PoWer ARC 200C

GeKaMac®

PoWer ARC 200C

Manual Instructions

Please Read and Understand This Manual
Before Operating Welding Machine

www.gedikwelding.com

This machine is for internal use only.

It complies with the WEEE Directive.

This machine has been designed in accordance with the EN 60974-1 and EN 60974-10 standards.

The machine is safe when installation, operation, and maintenance are performed in accordance with the user manual and regulations. The operator and machine owner are responsible for adhering to safety rules.

Gedik Kaynak San. Ve Tic. A.Ş. assumes no responsibility for safety or CE compliance if any modifications are made to the machine or if safety rules are not followed.

CE

This Class A equipment is not suitable for use in homes and similar residential areas where the power supply is provided by the low-voltage public electricity network.

This machine is not household waste and cannot be disposed of in the trash.

When the machine reaches the end of its service life or becomes obsolete, it must be disposed of in accordance with regulations.

COMPLIES WITH THE WEEE DIRECTIVE.

Eco Design Statement

This machine has been designed and manufactured in accordance with the requirements of the 2009/125/EC Eco Design Directive concerning the environmentally friendly design of energy-related products.

Accordingly, machines with an idle mode are as follows.

	Idle Mode
MMA	**X**
MIG	√
TIG	√
Plazma	√
SAW	**Out of Scope**

Efficiency measurements should be conducted only on the power unit. The water cooling system should be disabled. For more information on measurements and machine settings, Gedik Kaynak Sanayi ve Ticaret A.Ş. should be consulted.

AT UYGUNLUK BEYANI

EU DECLARATION OF CONFORMITY

Bu uygunluk beyanı yalnızca imalatçının sorumluluğu altında düzenlenir.

This declaration of conformity is issued under the sole responsibility of the manufacturer.

İstanbul, Turkey, 08.03.2024

İmalatçı / Manufacturer

GEDİK KAYNAK SANAYİ ve TİCARET A.Ş.

Ankara Cad. No.306 Seyhli Pendik ISTANBUL TURKIYE

Ürün / Product	ARC WELDING MACHINE
Marka-Model / Brand- Model	POWER ARC 200 C

Yukarıda tanımlanan beyanın nesnesi ilgili uyumlaştırılmış AB mevzuatı ile uyumludur.

The object of the declaration described above, is in conformity with the relevant union harmonisation legislation.

Direktifler / Directives 2014/30/EU & 2014/35/EU & 2009/125/EC

Uyumlaştırılmış standartlar ve uygunluğun deklare edilmesiyle ilişkili diğer referanslar.

References to the relevant harmonised standarts used and references to the other technical specifications in relation to which conformity is declared.

EN IEC 60974-1
EN IEC 60974-10

Bu ekipman, talimatlara uygun kurulduğunda, bakımı yapıldığında ve kullanıldığında belirtilen standartlara uygundur. Makine üzerinde bir değişiklik yapıldığında veya yanlış kullanımda deklarasyon geçersiz olur.

The equipment is in compliance with pertinent legislation when installed, utilized, and maintained in accordance with the enclosed instructions. This declaration will be invalid under any modification or improper use.

İmalatçı Adına imzalayan / Signed for and on behalf of:

Hatice Özel, Equipment Business Unit Director

Dear Customer

This instruction manual will help you get to know your new machine. Read the manual carefully and you will soon be familiar with all the great features of your new product. Meanwhile, please remember safety rules and operate as instructed.

If you treat your product carefully, this definitely helps to prolong its enduring quality and reliability-things which are both essential prerequisites for getting outstanding results.

Production specification may change without advance notice.

The model you purchase is for:

- PowerARC200C

Please find corresponding models from the “Contents”.

Important:

Please take special note of safety rules and operate as instruction in case of damage and serious injury.

Safety Rules

Danger!		**"Danger"** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
Warning !		**"Warning!"** indicates a possible hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are explained in the text.
Caution !		**"Caution"** indicates a possible hazardous situation which, if not avoided, may result in slight or moderate injury.
Note!		**"Note!"** indicates a situation which implies a risk of impaired welding result and damage to the equipment.
Important!		**"Important!"** indicates practical tips and other useful special-message. It is no signal word for a harmful or dangerous situation.
Utilisation for intended purpose only		• The machine may only be used for jobs as defined by the "Intended purpose". • Utilisation for any other purpose, or in any other manner, shall be deemed to be "not in accordance with the intended purpose". The manufacturer shall not be liable for any damage resulting from such improper use.
Safety signs		• All the safety instructions and danger warnings on the machine must be kept in legible condition, not removed, not be covered, pasted or painted cover.

Safety inspection		• The owner/operator is obliged to perform safety inspection at regular intervals. • The manufacturer also recommends every 3-6 months for regular maintenance of power sources.
Safety markings		Equipment with CE-markings fulfils the basic requirements of the Low-Voltage and Electromagnetic Compatibility Guideline (e.g. relevant product standards according to EN 60 974).
		Equipment with CCC markings meets the requirements of implementations rules for China compulsory certification.
Electric shock can kill		• Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In MIG/MAG welding, the wire, drive rollers, wire feed housing and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard. • Do not touch live electrical parts of the welding circuit, electrodes and wires with your bare skin or wet clothing. • The operator must wear dry hole-free insulating welding gloves and body protection while performs the welding. • Insulate yourself from work and ground using dry insulating protection which is large enough to prevent you full area of physical contact with the work or ground. • Connect the primary input cable according to rules. Disconnect input power or stop machine before installing or maintenance.

		• If welding must be performed under electrically hazardous conditions as follow: in damp locations or wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or in occasion when there is a high risk of unavoidable or accidental contact with the work piece or ground. Must use additional safety precautions: semiautomatic DC constant voltage (wire) welder, DC manual (Stick) welder and AC welder with reduced open-load voltage. • Maintain the electrode holder, ground clamp, welding cable and welding machine in good, safe operating condition. Replace damaged part immediately.
Electric and magnetic fields (EMF) may be dangerous		• If electromagnetic interference is found to be occurring, the operator is obliged to examine any possible electromagnetic problems that may occur on equipment as follow: - minas, signal and data-transmission leads - IT and telecoms equipment - measurement and calibration devices - Wearers of pacemakers • Measures for minimizing or preventing EMC problems: – Mains supply If electromagnetic interference still occurs, despite the fact that the mains connection in accordance with the regulations, take additional measures – Welding cables Keep these as short as possible. Connect the work cable to the work piece as close as possible to the area being welded.

		Lay tem well away from other cables. Do not place your body between your electrode and work cables. – Equipotential bonding – Workpiece grounding (earthing) – Shielding Shield the entire welding equipment and other equipment nearby.
ARC rays can burn.		• Visible and invisible rays can burn eyes and skin. • Wear an approved welding helmet or suitable clothing made from durable flame-resistant material (leather, heavy cotton, or wool) to protect your eyes and skin from arc rays and sparks when welding or watching. • Use protective screens or barriers to protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or material.
Fumes and gases can be dangero us		• Welding may produce fumes and gases, breathing these fumes and gases can be hazardous to your health. • When welding, keep your head out of the fume. If inside, ventilate the area at the arc to keep fumes and gases away from the breathing zone. If ventilation is not good, wear an approved air-supplied respirator. • Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. • Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air

		is safe.
Welding and cutting sparks can cause fire or explosion.		• When not welding, make sure the electrode circuit is not touching the work or ground. Accidental contact can cause sparks, explosion, overheating, or fire. Make sure the area is safe before doing any welding. • Welding and cutting on closed containers, such as tanks, drums, or containers, can cause them to blow up. Make sure proper steps have been taken. • When pressure gas is used at the work site, special precautions are required to prevent hazardous situations. • Connect work cable to the work as close to the welding zone as practical to prevent welding current from passing too long and creating fire hazards or overheat. • Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area. • Be attention that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas and start a fire. Remove fire hazardous from the welding area, if not possible, cover them thoroughly. Do not weld where flying sparks can strike flammable material and where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline). • Protect yourself and others from flying sparks and hot metal. Remove any combustibles from operator before perform any welding.

		• Keep a fire extinguisher readily available. • Empty containers, tanks, drums, or pipes which have combustibles before perform welding. • Remove stick electrode from electrode holder or cut off welding wire at contact tip when not in use. • Apply correct fuses or circuit breakers. Do not oversize or bypass them.
Cylinder can explode if damaged.		• Pressure gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully. • Cylinders should be located away from areas where they may be struck or subjected to physical damage. Use proper equipment, procedures, and sufficient number of persons to lift and move cylinders. • Always install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling over or tipping. • Keep a safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame. • No touching cylinder by welding electrode, electrode holder or any other electrically “hot” parts. Do not drape welding cables or welding torches over a gas cylinder. • Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the process used; maintain them and associated parts in good condition. • Use only compressed gas cylinders containing the correct shielding gas for the properly operating regulators designed for

		the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition. • Open the cylinder valve slowly and keep your head and face away from the cylinder valve outlet. • Valve protection caps should be kept in place over valve expect when the cylinder is in use or connected for use.
Hot parts can burn		• Do not touch hot parts with bare hand or skin. • Ensure equipment is cooled down before perform any work. • If touching hot parts is needed, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.
Flying metal or dirt can injure eyes		• When welding, chipping, wire brushing, and grinding can cause sparks and flying metal. It can hurt your eyes. • Remember wear appropriate safety glasses with side shields when in welding zone, even under your welding helmet.
Noise can damage hearing		• Noise from some processes or equipment can damage hearing. • Remember wear approved ear protection to protect ears if noise level is high.
Moving parts can injure		• Stay away from moving parts such as fans. • Stay away from pinch points such as drive rolls. • Keep all doors, panels, covers, and guards closed and securely in place. • Have only qualified persons remove doors, panels, covers, or guards for servicing and maintenance. • Reinstall doors, panels, covers, or guards when servicing and

		maintenance is finished and before reconnecting input power.
Overuse can cause overheating		• Use machine follow duty cycle. Reduce current or reduce duty cycle before starting to weld again. • Allow cooling period. • Do not block or filter airflow to unit.

Contents

1-GENERAL REMARKS

1-1 Power source features

PowerARC200C welding machine is suitable for DC MMA, CEL, Lift TIG process, which can weld carbon steel, stainless steel, copper, titanium, etc. Because of the ideal static characteristic and dynamic characteristics, machines highlights are as follows:

- Single phase power supply, portable design
- Leading IGBT tube technology
- Rapid adjustment adapting to changes in the load, stable arc length, excellent constant-current characteristics
- Low spatter
- Easily arc ignition, anti-stick features
- High penetration power, pretty weld formation
- Reliable and durable with patented technology

1-2 Schematic diagram

The schematic diagram is as shown in Fig. 1-2-1:

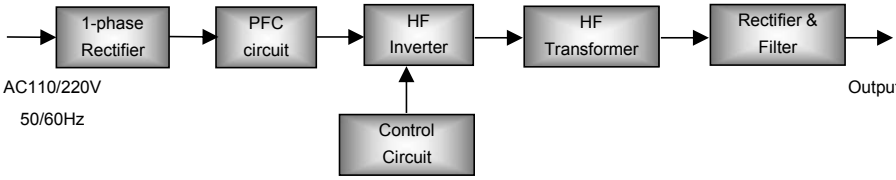


Fig. 1-2-1: Schematic diagram

This series welding machine applies HF inverter technology. 1- phase AC110/220V, 50/60Hz input volt is rectified, filtered, and voltage stabilized by PFC circuit, inverted into HF AC by IGBT single tube, reduced by HF transformer, rectified by HF rectifier, then output DC power suitable for welding. After this process, the welding machine's dynamically responsive speed has been greatly increased, so the welding machine size and weight are reduced noticeably.

Power source enjoy sound anti-fluctuating ability and high-quality performance during external condition changes (such as power grid voltage fluctuation, fast distance welding with long welding cable). Easy arc start, stable arc length, pretty weld formation and capability of continuous adjusting the welding current.

1-3 Output characteristics

The output characteristic as follow picture:

Stick process Lift TIG process

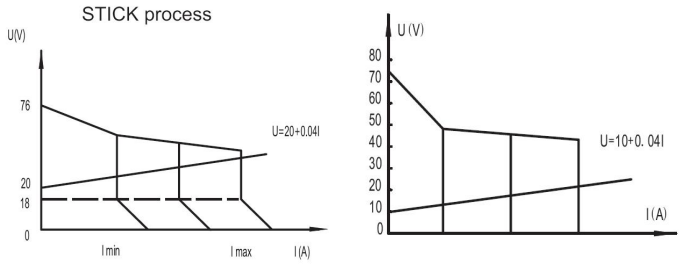


Fig. 1-3-1: Output characteristics

1-4 Duty cycle

Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating. If unit overheats, thermostat(s) will close, output stops. Wait for fifteen minutes for unit to cool down. Reduce amperage or duty cycle before welding.

NOTE! Exceeding duty cycle can damage unit and void warranty.

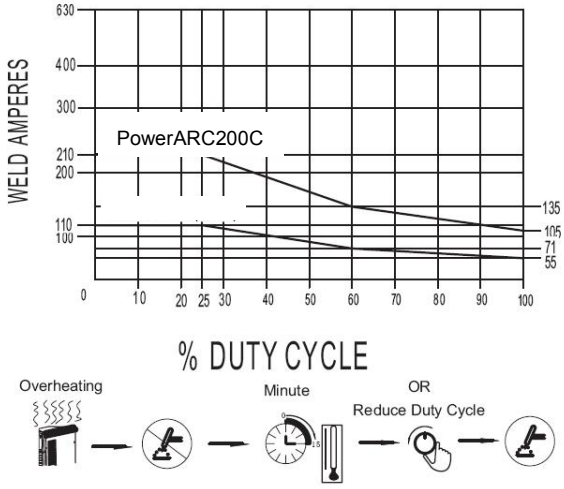


Figure 1-3: Duty cycle (at 40℃)

1-5 Applications

The ARC series can weld most of the metal materials absolutely including the welding of carbon steel,

stainless steel, etc. The recommend areas of use as follows:

- Boiler and pressure vessel fabrication
- Chemical industry
- Power generation and process
- Shipbuilding
- Automotive manufacture
- Machinery manufacturing
- Pipeline industry

2 - BEFORE COMMISSIONING

Warning! Operating the equipment incorrectly can cause serious injury and damage. Do not use the machine until you have read "Safety rules".

2-1 Utilization for intended purpose only

The power source may only be used for SMAW and Lift TIG welding. Utilization for any other purpose, or in any other manner, shall be deemed to be "not in accordance with the intended purpose". The manufacturer shall not be liable for any damage resulting from such improper use.

Please perform the inspection and maintenance work in accordance with all the instructions given in this manual.

2-2 Machines set-up regulations

According to test, protection degree of this power source is IP23S. However, the internal key components must be protected from direct soaking.

Warning! A machine that topples over or falls from its stand can easily kill someone. Place machine on an even, firm floor in such a way that it stands firmly.

The venting duct is a very important safety feature. When choosing the machine location, make sure it is possible for the cooling air to enter and exit unhindered through the louvers on the front and back of machine. Any electro conductive metallic dust from e.g. grinding-work must not be allowed to get sucked into the machine.

2-3 Power source connection

- The power source is designed to run on the mains voltage given on the respective rating plates.
- The mains cables and plugs must be mounted in accordance with the relevant technical standard.
- The power supply socket come with power source is designed to use strictly according to the marked voltage class.

Note! Inadequately dimensioned electrical installations can lead to protection failed or partially failed. The mains plug and socket, and its fuse protection, must be dimensioned in accordance with local power supply.

2-4 Welding cables instruction

- The cross section area of welding cable must meet the requirements of welding machine output current value.

- When the extension cable is being used, please appropriately increase the cross-sectional area of the cable.

3 –PowerARC200C

3-1 System components

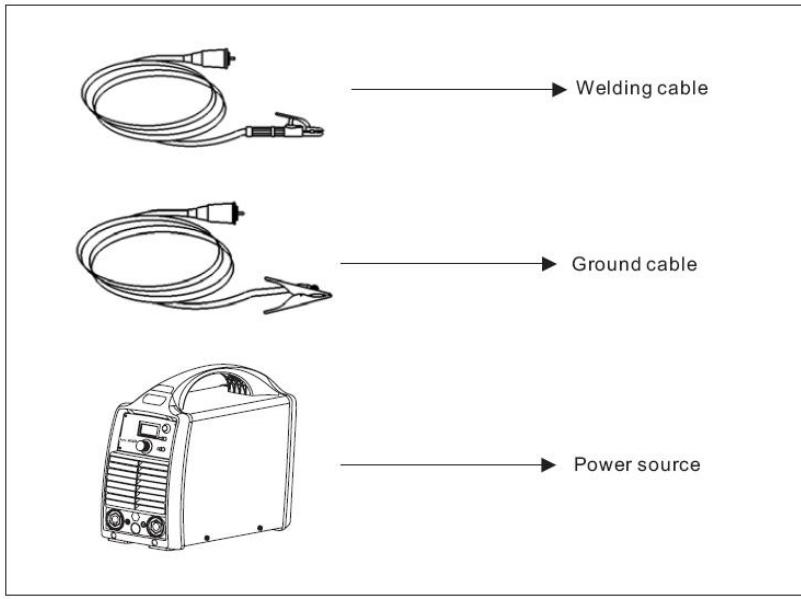


Fig. 3-1-1: System components

3-2 Basic equipments for welding

STICK

- Power source
- Ground cable
- Electrode holder
- Electrode

CEL

- Power source
- Ground cable
- Electrode holder
- Cellulose electrode

Lift TIG

- Power source
- Ground cable
- TIG torch
- Gas regulator, gas hose, gas cylinder

3-3 Control panel

	Note! Your machine has certain functions that are not in accordance with this operating manual, or vice versa. Also, certain illustrations may be slightly different from the actual controls on your machine. However, these controls function in exactly the same way.
	Warning! Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described here until you have read and completely understood this operating manual.

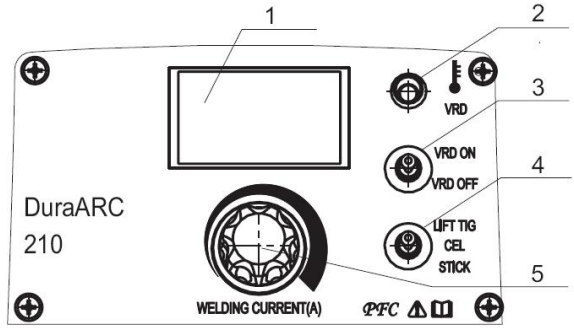


Fig. 3-3-1: Control panel

1. “Amp” displayer

When power on, it displays the welding current; and the welding current value can be adjusted by welding current regulation knob.

2. Temperature indicator

This indicator is yellow/green. When choose “VRD ON”, welding machine is on open lode mode, this indicator is green. It will light off if the machine operates properly. It will display yellow if the power source overheats or fan is faulty, machine will stop working automatically.

3. VRD ON/OFF indicator

It is used to choose low open circuit voltage mode and actual open circuit voltage mode.

4. Process selection switch

Used for selecting the desired welding mode, 3 modes are available, Lift TIG, CEL and Stick.

5. Welding current regulation knob

Used for adjusting current value. Adjust welding current according to work piece thickness, groove shapes, welding position, electrode diameter, etc. Welding current decides welding seam penetration and wire molten speed.

3-4 Interface

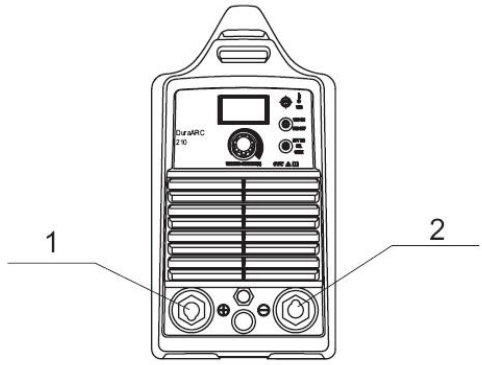


Fig. 3-4-1: Interface

1. Welding cable quick socket (+)

Stick mode: for connecting the electrode holder.

Cellulose electrode mode: for connecting the work piece.

Lift TIG mode: for connecting the work piece.

2. Welding cable quick socket (-)

Stick mode: for connecting the work piece.

Cellulose electrode mode: for connecting the electrode holder.

Lift TIG mode: for connecting TIG torch.

3-5 Rear panel

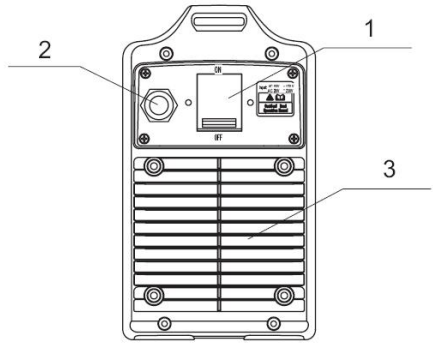


Fig. 3-5-1: Rear panel

1. Power switch

Switch for single-phase AC power.

Turn on this switch (on the position: “ON”), then the front panel digital meter lights up, and the fan runs.

2. Power supply cable

The mixed-colored wire must be firmly grounded; the rest 2 wires connect to 1- phase AC110/220V ~50/60Hz power supply.

3. Cooling fan

Cool down the hot components inside welding machine.

3-6 Installation and operation

Warning! If the machine is plugged into the mains supply during installation, there is a high risk of very serious injury and damage. Only carry out work on the machine when you have read "Safety rule" and when

- the mains switch is in the "OFF" position;
- the machine is unplugged from the mains;

- **Installation of power supply cable**

Specifications of mains input are shown in Table 3-6-1:

Model	PowerARC200C
Power supply (1~ phase)	1~230±15%
Electricity grid min. capacity (KVA)	8

Input protection (A)	Fuse	50
	Circuit breaker	60
Cable size (mm^2)	Input cable	2.5
	Output cable	16
	Protective GND wire	3.3

Table 3-6-1: Specifications of mains input

Note! The size of fuse and circuit breaker in the table are for reference only.

- The connection between input cable and distribution box (Fig. 3-6-1)

Warning! - Never perform hot-line work!
- Electric connection should be done by professional electrician!
- Two machines should not be connected to the same one circuit breaker!
- Check the input voltage, circuit breaker, input cable in accordance with Table 3-1.

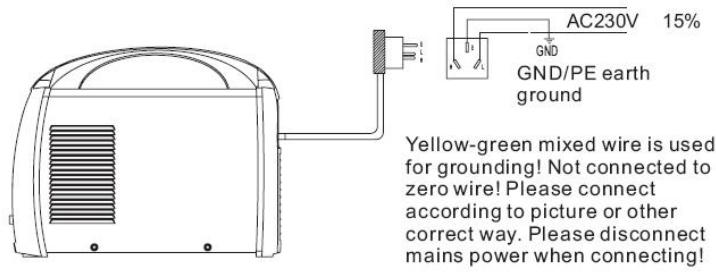


Fig. 3-6-1: Connection between input cable & distribution box

- Power socket and using region

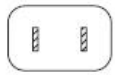
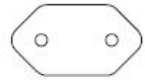
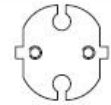
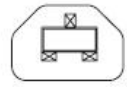
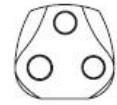
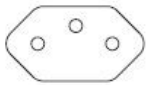
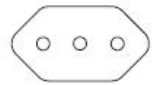
		
A: 2-plug flat type	B: 2-plug flat + GND round hole type	C: 2-plug flat 8 type
		
D: 3-plug flat 8 type	E: 2-plug round (4.0mm) type	F: 2-plug round (4.0mm) type
		
G: 2-plug round + GND round hole type	I: 3-pin flat type	K: 3-pin round type
		
M: Switzerland type	N: Italy type	O: Denmark type

Table 3-6-2: Power socket selection

Country	Type	Country	Type
Asian-Pacific region			
Hong-Kong	I	Macau	E, G
Vietnam	A, B, E, G	Thailand	A, B
Malaysia	I	Singapore	I
Indonesia	E, G	India	I, K
Australia	C, D	New-Zealand	C, D

Japan	A, B	Korea	E, G
Middle East region			
Saudi Arabia	A, B, I	Iran	E
Dubai	G		
Europe region			
Italy	E, N	Austria	E, F, G
Poland	E, F, G	Hungary	F, G
Greece	E, F, G	Belgium	E, F, G
Netherlands	E, F, G	United Kingdom	I
France	E, F, G	Switzerland	E, M
Spain	E, F, G	German	E, F, G
Finland	E, F, G	Denmark	E, F, G, O
Russia	E, F, G	Turkey	E, F
America region			
United States	A, B	Canada	A, B
Mexico	A, B	Columbia	A, B
Venezuela	A, B	Brazil	A, B, E
Peru	A, B, E	Argentina	C, D
Chile	E, N	Uruguay	E
Africa region			

Rep. South Africa	K		

Table 3-6-3: Using region selection

Warning! Operating the machine incorrectly can cause serious injury and damage. Do not use the machine until you have read the following:

- Safety rules
- Before putting the power source into service

Warning! If the machine is plugged into the mains supply and the mains switch is in "ON" position during preparation, there is a high risk of very serious injury and damage. Only carry out preparation when the machine is unplugged from the mains and mains switch is OFF.

- **Stick welding**

1. Plug the ground cable into the output socket (-) and fasten it;
2. With the other end of ground cable, establish a connection to the work piece;
3. Plug the welding cable into the output socket (+) and fasten it;
4. Connect with single phase power supply, and put the circuit breaker in ON position;
5. Switch on the mains switch;
6. Select STICK mode with the "LIFT TIG/CEL/STICK" knob on control panel;
7. Turn "Welding Current" regulation knob to adjust the welding current according to the size of electrode;
8. Start welding.

- **Cellulose electrode welding**

1. Plug the ground cable into the output socket (+) and fasten it;
2. With the other end of ground cable, establish a connection to the work piece;
3. Plug the welding cable into the output socket (-) and fasten it;
4. Connect with single phase power supply, and put the circuit breaker in ON position;
5. Switch on the mains switch;
6. Select CEL mode with the "LIFT TIG/CEL/STICK" knob on control panel;
7. Turn "Welding Current" regulation knob to adjust the welding current according to the size of electrode;
8. Start welding.

- **Lift TIG welding**

  - **Shielding gas regulator operating instructions**

Warning! The inert gas can be hazardous to your health. Work in a place only if it is well ventilated. Please do not use the shielding-gas cylinder until you have completely read and followed all the instructions about shielding-gas cylinder and accessories.

1. Take the protective cap off the shielding-gas cylinder;
2. Briefly open the shielding-gas cylinder valve anticlockwise to blow off any dust and dirt;
3. Check the tightness of pressure regulator;

4. Screw the pressure regulator onto the gas cylinder and tighten it;
5. Place the shielding-gas cylinder on the solid, level surface or use cylinder bracket to prevent from toppling over.

➢ **The connection and operation for gas-cooling TIG welding**

1. Plug the ground cable into the output socket (+) and fasten it;
2. With the other end of ground cable, establish a connection to the work piece;
3. Screw the pressure regulator onto the gas cylinder and tighten it;
4. Plug the gas hose plug on the end of torch into the gas outlet of pressure regulator and screw it;
5. Connect with single phase power supply, and put the circuit breaker in ON position;
6. Switch on the mains switch;
7. Select LIFT TIG mode with the “LIFT TIG/CEL/STICK” knob on control panel;
8. Turn “Welding Current” regulation knob to adjust the welding current;
9. Open the pressure regulator valve and set the desired gas flow rate on the pressure regulator;
10. Contact tungsten electrode with work piece on welding zone, lift torch slightly away from work piece, arc is established, start welding;
11. Pull out electric arc after finishing welding;
12. Close cylinder valve after seconds.

3-7 Technical data

Model	PowerARC200C	
Control type	IGBT inveter	
Rated input voltage	1~230±15%	
Input voltage frequency (Hz)	50/60	
Rated input power (KVA)	7	9.4
Rated duty cycle (%)(@40℃)	35	20
Rated output open circuit voltage (V)	76	59
Ouput welding current (A)	20 ~ 200	20 ~ 250
Arc force current in MMA (A)	50	
Hot start current in MMA (A)	70	
Protection class	IP23S	
Insulation class	F	
COSφ	0.98	
Efficiency (%)	≥80	
Cooling style	Forced air cooling	

Dimension (W×D×H) (mm)	381×155×298
Weight (Kg)	9.3

Table 3-7-1: Technical data

3-8 Disassembly and reassembly

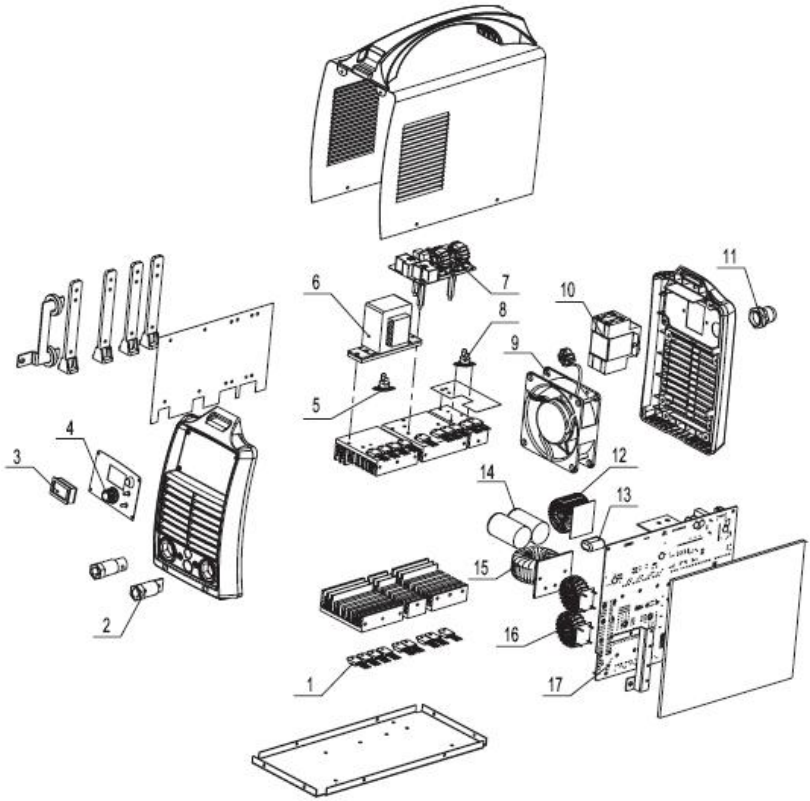


Fig. 3-8-1: Disassembly and Reassembly

No.	Item	Stock No.
1	Diode	730001-00027
2	Quick socket	740002-00080
3	Digital displayer	755001-00028
4	Potentiometer	766003-00062
5	Temperature relay	745008-00028

6	Power transformer	763001-00245
7	Dual voltage switch board	220900-00309
8	Temperature relay	745008-00031
9	Fan	746002-00025
10	Circuit breaker	745011-00068
11	Waterproof cable clamp connector	773002-00025
12	PFC inductor	763005-00145
13	Polypropylene capacitor	722001-00065
14	Aluminum electrolytic capacitor	722004-00146
15	Main transformer	763002-00030
16	Output reactor	763005-00023
17	Main control and drive board	210580-00964

Table 3-8-1: Main components

4 - TROUBLE SHOOTING

Note! The following troubles and causes are uncertain. However, during the process of welding and normal using conditions, that might happen.

№	TROUBLE	CAUSES	REMEDY
1	Digital display meter does not light up, fan does not run, no output when machine switches on	1. Power switch is damaged 2. No electricity on the electricity grid 3. Power supply cable is disconnection or break 4. Poor contact of power transformer between its input and output wire, or power transformer is damaged 5. Fuse FA1 is damaged	1. Check Power switch and the fan 2. Check power supply on the electricity grid 3. Check the connection of power supply cable 4. Check the power transformer input and output wire, or replace the power transformer 5. Replace Fuse FA1
2	Digital display meter lights up, but not Protection on LED, and no output	1. Output cables are not connected firmly 2. Main control board is damaged	1. Check and fasten the connection 2. Check and replace
3	Circuit breaker on the switchboard trips while in welding	1. The following devices may be damaged: IGBT, output diode, input rectifier bridge, etc	1. Check and replace
4	Welding current is not stable or not adjustable	1. Welding current adjustment potentiometer is damaged 2. Main control board is damaged 3. Bad connection in the welding machine	1. Check and replace
5	Fan does not work	1.Inverter does not work 2.Fan power circuit is damaged 3.Fan is damaged	1.Repair and replace
6	Varistor is damaged	1.Too large of voltage fluctuation 2.Generator power supply is unstable 3.Connect to 380V power or higher	1.Test power voltage 2.Change generator with stable power supply 3.Adopt 230V power supply

7	Protection LED is on	1.Fan does not work 2.Too large of duty cycle 3.Temperature relay is damaged	1.Repair or replace 2.Use as duty cycle marked on nameplate 3.Replace

Table 4-1: Trouble shooting

5 - CARE AND MAINTENANCE

- **Before open the machine**

Warning! An electric shock can be fatal. Before doing any work on the machine:

- Switch it off and unplug it from the mains
- Put up a clearly legible and easy-to-understand warning sign to stop anybody inadvertently switching it back on again
- Discharge the capacity if necessary
- Bolt in outer case also works for ground connection

- **Maintenance**

In order to guarantee normal use of power source, must follow the below points:

- Conduct safe check at regular intervals (see “Safety rules”)
- According to actual situation, but no less than twice a year, dismantle machine side panels by professional maintenance personnel and clean machine inner part with clean compressed air of low pressure. Avoid being too close to electronic components by the shower nozzle
- If a lot of dust has accumulated, clean the cooling-air ducts

- **Daily maintenance**

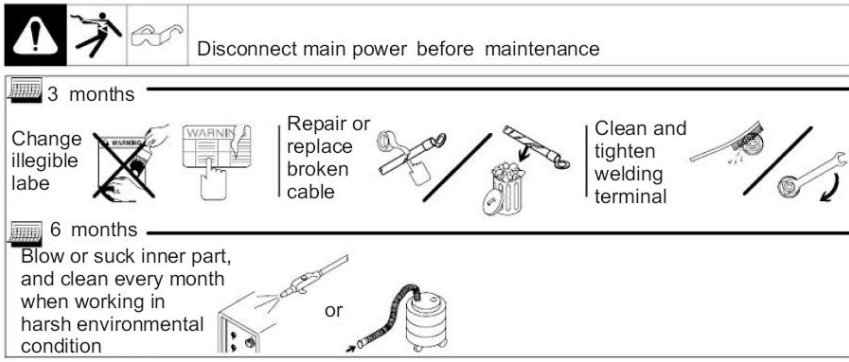


Fig. 5-1: Daily maintenance

6 - BASIC WELDING TECHNIQUE

Note! This section being general welding technique guide is for reference only.

Specific functions of your machine please refer to previous chapters.

6-1 TIG welding technique

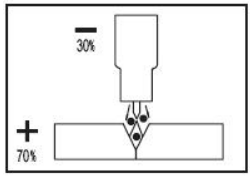


Fig. 6-1-1: Heat Input

The DC power source uses what is known as DC (direct current) in which the main electrical component known as electrons flow in only one direction from the negative pole (terminal) to the positive pole (terminal). In the DC electrical circuit there is an electrical principle at work which should always be taken into account when using any DC circuit. With a DC circuit 70% of the energy (heat) is always on the positive side. This needs to be understood because it determines what terminal the TIG torch will be connected to (this rule applies to all the other forms of DC welding as well).

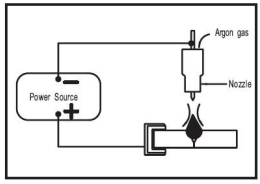
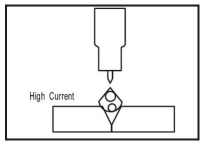


Fig. 6-1-2: TIG ARC

DC TIG welding is a process in which an arc is struck between a TUNGSTEN electrode and the metal work piece. The weld area is shielded by an inert gas flow to prevent contamination of the tungsten, molten pool and weld area.

When the TIG arc is struck the inert gas is ionized and superheated changing it's molecular structure which converts it into a plasma stream. This plasma stream flowing between the tungsten and the work piece is the TIG arc and can be as hot as 9000K+. It is a very pure and concentrated arc which provides the controlled

melting of most metals into a weld pool. TIG welding offers the user the greatest amount of flexibility to weld the widest range of material and thickness and types. DC TIG welding is also the cleanest weld with no sparks or spatter.



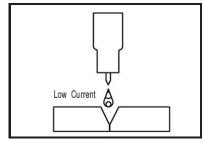
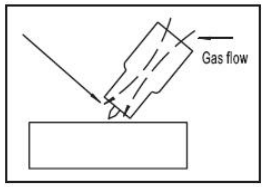


Fig. 6-1-3: Low current Fig. 6-1-4: High current

The intensity of the arc is proportional to the current that flows from the tungsten. The welder regulates the welding current to adjust the power of the arc. Typically thin material requires a less powerful arc with less heat to melt the material so less current (amps) is required, thicker material requires a more powerful arc with more heat so more current (amps) are necessary to melt the material.

LIFT ARC IGNITION for TIG (tungsten inert gas) Welding

Lift Arc is a form of arc ignition where the machines has low voltage on the electrode to only a few volts, with a current limit of one or two amps (well below the limit that causes metal to transfer and contamination of the weld or electrode). When the machine detects that the tungsten has left the surface and a spark is present, it immediately (within microseconds) increases power, converting the spark to a full arc. It is a simple, safe lower cost alternative arc ignition process to HF (high frequency) and a superior arc start process to scratch start.



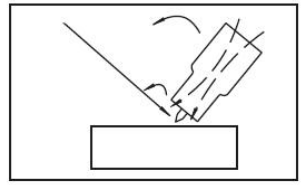
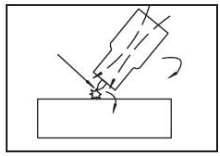


Fig. 6-1-5: Tungsten off the Work Fig. 6-1-6: Tungsten Touches the Work



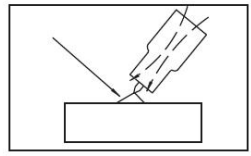


Fig. 6-1-7: Arc Ignition Fig. 6-1-8: Established TIG Arc

TIG Welding Fusion Technique

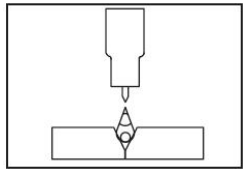


Fig. 6-1-9: TIG Arc

Manual TIG welding is often considered the most difficult of all the welding processes. Because the welder must maintain a short arc length, great care and skill are required to prevent contact between the electrode and the workpiece. Similar to Oxygen Acetylene torch welding, TIG welding normally requires two hands and in most instances requires the welder to manually feed a filler wire into the weld pool with one hand while manipulating the welding torch in the other. However, some welds combining thin materials can be accomplished without filler metal like edge, corner, and butt joints. This is known as Fusion welding where the edges of the metal pieces are melted together using only the heat and arc force generated by the TIG arc. Once the arc is started the torch tungsten is held in place until a weld pool is created, a circular movement of the tungsten will assist is creating a weld pool of the desired size. Once the weld pool is established tilt the torch at about a 75° angle and move smoothly and evenly along the joint while fusing the materials together.

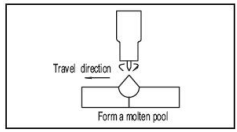


Fig. 6-1-10: Form a Weld Pool

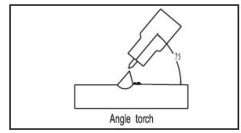


Fig. 6-1-11: Angle Torch

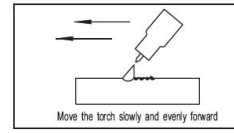


Fig. 6-1-12: Torch Move

TIG Welding with Filler Wire Technique

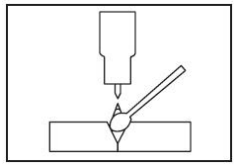


Fig. 6-1-13: Add TIG Filler Wire

It is necessary in many situations with TIG welding to add a filler wire into the weld pool to build up weld reinforcement and create a strong weld. Once the arc is started the torch tungsten is held in place until a weld pool is created, a circular movement of the tungsten will assist is creating a weld pool of the desired size. Once the weld pool is established tilt the torch at about a 75° angle and move smoothly and evenly along the joint. The filler metal is introduced to the leading edge of the weld pool. The filler wire is usually held at about a 15° angle and fed into the leading edge of the molten pool, the arc will melt the filler wire into the weld pool as the torch is moved forward. Also a dabbing technique can be used to control the amount of filler wire added, the wire is fed into the molten pool and retracted in a repeating sequence as the torch is moved slowly and evenly forward. It is important during the welding to keep the molten end of the filler wire inside the gas shield as this protects the end of the wire from being oxidised and contaminating the weld pool.

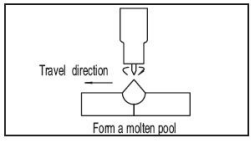


Fig. 6-1-14: Form a Weld Pool

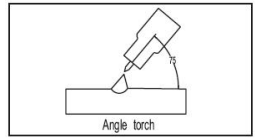


Fig. 6-1-15: Angle Torch

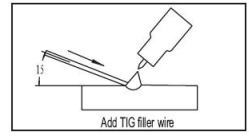


Fig. 6-1-16: Add TIG Filler Wire

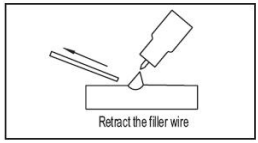


Fig. 6-1-17: Retract the Filler Wire

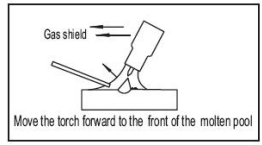


Fig. 6-1-18: Torch Move

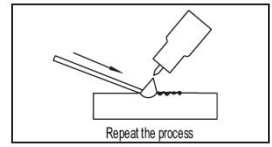


Fig. 6-1-19: Repeat the Process

Tungsten Electrodes

Tungsten is a rare metallic element used for manufacturing TIG welding electrodes. The TIG process relies on tungsten's hardness and high-temperature resistance to carry the welding current to the arc. Tungsten has the highest melting point of any metal, 3,410 degrees Celsius.

Tungsten electrodes are nonconsumable and come in a variety of sizes, they are made from pure tungsten or an alloy of tungsten and other rare earth elements. Choosing the correct tungsten depends on the material being welded, the amount of amps required and whether you are using AC or DC welding current.

Follow are common used tungsten types: Thoriated, Ceriated, Lanthanated, Zirconiated

Table 6-1-1: Tungsten Electrodes Rating for Welding Currents

Tungsten Diameter mm	DC Current Amps Torch Negative 2% Thoriated
1.0mm	15 - 80
1.6mm	70 -150
2.4mm	150 - 250
3.2mm	250 - 400
4.0mm	400 - 500

Tungsten Preparation

Always use DIAMOND wheels when grinding and cutting. While tungsten is a very hard material, the surface of a diamond wheel is harder, and this makes for smooth grinding. Grinding without diamond wheels, such as aluminium oxide wheels, can lead to jagged edges, imperfections, or poor surface finishes not visible to the eye that will contribute to weld inconsistency and weld defects.

Always ensure to grind the tungsten in a longitudinal direction on the grinding wheel. Tungsten electrodes are manufactured with the molecular structure of the grain running lengthwise and thus grinding crosswise is “grinding against the grain.” If electrodes are ground crosswise, the electrons have to jump across the grinding marks and the arc can start before the tip and wander. Grinding longitudinally with the grain, the electrons flow steadily and easily to the end of the tungsten tip. The arc starts straight and remains narrow, concentrated, and stable.

Table 6-1-2: Tungsten Diameter Rating for Angle and Current

Tungsten Diameter	Constant Included Angle - Degrees	Current Range Amps
1.0mm	20	05 - 30
1.6mm	25	08 - 50
1.6mm	30	10 - 70
2.4mm	35	12 - 90
2.4mm	45	15 - 150
3.2mm	60	20 - 200

3.2mm	90	25 - 250

6-2 STICK (SMAW) welding technique

One of the most common types of arc welding is manual metal arc welding (MMA) or stick welding. An electric current is used to strike an arc between the base material and a consumable electrode rod or 'stick'. The electrode rod is made of a material that is compatible with the base material being welded and is covered with a flux that gives off gaseous vapours that serve as a shielding gas and providing a layer of slag, both of which protect the weld area from atmospheric contamination. The electrode core itself acts as filler material the residue from the flux that forms a slag covering over the weld metal must be chipped away after welding.

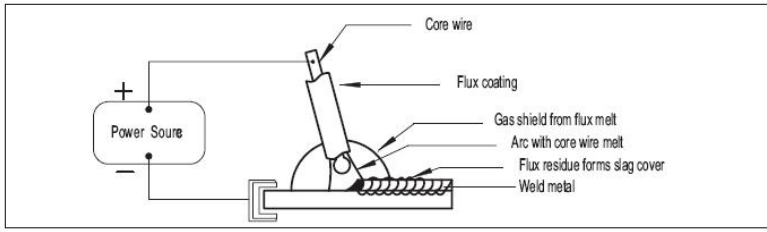


Fig. 6-2-1: Stick ARC

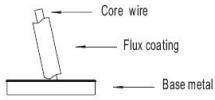


Fig. 6-2-2: Arc ignition

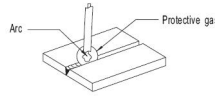


Fig. 6-2-3: Weld pool protection

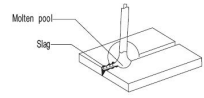


Fig. 6-2-4: Slag

• The arc is initiated by momentarily touching the electrode to the base metal.

• The heat of the arc melts the surface of the base metal to form a molten pool at the end of the electrode.

• The melted electrode metal is transferred across the arc into the molten pool and becomes the deposited weld metal.

• The deposit is covered and protected by a slag which comes from the electrode coating.

• The arc and the immediate area are enveloped by an atmosphere of protective gas.

Manual metal arc (stick) electrodes have a solid metal wire core and a flux coating. These electrodes are identified by the wire diameter and by a series of letters and numbers. The letters and numbers identify the metal alloy and the intended use of the electrode.

The Metal Wire Core works as conductor of the current that maintains the arc.

The core wire melts and is deposited into the welding pool.

The covering on a shielded metal arc welding electrode is called Flux.

The flux on the electrode performs many different functions.

These include:

● producing a protective gas around the weld area

● providing fluxing elements and deoxidizers

● creating a protective slag coating over the weld as it cools

● establishing arc characteristics

● adding alloying elements

Covered electrodes serve many purposes in addition to adding filler metal to the molten pool. These additional functions are provided mainly by the covering on the electrode.

MMA (Stick) Welding Fundamentals

Electrode Selection

As a general rule, the selection of an electrode is straight forward, in that it is only a matter of selecting an electrode of similar composition to the parent metal. However, for some metals there is a choice of several electrodes, each of which has particular properties to suit specific classes of work. It is recommend to consult your welding supplier for the correct selection of electrode.

Table 6-2-1: Electrode Size

Average Thickness of Material	**Maximum Recommended Electrode Diameter**
1.0 - 2.0mm	2.5mm

2.0 - 5.0mm	3.2mm
5.0 - 8.0mm	4.0mm
8.0 - > mm	5.0mm

The size of the electrode generally depends on the thickness of the section being welded, and the thicker the section the larger the electrode required. The table gives the maximum size of electrodes that maybe used for various thicknesses of section base on using a general purpose type 6013 electrode.

Table 6-2-2: Welding Current (Amperage)

Electrode Size ø mm	**Current Range (Amps)**
2.5mm	60 - 95
3.2mm	100 - 130
4.0mm	130 - 165
5.0mm	165 - 260

Correct current selection for a particular job is an important factor in arc welding. With the current set too low, difficulty is experienced in striking and maintaining a stable arc. The electrode tends to stick to the work, penetration is poor and beads with a distinct rounded profile will be deposited. Too high current is accompanied by overheating of the electrode resulting undercut and burning through of the base metal and producing excessive spatter. Normal current for a particular job may be considered as the maximum, which can be used without burning through the work, over-heating the electrode or producing a rough spattered surface.

The table shows current ranges generally recommended for a general purpose type 6013 electrode.

Arc Length

To strike the arc, the electrode should be gently scraped on the work until the arc is established. There is a simple rule for the proper arc length; it should be the shortest arc that gives a good surface to the weld. An arc too long reduces penetration, produces spatter and gives a rough surface finish to the weld. An excessively short arc will cause sticking of the electrode and result in poor quality welds. General rule of thumb for down hand welding is to have an arc length no greater than the diameter of the core wire.

Electrode Angle

The angle that the electrode makes with the work is important to ensure a smooth, even transfer of metal. When welding in down hand, fillet, horizontal or overhead the angle of the electrode is generally between 5

and 15 degrees towards the direction of travel. When vertical up welding the angle of the electrode should be between 80 and 90 degrees to the work piece.

Travel Speed

The electrode should be moved along in the direction of the joint being welded at a speed that will give the size of run required. At the same time, the electrode is fed downwards to keep the correct arc length at all times. Excessive travel speeds lead to poor fusion, lack of penetration etc, while too slow a rate of travel will frequently lead to arc instability, slag inclusions and poor mechanical properties.

Material and Joint Preparation

The material to be welded should be clean and free of any moisture, paint, oil, grease, mill scale, rust or any other material that will hinder the arc and contaminate the weld material. Joint preparation will depend on the method used include sawing, punching, shearing, machining, flame cutting and others. In all cases edges should be clean and free of any contaminates. The type of joint

PoWer ARC 200C

GeKaMac®

Gedik Welding
Ankara Caddesi No: 306 Şeyhli Pendik, İstanbul / Türkiye
T +90 216 378 50 00 F + 90 216 378 20 44
gedik@gedikwelding.com.tr
www.gedikwelding.com