OPERATOR'S MANUAL

INVERTER AC/DC PULSED TIG WELDER

TIG200ACDC-HF-P

Before using this machine, study the complete Operator's Manual and keep it within easy reach for quick reference. The safety instructions are included for your safety and should be taken seriously. Contact your distributor if any of the instructions are not clear.

CONTENT

1 SAFETY

1.1 Signal Explanation

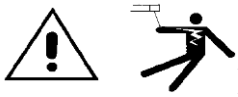
- The signals in this section is aimed at graphically depicting the areas associated with welding operations where personal safety can be compromised.

1.2 Hazards Relating to Arc Welding

The following activities may only be executed by qualified operators or artisans:

- Installation, debugging, maintenance and repairs.
- Since DC power remains in the machine's electrolytic capacitors after shut off, examination of and maintenance on the equipment must be done in accordance with paragraph 5

The following signs and explanations detail the most obvious bodily hazards related to welding operations. Be sure to take note and remind other interested parties of its importance.



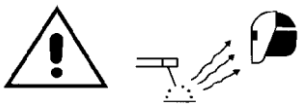
ELECTRIC SHOCK

- Electric shock can be lethal.
- Never touch electrical parts.
- Ensure personal insulation by wearing sound gloves and clothes void of wear and holes.
- The operator should be insulated from ground and workpiece using dry insulation of adequate size.
- Special care should be devoted when operating in confined spaces, elevated positions and wet conditions.
- Always ensure that power to the machine is shut off before installation.
- Always ensure that equipment is installed correctly and the workpiece is properly grounded in accordance with the operating manual.
- When the machine is switched on the electrode and workpiece are live and care should be taken not to touch live areas with uninsulated hands. This also applies when semi-automatic and automatic wire-welding machines are operated

- Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.
- Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
- The electrode should never be cooled down by dipping it in water.
- When two welding machines are close together, refrain from touching live parts simultaneously since the combined voltage can increase shock level.
- When working above floor level, a safety harness should be worn to obviate the danger of falling in case of an electric shock.

FUMES AND GASES

- During the welding process fumes and gases can be produced which may be detrimental to health. Inhalation of fumes should be avoided by introducing adequate relief systems. When using welding electrodes for stainless and hard-facing steel, lead or cadmium plated steel, galvanized steel or any other coated metals which produce toxic fumes, special ventilation and exhaust systems must be introduced to ensure exposure is kept below threshold limit values.
- Welding in or near locations where chlorinated hydrocarbon vapors are produced such as degreasing, cleaning and spraying operations should be avoided since phosgene, a highly-toxic gas as well as other irritants can be reaction products.
- Shielding gases can displace air causing breathing impairment. Therefore, adequate ventilation is of prime importance especially when working in confined spaces.
- Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet and follow your employer's safety practices.



ARC RAYS CAN BURN.

- Use a shield with a proper filter and cover plates to protect eyes from sparks and rays.
- For skin protection wear suitable clothing manufactured from flame-resistance material.
- Ensure that nearby personnel are screened from arc effects by using non-flammable material and safety warnings.

SELF-PROTECTION

• Keep safety guards, devices and covers in position and in good repair. Keep hands, hair, clothing, and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

• When a power generator is used, never attempt to override the governor or adjust the idler or throttle control rods while the engine is running.

FUEL HAZARDS

When a power generator is used, never add fuel to a running or hot engine. Allow the engine to cool down before refueling, clean any spillage and allow fumes to evaporate before restarting.

WELDING SPARKS CAN CAUSE FIRE EXPLOSION.

• Flammable material should be removed from the welding area or, if removal is not possible, such materials should be covered with non-flammable material. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

• Special precautions should be in place when compressed gases are to be used. Protection of gas lines is important.

• When the electrode is not active, care should be taken to ensure that it is safely removed from the workpiece. Accidental contact with the workpiece or the grounding clamp can result in overheating and create a fire hazard.

• Unless proper prescribed procedures for ensuring that tanks are free from combustible material, welding, cutting or heating these items are prohibited.

• Preventing explosion of hollow castings and containers will require venting before heating, cutting or welding.

• Sparks and spatter are thrown from the welding arc. Wear oil-free protective garments such as leather gloves, heavy shirt, cuff-less trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

• Connect the grounding cable to the workpiece as close as possible to the welding area. Cables connected to the building framework away from the welding area increase the possibility of the welding current passing through other circuits causing damage to for instance cranes and lifting chains.

GAS AND SAFEKEEPING OF GAS CYLINDERS.

• Use only compressed gas for the required shielding operation and only operating regulators designed for the gas used and pressure required. All hoses and fittings should fit the application and maintained in good condition.

• Cylinders should always be kept in an upright position, securely chained to an undercarriage or fixed support.

• Cylinders should be located:

- Away from collision areas or areas subject to physical damage.
- A safe distance from arc welding or cutting operations and other sources of heat, spark or flame.

• Never allow the welding electrode, electrode holder or any electrically live part to touch a cylinder.

• When opening the cylinder valve keep head and face away from the valve.

• Valve protection caps should always be in place and hand tight except when the cylinder is connected for use or in use.

1.3 The knowledge of Electric and Magnetic Fields

Electric current flowing through any conductor produces electric and magnetic fields (EMF). The discussion on the topic of the effects of EMF on health is ongoing worldwide and up to the present no evidence has been forthcoming proving negative effects on health. However, until the discussion is closed, it would be wise to minimise exposure to EMF as far as possible and the following procedures are suggested:

• Route the electrode and ground cables together and, where possible, secure them with tape.

• Keep all cables and welding machines as far away as possible from operators according to the actual circumstance.

• Power cables should never be coiled around body parts.

• Connect the earth cable to the workpiece as close as possible to the area being welded.

• Operators with heart-pacemaker implants should obtain medical advice before using equipment where EMF's are generated..

2 SUMMARY

2.1 Brief Introduction

The Taurus TIG200ACDC-HF-P welding machine incorporates the latest pulse width modulation (PWM) technology and insulated gate bipolar transistor (IGBT) power module. These can change work frequency to medium frequency thus replacing the traditional frequency transformer with the medium frequency cabinet transformer. This has led to a smaller size, portable and light-weight machine of lower power consumption.

The parameters of the Taurus TIG200ACDC-HF-P on the front panel can be adjusted continuously and stepless for instance start current, crater-arc current, welding current, base current, duty ratio, upslope time, downslope time, pre-gas, post-gas, pulse frequency, AC frequency, balance, hot start, arc force and arc length. When welding it selects high frequency and high voltage for arc ignition ensuring the success ratio of ignition arc.

Taurus TIG200ACDC-HF-P Characteristics：

- **MCU control system - responds immediately to any changes.**
- **High frequency and high voltage ensure the success ratio of ignition arc. The reverse polarity ignition ensures good ignition behavior in TIG-AC welding.**
- **AC arc-break is avoided - even if arc-break occurs it will be kept stable by HF.**
- **Pedal control of welding current.**
- **TIG/DC operation - when the tungsten electrode touches the workpiece, the current will drop to short-circuit to protect the tungsten..**
- **Intelligent protection protects against over-voltage, over-current and over-heat by means of output current cut off confirmed by lit alarm lamp on the front panel. It can self-protect and prolong the machines life.**
- **Double purpose - AC inverter TIG/MMA and DC inverter TIG/MMA with excellent performance on Al-alloy, carbon steel, stainless steel and titanium.**

Front-panel function selection offers the following welding possibilities:

- DC MMA
- DC TIG
- DC Pulse TIG
- AC MMA
- AC TIG
- AC Pulse TIG

1. For DC MMA - the polarity connection can be selected according to different electrodes. (Refer to paragraph 3.5)

2. For AC MMA - the magnetic flow caused by DC polarity can be avoided.

3. For DC TIG (DCEP) - is normally used when the workpiece is connected to the positive polarity and the torch to the negative polarity. This connection offers many advantages including a stable welding arc, low tungsten pole loss and a narrow and deep weld.

4. For AC TIG (rectangle wave) - the arc is more stable than Sine AC TIG. Simultaneously not only maximum penetration and minimum tungsten pole loss is obtained, but also a better clearance effect.

5. DC Pulsed TIG has the following characteristics:

a) Pulse Heating - Metal in the molten pool remains on a high temperature for a short period and solidifies quickly and the possibility of hot-cracks of thermal sensitive material is reduced.

b) The workpiece receives less heat - Arc energy is focused and suitable for thin and super-thin sheet welding.

c) Heat input and molten pool size is controlled exactly and depth of penetration is even.

d) High-frequency arc allows high-speed welding and leads to higher productivity.

e) High frequency arc can make metal for microlite fabric, eliminate blowhole and improve the mechanical performance of the joint.

Taurus TIG200ACDC-HF-P machines are suitable for multi-position welding on plates manufactured from a variety of materials including stainless steel, carbon steel, alloyed steel, titanium, magnesium

and cuprum. Applications include pipe installation, mould mending, petrochemical industries, architectural decoration, vehicle repairs, handicraft and general.

MMA - Manual Metal Arc welding.

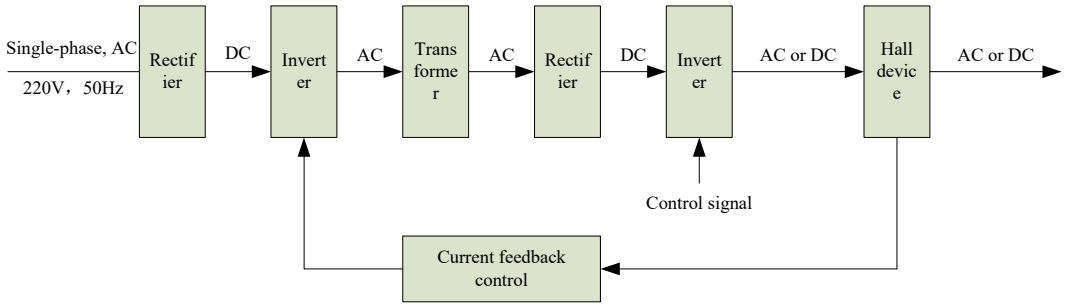
PWM - Pulse-Width Modulation.

IGBT - Insulation Gate Bipolar Transistor

TIG - Tungsten Insert Gas welding

2.2 Working Principle

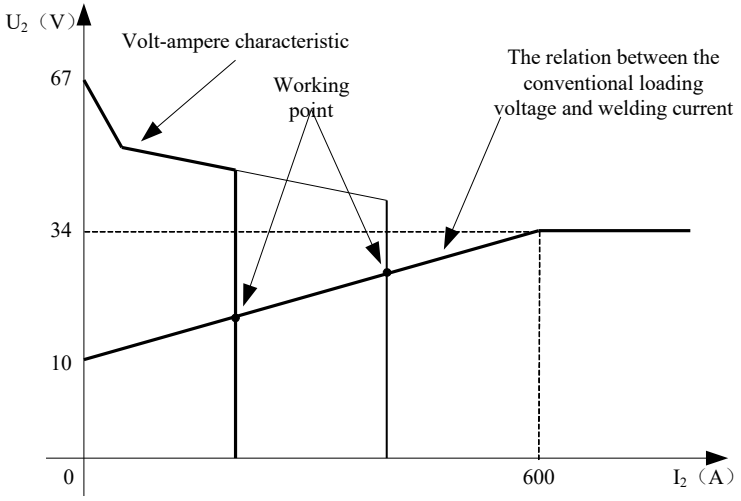
The operating principle of the Taurus TIG200ACDC-HF-P welding machines is depicted in the following figure. Single-phase 220V inlet AC frequency is rectified to DC (approximately 321V), then converted to a medium AC frequency (approximately 20KHz) by an inverter device (IGBT module). After voltage reduction by the main medium transformer and rectified by a medium frequency rectifier (fast recovery diodes), the output to AC or DC is selected by an IGBT module. The circuit employs current feedback control technology to ensure current output stability. In addition, the welding current parameters can be adjusted continuously to meet the welding requirements.



2.3 Volt-Ampere Characteristic

The Taurus TIG200ACDC-HF-P welding machine has an excellent volt-ampere characteristic, whose graph is shown as the following figure. The relation between the conventional rated loading voltage U_2 and the conventional welding current I_2 is as follows:

When $I_2 \leq 600A$，$U_2=10+0.04I_2(V)$; When $I_2 > 600A$,$U_2=34(V)$.



3 Installation and Adjustment

3.1 Parameters

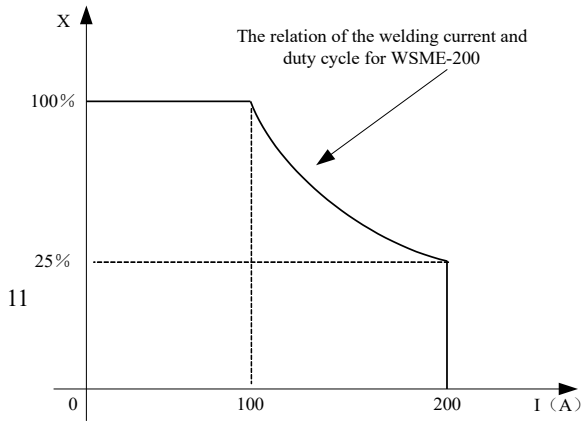
Models / Parameters	TIG200ACDC-HF-P			
Input power	1~220±10%，50Hz			
Rated input current（A）	35.4（TIG）		39.5（MMA）	
Rated input power（KW）	5.2（TIG）		6.4（MMA）	
Power factor	0.68			
Max no-load voltage(V)	66			
Adjustment range of start current（A）	TIG		MMA	
	AC	DC	AC	DC
	10～ welding current	5～ welding current	——	——
Adjustment range of welding current（A）	10～200	5～200	10～170	5～170
Adjustment range of downslope time（S）	0～10			
Pre-gas time（S）	0.1~1			
Adjustment range of post-gas time（S）	0.1～10			
Clearance effect（%）	15～50			
Efficiency	AC		DC	
Duty cycle（40℃，10 minutes）	60% 200A		60% 200A	
	80% 120A		80% 130A	
	100% 100A		100% 110A	
Protection class	IP23S			
Insulation class	F			
Dimensions of Machine（L×W×H）（mm）	470×240×380			
Weight (Kg)	12			

3.2 Duty cycle and Over heat

The rated duty cycle is defined as the proportion of the time that a machine can operate continuously within a certain time when it delivers the rated welding current.

In the figure on the right the duty cycle is shown as X and the output welding current as I. The time period is 10 minutes.

Should the welding machine overheat, the



IGBT protection unit will send an instruction for the welding current to be cut. The overheat pilot lamp on the front panel will light up to confirm the cut-off instruction. The cooling fan will operate for 15 minutes after which the welding operation will operate at a reduced output current.

3.3 Movement and placement

Care should be taken when moving the machine - always in the upward position by using the handle on the top of the machine or by forklift.

When a forklift is employed, the length of the lift arm should be sufficient to ensure a safe procedure.

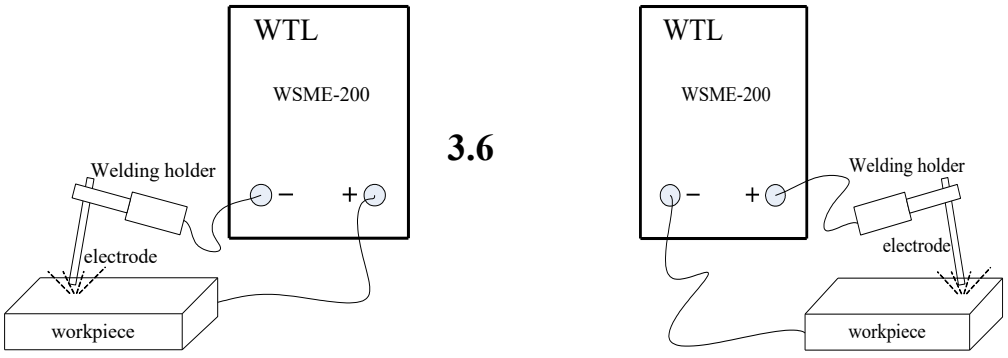
3.4 Input power supply connection

The operating current of the Taurus TIG200ACDC-HF-P welding machine is 220V and provision is made for a small current deviation. Should this deviation be exceeded a built-in protection system will cut the power.

3.5 Polarity Connection（MMA）

MMA (DC): Choosing the connection of DCEN or DCEP according to the different electrodes. Please refer to the electrode manual.

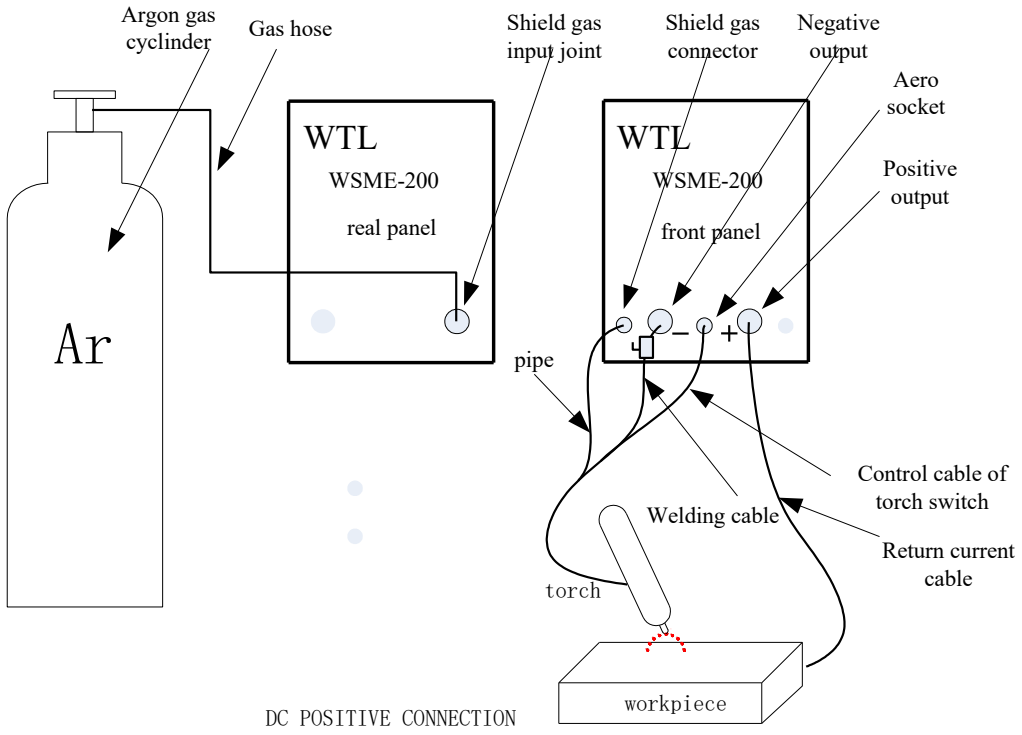
MMA (AC): No requirements for polarity connection.



DC POSITIVE CONNECTION

DC NEGATIVE CONNECTION

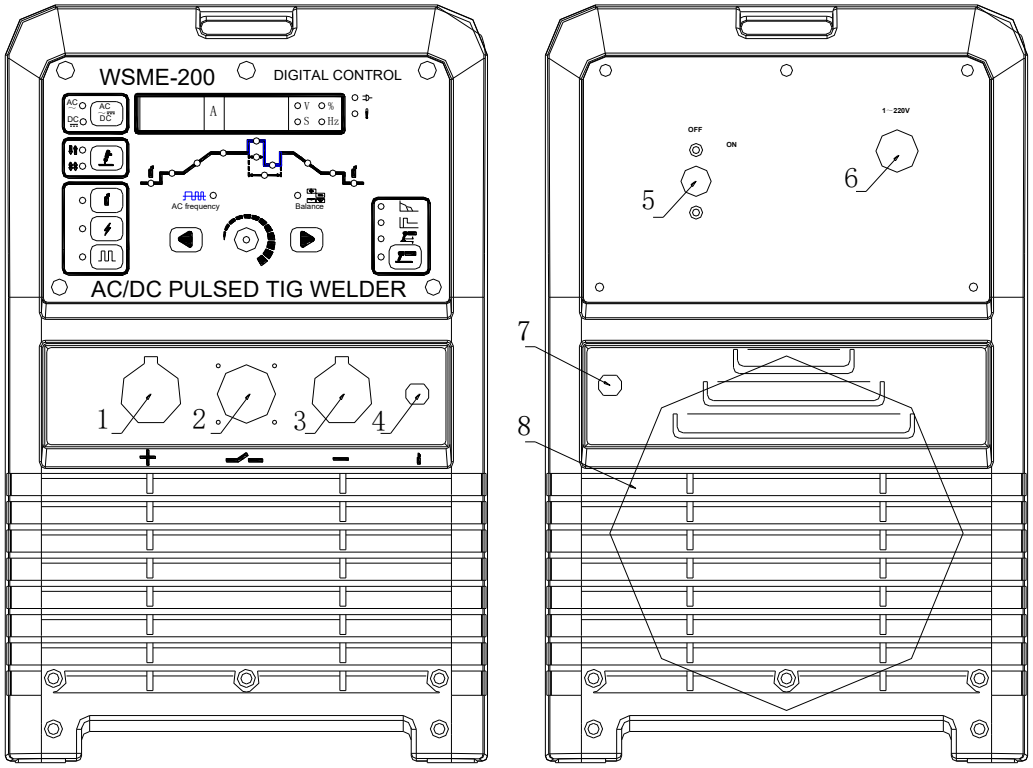
Assembling the equipment (TIG)



- When the workpiece is connected to the positive outlet of the welding machine and the welding torch to the negative outlet, the system is known as DC POSITIVE CONNECTION. Likewise, when the connections are reversed, the system is known as DC NEGATIVE CONNECTION. In general, TIG welding is normally performed in the DC POSITIVE CONNECTION.
- The control cable of the torch switch consists of two wires, that of the pedal control of three wires and the aero socket has 14 leads.
- Consumables and parts for TIG torches are available.
- When the Taurus TIG200ACDC-HF-P welding machines are operated in HF mode, the ignition spark can cause interference to electronic equipment. In order to curb this problem, shielding measures must be introduced

4 Operation

4.1 Layout for the panel



1 **Positive output** - The welder's positive polarity output socket.

2 **Aero socket -** Leads 8 and 9 are connected to the torch switch control wire.

3 **Negative output -** The welding machine's negative output socket.

4 **Shield-gas outlet connector** - Connects to the gas input pipe of the torch.

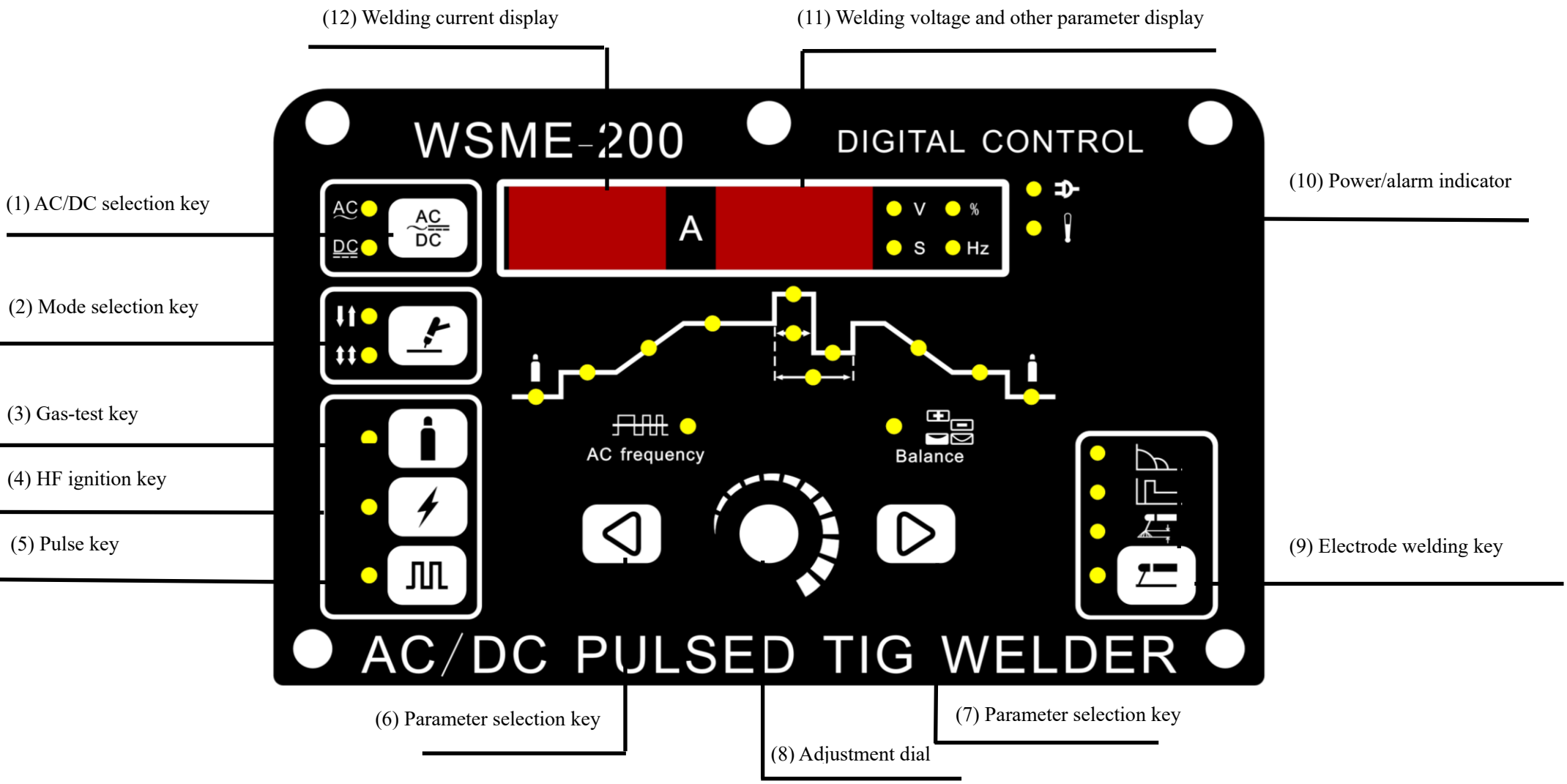
5 **Power source switch** - On/off switch for the system.

6 **Power source input** To connect power source.

7 **Shield-gas input connector** - Input connection point for external power.

8 **Cooling fan** - It is used for cooling the components and parts inside the welder.

4.2 Control panel



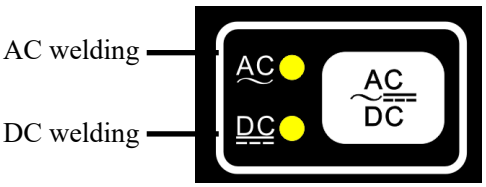
Overview

The key feature of the control panel is the logical way in which the controls are arranged. All the main parameters needed for day-to-day working can easily be;

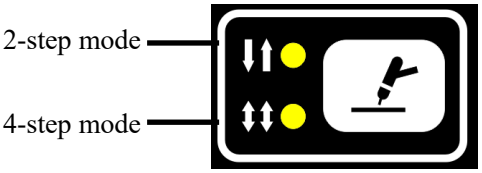
- Selected with the keys.
- Altered with the adjusting dial.
- Shown on the display during welding.

The illustration below shows an overview of the main settings needed for day-to-day working, using the Taurus TIG200ACDC-HF-P control panel as an example. You will find a detailed description of these settings in the following section.

(1) AC/DC selection key



(2) Mode selection key



(3) Gas-test key

Lights up when the gas-test key is pressed, after that gas will flow out for 15s. Press the key again to stop the gas flow before the 15 s have passed.

(4) HF (high-frequency) ignition key

Lights up when High frequency key is pressed, HF (high-frequency) ignition has been selected.

(5) Pulse key

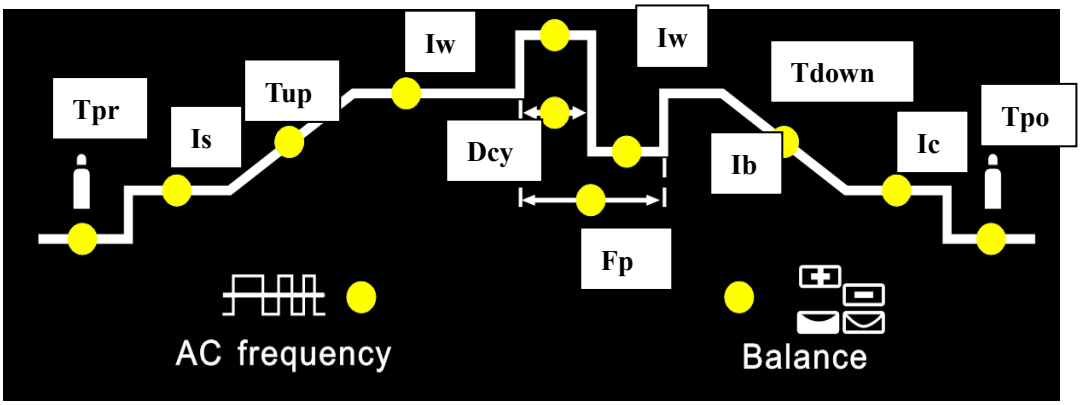
Lights up when Pulse key is pressed, Pulse has been selected.

(6) and (7) Parameter selection keys

If “2T/4T mode” has been selected, it is possible to change parameter indicator by means of the parameter selection keys (6) and (7) while the welding operation in progress.

(8) Adjustment dial

When the parameter indicator lights up, the selected parameter can be changed with the adjustment dial.



Available parameters where 2T and 4T mode have been selected:

Tpr - Gas pre-flow time
Unit: S
Setting range: 0.1 - 1
Factory setting: 0.3

Is - Starting current (only with 4T)
Unit: A
Setting range: 5 - 100% of main current Iw (DC): 10 - 100% of main current Iw (AC)
Factory setting: 5

Tup - Upslope time
Unit: S
Setting range: 0 - 10
Factory setting: 0

Iw - Welding current
Unit: A
5 - 200 (TIG-DC) :: 10 - 200 (TIG-AC) :: 5 - 170 (MMA-DC) :: 10 - 170 (MMA-AC)

Ib - Base current
Unit: A
5 - 200 (DC) :: 10 - 200 (AC)
Important! Only selectable when “pulse key” has been pressed.

Dcy - Ratio of pulse duration to base current duration
Unit: %
Setting range: 5 - 100
Factory setting: 5
Important! Only selectable when “pulse key” has been pressed.

Fp - Pulse frequency
Unit: Hz
Setting range: 0.5 - 200
Factory setting: 0.5
Important! Only selectable when “pulse key” has been pressed.

Tdown - Downslope time
Unit: S
Setting range: 0 - 10
Factory setting: 0

Ic - Crater arc current (only with 4T)

Unit: S

Setting range: 5 - 100% of main current Iw (DC) :: 10 - 100% of main current Iw (AC)

Factory setting: 5

Tpo - Gas post-flow time

Unit: S

Setting range: 0.1 - 10

Factory setting: 3

AC frequency (only with TIG-AC)

Unit: Hz

Setting range: 50 - 250 (Iw<50A) :: 50 - 200 (50A≤Iw<100A) :: 50 - 150 (100A≤Iw<150A) :: 50 - 100 (150A≤Iw<200A)

Balance (only with TIG-AC)

Balance adjustment is mainly used to set the adjustment of eliminating metal-oxide (such as Aluminium, Magnesium and its alloys) while AC output.

Unit: %

Setting range: 15 - 50

Factory setting: 15

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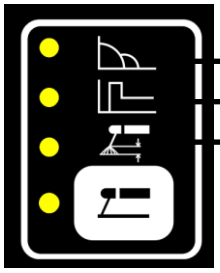
(9) Rod electrode (MMA) welding key

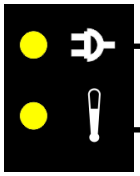


Arc force (Setting range 0 - 10)

Hot start (Setting range 0 - 10)

Arc length (Setting range 0 - 10)

(10) Power/Alarm indicator



Lights up if the power switch on

Lights up when the welding machine over heats and when over-voltage or over-current situations occur. At the same time an Err 001 code is displayed.

(11) Welding voltage/other parameter display

Indicate the welding voltage or other parameter.

Before welding is started, the right-hand display shows the pre-set value of Tpr, Tup, Dcy, Fp, Tdown and Tpo. There is a 3s time-lag, open-circuit voltage is displayed after adjusting those parameters.

After welding has been started, the right-hand display shows the present actual value of the welding voltage.

(12) Welding current display

Display the pre-set or the actual welding current value.

Before welding is started, the left-hand display shows the pre-set current value of Is, Iw, Ib and Ic.

After welding has been started, the left-hand display shows the present actual value of the welding current. The control panel indicates which position has been reached in the welding process by brightening the light.

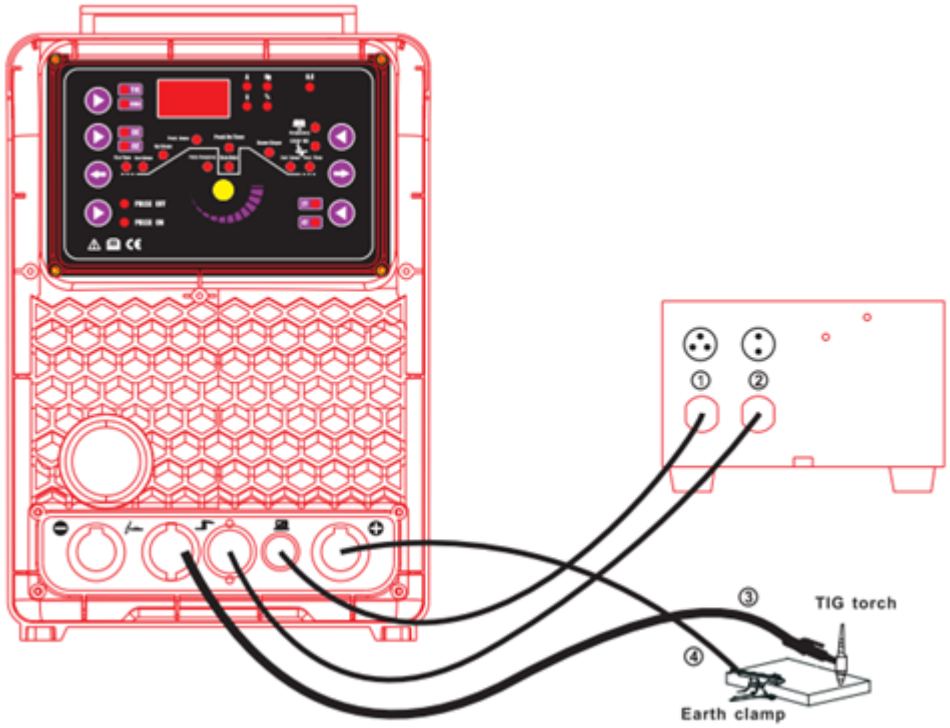
NOTE:

Only “parameter selection keys” and “adjustment dial” can be used in the welding process.

Only “rod electrode welding key”, “adjustment dial” and “AC/DC selecting key” can be used on MMA mode.

4.3 Remote control – Pedal switch control

FOOT PEDAL（REMOTE CURRENT CONTROL）



1. Three-core pedal interface.

2. Two-core pedal interface.

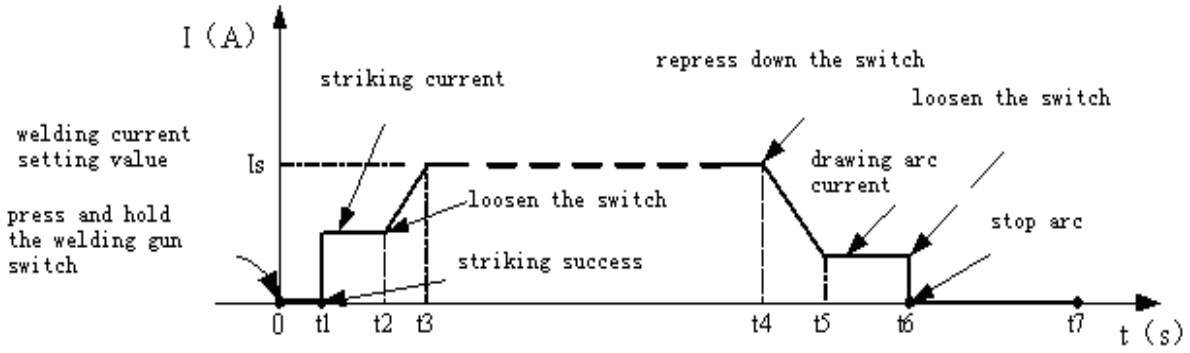
3. TIG torch.

4. Earth clamp connected to “+” pole and work piece.

4.4 Argon Arc Welding Operation

4.4.1 TIG welding (4T operation）

The start current and crater current can be pre-set. This function can compensate for the possible crater that appears at the beginning and end of the welding. Thus, 4T is suitable for the welding of medium thickness plates.



Introduction：

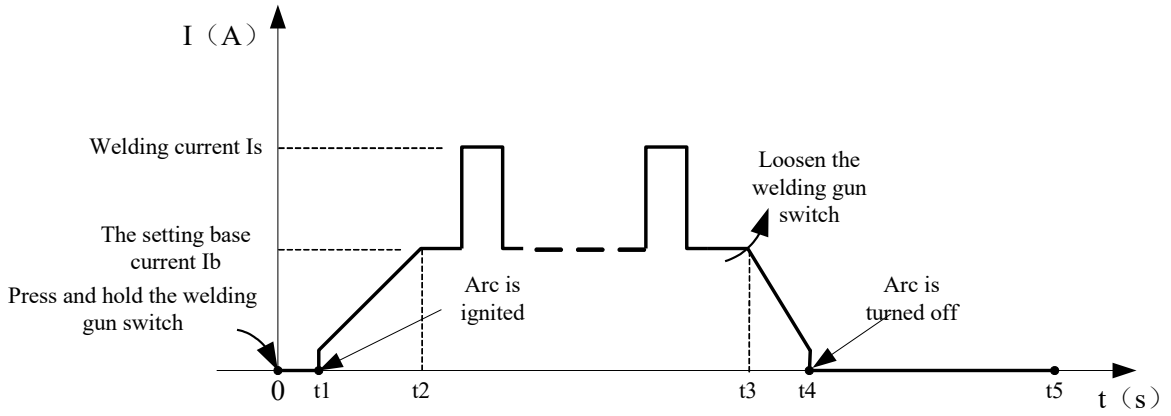
- 0: Press and hold the gun switch, electromagnetic gas valve is turned on. The shielding gas starts to flow;
- 0～t1: Pre-gas time (0.1~1s);
- t1～t2: Arc is ignited at t1 and then the output setting value of start current;
- t2: Once trigger switch is released, the output current slopes up from the start current;
- t2～t3: The output current rises to the setting value (Iw or Ib), the upslope time can be adjusted;
- t3～t4: Welding process. During this period, the trigger switch is released;

Note: Select the pulse output, the base current and welding current will be outputted alternately. Otherwise, output the setting value of the welding current;

- t4: Press the trigger switch again, the welding current will drop in accordance with the selected down-slope time;
- t4～t5: The output current slopes down to the crater current. The downslope time can be adjusted;
- t5～t6: The crater current time;
- t6: Release the trigger switch, stop the arc and continue with argon flow;
- t6～t7: Post-gas time can be set by the post-gas time adjustment knob on the front panel (0.1-10s);
- t7: Electromagnetic valve is closed and stops the argon flowing. Welding completed.

4.4.2 TIG welding (2T operation)

This function without the adjustment of start current and crater current is suitable for re-tack welding, transient welding, thin plate welding.



Introduction：

- 0: Press the gun switch and hold it. Electromagnetic gas valve is turned on. The shielding gas stars to flow.
- 0～t1: Pre-gas time (0.1~1s)
- t1～t2: Arc is ignited and the output current rises to the set welding current (Iw or Ib) from the min welding current.
- t2～t3: During the whole welding process, the gun switch is pressed and held without releasing.

Note: Select the pulsed output, the base current and welding current will be outputted alternately; otherwise, output the setting value of welding current;

- t3: Release the gun switch, the welding current will drop in accordance with the selected down-slope time.
- t3～t4: The current drops to the minimum welding current from the set current (Iw or Ib), and then arc is turned off.
- t4～t5: Post-gas time, after the arc is turned off. You can adjust it (0.1~10s) by turning the knob on the front panel.
- t5: electromagnetic gas valve turned off, the shield gas stops to flow, and welding is completed.

Short circuit protect function：

①TIG /DC/LIFT: When the tungsten electrode touches the workpiece, the current will drop to 20A and the tungsten spoilage will be reduced considerably. This prolongs the life of the tungsten electrode, and prevents tungsten clipping.

②TIG /DC/HF: When the tungsten electrode touches the workpiece, the current will drop to zero within one second and the tungsten spoilage will be reduced considerably. This prolongs the life of the tungsten electrode，and prevents tungsten clipping.

③MMA operation: When the electrode touches the workpiece for longer than two seconds the welding current will drop to zero and automatically protect the electrode.

④TIG operation - Arc-break prevention function: Prevents arc-break, but should it occur the HF function will restore and stabilise the arc.

⑤TIG：When the torch trigger is pressed once, the welding current will be halved. Pressing the trigger again, the welding current will be restored.

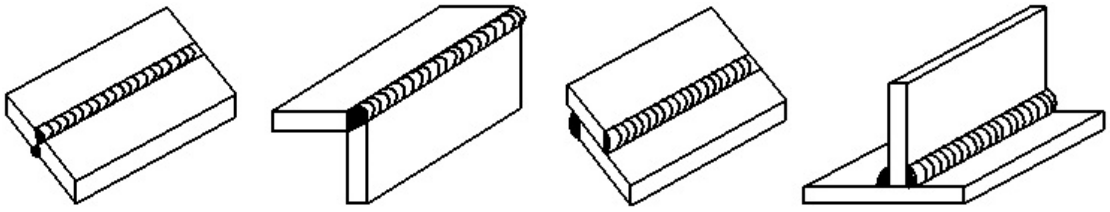
Notices:

- Avoid malfunction by carefully checking all connections such as ignition spark and gas leaks before commencing operation.
- The volume of Argon gas can be checked by testing the electromagnetic valve using the switch on the front panel.
- Never aim the torch at any body parts. When pressing the torch switch, a high-frequency and high-voltage arc is ignited which can also interfere with electronic equipment.
- The welding power determines the required gas flow which is adjusted on the flowmeter.
- The best spark ignition is obtained by maintaining a distance of 3mm between the workpiece and the tungsten electrode during ignition.

Note: When selecting AC output, the current and waveform remain as depicted in the figure above, but the output polarity changes alternately.

4.5 Welding Parameters

4.5.1 Joint forms in TIG/MMA



a butt joint b lap joint c corner joint d T - joint

4.5.2 The explanation of welding quality

The relation of welding area colour & protection effect of stainless steel

Welding area colour	argent, golden	blue	red-grey	grey	black
Protect effect	best	better	good	bad	worst

The relation of welding area colour & protect effect of Ti-alloy

Welding area color	bright argent	orange-yellow	blue-purple	caesious	white powder of titanium oxide
Protect effect	best	better	good	bad	worst

4.5.3 TIG Parameters Matching

The corresponding relationship between gas nozzle diameter and electrode diameter

Gas nozzle diameter/mm	Electrode diameter/mm
6.4	0.5
8	1.0
9.5	1.6 or 2.4
11.1	3.2
Note: the above parameters originate from《Welding Dictionary》P142, Volume 1 of Edition 2.	

Gas nozzle and the shield gas flow rate

Welding current range/A	DC positive connection		AC	
	Gas nozzle diameter/mm	Gas flow rate/L • min^{-1}	Gas nozzle diameter/mm	Gas flow rate/L • min^{-1}
10～100	4～9.5	4～5	8～9.5	6～8
101～150	4～9.5	4～7	9.5～11	7～10
151～200	6～13	6～8	11～13	7～10
201～300	8～13	8～9	13～16	8～15

Note: the above parameters originate from《Welding Dictionary》P149, Volume 1 of Edition 2.

tungsten electrode diameter /mm	sharpened of the electrode diameter/mm	angle of cone（°）	background current/A
1.0	0.125	12	2～15
1.0	0.25	20	5～30
1.6	0.5	25	8～50
1.6	0.8	30	10～70
2.4	0.8	35	12～90
2.4	1.1	45	15～150
3.2	1.1	60	20～200

TIG of stainless steel (single run welding)

Workpiece thickness /mm	Joint form	tungsten electrode diameter/mm	welding wire diameter/mm	Argon gas flow rate/ L • min^{-1}	welding current (DCEP)	Welding speed/ cm • min^{-1}
0.8	Butt joint	1.0	1.6	5	20～50	66
1.0	Butt joint	1.6	1.6	5	50～80	56
1.5	Butt joint	1.6	1.6	7	65～105	30
1.5	Corner joint	1.6	1.6	7	75～125	25
2.4	Butt joint	1.6	2.4	7	85～125	30
2.4	Corner joint	1.6	2.4	7	95～135	25
3.2	Butt joint	1.6	2.4	7	100～135	30
3.2	Corner joint	1.6	2.4	7	115～145	25
4.8	Butt joint	2.4	3.2	8	150～225	25
4.8	Corner joint	3.2	3.2	9	175～250	20

Note: the above parameters originate from《Welding Dictionary》P150, Volume 1 of Edition 2.

Parameters of piping back sealing welding for mild steel（DCEP）

Piping diameter Φ/mm	Tungsten electrode diameter/mm	Gas nozzle diameter/mm	Welding wire diameter/mm	Welding current/A	Arc voltage/V	Argon flow rate / L • min^{-1}	Welding rate / cm • min^{-1}
38	2.0	8	2	75～90	11～13	6～8	4～5
42	2.0	8	2	75～95	11～13	6～8	4～5
60	2.0	8	2	75～100	11～13	7～9	4～5
76	2.5	8～10	2.5	80～105	14～16	8～10	4～5
108	2.5	8～10	2.5	90～110	14～16	9～11	5～6
133	2.5	8～10	2.5	90～115	14～16	10～12	5～6
159	2.5	8～10	2.5	95～120	14～16	11～13	5～6
219	2.5	8～10	2.5	100～120	14～16	12～14	5～6
273	2.5	8～10	2.5	110～125	14～16	12～14	5～6
325	2.5	8～10	2.5	120～140	14～16	12～14	5～6
Note: the above parameters originate from《Welding Dictionary》P167, Volume 1 of Edition 2.							

Parameters of AC TIG (MMA) for Aluminum and its alloy

Sheet thickness /mm	Welding wire diameter /mm	Tungsten electrode diameter /mm	Pre-heat Temper-ature /℃	Welding current /A	Argon flow rate / L • min^{-1}	Gas nozzle diameter /mm	Remark
1	1.6	2	—	45～60	7～9	8	Flange welding
1.5	1.6～2.0	2	—	50～80	7～9	8	Flange or butt welding by one side
2	2～2.5	2～3	—	90～120	8～12	8～12	Butt welding
3	2～3	3	—	150～180	8～12	8～12	V-groove butt welding
4	3	4	—	180～200	10～15	8～12	
5	3～4	4	—	180～240	10～15	10～12	
6	4	5	—	240～280	16～20	14～16	
8	4～5	5	100	260～320	16～20	14～16	
10	4～5	5	100～150	280～340	16～20	14～16	
12	4～5	5～6	150～200	300～360	18～22	16～20	

14	5～6	5～6	180～200	340～380	20～24	16～20	
16	5～6	6	200～220	340～380	20～24	16～20	
18	5～6	6	200～240	360～400	25～30	16～20	
20	5～6	6	200～260	360～400	25～30	20～22	
16～20	5～6	6	200～260	300～380	25～30	16～20	X-groove butt welding
22～25	5～6	6～7	200～260	360～400	30～35	20～22	

Note: the above parameters originate from《Welding Dictionary》P538, Volume 2 of Edition 2.

4.6 Operational Environment

● Height above sea level is below 1000m.

● Working-environment temperature range: -10^0C～$+40^0$C.

● Relative humidity is below 90 % (20^0C).

● The machine should not be located at an angle exceeding 15 degrees to the floor level.

● Protect the machine from rain and harsh sunlight.

● The surrounding air-content of dust, acid and corrosive gas should be as low as possible and not exceed normal standards.

● A distance of at least 30cm between machine and wall should be maintained to ensure sufficient ventilation.

4.7 Operational Notifications

● Read section 1 carefully before attempting to use the Taurus TIG200ACDC-HF-P.

● Connect the earth cable directly to the machine as explained in section 3.5.

● Do not touch the output electrode with any part of your body while switching the machine on.

● Before operating the machine, ensure all people nearby are wearing welding eye protection.

● Ensure ample ventilation around the machine to maintain the duty cycle.

● In the interest of energy saving, the generator engine must be switched off once the operation has been completed.

● If the built-in protection system shuts off the machine, wait for the problem to be resolved before attempting to restart. Ignoring this, the range of the problem will be extended.

5 Maintenance & Troubleshooting

5.1 Maintenance

Efficient operation, safety as well as work life of the machine depends on regular maintenance.

Follow the table below to assist with your maintenance requirements.

● **Warning: Before maintenance is undertaken, shut off the power supply and wait for five minutes until the voltage of charged capacitors have declined to a safe level.**

date	Maintenance item
Daily examination	Ensure that the panel knobs and switches in the front and rear are in working order and are set correctly. If anything is broken or not working correctly then contact a qualified technician immediately. After the power is turned on, listen for peculiar noises and vibrations and for unnatural odours. If anything, out of the ordinary presents itself, call for maintenance assistance. Ensure that the display value of LED is intact. If the LED display is not intact then contact a qualified technician immediately. Observe whether the min/max value on the display is in accordance with the set value. If there is any difference and it has affected the normal welding craft, please adjust it. Check proper operation of the fan. Improper operation of the fan can result in overheating of the electronic components with negative effects on the operation thereof. If damage to the fan is suspected, call on a technician for assistance. Check the outlet connections for integrity and re-tighten if necessary. Damaged connectors should be replaced. Check the integrity of the output cable. If damaged, it should be re-insulated or replaced.
Monthly examination	Use clean, dry compressed air to clean out settled dust especially on the radiator, main voltage transformer, IGBT module, fast recovery diode and PC board. Check the integrity of bolts and nuts. Fasten or replace if necessary.
Quarter-yearly examination	Check that the actual current corresponds to the display value and adjust if necessary. A clamp meter can be used for this procedure.
Yearly examination	Measure the insulating impedance between the main circuit, the PC board and the case. If the reading is below one mega ohm, contact a qualified technician to investigate and rectify.

5.2 Troubleshooting

- Before shipment, all welding machines are tested and passed for operation. Any modifications to the machine may not be allowed or authorised.
- Regular maintenance is important to ensure successful machine operation and to obviate potential hazards.
- Machine overhaul should only be undertaken by authorised technicians. For further information contact your Taurus agent or supplier.

Follow the overhauling chart below for simple troubleshooting solutions:

S/N	Troubles		Reasons	Solution
1	Power turned on, fan works, but power pilot lamp does not light up.		Pilot light fused or insufficient connection.	Check end repair Pr7.
			Power transformer is broken.	Repair or change transformer.
			Control PC board failure.	Repair or change Pr4.
2	Power turned on, power lamp lights up, but fan not working.		Obstacle in fan.	Clear out obstacle.
			Fan-start capacitor defective.	Replace capacitor.
			Fan motor damaged.	Replace fan.
3	Power turned on, power lamp doesn't light up, fan not working.		No input power.	Check power supply.
			Fuse inside the machine has blown.	Replace the 3A fuse.
4	Display number not active.		LED display is defective.	Replace LED display.
5	Max and min displayed values are not corresponding to set values.		Refer to 3.1 Max value not corresponding.	Adjust potentiometer Imin on power board.
			Refer to 3.1 Min value not corresponding.	Adjust potentiometer Imax on power board.
6	No no-load voltage output (MMA).		Machine is faulty.	Check main circuit and Pr4.
7	Arc cannot be ignited (TIG)	There is spark on the HF igniting board.	The welding cable is not connected to the output of the machine.	Connect the welding cable.
			Welding cable is damaged.	Repair or change the welding cable.
			Earth cable connection unstable.	Check earth cable connection.
			Welding cable too long.	Use appropriate cable.
			Oil or dust on workpiece.	Clean-off oil or dust.
			Gap between electrode and workpiece too great.	Reduce gap to approximately 3mm.
		There is no spark on the HF igniting board.	HF igniting board defective.	Repair or change Pr8
			Discharger distance too short	Adjust distance to approximately 0.7mm
			Malfunction of welding gun switch.	Check control cable and aero switch.

S/N	Troubles	Reasons		Solution
8	No gas flow (TIG).	Gas pressure low or gas valve closed.		Change cylinder or open valve.
		Valve obstruction.		Remove obstruction.
		Electromagnetic valve damaged.		Change valve.
9	Continuous gas flow.	Gas-test on the front panel is switched on.		Switch gas-test off.
		Blockage in valve.		Remove obstruction.
		Damaged electromagnetic valve.		Replace valve.
		Damaged pre-gas time adjustment knob on front panel.		Repair or replace adjustment knob.
10	Welding current not adjustable.	Welding current potentiometer on front panel connection is faulty or damaged.		Repair or replace the potentiometer.
11	No AC output when selected.	Faulty power PC board.		Repair or change.
		Faulty AC drive PC board.		Replace
		AC IGBT module faulty.		Replace
12	Displayed welding current not corresponding to the actual value.	Min value adjustment. Refer to 3.1.		Adjust potentiometer Imax on the power board.
		Max value adjustment. Refer to 3.1.		Adjust potentiometer Imin on the power board.
13	Low penetration of molten pool	Welding current adjustment too low.		Increase welding current.
		Arc too long.		Use 2T operation.
14	Alarm lamp on front panel lights up.	Over-heat protection.	Welding current too high.	Reduce welding current output
			Long continuous operation.	Reduce working cycle.
		Over-voltage protection.	Fluctuating power supply.	Switch to stable power supply.
		Low-voltage protection.	Fluctuating power supply.	Switch to stable power supply.
			Too many machines operating simultaneously on same power supply.	Schedule operating machines.
		Over-current protection.	Unusually high current in the main system	Check and repair the main circuit and drive Pr6