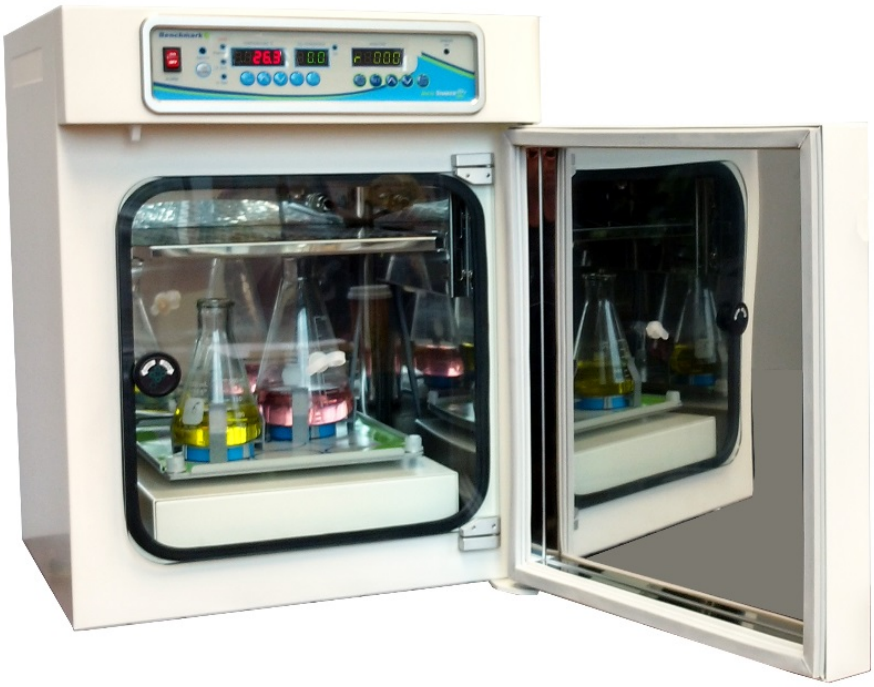
INCU-SHAKER CO_2 Mini

OPERATING MANUAL



Benchmark Scientific

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1. General Information and Precautions

Safety Symbols:

1.1. Precautions related to the power cable

Always allow at least 3cm between the power cable and the back wall to prevent the back wall from causing pressure on the power cable.

Always use the electrical plug that was supplied with this instrument.

Never touch the power cord with wet hands. (This can result in electric shock.)

Never use a damaged power cord or power outlet.

In the event of smoke or a burning smell, immediately remove the power cord from the outlet.

1.3. Precaution for use

Do not attempt to disassemble this instrument. If service is required, please contact your local representative.

Never operate a flammable spray near this instrument. (This can result in a fire hazard.)

Always use caution when using flammable substances such as benzene, alcohol and LP gas. (Failure to do so can result in a fire hazard.)

Prevent foreign substances from contacting the door seal. (The inflow of outside air can negatively impact the temperature in chamber.)

Permissible ambient temperature range for transport: -10℃to 60℃.

ALWAYS ensure that the instrument is connected to an outlet with specifciations that match those of the serial number label.

(Over-voltage or under-voltage can damage the product and result in poor performance.)

When installing the instrument, always allow a distance of at least 30cm from the back wall. Install the unit in the way that the power plug is easily accessible and can be easily pulled in case of danger.

Install the instrument on a flat and stable surface, free from vibration and in a well-ventilated location. (If the surface is not level, it can cause an excessive vibration of the product.)

Excessive CO2 can be harmful when in high concentrations.

Any excess amount of CO2 should be properly ventilated or by connection to a suitable exhaust system.

2. FEATURES AND SPECIFICATIONS:

2.1 Features

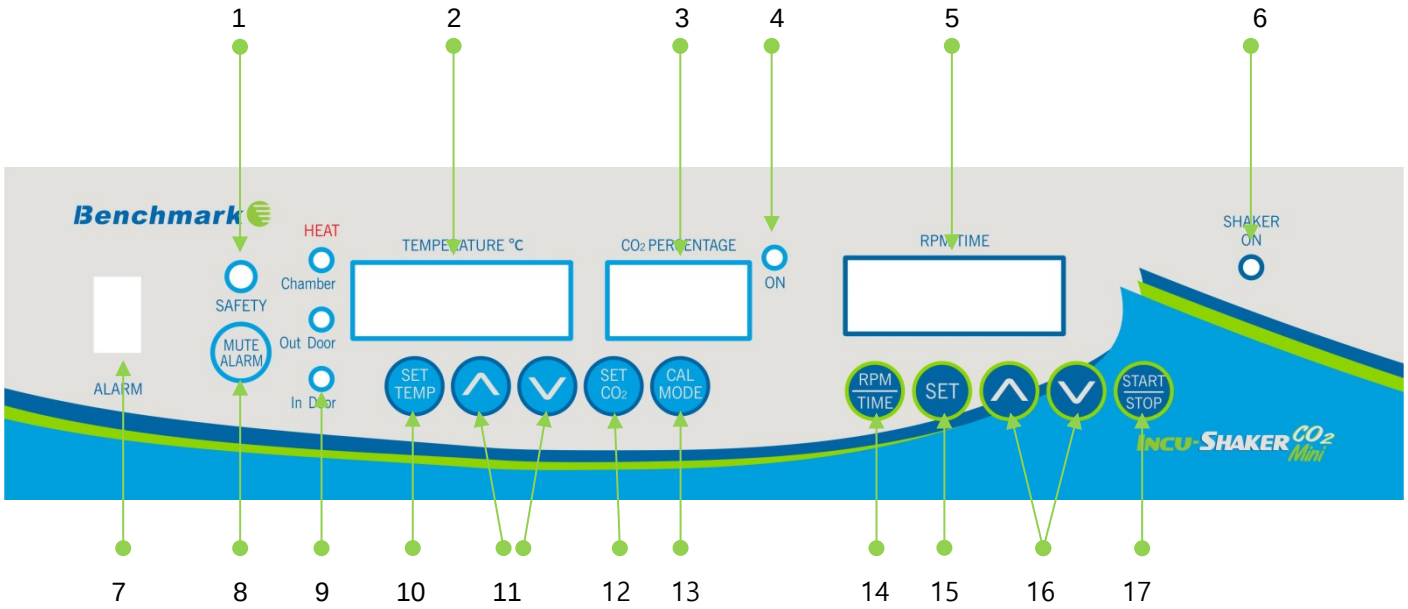
1. Excellent temperature uniformity of Temperature and CO_2 with a built in shaker
2. 6 Side direct heat for temperature uniformity and fast recovery
3. IR CO_2 Sensor detects precise density of CO_2
4. Outer heated door prevents condensation on glass viewing door.
5. Microprocessor PID control for Temperature, CO_2 and shaking speed
6. Natural Humidification System by water tray and circulation fan.
7. Simple, user-friendly operation for shaker apparatus.

2.2 Specification

Items	NB203QMS
Temperature	
Range	Ambient +5℃ to 60℃ *
Accuracy	±0.5℃ at 37℃
Controller	Microprocessor On Off Control
Humidity	70% ~ 80% at 37℃
CO2	
Range	0% to 20%
Accuracy	±0.1% at 5% at 37℃ setting
CO2 Increment	0.1%
CO2 Sensor	IR CO2 Sensor
Shaker	
RPM	30 to 300 rpm
RPM Accuracy	±1%
Increment	1 RPM
Orbital throw	19mm
Motor	BLDC (Plate Type Brushless DC Motor)
TIME Range	Continuous or up to 47hrs 59min
Platform	250(W) x 310(D)mm with Silicon Rubber Pad
Outer door	Silicon Magnet Packing Door
Inner door	Tempered Glass Door
Jacket type	Dry wall type (6 sides direct heating type)
Chamber material	STAINLESS STEEL
Weight	
Capacity / Shelve	47Liter / 1 shelf
Chamber dimension	335(W) x 361(D) x 392(H)mm
Overall dimension	420(W) x 465(D) x 553(H)mm
Power	110/220V, 50/60Hz (AC 230V : 350W , AC 115V : 340W)

*The minimum temperature specification may vary depending on the room temperature and shaking speed.

3.Control Panel



1. SAFETY activation indicator: If the over-temperature safety is activated, this LED will be ON
2. Temperature display LED window
3. CO_2 Gas % display window
4. CO_2 Supply Status Pilot Lamp : Pilot lamp ON means inflow of gas
5. RPM display : RPM value display
6. Shaker Status Pilot Lamp : When Shaker is running, this lamp is flashing.
7. Alarm On/Off Switch
8. Alarm Mute Button : When pressed, provides a10 minutes audible alarm delay.
9. Heating Signal: Shows the status of each heating at the 3 sensor locations. (Glass door = heater around glass door.)
10. Temperature Setting Button.
11. Adjustment button
12. CO_2 Gas Setting Button
13. Calibration Mode button
14. Display Mode Selection Button either RPM or TIME
15. RPM setting Button
16. Adjustment button
17. Shaker Start/Stop Button

4. Installation

Before beginning the installation, always:

Inspect the packaging for damage. When the instrument is received, please inspect the item carefully to check for any potential transit damage. In the event of damage, always report the damage to the shipping carrier and your local representative immediately.

Included in the package:

1. Stainless Steel Perforated shelf – 1 Pcs
2. Power Cord – 1 Pcs
3. Stainless Steel Water Container for humidity- 1Pc
4. CO_2 Gas Tubing with in-line CO_2 Gas filter – 1Pcs
5. Operating Manual- 1Pcs

Above parts are packed inside incubator. When received, open the door of incubator and remove all parts to check confirm receipt.

Cleaning before use

Before conducting cell culture in this mini incubator, It is recommended to clean up entire chamber and shelves and water container by using soft cloth with at least 70% Ethanol mixed of 30% distilled water.

Installation Procedure:

4.1 Place the incubator at the desired location.

Always avoid placing the incubator in:

- An area near equipment generating heat or cold air
- Direct sunlight
- An uneven surface or table.
- A place with heavy vibration
- A place with little air ventilation space behind the incubator.

4.2 Place the shelves and water container as shown in chapter "CONFIGURATION". If desired, place the stainless steel water container at bottom of chamber toward the back of incubator (in order to get it to be close to circulation fan). This increases the humidity.

Distilled water is recommended in order to avoid contamination and corrosion.
If possible, use warm (~37℃) distilled water for immediate humidification.

4.3. Connect the CO_2 Gas supply

The Gas tubes provided is a 6mm (dia) tube. Insert the edge of tube to gas inlet port and connect it to a gas regulator which should be installed on the gas cylinder. Or, install to the gas line in your lab.

-Turn on the gas supply with the pressure set to 1 Bar (or 14.5 Psi)

NOTE! : To confirm that there are no leaks in the CO_2 connections, a "bubble check" is recommended. Apply soapy water to each fitting and check if any bubbles are generated. If so, readjust the fitting.

4. **Connect the power cord.**
-Plug the power cord onto the power inlet on the back side of the incubator (refer to CONFIGURATION)
-Plug the power plug into an outlet of the appropriate voltage.

5. CO_2 Incubator Operation

5.1 Power switch

Turn on the power switch. The digital LED will display current temperature and CO_2% in the chamber.

5.2 Setting temperature

a. Press the "TEMP SET" key, then, the LED screen will flash and display current programmed temperature.
b. Set up the desired temperature by pressing UP (▲) or DOWN (▼).
c. Press "TEMP/SET" key after adjustment. The “SAVE” message is shown on the display.

Note: Always press the “SET/TEMP” key after adjusting to the desired value. Otherwise, the value will not be saved.

5.3 Setting CO2

a. Press "CO2 SET" key. Then, the LED screen will begin flashing.
b. Input the desired value of Co2 density by adjusting UP (▲) or DOWN (▼) key
c. Press "SET" key again after inputting the value. “SAVE” is shown up on LED screen as below.

Note: Always press the “SET/CO2” key after adjusting to the desired value. Otherwise, the value will not be saved.

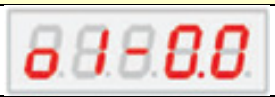
5.4 Calibration for temperature and CO2

In the event of a discrepancy, please follow the below procedure for adjusting the calibration.

Caution

Measure CO2 density and Temperature after incubator is stabilized. (Allow 2 hours for stabilization after the desired setting has been reached.

Please note that a very low deviation range such as ±0.1 ~ 0.3% could be difficult to correct precisely by this calibration.

No.	DISPLAY	FUNCTION
1		Chamber Temperature
2		Door Heater Temperature
3		Glass Door Heater Temperature
4		CO2 Calibration
5		Heating control

6		CO2 gas supply control
7		To apply a new value

a. Press and hold "CAL/SET" for 10 seconds. Then, LED will be flickering as below.

Channel 1 is for adjusting the calibration of the main chamber temperature.

Press UP (▲) by the difference measured from the set value and the value measured by precision thermometer or thermocouple. OR

Press DOWN (▼) by the difference measured from the set value and the value measured by precision thermometer or thermocouple

Ex.) If measured temperature is 38 and Display shows 37 , then press up 1 .

Note

* Temperature Calibration range is ±5℃

* To proceed to next calibration channel, press "CAL/SET" button. After 5th channel, the LED is back to temperature display.

b. Second Calibration Setting: Outer Door Temperature

Caution

The purpose of this heater is to prevent water condensation from forming on the glass door, caused by a large temperature difference between chamber and outside air. If water is condensing on the front door, we recommend adjusting this channel.

Note: Other than water condensing on the glass door, the calibration of channel 2 and 3 would not be recommended.

c. Third Calibration Setting: Door Frame

Caution

The purpose of this heater is to prevent water condensation from forming on the glass door, caused by a large temperature difference between chamber and outside air. This setting should be adjusted if making a chage to setting 2 has not resulted in preventing this condensation.

d. Fourth Calibration Setting: CO2 density calibration

Channel 4 is for adjusting the CO2 density.

Press UP (▲) by the difference measured from the set value and the value measured by precision analyzer.

Press DOWN (▼)by the difference measured from the set value and the value measured by precision analyzer.

Ex.) If the measured CO2 value is 5% and Display shows 4%, then press up to set to 1%.

e. Fifth Calibration Setting: Heating control

NOTE

Channel 5 is to set heating control point and is designed to prevent a significant temperature overshoot. This mode is preprogrammed in the factory and should NOT be adjusted by the user.

f. Sixth Calibration Setting: CO2 gas supply control.

NOTE

Channel 6 is to set the values associated with the CO2 release solenoid. This mode is preprogrammed in the factory and should NOT be adjusted by the user.

5.5 Alarm

Three minutes after the temperature and the CO2 density have reached the desired setting, all alarm systems are activated. (If the temperature or CO2 does not reach the set point, the alarm system will not be activated.) If the user would like to disable these alarms, the alarm can be set to the “OFF” position.

Alarm Activation

Temperature: ±1℃ from set point

CO2: ± 1% from set point

Door Open: 1 minute after door opening.

*When pressing the alarm mute button on the control panel will stop the alarm from activating.

If the alarm was stopped by mute button, the alarm will be re-activated after 3 minutes.

5.6 Temperature Thermostat

In the event of a malfunction, this thermostat knob is designed to prevent the heater from overheating.

- ■ Always set the Safety knob to a HIGHER value than the set temperature.
- ■ The Safety knob has a fairly wide deviation
- ■ Safety knob is the safety device designed to prevent the heater from overheating when the temperature control is malfunctioning.

This is the safety device for preventing temperature from rising caused by any circumstances.
So set the temperature at 5 higher than operating temperature or desired point.

■ If the “SAFETY” LED on the front panel is illuminated, this switch has been activated and is limiting the temperature.

6. Shaker Operation

6.1 To set the desired time, Press and hold the **"RPM/TIME"** key for approximately 1 second, the **LED** displays **"t”** followed by the current set time. Press the **"SET"** key located underneath the time/speed display. The set time is displayed and will blink continuously. It can be adjusted by using the UP (▲) and DOWN (▼) keys. Once the desired time is displayed, press the “SET” key to confirm.

* If you do not press the "SET" key to store the desired time, the new time will not be saved and the set time will return to the prior setting.

6.2 To set the desired mixing speed, Press and hold the **"RPM/TIME"** key for approximately 1 second until **LED** displays **“r”** followed by the current set mixing speed. Press the **"SET"** key located underneath the time/speed display. The set speed is displayed and will blink continuously. It can be adjusted by using the UP (▲) and DOWN (▼) keys. Once the desired speed is displayed, press the “SET” key to confirm.

* If you do not press the "SET" key to store the desired speed the new speed will not be saved and the set speed will return to the prior setting.

6.3 Platform Installation

The Orbi-Shaker includes a flat non-slip platform for low speed operation with many common vessels, including trays flasks and dishes. For installation of an optional platform, such as the optional MAGic Clamp platform, please follow the instructions below:

1.) Unscrew the four metal thumb screws from the corners of the internal (included) platform and remove the green rubber mat.

2.) Place the MAGic Clamp platform (with mat) on top of the included platform and retighten the four (previously removed) thumb screws.

6.4 Shaker Error Message

1) This message “rErrL” represents a **low** speed speed error

- Check the platform to ensure that nothing is obstructing it’s movement
- Check the set speed to make sure that it is within the acceptable range (30 to 300rpm)

Solution : Use your hand to physically move platform. While the platform is still moving press and hold the "STOP" and "SET" keys simultaneously for two seconds. The speed display will blink and can now be adjusted to a higher speed.

2) This message “rErrH” represents a high speed error.

- Remove the loaded vessels.

Solution : If a vessel has been removed, replace the vessel or restart the machine.

3) This message, “Error” represents an electrical error.

- Machine has lost power during the run.

Solution : Check that the power cord is properly installed and restart or check that the circuit has not been interrupted and restart.

4) Display will not illuminate

(1) Electrical connection - Please disconnect main power cord and connect again.

(2) Voltage supply - Please check to confirm the correct voltage.

(3) Check the fuse

(4) Verify voltage on the serial number label of the machine

(5) Defective power switch (check voltage at switch)

6.5 Disconnecting inside Shaker

Connector of the orbital shaker is located at upper right back wall of chamber (see below). Turn the connector counter-clockwise to disconnect the shaker. Before disconnecting, ensure that incubator is powered off.

Service and Contact

Service on the instrument should only be performed by qualified service personnel. To request service or technical support, please contact Benchmark Scientific or your local Benchmark Scientific representative.

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