Thank you for purchasing this Esco CO$_2$ Incubator. Please read this manual thoroughly to familiarize yourself with the many unique features and exciting innovations we have built into your new equipment. Esco provides many other resources at our website, www.escoglobal.com, to complement this manual and help you enjoy many years of productive and safe use of your Esco products.

For Technical Service, contact
North America
Esco Technologies, Inc.
2940 Turnpike Drive, Units 15-16 • Hatboro, PA 19040, USA
Toll-Free USA and Canada 888-375-ESCO
Tel 215-441-9661 • Fax 215-441-9660
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Rest of World
Esco Micro Pte. Ltd.
21 Changi South Street 1 • Singapore 486 777
Tel +65 6542 0833 • Fax +65 6542 6920
www.escoglobal.com • mail@escoglobal.com

User Manual

CelCulture

CO$_2$ Incubators

Esco CCL User Manual
Version A - Released July 2011

Copyright Information

Table of Contents

ESCO | CelCulture

Warranty Terms and Conditions

Esco products come with either a 1, 2 or 3 year limited warranty, depending on the product purchased, beginning on the date of shipment from any Esco international warehousing location. To determine which warranty applies to your product, refer to the appendix below.

Esco's limited warranty covers defects in materials and workmanship. Esco's liability under this limited warranty shall be, at our option, to repair or replace any defective parts of the equipment, provided if proven to the satisfaction of Esco that these parts were defective at the time of being sold, and that all defective parts shall be returned, properly identified with a Return Authorization.

This limited warranty covers parts only, and not transportation/insurance charges.

This limited warranty does not cover:
- Freight or installation (inside delivery handling) damage. If your product was damaged in transit, you must file a claim directly with the freight carrier.
- Products with missing or defaced serial numbers.
- Products for which Esco has not received payment.
- Problems that result from:
    - External causes such as accident, abuse, misuse, problems with electrical power, improper operating environmental conditions.
    - Servicing not authorized by Esco.
    - Usage that is not in accordance with product instructions.
    - Failure to follow the product instructions.
    - Failure to perform preventive maintenance.
    - Problems caused by using accessories, parts, or components not supplied by Esco.
    - Damage by fire, floods, or acts of God.
    - Customer modifications to the product
- Consumables such as filters (HEPA, ULPA, carbon, pre-filters) and fluorescent / UV bulbs.
- Esco is not liable for any damage incurred on the objects used on or stored in Esco equipment. If the objects are highly valuable, user is advised to have in place independent external preventive measures such as connection to a centralized alarm system.

Factory installed, customer specified equipment or accessories are warranted only to the extent guaranteed by the original manufacturer. The customer agrees that in relation to these products purchased through Esco, our limited warranty shall not apply and the original manufacturer's warranty shall be the sole warranty in respect of these products. The customer shall utilize that warranty for the support of such products and in any event not look to Esco for such warranty support.

Esco encourages all users to register their equipment online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.

ALL EXPRESS AND IMPLIED WARRANTIES FOR THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN TIME TO THE TERM OF THIS LIMITED WARRANTY. NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER THE LIMITED WARRANTY PERIOD HAS EXPIRED. ESCO DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES PROVIDED FOR IN THIS LIMITED WARRANTY OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, ANY LIABILITY FOR THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES, FOR PRODUCTS NOT BEING AVAILABLE FOR USE, OR FOR LOST WORK. ESCO'S LIABILITY WILL BE NO MORE THAN THE AMOUNT YOU PAID FOR THE PRODUCT THAT IS THE SUBJECT OF A CLAIM. THIS IS THE MAXIMUM AMOUNT FOR WHICH ESCO IS RESPONSIBLE.

These Terms and Conditions shall be governed by and construed in accordance with the laws of Singapore and shall be subject to the exclusive jurisdiction of the courts of Singapore.

Technical Support, Warranty Service Contacts
USA: 1-877-479-3726
Singapore: +65 65420833
Global Email Helpdesk: support@escoglobal.com
Visit http://www.escoglobal.com/ to talk to a Live Support Representative
Distributors are encouraged to visit the Distributor Intranet for self-help materials.

Product Appendix, Warranty Listings

Biological Safety Cabinets, Laminar Flow Cabinets, HEPA-Filtered Cabinets (except Streamline brand)	The warranty periods for BSC may vary by country. Contact your local distributor for specific warranty details.
Laboratory Fume Hoods	1 year limited.
Ductless Fume Hoods	3 years limited for Ascent Opti's, 5 years for Ascent Max's.
Cleanroom Equipment	1 year limited.
Laboratory Ovens and Incubators	1 year limited.
CO_2 Incubators	2 years limited.
Containment/Pharma Products	2 years limited.
Ultralow Temperature Freezer	3 years limited. 60 months on Compressor.

The warranty period starts two months from the date your equipment is shipped from Esco facility for international distributors. This allows shipping time so the warranty will go into effect at approximately the same time the equipment is delivered to the user. The warranty protection extends to any subsequent owner during the warranty period. Distributors who stock Esco equipment are allowed an additional four months for delivery and installation, providing the product is registered with Esco. User can register product online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.

Policy updated on 12th Apr 2011 (This limited warranty policy does not apply to products purchased before 12th Apr 2011)

ESCO|CelCulture

Introduction

1. Products Covered

CelCulture CO$_2$ Incubator						
Model	Size	Sensor	Control	Filter	Decontamination	Electrical Rating
CCL-170A-8	170 L	TC	CO$_2$	ULPA	90°C Moist Heat	220 - 240 V, AC, 50/60 Hz, 1Φ
CCL-170B-8	170 L	IR	CO$_2$	ULPA	90°C Moist Heat	220 - 240 V, AC, 50/60 Hz, 1Φ
CCL-170T-8*	170 L	IR	CO$_2$/O$_2$	ULPA	90°C Moist Heat	220 - 240 V, AC, 50/60 Hz, 1Φ
CCL-170A-9	170 L	TC	CO$_2$	ULPA	90°C Moist Heat	110 - 130 V, AC, 50/60 Hz, 1Φ
CCL-170B-9	170 L	IR	CO$_2$	ULPA	90°C Moist Heat	110 - 130 V, AC, 50/60 Hz, 1Φ
CCL-170T-9*	170 L	IR	CO$_2$/O$_2$	ULPA	90°C Moist Heat	110 - 130 V, AC, 50/60 Hz, 1Φ

*Please note that these units haven't been evaluated to UL/CB 61010-1

2. Safety Warning

- Anyone working with, on or around this equipment should read this manual. Failure to read, understand and follow the instructions given in this documentation may result in damage to the unit, injury to operating personnel, and / or poor equipment performance.
- Any adjustment, modification or maintenance to this equipment must be undertaken by qualified service personnel.
- The use of any hazardous materials in this equipment must be monitored by an industrial hygienist, safety officer or some other suitably qualified individual.
- Before you proceed, you should thoroughly understand the installation procedures and take note of the environmental / electrical requirements.

- In this manual, important safety related points will be marked with the symbol.

- If the equipment is used in a manner not specified by this manual, the protection provided by this equipment may be impaired.

3. Limitation of Liability

The disposal and / or emission of substances used in connection with this equipment may be governed by various local regulations. Familiarization and compliance with any such regulations are the sole responsibility of the users. Esco's liability is limited with respect to user compliance with such regulations.

4. European Union Directive on WEEE and RoHS

The European Union has issued two directives:
• **Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE)**
This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:
Esco sells products through distributors throughout Europe. Contact your local Esco distributor for recycling/disposal.
• **Directive 2002/95/EC on Restriction on the use of Hazardous Substances (RoHS)**
With respect to the directive on RoHS, please note that this freezer falls under category 8 (medical devices) and category 9 (monitoring and control instruments) and is therefore exempted from requirement to comply with the provisions of this directive.

CO$_2$ Incubator **ESCO**

Declaration of Conformation

In accordance to EN ISO/IEC 17050-1:2010

We,   Esco Micro Pte. Ltd.
of   21 Changi South Street 1
       Singapore, 486777
       Tel: +65 6542 0833
       Fax: +65 6542 6920
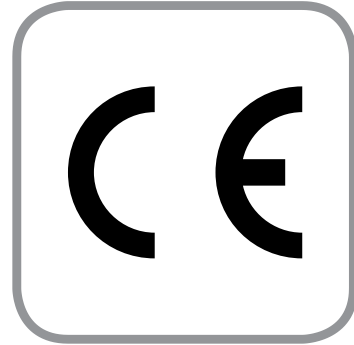
declare on our sole responsibility that the product:

Category   **: CO$_2$ Incubator**
Brand   **: CelCulture**
Model   **: CCL-170A-8, CCL-170B-8, CCL-170T-8**

in accordance with the following directives:

2006/95/EEC   **: The Low Voltage Directive and its amending directives**
92/31/EEC   **: The Electromagnetic Compatibility Directive and its amending directives**

has been designed to comply with the requirement of the following Harmonized Standard:

Low Voltage   **: EN 61010-1:2010**
EMC   **: EN 61326-1:2006 Class B**

More information may be obtained from Esco's authorized distributors located within the European Union. A list of these parties and their contact information is available on request from Esco.

_____

XQ Lin
Group CEO, Esco

This Declaration of Conformity is only applicable for 230V AC 50Hz units

CO$_2$ Incubator **ESCO**

Chapter 1 - Product Information

1.1 About CelCulture CO_2 Incubators

A CO_2 Incubator is a device for controlling the temperature, humidity, CO_2 level, and other conditions in which a cell culture is being grown or maintained. Incubators are essential for experimental work in cell biology, microbiology and molecular biology and are widely used in scientific research to grow and maintain cell cultures. Other typical fields of application include tissue engineering, in vitro fertilization, neuroscience, cancer research and other cell research.

The most common setting of the CO_2 Incubators is 37^oC temperature, 5% CO_2 concentration and 90-95% humidity, for culturing mammalian cells. Mammalian cells have very stringent requirements of the environment, which can be closely monitored and maintained by the use of CO_2 Incubators. Other applications such as hypoxic study or microorganism culture can also be carried out in CO_2 Incubators by adjusting the settings of temperature from ambient + 3^oC to 60^oC, CO_2 concentration from 0% to 20%, O_2 concentration 1% to 20.7% and humidity up to 97%.

Note: *Given high-accurate temperature and CO_2 level measurement and high-precision control, it is especially suitable for growing mammalian cells at 37^oC and in the presence of 5% CO_2.*

1.2 Labels
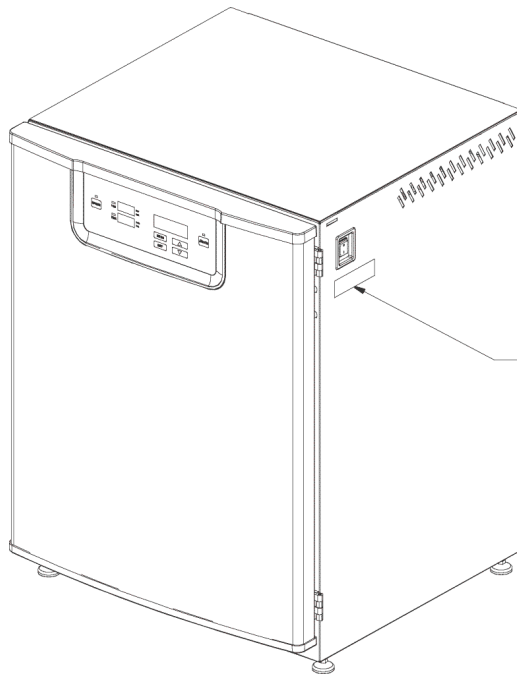
ESCO
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mail@escoglobal.com
www.escoglobal.com

Model: CCL - 170B - 8
Serial : 2011 - 58528
Power: 785W 220 - 240VAC 50/60HZ 1PH
FLA: 3.4A Interior Volume: 170L
Manufactured in 2011

Model – model of the unit
Serial – the unit's serial number
Power – max power requirement and electrical specification
Interior Volume – the unit's inner chamber volume
Manufactured in … - year of manufacture

1.3 Quick View

1.3.1 Front Quick View
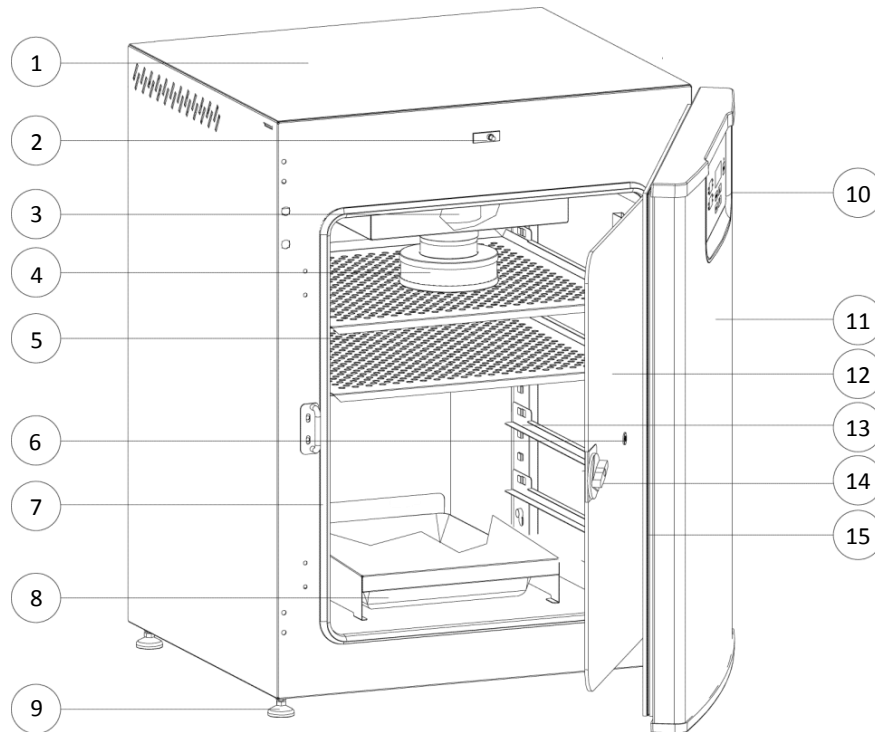
1. Top Cover
2. Door switch
3. Circulation fan
4. ULPA filter
5. Shelves
6. Sampling port
7. Glass door gasket
8. Humidity water pan
9. Leveling feet
10. Control panel
11. Outer door
12. Glass door
13. Pilaster shelf support
14. Glass door latch
15. Magnetic gasket

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1.3.2 Back Quick View
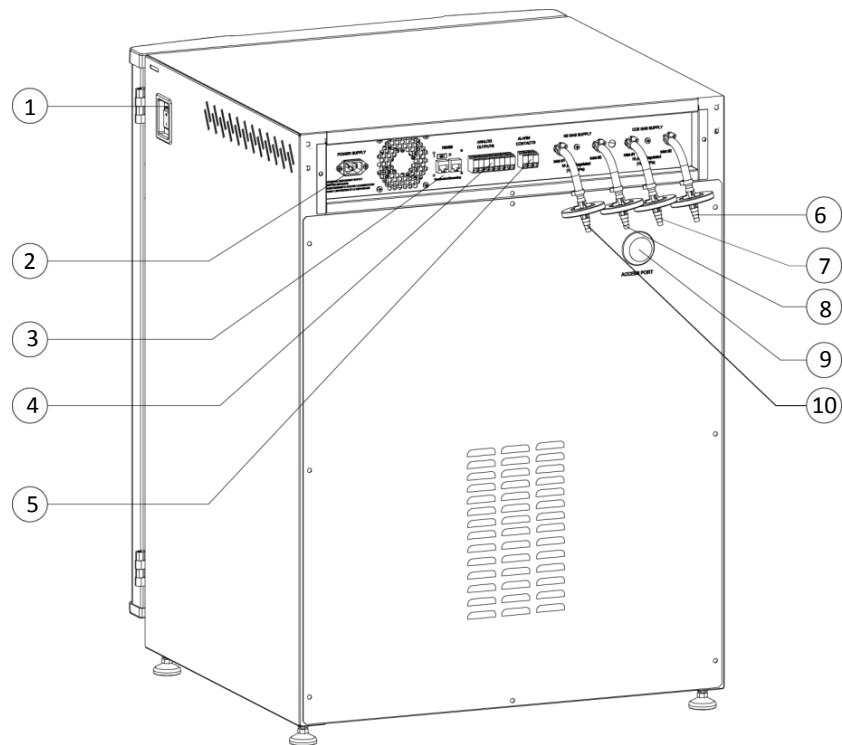
1. Main switch
2. Power inlet
3. RS485 communication
4. Analog output (optional)
5. Alarm contacts
6. CO_2 gas inlet
7. CO_2 gas inlet (CO_2 backup system)
8. N_2 gas inlet (for suppressed O_2 control)
9. N_2 gas inlet (for suppressed O_2 control - N_2 backup system)
10. Access port

CO_2 Incubator **ESCO**

Chapter 2 – Installation

2.1 General Requirement

2.1.1 Location Requirements
- The CelCulture CO_2 Incubator can be placed on the floor or working surface or floor stand. Do not place equipment close to flammable materials or devices that produce excess heat.
- Before moving or relocating the unit, make sure to:
    - Remove the water in the humidity to avoid spillage.
    - Transfer the sample cells to another incubator.
- It is essential to ensure adequate air ventilation around the equipment.
- When moving the equipment, do not lift using the door or door handle.
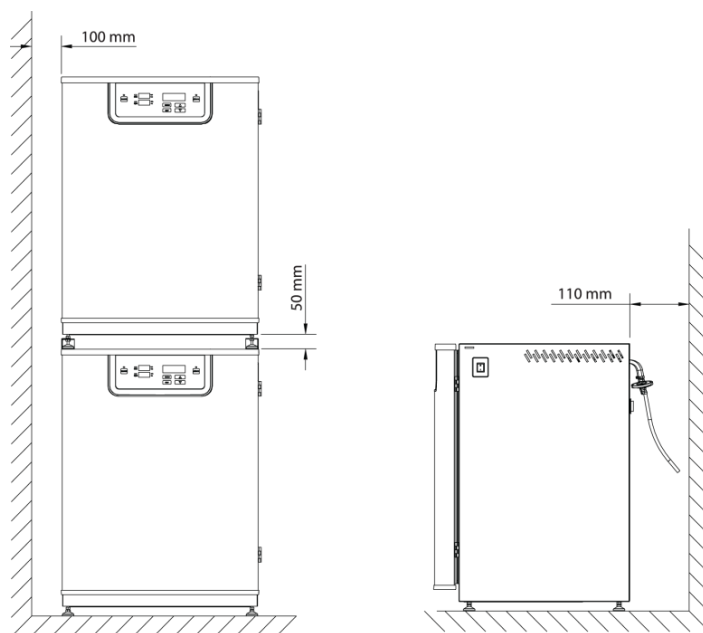
- The spacing to the side wall should be at least 10 cm (3.9").
- The spacing at the back of the equipment should be at least 11 cm (4.3").

2.1.2 Environmental Requirements
- Indoor use
- Altitudes of up to 2000 meters (6600')
- Up to 90% relative humidity – non condensing
- Temperature between 18°C - 34°C (64°F - 93°F)
  Note: *23°C - 27°C (73°F - 81°F) is the range of the best performance*
- Must be installed in room with sufficient ventilation. The room ventilation should be a technical ventilation that is in accordance with the requirements of ZH 1/119 (Guidelines for laboratories) or some other suited ventilation system with appropriate capacity.

2.1.3 Power Requirements

- The equipment is designed to work with an electrical supply of 220 VAC – 240 VAC, 50/60 Hz or 110VAC – 130 VAC, 50/60 Hz. If your available electrical supply is not within these parameters, then a suitable power supply must be used, otherwise damage may be caused to the device or a hazardous situation may result.
- It is recommended that the equipment is connected to a dedicated power source with protective grounding installed
- There should be unobstructed access to the main power plug. The power plug is the main disconnecting device on the unit
- This equipment can sustain a maximum of ±10% nominal voltage fluctuation; otherwise a power stabilizer is needed.

2.2 Installation

2.2.1 Unit Leveling

It is important that the equipment is properly leveled by positioning a bubble level on the center top shelf of the incubator. The incubator has a built in leveling feet that can be adjusted to level the unit. Adjust the feet until the unit sits level left to right and front to back.

2.2.2 Unit Stacking

If equipment is to be stacked on top of each other, the equipment with the lower working temperature must always be placed at the bottom.

1. Remove the screws from the back at top left and top right of the incubator. These screws will be used to secure the stacking brackets later.
2. Position a bubble level on the center top shelf of the incubator and adjust the leveling feet of the lower incubator until the incubator is level.
3. Lift the 2nd incubator onto the top the 1st incubator and align them.
   Note: *The feet are NOT to be removed and they should be adjusted to allow 40 mm to 50 mm (1.5" to 2") clearance between the incubators.*
4. There are 4 pieces provided in the accessory kit box, 2 for the front and 2 for the back.
5. Secure the stacking brackets to the cabinet using the M4 screw provided.
6. Tighten the nut on the foot to secure the stacking brackets.
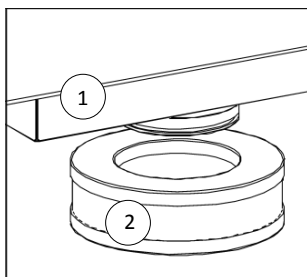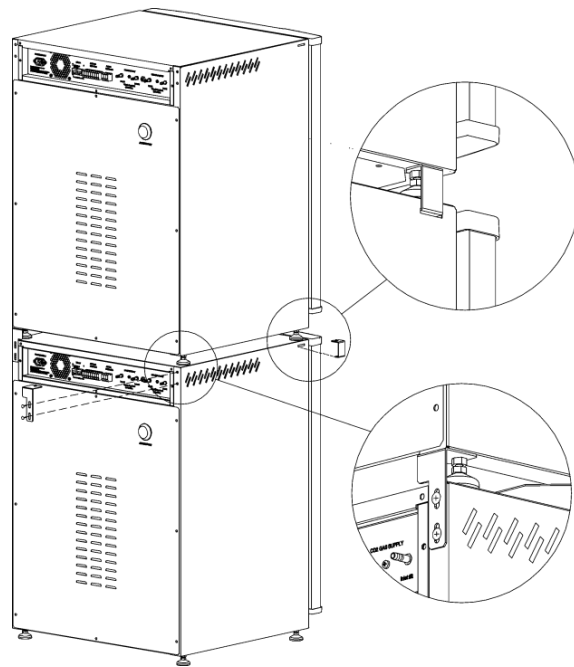
2.2.3 ULPA Filter Installation

To install the ULPA filter (2), push it upward in place – just beneath the top duct (1). To uninstall, pull it downward.

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2.2.4 Shelves System Installation
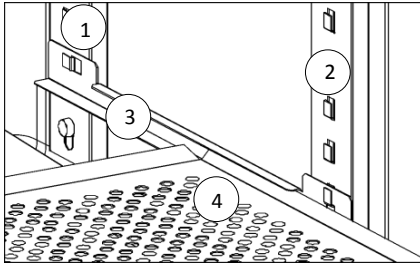
Pilasters are held against the chamber walls using thumbscrews. There are 2 pilaster models – the shelf railing holders in the front pilasters (2) is open upward, while the one in the back pilasters (1) are open toward the back of the unit.

Shelf railings (3) are installed by sliding them in the shelf railing holders in the back pilaster, then the front.

Slide in the shelves (4) in the openings of the shelf railings

2.2.5 Connecting the Unit to Electrical Power

Plug the provided power cord to the power inlet at the rear of the unit. Connect the power cord to the building outlet and turn ON the power switch of the outlet if necessary.

Note: *Refer to the serial number tag located on the right side of the cabinet for electrical specification. Ensure the cabinet is connected to the correct power source.*

2.2.6 Connecting the Unit to CO_2 and N_2 Gas Supply

CO_2 gas supply cylinder and N_2 gas supply cylinder (for suppressed O_2 model) should be industrial grade 99.5% pure and without siphon tube. Install a 2-stage pressure regulator to the tank outlet. The inlet pressure must be regulated to 15 psig (103.4 kPa).

- Use the Connection Hose Kit provided in the Accessories Kit Box. A 0.2 micron in-line filter (1) is provided to remove any contaminants in the CO_2 gas supply. Check all fittings for leaks.
- Connect one end of the tubing to the barb fitting at the rear of the cabinet labeled CO_2 Inlet #1 and install the clamp (2) to properly secure the tubing. For Suppressed O_2 model, connect another tube to the N_2 Inlet #1.
- Connect the other end of the tubing to the outlet of the 2-stage pressure regulator and install the clamp (2).
  Note: *Make sure that the pressure in the two stage gas is regulated to 15 psi or 103.4 kPa.*
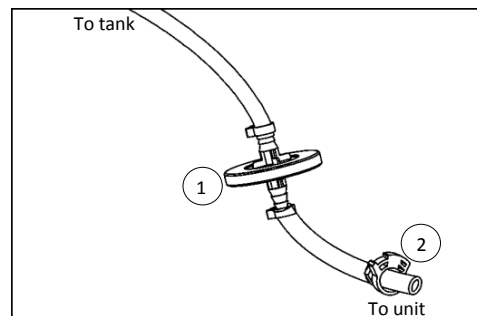
If unit is equipped with a built-in gas backup system, there will be 2 gas inlets. Each of the inlets should be connected to individual gas tanks as described above.

Note: *Consult your facility safety officer to ensure that the equipment is installed in accordance to your local regulations and code.*

2.2.7 Connecting Alarm Contacts and RS485 Communication Port

A set of relay contacts located on the rear of the unit is provided to monitor for temperature, humidity O_2 or CO_2 alarms. The terminals provided on the alarm contact allow for a NO (normally open) output, a NC (normally closed) and COM (common) connection. In the event of an alarm condition or power failure, the NO contact will close, and the NC contact will open. Once the alarm is cleared, the contacts return to their normal condition.

To activate this function, see **section 3.3.12. Relay Activation**.

The RS485 provides serial communication port for PC. It can be daisy chained from product to product and connected to PC.

CO_2 Incubator **ESCO**
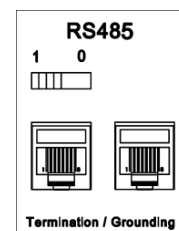
2.3 Preliminary Cleaning

- Remove the protective coating on the shelf supports and air duct, if present.
- Use a suitable laboratory disinfectant to disinfect all interior surfaces prior to using the product.
  Note: *Do not use chlorine based cleaner*
- See **section 5.1 Cleaning Procedure** for information on cleaning the unit

2.4 Filling the Humidity Pan

For best operation of the incubator, sterilized distilled, de-mineralized or de-ionized water should be used in the humidity pan.

Chlorinated tap water is not to be used as chlorine can deteriorate the stainless steel. Tap water may also have a high mineral content, which would produce a build-up of scale in the reservoir. Water should always be sterilized or treated with a decontaminant, safe for use with stainless steel as well as safe for the product, prior to being introduced into the humidity pan.

It is recommended to check the water level and refill the humidity pan once a week.

For normal operation, fill up water up to approximately 1000 ml and for decontamination process, fill water only up to 400 ml. Place the pan directly on the incubator floor to ensure optimum humidity and temperature response. The pan needs to be inserted completely to the back of the incubator, so that condensed water can drip back into the pan.

For Suppressed O_2 model: ensure that the sparger is fully immersed in water.

2.5 Filtered Air Exchange

Filtered air exchange is an intentional 'leak' in the chamber to reduce the relative humidity to an acceptable level and to ensure no condensation occurs within the chamber. A small amount of ambient air is being drawn from outside of the incubator by the re-circulating fan, through a tubing and 1µm filter to prevent contamination in the chamber. Air is being 'pushed out' through another tubing and 1µm filter installed on the access port plug located at the back of incubator. Tubing installed inside the chamber for filtered air exchange is silicon tubing which can withstand high decontamination temperature.

If high humidity level is required, the filtered air exchange can be removed and "Elevated Humidity" can be activated in the control panel. (Call Esco or your distributor to activate this function)

2.6 First Run

After the incubator has been properly installed, and connected to the power supply, humidity pan filled, and the unit connected to gas supply, follow the procedures for the unit's initial start-up.

1. Switch ON the unit. A welcome message will appear on the display. Press SET to continue.
2. Keypad operation will appear on the display. Press SET to continue.
3. Set the date, time, temperature set point, %CO2 set point and %O2 set point:
   a. Set Date. The digit will blink. Use UP/DOWN buttons to select the current date and press SET to confirm each digit.
   b. Set Time. The digit will blink. Use UP/DOWN buttons to select the current time and press SET to confirm each digit.
   c. Set Temperature Set Point. Use UP/DOWN buttons to select the temperature set point. Press SET to confirm
   d. Set %CO2 Set Point. Use UP/DOWN buttons to select the %CO2 set point. Press SET to confirm.

      e.   Set %O2 Set Point. Use UP/DOWN buttons to select the %O2 set point. Press SET to confirm. (For suppressed O_2 model only)

4. Incubator set-up is finish.
5. The unit will run a memory check.
6. Incubator will do initial start-up and will continue to the main menu.

The outer door has a magnetic closure, which can be opened by pulling on the rim of the door. The inner glass door has a tight gasket seal, which prevents the chamber from being contaminated and the chamber environment from being disturbed.

When the main door is opened, the blower fan and gas supply is automatically turned off.
Note: *Make sure that the door switch will not be overridden or controlled manually or by any means when the main door is opened.*

Allow 2 hours for the incubator to stabilize before proceeding to calibration.

2.7 Disclaimer
The performance and safety of the incubator, while rigorously evaluated at the factory, cannot be guaranteed once after transit and installation. Therefore the on-site testing is always recommended.

Chapter 3 - Control System and Operation

3.1 CelCulture Control System

DECON LED   HEAT LED ^{o}C/%RH Display   MENU Button   Main LCD   UP Button   ALARM LED

DECON Button   INJECT LED   %CO$_2$/%O$_2$ Display   SET Button   DOWN Button   MUTE Button
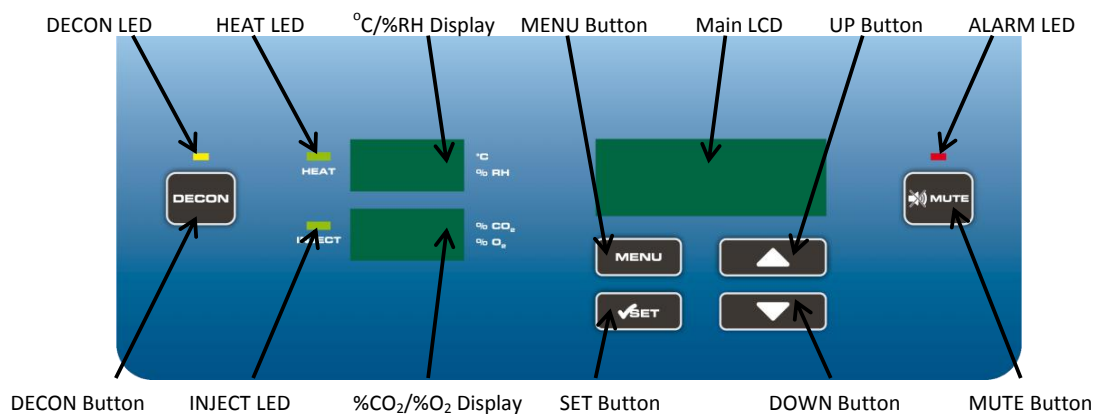
DECON Button & DECON LED
- To activate 90°C moist heat decontamination procedure
- During decontamination procedure, the yellow DECON LED will light up

MENU Button
- When the main LCD shows normal display – MENU button will activate the menu options
- Within the menu display – MENU button will bring up the previous menu level

SET Button
- Within the menu display – SET button will confirm a selection or value

UP/DOWN Buttons
- Within the menu display – UP and DOWN buttons will scroll the display up and down
- When an input is required – UP and DOWN buttons will increase and decrease a value

MUTE Button & ALARM LED
- MUTE button will mute the audible alarm for a period of time
- The red ALARM LED will light up whenever an alarm condition is triggered

HEAT LED
- HEAT LED will light up whenever a heating process is activated

INJECT LED
- INJECT LED will light up whenever a gas injection process is activated

^{o}C/%RH Display
- When ^{o}C displayed, the display shows the temperature in the chamber
- When %RH displayed, the display shows the relative humidity in the chamber (optional)

%CO$_2$/%O$_2$ Display
- When %CO$_2$ displayed, the display shows CO$_2$ concentration level in the chamber
- When %O$_2$ displayed, the display shows O$_2$ concentration level in the chamber (suppressed O$_2$ model)

CO$_2$ Incubator **ESCO**

3.2 Menu Options

```
MENU ─┬─ SETTINGS ─┬─ SET TEMP
      │            ├─ SET %CO2
      │            └─ SET %O2
      │
      │            CALIBRATION ─┬─ TEMPERATURE SENSOR
      │                         ├─ %CO2 SENSOR
      │                         ├─ %O2 SENSOR
      │                         └─ %RH SENSOR
      │
      ├─ ADMIN ─┬─ OVER TEMP ALARM
      │         ├─ LOW TEMP ALARM
      │         ├─ HIGH %CO2 ALARM
      │         ├─ LOW %CO2 ALARM
      │         ├─ NEW CO2 TANK
      │         ├─ HIGH %O2 ALARM
      │         ├─ LOW %O2 ALARM
      │         ├─ LOW %RH ALARM
      │         ├─ NEW PIN
      │         ├─ AUDIBLE ALARM
      │         ├─ ALARM RING BACK
      │         ├─ DOOR ALARM DELAY
      │         ├─ TEMP ALARM RELAY
      │         ├─ %CO2 ALARM RELAY
      │         ├─ %RH ALARM RELAY
      │         ├─ %O2 ALARM RELAY
      │         ├─ SET ULPA REMINDER
      │         ├─ REPLACE ULPA FILTER
      │         ├─ SET LANGUAGE
      │         ├─ SET DATE
      │         ├─ SET TIME
      │         ├─ SET RS-485 ADDRESS
      │         └─ RESET DEFAULTS
      │
      │            DATALOGGING ─┬─ SHOW TEMP DATA LOG
      │                         ├─ SHOW %CO2 DATA LOG
      │                         ├─ SHOW %O2 DATA LOG
      │                         ├─ SHOW %RH DATA LOG
      │                         └─ DATA LOG PERIOD
      │
      ├─ SERVICE ─┬─ DIAGNOSTIC READ OUT
      │           ├─ SHOW WARNING LOG
      │           ├─ SHOW TIME AND DATE
      │           ├─ CALIBRATE A/O TEMP
      │           ├─ CALIBRATE A/O %CO2
      │           ├─ CALIBRATE A/O %O2
      │           └─ CALIBRATE A/O %RH
      │
      └─ HELP ─┬─ USE THE KEYS
               ├─ USE DECON CYCLE
               ├─ TERMINATE DECON
               ├─ CONFIGURE ALARM
               ├─ SET PIN
               ├─ SET TEMP/%CO2
               └─ MORE HELP
```

Menu in the darker boxes are shown in special circumstances

ESCO |CelCulture

3.2.1 Settings

3.2.1.1 Set Temperature
Your Incubator has an operating temperature range of ambient +3°C to 60°C. The default temperature set point is 37°C.

MENU	→	SETTINGS	→	SET TEMP	→	20 < X < 60

3.2.1.2 Set %CO2
Your Incubator has a range of 0% -20% CO_2. The default CO_2 set point is 5%.

MENU	→	SETTINGS	→	SET %CO2	→	0 < X < 20

3.2.1.3 Set %O2 (*for suppressed O_2 model*)
Your Incubator has a range of 1% -20.7% O_2. The default O_2 set point is 5%.

MENU	→	SETTINGS	→	SET %O2	→	1 < X < 20.7

3.2.2 Calibration
After the unit has stabilized (recommended to run overnight); temperature, and CO_2, O_2, and RH sensors can all be calibrated to using a reference instruments. See *section 3.3.1 Unit Calibration*.

3.2.3 Admin

3.2.3.1 Over Temperature Alarm
The unit will display/sound the alarm when the temperature goes above the over temperature alarm value. The default over temperature alarm is temperature set point + 1°C.

MENU	→	ADMIN	→	OVER TEMP ALARM	→	SP + 1 ≤ X ≤ 65

3.2.3.2 Low Temperature Alarm
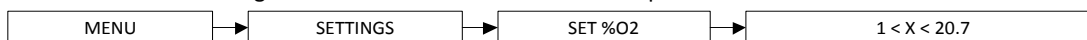The unit will display/sound the alarm when the temperature goes below the low temperature alarm value. The default low temperature alarm is temperature set point - 1°C.
Note: *The low temperature alarm will only be activated once the unit reaches the temperature set point.*

MENU	→	ADMIN	→	LOW TEMP ALARM	→	0 ≤ X ≤ SP - 1
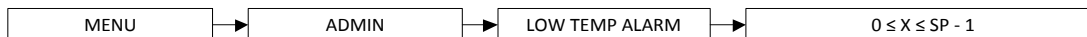
3.2.3.3 High %CO2 Alarm
The unit will display/sound the alarm when the CO_2 level goes above the high %CO2 alarm value. The default high %CO2 alarm is %CO2 set point + 1%.

MENU	→	ADMIN	→	HIGH %CO2 ALARM	→	SP + 1 ≤ X ≤ 21
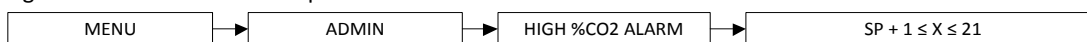
3.2.3.4 Low %CO2 Alarm
The unit will display/sound the alarm when the CO_2 level goes below the low %CO2 alarm value. The default low %CO2 alarm is %CO2 set point– 1%.

MENU	→	ADMIN	→	LOW %CO2 ALARM	→	0 ≤ X ≤ SP - 1
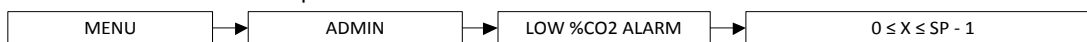
3.2.3.5 New CO2 Tank (*for unit without the optional gas backup switch system*)
The CO_2 tank depletion reminder automatically calculates how much CO_2 gas is left in the tank. It alerts the user one week before the gas is depleted which gives the user some buffer time to order new tanks.

MENU	→	ADMIN	→	NEW CO2 TANK	→	XXXX

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3.2.3.6 High %O2 Alarm (*for suppressed O₂ model*)

The unit will display/sound the alarm when the O_2 level goes above the high %O2 alarm value. The default high %O2 alarm is %O2 set point + 1%.

| MENU | → | ADMIN | → | HIGH %O2 ALARM | → | SP + 1 ≤ X ≤ 21 |

3.2.3.7 Low %O2 Alarm (*for suppressed O₂ model*)

The unit will display/sound the alarm when the O_2 level goes below the low %O2 alarm value. The default low %O2 alarm is %O2 set point– 1%.

| MENU | → | ADMIN | → | LOW %O2 ALARM | → | 0 ≤ X ≤ SP - 1 |

3.2.3.8 Low %RH Alarm (*for unit with optional RH display*)
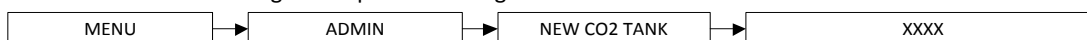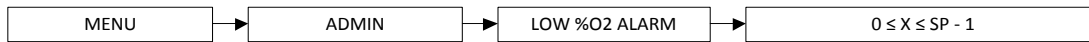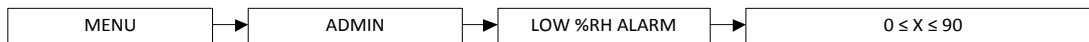
The unit will display/sound the alarm when the RH level goes below the low %RH alarm value. The default low %RH alarm is 75%.

| MENU | → | ADMIN | → | LOW %RH ALARM | → | 0 ≤ X ≤ 90 |

3.2.3.9 New PIN

PIN restricts access to Menu functions. User must enter 4 digits PIN before accessing MENU. Default PIN is 0000 (Disabled).

| MENU | → | ADMIN | → | NEW PIN | → | XXXX |
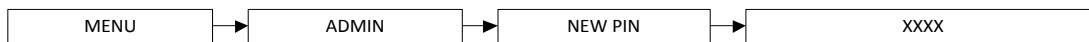
3.2.3.10 Audible Alarm

Audible alarms can be enabled or disabled, however the visual alarm will still be active even after audible alarm is disabled.

| MENU | → | ADMIN | → | AUDIBLE ALARM | → | ENABLE | DISABLE |
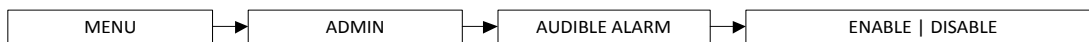
3.2.3.11 Alarm Ring Back Time

When the system encounter error it will sound the audible alarm, the user can temporarily press MUTE button to disable the sound. If the error is not corrected within the time set within this option, the audible alarm will be re-enabled.

| MENU | → | ADMIN | → | ALARM RING BACK | → | 0 ≤ X ≤ 30 |

3.2.3.12 Door Alarm Delay Time

To set the delay time for door alarm. Can be set between 1 to 15 minutes. Default is 15 minutes.

| MENU | → | ADMIN | → | DOOR ALARM DELAY | → | 1 ≤ X ≤ 15 |

3.2.3.13 Relay Activation

SPDT switch can be wired as normally open (NO) or normally close (NC) and common (COM). Rating of the switch is maximum 30 V DC, 2 A. The purpose of alarm relay is to facilitate monitoring. When there is a fault in the system pertaining to the relevant parameter (temperature, %CO2, %O2 (for suppressed O₂ model) or %RH (for units with optional %RH sensor)), the relay will make or break to signal to a remote device that the incubator is in a faulty condition.

				TEMP ALARM RELAY	→	ENABLE	DISABLE
				%CO2 ALARM RELAY	→	ENABLE	DISABLE
MENU	→	ADMIN	→	%O2 ALARM RELAY	→	ENABLE	DISABLE
				%RH ALARM RELAY	→	ENABLE	DISABLE
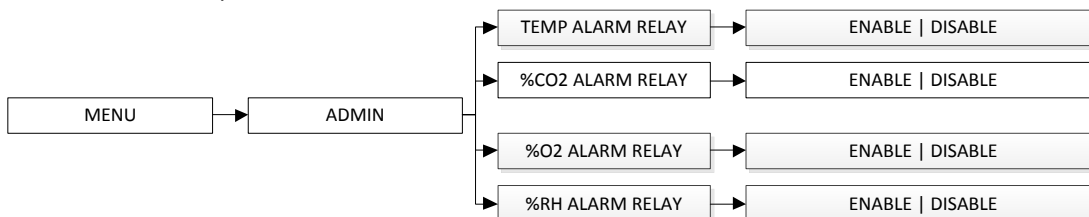
3.2.3.14 Set ULPA Reminder
The ULPA Reminder will alert the user to replace ULPA filter at a set period. Default is set to 12 months.

| MENU | → | ADMIN | → | SET ULPA REMINDER | → | 0 ≤ X ≤ 12 |

3.2.3.15 Replace ULPA Filter
The replace ULPA filter settings must be set when replacing ULPA filter in order for the Set ULPA Reminder to reset based on the set period.

| MENU | → | ADMIN | → | REPLACE ULPA FILTER |

3.2.3.16 Set Language
List of language available includes English, Spanish, German, French and Italian.

MENU	→	ADMIN	→	SET LANGUAGE	→	ENGLISH
					→	SPANISH
					→	GERMAN
					→	FRENCH
					→	ITALIAN
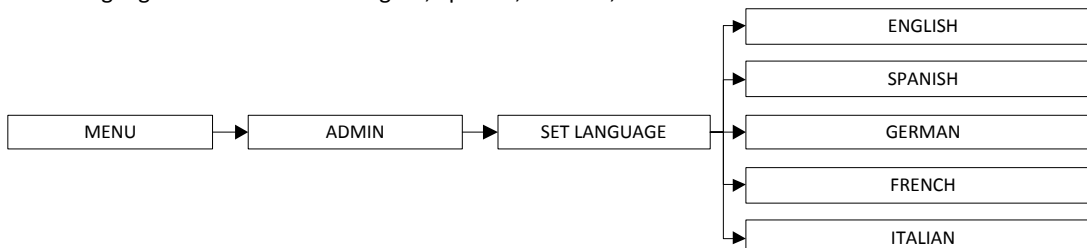
3.2.3.17 Set Date
User can set the date and it will be maintained even after the unit is turned off. The format is YYYY MM DD.

| MENU | → | ADMIN | → | SET DATE | → | YYYY MM DD |
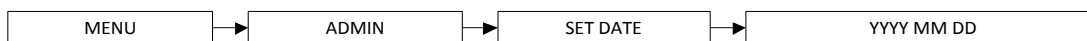
3.2.3.18 Set Time
User can set the time and it will be maintained even after the unit is turned off. The format is HHMMSS.

| MENU | → | ADMIN | → | SET TIME | → | HHMMSS |

3.2.3.19 Set RS-485 Address (*for unit with optional Voyager monitoring software*)
User can set the RS-485 address for PC connection.

| MENU | → | ADMIN | → | SET RS-485 ADDRESS | → | 1 ≤ X ≤ 32 |

3.2.3.20 Reset Default
User can reset the unit to the factory default settings by choosing this option. The features being reset are all set points and alarms.

| MENU | → | ADMIN | → | RESET DEFAULT |

3.2.4 Data Logging

3.2.4.1 Show Data Log
User can set to show temperature, %CO2, %O2 (for suppressed O_2 model) and %RH (for units with optional RH display) data log. The data format is MMDDYY HHMM INFO. Use the UP/DOWN buttons to read through the log. Press MENU to go back to previous level

MENU	→	DATALOGGING	→	SHOW TEMP DATA LOG
			→	SHOW %CO2 DATA LOG
			→	SHOW %O2 DATA LOG
			→	SHOW %RH DATA LOG

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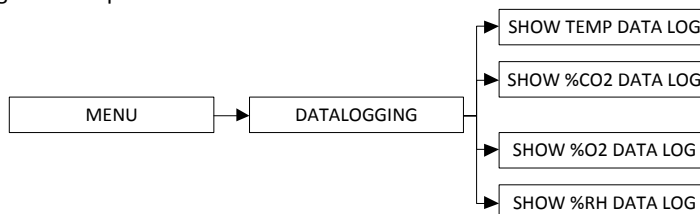
3.2.4.2 Data Log Period

The Data Log Period allows the user to specify the period in between the system log the data. The period can be set from 1 minute up to 24 hours.

MENU	DATALOGGING	DATA LOG PERIOD	1 MINUTES ≤ X ≤ 24 HOURS

3.2.5 Service

3.2.5.1 Diagnostic Readout

This menu will show all parameter and set points that is currently being set or operating in the incubator. See *section 3.4 Diagnostic Readout*. Use the UP/DOWN buttons to read through the readout. Press MENU to go back to previous level.

MENU	SERVICE	DIAGNOSTIC READOUT

3.2.5.2 Show Warning Message

This will display the description of the error with date and time. The user can scroll down or up if the error message is too long. It will only display up to maximum of 16 error messages after which the new errors will override the old error messages. Use the UP/DOWN buttons to read through the log. Press MENU to go back to previous level.

MENU	SERVICE	SHOW WARNING LOG

3.2.5.3 Show Date & Time

To show the actual time and date – based on the value input in set time and set date or during the first run.

MENU	SERVICE	SHOW TIME & DATE

3.2.5.4 Calibrate Analog Output

See *section 3.3.2 Analog Output Calibration* for the instruction*.

3.2.6 Help

This menu section will show brief explanation on the basic control of the unit.

3.3 Calibration

3.3.1 Unit Calibration

After the unit has stabilized (recommended to run overnight); several different systems can be calibrated. In the calibration mode, the temperature, CO_2, O_2 (for suppressed O_2 model), and RH reading can all be calibrated to reference instruments. To determine the exact measured value of the sensors, a comparison measurement has to be performed every year. If a major deviation is found during this check, calibration of the sensor is required. This is to ensure continuous and optimal performance of the CO_2 incubator.

A calibrated measuring instrument with higher accuracy (reference instrument) is required.

Place the reference instrument or its measuring probe on the center of work zone. Route the connecting cable either through the sampling port located on the glass door or the access port located at the rear of work zone. Close doors and wait until the value displayed in the reference instrument is stabilized. Record the measured value.

Enter MENU|CALIBRATION and select the responding options. When asked, enter the measured value. Press SET to confirm.

To reset the sensor to its default calibration, select DEFAULT CALIBRATION. Press SET button to confirm.

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3.3.2 Analog Output Calibration (*for units with optional analog output*)

A set of relay contacts are provided at the rear of the incubator that allows that allow the incubator to output analog signals representing the temperature, %CO2, %O2 (for suppressed O_2 model) and %RH depending on the options available in your incubator. This allows the chamber to be connected to an in-house data acquisition or alarm system.

The analog data output can be set to operate in either DC (0-5 V) or current (4-20 mA) mode. The factory default setting is voltage. The voltage of the analog output can be calibrated using a calibrated digital multi meter.

To calibrate	Rear Panel Terminal	MENU	SERVICE
Temperature Analog Output	Temp (+ and -)	Calibrate A/O Temp
CO2 Analog Output	CO2 (+ and -)	Calibrate A/O CO2
% Relative Humidity Analog Output	RH (+ and -)	Calibrate A/O RH
O2 Temperature Analog Output	O2 (+ and -)	Calibrate A/O O2

Place the multi meter's measuring probe on the responding + and - terminals of the analog output located at the rear panel and record the measured value.

Enter MENU|SERVICE and select the responding options. When asked, enter the measured value. Press SET to confirm.

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3.4 Diagnostic Readout

Messages	Description
MAIN_BOARD	Main board firmware version.
DISP_BOARD	Display board firmware version.
TEMP READ	Snap shot of actual temperature read.
ADC TEMP	Snap shot of actual Analog to Digital Conversion value of temperature read.
TEMP OFFSET	Offset value applied for temperature reading on 7 segment display.
TEMP SP	Temperature set point.
OV TEMP SP	Over temperature alarm set point.
LO TEMP	Low temperature alarm set point.
%CO2 READ	Snap shot of actual CO_2 level read.
ADC %CO2	Snap shot of actual Analog to Digital Conversion value of CO_2 level read.*
CO2 OFFSET	Offset value applied for CO_2 level reading on 7 segment display.
%CO2 SP	CO_2 level set point.
HI %CO2 SP	High CO_2 level alarm set point.
LO %CO2 SP	Low CO_2 level alarm set point.
%O2 READ	Snap shot of actual O_2 level read.**
ADC %O2	Snap shot of actual Analog to Digital Conversion value of O_2 level read.**
%O2 SLOPE	Offset value applied for O_2 level reading on 7 segment display.**
%O2 SP	O_2 level set point.**
HI %O2 SP	High O_2 level alarm set point.**
LO %O2 SP	Low O_2 level alarm set point.**
%RH READ	Snap shot of actual RH level read.***
ADC %RH	Snap shot of actual Analog to Digital Conversion value of RH level read.***
%RH OFFSET	Offset value applied for RH level reading on 7 segment display.***
%RH SETTING	Humidity level setting. High humidity will show LVTD. Default humidity will show DFLT.
LO %RH SP	Low RH level alarm set point.***
DOOR SWITCH	Door switch status of OPEN or CLOSE.
DOOR DELAY	Door open alarm delay set point.
THERMOSTAT	Thermostat status of OPEN or CLOSE.
MAIN HTRDCY	Percentage of average duty cycle of the main heater work over an hour.
BASE HTRDCY	Percentage of average duty cycle of the base heater work over an hour.
DOOR HTRDCY	Percentage of average duty cycle of the door heater work over an hour.
%CO2 INJDCY	Percentage of average duty cycle of the CO_2 solenoid valve work over an hour.
%O2 INJDCY	Percentage of average duty cycle of the O_2 solenoid valve work over an hour.**
CO2 TANK 1	If CO2 BACKUP is not installed then it will show the percentage of remaining capacity of CO_2 tank.
	If CO2 BACKUP is installed then it will show OK or NOK of the CO_2 tank capacity.****
CO2 TANK 2	Will show OK or NOK of the CO_2 tank 2 capacity.****
N2 TANK 1	Will show OK or NOK of the N_2 tank 1 capacity.*****
N2 TANK 2	Will show OK or NOK of the N_2 tank 2 capacity.*****
AUDIBL ALRM	Audible alarm status of "EN"able or "DIS"able.
RING BACK T	Current ring back time value.
TEMP RELAY	Temperature alarm condition is "EN"able or "DIS"able for activating the remote alarm relay.
CO2 RELAY	CO_2 level alarm condition is "EN"able or "DIS"able for activating the remote alarm relay.
O2 RELAY	O_2 level alarm condition is "EN"able or "DIS"able for activating the remote alarm relay.**
RH RELAY	RH level alarm condition is "EN"able or "DIS"able for activating the remote alarm relay.***
ULPA REMAIN	ULPA remaining life time in months.
ADDRESS	RS-485 address for this CO_2 Incubator.
LOG PERIOD	Log period applied in minutes or hours.
FLASH MEM	Total of FLASH memory used to keep the record of data log or warning log.

*   Only available for units with TC sensor
**   Only available for Suppressed O_2 model
***   Only available for units with RH display options installed
****   Only available for units with CO_2 backup options installed
*****   Only available for units with N_2 backup options installed

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3.5 Alarm

The CelCulture CO_2 Incubator alarm system is shown in the table below. When an alarm is active, the error message appears in the display of the controller. Pressing MUTE button will disable audible alarm for the ring back period. However, the visual alarm continues until the incubator returns to a normal condition.

Alarm name	Condition indicated	Alarm Delay	Additional notes
Temp sensor error	ADC reading is in overflow or reads less than 10 counts	No delay	7 seg display will show "---"; heating will be disabled
CO_2 sensor error	ADC reading is in overflow or reads less than 20 counts	No delay	7 seg display will show "---"; CO_2 injection will be disabled
O_2 sensor error**	ADC reading is in overflow or reads less than 20 counts	No delay	7 seg display will show "---"; N_2 injection will be disabled
RH sensor error***	ADC reading is in overflow or reads less than 20 counts	No delay	7 seg display will show "---"
TC out of cal*	TC sensor is not in the calibrated temperature range	15 minutes	7 seg display will show "---"; CO_2 injection will be disabled
Over temperature	Temp reading plus calibration offset is greater than overtemp setting	No delay	Heating is disabled, display shows temp reading
High CO_2 level	CO_2 reading plus calibration offset is greater than high CO_2 setting	15 minutes	CO_2 injection is disabled, display shows CO_2 reading
High O_2 level**	O_2 reading plus calibration offset is greater than high O_2 setting	15 minutes	N_2 injection will not stop. Display shows O_2 reading
Door open	Door has been open for over 'DOOR ALARM DELAY' time	1 - 15 minutes	All gas injections and chamber fan stop without delay. Heating disabled.
Low %RH***	%RH reading plus calibration offset is lower than low %RH setting	30 minutes	Display continues to report %RH as read
Low temperature	Temp reading plus calibration offset is lower than low temp setting	15 minutes	Display continues to report temp as read
Low CO_2 level	CO_2 reading plus calibration offset is lower than low CO_2 setting	15 minutes	Display continues to show CO_2 reading
Low O_2 level**	O_2 reading plus calibration offset is lower than low O_2 setting	15 minutes	Display continues to show O_2 reading, N_2 injection should be disabled
All CO_2 tanks low	Pressure switch on both CO_2 tanks indicate low pressure	No delay	Display continues to show CO_2 reading
All N_2 tanks low*****	Pressure switch on both N_2 tanks indicate low pressure	No delay	Display continues to show O_2 reading
CO_2 tank 1 low	Pressure switch on CO_2 tank 1 indicate low pressure and no backup	15 minutes	Alert the user to change the CO_2 tank (approx. 1 week before tank empty). Display shows CO_2 reading.
CO_2 tank 1 low****	Pressure switch on CO_2 tank 1 indicate low pressure and backup is installed	15 minutes	Solenoid control automatically switches to CO_2 tank 2. Display shows CO_2 reading
CO_2 tank 2 low****	Pressure switch on CO_2 tank 2 indicate low pressure and backup is installed	15 minutes	Solenoid control automatically switches to CO_2 tank 1. Display shows CO_2 reading
N_2 tank 1 low*****	Pressure switch on N_2 tank 1 indicate low pressure and backup is installed	15 minutes	Solenoid control automatically switches to N_2 tank 2. Display shows O_2 reading
N_2 tank 2 low*****	Pressure switch on N_2 tank 2 indicate low pressure and backup is installed	15 minutes	Solenoid control automatically switches to N_2 tank 1. Display shows O_2 reading
ULPA reminder	Timer reminder for ULPA replacement has been reached	No delay	

*   Only available for units with TC sensor
**   Only available for Suppressed O_2 model
***   Only available for units with RH display options installed
****   Only available for units with CO_2 backup options installed
*****   Only available for units with N_2 backup options installed

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Chapter 4 - General Maintenance

4.1 Scheduled Maintenance

Proper and timely maintenance is crucial for trouble free functioning of any device and your CO_2 incubator is no exception to this rule. We strongly recommend that you follow the maintenance schedule suggested hereunder in order to obtain optimal performance from your incubator.

No	Description of Task to Perform	Maintenance to be carried out every				
		Day	Week	6 Months	Year	As Needed
1	Check CO_2/N_2 gas tank level	√				
2	Check water level in the humidity pan		√			
3	Cleaning		√			
4	Calibration of O_2 sensor			√		
5	General Inspection				√	
6	Calibration of temperature sensor				√	
7	Calibration of CO_2 sensor				√	
8	Calibration of humidity sensor				√	
9	Change ULPA filter				√	
10	Change inline filters				√	
11	Decontamination					√

4.1.1 Check CO_2/N_2 Gas Tank Level

Check the pressure gauge on the two stage gas regulator daily to ensure the pressure is not below 15 psig. Replace new tank if necessary.

4.1.2 Check Water Level in the Humidity Pan

Check weekly to ensure there is sufficient water in the pan. It is recommended to check the water level and refill the humidity pan with distilled, sterile water once a week.

4.1.3 Cleaning and Decontamination

See *chapter 5 – Cleaning & Decontamination*

4.1.4 General Inspection

Check the following regularly – at least annually:
- Tightness of the glass door seal
- Functional check of the operating panel and device control
- Electrical safety check in accordance with the relevant regulations
- Check tightness of hinge screws on door's moving parts
- Check the latch of glass door if working properly and able to close tight

4.1.5 Calibration of Temperature, CO_2, O_2 and Humidity

See *section 3.3 - Calibration*

4.1.6 Change ULPA Filter

See *section 2.2.3 - ULPA Filter Installation*

4.1.7 Change Inline Filter

Inline filters are installed to remove any contaminants in the CO_2 or N_2 gas supply. It prevents accumulation of dirt in the gas inlet solenoid valves and the tubes leading into the work area of the incubator. Change the inline filters at least once a year or when the filter is dirty by visual inspection. Use the hose clamp to secure the tubing to the filter to ensure a gas-tight connection.

4.2 Maintenance/Service Log

It is good practice (and in some cases regulatory requirement) to maintain a log of all maintenance work
carried out on your incubator.

Chapter 5 - Cleaning & Decontamination

5.1 Cleaning Procedure

1. Transfer all samples to another CO_2 incubator or store them in a safe place.
2. Turn off and unplug the device. If needed; mark that the unit is deactivated or being serviced.
3. Strip the unit for cleaning:
   a. Remove the ULPA filter. See *section 2.2.3 ULPA Filter Installation*.
   b. Remove the shelf system. See *section 2.2.4 Shelves System Installation*.
   c. Remove the sparger and tubing (for suppressed O2 model) and the humidity pan.
4. Start cleaning process:
   a. Thoroughly remove dirt and residues onto the surfaces of the work space and on the accessories.
   b. Spray disinfectant onto work space surfaces and all dismantled parts or wipe with a cloth dampened with disinfectant.
      Note: *Do not spray disinfectant directly onto the CO_2, O_2 or humidity sensor.*
   c. Allow disinfectant to react as specified by manufacturer.
   d. Wipe all surfaces using a moistened clean cloth to remove disinfectant.
   e. Wipe all surfaces thoroughly until dry.
   Note: *When cleaning and disinfecting, always observe the safety instructions and hygiene regulations.*
5. Re-assemble the unit by reversing step 3

5.2 Decontamination

Decontamination in CelCulture uses 90°C moist heat to kill common organisms that contaminates workspace including all installed components. The entire program run of the decontamination routine takes approximately 15 hours (overnight process). The chamber is clean and dry at the end of the cycle. No further wipe down is necessary.

5.2.1 Decontamination Procedure

Press the DECON button. And follow the instruction in the main display.

Back

Front
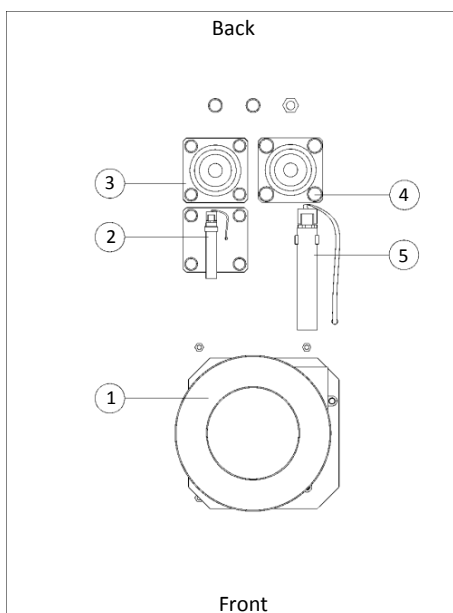
If IR (for units with IR sensor) and O_2 (for suppressed O_2 model) sensors are installed, they will need to be removed before the decontamination process start.

For unit with TC CO_2 sensor, there are 2 options:
- o   Remove the TC sensor before decontamination process started
- o   Leave the TC sensor installed during decontamination, however after the process is finished, the TC sensor needs to be re-calibrated.

All sensors are located in the top duct. To remove the sensor, first remove the top duct.

1. Blower
2. RH Sensor
3. O_2 Sensor
4. TC Sensor
5. IR Sensor

IR Sensor Removal
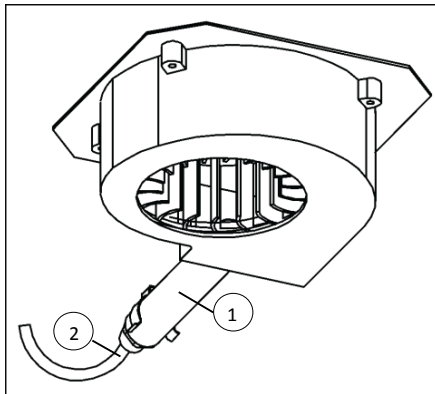
IR sensor is located behind the blower in the top duct.
To remove the IR sensor:
1. Unclip the sensor out of its place
2. Disconnect the probe (1) from its cable (2)

Do not touch this part (slotted filter cap) of the sensor
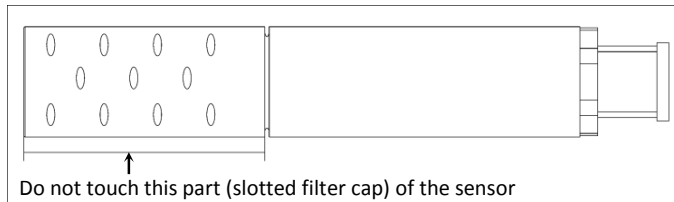
TC and O$_2$ Sensor Removal
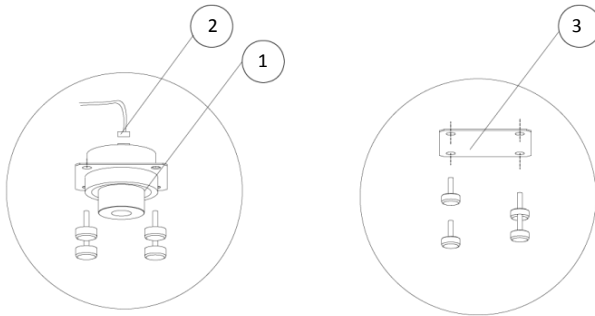
TC and O$_2$ Sensor are located behind the blower in the top duct
To remove the TC or O$_2$ sensor:
1. Unscrew all 4 screws at the corners of the sensor assembly (1)
2. Lower down the sensor assembly
3. Disconnect the sensor connector (2)
4. Replace the sensor assembly with the included blank plate (3)
5. Screw the blank plate in place

Once the decontamination is done, reinstall all the sensors

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Chapter 6 - Troubleshooting

Under no circumstances should the unit be disassembled, repaired, or converted by unqualified people. Failure to follow these instructions may cause personal injury and/or loss of property due to malfunctions, electric shocks or fire.

Should the unit malfunction, turn off the incubator and disconnect the power supply. Continuing to operate the unit when it shows signs of malfunctioning may cause electric shocks or fire.

The following troubleshooting guidelines address some of the basic problems that can be solved by the user or operator. However if the problem persist, please contact your local distributor.

Problem 1: Unit will not turn on

Possible Cause	Corrective Actions
Power failure	- Is the cord set connected to the power inlet at rear of cabinet as defined in the installation section of the manual? - Is there power at the electrical outlet which the unit is plugged into? - Use voltmeter or test pen to check power on the electrical socket. - Is the unit's power switch turned on? - Check whether power cord has been connected properly into the wall/building socket and also into the incubator. - Check whether the power cord is giving power, measure the AC voltage between the live and the neutral terminal of the cord by using a voltmeter. If voltage is not within +/-2% of the socket voltage, replace the power cord. - Check the fuse of the power cord.

Problem 2: CO_2 level is below or above CO_2 set-point

Possible Cause	Corrective Actions
Unit is not connected to the pressure regulated CO_2 source.	• Check gas hose connection at the rear of unit to the CO_2 source as defined in the installation section of the manual.
CO_2 inlet pressure not regulated correctly.	• The CO_2 inlet gas pressure should be regulated to approximate 15 psig.
CO_2 gas tank is empty.	• Replace CO_2 gas tank.
In-line filter is dirty / saturated.	• Replace in-line filter.
Gas hose is leaking.	- If hose is leaking, check the pressure regulator to ensure CO_2 inlet pressure is not more than 15 psig. - Check for leakage at hose connection.
Gas hose is dirty or obstructed.	• Check physically for dirt accumulation or obstruction, clean or replace it.
CO_2 set-point was recently lowered or raised. Unit is still not stabilized after the set-point was changed.	- Check CO_2 set-point. Allow 2 hours for the unit to stabilize after adjustment of new set-point. - If the CO_2 set point is lowered, the outer and inner doors must be opened.
Inner door opened for an extended period of time.	• Close the door and let the unit stabilize.
Access port stopper at the rear of cabinet was removed or not install.	• Ensure access port stopper and filter are installed.
Air leakage through Inner door gasket.	- Check installation of the gasket ensure it is properly secure to the cabinet and that there is no gap. - Check the joining ends of the gasket to make sure there is no gap. Use silicon sealant to seal the joins if there is a gap. - Check gasket profile is not deformed or torn. Otherwise replace new door gasket.

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Problem 3: Temperature is above or below temperature set-point

Possible Cause	Corrective Actions
Temperature set-point was recently lowered or raised. Unit is still not stabilized after set-point was changed.	• Check temperature set-point. Allow 2 hours for the unit to stabilize after adjustment of new set-point. • If the temperature was lowered, open the outer and inner doors. • Lowering the temperature without opening the doors could lead to condensation. • Check if the glass door latch is properly closed.
Inner door opened for an extended period of time.	• Close the door and let the unit to stabilize.
Air leakage through Inner door gasket.	• Check installation of the gasket ensure it is properly secure to the cabinet and that there is no gap. • Check the joining ends of the gasket to make there is no gap. Use silicon sealant to seal the joins if there is gap. • Check gasket profile is not deformed or torn. Otherwise replace new door gasket.

Problem 4: Humidity level is below standard humidity level (For units with RH display options installed)

Possible Cause	Corrective Actions
There is no water or not enough water in the humidity pan.	• Ensure there is enough water in the humidity pan. For normal operating temperature, humidity pan should be half filled.

Problem 5: Unusually high gas consumption

Possible Cause	Corrective Actions
Air leakage through Inner door gasket.	• Check installation of the gasket ensure it is properly secure to the cabinet and that there is no gap. • Check the joining ends of the gasket to make there is no gap. Use silicon sealant to seal the joins if there is gap. • Check gasket. • Check if the glass door latch is properly closed. • Ensure access port stopper and filter are installed.
CO_2 sensor not calibrated	• Calibrate CO_2 sensor.

Problem 6: Circulation fan not running

Possible Cause	Corrective Actions
Main door switch is faulty.	• Ensure outer door is closed and pressing the door switch button. • If the fan is still not working, contact local distributor.
Faulty fan motor.	• Ensure outer door is closed and pressing the door switch button. • If the fan is still not working, contact local distributor.

Problem 7: Condensation occurs in the chamber.

Possible Cause	Corrective Actions
Outer door opened for an extended period of time or frequency of opening door is very high.	• Close the door and let the unit to stabilize. Try to reduce the frequency of door opening.

Problem 8: Water accumulated at the base of the chamber.

Possible Cause	Corrective Actions
Condensed water from the cold spot did not drip back to the water pan.	• Ensure the water pan is push all the way to the back so that condensed water from the cold spot drips into water pan.

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Problem 9: Condensation occurs on the surface of inner door after decontamination process.

Possible Cause	Corrective Actions
Sampling port on inner door is not installed or capped.	• Ensure the sampling port is capped.
Leakage through magnetic gasket on outer door.	• Check to make sure outer door can close fully and no gap. • If there is gap and cannot closed properly, check that magnetic strength is not diminished and PVC gasket profile is not deformed. Otherwise replace with new magnetic gasket.
Decontamination pump failed.	• Contact local distributor.
Filtered air exchange not working or not installed.	• Check whether filtered air exchange is installed. • There is a short tubing with a 1μm filter attached to the access port located at the back of the chamber. • Check that filter is not saturated and tubing is not blocked. • Remove the ULPA filter and make sure the tube is connected to the hole in the blower intake, above where the ULPA filter mount • Check also 2nd filter is not saturated and tubing is not blocked. • Loosen the 2 thumbscrews at the front of the top duct and lower the top duct carefully. Check the tubing securing to the top of the chamber and tubing is not blocked. Re-secure any loose tubing connection and close the top duct.

Problem 10: Garbled or missing characters on LCD module

Possible Cause	Corrective Actions
Display intermittently not stable	• Press the MENU key twice and see if the display returns to normal. If it is return to normal and not occurring again then it is caused by intermittent electrical noise. Check the line cord grounding.
LCD Module faulty.	• If the garbled characters occur again on the same position and missing characters are exactly same as before, then the LCD module is faulty. Contact local distributor.

Problem 11: Buzzer has no sound

Possible Cause	Corrective Actions
Buzzer is disabled.	• Go to ADMIN menu and choose AUDIBLE ALARM to enable the alarm.
Buzzer spoiled.	• Contact local distributor.

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APPENDIX

LOG RECORD

Incubator   :   _____

Serial Number   :   _____

Person in Charge :   _____

1. This log record should be used by the operator to record any new agent that has been introduced to the incubator during its operation, problems encountered, etc.
2. Please also record any major maintenance procedure performed by the service technician, for example: parts replacement, recertification, etc.

Date	Event	User Signature	Supervisor Signature

In case of emergencies, please call:

Name   :   _____

Cell Phone Number :   _____

E-mail   :   _____