



orion

Orion™ 200i

Pulse Arc Welder Users Guide

20221020 • ITEM #1210



sunstone®
The Micro Welder Experts



Contents

ATTENTION: Read the Safety Guide before operating this welder!
Operator assumes all liability.



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REVISION	DATE	VERSION NO.	DESCRIPTION OF CHANGES
1	06/2021		New Formatting
2	01/2022	20220111	Minor Revisions and Changes

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Chapter 1: Welder Setup & Assembly

What is in the Box

BOX 1 CONTENTS:

- | | |
|--|-------------------------------|
| (1) Sunstone Touchscreen | (2) Alligator Grounding Clips |
| (1) Sunstone 200i Series Power Supply | (1) Shielding Gas Hose |
| (1) Foot Pedal | |
| (1) Electrode Vial (5 1.0 mm Electrodes and 1 Diamond Sharpening Disk) | |

BOX 2 CONTENTS

- | | |
|-------------------------|--------------------------------------|
| (1) Fiberglass Brush | (1) Sunstone Microscope Arm Assembly |
| (1) Cross Lock Tweezers | (1) Sunstone Safety Guide |
| (1) Flat Peaked Plier | |

ACCESSORIES BOX (Located in Box 2)

- | | |
|--|---------------------------------------|
| (1) Microscope Arm Mounting Hardware | (1) Pair Microscope Eye Piece Shields |
| (1) Welder Power Cord | (1) Loop Closing Pliers |
| (1) Welding Stylus Hand Piece | (1) Set Allen Wrenches |
| (1) Communications Cable (Display Port Ends) | (1) Shutter Cable (RJ45 ends) |

Microscope Arm Assembly Setup

- Remove the Microscope Arm Assembly from the box and place it on your table.
- There are three available options for mounting the Arm Assembly to your table. Select one of the following methods and use the required mounting hardware from the accessories box as outlined.

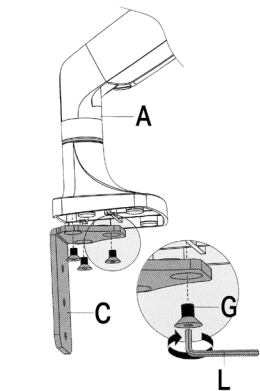


Figure 2.1. Attach angled bracket C to A

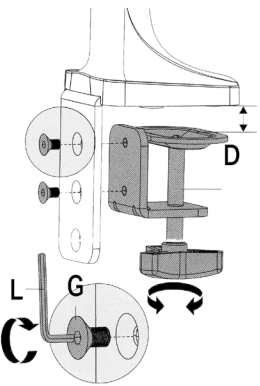


Figure 2.2. Attach clamp mechanism D to angled bracket C.

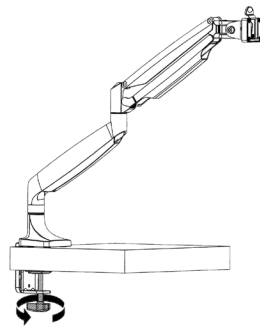


Figure 2.3. Lift Arm Assembly up and slide onto the table.

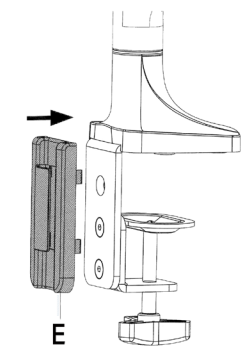


Figure 2.4. Cover the clamp mechanism D with the plastic cable guide cover E.

MOUNTING OPTIONS

Mounting Option 1 - Clamp to Table

This option is best for tables with accessible edges and for mounting without drilling holes in the table.

Note: If your table is thicker than 3-1/2" (9cm), follow the instructions for mounting options 2 or 3 on the next page.

Hardware required from Box 2:

- (1) Angled Bracket C
- (1) Sunstone Microscope Arm Assembly A
- (1) Clamp Mechanism D
- (5) Flat Head Hex Screws G
- Lay the arm assembly down on the tabletop.
- As shown in Figure 2.1, attach the angled bracket (C) to the bottom of the arm using three (3) of the included flat head hex screws (G) using a 4mm (5/16") Allen wrench (L).
- Attach the clamp mechanism (D) to the angled bracket using two (2) of the included flat head hex screws. See Figure 2.2. For thicker tables, attach the clamp mechanism D to the two lower holes in the angled bracket C.
- Adjust the knob on the clamp mechanism (C) until the gap is sufficient for the thickness of your tabletop.
- Lock the arm into place by turning the knob on the clamp mechanism until the clamp is pressing firmly against the bottom of the table.
- Lift the arm assembly up and slide the arm onto the table as shown in Figure 2.3.
- A plastic cable guide cover (E) can be clipped on over the angled bracket if desired. See Figure 2.4

Mounting Option 2 - Bolt through Table

Mounting Option 2 is best for tables without accessible edges. Hardware required from Box 2:

- (1) Flat Mounting Plate H
- (3) Flat Head Hex Screws G
- (1) Long Carriage Bolt F
- (1) Flat Pressure Plate I
- (1) Adjustment Knob J
- As shown in Figure 3.1, using a 4mm (5/32") Allen wrench, unscrew the flat head hex screws (G) holding the mounting plate (H) to the arm.
- Run the included 8mm (5/16") carriage bolt (F) through the included mounting plate (H).
- Attach mounting plate (H) to the bottom of the arm using (3) flat head hex screws (G).
- Drill a 3/8" (9.5mm) hole through the tabletop.
- Lower the arm so the bolt goes through the hole in the tabletop. See Figure 3.2.
- Slide the flat pressure plate (I) onto the bolt. Turn the adjustment knob (J) clockwise to tighten the plate to the underside of the table.

Mounting Option 3 - Screw to Table (vertical surface)

Required hardware from Box 2:

- (1) Angled Mount Bracket
- (3) Flat Head Screws
- (2) Wood Screws (**not included**)
- Attach the angled bracket (A) to the bottom of the arm assembly using three (3) of the included flat head hex screws (G) as shown in Figure 5.1.
- Lift and position the arm assembly onto the table in the desired location.
- Run wood screws through the bracket (A) and into vertical surface of the table, as shown in Figure 3.3.

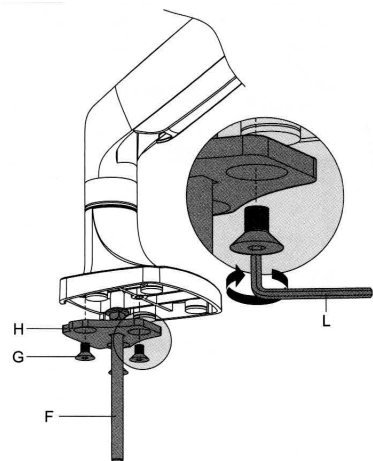


Figure 3.1. Remove the plate from the arm, run the carriage bolt through the plate, then re-attach the plate to the arm.

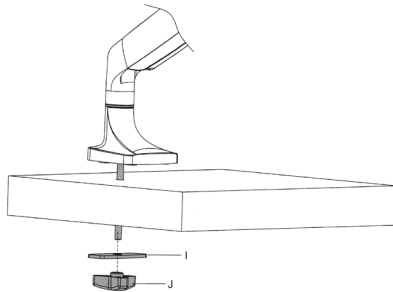


Figure 3.2. Lower the arm so the bolt goes through the hole in the table. Turn the twist knob clockwise to tighten the plate to the table.

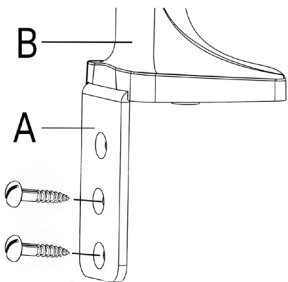


Figure 3.3. Use wood screws (not included) to attach the angled bracket (A) to the table.



Figure 4.1. Attach the Touchscreen to the Microscope Arm Assembly. Remove the screen protector film.

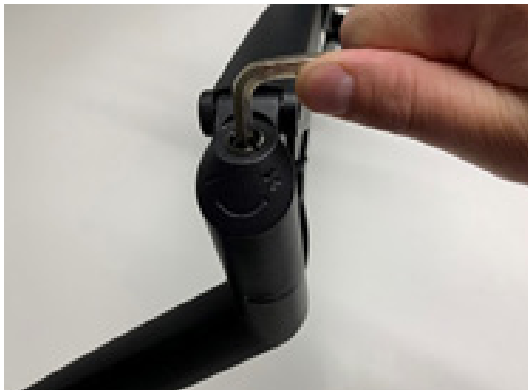


Figure 4.2. Adjust the tension of the Arm Assembly for more loose or more tight movement.



Figure 4.3 After installing the rubber eyepiece covers, use the Shutter Cable to connect the Touchscreen to the bottom of the microscope head.

Attach Touchscreen to Microscope Arm Assembly

Once the Microscope Arm Assembly has been firmly secured, the Touchscreen can be attached.

- Remove the Touchscreen from the foam in box 1.
- Line up the mount bracket on the back of the Touchscreen with the slot in the clip mechanism on top of the arm and lower it into the slot until the clip clicks into place. It can be helpful to pull the clip back while sliding down. See Figure 4.1.
- Remove the screen protector film from the front of the Touchscreen.

Arm Tension Adjustment

The spring tension is factory pre-set, but should changes be desired, the tension can be adjusted by turning a hex screw located on the arm joint, as shown in Figure 4.2. Use the included 6mm Allen wrench to make adjustments.

- Turn the hex screw counterclockwise (in the direction of the "+" symbol on the arm) if the arm does not hold the microscope up.
- Turn the hex screw clockwise (in the direction of the "-" symbol) if the arm does not allow the microscope to be lowered easily.

Microscope Setup

- Install the rubber eyepiece covers onto the microscope lenses.
- Plug the included Shutter Cable into the RJ45 port on the microscope (the bottom of the microscope head). See Figure 4.3.
- Plug the other end of the Shutter Cable into the shutter port on the back of the Touchscreen.

Note: Connecting other RJ45 compatible devices to the Sunstone shutter RJ45 port may damage the welder and/or the other devices.

Welding Stylus

- Remove the Welding Stylus from the accessories box.
- Insert the Welding Stylus into the holder at the bottom of the arm assembly as shown in Figure 5.1.
- The tubing can be routed up and through the removable cable guide portion of the arm if desired. See Figure 5.2.
- For now, position the Welding Stylus such that only the smaller diameter portion protrudes from the holder. Then, tighten the thumb screw on the bottom of the stylus holder to hold it in place.
- Rotate the stylus holder to approximately a 45-degree angle as shown in Figure 5.1 (the stylus should be angled down).
- Fine tune the position of the Welding Stylus while looking through the microscope: Loosen the thumb screw on the bottom side of the stylus holder and slide the Welding Stylus forward and backward until the tip of the Welding Stylus is in the center of your focus. See the example in Figure 5.3.
- Now securely tighten the Welding Stylus in place by tightening the thumb screw on the bottom of the stylus holder, which you can see in Figure 5.1.



Figure 5.1. Mount the Welding Stylus to the holder below the microscope.



Figure 5.2. Tubing and other cables can be routed up and through the removable cable guide portion of the arm.



Figure 5.3. When looking through the microscope, the stylus should appear in the center of your focus, as shown here.

Stylus Components

Figure 5.4



Electrode Setup

The Orion i Series pulse arc welder comes standard with a 1.0mm electrode collet and five (5) 1.0mm electrodes. The 1.0mm electrodes are a good multipurpose electrode for most welding applications. Available separately, Sunstone offers 0.5mm electrodes, which are more suited for very small applications (less than 5 Ws of energy).

INSTALL THE TUNGSTEN ELECTRODE ONTO THE WELDING STYLUS

See the Stylus Components Chart (Figure 5.4) on previous page to install the tungsten electrode (D).

- Remove the stylus hull (E) by pulling it away from the stylus shaft (A). See Figure 6.1.
- Loosen the collet cap (C) by twisting it counter-clockwise.
- The welder accommodates 0.5mm and 1.0mm electrodes. The electrode stylus will be shipped with the 1.0mm electrode collet (B) installed.
- Insert a 1.0mm electrode (D) into the collet.
Helpful Tip: There is a engraved guide on the side of the stylus hull (E) that helps measure the electrode length. Place the end of the stylus hull (E) against the collet cap, then make sure the electrode extends as indicated. See Figure 6.2.

- There should be between 0.6 - 0.7 inch (1.5 – 2cm) of the electrode (D) protruding from the stylus shaft (A). This will allow the electrode enough room to stick out from the stylus once the stylus hull (E) is placed back on the stylus.
- Lock the electrode (D) into place by hand tightening the collet cap (C) in a clockwise direction.
- Replace the stylus hull (E) by pushing it in until you feel it snap back into place. The electrode (D) should stick out between 1/8 – 1/4 inch (3.175 – 6.35mm after the stylus hull is snapped back into place). See Figure 6.3.



Figure 6.1. To install the electrode, first remove the stylus shaft (A) from the stylus hull (E) by pulling them apart.



Figure 6.2. Use the grooves engraved on the side of the stylus hull (E), marked in red in this image, for proper electrode (D) positioning.



Figure 6.3. The electrode should protrude past the stylus hull (E) 1/8 to 1/4 inch (3.175 to 6.35mm).

Adjusting The Microscope Focus

- Twist the knob on the microscope forward and backward to lower and raise the head. This will allow you to focus the microscope on the welding stylus. See Figure 7.1.
- Place your finger under the welding electrode to help judge the correct focus location. Focus the microscope until the texture on the skin of your finger is clearly visible.

Power Supply Setup

POWER SUPPLY SUPPORT MOUNT BRACKETS

The Orion i Series power supply can either be mounted to a flat vertical surface (such as a wall or the side of a desk) using mounting brackets, or rest on a flat horizontal surface. Keep in mind that the power supply will need to be mounted in proximity to the microscope arm assembly.

Optional Mounting Brackets (Not Included)

To mount the power supply to a vertical wall, request mounting brackets from Sunstone. Call +1 801-658-0015. Attach the mounting brackets only to a structurally sound vertical support. One mounting bracket should attach to the top of the power supply and one to the bottom.

Attach the lower mounting bracket to the wall first (using wood screws or other appropriate hardware, not included) and attach the power supply to the lower mounting bracket using the two provided screws. Next, attach the upper mounting bracket to the power supply, then attach the upper mounting bracket to the wall. See Figure 7.2.



Figure 7.1. Turn this knob to adjust microscope focus. You'll find one knob on each side of the microscope arm.



Figure 7.2. Use two mounting brackets (not included) to attach the Power Supply to wall or other vertical surface. Call Sunstone at +1 801-658-0015 to request the mounting brackets.

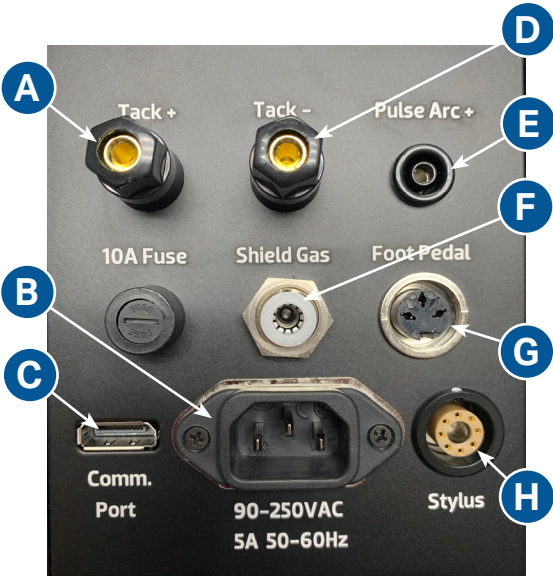


Figure 8.1. Power supply setup - Back Panel

Power Supply Setup - Back Panel

Reference Figure 8.1 and follow these instructions (all required cables are found in the accessories box).

- Plug the female end of the included power cable into the 90-250 VAC Power Port (B).
- Connect the male end of the power cable into AC power (wall outlet). The Orion i series can accept voltages ranging from 90VAC to 250VAC. (When plugged in for the first time the Power Button LED will blink a couple of times and then turn off.)
- Insert the included 1/4" gas tube firmly into the Shield Gas Port (F). The tube may feel loose when connected but should not come out if pulled.
- Plug the foot pedal cable into the Foot Pedal Port (G).
- Insert the stylus connector into the Weld Stylus Port (H) on the back panel of the power supply. Ensure that the white circular indicator on the stylus is lined up with the white indicator on the Weld Stylus Port. The connector will snap into place.
- When making welds using the stylus, an alligator clip cable can be connected to the Pulse Arc+ Port (E) on the back of the power supply for grounding the workpiece during the weld.
- When tack welding, plug one alligator clip cable into the Tack+ Port (A) and one into the Tack-Port (D). Be sure to attach each alligator clip to each workpiece before tacking the two pieces together.
- Plug the included communications cable (long display port cable) into the Comm. Port (C).
- Plug the other end of the communications cable into the Comm. Port on the back of the Touchscreen (the cable can be routed through the removable cable guides on the Microscope Assembly Arm).

Note: Connecting other display port compatible devices to the Orion 200i's Comm. Port may damage the welder and/or the other devices.

How to Turn on the Power Supply

On the front of the power supply, push the power button to initiate the power up sequence. The power button will illuminate and the touchscreen and the microscope light will begin to power on.

Electrode Care

WORKPIECE ELECTRODE PRESSURE

Touch the workpiece to the electrode with very light pressure. Too much pressure will cause the workpiece to stick to the electrode and cause the electrode to become contaminated (workpiece material on the electrode). Sunstone recommends cleaning or changing the electrode when it sticks to the workpiece.

When to Sharpen the Electrode

Refer to Chapter 3 for more information on electrodes.

The majority of applications are best accomplished using a sharp electrode tip. A sharp tip improves arc initiation and helps focus the arc properly. It is recommended that you pay close attention to the electrode condition. An electrode that appears to be dark colored or covered with material from previous welds can lead to inconsistent welding and poor ignition of the weld arc. When this occurs, simply sharpen the electrode with the included diamond disk. The diamond disk can be attached to a rotary tool. Follow these steps for sharpening the electrode:

- Completely remove the electrode from the stylus.
- Pinch the electrode between the thumb and index and/or middle finger with the shaft going perpendicular to the fingers. See Figure 9.1.
- Power on the rotary tool then hold it with the opposite hand.



Figure 9.1. A sharp electrode tip improves arc initiation and results in a better overall weld.

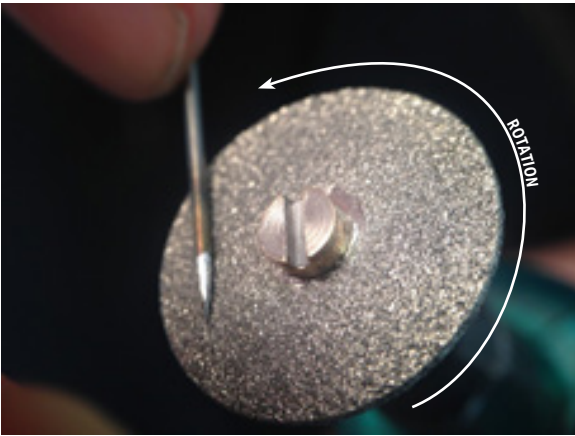


Figure 9.2. Use a rotary tool to sharpen the electrode.

- Place the electrode tip on the diamond disc so the grit of the disk is moving parallel with the electrode shaft and moving towards the tip. See Figure 9.2. Sharpening the electrode in a way other than explained here will affect the quality of the weld.
- Set the electrode on the diamond disk at a 10-degree angle and begin to spin the electrode with the thumb and middle finger. **Tip: A helpful way to get a sharp electrode is to push down on the electrode with your index finger while twisting the electrode with the thumb and middle finger. See Figure 9.2**
- Once the electrode is sharp and clean, turn off the rotary tool and insert the electrode back into the stylus as explained above.

Note: As a rule of thumb, Sunstone recommends a sharpened electrode anytime a new workpiece is being welded.

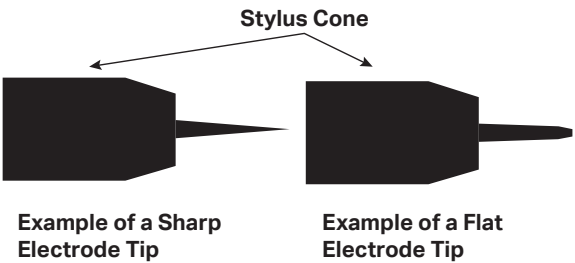


Figure 10.1. When working with silver, copper, and other highly conductive metals, a flat or blunt electrode provides better results.

WHEN TO FLATTEN/ BLUNT THE ELECTRODE

- When working with silver, copper, and other highly conductive metals in energy levels above 20 Ws, it can be helpful to blunt the electrode, as shown in Figure 10.1.
- Follow the “When to Sharpen the Electrode” instructions on the previous page.
- Once the electrode is sharp and clean, turn the electrode to a 90-degree angle and push it against the diamond disk in order to place a flat/blunt tip on the electrode. Cleaning the edge of a blunt tip electrode assists in preventing the electrode from sticking to the weld surface.
- Once the electrode has a flat/blunt tip, turn off the rotary tool and insert the electrode back into the stylus as explained earlier.

Shield Gas Setup

During the pulse-arc welding process high temperature plasma quickly melts metal into a molten pool. As the weld is performed, a small amount of shielding gas is released through the weld stylus to prevent oxygen from entering the molten pool. After the weld has occurred the protective gas turns off.

If oxygen from the air enters this molten pool, the result is a metal oxide that is brittle, porous, and burnt-looking. Protective shielding gas is used, such as 99.996% pure argon (Argon 4.6), to prevent these effects.

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- Right-sized tank fits almost anywhere!
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PRESSURIZED GAS SAFETY

There are several important rules that should be followed when using a compressed shielding gas such as argon:

Always secure the pressurized gas tank to a fixed location (such as a sturdy table leg). If the pressurized gas cylinder were to tip and become damaged there is possibility that the tank could become a projectile, expelling the high-pressure shielding gas as propellant.

Always turn off the shielding gas at the main valve when finished. This will help your shielding gas supply last longer in case there is a small leak in the tubing. This is also a good safety practice. If the tube becomes dislodged shielding gas could fill the room and displace oxygen, which can lead to suffocation. Argon is heavier than air and will fill the room from the bottom upward. If you experience a large shielding gas leak, open all of the doors and windows in the room.



Need argon gas? Sunstone will ship a right-sized tank to your doorstep. No more adventurous trips to the gas store! Call Sunstone for immediate delivery: +1 801-658-0015 or scan the QR code above.





Figure 12.1. First, turn the regulator dial (C) counterclockwise to close the regulator valve. Screw the gas regulator (A) to the top of the shielding gas tank (B).



Figure 12.2. Connect the OD gas tube from the power supply to the gas regulator port.

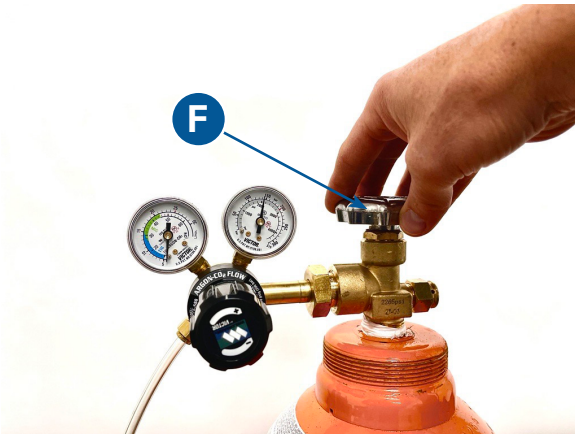


Figure 12.3. Open the shielding gas tank main valve slowly clockwise until the left dial on the regulator port indicates gas pressure of 7-10 liters per second.

SHIELDING GAS TANK AND REGULATOR SETUP

- Ensure that your shielding gas tank is securely fastened to a stationary point near the welding area.
- Turn the regulator dial COUNTERCLOCKWISE (closed) until it is fully backed out, meaning the dial becomes loose, to prevent over-pressurization of the line. See Figure 12.1.
- Screw the gas regulator (A) onto the shielding gas tank (B) and tighten fully using a wrench.
- If not already done, insert one end of the included 1/4" OD gas tubing into the gas port on the back of the power supply. Tug gently on the tube to verify a tight fit.
- Connect the other end of the gas tubing (E) to the gas regulator (D), as shown in Figure 12.2.
- Open the gas tank at the main valve (F) slowly as shown in Figure 12.3. The dials attached to the regulator should respond as the valve is opened. The right dial should measure and show pressure inside the tank; the dial on the left, which measures pressure in the hose, should remain at zero (when the regulator dial is fully backed out).
- Slowly turn the regulator dial CLOCKWISE until the dial on the left shows gas pressure between 7-10 liters per second.

Microscope LCD Filter Shutter System

The Microscope LCD Filter Shutter System provides an unobstructed working view before welding and completely protects your eyes during the welding process. The Orion 200i's internal computer verifies the Microscope LCD Filter Shutter System has been closed before allowing the weld to take place. Should the shutter not close, the microscope lens is equipped with >UV 16 and >IR 16 for maximum eye protection.

BECOME FAMILIAR WITH THE MICROSCOPE

The Sunstone microscope has been designed to provide maximum visual clarity, eye protection, and ease of use. One challenge using the microscope is getting used to bringing the workpiece to the welding electrode while looking through the microscope. This is an easy challenge to overcome. To begin, follow the suggested practices below while the welder is in Weld Off Mode. While the welder is in Weld Off Mode, it will not be able to make a weld when the workpiece touches the electrode.

- Rest your hands on the table and position the workpiece close to the welding electrode before looking into the microscope.
- Make sure your focus is at the tip of the electrode.
- Use slow, controlled movements.
- It is helpful to have your hands resting on the table and to only use your fingers to move the workpiece up to the electrode. See Figure 13.1.
- Place the workpiece surface perpendicular to the point of the electrode. **As discussed in later chapters, the angle of the electrode tip relative to the workpiece surface is very important and will take practice.**
- Now practice making soft contact with the workpiece to the electrode.
- Once you feel comfortable, attach the alligator clip to the workpiece and enable welds (switching the unit to Weld On Mode) to begin welding. **Be mindful of your energy setting: Too much power may damage the workpiece.**



Figure 13.1. Rest your hands on the table and position the workpiece close to, but not touching the electrode. Then look through the microscope.

Chapter 2: How to Use the Welder Software

The Orion 200i interface consists of four main “screens” that can be accessed at any time by touching the icons located along the top of the screen in the header area. The four main screens are:

- Home Screen
- Media Screen
- Save/Load Screen
- Settings Screen

Home Screen

The Home Screen is comprised of three areas: The Waveform Graphic Area (1), The Parameter Selection Area (2), and the Mini-Screen Area (3) as shown in Figure 14.1.

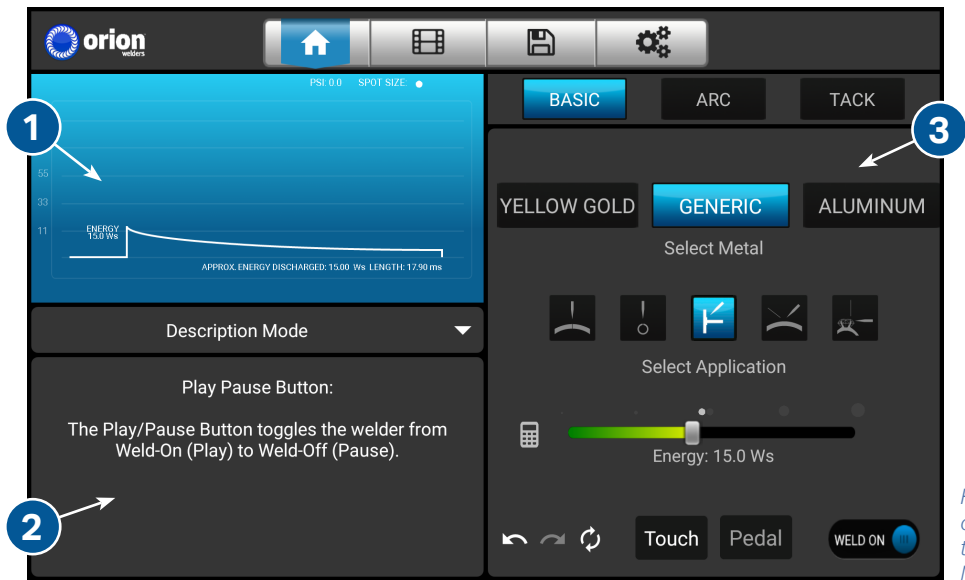


Figure 14.1. The Home Screen is comprised of three areas: The Waveform Graphic (1), the Parameter Selection Area (2), and the Mini-Screen Area (3).

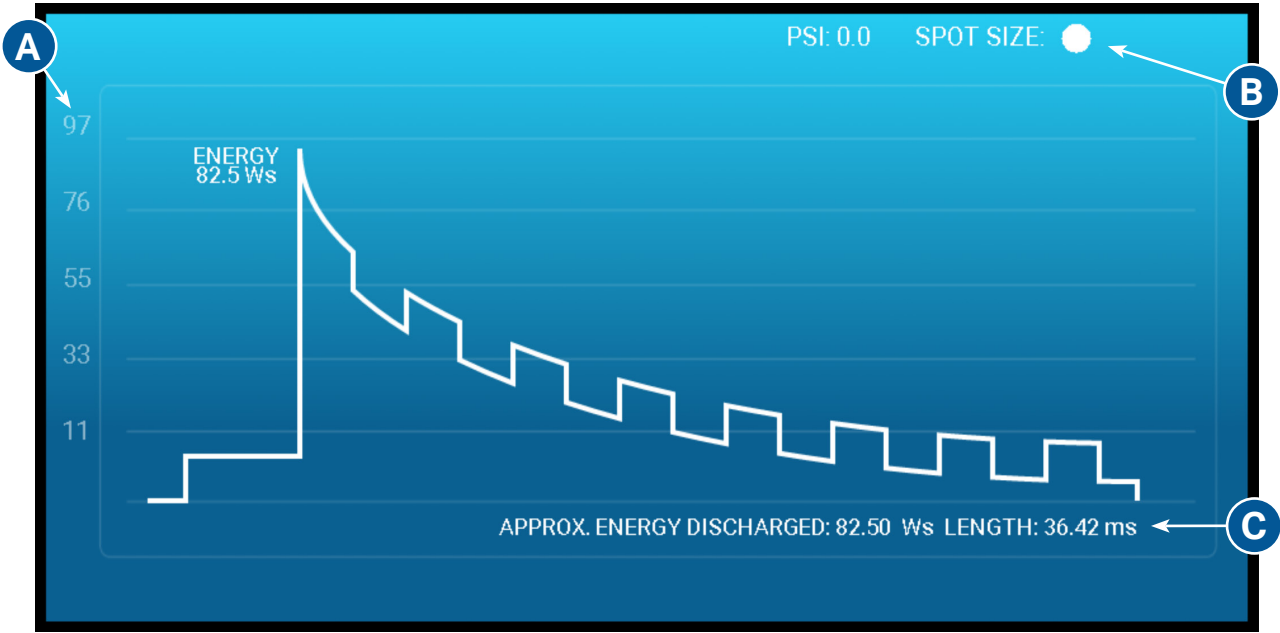


Figure 15.1. The Waveform Graphic. The vertical axis represents the total weld energy available (A). The horizontal axis represents time in milliseconds. An approximation of the weld spot size (B) is also displayed. Current settings (C) are displayed along the bottom of the graph. Ignition, agitation, length, and weld speed values are shown.

WAVEFORM GRAPHIC AREA

The Waveform Graphic Area displays a graphic representation of what will take place during each weld and provides a quick reference for various settings, as shown in Figure 15.1. The waveform displayed will change based on the control settings selected by the operator (see Chapter 4: How to Read the Waveform for more information).

Along the left side of the graph, the vertical axis represents the total weld energy available (A). The horizontal axis represents time (ms). The actual values are displayed below the graph.

In the upper right-hand corner, an approximation of the weld spot size (B) is shown based on the current settings and represents a full discharge of the total weld energy available. The spot provides a visual reference of changes in spot size as settings are adjusted.

Current settings (C) are displayed along the bottom of the graph. Ignition, agitation, length, and weld speed values are shown.

As length decreases, the amount of energy discharged will decrease as represented in text just below the graph. The represented spot size displayed will not decrease, but the actual weld spot size will decrease as length is adjusted down.

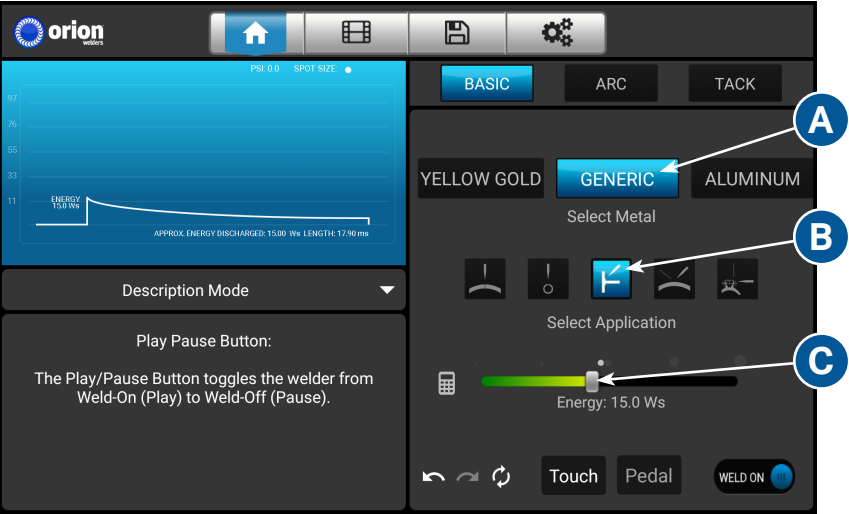


Figure 16.1. The Parameter Selection Area with the Basic layout selected.

PARAMETER SELECTION AREA

The Parameters Selection Area displays the buttons and sliders used to control the parameters that will affect the weld. The three buttons at the top of the Parameter Selection Area, Basic, Arc, and Tack, are used to switch between different welding controls and are always displayed. Touching one of these buttons will change the controls that are displayed in the Parameter Selection Area.

Basic

The Basic layout allows you to simply select the metal being welded and the type of weld being performed. Based upon the material selected, the Orion 200i will automatically choose the best settings that will deliver an optimum weld. See Figure 16.1.

Select Metal

At the top of the Basic layout are buttons labeled with different types of metals (A). The buttons scroll from left to right or right to left. To scroll, touch and hold any one of the buttons and then drag left or right. Select the metal type being welded and the Orion 200i will automatically choose weld parameters for that metal.

Select Application

Select the type of weld desired by pressing the representative icon (B). The welder will modify the settings accordingly. Choose from the following: Thick work-piece, Thin work-piece, Inside Joint, Adding Material, or Prong.

Energy Slider

The Energy Slider (C) adjusts the amount of energy to be used in the weld to achieve the desired results for your application. You can adjust the energy by touching and sliding the bar left or right. If you need more precision press the keypad Icon to open the keypad mode.



Figure 17.1. The Parameter Selection Area with the Arc layout selected.

ARC

The Arc layout, as shown in Figure 17.1, consists of controls for Waveform (A), Ignition (B), Agitation (C), Energy (D), Length (E), and Weld Speed (F). With these controls, you can make adjustments that will allow you to successfully weld many different types of metals in different applications.

Waveforms

The waveform selections determine and control how energy is released when welds are made.



Classic

The classic waveform is the default waveform for welding on all Orion welders. It has a high initial peak current, followed by a capacitive discharge slope. One key advantage of the classic waveform is its ability to create large weld spots with shallow surface penetration, which helps keep the overall work-piece cooler. The capacitive discharge slope allows the weld spots to cool with less internal stress, and without surface ripples. Classic welds will typically have a smoother surface than other waveforms.



Triangle

The Triangle waveform is similar to the classic waveform's ability to make smooth and uniform weld results. One key advantage of the triangle waveform is the ability to set the peak current lower and still be able to discharge the full amount of energy over a longer period of time. Welds performed in Triangle Mode will typically get deeper into the weld surface than with Classic. Triangle also gives users more control over the total energy being discharged than is possible with Classic.



Square

Similar to the triangle waveform, a square waveform allows users to utilize the full amount of energy over a longer period of time. The difference of this waveform compared to Classic and

Triangle is the abruptness of power at the start and end of each weld. The square waveform closely mimics the weld output of a typical laser welder.

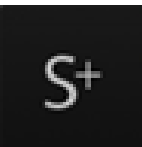
Ignition

The ignition options control the timing of released energy in relation to the position of the electrode.



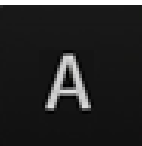
Standard

In the Standard ignition option, the energy discharge occurs at approximately the same time as the tip lifts off the work-piece surface. This mode is perfect for metal types that do not require a pre-heat phase during the weld. Because the electrode is closer to the work-piece, the electrode may dull more quickly. Standard ignition mode is typically used for welding very fine applications that would be damaged by high energy levels since there is no pre-ignition arc. Standard may also be suitable when welding a tight joint.



Standard+

In Standard+ ignition mode, the energy discharge occurs well after the electrode tip lifts off the work-piece surface. While similar to the Standard option, Standard+ includes a “pre-heat” function know as a Focus Arc before the main weld. As the electrode begins to pull away from the surface, a small amount of energy is discharged prior to the main weld discharge. This additional energy helps preheat the weld area and helps establish an arc when the electrode is further away from the surface. The Standard+ ignition helps provide better weld consistency by allowing more variation in contact pressure before the weld takes place. You may also see this ignition mode preserve the electrode tip and accumulate less contamination.

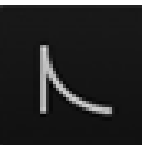


Adaptive

In adaptive ignition mode, the arc can be maintained for longer periods of time in order to adapt to variations in work-piece positioning techniques from user to user. This mode is more forgiving of movement of the work-piece during arc formation. Initially, however, more energy is released into the work-piece than in the other modes and can be detrimental for smaller weld applications or heat sensitive metals. It is recommended to perform a few welds on a test piece, to allow this mode to adapt, before performing actual welds on a work-piece. Welds on a test piece will need to be done every time the unit is powered down.

Agitation

During the weld, a high frequency agitation feature can be used to improve weld formation and strength in certain applications. Positive agitation is added energy to the weld in the form of micro energy bursts. Negative agitation is subtracted energy from the weld in the form of micro energy pockets. These energy bursts occur at a rate of up to 10,000 times per second. Agitation can produce an audible, high-pitched “ping” noise. Additional Agitation settings can be found in the Settings Screen on page 27.



None

With “None” selected, no agitation is added to the weld. This is the standard weld discharge curve with a smooth slope.



Negative

Negative agitation decreases the overall energy of the weld and has the same peak voltage of the weld without agitation. This can be useful to minimize porosity of the weld.



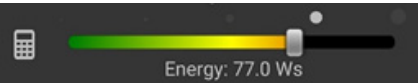
Sloped

The Sloped agitation option offers low levels of agitation. It has minimal impact on spot size formation, but yields additional penetration and enhanced weld strength. This agitation is available up to 233Ws of energy.



Sustained

The Sustained option offers high levels of agitation for improved weld spot strength in some metals. The high levels of agitation energy will affect the spot size because of the extra energy used in this option. To compensate for this addition of agitation energy, users may need to slightly lower the overall weld energy when using this option. This agitation is available up to 133Ws of energy.



Power/ Energy Slider

The Power or Energy slider adjusts the amount of weld energy or weld power that will be discharged depending on the waveform selected. You can touch or drag along the slider to adjust the value.

Pressing on the calculator icon will bring up a keypad for entering exact values. On the keypad, type in the desired value and press enter. The value on the slider will change and the keypad will disappear.

As the setting increases it will lead to more forceful welds, more heat at the weld site, deeper penetration, and larger spot sizes.

It can be helpful to start at lower values and gradually increase to higher values to fine tune the weld results without damaging the work-piece.



Length Slider

The Length value dictates the duration of time for each weld energy discharge.

When using the classic waveform mode, the length should typically be set to 100% for most weld applications. This allows the weld puddle to cool at the proper rate and will result in smoother weld spots.

In the Triangle and Square waveform modes, changing the length of the weld has a much bigger impact on weld results. Longer length settings lead to more heat at the weld-site and generally result in bigger spot sizes/deeper welds. Experimentation with different lengths and power settings can help achieve the best results when using Triangle and Square modes. Generally speaking, if you’re new to pulse arc welding, move the energy and



Figure 20.1. The Parameter Selection Area with the Tack layout selected.

length slider bars in tandem. In other words, if the Energy slider bar is in the green, so too should the Length slide bar be in the green.

TACK

The Orion 200i is capable of performing resistance tack welds. See “Make a Tack Weld” section in Chapter 3 for more information. Press the Tack button to see controls related to making tack welds, as shown in Figure 20.1.

Quick Power Settings

The Quick Power Setting buttons (A) allow you to quickly set the power to one of three common settings. The available options are:

- Low:** Tack energy is set to 30 Ws.
- Medium:** Tack energy is set to half its maximum.
- High:** Tack energy is set to maximum.

Pre-Weld Delay

The Pre-Weld Delay buttons (B) set the time between weld trigger and weld initiation. The available pre-weld delay options are:

- Short:** Sets a quarter-second delay before initiating the weld.
- Medium:** Sets a half second delay before initiating the weld.
- Long:** Sets a one second delay before initiating the weld.

Energy Slider

The Energy slider (C) in the Tack control layout adjusts the amount of weld energy that is being used. In order to precisely adjust the energy, click the keypad icon to enter keypad mode.



Figure 21.1. The Footer buttons display at all times for convenient access.

Footer Buttons

The buttons along the bottom of the Parameter Area are displayed at all times for convenient access, as they are often needed. See Figure 21.1

Undo

The Undo icon (A) allows you to undo or cycle back through the five previous changed settings.

Redo

The Redo icon (B) allows the user to cycle forward after pressing undo.

Reset

The Reset icon (C) resets all the variables and parameters to the factory default settings.

Touch Detect

In Touch Detect mode (D), the welder will initiate the weld process any time that a grounded work-piece makes contact with the electrode. When this button is selected, the “Pedal” button will be grayed out.

Foot Pedal

In Foot Pedal mode (E), the welder will only initiate when the foot pedal is depressed. Move the grounded work-piece into contact with the electrode, hold still, and press the foot pedal to initiate the weld. Foot Pedal mode can be useful when welding complex parts without worrying about triggering a weld prematurely. When selected, the “Touch” button will be grayed out.

Weld ON/OFF

Pressing Weld ON/OFF icon (F) toggles the Orion 200i between an active and inactive state. If the icon shows “WELD ON”, the weld sequence can be initiated and welds can take place. When the icon shows “WELD OFF”, welds can not be initiated.



Figure 22.1. The Mini-Screen Area (A) displays additional information. You can customize what information you wish to view. Touch the down-arrow button to view a list of available information widgets.

Mini- Screen Area

The Mini-Screen Area, (A) in Figure 22.1, allows you to customize what additional information you wish to see in the Home Screen. You can choose from a list of widgets that will be displayed for quick access to various weld control parameters, system settings, and information without leaving the Home Screen.

To change the information displayed here, push the drop-down arrow (B) to display the list of available widgets. See Figure 20.2. The current option is highlighted in blue. There are different options based on whether you are in Basic, Arc or Tack screen. A description of all widgets follows:

Mini-Screen Options	
Weld Parameters	Help and Accessibility
Agitation Options	Description Mode
Gas Options	Keypad Mode
Dynamic Energy Adjustment	Weld Counters
Save Load Mode	

Figure 22.2. You can choose what information you wish to view in the Mini-Screen area by choosing from a list of available widgets. Choose the down-arrow button (B) to display the list of available widgets.

WELD PARAMETERS

Agitation Options

This widget allows you to adjust the agitation frequency, duty cycle, and weld percentage. (See Agitation on page 18).

Gas Options

This widget displays the gas pressure gauge and allows you to adjust gas flow timing. Tapping on the gas gauge will cause a purge of the gas line. (See Gas on page 11).

Dynamic Energy Adjustment Mode

By selecting this widget you can enable or disable the Dynamic Energy Adjustment mode and adjust the

desired energy percentage. When this mode is active, you can press the foot pedal to momentarily change the weld energy by the set percentage. You can choose to increase or decrease the weld energy by up to 50% while the foot pedal is depressed, useful for making energy adjustments without using hands or looking away from the scope. Touch detect triggering is required and the only trigger mode available when using this mode.

Save Load Mode

Use the widget to access save and load settings (see the Save Load Screen on page 24).

HELP AND ACCESSIBILITY

Description Mode

In this mode, a short description will appear for various buttons/sliders when they are in use.

Keypad Mode

In this mode the numbered keypad will stay visible when this mode is selected.

Weld Counters

In this mode you can view and reset weld counters (see System on page 31).

Media Screen

The Orion 200i provides a media library that can be viewed from the Media Screen for help and information regarding welding. See Figure 23.1. The user manual can also be found here. To access the Media Screen press the Media Screen icon (A) in the main toolbar at the top of the screen.

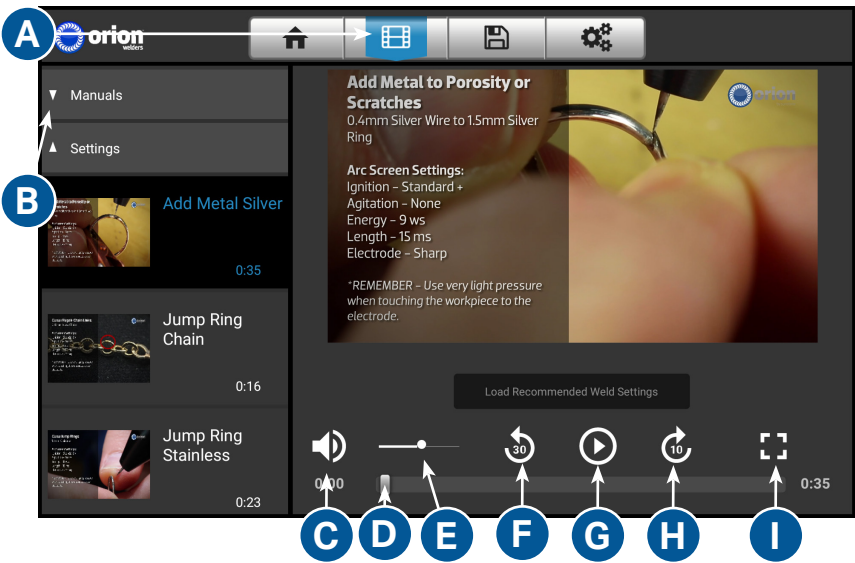


Figure 23.1. The Media Screen provides access to pre-loaded media library of application videos and this users guide. Press the Media Screen icon (A) to open the Media Screen.

Press on the desired drop down box (B) on the left to expand the lists of viewable content. Press on one of the file names to play the file in the viewing area.

To view a video, press the Play icon (G) to begin viewing the file. When the file is playing, the Play icon will change to a Pause icon. Press the Pause icon to stop or press the arrows to advance or rewind. Clicking on the video will also play and pause it. The Forward (H) and Reverse (F) icons will advance or rewind the video by 10 seconds. The slider bar (D) located at the bottom allows you to advance or rewind the video by pressing and holding the slider bar, and then sliding your finger left or right.

The volume can be adjusted using the slider or muted by tapping the Volume icon (C). The volume setting is then displayed next to the volume icon (E)

The files can be viewed in full screen as well by pressing the Full Screen icon (I)

“Load Recommended Weld Settings” button can be pressed if you want the Orion 200i to use those settings.

Save/ Load Screen

The Orion 200i can save and load weld settings for future use. For example, if you find a set of weld parameters that are particularly successful for a particular application, you can save all parameters under a custom name. You can then access that set of parameters at any time, which retains key information and saves time. To access the Save/Load Screen, press the Save/Load icon in the top toolbar. See Figure 24.1.

HOW TO SAVE A WELD

To save your current weld parameters follow these steps:

- Press the Save/Load icon (A) in the main toolbar at the top of the screen, as shown in Figure 24.1. The parameters of the current weld will be represented in the graphic waveform window (D).



Figure 24.1. The Save/ Load Screen allows you to save a particular set of weld parameters for future use.

- Click on the field below the graph (E) to enter a name for the saved weld settings, i.e. “1 mm jump rings”. When you click in the name field, a keyboard will automatically appear.
- Enter any notes regarding the weld process if desired in the notes field (F). You may choose not to enter any notes.
- Click the Save as New button (G). The current weld is saved to file for retrieval at a later date. The saved file will appear in the column on the left (C). Click the Save button (H) to save the current settings over an existing saved weld.

HOW TO LOAD A WELD

Previously saved welds can be loaded (the current weld settings will all change to the loaded weld’s settings). To load a weld, follow these steps:

- Look for the desired file in the column on the left side (C) or search for the file name by entering it into the search box (B). Press the Alphabetical button to sort the list by starting letter or the Creation date to sort the list by order created. Pressing either button again will reverse the order listed, i.e. (a-z, z-a). Each weld is represented by it’s graphic waveform and file name.
- Touch the weld you wish to load. The waveform graphic will appear in the graphic waveform window (D). Verify the selected weld is the one you wish to load.
- Press the Load button (J) and the settings will be applied to the welder. Press the Home icon in the toolbar at the top of the screen to begin welding.

HOW TO DELETE A WELD

Previously saved welds can be deleted. To delete a weld, follow these steps:

- Look for the desired file in the column on the left side (C) or search for the file name by entering it into the search box (B). Press the Alphabetical button to sort the list by starting letter or the Creation date to sort the list by order created. Pressing either button again will reverse the order listed, i.e. (a-z, z-a). Each weld is represented by it’s graphic waveform and file name.
- Touch the weld you wish to delete. The waveform graphic will appear in the graphic waveform window (D). Verify the selected weld is the one you wish to delete.
- Press the Delete button (I). You will be asked to verify your selection. Once you verify you wish to delete the selected weld, the file will be deleted and no longer appear as a saved weld.

Note: A deleted weld can not be restored.

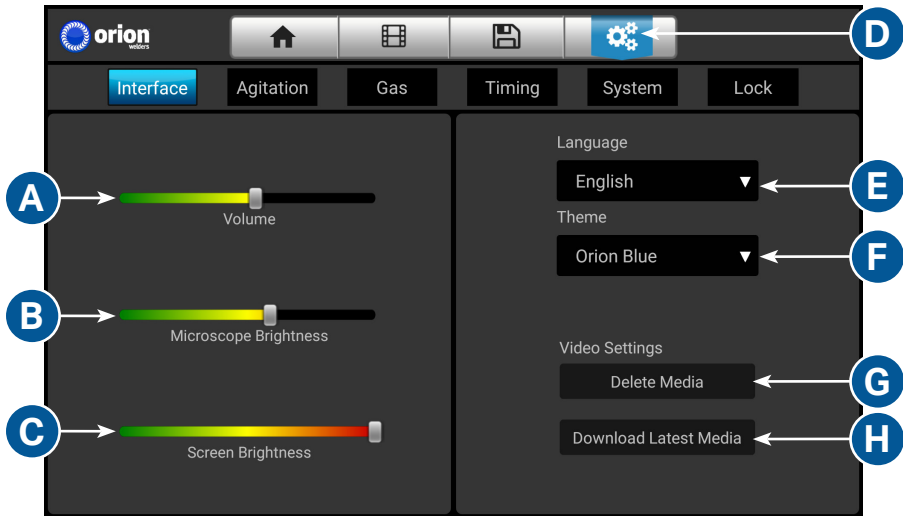


Figure 26.1. Use the Systems screen to access and make adjustments to various system settings.

Settings Screen

The Settings screen provides access to various system settings and weld parameter settings. See Figure 26.1. Click on the Settings icon (D) in the main toolbar at the top of the screen to access the Settings screen. At the top of the Systems screen, just below the main toolbar, are six system category buttons: Interface, Agitation, Gas, Timing, System, and Lock. Follows is a description of each system category. The Interface system options is the default screen when you access the Settings screen.

INTERFACE SYSTEM OPTIONS

Volume Slider. The Volume slider (A) adjusts the volume of all system sounds.

Microscope Brightness. You are able to increase or decrease the brightness of the LED lights on the bottom of the microscope by moving your finger left or right on the Microscope Brightness slider (B).

Screen Brightness. Adjust the brightness of the screen by moving your finger left or right on the Screen Brightness slider (C).

Language. The Orion 200i comes preloaded with several language settings. Press on the down arrow in the Language box (E) to display a list of languages and then press the desired language. All controls will be displayed in the selected language.

Theme. The Orion 200i has two different thematic color schemes. (Orion Blue or Sunstone Orange). Press the desired color from the Theme drop-down box (F).

Video Settings. With this control you can clear all media from memory or download the latest media to the 200i. Press the Delete Media button (G) to clear all media from memory. Press the Download Latest Media button (H) to connect to Sunstone's media library and download all new content. A Wi-Fi connection to the Internet is required. If a new file or an updated file exists on the server it will be downloaded.

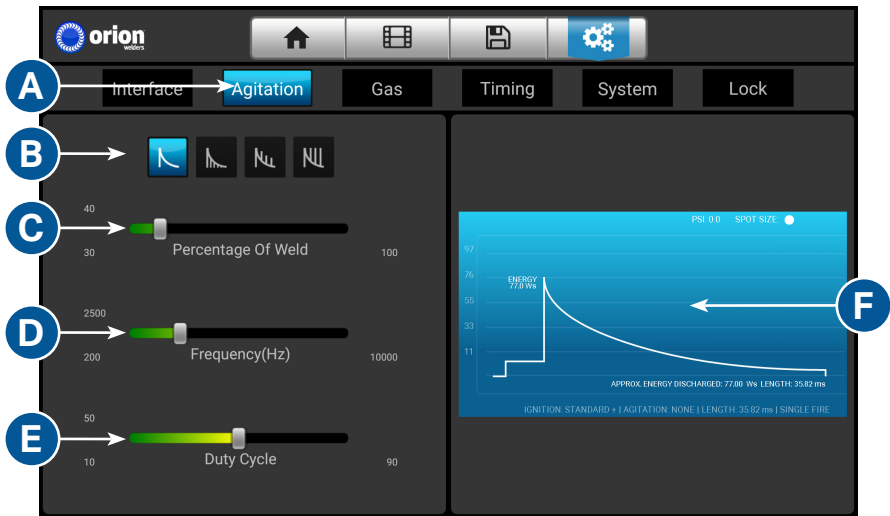


Figure 27.1. Choose the Agitation button (A) within the Settings Screen to access and make changes to the agitation settings.

AGITATION SYSTEM OPTIONS

To make changes to the Orion 200i's agitation settings, press the Agitation button (A) within the Settings Screen. See Figure 27.1. As noted earlier, with the Orion 200i you can choose to use one of four different agitation profiles while welding: None, Negative, Sloped, and Sustained. See page 18 for a description of each.

To adjust the settings for an agitation type, follow these instructions:

- Press the agitation profile (B) you wish to adjust. The button will turn blue or orange to indicate it has been selected. The waveform graph for that agitation profile will appear on the right (F). The waveform is for reference only and was achieved using a set system resistance. As you make changes to the profile's duration, frequency, and duty, the graph will display the changes accordingly.
- Make Percentage of Weld adjustments. By moving your finger left or right on this slider (C) you can set the duration of the agitation spikes in relation to the length of the weld. At 100%, the agitation spikes will last for the entire discharge of weld energy. At anything less than 100%, the percentage is measured from the end of the weld.

Note: When you've moved the slider left or right and then remove your finger, a positive (+) and minus (-) button will appear on both ends of the slider, allowing you to make more accurate adjustments. While these positive and minus buttons are displayed, the slider bar does not function. These buttons disappear after five seconds.

- Make Frequency adjustments. The Frequency slider (D) allows you to adjust the frequency (Hz) of the agitation spikes. Typically, values of around 2500Hz are ideal for good weld results; but different metals may require different values. Higher frequencies will help break up crystalline structures during cooling.
- Make Duty Cycle adjustments (E). Higher duty cycle means more spikes will occur during the weld, and also means less time between spikes. Higher duty cycles will add more energy to the weld than lower duty cycles.

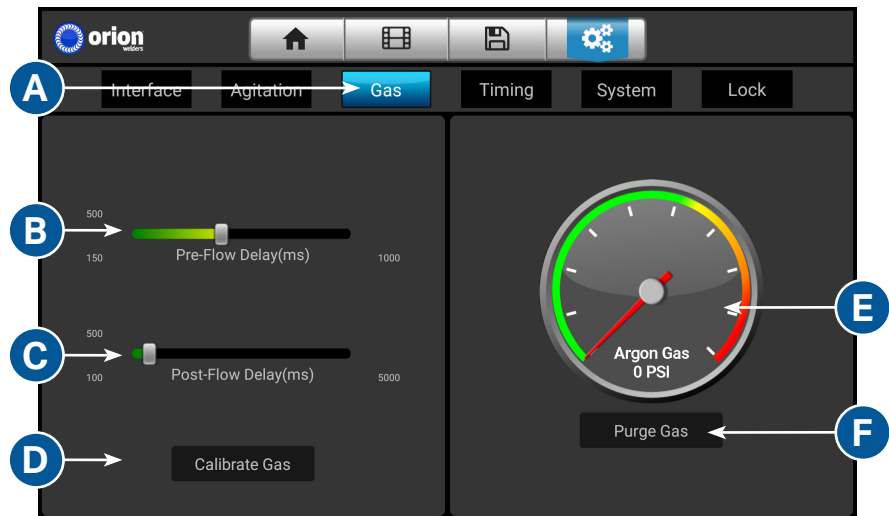


Figure 28.1. Choose the Gas button (A) within the Settings Screen to access and make changes to shielding gas settings..

GAS OPTIONS

The Orion 200i automatically delivers shielding gas to the work piece with every weld. You can control how long you wish gas to flow prior and after the weld. To make changes to the gas settings, press the Gas button (A) in the Settings Screen. See Figure 28.1.

Pre-Flow Delay. Use the Pre-Flow Delay slider (B) to set how long shielding gas will flow to the work piece before the weld initiates. The welder will automatically increase this time if a weld hasn't occurred for a given time in order to purge the line and decrease oxygen at the weld location.

Note: When you've moved the slider left or right and then remove your finger, a positive (+) and minus (-) button will appear on both ends of the slider, allowing you to make more accurate adjustments. While these positive and minus buttons are displayed, the slider bar does not function. These buttons disappear after five seconds.

Post-Flow Delay. You can set the amount of time shielding gas will remain flowing after a weld has taken place. Longer delays are useful for metals that oxidize quickly, such as titanium, where oxygen will cause cracks while the molten metal is cooling. Use the Post-Flow Delay slider (C) to make adjustments.

Calibrate Gas. At times, the digital gas gauge (E) will not accurately display the correct pressure, especially after gas lines are connected or disconnected. To calibrate the gauge, close the main valve on the shielding gas tank, disconnect the gas line from the back of the Orion 200i power supply, and press the Calibrate Gas button (D). Then reconnect the gas line on the back of the power supply and open the main valve on the shielding gas tank. The gauge should then correctly display the current shielding gas pressure.

Purge Gas. You may wish to occasionally purge the shielding gas lines to pressurize the lines or to check for gas flow. Press the Purge Gas button (F). You'll hear a short hissing as the shielding gas is purged.

TIMING OPTIONS

You can make changes to the intricate timing of a weld, such as pre-weld delays, or shutter delays, tip return delays, and more. To make changes, press the Timing button (D) in the Settings Screen. See Figure 29.1.

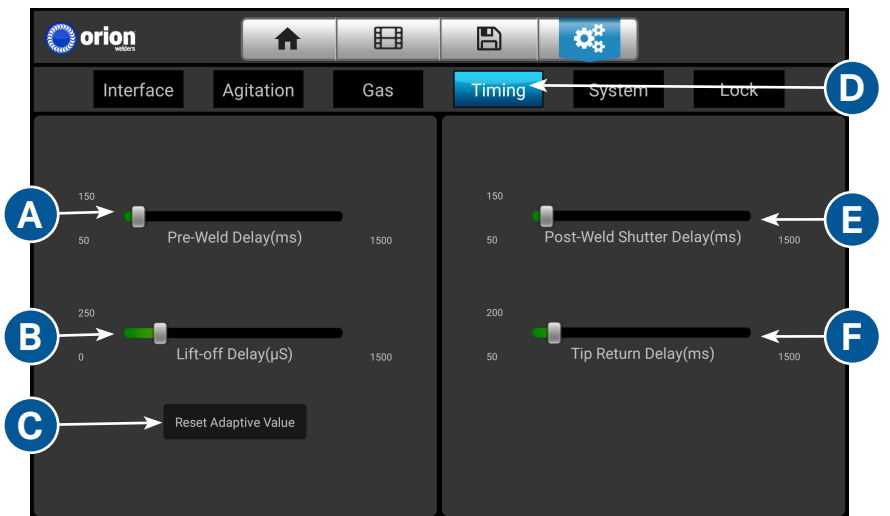


Figure 29.1. Choose the Timing button (A) within the Settings Screen to access and make changes to weld timing..

Pre-Weld Delay. You can modify the delay time between weld initiation (touch detect or foot pedal press) and the actual arc formation. This can provide operators extra time to ensure correct position of electrode. Use the Pre-Weld Delay slider (A) to make adjustments.

Note: When you've moved the slider left or right and then remove your finger, a positive (+) and minus (-) button will appear on both ends of the slider, allowing you to make more accurate adjustments. While these positive and minus buttons are displayed, the slider bar does not function. These buttons disappear after five seconds.

Lift-Off Delay. You can adjust the timing of the weld discharge (arc formation) in relation to the position of the electrode as it retracts. The longer the delay, the further away from the work-piece the electrode will be when the arc forms. Longer delay times can help improve electrode life, but may lead to increased difficulty in starting or maintaining the arc (aborted welds). Longer delay times can also increase weld spot size inconsistencies. Use the Lift-Off Delay slider (B) to make adjustments.

Pre-Weld Shutter Delay. You can adjust the amount of time between darkening of the shutter and weld energy discharge (how long will the shutter be darkened before a weld can take place). Use the Pre-Weld Shutter Delay slider (D) to make adjustments.

Post-Weld Shutter Delay. You can adjust the amount of time between end of weld energy discharge and turning off the weld shutter darkening (how long will the shutter stay darkened after a weld). Use the Pre-Weld Shutter Delay slider (E) to make adjustments.

Tip Return Delay. You can adjust the amount of time that the electrode will stay retracted after a weld takes place. Low values allow operators to quickly initiate the next weld, high values allow for time to adjust work-pieces with complex geometries without worrying about accidentally starting another weld. Use the Tip Return Delay slider (F) to make adjustments.

Reset Adaptive Value. When you make one change to one timing parameter, pressing the Reset Adaptive Value button (C) will change the other parameters accordingly.

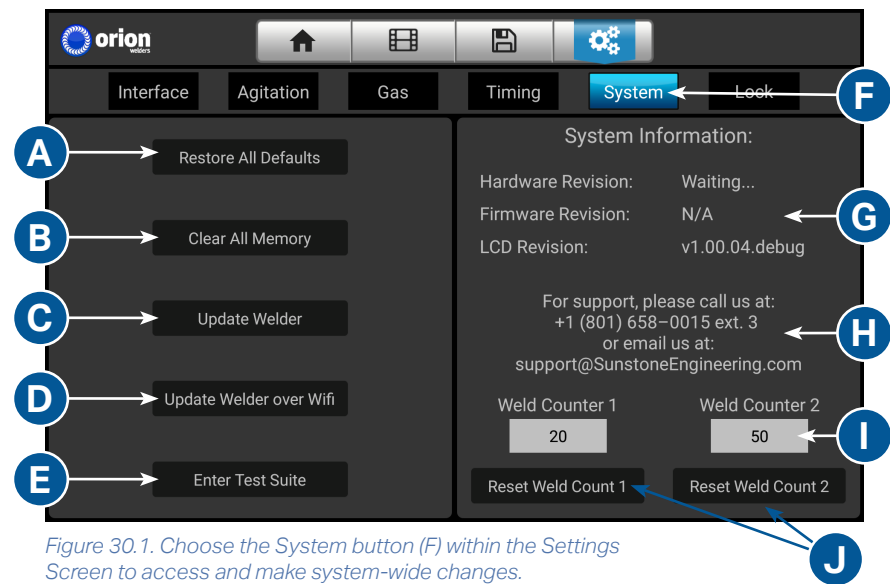


Figure 30.1. Choose the System button (F) within the Settings Screen to access and make system-wide changes.

SYSTEM OPTIONS

Use the System Options to restore defaults, clear memory, update the welder’s software, enter the welder’s test suite, make a hardware or firmware revision, access LCD revision numbers, access support information, or view weld counters. To access the System Options features, press the System button (F) in the System Screen. See Figure 30.1.

Restore All Defaults. Press the Restore All Defaults button (A) to restore the weld settings to factory defaults. Saved welds, weld counts, adaptive ignition settings, gas pressure warnings and other stored information is not erased. To erase all memory, use the Clear All Memory function.

Clear All Memory. Press the Clear All Memory button (B) to restore all weld settings to factory defaults and clear memory of any saved welds, weld counts, adaptive ignition, gas pressure warnings and other stored information. Once this function is completed it can not be undone.

Update Welder. Periodically, Sunstone will update the software for the Orion 200i and send the update file to you via email, or it may be available for download on Sunstone’s website. Keeping your welder’s software up to date will ensure the very best welding results. To receive updates you must be subscribed to the Sunstone Circle. Visit www.sunstonewelders.com/circle to learn more. Press the Update Welder button (C) to update the system using a file stored on an SD card. Follow these instructions to update the software with an SD card:

- Download the update from email or from the website. The file will be compressed in a ZIP format.
- Unzip the file. The unzipped (or uncompressed) file will be called “I3-2XX-UPDATE-vX.XX.XX.apk”.
- Insert an SD card into your computer and copy the file to the SD card’s root directory. Do NOT place the file into any subdirectory or folder on the SD card. Do NOT rename the file. Your welder will be looking for the update file in the root directory and for a specific name format.
- Turn the welder off.
- Insert the SD card into the slot on the back of the screen case labeled “SD Card”.

- Turn the welder on and navigate back to this screen.
- Press the Update Welder button to initiate the process. Do not remove the SD card from the slot unless the welder is off.

Update Welder over WiFi. If your welder is connected to the Internet via WiFi, you can update the software through the WiFi connection. Follow these instructions to update your welder via WiFi:

- Press the Setting Screen icon in the main toolbar at the top of the screen.
- Press the System button (F).
- Press the Update Welder over WiFi button (D)
- A list of available WiFi connections will be displayed. Select the desired WiFi connection. If a password is required you’ll be prompted to enter it.
- Once you’re connected to WiFi, follow the on-screen instructions. The welder will also display the progress of the update.
- When the update is complete, turn the welder off.
- To complete the update, turn the welder on.

Enter Test Suite. To assist Sunstone in diagnosing and repairing potential problems, your Sunstone customer service rep will place the welder in a test suite. Only access the test suite while working a Sunstone customer service representative. When you press the Enter Test Suite button (E), the welder will ask for a password. Your Sunstone customer service representative will provide that password to you.

System Information. In the System Information section (G), you’ll find the Hardware Revision number, Firmware Revision number, and LCD Revision number.

Support Information. You’ll find contact information for the Sunstone customer service team here (H).

Weld Counters. The Orion 200i provides you with two weld counters (I). You can reset either weld counter by pressing the Reset Weld Count button (J). Weld counters are useful for tracking electrode use, for example.

LOCK OPTIONS

The Orion 200i can be locked to prevent changes from being made to weld settings or system changes. When the welder is locked every interface screen can be viewed, but no changes can be made; however, weld settings can be loaded during a locked state. To lock or unlock the welder, or to choose a lock mode, press the Lock button in the System Screen. See Figure 32.1.

Toggle Lock Mode. Press the Toggle Lock Mode button (B) to lock or unlock the screen. A pop-up dialog box will appear. See Figure 32.2. You can choose to lock/unlock the welder, change the PIN, or cancel.

A four-digit PIN code will need to be entered (or created if this is the first time locking the interface). If the PIN is forgotten, call Sunstone’s customer service team at +1 801-658-0015 or send a message via email to support@sunstonewelders.com.

When the welder is locked a lock icon (C) will appear in the upper right corner of the screen. See Figure 32.3. When you press the lock icon a keypad will appear. Use the keypad to enter the 4-digit PIN to unlock the welder. Likewise, if you attempt to change a setting, the keypad will appear prompting you to enter the 4-digit PIN.

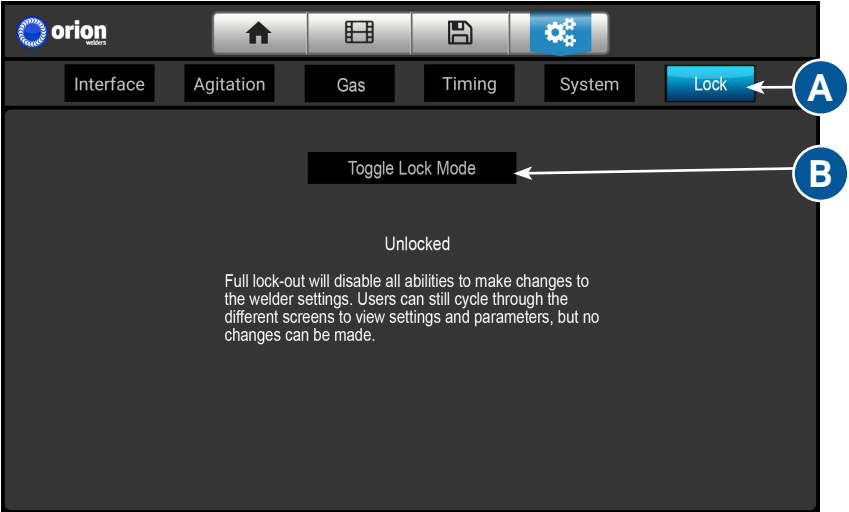


Figure 32.1. To lock or unlock the welder, press the Lock button (A) in the Settings Screen then press the Toggle Lock Mode button (B). To lock/unlock the welder, you will need to create or enter a 4-digit PIN.

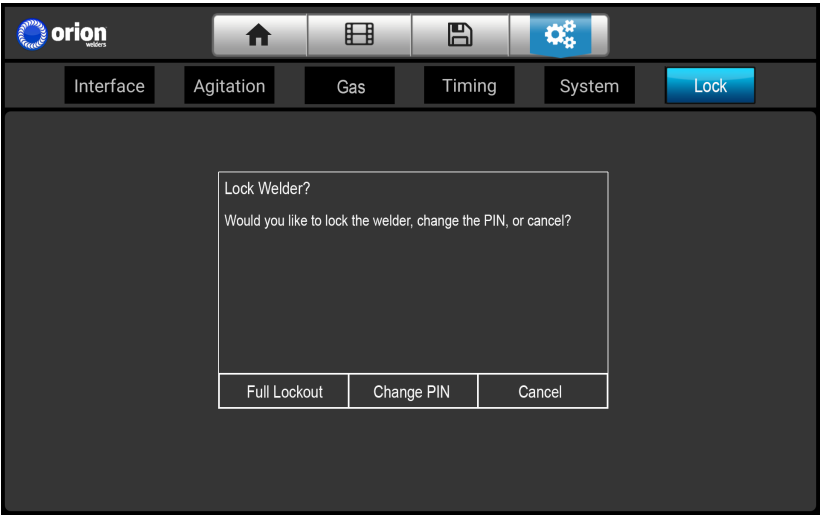


Figure 32.2. When you press the Toggle Lock Mode, a pop-up appears. You can choose to lock/unlock the welder, change the PIN, or cancel the operation.



Figure 32.3. When the welder is locked a lock icon (A) appears in the upper right-hand corner of the screen. Press the lock icon to unlock the welder.

Chapter 3: How to Weld with the Orion 200i

Before you begin to weld, Sunstone highly recommends you carefully review the Safety Guide & Pulse Arc Welding Workbook. Make sure you are in compliance with all safety precautions. Sunstone also recommends you practice welding on the included stainless steel weld plate.

How to Make a Basic Weld

When you feel confident in your ability to weld on a work piece, follow these steps to make a weld:

- Turn on the welder by pushing the power button on the left side of the front of the power supply. Wait for the welder to power on and the touch-screen interface to load.
- Upon power up, the waveform screen will appear gray, as shown in Figure 33.1. In order to create welds, the Weld State button (E) must be toggled to the “WELD ON” position. The waveform screen will change to a blue background. To return the unit to a non-welding state, simply toggle the button back to “WELD OFF”.
- Attach the alligator clip (or other Sunstone ground) firmly to the work piece, as shown in Figure 33.2.
- On the Home Screen, press the BASIC tab (A)
- Select GENERIC (B) from the list of metals.
- Select the desired type of welding application by pressing one of the following icons (C) located below the GENERIC tab: Thick work-piece, Thin work-piece, Inside Joint, Adding Material, or Prong.

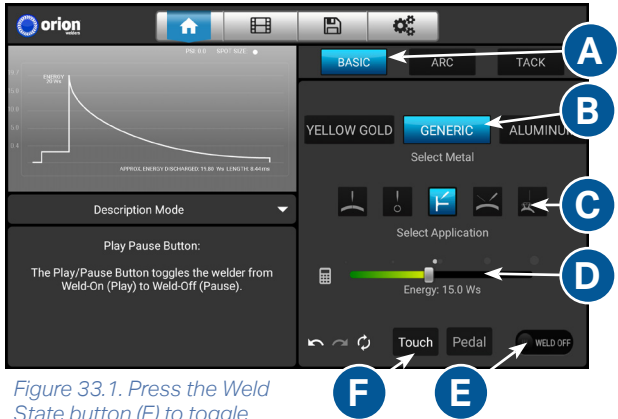


Figure 33.1. Press the Weld State button (E) to toggle between a WELD ON/WELD OFF mode.



Figure 33.2. Attach the alligator clip firmly to the work piece.



Figure 34.1. Adjust the arm to a comfortable height. Ideally your hands will be able to rest on the table while making welds for greatest stability.

- Slide the Energy bar (D) to desired value (between 10 and 20 is a good place to start).
- Press the Touch button (F) to enable touch detect.
- Press the Weld State button (E) to toggle the welder to “WELD ON”.

Note: Verify shielding gas pressure is present. Purging gas is recommended after initial setup. Verify the microscope is connected to the welder.

- Adjust the microscope arm to a comfortable height (ideally your hands will be able to rest on the table while welding for greatest stability). See Figure 34.1
- Look through the microscope and raise the work-piece toward the stylus until it makes contact with the electrode.
- Once contact is made between the electrode and grounded work-piece; the weld will automatically initiate. The electrode will retract slightly and energy will be discharged to form an arc. Once the energy has discharged, the electrode will return to its original position. Once contact is made, maintain position until the weld is completed.

Important Tip: The initial tendency for beginning welders is to continue to push upward as the electrode retracts. Rather, you should hold the work piece still during the weld process. Pushing up can cause the electrode to stick to the work piece. Pulling away can cancel the formation of the arc.

How to Make a Tack Weld

Tack welding is useful for positioning various components of a work piece first. Once you are satisfied with the position of the components, then they can be welded more securely together.

Tack mode requires the use of two alligator clips or other cables connected to the Tack + and Tack – terminals on the back of the power supply.

Warning: Do NOT use the Pulse Arc + terminals for Tack Welds. Do NOT use the stylus in Tack Mode.

Refer to Figure 35.1 and carefully follow these instructions to weld in Tack Mode:

- From the Home Screen, press the TACK button (A) to display the tack controls.
- Select Medium from the Quick Power Settings row (B).
- Select Short from the Pre-Weld Delay row (C).
- Press the Pedal button (E)
- Toggle the Weld State button (D) to “WELD ON”
- Attach the negative alligator clip to one work piece and the positive alligator clip to the other work piece.
- Lightly touch the two work pieces together where you want to tack them, as show in Figure 35.2. Too much pressure can weaken the tack strength; too little pressure can cause arcing between the two surfaces and lead to sparks or poor tack quality.
- Step on the foot pedal to tack the two work pieces together. See Figure 35.3. After the short weld delay, energy will discharge and the weld will take place. Try to maintain even pressure throughout the weld process. Again, a lack of pressure will result in a hotter weld and could cause a spark. Too much pressure will result in a colder weld and may result in an unsuccessful tack weld.

If the work pieces stay together, proceed to the Arc screen to perform a permanent weld using the stylus. If the pieces do not stay together, increase the energy and repeat.

How to Find the Right Settings

Several different factors can effect the way the welder will behave for any given combination of settings (i.e. types of metal being used, thickness of metal, geometry of the work-pieces, gaps between mating surfaces,



Figure 35.1. Press the Tack button to place the welder in a tack welding mode.



Figure 35.2. In Tack Mode, you'll use two different alligator clips to hold two different work pieces. Touch the two pieces together where you wish to place a tack weld, thus tacking one work piece to another.



Figure 35.3. In Tack Mode, when two work pieces are positioned as desired, press the foot pedal to initiate the weld.

electrode size and shape, gauge of ground wire, argon coverage, etc.). For this reason, it can be important to experiment and get to know the proper settings for your specific applications.

The Basic Control Layout on the Home Screen can give new users an idea of where to start and helps get the ball rolling initially; but to fine tune the results and maximize weld quality, it can be extremely helpful to make use of the many configurations the Orion 200i has to offer. Although it can be intimidating to experiment with new technology, “playing” with weld parameters on the Orion 200i can be a fun, educational experience and lead to a better understanding of welding varied applications.

Welding Tips and Tricks

- Try the Classic Waveform first. It is usually the easiest to adjust for ideal results. Some metals will weld better using Triangle Waveform or Square Waveform, however. Try all three to see the differences!
- Always start low in energy and work your way up until the welds are strong enough and look good.
- In Triangle and Square modes, try setting the Length shorter or longer while keeping the Power the same. Compare the results.
- Start with no agitation at first, then add it to see the changes in the results. Compare spot sizes and weld quality for each agitation setting.
- Start with the Standard + ignition profile, but try out the other profiles as well to find out which one suits your techniques and application best.

HOW TO AIM THE ELECTRODE FOR BEST RESULTS

Electrode placement in relation to the work piece prior to the weld can have a large influence on weld quality and behavior. Knowing the correct angle of approach and the correct place to touch the electrode can lead to more consistent weld results and weld quality. Review Figure 36.1 and try these tips:

- Aiming the electrode perpendicular to the surface will deliver the most uniform weld spots and the best smoothing.
- The molten metal can sometimes be “pushed” by aiming the electrode at a steeper angle (other than perpendicular). Some metals (like silver) flow better than other metals when being welded and care must be taken not to “dig holes”.
- When adding fill material, the heat of the weld can actually kind of “pull” the metal toward the electrode. Holding the fill wire too close to the electrode can cause it to stick.
- The weld arc typically originates at the tip of the electrode, but if the shaft of the electrode is close to an edge of the work-piece, arcing can occur and cause the electrode to stick.

Figure 36.1. Electrode Placement Examples



HOW TO READ THE WAVEFORM GRAPH

The Waveform Graph is a helpful tool for understanding the things taking place during a weld. One quick look can provide information such as which ignition mode is being used, which waveform has been selected, which agitation profile is being used, and the length of the energy discharge. The resulting “area under the curve” represents the total energy being discharged and doesn’t include the ignition bump and agitation.

Ignition

During the time right before the main energy discharge of the weld, a low current “Focus Arc” will be displayed for “Standard +” and “Adaptive” ignition modes. See Figure 37.1.

Weld Discharge Waveform

The shape of the Waveform indicates the way the energy is being discharged.

Classic mode has a high peak current which drops more quickly than the other two waveforms, leading to a smooth weld puddle, as shown in Figure 37.2. The higher the peak, the longer the weld discharge will last (as long as the length is set to 100%). Welds performed with higher peaks are more forceful and produce larger weld spots with more penetration than welds with lower peaks.

Triangle mode is very similar to Classic, but the discharge is linear and the length can be adjusted independent from the Peak (a very high peak can be combined with very short length, or a very short peak can be combined with very long length). See Figure 37.2. Triangle mode provides you with the ability to better tailor the way energy is released into the weld site.

Figure 37.1. Ignition Profiles

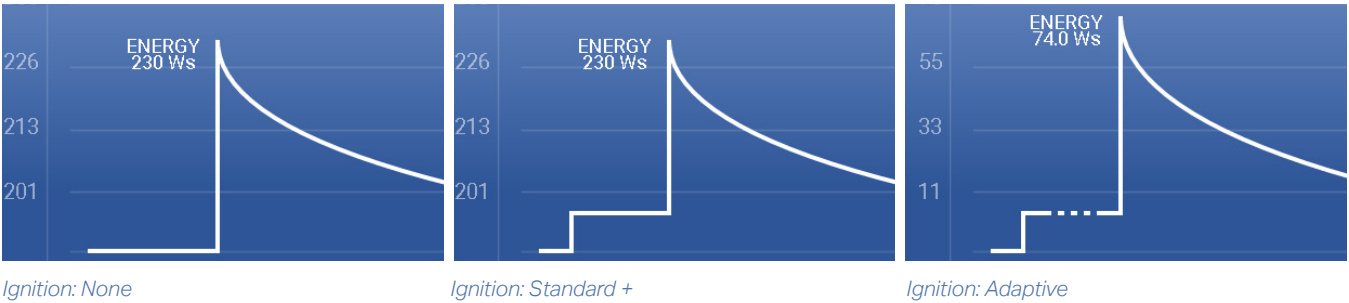
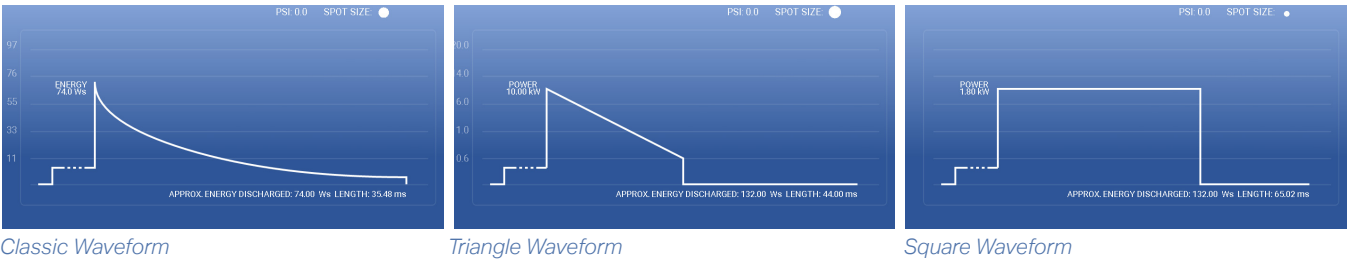


Figure 37.2. Weld Discharge Waveforms



Square mode can also be adjusted independently, but the peak remains constant for the duration of the discharge, as shown in Figure 37.2. As a result, twice the energy will be released into the weld site compared to Triangle mode if the peak and lengths were set to the same values.

Agitation Profiles

If agitation is enabled, the spikes will be displayed on the graph accordingly. Each spike adds to the total energy being discharged. This generally leads to increased penetration, heat, and spot size. Agitation can also improve weld quality in certain metals like stainless steel.

Length

The length of the weld discharge is a large part of how much energy is released into the weld site. The longer the length, the more energy/heat goes into the weld site - especially in Triangle and Square modes. In Classic Mode, the long length gives weld puddles time to cool properly for smooth results because there is less energy being added to the weld spot the longer the weld lasts.

Energy

The total area under the graphed line (shown red in Figure 38.1 for clarity) represents the amount of energy being released into the weld. Generally speaking, the larger the area, the more heat, the larger the spot size, and the more penetration.



Figure 38.1. The red area illustrates the total amount of energy released during a weld.

DECLARATION OF CONFORMITY
CE Marking

Manufacturer Information	
<i>Name</i>	Sunstone Engineering LLC
<i>Address</i>	1693 American Way #5 Payson, UT 84651
<i>Telephone</i>	+1 801 658 0015
<i>Fax</i>	+1 866 701 1209
Product Information	
<i>Name</i>	Orion
<i>Description</i>	Multi-mode pulse welding unit, capable of welding as a resistance and pulsed arc welder
<i>Model Numbers</i>	100c, 150s, 250s, 900s, 1500s, Pulse 150i, Pulse 200i, Pulse 250i, 100C2, 150SV2, 250SV2, Orion mPulse, Orion 200i², Orion 250i², Orion 200i3, Sunstone ΩMEGA PA250i

Conformity Information

This product conforms to the following directives:

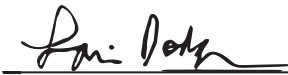
<i>Directive</i>	<i>Document Number</i>	<i>Description</i>
Electromagnetic Compatibility (EMC)	2014/30/EU	Council Directive 2014/30/EU (February 26, 2014) on Electromagnetic Compatibility
Low Voltage Directive (LVD)	2014/35/EU	Council Directive 2014/35/EU (February 26, 2014) Low Voltage Equipment Safety

This product conforms to the following harmonized standards:

<i>Standard</i>	<i>Document Number</i>	<i>Description</i>
EMC Immunity Standard	EN 61000-6-1:2007	Immunity for residential, commercial, and light industrial environments
EMC Emissions Standard	CISPR 11:2009+A1:2010	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement
LVD Standard	EN 60974-6:2016	Arc Welding Equipment – Safety Requirements

The Technical File required by both directives above is maintained at the headquarters of Sunstone Engineering LLC, 1693 American Way #5, Payson, UT 84651, U.S.A. CE Year 2020

May 19, 2020


Larin Dodgen
Engineering Manager



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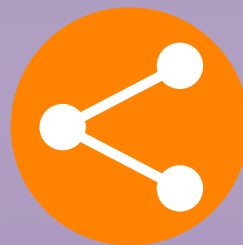
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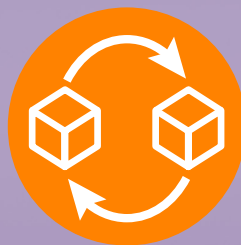
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