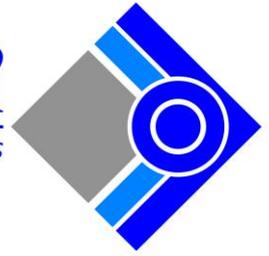


GENERAL INSTRUCTIONS

FOR MOUNTING, FITTING, CONNECTING &
CHECKING a **L. LAIR** HEATING UNIT
SYSTEM MAIN ELEMENTS



L.LAIR
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INTRODUCTION

The following instructions are based on the supply by L. LAIR Company of a complete heating unit. Its includes components such as:

- Burner (with or without gas manifold).
- Combustion chamber or front plate.
- Gas fuel supply set.
- Electrical panel control and safety device cabinet (with or without T°C regulations).
- Temperature sensor (s), High Temperature safety, Gas pressure control & safety switches, etc...

☞ This manual provides information in the use of the burner &/or a gas heating system for its specific design purpose. Do not deviate from any instructions or application limits described herein without written advice from L. LAIR Company.

☞ In case of doubt, do not hesitate to contact L. LAIR Company for more information or further advices.

PRELIMINARY REMARKS

- This manual provides general information for the use of burning equipments and additional components in the conditions for which they have been designed and fitted.
- Read carefully this entire document with the specific instructions that relate to it before connecting the heating unit equipment.
- Specific instructions supplied by the manufacturer of the whole installation into which our equipment is integrated take precedence over all other concerns as long as they do not affect either the correct operation or safety of the heating unit as a whole. It is the user's responsibility to check for the presence of such specifications, standards, recommendations or other specific conditions.
- In case of inconsistency between any of the instructions supplied by L. LAIR Company and the local standards, specific regulations, etc., please contact L. LAIR Company before commissioning.
- If you do not understand any part of these instructions, please contact L. LAIR Company for further information.

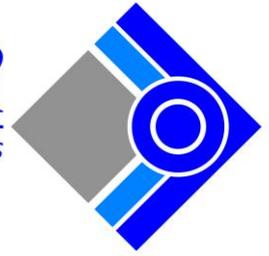
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GENERAL INSTRUCTIONS FOR MOUNTING, FITTING, CONNECTING & CHECKING a L. LAIR HEATING UNIT SYSTEM MAIN ELEMENTS

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SAFETY

☞ In this section, you will find fundamental notices about safe operation of a burner system or material of L. LAIR Company.

- Do not deviate from any instruction without written consent from L. LAIR Company.
- Read carefully this entire document before you attempt to start the system well designed by L. LAIR Company or try to manipulate one of its components.
- The burners covered in this document are designed to mix fuel with air and burn the resulting mixture. All gas burning devices are capable of producing fires and explosions when improperly applied, installed adjusted, controlled or maintained.
- Do not bypass any safety feature. You can cause fires and explosions. Moreover, you could affect human beings by letting out noxious substances.
- Never try to light the burner if the burner shows signs of damage or malfunctioning.
- The burner and duct sections are likely to have HOT surfaces. Always wear protective clothing when approaching the burner.

 **CAUTION!** Attempting to start the system which will receive the different components presented in this manual without any control on the basic machine according to EC Standards is strictly forbidden.

☞ SKILLS:

- Regulating, maintenance and recovery operations of mechanical and electric components of the burner or heating equipment shall only be executed by qualified, authorized, awarded and experienced personnel who have received an appropriate technical formation in specific sector of burning component and security in flame and gaz.

☞ SERVICE ENGINEER TRAINING:

- The best way to guarantee safety is to have a qualified and watchful alert technician. It is essential to focus on technicians' formation and replaced them when necessary so they are perfectly in adequacy with the functioning and the use of the components on burners installations.
- L.LAIR Company is registered as a training centre and accredited to give specific formation on burning equipments and components of its sector. Internship agreement is available at the administrative centre. Please contact our head office (contact@lair.com.fr).
- The global running of the equipment as a whole is directly linked to its valid installation. It is necessary to read the general use terms concerning the global equipment on which is installed the different components provided by L. LAIR Company.
- For some systems as VEIN'AIRNOX series, the burner is designed for air direct firing. The heated air will be going to the inside of the general equipment. This air, needed by the process air duct is generally used for burner air combustion (except burner series with Air Combustion Blower incorporated).
- The burner is designed for natural gas, LPG or Biogas (then gas and its pressure is given by the customer at the order, a long time before delivery).
- The whole system burner/gas line/electrical panel/combustion chamber or front plate is designed and wired in L. LAIR Company.

☞ According to our scope of supply, each component is fully tested before delivery (tests FAT). Some are pre adjusted but final regulations are proper to every system model but also to each kind of gas, depending on the type of installation (Conditioner, Oven, Dryer, Oven Incubator, Oxidizer, Incinerator, Boiler, Air Exchanger, etc. ...).

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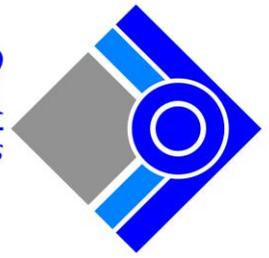
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SAFETY

- Make sure the area is clean.
- Inspect the whole system, ensure that all components are clean and free from damage.
- Use appropriate support and handling equipment when lifting the burner.
- Protect the system from weather, damage, dirt and moisture.
- Protect the system and its components from excessive temperatures and humidity.
- Store the components in a cool, clean and dry room.
- After making sure everything is present and in good condition, keep the components in original packages as long as possible.

- Don't bypass any safety feature! You can cause firing &/or explosions and danger.
- Any operations as adjustments, installation, wiring, maintenance and troubleshooting of the mechanical and electrical parts of any system should be done by qualified personnel with good aptitude and experience with gas combustion equipment's and safety.
- The best safety precaution is an alert and competent operator. Thoroughly instruct new operators so they demonstrate an adequate understanding of the equipment and its operation. Regular retraining must be scheduled to maintain a high degree of proficiency.

☞ *The following instructions must be installed close to the heating equipment (exclude from L. LAIR scope of supply):*



Flame prohibited.



No smoking.



Access only permitted to operating staff.

☞ Fire-fighting facilities and gas leak detection system and safety must also be installed close to the heating unit.

These instructions are not restrictive, and it does not take the place of the specific instructions for some components (such as servomotors or regulators, etc.). In the case that L. LAIR Company only supplies a part of a complete system, its liability is not committed for the whole. In particular, if the electrical control cabinet is not supplied by L. LAIR Company, we decline any responsibility for the compatibility of the components of the designed system as well as any cross connection.

L. LAIR Company systems are designed to minimize the use of materials that contain crystalline silica. Examples of these chemicals are respirable crystalline silica from bricks, cement or other masonry products and respirable refractory ceramic fibers from insulating blankets, boards, or gaskets. Despite these efforts, dust created by sanding, sawing, grinding, cutting and other construction activities could release crystalline silica. Crystalline silica is known to cause cancer, and health risks from the exposure to these chemicals vary depending on the frequency and length of exposure to these chemicals. To reduce the risk, limit exposure to these chemicals, work in a well-ventilated area and wear approved personal protective safety equipment for these chemicals.

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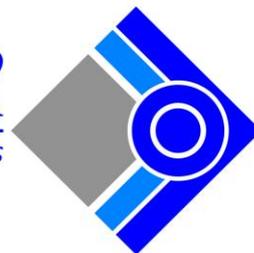
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GAS PIPE LINES CLEANING

Before connecting the heating unit, clean all the gas pipe work with compressed air before installation and with nitrogen after installation on site to remove any dust and other impurities from the supply system and to purge the whole pipes.

☞ *The performance of the burner and its equipments can be seriously affected when impurities block the gas emission ports.*

* FAN POSITION:

- As for any electrical equipment, the best position is a clean, cool and dry place, clear of passageways but easy to access for maintenance.
- If it is impossible to have a proper environment, protect the installation against excessive irradiated heat, hot convection gases, drips of liquid, condensation, etc...
- If the air is dirty or polluted, provide a filter for the combustion air at the fan inlet and/or bring in unpolluted air through a duct.
- If the installation is in a pit, mechanical ventilation is often necessary, or compulsory if the fuel used is "LPG", as it is heavier than air.

FRONT or SIDE PLATES / CASINGS INSULATED BOXES

- Check the airflow direction in which the casing or box must be fitted.
- The casings have been designed to withstand only their own weight & the weight of the burner and its associated equipment. The ducting must be supported by its own frames.
- Inspection window(s) and access door(s) must always be kept clear.
- There must be compensation for expansion due to high temperature.
- The flanges or front/side plate / buffer require the installation of a gasket depending on the temperature level of the heated fluid and sometimes a thermal break. This choice is the responsibility of the installer.
- The bolts and nuts to be used for tightening the inlet / outlet flanges of a casing or a front/side plate / buffer remain the responsibility of the customer or the installer.
- The tightening torque of the inlet / outlet flanges of a casing or of a front plate / buffer remain the responsibility of the customer or the installer and depending on the type of gasket that he has defined and installed.
- The customer or the installer must allow easy human access upstream and downstream of the burner or the box equipped with its burner using suitable equipment installed on its machine.

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INSTALLING A BURNER - HEATING SYSTEM

- Provide an inspection window or a peep sight of adequate size for pilot and main flame observation.
- The large casings in which the burners are installed must be fitted with an access door for inspection (in order to guarantee maximum maintainability). If this is not provided in our supply (optional equipment), it is to be provided by the customer or the installer when installing the machine in which our equipment is integrated.
- Do not forget that large burners undergo considerable expansion when firing. Ensure that the burners can expand freely to avoid the breakage of parts due to the operating temperature.

☞ *Burner can only operate if several conditions are met (list that can be added to):*

- ✓ Burner must be securely supported to avoid misalignment of the burner in the duct.
- ✓ Supports should allow for thermal expansion of the burner and duct as the temperature of the components increase. Piping expansion joints should be used outside of the duct to accommodate movement of the duct section when heated. Avoid large obstructions in the airflow from support causing uneven airflow into the burner. Do not forget the gaskets (see above).
- ✓ Use low profile supports such as flat iron to minimize flow disturbances.
- ✓ Use brackets or hangers to support the piping. If you have questions, consult your local gas company.
- ✓ Ventilation of the installation must be set up correctly.
- ✓ The adjustable profile plates must be adjusted if required to regulate the speed of the airflow for the burner.
- ✓ Pressure regulator (with or without safety devices) must be calibrated according to the pressure planned at the time of the order.
- ✓ Temperature regulator must be demanding heat (set temperature above the ambient temperature).
- ✓ Manual inlet gas valve must be open.
- ✓ Air and gas safety devices must be adjusted (reminding: a pre adjustment is done in the L. LAIR Company during the tests before delivery).
- ✓ The overheating safety device of the burner must be adjusted according to the maximum planned operating temperature.

It must be understood that L. LAIR Company liability for its product (s), whether due to breach of warranty, negligence, strict liability, or otherwise is limited to the furnishing of replacement parts and L. LAIR Company will not be liable for any other injury, loss, damage or expenses, whether direct or consequential, including but not limited to loss of use, income, or damage to material arising in connection with the sale, installation, use of, inability to use, or the repair or replacement of L. LAIR Company products. Any operation expressly prohibited in this manual, any adjustment, or assembly procedures not recommended or authorized in these instructions shall avoid the warranty.

At the first commissioning, it is necessary to repeat &/or control all the pre-adjustments made by L. LAIR Company, and in particular:

- Adjustment of the air combustion pressure inside the burner,
- Adjustment of the duct air pressure drop across the burner and duct air speed,
- Adjustment of the pilot flame and gas control valve (s),
- Adjustment of the safety devices.
- Once the high and low fire conditions have been set, cycle the burner from high to low fire several times to check repeatability of settings.

☞ Only follow the instructions supplied or written & validated by L. LAIR Company.

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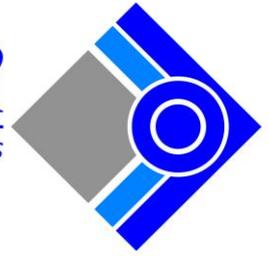
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PREPARATION WORKS

➤ **Before any start up or commissioning, please, check the following items:**

- Check the burner installation (or the front plate/casing/burner assembly). Check its position in relation to the air direction.
 - Connect the gas set to the supplied gas line; check the connections for leaks; check that the available pressure matches that for which the set has been designed. The gas pipes must be installed by skilled and approved staffs that are fully trained for safety with gas fuels. The burner L. LAIR Company fitted is designed for the gas and the operating pressure gave at the order by the customer. The customer's installer must decide the diameter of the pipework and any regulator and accessory sets, on the basis of the gas flow that has been communicated, as well as on the basis of the initially planned operating pressure. Never take the diameter of the burner connection as a basis (a gas pipe can never be too big).
 - Connect the control and safety cabinet to the electrical supply. If the control cabinet is remote from the gas set, connect the electrical components of the gas set to the terminals of the cabinet in accordance with the wiring diagram supplied and/or validated by L. LAIR Company. Check this wiring carefully. Usually, the various components of the burner/gas set equipment (valves, gas pressure switch (es), air pressure switch (es), ignition transformer, etc.) have already been connected to the burner in L. LAIR Company. In most of the cases, only the connection between the general electrical cabinet and the burner remains to be made on site.
 - Connect the remote components to the electrical cabinet: the type and number of these connections vary according to the burner or the L. LAIR equipment. Generally, it is a question of the ignition unit, the flame monitoring (ionising sensor(s) or UV cell(s)), the ignition transformer, the duct air pressure switch or differential pressure switch, the combustion air pressure switch and/or the combustion air fan motor. The high-tension wiring cable for spark ignitor must be totally separated from the others wiring cables devices.
 - Connect the control servomotor if this is not included in the wiring of the gas set. Follow the instructions of the manufacturer of this motor.
 - Install the temperature sensors; the choice of position of these sensors is not necessarily decided by L. LAIR Company but by the fitter of the whole installation, given that their correct operation depends on the process parameters.
 - Make the electrical connection between the regulator(s) and the temperature sensor(s). The appropriate cable wiring should be used, its type depending on the type of regulator and the temperature range. Follow the manufacturer's instructions and/or the electrical diagram supplied or validated by L. LAIR Company.
 - Check that the cables are not close to or touching a hot surface; this applies in particular to the temperature sensor connection cables.
 - Connect the various vents of the gas sets to the exterior of the building, using steel pipe. In general, but not exclusively, this applies to gas regulators and/or pressure switches depending on the pressure and the equipment used.
 - If LPG is used, any setting out must be done by the customer.
 - If provided on the UV cell burner flame control, the sensor cooling must be connected by the customer to their compressed air network, filtered, dry, clean and oil-free instrumentation air (P counter / back pressure form combustion chamber +10mb—Q=3Nm³/h).
- Any modification for mounting or installing an L. LAIR Company burner, system (s) or component (s) should not be done without a clear & written document from L. LAIR Company.

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RECOMMENDED WIRING FOR MEASURING AND CONTROL DEVICES

- **MEASUREMENT CABLE:** Relates to low power signal cables. Thermocouples, Resistance thermometer (Pt 100, Ni 100, etc...), Current (0-20 mA, 4-20 mA), Voltage (0-10 V, 0-5 V etc...), Flame control, Logic signals (Dry contact, frequency or pulse inputs). These signals should be in their own trunking, or if not, be as far as possible from other cables. These signals must be connected with standard shielded cable (internal twisted wires and shielding by metal braid connected as short as possible to the device ground).
- **POWER SUPPLY CABLE:** Concerns the cables for the power supplies of measuring devices. Usually encountered voltages: 24, 48, 115, 230 V AC; 12, 24, 48, 110 V DC. These power supplies must not come directly from the power supplies (isolation transformer). To eliminate common mode phenomena, it is preferable to separate the power cables from the power cables at the level of the general transformer. } **POWER CABLE:** Concerns the cables of power components. Power supply for motors, heating resistor, solenoid valve, relay, etc. These cables are the main source of industrial disturbance and must therefore be confined in separate and closed chutes (Faraday cage). }
- **PROTECTIONS:** The relaying zones must be separated from the measurement signal processing zones. Connect RC networks to the terminals of the interfering self-inductors (relaying, solenoid valve, etc.).
- **EQUIPOTENTIALITY:** The mass of the measuring devices and the surrounding masses must be connected to each other by short links and large sections. To guarantee a good equipotentiality of the site, it is necessary to multiply the interconnections (mesh of the masses). Trunking is a good way to make interconnections between cabinets, provided that their electrical connections are taken care of. When laying cables (serial link, 4-20 mA, etc.) between two buildings, it is advisable to pull a 35 mm² cable at the same time connected at both ends to the earth. This bond attenuates the strong potential differences that appear during a lightning strike near one or the other of the buildings.

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**MAIN COMPONENTS CHECKING
AND MAINTENANCE ROUTINE**

(non-exhaustive list - depending on site/plant/workshop area conditions)

| COMPONENT | CHECK | Frequency |
|---|--|---|
| BURNER | Check for general fouling (body, gas ports, air wings, nozzles, mixing cones, etc...) Clean or replace damaged component(s) | 6 months / 1 Year <i>depending on the application or the operating periods</i> |
| Ignition devices | Check for general fouling. Retighten the wiring terminals. Clean or replace damaged component(s) | 6 months |
| Flame Rod sensor | Check for general fouling. Retighten the wiring terminals. Clean or replace damaged component(s) | 6 months |
| UV sensor (s) - UV tube limit: According to manufacturer data sheet SIEMENS = approx. 10 000 H | Check for general fouling. Retighten the wiring terminals. Clean or replace damaged component(s) | 6 months |
| Pipe Works | Check for leaks. (Welds, gaskets, etc.) Check for a clear passage / port. | 6 months/1 year |
| Isolating valves Manual adjustment valves | Check the sealing of gaskets and glands or replace component(s) if damaged. Check the component in manual mode | 6 months/1 year |
| Filter (s) | Check for leaks. Check for fouling. Clean or replace if damaged | 1 year |
| Main and/or Pilot gas pressure regulator (s) | Check for leaks. Check for general fouling. Clean, repair or replace damaged component(s) Check the operation of safety devices. | 1 year |
| Safety pressure sensors & devices | Check for leaks. Check fouling of pipe work. Check for correct operation. Clean or replace. | 6 months |
| Automatic safety Valves | Check for leaks. Check for correct operation. Repair or replace. | 6 months/1 year |
| Control motor and valve. Position control contact(s) | Check for leaks. Check for correct electrical and mechanical operation in manual mode and automatic mode. Check the min/max flow rate. | 6 months |
| Programmer/sequencer | Check & tight connections. Check the general operation. | 1 year |
| Any electrical device | Check & tight connections | 6 months / 1 year |
| Leak gas detection devices | Check & tight connections/calibrate all detectors | 6 months / 1 year <i>(according to manufacturer)</i> |

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L. LAIR is a partner, fitter and installation engineer for: **Honeywell**
Division combustion



CAUTION !



☞ **Only qualified, awarded and well-trained personnel are allowed to carry these instructions or procedures.**

- ⇒ Any operation from the whole or a single part of a heating system with gas burner must be done according to EC standards and must comply with all Machine Directives applicable to the gas system.
- ⇒ Make sure that the system is installed in such a way that anybody can get easy access for inspection, maintenance routine or replacement.
- ⇒ Do not bypass any safety feature! You can cause firing &/or explosions and danger.
- ⇒ Never try to repair a system if it shows signs of damage. Act with great care and following instructions of the manufacturer of the heating system.
- ⇒ Any operations as adjustments, installation, wiring, maintenance and troubleshooting of the mechanical and electrical parts of any system should be done by awarded and qualified technician with good aptitude and experience with gas combustion equipment's and safety.
- ⇒ The best safety precaution is an alert and competent operator. Thoroughly instruct new operators so they demonstrate an adequate understanding of the equipment and its operation. Regular retraining must be scheduled to maintain a high degree of proficiency.
- ⇒ L. LAIR is a TRAINING FRENCH REGISTERED COMPANY and can provide training courses for plant maintenance technicians / engineers that will help to keep process running and high safety degree.
- ⇒ For further information or for a material – system definition or design, please contact L. LAIR technical support to get the right advice and to find the best solution for your process.

⚠ According to Ets L. LAIR manufacturer's policy of continual products improvements, this data sheet is subject to change without previous notice.

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