


CO₂ Incubator



HF90
HF240

Instruction Manual





Version: 20081015 **CE**

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Environmental conditions

- * Indoor use only.
- * Altitude up to 2,000 m.
- * The temperature surrounding the incubator must be at 18°C-30°C.
- * Maximum relative humidity is 80% for temperatures up to 30°C.
- * The mains supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage.
- * Transient over-voltages typically present on the mains supply category II.
- * Applicable rated pollution degree 2.
- * The room must be equipped with adequate ventilation.
- * The setup surface must be firm, level, and nonflammable.
- * The unit must be set up where it will not be in direct sunlight.
- * There must be no hot sources nearby the unit.

Safety Information

- * It is important that you read this instruction manual carefully before using the unit for the first time.
- * The CO₂ Incubator may only be operated by trained, authorised personnel.
- * Maintenance work on the unit may only be performed by Envair Lab staff or authorised agents.
- * Tissues, materials or liquids that are highly flammable or potentially explosive, those which vapors form flammable or explosive mixtures with air may not be used!
- * The pressure of the CO₂ supply can be adjusted to a range of 0.8-1 bar, and this range cannot be altered.
- * CO₂ is a kind of gas that poses a potential health hazard.
- * Only qualified personnel using suitable tools may work on supply lines, compressed gas container or bottles, or collective systems in which CO₂ is stored for use with the incubator.



Warning :

Warning: Important operating and/or maintenance instructions. Read the accompanying text carefully.



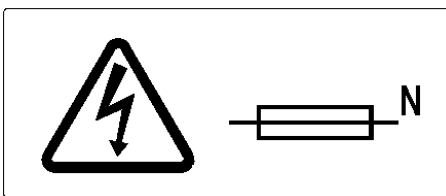
Caution: hot surface.



Warning: be careful of the glass.



Caution: risk of electric shock.



CAUTION: fuse.



Protective GND indicator !



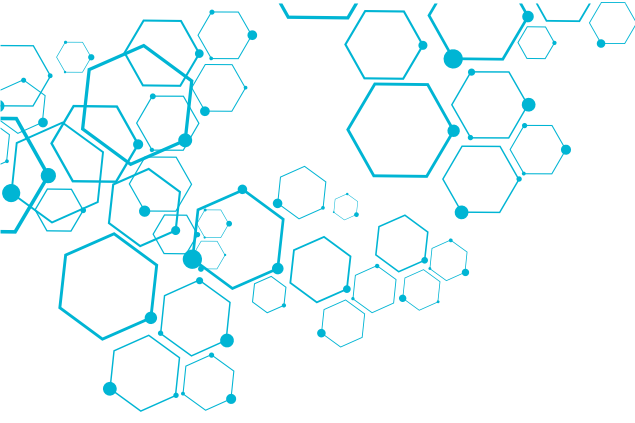
Simple Operational Procedure for HF90 & HF240 CO₂ Incubator.

Default setting: Temperature - - - 37.0°C, %CO₂ - - - 0 %

Please perform 90°C moist heat disinfection before first using (refer to P.23). Then the following procedures should be strictly followed:

1. Open the outer and glass doors. Input distilled water (3L) into the pool and close the doors after doing so.
2. Connect the unit to the source of CO₂.
3. Connect the power supply and switch the incubator on.
4. Self-checking will be done automatically. [%CO₂] and [°C] will display [888] and a version number. Checking will be terminated after 40s. [%CO₂] and [°C] display the setting data inside the unit.
5. Press the [auto-start] key for about 10 seconds, then the "auto-start" light will come on.
6. Please open the glass door according to the prompts of the [%CO₂] and [°C] display windows.
7. Close the glass door after 1 minute, and the unit will AUTO-START.
8. Wait for 16 to 24 hours.
9. Adjust the exit pressure of CO₂ source to 1bar (0.1MPa) .
10. Press [%CO₂] and [▼] / [▲] to input CO₂ setting value (eg.5.0%, 7.0% or 0%.
11. The unit will input the CO₂ gas until the set value is reached.
12. Now, the unit can be used.
13. You must set the CO₂ value to [0%] according to step 10 after operating but before switching off.
14. Open the glass window to release the gas, and dry the inner chamber.





Content

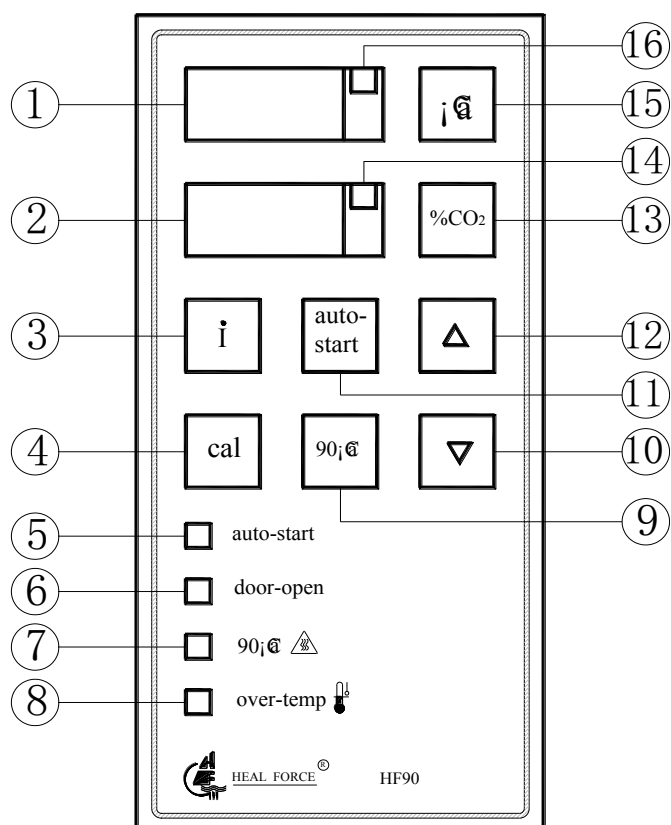
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Control Panel

Picture 1: HF90 Display Panel

Simple Introduction of Display Panel :



1. “°C” display window

Displays the actual values. The SET value can be displayed by pressing [°C] .

The source of temperature malfunction can be displayed by pressing [i] ; you can also switch to special function mode by pressing [cal] .

2. “%CO₂” display window

Displays the actual value of CO₂ concentration; the SET value can be seen by pressing [%CO₂] .

The source of CO₂ malfunction can be displayed by pressing [i] ; you can also switch to the special function mode by pressing [cal] .

3. Pressing [i] will display the source of malfunction.

4. Pressing [cal] to enter adjusting mode. Select special functions with [▼] and [▲] key.

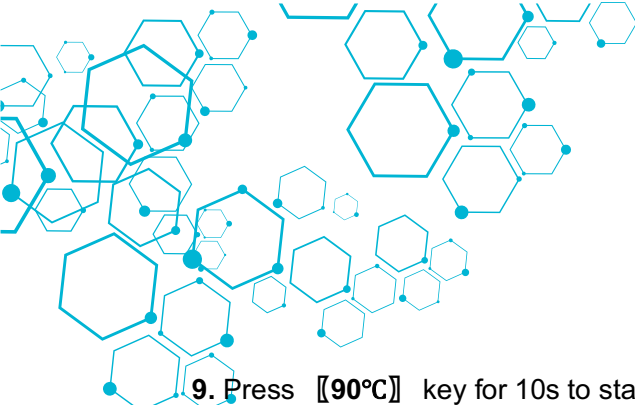
5. “Auto-start” light will show when the equipment begins Auto-start.

6. “Door-open” light will show when the glass door is open.

7. “90°C” light will show when the equipment begins disinfection at 90°C.

8. “Over-temp” light will show if the temperature is over the set value and the heating progress will be terminated.





9. Press **[[90°C]]** key for 10s to start disinfection at 90°C (See P.23).

10. **[[▼]]** is used to reduce the value.

11. Press **[[auto-start]]** key for 10s to enter Auto-start mode.

12. **[[▲]]** is used to increase the value.

13. **[[%CO₂]]** is used to set concentration of CO₂.

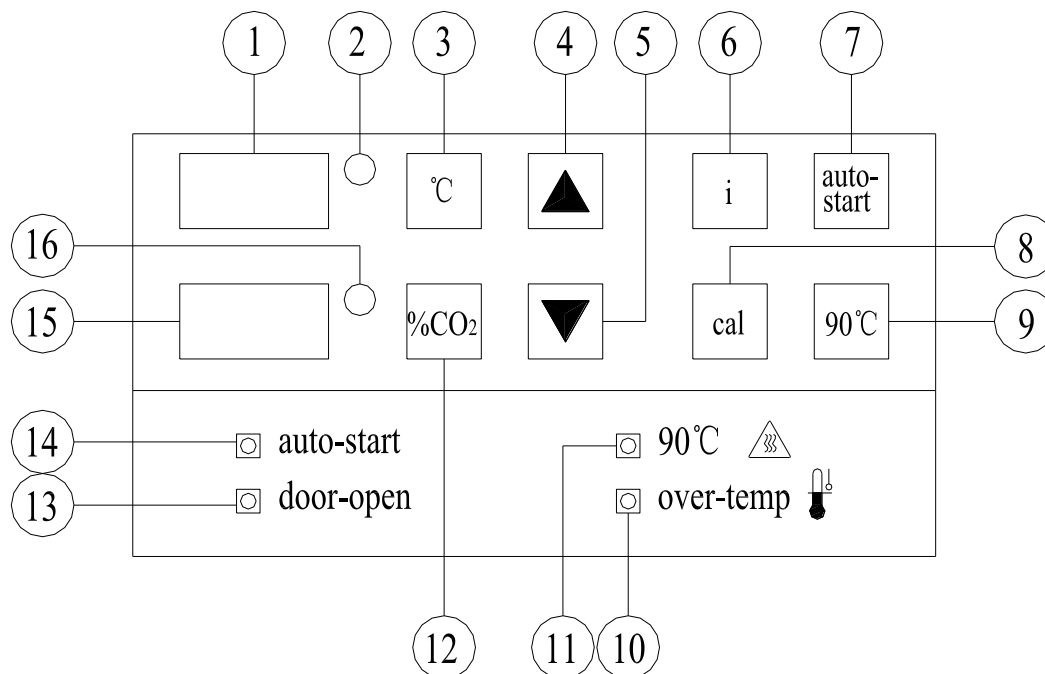
14. **GAS light** will show when the gas comes in.

15. **[[°C]]** is used to set the temperature.

16. **Heating light** will show in heating process.



Picture 2 : HF240 Display Panel



Simple Introduction of Display Panel :

1. “°C” Display Window:

Displays the actual value. The SET value can be displayed by pressing **[[°C]]** key.

The source of temperature malfunction can be displayed by pressing **[[i]]** ; you can also switch to the special function mode by pressing **[[cal]]** (See Function Select, P.20).

2. **Heating light** will show in heating progress.

3. **[[°C]]** is used to set the temperature.

4. **[[▲]]** is used to increase the value.

5. **[[▼]]** is used to reduce the value.

6. Pressing **[[i]]** will display the source of malfunction.

7. Pressing **[[auto-start]]** for 10s will enter the Auto-start mode.



8. Press **[[cal]]** key for over 5 seconds to enter the adjusting mode. Select special functions together with **[[▼]]** and **[[▲]]** key.
9. Press **[[90°C]]** key for 10s to enter the disinfection at 90°C (See P.23)
10. **“Over-temp”** will show if the temperature is over the set value and the heating progress will be terminated.
11. **“90°C” light** will show when the equipment begins disinfection at 90°C.
12. **[[%CO₂]]** is used to set concentration of CO₂
13. **“Door-open” light** will show when the glass door is opened.
14. **“Auto-start” light** will show when the equipment begins auto-start.
15. **“%CO₂”** display window displays the actual value of CO₂ concentration; the SET value can be seen by pressing **[[%CO₂]]** key. The source of CO₂ malfunction can be displayed by pressing **[[i]]** key; you can also switch to the special function mode by pressing **[[cal]]** key (See Function Select, P.20).
16. **GAS light** will show when the gas comes in.



Introduction

HF90 & HF240 Incubators are delicate pieces of lab equipment mainly used in medical areas and the incubation of cells, tissues and bacilli. There are new functions like disinfection at 90°C, the control of CO₂ concentration, and the Micro Control System, which improve the incubation of cells, tissues and other materials. They are important pieces of equipment of High Levelled biological and medical experiments.

Please carefully read this manual before using the incubator in order to prevent damage to the equipment.

Only the personnel authorised by Envair Lab can do the necessary test or maintenance work in order to keep the incubator in normal working condition and adhere with the corresponding safety standards.

Please note the Serial No. when handling the malfunction report or speak to Envair Lab for components.

Only authorised or trained personnel can operate the equipment.

Please keep the incubator in a steady environment without acute change of temperature, which is helpful to the incubation.

The equipment quotes the following standards:

- * Q/TEUC₈-2002 (HF90)
- * Q/TEUC₁₄-2003 (HF240)
- * EN 61010-2-010

Equipment Model and its Meaning :

HF---CO₂ Incubator

90---Moist heat disinfection system at 90°C.

The inside volume is 151L.

240---Moist heat disinfection system at 90°C.

The inside volume is 240L.

Sorts of equipment:

Common equipment of Class I .

The important part is labeled by



Application

The incubator can simulate the natural data of cells and tissues. **The equipment CANNOT be used to incubate flammable materials.**

Equipment Description

■ Fabric Shell.

Electrolysed galvanization steel (RAL 9002).
Control parts are made of plastic.
Stainless steel is used in inner chamber.

■ Inner Components.

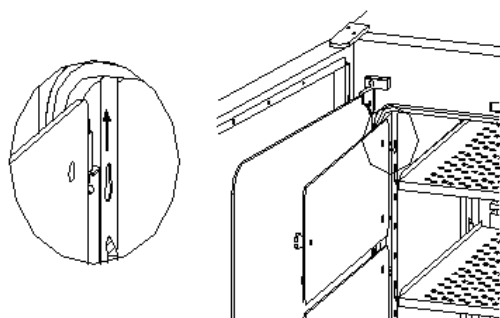
The insert shelves are shake resisted, and can be adjusted at 50mm height. You can remove the shelves and support frame simultaneously without any additional tools.

■ Three small doors (HF90).

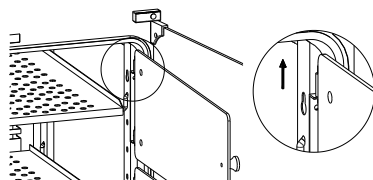
There are three small doors located in the front of the inner chamber. The unique design can reduce the gas and the temperature lost when the front door is opened. Way of teardown :(Refer to Figure 3-1-1 & 3-1-2). Open the small glass door at 45°, and lift slowly until it is completely removed.

■ Six small doors (Option for HF240 doors Opened to the right).

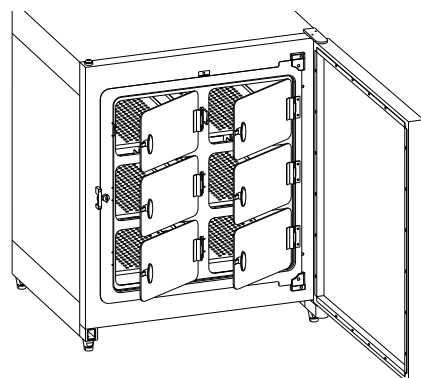
There are six small doors opened to the right located in the front of the inner chamber. The unique design can reduce gas and temperature lost when the front door is opened. Way of teardown :(Refer to Figure 3-2). Open the small glass door at 45°, and lift slowly until it is completely removed.



**Picture 3-1-1 : HF90 doors opened
To the left Three Small doors**



**Picture 3-1-2 : HF90 doors opened
To the right Three Small doors**



**Picture 3-2 : HF240 doors opened to the right
Six Small doors**



■ Heating System:

The heating system is spread on the surface of the inner chamber to heat it. The heating system is normally placed at the top, the back, the front, the left side and the right side of the pool and on the front of the outer door. The condensed water will not appear because the outer door is also heated so that it will keep clear.

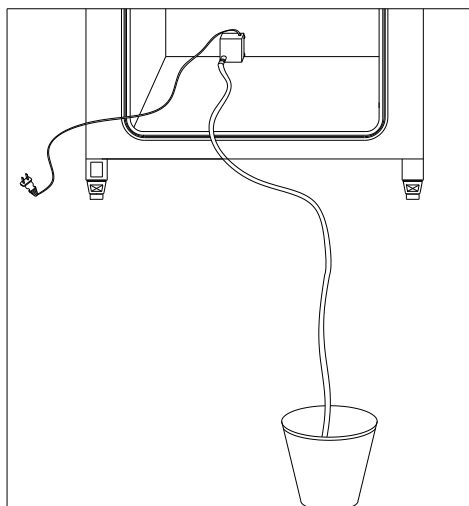
The main heating system allows the equipment to run at a temperature that is 8 °C above the room temperature. If you hope to operate at a lower temperature, you can switch off the door heating to make the equipment work at a temperature that is 5°C above the surrounding. There will be condensed water formed at the corner of the glass door.

The door-heating switch is “ON” at normal condition (refer to function 5, P.20). The additional heating system is always on when the newly added slowly heating mode and normal heating mode could make the incubator work at the different temperature. Anyway, normal heating mode is suggested.

■ Humidity:

The distilled water in the pool vapourise and makes the air inside of the chamber humid. The humidity at normal condition is $\geq 95\%$.

The condensed water will not appear at the top of the chamber and on the door because the particular heating system is used. Instead, it will gather at the other sides of the inner chamber.



The container of the pool: 3L distilled water.



Please ensure that there is no chemical material in the water or it will canker the pool.

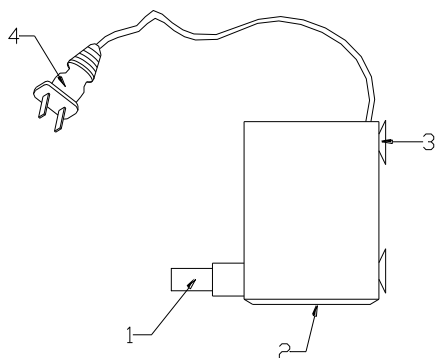
Each incubator is equipped with an electric suction pump.

Steps of using:

Instruction

- Take the draining pipe out of the bag.
- Remove the lower shelf inside the chamber.
- Connect one point of the pipe to the discharge port of the electric suction pump.





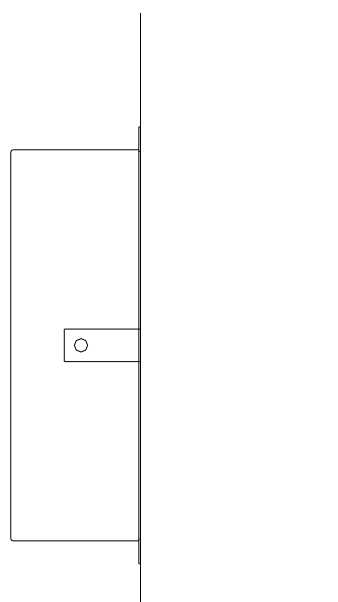
Picture 5: Electric Suction Pump.

1. Drainpipe
2. Bottom of pump
3. Osculum
4. Plug

- Put the other point into the bucket.
- Install the four osculum onto the back of the chamber (below the wind channel) and put the bottom into the water.
- Take the plug out and put it into the 220V power jacket.
- The pump begins to work until the chamber is dried
- Take off the plug and remove the pump from the chamber.
- Unplug the drainpipe and dry the pump
- Dry the pool

Attention of using the pump:

- The Pump cannot run without sopping up.
- Do not make the pump run for more than 10 minutes.
- Drainpipe must be connected when draining.
- Dry the pump after draining.
- **Don't take water to the plug of the pump because of the 220V AC working voltage.**



Picture 6: CO2 entrance

- **Gas Source**

The joint of the gas entrance is at the back panel of the equipment (refer to Picture 6).

The max input press is **1 bar**.

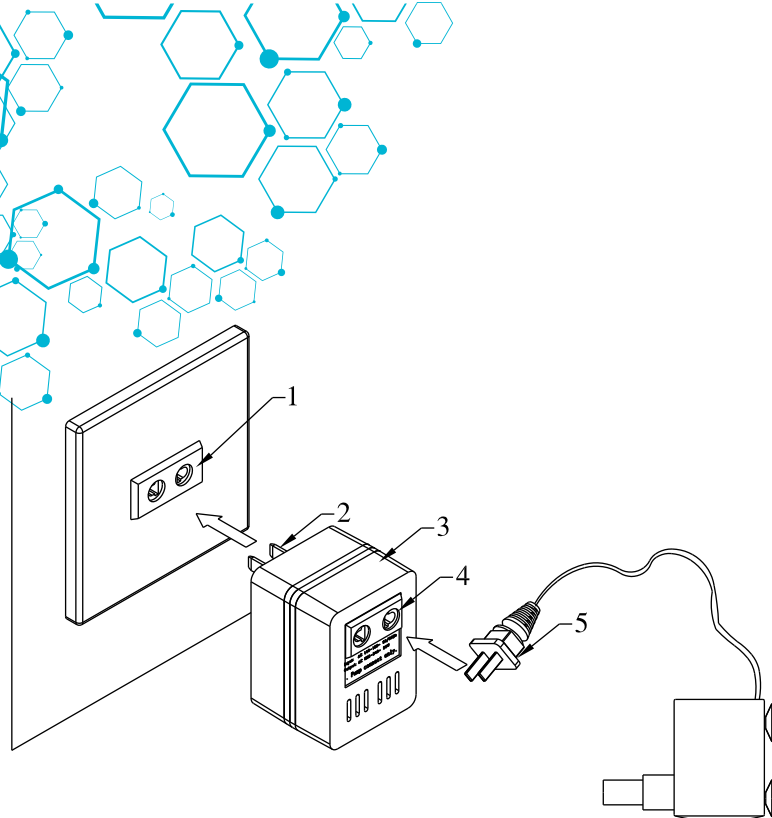
Please carefully check the joint at the gas entrance!

The gas will pass a filter and enter the chamber after the grains that's are larger than $0.3\mu\text{m}$ are being sieved. The sieving ratio is 99.998%, and the blower mixes the inputting gas and air inside.

CO2 gas should be a high pure food-class gas.

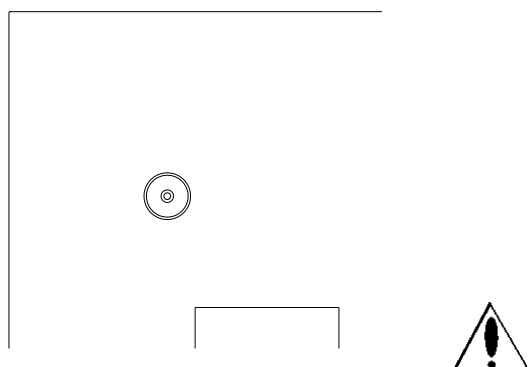
- **Door Switch:**

There is a switch at the back of the glass door. This switch will cut the gas supply and the heating system to prevent the inputting gas from overheating. All the display will flash until the door is closed. If the door remains open for 5 minutes, the equipment will give out an alarm. The outer door can only be closed when the glass door is closed and gastight.



Electric Suction Pump

1. Power jack
2. Alternating current adapters plug
3. Alternating current adapter (input: 110-120V~ 50/60Hz ,Output: 220-240V~ 30W)
4. Alternating current adapters jacket
5. Pump



Picture 7: Pressure Compensation Hole

■ **Press Compensation:**

The press compensation hole prevents the abnormal press when the gas enters and assimilating of air when the glass door is open (see Picture 7).

The equipment should be placed with good compensation to ensure the gas letting by valve can be cleaned in time.



Micro Control System

The System includes the following separated control function:

a) Data Control:

Set Range:

- Temperature : 5.0°C...50.0°C
- CO₂ : 0.0%...20.0%

b) CO₂ Zeroing

Adjust the CO₂ testing system

c) Supervisor:

- Door Control
- Wrong Message
- Malfunctions Restoration
- Sources of Malfunction

d) Special Function

- Buzzer: On/Off
- Gas Supply: On/Off
- CO₂ Adjusting
- Set Point: Lock
- Heating Mode: Slowly/Normally
- Door Heating: On/Off



a) Data Control:

■ Temperature

A Pt1000 resistance of Micro Control system controls the chamber temperature.

■ CO₂ Control:

In order to keep the pH value of the samples stable, the concentration of CO₂ in the chamber should be controlled. The concentration of CO₂ depends on the expected pH value and the content of buffer solution of NaHCO₃ in the incubation medium. The measure of CO₂ is a continuous process based on the thermal conductivity of the inner chamber. Thus, the input of CO₂ will cause the change of the thermal conductivity inside the chamber and form a signal indicating that there is a direct ratio between thermal conductivity and concentration.

b) Self-adjusting of Measuring System

Self-adjusting of Measuring System

The TC sensor will drift over time and become less accurate. The Auto-Start function will do self-adjusting to the measuring system when the temperature and humidity both reach steady state. The process takes 15 hours if it is started at room temperature.

Suggestions : Do AUTO-START every six weeks or whenever the temperature is changed!

c) Supervisor Function:

• Door Control:

All the actual values displayed will flash until the glass door is closed. If the door is left open for 5 minutes then this will be considered as a malfunction, as a result a source of malfunction will be given out.

• Malfunction Identification:

Micro Control System supervises all the data and possible malfunctions. All the SET values have a range, and the equipment will give an alarm together with the wrong message if the actual value is out of the range.

• Error Range:

- Temperature: $\pm 0.5^{\circ}\text{C}$
- CO₂: $\pm 1.0\%\text{CO}_2$

• Wrong Message:

Each malfunction identified by Micro Control System has a special source that will help you recognize the reason of malfunction.

The radiation digital tube will flash when malfunction occurs to inform you the situation, and if the buzzer is connected, you will also hear sound signal. If you keep pressing **[[i]]** key, you will get the source of malfunction on the display, and if there is no faults, it will display **[- - -]** .



- **Attention:**

Please press **[[i]]** key to get the source at first when malfunction occurs.

Following actions may interrupt wrong Message:

- Change the SET value
- Switch on/off the equipment

■ **Source Table of Malfunction:**

Source of Malfunction	Possible Reason	Solutions
99 Glass door is open	Glass door is not closed	Close the door
100 Temperature too low (Set point)	Door heating is switched off	Switch on the door heating (Function 5)
101 Temperature too high (Set point)	Surrounding temperature too high	Switch off the door heating (Function 5)
200 CO ₂ too low (Set point)	CO ₂ not connected CO ₂ is used up Low press of CO ₂ entrance	Connect the gas Replace the CO ₂ bottle Adjust the press to 1bar
201 CO ₂ too high (Set point)	High press of CO ₂ entrance	Adjust the press to 1bar

d) Special Function:

Adjusting the functions on Page 20.

Choose the following functions by **[[cal]] + [[▼]]** or **[[▲]]**

- Buzzer: On/Off
- Function 1:

You will hear a sound signal when malfunction occurs if the buzzer is on.
Switch off the buzzer: "Silent".

Default set: Buzzer is on

- Gas supply On/Off
- Function 2:

The gas source will be cut off if you choose "Gas OFF", and the green diode "Gas" will go off.

Default set: Gas On; the green diode "Gas" lights when the gas enters.

- CO₂ zeroes
- Function 3

If the warp of CO₂ display is too large, the function allows manual zeroing CO₂.

- Lock the SET point:
- Function 4:

This function allows you lock the SET point of temperature and CO₂ SET value and these points will not change when the equipment is wrongly operated.

Default set: Unlocked



- Door Heating: On/Off
- Function 5:

The main heating system allows the equipment working at a temperature that is 8°C higher than the surrounding. If you want to operate at a temperature that is 5°C higher than the surrounding, you can simply switch off the door heating system. But condensed water will form on the glass door.

Default set: Door heating system on.

- Heating Way: Normally/Slowly
- Function 6 :

The two different heating ways ensure the equipment working normally at different temperature. The Slowly Heating Way is suitable for high-temperature situation. The Normally Heating Way is suggested.

Default Set: Slowly Heating

- Operational Way: Default Set
- Function 7 :

This Set ID to test the function of the incubator, please set to 1.

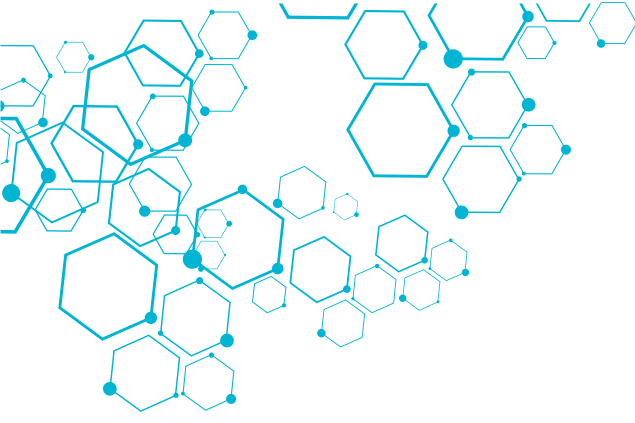
Default Set: 1

- Operational Way: Monitoring the surrounding temperature
- Function 8 :

Monitor the surrounding temperature to make the temperature inside the chamber steadier.

Default Set: Monitoring the surrounding temperature





Overheat Protection

- **Temperature Limit Controller (TLC):**

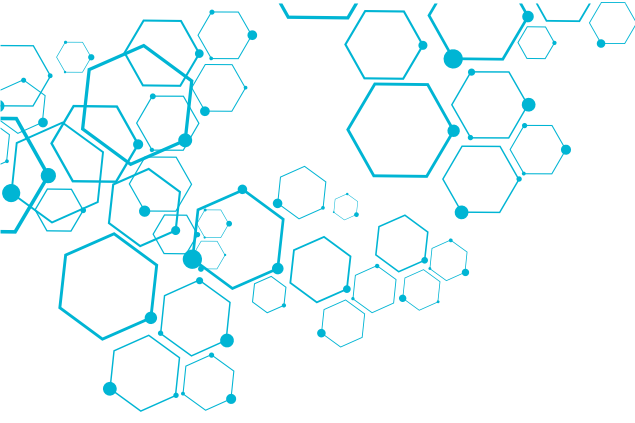
There is a separated TLC to protect the incubator.

When the temperature control circuit is unmanageable, the TLC will control the power in case it is 1.5°C higher than the set value.

The red light (over-temp) will be lit when the TLC responds.

If the TLC is in charge of the controlling, please refer to the source table of malfunction to find out the reason.





Placing Position and Installation

Open the box and take out the components.

- **Positioning:**

The incubator must be put in an irremovable place.

Avoid direct radiation from the sun.

The placing position should stay dry and the surrounding temperature cannot be higher than 30°C (18°C-30°C is the most suitable).

Keep the equipment at a level place and the bracket should be shake resistant and apyrous.

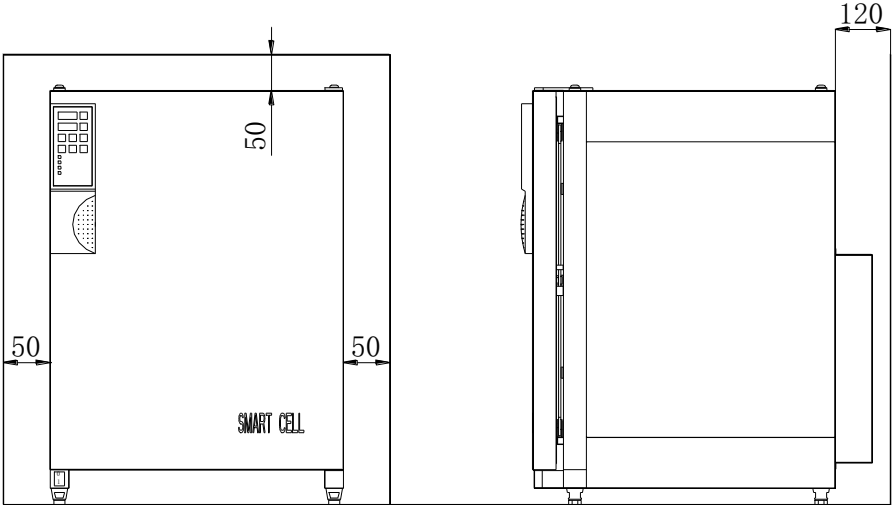
CO₂ is needed when the incubator is working, as CO₂ is also harmful to health the incubator must be put in a position with good ventilation. The gas discharged from the back panel must be immediately carried off.

The equipment cannot work without a ventilation device. Therefore if several pieces of equipment are in the same room or the equipment is placed at the bottom of the lab, an additional ventilation device is needed.

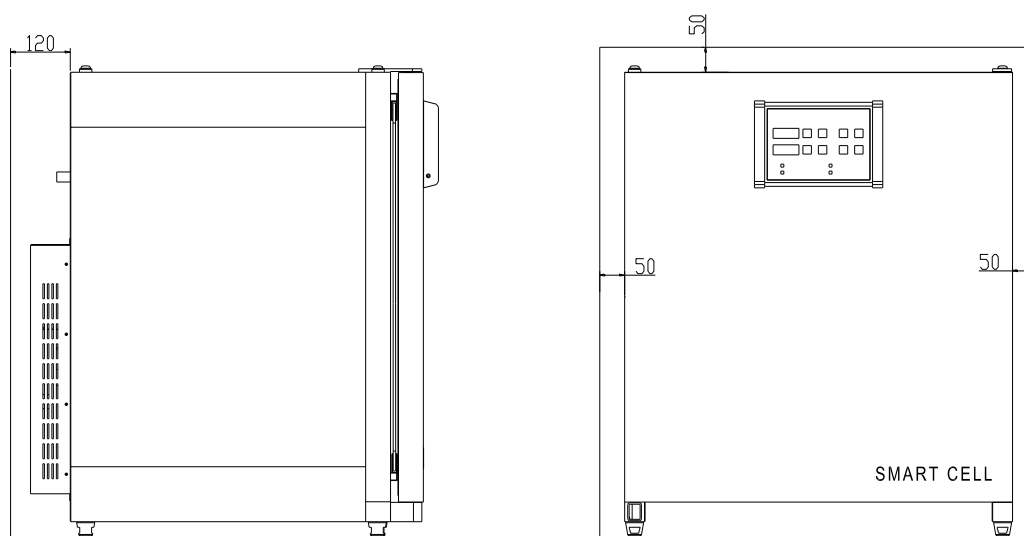
For the detail of gas releasing, please refer to the appendix.

- **Space:**

There should be some space left between the equipment and the wall or other instruments. (Refer to picture 8, 9)



Picture 8: Space between the HF90 incubator and the wall (mm)



Picture 9: Space between the HF240 incubator and the wall (mm)

The press compensation hole at the back panel cannot be jammed.

- **Stacking:** (See picture 11 P.31, picture 12 P.32)

- **Installation and Connection of Gas Source:**

The correspondent-connecting interface is at the back of equipment (See picture 6 P.10). The connecting pipe is included with the unit.

The gas entering the equipment should first pass a reduction valve to reduce the press to 1 bar. The press of 1bar cannot be changed for safety reason.

- **CO₂:**

Connect the reduction valve to the equipment again.

- **Attention:**

CO₂ gas should be food class and its purity is at least 99.5%. CO₂ Cylinder with catalytic converter is not allowed.

The sensor with high sensitivity is used in this incubator, and it cannot be used under electromagnet interference (e.g. mobile phone).

- **Put through the Main Power:**

Please ensure the power supply matches the power written on the nameplate before putting through the power.

There is a grounded power cable together with the incubator. The main power needs 2 4A fuses.



Startup

The surrounding temperature is at least 8°C lower than the SET value.

- Keep the outer door and glass door open.

Distilled water used:

- Pour the distilled water into the pool (approach the room temperature)

Input Quantity: 3L

Avoid overflow during the inputting.

Ensure the humidity inside the chamber will not change.

- Open the cutoff valve of the bottle
- Switch on the main power

- The green light is on
- [888] will be displayed for about 40s.
- Regular Self-checking
- Actual value will be displayed after Self-checking.

▪ Adjust the SET Point:

Keys used: [°C] , [▼] / [▲]

- Press and Hold [°C] key to adjust the [°C] value:
- Press and Hold [%CO₂] key to adjust the [%CO₂] value:

- Display the value being set last time
- The last number of the display flashes
- Set the expected value by [▼] or [▲] key, and the value will be stored after releasing the SET keys and the actual value will be again displayed.

▪ Default Set:

Temperature: 37.0°C
CO₂: 0.0%

Attention!
Only **air gas** can be in the chamber.

AUTO-START

- Press and Hold the [auto-start] on the control panel for 10s.
 - "OPEN DOOR": The temperature display panel will show [OPE] , "%CO₂" display panel will show [dor] , and open the outer door and glass door for about 60s.



- The Auto-start mode is activated and the “%CO₂” display panel will show $[[0.0]]$ and the “°C” display panel will show the actual value after closing the doors.
- The “GAS” light is off and “AUTO-START” light will be on.
- Close the doors.

Attention:

Heat the equipment to the SET value and establish the relative humidity.

After regular AUTO-START:

- “Auto-start” light will be off
- Actual values displayed

The equipment will continuously input the gas until it reaches the SET value.

- The equipment can now be used in incubating work.

Special Functions:

$[[cal]]$ and $[[\blacktriangledown]]$ or $[[\blacktriangle]]$ keys

You can choose and set the special function by $[[\blacktriangledown]]$ and $[[\blacktriangle]]$ key, Press and Hold the $[[cal]]$ key.

“°C” will display the Function source $[[1]]$, press $[[cal]]$ again after releasing it then the “%CO₂” display window will show the actual mode. The mode can be changed by pressing $[[cal]] + [[\blacktriangledown]]$ / $[[\blacktriangle]]$.

Function Name	“°C” Display Window	“%CO ₂ ” Display Window	Function	Default Set
1 Buzzer	$[[1]]$	$[[A 1]]$ $[[A 0]]$	On Off	On
2 Ventilation	$[[2]]$	$[[G 1]]$ $[[G 0]]$	On Off	On
3 CO ₂ Zeroing	$[[3]]$	$[[.0]]$	CO ₂ Zeroing	
4 Opening Set	$[[4]]$	$[[S 0]]$ $[[S 1]]$	Not Opened Opened	Opened
5 Door Heating Switch	$[[5]]$	$[[d 1]]$ $[[d 0]]$	On Off	On



6 Heating Way	[[6]]	[[h 0]] [[h 1]]	Slowly Normally	Slowly
8 Monitor the Surrounding Temperature	[[8]]	[[P 1]] [[P 0]]	Not Monitoring Monitoring	Monitoring

Please refer to Page 14 - Page 15 for details.

■ **Attention:**

■ **Temperature:**

Please restart AUTO-START for calibration when the setting temperature is over 1°C, which make the unit works precisely.

■ **CO₂ Comparison**

If the value of CO₂ concentration measured is different from the value shown on the [%CO₂], you can adjust CO₂ zeroing manually. The unit will recover to the original CO₂ zeroing after next AUTO-START operation.

■ **Example for Reference:**

CO₂ display value: 7.0% CO₂

CO₂ actual value: 6.2% CO₂

- Choose function No. 3 by [[cal]] key and [[▲]] key.
 - Release the [[cal]] key
 - Press the [[cal]] key again
- The [[°C]] displays [[3]] flashing.
- “%CO₂” display window shows [[.0]]
- Input the actual CO₂ concentration value into the temperature display window by [[cal]] + [[▼]] / [[▲]] .
 - Release the [[cal]] key.
 - Press [[i]] to confirm.

CO₂ will display the modified concentration. If the actual value is higher than the SET one, please keep the door open for one minute to let the extra gas out.

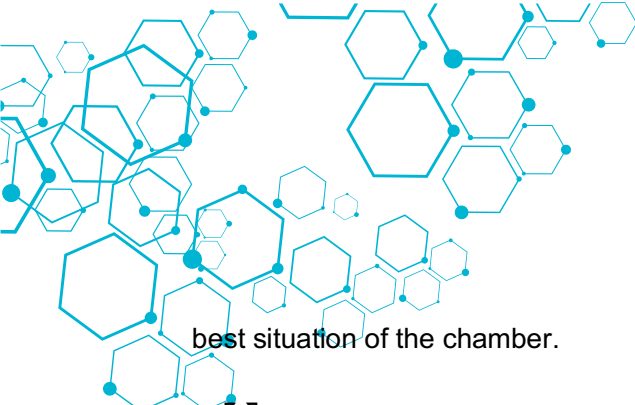
■ **Important:**

※Please pour out the water in the pool and dry the chamber if the equipment is not going to be used for a period of time.

※Do not switch on/off the equipment continuously.

※Please keep the door closed and try to shorten the opening time when necessary to ensure the





best situation of the chamber.

■ **[[i]] key**

If any malfunction occurs during work time, the corresponding display will flash, and if the buzzer is connected, you will hear a sound alarm at the same time. You can know the reason of malfunction by pressing the **[[i]]** key, and the display window will show the source of malfunction. (Refer to the table of source of malfunction page 22).



Table of Source of malfunction

Please check the following table to solve the problem more efficiently.

Source of Malfunction	Reason of Malfunction	Solutions
99 Glass door is Open	Glass door is not closed	Close the door
100 Temperature too low (SET point)	Door heating is switched off	Switch on the door heating (Function 5)
101 Temperature too high (SET point)	Surrounding temperature too high	Switch off the door heating (Function 5)
200 CO ₂ too low (SET point)	CO ₂ gas not connected CO ₂ bottle is used off CO ₂ entrance press too low	Connect the gas input Replace the CO ₂ bottle Adjust the entrance press to 1bar
201 CO ₂ too high (SET point)	CO ₂ entrance press too high	Adjust the entrance press to 1bar

- Please contact the maintaining engineer if the table above cannot solve the problem.

Malfunction that cannot be shown by the equipment

Malfunction	Way of Checking
* Equipment does not heat	- Check the SET value
* No gas entrance	- Check the diode GAS. - Check if the input is switched off. - Check the SET value
*Buzzer does not give out alarm when malfunction occurs.	- Check if the buzzer is switched on. Please check the special function.
*SET value cannot be changed	- SET point is locked. Please check the special function.
*There is too much water on the glass door.	- Check if the door heating is switched on.

Switch Off:

- Switch off the main power
- Switch the gas reduction valve



Disinfection, Cleanliness, and Examine

Weekly Checks:

- Check the water level of the pool.
- Check if the entrance press is 1bar.

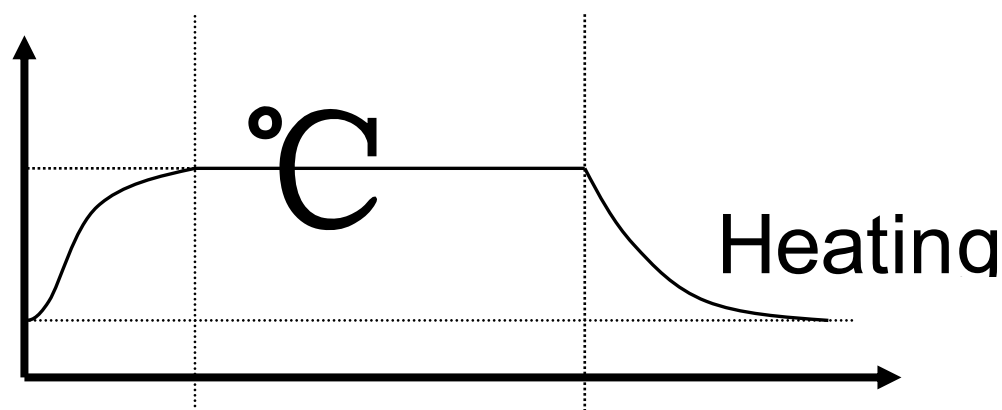


Warning: Hot surface in Disinfection mode, don't touch or open the door.

Clean the Chamber with 90°C moist heat disinfection (suggestion : once every 2 months)

- Switch off the Incubator
- Open the glass door
- Dry the chamber
- 90°C moist heat disinfection

The whole procedure of 90°C moist heat disinfection.



Picture 10: The procedure of the 90°C moist heat disinfection

How to do a 90°C moist heat disinfection:

- Open the outer door and glass door, **and take out all the materials inside the incubator!**
- Dry and clean the incubator, and add 200 ml distilled water.
- Close the glass door and outer door. Turn on the power supply.
- Keep pressing the **90** button on the display panel until the green light "90°C" on the display panel shows.
- Wait for about 10s, the "°C" display window will show **[OPE]** and "%CO₂" display window will show **[dor]**. **Please check if there is anything left inside the incubator!** Please do this after opening the outer door and glass door.
- After keeping open for one minute, the "%CO₂" window will show **[(-25)]** and "°C" window will show the actual value of temperature and flash, which indicates the disinfection procedure will last for 25 hours.
- Please close the doors!
- The equipment now begins the disinfection.



Disinfection, Cleanliness, and Examine

Explanation of 90°C moist heat disinfection.



The whole procedure is divided into three phases:

1. Heating ---The heating procedure will increase the temperature to 90°C, and the procedure will last for 2 hours (based on surrounding temperature)
2. Sterilization---The temperature has reached 90°C, and the sterilization will last for 9 hours.
3. Recovery---The equipment will return to the incubation mode (decrease the temperature), and the procedure will last for 14 hours.

Note: The procedure of disinfection may last for a longer time in the conditions where the heat is difficult to emit. If the procedure is over 25 hours and the temperature has not yet recovered to 37°C, then “%CO₂” will always display [(-4)] (4 hours remains). At that time, operator can terminate the disinfection manually by pressing and holding the [90°C] key until the light goes out, which will not affect the disinfection.

Input 3L distilled water and do “SUTO-START” after disinfection! Incubation can only be started after “AUTO-START”!

The “°C” window displays the actual value of temperature while the “%CO₂” window has three displays show the remaining time and remind you the current phase.

Phase 1, the cursor of the “%CO₂” window is climbing in ①.

→ →

E.g. : [(-25)] [(-25)] [(-25)] ;

Phase 2, the cursor of the “%CO₂” window is in the middle and flashing in ②.

→

E.g. : [(-23)] [(-23)] ;

Phase 3, the cursor of the “%CO₂” window is descending in ③.

→ →

E.g.: [(-14)] [(-14)] [(-14)] .



Disinfection, Cleanliness, and Examine

■ Warning:

Please do the cleaning and disinfecting before informing the maintenance engineer.

As the rust preventative disinfectant with chlorine ingredient is corrosive to metals, it is absolutely prohibited to use it to disinfect either interior or exterior parts of any equipment.

In the event that the rust preventative disinfectant with chlorine ingredient is used to disinfect either interior or exterior parts of any equipment, it is necessary to rinse out the disinfected parts with aseptic distilled water and swab up the equipment prior to further utilisation.

■ Maintenance

We can assure the normal condition of the equipment only when it is maintained or improved by engineers authorized by Envair Lab. The equipment should be overhauled every a certain time to ensure the normal condition.

Suggestion : The equipment needs an annual check to keep it in normal working condition.

Each Incubator is strictly checked before being putting into use. Please contact the engineer of Envair Lab if you want to keep it at top precision.

Condition for Normal Use :

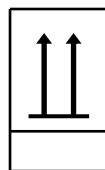
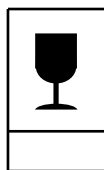
- A. Ambient temperature : 18°C-30°C
- B. Relative humidity : <80%
- C. There are no violent shakes.
- D. No corrosive gases near the equipment.
- E. No effects from sunshine or other heat or cooling source.

Envair Lab reserves all the rights of updating and improving of the product.

Warranty

- The warranty period is one year after purchasing.
- Our company will not take responsibilities if the malfunctions are caused by improper use even if it is within the warranty period.
- Our company will be responsible for the maintenance after the warranty period, but a quotation would need to be requested.
- Please show the related materials to the authorised personnel.

Protection Signals :



Avoid shaking, knocking and water damage during the transporting.

Condition of transportation and restoration : Temperature : -40°C ~ +55°C, humidity : ≤95%



Adjust the Data:

The equipment should be adjusted regularly to ensure the best working condition. The user could adjust the equipment under the help of professional personnel at least once a year.

Condition of Temperature Adjusting :

Put a thermometer with the minimum scale as 0.1°C into the center of the incubator. Wait for another 2 hours after the temperature value is steady, and note the actual value.

Way of Temperature Adjusting :

- Open the outer door, observe the temperature inside the chamber and note it down.
- Close the outer door and press and hold the **[[cal]]** key for more than 5s.
- Release the **[[cal]]** key when the flashing “cal” appears on the display window.
- The “%CO₂” window will display the temperature value if you press the **[[°C]]** key.
- Adjust the temperature according to the noted actual value by pressing **[[▲]]** or **[[▼]]** key.
- Confirm by pressing **[[i]]** key.
- Repeat the above steps until the precise temperature.

Condition of %CO₂ adjustment :

The temperature and humidity of incubator is steady and the conditions remain the same for more than 2 hours. The concentration of CO₂ should be 0%.

%CO₂ zero adjusting :

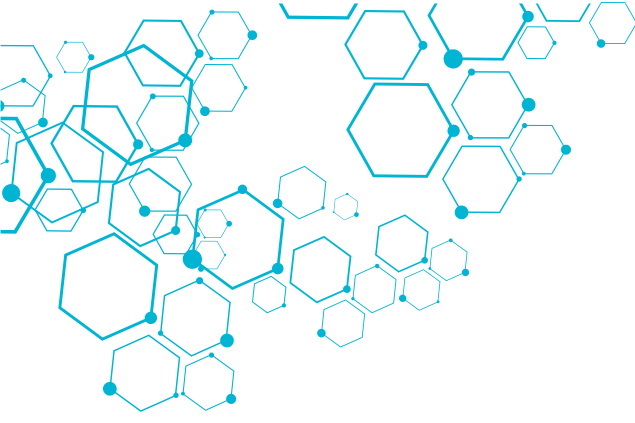
- Press **[[%CO₂]]** + **[[▼]]** to set “%CO₂” to “.0”
- Press and hold **[[cal]]** key for more than 5s
- Release the **[[cal]]** key when “CAL” is flashing in the temperature display window.
- Press **[[AUTO-START]]** once to make “0.0” appear in the window.
- Release **[[AUTO-START]]** and press **[[i]]** until the “0.0” is flashing in the window.
- The procedure will be completed after two or three minutes.

Adjust the concentration of %CO₂ :

(The concentration should be higher than 2%, usually is 5%-7%)

- To set the concentration of CO₂ 5.0%. Wait for more than 0.5 hour for stabilisation, then measure the real concentration.
- Press **[[cal]]** for more than 5s
- Release the **[[cal]]** key when “CAL” is flashing in the temperature display window.
- Press **[[%CO₂]]** once and the concentration will be displayed in “%CO₂” window.
- Adjust the concentration by pressing **[[▲]]** or **[[▼]]** according to the actual value.
- Confirm by pressing **[[i]]** key.
- Repeat the steps above until the value is according with the precision.





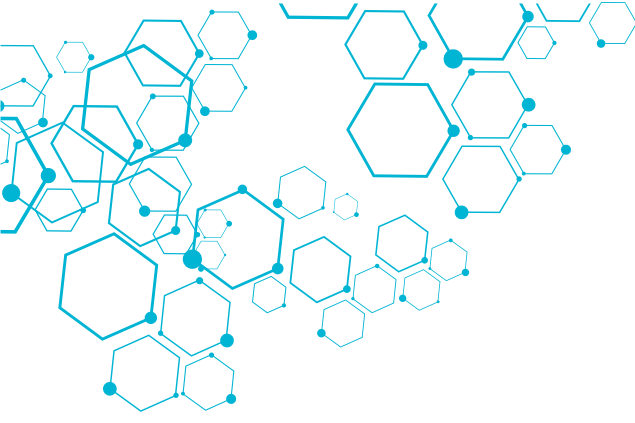
HF90 Technical Data:

	DATA	UNIT	
<u>Size</u>			
Shell	Width	637	mm
	High	909	mm
	Depth	762	mm
Chamber	Width	470	mm
	High	607	mm
	Depth	530	mm
<u>Cubage</u>			
		151	L
<u>Shelf</u>			
Number of Shelves:			
	Standard	3	Floor
	At most	10	Floor
Size			
	Width	423	mm
	Depth	445	mm
<u>Net Weight</u>			
		85	kg
<u>Electric Data</u>			
	Rated input voltage	110	V~
	Rated Power	0.65	kW
	Rated Power Frequency	60	Hz
	FUSE	250V AC F6.3 A	

<u>Digital Temperature Control</u>		
Range	+5—50	°C
Power Cost at 50°C	0.1	kW
Chamber Deviation (DIN 12880)	±0.4	°C
Transient Deviation (DIN 12880)	±0.1	°C

	DATA	UNIT
<u>Digital CO₂ Control</u>		
Set Range	0—20	%CO ₂
Set Precision	±0.1	%CO ₂
Recovery Time	About 1	%CO ₂ /min
Gas Source	About 3.7	L/min
<u>Humidity</u>		
Relative Humidity	>95	%
Coat		
Texture Paint	9002	RAL
<u>Data of Gas Source</u>		
Filter: Ratio	99.998	%
Grain	>0.3	µm
Strained Purity Ratio	99.5	%
At Least Entrance Press	1	bar
<u>Yawp</u>	< 60	dB (A)
<u>Capacity of Distilled Water</u>	3	L





HF240 Technical Data:

	DATA	UNIT	
<u>Size</u>			
Shell	Width	780	mm
	High	944	mm
	Depth	820	mm
Chamber	Width	607	mm
	High	670	mm
	Depth	583	mm
<u>Cubage</u>	240	L	
<u>Shelf</u>			
Number of Shelves:			
	Standard	3	Floor
	At most	12	Floor
Size			
	Width	554	mm
	Depth	503	mm
Net Weight	98	kg	
<u>Electric Data</u>			
Rated input voltage	110	V~	
Rated Power	0.735	kW	
Rated Power Frequency	60	Hz	
FUSE	AC250V F6.3 A		

<u>Digital Temperature Control</u>		
Range	+5—50	°C
Power Cost at 50°C	0.1	kW
Chamber Deviation (DIN 12880)	±0.4	°C
Transient Deviation (DIN 12880)	±0.1	°C

	DATA	UNIT
<u>Digital CO₂ Control</u>		
Set Range	0—20	%CO ₂
Set Precision	±0.1	%CO ₂
Recovery Time	About 1	%CO ₂ /min
Gas Source	About 3.7	L/min
<u>Humidity</u>		
Relative Humidity	>95	%
Coat		
Texture Paint	9002	RAL
<u>Data of Gas Source</u>		
Filter: Ratio	99.998	%
Grain	>0.3	µm
Strained Purity Ratio	99.5	%
At Least Entrance Press	1	bar
<u>Yawp</u>	< 60	dB (A)
<u>Capacity of Distilled Water</u>	3	L

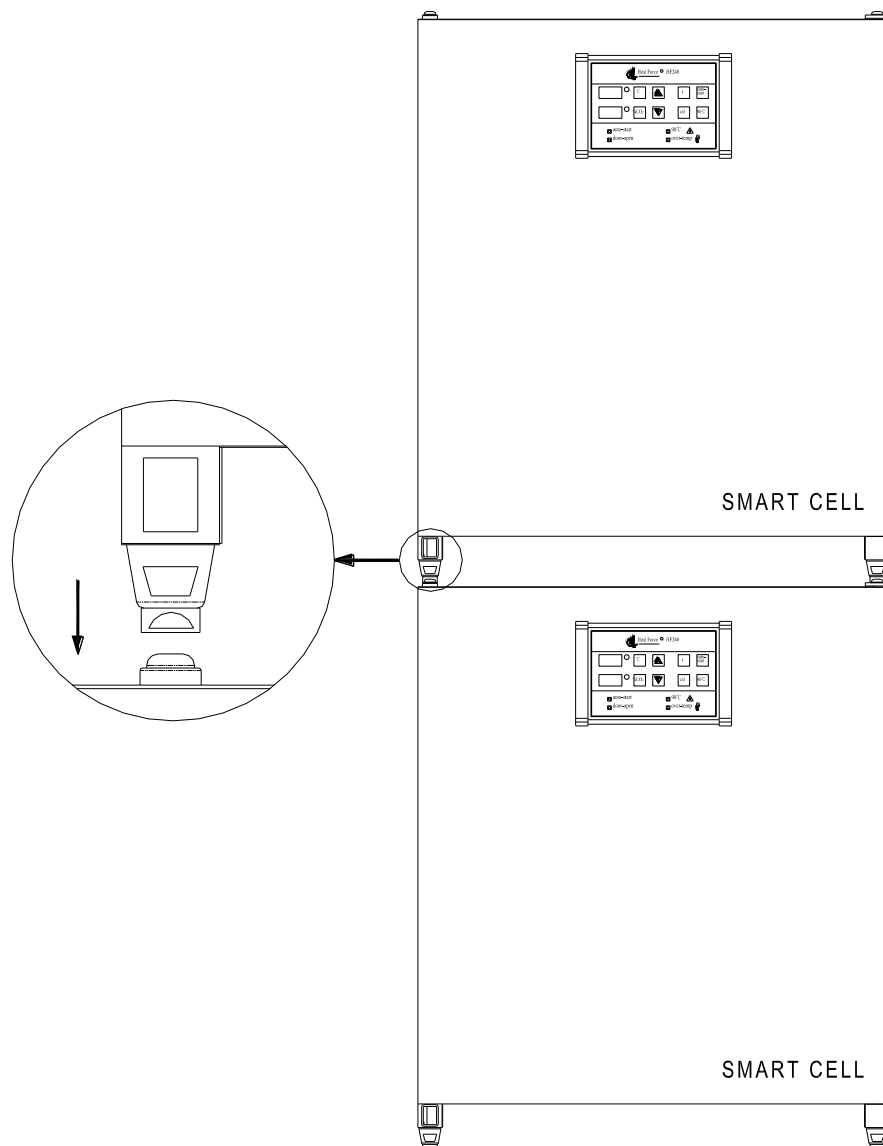


Appendix

- The stacking of incubators (refer to picture 11 and 12).
- Capacity of gas under normal and abnormal condition.
- Appendix of CO₂ ventilation (refer to picture 13 P.34).
- PH value based on the concentration of CO₂ (refer to picture 14 P.34).

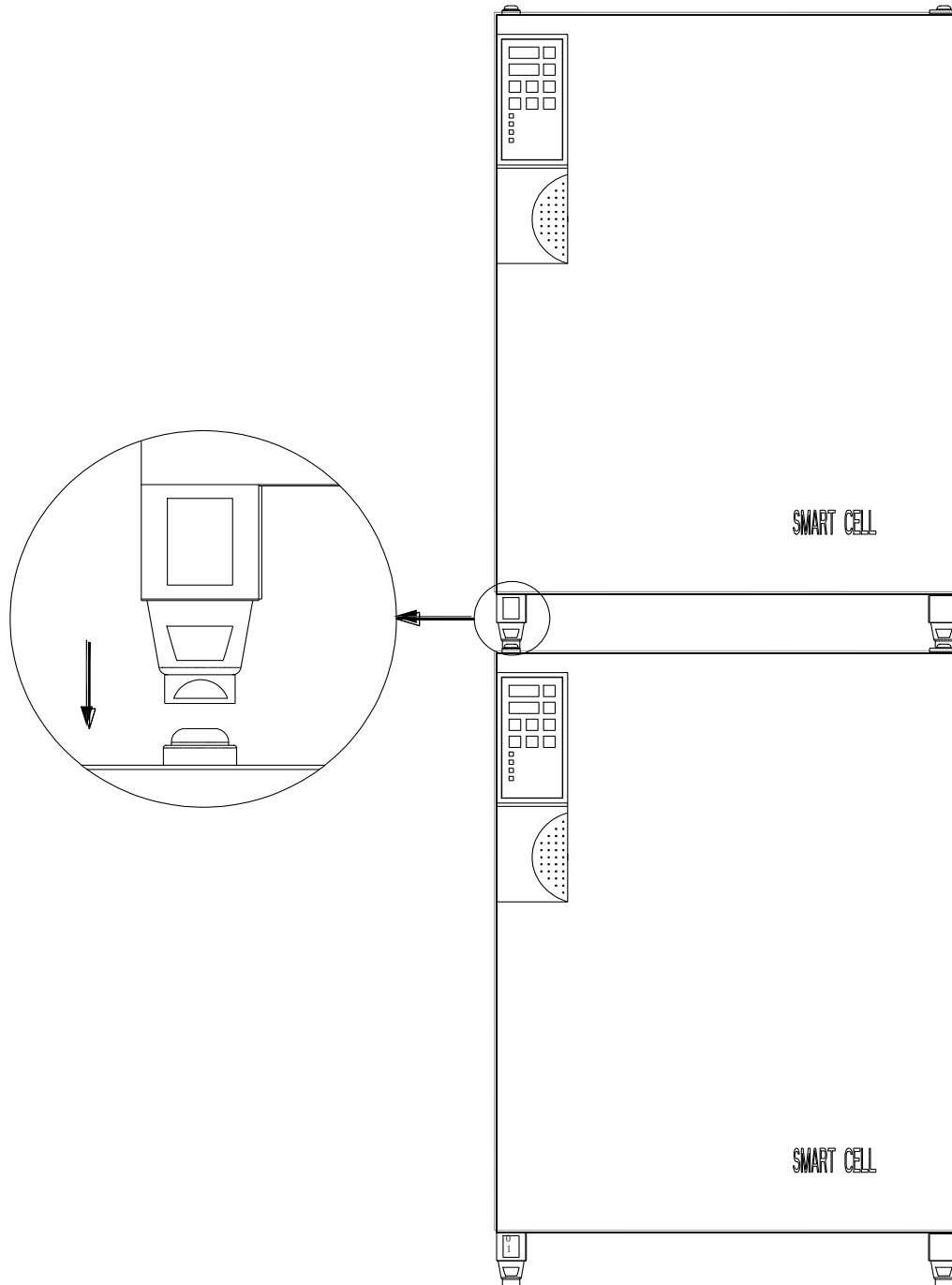


Stacking Picture of HF240



Picture 11 : Stacking figure of **HF240**

Stacking Picture of HF90



Picture 12 : Stacking Picture of HF90

■ Stacking of Incubators (refer to Figure 11 and 12)

Additional ventilation is needed if there are several equipment's in one room or the equipment is installed at the ground floor of the lab.

The two equipment's can be stack together by the piling feet, which are riveted on the top of the equipment.

Capacity of gas under normal and abnormal condition.

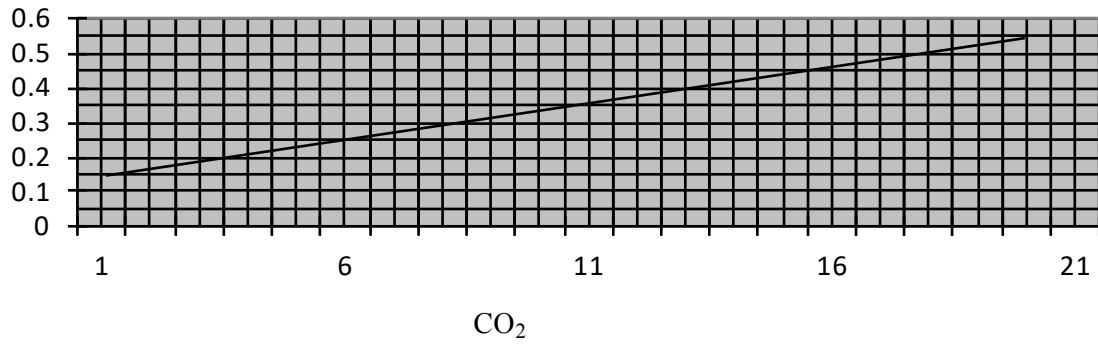
- (1) Gas required: The necessary gas quantity for SET point
- (2) Gas cost: The gas quantity at max SET point
- (3) Malfunction: Gas output at the max SET point and in case of sound and light alarm (2h when malfunction).
- (4) Runoff the gas: The max gas input through the capillary per hour when the valve is open

Type of Gas	Press of Entrance	Capillary	Excretion of Gas (*4)	Requirement of Gas (*1)
CO ₂	1bar	0.65mm	222L/h	~ 50L

Type of Gas	Cost of Gas (*2)	Excretion of Gas when Malfunction (*3)	High-point
CO ₂	~ 0.52L/h	444L	5L/m ³



★ Consume of CO₂ (door closed)



Picture 13 : Consume of CO₂ (door closed)

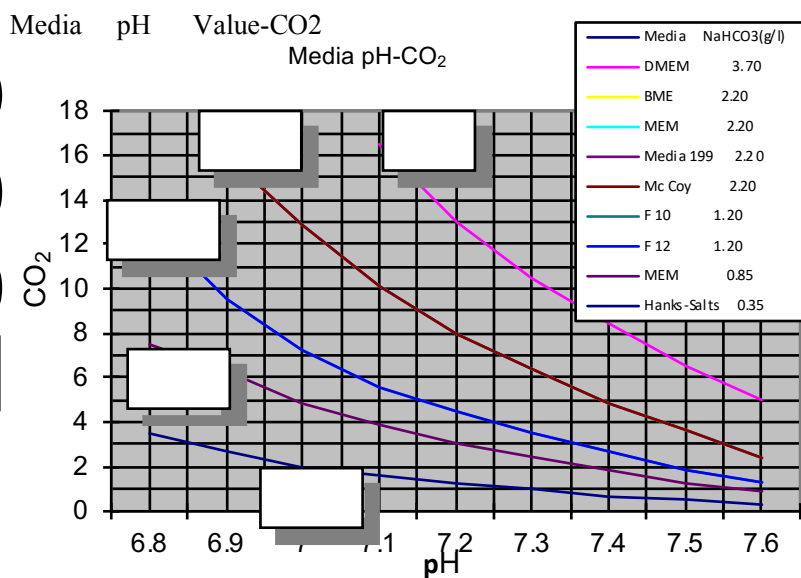
The pH value of incubation liquid

The pH value is affected by the concentration of CO₂ inside the incubator.

The following picture shows the relationship between pH value and CO₂ concentration.

CO₂ COST

Picture 14 : The pH value-concentration of CO₂ inside the incubator



2.20

1.20

Quality Policy:

- ★ Envair Lab is entitled to make alternation to the performance of the machine at any time without appropriate notification.
- ★ If there is something wrong with our products, please contact a member of our company.
- ★ Envair Lab Scientific Equipment Co., Ltd. is holding the unit of Heal Force trademark.

