WELD HEAD

TL-180B

OPERATION MANUAL

AMADA®

AA10OM1214704-01

Thank you for purchasing our Weld Head **TL-180B**.

- This operation manual explains its method of operation and precautions for use.
- Before using, read this operation manual carefully; after reading, save it in a proper place where you can easily access.

Contents

1. Special Precautions

(1) Safety Precautions

Before using, read "Safety precautions" carefully to understand the correct method of use.

- These precautions are shown for safe use of our products and for prevention of damage or injury to operators or others. Be sure to read each of them, since all of them are important for safety.
- The meaning of the words and symbols is as follows.

⚠ DANGER

Denotes operations and practices that may imminently result in serious injury or loss of life if not correctly followed.

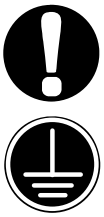
⚠ WARNING

Denotes operations and practices that may result in serious injury or loss of life if not correctly followed.

⚠ CAUTION

Denotes operations and practices that may result in personal injury or damage to the equipment if not correctly followed.

These symbols denote "prohibition".
They are warnings about actions out of the scope of the warranty of the product.



These symbols denote actions which operators must take.

Each symbol with a triangle denotes that the content gives notice of DANGER, WARNING or CAUTION to the operator.

⚠ DANGER

Do not touch the inside of the Welding Head unnecessarily
You may receive an electric shock or be burned.
Do not touch the inside of the Welding Head other than for maintenance as described in the operation manual.

Never disassemble, repair or modify the Welding Head
These actions can cause electric shock and fire. Do not do anything other than the maintenance described in the operation manual.

Never burn, destroy, cut, crush or chemically decompose the Transformer.
This product incorporates parts containing gallium arsenide (GaAs).

⚠ WARNING

Do not put your hands between the electrodes

When welding, keep your fingers and hands away from the electrodes.

Do not touch any welded part or electrodes during welding and just after welding finished

The welded part of a workpiece, electrodes and electrode holder are very hot. Do not touch them; otherwise you may be burnt.

Connect the specified cables securely

Cables of insufficient current-carrying capacities and loose connections can cause fire and electric shock.

Use proper tools (wire strippers, pressure wire connectors, etc) for termination of the connecting cables

Do not cut the conductor of wire. A flaw on it can cause fire and electric shock.

Do not damage the power cable and connecting cables

Do not tread on, twist or tense any cable. The power cable and connecting cables may be broken, and that can cause electric shock and fire.
When you need any repair or replacement, consult us or your distributor.

Stop the operation if any trouble occurs

Continuous operation after occurrence of a trouble such as burning smell, abnormal sound, abnormal heat, smoke, etc. can cause electric shock and fire. If such a trouble occurs, immediately consult us or your distributor.

Persons with pacemakers must stay clear of the welding machine

A person who uses a pacemaker must not approach the welding machine or walk around the welding shop while the welding machine is in operation, without being permitted by his/her doctor. The welding machine generates a magnetic field and has effects on the operation of the pacemaker while it is turned on.

Protective gear must be worn

Put on protective gear such as protective gloves, long-sleeve jacket, leather apron, etc. Surface flash and expulsion can burn the skin if they touch the skin.

Wear protective glasses

If you look at the spatter directly during welding, your eyes may be damaged.

⚠ CAUTION

Do not splash water on the Welding Head

Water splashed over the electric parts can cause electric shock and short circuits.

Install the Welding Head on firm, level surface.

If the Welding Head falls or drops, injury may result.

Keep combustible matter away from the welding machine.

Surface flash and expulsion can ignite combustible matter. If it is impossible to remove all combustible matter, cover them with non-combustible material.

Do not cover the Welding Head with a blanket, cloth, etc.

If such a cover is used, it may be overheated and burn.

Keep a fire extinguisher nearby.

Keep a fire extinguisher in the welding shop in case of fire.

Maintain and inspect the Welding Head periodically.

Maintain and inspect the Welding Head periodically, and repair any damage nearby before starting operation.

Do not use this Welding Head for purposes other than welding

Use of this Welding Head in a manner other than specified can cause electric shock and fire.

(2) Precautions for Handling

■ Install this Welding Head on a firm, level, horizontal surface. If it is inclined, malfunction may result.

■ Do not install this Welding Head in the following:
- Damp places where humidity is higher than 90%,
- Dusty places,
- Places where chemicals are handled,
- Places near a high noise source,
- Hot or cold places where temperatures are above 40°C or below 5°C, and
- Places where water will be condensed.

■ Clean the outside of the Welding Head with a soft, dry cloth or one wet with a little water. If it is very dirty, use diluted neutral detergent or alcohol. Do not use paint thinner, benzine, etc., since they can discolor or deform the Welding Head.

■ Do not put anything other than a workpiece, e.g., a tool, a screw, etc., between the electrodes. It can cause serious trouble.

■ Do not put a screw, a coin, etc., in the Welding Head, since they can cause a malfunction.

■ Operate the Welding Head according to the method described in this operation manual.

(3) On Disposal

This product incorporates parts containing gallium arsenide (GaAs). At the time of disposal, separate it from general industrial waste or domestic waste and carry out the disposal in accordance with applicable laws and regulations.

2. System Description

(1) Features

Overview

This manual is organized to assist you in getting productive quickly with your TL-180B Weld Head.

Our **TL-180B** Weld Heads are production line heads having a narrow vertical profile. They are characterized by low inertia, force fired operation. Their primary operational features allow them to be used in a wide variety of precision resistance welding applications.

- 1.75 inch (4.44 cm) width (actual head module)
- 1.25 inch (3.17 cm) stroke
- 5 to 100 pound (22.2 to 445 N) force range
- 6.031 to 10.125 inch (15.32 to 25.72) throat depth

Bearing life is designed for a minimum of 20 million operations when the head is used according to specifications.
The design of the aluminum extrusion mounting system and main shaft ensures that the offset electrodes do not slide from side to side more than 0.015 inch (0.381 mm) at 100 pounds (445 N). The four mounting holes on the head spine allow you to easily incorporate the head into your custom welding machines. In addition, you can modify the aluminum extrusion used for the base of the head to accommodate your custom fixtures and tooling.
Precision Welding The weld heads excel in their ability to deliver repeatable weld force and electrode placement on your parts. The low inertia, lightweight design ensures fast dynamic response. This allows the top electrode to follow the minute expansion and contraction of the weld joint as it heats and cools. A "differential motion" force-firing system triggers the weld energy power source at the precise moment when the electrodes reach the preset firing force applied on the workpieces.
Rugged construction, linear ball bearing bushings, and an over-sized anti-rotation system provide perfect in-line electrode travel, which assures smooth vertical travel of the upper electrode arm. This system minimizes the "wiping" (side-to-side sliding) action of the electrodes during welding, even at maximum force settings.

Weld Force

The weld force is continuously adjustable from a minimum of 5 pounds (22.2 N) to a maximum of 100 pounds (445 N). Settings are quickly reproduced by using the force adjustment knob and easy-to-read visual scale. An adjustable tare spring allows you to compensate for the weight of non-standard electrode holders. An adjustment screw allows you to adjust the sensitivity of the force-firing switch. Weld force is applied via an air cylinder.

Adjustable Stops

TL-180B Weld Heads have adjustable upstops and downstops. You can use the downstop to limit excessive over-travel. You can use the upstop to reduce the stroke and, therefore, the travel time of the head. This is a particularly useful feature when using the head in an automated system.

Electrode Holders

Electrode holders use 0.25 inch diameter, ES0800 Series Electrodes.

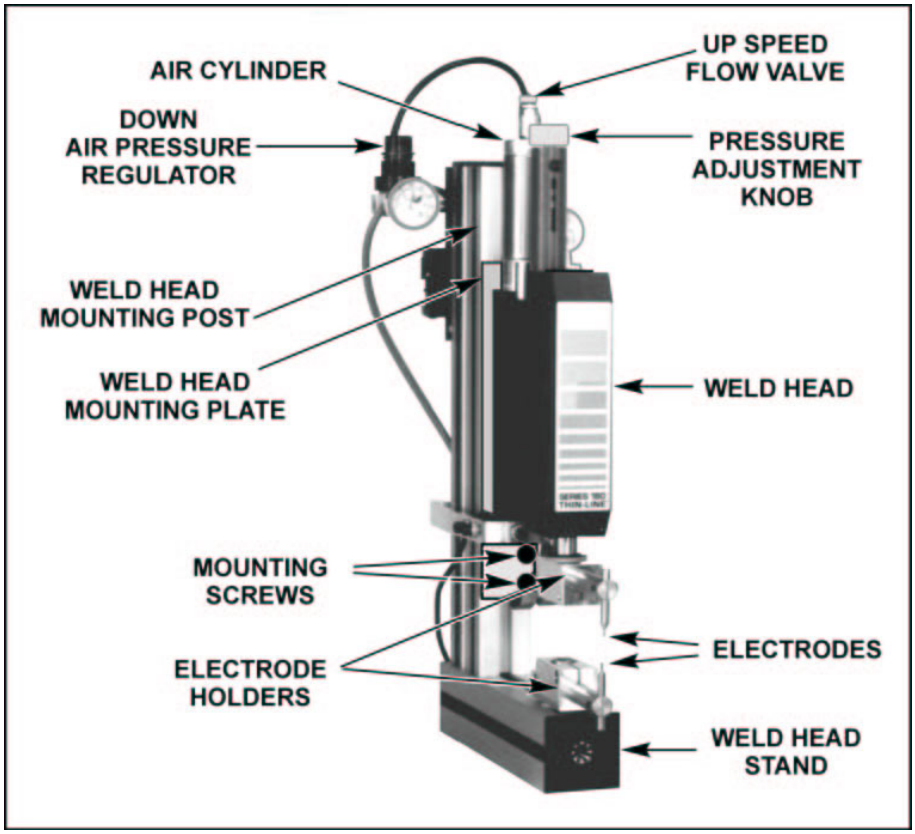
Welding Cables

#2/0 Welding Cables is provided to connect **TL-180B** Heads to the power source. Our Heads deliver maximum performance when used with the appropriate our power sources.

Air Actuation

TL-180B heads come with factory-installed air actuation kits. Air actuation facilitates incorporation of these heads into automated welding systems. The speed of the air-actuated system is limited by the speed at which the upper electrode can move without damaging both the electrode or work pieces as a result of the impact. A repetition rate of one weld per second is possible.
For Air Head instructions, see the separate Operator Manual supplied with the Air Kit installed on the weld head.

(2) System Components



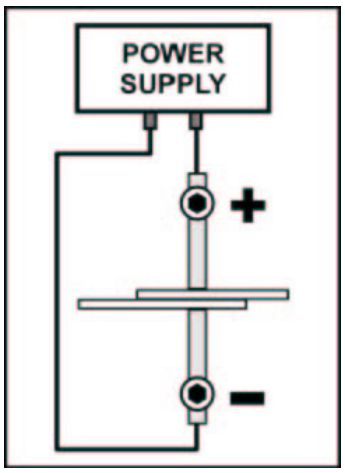
TL-180B Weld Head

TL-180B is an air-actuated head. The actuation source is the top-mounted, 1.5-inch (3.81 cm) diameter air cylinder. This model provides throat depth of 10.125 inches (25.72 cm).

(3) Welding Capabilities

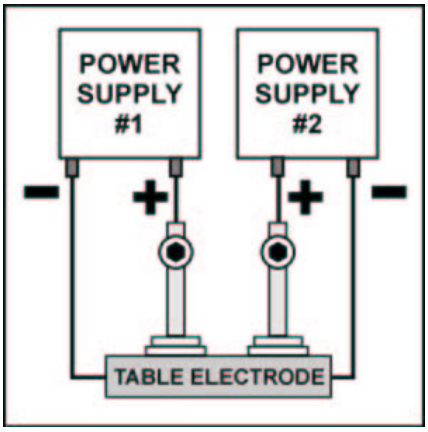
Opposed Welding

With opposed welding, the top and bottom electrodes are used to hold the parts and provide the current path. Weld current flows from one electrode through both parts to the other electrode. An opposed weld is preferred over other configurations because it is easier to set up and the current path is more easily controlled. It should be used whenever possible.



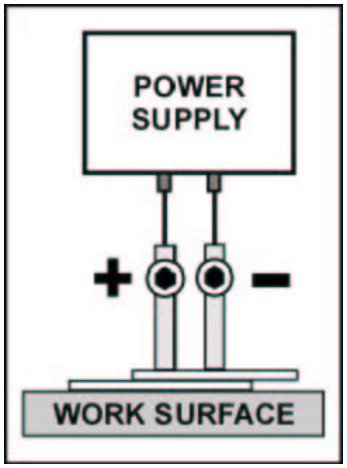
Dual-Opposed Welding

This method of welding uses two opposed welds being made on a single part, using two separate weld energy power supplies. Weld energy can be delivered in a simultaneous or alternate fashion, depending on your manufacturing requirements. Opposed welding provides maximum weld strength repeatability.
The Table Electrode, or a user supplied fixture, acts as a support for the workpieces in step welding. If the Table is insulated from the workpieces, there is no possibility of shunting current away from the (-) electrode.



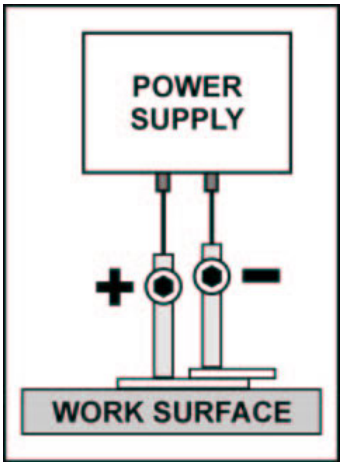
Series Welding

In series welding applications, both electrodes contact the *same* surface of each workpiece. The weld current flows from one electrode through the workpiece to the other electrode. This technique is used to weld workpieces which have only one surface accessible.
The work surface, or a user supplied fixture, acts as a support for the workpieces in series welding. If the Table is insulated from the workpieces, there is no possibility of shunting current away from the (-) electrode.



Step Welding

Series welding is ideal for welding thin resistive parts, 0.006 inch (0.15 mm) maximum thickness, to a larger part that cannot easily accommodate an opposed electrode. Model HE188 Electrode Holders provide up to 0.75 inch (19.0 mm) of electrode gap adjustment. In step welding, the size of the weld and the surface marking is frequently controlled by the diameter of the face of each electrode. If the (+) Electrode is significantly larger than the (-) Electrode the lower workpiece will not have any marking and the weld will be under the (-) Electrode.



(4) Operating Controls

Air Cylinders

The top mounted 1.5 inch (3.81 cm) diameter air cylinder is supplied with two pressure gauges, pressure regulators, and flow controls. The four-way air solenoid, which controls the direction of air flow to the air cylinder, is available with a 115 V AC rating. The pressure regulators and flow control valves allow independent adjustment of the up and down speed of the upper electrode.
The solenoid and regulator assembly is contained in a separate package, which mounts on the spine of the head.

There are several our direct energy welding controls, high frequency inverter controls, and microprocessor controlled series of stored energy power supplies that have a 115 V AC valve output for automatically energizing and controlling the timing of the air solenoid valve. The Model FS1L or FS2L Foot Switch is used to initiate all of these our weld energy controls.

Any control that does not supply a valve output requires the use of the 115 V AC FSAC Foot Switch to provide switched solenoid power to the **TL-180B**, 115 V AC, air-actuated heads. **TL-180B**, 24 V DC air actuated heads can also be used in automated environments where a programmable logic control (PLC) provides solenoid power and timing control. The Footswitch can be a single or two level types, depending on the power supply and the user's preference. Lubricators should not be used in "clean" environments. However, the user will then be required to periodically put a few drops of oil in the cylinder. Some users use lubricators, some do not.

3. Installation

(1) Introduction

Overview

The installation principle is as follows:

- If not already attached, the weld head mounting post is attached to the stand.
- The weld head stand is bolted securely to a workbench.
- If not already attached, the weld head is attached to the mounting post.
- The air head is installed.
- Electrodes and weld cables are installed on the weld head.

Requirements

Work Area

We recommend that you install your weld head in a well-ventilated area that is free from excessive dirt and moisture. The workstation must be stable, free from vibration, and capable of supporting the combined weight of the head, its accessories, and the weld energy power supply and welding transformer. The combined system weight can reach approximately 120 lbs (54.4 kg).

Utilities

- **AC Power**
  Included in our weld energy power supplies.
  115 V AC required for use with power supplies, which do not supply valve power.
- **Compressed Air**
  65 psi (4.5 bar) minimum.

(2) Weld Head Installation

Overview

First, this section will give "Typical Installation" instructions that are common to ***all* TL-180B** weld heads. Then, additional instructions for installing ***specific*** weld head models are listed. ***Before you start installation***:

- Read the *Typical Installation* instructions **and** the instructions for the *specific* weld head you want to install.
- Make sure you have all necessary parts and mounting hardware. Use the shipping list as a reference. Verify that the paper mounting template corresponds to the model number of the weld head. If you do ***not*** have the correct template, contact us at the address shown in the rear of the manual.

TL-180B weld heads may be purchased with or without mounting hardware. we provide an extruded aluminum post with channels on the front and back. By inserting T-Nuts into the channels, mounting plates can be screwed onto the front (for weld head), back (for air head), or both sides of the post (only the weld head is shown). This installation allows you to adjust the height of the weld head and air head separately.

Typical Installation

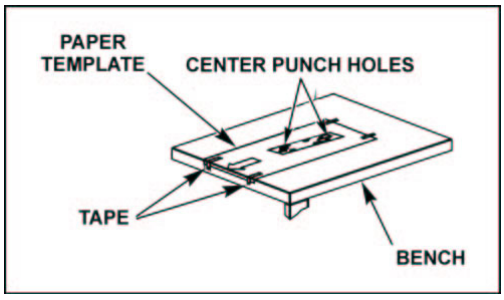
Allow about 8–10 inches (20.32–25.4 cm) between the front edge of the bench and the stand so the operator can use the bench as a support when positioning the workpiece.

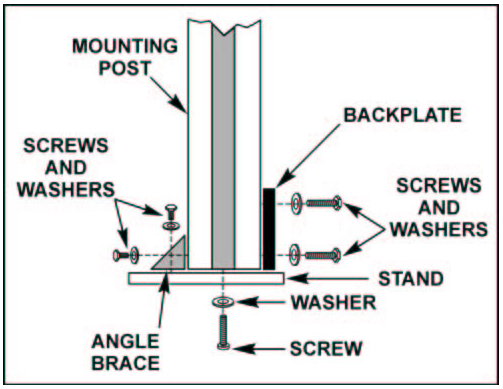
① Place the mounting template in the desired location on the workbench and tape it in place.

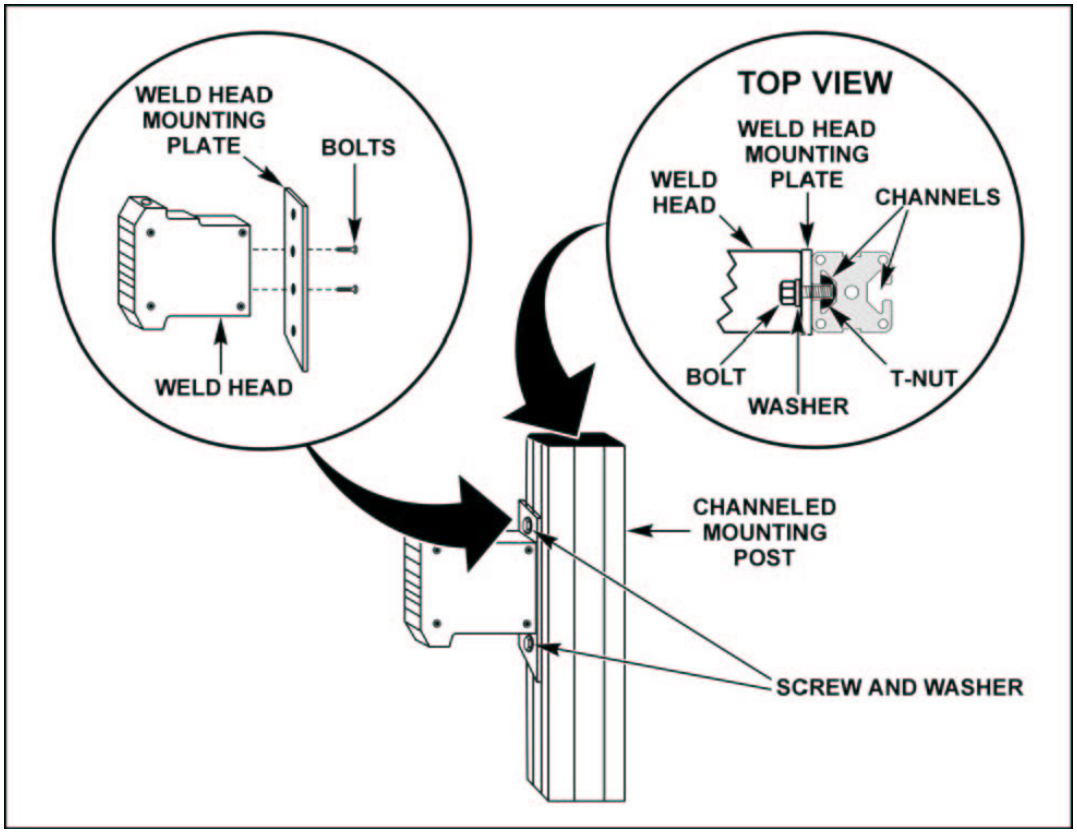
② Drill the mounting holes as shown on the template.

③ If necessary, install the weld head mounting post to the stand.

④ Screw the weld head stand to the workbench.







⑤ Install the weld head mounting plate onto the weld head using the screws as shown.

⑥ Install the screws, washers, and T-nuts into the weld head mounting plate as shown.

⑦ If necessary, remove the end cap from the mounting post to expose the channels in the mounting post.

⑧ Raise the weld head and mounting plate above the mounting post, insert the bottom T-nut into the front channel of the mounting post, and slowly lower the weld head until you can insert the top T-nut into the channel. Slide the weld head to the desired height, then tighten the mounting screws.

⑨ If you are using an air head, install it on the rear of the mounting post following the procedures in Steps 3 through 7.

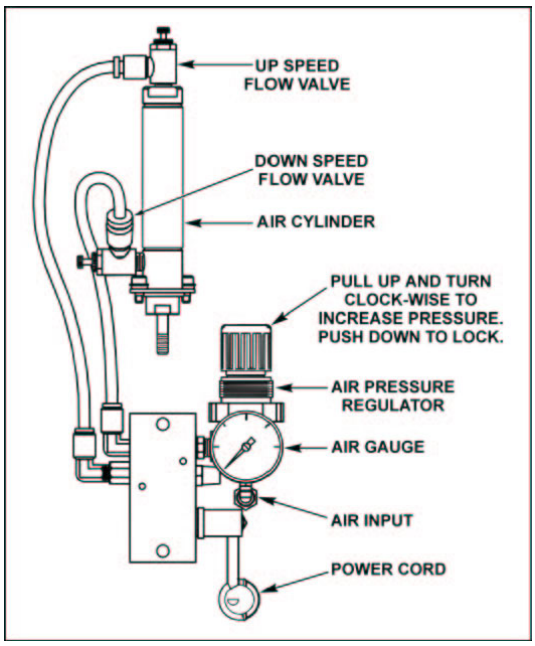
Air Head Installation

Our Air Kits are factory-installed to the **TL-180B** Weld Heads. User installation consists of connecting the airhead to an air source and connecting the airhead power cable to a welding control.
The air input line on each head uses a "quick release" fitting so special tools are not needed. The hoses simply push into the "quick release" fitting as far as they will go.

Single-Air Installation

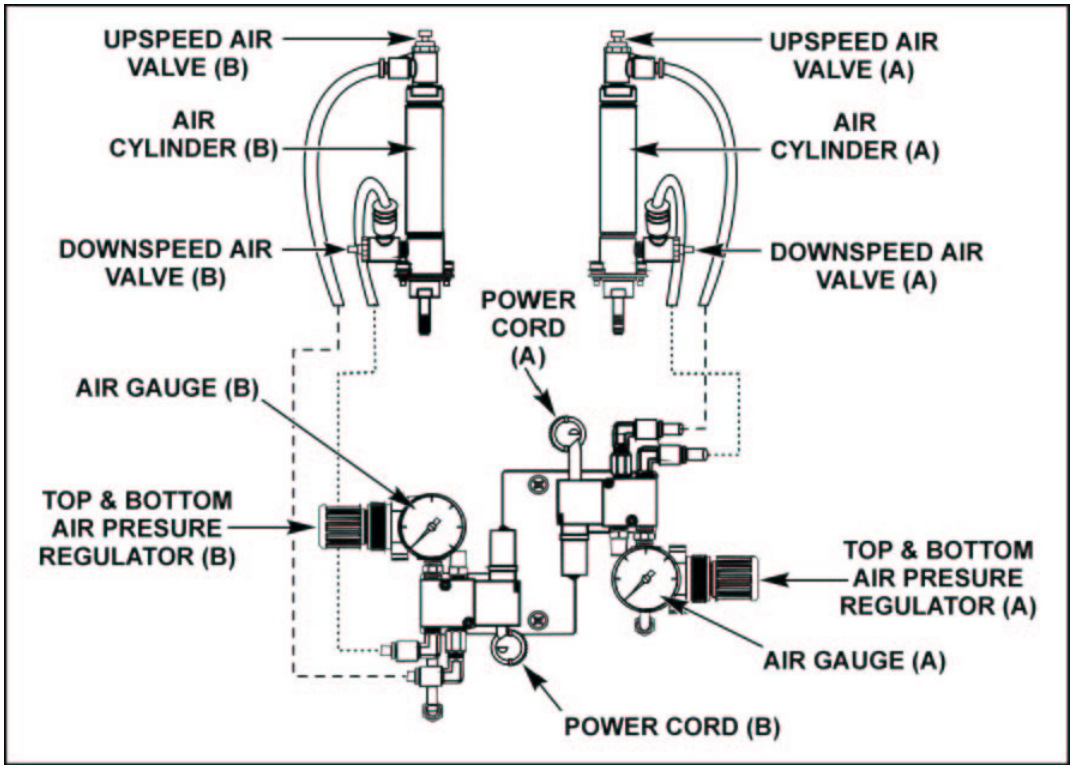
NOTES:

- The inside diameter of the main air supply line must be at least 0.5 inch (13 mm) to allow sufficient air flow.
- The air supply must be properly filtered at a maximum pressure of 100 psi (690 kPa).
- We suggest that in-line lubricators only be used in automated applications, since excess oil can blow-by worn seals in the Air Cylinder and be deposited on the workpieces.
- If an in-line lubricator is ***not*** used, then the air line should be removed from the top of the cylinder(s) once every 1 million cycles, and several drops of a light machine oil should be squirted into the top of the cylinder(s).
- Verify that the air lines are inserted all the way into the sleeve on the fittings to prevent inadvertent blow-outs.



- Use the shortest air lines possible to obtain the fastest mechanical response.
- To facilitate dressing the electrodes, reduce the air pressure to the top of the cylinder. As an alternative to changing the setting of the Top Air Pressure Regulator, a customer supplied bleeder valve connected to the output of the Top Air Pressure Regulator can be used to reduce the air pressure.

Dual-Air Installation



Installation Instructions

① Insert the air supply hose into the "quick release" fitting(s) on the air head(s).

② Connect the power cord from the air head to the Welding Control following the instructions in the Welding Control Users' Manual.

③ Install the system in accordance with established safety practices and standards. Anti-Tiedown Palm Buttons are not usually required if the electrode spacing will not allow the operator's fingers to fit between them.

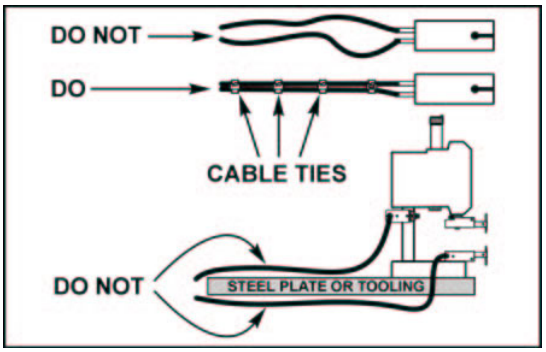
(3) Connect Weld Cables

Weld Cables and Energy Losses

All our weld heads are supplied with the correct weld cables to provide maximum weld energy. If you need to install longer cables, or replace damaged cables,

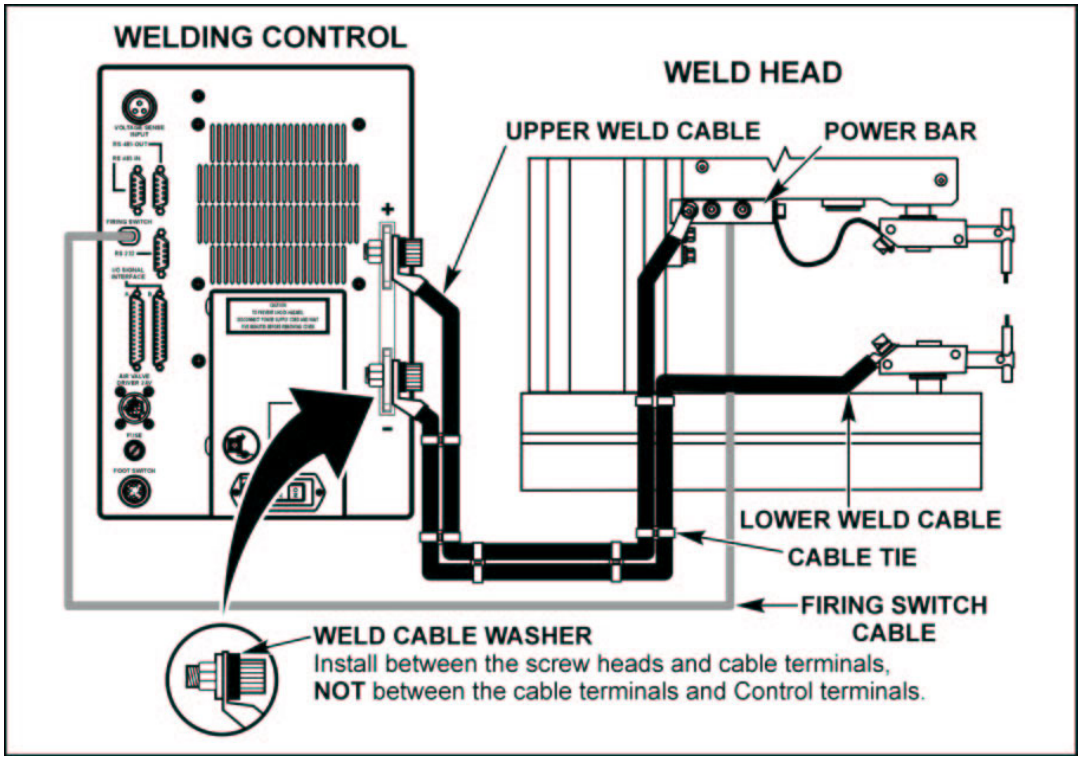
- ***Use #2 AWG for lengths under 12 inch (30.5 cm) and #2/0 AWG for longer lengths***. Tie or tape cables together to minimize inductive losses. A separation of weld cables surrounding an area of one square foot could result in losses of up to 65%.
- ***Use the shortest possible Welding Cables***. It is common to have losses of up to 50% per foot for #6 cables and 20% for #2 cables.
- Connect the welding cables on the ***same side of the head***. Otherwise, the inductive losses added by the intervening support post could substantially increase the amount of energy required to join metal satisfactorily

Connect Cables to Head



- Place the washer securing the welding cable terminal between the screw head and the welding cable terminal, *not* the welding cable terminal, and the terminal to which the cable is being attached.
- Make sure the connections are free of oxidation, dirt and grease.
- Use 2/0 AWG cable for lengths under 18 inches (45 centimeters), and 4/0 AWG for longer lengths.
- Use the shortest possible welding cables. Energy losses can range up to 20% per foot for 2/0 AWG cables.
- Tie the welding cables together to minimize weld energy losses caused by unwanted welding cable inductance.
- Route the welding cables so that they do not run adjacent to magnetic materials and devices such as air solenoids, tooling and steel heads. Run the welding cables through a single hole in a steel plate.

Offset Weld Head Connection



① Place the welding control, weld energy power supply, or welding transformer approximately 4 to 5 inch (10.2 to 12.7 cm) behind the weld head.

② Inspect the connections on the weld cables, welding control, weld energy power supply, or welding transformer. Remove any oxidation, dirt, or grease.

③ Connect the short welding cable to one terminal on the weld head power bar, using a 5/16-18 x 1/2 inch hex head bolt, and flat washer. Place the washer between the bolt head and the welding cable terminal, do ***not*** place the washer between the Cable and the Power Bar because you will get an unstable connection and, consequently, unstable current flow. Tighten connections securely.

④ Connect the longer welding cable to the lower electrode holder, or user-supplied welding fixture, using the procedures in Step 3.

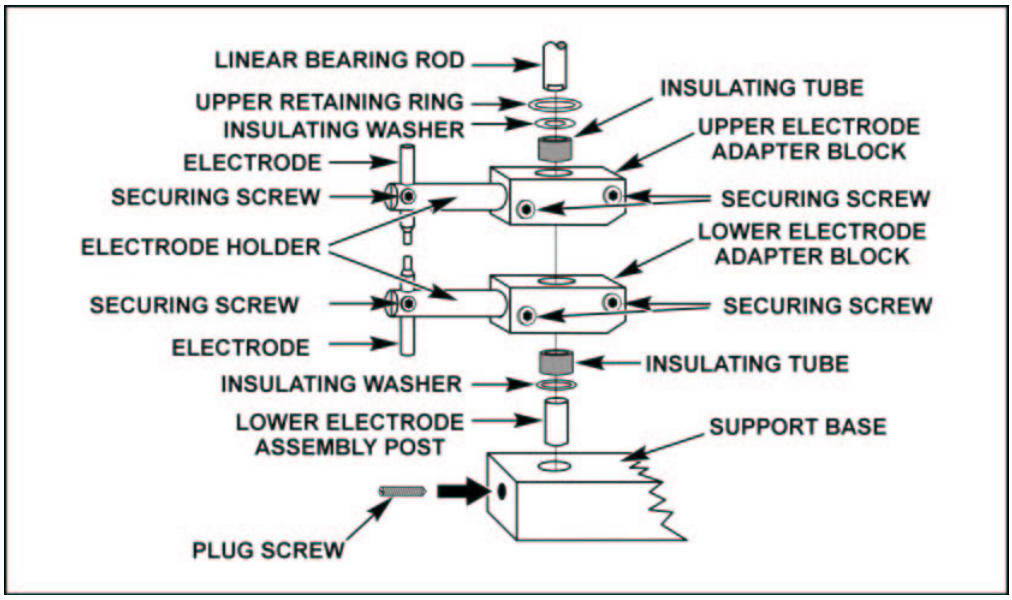
⑤ Connect the other end of the cables to the welding control, weld energy power supply, or welding transformer in accordance with the instructions in its Users' Manual.

⑥ Connect the firing switch cable to the welding control, weld energy power supply, or welding transformer in accordance with the instructions in its Users' Manual.

(4) Install Electrode Holders

Various electrode holders are interchangeable, as required by your weld head application. **TL-180B** Weld Heads are shipped with the electrode holders installed. Use the following procedures to change electrode holders.

Offset Electrode Holders



① Install the upper insulating washer on the linear bearing rod, followed by the upper insulating tube.

Note: Do ***not*** remove the upper retainer ring from the linear bearing rod.

② Slip the upper electrode adapter block over the upper insulating tube. The linear bearing rod should now be flush with the bottom of the upper electrode adapter block.

③ Secure the upper electrode adapter block on the linear bearing rod by tightening the upper electrode adapter block securing screw.

④ Slip the lower insulating washer over the lower electrode assembly post, followed by the lower insulating tube.

⑤ Slip the lower electrode adapter block over the lower insulating tube. Secure the lower electrode adapter block on the lower electrode post by tightening the lower electrode adapter block securing screw.

⑥ Insert one finger into the lower electrode post mounting hole in the support base until you feel the plug screw. Turn the plug screw counter-clockwise until it no longer protrudes from the mounting hole.

⑦ Insert the lower electrode assembly post into the support base mounting hole. Secure the assembly by turning the plug screw clockwise.

⑧ To remove the offset electrode holder assembly, reverse the installation procedure.

(5) Install Electrodes

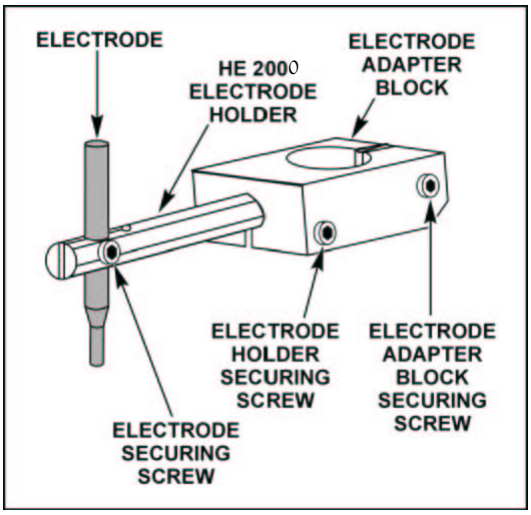
Offset Electrodes

① Turn the electrode securing screw in the upper electrode holder counterclockwise to loosen it.

② Insert the electrode in the electrode holder and turn the electrode securing screw clockwise to secure the electrode in the holder.

③ Repeat Steps 1 and 2 for the lower electrode and electrode holder.

CAUTION: For safety purposes, adjust the upper and lower electrodes so that the gap between the electrode tips is less than a finger diameter.



④ Loosen the lower electrode holder securing screw and rotate the HE2000 electrode holder to bring the lower electrode into alignment with the upper electrode. Re-tighten the lower electrode holder securing screw.

⑤ Loosen the lower electrode adapter block securing screw and rotate the lower electrode holder assembly to bring the lower electrode into alignment with the upper electrode. Retighten the lower electrode adapter block securing screw.

⑥ Tighten the plug screw to secure the lower electrode holder assembly.

4. Operating Instructions

(1) Getting Started

Installation Checklists

INSTALLATION CHECKLIST FOR ALL HEADS	
	Check that the cables are correctly attached at both ends.
	Verify that the Firing Switch Cable is attached to the welding power supply or Control.
	Set the **WELD/NO WELD** Switch, located on the front of the welding power supply (Control), to the **NO WELD** position.
	Verify that the welding power supply (Control) is connected to the appropriate power source and that the power is switched to **ON**.
	Switch the welding power supply (Control) to **ON**. Follow the procedures in the manual to program and operate the welding power supply (Control).
INSTALLATION CHECKLIST FOR AIR ACTUATED HEADS	
	Verify that the air lines are properly connected to the head and the main air supply (65 psi/448 kPa nominal) is turned **ON**.
	Verify that the line cord from the air solenoid is connected to the power supply (Control) or to a 115 V AC source, if required.
	Verify that the footswitch is connected to the welding power supply (Control).

Troubleshooting

WELDHEAD TROUBLESHOOTING GUIDE			
SYMPTOM OR PROBLEM	**PRIMARY CAUSE** Weldhead-Related Cause	**PRIORITY***	**SOLUTION**
Overheating of Weldment	**Excess Welding Time**	**1**	Decrease Welding Time (A.C. Welding)
	Insufficient Force	2	Increase force in steps of 10–20%
	Wrong Electrode Material	2	Check Electrode/Material Selection Guide
	Dirty Electrodes	3	Clean electrodes and/or parts to be welded
	Electrode Tip Shape	3	Use constant area electrodes or shape to suit application
Discoloration	**Excess Welding Time**	**1**	Decrease Welding Time (A.C. Welding)
	Wrong Electrode Material	**1**	Check Electrode/Material Selection Guide
	Insufficient Force	2	Increase force in steps of 10–20%

WELDHEAD TROUBLESHOOTING GUIDE			
SYMPTOM OR PROBLEM	**PRIMARY CAUSE** Weldhead-Related Cause	**PRIORITY***	**SOLUTION**
Weak Weld	**Insufficient Current/Energy**	**1**	Increase current/energy in steps of 5–10%
	Dirty Electrodes	**1**	Clean electrodes and/or parts to be welded
	Electrode Tip Shape	**1**	Use constant area electrodes or shape to suit application
	Mushroomed Electrodes	**1**	Replace or reshape electrodes or increase cleaning schedule
	Excess Force	2	Decrease force in steps of 10–20%
	Insufficient Force	2	Increase force in steps of 10–20%
	Wrong Electrode Material	2	Check Electrode/Material Selection Guide
	Poor Weldhead Follow-up	3	Reduce mass of top electrode holder assembly
Insufficient Nugget **	**Insufficient Current/Energy**	**1**	Increase current/energy in steps of 5–10%
	Wrong Electrode Material	**1**	Check Electrode/Material Selection Guide
	Electrode Tip Shape	**1**	Use constant area electrodes or shape to suit application
	Mushroomed Electrodes	**1**	Replace or reshape electrodes or increase cleaning schedule
	Dirty Electrodes	2	Clean electrodes and/or parts to be welded
	Excess Force	2	Decrease force in steps of 10–20%
	Insufficient Force	3	Increase force in steps of 10–20%
Metal Expulsion	**Excess Current/Energy**	**1**	Decrease current/energy in steps of 5–10%
	Insufficient Force	**1**	Increase force in steps of 10–20%
	Poor Weldhead Follow-up	**1**	Reduce mass of top electrode holder assembly ***
	Dirty Electrodes	2	Clean electrodes and/or parts to be welded
	Electrode Tip Shape	2	Use constant area electrodes or shape to suit application
Sparking	**Excess Current/Energy**	**1**	Decrease current/energy in steps of 5–10%
	Insufficient Force	**1**	Increase force in steps of 10–20%
	Poor Weldhead Follow-up	**1**	Reduce mass of top electrode holder assembly ***
	Electrode Tip Shape	**1**	Use constant area electrodes or shape to suit application
	Wrong Electrode Material	2	Check Electrode/Material Selection Guide
	Dirty Electrodes	2	Clean electrodes and/or parts to be welded

WELDHEAD TROUBLESHOOTING GUIDE			
SYMPTOM OR PROBLEM	**PRIMARY CAUSE** Weldhead-Related Cause	**PRIORITY***	**SOLUTION**
Warping	**Excess Welding Time**	**1**	Decrease Welding Time (A.C. Welding)
	Excess Force	**1**	Decrease force in steps of 10–20%
	Electrode Tip Shape	2	Use constant area electrodes or shape to suit application
Electrode Sticking	**Insufficient Force**	**1**	Increase force in steps of 10–20%
	Wrong Electrode Material	**1**	Check Electrode/Material Selection Guide
	Electrode Tip Shape	**1**	Use constant area electrodes or shape to suit application
	Dirty Electrodes	2	Clean electrodes and/or parts to be welded
	Poor Weldhead Follow-up	3	Reduce mass of top electrode holder assembly ***
Electrode Damage	**Excess Current/Energy**	**1**	Decrease current/energy in steps of 5–10%
	Insufficient Force	**1**	Increase force in steps of 10–20%
	Electrode Tip Shape	**1**	Use constant area electrodes or shape to suit application
	Excess Force	2	Decrease force in steps of 10–20%
	Wrong Electrode Material	2	Check Electrode/Material Selection Guide
	Dirty Electrodes	2	Clean electrodes and/or parts to be welded

* Priority numbers refer to troubleshooting priority, with 1 as highest priority. Start troubleshooting with 1 and then proceed to 2 and so on. When there are multiple causes with the same priority, use personal judgment in determining which is more probable in the specific application.

** In most cases capacitor discharge welds do not have a significant nugget.

*** For non-our weld heads.

A certain amount of experimentation is necessary to achieve the proper welding force setting for a specific application. The following are some general rules to make quality welds:

a. Larger parts require higher force.
b. Larger diameter electrode faces require higher force.
c. Higher electrode forces require higher weld currents (energy).

(2) Air-Actuated Head Setup

This Section describes the following adjustments:

- **Firing force** to the value required by the specific application.
- **Maximum force** the electrodes can exert on the workpiece during the welding cycle.
- **Down stroke** limits.

CAUTION: Excessive force can damage the electrodes and/or the workpiece.

In automated applications, the maximum repetition rate is usually limited by the stroke of the head and the air pressure on the top of the air cylinder. The higher the pressure, the faster the upper arm will move. The air pressure on the top of the cylinder will determine the *welding, but not the firing force*. If the welding force exceeds the firing force, which is set by the force adjustment knob on the head, by more than five percent, a noticeable decrease in weld quality often results.

① Use the flow control on the bottom of the cylinder to reduce the down speed.

② Use the force adjustment knob to set the weld head force indicator to "4". Indicator is located on the front of the force tube just below the force adjustment knob. Set heads with digital readouts to "100."

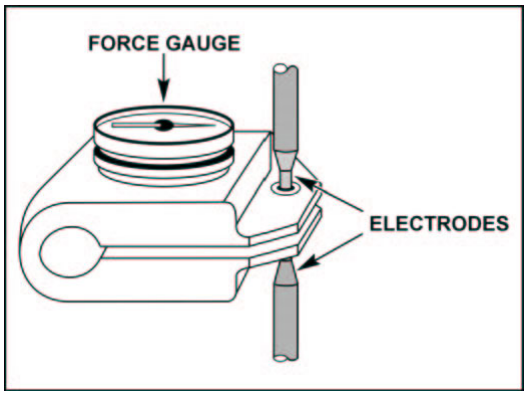
③ Close, but do not tighten, both air flow control valves.

④ Re-open each valve 3 or 4 turns.

⑤ Adjust the air pressure regulator to an indicated 10 psi (69 kPa).

⑥ Cycle the weld head by depressing and releasing the footswitch. Adjust the upspeed air flow control valve located at the ***top*** of the air cylinder, so that the upper arm moves up at a reasonable rate. It should not move so rapidly that it slams against the upstop.

⑦ If the application is a welding application, ad just the electrode spacing so that our force gauge fits between the electrodes, as illustrated.



⑧ Depress and hold the footswitch. Note the force indication on the force gauge when the head firing switch "clicks." If the firing switch does not close, increase the pressure from the air pressure regulator until the firing switch does close. If the firing switch closure is inaudible, it is easily detected by observing the firing switch indicator on the welding power supply or control.

NOTE: For older or non-our controls, an ohmmeter or continuity checker can be connected to the pins on the firing switch connector.

⑨ Use the force gauge reading from the previous step as a starting point. Use the force adjustment knob to increase the indicated force if the initial force reading is less than the required force setting. If the initial force reading is greater than the required force setting, decrease the indicated force.

⑩ Release and depress the footswitch. Verify that the welding force applied by the upper arm does not exceed the force required to close the firing switch by more than five percent (5%). If necessary, adjust the pressure from the air pressure regulator and/or the force adjustment knob on the head.

⑪ After setting the required force, particularly in automated applications, remove the force adjustment knob by loosening the two set screws which secure it to the shaft. Invert the knob and place it on the shaft. Be sure to insert the locking tab on the knob into the slot on the force tube. Re-tighten both set screws.

⑫ If necessary, re-adjust the electrodes in their holders to accommodate the workpiece.

⑬ Turn the downstop screw counter-clockwise to its fullest extension without actually disengaging it. This will allow maximum downward travel of the upper arm. The following downstop adjustment should be made only if the workpiece would be damaged if the upper arm travels too far. In most applications, use of the downstop is not recommended.

i) Depress and ***hold*** the footswitch. Slowly rotate the downstop counter-clockwise until the force firing switch in the head closes. Rotate the downstop one or two additional turns counter-clockwise. The additional turn(s) will allow for electrode wear and/or the slight variations of the position of the electrode in its holder.

ii) Re-check that the firing switch consistently closes.

CAUTION: Do ***not*** attempt to use the downstop adjustment to limit the force, which is applied to the workpiece. This will result in inconsistent welds.

⑭ Depress the footswitch. Adjust the downspeed air flow control valve so that the upper electrode arm descends slowly enough to prevent impact damage to the workpiece and electrodes.

⑮ Re-adjust upspeed air flow control valve if necessary.

NOTE: Once the required firing force is setup, ***do not change the regulator setting*** **!** Use only the air flow control valves to control the up and down speed of the upper arm. Changes in the regulator setting will change the welding force.

5. User Maintenance

(1) General Maintenance

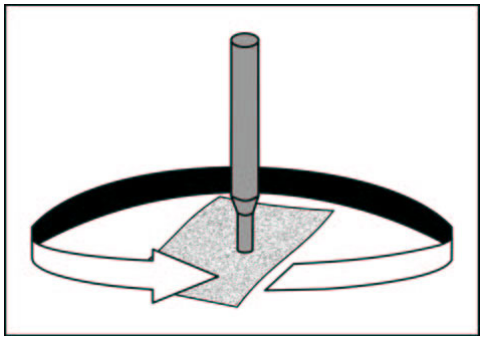
Inspection

Clean all electrical connections every six months to minimize welding circuit resistance. Inspect all bearings and braces for excessive wear every three years and replace as necessary.

Lubrication

All bearing surfaces are designed for non-lubricated operation. Do ***not*** oil any bearings or sleeves ***except*** for the use of a dry lubricant on weld heads used in automated, air actuated systems.

(2) Electrode Cleaning



① Re-surface tips periodically to remove oxides and welding debris from the electrodes.

② Set the **WELD/NO WELD** Switch on the welding power supply, or control, to the **NO WELD** position.

③ Clean the electrodes using 400 to 600 grit emery paper. Fold the emery paper over a *flat, rigid backing* with the grit surface facing out. The rigid backing will maintain the "flatness" of the electrode face during cleaning.

④ Place emery paper and backing between electrodes. If the head is air actuated, reduce the pressure on the top of the cylinder. Actuate the head. The electrodes should contact with the paper with a force which is low enough to allow the paper to be moved without damaging its surface. Move the paper in a circular motion while maintaining the contact force.

⑤ Wipe the electrodes so that they are clean.

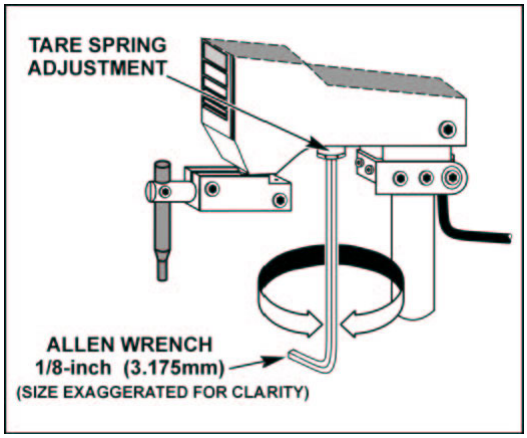
(3) Tare Spring Adjustment

The tare spring adjustment compensates for the varying mass of different upper electrodes and adapters.

① With the head in a vertical position and the upper arm and electrodes installed, set the force adjustment to ***minimum*** by turning the firing force adjustment knob fully counterclockwise.

② Hold a measuring scale beside the upper electrode adapter block, grasp the block, and move the block up and down between the tare spring travel limits. The total travel will be about 1/8 inch (3.2 mm). Push the block down against the bottom limit, then gently release it. The tare spring should exert enough force to return the electrode to the center of its travel, approximately 1/16 inch (1.6 mm) from either extreme. If the electrode block does not re-center, adjust the tare spring.

③ If necessary, adjust the tare spring tension adjustment screw setting with a 1/8 inch (3.2 mm) Allen wrench. The adjustment screw is recessed in the center of the tare spring assembly at the bottom of the force spring tube.



④ Adjust the screw until the electrode block centers itself after being depressed and released. Tightening the screw increases tare spring tension, which increases the upward force on the upper electrode assembly. If the upper electrode interconnecting flexure interferes with the adjustment procedure, temporarily disconnect it from the upper electrode adapter block.

⑤ After adjusting the tare spring tension, recheck the firing force adjustment and readjust if required.

6. Specifications

① Specifications

Features \ Model Name		TL-180B-00
Actuation	—	Air
Weld Force	N (kgf)	22 to 445 (2.3 to 45.4)
Maximum Rating (at 5% duty cycle)	kVA watt-seconds	20 875
Electrode Stroke	mm	32
Electrode Diameter	mm	6
Maximum Distance between Electrodes	mm	132
Max. Throat Depth	mm	262
Air Solenoid Voltage	V AC	115
Air Pressure for Max. Force	MPa (kgf/cm^2)	0.41 (4.2)
Cylinder Inside Diameter	mm	38.1
Cycle Rate at Min. Force at greater than 20% of Rated Force	full strokes/sec	 1 2
Max. Dimensions	—	See outline drawings.
Weight	kg	9.8

② Accessories

Items	Q'ty
T-Bolt Fastener Kit (For fixing Base)	2
Hexagon Wrench 7/64, 1/8, 5/32, 3/16, 1/4	1 each
Hexagon Wrench 4, 5, 6 mm	1 each
Polishing Disk	1
Connector 80-MC2F* (For assembling the start cable A or B)	1
Operation Manual	1

* The model numbers of accessories are subject to change without notice. Depending on the part to be changed, the mounting screw shape may change and a necessary tool may be different. For the latest parts information, contact a nearest sales office.

③ Sold Separately Items

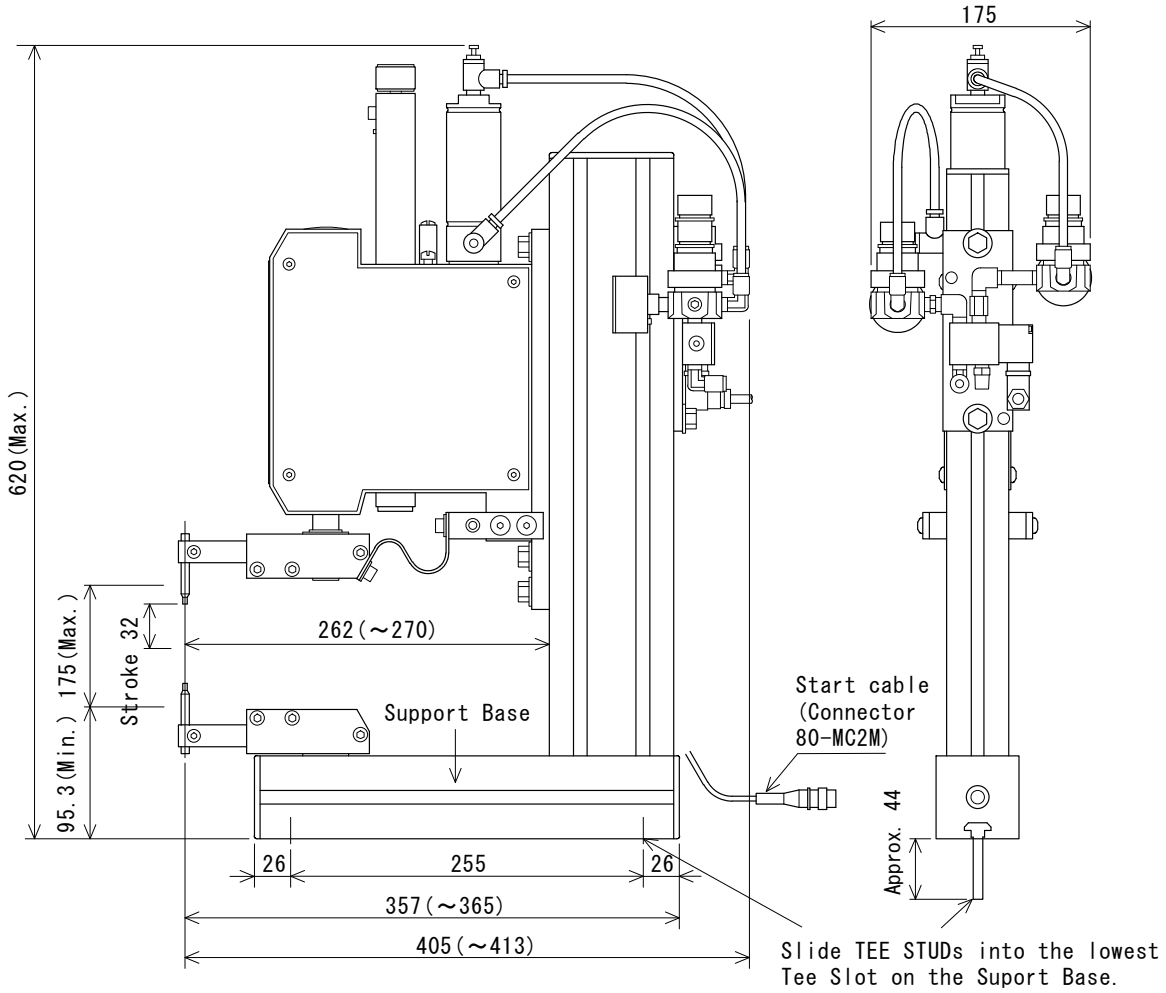
- Polishing Disk

Model	Description
PD	Polishing Disks (50 pieces, 600 grit, 38.1 mm dia., For polishing electrode)

7. Outline and Workbench Drilling

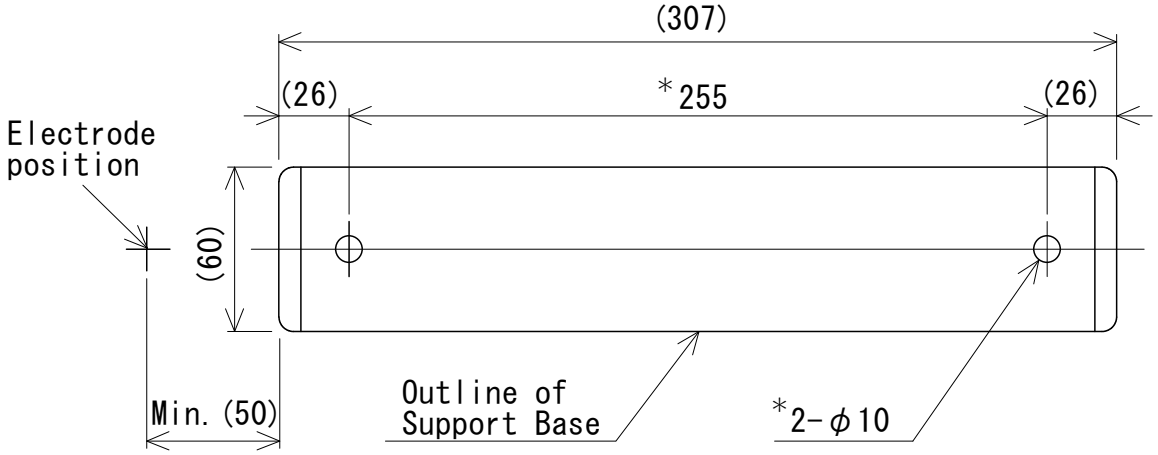
(1) Outline

Dimensions in mm



(2) Workbench Drilling

Dimensions in mm



8. Metric Screws Location

Inch screws are used except as shown below.

Dimensions in mm