



INSTALLATION, OPERATION AND MAINTENANCE MANUAL FOR HIGH STATIC FRESH AIR SUPPLY HEATERS INCLUDING UNITS WITH DDC CONTROLS

ATTENTION: READ THIS MANUAL AND ALL LABELS ATTACHED TO THE UNIT CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THESE UNITS! CHECK UNIT DATA PLATE ELECTRICAL SPECIFICATIONS AND MAKE CERTAIN THAT THESE AGREE WITH THOSE AT POINT OF INSTALLATION.

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

POUR VOTRE SÉCURITÉ

L'utilisation et l'entreposage d'essence ou d'autres liquides ou produits émettant des vapeurs inflammables dans des récipients ouverts à proximité de cet appareil est dangereux.



FOR YOUR SAFETY

If you smell gas:

1. Open Windows
2. Don't touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.



POUR VOTRE SÉCURITÉ

Si vous sentez une odeur de gaz :

1. Ouvrez les fenêtres.
2. Ne pas actionner d'interrupteur.
3. Éteindre toute flamme ouverte.
4. Appelez immédiatement votre fournisseur de gaz.

WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

AVERTISSEMENT : Une installation déficiente, de même qu'un mauvais réglage, modification, entretien ou maintenance peuvent occasionner des dommages matériels, corporels voire causer la mort. Lire attentivement les instructions d'installation, d'utilisation et d'entretien avant d'installer ou d'intervenir sur cet appareil.

WARNING

Install, operate and maintain unit in accordance with manufacturer's instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The state of California has determined that these substances may cause cancer, birth defects, or other reproductive harm.

INSTALLER'S RESPONSIBILITY

Installer Please Note: This equipment has been tested and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. **It is the installer's responsibility to inspect and correct any problems that may be found.**



SECTION I - FOREWORD

As is the case with any fine piece of equipment, care must be taken to provide the proper attention to the operation and maintenance detail of this machine.

This manual of instructions along with Digital Control System User Manual (for systems with optional DDC controls) has been prepared in order for you to become well-acquainted with those details, and in doing so, you will be able to give your High Static Fresh Air Supply Heater the care and attention which any piece of equipment needs and deserves.

It is the customer and installation personnel responsibility to determine if the unit is equipped with all of the safety devices required for the particular application. Safety considerations include the accessibility of the unit to non-service personnel, the provision of electrical lockout switches, maintenance procedures and automatic control sequences. Clearly mark any shutoff devices.

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* IMPORTANT NOTICE *

LJ Wing assumes no responsibility for loss or damage in transit; therefore, you should protect yourself by following these instructions. Failure to do so is your responsibility.

BILL OF LADING

Save your bill of lading. It is a contract, and you will need it, provided you have to file a loss or damage claim. Remember, claims are outlawed after nine months.

LOSS IN TRANSIT

Before you sign for this shipment, check against the bill of lading, also the transportation company's delivery ticket. Make sure that you get the exact total of articles listed. Should the delivery ticket show more or less items than you are offered, then the carrier's agent must mark the difference on your freight bill before you sign.

VISIBLE DAMAGE IN TRANSIT

If something is damaged, accept the shipment only if the carrier's agent places a notation on your freight bill explaining the nature and extent of damage. Upon inspection of article, make claim to the delivering carrier.

CONCEALED DAMAGE IN TRANSIT

Sometimes transit damage is not noticed until the goods are unpacked. In such cases, notification to the carrier must be made within fifteen (15) days of receipt of shipment. In such cases, save the packages and packing material, then notify the transportation company at once, and request an inspection. When the inspector calls, have him make out and leave a "concealed" bad order report. He is obliged to give one to you. Insist on it.

DISPOSITION OF DAMAGED ARTICLES

Never return damaged articles to us. They are the property of the transportation company when the claim is filled. They will give you disposition instructions.

PACKING

We comply with the packing requirements of the transportation companies, and your bill of lading proved that everything was in good condition when shipped. That bill of lading contract requires them to deliver in perfect condition.

SECTION II - GENERAL INFORMATION

A. Purpose

The purpose of this manual is to present a guide for proper installation, maintenance, and operation of the High Static Fresh Air Supply Heater, and supplement, **but not to replace**, the services of qualified field service personnel to supervise the initial start-up and adjustment of the unit. Persons without previous experience with large commercial and industrial heating equipment should not attempt the initial adjustment and checkout procedure, which is essential before such installations may be considered ready for operation. This manual should be made readily available to all operating personnel as an aid in troubleshooting and proper maintenance. Due to the custom nature of LJ Wing equipment, not all possibilities are addressed in this manual. The customer or installer can obtain information from LJ Wing's sales representative or the LJ Wing factory.

WARNING: Failure to comply with general safety information may result in extensive property damage, severe personal injury or death.

B. Shipping

Base High Static Fresh Air Supply Heaters are shipped completely assembled where shipping limitations allow. Optional inlet hoods, filter and /or damper sections, or other large accessories are assembled and shipped mounted and wired whenever possible within limitations of shipping and handling. Some optional accessories shipped separately may require field assembly. Any wired accessories, which have been disassembled for separate shipment, require no additional conduit or wire for field reassembly. All wire leads will be tagged for ease of reconnection in the field.

If the heater and/or accessories cannot be installed immediately, they should be stored in a clean dry environment. If this is not possible and the heater must be stored outdoors, it should be protected from the weather with tarpaulins or plastic coverings. Rotate the fan monthly. Prior to beginning installation of a unit that has been in storage for weeks or months, the unit and its components should be closely inspected.

Prior to beginning installation of a unit that has been in storage for weeks or months, the unit and its components should be closely inspected.

Shipments are made F.O.B. Dallas, Texas by truck. The unit is securely strapped, tied, and blocked to prevent shipping damage. All shipments are checked by an inspector before they are accepted by the carrier. Parts that are shipped un-mounted are noted on the bill of lading. These parts, where feasible, are packaged and shipped with the units. Upon receipt of shipment, all units should be checked against the bill of lading to insure all items have been received. All equipment (and any optional accessories) should be checked carefully for physical damage in the presence of the carrier's representative. If parts are missing or damage has occurred, a claim should be filed immediately with the carrier.

All High Static Fresh Air Supply Heaters are given a complete operations test and control circuit checkout before shipment. Copies of the wiring diagram, piping diagram and bill of material are included with each unit shipped. If correspondence with the factory is necessary, please provide the unit model and serial number.

C. Optional Factory Service

Periodic service on any piece of mechanical equipment is necessary for efficient operation. A nationwide service support network is available to provide quick and dependable servicing of make-up air, heating, ventilating, or air handling types of equipment. The factory also offers start-up service, which includes the presence of a service engineer to supervise the initial start-up and adjustment of the equipment and provide instructions for the owner's maintenance personnel in proper operations and maintenance. Consult factory for quotations on periodic or start-up service.

SECTION III - INSTALLATION

FOR CANADIAN INSTALLATIONS ONLY

All electrical connections must be in accordance with Canadian Electrical Code, Part 1, CSA Standard C22.1.

All electrical connections must conform to the current edition of ANSI/NFPA No. 70 National Electrical Code and applicable local codes: in Canada, to the Canadian Electrical Code, Part 1 CSA Standard C22.1. The following recommendations are not intended to supplant any requirement of federal, state, or local codes having jurisdiction. Authorities having jurisdiction should be consulted before installations are made. Local codes may require additional safety controls and /or interlocks. All installations in airplane hangers must be in accordance with current ANSI/NFPA No. 409. All installations in public garages must be in accordance with current NFPA No. 88A and NFPA No. 88B.

A. Handling the Equipment

As explained previously, the basic unit is designed for shipping in one piece where shipping limitations allow. Some optional accessories may require field mounting.

The High Static Fresh Air Supply Heater has been designed for rigging and handling through the use of special lifting lugs installed on the top and/or sides of each unit. When unloading and setting the unit, use the lifting lugs provided as shown in Drawing #C000790. Hooks, jacks, or chains must not be used around the casing, main control panel or exterior mounted controls.

During transit, unloading and setting of the unit; bolts and nuts may have become loosened, particularly in the pillow block ball bearing assemblies in the fan section. It is recommended that all nuts and set screws be tightened. Turn fan shaft by hand to make certain that blower does not rub against blower housing, and that bearing set screws are tight.

If units are not set immediately, cover all openings that might be exposed to the weather.

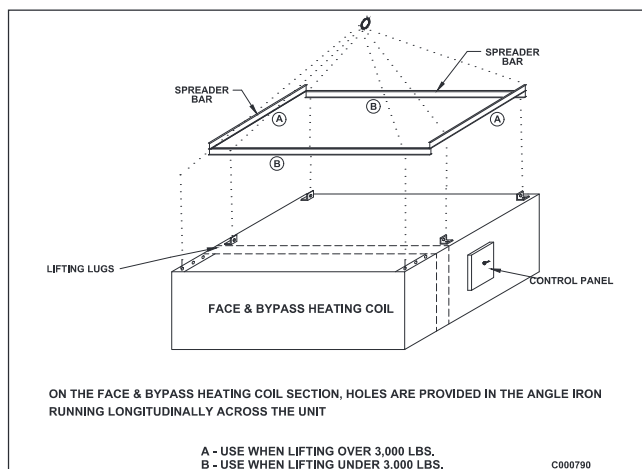
Rotate fan monthly.

IMPORTANT: Lift and install the modules or sections of a unit separately. Flange connections provided between modules or sections are not structural and damage will occur if any attempt is made to lift modules that have flanged together.

See the specification sheet and submittal drawing for unit or section weight and to determine proper orientation for each section.

When unloading sections and/or units or moving equipment to its final location, exercise care to avoid distortion. Lift sections and/or units only by the lifting lugs provided and follow the procedures as outlined below.

RIGGING AND MOUNTING – HIGH STATIC FRESH AIR SUPPLY HEATER



Warning: To insure that a proper unit lift is made, lift unit approximately 24 inches and verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in death or serious injury or possible equipment or property-only damage.

B. Locating the Unit

Prior to locating the unit, authorities having jurisdiction should be consulted before installations are made. Approval permits should be checked against the unit received.

Locate the unit exactly level. Special attention should be given to the duct, electrical, and piping connection points. Install ductwork with adequate flexible connection to isolate vibration from the ductwork.

All ductwork should have taped or caulked seams. Ductwork should be properly sized so as not to inhibit airflow. This information should be cross-checked with the position of support beams and stand pipes to insure that clearance dimensions coincide with those of the unit.

The recommended minimum access clearance is 36 inches on both sides of unit.

Make a visual inspection to insure no damage has occurred to the unit during installation.

C. Location of Accessories

Where applicable, standard or optional accessories will be placed inside the fan section of the unit for shipment, and must be removed and installed by the mechanical or electrical contractor.

Field constructed intake accessories should be properly designed to minimize the entry of rain and snow.

Adequate building relief must be provided, so as to not over-pressurize the building, when the heater is operating at its rated capacity. This can be accomplished by taking into account, through standard engineering methods, the structure's designed infiltration rate, by providing properly sized relief openings, by interlocking a powered exhaust system, or by a combination of these methods.

D. Electrical Connections

Warning: Open all disconnect switches and secure in that position before wiring unit. Failure to do so may result in personal injury or death from electrical shock.

Warning: Controls must be protected from water. Do not allow water to drip on the electrical controls.

Note: Before installing any wiring, check the unit rating plate for power supply voltage, and minimum amperage.

All electrical connections must conform to the current edition of: ANSI/NFPA No. 70 National Electrical Code and applicable state and local codes; in Canada, to the Canadian Electrical Code, Part 1 CSA Standard C22.1 and applicable provincial and local codes. Since shipment of unit may require disassembly after factory check and test, reconnection of some electrical devices will be required in the field. Connect electrical wires (supplied in factory furnished conduit) to appropriate terminals. All leads are tagged to facilitate field connections. See wiring diagram provided with equipment. Complete all wiring to any optional accessories as shown on unit bill of material and electrical wiring diagram as required before applying voltage to the unit.

Entry location for all field-installed and control wiring is through the control panel.

If optional disconnect is not furnished with heater, the field provided disconnect must be of the proper size and voltage. Refer to unit nameplate for minimum circuit ampacity and voltage. The disconnect must be installed in accordance with Article 430 of the current edition of ANSI/NFPA No. 70 National Electrical Code, and applicable local codes; in Canada, to the Canadian Electrical Code, Part 1, CSA Standard C22.1.

Check the supply voltage before energizing the unit. The maximum voltage variation should not exceed $\pm 10\%$. Phase voltage unbalance must not exceed 2%.

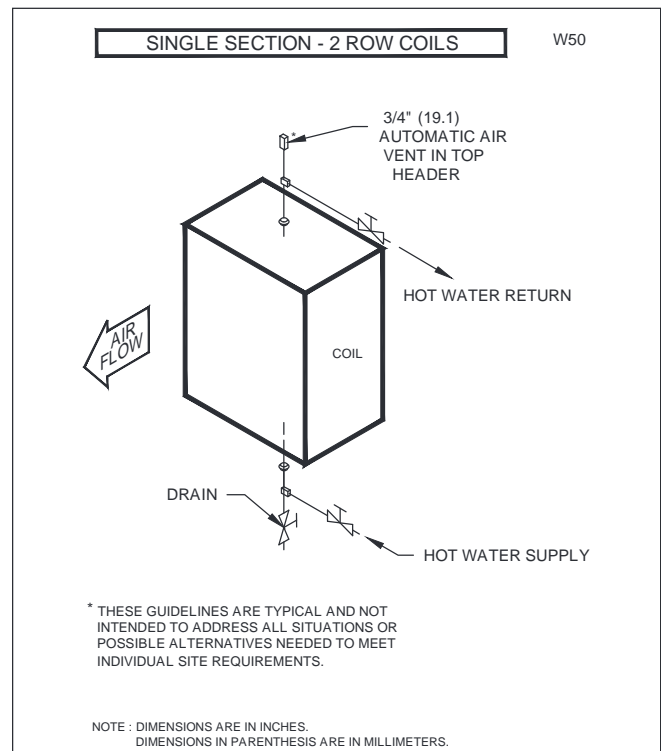
NOTE: Should any original wire supplied with the heater have to be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C.

E. RECOMMENDED HOT WATER AND STEAM PIPING Hot Water Systems

- Install the casing level, pitch for draining has been built into coil.
- Refer to piping arrangement shown in Drawing #W50.

HOT WATER SUPPLY SHOULD BE ON THE LOWER HEADER CONNECTION.

HOT WATER RETURN SHOULD BE ON THE HIGHER HEADER CONNECTION TO PURGE AIR FROM THE COIL.

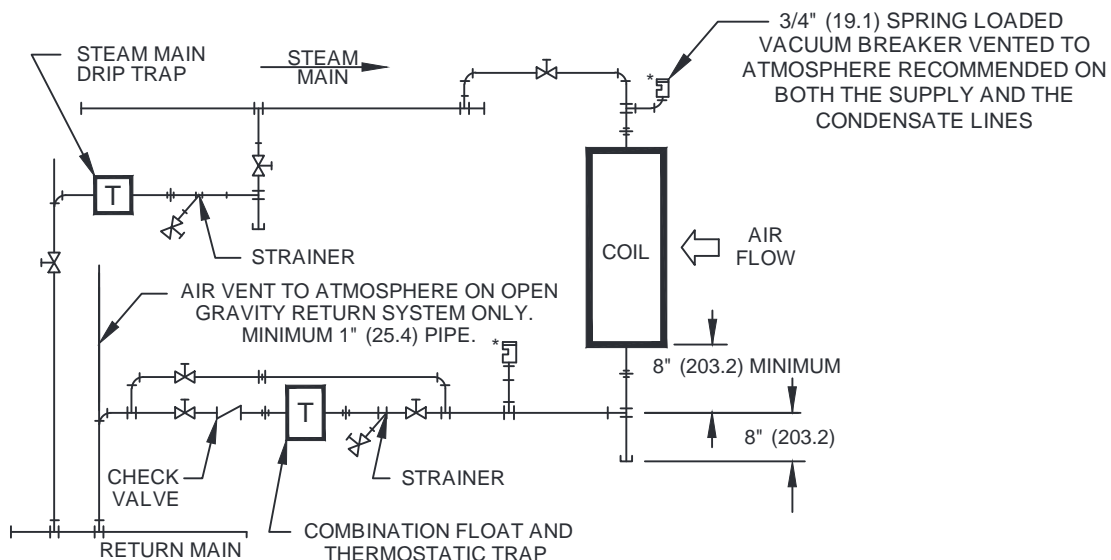


- Supply and return mains should be anchored and supported independently of the HSFAS coil.

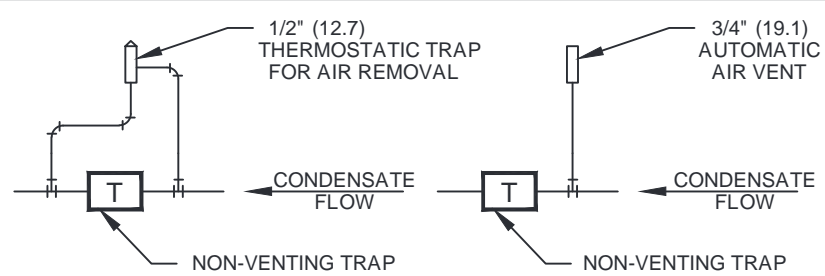
Steam Systems

- Install the casing level, pitch for condensate draining has been built into coil.
- Refer to piping arrangement shown in Drawing #W51. A steam supply system which will keep the HSFAS coil full of steam, and a condensate drainage system which will immediately remove condensate from the coil are essential to obtain reliable performance and full rated heating capacity from the coil.

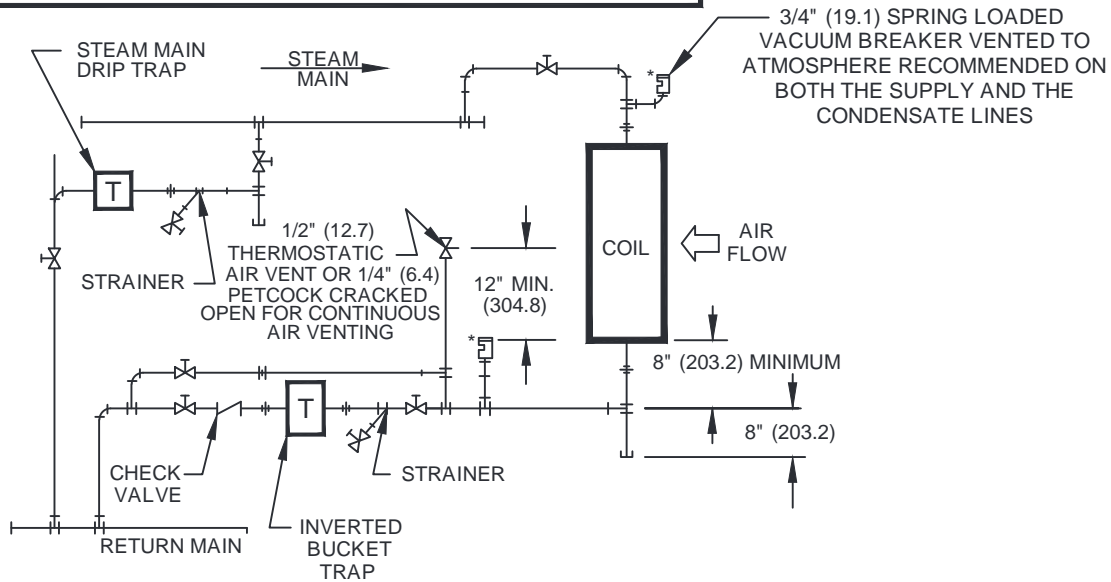
STEAM PRESSURE AT OR BELOW 15 PSIG OR 103.4 KPA



Additional Piping Required For Non-Venting Type Steam Traps



STEAM PRESSURE ABOVE 15 PSIG OR 103.4 KPA



* THESE GUIDELINES ARE TYPICAL AND NOT INTENDED TO ADDRESS ALL SITUATIONS OR POSSIBLE ALTERNATIVES NEEDED TO MEET INDIVIDUAL SITE REQUIREMENTS.

NOTE : DIMENSIONS ARE IN INCHES. DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

- c.) Tube Expansion – The HSFAS coil design incorporates space to provide for the expansion of the finned tubes when steam is applied to the coil.
- d.) Steam mains, return mains and traps must be anchored and supported independently of the HSFAS coil. Steam piping should incorporate expansion joints to isolate piping expansion strains from the unit.
- e.) A drip trap should be installed between the pressure side of the heating section supply valve and the return line. This will prevent steam line condensate from entering the unit with the steam. **DO NOT DRIP STEAM MAINS INTO COIL OR INTO LINE BETWEEN COIL AND THE TRAP.**
- f.) Steam traps should be sized for 3 times the calculated condensate loading at the coil design conditions, based on the pressure differential across the trap, **NOT THE BOILER PRESSURE.** Traps should be of types which pass condensate and air at saturated steam temperature. Inverted bucket traps should incorporate thermostatic air vents.
- g.) The steam trap should have provision for air venting. If the trap is non-venting, proper air vents should be provided for each coil to eliminate non-condensable gases. All air vents should be a minimum of 1" and properly pitched to assure free venting of air. The venting device should be located at least 12" above the bottom casing of the coil. In high pressure steam systems (above 15 PSIG), where a non-venting trap is used for condensate removal, an automatic air vent should be installed in a 1" air line before the condensate trap. Do not return vented air to the condensate return main line.
- h.) **MAKE RETURN CONNECTIONS FULL SIZE OF COIL HEADER AND REDUCE AT TRAP. DO NOT USE REDUCING BUSHING ON COIL RETURN CONNECTION.** If shutoff valve, strainer and trap are piped together with pipe nipples, pipe can be reduced to the trap inlet size at the shutoff valve.
- i.) Strainers should be installed ahead of traps to prevent dirt and sludge from affecting trap operation. If the strainer is installed in the steam supply line, a strainer ahead of the trap is not required.
- j.) **DO NOT** install risers in condensate return lines.
- k.) Each coil must be individually trapped and vented.
- l.) Install a valved by-pass line around the trap to allow operation of the coil during trap maintenance, and for use in start-up of the coil in below freezing conditions.
- m.) If condensate must be lifted above coil discharge into overhead mains, or if return mains are pressurized, a receiver and condensate pump should be installed between condensate traps and return mains.
- n.) Use only bucket, or float and thermostatic traps for condensate removal. Use thermostatic traps for venting only.
- o.) Proper vacuum breakers should be provided as shown in piping drawings.
- p.) Check valves should be used to prevent condensate backup in case of steam failure.

F. Field Wiring and Remote Control Installation

1. If the optional low temperature controller was not an integral part of the heater, the factory recommends that a low temperature limit control be installed in areas where freeze protection is needed in the event of burner shut down.
2. Connect the power lines to the line side of the power distribution block or optional main disconnect switch.
3. Field wiring is indicated on the wiring diagram, typically dashed lines. Where field wiring of the control circuit is required, take care to size the wires for a maximum 10% voltage drop. The VA rating of the transformer should be the maximum load.
4. Mount and wire remote control panel, thermostat temperature sensors, and any other field-installed controls as indicated on the unit control-wiring diagram.
5. Connect all wiring to the appropriate field wiring terminal and any shielded or twisted wires as indicated on the unit control-wiring diagram.
6. Field wiring shall have a temperature rating of at least 105°C. The minimum size of the supply cable circuit shall be sufficient for the maximum ampacity of the heater.

G. Locating Temperature Controls

The room or outdoor thermostats should be mounted where they will not be subjected to direct impact of the heated air or radiant heat from the sun. It is also recommended that thermostats, especially those with mercury bulb contacts, be mounted on a vibration free surface. The sides of building columns away from the heater or interior walls are usually the location best suited for mounting thermostats.

Controls with outdoor bulbs require that the outdoor bulb be shielded from direct radiation from the sun. Unit mounted sensors are factory located and mounted.

SECTION IV – PRE START-UP

Do not attempt start-up without completely reading and understanding this manual, along with the Digital Control System user manual (if applicable).

Pre Start-Up

The owners representative or equipment operator should be present during start-up to receive instructions on care and adjustments of the equipment.

All equipment has been factory tested, adjusted and inspected to meet conditions set at the time the order was placed. Only minimal adjustments should be required. All information in this service manual is typical. All products are semi-custom and changes may occur.

CAUTION: Line side of disconnect may be energized. Follow proper “lockout/tagout” procedures.

NOTE: A qualified service engineer should perform all servicing and adjustments of the High Static Fresh Air Supply Heater.

Perform a visual inspection, internally and externally, to make sure no damage has occurred and that everything is secure. This inspection is very important and should be completed with great care given to detail. A good pre-start inspection will insure against possible unit damage on start-up and will save valuable analysis time.

1. Check that the physical condition of the unit exterior is acceptable.
2. Check that any insulation inside the unit is properly secured.
3. Check all terminals for loose connections and inspect all wiring terminations to insure that all crimped connections are tight.
4. Check set screws on all fans for tightness.
5. Check voltage supplied to disconnect switch; the maximum voltage variation should not exceed + 10%. Phase voltage unbalance must not exceed 2%.
6. Check thermostat(s) for normal operation.
7. Check that system duct work is installed and free of obstructions.
8. Check that fan turns freely.
9. Check that the area around the unit is clear of flammable vapors or containers of flammable liquids.
10. Check that all piping connections, particularly unions, are tight. Check all piping for leaks.
11. Check that all accessories requiring field wiring have been properly installed.
12. Check that filters, accessories and any ship loose items are installed properly.
13. Check that all manual shut-off valves are closed.
14. When failure or malfunction of this heater creates a hazard to other fuel burning equipment, (e.g. when the heater provides make-up air to a boiler room), the heater is to be interlocked to open inlet air dampers or other such devices.
15. Motor overload relay setting should match the motor's nameplate full load amperage.
16. Check any dampers or mixing boxes (if supplied). Make sure all damper linkage is free to move and no binding will occur. If dampers are of the modulating type, check control capillary tubes to insure that the tubes and bulbs are in the proper location and will not rub against any other parts.
17. Check that all fuses are installed.
18. If optional Piezometer Ring is supplied, check to make sure it is properly connected.

SUGGESTED TOOLS AND INSTRUMENTS

Volt/Ohm meter
Ammeter/Amprobe (or equal)
Standard Hand Tools

D.C. Volt Meter
Equipment Touch (KP-02) for DDC Controls (if applicable)

SUGGESTED CONTROLS SETTINGS

PS-12	Clogged Filter Switch.....Adjust to field condition	TC-06	High Limit Discharge Ductstat..... 100° F
RE-21	Time Clock.....Customer Discretion	TC-07	Low Limit Discharge Ductstat.....60° F
TC-01	Room Thermostat Customer Discretion	TC-08	Freeze Thermostat.....45° F & 3 Minutes
TC-02	Modulating Discharge Ductstat..... 70° F	TC-58	Night Setback Thermostat....Customer Discretion
TC-03	On-Off Inlet Ductstat.....65° F		

SUGGESTED CONTROLS SETTINGS FOR OPTIONAL DDC CONTROLS

(Refer to Digital Control System user manual for default settings)

TS-02	Space Temperature Sensor..Customer Discretion	MP-05	Damper Control Potentiometer.....Customer Discretion
KP-02	Touchscreen Module Customer Discretion	MP-15	Unit Enable Potentiometer...Customer Discretion
		PT-13	Building Pressure Transducer.....Adjust to Field Condition

SECTION V – UNIT START-UP WITHOUT DDC CONTROLS

Before attempting to start the unit read and understand the sequence of operations and electrical schematic.

WARNING: During installation, testing, servicing and trouble shooting of this product, it may necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components to perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Make sure all doors and service panels have been closed or replaced.

Turn main disconnect switch off. Check the incoming line voltage to match unit nameplate rating. If voltage is over +10% of nameplate rating or phase voltage unbalance is over 2%, notify contractor or power company.

If power supply meets requirements turn main disconnect switch on. Turn Fan “on-off” switch to “on” position. Face and By-Pass damper(s) opens and the blower runs.

Check that all amp draws do not exceed nameplate ratings and overloads are set to nameplate amps.

Check to make sure all dampers and controls are working properly.

Turn Fan “on-off” switch to “off” position.

SECTION V – UNIT START-UP WITH DDC CONTROLS

Before attempting to start the unit read and understand the sequence of operations, electrical schematic, control component and the Digital Control System user manual.

WARNING: During installation, testing, servicing and trouble shooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components to perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Make sure all doors and service panels have been closed or replaced.

Turn main disconnect switch off. Check the incoming line voltage to match unit nameplate rating. If voltage is over +10% of nameplate rating or phase voltage unbalance is over 2%, notify contractor or power company.

Fans Are Enabled And Disabled By The Following:

MRT-Touch or MDT-Touch with an Equipment Touch (KP-02):

To **enable** the fans, go to the Modes screen and change the Unit Mode to **Manual**. This mode will enable the fans.

To also **enable** the fans, go to the Modes screen and change the Unit Mode to **Auto**. This mode has five different functions that control the fans and unit operation. They are a Time Clock, Heating and Cooling Night Setbacks, a signal from an external source to an auxiliary digital input, and a network enable signal from a building automation system.

To **disable** the fans, go to the Modes screen and change the Unit Mode to **Off**.

NOTE: An Equipment Touch or PC is required to change Unit Modes. For a more detailed control sequence see the Digital Control User Manual.

If power supply meets requirements, turn main disconnect switch on and Enable fans. Dampers and the blower fan turns on. (See operating modes in Digital Control System user manual).

Disable the fans.

Enable the fans. Check that all motor amp draws do not exceed motor nameplate ratings and overloads are set to motor rating plate amps.

Check all dampers for proper operation, and linkage does not bind, see “Sequence of Operation”, and Digital Control System user manual for damper control modes.

Disable the fans.

Heat is Enabled By The Following:

MRT-Touch or MDT-Touch with an Equipment Touch (KP-02):

To **enable** the heat, go to the **Setpoints** screen in the Equipment Touch and enter the desired Heating Occupied and Night Setback setpoints.

Energy Savings Modes:

There are three (3) Energy Savings Modes that could disable the unit.

NOTE: An Equipment Touch or PC is required to change Setpoints. For a more detailed control sequence, see the Digital Control System Users Manual.

Sequence and Unit Setup with DDC

The I/O Zone 583 Controller (UC-01) must be calling for the unit to be enabled. You will need to disconnect the plug where the Outside or Inlet Air Temperature Sensor (TS-01) and Discharge Air Temperature Sensor (TS-03) are wired to the I/O Zone 583 Controller (UC-01). Reconnect the plug if you are getting close to the Freezestat lockout time, which is approximately 3 minutes. To reset the Freezestat alarm, simply turn the power off and back on at the disconnect switch.

NOTE: An Equipment Touch or PC is required to change settings. See the Digital Control System User Manual for a more detailed sequence of operation.

CAUTION: You will have approximately three (3) to nine (9) minutes (user-configurable by adjusting the Freezestat Buffer Time setpoint) before the unit shuts down on Freezestat (Low Discharge Temperature), if you have disconnected plug wires TS-01 and TS-03.

Enable the fan and heat as described earlier in this section.

FINAL CHECKS AND ADJUSTMENTS

Check voltage and amperage on all motors.

Check all dampers, linkages, and locking quadrants to make sure they are secure and operating correctly.

SECTION VI - UNIT SHUTDOWN

A. Extended Shutdown

1. Open the main electrical disconnect switch.

SECTION VII - TROUBLESHOOTING

Symptom	Cause	Remedy
<p>A. Supply fan does not operate.</p>	<ol style="list-style-type: none"> 1. Low or no voltage. 2. Fuse(s) blown. 3. Customer's interlock not closed or connected. 4. Fan "on-off" switch in "off" position. 5. Freeze protection tripped. 6. Overload protection on motor tripped. 7. Motor may be burned or incorrectly wired. 8. Time clock or field installed controls not closed. 9. Night set back thermostat not closed. 	<ol style="list-style-type: none"> 1. Check power source. 2. Replace fuse(s). 3. Close or connect customer interlock. 4. Switch to "on" position. 5. Check stat and settings, reset by re-cycling the power. Check sensor and location. 6. Reset by pushing red button, check amp draw. 7. Turn power off and check motor and wiring. 8. Check time clock and field installed controls for correct settings and voltage. 9. Check night set back thermostat for correct settings.
<p>B. Return air or outside air damper not functioning properly (see sequence of operations).</p>	<ol style="list-style-type: none"> 1. Damper motor and/or end switch not wired correctly or defective. 2. Thermostat, relays and/or potentiometer not wired correctly or defective. 3. Dampers binding and/or loose. 	<ol style="list-style-type: none"> 1. Check wiring and/or replace end switch. 2. Check wiring and/or replace bad components. 3. Check and/or replace.

SECTION VII - TROUBLESHOOTING WITH DDC CONTROLS

Symptom	Cause	Remedy
<p>A. Supply fan does not operate.</p>	<ol style="list-style-type: none"> 1. Low or no voltage. 2. Fuse(s) blown. 3. Customer's interlock not closed or connected. 4. Fan is disabled. 5. DO-1 on UC-01 not energized. 6. RE-57 contacts not closed. 7. Freeze protection tripped. 8. Overload protection on motor tripped. 9. Motor may be burned or incorrectly wired. 10. Auxiliary Unit Enable Switch (SW-09) not closed. 11. Multiplexed voltage values not correct. 	<ol style="list-style-type: none"> 1. Check power source. 2. Replace fuse(s). 3. Close or connect customer interlock. 4. Enable the fan(s). 5. See digital control system user manual. 6. Check power source and/or replace. 7. Check stat and settings, reset by re-cycling the power. Check sensor and location. 8. Reset by pushing red button, check amp draw. 9. Turn power off and check motor and wiring. 10. Close switch (if applicable). 11. See multiplex voltage value chart.
<p>B. Return air or outside air damper not functioning properly (see sequence of operations for damper control).</p>	<ol style="list-style-type: none"> 1. Building Pressure Transducer (PT-13), Damper Control Potentiometer (MP-05), or Photohelic Controller (PS-13) defective or not calibrated. 2. Building Pressure Transducer (PT-13), Damper Control Potentiometer (MP-05), or Photohelic Controller (PS-13) defective or not wired correctly. 3. Building Pressure Transducer (PT-13), Damper Control Potentiometer (MP-05), or Photohelic Controller (PS-13) defective or not installed correctly. 4. Unit Control Module (UC-01) defective. 5. Unit Control Module (UC-01) not wired correctly. 6. Two position switch defective. 7. Damper motor defective. 8. Dampers binding and/or loose. 	<ol style="list-style-type: none"> 1. Check and/or replace components. See section on trouble shooting PT-13. 2. Check wiring and/or replace bad components. 3. Install correctly. See section on trouble shooting PT-13 and manufacturer's cut sheet. 4. Check and/or replace. Contact Factory. 5. Check wiring. 6. Check and/or replace. 7. Check and/or replace. 8. Check and repair.

SECTION VII - TROUBLESHOOTING WITH DDC CONTROLS

To Calibrate the Building Pressure Transducer (PT-13)

1. Disconnect the tubes from the transducer.
2. **Make sure the Low and High fittings are clean and clear (do not insert any sharp objects into the pressure fittings). Make sure the tubing is also clean and clear of any debris.**
3. Connect the High and Low ports on the transducer together with a short length of tubing. Do not allow any kinks in the tubing.
4. Place the rotary switch into the [+/-] position. The current directional mode will show on the display. Press the NEXT button until -bl shows on the display.
5. Place the rotary switch in the [OUT] position. Press the NEXT button until 0 – 5 shows on the display.
6. Place the rotary switch into the [0] position. The display will show Aut0.
7. Press the NEXT button. The display will show a series of progress bars starting with one bar and ending with four. When the Auto Zero process is complete, the display will show “done” for approximately 4 seconds, then Aut0.
8. The voltage at Voltage Out and Gnd/4-20mA Out should now be 2.5 VDC.
9. Return the rotary switch to the [R1] position.
10. Reinstall the tubes on the transducer. **It is very important that the High tube be placed inside the building, and positioned so that air movement does not affect it. The Low side should be to atmosphere, and positioned so it is not exposed to the weather.**
11. With the use of an Equipment Touch (KP-02) place the unit in the Building Pressure mode. (See the Digital Control System User Manual).
12. The voltage at Voltage Out and Gnd/4-20mA Out will vary between 0 to 5 VDC. 0 VDC means the building is in a negative pressure and should open the Outside Air Damper and close the Return Air Damper. 5 VDC means the building is in a positive pressure and should open the Return Air Damper and close the Outside Air Damper.

PT-13			
Bapi P/N	Mestex P/N	Range	Rotary Switch Position
ZPS-LR-EZ-NT-IN	68.0330.82	± 0.1 IN WC	R1



SECTION VII - TROUBLESHOOTING WITH DDC CONTROLS

To Calibrate the Piezometer Ring Transducer (PT-17)

1. Disconnect the tubes from the transducer.
2. Make sure the Low and High fittings are clean and clear (do not Insert any sharp objects into the pressure fittings). Make sure the tubing is also clean and clear of any debris.
3. Connect the High and Low ports on the transducer together with a short length of tubing. Do not allow any kinks in the tubing.
4. Place the rotary switch into the [+/-] position. The current directional mode will show on the display. Press the NEXT button until -UNI shows on the display.
5. Place the rotary switch in the [OUT] position. Press the NEXT button until 0 - 5 shows on the display.
6. Place the rotary switch into the (0) position. The display will show Auto.
7. Press the NEXT button. The display will show a series of progress bars starting with one bar and ending with four. When the Auto Zero process is complete, the display will show "done" for approximately 4 seconds, then Auto.
8. Return the rotary switch to the [R5] position.
9. Reinstall the tubes on the transducer. It is very important that the High side be piped to the static pressure probes on the intake plenum section. The Low side should be piped to the piezometer ring, and positioned carefully along the casing so that it does not obstruct the plenum fan.
10. With the use of an Equipment Touch (KP-02), place the unit in the Piezo Ring mode. (See the Digital Control System User Manual to operate in the unit in Piezo Ring Mode).

PT-17			
Bapi P/N	Mestex P/N	Range	Rotary Switch Position
ZPS-SR-EZ-NT-IN	68.0330.83	+/- 5 IN WC	R5



SECTION VIII - MULTIPLEXED VOLTAGE CHART

RESISTOR VALUE	RESISTOR ID	SWITCH CLOSED	OHMS IN CIRCUIT	VOLTS DC
1000	RS1	RS1,2,3,4	0	0
2000	RS2	RS2,3,4	1000	0.30
4020	RS3	RS1,3,4	2000	0.55
8060	RS4	RS3,4	3000	0.76
MULTIPLEXED VOLTAGE VALUES		RS1,2,4	4020	0.95
		RS2,4	5020	1.10
		RS1,4	6020	1.24
		RS4	7020	1.36
		RS1,2,3	8060	1.47
		RS2,3	9060	1.57
		RS1,3	10060	1.65
		RS3	11060	1.73
		RS1,2	12080	1.80
		RS2	13080	1.87
		RS1	14080	1.92
		NONE	15080	1.98
		UNPLUGGED	NA	3.30

IN-3	JUMPER	RS-04	100% OA or 100% OUTPUT	= 1.92
TO	JUMPER	RS-03		
GND	JUMPER	RS-02	FREEZE STAT	= 1.36
	SW-72	RS-01	FAN STATUS	= 1.73
			CLOGGED FILTER	= 1.87
IN-4	TC-08	RS-04	AUXILIARY UNIT ENABLE	= 1.92
TO	RE-65	RS-03		
GND	PS-12	RS-02		
	SW-09	RS-01		

CHECK ALL TERMINAL CONNECTIONS FOR TIGHTNESS

The DC voltage is to be checked at the UC-01 board

With the Fan Enabled:

When the fan status relay (RE-65) is energized, the contacts will close and the VDC at IN-4 & GND will be 1.73.

SECTION IX - MAINTENANCE SCHEDULE AND LUBRICATION REQUIREMENTS

WARNING: Failure to comply with the general safety information may result in extensive property damage, severe personal injury or death.

Periodic maintenance is essential to the efficient operation and extended service life of this equipment. Failure to provide maintenance as recommended may void the equipment warranty.

A. Maintenance Schedule

1. Monthly

- a. Check all valves, piping and connections for leaks.
- b. . Inspect filters. Clean or replace as necessary.
- c. Check all dampers, damper actuators and linkages. Adjust and tighten if necessary.
- d. Inspect area and make sure that no combustible or hazardous material has been stored within clearances as shown on the specification plate.
- e. Check for any vibration or unusual noise. If any is observed, locate the cause and correct.
- f. Ensure the supply and discharge remain clean and open.
- g. Check and clear air sensing tubes and fittings. CAUTION: Remove tubes from switches and transducers before using compressed air to blow through tubing.

2. Quarterly

- a. Complete the monthly maintenance schedule.
- b. Check the voltage and amps on all motors.
- c. Check the operation of all safety limits and controls. Clean and recalibrate or replace.
- d. Inspect all electrical components, connections, and terminals. Clean or replace and tighten as necessary.
- i. **For DDC Controls: Check that the battery in the UC-01 controller has 3 VDC. CAUTION: Do not remove the battery with the power to the unit turned off.**

3. Off Season or Yearly

- a. Complete the monthly and quarterly maintenance schedules.
- b. Inspect, and if necessary, clean all fan wheels.
- c. Check all nuts and bolts for tightness.
- d. Check the hot water or steam piping for any leaks or blockages.
- e. Lightly oil all door latches.
- f. The finned tube heater element should be cleaned by blowing compressed air through the section in the direction opposite of normal air flow.

NOTE: Keep screened air intakes clear of obstructions at all times.

1. Dampers – Dampers should be inspected monthly (**daily in icy weather**) for securely fastened linkages, and smooth operation. If dampers are binding or excessively noisy, then lubrication may be required. Place one drop of #20 wt. machine oil, silicone spray, graphite or equal on each blade bearing, and linkage ball joint. Do not over lubricate, and wipe any excess from the area. Be sure to note that dampers over 49 inches long have intermediate bearings which require lubrication.

2. Louvers – Louvers should be inspected monthly (**daily in icy weather**) to insure they are clean and clear.

B. Air Filters

All filter banks should be equipped with a manometer or differential pressure switch to indicate when the filters are dirty. Filters should be replaced when the differential pressure across them reaches the manufacturer's recommended final value. Dirty filter elements should be replaced with a clean element of the same type and size. In addition, the factory not only suggests, but insists, that air filters be **checked every 30 days (daily in icy weather)** and replaced with new filters (throw-away type) or cleaned (washable type) as required. Cleanable filters should be given new application of filter coating after washing to maintain optimum filter performance.

The frequency of cleaning and replacing air filters applies twelve months of the year, **where blowers are used for ventilation and heating.**

C. Gaskets

Gaskets are used on doors, inspection covers, some filter racks, and some outdoor air dampers. Inspect gaskets periodically and repair or replace as required.

D. Caulking

Inspect cabinet and add caulking as required.

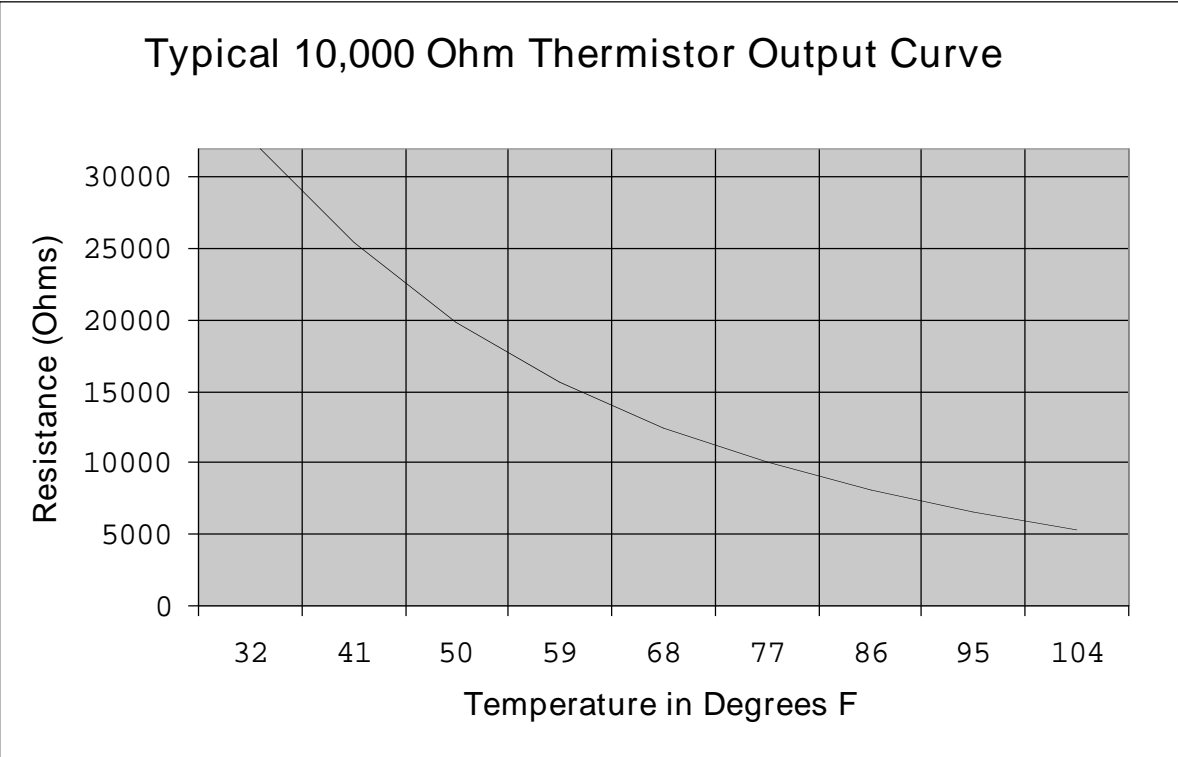
E. Casing

Periodic cleaning of the casing is recommended to remove dirt, grease and any corrosive substances that may harm the finish. Rusted or corroded spots should be cleaned and repainted.

F. Support Means

Inspect the entire unit to be sure everything is firmly in place.

**SECTION X - THERMISTOR OUTPUT CURVE
FOR UNITS WITH DDC CONTROLS**



SECTION XI - REPLACEMENT PARTS

Replacement parts may be ordered from the factory. All warranty parts will be shipped freight allowed from the factory via standard ground service. Warranty parts must be returned within 30 days. Credit will be issued if part is complete, defective and returned on time.

When parts are ordered, MODEL NUMBER, SERIAL NUMBER, FACTORY ORDER (F.O.) AND PART NUMBERS are required. Belts, filters and fuses are not covered under warranty.

Dealer/Contractor Name: _____

Address: _____

City: _____

State: _____ Zip: _____ Ph: _____



4830 Transport Drive, Dallas, TX 75247
Phone: 214-638-6010
www.ljwing.com