top board. •Circuit board problem, need to replace.
Switch off after power on.	<ul style="list-style-type: none"> •Power cable or pcb short circuit. •Silicon bridge problem. 	<ul style="list-style-type: none"> •Check it. •Check and replace. •Check it and replace.

TROUBLE SHOOTING

<p>Press torch switch, can hear hf voice and blue arc when torch touch metal, no output can not get arc starting.</p>	<ul style="list-style-type: none"> •Torch cable connect not well or problem, ground wire problem. •PCB problems to connect to the ground. 	<ul style="list-style-type: none"> •Inspection.
<p>Can not to get arc starting.</p>	<ul style="list-style-type: none"> •Distance problem between HF point, or over life. •Power leakage on HF board. •Gas/power connector damaged cause power leakage. 	<ul style="list-style-type: none"> •Adjust the distance between hf point. •Inspection. •Check and replace.
<p>Hf keep working after press torch trigger.</p>	<ul style="list-style-type: none"> •HF disturb the torch switch. •Machine set on function 4t. 	<ul style="list-style-type: none"> •Check each point, make sure no hf power leakage. •Please understand how to use 2T/4T.
<p>No pilot arc but have hf after press torch trigger.</p>	<ul style="list-style-type: none"> •Check pilot arc wire touch good or not. •Torch consumables maybe touch not well. •Pilot arc wire loosen inside of machine. •Pilot arc relay problem. 	<ul style="list-style-type: none"> •Inspect is there any problem on torch. •Check is there any problem on pilot arc.
<p>Fan not working while welding.</p>	<ul style="list-style-type: none"> •24V fan problem or wires problem. 	<ul style="list-style-type: none"> •Inspection.



PLASMA CUTTER OPERATION MANUAL