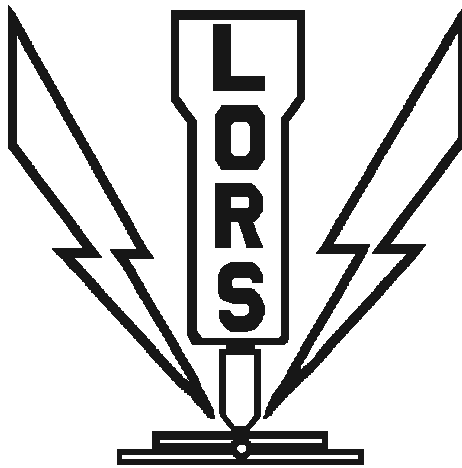


# LORS



# OPERATIONS MANUAL

**Model #**  
**Butt Welder**  
**Serial #**

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# Installation Instructions

**Customer:**  
**Model Number:**  
**Serial Number:**  
**Machine Type:** Butt Welder  
**Voltage:**  
**Hertz:**  
**Phase:**  
**Fuse Rating:**



**This manual must be completely read and understood before operating the welder.**

1. Level and firmly anchor the welder.
2. Connect welder to electrical service of primary voltage specified on the nameplate using **400 MCM** copper wire on all runs of 100 feet or less. All wiring is to conform to local codes and regulations. Primary line terminals on welder terminal plates are marked for easy identification.



**WARNING:** It is mandatory that the welder be grounded according to all local safety codes and regulations. It is recommended that you ground the frame to a water pipe, grounding rod or some other earth ground. Remember paint is an insulator, so strip the portion of the frame as well as the earth ground. Check with your electrician to find a good ground for you. Failure to ground this machine may result in severe injury or death.

3. Connect air supply line to the input fitting of the lubro assembly. The lubro assembly includes a filter station, however individual plant conditions could warrant additional traps and/or filters to avoid unnecessary damage due to moisture condensation or other foreign material.
4. Connect all water inlets and drains, furnish a water supply which will maintain sufficient cooling. Welders with water-cooled electrode holders require a minimum of 1½ GPM. Welders with water-cooled transformer Ignitron Contactors and water-cooled SCR Contactors require a minimum of 5 GPM.
5. After the completion of the installation, the welder should first be sequenced through it's various functions without application of any weld currents. When the welder performs this satisfactory, then it can be setup for production runs.

# Recommended Wire Sizes, Fuse and Disconnect Sizes

WELDER KVA	WIRE USE	WIRE SIZE @208/230V	DISCON SWITCH RATING @250V	FUSE RATING @250V	WIRE SIZE @460V	DISCON SWITCH RATING @600V	FUSE RATING @600V	WIRE SIZE @550V	DISCON SWITCH RATING @600V	FUSE RATING @600V
5	SPOT	#6	30A	30A	#12	30A	15A	#12	30A	10A
10	SPOT	#4	60A	40A	#10	30A	20A	#10	30A	15A
15	SPOT	#2	60A	50A	#8	30A	30A	#8	30A	25A
20	SPOT	#1	100A	70A	#6	60A	40A	#6	30A	30A
25	SPOT	1/O	100A	80A	#4	60A	50A	#6	60A	40A
30	SPOT	2/O	100A	100A	#2	60A	60A	#4	60A	50A
35	SPOT	3/O	200A	125A	#1	100A	70A	#3	60A	60A
40	SPOT	3/O	200A	150A	#1	100A	80A	#3	60A	60A
50	SPOT	4/O	200A	150A	#1	100A	90A	#2	60A	60A
50	PROJ	250MCM	200A	150A	1/O	100A	90A	#1	60A	60A
65	SPOT	250MCM	200A	175A	1/O	100A	100A	#1	100A	80A
65	PROJ	300MCM	200A	175A	2/O	100A	100A	1/O	100A	80A
75	SPOT	350MCM	400A	250A	1/O	200A	125A	#1	100A	100A
75	PROJ	400MCM	400A	250A	2/O	200A	125A	1/O	100A	100A
100	SPOT	500MCM	400A	350A	2/O	200A	175A	1/O	200A	125A
100	PROJ	600MCM	400A	350A	3/O	200A	175A	2/O	200A	125A
150	SPOT	600MCM	600A	500A	250MCM	400A	250A	4/O	200A	200A
150	PROJ	750MCM	600A	500A	350MCM	400A	250A	250MCM	200A	200A
200	SPOT	2X400MCM	600A	600A	350MCM	400A	350A	250MCM	400A	300A
200	PROJ	2X500MCM	600A	600A	400MCM	400A	350A	350MCM	400A	300A
300	SPOT	2X600MCM	CONSULT LORS		500MCM	600A	500A	400MCM	400A	400A
300	PROJ	2X750MCM			600MCM	600A	500A	500MCM	400A	400A

NOTE 1.) For seam welders use the equivalent projection welder recommendations.

NOTE 2.) Above wire sizes are based on a 100-foot run. Furthermore, it is assumed that the allowable voltage drop takes place in this cable and that the user's power supply is inherently stiff. The next smaller size wire may be used for runs shorter than 50 feet.

NOTE 3.) All values are recommended only. Installation must be done in accordance to all local codes.



# Safety



The text you are about to read is only to be used as a general guideline. Each plant and machine having unique characteristics. Use your experience to apply this guide to your application.

## **Resistance Welding Guarding**

1. Welder manufacturers do not know and cannot foresee the magnitude of potential danger when welders are improperly utilized. It is the responsibility of user management to make certain that all OEM operating instructions and/or personnel training is complied with and to furnish other safety instructions according to application. The welder must be setup so that it is impossible for the operators to place their hands or any other body part in any pinch point or moving area. A pinch point is explained on a separate page and can be identified by a warning label.
2. Guards or other devices to keep the operators hands out of danger should be furnished by user management and maintained operational.
3. Management must schedule periodic checks to insure safe and proper operation of the welder.

**LORS** Resistance Welders are designed to the highest performance and safety standards known to the resistance welding industry. However, the installation, usage, suitability and fitness of our equipment can be overcome by improper usage.

## **General**

1. The operator of this equipment must read and thoroughly understand this section prior to the operation or repair of this equipment.
2. Company management and supervision has the responsibility to insure that all personnel operating this machine are properly trained and is judged competent and physically able to operate this equipment.
3. Using the documentation and the warning labels the operator must be alerted by his supervisors of the safety hazards that can occur if precautions are not taken.
4. Users of the equipment are responsible for full compliance of all safety and operating procedure as well as with all Federal, State and Local codes.
5. The user is responsible for insuring that all non-English speaking personnel understand all instructions and safety procedures.

6. The user should conform to **OSHA** regulation 29 CFR 1910 in the installation, operation and maintenance of this equipment.
7. The user should institute a periodic safety inspection to insure proper and safe operation of the equipment.
8. All repairs or modifications should be performed or authorized by LORS.
9. Operators of this equipment must be instructed as to the proper procedure to follow in the event of an emergency.
10. First aid equipment must be readily available at all times when operating this equipment.

### **Electrical**

1. High voltage is present in the controls, tap switch, terminal blocks and by transformers. All the necessary precautions are to be observed.
2. Installation of the main disconnect and main power connections to the machine are to be made by a licensed electrician. All local codes must be observed.
3. All HIGH VOLTAGE power wiring must be properly sized.
4. The equipment and cabinets must be properly grounded. The ground lead should be sized sufficiently.
5. Failure to follow electrical safety precautions could result in serious injury or death.

### **Pneumatic and Water**

1. The operator must monitor the equipment upon start up for air and water leaks.
2. The air filter must be bled regularly and air lines must be kept clean.
3. Insure that the air pressure is adequate and consistent for the welder.
4. Insure that the water flow is not hampered or obstructed.
5. In the event of an air or water leak, remove all power from the machine before qualified personnel attempt to correct the problem.

## **Operator Precautions**

1. A daily safety check should be made prior to powering up the welder. If a problem is found, it should be corrected before proceeding with the work.
  2. Only properly trained personnel should operate this equipment. Only qualified maintenance personnel should attempt to repair this welder.
  3. No modification of the safety devices shall be made without the written authorization of LORS machinery.
  4. Keep all body parts clear of all moving parts.
  5. Heed all Warning or Caution labels.
  6. The operator should be aware of the function and operation of the Emergency Stop buttons.
  7. Do not leave the welder unattended with the power on for any extended period of time.
  8. It is the user's responsibility that proper safety equipment is used when the welder is being operated. These include but are not limited to:
    - Protective glasses
    - Protective shoes
    - Non flammable outer garments
  9. Initiation should normally be made by only one person unless other safety designs have been incorporated by the manufacturer to allow multiple initiations.
  10. Operators should be aware of the magnetic fields generated by the welder. The fields can play havoc with watches and other electromechanical devices.
  11. If a welder malfunctions or operates in an unusual manner, the equipment should be powered down and corrected by qualified personnel.
- Any questions should be routed to your local distributor or LORS.

# Setup and Operating Instructions

Before attempting to use your new Butt Welder you must first thoroughly understand it. Be sure to read this manual completely. If you then have any questions contact LORS Machinery, Inc. or your local distributor to help you out. Remember used incorrectly this machine can be a possible hazard.

## LORS MODEL BW

**INSTALLATION:** The welder should be leveled and firmly anchored to the floor and grounded as a safety measure with #10 wire to the steel building structure or a water supply pipe.

**AIR SUPPLY:** The machine is completely piped at LORS. Therefore, the only air connection required is a supply line connected to the air filter which is the last unit of the air line accessory group.

**WATER SUPPLY:** The water requirements of this machine are approximately 1½ gallons per minute. The water should never exceed 70 degrees F. It is very essential that the water be turned on before the current is applied. It is recommended that you use an open sight water drain in order to detect water flow at all times. You can use external water coolers, chillers and conservers to help regulate the temperature and flow of the water. These can be purchased from LORS.

**ELECTRICAL CONNECTIONS:** The transformer of this machine is designed for single phase operation. The welder should be installed on a power line of adequate capacity to eliminate any possibility of a voltage drop. A voltage drop over 10% of the line voltage will result in defective welds. All connections to the welder should be made according to the attached labels. This should be done by a qualified electrician. Any deviation might result in the malfunctioning of the welding sequence and may result in possible injury.

Below is a general description of the components that were used to make your LORS Butt Welder. Styles may vary slightly and the control changes upon request. Use the descriptions as a guide and remember that your machine may have slight variations.

## **REGULATOR AND GAUGE**

The air pressure regulators are of the self-bleeding, spring loaded, diaphragm type and are used to adjust the air pressure to the air cylinders thereby controlling the actual clamping and welding pressure. The electrode force is calculated by using the multiplication of the air cylinder bore times the weld pressure gauge setting.

## **LUBRICATOR**

This pulsating type lubricator functions only when the welder is in operation and injects sufficient oil into the air stream to create an oil fog which travels with the air stream to lubricate the internal working parts of the pneumatic system.

Adjust the needle valve on top of the lubricator, when the welder is in operation, for one drop to about every 20 to 25 strokes of the welder.

## **AIR FILTER**

The air filter eliminates most particles of grit, pipe, scale, condensation and other foreign matter from entering the air stream to the pneumatic system. Opening the waste petcock for cleaning purposes should be done daily or as often as required. Periodically remove the plug on top of the filter then remove the screen and clean it. Replace components when completed.

## **SOLENOID AIR VALVE**

This is a four-way air valve operated by an electric solenoid and may be of the poppet or the spool type with either spring or air return. This valve is actuated by the footswitch and controls the flow of air to the clamping and push-up cylinders during the welding cycle.

## **PRESSURE SWITCH**

When used, the pressure switch is connected to the air operated push-up cylinders. When pressure on the air cylinder reaches a predetermined setting, the normally open contacts of the pressure switch will close to energize the welder control circuit for a weld sequence.

The procedure for adjusting the pressure switch is as follows:

Adjust the pressure switch by turning adjuster knob clockwise to set pressure higher than the pressure reading on regulator gauge. Set Weld/No Weld switch to weld position. Place material between weld jaws and depress footswitch. After the welding jaws contact the material, rotate adjuster knob counter clockwise slowly until the weld current is applied. The function of the pressure switch is to insure that proper pressure is applied

before current flows. Improper adjustment can cause a pre-fire condition. If the period of delay is longer than desired, make the necessary adjustments by further counter clockwise rotating the adjuster knob.

### **HEAT REGULATOR**

The heat regulator is a heavy-duty tap switch properly rated for the KVA capacity of the welder and is used to pre-select the current required. This switch must not be adjusted during the weld cycle.

### **SPEED CONTROLS**

Speed controls are used to adjust the speed of the travel of the welding jaws. When properly adjusted excessive hammering of the weld jaws will be avoided. After setting these controls be sure to lock all adjusters. Refer to parts diagram of your welder for location of these speed controls.

### **LIMIT SWITCH CUTOFF**

This normally closed sensitive limit switch is used for automatically cutting off the current at completion of the weld. As the metal starts to heat, the upset cylinder actuates the moveable platen thereby forcing the metal together and consequently tripping the limit switch for the current cutoff. Whenever the platen opening is changes the cutoff limit switch will have to be adjusted accordingly. The mechanical upset knob and lock are used for this adjustment.

### **DIE OPENING ADJUSTMENT SCREW**

This adjustment screw regulates the die opening by controlling the upset cylinder stroke. Adjustment can be accomplished by depressing the foot pedal to the first stage thereby relieving the air pressure and regulating the adjustment screw for the desired die opening. It is advisable to have the test switch in the NO WELD position while making this adjustment.

### **SQUEEZE TIMER**

On Butt Welders featuring electronic squeeze timer and limit switch cutoff you must adjust the squeeze time to insure that the proper weld force is applied before turning on of the weld current.

## **INITIAL TRYOUT OF WELDER**

1. Turn on air, power and water.
2. Select two pieces of weldable material of a gauge for the welder KVA capacity.
3. Set weld time control to three cycles.
4. Select low tap on heat regulator.
5. Adjust air regulator for clamping and upset force.
6. Adjust pressure switch per instructions.
7. Place Weld/No Weld switch to WELD position.
8. Actuate welder by depressing footswitch.
9. Test welds and adjust weld time and / or heat regulator.

## **WELDING CONTROLS**

Weld controls are available in many different forms. From the basic Non-Synchronous to the Solid State / Binary count controls, all the way to the precision Microprocessor controls. The one thing that they have in common is that they regulate your welding. The Non-Synchronous gives you the basic functions you need while the Microprocessor on the other end of the spectrum gives you a full function of features. We will cover the most basic functions while you will have to go to the control manual for more detailed explanations.

### **SQUEEZE TIME**

The Squeeze Time is the time interval between the initiation and the beginning of the welding cycle. The set value should be long enough to allow the upset pressure to reach the correct force before the beginning of the welding cycle. Too little squeeze time can cause pre-firing between the workpieces at the beginning of the welding cycle, this can lead to a poor weld quality. Too much squeeze time can slow down production.

### **WELD TIME**

Weld Time is the period weld current is applied. It starts at the conclusion of squeeze time and times the duration of the current flow through the work.

### **CURRENT**

The value expressed in CURRENT indicates the percent of welding operating power for the current tap setting.

### **HOLD**

The Hold Time is the time elapsing between the end of the welding process and the opening of the jaws. It enables a shorter cooling of the welding spot and avoids its stress before a proper cooling.

## **OFF TIME**

Off Time is the time between the de-energizing and energizing of the weld valve during the auto repeat mode. It must be set to a time, which allows you to safely move your workpiece during production.

## **WELD / NO WELD**

The Weld / No Weld switch allows you to sequence the control without passing actual weld current. This can be useful when sizing up your workpiece to plan production.

## **PULSATION**

Pulsation allows the use of multiple pulses of the preset current percent and time values. This is used for coated and for metals which may exceed the KVA rating of the welder.

## **COOL TIME**

The Cool Time function is used when you require multiple pulses. It is the time elapsing between one welding pulse and the next one.

*See the manufacturers manual for additional instructions on their specific control.*

## **OPERATING ADJUSTMENTS**

After the welder is installed and the proper connections are made and mechanical setup is performed, it is desirable to determine if the welder sequences properly. Check to determine if the welder is installed properly and connected to the proper voltage. Certain models are capable of running on 220 or 440 volts, you can find the instructions to change these voltages elsewhere in this manual. Make sure the welder is properly fused according to the wire chart enclosed in this manual. Make sure it is in compliance with all local codes and regulations.

Check that all air and water connections are installed properly. First apply air to the welder, then apply water and electrical power to the welder. Check the air and water flow. Set the air pressure regulator to the required air pressure to obtain desired upset force.

After the power is on, adjust the squeeze time to the maximum setting so that the welder will not pre-fire. Adjust the weld time sequence to recommended setting for the type and thickness of the material to be welded. Refer to the weld schedules listed in most electrode and accessory catalogs. The hold time should initially be set to five cycles and adjusted as needed. Put the control into Non-Repeat operation and no weld. This will permit the welder to cycle without welding.

**CAUTION:** Be sure that hands, fingers, clothing or other items are clear of jaws.

## **REPEAT / NON-REPEAT SWITCH**

### **Non-Repeat Position**

The welder will go through one sequence of squeeze, weld and hold time even though the initiation switch is closed momentarily. This is the inherent NON-REPEAT feature of this control initiation. The welder will go through only one sequence even if the initiation switch is held closed after the completion of the cycle.

### **Repeat Position**

The welder will continue to go through sequence cycles of squeeze, weld, hold and off times as long as the initiation switch is held closed. The welder will finish the sequence in which the initiating switch is opened and then stop.

Off time should be set long enough to allow the operator to reposition the piece for the next weld. The automatic operation resulting from the "Repeat" position is normally used only when the spot welds are closely spaced and it takes about the same interval of time to reposition them.

All of the above functions have been described on the assumption that Single Stage Initiating Switch Operation has been used. This means that once the initiating or pilot switch is closed the complete sequence starts.

## **TWO STAGE INITIATING SWITCH OPERATION**

When the first stage is initiated, the electrodes close on the work pieces. However, the remainder of the cycle of weld and hold times will not begin until the second stage is initiated. With this arrangement the operator can reopen the electrodes by releasing the first stage again. Providing he is satisfied with the work position, the operator will then proceed to the second stage, which will allow the control to go through the remainder of the sequence. The second stage initiation need only be momentary.

## **FOOTSWITCH / PALM BUTTON OPERATION**

It is often recommended that for safety your welder be equipped with hand initiation. Hand initiation prevents the operator's hands from entering the weld area pinch points. Two hands must trigger the hand initiation system simultaneously. Older systems use the mechanical palm buttons. LORS exclusively uses soft touch initiation buttons. This helps to cut down on fatigue and eliminate Carpal Tunnel Syndrome.

Some machines may be equipped with both a footswitch and hand initiation. The operating mode can be changed by a switch, usually key operated, to switch from one system to the other.

## **MAINTENANCE**

Proper maintenance consists of the following:

1. The timer should be kept clean by periodically blowing out the dirt with a low-pressure dry airline. Care should be taken to use dry air. A portable type vacuum cleaner is suitable also.
2. Relay maintenance consists primarily of occasionally dressing (with power off) the contacts with fine crocus cloth or equivalent. **DO NOT USE FILES OR ABRASIVES**, which can remove the non-corrosive plating. **DO NOT OIL ANY MOVING PARTS ON THE RELAY.**
3. Inspect all wires and pluggable components occasionally to make sure that they are secure in place. It is recommended that you have some spare components available for replacement if necessary.

# Troubleshooting

As with any welding process you may sometimes encounter difficulty. If you stop to examine what you are doing, you will usually find that the problem can be corrected. The most common cause of spotwelding problems is the failure to properly select and maintain the electrodes. Poor electrode life is usually traced to improper water cooling and/or incorrect weld schedules. Excessive weld times do not make better welds and will result in poor weld appearance, as well as, shorter electrode life.

Refer to the chart below for a general troubleshooting guide, which lists some resistance welding problems and their possible causes. A better understanding of the resistance welding process and how to use it will enable you to increase your spotwelding productivity and improve the quality of your welded assemblies.

♣Primary Cause ♦Secondary Cause	TYPE OF WELD DEFECTS						
		Weak Weld	Expulsion or Weld Splash	Electrode Mushrooming	Excessive Weld Marking	Electrode Sticking	No Weld
Possible Cause of Weld Defect	Weld Current	LOW	♣			♦	♣
		HIGH		♣	♦	♣	♦
Weld Time		SHORT	♣				♣
		LONG		♣	♣	♦	
Weld Force		LOW	♦	♣		♦	
		HIGH			♣	♣	♦
Short Squeeze Time			♣		♦	♣	♦
Incorrect Follow Up			♦			♦	
Inadequate Cooling		♦		♣	♦	♦	
Electrode Face Diameter		SMALL	♣	♦		♦	
		LARGE	♣				♦
Poor Metal Fit Up		♣	♣		♣		♣
Dirty or Scaley Metal		♦	♦			♦	♣
Too Close Weld Spacing		♣					♦
Incorrect Weld Tooling Setup		♦	♦				♦
Incorrect Electrode Alloy		♦		♦		♦	

# Preventive Maintenance

Excuse me sounding like an old cliché but “A Clean Machine Is A Happy Machine” and happy machines make happy users. If properly maintained your welder will keep up production, save you money and function flawlessly. Not only do you want to keep the welder cleaned and properly maintained but you also want to keep the surrounding area properly maintained. A clean shop results in your expensive machinery operating much more efficiently. This especially holds true for today’s modern microprocessor controls.

Your welding machine or any equipment for that matter should never be used as tool cribs, clothing racks, ashtrays, coffee tables or sort. Not only will this hamper your machine performance but can result in a safety hazard.

**CAUTION:** Before performing any preventive maintenance be sure to remove all power and air to the welder.

The points outlined in this section are not intended as a detailed schedule for preventive maintenance on all types of resistance welders. You can however use this as a guideline and adapt it to your production. The suggested intervals are based on an eight-hour day. If you use your equipment on multiple shifts adjust your procedure accordingly.

## Records

Each welder should have a separate equipment history book. This book should have tabulations of all maintenance problems and solutions occurred. This will become a valuable aid when troubleshooting and result in greater up time.

This book is an excellent place to log your preventive maintenance schedules and results.

## Daily

- Wipe all surfaces clean of dirt, dust, grease, oil and water. Pay particular attention to cleaning clamp surfaces.
- Clean up work area.
- Check the water flow.
- Check for air and water leaks and repair if needed.

**CAUTION:** Use a mild detergent for cleaning paintwork or Lucite windows.

**With power on and in setup mode...**

- Listen for any abnormal noises coming from the control area.
- Check timers and control for proper dial settings according to schedule chart.
- Check for malfunctioning interlocks or safety devices.
- Sequence machine and check for abnormalities.

**With power off...**

- Clean electrode or die holders and clamps.
- Check for misalignment and realign if needed.

**Weekly**

- Check relays for wear or looseness.
- Check for burned out indicator lights and other display functions.
- Clean nameplates.
- Check cylinder rod locking nuts.
- Remove sample of oil from lubricator unit and test for deterioration or contamination.
- Check fluid filters if applicable.
- Check cylinder for air leaks and mounting.

**Monthly**

- Flush the entire system or reverse to remove any accumulation of foreign matter. If you notice a build up you may want to flush it with a solution of vinegar and water.
- Remove and clean any strainers or filters.
- Replace worn or cracked hoses.
- Tighten all hose clamps.
- Check and correct water temperature and pressure.
- Make sure that shutoff solenoids and valves are operating correctly.
- Check ground connections on your separate earth ground.
- Tighten all terminal connections and visually examine all solder connections.
- Check line voltage with and without welder load. Voltage should not vary more than 10%.
- Make sure all air vents are free.
- Check wire insulation for cracks and dirt accumulation. Replace if needed.
- Vacuum or blow out control unit, be sure to cover any electronic components when blowing out control.
- Remove air filter and clean.
- Check for loose cylinder bolts or hold down plates.
- Inspect shock blocks for secure weldments.
- Check cylinders for air leaks and rods for score marks.

- With the air removed check for sluggishness or sticking of cylinders. All cylinders should move freely without air connected.
- Check air gauge for excessive pressure drops during operations.
- Check all speed control setting, adjust and lock.

### **Quarterly**

- Use master level and check machine. Re-level if needed.
- Check water system thoroughly and replace components, which show wear or corrosion.
- Polish all secondary contact surfaces to remove corrosion or oxidation. Use a very fine sandpaper and steel wool. Avoid using tetrachloride in poorly ventilated areas.
- Tighten all secondary contact connections.
- Check protective and overload devices.
- Check air gauges and regulators with pressure indicator. Replace damaged regulators and gauges or those that are sluggish or need calibrations.
- Replace worn or cracked air hoses, air mufflers, lubricators or filters.
- Replace oil in lubricator unit and change or clean oil filters.

### **Annually**

- Remove all grease and rust from the welder and apply a coat of machinery paint.
- Check for extensive wear of trunnions, bearing, brushed, etc. and replace worn or damaged parts.
- Reverse flush water system and replace hoses where required.
- Check and replace air hoses and piping where required.
- Check and replace over temperature switch or flow switch if needed.





# Drawings