



PAUL N GARDNER COMPANY
9104 GUILFORD ROAD, SUITE H
COLUMBIA, MD 21046 USA

EMAIL GARDCO@ALTANA.COM
PHONE +1-954-946-9454



INSTRUCTIONS

GARDCO DISTRIBUTED PRODUCTS



INSTRUCTIONS

LABORATORY OVENS

<u>MODEL</u>	<u>MAXIMUM OPERATING TEMPERATURE</u>
LO-201C	200°C
LR-271C	270°C
LW-201C	200°C

**LABORATORY OVEN GENERAL INSTALLATION, OPERATION AND
MAINTENANCE INSTRUCTIONS FOR
MODELS LO-201C, LR-271C & LW-201C**

TABLE OF CONTENTS

1	SHIPPING DAMAGE & HANDLING
2	PROPER OVEN APPLICATION
2-1	General
2-2	Flammable Solvents
2-3	Combustible Material
2-4	Personnel Hazards
2-5	Maintenance and Inspection
3	INSTALLATION
3-1	Location
3-2	Building Considerations
3-3	Clearances
3-4	Ventilation
3-5	Exhaust Ductwork
3-6	Thermometer
3-7	Electrical
4	PRIOR TO PLACING OVEN IN SERVICE
5	PROCESSING
6	SAFETY EQUIPMENT
7	MAINTENANCE
8	TROUBLE SHOOTING
9	APPENDIX A - REFERENCES
10	APPENDIX B - MINIMUM PERIODIC MAINTENANCE REPORT
11	APPENDIX C - PARTS LIST
12	APPENDIX D - WARRANTY AND LIMITATIONS OF REMEDIES

These GENERAL INSTRUCTIONS have been written for three models of ovens, therefore, some components referred to may not be present on your particular piece of equipment.

1 SHIPPING DAMAGE AND HANDLING

DO NOT RETURN DAMAGED MERCHANDISE TO US. FILE YOUR CLAIM AS OUTLINED BELOW

This merchandise has been thoroughly inspected and carefully packed before leaving our plant. Responsibility for its safe delivery was assumed by the carrier at the time of shipment. Claims for loss or damage to the contents must be made with the carrier, as follows:

1-1 VISIBLE LOSS OR DAMAGE

Any external evidence of loss or damage must be noted, at the time of delivery, on the freight bill or express receipt and signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier refusing to honor a damage claim. Make a written request for inspection by the carrier's agent within fifteen days of the delivery date. Review the inspection report and do not sign it unless it adequately describes the damage.

A claim must be filed with the carrier since such damage is the carrier's responsibility.

1-2 CONCEALED LOSS OR DAMAGE

Concealed loss or damage means loss or damage which does not become apparent until the merchandise has been unpacked. The contents may be damaged in transit due to rough handling even though the carton may not show external damage. When the damage is discovered upon unpacking, contact the carrier and make a written request for inspection by the carrier's agent within fifteen days of the delivery date. Review the inspection report and do not sign it unless it adequately describes the damage.

A claim must be filed with the carrier since such damage is the carrier's responsibility. By following these instructions carefully, we guarantee our full support of your claims to protect you against loss from concealed damage.

1-3 RETURNING DAMAGED EQUIPMENT

Damaged equipment will not be accepted at our factory unless we have been advised and instructions provided on how it should be returned. A copy of the freight claim must be provided prior to returning the equipment.

1-4 HANDLING

After inspection, store and handle all equipment and components in their original crates until ready for installation. Handle with care. The equipment may be heavy but some components are of a delicate nature. If the equipment is to be stored, keep it in the original crates and store in a location free from excessive dust, heat and moisture until ready for installation.

2 PROPER OVEN APPLICATION

2-1 GENERAL

- 2-1.1 While ovens are extremely versatile, they are usually purchased with a specific application in mind. If your process has changed significantly or if you should have reason to doubt that a specific application is a proper use of the equipment, consult the factory before proceeding.
- 2-1.2 Explanatory Material (Annex A1.1) of the National Fire Protection Association Publication 86 "Standard for Ovens and Furnaces" states; in part:
- "Explosions and fires in fuel-fired and electric heat utilization equipment constitute a loss potential in life, property and production."
- "Most failures can be traced back to human error. The most significant failures include inadequate training of operators, lack of proper maintenance, and improper application of equipment."
- 2-1.3 To protect the oven, oven contents, property and personnel, a responsible person should be in attendance during operation. **Do not operate oven unattended.** Special attention must be paid to:
- Setting correct temperature.
 - Placing flammable solvents in oven; these ovens are not designed for that purpose.
 - Placing combustibles in an oven that does not have adequate fire protection.
 - Allowing the product to remain in the oven too long, thereby encouraging combustion.
 - Using an oven for a process other than that for which it was designed.
- 2-1.4 Operator should turn off oven immediately and notify their supervisor if there is a change in performance and / or the excess temperature limit interlock trips – See 6-5.

2-2 FLAMMABLE SOLVENTS

- 2-2.1 This oven is not equipped for handling flammable solvents. Do not place items that produce flammable solvents or vapors in the oven, such as, but not limited to, paint, ink, solder mask, adhesives or other coatings. Introduction of such items into the oven may result in fire and/or explosion.
- 2-2.2 It shall be the user's responsibility to insure that flammable solvents are not placed in the oven and the operating temperature does not exceed the maximum rated temperature of the oven.
- 2-2.3 In areas outside of the oven where flammable solvents are given off by material prior to entering the oven, provisions shall be made to exhaust these vapors to atmosphere to prevent them from being pulled into the oven or collecting and creating a flammable mixture.

2-3 COMBUSTIBLE MATERIAL

2-3.1 Introduction of combustible materials (such as paper, cardboard or wood) into the oven should be avoided because it might cause a fire. Do not use combustible racks, trays, holders, spacers, etc. Periodically, clean all combustible material from non-combustible racks, trays, holders, spacers, etc. If combustible products must be processed in an oven, extreme care must be taken to ensure that the operating temperature does not exceed the ignition temperature of the product.

2-3.2 Ovens containing or processing sufficient combustible materials (including consideration for combustible drippings or deposits) to sustain a fire shall either be located in an area where a fire would not do damage or be equipped with an automatic fire protection system including areas in exhaust ducts that could accumulate combustible material. Fire protection systems should be installed in accordance with the applicable National Fire Protection Guidelines:

- Sprinkler Systems in accordance with NFPA 13
- Water Spray Systems in accordance with NFPA 15
- Carbon Dioxide Extinguishing Systems in accordance with NFPA 12
- Foam Extinguishing Systems in accordance with NFPA 11
- Dry Chemical Extinguishing Systems in accordance with NFPA 17
- Water Mist Systems in accordance with NFPA 750

The extent of protection required will depend upon the construction and arrangement of the oven as well as the materials handled. Fixed protection, such as automatic sprinklers or other types of fire extinguishing systems, should be designed and installed by a qualified contractor.

2-3.3 Drip pans shall be provided to collect any combustible materials that may accumulate beneath the product. Drip pans must be a minimum of 2" above perforated bottom of oven work space and allow 2" clearance around the edges. A maintenance program must be developed to remove any such accumulation before a dangerous build up occurs. If you cannot acquire drip pans locally, contact us for a quotation.

2-4 PERSONNEL HAZARDS

2-4.1 Heat processing equipment must always be used with caution. Proper equipment such as insulated gloves, safety goggles and tongs should be used for loading hot equipment. Proper supervision is essential and only trained personnel should be allowed to operate the oven.

Always remember you are working with elevated temperatures.

- Do not touch surfaces - they could be hot and burns could result.
- Do not breathe hot oven air. Heated air could burn lungs.
- Many items become dangerous when heat is applied. Explosion or fire could result. Make sure you know what you are putting in the oven can be heated safely at the oven operating temperature.

2-4.2 Disconnect power before servicing equipment by unplugging from electric outlet. Ovens operate under high voltage and electrical shock is possible. Proper lockout procedures should be followed.

2-4.3 Do not operate mechanical or electrical equipment with guards removed. Operating with guards removed could result in bodily injury.

2-5 MAINTENANCE AND INSPECTION

- 2-5.1 Regularly scheduled inspection and maintenance of all safety devices shall be performed by user. Failure to do this may result not only in fire or explosion damage, but also contribute to accidental shutdowns and loss of production. See Section 7 - "Maintenance" and Appendix B - "Minimum Periodic Maintenance Report".
- 2-5.2 Regularly scheduled inspection of the oven interior, heat chamber and ductwork shall be performed by user to determine need for cleaning and repair. Failure to do this may result in internal fires or component failure resulting in oven damage and loss of production.
- 2-5.3 It shall be the sole responsibility of the user to establish, schedule and enforce the frequency of and the extent of the inspection/maintenance program (as well as the corrective action to be taken) because only the user can know what the actual operating conditions are. Contact your insurance authority, Factory Mutual or the National Fire Protection Association, whose addresses are listed in Appendix B, for more information on inspection/maintenance programs.

2-6 RETROACTIVITY

This equipment has been designed and manufactured in accordance with applicable National Codes in effect as of the date of manufacture. It is the responsibility of the end user to update equipment as necessary to comply with future code changes. If you are in doubt, contact manufacturer to review your equipment design against current National Codes.

3 INSTALLATION

3-1 LOCATION

- 3-1.1 Ovens shall be located to protect them from damage by external heat, vibration and mechanical hazards.
- 3-1.2 Ovens shall be located to minimize exposure to power equipment, process equipment and sprinkler risers. Unrelated stock and combustible materials shall be maintained at a fire-safe distance but not less than 2-1/2 feet from an oven or ductwork.
- 3-1.3 Ovens shall be located to minimize exposure to people from the possibility of injury from fire, explosion, asphyxiation, and hazardous materials and shall not obstruct personnel travel to exit ways.
- 3-1.4 Ovens shall be located to prevent an ignition source to flammable coating dip tanks, spray booths, storage and mixing rooms for flammable liquids, or exposure to flammable vapor or combustible dust clouds. Ovens should not be located in hazardous (classified) locations unless they are designed to comply with the applicable requirements of NFPA 70 "National Electrical Code" (see Appendix A).
- 3-1.5 Equipment shall be protected from corrosive external processes and environments, including fumes or materials from adjacent processes or equipment that produces corrosive conditions when introduced into the oven environment.
- 3-1.6 The oven is not intended for outdoor installation and must be sheltered from weather. Unheated shelters may result in non-uniform temperatures or insufficient heat to attain maximum operating temperature. Condensation may also occur which would be detrimental to the steel structure and electrical components.
- 3-1.7 Suitable portable fire extinguishers should be available and operators trained in their use. All such fire protection equipment should be inspected periodically in accordance with appropriate standards. Reference NFPA 10 "Standard for Portable Fire Extinguishers" (see Appendix A).

3-2 BUILDING CONSIDERATIONS

- 3-2.1 When selecting the location for an oven, consideration must be given to the possibility of fire, building damage and personal injury. Hazards to be considered include overheating of material in the oven and escape of exhaust into the work place.
- 3-2.2 Ovens should be placed on non-combustible surfaces.

3-3 CLEARANCES

- 3-3.1 Ovens shall be located with adequate space above and on all sides to allow inspection and maintenance. Provisions also shall be included for the installation of automatic sprinklers, if applicable.
- 3-3.2 Do not place the oven up against a wall. A minimum air space of 3" must be provided on all sides to allow for air circulation, with additional space being provided for ovens operating over 450°F (232°C) to keep temperature at adjacent structures and materials below 160°F (71°C).

3-3.3 Do not store material on top of oven. The oven is not designed to carry exterior loads. Also, material may get hot, ignite and cause a fire.

3-3.4 The oven doors have spring loaded latches which will allow the doors to open if pressure develops in the oven. The door travel must not be restricted and should face away from main aisles, work areas and automatic sprinkler risers, feeds and cross mains.

3-4 VENTILATION

3-4.1 Where ovens are located in basements or enclosed areas, sufficient room ventilation shall be supplied to prevent the hazardous accumulation of vapors from processing.

3-4.2 Fresh air inlets and exhaust outlets must never be restricted.

3-5 EXHAUST DUCTWORK

3-5.1 The oven has vent holes in the top. If the oven vented air is to be collected and ducted from the area, it must be in accordance with local codes and requirements. Exhaust gas temperature is the same as internal oven temperature. Caution must be taken to protect combustible building materials from coming in contact with the hot exhaust stack.

3-5.2 Wherever oven ducts or stacks pass through combustible walls, floors or roof, non-combustible insulation or clearance, or both, shall be provided to prevent combustible surface temperatures from exceeding 160°F (71°C).

3-5.3 Where ducts pass through non-combustible walls, floors or partitions, the space around the duct shall be sealed with non-combustible material to maintain the fire resistance rating of the barrier. Ducts that pass through fire walls should be avoided.

3-5.4 Ducts shall be constructed entirely of sheet steel or other non-combustible material capable of meeting the intended installation and conditions of service. The installation shall be of adequate strength and rigidity and shall be protected where subject to physical damage.

3-5.5 Ducts handling fumes that leave a combustible deposit shall be provided with clean-out doors and such doors should be equipped with tight fitting doors or covers. It is important that ovens and ducts be kept clean if they are subjected to a build-up of flammable deposits of dust or other combustible debris. The build-up of condensed vapors or combustible debris is a major cause of fires. Frequency of cleaning should be based on never allowing build-up to exceed 1/8" thickness in any location.

3-5.6 No portions of the building shall be used as an integral part of the duct.

3-5.7 Ducts handling combustible solids shall be designed to minimize the accumulation of solids within the ducts.

3-5.8 Exhaust ducts that will contain combustible deposits of any type require automatic sprinklers.

3-5.9 Clearance between metal ducts and stored combustible material should be at least 2-1/2 feet. Guards should be installed to assure this clearance.

3-6 THERMOMETER

- 3-6.1 On all standard models a dial thermometer is included. Insert it into its spring steel holder so that it extends at least three inches (3") into oven work space. The thermometer can be installed through any of the vent ports in the top of the oven.

3-7 ELECTRICAL

- 3-7.1 All electrical connections should be made in accordance with the appropriate local and national codes. Refer to NFPA 70 "National Electric Code" (see Appendix A).
- 3-7.2 Properly size the electrical supply using information provided on the oven nameplate. Electric supply must include a safety shut off such as a circuit breaker or disconnect switch between your power supply and the equipment.
- 3-7.3 Where a plug is provided, it must not be removed or changed. A properly sized circuit and receptacle must be installed.
 - 3-7.3.1 120 Volt Units - Plug into grounded (3 prong) 120 volt outlet. Do not remove ground prong from plug. If no grounded outlet is available, have one installed prior to using this equipment.
 - 3-7.3.2 240 Volt Units - A plug suitable for use with your existing 240 volt receptacle must be installed on the cord provided. Make sure that your existing receptacle and the plug installed provide a secure ground.
- 3-7.4 The oven must be adequately grounded. Where a plug is provided, do not remove the ground prong. Grounding wire must be sized in accordance with local codes. Where more strict codes do not exist, refer to the NFPA 70 "National Electrical Code" (see Appendix A).

4 **PRIOR TO PLACING THE OVEN IN SERVICE**

- 4-1 Read instruction manual completely.
- 4-2 After the installation is completed, replace all covers and guards that had been removed for installation. At no time should equipment be operated if covers or guards are open, removed or partially closed.
- 4-3 Check incoming voltage against that shown on the nameplate.
- 4-4 Check operating current against nameplate rating.
- 4-5 All ovens will produce smoke and odors when first heated. The smoke and odors come from three sources:
 - 1) Surfaces that have not been heated during test such as shelves
 - 2) Binders that remain in the insulation
 - 3) Moisture that has been absorbed by the insulation.

If during the initial run of the oven, the smoke and odors become objectionable, set the temperature at 300 °F and allow the oven to remain at 300 °F until the smoke is no longer generated. Increase the temperature in steps until you've reached the maximum operating temperature. It may take several days of running at the maximum operating temperature to eliminate all smoke and odors.

If the oven is not heated for an extended time period, moisture may accumulate in the insulation. When heated, this moisture will be driven out and the above process may have to be repeated.

- 4-6 Personnel operating, maintaining or supervising shall be instructed and trained in their job functions and be required to demonstrate an understanding of the equipment, its operation and safe operating procedures including emergency shutdown.
- 4-7 Equipment shall be operated in accordance with original design parameters.
- 4-8 Personnel operating, maintaining or supervising shall be informed of the danger of removing, or rendering ineffective, safety devices.

5 **PROCESSING**

5-1 **DO NOT LEAVE THIS EQUIPMENT IN OPERATION UNATTENDED**

When using any heat processing equipment there is always the risk of overheating due to a component malfunction. A trained operator should always be present. If this is not possible, the oven should be located where overheating will not cause damage to the building, adjacent stock or endanger personnel. Special consideration should be made for the potential of smoke damage should a fire ensue. Fire suppression equipment should be installed to protect the oven and building.

5-2 When loading an oven care must be taken to avoid touching or insulating the thermocouple or temperature sensor. Free air movement around this sensor is essential for safe and correct temperature control.

5-3 Do not overload the oven. Air circulation is very important to the proper operation of an oven. For maximum uniformity, the work should be placed in the middle of the oven work space and room (1" to 1-1/2") left around the work for vertical air movement.

5-4 The inside walls of the oven are equipped with perforated strips and clips to adjust the shelf height to the most desirable height for your process. However, do not place the bottom shelf closer than 2" from the perforated oven bottom.

5-5 This oven is designed for shelf loading, parts must not be placed on heat chamber guard at bottom of work space. This surface could be hotter than air temperatures and it is not designed to support a load. Do not cover heat chamber guard at bottom of work space as this will trap heat in the heat chamber and result in excessive temperature in heat chamber.

5-6 Leave space between articles on each shelf to allow air to move between parts.

5-7 Parts should be staggered from one shelf to another, to prevent dead spots in the air pattern.

5-8 For drying applications, the air circulation damper should be fully open to allow moisture to escape and be replaced by dry room air. For maximum temperature, close the air circulation damper to reduce heat losses. In the medium and lower temperature ranges of the oven, better temperature uniformity will be obtained with the circulation damper open.

5-9 To turn oven on, push top of on-off switch in. When the oven is not in use, the on-off switch must be turned OFF - bottom pushed in. Do not rely on the thermostat to interrupt power to the heating elements indefinitely.

5-10 **EMERGENCY SHUT DOWN:**

- press power switch to "OFF" - bottom pushed in
- unplug oven
- disconnect power to oven at disconnect switch or circuit breaker

5-11 TEMPERATURE CONTROL

- 5-11.1 The thermostat is marked with numbers for reference only and does **NOT** indicate the oven temperature. To obtain the desired temperature, make a trial setting of the thermostat and observe the actual oven temperature as shown by the thermometer. Allow the oven to cycle several times, as indicated by the red pilot light, before making a new trial setting of the thermostat. A few trial settings will show you the approximate position of the thermostat for various temperatures.
- 5-11.2 Do not attempt to operate your laboratory oven at temperatures above the maximum rating of the oven. Higher temperature units are available — please contact the factory for information.

5-12 OVER TEMPERATURE PROTECTION

- 5-12.1 Units rated up to 200°C are equipped with a one time excess temperature limit interlock. Operating these ovens at temperatures above their maximum rating or restricting free movement of the heated air from the heat chamber (located below the perforated bottom of the oven work space) will result in these devices opening the circuit to the heating elements. These devices are **NOT** resettable and must be replaced. They are located within the heat chamber (under the heat chamber guard at the bottom of the workspace) connected to one terminal of the thermostat.
- 5-12.2 Units rated to 270°C have a manual reset excess temperature limit interlock. This interlock is reset by pushing in the red button located at the rear of the oven. This excess temperature limit interlock will **NOT** reset until oven temperature is well below maximum operating temperature.
- 5-12.3 Do not operate oven without a functional heat limiter or an excess temperature interlock. Do not bypass or otherwise defeat the excess temperature interlock.

6 **SAFETY EQUIPMENT**

- 6-1 Practically all explosions and fires in ovens can be traced back to human error. It should be noted that:
 - 6-1.1 For the protection of personnel and property, careful consideration should be given to the supervision and monitoring of conditions that could cause, or could lead to, a real or potential hazard on any installation.
 - 6-1.2 The presence of safety equipment on an installation cannot, in itself, ensure absolute safety of operation.
 - 6-1.3 There is no substitute for a diligent, capable, well-trained operator.
 - 6-1.4 Highly repetitive operational cycling of any safety device can reduce its life span.
- 6-2 Thermostats, switches and electric relays should not be used as substitutes for electrical disconnects or unplugging equipment.
- 6-3 Regularly scheduled inspection, testing, and maintenance of all safety devices shall be performed. (See Section 7 - Maintenance and Appendix B - Minimum Periodic Maintenance Report)
- 6-4 Safety devices shall not be removed or rendered ineffective by bypassing them electrically or mechanically.
- 6-5 All units are equipped with an excess temperature limit interlock. Operating at temperatures above the setting of this device will result in opening the circuit to the heating elements. These devices must be replaced or reset before power will be restored to the heating elements. These devices are installed to protect the oven from a runaway condition. It is the users responsibility to monitor any product in the oven if over-heating can cause damage to the product or cause a fire. The cause of over-heating should be determined and corrected before processing is continued. Do not remove or bypass excess temperature limit interlock.
 - 6-5.1 One-time excess temperature limit interlock (standard on Models LO-201C and LW-201C) is installed in series with the oven thermostat. If the oven runs over maximum temperature, the excess temperature limit interlock will open the circuit to the heating elements. The excess temperature limit interlock and lead wire must be replaced after this happens. The excess temperature limit interlock cannot be reset.
 - 6-5.2 Non-adjustable manual reset excess temperature limit interlock (standard on Model LR-271C) will trip at approximately 50°F above the maximum operating temperature of the oven. This device is reset by depressing the red button located on the rear of the oven.
- 6-6 No matter how much safety equipment is provided on the oven, it cannot protect the operator, other personnel or property from unsafe conditions caused by poor judgement or misapplication. Common sense must be used for safe operation. If in doubt, contact the factory. Check the process periodically to ensure oven is being used as originally intended.

7 MAINTENANCE

- 7-1 For safe oven operation, a preventative maintenance program must be developed and followed for each individual oven application. The user should review recommendations from their insurance underwriters. We suggest the review of Factory Mutual (FM) Specification 6-9 on Industrial Ovens and Dryers and the National Fire Protection Association (NFPA) Specification 86 on Ovens and Furnaces. We also recommend a Maintenance Report be developed which lists tests and inspections performed. A copy of this report should be kept on file for future review. At a minimum, the unit should be fully inspected annually.

A Minimum Periodic Maintenance Report is provided in Appendix B as an example for developing your own periodic maintenance schedule and report.

- 7-2 Disconnect electric power and any other energy source before servicing equipment. Ovens operate under high voltage and electrical shock is possible. Proper OSHA required lockout procedures should be followed.
- 7-3 Removing the heat chamber guard at the bottom of the work space will expose high voltage connections. Do not operate with this guard, or any other mechanical or electrical components that have guards, removed. Operating with guards removed could result in bodily injury.

7-4 RECOMMENDED MAINTENANCE ITEMS:

It shall be the sole responsibility of the user to establish, schedule and enforce the frequency of and the extent of the inspection/maintenance program (as well as the corrective action to be taken) because only the user can know what the actual operating conditions are. The tests should be made by personnel who are familiar with the equipment. It is usually better that maintenance personnel from mechanical and electrical departments check the equipment rather than regular oven operators. These additional hands and eyes may catch things that may be otherwise overlooked.

The following are minimum maintenance items we recommend be covered. Your list will vary depending upon the specific oven and operating conditions.

7-4.1 Application

- 7-4.1.1 The user is responsible to insure that the oven process has not changed from the conditions for which it was originally purchased and that the oven is not modified. It is the user's responsibility to ensure that flammable solvents are not placed in the oven and the operating temperature does not exceed the maximum design temperature.

7-4.2 Electrical

- 7-4.2.1 Inspect power cord and plug for damage; repair or replace as necessary.
- 7-4.2.2 Periodically inspect contacts in open thermostats for foreign matter, signs of wear, or sticking; clean or replace as necessary.

7-4.3 Oven Body

- 7-4.3.1 Do not allow accumulation of combustible material or other foreign matter in the work space, heat chamber (including heating elements) ductwork, air inlets, vent outlets, control enclosures, door latches, and door hinges. Care must be taken in cleaning any combustible build-up to avoid creating a source of ignition (spark). Scraping with non-sparking tools is suggested. Lint and dust should be removed by vacuum cleaning. Blowing with compressed air or steam should be avoided if there is a possibility of explosion from a combustible dust cloud.
- 7-4.3.2 Do not allow accumulation of combustible material on work holders, drip pans or on floor of oven.
- 7-4.3.3 Temperature control and excess temperature control sensing bulb or bi-metal must be inspected periodically for damage. Location of these cannot be changed.

7-4.4 Duct Work

- 7-4.4.1 It is important ovens be kept clean. If they are subjected to a build-up of combustible deposits of dust or other combustible debris they must be periodically cleaned. The build-up of condensed vapors or combustible debris is a major cause of fires.

7-4.5 Doors/Gaskets

- 7-4.5.1 The oven doors should be inspected regularly to see that latches are holding the door firmly and uniformly against the oven providing a maximum sealing force.
- 7-4.5.2 The door should be inspected for damage which would allow excessive leakage of hot air. The gasket (applicable to LR-271C only) should be replaced when damaged or when an adequate seal cannot be maintained.
- 7-4.5.3 The door and associated spring loaded latches should be checked periodically.

7-4.6 Temperature Control

- 7-4.6.1 Run oven at predetermined setting and compare temperature at thermometer to previous tests. Significantly higher temperatures could indicate temperature controller is failing.

7-4.7 Location

- 7-4.7.1 The user is responsible to determine that facility changes in the vicinity of the oven have not created a hazardous condition. Specifically, the oven should be protected from external heat, vibration, mechanical hazards and corrosive environment.

- 7-4.7.2 Processes involving flammable liquids or creating explosive vapor or combustible dust clouds must not be located near the oven.
- 7-4.7.3 Portable fire extinguishers located in the vicinity of the oven must be inspected periodically.
- 7-4.7.4 Fire suppression system installed in the oven should be periodically tested. All sprinkler heads in oven or located in work area should be periodically inspected and cleaned.

8 TROUBLE SHOOTING

8-1 NO HEAT

8-1.1 Oven Has Run Over-temperature.

For Model LO-201C and LW-201C, check continuity of heat limiter (one time thermal fuse) and replace it if there is no continuity through the heat limiter. Heat limiter is located in one of the wires leading to the thermostat. This wire is covered with a radiant shield that must cover the heat limiter for correct operation.

For Model LR-271C, reset excess temperature limit interlock (after oven has cooled) by pressing red reset button located on rear of oven. If excess temperature limit interlock will not reset, it needs to be replaced.

8-1.2 On/Off Switch

Check for defective switch.

8-1.3 Fuse Burned Out or Circuit Breaker Tripped

Make sure there is power at the oven.

8-1.4 Burned Out Heating Element

Check that there is power to each heating element and that elements are not open.

8-2 REDUCED OVEN TEMPERATURE

8-2.1 Excessive Exhaust

The amount of heated air removed from the oven may be excessive and result in a reduced operating temperature. In this case, the oven heat will be running continuously. This can be corrected by reducing the exhaust until the maximum operating temperature is achieved.

8-2.2 Door Leakage

Poorly adjusted door or damaged door gaskets (Model LR-271C only) could result in excessive heat loss around the doorway. Adjust door and/or repair gasket.

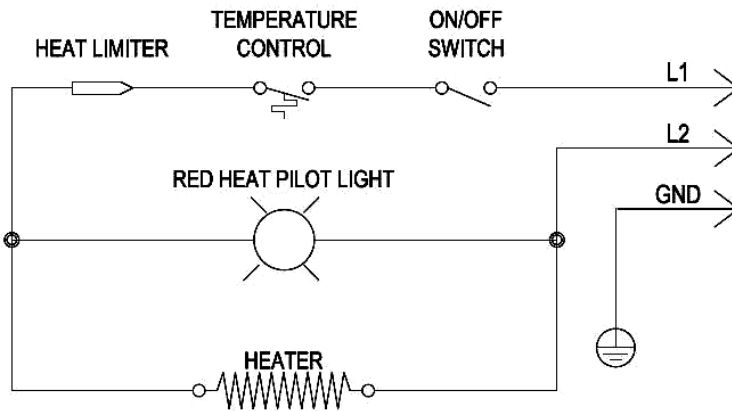
8-2.3 Improper Line Voltage

Voltage at the oven should be measured to determine if an excessive line drop is causing reduced power input to the heating elements on an electrically heated oven. This could be caused by too many devices connected to the same circuit or by undersized wiring between the oven and the power source. Measure the voltage with the oven heating elements on and all other equipment on the same circuit operating.

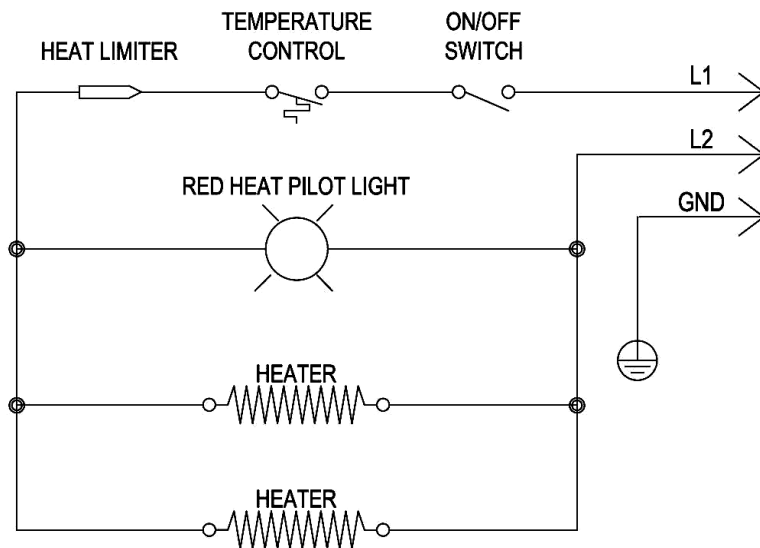
8-3 WIRING DIAGRAMS:

Do not operate oven without a functioning heat limiter or manual reset excess temperature interlock. Do not bypass or otherwise defeat the heat limiter or manual reset excess temperature interlock.

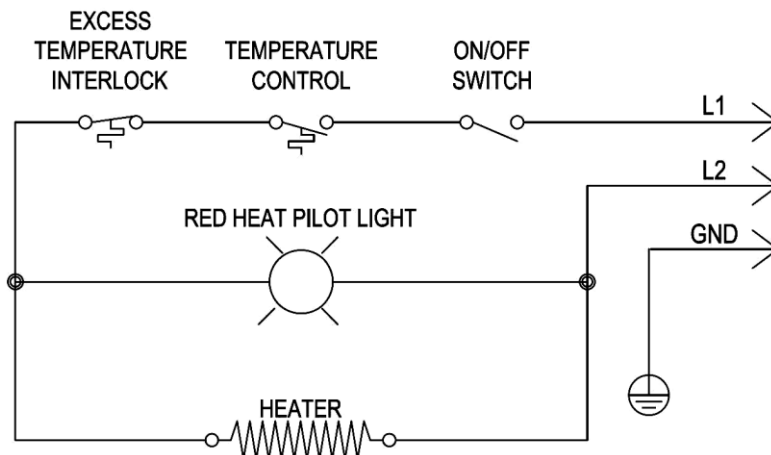
LO-201C



LW-201C



LR-271C



9 **APPENDIX A - REFERENCES**

The following sources of additional information are referenced in these instructions. This is not presented as a complete list of all possible reference sources.

- 9.1 Factory Mutual Engineering Corporation
1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, Massachusetts 02062
Attn: Publications Order Processing

Specifications 6-9, Industrial Ovens and Dryers

- 9.2 National Fire Protection Association
One Batterymarch Park
Quincy, Massachusetts 02209-9101

Most current issue of:

NFPA 86 - Ovens and Furnaces
NFPA 70 - National Electric Code
NFPA 10 - Standard for Portable Fire Extinguishers
NFPA 11 - Standard for Low-Expansion Foam
NFPA 12 - Standard on Carbon Dioxide Extinguishing Systems
NFPA 13 - Standard for the Installation of Sprinkler Systems
NFPA 14 - Standard for the Installation of Standpipe and Hose Systems
NFPA 15 - Standard for Water Spray Fixed Systems for Fire Protection
NFPA 17 - Standard for Dry Chemical Extinguishing Systems
NFPA 17A-Standard for Wet Chemical Extinguishing Systems
NFPA 25 - Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems
NFPA 30 - Flammable and Combustible Liquids Code

10 APPENDIX B - MINIMUM PERIODIC LABORATORY OVEN INSPECTION REPORT

Model: _____ Serial No.: _____

Inspected By: _____ Date: _____

BEFORE APPLYING POWER CHECK THAT:

1. _____ No changes in process have been made including types of materials processed and temperature:

-Oven originally purchased for (reference previous Inspection Report): _____

-Oven being used for: _____

2. _____ No flammable solvents are involved in process.
3. _____ All thermostats with open contacts have been inspected for foreign matter, wear or sticking.
4. _____ Oven interior inspected, cleaned, and all foreign matter removed from:
_____ Floor
_____ Heat chamber (including heating elements)
_____ Control enclosure and components
_____ Door hinges
5. _____ Remove and clean all drip pans. Inspect and clean all work racks, trays, holders or spacers.
6. _____ Locate temperature controller sensors and inspect for damage. Make sure sensor is in free air and not touching anything.
7. _____ On Models LO and LW: Locate heat limiter in lead to thermostat to make sure it is present. This lead is covered with a radiant shield that must be present for correct operation.
On Model LR: Locate manual reset excess temperature limit interlock sensor, inspect for damage and make sure located in free air.
8. _____ Inspect heating elements for contamination, distortion and adequate support.
9. _____ Doors are free to move and not obstructed.
10. _____ Exhaust ductwork from oven (if applicable) has been inspected and cleaned; all foreign matter removed.
11. _____ Inspect door latches and check for freedom of movement.

APPLY POWER AND CHECK:

12. _____ Supply voltage agrees with oven nameplate - measure and record: _____.
13. _____ Set oven at number _____, temperature on thermometer fluctuates from _____ to _____. Compare to previous test report.

LOCATION:

- 14. ____ No changes in the oven area have created a hazardous condition such as external heat, vibration, mechanical hazard or corrosive environment.
- 15. ____ No process change has resulted in flammable liquids or explosive vapors or dust cloud being stored or produced in vicinity of oven.
- 16. ____ Portable fire extinguishers in the area have been inspected.
- 17. ____ Fire suppression systems, such as sprinkler system, have been inspected.
- 18. ____ Sprinkler heads in oven or in work area have been inspected and cleaned.

TRAINING

- 19. ____ Review job function, oven operation and emergency shutdown with operators and supervisors.

11 **APPENDIX C - REPLACEMENT PARTS LIST**

(Please specify oven model and voltage when ordering)

ITEM NO.

MODEL LO-201C

-Interior shelf	SHLFLO
-Dial Thermometer (10°-290°C / 50°-550°F)	TDIAL
-Thermostat	THRMSTT
-Thermostat knob	KNBLOLW
-Electrical power cord and plug	PWRCRD16GA
-Heat limiter with lead	HTLMTLO
-Door catch	CTCH1
-Door	DOORLO

MODEL LR-271C

-Interior shelf	SHLFLR
-Dial Thermometer (10°-290°C / 50°-550°F)	TDIAL
-Temperature controller	TMPCTRLLR
-Excess temperature limit interlock	LCH575
-Temperature controller knob	KNBLR
-Electrical power cord	PWRCRD16GA
-Silicone rubber door gasket (requires 5 feet)	GSKTRBD
-Door catch	CTCH4
-Door latch pin	LTCH4
-Door	DOORLR

MODEL LW-201C

-Interior shelf	SHLFLW
-Dial Thermometer (10°-290°C / 50°-550°F)	TDIAL
-Thermostat	THRMSTT
-Thermostat knob	KNBLOLW
-Electrical power cord and plug	PWRCRD14GA
-Heat limiter with lead	HTLMT
-Door catch	CTCH1
-Door	DOORLW

ALL MODELS - LO, LR, LW

-Thermometer grommet	THRMGRM
-Heating element - 115 volt oven	L120
-Heating element - 230 volt oven	L240
-On-off switch	SW1600
-Shelf clip (4 required per shelf)	SHLFCPL
-Pilot light (115 volt oven)	PLT115R
(230 volt oven)	PLT230R
-Door handle	HNDLB
-Oven feet (set of 4)	OVFEET

12 APPENDIX D - WARRANTY AND LIMITATIONS OF REMEDIES

Any equipment sold by GRIEVE is warranted for one (1) year after the Purchaser receives the equipment to be free from defects of material and workmanship. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF; WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, GRIEVE EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE PURCHASER'S EXCLUSIVE REMEDY FOR ANY BREACH OF THIS WARRANTY SHALL BE FOR THE REPAIR OR REPLACEMENT (AT GRIEVE'S OPTION) OF THE DEFECTIVE EQUIPMENT OR PART.

Parts under warranty are shipped via ground transportation. Express or expedited shipping costs are the sole responsibility of the customer. In order to obtain repair or replacement under this warranty, the user must deliver the defective product or part to GRIEVE's factory on a prepaid basis promptly after discovery of the defect. GRIEVE's warranty ceases to be effective if the equipment is altered or modified, repaired other than by persons authorized by GRIEVE, misused, used by any person in an unsafe or unreasonable manner or used other than in accordance with "GRIEVE's" written instructions. Although GRIEVE makes no additional or extended warranty with respect to thermostats, recorders, control equipment or other accessories, to the extent such items may also be warranted by their respective manufacturers, those warranties are passed on to you by GRIEVE as agent of the respective manufacturer and not as a separate warrantor.

In no event shall GRIEVE be liable for any direct, indirect, special, incidental or consequential damages hereunder, whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other theory of legal liability.

INSPECTION RECORD

OVEN MODEL (Check One)

POWER SUPPLY (Check One)

Volts

LO-201C ()

120 ()

LW-201C ()

240 ()

LR-271C ()

ASSEMBLED BY: _____ INSPECTED BY: _____

PACKED BY: _____ SERIAL NO.: _____

(NOTE: If this oven is in any way defective, please return a copy of this Inspection Record with your report.)