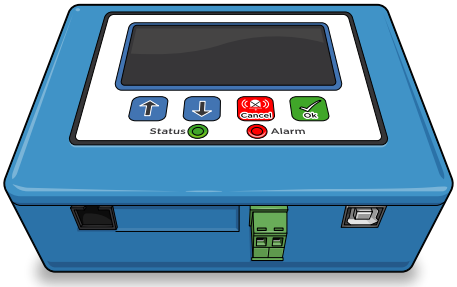
VM 1000

Vaccine Monitor

user **MANUAL**

VM 1000
Vaccine Monitor



Thank you for purchasing our product which adopts excellent workmanship and exceptional reliability. We suggest that you take a few minutes to read through this instruction manual to familiarize yourself with all the features of the product before you proceed to install the system.

Intended Users

This manual is to be available to all persons who are required to install or configure equipment described herein, or any other associated operation.

The information given is intended to highlight safety issues, and to enable the user to obtain maximum benefit from the equipment.

Hazards

⚠ Warning! Failure to observe the following will constitute damage to the UNIT.

- This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling and installing this product.
- This product contains lithium ion batteries:
    - Ensure correct polarity when inserting batteries into the holder.
    - Please take care to safely dispose of used batteries as per your local laws and by-laws.
- Dangers involved in case of fire:
    - Danger of dust particle explosions
    - Decomposition through fire or heat under development of toxic and cauterizing gases
    - Combustion gasses which strongly irritate eyes and respiratory organs
- Instruction for fire extinguishing:
    - Extinguish with water, if possible cover battery completely in water
    - Extinguishing with water will produce fluoride, phosphate, fluoride-oxide and carbon-oxide.
    - Alternatively extinguish with a CO2 extinguisher
- Do not place this product on unstable surfaces. The product may drop, causing serious damage to the product.
- Take care when plugging the adaptor into an AC mains power source
    - Do not overload wall outlets and extension cords as this can result in fire or electric shock.

Equipment Inspection

- Check for signs of transit damage
- Check that the product code on the rating conforms to your requirement

If the unit is not being installed immediately, store unit in a well-ventilated place away from high temperature, humidity, dust, or metal particles.

Foreword

- This manual contains text and explanations which will guide the reader with the correct installation and operation of the VM1000. It should be read and understood before attempting to install or use the unit.
- If in doubt about the operation of the device please consult the nearest **Ikhaya Automation Systems** reseller.

Table of Contents

1. Introduction

Ikhaya Automation Systems provide equipment and services to manage controlled-temperature environments for Pharmaceutical, Health care sectors, and Perishables. Our solution allows you to monitor multiple temperatures from anywhere in the world via the internet. Instant notification via sms or email alerts the user of any deviations from set point. System generated reports sent to email serve as quality control and proof in case of legal obligations.

2. What is in the Box

The standard unit comprises of:

- 1 x VM 1000
- 1 x Digital Probe
- 1 x On Board Temperature & Humidity Sensor
- 1 x Door Sensor
- 1 x 100 -240Vac Power Adaptor with 12vdc output @ 1 Amp (Type C Adaptor)
- 2 x Lithium Ion Batteries
- 1 x SD card (Optional)
- 1 x Type B USB Cable (Optional)
- 2 x 6mm Wall Plugs
- 2 x Velcro Tape for mounting on metal surfaces

3. Mounting Arrangements

The installation of the unit has been designed to be safe and easy (plug and play). The VM1000 is supplied in a suitable ABS IP 54 enclosure and may be installed as-is via 6mm wall plugs or velcro tape on any metal surface.

Caution

- Units should not be installed in areas subject to the following conditions: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration.
- Ensure that the unit is mounted in an area that has sufficient GSM signal strength
- Ensure the unit is mounted at a safe position where it will not be damaged or knocked down by passing traffic.
- Always ensure that mounted unit is kept as far away as possible from high-voltage cables, high-voltage equipment and high-voltage power equipment.
- Do not lay signal cables near high-voltage power cabling or cabinet housing along the same trunking duct. Effects of noise or surge induction may occur. Keep signal cables more than 100mm (3.94") away from these power cables.
- Disconnect the power jack before installation or performing wiring work to avoid electrical shock. Incorrect operation can lead to serious damage to the product.
- When using an incorrect power source or performing incorrect operation, serious damage will occur regardless of the level of the voltage and frequency.
- During transportation avoid any impact as the VM1000 is a precision instrument. It maybe necessary to check the operation of the VM1000 after transportation, in case of any impact damage.
- When storing the VM1000, conform to the environmental conditions specified in the technical specification sheet Annexure A.
- The VM1000 contains lithium ion battery technology; please refer to the Hazards section on Page 1.

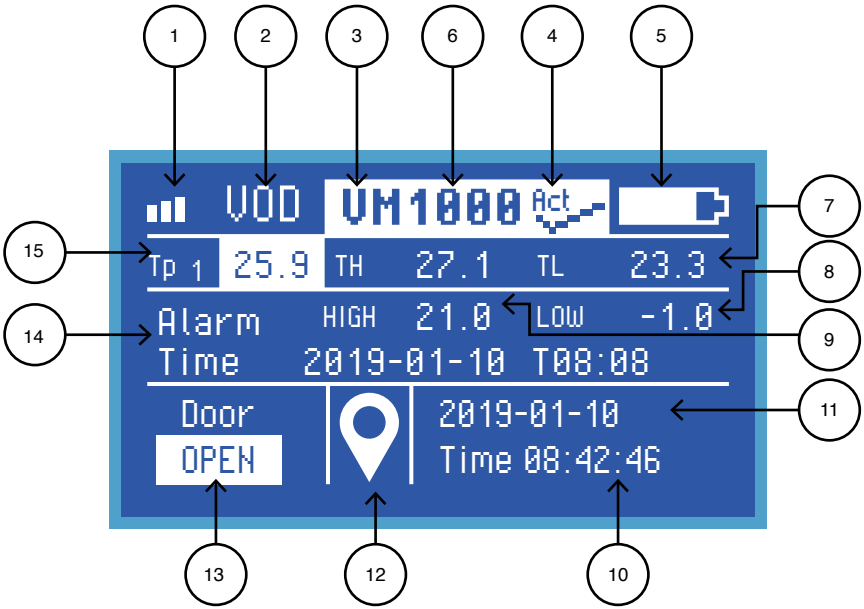
4. Standard Solution

Wiring for the VM1000 has been designed to be safe and easy. If the user is concerned about the correct installation, please contact your nearest Ikhaya Automation Systems Reseller.

- Mount the VM1000 using the 6mm wall plugs or Velcro tape on any metal surface.
- Install the probe into the controlled environment you wish to monitor then connect the probe to the VM1000
- If door monitoring is a requirement install the Door Sensor onto the door and connect the wires into the VM1000
- Plug in the adapter into a power source (100 -240Vac), then connect the DC jack

See **Annexure A** for Technical Specification of the VM1000

5. Main Screen Functionality



1. **GSM Signal Strength**. A single bar represents a weak signal and five bars a strong signal. Should no bars be displayed, signal is too weak or a GSM error has occurred.
2. **Network Name**.
3. **Product Identification Name**.
4. **Activation Status**. Should the product be fully activated, a tick symbol will be displayed below the name. In this case, product is activated.
5. **Power Status**. The bitmap image illustrates if device is powered via external adapter or via internal battery. (as currently displayed)
6. **Probe History High value**. The TH 27.1 value is the highest temperature that has been recorded over a predefined period of time. The period of time can be adjusted via the setup menu options.
7. **Probe History Low value**. The TL 23.3 value is the lowest temperature value that has been recorded over a predefined period of time.
8. **Alarm Set-point Temperature Low**. The set point that will cause an alarm should the temperature fall below for a predefined period of time.
9. **Alarm Set-point Temperature High**. The set-point that will cause an alarm should the temperature exceed for a predefined period of time.

10. **Current Time**.
11. **Current Date.**
12. **GPS availability**. Should the logo appear, the VM1000 device has GPS enabled. A flashing logo indicates that GPS lock has not been achieved. Should lock be achieved, the logo will stop flashing and stay illuminated.
13. **Digital Input**. A dedicated input assigned for open /closed door status.
14. **Alarm Time**. Should an alarm be triggered, a time stamp will indicate the time as to when the alarm activated.
15. **TP 1/2/3/4**. Last measurement value. *(Select probe using the up / down keys)*

The main screen displays information about the VM1000 device and measurements pertaining to probes connected. Should 2 probes or more probes be connected, the up down keys will result in data pertaining to each specific probe being displayed. Should only a single probe be attached, then the up down keys will have no effect. Display item 15 indicates which probe data is being presented.

6. Navigation Buttons

The 4 buttons, Up, Down, Cancel and Ok are used to navigate the menu and edit values as required. Two types of key presses are handled, one being the short key press and the other a long key press. A long Down key press is typically used to access special functions, such as QR code access.

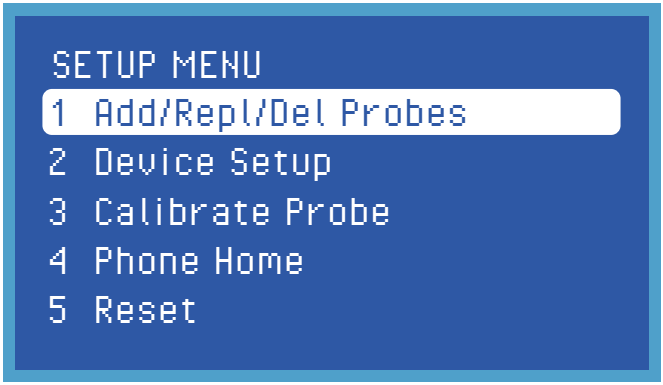
The Cancel button primary function is to reverse navigate menus and to cancel any active alarm. When an alarm is active, a screen displaying the offending alarm will be presented and remain until such time as the alarm is cancelled by the "cancel" button or by other selected means of alarm termination. Pressing the alarm button when no alarms are present, will select the alarms menu with supported functionality.

The OK button is used to navigate between menus and for menu selection. The up and down arrows allow for menu item selection and the editing of parameters.

7. Let's get started...

In order to take a measurement, a temperature sensor probe needs to be connected and configured to the VM 1000 device. Each probe has a unique ID that identifies itself. The VM1000 will read the unique id and save it to internal memory before a measurement cycle can be initiated.

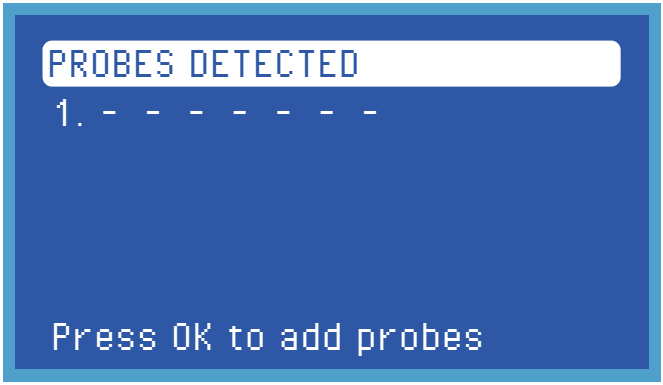
Press the Ok button to enter the setup menu

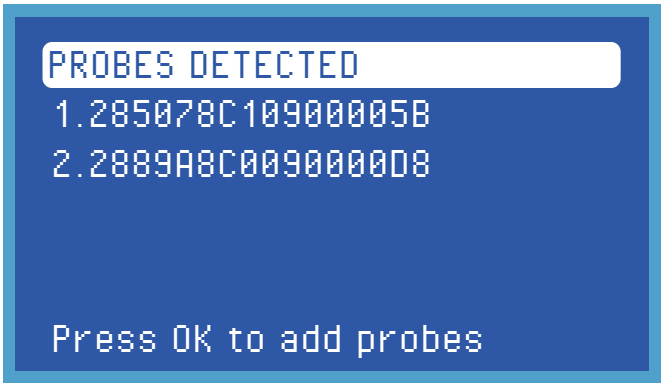


Press the down arrow to highlight the **ADD/REPLACE/DELETE PROBE**.
Press OK.

8. Adding a Probe

Plug in a probe and as per the hint at bottom of screen, **press the OK button**.
The probe scanning procedure takes a few seconds to complete. When successfully completed, the ID number will be displayed.



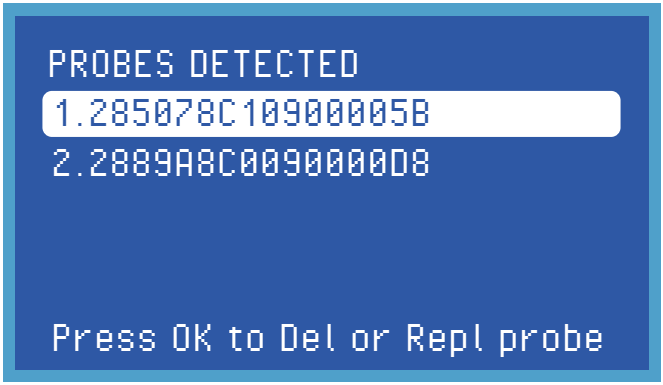


Should additional probes be added, the process can be repeated. Adding a single probe at a time allows the identification and physical marking of a probe. A user could then identify each probe as per the number in the listing on screen.

Multiple probes can be connected and a single scan initiated to identify and configure all connected. While a faster process, it is not possible to know which probe is what number as per listing without taking measurements to deduce which probe is which.

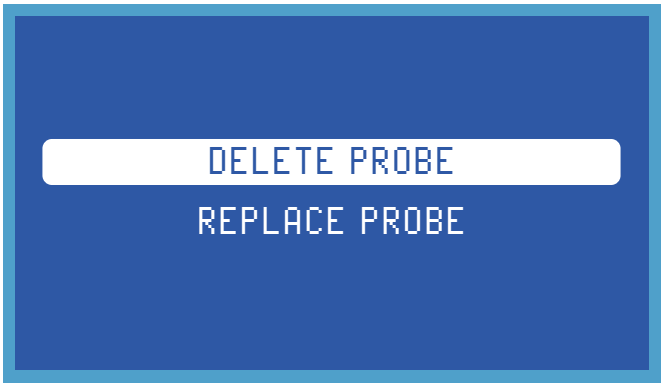
9. Deleting a probe

Scroll down using the up down keys to the probe ID number requiring deletion.



The hint now provides the option of deleting or replacing a probe.
To delete, **press OK.**

You will be prompted to confirm your choice.



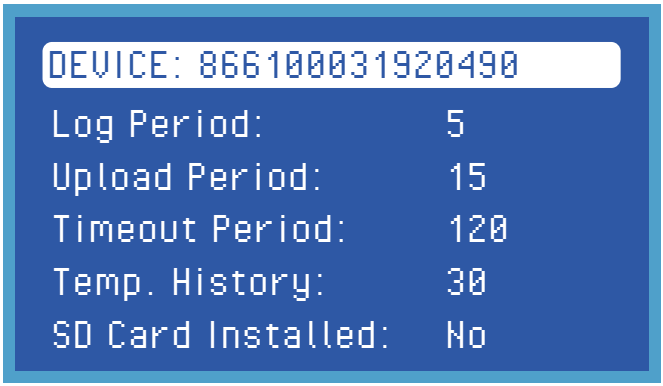
Select the **DELETE PROBE** option and **press OK**.
After a few seconds, probe number 2 will move to probe number 1 position.

10. Replacing a Probe

To replace a probe, the existing probe needs to be disconnected and the replacement inserted into a RJ11 socket. Note that any socket can be used and that sockets do not facilitate any ordering of connected probes.
The **REPLACE PROBE** option will read the new probes ID and insert it into the existing position that the deleted probe held.

11. Device Setup Menu

Now that a temperature probe has been added to the VM1000 device, we are in a position to read some basic server settings. Whilst the server General User Interface (GUI) functionality provides access to a variety of functionality, the VM1000 has limited read/write accessibility. The server GUI provides a much better interface to VM1000 device setup and has thus been chosen as the means to setup a VM1000 correctly.



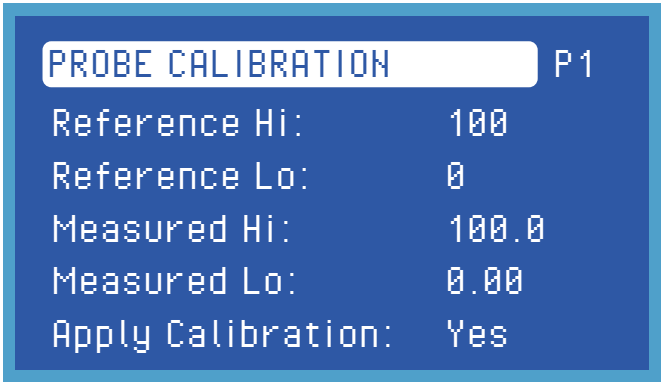
The DEVICE SETUP menu allows read access to some basic device setup information.

Device:	The unique IMEI number of the VM1000 device
Log Period:	Duration (in minutes) between measurement samples.
Upload Period:	Duration(in minutes) between server uploads/downloads.
Timeout Period:	Duration(in minutes) If the device does not communicate with the Server within this period of time the device will be marked as "Timeout"
Temperature History:	Displays the temperature history (in days) as per main screen items 6 and 7.
SD Card Logging:	Indicates if a SD card has been detected

12. Calibration

Always try to perform calibration using the online method (contact your IKhaya Automation Systems reseller for more information*) alternately you could use the method detailed below.*

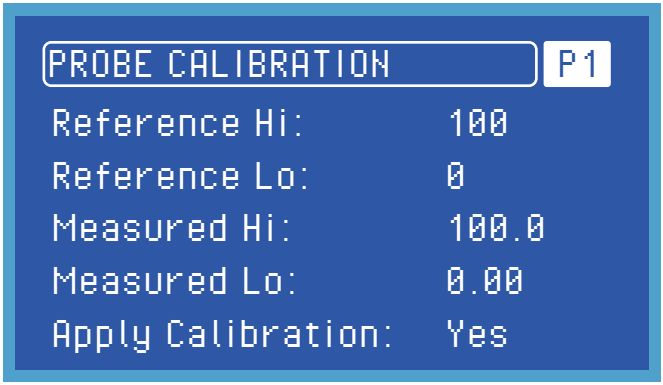
The VM1000 has the ability to apply calibration constants to measurements for improved accuracy. The calibration procedure relies on accurate calibration measurements in order to improve accuracy, otherwise it could impair the accuracy the probe is capable of. Please note:



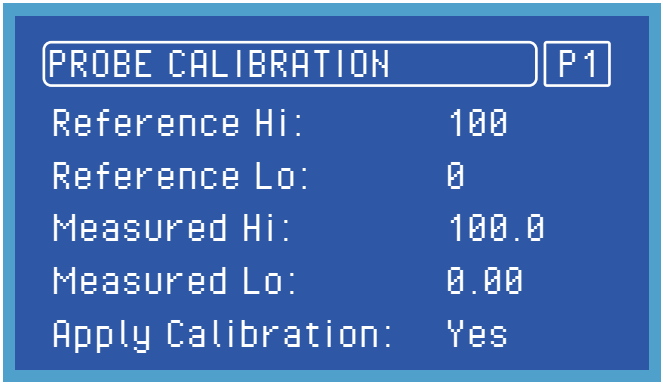
The calibration formula applied requires that 2 measurement be taken, a high reference and a low reference. The high value should be equal to or greater than the expected maximum temperature to be measured. Likewise, the low temperature should also be equal to or less than the lowest temperature of interest.

To access the calibration menu, **press the OK button** to access the main menu. Move down to the "**Calibrate Probe**" and **press OK**. The calibration data can now be entered.

The **UP** and **Down** keys will navigate through the 6 options. The first option is to select the probe.
Move to the **P1** left of "Probe Calibration". It will show as a solid rectangular block.



To select a specific probe, press OK. The sold rectangular block becomes a frame indicating that the UP and DOWN keys can now be used to edit the values. Once the probe has been selected, press the OK button once again to toggle back to selection mode.



The high reference to be used is adjusted for "Reference Hi" and the low reference measurement to Reference Lo". To edit a value, highlight the item of interest and **press the "OK" button**. The solid block will turn to a frame allowing for editing as already explained.

When changing the high and low reference values, holding the button for a couple of seconds will cause the value to jump up or down in up to 10 degree increments.

Press the OK button to exit edit mode.

Once a probe has settled at the high or low reference temperature, **pressing OK** when "**Measured Hi**" has been selected will automatically start a temperature measurement and reflect the measurement taken. The same procedure applies to the "**Measured Lo**".

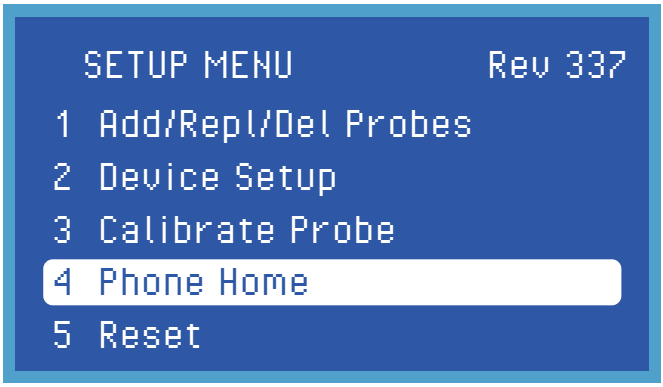
Lastly, the "**Apply Calibration**" can be used to enable or disable the application of calibration data. Using the UP and DOWN keys will toggle the selection when selected.

The default settings have neutral calibration data entered. Using the values as shown will result in no change to measurement values when calibration applied.

Use the **CANCEL button to exit menu**. Exiting the menu will result in entered data being written to internal storage.

Using the same principles described, the remaining data can be adjusted as needed in order to create the calibration data required.

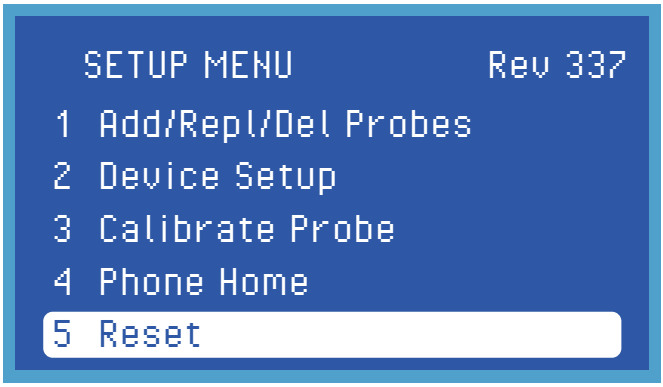
Phone Home



The phone home command will force the VM1000 to establish a connection with the server and refresh its memory with any changed setting on server. Should data logs be awaiting upload, they will be uploaded to server at this time.

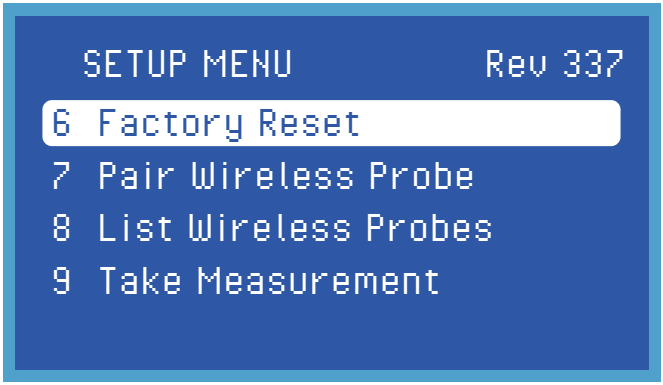
The Phone home feature assists in updating the device immediately and not having to wait for the regular server communication timing, which may be hours between server contact intervals.

Reset



The Reset command puts the VM into a state that results in a watchdog timer reset.
The VM1000 will then restart itself. This command has the same effect as physically unplugging the power supply.

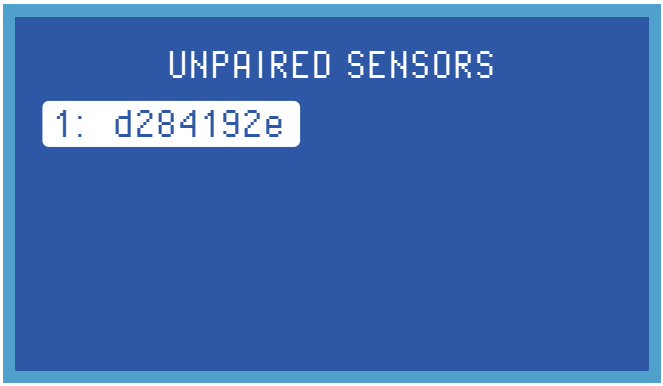
Factory Reset



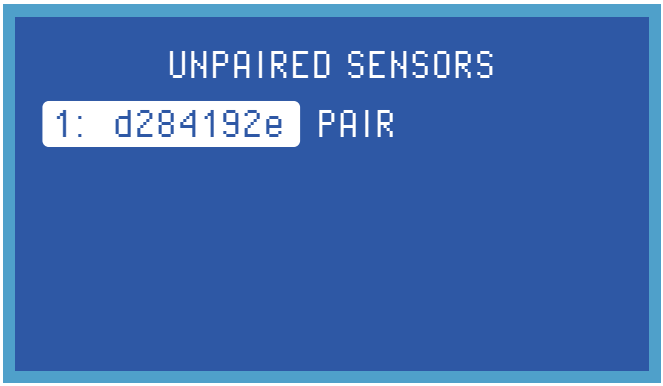
The Factory Reset command will erase all settings and sensor IDs from the device. All settings will be refreshed when contact is made with server. All probes will need to be added as per the instructions in this manual. Note that when Factory Reset is selected with the OK button, the VM device will appear to be frozen. Onboard memory is being erased and formatted. Once completed, a device reboot will occur twice before being ready.

Pair Wireless Probe

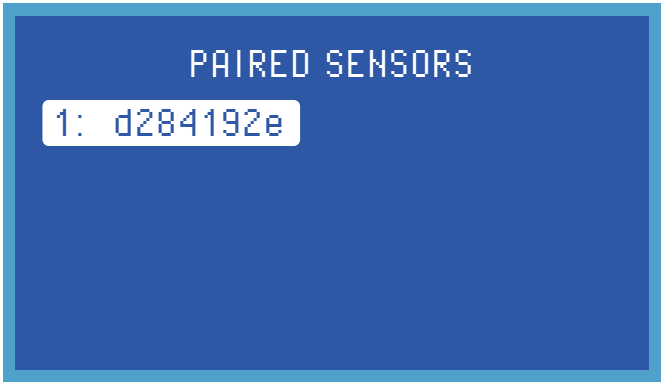
In order to setup wireless probes with a VM1000, the VM needs to know the sensor ID number. In an environment where a number of wireless sensors is present, the VM will receive broadcast from all sensors. If a sensor ID matches that which is stored in the VM1000 lookup table, that sensor will deem to be paired with the device. Should the ID not be found, the sensor is ignored.



An unpaired wireless sensor will be listed in the Unpaired sensors menu. To pair the sensor, use the up and down keys to select the desired sensor. Pressing OK will toggle a command to pair or ignore the sensor. Multiple key presses may be required from time to time to enable pair mode.



When pair mode has been selected, the VM will wait for the next sensor broadcast and instruct pairing. Once a pairing confirmation message is returned, the Sensor ID will be removed from the Unpaired Sensors list and appear in the Paired Sensors menu listing as shown below.



To delete a wireless sensor, select the sensor using the up down keys. The selected sensor will be highlighted as shown. Use the OK button to access the delete option. A further press of the OK button will delete the sensor from the VM1000 memory. Should the sensor need to be "un marked", the up down arrow button will remove the delete option.

Take Measurement

It may be desired to take measurements immediately. This command will initiate all measurements and display the results on the main menu screens.

13. QR CODE

The VM1000 can generate a QR code that contains specific information relating to a probe temperature and its history. This feature allows for taking snapshots of recorded temperature via a cell phone or any other capable device using QR Code scanning application.

To access the QR code, the main measurements screen (default view) must be selected. Hold the down arrow key for about 3 seconds till the code appears.

The data displayed starts with:

Device name:	"Demo Unit 1"
Probe Name (PN):	"External 1".
Temperature (TP)	18.56°C
Set-points (SP):	"15.0" = high set-point / "0.0" = Low set-point
History (TH):	"29.6" = high / "17.9" = low.

The history reflects the probe high and low temperature range over a predefined period of time.
The period can be adjusted via the setting menu.

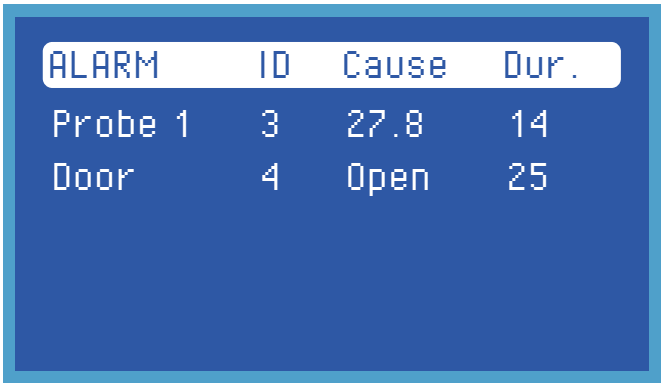
To exit the QR code, press the "**CANCEL**" button.

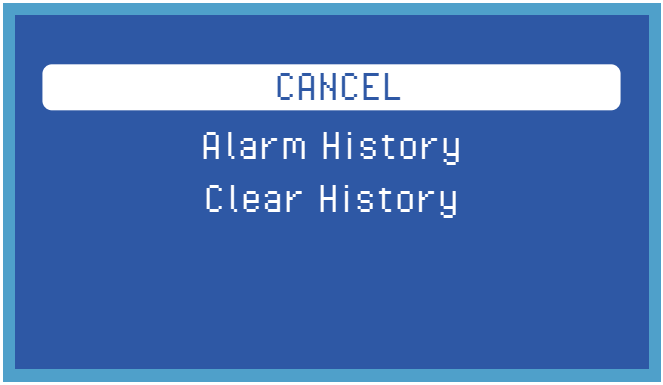
14. Alarms

When the temperature exceeds a set limit for a predefined period of time, an alarm is triggered. The alarm could be a buzzer, SMS, email a combination of two or all three. A user will be required to action the alarm either by the VM1000 keypad or via the server GUI.

When an alarm is active, the Alarms screen will automatically be displayed and remain in this state until such time all alarms are cleared. To cancel all active alarms, press the cancel button. After a few seconds, the main screen should return indicating all alarms were successfully terminated. Should an alarm be terminated by other means (SMS or email), only the alarm actioned will be terminated and removed from the list presented on the alarms screen.

The alarms screen does provide some basic information relating to the nature of the alarm, such as the current duration of the alarm state, the temperature that has been exceeded and identification number.





Use the **UP** and **DOWN** buttons to select the required action.

Cancel: return back to the default measurements screen
Clear alarm: If buzzer is sounding, it will be turned off. Further notifications will be suspended and the server will be updated as to the response action taken.
Alarm History: Display alarm history and timing data related to alarms
Clear History: Erase all alarm history.

15. Alarm History

Use the **UP** or **DOWN** button to select the ALARM History. **Press the OK button** to access the Alarm History data.

The Alarm history menu is related to the main screen probe selection. Should 3 probes be attached, the user must navigate to the 3rd probe main screen before pressing the "**cancel**" button to view the data pertaining to probe number 3.

As per the sample data, each alarm has a number starting from 00 to 99. The zero number will relate to last alarm and the highest number to oldest. Using the **UP** and **DOWN** buttons will move 2 alarms lower into the saved history.

The first line is Date and Time. The "Dur;" is the duration the temperature has been outside prescribed limits. The violation in this case is that the temperature has become greater than the 15. 0 degree High limit.

The "Resp;" records the type of response the user has taken. In this case, the alarm was cancelled by an SMS message. In contrast, note that the "01" alarm had not been actioned. Lastly, the "Time:" records the time elapsed from when an alarm notification has been sent till such time a user responds. In the case of "02", the Time shows 0 minutes, but is of no value as no Response had been taken in order to capture a time frame.

To exit the Alarm History, use the **CANCEL** button.

Annexure A

Technical Specifications VM 1000

General	
Model	VM 1000
Dimensions	135x100x50
Weight	0.45kg
Mounting method	Velcro/Mounting Screws
Mode of Communication	GPRS
Mode of Operation	Electronic
ICASA Approval	TA-2018/2266
WHO Approval	PQS Code: E006/061
Environmental Specifications	
Operating Temperature	5°C to 60°C
IP Rating	IP 54
Storage Temperature	5°C to 50°C
Electrical Specifications (Option 1)	
Input Supply	100 – 220Vac Adaptor with 12vdc output, 1 Amp (centre pin positive)
Standalone Battery Backup	Yes (Lithium - Non rechargeable)

Current Consumption @ 12V	Active Mode (GSM Transmission active): 150mA (typical) average Instantaneous peak current: 0.6 - 1 Amp
	Standby Mode: 55mA, Display ON Standby Mode (Adapter): 15mA (Power Down - LCD Off) Standby Mode (Battery): <40uA
Battery Type	Lithium Non Rechargeable
Battery operating life	3-5 Years (LCD Display off, Power Save mode active)
Electrical Specifications (Option 2)	
Input Supply	Lithium Battery 3.6Vdc, 6.5Ah
Current Consumption @ 7.2 VDC	Active Mode (Transmission): 150mA
	Standby Mode: 40uA (Display off)
Battery Type	Lithium Non Rechargeable
Battery operating life	3-5 Years
Number of Batteries	2 x C Cell Lithium
Logging	
Logging Interval	Default: 10 Minutes Minimum: 1 Minute Maximum: 1440 Minutes (Configurable in 1 minute step duration)
Standard Upload Frequency	Once per day or on alarm when in battery mode; Configurable when connected to mains power
Memory capability	14 000 logs internal Flash
SD card	Optional
USB	Type B; download of a comma delimited file (SD Card Functionality only)
Alarms	
On-board	LCD
	Internal Buzzer
Remote	SMS, Email, Web
User interface	
Viewing and Programming	WEB
	Membrane & LCD
Quality	
Standard	ISO 9001-2015
Inputs	
Digital Inputs	One (Door Sensor)

Temperature Sensor	
Digital Probes	4 ports up to 4 wired sensors in parallel Max of 80 meters cable in total & 4 wireless sensors
Sensor Temperature Range	-30°C to +55°C
Sensor Temperature Accuracy	±0.5°C (-20°C to +55°)
Sensor Resolution	0.0625°C steps
Internal Temperature Humidity Sensor	
Digital Probes	1
Sensor Temperature Range	0°C to +60°C
Sensor Temperature Accuracy	±0.3°C
Sensor Humidity Range	0 to 100%
Sensor Humidity Accuracy	±2%
Interface	
Membrane	Control Buttons
Display	
Type	Graphic, LCD, LED Backlit
Resolution	128 x 64 Pixels
Colour	Blue
Display Length / Width	65mm x 33mm

For More Information and Pricing Options Contact:

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