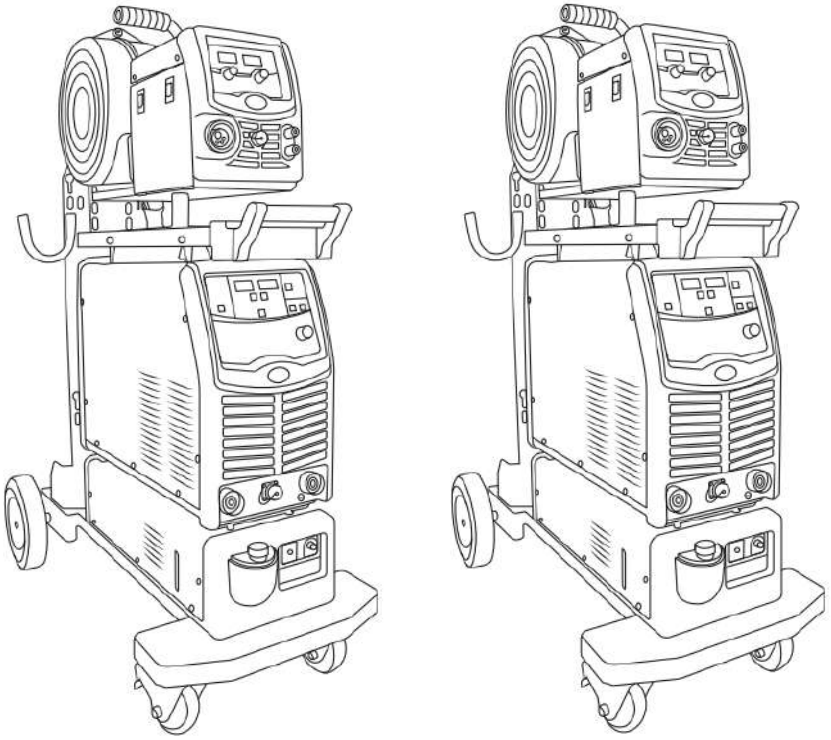
JASIC



INVERTER WELDER

OPERATOR'S MANUAL

MODEL: MIG 350P (N316), MIG 400P (N317)

L2040ASC-A4

TABLE OF CONTENTS

DECLARATION

SHENZHEN JASIC TECHNOLOGY CO., LTD. solemnly promises: This product is manufactured according to relevant standards of China and relevant international standards, and meets safety standards such as GB15579.1, IEC 60974-1, EN 60974.1, AS 60974.1 and UL 60974.1. Relevant design plans and manufacturing technologies of this product are patented.

Operate after reading this manual carefully.

1. JASIC has the right to modify this manual at any time without prior notice.
2. Though contents in this manual have been carefully checked, inaccuracies might have occurred. For any inaccuracy, please contact us.
3. This manual was released in Dec, 2015.

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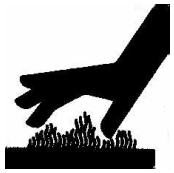
1. SAFETY

Welding is dangerous, and may cause damage to you and others, so take good protection when welding. For details, please refer to the operator safety guidelines in conformity with the accident prevention requirements of the manufacturer.

	**Professional training is needed before operating the machine.** ● Use labor protection welding supplies authorized by national security supervision department. ● Operators should be with valid work permits for metal welding (cutting) operations. ● Cut off power before maintenance or repair.
	**Electric shock—may lead to serious injury or even death.** ● Install earth device according to the application criteria. ● Never touch the live parts when skin bared or wearing wet gloves/clothes. ● Make sure that you are insulated from the ground and workpiece. ● Make sure that your working position is safe.
	**Smoke & gas—may be harmful to health.** ● Keep your head away from smoke and gas to avoid inhalation of exhaust gas from welding. ● Keep the working environment well ventilated with exhaust or ventilation equipment when welding.
	**Arc radiation—may damage eyes or burn skin.** ● Wear suitable welding masks and protective clothing to protect your eyes and body. ● Use suitable masks or screens to protect spectators from harm.
	**Improper operation may cause fire or explosion.** ● Welding sparks may result in a fire, so please make sure no combustible materials nearby and pay attention to fire hazard. ● Have a fire extinguisher nearby, and have a trained person to use it. ● Airtight container welding is forbidden ● Do not use this machine for pipe thawing.
	**Hot workpiece may cause severe scalding.** ● Do not touch hot workpiece with bare hands. ● Cooling is needed during continuous use of the welding torch.
	**Noise may be harmful to people' s hearing.** ● Wear approved ear protection when welding. ● Warn spectators that noise may be harmful to their hearing.

	**Magnetic fields affect cardiac pacemaker.** ● Pacemaker users should be away from the welding spot before medical consultation.
	**Moving parts may lead to personal injury.** ● Keep yourself away from moving parts such as fan. ● All doors, panels, covers and other protective devices should be closed during operation.
	**Please seek professional help when encountering machine failure.** ● Consult the relevant contents of this manual if you encounter any difficulties in installation and operation. ● Contact the service center of your supplier to seek professional help if you still can not fully understand after reading the manual or still can not solve the problem according to the manual.

2. GENERAL DESCRIPTION

2.1 Model coding

1) Model:MIG350P(N316) MIG400P(N317)
2) Coding description: "MIG" refers to MIG/MAG welding; "350/400" refers to the rated welding current; "P" refers to pulse.

2.2 Product characteristics

The main circuit of this product adopts full-bridge converting technology based on the traditional PWM (pulse width modulation) and current control mode, and it adopts insulated gate bipolar transistor (IGBT) as its switching device. By adopting advanced soft switching technology, the switching loss of the switching device is greatly reduced, the product efficiency is increased, and consequently the reliability and stability of this machine is improved. By adopting internationally advanced DSP digital technology and with abundant functions and good performance, this machine is an all-digital inverter welder with pulse MIG/MAG and standard MIG/MAG. When compared with the traditional welding machine, it mainly has the following characteristics.

1) **Abundant functions:** This product has many welding modes available, such as MIG/MAG, pulse MIG/MAG and double-pulse MIG/MAG, etc. At the same time, there are many optional operation modes under each welding mode, such as spot welding, 2T and 4T, etc. Welding wires of different diameters between 0.8mm and 1.6mm are all applicable to this product according to different capacity. Users may choose welding wires of different materials and different diameters to weld different metals and alloys according to different welding requirements. In addition, parameters such as welding current, welding voltage, ignition current, crater filling current, ignition time, crater filling time and pulse frequency can be set via the human-computer interaction interface. Besides, current, voltage and wire feed speed can be calibrated by software for this machine.
2) **High precision and good consistency:** The composition characteristic of the traditional welding machines determines that their performance completely depends on the parameters of their components. That is to say, the inconsistency in the parameters of components directly leads to the inconsistency in the performance of the welding machines. However, it cannot be guaranteed that the components made by any manufacturers are completely consistent in their parameters. Besides, highly precise control cannot be obtained due to non-ideal features of the operational amplifier. Therefore, even for the welding machines of the same brand, they often differ from each other. In addition, welding performance of the machine may change to some extent, since parameters of the components may vary according to the environment such as temperature and humidity, etc. This product adopts digital circuit, for which most of the parameters are set via software, and it is insensitive to the change of the parameters of the components. Therefore, the consistency

and stability of digital welding machine is better than that of traditional welding machine.

3) **High reliability:** Overheating protection, overcurrent protection and input undervoltage/overvoltage protection are all available for this product, which contributes a lot to the reliability improvement of this product, and meanwhile facilitates the maintenance and repair of this product.
4) **Excellent welding performance:** In order to improve the welding performance to meet the higher requirements of welding process, experts at home and abroad have done a lot of work and put forward many excellent mathematical control models. However, such complicated mathematical models are very difficult to implement on the traditional analog welding machines. Instead, they are well applied in the digital welding machines.
5) **Convenient optimization and upgrade of welding performance:** With the development and improvement of the welding process, it is certainly required that our welding machine has more excellent welding performance. And all welding performance of this product is achieved by software. Therefore, the welding performance of this welding machine can be optimized and upgraded by upgrading the software without changing any hardware circuits.
6) **User-friendly design:** Differences in user and using occasion are taken into consideration when designing this product, so as to meet the personalized requirements of users to the largest extent. For example, this product provides a variety of welding torch operating modes and user-defined modes. Besides, this product adopts synergic design. That is to say, users only need to adjust one of the parameters, and other related parameters would change respectively to achieve the optimal matching. It is unnecessary to set each parameter independently. For example, when the user changes the welding current, parameters such as welding voltage, wire feed speed and base metal thickness would change respectively. Of course, users can make fine-tuning on certain parameters such as welding voltage to adapt to their welding habits.
7) **Energy-saving and small size:** This machine adopts advanced IGBT inverter technology, which reduces the volume and weight of the welding source and the whole machine, improves the efficiency and power factor of the power supply, and brings significant energy saving effect.

3. FUNCTIONS AND TECHNICAL PARAMETERS

3.1 Functions

3.1.1 Welding modes available

1) DC MIG/MAG welding
2) Pulse MIG/MAG welding
3) Double-pulse MIG/MAG welding
4) MMA welding

3.1.2 Base metal optional

1) Carbon steel (Steel)
2) Stainless steel (CrNi)
3) Aluminum silicon alloy(AlSi 5)
4) Aluminum magnesium alloy (AlMg 5)
5) Pure aluminum (Al99.5)

3.1.3 Gas optional

1) 100% CO_2
2) 80% Ar＋20% CO_2
3) 90% Ar＋5% CO_2＋5% O_2
4) 98% Ar＋2% O_2
5) 100% Ar

3.1.4 Welding wire optional

1) Φ0.8 (solid wire)
2) Φ1.0 (solid wire or flux-cored wire)
3) Φ1.2 (solid wire or flux-cored wire)
4) Φ1.6 (solid wire or flux-cored wire)
5) Flux cored

3.1.5 User interface

1) Graphical coordinate panel
2) Single-knob stepless digital adjustment
3) Double 3-digit display

3.2 Technical parameters

MODEL	MIG350P(N316)	MIG400P(N317)
Input voltage	3-phase 380V±15% (50/60Hz)	3-phase 380V±15% (50/60Hz)
Recommended fuse capacity	40A	50A
Rated output	350A/34V	400A/36V
Rated no-load voltage	70V	70V
Rated no-load current	＜1A	＜1A
Rated duty cycle (40℃)	60%	60%
Power factor	COSΦ≥0.85	COSΦ≥0.85
Efficiency	η≥85%	η≥85%
Insulation class	F	F
Protection class	IP21S	IP21S
Welding current range	10-350A	10-400A
Wire feed speed range	1.0-18.0m/min	1.0-18.0m/min
Welding voltage range	12.0-39.0V	12.0-39.0V
Torch connection	European type	European type
Maximum diameter of wire spool	S200/S300, 300mm	S200/S300, 300mm
Wire diameter	0.8-1.6mm	0.8-1.6mm

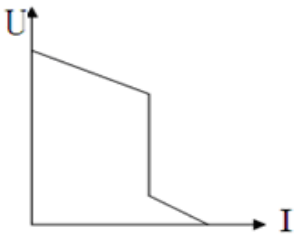
3.3 Functional parameters

MMA	MIG350P(N316)	MIG400P(N317)
Welding current range	10-350A	10-400A
Arc force current range	0-99 (A/ms, absolute maximum:	0-99 (A/ms, absolute maximum:
Arc ignition current range	10-350A	10-400A
Arc ignition time range	0-0.99s	0-0.99s
Arc breaking voltage range	40.0-80.0V	40.0-80.0V
MIG/MAG	**MIG350P(N316)**	**MIG400P(N317)**
Pre-flow time	0-5.0s	0-5.0s
Post-flow time	0-9.9s	0-9.9s
Operation mode	4 modes	4 modes
Wire feed speed range	1.0-18.0 m/min	1.0-18.0 m/min
Welding current range	20-350A	20-400A
Base metal thickness range	0.5-20.0mm	0.5-20.0mm
Welding voltage range	12.0-40.0V	12.0-40.0V
Arc force range	-15-+15	-15-+15
LF pulse frequency range	0.5-5.0Hz	0.5-5.0Hz
LF pulse duration ratio range	10-90%	10-90%
Upslope time	0.1-9.9s	0.1-9.9s
Downslope time	0.1-9.9s	0.1-9.9s

3.4 External characteristic

This machine is with constant voltage external characteristic in pulsed welding and MIG/MAG welding, while it is with constant current external characteristic in MMA welding.

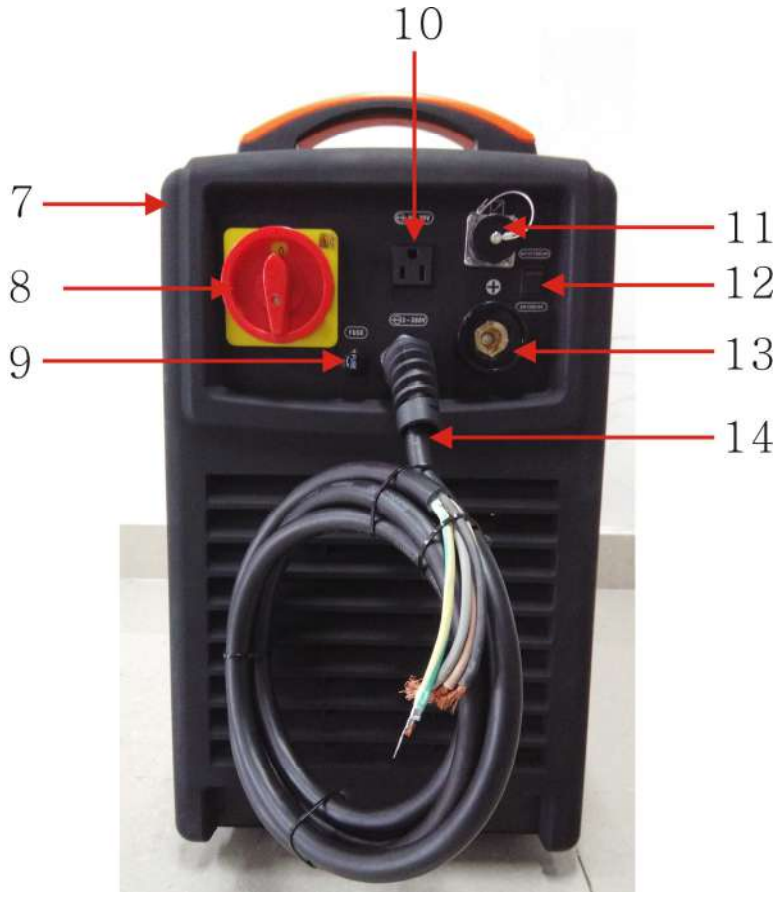
External characteristic in pulsed welding and MIG/MAG welding



External characteristic in MMA

4. PANEL STRUCTURE AND SYMBOL DESCRIPTION

4.1 Panel structure (take MIG350P(N316) for example)



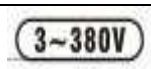
1) Power supply monitoring panel
2) Front panel
3) Parameter adjustment knob
4) Power output terminal "+"
5) Power output terminal "-"
6) Interface for the control cable
7) Back panel
8) Air switch
9) Fuse
10) Socket for CO2 heater (applicable to heater of 36V/120W)
11) Interface for the control cable
12) Water cooling/Air cooling switch
13) Power output terminal "+"
14) Power input cable

4.2 Symbol description

Table 4-1: Symbols on the front panel

Symbol		
Description	Output terminal "-" of the welding machine	Output terminal "+" of the welding machine

Table 4-2: Symbols on the back panel

Symbol	AC36V		1	0
Description	Power source of the heater	Input cable of the welding machine	Breaker "ON"	Breaker "OFF"

Symbol	Description	Symbol	Description
U_0	Rated no-load voltage		Gas shielded arc welding
U_1	Rated input voltage		MMA
U_2	Conventional load voltage		Three-phase 50/60Hz input
I_1max	Maximum rated input current		DC output
I_1eff	Maximum effective input current		Symbol for inverter welder
I_2	Rated welding current	X	Duty cycle

Table 4-3: Symbols on the nameplate

5. CONTROL PANEL

5.1 Power supply monitoring panel (take MIG400P(N317) for example)

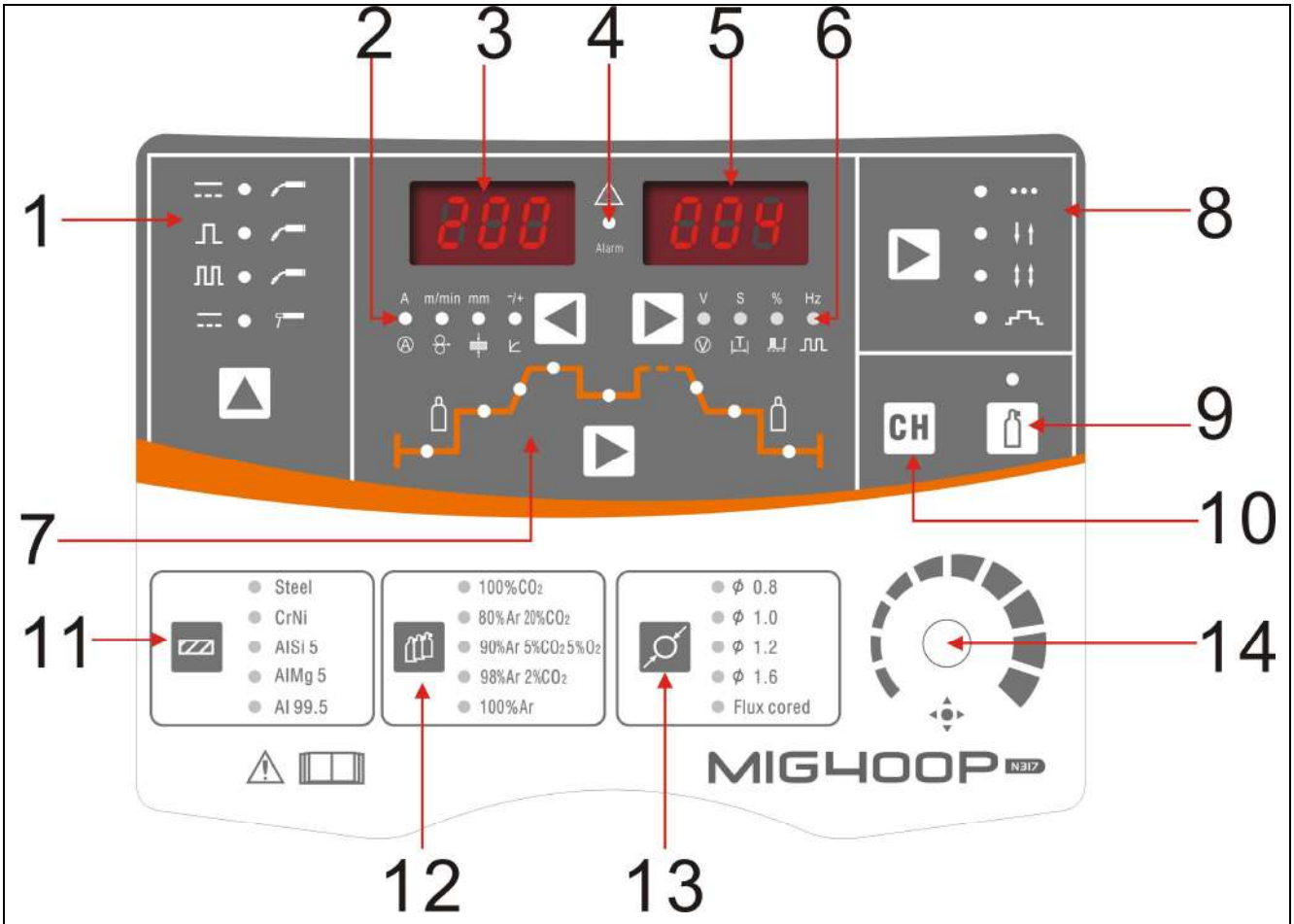


Figure 5.1: Sketch map of the power supply monitoring panel

1. Welding mode selecting zone;
2. Current column parameters selecting zone;
3. Current column parameters display window;
4. Abnormity indicator;
5. Voltage column parameters display window;
6. Voltage column parameters selecting zone;
7. Welding process parameters selecting zone;
8. Operation mode selecting zone;
9. Gas-check zone;
10. Channel key;
11. Base metal selecting zone;
12. Gas selecting zone;
13. Wire diameter selecting zone;
14. Parameter adjustment knob.

5.2 Details of the functional zones on the power supply monitoring panel

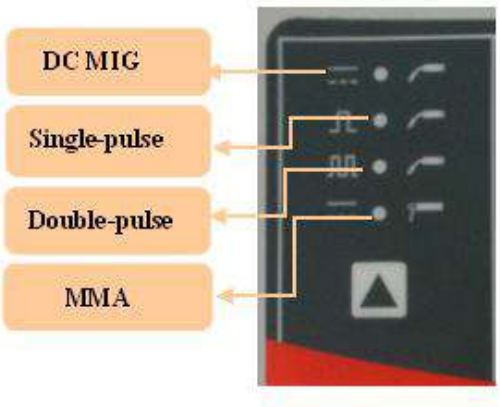


Figure 5.2: **Welding mode selecting zone**

It contains components such as welding mode LEDs and selecting key.
There are 4 welding modes, namely standard MIG/MAG, pulsed MIG/MAG, Double pulse MIG/MAG and MMA. Users can select the desired welding mode by pressing the selecting key, and the corresponding LED will be on when a certain welding mode is selected.

Note: The welding mode LED blinks during welding (when there is welding current output).

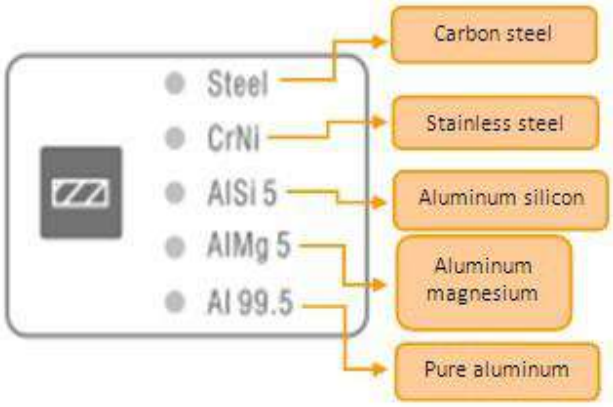


Figure 5.3: **Base metal selecting zone**

It contains components such as base metal LEDs and selecting key.
Base metal includes carbon steel, stainless steel, aluminum alloy, aluminum magnesium alloy, pure aluminum. Users can select the desired base metal by pressing the selecting key, and the corresponding LED will be on when a certain kind of base metal is selected.

Note: There is no such function in MMA .

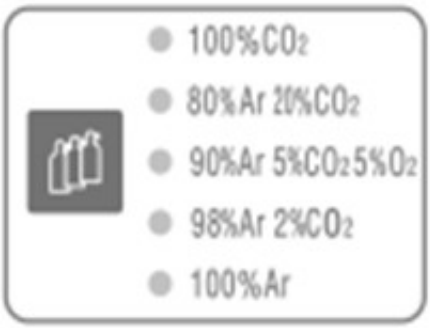


Figure 5.4: **Gas selecting zone**

It contains components such as gas LEDs and selecting key.
Gas includes 100% CO2, 80% Ar+20% CO2, 90% Ar+5% CO2+5% O2, 98% Ar+2% CO2 and 100% Ar . Users can select the desired shield gas by pressing the selecting key, and the corresponding LED will be on when a certain kind of shield gas is selected.

Note:There is no such function in MMA .

Figure 5.5: **Wire diameter selecting zone**

It contains components such as welding wire LEDs and selecting key.
Welding wire includes solid wire of Φ0.8, Φ1.0, Φ1.2 andΦ1.6, flux-cored wire ofΦ1.0, Φ1.2 and Φ1.6 and Flux cored. Users can select the desired wire by pressing the selecting key, and the corresponding LED will be on when a certain kind of wire is selected. The flux-cored wire LED on indicates that flux-cored wire is selected, while the LED off indicates that solid wire is selected.

Note: There is no such function in MMA .

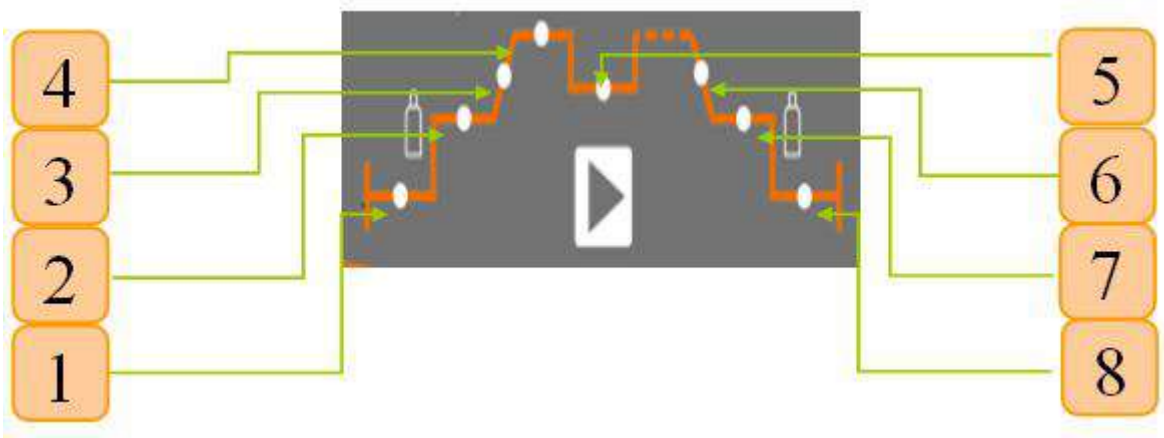


Figure 5.6: **Welding process parameters selecting zone**

1.Pre-flow time; 2. Initial parameters (speed, current and voltage); 3. Upslope time; 4. Peak parameters (time, current, speed, thickness, arc characteristic, voltage, percentage and frequency); 5.Base parameters (current, speed and voltage); 6. Downslope time; 7. Crater filling parameters (current, speed and voltage); 8. Post-flow time

It contains components such as process parameters LED and right selecting key. Process parameters include preposed parameters (such as pre-flow time), initial parameters (such as speed, current and voltage), upslope parameters (such as time and pitch ratio), peak parameters (such as time, current, speed, thickness, arc characteristic, voltage, proportion and frequency), base parameters (such as current, speed and voltage), downslope parameters (such as time and pitch ratio), crater parameters (current, speed and voltage) and postposed parameters (such as post-flow time). Users can select the desired process parameters by pressing the right selecting key, and the corresponding LED will be on when a certain segment is selected. There are some parameters (1~8) in some segments, while no parameters in other segments. Only segments with one or more parameters can be selected, and those segments without parameters cannot be selected. To select the parameters to be ultimately displayed or adjusted, users need to make a second choice through the current column or voltage column.

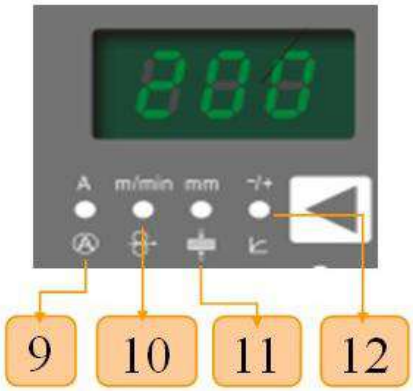


Figure 5.7: **Current column parameters selecting zone**

9.Current; 10. Wire feed speed; 11. Base metal thickness; 12. Arc characteristic
It contains components such as current column parameters display meter, LEDs and selecting key. The current column parameters include 4 parameters, namely current (A), wire feed speed (m/min), thickness of base metal (mm) and arc characteristic (-/+). Current column parameters display meter can display system information, actual welding current and the contents of the column parameters. Users can select the desired parameters by pressing the selecting key, and the corresponding LED will be on when a certain parameter is selected. Meanwhile, the contents of the selected parameter will be displayed on the meter.
Note: The meter will display the actual current when there is welding current output. To modify a parameter, users should make corresponding LED blink by pressing the selecting key.

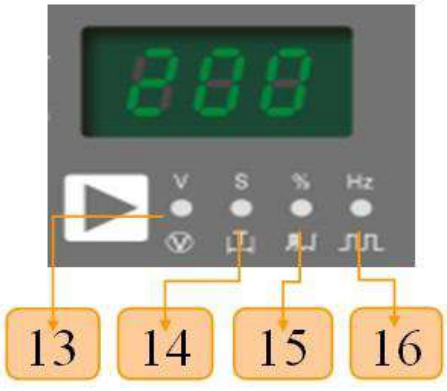


Figure 5.8: **Voltage column parameters selecting zone**

13.Voltage; 14.Time; 15.Pulse duration ratio; 16. Frequency
It contains components such as voltage column parameters display meter, LEDs and selecting key. The voltage column parameters include 4 parameters, namely voltage (V), time (s), proportion (%) and frequency (Hz). Voltage column parameters display meter can display system information, actual welding voltage and the contents of the column parameters. Users can select the desired parameters by pressing the selecting key, and the corresponding LED will be on when a certain parameter is selected. Meanwhile, the contents of the selected parameter will be displayed on the meter.
Note: The meter will display the actual voltage when the main power circuit is connected. To modify a parameter, users should make corresponding LED blink by pressing the selecting key.

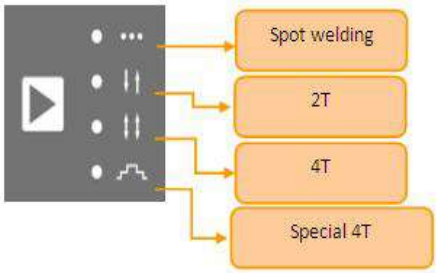


Figure 5.9: **Operation mode selecting zone**

It contains components such as operation mode LEDs and selecting key.
There are 4 operation modes, namely spot welding, 2T, 4T and programmed 4T . Users can select the desired operation mode by pressing the selecting key, and the corresponding LED will be on when a certain operation mode is selected.
Note: There is no such function in MMA.

Figure 5.10: **Parameter adjustment knob**

It contains components such as parameter control knob and adjustment indicator. All welding parameters are set by adjusting this knob. The adjustment indicator tells users that the knob is effective only when the corresponding parameter LED in the current column or voltage column blinks.

Figure 5.11: Gas-check zone

It contains components such as gas-check key and gas flow LED.
When pressing the gas-check key once, the gas path will be connected, and when pressing the key again, the gas path will be disconnected. The gas flow LED indicates the connection state of the gas path.
Note: Users can stop gas flow by pushing the torch trigger in the gas-check state.

Figure 5.12: Channel key

In order to facilitate the simple and effective management on welding instructions, the machine is equipped with 64 channels. A channel is an aggregate or a sequence of all parameters in a welding instruction. A welding instruction includes parameters such as welding mode, base metal type, gas type, wire type, operation mode, pre-flow time, initial current, initial speed, initial voltage, upslope time, peak current, peak speed, thickness of base metal, arc characteristic, peak voltage, spot welding time, downslope time, crater current, crater speed, crater voltage and post-flow time. All these parameters constitute a process data channel or a channel for short. Channels are indicated with channel numbers. Working channel means the channel being used currently.

1)To access the channel management mode: Press the channel key in standby mode, the channel LED will be on, and the channel management mode can be accessed.

2)To view and change the working channel number: The machine will work in a certain working channel (the working channel when the machine is shut down last time) once it is powered on, and users can view the channel number, which will be displayed on the voltage column parameters display meter, by pressing the channel key. And at this time, users can change the working channel number by adjusting the knob.

3)To exit the channel management mode: Press the channel key or any other key, the channel LED will be off, and the channel management mode will be exited.

4)To store parameters in channel: Parameters of the working channel will be saved into the parameter storage automatically after welding, and users do not need to save it manually.
Note: Parameters will not be saved if users don't weld after modifying.

5) Press channel key to start the machine, with front panel indicator and display lighting up, which means all welding parameters are in default setting. Power off the machine to exit. Restart the machine and operation can be carried out.

6. OPERATION OF CONTROL PANELS

6.1 General operation steps for the control panel on the power supply part(recommended)

After the machine is powered on, the system will be under the functional state when the machine is shut down last time. If users want to continue the original welding task, do not operate the control panel but just carry out welding directly. However, if users want to change the welding task or welding instruction, they should operate the control panel firstly. The recommended operation steps for the control panel on the power supply part are as below.

1) Select the welding mode

Select the desired welding mode by pressing the selecting key in the welding mode selecting zone (Figure 5.2) if necessary.

2) Select the base metal type

Select the desired base metal type by pressing the selecting key in the base metal selecting zone (Figure 5.3) if necessary.

3) Select the gas type

Select the desired gas type by pressing the selecting key in the gas selecting zone (Figure 5.4) if necessary.

4) Select the welding wire type

Select the desired welding wire type by pressing the selecting key in the wire selecting zone (Figure 5.5) if necessary.

5) Select the operation mode

Select the desired operation mode by pressing the selecting key in the operation mode selecting zone (Figure 5.9) if necessary.

6) Select the parameter to be viewed or modified

If necessary, select the segment, to which the parameter to be viewed belongs, by pressing the selecting key in the welding process parameters selecting zone (Figure 5.6), and then select this parameter by pressing the selecting key in the current column parameters selecting zone (Figure 5.7) or voltage column parameters selecting zone (Figure 5.8), and the current value of this parameter will be displayed on the current column or voltage column parameters display meter. Users can modify this parameter by adjusting the control knob (Figure 5.10) when the corresponding parameter LED blinks

6.2 Parameters in MMA

There are 5 adjustable parameters in MMA welding, namely arc ignition current, arc ignition time, arc current, arc characteristic (arc force) and arc breaking voltage. These parameters can be operated only through the control panel on the power supply part. Besides, Select the desired welding mode before any operation on parameters.

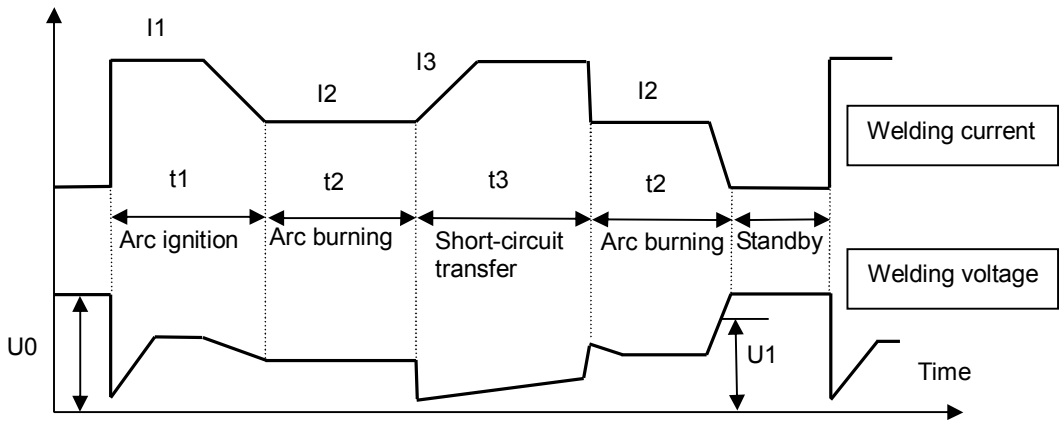


Figure 6.1 Welding current and welding voltage in

Combined with Figure 6.1, parameters in MMA are described as below.

1) Arc ignition current (I1)

It is located at "initial segment-current column-current (A)". It indicates the current during arc ignition period, and can be adjusted within the full range.

2) Arc ignition time (t1)

It is located at "initial segment-voltage column-time (s)", and it indicates the time arc ignition period lasts.

Arc current (I2)

It is located at "peak segment-current column-current (A)", and users can set it according to their own technical requirements.

3) Arc characteristic (arc force)

It is located at "peak segment-current column-arc characteristic (-/+)". It determines the rising rate of I3, and it should be set according to the electrode diameter, preset current and the technical requirement. If the arc force is big, the molten drop can be transferred quickly, and electrode sticking seldom occurs. However, too big arc force may lead to excessive spatter. If the arc force is small, 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 20~70.

Simple TIG welding: Set the arc characteristic (arc force) at 0 in MMA welding, and simple TIG welding can be carried out. Simple TIG welding is a kind of DC TIG welding achieved by users in MMA welding through adding necessary gas path equipment connected to the welding machine and igniting arc by scraping the electrode. Various TIG operation modes in general TIG welding are unavailable in simple TIG welding.

4) Arc breaking voltage (U1)

It is located at "peak segment-voltage column-voltage (V)", and it is used for setting the arc breaking voltage during welding. This parameter 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. Generally, the arc breaking voltage should be higher than 40.0V.

※ Operation tips	Arc ignition mode in MMA (arc force≠0)
● Low current arc ignition: It can be also called lift/soft arc ignition. Set the arc ignition time to be a value other than 0, and 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 workpiece with the electrode, and lift the electrode to the normal position to weld after arc is ignited. ● High current arc ignition: It can be also called contact/hot start arc ignition. Set the arc ignition time to be a value other than 0, and 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 workpiece with the electrode, and normal welding can be carried out without lifting the electrode.	

6.3 Parameters in standard MIG/MAG

There are 16 adjustable parameters in standard MIG/MAG welding, namely pre-flow time, initial current, initial speed, initial voltage, upslope time, peak current, peak speed, peak voltage, thickness of base metal, arc characteristic, spot welding time, downslope time, crater current, crater speed, crater voltage and post-flow time. 9 parameters of them, namely peak current, peak speed, peak voltage, thickness of base metal, arc characteristic, spot welding time, crater current, crater speed, crater voltage can be operated either through the control panel on the power supply part or through the control panel on the wire feeder part, and other parameters can be operated only through the control panel on the power supply part. Besides, Select the desired welding mode, base metal type, gas type, welding wire type and operation mode before any operation on parameters.

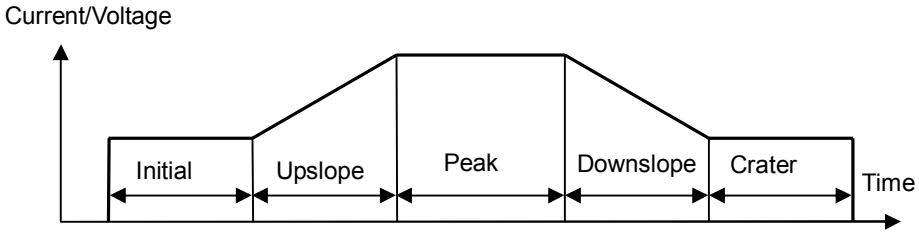


Figure 6.2 Welding current and welding voltage in general MIG/MAG

1) Pre-flow time

It is located at "preposed segment-voltage column-time (s)", and users can set it according to their own technical requirements.

2) Initial current

It is located at "initial segment-current column-current (A)", and it varies with the change of the initial speed. Therefore, it is unnecessary to set this parameter when the initial speed is set properly.

3) Initial speed

It is located at "initial segment-current column-wire feed speed (m/min)", and it varies with the change of the initial current. Therefore, it is unnecessary to set this parameter when the initial current is set properly.

4) Initial voltage

It is located at "initial segment-voltage column-voltage (V)", and it varies with the change of the initial current or initial speed. Beside, this parameter can be adjusted within a certain range.

5) Upslope time

It is located at "upslope segment-voltage column-time (s)", and it makes sense only in programmed 4T mode.

6) Peak current

It is located at "peak segment-current column-current (A)". Since peak current, peak speed and thickness of base metal are interacting parameters, if one of them varies, the other two will be changed. Generally, users may choose one of the three to operate according to their own technical requirements or operation habits, leaving the other two parameters out of consideration.

7) Peak speed

It is located at "peak segment-current column-wire feed speed (m/min)". For the relative description, see the contents of peak current above for reference.

8) Thickness of base metal

It is located at "peak segment-current column-thickness of base metal (mm)". For the relative description, see the contents of peak current above for reference.

9) Peak voltage

It is located at "peak segment-voltage column-voltage (V)", and it varies with the change of the peak current and its interacting parameters. Beside, this parameter can be adjusted independently within a certain range.

10) Arc characteristic

It is located at "peak segment-current column-arc characteristic (-/+)", and the recommended value of arc characteristic is 0. If the arc force is big, the arc will be hard and there will be excessive spatter. If the arc force is small, the arc will be soft and there will be little spatter. This parameter

is especially important when welding under low current. Users may adjust it according to their own technical requirements or operation habits.

Spot welding time

It is located at "peak segment-voltage column-time (s)", and it makes sense only in spot welding.

11) Downslope time

It is located at "downslope segment-voltage column-time (s)". The craters can be filled by adjusting this parameter properly in non programmed 4T mode.

12) Crater current

It is located at "crater segment-current column-current (A)", and it varies with the change of the crater speed. Therefore, it is unnecessary to set this parameter when the crater speed is set properly.

13) Crater speed

It is located at "crater segment-current column-wire feed speed (m/min)", and it varies with the change of the crater current. Therefore, it is unnecessary to set this parameter when the crater current is set properly.

14) Crater voltage

It is located at "crater segment-voltage column-voltage (V)", and it varies with the change of the crater current or crater speed. Beside, this parameter can be adjusted independently within a certain range.

15) Post-flow time

It is located at "postposed segment-voltage column-time (s)", and users can set it according to their own technical requirements.

6.4 Parameters in pulsed MIG/MAG

There are 16 adjustable parameters in pulsed MIG/MAG welding, namely pre-flow time, initial current, initial speed, initial voltage, upslope time, peak current, peak speed, peak voltage, thickness of base metal, arc characteristic, spot welding time, downslope time, crater current, crater speed, crater voltage and post-flow time. 9 parameters of them, namely peak current, peak speed, peak voltage, thickness of base metal, arc characteristic, spot welding time, crater current, crater speed, crater voltage can be operated either through the control panel on the power supply part or through the control panel on the wire feeder part, and other parameters can be operated only through the control panel on the power supply part. Besides, Select the desired welding mode, base metal type, gas type, welding wire type and operation mode before any operation on parameters.

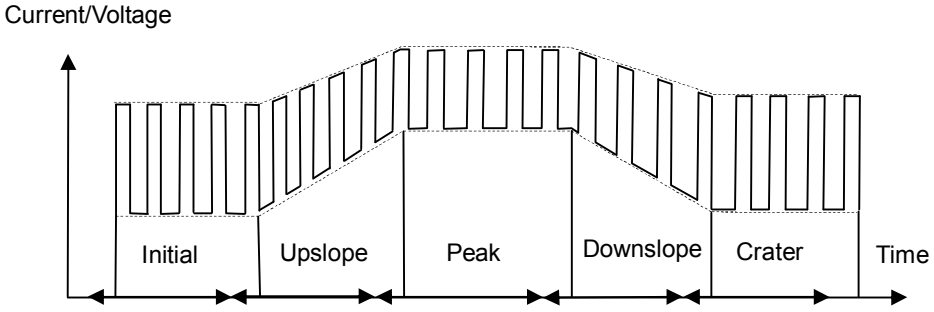


Figure 6.3 Welding current and welding voltage in pulsed MIG/MAG

For most of the parameters in pulsed MIG/MAG, see the contents of 6.3 section for reference. While a few of them are especially described as below.

1) Voltage type parameters

Voltage type parameters include initial voltage, peak voltage and crater voltage, and they are used for adjusting the arc length. When voltage is high, arc length will be long, and when voltage is low, arc length will be short.

2) Arc characteristic

It is located at "peak segment-current column-arc characteristic (-/+)". Besides the function described in standard MIG/MAG welding, fine adjustment of arc length can be achieved through this parameter.

※ Operation tips	Arc ignition in pulsed MIG/MAG
It is very important to set the arc ignition parameters in pulsed MIG/MAG, especially for welding aluminum. The initial parameters (initial current and initial voltage) and upslope parameter (upslope time) available for the machine should be set properly, for they affect the arc ignition performance to a great extent. When welding aluminum, users may select higher initial current and initial voltage generally.	

6.5 Parameters in double pulse MIG/MAG

There are 21 adjustable parameters in double pulsed MIG/MAG welding, namely pre-flow time, initial current, initial speed, initial voltage, upslope time, LF peak current, LF peak speed, LF peak voltage, thickness of base metal, arc characteristic, LF pulse duration ratio, LF frequency, LF base current, LF base speed, LF base voltage, spot welding time, downslope time, crater current, crater speed, crater voltage and post-flow time. 11 parameters of them, namely LF peak current, LF peak speed, LF peak voltage, thickness of base metal, arc characteristic, LF pulse duration ratio, LF frequency, spot welding time, crater current, crater speed, crater voltage can be operated either through the control panel on the power supply part or through the control panel on the wire feeder part, and other parameters can be operated only through the control panel on the power supply part. Besides, Select the desired welding mode, base metal type, gas type, welding wire type and operation mode before any operation on parameters.

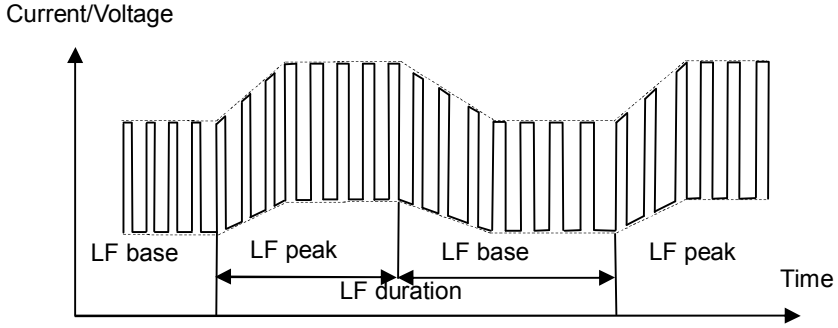


Figure 6.4 Welding current and welding voltage in dipulse MIG/MAG

For most of the parameters in double pulse MIG/MAG, see the contents of 6.3 section for reference. And the unique parameters in double pulse MIG/MAG are especially described as below combined with Figure 6.4.

1) LF peak current

It is located at "peak segment-current column-current (A)", and it is the preset current for the LF peak value running.

2) LF peak speed

It is located at "peak segment-current column-wire feed speed (m/min)", and it is the preset wire feed speed for the LF peak value running.

3) LF peak voltage

It is located at "peak segment-voltage column-voltage (V)", and it is the preset voltage for the LF peak value running.

4) LF pulse duration ratio

It is located at "peak segment-voltage column-proportion (%)", and it is the percentage the LF peak value time holding in the LF duration.

5) LF frequency

It is located at "peak segment-voltage column-frequency (Hz)", and it is the reciprocal of the LF duration (the sum of the LF peak value time and the LF base value time).

6) LF base current

It is located at "base segment-current column-current (A)", and it is the preset current for the LF base value running.

7) LF base speed

It is located at "base segment-current column-wire feed speed (m/min)", and it is the preset wire feed speed for the LF base value running.

8) LF base voltage

It is located at "base segment-voltage column-voltage (V)", and it is the preset voltage for the

LF base value running.

6.6 Operation mode selecting

For MIG/MAG operation modes, see Table 6.6.1 for reference; for torch trigger operation notes, see Table 6.6.2 for reference.

Table 6.6.1 MIG/MAG operation modes

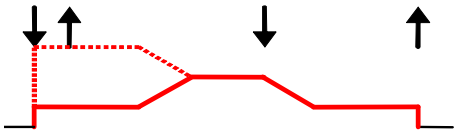
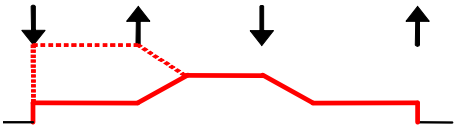
Mode no.	Operation	Gun trigger operation and current curve
1	**1T/Spot welding mode:** ① Push the torch trigger: arc is ignited and current rises to the preset value. ② When the spot welding time is up, current drops gradually, and arc stops.	
2	**Standard 2T mode:** ① Push the torch trigger: arc is ignited and current rises to the initial value, then gradually rises or drops to the preset value. ② Release the torch trigger: current drops gradually, and arc stops.	
3	**4T mode:** ① Push the torch trigger: arc is ignited and current rises to the initial value, then rises or drops gradually. The torch trigger can be released at any time. ② Push it again: current gradually drops to crater current value. ③ Release it: arc stops.	
4	**Programmed 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 crater current value. ④ Release it: arc stops.	

Table 6.6.2 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.

7. CAUTIONS AND MAINTENANCE

7.1 Cautions

1) Lifting method of the welding machine: Please lift this welding machine with a forklift or a crane, and pay special attention to the fixing of the machine when lifting it with a crane for no lifting rings are assembled for this welding machine.
2) Specification of the input cable: Connect the switching box to the welding machine with a cable of 4*4mm^2, and the switching box should be equipped with a circuit breaker or fuse of 60A or more.
3) Connection of the grounding wire: Make sure that the yellow/green wire of the input cable of the welding machine is connected to the protective ground in the welding area when operating.
4) Cooling mode of the welding machine: This machine adopts air-cooling mode, so there should be no obstructions at the air inlet and outlet of the welding machine so as to ensure good ventilation.
5) Ingress protection of the welding machine: The ingress protection of this machine is IP21S, and it is not suitable to use in the rain. In addition, try to avoid placing the machine in damp environment.
6) Duty cycle of the welding machine: The rated duty cycle of this machine is 60%. Overheating protection is available for this machine, and the machine would cut off output automatically when overheating protection occurs.
7) Inclination of the welding source: The inclination of the welding source should not be greater than 15° , or it would tip over.
8) Operating environment of the welding machine: The environment should meet the below requirements:
   a) Ambient temperature range: -10℃~+40℃ during welding; -25℃~+55℃ during transport and storage.
   Note: When using a water cooler, please avoid using or storing it under the solidification temperature of the coolant. Empty the coolant firstly if you want to store it under a low temperature.
   b) Relative humidity of the air: not greater than 50% at 40℃; not greater than 90% at 20℃.
   c) Dust, acid or corrosive gas or materials in the ambient air should not exceed the standard content, except for such materials produced in the process of welding.
9) Never use this welding source for pipe thawing.
10) Do not expose the welding machine in the sunlight for a long time, and try to avoid using the welding machine in strong sunlight.
11) Keep hands, hair and tools away from the moving parts such as the fan to avoid personal injury or machine damage.
12) Avoid rain, water and vapor infiltrating the machine. If there is, dry it and check the insulation of the equipment (including that between the connections and that between the connection and the enclosure). Only when there are no abnormal phenomena anymore, the machine can be used.
13) The welding machine and welding torch has its rated duty cycle respectively. Use them according to their duty cycle, and overloading running is not allowed.
14) Use appropriate welding cable: If the cable is overly thin, the current would be insufficient, the arc stability would be poor, rated output power could not be obtained, and the cable could be easily burned.
15) Correct connection is a precondition to ensure good welding effect, so make sure that the output terminals of the welding machine are connected correctly.
16) Using water-cooling torch: In order to prevent the welding torch against being burned, the water pressure of the cooling water should be 1~2kg/cm^3.Even though the current is low, water-cooling should be used as long as water-cooling torch is used.
17) Unobstructed gas hose and water hose: If the hose is pressed by heavy things or the hose is bended, water or gas would stop flowing. Thus, the welding torch would be burned or welding defects would be produced.
18) Take good care of the welding torch: Careless operation of the welding torch would lead to wire breaking, water or gas leakage and nozzle damage easily.
19) Unreliable connection of the gas regulator or gas hose would lead to gas leakage or gas flow reducing at the nozzle front, consequently, gas protection effect would be weakened, and air holes in the weld bead would be caused. Check with suds whether there is gas leakage.

20) Reliable connection: The connection between the welding machine and the power supply, between the welding machine and the welding torch, between the welding machine and the electrode holder, between the welding machine and the wire feeder and between the welding machine and the earth cable should be reliable, and the connection of all kinds of control cables should be reliable as well. Improper connection would cause poor contact, which would lead to malfunction, resulting in abnormity and burnout, etc.
21) Connection with the workpiece: If someone uses steel plate or steel bar instead of the cable connecting the workpiece, the resistance would be greater, and the welding current would be unstable. Besides, overheating would lead to fire hazard. Therefore, please connect the base metal reliably with normal insulated cable.
22) Take protective measures when welding in windy environment. Otherwise, the shield gas would be blown away and air holes would be caused.
23) Clean the base metal before welding if there is any oil, rust, paint, moisture or other matters on the surface of it. Otherwise, air holes or cracks would be caused, and good welding effect could not be obtained.
24) Special tractor is available for integrated machine, and users can fix the machine and cylinder on the tractor. However, for separate machine, no fixed location is available for the cylinder, and users should ensure that the cylinder is securely fixed by themselves.

7.2 Maintenance

1) Clean the dust inside the power supply periodically: Too much dust inside the power supply would reduce the insulation performance of the welding machine, which brings direct threat against machine security and personal safety. Therefore, it should be cleaned at least twice a year. If welding environment with heavy smoke and pollution, the machine should be cleaned daily. Before cleaning, turn off the power switch, remove the side plate and top cover, and blow the dust with dry compressed air from top to bottom. The pressure of compressed air should be at a proper level in order to avoid the small parts inside the machine being damaged. If any grease, wipe with a cloth.
2) Check periodically whether inner circuit connection is in good condition (esp. plugs). Tighten the loose connection. If there is oxidization, remove it with sandpaper and then reconnect.
3) Check periodically whether the insulation covers of all cables is in good condition. If there is any dilapidation, rewrap it or replace it.
4) Check the insulation resistance of the welding machine periodically: Mainly check the insulation resistance between the welding machine power input and output and insulation resistance between the power input and the enclosure, and make sure such insulation resistance should be greater than 10 ohms.
5) Put the machine into the original packing in dry location if it is not used for a long time.

	Ask professionals for help if any difficulty.
● If any difficulty in installation or operation of the machine, please refer to the relevant contents in this manual. ● If you can not fully understand after reading, or can not solve the problem according to the instructions in this manual, please contact your supplier or our company for help.	

	Component explosion may cause injury.
● When the inverter welder is powered on, invalid components may explode or lead to explosion of other components. ● Wear face guard and long-sleeved clothing when maintaining the inverter welder.	

	Static causes damage to PCB.
● Wear a grounded antistatic wristband when carrying PCBs and components. ● Store, carry and transport PCBs with appropriate antistatic bags or boxes.	

	Electric shock may occur when testing.
● Cut off the power supply of the welder before lead testing. ● Test with an instrument with auto-fixing clamp on one of its leads. ● Read the instruction of the testing equipment carefully.	

The machine may be damaged during welding. Timely maintenance should be carried out after the confirmation of damage. Only qualified individuals can uncover or repair the machine. Otherwise, further machine fault and further damage to valuable parts may occur.

8. TROUBLESHOOTING

⚠	WARNING

- The following operation requires sufficient professional knowledge on electric aspect and comprehensive safety knowledge. Operators should be holders of valid qualification certificates which can prove their skills and knowledge.
- Make sure the input cable of the machine is cut off from the electricity utility before uncovering the welding machine.
- The phenomena listed blow may be caused by the accessory and gas you use, the working environment or the power supply condition. Try to improve the working environment to avoid such occurrences.

Table 8.1 General troubleshooting

Phenomena	Cause	Solution
There is no display on the control panel after the machine is turned on.	The power supply is not well connected.	Reconnect it.
	Machine failure	Ask professionals for help.
The fan does not work or works abnormally.	The 3-phase power cord is not well connected.	Reconnect the 3-phase power cord.
	Phase failure	Solve the phase failure problem.
	The mains voltage is overly low.	Welding can be carried out after the mains voltage recovers.
There is no no-load voltage output, the protection LED is on, and the meter displays "Err 003".	Air cooling/Water cooling switch is switched to the wrong position.	Switch the air cooling/water cooling switch to the correct position.
	The water circuit fails.	Eliminate the water circuit failure problem.
There is no no-load voltage output, the protection LED is on, and the meter displays "Err 002".	Overheating protection	It can recover automatically after the machine is cooled.
There is no no-load voltage output, the protection LED is on, and the meter displays "Err 001".	The mains voltage is overly low.	Welding can be carried out after the mains voltage recovers.
	The mains voltage is overly high.	Disconnect the power supply with the machine, and reconnect it after the mains voltage recovers.
	Auxiliary power fails.	Replace the fault circuit board of the auxiliary power.
There is no no-load voltage output, the protection LED is on, and the meter displays "Err 000".	Overcurrent or damage of power parts	Restart the machine. If overcurrent problem still exists, contact the service center of our company.

Table 8.2 Troubleshooting in MMA

Phenomena	Cause	Solution
Very difficult to ignite arc	The machine is working in simple TIG mode.	Set the arc force to be a value other than 0.
Hard to ignite arc	The arc ignition current is too low.	Increase the arc ignition current properly.
	The arc ignition time is too short.	Prolong the arc ignition time properly.
Excessive spatter or overly big molten pool during arc ignition.	The initial current is too high.	Reduce the initial current properly.
	The initial time is too long.	Shorten the initial time properly.
Normal arc can not be started.	Phase failure of the mains power supply or the power cord is not well connected.	Solve the phase failure problem or reconnect the power cord.
Electrode sticking	The arc force current is too low.	Increase the arc force current properly.
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.
Arc is easy to break.	The arc breaking voltage is too low.	Increase the arc breaking voltage properly.

Table 8.3 Troubleshooting in MIG/MAG

Phenomena	Cause	Solution
The wire feeder loses communication with the welding power supply.	The control cable is disconnected.	Connect the control cable.
	The control cable is not well connected.	Reconnect the control cable.
There is no response when pushing the torch trigger, and the protection LED is off.	The welding torch is not well connected to the wire feeder.	Reconnect it.
	The control cable of the wire feeder is not well connected to the welding power supply.	Reconnect it.
	The torch trigger fails.	Repair or replace the welding torch.
When the torch trigger is pushed, wire feeder works and gas flows, but there is no output current, and the protection LED is off.	The earth cable is not well connected to the workpiece.	Reconnect it.
	The control cable of the wire feeder is not well connected.	Reconnect it.
	The wire feeder or welding torch fails.	Repair the wire feeder or welding torch.
There is output current when pushing the torch trigger to feed gas, but the wire feeder does not work.	The control cable of the wire feeder is broken.	Repair or replace the control cable of the wire feeder.
	The wire feeder is clogged.	Solve the clogging problem.
	The wire feeder fails.	Repair it.
	The control PCB or wire feeding power PCB inside of the machine fails.	Replace the PCB.

Welding current is unstable.	The pressure arm on the wire feeder is not properly adjusted.	Adjust it properly.
	The drive roll do not match the welding wire being used.	Use matching drive roll and welding wire.
	The contact tip of the welding torch is badly worn.	Replace the contact tip.
	The guide tube in the torch is badly worn.	Replace the guide tube.
	The welding wire is of bad quality.	Replace it with welding wire of good quality.
The gas regulator cannot be heated.	The plug of the heater is well connected.	Connect it well.
	The heater wire is shorted.	Repair the heater wire.
	The resettable fuse inside the machine functions.	Shut down the machine, and restart it.
	The heater inside the gas regulator is damaged.	Replace it.

9. WIRING DIAGRAM OF THE MACHINE

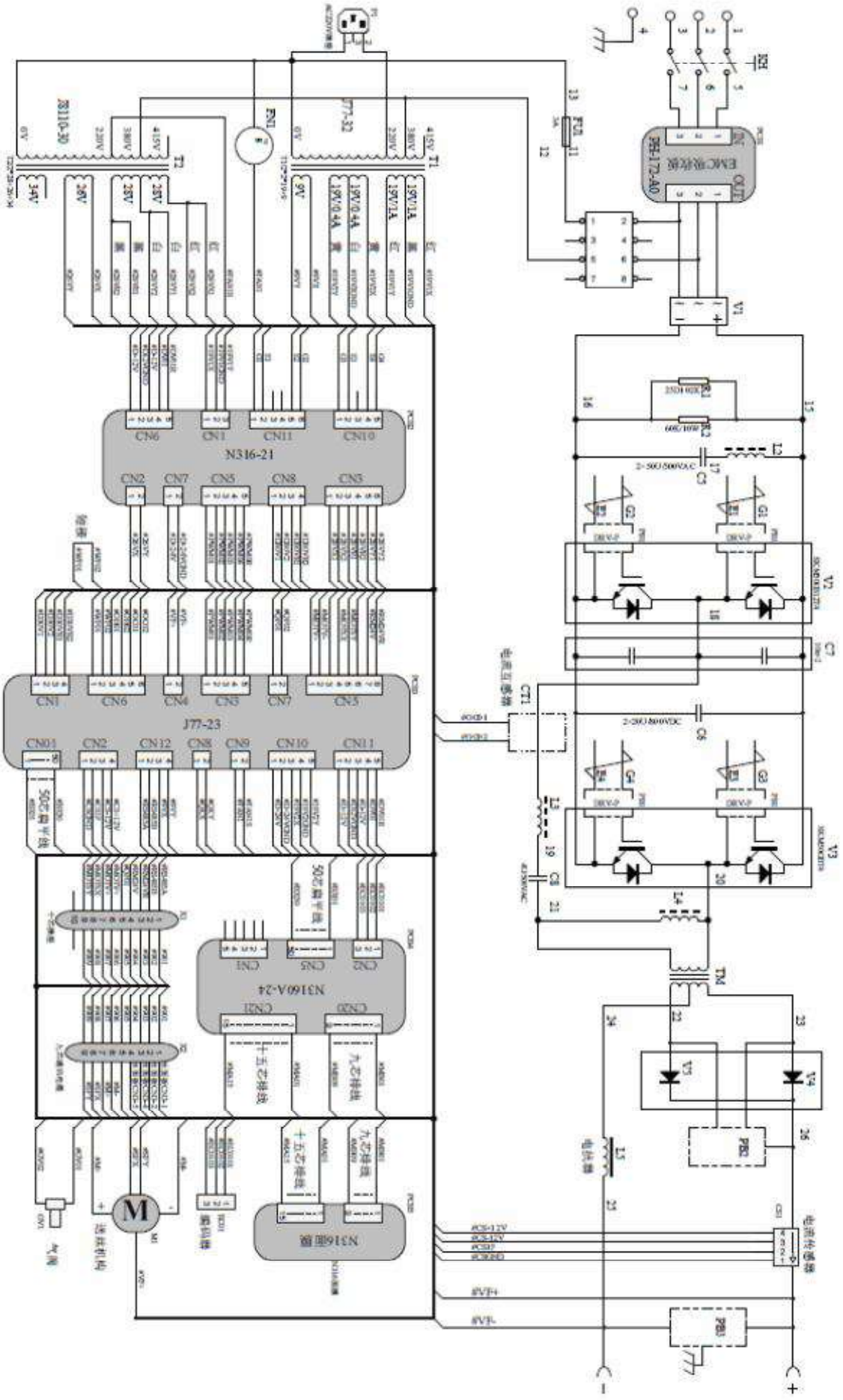
9.1 Wiring diagram of the machine (see APPENDIX)

10. ABOUT THIS MANUAL

This manual is applicable to MIG350P(N316) and MIG400P(N317).

We are still constantly improving this welder, therefore, some parts of this welder may be changed in order to achieve better quality, but the main functions and operations will not be alternated. Your understanding would be greatly appreciated.

APPENDIX:



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