



WH1 Opposed Weld Head

For Models WH1125A, WH1125M, WH1250A, WH1250M, WH1187A HF

Users Guide

Version 20201010 • Part #1170



sunstone[™]

The Micro Welder Experts



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

Limitation of Liability

IN NO EVENT, UNDER ANY CAUSE OF ACTION OF THEORY OF LIABILITY, SHALL SUNSTONE ENGINEERING LLC, ITS DISTRIBUTORS, OR SUPPLIERS BE LIABLE TO YOU OR ANY THIRD PARTY FOR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, OF ANY NATURE WHATSOEVER, ARISING OUT OF THE USE OF OR INABILITY TO USE ANY SUNSTONE ENGINEERING LLC PRODUCT, INCLUDING, WITHOUT LIMITATION, PROPERTY DAMAGE, LOSS OF VALUE OF THE SUNSTONE ENGINEERING LLC PRODUCT OR ANY THIRD PARTY PRODUCTS THAT ARE USED IN OR WITH THE SUNSTONE ENGINEERING LLC PRODUCT, OR LOSS OF USE OF THE SUNSTONE ENGINEERING LLC PRODUCT OR ANY THIRD PARTY PRODUCTS THAT ARE USED IN OR WITH THE SUNSTONE ENGINEERING LLC PRODUCT, EVEN IF SUNSTONE ENGINEERING LLC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. WITHOUT LIMITING THE FOREGOING, YOU UNDERSTAND AND AGREE THAT SUNSTONE ENGINEERING LLC HAS NO LIABILITY FOR ANY DAMAGE OR DESTRUCTION TO ANY PROPERTY. NOTWITHSTANDING ANY DAMAGES THAT YOU MIGHT INCUR FOR ANY REASON WHATSOEVER (INCLUDING, WITHOUT LIMITATION, ALL DAMAGES REFERENCED HEREIN AND ALL DIRECT OR GENERAL DAMAGES IN CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE), THE ENTIRE AGGREGATE LIABILITY OF SUNSTONE ENGINEERING LLC AND ANY OF ITS DISTRIBUTORS AND/OR SUPPLIERS SHALL BE LIMITED TO THE AMOUNT ACTUALLY PAID BY YOU FOR THE SUNSTONE ENGINEERING LLC PRODUCT GIVING RISE TO LIABILITY. SOME STATES AND/OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THE LIMITATIONS OF LIABILITY SET FORTH ABOVE SHALL APPLY TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW.

| ISSUE | DATE | APPROVAL | NOTES |
|-------|------------|----------|--|
| 1 | 10/10/2020 | DH | FORMATTING CHANGES, WELD HEAD TRIGGER HUB ADDITION, HIGH FORCE MODEL ADDITIONS, IMAGE UPGRADES |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Table of Contents

| | | | |
|--|-----------|--|-----------|
| Chapter 1: A Quick Look | 1 | Chapter 5: Welding with the Weld Head | 21 |
| What is in the Box | | Basic Welding Steps | |
| Precautions | | | |
| Chapter 2: Pneumatic Weld Head Setup | 3 | Chapter 6: Electrode Care | 22 |
| Bolt the Weld Head to the Table | 3 | Electrode Tip Shapes and Positioning | 22 |
| Set up Weld Head Trigger Hub | 4 | Electrode Material Choice | 23 |
| Set up MAC Valve Air Hoses and Pressure | 5 | Electrode Shaping | 23 |
| Chapter 3: Manual Weld Head Setup | 8 | Chapter 7: Resistance Welding Basics | 24 |
| Bolt the Weld Head to the Table | 8 | Single and Dual Pulse Description | 24 |
| Manual Foot Pedal Installation and Setup | 9 | Weld Formations | 24 |
| Setting Up the Manual Foot Pedal | 10 | Weld Pressure | 24 |
| | | Welding Attachments | 25 |
| | | Electrode Configurations | 25 |
| Chapter 4: Completing Weld Head Setup | 11 | Technical Assistance | 26 |
| Connect Weld Head Cables to the Welder | 11 | | |
| Set up Weld Head Triggering | 12 | Data Specifications | 27 |
| Automatic Triggering, One Foot Pedal | 12 | | |
| Foot Pedal Triggering | 13 | Opposed Weld Head Mounting Template | 29 |
| Standard Electrode Setup, Adjustment | 14 | | |
| High Force Electrode Setup, Adjustment | 15 | | |
| Adjust Electrode Gap | 15 | | |
| Weld Head Height Adjustment | 16 | | |
| Electrode Spring Pressure Setup | 17 | | |
| Standard Spring Pressure Values | 19 | | |
| High Force Spring Pressure Values | 20 | | |

WH1 WELD HEAD USERS GUIDE

Chapter 1: A Quick Look

Thank you for choosing Sunstone to help you reach your vision and goals. Every member of the Sunstone team is working to make sure you love our products and rave about our customer service. If you need assistance for any reason, please call or text **+1 801-658-0015**.

Before you begin to set up and use your Sunstone WH1 Weld Head you should become familiar with its various components and controls.

Carefully review the illustrations on page 2.

What is in the Box

Carefully open the weld head package. Remove and place the contents on a clear and clean workbench. You'll find the following items inside the box:

- Safety Guide: Carefully review this guide prior to operation
- Weld Head Unit
- Mac Valve Foot Pedal (for WH1125A, WH1250A, and WH1187A HF models) OR a Manual Foot Pedal system (for WH1125M and WH1250M models)
- Weld Head Trigger Hub
- Quick Start Guide (including Mounting Template)

Note: The weld head footprint of 10.25"x4.5". Verify there is enough work space for the weld head and welding unit.

Precautions

- Pieces that have been welded can be HOT. Always use caution when handling welded pieces.
- For best results sand (shape) and clean the electrodes prior to performing welds and after electrode tip wear; smoother electrodes will provide better results.

WH1 WELD HEAD USERS GUIDE

Pressure Knob. Use this knob to adjust electrode pressure. Turn counter-clockwise to decrease; turn clockwise to increase.

Weld Cable Connectors. Cables coming from the welder are attached to the weld head here. Note that the cable connected to the positive (+) terminal on the welder will put a little bit more heat to the positive electrode on the weld head. If you are welding a coated or thick to thin piece, configure the welding process with the positive (+) electrode contacting the coated or thicker part first.

80/20 Base. The base of the weld head is designed sufficiently to safely support the weld head during operation; however, it is recommended that you bolt the weld head to a table when possible.



Height Adjustment. Loosen these knobs to move the weld head up and down when positioning the electrodes above the work piece. Sunstone suggests you start with a gap of 1/8" (0.125 inches) above the work piece.

Pressure Regulator. The amount of air pressure coming in to the weld head from the air compressor is regulated by this valve. Sunstone recommends a pressure between 60 to 80 PSI.

Flow Control Valves. The Flow Control Valves adjust the air flow that is raising and lowering the weld head after stepping on the weld head foot pedal. The valves control how quickly or slowly the weld head raises or lowers.



Moveable Electrode Gap Scale. Refer to this scale when configuring the electrode gap (the distance between the heads of the two electrodes). Follow the directions as noted in the Electrode Spring Pressure Setup section on page 17.

Electrode Holders. Place the electrodes in these holders and tighten.

Chapter 2: Pneumatic Weld Head Setup

NOTE: For Manual weld head setup (WH1125M and WH1250M) see Chapter 3.

Bolt the Weld Head to the Table

This step is optional. The weld head will stand upright on its own. However, we recommend bolting it to your work table for better support and added stability.

Bolting Instructions (Option 1 - Use the Mounting Template)

- Tape the mounting template, found on page 29, to the table that will support the weld head. When instructed to drill a hole, simply drill through the illustrated holes on the mounting template.
- Drill the four holes numbered 1, 2, 3, & 4 with a 0.315" or 8mm drill bit.
- Ensure that the bolts will go through your table. (If not, you may need to drill a counter-bore on the underside of your table for the nut.)
- Slide the provided 5/16-18 T-SLOT Bolts into the channels on the underside of the weld head. See Figure 3.1.
- Align the bolts with the drilled out holes then lower the bolts into the holes.
- Next, secure the weld head by tightening the provided 5/16-18 nuts to the bolts on the under-side of the table.

Bolting Instructions (Option 2 - No Mounting Template)

- Use provided T-SLOT 5/16-18x1.5" bolts and the 5/16-18 nuts. Ensure the bolts will go through your table. (If not, you may need to drill a counter-bore on the underside of your table for the nut.) See Figure 3.1.
- The two T-SLOT grooves on the 80/20 aluminum base are 3" apart.



Figure 3.1. The heads of the included T-SLOT 5/16-18x1.5" bolts will slide into the channels found on the 80/20 aluminum base of the weld head. Use the bolts to secure the weld head to the table, with or without using the template found on page 29.

WH1 WELD HEAD USERS GUIDE

- Mark and drill the locations through your table. We recommend positioning the bolts about 1" from the edges of the triple T-SLOT extrusion.
- Tighten by tightening the bolt on the underside of the table.

Set up Weld Head Trigger Hub

Connect Foot Pedal to Weld Head Trigger Hub

Connect the Foot Pedal cable to the 3-pin connector port on the left side of the Weld Head Trigger Hub, as shown in Figure 4.1.

Connect MAC Valve Control Cable to Weld Head Trigger Hub

Connect the MAC Valve Control Cable to the 4-pin connector port on the right side of the Weld Head Trigger Hub, as shown in Figure 4.1.

Connect Weld Head Trigger Hub Power

Plug the Weld Head Trigger Hub power cable into a reliable power source.

Safely Position Weld Head Trigger Hub

Place the Weld Head Trigger Hub in a spot that secures all cables from impeding operation or contacting extremely hot surfaces.

Figure 4.1. Weld Head Trigger Hub

Foot Pedal Connection. Connect the cable from the Foot Pedal to the Weld Head Trigger Hub here.



Power Cable Connection. Using the power cable that came with the Weld Head Trigger Head, connect the power here.

MAC Valve Control Cable. The MAC Valve Control Cable coming from the MAC Valve on the weld head is connected to the Weld Head Trigger Hub here.

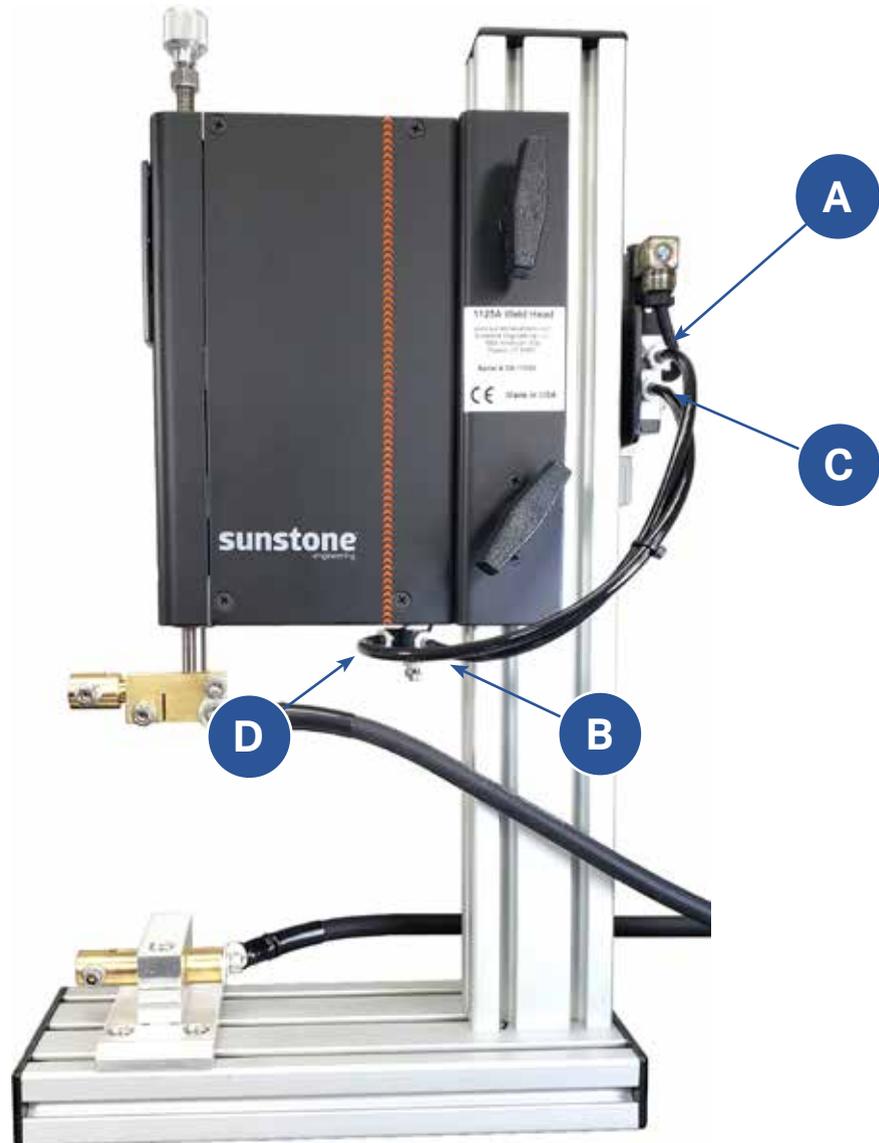


Figure 5.1. Under the MAC Valve are two air ports, which are connected to valves located under the weld head. The connections between the ports and valves are completed on the factor floor. Verify they are installed correctly.

Setup MAC Valve Air Hoses, Pressure (WH1125A, WH1250A, WH1187A HF)

Verify MAC Valve Air Hoses

- Verify that your air hoses are securely fastened.
- Verify that your air hoses are in the correct ports. See Figure 5.1. The air hose leading from the top port on the MAC Valve (A) should connect to the right valve under the weld head (B). The air hose leading from the bottom port on the MAC Valve (C) should connect to the left valve under the weld head (D).

WH1 WELD HEAD USERS GUIDE

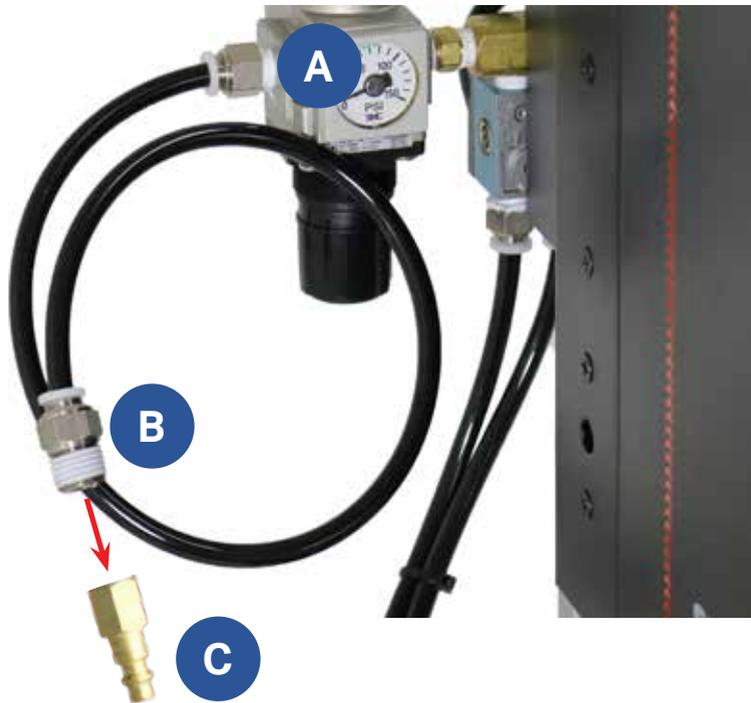


Figure 6.1. Connect the included 1/4" air hose to the air hose port (A) located on the left side of the MAC Valve. Next, connect the provided silver fitting (B) to the other end of the air hose. Then connect the hose to a supply of compressed air using a brass connector (C) (not included).

Connect Compressed Air

- Connect the included 1/4' air hose to the MAC Valve air hose port (A) as show in Figure 6.1.
- Connect the provided silver fitting (B) to the other end of the air hose.
- Next, connect the hose to a supply of compressed air using a brass connector (C) (not included).
- Set the air compressor pressure between 80 and 100 PSI.

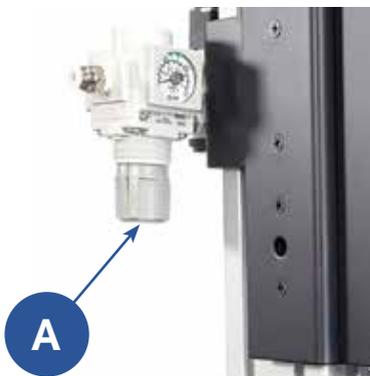


Figure 6.2. Pull down and turn the regular adjustment knob (A) to increase or decrease air pressure to the weld head.

Set the MAC Valve air pressure

- Pull down on the regulator adjustment knob (A) as seen in Figure 6.2.
- Turn the knob to the clockwise to increase the amount of air pressure coming into the weld head from the air compressor or counterclockwise to decrease the air pressure coming into the weld head.
- Set the MAC Valve pressure between 60 and 80 PSI.
- Push the regulator adjustment knob back in to lock the air pressure setting in place.

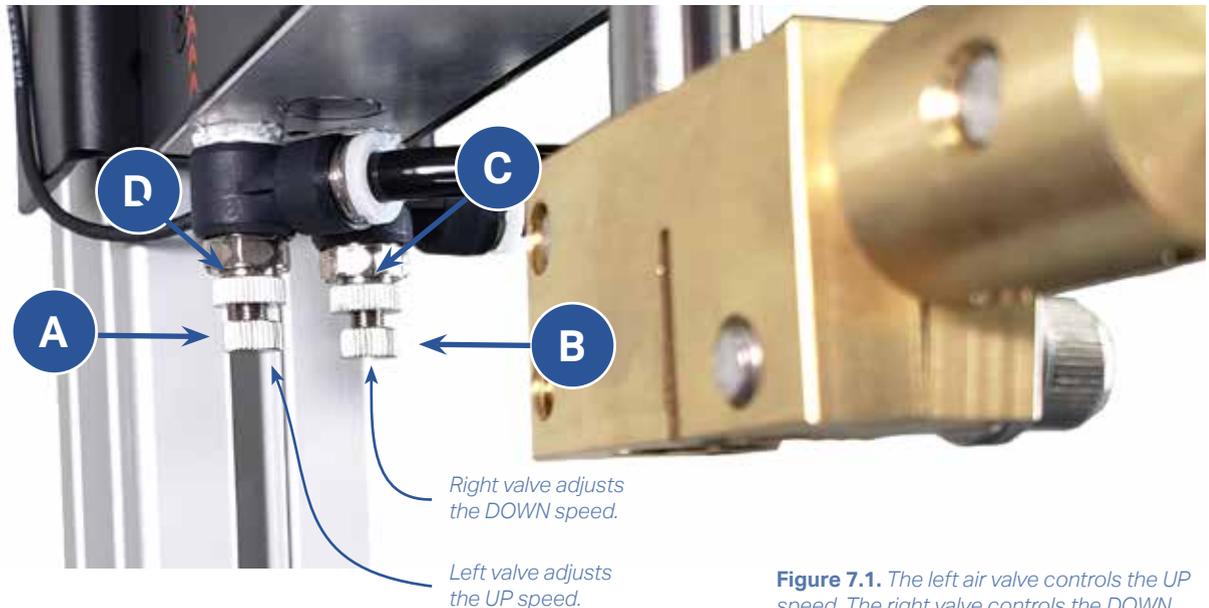


Figure 7.1. The left air valve controls the UP speed. The right valve controls the DOWN speed. To adjust the up or down speed, first loosen the lock nut (C or D); adjust the speed; then tighten the lock nut (C or D).

Adjust Weld Head Up/Down Speed Using the Air Valves

The air valves shown in Figure 7.1 adjust the up and down speed of the weld head. The air valve on the left controls the up speed; the air valve on the right controls the down speed. To adjust the up or down speed of the weld head, follow these steps:

To Adjust UP Speed

- Loosen the lock nut on the left valve (D) by turning counter clock wise.
- Turn the left air valve adjustment knob (A) clockwise to decrease the up speed of the weld head.
- Turn the left air valve adjustment knob (A) counter clockwise to increase the up speed of the weld head.
- When the desired adjustment is reached, tighten the lock nut on the left valve (D) by turning clockwise.

To Adjust DOWN Speed

- Loosen the lock nut on the right valve (C) by turning counter clockwise.
- Turn the right air valve adjustment knob (B) clockwise to decrease the down speed of the weld head.
- Turn the right air valve adjustment knob (B) counter clockwise to increase the down speed of the weld head.
- When the desired adjustment is reached, tighten the lock nut on the right valve (C) by turning clockwise.

Pneumatic Setup Completed. Jump to Chapter 4 on page 11 to complete weld head setup.

Chapter 3: Manual Weld Head Setup

Note: The instructions in this chapter are only for the WH1125M and WH1250M manually actuated weld head models. If you have a pneumatic model, skip to Chapter 4 on page 11 to complete setup.

Bolt the Weld Head to the Table

Your Sunstone manual weld head must be bolted to a table. Refer to Figure 8.1 and follow these instructions to secure your weld head to a working table:

- Remove the mounting template (C) found on page 29 and tape it to the work table's top side. When instructed to drill a hole, simply drill through the hole illustrated on the mounting template.
- Drill the four holes numbered 1, 2, 3, and 4 with a 0.315 or 8mm drill bit.
- Drill hole number 5 with a 1.0" or 26mm drill bit.
- Ensure that the provided 5/16-18 T-SLOT Bolts for holes 1, 2, 3, and 4 will go through your table.
- Slide the provided 5/16-18 T-SLOT Bolts into the channels on the underside of the weld head as seen in the image.
- Be sure to run the manual foot pedal rod (A) through the hole in the weld head base (B).
- Remove the taped mounting template (C) from the table.
- Align the bolts and the rod with the holes that have been drilled through the mounting template into the table.
- Lower the bolts and rod into the holes.

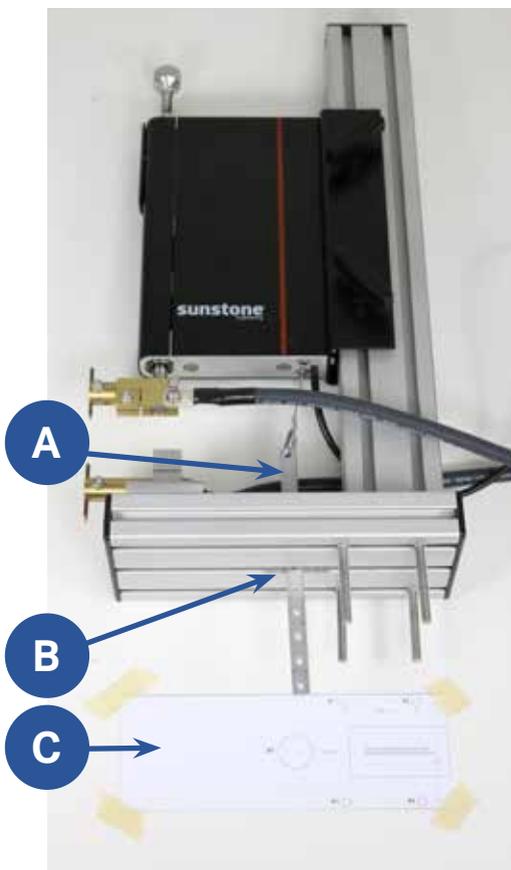


Figure 8.1. When used manually, the weld head must be bolted to a work surface. Use the mounting template found on page 29.

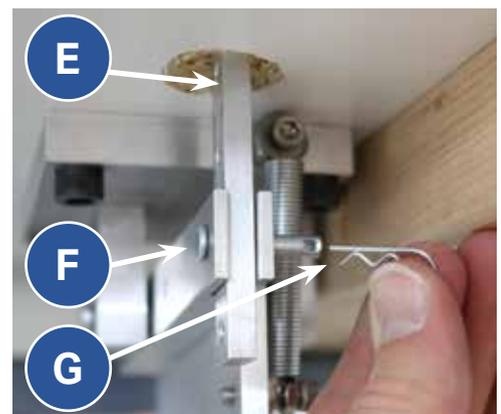
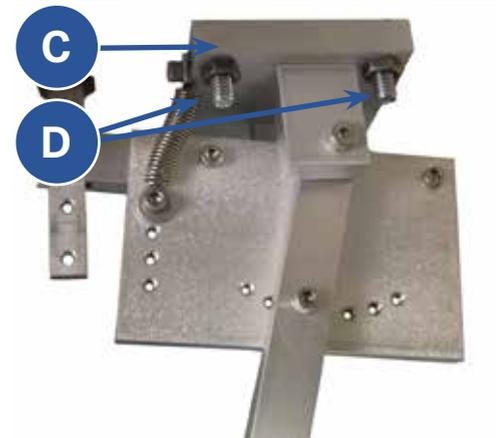
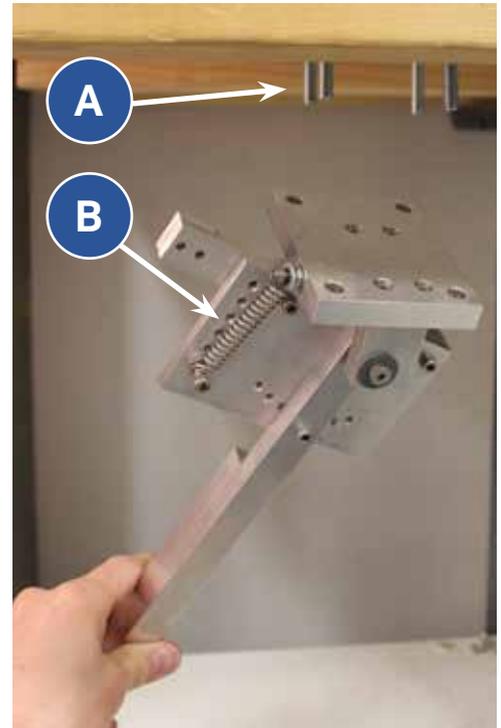
The manual foot pedal will connect into the bolts on the under side of the table as described in the next section.

Manual Foot Pedal Installation and Setup

Attaching the Manual Foot Pedal

The manual foot pedal system will connect to the bolts running from the weld head base through the table. To attach the manual foot pedal to the weld head, follow these instructions while referencing the figures at left:

- Line up the manual foot pedal holes with the bolts going through the table (A).
- Be sure that the spring on the manual foot pedal base is facing forward (B) (the same direction as the front of the weld head).
- Insert the manual foot pedal base (C) into the bolts (D).
- Secure the manual foot pedal to the table by tightening the four provided 5/16-18 nuts onto the four bolts (D) running through the table/manual foot pedal base.
- Next, connect the weld head rod to the manual foot pedal.
- Connect the manual foot pedal rod (E) that is running through the 1" center hole to the manual foot pedal table mount (B).
- Insert the connection pin (F) and attach the safety clip (G).



Setting Up the Manual Foot Pedal

With the foot pedal system attached to the work table, you can now attach the manual foot pedal leg to the arm of the manual foot pedal system, as shown in Figure 10.1 (C).

You can adjust the angle and pressure of the manual foot pedal by changing the pin locations in (A) and (B).

Continue to Chapter 4 to complete the setup of your Sunstone weld head.

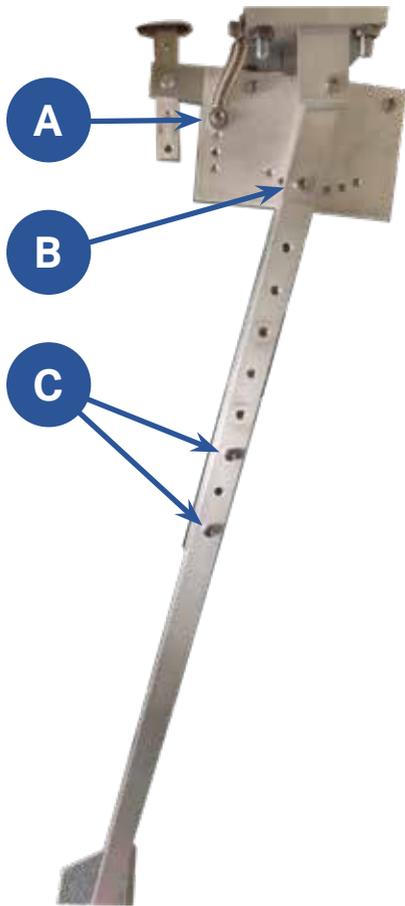


Figure 10.1. With the foot pedal system attached to the work table, attach the foot pedal leg to the arm of the manual foot pedal system.

Chapter 4: Completing Weld Head Setup

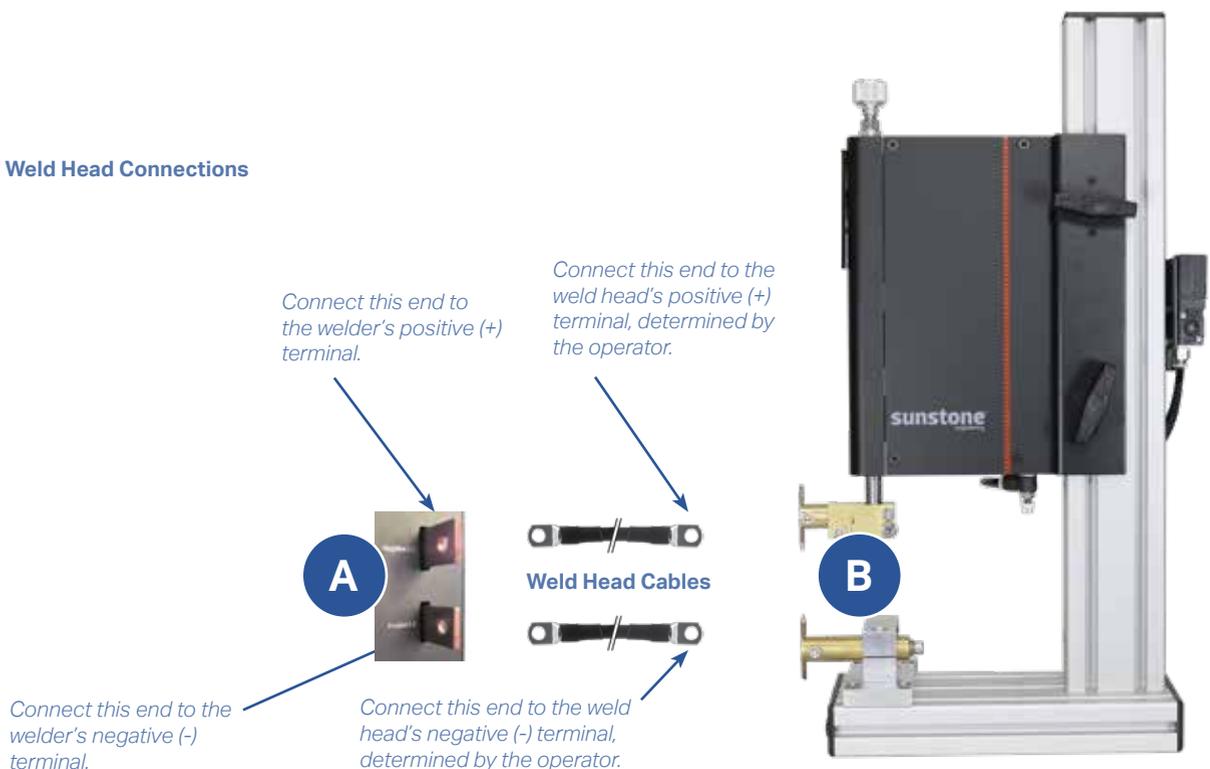
Connect Weld Head Cables to the Welder

The 1AWG weld head cables will come attached to the electrode blocks (B) on the weld head, but you'll need to connect the weld head cables to the welder (A). Refer to Figure 11.1.

Bolt the 1AWG weld head cables to the positive and negative terminals on the welder (A) with the provided nuts and bolts. Verify connections on both the welder and the weld head are securely fastened.

Note: The cable connected to the positive (+) terminal on the welder will produce slightly more heat to the respected electrode on the weld head. If you are welding a coated part or a thick to thin piece, try setting up the welding process so that the positive (+) electrode contacts the coated part or thicker piece.

Figure 11.1. Weld Head Connections



WH1 WELD HEAD USERS GUIDE

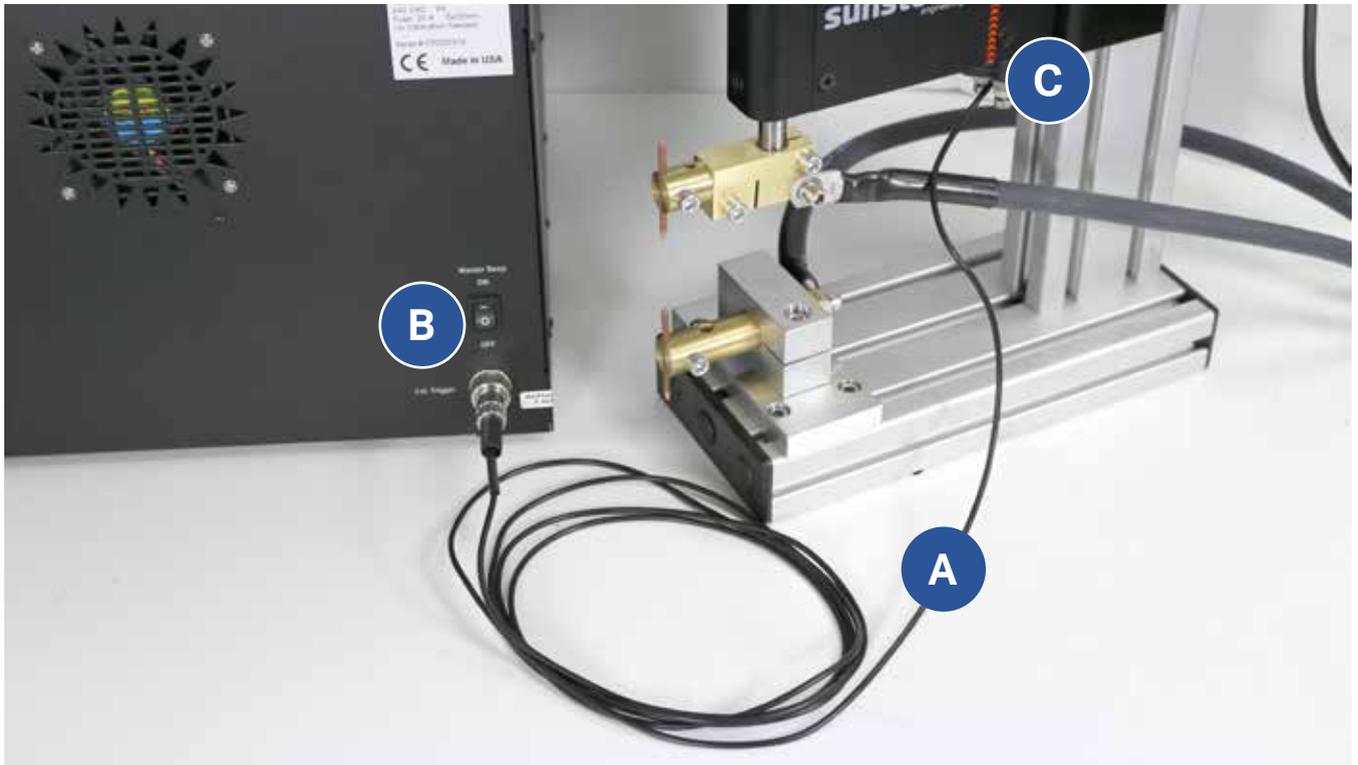


Figure 12.1. For automatic triggering, connect the Weld Head Actuating Cable (A) to the Trigger Port (B) on the back of the welder. Refer to your Sunstone welder users guide for the proper port to use on the back of the welder.

Set up Weld Head Triggering

With a Sunstone weld head you can choose to trigger the weld head using two options: 1)Automatic triggering using one foot pedal; and 2)Foot pedal triggering wherein two foot pedals are employed.

AUTOMATIC TRIGGERING USING ONE FOOT PEDAL

With automatic triggering, the weld head will automatically trigger when the force of the electrode on the work piece reaches a certain pressure point.

Before attaching the 3-pin Weld Head Actuating Trigger Cable (A) from the weld head to the back of the welder, lower the weld head by pressing and holding the weld head foot pedal for the pneumatic model, or the manual foot pedal for manual models. Verify the electrodes are in the correct location on the work piece. The weld head foot pedal for pneumatic models will be connected to the Weld Head Trigger Hub, as seen on page 4. **See the electrode setup sections on page 14 and 15 for further information on electrode placement.**

Next, attach the 3-pin Weld Head Actuating Trigger Cable (A) to the trigger port on the back of the welder (B).

Note: The trigger port will differ from welder to welder. Refer to your Sunstone welder users guide.

The Weld Head Actuating Trigger Cable (A) can be found attached to the bottom of the weld head at the back (C). See Figure 12.1.

How to Use Automatic Triggering

- Press and hold the weld head foot pedal or manual foot pedal that lowers the weld head.
- As the weld head is lowering it will reach a sensor that will send a signal to the welder through the Weld Head Actuating Trigger Cable to tell the welder to initiate the weld
- Once the weld has triggered, release the weld head foot pedal.

Automatic triggers have two key advantages: 1)It increases production speeds; and 2)Only one foot pedal is needed.

For increased precision, if you want to use the foot pedal to trigger the weld instead of using automatic triggering, you'll want to use the Foot Pedal Trigger option, as described next.

FOOT PEDAL TRIGGERING

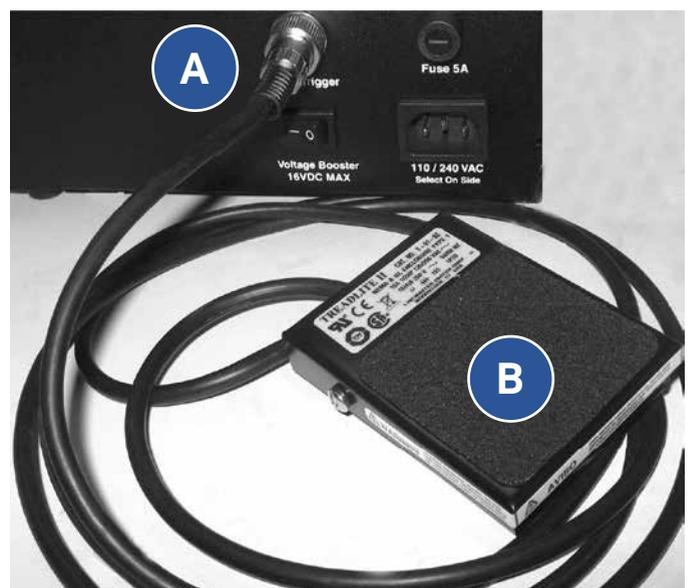
With foot pedal triggering the weld head will be triggered by using a second foot pedal that was shipped with your Sunstone welder.

Note: Don't confuse the foot pedal that came with your Sunstone welder with the weld head foot pedal, or manual foot pedal, that lowers the weld head during operation.

To configure foot pedal triggering, see Figure 13.1 and follow these steps:

- Disconnect the Weld Head Actuating Trigger Cable (if it is connected to the back of the welder) from the "trigger" port on the back of the welder.
- Connect the 3-pin foot pedal triggering cable to the "trigger" port on the back of the welder (this is the foot pedal that came with the Sunstone welder).

Figure 13.1. For foot pedal triggering, connect the foot pedal that came with your Sunstone Welder (B) to the Ext. Trigger Port (A) on the back of the welder.



WH1 WELD HEAD USERS GUIDE

How to Use Foot Pedal Triggering

- Press and hold the weld head foot pedal that lowers the weld head.
- Verify electrodes are in the correct location on the work piece.
- Now press the trigger foot pedal connected to the Sunstone welder.
- Once the weld has triggered, release both foot pedals.

NOTE: The trigger foot pedal does not need to be held down, a single press will suffice to trigger a weld.

Foot pedal triggering provides the operator with more control by deciding when to trigger the weld.

Standard Electrode Setup and Adjustment

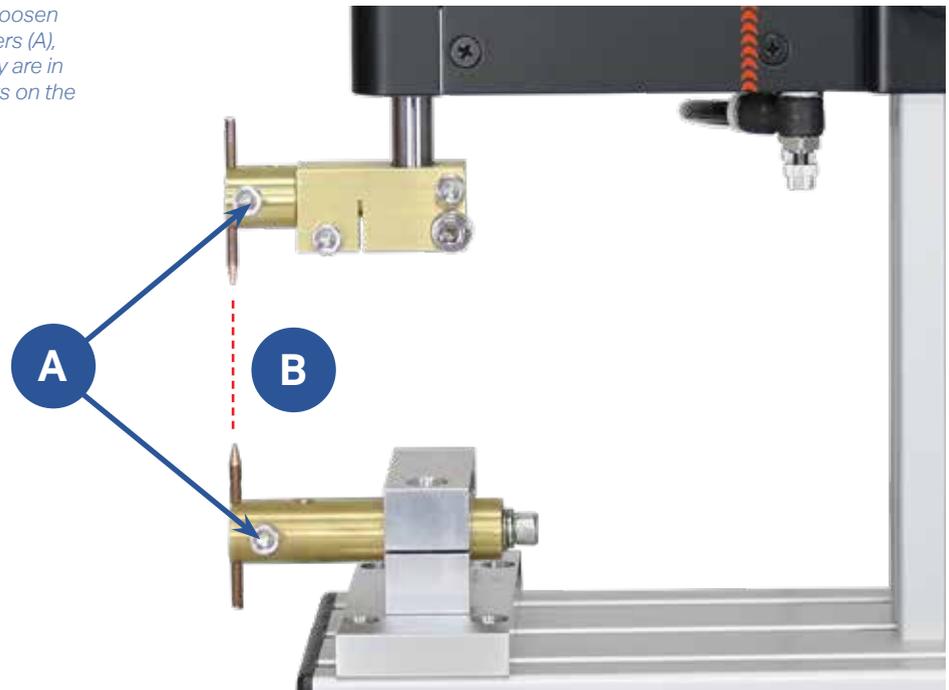
Note: For the WH1187 HF model, jump to the next section, "High Force Electrode Setup and Adjustment."

Note: Carefully follow the steps below in the same order every time you adjust your electrodes.

Insert electrodes into the electrode holders

- Loosen the bolts on the side of the electrode holders (A) as shown in Figure 14.1.
- Insert electrodes and make sure the opposed tips are in vertical alignment with each other (B).
- Tighten the electrodes into their holders (A).

Figure 14.1. To insert the electrodes, first loosen the bolts on the side of the electrode holders (A), then insert the electrodes making sure they are in vertical alignment (B). Then tighten the bolts on the side of the electrode holders (A).



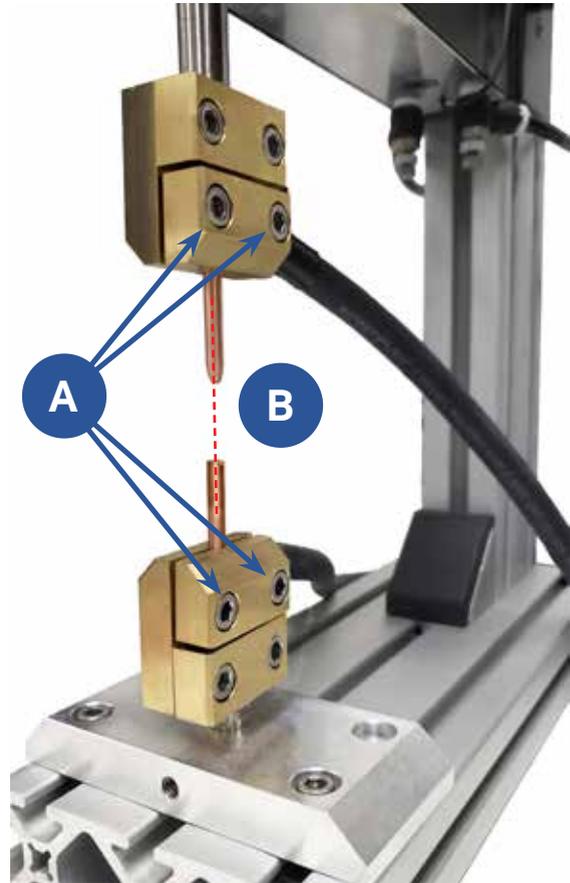


Figure 15.1. To insert the electrodes on a high force weld head, first loosen the bolts on the side of the electrode holders (A), then insert the electrodes making sure they are in vertical alignment (B). Then tighten the bolts on the side of the electrode holders (A).

High Force Electrode Setup and Adjustment

Note: Carefully follow the steps below in the same order every time you adjust your electrodes.

Insert electrodes into the electrode holders

- Loosen the bolts on the side of the electrode holders (A) as shown in Figure 15.1.
- Insert electrodes and make sure the opposed tips are in vertical alignment with each other (B).
- Tighten the electrodes into their holders (A).

Adjust Electrode Gap

Move the weld head up or down as described in the next section, Weld Head Height Adjustment. Sunstone recommends that the weld head be set to a height where the top electrode is an 1/8" (0.125") above the work piece when the work piece is placed on top of the lower electrode. See Figure 16.1.

For best results sand (shape) and clean your electrodes prior to performing welds and after electrode tip wear.

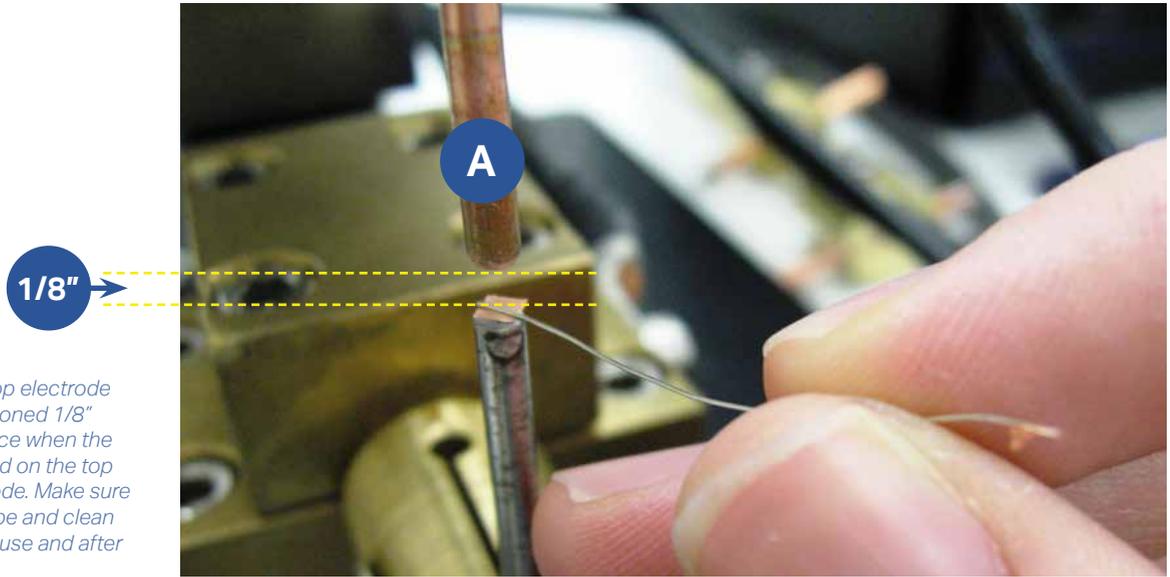


Figure 16.1. The top electrode (A) should be positioned 1/8" above the work piece when the work piece is placed on the top of the lower electrode. Make sure you frequently shape and clean electrodes prior to use and after tip wear.

Weld Head Height Adjustment

To adjust the weld head height, see Figure 16.2 and follow these instructions:

- Place one hand under the weld head body to support the weight as the weld head height adjustment knobs are being loosened.
- Use your other hand to loosen the Weld Head Height Adjustment Knobs (A).
- Now move the weld head up or down.
- Tighten the Weld Head Height Adjustment Knobs once the desired height is reached.
- We recommend that the weld head be set to a height where the electrodes are an 1/8" (0.125") above the work piece.

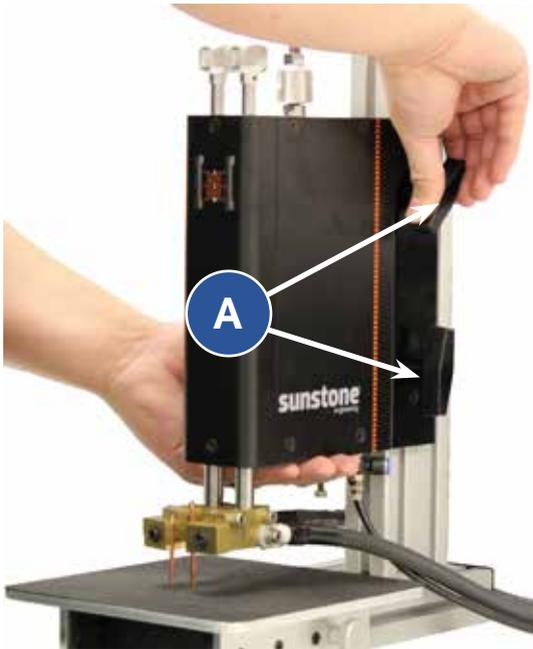


Figure 16.2. To adjust the height of the weld head, place one hand under the weld head for support. With the other hand, loosen the Weld Head Height Adjustment Knobs (A). Position as desired, and then tighten the knobs.

Electrode Spring Pressure Setup

The spring pressure on the weld head is user adjustable to help achieve desired weld characteristics. An adjustment knob at the top of the weld head is used to change the amount of compression the spring will experience. The scale on the front of the weld head is movable and should be at the most upward position, which represents an 1/8" gap between the work piece and the top electrode. This is the default movable scale setting location. The scale is movable to compensate for welding situations in which the gap between the part being welded and the top electrode is larger than an 1/8" (0.125").

Set The Electrode Gap and Height

Adjust the electrode gap and weld head height as described previously on pages 15-16, "Adjust Electrode Gap" and "Weld Head Height Adjustment." Sunstone recommends an 1/8" (0.125") gap between the work piece and the top electrode (A) in Figure 16.1.

Set The Movable Scale

The process of setting the Moveable Scale (A), as shown in Figure 17.1, will ensure that the spring is compressed the same amount regardless of the gap distances. The Moveable Scale (A) is a metal slider that sits on the front of the weld head and can be moved up and down. Below the Moveable Scale, you'll see horizontal red lines (B), which represent the height between the top electrode and work piece.

Before welding, set the Moveable Scale. As shown in Figure 17.1, slide the Movable Scale (A) up as high as it will go. This represents an 1/8" (0.125") gap between the part being welded and the top electrode. The bottom of the Movable Scale will be at the orange 0.125 line, which is the default position.

The Moveable Scale should be set to the height between the top electrode and the work piece. For example: If there is a 1/2" (0.5") gap between the part being welded and the top electrode, adjust the bottom of the Movable Scale down to the 0.5" orange line.



Figure 17.1. Set the Moveable Scale to the same height between the top electrode and the work piece.



Figure 18.1. To adjust pressure, loosen the hex nut (B), rotate the Pressure Knob (A) until the brass Force Indicator (D) reached the desired pressure (C). Then tighten the hex nut (B) to lock the pressure value.

Adjust the Electrode Spring Pressure

The force applied to the electrode plays a very large role in achieving successful resistance welds. It is important to find the correct balance between the weld energy being applied and the amount of force being applied. Too much force can decrease the amount of resistive heat being generated at the weld site and lead to weaker welds. Sometimes the part may deform (bend) if too much force is used. Too little force can cause arcing, blowouts, and inconsistent weld results. As a general rule of thumb, the more energy being released by the welding power supply, the more electrode force will be required.

The Sunstone weld head comes standard with light duty springs that range between 1-15 lbs of compression force. The eight notches (C) on the Movable Scale (E) (see Figure 18.1) divide the compressible distance into quantifiable sections. Each section represents an approximate amount of force that will be applied to the electrode. The tables on pages 19 and 20 show these values.

To adjust the spring pressure, refer to Figure 18.1 and follow these steps:

- Loosen the hex nut (B) on the threaded adjustment rod at the top of the weld head.
- Rotate the Pressure Knob (A) clockwise to increase spring compression (electrode pressure). Rotate the Pressure Knob counter clockwise to decrease spring compression.
- Look through the opening in the Movable Scale (E). Inside you will see the brass Force Indicator with a line carved through the middle (D). The Force Indicator will move up and down as you adjust the pressure knob up and down.
- Adjust the Pressure Knob (A) until the line on the brass Force Indicator (D) corresponds to your desired mark (C) on the Movable Scale (E). Each mark represents a pressure value. Values for Standard and High Force weld heads can be found on pages 19 and 20.
- Once the brass Force Indicator (D) is at your desired pressure mark (C), tighten the hex nut (B) to lock the spring pressure in place.

Standard Spring Pressure Values

For weld heads with force ranges between 1-15 lbf (WH1125, WH1250)

| 1/8" (0.125) Electrode Gap | | | | |
|-----------------------------|------------------------------------|---------------------|---------------------|--------------------|
| Electrode to Work Piece Gap | Electrode to Work Piece Gap Marker | Spring Force Marker | lbs / ONE electrode | Kg / ONE electrode |
| 1/8" (0.125) | 1/8" (0.125) | 1st Notch (top) | 1 | .45 |
| 1/8" (0.125) | 1/4" (0.250) | 2nd Notch | 3 | 1.4 |
| 1/8" (0.125) | 3/8" (0.375) | 3rd Notch | 5 | 2.3 |
| 1/8" (0.125) | 1/2" (0.5) | 4th Notch | 7 | 3.2 |
| 1/8" (0.125) | 5/8" (0.625) | 5th Notch | 9 | 4.1 |
| 1/8" (0.125) | 3/4" (0.750) | 6th Notch | 11 | 5 |
| 1/8" (0.125) | 7/8" (0.875) | 7th Notch | 13 | 5.9 |
| 1/8" (0.125) | 1" (1) | 8th Notch | 15 | 6.8 |

High Force Spring Pressure Values

For high force weld heads with force ranges between 5-50 lbf (WH1187A HF)

| 1/8" (0.125) Electrode Gap | | | | |
|------------------------------------|---|----------------------------|----------------------------|---------------------------|
| Electrode to Work Piece Gap | Electrode to Work Piece Gap Marker | Spring Force Marker | lbs / ONE electrode | Kg / ONE electrode |
| 1/2" (0.5) | 1/8" (0.125) | 1st Notch (top) | 5-7 | 2-3 |
| 1/2" (0.5) | 1/4" (0.250) | 2nd Notch | 9-11 | 4-5 |
| 1/2" (0.5) | 3/8" (0.375) | 3rd Notch | 15-17 | 7-8 |
| 1/2" (0.5) | 1/2" (0.5) | 4th Notch | 21-23 | 10-11 |
| 1/2" (0.5) | 5/8" (0.625) | 5th Notch | 27-29 | 12-13 |
| 1/2" (0.5) | 3/4" (0.750) | 6th Notch | 33-35 | 15-16 |
| 1/2" (0.5) | 7/8" (0.875) | 7th Notch | 39-41 | 18-19 |
| 1/2" (0.5) | 1" (1.0) | 8th Notch (Bottom) | 45-47 | 20-21 |
| 1/2" (0.5) | 1-1/8" (1.125) | Below Bottom Notch | 51-53 | 23-24 |

Chapter 5: Welding with the Sunstone Weld Head

Basic Welding Steps

With your weld head secured to a work table, all power connected, and the ability to actuate the weld head either automatically with a single foot pedal, or manually with two foot pedals, you're now ready to weld. Follow these instructions for a safe weld:

- Ensure that the weld head cables are connected correctly and tightly to the negative (-) and positive (+) terminals.
- Verify the Moveable Scale is set correctly (equal to the electrode gap distance between the work piece and the top electrode). Sunstone recommends a 1/8" (.125") gap.
- Set the spring force on the weld head (half of max force is often a good starting point).
- Set the air pressure (Pneumatic Versions): Between 60-80 PSI standard.
- See welder user manual for setting the welding parameters.
- With the weld pulses off or at the lowest energy setting, lower the weld head and verify the electrode placement on the work piece. If you're incorporating automatic triggering, the weld head will descend and trigger the weld.
- If using a separate foot pedal to trigger the weld, press the foot pedal to trigger a weld.
- Inspect the weld and adjust weld parameters accordingly.
- Once acceptable weld settings have been established, a pull test can be performed to establish a statistical tracking value.

Chapter 6: Electrode Care

Electrode Tip Shapes and Positioning

Electrode tip shape can play an important role in achieving desired weld characteristics. Several different sizes and shapes can be used to manipulate weld results in your favor, as show below. Experimentation with size, orientation, and geometry can often lead to increased weld strength and longer times between necessary electrode cleaning. Below are some electrode tip shape examples and descriptions:



A **stepped-down eccentric tip** is often used for battery pack tabs and other series welding applications that require the electrode tips to be close together.



Tapered tips are used if the distance between tips isn't as critical. The tip diameter is smaller in relation to the shank diameter. The weld energy becomes more focused and penetrates more fully, but the weld spot diameters will be smaller.



As the **tip diameter is made larger**, sticking is less likely at higher energies and the weld nugget will be larger in diameter, but more weld energy will be required to achieve strong welds.



At higher energies and for difficult geometries, it can sometimes be helpful to have a **non-tapered tip** (the tip is the same as the shank).



A **hemispherical (rounded) tip** may help reduce weld splash and create a smoother weld spot, but flat tips are easier to maintain/create and will suffice in most situations.



Wedge shaped tips are used for welding wires and tubes when access to the bottom surface is limited or isolated. The long narrow surface of the wedge tip helps ensure contact will be made with the wire for easier welding position.



A **notch can be cut into the wedge tips** to help alleviate the necking that can occur when welding solid wires. The notch also helps gather all the strands when welding stranded wires.

Electrode Material Choice

Spot welding electrodes are typically made of conductive metals such as a copper alloy, or of resistive metals such as tungsten or molybdenum.

If the material you want to weld is resistive (stainless steel, nickel, platinum, etc.), the typical electrode used would be copper.

If the material you want to weld is conductive (copper, wires, etc.), the typical electrode material choice would be tungsten or molybdenum. Keep in mind that tungsten is more brittle than molybdenum and harder to shape, but will endure many more welds.

Electrode Shaping

Always be sure to clean and sand your electrodes prior to performing welds and after electrode tip wear. Dirty electrodes can cause sticking, weld splash, and inconsistent weld results.

The contact surfaces between the electrodes and your parts should be as clean and flat as possible for best results (the better the contact, the more energy can be transferred into the weld nugget area without being lost at the electrode tips).

A fine 600 grit sand paper can be used to clean the tips and ensure smooth surfaces.

Chapter 7: Resistance Welding Basics

Single and Dual Pulse Description

Single pulse welds are typically used where the work pieces are fairly clean. Single pulse welds are often beneficial when welding small parts, such as fine wires, where very low heat is required. Dual pulse welds are helpful when the piece is dirty, or has oxides/plating on it. The first pulse preheats the part, burns off any oxides, and helps the second pulse to perform the weld accurately and consistently.

Weld Formations

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. There are two phases to the melting process. The welder must overcome both the material contact resistance and the bulk resistance of the material.

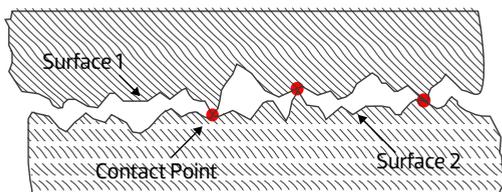


Figure 24.1. Example of a micro-scale profile.

Figure 24.1 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 all of the bridges have fused, the contact resistance is zero. The bulk resistance of the metal then plays the final role in the weld formation. See Figure 24.2 as an example.

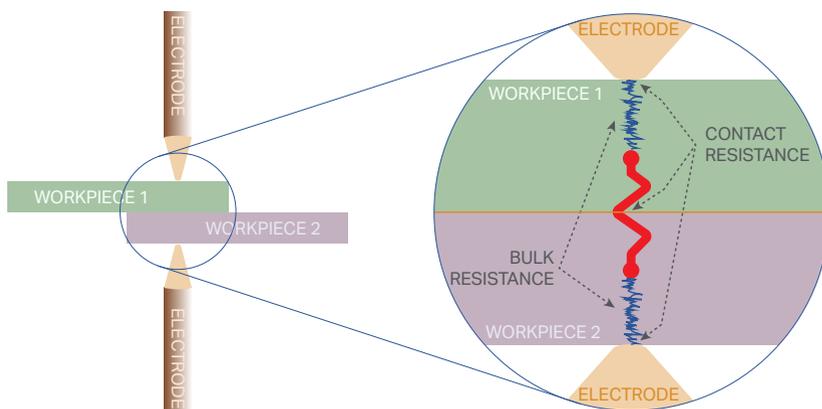


Figure 24.2. Contact and bulk resistance example.

the weld materials. There are two phases to the melting process. The welder must overcome both the material contact resistance and the bulk resistance of the material.

Weld Pressure

Several other factors play a part in the contact resistance. The larger the contact resistance the hotter the re-

sultant weld. On the micro-scale, contact resistance is reduced when more metal bridges or contact points are formed. Using more electrode pressure creates more metal bridges. This results in a lower contact resistance and a cooler weld. Conversely, light electrode pressure results in less metal contact, higher resistance, and a hotter weld. An appropriate amount of pressure should be used to insure good weld strength.

Welding Attachments

Weld heads or welding hand attachments will be chosen based on electrode access and the type of application. When both sides (top and bottom) of the work piece can be accessed, an opposed type weld head or welding hand attachment is ideal. When the user only has access to one side of the work piece, either a parallel weld head or a welding hand attachment can be used. Weld heads are typically the best option, as the welding force is consistent from weld to weld, and is not dependent on the user.

Electrode Configurations

This figure shows several electrode configurations used in resistance welding. The Sunstone WH1 weld head will make direct welds as shown in Example A in Figure 25.1. Current is passed from one electrode through both work pieces and out an opposing electrode. Examples B and C are for parallel weld heads and not achievable with the WH1, but shown here for clarification. Example B shows a step electrode configuration. This configuration is used when there is access to only one side of the work piece and an electrode can be placed on both materials. Example C is a series configuration. Electrodes can only be placed on one metal surface from one side. Current is divided between the two parts. This weld configuration requires more weld energy.

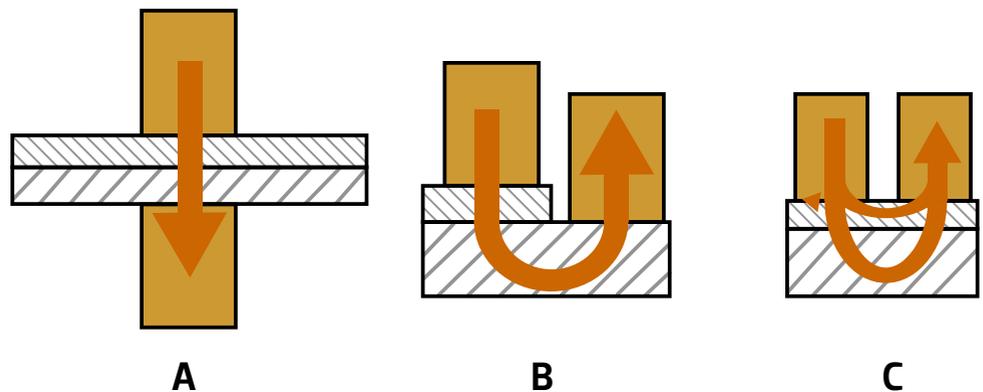


Figure 25.1. Electrode configurations. Example A is the only type of configuration achievable with the Sunstone WH1 weld head.

Technical Assistance

In rare circumstances the unit may become inoperable. If this happens turn the unit off and back on. If the issue continues to happen, please contact support and we will gladly help resolve the issue. If the unit is visibly having issues, please disconnect unit from power and contact Sunstone's customer service team.

Call +1 801-658-0015 • eMail support@sunstonewelders.com

Data Specifications

| WH1 - Opposed Weld Head | | |
|-----------------------------------|--|--------------------------------------|
| | Standard Force Model | High Force Model |
| Weld Force | 1 - 15 lbs | 1.7 - 45 lbs |
| Max Electrode Stroke | 1 in | 1 in |
| Electrode Diameter | 1/8 in | 3/16 in |
| Electrode Diameter Upgrades | 3/16, 1/4 in | 1/4 in |
| Electrode Configuration | Opposed | Opposed |
| Electrode Holder Type | Offset | Inline |
| Weld Cable Size/Length | 1 AWG / 24 in | 1 AWG / 24 in |
| Foot Pedal Type | Pneumatic or Manual Foot Pedal Options | Pneumatic |
| Air Pressure for Max Force | 60-80 PSI | 60-80 PSI |
| Air Cylinder Inside Diameter Bore | 0.75 in | 1.125 in |
| Cycle Rate (Stroke) | 1 in | 1 in |
| Dimensions (L x W x H) Weight | 10.5 x 4.5 x 22.5 in 25 lbs (11.35kg) | 14 x 6.75 x 24 in 28 lbs (12.7kg) |

WH1 WELD HEAD USERS GUIDE

Opposed Weld Head Mounting Template

Instructions

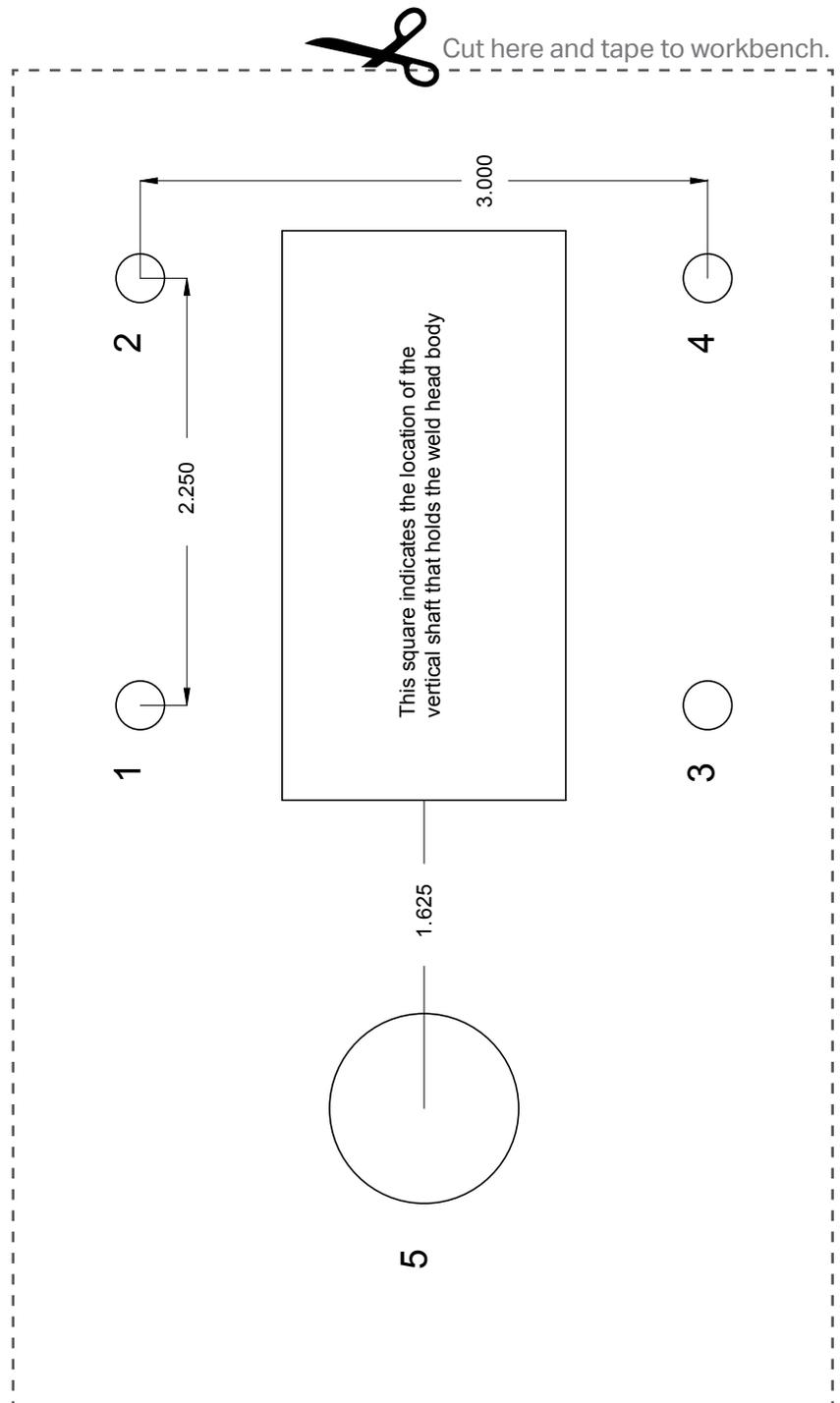
Tape the template to your workbench. When ready to drill, simply drill through the circles printed on the paper.

For Air/Pneumatic Models

- Drill the four holes numbered 1, 2, 3, 4 with a 5/16" (0.3125) in drill bit.
- Slide the provided 5/16 18 T-SLOT bolts into the channels on the underside of the weld head.
- Line up the bolts with the holes in the table; lower the weld head down so the bolts enter the holes.
- Attach and tighten the bolts on the underside of the workbench.

For Manual Models

- Drill the four holes numbered 1, 2, 3, 4 with a 5/16" (0.3125) in drill bit.
- Drill hole 5 using a 1" drill bit.
- Slide the provided 5/16 18 T-SLOT bolts into the channels on the underside of the weld head.
- Line up the bolts with the holes in the table; lower the weld head down so the bolts enter the holes.
- Attach and tighten the bolts on the underside of the workbench.
- Feed the rod through hole 5 then attach the cable to the weld head. The lower the lever arm below the workbench.



WH1 WELD HEAD USERS GUIDE

Other World-Class Micro Welders from Sunstone:



The World's Most Advanced Micro TIG Welder
When you need a tiny little weld in exactly the right spot!

Call or Text **+1-801-658-0015**
www.sunstonewelders.com



sunstone
The Micro Welder Experts



sunstone[™]

The Micro Welder Experts

1693 American Way Ste 5 • Payson UT 84651 USA

Tel. +1-801-658-0015

www.sunstonewelders.com