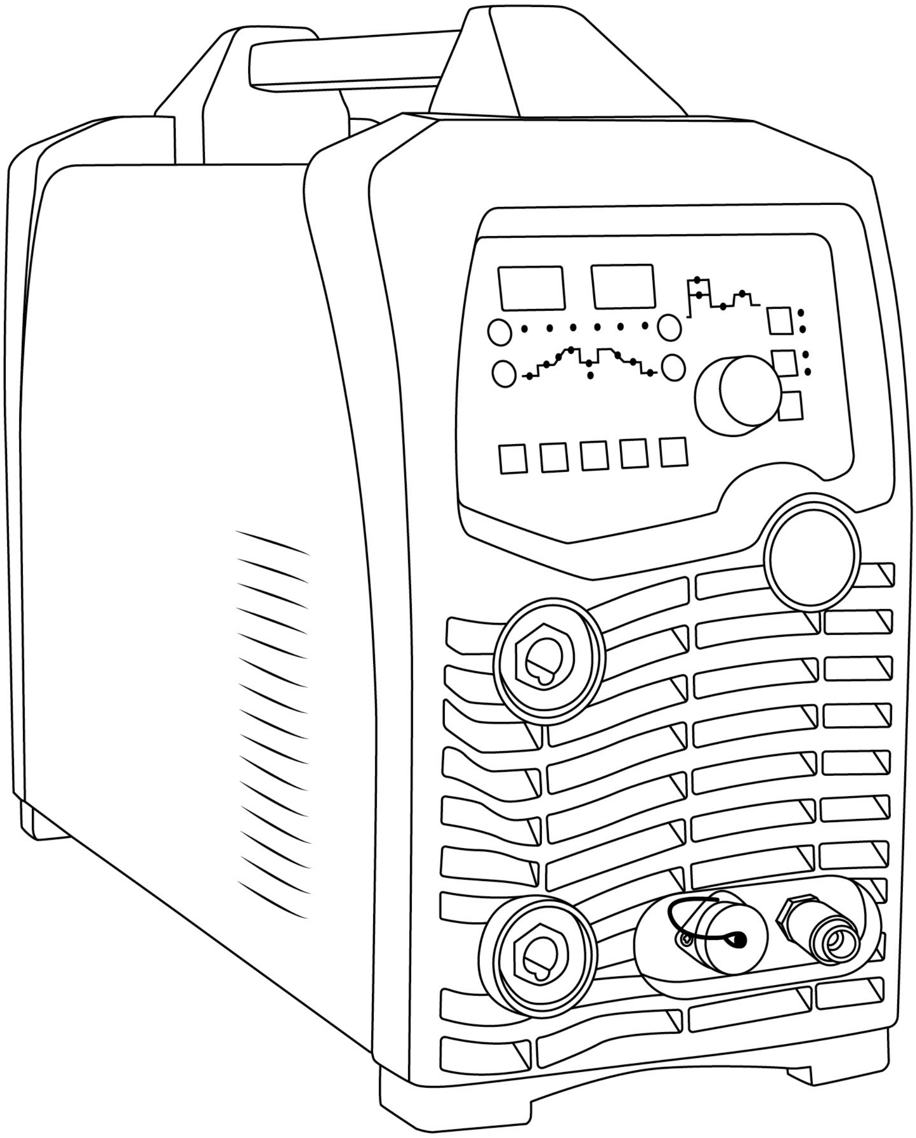
www.jasic.co.uk

TIG Series

| TIG 315P Multi Wave (JT-315PMWD) |



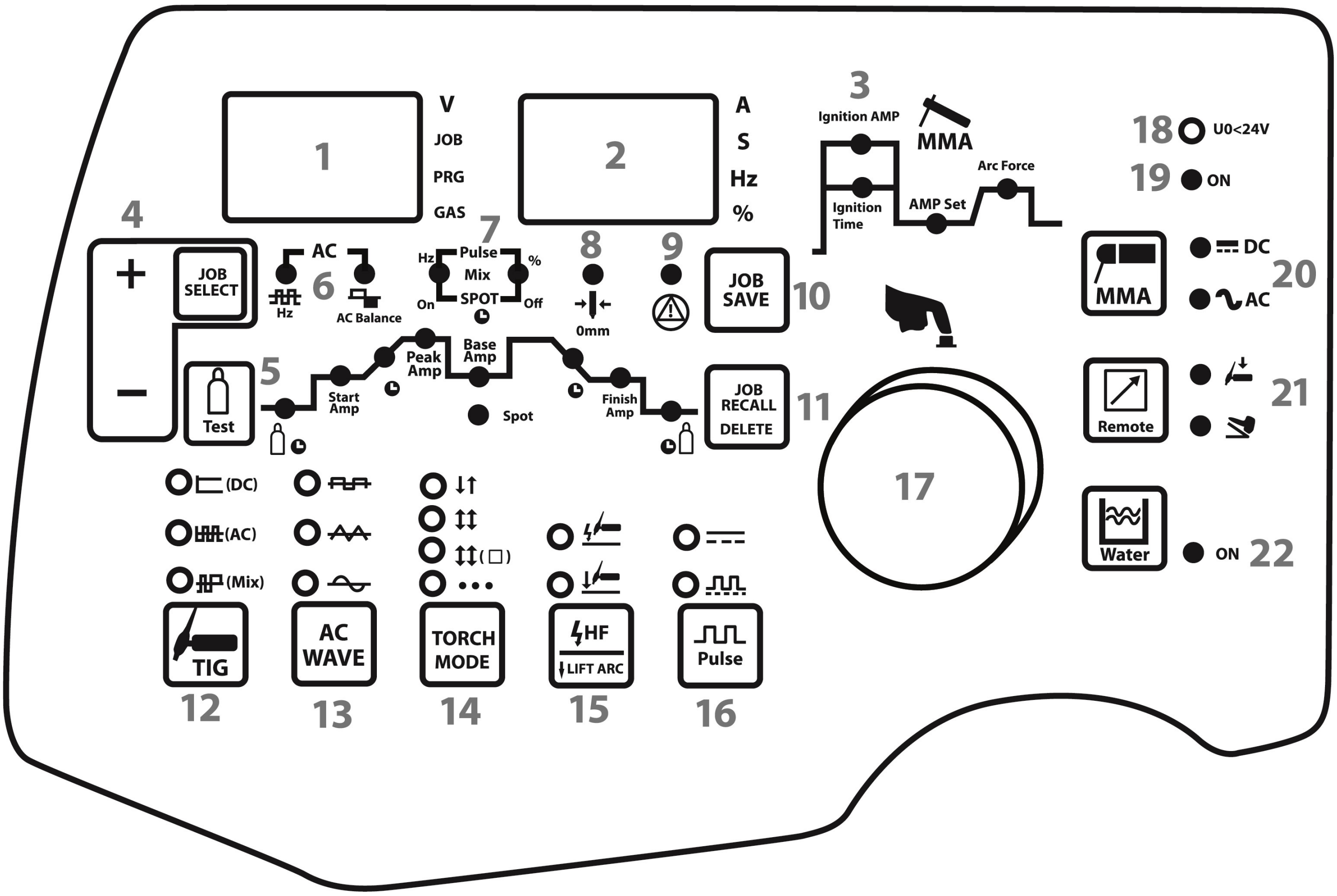
Wave Form Manual

RoHS 2002/95/EC

ISO 9001 CERTIFICATION Intertek

WILKINSON STAR
wilkinsonstar.com

Control panel



1 Digital display

2 Digital display

3 MMA control area

4 Job selection area

5 Gas purge button

6 AC frequency and balance

7 Parameter LEDs

8 Tungsten selection LED

9 Warning LED

10 Job save button

11 Job recall / delete button

12 TIG mode selector button

13 AC wave type button

14 Torch switch mode button

15 Arc starting mode button

16 Pulse / no pulse selection button

17 Rotary adjustment / push selector

18 VRD selection LED

19 VRD on LED

20 MMA welding mode selection

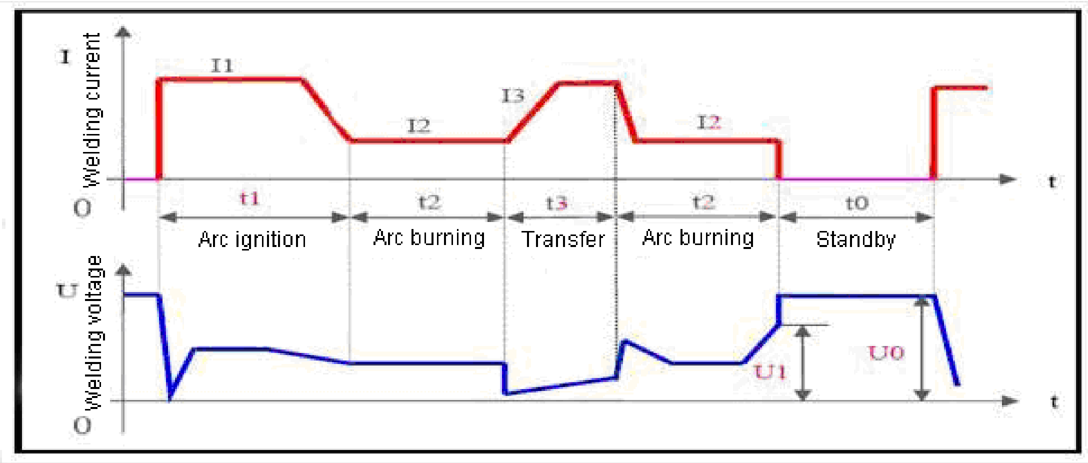
21 Remote control selection

22 Cooling selection

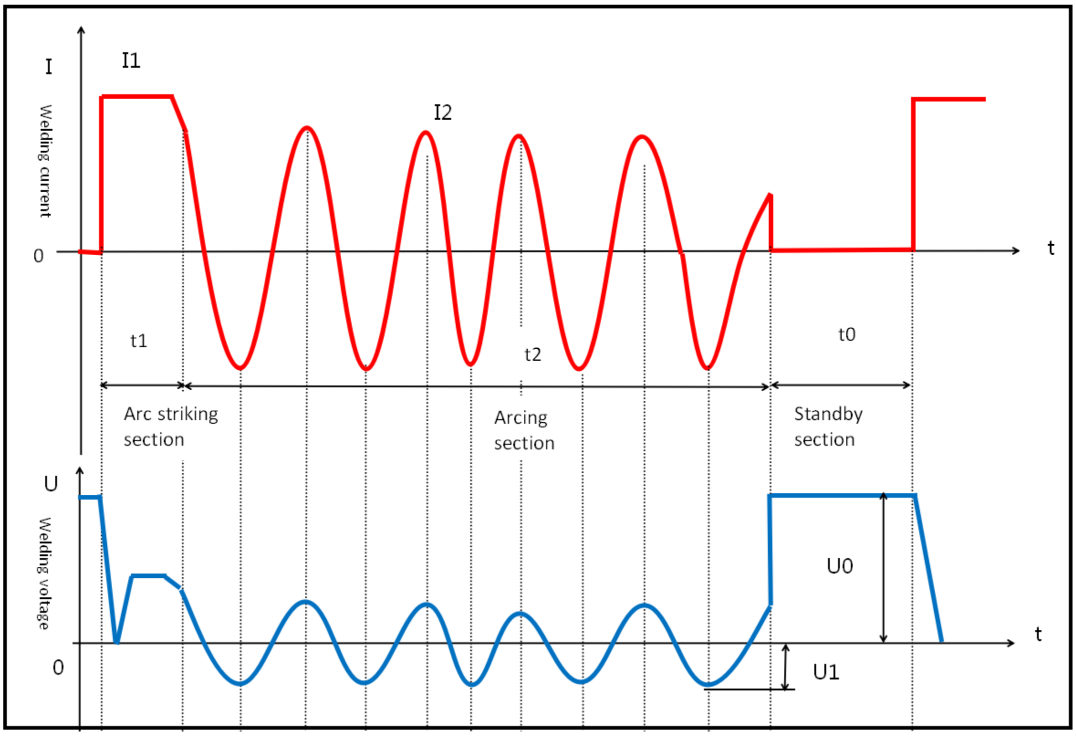
11 Technical Parameters

Item name		Unit	Parameters
Supply voltage		VAC	AC400V±15%
Input frequency		Hz	50
Rated input current		A	19.5@TIG 21.0@MMA
Power capacity		kVA	9.0@TIG 10.0@MMA
Output current adjustment range (TIG)		A	10 ~ 315
Output current adjustment range (MMA)		A	10 ~ 270
Arc force current adjustment range		A	0 ~ 100
Hot start current adjustment range		A	0 ~ 80
No-load voltage		V	70
VRD voltage		V	12.4
Rated operating voltage		V	22.6@TIG 30.8@MMA
AC output frequency		Hz	50 ~ 200
AC balance (Cleaning width)		%	20 ~ 60
AC-DC hybrid output frequency		Hz	1.0 ~ 20
AC-DC hybrid duty cycle (DC)		%	5 ~ 95
Base current		%	6 ~ 315
Pulse frequency	DC	Hz	0.5 ~ 200
	AC	Hz	0.5 ~ 20
Pulse duty cycle		%	5 ~ 95
Pre flow gas time		S	0.5 ~ 10
Post flow gas time		S	0.5 ~ 15
Upslope time		S	0 ~ 15
Downslope time		S	0 ~ 15
Hot start current time		S	0.01 ~ 1.5
Remote control			Yes
Arc strike mode			High frequency oscillation arc striking, contact arc
Efficiency (%)		%	80
Duty cycle (%)		%	TIG: 315@30% - MMA: 270@30%
Power factor			0.70
Insulation class			F
Enclosure rating			IP21S
Operating temperature		°C	-10 ~ 40
Dimensions		mm	566.0 x 223.5 x 405
Weight		Kg	25.5

MMA



Current and Voltage Changes in DC MMA



Current and Voltage Changes in AC MMA

Note:	t0	- Standby section, no welding current, output no-load voltage.
	t1	- Arc striking section, the length adjusted according to hot arc striking time.
	t2	- Arcing section
	t3	- Short circuit transition section
	I1	- Arc strike current
	I2	- Operating current
	I3	- Arc force current
	U1	- Operating voltage
	U0	- No-load voltage

There is no arc force current in MMA AC mode.

MMA AC mode outputs 50Hz sine wave.

Current I2: The current of the arcing section during welding, set by the user according to process requirements.

Arc force

Arc force refers to the slope of the current rise during a short circuit and it is set to increase the current every millisecond on this machine. After a short circuit, the current rises from the set current according to this slope. For example, when the current is set to 100A and the Arc force is 10, the current value after a short circuit of 5ms is: 100+5*10=150A. If the short circuit state still exists the arc force current can rise to the permitted maximum value of 270A. If the short circuit state lasts longer than 0.8 second, the welder enters anti stick mode where the current will drop to a low value and wait for the welder to break the electrode free. The Arc force value should be determined according to rod diameter, set current and process requirements. Larger arc force results in quicker transition of the droplets and less freezing of the rod into the weld pool, but too much arc force will increase the spatter. Low arc force will result in lower spatter and good weld formation, but sometimes it will cause the arc to become soft or cause sticking. In particular, the arc force should be increased when welding thick rods at low current. The arc force is generally 0~40.

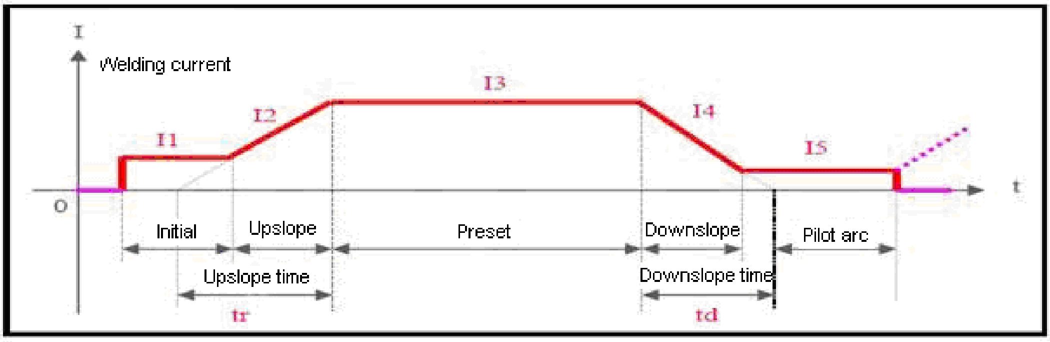
Hot start (Ignition Amps)

Hot start current is beneficial to the arc strike as it reduces the tendency of welding rod and weld material to stick. The size of the hot start striking current is generally determined according to rod type, the specifications and welding current. Rods with better arc striking performance and small diameter generally need lower hot start striking current, higher welding current often will not need any hot start current. The hot start striking time is related to the arc striking current. If the hot arc striking current is large, the hot start time can be shortened.

During DC welding, the heat of the welding arc is different on the positive and negative electrodes. Therefore with a DC power supply the different polarities must be taken into account. The electrode negative (DCEN) means that the welding rod is connected to the negative electrode of the power supply and the work piece is connected to the positive outlet. At this time, the work piece acquires more heat, features high temperature, deep molten pool and easy penetration and it is suitable for welding thick material. The electrode positive (DCEP) means that the welding rod is connected to the positive outlet of the power supply and the work piece is connected to the negative outlet. At this time, the work piece acquires less heat, features low temperature, shallow molten pool and difficult penetration and it is suitable for welding thin pieces.

If AC welding equipment is used for welding, the polarities of the arcs will change alternately and instantaneously. Therefore, the two electrodes has same heating and basically same temperatures and there is no problem in positive connection and reverse connection.

DC TIG



DC TIG Current Change Waveform

Note: I1- Arc striking current

I2 - Current corresponding to upslope time

I3 - Set current

I4 - Current corresponding to down time

I5 - Arc final current

Tr - Upslope time

Td - Downslope time

● Arc striking current I1: The initial current is the current after pressing the torch switch. It should be determined according to the process requirements. Striking is easy if the initial current is large, but it should not be too large when welding thin plates or else it is easy to burn through the work piece. After striking in certain modes of operation, for example 4T the current first stays at the initial current and does not go upslope.

● Set current I3: This parameter is set by the user according to process requirements and is the normal welding current.

● Arc final current I5: In some operating modes, for example 4T, the current maintains the arc continuously after a downslope instead of the arc being extinguished. The operating current in this state is called arc stopping current which avoids welding defects or large craters caused by cutting the output immediately. The current should be determined according to the process requirements.

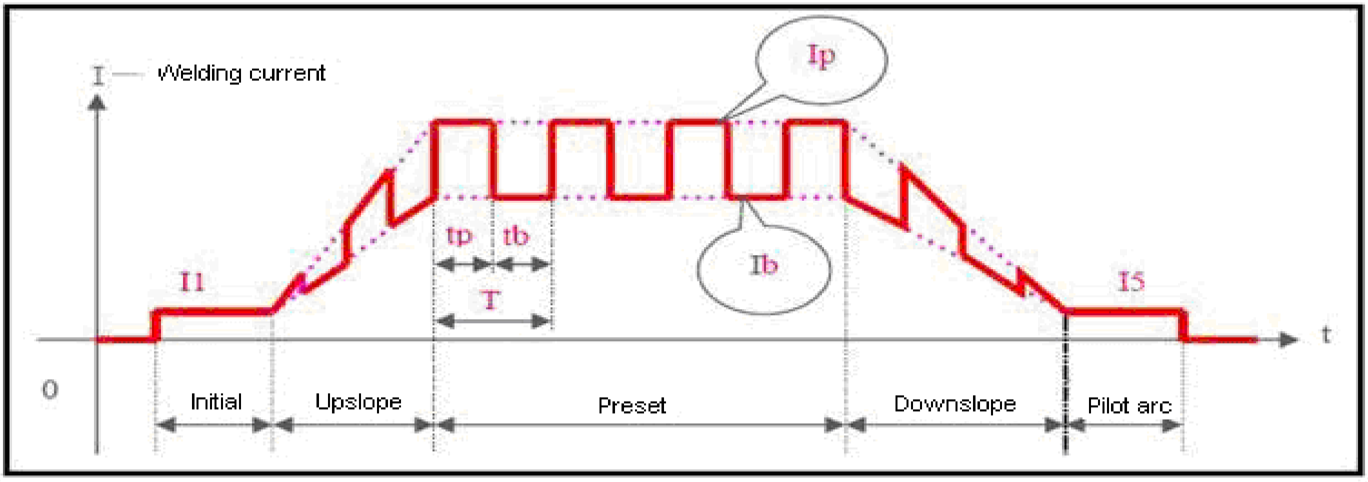
● Pre flow time: Pre flow time refers to the time from when the torch switch is pressed to deliver shield gas before arc striking. Generally, it should be greater than 0.5s in order to ensure that the argon has been delivered through the welding torch and to the weld zone at the normal flow rate when the arc is struck. As an example the pre flow time should be increased when using a long welding torch.

● Post flow gas time: This is the time the shield gas flows after the arc is extinguished. Too long a time will cause a waste of shield gas and too short a time will cause the weld to oxidize due to premature shield gas flow and the weld cooling without the shield.

● Upslope time tr: Upslope time refers to the time when the current rises from the arc striking current to the set current. It can be determined according to the process requirements.

● Downslope time td: Downslope time refers to the time when the current drops from the set current to the arc final current. It can be determined according to the process requirements.

DC PULSED TIG

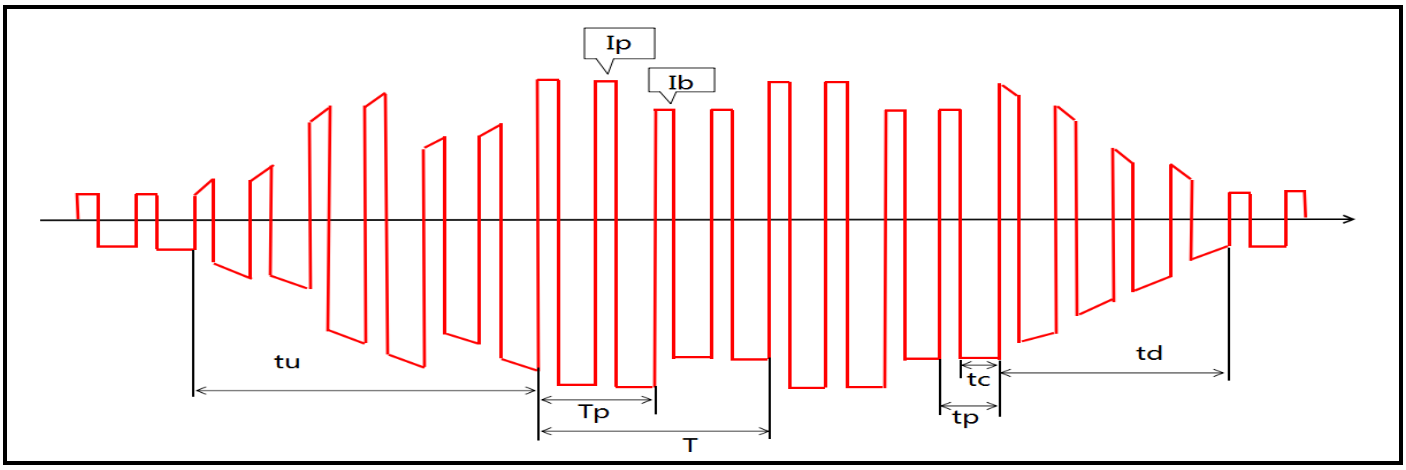


Note:	I1	- Arc striking current
	Ip	- Set peak current
	Ib	- Set base current
	I5	- Arc stopping current
	Tp	- Peak width
	Tb	- Base width
	T	- Pulse period

Pulsed TIG welding contains all the parameters of DC TIG welding with the addition of four adjustable pulse parameters which are described below in combination with the figure above.

- Peak current (Ip): Adjusted according to process requirements.
- Base current (Ib): Adjusted according to process requirements.
- Pulse frequency Hz (1/T): T=Tp+Tb adjusted according to process requirements.
- Duty cycle % (100*tp/T): The duty cycle is the percentage of the peak current duration in the pulse period and is adjusted according to the process requirements.

AC TIG



Current Change Waveform of AC Pulsed Argon Arc Welding

Note:
- tc - Current clearing time
- tp - AC cycle
- Tp - Pulse peak time
- T - Pulse cycle
- tu - Upslope time
- td - Downslope time
- Ip - Peak current
- Ib - Base current

● AC frequency Hz (1/tp): Adjusted according to process requirements.

● Pulse frequency Hz (1/T): Adjusted according to process requirements.

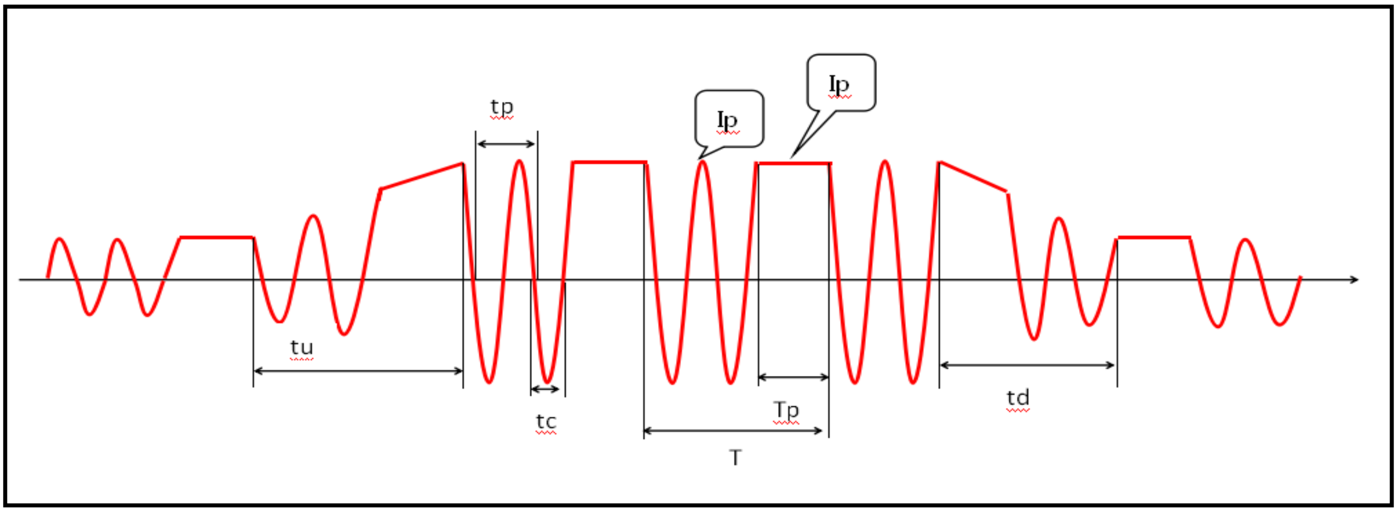
● Duty cycle % (100*Tp/T): Adjusted according to process requirements.

● Clearing width % (100*tc/tp): Adjusted according to process requirements.

● AC TIG welding has square waves, triangle waves and sine waves. They are only different in output waveform. The AC pulsed TIG welding is basically the same as the AC square wave argon arc welding. The difference is that the welding current is controlled by a low frequency pulse so that the welding current changes with the pulses to form the peak and base current and the set peak and base currents are also the peak (average) and base (average) of the low frequency pulse.

● In AC TIG pulse mode, the range of pulse frequency is affected by AC frequency and frequency division factor. The minimum frequency division factor is 10 and the maximum is 2 times the AC frequency. The pulse frequency range is 0.5 Hz to AC frequency/10 Hz. You can choose any frequency in the range. When the AC frequency changes, the AC frequency/actual frequency of current pulse is equal to the frequency division factor and updated. When the frequency division factor is determined, the current AC frequency/ frequency division factor is equal to the actual frequency of the current pulse and stored so as to maintain the pulse frequency unchanged. Once the AC frequency and the pulse frequency are set, the frequency division factor is determined that is, the AC frequency divided by the pulse frequency. For example: When the AC frequency is set to 100 Hz, the pulse frequency range is 0.5~10 Hz. When the AC frequency is set to 100 Hz and the pulse frequency is 5 Hz, the current frequency division factor is 100/5 = 20. When the AC frequency changes to 70 Hz, the frequency division factor is 70/5 = 14 that is, the frequency division factor is variable and the pulse frequency is unchanged. **In other words, the AC frequency affects the pulse frequency range. When the pulse frequency is determined, the change of the AC frequency no longer affects the pulse frequency.**

HYBRID TIG



Current Change Waveform of Hybrid Argon Arc Welding

Note:	tc	- Current welding time
	tp	- AC cycle
	Tp	- DC operating time
	T	- Hybrid cycle
	tu	- Upslope time
	td	- Downslope time
	Ip	- Peak setting current

● AC frequency Hz (1/tp): Adjusted according to process requirements.

● Hybrid cycle frequency Hz (1/T): Adjusted according to process requirements.

● Duty cycle (100*Tp/T): Adjusted according to process requirements.

● Clearing width (100*tc/tp): Adjusted according to process requirements.

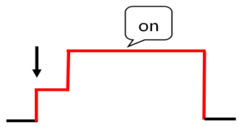
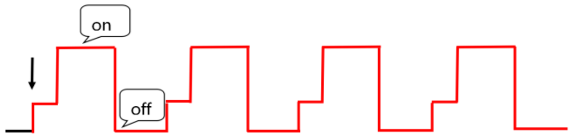
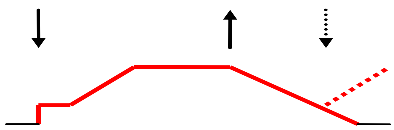
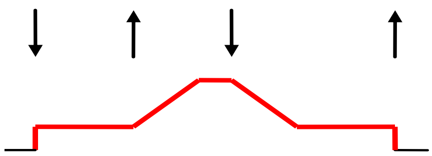
● Hybrid argon arc welding includes the combination of square wave and DC, triangle wave and DC and sine wave and DC. They are only different in output waveform.

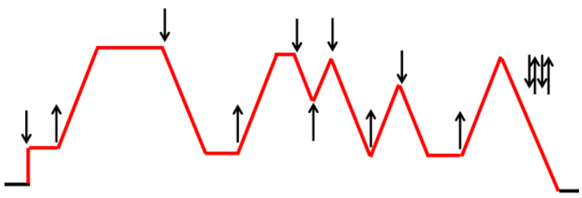
● In hybrid TIG arc welding mode, the range of hybrid TIG arc welding frequency is affected by the AC frequency and the frequency division factor. The minimum frequency division factor is 10 and the maximum is the AC frequency. Then the frequency range of hybrid TIG arc welding is 1 Hz to AC frequency/10 Hz. You can choose any frequency in the range. When AC frequency changes, the AC frequency/ the actual frequency of current hybrid TIG arc welding is equal to the frequency division factor and updated. When the frequency division factor is determined, the current AC frequency/ frequency division factor is equal to the actual frequency of the current hybrid TIG arc welding and stored so as to maintain the hybrid TIG arc welding frequency unchanged. Once the AC frequency and the hybrid TIG arc welding frequency are set, the frequency division factor is determined that is, the AC frequency divided by the hybrid TIG arc welding frequency. For example: when the AC frequency is set to 100 Hz, the hybrid TIG arc welding frequency range is 1~10 Hz. When the AC frequency is set to 100 Hz and the hybrid TIG arc welding frequency is 5 Hz, the current frequency division factor is 100/5 = 20; when the AC frequency changes to 70 Hz, the frequency division factor is 70/5 =14 that is, the frequency division factor is variable, and the hybrid TIG arc welding frequency is unchanged. **In other words, the AC frequency affects the frequency range of the hybrid TIG arc welding. When the hybrid TIG arc welding frequency is determined, the change of the AC frequency does not affect the hybrid argon arc welding frequency.**

COMMONLY USED TORCH SWITCH OPERATIONS

The TIG arc operation mode has several variations which specify the methods for controlling the welding current variation through different operations of the torch switch in the TIG arc (DC, pulse, AC TIG, hybrid TIG arc) welding process. The introduction of the TIG arc operation mode has strengthened the application of the torch switch remote control function, so that users can obtain a very practical welder remote controller without increasing the investment.

Diagram of commonly used torch switch operations			
↓	Press the torch switch	↑	Release the torch switch

Mode Number	Conventional operations	Torch switch operation and typical DC argon arc current curve
1	**Single spot welding:** Single mode under lift arc striking. Press the torch switch to strike arc to the set value. Arc off after set time of spot welding. Continuous spot welding. 1. Continuous mode under high frequency arc striking. 2. Press and hold the torch switch, strike the arc to the set value and the arc goes off after the set on time. After the set off time, the arc is automatically struck to the set value and the cycle sustains as long as the torch switch is not released.	 Single spot welding  Continuous spot welding
2	**Standard 2T method**: 1. After pressing the torch switch, arc strikes to set peak value. 2. When the torch switch is released, the arc extinguishes. 3. If the torch switch is pressed again before arc downslope time ends, it up slopes to the peak again.	
3	**Standard 4T method:** 1. Arc strikes to the initial value when the torch switch is pressed down. 2. Arc rises to the peak when the torch switch is released. 3. Arc drops until the final current when the torch switch is pressed down. 4. Arc extinguished when the torch switch is released.	

Mode Number	Conventional operations	Torch switch operation and typical DC argon arc current curve
4	Cycle mode: 1. Arc strikes to the initial value when the torch switch is pressed down 2. Arc rises to the peak when the torch switch is released 3. Arc drops to the final current when the torch switch is pressed down 4. Arc rises to the peak when the torch switch is released 5. Cycle 3-4 repeats. 6. Corresponding actions will appear when the torch is released or pressed at the moment of rising or dropping. 7. Press, release, press and release the torch continuously within 500 milliseconds to exit the cycle mode.	

Waveforms summary

The waveform selection should be made to meet a specific requirement or operator preference. The wave forms available with the JT-315 MWD are:

Squarewave: This provides fast transitions which provide a responsive and dynamic arc. The fast transitions eliminate the need for continuous HF. The focused arc provides good directional control.

Sine wave: The sine wave gives the operator a softer feel arc similar to that of the older conventional power source. The arc tends to be much wider than the squarewave arc.

Triangular wave: The triangular wave provides the required peak amperage but the waveform shape has the effect of reducing the heat input. This reduction in heat input makes it particularly suited to thin material welding.

Hybrid Mix: The hybrid mix allows for the benefit of the selected AC waveform (detailed above) to be mixed with a DC positive element which increases cleaning of aluminium oxides and welding speeds.

The ability to provide maximum productivity depends on a combination of the characteristics provided by the machine and the welders skill to provide a weld beads profile and characteristics that meet the application needs.

JT Series

TIG 315MWD   Order code ZXJT-315MWD