

Invertig 201 AC/DC

Owner's Manual



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 years after delivery to the original purchaser. HTP America, Inc. will repair and replace, at its factory, any part or parts thereof, products to 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 expressly 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 within not more than 30 days after the discovery, actual or construction alleged breach of warranty specifying the claimed defect.

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

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

Note:

Exclusions to Warranty:

1. The Tig Welding Torch is warranted for a period of ninety (90) Days against defects in material and workmanship.
2. The tungsten, collet, collet body, ceramic nozzles are consumable items,
WHICH CARRY NO WARRANTY.

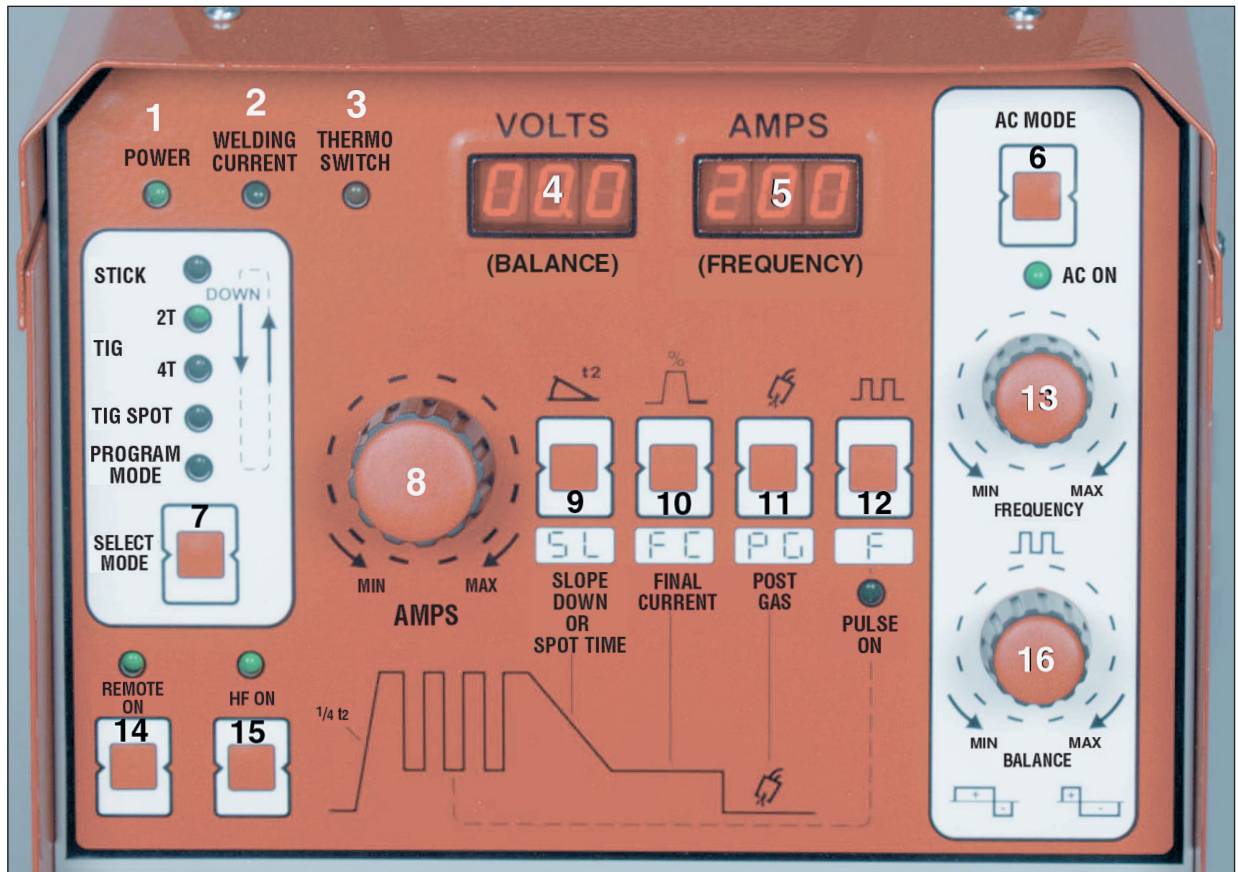
Safety Suggestions

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 flameproof welding gloves which are not oily or greasy. The oil or grease on the gloves may ignite. Wear a heavy, pocket-less, long sleeve shirt, cuffless trousers, and high-topped work shoes. Wear a full-face welding helmet with a number eight or darker lens and a cap. These precautions will protect eyes, hair, face, and skin from arc rays and hot material.

- To avoid fire, do not weld on wood, plastic tile, or carpeted floors. Concrete or masonry floors are safest.
- Do not weld on drums, barrels, tanks or other containers until they have been cleared as described in AWS Standard A6.01.
- Provide adequate ventilation in the welding area at all times. Do not weld on galvanized zinc, cadmium or lead beryllium materials unless POSITIVE 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 phosgene gas.
- If you develop momentary 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 ventilation is improved.
- Exposed, electrically hot conductors or 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.
- Frequently inspect cables for wear, cracks, and damage. Replace those with excessively worn insulation to avoid a possible lethal shock from bared cable.

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 Welding Society, 2051 NW 7th St., Miami, FL 33125.
2. ANSI Standard Z87.1 SAFE PRACTICE FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018.
3. America Welding Society Standard A6.0 WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable same as item 1.
4. NFPA STANDARD 51. OXYGEN-FUEL GAS SYSTEMS FOR WELDING AND CUTTING, obtainable from the National Fire Protection Assoc., 470 Atlantic Avenue, Boston, MA 02210.
5. NFPA Standard 51B. CUTTING AND WELDING PROCESSES, obtainable same as item 4.
6. CGA PAMPHLET P-1. SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.
7. OSHA Standard 29 CFR, Part 1910, Subpart Q WELDING, CUTTING AND BRAZING.



(Fig. 1)

Electrical Connection

Your Invertig 201 AC/DC operates on single-phase 230 volt power (+/- 20%). The machine is not shipped with a plug. The input power cord has 3 wires. The yellow-green wire is ground, and the blue and brown wires are the hot leads.

Input power and will require a 30-amp circuit when operating at 200 amps.

All electrical connections should be performed by a qualified electrician in accordance with the National Electrical Code and local codes and ordinances.

Front Panel Controls (See Fig. 1)

1. Power Indicator Lamp

This lamp is illuminated when the On-Off switch on the back of your Invertig 201 is turned to the 1 or "On" position, indicating the unit is correctly connected to 220 volt AC power.

2. Welding Current Indicator Lamp

When either the foot pedal or the trigger switch on the TIG torch is depressed, welding current will be applied to the welding torch and the Welding Current Indicator Lamp will be illuminated.

If your Invertig 201 AC/DC is in the stick-welding mode, the welding current indicator lamp will be illuminated all the time.

3. Thermoswitch Indicator Lamp

The thermoswitch indicator lamp will light up when the duty cycle of your Invertig 201 AC/DC has been exceeded. When this lamp is illuminated, the machine will no longer weld because the machine has overheated. Leave the machine plugged in and turned on so the cooling fans can cool the unit down. Allow the machine to cool for 15 to 30 minutes, the thermoswitch should reset automatically and your Invertig will be ready to weld.

4. Welding Volts - Digital Display

The Welding Volts Digital Display is a multi function display. When you are welding, this displays the welding voltage.

Pressing other touch pad buttons will display other parameters in the "VOLTS" display. Those displays will be covered in the section covering those touch pad buttons.

5. Welding Amps - Digital Display

The Welding Amps Digital Display is a multi function display. When you are welding, this displays welding amperage.

Pressing other touch pad buttons will display other parameters in the "APMS" display. Those displays will be covered in the section covering those touch pad buttons.

6. AC Welding Mode

Depressing the AC welding mode button will illuminate the green “AC ON” light indicating your Invertig 201 is in the AC welding mode.

To turn the AC Welding Mode off, depress the AC Welding Mode button for at least 3 seconds until the green AC welding mode light goes out.

7. Welding Mode Switch

The welding mode push button allows you to select the welding mode of your Invertig 201 AC/DC.

- A) Stick Welding – this mode is used when stick electrode welding. The electrode will always be hot and the gas solenoid will not operate. The green “Welding Current” lamp will be illuminated indicating the welding current is on.
- B) TIG 2T mode – With the torch trigger or foot pedal depressed, your Invertig 201 will start the arc. When the trigger is released, the unit will stop. Select this welding mode for operation with the foot pedal or the torch mounted amperage control. This will generally be the most common mode of operation.
- C) TIG 4T mode – This is like a lock on trigger on a drill or grinder. This mode is generally used with a TIG torch which has an trigger to start and stop the arc. It is generally not used with a foot pedal or a torch mounted amperage control.

When you depress the trigger on the torch, your Invertig 201 provides pre-gas flow for as long as the trigger is depressed. When the trigger is released, it will slope up to the welding amperage that has been selected. When the trigger is depressed again, the welding current will slope down to the final current. As long as the trigger is depressed, your Invertig 201 will continue to weld at the final current which has been selected. When the trigger is released, the arc will extinguish, and the post flow will start.

We do not recommend using the 4t mode with either the foot pedal or the torch mounted amperage control.

- D) TIG SPOT – the spot welding mode allows you to weld for between 0.1 and 10 seconds and then the unit will automatically stop. This would be a good selection if you were performing a series of repetitive tack welds.

To select the spot welding time, adjust the “SPOT TIME” buttons (#7) up or down to select a time between 0.1sec and 10.0 sec. Touching the “SPOT TIME” button will display “SI” for “Spot Time” in the “Volts” display (#4) and the actual spot welding time in the “Amps” display (#5).

- E) PROGRAM MODE – using a TIG torch which has a trigger switch, the program mode allows you to switch between 2 programmed welding amperages.

For example, let's say you have your welding current set at 150 amps, and your “FINAL CURRENT” set at 50% or 75 amps. Depress the trigger and you have pre-gas flow for as long as you keep the trigger depressed. Release the trigger and your TIG 201 will begin to weld at 150 amps. Depress and release the trigger and you will go to your final current of 75 amps. Depress and release the trigger again and you will go back to 150 amps. To stop welding, depress the trigger for 5 seconds or longer. When the trigger is released the arc is extinguished and the machine will go into post gas flow.

8. Adjustment Knob

This knob determines the welding amperage. The amperage on your Invertig 201 can be adjusted from 5 to 200 amps. The amperage is displayed in the digital display panel (#5) when the remote switch (#14) is off.

When using a remote amperage control, the amperage adjustment knob is used to select the maximum amperage for your particular welding application. For example, when welding .050" 6061 alloy aluminum, I adjusted the amperage knob to 100 amps with the remote off. This is about 20% more power than I will be welding the aluminum with. I then turned the remote switch on (green “REMOTE ON” lamp is on) and the digital display showed the minimum amperage of 5 amps. If I were to depress the foot pedal completely, the maximum amperage would now be 100 amps.

Setting the machine so the maximum amperage is 100 amps vs the maximum output of the machine of 200 amps, the pedal becomes less sensitive. More of a movement in the pedal results in a smaller variance of the amperage, making it easier to control the heat and therefore easier to control your puddle.

9. SLOPE DOWN or SPOT TIME Button

When the Welding Mode is in the TIG 2T Mode, TIG 4T Mode, or the PROGRAM Mode, this button allows you to adjust the slope down time from 0.1 sec to 10 sec. This is the amount of time it will take for the welding amperage to go from the welding amperage to the final current. To adjust the “SLOPE DOWN” time, depress and release the “SLOPE DOWN” Button. The “VOLTS” display will flash “SL” for slope, and the “AMPS” display will flash and display the slope down time in seconds. While both displays are flashing, adjust the “AMPS” knob (#8) to set the slope down time.

NOTE: If you are using a torch mounted remote amperage control or a foot pedal, it is advisable to set the slope down time to 0.1 sec, as you are controlling the slope down manually with your remote amperage control or foot pedal.

When the welding mode is in the TIG SPOT Mode this button adjusts the spot welding time from 0.1 sec to 10.0 sec in 0.1 sec increments. To adjust the “SPOT TIME”, depress and release the “SLOPE DOWN or SPOT TIME” Button. The “VOLTS” display will flash “St” for spot time, and the “AMPS” display will flash and display the spot time in seconds. While both displays are flashing, adjust the “AMPS” knob (#8) to set the slope down time.

10. FINAL CURRENT Buttons

Depressing this button allows you to adjust the Final Current. This is only applicable when your Invertig 201 is set in the TIG 4T mode, PROGRAM mode, or pulse mode. The final current is adjustable from 10% to 90% of the base current that is set by the amperage adjustment knob (#8). For example, if the amperage adjustment knob is set to 100 amps, and the final current is set to 15%, the final current will be 15 amps.

To adjust the “FINAL CURRENT” time, depress and release the “FINAL CURRENT” button. The “VOLTS” display will flash “FC” for final current, and the “AMPS” display will flash and display the final current in percent. While both displays are flashing, adjust the “AMPS” knob (#8) to set final current in percent of the base current.

11. POST GAS

The post gas flow is adjustable from .5 sec to 30 sec in 0.1 sec increments. Post gas flow is necessary because after the arc is extinguished; if the gas stopped flowing immediately, there is a possibility the molten weld puddle would come in contact with the atmosphere, causing weld defects. Additionally it prevents the tungsten from becoming contaminated by the atmosphere while it is still hot. The gas flow should run long enough to allow the orange color of the tungsten to disappear. It is important to remember not to remove the TIG torch from the weld until the post gas cycle has been completed. A good starting point for the post gas flow is 5.0 sec. If you are welding at higher amperages or on more critical alloys it may be necessary to increase the post gas flow to a higher value.

To adjust the “POST GAS” time, depress and release the “POST GAS” button. The “VOLTS” display will flash “PG” for post gas, and the “AMPS” display will flash and display the post gas time in seconds. While both displays are flashing, adjust the “AMPS” knob (#8) to set the post gas flow time in seconds.

12. PULSE ON

By depressing the “PULSE ON” button, the green light will illuminate indicating your Invertig 201 is in the pulse mode. At this time the “VOLTS” display will show “dut” for the pulsing duty cycle. The “AMPS” display will show “FrE” for the pulsing frequency. Which ever display is flashing is the one which can be adjusted by the amperage adjustment knob (#8). If the “dut” is flashing and you want to adjust the frequency, simply depress and release the “PULSE ON” button and the other display will begin flashing and you will be able to adjust it.

To adjust the pulse duty cycle, depress and release the “PULSE ON” button until “dut” which is displayed in the “VOLTS” display is flashing. While the display is flashing, adjust the “AMPS” knob (#8) to set the pulse duty cycle. Once the amps knob is turned, the display will change from “dut” to display the duty cycle in percent. The duty cycle can be adjusted from 30% to 65% in increments of 5%.

To adjust the pulse frequency, depress and release the “PULSE ON” button until “FrE” which is displayed in the “VOLTS” display is flashing. While the display is flashing, adjust the “AMPS” knob (#8) to set the pulse frequency. Once the amps knob is turned, the display will change from “FrE” to display the frequency in Hz. The frequency can be adjusted from 0.4 to 2.0 Hz in the AC mode, and from 0.4 to 300 Hz in the DC mode.

To turn off the pulse mode, depress the “PULSE ON” button at least 3 seconds until the green pulse light goes off.

13. AC Frequency Knob

The AC frequency knob adjusts the length of the AC square wave. It can be adjusted from 20 Hz to 200 Hz without any loss in welding output. When the AC is on, and the “FREQUENCY” knob is adjusted, the amps display flashes and becomes the frequency display.

Conventional transformer machines have their AC frequency fixed at 60 Hz. It is beneficial to run the machine at the higher frequencies (150 to 200hz) for the following reasons:

- A) Produces a more focused arc that results in a narrower bead.
- B) Heat is more concentrated, minimizing the heat affected zone.
- C) Allows you to weld aluminum with a 2% thoriated, 2% ceriated or 2% lanthanated tungsten sharpened to a point. Arc is much more stable and is less likely to wander.

14. REMOTE ON

When the remote is on, the green indicator lamp will be illuminated position, the amperage is infinitely adjustable by either the foot pedal or the torch mounted amperage control. It is possible to limit the maximum amperage of your TIG 201. To limit the maximum amperage of the machine to 100 amps, for example, with the foot pedal plugged in or torch mounted amperage control plugged into the 5 pin connection, depress the “REMOTE ON” button for 5 seconds until the green indicator lamp turns off. Using the amperage adjustment knob (#8) adjust the amperage to 100 amps. Depress the “REMOTE ON” button for 5 seconds until the green indicator lamp turns on. The digital display panel should read 5 amps. Now, when you fully depress the foot pedal, the amperage displayed should be 100 amps. This makes the foot pedal less sensitive and makes it easier to control your puddle.

It is also possible to adjust the starting amperage. When you push the remote on button, “rem” is flashing and displayed in the “Volts” display (#4) and the starting amperage is flashing and displayed in the “Amps” display (#5). While both displays are flashing, adjust the amperage adjustment knob (#8) to adjust the starting amperage. The starting amperage can be set to any value as long as it is less than the maximum amperage.

When the remote is off, the green light will be off, and the amperage will be adjusted by the amperage adjustment knob (#8) on the front of the welder

15. HF ON

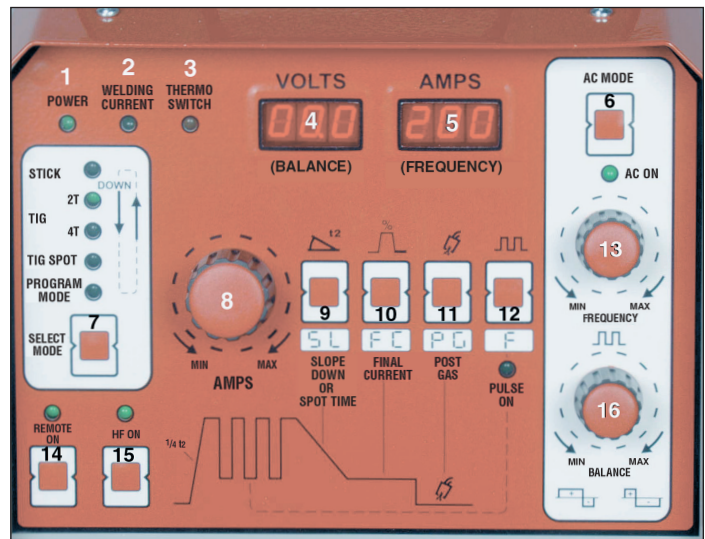
Depressing the “HF ON” button so the green light is illuminated turns the high frequency arc starting on. When the foot pedal is depressed, a high frequency arc will jump from the tungsten to the ground, initiating the arc. This makes it very easy to start the arc. Additionally, in the AC mode, the high frequency is only used to start the arc, unlike conventional transformer welders which must have the high frequency on all the time to maintain the arc.

When the high frequency is off, it is possible to do “lift arc” starting. The lift arc mode allows you to initiate the welding arc without high frequency. This is important in any environment where the high frequency arc will cause interference with sensitive electrical components or computers. A good example of this would be stainless steel or aluminum repair in hospitals. The Lift Arc mode works for both AC and DC welding.

To TIG Weld using the Lift Arc Mode, simply touch the tungsten to the workpiece, activate the torch trigger or depress the foot pedal and lift off. When the tungsten breaks contact with the work, the arc will start. You can also use this method for Stick welding with the added benefit of being able to vary your amperage with the foot pedal.

For Lift-Arc in aluminum, please remember the following pointers to make arc ignition easier:

1. Keep the tungsten in contact with the workpiece for at least 5 seconds before lifting off the work piece.
2. When using remote amperage control, it is advisable to start the arc at a much higher amperage than the actual welding amperage. Once the arc has been established, reduce the amperage to the welding amperage.
3. For Lift Arc at lower amperages, the correct tungsten (2% Lanthanated) correct diameter, and a correctly ground tungsten are very important.
4. A higher frequency (200 Hz) and higher balance (90%) will make it easier to initiate your arc.



Front Panel Controls

16. AC Balance Knob

The AC Balance Knob lets you adjust the “balance” of the positive part of the AC wave with respect to the negative part of the AC wave. When the AC is on, and the “BALANCE” knob is adjusted, the volts display flashes and becomes the balance display. Your Invertig 201 allows you to adjust the AC balance from 10% to 90%, a substantially greater range than is possible with conventional transformer units (40% to 60%). When the AC balance is set to 50%, the positive part of the AC wave and the negative part of the AC wave are equal.

Setting the AC balance to a higher percentage (51 to 90 %) increases the electrode negative portion of the wave (torch or tungsten is negative, work piece is positive – the electrons flow from the torch to the workpiece). This increases penetration, lengthens the tungsten life, but reduces the cleaning portion of the wave.

Setting the AC balance to a lower percentage (49 to 10%) increases the electrode positive portion of the wave (torch or tungsten is positive, work piece is negative – the electrons flow from the workpiece to the torch). This increases the amount of heat that builds up in the torch and shortens tungsten life, decreases penetration, but increases the cleaning portion of the wave.

Front Panel Connections

1) Gas Output Connection

This is where you connect the gas fitting from the TIG Torch. The gas output is controlled by the solenoid valve, which is mounted inside the welder.

2) Negative Output Receptacle

When TIG welding, this is where the TIG Torch connects to your Invertig 201 Welder. That's right, we said the TIG Torch. This is called straight polarity, with the torch negative and the work positive. When using your Invertig Welder to TIG weld, all work will be done in straight polarity.

When Stick Welding Direct Current Electrode Negative (DCEN), the optional electrode holder will be plugged into the negative output receptacle. When Stick Welding Direct Current Electrode Positive (DCEP), the ground cable will be plugged into the negative output receptacle

To install a cable into the negative output receptacle, insert the male end of the cable into the negative output receptacle and twist clockwise until snug.

3) 3 Pin Trigger Connection

This connection is used with TIG torches, which have on/off triggers on the torch. Your Invertig 201 comes standard with a footpedal which has the on/off function built into the pedal, so an on/off trigger on the TIG torch is not necessary. Therefore, this connection is not used.

4) Positive Output Receptacle

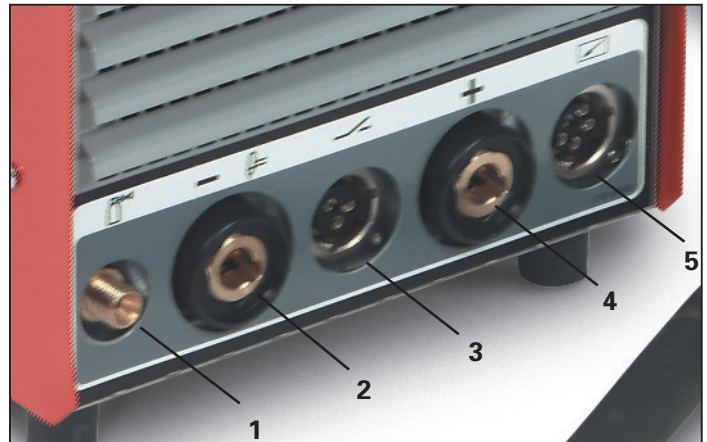
When TIG welding, this is where the ground cable connects to the front of the TIG Adapter. That's right, we said the ground cable. This is called straight polarity, with the torch negative and the work positive.

When Stick Welding Direct Current Electrode Negative (DCEN), the ground cable will be plugged into the positive output receptacle. When Stick Welding Direct Current Electrode Positive (DCEP), the electrode holder will be plugged into the positive output receptacle.

To install a cable into the positive output receptacle, insert the male end of the cable into the positive output receptacle and twist clockwise until snug.

5) 5 pin Footpedal Connection

this is where the footpedal connects to the Invertig 201. Insert the connection into the machine and twist the lock ring to lock into place.



Front Panel Connections

Rear Panel Controls

1) On-Off Switch

This switch controls the input power to your Invertig Welder. 0 is off and 1 is on.

Shield Gas

TIG welding requires a shield gas of 100% Argon. A shield gas is used to keep the surrounding atmosphere from coming in contact with the molten weld puddle. The correct flow rate is enough gas to shield the molten weld puddle and protect the tungsten electrode. Any greater flow rate is a waste of shield gas. Usually, the flow rate will be set anywhere between 15 and 30 cubic feet per hour (cfh).

Use a flowmeter as HTP Part #12020-F which is compatible with Argon cylinders and has a barbed fitting for the delivery hose. Connect a gas hose to the gas fitting at the rear of the machine and to the barbed fitting on the regulator.

Your Invertig welder comes with a gas hose that connects the TIG welder to the flowmeter. The input gas fitting is located in the back of the welder.

If you will be welding thick aluminum castings such as an aluminum cylinder head, high purity helium can be used. When welding thick aluminum sections like this and using helium, to achieve added penetration it should be welded in DC.



Tungsten Electrodes

With conventional transformer Tig welders, the general rule of thumb is to use a pure tungsten (identified by a green tip) for AC welding (generally aluminum), and a 2% thoriated tungsten (identified by a red tip) for DC welding (generally steel welding). However, with an inverter Tig welder, the ability to control the frequency and balance over a much wider range allows you to take advantage of the new “rare earth” tungsten which is no available.

A 2% lanthanated or 2 % ceriated tungsten is the best tungsten selection for both AC and DC welding with a modern inverter power source.

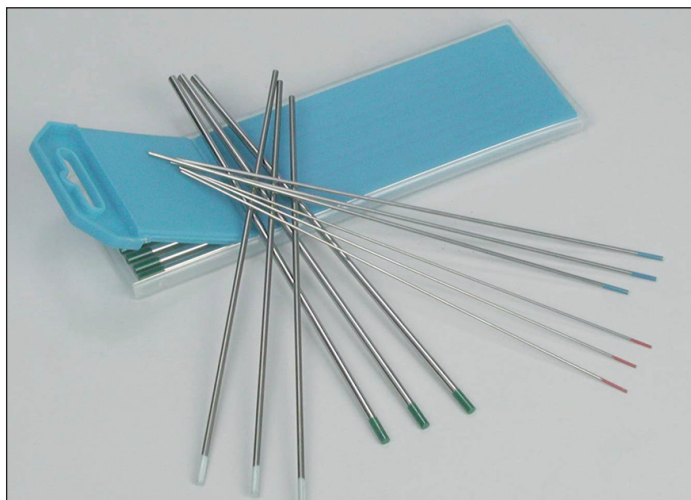
HTP offers the following premium quality tungsten ground to a high quality finish. All tungsten is 7" long and can be purchased individually.

Pure Tungsten (TP) – green tip - Pure tungsten readily forms a ball on the end. It is generally used with transformer based power sources for AC welding of aluminum.

2% Thoriated Tungsten (TT2) – red tip - This tungsten is the most common tungsten currently used. Generally used for DC welding of steel and stainless steel. Draw back is it has a low level radiation hazard. Offers good overall performance.

2% Ceriated Tungsten (TC2) – grey tip - 2% ceriated is an excellent substitute for 2% thoriated tungsten if you are using a transformer based power source for DC welding. More popular for thinner materials because it requires less amperage to start. Offers a stable arc. Can be used for both AC and DC welding with inverter power sources.

2% Lanthanated Tungsten (TL2) – blue tip – 2% lanthanated is probably the most popular substitute for 2% thoriated tungsten. It offers good arc starting characteristics and longer life than 2% thoriated. Can be used for both AC and DC welding with both inverter and transformer power sources.



Tungsten Type	Diameter			
	.040" (1.0mm)	1/16" (1.6mm)	3/32" (2.4mm)	1/8" (3.2mm)
Pure Tungsten	TP-7040	TP-7116	TP-7332	TP-718
2% Thoriated	TT2-7040	TT2-7116	TT2-7332	TT2-718
2% Ceriated	TC2-7040	TC2-7116	TC2-7332	TC2-718
2% Lanthanated	TL2-7040	TL2-7116	TL2-7332	TL2-718
Amperage - AC	20-30	30-80	60-130	120-200
Amperage - DC	15-50	50-120	80-150	130-250



Tungsten Sharpener

The electrode should be sharpened to a point with a fine grinding wheel. If the stone used for sharpening the electrode is not clean, contaminants could lodge in the electrode and dislodge when welding. The grinding wheel used for tungsten electrodes should not be used for any other materials. When grinding the electrode to a point, a 15 to 30 degree angle is desired. The grinding marks should run lengthwise with the point, opposed to in the direction of the diameter.

The HTP Tungsten Sharpener is an excellent tool for precisely sharpening tungsten electrodes without any fear of contamination.

General Welding Parameters

Following are some “rule of thumb” welding parameters tungsten diameters and amperage settings for welding different thicknesses of aluminum and steel. Keep in mind these are general settings and the specific application may require more or less power to get the job done.

Aluminum

Thickness	Tungsten Diameter	Machine Amperage	Welding Amperage	Filler Diameter
.030"	.040"	50	30-40	1/16"
.050"	1/16"	70	50-60	1/16"
.062" (1/16")	1/16"	80	65-75	1/16"
.093" (3/32")	3/32"	120	105-115	1/16"
.125" (1/8")	3/32"	150	125-135	3/32"
.187" (3/16")*	1/8"	170	150-160	3/32"
.250" (1/4")*	1/8"	200	180	3/32"
.312" (5/16")*	1/8"	200	200	3/32"

* May require beveling – depends on joint

Steel

Thickness	Tungsten Diameter	Machine Amperage	Welding Amperage	Filler Diameter
.030"	.040"	50	30-40	.035"
.050"	1/16"	70	45-55	.035"
.062" (1/16")	1/16"	80	55-65	1/16"
.093" (3/32")	1/16"	110	80-90	1/16"
.125" (1/8")	1/16"	130	110-120	1/16"
.187" (3/16")*	1/16"-3/32"	150	130-140	1/16"
.250" (1/4")*	3/32"	170	150-160	3/32"
.312" (5/16")*	3/32"-1/8"	200	170-180	3/32"
.375" (3/8")*	1/8"	200	200	3/32"

* May require beveling – depends on joint

Quick Set Up

- 1) Welding Mode in 2T for foot pedal.
- 2) Steel welding AC off – Aluminum Welding AC on
- 3) Slope down – 0.1 seconds
- 4) Final Current – 1%
- 5) Post Gas Flow – 5 Sec
- 6) Frequency – 200 Hz for aluminum.
Not applicable for steel.
- 7) Balance – 60% for aluminum.
Not applicable for steel.
- 8) Remote – on
- 9) Ground clamp plugged into Positive receptacle
- 10) Tig Torch into Negative receptacle
- 11) Pulse off

Filler Rod

Part #	Material	
4043-1/16-1	4043 Alloy Aluminum Wire	1/16" x 36"
4043-3/32-1	4043 Alloy Aluminum Wire	3/32" x 36"
5356-1/16-1	5356 Alloy Aluminum Wire	1/16" x 36"
5356-3/32-1	5356 Alloy Aluminum Wire	3/32" x 36"
308L-035-1	308L Stainless Steel Wire	.035" x 36"
308L-1/16-1	308L Stainless Steel Wire	1/16" x 36"
70S6-1/16-1	ER70S-6 Steel Wire	1/16" x 36"
70S6-3/32-1	ER70S-6 Steel Wire	3/32" x 36"
70S2-1/16-1	ER70S-2 Steel Wire	1/16" x 36"
80SD2-1/16-1	ER80SD-2 Steel Wire	1/16" x 36"



Filler Rod for TIG Welding

HTP offers you high quality filler rods in affordable quantities. All filler rod is packaged in 1lb air-tight plastic tubes to keep your filler rod fresh and contaminant free. The tubes are completely re-sealable.

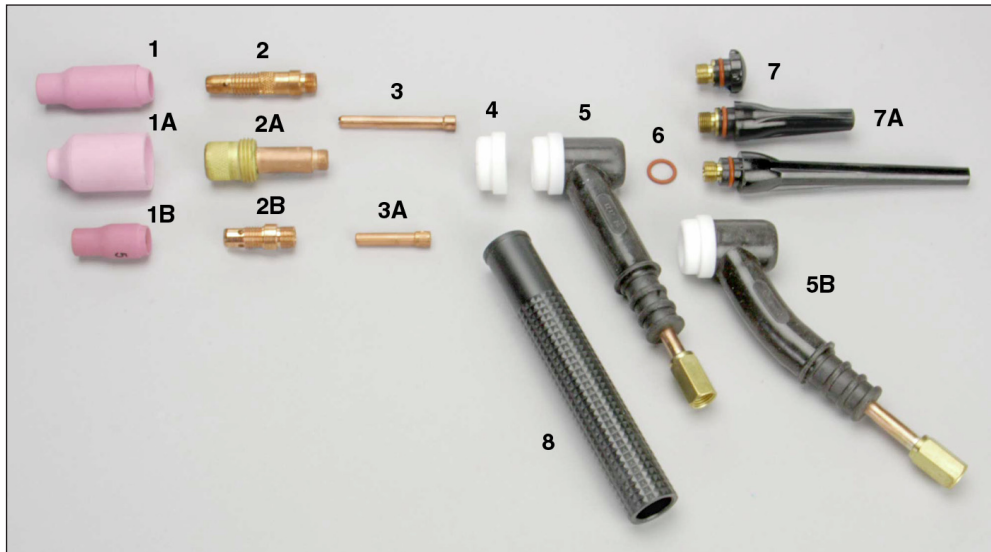
In TIG welding, the filler rod is fed into the molten puddle by hand. The choice of filler rod is extremely important as the rod must correctly match the material and alloy you will be welding. The thickness of the material to be welded determines the diameter of the filler rod.

Here are some good rules of thumb to help you select the correct filler metal:

- 1) 4043 is a good general filler metal for most aluminum applications. Remember 2xxx and 7xxx series aluminum is generally not recommended if the application requires welding.
- 2) 5356 is used for 5xxx series aluminum and is generally preferred if the finished piece will be anodized.
- 3) ER70S-6 is generally used for mild steel welding.
- 4) ER70S-2 is highly recommended for welding 4130 chrome-moly tubing in many applications.
- 5) ER80S-D2 is recommended for welding 4130 chrome-moly tubing if a higher strength, less ductile weld is required. If your weld will be heat treated to obtain optimum strength, then use a filler metal which matches the chemistry of your tubing, which neither 70S-2 nor 80S-D2 wires do.
- 6) Generally speaking, use a 1/16" diameter filler rod for applications where the material is 1/8" and less. Use a 3/32" diameter rod for 1/8" and thicker.

The following Filler Rod is available from HTP in 1 lb. tubes which are tightly sealed to prevent oxidation.

17 Series Air-Cooled Tig Torch Parts Breakdown

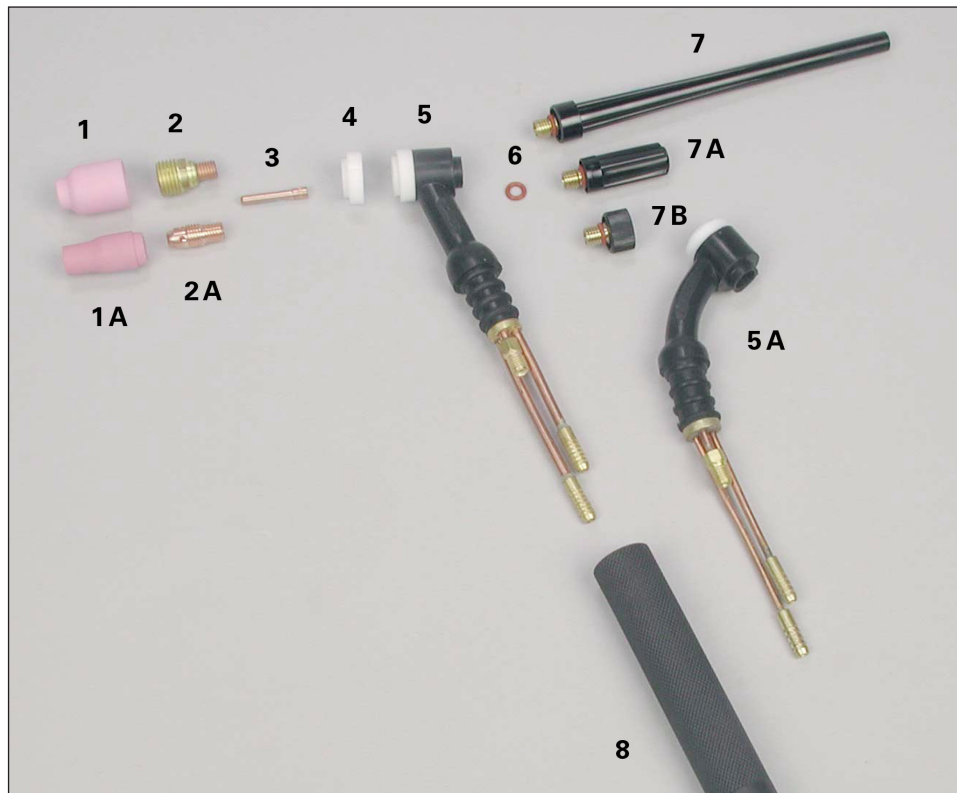


Illus #	Description	Tungsten Diameter			
		0.040"	1/16"	3/32"	1/8"
Standard Configuration					
1	Alumina Nozzle	10N49	10N48	10N47	10N46
2	Collet Body	10N30	10N31	10N32	10N28
3	Collet	10N22	10N23	10N24	10N25
Gas Lens Configuration (optional)					
1A	Alumina Nozzle	54N17	54N16	54N15	54N14
2A	Gas Lens Collet Body	45V24	45V25	45V26	45V27
3	Collet	10N22	10N23	10N24	10N25
Short Configuration (optional)					
1B	Alumina Nozzle	13N08	13N09	13N10	13N11
2B	Collet Body	17CB20	17CB20	17CB20	17CB20
3B	Collet	13N21	13N22	13N23	13N24

Following parts fit all tungsten diameters

4	Cup Gasket (Std& Short)	18GC
	Cup Gasket (Gas Lens)	3GHS
5	Torch Head	SR-17
5A	Flexible Torch Head	SR-17F
6	O-Ring	98W18
7	Short Back Cap	300S
7A	Medium Back Cap	300M
7B	Long Back Cap	300L
8	Handle	H-100

20 Series Water Cooled Tig Torch Parts Breakdown

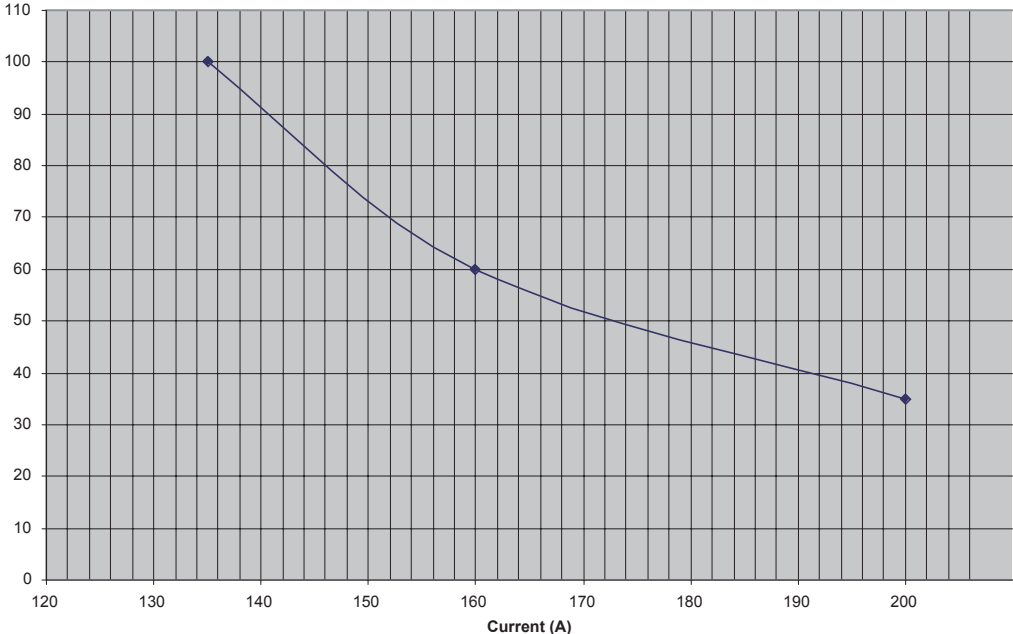


Illus #	Description	Tungsten Diameter			
		0.040"	1/16"	3/32"	1/8"
Gas Lens Configuration (optional)					
1	Alumina Nozzle	53N59	53N60	53N61	53N61S
2	Gas Lens Collet Body	45V42	45V43	45V44	45V45
3	Collet	13N21	13N22	13N23	13N24
Standard Configuration					
1A	Alumina Nozzle	13N08	13N09	13N10	13N11
2	Collet Body	13N26	13N27	13N28	13N29
3	Collet	13N21	13N22	13N23	13N24

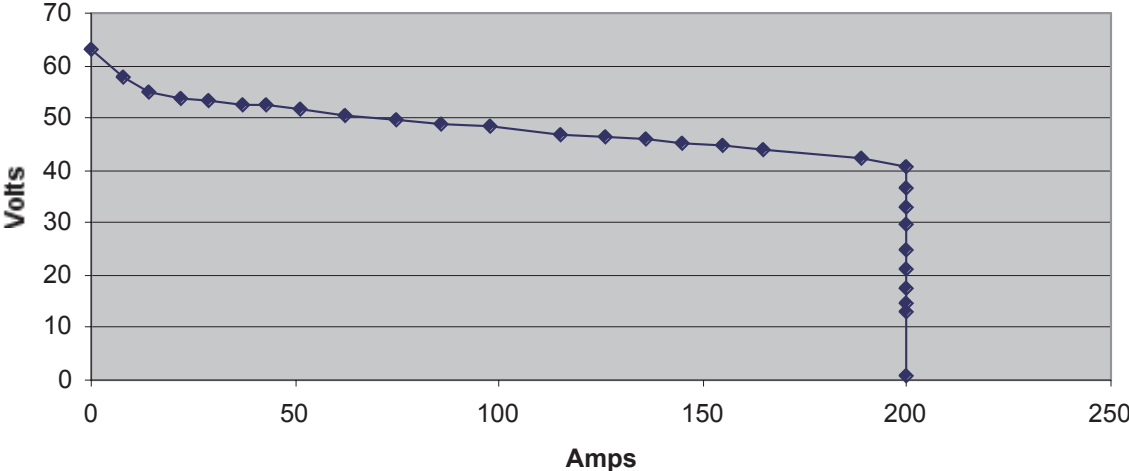
Following parts fit all tungsten diameters

4	Cup Gasket	2GHS
5	Torch Head	20
5A	Flexible Torch Head	20F
6	O-Ring	200R
7	Long Back Cap	200L
7A	Medium Back Cap	200M
7B	Short Back Cap	200S
8	Handle	20HR

Duty Cycle Curve HTP Invertig 201



Voltage/Amp Curve HTP Invertig 201



HTP Water Cooler - P/N 60070 HTP 201

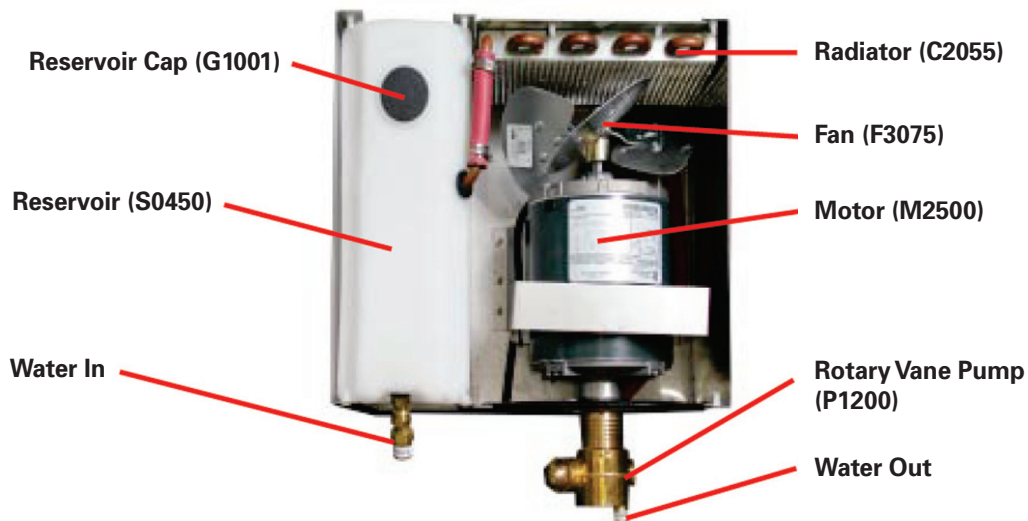
Installation

Remove the reservoir cap and fill the reservoir tank with HTP Coolant. HTP coolant has a pump lubricant designed to lubricate and extend the life of the water pump. HTP coolant also protects your cooling system from freezing down to 10 Deg F. It is also recommended to use HTP's Eliminator which will prevent algae from growing in your cooling system.

Install the 20 series torch into the negative output receptacle on the front of the Invertig 201. The cooling line, which comes out of the quick connector, is the Hot Water Out Line from the TIG torch and should be connected to the Water In connection on the water cooler. Note the threads are left hand. Tighten using 2 wrenches. Since the seal is made by the fitting and not the threads, do not use teflon tape.

The other cooling line, which runs directly into the Velcro outer cover, is the Cool Water In Line. This line takes the cool water from the water cooler and runs it directly to the torch head. Connect this line to the Water Out connection on the water cooler. Note the threads are left hand. Tighten using 2 wrenches. Since the seal is made by the fitting and not the threads, do not use teflon tape.

Connect the power cord to the back of the Invertig 201's 6-pin ILME connector. When you turn on the Invertig 201, the water cooler will automatically turn on. Turn the machine on and check for leaks.



TIG Torch Recirculating Water Cooling System

Pressure – 50 psi

Capacity – 2 gallons

Power Requirements – 230 VAC 1.5 amps 50/60 Hz

Cooling Capacity – 10,000 BTU (torches up to 250 amps)

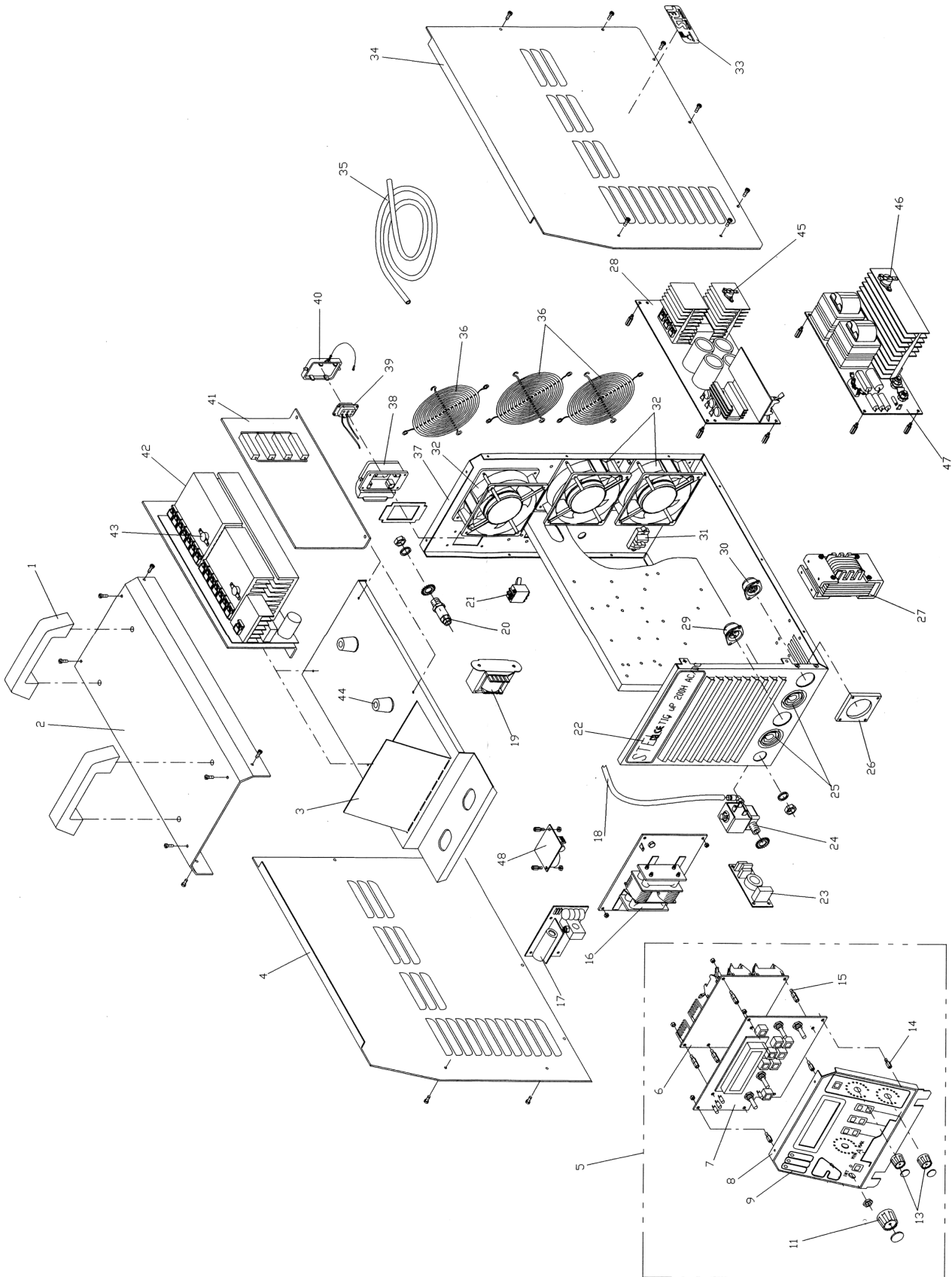
Dimensions – 12" L x 14" W x 9" H

Weight – 30 lbs.

Water Fittings – 5/8 x 18 LH Inert Gas Fittings

Power Cord – 8 ft with 6-pin ILME connector

HTP Invertig 201 Parts Breakdown



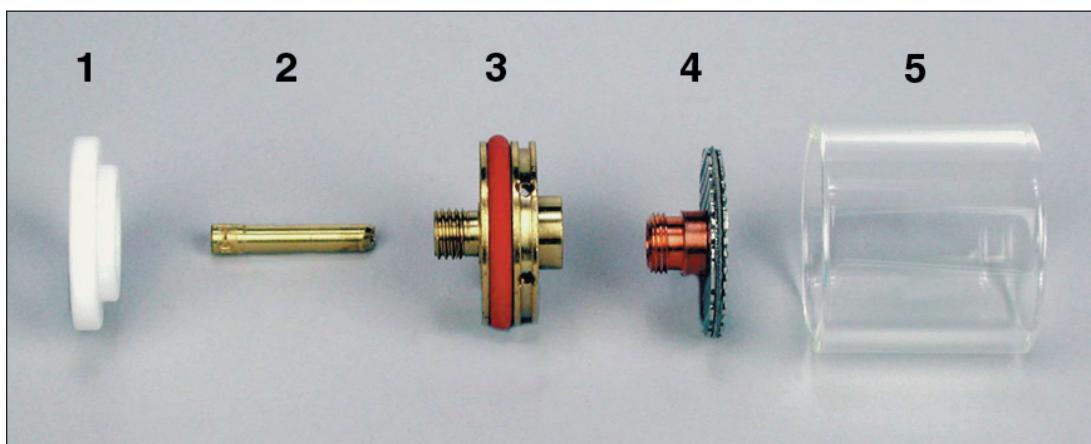
HTP Invertig 201 Spare Parts List

Illus #	Part #	Description
1	66109	HANDLE
2	62500	LID
3	62483	INTERMEDIATE PANEL
4	62349	SIDE PANEL
5	610092	FRONT PANEL ASSEMBLY
6	613330	DRIVER PCB
7	610716	LOGIC PCB
8	62482	FRONT PANEL
9	660136	FRONT PLATE
11	66208	KNOB d.29
13	66121	KNOB d.22
14	63131	BRASS SUPPORT M4 X 15mm
15	63130	BRASS SUPPORT M4 X 10mm
16	61950	FILTER PCB FOR HF
17	61895	HF PCB
18	66160	GAS HOSE
19	65997	AUXILIARY TRANSFORMER
20	61702	COUPLING
21	64053	ON/OFF SWITCH
22	66537	LOGO PLATE
23	61733	LINE FILTER PCB
24	61703	SOLENOID VALVE
25	64274	SOCKET
26	66797	INSULATING PLATE
27	61457	INDUCTANCE
28	610643	PRIMARY POWER ASSEMBLY
29	61620	3 WAY ANPHENOL CONNECTOR
30	61623	5 WAY ANPHENOL CONNECTOR
31	66061	CORE HITCH
32	64182	MOTOR POWER FAN
33	66293	SIDE PLATE
34	62349	SIDE PANEL
35	61650	POWER SUPPLY CABLE
36	66098	GRID
37	62481	BASE
38	64518	ILME CONNECTOR
39	64519	6 WAY ILME
40	64520	PLUG
41	61732	CLIPPING RESISTANCES
42	61896	CONVERTER PCB
43	64215	THERMAL SWITCH 70°C
44	66501	FOOT
45	65776	THERMAL SWITCH 60°C
46	65774	THERMAL SWITCH 80°C
47	610628	SECONDARY POWER PCB
48	61049	TORCH SWITCH FILTER PCB

Pyrex Parts

Pyrex Cup Kits

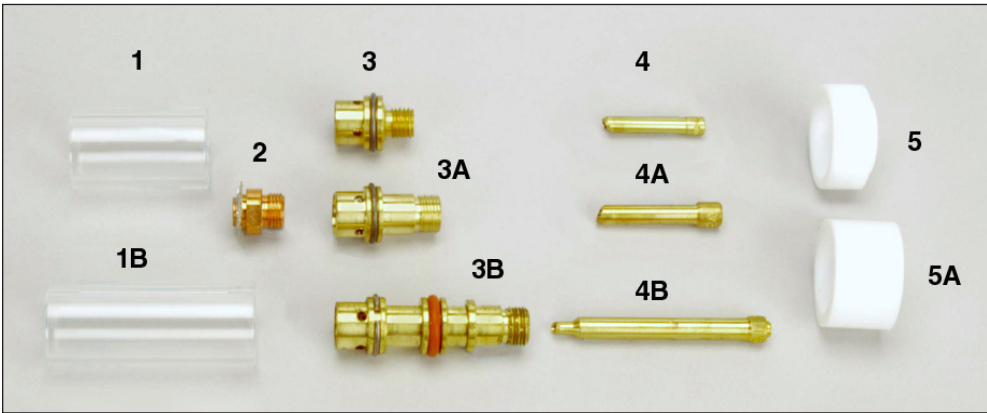
Nothing makes welding easier than being able to see what you are doing. HTP's Pyrex Cup kits do just that! The clear Pyrex cup gives you unparalleled visibility of the arc and work. The Pyrex Cup kit also comes standard with our special gas saver gas lens kit. This unique system saves gas while at the same time providing better gas coverage with a more even and uniform gas flow. Eliminates gas turbulence which can cause weld quality problems. Pyrex cup kits are available to fit all standard torches. There is even a special large diameter kit available for welding titanium.



Pyrex-Big Parts

Large Diameter Pyrex Cup Kits

Illus #	Description	Tungsten Diameter			
		0.040"	1/16"	3/32"	1/8"
<i>9 and 20 Series Tig Torches</i>					
1	Heat Shield	2HSGSLD	2HSGSLD	2HSGSLD	2HSGSLD
2	Wedge Collet	PYR20C040	PYR20C116	PYR20C332	PYR20C18
3	Collet Body	PYR20LDCB	PYR20LDCB	PYR20LDCB	PYR20LDCB
4	Tungsten Adapter	PYR040TA-LD	PYR116TA-LD	PYR332TA-LD	PYR18TA-LD
5	Pyrex Cup	PYR20LD	PYR20LD	PYR20LD	PYR20LD
	Complete Kit	PYREX20LD-040	PYREX20LD-116	PYREX20LD-332	PYREX20LD-18
<i>17, 18, and 26 Series Tig Torches</i>					
1	Heat Shield	4HSGSLD	4HSGSLD	4HSGSLD	4HSGSLD
2	Wedge Collet	PYR17SC040	PYR17SC116	PYR17SC332	PYR17SC18
3	Collet Body	PYR17LDCB	PYR17LDCB	PYR17LDCB	PYR17LDCB
4	Tungsten Adapter	PYR040TA-LD	PYR116TA-LD	PYR332TA-LD	PYR18TA-LD
5	Pyrex Cup	PYR17LD	PYR17LD	PYR17LD	PYR17LD
	Complete Kit	PYREX17LD-040	PYREX17LD-116	PYREX17LD-332	PYREX17LD-18

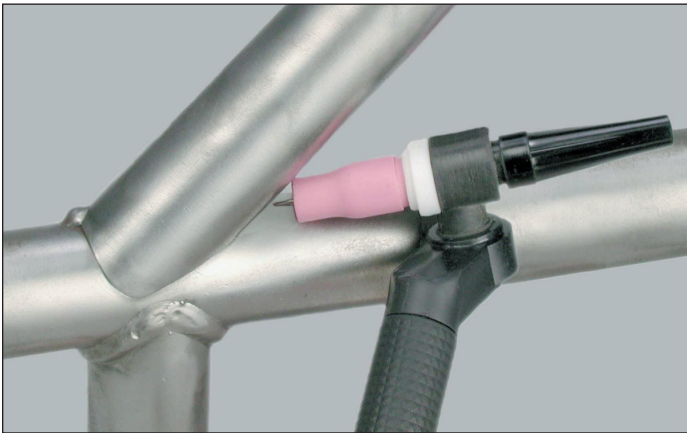


Pyrex Cup Parts

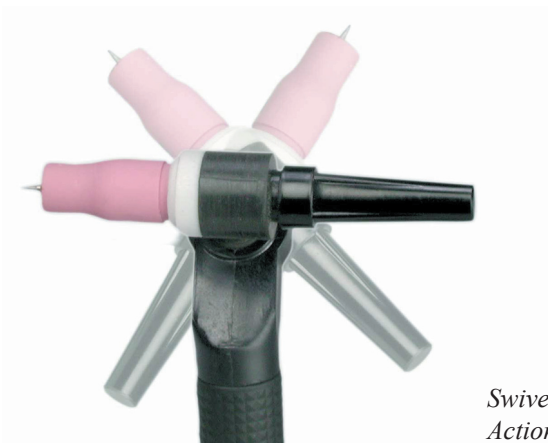
Illus #	Description	Tungsten Diameter			
		0.040"	1/16"	3/32"	1/8"
<i>For 9 and 20 Tig Torches</i>					
1	Pyrex Cup	PYR8S	PYR8S	PYR8S	PYR8S
2	Tungsten Adapter	PYR040TA	PYR116TA	PYR332TA	PYR18TA
3	Collet Body	PYR20CB	PYR20CB	PYR20CB	PYR20CB
4	Wedge Collet	PYR20C040	PYR20C116	PYR20C332	PYR20C18
5	Heat Shield	2HSGS	2HSGS	2HSGS	2HSGS
	Complete Kit	PYREX20-040	PYREX20-1/16	PYREX20-3/32	PYREX20-1/8
<i>For 17, 18, and Series 26 Tig Torches</i>					
<i>Short Configuration</i>					
1	Pyrex Cup	PYR8S	PYR8S	PYR8S	PYR8S
2	Tungsten Adapter	PYR040TA	PYR116TA	PYR332TA	PYR18TA
3A	Collet Body	PYR17SCB	PYR17SCB	PYR17SCB	PYR17SCB
3A	Wedge Collet	PYR17SC040	PYR17SC116	PYR17SC332	PYR17SC18
5A	Heat Shield	3HSGS	3HSGS	3HSGS	3HSGS
	Complete Kit	PYREX17S-040	PYREX17S-1/16	PYREX17S-3/32	PYREX17S-1/8
<i>Standard Configuration</i>					
1B	Pyrex Cup	PYR8L	PYR8L	PYR8L	PYR8L
2	Tungsten Adapter	PYR040TA	PYR116TA	PYR332TA	PYR18TA
3B	Collet Body	PYR17LCB	PYR17LCB	PYR17LCB	PYR17LCB
4B	Wedge Collet	PYR17LC040	PYR17LC116	PYR17LC332	PYR17LC18
5A	Heat Shield	3HSGS	3HSGS	3HSGS	3HSGS
	Complete Kit	PYREX17-040	PYREX17-1/16	PYREX17-3/32	PYREX17-1/8

Flex Neck Tig Torch

Need to change the angle of your Tig torch to get into that tight area? Trouble is, with a standard Tig torch you can't. Well, HTP has the answer: our Flex Neck Tig Torch. This unique torch lets you bend the end of your Tig torch into virtually any position, allowing you quick, easy access to practically any tight, cramped or out-of-the-way spot. Imagine how much easier your welding will be!

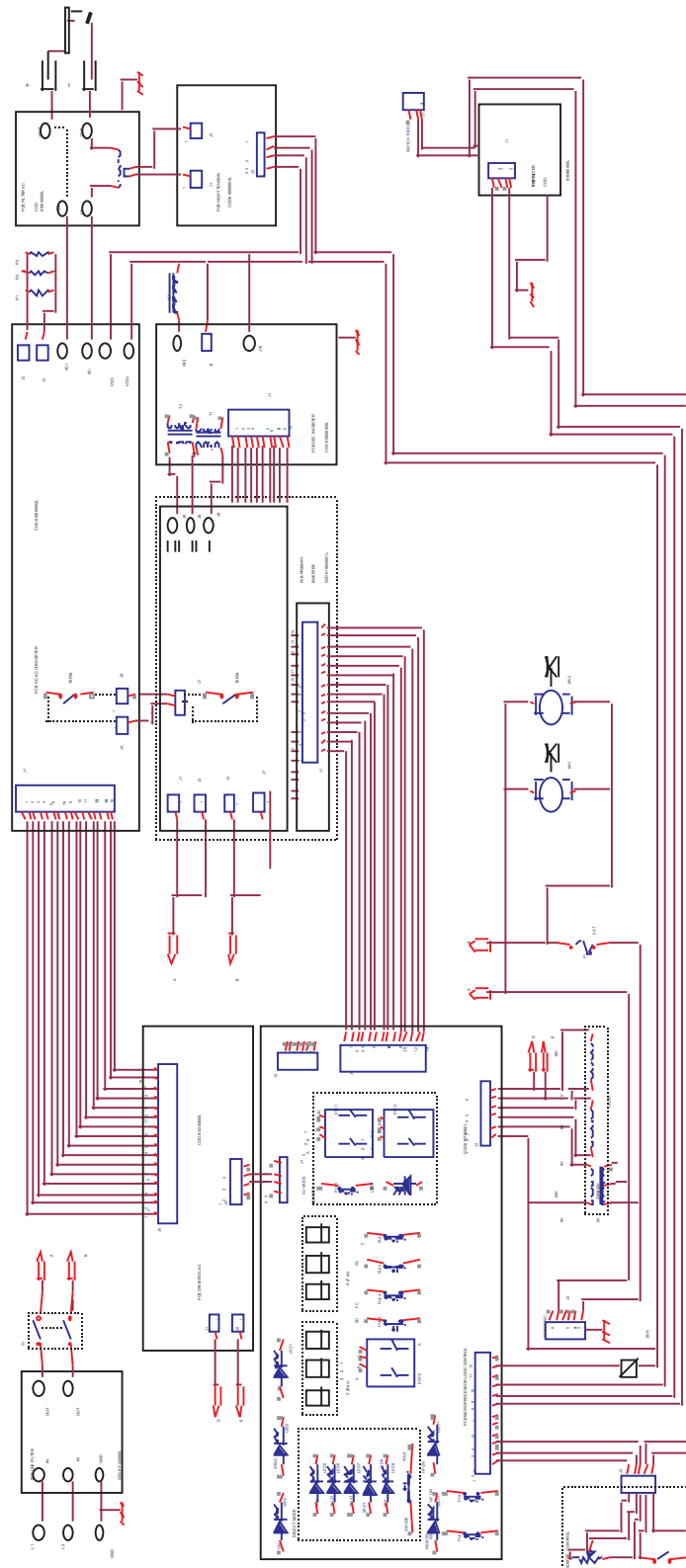


Swivelhead



*Swivelhead
Action*

HTP Invertig 201 - Wiring Diagram



HTP Invertig 201 AC/DC Troubleshooting Guide

