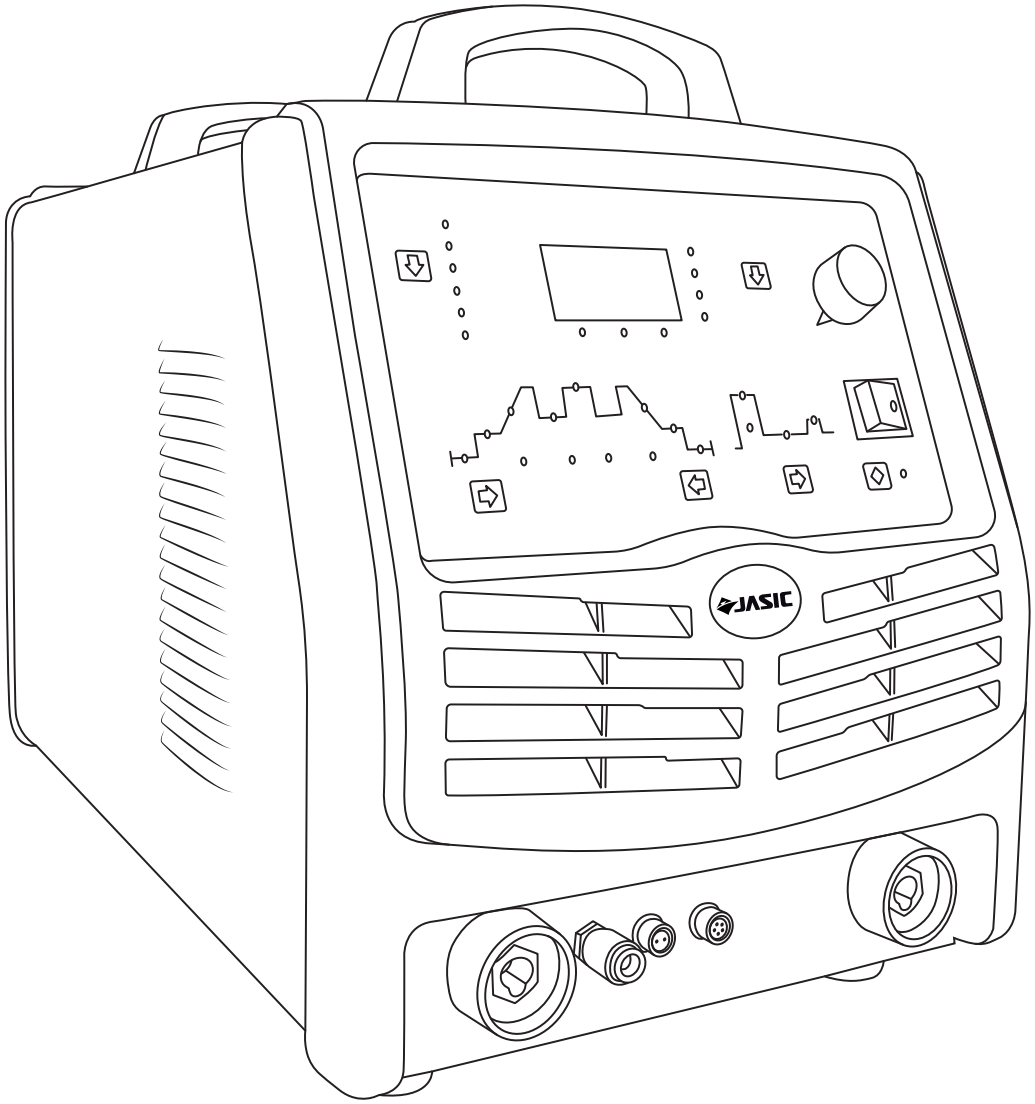
JASIC

www.jasic.co.uk

TIG Series

| TIG 200P AC/DC Digital (JT-200D) |
| TIG 315P AC/DC Digital (JT-315D) |



Operator Manual

ISO 9001 CERTIFICATION
Intertek

WILKINSON STAR
wilkinsonstar.com

Your new product

Thank you for selecting this Jasic Technology, Wilkinson Star product.

This product manual has been designed to ensure that you get the most from your new product. Please ensure that you are fully conversant with the information provided paying particular attention to the safety precautions. The information will help protect yourself and others against the potential hazards that you may come across.

Please ensure that you carry out daily and periodic maintenance checks to ensure years of reliable and trouble free operation.

Wilkinson Star Limited are a leading supplier of equipment in the UK and our products are supported by our extensive service network. Call your distributor in the unlikely event of a problem occurring. Please record below the details from your product as these will be required for warranty purposes and to ensure you get the correct information should you require assistance or spare parts.

Date purchased _____

From where _____

Serial Number _____

(The serial number will normally be located on the equipment data plate on the underside of the machine or on the rear panel)

Please note products are subject to continual development and may be subject to change without notice

1

Safety Precautions

These general safety norms cover both arc welding machines and plasma cutting machines unless otherwise noted.

The equipment must only be used for the purpose it was designed for. Using it in any other way could result in damage or injury and in breach of the safety rules.

Only suitably trained and competent persons should use the equipment. Operators should respect the safety of other persons.

Prevention against electric shock

The equipment should be installed by a qualified person and in accordance with current standards in operation.It is the users responsibility to ensure that the equipment is connected to a suitable power supply. Consult with your utility supplier if required

If earth grounding of the work piece is required, ground it directly with a separate cable.

Do not use the equipment with the covers removed.

Do not touch live electrical parts or parts which are electrically charged.

Turn off all equipment when not in use.

Cables (both primary supply and welding) should be regularly checked for damage and overheating. Do not use worn, damaged, under sized, or poorly jointed cables.

Ensure that you wear the correct protective clothing, gloves, head and eye protection.

Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work ground.

Never touch the electrode if you are in contact with the work ground, or another electrode from a different machine.

Do not wrap cables over your body.

Ensure that you take additional safety precautions when you are welding in electrically hazardous conditions such as damp environments, wearing wet clothing, and metal structures. Try to avoid welding in cramped or restricted positions.

Ensure that the equipment is well maintained. Repair or replace damaged or defective parts immediately. Carry out any regular maintenance in accordance with the manufacturers instructions.

Safety against fumes and welding gases

Locate the equipment in a well-ventilated position.

Keep your head out of the fumes. Do not breathe the fumes.

Ensure the welding zone is in a well-ventilated area. If this is not possible provision should be made for suitable fume extraction.

If ventilation is poor, wear an approved respirator.

Read and understand the Material Safety Data Sheets (MSDS's) and the manufacturer's instructions for metals, consumable, coatings, cleaners, and de-greasers.

Do not weld in locations near any de-greasing, cleaning, or spraying operations. Be aware that heat and rays of the arc can react with vapours to form highly toxic and irritating gases.

Do not weld on coated metals, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings on many metals can give off toxic fumes if welded.

Prevention against burns and radiation

Arc rays from the welding process produce intense, visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

Wear an approved welding helmet fitted with a proper shade of filter lens to protect your face and eyes when welding or watching

Wear approved safety glasses with side shields under your helmet.

Never use broken or faulty welding helmets.

Always ensure there are adequate protective screens or barriers to protect others from flash, glare and sparks from the welding area. Ensure that there are adequate warnings that welding or cutting is taking place.

Wear suitable protective flame resistant clothing.

The sparks and spatter from welding, hot work pieces, and hot equipment can cause fires and burns

Welding on closed containers, such as tanks, drums, or pipes, can cause them to explode.

Accidental contact of electrode to metal objects can cause arcs, explosion, overheating, or fire.

Check and be sure the area is safe and clear of inflammable material before carrying out any welding.

Protection against noise

Some welding and cutting operations may produce noise.

Wear safety ear protection to protect your hearing.

Protection from moving parts

When the machine is in operation keep away from moving parts such as motors and fans. Moving parts, such as the fan, may cut fingers and hands and snag garments.

Protections and coverings may be removed for maintenance and controls only by qualified personnel, after first disconnecting the power supply cable.

Replace the coverings and protections and close all doors when the intervention is finished, and before starting the equipment.

Take care to avoid getting fingers trapped when loading and feeding wire during set up and operation.

When feeding wire be careful to avoid pointing it at other people or toward your body.

Always ensure machine covers and protective devices are in operation.

Precautions against fire and explosion

Avoid causing fires due to sparks and hot waste or molten metal

Ensure that appropriate fire safety devices are available near the cutting / welding area.

Remove all flammable and combustible materials from the cutting / welding zone and surrounding areas

Do not cut/weld fuel and lubricant containers, even if empty. These must be carefully cleaned before they can be cut/ welded.

Always allow the cut/welded material to cool before touching it or placing it in contact with combustible or flammable material.

Do not work in atmospheres with high concentrations of combustible fumes, flammable gases and dust.

Always check the work area half an hour after cutting to make sure that no fires have begun.

Risks due to magnetic fields

The magnetic fields created by high currents may affect the operation of pacemakers or electronically controlled medical equipment.

Wearers of vital electronic equipment should consult their physician before beginning any arc welding, cutting, gouging or spot welding operations.

Do not go near welding equipment with any sensitive electronic equipment as the magnetic fields may cause damage.

RF Declaration

Equipment that complies with directive 2004/108/EC concerning electromagnetic compatibility (EMC) and the technical requirements of EN60974-10 is designed for use in industrial buildings and not those for domestic use where electricity is provided via the low voltage public distribution system. Difficulties may arise in assuring class A electromagnetic compatibility for systems installed in domestic locations due to conducted and radiated emissions.

In the case of electromagnetic problems, it is the responsibility of the user to resolve the situation. It may be necessary to shield the equipment and fit suitable filters on the mains supply.

LF Declaration

Consult the data plate on the equipment for the power supply requirements.

Due to the elevated absorbance of the primary current from the power supply network, high power systems affect the quality of power provided by the network. Consequently, connection restrictions or maximum impedance requirements permitted by the network at the public network connection point must be applied to these systems.

In this case the installer or the user is responsible for ensuring the equipment can be connected, consulting the electricity provider if necessary.

Materials and their disposal

The equipment is manufactured with materials, which do not contain any toxic or poisonous materials dangerous to the operator.

When the equipment is scrapped, it should be dismantled separating components according to the type of materials.

Do not dispose of the equipment with normal waste. The European Directive 2002/96/EC on Waste Electrical and Electronic Equipment states the electrical equipment that has reached its end of life must be collected separately and returned to an environmentally compatible recycling facility.

Handling of Compressed gas cylinders and regulators

All cylinders and pressure regulators used in welding operations should be handled with care.

Never allow the electrode, electrode holder or any other electrically “hot” parts to touch a cylinder.

Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

Always secure the cylinder safely

Never deface or alter any cylinder

2

Product Overview

The JT-200D and 315D are a series of digital controlled AC/DC pulsed TIG/MMA inverter welding machines with excellent performance and utilising advanced technology system. They It have various AC/DC modes such as AC square-wave TIG, AC pulsed TIG, DC TIG, DC pulsed TIG, AC MMA (SMAW), DC MMA (SMA, TIG spot welding (DC, pulsed or AC), and composite waveform TIG, etc., and can be widely used in high quality welding of a wide range of materials.

The design uses both advanced and mature technologies to ensure reliability and extended machine life.

Key features

Advanced digital control

The machines adopt advanced MUC intelligent digital control technology, and all the major functions are performed through the software. It is this digital control that provides a much improved performance when compared with the traditional welding machines.

Advanced inverter technology

The primary inverter frequency is 100 KHz, which greatly reduces the volume and weight of the welder. The great reduction in magnetic and resistance loss obviously enhances the transformer efficiency and energy saving effect. The working frequency is beyond audio range, which almost eliminates the noise pollution.

Automatic protection functions

When the mains voltage fluctuates sharply, the welding machine will automatically stop working with the fault information displayed, and it will automatically recover after the mains voltage turns stable. In the case of over current or overheating, the machine will stop working automatically with the fault information displayed. Such protection functions greatly increase the lifespan of the machine.

Excellent consistency and stable performance

The machines adopt intelligent digital control, so it is not sensitive to the change of parameters of components. That is,the performance of welding machine will not be affected by the change of the parameters of certain components. It can also compensate for any change of the working environment such as temperature and humidity, etc. Therefore, the consistency and stability of the digital control welder is better than that of traditional welder.

Parameters are easy to adjust and software easy to update

The control of parameters for a welding machine with intelligent digital control is much easier and more accurate, because its main functions are achieved through software. To change the a function or some of the parameters, you do not need to change the circuit, and the only thing you have to do is to download the updated software.

User-friendly interface

This machine adopts international standard graphic language interface, which is simple, clear, intelligible, and convenient for users' operation.

Practical welding process management function

The machine allows users to divide the welding parameters into five groups, according to different techniques during operation, each of which can complete a particular welding task. It undoubtedly facilitates the technical standardisation management in welding production.

High-quality MMA welding

MMA welding performance is significantly improved with an excellent control algorithm: easier to ignite arc, stable welding current, little spatter, no electrode sticking, good shaping, and adaptable to the change of length or section of welding cable.

High-quality TIG welding

Improved digital technology for constant current ensures the low noise and a high stability of arc quality as well. The mature control algorithm provides users with a convenient and practical approach to control the current. Totally 20 TIG operation modes, including the typical 2T/4T, and 4 of them

are programmable, which offers a facility for a user‘s special application.

Remote control available

The machine offers an analog remote control mode (foot control), which can realise real-time adjustment of TIG welding current over 10m away.

Robot system for automatic welding available

The machine is provided with RS-485 communication interface, and it is easy for users to use with an automatic welding system or with other equipment with the embedded standard ModBus communication protocol. Available as a special order.

Perfect automatic recording function

All data such as cumulative start up times, cumulative running time, cumulative welding time, cumulative TIG welding time, accumulative MMA welding time, cumulative times of alarm, cumulative times of over current, cumulative times of overheating, cumulative times of under voltage and cumulative times of water-cooling alarm can be calculated and stored in FLASH memory.

Control interface for automatic welding equipment available

This machine provides torch trigger signal, current signal and fault alarm signal for connection with automatic welding equipment.

Wide input voltage range tolerance

3

Technical data

Parameter	JT-200D AC/DC	JT-315D AC/DC
Input voltage Range	Single-phase 190~250V AC, 50/60Hz	3-phase 280~420V AC, 50/60Hz
Rated input capacity (KVA)	4.6	9
Rated input power (KW)	4.2	8.4
Recommended fuse capacity (A)	40	40
Rated duty cycle @ 40^{0}C	TIG: 200@35%- MMA: 160@40%	TIG: 315@20% - MMA: 250@40%
No-load voltage (V)	60	50
Insulation class	B	
Cooling mode	Forced air cooling	
Protection class	IP21S	
Overall size (mm)	570×350×420	590×375×380
Weight (kg)	27	33
Welding current range MMA(A)	DC: 10~160; AC: 20~160	DC: 10~250; AC: 20~250
Arc ignition current range MMA(A)	DC: 10~200; AC: 20~200	DC: 10~300; AC: 20~300
Arc force current range MMA(A)	0~100	0~100
Initial current range (A)	DC: 10~200; AC: 20~200	DC: 10~320; AC: 20~250
Peak current range (A)	DC: 10~205; AC: 30~205	DC: 10~320; AC: 30~320
Base current range (A)	DC: 10~205; AC: 30~205	DC: 10~320; AC: 30~320
Crater current range (A)	DC: 10~200; AC: 20~200	DC: 10~320; AC: 20~250
DC pulse frequency range (Hz)	0.5~200	
DC pulse duration ratio range (%)	10~90	
AC frequency range (Hz)	20~70	
Positive and negative half-wave time ratio (%)	10~60	
AC pulse frequency range (Hz)	0.5~5.0	
AC pulse duration ratio range (%)	10~90	
Upslope time (s)	0~60	
Downslope time (s)	0~60	
Pre-flow time (s)	0~15.0	
Post-flow time (s)	0~20.0	
Spot welding time (s)	0.0~8.9	
Arc ignition mode	Contact arc ignition, HF arc ignition	

Product design may vary due to continual improvements or customer requirements.

4

Controls

Front view JT-200D

1. Control panel
2. Negative output socket
3. Torch gas connector
4. Torch switch connector
5. Remote control connector
6. Positive power connector
7. Mains switch
8. Adjustment control

Front view JT-315D

1. Control panel
2. Negative output socket
3. Torch gas connector
4. Torch switch connector
5. Remote control connector
6. Water connection
7. Positive power connector
8. Adjustment control

Rear View JT-200D

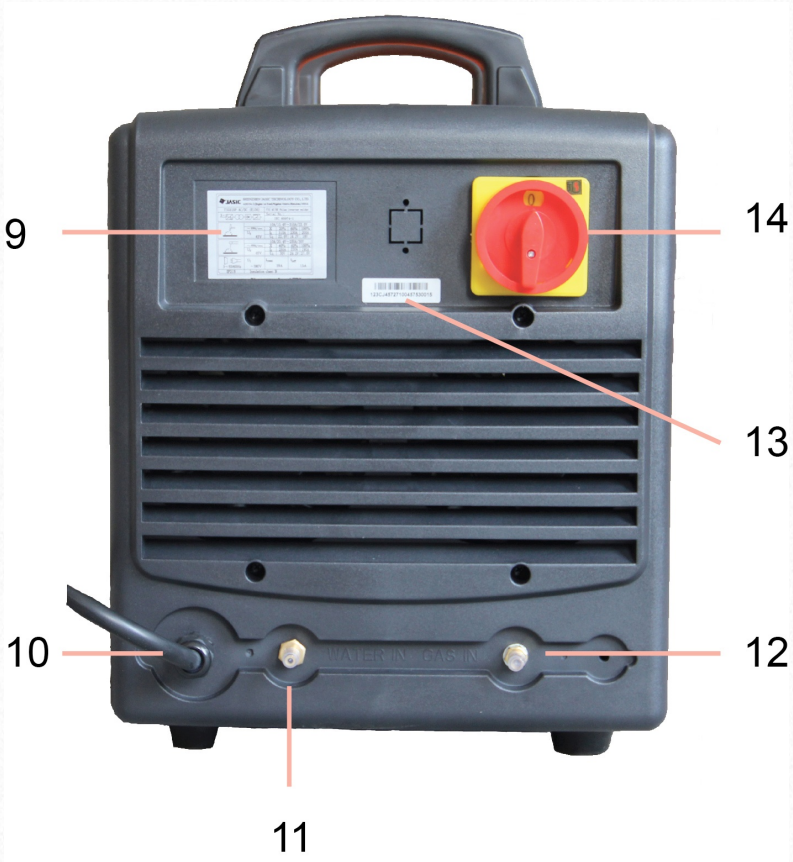
9 Data plate

10 Power cable input

11. Shield gas input connector

12. Serial number

Rear View JT-315D



9. Data plate

10. Power cable input

11. Water input connector

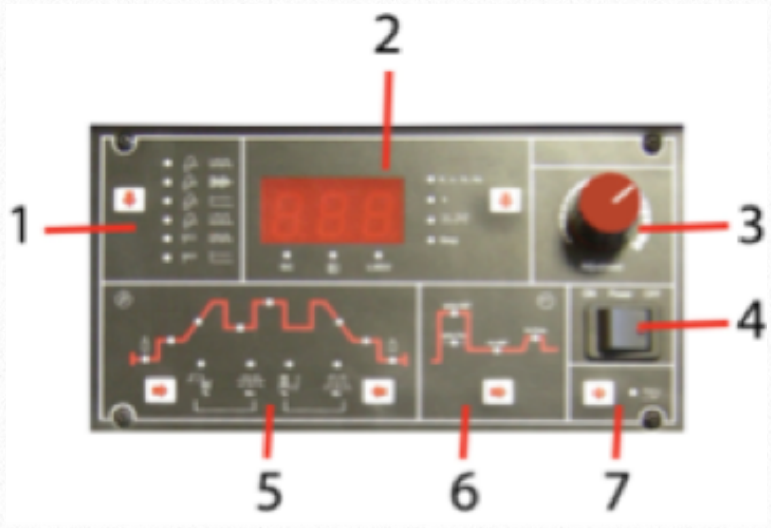
12. Shield gas input connector

13. Serial number

14. Mains switch

Control Panel

1. Welding mode selector
2. Parameter and alarm displays
3. Parameter adjustment knob
4. Mains on off switch
5. TIG parameter selection area
6. MMA parameter selection area
7. Remote control selection



JT-200D panel shown

1—Welding mode selecting zone

It is used to select the welding mode. Press the key in this zone to shift the welding mode among “” (AC square-wave TIG), “” (AC pulsed TIG), “” (DC TIG), “” (DC pulsed TIG), “” (AC SMAW) and “” (DC SMAW) with the corresponding LED lit. However, if the LED flashes, it indicates that welding is being carried out in the corresponding welding mode and that re selection cannot be performed.

2—Parameter and alarm display zone

The digital meter is used for displaying the parameters and error codes, and it also displays the software version when starting the machine. The details are as below.

A. Generally, the digital meter displays the pre-set current, time, pulse duration ratio and frequency with the corresponding LED “A S % Hz” lit. Parameters can be adjusted by turning the knob. The digital meter displays the welding current during welding, and parameters can be adjusted at this time as well. It displays the parameter being adjusted, and turns to display the welding current 3s after the adjustment.

B. Press the key “↓” in this zone to shift the display of the digital meter among “A S % Hz”, “V”, “” and “MEMORY” with the corresponding LED lit. “V” indicates the output voltage; “” is used for selecting the operation mode of TIG welding

“MEMORY” can store 5 groups of parameters, and users may perform welding conveniently with these parameters.

C. The digital meter displays the software version after the machine is started, and displays the pre-set current 2 seconds later.

D. In normal condition, all alarm LEDs are off. In case of any error, the corresponding LED will illuminate, and the digital meter will display the corresponding error code.

When the “OC” LED illuminates and the digital meter displays “E-0” or “E-1”, it indicates that over current occurs. Restart the machine, and welding can be continued.

When the “LV/OV” LED illuminates and the digital meter displays “E-2”, it indicates that the mains voltage is overly low or that the secondary inverter drive power source fails. In the former condition, welding can be recovered when the mains voltage goes into normal. In the latter condition, please consult the service department.

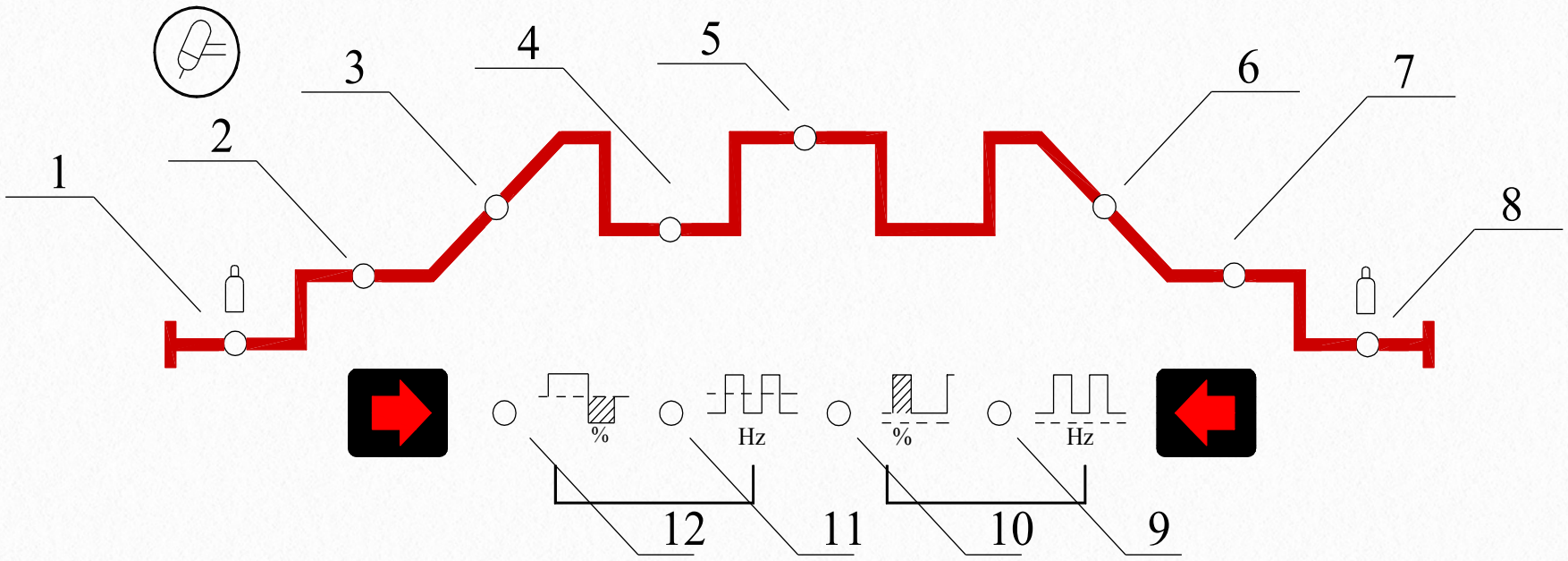
When the “OH” LED illuminates and the digital meter displays “E-3” or “E-4”, it indicates that welding is forced to stop because the main circuit of the machine is overheated. In this condition, it is unnecessary to turn off the machine, but just wait a few minutes, and then welding can be continued.

3—Parameter adjustment knob

It is used to adjust all adjustable parameters.

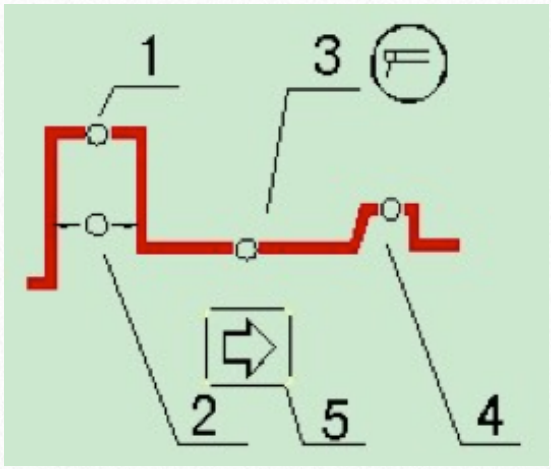
4—Mains switch

5—TIG parameter selecting zone



1-Pre-flow time	7-Pilot arc current
2-Initial current	8-Post-flow time
3-Upslope time	9-Pulse frequency
4-Base current	10-Pulse duration ratio
5-Peak current	11-AC frequency
6-Downslope-time	12-Cathode current

6-MMA Parameter selection area



1-Arc ignition current
2-Arc ignition time
3-Welding current
4-Arc force current
5-MMA parameter selecting key

7—Foot control selecting zone

Select the foot control to control the welding current by pressing the foot control key until the LED is on. The welding current should be 30A at least (to avoid arc breaking due to overly low current) and should not be higher than the pre-set current. The foot control is effective only in TIG mode.

Parameter setting

Operation hints

Selection and adjustment of parameters

- Press “↓” in parameter display selecting zone to select the parameter to be displayed.
- Press “↓” in welding mode selecting zone to select welding mode (totally 6 welding modes).
- Press “←”or “→” in TIG parameter selecting zone to select parameter in TIG. (only parameters associated with TIG mode can be adjusted)
- Press “→”in MMA parameter selecting zone to select parameter in MMA. (only parameters associated with MMA mode can be adjusted)
- Turn the adjustment knob to set or amend the parameter currently selected.

Operation hints

Parameter storage

The parameters having been adjusted will be auto saved in the parameter group currently used (no auto saving will be done if no welding is done after parameters are adjusted or the machine was turned off within 3s’ time). When the machine is turned on next time, the parameters in this parameter group will be the parameters used last time. No special save key and manual saving operation is available for this machine.

Concept hints

Parameter group

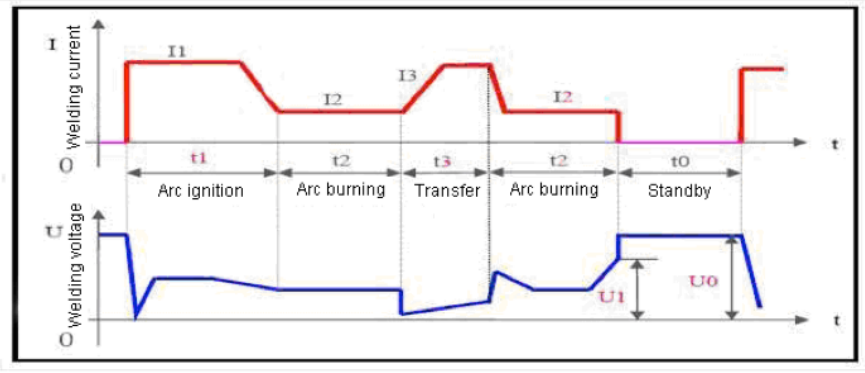
5 parameter groups (1-5) are available for users to save the welding parameters based on a welding application, and all parameters in all the six welding modes can be saved in each parameter group. Every time when the machine is turned on, the parameter group of last time when the machine is turned off will be used. If users do not reselect a different parameter group, the machine will continue its working under this parameter group. Users can set different parameters in different parameter groups and select the corresponding one to weld. (Note: Parameters in all the five parameter groups are the same and are all default when using the machine for the first time.)

Parameter group selecting

In standby mode, press “↓” in parameter and alarm display zone to light the “MEMORY” LED, and at this time, what the digital meter displays is the number of the parameter group being used. Turn the adjustment knob, the parameter group number will be changed, and you can select the desired parameter group. After selecting the parameter group, you can repress “↓” to exit, or you can wait for about 10s when the machine return to parameter display status automatically.

Program key setting

MMA (DC)



Note: t0—Standby: No welding current; output voltage is the no-load voltage.

t1—Arc ignition: Welding current is arc ignition current (I1).

t3—Arc burning: Welding current is the pre-set current (I2).

t4—Short-circuit transfer: Welding current is the short-circuit transfer current (I3).

In MMA mode, 4 parameters that can be adjusted directly and 1 parameter that can only be adjusted through programming are available for this machine. These are shown below.

Current (I2): This is the welding current when arc is burning, and users can set it according to their own technical requirements.

Arc force: It refers to the ascending slope of the current in short circuit, and it is set as the amperage increased per millisecond in this machine. The current will rise from the pre-set value by this slope after short circuit occurs. (E.g. When the pre-set current is 100A and the arc force is 20, the current will be 200A 5ms after short circuit occurs.) If it is still under short circuit when the current increases to the allowable maximum value 250A, the current will not rise any more. If the short circuit status lasts for 0.8s or more, the machine will enter into electrode sticking process: to wait the disconnection of the electrode under low current. Arc force should be set according to the electrode diameter, pre-set current and the technical requirement. If the arc force is high, the molten drop can be transferred quickly, and electrode sticking seldom occurs. However, too high arc force may lead to excessive spatter. If the arc force is low, there will be little spatter, and the weld bead will be shaped well. However, too small arc force may lead to soft arc and electrode sticking. Therefore, the arc force should be increased when welding with thick electrode under low current. In general welding, the arc force may be set at 5~50.

Arc ignition current (I1) and arc ignition time (T1): Arc ignition current is the output current of the machine when the arc is ignited. Arc ignition time is the time the arc ignition current lasts. When in high current ignition mode, the arc ignition current is generally 1.5~3 times the welding current, and the arc ignition time is 0.02~0.05s. When in low current ignition mode, the arc ignition current is generally 0.2~0.5 times the welding current, and the arc ignition time is 0.02~0.1s.

Operation hints

Arc ignition modes in MMA

Low current arc ignition: This can be also called lift/soft arc ignition. Set the arc ignition current (I1) to be a value lower than I2 and the machine will enter into low current arc ignition mode. Touch the work piece with the electrode, and lift the electrode to the normal position to weld after arc is ignited.

High current arc ignition: This can be also called contact/ thermal arc ignition. Set the arc ignition current (I1) to be a value not lower than I2 and the machine will enter into high current arc ignition mode. Touch the work piece with the electrode, and normal welding can be carried out without lifting the electrode.

Arc breaking voltage (U1): This parameter is used for setting the arc breaking voltage during welding. It is specially designed to meet the requirement in HF intermittent welding, and its resolution is 0.1V. The arc breaking voltage indicates the maximum allowable arc voltage during welding, that is to say, welding can be continued when the arc voltage is lower than U1, or else welding will stop immediately. This parameter cannot be simply adjusted like other parameters, and should be adjusted by the following method.

Operation hints

Arc breaking voltage programming

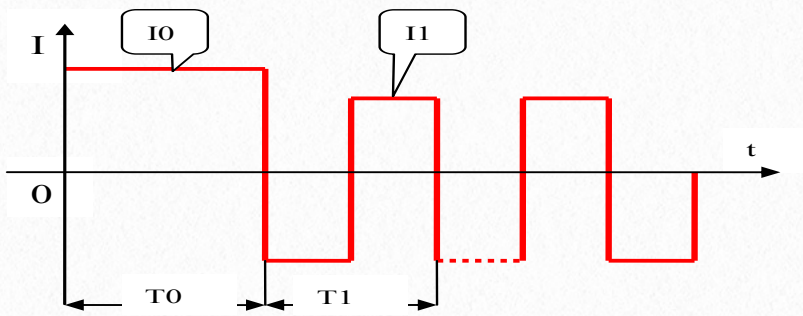
Enter into the amendment state: Press the MMA parameter selecting key and turn on the machine, and the parameter display meter will flash “P-1”, which will disappear 5s later. At this time, the voltage LED will turn on, and the machine will enter into arc breaking voltage amendment state.

Amend the arc breaking voltage: After entering into arc breaking voltage amendment state, what the parameter display meter shows is the effective arc breaking voltage before amendment. You can amend it to your desired value by turning the knob.

Exit the amendment state: Exit by pressing the MMA parameter-selecting key after amendment. At this time, the new arc breaking voltage comes into being and it can be automatically saved.

Note: In general welding, the arc breaking voltage should be above 45V. If it is too low, arc breaking will occur during welding.

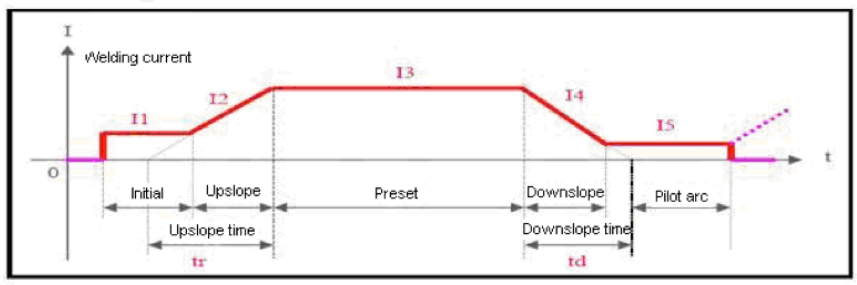
MMA (AC)



T0-Arc ignition time (0.01~1s)
T1-AC period (20ms)
(i.e. frequency=50Hz)
I0-Arc ignition current (20~300A)
I1-Welding current (20~250A)

In MMA AC mode, the adjustment of all parameters is the same with that in MMA DC mode except that the arc force is 0 fixed.

TIG DC welding



In the DC TIG mode, 8 adjustable parameters are available for this machine. These are described below.

Current (I3): This parameter can be set according to users' own technical requirements.

Initial current (I1): It is the current when arc is ignited by pushing the torch trigger, and it should be set according to users' own technical requirements. If the initial current is high enough, arc is easier to ignite. However, it should not be too high when welding thin plate, so as to avoid burn through the work piece during arc ignition. In some operation modes, the current can stay at the initial current value to preheat the work piece or illuminate the weld area.

Pilot arc current (I5): In some operation modes, the arc does not stop after current downslope but stays in the pilot arc state. The working current in this state is called pilot arc current, and it should be set according to users' technical requirements.

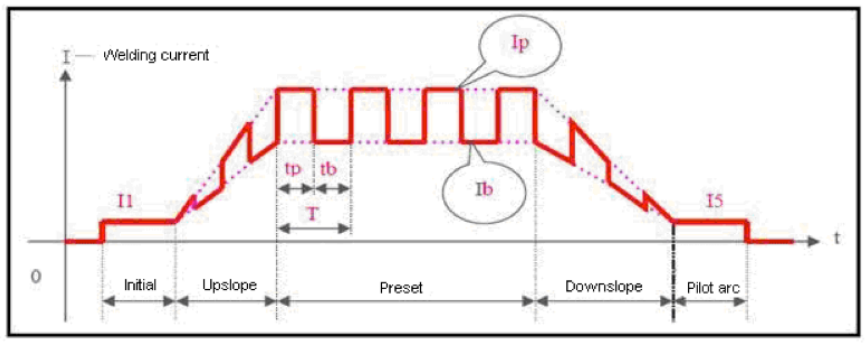
Pre-flow time: It indicates the time from the torch trigger is operated to the arc being ignited in non-contact mode. Commonly it should be longer than 0.5s to make sure that the gas has been delivered to the welding torch in normal flow before arc ignition. The pre-flow time should be increased if the gas hose is long.

Post-flow time: It indicates the time from the welding current being cut off to the gas valve inside the machine being closed. If it is too long, it will lead to a waste of shield gas; if it is too short, it will result in the oxidation of weld bead and electrode. When in AC TIG or for special materials, the time should be longer.

Upslope time (tr): It indicates the time taken for the current to rise from 0 to the pre-set value, and it should be set according to users' technical requirements.

Downslope time (td): It indicates the time taken for the current to fall from the pre-set value to 0, and it should be set according to users' technical requirements.

Pulsed TIG DC welding



Current change in pulsed TIG welding

In pulsed TIG mode, all DC TIG parameters except current (I3) and another 4 adjustable parameters are available for this machine. Describe them as below.

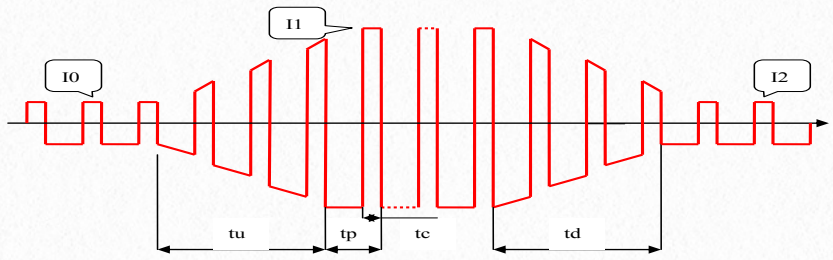
Peak current (Ip): It should be adjusted according to users' technical requirements.

Base current (Ib): It should be adjusted according to users' technical requirements.

Pulsed frequency (1/T): T=Tp+Tb. It should be adjusted according to users' technical requirements.

Pulse duration ratio (100%*Tp/T): The percentage peak current time holding in pulse period. It should be adjusted according to users' technical requirements.

AC square wave TIG welding



I0-Initial current, I1-Welding current, I2-Pilot arc current,

tu-Upslope time, td-Downslope time

tp-AC period, tc-Cathode current time

Current change in AC square wave TIG welding

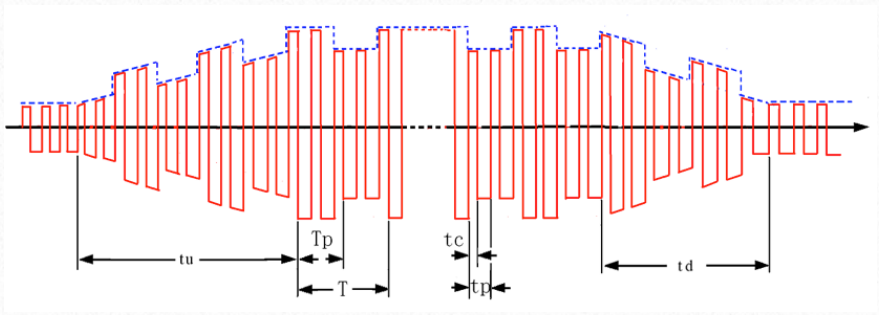
In AC square wave TIG welding, the pre-flow time and post-flow time are the same as in DC TIG welding. Others parameters are described as below.

Initial current (I0), welding current (I1) & pilot arc current (I2): The pre-set value of the three parameters is approximately the absolute average of the practical welding current, and can be adjusted according to users' technical requirements.

Pulse frequency (1/tp): It can be adjusted according to users' technical requirements.

Cleaning strength (100%*Tc/Tp): Generally, in AC welding, when taking the electrode as the anode, the current is called the cathode current. Its main function is to break up the oxidized layer of the work piece, and the cleaning strength is the percentage cathode current holding in the AC period. This parameter is 10~40% commonly. When the value is smaller, arc is concentrated, the molten pool is narrow and deep, and when it is larger, the arc is spread, the molten pool is wide and shallow.

AC pulsed TIG welding



tc-Cathode current time, tp-AC period

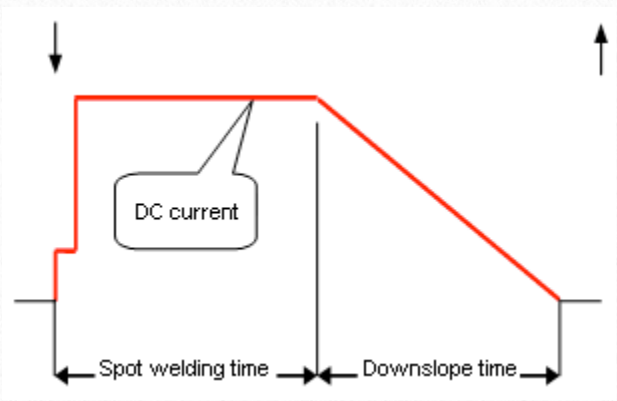
Tp-Pulsed peak current time, T-Pulse period

Current change in AC pulsed TIG welding

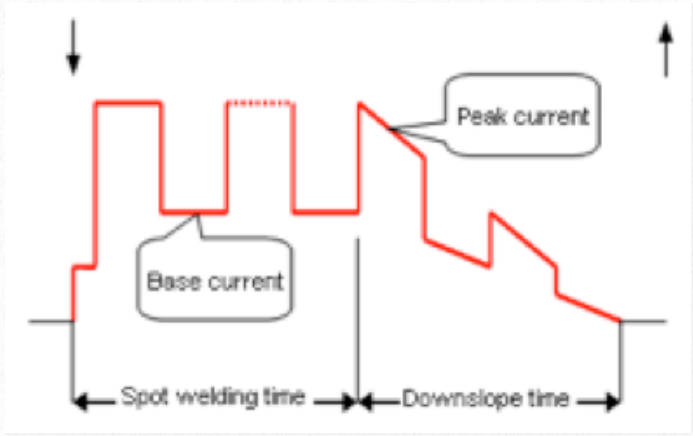
AC pulsed TIG welding is almost the same as AC square wave TIG welding, and what makes them different is that in AC pulsed TIG welding, the welding current varies with the pulse peak current and base current. For the AC square wave parameter selecting and setting, please refer to the corresponding contents in AC square wave TIG welding. For the pulse frequency and pulse duration ratio, users may refer to the corresponding contents in DC pulsed TIG welding. The pulse frequency (1/T) can be adjusted between 0.5Hz and 5Hz. The pulse duration ratio (Tp/T) can be adjusted between 10% and 90%.

TIG spot welding

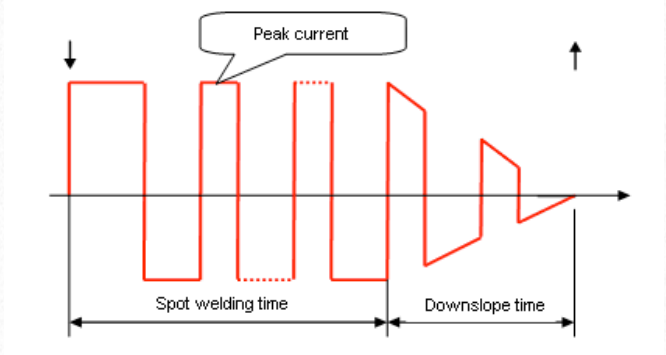
Select TIG operation mode 1 and TIG spot welding function can be achieved. Spot welding is available in all the four TIG welding modes. Please note that the spot welding time is 1/10 of the upslope time, and that the upslope time is still the pre-set value. For current change in DC TIG spot welding, pulsed TIG spot welding, AC TIG spot welding and AC pulsed TIG spot welding; please refer to the figures below. In AC mode, the pre-set value of spot welding current is approximately the absolute average of welding current.



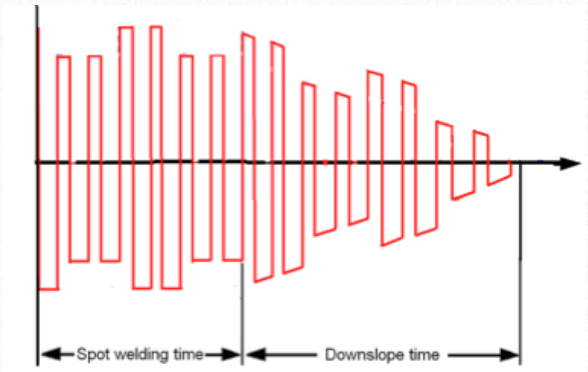
Current change in DC TIG spot welding



Current change in pulsed TIG spot welding

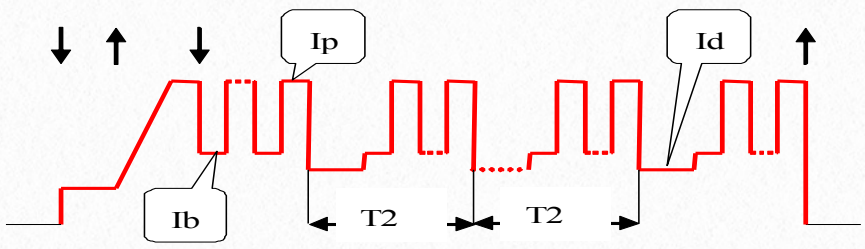


Current change in AC TIG spot welding



Current change in AC pulsed TIG spot welding

Complex waveform TIG welding



Current change in complex waveform DC pulsed welding

This machine can provide complex waveform TIG welding through programming. Special pulsed welding can be obtained in DC TIG mode, dual-pulse welding can be obtained in pulsed TIG mode, and variable polarity pulsed welding can be obtained in AC TIG mode. To obtain complex waveform TIG welding, it is necessary to select the appropriate TIG operation mode or reprogram the TIG operation mode according to the appendix Programming Guide for Users (TIG mode). Take complex waveform DC pulsed welding for example. By adding a pulsed current with

higher frequency to the peak pulsed current with lower frequency, some special welding requirements can be met. Complicated complex waveform DC pulsed welding can be obtained by selecting the operation mode 18/19 or self-programming in pulsed welding mode. A typical waveform of complex waveform DC pulsed welding (operation mode 18) is showed in the above figure, in which, Ib and Ip stand for the base current and peak current in pulsed welding mode respectively. Id ‘s value is equal to that of the pilot arc current, but it has no sense of pilot arc current, and it can be considered as secondary base current. T2 stands for the period of the secondary pulse (LF), and here in this example T2 is 200ms. In operation mode 19, the period of the secondary pulse (LF) can be changed at any moment by adjusting the upslope time.

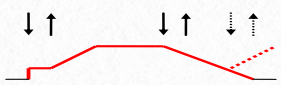
TIG operation mode

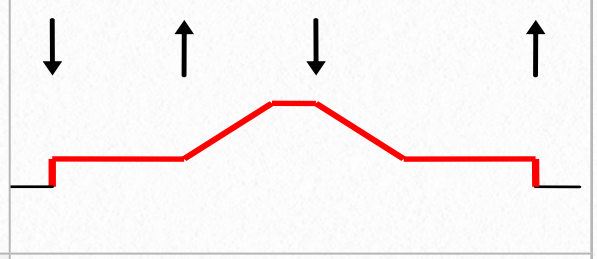
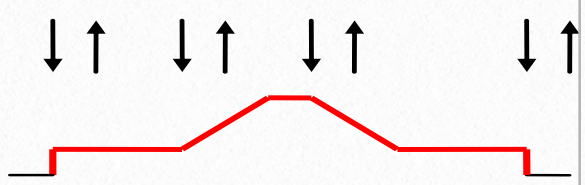
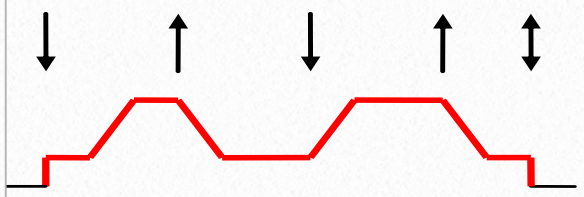
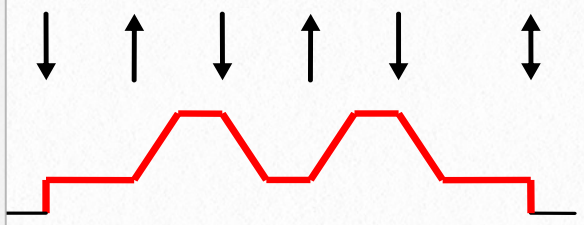
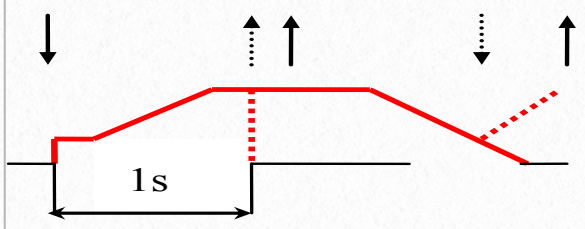
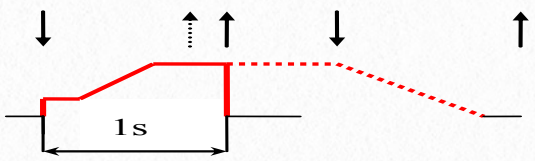
20 TIG operation modes are available for this machine, in which 0-15 cannot be amended by users, and 16-19 can be amended. If you want to amend the TIG operation modes, please refer to the appendix Programming Guide for Users (TIG mode).

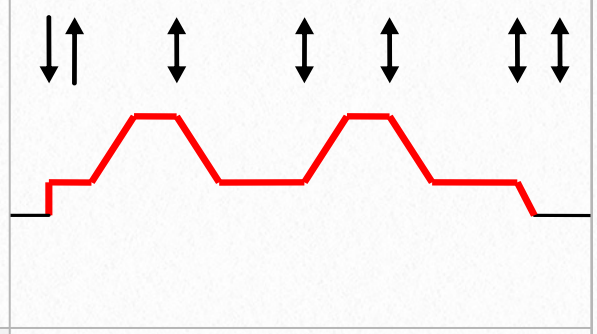
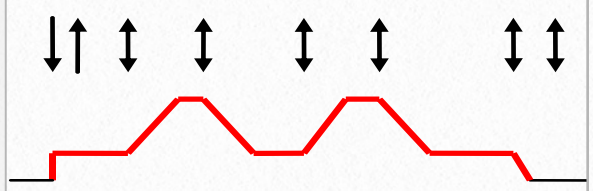
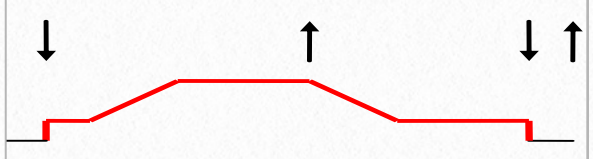
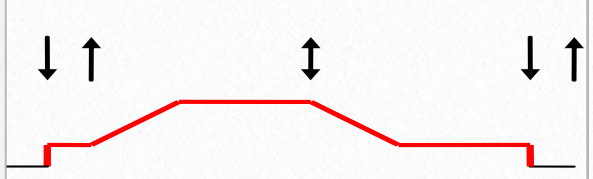
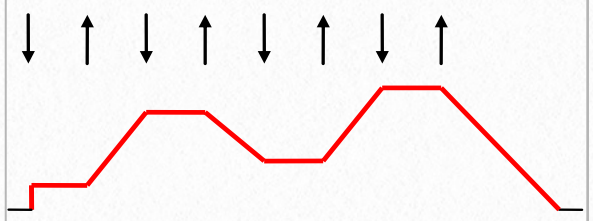
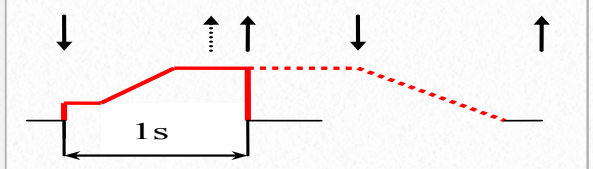
TIG operation mode should be selected according to users’ technical requirements. All the 20 TIG operation modes for this machine are listed in the table TIG operation modes below.

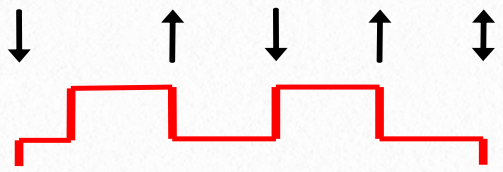
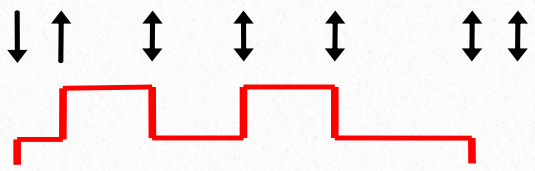
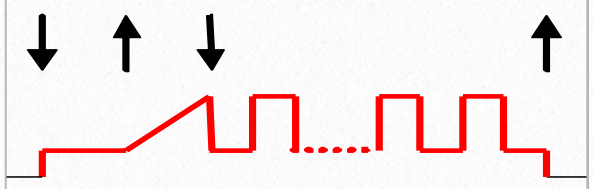
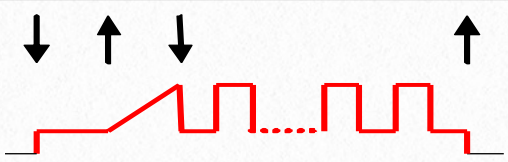
Torch trigger operation notes			
↓	Push the torch trigger.	↑	Release the torch trigger.
↓↑	Push the torch trigger and then release it at any time.	↑↓	Release the torch trigger and then push it at any time.
↕	Push and release the torch trigger within 0.5s, or release and push the torch trigger within 0.5s.	↕↕	Push the torch trigger twice within 0.5s, or release the torch trigger twice within 0.5s.

TIG operation modes

Mode no.	Operation	Torch trigger operation and current curve
0	**Follow mode:** ① Push the torch trigger: arc is ignited and current rises to the pre-set value. ② Release it: arc stops.	
1	**1T/Spot welding mode:** ① Push the torch trigger: arc is ignited and current rises to the pre-set value. ② When the spot welding time is up, current drops gradually, and arc stops. Note: Spot welding time is 1/10 of the upslope time.	
2	**Standard 2T mode:** ① Push the torch trigger: arc is ignited and current rises gradually. ② Release the torch trigger: current drops gradually, and arc stops. ③ If the torch trigger is re operated again before arc stops, the current will gradually rise again, to status ②.	
3	**Double operation 2T mode:** ① Push the torch trigger: arc is ignited and current rises gradually. The torch trigger can be released at any time. ② Push it again: current drops gradually, and arc stops. The torch trigger can be released at any time. ③ If the torch trigger is re operated again before arc stops, the current will gradually rise again, to status ②.	

4	**Standard 4T mode:** ① Push the torch trigger: arc is ignited and current reaches the initial value. ② Release it: current rises gradually. ③ Push it again: current drops to pilot arc current value. ④ Release it: arc stops.	
5	**Double operation 4T mode:** ① Push the torch trigger: arc is ignited and current reaches the initial value. The torch trigger can be released at any time. ② Release it: current rises gradually. The torch trigger can be released at any time. ③ Push it again: current drops to pilot arc current value. The torch trigger can be released at any time. ④ Release it: arc stops.	
6	**Cycle single operation mode without initial current:** ① Push the torch trigger: arc is ignited and current rises gradually. ② Release it: current drops to pilot arc current value. ③ Push it again: current rises gradually again, and then turn to ②. ④ If push the torch trigger and release it at once, arc will stop.	
7	**Cycle single operation mode with initial current:** ① Push the torch trigger: arc is ignited and current reaches the initial value. ② Release it: current rises gradually. ③ Push it again: current drops to pilot arc current value, and turn to ②. ④ If release the torch trigger and push it at once, arc will stop.	
8	**Inner timing operation mode:** ① Push the torch trigger: arc is ignited and current rises gradually. ② If release it within 1s, arc will stop; if release it after 1s, it will turn to ③. ③ Push it again: current drops gradually, and arc stops. The torch trigger can be released at any time. ④ If push the torch trigger again before arc stops, the current will gradually rise again, and then turn to ③.	
9	**Outer timing operation mode:** ① Push the torch trigger: arc is ignited and current rises gradually. ② If release it within 1s, it will turn to ③; if release it after 1s, arc will stop. ③ Push it again: current drops gradually, and arc stops.	

10	**Cycle double operation mode without initial current:** ① Push the torch trigger: arc is ignited and current rises gradually. The torch trigger can be released at any time. ② Push the torch trigger and release it at once: current drops to pilot arc current value. ③ Push the torch trigger and release it at once: current gradually rises again, and then turn to ②. ④ If push the torch trigger twice within 0.5s, the current will drop gradually, and arc will stop.	
11	**Cycle double operation mode with initial current:** ① Push the torch trigger: arc is ignited and current reaches the initial value. The torch trigger can be released at any time. ② Push the torch trigger and release it at once: current gradually rises. ③ Push the torch trigger and release it at once: current drops to pilot arc current value, and then turn to ②. ④ If push the torch trigger twice within 0.5s, the current will drop gradually, and arc will stop.	
12	**Single operation 3T mode:** ① Push the torch trigger: arc is ignited and current rises gradually. ② Release it: current drops to pilot arc current value. ③ Push it again: arc stops.	
13	**Double operation 3T mode:** ① Push the torch trigger: arc is ignited and current rises gradually. The torch trigger can be released at any time. ② Push the torch trigger and release it at once: current drops to pilot arc current value. ③ Push it again: arc stops.	
14	**Real time waveform control operation mode with initial current (intermittent up-down):** ① Push the torch trigger: arc is ignited and current reaches the initial value. ② Release it: current gradually rises. ③ Push it again: current stops rising. ④ Release it: current drops gradually. ⑤ Push it again: current stops dropping, and then turn to ②. ⑥ If the torch trigger is not pushed after the current begins to drop, the current will drop gradually till arc stops.	
15	**Real time waveform control operation mode without initial current (intermittent up-down):** ① Push the torch trigger: arc is ignited and current rises gradually. ② Release it: current stops rising. ③ Push it again: current drops gradually. ④ Release it: current stops dropping. ⑤ Push it again: current rises gradually, and then turn to ②. ⑥ If the torch trigger is not pushed after the current begins to drop, the current will drop gradually till arc stops.	

16	**Manual pulsed single operation mode:** ① Push the torch trigger: arc is ignited and current reaches the preset value. ② Release it: current drops to pilot arc current value. ③ Push it again: current rises to the preset value, and then turn to ②. ④ If push the torch trigger and release it at once, or release the torch trigger and push it at once, arc will stop. Note: Preset value is the peak value; pilot arc value is the base value. It is programmable.	
17	**Manual pulsed double operation mode:** ① Push the torch trigger: arc is ignited and current reaches the preset value. The torch trigger can be released at any time. ② Push the torch trigger and release it at once: current drops to pilot arc current value. ③ Push the torch trigger and release it at once: current rises to the preset value, and then turn to ②. ④ If push the torch trigger twice within 0.5s, the current will drop gradually, and arc will stop. Note: Preset value is the peak value; pilot arc value is the base value. It is programmable.	
18	Pulsed welding with fixed frequency (5Hz) and fixed duty cycle (50%): ① Push the torch trigger: arc is ignited and current reaches the initial value. ② Release it: current gradually rises. ③ Push it again: current drops to pilot arc current value, and the timing function is started. ④ If time is out, do peak-base switch. ⑤ Release the torch trigger: arc stops. Note: Preset value is the peak value; pilot arc value is the base value. It is programmable.	
19	Pulsed welding with unfixed frequency (the cycle is 1/5 of the upslope time) and fixed duty cycle (50%): The same with that of mode 18.	

When reading the above table, please note:

- Whether the arc is ignited by HF or by striking the electrode, and no matter what kind of operation mode is selected, after arc is ignited successfully, it enters into initial current, and later into operational mode control.
- Some operation modes adopt the exit mode by pushing the torch trigger. The operator should release it after exiting welding. In this way, another welding operation can be entered by pushing the torch trigger.
- Current curves in all operation modes are drawn on the assumption that the machine works in DC TIG mode. If the machine works in pulsed TIG mode, the current curve appears a pulse shape; if the machine works in AC TIG mode, the current curve appears a variable polarity pulse shape.
- Normally, the TIG operation modes most widely used are 2T and 4T, which exactly correspond to operation mode 2 and 4 for this machine respectively.
- Use the operation mode programming function carefully, since it can be complicated.

5

Installation

Unpacking

Check the packaging for any signs of damage.

Carefully remove the machine and retain the packaging until the installation is complete.

Location

The machine should be located in a suitable position and environment. Care should be taken to avoid moisture, dust, steam, oil or corrosive gases

Place on a secure level surface and ensure that there is adequate clearance around the machine to ensure natural airflow.

Input connection

Before connecting the machine you should ensure that the correct supply is available. Details of the machine requirements can be found on the data plate of the machine or in the technical parameters shown in the manual.

The equipment should be connected by a suitably qualified competent person. Always ensure the equipment has a proper grounding.

Never connect the machine to the mains supply with the panels removed.

Output connections

Electrode polarity

In general when using manual arc welding electrodes the electrode holder is connected the the positive terminal and the work return to the negative terminal. Always consult the electrode manufacturer's data sheet if you have any doubts.

When using the machine for TIG welding the TIG torch should be connected to the negative terminal and the work return to the positive terminal

MMA welding DC

Insert the cable plug with electrode holder into the "+" socket on the front panel of the welding machine, and tighten it clockwise.

Insert the cable plug of the work return lead into the "-" socket on the front panel of the welding machine, and tighten it clockwise

If the welding mode is not pointing to "DC MMA", press the key in the welding mode selecting zone on the front panel of the machine to select " " DC MMA mode. After adjusting all parameters according to relevant content in this manual, SMAW can be carried out. When welding, the digital meter displays the welding current, and it can also display the arc voltage if you press the key in the parameter and alarm display selecting zone.

MMA welding AC

The only difference from that of SMAW (DC) is that the welding mode points to " ".

TIG Welding

Insert the cable plug with the work clamp into the "+" socket on the front panel of the welding machine, and tighten it clockwise.

Insert the cable plug of the TIG torch into the "-" socket on the front panel of the machine and tighten clockwise.

Connect the TIG torch control switch into the socket on the machine front panel.

Connect the remote control if fitted into the socket on the machine front panel.

Connect the gas hose to the regulator / flowmeter located on the shield gas cylinder and connect the other end to the machine.

Operation

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the area.

MMA (DC)

After connecting the cables as above, make sure that all are correctly installed. Switch on the mains supply to start the machine. Select the welding mode " " DC MMA by pressing the key in the welding mode selecting zone on the front panel of the machine. After adjusting all parameters according to relevant content in this manual, MMA welding can be carried out. When welding, the digital meter displays the welding current, and it can also display the arc voltage if you press the selection key in the parameter and alarm display selecting zone.

For DC welding, the connection as mentioned above is DCEP polarity. The operator may choose DCEP/DCEN according to work piece and electrode application requirement. Generally, DCEP polarity is recommended for basic electrodes, while there is no special polarity requirement for acid electrodes.

MMA (AC)

The only difference from that of MMA (DC) is that the welding mode points to " ".

Set the amperage on the machine suitable for the electrode being used. Please see below a guide to amperages required. Ensure you check that you have the electrode polarity correct.

Electrode Diameter (mm)	Recommended Welding Current (A)
1.6	44~84
2.0	60~100
2.5	80~120
3.2	108~148
4.0	140~180

Set the arc force current percentage as required. This can be adjusted during welding.

TIG Welding

After making sure that all leads and cables are correctly installed, close the power supply switch to start the machine. Select AC square wave TIG, AC pulsed TIG, DC TIG or DC pulsed TIG by pressing the welding mode selecting key on the front panel of the machine, or select welding mode such as TIG spot welding or composite waveform TIG welding by selecting operation mode. Open the gas valve of the cylinder, adjust the gas flow to the proper value, select the correct cooling mode, adjust all parameters to the proper value according to the relevant content in this manual, and TIG welding can be carried out. The arc ignition mode of this machine is non contact arc ignition. During welding, the parameter display meter displays the welding current, and it can display the arc voltage by pressing the key in the parameter display selecting zone.

Foot control

Foot control function is generally used in TIG mode:

Connect the foot control to the corresponding terminal on the front panel of machine with a special cable.

Press the foot control selecting key on the front panel of the machine to lighten the foot control LED.

Adjust the welding parameters to the proper value, and then welding can be carried out.

When welding under foot control, TIG operation mode 0 is used, and it has nothing to do with the current operation mode setting.

Step on the foot control to ignite arc in non-contact arc ignition mode. After arc is ignited successfully, the welding current will be controlled by the foot control. The minimum current value is 30A, while the maximum current is the preset value.

Note: Foot control is optional. Give your requirement when placing your order if necessary.

Application of automatic welding

Connect the computer with the communication interface RS-485 (It is optional, and give your requirement when placing your order if necessary.) of the machine; equip proper software; and computer-controlled automatic welding can be carried out. The communication protocol of automatic control is available against payment with this machine, while the computer software for automatic welding should be provided by users themselves.

Press the foot control selection key on the front panel of the machine to light the foot control LED.

Adjust the welding parameters to the proper value, and then welding can be carried out.

When welding under foot control, TIG operation mode 0 is used, and it has nothing to do with the current operation mode setting.

For welder training please visit our Academy website at

www.wilkinson-welding-academy.com

6

Maintenance and troubleshooting

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

In order to guarantee that the arc welding machine works efficiently and in safety, it must be maintained regularly. Operators should understand the maintenance methods and means of arc welding machine operation. This guide should enable customers to carry on simple examination and safeguarding by oneself, try to reduce the fault rate and repair times of the arc welding machine, so as to lengthen service life of arc welding machine

Period	Maintenance item
Daily examination	Carry out a full visual inspection. Check for any damage to the machine, leads, cables and connections. Replace where necessary. Switch on the machine and check for any warning Led's and general operation
Monthly examination	Using the dry compressed air to clean the inside of arc welding machine. Especially check for build up of dust / debris on intake grills, main voltage transformer, inductance, IGBT module, the fast recover diode and PCB, etc. Take care when blowing electronic components and do not dislodge any wiring connections Check the security of output connections and plugs. Replace if signs of overheating.
Yearly examination	Carry out an annual service. Check earth continuity and insulation resistance of the machine at the relevant points. PLEASE NOTE THIS WORK SHOULD BE CARRIED OUT BY A TRAINED COMPETENT PERSON.

Troubleshooting

Before arc welding machines are dispatched from the factory, they have already been checked thoroughly. The machine should not be tampered with or altered.

Maintenance must be carried out carefully. If any wire becomes loose or is misplaced, it maybe potential danger to user!

Only professional maintenance personnel should repair the machine!

Ensure the power is disconnected before working on the machine. Always wait 5 minutes after power switch off before opening the case.

NOTE

- When the inverter welder is powered on, defective components may explode or lead to explosion of other components.
- Wear face guard and long-sleeved clothing when maintaining the inverter welder.
- Wear a grounded antistatic wristband when carrying PCBs and components.
- Store, carry and transport PCBs with appropriate antistatic bags or boxes.
- Cut off the power supply of the welder before testing.
- Test with appropriate instruments and leads
- Read the instructions of the testing equipment carefully.

Phenomena		Cause	Solution
The fan does not work or it works abnormally.		The power cord is not well connected.	Reconnect the power cord.
		Input failure	Solve the input failure problem.
		The mains voltage is overly low.	Welding can be carried out after the mains voltage recovers.
The fan does not work or it works abnormally.		The power cord is not well connected.	Reconnect the power cord.
		Input failure	Solve the input failure problem.
		The mains voltage is overly low.	Welding can be carried out after the mains voltage recovers.
MMA	Hard to ignite arc	The arc ignition current is too low or the arc ignition time is too short.	Increase the arc ignition current or prolong the arc starting time.
	Excessive spatter or the molten pool is too big.	The arc ignition current is too high or the arc ignition time is too long.	Reduce the arc ignition current or shorten the arc ignition time.
	Normal arc cannot be started.	Input failure of the mains power supply or the power cord is not well connected.	Solve the input failure problem or reconnect the power cord.
	Electrode sticking	The arc force current is too low.	Increase the arc force current.
	The electrode holder becomes very hot.	The rated current of the electrode holder is lower than its actual working current.	Replace it with a higher rated current holder.
	Arc is easy to break.	Arc breaking voltage is too low.	Increase the arc breaking voltage.
TIG	There is no current output when pushing the torch trigger.	Welding can be exited when the torch trigger is pushed in some TIG operation modes.	Release the torch trigger and try again.
		The welding circuit is not in good connection.	Check the welding circuit, and reconnect it if necessary.
	There is no discharge and arc cannot be ignited when pushing the torch trigger in HF arc ignition mode.	The torch trigger is not connected.	Connect the torch trigger.
		The spark gap on the discharge board is too big.	Adjust the spark gap on the discharge board to about 1.0mm.
	The electrode burns quickly in TIG welding.	The output polarity connection is incorrect.	Exchange the polarity.
		The cleaning strength is too big in AC mode.	Reduce the cleaning strength.
	Black weld bead	The weld bead is not well protected and is oxidized.	Make sure the gas valve of the cylinder is open and the pressure inside the cylinder is high enough. Generally, it is necessary to refill the cylinder when the pressure is lower than 0.5MPa.
		The weld bead is not well protected and is oxidized.	Check if the gas flow is normal. You may select different gas flow according different welding current. However low the current is, the gas flow is recommended to be not less than 5L/min. Otherwise, the weld bead may not be fully covered for lack of shielded gas.
			Check if the gas path is air proof and if the gas is pure enough.
			Check if the environment is with strong wind.

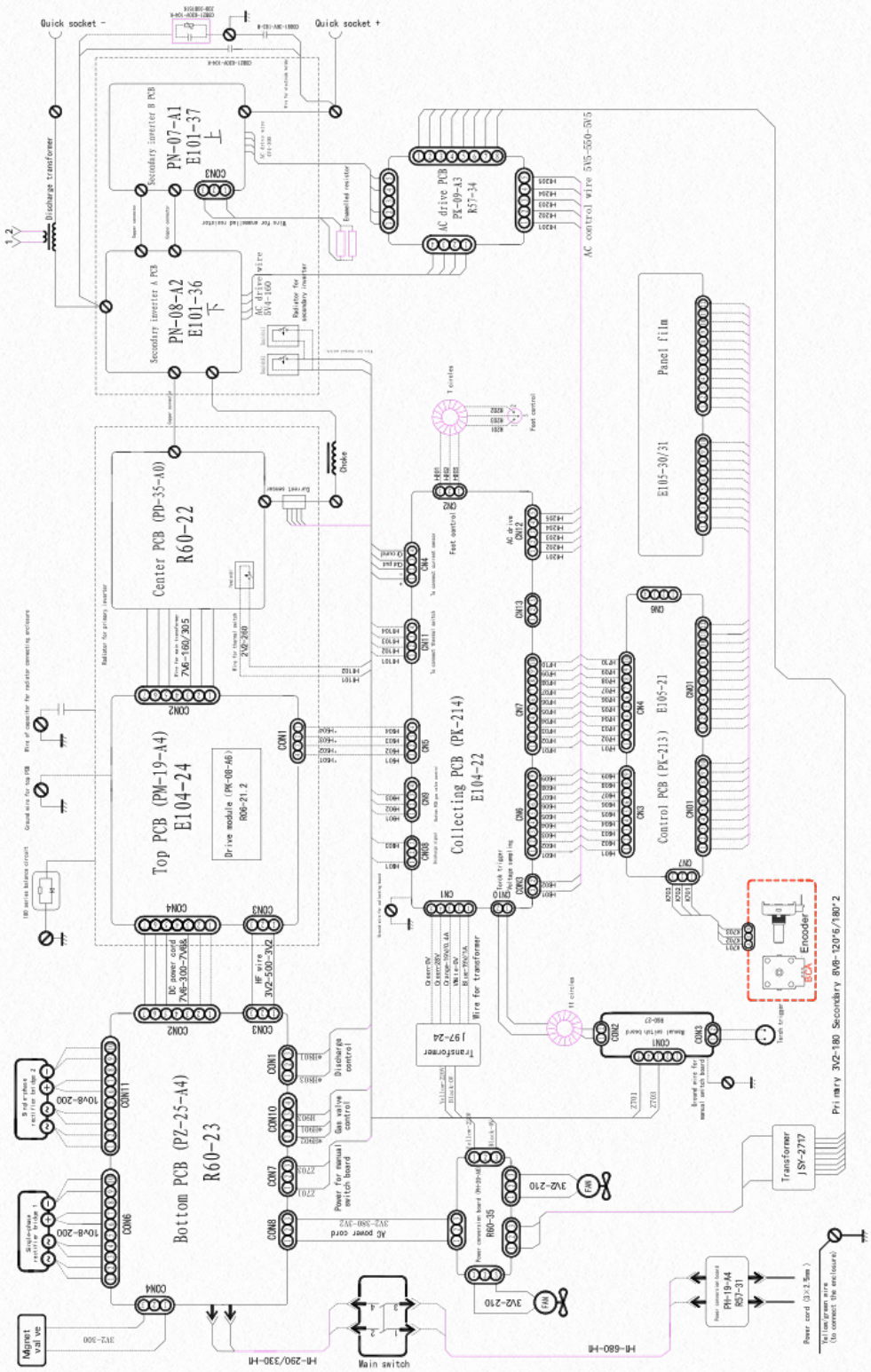
Phenomena		Cause	Solution
TIG	Arc is hard to start but easy to break.	The electrode you use is of poor quality or is badly oxidized.	Replace it with electrode of better quality.
			Remove the oxidized layer of the electrode.
			Prolong the post-flow time to avoid oxidization of the electrode.
			Adjust the spark gap on the discharge board to about 1.0mm.
	Unstable current during welding	Mains voltage fluctuates badly, or the input cable is loosely connected with the mains power supply.	Check the mains power supply for normal state, and reconnect the power cord.
		There is serious interference from other electric appliances	Do not connect the machine to the power cord, which is connected to other electric appliances of serious interference.
	Other malfunction		Contact the service centre

Alarms

Type	Alarm	Automatic response	Cause	Solution
Over current	Over current LED flashes and there are alarm beeps.	Cut off the main circuit permanently.	Load current is too high, or over current protection of main power unit occurs.	Restart the machine. If the problem remains, shut down the machine and contact the service department.
Under voltage	Over voltage/ under voltage LED flashes and there are alarm beeps.	Cut off the main circuit temporarily.	The mains voltage is low	Problem will be automatically eliminated when the mains power supply recovers, and welding can be continued. If under-voltage sustains, ask an electrician to check the input power. Welding cannot be carried out until the mains power supply recovers. If the mains voltage is normal, but alarm beeps still exist, contact the service department
Overheating	Overheating LED flashes and there are alarm beeps.	Cut off the main circuit temporarily.	Excessive work of the main circuit	It is unnecessary to shut down the machine, but just wait for the overheating LED to go off, and then welding can be continued.

7

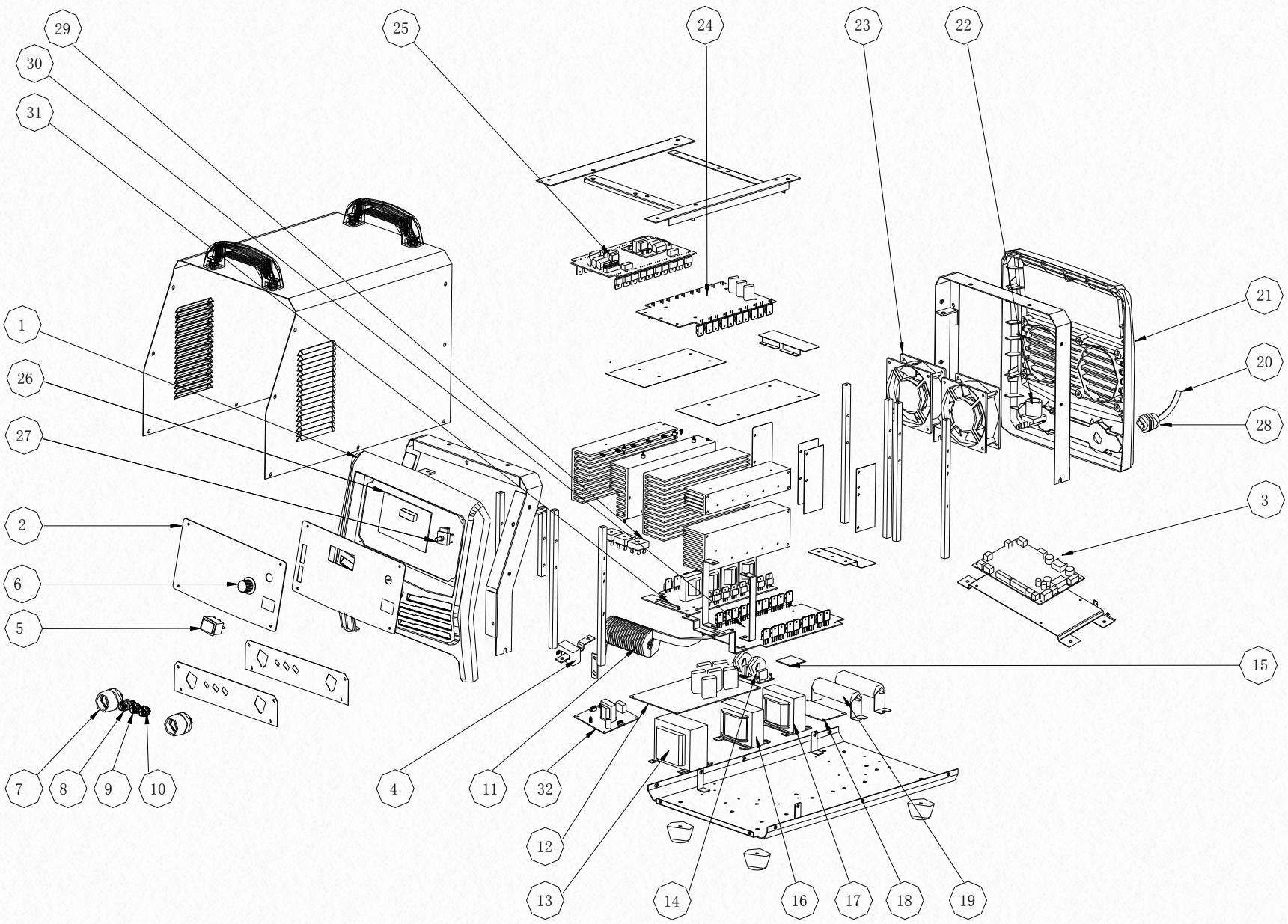
Electrical schematic



8

Parts list

JT-200D



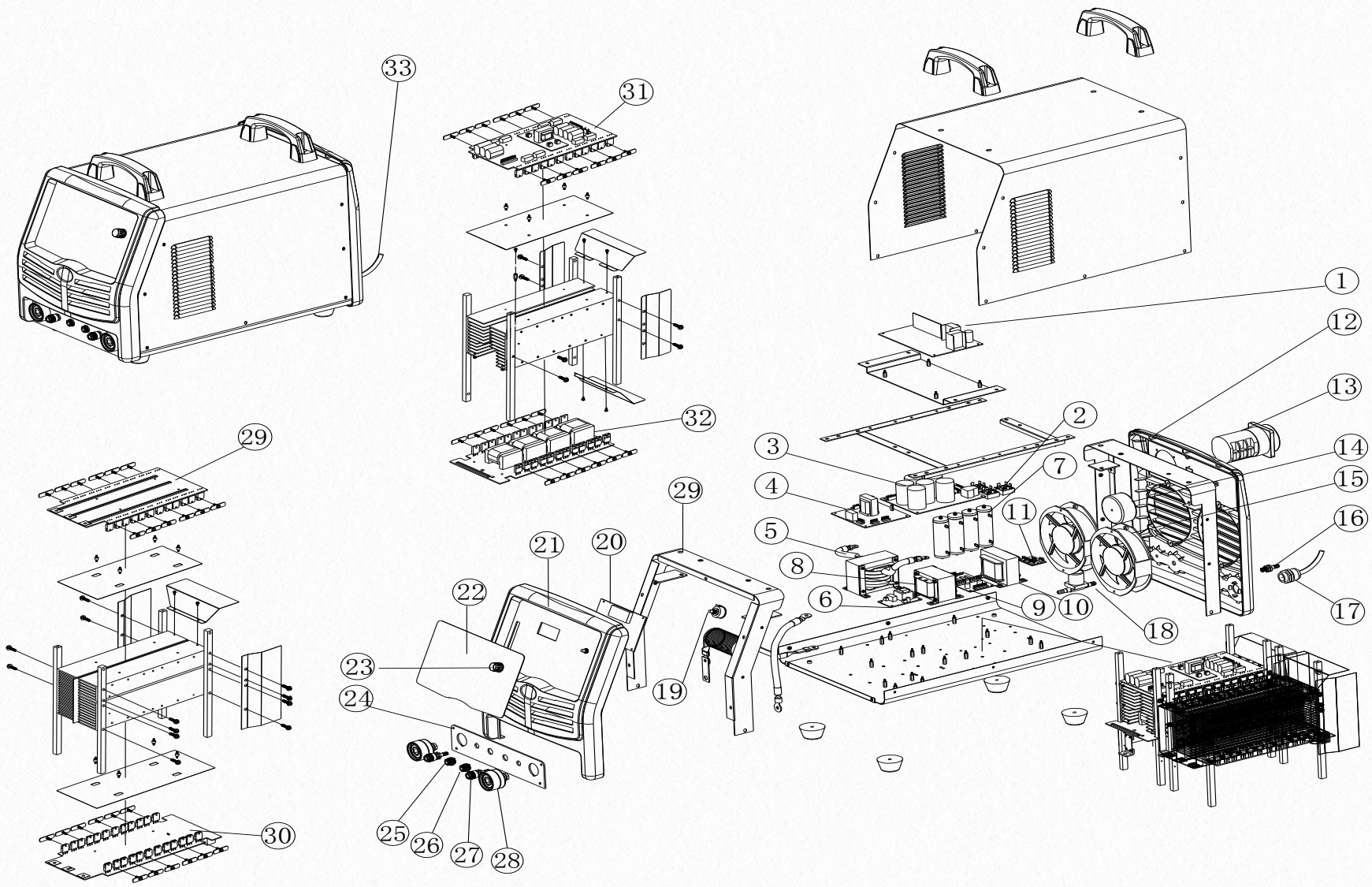
JT-200D

No.	Part no	Description	No.	Part no	Description
1	10014869	Front Panel	17	10020665	Secondary power transformer
2	10038551	Panel overlay	18	10037776	Secondary inverter driver board
3	10040580	Summary board	19	10005305	Glaze resistor
4	10006803	Electric current trans	20	10020809	Power line
5	10004946	Power switch	21	10013302	Back panel
6	10004919	Knob	22	10022039	Solenoid value
7	10021855	Quick Socket	23	10022060	Fan
8	10016390	Water fast socket	24	10020998	Secondary inverter board A
9	10004684	Two pin socket	25	10040579	Top board
10	10001685	Five pin socket	26	10042330	Control board
11	10021002	Arc coil	27	10006520	Encoder
12	10020441	Bottom panel	28	10021912	Line button
13	10006562	Reactor	29	10006625	Silicon bridge
14	10021614	EMC	30	10020997	Secondary inverter board B
15	10020608	Power transform board	31	10039434	Central board
16	10040655	Power transformer	32	10020646	Hand switch board

JT-315D

No.	Part no	Description	No.	Part no	Description
1	10040581	Summary board	18	10022040	Solenoid value
2	10006625	Silicon bridge	19	10006520	Encoder
3	10020434	Bottom panel	20	10040130	Control board
4	10020604	Arc start board	21	10044448	Front panel
5	10006560	Reactor	22	10044430	Panel overlay (with electro circuit)
6	10020646	Hand switch board	23	10004919	Knob
7	10005295	Glaze resistor	24	10045761	Underneath stick for the front panel
8	10040654	Power transformer	25	10004684	Two pin socket
9	10037776	Secondary driver board	26	10004685	Five pin socket
10	10020665	Secondary power transformer	27	10016390	Water connection
11	10020608	Power transform board	28	10021856	Quick socket
12	10037448	Back Panel	29	10020975	Secondary inverter board A
13	10004935	Power switch	30	10020977	Secondary inverter board B
14	10037303	EMC	31	10040578	Top board
15	10022057	Fan	32	10038699	Central board
16	10016389	Connector for water	33	10020826	Power line
17	10021912	Line button			

JT-315D


33
31
1
12
13
2
3
14
7
4
15
11
5
16
8
6
9
10
18
17
29
21
20
29
22
23
19
24
25
26
27
28
29
30

JT-200D / JT-315D DIGITAL AC/DC PULSE TIG/MMA WELDING MACHINE
Order code JT-200D, JT-315D

Issue 1 January 2014

Product is subject to change without notice

Appendix

PROGRAMMING GUIDE FOR USERS (TIG MODE)

Skip this chapter over if user-programming function (TIG mode) is not to be used.

4 programmable TIG operation modes (No.16-19) are available for this welding machine, and all the 4 modes are clearly defined when leaving the factory. Users can freely modify them to meet their special requirements according to the methods provided in this chapter. Read this chapter carefully and fully understand all contents before the re-programming or modifications of the operation modes.

1. **Operation of the torch trigge**r

It is the operation mode's connotation that different operation of the torch trigger during welding lead to different current waveform. The operation of torch trigger typically includes the following forms:

⊙ Push the torch trigger (↓)

⊙ Release the torch trigger (↑)

⊙ Push the torch trigger and release it at once (↓↑)

⊙ Release the torch trigger and push it at once (↑↓)

⊙ Push the torch trigger twice within 0.5s (↓↑↓or↑↓↑↓)

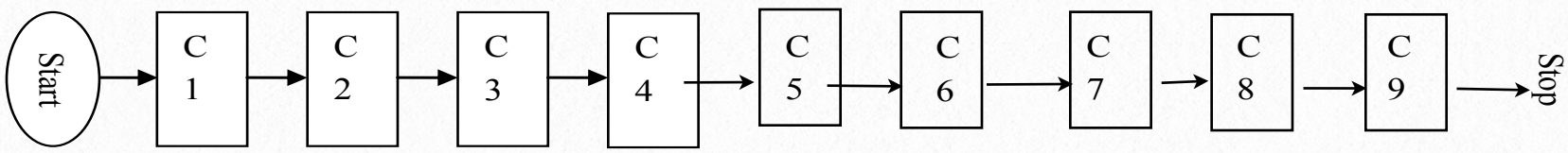
⊙ Release the torch trigger twice within 0.5s (↑↓↑or↓↑↓↑)

These are the general descriptions of the operation of the torch trigger. In addition, descriptions based on operation times are used in this chapter.

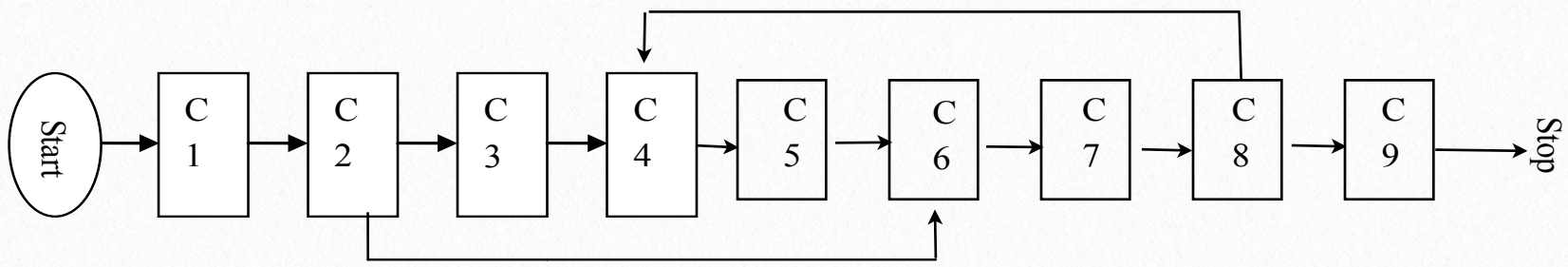
- **Single operation**: Push or release the torch trigger.
- **Double operation**: Push and release the torch trigger within 0.5s, or release and push the torch trigger within 0.5s.
- **Triple operation**: Push, release and push the torch trigger within 0.5s, or release, push and release the torch trigger within 0.5s.
- **Quartic operation**: Push, release, push and release the torch trigger within 0.5s, or release, push, release and push the torch trigger within 0.5s.
- 2. Coding of operation mode
- For digital welding machine, the function of TIG operation mode is realized by running an orderly code group. This orderly code group is called operation mode code sequence, and codes that composing of this sequence code are named operation

mode codes. To plan and design a new TIG operation mode is actually to design a code sequence group and to program it into the welding machine. The code sequence of operation mode is composed of the following.

- **Operation mode code sequence**: C0, C1, C2, C3, C4, C5, C6, C7, C8, C9
- In this sequence, Ci (i stands for code no. 0~9) is a code in the code sequence. The code sequence of an operation mode is composed of 10 codes, and each code can be a number among 0~99. The meaning of all codes in the code sequence are detailed as below.
- C0 is the no. 0 code in the sequence, and it defines the operation time of the operation mode:
- C0=0~89 stands for that the operation time is 0.0~8.9s.
- C0=9X stands for that the operation time is (X+1)/10 of the upslope time.
- C1~C9 respectively stands for no.1~9 code in the sequence and also the operation stipulation of step 1~9. Different values of these codes stand for different operation stipulations. 100 codes are classified and explained in Attached Table 2 based on their functions and characteristics, and users should fully understand all those. For welding machine, operation mode is realized by implementing the code sequences one by one. Here Attached Figure 1 and Attached Figure 2 show the general steps to implement the code sequences.



Attached Figure 1 Flow chart of operation sequences without code transfer



Attached Figure 2 Flow chart of operation sequences with code transfer

General steps for operation mode code sequence design:

① Function setting: set operation function according to the welding technical requirements.

② Function decomposing: decompose function referring to Attached Table 2 to bring out several sub-functions.

③ Code selecting: select appropriate codes referring to Attached Table 2 to realize each sub-function.

④ Sequence composing: arrange the order of codes appropriately to compose applicable code sequences.

Tips in operation mode code sequence design:

① During welding, users always enter into operation mode control after the torch trigger is pushed and arc is successfully ignited, so users do not need to care about the arc ignition requirements of welding in the code design.

② Operation mode control will be exited once arc stops. If users want to enter into it again, arc should be ignited for another time.

③ Operation codes "1X" and "2X" are with a rapid response, while "3X", "4X" and "5X" are with a slow response, because it takes about 0.5s for the latter to collect the effective changes of torch trigger.

④ Except C0, select “0” in any other codes means no operation and not turning to the next step (i.e. waiting).

⑤ Since as many as 100 kinds of operation codes are available for this machine, there is more than one code sequence to achieve the specific operation function, and users only need to choose one of them.

⑥ It should be stressed that not all the programming codes can be combined arbitrarily. Some code combinations do not make sense, and some can achieve some specific functions but against users’ habit. Therefore, users should pay attention when obtaining code combinations.

20 kinds of TIG operation modes are available for this machine, in which 0-15 are non-programmable, and 16-19 are programmable. Whether non-programmable ones or programmable ones, they are achieved by their own operation mode code sequences, which are obtained based on “Operation mode encoding rules” (see Attached Table 1). Please refer to the description of the operation modes in the text when reading this table.

Attached Table 1 TIG operation mode code sequences list

Mode	Code sequences											Description (SEE TEXT FOR DETAILS)
0												Follow mode
1												1T/spot welding mode
2												Standard 2T mode
3												Double operation 2T mode
4												Standard 4T mode
5												Double operation 4T mode
6												Cycle single operation mode without initial current
7												Cycle single operation mode with initial current
8												Inner timing operation mode
9												Outer timing operation mode
10												Cycle double operation mode without initial current
11												Cycle double operation mode with initial current
12												Single operation 3T mode
13												Double operation 3T mode
14												Real time waveform control operation mode with initial current (intermittent up-down)
15												Real time waveform control operation mode without initial current (intermittent up-down)
16												Manual pulsed single operation mode
17												Manual pulsed double operation mode
18												Pulsed welding with fixed frequency (5Hz) and fixed duty cycle (50%)
19												Pulsed welding with unfixed frequency (the cycle is 1/5 of the upslope time) and fixed duty cycle (50%)

Attached Table 2 TIG operation mode code function

Code	Operation stipulation	Code	Operation stipulation
0X	Immediate executive code: Execute order X immediately.	5X	Transfer code in torch trigger operation condition: Wait for the torch trigger operation. Stop arc if triple or quartic operation, turn to next step if single operation, and if double operation: X = 0: Turn to next step X≠0: Turn to Step X (X=0~9)
1X	Executive code in torch trigger operation condition: Wait for the torch trigger operation, and execute order X when pushing the torch trigger.	6X	Timing executive code: Wait for the operation time, and during this period, no influence if single or double operation, stop arc if triple or quartic operation. If no operation of the torch trigger and time is up, execute order X.
2X	Executive code in torch trigger operation condition: Wait for the torch trigger operation, and execute order X when releasing the torch trigger.	7X	Timing transfer code: Wait for the operation time, and during this period, turn to next step if single or double operation, stop arc if triple or quartic operation. If no operation of the torch trigger: X = 0: Turn to next step X≠0: Turn to Step X (X=0~9)
3X	Executive code in torch trigger operation condition: Wait for the torch trigger operation. If single operation, execute order X. Otherwise, stop arc.	8X	Transfer code with torch trigger state: X = 0: Turn to next step immediately X≠0: Turn to Step X if the torch trigger is pushed. Otherwise, turn to next step. (X=0~9)
4X	Executive code in torch trigger operation condition: Wait for the torch trigger operation. If single operation, no influence; if double operation, execute order X; if triple or quartic operation, stop arc.	9X	Immediate transfer code: X = 0: Turn to next step X≠0: Turn to Step X (X=0~9)
The definition of order X:			
X = 0: Turn to next step			
X = 1: Go to the initial current and turn to next step			
X = 2: Go to the preset current and turn to next step			
X = 3: Go to the pilot arc current and turn to next step			
X = 4: Upslope and turn to next step			
X = 5: Stop upslope and turn to next step			
X = 6: Downslope to the pilot arc and turn to next step			
X = 7: Downslope till arc stops and turn to next step			
X = 8: Stop downslope and turn to next step			
X = 9: Stop arc			

3. Operation mode programming

After designing a group of operation code sequence, you can enter into the operation mode programming state and input the code sequence into the machine. The main steps of operation mode programming are described as below.

① Access programming state

Press the TIG parameter selecting right shift key to start the machine, and the digital meter displays the flashing “P-2”. After about 5s, “P-2” disappears and “16” appears, and “ ” LED turns on, which means that the programming state has been accessed. Note: If no operation within 5min after accessing the programming state, it will exit automatically.

② Select operation mode no.

After you access operation mode programming state, “16” displayed on the digital meter stands for the operation mode 16, and you can select the operation mode to be programmed with the adjustment knob. (Operation mode no. for your selection is 16-19.)

③ Enter into code editing state

After the operation mode no. is determined, you can press the parameter display selecting key, and the operation mode LED “ ” flashes. This means you have entered into code editing state.

④ Code no. selecting and code content editing

After you enter into code editing state, the digital meter will display a 3-figure number, of which the flashing higher one stands for the operation mode code sequence no. and the lower two refer to the code content. You can change the code no. (0~9) by pressing the TIG parameter selecting right/left shift key and edit the code content (0~99) by turning the adjustment knob.

⑤ Exit code editing state

After you finish editing an operation mode, you can exit code editing state by pressing the parameter display selecting key.

⑥ Exit programming state

After making sure that the edited code is correct, and that you are not going to edit any other operation modes, you can exit programming state by pressing the MMA parameter selecting key.

The machine will run into normal operation after exiting operation mode programming state. Users can select TIG parameters appropriately, and check whether the code sequence designed and edited can achieve the desired function by test-welding.