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Сварочный аппарат переменного тока

WAVE AC WAVE AC MARKE AC Users Guide

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Chapter 1: Overview

Features

Sunstone's AC welders are well equipped with a large capacitive touch-screen interface to select and view the weld settings. The touch-screen interface provides easy access to all weld parameters. In addition, you get a visual of the weld waveform graph and other useful features.

Sunstone's AC welders provide the following benefits:

- Precision control of the weld discharge
- A very small heat-affected zone during the weld
- Up to 30 seconds of continuous weld energy release
- 4 different tapped transformer locations for precise power ranges
- The versatility of welding on very small, thin, and delicate metal parts
- A wide range of power settings to account for various weldable metals
- Single spot, multiple discharge, or continuous discharge weld modes
- Consistency and seamability
- Very low maintenance on the machine
- Up to 100% duty cycle (at lowest power output settings)

Key Features

The key features of the Sunstone AC 5kVA welder are as follows:

- Touch-screen interface
- Microprocessor controlled operation
- Multiple pulse modes
- Control for weld cycles, power percentage, and power range.



Figure 2.1. Sample AC discharge curve.



Figure 2.2. On the micro scale, surface roughnesslimits surface-to-surface contact. More contact points result in lower resistance.

- Visual graph of weld waveform
- Alarms and warnings
- Emergency stop
- High-precision energy adjustment
- Software updates
- Save settings
- Wi-Fi connectivity for updates

What is AC Resistance Welding?

Alternating Current (AC) resistance welders utilize a large transformer to manipulate AC current coming from the wall outlet, allowing operators to select output range and duration of weld pulses. Because the energy is simply being modified and not stored for later release, AC welders can discharge continuous weld energy for extended periods of time (for continuous welding) or release the energy in short single pulses (spot welding). The AC current changes its polarity 120 times per second (at 60hz), half the time in one direction, half the time in the opposite. (See Figure 2.1) AC welds are useful for magnetized materials, thicker metals, and welds that require extended

weld times. AC weld spots can often be cleaner/smoother than other types of resistance welds such as capacitive discharge.

WELD FORMATION

Spot welding relies on metal resistivity (resistance) to heat and fuse metal. A large current is passed through the work piece metal. Energy is dissipated due to metal resistance in the form of heat which melts and fuses the weld materials. The welder must overcome both the contact resistance and the bulk resistance of the material in order to begin the melting process.

Figure 2.2 shows an example of a micro-scale surface profile. On the micro-scale, material surfaces are rough and only contact in a limited number of locations. In the first few milliseconds of weld formation, the high-resistance metal bridges melt, allowing other bridges to come into contact to continue the melting process. When the bridges have fused, the contact resistance is zero. The bulk resistance of the metal then plays the final role in the weld formation.

Welding Attachments

In order to create welds, a weld head or hand-held attachment is needed to deliver the weld energy to the weld spot and apply sufficient force. Several types of attachments are available to choose from. The best selection for a given application will depend on desired production rates, part geometry/access, and available budget. Sunstone offers a large selection of weld heads and hand attachments that will complement the AC 5kVA welder including:

Weld Heads:

- WH1 Opposed Pneumatic Weld Head
- WH2 Parallel Pneumatic Weld Head
- PRO X Parallel or Opposed head for automated solutions.

Hand-Held Attachments:

Single and Dual Probe Hand Pieces

Tweezer Hand Pieces

PG2 Pistol Grip

- Microswitch controlled
- 300 grams total weight
- 10mm diameter electrode with 3/8" thread

PG2 Pistol Grip with Roll Spot

- Same specs as PG2 Pistol grip
- Added copper wheel attachment

PG3 Medium Duty

- Microswitch controlled
- 450 grams total weight
- 1/2" taper electrode

PG5 – Tweezer Hand Piece

- Microswitch controlled
- Ergonomically designed pliers

PG6 – Heavy Duty

- Pressure Actuated
- Cast aluminum body with adjustable spring-loaded action
- 1/2" electrode tips, water cooled

Welding Tips and Recommendations

Remember that every weld application is different. Several factors must work together and be balanced to achieve successful welds. Sometimes experimentation and tweaking are required to get just the right weld. As previously discussed, the resistivity of the materials and contact resistance play a major role. Other important factors include the force being applied, the weld discharge energy, the weld discharge length, and the electrodes being used.

WELD FORCE

Since contact resistance plays such an important role in the weld process, the weld force being applied by the electrodes is critical. The larger the contact resistance, the hotter the resultant weld. As more force is applied, the contact resistance is reduced due to an increased number of contact points between the two surfaces at the weld spot (more contact points result in lower contact resistance). More contact points result in a cooler weld. Conversely, too little force can lead to arcing between the two surfaces, which causes undesirable weld results. Too much force can lead to weaker welds and part deformation.

WELD ENERGY

The weld discharge of the Sunstone AC 5kVA welder is adjusted using the touch screen user interface.

Sunstone recommends that you first try a weld at a low energy setting and then increase energy until the desired hold strength is achieved. This tactic helps prevent destroying the workpiece by having too much energy to start out.

WELD LENGTH

Some applications require longer weld times than others to achieve good welds. Keep in mind that the longer the weld lasts, the larger the heat affected zone will become. Some applications (more conductive metals) could require a longer weld time.

Common Electrode Types

For standard weld heads

OPPOSED

The opposed configuration is ideal for cross-wire welds and welds that offer access to both top and bottom of the material. Electrodes come in Glidcop, Molybdenum, and Tungsten, with a variety of tip shapes.

SERIES/PARALLEL

These electrodes typically have a smaller, non-concentric tip protruding from the shank of the electrode that enables the weld spots to be closer together. They are generally made from Glidcop.

Common Electrode Configurations used with the AC Welder

DIRECT WELD (OPPOSED) SEE "A"

Current passes from one electrode through both workpieces and out the opposing electrode. Typically, the easiest configuration to achieve good weld nuggets and strength.

STEP (PARALLEL) SEE "B"

The electrode is placed on both materials, but from the same side. A step or adjustable gap electrode configuration can be challenging to maintain proper pressure at each electrode due to possibly uneven surface.

SERIES (PARALLEL) SEE "C"

The electrodes are placed on the surface material only. Because the current is split between both materials, sometimes this configuration requires more weld energy than a direct weld would.

ROLLER WHEEL (CONTINUOUS) SEE "D"

When performing a Continuous Weld, the material can be placed on a copper grounding plane while the roller wheel is moved along the edges of the continuous, or a separate grounding wheel can be used in place of the grounding plane for a more opposed type of weld.

HAND PIECE (SPOT) SEE "E"

When using a hand piece to perform the weld, a grounding clamp must be attached to the work piece or a grounding plane should be used. It is important that operators attempt to apply consistent pressure on the hand piece for each weld for consistent results.



Figure 5.1. Common Electrode Configurations.

How to Maintain Repeatable Welds

Consistent weld results require a consistent and repeatable process. A few suggestions for ensuring repeatable welds include:

- Keep a weld logbook documenting the process once a successful weld has been achieved. Try to keep track of the following:
 - Force applied
 - Electrodes (tip size/shape, electrode material, etc.)
 - Measured gap distances (between electrodes, between the tips and workpiece, etc)
 - Electrode placement in electrode holders (flush with top, extending "X" amount, etc.)
 - Welding power supply settings (energy, length, etc.)
- Make sure there are no impediments to weld head shaft movement.
- Make sure all the screws and connectors are tight.
- Make sure the weld head is placed on a stable, level surface that does not wobble.
- Try to make sure the materials being welded are clean and free of contaminants like dirt and oil.
- Whenever possible, fixture the parts being welded to ensure repeatable positioning and stability during the weld.
- Keep electrodes clean (create a process of maintaining the electrodes after a predetermined number of welds.

Chapter 2: Setup and Installation

Safety Precautions

As the operator of this welder, you assume responsibility for your safety and those around you.

Carefully read the user guide that accompanied your weld head or hand piece.

Before pressing the foot pedal and triggering a weld, make sure nothing is obstructing the electrodes, other than the work piece being welded.

If maintenance or setup is required, put the welder in a "Weld Off" state, or turn unit off before adjusting weld head.

WORKSPACE CONSIDERATIONS

- Ensure the workspace around the power supply is adequate for welding operation.
- Ensure enough clearance on both sides and back of power supply for cables to run.
- Good ventilation is important to keep the power supply from overheating. Be sure to have proper air flow around the power supply.
- Be sure to keep the work surface stable, level, free of vibration, and strong enough to support the power supply.
- Ensure the power supply is mounted the proper distance from the weld head, and incoming power.
- Avoid placing the power supply near sources of high frequency radiation.
- Keep the working area clear of excessive dust, acids, corrosive gases, salt, and any moisture.
- Ensure that both weld terminals are not Earth Grounded in any way.

VOLTAGE AND POWER REQUIREMENTS

The Sunstone AC 5kVA welders require 200 to 250VAC

input (40amp breaker, 50/60Hz).

WHAT'S IN THE BOX

- Box 1 Power Supply
 - Welder
 - User Manual
 - Safety Guide
- Box 2 Accessories
 - Accessories
 - Foot Pedals
 - Cables

Exploring the Welder's Front Panel

The front of the welder (see Figure 7.1) consists of the digital touchscreen, two buttons, and a USB port.

Digital Touchscreen (1) displays the graphic user interface and allows the operator to make changes to the welding parameters. Every interaction with the weld settings will happen via the touch screen.

Power Button (2) cycles power to the welder and activates the touchscreen. Press once to turn on, press again to turn off. An LED will light to indicate power.

Weld ON/OFF Button (3) can be used anytime the welder is turned on. When this button is activated, the capacity to weld is enabled. When this button is off, no weld energy will be released, and no welds will be made. The Weld ON/OFF button allows operators to safely make changes to welding electrodes, weld heads, and hand attachments. Operators can also perform 'dry runs' to test timing, delays, and automation, without releasing any weld energy.

USB Port (4) can be used to update the software/firmware for future changes



Figure 7.1. The Front Panel houses the digital touchscreen and buttons:

- 1. Digital Touchscreen
- 2. Power Button
- 3. Weld ON/OFF Button
- 4. USB Port



Figure 8.1. The back of the AC 5KVA is where the main terminals, input, and connectors can be found

- 1. E-stop
- 2. Primary Trigger
- 3. AC Input Terminal
- 4. Top Weld Terminal
- 5. Bottom Weld Terminal
- 6. Five amp Fuse
- 7. Fans

Exploring the Welder's Back Panel

The Back Panel components include:

E-Stop Port, Primary Trigger Port, 240VAC line in, Positive and Negative Weld Terminals, 5amp Fuse, and Fans.

The back panel also shows identifying details such as model number, serial number, and certification marks.

E-Stop (1) can be used to connect an emergency stop button (not included). The E-stop is normally open and engaged. It must be closed to disengage the E-Stop (if nothing is plugged in to this port, the E-stop is engaged). A bypass dongle is included with the welder for use when an E-stop button is not used.

Primary Trigger (2) is used to connect a foot pedal, or other switch, to initiate the weld process.

AC INPUT Terminal (3) accepts a bare wire power cord that will be connected to a 240VAC wall outlet. A 12AWG 3-conductor cable with shield is used.

Weld Terminals (4) (5) Terminals are used to connect a weld head or hand attachment to deliver the weld energy. Make sure the weld cable resistance is greater than or equal to 1/2 milliohm $(1/2m\Omega)$ of resistance.

5amp Fuse Port (6) accepts a 5A 250V 5mm x 20mm glass fuse (included).

Fans (7) are present to cool the unit. Make sure there is sufficient space for air flow and that nothing blocks the fans.

How to Set Up Your Welder

Follow these initial setup steps when setting up the welder for the first time.

- Unbox the welder and place it on a secure work table.
- Connect the E-Stop bypass plug, or an E-Stop switch, into the E-Stop Port (1) on the back of the welder.
- Connect AC Cable to the AC Input Terminal on the Back Panel
 - Remove the AC INPUT cover (3) from the Back Panel to reveal the Terminal Block by removing the two Phillips head screws.

- Attach the three wires to the terminal block according to the labels (L to L, N to N, etc.)
- Replace the cover on the back panel. Make sure the two Phillips head screws are tight.
- Connect the weld cables coming from the weld head or hand attachment to the welding terminals of the welder.
 - Connect one of the weld cables to the top terminal (5) on the back of the welder. Use the included 1/4-20 socket cap screw with lock washer and hex nut.
 - Connect the other weld cable to the bottom terminal (4) on the back of the welder. Use the included 1/4-20 socket cap screw with lock washer and hex nut.
 - If the other ends of the weld cables are not connected to the weld head or hand attachment, refer to that product's user manual for instructions on how to connect the weld cables.
- Attach Foot Pedal/Trigger.
 - Plug the 3DIN connector from the foot pedal (or the trigger cable from the hand piece) into the Primary Trigger Port (2) on the back of the welder.
- Connect AC power to wall (plug in the welder).

The system is now properly connected and ready to power on.

NOTE: ALTERNATIVE WELD ACTUATION

The AC welder is actuated by means of an external trigger port located on the back of the welder (Primary trigger) (see Figure 9.1). The trigger uses a 3 DIN connector and requires shielded wire. If you wish to use a trigger method that is different from the included Sunstone foot pedals, the following diagram (Figure 9.1) shows the proper pin placement for custom external triggercables. The standard external trigger cable connector is an SD-30LP made by CUI, Inc.



Figure 9.1. External trigger wiring diagram. N.O. is short for "Normally Open.".

Chapter 3: How to use the AC 5kVA Software Interface

This chapter provides a brief overview of the different screens, parameters, and elements found on the touchscreen interface of the welder. More detailed information is found in the following chapters.

NAVIGATION BAR

Always found at the top of the tablet interface

Press the icons to navigate between screens.



Figure 10.1. Navigation Bar.

Run Screen

Touch the Run Screen Icon (A) in the Navigation Bar to display and modify the Weld Settings.

Save/Load Screen

Touch the Save/Load Screen Icon (B) to save current weld settings as a weld schedule or to load weld settings from a previously saved schedule.

System Settings Screen

Touch the System Settings Screen Icon (C) to modify basic system settings such as language, brightness, and update the welders software via both USB and over Wi-Fi.

Chapter 4: A Closer Look at Operation of Each Screen

RUN SCREEN OPERATION



The Run Screen, seen in Figure 11.1, displays current settings related to the weld discharge. The Run Screen is equivalent to a "home" screen and should be the active screen when triggering a weld.

The Run Screen contains the following elements:

Navigation Bar (A), Single Weld Cycle Graph (B), Multiple Weld Cycle Graph (C), Power Range Slider (D), Percent of Phase Slider (E), Weld Cycle Slider (F), Rest Cycle Slider (G), Weld Rate Toggle (H), Waveform Toggle (I), and Weld Ready Indicator (J).



Waveform Displays

Single Weld Cycle (B)

The Single Weld Cycle Graph (See Figure 12.1) displays a visual representation of the expected weld discharge for a Single Weld Cycle based on the Slider Bar positions below.

The following weld parameters can be viewed on the graph:

- Time (X Axis)
- Voltage (Y Axis)

When the waveform is set to HALF, the Single Weld Cycle Graph will be replaced by the Two Weld Cycle Graph (See Figure 12.2), which displays a visual representation of the expected weld discharge for two half cycles based on the Slider Bar positions below.

Note: This graph is intended for theoretical visualization of the weld. It does not display actual values, as these will change based on the weld cables, force, electrode, and other factors.

Note: The 1, 2, 3, 4 on the Y axis are representative of the selected power range, not the voltage.

Note: 1 will have the lowest voltage, then 2, then 3, and 4 will have the largest voltage.

Multiple Weld Cycle Graph (C)

The Multiple Weld Cycle Graph (See Figure 12.3) displays a visual representation of a complete weld discharge. The graph is based on the number of weld and rest cycles set on the slider bars below.

The following parameters are displayed on the graph:

- Time (X Axis)
- Orange lines located along the "ON" labels indicate active weld cycles during that time frame.
- Orange lines located along the "OFF" label indicate the duration of the rest cycles.

Note: Orange lines are present along both "ON" labels only when the waveform toggle is set to "FULL".





Figure 12.2. Two Weld Cycle.



Figure 12.3. Multiple Weld Cycle.

Weld Parameter Sliders

Power Range Slider (D)

The Power Range Slider is used to select the desired power range. Power levels range from 1-4 with 4 being the highest. For smaller welds on thinner material, select a lower power range. For larger welds on thicker material, select a higher power range.

Percent of Phase Slider (E)

The Percent of Phase Slider is used to limit the percentage of the Phase. This slider ranges from 40% to 100%. Lowering the slider will decrease the maximum weld energy output, creating less heat and leading to smaller welds.

Weld Cycle Slider (F)

The Weld Cycle Slider is used to set the number of cycles a weld discharge will last (weld duration). Each cycle represents the time it takes to complete a full sine wave. A single cycle lasts 16.67ms (at 60hz). The slider can be adjusted from 1 cycle (16.67ms) to 30 cycles (500ms). The higher the number of cycles, the longer the weld discharge will last, and the more heat will be put into the weld.

Rest Cycle Slider (G)

The Rest Cycle Slider is used when the Weld Rate Toggle (H) is set to "Seam". The slider selects the number of cycles that will transpire between each weld discharge. Possible values range from 1 cycle (16.67ms) to 30 cycles (500ms).

Toggles

Weld Rate Toggle (H)

The Weld Rate Toggle toggles the weld mode between SINGLE mode and SEAM mode.

SINGLE MODE: Upon triggering a weld (using a foot pedal, etc.), a single weld discharge will take place that lasts for the number of weld cycles (1 to 30) selected on the Weld Cycle Slider (F).



Figure 13.1. Single Mode.

SEAM MODE: In this mode, if the foot pedal is held down, the welder will perform a weld discharge cycle with a duration dictated by the Weld Cycle Slider (F), followed by a rest cycle with a duration dictated by the Rest Cycle Slider (G) followed by another weld discharge cycle. This is repeated until the foot pedal is released.



Waveform Toggle (I)

The Waveform toggle switches between HALF and FULL.

HALF: When "HALF" is toggled, the welder only permits the flow of one half-cycle. The direction of the current is inverted with each cycle.



FULL: When "FULL" is toggled, the full sinusoidal wave will be discharged each cycle during the weld.



Figure 14.3. Two cycles of WAVEFORM FULL.

Weld Ready Indicator

The Weld Ready Indicator is shown at the bottom right of the screen. This indicator displays one of three colors:

- Green indicates that the welder is ready to weld.
- Black indicates that the welder is not ready to weld, or the Weld On/Off button is off.
- Red indicates that the E-Stop is engaged.

SAVE/LOAD SCREEN OPERATION

The Save/Load screen allows you to save and load weld schedules. See Figure 15.1.

A weld schedule is the collection of all settings for a particular weld including the following: Power Range, Percent of Phase, Weld Cycles, Rest Cycles, Weld Rate, and Waveform.

The Save/Load Screen consists of the following elements:

- Weld Schedule Selection Window (A)
- Weld Name (B)
- Weld Notes (C)
- Save As New Button (D)
- Save Button (E)
- Load Button (F)
- Delete Weld Button (G)

Weld Schedule Selection Window

The top portion of the screen displays a list of the previously saved weld schedules accompanied by a graphical representation.

You can scroll through the list by swiping left or right. The selected weld schedule will have a Grey Border/ Background.



Figure 15.1. Save/Load Screen.

Filter the list by pressing the filter button to bring up a drop-down box. Choose to order by name or by date saved in ascending or descending order.

To save a new schedule:

- Type the desired name in the Weld Name box (B).
- Enter custom notes in the Weld Notes box (C).
- Press the Save as New Button (D) to save the schedule.

The schedule (consisting of all the current weld settings and weld head control settings) will now be added and displayed in the Weld Schedule Selection Window (A).

To save over an existing weld:

• Tap on the previously saved schedule from the Schedule Select Window (A)

- Edit the name and or notes (B) and (C)
- Press the Save Button (E).

To load an existing weld schedule:

- Tap on a previously saved schedule, so the scheduled is highlighted.
- Press the Load button (F).
- The weld schedule is now loaded and ready to be used.

To delete an existing weld schedule:

- Select the schedule you wish to delete by tapping on a previously saved schedule in the Schedule Select Window (A), which will highlight the schedule.
- Press the Delete Weld Button (G).

Settings Screen Operation

Use the Settings Screen to make changes to the AC Welder's general system settings, such as Language, Weld Mode, Screen Brightness, and Software Updates.

The Settings Screen has two separate tabs which can be accessed by pressing the Interface Button (A) or the System Button (B):



Figure 17.1. Setting Screen Operation..

Interface Tab:

- Language (C)
- Weld Mode Toggle (D)
- Screen Brightness Slider (E)

System Tab:

- Restore All Defaults Button (F)
- Clear All Memory Button (G)
- Update Welder Button (H)
- Update Welder over WIFI Button (I)
- Enter Test Suite Button (J)
- System Information (K)

Interface Tab:

Tap the Interface Button (A) to choose the desired language, select Weld Mode, or change screen brightness.

To change the language:

- Touch the Language box (C). A list of available languages will appear.
- Press the desired language. The software will now use the selected language.

To change the Weld Mode:

- Touch the Weld Mode Box (D). This button toggles between SEAM and CONTINUOUS:
 - SEAM is the standard mode and allows the operator to adjust the Weld Cycles and Rest Cycles as desired.
 - CONTINUOUS Switching to Continuous automatically adjusts the Weld Cycles to a setting of "1" and the Rest Cycles to a setting of "0". This means the welder will make a continuous weld discharge for as long as the foot pedal is held down, with no rest between weld cycles. For up to 30 seconds of continuous energy release. A cooling period will be required before additional welding can occur. The welding/rest time is calculated based on energy level and duty cycle.

To adjust the screen brightness:

• Press and move the Slider Bar (E) to the right to increase the brightness or to the left to decrease the brightness.

System Tab:

Tap the System Button (B) to access the following tools:

Restore All Defaults (F)

Press the Restore All Defaults Button to set all welder settings to factory default status.

Clear All Memory (G)

Press the Clear All Memory Button to erase all memory including saved schedules.

Update Welder (H)

To update the software using a USB drive, press the Update Welder Button and follow the instructions that appear on the screen or see instructions below.

Update Welder Over Wi-Fi (I)

To update the software over a Wi-Fi connection, press the Update Welder Over Wi-Fi Button and follow the instructions that appear on the screen. See detailed instructions below.

Note: The AC Welder must be connected to a Wi-Fi connection with Internet access. A popup message will appear with prompts and inputs to connect to Wi-Fi.

Enter Test Suite (J)

The Test Suite is helpful for diagnostics and technical support and can only be accessed with a password. Contact Sunstone Support if this password is needed.

System Information (K)

System Information is displayed at the bottom of the Settings Screen.

- Hardware Revision
- Firmware Revision
- LCD Revision

How to Update the AC 5kVA Welder Software

The Sunstone AC 5kVA software may be updated from time to time as needed. The software can be updated directly from the welder via Wi-Fi or the update can be downloaded to a USB storage device and plugged into the welder for updating.

UPDATING VIA A USB STORAGE DEVICE

- With the welder on, insert a USB storage drive containing the update files into the USB slot on the left, front side of the unit.
- Press the Settings Button in the Navigation Bar.
- Press "Update Welder."
- At this stage, you'll wait approximately 20 seconds for the welder to do a quick systems check.

- When the check is complete, the welder will prompt you to update. Press "Install".
- The welder will begin to update. Once the update is completed the welder will display the following message: "Error – Please contact Sunstone Customer Support." **Don't call Sunstone Customer Service.** Disregard the message and ontinue to the next bullet point.
- Turn the unit off and wait 10 seconds.
- Remove the USB storage device.
- Turn the unit on.
- The updated software will now launch, which may take a few minutes.
- Once the new software is launched the following message will appear: "Firmware upgrading".
- Once completed, a message will appear letting you know the process was successful.

UPDATING OVER WI-FI

- Press the Settings Button in the Navigation Bar .
- Press System Button.
- Tap the Update Over Wi-Fi Button. If the welder is not connected to a network, a popup message will appear and display all available networks. Choose the network to which you wish to connect. If you do not see your network or your network is hidden, you can press the Other Network Button to manually type in your network SSID. Enter your password to login to your network and press Okay.
- If the welder is already using the most updated software, a popup will appear stating that "There are no new files to download. You are already up-to-date". If that's the case, you can discontinue the update process. If the welder's software is not the most current version, a popup with a progress bar will appear and display the status of the download.
- Once the update file is downloaded and the progress bar reaches 100%, a new message will appear and display the status of the update. Follow the on-screen prompts.
- Once the update is complete, the app will close.
- Turn the welder off and wait 10 seconds.
- Turn the welder on. The updated software will now launch.

Chapter 5: Weld Operation Examples

EXAMPLE PROJECT SETUP #1 - HAND PIECE SPOT WELD OF 0.1MM SHEETS

1. Attach a hand piece:

- Attach the weld cable coming from the hand piece to the Positive Terminal on the back of the welder.
- If equipped, attach the Trigger Cable (3DIN Connector) to the back of the welder in the "Primary Trigger" port.
- If the hand piece is not equipped with a trigger cable, plug a foot pedal into the "Primary Trigger" port on the back of the welder instead.

2. Attach the ground:

- Attach the ground cable (coming from a grounding plane or clip) to the Negative Terminal on the back of the welder.
- Make sure the part being welded is making firm contact with either the grounding plane or the ground clamp.
- Attach the ground clip to the work piece as near to the weld location as possible to provide a good path for the weld current.

3. Configure Weld Settings:

- For a sheet of 0.1mm thickness:
 - Set the welder to "Single".
 - Select power range "1"
 - Set 'Rest' time at 5 cycles.
 - Set 'Weld' time at 4 cycles.
 - Set 'percent of phaser' at 50%.

4. Perform a Weld:

• Ensure that the welding electrode tip is dressed to a fine, slightly rounded point.

- Make sure the "Weld ON/OFF" button located on the front panel is ON (LED Lit).
- Place the electrode firmly onto the work piece in the desired spot location and trigger a weld using the configured method (hand piece button, foot pedal, etc.)
- Check weld spot size and strength to ensure proper settings.
- Generally, as the thickness or the sheet or wire varies, increase or decrease the power to suit. Always weld with the lowest power setting and the shortest weld time commensurate with a good weld.

EXAMPLE PROJECT SETUP #2 - HAND PIECE CONTINUOUS WELD OF 0.1MM SHEETS

1. Attach a Hand Piece with a Rolling Wheel Electrode:

- Attach the weld cable coming from the hand piece to the Positive Terminal on the back of the welder.
- If equipped, attach the Trigger Cable (3DIN Connector) to the back of the welder in the "Primary Trigger" port.
- If the hand piece is not equipped with a trigger cable, plug a foot pedal into the "Primary Trigger" port on the back of the welder instead.
- Attach the wheel electrode to the hand piece (follow the instructions in the hand piece manual).

2. Attach the ground:

- Attach the ground cable (coming from a grounding plane) to the Negative Terminal on the back of the welder.
- Make sure the part being welded is making firm contact with the grounding plane.

3. Configure Weld Settings:

- For a sheet of 0.1mm thickness:
 - Set the welder to "seam".
 - Select power range "1"
 - Set 'Rest' time at 1 cycle.
 - Set 'Weld' time at 4 cycles.
 - Set 'percent of phase' at 50%.

4. Perform a Weld:

- Make sure the "Weld ON/OFF" button located on the front panel is ON (LED Lit).
- Ensure that the Wheel Electrode tip makes firm contact with the sheet to be welded.
- Place the electrode firmly onto the work piece in the desired spot location and trigger a weld using the configured method (hand piece button, foot pedal, etc.)
- Move the Wheel Electrode along the sheet at a uniform pace and using uniform pressure (dwelling for too long in one place can cause uneven weld results).
- Check the weld results and adjust settings as necessary.
- Generally, as the thickness or the sheet or wire varies, increase or decrease the power to suit. Always weld with the lowest power setting and the shortest weld time commensurate with a good weld.

EXAMPLE PROJECT SETUP #3 - WELD HEAD SPOT WELD OF 0.1MM SHEETS

1. Attach a Pneumatic Weld Head:

- Attach one of the weld cables coming from the Weld Head to the Positive Terminal on the back of the welder.
- Attach the other weld cable coming from the Weld Head to the Negative Terminal on the back of the welder.
- Plug the DC supply into a wall outlet.

2. Attach the Trigger Cable:

- For weld head triggering, plug the trigger cable coming from the weld head (if equipped) into the Primary Trigger port on the back of the welder.
- For dual pedal triggering, plug a foot pedal into the port on the back of the welder.

3. Configure Weld Settings:

- For a sheet of 0.1mm thickness:
 - Set the welder to "Single".
 - Select power range "1"
 - Set 'Rest' time at 5 cycles.
 - Set 'Weld' time at 4 cycles.
 - Set 'percent of phase' at 50%.

4. Perform a Weld:

- Ensure that the welding electrode tips are dressed to fine, slightly rounded points.
- Make sure the "Weld ON/OFF" button located on the front panel is ON (LED Lit).
- Set the force on the weld head.
- Place the work piece in the proper configuration for the electrodes selected.
- Press the foot pedal to lower the weld head.
- If using dual foot pedal triggering, press the second foot pedal to trigger the weld, otherwise the weld will be triggered by the weld head automatically.
- Check weld spot size and strength to ensure proper settings.
- Generally, as the thickness of the sheet or wire varies, increase or decrease the power to suit. Always weld with the lowest power setting and the shortest weld time commensurate with a good weld.

OTHER RECOMMENDATIONS

- 1. Select the shortest weld time possible, consistent with achieving a satisfactory weld, to help minimize heating of the hand attachment and cables over time.
- 2. Better weld nugget results will be obtained by placing the ground clip as close to the weld as possible.
- 3. Weld nugget results can be affected by electrode tip size. As electrode tip diameter decreases, the weld penetration increases, but the spot size decreases.

Appendix A: Connection Pin-Out Diagrams

E-STOP Pin-Out

Refer to Figure 23.1.

1: GND/Shield

2 & 3: Normally open, E-STOP enabled. Close circuit to disable E-STOP

Note: Pins 4 through 6 are unused.



Figure 23.1. E-Stop Pin-Out.

Primary Trigger Pin-Out Refer to Figure 23.1.

1: Not Connected

2: +12V

3: Secondary Trigger. Connect this to Pin 2(+12VDC) when trigger is desired.



Figure 23.2. Primary Trigger Pin-Out.

Appendix B: Warnings and Alarms

If the AC Welder experiences a problem, a warning or alarm message will appear. Appendix B provides a list of all warnings/alarms, what they mean and how they may be resolved. If you need additional assistance, call or text +1 801-658-0015.

Warning	Solution
Welder Not Ready	The Welder detected a trigger signal, but the Weld ON/OFF button is OFF, or is in a cooling state between welds. Press the Weld ON/OFF Button to enable welds.
Emergency Stop Active	Should the Welder encounter an unsafe state, the unit will stop all welding and display this alarm. Unsafe states may include the following: Internal communications error or internal temperature over heating. Call Sunstone's customer service team for immediate assistance.
Error Corrupt File	If the Welder is unable to read a file, the unit will display this alarm and name the corrupted file. Touch on the Dismiss button and then try reloading a dif- ferent file.
Failed to Connect to Server	If the Welder is unable to connect to the Sunstone server in order to update its soft- ware and firmware, this alarm will appear. Touch the Dismiss button and then check all physical connections, software configuration settings on the Welder, and verify the software has access to the Internet. Then try reconnecting to the server again. If you encounter this problem again, call Sunstone's customer service team for immediate assistance.
Firmware Update Failed	If the Welder is attempting to update its firmware and that attempt fails, this alarm will appear. Touch the Dismiss button. Contact Sunstone's customer service team if the problem persists.

Firmware Updated	If the Welder successfully updates its firmware this alarm will appear. Touch the Okay button to return to normal operation.
Firmware Updating	While the Welder is updating its firmware this warning will be displayed with a bar representing how much of the operation has been completed. When the update is completed a new warning will appear, "Firmware Updated." You will not be able to operate the Welder during this process.
Hardware Issues with Welder	If the Power Supply Unit (PSU) or main circuit board is unable to communi- cate with the touchscreen interface (LCD), this alarm will appear. Restart the welder. If the message persists, contact Sunstone's customer service team for immediate assistance.
Welder Cooled	If the welder becomes overheated, wait for Welder to cool and display this message. Touch the Dismiss button, verify you are operating under safe con- ditions, and then continue. Feel free to contact Sunstone's customer service team if the Welder continues to overheat.
Welder is Overheated	If the Welder exceeds safe operating temperatures this warning will appear. Emergency stop mode is activated and you will not be able to continue op- eration until the unit cools. If you press the Dismiss button the welder will not function until the unit has cooled. If you do nothing, this message will auto- matically close when the welder reaches a safe operating temperature. Check weld settings, the work piece, and the work space and verify you are operat- ing under safe circumstances before continuing operation.

NOTE: This unit may experience communication problems, including problems between the user interface and the internal hardware. These problems are rare, but they will occasionally occur when the unit is used in an electrically noisy environment. If communication problems do arise, a power cycle will usually resolve this problem. Simply turn the machine off, wait 30 seconds, and power the machine back up. If the error persists, the unit mayneed to be sent in for servicing.

Appendix C: Specifications

AC 5kVA DATA SPECIFICATIONS TABLE	
TABLETOP FOOTPRINT (L X W X H)	18.9 x 12.5 x 11.9 inches
UNIT WEIGHT	98lbs
INPUT VOLTAGE	200VAC - 250VAC single phase
FREQUENCY RANGE	50-60 Hz
POWER FACTOR (typ.)	PF>0.94/230 VAC
POTENTIAL PEAK INPUT	30A/230 VAC
ACTUAL AVERAGE CURRENT (welding)	
SINGLE AND SEAM PULSE	YES
CONTINUOUS MODE	YES
PERCENT PHASE ADJUSTMENT	40-100%
WELD PULSE CHARACTERISTICS	
MIN AND MAX OUTPUT (Power)	0.13kVA to 5kVA
MAX PULSE WIDTH	16.67ms (1 cycle), 500ms (30
	cycles)
MAX PULSE WIDTH	8.3ms (1 cycle), half waveform
MIN AND MAX CURRENT	225A to 2700A
MIN AND MAX VOLTAGE	0.44V-2.8V

OUTPUT TABLE (ACCORDING TO LOAD)

LOAD		OUTPUT							
	Power Range	1	1	2	2	3	3	4	4
	Phase	40%	100%	40%	100%	40%	100%	40%	100%
2.2mΩ									
	Power (kVA)	0.13	1.6	0.15	2.16	0.25	3.72	0.39	5
	Voltage (V)	0.6	1.52	0.66	1.8	0.84	2.36	1.04	2.8
	Current (A)	225	1050	225	1200	300	1575	375	1800
1.1mΩ									
	Power (kVA)	0.14	1.35	0.17	1.95	0.26	2.87	0.38	4.13
	Voltage (V)	0.6	1	0.64	1.3	0.8	1.5	0.9	1.9
	Current (A)	240	1350	270	1500	330	1913	420	2175
0.55mΩ									
	Power (kVA)	0.13	1.26	0.15	1.69	0.24	2.75	0.34	3.67
	Voltage (V)	0.44	0.8	0.48	0.92	0.6	1.08	0.68	1.36
	Current (A)	285	1575	315	1838	405	2250	495	2700

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