





# Orbital Shaking Incubator Model 1102 - 2102

Cod. 5312094 Cod. 5312095

**USER MANUAL** 

Safety instruction! Please be sure to follow the instructions, which are really important for your safety.



Warnings against injury and damage.

1. The electrical supply circuit to the incubator must confirm to all national and local electric codes. Check the serial-data plate for voltage, cycle, phase and amperage requirements before you connect the unit.

2. Only use grounded power source (outlet) to avoid an electric shock or fire, and it is recommended that the equipment has an unobstructed access to a dedicated power source.

3. In case of a problem, do not attempt to repair the product yourself. Do not open the power box to avoid electric shocks.

4. Do not pull out the plug when the unit is in use. Never drag on the wire to unplug the unit.

Danger!

5. This equipment can sustain a maximum of  $\pm$ 10% nominal voltage fluctuation; Otherwise a power stabilizer is needed.

6. A surge protector is recommended to avoid power-related faults.

7. In case of malfunction or burning smell, the unit must be unplugged immediately. Use a circuit breaker to cut off the power supply. Continuance of abnormal state will result in fire caused by overheating.

8. The electric power supply must be cut off in following situations:

8.1.-When opening the door of electrical power box without cutting off power supply might result in electric shock.

8.2.-When replacing the fuse. Replacing the fuse without cutting off the power supply will probably result in electric shock.

8.3.-When a malfunction occurs, mishandling will result in further damage of the equipment or accidental injury to the user(s).

8.4.-If you do not use the unit for a long period of time.

9. Never touch the glass door and/or inner chamber when the incubator is hot.



#### Attention! Instructions for optimal performance

- 1. Before starting your equipment, the unit must be placed horizontally on a solid, flat floor, and elevated and leveled with four foot blocks.
- 2. The incubator needs even heat lost on all surfaces in order to maintain small internal temperature variations .As a result, a minimum of 20 cm must be allowed between the rear and sides of the incubator to any obstructions.
- 3. Do not locate the unit exposed to direct sunlight or near heating /cooling ducts.
- 4. The unit must be kept away from electromagnetic interference sources.
- 5. Flasks placed inside the shaking incubator should be placed to avoid (as much as possible) imbalance on the shaking platform
- 6. Slam the door(s) will probably leads to damage of the equipment.
- 7. When in operation (the platform is still moving), do not open the lid (too much or too long) as this might affect the temperature inside.
- 8. The incubator must be kept away from volatile, flammable, explosive liquids or gases
- 9. Please keep the chamber clean. Regular cleaning is required.

#### Extra for refrigerated units:

- 10. After transport of this shaking incubator –DO NOT USE IT for at least 24 Hours, unless you are a 100% sure that the unit has been moved in an upright position only.
- 11. Each refrigerated unit is equipped with a dripping water tray for condensation collection, locate it underneath the right back of the unit where the cooling compressor is. Empty it on a regular basis if cooling system is running continuously.
- 12. If the incubator is continuously used at low temperatures, condensate can occur inside of the incubator. You might need to wipe this out, or-if possible-heat up the incubator to evaporate this small amount of condensation.
- 13. To extend the compressors life and to maintain an excellent performance of your refrigeration system, the condenser of the unit should be cleaned every month.



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### 1. Performance Parameters

- Both the interior and exterior are made of robust materials for lifetime operations. The inner chamber is made of high quality #304 stainless steel sheets, with 4 round coved corners. All exposed edges are de-burred to insure no sharp edges. The exterior is cold rolled steel finished with powder coated polyurethane finish, which is resistant to most chemicals and easily cleaned with mild household detergents.
- The shaking incubator's microprocessor control system uses fast responding PT 100 sensors which commands and executes a special control algorithm that energizes a solid-state switch to supply power to the heaters.
- The control electronics are protected trough a circuit breaker that may trip at 110% of loading rate, but will trip within 1 second at 150% of load rating.
- \* The compressor (in refrigerated units only) has an independent overload protection.
- \* CFC-free refrigerant which causes no damage to ozone layer.(Applies on ZWY-2/ZWF-2 models)
- \* Large double fold tempered glass window and fluorescent light, provide complete visibility of chamber interior.
- \* LCD display presents all actual and (pre)set parameters.
- ★ Electronic timer, from 0 500 hours, automatic stop, audio/ visual alarm.
- \* Password protection against unauthorized change of parameters.
- \* Audible and visual alarms for motor temperature and set point deviations
- \* Non-violate memory for set point retention after a power interruption.
- \* "Long-Life" brushless AC motor creates a smooth, quiet and uniformed shaking motion
- Option: unit equipped with RS-485 interface communication can be connected to local network so that remote data logging and control can be achieved via laptop/ PCs.

# 2. Technical Specifications

Model	1102	2102	
Volume (L)	330		
Shaking Mode	Orbital		
Temperature Range(°C)	A +5 to 60	4 to 60	
Temperature Accuracy	±0.1°C		
Temperature Uniformity	≤±1°C@37°C		
Stroke (mm)	Ø26		
Shaking Speed (rpm)	30-300		
Tray Dimension (mm)	734x458		
Flask Configuration	*Glass dimensions may reduce max. capacity		
50 ml	104		
100 ml	104		
250 ml	56		
500 ml	44		
750 ml	30		
1000 ml	24		
Inner Dimensions (mm) (WxDxH)	845x515x765		
Exterior Dimensions (mm) (WxDxH)	950x710x1370		
Packing Dimensions (mm) 1070x830x1540 (WxDxH)		0x1540	
Net/Gross Weight (kg)	225/265	235/272	
Power (W)	1050	1300	
Electricity	220-240Volt 50/60 HZ		
Approval	CE		

### 3. Control Panel











#### Time button:

Button to display the preset time and the status of the power-off recovery function. Press again to display the remaining time (if Timer is set). Press it to stop the acoustic alarm when needed



#### Refrigeration status button (Refrigerated unit only)

Button to display the current refrigerating parameter, defrost timer and the defrost period in turns.



#### Power button:

Hold this button for 2 seconds to turn the unit on/off the standby mode



#### **Temperature button:**

Press this button to display the actual temperature value and the set temperature in turns



#### Speed button:

Press this button to display the actual speed value and the set speed in turns



#### Start/Stop button:

Button to start or stop current operation



#### Increase button:

Press this button and the parameter will increase by one digit, the parameter will keep increasing while this button is held.



#### Decrease button:

Press this button and the parameter will decrease by one digit, the parameter will keep decreasing while this button is held .



#### Set/Confirm button:

Press this button to enter the menu of setting, press it at the end of the setting to save and exit..

#### Temperature alarm indicator:

ALARM When the temperature inside the chamber is deviated over the preset alarm limit , the indicator flashes and the alarm beeps



When the heater is connected with power supply, this indicator will be light. This indicator will twinkle when the real temperature close to the preset value

#### • COLD

HEATING

#### Refrigeration indicator:

Lights when the cooling system is switched on to cool down the inner chamber.



### 4. Preparation and Start-up

4.1 Before starting your equipment, the unit must be placed horizontally on a solid, flat floor, and elevated and leveled with four foot blocks. The foot blocks are provided to level as well as "fix" the unit firmly on the floor. To allocate the blocks in position, please do strictly follow the procedures:



4.2 Turn the main switch which is located on the right side of the unit, power is applied to the

Unit and the LCD display

-Incubator Shaker

-Pre-set Speed -Pre-set Time

-Pre-set Temperature

٩		$\bigcirc$
B		*
Incubator Shaker		

shows:

4.3 The screen in turns displays the operating parameter stored in the equipment: Preset temperature; Preset speed; Preset time; Real temperature.

And now, the microprocessor system has started controlling the temperature according to the preset value.



### 5. Control Mode & Clock Checking



- 5.1. Press "Set/confirm", press the "Increase" button to "1", then press the "Set/confirm" again. The screen shows the current control mode and current date & time.
- 5.2. Press "Set/confirm" to exit to the home page



### 6. Temperature Retaining Switch Setting



- 6.1. Press "Set/confirm", press the "Increase" button to "2", then press the "Set/confirm" again. The screen shows the current status of temperature retaining (Keep Temp Mode) function, press "Increase" or "Decrease" to change the setting.
- 6.2. Press "Set/confirm" to exit to the home page





#### Special Attention!

When the status is "on", the temperature will remain under control at its preset value even when shaking operation has been turned off manually or by timer. Otherwise, when the status is "off", the system will stop both shaking motion and temperature control when operation is stopped.

### 7. Temperature, Speed, Timer Settings



- 7.1. Press "Set/confirm", press the "Increase" button to "3", then press the "Set/confirm" again. The screen shows the current temperature preset value, press "Increase" or "Decrease" to change the value; press "Set/confirm" to save and switch to speed page, press "Increase" or "Decrease" to change the value, and press "Set/confirm" again to save and switch to the timer page, press "Increase" or "Decrease" to change the value if necessary. If Timer is set as "0", the unit will keep running continuously.
- 7.2. Press "Set/confirm" to exit to the home page





1. This unit is equipped with "door switch". The temperature control (main heater) will be temporarily disabled when lid is opened. Therefore, always close the lid in time to avoid exceeded heat loss.

2. The timer can be set within 0-9999mins, the unit stops running when timer is due. Acoustic alarm can be muted by pressing the "Time" button.

### 8. Date & Time Settings



- 8.1. Press "Set/confirm", press the "Increase" button to "4", then press the "Set/confirm" again. The screen shows the current time clock, press "Increase" or "Decrease" to change the time; press "Set/confirm" to save and switch to "year" setting page, press "Increase" or "Decrease" to set the year, and press "Set/confirm" again to save and switch to the "month" page, repeat the above steps to set "month" and "date".
- 8.2. Press "Set/confirm" to exit to the home page



### 9. Temperature & Speed Alarm Settings



- 9.1. Temperature and speed alarm is activated when temperature or speed is deviated over limit. The deviation alarm limit can be preset as below,
- 9.2. Press "Set/confirm", press the "Increase" button to "5", then press the "Set/confirm" again. The screen shows the current "temperature deviation" value, press "Increase" or "Decrease" to change the value; press "Set/confirm" to save and switch to "speed deviation" setting page, press "Increase" or "Decrease" to change the value.
- 9.3. Press "Set/confirm" to exit to the home page

	$\bigtriangleup \longrightarrow 5 \longrightarrow $	
	$\begin{array}{c} & \\ & \\ & \\ \hline \\ & \\ & \\ & \\ & \\ & \\ & \\$	
	$\xrightarrow{\bigtriangledown}$ Set Speed $\longrightarrow$ Deviation $\longrightarrow$ Exit	
	Special Attention!	
	1. Deviation alarms can only be activated when unit is running, and once actual temperature or speed has reached its preset value and stabilized for a certain period of time.	
2. Deviation alarm is activated when the actual parameter exceeds preset value $\pm$ preset deviation alarm value. The "indicator is lighted, but can be muted by pressing "Run/Stop" by		
	exceeds preset value $\pm$ preset deviation alarm value. The "Alarm" indicator is lighted, but can be muted by pressing "Run/Stop" button.	

### 10. Refrigeration & Defrost Settings

#### (Only for refrigerated model 2102)

This unit is equipped with automatic and manual defrosting functions. With proper settings of refrigeration function and auto-defrosting cycle, this unit can be used for continuous operation at low temperature settings. Please note defrosting function will only be activated when actual temperature at  $10^{\circ}$ C or below.



- 10.1 Press the "Set/Confirm" button, then press the Increase button to "6", next press the "Set/Confirm" button to display the preset refrigeration function on the screen, SV flashes. Press the "Increase" or "Decrease" button to switch the refrigeration function "On/Off".
- 10.2 Press "Set/Confirm" to confirm setting and enter the page of defrost timer setting, press "Increase" or "Decrease" to set the time interval between two defrosting cycles. Set range from 1-240 hours.
- 10.3 Press "Set/Confirm" to confirm setting and enter the page of defrost period setting. Press "Increase" or "Decrease" to set the time length of each defrost cycle. Set range from 1-24 minutes.
- 10.4 When setting is finished, press the Set/Confirm button to confirm and store the changed value.



#### 10.5 Explanation for setting auto defrosting cycle:

a) "Defrost Timer" is the time interval between two cycles. For example, if this is set as "6", the unit will defrost once every 6 hours.

To find out the suitable "defrost timer" setting, the frosting time duration should be counted from start of the low-temperature operation to the point that the actual temperature start bouncing up due to the frosting inside the evaporation chamber. Then set the "defrost timer" as somewhere between 1/10-1/5 of the frosting time duration. For example, if the frosting time duration is 20 hours, the "defrost timer" can be set from 2-4 hours. High relative humidity will require more frequent defrosting cycle.

b) "Defrost Period" is the time duration of each defrosting cycle. For example, if this is set as "3", the unit will run a defrosting cycle for 3 minutes.

When the ambient temperature is higher than  $25^{\circ}$ C, like in summer, the recommended setting is 30 seconds, otherwise, 1 min is considered as adequate. As ambient conditions may vary, therefore, always try to find the most appropriate settings for your own particular ambient condition.

Alternatively, if the set temperature is not so low as critical, in most cases, manual defrosting will be adequate.

- c) The proper of defrosting cycle can vary upon actual environmental conditions, preset temperature value and running time. We recommend defrost at least 1-2 times per day, with 3-5 minutes for each cycle.
- d) If after a defrosting cycle, there is still some ice inside the evaporator chamber (normally by long term, low temperature operation) the "defrosting timer" needs to be shortened and/or the "defrosting time" must be extended accordingly.
- e) During the defrosting process, the actual temperature inside can have a temporary deviation of 3°C to the set point. This is normal, so does not require any action.

#### **10.6 Explanation for setting Manual Defrosting cycle:**

Alternatively, during the operation, the unit can run a manual defrosting cycle when necessary. To activate the cycle, press a button and hold for 3 seconds, the unit will start manual defrost for set "defrosting period". To abort, press a button and hold for 3 seconds. Minimum time interval between two manual defrost cycles is 1 min.



### 11. Temperature Calibration



#### Special Attention!

Temperature of each unit has been carefully calibrated in factory before dispatch.

No further calibration is needed. But if it does, do follow the calibration process strictly or consult your supplier, as wrong operation can interfere the temperature accuracy significantly.



To calibrate the temperature, take a certified calibrated thermometer in a small bottle with glycerin and place that in the geometrical center of the incubator.

#### 11.1 Low Temperature Point Calibration (0.0)

- a) Change the set point to lower temperature value, 37°C for HEATING ONLY UNITS (or 8°C for REFRIGERATED UNITS,) and let the incubator run for at least 1 hour– until the temperature is constant, and let the temperature inside of the chamber uniform.
- b) Read the temperature on the thermometer through the glass lid; calculate the difference with actual displayed temperature. for example, if reading is 35°C, difference would be 35-37= -2°C, while if reading is 38°C, the difference would be 38-37=1°C
- c) Press the "Set/Confirm" button and go with the up arrow to code "7". Press the Set/Confirm again, to enter the Step 1. "Low Temperature Point Correction (0.0)", the display shows the "Temperature Calibration" with "0.0" and the "Current Calibration Value". Use the up and/or down key to make a further adjustment on the current correction value by the temperature difference calculated above, for "-2°C ", decrease by 2, for "1°C ", increase by 1.
- d) Keep pressing "Set/Confirm" button, skip the " High Temperature Point Correction (100.0)" setting, save and exit.
- e) The displayed temperature should have changed due to the calibration. Waiting for another one hour to let the temperature stabilize again at 37°C, and check the thermometer value again, and calculate the new difference.
- f) if necessary, perform the calibration again until the actual display value equals to the calibrated thermometer value. Thus the Step 1. "Low Temperature Point Correction (0.0)" is completed.

#### **11.2 High Temperature Point Calibration (100.0)**

- a) If the incubator is to be used for more than one temperature setting, and "High Temperature Point Calibration (100.0)" needs to be performed as well.
- b) Change the set point to a higher temperature point as required, for example 60.0°C and let the incubator run for at least 1 hour– until the temperature is constant, and let the temperature inside of the chamber is uniformed
- c) Change the enter the code "7" again and press "SET" skip the "0.0", and enter the "100.0" page.
- d) Repeat the same procedure, like the "Low Temperature Point Calibration", to correct the high temperature point, until the display value equals to the actual thermometer value. Then the "Step 2 High Temperature Point Calibration (100.0)" is completed.



### 12. Non-Volatile Memory Setting

If the non-volatile memory function is active (ON), the unit will run to the originally temperature, speed and time program when the external power is recovered after a power failure.



- 12.1 To set the non-volatile memory function, first press the, then press the Increase button to "8", next press the "Set/Confirm" button and the screen will display the character ON or OFF. Press the "Increase" or "Decrease" button to change the parameter and press the "Set/Confirm" button to save the change and exit.
- 12.2 Press the Timer button, if the symbol "A" is displayed on the lower left corner of the screen, it means the non-volatile memory function has been active.



### 13. Setting of communication address for RS485 connection (Opt)

If the RS-485 communication kit is equipped on this product, please follow the instructions below for address setting.



- 13.1 Press the Change/Confirm button, then press the Increase button to "9", press the Change/Confirm button again to enter the "communication" address setting page.
- 13.2 The screen displays the current communication address, and use Increase or Decrease button to change the address, within the range of 0 to 63
- 13.3 Press the Change/Confirm button to save and exit



### 14. Sum Run Time Checking

The total run time of current operation can be checked via following steps. Run time starts counting once "Start/Stop" button is pressed, and stops when pressed again.



- 14.1 Press "Set/Confirm" button and press the "Increase" button to "10", then press "Set/Confirm" button again to see "Sum Run Time".
- 14.2 This is the accumulated time of current operation, which cannot be changed.





#### Special Attention!

The communication address is used as an identifying code for each unit to pair with the software of the PC terminal. Each communication code must be connected to only one unit. Different communication addresses must be used if multiple units are to be connected to the same PC terminal.

### 15. Operation and Switch off

- 15.1 When all the above settings are done, press the Start/Stop button and the equipment will run according to the stored settings.
- 15.2 When during operation, the Start/Stop button is pressed, the platform stops from shaking temporarily. The operation time remains on hold.
- 15.3 Press the Start/Hold button again to resume operation, the pre-set time starts to count down from the remaining time when the operation was stopped.
- 15.4 When during operation, if the Start/Stop button is held on, within 3 seconds the remaining operating time will be cleared to zero. Press the Start/Stop button once more, and the unit starts again to count down from the preset operation time.
- 15.5 While the unit is in use, the current remaining operating time cannot be changed. If however changed at this time, it is invalid with the current operation. Only when the current operation has passed or stopped according to the above method, only if the instrument is re- started the new changed value will be effective.
- 15.6 The equipment can be turned off by holding on the Power button on the control panel for 2 seconds. At this time, the control board is still connected to the power supply, so the main switch on the right side of the equipment must be shut off to end operation completely.

# 16. Trouble Shootings

Error Indicator	Possible cause	Corrections
	Power supply is not connected	Check the power supply system to see if there is voltage on the line
Power on , No display	Plug has no access to socket	Plug in firmly
	The power switch has not been turned on.	Turn on the power switch on the right side of the unit
	The fuse is broken	Replace fuse with new one of same specification
	Circuit occurs mall function of power box	Notify distributor for repair service
Actual temperature is higher than the set point, high	Unit has not yet reached the required (constant) temperature.	Wait a moment and observe
temperature alarm is activated	Temperature setting is at the blind area of temperature control	Open the ventilation hole
	Improper setting of refrigeration parameter	Set the refrigeration parameter to be "0.5" and close the ventilation opening.
	The ventilation fan is broken	Notify the distributor to replace the fan
	Malfunction occurs with	Notify the distributor to repair the refrigeration
	refrigeration system	system
Actual temperature	Unit has not yet reached the required ( constant) temperature	Wait a moment and observe
is lower than the set point.	The circulation of cold air is excessive	Close(a part of) the ventilation opening
low temperature	The ventilation fan is broken	Notify the distributor to replace the fan
alarm is activated	The heater does not work	Notify the distributor to repair the heater
Actual temperature	Improper setting of refrigeration parameter	Refer to Users Guide and reset the refrigeration parameter
is fluctuating and will not be stable	The door (lid) is not closed firmly	Close the door (lid) firmly
	Malfunction occurs with the control circuit	Notify distributor for repair service
Temperature is constant out of control	Malfunction occurs with the control circuit	Notify distributor for repair service
The oscillation of	The platform is in imbalance due to a spoiled object	Remove the object , clear and clean the chamber
platform is unstable	The equipment is not placed horizontally	Adjust the left-back foot leveler install the equipment in a proper way.
	Malfunction occurs with control circuit	Notify distributor for repair /service
The shaking	The door switch has not yet made contact	Check the door to see if it is closed firmly
platform does not work	The platform is blocked with an object at the bottom	Remove the platform and clear the object and clean the inside
	I ne belt is broken	Notify the distributor to replace the belt
	Malfunction occurs with control circuit	Notify distributor for repair service
I he oscillation of platform is out of control	control circuit	NOTITY distributor for repair service

The platform keeps	The door switch has short	Use a blower drier to dry the chamber
shaking after the	circuit ,could be caused by	Press the Start/Stop button before opening the door
door is opened	humidity	
As the door is	Improper operating method	Refer to Users Guide and press the Start/Stop
closed ,the platform		button to operate again
starts shaking but		
the speed runs high		
suddenly		
	Equipment is disturbed by	Press the Change/Control button and try other
Screen has no	high frequency.	operation mode.
response when		Restart the equipment-if it does not work:
button on the		Notify the distributor.
control keyboard is		
pressed		
	The equipment is not	Adjust the left back foot to make the equipment
	placed horizontally	stable
The equipment	The fixed screw of clamp is	Remove the platform and tighten the screw
causes a strange	loose	
loud noise	The platform is loose	Remove the platform an tighten the screws on the
		four corners
	There is strange object, like	Remove the platform ,clear the object and clean the
	a piece of a bottle, under the	inside
	platform	
	Mechanical malfunction	Notify the distributor for repair service
	occurs	
The accumulation	The refrigerating time is too	Refer to Users Guide and conduct a drying
of frost is fast after	long and the evaporating	maintenance on the evaporation chamber
refrigeration is	chamber is too humid	
started, resulting in		
the rise of		
temperature		

## 17. Electronic Control System

