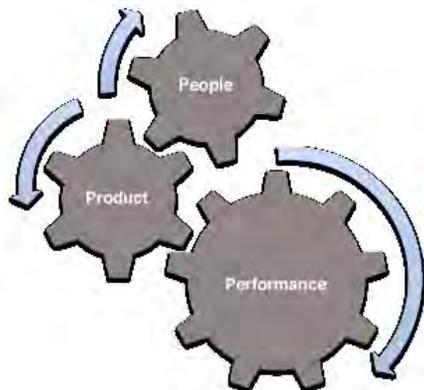




SERVICE MANUAL

HU-80-1645
Sahara Storm
Oil-Fired
Humidaire Unit



SAMUEL JACKSON

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*We appreciate your business and hope you enjoy your
Samuel Jackson Sahara Storm Oil-Fired Humidaire Unit*

This manual contains information on the installation, startup, and operation of your Humidaire Unit. Included is information on:

- Humidaire operation.
- Electrical installation.
- Oil piping and supply.
- Water supply and drainage.
- Humidaire Unit dimensions.
- Maintenance and troubleshooting.

When taking delivery of your new Humidaire Unit, 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 thermocouple and shielded cable thermocouple hookup wire. If your Humidaire Unit will be used to add moisture to lint cotton a 14900B Lint Flue Scanner will also be included in this box.

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. Humidaire Unit installation will then go smoothly with no delays waiting or looking for missing parts.

If the Humidaire Unit is part of a Samuel Jackson Conditioning Hopper Moisture System or a Steamroller System, more detailed information for your system will be shipped to you under separate cover.

IS STARTUP ASSISTANCE PROVIDED?

Depending upon your location, a startup and inspection service may be provided with your new Humidaire Unit 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 people are available to assist you in obtaining the best performance from your Samuel Jackson, Inc. products.

***Again, thanks for choosing a Samuel Jackson Sahara Storm
Oil-Fired Humidaire Unit!***

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Safety



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 806-795-5218 before proceeding. Failure to do so could result in injury or even death. (Si usted no entiende, llamar a Samuel Jackson en 806-795-5218 antes de proceder. La falta de hacer tan podía dar lugar a lesión o aún a 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.

Sahara Storm Humidaire Unit Specifications

Burner Input Capacity (maximum)	2 Million Btu/hr
Burner Input Capacity (normal operation)	900,000 Million Btu/hr
Fuel Consumption (full throttle)	15.4 US Gal/Hr Kerosene
Fuel Consumption (normal operation)	6.9 US Gal/Hr Kerosene
Heating efficiency (air and water)	1170 Btu/lb water at 2900 CFM
Evaporation (maximum)	3 US gallons/minute
Evaporation (normal operation)	2 US gallons/minute
H2O Purge (fresh H2O at 15 grains/US gal)	0.6 US gallons/minute (864 gal/24 hrs)
Recommended water supply	5 US gallons/min at 15 PSI – 30 PSI
Standard Electrical Power	380/50, 415/50

The Samuel Jackson Humidaire Unit generates warm humid air which carries water vapor to cotton fibers in a form that is quickly and uniformly absorbed. Samuel Jackson Humidaire Units have been in extensive use since 1959.



Moist air from Humidaire Units is applied to seed cotton to preserve fiber properties in dry conditions. It is applied to lint cotton to improve bale press efficiency and to enjoy stable bale weights and bale opening characteristics.

Humidaire Units comes in various sizes, fuel types, and efficiencies. In choosing the model best suited for your need, we recommend first determining the method you wish to apply the moist air to the cotton with. Following this decision, heating fuel (gas or oil), air volume, and efficiency will narrow the choices to the one that best matches the need.

In reviewing the specifications, verify availability of power, fresh water supply, fuel type, and provision for water drainage. “Normal Operation”, as noted in the specifications, refers to air temperature of 135 degrees F, moisture output at 20% with moist air volume of 2,900 CFM.

Summary of New Features

What's new in the HU-80-1645 Sahara Storm for experienced Humidaire users?

The following information is for those users with experience using older model Samuel Jackson Humidaire Units who are making the transition to the HU-80-1645 Sahara Storm. 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 default settings that are preprogrammed in the Humidaire Unit.

The Sahara Storm Humidaire Unit is the first Humidaire Unit to integrate oil-burning capabilities with Moisture Direct. Now you have the luxury of using oil without having to sacrifice efficiency or power.

Moisture Direct Control – The most stable and user-friendly Humidaire Unit operating system ever designed. Simply set your desired air temperature and moisture output and the Sahara Storm quickly takes you there with almost no “overshoot” of moisture output.

Oil Friendly – A Fuel Filter is also used to remove contaminants and water from the fuel, elongating your machines' life. The fuel and purge Flow Meters are pass through, which requires less maintenance to keep the fuel and water flowing smoothly. The Sahara Storm also has an integrated fuel metering capability, meaning it can tell you how much fuel has been used.

Touch Screen Diagnostics – In earlier Samuel Jackson Humidaire models, diagnostics are accessed by running a special test program. On the Sahara Storm, the technician can activate diagnostic routines selectively from the touch screen without the need for going through the sequence of a test program.

Moisture Mirror 2X, 3X and 4X Compatible – The model Sahara Storm has Ethernet communications capability which gives you the option of connecting it to a Moisture Mirror 2X, 3X or 4X. You may simply connect it using a standard Ethernet CAT-5 cable to the Moisture Mirror. A single Mirror will act as a common remote control for a maximum of four Humidaire Units and eight Samuel Jackson heaters at the same time. In addition to this, the Mirror, properly equipped with sensors, can control the moisture output of the Humidaire automatically while coordinating the interaction of all of your Sam Jackson moisture control products.

Humidaire Unit Operations

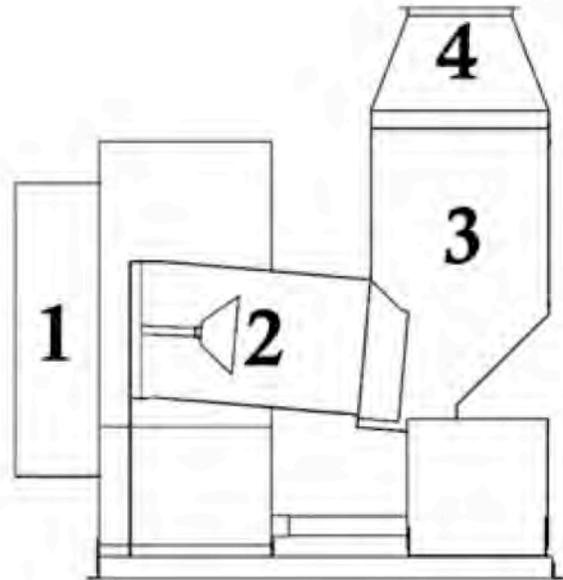
Understanding the principles of operation of a Humidaire Unit is easiest when you break it down into the following four steps:

Step 1: Ambient air is pulled in through the air inlet of the Humidaire Unit.

Step 2: The air passes through the Maxon burner head, which raises the temperature of the air. Heated air will carry much more moisture than cool or ambient air.



Step 4: The moist air leaves the Humidaire Unit through a pipe connected to the top of the spray chamber and goes to the application point. The picture shows humidified air being exhausted from our Humidaire Test Stand as an example of the volume of moisture generated. In a gin, the humidified air would go to a seed cotton or lint moist air applicator.



Step 3: The heated air enters the spray chamber where it mixes with a torrent of water that is circulated through the unit and sprayed out of nozzles. The air absorbs the moisture to become humidified air.



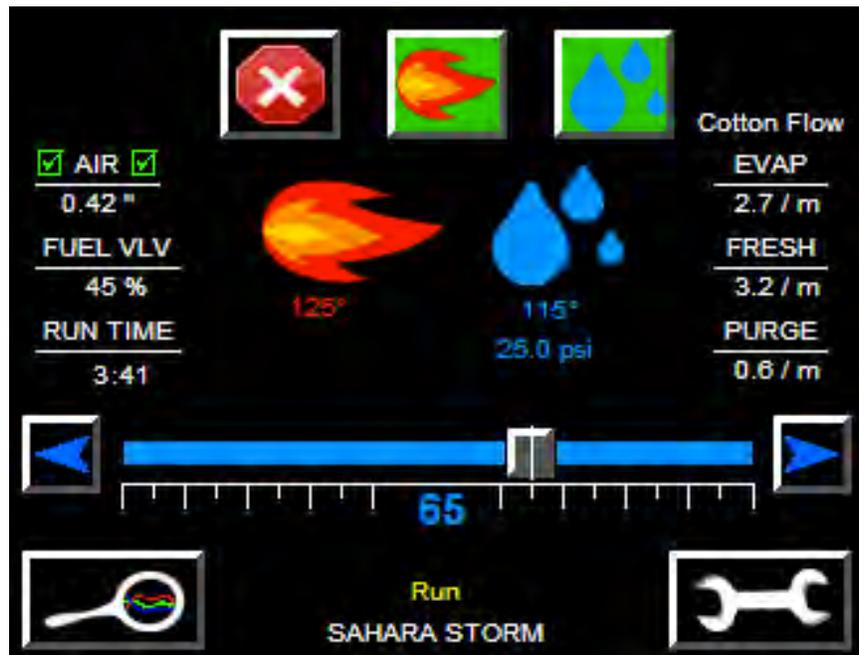
HOW DO I TURN IT ON & OFF?

Refer to the *MOISTURE MIRROR* section of manual for more information on operating the Humidaire Unit remotely using the optional Moisture Mirror color touch panel. The instructions below are for using the color touch panel mounted in the upper cabinet door on the unit with the display on the “HOME” screen.

Touch the water pump enable button  on the screen. Normally, the water pump will only run when the flame is on so pressing this button will also start the flame. The water pump will not start until the warm-up time has passed and the cotton flow signal is present. If you wish to only have flame on and not enable the water pump, then press the flame button . Press the stop  or flame button to turn off the flame.

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

Once flame is established, the system will begin warming up. There is a 90-second (default) delay that prevents the water pump from coming on even if the lint flue scanner reports cotton is flowing during this period.



Home Screen



TIPS

Many ginners normally turn the Humidaire Unit on first in the gin startup sequence to give additional warm-up time for improved operation.

WHY IS THERE A DELAY AFTER I TURN IT ON?

After the flame or water pump enable button is touched, the PLC 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 ERROR message that corresponds to the problem.

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



TIPS

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

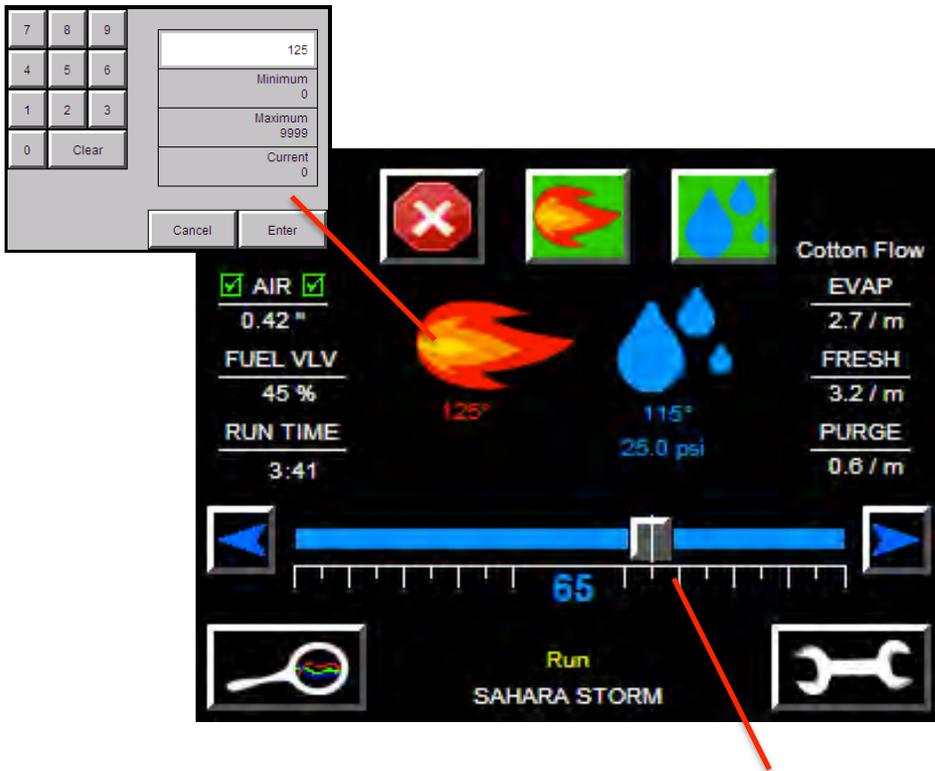
To prevent lightning damage to controls in the off-season, it is a good idea to turn power off to the control cabinet until it is needed again.

HOW DO I SET THE AIR TEMPERATURE AND MOISTURE OUTPUT?

The Sahara Storm uses “Moisture Direct Control” making adjusting the moisture output of the unit easy. Press on the flame picture to bring up the air temperature target keypad. After keying in the air temperature target, press ENTER on the keypad. The keypad will then disappear.

The air temperature target range is from 95 to 155 deg F (35 to 68 deg C). A higher air temperature will evaporate more water and reduce applicator problems from condensation.

If the unit is operating with a Moisture Mirror and automatic bale moisture control based on bale lint moisture is active, the moisture output will be adjusted automatically. In all cases, the air temperature is adjusted manually. More details for operation with the optional Moisture Mirror is described later in this manual.



Press and drag the slider to manually adjust the moisture output. You can also press the left or right blue arrow keys to adjust the output.

HOW DO I CONTROL THE AMOUNT OF MOISTURE OUTPUT?

The higher the air temperature setting and the higher the moisture output setting, the more water will be evaporated into the air. This increases the moisture added to the cotton. When the moisture output setting is too high for the air temperature setting, excessive condensation can occur and create applicator problems especially in cold weather.

It is better to adjust the air temperature setting so that the desired amount of moisture is obtained at all times without the occurrence of excessive condensation regardless of the moisture output setting. This may require that the air temperature is set at 150 °F (66 °C) most of the time. It is especially important to set the air temperature near the higher end of the range during cold ambient conditions. However, operating the unit at a lower air temperature when possible will save fuel. Call the factory if applicator problems persist.

The maximum air temperature target is preset at 155 deg F (68 deg C). Operating the Humidaire Unit at high temperatures higher than this will shorten its life.

WHAT IS THE “TEST PROGRAM”?

The *TEST PROGRAM* is performed 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 Humidaire Unit can be checked, calibrated and adjusted. The *TEST PROGRAM* may also be used in the future by the operator or service man to troubleshoot a problem.

The *TEST PROGRAM* is also performed on each new Humidaire Unit before it leaves the factory. See the *TEST PROGRAM* section of manual for more information.

WHAT IS THE “SETUP WIZARD”?

The *SETUP WIZARD* will guide you through the setup of a new Humidaire installation, in a step-by-step fashion. It covers the same setup details as the *TEST PROGRAM*.

WHAT NEEDS TO BE DONE AT THE END OF THE SEASON?

During the last days of the ginning season we recommend using our *Powdered Acid Descaler* (Part No. 14000) to assist in removing scale from the piping and spray chamber of the Humidaire Unit. We also recommend using the descaler periodically during the ginning season if excessive scale buildup is noticed. See *POWDERED ACID DESCALER* section for instructions on its use.

When the unit is finished for the season, wash sludge from the tank and use the drain outlet to empty the tank. Also wash and scrub the water tank screen in the bottom of the water tank as well as the mist eliminator above the spray chamber. To prevent damage to the water train components from freezing water, use the plug in the bottom of the water pump to drain it and open the pipe fittings on the Purge Water Flow Meter (FM2) as this meter is located at the lowest point in the water train.



Drain plug on pump housing



Open fittings on Purge Water Flow Meter to drain water

Use an air hose to blow dust buildup off burner duct, water pump, and gas valve assemblies. Cut off the gas supply at the ball valve. Disconnect electrical power.

WHAT IDEAS & TOOLS ARE AVAILABLE TO ENHANCE PERFORMANCE?

Insulation of moist air pipes

In areas where the weather is sometimes cold during ginning season, insulating (lagging) the humid air pipes and the lint slide is a good idea. This will usually allow operating the unit at higher moisture outputs with fewer problems.

For Conditioning Hopper Systems operating in cold climates, insulating the manifold pipes connecting the air to the Hoppers is a necessity. Keeping the moist air temperature uniform throughout the manifold piping ensures the moisture application is uniform at each gin stand.

A cost effective method of insulation is to wrap the moist air pipes with 4 inch thick fiberglass batt insulation. Cover the insulation with Cotton Koozie Shrink Wrap Film (Part No. 20750) and shrink in place with a propane powered heat gun (Part No. 20751). Heat guns are available from the factory for rental or purchase.



Cotton Koozie Shrink Wrap in place over fiberglass batt insulation on moist air and exhaust pipes for a Steamroller installation



TIPS

Some moisture condensation will form even inside insulated (lagged) pipes. When insulating moist air pipes, it is recommended that the flange joints not be insulated. The flanges are where most leakage will occur. If the flanges are wrapped, then this water is captured and will soak the insulation. Drain holes in the lowest point of the moist air pipe are also recommended.

Handheld Moisture Meter

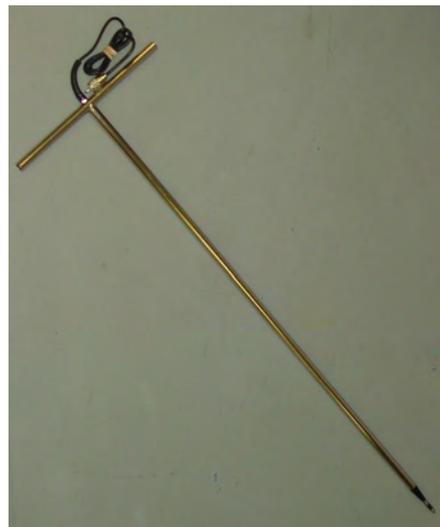
If a handheld moisture meter is desired for a fast and convenient cotton moisture reading with excellent repeatability, Samuel Jackson offers the Delmhorst Model C-2000. Probes are available to measure moisture content using a bale probe for lint and a module or cup electrode for seed cotton.

C-2000 Moisture Meter
(Part No. 16001A)
shown with
52-E/C Seed Cotton Cup Electrode
(Part No. 16003A).



30-E/C Bale Moisture Probe
(Part No. 16002A)

830-T/C Tee Handle Module
Moisture Probe, 38 inch long
(Part No. 16876A)



Tex-Max Microwave Bale Moisture Sensor

The Tex-Max scans every bale thousands of times as the bale passes through the antennas and provides a single average bale moisture reading. When the Tex-Max is connected to a Moisture Mirror, the Mirror can automatically adjust the moisture output of the Humidaire Unit based on the operator-defined target for bale moisture.



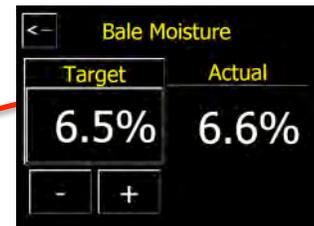
Moisture Mirror Control Options

The HU-80 Sahara Storm Humidaire Unit is compatible with the optional Moisture Mirror 2X, 3X and 4X offering remote control (normally from ginner's console) of the unit via a CAT5 ethernet connection. These Mirrors have the ability to control up to four Samuel Jackson Humidaire Units and eight Samuel Jackson Heaters.

When these Moisture Mirrors are equipped with compatible moisture sensors at various stages in the ginning process they offer automatic dryer temperature control. It can also automatically adjust the moisture output setting for the Humidaire Unit supplying moist air to moist air applicators like the Steamroller and Lint Slide Grid. Refer to the Moisture Mirror manuals for more information on features, connections and compatible moisture sensors like the *Tex-Max Bale Moisture Sensor*.

The START / STOP operations, air temperature setting, moisture output setting, display of actual temperatures and information like evaporation rates and run time are displayed on the various Moisture Mirror color touch panels. When an ERROR occurs, this information is also displayed.

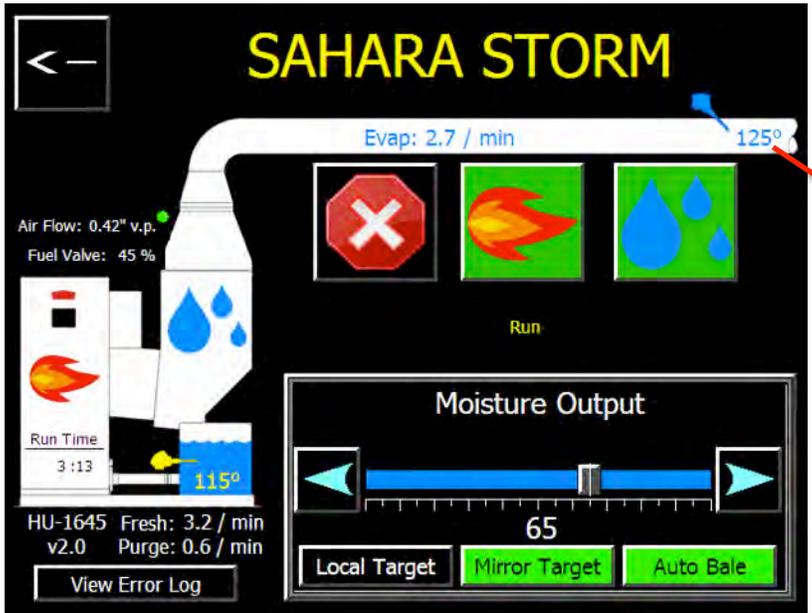
To access screens that require a password, 1234 is the default user password. If there is any question about a making a change to a default setting, press the large question mark button (?) for a brief explanation.



Press the "Bale Moisture" button on Home screen. The desired bale moisture target is changed on the screen that appears.

Home Screen for Moisture Mirror 2X

For the example Home screen on the previous page, the single Humidaire Unit is called “Sahara Storm”. Pressing this button area will bring up the following screen.



Press on the number here to bring up air temperature target keypad

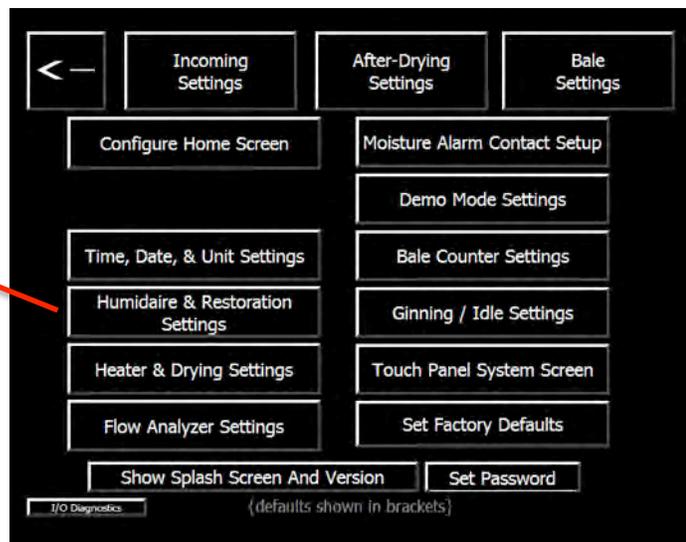
The controls to start and stop the unit and to adjust the moisture output, the flame, water pump and moisture output operators are the same as described for the local control using the color touch panel at the unit. “Mirror Target” button will be green for Mirror control.

If automatic “feedback” control of lint moisture is desired and a compatible sensor is installed, the “Auto Bale” button will be green like on the screen shown above. The button appears if this Humidaire is the one that generates moisture for the bales.

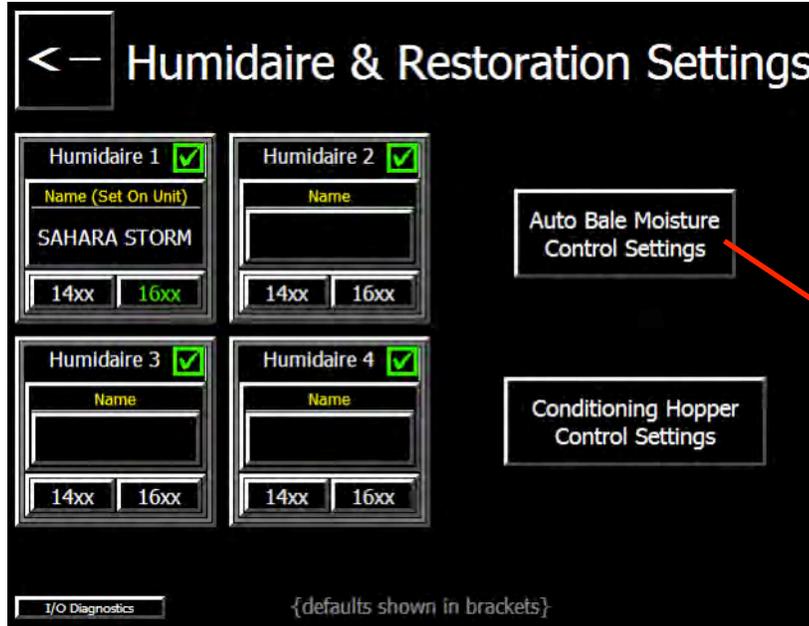
To enable automatic control, press the wrench button  on the Mirror’s home screen.

This will take you to the screen shown below. Press the “Humidaire & Restoration Settings” button.

Press the “Humidaire & Restoration Settings” button

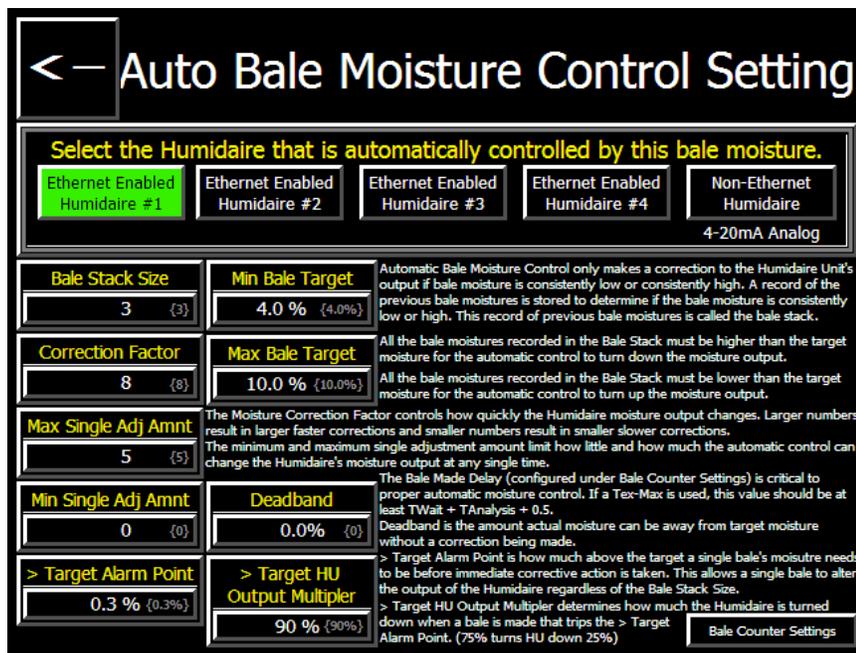


The following screen will appear. The single Humidaire Unit shown in these example screens is Humidaire 1 with the user given name “Sahara Storm”. 16xx must be green to allow operation with this 16xx series product. Now press the button “Auto Bale Moisture Control Settings”.



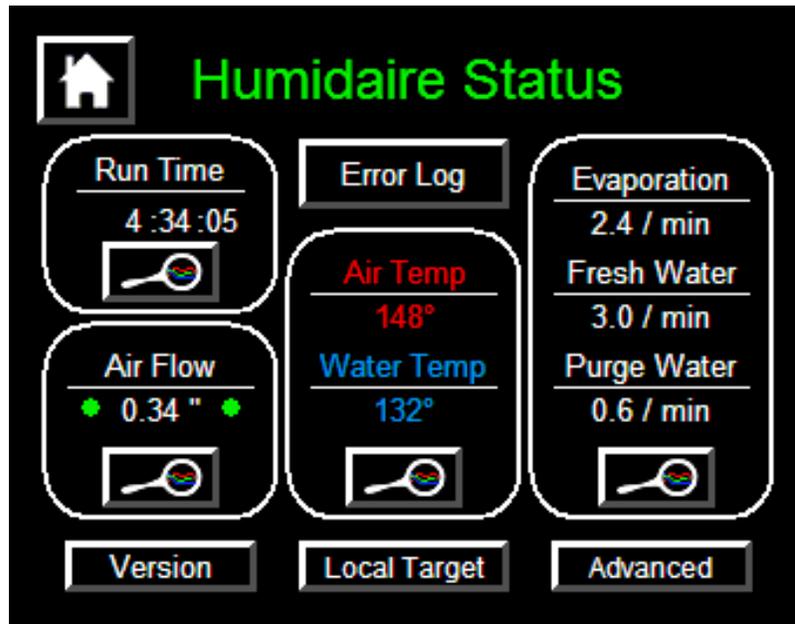
Press the “Auto Bale Moisture Control Settings” button

The “Auto Bale Moisture Control” screen will then appear. “Ethernet Enabled Humidaire #1” should be green for our example screen setup. The rest of the settings should be set to the default values shown in the {x} in each box. Consult the factory before adjusting these default values.



Humidaire Status

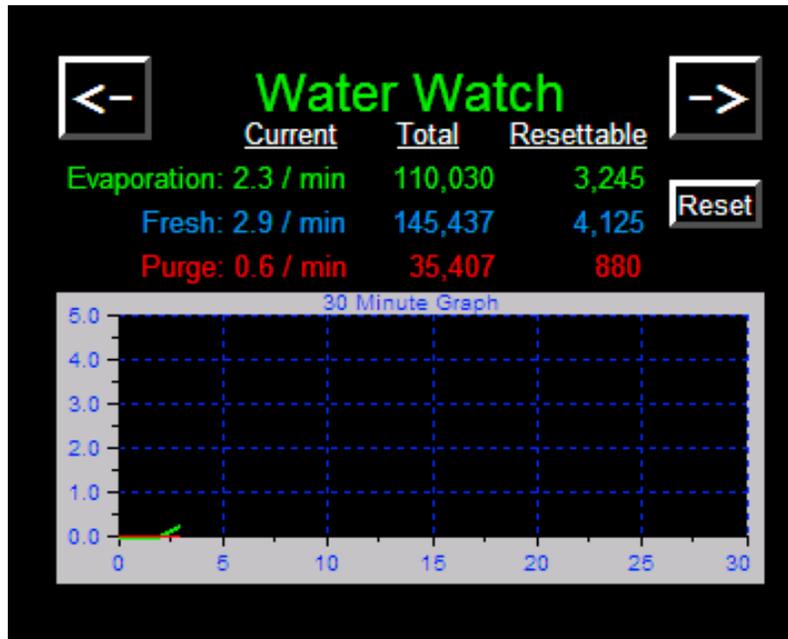
Pressing the magnifying glass button  on the HOME screen brings up the HUMIDAIRE STATUS screen.



Monthly run times for the flame and water pump, graphs for water usage, air flow and air and water temperatures are all accessed here. Pressing the *ERROR LOG* button brings up the error log which is described in detail later in the manual.

Water Watch

Pressing the magnifying glass on the Humidaire Status screen in the box showing water evaporation, fresh and purge water rates brings up the *WATER WATCH* screen. The Water Watch system shows the evaporation rate of water and is standard on the Sahara Storm Humidaire Unit. During operation, two water meters keep track of fresh water supplied to the unit and purge water released from the unit.



The “Fresh” value is the 15-minute average intake water usage. The “Purge” value is the 15-minute average purge water released from the unit. By subtracting the purge water volume from the fresh water volume, the 15-minute average rate of evaporation is calculated. All three of these values are expressed in gallons or liters per minute depending on the selected unit.

The Water Watch screen shows all three rate values in addition to the total cumulative values and user resettable values. The rates are also graphed for 30 and 60 minutes.

Error Logging System

The *ERROR LOGGING SYSTEM* is designed to make troubleshooting easier for both the user and Samuel Jackson service personnel. This system remembers the last 64 ERRORS, thus showing a history of past problems.

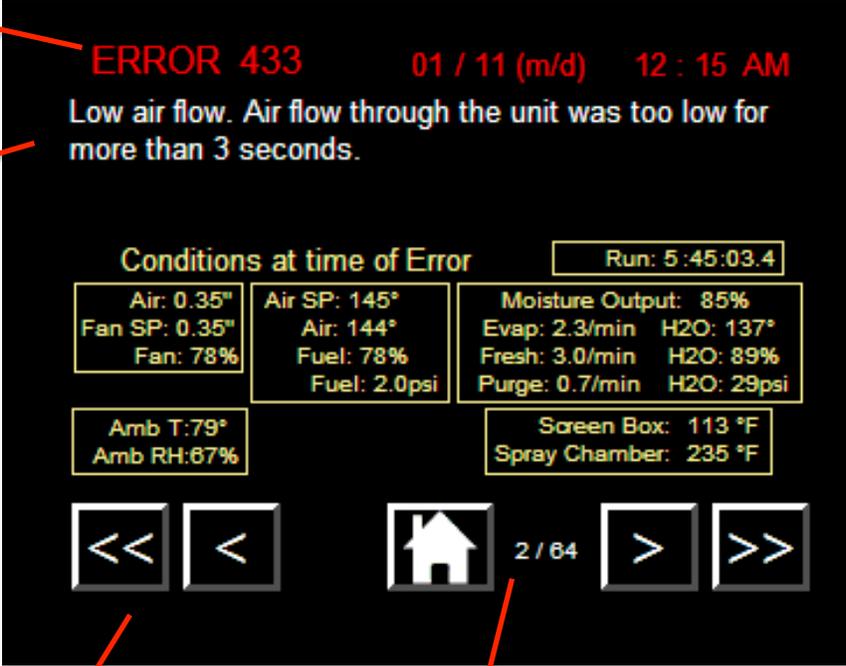
To access the log, press the magnifying  glass on the color touch panel's Home screen, then press the "Error Log" button. Navigate through the log history by pressing the < or > buttons or press the << or >> buttons to step through 10 events at a time. Note that the time and date of each occurrence are shown along with the operating conditions at time of the error to facilitate troubleshooting.

The home button  returns you to the home screen.

Error Log Screen

Error number

Error description
& abbreviated
remedy



The screenshot displays the Error Log Screen with the following information:

- Error number:** ERROR 433
- Date and Time:** 01 / 11 (m/d) 12 : 15 AM
- Error description:** Low air flow. Air flow through the unit was too low for more than 3 seconds.
- Conditions at time of Error:**
 - Air: 0.35"
 - Fan SP: 0.35"
 - Fan: 78%
 - Air SP: 145°
 - Air: 144°
 - Fuel: 78%
 - Fuel: 2.0psi
 - Moisture Output: 85%
 - Evap: 2.3/min H2O: 137°
 - Fresh: 3.0/min H2O: 89%
 - Purge: 0.7/min H2O: 29psi
 - Amb T: 79°
 - Amb RH: 87%
 - Screen Box: 113 °F
 - Spray Chamber: 235 °F
- Run time:** 5:45:03.4
- Navigation buttons:** <<, <, Home icon, 2 / 64, >, >>

Use these buttons to
navigate through logs

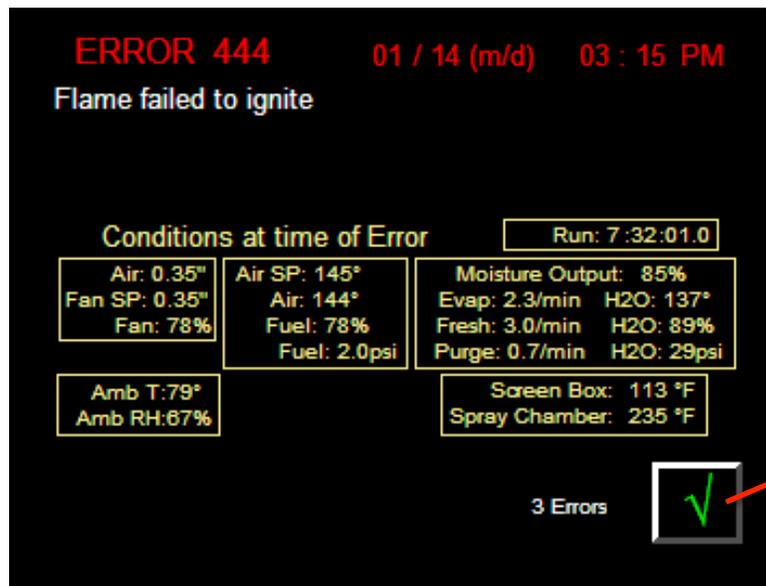
Shows position in
Error stack. Lower
number is more recent
Error.

Error Explanations

PRELIMINARIES – Most ERRORS will cause the Humidaire Unit to automatically shut down. A few ERRORS, indicated with an * before the ERROR number in the list below, are non-fatal and will permit the unit to continue operation but warn of conditions which may cause a shutdown if left unattended. In each case, a brief description of the ERROR will be shown on the color touch screen often along with an abbreviated remedy.

The display will continue to show the ERROR until the  button is pressed.

Only one ERROR condition is displayed at a time. The oldest unacknowledged ERROR condition is shown even if the Humidaire shuts down due to another ERROR. Pressing the  button will show consecutive ERROR conditions leading up to the latest shutdown ERROR. The number of unacknowledged errors is shown to the left of the  button.



Active ERROR Screen



Pressing this button clears error display screen

EXAMPLE:

The flame scanner has failed. This prevents the burner from having a flame signal. ERROR 444 “Flame failed to ignite” is displayed. The burner is automatically restarting itself for a maximum of three attempts. After three unsuccessful tries, the burner will shut down on ERROR 446 “Excessive flame failures”. The display will continue to show ERROR 444. Press the  button to clear each ERROR 444 and then to clear ERROR 446.

*** ERROR 400**

ETHERNET COMMUNICATIONS ERROR: This error is triggered when the Humidaire Unit’s Programmable Logic Controller (PLC) is unable to communicate with the Moisture Mirror. Check that the CAT5 cables are plugged in well both at the

communication card on the PLC and the network switches both in the Humidaire Unit cabinet and at the Moisture Mirror. Check that the network card ID settings are correct on the communication card referring to the network ID settings page in this manual. Check that the CAT5 cable is not damaged and that the wires have been terminated in the RJ-45 terminal in the correct sequence.

ERROR 401

ANALOG CARD #1 JUMPER ERROR: The analog input card #1 for the PLC has a jumper in place that needs to be removed. Consult the factory for help.

ERROR 402

ANALOG CARD #2 JUMPER ERROR: The analog input card #2 for the PLC has a jumper in place that needs to be removed. Consult the factory for help.

ERROR 403

ANALOG CARD #3 JUMPER ERROR: The analog input card #3 for the PLC has a jumper in place that needs to be removed. Consult the factory for help.

ERROR 404

ANALOG INPUT 1.1 (MOIST AIR TEMPERATURE) FAILED TRANSDUCER, FAILED SENSOR OR BROKEN WIRE: The analog input is less than 4mA DC from the moist air thermocouple. First check that all wires are firmly attached in the circuit, that there is no broken wire and that fuse 1.1 is not blown.

ERROR 405

ANALOG INPUT 1.2 (WATER TEMPERATURE) FAILED TRANSDUCER, FAILED SENSOR OR BROKEN WIRE: The analog input is less than 4mA DC from the water thermocouple. First check that all wires are firmly attached in the circuit, that there is no broken wire and that fuse 1.2 is not blown.

ERROR 406

ANALOG INPUT 1.3 (SCREEN BOX TEMPERATURE) FAILED TRANSDUCER, FAILED SENSOR OR BROKEN WIRE: The analog input is less than 4mA DC from the screen box temperature transducer. First check that all wires are firmly attached in the circuit, that there is no broken wire and that fuse 1.3 is not blown.

ERROR 407

ANALOG INPUT 1.4 (SPRAY CHAMBER TEMPERATURE) FAILED TRANSDUCER, FAILED SENSOR OR BROKEN WIRE: The analog input is less than 4mA DC from the spray chamber temperature transducer. First check that all wires are firmly attached in the circuit, that there is no broken wire and that fuse 1.4 is not blown.

ERROR 408

ANALOG INPUT 2.1 (AIR FLOW) FAILED TRANSDUCER, FAILED SENSOR OR BROKEN WIRE: The analog input is less than 4mA DC from the air flow transducer. First check that all wires are firmly attached in the circuit, that there is no broken wire and that fuse 2.1 is not blown.

ERROR 409

ANALOG INPUT 2.2 (COMBUSTION AIR PRESSURE) FAILED TRANSDUCER, FAILED SENSOR, OR BROKEN WIRE. The analog input is less than 4mA DC from the combustion air pressure transducer. First check that all wires are firmly attached in the circuit, that there is no broken wire and that fuse 2.2 is not blown.

ERROR 410

ANALOG INPUT 2.3 (WATER PUMP PRESSURE) FAILED TRANSDUCER, FAILED SENSOR OR BROKEN WIRE: The analog input is less than 4mA DC from the water pump pressure transducer. First check that all wires are firmly attached in the circuit, that there is no broken wire and that fuse 2.3 is not blown.

ERROR 411

ANALOG INPUT 2.4 (FUEL PRESSURE) FAILED TRANSDUCER, FAILED SENSOR OR BROKEN WIRE: The analog input is less than 4mA DC from the fuel pressure transducer. First check that all wires are firmly attached in the circuit, that there is no broken wire and that fuse 2.4 is not blown.

ERROR 412

ANALOG INPUT 3.1 (ATOMIZING AIR PRESSURE) FAILED TRANSDUCER, FAILED SENSOR, OR BROKEN WIRE. The analog input is less than 4mA DC from the atomizing air pressure transducer. First check that all wires are firmly attached in the circuit, that there is no broken wire and that fuse 3.1 is not blown.

ERROR 416

WATER PUMP OVERLOAD: This error may occur while the unit is idle and first receives power, during normal operation, or during an automatic tank purge operation. Reset the overload relay before clearing the error with the reset button. This diagnostic is not active in the test program, although the overload relay continues to protect the water pump motor. The following should be checked before continuing operation following this error.

- Verify setting of water pump motor overload relay WPOL at 7.3 amperes.
- Verify 3Ø voltage/hertz at one of the following, 380/50 or 415/50.
- Check for low voltage condition.

- Verify free rotation of motor shaft and pump impeller.
- Verify that the motor is wired correctly for the voltage.
- Verify that the spray header flush valve is closed.

ERROR 418

FUEL PUMP MOTOR OVERLOAD: Reset the overload relay before clearing the error with the reset button. This diagnostic is not active in the test program, although the overload relay continues to protect the fuel pump motor. The following should be checked before continuing operation following this error.

- Verify setting of overload relay FPOL at 0.85 amperes.
- Verify voltage at one of the following, 380/50 or 415/50.
- Check for low voltage condition.
- Verify free rotation of motor and pump shaft.
- Verify fuel oil high pressure is not set too high.

ERROR 419

COMBUSTION FAN MOTOR OVERLOAD: Reset the overload relay before clearing the error with the reset button. This diagnostic is not active in the test program, although the overload relay continues to protect the combustion fan motor. The following should be checked before continuing operation following this error.

- Verify setting of overload relay CAFOL at 2.8 amperes.
- Verify voltage at one of the following, 380/50 or 415/50.
- Check for low voltage condition.
- Verify free rotation of motor shaft and fan impeller.

ERROR 420

LOW FUEL PRESSURE: Oil pressure fell below 30 psi (default limit). Check fuel pump rotation when restart is attempted. It should rotate counter clockwise when viewed from the motor side of the pump. If fuel pump rotates correctly, check the following: Check for empty oil supply tank. Look for a closed valve in the supply pipe. Clean all three oil filters (to the left of the control cabinet, inside the lower cabinet, and on the burner head). Check for oil leaks, which could let air leak into supply pipe and cause pressure to

fluctuate. Run the test program to adjust the oil pressure. Remember that the oil pressure determines the maximum heat output and that the oil pressure should be adjusted equal to the air pressure. Oil pressure higher than air pressure can result in smoky operation and difficulty in starting.

ERROR 421

HIGH FUEL PRESSURE: A shutdown due to this error is to prevent rupturing the fuel line hoses from high oil pressure (default above 80 psi). Check to see if the Fuel Pressure Relief Valve (FPR) is jammed shut or its discharge connection is closed off. If this is not the case, check to see if the Oil High Pressure High Limit has been set to a pressure lower than the setting of the FPR.

ERROR 422

FUEL MODULATING MOTOR FAILED TO OPEN: The modulating valve on the burner head failed to open in a timely fashion. Check that the modulating motor is functioning and that the low fire sensor (LFS) is operating and adjusted correctly.

ERROR 423

FUEL MODULATING MOTOR FAILED TO CLOSE: The modulating valve on the burner head failed to close in a timely fashion. Check that the modulating motor is functioning and that the low fire sensor (LFS) is operating and adjusted correctly.

ERROR 424

LOW ATOMIZING AIR PRESSURE: The atomizing air pressure fell below 60 psi (default). This may be caused by an inadequate air compressor, a closed valve in the supply line or an unusual usage of compressed air elsewhere in the plant. Dependable air pressure is essential for the proper operation of the burner.

ERROR 425

LOW COMBUSTION AIR PRESSURE: This error occurs when the Combustion Air Pressure Transducer (CAT) senses insufficient combustion air pressure during certain steps of the operating program. Check for proper rotation of the combustion air fan motor FM, and make sure the overload relay CAFOL for this motor is not tripped. Reset CAFOL if tripped. After verifying good combustion air pressure (through the tubes going to CAT), check for proper operation of CAT.

ERROR 426

HIGH TEMPERATURE AT AIR INLET SCREEN BOX: This error will shut the burner down due to a high temperature condition sensed in the air inlet screen area, before the burner head. This temperature sensor will only be exposed to flame or excessive heat when air through the Humidaire Unit is suddenly interrupted, causing the flame to go in a direction other than the spray chamber. This condition can be caused by opening the

spray chamber door during operation. It can also be caused by not cleaning the air inlet screen, very low air flow or a failed temperature sensor. This ERROR is triggered when the temperature is above 200 °F.

ERROR 427

HIGH TEMPERATURE AT SPRAY CHAMBER: This error will shut the burner down due to a high temperature condition sensed at the burner duct leading into the spray chamber. Operating the Humidaire Unit at very low air flows (less than 1,000 CFM) or running the air temperature above 155 °F (68 °C) will cause this error. By default setting, this ERROR is triggered when the temperature is above 400 °F. A failed temperature sensor can also cause this error. Consult the factory if this error becomes a nuisance. A higher spray chamber temperature setting is permissible for some applications.

ERROR 428

HIGH TEMPERATURE IN MOIST AIR LINE: Actual moist air temperature was more than 220 °F.

- Is the air volume too small?
- A failed thermocouple can cause this error.

ERROR 429

LOW WATER PRESSURE: Water pressure from the Humidaire Unit's water pump is constantly monitored while the pump is running. If the water pressure is not above the water pressure low limit at this location, the Humidaire Unit will shut down with ERROR 429. Possible causes of ERROR 429 follow:

- Water level in the tank may be too low. Verify that the drain valve is closed. Verify that the water supply is turned on.
- Water pump may be running in reverse. Verify rotation.
- Pump intake or impeller may be impeded with trash or sludge. Check cleanliness of tank and water system.
- Inlet screen for pump intake may not be in position correctly blocking intake.
- Water nozzles may have been removed and not replaced. Verify presence of all 25 water spray nozzles.
- Spray nozzle header pipe flush valve may be open.
- If all of the above are ok, check for a clogged port on the Water Pump Pressure Transmitter (WPT).

*** ERROR 430**

LOW WATER PRESSURE AT 100% MOISTURE OUTPUT: Similar to ERROR 429 above but may indicate worn pump impeller as the actual maximum water pressure is below the default low water pressure reading of 23 PSI.

*** ERROR 431**

UNSTABLE COTTON FLOW SIGNAL: The error is triggered when the lint flue scanner is not providing a stable signal to the Humidaire Unit. This will occur when the scanner's contact turns off three times in less than two minutes. This condition can shorten the life of the water pump motor and starter in "instant off" mode or reduce humid air output in "delayed off" mode.

When running in "instant off" mode this alarm turns off the water pump and prevents it from operating until the √ button is pressed to acknowledge the condition. The burner continues to operate to keep the system warm. When running in "delayed off" mode, ERROR 431 will not turn off the water pump and lock it out as the control action of delayed off operation inherently protects the water pump from rapid cycling.

Check the lint flue scanner for proper alignment in the flue. Check adjustment of the sensitivity and time delay on the scanner. Refer to the "14900B Lint Flue Scanner Installation, Settings and Use" section in the manual. Remove any lint tags near the scanner window. Set the time delay on the scanner to approximately 8 seconds. Remember that when starting a new press, or other machinery that may be troublesome, it is best to leave the Humidaire Unit off until the other problems are worked out.

*** ERROR 432**

MOMENTARY LOW AIR FLOW: This ERROR is an indication that a choke of the air flow is occurring. It is displayed when the Air Flow Transducer (AFT) detects low air flow for less than 3 seconds. If air flow is ok, the low air flow limit may be set too high. See "AIR SYSTEM" in the "TEST PROGRAM" section of manual for adjustment of the "warning" limit.

ERROR 433

LOW AIR FLOW: This ERROR occurs when the air flow is interrupted for more than 3 seconds. Verify proper air flow and adjust alarm threshold of Air Flow Transducer (AFT) setting if necessary. See "AIR SYSTEM" in the "TEST PROGRAM" section of manual for adjustment of the "alarm" threshold.

ERROR 437

NO FAN INTERLOCK – IS THE FAN 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 (FIR) 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 to the fan circuit.

*** ERROR 438**

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

*** ERROR 439**

AIR FLOW SENSOR BYPASSED: This ERROR indicates that air flow is being sensed from the Air Flow Transducer (AFT) with no fan interlock (FIR) signal present after turning the Humidaire Unit off, effectively bypassing this important safety feature. Check the adjustment of the Air Flow Transducer alarm threshold and verify its operation. See “AIR FLOW” in the “SETUP” section of manual for adjustment of the limits.

*** ERROR 444**

BURNER FAILED TO IGNITE: This ERROR means that the Humidaire burner failed to light during its ignition sequence. See the maintenance tips under ERROR 445.

*** ERROR 445**

FLAME FAILED IN OPERATION: This ERROR means that the Humidaire burner 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 igniter if it appears dirty. Look for oil on the spark igniter. See drawing in Service Manual entitled *ADJUSTMENT OF 12796 AND 14200 SPARK IGNITORS* for correct adjustment.
- Check for proper clamping position of the spark igniter. See drawing for this adjustment.

- Make sure that the oil purge in the test program was complete and that you see fuel rising in the Flow Meter (FF) without air bubbles when ignition is attempted. Verify that the small purge cock at the burner head is closed.
- If you see a flame in the viewing window of the burner, but the flame light does not come on, suspect a defective Flame Scanner (FS) or a defective Flame Relay (FLR). Unscrew FS and test it with a lighted match while watching for light on Flame Relay.

ERROR 446

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 446. Use the error log to determine which ERRORS were logged before ERROR 446. Knowing which three previous ERRORS caused ERROR 446 may help determine the problem.

ERROR 447

FLAME SIGNAL BEFORE FUEL BEFORE SPARK: This ERROR is normally caused by a malfunction or tampering with the flame relay (FLR). Also check for carbon build-up or a piece of metal in the burner head causing a short to the flame electrode.

*** ERROR 449**

FLAME LASTS TOO LONG AFTER SHUTDOWN): This ERROR means the flame is detected more than ten seconds after the burner stop. Look at the fuel flowmeter to check the Fuel Oil Valve (FOV) is correctly closed. Verify if the fuel pressure is within the recommended range from 30 to 50 psi [2 to 3.5 bars].

ERROR 450***

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.

ERROR 451

MOIST AIR THERMOCOUPLE WIRING REVERSED: The air 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 *Thermocouple Wiring* section in this manual for more information.
- This condition is checked for once after each power cycle just after flame is established and the air temperature should be increasing as the fuel valve opens.

*** ERROR 452**

FREEZING AMBIENT TEMPERATURE DETECTED: Protect water lines, water pump, water valves and meters from freezing. It is a good idea to drain the water from the water tank, water pump and the water flow meters if the unit is going to be off during cold periods. Be aware that the Purge Water Flow Meter (FM2) is a low point in the water piping system. The air inlet screen box temperature sensor is used for monitoring this condition.

*** ERROR 453**

THE DIFFERENCE BETWEEN THE EXPECTED WATER PRESSURE AND THE OBSERVED WATER PRESSURE IS GREATER THAN ALLOWED: Check for open spray header flush valve, clogged nozzles or a water valve linkage that is out of calibration.

ERROR 454

AIR FLOW UNCHANGED FOR 24 HOURS: The Air Flow Transducer (AFT) reading has not changed in 24 hours indicating that the transducer may not be working correctly or may be damaged or bypassed.

*** ERROR 455**

NO PURGE DETECTED LAST HOUR. PURGE VALVE OR PURGE FLOW METER FAILED OR CLOGGED: This error occurs when purge water is unable to flow through the Purge Water Meter (FM2) and Purge Water Valve (PWV). When the purge system is enabled, the PLC expects to see a periodic input, from the meter located before the purge valve, indicating water flow. Check that the Purge Water Valve is opening.

*** ERROR 456**

PURGE SYSTEM OFF FOR 24 HOURS: This error occurs when the purge system has been disabled for more than 24 hours of pump run time. When treating the Humidaire Unit with *Powdered Acid Descaler*, the purge system should be disabled to prevent debris that is dislodged from plugging the water purge train. This error will occur if the operator forgets to enable the purge system after dumping the water and acid out after descaling treatment.

Test Program

PRELIMINARY:

To commission a new installation, first check that all necessary connections for electrical, water, oil and drain are made. Standard 3-phase electrical power supplies are 415 VAC/50 HZ or 380 VAC/50 HZ.

Check installation of moist air thermocouple, be sure it is connected to the correct terminals and then apply power by turning on disconnect but keeping the control breaker CB opened. Check that power on terminals 1 and 3 on the electrical panel is between 110 and 120 VAC.

Close the control breaker (CB). If the air temperature displayed on the Touch Screen is 777°F, it means the air thermocouple is not correctly connected.

Prepare to purge the oil line of debris and air by opening the cock at the back of the burner head and opening the oil valve. Oil mod motor may need to be partially opened in order to purge air. Air is present in line if pressure gauge needle bounces or if air bubbles are in flow meter.

Check the spray chamber for any packing material, debris or extra parts that may have accumulated there. Close the 2-inch drain valve at the rear of the tank and verify that the small drain on the bottom of the water pump is closed. Begin filling the tank with water.

Start the moist air fan and set the air gate valve in the piping that regulates the air volume from the Humidair Unit's outlet for the application. This air volume will vary depending on whether the application is a Lint Slide Grid, Conditioning Hoppers, a moisture condenser, a Steamroller, or some combination of these devices.

This is where the Air Velocity Vane Tool (Part No. 21101) comes in handy. The operator will adjust the moist air fan to position the swinging vane in the area marked "OK" between the two lines. Make sure the vane is hanging vertically down with no air flow before making any adjustments.



The swinging vane should float between the two lines in the area marked “OK”



The *TESTS* feature offers a methodical way to check and 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 “Tests” button accesses the test program. This button is only displayed when the flame is off.



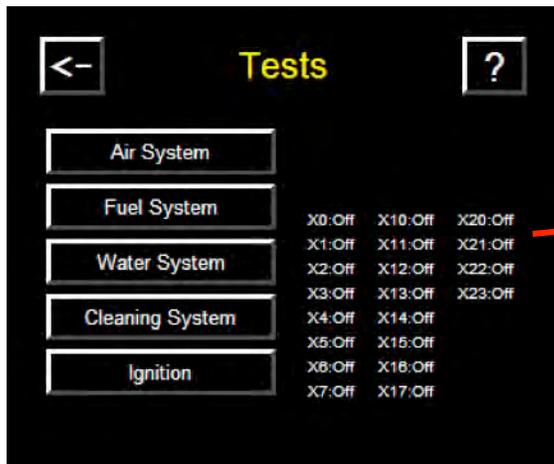
TIPS

The user default password is 1234. The user can change this password after accessing the SETUP screen and then pressing the “Customize” button.

Press the HOME button to go to main (home) screen when finished with TEST program



Press the TESTS button to access the TEST Program



ON/OFF conditions of the discrete inputs to PLC are shown here

TEST Program Main Screen

Methodically press each button on the “Tests” screen to check and make adjustments before attempting to light the unit.

An alternative method that automatically steps through all the tests is the “Setup Wizard”. See the **SETUP WIZARD** section for details.

AIR SYSTEM

The operation of the Air Flow Transducer (AFT) and Fan Interlock (FIR) are checked after pressing the “Air System” button. Start the moist air fan and make sure the air volume is adjusted for the application. The water spray chamber door should be closed

and gate valves set before making any adjustments. Both lights indicating adequate air flow and satisfied fan interlock should be green. If the Air Flow light is red, the alarm threshold setting for the air flow may need to be adjusted.

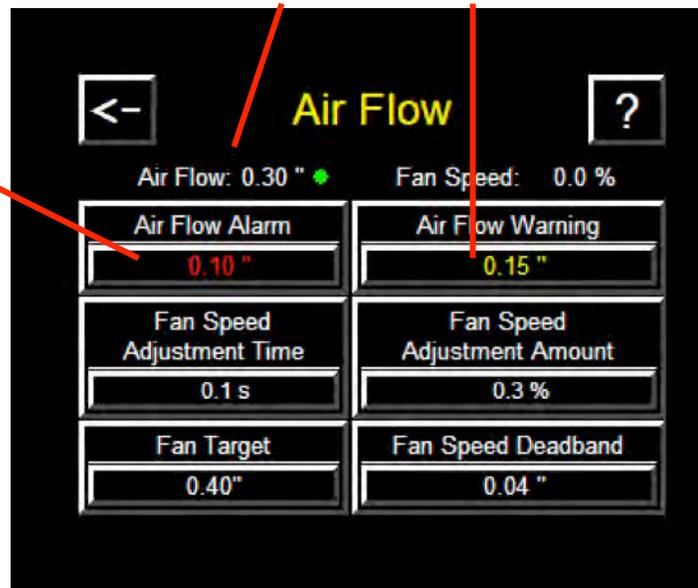
To adjust the air flow threshold settings, touch the page back button (←) twice to go back to the SETUP screen. Now press “Air Flow” button. This will take you to the screen shown below. The default settings for “Air Flow Alarm” value is 0.10 inches water column (in w.c.) and “Air Flow Warning” is 0.15 in w.c.

As a starting place, take the measured Air Flow (velocity pressure shown in inches water column) reading and multiply this number by 0.5. Use this as the “Air Flow Warning” setting. For example using the screen below, $0.30 \times 0.5 = 0.15$. Set “Air Flow Warning” to 0.15.

Set the “Air Flow Alarm” limit 0.05 less than the “Air Flow Warning” limit.

Example:
 $0.30 \times 0.5 = 0.15$

Set to 0.05 less than Air Flow Warning



FUEL SYSTEM

Check for any leaks in the oil supply piping. Once you are sure there are no leaks, open the cock at the back of the burner head and place a container below it to catch fuel oil as it is bled off. Press the button labeled FUEL OIL VALVE to open the valve. Partially open the mod motor (25% is usually enough) to allow more oil to flow and speed up the air bleeding process. The system is bled when the oil pressure gage stops bouncing and there are no bubbles in the oil flow meter on the back of the burner. Be sure to close the cock before proceeding.

Adjust oil pressure to the recommended 40 psi using the regulator inside the lower portion of the control cabinet. The pressure is adjusted by taking the cap off of the regulator, loosening the lock-nut and turning the adjustment screw in (to raise pressure) or out (to lower pressure).

Oil Pressure
Regulator (FPR)



Tighten the adjustment screw to raise the pressure or loosen the adjustment screw to lower the oil pressure.

It should be noted that the atomizing air pressure should be set at 80 psi.

WATER SYSTEM

Open the water supply valve and allow the water tank to fill. The optimal water level is 3 to 3 ½ inches (76 to 89 mm) above the bottom of the air lock baffle. This will have the water level about 1 inch (25 mm) below the overflow opening in the tank.

Adjust pawl on
water valve
linkage for
water level.
Avoid bending
float ball rod if
possible.



Measure water
level on air
lock baffle
here.

Operation of the water pump (WP50 or WP60), Water Valve Motor (WVM), Water Pressure Transmitter (WPT) and Water Butterfly Valve (WBV) are checked here. Press the “Water Pump Off” button to toggle the water pump on and off.

Before proceeding, check that the rotation of the water pump is correct.



If the rotation is wrong, disconnect 3 phase power to the Humidaire Unit following OSHA lockout/tag-out procedures before proceeding.

Swapping the positions of two of the 3Ø wires at the supply side of the motor contactor (MC) will reverse the water pump motor. After checking the wires a final time for tightness, reconnect the power.

Press the “Mod Motor Power Off” to toggle power on and off to the water valve motor. With the water pump on and power to the water valve motor, the water valve position can be changed by pressing the button below the “Water Valve Position” and keying in a position from 0 to 100% open.

A value from 0 to 100 % can be entered on the keypad that appears to actuate the water throttling valve through its range. At 0 % valve position, the water pressure will be close to 5 PSI. At 100 % valve position the pressure will be between 35 to 39 PSI.



VERY IMPORTANT

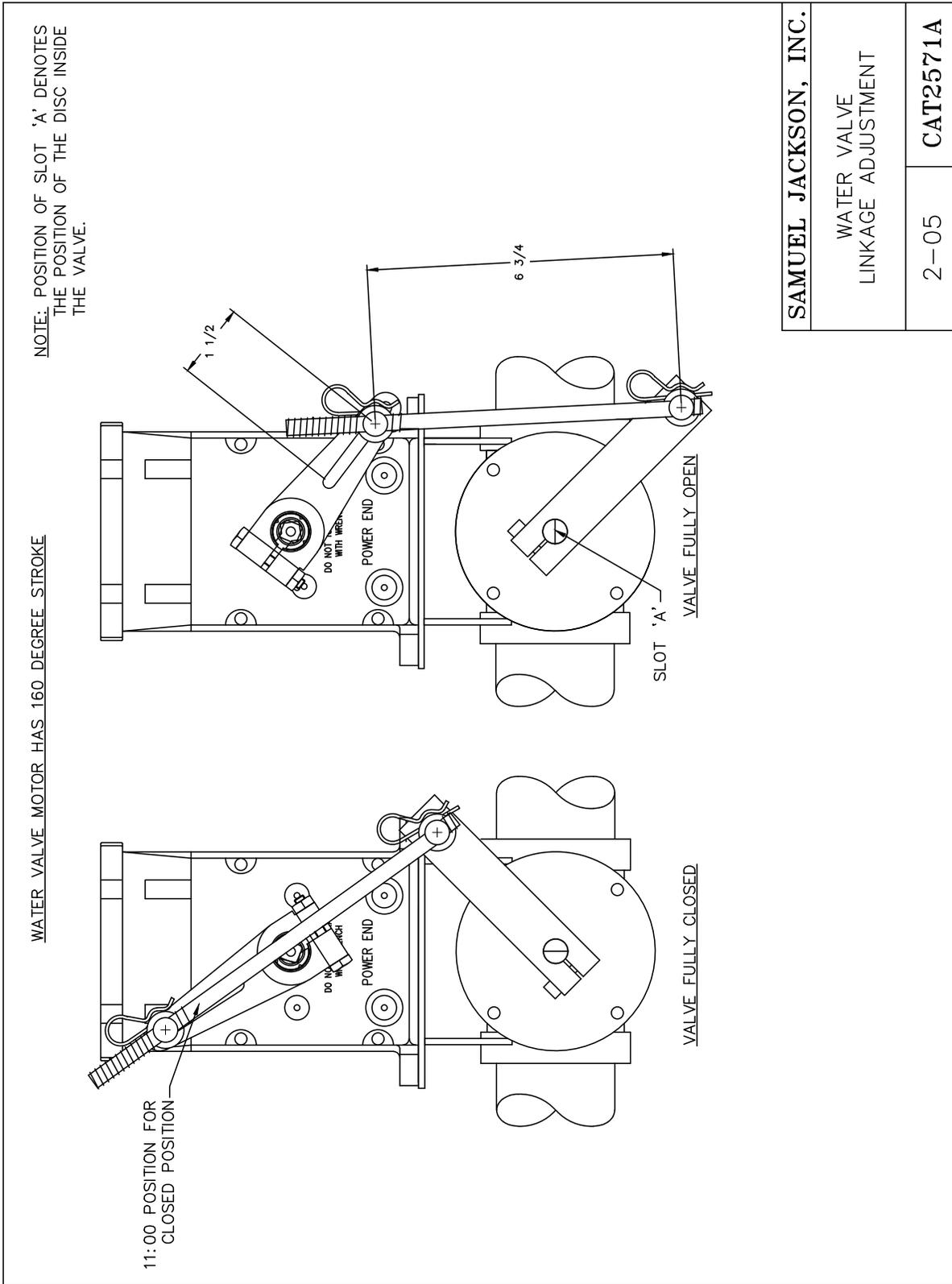
The linkage connecting the Water Valve Motor to the Water Butterfly Valve has been factory calibrated. Recalibration is necessary if this linkage is removed or adjusted. Refer to the linkage adjustment drawing on the next page for proper linkage adjustment.

For the **MOISTURE DIRECT** control to operate properly, the output of the Water Valve Motor must be calibrated to the Water Butterfly Valve to establish a linear relationship of water flow to valve position. Water flow is indirectly measured by measuring the water pressure on the water header nozzles after the Water Butterfly Valve.

If calibration is required, press the “Calibrate Water Valve” button to start the calibration process. The water pump and water valve motor must be on. Calibration takes about 15 minutes and the Humidaire cannot be used for moist air generation during this time.

Before beginning the calibration process, make sure the header flush valve is closed. Once the calibration process is started it must complete. If power is interrupted during the calibration, redo the process.

Water Valve Linkage Assembly





Water Valve Motor and Water Butterfly Valve are shown here at the 0 % (closed) position.

CLEANING SYSTEM

The Purge Water Valve (PWV) and optional Hydro-cyclone Flush Valve are checked here. Pressing the button for each valve toggles the valve open or closed. Pressing the “Water Pump Off” button toggles the water pump on so the operation of the Purge Water Flow Meter (FM2) can be checked.



Indicator vane on top of valve shows position of ball valve

IGNITION

Operation of the Ignition Transformer (IGT) and spark plug is checked here. Electrical interference between the spark plug wire and flame scanner wires is also checked. The moist air fan 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 Transducer (AFT) and the Fan Interlock Relay (FIR) being satisfied.

Touch the IGT button. The green light should remain green at all times.

If the light turns red indicating interference, check the path of the spark plug wire from the ignition transformer to the burner head. 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.

Setup Wizard

Located on the Setup screen is the “Setup Wizard” button. Press this button to enter a test program wizard that will guide you through all the checks that should be done before attempting to light and operate the Humidaire Unit. Use the ← and → buttons to navigate back to the previous step or to go forward.

Step 1

A unique name for the Humidaire can be entered here. This name shows up on the Home screen and also on the Moisture Mirror screen area dedicated for this Humidaire Unit. The user password can be set here. The brightness of the screen can be adjusted from a value of 1 to 7 to make the screen easier to see.

Step 2

The water pump motor overload relay should be set on 7.3 amps.
The combustion air fan motor overload relay should be set on 2.8 amps.
The fuel pump motor overload relay should be set on 0.85 amps.

Step 3

The rotation of the water pump motor, oil pump motor, and combustion air fan are checked here.



If the rotation is wrong, disconnect 3 phase power to the Humidaire Unit following OSHA lockout/tag-out procedures before proceeding.

Swapping the positions of two of the 3Ø wires at the supply side of the motor contactor (MC) will reverse the water pump motor. After checking the wires a final time for tightness, reconnect the power.

Step 4

Refer to the WATER SYSTEM page in the TEST PROGRAM section for a description of the calibration of the water valve motor to the water butterfly valve. Pressing the “Calibrate Water Valve” button toggles the water pump motor and the water valve motor on and begins the calibration process. The calibration process takes about 15 minutes. Calibration was performed at the factory and is normally not necessary unless the linkage connecting the Water Valve Motor to the Water Butterfly Valve has been adjusted.

Step 5

Turn on power to the fuel modulating motor and then set the fuel valve position to 100% to test the operation of the low fire switch (LFS). The low fire switch should turn off with 8 seconds of the fuel valve beginning to move open. Set the fuel valve position to 0% to close the fuel valve and wait until the modulating motor stops moving if this test needs to be performed again.

Refer to the FUEL SYSTEM page in the TEST PROGRAM section for a more detailed description of the fuel valve operation and adjustments.

Step 6

A list of inputs to the PLC that are expected to be on are listed here. The light will be green and indicate ON if the condition of certain inputs to the PLC are satisfied.

Step 7

A list of inputs to the PLC that are expected to be off at this point are shown here. A green OFF light next to the input device indicates the condition is correct. If the moist air fan is turned on, the Fan Interlock input will be ON.

Step 8

The Purge Water Valve, optional hydro-cyclone Flush Valve, ing air valve, and fuel oil valve are checked here. Pressing the corresponding button area will turn the valve on and off.

Step 9

Turn on the moist air fan. Make sure the spray chamber door is closed. The shutters on the inlet to the burner duct should be adjusted per steps in the TEST PROGRAM section. The Fan Interlock and Air Flow lights should be green and the actual air velocity pressure value will be shown.

Turn on the combustion air fan by pressing the button and verify combustion air pressure is measured and the red X turns into a green check.

Open the atomizing air valve by pressing the button and verify the atomizing air pressure reads 60 psi and the red X turns into a green check.

Step 10

This screen allows you to test that all parts of the oil pump system are working correctly. With the OIL PUMP POWER OFF, the light next to OIL PRESSURE OK should be RED. When the pump is powered on, the OIL PRESSURE OK should turn green. With the MOD MOTOR POWER off, the oil modulation motor should not move regardless of the FUEL VALVE POSITION. With the MOD MOTOR POWER on, change the FUEL VALVE POSITION and make sure that a) it moves and b) it stops moving when MOD MOTOR POWER is turned off. When the FUEL OIL VALVE button is pressed, there should be an audible click signaling that the valve is opening and closing.

Step 11

The moist air fan must be on for this step. The Fan Interlock and Air Flow indicator lights should be green. Press the “Transformer Off” button to turn the ignition transformer on. The “Flame Signal” indicator should remain green for OFF when the ignition transformer is on. For safety, the “Transformer Off” button will not be available until both the fan interlock and air flow conditions are satisfied for 20 seconds.

Step 12

Select if the “Setup Wizard” will be shown first on the color touch screen on the next power-up.

Additional Setup Selections

The Setup Wizard and Tests features accessed from the Setup screen are described in detail in the previous sections. Descriptions for the rest of the Setup page buttons are given below.

LANGUAGE & UNITS

Several choices for the language used for screen displays are shown here. The default temperature unit is Fahrenheit with the option for using Celsius. The default unit for volume is gallons with the option of using liters.

TIME/DATE

Press the “Time/Date Source” button to toggle between MOISTURE MIRROR and LOCAL. When the Humidaire Unit is connected to a Moisture Mirror, the time and date are automatically provided by the Moisture Mirror. If a Moisture Mirror is not used, the the time and date can be set on this screen. Key in the values then press “Set Date” and “Set Time” buttons.

CLEANING

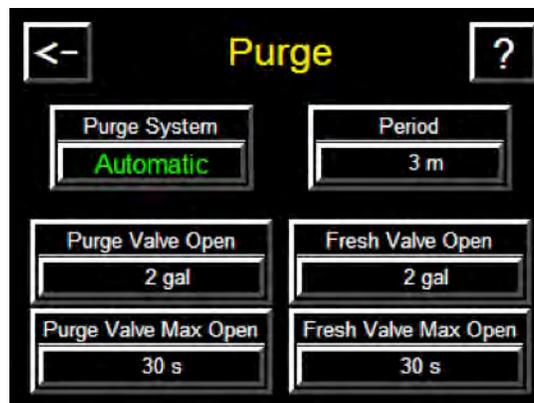
Press the “Purge System” button to access settings for the purge system. Normally, the purge system is set to “Automatic” meaning the purge water valve (PWV) will open and close automatically.

The default settings for purging water every 3 minutes (Period) and leaving the purge valve (PWV) open until 2 gallons have passed through will yield a purge rate of approximately 0.6 gallons per minute (2 gallons / 3 minutes). This is a good place to start for purge to minimize the formation of scale in the spray chamber. To increase the level of purge, consider decreasing the period meaning the purge will happen more frequently.

Set the purge system to “DISABLED” when running powdered acid descaler.

The “Hydro-Cyclone System” button is for the optional Hydro-Cyclone setup.

Purge system setup screen with default settings.



STARTUP

When the Humidaire flame starts, it chooses either a cold or warm start routine depending on the temperature of the water in the tank. The variables for the two startup routines are accessed here. The goal of the startup routine is to reach the desired moisture output level with as much speed and stability as possible without creating problems with condensation on cold surfaces and overshoot of temperature and moisture.

Press the ? button in the right hand corner of the screens for more help with the settings.

IDLE

During the time when the flame is on but cotton is not flowing, the Humidaire Unit is in “Idle”. The flame can remain on all the time in idle or can cycle on and off. It is desirable to keep the moist air pipes and the applicator warm during idle. However, since the burner is optimized for normal running operation with the water pump on, the air temperature may overshoot the desired temperature with the pump off.

Settings for fine tuning the idle feature are adjusted here. Once cotton begins flowing again, the unit comes out of idle when the pump starts.

AIR FLOW

Settings for air flow alarm and warning thresholds are adjusted here. The alarm threshold is the air flow velocity at which the flame will turn off due to too low air flow. The warning threshold is the air flow velocity at which an indication is given that the air flow is getting low but the flame will remain on. See the *TEST PROGRAM* section subsection *AIR SYSTEM* for more information on adjustments.

The Sahara Storm also has the ability to maintain a constant volume of air flowing into the unit. A 4-20mA VDC output signal is available for connection to a variable frequency drive (VFD) on the moist air fan’s motor to regulate fan speed maintaining the air velocity measured for the air entering the unit with the Air Flow Transducer (AFT).

CUSTOMIZE

The name of the Humidaire shown on the home screen and the optional Moisture Mirror is entered here. The user password (default is 1234) is set on this screen along with adjustments for screen brightness and how much operation details are shown on the home screen.

ADVANCED

Settings accessed in the Advanced screen are rarely changed so they are protected by an advanced password. The default advanced password is 4321. It can be changed to a custom password using the “Advanced Password” button.

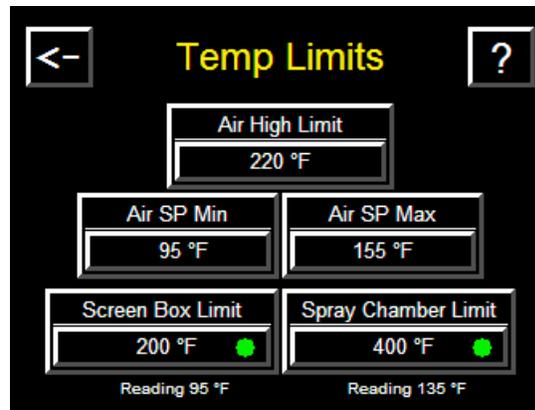
- **Analog Card 1, Analog Card 2, Analog Card 3**

These screens show the filtered 4-20mA VDC signals from each of the analog sensors like the moist air and water thermocouples, screen box inlet and spray chamber thermocouples, and various air, water and fuel

pressures. The engineering units unique to the sensors are shown here. These screens are useful for troubleshooting the sensors and analog inputs.

- **Temp Limits**

The maximum and minimum air temperature set-points (targets) are adjusted here. The high temperature limits for the moist air, screen box air inlet and spray chamber are also adjusted here. The defaults are shown in the following screen.



- **Flame Controls**

The PID Gain, Reset and Rate are called the “tuning” values. These values determine the speed of control reaction to a change in air temperature which controls the fuel valve. Consult the factory before making changes to the default PID values.

Usually, the water pump only runs when the flame is on during operation. If it is desired to just run the water pump, then set the condition “Flame Always Run With Pump” to OFF.

- **Water settings**

Normally the water pump will remain on once cotton flow stops for the pump off delay time set on the IDLE screen. The default is 120 seconds. The water valve will immediately begin closing when cotton flow stops to limit the generation of moisture in the air. This PUMP MODE is called “Delayed Off”. Once the pump turns off, the water valve opens back up to the normal operation point to allow a fast return to normal operation once cotton begins flowing again and the pump turns back on.

The other choice is for the pump to immediately stop when cotton flow stops. This is “Instant Off”.

The maximum moisture output can be limited here by adjusting the “Moisture Output Limit” down. The default is 100%. This setting is useful

if you know that a moisture output above XX% always yields applicator problems.

- **Combustion Limits**

The fuel pressure threshold low and high limits are set here. The defaults are:

- Fuel Pressure Low Limit: 30.0 PSI
- Fuel Pressure High Limit: 80.0 PSI
- Atomizing Air Pressure Low Limit: 60.0 PSI
- Combustion Air Pressure Low Limit: 1.00”

- **Set Factory Defaults**

Pressing this button and entering the “Advanced Password” will restore all the user adjustable variables to the factory defaults.

Burner Head Sub-Assembly Maintenance

Model "500-SP" OVENPAK® Gas/Oil Burners

CAT 3590
1-94

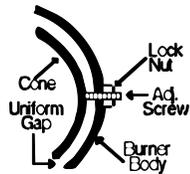
Suggested Maintenance/Inspection Procedures

Discharge sleeve and cone alignment

Centering of the mixing cone provides a small annular opening for the flow of some cooling combustion air along and inside the discharge sleeve wall. We suggest periodic inspection from the discharge side of the burner to assure this critical alignment is maintained.

Inside inspections (from discharge end of burner) can spot possible mixing cone or discharge sleeve deterioration before performance is drastically affected.

Check specifically that mixing cone is centered within burner body and discharge sleeve, so as to give the intended flow of cooling air along the sleeve. If necessary, re-adjust by loosening the four lock nuts (see sketch) and turning the four adjusting screws to center cone within the opening.



Back each screw off 1/4 turn (to allow for thermal expansion of hot mixing cone) then hold in position and turn all four lock nuts down snugly.

CAUTION: OVER-TIGHTENING ADJUSTING SCREWS CAN GREATLY REDUCE CONE AND DISCHARGE SLEEVE LIFE.

Critical check points in oil line

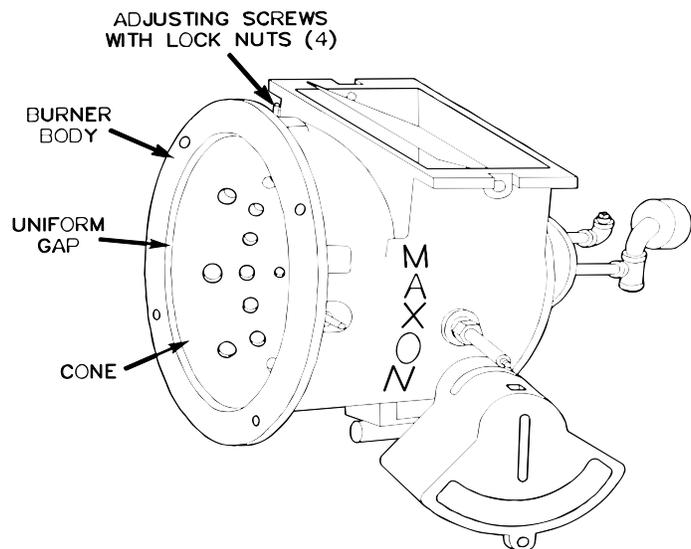
1. Pump (wear, lubrication)
2. By-pass valve (loose packing)
3. Strainer (filled with scale, etc.)
4. Filters (plugged)
5. Regulator (not bottomed)
6. Viscosity no higher than 50 SSU (about 45°F with #2 oil)

Critical check points in compressed air line

1. Compressor (lubrication, water accumulation)
2. Filters (plugged)
3. Water traps (full)
4. Regulator (set to give desired pressure)

Critical check points on burner

1. Oil control valve (working smoothly)
2. Oil nozzle (clean, no nicks or scratches)
3. Oil insert (plugged)
4. Universal screw carrier snug on operating shaft
5. Set collar tight and snug on operating shaft
6. Set screws holding cone backed off 1/4 turn and locked
7. Cone mounted concentrically in housing
8. Cam strips and/or plunger cap wear



WARNING: If burner is run on oil, but subject to long intervals of gas-only firing, the oil line, components and piping should be blown clear at shutdown to prevent start-up difficulties during later oil light-off.

Filter maintenance

Filters MUST be kept clean for optimum burner performance. They should be inspected regularly (experience will dictate the required frequency) and cleaned as needed.

To clean washable/replaceable elements, remove from burner, then vacuum to remove dry accumulations. Wash in warm soapy water, wring gently and dry before replacing in filter assembly.

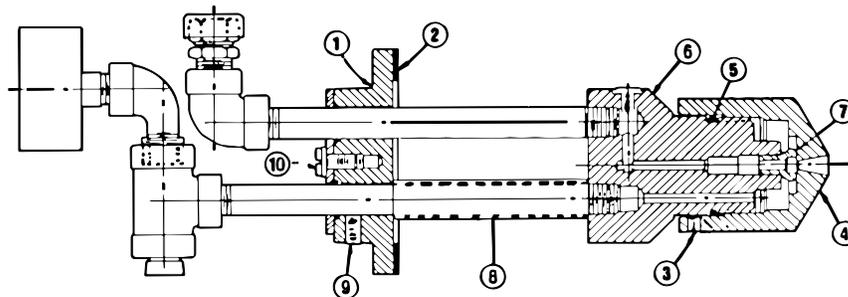
To clean permanent elements, remove from burner, vacuum or blow clean of excess dirt, then wash in soap and water (or solvent, if necessary), dry, re-coat (if desired) and re-install.

Model "500-SP" OVENPAK® Gas/Oil Burners

Suggested Maintenance/Inspection Procedures

To clean oil nozzle sub-assembly

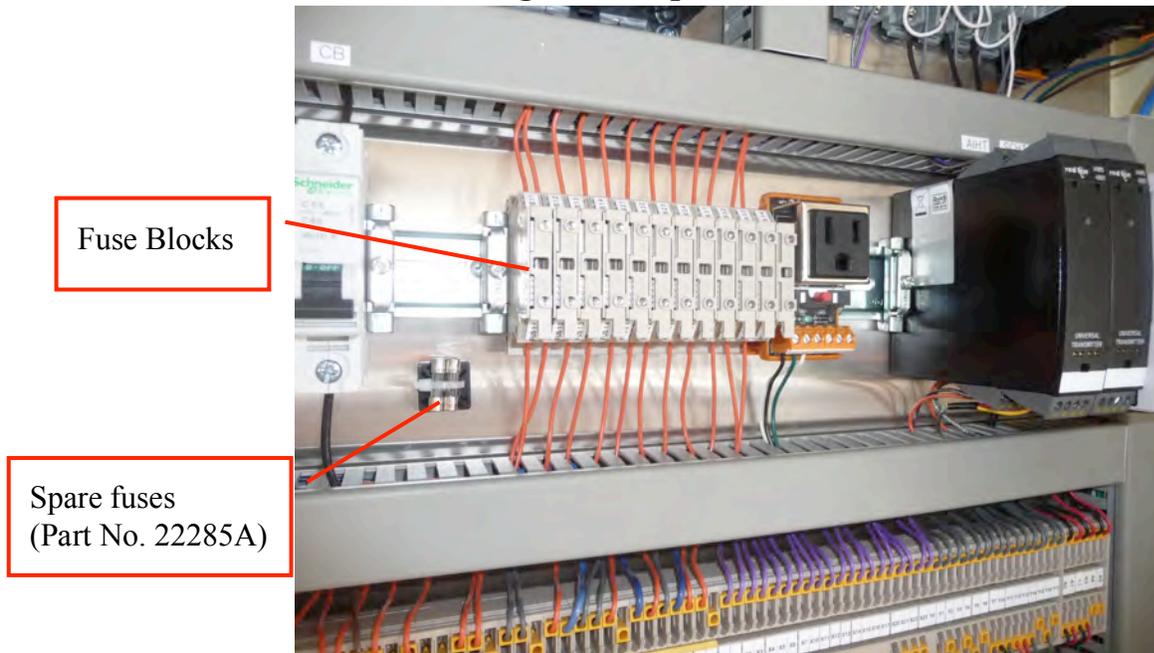
1. Disconnect the oil and compressed air lines at burner and remove the four socket head cap screws holding tube retainer ① to burner.
2. Carefully withdraw the oil nozzle sub-assembly. Save the gasket ②.
3. If a new nozzle sub-assembly is to be installed, replace gasket ② and reverse steps 1 and 2. If the nozzle itself is to be changed or cleaned, loosen the set screw ③.
4. Unscrew nozzle ④ from nozzle sub-assembly. Be careful not to damage the O-ring ⑤ or the insert ⑦. Remove the O-ring ⑤ and save if undamaged.
5. Clean nozzle ④ and insert ⑦. Do not nick or dent the leading edge. Use compressed air or a solvent that will remove all foreign particles. Do not use an abrasive.
6. Re-install VITON O-ring ⑤ or replace if damaged. For a replacement, use a VITON O-ring, size #122 (1-1/8" x 3/32") on 508, 515, EBC-2, and EBC-3 burners (including older versions). On larger burners, such as the 525, 535, 550, EBC-5, and EBC-6, use size #126 (1-3/8" x 1-9/16" x 3/32").
7. Spacer bushing ⑥ should be tightly held between nozzle body ⑧ and tube retainer ①. If adjustment is necessary, loosen Allen screw ⑨ and cap screw ⑩, then slide tube retainer ① towards nozzle body ⑧ as far as possible. Re-tighten Allen screw ⑨ and cap screw ⑩.
8. Re-install oil nozzle ④ on the body ⑧. A drag will be felt when the nozzle contacts O-ring. Continue to screw the nozzle onto the body until insert ⑦ is contacted. Do not exceed 150 In-lbs torque under any circumstances. (If nozzle is sealed too hard on the insert or if oil nozzle does not contact, poor burner performance will result.) Do not use pipe dope, permatex, etc. on threads.
9. Tighten set screw ③; it must not protrude from nozzle.
10. Insert oil nozzle sub-assembly in burner. Make sure gasket ② is in place, then re-install and tighten the four socket head cap screws, holding tube retainer ① in place.
11. Reconnect the oil and compressed air lines, then fire burner and check compressed air pressure and oil flow to insure that nothing has changed. Following established light-off procedure, check pressures, oil flow, main flame, etc.



SAMUEL JACKSON INCORPORATED

P. O. BOX 16587 / LUBBOCK, TX 79490 / U S A
TELEPHONE 806-795-5218 FAX 806-795-8240

Analog Fuse Replacement



Your Humidaire Unit is equipped with 32 mA fuses on the analog 4-20mA DC inputs to prevent damage to the input card in the event that the analog sensors 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 or other analog transmitter device is wired correctly using the correct hookup wire.
- Type J Thermocouple wire cannot be used to connect the 4-20mA transmitter type thermocouples to the unit.
- 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. 22285A).

Powdered Acid Descaler

Powdered Acid Descaler (Part No. 14000) is a special formulation designed for removing mineral scale from the piping and spray chamber of the Humidaire Unit. It is supplied in a 50 pound (22.7 kg) pail. Use the Powdered Acid Descaler periodically during the season if excessive scale buildup is noticed and also near the end of the season. It does not prevent the build up of scale.

Maintaining a properly adjusted and working Water Purge System is the best insurance against excessive scale buildup and maximum Humidaire Unit performance. If excessive scale build up continues to be a problem, call the factory for assistance. Perform treatment sparingly since excessive Powdered Acid Descaler use will shorten life of water pump impeller and water train components.



TIPS

Humidaire Unit users find that using a treatment of Powdered Acid Descaler during the last day or so of the ginning season results in a clean machine for the beginning of the next season.

A good way to reduce the formation of scale buildup is to periodically drain the water tank, flush and refill with fresh water. Small lint fly, dirt, and sediment captured by the water tank screen can then be removed. The water purge system cannot remove these items since they are not circulated through the water pump.

Many Humidaire Unit users find it handy to attach a garden hose with a spray nozzle for spray chamber cleaning to the pipe just before the fresh water inlet on the water tank.

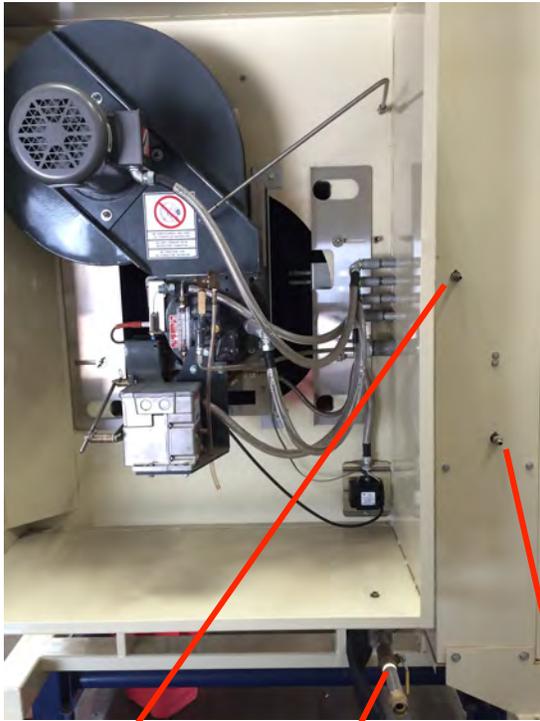
HOW TO USE THE DESCALER

1. Drain water and sludge from water tank of Humidaire Unit using 2 inch drain outlet.
2. Clean the Water Tank Screen.
3. Place 10 pounds (4.5 kg) (about 1 gallon or 3.8 liters) of descaler in the water tank.
4. Close drain outlet and refill water tank.
5. Set Purge System to DISABLED. See *ADDITIONAL SETUP SELECTIONS* section of manual and subtopic CLEANING or how to do this.
6. Resume normal operation for 24 hours.
7. Drain dissolved minerals and acid from tank using 2 inch drain outlet.
8. Clean tank Water Screen and refill.
9. Set Purge Valve Control back to AUTOMATIC.

Humidaire Unit Installation Stub-Ups

<u>NO.</u>	<u>DESCRIPTION</u>	<u>ROUTING AND NOTES</u>
1	HUMIDAIRE UNIT 3-PHASE POWER	FROM ELECTRICAL SERVICE TO UNIT. 3 – 10 GAGE WIRES , 415 VAC OR 380 VAC, 5 HP, 3/4 CONDUIT, 30 A BREAKER. STARTER AND 120 V CONTROL TRANSFORMER ARE IN HUM UNIT.
2	FAN INTERLOCK SIGNAL	FROM GIN CONSOLE OR MOTOR CONTROL CENTER TO HUMIDAIRE UNIT CABINET. ONE ½” CONDUIT WITH TWO 16 GA WIRES FOR INTERLOCK SIGNAL (120VAC, 240VAC OR 24VDC)
3	THERMOCOUPLES: WATER (MARKED YELLOW)	PREWIRED AT FACTORY
	AIR (MARKED BLUE)	HUMIDAIRE UNIT CABINET TO MOIST AIR PIPE BEFORE POINT OF APPLICATION. ½” STEEL CONDUIT WITH SHIELDED 2 CONDUCTOR, 18 GA CABLE *.
4	HUMIDAIRE UNIT TO MIRROR 2X, 3X OR 4X (OPTIONAL)	HUMIDAIRE UNIT CABINET TO MOISTURE MIRROR NETWORK SWITCH, 1/2” CONDUIT, ONE CAT5 SHIELDED ETHERNET CABLE WITH RJ-45 TERMINATION (BOTH ENDS). DO NOT RUN WITH AC POWER WIRES
5	HUMIDAIRE UNIT LINT FLUE SCANNER (FOR CONDITIONING HOPPERS, THESE WIRES GO TO HOPPER RELAY PANEL)	HUM UNIT TO SCANNER LOCATION IN LINT FLUE RISER. 1/2” CONDUIT, THREE 16 GA WIRES. POWER TO LINT FLUE SCANNER IS 24 VDC SO THESE CAN SHARE CONDUIT WITH THERMOCOUPLE WIRES.
6	FUEL OIL SUPPLY FOR HUMIDAIRE UNIT	1/2” PIPE KEROSENE or DIESEL
7	WATER SUPPLY FOR HUMIDAIRE UNIT	3/4” WATER LINE, 20 PSI (1.4 BAR) MINIMUM, 60 PSI (4.1 BAR) MAXIMUM
8	WATER DRAINAGE LINE FOR HUMIDAIRE UNIT	2” PVC DRAIN PIPE, 500 – 1,000 GALLONS (1,900 TO 3,800 LITERS) PER 24 HOURS TYP.
	•	200 FEET SHIELDED 2 CONDUCTOR, 18 GA CABLE IS SUPPLIED WITH UNIT.

Humidaire Unit Installation Stub-Ups Continued



Compressed Air
Connection

Water Supply
Connection

Oil Supply
Connection

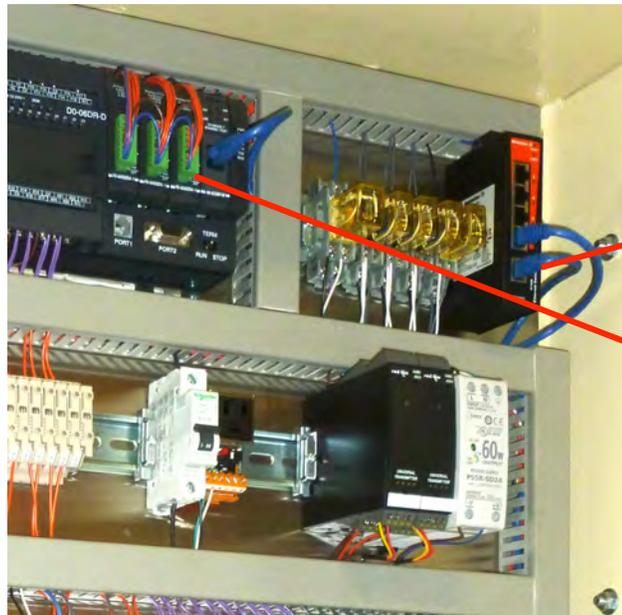
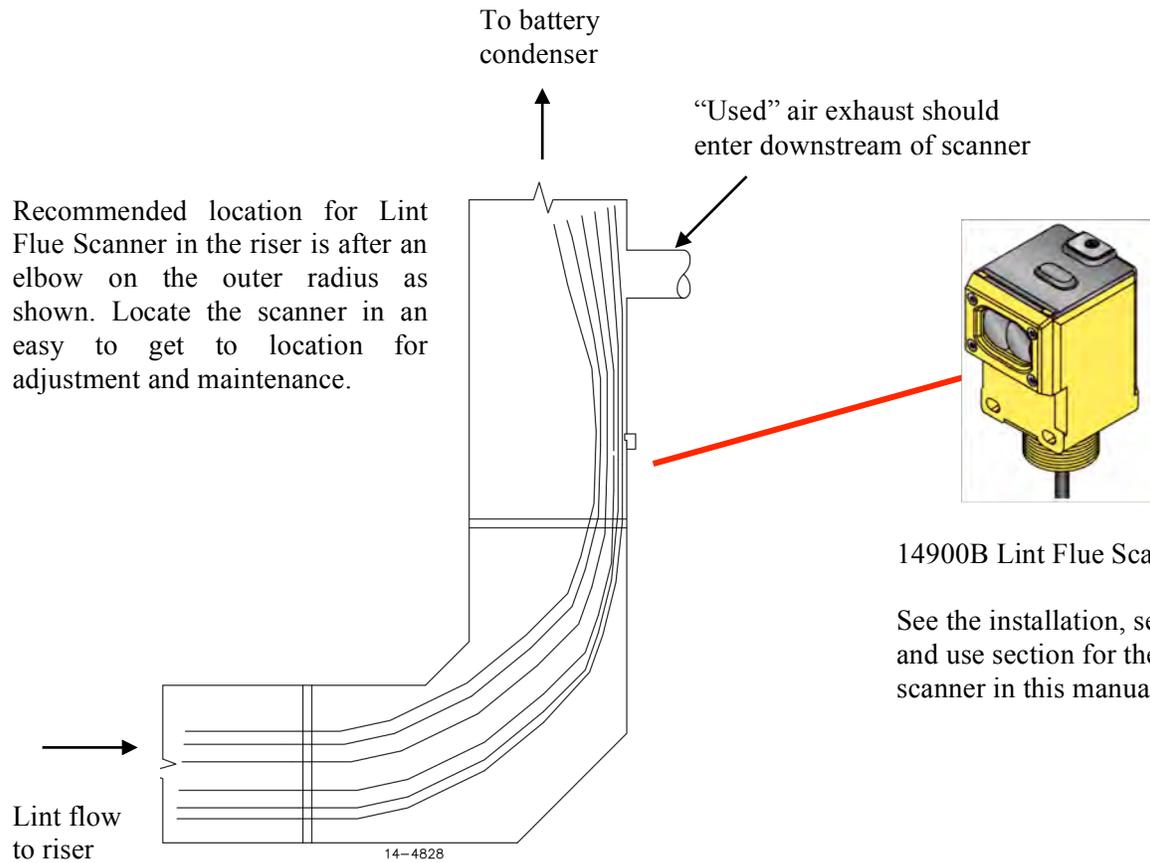


Connect 2 inch PVC
water drainage line
(gravity flow) here.

Connect 3Ø power here. Control
transformer under disconnect supplies
120VAC to unit. No other source of power
is connected to unit.



Humidaire Unit Installation Stub-Ups Continued

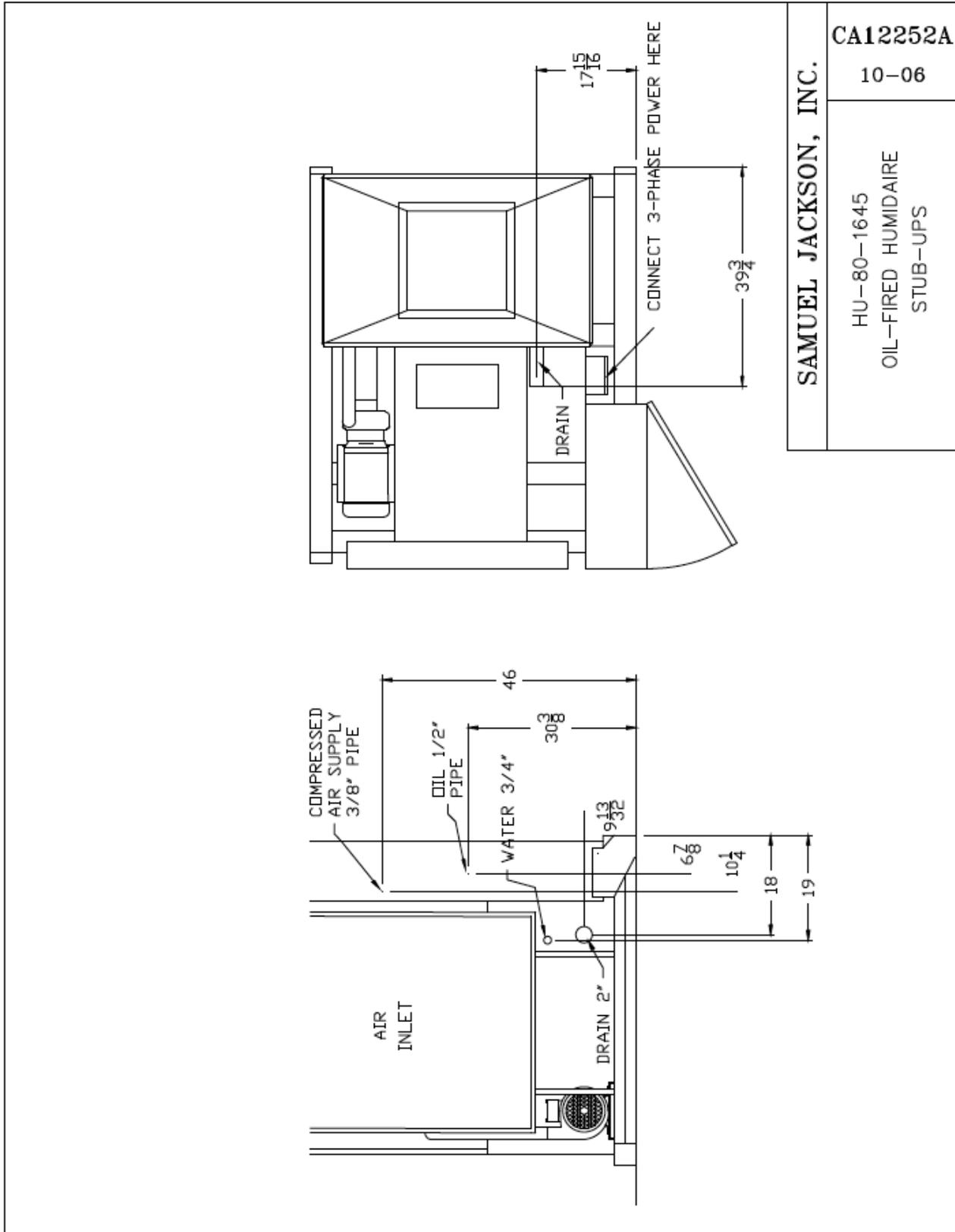


Electrical Panel

CAT-5B Ethernet Cable to optional Moisture Mirror connects to PLC ethernet multi-port switch here.

See Drawing CA150004A for network ethernet card ID switch settings.

Humidaire Unit Installation Stub-Ups Continued



SAMUEL JACKSON, INC.	CA12252A
HU-80-1645 OIL-FIRED HUMIDAIRE STUB-UPS	10-06

Installation Notes and Instructions

LIFTING: When using a forklift to lift the Humidaire Unit, it is important to verify that the forks are inside the special brackets welded to the frame of the Humidaire Unit under the water tank. The center of gravity is behind the base of the spray chamber, and the unit will tip over if the brackets are not around the forks.

LOCATION: If the location of the Humidaire Unit has not been specified on gin plans, it should be located in a clean place, fairly close to the point of application of humid air. If the pipes are insulated (lagged), the humid air pipe can be run 80 to 100 feet (25 to 30 meters) without difficulty.



TIPS

Avoid an area in close proximity to the press pumps. The extra heat generated by press pumps tends to hurt the performance of the unit.

Please note: Outside the USA, some insurance companies or government authorities may require the Humidaire Unit to be located in a room separate from cotton processing operations.

AIR PIPES: Connect air pipes in accordance with installation drawings. **IMPORTANT:** Even if not shown on drawings, make sure a slide valve is installed to regulate the flow of air through the Humidaire Unit. This is usually installed between the Humidaire and the fan.

Joints should be taped to prevent air leakage before draw bands are applied to joints. The pipe which conducts the humid air to the point of application is often insulated or lagged to prevent condensation. If the insulation has an outer covering, which is impervious, then it should not be applied to the pipe joints. Otherwise, slight leaks of vapor through the pipe joints will fill the insulation with water vapor, which will cause condensation. Interrupting the insulation at the pipe joints allows this vapor to escape.

WATER TANK SCREEN: The water tank screen is shipped in the spray chamber. It goes in the bottom of the water tank, covering the pump intake pipe, but not the drain outlet.

FUEL OIL: Kerosene should be used whenever it is available because of its low sulfur content. If diesel fuel is used the sulfur will form concentrations of sulfuric acid in the tank, which will eventually damage water train components on the Humidaire Unit. Connect the pipe supplying the fuel oil to the gate valve connection as indicated on the side of the control cabinet. Make sure that the pipe supplying the unit is free of debris and, after running the unit for several hours, check and clean the fuel oil filter on the oil supply line for any residual debris it may have collected.

To prolong the life of the water train components when using diesel, the purge cycle may need to be changed. A longer or more frequent purge cycle will help keep water quality high, but too long will cause moisture output to be unstable. These settings can be accessed via Setup > Cleaning > Purge System.

WATER SUPPLY: We are frequently asked about suggested water supplies appropriate for the Humidaire Unit. The most ideal source would be an endless supply of crystal clear distilled water arriving to the Humidaire Unit in stainless steel pipe at a perfectly regulated pressure of 30 PSI. Unfortunately, we often have to settle for muddy water that can be cut with a knife arriving to the unit as a trickle from a garden hose. There is a strong chance that your water supply will be somewhere between these extremes. This section will offer some brief guidance to assist you in making the most of your water source, whatever it may be.

Water Volume

Your Humidaire Unit has little chance of pleasing you with performance unless it can receive enough water to evaporate and to expel salts and minerals through purging or blow down.



TIPS

A good rule of thumb to test if water supply is adequate is to time how long it takes to fill a 5 gallon (19 liter) container using a spigot and garden hose near the source of water for the Humidaire Unit. If the filling time is 1 minute, the water supply is very adequate. If the filling time is 2 minutes, the supply is very marginal and you can expect unstable operation and excessive scale formation in normal operation.

If the water supply is marginal, you may be able to operate the unit at very low evaporative output to improve stability, but this is not recommended as a long term solution. Ultimately, water volume must be sufficient.

Maximum water consumption at full throttle will be about 300 gal/hr (1,136 liters/hr) of which about 85 percent is evaporated and the remainder is bled off to the drain. Average water consumption will be much less than this, perhaps as little as 50 gal/hr when the unit supplies humid air only to a Lint Slide Grid.

Water Pressure

Inlet water pressure to the unit should be no less than 20 PSI, particularly if the minimum water volume requirement is satisfied. Conversely, do not exceed 60 PSI water pressure to avoid overwhelming the water float valve. A pressure regulator ahead of the unit is recommended in the instance of too high of water pressure.

Depending on the water piping system used, water hammer or vibration of the float valve rod may be a concern. If the float valve bounces in the tank during operation, it may be possible to reduce or eliminate this behavior by hanging a small weight on the float ball rod. Float Ball Rod Weight Assembly (Part No. 23872) is available for this purpose.

If water hammer is severe, damage can occur to valves, flow meters and gages in the system. You may wish to install a water hammer arrestor (available from Samuel Jackson as Part No. 23873) at the water inlet service to your Humidaire Unit. Contact the factory for suggestions in this regard.



Water Hammer Arrestor
(Part No. 23873)

Water Quality

When we speak of water quality in relation to a Humidaire Unit, we will speak exclusively of mineral content in the water. If there are biological hazards in the water but mineral content is within reasonable limits, anticipate no complaints from the Humidaire Unit. It will drink contaminated water all day and never complain.

If mineral content is excessive, scale can form rapidly inside the Humidaire Unit spray chamber. Your first line of defense is the built-in water purging system on the unit. Insure that this is connected to a drain and is functioning properly. The amount of water expelled will be shown under the water usage statistics as "purge water". It is possible to adjust the purging volume and frequency to assist in scale reduction. Purge more water to reduce scale formation. Purging more than needed wastes both water and heating fuel used by the unit. Experiment to find the perfect setting for your water by increasing purge amount just until scale disappears and no farther.

Sometimes water quality is low enough that purging is not enough. In these instances, we recommend investigating use of water treatment for the Humidaire supply. There are three types of water treatment frequently used in conjunction with Humidaire Units.

1) Water softening is a process that uses special resins in a cylinder to exchange calcium ions in the water with sodium ions. Sodium is easier to manage from the perspective of cleaning and it has the added advantage of making the water easier to heat, saving fuel. Water softening systems are relatively inexpensive and require only the addition of commonly available salt pellets by the user. We recommend softening systems with dual

cylinders that automatically recharge on an alternating basis, providing a continuous supply of soft water to the Humidaire Unit.

2) Reverse osmosis (RO) is a filtration technique that uses a membrane. Depending on the water quality challenge you face, these systems range from reasonable to expensive. If the total dissolve solids of the source water can be reduced to something below 500 ppm, satisfactory results can be anticipated when used in conjunction with a typical water purging routine. Water softening may be used together with RO to increase the life of the membrane.

3) Chemical injection is sometimes the only practical alternative, particularly in cases of extremely poor water quality. An acidic solution is automatically injected into the water during operation to maintain the Langelier Saturation Index (LSI) at a level where scale is dissolved, rather than precipitated as scale. The supplier of this service should keep in mind that the water in the Humidaire Unit may be maintained at an elevated temperature close to 150 F, causing this index to shift significantly. This requires additional solution to maintain the LSI index at the desired target. The user should keep in mind that some acids accelerate degradation of certain wetted Humidaire parts through corrosion, requiring more frequent maintenance.

Water Supply Summary

Regardless of the water treatment options you choose, over time, it is normal to experience scale buildup in areas of your unit visible to the eye as well as inside pipes and hidden recesses. You may want to consider having your unit factory blast cleaned and reconditioned on a regular basis to supplement your own maintenance regimen. Water conditions change naturally over time. Send a fresh water sample to us if you would like advice regarding water treatment options. Contact us about reconditioning when you want to begin your next season with a unit that performs like new.

WATER DRAINAGE FACILITY: The HU-80 drains water through a 2-inch pipe located behind the water tank. Drainage is absolutely necessary for proper operation of the HU-80 because the water evaporated by the HU-80 is distilled water. All minerals are left behind in the machine. A small amount of water is purged automatically while the water pump is operating. The amount of water purged will vary based on operating conditions of the unit and the quality of the water. As a general rule, the drainage pit should be capable of accepting about 1,000 gallons (3,800 liters) per day.

ELECTRICAL: The electrical supply required for the Humidaire Unit is 3 phase 380 VAC, 50 HZ or 415 VAC, 50 HZ (18 Amperes).

CAT5 SHIELDED ETHERNET CABLE: CAT5 shielded ethernet cable is used when connecting the Humidaire Unit to the optional Moisture Mirror 2X, 3X or 4X control. RJ-45 termination is used for both cable ends. 330 feet (100 meters) is the recommended maximum cable run length.

WARNING!

FAN INTERLOCK: The installing electrician must connect a fan run interlock signal of 120 VAC (240 VAC if 240 VAC relay is supplied, 24 VDC if 24 VDC relay is supplied) to terminals FIR+/L AND FIR-/N on the Humidaire 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 Humidaire Unit. It is labeled FIR. The Humidaire's PLC control system will verify the presence of the fan interlock before permitting operation. If bypassed, the Humidaire will signal this as an error later in operation.

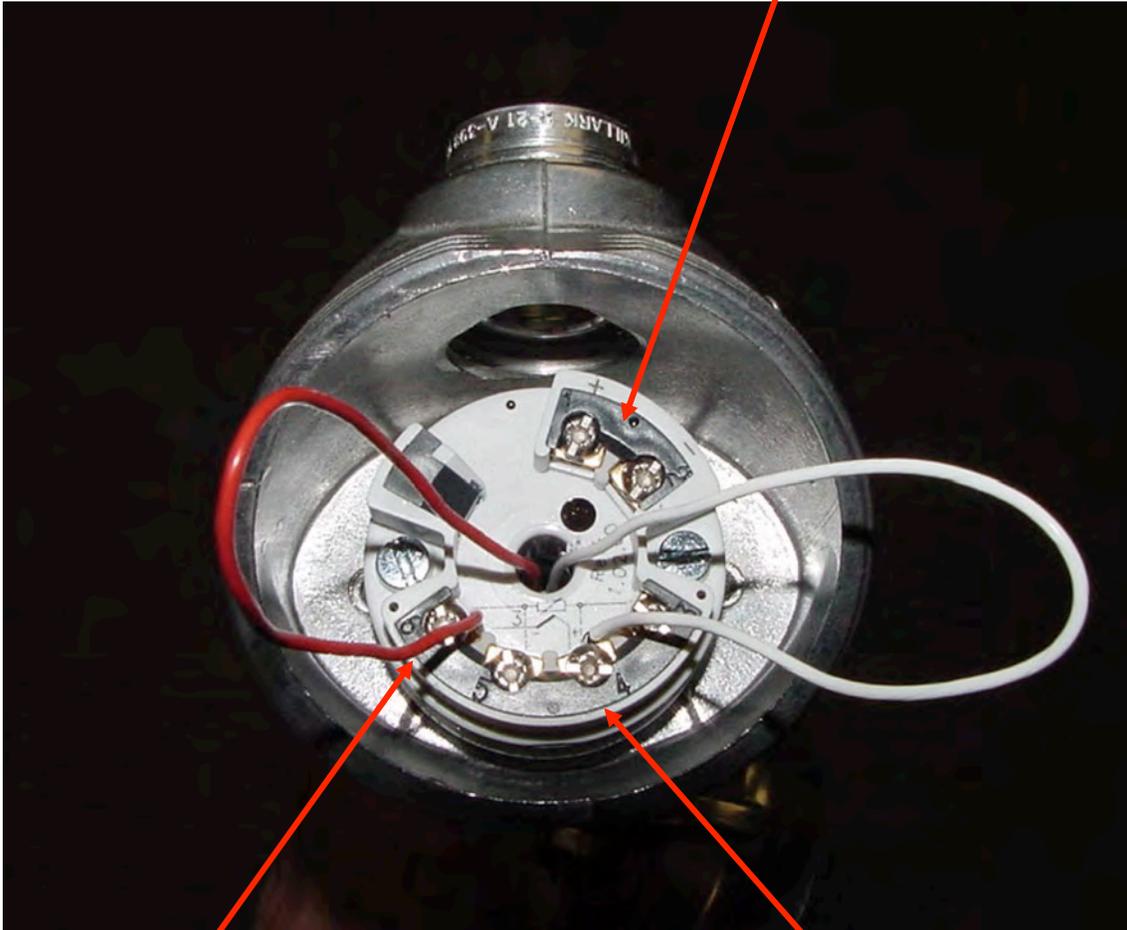
THERMOCOUPLE WIRING: The following rules need to be followed when wiring the thermocouple temperature sensors from the Thermocouple to the Humidaire Unit electrical panel. The signal from the temperature sensor is 4-20mA DC.

- **Always** use shielded, 2 conductor cable from the thermocouple to the control panel terminal blocks. Terminate the shield only on the electrical panel end. Do not use Type J thermocouple wire for hookup.
- **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.

See next page for a picture of thermocouple.

Part No. 21708 & 21710 Type 'J' Thermocouple shown with 4-20mA Transmitter in junction head.

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

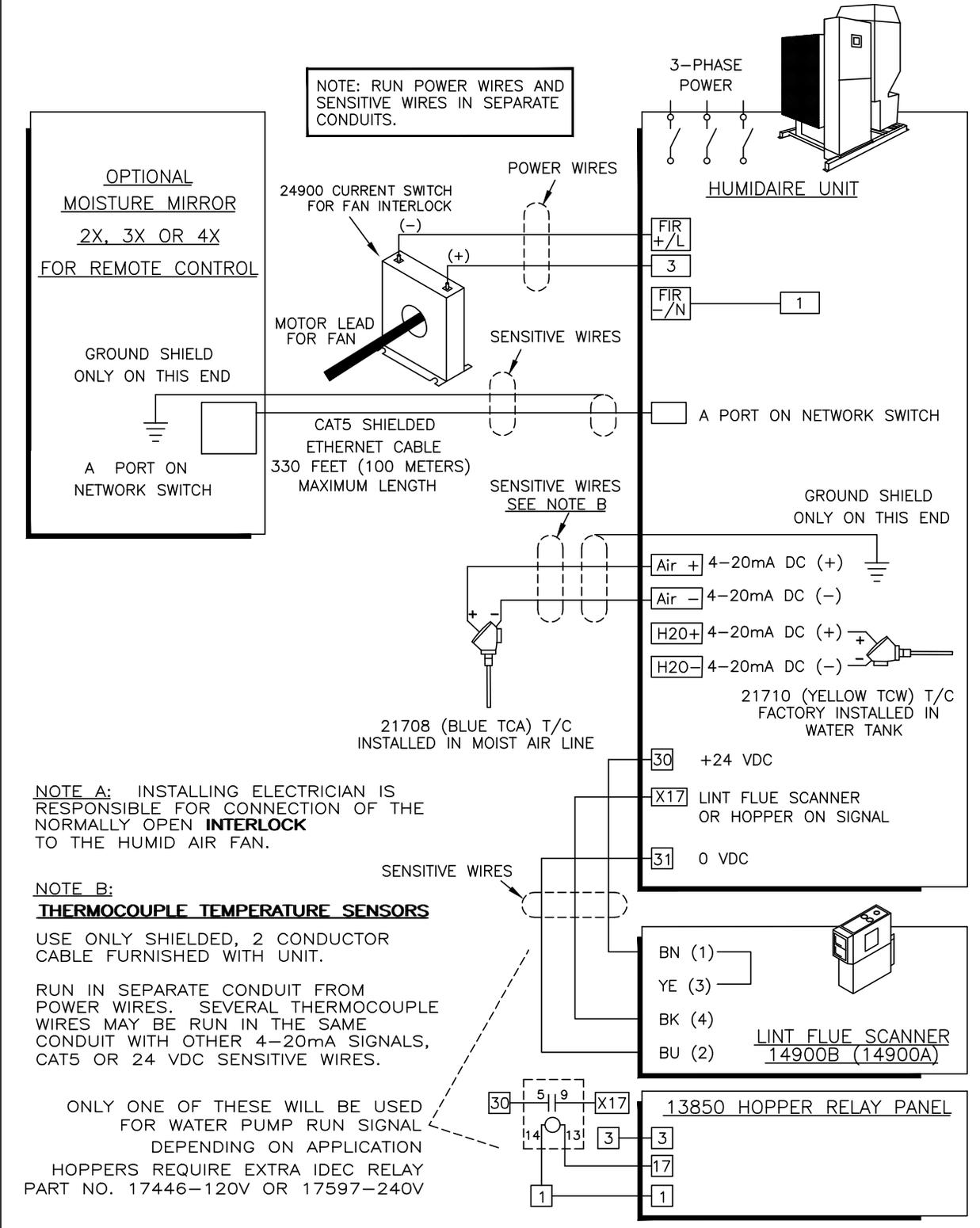


Red (-) wire from Thermocouple junction goes to terminal 6.

White (+) goes from Thermocouple junction goes to terminal 4.

External Electrical Connections

HU-80-1635 "KING MESA" HUMIDAIRE UNIT CA12129A 6-15 EXTERNAL ELECTRICAL CONNECTIONS WITH OPTIONAL MOISTURE MIRROR REMOTE CONTROL



Network ID Settings

NETWORK ID SETTINGS FOR SAMUEL JACKSON HUMIDAIRE UNITS

CA15004A
1/12

HUMIDAIRE # 1

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	41
0	ON
1	OFF
2	OFF
3	ON
4	OFF
5	ON
6	OFF
7	ON

HUMIDAIRE # 2

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	42
0	OFF
1	ON
2	OFF
3	ON
4	OFF
5	ON
6	OFF
7	ON

HUMIDAIRE # 3

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	43
0	ON
1	ON
2	OFF
3	ON
4	OFF
5	ON
6	OFF
7	ON

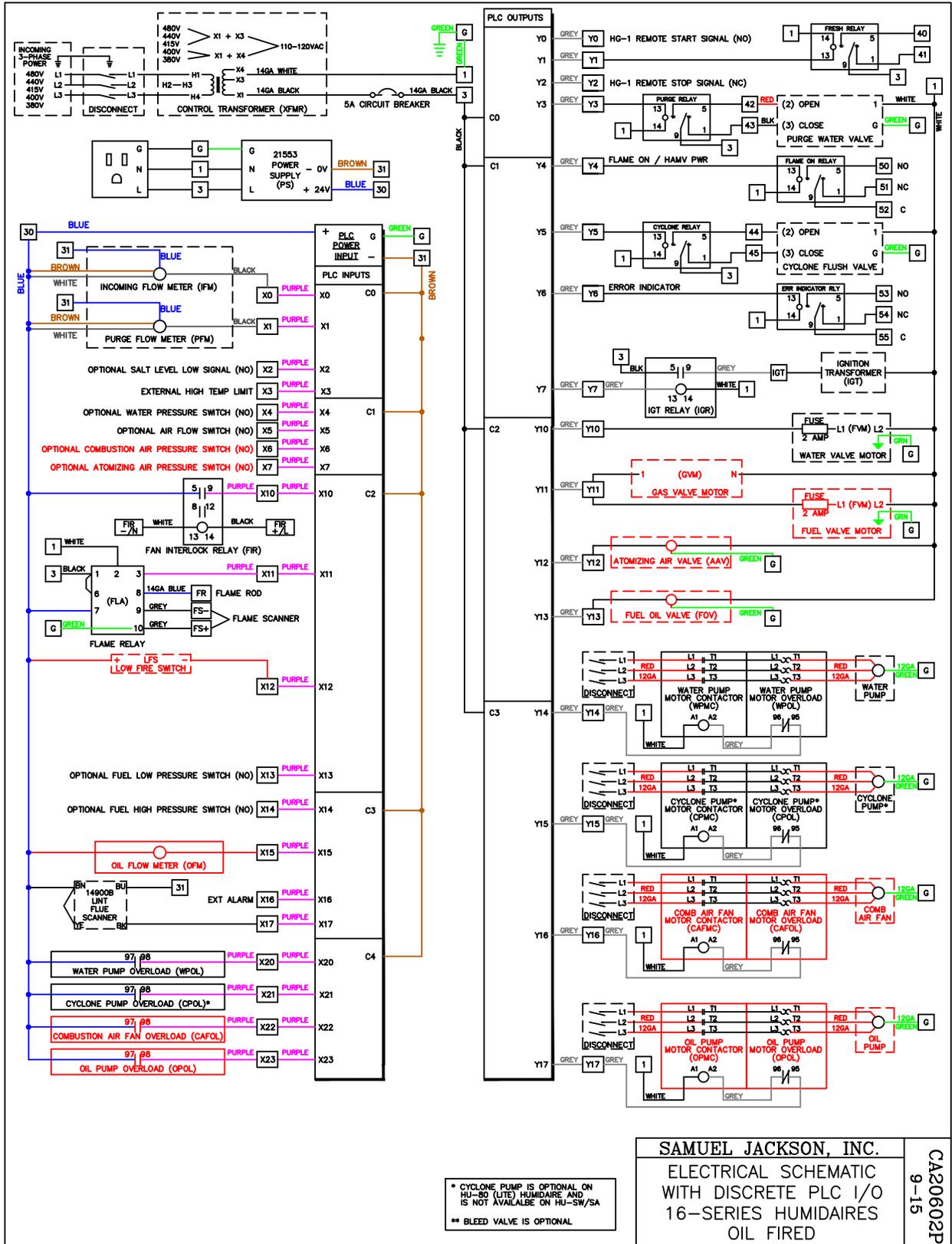
HUMIDAIRE # 4

ETHERNET CARD
H0-ECOM100

10B-T
PORT

MODULE ID	
SW	44
0	OFF
1	OFF
2	ON
3	ON
4	OFF
5	ON
6	OFF
7	ON

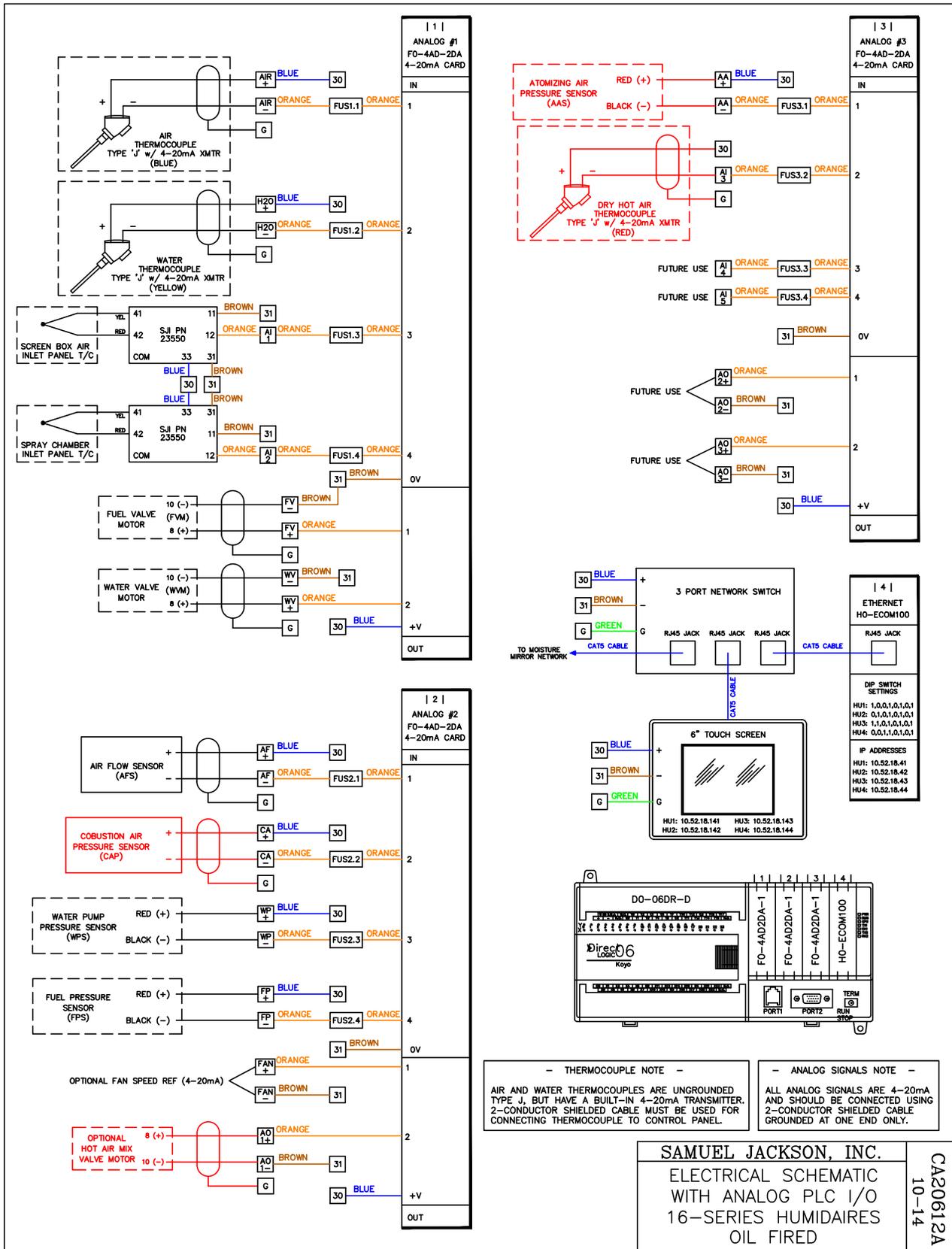
Electrical Schematic with Discrete PLC I/O



SAMUEL JACKSON, INC.
ELECTRICAL SCHEMATIC
WITH DISCRETE PLC I/O
16-SERIES HUMIDAIRE
OIL FIRED

CA20602P
9-15

Electrical Schematic with Analog PLC I/O



- THERMOCOUPLE NOTE -
 AIR AND WATER THERMOCOUPLES ARE UNGROUNDED TYPE J, BUT HAVE A BUILT-IN 4-20mA TRANSMITTER. 2-CONDUCTOR SHIELDED CABLE MUST BE USED FOR CONNECTING THERMOCOUPLE TO CONTROL PANEL.

- ANALOG SIGNALS NOTE -
 ALL ANALOG SIGNALS ARE 4-20mA AND SHOULD BE CONNECTED USING 2-CONDUCTOR SHIELDED CABLE GROUNDED AT ONE END ONLY.

SAMUEL JACKSON, INC.
 ELECTRICAL SCHEMATIC
 WITH ANALOG PLC I/O
 16-SERIES HUMIDAIRE
 OIL FIRED

CA20612A
10-14

14900B Lint Flue Scanner

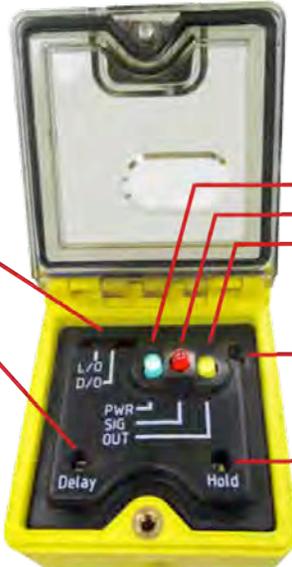
Newest version offered

14900B Lint Flue Scanner Setup & Wiring

Open transparent cover to make adjustments

Set to L/O — Light/Dark Switch

Does not affect LFS Applications — Timer Delay



Power ON Indicator
Signal Indicator
Output Indicator

Sensitivity Adjustment — Tighten to increase sensitivity

Timer Hold — Tighten to increase output hold time

The Signal indicator blinks whenever it sees cotton. The better it sees cotton, the faster it blinks.

Wiring

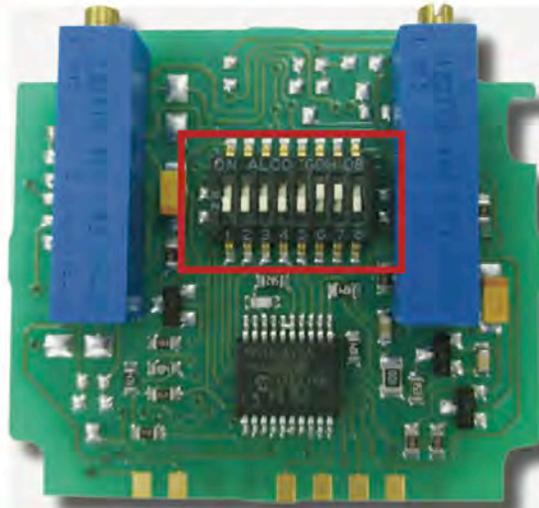
14900A*	14900B	
1	bn	PWR
2	bu	PWR
3	ye	C
4	bk	NO
5	wh	NC



DIP Switch Settings for Lint Flue Scanner Applications

Switch	Position
1	OFF
2	OFF
3	OFF
4	OFF
5	OFF
6	ON
7	ON
8	OFF

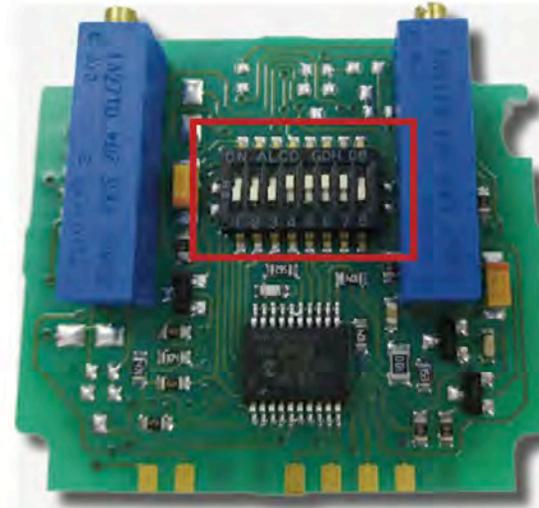
Slide switch up to turn on.



DIP Switch Settings for Flow Tools Applications

Switch	Position
1	OFF
2	OFF
3	OFF
4	ON
5	ON
6	ON
7	ON
8	OFF

Slide switch up to turn on.



14900A Lint Flue Scanner

Previous Version Offered

APPLICATION

The 14900A control is used to determine when cotton is passing through a lint flue. It is used with the Samuel Jackson Humidaire Unit to operate its water pump only when cotton is being ginned.

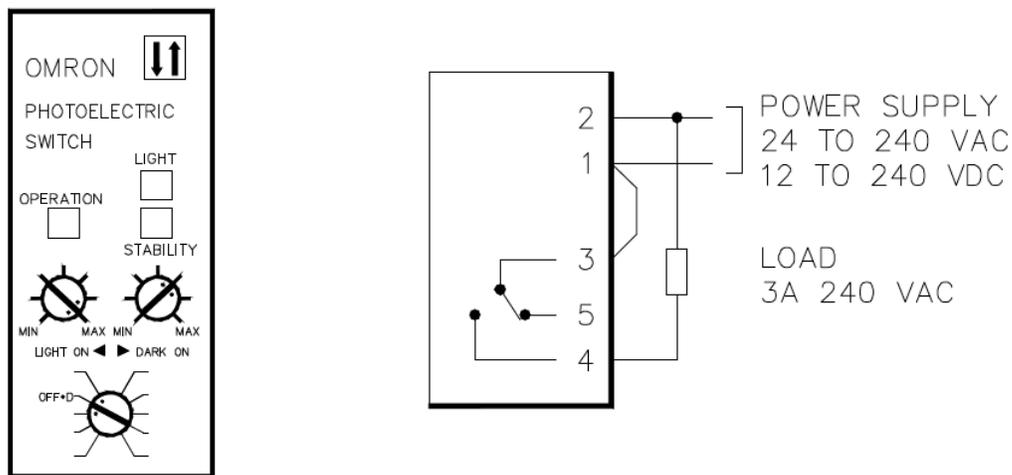
The 14900A control has a special mount which allows the 14953 photoelectric infrared scanner to look through a tiny window at the oncoming flow of air and lint. When cotton is detected, the control closes its circuit, and turns the water pump on. A built-in time delay keeps the circuit closed even if the presence of lint is interrupted for a few seconds.

MOUNTING THE CONTROL

The 14900A Lint Flue Scanner should be mounted in a flat area of the lint flue, usually in the riser to the battery condenser. Avoid locations where elbows and offsets might divert lint away from the control. The 14775 mount fits into a 3 x 4 inch (75 x 100 mm) rectangular hole in the wall of the flue. The stream of air and lint should blow against the small window.

ELECTRICAL WIRING

Be sure to follow the wiring diagram supplied with the Humidaire Unit. The 3 wires going to the 14900A control should be in a separate conduit from any power wires.



The diagram above shows the normal setting and wiring of the 14953 Photoelectric Switch, which is part of the 14900A Lint Flue Scanner. The lower selector determines the operating mode for the scanner. The setting for the lint flue is LIGHT ON and OFF DELAY.

ADJUSTMENT

The 14900A Lint Flue Scanner has been adjusted at the factory, but may require further adjustment. If further adjustment is necessary:

1. Insure that 14900A has been wired into the system correctly. Apply power.
2. With the 14900A installed correctly in the lint flue and with cotton coming through the lint flue, the red "LIGHT" LED should be on. The yellow "OPERATION" LED should be on and remain on until cotton is no longer present and the time delay has timed out. If the "LIGHT" LED fails to turn on with cotton in the system, turn the sensitivity adjustment clockwise until "LIGHT" comes on. This adjustment is located on top of the 14900A.
3. When no cotton is present in the lint flue the "LIGHT" LED should be off. If the "LIGHT" LED fails to turn off, adjust sensitivity counterclockwise until it goes off.
4. Set the sensitivity pot midway between the two operating points determined in steps 3 and 4 for optimum operation. Make sure the green "STABILITY" light illuminates in both detecting and non-detecting. The off time delay is set to maximum (12 seconds) and should not need further adjustment. This prevents cycling the water pump.

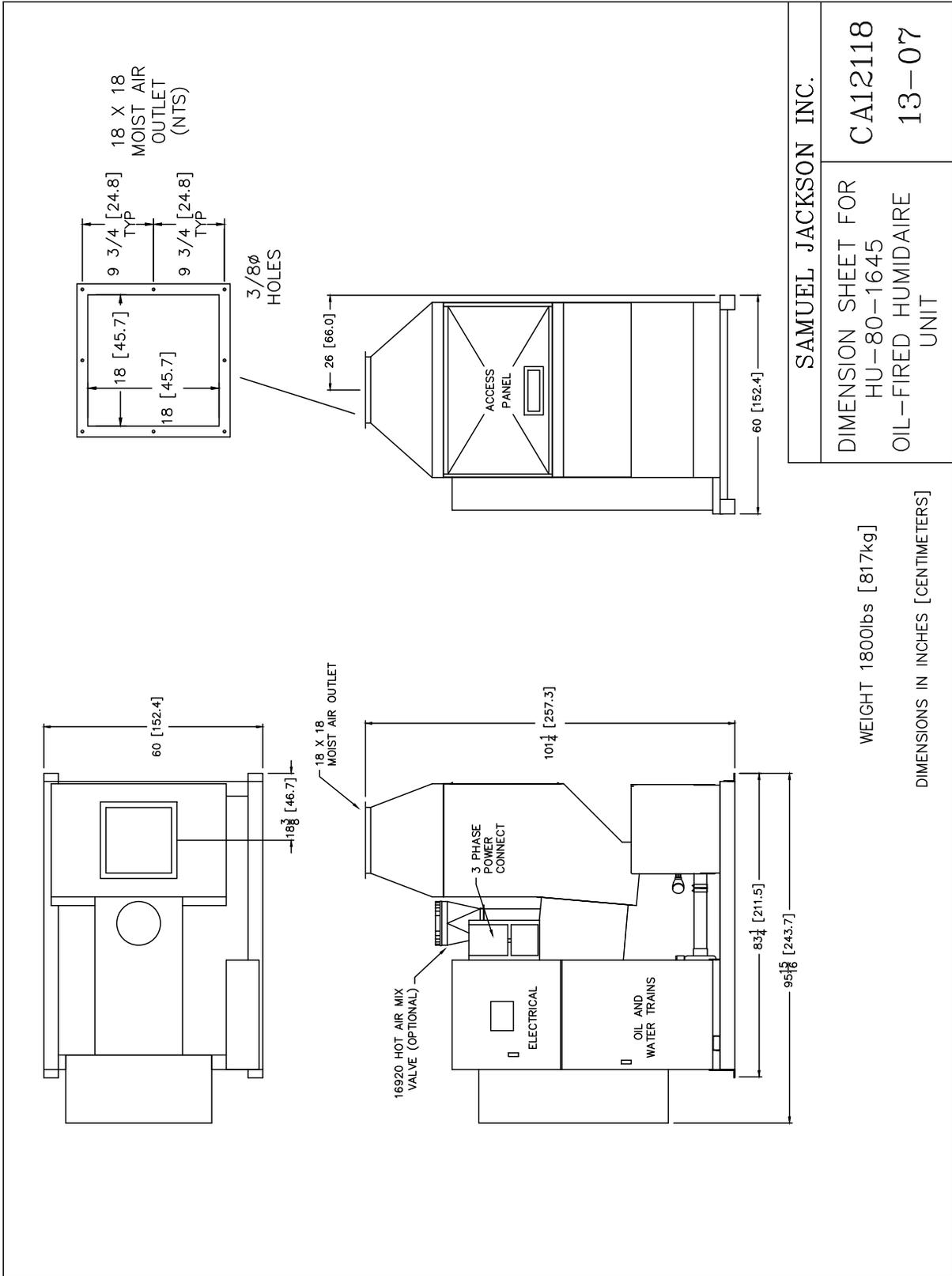
TROUBLESHOOTING

If the control does not operate properly, follow the steps below (A voltmeter is the only test equipment needed).

1. Remove the scanner from its mount. Look through the window and see if cotton can be seen going past the window. If not, the scanner and mount must be moved to a better location.
2. Make certain that window glass and lenses of the control are clean and dry. An accumulation of dust or lint on the window glass next to the control can affect its operation.
3. Check power to 14900A, by removing switch from mount, then remove top cover. Connect a voltmeter across terminals 1 and 2. With the Humidaire Unit on and running, there should be 24 volts DC present when connected to the Humidaire Sahara Storm control panel.

4. With the scanner seeing cotton, the same voltage should appear across terminals 4 and 2. If no voltage can be found, then trouble lies elsewhere in the circuit, not in this control.
5. If control does not respond to cotton properly, see Adjustment steps 2 to 4 above.
6. If, when the switch is tested, the yellow "OPERATION" LED comes on and the water pump stays off, check the pump wiring and overload.

Dimensions of Humidaire Unit



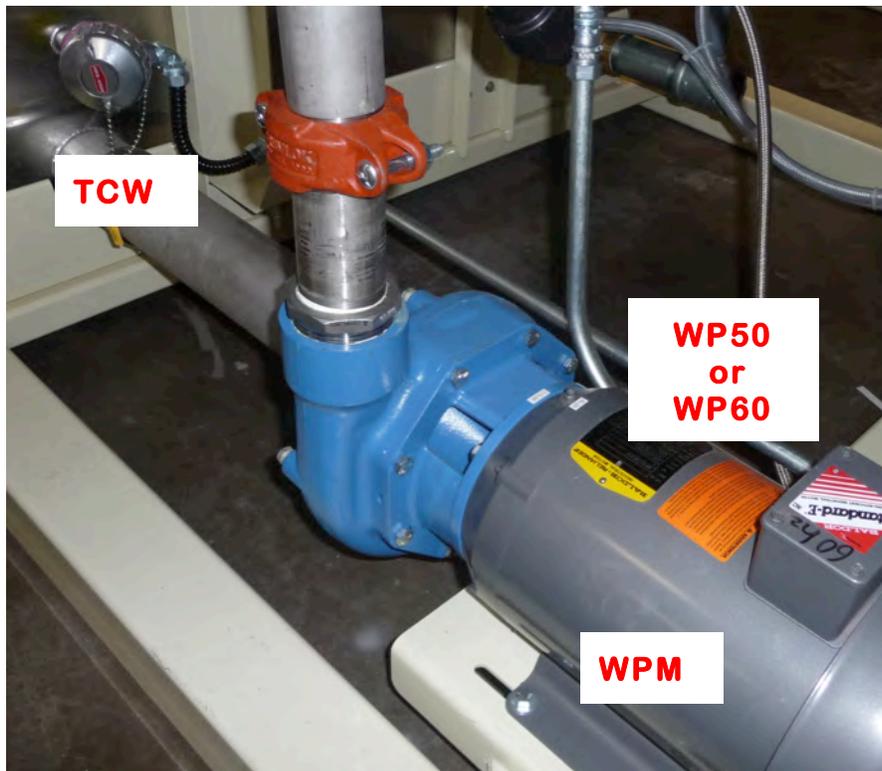
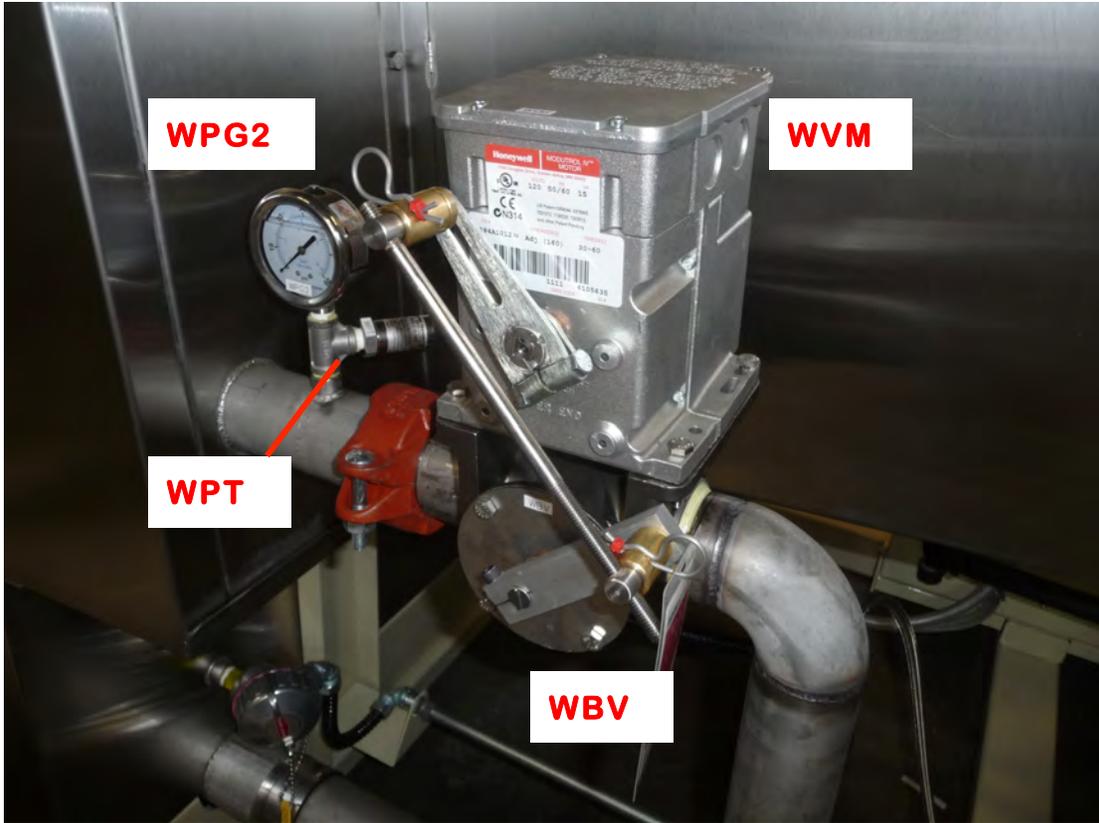
SAMUEL JACKSON INC.
DIMENSION SHEET FOR HU-80-1645 OIL-FIRED HUMIDAIRE UNIT
CA12118 13-07

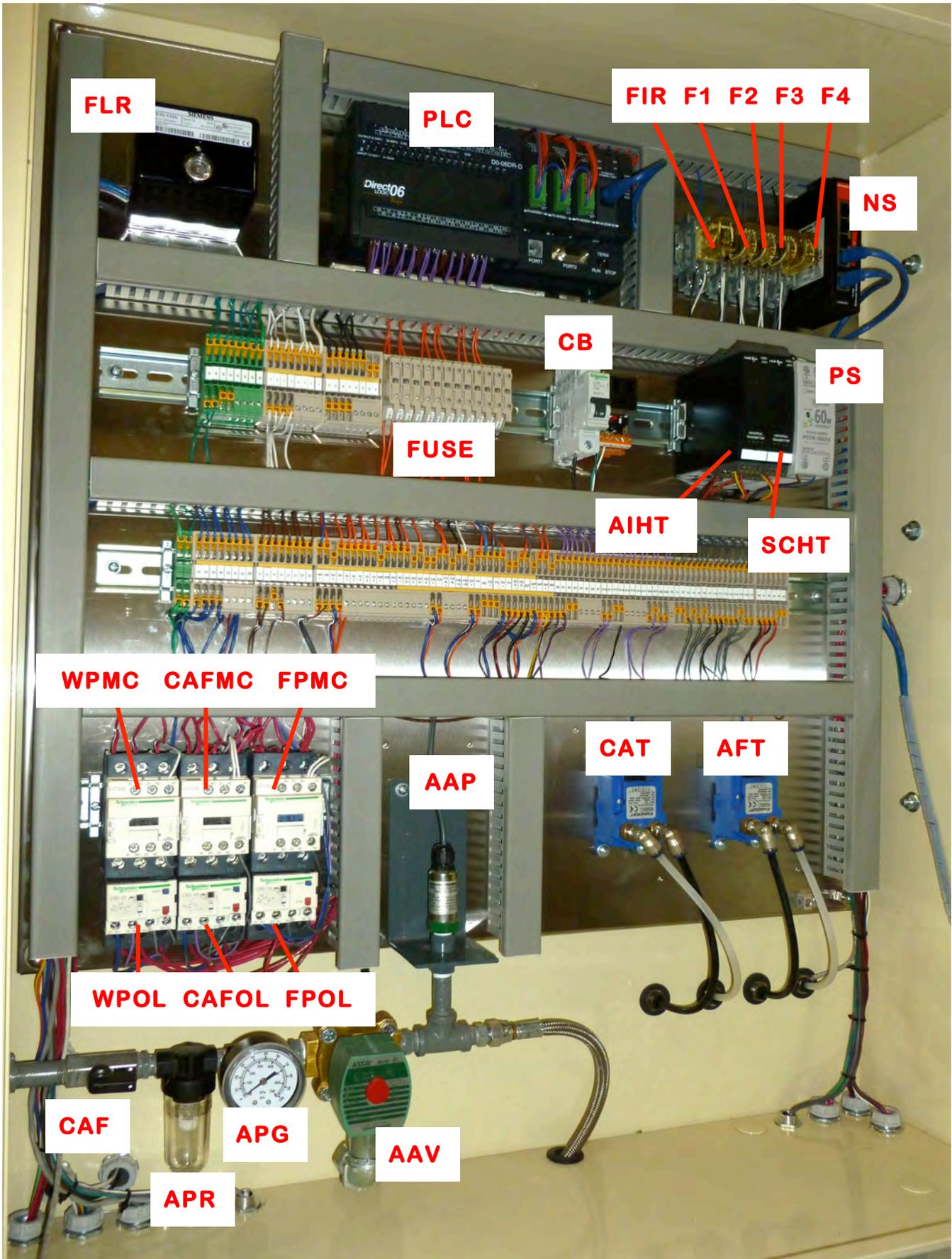
WEIGHT 1800lbs [817kg]

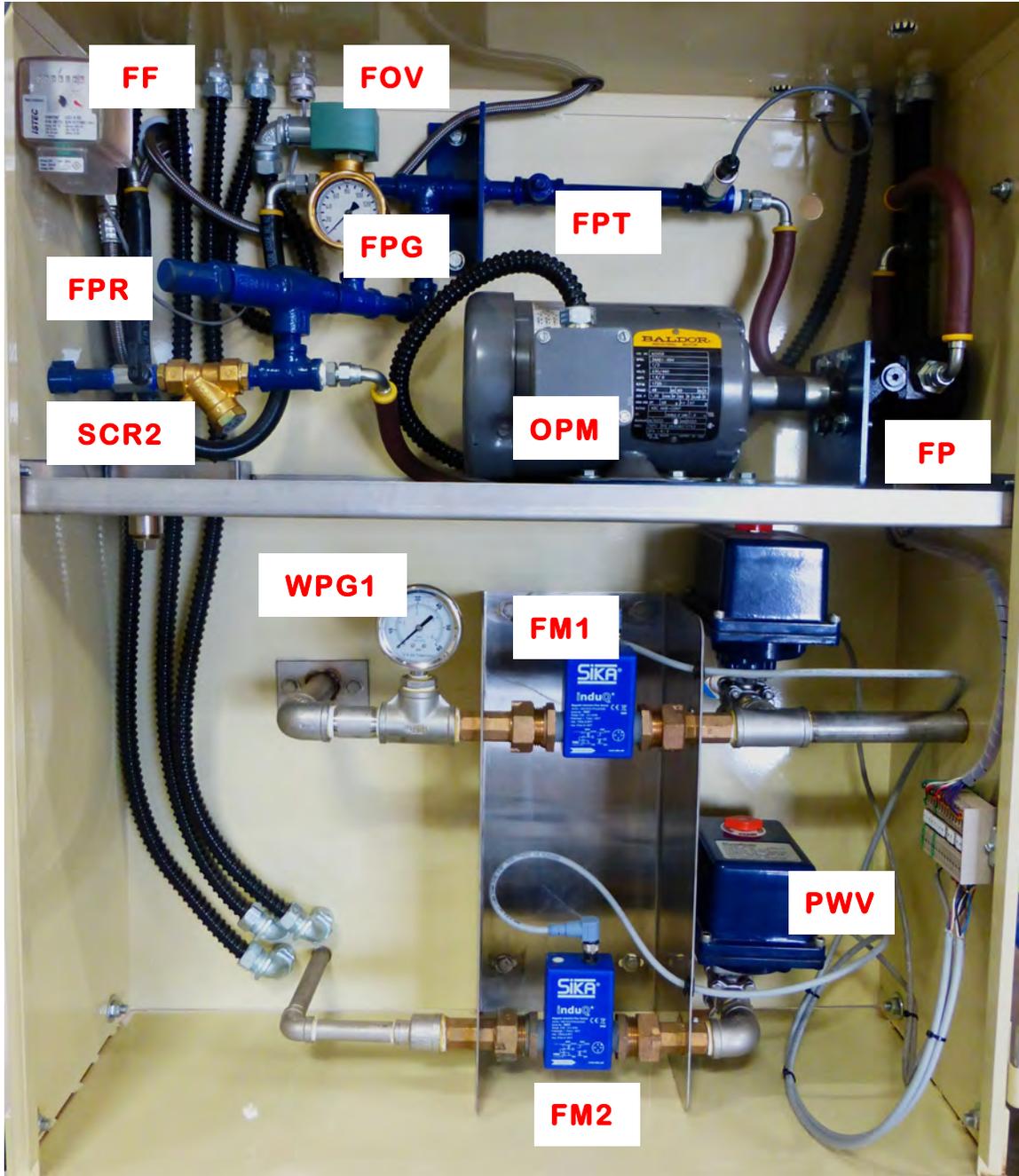
DIMENSIONS IN INCHES [CENTIMETERS]

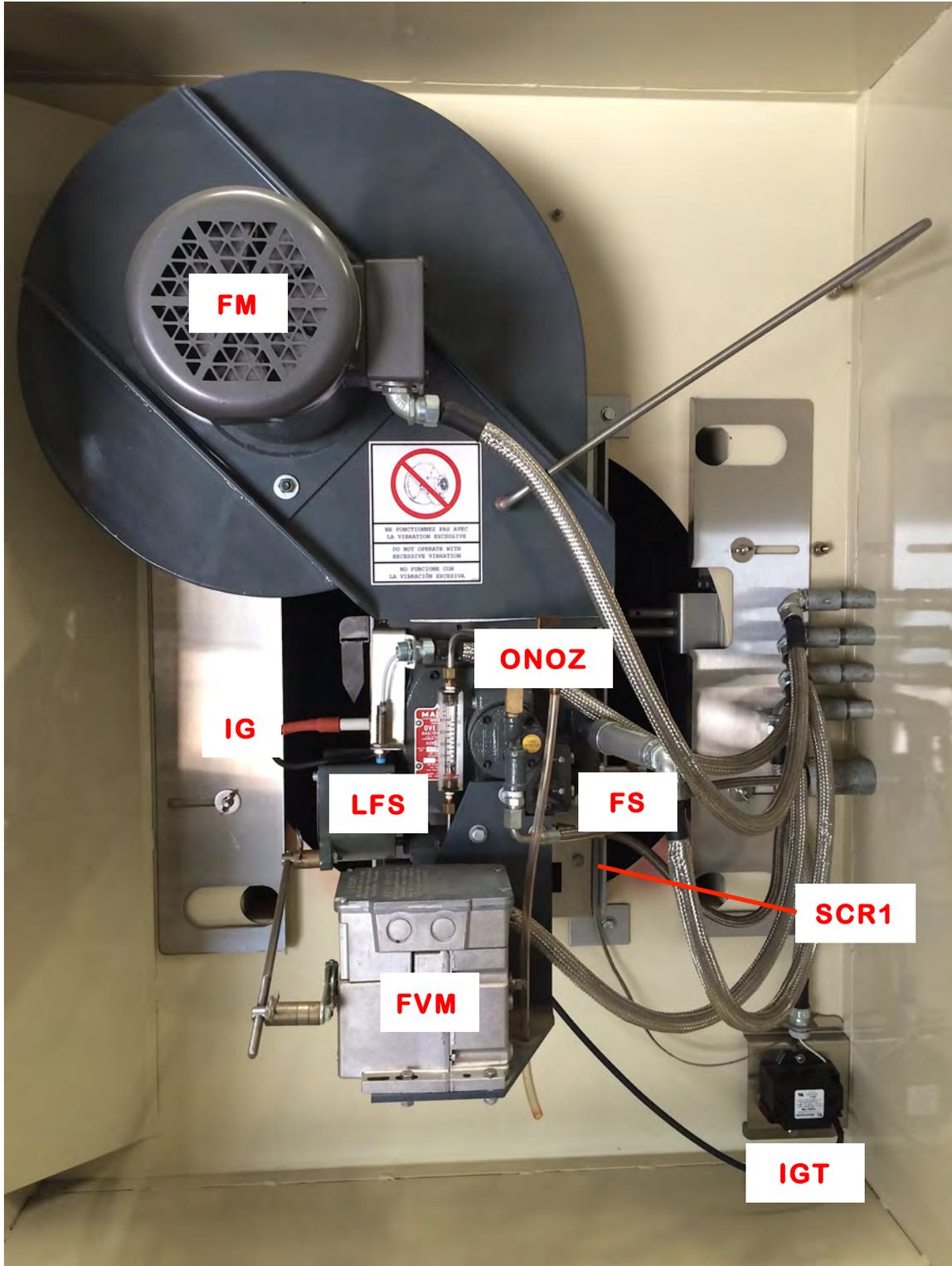
Components











Component List

<u>SYMBOL</u>	<u>PART NAME, NUMBER, MFR'S TYPE</u>	<u>LOCATION</u>
AAP	ATOMIZING AIR PRESSURE TRANSDUCER 23732, 628-10-GH-P1-E1-S1	UPPER CABINET
AAV	ATOMIZING AIR VALVE 13598, 25005	UPPER CABINET
AFT	AIR FLOW TRANSDUCER 22446, CX 8 FO1 42 2IW	UPPER CABINET
AIHT	AIR INLET HIGH TEMPERATURE TRANSDUCER (FACTORY SET TO 200° F) 23550, IAMS0001 & THERMOCOUPLE, 20514B, KTN-F6-F3B108-3	UPPER CABINET
APG	AIR PRESSURE GAUGE 20266, 0-100 PSI	UPPER CABINET
APR	AIR PRESSURE REGULATOR 13594A, R07-200-RNKA	UPPER CABINET
CAF	COMPRESSED AIR FILTER 13593A, F07-200-MITA	UPPER CABINET
CAFMC	COMBUSTION AIR FAN MOTOR CONTACTOR 14854A, LC1D0910G6	UPPER CABINET
CAFOL	COMBUSTION FAN OVERLOAD 14736A, LR2D1308	UPPER CABINET
CAT	COMBUSTION AIR FLOW TRANSDUCER 22446, CX 8 FO1 42 2IW	UPPER CABINET
CB	CIRCUIT BREAKER 22174, MG17414 C60 C 5A 1P	UPPER CABINET
CT	CONTROL VOLTAGE TRANSFORMER 16480A, 500 VA, E500TF	BOX BELOW DISCONNECT SWITCH
F2	PURGE WATER VALVE RELAY 17446, RH1B-U 120VAC	UPPER CABINET
F3	FLUSH VALVE RELAY 17446, RH1B-U 120VAC	UPPER CABINET
F4	IGNITION RELAY 17446, RH1B-U 120VAC	UPPER CABINET
FF	FUEL FLOW METER 13319, 2-20 GPH 26989	BURNER

FIR	FAN INTERLOCK RELAY 19181, RH2B-AC120, 120VAC OR 17597, RH2B-U, 240VAC	UPPER CABINET
FLR	FLAME RELAY 20107, LFE10	UPPER CABINET
FM	FAN MOTOR, 2HP 14375, VM 3555T	BURNER
FM1	FRESH WATER FLOW METER 24372, VZM15CS1	LOWER CABINET
FM2	PURGE WATER FLOW METER 24372, VZM15CS1	LOWER CABINET
FOV	FUEL OIL VALVE 16384, M8263B206V	LOWER CABINET
FP	FUEL PUMP 16334,1300099	LOWER CABINET
FPG	FUEL PRESSURE GAGE 12313, 0-160 PSI	LOWER CABINET
FPMC	FUEL PUMP MOTOR CONTACTOR 14854A, LC1D0910G6	UPPER CABINET
FPOL	FUEL PUMP OVERLOAD 14737A, LR2D1305	UPPER CABINET
FPR	FUEL PRESSURE RELIEF VALVE 12385, VJ-2W/WS	LOWER CABINET
FPT	FUEL PRESSURE TRANSDUCER 23732, 628-10-GH-P1-E1-S1	UPPER CABINET
FS	FLAME SCANNER 20244, QRA2	BURNER
FUSE	FUSE FOR 4-20mA ANALOG INPUT 22285A, 32mA 5mm X 20mm	UPPER CABINET
FVM	FUEL VALVE MOTOR 21560, M7284A1012	BURNER
IG	IGNITION ELECTRODE 14200, IP-19	BURNER
IGT	IGNITION TRANSFORMER 21706, 2260-TW	BEHIND CABINET

LFS	LOW FIRE SWITCH 20109, NIH-M12-AD4X	BURNER
NS	NETWORK SWITCH 23702A, IE-SW5-WAVE	UPPER CABINET
OF	OIL FILTER 24106, GTB228 Fuel filter replacement cartridge 24303, GTB22-30	BELOW CONTROL VOLTAGE TRANSFORMER
ONoz	OIL NOZZLE SUB-ASSEMBLY 16511, 36546515SPEBC-3SP	BURNER
OPM	FUEL PUMP MOTOR, 1/3HP 14735, M3458	LOWER CABINET
PLC	PROGRAMMABLE LOGIC CONTROL ASSEMBLY CONSISTING OF: PLC BASE, 21563, D0-06DR-D – DL06 PLC ANALOG IN/OUT CARD (3), 21566, F0-4AD2DA-1 ECOM CARD, 21567A, H0-ECOM100 BATTERY, 19857, D2-BAT-1	UPPER CABINET
PS	POWER SUPPLY, 120VAC TO 24VDC 21553, IDEC PS5R-SD24	UPPER CABINET
PWV	PURGE WATER VALVE 23833, ½ INCH BALL VALVE, EVS23AJE20	LOWER CABINET
SCHT	SPRAY CHAMBER HIGH TEMPERATURE TRANSDUCER (FACTORY SET TO 400° F) 23550, IAMS0001 THERMOCOUPLE, 20513B, KRS2-F3B108-3	UPPER CABINET
SCR1	FUEL STRAINER 9991, WITH 9992 SCREEN	LOWER CABINET
SCR2	FUEL STRAINER 16382 WITH 16383 SCREEN	LOWER CABINET
TCA	THERMOCOUPLE (AIR) 21708, 8”, TYPE ‘J’, 0-777, 4-20mA TRANSMITTER	MOIST AIR
TCW	THERMOCOUPLE (WATER) 21710, 5”, TYPE ‘J’, 0-777, 4-20mA TRANSMITTER	WATER TANK
TP	COLOR TOUCH PANEL 22044A, EA7-T6CL-R - 6 IN	UPPER CABINET DOOR
WBV	WATER BUTTERFLY VALVE 22432, SS BUTTERFLY	WATER PIPE
WPG1	WATER PRESSURE GAGE	LOWER CABINET

	22434, SS, 0-60 PSI	
WPG2	WATER PRESSURE GAGE 22434, SS, 0-60 PSI	WATER PIPE
WPM	WATER PUMP MOTOR, 5 HP 14975, JMM 3613T	WATER PIPE
WPMC	WATER PUMP MOTOR CONTACTOR 21681, SC-E04-110VAC	UPPER CABINET
WPOL	WATER PUMP OVERLOAD 14856A, LR2D1312	UPPER CABINET
WPT	WATER PRESSURE TRANSMITTER 23733, 628-09-GH-P1-E1-S1	WATER PIPE
WP50	WATER PUMP, 50 HZ, LESS MOTOR 14973A, 4BF50SJM	WATER PIPE
WP60	WATER PUMP, 60 HZ, LESS MOTOR 14972A, 4BF60SJM	WATER PIPE
WVM	WATER VALVE MOTOR 21560, M7284A1012	WATER PIPE

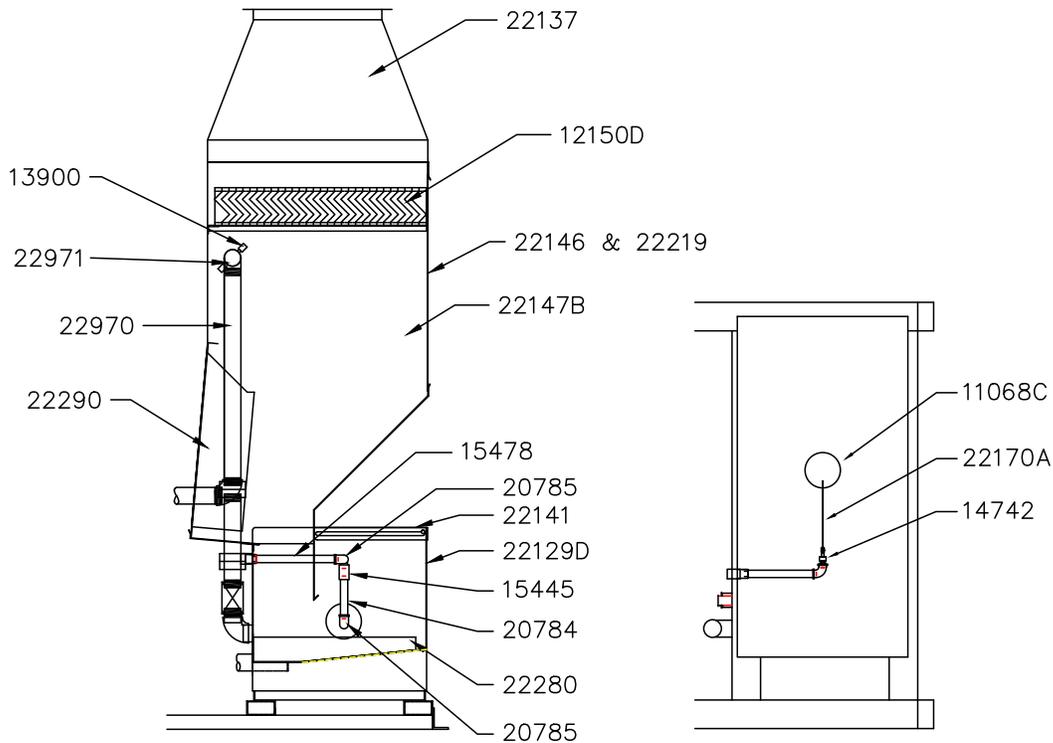
Water Spray Chamber Assembly

WATER SPRAY CHAMBER ASSEMBLY

HU-80 KING MESA HUMIDAIRE UNIT

CA12187B

8-17



PART NO.	QTY. USED	DESCRIPTION
22147B	1	SPRAY CHAMBER WELDMENT
22129D	1	WATER TANK ASSEMBLY
22137	1	AIR HOOD ASSEMBLY
12150D	1	MIST ELIMINATOR ASSEMBLY
22146	1	SPRAY CHAMBER DOOR
22219	1	PANEL HANDLE
22280	1	WATER TANK SCREEN
22970	2	30 1/4 HEADER PIPE
22971	1	36 3/4 HEADER PIPE
22141	1	WATER TANK LID
14742	1	WATER FLOAT VALVE
22170A	1	FLOAT ROD
11068C	1	FLOAT BALL
13900	25	STAINLESS WATER SPRAY NOZZLE
22290	1	FLAME INLET DEFLECTOR ASSEMBLY
20785	2	3/4 STAINLESS ELBOW
20784	1	3/4 X 6 STAINLESS NIPPLE
15445	1	3/4 STAINLESS COUPLING
15478	1	3/4 X 12 STAINLESS NIPPLE

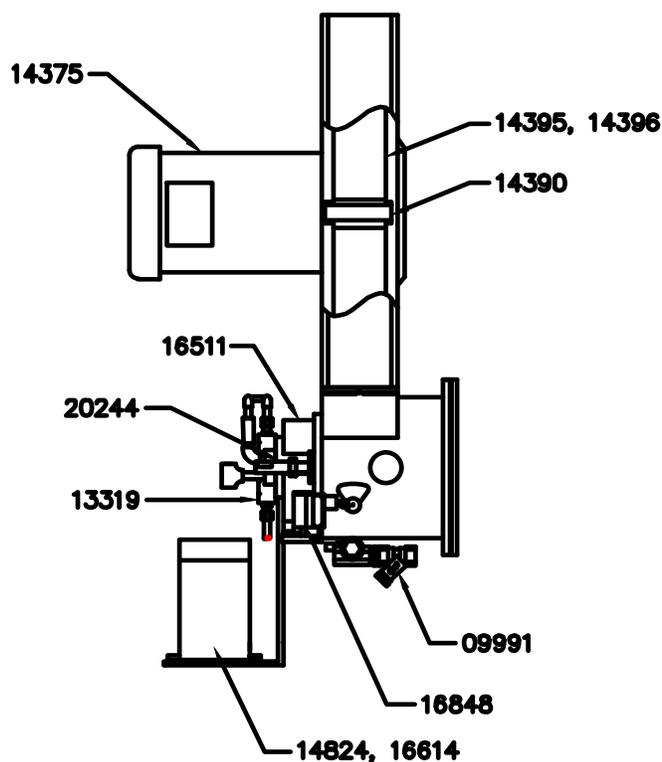
Oil Burner Assembly

OIL BURNER ASSEMBLY

CA12291A

HU-60 and HU-80 OIL-FIRED HUMIDAIRE UNIT

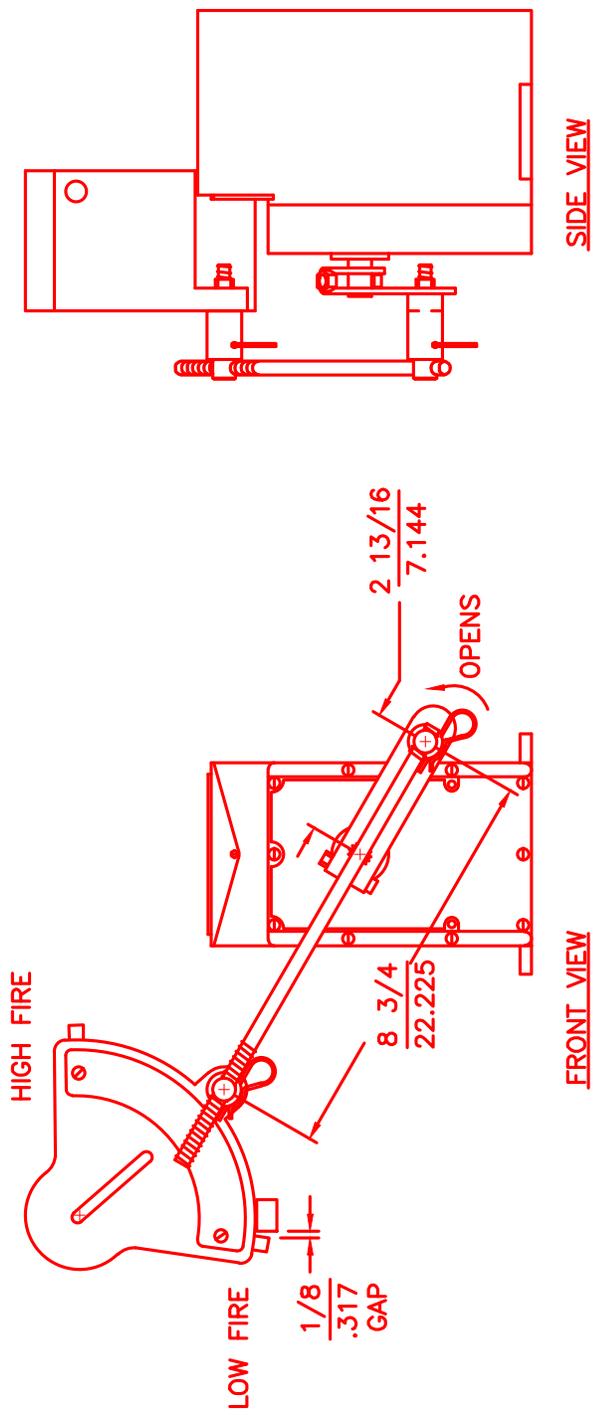
4-06



<u>PART NO.</u>	<u>QTY. USED</u>	<u>DESCRIPTION</u>
14390	1	BURNER FAN IMPELLER
14395	3	IMPELLER BELT, 50 HZ
14396	3	IMPELLER BELT, 60 HZ
14375	1	FAN MOTOR, 2 HP
16511	1	OIL NOZZLE ASSEMBLY
13319	1	FUEL OIL FLOWMETER
20244	1	FLAME SCANNER
16848	1	LOW LIMIT MICROSWITCH
16614	1	MOD MOTOR, 50 HZ
14824	1	MOD MOTOR, 60 HZ
09991	1	FUEL STRAINER, 1/4 INCH
09992	1	SCREEN FOR 09991 (NOT SHOWN)
14200	1	SPARK ELECTRODE (OTHER SIDE)

Fuel Valve Linkage Assembly

FUEL VALVE LINKAGE ASSEMBLY
 HU-60 and HU-80 OIL-FIRED HUMIDAIRE UNIT
 CA12293A
 4-06



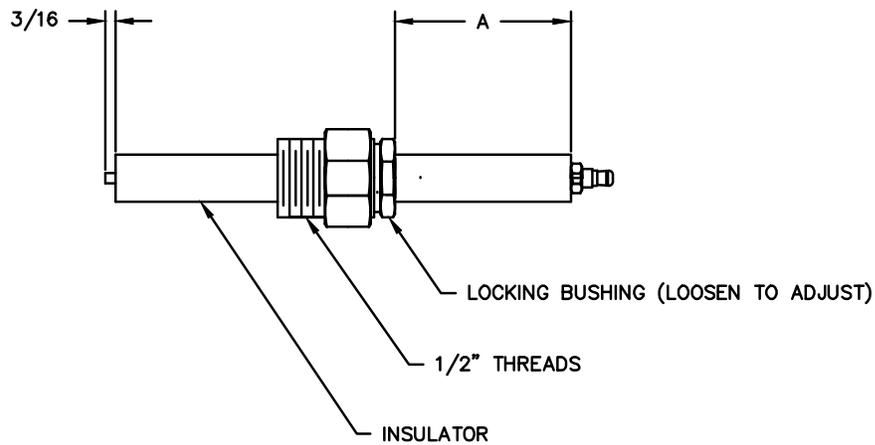
MODULATING MOTOR SHOWN IN CLOSED POSITION
 WITH CORRESPONDING VALVE POSITION AT LOW FIRE.

Adjustment of 12796 and 14200 Spark Ignitors

**ADJUSTMENT OF
_12796 AND 14200 SPARK IGNITORS**

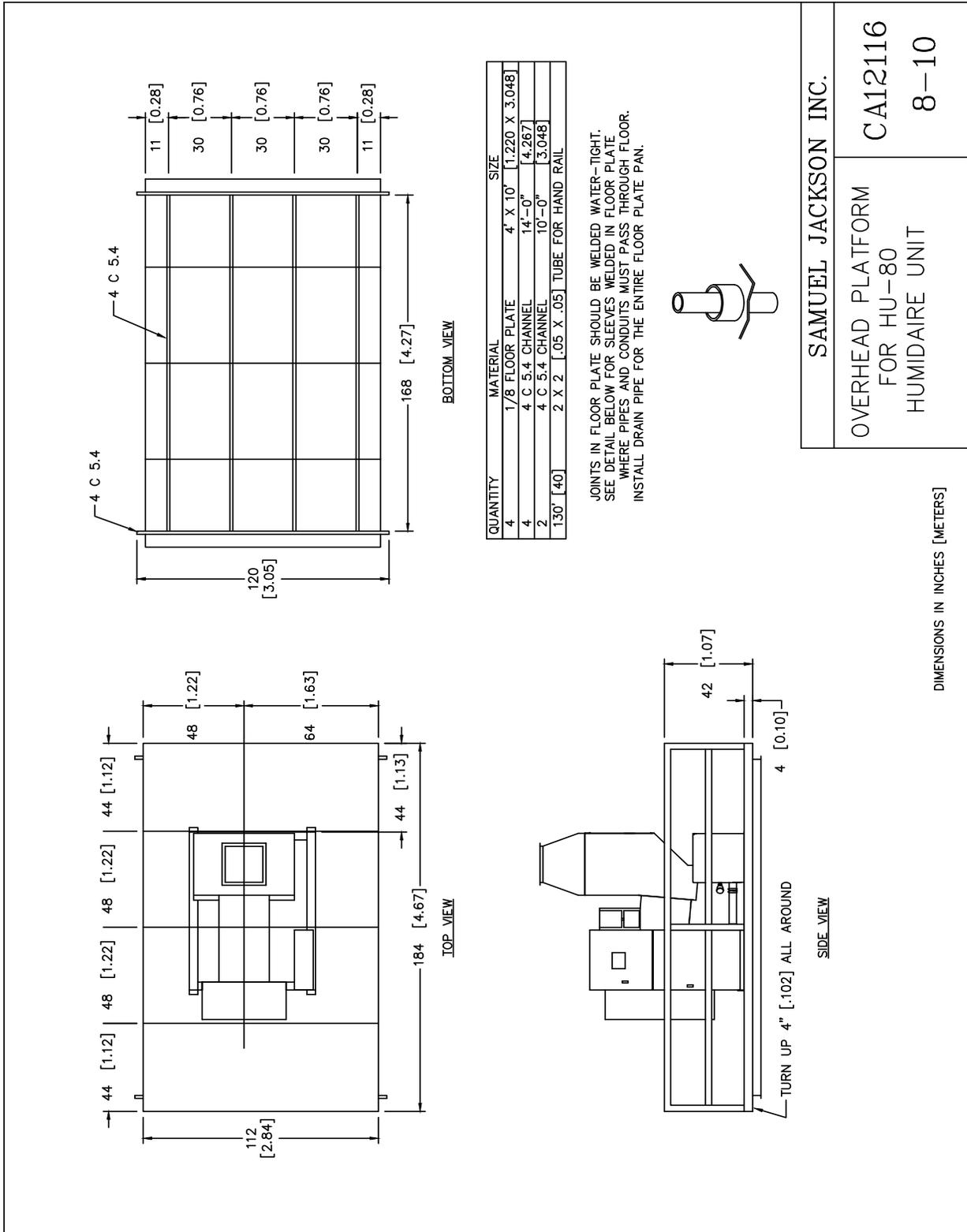
14-2378E

3-07



PART NO.	FOR SAMUEL JACKSON MACHINES	DIMENSION A	
		MM	INCHES
12796	HU-60-1065	25	1.00
	HO-7-1114		
	HO-7-1137		
	HO-7-1237		
14200	HO-4-1112	40	1.56
	HO-4-1112A		
	HO-4-1118		
	HO-4-1234		
	HU-60-1105		
	HU-60-1200		
	HU-60-1260		
	HU-60-1265		
	HU-60-1465		
	HU-80-1545		

Construction Drawing for Overhead Platform



Supplemental Section

Following is information on Samuel Jackson moist air applicators for seed cotton and lint cotton and the HG-1-1501 1-million BTU/hr heater. More detailed information may be shipped to you under separate cover for your particular system.

Steamroller Lint Conditioner

The *Steamroller* is the most powerful lint conditioning system available. Designed primarily for gin operations in excess of 40 bales per hour, the *Steamroller* is the only machine that can consistently take cotton lint to maximum safe moisture levels under all conditions.

Warm, moist air from a Humidaire Unit is pushed into the bottom of the *Steamroller* where it must pass through a perforated screen that the cotton batt is pressed against. After penetrating the batt, the moist air enters a rotating, perforated drum where it is then evacuated by suction. Application efficiency is so high that there is little remaining of the moist air to be evacuated!

A final combination doffing and compression roller takes the fully conditioned batt from the large drum and gives it a final compression into a thin, heavy batt that slides easily down the warmed lint slide to the press.

The Steamroller



Steamroller Lint Conditioner System

Lint Slide Grid for lint cotton conditioning

The *Lint Slide Grid* is popular with smaller gins taking their first steps with moist air technology, due to the economics of the grid design. The lint batt flows from the battery condenser and floats on top of the air coming from a series of stainless steel louvers. A Humidaire Unit supplies the moist air to a false bottom underneath the louvers. Replacing the lint slide is not necessary as a grid assembly fits inside the existing slide. A separate manual is shipped with the *Lint Slide Grid*. The manual covers suggested installation of the grids and gives recommendations on the air return hood, moist air fan, and pipe sizes.



The Lint Slide Grid

Seed Cotton Conditioning Hoppers

Samuel Jackson Seed Cotton Conditioning Hoppers are used for restoring some moisture to seed cotton before ginning in order to preserve fiber quality. A Humidaire Unit provides the moist air. These special hoppers are installed between the conveyor distributor and the gin stand feeder. They are available to fit most gin stand types. Double air entry hoppers are available for high capacity stands.

When cotton is not flowing through a hopper, an air valve at the hopper closes off the moist air to prevent saturating the cotton. To prevent disturbing the airflow through the Humidaire Unit, the *Relief Plug Assembly (Part No. 13860)* is included with Conditioning Hoppers. This device automatically relieves the excess moist air not going to the hoppers. When cotton flow begins again, the moist air is immediately available to the hopper.

A separate manual is included with the Conditioning Hoppers. In this manual are electrical schematics for connecting the *Relay Panel (Part No. 13850)* to single and double entry conditioning hoppers.



Conditioning Hopper with double air entry for high capacity gin stands (Model CH-96-1225 with moist air entry on ends shown)

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

Warranty

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
3900 Upland Avenue
Lubbock, Texas 79407
806-795-5218

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