SAFETY

Read manual before installing or using product. Failure to follow instructions and safety precautions in manual can result in death or serious injury. Keep manual in a safe location for future reference.

On safety decals, this symbol and the signal words Danger, Warning, Caution and Notice draw your attention to important instructions regarding safety. They indicate potential hazards and levels of intensity.

DANGER RED - **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING ORANGE - **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION YELLOW - **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE BLUE - **NOTICE** alerts you to practices unrelated to personal injury, such as messages related to property damage.

IMPORTANT: To prevent death or serious injury to you or your family, it is essential that safety decals are clearly visible, in good condition, and applied to the appropriate equipment.

FOLLOW MANUAL & SAFETY DECAL MESSAGES

Carefully read this manual and all safety decals on your equipment. Safety decals must be kept in good condition. Replace missing or damaged safety decals by contacting Sukup Manufacturing Co. via mail at PO Box 677, Sheffield, Iowa USA, 50475; by phone at 641-892-4222; or by e-mail at info@sukup.com.

It is the responsibility of the owner/operator to know what specific requirements, precautions, and work hazards exist. It is also the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of hazards and safety precautions that need to be taken to avoid personal injury or death. Always keep children away from bins and vehicles with flowing grain.

Make no unauthorized modifications to machine. Modifications may endanger function and/or safety of unit. Keep unit in good working condition. Repair and/or replace worn parts.

Keep shields in place. Replace worn or missing shields free of charge by contacting Sukup Manufacturing Co.

GRAIN BIN SAFETY

Owners/operators are responsible for developing site-specific confined space entry procedures. OSHA's confined space entry procedures (29CFR 1910.146) can be found at www.osha.gov.

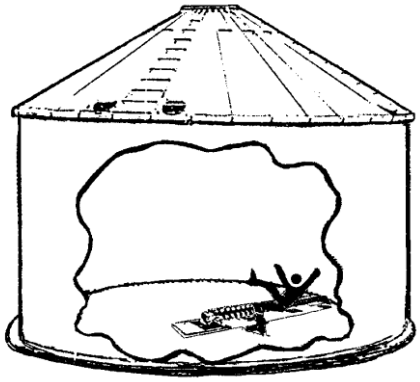
If you must enter bin for repair or maintenance:

- Use a safety harness, safety line and respirator
- Station another person outside of bin
- Avoid the center of the bin
- Wear appropriate personal protective equipment
- Keep clear of all augers and moving parts

DANGER: Never enter bin unless all power is locked out and another person is present.

Rotating augers can kill or dismember!

NEVER enter bin when augers are running!
When bin is nearly empty, sweep auger will travel at an increasingly fast speed. Keep away from sweep and sump augers to avoid entanglement.



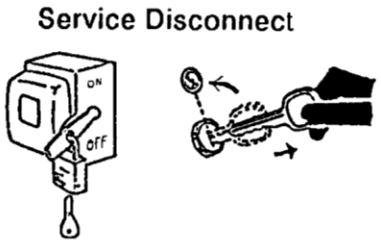
Failure to follow precautions above will result in serious injury or death.

DANGER: Flowing grain may trap and suffocate. If you enter a bin of flowing grain you can be completely submerged in grain in about 8 seconds.

Failure to heed this warning will result in serious injury or death.

To avoid electric shock or electrocution, all equipment must be properly wired and grounded according to electrical codes. Have unit wired by qualified electrician.

Have an electrician install a main power disconnect switch capable of being locked only in OFF position. Mark disconnect clearly as to equipment it operates. Always lock out main power disconnect switch whenever equipment is not in use.



WARNING: Heater must be electrically interlocked with fan. When this is not possible, an air switch kit needs to be added to heater.

NEVER operate heater without airflow.

Failure to heed these precautions may cause a fire, resulting in death or serious injury.

WARNING: When servicing equipment, never enter bin unless all power is locked out and another person is present. Always LOCK OUT all power and always check with voltage meter before servicing.

Failure to do so could result in death or serious injury.

NOTE: Refer to OSHA's typical minimal lockout procedures (29CFR 1910.147 App A) at www.osha.gov to establish a written plan for your work site.

Frequently inspect all mechanical and electrical components. Ensure all electrical wires are in good condition.

WARNING: KEEP CLEAR OF ALL MOVING PARTS.

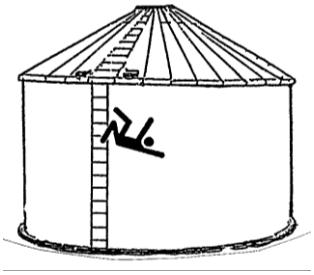
Keep people (ESPECIALLY YOUTH) away from equipment, particularly during operation.

Keep away from all moving parts. Keep all shields in place. SHUT OFF AND LOCK OUT all power before servicing. Keep inlet guard in place and in good working condition.

If fan is used for suction (not recommended), outlet must be shielded to protect from injury from moving parts.

Failure to follow precautions above could result in death or serious injury.

WARNING: Metal is slippery when wet. To avoid falls, never carry items if climbing on bin. Maintain secure hand and foothold if climbing on bin. Failure to do so could result in death or serious injury.



CAUTION: Metal edges are sharp. To avoid injury, wear protective clothing and handle equipment and parts with care.

Failure to do so may result in minor or moderate injury.

PERSONAL PROTECTIVE EQUIPMENT

Refer to OSHA 1910.132 (Personal Prot. Equip.)

Owners/Operators are responsible for developing site-specific personal protective equipment standards. OSHA's personal protective equipment standards (29CFR 1910.132) can be found at www.osha.gov.

WARNING:
PREVENT EXPLOSION OR FIRE

- Carefully review operators manual.
- Clean under floor; fines may cause a bin fire.
- Check for gas leaks. Spray soapy solution on piping and joints.
- Run fan at least a half minute before starting heater.
- NEVER start heater if you smell gas or hear a hissing sound.
- NEVER run heater with inspection door open.

- Check fan blade, hub and shaft for cracks. Replace immediately if cracks are visible.

Failure to heed these warnings may cause death or serious injury.

CAUTION:
Wear hearing protection when near Axial Fan.

Failure to do so may result in hearing loss.

EMERGENCIES – KNOW WHAT TO DO
Have emergency numbers and written directions to work site readily available in case of emergency. An area for emergency phone numbers to be recorded is provided below and at end of this manual.

Ambulance • Fire • Police: 9-1-1

Farm rescue team:_____

Local EMS team: _____

Address of work site: _____

Directions to work site:_____

Safety Decal Placement for Axial Fans & Heaters

Safety decals are mounted at factory when possible.

Yearly and prior to equipment use, check that all decals are in place according to these drawings and are legible. To order a replacement decal or shield free of charge, contact your dealer or Sukup Manufacturing. Co., P.O. Box 677, Sheffield, IA, USA 50475. Please specify component number.

IMPORTANT! If suggested locations are not clearly visible, place safety decals in a more suitable area. Never cover up any existing safety decals.

Make sure location for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position.

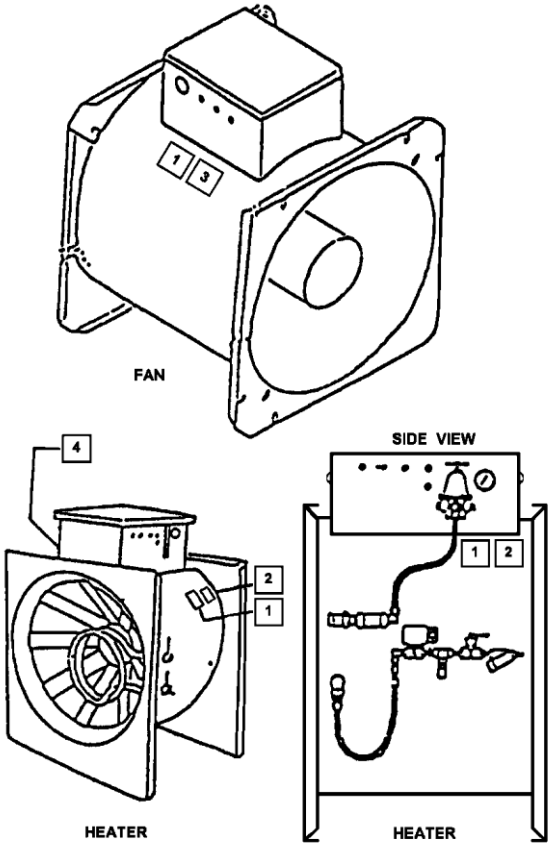
1. **DECAL L0281 – WARNING:** Follow general safety regulations.

2. **DECAL L0165 – WARNING:** Disconnect electricity; Bleed gas.

3. **DECAL L0166 – WARNING:** Keep guards and shields in place; Disconnect electricity; Check fan blade for tightness.

4. **DECAL L0204 – DANGER:** Do not operate with door removed.

Numbers on drawings below refer to location of safety decals listed on this page.



PROPANE FUEL SUPPLY INSTALLATION

Local gas supplier will install tank and proper tank fittings. Tell supplier whether vapor or liquid service is required. Vapor is drawn from top of tank. On vapor heaters, a manual shut-off valve and a 100-mesh gas strainer should be installed between heater pipe train and fuel supply line. Liquid is drawn from near bottom of tank.

Table 17 – LP tank size (gallons) for vapor withdrawal(1)

BTU/HR(2)	Lowest Average 24-hr Outdoor Temperature						
	32	20	10	0	-10	-20	-30
125,000	115	115	115	250	250	400	600
250,000	250	250	250	400	500	1000	1500
375,000	300	400	500	500	1000	1500	2500
500,000	400	500	750	1000	1200	2000	3500
750,000	750	1000	1500	2000	2500	4000	5000

Source: LP Gas Handbook of Technical Data (Fisher Controls Co.)

(1) Tank is assumed to be half full
(2) Average rate in 8 hr. period

For LP fuel line, use 5/8" OD Type K copper tubing or 1/2" schedule 80 black steel pipe. Use 3-5 ft. of flexible LP hose between fuel line and heater. Before connecting to heater, purge gas line to blow out any dirt in pipe. Connect LP vapor line to heater at regulator. See Detail A of Fig. 10. Connect liquid line to heater at Y strainer. See Detail B of Fig. 10.

NOTE: Vapor high limit with auto reset is located as shown below.
Vapor high limit with manual reset is on pipe train in control box.

IMPORTANT: After adjusting regulator, tighten nut below T-handle so no moisture gets in.

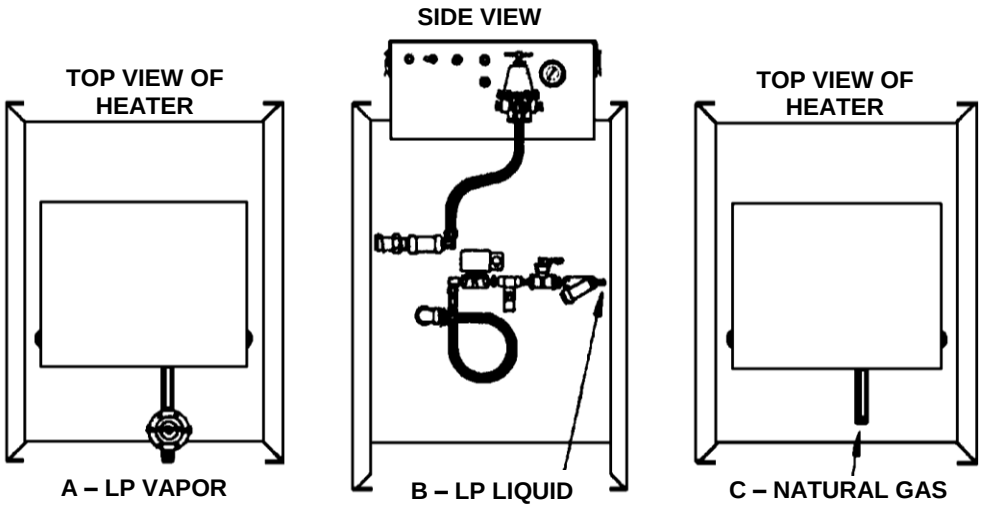


Fig. 10

NATURAL GAS FUEL SUPPLY INSTALLATION

Check with gas company to determine fuel line size. Gas company will install regulator on fuel line. Regulator not included with natural gas models. Install gate valve (not included) in fuel line near heater to control heat output. A 100-mesh gas strainer should be installed between heater pipe train and fuel supply line. See Detail C of Fig. 10.

SOLID STATE HEATER OPERATION

NOTE: Check piping before each use to ensure components are properly connected and in good working order.

1. **Heater Power Cord** must be hardwired into fan for safe operation. This interlocks the fan with heater, assuring fan will be on before the heater. Never operate the heater without airflow.
2. After heater is switched on, a 25-second purge delay will occur. Then the red light on control panel will come on, indicating power to solenoid valves and ignition transformer. This 25-second purge delay allows the fan to blow out any gas that may be in the bin.
3. After the purge delay, the solenoids will open and ignition should occur.
4. If flame is not detected within 10 seconds, the solid state board will "lockout." The purpose of this is to prevent raw gas from entering the bin. The circuit is reset by turning the toggle switch off for 2 seconds. (The only time the red light goes off is if lockout occurs.)
5. **Solenoid Valves** are electrically operated shut-off valves, opening when energized. A sharp snap will be heard when valves open. (An arrow on solenoid body indicates direction of gas flow.)
6. **Regulator** delivers a constant pressure to the burner. Turn handle clockwise to increase pressure. (Regulator ports are marked to indicate direction of fuel flow.)
7. **Spark Plug** relieves high voltage energy necessary to ignite fuel.
8. **Burner High Limit** is located inside the burner housing. It trips upon excessive heat in burner. It is reset with pencil from inside electrical box.
9. **Transition High Limit** detects high temperature in transition. Manually reset by depressing red reset button.
10. **Plenum Control** regulates drying temperature (See Plenum Control section.)

LP HEATER COMPONENTS

1. **Coiled vaporizer** converts liquid propane into vapor by using heat from burner. Upper hose should be warmer than lower hose. **IMPORTANT:** There should be no frost on regulator or on piping inside control box. Loosen bolts and adjust vaporizer closer to flame for warmer operation. See Step 9 on Page 27.
2. **Vapor high limit switch** shuts gas off if upper hose is too hot. Slide vaporizer out if very hot. Vapor high limit is open on temperature rise. Vapor high limit switch with red reset button must be manually reset if tripped. Vaporizer must be adjusted before operating. Loosen bolts and adjust vaporizer; approximately 8-9" downstream; 3-4" vane axial. Vaporizer pipe should be warm to the touch but not so hot you can't hold onto it.
3. **Y (Wye) fuel strainers** filter fuel. Remove plug to clean screen.
4. **Pressure relief valves** bleed excessive pressure in piping.

NOTE: Vapor high limit switch with auto reset is located as shown in Fig. 11. Vapor high limit with manual reset is in control box.

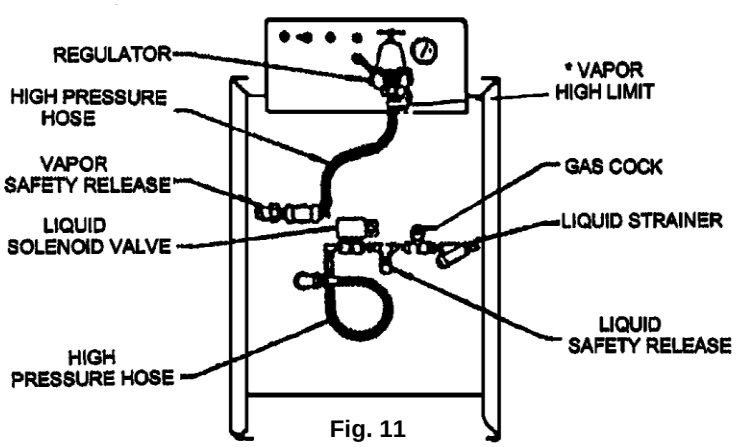


Fig. 11

PLENUM TEMPERATURE CONTROL

See instructions on this or following pages to adjust plenum temperature controls.

THERMOSTAT

1. Open fuel supply valve (and gas cock on liquid models).
2. Loosen regulator lock nut. Turn regulator handle counterclockwise to minimum setting.
3. Set plenum thermostat at desired temperature.
4. Start fan.
5. Turn on heater. Wait for 25-second delay.
6. Red light comes on.
7. Adjust regulator until flame is on longer than off. Tighten lock nut.
8. Check vaporizer (LP models only). See Page 20.

NOTE: Heater Troubleshooting Guide starts on Page 28

SHUT-OFF PROCEDURE:

1. Close fuel supply valve. Wait for fuel to burn out of line.
2. Test flame detection device. Solid state board should lock out if flame probe is operating.
3. Turn off heater.
4. Turn off fan.

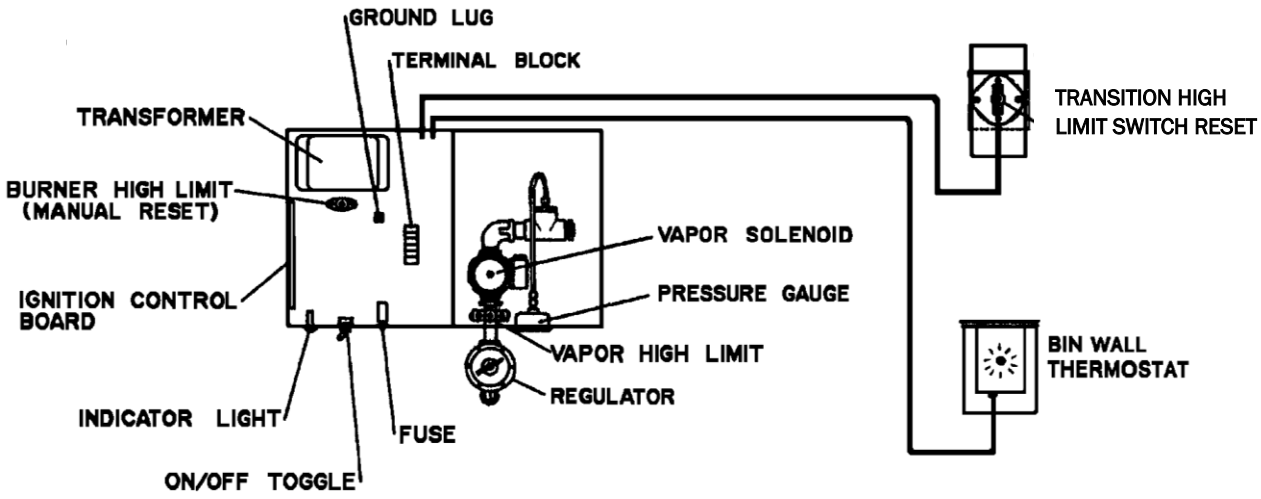


Fig. 12 – Solid state thermostat controller

MODULATING VALVE

1. Open fuel supply valve (and gas cock on LP models).
2. Turn modulating valve counterclockwise to minimum setting. **Never adjust regulator.** It is factory-set at 15psi).
3. Start fan.
4. Turn on heater. Wait for 25-second delay.
5. Red light comes on.
6. Adjust modulating valve until dial thermometer in bin stabilizes at desired drying temperature.
7. Check vaporizer (LP models only). See Page 20.

NOTE: Heater Troubleshooting Guide starts on Page 28.

SHUT-OFF PROCEDURE:

1. Close fuel supply valve. Wait for fuel to burn out of line.
2. Test flame detection device. Flame delay on dual relay or solid state board should lock out if flame sensor is operating properly.
3. Turn off heater.
4. Turn off fan.

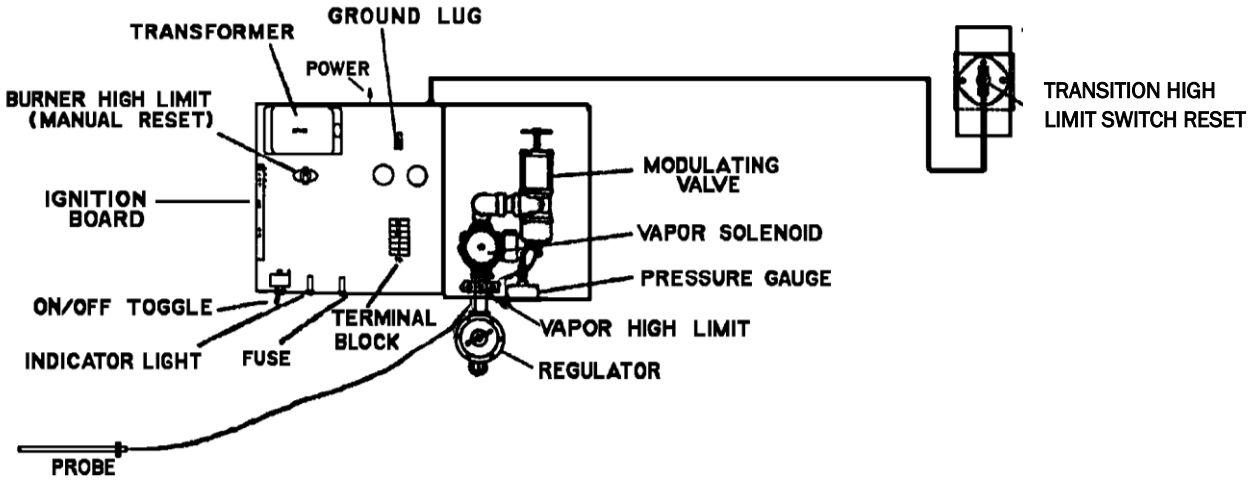


Fig. 13 – Solid state modulating valve temp controller

HUMIDISTAT

1. Open fuel supply valve (and gas cock on LP models).
2. Loosen regulator lock nut. Turn regulator handle counterclockwise to minimum setting.
3. Set humidistat at lowest setting.
4. Start fan.
5. Turn on heater. Wait for 25-second delay.
6. When red light comes on, turn regulator handle clockwise until ignition occurs.
7. Adjust regulator to pressure between 2 and 4 psi. Pressure may be adjusted further if a lower or higher temperature rise is desired. Tighten lock nut.
8. Check flame probe.
9. Check vaporizer (LP models only). See Page 20.
10. Adjust humidistat to desired relative humidity of drying air. Heater will remain on if relative humidity of drying air is above this setting.

NOTE: Heater Troubleshooting Guide starts on Page 28.

SHUT-OFF PROCEDURE

1. Close fuel supply valve. Wait for fuel to burn out of line. Close gas cock (on LP models).
2. Test flame detection device. Flame delay on dual relay or solid state board should lock out if flame sensor is operating properly.
3. Turn off heater.
4. Turn off fan.

HIGH-LOW THERMOSTAT

1. Open fuel supply valve (and gas cock on liquid models).
2. Loosen regulator lock nut. Turn regulator handle counterclockwise to minimum setting.
3. Set high-low thermostat at desired drying temperature.
4. Start fan.
5. Turn on heater. Wait for 25-second delay.
6. Red light comes on. Turn regulator handle clockwise until ignition occurs.
7. Adjust regulator until heater cycles evenly between high and low flame (watch pressure gauge). **If flame cycles off**, regulator is set too high. **If flame does not cycle** from high to low, regulator is set too low. Tighten regulator locknut.
8. Check vaporizer (liquid models only). See Page 20.

NOTE: Heater Troubleshooting Guide starts on Page 28.

SHUT-OFF PROCEDURE:

1. Close fuel supply valve. Wait for fuel to burn out of line.
2. Test flame detection device. (Flame safety delay on dual relay or solid state board should lock out for a properly operating flame probe or flame sensor.
3. Turn off heater.
4. Turn off fan.

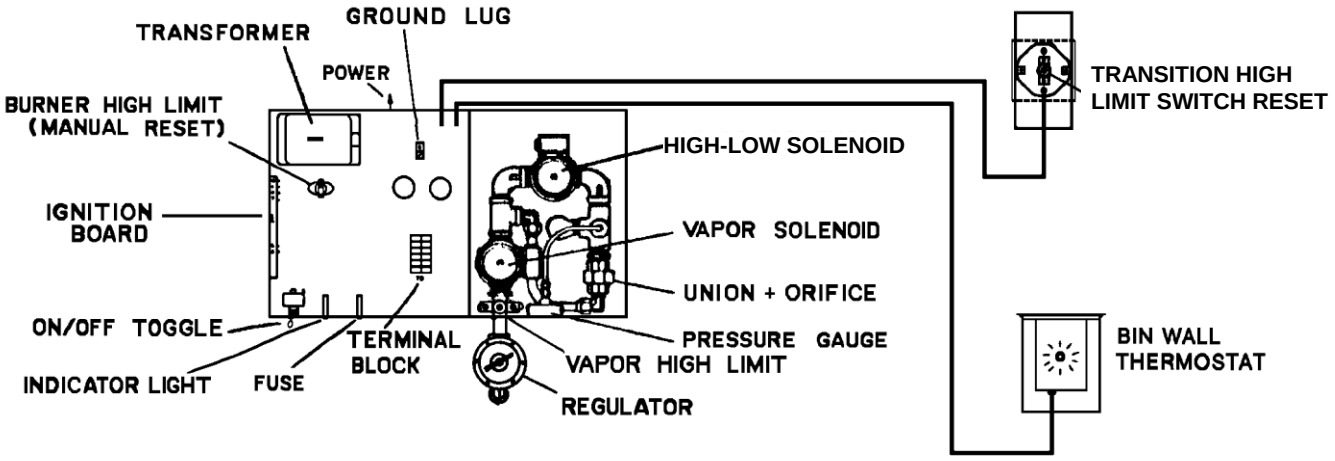


Fig. 14 – Solid state high-low temp controller

DRYING PRECAUTIONS

WARNING: Read and follow all safety information below. Failure to do so could cause fire damage to grain and equipment and could result in death or serious injury.

Precautionary Steps to Help Prevent an In-Bin Fire

- Maximum plenum temperature for in-bin drying without stirring should be no more than 10°F (5°C) above ambient (outside) air. This will help prevent a fire and maintain grain quality. See Table 18.

	Maximum Plenum Temperature for Corn*	
In-Bin Drying without Stirring Machine	10°F (5°C) above ambient (outside) air	
In-Bin Drying with Stirring Machine	120°F	49°C
In-Bin Continuous-Flow Drying	160°F	71°C

Table 18 – Maximum plenum temp* for corn to avoid an in-bin fire & maintain grain quality

***Temperatures are only recommendations. Temperatures for other grains vary due to ambient temperature, grain moisture content and rate of drying. Consult local extension office for further information on specific plenum temperatures when drying other grains.

- **DO NOT** combine drying equipment from various companies. Sukup heaters are intended to be used with Sukup fans only. Sukup heaters have a variety of automatic controls to shut them down in case of ignition failure, excessive heat and/or airflow failure. Combining equipment from various companies may compromise safety controls needed to cut power. Check these items regularly for proper operation.
- **Keep area beneath perforated floor clean of all fines and foreign material as they may cause a bin fire. For even heat distribution, floor supports should not block transition.**
- Grain should be screened before going into bin to avoid formation of fines and trash. Use of a grain spreader will help distribute fines.
- Thoroughly ventilating bins with fan before igniting heater will reduce risk of a fire or explosion from leaking fuel.
- Faulty electrical wiring can also cause fire. Ensure components are wired by a qualified electrician.

If a fire is suspected. Follow these basic fire safety procedures to ensure safety of you, your family, and employees.

- Always account for all co-workers, neighboring farmers and first responders.
- **Shut off gas** at heater and supply tank. **Shut off fan. Call fire department.**
- Keep fire away from fuel supply tanks and keep them cool by spraying water on them if needed.
- Seal fan inlet and any other openings to smother fire.
- Remove fan and heater from transition. Sandbag transition opening. If possible, flood bottom of bin (plenum) with water to a depth of 4” (100 mm) above perforated floor. This will protect steel floor supports and may extinguish fire, depending upon its location.
- If fire is located higher in bin, a long pipe with small holes may be inserted through bin wall or manhole and into grain to direct water at source of fire. This may help keep fire in a centralized location, but it’s nearly impossible to extinguish a fire in a grain bin by simply pouring water on it. These fires can only be extinguished by completely emptying bin.
- Take note of bin surroundings to avoid heat transfer onto neighboring structures.
- **ALL GRAIN MUST BE REMOVED FROM BIN TO REACH POINT OF FIRE**. Do not cut holes in bin to remove grain. Do not enter a bin that is on fire. Grain may bury you.
- Grain may smolder for days. Do not restart fan in hope that fire has gone out unless all grain has been removed from bin.

NOTE: These are general guidelines. Consult with local extension office for your specific situation.

MAINTENANCE

WARNING: Keep all guards and screens in place. Disconnect all power sources before doing any repair, maintenance or inspections. Failure to heed this warning could result in death or serious injury.

BEGINNING OF EACH DRYING SEASON:

Remove inlet screen. Check for foreign material on fan. With power off, turn fan by hand to ensure it rotates freely.

Lubricate fan motor bearings with high temperature grease as indicated on motor nameplate or motor fact sheet. Do not over-grease. Check ventilation openings in motor for any blockage.

Check wiring of fan and heater. Look for loose connections, bare wires, or rodent damage. Be sure to check ignition wire and flame sensor wires for any damage.

Examine flame rod for cracked insulation.

Examine spark plug for proper gap. Gap should be about 1/8". Spark plug and flame rod should be examined periodically throughout drying season.

All plenum controls should be checked.

Check all pipe train connections for leaks, using soapy solution.

Check vaporizer daily. Weather condition changes can demand new adjustment.

AFTER DRYING SEASON:

Balance of fan is critical. Vibration can cause fan housing to crack. To prevent this, check blades for dirt, dust or foreign material.

Burn fuel out of lines and turn off at source.

Cover fan inlet to keep out weather and pests and to prevent “windmilling,” which can cause wear on start switch in single-phase motors.

DURING OFF-SEASON:

Every six weeks, operate fan to redistribute grease in bearings. Let motor warm up enough to force out any accumulated moisture.

Make sure control box cover is in place and secured. Turn off power at source.

IMPORTANT: Be sure to check vaporizer coil yearly. It should be replaced every five years.

WARNING: One drop of liquid propane will expand 270 times as it converts to vapor. It is very dangerous to have vaporizer coil develop a leak during heater operation. Gas leak could cause explosion or fire resulting in death or serious injury.

CAUTION: Vaporizer should be replaced only by qualified service personnel. Shut off fuel supply and bleed all fuel lines. Run fan several minutes to purge gas from heater. Check all piping joints for leaks with soapy solution before operating heater after turning vaporizer. Failure to take these steps may result in minor or moderate injury.

SOLID STATE HEATER CHECKLIST

Follow steps below after installation to ensure proper operation. See troubleshooting steps on next page as needed.

1. Start fan and turn heater on.
2. If operating light comes on immediately, thermostat is open. To proceed, turn thermostat up. After a 25-second purge delay, operating light will come on. Gas solenoids should snap open and spark should occur.
3. Check operating light. It should remain on as long as heater operates and cycles properly. If light is off, heater is locked out.
4. If solenoids do not snap open or operation light does not glow:
   a. Are heater and fan on?
   b. Is heater properly wired to fan? Is fan wired with a neutral?
   c. Check fuses in fan and heater. 3-amp fuses are used. Never over-fuse.
   d. Is thermostat (or modulating valve) calling for heat?
   e. Reset transition high limit switch.
   f. Reset burner high limit switch.
5. Operating light is on, solenoids snap open, but no spark:
   a. Check spark plug. Adjust gap to 1/8". Check gap periodically throughout drying season).
   b. Check spark plug wire for grounding or an open condition.
6. Operating light is on, spark is present, but no ignition occurs:
   a. Is gas supplied to burner? Check gauge. Are fuel valves open? Adjust regulator. Check storage tank.
   b. Are solenoids opening? Put hand on valve and turn heater on. After a 25-second delay, valve should snap open.
   c. Is there an obstruction in fuel line? Check strainers and orifice.
7. Heater starts properly, but locks out after 10 seconds:
   a. Check condition of flame rod. If cracked or burned off, replace it.
   b. Check flame sensor wires and electrical connectors.
   c. Flame rod needs only to make contact with flame. Flame is sensed electronically.
8. Freezes up while starting:
   a. Start on minimum pressure and increase after ignition.
   b. Moisture in fuel. Call gas supplier.
9. Frost on regulator or inside control box. Upper hose is not warmer than lower hose. Flame is present:: Vaporizer is not hot enough. Adjust vaporizer inward. Start by loosening pivot bolts (1 top, 1 bottom) of vaporizer adjustment bracket. Pivot vaporizer in or out of flame as needed to regulate temperature at vaporizer outlet. U-bolts mounting vaporizer to adjustment bracket can also be loosened and vaporizer can be moved in and out to adjust. Viewing hole is present to watch vaporizer adjustment.
10. Upper hose very hot. Gas shuts off:
    a. Vaporizer is too hot. Adjust vaporizer outward. See Step 9. Vapor high limit has red reset button; reset manually by depressing button.
    b. Is tank hooked up for vapor rather than liquid? Call gas supplier.
11. Fan will not start:
    Is power supply to fan turned on? Is thermal overload button pressed?
12. Fan vibrates:
    a. Is there foreign material (dirt, etc.) on blades? Blades must be clean to be in balance.
    b. Check to be sure housing is solid and level.
13. Overload continues to kick out:
    Have service person check fan.
14. Do not operate heater with service door removed.

HEATER TROUBLESHOOTING GUIDE

Sukup Solid State Ignition Board
Check and Correction Procedure
(See electrical schematics beginning on Page 33)

Procedures outlined below are for use ONLY by qualified service personnel.

WARNING: Shut off fuel supply and bleed all lines before servicing. Run fan several minutes to purge gas from heater. Failure to heed this warning could cause a fire, resulting in death or serious injury.

1. **Start fan and heater.** After about 25-second delay, visually check red light on control panel and also for spark at burner.

OPERATING LIGHT IS NOT ON:

2. Connect one lead of voltmeter to neutral (wire #2) at terminal block. This will remain connected throughout procedure.
3. Check power supply. Connect lead to wire L1 (Power) at toggle switch. If meter does not show voltage, check power supply to heater and heater fuse.
5. Check on-off toggle switch: Connect lead to wire #5 for vapor unit, wire #3 on liquid unit, at switch while switch is **ON**. If meter does not show voltage, replace toggle switch.

   4a. For liquid LP unit with vaporizer, check vapor high limit switch. Connect voltmeter to wire #5 at burner high limit switch. Be sure vapor high limit switch is reset. If still no voltage, replace vapor high limit switch.
5. Check heater high limit switch. Connect lead to wire #6 at heater high limit switch terminal. Be sure heater high limit switch is reset. If still no voltage, replace heater high limit switch.
6. Check transition high limit switch. Connect lead to wire #7 at terminal block. If meter does not show voltage, push reset button. If still no voltage, replace transition high limit switch.
7. Check thermostat: Connect lead to wire #8 at terminal on ignition board. If meter does not show voltage, adjust thermostat to higher setting. If still no voltage, replace thermostat. If power is present at terminals #7 and #8, the 25-second delay time has passed, and NO power has come out at terminals #9 and 10, replace solid state circuit board.

NOTICE: Circuit board may be damaged by static electricity. Before handling it, ground yourself by touching heater housing to discharge any static that may have built up. Transport circuit board in a static shielding bag. Following these procedures will ensure maximum lifespan of board.

LIGHT IS ON, BUT NO SPARK:

8. Check for power at terminal #9 during trial for ignition period.

WARNING: Stay clear of end of live ignition wire. Failure to take precautions when working around high voltage could result in death or serious injury.

9. Disconnect ignition wire from transformer. Ground one end of screwdriver to heater housing. Bring screwdriver shaft to about 1/8" from transformer high voltage terminal to establish an arc. If no arc is obtained, replace transformer.
10. Connect ignition wire to transformer. Disconnect ignition wire from spark plug. Carefully using insulated pliers, hold ignition wire by insulation and try to get arc between wire and heater housing.

SPARK IS PRESENT, BUT NO FLAME:

11. Check for power at terminal #10 during trial for ignition period.
12. Check solenoid valves: Remove screw from top of valve. Coil will lift off easily. Insert screwdriver into hole in bottom of coil. Screwdriver should be "grabbed" magnetically. If coil fails to "grab" screwdriver, check electrical connections or replace coil.

BURNER IGNITES, BUT LOCKS OUT IN 10-20 SECONDS:

13. Look for cracked porcelain on flame-sensing rod. If cracked, replace.
14. Check flame-sensing rod wire for grounding or weak connection. Check burner ground for weak connection.
15. Check current in flame-sensing circuit.
    Test equipment required: Volt-Ohm meter with a 50 micro-amp, DC scale

    PROCEDURE:
    a. Insert meter (set at 50 micro-amp, DC scale) in series with flame sensor.
    b. Turn on heater
    c. Observe meter reading:
       (1) During lighting period the meter may move erratically due to spark interference.
       (2) After spark ceases, meter reading should be constant between 10 and 25 micro-amps.
       NOTE: A reading of at least 3 micro-amps is needed to maintain operation. Any reading below 3 micro-amps will cause lockout.
    d. If amp meter readings are above 3 micro-amps, but lockout still occurs, replace solid state circuit board.

BURNER IGNITES AND OPERATES, BUT NUISANCE LOCKOUT OCCURS:

16. Replace spark plug or gap at 1/8".
17. Check transformer spark plug and ignition wire as in Steps 8-10.
18. Check tank pressure, line, and strainer for blockage. On vapor heaters a manual shut-off valve and a 100-mesh gas strainer (supplied by customer) should be installed between heater pipe train and fuel supply line.
19. Is there possible freezing-up of regulator? If so, allow heater to warm up. Adjust vaporizer if it is still not warm. See Step 9 on Page 27.

IMPORTANT: Use a soapy solution to check all pipe joints for leaks before operating heater.