User Manual for Bio-Oxygen Demand(BOD) incubator

INTRODUCTION

The incubator is an enclosed apparatus where we can provide a controlled and protective environment. This incubator is dedicated for culture of microorganisms in a systematic way. Temperature of the incubator is controlled by means of Peltier effect. Hot air is driven out of the incubator chamber by means of the Exhaust Fans 1,2 and 3 and cold air is supplied to the incubator chamber through Cooling Fans 1 and 2. Air circulating Fan is also accommodated at the bottom of the incubator chamber to provide uniform temperature distribution throughout the incubator. . The smart incubator will be equipped with a 4.3inch LCD touch display for the user to input the valued of the temperature that is to be maintained. The smart incubator has a WiFi module which is interfaced with the microcontroller. When the device is connected to the internet, the temperature, humidity and the input parameters are monitored remotely with an android application. The application enables real time monitoring and enables the user to receive email updates about the status of the incubator remotely. The smart incubator contains high precision digital temperature and humidity temperature sensors to maintain the desired temperature within the incubator.

SPECIFICATIONS

Temperature	**19°C – 31°C**
Temperature accuracy	**0.2°C**
Humidity	**0%-100%**
Exterior dimension	**372mm x412mm x581mm**
Interior dimension	**250mm x300mm x400mm**
Voltage requirement	**230V,50 Hz**
Power supply	**12V/20A**

CONTROLS OVERVIEW

Power Switch: The main power ON/OFF switch controls all power to the unit. It must be on before any systems are operational.

Kill Switch: The kill switch is used to switch OFF the incubator when the operator feels that incubator parameters has gone beyond the critical condition.

Touch Display interface: It is used for monitoring the incubator parameters like temperature, humidity, voltage and consists of the digital display and Up/Down buttons for inputting set point temperatures and calibration.

Android Application: The data from the incubator is uploaded to the cloud and an android application is developed for monitoring the parameters of the incubator remotely.

OPERATION

1. **Connect the main plug of the incubator to 230V, 50 Hz power supply.**
2. **Switch on the Power Switch.**

3. **Monitor the current parameters of the incubator in the touch display interface.**
    a. **To access the incubator click on the "Unlock" button.**
    b. **Type the 4 digit password of the incubator and then click on "Enter" button. In case the operator has forgotten the password, click on the "Forgot Password" button.**
    c. **A 4 digit OTP will be sent to the registered user's email id , and type the OTP and click on "Enter" button.**
    d. **Home screen of the incubator appears. Click on "Menu" button.**
    e. **To change the set point of the temperature and monitoring other parameters like humidity, voltage etc click on "Control and Monitor" button.**
        I. **Temperature**
            - **To access the temperature , click on "Incubator Temperature" button.**
            - **Increase and decrease the set point using the "+" and "-" buttons.**
            - **Click on "Update" button to update the set point, set by the operator to the controller.**
            - **Click on "Graph" to obtain a graph between temperature vs time.**
        II. **Humidity**
            - **To monitor the humidity , click on "Humidity" button.**
            - **Click on "Graph" to obtain a graph between humidity vs time.**
        III. **Voltage**
            - **To monitor the voltage , click on "Voltage" button.**
            - **Click on "Graph" to obtain a graph between voltage vs time.**
    f. **Click on the "Status" button and the status of the fans in OFF condition is indicated by RED colour and their status in ON condition is indicated by GREEN colour.**
    g. **Click on "About device" button to get a brief description of the incubator and after scanning the QR Code a webpage appears from where the user manual can be downloaded.**
    h. **Click on the "Settings" button for setting temperature alarms and new password.**
        - **Click on "Reset Password" button to change the password.**
        - **Click on the "Temperature Alarm" button for setting 2 alarms when the incubator goes below a certain temperature and above a certain temperature respectively.**
    i. **Click on "Lock" button in the homescreen to manually lock the incubator by entering a password.**
4. **Open the Android Application app in the mobile.**
    a. **Click on the "Current Status" Menu. The status of the fans whether they are ON/OFF are indicated by LEDs. Click on the "Temperature" button to retrieve the temperature data from the thermistor and "Humidity" button to retrieve the humidity value inside the incubator chamber.**

Similarly, click on the "Voltage" button to retrieve the voltage value from the tsensor.

b. **Click on the "Data History" to obtain the history of temperature, humidity and voltage data in form of graph.**