



SERVICE MANUAL

Delta 1 & 2
Gas-Fired Heaters



SAMUEL JACKSON

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*We appreciate your business and hope you enjoy your
Samuel Jackson Gas-Fired Heater*

This manual contains information on the installation, startup, and operation of your Gas-Fired Heater. Including information regarding:

- Heater operation.
- Electrical installation.
- Gas piping and supply.
- Heater and Control Cabinet dimensions.
- Maintenance and troubleshooting.

When taking delivery of your new Heater, take a moment to familiarize yourself with the location of the less obvious items in the shipment. This service manual is normally shipped in the *BOX OF CONTROL PARTS*. Included in this box are the air temperature thermocouples, thermocouple extension wire, glass windows, air flow tubes, spark plug and flame rod wire and the gas inlet valve and purge assembly for the control cabinet.

We suggest that you check the contents of the box of control parts and then store them in a safe place until installation time. This will help prevent some of the items from being misplaced or being used for other jobs. Heater installation will then go smoothly with no delays waiting or looking for missing parts.

This manual gives general information on the location of thermocouples and optional moisture sensing equipment and the temperature control logic. If the Heater is part of a Samuel Jackson Drying System, more detailed information will be shipped to you under separate cover specifically for your system.

IS STARTUP ASSISTANCE PROVIDED?

Depending upon your location, a startup and inspection service may be provided with your new Heater free of charge by Samuel Jackson, Inc. Please contact us to make arrangements or for questions regarding startup services.

In the future when you require service, technical support, or parts please contact us by phone, fax, or email. Our engineers and service team are available to assist you in obtaining the best performance from your Samuel Jackson, Inc. products.

Again, thanks for choosing a Samuel Jackson Gas-Fired Heater!

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Warning



READ THIS CAREFULLY BEFORE OPERATING THIS SAMUEL JACKSON PRODUCT!

The Samuel Jackson product line consists of sophisticated technology capable of greatly enhancing a gin's productivity and efficiency. Improper use of these products could adversely affect those very same factors and potentially cause injury to gin personnel. For this reason, we include an extensive manual with every product. These manuals outline the proper and safe operating procedure for their respective product. **Do not operate any Samuel Jackson product without first reading the entire manual and all accompanying information.**

Sometimes there are updates added at the customer's discretion to products already in the field. We always refer customers to our website, www.samjackson.com, for the latest product information. The latest manual can be downloaded or printed from the website free of charge. In addition to printed literature, the website includes training videos on several popular products. When available, these videos are highly recommended for viewing before operating a respective product. If you do not have internet access, give us a call and we will gladly send you the latest product information.

DANGER: Please read and understand all the warnings below before operating or maintaining a Samuel Jackson product. If you do not understand, call Samuel Jackson at +1-806-795-5218 before proceeding. Failure to do so could result in injury or even death. (Si usted no entiende, llame a Samuel Jackson al +1-806-795-5218 antes de proceder. La falta de hacerlo podría causar lesión o muerte.)

Electrical.

Most Samuel Jackson products use supply voltage between 110 and 480 volts AC. These levels are considered high voltage and are extremely dangerous. The ignition transformer voltage output is much higher than this.

Fire.

Samuel Jackson Humidair Units and Heaters are combustion-based products. They ignite and burn fuel during operation. These products can reach very high temperatures inside and out. Allow combustion based products 15 minutes to cool before attempting any work.

Automatic Flame Ignition.

Some Samuel Jackson Humidair Units and Heaters use technology to ignite automatically. If you do not see a flame, it does not mean that respective product is not in operation.

Access Doors.

Samuel Jackson products have access doors for added convenience of product maintenance. Access doors must not be opened while the equipment is in operation.

Access doors should also remain closed while any connected equipment such as a fan or conveyor is in operation.

Moving Parts.

Many Samuel Jackson products have moving or rotating parts. These parts could form pinch points or grab loose clothing or jewelry. Do not reach across or into any product while in operation.

Replacement Parts.

When repairing or maintaining this equipment, use only Samuel Jackson approved parts.

Do not work on any Samuel Jackson product without first following OSHA Lockout/Tagout procedures. Confirmation by a licensed electrician that there is no electricity present is highly recommended. We recommend using a Samuel Jackson Authorized Technician for all work Samuel Jackson products. Additional safety information is located throughout this manual and should be read carefully before operating this Samuel Jackson product. If you have any questions about how to properly operate a Samuel Jackson product, please call +1-806-795-5218 before proceeding.

Safety Features of Gas-Fired Heaters

Many of the traditional safety features designed into drying Heaters are universal in nature. Delta 1 and 2 Heaters have the capability of extending safety to cotton ginning specific applications, where traditional safety methods might leave a cotton gin vulnerable. This is particularly helpful when production pressures are high and a one-size-fits-all approach to safety is a recipe for desperate personnel to bypass safety entirely when it frustrates their production efforts. Some of these special safety capabilities are outlined below:

- ◆ One design aspect aimed at performance, but contributing to safety, is the achievement of high flame electrode current. This prevents nuisance shutdowns by the flame safeguard device, which can drive operators to desperation. This is particularly helpful in foggy and rainy ambient conditions, when you need a drying heater the most.
- ◆ A static pressure switch is often used as a universal safety method to infer that air is moving through the dryer. If a choke-up occurs in a cotton gin's pneumatic conveyance system, static pressure may still be present and the burner may continue to operate. This can cause a fire. All Samuel Jackson heaters measure air safety as a difference in pressure sensed by orifices pointing upstream and downstream. In order to give immediate burner shutoff, and serve as a safety backup for the air flow sensor, we include a fan interlocking device for each burner.
- ◆ The supervisory control system performs several air flow tests and interlocks, including tests for a jammed or jumpered air flow sensor, presence of electrical fan interlocks, and warnings of impending chokages in the air stream.
- ◆ The advanced diagnostic systems on Delta Heaters are capable of self-diagnosis of malfunctioning or compromised valves, sensors, and related combustion control safety components. (Please note that depending on local safety requirements, some of these capabilities may not be available to you in order to comply with specific regulations*) Any problems encountered in this diagnosis are recorded with the time, date, and operation conditions for later review, operator instruction, and correction.

* Sometimes local safety regulations give precedence to universally approved and mandated safeguards for all combustion systems in all industries. While well intentioned, sometimes these universal requirements preclude use of embedded specialized safety features from the manufacturer. Unfortunately, this one-size-fits-all approach to safety on a regulatory basis ignores the safety benefits of application or manufacturer-specific safeguards, requiring a choice between regulatory compliance and application-specific safety. Be advised that Samuel Jackson will always configure your Delta Heater to meet local safety regulations unless we are specifically instructed otherwise. Samuel Jackson recommends focusing on application-specific safety rather than regulatory compliance wherever it is practical and legal to do so.

Delta Heater Modes

The Delta 1 and 2 Heaters can be configured for operation in one of two separate modes of operation. These modes are referred to as “Factory Default” and “Mandate Compliance”. (Note: Factory Default mode may be referred to as “Diagnostic”) If the heater is being operated in Mandate Compliance mode, a servicing technician may on occasion temporarily reconfigure to Factory Default mode in order to better diagnose and troubleshoot certain problems.

When operating in Mandate Compliance mode a Siemens LFL is employed for combustion control. An additional before-mix thermocouple with manual reset lockout controller is installed in the drying system and the heater employs two air flow sensing devices. A mechanical airflow sensor is connected to the Siemens LFL in accordance with local regulations. An additional analog sensor is connected to the heaters PLC to allow for simplified diagnostics of air problems that impact the heater's performance. Only the mechanical air flow sensor has direct control within the combustion safety provided by the Siemens LFL. More details are provided throughout this manual.

Some of the feature differences are listed in the following table.

Special Feature Differences		
Feature	Factory Default	Mandate Compliance
Ignition interference with flame detection system	Yes	No
Compromised flame sensing electrode annunciation	Yes	No
Historical ignition failure reporting	Yes	No
Historical flame failure during operation reporting	Yes	No
Residual flame detection on shutdown annunciation	Yes	No

New Features

WHAT'S NEW IN THE DELTA HEATERS FOR THE EXPERIENCED SAMUEL JACKSON HEATER USERS?

The following information is for users with experience using older model Samuel Jackson Heaters who are making the transition to a new Delta Heater. New features and differences in operation are briefly summarized. More detail on specific features and options can be found in this manual under the appropriate section. In normal circumstances, the user may safely use the factory settings that are preprogrammed in the Heater.

Touch Screen Diagnostics – In earlier Samuel Jackson Heater models, a special test program is run to access diagnostics. For the Delta Heaters, the technician can activate diagnostic routines selectively from the color touch screen without the need for going through the sequence of a test program.

Touch Screen Temperature Control – On the Delta Heaters, the temperature is adjusted on the color touch screen mounted on the Heater cabinet or with the optional Moisture Mirror X. The Heater's onboard PLC takes care of temperature control action. This control action allows for a number of diagnostic checks of the temperature control system not possible with the previously used method.

Moisture Mirror X Compatible – The Delta Heaters have Ethernet communications capability, which gives you the option of connecting it to a Moisture Mirror X. You may simply connect it using a standard Ethernet CAT-5e cable to a Samuel Jackson Moisture Mirror X. A single Moisture Mirror X will act as a common remote control for a maximum of eight Samuel Jackson Delta Heaters and four 1600 Series Humidaire Units at the same time. In addition to this, the Mirror X, when properly equipped with sensors, can control the temperature of the Heaters automatically while coordinating the interaction of all of your Sam Jackson moisture control products.

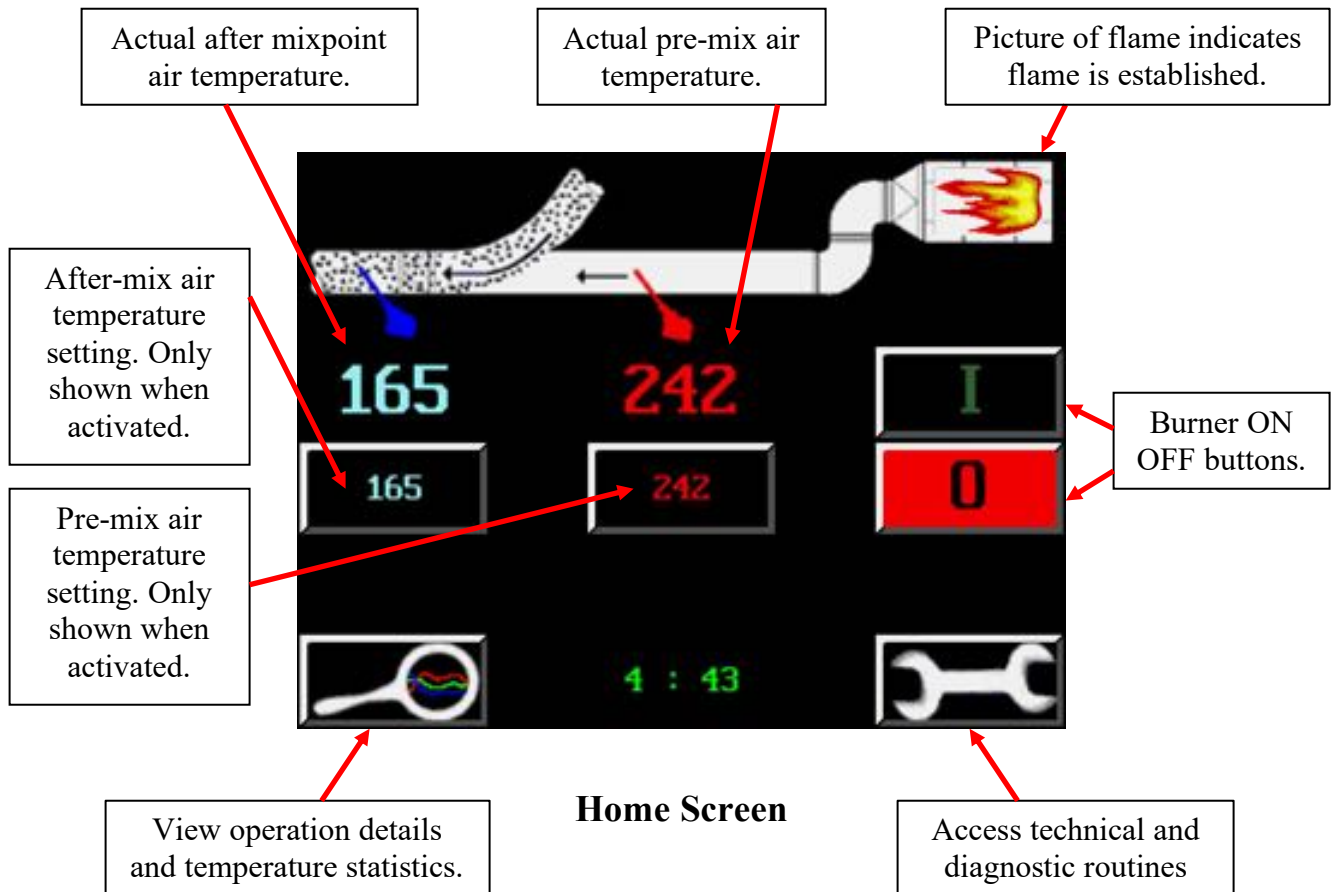
24 Hour Temperature Graphs – The actual before and after mixpoint temperatures are digitally graphed on an easily accessible screen. Buttons on this screen allow the user to scroll to different times over the last 24 hours to view these temperatures.

Heater Operation

HOW DO I TURN IT ON?

Refer to the *MOISTURE MIRROR X* section of manual for more information on operating the Heater remotely using the optional Moisture Mirror X color touch panel. The instructions below are for using the color touch panel mounted in the upper cabinet door on the unit.

Touch the button on the right side of the screen marked with an “I” to turn on the Heater. The button marked with “0” is the corresponding OFF button.



If there is a problem detected by the Heater’s control system, it will notify you on the touch screen with a brief description that includes a diagnostic number. This number will be helpful to the technician that offers assistance if you call the factory. Many problems are simple in nature (for instance a gas supply valve that is closed) and you may be able to correct it without assistance.

WHY IS THERE A DELAY AFTER I TURN IT ON?

After the Heater start button is touched, the combustion control computer begins opening and closing valves to test the integrity of various safety switches. If it finds a problem with one of these devices, it alerts the operator with an ALARM or ERROR message that corresponds to the problem.

These diagnostics are performed every time the Heater is started. They continue during operation and for approximately 10 minutes **after** shutdown.

ALARMS and ERRORS are described more fully later in this manual. ALARMS will warn until reset by pressing the OK button and ERRORS will cause an immediate shutdown.



TIPS

Always leave power on the Heater during the gin season. There is a permanent memory in the combustion control computer that remembers when you turned off the power and did not permit the computer to check the gas valves. It will result in an error if power is removed before diagnostics are completed.

To prevent lightning damage to controls in the off-season, it is a good idea to turn power off to the control cabinet until it is needed again.

WHERE DO I INSTALL THE THERMOCOUPLES?

The thermocouples are color-coded to assist the user in the installation of the correct thermocouple in the before and after-mix locations.

A thermocouple with red on the mounting threads is for installation before the mix-point. This is the high limit thermocouple. The stainless protection sheath is trimmed back exposing the sensing tip for fast response. This exposed thermocouple should not be used in pipes with cotton flow.

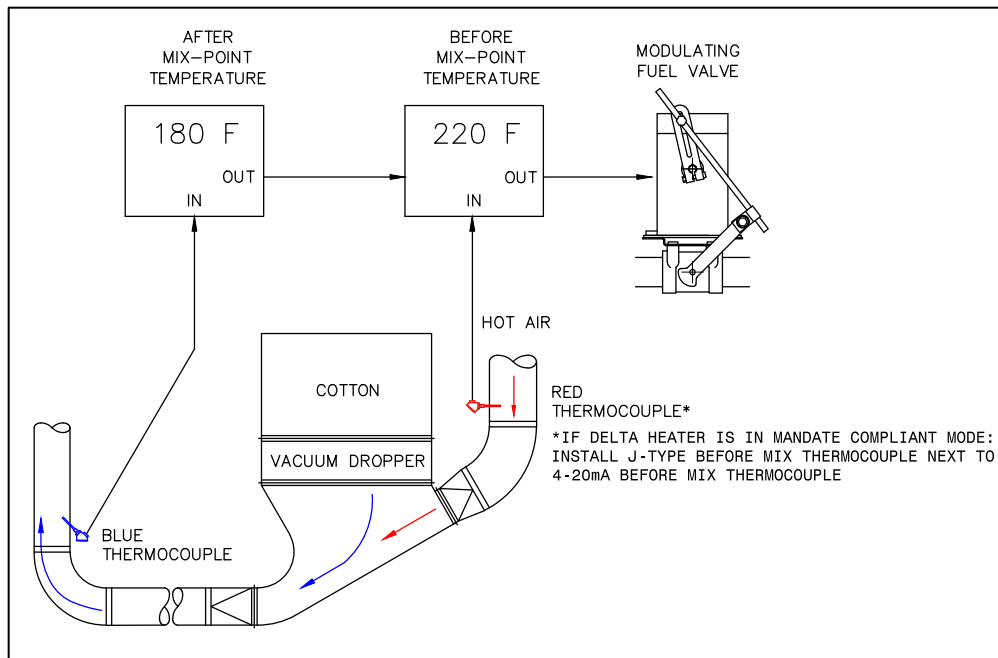
If the Delta Heater is in Mandate Compliance Mode, in addition to the 4-20mA before-mix thermocouple, a J-type before-mix thermocouple is required.

A thermocouple with blue paint on the pipe threads is for installation after the mix-point. This is the primary thermocouple. The stainless sheath is left intact over the sensor bulb to protect it from abrasion.

Referring to the following figure, placement of the after mix-point thermocouple (blue thermocouple) on the inner radius side after an elbow will protect it from abrasion.

Angling the thermocouple 45 degrees in the direction of cotton flow will prevent cotton and trash from tagging on the thermocouple.

Basic Temperature Control



In Samuel Jackson drying systems, the after mix-point thermocouple is placed after the dryer's skimmer in the skimmed air. In some Samuel Jackson drying systems, one after mix-point temperature will be used for controlling the before mix-point temperatures of more than one Heater. The factory will recommend where to place the thermocouples.

For tower, vertical flow, Diamond K, and all other drying systems, the after mix-point thermocouple should be placed at the entrance of the dryer or in the transition immediately before the dryer. Due to the responsiveness of the temperature controls, placing this thermocouple too far away will cause control instability.

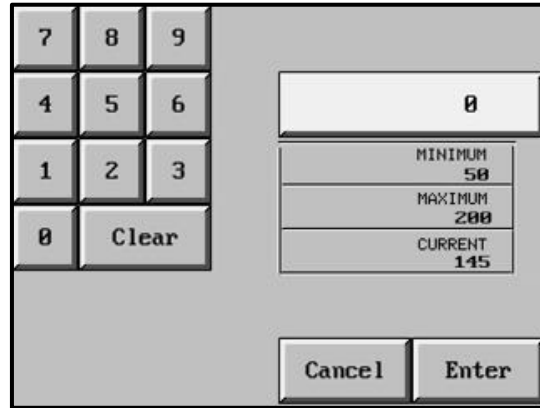
For Heaters operating with Hot Boxes and module feeders, with the cotton going to an unloading separator, place the after mix-point thermocouple in the seed cotton pipe before the unloading separator. Call the factory for information on feed control operation when used in conjunction with a module feeder and Heater.

For systems that use pipe drying or do not have a dryer in the second stage, the after-mix thermocouple should be installed at the entrance of the incline cleaners.

See the "ADDITIONAL SETTINGS" section in this manual for more information on setting the temperature control action of the Heater.

HOW DO I SET THE TEMPERATURES? (When not operating in automatic control)

The setpoint temperature is set on either the color touch panel located at the Heater or on the optional Moisture Mirror X screen. To set the temperature, touch the highlighted temperature button box under the actual temperature. The screen shown next will come up. Enter the new temperature setting then press “ENTER”. The after mixpoint temperature is normally the temperature adjusted.

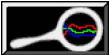


Temperature Setpoint Screen

If the Heater is operating with a Moisture Mirror X and automatic temperature control based on incoming seed cotton moisture is active, the after mixpoint temperature is adjusted automatically and the setpoint button will not be shown. More details for operation with the optional Moisture Mirror X are described later in the manual.

WHAT IS THE STATUS SCREEN?

The status screen shows operation details and statistics for the Heater including run times and fuel valve position. The Error Log, Air Flow Status, and display of software version number are also accessed here.

Press the magnifying glass  on the Home Screen to switch to the Heater STATUS screen.

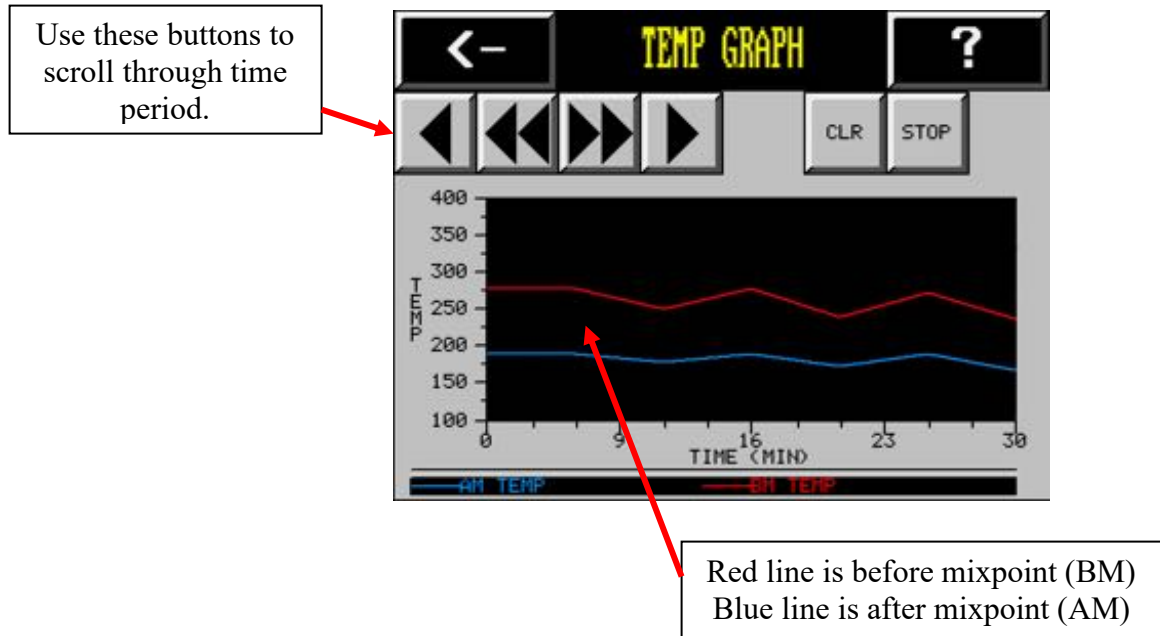


Heater Status Screen

CAN I SEE WHAT THE ACTUAL BEFORE AND AFTER MIXPOINT TEMPERATURES HAVE BEEN OVER THE LAST FEW HOURS?

The actual before and after mix point temperatures are graphed on a screen over time for the last 24 hours. If power is turned off to the Heater, this historical graph information is lost. Press “TEMPERATURE GRAPH” button on the Heater Status screen to pull up the graphs for the temperatures.

Temperature Graph Screen



WHAT IS THE ERROR & ALARM LOGGING SYSTEM?

The *ERROR & ALARM LOGGING SYSTEM* is designed to make troubleshooting easier for both the user and Samuel Jackson service personnel. This system remembers the last 500 ERRORS and ALARMS, thus showing a history of past problems along with the time and date of each one.

WHAT IS THE “TEST PROGRAM”?

The *TEST PROGRAM* can be activated by a qualified service man to test a new installation. This feature allows the serviceman to proceed through a series of tests where individual components of the Heater can be calibrated and adjusted. The operator or serviceman may also use the test program to troubleshoot a problem with the Heater.

The test program is performed on each new Heater before it leaves the factory. See the *TEST PROGRAM* section of manual for more information.

Note: the Delta Heater must be in Factory Default Mode to run the *TEST PROGRAM*.

Navigating Important Menus

Heater Status Screen:

Selecting the Magnifying Glass on the Home Screen will direct the user to the Heater Status Screen.

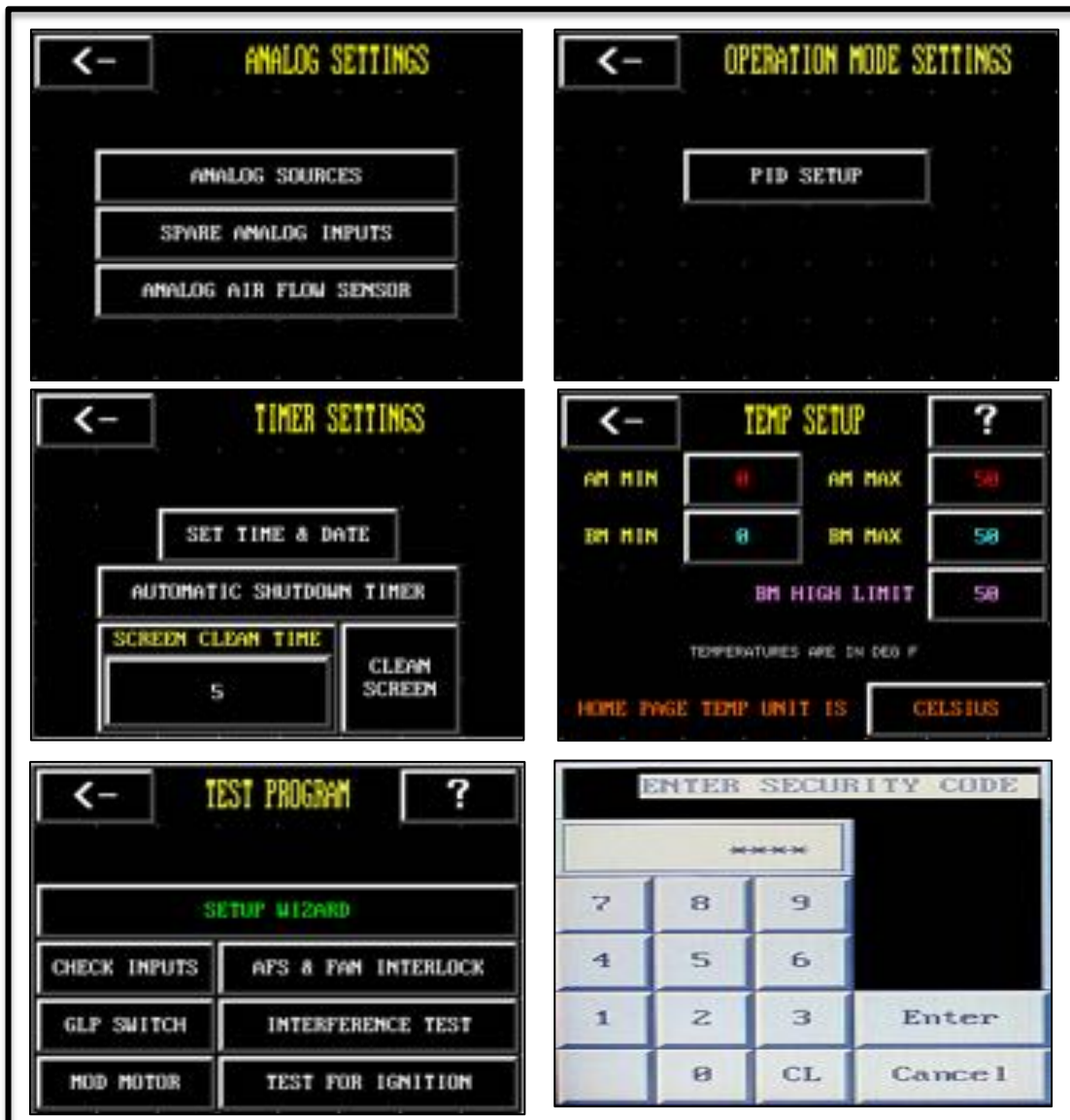


Heater Setup Screen:

Selecting the Wrench on the Home Screen will direct the user to the Heater Setup Screen.

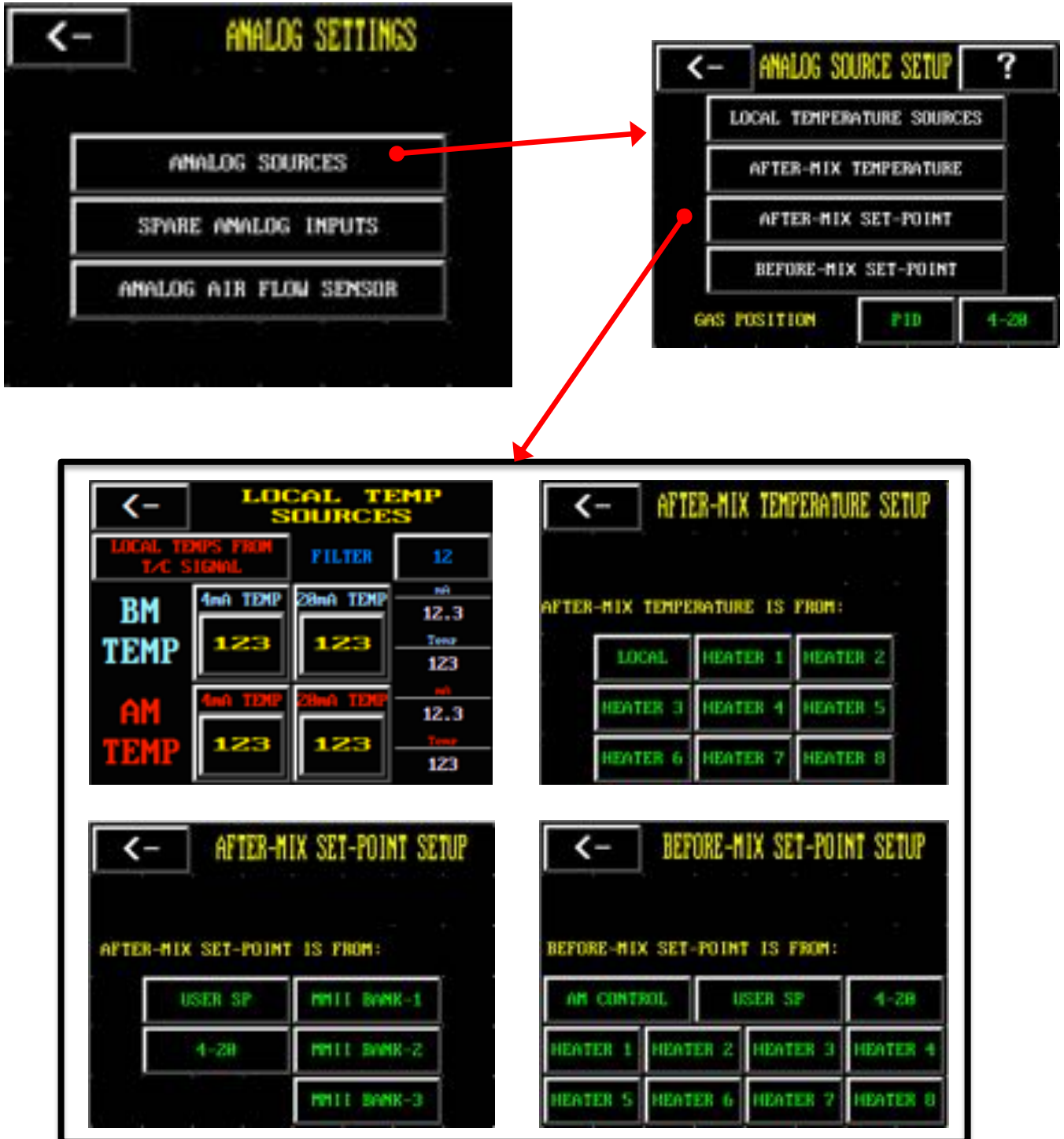


Under heater setup, press the button to proceed to the corresponding menu below.



Analog Source Setup Screen:

On the Heater Setup Screen, selecting the Analog Settings button, followed by the Analog Sources button, will direct the user to the Analog Source Setup Screen.



Enhancing Fuel Efficiency

IS THERE ANYTHING I CAN DO TO ENHANCE FUEL EFFICIENCY?

AUTOMATIC DRYING TEMPERATURE CONTROL:

A variety of incoming seed cotton moisture sensors are available depending on the seed cotton hot air pickup method. These moisture sensors, when combined with a Moisture Mirror, allow automatic control of the dryer temperatures.

When wet cotton enters the drying system, the dryer temperatures are automatically and quickly raised often resulting in no loss of production. When dry cotton enters the system, the temperatures are automatically reduced saving fuel and possible fiber damage.

INSULATION:

Significant fuel savings will result from insulating the hot air pipes in the drying system, especially those pipes exposed to areas outside of the building. A cost effective method of insulation is to wrap the air pipes with 4 inch thick fiberglass batt insulation. Cover the insulation with Cotton Koozie Shrink Wrap Film (part number 20750) and shrink in place with a propane powered heat gun. Heat guns are available from the factory for rental or purchase.



Applying Cotton Koozie Shrink Wrap Film over fiberglass batt insulation.

Moisture Mirror X Option

Remote Control and Optional Automatic Control

The Delta Heaters are compatible with the Ethernet Moisture Mirror X functions. This offers remote control (normally from ginner's console) of the unit via a CAT5 cable. The Moisture Mirror X has the ability to control up to eight Samuel Jackson Heaters. When the Moisture Mirror X is equipped with compatible moisture sensors, it offers automatic dryer temperature control.

Displayed on the Moisture Mirror X color touch panel are the START / STOP operations, temperature settings, actual and target temperatures, and additional information such as runtimes. When an ERROR or ALARM occurs, this information is also displayed and can be cleared from the Moisture Mirror X console.

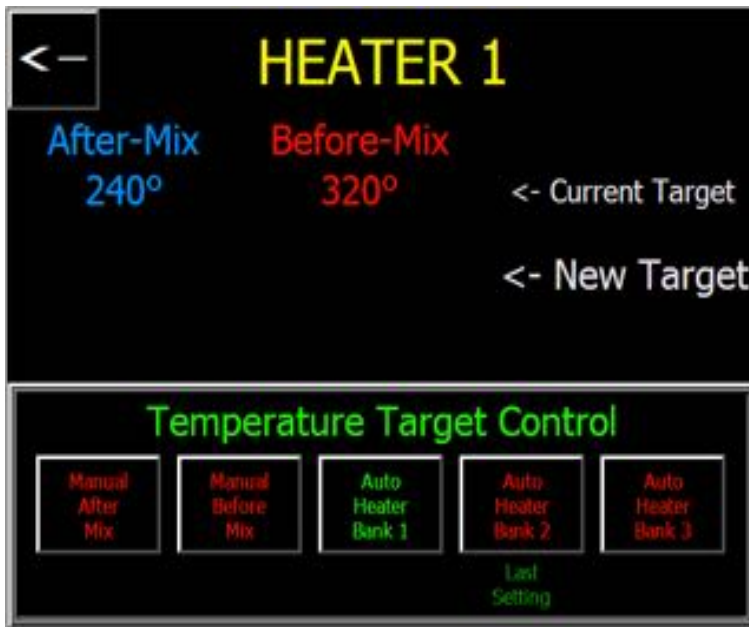
After pressing the desired Heater button, for instance "Heater 1", the screen below will appear. This is where you can start/stop, adjust temperatures, turn Shed on/off, and view error messages for the specific Heater.

The screenshot shows the control interface for HEATER 1. At the top, it says "HEATER 1" in yellow. Below that, there's a "Current Run Time" of "0002 : 22" and "0.72" v.p.". The main display shows two temperature readings: "122°" (blue) and "312°" (red). Below these are "120°" (blue) and "308°" (red). There are buttons for "Start", "SHED ENABLED", and "Stop". A "Run" indicator is at the bottom. A "View Error Log" button is in the bottom right corner. Five callout boxes provide instructions: 1. Red numbers indicate before-mix temperatures, and blue numbers represent after-mix temperatures. 2. Press Start to run the heater and Press Stop to turn the unit off. 3. Press Target to navigate to the temperature target screen. 4. Press the "Shed" button between Start and Stop to enable or disable "Shed". 5. Indicates the current status of the heater. "Run", "Standby", "Shed Off", "Ready" among others.

Heater Target Screen

Selecting the Target button on the Moisture Mirror X “Heater 1” Screen will direct the user to the Heater 1 Target Screen.

If manual Before-Mix/After-Mix is active, you can manually change heater temperatures at the Moisture Mirror or Heater Cabinet. To change the temperature manually at the Mirror, press the box underneath the temperatures to navigate to a numerical keypad. When you have typed in the desired temperature, press ENT and then press Set Now underneath the number you just entered. When Heater Banks are active, the Mirror will automatically control the Heater After-Mix set point.

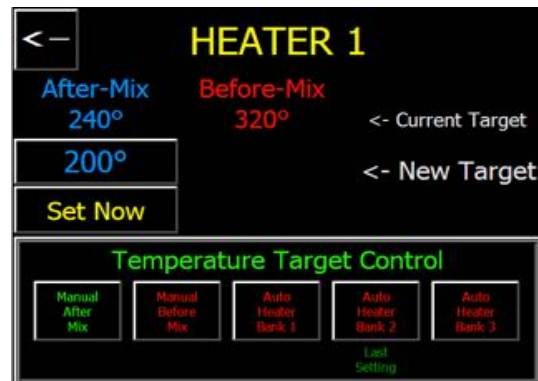
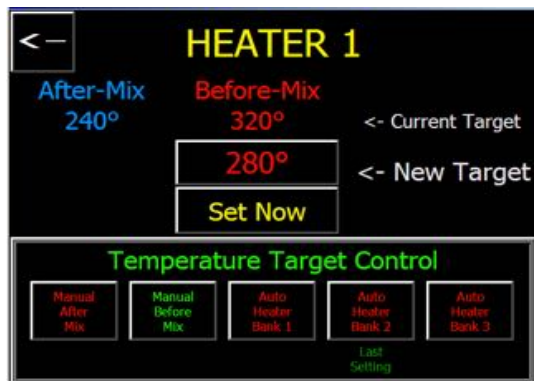


Auto Heater Control: Each heater can be setup with automatic Moisture Mirror control using one of 3 heater banks.

Manual After Mix: Allows the user to manually set the After Mix temperature target from either the Moisture Mirror or the Heater.

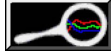
Manual Before Mix: Allows the user to manually set the Before Mix temperature target from either the Moisture Mirror or the Heater.

By pressing either manual button the heater can then be controlled by manually putting in either a Before-Mix or After-Mix temperature target. These options can be seen in the following two screenshots.

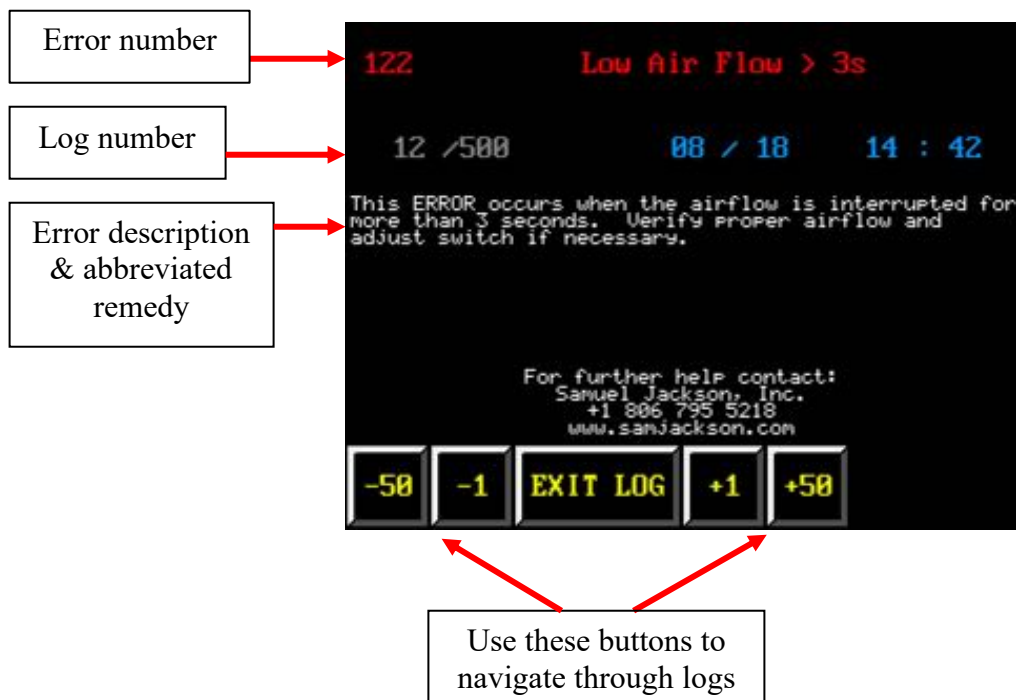


Error & Alarm Logging System

The *ERROR and ALARM LOGGING SYSTEM* is designed to make troubleshooting easier for both the user and Samuel Jackson service personnel. This system remembers the last 500 ERRORS and ALARMS, thus showing a history of past problems.

To access the log, press the magnifying glass  on the color touch panel's Home Screen, which brings up the STATUS screen. Then press "VIEW ERROR LOG" button. Navigate through the log history by pressing the -1 or +1 buttons or press the -50 or +50 buttons to step through 50 events at a time. Note that the time and date of each occurrence are shown. The "EXIT LOG" button returns you to the Home Screen.

Error Log Screen



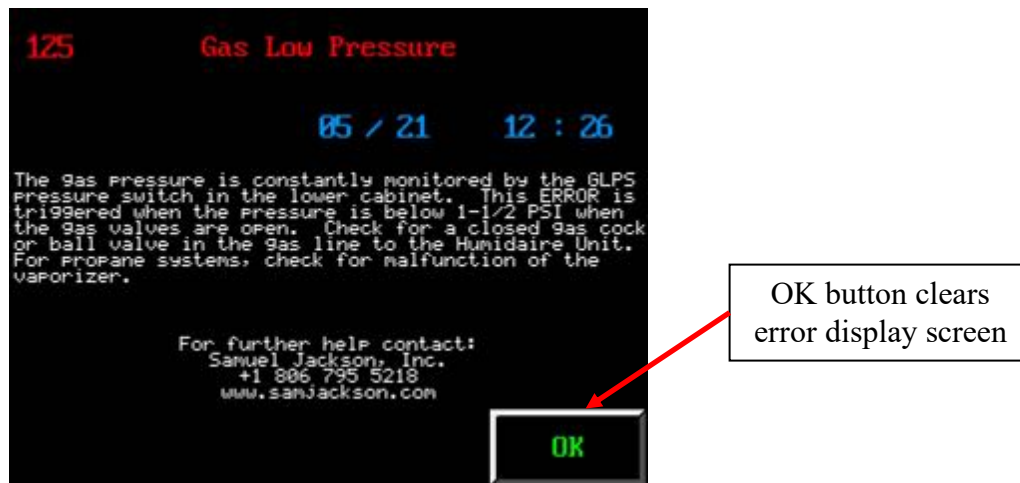
Error & Alarms Explanation

For software versions 1.0 and later

PRELIMINARIES -- ERRORS will cause the Heater to automatically shut down. ALARMS will permit the Heater to continue operation but warn of conditions that may cause a shutdown if left unattended. In each case, a brief description of the ERROR or ALARM will be shown on the color touch screen along with an abbreviated remedy.

The display will continue to show the ALARM or ERROR until the OK button is pressed. Only one ALARM or ERROR condition is displayed at a time. The oldest unacknowledged ALARM condition is shown even if the Heater shuts down due to an ERROR. Pressing the OK button will show consecutive ALARM conditions leading up to the shutdown ERROR.

Active ERROR/ALARM Screen



EXAMPLE: The flame electrode is fouled. This prevents the Heater from having a flame signal. ALARM code 146 (Burner failed to ignite) is displayed and the status light flashes. While this is occurring, the burner is automatically restarting itself (three times max) attempting to light. The burner shuts itself down on ERROR code 144 (Excessive flame failures) after 3 unsuccessful tries. The display continues to show ALARM code 146 although the status light is still flashing and the burner is shut down due to an ERROR. Press OK to clear each ALARM code and then to clear ERROR code 144. After ERROR code 144 is cleared, the operator can attempt to restart the burner.

ERROR 120

AIR FLOW SENSOR NOT OFF IN 24 HOURS: The air flow sensor (AFS) must be exercised periodically to insure its proper operation. This error occurs if the Heater and fan(s) have run continuously for over 24 hours. The Heater will **NOT** shut down due to this ERROR; however, if the Heater is turned off and an attempt is made to restart it without turning off the fan(s), it will not start and will display ERROR 120. The RESET

button will **NOT** allow restart. The fan **MUST** be turned off and then back on to allow the Heater to start again.

If the operator is aware of the safety issues involved in bypassing the function of this sensor, a temporary software bypass is available by pressing the BYPASS button on the error screen.

ALARM 121

MOMENTARY LOW AIR FLOW: This ALARM is an indication that a choke of the air flow is occurring. It is displayed when the air flow sensor goes off and comes back on in less than 3 seconds. If air flow is ok, limits may be set too tight. See Air Flow Sensor adjustment section in *TEST PROGRAM* section of manual for adjustment of limits.

ERROR 122

LOW AIR FLOW FOR MORE THAN 3 SECONDS: This ERROR occurs when the air flow is interrupted for more than 3 seconds. Verify proper air flow and adjust lower limit of sensor if necessary. See Air Flow Sensor adjustment (AFS & Fan Interlock) section in *TEST PROGRAM* section of manual for adjustment of limits.

ERROR 123

BAD VALU-HOUR CODE: The Valu-Hour code entered is not valid for this Heater at this time. This error occurs only on rental units.

ERROR 124

NO VALU-HOURS REMAIN: All available Valu-Hours have been used. Contact the factory to purchase more hours. This error occurs only on rental units.

ERROR 125

GAS LOW PRESSURE: During operation, the gas pressure is constantly monitored by the Gas Low Pressure Switch (GLPS) in the lower cabinet. This ERROR is triggered when the pressure is below 1-1/2 PSI when the gas valves are open. Check for a closed gas cock or ball valve in the gas line to the Heater. For propane systems, check for malfunction of the vaporizer. The GLPS is set to 1.5 PSI.

The GLPS will need to be manually reset. Push the black button on the outside over to reset the switch.

ERROR 126

GAS HIGH PRESSURE: During operation, the gas pressure is constantly monitored by the GHPS pressure switch in the lower cabinet. This ERROR is triggered when the pressure is above 7 PSI. Check for a failed gas pressure regulator. The Gas High Pressure Switch (GHPS) is set to 7 PSI. The regulated gas pressure shown on Gas Pressure Gage 2 (GPG2) is normally set to 5 PSI.

The GHPS will need to be manually reset. Push the black button on the outside over to reset the switch.

ERROR 127

ONLY 48 VALU-HOURS REMAIN: There are less than 48 Valu-Hours remaining. The unit will not operate after all hours are used. Contact the factory to purchase more hours. This error occurs only on rental units.

ERROR 130

GAS LOW PRESSURE SWITCH IS NOT WORKING: The Gas Low-Pressure Switch (GLPS) is not responding as it should in normal operation. The combustion control computer performs an automatic check of most of the Heater's switches and safety devices each time the burner is started. One of these checks is the GLPS. If this switch is closed when it should be open, the combustion control computer will not permit the burner to start. Possible causes of this abnormal operation of GLPS are:

- Upstream SSOV1 is malfunctioning and is open, maintaining gas pressure on GLPS at all times.
- The GLPS switch is out of adjustment. GLPS should close above 1.5 PSI. The GLPS may need to be manually reset. Push the black button on the outside over to reset the switch.
- GLPS has been tampered with or bypassed electrically.
- The manual low fire adjustment valve is closed off too much which prevents the gas from being released when the pilot valve is energized.

To check GLPS, select GLP SWITCH from the Test Program Screen. Press SSOV1 which opens first Safety Shut-off Valve pressurizing the gas train.

If the operator is aware of the safety issues involved in bypassing the function of this switch, a temporary software bypass is available by pressing the BYPASS button on the error screen.

ERROR 131

USER SPECIFIED TIME FOR SHUTDOWN: Some countries require that gas-fired combustion products turn off once every 24 hours as a safety measure. To accommodate operators that need to comply with this regulation, this error will force the Heater to shut down once a day at a user defined time. This error will only occur if it is enabled.

ERROR 132

EXCESSIVE LOW AIR TEMPERATURE: Actual air temperature was more than 10 degrees (F) lower than the target (setpoint) temperature for more than 15 minutes.

- Is the burner shim too small?
- Is the air volume too large?
- Is the gas pressure too low?

- Is the Gas Valve Motor (GVM) working?

ERROR 133

EXCESSIVE HIGH AIR TEMPERATURE: Actual air temperature was more than 10 degrees (F) higher than the target (setpoint) temperature for more than 15 minutes.

- Is the pilot valve opened too much?
- Is the burner shim too big?
- Is the air volume too small?

ERROR 134

SSOV1 FAILED: The PLC was not able to verify that Safety Shut-Off Valve 1 (upstream SSOV1 valve) is opening and closing in a timely manner. If this problem persists, try the following: Check that SSOV1 opens and closes. Check for gas leaks. Check operation of SSOV's proof of closure switch. Replace SSOV1 valve actuator.

If the operator is aware of the safety issues involved in bypassing the function of the valve's proof of closure switch, a temporary software bypass is available by pressing the BYPASS button on the error screen.

ERROR 135

SSOV2 FAILED: The PLC was not able to verify that Safety Shut-Off Valve 2 (downstream SSOV2 valve) is opening and closing in a timely manner. If this problem persists, try the following: Check that SSOV2 opens and closes. Check for gas leaks. Check operation of SSOV's proof of closure switch. Replace SSOV2 valve actuator.

If the operator is aware of the safety issues involved in bypassing the function of the valve's proof of closure switch, a temporary software bypass is available by pressing the BYPASS button on the error screen.

ERROR 136

GAS LEAK UPSTREAM – CHECK SSOV1: This is a serious error caused by a leak in the SSOV1 (this is the "upstream" gas valve). The Test Program may be run to determine the severity of the leak. See *GLP SWITCH* section of *TEST PROGRAM* in this manual. This ERROR is normally a result of contamination under the valve seat of SSOV1. If severe contact the factory for service.

ERROR 137

GAS LEAK DOWNSTREAM – CHECK PV & SSOV2: The PLC has detected a possible gas leak on the down-stream side. If this problem persists, try the following: Check that SSOV2 (this is the "downstream" valve) and PV are not leaking. Check for down-stream

gas leaks in gas train. Check for contamination in valve seats of SSOV2 and PV. Refer to Test Program section *GLP SWITCH* for actuating the individual gas valves.

ERROR 140

NO GAS LEAK TEST PERFORMED, LAST 6 SHUTDOWNS: Automatic gas leak testing has been interrupted for the past 6 shutdowns. Each time the Heater is turned off, the PLC attempts to spend about 10 minutes performing an automatic leak check on the gas valve assembly. These tests can be interrupted by simply turning off the power, or restarting the Heater before the 10 minutes has ended. The PLC demands however, that a leak test be performed at least once every 7 shutdowns. If each of the past 6 shutdowns have had the leak test interrupted, the PLC will not start until the OK button is pressed.

ERROR 141

FAN INTERLOCK BYPASSED: Samuel Jackson Heaters are provided with a fan interlock relay (FIR) to provide immediate shutdown of the Heater when the fan(s) are turned off. This error indicates that an electrical signal is being received through the fan interlock with no air flow present, effectively bypassing this important safety feature.

ERROR 142

AIR FLOW SENSOR (AFS) BYPASSED: This error indicates that an electrical signal is being received from the air flow sensor with no fan interlock signal present 10 minutes after turning the Heater off, effectively bypassing this important safety feature. Check the adjustment of the air flow sensor (AFS) and verify its operation.

ERROR 143

NO FAN INTERLOCK, ARE ALL FANS ON?: This error is caused when an attempt is made to start or operate the burner when no fan interlock signal is present. A fan interlock relay is supplied with the unit to provide instant shutdown when the fan(s) stop. The installing electrician is responsible for wiring the coil of this relay (FIR) to the fan circuit.

ERROR 144

EXCESSIVE FLAME FAILURES: During ignition and operation, flame failures are counted. When the total comes to 3, the PLC shuts the unit down on ERROR 144. Use the error log to determine which alarms the flame failure triggered. Knowing which three alarms caused the error will help determine the problem.

ALARM 145

BURNER A & B FAILED TO IGNITE: This ALARM means that both burner heads in the Heater failed to light during ignition sequence. See the maintenance tips later in this section.

ALARM 146

BURNER A FAILED TO IGNITE: This ALARM means that burner head A in the Heater failed to light during ignition sequence. See the maintenance tips later in this section.

ALARM 147

BURNER B FAILED TO IGNITE: This ALARM means that burner head B in the Heater failed to light during ignition sequence. See the maintenance tips later in this section.

ALARM 151

BURNER A FLAME FAILED DURING OPERATION: This ALARM means that burner A failed after the flame had been established. See maintenance tips below.

ALARM 152

BURNER B FLAME FAILED DURING OPERATION: This ALARM means that the burner B failed after the flame had been established. See maintenance tips below.



THE FOLLOWING MAINTENANCE TIPS WILL HELP TO MINIMIZE FLAME FAILURE ALARMS:

- Clean the spark plug if it appears dirty.
- Scrape off the flame electrode and wipe the ceramic insulator with a clean cloth.
Make sure the power is switched off before doing this.
- Adjust the low fire setting or open the air flow shutters if the smallest flame appears to die in air turbulence.
- Inspect the flame rod wire for damaged insulation or exposed wires.
- Make sure the flame rod wire and spark plug wire are connected correctly. The flame rod wire is blue, the spark plug wire is black and looks like an automotive spark plug cable with copper wire core.

ERROR 153

FLAME SIGNAL FOR BURNER A, BEFORE FUEL, BEFORE SPARK: This ERROR is normally caused by a malfunction or tampering with the flame relay (FLA). Also check for carbon build-up in the burner head causing a short to the flame rod.

Make sure the power is switched off before doing this.

ERROR 154

FLAME SIGNAL FOR BURNER B, BEFORE FUEL, BEFORE SPARK: This ERROR is normally caused by a malfunction or tampering with the flame relay (FLB). Also check for carbon build-up in the burner head causing a short to the flame rod.

Make sure the power is switched off before doing this.

ERROR 155

FLAME SIGNAL FOR BURNER A BEFORE FUEL DURING SPARK: This ERROR is caused by electrical interference between the spark plug wires and the flame electrode wires for burner A. Separate the wires to help eliminate this interference.

ERROR 156

FLAME SIGNAL FOR BURNER B BEFORE FUEL DURING SPARK: This ERROR is caused by electrical interference between the spark plug wires and the flame electrode wires for burner B. Separate the wires to help eliminate this interference.

ERROR 157

EXTERNAL FLAME CONTROL ALARM: The external combustion control has detected an unsafe condition and shut down the burner. Check the external flame control for more details.

Some alarms are caused by high or low gas pressure. These switches are **NOT** directly monitored by the PLC and will cause a generic flame failure alarm. Verify that these switches have been reset by pressing the black button located on the cover of the switch.

ERROR 160

BEFORE MIX-POINT THERMOCOUPLE WIRING REVERSED: The before mix-point temperature shows air getting cooler after flame is established indicating reversed thermocouple wiring. If this problem persists, try the following:

- In the junction head of the red Thermocouple, check that RED wire is connected to negative (-) junction and WHITE wire is connected to positive (+) junction on transmitter. Reversing these wires will cause this problem.
- Refer to *ELECTRICAL INSTALLATION NOTES* section in this manual for more information.

ERROR 161

AFTER MIX-POINT THERMOCOUPLE WIRING REVERSED: The after mix-point temperature shows air getting cooler after flame is established indicating reversed thermocouple wiring. If this problem persists, try the following:

- In the junction head of the blue Thermocouple, check that RED wire is connected to negative (-) junction and WHITE wire is connected to positive (+) junction on transmitter. Reversing these wires will cause this problem.
- Refer to *ELECTRICAL INSTALLATION NOTES* section in this manual for more information.

ERROR 164

BAD BEFORE MIX-POINT THERMOCOUPLE: The integrity of the thermocouple wiring and thermocouple is checked during the pre-ignition checks each time the Heater is started. This error occurs when the before mix-point thermocouple connection is an open circuit indicating a loose wire or a failed thermocouple sensor.

ERROR 165

BAD AFTER MIX-POINT THERMOCOUPLE: The integrity of the thermocouple wiring and thermocouple is checked during the pre-ignition checks each time the Heater is started. This error occurs when the after mix-point thermocouple connection is an open circuit indicating a loose wire or a failed thermocouple sensor.

ERROR 166

SSOV1 PROOF OF CLOSURE SWITCH FAILED: A proof of closure switch on the actuator of the SSOV1 (“upstream” valve) that tells the PLC when the valve is closed has failed. Check for loose wires and that SSOV1 valve is actually opening.

If the operator is aware of the safety issues involved in bypassing the function of the proof of closure switch, a temporary software bypass is available by pressing the “BYPASS” button on the error screen.

ERROR 167

SSOV2 PROOF OF CLOSURE SWITCH FAILED: A proof of closure switch on the actuator of the SSOV2 (“downstream” valve) that tells the PLC when the valve is closed has failed. Check for loose wires and that SSOV2 valve is actually opening.

If the operator is aware of the safety issues involved in bypassing the function of the proof of closure switch, a temporary software bypass is available by pressing the “BYPASS” button on the error screen.

ERROR 170

LOW PLC BATTERY: The battery in the PLC is low and needs replacing. The Heater will continue to operate with a low battery or without a battery, but all custom user settings will be lost.

ERROR 171

HIGH TEMPERATURE EXCEEDED AT MIXPOINT: This error will shut the Heater down to excessively high temperatures before the mixpoint which the modulating gas valve and controls are unable to constrain. Check for the following:

- Deficient air volume, especially when cotton begins to enter the system.
- Chokes in the air system.

A smaller burner shim will normally improve both the flame appearance and the frequency of this error, although this will do nothing to improve the larger issues of deficient air volume and chokes.

ERROR 172

BURNER A FLAME LASTS TOO LONG AFTER SHUTDOWN: This error means that flame is detected in burner A for more than 12 seconds following closure of all gas valves. This indicates a probable gas leak in the system. In the Test Program, use the Gas Low Pressure Switch Test *GLP SWITCH* to determine the severity of the leak. Consult the factory for service recommendations.

ERROR 173

BURNER B FLAME LASTS TOO LONG AFTER SHUTDOWN: This error means that flame is detected in burner B for more than 12 seconds following closure of all gas valves. This indicates a probable gas leak in the system. In the Test Program, use the Gas Low Pressure Switch Test *GLP SWITCH* to determine the severity of the leak. Consult the factory for service recommendations.

ALARM 175

HOT BOX TRASH GATE: This ALARM is optional for users of the Samuel Jackson Hot Box II. The pivoting trash gate on the Hot Box II has remained open for more than 20 seconds allowing outside air to leak into the drying system. This condition greatly hurts the performance of the drying system. Check for junk jamming the trash gate open.

ERROR 176

HOT BOX TRASH GATE

This ERROR is similar to ALARM 175 except the trash gate on the Hot Box II has remained open for more than 2 minutes. The burner will shut down and this ERROR will be displayed after resetting ALARM 175.

ERROR 177

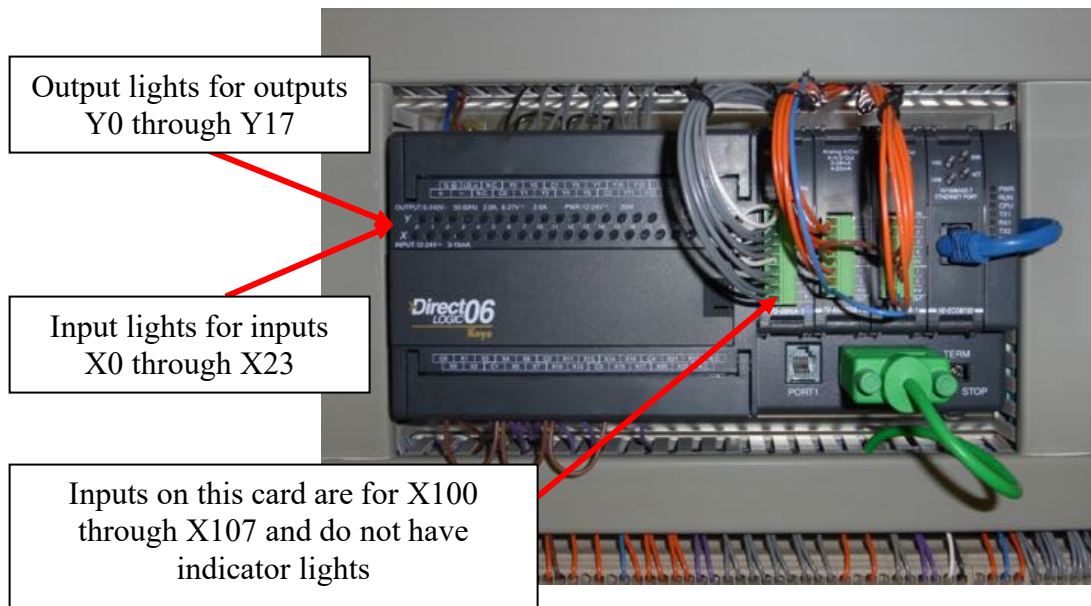
POWER FAULT DURING OPERATION STAGE: This error means that electrical power was disconnected while the burner was on or during the 10 minute leak test after shutdown. Check for faulty supply wiring connections.

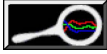
Troubleshooting

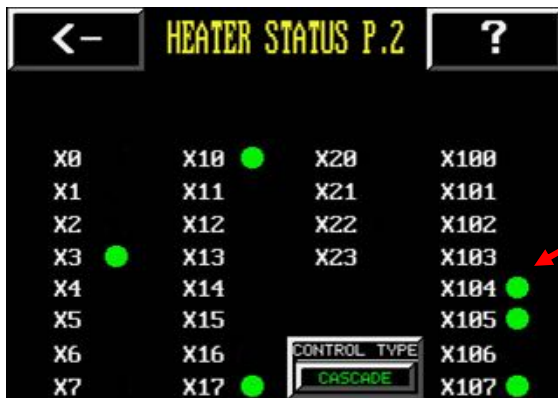
Using PLC input and output lights

Knowing the input and output conditions of the PLC can help diagnose problems, often without the need for an electrician or a voltmeter. Most of the voltage inputs and outputs (such as voltage signal showing on/off condition of a switch) have small red lights that are shown on the face of the PLC. The “Electrical Schematic for Analog PLC Inputs and Outputs”, included in this manual and located on the inside door of the cabinet, show the input/output numbers for the PLC.

Input lights for X0 through X23 are shown on the PLC. Input lights for X100 through X107 are not shown on the PLC so a screen on the color touch panel shows all of the input conditions. A green light beside the input number indicates an “on” condition.



Press the magnifying glass  on the Home Screen to access the Heater Status screens, then go to the second page.



A green light next to an input means that input is “on”.

Heater Status Screen
(Page 2, showing input conditions)

Test Program

For software versions 1.0 and later

Note: the Delta Heater must be in Factory Default Mode to run the *TEST PROGRAM*.

PRELIMINARY:

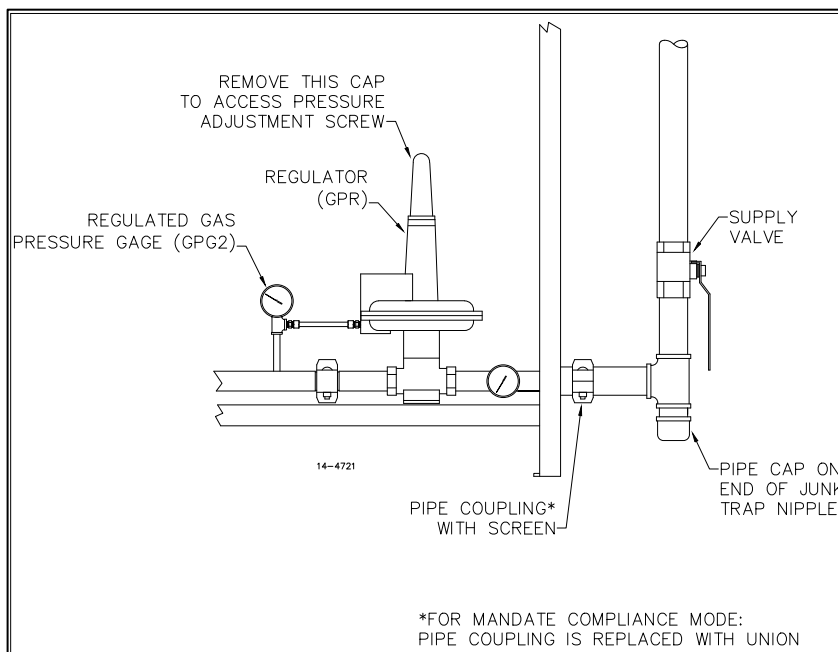
To test a new installation, first check that all necessary connections for electrical and gas are made. Standard electrical power supply is 120VAC, 50/60HZ. If 220VAC power is supplied, a step down transformer kit (Part No. 16372) is available. Natural gas or propane vapor supplied to the Heater should be regulated for 6 to 25 PSI (0.4 to 1.7 bars).

With electrical power off, prepare to purge the gas line of debris and air by closing off the gas supply valve before the Heater's regulator and having the main gas supply on. Open the pipe cap on the end of the short junk trap nipple under the supply valve and quickly open/close the gas supply valve several times. Debris in the pipe will blast out. Keep doing this until gas is noticeable then apply pipe sealant to pipe cap and replace on end of junk trap nipple.

While purging the gas line, make sure good ventilation is present and no one is smoking!

Do not use your hand to test for presence of junk in the gas line!


Gas Supply Inlet Valve and Junk Trap



Turn on the electrical power to the cabinet, but leave the circuit breaker (CB) off. Check that power to terminals 0 and 2 on the electrical panel is between 103 and 125 VAC.

Turn on the circuit breaker (CB). Check that the thermocouples are connected and hooked to the correct terminals on the electrical panel. If a temperature shows 777 on the color touch panel, then the thermocouple is not connected. A good test to check that thermocouple is connected to correct panel terminals is to disconnect one of the wires at the thermocouple. The temperature displayed for that thermocouple (before or after mixpoint) should be 777. When disconnecting a wire from the thermocouple, it is important to not let the wire touch the metal casing of the thermocouple. Doing so may cause a short, burning out a fuse or the PLC input.

The *TEST PROGRAM* offers a methodical way to correct problems. Access it by pressing


the wrench button  on the color touch panel's home screen. The *SETUP* screen shown below will come up. Pressing the "TEST PROGRAM" button accesses the *TEST PROGRAM*. This button is only displayed when the flame is off.



TIPS

The default password is 1234. The user can change this password after accessing the SETUP screen.

Heater Setup Screen



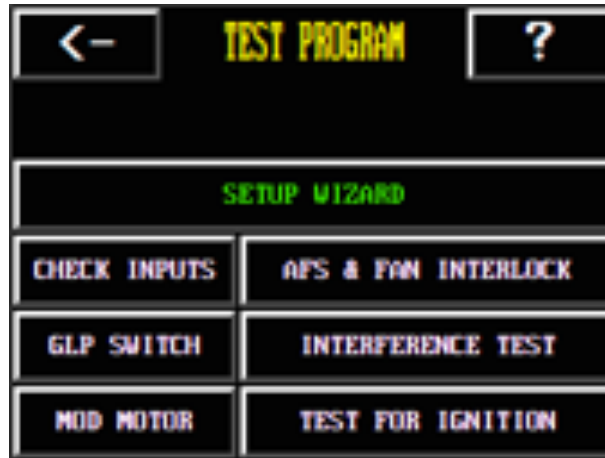
The screenshot shows the "HEATER SETUP" screen with the following layout:

- Top bar: Home icon, "HEATER SETUP" title, and Help icon (?)
- Menu items: LANGUAGE SELECTION, ANALOG SETTINGS, TIME SETTINGS, TEST PROGRAM, SET FACTORY DEFAULTS, OP MODE SETTINGS, TEMP LIMITS & UNITS, PASSWORD (1234), and CONTRAST (18).
- Contrast controls: Up and down arrow buttons.

Callout boxes provide the following instructions:

- Press the "HOME" button to go to main (home) screen when finished with TEST PROGRAM (points to the Home icon).
- Press the "TEST PROGRAM" button to access the TEST PROGRAM (points to the TEST PROGRAM button).
- Contrast button adjusts the brightness of the screen for easier viewing (points to the Contrast button).

Access to the *TEST PROGRAM* is denied if a jumper wire is not in place between terminals 30 and 94 on the electrical panel for “remote stop” signal (Input X3). If the optional “remote stop” feature is used, then this jumper is removed when installing a normally closed operator switch.



TEST PROGRAM Screen

Now methodically press each button on the TEST PROGRAM screen to check and make adjustments before attempting to light the unit.

CHECK INPUTS

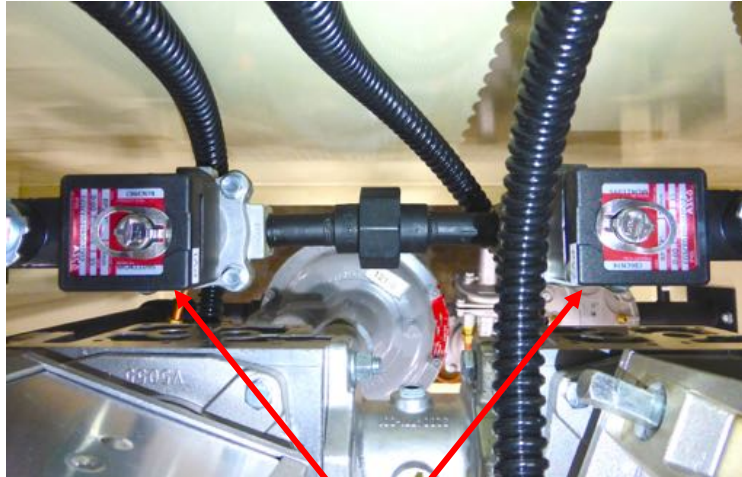
Several important inputs to the PLC are checked here. If the light to the left of the component is green, the input condition is ok. If it is red, then the component may have failed, may not be connected properly, or is out of adjustment.

GLP SWITCH

Operation of the Gas Low Pressure Switch (GLPS) and gas valves are checked here. Turn the gas supply on. Pressing and holding the “SSOV1” button opens the upstream safety shut-off valve allowing gas to fill the gas train. The CAVITY CHARGED light should turn from red to green when the cavity is charged. This indicates that the GLPS and the upstream Safety Shut Off Valve (SSOV1) are working. The GLPS activates when pressure goes above 1 ½ PSI.

Press the “SSOV2” button to open the downstream safety shut-off valve allowing gas to escape from the gas train. The CAVITY CHARGED light should turn red indicating no gas pressure.

In some cases, the GLPS may need to be manually reset. Push the black button on the outside over to reset the switch.



Gas Pilot Valves are located behind the SSOV1 and SSOV2

MOD MOTOR

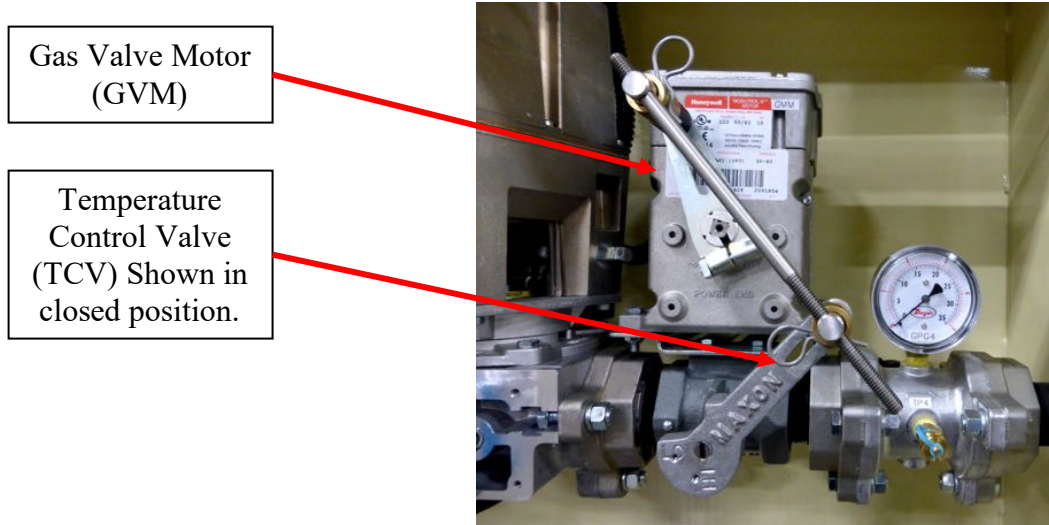
The operation and adjustment of the Gas Valve Motor (GVM) is checked here.



Turns 120VAC power on/off to GVM.

Press this button to toggle between closed and open to check the operation and adjustment of the gas valve. 4mA DC signal is supplied to valve for closing, 20 mA DC for opening.

The linkage from the Gas Valve Motor (GVM) to the Temperature Control Valve (TCV) has been adjusted at the factory for correct travel. TCV is shown in closed position below. It travels 90 degrees for fully open while GVM linkage arm travels 160 degrees.



AFS AND FAN INTERLOCK

The operation of the Air Flow Sensor (AFS) and Fan Interlock (FIR) are checked here. Begin by adjusting the air in the drying system. When the air volume is satisfactory, the technician will need to adjust the air shutters in the Heater's body to maintain the correct air velocity across the burner head by performing the following.

To adjust the air shutters and the air flow range settings for the AFS, touch the page back button to go back to the Test Program screen, then touch the back button (←) to go back to the SETUP screen. Now press "ANALOG SETTINGS" button and then ANALOG AIR FLOW SENSOR button. This will take you to the AFS SETUP screen.

Observe the Air Flow (V.P.) reading. This is the velocity pressure through the burner body in the area of the burner heads. The velocity pressure should be about 0.4, which is in inches water column. If necessary, adjust this by moving the vanes (shutters), which constrict the air just ahead of the burner heads. Make the same adjustments on all the vanes. On high air volume systems where the velocity pressure cannot be reduced to 0.4 inch with the shutters, burner operation will not be adversely affected.

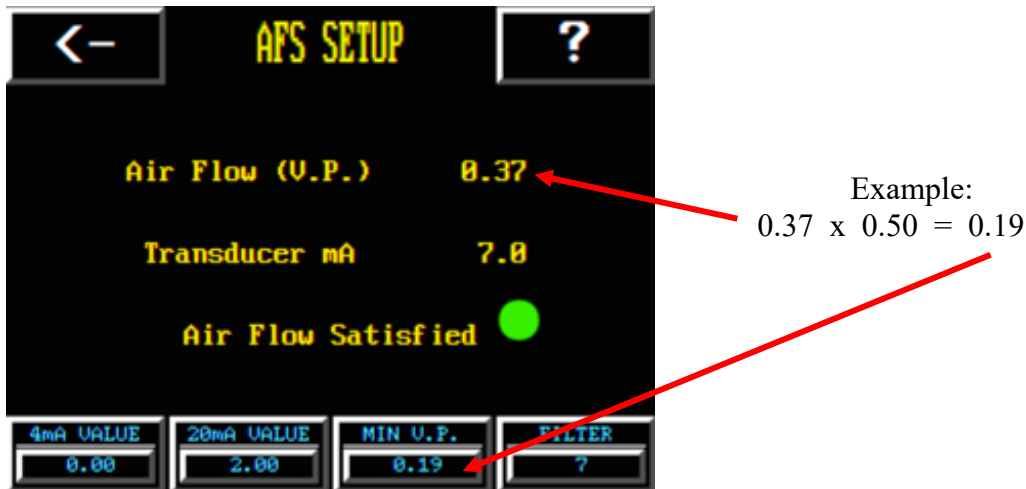
If the VP is too low, the flame may be yellowish and the Air Flow Sensor (AFS) not responsive. If the VP is too high, the burner may be hard to light requiring a larger gas low fire valve opening, and burner may roar at high output.

Burner body with two adjustable vanes
(Delta 2 body shown)



Adjust vanes equally with link arms

Take the Air Flow (V.P.) reading and multiply this number by 0.7. This is the minimum air flow setting (MIN V.P.). For example, using the screen below, $0.37 \times 0.5 = 0.185$, which is approximately equal to 0.19. Press “MIN V.P.” button and set MIN V.P. to 0.19.



Now go back to the TEST PROGRAM and the AFS AND FAN INTERLOCK screen. Both lights should be green. If the Air Flow Sensor light is red, the range settings for the air flow will need to be adjusted. If the Fan Interlock light is red, the fan interlock (FIR) is not working.

INTERFERENCE TEST

Operation of the ignition transformer and spark plug is checked here. Electrical interference between the spark plug wire and flame rod wire is also checked.

The fans must be running at least 20 seconds before you are able to access this screen. Operation of the fan is verified by both the Air Flow Sensor (AFS) and the Fan Interlock Relay (FIR) being satisfied.

Touch the “IGT” button. The green light should remain green at all times. If it is quiet in the gin, you should hear the hiss of the spark. The spark electrode gap should be between 1/16 and 1/8 inch (1.5 to 3mm).

If the light turns red indicating interference, check the path of the spark plug wire from the ignition transformer to the burner head. This 6,000 Volt wire may be too close to the flame rod wire. It is ok to run them together for a short distance through the metal conduit to the burner. *It is not ok to coil the spare length of wires together.* Since the operating program makes a similar test during each trial for ignition, the burner will not operate until this problem is corrected.

TEST FOR IGNITION


This step allows adjustment of the manual gas low fire valve. Air volume through the Heater and the air shutters should already be set before adjusting the low fire valve.

With all the fans on that contribute to the air volume through the Heater, the spark plug fires continuously until the OK button is pressed after the flame is established and the low fire valve is adjusted. Adjust the low fire valve just enough for easy ignition. Opening it too far will produce a large flame at low fire and waste fuel.



Adjust manual gas low fire valve open just enough for easy ignition. The valve is located behind the Gas Valve Motor.

Additional Settings

After completing the *TEST PROGRAM*, some additional adjustments are made from the Heater SETUP screen. Access the SETUP screen by pressing the wrench button  on the color touch panel's home screen then enter the password. The "SET FACTORY DEFAULTS" button returns all custom settings back to factory defaults. The TEST PROGRAM features are described in the previous section of this manual. Descriptions for the rest of the setups are shown below.

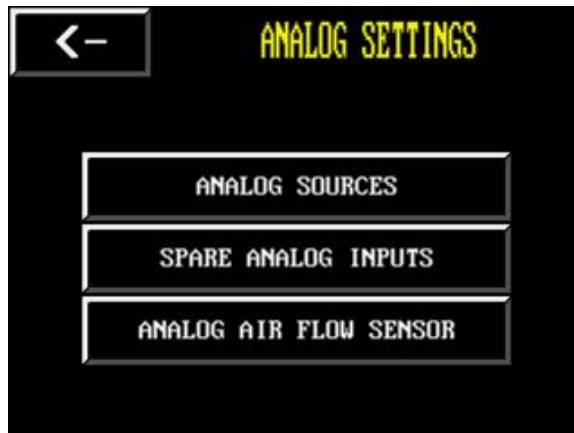
Heater Setup Screen



ANALOG SETTINGS

Only the "ANALOG AIR FLOW SENSOR" button should normally be pressed here once the Heater has been commissioned. The function of adjusting the air flow sensor settings is covered in the *TEST PROGRAM* section of manual.

Analog Settings Screen



The other two buttons, “ANALOG SOURCES” and “SPARE ANALOG INPUTS”, will activate screens that you may be asked to access by the factory under special circumstances.

During Heater Commissioning, the technician will use the “ANALOG SOURCES” button to access screens for setting up the logic for temperature sensing and control. A brief explanation of these screens and the control logic follow. Please consult with the factory before making any changes to the control settings on these screens.

Pressing the “ANALOG SOURCES” button brings up the following screen.

Analog Source Setup Screen



The “PID” button is normally left green indicating internal control is used for setting gas valve motor (GVM) position

Now press the “AFTER-MIX TEMPERATURE” button. Normally, the “LOCAL” button is activated here. Active is indicated by green word color. “LOCAL” indicates that this Heater control is responsible for internally setting the after mix temperature setpoint.

After-Mix Temperature Setup Screen

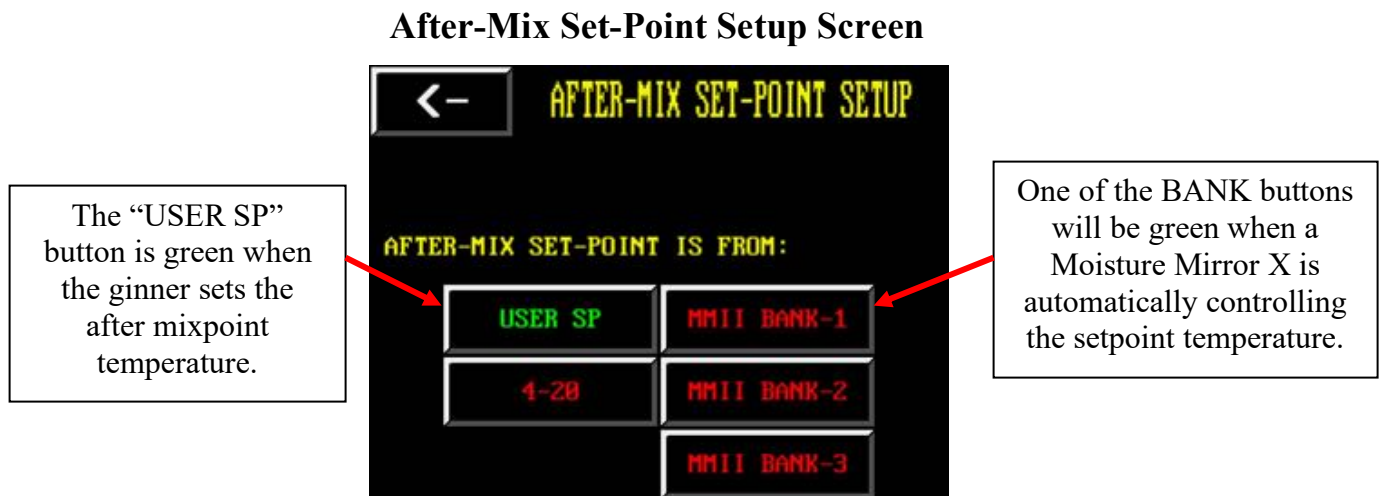


“HEATER 1”, “HEATER 2”, etc. buttons refer to the ethernet port ID number of the Heater that the after mix thermocouple is connected to for some drying systems.

When more than one heater is used in a Samuel Jackson drying system, it is common to have one after mixpoint temperature controlling the before mixpoint setpoints of all the Heaters. The “HEATER 1”, “HEATER 2”, etc. buttons are referring to which Heater is connected to the after mixpoint thermocouple. Heater 1 will have its network ID set for Heater number 1 by the setting of the DIP switches on its Ethernet port card on the Heater’s PLC.

Network ID number settings for Heaters 1 – 8 are shown on the drawing titled “*Network ID Setting*” included in this manual.

Go back to the ANALOG SOURCE setup screen by pressing the back (←) button. Press “AFTER-MIX SET-POINT” button. If no automatic dryer temperature control is available, the ginner will set the after mixpoint temperature. This is activated by having the “USER SP” button green.



If the Moisture Mirror X is used with an incoming moisture sensor, then select “MMX BANK-1” button. The BANK-2 and BANK-3 buttons are used when multiple stages of Heaters are connected and the user wants the temperatures to be different between the stages.

For example, more heat for collision air and less heat for the Hot Box pickup for a Samuel Jackson Collider Drying System may be desirable. The percentage of difference between the banks is set on one of the additional settings screens accessed from the INCOMING MOISTURE screen of the Moisture Mirror X.

Now press the “BEFORE-MIX SET-POINT” button. On this screen, normally the “AM CONTROL” button is selected and will be green. This means that the before mixpoint temperature is set automatically based on the after mixpoint control. This is the default setting.

As the actual after mixpoint temperature changes based on incoming cotton moisture conditions, the before mixpoint temperature setpoint is automatically changed to maintain the desired after mixpoint temperature. This temperature control logic has been a standard on Samuel Jackson Heaters for a number of years.

Before-Mix Set-Point Setup Screen

The default is for “AM CONTROL” to be active, so this button is green.



TIME SETTINGS

- **SET TIME & DATE:** Clock time and date are set here. Be aware that if a Moisture Mirror X is connected to the Heater, the Moisture Mirror X has priority over time and date settings making changes to time and date via the color touch panel at the unit null and void.
- **AUTOMATIC SHUTDOWN TIMER:** Some countries require that gas-fired combustion products turn off once every 24 hours as a safety measure. This feature is used to activate an automatic 24-hour shutdown. If enabled, every day at a user specified time, the Heater will automatically shut down and ERROR 131 will be shown.

PID SETUP

The control action of the Temperature Control Valve TCV is determined by the “tuning” values called the PID. The PID values are labeled as GAIN, RESET and RATE for both before mix point and after mix point temperature action on the PID SETUP screen. The default values work for most installations. Consult the factory before adjusting these values.

TEMP LIMITS & UNITS

The set point temperature ranges for modulating before and after mix point temperatures are set in this screen. The high limit kill point is also set here.

Default values are:

Modulating before mix point

95° F [35° C] for minimum

350° F [177° C] for maximum

After mix point

95° F [35° C] for minimum

300° F [149° C] for maximum

High limit kill point for before mix point

415° F [213° C]

When the Delta Heater is operating in Mandate Compliance Mode, the high limit kill point is also controlled by the High Temperature Limit Controller. This setting is adjusted manually using the dial on the High Temperature Limit Controller.

Temporary before mix point override

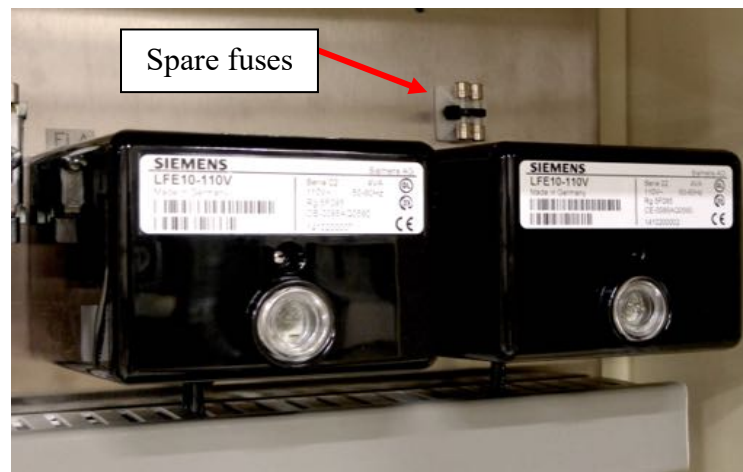
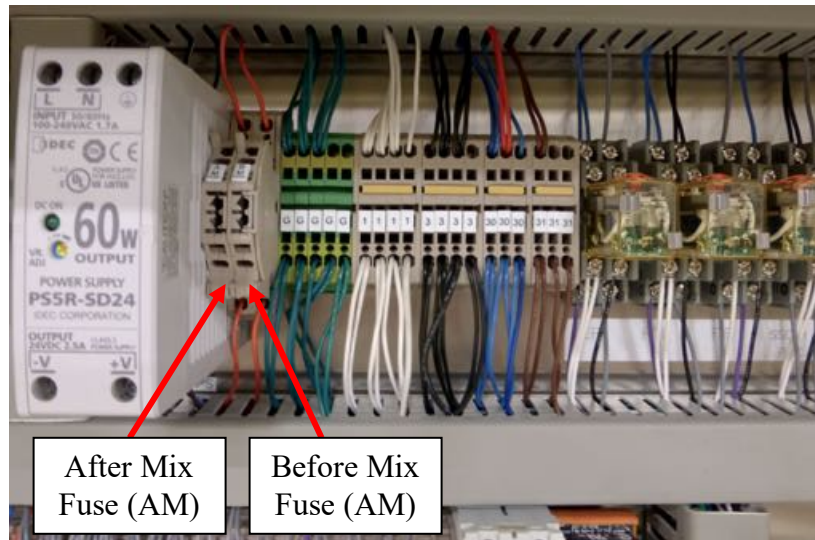
50° F [10° C] above modulating before mix point maximum

If the user wants the temperature units displayed in Celsius on the home page, then touch the “HOME PAGE TEMP UNIT IS” button to toggle between Celsius and Fahrenheit.

PASSWORD

The default password is 1234. Touch the “PASSWORD” button to go to a screen that allows you to change the default password. The password can be a 1 - 4 digit number.

Analog Fuse Replacement



The Delta Heaters are equipped with fuses on the thermocouples to prevent damage to the input card in the event that the thermocouples are wired incorrectly. In the event that a fuse is burned out, two spares are provided.

To replace a fuse, do the following:

- Make sure the Thermocouple is wired correctly.
- Pull the top tab. The fuse holder will rotate out.
- The fuse is secured on the right side of the fuse holder. Pry it out using a small screwdriver or similar instrument.
- Press the new fuse into position.
- Close the fuse holder.

If the fuse continues to burn out, check to see that there are no shorts in the wiring and that the thermocouples are not wired backwards. If needed, contact the factory to order more fuses (Part No. 22285).

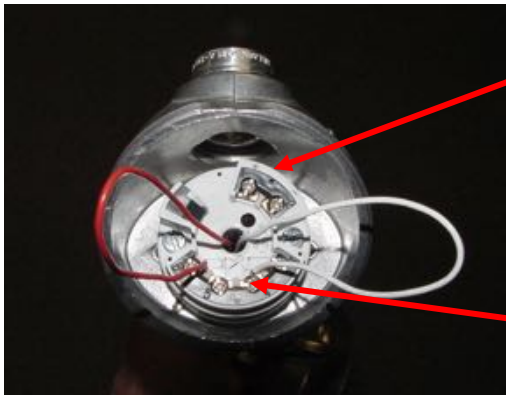
Electrical Installation Notes

SINGLE PHASE SUPPLY TO HEATER: Run 120VAC 50/60HZ power to the Heater from a 15-ampere fusible disconnect switch or circuit breaker which you will provide. If 220VAC power is supplied, a step down transformer kit is required (Part No. 16372).

ETHERNET CABLE (CAT5 or CAT6): Ethernet cable is used when connecting the Heater to the optional Moisture Mirror X control system. The cable should be category 5, 5E, or 6 (CAT5, CAT5E, or CAT6) and should be of a 100% shielded type or run in a dedicated metal conduit. The maximum cable length is 330 feet (100 meters). Termination on both ends should be made with category 5, 5E, or 6 certified RJ-45 connectors and should follow either the 568A or 568B standard on both ends. Details on terminating Ethernet cables can be found on our website.

THERMOCOUPLE WIRING: The following rules need to be followed when wiring the thermocouple temperature sensors from the thermocouple to the Heater control panel. The signal from the temperature sensor is 4-20mA DC.

- **Always** use shielded, 2 conductor cable from the thermocouple to the control panel terminal blocks. Terminate the shield only on the cabinet end.
- **Never** run the shielded sensor wires with the power wiring (including 120 VAC control wires). You can run several shielded 4-20mA shielded wires together in the same conduit with other wires marked sensitive on the external connection diagram.



Connect 4-20mA signal wires to heater cabinet to terminals 1 (+), 2 (-).

Red (-) wire from Thermocouple junction goes to terminal 6, white (+) wire goes to terminal 4.

WARNING!

FAN INTERLOCK: The installing electrician must connect a fan run interlock signal of 120VAC (or 240VAC if 240VAC relay is supplied) to terminals 96 and 97 on the Heater Electrical Panel. This interlock is an extra safety device. It turns off the burner instantly when the fan motor stop button is touched. A relay for this purpose is supplied on the electrical panel of the Heater Unit. It is labeled FIR. The Heater's PLC control system will verify the presence of the fan interlock before permitting operation. If bypassed, the Heater will signal this as an error later in operation.

Delta 1 Heater Installation Stub-Ups

<u>NO.</u>	<u>DESCRIPTION</u>	<u>ROUTING AND NOTES</u>
1	BURNER POWER	FROM POWER CENTER TO BURNER CABINET. 120 VAC 50/60 HZ, 15 A SUPPLY ½" CONDUIT, 2 - 14 GA WIRES (FOR 220VAC SERVICE, A STEP DOWN TRANSFORMER (PART NO. 16372) IS AVAILABLE.
2	FAN INTERLOCK SIGNAL	FROM GIN CONSOLE OR MOTOR CONTROL CENTER TO BURNER CABINET. ONE ½" CONDUIT WITH TWO 16 GA WIRES FOR INTERLOCK SIGNAL (120VAC OR 240VAC)
3	BURNER IGNITION TRANSFORMER WIRE RUN OVERHEAD	FROM BURNER CABINET TO THE BURNER BODY. ONE 1" STEEL CONDUIT WITH 2 14GA WIRES AND ONE ¼" PLASTIC AIR FLOW TUBE. *
4	BURNER FLAME ROD WIRE AND GROUND WIRE RUN OVERHEAD	FROM BURNER CABINET TO THE BURNER BODY. ONE 1" STEEL CONDUIT WITH 2 - 14 GA WIRES AND ONE ¼" PLASTIC AIR FLOW TUBE. *
5	THERMOCOUPLES: PRIMARY (MARKED BLUE)	½" CONDUIT WITH SHIELDED 2 CONDUCTOR, 18 GA CABLE. DO NOT RUN WITH AC VOLTAGE WIRES. OKAY TO RUN WITH OTHER THERMOCOUPLE OR DC VOLTAGE SENSOR WIRES. (SEE HEATER OPERATION SECTIONS FOR MORE INFORMATION ON THERMOCOUPLE LOCATIONS)
	HIGH LIMIT (MARKED RED)	HOT AIR BEFORE MIX POINT. ½" CONDUIT WITH SHIELDED 2 CONDUCTOR, 18 GA CABLE. * DO NOT RUN WITH AC VOLTAGE WIRES. OKAY TO RUN WITH OTHER THERMOCOUPLE OR DC VOLTAGE SENSOR WIRES. (SEE HEATER OPERATION SECTIONS FOR MORE INFORMATION ON

THERMOCOUPLE LOCATIONS)

	HIGH TEMP (MARKED RED)	J-TYPE THERMOCOUPLE WIRE. CAN BE RUN IN SAME CONDUIT AS HIGH LIMIT THERMOCOUPLE.
6	GAS SUPPLY FOR BURNER	2" GAS SUPPLY LINE. NATURAL GAS OR PROPANE. 8 TO 25 PSI, 0.4 TO 1.7 BARS. SEE <i>RECOMMENDED MINIMUM PIPE SIZES</i> IN MANUAL FOR NOMINAL RECOMMENDED PIPE SIZES.
7	CONNECTION TO MIRROR X (OPTIONAL)	FROM BURNER CABINET TO MIRROR X: ½" STEEL CONDUIT WITH ONE CAT5B ETHERNET CABLE WITH RJ-45 TERMINATION (BOTH ENDS). DO NOT RUN WITH ANY AC POWER WIRES.
8	HOT BOX II TRASH GATE OPEN SWITCH (OPTIONAL)	½" CONDUIT, 3 -14 GA WIRES OKAY TO RUN WITH THERMOCOUPLE WIRE OR OTHER DC WIRES.

* FOLLOWING SUPPLIED WITH HEATER

¼" BLACK AIR FLOW TUBE - 25 FEET
¼" WHITE AIR FLOW TUBE - 25 FEET
BURNER FLAME ROD WIRE (BLUE) - 25 FEET
SHIELDED 2 CONDUCTOR, 18 GA CABLE - 200 FEET
J-TYPE THERMOCOUPLE WIRE – 100 FEET

Delta 2 Heater Installation Stub-Ups

<u>NO.</u>	<u>DESCRIPTION</u>	<u>ROUTING AND NOTES</u>
1	BURNER POWER	FROM POWER CENTER TO BURNER CABINET. 120 VAC 50/60 HZ, 15 A SUPPLY ½" CONDUIT, 2 - 14 GA WIRES (FOR 220VAC SERVICE, A STEP DOWN TRANSFORMER (PART NO. 16372) IS AVAILABLE.
2	FAN INTERLOCK SIGNAL	FROM GIN CONSOLE OR MOTOR CONTROL CENTER TO BURNER CABINET. ONE ½" CONDUIT WITH TWO 16 GA WIRES FOR INTERLOCK SIGNAL (120VAC OR 240VAC)
3	BURNER IGNITION TRANSFORMER WIRES RUN OVERHEAD	FROM BURNER CABINET TO THE BURNER BODY. ONE 1" STEEL CONDUIT WITH 3 14GA WIRES AND ONE ¼" PLASTIC AIR FLOW TUBE. *
4	BURNER FLAME ROD WIRES AND GROUND WIRE RUN OVERHEAD	FROM BURNER CABINET TO THE BURNER BODY. ONE 1" STEEL CONDUIT WITH 3 - 14 GA WIRES AND ONE ¼" PLASTIC AIR FLOW TUBE. *
5	THERMOCOUPLES: PRIMARY (MARKED BLUE)	½" CONDUIT WITH SHIELDED 2 CONDUCTOR, 18 GA CABLE. DO NOT RUN WITH AC VOLTAGE WIRES. OKAY TO RUN WITH OTHER THERMOCOUPLE OR DC VOLTAGE SENSOR WIRES. (SEE HEATER OPERATION SECTIONS FOR MORE INFORMATION ON THERMOCOUPLE LOCATIONS)
	HIGH LIMIT (MARKED RED)	HOT AIR BEFORE MIX POINT: ½" CONDUIT WITH SHIELDED 2 CONDUCTOR, 18 GA CABLE. DO NOT RUN WITH AC VOLTAGE WIRES. OKAY TO RUN WITH OTHER THERMOCOUPLE OR DC VOLTAGE SENSOR WIRES. (SEE HEATER OPERATION SECTIONS FOR MORE INFORMATION ON THERMOCOUPLE

	HIGH TEMP (MARKED RED)	LOCATIONS) J-TYPE THERMOCOUPLE WIRE. CAN BE RUN IN SAME CONDUIT AS HIGH LIMIT THERMOCOUPLE.
6	GAS SUPPLY FOR BURNER	2" GAS SUPPLY LINE. NATURAL GAS OR PROPANE. 8 TO 25 PSI, 0.4 TO 1.7 BARS. SEE <i>RECOMMENDED MINIMUM PIPE SIZES</i> IN MANUAL FOR NOMINAL RECOMMENDED PIPE SIZES.
7	CONNECTION TO MIRROR X (OPTIONAL)	FROM BURNER CABINET TO MIRROR X: ½" STEEL CONDUIT WITH ONE CAT5B ETHERNET CABLE WITH RJ- 45 TERMINATION (BOTH ENDS). DO NOT RUN WITH ANY AC POWER WIRES.
8	HOT BOX II TRASH GATE OPEN SWITCH (OPTIONAL)	½" CONDUIT, 3 -14 GA WIRES OKAY TO RUN WITH THERMOCOUPLE WIRE OR OTHER DC WIRES.

* FOLLOWING SUPPLIED WITH HEATER

¼" BLACK AIR FLOW TUBE - 25 FEET
¼" WHITE AIR FLOW TUBE - 25 FEET
BURNER FLAME ROD WIRE (BLUE) - 50 FEET
SHIELDED 2 CONDUCTOR, 18 GA CABLE - 200 FEET
J-TYPE THERMOCOUPLE WIRE – 100 FEET

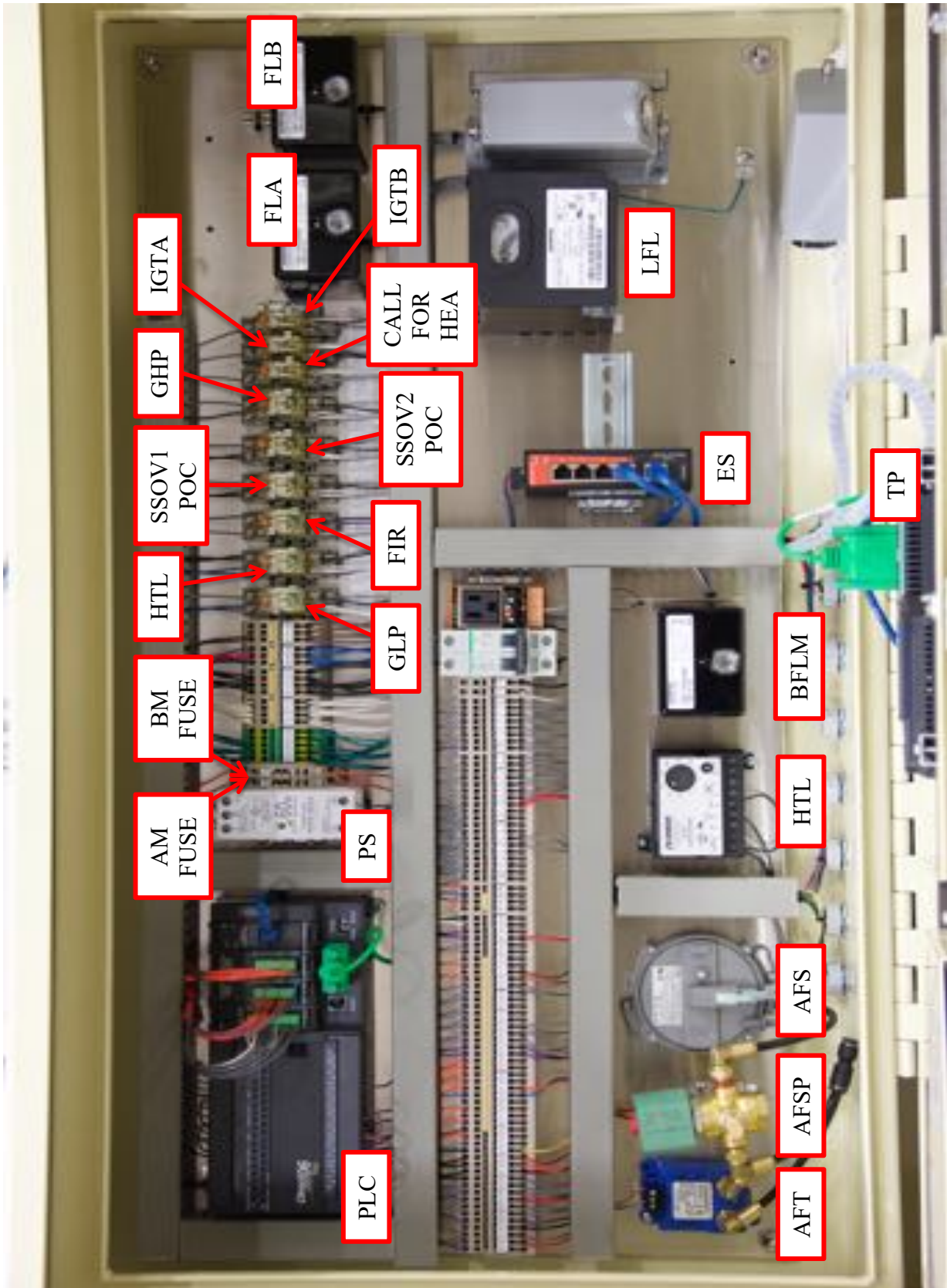
Component List for Delta Heaters

<u>SYMBOL</u>	<u>PART NAME, NUMBER, MFR'S TYPE</u>	<u>LOCATION</u>
AFS	AIR FLOW SWITCH 24595	UPPER CABINET
AFT	AIR FLOW TRANSDUCER 22446	UPPER CABINET
AFSP	AIR FLOW SENSOR PROVE 24420B, 8320G089	UPPER CABINET
BFLM	B FLAME MONITOR 20107, LFE10	UPPER CABINET
CB	CIRCUIT BREAKER 17427, NRAS1100F5AAA	UPPER CABINET
ES	ETHERNET SWITCH 23702B, 1240840000	UPPER CABINET
FE	FLAME ELECTRODE 12399A, CA390	BURNER HEAD
FIR	FAN INTERLOCK RELAY 17446, RH1B-U, 120VAC OR 17597, RH2B-U, 240VAC	UPPER CABINET
FLA	FLAME RELAY A 20107, LFE10	UPPER CABINET
FLB	FLAME RELAY B (NOT USED ON DELTA 1 HEATER) 20107, LFE10	UPPER CABINET
GHPS	GAS HIGH PRESSURE SWITCH 24299	LOWER CABINET
AGLPS	AUTOMATIC GAS LOW PRESSURE SWITCH AUTOMATIC	LOWER CABINET
GLPS	GAS LOW PRESSURE SWITCH 24296	LOWER CABINET
GF	GAS FILTER 24350A	LOWER CABINET
	SPARE FILTER ELEMENT AND COVER GASKET 24732	

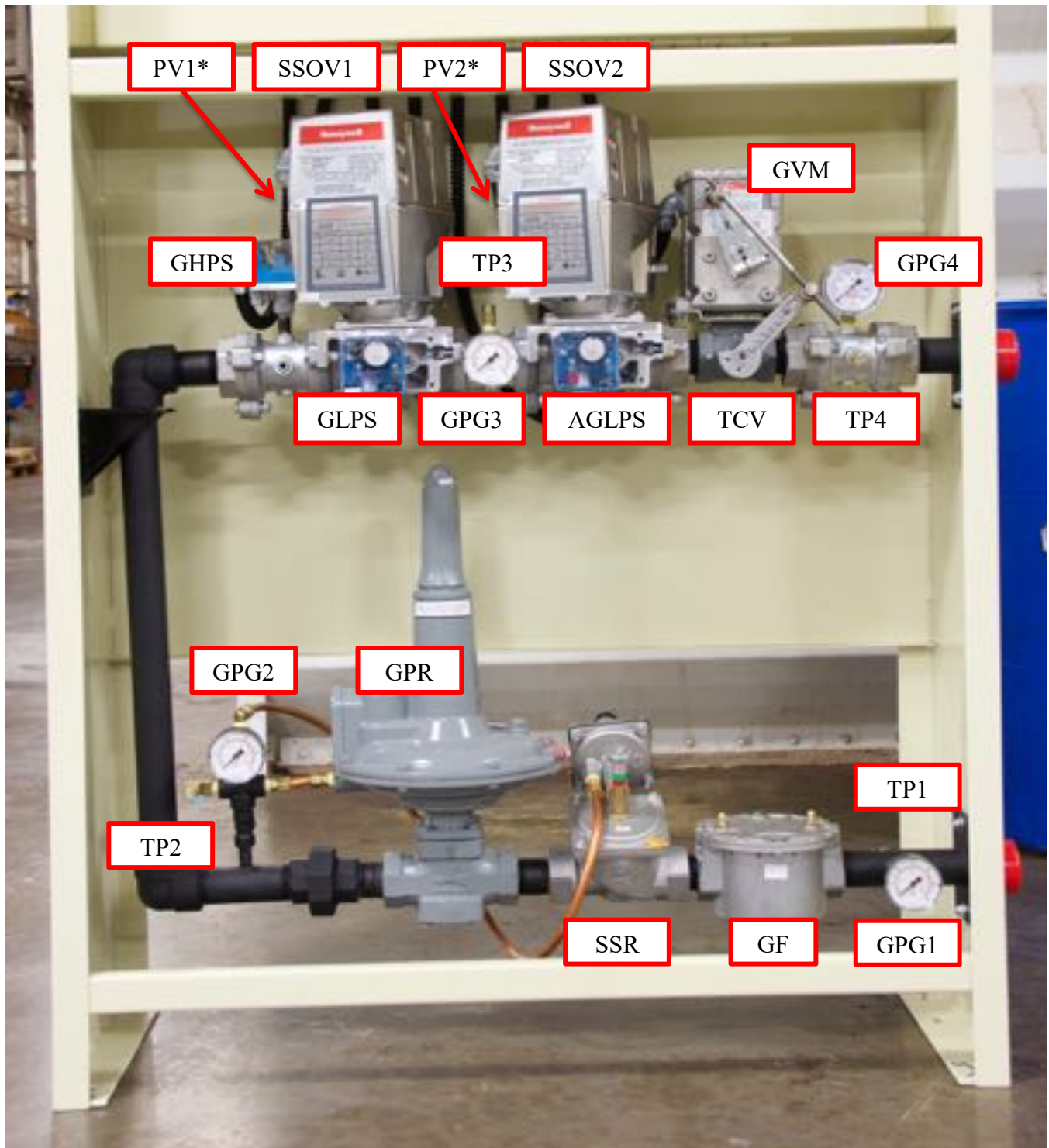
GPG1	GAS PRESSURE GAGE 1 19191, 2 ½" DIAL, 0-30 PSI, ¼ NPT BACK CENTER	LOWER CABINET
GPG2	GAS PRESSURE GAGE 2 19190, 2 ½" DIAL, 0-15 PSI, ¼ NPT BACK CENTER	LOWER CABINET
GPG3	GAS PRESSURE GAGE 3 19190, 2 ½" DIAL, 0-15 PSI, ¼ NPT BACK CENTER	LOWER CABINET
GPG4	GAS PRESSURE GAGE 4 11278, 2 ½" DIAL, 0-5 PSI, ¼ NPT LOWER MOUNT	LOWER CABINET
GPR	GAS PRESSURE REGULATOR 19240 FOR DELTA 1 HEATER 16595A FOR DELTA 2 HEATER	LOWER CABINET
GVM	GAS VALVE MOTOR 21560, M7284A1012	LOWER CABINET
HBM	HOT BOX TRASH GATE MONITOR RELAY (OPTION) 20124, RH2B-U, 24VDC	UPPER CABINET
HTL	HIGH TEMPERATURE LIMIT 24464, CN3261	UPPER CABINET
HTTC	HIGH TEMPERATURE THERMOCOUPLE (RED), BEFORE MIXPOINT (NOT USED ON DELTA HEATERS IN FACTORY DEFAULT MODE) 18065B, 8", TYPE 'J', 0-777	PIPING BEFORE MIXPOINT
IGP	IGNITER PLUG 12398A, CA475	BURNER HEAD
IGTA	IGNITION TRANSFORMER A 21706, 2260-TW	BURNER BODY
IGTB	IGNITION TRANSFORMER B (NOT USED ON DELTA 1 HEATER) 21706, 2260-TW	BURNER BODY
LFL	LFL FLAME CONTROLLER 24418	UPPER CABINET
PLC	PROGRAMMABLE LOGIC CONTROL 21562, DL06 PLC	UPPER CABINET
PS	POWER SUPPLY, 120VAC TO 24VDC 21553, PS5R-SD24	UPPER CABINET

PV1	PILOT VALVE 1 24304	LOWER CABINET
PV2	PILOT VALVE 2 24304	LOWER CABINET
SSOV1	SAFETY SHUT OFF VALVE 1 21502, V4055E1016	LOWER CABINET
SSOV 2	SAFETY SHUT OFF VALVE 2 21502, V4055E1016	LOWER CABINET
SSR	SLAM SHUT REGULATOR 24349	LOWER CABINET
TCA	THERMOCOUPLE (BLUE), AFTER MIX- POINT 21708, 8", TYPE 'J', 0-777, 4-20mA TRANSMITTER	PIPING AFTER MIXPOINT
TCB	THERMOCOUPLE (RED), BEFORE MIX- POINT 21709, 8", TYPE 'J', 0-777, 4-20mA TRANSMITTER	PIPING BEFORE MIXPOINT
TP	COLOR TOUCH PANEL 22045A	UPPER CABINET DOOR
TP1	TEST PORT 1 24656	LOWER CABINET
TP2	TEST PORT 2 24656	LOWER CABINET
TP3	TEST PORT 3 24656	LOWER CABINET
TP4	TEST PORT 4 24656	LOWER CABINET
TRAN	TRANSFORMER (ONLY ON HEATERS WITH 220VAC SUPPLY) 16790, 220VAC TO 120VAC STEPDOWN	UPPER CABINET
TVC	TEMPERATURE CONTROL VALVE 21748	LOWER CABINET

Delta Heater Component Diagram – Upper Cabinet

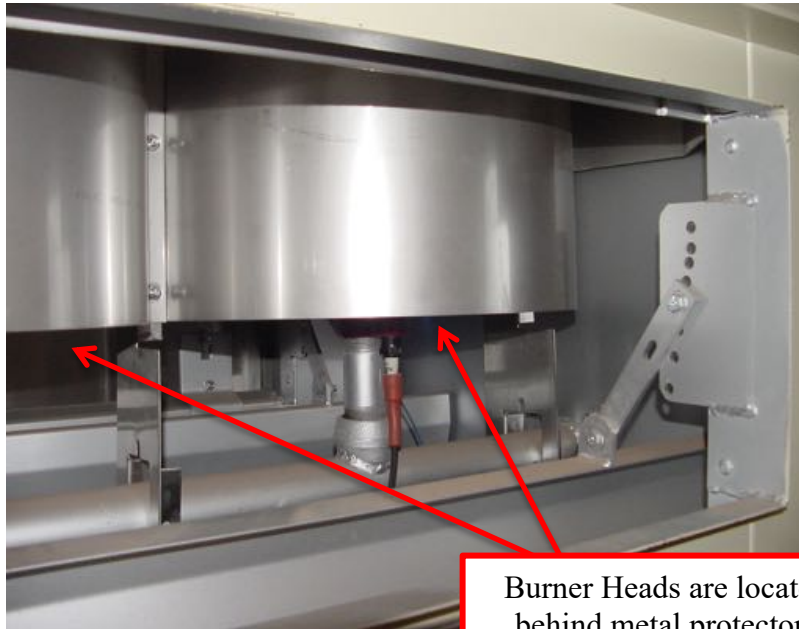


Delta Heater Component Diagram – Lower Cabinet



*The Pilot Valves (PV1 and PV2) are located behind the SSOV1 and SSOV2

Delta Heater Component Diagram – Burner Body



Burner Heads are located behind metal protectors

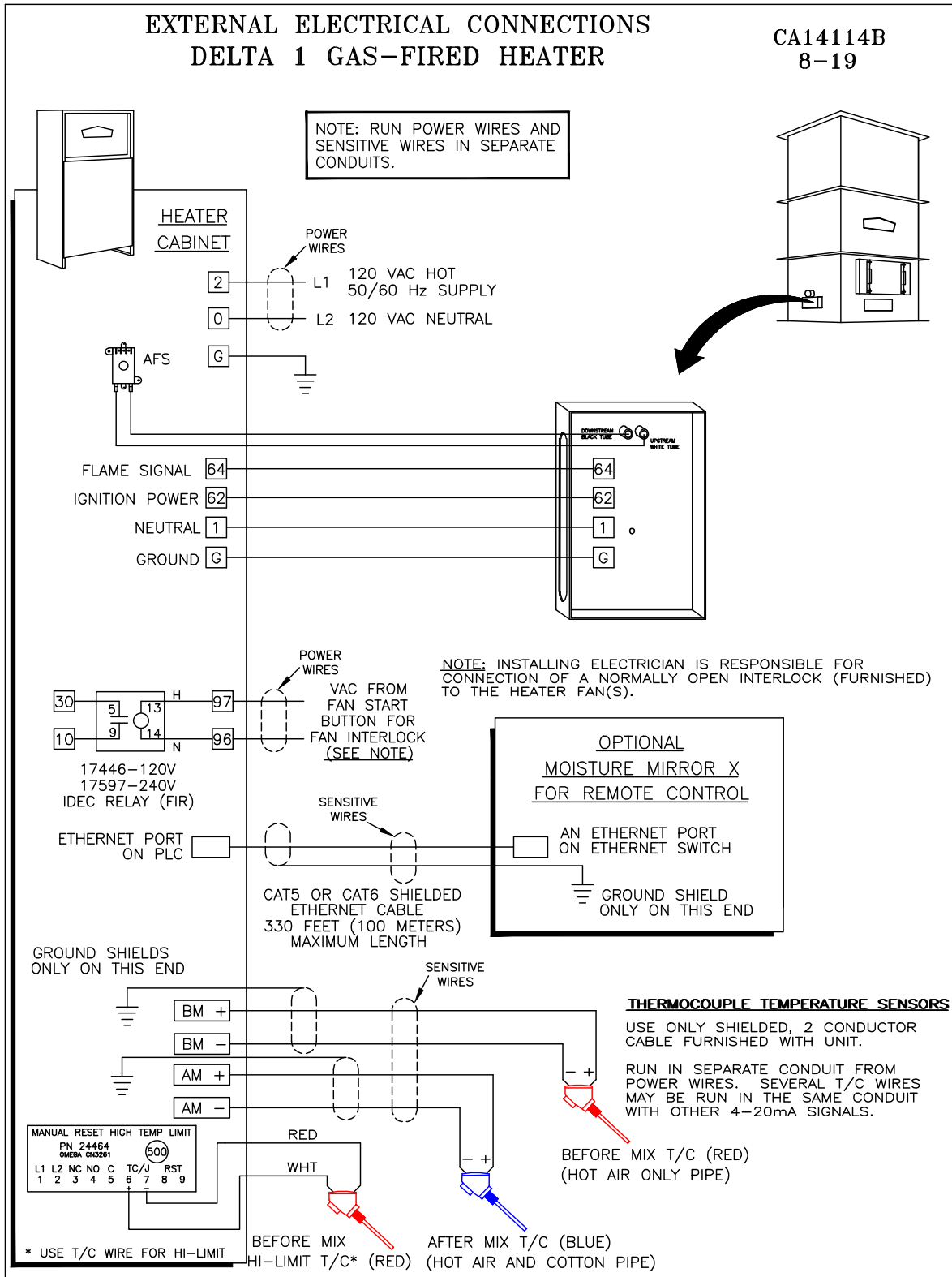


IGTA

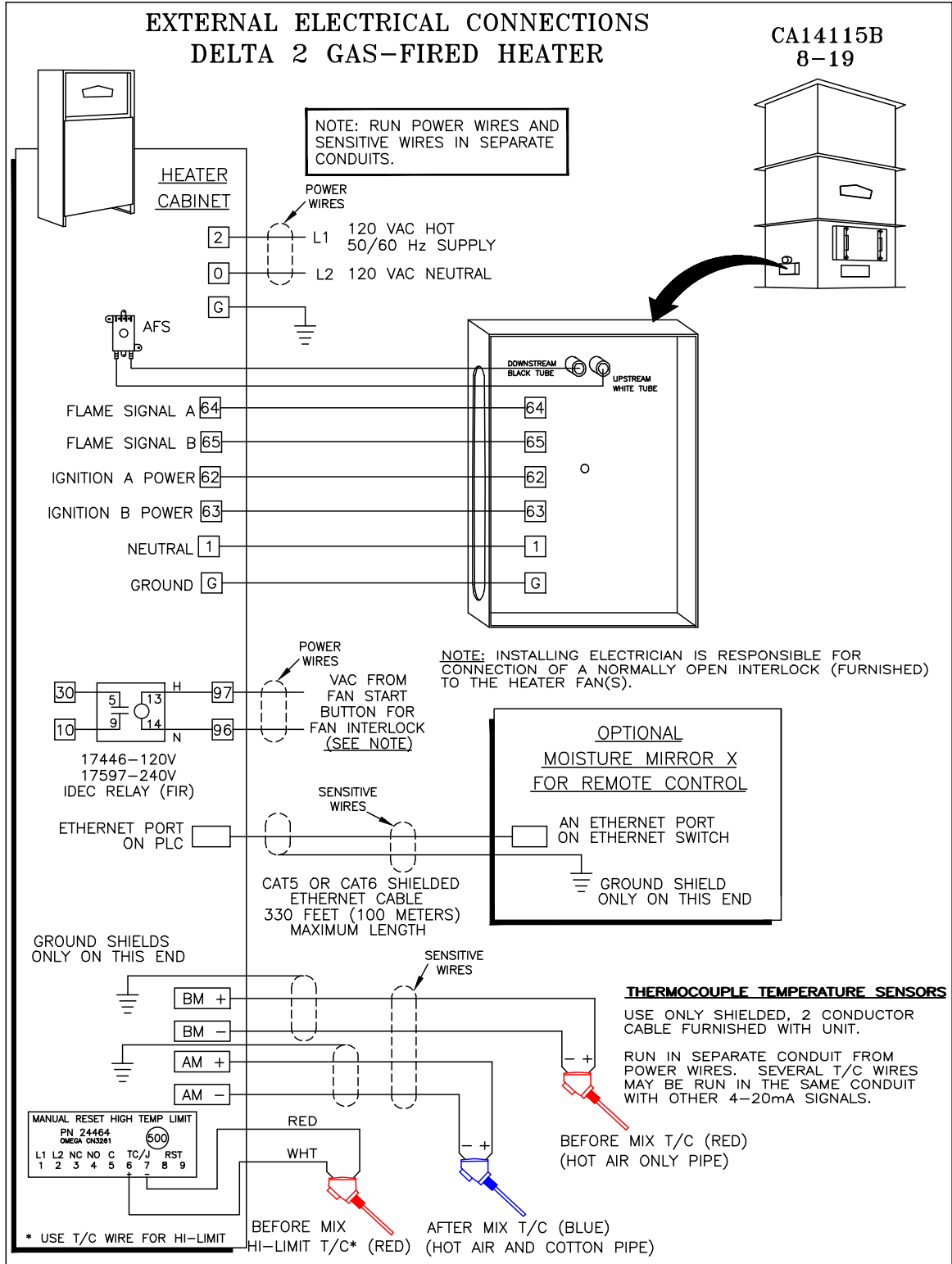


IGTB

External Electrical Connections For Delta 1 Heaters:

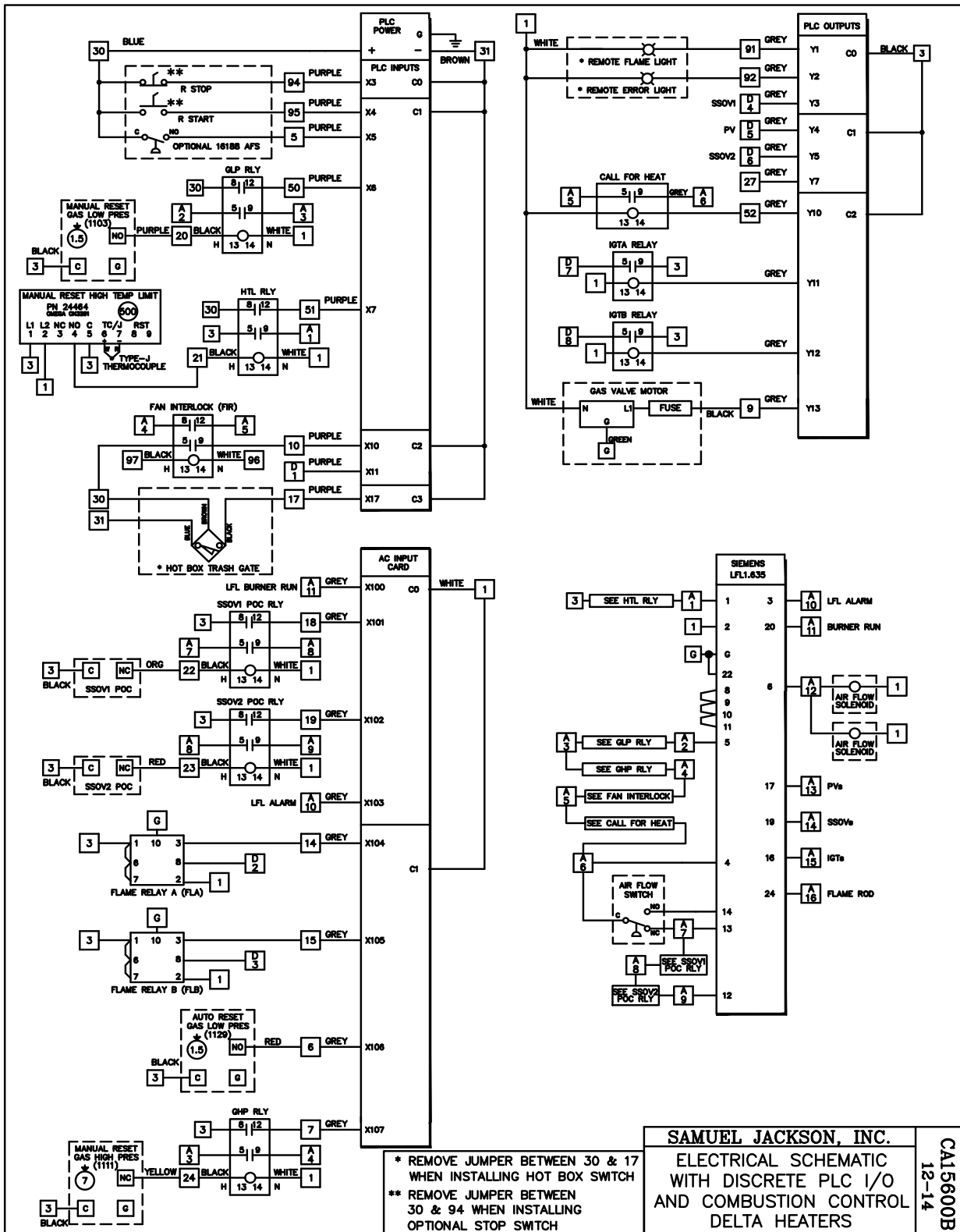


For Delta 2 Heaters:

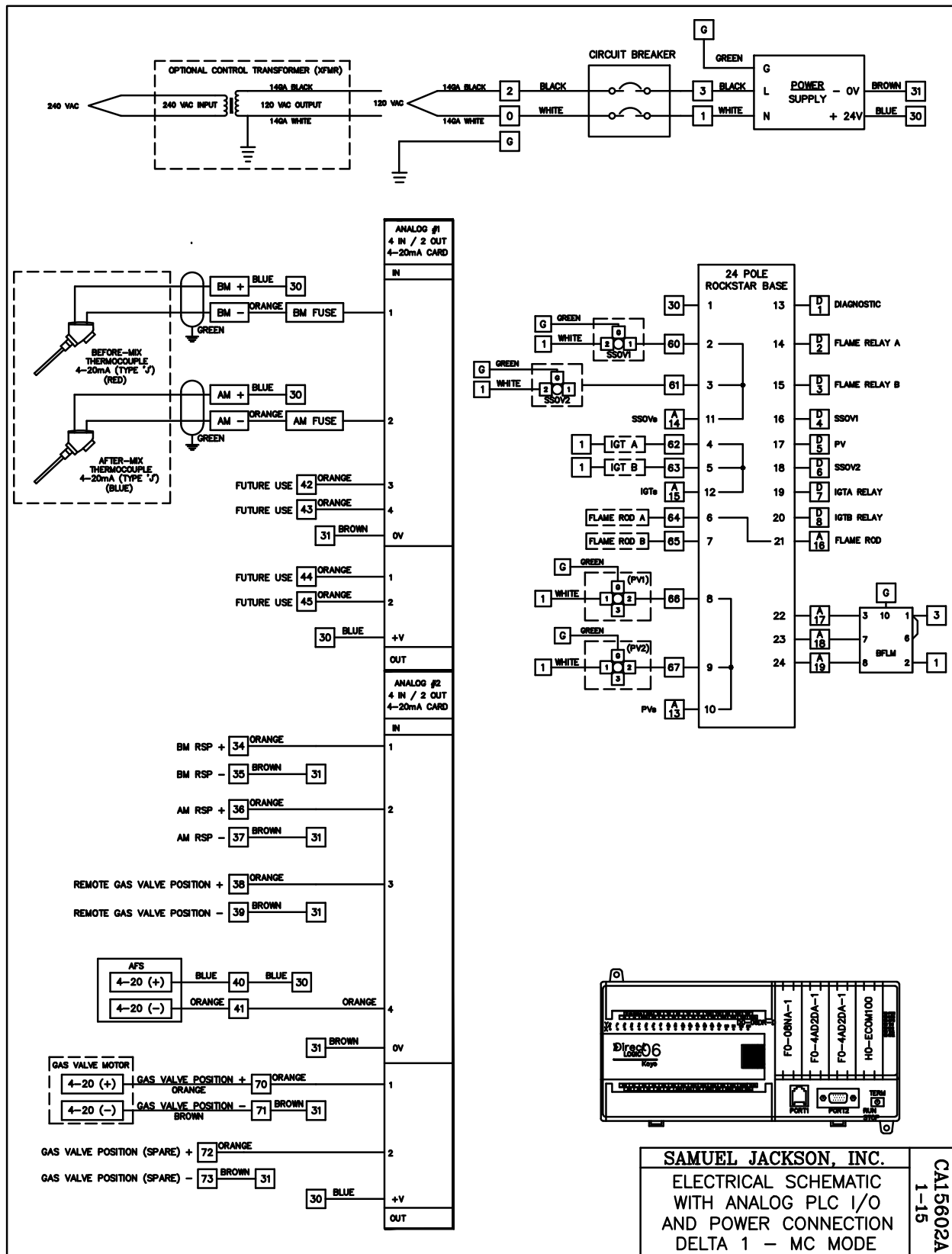


Electrical Schematic for Discrete PLC Inputs/Outputs

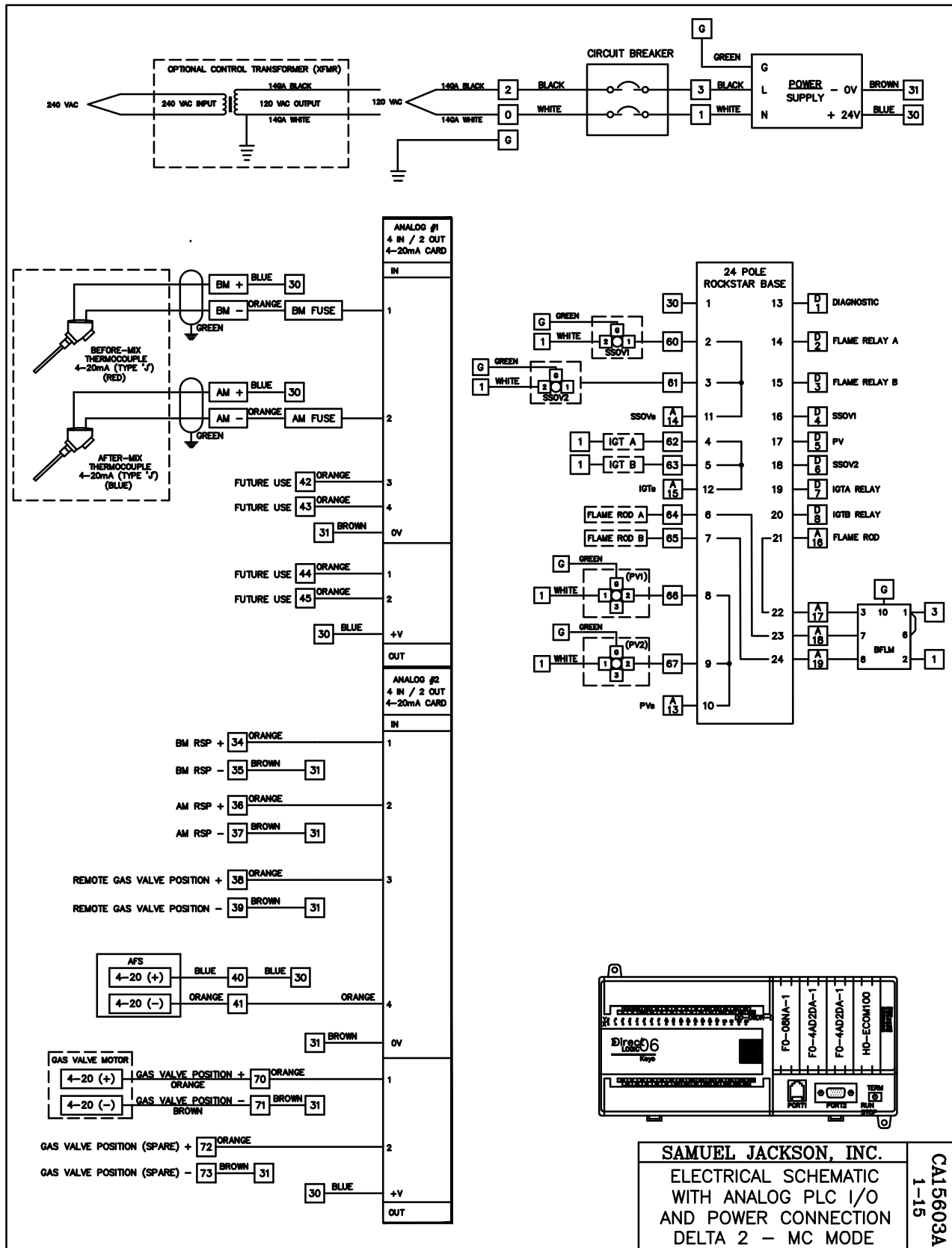
For All Delta Heaters:



For Delta 1 Heaters in Mandate Compliance Mode:

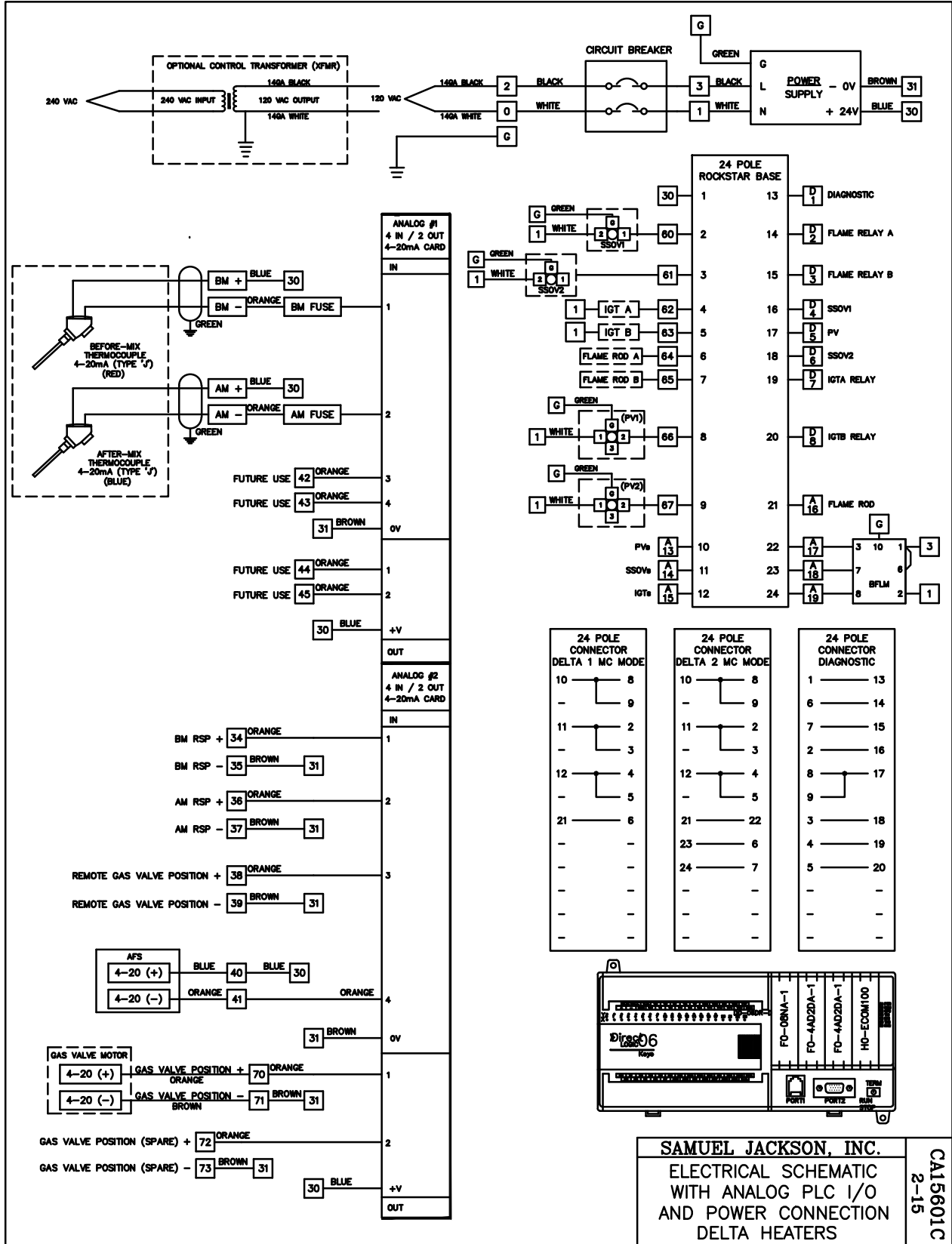


For Delta 2 Heaters in Mandate Compliance Mode:



SAMUEL JACKSON, INC.
 ELECTRICAL SCHEMATIC
 WITH ANALOG PLC I/O
 AND POWER CONNECTION
 DELTA 2 - MC MODE
 CA15603A
 1-15

For All Delta Heaters:

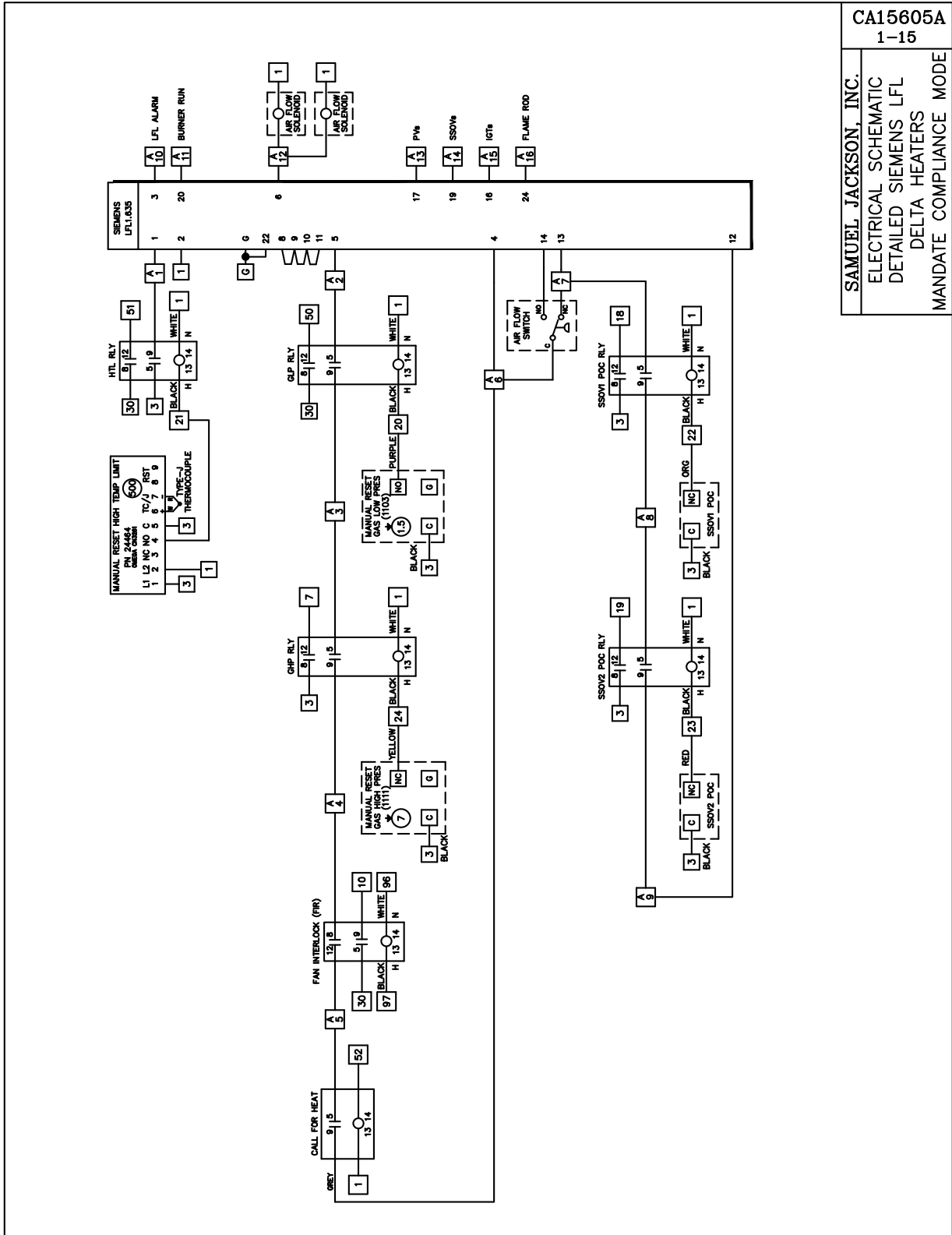


SAMUEL JACKSON, INC.
 ELECTRICAL SCHEMATIC
 WITH ANALOG PLC I/O
 AND POWER CONNECTION
 DELTA HEATERS

CA15601C
 2-15

Electrical Schematic for Siemens LFL1

For All Delta Heaters in Mandate Compliance Mode:



CA15605A 1-15
SAMUEL JACKSON, INC. ELECTRICAL SCHEMATIC DETAILED SIEMENS LFL DELTA HEATERS MANDATE COMPLIANCE MODE

Network ID Settings

For All Delta Heaters:

CA15001C
6/15

NETWORK ID SETTINGS FOR GAS FIRED HEATERS

HEATER # 1

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	51
0	ON
1	ON
2	OFF
3	OFF
4	ON
5	ON
6	OFF
7	ON

HEATER # 2

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	52
0	OFF
1	OFF
2	ON
3	OFF
4	ON
5	ON
6	OFF
7	ON

HEATER # 3

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	53
0	ON
1	OFF
2	ON
3	OFF
4	ON
5	ON
6	OFF
7	ON

HEATER # 4

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	54
0	OFF
1	ON
2	ON
3	OFF
4	ON
5	ON
6	OFF
7	ON

HEATER # 5

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	55
0	ON
1	ON
2	ON
3	OFF
4	ON
5	ON
6	OFF
7	ON

HEATER # 6

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	56
0	OFF
1	OFF
2	OFF
3	ON
4	ON
5	ON
6	OFF
7	ON

HEATER # 7

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	57
0	ON
1	OFF
2	OFF
3	ON
4	ON
5	ON
6	OFF
7	ON

HEATER # 8

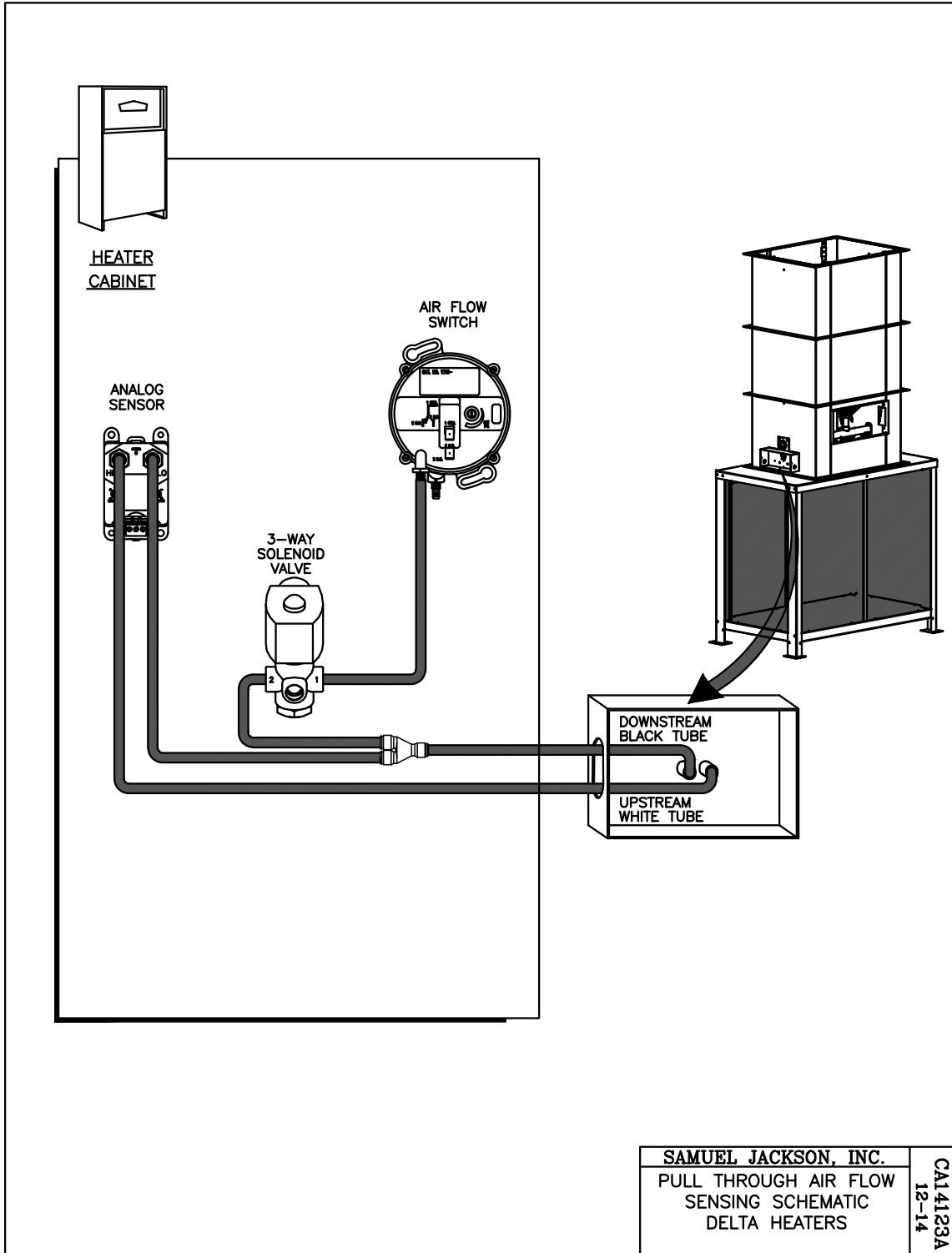
ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	58
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2	OFF
3	ON
4	ON
5	ON
6	OFF
7	ON

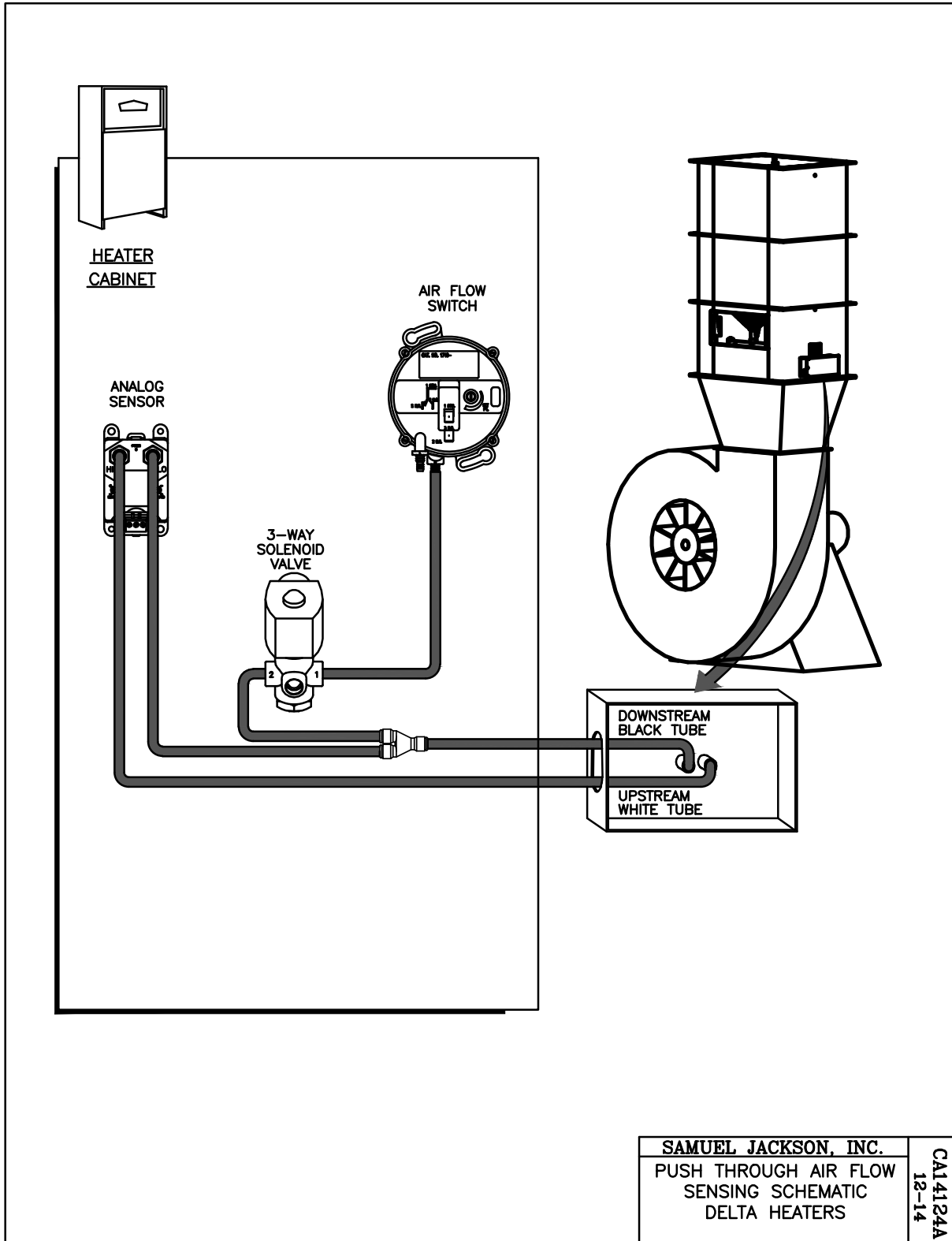
Air Flow Pneumatics Schematic – Pull Through

For All Delta Heaters:



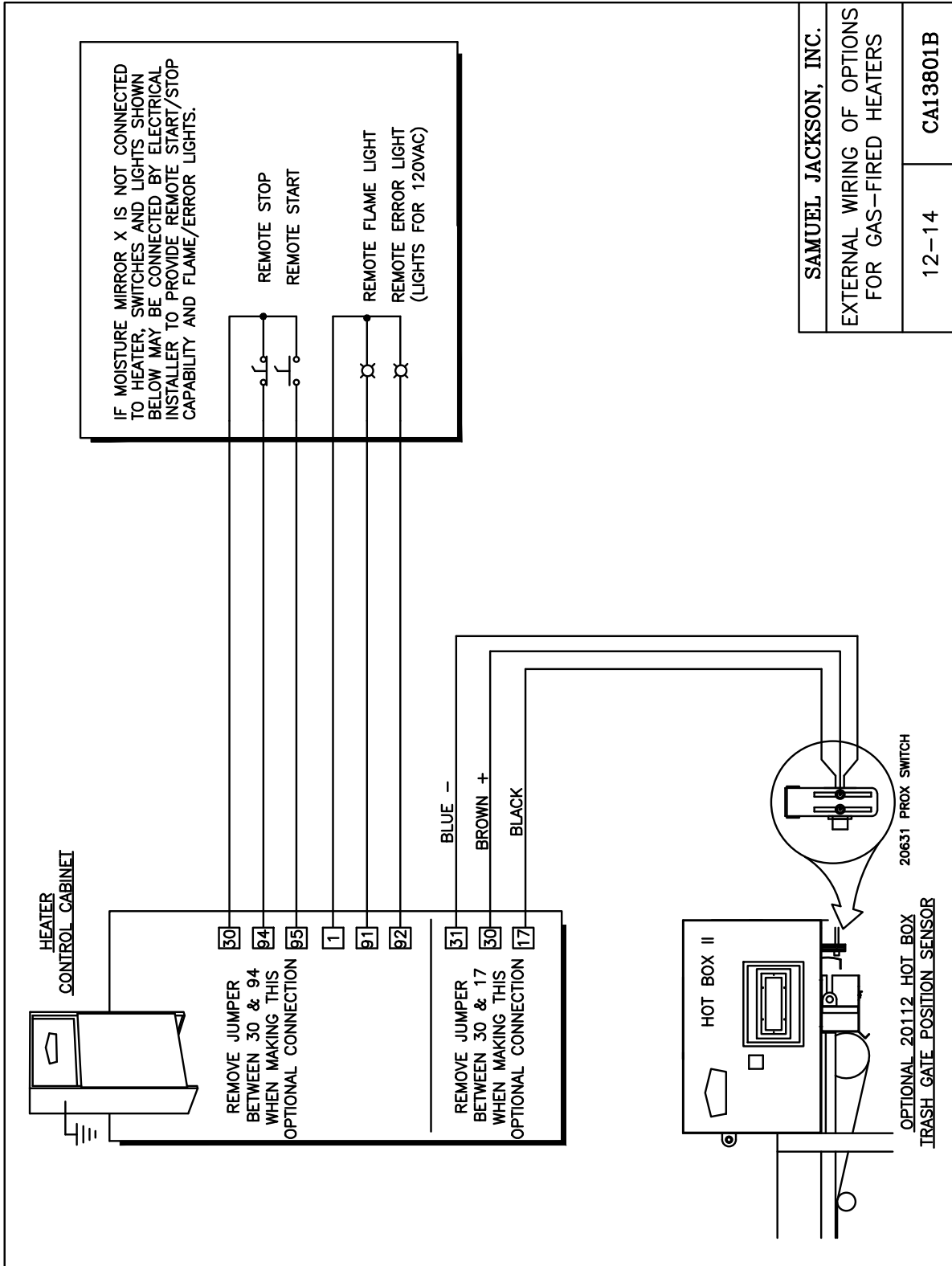
Air Flow Pneumatics Schematic – Push Through

For All Delta Heaters:



External Wiring of Options

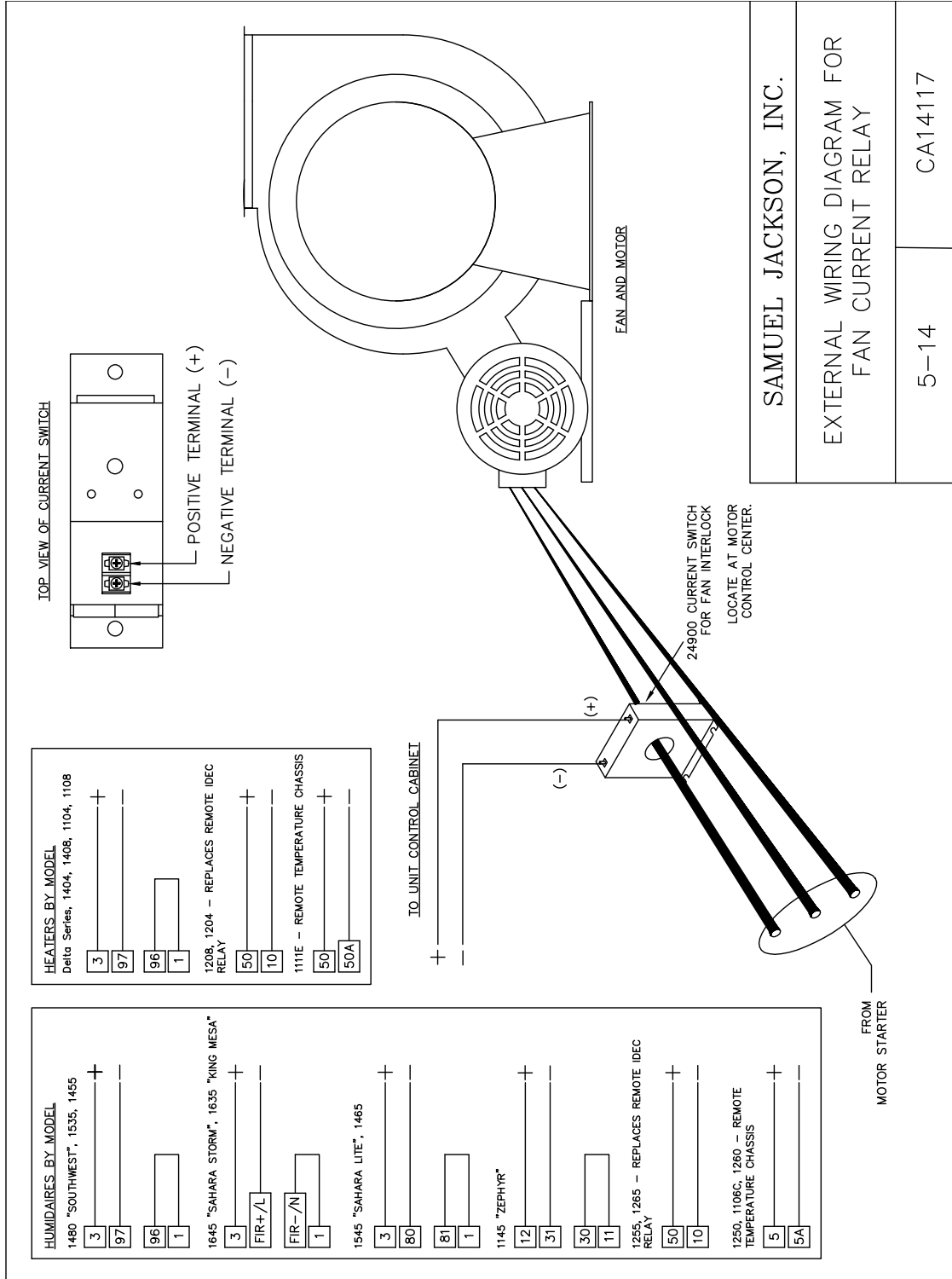
For All Delta Heaters:



SAMUEL JACKSON, INC.	
EXTERNAL WIRING OF OPTIONS FOR GAS-FIRED HEATERS	
12-14	CA13801B

External Wiring Diagram For Fan Current Relay

For All Delta Heaters:



SAMUEL JACKSON, INC.	
EXTERNAL WIRING DIAGRAM FOR FAN CURRENT RELAY	
5-14	CA14117

Gas Piping

Size of pipe supplying gas to Heaters and other appliances should be large enough to prevent excessive pressure losses when all of them are in use. See the following Table of *RECOMMENDED MINIMUM PIPE SIZES* for Heater capacities, pipe lengths, and pressures.

Where LPG (Liquefied Petroleum Gas, Propane, Butane) is used as fuel, see the following Drawing: *LIQUEFIED PETROLEUM GAS TANK INSTALLATION FOR HUMIDAIRE UNITS AND DRYING HEATERS* for recommended practices.

Emergency shut-off valves should be provided to permit turning off the fuel in an emergency. They should be located so that they are accessible in an emergency situation.

IRI (Industrial Risk Insurers) and some state and local authorities require venting the gas regulator and the normally open vent valve.

NFPA (National Fire Protection Association) 86* states:

3-3.4.3.2 Regulators shall be vented to a safe location, where vented gas cannot re-enter the building without extreme dilution. The terminating end shall be protected against water entry and bug-screened. Vent pipe shall be of adequate size so as to not lengthen response time.

3-3.4.3.3 Vent lines from multiple regulators, where manifolded together, shall be piped in such a manner that diaphragm rupture of one will not backload the others.

3-3.4.3.4 Vents from gas pressure switches, but from no other devices, may be vented into the regulator lines provided that switch or regulator diaphragm failure will not backload the regulator.

* Reprinted with permission from NFPA 86-1985, Standard for Ovens and Furnaces, Copyright © 1985, National Fire Protection Association, Quincy, Mass. 02269. This reprint of material is not the complete and official position of the NFPA on the referenced subject, which is represented only by the standard in its entirety.

Recommended Minimum Pipe Sizes

TOTAL HEATER CAPACITY MILLION BTU/HR	PIPE LENGTH FEET	RECOMMENDED MINIMUM PIPE SIZES				
		PRESSURE AT SERVICE REGULATOR OR VAPORIZER OUTLET, PSIG				
		NATURAL GAS			PROPANE *	
		6	10	15	10	15
2	100	1-1/4	1	3/4	3/4	3/4
	200	1-1/4	1	1	3/4	3/4
	500	1-1/2	1-1/4	1	1	3/4
4	100	1-1/2	1-1/4	1	3/4	3/4
	200	2	1-1/2	1-1/4	1	1
	500	2	1-1/2	1-1/4	1-1/4	1-1/4
8	100	2	1-1/2	1-1/4	1-1/4	1
	200	2-1/2	2	1-1/2	1-1/4	1-1/4
	500	3	2	2	1-1/2	1-1/2
16	100	3	2	1-1/2	1-1/2	1-1/4
	200	3	2-1/2	2	2	1-1/2
	500	4	2-1/2	2-1/2	2-1/2	2
24	100	3	2-1/2	2	2	1-1/2
	200	4	3	2-1/2	2-1/2	2
	500	5	3	2-1/2	2-1/2	2-1/2

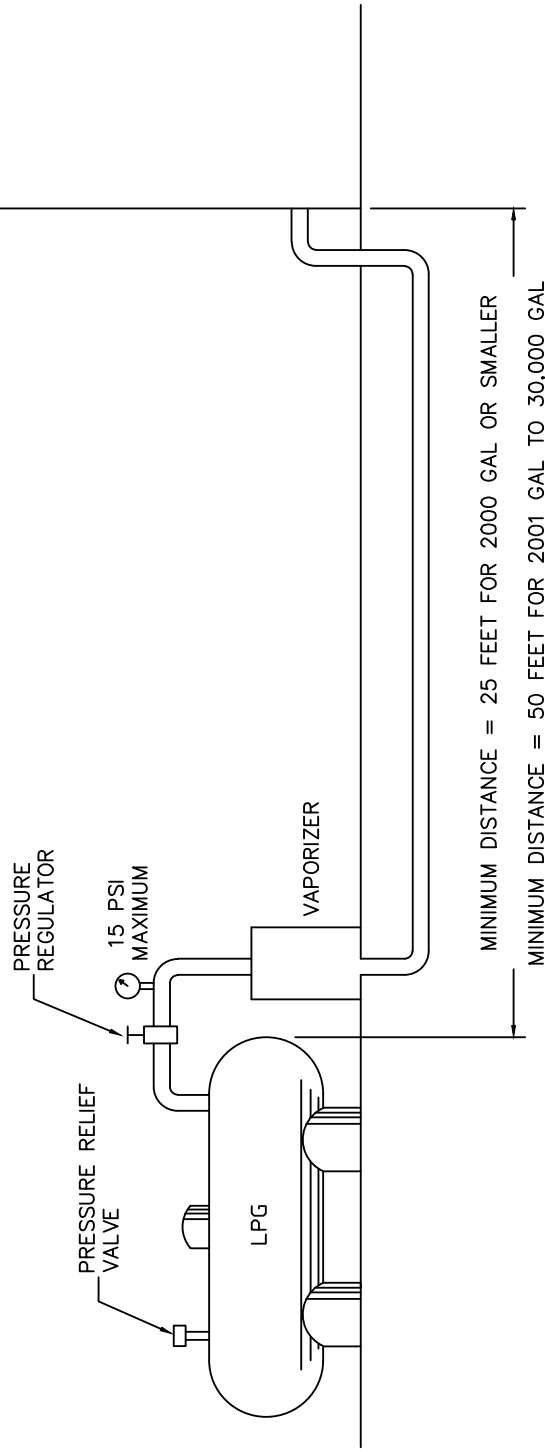
* OR BUTANE

FILE: 14-1899

PIPE SIZES ARE NOMINAL DIAMETERS, SCHEDULE 40, AND ARE BASED ON 5 PSIG BEING REQUIRED AT INLETS OF COMBUSTION REGULATORS.

LPG Gas Tank Installation

Liquefied Petroleum Gas Tank Installation for Humidaira Units and Drying Heaters



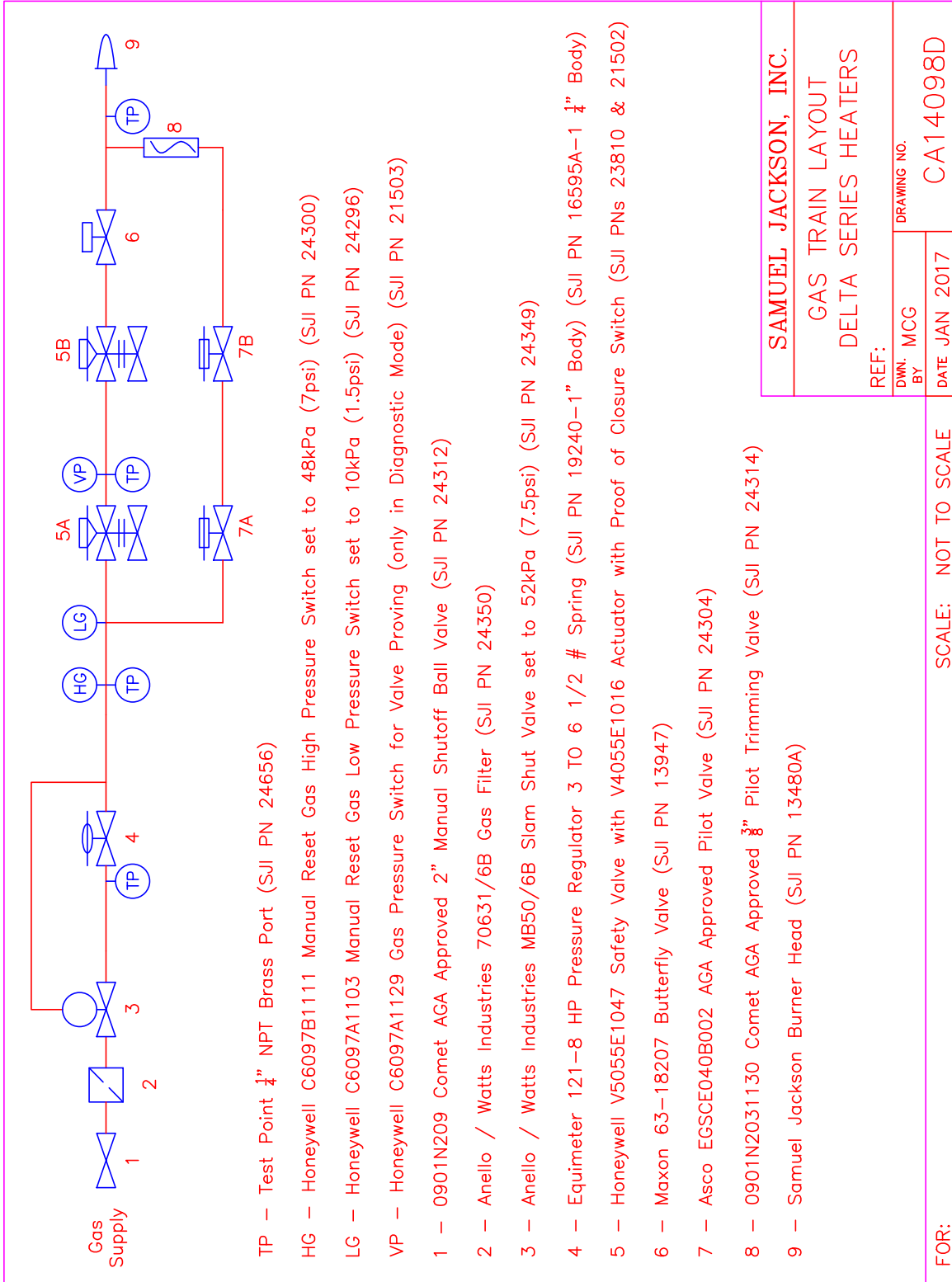
For LPG installations, the tank should be at least 1200 US gallons to provide adequate surface area to absorb heat of vaporization from the atmosphere. To be compatible with the quantity of LPG received in each delivery, a larger tank may be necessary. A battery of small tanks of the desired total capacity has more heat-absorbing area than one large tank.

Whether or not a vaporizer is used, make sure that a regulator reduces the pressure to 15 psi (1 bar) BEFORE the pipe goes underground. Otherwise, reliquefaction will take place in the cool earth and cause MUCH trouble. If the gas line in the building feels extremely cold during operation, liquid is in the line and the situation should be corrected immediately.

14-3566

Gas Train Layout

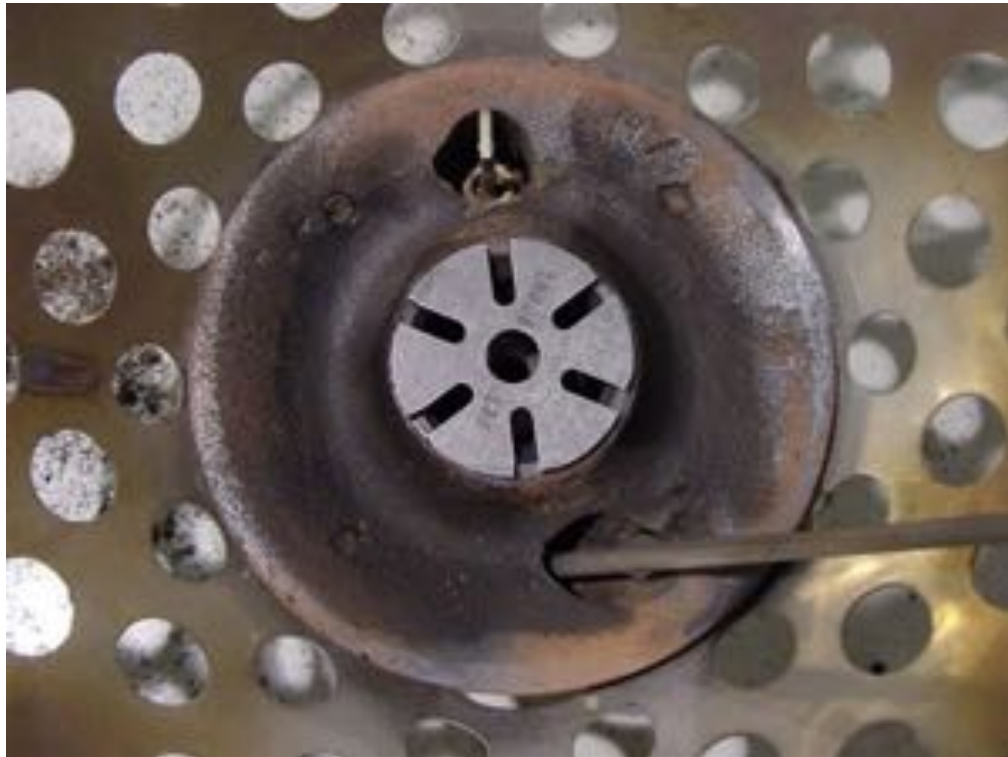
For All Delta Heaters:



Burner Orifice Alignment

If you are experiencing excessive flame failures or difficulty establishing flame, check to make sure the orifice in your burner head is aligned correctly to the flame rod. Proper orifice alignment will also reduce the formation of soot and carbon on the flame rod especially when using propane or butane fuels.

The picture below shows the correct alignment of the orifice disk. The contoured stainless steel disk has been removed for illustration. Note that one of the orifice slots is pointed directly toward the spark plug.



To adjust the orifice alignment, remove the contoured disk from the burner body by removing the 3/8 inch stainless steel cap screw. Rotate the orifice disk so that one of the slots is pointed directly at the spark plug. Insert a small screwdriver through the hole in the burner shell and into a slot in the orifice. Reinstall the contoured disk while using the screwdriver to keep the orifice from rotating.

After reinstalling the burner assembly, the flame rod should glow red hot while the flame is on improving ignition, reducing flame failures and reducing formation of soot and carbon on the flame rod.

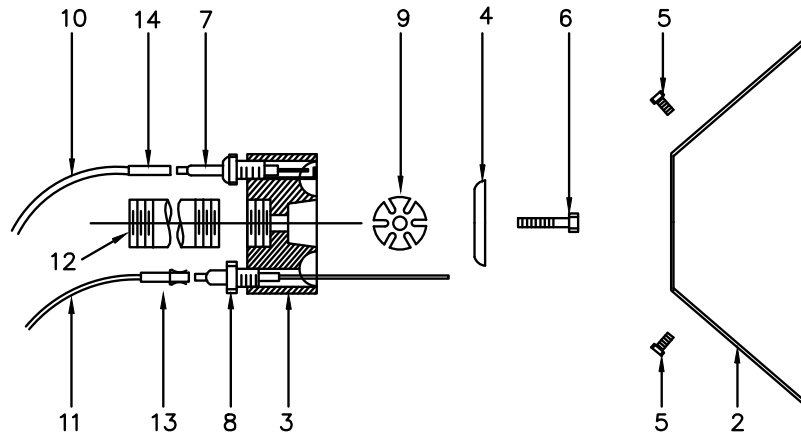
13480A Burner Head Assembly

For All Delta Heaters:

13480A BURNER HEAD ASSEMBLY

CAT3131B

5-04

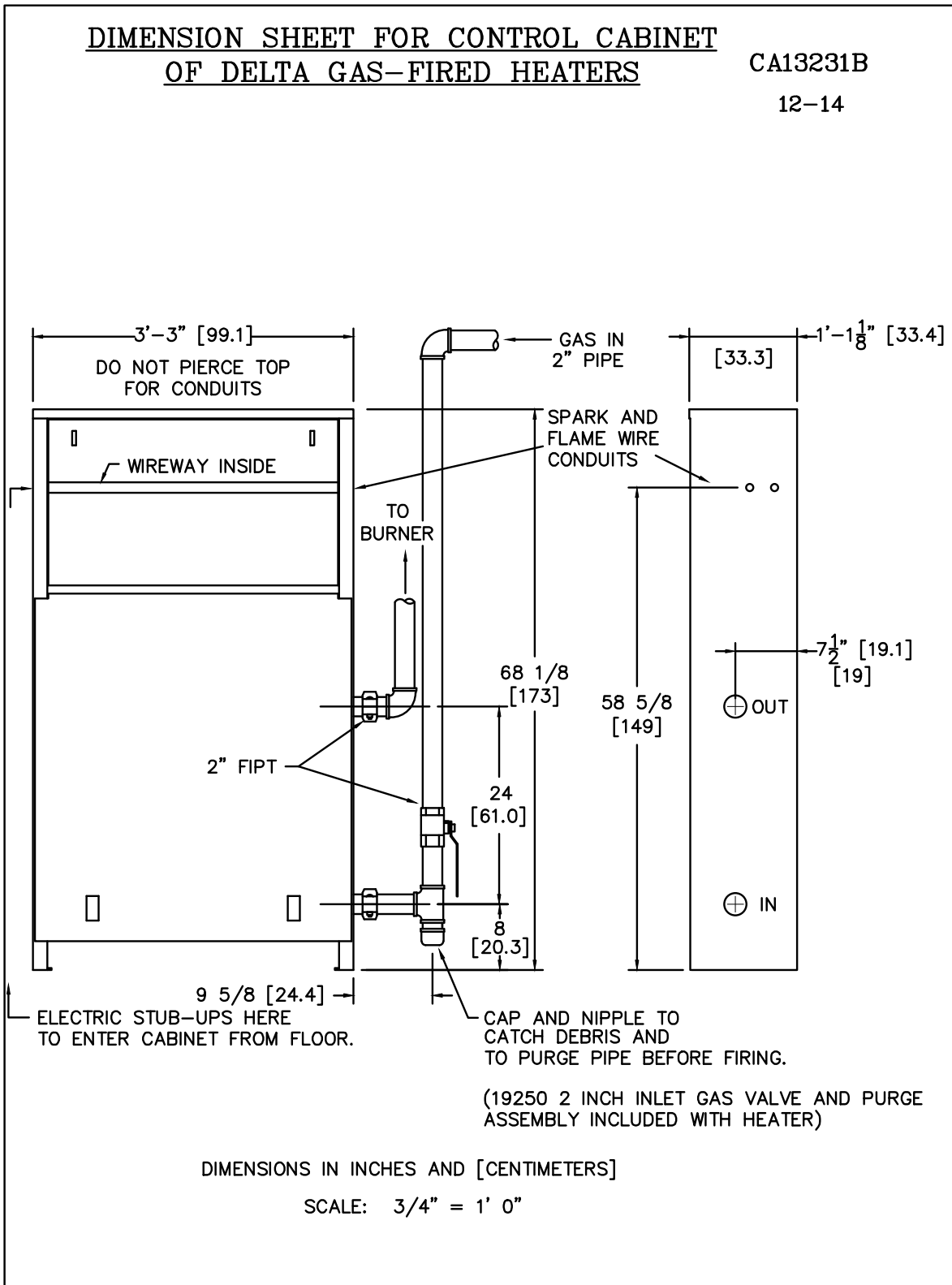


TOP VIEW

<u>REF</u>	<u>QUANTITY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
2	1	12975B	GAS BURNER SHELL
3	1	14620	BURNER BODY USE 18000 FOR HIGH OUTPUT
4	1	12985B	CONTOURED DISC
5	4	15724	5/16 X 1/2 HX HD SS CAP SCREW
6	1	15767	3/8 X 1 3/4 HX HD SS CAP SCREW
7	1	12398A	SPARK PLUG, CA475
8	1	12399A	FLAME ELECTRODE, CA390
9	1		BURNER ORIFICE DISC ONE OF THE FOLLOWING:
			<u>SLOT</u> <u>THICK</u> <u>FLOW AREA</u>
		18031	.080 .048 15
		18032	.114 .048 21
		18033	.103 .075 30
		18034	.149 .075 43
		18035	.216 .075 63
		18036	.179 .135 94
		18037	.286 .135 149
			PARTS NOT INCLUDED IN 13480A BURNER HEAD:
10	1	11159	SPARK PLUG WIRE
11	1	11158	FLAME ELECTRODE WIRE
12	1	15189	1 1/4 X 4 BLACK PIPE NIPPLE
13	1	13923	RAJAH TERMINAL
14	1	13925	SPARK PLUG TERMINAL

Control Cabinet Dimensions:

For all Delta Heaters:

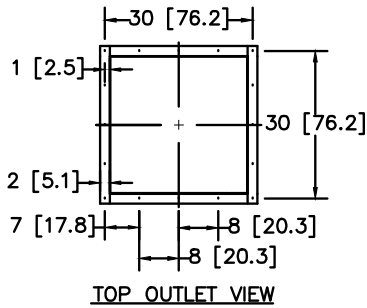


Burner Body Dimensions for Pull Through

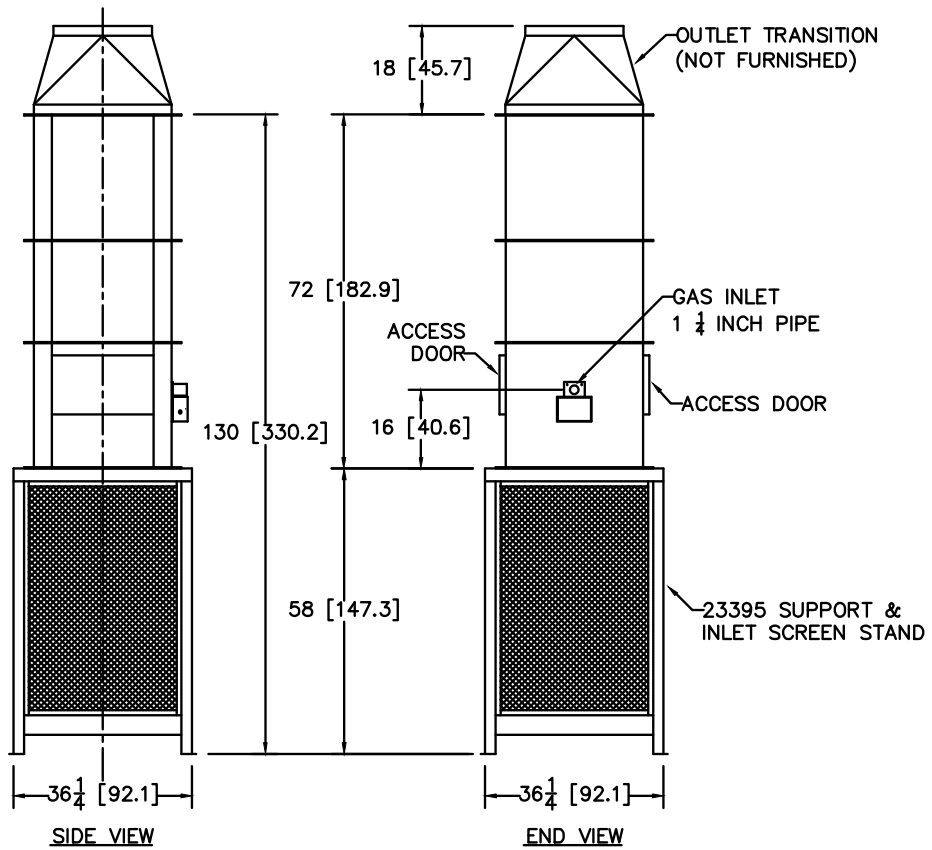
For All Delta 1 Heaters:

DIMENSION SHEET
DELTA 1 GAS-FIRED HEATER
PULL THROUGH

CA13123A
12-14



INLET AND OUTLET
FLANGES IDENTICAL
28 X 28 INSIDE
3/8" HOLES



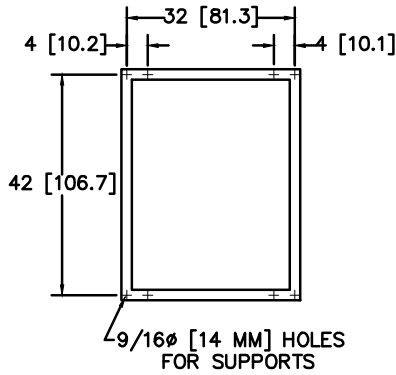
SCALE: 1/32 3/8"=1' 0"
DIMENSIONS IN INCHES AND (CENTIMETERS)

For All Delta 2 Heaters:

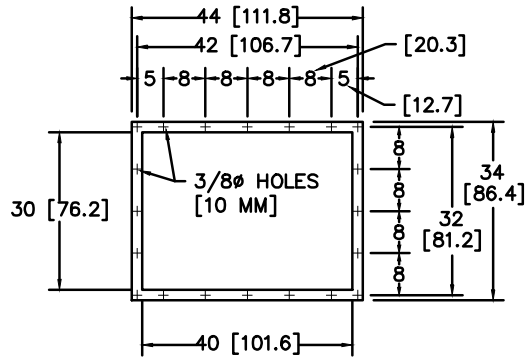
DIMENSION SHEET
DELTA 2 GAS-FIRED HEATER
PULL-THROUGH

CA13221B

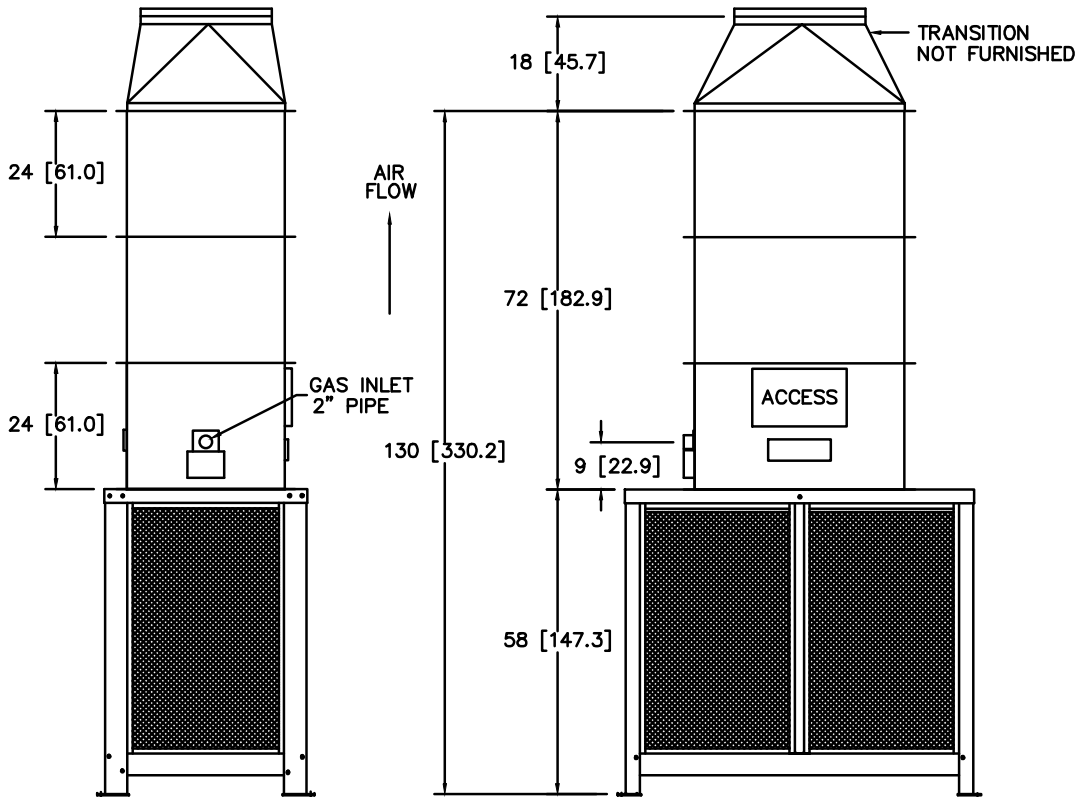
12-14



INNER FLANGES



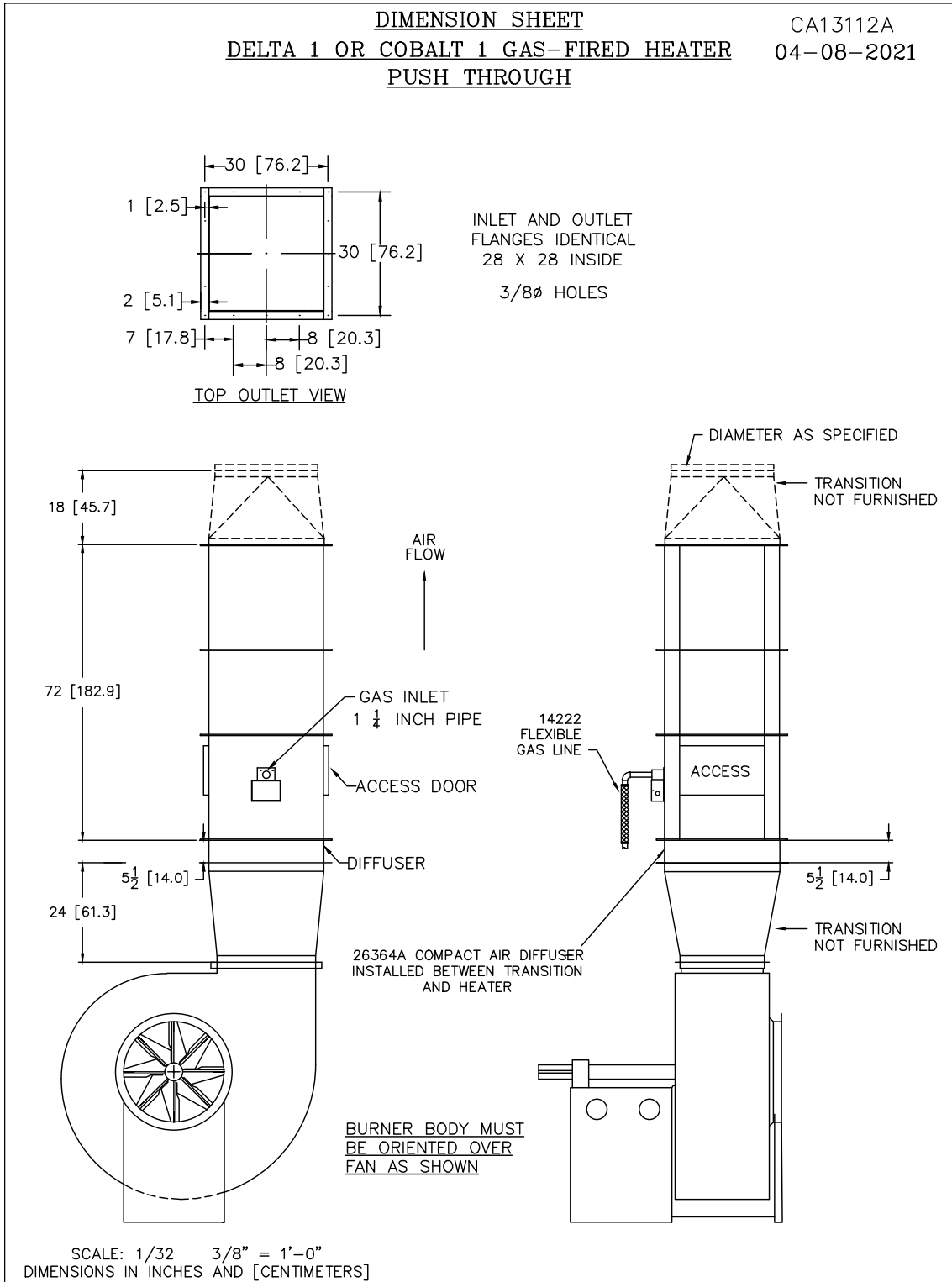
END FLANGES



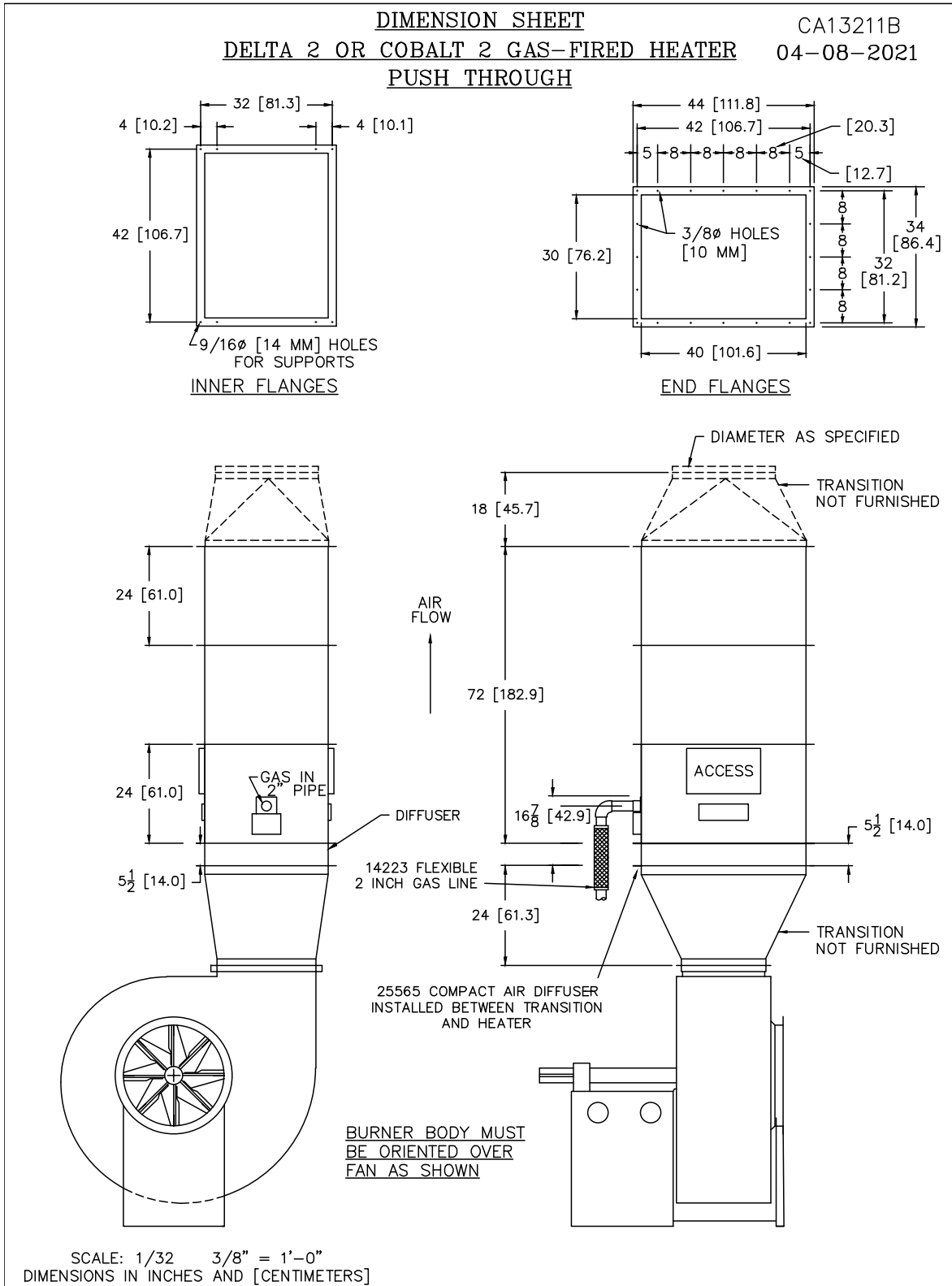
SCALE: 1/32 3/8" = 1'-0"
 DIMENSIONS IN INCHES AND [CENTIMETERS]

Burner Body Dimensions for Push Through

For All Delta 1 Heaters:



For All Delta 2 Heaters:

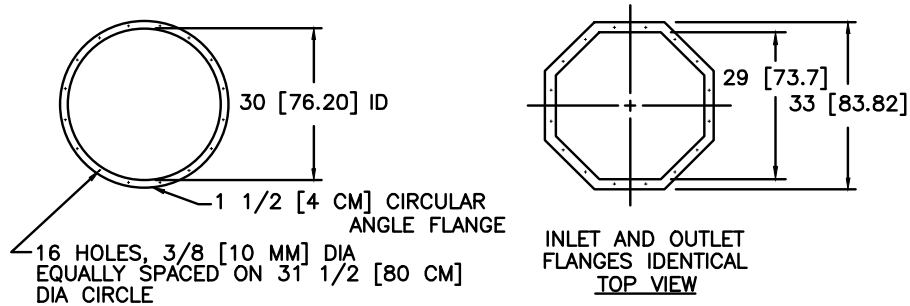


Burner Body with 80047 Push Plenum

For All Delta 1 Heaters:

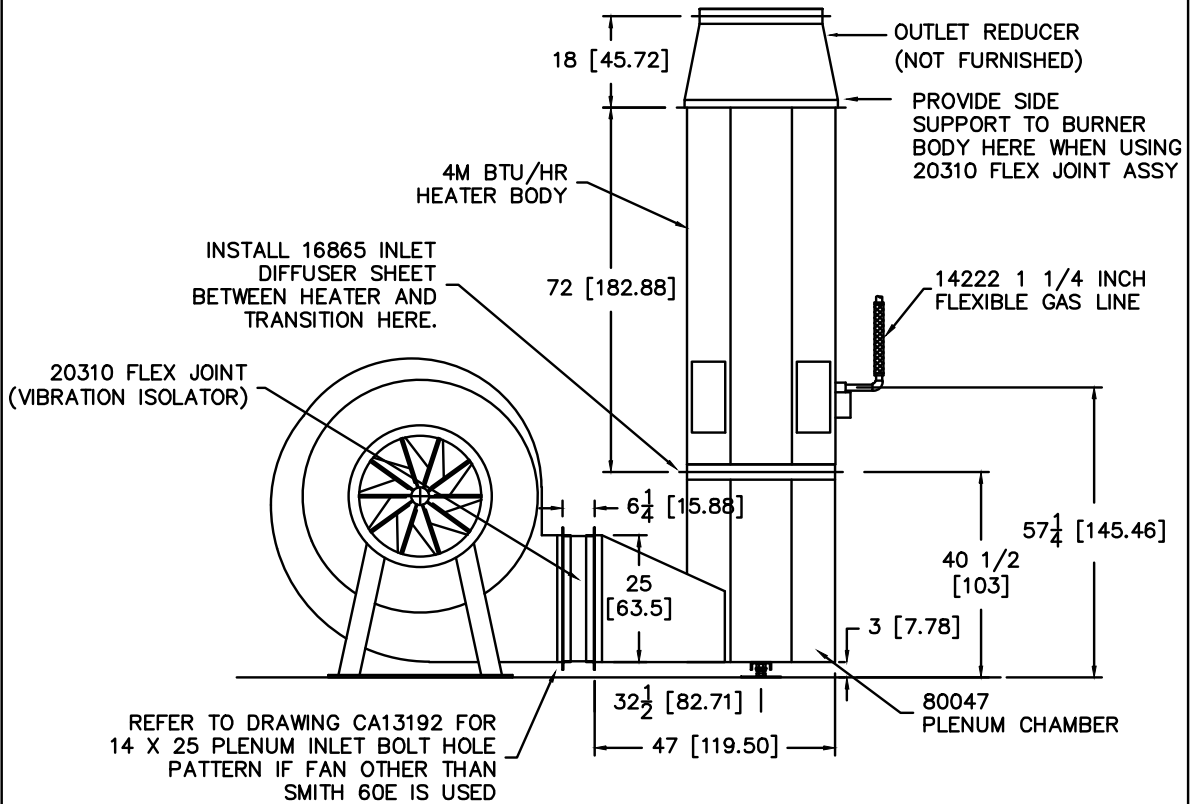
DIMENSION SHEET DELTA 1 GAS-FIRED HEATER OVER 80047 PUSH-PLENUM

CA13191B
12-14



CONNECTION DETAIL

THIS CIRCULAR FLANGE WILL FIT THE OCTAGONAL INLET AND OUTLET FLANGE

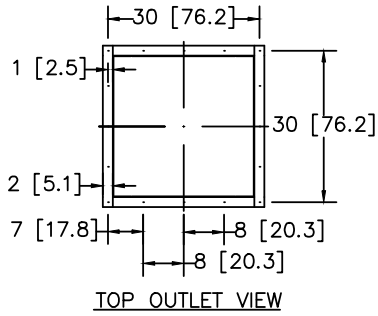


SCALE: 1/32 3/8"=1' 0"
DIMENSIONS IN INCHES AND (CENTIMETERS)

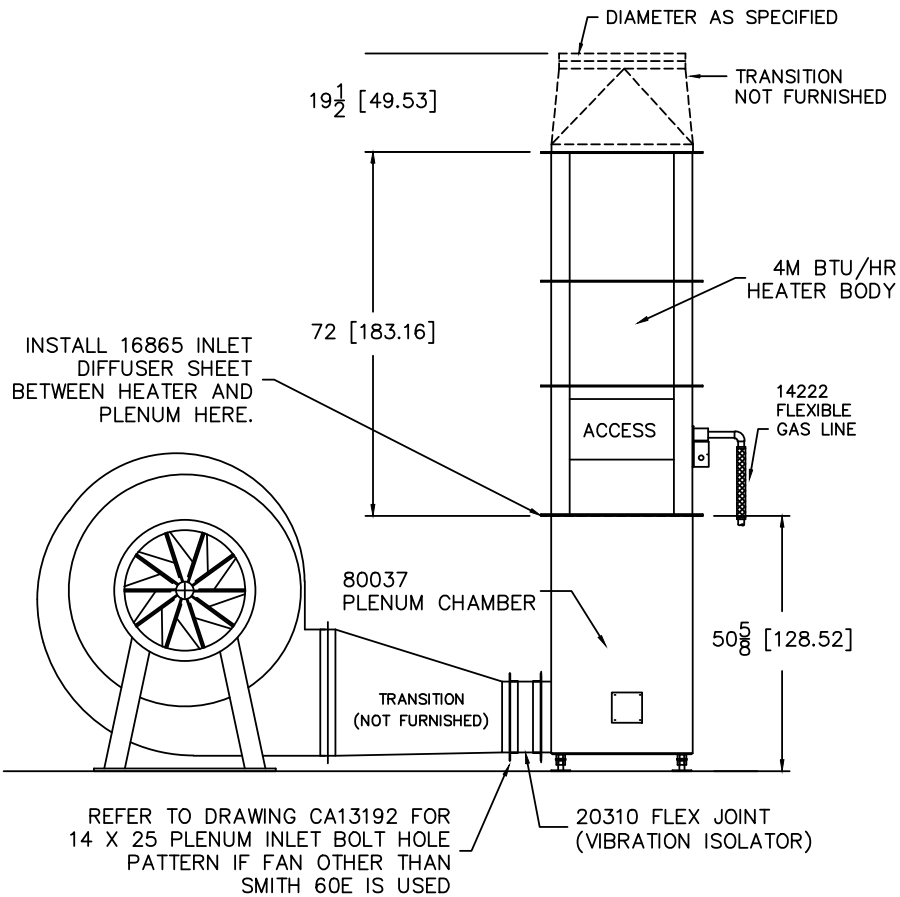
For All Delta 1 Heaters:

DIMENSION SHEET
DELTA 1 GAS-FIRED HEATER
OVER 80047 PUSH-PLENUM

CA20708
 8-16

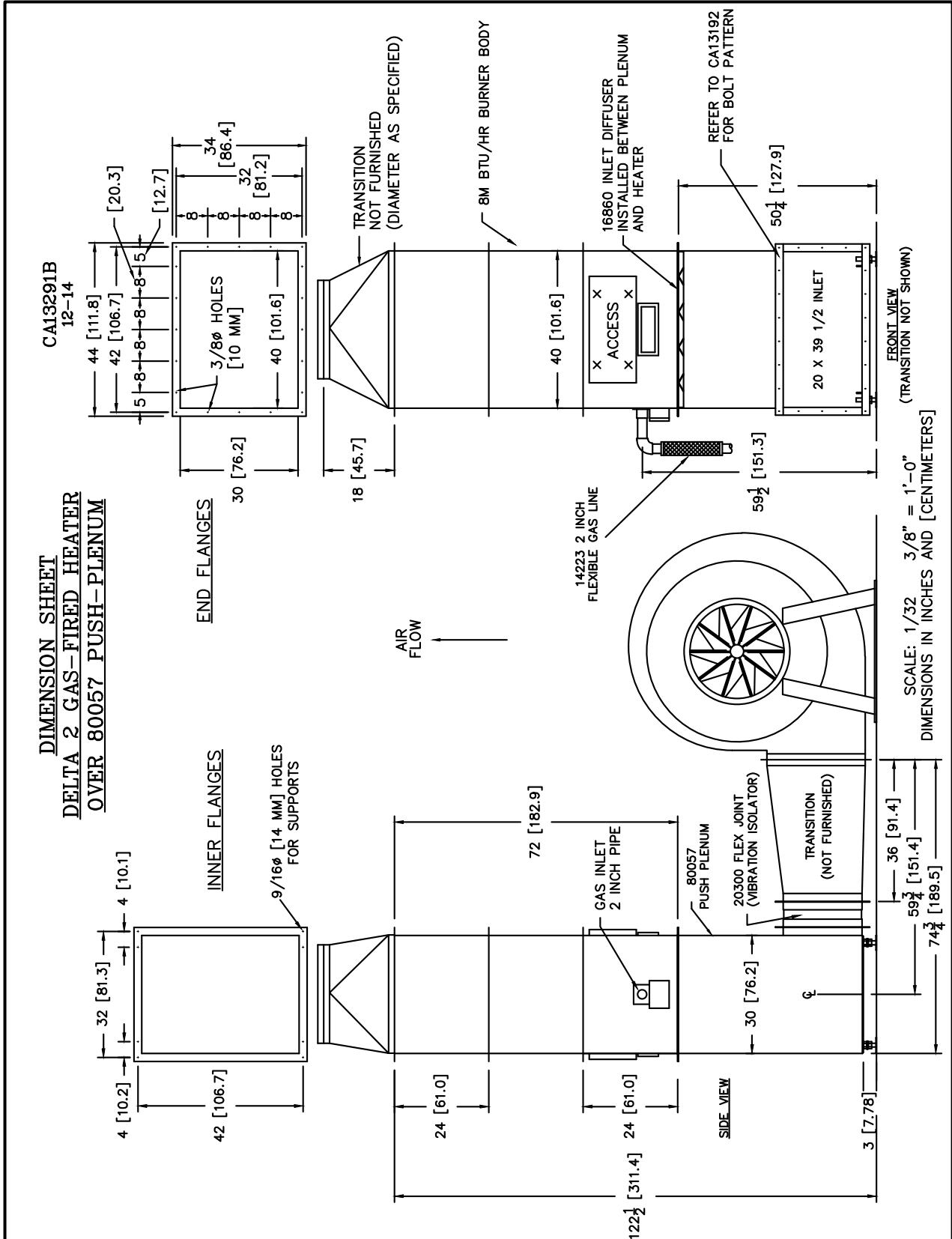


INLET AND OUTLET
 FLANGES IDENTICAL
 28 X 28 INSIDE
 3/8 ϕ HOLES



SCALE: 1/32 3/8"=1' 0"
 DIMENSIONS IN INCHES AND (CENTIMETERS)

For All Delta 2 Heaters:



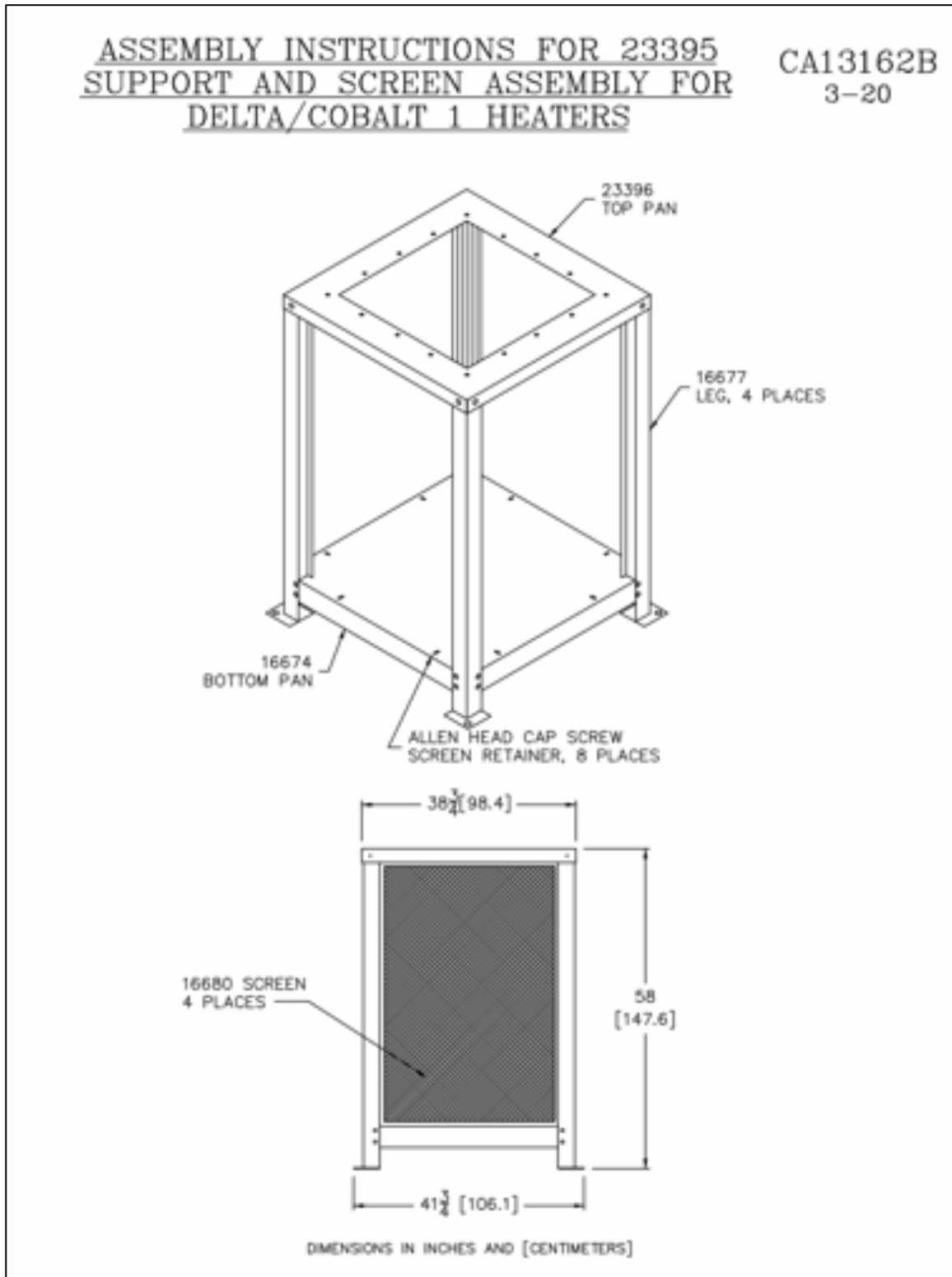
Inlet Hole Patterns for 80047 & 80057 Push Plenums

For All Delta Heaters:

<p style="text-align: center;">INLET BOLT HOLE PATTERN FOR 80047 PUSH PLENUM FOR DELTA 1 GAS-FIRED HEATER</p> <p style="text-align: center;">(7/16 ϕ HOLES)</p> <p style="text-align: center;">1 1/2 X 1 1/2 X 1/8 ANGLE FLANGE</p>	<p style="text-align: center;">INLET BOLT HOLE PATTERN FOR 80057 PUSH PLENUM FOR DELTA 2 GAS-FIRED HEATER</p> <p style="text-align: center;">(7/16 ϕ HOLES)</p> <p style="text-align: center;">2 X 2 X 3/16 ANGLE FLANGE</p>
SAMUEL JACKSON, INC.	
80047 & 80057 HEATER PUSH PLENUM INLET HOLE PATTERN	CA13192A 12-14

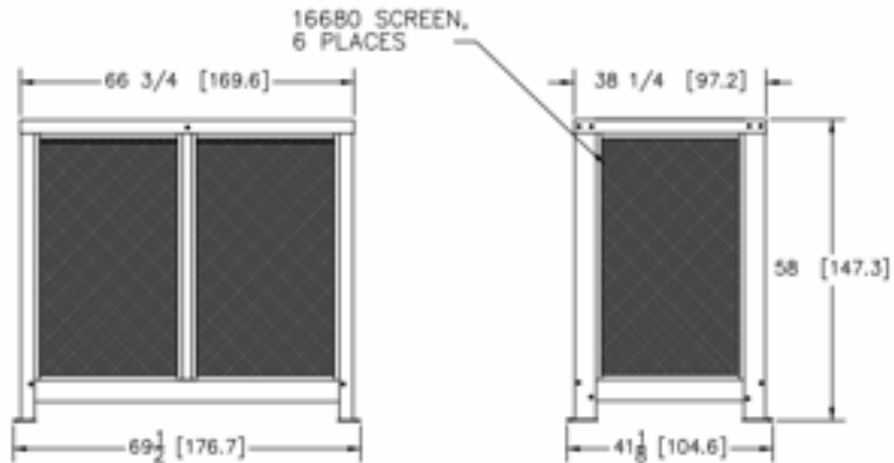
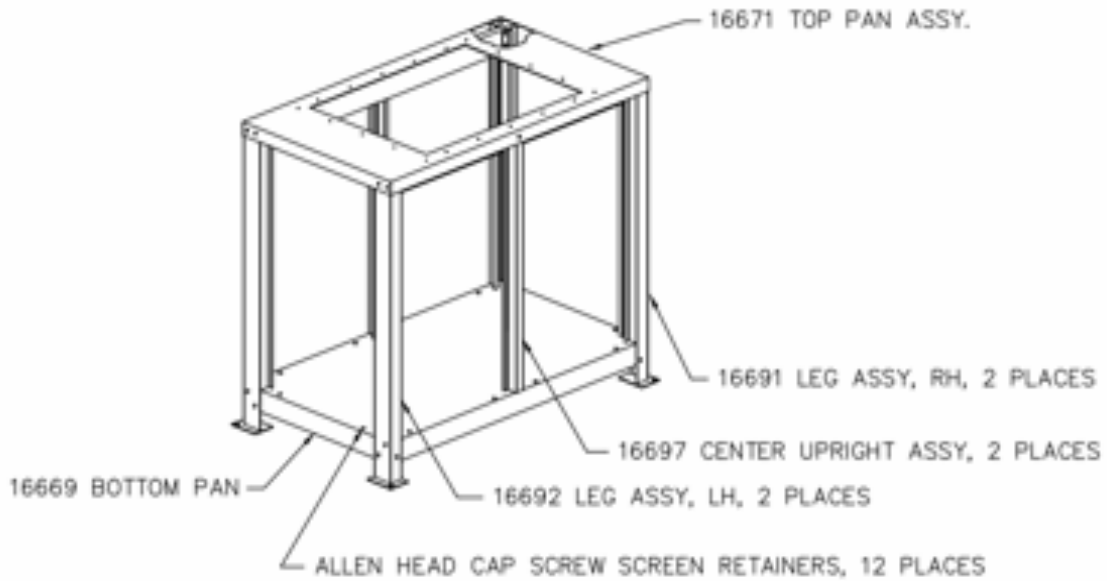
Assembly of Screen Stand

For All Delta 1 Heaters:



For All Delta 2 Heaters:

ASSEMBLY INSTRUCTIONS FOR 16555 CA13261C
SUPPORT AND SCREEN ASSEMBLY FOR 3-20
DELTA/COBALT 2 HEATERS



DIMENSIONS IN INCHES AND [CENTIMETERS]

Warranty and Safety Notices

LIMITED WARRANTY

SAMUEL JACKSON, INCORPORATED

For Commercial and Industrial Customers of Samuel Jackson Moisture Control Products

SAMUEL JACKSON, INCORPORATED ("Sam Jackson") warrants to its customers who purchase Sam Jackson products that its equipment is free from defects in material and workmanship under normal use and service for 12 months from the date of shipment from its Lubbock, Texas factory.

THIS WARRANTY DOES NOT EXTEND TO EQUIPMENT SUBJECTED TO MISUSE, NEGLIGENCE, OR ACCIDENT; NOR DOES THIS WARRANTY APPLY UNLESS THE PRODUCT COVERED BY IT IS PROPERLY INSTALLED BY A QUALIFIED, COMPETENT TECHNICIAN, WHO IS LICENSED WHERE STATE AND LOCAL CODES REQUIRE, AND WHO IS EXPERIENCED IN MAKING SUCH INSTALLATIONS.

Equipment, which is defective in material or workmanship and within the warranty period, will be repaired or replaced, at Sam Jackson's option, in order to facilitate proper operation.

THIS WARRANTY IS LIMITED TO THE PRECISE TERMS SET FORTH ABOVE, AND PROVIDES EXCLUSIVE REMEDIES EXPRESSLY IN LIEU OF ALL OTHER REMEDIES, AND IN PARTICULAR THERE SHALL BE EXCLUDED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL SAM JACKSON BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE OF ANY NATURE.

Sam Jackson neither assumes nor authorizes any person to assume for Sam Jackson any other liability or obligation in connection with the sale of this equipment. Sam Jackson's liability and Customer's exclusive remedy being limited to repair or replacement as set forth above.

SAMUEL JACKSON, INCORPORATED
3900 Upland Avenue Lubbock, Texas 79407

IMPORTANT!

The following notice affects your warranty.

Electrical Controls and Your Safety

Your new Sam Jackson product may be equipped with electrical controls, or designed to interact with controls on a related Sam Jackson product.

In the event that local, state, federal or other specified safety compliance is required, we will consider modifications to meet the particular requirements. Implementation of alternative safety devices may incur additional charges. No warranty of compliance with a particular standard is made in the absence of specific reference to it in our quotation.

If you modify, or permit others to modify, these controls without specific written permission from Sam Jackson, Inc. the warranty on your product will be void and there is a possibility of serious damage to machinery, damage to product, serious injury to personnel, or death. The modifier of the controls assumes all liability for these consequences.

Samuel Jackson, Incorporated
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Lubbock, Texas 79407
+1-806-795-5218

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