ESCO

WORLD CLASS. WORLDWIDE.

CelCulture®

CO_2 Incubators

Cradle for Beautiful Cells

CelCulture® CO_2 Incubator

Introducing CelCulture®

CO_2 incubators are widely used in scientific research to grow and maintain cell cultures. Typical fields of application include tissue engineering, *in vitro* fertilization, neuroscience, cancer research and other mammalian cell research.

Sleek, reliable and intuitive, Esco CelCulture CO_2 incubators provide all-rounded sample protection that brings your scientific dreams one step closer to reality.

Esco CelCulture® CO_2 Incubators

Cradle for Beautiful Cells

Door Switch

Automatically turns off the blower and gas supply when the door is opened

Blower

Gentle airflow in chamber improves recovery and uniformity

ULPA Filter

- 99.999% efficient, superior to conventional HEPA filters
- Filters air continuously
- Chamber returns to ISO Class 5 cleanliness in 13 minutes upon door closing to prevent contamination

O_2 Sensor

- Long life
- Stable output signal
- No influence from CO_2

Shelving

- Perforated shelving to improve uniformity
- Anti-tip
- Stainless steel
- Built-in grip
- Dismantles without tools for easy cleaning

Direct Heat & Air Jacket

- Fast and uniform heating
- Rapid temperature recovery without overshoot
- Air jacket improves chamber stability

ISOCIDE ™ Coating

Antimicrobial coating eliminates 99.9% of surface bacteria within 24 hours of exposure

Pilaster

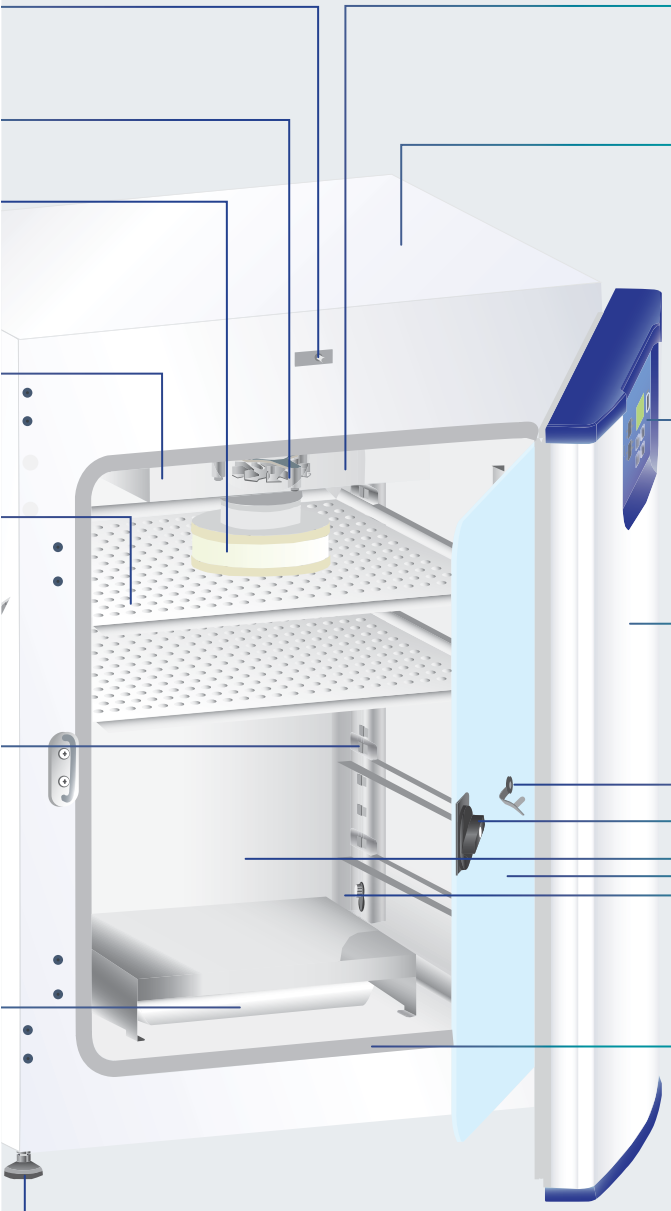
Can be removed without tools for easy cleaning

Water Pan

- Precisely heated by base heater to provide high humidity
- Gentle airflow over water surface accelerates humidity recovery

Leveling Feet

Easily adjustable



Esco CelCulture CO_2 Incubators,

CO_2 Sensor

- Choice of TC or IR
- Single beam dual wavelength IR sensor is drift free
- Auto-zeroing

Top Cover

Provides quick access to electrical panel components

Smartsense ™ Microprocessor Interface

Intuitive, fully equipped control and monitoring system

Outer Door

- Reversible
- Heated to prevent condensation

Sample Port

Allows direct measurement of chamber atmosphere such as temperature and CO_2 concentration

Door Latch

To lock / unlock the glass door

Duct Work

- Directs air flow for rapid recovery and excellent uniformity
- Easily removed for cleaning

Glass Door

For observing sample cells inside the chamber during operation

Rounded Corners

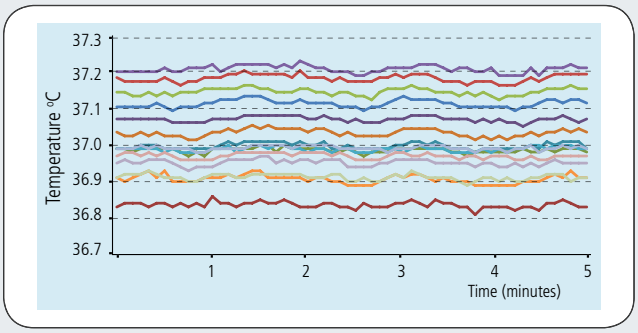
- Seamless design
- Facilitates cleaning

Inner Door Seal

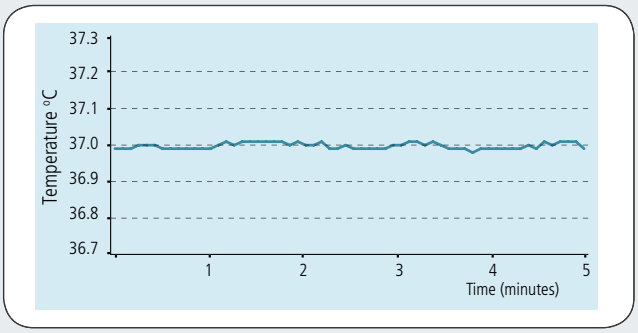
Airtight to prevent CO_2 leakage thus lowers CO_2 consumption

VivoCell™ Precise Parameter Control

Best Uniformity and Control Among Competition

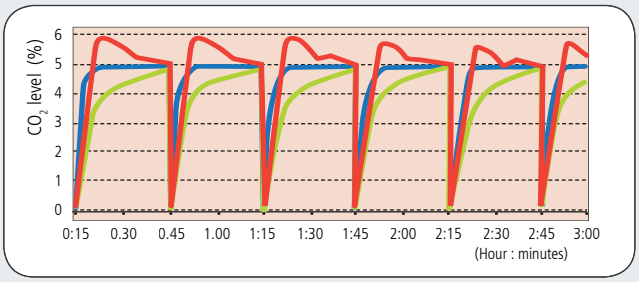


Different lines represent different sensor positions inside the chamber. Esco CelCulture has uniformity variance of less than ± 0.2 °C which means all the samples are evenly heated.*



Minimal fluctuation (± 0.1 °C) ensures temperature stability.*

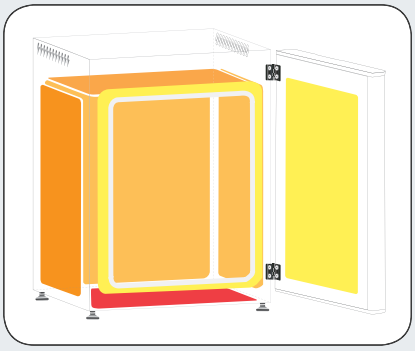
Fast CO_2, Temperature and Humidity Recovery Without Overshoot

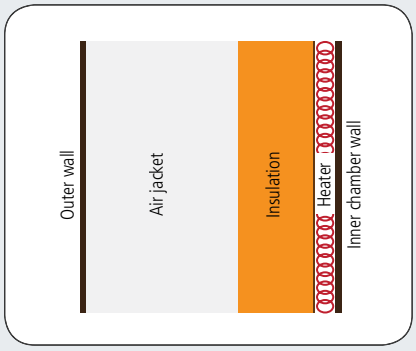


Precisely tuned sensor and software result in fast recovery of CO_2 without overshoot. This ensures uniform CO_2 levels even with frequent incubator door openings.*
Similarly, temperature and humidity recoveries are twice as fast as conventional incubators.

- Company A's model: overshoot.
- Company B's model: slow recovery.
- Esco CelCulture: fast recovery, no overshoot.

Direct Heat and Air Jacket

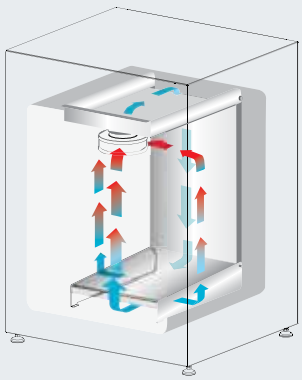




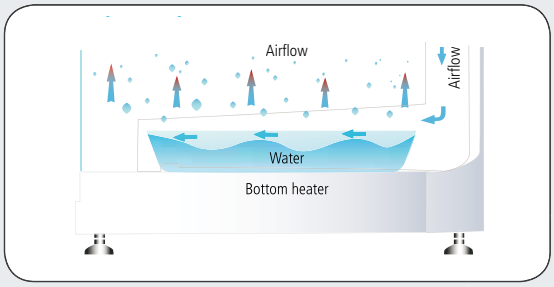
- Direct heating enables rapid temperature recovery while air jacket provides isolation against ambient temperature fluctuations.
- All six surfaces of the incubator are heated via eight heaters grouped into three control zones

- The main heater provides precise temperature control.
- The bottom heater warms the water pan and controls humidity.
- The outer door heater prevents condensation on glass door and facilitates temperature recovery.

VentiFlow™ Forced Convection



- No disturbance to cell culture.
- Blower automatically stops when door is opened, to minimize mixing of chamber and room air.
- Accelerates recovery of chamber air to ISO Class 5 Cleanliness after door closing to prevent contamination.
- Improves CO_2, humidity and temperature uniformity.

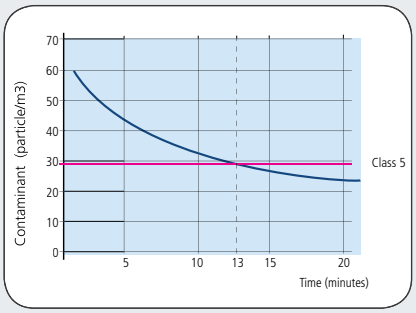


- Filtered air circulates across water pan to accelerate humidifying process.

** Units were factory tested under controlled environmental conditions per Esco method. Esco does not guarantee identical results in the field under differing conditions. Original report available upon request. .*

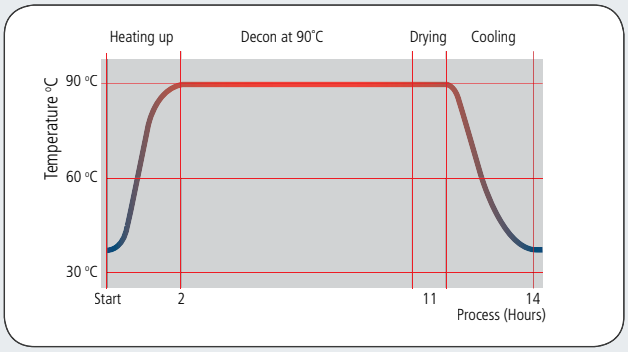
CelSafe™ Robust Contamination Control

SteriSafe™ ULPA Filtration System



- An ULPA filter filters the chamber air continuously to keep chamber at ISO Class 5 cleanliness.
- This ensures all contaminants from the room air and chamber air are filtered and only clean air is recirculated.
- ULPA filters operate at 99.999% efficiency, superior to conventional HEPA filters which are 99.99% efficient.
- Chamber achieves ISO Class 5 Cleanliness condition after a mere 13 minutes following a door closing.*

Validated SwiftCon™ Overnight Decontamination Cycle



Microorganisms	Before Decon	After Decon
Bacillus atrophaeus	1.59 x 10^6	0
Aspergillus brasiliensis	1.52 x 10^4	0
Pseudomonas aeruginosa	2.38 x 10^6	0
Staphylococcus epidermis	2.33 x 10^6	0
Escherichia coli	1.57 x 10^6	0
Staphylococcus aureus	5.72 x 10^6	0
Enterobacter faecalis	2.15 x 10^6	0

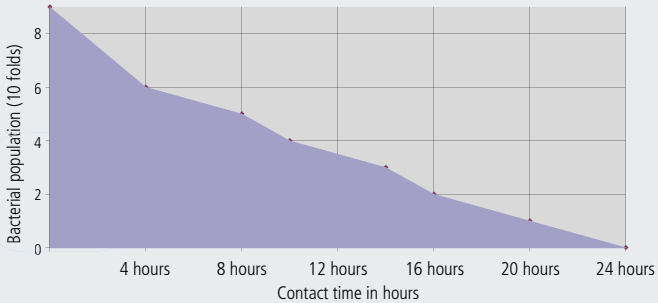
- The ESCO Celculture CO_2 incubator 90°C decontamination cycle has been evaluated by Health Protection Agency (HPA) in UK and shown to be an effective method of deactivation of the normally resistant fungi, bacterial spore and vegetative cell.
- Use of 90°C moist heat kills most microorganisms.**
- SwiftCon™ completes within 15 hours.
- Chamber is cool and dry at the end of the cycle. No further wipe down is needed.
- Independently proven to be as effective as high temperature decontamination.
- Lower temperature causes less damage to electronic components, therefore prolongs the life span of the incubator.

Gas Injection Lines Are Filtered

- All gas injection lines are filtered via 0.2 micron in-line filter to remove impurities and contaminants before being injected into the chamber.
- In-line filters are field replaceable external to the incubator.

ISOCIDE™ Antimicrobial Coating

- Chamber is made of type 304 stainless steel. Main body is electrogalvanized steel with ISOCIDE™ antimicrobial coating.

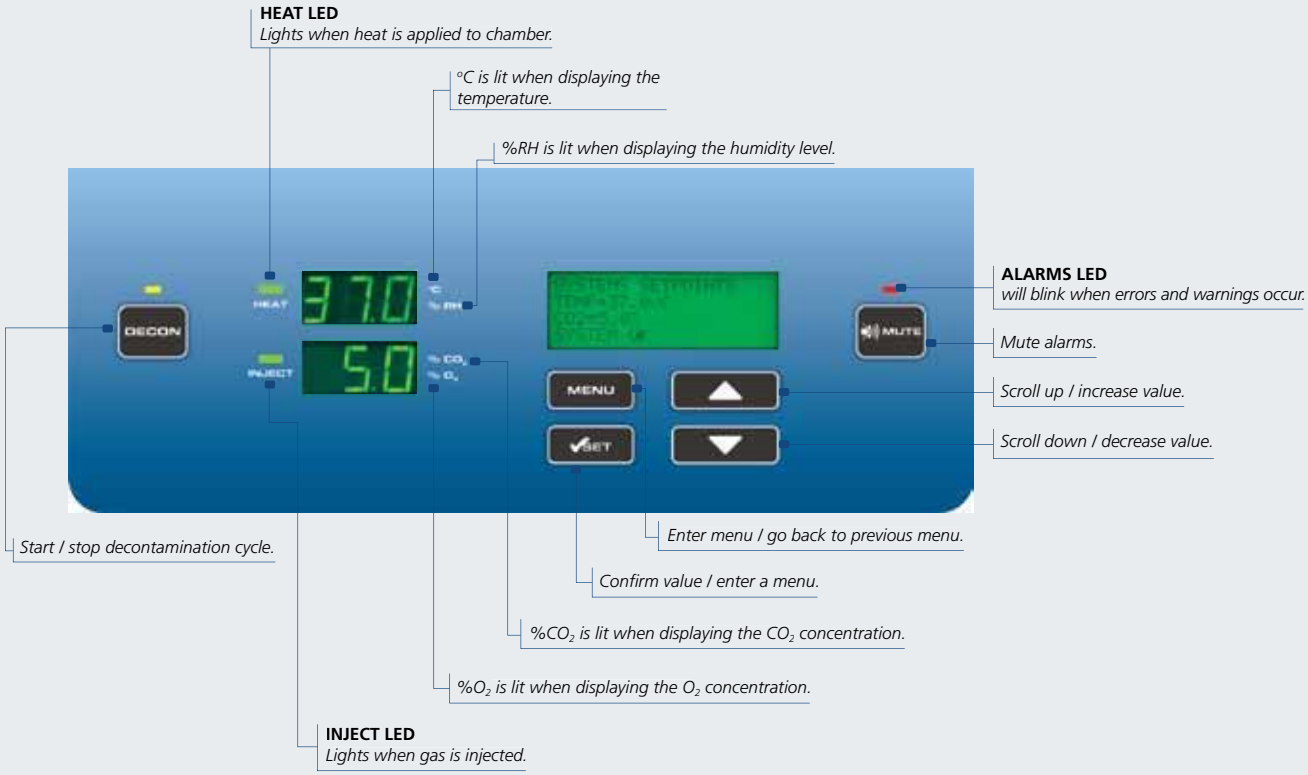


Esco ISOCIDE™ is an antimicrobial inhibitor that eliminates 99.9% surface bacteria within 24 hours of exposure. Isocide is integrated into the coating and cannot be washed out or diminished by repeated cleaning.

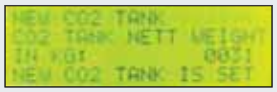
* *Units were factory tested under controlled environmental conditions per Esco method. Esco does not guarantee identical results in the field under differing conditions. Original report available upon request..*

** *During decontamination cycle, temperature may increase from 90°C to 94°C.*

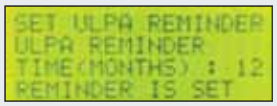
User - Friendly Software Interface



- Comprehensive, user-configurable alarms:
  - Temperature
  - CO_2
  - Humidity (if installed)
  - O_2 (if installed)
- CelAlert™ alarm system reminds user to replace parts.
  - CO_2 tank depletion reminder in addition to CO_2 tank low alarm. Automatic calculation of how much CO_2 gas is left in the tank provides fail proof reminder that alerts user one week before the gas is depleted. This gives user some buffer time to place order for new tanks.



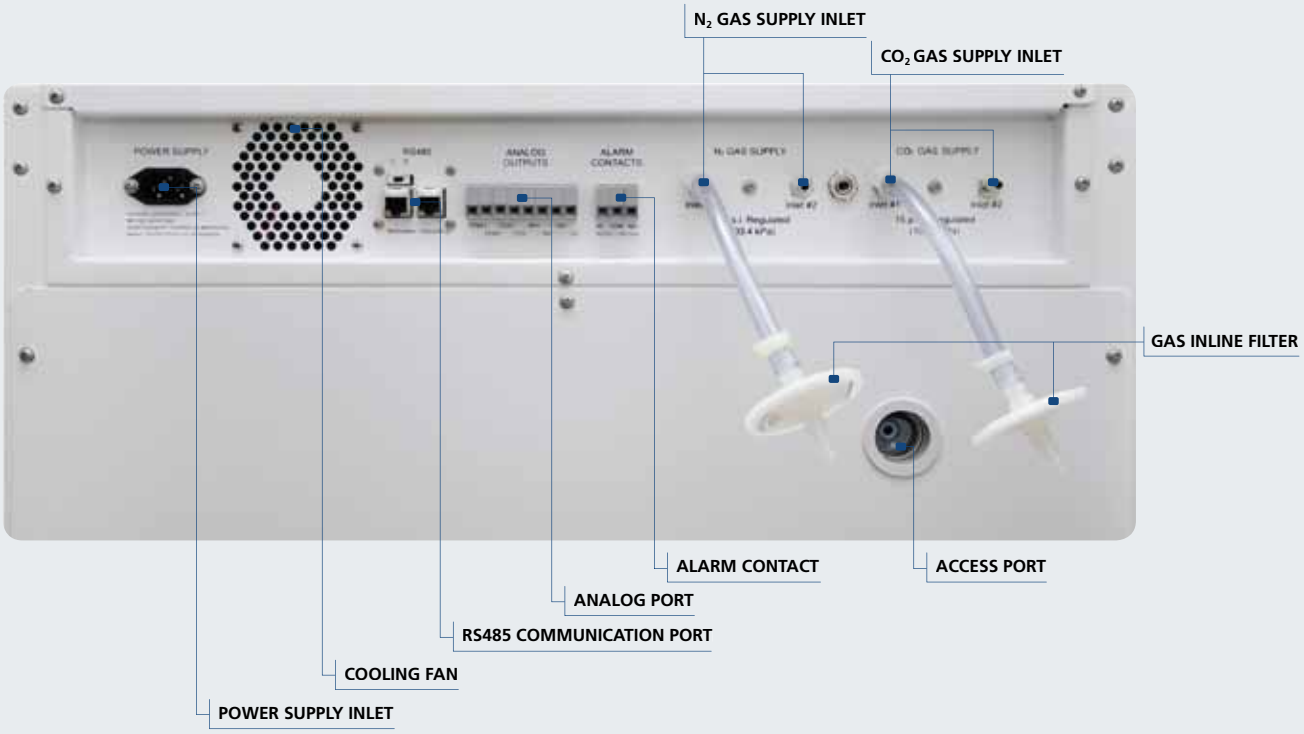
  - ULPA reminder will alert user to replace ULPA filter.



- Intelligent data and event logger records all incubator parameters for on screen recall. 16 Mb built-in flash memory guarantees long term storage of data.

- Diagnostic interface and on line quick help provide comprehensive solutions to frequently encountered problems.

Rear Panel



Power Supply Inlet

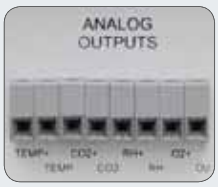
The power supply inlet connects the incubator unit to the power source.

Cooling Fan

The cooling fan prevents the electrical panel from overheating.

RS485 Communication Port

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



Analog Port (Optional)

The analog port allows the incubator to output analog signals representing temperature, CO_2/O_2* concentration and relative humidity, depending on the options available in the incubator. This allows the Incubator to be connected to an in-house data acquisition or alarm system.

Alarm Contact

A set of relay contacts located on the rear of the unit is provided to monitor temperature, humidity or CO_2 alarms. The alarm contacts can be connected to a remote alarm system.

CO_2 Gas Supply Inlet

The CO_2 gas supply inlet connects the CO_2 gas supply with the Incubator unit.

N_2 Gas Supply Inlet

The N_2 gas supply inlet is only applicable for models with N_2* Control function.

Gas Inline Filter

Inline filters are provided to remove any contaminants from gas supply.

Access Port

Allows cables, hoses or additional sensors to be routed into the work space. Rubber stopper with controlled leak is installed as standard configuration and is part of standard accessories.

** O_2 and N_2 functions are applicable only to models with Suppressed O_2.*

CelCulture CO_2 Incubators Sensors

Vaisala IR Sensor

Vaisala's IR sensor is a versatile instrument for measuring CO_2 level inside the Incubator. The CARBOCAP® sensor is silicon based and its operation is based on the NDIR Single-Beam Dual-Wavelength principle.

IR based sensors are not affected by water vapor, dust or most chemicals. The single beam dual wavelength technology (one reference and one measurement) ensures a drift free sensor that does not require calibration by the user.

Operating principle

The light source is positioned to shine at the IR detector so that the light travels a fixed distance to the detector, where the intensity of the light is measured. A Fabry-Perot Interferometer (FPI) is positioned just in front of the IR detector. The FPI is a tunable filter which allows only certain wavelengths of light to pass through to the detector.

Carbon dioxide absorbs certain wavelengths of light and not others, so the FPI is designed to pass light at a CO_2 absorption wavelength (4.26 µm) and a nearby, non-absorbing wavelength.

When the sensor is operating, the FPI is regularly tuned back and forth between the two wavelengths. At the CO_2 absorption wavelength, the intensity of detected light is reduced in proportion to the concentration of CO_2 in the optical path. The light intensity measured at the non-absorbing wavelength serves as a baseline for comparison.

Operating Conditions:

%CO_2 detection range: ***0 to 20%*** *CO_2 Concentration*
%RH operating range: ***Not affected by Humidity***
Temperature range: ***-20°C to +60°C***

TC CO_2 Sensor

Esco TC CO_2 sensor's operating principle relies on a resistor as a heater and two thermocouples as a sensing element for the CO_2 gas. Accurate sensing is made possible by the porous cap on the eye of the sensor probe.

One of the thermocouples functions as a reference signal, while the other functions as the sensing signal. An amplifier will feed the data variance between the two thermocouples to an electronic control system.

Operating Conditions:

%CO_2 detection range: ***0 to 20%*** *CO_2 Concentration*
%RH operating range: ***40% to 98%*** *Relative Humidity*
Temperature range: ***+25°C to +100°C***

O_2 Sensor

Fiagro's O_2 sensor is a unique galvanic cell type oxygen sensor. Its most notable features are long life expectency, excellent chemical durability, and it is not influenced by CO_2. The O_2 sensor is ideal to meet the ever-increasing demand for oxygen monitoring in various fields such as combustion gas monitoring, the biochemical field, medical applications, domestic combustion appliances, etc.

Operating Conditions:

%O_2 detection range: ***1 to 20.7%*** *O_2 Concentration*
%RH operating range: ***10% to 90%*** *Relative Humidity*
Temperature range: ***5°C to +40°C***

Options and Accessories

COA-1001-F Humidity Display

This option allows the Incubator to monitor the relative humidity inside the chamber.

The probe for the sensor works in freezing conditions (-70°C) and also in temperatures up to +180°C. The sensor is easy to install and has excellent accuracy. The airflow in the chamber does not affect the measurement. The sensor is maintenance free. It does not need to be removed during 90°C moist heat decontamination cycle.

COA-1002-F CO_2 Backup

This option allows two tanks of CO_2 to be connected to the Incubator. It will automatically switch from the primary tank to the secondary tank when low gas pressure is detected on the primary tank.

COA-1006 Sealed Inner Door Kit

Celculture CO_2 Incubator can be equipped with 4 glass doors, which allows access to defined sections of the incubator without disturbing the inner atmosphere. This minimizes recovery times and contaminated risks. The Sealed Inner Door is available as a factory installed option or field installed retrofit kit.

COA-1007-F N_2 Back-up

This option allows two tanks of N_2 to be connected to the incubator. It will automatically switch the primary tank to the secondary tank when low gas pressure is detected on the primary tank.

COA-2001-F Roller Base

Roller base is available with casters for mobility of your incubators and to provide protection against floor contamination.

COA-2002-F Floor Stand 200 mm (8.0") With Adjustable Feet

Floor stands are available with adjustable feet, nominal range 180 mm to 250 mm (7.1" to 9.8") for comfortable access to the incubator and to avoid floor contamination.

COA-2003-F Floor Stand 700 mm (27.6") With Casters

This support stand raises the incubator to a height of 700 mm (27.6") above the floor for comfortable access. It comes with casters for mobility of your incubators.

5250001-Voyager Software Kit

Esco Voyager is a PC-based software package developed for the remote monitoring, datalogging and programming / device configuration of Esco controlled environment laboratory equipment. Compatible equipment includes Laboratory Ovens and Incubators, Low Temperature Incubator, CO_2 Incubators and Ultra-Low Temperature Freezer.

COA-2005-F 2-Stage Gas Regulator for CO_2/N_2

CO_2 and N_2 gas input regulators reduce pressure from the tank to the incubator. It has dual pressure gauges, barbed line connection and shut-off valve. It prevents over-pressurization of the gas supply into the incubator which could cause the tubing to burst.

- CGA 320 connector (U.S. Standard)
- BP-BS341-#8-NT4 connector (British Standard)
  Note: Compatible with European DIN477, French NFE29-650 and Australia AS2473
- G5/8-RH connector (China Standard)

COA-2007-F Extra Shelf, With 2 Support Rails

Each Celculture CO_2 Incubator comes standard with 4 shelves and it can accommodate up to a maximum of 7 shelves.

Extra shelves are available and each shelf comes with 2 support rails.

COA-2008-F Stacking Kit

Stacking kit is a provision to stack one incubator on top of another incubator. Four stacking brackets are included as standard inside the Accessories Kit Box with each incubator.

COA-2010-F Electronic CO_2 Analyzer, For CO_2 / Temp Measurement

COA-2016-F Electronic CO_2 + O_2 Analyzer, For CO_2 / O_2 / Temp Measurement

COA-2017-F Electronic CO_2 + O_2 + RH Analyzer, For CO_2 / O_2 / RH / Temp Measurement

The Electronic Analyzer allows the measurement of CO_2 concentration, O_2 concentration, Relative Humidity and temperature (temperature probe already included).

COA-2012-F 6" Chart Recorder, Temp, 115/230VAC 50/60HZ

The chart recorder provides an easy-to-read graph of data vs time. It is a reliable, accurate, and stable instrument, for on-the-spot written documentation of incubator chamber temperature. This model offers 6" chart of temperature data.

COA-2013-F 8" Chart Recorder, Temp/Temp, 115/230VAC 50/60HZ

The chart recorder provides an easy-to-read graph of data vs time. It is a reliable, accurate, and stable instrument, for on-the-spot written documentation of incubator chamber temperature. This model offers 8" chart of temperature data and comes with 2 remote probes for dual temperature monitoring.

COA-2014-F 6" Chart Recorder, Temp/RH, 115/230VAC 50/60HZ

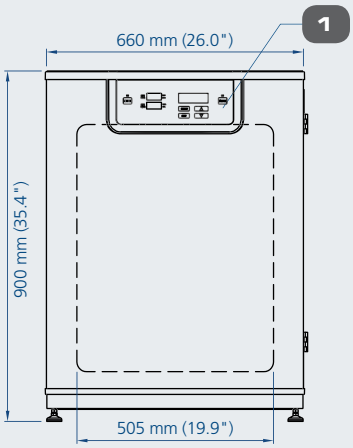
The chart recorder provides an easy-to-read graph of data vs time. It is a reliable, accurate, and stable instrument, for on-the-spot written documentation of incubator chamber temperature. This model offers 6" chart of temperature and humidity data.

COA-2015-F Inner Door Shelving Kit (4 Sets With Total 12 Mini Shelves For One Incubator)

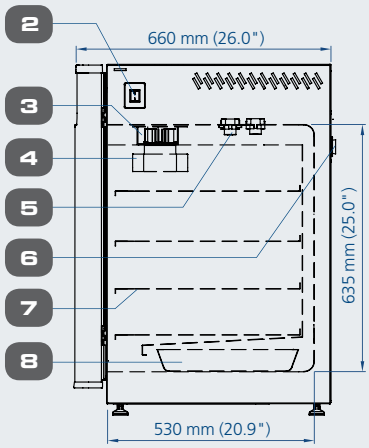
These mini shelves are to be used with the Sealed Inner Door Kit installed. There are 4 sets with a total of 12 mini shelves on each incubator.

CelCulture CO_2 Incubators Technical Specifications

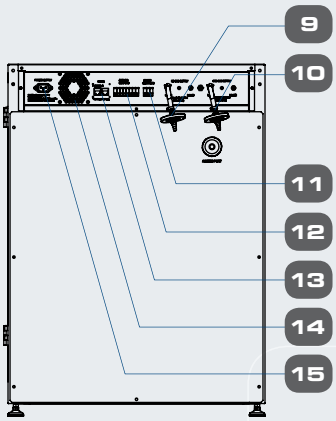
Front view



Side view



Rear view



1. *Control panel*
2. *On / off switch*
3. *Blower*
4. *ULPA filter*
5. *Sensors*
6. *Access port*
7. *Adjustable shelves*
8. *Humidity pan*
9. *N_2 gas supply*
10. *CO_2 gas supply*
11. *Alarm contact*
12. *Analog output*
13. *RS485*
14. *Cooling fan*
15. *Power supply inlet*

Celculture CO_2 Incubator	
Temperature	
Temp. Control Method	Direct heat & air jacket using Microprocessor PID
Temp. Range, °C	Amb. +3 to 60
Temp. Uniformity, °C	<± 0.2*
Temp. Accuracy, °C	<± 0.1
Recovery Time Without Overshoot** (after 1 min. door opening)	6 mins
Ambient Temp. Range	18 to 34°C (64 to 93 °F)
CO_2	
CO_2 Control System	Microprocessor PID
CO_2 Range, % CO_2	0-20.7
CO_2 Accuracy, % CO_2	± 0.1
CO_2 Sensor	TC or IR sensor
CO_2 Recovery Time Without Overshoot*** (after 1 min. door opening)	Standard Unit: 4 minutes
CO_2 Recovery Time Without Overshoot (after 30 seconds door opening)	with Suppressed O_2: 5 minutes
O_2 (For Suppressed O_2 Model)	
O_2 Control System	Microprocessor PID
O_2 Range, % O_2	1-20.7
O_2 Accuracy, % O_2	± 0.2
O_2 Sensor	Galvanic Cell Type
O_2 Recovery Time (after 30 sec. door opening)	at 1.0 % O_2 by vol: 20 mins
	at 5.0 % O_2 by vol:10 mins
Humidity	
Humidification Method	Humidity pan
Humidity Range, % RH	Up to 97%
Humidity Recovery Standard Model (- 5% from initial)	20 mins
Humidity Recovery with Suppressed O_2 Model (- 5% from initial)	45 mins
Physical Construction	
Interior Volume	170 l (5.7 cu.ft.)
External Dimensions (W x D x H)	660 x 660 x 900 mm (26.0'' x 26.0'' x 35.4'')
Internal Dimensions (W x D x H)	505 x 530 x 635 mm 19.9'' x 20.9'' x 25.0''
Shipping Weight	120 kg (264.6 lbs)
Shipping Dimensions (W x D x H)	850 x 820 x 1150 mm (33.5" x 32.3" x 45.3")
Number of Shelves	4
Maximum No. of Shelves	7
Shelves Area (W x D)	470 x 470 mm (18.5" x 18.5")
Max. Load per Shelf	11 kg/shelf (24.3 lbs/shelf)
Available Electrical Configuration	230 V, AC, 50/60 Hz, 1Φ, 3.4 A
	115 V, AC, 50/60 Hz, 1Φ, 7.0 A
Power Consumption	800 watts
Effective Watt at 37°C	80 watts
Contamination Control	
Interior Material	Stainless steel, type 304
Contamination Control Methods	1) Main body is electrogalvanized steel with ISOCIDE antimicrobial coating; 2) Moist 90°C OVERNIGHT decon. cycle (HPA validated); 3) 0.2 micron in-line filter for gas inputs; 4) ULPA filter

* Data recorded under optimum factory testing conditions
** For temperature not exceeding 37.3°C
*** For CO_2 not exceeding 5.2%
Recovery time with TC Sensor is longer

ESCO®

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