InverArc 160 Plus
Owner's Manual

180 Joey Drive, Elk Grove Village, IL 60007 · Ph: (847) 357-0700 · Fax: (847) 357-0744 · Web: www.usaweld.com

Manufacturer's Warranty

It is expressly agreed that there are no warranties, expressed or implied, made by either the Salesman, Dealer, or HTP America, Inc. on products or parts furnished hereunder, except the Manufacturer's Warranty against defective materials or workmanship as follows:

HTP America, Inc. warrants each new welding machine to be free from defects in material and workmanship under normal use and service for three (3) years after delivery to the original purchaser. HTP America, Inc. will repair or replace, at its factory, any part or parts thereof. Products should be returned to HTP America, Inc., with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective. This warranty being in lieu of all other warranties, expressed or implied, and all other obligations or liabilities on its part and it neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale of its machines.

This warranty shall not apply to any welding machine which has been repaired or altered by unauthorized service departments in any way so as, in the judgment of HTP America, Inc., to affect its stability and reliability, nor which has been subjected to misuse, negligence, or accident.

HTP America, Inc. shall not be liable in any event, unless HTP America, Inc. receives notice of alleged breach of warranty, specifying the claimed defect, within not more than thirty (30) days after discovery.

HTP America, Inc. has reserved the right to make changes in design and/or add any improvements to its product at any time without incurring the obligation to install the same on equipment.

This warranty is void unless warranty card is sent to HTP America, Inc. within fifteen (15) days from the date of purchase.

Exclusions to Warranty:

The electrode holder and ground clamp is warrantied for a period of ninety (90) days against defects in material and workmanship.

NOTE: This warranty is to the original purchaser only. The warranty can be transferred to another owner, with HTP's approval, for a warranty transfer fee. HTP America, Inc. must be notified within fourteen (14) days of the sale and must be provided with the contact information of the original owner, the contact information of the new owner, and the serial number of the machine.

Safety Suggestions

People with PACEMAKERS should not use or come near the InverArc 160 Plus when in use.

Electric arc welding produces ultra-violet rays which are harmful to skin and eyes. Ultra-violet radiation can penetrate lightweight clothing, reflect from light-colored surfaces, and burn the skin and eyes.

- Wear a heavy, pocket-less, long-sleeved shirt, cuff-less trousers, and high-topped work shoes.
- Wear a full-faced welding helmet with a number ten (10) or darker shade and a cap.

Electric arc welding produces flying sparks and hot material, which can cause fire.

- Wear non-oily/non-greasy, flameproof welding gloves; the oil or grease on the gloves may ignite.
- To avoid fire, do not weld on wood, plastic tile, or carpeted floors. Concrete or masonry floors are safest.
- Do not weld on pressurized containers
- Do not weld on drums, barrels, tanks, or other containers until they have been cleared and cleaned as described in AWS Standard A6.01.
- Do not weld near flammable materials.

- Avoid having any type of fuel, such as cigarette lighters or matches, on your person as you weld.
- Ensure that there is a fire extinguisher in the welding area.

Electric arc welding produces toxic fumes.

- Provide adequate ventilation in the welding area at all times.
- Do not weld on galvanized zinc, cadmium, or lead beryllium materials unless you are POSITIVE that sufficient ventilation is provided. These materials produce toxic fumes.
- Do not weld in areas close to degreasing or spraying operations. Chlorinated hydrocarbon vapors may react with the ultra-violet rays and form highly toxic phosphine gas.
- If you develop eye, nose, or throat irritation during welding, stop welding immediately. This is an indication that ventilation is not adequate. Do not continue to weld until proper ventilation is provided.

Noise can damage your hearing. Protect yourself to avoid hearing damage.

The welding arc can cause burns. Keep the tip of the welding gun, torch, or arc welding clamp far from your body and from other persons.

ELECTRIC SHOCK CAN KILL.

Exposed, electrically hot conductors, other bare metal in the welding circuit, or ungrounded, electrically hot equipment can fatally shock a person whose body becomes a conductor. Do not stand, sit, lie, lean on, or touch a wet surface when welding.

- Disconnect the power supply before working on the welding machine.
- Do not work with deteriorated or damaged cables.
- Frequently inspect cables for wear, cracks, and damage. Replace cables with excessively worn insulation to avoid possible lethal shock from bare wire.
- Do not touch bare electrical parts.
- Ensure that all the panels covering the welding machine are firmly secured in place when the machine is connected to the power supply.
- Insulate yourself from the workbench and from the floor (ground); use insulating footwear and gloves.
- Keep gloves, footwear, clothes, the work area, and the welding equipment clean and dry.
- Check the machine power cable frequently; the power cable must be free from damage to the insulation. BARE CABLES ARE DANGEROUS. Do not use the machine if the power cable is damaged; it must be replaced immediately.
- If it is necessary to open the machine, first disconnect the power supply. Wait five (5) minutes to allow the capacitors to discharge. Failure to take this precaution may expose the operator to the dangerous risk of electric shock.

For more information, refer to the following standards and comply as applicable.

1) ANSI Standard Z49.1 SAFETY IN WELDING AND CUTTING, obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
2) ANSI Standard Z87.1 SAFE PRACTICE FOR OCCUPATIONAL AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
3) AWS Standard A6.0 WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable from the American Welding Society, 2051 NW 7th St., Miami, FL 33125.
4) NFPA Standard 51 OXYGEN-FUEL GAS SYSTEMS FOR WELDING AND CUTTING, obtainable from the National Fire Protection Association, 470 Atlantic Ave., Boston, MA 02210.
5) NFPA Standard 51B CUTTING AND WELDING PROCESSES, obtainable from the National Fire Protection Association, 470 Atlantic Ave., Boston, MA 02210.

6) CGA Pamphlet P-1 SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 500 Fifth Ave., New York, NY 10036.
7) OSHA Standard 29 CFR, Part 1910, Subpart Q WELDING, CUTTING, AND BRAZING.

Specifications

Input Power	120V, Single Phase, 50/60Hz		230V, Single Phase, 50/60Hz	
	Stick	TIG	Stick	TIG
Maximum Input Amperage (A)	31.8	19.5	21.3	13.8
Effective Input Power (A)	17.4	15.1	13.5	8.7
Power Factor	0.99		0.99	
Output Amperage (A)	10 to 125		10 to 160	
Max No-Load Voltage (V)	55 (80)			
Duty Cycle (Stick & TIG)	30%@125A 60% @ 95A 100% @ 75A	60% @ 125A 100% @ 90A	40% @ 160A 60% @ 125A 100% @ 100A	
Protection Class	IP23			
Insulation Class	F			
Dimensions (L x W x H)	14.37” x 5.51” x 9.06”			
Weight	17.64 Lbs.			

Electrical Connection

Your InverArc 160 Plus operates on single-phase, 110V or 220V power. The machine draws 21.3 amps out of the wall when operating at a welding output of 160 amps. This machine is NOT APPROVED for generator use.

General Characteristics

With the InverArc 160 Plus, you can run the following processes: SMAW (stick) and GTAW (TIG). The InverArc 160 Plus features an IGBT (insulated gate bipolar transistor) power module. The microprocessor circuit controls and optimizes arc transfer irrespective of the load variation and of the impedance of the welding cables. The inverter technology used in the InverArc 160 Plus enabled us to obtain the following:

- Lightweight design with compact dimensions
- Reduced energy consumption
- Excellent dynamic response
- Very high power factor and yields
- Better welding characteristics
- Ease of use

The sensitive components used in the InverArc 160 Plus are cooled with forced air by fans with low noise production, and the InverArc also features sophisticated, electronic overheat protection to prevent damage to your machine.

The InverArc 160 Plus also functions as a lift-start, DC TIG. To run the InverArc in the TIG welding mode, you only need a TIG torch (with a gas valve in the handle), a flowmeter, and a gas bottle. You can adjust the output amperage without a remote control—simply use the knob on the InverArc to adjust the output amperage as necessary.

General Information About Stick Welding

Whether welding or hard surfacing, you can choose from a plethora of stick welding electrodes, in a multitude of material types, with even a variety of rods available in a single material type (for example, mild steel). Varieties include fast freeze rods, high elongation rods, high tensile strength rods, low tensile strength rods, easy slag removal rods, in-position rods, out-of-position rods, high deposition rate rods, etc. All of these rod types and varieties work on Direct Current (although, some may also work on Alternating Current).

If you purchase rods from name brand manufacturers, the box typically provides the specifications for the rod. For example, the specifications include the amperage range the rod is designed to run in. A good rule of thumb is to start welding in the middle of the provided amperage range. If you experience the rod sticking, increase the amperage until the arc runs smooth. On the other hand, if you experience a large amount of spatter, reduce the amperage until the arc runs smooth.

The specifications will also state the required polarity. If the specifications show DCEP (Direct Current Electrode Positive), the electrode holder and cable must be connected to the positive output receptacle (Fig. X, #Y), and the ground clamp and cable must be connected to the negative output receptacle (Fig. X, #Y). This is commonly referred to as reverse polarity. If the specifications show DCEN (Direct Current Electrode Negative), the electrode holder and cable must be connected to the negative output receptacle, and the ground clamp and cable must be connected to the positive output receptacle. This is commonly referred to as straight polarity.

Lastly, the specifications will often state the tensile strength, elongation, and which welding positions you can use the rod for. For example, the specifications will state All Position, All Position Except Vertical Down, Flat and Horizontal

Only, and so on. In some cases, smaller diameters such as 3/32", 1/8", and 5/32" will be labeled All Position and bigger rods such as 3/16" and ¼" will be labeled Flat Only—but this is not always the case. When in doubt about acceptable welding positions, simply check the rod box. The specifications chart on the box should tell you everything, or close to everything, you need to know about the rod.

Common Stick Welding Electrode Types and Descriptions

6010—Rod with a cellulosic coating, fast freeze puddle, deep penetration, slag can be hard to remove, less elongation of welds, not the most attractive welds, may present some hydrogen cracking. However, rod runs All Position including vertical up and down. Also forgiving for some contamination of the parent metal. An excellent choice for root passes.

7018—Rod with a low hydrogen coating. Flows nicely. Probably the most popular rod in today's market. Builds a thick, easy to remove slag layer on top of the weld, medium penetration, excellent bead appearance, puddle stays wet and fluid much longer than 6010, higher tensile strength than 6010. Good choice for the maintenance welder and even to do x-ray quality structural welds.

6013—Rod with a cellulosic coating that runs on old and simple AC (Alternating Current) stick welders. Typically referred to as the farmer's rod.

7014—Rod with properties similar to 7018, but also designed to run on older, simpler stick welders.

The stick rods listed above represent the most common types of rods available today. However, an almost endless selection of rod types are available to you. We simply cannot cover all rod types in the manual.

Since 7018 is probably the most popular welding rod available today, please find a few pointers below.

How to find the right amperage when you lose the box?

The general rule of thumb with 7018: For every 0.001" of welding rod diameter, you need about 1 amp.

What does this mean?

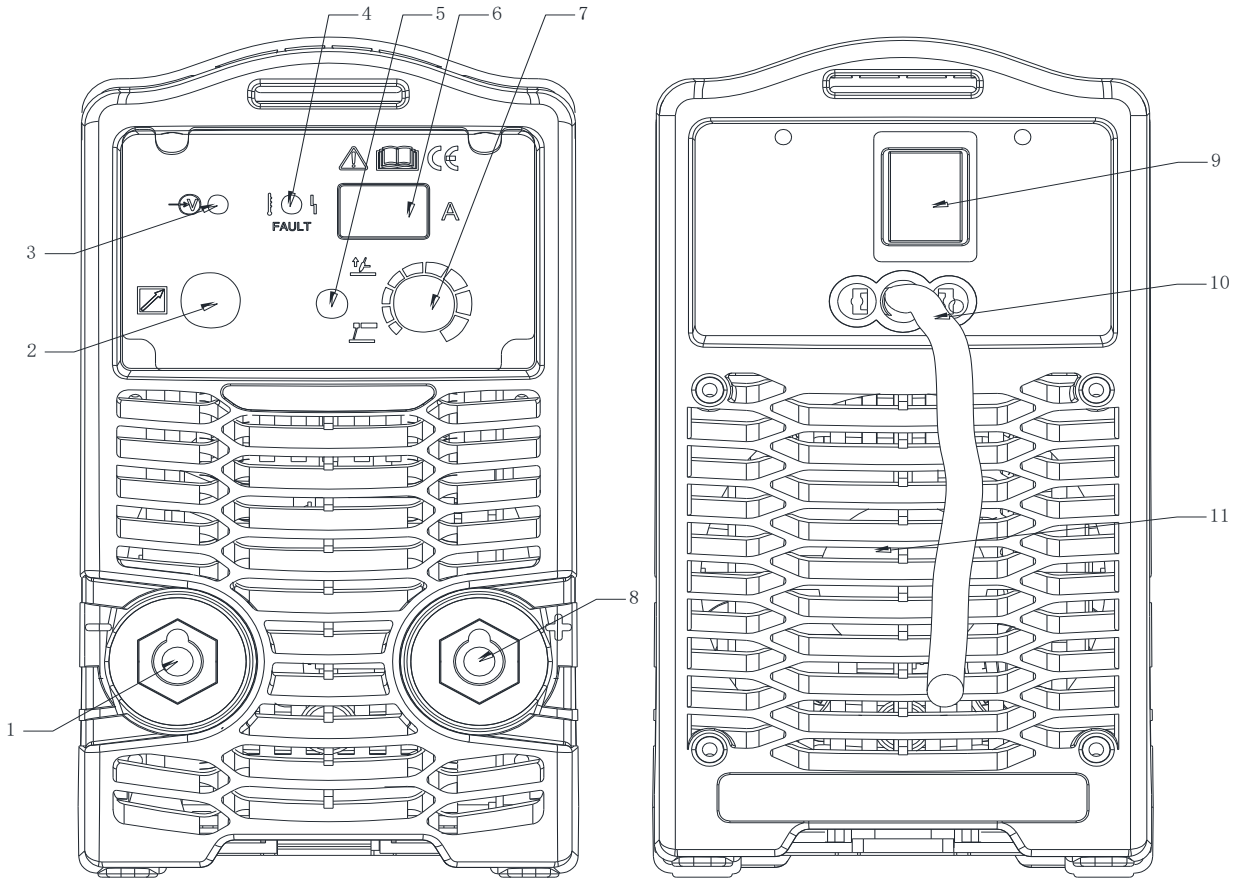
Rod Diameter Fraction	Rod Diameter Decimal	Required Amperage
3/32"	0.09375" rounded to 0.094"	94 amps
1/8"	0.125"	125 amps
5/32"	0.15625" rounded to 0.156"	156 amps

Fig. X

Will these numbers be a perfect fit for every rod manufacturer and every position you will weld 7018 rod in?

No, but the numbers get you really close.

Operation Controls & Connections



Position	Description	Position	Description
1	Negative Output Receptacle	7	Encoder
2	Remote Control Connection	8	Positive Output Receptacle
3	Power LED	9	Power Switch
4	Alarm LED	10	Power Cable
5	Welding Mode Selection Switch	11	Fan/Fan Grid
6	Amperage Display		

TIG Welding with the InverArc 160 Plus

1) Use the Welding Mode Selection Switch (Fig. X, #5) to put the InverArc 160 Plus into the TIG welding mode.
2) Use the encoder (Fig. X, #7) to select your welding amperage (shown in the Amperage Display (Fig. X, #6)).

Procedure for TIG Welding with Lift Start Ignition

Start Welding:

1) Bring the tip of the electrode (tungsten) into contact with the work piece at a slight slant.
2) Touch the electrode (tungsten) against the work piece, and then slightly lift the torch away from the work piece, by approximately 2 to 4mm, to start the welding process.

End Welding:

1) Pull the arc away from the work piece to end the welding process.

Stick Welding with the InverArc 160 Plus

1) Use the Welding Mode Selection Switch (Fig. X, #5) to put the InverArc 160 Plus into the Stick welding mode.
2) Use the encoder (Fig. X, #7) to select your welding amperage (shown in the Amperage Display (Fig. X, #6)).
3) With the InverArc 160 Plus, you can strike an arc in two different ways: through knocking or lifting. When using the knocking method, hold the electrode upright to touch the work piece. Then, quickly lift the electrode by about 2 to 4mm to start the arc and weld. The knocking arc method may be difficult to master, but this is the preferred arc starting method when welding brittle or hard steel. When using the lifting method, scrape the electrode against the work piece to strike an arc, slightly lift the electrode off the work piece, and weld.
4) To end welding, pull the arc away from the work piece to end the welding process.

InverArc 160 Plus Wiring Diagram