



DIESEL BURNER TROUBLE SHOOTING GUIDE



TROUBLESHOOTING

Diesel Burner

Problem	Possible Cause	Items To Check/ Service
Lock Out Message On	Fuel Delivery	Make sure that there is enough fuel in the tank.
		Ball valve on fuel tank is in the on position
		Bleed burner (see burner adjustment page)
		Check fuel filter for clogged or dirty filter
		If ambient temperature is below 30 degrees F is fuel gelled. <ul style="list-style-type: none"> * Bio Fuels with higher content of bio are more susceptible to gelling at lower temperatures * Stepp Recommends high quality winter blend fuels for cold weather operation. (winter blend fuels may require burner adjustment)
		Fuel is bad. <ul style="list-style-type: none"> * Fuel stored for long periods can attract moisture and even have algae growth in tank.
		Air leak in fuel line. Fuel pressure gauge may flutter excessively. <ul style="list-style-type: none"> * Check fuel line swivel connectors. * Make sure that fuel line connections are tight.
		Drive Coupler Between motor and fuel pump. <ul style="list-style-type: none"> * Could be stripped on the drive ends or melted.
		Fuel Coil failure. <ul style="list-style-type: none"> * See Fuel solenoid see Page 16
		Fuel Stem Failure. <ul style="list-style-type: none"> * Remove Fuel Stem and shake. If you can not hear valve move replace.
		Plugged or damaged fuel nozzle
		Bad Fuel Pump
	No flame or Flame Detection	Dirty Cad Cell (Eye)
		Faulty Cad Cell (eye)
		Faulty Primary Control See test page 24-27
		Flame Being Blown Out
	Ignition Source	Low Voltage
		Faulty Ignition Transformer See test page???
		Faulty Electrodes See Test page???
		Electrode out of adjustment
		Worn Electrodes

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Problem	Possible Cause	Items To Check/ Service
Lock Out Message On	Ignition Source	Faulty Primary Control –No signal to fire * 10 Amp Fuse is blown on Primary Control (underside of primary)
		Bad Connection between electrode and transformer. (springs) * Rusty or corroded.
	Improper Air Fuel Mixture	Drive coupler failure (cracked, stripped, melted)
		Elevation Change
		Voltage to low or to high (12-14volts optimum)
		Cold weather adjustments
		Wrong air settings See Page 13-14 For burner setup
		Clogged nozzle
		Wrong size nozzle
		Bypass plug missing in fuel pump. (only on single fuel line sys)
		Wrong retention head –see page ??
		Collapsed or plugged flue or burner liner
		Obstruction in fire chamber
		Plugged or restricted air intake
		Clogged or restricted fuel filter
		Ignition transformer gasket bad allowing additional air
	Plug on side of burner missing or leaking air	
	Squirrel cage fan faulty	
	Air guide faulty	
Won't Fire at All	Clogged/deformed Buner Firing Chamber or Tube	Carbon /Soot build up on firing chamber/tube * Check burner air settings * check for bad nozzle
		Worn out/burned out burner tube
		Insulation out of place/blocking air flow
		Debris buildup in fire tube/chamber
	No Fuel	Low Fuel in tank
		Shut of valve closed
		Fuel Filter Clogged
		Pick up tube clogged-debris in fuel tank
		Pinched or kinked fuel line
		Broken hose
		Bad Hose fittings
		Burner air locked not bled
		Gelled fuel (cold weather)
		Clogged strainer in fuel pump

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Problem	Possible Cause	Items To Check/ Service	
Won't Fire at All	No Fuel	Clogged nozzle strainer	
		Fuel pump failure	
		Bad drive coupler (broken, stripped, or melted)	
		Fuel valve failure-Stem, coil, or cord failure	
		Water in fuel/bad fuel	
	No Power to Burner	Power switch is off	
		Engine is not running	
		Burner switch is not on	
		Thermostats not turned up (2 thermostats on oil jacketed units, both must be calling for heat)	
		Fuse in control box blown	
		Burner harness is faulty	
		Tilt switch not working (only on SPHD/dumping units)	
		Wash-down switch turned on (burner interlocked when on)	
		Bad or dead battery	
		Auto reset breaker in control box tripped	
		30 amp fuse on primary control blown	
		10 amp fuse on primary control blown	
		Not Enough Voltage	Low battery voltage
			Dead or bad battery
		12V alternator on engine faulty (on units equipped with an engine)	
		Lack of voltage from towing vehicle to maintain battery	
		* Blown fuse on vehicle	
		* Bad connection	
		* No connection	
		* Wrong pin orientation on trailer plug	
		Lack of proper amperage from towing	
		* Supply wire to small (we recommend 10 ga)	
		Bad Connections	
		Bad Ground	
		Faulty Isolator (sphd units only)	
		Auto resetting breaker tripped or faulty	

TROUBLESHOOTING

Diesel Burner

Problem	Possible Cause	Items To Check/ Service
Won't Fire at All	No Call For Heat Signal	Control box not sending signal
		Wire harness is faulty
		Tilt switch is on the open position
		* Pendulum is stuck
		* Mount loose or out of adjustment (15 Degree setting)
		* Switch Is Faulty
		Wash down pump is on
Won't Stop Firing	Fuel Valve Not Closing	Fuel valve is energized after the call for heat light goes out
		* Check primary control functionality
		* Check burner wiring
		Fuel stem stuck in the on position
Fires but goes off after 15 seconds	Burner in lock out	Reference Lockout section
	Low or No Fuel	Reference low/no fuel section
Fires Intermittently	Bad Connections	Check connectors at control box and burner
	Bad Ground	
	Poor Flame Detection	See flame out detection section
	Low Fuel	Plugged Filter
		Plugged Strainer in fuel pump
		Plugged strainer in nozzle
		Bad Nozzle
		Unstable Voltage
	Burner Out of Adjustment/dirty	See burner adjustment page
		Unstable Voltage
Burner Fires Until Call For Heat Light Goes Off But Will Not Relight	Burner Setting Different When Unit Reaches Temperature	To lean / air fuel mixture not set right
		No Call for Heat Light
Works Fine At The Shop But Wont Fire on the Road/ Job	Improper Voltage	Verify that both thermostats are calling for heat
		No/ Low charge from tow vehicle.
		Low battery voltage
		Dead or bad battery

TROUBLESHOOTING

Diesel Burner

Problem	Possible Cause	Items To Check/ Service
Works Fine At The Shop But Wont Fire on the Road/ Job	Improper Voltage	Lack of voltage from towing vehicle to maintain battery
		* Blown fuse on vehicle
		* Bad connection
		* No connection
		* Wrong pin orientation on trailer plug
		Lack of proper amperage from towing
		* Supply wire too small (we recommend 10 ga)
		Bad Connections
		Bad Ground
		Faulty Isolator (sphd units only)
		Auto resetting breaker tripped or faulty
		No/ Low Charge from engine
		* RPM of engine too low (gasoline or LPG engine)
		* Belts loose or worn on alternator (diesel engine only)
		12V alternator on engine faulty (on units equipped with an engine)
	Improper Burner Setting	Cold weather settings– Adjust burner air fuel settings
		Bad or gelled fuel
	No call for heat	Tilt switch open/ stuck (sphd units only)
	Won't Fire	Backdraft while driving
Smokes To Much	Improper Air Fuel Mixture	Drive coupler failure (cracked, stripped, melted)
		Elevation Change
		Voltage too low or too high (12-14volts optimum)
		Cold weather adjustments
		Wrong air settings See Page 56-57For burner setup
		Clogged nozzle
		Wrong size nozzle
		Bypass plug missing in fuel pump. (only on single fuel line sys)
		Wrong retention head –see page ??
		Collapsed or plugged flue or burner liner
		Obstruction in fire chamber
		Plugged or restricted air intake
		Clogged or restricted fuel filter

TROUBLESHOOTING

Diesel Burner

Problem	Possible Cause	Items To Check/ Service	
Smokes To Much	Improper Air Fuel Mixture	Ignition transformer gasket bad allowing additional air	
		Plug on side of burner missing or leaking air	
		Squirrel cage fan faulty	
			Air guide faulty
	Improper Voltage		No/ Low charge from tow vehicle.
			Low battery voltage
			Dead or bad battery
			Lack of voltage from towing vehicle to maintain battery
			* Blown fuse on vehicle
			* Bad connection
			* No connection
			* Wrong pin orientation on trailer plug
			Lack of proper amperage from towing
			* Supply wire to small (we recommend 10 ga)
			Bad Connections
		Bad Ground	
		Faulty Isolator (sphd units only)	
		Auto resetting breaker tripped or faulty	
		No/ Low Charge from engine	
		* RPM of engine to low (gasoline or LPG engine)	
		* Belts loose or worn on alternator (diesel engine only)	
		12V alternator on engine faulty (on units equipped with an engine)	
	Clogged/deformed Buner Firing Chamber or Tube	Carbon /Soot build up on firing chamber/tube	
		* Check burner air settings	
		* check for bad nozzle	
		Worn out/burned out burner tube	
		Insulation out of place/blocking air flow	
		Debris buildup in fire tube/chamber	

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Diesel Burner

Problem	Possible Cause	Items To Check/ Service
Fuel Pump	No fuel supply	Verify proper supply of fuel, ball valve on fuel tank, filter plugged, hoses not kinked
		For units with dual fuel line (return line) installed verify that return port has a by pass plug.
		Verify that pump has been bled on single fuel line systems. (See primary control section on Page67
		Verify fuel pressure (see burner adjustment chart page 57
		Verify that fittings are installed properly
		Fuel standby pressure is 40-60 PSI
		Infire pressure should be 100-120 PSI
		Check shaft seal (fuel is usually leaking in burner housing)
Photo eye/ Cad Cell (senses presence of flame or lack of flame and shuts system down if no flame is present)	Light but would shut off going into lockout	Verify eye is clean/ not covered in soot Open top at hinge Remove eye Clean with Q tip or soft rag
		Eye is faulty See Page 62 For instructions on testing
		Eye is not properly seated/ aligned and can not see flame. Bend eye mount and may need new gasket.
		Check weather pack connector for loose connection or broken pins.
		Check for pinched wire under lid.
Ignition Transformer	Caution HIGH VOLTAGE OUTPUT Disconnect Power Before testing	Check Ohms between springs. Should ohm out 480-580
		Check power connection from primary control is 12+volts
		Verify that blue and white wire from transformer are connected to blue wire from burner /primary control harness.
		Verify spring contacts are clean/free of rust and properly aligned with electrodes.
Electrode		Check alignment and spacing from nozzle –See data sheet page 60
		Check for broken electrodes.
		Check contact between electrode and ignition transformer springs.
		Check for excessive rust or soot prevent good contact.
		Check continuity between tip and stem of electrode.
		Check for cracked ceramic insulator.

Start Up Burner & Set Combustion

WARNINGS Fire & Smoke Hazard

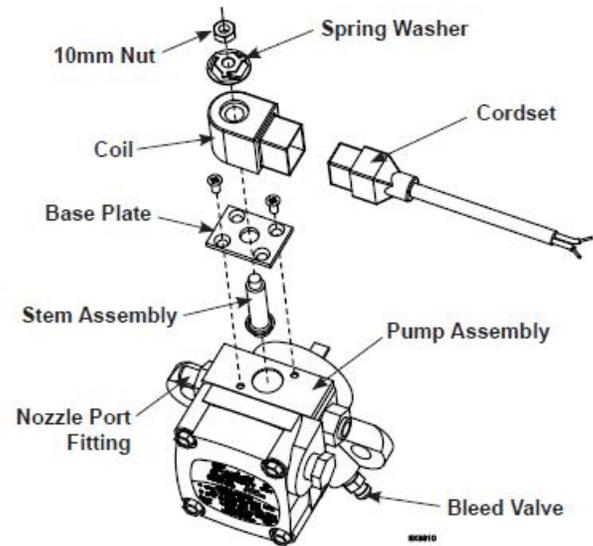
Basic Burner Operation

Typical Constant Duty Ignition Configuration - With this Beckett ADC oil burner configuration, the motor and igniter operate continuously while the valve that controls oil flow is cycled by the switches on the power washer. The motor is used to drive the blower and pump. The rotational speed of the motor is determined by the voltage supplied and the load placed on the motor. Pump pressure and air settings are the main factors affecting the motor load. The igniter converts battery DC voltage into a high voltage spark to ignite the oil. The igniter is capable of running continuously as long as the blower wheel is circulating air across the igniter base. The pump and solenoid valve are used to control the flow of oil from the reservoir to the nozzle.

Igniter with Interrupted Duty Ignition - This optional control circuit is available to reduce current draw on the charging system by turning the igniter off after a flame has been established. This option controls igniter operation based on a signal from a light sensing cad cell. When light hits the cell the control will sense a decrease in resistance across the sensor. A few seconds delay will occur prior to the igniter switching off. As long as sufficient light is reaching the cell eye, the igniter will remain off. If light is removed from the sensor, the igniter will turn on until light is again sensed by the cad cell.

Primary Safety Control - The 7556 control provides the same benefits as the ignition control board as described above as well as added safety, convenience, and performance features. It adds a valve on delay and motor-off delay to the burner's operation sequence that promote clean burner operation. It has a lock-out function that shuts the burner down if it is not operating properly. The control adds fusing at the burner to protect against component failures. The control also has redundant motor relays that are checked for proper operation every heat cycle.

Figure 8. Pump and Valve Assemblies



WARNING Adequate Voltage Required

A low or erratic power supply could result in impaired burner operation, severe delayed ignition or an explosion inside the heat exchanger resulting in a burn and/or asphyxiation hazard.

- The Model ADC requires a continuous supply of 11V to 16V DC at 15A measured at the burner during operation.
- An automotive or small engine charging system that is capable of supplying the required continuous voltage/ amperage is recommended with certain road equipment, such as asphalt hot patchers and similar applications.
- This is especially true while maintaining nominal load temperatures during idle periods.



WARNING Adequate Combustion and Ventilation Air Supply Required

Failure to provide adequate air supply could seriously affect the burner performance and result in damage to the equipment, asphyxiation, explosion or fire hazards.

- The burner cannot properly burn the fuel if it is not supplied with a reliable combustion air source.
- Follow the guidelines in the latest editions of the NFPA 31 and CSA-B139 regarding providing adequate air for combustion and ventilation.

Start Up Burner & Set Combustion

All Stepp Mfg. Burners are set at the factory to operate between 50-90°F and at approximately 900ft elevation. Weather conditions/temperatures, elevation, fuel quality may dictate adjustments be made to operate the burner properly.

If your burner is not operating properly start by returning the burner to the factory settings and make minor adjustments as needed.

Combustion Set-up/Bleed Burner

As soon as burner motor starts rotating bleed all the air from the pump. (Required with single-pipe systems.) To bleed the pump, attach a clear plastic hose over the vent fitting. Loosen the fitting and catch the oil in an empty container. Tighten the fitting when all air has been purged from the supply system. Note: If the burner stops after a flame is established, the unit probably requires additional bleeding. Continue to bleed the system until the pump is primed and a flame is established when the bleed valve is closed.

Set Combustion without Instruments (Field adjustments)

Follow these steps to properly adjust the burner:

1. Determine factory burner setting by reviewing burner setup sheet for your specific unit.
2. Bleed burner to ensure you have no air in the fuel line. Not required on dual fuel line units.
3. Determine air band settings (large air) and shutter settings (small air) and adjust to factory recommended settings.
4. Determine fuel pressure and adjust to factory recommendations.
5. Allow the burner to run for approximately 5 to 10 minutes.

Once the combustion level is set, tighten the fasteners on the air band and air shutter.

Start and stop the burner several times to ensure satisfactory operation.

Test the equipment safety controls to verify they function according to the manufacturer's specifications
Recheck the smoke level. It should be zero.

General Guidelines:

If you have black smoke the burner is firing to rich.

Decrease fuel pressure or increase air settings

If it lights but goes out the burner is to lean

Increase fuel pressure or decrease air settings.

Check gaskets on burner ignition transformer as it may be sucking air.

If the burner lights but chugs or puffs repeatedly.

Decrease Air settings

Check gaskets on burner ignition transformer as it may be sucking air.

Set Combustion with Instruments

Allow the burner to run for approximately 5 to 10 minutes.

Follow these four steps to properly adjust the burner:

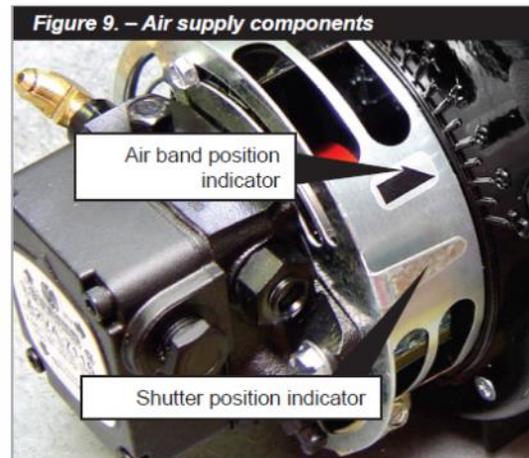
1. Adjust the air until a trace smoke level is achieved.
2. At the trace of smoke level, measure the CO₂ (or O₂). This is the vital reference point for further adjustments.
3. Increase the air to reduce CO₂ by 1 percentage point (O₂ will be increased by approximately 1.4 percentage points).
4. Recheck the smoke level. It should be zero.

This procedure provides a margin of reserve air to accommodate variable conditions.

Once the combustion level is set, tighten the fasteners on the air band and air shutter.

Start and stop the burner several times to ensure satisfactory operation.

Test the equipment safety controls to verify they function according to the manufacturer's specifications



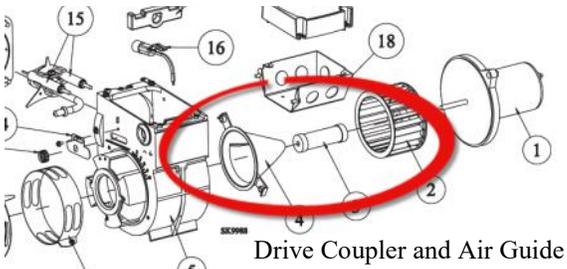
TROUBLE SHOOTING

Diesel Burner Factory Settings

Model	SRM 10x120	Model	OJK 75, Ojk-125	Models	SSPH-1.0
Stock Code	A10008105-001	Stock Number	A10008105-005	Stock Number	A10008105-012
Flange Length	2 1/2	Flange Length	4	Flange Length	2 1/2
Nozzle GPH	2.5	Nozzle GPM	1.5	Nozzle GPH	0.75
Spray Angle	80°	Spray Angle	80°	Spray Angle	80°
Head Size	F31	Head Size	F-12	Head Size	F3
Large Air Setting	3	Large Air Setting	0	Large Air Setting	0
Small Air Setting	10	Small Air Setting	5	Small Air Setting	3
Pressure	120	Pressure	115	Pressure	105
Oil Inlet Location	Back	Oil Inlet Location	Back	Oil Inlet Location	Back
Oil Return	SRM-NO	Oil Return	NO	Oil Return	YES
Model	SGS, STPH-6.0 STPH-7.0	Model	Ojk-185, Ojk-275, Ojk-400	Models	SPHD-2.0 SPHD-3.0, SSPH-2.0, SSPH-3.0
Stock Number	A10008105-002	Stock Number	A10008105-008	Stock Number	A10008105-013
Flange Length	2 1/2	Flange Length	2 1/2	Flange Length	2 1/2
Nozzle GPH	2.5	Nozzle GPH	2.5	Nozzle GPH	1.00
Spray Angle	80°	Spray Angle	80°	Spray Angle	80°
Head Size	F31	Head Size	F31	Head Size	F3
Large Air Setting	3	Large Air Setting	3	Large Air Setting	0
Small Air Setting	10	Small Air Setting	10	Small Air Setting	3
Pressure	120	Pressure	120	Pressure	105
Oil Inlet Location	Back	Oil Inlet Location	Back	Oil Inlet Location	Back
Oil Return	No	Oil Return	YES	Oil Return	YES
Model	SPH-OJ, STPH-4.0, STPH-5.0	Model	SSPH-4.0 SSPH-5.0	Model	SBF-300, SMMT
Stock Number	A10008105-003	Stock Number	A10008105-009	Stock Number	A10008105-014
Flange Length	2 1/2	Flange Length	2 1/2	Flange Length	2 1/2
Nozzle GPH	1.5	Nozzle GPH	0.75	Nozzle GPH	2
Spray Angle	80°	Spray Angle	80°	Spray Angle	80°
Head Size	F-12	Head Size	F3	Head Size	F-12
Large Air Setting	3	Large Air Setting	0	Large Air Setting	3
Small Air Setting	5	Small Air Setting	5	Small Air Setting	5
Pressure	115	Pressure	105	Pressure	115
Oil Inlet Location	Back	Oil Inlet Location	Back	Oil Inlet Location	Back
Oil Return	No	Oil Return	YES	Oil Return	No
Model	STRD, SMT-400-1200	Model	Sph-1.5 Sph-2.0, Sph-3.0, 40 Gallon Tack Tank, SRM-10x120 Tack oil tank,	Model	SMM-72
Stock Number	A10008105-004	Stock Number	A10008105-010	Stock Number	A10008105-015
Flange Length	2 1/2	Flange Length	2 1/2	Flange Length	2 1/2
Nozzle GPH	2	Nozzle GPH	0.75	Nozzle GPH	1.50
Spray Angle	80°	Spray Angle	80°	Spray Angle	80°
Head Size	F-12	Head Size	F3	Head Size	F12
Large Air Setting	3	Large Air Setting	0	Large Air Setting	3
Small Air Setting	5	Small Air Setting	3	Small Air Setting	5
Pressure	115	Pressure	105	Pressure	115
Oil Inlet Location	Back	Oil Inlet Location	Back	Oil Inlet Location	Back
Oil Return	No	Oil Return	No	Oil Return	NO

Driver Coupler and Air Guide

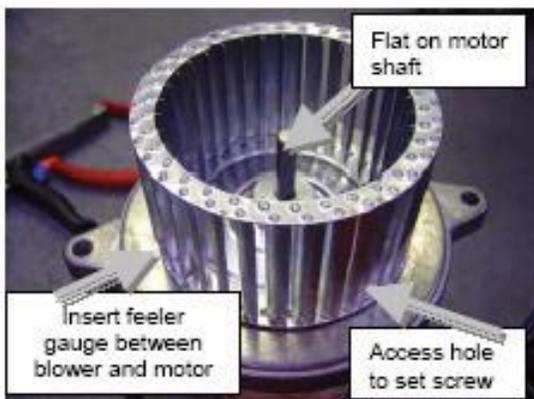
NOTE: Acts as a fusible link between fan motor and fuel pump, Will melt or soften if backdraft or fire is present to shut off flow of fuel.



Drive Component Maintenance

A. Motor, Blower Wheel, and Coupling Replacement

1. Inspect drive coupler for failure or deformation. Make sure to check drive lugs to make sure that they are not stripped on the ends or the tube side.
2. Inspect air guide. Often if the drive coupler melts that air guide will also be deformed.
3. Inspect blower wheel for damage. If couple melts it can also damage the blower wheel.
4. The motor will require replacement if the proper voltage is measured at the motor input, and the motor will either not run, or the current draw with a free running pump exceeds 10% of the rated current.
5. To replace the burner motor, coupling and/or blower wheel perform the following steps.
6. Before servicing, turn off and/or disconnect all power to the burner.
7. Disconnect the burner motor wires.
8. Remove the bolts securing the motor to the burner housing.
9. Remove the motor, coupling, and blower wheel.
10. Loosen the set screw on the blower wheel to slide the existing wheel off the shaft.
11. Slide the new blower wheel onto the old shaft (after thoroughly cleaning housing) and/or slide the old blower wheel onto the new motor shaft.
12. Place a .030" (1/32" ± 1/64") feeler gauge between the blower wheel and the motor housing.



13. Slide the blower wheel toward the motor until it contacts the feeler gauge.
14. Rotate the blower wheel until the setscrew is centered on the flat of the motor shaft. Tighten the
15. setscrew to secure the wheel.
16. Slide the motor coupling on the motor shaft then install the motor on the burner housing. Insure that
17. the motor coupling fits between the motor shaft and the pump shaft inside the housing. Tighten the
18. motor retaining screws. Reconnect the wires.
19. Restore power, start the burner and perform the combustion test described previously in this manual.

Fuel Solenoid Valve

NOTE: The Fuel Valve can be bench tested for proper operation using an automotive type 12 volt battery as a power source.

1. Disconnect the two leads and remove the fuel lines from the fuel valve.
2. The valve should be closed when no power is available.
3. Apply 12 volts to the two leads and the valve should open.

CAUTION: Replace the fuel valve if it does not respond in this way.

Valve Coil and Stem Replacement

To determine if the valve coil requires replacement perform the following steps.

1. Remove the cord set from the valve.
2. Place the leads from an ohm meter across the coil.
3. A 12 volt coil should measure between 15 and 25 ohms.
4. If the meter indicates an open circuit, replace the coil.

To check pump operation perform the following.

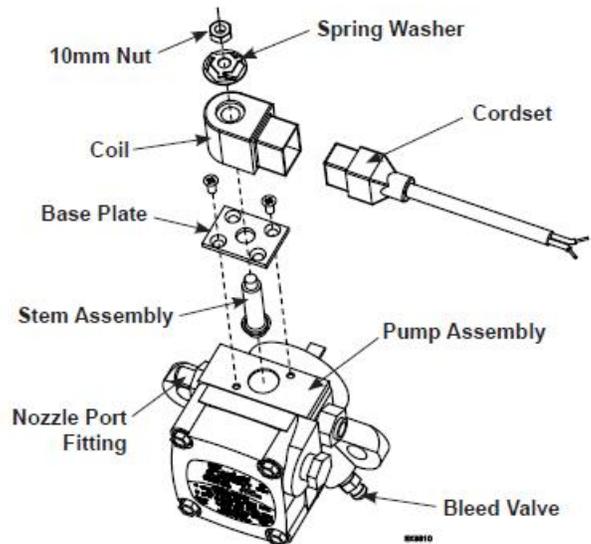
1. Check the operating pressure by removing the copper tubing from the nozzle line and installing a pressure gauge in the line. With the motor running and the coil energized, check the gauge. The pressure should read 100 psig unless otherwise stated. If the burner is not firing it should have a standby pressure between 40-60 PSI
2. To check the cutoff function, deadhead the pressure gauge onto the copper connector tube attached to the nozzle port. Run the burner for a short period of time. Shut the burner off; the pressure should drop and hold.

To replace the coil and/or pump assembly perform the following steps.

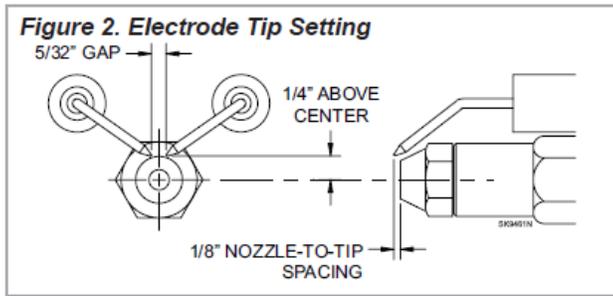
1. Before servicing, turn off and/or disconnect all power to the burner.
2. Remove the copper tube assembly when replacing the pump or when removing the coil and the tube blocks the coil.
3. Using a flat tip screwdriver, press the flat tip into the spring washer to prevent it from rotating. If nut is corroded you may need to use a hacksaw to cut a small straight groove into the top of the stem to be able to use a screw driver to remove the jam nut. This will not damage the stem.
4. Using a 10mm wrench or adjustable wrench, remove the nut and spring washer. Pay close attention not to damage spring washer as it not a replacement part.
5. Remove the coil by lifting it straight up. Remove the two base plate screws, (requires special **Philips bit part number P1000000**) then the base plate by lifting straight up.
6. Remove valve stem assembly by pulling straight up. Check for debris in stem seat
7. You can shake stem to listen for plunger movement inside of stem.
8. To install the new stem and coil assemblies, follow the above steps in reverse order, tightening each part as you go.
9. Restore power, start the burner and perform the combustion test described previously in this manual.

Cord Set

Replace cord set if you have no signal to coil. Check signal from primary controller to have power on purple/violet wire. If primary control has output then corset is bad. If no signal from primary control see primary control trouble shooting.



Electrodes



Check/Adjust Electrodes

Check the electrode tip settings. Adjust if necessary to comply with the dimensions shown in **Figure 2**. To adjust, loosen the electrode clamp screw and slide/rotate electrodes as necessary. Securely tighten the clamp screw when finished.

Igniter Maintenance

The igniter assembly does not require any adjustments beyond making sure the springs and the burner electrode rods make solid contact when the igniter is in the closed position. The sealing surfaces of the gaskets should be checked and replaced at the first signs of any damage or deterioration. Clean any dirt or residue from the porcelain bushings, springs, and baseplate.

The simplest way to check igniter operation is by supplying voltage to the input and checking to see whether an arc is produced. Check by either looking or listening to see if there is an arc across the electrodes while the burner is running and the igniter is energized.

The igniter must be grounded to the burner before checking the following. To check the igniter, ensure all power to the burner is off and use an ohmmeter to check the resistance between the two springs. The meter should read between 480 - 580 ohm.

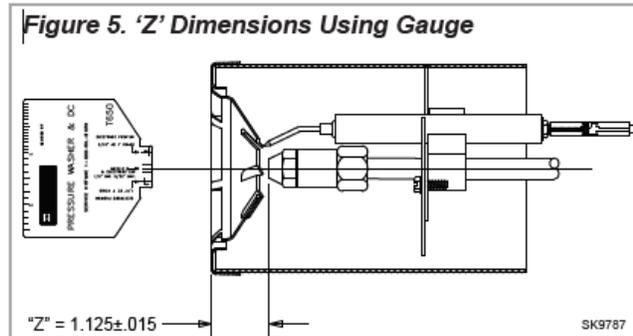
The igniter should be replaced if the meter indicates an open circuit, or the spring-to-spring resistance exceeds the 480 - 580 ohm range by more than 10%.

Check/Adjust "Z" Dimension

Refer to **Figure 5**. The critical "Z" dimension is the distance from the face of the nozzle to the flat face of the head. This distance for F heads is 1-1/8". The "Z" dimension is factory set for burners shipped with the air tube installed but should always be verified during service and installation. If the "Z" dimension is out of adjustment, perform the following steps.

Before proceeding, turn off power to the burner.

1. Disconnect the oil connector tube from the nozzle line.
2. Referring to **Figure 4**, loosen the splined nut from the nozzle line. Loosen the hex head screw securing the escutcheon plate to the burner housing.
3. A Beckett T650 gauge should be used to set the Z dimension.
4. Place the end of a ruler at the face of the nozzle and, using a straight edge across the head, measure the distance to the face of the head.
5. Slide the nozzle line forward or back until this dimension for F heads is 1-1/8".
6. Tighten the hex head screw to secure the escutcheon plate to the burner chassis. Then tighten the splined nut and attach the oil connector tube.
7. Recheck the "Z" dimension periodically when servicing to ensure the escutcheon plate has not shifted. You will need to reset the "Z" dimension if you replace the air tube or nozzle line assembly.



Servicing Nozzle Line Assembly

Before proceeding, turn off power to the burner.

1. Disconnect the oil connector tube from the nozzle line.
2. Referring to **Figure 4**, loosen the two screws securing the igniter retaining clips (**a**) and rotate both clips to release the igniter baseplate. Then tilt the igniter back on its hinge.
3. Remove the splined nut (**b**).
4. Remove the nozzle line assembly from the burner, being careful not to damage the electrodes or insulators while handling. To ease removal of short assemblies, it may be necessary to loosen the escutcheon plate (**c**). Reset to the edge of the label.
5. To replace the nozzle line assembly, reverse the above steps.



Electronic Oil Igniter

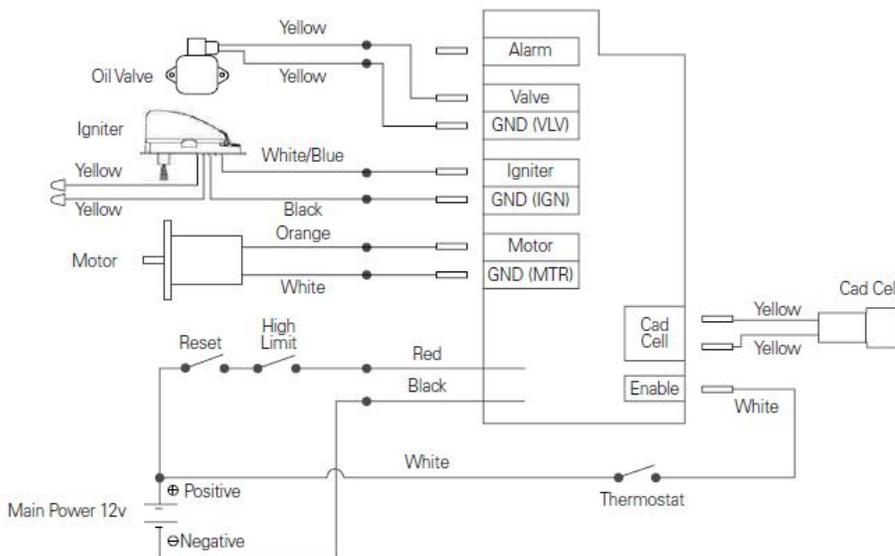
Installation Instructions:

1. Mount the assembled unit to the burner using the screws supplied.
2. Use "paint scraping" screws for all burners (2 at the hinge and 2 for non-hinged base plates). Tighten these screws securely to provide effective grounding to burner housing.
3. Verify the burner is properly connected to the negative battery terminal.
4. Install the cad cell. Carefully route the igniter input and cad cell leads to prevent them from being pinched during closing of the igniter at the hinge.
5. Wiring Igniter to GeniSys 12 Vdc Primary Control Carefully follow the control, or equipment manufacturer's wiring instructions and diagrams.
6. Fasten cad cell leads to control CAD CELL spade terminals.
7. Attach the Black lead with insulated flag terminal to the primary control GND (IGN) spade terminal Negative.
8. Combine the Blue-White striped to the insulated flag terminal to the primary control IGNITER spade terminal.
9. The Yellow leads from the igniter will NOT be used and shall be wire nuted INDIVIDUALLY and placed in the housing wiring compartment.
10. Verify the igniter secondary output/spring terminals are correctly arranged to make good electrical contact with the oil burner electrodes.
11. Close the igniter. Install and securely tighten the two front base plate retaining screws (4 screws, if no hinge).
12. Reconnect electric power to the burner circuit.
13. Verify with instruments that the burner is adjusted to the manufacturer's recommended settings.
14. Cycle the burner several times to verify prompt and smooth ignition. Verify proper operating and limit control operation before leaving



Electrical shock can cause severe personal injury or death.

- Disconnect all electrical power to the burner before servicing. More than one disconnect switch may be in the supply circuit.
- Installation and service must only be performed by a qualified service technician.
- Remove all jewelry, such as rings and watches before servicing.
- Provide ground wiring to the burner, metal control enclosures and accessories. (This may also be required to aid proper control system operation).



Wires are to be sized to prevent a voltage drop between the battery and the burner with the burner running at full load.

2. Fuse Sizes (inside control) 30 Amp. = Motor.
10 Amp = Igniter, Control, Valve, & Alarm.

3. Hard-wire burner ground to battery. Do NOT use chassis ground system.

4. Input power to the control's +12 Volt wire shall be provided from a fused service switch, rated at 50 amps or less.

5. Motor-off delay on a 7556P will be disabled if the safety and operating limits interrupt power to the control's red +12 Volt wire.

6. Do not wire power directly to the burner motor. Always wire the motor to the primary control "motor" terminals. If instant burner heat is required by the application, purchase or program

a control with a long motor-off delay time, which will ensure instant heat if a new call for heat is received within the motor-off delay time.

7. Igniter Yellow leads are capped and not used. Bundle with the other leads in the wiring box with a cable tie.

8. The igniter Blue-White striped attached to the primary control igniter spade terminal.

TROUBLE SHOOTING

Diesel Burner

Photo Eye/ Cad Cell

The cadmium sulfide cell, or cad cell, is part of the primary control system and is used to sense the presence of the oil burner flame. The cad cell assembly consists of the actual cell, a holder, and cord to connect the cell to the primary control. This detector is mounted in the air tube of the burner in such a way as to sight the flame.

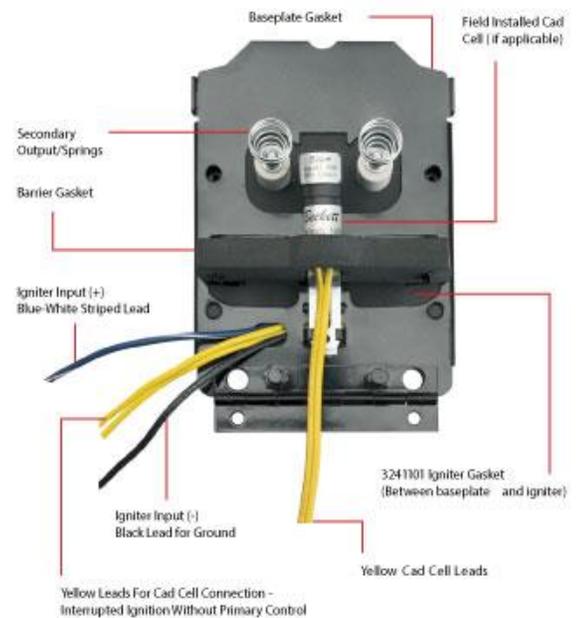
For a properly adjusted burner, during operation, the cad cell resistance should be approximately 300-1000 ohms, but not more than 1600 ohms. A resistance above 1600 ohms signals a problem that should be corrected.

NOTE: The Photo Electric Eye can be bench tested for proper operation using an ohm meter. Assure the lens of the Photo Electric Eye is clean prior to testing.

1. Block off all light to the Photo Electric Eye. Test across the yellow leads with your ohm meter; you should get an infinite resistance reading (a lot of resistance).
2. Point the Photo Electric Eye at a light source, the brighter the light, the less resistance your ohm meter will show. **CAUTION:** Replace the Photo Electric Eye if it does not respond in this way.

Troubleshooting

To understand how to troubleshoot the cad cell, it is important to first know how the control operates. Initially, the control must have a high resistance across its F-F terminals (cad cell does not sense visible light) before it will attempt to start the burner. If the cad cell senses light or is shorted, the relay in the primary control will not pull in to start the burner. Once the burner is running and the flame is established, the cad cell must have a low resistance (cad cell sensing flame) to keep the primary control from locking out on safety.

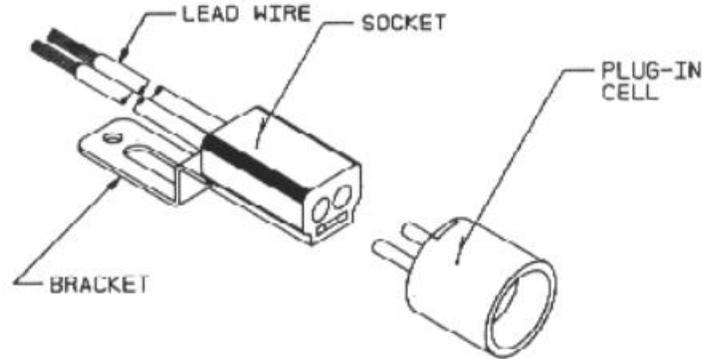


OHMMETER READING	CAUSE	ACTION
Less than 1600 ohms but not zero.	Cad cell operating properly.	None
Above 1600 ohms but not infinite	Defective or dirty cad cell, misaligned sighting of flame, or improper flame adjustment.	Clean cad cell and check for proper sighting of flame. Check for proper flame adjustment. If cell is defective then replace.
Infinite resistance. (0)	Open circuit.	Check for broken cell, holder, or wire. Loose cad cell in holder. If defective, replace necessary parts.

Photo Eye/ Cad Cell

Symptom #1

What if the burner will not start and the cad cell is suspected? The procedure for solving this problem would be first to make sure the thermostat is calling for heat and that there is line voltage to the control. Then remove one lead of the cad cell from the F-F terminals. If the burner starts, this suggests that the cad cell is either seeing external light inside the housing, cad cell wires are pinched, the assembly is shorted, or the cell is defective. You may need to shield the cell from external light, repair pinched wires, or put in a new cad cell.



Symptom #2

What if the burner starts but locks out and the cad cell is suspected? This symptom initially shows that the control did see the high resistance necessary to start the burner. However, during the lock-out timing period, it did not sense the low resistance on the cad cell necessary to keep the burner running. As stated earlier, the control must have no more than 1600 ohms of resistance to prevent random lock-out.

To troubleshoot this problem, start the burner and before the safety lock-out timing period ends, disconnect the cad cell wires from the F-F terminals on the control. Next, jumper the F-F terminals with a piece of wire or use a 1500 ohm resistor. This will allow the burner to continue running so that you will be able to check the cad cell resistance during the run cycle. If you did not get the F-F terminals on the control jumpered before the burner locked out, wait 3-5 minutes before attempting this again. With the burner running, connect the ohmmeter across the cad cell leads. Use the chart above and the resistance you measure on the cad cell to find the cause and the appropriate action recommended for solving the problem.

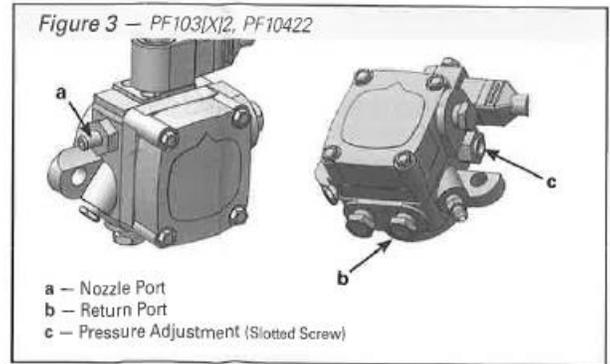
The cad cell control system has proven to be extremely reliable in our industry. This brief technical discussion should help you become more familiar with its operation and application. Remember, if it is installed so that it can sight the flame properly, is tightly secured, and is kept clean, you can expect to have years of uninterrupted service.

Fuel Pump

Configure Pump Before Installation

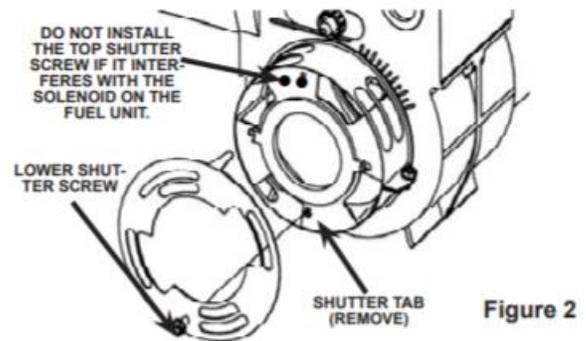
1. 1-pipe operation: Remove the hex plug from the desired inlet port with 5/8" or 1/4" allen and discard. Connect inlet piping to the 1/4" NPT fitting using the appropriate sealant. Do not use Teflon tape or compression fittings
2. 2-pipe Operation (return line) The return port is only used for 2 pipe operation. For 2 pipe operation a by-pass plug will need to be installed.

Clean-cut (figure 3) Remove the return port 5/8" hex plug and discard. Install bypass plug set screw with a 5/32" Allen wrench in the return port and tighten. Connect the return piping to the return port using appropriate sealant. Make sure no valves are placed in the return line. Do not use Teflon tape or compression fittings.\



MOUNTING PUMP (If the shutter screw interferes with the solenoid on the fuel unit)

To install a CleanCut fuel unit on chassis with existing shutter tab see Figure 2 and follow these steps: Remove existing fuel unit and solenoid valves, if applicable, and appropriately dispose of them. Note the air setting of the shutter, then remove the air shutter, set the shutter aside to be reinstalled.



Bleeding the Pump

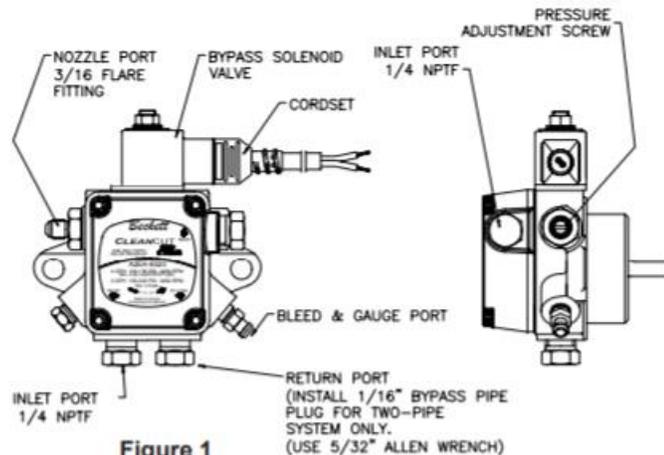
1. Open all fuel valve and inspect for line leaks.
2. One pipe systems require a manual bleeding process. Two pipe systems "bleed automatically but the bleeding process and be accelerated with the manual process.
3. All fuel line must be air tight with no leaks or the burner performance will be impacted. With poor combustion rumbles and pulsations may occur.
4. For Accelerated bleeding oil system.
 - a. Place hose on bleed port and position a catch can underneath.
 - b. Open 3/8" hex head on port and turn counter clockwise 1/2 –1 full turn and allow the oil to flow into the catch can.
 - c. Apply power to burner (turn on switch) the oil will start to flow.
 - d. Allow the oil to flow for 15 seconds in can until there is no sign of foam or air bubbles. If sign of air remain make sure all air is purged from fuel filter and repeat process until no air is present. You may have to turn the power switch off and then on to recycle the burner.
 - e. Tighten the 3/8" hex bleed port clock wise.

Fuel Pump

Adjusting the Pump Pressure

1. Install Pressure gauge in the gauge port. (most modern Stepp units come with gauge installed)
2. Set the pump pressure per the unit specific burner set up.
3. Turn the adjustment screw clock wise to increase and counter clockwise to decrease pressure.
4. Standby pressure (when burner is not firing) should be between 40-60 PSI.
5. Operating Pressure should be between 100-120 PSI *See Burner Set up page

Note: Minor adjustments to fuel pressure up or down may be required to get burner smoothly. See Start Up Burner & Set Combustion page for further details.



Fuel Nozzle Replacement

Remove burner from machine.

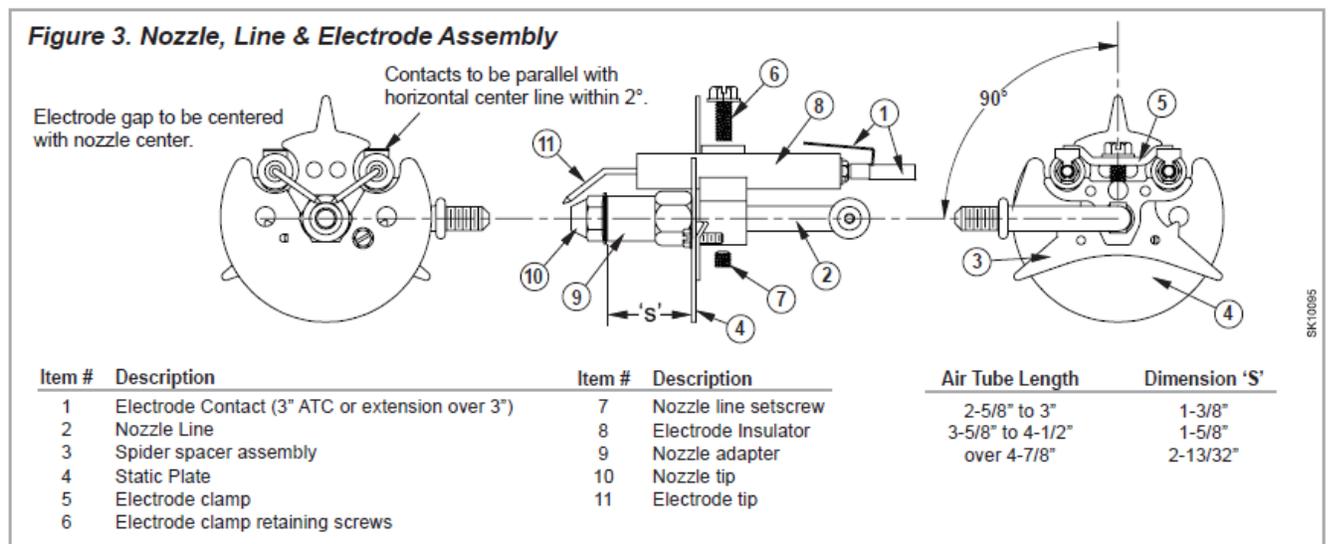
Remove Burner Tube assembly to expose electrode / nozzle assembly

using a 5/8" inch wrench remove nozzle. Make sure not to damage electrodes or insulators.

Install new nozzle

Reinstall burner tube and install burner onto machine

You can also remove the nozzle electrode assembly through the top of the burner without removing it from the machine. See Servicing Nozzle Line Assembly on page previous page.



CAUTION Use care when removing or installing an oil nozzle

A damaged nozzle could cause impaired combustion, sooting, puffback of hot gases, oil leakage and potential fire or asphyxiation hazards.

- Inspect the nozzle adapter to insure that the sealing surface is not grooved or scratched.
- To insure that the nozzle functions properly, check the orifice and strainer for dirt, scratches or other damage before installation.
- Do NOT attempt to install or remove a nozzle without securing the adapter to prevent seriously damaging the alignment.
- Use care when handling the nozzle line assembly to prevent changing the electrode tip settings or damaging the ceramic electrode insulators.
- Ensure that the electrode settings match the values shown in **Figure 2**.

WARNING Correct Nozzle and Flow Rate Required

Incorrect nozzles and flow rates could result in impaired combustion, under-firing, over-firing, sooting, puff-back of hot gases, smoke and potential fire or asphyxiation hazards.

Use only nozzles having the brand, flow rate (gph), spray angle and pattern specified by the appliance manufacturer.

Follow the appliance manufacturer's specifications for the required pump outlet pressure for the nozzle, since this affects the flow rate.

- Nozzle manufacturers calibrate nozzle flow rates at 100 psig.
- When pump pressures are higher than 100 psig, the actual nozzle flow rate will be greater than the gph stamped on the nozzle body. (Example: A 1.00 gph nozzle at 140 psig = 1.18 gph)

Securely tighten the nozzle (torque: 90 in. lbs). For typical nozzle flow rates at various pressures refer to **Table 3**.

Primary Controller Burner

The Beckett GeniSys™ 12V Advanced Burner Control is a 12 Vdc primary safety control for oil burners used in special applications including, but not limited to, water heaters, pressure washers, crack sealers and portable heaters having firing rates less than 5.5 GPH. The GeniSys™ 12V is used with a suitable cad cell flame sensor to control the oil burner motor, igniter, and optional solenoid valve. It has 12 volt enable input compatible with mechanical and high limit switches. It can provide interrupted or intermittent duty ignition, and it has a 15 second lockout time on flame failure.

Maintain Specified Voltage

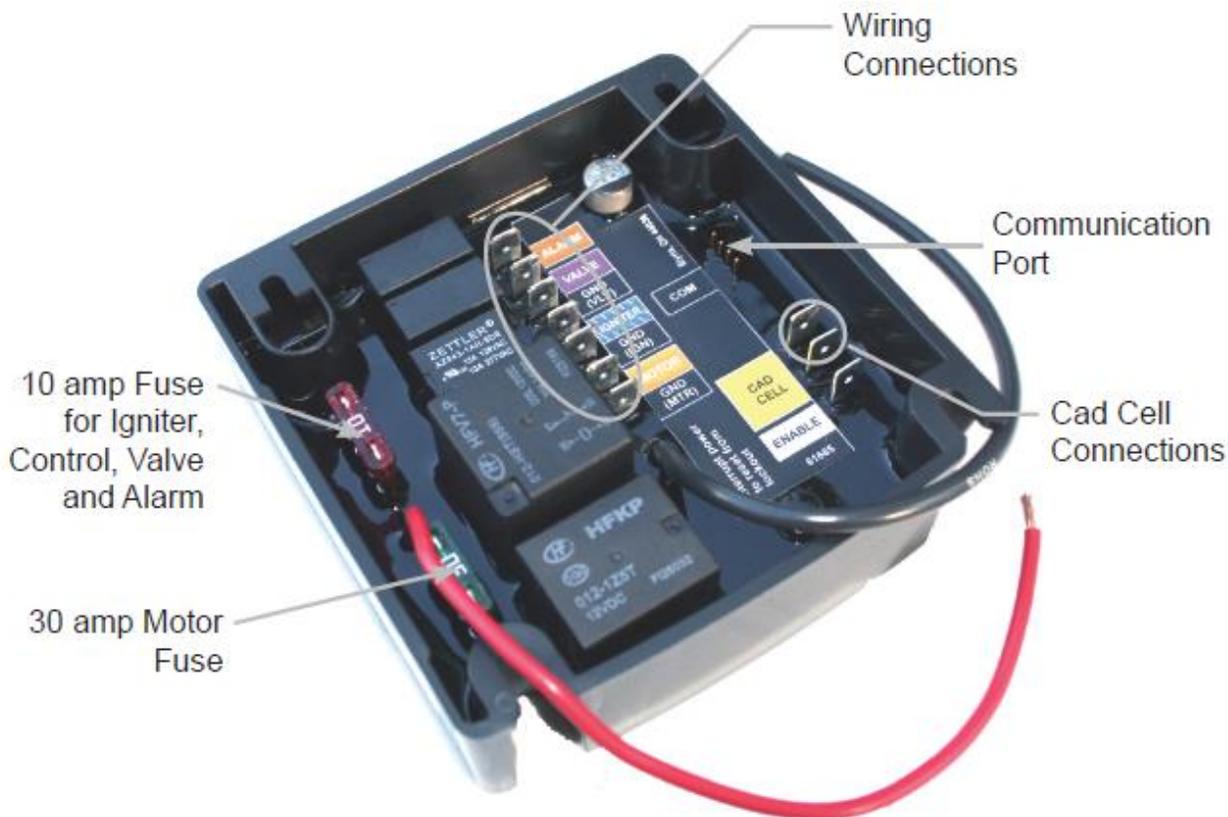
A low or erratic power supply could result in impaired burner operation, severe delayed ignition or an explosion inside the heat exchanger resulting in a burn and/or asphyxiation hazard.

Beckett DC Burners require a continuous supply of 11 to 16 volts DC (at 15 amps for Model ADC), measured at the burner during operation.

Special Note: The 7556 Control shuts the burner down if the input voltage drops to a sustained level of 10 volts DC, or below.

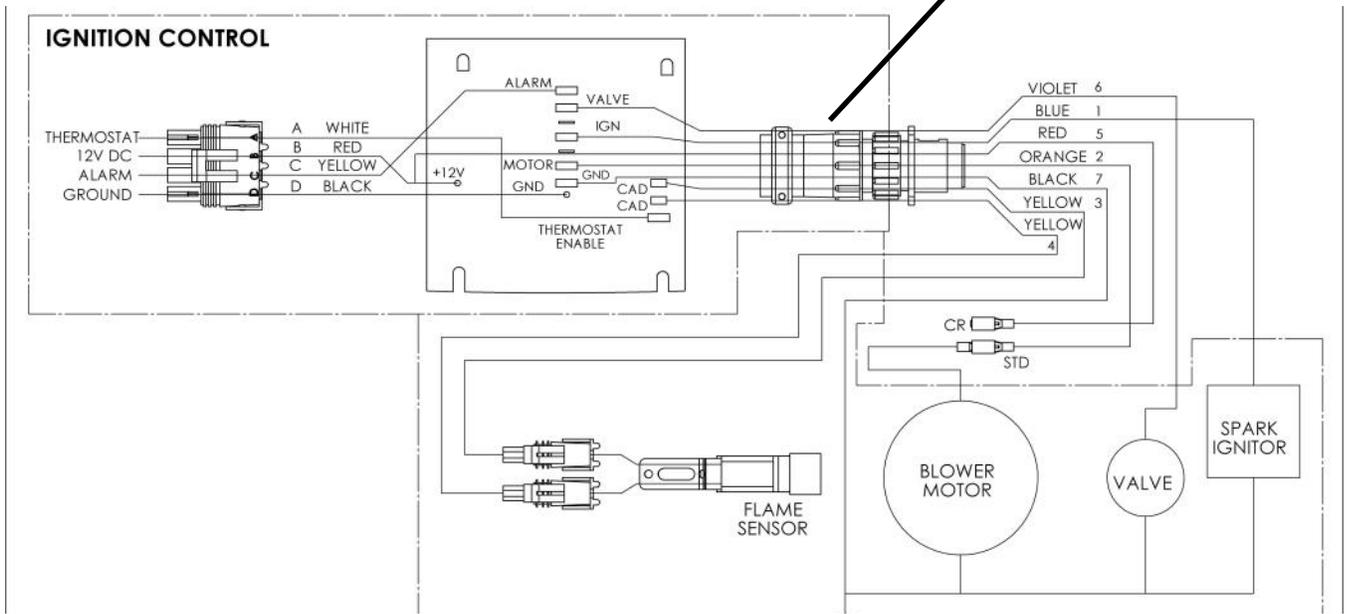
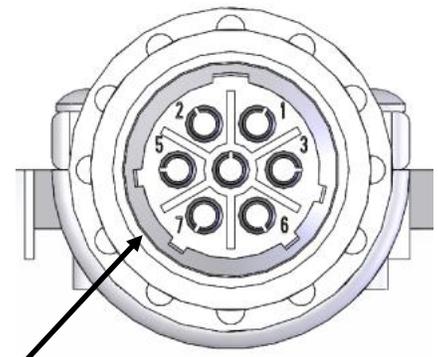
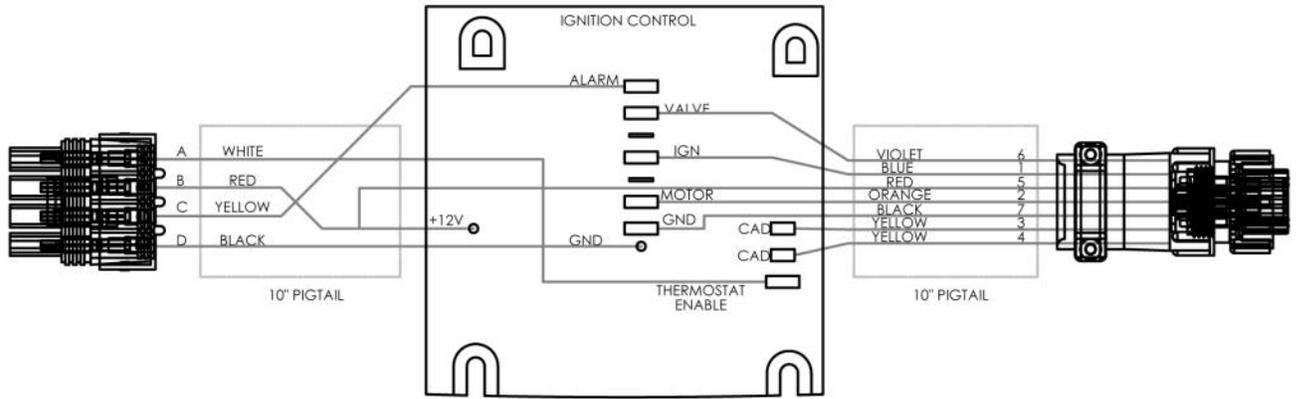
Operation resumes at a sustained input voltage of 11 volts DC, or above.

An automotive or small engine charging system that is capable of supplying the required continuous voltage/ampereage is recommended with certain road equipment, such as asphalt hot patchers and similar applications. This is especially true while maintaining nominal load temperatures during idle periods.



Primary Controller Burner

A1000821 6 REMOTE IGNITION CONTROLLER WITH LABEL
USED WITH OR WITHOUT CONTINUOUS RUN



Primary Controller Burner

WARNING: Fire Hazard

Reset and Service by Qualified Technician only

Startup / Checkout

If the burner or control fails any of the following tests, recheck control wiring. If the burner or control still fails any tests, replace the control.

Starting the System

1. Open the shut-off valve(s), if applicable, in the supply line from the fuel tank.
2. Adjust the thermostat to call for heat.
3. If the pump has not been primed, refer to “*Priming the Pump*” in this manual.
4. Monitor burner operation to insure that the burner ignites.
5. End the call for heat by turning the thermostat(s) to the lowest setting
6. Verify that the burner turns off before leaving .

Check Safety Features

Safe Start Check

1. Place a jumper across the cad cell terminals.
2. Refer to the steps for “*Starting the System*” and have the system call for heat.
3. Burner must not start. Verify that the control remains in Standby mode.
4. End the call for heat and remove the cad cell jumper.

Simulate Flame Failure and Ignition Failure

1. Refer to the steps for “*Starting the System*” and have the system call for heat.
2. After flame is established and the burner igniter turns off (if wired for interrupted ignition), simulate flame failure by pulling the cord set out of the solenoid valve.
3. At flame loss, the control will enter Relight mode. The control will immediately turn the igniter on.
4. After the 15 second lockout time, the control will lock out the burner. Verify that the burner motor and igniter are off and that the burner oil solenoid valve is not energized.
5. Push the cord set back in.

Sequence of Operation

Burner States

Standby: The burner is idle, waiting for a call for heat.

Valve-On Delay: The igniter and motor are on while the control delays turning on the oil solenoid valve for the programmed time. **15 Seconds**

Trial For Ignition: The oil solenoid valve is energized. A flame should be established within the factory set trial for ignition time (“lockout time”). **15 Seconds**

Lockout: The control has shut down for one of the following safety reasons:

- A. The trial for ignition (lockout) time expired without flame being established.
- B. The cad cell detected flame at the end of the Valve On Delay state.
- C. The pre-set time allotment for relighting is exceeded.
- D. Failed welded relay check.

If the control detects a welded motor contact, the motor only will cycle 5 seconds on, 5 seconds off, 3 times before locking out.

To reset the control from lockout turn off the power switch or turn off engine control switch for at least 2 seconds.

Primary Controller Burner

Ignition Carryover: Once flame is established, the igniter remains on for 10 additional seconds to ensure flame stability.

Run: The flame is sustained until the call for heat is satisfied. The control then switches to Motor-Off Delay, if applicable, or it shuts down and returns to Standby.

Relight: If the flame is lost while the burner is firing, the control immediately repeats the ignition sequence. The control will continue to relight each time the flame is lost, until it reaches a pre-set time allotment. The control will then go into Lockout instead of Relight. This feature prevents excessive accumulation of oil in the equipment's combustion chamber.

Motor-Off Delay: If applicable, the oil solenoid valve is turned off and the control delays turning the motor off for the set motor-off delay time before the control returns to standby. Note that to utilize the motor off delay, power must remain to the red wire after the call for heat ends.

Priming the Pump/ Bleeding the Burner

WARNINGS

Hot Gas Puff-Back & Heavy Smoke Hazard

Failure to bleed the pump properly could result in unstable combustion, hot gas puff-back and heavy smoke.

- Do not allow oil to spray into a hot combustion chamber while bleeding air from the pump.
 - Install a gauge in the nozzle discharge port tubing or fully open the pump bleed valve to prevent oil spray from accumulating in the combustion chamber during the air bleed procedure.
 - Insure that all bubbles and froth are purged from the oil supply system before tightening the pump bleed valve.
 - Insure that the equipment is free of oil and oil vapor before starting or resetting the burner
1. Prepare the burner for priming by attaching a clear plastic hose over the bleed port fitting and fully opening the pump bleed port.
 2. Use a suitable container to collect purged oil. Initiate a call for heat.
 3. Bleed the pump until all froth and bubbles are purged. You may have to cycle the power switch multiple time to clear all air in the system.
 4. If desired, terminate the call for heat to return to Standby. If prime is not established during the valve on delay and the trial for ignition times, repeat Step 3 until the pump is fully primed and the oil is free of bubbles.
 5. Terminate the call for heat, and the control will resume normal operation.

Primary Controller Burner

Resetting From Lockout

WARNINGS Fire & Smoke Hazard

Before starting or resetting the control from lockout state, troubleshoot the heating system for the root cause (s) of the lockout.

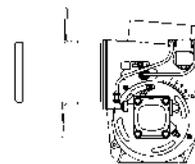
1. Make necessary repairs or adjustment to ensure a safe start condition.
2. Insure that the equipment is free of oil and oil vapors before starting or resetting the burner.
3. To reset, interrupt power for at least 2 seconds.
4. Always verify the control functions according to all specifications before leaving the installation site.
5. Replace the control if it does not operate as specified.

NOTES

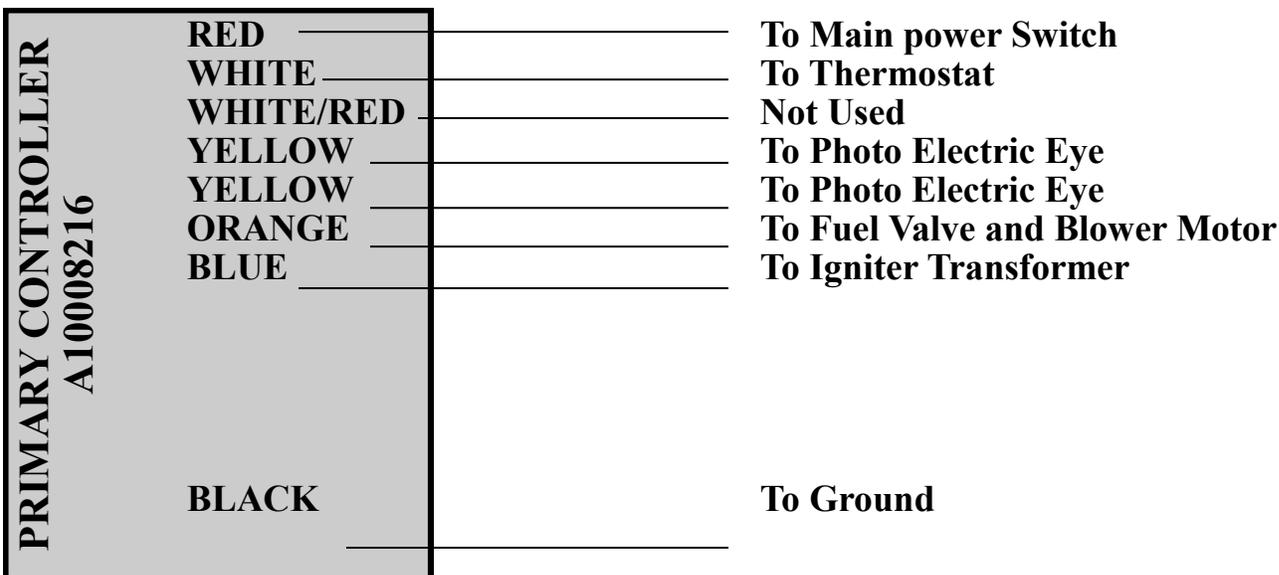
- Inspect the exterior of the control.
- Replace the control if there is any sign of impact damage.
- Use a multi meter to test the input voltage at the control.
- It should read 11 to 16 Vdc.
- Inspect all external wiring for secure connections and verify insulation integrity.
- Verify the control lockout and operation sequence, (Reference Startup/Checkout section).
- Observe a full operating cycle to prove the sequence and timings are correct.
- Replace any control that does not meet listed specifications.
- Always replace with the parts specified by the equipment manufacturer.
- Replace a blown fuse with an equivalent fast-acting automotive blade style fuse

Primary Controller Burner

NOTE: *The primary controller can be bench tested for proper operation using an automotive type, 12 volt battery as a power source. Refer to the wiring schematics for wire identification.*



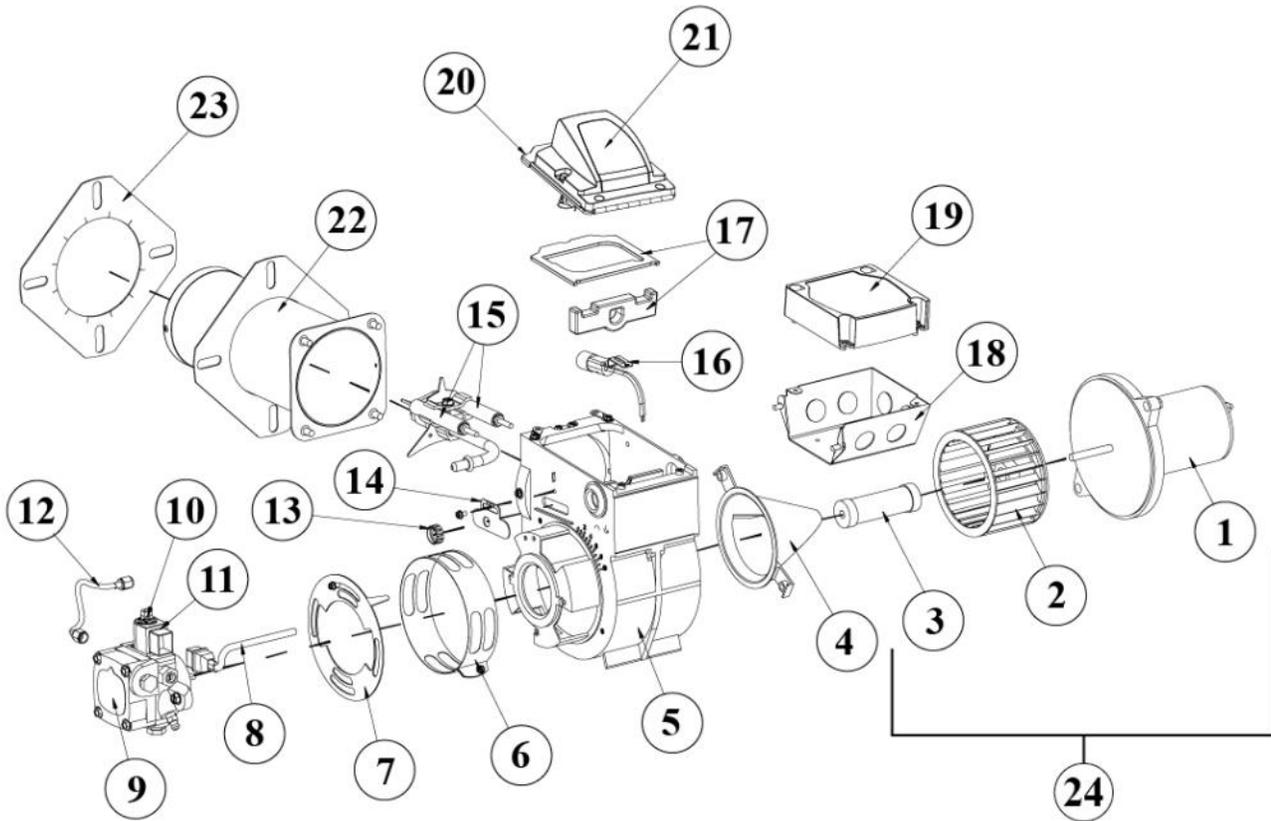
1. Remove controller from burner.
2. Using two test lights, or volt meters, connect one to the blue wire, and one to the white/orange wire of the controller. Connect the black leads of your test instruments to the negative (-) terminal of the battery.
3. Connect the black wire from the controller to the negative (-) terminal of the battery.
4. Connect the red, white/red, and the white wires together, then connect these three wires to battery (+) terminal. Both test instruments should show voltage for approximately 15 seconds. After 15 seconds, the controller should "lock out" and no voltage will be present.
5. Repeat step #4, only this time connect the two yellow wires from the controller together three seconds after applying power to the three wires of the controller. (This simulates the controller receiving a "flame" signal from the photo electric eye). The white/orange wire should show voltage as long as the controller is hooked to the battery. The blue wire should only show voltage for about 15 seconds. Replace the controller if it fails any of these tests.



REPLACEMENT PARTS

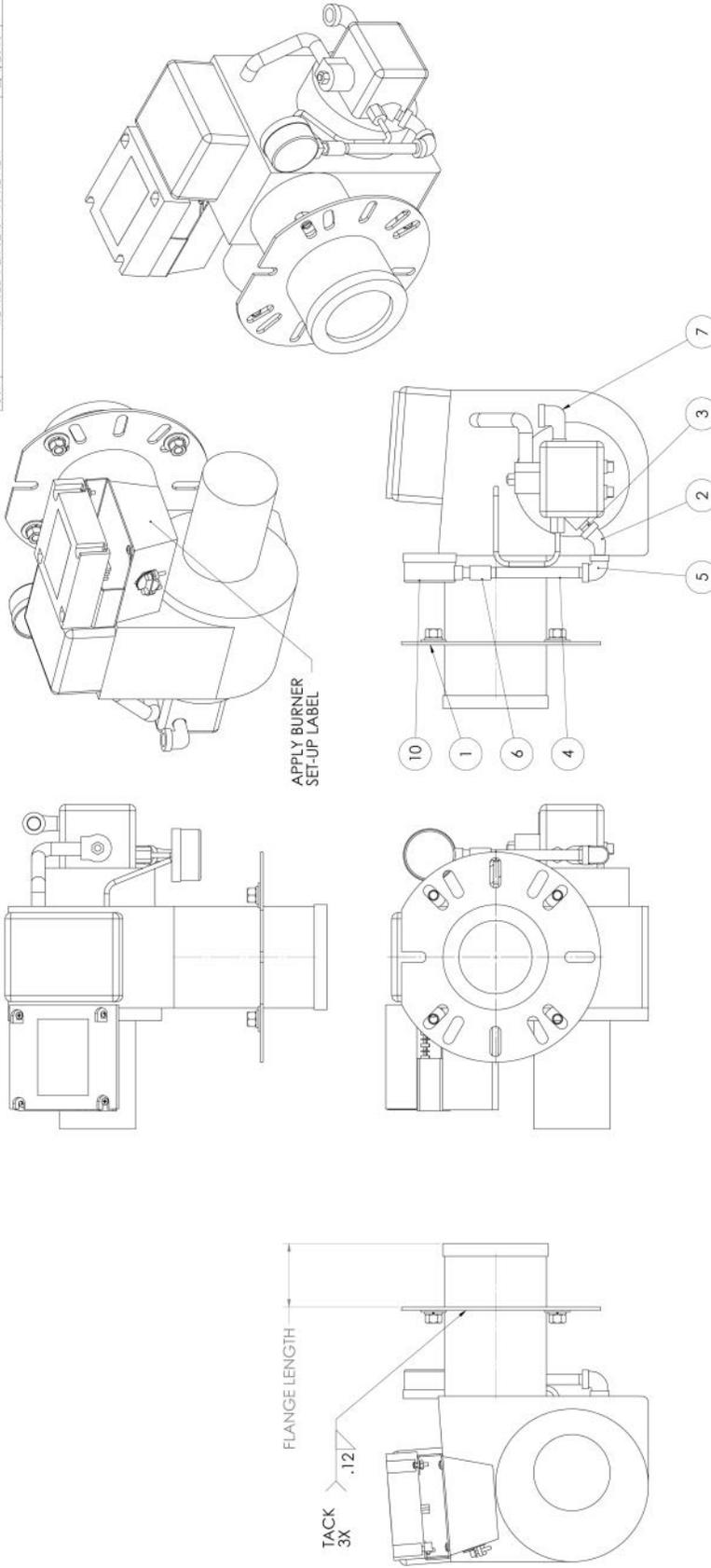
REPLACEMENT PARTS

Diesel Burner



ITEM	QTY	DESCRIPTION	PART#
1	1	Motor, blower	509092
2	1	Blower Fan Wheel	509069
3	1	Coupling, pump to motor.....	509086
4	1	Air Tube	509066
5	1	Burner Housing	P10015946
6	1	Air Band	Call
7	1	Air Shutter	Call
8	1	Cord Set.....	P10015940
9	1	Pump.....	509109
10	1	Valve Stem	P10015922
11	1	12 Volt Coil.....	P10015920
12	1	8" Copper Tubing.....	P10015921
13	1	Escutcheon Plate Spline Nut.....	Call
14	1	Escutcheon Plate.....	Call
15	1	Electrode and Fuel Line assembly	509112
	1	Electrode only.....	509089
16	1	Cad Cell	A10008216
17	1	Igniter Gasket Kit	P10015548
18	1	4x4 Wiring Box kit.....	Call
19	1	Primary Control	A10008216
20	1	Igniter Assembly With Base Plate	509087
21	1	Igniter Only	N/A
22	1	Air Tube Assembly	509070
23	1	Flange Mounting Gasket	509111
	1	Flange with Gasket.....	509071
24	1	Motor Kit with Blower Wheel and Coupling	509092
25	1	Complete Burner Assembly of OJK 75 and 125	A10008105-005

REV.	DESCRIPTION	DATE	APPR
B03	CHANGED GAUGE FITTINGS	9/25/2013	
B04	REVISED AND REDRAWN	1/9/2015	
B07	REVISED PER 02-04-15 REVIEW	2/4/2015	



**NOTE: USE BURNER SET-UP SHEET A10008105-005
TEST AFTER ASSEMBLY**

ITEM NO.	PartNo	Description-1	Description-2
10	P10012560	PRESSURE GAUGE	0-200 PSI
9	P10005132	F - 1/2 FUEL RETURN HEAD	BECKETT MODEL ADC DIESEL BURNER
8	P10005125	1.50 GPH BURNER NOZZLE	DIESEL BECKETT MODEL ADC BURNER
7	P10001539-002	ELL - ST - 90°	1/4 NPT
6	P10001520-001	COUPLING - FULL STANDARD	1/8"
5	P10001465-001	ELBOW - BLK 90°	1/8"
4	P10001298-007	PIPE NIPPLE - SCH.40	1/8 x 4
3	P10001298-001	PIPE NIPPLE - SCH.40	1/8 x CLOSE
2	P10001048-001	ELBOW - ST - 45°	1/8 NPT
1	A10008215	BURNER BASE UNIT ASSY CPC	BURNER BASE UNIT ASSY
ITEM NO.	-005/QTY.	PartNo	Description-1
			Description-2

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BURNER ASSY
 CLK 75 & 125
 FROM A10008105-005 B07

ROUTINGS
 ASSEMBLY GC
 WEIGHT: 23.54
 DO NOT SCALE DRAWING
 SHEET 1 OF 2