

Deluxe Vane Axial Heater

Model # VHC _ _ _ _ -D (HIGH-FIRE)

Model # VLC _ _ _ _ -D (LOW-FIRE)

Owner's Manual

PNEG-581

Date: 07-18-08

GSI GROUP



PNEG-581

Check List

1. All wire connections
2. Spark plug gap 0.125
3. Pipetrain tightness and gas leaks
4. Flame sensor tight
5. Fuse in place, extra fuse provided
6. Time delay reset
7. Indicator light
8. Pressure gauge
9. Regulator adjusted
10. Shut off valve operates correctly
11. Vapor High-Limit
12. Unit cycles ON to OFF
13. Heat rise even across transition
14. Unit cycles High-Low (High-Low only)
15. Modulating valve holds temperature within 1 degree (modulating units only)
16. All decals and serial number tag
17. Aesthetic appearance
18. Manual

Tester Signature: _____

Date: _____

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Safety Guidelines

This manual contains information that is important for you, the owner/operator, to know and understand. This information relates to protecting **personal safety** and **preventing equipment problems**. It is the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of these safety guidelines. To help you recognize this information, we use the symbols that are defined below. Please read the manual and pay attention to these sections. Failure to read this manual and its safety instructions is a misuse of the equipment and may lead to serious injury or death.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



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



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



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



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.



NOTE indicates information about the equipment that you should pay special attention.



WARNING! BE ALERT!

Personnel operating or working around electric fans should read this manual. This manual must be delivered with the equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

Fuel Warning



Do not use propane tanks which have previously been used for ammonia unless they have been purged according to procedures of the National LP Association.

***Be sure fuel supply system complies with all local codes for LP gas installations.
DO NOT USE FLAME FOR LEAK TESTING.***

Power Warning

Be sure power is disconnected and locked out before installation. Failure to do so may cause serious injury or death.

IMPORTANT: *Heater must be interlocked with fan for safe operation.*

IMPORTANT: *Thermostat must be installed for safe operation.*

Proper Use of Product

This product is intended for the use of grain drying only. Any other use is a misuse of this product. This product has sharp edges. These sharp edges may cause serious injury. To avoid injury handle sharp edges with caution and use proper protective clothing and equipment at all times. Guards are removed for illustration only. All guards must be in place before and during operation.

Heater Operation

Thank you for choosing a GSI product. It is designed to give excellent performance and service for many years.

This manual describes the operation of the GSI Deluxe Vane Axial Heater. Many models are available to accommodate low, medium or High-Temperature grain conditioning.

Safety Instructions

Our foremost concern is your safety and the safety of others associated with this equipment. We want to keep you as a customer. This manual is to help you understand safe operating procedures and some problems which may be encountered by the operator and other personnel.

As owner and/or operator, it is your responsibility to know what requirements, hazards and precautions exist, and to inform all personnel associated with the equipment or in the area. Safety precautions may be required from the personnel. Avoid any alterations to the equipment. Such alterations may produce a very dangerous situation where **SERIOUS INJURY** or **DEATH** may occur.

This equipment shall be installed in accordance with the current installation codes and applicable regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

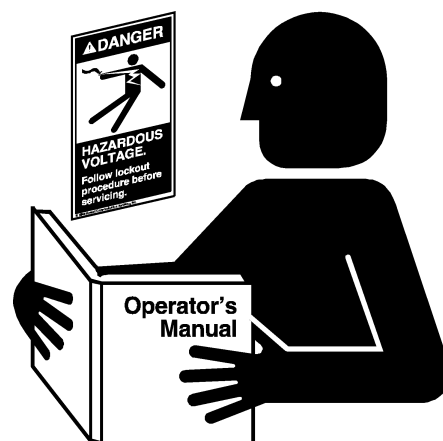
Follow Safety Instructions

Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machinery in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual or need assistance, contact your dealer.



Read and Understand Manual

Install and Operate Electrical Equipment Properly

Electrical controls should be installed by a qualified electrician and must meet the standards set by the National Electrical Code and all local and state codes.

Disconnect and lock out all power sources before installing wires/cables or servicing equipment.

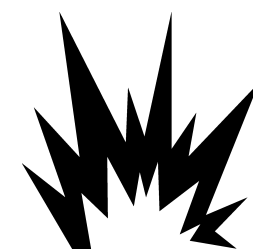


Electric Shock Hazard

Install and Operate Gas-Fired Equipment Properly

Fuel supply should be installed by a qualified gas technician and must meet local and state codes for gaseous fuel supplies.

Disconnect and lock out all fuel sources before servicing equipment.



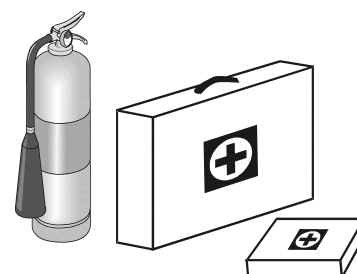
Explosive Gases

Prepare for Emergencies

Be prepared if fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital and fire department near your telephone.



Keep Emergency Equipment Quickly Accessible

Wear Protective Clothing

Wear close fitting clothing and safety equipment appropriate to the job.

Remove all jewelry.

Long hair should be tied up and back.

Safety glasses should be worn at all times to protect eyes from debris.

Wear gloves to protect your hands from sharp edges on plastic or steel parts.

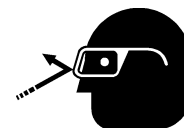
Wear steel toe boots to help protect your feet from falling debris. Tuck in any loose or dangling shoe strings.

A respirator may be needed to prevent breathing potentially toxic fumes and dust.

Wear hard hat to help protect your head.

Wear appropriate fall protection equipment when working at elevations greater than six feet (6').

Eye Protection



Gloves



Steel Toe Boots



Respirator



Hard Hat



Fall Protection



2. Safety Decals

The GSI Group recommends contacting your local power company, and having a representative survey the installation so the wiring is compatible with their system, and adequate power is supplied to the unit.


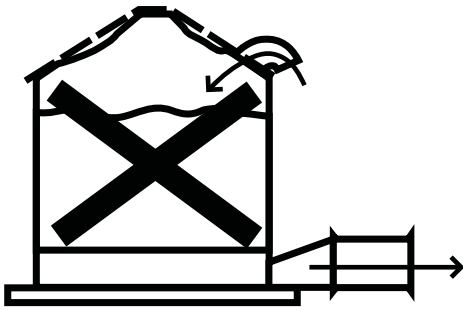
Safety decals should be read and understood by all people in the grain handling area. The bottom-right decal warns that the enclosure contains electrical devices carrying high voltages that will cause injury or death. Lock out power before servicing. If a decal is damaged or is missing, contact:

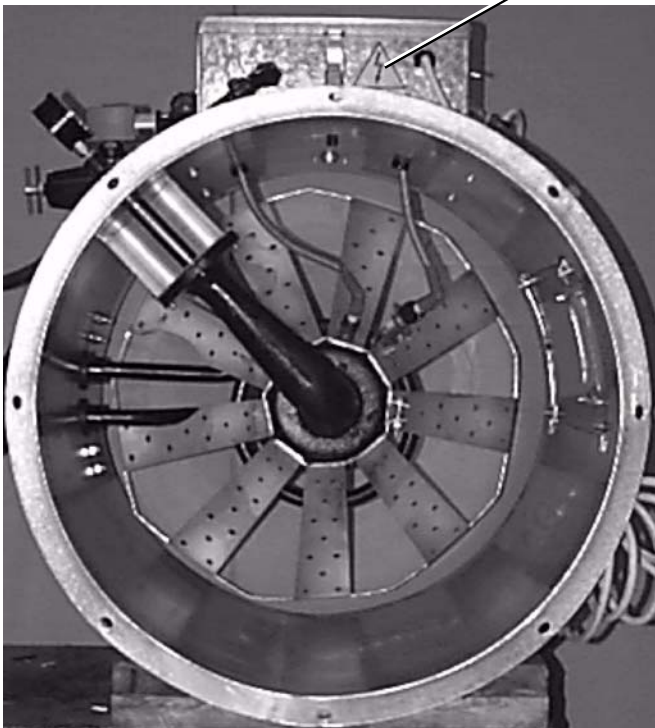
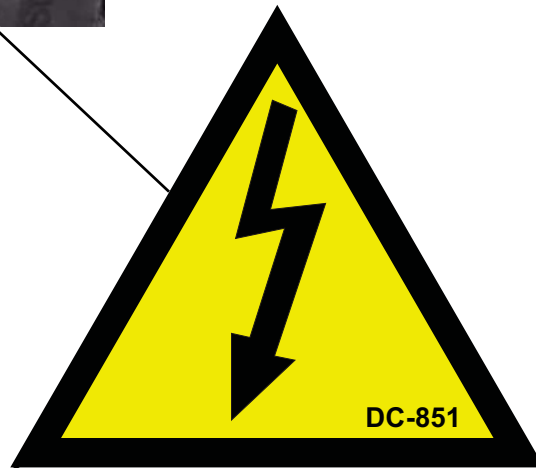
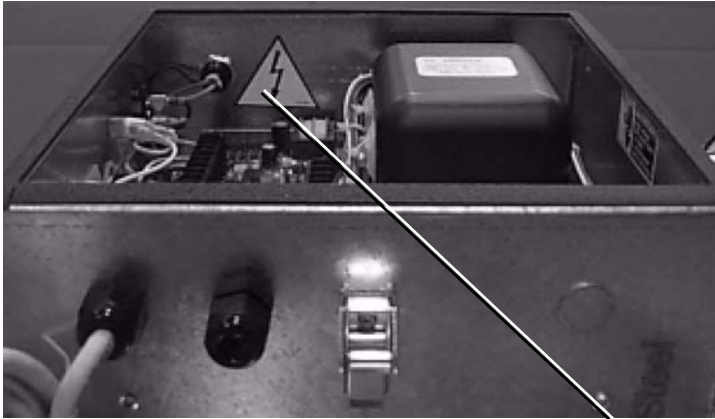
GSI Decals

1004 E. Illinois St.
Assumption, IL. 62510
Phone: 217-226-4421

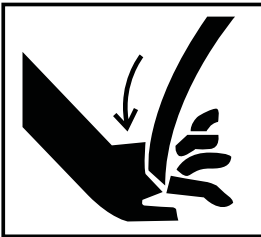
A free replacement will be sent to you.

Roof Damage Warning and Disclaimer

<div data-bbox="215 667 742 745"> CAUTION!</div> <div data-bbox="277 766 737 1073"></div> <div data-bbox="203 1102 769 1383"><p>Excessive vacuum (or pressure) may damage roof. Use positive aeration system. Make sure all roof vents are open and unobstructed. Start roof fans when supply fans are started. Do not operate when conditions exist that may cause roof vent icing.</p></div> <div data-bbox="703 1404 774 1428"><p>DC-969</p></div>	<p>GSI does not warrant any roof damage caused by excessive vacuum or internal pressure from fans or other air moving systems. Adequate ventilation and/or "Makeup Air" devices should be provided for all powered air handling systems. GSI does not recommend the use of downward flow systems (suction). Severe roof damage can result from any blockage of air passages. Running fans during high humidity/cold weather conditions can cause air exhaust or intake ports to freeze.</p>
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Safety Alert Decals for Door



!WARNING

Stay clear of rotating blade. Blade could start automatically. Can cause serious injury. Disconnect power before servicing.

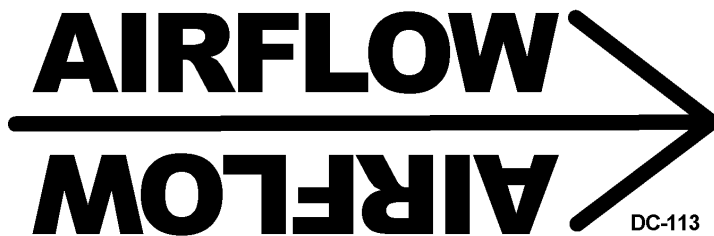
DC-1225



!WARNING

Flame and pressure beyond door can cause serious injury. Do not operate with service door removed. Keep head and hands clear.

DC-1227



DC-113

!DANGER



HIGH VOLTAGE.

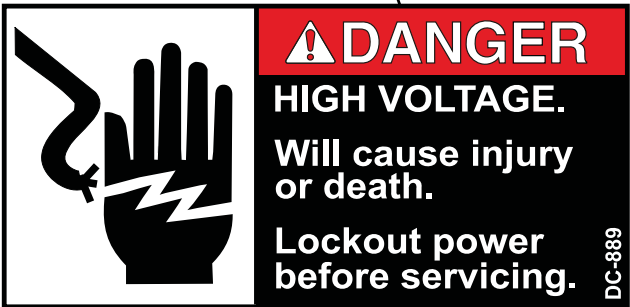
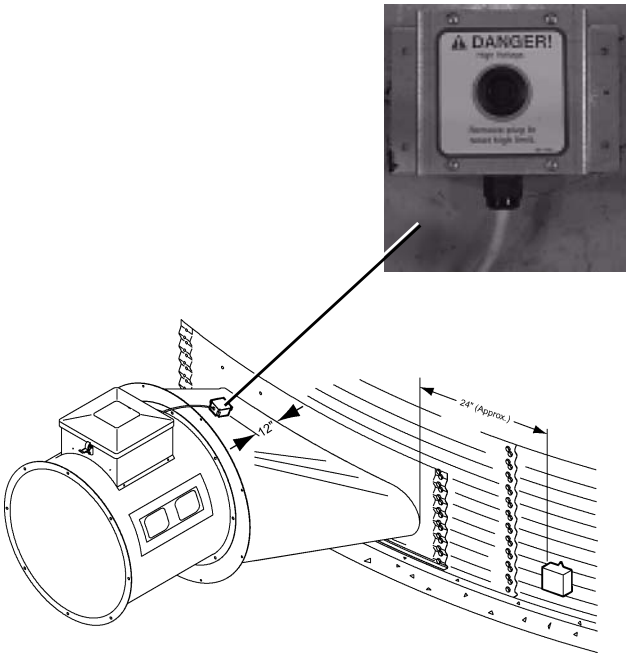
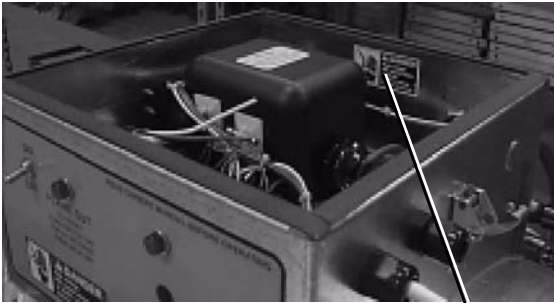
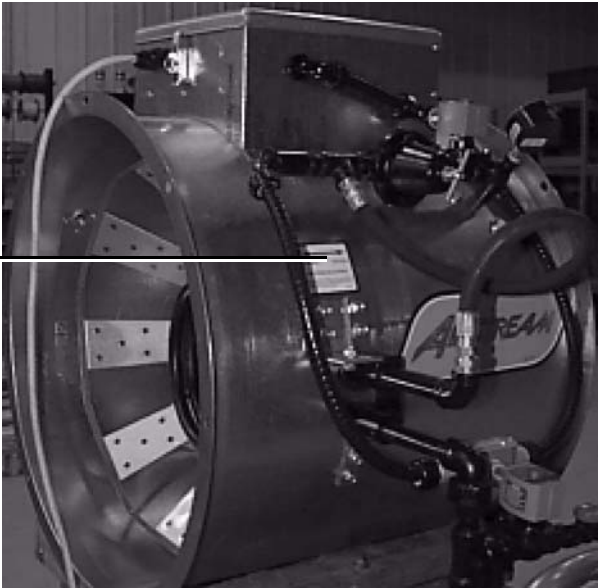
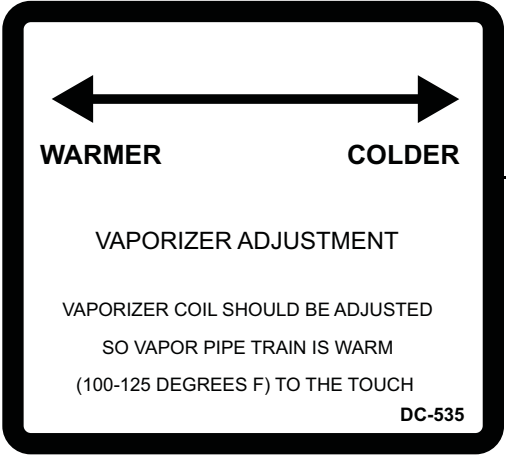
- Will cause serious injury or death.
- Lockout power before servicing.

DC-1224

Safety Decals for Bin



2. Safety Decals



Fuel Connection



Do not use propane tanks which have previously been used for ammonia unless they have been purged according to procedures of the National LP Association.

Be sure fuel supply system complies with all local codes for LP gas installations. DO NOT USE FLAME FOR LEAK TESTING.

Liquid Propane Models

1. LP models are designed to run on liquid propane, with liquid draw from the propane tank. Avoid using propane supply tanks that have been used for vapor draw for long periods of time. When using liquid draw systems any moisture that may be present in tank or lines may freeze when system is used in cold weather. To avoid this, the usual precaution is to purge the system with methanol.
2. Run proper size line ([see Specifications on Page 19](#)) to liquid pipetrain on heater. Have a qualified gas service man inspect installation to be sure that everything is installed according to local codes and ordinances.
3. After installation is complete check all connections for leaks with liquid detergent or comparable. Wear rubber gloves and eye protection. Avoid contact with liquid propane. DO NOT USE FLAME FOR LEAK TESTING.

Propane Vapor Models

1. Propane vapor models are designed to run directly off of a supply tank or from a separate external vaporizer.
2. Run proper size line ([see Specifications on Page 19](#)) to pipetrain on heater. Have a qualified gas service person inspect installation to be sure everything is installed according to local codes and ordinances.
3. After installation is complete check all connections for leaks. DO NOT USE FLAME FOR LEAK TESTING.

Natural Gas Models

1. Natural gas models are similar to vapor models, but have a larger orifice to accommodate lower pressure sometimes found with natural gas.
2. Run proper size line ([see Specifications on Page 19](#)) to pipetrain on heater. Have a qualified gas service man inspect installation to be sure everything is installed according to local codes and ordinances.
3. After installation is complete check all connections for leaks. DO NOT USE FLAME FOR LEAK TESTING.

Heater Electrical Installation (230V Fans)

These instructions are for heater installation on fan units with 230V motors.



Be sure power is disconnected and locked out before installation. Failure to do so may cause serious injury or death.

1. Connect power cord to fan control box.
2. Make field connection of wires in fan box as [shown in Figure 3B on Page 15](#). 110V power supply or 0.5KVA 460V to 110V transformer must be used to supply power for heater.

IMPORTANT: Heater must be interlocked with fan for safe operation.

3. Connect deluxe thermostat control (optional) as [shown in Figure 3B on Page 15](#).

IMPORTANT: Thermostat must be installed for safe operation.

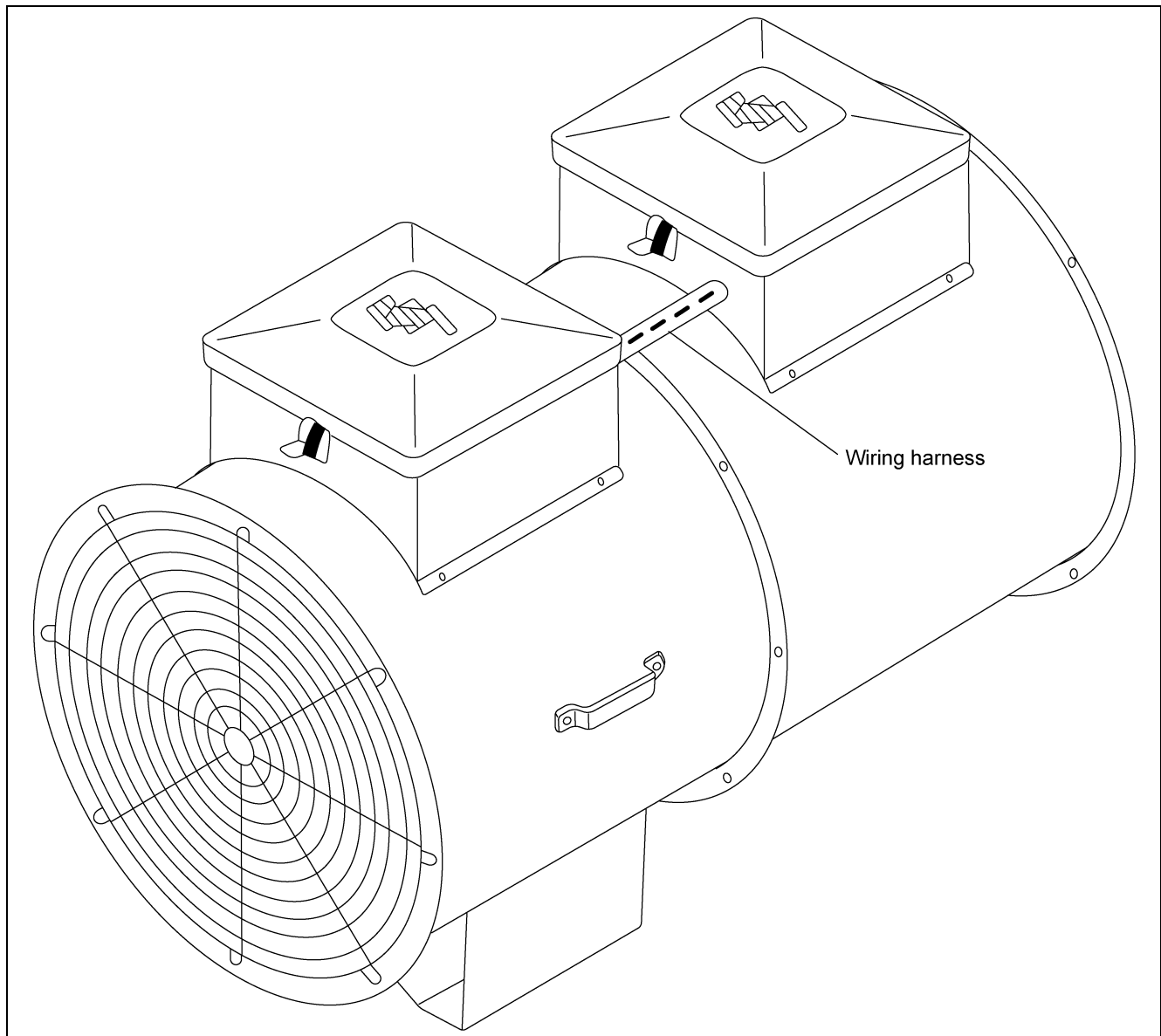


Figure 3A Illustration of Deluxe Vane Axial Heater Wiring Installation on a Fan Unit

Heater Electrical Installation (230V Fans) (Continued)

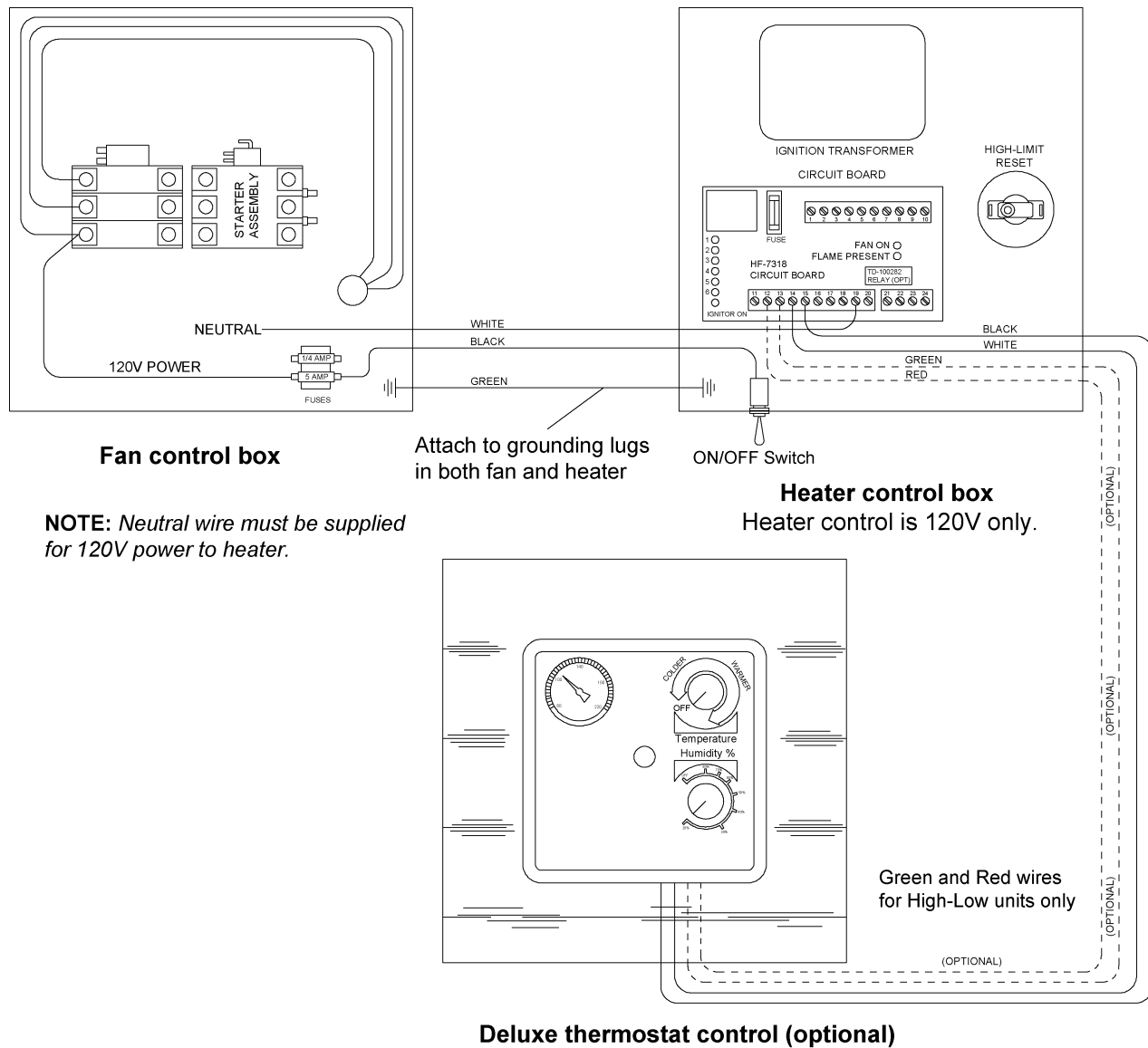


Figure 3B Deluxe Vane Axial Heater Wiring to Fan Unit

Bin Configuration

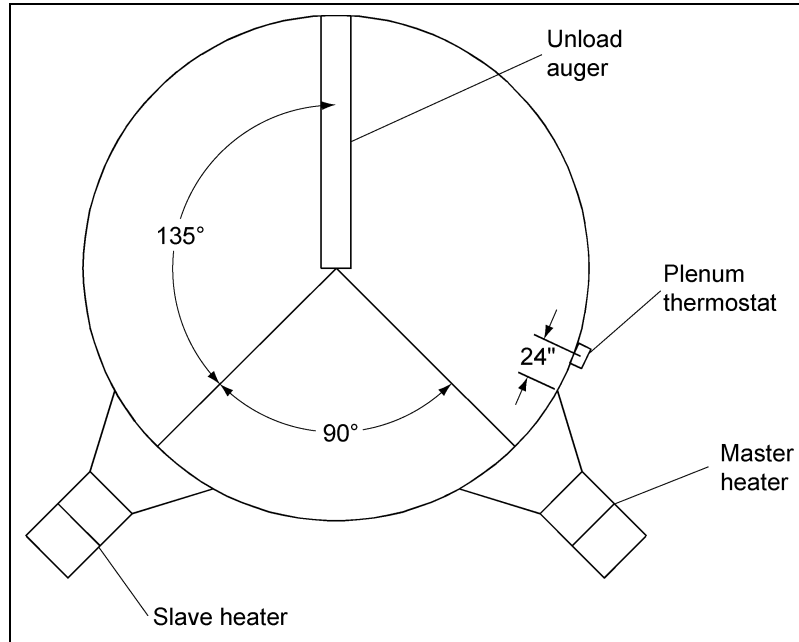


Figure 3C

IMPORTANT: When mounting two (2) heaters on a bin it is imperative that they be situated as in [Figure 3C](#). Plenum thermostat must be to the right of master heater and master heater must be to the right of slave heater.

Transition High-Limit Installation

1. Mark location on transition one (1) foot up from the bottom (entrance collar) and centered in the transition.
2. Drill or knock out 7/8" diameter hole on marked location.
3. Install transition High-Limit using supplied self-drilling screws.

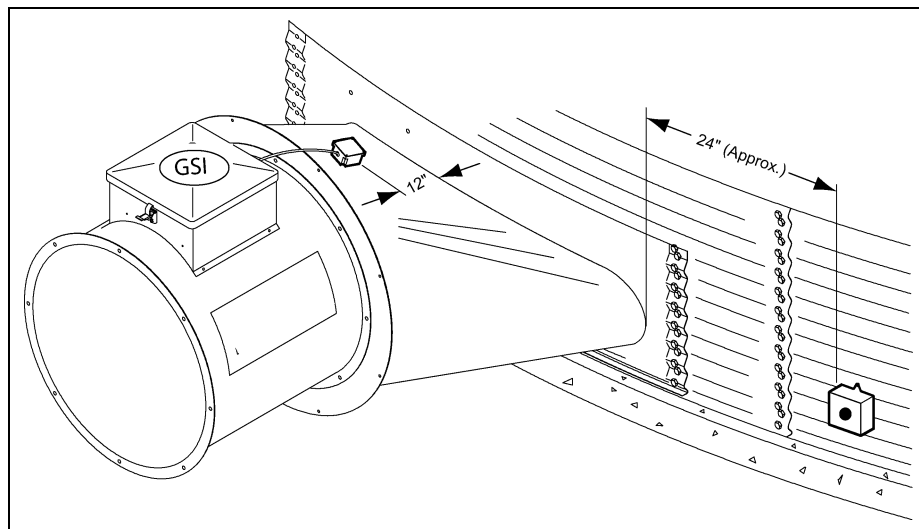


Figure 3D The transition connecting the Vane Axial Heater to the bin with the plenum sensor in place.

Plenum Thermostat Mounting

The plenum thermostat is the 4 x 4 white box with knob that is preconnected to heater when heater is ordered with thermostat.

1. 24" to the right side of the transition, drill one (1) 3/8" hole (High-Temperature) or 1-1/2" hole (Low-Temperature) in the center of the plenum in a valley (4.00" corrugation) or hill (2.66" corrugation) on bin sidewall.
2. Insert the probe through the hole.
3. Position the housing so that the tabs are vertical, and the cord exits the housing horizontally.



Figure 3E Plenum Thermostat Mounting on Bin Wall

4. Use four (4) self-drilling screws to mount the housing to the bin sidewall.
5. Caulk between the housing and the sidewall to seal.

IMPORTANT: Do not exceed plenum temperatures listed in table.

Operating Temperature Table

	Low-Temperature Batch	High-Temperature Batch Dry No Stirring	High-Temperature with Stirring	Continuous Flow (Recirculating)
Corn	5-20° Above Ambient Temp.	120°	140°	160°
Rice	5-10° Above Ambient Temp.	100°	100°	Not Recommended
Beans and Wheat	5-20° Above Ambient Temp.	110°	120°	Not Recommended

This table is not intended as a drying guide. It should be used as a reference for setting maximum plenum temperature for safe operation.

Second Heater Installation

For Units Using HF-7318 Control Board

Two (2) deluxe heaters may be connected to one (1) grain drying system and wired so they cycle together. One (1) of the heaters should have a thermostat connected to it as per the installation instructions. That heater will be referred to as the master. The other heater (without the thermostat) will be referred to as the slave.

Installation for Standard Units

1. Install relay base (TD-100283) in master heater control box.
2. Connect wire between terminal 6 on circuit board and terminal 14 on relay base in master heater.
3. Connect wire between terminal 13 on relay base and terminal 8 on circuit board in master heater.
4. Run two (2) wires (18 gauge) between master and slave heaters.
5. Connect wires to terminal 5 and 9 (points A and B) on relay base in master heater.
6. Connect wire from terminal 9 in master to terminal 14 (point F) in slave unit.
7. Connect wire from terminal 5 in master to terminal 15 (point E) in slave unit.
8. Install relay (TD-100282) in relay base.

Additional Steps For High-Low Units

1. Run two (2) wires (18 gauge) between master and slave unit.
2. Connect wires to terminal 21 and 22 (points C and D) on circuit board in main heater.
3. Connect wire from terminal 21 in master to terminal 12 (point H) in slave unit.
4. Connect wire from terminal 22 in master to terminal 13 (point G) in slave unit.
5. Install relay (TD-100282) in relay base.

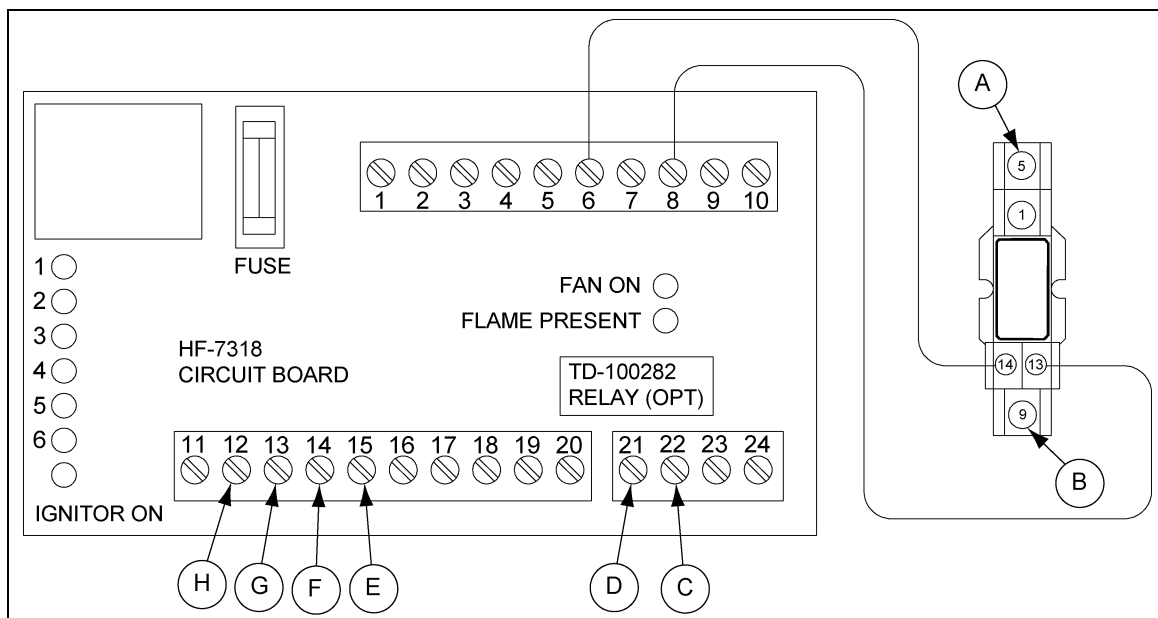


Figure 3F The HF-7318 Control Board

Temperature Heater Specifications

High-Temperature Heater Specifications

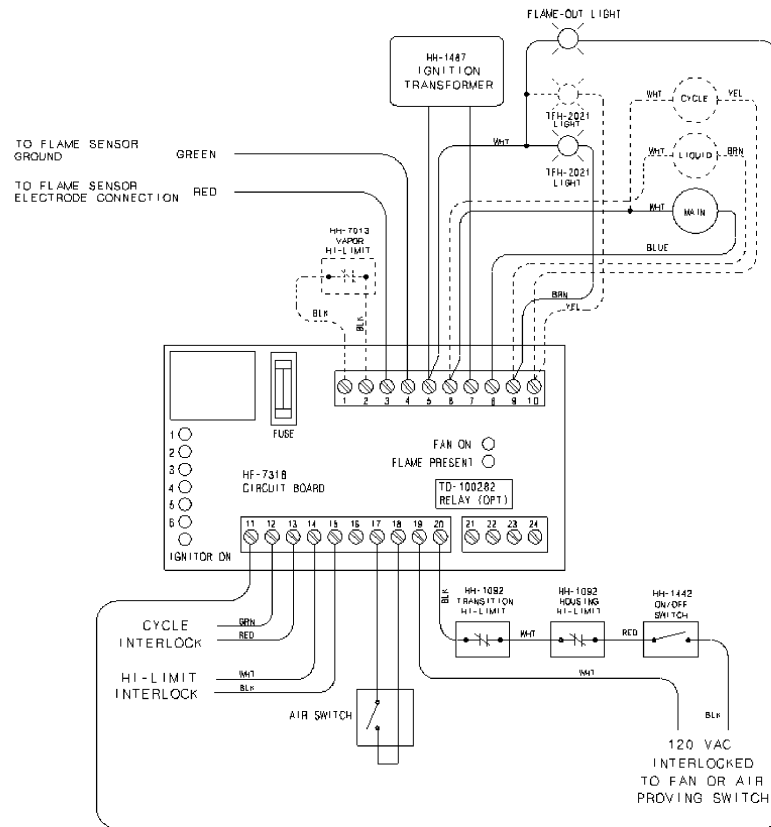
		18"	24"	26"	28"
All Models	Inside Diameter	18-5/16"	24-1/4"	26-5/16"	28-1/8"
	Bolt Circle Diameter	19-7/16"	25-3/4"	27-15/16"	29-5/8"
	Length	22"	22-1/2"	22-1/4"	25-1/4"
	BTU Rating	1400000	2100000	2700000	3000000
	Weight	81	110	115	140
Liquid Models	Maximum Fuel Flow (GPH)	N/A	23	30	34
	Orifice	N/A	3/16"	7/32"	15/64"
	Modulating Valve Bypass Orifice	N/A	Blue	Blue	Aluminum
	Minimum Operating Pressure	N/A	2	2	2
	Maximum Operating Pressure	N/A	20	20	20
	Minimum Line Size	N/A	3/8"	3/8"	3/8"
Vapor Models	Maximum Fuel Flow (CFH)	585	877	1128	1253
	Orifice	5/32"	3/16"	7/32"	15/64"
	Modulating Valve Bypass Orifice	Green	Blue	Blue	Aluminum
	Minimum Operating Pressure	2	2	2	2
	Maximum Operating Pressure	20	20	20	20
	Minimum Line Size	1/2"	3/4"	3/4"	3/4"
Natural Gas Models	Maximum Fuel Flow (CFH)	1473	2210	2842	3157
	Orifice	1/4"	5/16"	23/64"	3/8"
	Modulating Valve Bypass Orifice	Blue	Aluminum	Aluminum	Aluminum
	Minimum Operating Pressure	1	1	1	1
	Maximum Operating Pressure	7	7	7	7
	Minimum Line Size	3/4"	1"	1-1/4"	1-1/4"

Low-Temperature Heater Specifications

		18"	24"	26"	28"
All Models	Inside Diameter	18-5/16"	24-1/4"	26-5/16"	28-1/8"
	Bolt Circle Diameter	19-7/16"	25-3/4"	27-15/16"	29-5/8"
	Length	22"	22-1/2"	22-1/4"	25-1/4"
	BTU Rating	400000	500000	500000	500000
	Weight	81	110	115	140
Vapor Models	Maximum Fuel Flow (GPH)	167	292	292	292
	Orifice	5/64"	3/32"	3/32"	3/32"
	Modulating Valve Bypass Orifice	Red	Yellow	Yellow	Yellow
	Minimum Operating Pressure	2	2	2	2
	Maximum Operating Pressure	20	20	20	20
	Minimum Line Size	3/8"	3/8"	3/8"	3/8"
Natural Gas Models	Maximum Fuel Flow (CFH)	421	736	736	736
	Orifice	9/64"	5/32"	5/32"	5/32"
	Modulating Valve Bypass Orifice	Yellow	Green	Green	Green
	Minimum Operating Pressure	1	1	1	1
	Maximum Operating Pressure	7	7	7	7
	Minimum Line Size	1/2"	1/2"	1/2"	1/2"

4. Deluxe Heater Wiring Diagram

DELUXE HEATER WIRING DIAGRAM



● INDICATES LIGHT ON ○ INDICATES LIGHT OFF

INDICATION	POSSIBLE CAUSE	POSSIBLE SOLUTION
● ○ ○ ○ ○ ○	Bad On/Off Switch	Replace Switch
1 2 3 4 5 6	Heater Housing Hi-Limit	Reset Or Replace Hi-Limit
	Transition Hi-Limit	Reset Or Replace Hi-Limit
	No Power To Heater	Check Heater
● ○ ○ ○ ○ ○	Blown Fuse	Replace Fuse
1 2 3 4 5 6	Flame Sensor (if flame present light on)	Clean Or Replace Flame Sensor
● ● ○ ○ ○ ○	Control Board	Replace Control Board
1 2 3 4 5 6	Air Switch (if fan on light not on)	Check Air Switch
● ● ● ○ ○ ○	Vaporizer Hi-Limit	Adjust Vaporizer Coil Replace Vapor Hi-Limit
1 2 3 4 5 6	Humidistat/Thermostat	Temperature Reached Replace Thermostat Or Humidistat
● ● ● ● ○ ○	Spark Plug	Clean Or Replace Spark Plug
1 2 3 4 5 6	No Fuel To Burner	Check Fuel Supply
	Bad Solenoid	Replace Solenoid

● ● ● ● ● ○ WAIT FOR 20 SECOND PURGE DELAY TO TROUBLESHOOT!
1 2 3 4 5 6 INDICATING LIGHTS SHOWN ON LEFT SHOULD BE LIT
WHEN UNIT IS OPERATING PROPERLY

DC-1161

Standard Heater Operation

1. Thermostat must be wired into heater control box for heater to operate.
2. Open all manual shut off valves to heater unit.
3. Start fan. This will supply power to heater.
4. Turn thermostat dial to its highest setting.
5. Turn toggle switch ON.
6. Heater should now be lit. If not check to see that all gas is ON.
7. Watch thermometer on plenum and when it reaches desired temperature turn thermostat back slowly until heater cycles off.
8. Gas pressure should be adjusted so burner is on 75% of the time.
9. Watch plenum temperature as burner goes through a few cycles, to be sure that it is operating properly.

High-Low Heater Operation

1. High-Limit and cycling thermostat must be wired into heater control box for heater to operate.
2. Open all manual shut off valves to heater unit.
3. Start fan. This will supply power to heater.
4. Turn thermostat dial to its highest setting.
5. Turn toggle switch ON. Both red lights should light up indicating power to the control circuit.
6. Heater should now be lit. If not check to see that all gas is ON.
7. Open Low-Fire ball valve all the way.
8. Turn thermostat dial back slowly until heater cycles to low flame.
9. Adjust ball valve so that low flame pressure is at desired setting.
10. Turn thermostat dial to desired setting and wait for bin plenum to come up to temperature. Heater should cycle to low flame after a few minutes. If heater does not cycle to low flame increase high flame gas pressure.
11. Low flame should be adjusted so that temperature drops slowly until burner goes back to high flame.
12. Watch as burner goes through a few cycles, to be sure that it is operating properly, back to high flame.

Modulating Valve Operation

1. The modulating valve regulates gas flow through the heater based on sensing unit in the plenum, and maintains a constant drying air temperature.
2. The sensing bulb of the modulating valve should be mounted through the bin wall with the side reading “top” up. The bulb reacts to temperature. It changes the amount of gas (increase or decrease), burning warmer or cooler depending on the position of the valve SET POINT. If the bulb is cooler than it was at the SET POINT, the bulb senses the cooler temperature and opens the valve further so more heat is applied to the drying air. If the bulb is warmer than it was at the SET POINT, the valve closes further and reduces the temperature until the air is at the valve SET POINT.
3. It is important that the pressure regulator be set high enough to allow the modulating valve to deliver enough gas to maintain the plenum temperature necessary. The regulator is normally factory set at 15 PSI (propane units). To set the regulator, run the heater and turn the modulating valve T-handle in. This gets full line pressure to the burner. Then adjust regulator to read 15 PSI (depending on the plenum temperature needed).
4. Turn the fan and heater ON. To set the modulating valve, turn the T-handle out (counterclockwise) until loose and wait a few minutes for the plenum temperature to equalize. When the temperature under the bin has equalized, gradually turn T-handle in (clockwise) about 1/2 turn at a time. Wait until temperature under bin has equalized as before. If temperature under bin is less than the desired temperature, continue turning T-handle in, increasing gas flow and waiting for plenum temperature to equalize until the desired temperature is the stable temperature of the plenum. If temperature under bin is the same 10 minutes after you last made any adjustments to the T-handle you can be certain that the temperature under the bin is the SET POINT of the valve. **One (1) turn of the T-handle equals approximately 7°F of temperature.**
5. The valve will now keep the plenum temperature at the set point regardless of ambient conditions as long as humidistat or thermostat do not shut down the heater. A bypass orifice is used to maintain a small flame when outside temperature is near or above the set point of the valve. The bypass insures steady application of heat at minimum gas flow operation. Bypass orifice will only operate correctly if pressure regulator is set correctly.
6. To observe how the modulating valve increases the efficiency of bin drying, check the gas pressure of the unit in the morning and compare to the pressure read mid-afternoon. If the ambient (outside) temperature is significantly greater later in the day (as normal), the gas pressure will be less. Since less heat is required to maintain the same temperature in the plenum, the modulating valve will have reduced the amount of gas used by the heater.

BTUs per Gauge Pressure (PSI) Propane Models (Approximate)

High-Temperature

Diameter	Operating Pressure (PSI)									
	2	4	6	8	10	12	14	16	18	20
18"	416380	588680	720290	832760	930880	1019420	1107800	1174960	1244360	1340080
24"	598250	844730	1036170	1198890	1340080	1464520	1581770	1689460	1787570	1892860
26"	816010	1148640	1409480	1632030	1825860	1995762	2153700	2302070	2436070	2577260
28"	935660	1318540	1617670	1868930	2091480	2309250	2467180	2649050	2792630	2955360

Low-Temperature

Diameter	Operating Pressure (PSI)									
	2	4	6	8	10	12	14	16	18	20
18"	102900	145970	181870	208190	234510	253660	275200	294340	311090	335020
24-28"	148370	210580	258440	299130	335020	366130	394850	421170	447490	473810

Gauge Pressure (PSI) Required to Maintain Temperature (Approximate) (High-Temperature Units Only)

Fan Model	Static Pressure	Heat Rise °F						
		60	80	100	120	140	160	180
3 HP-18"	1"	2	3	4	5	6	8	9
	2"	1	1	2	3	4	5	6
	3"	Low-Temperature	Low-Temperature	1	2	2	3	3
7 HP-24"	1"	2	4	6	8	10	14	17
	2"	1	3	4	5	7	9	11
	3"	Low-Temperature	Low-Temperature	1	2	3	3	4
	4"	Low-Temperature	Low-Temperature	Low-Temperature	Low-Temperature	1	2	3
10 HP-24"	1"	4	6	9	13	18	22	26
	2"	3	5	8	10	14	18	22
	3"	2	3	4	6	8	9	11
	4"	1	2	3	4	5	6	8
15 HP-26"	1"	2	4	6	8	11	14	18
	2"	2	4	5	7	9	13	16
	3"	1	3	4	5	7	10	13
	4"	1	3	4	5	7	9	11
	5"	Low-Temperature	1	2	3	3	4	5
15 HP-28"	1"	3	4	7	9	12	16	20
	2"	2	4	6	8	11	14	18
	3"	2	3	4	5	8	10	13
	4"	1	2	3	4	6	8	10
	5"	Low-Temperature	1	2	3	3	4	5

5. Heater Operation

BTUs per Gauge Pressure (PSI) Natural Gas Models (Approximate)

High-Temperature

Diameter	Operating Pressure (PSI)						
	1	2	3	4	5	6	7
18"	454180	644780	787970	909260	1016880	1115380	1204750
24"	710450	1006850	1231200	1419980	1587790	1741920	1881456
26"	938450	1331520	1627920	1876896	2099420	2302800	2487940
28"	1022350	1450080	1772020	2043790	2285470	2507090	2708640

Low-Temperature

Diameter	Operating Pressure (PSI)						
	1	2	3	4	5	6	7
18"	144100	205200	250800	289100	322850	353860	383040
24-28"	177840	251710	308260	355680	397632	435936	470590

Gauge Pressure (PSI) Required to Maintain Temperature (Approximate) (High-Temperature Units Only)

Fan Model	Static Pressure	Heat Rise °F						
		60	80	100	120	140	160	180
3 HP-18"	1"	1	1	2	2	3	3	4
	2"	1	1	1	1	2	2	3
	3"	Low-Temperature	Low-Temperature	1	1	1	1	31
7 HP-24"	1"	1	2	2	3	4	5	6
	2"	1	1	1	2	2	3	4
	3"	Low-Temperature	Low-Temperature	1	1	1	1	2
	4"	Low-Temperature	Low-Temperature	Low-Temperature	1	1	1	1
10 HP-24"	1"	2	2	4	5	6	7	8
	2"	1	2	3	3	4	6	7
	3"	1	1	1	2	2	3	4
	4"	Low-Temperature	1	1	1	1	2	2
15 HP-26"	1"	1	2	2	3	4	5	7
	2"	1	1	2	3	3	4	5
	3"	1	1	2	2	3	3	4
	4"	1	1	1	1	2	2	3
	5"	Low-Temperature	Low-Temperature	1	1	1	1	2
15 HP-28"	1"	1	2	3	4	5	7	8
	2"	1	2	2	3	4	5	6
	3"	1	1	2	2	3	4	5
	4"	1	1	1	1	2	2	3
	5"	Low-Temperature	Low-Temperature	1	1	1	2	2

Adjusting the Vaporizer

1. Vaporizer should be adjusted so the vapor pipetrain runs warm to the touch (100°F-120°F).
2. Loosen 5/16" bolt on adjustment bracket.
3. Swivel vaporizer away from flame if running too hot, closer to flame if too cold.
4. Move vaporizer only 1" at a time and allow a few minutes for temperature to equalize.
5. Tighten 5/16" bolt and watch heater run for several minutes to verify adjustment.

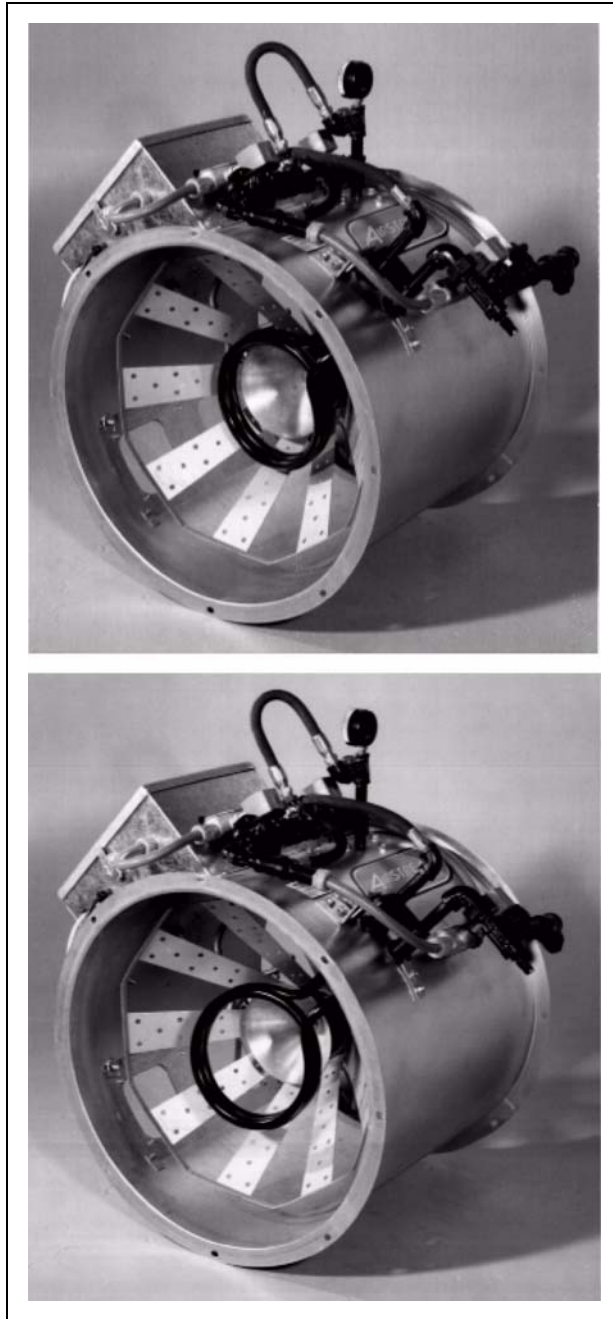
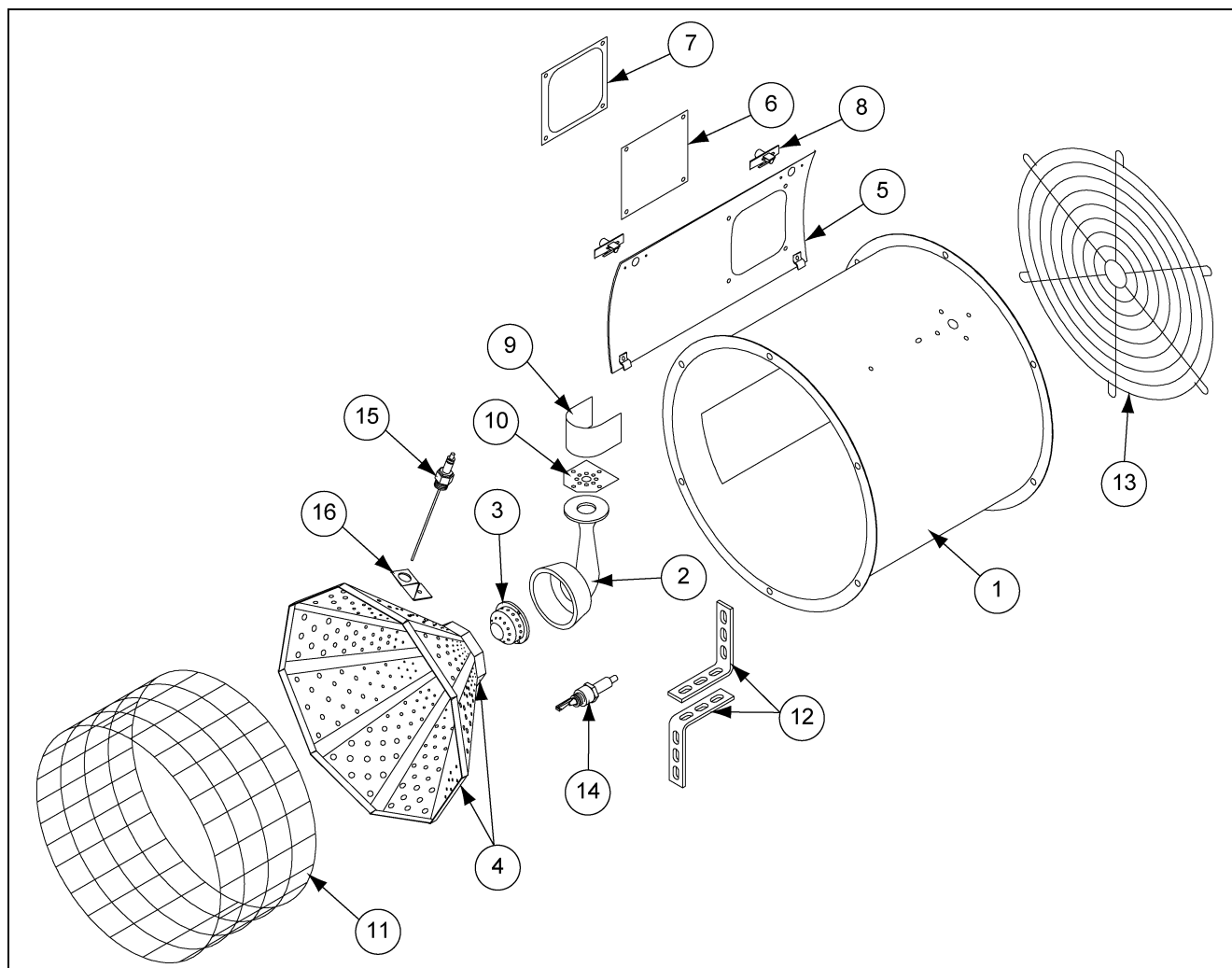


Figure 5A *Adjusting the vaporizer coil on a liquid propane model.
The top photo shows the setting in, and the bottom photo shows the coil out.*

6. Parts List

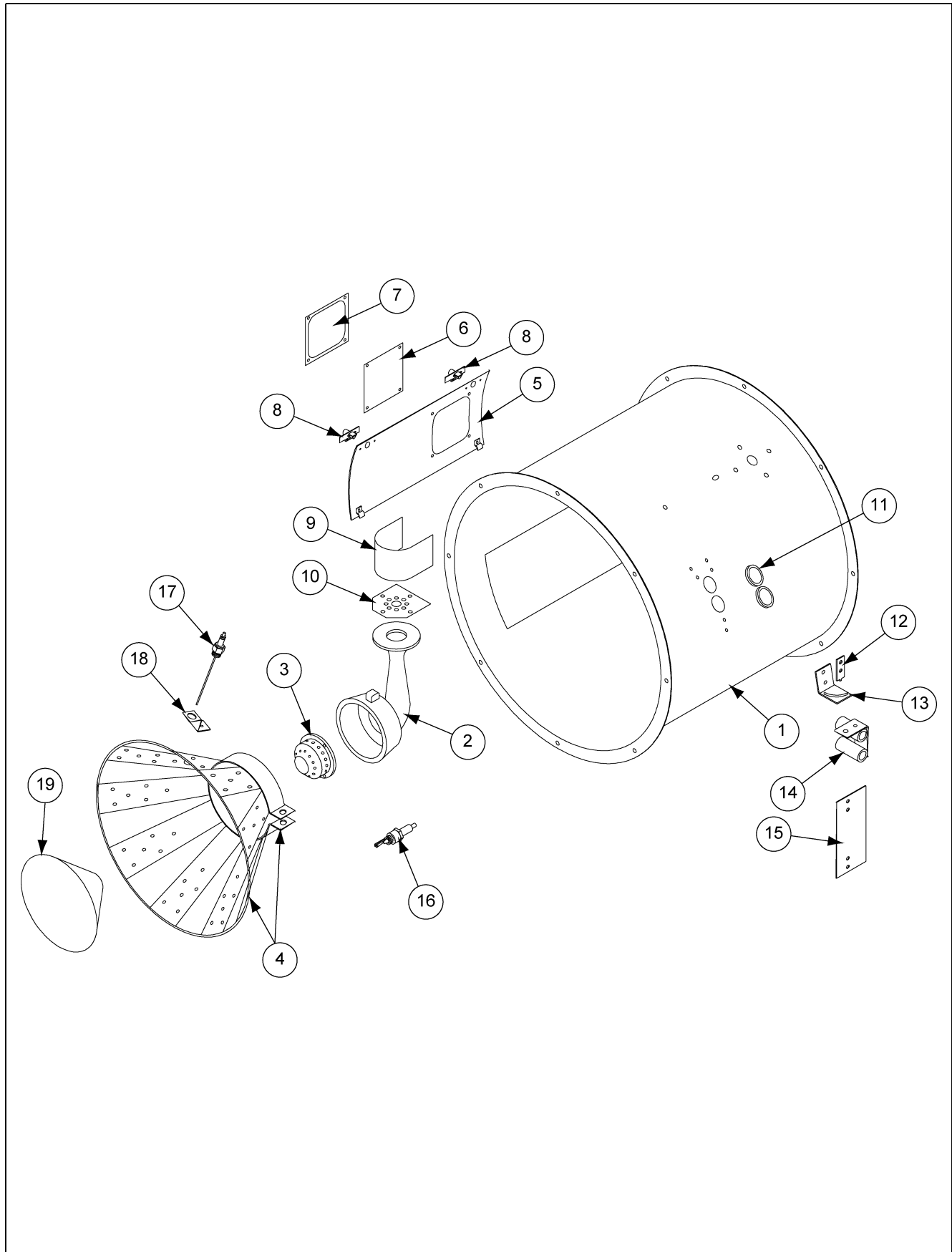
1. 18" Gas Heater
2. 24" and 26" Gas Heater
3. 28" Gas Heater
4. Control Box Parts
5. Axial Propane Vapor Pipetrain
6. Axial Natural Gas Pipetrain
7. Axial Propane Vapor High-Low Pipetrain
8. Axial Natural Gas High-Low Pipetrain
9. Axial Liquid Propane Pipetrain

18" Gas Heater



Ref #	Part #	Description
1	HF-6785	18" Heater Housing
2	HH-3933	18" Burner Casting
3	HH-1180	18" Flame Spreader
3	HH-4410	18" Low-Temperature Flame Spreader
4	HF-7078	18" Flame Diverter
4	HF-7073	18" Low-Temperature Flame Diverter
5	HF-6062-18	18" Access Panel (Deluxe, SR 2000)
6	HF-7380	Plastic View Window
7	HF-7379	Access Panel Cover Plate
8	TFH-2046	Access Panel Latch
9	HF-983	18/24" Burner Collector
10	HF-978	18/24/26" Burner Collector Plate
11	HH-4416	Drum Grill Guard (LTD)
12	HH-4421	Stand-Off Bracket (LTD)
13	F-953	18" Grill Guard (LTD)
14	HH-1650	Spark Plug
N/S	HF-1810	Spark Plug Nut
N/S	HF-7260	18-28" Heater Spark Plug Wire
N/S	HF-7262	18-28" Heater Flame Probe Wire
15	THH-4179	Flame Sensor (Deluxe, SR 2000)
16	CD-0187	Flame Sensor Bracket (Deluxe, SR 2000)

24" and 26" Gas Heater



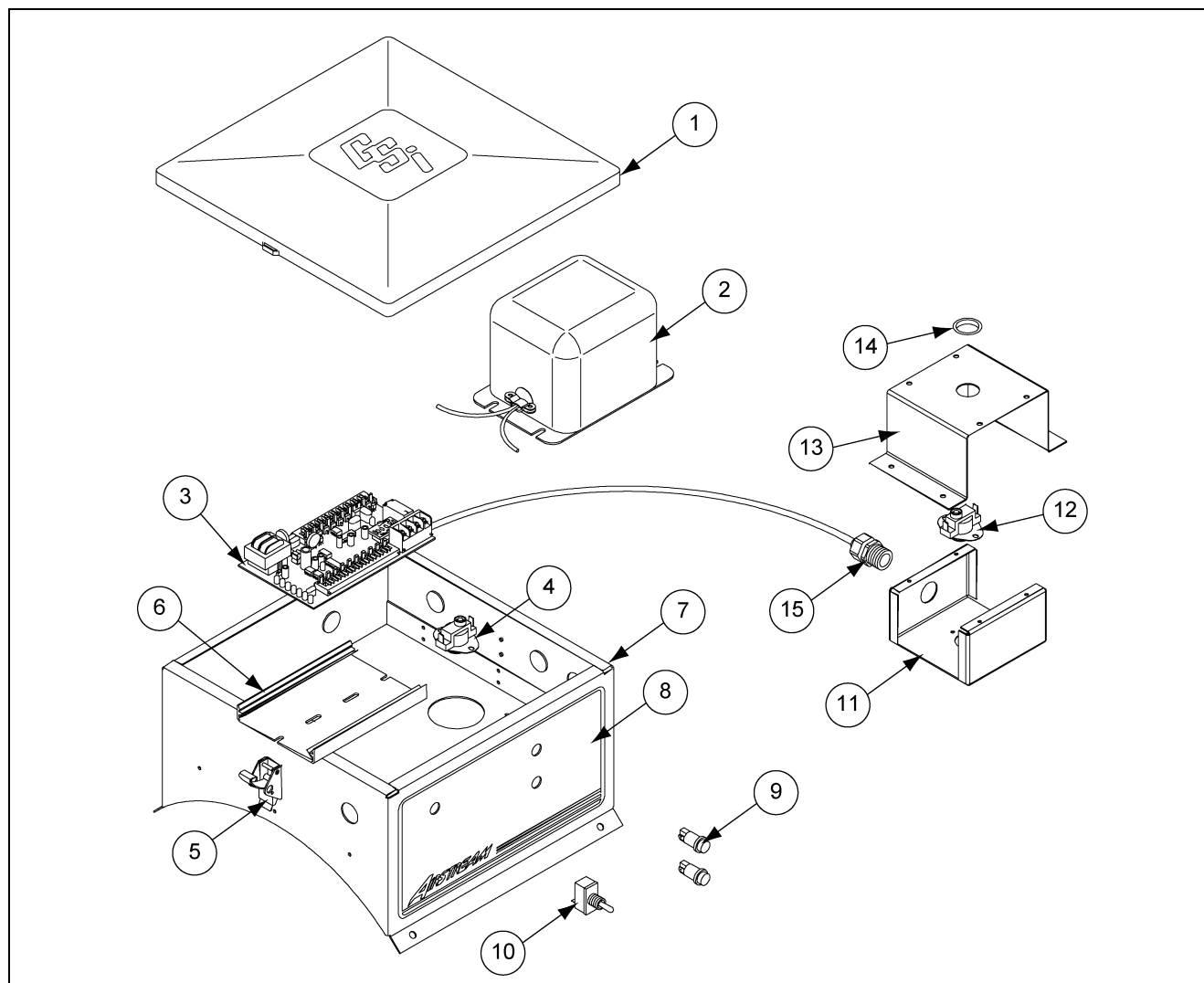
24" and 26" Gas Heater

Ref #	Part #	Description
1	HF-6175	24" Heater Housing
1	HF-6176	26" Heater Housing
2	HH-3934	24/26" Burner Casting
3	HH-1179	24/26" Flame Spreader
3	HF-6757	24/26/28" Low-Temperature Flame Spreader
4	HF-7103	24/26" Flame Diverter
4	HF-7107	24/26/28" Low-Temperature Flame Diverter
4	HF-7104	24/26" Diverter Collar
5	HF-6062-24	24" Access Panel (Deluxe, SR 2000)
5	HF-6062-26	26" Access Panel (Deluxe, SR 2000)
6	HF-7380	Plastic View Window
7	HF-7379	Access Panel Cover Plate
8	TFH-2046	Access Panel Latch
9	HF-983	18/24" Burner Collector
9	HF-986	26" Burner Collector
10	HF-978	18/24/26" Burner Collector Plate
11	HH-7016	Rubber Grommet
12	HF-7056	Pivot Bracket
13	HF-7057	Adjustment Bracket
14	HF-7060	Vaporizer Support Weldment
15	THF-3237	Vaporizer Cover
16	HH-1650	Spark Plug
N/S	HF-1810	Spark Plug Nut
N/S	HF-7260	18-28" Heater Spark Plug Wire
N/S	HF-7262	18-28" Heater Flame Probe Wire
17	THH-4179	Flame Sensor (Deluxe, SR 2000)
18	CD-0187	Flame Sensor Bracket (Deluxe, SR 2000)
19	HH-7054	24-28" Burner Cone

PNEG-581 Deluxe Vane Axial Heater

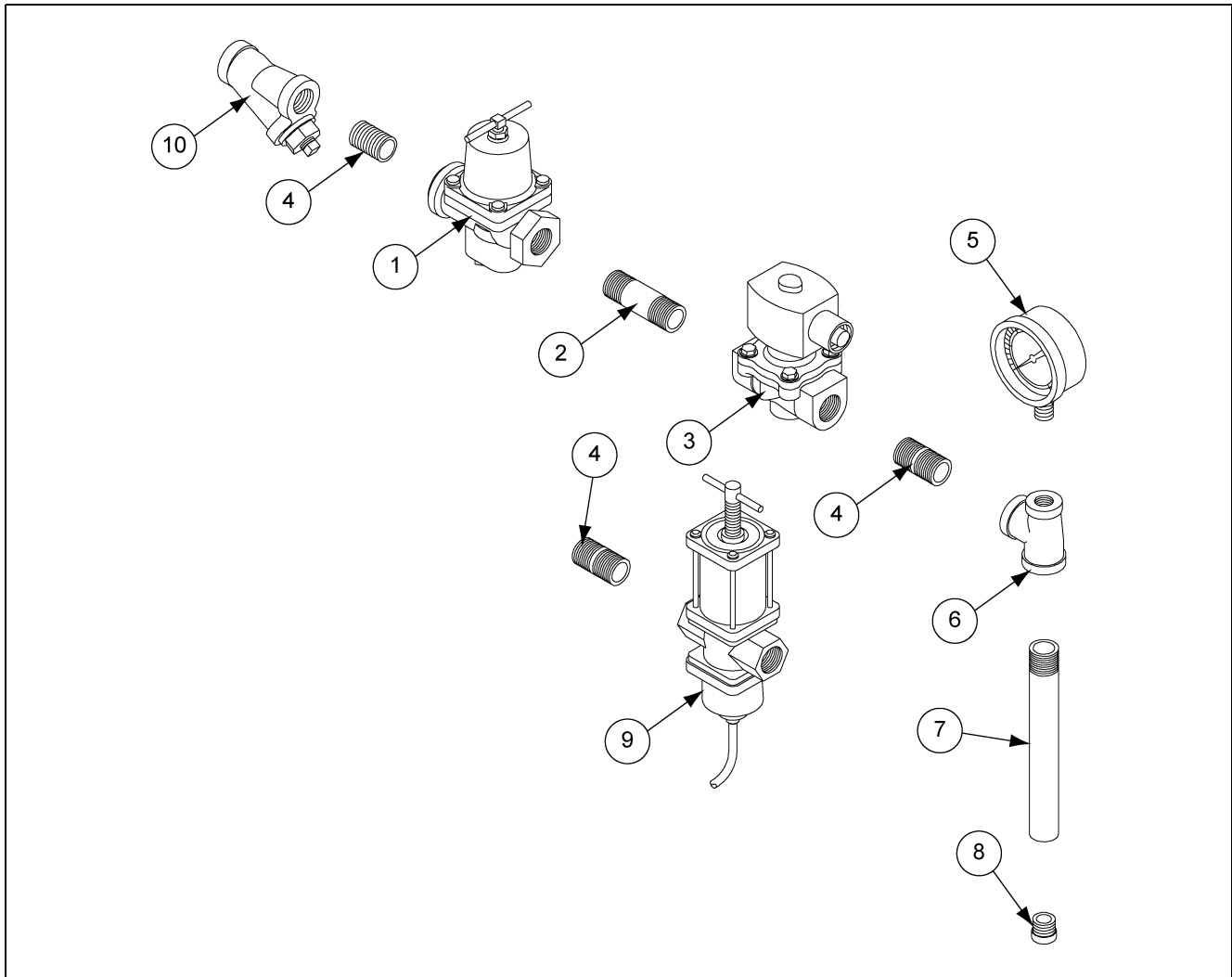


Control Box Parts



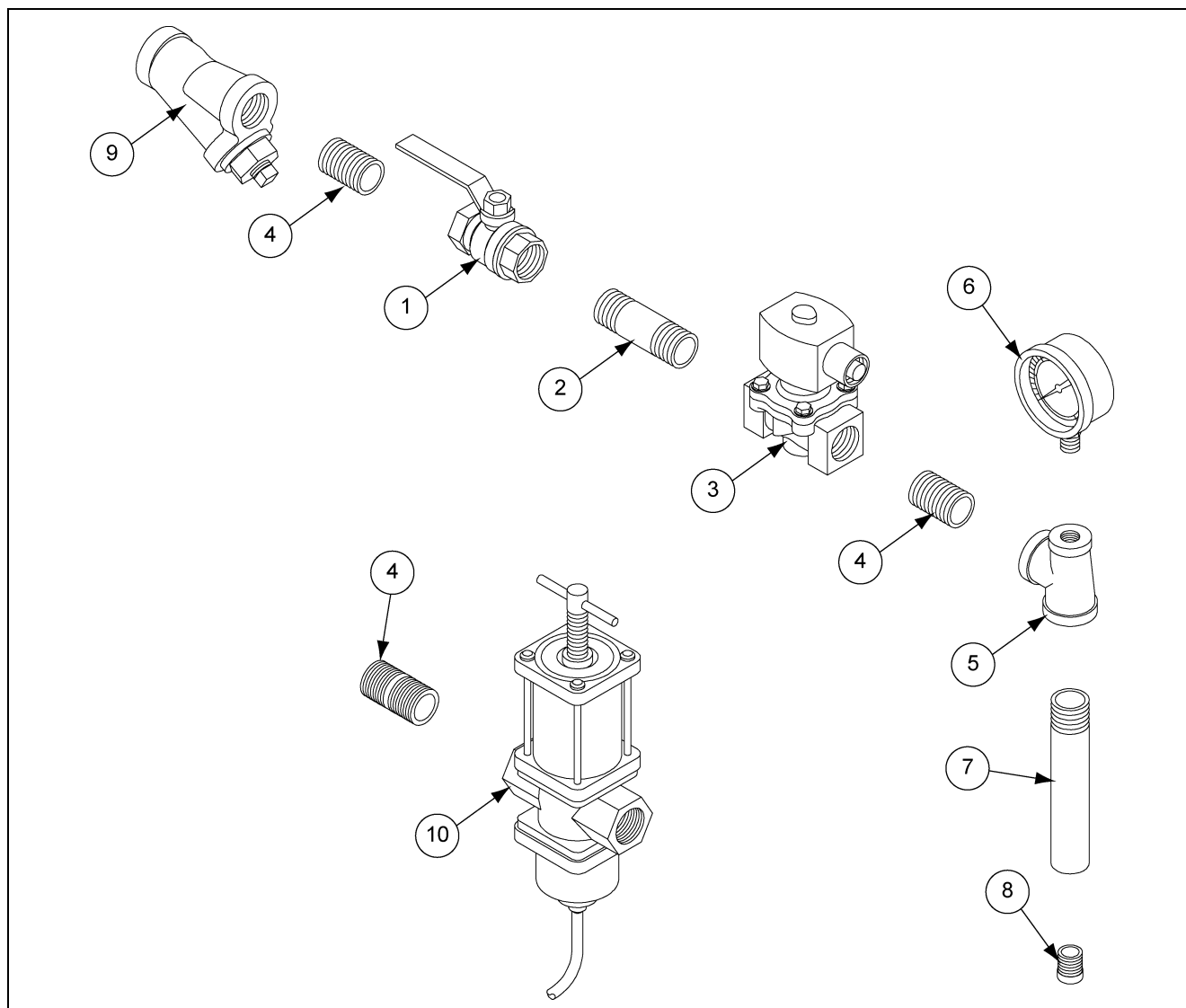
Ref #	Part #	Description
1	F-942	Control Box Lid
2	HH-1487	Ignition Transformer
3	HF-7318	Circuit Board Assembly
4	HH-1092	High-Limit Switch 180°
5	FH-4429-1	Spring Latch
6	HH-7015	Snap Trak
7	HF-7046	18" Control Box Housing
7	HF-7047	24" Control Box Housing
7	HF-7098	26" Control Box Housing
7	HF-7051	28" Control Box Housing
8	DC-1166	Decal Deluxe Heater Front Panel
9	TFH-2021	Red Light (110V)
10	HH-1442	Toggle Switch
11	HF-7455	High-Limit Switch Box Bottom
12	HF-7439	High-Limit Switch 250°
13	HF-7454	High-Limit Switch Box Top
14	HF-7414	Recessed Plastic Plug
15	TD-100282	Optional Relay
15	FH-1310	Cord Connector

Axial Propane Vapor Pipetrain



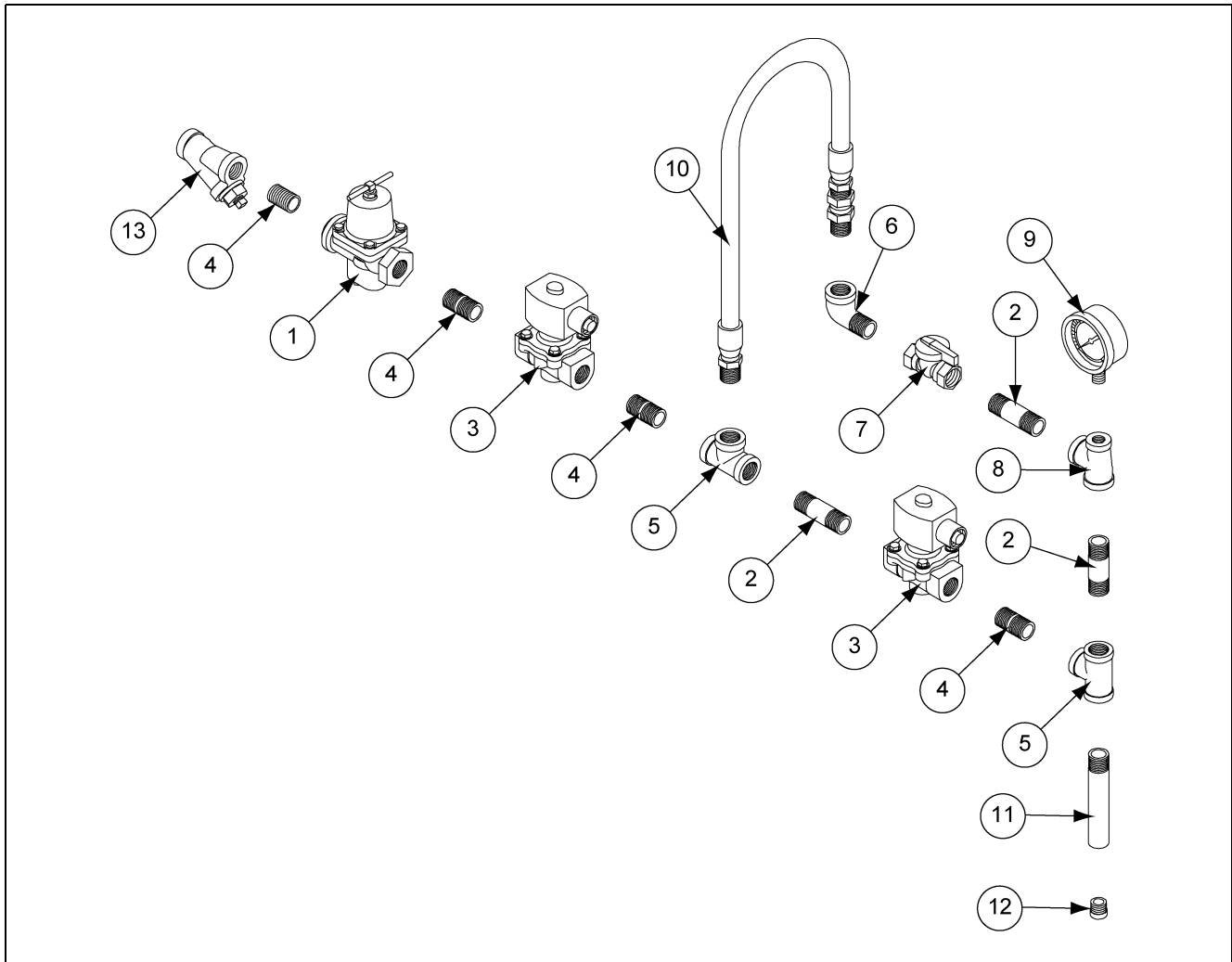
Ref #	Part #	Description
1	TFC-0023	1/2" 0-30 PSI Regulator (Deluxe, SR 2000)
2	HH-3670	1/2" x 2-1/2" Nipple
3	TFC-0032	1/2" Solenoid (Deluxe, SR 2000)
4	HH-2029	1/2" x 1-1/2" Nipple
5	HH-2984	30 PSI Gauge
6	S-3853	1/2" x 1/4" x 1/2" Tee
7	HH-1083	18/24/28" Orifice Pipe
7	HH-1107	26" Orifice Pipe
8	HF-7036	5/32" Orifice Plug (18" Standard)
8	CD-0149	5/64" Orifice Plug (18" Low-Temperature)
8	HF-7086	3/16" Orifice Plug (24" Standard)
8	HF-7084	3/32" Orifice Plug (24/26/28" Low-Temperature)
8	HF-7087	7/32" Orifice Plug (26" Standard)
8	HF-7088	15/64" Orifice Plug (28" Standard)
9	HH-2653	Modulating Valve (Optional)
10	HH-1251	1/2" Strainer

Axial Natural Gas Pipetrain



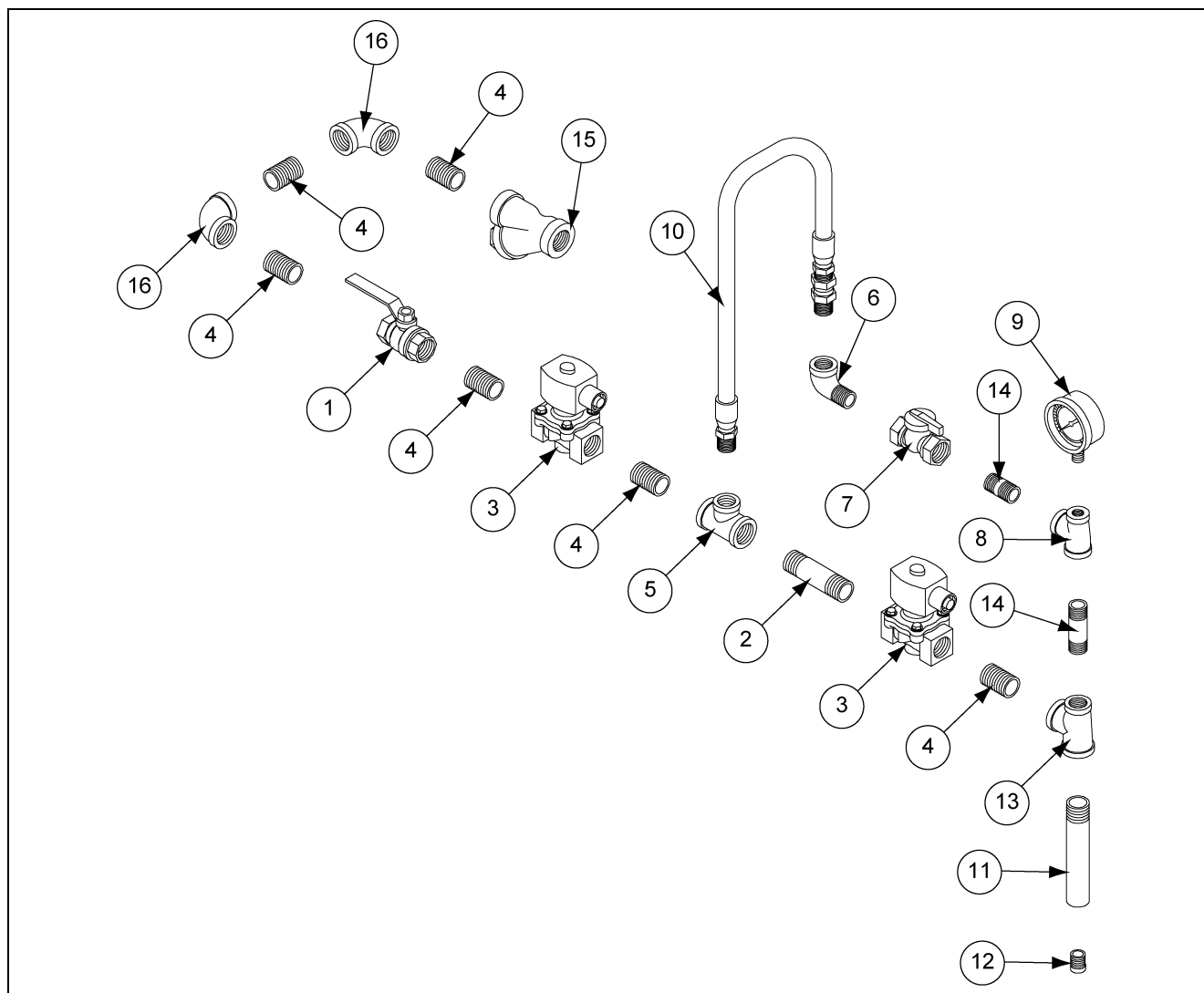
Ref #	Part #	Description
1	TFC-0051	3/4" Ball Valve
2	THH-4136	3/4" x 3" Nipple
3	TFC-0081	3/4" Solenoid (Deluxe, SR 2000)
4	THH-4121	3/4" Close Nipple
5	THH-4158	3/4" x 1/4" x 3/4" Tee
6	D08-0022	15 PSI Gauge
7	HH-7026	3/4" 18/24/28" Orifice Pipe
7	HH-7027	3/4" 26" Orifice Pipe
8	HF-7123	1/4" Orifice Plug (18" Standard)
8	HF-7124	5/16" Orifice Plug (24" Standard)
8	HF-7125	23/64" Orifice (26" Standard)
8	HF-7126	3/8" Orifice (28" Standard)
9	D67-0008	3/4" Strainer
10	HH-7064	3/4" Modulating Valve (Optional)

Axial Propane Vapor High-Low Pipetrain



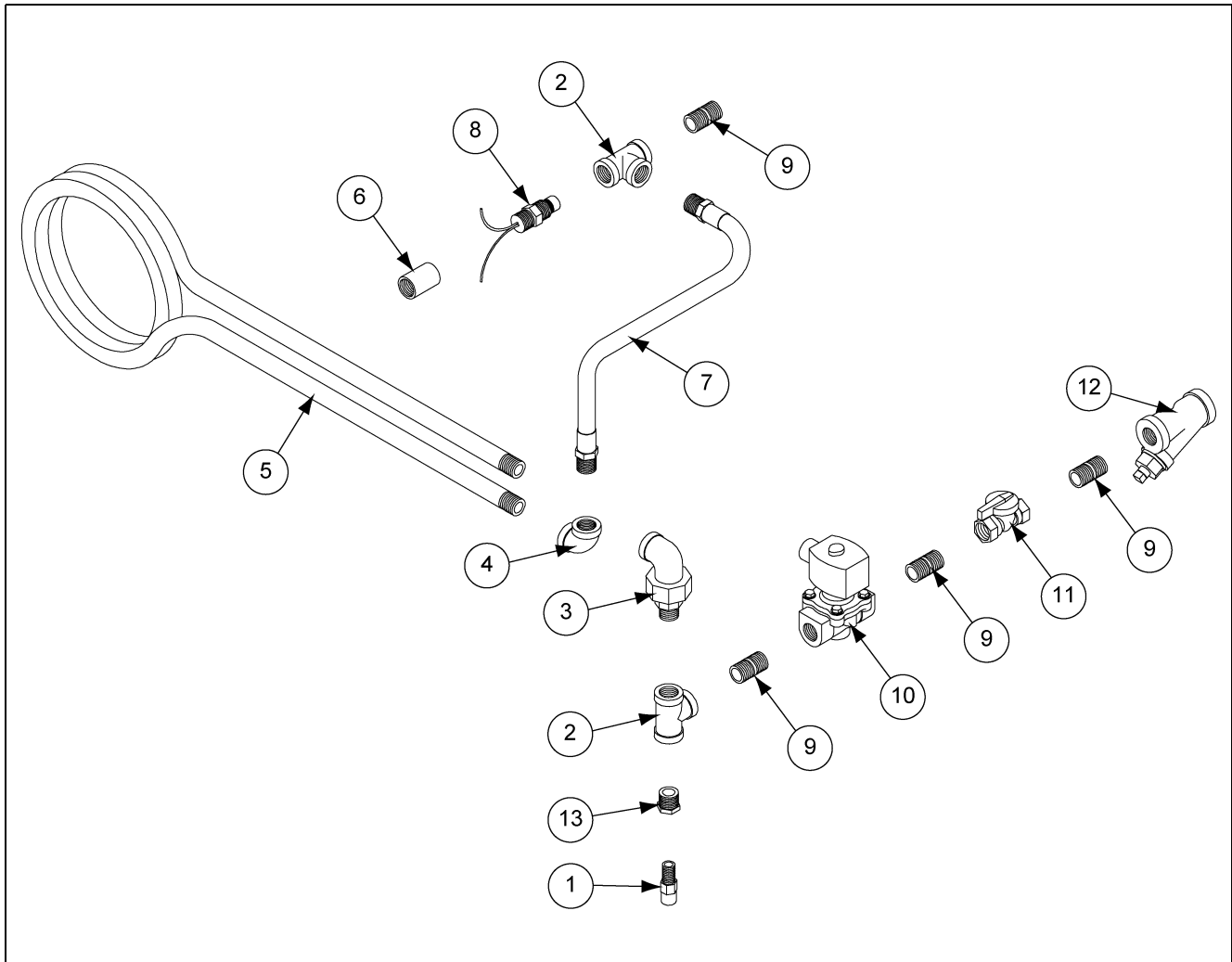
Ref #	Part #	Description
1	TFC-0023	1/2" 0-30 PSI Regulator (Deluxe, SR 2000)
2	HH-3670	1/2" x 2-1/2" Nipple
3	TFC-0032	1/2" Solenoid (Deluxe, SR 2000)
4	HH-2029	1/2" x 1-1/2" Nipple
5	HH-1453	1/2" x 1/2" x 1/2" Tee
6	THH-4067	1/2" Street Elbow
7	TFC-0030	1/2" Ball Valve
8	S-3853	1/2" x 1/4" x 1/2" Tee
9	HH-2984	30 PSI Gauge
10	HH-7019	1/2" Gas Hose
11	HH-1107	26" Orifice Pipe
11	HH-1083	18/24/28" Orifice Pipe
12	HF-7036	5/32" Orifice Plug (18" Standard)
12	HF-7086	3/16" Orifice Plug (24" Standard)
12	HF-7087	7/32" Orifice Plug (26" Standard)
12	HF-7088	15/64" Orifice Plug (28" Standard)
13	HH-1251	1/2" Strainer

Axial Natural Gas High-Low Pipetrain



Ref #	Part #	Description
1	TFC-0051	3/4" Ball Valve
2	THH-4136	3/4" x 3" Nipple
3	TFC-0081	3/4" Solenoid (Deluxe, SR 2000)
4	THH-4121	3/4" Close Nipple
5	THH-4174	3/4" x 3/4" x 1/2" Tee
6	THH-4067	1/2" Street Elbow
7	TFC-0030	1/2" Ball Valve
8	S-3853	1/2" x 1/4" x 1/2" Tee
9	D08-0022	15 PSI Gauge
10	HH-7019	1/2" Gas Hose
11	HH-7026	3/4" 18/24/28" Orifice Pipe
11	HH-7027	3/4" 26" Orifice Pipe
12	HF-7123	1/4" Orifice Plug (18" Standard)
12	HF-7124	5/16" Orifice Plug (24" Standard)
12	HF-7125	23/64" Orifice (26" Standard)
12	HF-7126	3/8" Orifice (28" Standard)
13	D18-0002	3/4" x 1/2" x 3/4" Tee
14	HH-3670	1/2" x 2-1/2" Nipple
15	D67-0008	3/4" Strainer

Axial Liquid Propane Pipetrain



Ref #	Part #	Description
1	HH-4845	1/4" Relief Valve
2	THH-4058	1/2" x 1/2" x 1/2" Tee SCH 80
3	THH-4089	1/2" Male Union Elbow SCH 80
4	THH-4071	1/2" Elbow SCH 80
5	CD-0198	Vaporizer Coil
6	D67-0005	1/2" Coupling
7	D07-0009	5/16" x 24" LP Gas Hose
8	HH-7013	200° Vapor High-Limit
9	D07-0019	1/2" x 1-1/2" Nipple SCH 80
10	TFC-0092	1/2" Solenoid Valve 300 PSI
11	TFC-0030	1/2" Ball Valve
12	HH-1251	1/2" Strainer
13	THH-4023	1/2" x 1/4" Reducer Bushing



Limited Warranty

The GSI Group, LLC. ("GSI") warrants products which it manufactures to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months after sale to the original end-user or if a foreign sale, 14 months from arrival at port of discharge, whichever is earlier. The end-user's sole remedy (and GSI's only obligation) is to repair or replace, at GSI's option and expense, products that in GSI's judgment, contain a material defect in materials or workmanship. Expenses incurred by or on behalf of the end-user without prior written authorization from the GSI Warranty Group shall be the sole responsibility of the end-user.

Warranty Extensions: The Limited Warranty period is extended for the following products:

	Product	Warranty Period
AP Fans and Flooring	Performer Series Direct Drive Fan Motor	3 Years
	All Fiberglass Housings	Lifetime
	All Fiberglass Propellers	Lifetime
Cumberland Feeding/Watering Systems	Feeder System Pan Assemblies	5 Years **
	Feed Tubes (1.75" & 2.00")	10 Years *
	Centerless Augers	10 Years *
	Watering Nipples	10 Years *
Grain Systems	Grain Bin Structural Design	5 Years
Grain Systems Farm Fans Zimmerman	Portable & Tower Dryers	2 Years
	Portable & Tower Dryer Frames and Internal Infrastructure †	5 Years

* Warranty prorated from list price:

0 to 3 years – no cost to end-user
 3 to 5 years – end-user pays 25%
 5 to 7 years – end-user pays 50%
 7 to 10 years – end user pays 75%

** Warranty prorated from list price:

0 to 3 years – no cost to end-user
 3 to 5 years – end-user pays 50%

† Motors, burner components and moving parts not included. Portable Dryer screens included. Tower Dryer screens not included.

GSI further warrants that the portable and tower dryer frame and basket, excluding all auger and auger drive components, shall be free from defects in materials for a period of time beginning on the twelfth (12th) month from the date of purchase and continuing until the sixtieth (60th) month from the date of purchase (extended warranty period). During the extended warranty period, GSI will replace the frame or basket components that prove to be defective under normal conditions of use without charge, excluding the labor, transportation, and/or shipping costs incurred in the performance of this extended warranty.

Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH ABOVE. SPECIFICALLY, GSI MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (i) PRODUCT MANUFACTURED OR SOLD BY GSI OR (ii) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

GSI shall not be liable for any direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. The sole and exclusive remedy is set forth in the Limited Warranty, which shall not exceed the amount paid for the product purchased. This warranty is not transferable and applies only to the original end-user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor.

GSI assumes no responsibility for claims resulting from construction defects or unauthorized modifications to products which it manufactured. Modifications to products not specifically delineated in the manual accompanying the equipment at initial sale will void the Limited Warranty.

This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained. This Limited Warranty extends solely to products manufactured by GSI.

Prior to installation, the end-user has the responsibility to comply with federal, state and local codes which apply to the location and installation of products manufactured or sold by GSI.

This equipment shall be installed in accordance with the current installation codes and applicable regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

G S I G R O U P



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