



Thank you for using our welder!

For important safety of bodies, please read this manual book and understand its contents before operation.

GUARANTEE

We give our unreserved guarantee that the Inverter Welding and Cutting Power Source series comply with IEC974 international safety standard, Maintenance for one year since the date of purchase.

Safety tips!



Cautions:

- During the welding course , do not change the switch for function exchange lest the machine may be damaged.
- Plug off the air plug connected to the electrode holder to make sure that the holder is separated from the main machine to avoid an electric shock.
- A certain switch is needed to protect the machine from electricity-leaking.
- Please use welding tools of high quality.
- Operators should be qualified for welding.

Electric-shock: it may be fatal to life

- Set earth cable to the standard.
- No touching electric parts with bare hands, wet hands or wet clothes.
- Make sure that you and working piece are in insulation circumstances.
- Make sure that your working is in safety.

Smoke: it may be harmful to your health

- Keep your head out of the smoke.
- When welding, make sure the air is flowing to avoid breathing in the smoke.

Arc-emission---may be harmful to your eyes and skin

- Wear suitable welding mask and clothes to protect your eyes and skin.
- Use suitable screen or curtain to keep the look-ups from the emission .
- The welding splash may cause fire , so make sure that there is no flammable things nearby the working place.

Noises—too much noise may be harmful to your hearing.

- Please wear something to protect your ears from the noises.
- Warn the look-ups of the hidden harm the noise may cause.

Break-down: ask the professional for help

- If you have any problems in setting up or operating, please first consult this manual.
- If you still can not understand after reading this manual, please contact your supplier or manufacturer to get professionals' help.

A brief introduction to the products

CT312 and CT416 are multi-functional welders made with advanced inverter technology, and they have three functions: TIG/MMA/CUT.

The inverter power is the power that first changes 50/60HZ working frequency to high frequency(as high as 100HZ) with high power factor V-MOS, and then reduces the voltage and rectifies, and then output with PWM the welding and cutting power of high power factor. By using the inverter technology of switch power, the weight and volume of the mains transformer greatly reduces, while the efficiency is raised by over 30%.

When working as MMA or TIG, the outer characteristic is constant current and the welding current doesn't change with the length of the arc, the current is very stable. When working as CUT, the arc is compressed by the rapid-circulating air, and then its temperature reaches 10000~ 15000? in the state of ionization, thus turning into strong plasma arc. The plasma arc into cutting makes the energy more concentrating, and gets smooth arc surface, which may take convenience for later work.

CT312 and CT416 can be widely used in welding and cutting carbon steel, stainless steel, alloy steel, copper and other nonferrous metals. They are portable, efficient, energy-saving and stable, and the exchange cycle of the assembled machinery can be as high as 85%.

Welcome friends of all walks to use our products, and give your suggestion; we will contribute all to make our products and service better!

? ? The main parameter

TYPE	CT312			CT416		
Input voltage(V, Hz)	AC220±15%, 50/60			AC220±15%, 50/60		
Input power capacitance(KVA)	4.2			6		
No-load loss(W)	40			40		
Duty cycle (%)	60			60		
Power factor	0.93			0.93		
Efficiency (%)	85			85		
Insulation class	B			B		
Protection class	IP21			IP21		
Weight (Kg)	9			13		
Size (mm)	371×155×285			425×205×355		
	TIG	MMA	PLASMA CUT	TIG	MMA	PLASMA
Input current(A)	10.2	15.6	19	15	22	27.3
Rated output current(A)	120	110	30	160A	150	40
Current range(A)	10-120	10-110	15-30	15-160	15-150	20-40
No –load voltage(V)	55	55	220	62	62	250
Working voltage(V)	15	25	110	16.5	26	120V
Nozzle internal(mm) Ø	-	-	Ø1.0	-	-	Ø 1.2
Air pressure(mPa)	-	-	0.4	-	-	0.4
Gas flow(L/min)	2-5	-	80	2-5	—	80
Cut thickness (mm)	-	-	1-8	-	-	1-12
Arc-leading	HF vibrate	Touch	HF vibrate	HF vibrate	Touch	HF vibrate

?? INSTALLATION

2-1 Connection of the input wire

The power wire at the back of the welder is connected to the 220V AC power supply, no wrong connection.

2? connect the case to earth with cable whose section is no less than 2.5mm from the earth screw at the back of the machine to earth from a cable.

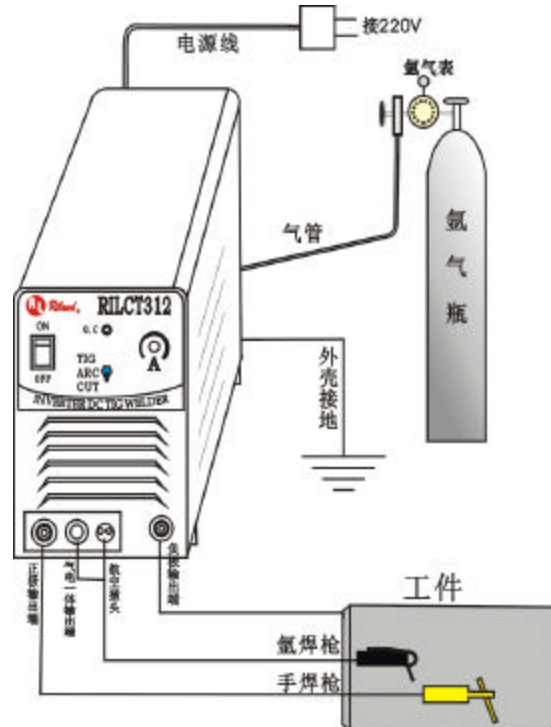
2-2 Connection

TIG FUNCTION

To gas supply: connect the argon hose to the copper nozzle on the back panel, the whole course includes gas bottle, air regulator and gas hose, and use the hose clamp to tighten it lest the gas leaks or air in.

Install the argon torch in compliance with the sketch, and connect the knob-one, air plug to the suitable places on the panel board, and tighten it in the clockwise direction.

Connect the air plug of the back circuit to the " + " air socket on the panel board, and wind it in the clockwise direction, the earth clamp at the other terminal holds the work piece.



MMA ARC FUNCTION

(1) connect the black air plug on the electrode holder to the black air socket on the front panel board, tighten it .

(2) connect the air plug at the other end of the earth cable to the air socket on the front panel board, tighten it .

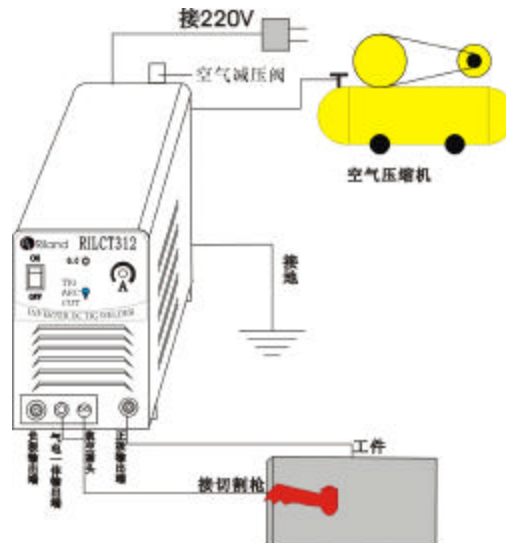
Re: the above method is positive connection, suitable for acid welding rod; while for alkaline or stainless steel , it should be negative connection.

CUT FUNCTION

Connect the gas hose of the compressed air to the IN and OUT terminals as well as the copper hose at the back of the machine, and tighten it with hose clamp. (The gas source should provide suitable pressure, sufficient flow and dry gas) .

2? connect the screw nut at one end of the torch to the knob-one on the panel board, and tighten it in the clockwise direction, and the air plug to the right place on the panel board, tighten it with screw.

3? connect the air plug of the earth clamp to the red air



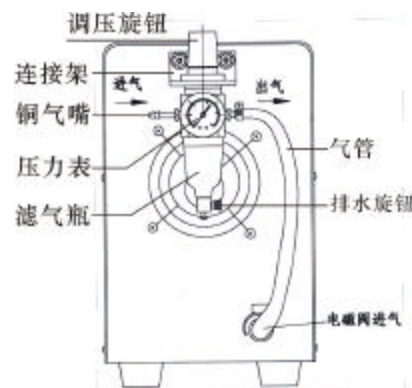
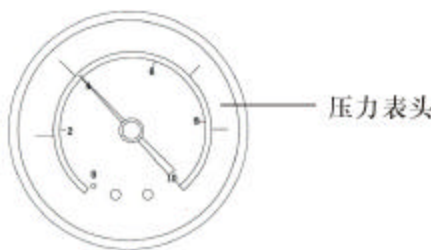
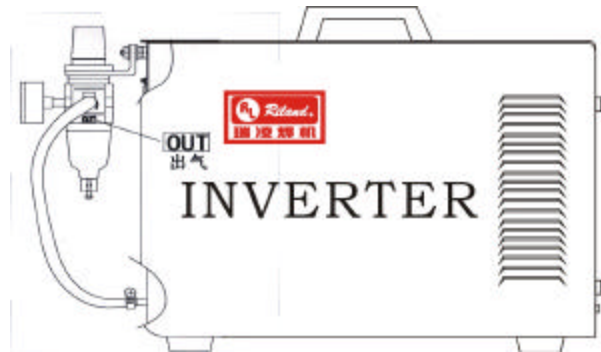
socket on the panel board, tighten it.

The installation and operation of the air regulator

- (1)? stick the copper gas hose seal to the IN and OUT terminals.
- (2)? connect the regulator seal to the installation place of the regulator.
- (3)? fix the rack with screw to the place of the air regulator at the back of the machine.

INSTALLATION OF THE AIR REGULATOR:

- (4)? take off the screw nut, and fix the air regulator as showed in the sketch.
- (5)? air-circulation, put the gas-regulating switch upward, and regulate the gas value to the given one.
- (6)? the graduation of the meter is showed in the sketch, 4 Kg air pa.
- (7)? when the filter bottle has too much water, open the valve to give it off.



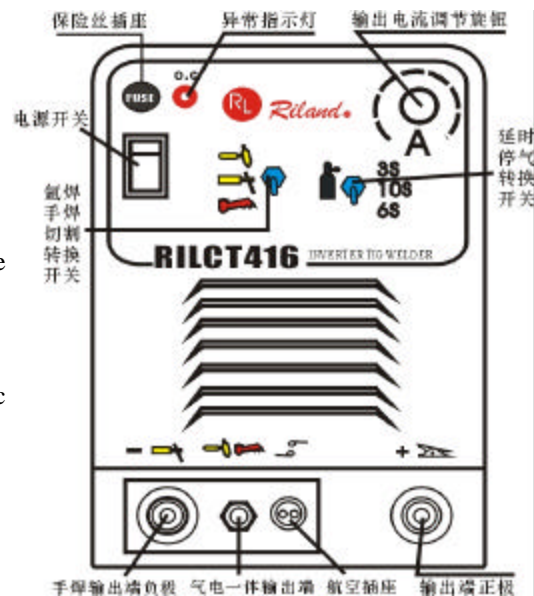
- Re: 1) please exchange the gas supply at TIG and CUT function.
 2) The duty cycle for cutting of CT416 is 40%.

?? OPERATION

3-1 TIG FUNCTION

- 1? Turn the power switch on the panel boards to " ON" , and then the pilot light is on, and the fan begins to work...
- 2? put the exchange switch to the TIG gear.
- 3? turn on the argon gas switch, and set the flow volume to the rated value.
- 4? the electromagnetic valve works after you push down the button on the torch, and then you can hear the sound of HF electricity-releasing, and meanwhile there are gas flowing out of

WELDERS-USERSMANUAL-CT Serials



the torch mouth. Re: for the first welding, please press the button on the torch for seconds, waiting for all the air in it empty, and then you can begin the welding; after you stop welding, there will still be argon gas coming out, and this is specially designed for protecting the welding point before cooling. So please keep the torch at the welding place for a while even after the work is finished.

5? set the suitable welding current according to the thickness of the work piece and the technology requirements.

6? keep the tungsten and the work piece 1-4mm away from each other, push the control button of the torch, there will be HF electricity-releasing between the electrode and the work piece; and it will disappear soon after the arc starts, then you can begin the work of welding.

3-2 MMA ARC FUNCTION

Place the switch to "welding" gear.

Turn on the power switch, and then the pilot light is on, and the inner fan begins to work.

According to thickness of the welding rod, choose suitable welding current and welding rod, and then you can begin your work of welding.

3-3 CUT FUNCTION:

Put the function exchange switch to "CUT" gear.

Turn on the power switch, and the power pilot light is on, and the inner fan begins to work.

Turn on the control switch or air regulator, set the pressure and gas flow volume to the rated value.

Push down the button on the torch, and starts the electromagnetic valve, you can hear the sound of HF splash electricity-releasing, and meanwhile the gas flows out of the torch mouth.

Set cutting current according to the thickness of the work piece.

Make the nozzle touch the work piece, and push the switch on the torch to start the arc, the sound of HF arc-leading disappeared, and you can begin your work now. After the arc-starting, keep the nozzle and work piece about 1mm from each other, which is good for protecting the nozzle.

Re: if the output voltage has difficulty in arc-starting, please lower the air pressure to a certain value.

If the nozzle is heavily burnt, please raise the air pressure to a certain value.

?? CAUTIONS

4-1. Working environment

1). The machine should be placed where there is little dust and no corrosive chemical gas or flammable gas or matter, and moisture = 80% ;

2). Keep it away from the sun and rain, room temperature under -10°C to +40°C;

3). 30cm away from the wall;

4). There should be 30cm between each machine if many machines are put together;

5). If the air flow is not well in the room, fan is needed.

4-2. Safety tips

- 1) Make sure the air is flowing.

This machine is small in volume, tight in structure, large in current output, and the natural air circulation can no longer satisfy the need of heat sink, so we put fans in it to achieve cooling.

Cautions: make sure the two terminals and shutter of the cutter are not blocked and covered, and the machine should be placed 0.3m away from the surroundings; please always improve the circulating condition, because it's very important for the normal working of the welding machine.

- 2) No over-load working

Over-loading is forbidden, or the cutter may stop suddenly during the cutting course. That's, the inner thermal parts work under over-load condition. Under this circumstance, no need to cut off the power switch, leave the fan whirl to speed up the temperature-lowering. If the temperature drops to the given range, the work will recover.

- 3) No over-voltage

The power voltage range of the machine see the "Main parameter" table, under this circumstance, the inner voltage will complement all by itself, and guarantee the welding current not surpass the allowed value.

Please be more careful if the parts are damaged because of over-voltage.

- 4) Each machine has a screw for earth connecting, the mark is earth signal, please choose a 10mm cable to connect the case of the machine to earth to avoid breakdown caused by static electricity or electricity-leaking.
- 5) Do not touch the output terminal when working or it may cause electric shock.

?? MAINTENANCE

- 1) Clear the dust at regular intervals with clean and dry compressed air; if the working condition has heavy smoke and pollution, the welding machine should be cleaned once a month.
- 2) The compressed air should be reduced to the required pressure lest the little parts in the welding machine be damaged.
- 3) Check whether the inner gas-electricity connection is well (esp. the plugs), and tighten the loose connection; if there is oxidization, remove it with sand paper and then re-connect.
- 4) **Re:** The operator is supposed to have a learned knowledge of electric. To avoid water and rain, if there is, dry it in time, and check the insulation with mega meter (including that between the connection and that between the case and the connection). Only when there is no abnormal phenomena can the welding continue.
- 5) If the machine is not used for a long time, put it into the original packing in dry condition.

?? BREAKDOWN-CHECKING

Cautions: The operators are supposed to have enough knowledge of electric electric -gas and common sense of safety, and concerning certificates are needed. We suggest you contact us before operation and meanwhile get permission.

6-1 CT312 Breakdown maintenance

Breakdown	Solution
<p>1? the power pilot light isn't on, and the fan doesn't work, and no welding output.</p>	<p>1? the power switch is broken. 2? check whether the electric net connected to input wire has electricity or not. 3? check whether the input cable is short-circuited or not.</p>
<p>2? the power switch is not on, and the fan doesn't revolve or revolve a little, and there is no welding output.</p>	<p>1? it may be wrongly connected to the 380V power supply, thus causing over-voltage protection, re-connect it to 220V power supply, renew the fuse and restart the machine. 2? the assistant transformer is broken. 3? the fuse is broken. 4? voltage -deficiency protection. 5? the wire from the switch to the bottom board is loose, tighten it again. 6? the relay on the bottom board is damaged, renew it.</p>
<p>3? the fan winds, and the abnormal pilot light is not on, no HF electricity-releasing, can not start the arc.</p>	<p>1? the voltage from the power board to the VH-07 on the MOS should be about DC308. (1) whether it is short-circuited, whether the si bridge wire is well-connected. (2) there are 4 capacitors on the bottom board, one of which may be leaking , just renew it . 2? the assistant power supply is abnormal , it should be DC24V. 3? check all the connection in the machine. 4? something wrong with the control circuit, find the reason or contact the seller.</p>
<p>4? the abnormal pilot light is off, no sound of electricity-releasing, no welding and cutting output. 5? the abnormal pilot light is not on, no sound of electricity -releasing.</p>	<p>1? the welding cable is broken. 2? the earth cable is broken or not connected to the work piece. 3? the " +" output terminal is not connected well. 1? the primary wire of the transformer and the power board is not well-connected, and re-tighten it. 2? the nozzle is oxidized or too faraway, remove the oxidization on the surface or the distance is 1mm. 3? the switch for MMA/CUT exchange is broken, renew it. 4? certain parts of the Hf arc-leading is damaged, check and renew it .1?</p>

6? the abnormal pilot light is not on.	<p>1? it may be over-current protection, please turn off the power until the abnormal pilot light is off, and then everything recovers.</p> <p>2? it may be over-voltage protection, no need to turn off , just wait for 2 or 3 mins ;or it may be something wrong with the inverter circuit, plug off the plug for power on the MOS of the mains transformer, restart the machine</p> <p>(1) if the abnormal pilot light is still on ,turn off the machine and plug off the HF arc-leading power plug, and restart the machine.</p> <p>a. if the abnormal pilot light is on, there is something wrong with the MOS, check and renew the MOSFET.</p> <p>b. if the abnormal pilot light is not on, there is something wrong with the step-up transformer, renew it.</p> <p>(2)if the abnormal pilot light is not on:</p> <p>a. it may be something wrong with the transformer on the center board, you can use the electric bridge to measure the transformer. L=0.9-1.6mH Q>35</p> <p>b. renew the secondary rectifier.</p> <p>c. may be something wrong with the relay on the center board.</p> <p>4? the feedback circuit may be short-circuited.</p>
7? the output current is not stable, or out of the control of the potentiometer, and the current is not stable.	<p>1? the 1K potentiometer is broken, renew it in time.</p> <p>2? the connections are not well-connected, esp. the plug-ins.</p>
8? the MMA welding has big splash, and difficult to weld the alkaline rod.	<p>1? the poles are mixed, and change it.</p>
9 ? the welding or cutting ability is not enough, and the arc is not constant.	<p>1.the input voltage is too low.</p> <p>2. the earth cable is too long or not well-connected. 3. the air pressure is too high or too low. 4. the nozzle and electrode of the torch doesn't match well.</p> <p>the welding rod is wet or not good enough, and the given current is too small.</p>

6-2 CT416 breakdown maintenance

Breakdown phenomena	Solution
1? the power pilot light is off, and the fan doesn't work, and there is on output.	<p>1? the power switch is broken.</p> <p>2? check whether the electric net connected to the input wire has electricity</p> <p>3? check whether the input cable is short-circuited.</p>

<p>2? the power pilot light is on, but the fan doesn't work, and no welding output.</p>	<p>2? it may be wrongly connected to the 380V power supply, thus causing over-voltage protection, re-connect it to 220V power supply, renew the fuse and restart the machine. 2? the assistant transformer is broken. 3? the fuse is broken. 4? voltage -deficiency protection. 5? the wire from the switch to the bottom board is loose, tighten it again. 6? the relay on the bottom board is damaged, renew it</p>
<p>3? the fan winds, and the abnormal pilot light is not on, no HF electricity-releasing, can not start the arc.</p>	<p>1? the voltage from the power board to the VH-07 on the MOS should be about DC308. (1) whether it is short-circuited, whether the si bridge wire is well-connected. (2) there are 4 capacitors on the bottom board, one of which may be leaking , just renew it . 2? the assistant power supply is abnormal, it should be DC24V. 3? check all the connection in the machine. 4? something wrong with the control circuit, find the reason or contact the seller.</p>
<p>4? the abnormal pilot light is off, no sound of electricity-releasing, no welding and cutting output.</p>	<p>1? the welding cable is broken. 2? the earth cable is broken or not connected to the work piece. 3? the " +" output terminal is not connected well.</p>
<p>5? the abnormal pilot light is not on, no sound of electricity -releasing.</p>	<p>1? the primary wire of the transformer and the power board is not well-connected, and re-tighten it. 2? the nozzle is oxidized or too faraway, remove the oxidization on the surface or the distance is 1mm. 3? the switch for MMA/CUT exchange is broken, renew it. 4? certain parts of the Hf arc-leading are damaged, check and renew it.</p>
<p>6? the abnormal pilot light is not on.</p>	<p>1? it may be over-current protection, please turn off the power until the abnormal pilot light is off, and then everything recovers. 2? it may be over-voltage protection, no need to turn off , just wait for 2 or 3 mins ;or it may be something wrong with the inverter circuit, plug off the plug for power on the MOS of the mains transformer, restart the machine (1) if the abnormal pilot light is still on ,turn off the machine and plug off the HF arc-leading power plug, and restart the machine. a. if the abnormal pilot light is on, there is something wrong with the MOS, check and renew the MOSFET. b. if the abnormal pilot light is not on, there is something wrong with the step-up transformer, renew it. (2)if the abnormal pilot light is not on: a. it may be something wrong with the transformer on the center board, you can use the electric bridge to measure the transformer. $L=0.9-1.6mH$ $Q>35$ b. renew the secondary rectifier. c. may be something wrong with the relay on the center board.</p>

	<p>4? the feedback circuit may be short-circuited.</p>
<p>7? the output current is not stable, or out of the control of the potentiometer, and the current is not stable.</p> <p>8? big splash, and hard to weld alkaline rods.</p>	<p>1? the 1K potentiometer is broken, renew it in time.</p> <p>2? the connections are not well-connected, esp. the plug-ins.</p> <p>1? the poles are wrongly connected, and exchange the earth cable and holder cable.</p>
<p>9? the welding and cutting ability is not enough, and arc breaks.</p>	<p>1? too low input voltage.</p> <p>2? the earth cable is too long or not well-connected.</p> <p>3? the air pressure too high or too low.</p> <p>4? the nozzle and the electrode doesn't match well</p> <p>5? the filter capacitor 470μ /450V is invalid. 6? the welding rod too wet or not good.</p> <p>7? the given current is too low.</p>