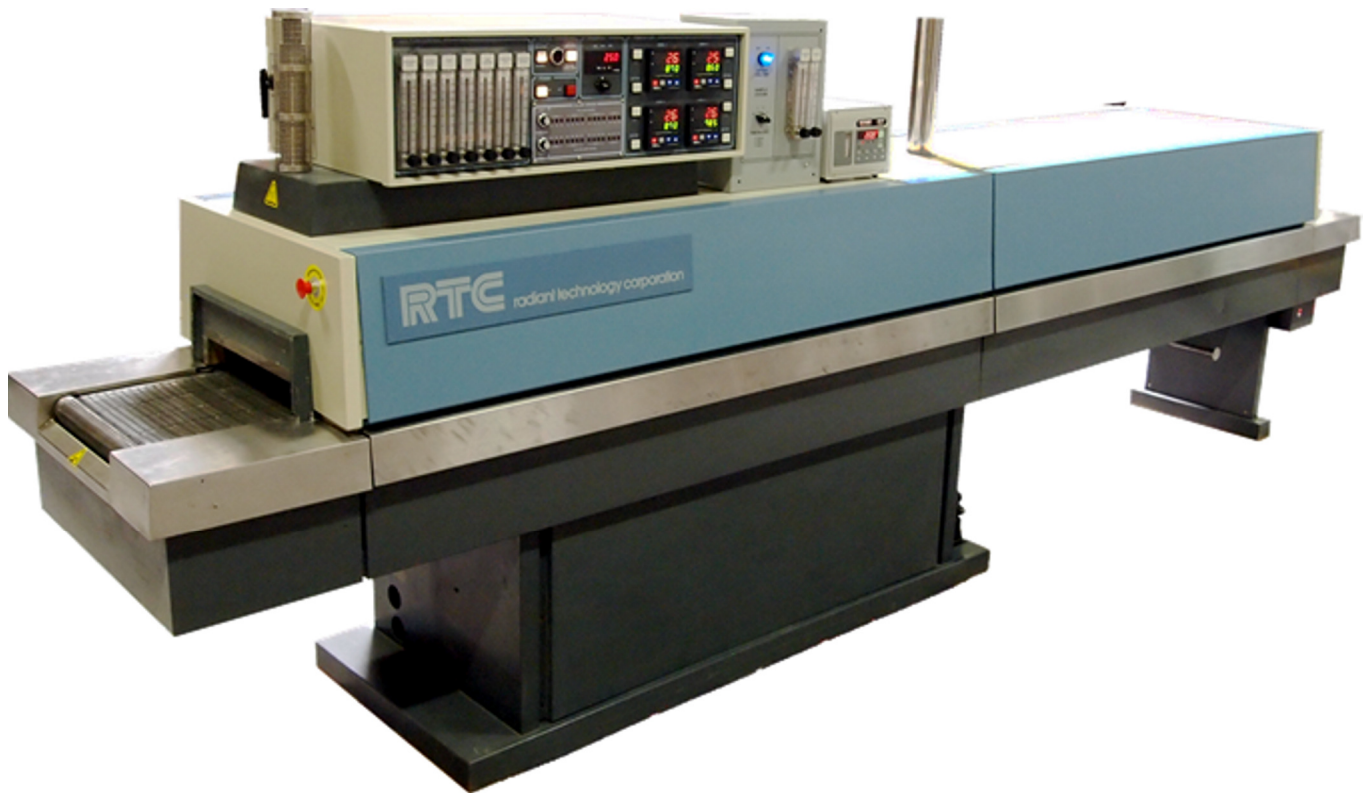


CONTROLLED ATMOSPHERE INFRARED BELT FURNACE

Model CU-915 Owner's Manual

Revision 0



MODEL: RTC CU-915

SERIAL NUMBER: 850049

FACTORY ORDER NUMBER: 15-003

Infrared Furnace Setup, Operation, Theory & Troubleshooting Guide

This Owner's Manual contains product information specific to the newly installed equipment. In addition, this manual contains information regarding features and options which may or may not be included in your furnace system.

Controlled Atmosphere Infrared Belt Furnace

Owner's Manual

Rev. 0

Model: CU-915

Serial Number: 850049

Part No. 15-003 - 676-110000-01 CD

Part No. 15-003 - 676-110000-02 Loose Leaf

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TABLE OF REVISIONS

Rev	Sections	Description	Date
0	All	Initial Release	08/07/2015

INTRODUCTION

This manual covers the LCI infrared high quality controlled atmosphere infrared belt furnace designed for industrial production and laboratory infrared thermal processing. If you have acquired an RTC IR furnace rebuilt by LCI, this manual describes its operation with few exceptions.

Achieving high performance and high yields is attainable with careful adjustment of the sophisticated digital temperature controllers and gas flow controls provided on the furnace. Infrared furnaces are highly responsive to critical temperature settings. With lamps as the primary heat source, the equipment is literally heating with light. The unique gas management system provides an extremely even distribution and well regulated flow of gas throughout the process chambers. Understanding how to control both the heat and gas flow is essential to the effective operation of the furnace. When the interaction and performance of the control elements are well managed the tool can achieve its potential. For many, our furnaces become regarded more than just an effective tool; they are viewed as a fine instrument that can produce results over a variety of thermal processing situations.

WHAT IS IN THIS MANUAL

This manual explains furnace equipment installation and setup, operation and troubleshooting of LCI IR series furnaces as well as RTC IR furnaces refurbished by LCI/RGL. Some equipment described in this manual is optional or may not apply to your model as configured. The manual also covers aspects of infrared processing theory and techniques to assist you in achieving highly repeatable and reliable thermal processes.

Study this manual carefully. Experience has shown that clients who thoughtfully master the contents of this manual can become expert in understanding the process system capabilities of our infrared furnaces. In doing so, many are able to push the initial process performance envelope and thus achieve higher degrees in both process reliability and throughput than previously anticipated.

Note that throughout this Owner's Manual the equipment is generally referred to as a furnace. A dryer is a furnace with only the top lamp elements installed or operated.

FORMATTING CONVENTIONS

This manual uses the following formatting conventions.



DANGER: This signifies a potential threat to human safety.

Warning: This signifies a potential threat to equipment damage or product loss.

Note: This signifies an important fact that could affect process control.

Examples are shown in italic text.

Bold text words or phrases embedded in this document, are terms with definitions in the glossary.

Bold Underlined text is used for pop-up windows, button descriptions & selector button/box choices.

Cross-references to "Section Titles" are bound with quotes.

(Optional ☐) accessories will be shown in parenthesis with a checkbox. If supplied, please check the box as appropriate.

ABOUT LCI

LCI Furnaces specializes in the manufacture and sales of near infrared (0.5-5.5 μm) wavelength continuous belt dryers, ovens and furnaces worldwide. We provide the highest quality controlled atmosphere infrared thermal processing equipment, parts and service available anywhere.

Should you have a furnace operating question, contact LCI Furnaces or FurnacePros Technical Support.

WHERE TO GET HELP

Corporate Offices & Factory: LCI Furnaces

Address: 675 N Eckhoff St, Ste D, Orange, California 92868 USA
Phone: +1 (714) 935-0302
Fax: +1 (714) 935-9809

Technical Support & Service

Department: Aftermarket
e-mail: service@furnacepros.com
Phone: +1 (714) 935-0302 x220

Aftermarket Parts Ordering

Department: Aftermarket
e-mail: parts@furnacepros.com
Phone: +1 (714) 935-0302 x220

Websites

IR Furnaces: www.LCIfurnaces.com
Aftermarket Parts: www.FurnacePros.com

EQUIPMENT LIST

Verify that the following equipment was received.

Qty	Unit	Description	Part Number
(1)	ea	CU-915 Furnace	15-003-CU-915
(1)	ea	Oxygen Analyzer, Illinois Instruments	EC-913
(1)	ea	Thermocouple Wheel, Dual	TCW-2
(1)	ea	Motor, DC (low speed) with chain	Bison 650 DC-1/20HP

In addition verify that you received the following, shipped separately.

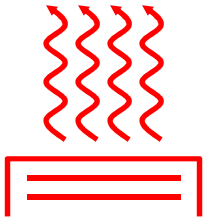
Qty	Unit	Description	Part Number
(1)	ea	Manual, Owner's, 3-Ring Bound	15-003-676-110000-02
(1)	ea	Manual, CD	15-003-676-110000-01

GENERAL SAFETY GUIDELINES

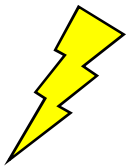
The following set of guidelines is intended to create awareness of potential health and safety hazards.

Normal Good Laboratory Practice

Normal good laboratory practices apply to the operation of IR furnaces. Do not use the space above the furnace as storage. Do not block the cabinet doors preventing the cooling of the electronic equipment inside. Do not operate with side covers off as this will prevent normal cooling of the electronic equipment thus voiding the warranty. Tuck electrical cords out of the way. Do not store flammables in the vicinity of the furnace and especially while operating the furnace with an oxygen atmosphere.



HIGH TEMPERATURES. In general, the operation of any furnace may expose operators or maintenance technicians to the risk of burns. After being processed in an infrared furnace, customer product may still be dangerous to handle. Each owner is responsible for providing a safe work environment and proper training in the handling of material being processed in a furnace.



ELECTRICAL SHOCK HAZARD. IR furnaces operate at high voltages. Operation with side covers off constitutes a safety hazard. Ensure that main power is off while side covers are removed.

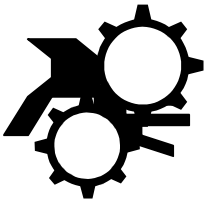
Electrical shock hazards exist for those technicians who service the furnace. High voltages are required to operate the furnace and precautions must be taken to reduce the exposure to these elements. Again, it is the responsibility of the furnace owner to assure that only properly trained service technicians, familiar with high voltage operations be allowed to service the equipment



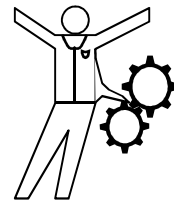
EXPLOSION Explosive dangers may exist in the high temperature process environment of the furnace. If the furnace operates with process gas containing hydrogen, measures must be taken to avoid the dangers of explosion. Furthermore, improper gas flow balance may draw oxygen rich air into the furnace, mixing with effluent gases and material from products, also creating a hazardous environment.



HAZARDOUS MATERIALS. Persons performing maintenance tasks such as replacement of lamps may become exposed to silica fiber compounds. Such tasks should be performed by qualified persons wearing gloves, eye protection and a facemask to prevent inhalation of particulates.



ROTATING EQUIPMENT. Roller dangers exist when working around the conveyor belt of the furnace. Care should be taken not to place hands or garments on or near the belt drive mechanisms when the conveyor system is operating as roller crush may occur. Operators should avoid walking near the open ends of the conveyor belt. Those who must be near the moving parts should wear close fitting clothing.



SAFETY EQUIPMENT

EMO Buttons



This infrared furnace is fitted with at two (2) SEMI S2 compliant Emergency Machine Off buttons (EMO's), two located at each end of the furnace. Each Emergency Machine Off button (EMO) is attached directly to a switch that automatically shuts down all furnace electrical systems. In many cases, process gas flow will remain on after power is shut off to assure the furnace continues to safely cool.

Locate and insure their proper function prior to regular furnace operation.



DANGER: Bypassing the emergency off switches increases maintenance personnel exposure to electrical hazards. The user must ensure that any interlock switches placed in override mode are returned to normal operation following any inspection or adjustment.

Safety Panel and SCR Panel Safety

The rear side lower compartment houses the main power (Safety Panel) and front side compartment houses the lamp power (SCR Panel), both which have line voltage (208-480 Vac) present. To access these compartments, disconnect power to the furnace and remove the fasteners around the edges of the cover.



DANGER: Because a tool is required to access these compartments, they are NOT otherwise protected by interlock switches that, if present, would prevent operation of the furnace when high voltage access covers out of place. Always make sure power is disconnected and properly locked-out before accessing these compartments.

Control Enclosure

The Control Enclosure is located on top of the furnace near the entrance. Access inside this enclosure by using a tool to remove the top and/or rear panel. The control enclosure houses the furnace instrumentation and control boards. Inside this enclosure 117 Vac and low voltage DC power are present and can cause serious harm. To access this enclosure, disconnect power to the furnace and remove the fasteners around the edges of each cover.



DANGER: Because a tool is required to access this enclosure, it is NOT otherwise protected by interlock switches that, if present, would prevent operation of the furnace when the access covers have been removed. Always make sure power is disconnected and properly locked-out before accessing these compartments.

Dual Gas – Safety with forming gas, FG (Nitrogen/Hydrogen Premix) DGO Option

The dual gas option provides for separate manifolds for use of two or more gases for the process gas. Use of forming gas (FG) is generally safe provided the concentration of hydrogen in the mixture is lower than the lower flammable limit of hydrogen. Hydrogen is flammable in concentrations of 4.5-74% in air; explosive range is 18-59% in air.

Dual gas furnaces are equipped with an audible alarm to indicate gas supply pressure.

This furnace is not to be used with combustible process gas. Dual gas furnaces are not equipped with combustible gas sensors and will not alert users to escaping combustible gas, if present.



DANGER: Combustible gas should NOT be connect to this furnace. Forming gas or other gas mixtures which have a combustible gas component can be safely introduced into furnace provided the delivered concentration is below its lower flammable limit (LFL) in air.

LIMITED WARRANTY

BUYER: GE Fuel Cells LLC PROJECT: 15-003
PRODUCT: RTC CU-915 IR Furnace SHIPMENT DATE: 7/14/2015
SERIAL NUMBER: 860049 STARTUP DATE: 7/20/2015

EQUIPMENT	WARRANTY PERIOD
IR Continuous Belt Furnaces & Dryers	Checkout/Startup by Seller: Ninety (90) days from date of initial startup, in no event exceeding 150 days from date of shipment.
✓ Refurbished Equipment, Cooling systems & Controls Upgrades	Furnace Warranty Expires: 11/15/2015 . Checkout/Startup by others: Ninety (90) days from date of shipment.
Computer	Next Business Day Support: Dell/UNY Next Business Day Support warranty expires: 08/02/2017 .
✓ Aftermarket Parts & Consumables	Sixty (60) days from date of shipment.

Lochaber Cornwall, INC. / RGL Enterprises (SELLER) warrants that during the Warranty Period the original SELLER supplied Equipment shall conform to its specifications and be free from defects in material and workmanship. This warranty is only applicable to the original system and components under normal use and service, and excludes damage due to misuse, chemical attack, wear and tear from abrasion or corrosion. Consumables such as filters, fuses, lamps, and thermocouples shall be expressly excluded from this warranty, except to the extent SELLER is notified a failure of any consumable item within the first 60 days from shipment of the furnace from SELLER.

During the Warranty Period SELLER will at its option, repair or replace the defective part provided (1) BUYER promptly notifies SELLER of any claimed defect, (2) BUYER receives return authorization and returns the product to SELLER for inspection, and (3) the Product is determined by SELLER to be defective and the remedy the responsibility of SELLER. Minor deviations from the specifications shall not constitute defects or non-conformance.

No parts shall be received by SELLER without SELLER prior written authorization. If SELLER determines that the warranty does not apply, BUYER will be responsible for any repair or replacement costs and all associated freight charges.

BUYER shall bear the cost of return of any materials, components and equipment to SELLER. SELLER shall bear the cost of non-expedited shipping to BUYER of parts and materials replaced under this warranty. When a SELLER representative visits BUYER's facility for warranty work, BUYER shall only reimburse related normal and customary travel and lodging expenses.

Unless otherwise specifically authorized in advance, payment of charges incurred by others shall not be borne by SELLER. In any event, approved charges shall be limited to the cost SELLER would have reasonably incurred had the equipment been returned to its plant for correction. SELLER will not accept any back charges for field corrections made without its prior written approval and instructions.

These warranties will not apply if the equipment or any components thereof have been subject to:

- (1) operation, maintenance, overhaul, installation, storage or use which is improper or not in accordance with SELLER's instructions;
- (2) any alteration modification, or repair by anyone other than SELLER or its authorized representative;
- (3) any accident, misuse, neglect, or negligence after shipment; or
- (4) damage due to uncontrollable external events or acts of God.

SELLER's LIABILITY IS LIMITED TO THE REPAIR OR REPLACEMENT OF THE EQUIPMENT FOUND TO BE DEFECTIVE AT SUCH LOCATION AS MAY BE DETERMINED IN THE SOLE DISCRETION OF SELLER. ALL WORK UNDER THIS WARRANTY SHALL BE PERFORMED DURING NORMAL WORKING HOURS. ALL REPLACEMENT PARTS, WHETHER NEW OR REMANUFACTURED, ASSUME AS THEIR WARRANTY PERIOD ONLY THE REMAINING TIME PERIOD OF THIS WARRANTY.

All payments must be made according to the agreement terms to activate this warranty. Warranties will commence for the remainder of the original Warranty Period upon late receipt of any balance due SELLER.

THE EXPRESS WARRANTIES MADE HEREIN ARE EXCLUSIVE AND ALL OTHER WARRANTIES, EXPRESS, STATUTORY OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL LOCHABER CORNWALL, INC. OR ANY OF ITS SUBSIDERARIES BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES (SUCH AS SPECIAL OR INDIRECT) NOR FOR ANY LOSS OF PRODUCTION OR OTHER LOSSES arising out of, resulting from, or in any way connected with its work, the performance of the Equipment, any failure of the Equipment or any breach of the agreement.

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