

CARON®

Caron Products & Services  
**OPERATIONS MANUAL**



**FINGERPRINT DEVELOPMENT CHAMBERS**

*Model: 6105*

Dear Valued Customer:

Thank you for purchasing CARON Products & Services equipment. We appreciate your business and look forward to being your preferred supplier of controlled environment equipment products in the future.

At CARON, we are committed to continuous quality improvement. Our goal is to supply our customers with highly reliable equipment at a fair price. In order to openly monitor our performance, we would appreciate your feedback on our products and services.

If you have questions, or any suggestions for improvement based on the installation or operation of the equipment you have purchased, please contact our service department at [www.caronproducts.com](http://www.caronproducts.com) or 740-373-6809.

Thanks again for your business!

## Revision Log

<b>Version</b>	<b>Date</b>	<b>Description</b>
K	08-02-17	Updated consistency between all manuals
L	11-15-17	Added door heat and light connection instructions

## **EQUIPMENT LIMITED WARRANTY**

Please review this section before requesting warranty service. At CARON, one of our primary goals is to provide customers with high levels of personal service and top quality products, delivered on time, backed by technical service and supported for the life of the product.

**Before contacting us for warranty service, please be aware that there are repairs that are not covered under warranty.**

### **WARRANTY DEFINED**

Caron Products & Services, Inc. (herein after CARON) hereby warrants that equipment manufactured by CARON is free from defects in materials and workmanship when the equipment is used under normal operating conditions in accordance with the instructions provided by CARON.

### **COVERED:**

- Parts and labor for a period of one (1) year from date of shipment.
- Any part found defective will be either repaired or replaced at CARON's discretion, free of charge, by CARON in Marietta, OH. Parts that are replaced will become the property of CARON.
- If CARON factory service personnel determine that the customer's unit requires further service CARON may, at its sole discretion, provide a service technician to correct the problem, or require the return of the equipment to the factory or authorized service depot.
- CARON will have the right to inspect the equipment and determine the repairs or replacement parts necessary. The customer will be notified, within a reasonable time after inspection, of any costs incurred that are not covered by this warranty prior to initiation of any such repairs.

### **NOT COVERED:**

- Calibration of control parameters.
- Improper installation; including electrical service, gas and water supply tubing, gas supplies, room ventilation, unit leveling, facility structural inadequacies or ambient conditions that are out of specification.
- Cost of express shipment of equipment or parts.
- Any customer modifications of this equipment, or any repairs undertaken without the prior written consent of CARON, will render this limited warranty void.
- CARON is not responsible for consequential, incidental or special damages; whether shipping damage or damages that may occur during transfer to the customer's point of use. When the equipment is signed for at the customer's site, ownership is transferred to the customer. Any damage claims against the shipping company become the responsibility of the customer.
- Repairs necessary because of the equipment being used under other than normal operating conditions or for other than its intended use.
- Repair due to the customer's failure to follow normal maintenance instructions.
- Parts considered consumable; including: light bulbs, filters, gases, etc.
- Damage from use of improper water quality.
- Damage from chemicals or cleaning agents detrimental to equipment materials.
- Force Majeure or Acts of God.

This writing is a final and complete integration of the agreement between CARON and the customer. CARON makes no other warranties, express or implied, of merchantability, fitness for a particular purpose or otherwise, with respect to the goods sold under this agreement. This warranty cannot be altered unless CARON agrees to an alteration in writing and expressly stated herein shall be recognized to vary or modify this contract.

Ohio Law governs this warranty.

## **EQUIPMENT INTERNATIONAL LIMITED WARRANTY**

Please review this section before requesting warranty service. At CARON, one of our primary goals is to provide customers with high levels of personal service and top quality products, delivered on time, backed by technical service and supported for the life of the product.

**Before contacting your distributor for warranty service, please be aware that there are repairs that are not covered under warranty.**

### **WARRANTY DEFINED**

Caron Products & Services, Inc. (herein after CARON) hereby warrants that equipment manufactured by CARON is free from defects in materials and workmanship when the equipment is used under normal operating conditions in accordance with the instructions provided by CARON.

### **COVERED:**

- Parts for a period of two (2) years from date of shipment.
- Any part found defective will be either repaired or replaced at CARON's or their authorized representative's discretion. Parts that are replaced will become the property of CARON.
- If CARON or their authorized representatives determine that the customer's unit requires further service, CARON or the representative may, at its sole discretion, provide a service technician to correct the problem, or require the return of the equipment to the an authorized service depot.
- CARON or their authorized representative will have the right to inspect the equipment and determine the repairs or replacement parts necessary. The customer will be notified, within a reasonable time after inspection, of any costs incurred that are not covered by this warranty prior to initiation of any such repairs.

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- Cost of express shipment of equipment or parts.
- Any customer modifications of this equipment, or any repairs undertaken without the prior written consent of CARON, will render this limited warranty void.
- CARON and their representative are not responsible for consequential, incidental or special damages; whether shipping damage or damages that may occur during transfer to the customer's point of use. When the equipment is signed for at the customer's site, ownership is transferred to the customer. Any damage claims against the shipping company become the responsibility of the customer.
- Repairs necessary because of the equipment being used under other than normal operating conditions or for other than its intended use.
- Repair due to the customer's failure to follow normal maintenance instructions.
- Parts considered consumable; including: light bulbs, filters, gases, etc.
- Damage from use of improper water quality.
- Damage from chemicals or cleaning agents detrimental to equipment materials.
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Ohio Law governs this warranty.

**Caron Products & Services, Inc.**  
PO Box 715 • Marietta, OH 45750  
740-373-6809

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## INTRODUCTION

CARON's 6105 fingerprint chambers are designed specifically to create conditions for developing DFO, Ninhydrin, and other fingerprint development process prints.

The chamber features rapid condition recovery after the chamber door is opened and closed. The large viewing area offers easy observation of critical samples. The chamber interior is made of high quality, corrosion resistant material.

### Specifications

Temperature Range	40°C to 100°C
Temperature Control	± 0.5°C
Humidity Range	40 to 80% RH (of specified temperature range)
Humidity Control	± 3%
Interior Dimensions	24" W x 18" D x 22" H
Exterior Dimensions	28" W x 26" D x 37" H
Work Space	5 ft <sup>3</sup>
Shelf Work Area	5.3 ft <sup>2</sup> (shelf plus bottom)
Electrical	208/230V, 15 A, 60 Hz Model 6105-2 208/230V, 15 A, 50 Hz Model 6105-3

Specifications are based on exhaust air vent closed.

### Features

- Digital temperature and humidity display, PID control 1/16DIN, set-point & process value displayed simultaneously
- Digital countdown programmable timer
- Rapid recovery after chamber door is opened and closed
- Solid state sensors eliminate need for frequent replacement of wicks
- Chamber interior made of high quality, corrosion resistant material
- Exhaust adaptable air vent
- Forced air flow to ensure uniform internal conditions
- Large front viewing window
- Low water level alarm

## INTERNATIONAL SYMBOLS AND DEFINITIONS



Warning of hazardous area



Warning of dangerous electric voltage



Earth (ground) protective conductor

## WARNINGS



Local government may require proper lamp disposal

Use eye protection, gloves and aprons if exposure to hazardous materials could occur



## INSTALLATION

### Unpacking

This product has been completely tested, cleaned and packed for shipment. Carefully remove all packing material. Please examine the chamber completely. Should any damage be found, notify the delivering carrier immediately. Report any shortages to your local distributor or contact CARON customer service at 740-373-6809, 800-648-3042 (USA only) or [www.caronproducts.com](http://www.caronproducts.com).

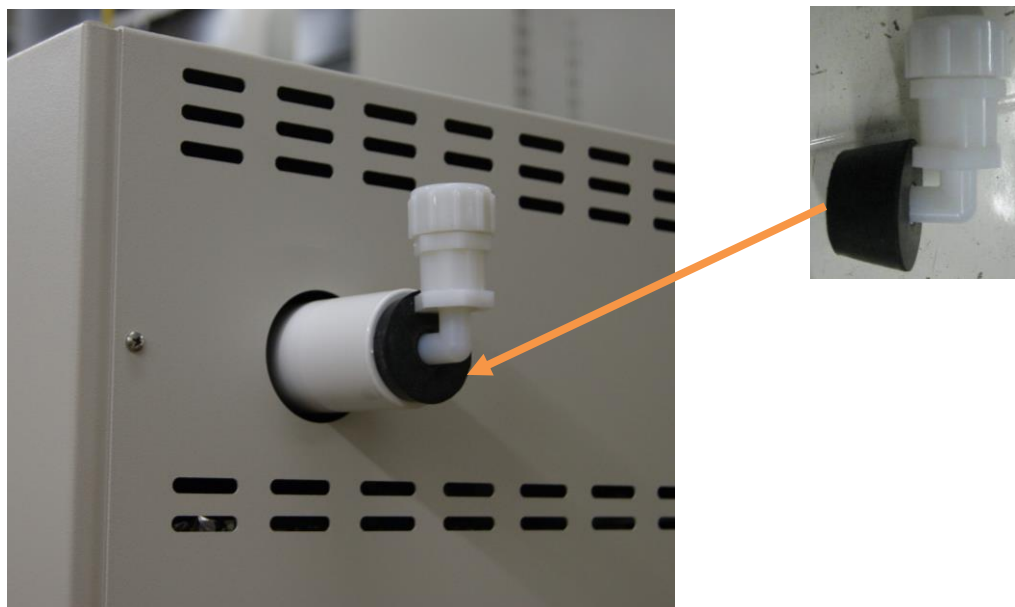
Caron provides full on-site installation services for all models. Our installation services guarantees the proper set-up and startup of all equipment. Please contact the Service Department at 740-373-6809 or [www.caronproducts.com](http://www.caronproducts.com) for details.

### Chamber Location

The chamber must be located in a dry, clean, and level area. Allow a 2 inch (51 mm) clearance from the back of chamber for proper air circulation. Locate the chamber in an area out of direct sunlight and away from heating and cooling ducts.

Caution: Do not put more than 5 lbs (2.3kg) on top of unit.

The figure below shows the exhaust port on the back of the chamber. Install rubber stopper/vent into port and press in firmly. Make sure vent is in upward position as shown. If external ducting to a fume hood or exterior vent is necessary, make connection here. Note that temperature, humidity, and recovery time will be affected.





Connect the unit to a dedicated grounded outlet that matches the units power requirements. Failure to do so could result in electrical shock or damage to the unit.

### Power Requirements

The power cord of this chamber is equipped with a grounded plug. Be sure to connect the ground. CARON recommends that the chamber have a dedicated wall outlet. Verify correct power supply required for particular unit. (Nema 6-15 15A Cord, Model 6105-2 only.)

(CEE 7/7 Continental European 16A Cord, 6105-3 only)

### Water Connections

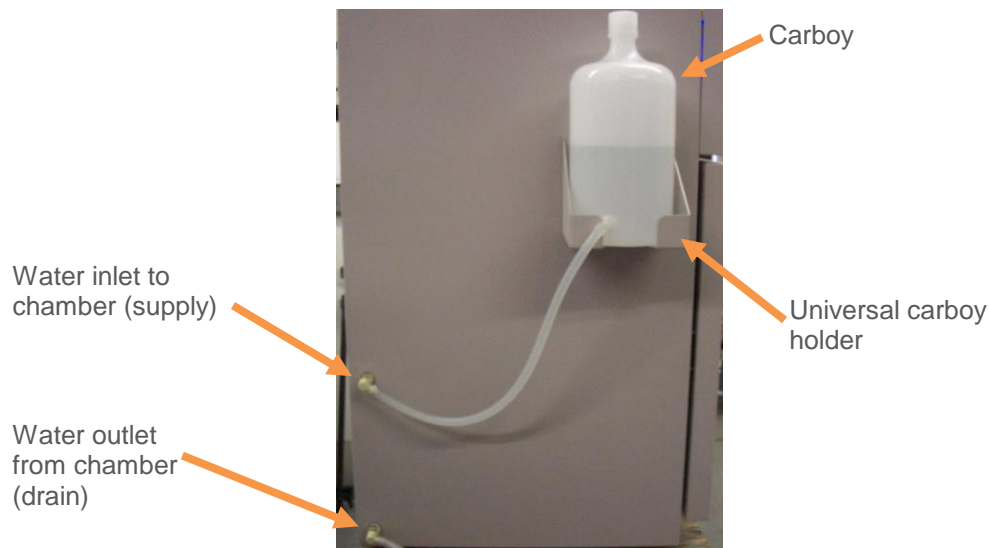
Plumb the water drain connection to a facility drain. Connect the water inlet to a water supply. The chamber requires *distilled, reverse osmosis or deionized* water with resistivity between 0.05 & 1 Mega Ohm-cm and pH above 6.5. Using water outside this range will void the warranty.

### Door Heat and Light Connection

Locate the connection input on the bottom right of the door. Be sure the corresponding yellow connector is properly inserted. **Note:** The black shroud on the yellow connector must be pulled back for insertion and then pushed forward once connected to lock.

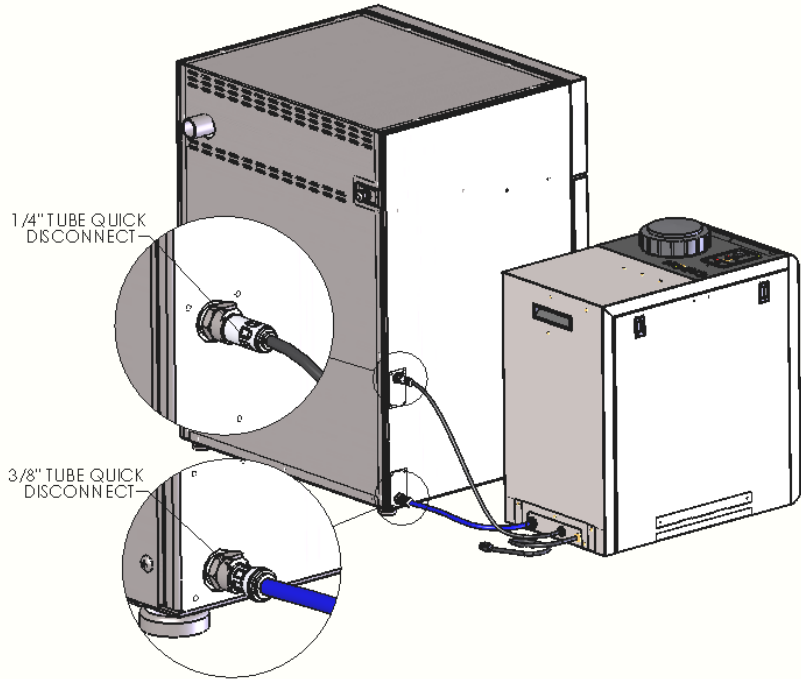
### Carboy water bottle: BTL101 (optional)

Mount the universal carboy holder either on the top of the chamber or on the side (as shown below). Use the mounting screw holes provided and secure the holder. Connect tubing to carboy, fill bottle and install as shown. The water supply must gravity drain. The bottle cap must have a weep hole for it to work properly.



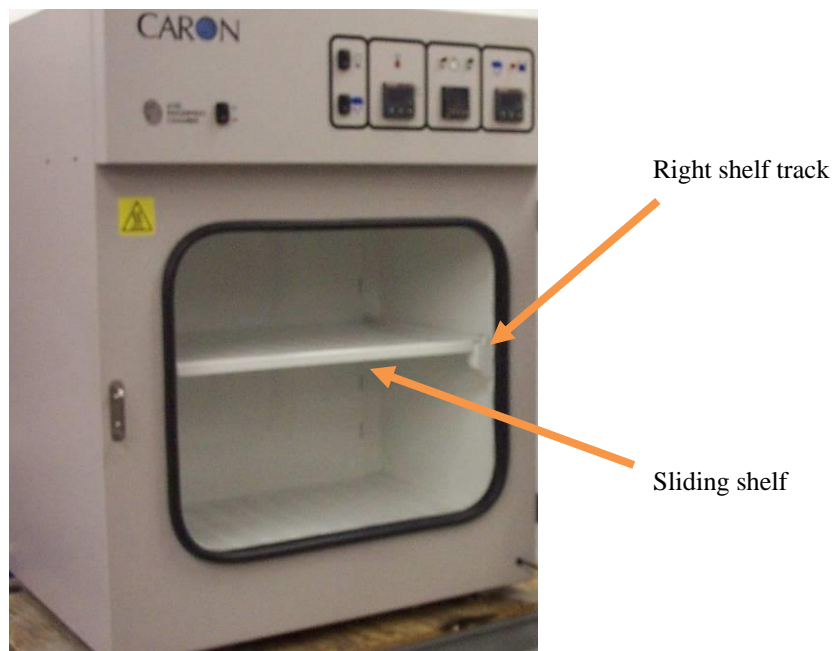
### Condensate Recirculating System: CRSY102 (optional)

The Condensate Recirculating System can be used in conjunction with CARON's 6105 chambers as a water delivery system. This system is typically used in facilities where a drain or in-house source of distilled, RO or deionized water is not available. The system provides continuous, clean, filtered water to the chamber's humidity injection system, collects and recycles the condensate that forms in the base of the chamber. Refer to instructions with the CRSY102 for connection details. Use fittings provided with 6105 to connect to CRSY102.



### Install Shelf / Hanging Rails

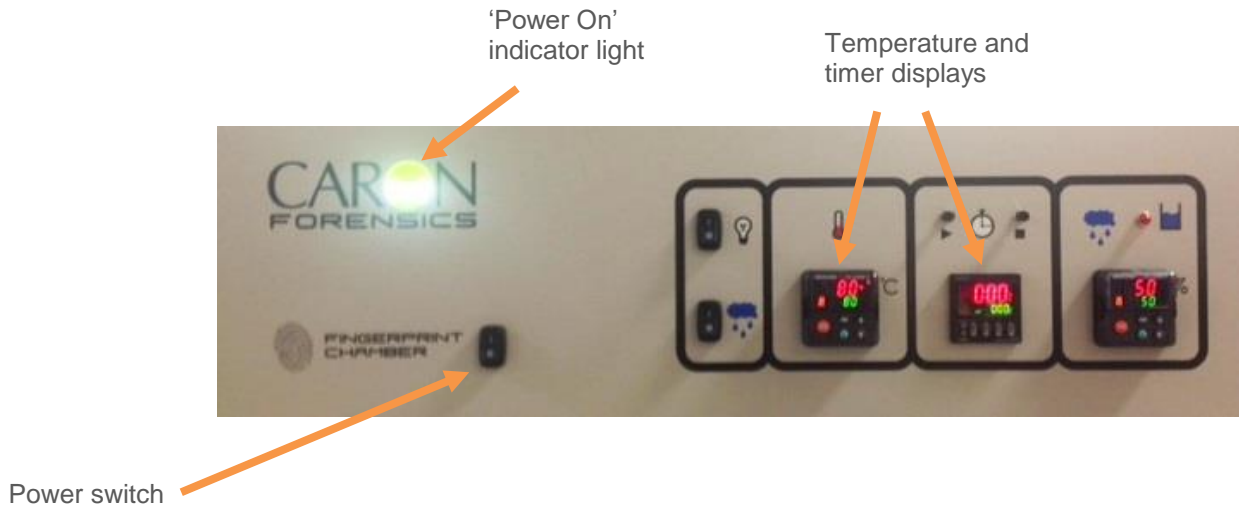
Insert both shelf tracks into the chamber (see picture below). Each unit is equipped with both a shelf and evidence rails/clips. Orient the shelf handle toward the front. Maximum shelf load is 22lbs (10kg) per shelf.



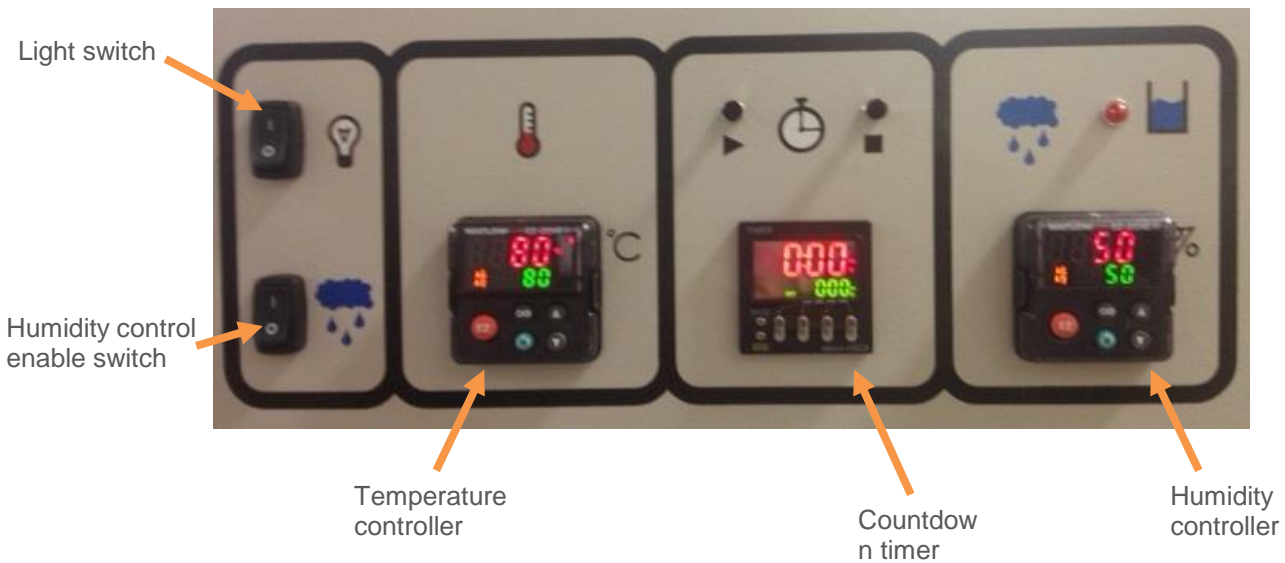
# OPERATION

## Start Up

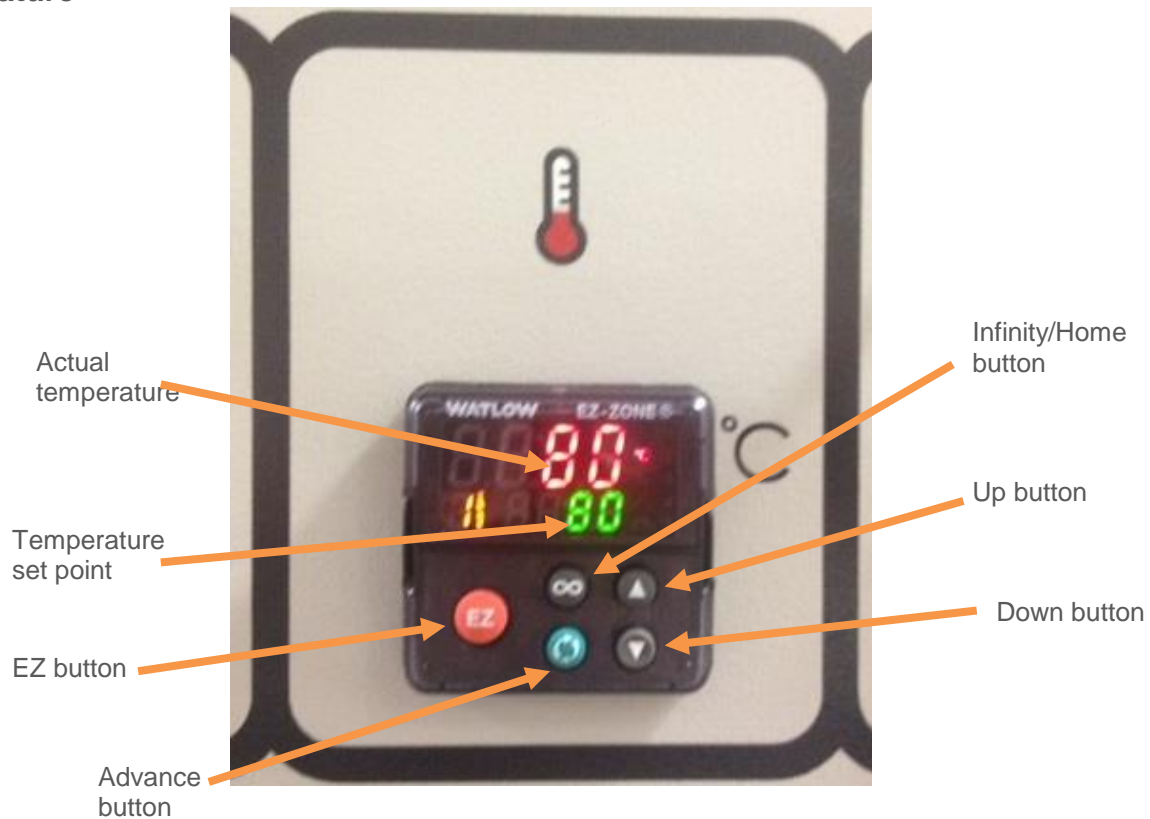
Be sure the water connections are properly made and the exhaust vent properly closed (see installation section). Turn on unit by pressing the power switch. The 'power on' indicator light, temperature and timer displays will illuminate. Air should be gently circulating internally.



## Control panel layout



## Temperature



The unit is capable of reaching temperatures that could result in burns. Always wear protective clothing when accessing the unit. Use caution when opening the outer door.

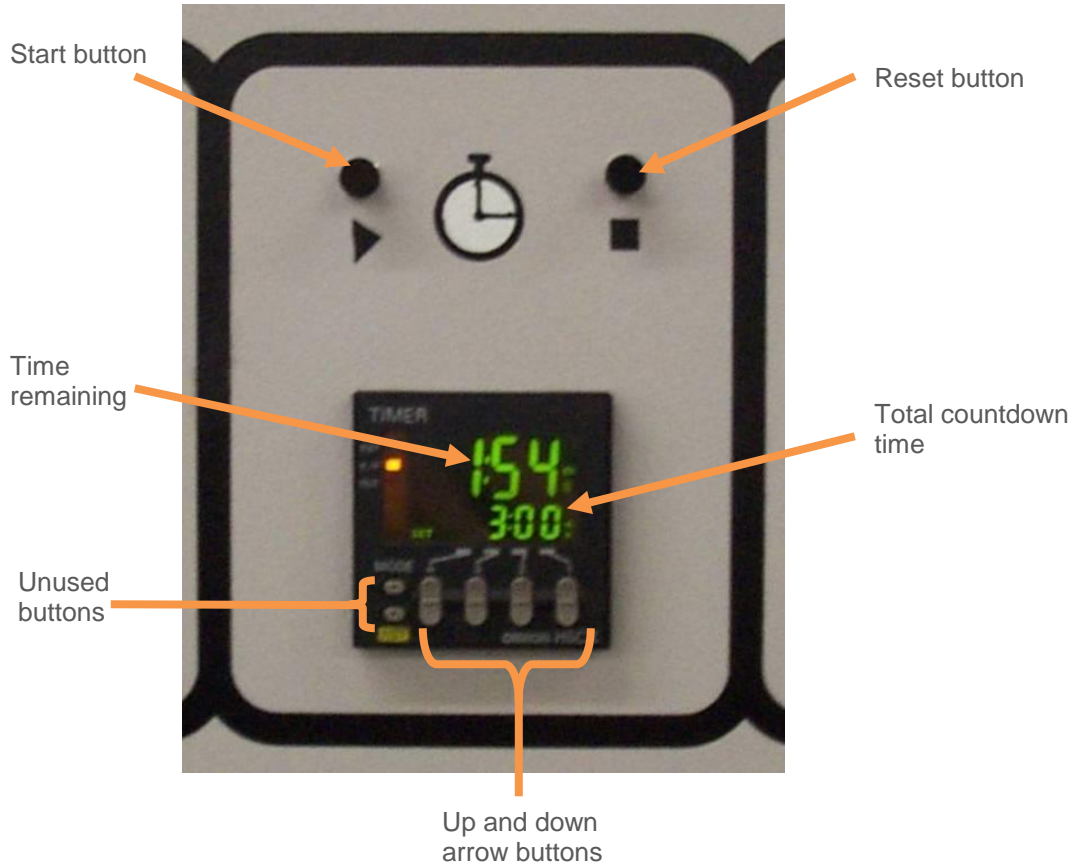
### Change Set Point

Use the up and down arrow push-buttons to obtain the desired temperature set point (red upper display). The temperature is displayed in °C.

The chamber drops in temperature slowly. For faster recovery time when lowering the temperature, open the door. The chamber will only control temperature within the specified range.

## Countdown Timer

The countdown timer provides users with a way to alert them to check or remove chamber contents. It does *not* turn the chamber off or in any way affect the temperature and humidity control. Time is displayed in minutes and seconds.



### Using the timer

1. Set total countdown time to desired value using the four up and down arrow buttons.
2. Press the start button.
3. When the time remaining reaches 0:00, the alarm buzzes and display turns red for 3 seconds.
4. Press the reset button; the time remaining resets to the total countdown time

Press the reset button at any time to stop the countdown.



Timer just reached 0:00, alarm is buzzing

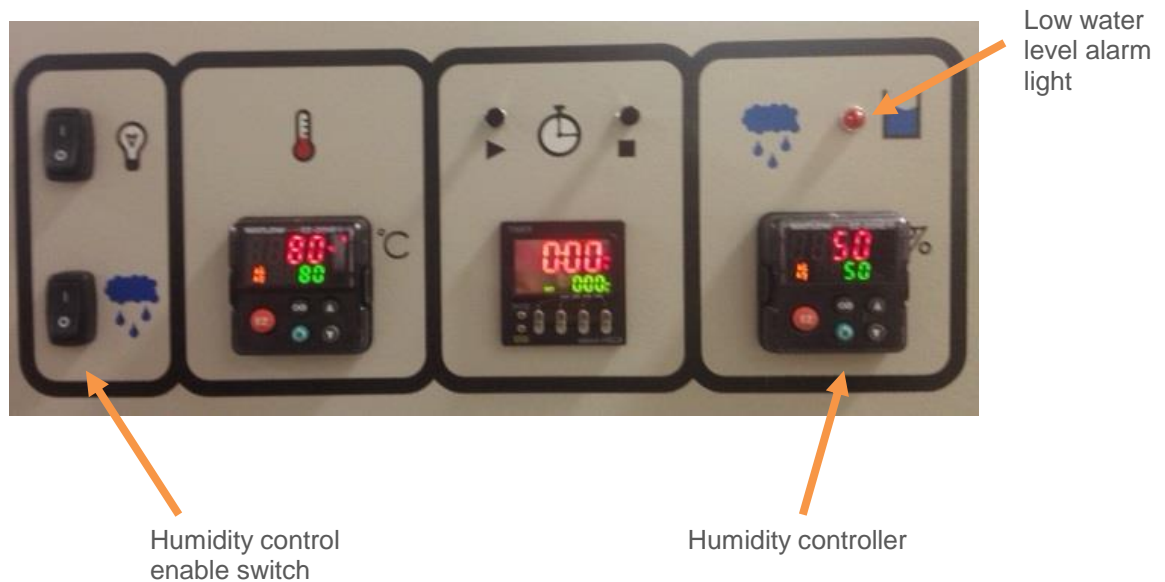


3 seconds after timer reaches 0:00, alarm is off

## Humidity

For fingerprint development processes that require humidity such as Ninhydrin, 1, 2-Indanedione, Nickel Nitrate, 5-MTN, and Zinc Chloride, the humidity should be enabled. To enable humidity control, turn the humidity control enable switch on. This turns on the humidity controller display and fills the steam generator with water. When the humidity switch is enabled, the glass viewing window is heated to minimize the condensation on the inside.

For fingerprint development processes that do not require humidity (temperature control only), the humidity switch should be off. Turning the humidity enable switch off drains the steam generator.

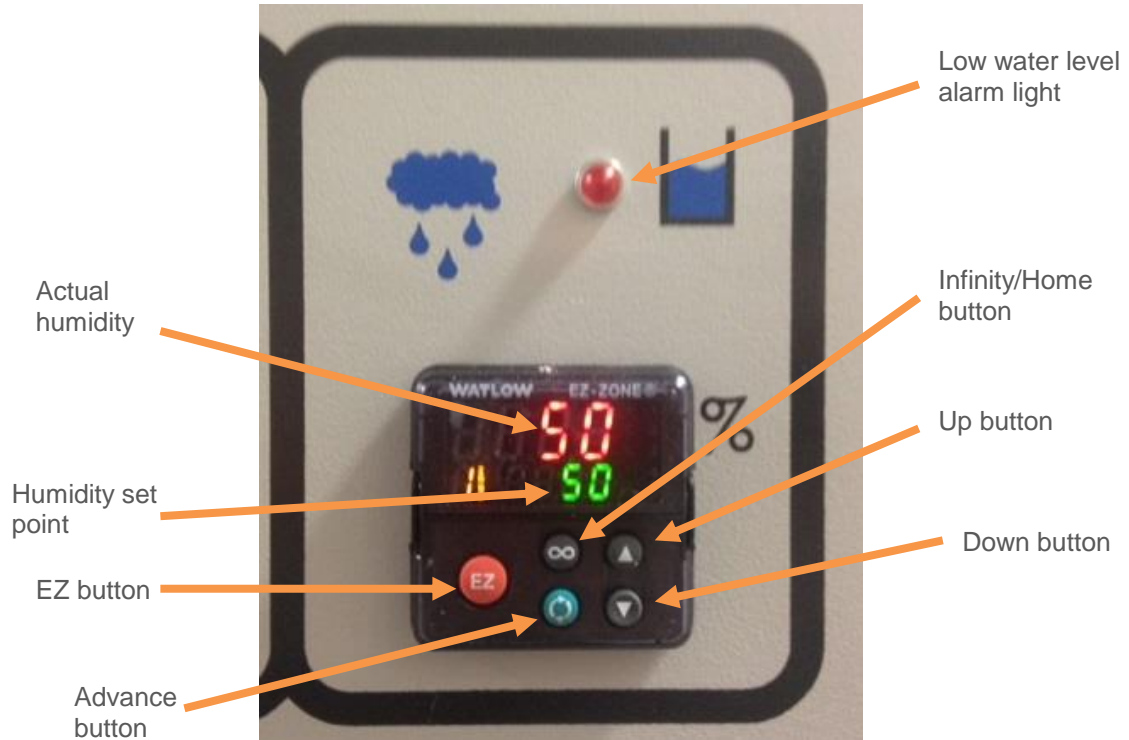


### Low water level alarm

The low water level alarm light will illuminate if the humidity control switch is enabled and, after 30 seconds, the internal steam generator does not fill properly. See troubleshooting guide if necessary. Once an adequate water supply is connected and the steam generator fills, the alarm light will automatically reset.

If the low water level alarm light is on, the chamber will not control humidity.

## Change Set Point



Use the up and down arrow push-buttons to obtain the desired humidity set point (red upper display). The relative humidity is displayed in %.

To lower the humidity, open the door or rear vent. The chamber will only control humidity within the specified range.



## Viewing light

To illuminate the interior, turn on the light switch. If lighting does not come on, see troubleshooting guide.

Light switch



## Unlocking the Controllers



The temperature and humidity controllers are factory programmed for precise control. Unlocking the controllers gives the user access to all parameters. Modifying parameters that are not thoroughly understood can adversely affect chamber performance that will not be covered under warranty.

To unlock an individual controller

- 1) Press and hold the advance and infinity keys simultaneously for six seconds
- 2) Press the up key until LOC is displayed in the upper display
- 3) Press the advance key until rLoC is displayed in the lower display
- 4) Press the up key to change the security level from 2 to 5
- 5) Press the advance key until sLoC is displayed in the lower display
- 6) Press the up key to change the security level from 2 to 5
- 7) Press infinity key twice to return to the main menu

All controller parameters are now available to be modified. Once the appropriate changes have been made, it is highly recommended to relock the controllers per the instructions below.

## Locking the Controllers

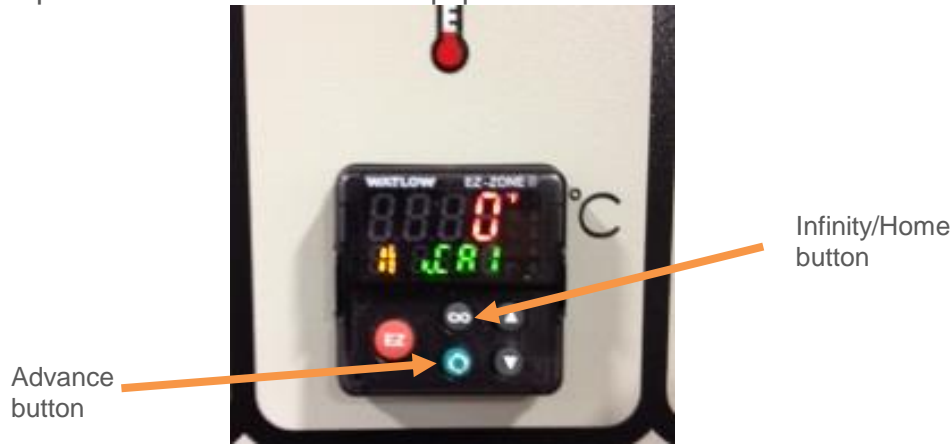
To lock an individual controller

- 1) Press and hold the advance and infinity keys simultaneously for six seconds
- 2) Press the up key until LOC is displayed in the upper display
- 3) Press the advance key until rLoC is displayed in the lower display
- 4) Press the up key to change the security level from 5 to 2
- 5) Press the advance key until sLoC is displayed in the lower display
- 6) Press the up key to change the security level from 5 to 2
- 7) Press infinity key twice to return to main menu

All controller parameters are now locked.

## CALIBRATION

The temperature and humidity systems can all be calibrated as necessary. CARON recommends an annual calibration check of each system. Before making a calibration adjustment, allow the cabinet to stabilize a minimum of 12 hours from a power off condition. If the unit has been in operation, allow a minimum of 3 hours of stable operation at all set-points. If you do not have the appropriate reference instruments to perform calibration, contact CARON's service department for on-site calibration at [www.caronproducts.com](http://www.caronproducts.com). Caron also provides validation services which ensures that the unit is functioning properly according to IQ, OQ and PQ protocols which satisfy FDA guidelines for qualification verification of equipment.



### Calibration Procedure:

1. Place an external temperature/humidity detector\* as close to the center of the chamber as possible. Allow sufficient time for the chamber and the sensor to stabilize. It is recommended to place the detector with only the heat on to allow the sensor to stabilize to the temperature. Once the sensor has had sufficient time to stabilize; turn the humidity on. This should eliminate condensation on the sensor.

*It is recommended that the acceptable range is  $\pm 1^{\circ}\text{C}$  and  $\pm 2\% \text{ RH}$ .*

2. If the reading difference is within the acceptable range; no changes will need to be made. If the difference is greater than the acceptable range; use the following steps to adjust the controller to be within the acceptable range. The difference will be used as the offset below.
3. To make the adjustment to controllers, press the advance key until the green display reads i.CAL.
4. Press the UP arrow to increase the calibration offset. Press the DOWN arrow to decrease the offset.
5. Press the infinity key to save calibration and return to main menu.

\*Caron recommends using NIST traceable device to calibrate the controllers. A Vaisala HMI41/HMP46 temperature/humidity detector or a similar device is recommended. A "wick" type

sensor is not recommended due to the likelihood that the sensor will become saturated and give inaccurate readings.

### Temperature calibration example



If the chamber temperature display reads 40.0°C and the calibrated independent sensor shows 40.3°C, set the i.CAL offset value to 0.3°C. If the calibrated independent sensor shows 39.6°C, then the entered offset should be negative. In this example the required offset to i.CAL would be -0.4°C.

### Humidity calibration example



If the chamber temperature display reads 80% and the calibrated independent sensor shows 83%, set the i.CAL offset value to 3.0%. If the calibrated independent sensor shows 74%, then the entered offset should be negative. In this example the required offset to i.CAL would be -6.0%.

## MAINTENANCE

The CARON chamber has been robustly designed to minimize performance problems. However, regular maintenance is very important for continuous trouble free operation.

As a general rule, CARON recommends an annual calibration check of the temperature, and humidity systems. CARON offers a full range of on-site calibration and validation services. We also offer preventative maintenance contracts on our equipment. Contact our Service department for details at 740-373-6809 or visit us on the web at [www.caronproducts.com](http://www.caronproducts.com).



WARNING: Before removing top/back panel, disconnect all power!

Electrical components (circuit breakers, fuses, relays, power supplies, etc.) are located underneath the top/back panel. For additional service support, contact your local distributor or CARON service department at [www.caronproducts.com](http://www.caronproducts.com). When contacting CARON, please provide model number and serial number

### Routine Maintenance

Routine chamber maintenance is necessary to keep the chamber working properly. The recommended chamber maintenance schedule is:

- a) Clean interior chamber (as needed)
- b) If the humidity control portion of the chamber is going to be unused for 20 days, the small internal water reservoir should be drained. To drain the internal reservoir:
  - turn the chamber on
  - set the humidity switch to off
  - set the temperature to 100°C
  - open the back vent (remove stopper)
  - run for four hours
  - leave humidity switch off until humidity control is required
- c) Check drains for blockage (monthly)

## Brief Troubleshooting

Unit won't reach temperature set point

- Is the set point within the unit specification range?
- Is the rear vent closed?
- Is the door closed and latched?
- Can air flow freely throughout the chamber? Inhibited air flow can trip the over temperature safety device. Remove airflow obstructions and let stabilize for 30 minutes

Temperature displayed is different than measured temperature inside chamber

- Can air flow freely throughout the chamber?
- Contact CARON service department to apply a temperature offset

Temperature is higher than set point

- Is the set point within the unit specification range?
- Is the ambient temperature no more than 25°C?
- Turn unit off and open door for 1 hour.

Humidity controller is blank (temperature controller is illuminated)

- Is the humidity enable switch on?

Unit won't reach humidity set point

- Is the rear vent closed?
- Is the door closed and latched?
- Is the low water level alarm light on?
- Is there adequate water supply?
- Can air flow freely throughout the chamber?
- Is the humidity set point within the unit specification range?

Low water alarm light stays lit

- Is the water supply connected?
- Is there adequate water being supplied to the chamber?
- Are there any air traps in the line?
- If using a carboy or other reservoir, is there a weep hole to allow free flow?

Humidity displayed is different than measured humidity inside chamber

- Can air flow freely throughout the chamber?
- Contact CARON service department to apply a humidity offset

Humidity is higher than set point.

- Is the set point within the unit specification range?
- Is the drain line connected and draining properly? No kinks or up-hill traps in the line?
- Is the internal air saturated? Turn humidity enable switch off, open door, and set temperature to 100°C for 1 hour to dry out the chamber.
- Is water present in exhaust vent? Remove stopper and let water drain out.

Interior lights won't come 'on'

- Are lights turned 'on'?
- Is the connector on the bottom of the door switch connected (see below)?

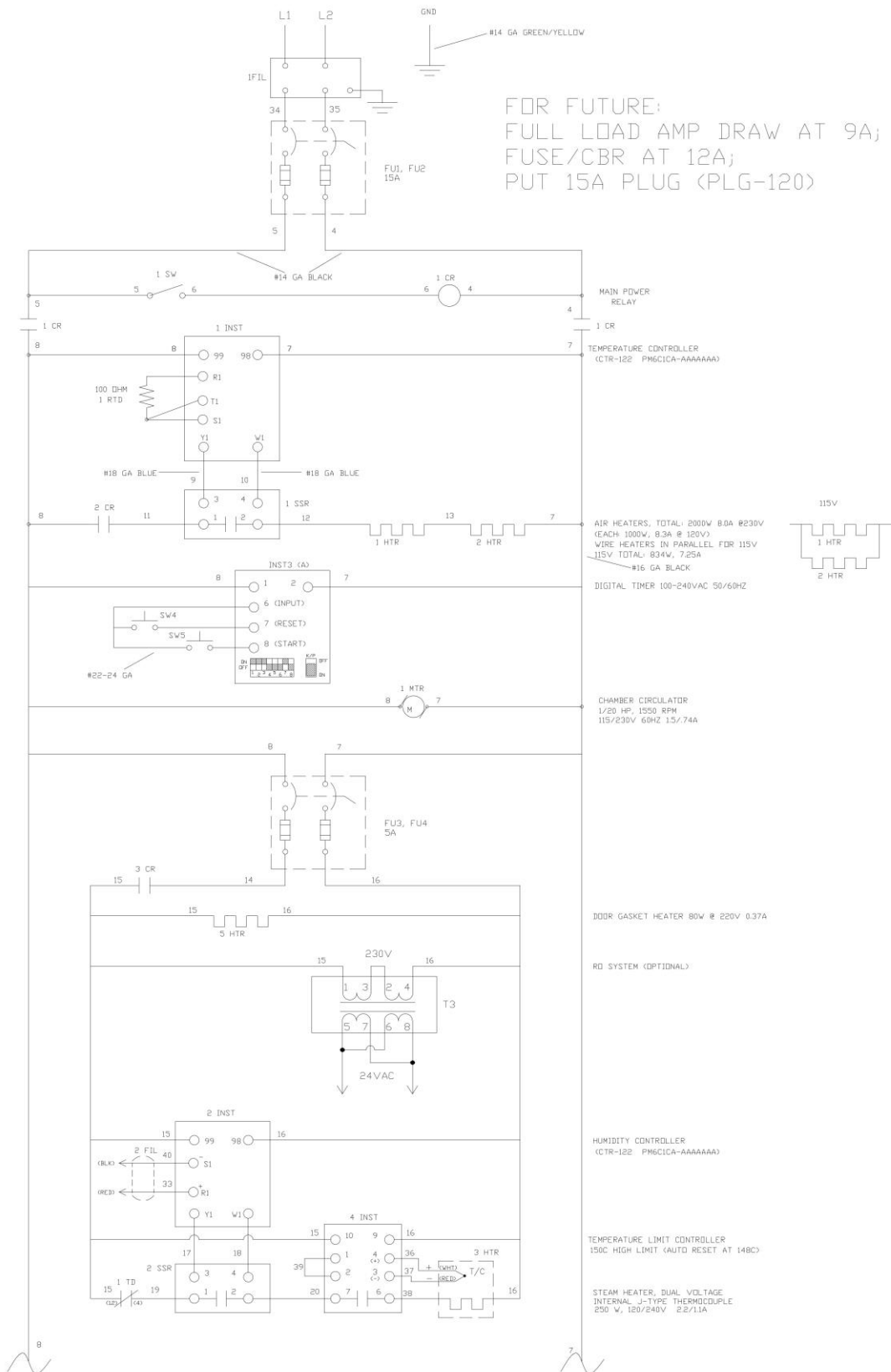


#### Glass fogs up on inside

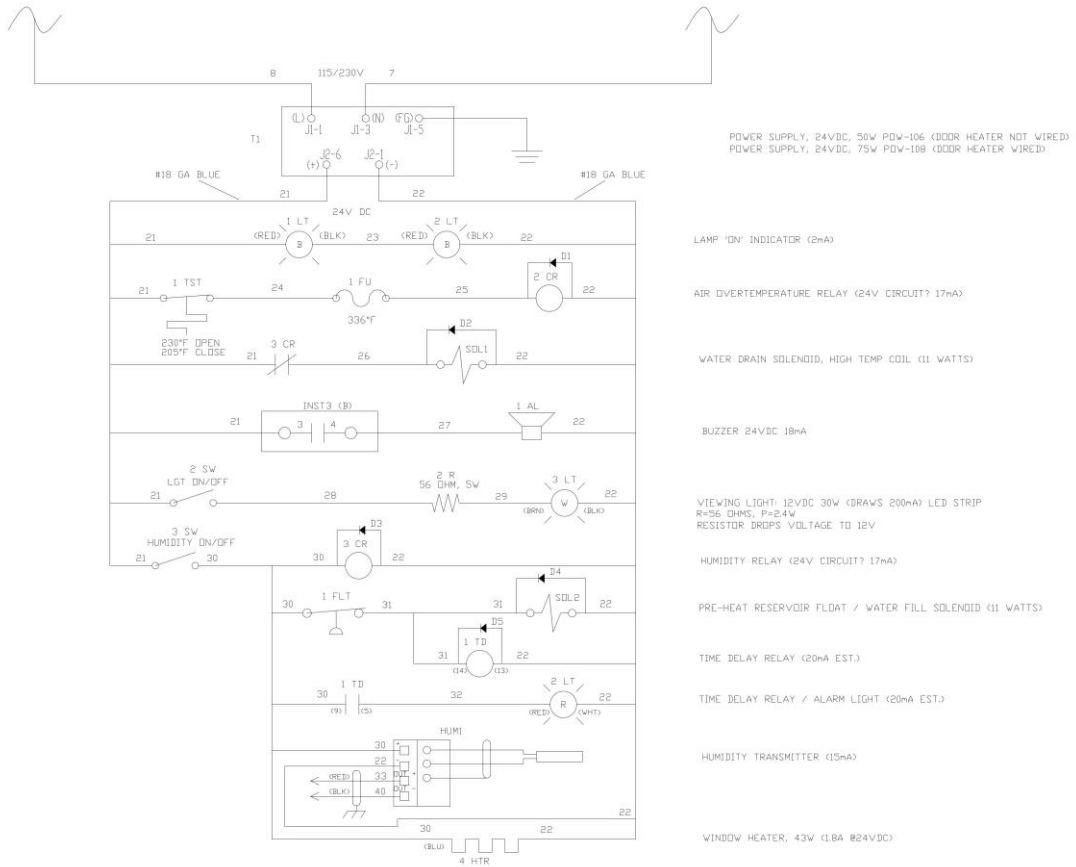
- Is the humidity switch on?
- Is the connector on the bottom of the door switch connected (see picture)?
- Is the door sealed tightly?
- Is the door gasket collapsed?
- Has the unit stabilized 1 hour?

# Electrical Schematic

230 VAC, 15 AMP, 50/60 Hz







## Spare Replacement Parts

### General

<b>Part Number</b>	<b>Description</b>
MTR-107	BLOWER MOTOR
BLW-110	BLOWER WHEEL
CTR-122	WATLOW STANARD CONTROLLER
POW-108	24V POWER SUPPLY
CRD-108	LINE CORD 50 HZ ONLY
GSK-136	DOOR GASKET
LGT-143	DOOR LIGHT

### Temperature Related

<b>Part Number</b>	<b>Description</b>
HTR-143	AIR HEATER
RMT-114	SNAP DISK 225 F
RMT-115	THERMAL FUSE 169 C
RTD-101	TEMPERATURE SENSOR
REL-103	HEATER SOLID STATE RELAY

### Humidity Related

<b>Part Number</b>	<b>Description</b>
HUM-114	RH SENSOR
SOL-133	HUMIDIFICATION SOLENOLD
SOL-135	DRAIN SOLENOLD
LEV-106	STEAM GENERATOR LEVEL SWITCH
HTR-144	STEAM GENERATOR HEATER
REL-103	HUMIDITY SOLID STATE RELAY
CTR-124	TEMPERATURE LIMIT CONTROLLER
REL-150	TIME DELAY RELAY

# DECLARATION OF CONFORMITY

## CE Compliant Product



## Declaration of Conformity

### Caron Products

27640 State Route 7

Marietta, OH 45750 USA

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Declares that the following product:

Designation: 6105  
Model Number: 6105-3  
Classification: Electrical Equipment for Measurement, Control, & Lab Use  
Rated Voltage: 220-240 V~ (ac)  
Rated Frequency: 50Hz  
Rated Power Consumption: 15 amps

Meets the essential requirements of the following European Union Directive(s) using the relevant section(s) of the normalized standards and related documents shown:

### *89/336/EEC Electromagnetic Compatibility Directive*

EN 61326:1997	Laboratory Equipment, Immunity Measurement & Control requirements
EN 61000-3-2:2000	Limits for harmonic current emission
EN 61000-4-2:1995	Electrostatic Discharge
EN 61000-4-3:1995	Radiated Susceptibility
EN 61000-4-4:1995	Electrical Fast Transient
EN 61000-4-5:1995	Lightning Surge
EN 61000-4-6:1996	Conducted Disturbances Induced by RF Fields
EN 61000-4-11:1994	Voltage Variations, Dips and Interruptions
CISPR 11:1990	Emissions Standards

### *73/23/EEC Low-Voltage Directive*

EN 61010-1:2001	Safety requirements for electrical equipment for measurement, control, and laboratory use.
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