

# Hot Water Unit Operations Manual



**AMRON**  
INTERNATIONAL

1380 Aspen Way  
Vista, CA 92081  
Toll Free: 877.462.1277  
Phone: 760.208.6500  
Fax: 760.599.3857  
Email: [sales@amronintl.com](mailto:sales@amronintl.com)

*Congratulations on the purchase of your new hot water unit from Amron International! This manual is being provided to better help serve you with information regarding suggestions for maintenance, operation, requirements and other helpful suggestions. Please take a moment to familiarize yourself with its contents.*

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# CAUTION

**This equipment is only to be used by individuals trained in its proper operation. Misuse of this equipment could cause injury or death.**

**GFI** - Always use a ground fault interrupter mechanism when operating this unit. Failure to do so could result in electrical shock.

**Guards** - Do not remove safety guards and attempt to start or run this unit. Serious injury could result.

**Hot Surfaces** - Touching of hot surfaces can cause injury. Please do not touch burner, boil chamber or volume tank with unprotected hands during operation or immediately after use.

**Hot Water** - Unnecessary increase of water temperature can cause burns. Do not increase temperature without consent from the diving supervisor.

# Unit Specifications

## Safety Features:

- Burner cover
- NEMA 4 electrical enclosure
- Fuel pressure gauge
- Electronic temperature control
- Low flow switch
- Low flow indicator
- Low pressure switch
- GFI Included

## Weight and Dimension:

- Weight: 800 LBS (Dry)
- Length: 48"
- Width: 36"
- Height: 52"

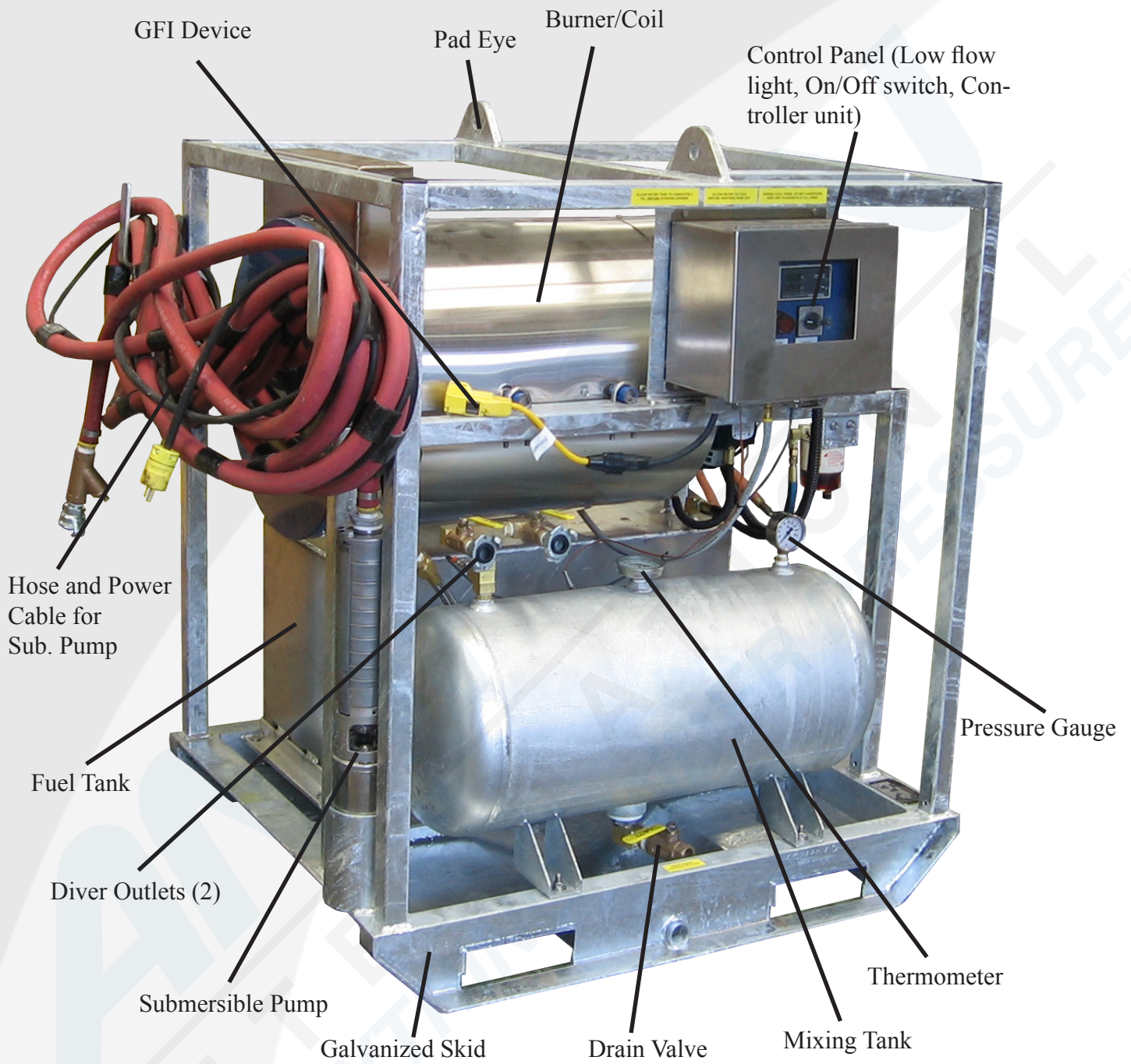
## Standard Unit:

- Galvanized frame
- 8-10 GPM
- 115VAC/60HZ
- Stainless steel submersible pump
- 385,000 BTU heating capacity
- 1/2" Schedule 80 stainless steel coil assembly
- Stainless steel coil wrap
- Oil fired burner
- Burner cover
- Rain cap
- Stainless steel fuel tank
- 20 gallon mixing tank
- Dual lifting eyes
- Drip pan

The Model: HWUDR401 is one of the most widely used and dependable hot water units available today. These units provide hot water for up to two divers down to 300 FSW. These units include a steel galvanized frame, electronic controls, safety shut downs and a stainless steel submersible pump.

## Submersible Pump Assembly

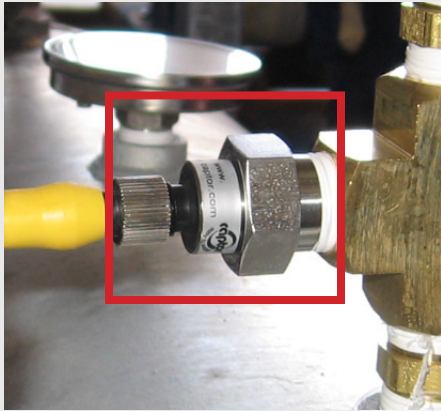
- Stainless steel submersible pump
- 50' hose with fittings
- 50' power cable



## Safety Features

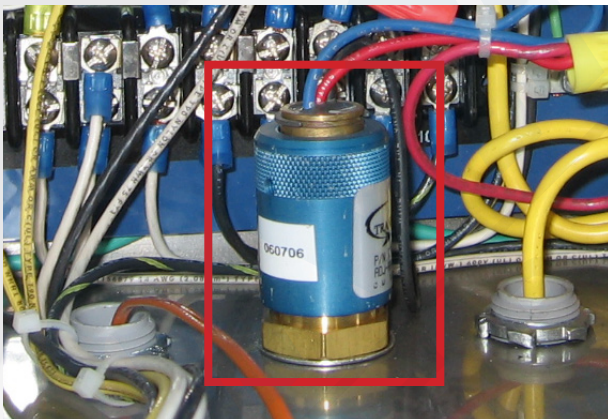
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Listed below are the numerous safety features of the HWUDR401 Hot Water Unit from Amron International. Please take a moment to familiarize yourself with them.



**Temperature Limit / Flow Switch**

All hot water units are supplied with a high temperature limit / flow switch which works to shut down the burner if safe heating temperature is exceeded or flow stops. This is set to 160° F and cannot be adjusted. This switch is powered by a power supply unit that is installed behind the main control panel. Should low flow be a problem, an indicator light on the panel will activate.



**Low Pressure Switch**

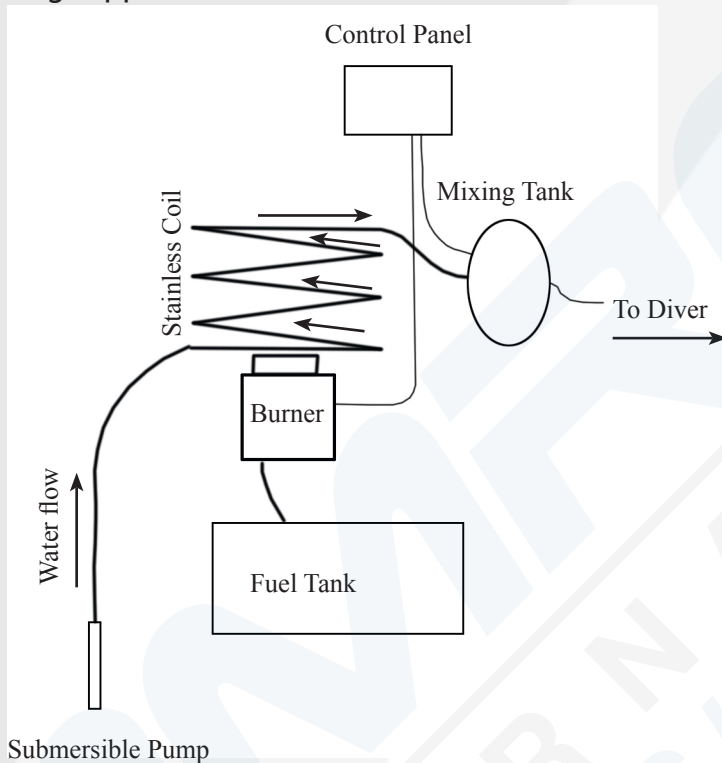
Each unit is also supplied with a pressure switch. This switch monitors the submersible pump and should the pressure drop too low, it will shut the unit down to minimize the fire hazard and subsequent damage that could result from low water pressure/ no water going to the coil.

# Basics of Operation

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## How this unit works:

- The **submersible pump** that is part of the unit that pumps water through a hose and into the **stainless steel coil**. This pump provides the correct amount of pressure required for this system to work. **Do not disconnect the pump in order to use another water source. If the pressure is too low or too high, the unit will not work.**
- The **burner** ignites kerosene or diesel from the **fuel tank** and heats the incoming water which flows to the **mixing tank**.
- A thermocouple, which connects to the **control panel**, constantly monitors the temperature and turns the burner off and on to keep the water temperature consistent in the mixing tank as it is being supplied to the diver.



## Installation Requirements

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### Electrical requirements:

An adequate electrical system is critical to satisfactory operation of this unit. The electrical manufacturer, in accordance with NEMA standards, requires these electrical requirements at the equipment while the unit is in operation.

- 115V/AC, 1ph, 60hz

Use only grounded drop cords with this unit.

### **WARNING!**

Inadequate electrical system may result in erratic operation, unscheduled shut down due to overloading, failure of electrical equipment due to overheating, failure of protective controls to respond and inadequate burner performance.

### Fuel Oil Requirements:

Use a good grade of diesel, kerosene or #1 fuel oil if possible. Heavier fuel such as #2 fuel oil may be used, although it can cause the coil rings to fill with carbon, inhibiting the flow of combustion air, reducing heat transfer, causing erratic pressure changes and poor burner operation.

### Water Supply Requirements:

Use the submersible pump at all times. Do not allow use of other water sources. Water pressure should not be excessive. Desired water pressure is between 100 and 125 PSI.

### Intake Requirements:

Be sure air inlet openings are not located at a point where they can be covered or where they can be obstructed in any other manner.

### Exhaust Stack Requirements:

Stack from the combustion chamber should generally be the same size as the stack hood on the machine. For heights exceeding 20ft, it may be necessary to increase stack size to avoid restriction in the exhaust of gases.

### Location Requirements:

Unit should be located on a level surface and kept out of inclement weather.

### **This unit should never be placed near:**

- Flammable liquids such as gasoline
- Hazardous materials such as gases
- Combustible liquids
- Flammable materials
- Other dangerous materials
- Diving compressor or other breathing air sources

## Operational Guidelines

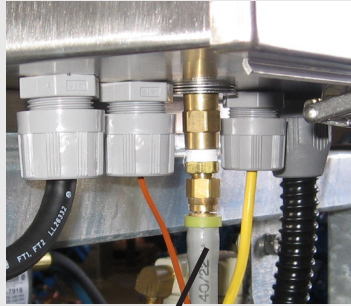
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The following is a list of guidelines that must be adhered to for continued operation of the hot water unit.

- Drain mixing tank, coil and pressure switch hose in freezing weather.
- *To drain tank, open valve at bottom and leave open.*
- *To drain pressure switch hose, disconnect the hose from the bottom of the control panel and secure in place.*
- *To blow water out of coil assembly, disconnect submersible pump from the coil and attach an air hose to the crowsfoot fitting. Use a maximum of 30 psi to push water from the coil to the mixing tank.*
- *Once water is blown out, re-connect hoses to the pressure switch and to the submersible pump and close the valve at the bottom of the mixing tank.*



Mixing Tank Drain



Pressure Switch Hose



Coil

- Leave unit plugged in at all times in cold weather (50 degrees and below).  
*There is a heater installed in the control panel that will keep the electronics warm and dry.*
- Check GFI before every start.

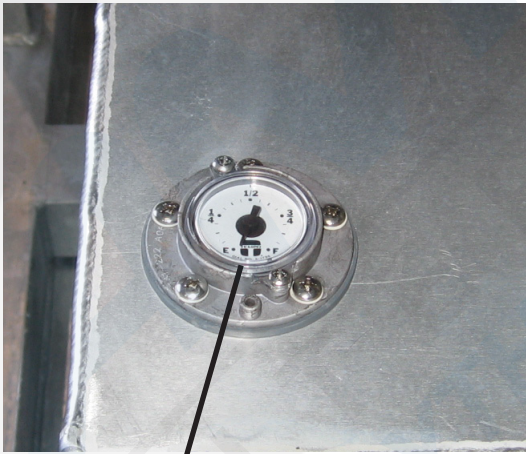
By following these three tips, you greatly decrease the risk of unexpected downtimes due to electrical system failures or inclement weather.

## Pre-Starting

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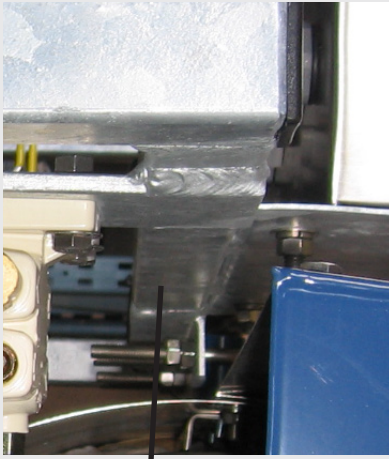
Please follow these guidelines before starting your hot water unit every day.

- Check fuel in tank.



Fuel Gauge on Tank

- Make sure Submersible Pump is connected to the coil and safety pins or safety wires are in place.
- Check GFI for operation (may have to reset blower motor as well. See troubleshooting guide).
- Check fuel filter for debris (visual inspection through sight glass).



Fuel filter w/sight glass

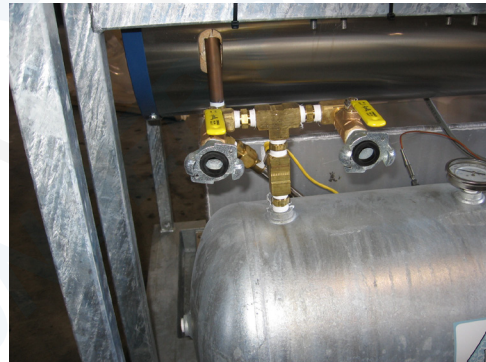
## Starting

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- Place submersible pump in water and then plug it in. Open the valve to the divers hose. A good rule of thumb here is to remember that the first thing to do is turn the water on and the last thing to do, during shut down, is turn the water off (more detail during shutdown).



Submersible Pump w/Hose



Diver Outlet Valves

- Purge out all air before operation begins. **Make sure there is a steady, free flow of water discharging from the divers outlet valves before turning on burner switch.** If water is not flowing out of the valve, to the diver, do not turn on the burner until it is. Air in the system can cause serious damage to the unit.
- Turn burner switch to the "ON" position. The burner should ignite immediately.



Burner On/Off Switch

- Set desired temperature by pressing arrows up or down - which are located on the controller panel.



Temperature Control

## Shutdown

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Shutdown of this unit is fairly easy but steps must be followed in order with no deviation. Burner should be shut down first and **water should be kept flowing until the water coming from the divers outlet is cool.**

1. Turn burner switch off.
2. AFTER discharge from unit is cool, shut down the submersible pump.
3. Unplug electrical cord from unit.\*

\*Electrical cord should only be unplugged in warm weather.

## Maintenance

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### Do's and Don'ts:

- Do check hose and fittings, being sure to keep hose away from sources of heat.
- Do be sure electrical requirements are met.
- Do keep fuel tank full.
- Do keep unit out of a freezing atmosphere
- Do delime coil on a routine basis.
- Do check fuel filter weekly and change the cartridge monthly.
- Do keep strainers free of debris
- Don't pull unit by the hoses.

### Preventative Maintenance:

- Delime coil of build-up in system which can cause excessive operating pressure.
- Tighten loose fittings and check electrical connections.
- Check strainers or filters, if applicable.
- Check pump and plumbing system for leaks.
- Inspect burner and check flame. Check fuel filter weekly.
- Clean coil of excess carbon. Remove coil and clean with high pressure cleaner if needed.
- Protect the unit from freezing. Freezing will crack and split the coil, pump and piping.
- Open all drain valves if unit is not in use.

### **Storage:**

If usage is seasonal or unit will be stored for a period of time, to assure proper operation when unit is needed again.

- Drain the unit completely (this includes fuel).
- Replace fuel filter.
- Tape all openings, water inlet, water outlet and hose ends.
- Store hose, wrapped in plastic or in a cool dry place.
- Cover with waterproof material to keep out dust and moisture.
- In high humidity environments, provide desiccant or calcium chloride within insulated enclosure to absorb excessive moisture.

## **Troubleshooting**

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### **Check Sheet:**

The following is information for locating and correcting many of the possible operating problems that may develop in the unit. Each of the major problems is followed by a list of causes and remedies which will help you to determine corrective actions that might be taken. We have not listed all malfunctions that may occur, nor all causes and remedies, and you may experience problems other than those listed. However, if you go over the information in this section, you will likely solve your problems.

Please review installation requirements, paying close attention to the electrical requirements, as most problems are due to an inadequate electrical system.

Use this list to help solve the most common issues that could arise with the unit:

1. Are you using a grounded drop cord? Is the size adequate for it's length?
2. What is the rating of the circuit breaker in the electrical system you are using?
3. Are you using the supplied pump or some other source? If you are not using the supplied pump, what is the Pressure Rating of your water supply?
4. Is the water supply interrupted?
5. Do you have sufficient air for combustion?
6. What number fuel oil are you using? Is it clean?
7. Did you run out of fuel? (if so, reprime pump and fuel system)
8. Did the unit stop due to an overload?
9. Is air purged from the water system?
10. Is the coil obstructed?

### **Problem/Cause/Remedy**

A. First, check for adequate electrical system.

1. A heavy duty drop cord is required as well as a good supply of water.
2. Flow and pressure of water must be sufficient to open flow control switch.
3. Covering or restricting exhaust in any way will impair performance and can be dangerous.
4. The sides of the lower portion of the burner should never be covered as this restricts air to the burner.
5. Clean fuel is required.

## **Insufficient Heat:**

1. Soot buildup on coil.
  - A. Clean coil and adjust air inlet bands so there is minimum smoke in exhaust. To clean coil: Remove coil from unit, pressure wash and replace.
  - B. Make adjustments in air inlet bands to minimize smoke in exhaust.
2. Lime build-up in coil.
  - A. Check coil, delime if necessary.
3. Dirty or clogged fuel filter, fuel lines or fuel burner nozzle.
  - A. Check and clean fuel filter. Remove fuel line and clean. Check burner nozzle and if necessary, replace it.
4. Damaged pressure gauge.
  - A. Replace pressure gauge.

## **Cycling:**

Unit gets hot, develops heat, burner shuts off, water cools, then burner reignites or Excessive pressure.

1. Flame to high.
  - A. Reduce fuel pressure.
2. Inadequate water.
  - A. Provide adequate water flow.
3. Air leaks in water system; pump not primed.
  - A. Check plumbing connections and piping for air leaks. Prime pump and inlet water system. Always bleed air from lines before operating.
4. Obstruction in hose.
  - A. Remove and clean hose. Delime if necessary.
5. Restriction in coil.
  - A. Check coil. Delime if necessary, keep strainers clean. Replace if damaged.
6. Inadequate or interrupted water supply.
  - A. Provide steady, uninterrupted water supply. keep inlet water supply valve open during all operations.
7. Temperature exceeds 160°F (the limit of the temp limit switch)
  - A. A temperature exceeding 160°F opens the temp limit switch circuit, shutting down the burner until water has cooled approximately 10 degrees below limit, permitting burner to re-ignite. If temp limit switch is defective, replace it.
8. Water pump, Jammed or frozen water pump.
  - A. Check for damaged parts in pump if it has been frozen. Repair or replace if necessary.
9. Discharge hoses too small or too long.
  - A. Use proper hoses, at minimum 5/8" diameter.
10. Malfunction of flow control switch, pressure control switch or other necessary controls.
  - A. Check each control in turn by using an insulated jumper to temporarily bypass other controls to provide successful operation. Controls can be re-adjusted and re-established or replaced as necessary.

## **Smoky or Dirty Burner (there should be no smoke in discharge):**

1. Improper burner combustion.
  - A. Open air bands on burner until smoke disappears.
2. Soot buildup on coil.
  - A. Inspect coil, clean if necessary.

## Burner Not Igniting:

1. Empty fuel tank.
  - A. Fill fuel tank with good grade of clean fuel.
2. Dirty or damaged fuel filter, burner nozzle or fuel line.
  - A. Check and clean fuel line, fuel filter, and burner nozzle.
3. Burner motor out on overload.
  - A. If red button on burner motor is tripped, allow motor to cool and then push red button to reset.
4. Protector relay.
  - A. If red button on relay is tripped, push red button to reset.
5. Damaged or defective.
  - A. Replace one or more of the following: Protector relay, ignition transformer, cad cell or fuel solenoid.
6. Temperature exceeds 160°F (limit of temperature switch).
  - A. Temperature limit switch shuts down burner when safe heating temperature is exceeded. If burner does not come back on line after water has cooled, temperature limit switch may be defective and should be replaced.
7. Inoperative burner switch.
  - A. Unplug electrical supply. Replace switch.
8. Inoperative burner transformer. (Most shorted burner electrical components are due to inadequate electrical supply to equipment.)
  - A. Check transformer
9. Inoperative fuel pump.
  - A. Check fuel pump and, if inoperative, replace.
10. Improper electrodes positioning.
  - A. check for proper positioning. Reset or replace as necessary.

## Coil Drip:

Note: Condensation will accumulate whenever water temperature is less than the temperature of the surrounding air. This will be particularly noticeable on humid days and when inlet water temperatures are low.

1. Condensation (test to determine if drip is condensation or a leak).
  - A. Pressure test coil to verify that it is sound.
    - Turn burner switch OFF.
    - Remove hoses.
    - With pump ON, gradually close hand valve until pressure gauge reads 100 PSI.
    - Shut pump OFF to trap pressure in coil system.
    - Pressure drop on pressure gauge from the 100 PSI reading indicates a leak in coil or water system. Tighten fittings or replace coil as required. If pressure holds at 100 PSI coil is sound and dripping is a result of condensation.
2. Frozen coil.
  - A. Replace coil (a frozen coil has split or cracked). Protect unit from freezing atmosphere.
3. Damaged coil, due to thermal shock.
  - A. Replace coil. Always allow unit to cool until discharge water from the pump is cool. **NEVER ADD COLD WATER TO A HOT COIL.** Allow coil to cool to ambient temperature first.
4. Loose fittings.
  - A. Tighten all fittings.

## General Reference:

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### Oil Burner - General parts information.

1. Motor is a continuous duty, flange mounted, split phase type.
2. Fuel Unit consists of a pump, strainer and pressure regulating valve. Fuel unit is driven by the motor through a flexible coupling. Fuel pump is a single stage fuel unit. Fuel pressure is adjusted to 150 PSI in operation tests.
3. Transformer is a hinge type AC low voltage primary with 10,000 V/DC secondary voltage, midpoint grounded, for use with intermittent or interrupted ignition.
4. Air Bands are to allow for proper settings for mixture of air with the fuel for maximum efficiency.
5. Assembly motor, transformer and fuel units are mounted on a fabricated blower housing assembly insuring correct alignment. Flexible coupling is used between motor and fuel unit so that either can be removed quickly for inspection or replacement.
6. Nozzle - the delivery of oil from the nozzle may vary due to variations in temperature and viscosity of the oil.

### Fuel

The oil burner is designed to burn kerosene, #1 fuel oil and in this case, diesel. It is possible to burn heavier fuel oil, such as #2 fuel oil. To burn these heavier fuels it is necessary to increase air to fuel ratio by opening the air bands to "clear" the exhaust. In some cases, it may be necessary to decrease fuel pressure or even switch to a smaller burner nozzle.

Due to the variations in quality of fuels and condensation in fuel supply tanks, it is recommended that you use a bactericide additive in the fuel. This additive will extend the life span of your fuel pump and provide more consistent combustion from your burner. Most fuel suppliers have bactericides available for purchase.

**NOTE: A fuel additive may be needed in temperatures below 32°F to keep fuel from thickening.**

### Maintenance:

1. When burner is in operation.
  - A. Check flame periodically; if it is out of shape or smoky, adjust.
  - B. Check electric ignition system and controls periodically for reliability of operation. Adjust if necessary.
  - C. Keep inlet opening free of dust and lint.
2. Lubrication.
  - A. Lubricate ONLY motor on the burner.
  - B. Use good grade of medium weight detergent free automobile engine oil.
  - C. Oil lightly, twice yearly.
3. Check fuel filter weekly, replace monthly.

## Temperature Limit Switch - General information

Hot water units are supplied with a high temperature limit switch which works to shut down the burner if safe heating temperature is exceeded.

The switch operates with a closed switch within allowable temperature, up to 160°F. When the temperature exceeds the limit, the circuit opens and the burner circuit shuts down. After water has cooled approximately 10 - 15 degrees, the burner automatically re-ignites.

## Repair Information, Burner:

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1. Ignition System - Hard (rough) lighting can be caused by ignition problems.
  - A. Check for spark. Spark should appear immediately when the burner starts. If spark is delayed, check the voltage supply to the burner. Voltage drops are usually caused by under sized wiring or a long run from the burner to the source of power.
  - B. Check the ignition transformer which should produce 10,000 V/DC secondary voltage for output.
    1. **Transformer Bench Test:** Remove transformer from burner housing. Make sure transformer is completely dry and connected to appropriate primary voltage (check on nameplate of transformer) wiring to the two wires on the transformer. Note: There is no polarity to these wires. Use an insulated screwdriver (no cracks in the handle) and keep fingers off of the blade.

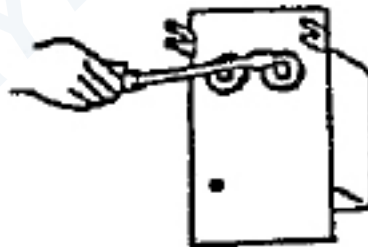
### CAUTION!

Secondary voltage on ignition transformer is 10,000 volts DC. Exercise caution in testing transformer. Electric shock can be the result of carelessness.

Lay blade across one contact and arc across to the other contact. the spark should be bright blue and have a sharp cracking sound. You should be able to pull the spark away from one contact 3/4" to 1". A yellow spark, a spark that is short and lacks the "cracking" sound is insufficient and the ignition transformer should be replaced.

### Safety Warning!

If delayed ignition is not corrected, it could cause an explosion!



Transformer Check

C. If ignition transformer checks out, the problem is probably in the Drawer Assembly. If there is a crack in the insulators, however small, the electricity will follow it and this will cause a problem of inconsistent or incomplete combustion.

To remove Drawer Assembly:

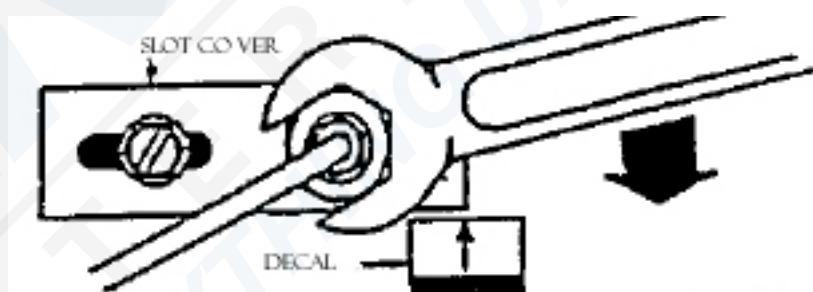
- a. Loosen retaining clip and swing transformer door open.
- b. Remove fitting nut.
- c. Pull oil line to right side of burner housing.
- d. Pull drawer assembly for air tube.
- e. Examine electrode assembly.

Check insulators for cracks. Replace insulators if there is any question about possibility of cracks. Check the points for adequate clearance of a ground.

### CAUTION!

It is important when servicing the burner that the gun (drawer) assembly locknut be securely wrench tightened. Wrench tightening will assure proper nozzle centering. The two upper Electrode Support legs must contact the inner surface of the Air tube firmly. This can be confirmed visually by viewing the Electrode Support through transformer opening while tightening locknut. The spring located on the lower Electrode Support leg is designed to force upper locating legs against the Air Tube. Wrench tightening will insure proper positioning.

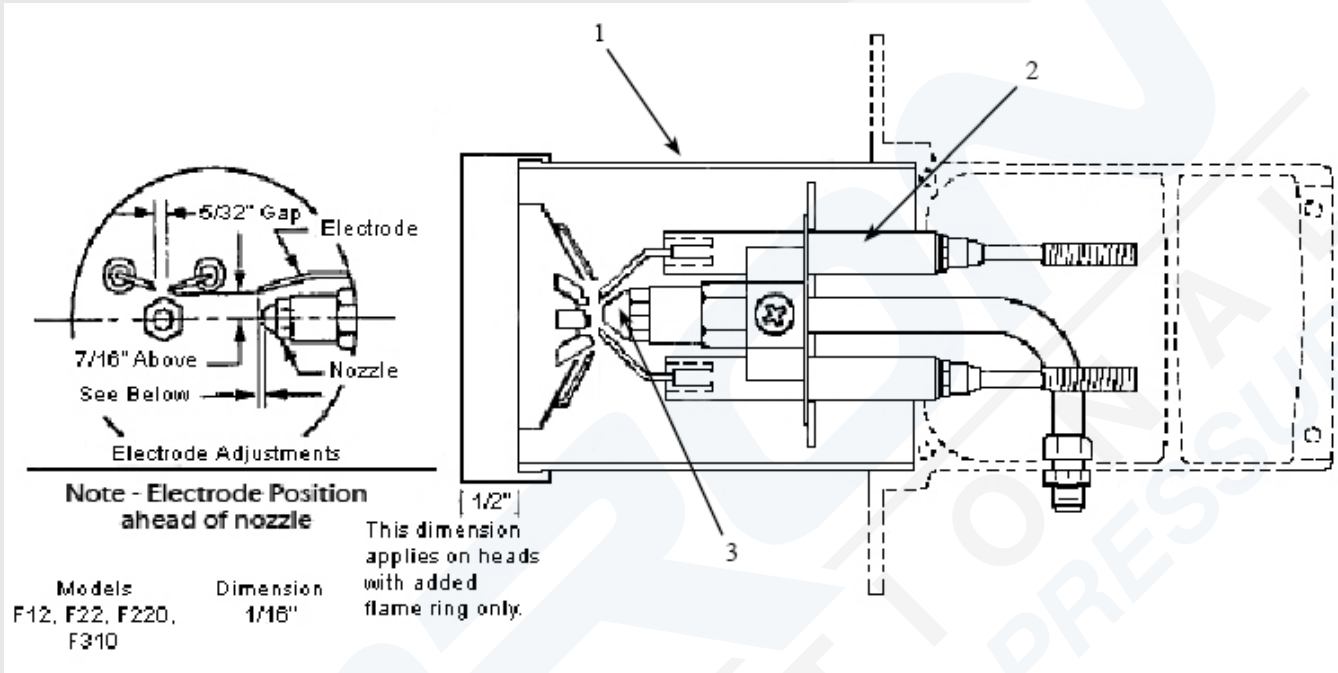
Improper nozzle centering in relation to Air Cone can result in poor combustion due to flame impingement.



f. After making adjustment, check the electrode spring from the electrodes to the transformer, making sure there is adequate clearance of a ground and there is no possibility of a short circuit.

2. **Nozzle and electrodes:** Use only the nozzle recommended by the manufacturer as it is the proper type, capacity and spray angle to give best performance.

## Air Tube Combination Details



| Loc | Part Number | Description                                    |
|-----|-------------|--|
| 1   | 58020122    | Complete Air Tube Assembly w/Gasket and Flange |
| 2   | NL35XN      | Nozzle Electrode Assembly                      |
| 3   | BR00364     | Nozzle   |

Do not attempt to install the nozzle through the choke (end cone.) It is impossible to get a tight joint between the nozzle and the adapters unless two wrenches are used. When required to replace the nozzle, remove the drawer assembly, then proceed as follows:

Observe exact position of electrodes.

Unscrew burner nozzle.

Clean, or if corroded or clogged, replace with nozzle of same rating as stamped on side of tip.

position electrodes to the correct setting:

- 1.) Offset from directly over the center of the nozzle. (this is indicated on drawing)
- 2.) Set electrodes with 5/32" gap between the tips and 7/16" above the burner nozzle.

Reconnect the oil line.

Reposition the transformer.

Check the operation of the burner.

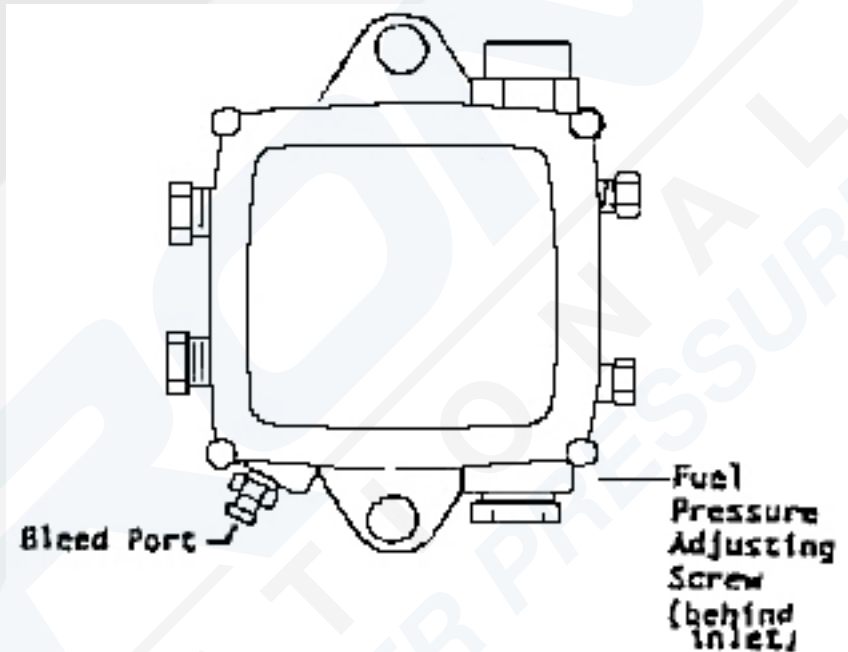
3. To adjust fuel pressure:

- A. Locate slot head fuel pressure adjusting screw behind inlet.
- B. Make adjustments by 1/4 turn or less each time.

*To Increase pressure, turn adjusting screw IN (clockwise) 1/4 turn.*

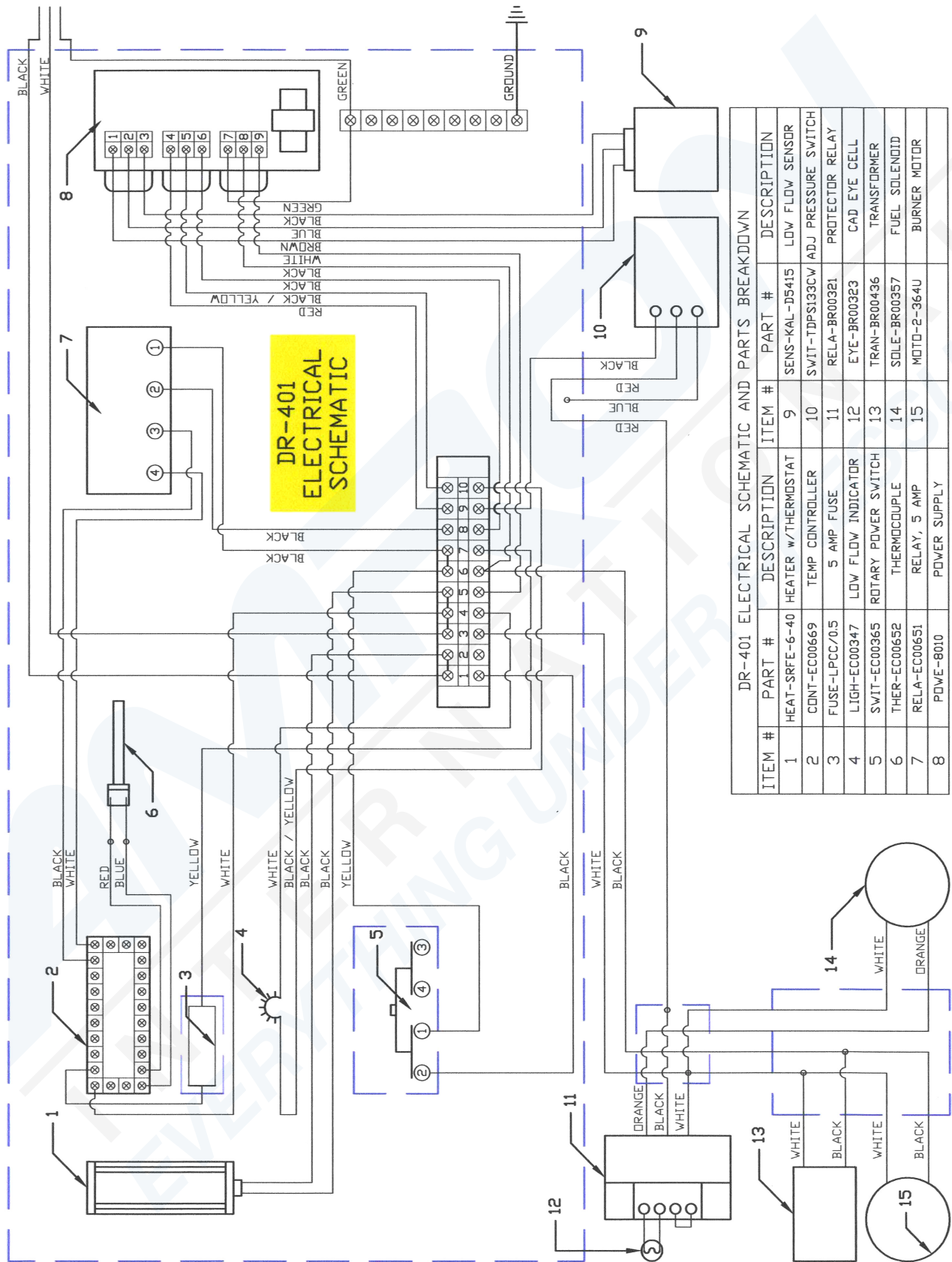
*To Decrease pressure, turn adjusting screw OUT (counter-clockwise) 1/4 turn.*

*With fuel pressure adjusted, correct air intake for maximum performance. See Air Mixture below. After making all adjustments, operate unit, and if necessary, readjust, follow the steps above. If desired results are not obtained, it may be necessary to replace the burner nozzle.*



4. When replacing a fuel pump, we recommend completely cleaning the fuel system:
  - a. Drain fuel tank and refill with fresh fuel.
  - b. Install new fuel filter.
  - c. Install new burner nozzle.
  - d. Flush fuel pump.
  - e. Disconnect the fuel pump discharge line from the oil line fitting at the burner housing. Turn burner switch "ON" and allow to run long enough to flush any old fuel out of the lines. Re connect fuel pump discharge line.
5. Air/Fuel Mixture: For ideal setting, the air bands are open just enough to exhaust smoke. To little air may soot the coil. Too much air may cause cool burning and raw fuel vulcanization on coil.

**The setting is made at the factory about 1400' altitude, and is correct for most operating conditions. However, variations in altitude or types of fuel may require adjustment of setting.**

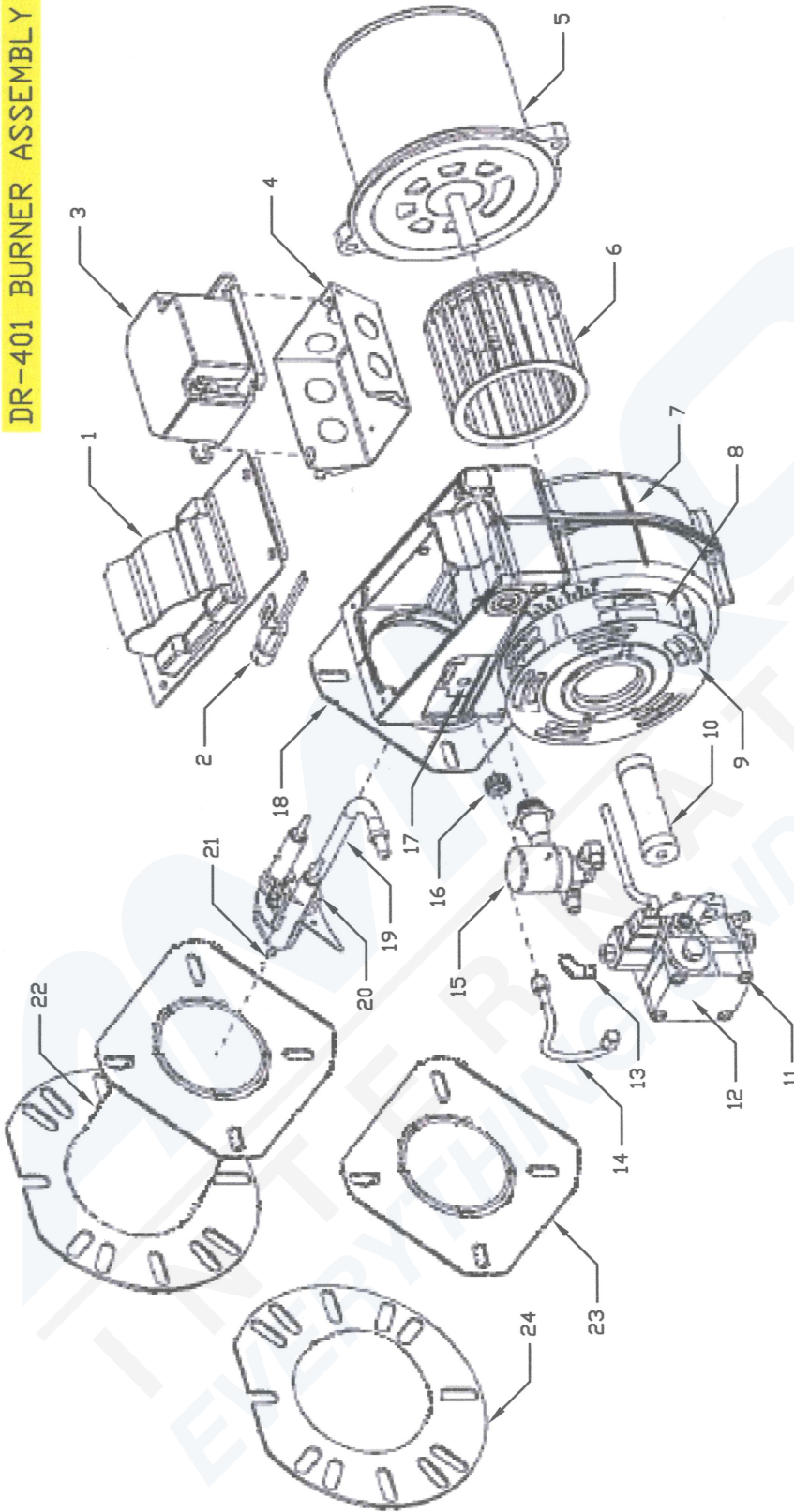


DR-401 ELECTRICAL SCHEMATIC AND PARTS BREAKDOWN

| ITEM # | PART #         | DESCRIPTION         | ITEM # | DESCRIPTION                        |
|--------|----------------|---------------------|--------|------------------------------------|
| 1      | HEAT-SRFE-6-40 | HEATER w/THERMOSTAT | 9      | SENS-KAL-D5415 LOW FLOW SENSOR     |
| 2      | CONT-EC00669   | TEMP CONTROLLER     | 10     | SWIT-TDPSI33CW ADJ PRESSURE SWITCH |
| 3      | FUSE-LPCC/0.5  | 5 AMP FUSE          | 11     | RELA-BR00321 PROTECTOR RELAY       |
| 4      | LIGH-EC00347   | LOW FLOW INDICATOR  | 12     | EYE-BR00323 CAD EYE CELL           |
| 5      | SWIT-EC00365   | ROTARY POWER SWITCH | 13     | TRAN-BR00436 TRANSFORMER           |
| 6      | THER-EC00652   | THERMO-COUPLE       | 14     | SOLE-BR00357 FUEL SOLENOID         |
| 7      | RELA-EC00651   | RELAY, 5 AMP        | 15     | MOTO-2-364U BURNER MOTOR           |
| 8      | POWE-8010      | POWER SUPPLY        |        |                                    |

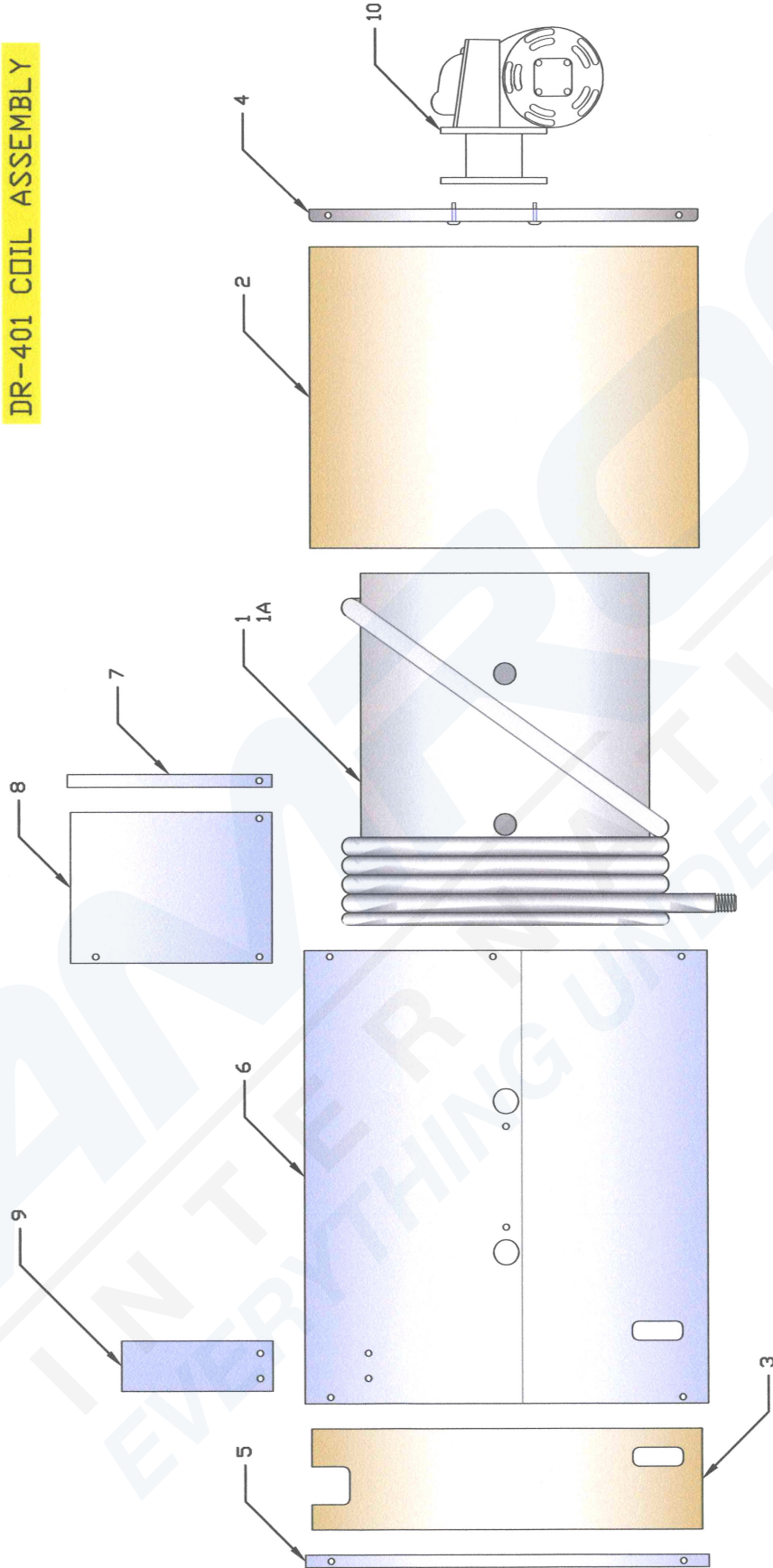
# BT-DR401, Continued

## DR-401 BURNER ASSEMBLY



| DR-401 BURNER ASSEMBLY PARTS BREAKDOWN |              |   |        |              |                                    |
|--|--------------|---|--------|--------------|------------------------------------|
| ITEM #                                 | PART #       | DESCRIPTION                               | ITEM # | PART #       | DESCRIPTION                        |
| N/A                                    | BURN-BR00131 | BURNER ASSEMBLY                           | 13     | ELB0-49X3X2  | PUMP OUTLET FITTING                |
| 1                                      | TRAN-BR00436 | TRANSFORMER, IGNITER AND BASE PLATE       | 14     | TUBE-BR00572 | CONNECTOR TUBE ASSEMBLY            |
| 2                                      | EYE-BR00323  | CAD CELL DETECTOR                         | 15     | SOLE-BR00357 | BLOCKING OIL SOLENOID VALVE        |
| 3                                      | RELA-BR00321 | PROTECTOR RELAY                           | 16     | NUT-BR00474  | SPLINED NUT                        |
| 4                                      | BDX-BR00609  | ELECTRICAL BOX                            | 17     | PLAT-3493    | NOZZLE-LINE ESCUTCHEON PLATE       |
| 5                                      | MOTO-2-364U  | DRIVE MOTOR                               | 18     | PLAT-3399    | UNIT FLANGE (SQUARE)               |
| 6                                      | WHEEL-2383   | BLOWER WHEEL                              | 19     | TUBE-BR00460 | NOZZLE LINE                        |
| 7                                      | HOUS-5348B   | BURNER HOUSING ASSEMBLY w/INLET BELL      | 20     | ELEC-BR00438 | ELECTRODE KIT (PAIR)               |
| 8                                      | BAND-5151503 | BULK AIR BAND, 10 SLOT                    | 21     | NOZZ-BR00364 | NOZZLE                             |
| 9                                      | SHUT-3215    | AIR SHUTTER, 10 SLOT                      | 22     | TUBE-BR00564 | AIR TUBE COMBINATION               |
| 10                                     | COUP-5A34F   | FLEXIBLE COUPLING (FITS 5/16" PUMP SHAFT) | 23     | GASK-BR00862 | GASKET, UNIT FLANGE (SQUARE)       |
| 11                                     | SCRE-482     | PUMP HOLDING SCREWS                       | 24     | GASK-BR00450 | GASKET, FLANGE TO COIL MOUNT PLATE |
| 12                                     | PUMP-BR00278 | FUEL PUMP UNIT                            | -      | -            | -                                  |

DR-401 COIL ASSEMBLY



DR-401 COIL ASSEMBLY PARTS BREAKDOWN

| ITEM # | PART #              | DESCRIPTION  | ITEM # | PART #          | DESCRIPTION                                 |
|--------|---------------------|--|--------|-----------------|---|
| N/A    | COIL-SA10014-2-1    | COIL ASSEMBLY, STEEL COIL, ITEMS 1 THRU 6            | 6      | WRAP-FR10017-AD | SS WRAP                                     |
| N/A    | COIL-SA10014-2-1-SS | COIL ASSEMBLY, STAINLESS STEEL COIL, ITEMS 1A THRU 6 | 7      | COVE-FR20130-1  | SS COVER BURNER END w/SS DOOR               |
| 1      | COIL-CL10016        | STEEL COIL   | 8      | COVE-FR20130    | SS COVER BURNER TOP                         |
| 1A     | COIL-CL10016-A      | STAINLESS STEEL COIL                                 | 9      | CAP-FR20125     | SS RAIN CAP (NOT PART OF THE COIL ASSEMBLY) |
| 2      | REFR-IN00104        | REFRACTORY, LOWER                                    | 10     | BURN-00131      | BURNER                                      |
| 3      | REFR-IN00106        | REFRACTORY, UPPER                                    | -      | -               | -   |
| 4      | MOUN-FR10008        | BURNER MOUNT PLATE                                   | -      | -               | -   |
| 5      | CAP-FR10018-1A      | SS END CAP, COIL COVER                               | -      | -               | -   |

# Technical Reference:

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## Controller Settings for BT-DR401



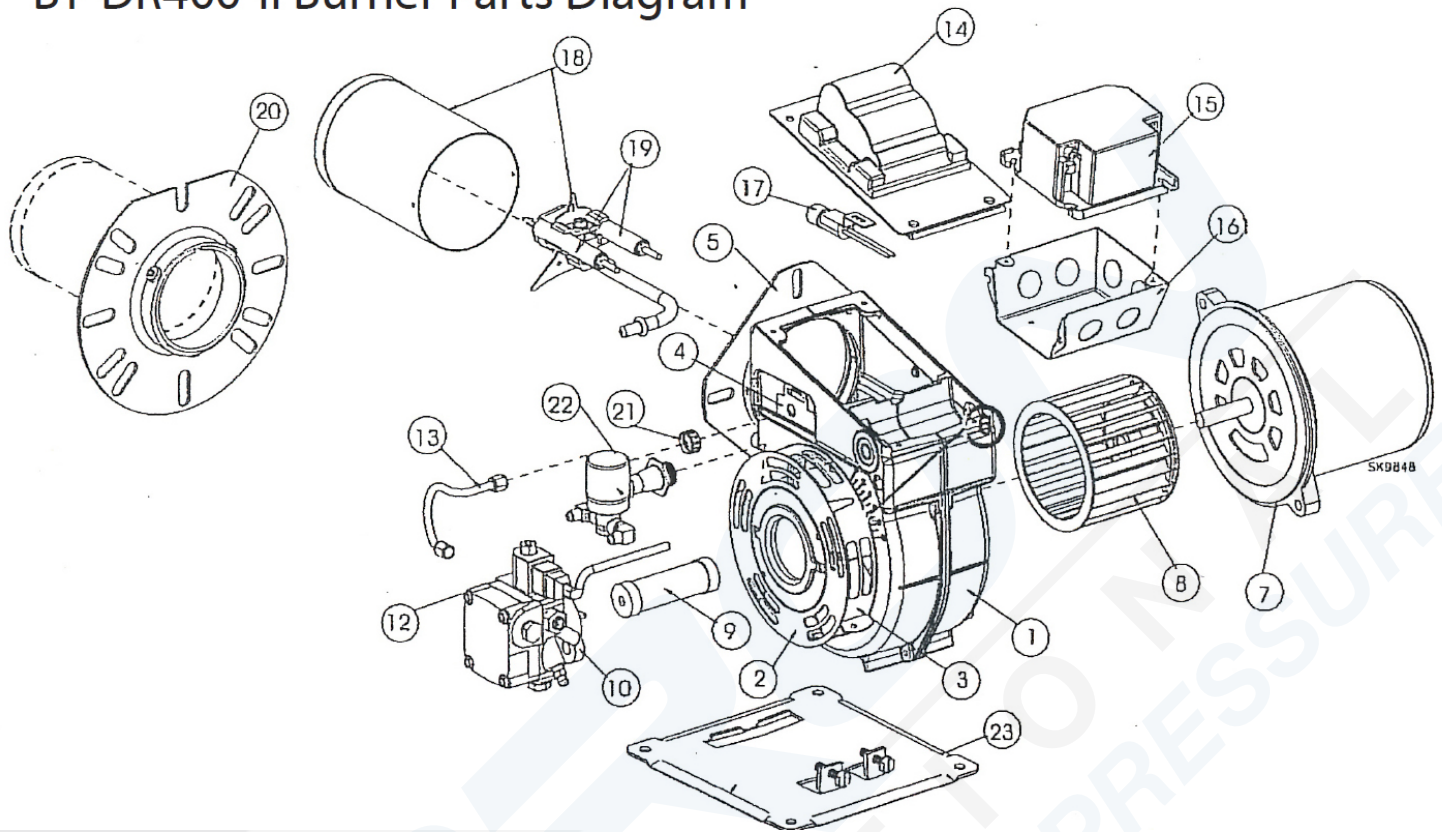
|       |   |       |
|-------|---|-------|
| GN    | - | 36    |
| GN2   | - | 1.0   |
| Rate  | - | 20    |
| Reset | - | 110   |
| dpng  | - | NL    |
| Cyl   | - | 7     |
| CYL2  | - | 00    |
| Sptt  | - | Off   |
| LSPL  | - | 80    |
| USPL  | - | 160   |
| Id.NO | - | 01    |
| baud  | - | 12.07 |
| CAL.L | - | --    |
| SnSR  | - | T     |
| File  | - | 0.1   |
| OUT 1 | - | HT.P  |
| OUT 2 | - | CL.P  |
| COL.T | - | Nor   |
| A1HL  | - | Lo    |
| A1PD  | - | De    |
| A1OP  | - | Off   |
| A2HL  | - | Lo    |
| A2PD  | - | Pr    |
| A2OP  | - | Off   |
| Unit  | - | F     |

# **APPENDIX A**

BT-DR400-II Unit Schematics

**AMERSON**  
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EVERYTHING UNDER PRESSURE™

# BT-DR400-II Burner Parts Diagram



| Loc. | Part Number      | Description  |
|------|------------------|--|
| 1    | N/A              | Burner Housing Assembly w/ Inlet Bell                        |
| 2    | 3215             | Air Shutter, 10 Slot   |
| 3    | 5151503          | Bulk Air Band, 10 Slot                                       |
| 4    | 3493             | Nozzle-Line Escutcheon Plate                                 |
| 5    | 3399             | Unit Flange or Square Plate, Please Specify                  |
| N/A  | Not Shown        | Air Tube Gasket  |
| 6    | 2139             | Hole Plug - Wiring Box                                       |
| 7    | BR00437          | Drive Motor  |
| 8    | BR00480          | Blower Wheel   |
| 9    | BR00320          | Flexible Coupling (fits 5/16" pump shaft)                    |
| 10   | BR00278          | Fuel Pump Unit   |
| 10   | 2184404U<br>2460 | <b>Fuel Units "SM" Only</b><br>Clean Cut<br>Single-Stage "A" |
| 12   | BR00357          | Pump Outlet Fitting  |
| N/A  | 482              | Pump Holding Screws (not shown)                              |

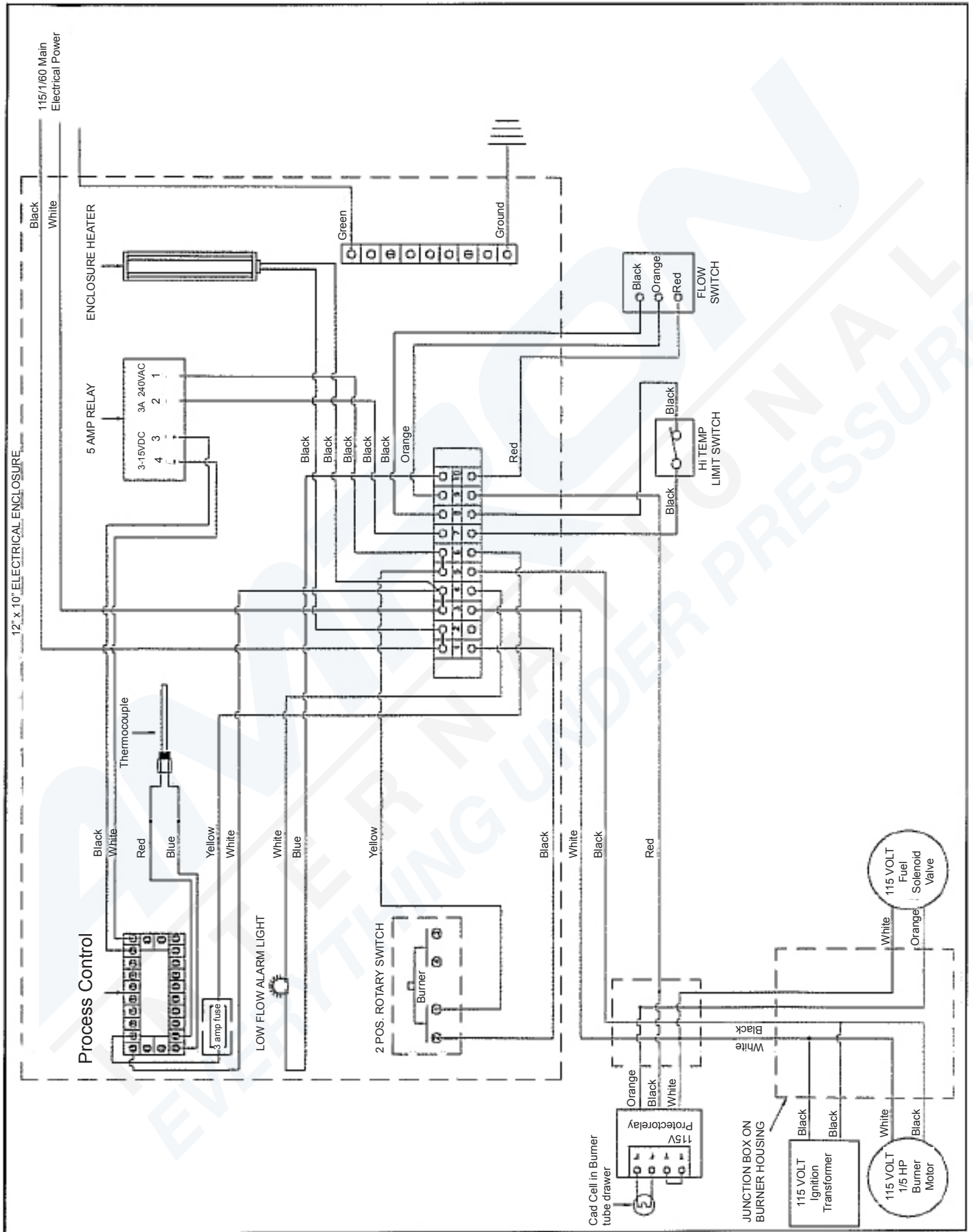
| Loc. | Part Number | Description                           |
|------|-------------|---------------------------------------|
| 13   | 5394        | Connector Tube Assembly               |
| 14   | BR00436     | Igniter and Base Plate                |
| 15   | BR00321     | Protectorelay                         |
| 16   | 5770        | Electrical Box                        |
| 17   | BR00382     | Cad Cell Detector                     |
| 18   | N/A         | Air Tube Combination - Please Specify |
| 19   | BR00438     | Electrode Kit (pair)                  |
| 20   | BR00450     | Gasket                                |
| 21   | 3666        | Splined Nut                           |
| 22   | 2182602     | Blocking Oil Solenoid Valve           |
| 23   | 5685        | Base Pedestal Kit                     |
| N/A  | BR00364     | Nozzle                                |

## Parts List: BT-DR400-II

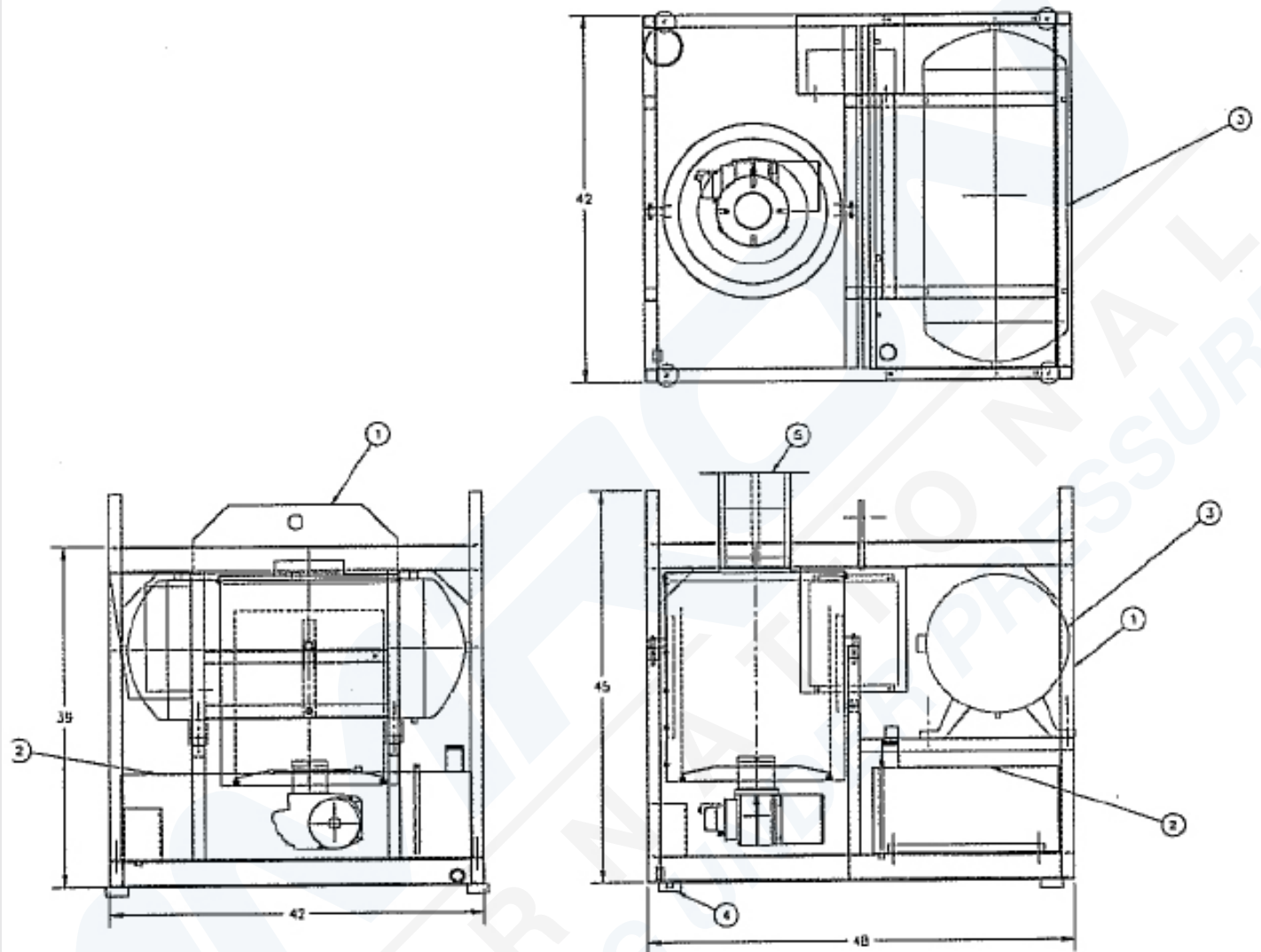
|         |   |
|---------|---|
| BR00130 | Oil Burner, 115v, SF                        |
| BR00255 | Replacement cartridge (Fuel Filter element) |
| BR00364 | Nozzle, 2.75, 90deg B                       |
| EC00140 | Fuse Block                                  |
| EC00173 | Fuse, 1/2 amp                               |
| EC00314 | Enclosure                                   |
| EC00347 | Indicator light, complete, red              |
| EC0365  | Switch, two pole, two position              |
| EC00418 | Maxloc, 5528w 1/2" w/o-ring                 |
| EC00444 | Conduit box                                 |
| EC00452 | Heater control panel                        |
| EC00454 | Outlet box cover                            |
| EC00460 | Gasket, for outlet box cover                |
| EC00475 | Plug, 15A, 90deg, 120v                      |
| EC00650 | Flow switch                                 |
| EC00651 | Relay, 5amp, solid state                    |
| EC00652 | Thermocouple                                |
| EC00669 | Temperature control                         |
| EC00680 | Temperature limit switch                    |
| FT00140 | Pressure gauge, 160psi                      |
| FT00212 | Ball valve, 3/4"                            |
| FT00683 | Thermometer, 0-250F                         |
| FT00880 | Oil fill cap, 1 1/2" galvanized, FPT        |
| FT00911 | Compression fitting                         |
| HR00307 | Bumper, rubber, recessed                    |

|             |                                       |
|-------------|---------------------------------------|
| SA10000-2-2 | Coil, 2-pancake, oil, mild steel wrap |
| BR00436     | Ignition transformer, 120v/60hz       |
| BR00439     | Burner gasket                         |
| BR00357     | Fuel solenoid, 115v                   |
| BR00323     | Cad cell eye                          |
| BR00321     | Protecto relay, R8184G-1294           |
| IN00105     | Upper refractory                      |
| ST00852     | Relief valve                          |
| BR00438     | Electrodes, pair                      |
| BR00460     | Line nozzle                           |
| BR00278     | Fuel pump                             |
| BR00439     | Burner motor                          |
| BR00320     | Pump/motor coupling, for oil burner   |
| BR00254     | Head, fuel filter, complete           |
| 4100-2M     | Cable                                 |
| 148804001   | Ground Fault                          |
| 8010        | Power supply                          |
| 105504      | Strainer, Y                           |
| 4100-70-.3  | Sensor                                |
| TDPS133CW   | Switch                                |
| FT00693     | Gauge                                 |
| T6D         | Gauge                                 |
| 3/4" X 40"  | Hose, SS                              |
| 102-822     | Tank                                  |
| 1/2-HP-115V | Motor                                 |
| 10505-9     | Pump                                  |

# BT-DR400-II, Continued



# BT-DR400-II, Continued



|   |                                      |
|---|--------------------------------------|
| 1 | Rain Cap, For 7 7/8" dia Exhaust     |
| 2 | Rubber bumper (feet)                 |
| 3 | Galvanized water tank                |
| 4 | Stainless steel fuel tank, 35 gallon |
| 5 | Main frame, diving heater            |

## WARRANTY

Amron International warrants that all equipment manufactured by Amron International shall be free from defects in material and workmanship under normal use and service for a period of 12 months from the date of purchase. This obligation does not extend to normal wear or equipment that may have been subjected to misuse, neglect, accident, improper maintenance, or to items that have been altered or modified. Amron International is not responsible for shipping charges incurred for warranty issues unless otherwise stated with expressed consent.

Any failure of the purchaser to properly use the equipment shall absolve Amron International of all its warranty liabilities and obligations.

## Certificate of Conformance

Amron International certifies that this equipment meets or exceeds requirements set by jurisdictional agencies and industry associations in the United States of America.

U.S. Coast Guard  
U.S. Army Corps of Engineers  
Occupational Safety and Health Administration  
Association of Diving Contractors