Farm Fans Combined Fan/Heater

Installation and Operation Manual

PNEG-1523

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PNEG-1523

All information, illustrations, photos, and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

Contents

Safety Guidelines

Safety guidelines are general-to-specific safety rules that must be followed at all times. This manual is written to help you understand safe operating procedures and problems that can be encountered by the operator and other personnel when using this equipment. Save these safety guidelines for future reference.

As owner or operator, you are responsible for understanding the requirements, hazards, and precautions that exist and to inform others as required. Unqualified persons must stay out of the work area at all times.

Alterations must not be made to the equipment. Alterations can produce dangerous situations resulting in SERIOUS INJURY or DEATH.

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

When necessary, you must consider the installation location relative to electrical, fuel and water utilities.

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

ST-0001-3

Cautionary Symbols Definitions

Cautionary symbols appear in this manual and on product decals. The symbols alert the user of potential safety hazards, prohibited activities and mandatory actions. To help you recognize this information, we use the symbols that are defined below.

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

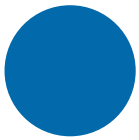
WARNING — This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**

CAUTION — This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**

NOTICE — This symbol is used to address practices not related to personal injury.

This symbol indicates a general hazard.

This symbol indicates a prohibited activity.



This symbol indicates a mandatory action.

ST-0005-2

Safety Cautions

Use Personal Protective Equipment

- Use appropriate personal protective equipment:

Eye Protection

Respiratory Protection

Foot Protection

Hearing Protection

Head Protection

Fall Protection

Hand Protection

- Wear clothing appropriate to the job.
- Remove all jewelry.
- Tie long hair up and back.

ST-0004-1

Follow Safety Instructions

- Warning: If the information in the manual is not followed exactly, a fire or explosion can result, causing property damage, personal injury or loss of life.
- 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.
- If you do not understand any part of this manual or need assistance, contact your dealer.
- Retain these instructions for future reference.

ST-0025-3

Prevent Roof Damage Due to Vacuum Pressure

- Roof damage can result from excessive vacuum or internal pressure from fans or other air moving systems. The manufacturer does not warrant this type of roof damage.
- Adequate ventilation or “makeup air” devices must be provided for all powered air handling systems.
- The manufacturer does not recommend the use of downward flow systems (suction).
- Severe roof damage can result from any blockage of air passages.
- Operating fans during high humidity or cold weather conditions can cause air exhaust or intake ports to freeze.

ST-0028-2

Exercise Caution When Drying Flammable Grains

- Be aware that some grains are highly flammable including but not limited to rapeseed, canola, linseed, sunflower and milo.
- All grain and seed must be whole (minimal cracking or crushing), clean, and dust free before drying.
- Avoid dust and chaff from being drawn into the fan and heater.
- To reduce risk of fire, keep the fan, heater, drying plenum and ducts clean at all times.
- In the event of a fire (or suspected fire):
  1. Shut down the entire dryer.
  2. Turn OFF the fuel at the tank or supply valve.
  3. Shut off and lock electrical power.
  4. Evacuate the area.
  5. Call the fire department.

ST-0032-1

Install and Operate Equipment Properly

- Before attempting to remove and reinstall the fan blade, contact GSI for the recommended procedure.

ST-0033-2

Maintain Equipment and Work Area

- Understand service procedures before doing work.
- Keep area clean and dry.
- Do not service equipment while it is operating. Disconnect and lock-out power and fuel supply before entering equipment or before performing maintenance.
- Keep your equipment in proper working condition. Replace worn or broken parts immediately.
- Depressurize the fuel train before disassembling for service.
- Allow the fan to operate for 20 minutes with the burner off to purge products of combustion and to cool the components before entering.
- Check regularly for any developing gas plumbing leaks. Do not operate the dryer if any gas leak is detected. Shut down and repair before further operation.

ST-0030-2

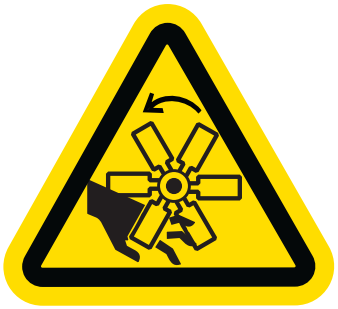
Handle and Use Equipment Properly

- Equipment is intended for the use of grain drying only. Any other use is a misuse of this equipment.
- The operating instructions in this manual pertain to the common cereal grains as indicated. When drying any other grain, contact GSI for additional recommendations.
- On LP fired units, set pressure regulator to avoid excessive gas pressure applied to the burner during ignition and operation. Do not exceed maximum recommended drying temperatures.
- Equipment has sharp edges that can cause serious injury. To avoid injury, handle sharp edges with caution and use proper protective clothing and equipment at all times.
- All guards must be in place before and during operation. Images of guards removed in this manual are for illustration purposes only.
- Use caution when working around high-speed fans, gas burners, augers and auxiliary conveyors which can start automatically.
- Keep hands, feet, and clothing away from moving parts.
- Do not bypass any safety device or interlock.
- Do not enter the dryer or bin while it is operating.
- Do not operate in an area where combustible material will be drawn into the dryer.

ST-0029-2

Keep Hands Away from Moving Parts

- Do not operate the fan with electrical or mechanical guards removed. Serious injury or death can result.
- Do not put hand or arm in fan. Rotating parts can crush and dismember.
- Do not put any kind of tool inside the fan to clear debris while the fan is operating. Damage to the equipment will result.
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.



ST-0020-2

Install and Operate Gas-Fired Equipment Properly

- Gas-fired equipment should be installed by a qualified pipe fitter and must conform with local codes.
- For Canada: The equipment shall be installed in accordance with the *Natural Gas and Propane Installation Code, CSA B149.1, or the Propane Storage and Handling Code, CSA B149.2,* or applicable provincial regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.
- For the United States: The equipment shall be installed in accordance with the *National Fuel Gas Code ANSI Z223.1/NFPA 54.*

ST-0016-2

For Your Safety

- If you smell gas:
  - Do not try to light any appliance.
  - Extinguish any open flames.
  - Do not touch any electrical switch.
  - Immediately call your gas supplier. Follow the gas supplier's instructions.
  - If you cannot reach your gas supplier, call the fire department.

- The use and storage of gasoline and other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.
- Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

ST-0024-1

Install and Operate Electrical Equipment Properly

- Electrical controls must be installed by a qualified electrician and must meet the standards set by applicable local codes (National Electrical Code for the US, Canadian Electric Code, or EN60204 along with applicable European Directives for Europe).
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.
- Make sure all equipment and bins are properly grounded.

ST-0075-1

Safety Sign-Off Sheet

Below is a sign-off sheet that can be used to verify that all personnel have read and understood the safety instructions. This sign-off sheet is provided for your convenience and personal record keeping.

Date	*Employee Name*	*Supervisor Name*

ST-0007

The GSI 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 rotating blade, fire warning decals and voltage danger decal must be displayed on the fan can. The decal DC-GBC-1A should be present on the inside bin door cover of the 2 ring door, 24" porthole door cover and the roof manway cover.

If a decal is damaged or is missing contact:

GSI Decals
1004 E. Illinois St.
Assumption, IL. 62510
Phone: 1-217-226-4421

A free replacement will be sent to you.

Decal No.	Decal	Description
DC-1224		Decal Danger Hi-Voltage (LG)
DC-1225		Decal Warning Rotating Blade

Decal No.	Decal	Description
DC-1227		Decal Warning Fire (small)
DC-GBC-1A		Danger Keep Clear of Auger

Fan/Heater Mounting

1. Inspect the fan platform for proper installation per instructions in the bin erection manual.
2. Raise the fan/heater units to the platform.
3. Mount the fan/heater units to the bin entrance sheets. Fan legs should set on the platform.

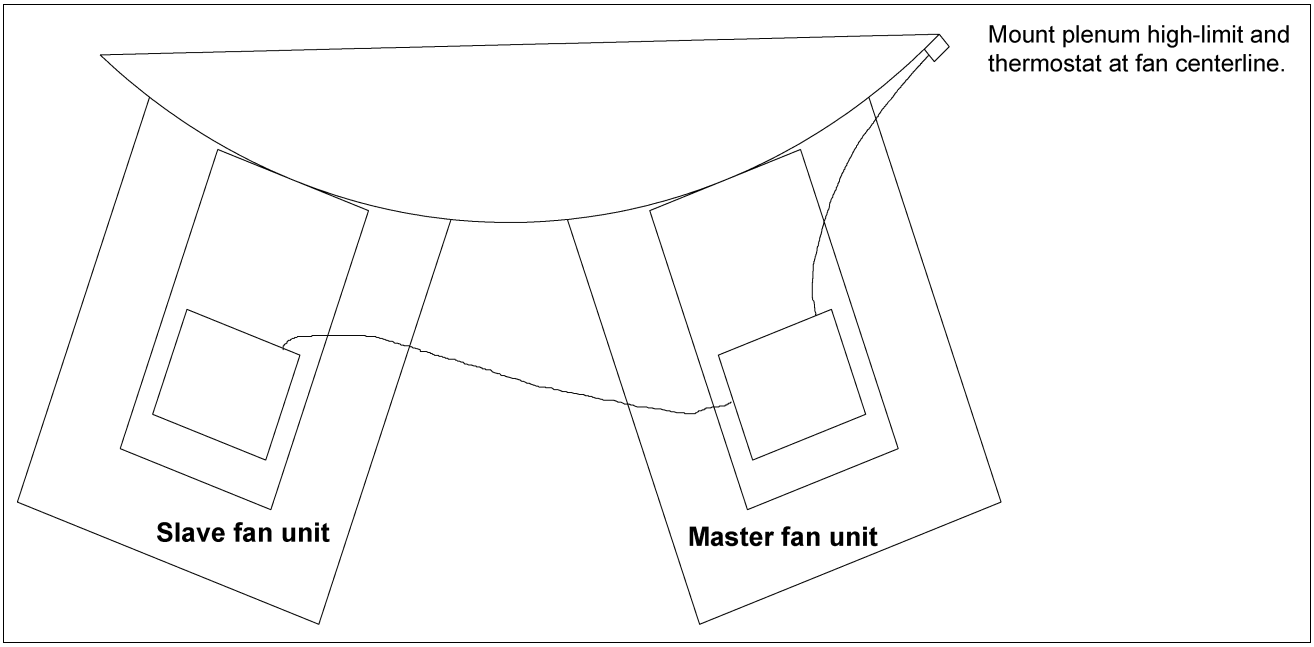


Figure 3A

Fan/Heater Unit Installation Dimensions

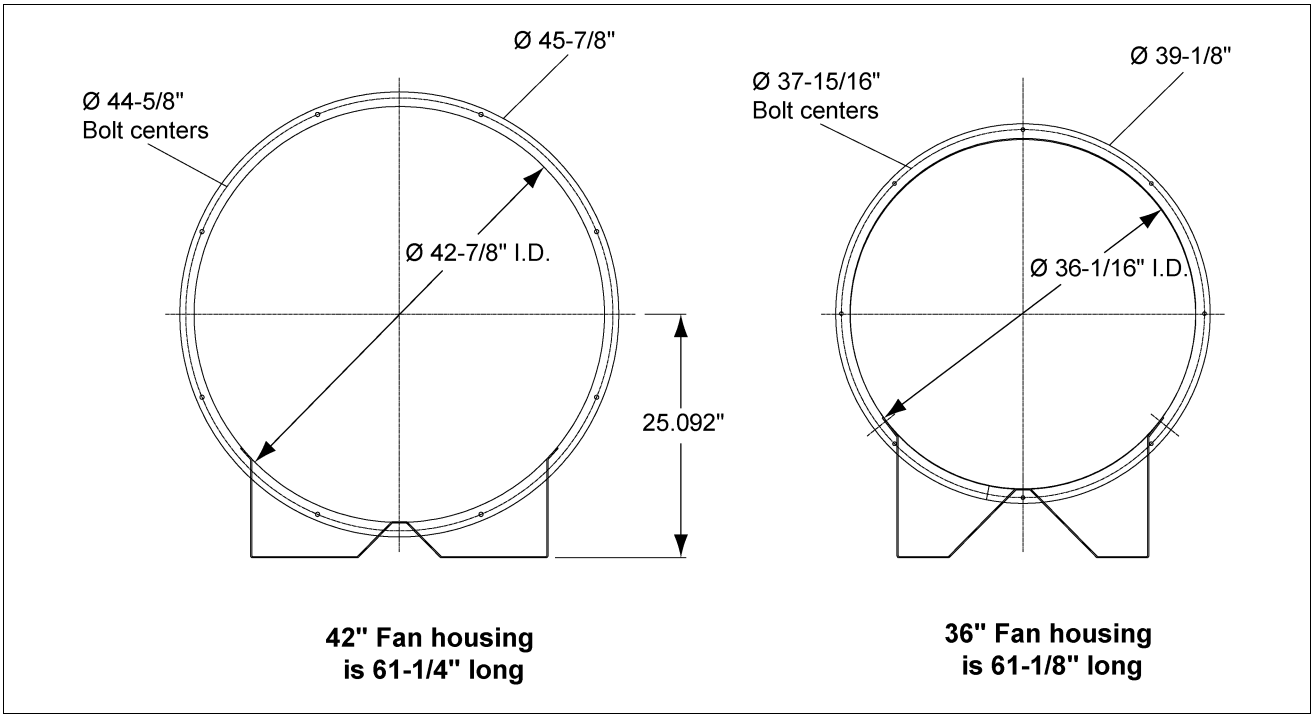


Figure 3B

Duct and Drying Fan Pad Optional

Placement of the duct fan pad: GSI top dry duct system only.

Refer to *Figure 3C* to determine the duct pad size. The top of this pad should be level with the top of the bin's foundation. Recommended pad thickness is 4" minimum.

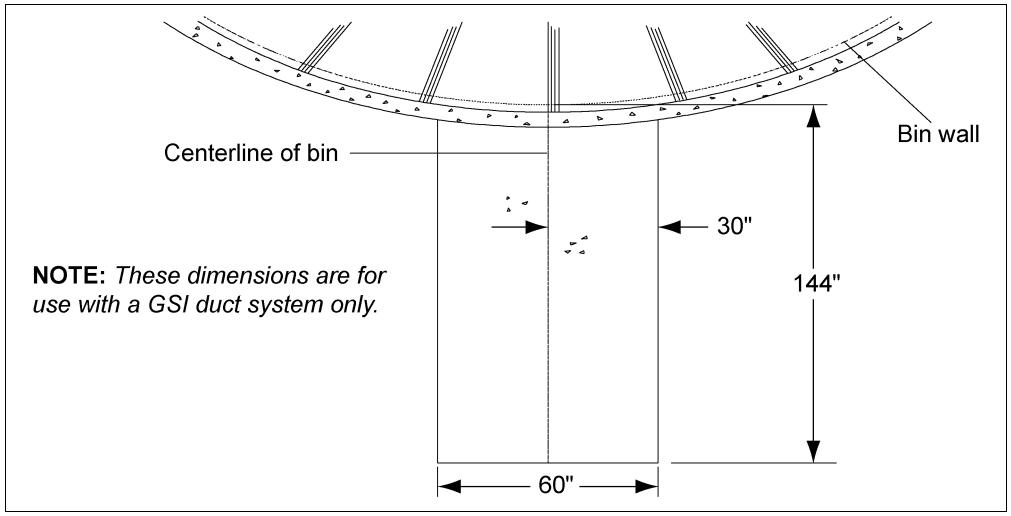


Figure 3C

Fuel System Specifications and Recommendations Liquid Propane (LP)

Dryer Fan Size	Dryer Horsepower	Maximum Heat Capacity BTU per Hour	Maximum Fuel Flow Gallons per Hour	Minimum Line Size	Orifice Size	Minimum Operating Pressure (PSI)	Maximum Operating Pressure (PSI)
36"	15	4-1/2 Million	54	1/2"	21/64"	1 lb.	15 lbs.
42"	30	8-3/4 Million	95	1/2"	7/16"	1 lb.	15 lbs.

These fan/heater units have internal vaporizers and they are designed to operate on liquid draw from the supply 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 tanks or lines may freeze when the system is used in cold weather. To avoid this situation, purge the system with methanol. Also do not make any line size changes from the supply tank to the burner. This can cause premature vaporizing of the fuel and will result in burner failure.

WARNING

Do not use tanks which have been used for ammonia or fertilizer solutions. These substances are extremely corrosive and will damage fuel supply and burner parts.

Because the vaporizer coil may need to be adjusted during operation flexible hose suitable for LP should be used for the final field connection. See the *above* Fuel Systems Specifications and Recommendations chart for Liquid Propane (LP) to determine the correct size line to run from the tank to the dryer. Installation and maintenance should be performed only by qualified personnel. Installation must meet the requirements and provisions of NFPA #54, NFPA #58, DOT, ANSI and all applicable federal, state, provincial and local standards, codes, regulations and laws. 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.

WARNING

Do not use flame for leak testing.

WARNING ***Pressure relief valve should always be pointed away from the user. If the pipe train is altered for installation purposes it is up the installer or end user to position or add additional plumbing to direct the pressure relief valve away from the user.***

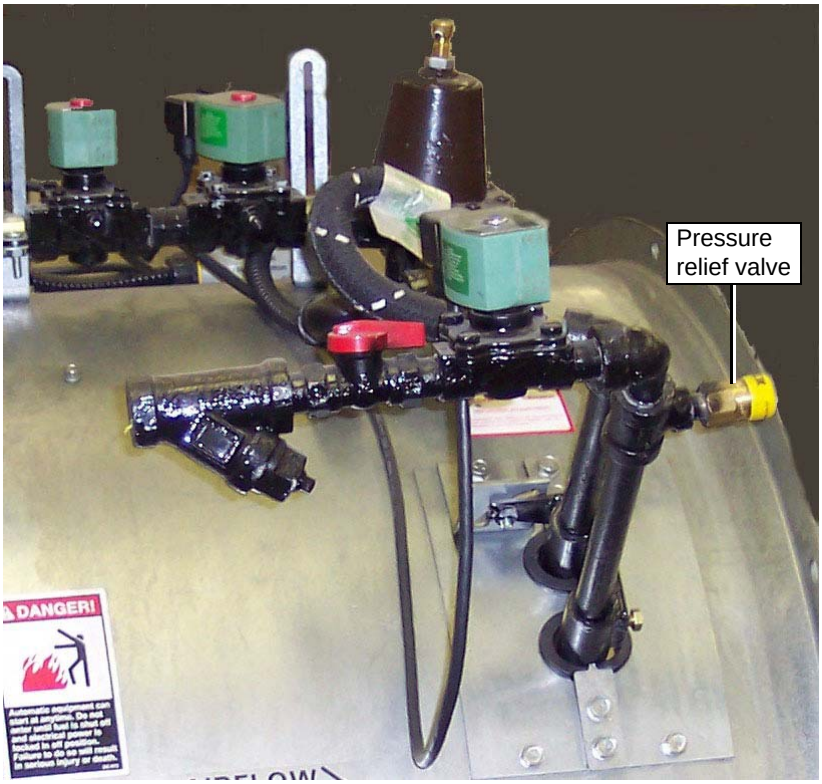


Figure 3D *LP Line Field Connection*

Fuel System Specifications and Recommendations Natural Gas (NG)

Dryer Fan Size	Dryer Horsepower	Maximum Heat Capacity BTU per Hour	Maximum Fuel Flow Cubic Ft. per Hour	Minimum Line Size	Orifice Size	Minimum Operating Pressure (PSI)	Maximum Operating Pressure (PSI)
36"	15	5 Million	5280	2"	1/2"	1 lb.	7 lbs.
42"	30	9 Million	9536	2"	43/64"	1 lb.	7 lbs.

Natural gas units have a larger orifice to accommodate lower pressures sometimes found with natural gas and do not have vaporizer coils like liquid propane units. A regulated pressure of 10 PSI minimum, 30 PSI maximum must be provided at the field connection point on the fan/heater unit, with gas available in sufficient volume to maintain the operating pressure.

See the *above* Fuel Systems Specifications and Recommendations chart for Natural Gas (NG) to determine the correct size line to run to the dryer. Have a qualified gas service person inspect the installation to be sure everything is installed according to local codes and ordinances. After installation is complete check all connections for leaks with liquid detergent or comparable. Wear rubber gloves and eye protection.

WARNING ***Do not use flame for leak testing.***

Electrical Load Information

The following charts provide information for the electrician wiring the grain dryer and are a reference guide for parts. It is recommended that you contact the local power company and have a representatives survey the installation to see that the wiring is compatible with their system and that adequate power is supplied to the unit. **NOTE:** *The only thing connected to the recommended service amps should be the grain dryer.* Standard electrical safety should be used. (Refer to the National Electrical Code Standard Handbook by the National Fire Protection Association.) A qualified electrician should make all electrical wiring installations.

Dryer Fan Size	Voltage	Horsepower	Full Load Amps	Fuse (Slow-Blow)	Breaker
36"	230V 1 PH	10-16	78	150	150
	230V 3 PH	15	39	125	125
	460V 3 PH	30	20	50	50
42"	230V 3 PH	30	74	150	150
	460V 3 PH	30	37	100	100

Power Supply

An adequate power supply and proper wiring are important factors for maximum performance and long life of the dryer. Electrical service must be adequate enough to prevent low voltage damage to motors and control circuits. *(See Electrical Load Information.)*

Transformer and Wiring Voltage Drop

It is necessary to know the distance from the unit to the available transformer and the horsepower of the fan unit. Advise the service representative of the local power supplier that an additional load will be placed on the line. Each fan motor should be wired through a fused or circuit breaker disconnect switch. Check on KVA rating of transformers, considering total horsepower load. The power supply wiring, main switch equipment and transformers must provide adequate motor starting and operating voltage. Voltage drop during motor starting should not exceed 14% of normal voltage and after motor is running at full speed it should be within 8% of normal voltage. Check electrical load information for HP ratings and maximum amp loads to properly size wire and fusing elements. Standard electrical safety practices and codes should be used. (Refer to National Electrical Code Standard Handbook by National Fire Protection Association.)

Machine to Earth Grounding

It is very important that a *machine to earth ground rod* be installed at the fan. This is true even if there is a ground at the pole 15' away. Place the ground rod within 8' of the dryer and attach it to the dryer control panel with at least a #6 solid, bare, copper ground wire and the clamp provided. The grounding rod located at the power pole will not provide adequate grounding for the dryer. The proper grounding will provide additional safety in case of any short and will ensure long life of all circuit boards and the ignition system. The ground rod must be in accordance with local requirements.

Proper Installation of Ground Rod

It is not recommended that the rod be driven into dry ground.

Follow these instructions for proper installation:

1. Dig a hole large enough to hold 1 to 2 gallons of water.
2. Fill hole with water.
3. Insert rod through water and jab it into the ground.
4. Continue jabbing the rod up and down. The water will work its way down the hole, making it possible to work the rod completely into the ground. This method of installing the rod gives a good conductive bond with the surrounding soil.
5. Connect the bare, copper ground wire to the rod with the proper ground rod clamp. *(See Figure 3E.)*
6. Connect the bare, copper ground wire to the fan control boxes with a grounding lug.
7. Ground wire must not have any breaks or splices.

Dig a hole large enough to hold 1 or 2 gallons of water. Work the ground rod into the earth until it is completely in the ground.

Figure 3E

Main Power Schematic

Figure 3F details the configuration for correct main power installation. Use the diagram in conjunction with the electrical load information and wire size information provided. The diagram details the correct main power installation for 220V 1 PH, 220V 3 PH, 460V 3 PH, 575V 3 PH and 380V 3 PH 50 Hz power supplies.

On all 3 phase systems put the leg with the highest potential difference between that leg and ground (wild or high voltage leg) on the center terminal (L2) at the motor starter.

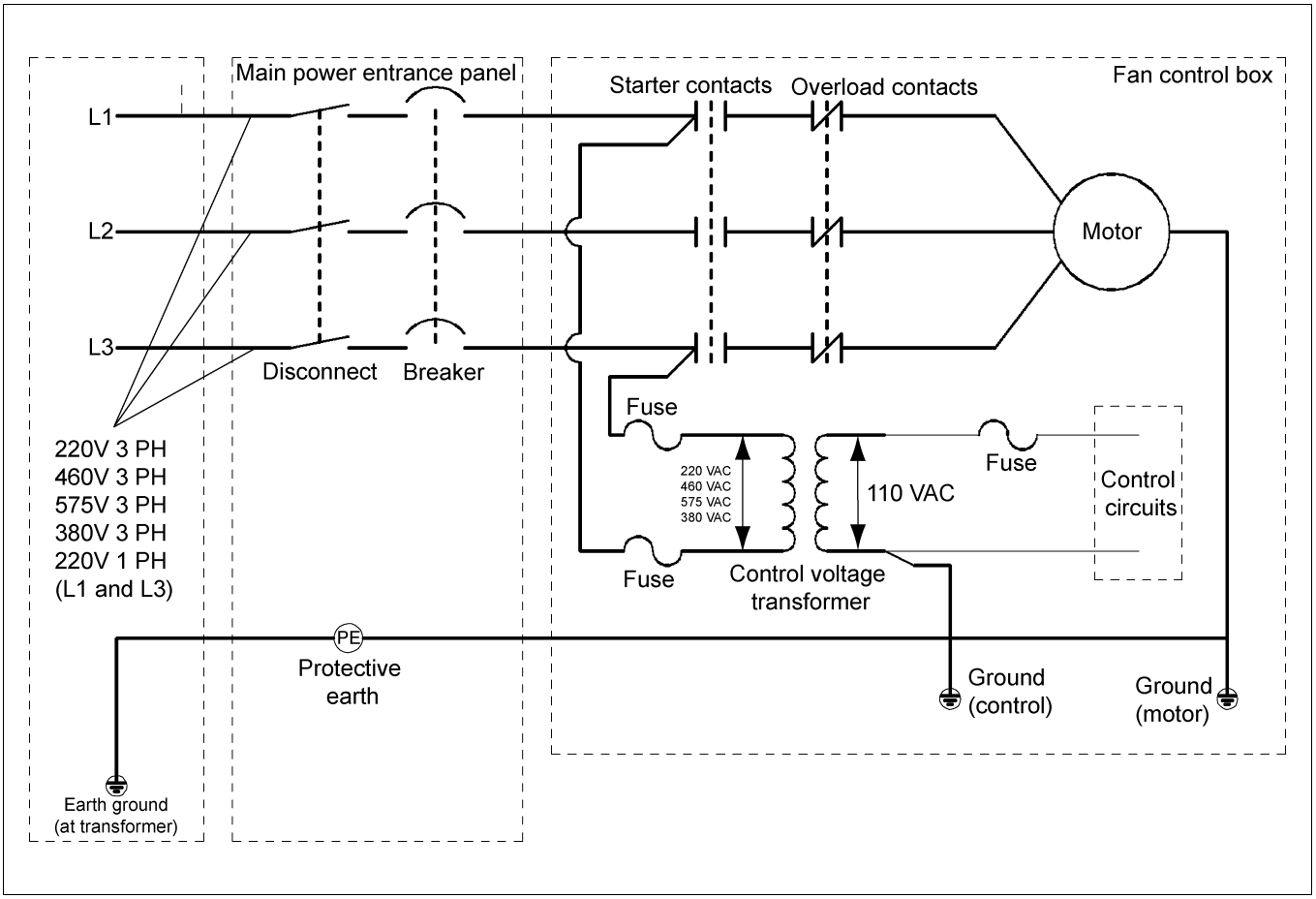


Figure 3F

WARNING

Standard electrical safety should be used. (Refer to the National Electrical Code Standard Handbook by the National Fire Protection Association.) A qualified electrician should make all electrical wiring installations. Follow all local or national electrical safety standards and ordinances when installing the equipment.

Thermostat Connections

The cycle thermostat will connect to terminals 15 and 16. The plenum high-limit will be connected to terminals 13 and 14. Be sure to remove jumpers from terminals 2 and 3 and 4 and 5 when connecting to a DCT-102A control or a manual control center. *(See Figure 3G.)*

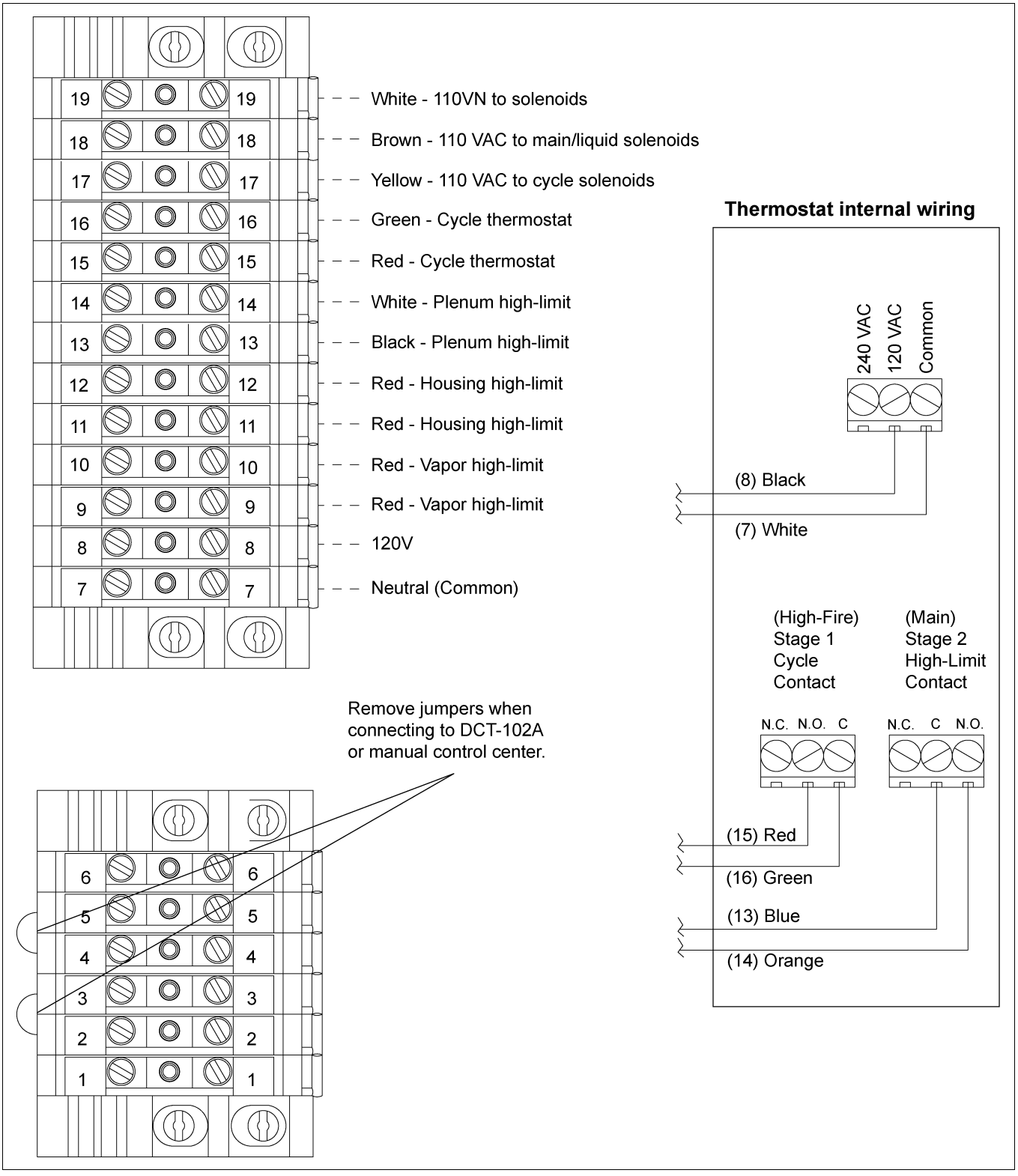


Figure 3G

Fan Operation

1. Make sure fan/heater is properly installed and connected as described earlier.
2. Position the heater switch OFF to prevent it from operating.
3. Check the direction of the propeller rotation by pressing the Start button then immediately pressing the Stop button. This will spin the fan enough to determine if the propeller is rotating the correct direction. Propeller should rotate in the same direction as indicated by the arrow on the venturi.

   NOTE: *3 Phase motors may be reversed by interchanging any two (2) power leads. For changing rotation on 1 phase see wiring diagram on the motor* *on Page 40* *or in the back section of this Owner's manual*.

4. Once propeller direction is correct press Start button on fan. Fan should come to full operating speed in less than 5 second. If there is any doubt as to proper operation, check the current draw of the motor. The motor amperage should not exceed the maximum full load amps listed in the electrical specifications *on Page 16* of this manual.

Heater Operation

Burner sequence of operation: Once the fan Start button is depressed with the burner switch in the AUTO position, the control power goes through a series of normally closed safety circuits and then supply's power to a 10 second, normally open time delay. Once the time delay has been energized for 10 second, it closes and allows power to the fenwal ignition board. Once the fenwal receives power, it energizes the solenoid valves and ignitor. There is a trial for ignition for 4 second. If the board fails to recognize flame present after the 4 second, the fenwal goes into a lock out mode. Once this happens the burner power must be shut off for 10 second to reset the board. If the fenwal does recognize flame within 4 second, it de-energizes the ignitor and continues to operate normally.

1. Make sure the correct type of heater control device is installed and properly adjusted for the desired type of drying operation.

   NOTE: *The thermostat or humidistat controller must be connected into the terminal strip of the master fan. The heater will not operate unless the controller is connected into the circuit. Refer to thermostat installation section* *on Page 19* *of this manual.*

2. Open all hand shut off valves within the fuel supply.

   NOTE: *Open each valve slowly to prevent a sudden pressure surge. A sudden pressure surge will close the excess flow valve.*

3. Check the initial gas pressure regulator setting to verify that it is open, but not adjusted for excessive pressure. Turn the handle out as far as possible without removing it from the regulator. Slowly turn the handle in until you can feel a slight resistance from the internal spring of the regulator. Advance the screw in 2 more full turns.
4. With the control device set so it is calling for heat, place the burner switch in the AUTO position and press the fan Start button. After a delay of 10 second the burner should ignite and start operating.

   NOTE: *LP units equipped with an internal vaporizer may operate slightly erratic for several seconds on initial start-up in cold weather. This is due to poor initial fuel vaporization. Allow the heater to operate and stabilize the gas pressure prior to adjustments.*

Heater Operation (Continued)

5. Adjust the gas pressure regulator to provide the desired heat. Turn the handle in to increase pressure or out to decrease pressure. DO NOT EXCEED THE MAXIMUM OR MINIMUM OPERATING PRESSURES LISTED IN THE *BELOW* SPECIFICATIONS.

Fuel System Specifications and Recommendations Liquid Propane (LP)

Dryer Fan Size	Dryer Horsepower	Maximum Heat Capacity BTU per Hour	Maximum Fuel Flow Gallons per Hour	Minimum Line Size	Orifice Size	Minimum Operating Pressure (PSI)	Maximum Operating Pressure (PSI)
36"	15	4-1/2 Million	54	1/2"	21/64"	1 lb.	15 lbs.
42"	30	8-3/4 Million	95	1/2"	7/16"	1 lb.	15 lbs.

Fuel System Specifications and Recommendations Natural Gas (NG)

Dryer Fan Size	Dryer Horsepower	Maximum Heat Capacity BTU per Hour	Maximum Fuel Flow Cubic Ft. per Hour	Minimum Line Size	Orifice Size	Minimum Operating Pressure (PSI)	Maximum Operating Pressure (PSI)
36"	15	5 Million	5280	2"	1/2"	1 lb.	7 lbs.
42"	30	9 Million	9536	2"	43/64"	1 lb.	7 lbs.

Under normal operation the burner should cycle from high-fire to low-fire. To ensure the dryer is getting the best possible heat mix the burner should make one complete cycle, (from the time the burner cycles from high-fire to low-fire then back to high), in about 3 minute or less. If this is not how the unit is operating gas pressures will need adjusted. If the burner remains on high but does not cycle to low-fire increase the gas pressure by turning in the regulator. Normal operating pressure on high-fire for LP units should be about 10 lbs.-15 lbs. Natural gas units will be around 5 lbs.-7 lbs. If the unit is staying on low-fire for too long decrease the gas pressure on the low-fire adjustment. There will be either a set screw with a lock nut on the cycle solenoid or a ball valve which bypasses the cycle solenoid. In normal conditions, the low-fire gas pressure will be about half of the high-fire gas pressure setting.

6. **LP units only** - After initial installation and occasionally during operation, check the temperature of the gas line on the outgoing side of the internal vaporizer. The vaporizer should be adjusted to the gas line is just warm to the touch, (100°F-120°F). To adjust the vaporizer loosen the 5/16" bolt on the adjustment bracket. Swing the vaporizer away from the flame if the gas line is too hot or swing it closer to the flame if it is running to cool and frosting the gas line.

7. When stopping the fan/heater unit at the end of the drying season or for any type of service involving the gas lines, shut off the gas and allow the burner to run out any remaining gas in the supply lines and gas lines on the burner.

Seasonal Inspection and Service

Always disconnect and lock out power before performing any maintenance.

All seasonal inspection should be performed by a qualified technician.

All fan/heater units are constructed of durable weather-resistant materials, so a minimum amount of service should be required. Before the unit is put in use each season there are a few items that need to be checked. All damaged parts should be repaired or replaced.

1. Disconnect and lock out power to the fan/heater unit. Open control box lid and inspect all components for moisture, vibration or rodent damage. Inspect and tighten all loose wiring connections. Check motor starter for bad contact points. Check fan motor overload for correct setting and verify that it is not tripped. Replace any damaged wiring or components.
2. Remove burner orifice tube and inspect for dirt or foreign material. Clean if necessary.
3. Inspect all holes in the burner for possible plugging or corrosion from dirt or rust. Clean or replace if necessary.
4. Inspect the flame probe and ignitor and adjust or clean if necessary.
5. Inspect all gas hoses on the pipe train. Replace gas hoses every 3 to 5 years minimum. Look for signs of deterioration on the hoses. Replace if necessary.
6. Inspect the fan propeller for freedom of rotation and uniform tip clearance around the fan housing. It should also be inspected for dirt and debris build up. Clean, repair or replace if necessary.
7. **LP units only** - Inspect the gas pressure relief valve. Make sure the plastic cap is always in place to prevent foreign material from getting in the valve and causing the valve to become defective. Replace if necessary. Replace pressure relief valves every 5 years minimum.
8. **LP units only** - Inspect the vaporizer coil. Check for material deterioration, cracks and leaks. Replace if necessary. Replace vaporizer coils every 5 years minimum.

   NOTE: *Fan motors are all standard NEMA frame motors and are specially designed for use in crop drying applications. Replacement parts for these motors are handled by authorized service stations of the various motor manufacturers.*
9. For extra motor life, any electrical motor should run for 30 minute once a month. This will help eliminate any damaging moisture build up in the motor and bearings.
10. Fans setting idle in the summer are susceptible to wasps building mud nests. If there are any on the fan propeller it will cause the fan to be out of balance which will lead to premature motor failure or propeller damage.
11. Motor lubrication - These motors have ball bearings that are pre-lubricated at the factory. Motors that do not have regreasing capabilities are factory lubricated for normal bearing life.

Baldor motors are pre-lubricated with Shell Oil Company's "Dolium R". Several equivalent greases which are compatible with the Baldor furnished grease are Chevron's "SRI No. 2" and Texaco's "Premium RB".

Overgreasing bearings can cause premature bearing failure. If motor is equipped with alemite fitting, clean tip of fitting and apply grease gun. Use 1 to 2 full strokes on motors in NEMA 215 and smaller frame. Use 2 to 3 full strokes on NEMA 254 through 365 frame. Use 3 to 4 full strokes on NEMA 404 and larger frames. On motors having drain plugs, remove the drain plug and operate motor for 20 minute before replacing drain plug. On motors equipped with a slotted head grease screw, remove screw and apply grease tube to hole. Insert a 2" to 3" length of grease string into each hole on motors in NEMA 215 and smaller frame. Insert 3" to 5" string of grease into larger motors. Keep grease clean. Lubricate motors at a stand still. Remove and replace drain plugs or set screws at a stand still. Do not mix petroleum grease and silicone grease in motor bearings.

See chart below for lubrication interval recommendations:

Lubrication

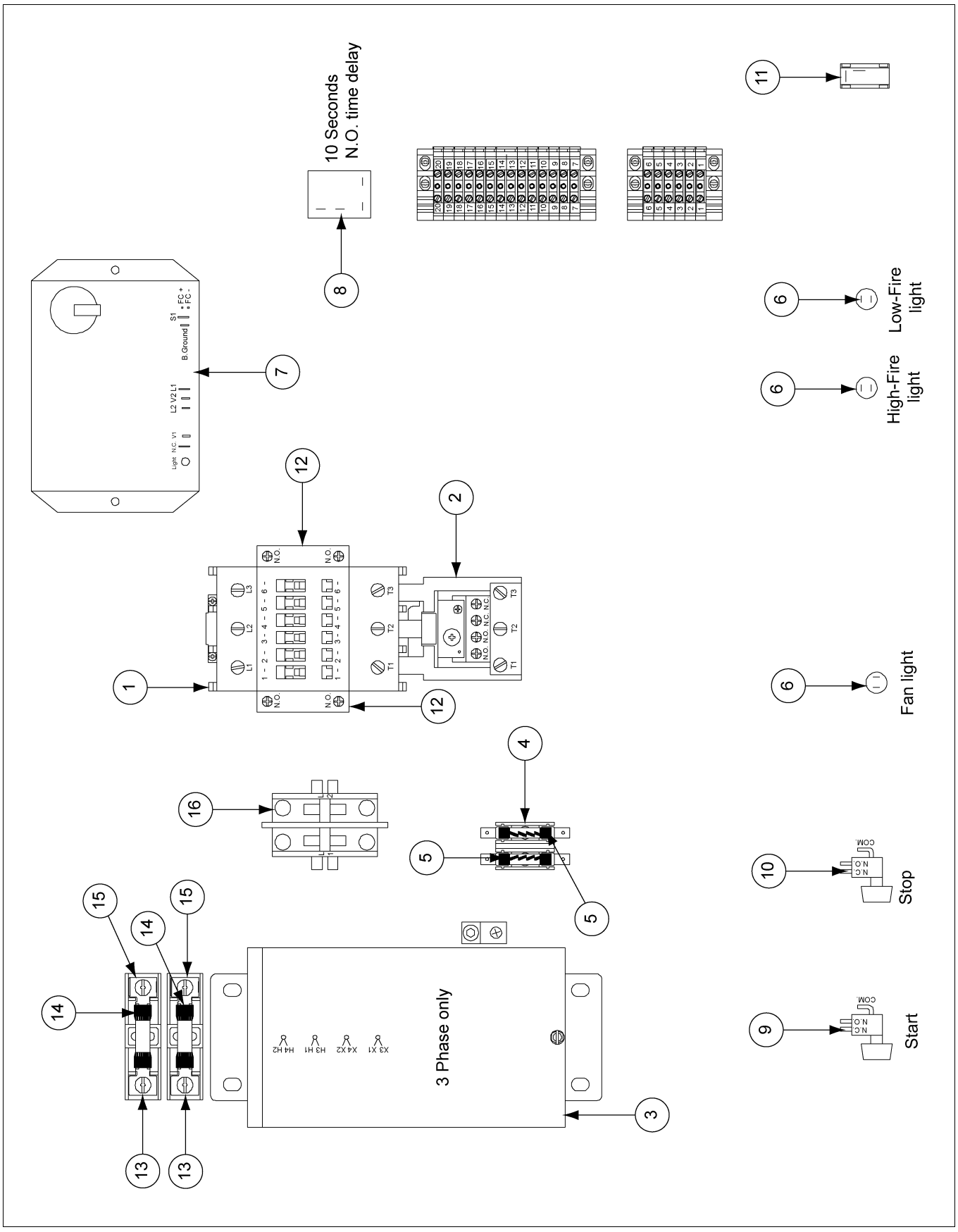
Hours of Service per Year	Suggested Relube Interval		
	NEMA Frame Size		
	42 to 215T	254 to 326T	364 to 447T
5000 Hours	5 Years	3 Years	1 Year
Continuous Normal Application	2 Years	1 Year	9 Months
Seasonal service motor is idle for 6 months or more.	1 Year (Beginning of Season)	1 Year (Beginning of Season)	1 Year (Beginning of Season)
Continuous high ambients, dirty or moist locations, high vibration or where shaft end is hot (pumps-fans).	6 Months	6 Months	3 Months

Problem	Possible Cause
Fan will not run.	Check that main power and circuit breakers are turned ON. Check for tripped breaker.
	Check for blown 5 amp control circuit fuses.
	Check for blown primary step-down transformer fuses on 3 phase units only.
	Defective transformer or wiring 3 phase only.
	Check for defective ON/OFF switches.
	Check all wiring connections. See schematic or wiring diagrams *on Pages 38-42*.
	Check magnetic contactor for malfunction.
	Check overload on motor starter. Push to reset.
Fan runs for a short period of time then shuts off.	Check to verify that power wires are the proper size.
	Check incoming supply voltage. If low contact power company.
	Check full load amps. Verify correct with specifications section *on Page 16* of this manual.
	Check for power failure.
	Check for motor overload tripped. Push to reset.
	Check for defective Start/Stop switches.
Burner will not fire with fan operating.	Check burner switch position and verify that it has not malfunctioned.
	Check for power to the fenwal board terminals L1 and L2 should have 115 VAC after the fan has run for 10 second.
	Check gas supply. Also check gas line for obstructions.
	Closed valves, plugged solenoids, etc.
	Inspect solenoid valves for defective coils or improper wiring. Replace valve or coil if valve will not open with proper voltage applied (115 VAC).
	Check for power out to the solenoids. V1 and V2 on the fenwal board should have 115 VAC for the ignition trial period of 4 second.
	Check fenwal board for ignition spark. Remove ignition wire from the fenwal board and hold a screwdriver against the output terminal and 1/4" away from the control box housing. There should be a strong spark. Check board wire connections. Replace fenwal board if necessary.
	Check ignitor gap. 1/16" to 1/8". Check porcelain and electrodes for damage and cracking. Replace or clean if necessary.
No power to fenwal board terminals L1 and L2 (115 VAC).	These checks are listed in the order the voltage travels to get to the fenwal board.
	Check the 5 amp fuse in the fuse block. Replace if blown.
	Check the burner toggle switch. Verify that it is ON or replace it if defective.
	Check the vapor high-limit on LP units only. This should automatically reset after it cools and is normally closed. If it remains open replace it.
	Check the housing high-limit. This is located on the burner housing and must be manually reset by pushing the red button located in the center. This is normally closed also.
	Check the plenum high-limit. This is normally the thermostat control located on the bin sidewall. This must be closed.
	Check the time delay relay. This is normally open.
	This relay will close after it has power applied for 10 second. If the normally open contacts are not closing after 10 second replace the time delay.

Problem	Possible Cause
Burner will not fire but gauge shows gas pressure.	Check fenwal board for ignition spark. Remove ignition wire from the fenwal board and hold a screwdriver against the output terminal and 1/4" away from the control box housing.
	There should be a strong spark. Check board wire connections. Replace fenwal board if necessary.
	Check ignitor gap. 1/16" to 1/8". Check porcelain and electrodes for damage and cracking. Replace or clean if necessary. Also ignitor position may need adjusted.
Heater lights and gas solenoids go ON and OFF erratically or chatter.	Check the heater lights on the front of the control box. If the lights are blinking this indicates the flame sensor is not consistently detecting flame and requires adjustment.
	The chattering solenoids are due to the loss of flame signal and the thermostat and fenwal board trying to re-establish flame. Check for loose or damaged wires on the flame sensor.
Burner maintains desired drying temperature but cycles from high-fire to OFF, (without going to low-fire).	Check to see if low-fire gas pressure adjustment is closed completely. If yes open it slightly.
	Main gas pressure set to high. Close main ball valve on NG units or adjust regulator on LP units.
	Bin high-limit not set above cycle thermostat setting. Adjust cycle point down or high-limit up.
Burner operates but will not cycle from high-fire to low-fire.	Gas pressures set incorrectly. Manually decrease the cycle thermostat to verify burner will cycle from high to low. If burner does cycle by doing so it indicates insufficient gas pressure. Increase the main gas pressure for additional heat output. Do not exceed maximum pressures.
	High-fire to low-fire thermostat control may be defective. If the burner does not cycle manually with the cycle thermostat. Check the contacts of the thermostat to see if they are opening and closing when turned manually. If not replace the thermostat.
	If burner continues to operate on high-fire, check the main gas solenoid for a stuck or blacked open condition. The solenoid valve must not allow gas to flow when de-energized.
Burner operates but will not cycle from low-fire to high-fire.	Check for excessive low-fire gas pressure setting. Observe gas pressure setting shown on gauge and compare with recommended gas pressures in this manual. Adjust low-fire flow control valve if necessary.
	Check setting for cycle thermostat. Manually increase the set point. It should cycle the unit to high-fire. If not repair or replace the cycle thermostat.
	Check for faulty high-fire solenoid valve. Verify that it is opening. Replace the valve if necessary.
Burner cycles OFF without reaching plenum high-limit setting.	Check vapor high-limit. This is a normally closed switch that opens if the gas in the vaporizer reached 210°. Adjust vaporizer if needed or replace vapor high-limit.

NOTES

Control Box Parts



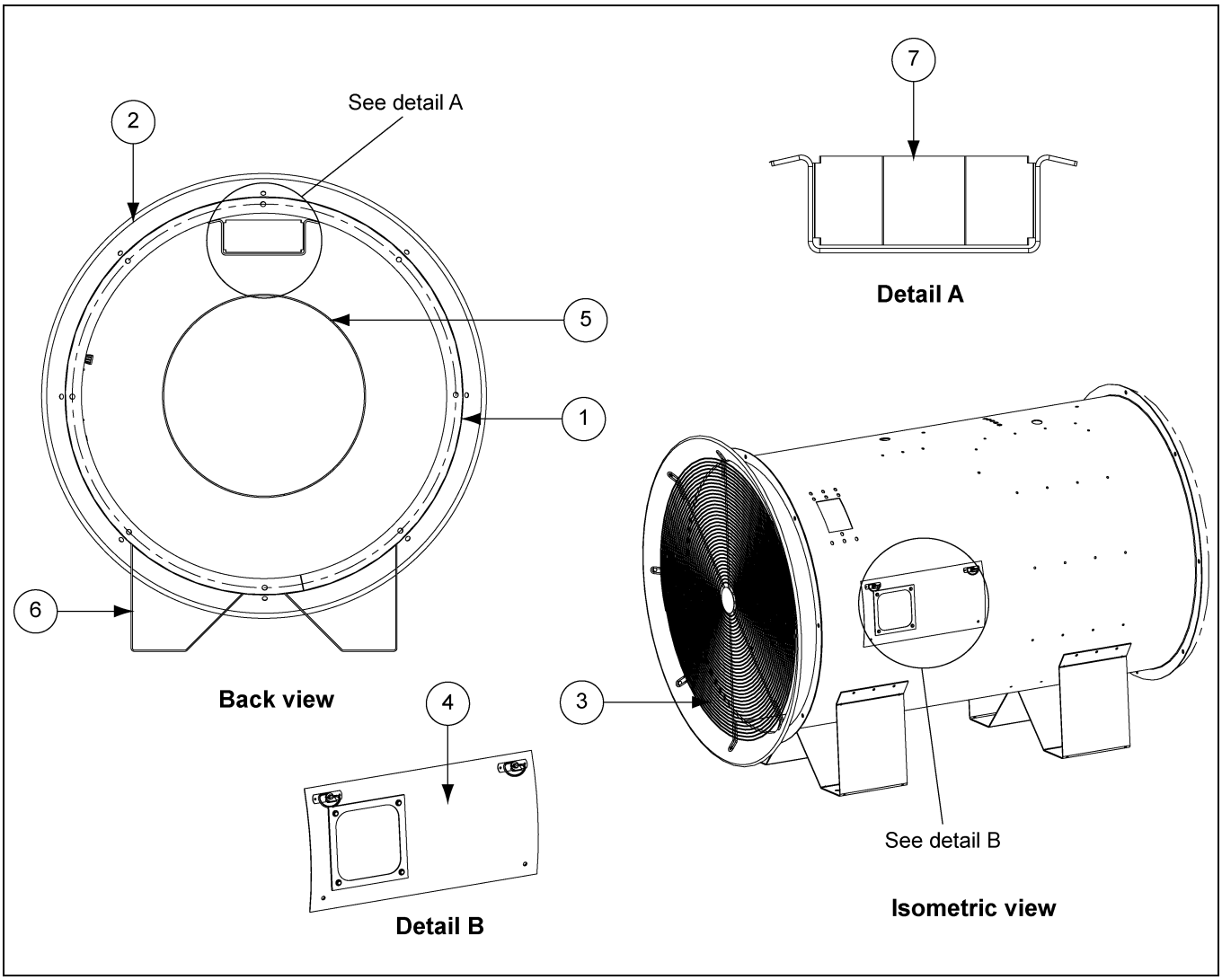
36" Fans Parts List

Ref #	Part #	Description	Qty		
			FTF-3615-1	FTF-3615-3	FTF-3615-4
1	D03-0497	Relay, IEC 3 Pole 80A CL09	1		
2	D03-0484	Overload Relay, IEC 65A CLS20 RT22H	1		
1	D03-0495	Relay, IEC 3 Pole 62A CL07 CL07A311MJ		1	
2	D03-0483	Overload Relay, IEC 42-55A RT22G CLS20		1	
1	D03-0491	Relay, IEC 3 Pole 22A CL25			1
2	D03-0477	Overload Relay, IEC 22A CLS20 RT12T			1
3	FH-3807	Transformer 1/2 KVA 240/480 110V		1	1
4	FH-1058	Fuse Block	1	1	1
5	FH-1059	5 Amp Fuse	2	2	2
6	TFH-2021	Red Light (No Leads)	3	3	3
7	HF-4624	Flame Detection Board (Fenwal)	1	1	1
8	D03-0077	Relay Time Delay 10 Second N.O.	1	1	1
9	FH-999	Start Switch	1	1	1
10	FH-1000	Stop Switch	1	1	1
11	HH-1442	SPST 10A-125V Toggle Switch	1	1	1
12	D03-0511	Auxiliary Contact Block N.O./N.C. GE IEC	2	2	2
13	D03-0562	Cover, Fuse Block Bussman Sami-7N		2	2
14	D36-0002	Fuse #FNQ5 500V Slow-Blow		2	2
15	D36-0003	Fuse Block Panel Mount 1 Fuse		2	2
16	TF-1914	Switch, Start for C-7815 15 HP	1		

42" Fans Parts List

Ref #	Part #	Description	Qty	
			FTF-4230-3	FTF-4230-4
1	D03-0497	Relay, IEC 3 Pole 80A CL09	1	
2	D03-0485	Overload Relay, IEC 64-82A RT22J	1	
1	D03-0494	Relay, IEC 3 Pole 48A CL06		1
2	D03-0482	Overload Relay, IEC 30-43A RT22E		1
3	FH-3807	Transformer 1/2 KVA 240/480 110V	1	1
4	FH-1058	Fuse Block	1	1
5	FH-1059	5 Amp Fuse	2	2
6	TFH-2021	Red Light (No Leads)	3	3
7	HF-4624	Flame Detection Board (Fenwal)	1	1
8	D03-0077	Relay Time Delay 10 Second N.O.	1	1
9	FH-999	Start Switch	1	1
10	FH-1000	Stop Switch	1	1
11	HH-1442	SPST 10A-125V Toggle Switch	1	1
12	D03-0511	Auxiliary Contact Block N.O./N.C. GE IEC	2	2
13	D03-0562	Cover, Fuse Block Bussman Sami-7N	2	2
14	D36-0002	Fuse #FNQ5 500V Slow-Blow	2	2
15	D36-0003	Fuse Block Panel Mount 1 Fuse	2	2

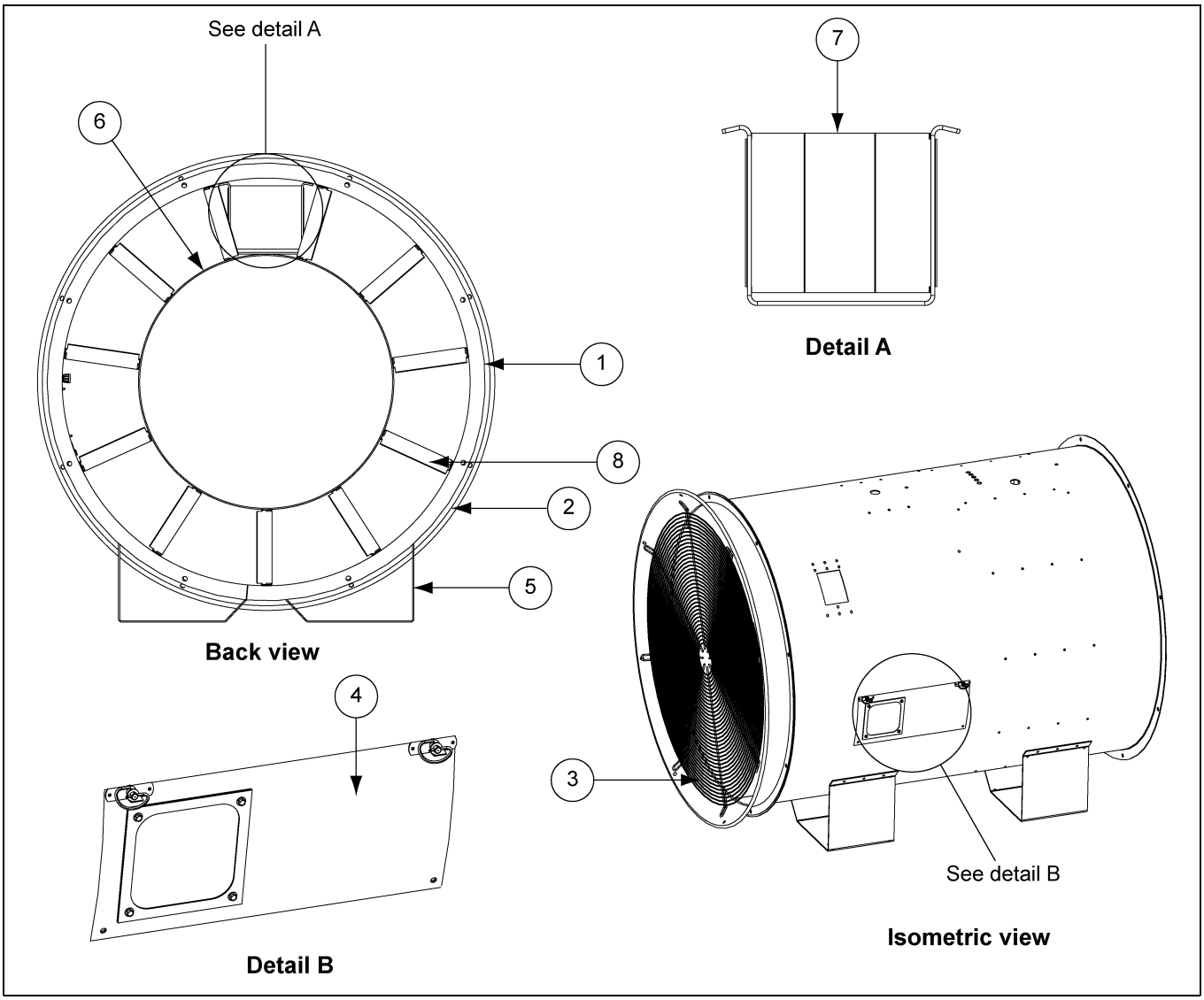
36" TD Can Assembly (TF-1613)



36" TD Can Assembly (TD-1613) Parts List

Ref #	Part #	Description	Qty
1	TF-1722	36" 2000 Series Fan Can Wrapper	1
2	CD-0543-Y	Venturi, 36" Ochre	1
3	CD-0544	Grill Guard, 36" Black VA	1
4	HF-6065-36	Heater Access Panel Assembly	1
5	TF-1608	TD Motor Support Assembly 36" 15 HP	1
6	TF-1229	Base Leg for 36" Crop Dryer	2
7	TF-1615	TD Burner Assembly 36" LP	1

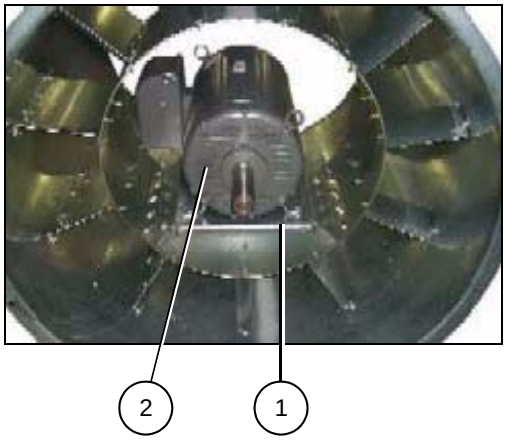
42" TD Can Assembly (TF-1614)



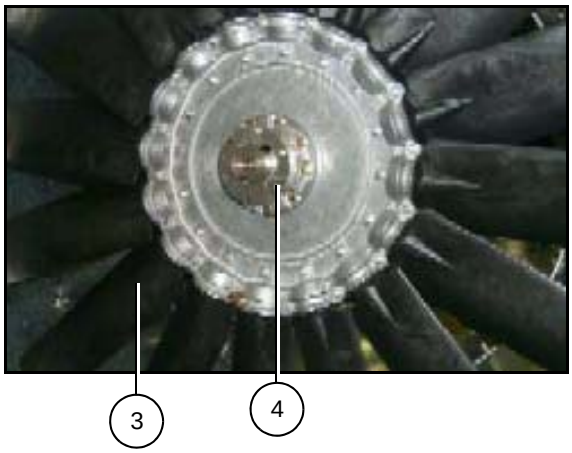
42" TD Can Assembly (TD-1614) Parts List

Ref #	Part #	Description	Qty
1	TF-1723	42" 2000 Series Fan Can Wrapper	1
2	TFH-2005	Venturi, 42" VA	1
3	CD-0547	Grill Guard, 40" and 42" Black	1
4	HF-6065-42	Heater Access Panel Assembly	1
5	TF-1210	Base Leg for 42" Crop Dryer	2
6	D01-1451	Inner Can, 42" Dryer Fan	1
7	TF-1617	TD Burner Assembly 42" LP	1
8	D01-1452	Straightening VN 36"-42" Inner Can	11

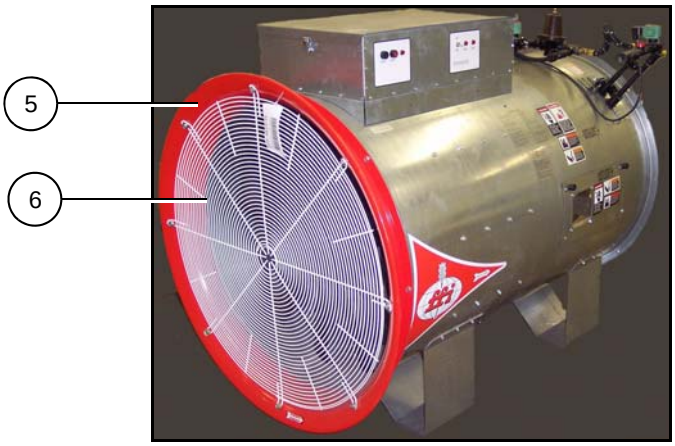
Fan Motor, Motor Mount and Fan Blade



Fan motor and motor mount



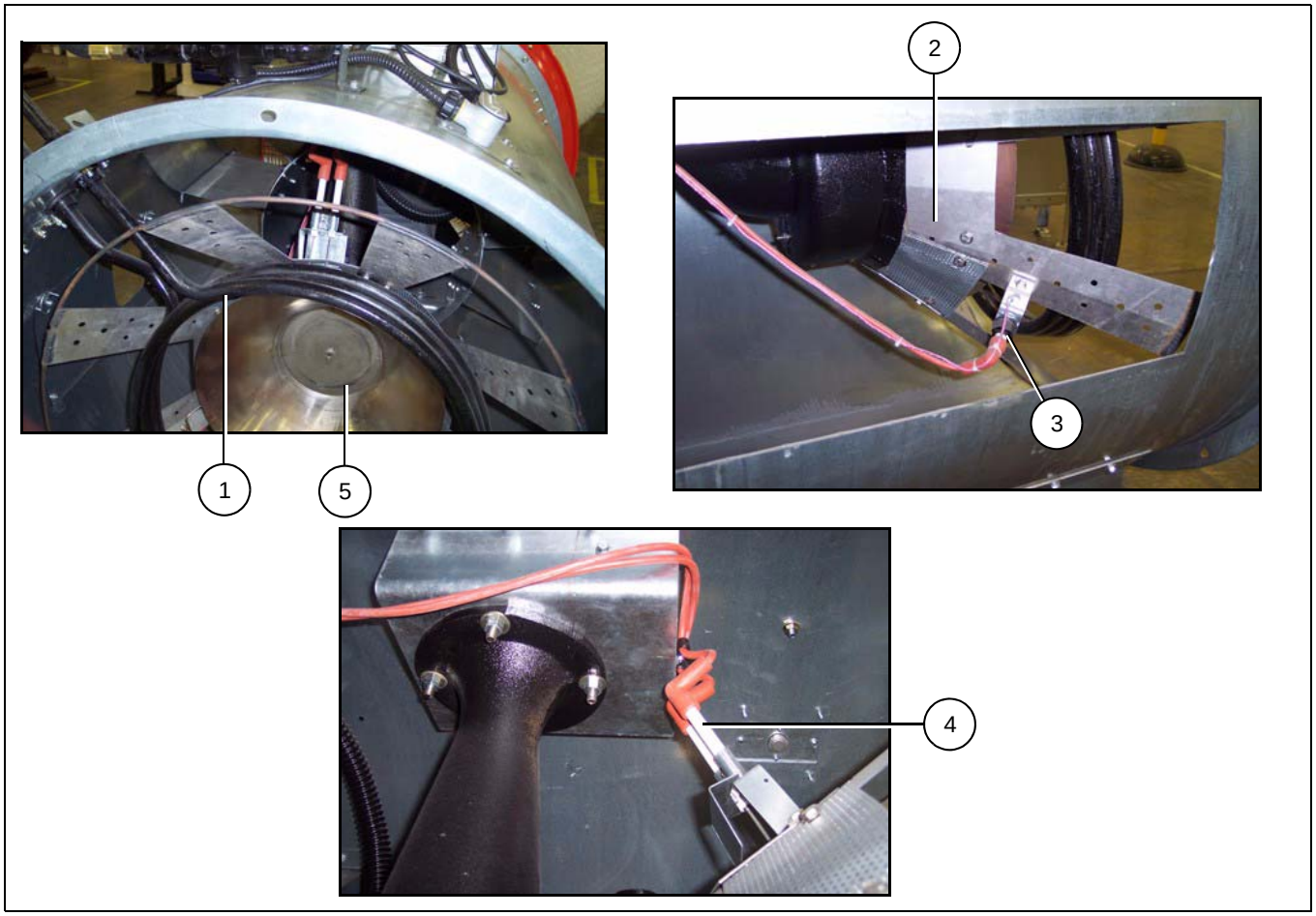
Fan blade and bushing



Fan Motor, Motor Mount and Fan Blade Parts List

Fan/Heater Diameter HP	Ref #	Part #			Description
		220V 1 PH	230V 3 PH	460V 3 PH	
36" 15 HP	1	D01-1478	D01-1478	D01-1478	Motor Mount
	2	002-1073-2	CH-1050	CH-1050	Motor
	3	D82-0002	D82-0002	D82-0002	Fan Blade
	4	FH-1009	FH-6963	FH-6963	Bushing
	5	004-1017-5-F	004-1017-5-F	004-1017-5-F	Venturi
	6	014-1047-1-W	014-1047-1-W	014-1047-1-W	Grill Guard
42" 30 HP	1	N/A	D01-1474	D01-1474	Motor Mount
	2	N/A	TFH-2011	TFH-2011	Motor
	3	N/A	D01-0472	D01-0472	Fan Blade
	4	N/A	CE-00617	CE-00617	Bushing
	5	004-1018-3F	004-1018-3F	004-1018-3F	Venturi
	6	014-1048-9-W	014-1048-9-W	014-1048-9-W	Grill Guard

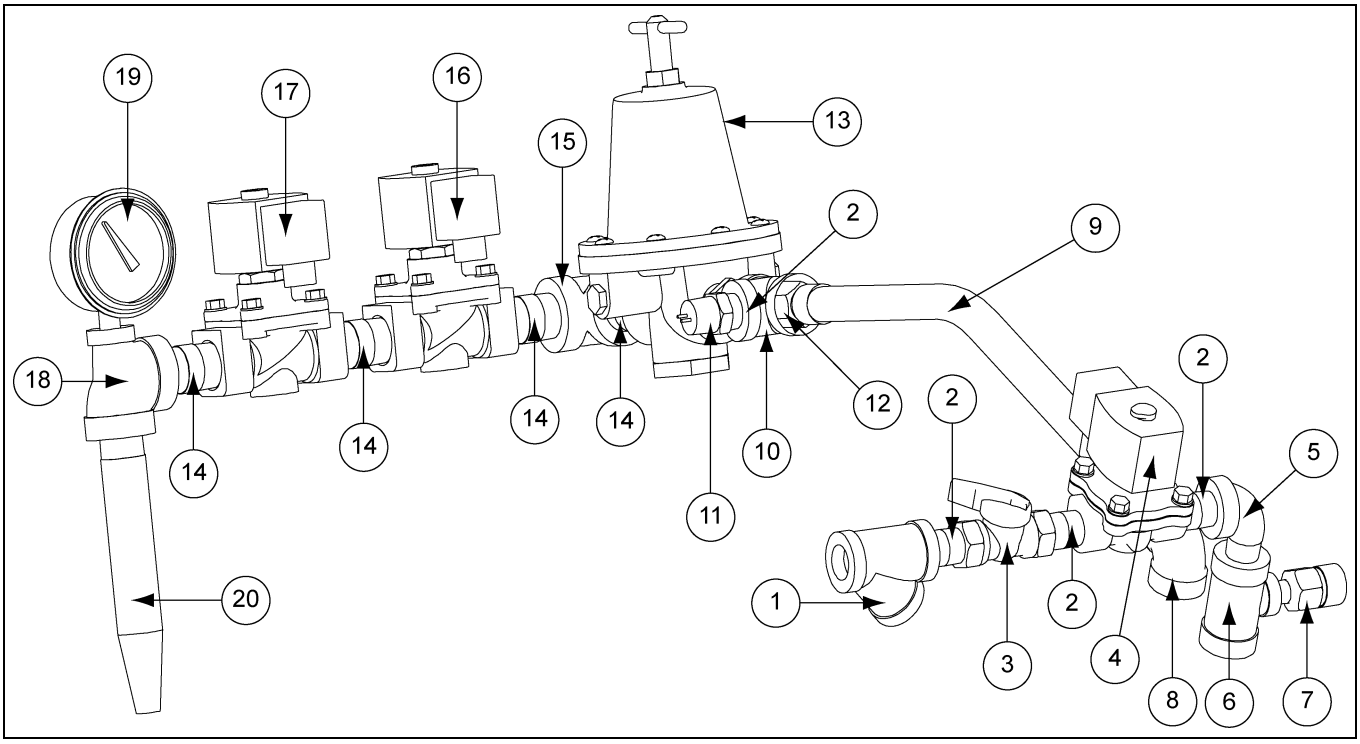
Fan Burner



Fan Burner Parts List

Fan/Heater Diameter HP	Ref #	Part #		Description
		LP Units	Natural Gas Units	
36" 15 HP	1	HF-7207	N/A	Vaporizer Coil
	2	THF-3047	THF-3047	Burner Assembly
	3	TF-1559-T	D82-0002	Flame Probe and Wire Assembly
	4	TF-1558	FH-6963	Ignitor and Wire Assembly
	5	HH-7056	N/A	Burner Cone
42" 30 HP	1	HF-7251	N/A	Vaporizer Coil
	2	THF-3028	THF-3028	Burner Assembly
	3	TF-1559-T	D01-0472	Flame Probe and Wire Assembly
	4	TF-1558	CE-00617	Ignitor and Wire Assembly
	5	HH-7056	N/A	Burner Cone

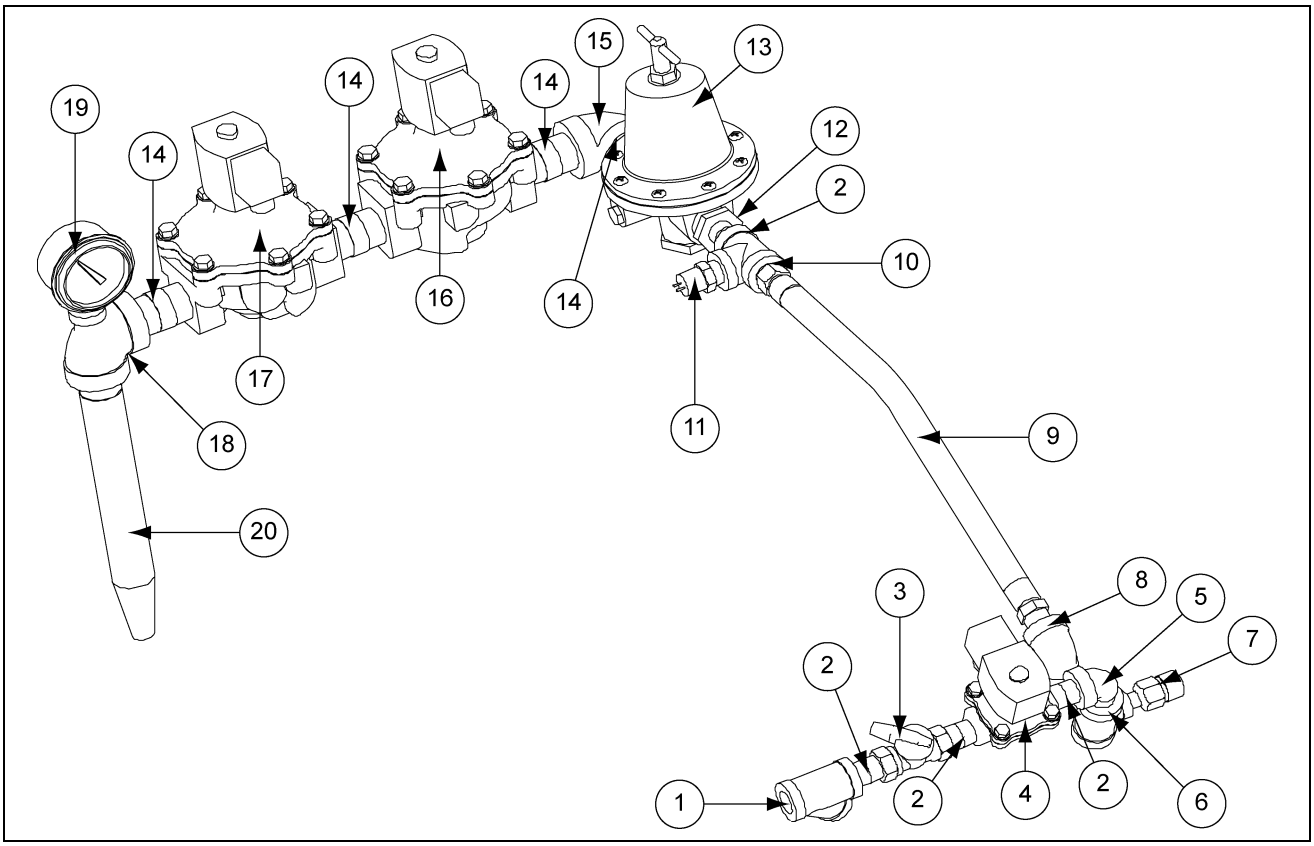
LP Gas Train



LP Gas Train Parts List

Ref #	Part #	Description	Qty
1	HH-1251	Strainer, 1/2" Y 250# WOG SCH 80	1
2	D07-0019	Nipple, 1/2" x 1-1/2" SCH 80 Black	4
3	TFC-0030	Valve, 1/2" NPT Ball-Bronze	1
4	TFC-0100	Valve, 1/2" NPT Solenoid LP w/ DIN	1
5	HH-1082	Elbow, 1/2" - 90° Street SCH 80 Black	1
6	HH-4846	Tee, 1/2" x 1/2" x 1/4" SCH 80 Black	1
7	TFC-0027	Valve, 1/4" NPT 250# Relief	1
8	HH-4847	Elbow, 1/2" - 90° SCH 80 Black	1
9	HF-7509	Hose, 1/2" x 18" LP Gas Assembly	1
10	THH-4058	Tee, 1/2" x 1/2" x 1/2" SCH 80 Black	1
11	HH-7013	Switch Screw-In Vapor High-Limit	1
12	D07-0028	Reducer Bushing 1/2" x 3/4"	1
13	TFC-0020	Regulator, 3/4" (CSA)	1
14	THH-4125	Nipple, 3/4" x 2" SCH 40 Black	4
15	THH-4120	Elbow, 3/4" - 90° SCH 40 Black	1
16	056-2228-7	Valve, Solenoid 3/4" NPT 115V DIN w/ Bypass	1
17	056-2223-8	Valve, Solenoid 3/4" NPT 115V DIN	1
18	THH-4158	Tee, 3/4" x 1/4" x 3/4" SCH 40 Black	1
19	HH-2984	Gauge 0-30# Pressure LP	1
20	CD-0150	Orifice Tube 36" 15 HP LP 21"/64"	1

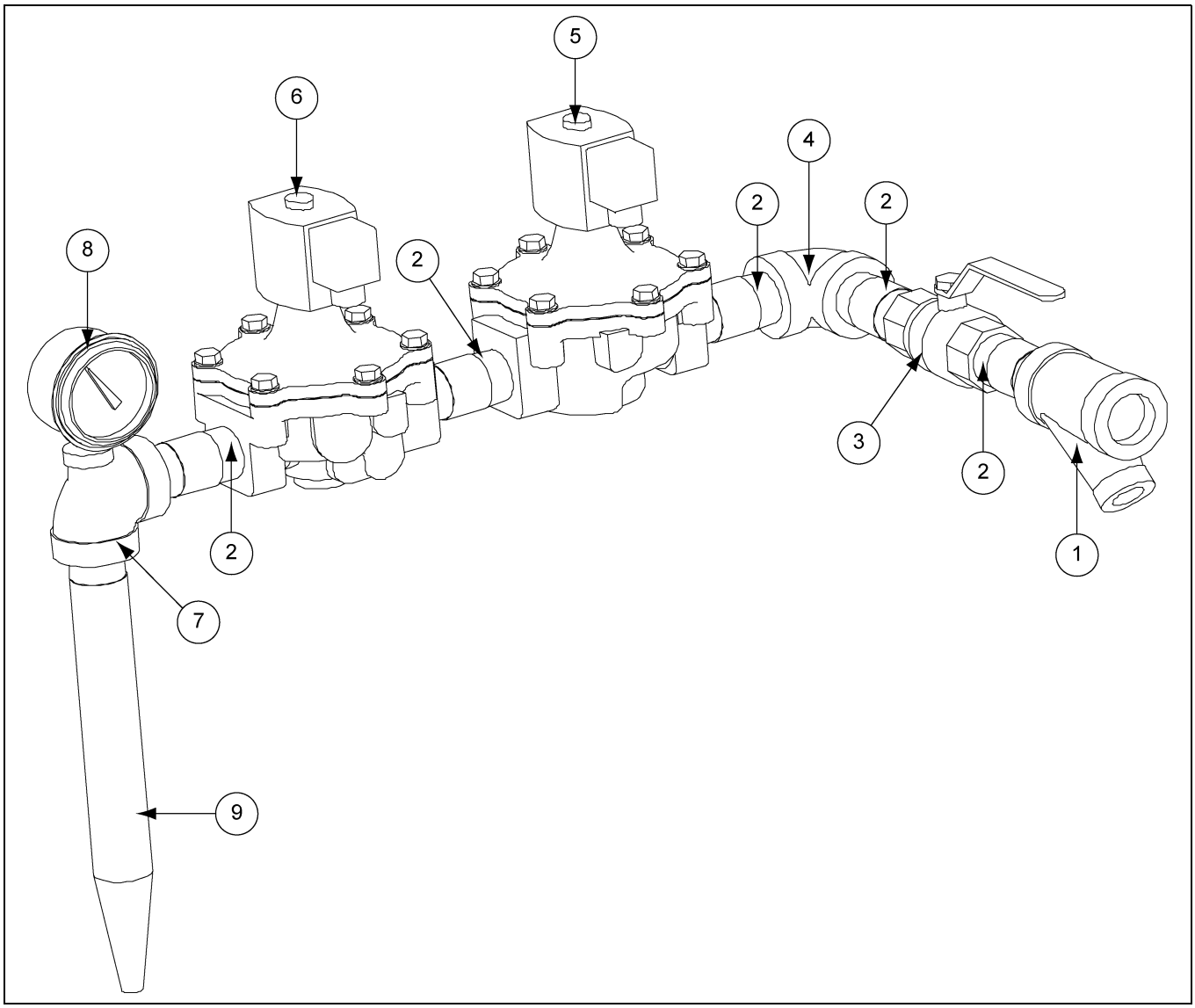
LP Gas Train (Continued)



LP Gas Train Parts List

Ref #	Part #	Description	Qty
1	HH-1251	Strainer, 1/2" Y 250# WOG SCH 80	1
2	D07-0019	Nipple, 1/2" x 1-1/2" SCH 80 Black	4
3	TFC-0030	Valve, 1/2" NPT Ball-Bronze	1
4	TFC-0100	Valve, 1/2" NPT Solenoid LP w/ DIN	1
5	HH-1082	Elbow, 3/4" - 90° Street SCH 40 Black	1
6	HH-4846	Tee, 1/2" x 1/2" x 1/4" SCH 80 Black	1
7	TFC-0027	Valve, 1/4" NPT 250# Relief	1
8	HH-4847	Elbow, 1/2" - 90° SCH 80 Black	1
9	HF-7509	Hose, 1/2" x 18" LP Gas Assembly	1
10	THH-4058	Tee, 1/2" x 1/2" x 1/2" SCH 80 Black	1
11	HH-7013	Switch Screw-In Vapor High-Limit	1
12	THH-4005	Reducer Bushing 1/2" x 1"	1
13	TFC-0021	Regulator, 1" (CSA)	1
14	THH-4037	Nipple, 1" x 3" SCH 40 Black	4
15	THH-4115	Elbow, 1" - 90° SCH 40 Black	1
16	056-2230-3	Valve, Solenoid 1" NPT 115V Din w/ Bypass 30 PSI	1
17	056-2224-6	Valve, Solenoid 1" NPT 115V Din 25 PSI	1
18	THH-4163	Tee, 3/4" x 1/4" x 3/4" SCH 40 Black	1
19	HH-2984	Gauge 0-30# Pressure LP	1
20	THF-3059	Orifice Tube 40" LP	1

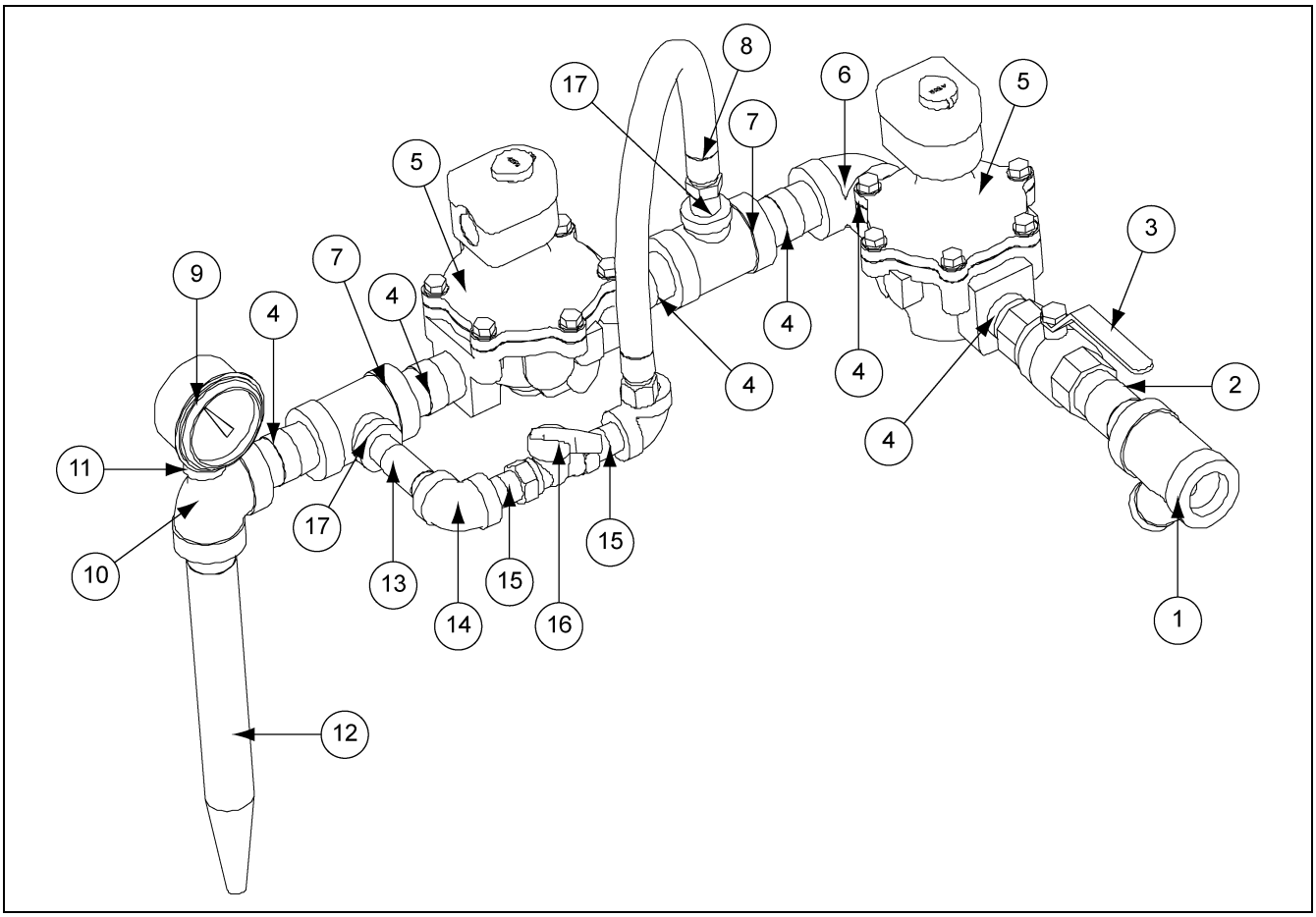
NG Gas Train



NG Gas Train Parts List

Ref #	Part #	Description	Qty
1	TF-1283	Strainer, 1" Y 250# WOG SCH 80 Black	1
2	THH-4151	Nipple, 1" x 3" SCH 40 Black	1
3	TFC-0093	Ball Valve 1" w/ Lever Handle	1
4	THH-4115	Elbow, 1" - 90° SCH 40 Black	1
5	056-2230-3	Valve, Solenoid 1" NPT 115V Din w/ Bypass 30 PSI	1
6	056-2224-6	Valve, Solenoid 1" NPT 115V Din 25 PSI	1
7	THH-4163	Tee, 3/4" x 1/4" x 3/4" SCH 40 Black	1
8	D08-0022	Gauge 0-15# Pressure LP	1
9	THF-3244	Orifice Tube 36" 10-16 HP Natural	1

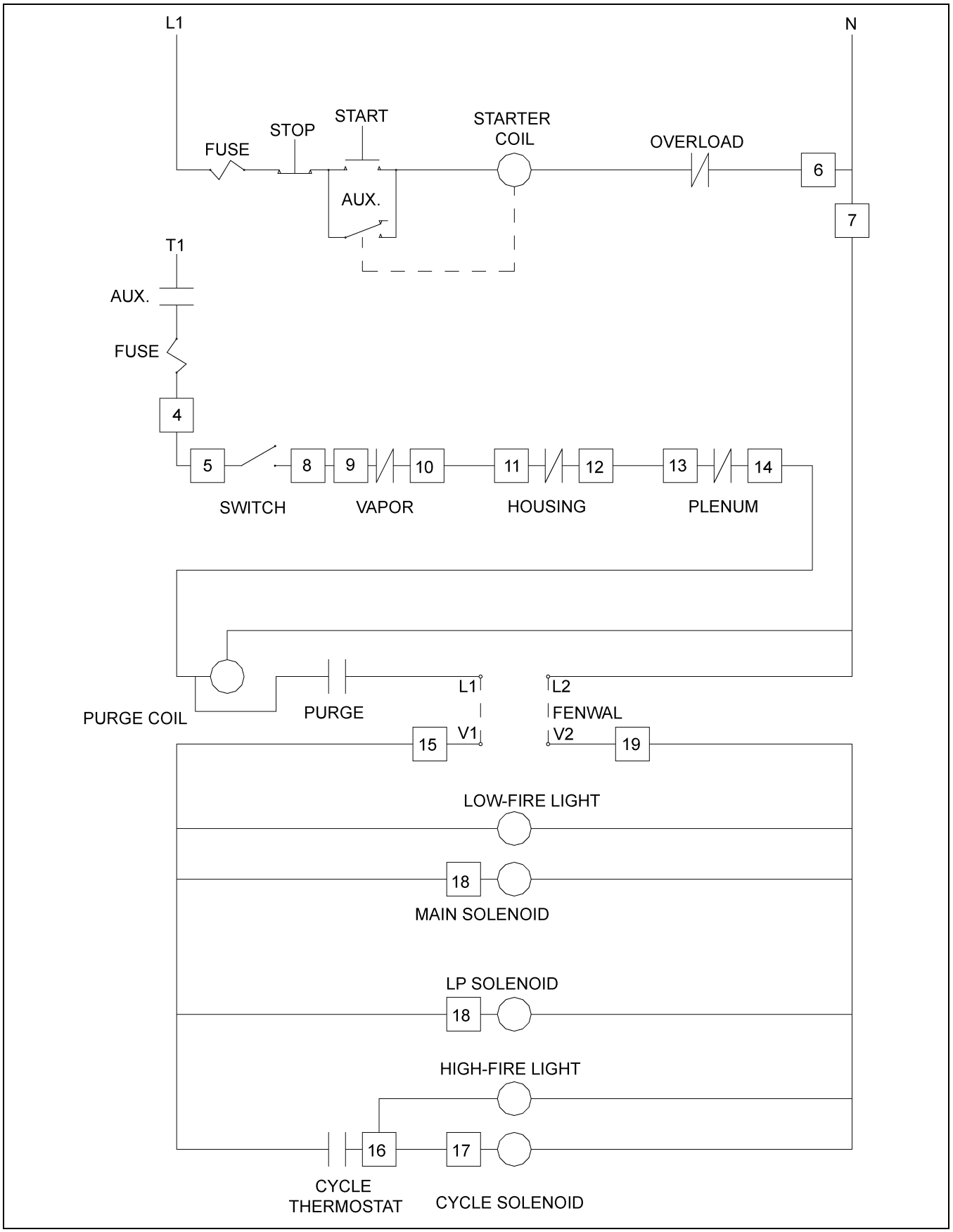
NG Gas Train (Continued)



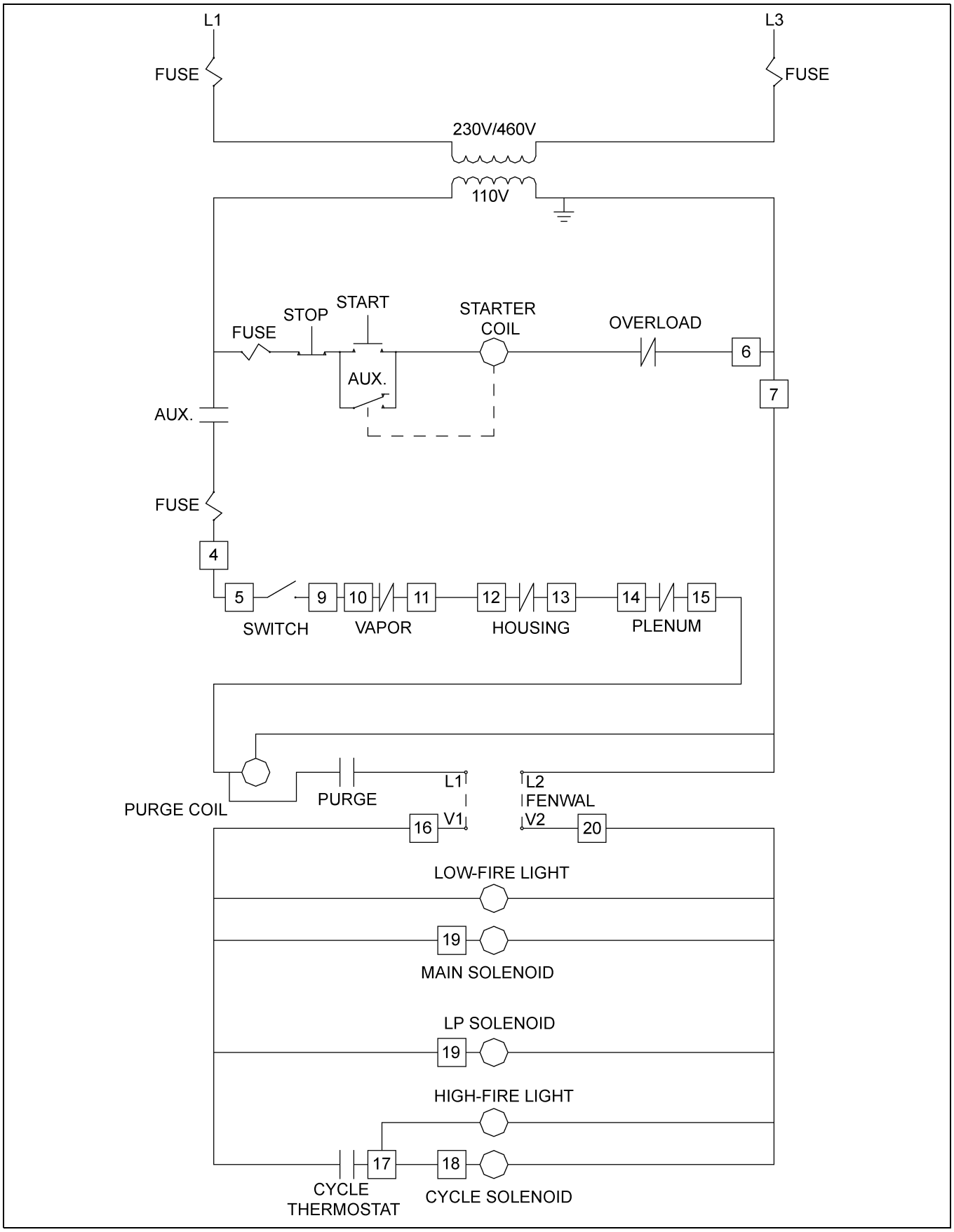
NG Gas Train Parts List

Ref #	Part #	Description	Qty
1	D08-0015	Strainer, 1-1/2" Y SCH 80 Black	1
2	D08-0013	Nipple, 1-1/2" x 3" SCH 40 Black	1
3	D08-0008	Valve, 1-1/2" NPT B-Cock Shut Off	1
4	D08-0009	Nipple, 1-1/2" Close SCH 40 Black	6
5	TF-1536	Valve, 1-1/2" NPT Solenoid	2
6	D08-0011	Elbow, 1-1/2" - 90° SCH 40 Black	1
7	D38-0001	Tee, 1-1/2" x 1-1/2" x 1" SCH 40 Black	2
8	HF-7509	Hose, 1/2" x 18" LP Gas Assembly	1
9	D08-0022	Gauge 0-15# Pressure LP	1
10	D03-0445	Tee, 1-1/2" x 1" x 1-1/2" SCH 40 Black	1
11	THH-4001	Reducer, 1" x 1/4" Hex Bushing SCH 40 Black	1
12	THF-3251	Orifice Tube 42" 30 HP Natural Gas	1
13	D07-0023	Nipple, 1/2" x 3" SCH 80 Black	1
14	HH-4847	Elbow, 1/2" - 90° SCH 80 Black	2
15	D07-0019	Nipple, 1/2" x 1-1/2" SCH 80 Black	2
16	TFC-0030	Valve, 1/2" NPT Ball-Bronze	1
17	THH-4005	Reducer, 1" x 1/2" Hex Bushing SCH 40	2

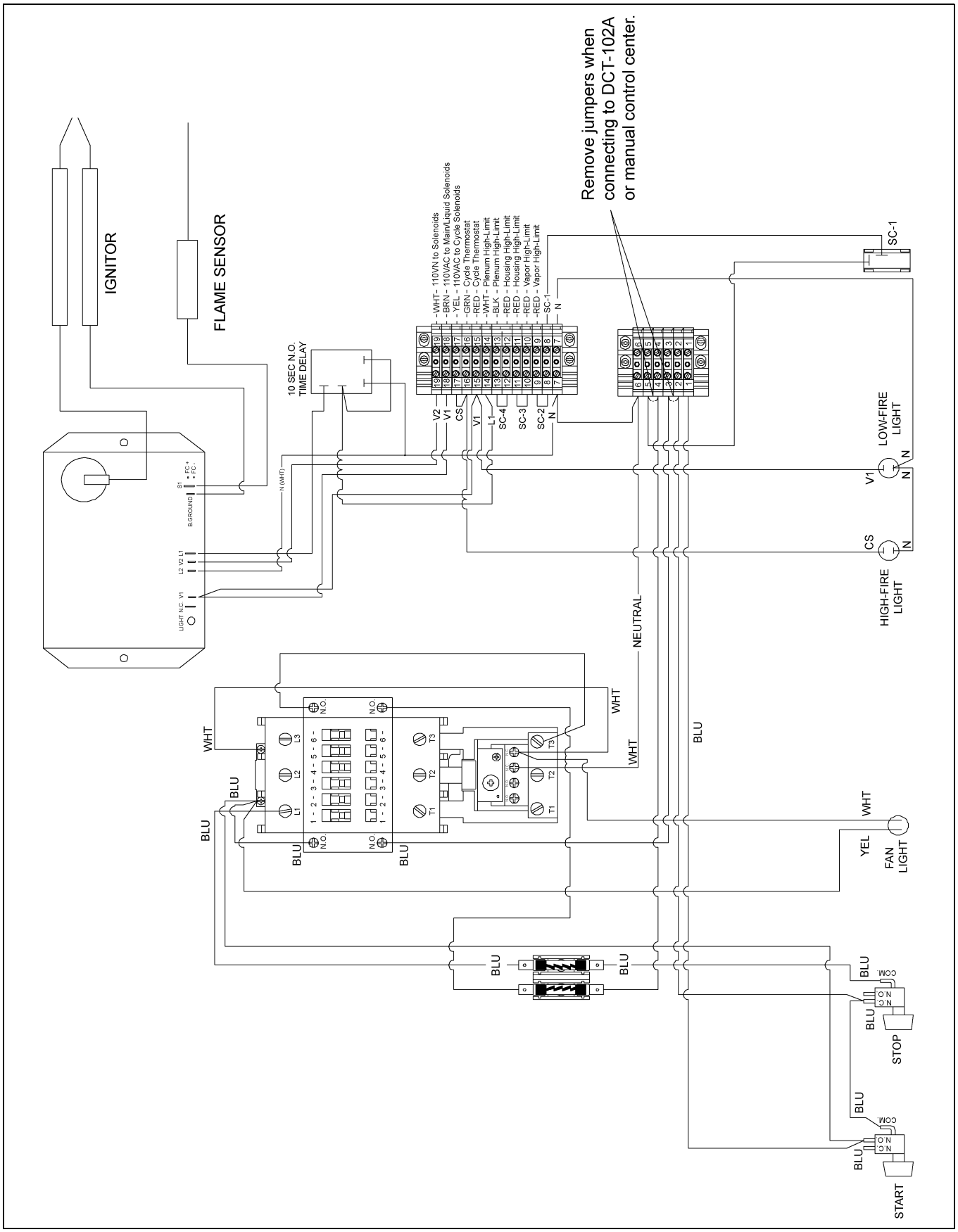
230 Volt 1 Phase Control Circuit Schematic



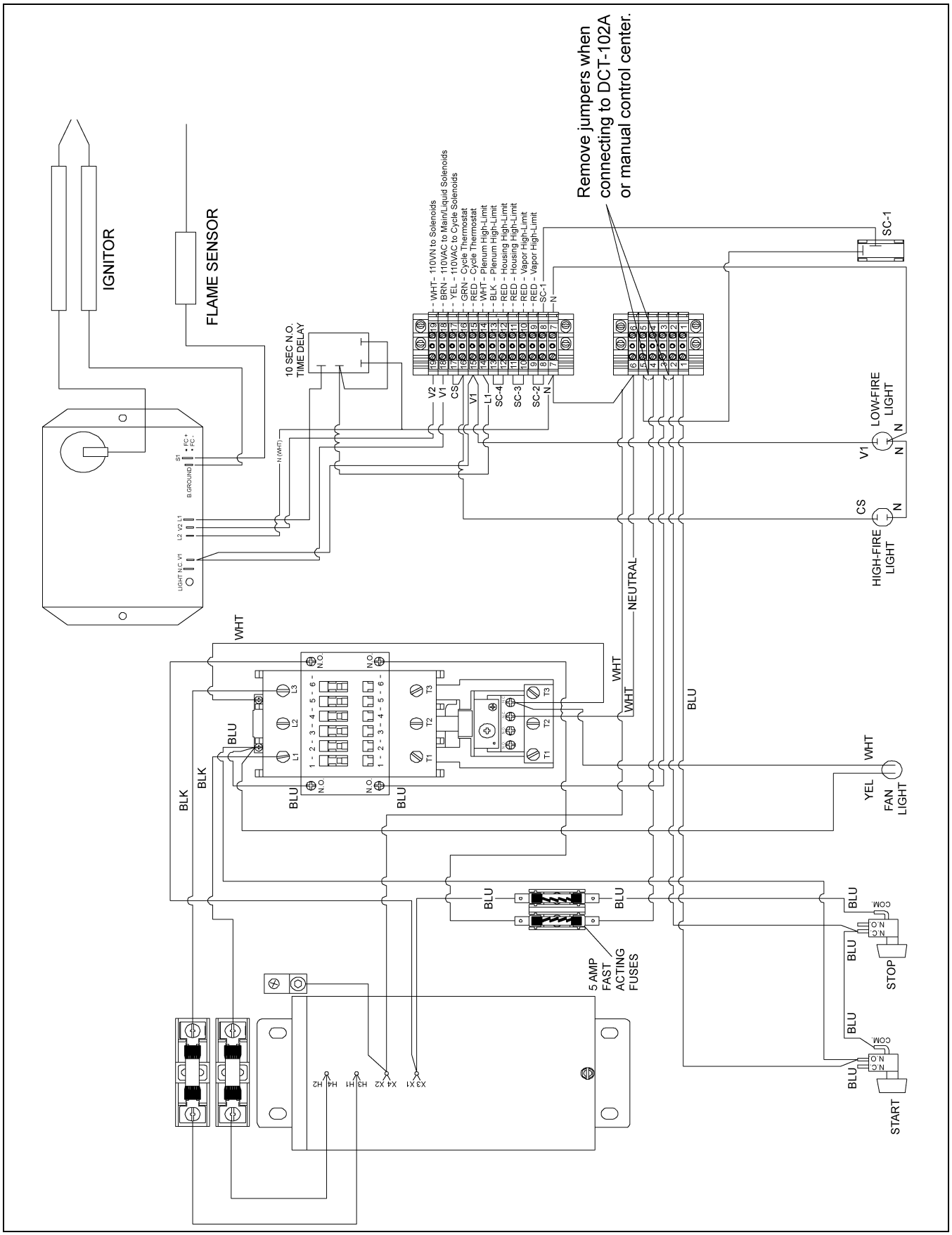
230/460 Volt 3 Phase Control Circuit Schematic



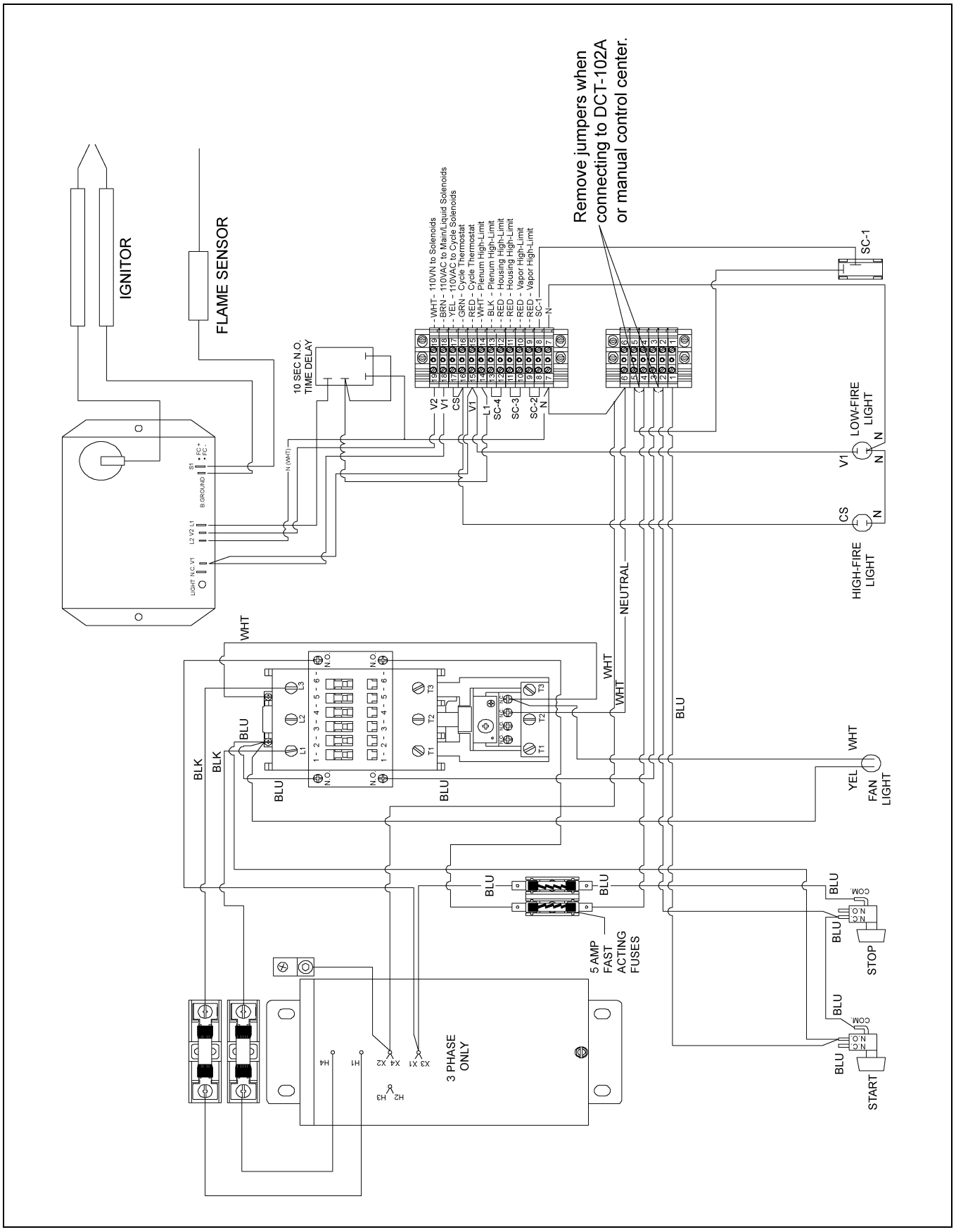
230 Volt 1 Phase Wiring Diagram



230 Volt 3 Phase Wiring Diagram



460 Volt 3 Phase Wiring Diagram



GSI Group, LLC 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
AP and Cumberland	Flex-Flo/Pan Feeding System Motors	2 Years
Cumberland Feeding/Watering Systems	Feeder System Pan Assemblies	5 Years **
	Feed Tubes (1-3/4" and 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 and Tower Dryers	2 Years
	Portable and 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 (12^{th}) month from the date of purchase and continuing until the sixtieth (60^{th}) 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.

9101239_1_CR_rev8.DOC (revised January 2014)

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.

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Assumption, IL 62510-0020
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