



# **vPad-RW <sup>TM</sup>**

*Radiant Warmer Tester*

Operating Manual



vPad-RW <sup>TM</sup>  
***Radiant Warmer Tester***  
Operating Manual

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- Damage in transit or when moving the instrument;
- Improper power supply such as low voltage, incorrect voltage, defective wiring or inadequate fuses;
- Accident, alteration, abuse or misuse of the instrument;
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## **vPad-RW OPERATING MANUAL**

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## Abbreviations, Definitions and Symbols

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The following abbreviations, terms and acronyms are used throughout this manual:

ACTRE	Air Control Temperature Regulation Error
AIT	Average Incubator Temperature
ATX	Average Temperature of Temperature Sensor X, where X = 2 - 5
AV	Air Velocity
BSL	Background Sound Level
°C	degrees Celsius (centigrade)
°F	degrees Fahrenheit
Autosequence	A series of measurements or test operations that are run automatically in a predefined order, with or without user involvement.
DUT	Device Under Test
GUI	Graphical User Interface
IT	Incubator Temperature
IIT	Independent Incubator Temperature
NSL	Noise Sound Level
STC	Steady Temperature Condition
STS	Skin Temperature Sensor
TC	Temperature Control
TEMP	Temperature
WT	Warm Up Time



CAUTION: Read the instructions for use before operating this device.

### Definitions:

Some of the following definitions are paraphrased from the relevant sections and clauses of IEC 60601-2-21

Mid Point Average Temperature	Section 1, clause 2.10.103: the TEST DEVICE AVERAGE TEMPERATURE of the TEST DEVICE positioned at the mid point of the EQUIPMENT mattress
Test Device Average Temperature	Section 1, clause 2.10.102: the average temperature reading taken during a STEADY TEMPERATURE CONDITION at regular intervals at the center of a TEST DEVICE

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TEST DEVICE	Section 1, clause 2.1.102: the A totally matte blackened disc used as a reproducible receiver of radiant energy during the testing of the INFANT RADIANT WARMER
Control Temperature	Section 1, clause 2.10.104: temperature set at the temperature control (of the RADIANT WARMER as the desired temperature)
Autosequence	A series of measurements or test operations that are run automatically in a predefined order, with or without user involvement
Device Under Test (DUT)	The device being tested by vPad-RW (the RADIANT WARMER)
Graphical User Interface	A display system for the test instrument (vPad-RW) which relies on graphics to a large extent to display information. In the case of vPad-RW, this is an Android Tablet (10") with an Android type operating system (4.1.1), or equivalent
Infant Radiant Warmer	Section 1, clause 2.2.101: an electrically powered device with a radiant heating source intended to maintain the thermal balance of an infant PATIENT by direct radiation of energy in the infra-red region of the electromagnetic spectrum
Steady Temperature Condition	Section 1, clause 2.10.101: the condition reached when the temperature, measured at the center of the TEST DEVICE positioned on the midpoint of the EQUIPMENT mattress, does not vary by more than 1°C over a period of one hour
Skin Temperature Sensor	Section 1, clause 2.10.101: a sensing device including the link with the EQUIPMENT intended to measure the infant's SKIN TEMPERATURE

## Chapter

# 1

# 1 Specifications

## 1.1 General Specifications

### Environment:

- 15 °C to 40 °C (59 °F to 104 °F)
- 10% to 90% Relative Humidity
- Indoor Use Only
- Category II
- Pollution Degree 2

Note: Mains supply voltage fluctuations not to exceed +/- 10% of the nominal supply voltage.

### User Interface:

vPad-RW is supplied with a 10" (nominal) Android tablet which has the vPad-RW software application pre-installed and ready to run. In some instances, the hardware for vPad-RW may have been supplied with vPad-IN. The software is controlled by touching a function button on the graphical user interface (GUI) or, where applicable, by entering specific data via the on screen keyboard.

### Display (10" Android Tablet):

1920 x 1200 color IPS touch screen LCD

## 1.2 Data Collection Specifications

### Temperature:

- Measurement Range: 0 °C - 50 °C
- Accuracy: T1:  $\pm 0.05$  °C
- Resolution: 0.01 °C
- Convection: 5 'puck' sensors (T6 - T10) - radiant warmer
- Air Conduction: 5 sensors (alternate 'post' T1 - T5) - incubator  
1 mattress temperature
- Optional Skin Sensor 'oven' with thermal pad contact: 28 °C to 40 °C in 2 °C increments  $\pm 0.01$  °C resolution,  
 $\pm 0.05$  °C Accuracy

### Airflow:

- Measurement Range: 0.1 to 1 m/s
- Accuracy:  $\pm 0.1$  m/s  
at 50% RH  $\pm 15\%$

### Sound Level:

- Measurement Range: 30 dbA to 90 dbA, Type III
- Accuracy:  $\pm 3$  dbA
- Resolution: 0.1 dbA

### Data Retention:

- Capacity: up to 48 hours per test
- Sample Rate: 1/min or 1/sec, depending on parameter

## 1.3 Standard Accessories

AC Adapter (all models) 100-240 VAC 50/60 Hz to 9 VDC: P/N 3000-611

Blade Sets Kit (for P/N 3000-611): P/N 7500-490

(Includes: North America; Europe/Schuko; United Kingdom; China/Australia)

AA Battery, 1.2V 2300mAH: P/N 3310-012

## 1.4 Optional Accessories

For a complete list of available accessories, visit [www.datrend.com](http://www.datrend.com) or contact Datrend Customer Service (see Chapter 7 for contact details).





**Chapter****2**

## 2 General Information

### 2.1 Overview

vPad-RW is a portable datalogging system for temperature, air flow, and sound level; specifically configured to test infant radiant warmers and, optionally, incubators and transport incubators to applicable IEC performance standards. The data collection system is designed to operate for up to 48 hours from a rechargeable 4.8VDC nickel-metal hydride (4 AA cells) battery, or alternatively, from a 5VDC switchmode AC adapter. The sensors and the data collection system are placed on the mattress of the radiant warmer, and external to the device under test (DUT), a user interface based on an Android tablet communicates wirelessly to the sensor system via Bluetooth, and provides the user with the ability to control the test operation and display the results without disturbing the test environment.

vPad-RW incorporates all the functionality necessary to meet the requirements of the IEC standards, related to temperature, airflow and sound level tests. vPad-RW incorporates a graphical user interface which interfaces wirelessly to 5 temperature sensors, 1 airflow sensor, and 1 sound level meter. vPad-RW also incorporates a non-volatile memory or "data log" which is used to save test data, such tests typically being conducted by the user over several hours or days.

### 2.2 Features

IEC 60601-2-21<sup>1</sup> is a standard which specifies safety and performance requirements for an infant radiant warmer. Some of the parameters that lend themselves to testing are temperature, sound level, and air flow. These parameters are monitored at specific locations within the radiant warmer and are expected to conform to the values defined by the Standard. vPad-RW provides a mechanical framework to hold the sensors in the appropriate locations, and provides the ability to adjust the framework to fit warmers of various sizes.

vPad-RW provides 5 temperature sensors which are positioned according to the Standard, with one central sensor and one sensor in the center of each of four quadrants on the mattress. The central sensor is an integral component of the data collection and wireless communication hub

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<sup>1</sup>Throughout this manual, IEC 60601-2-21 is referred to as the "Standard"

of the system. In addition to the 5 temperature sensors, vPad-RW provides airflow, and sound level sensors in separate packages which connect to the central hub. The test protocols are designed to perform all the temperature tests in one contiguous time block to avoid numerous long heating and cooling cycles. Tests of airflow, or sound are performed either before or after the temperature tests so that the sensors can be moved about in the radiant warmer without disrupting a temperature test.

## 2.3 Controls and Interface Connections

Referring to **Figure 1** through **Figure 6**, the following components, controls and interfaces of the vPad-RW Radiant Warmer Test system are:

Note: the hardware components for vPad-RW are virtually identical to vPad-IN. The differences are in the setup, and which temperatures to measure. If the user has one of the systems (hardware), only the software is needed to do the other EQUIPMENT (incubator).

1. Sensor Electronics and Wireless Hub (the <b>HUB</b> )	Provides the connection point for all sensors used internally to the incubator or warmer under test. Also referred to as the DAT unit
2. Temperature Connectors	Temperature Probes (T1 - T5) are connected on the top of the large, black thermal mass (Puck) to place the thermistor in the correct position above the mattress. T6 - T10, Temperature Probes are embedded in the thermal mass (Puck) for use in radiant warmers.
3. Thermal Mass (the <b>Puck</b> )	Thermal mass to mimic the infant body for convection warming in a radiant warmer. Contains Magnetic Fasteners (3.b) for attachment of other sensors
4. Temperature Probe (T1 - T5)	Bypasses the thermistor in the Puck and places the thermistor at the correct position above the mattress, per the Standard. For use with vPad-IN
5. Mattress Temperature	Measures the temperature of the mattress. For use with vPad-IN
6. Airflow Probe	Measures the flow of air, and can be moved as required. Held in place on the Puck magnetically.

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7. Sound Level Probe	Measures sound level. Can be moved within the device under test ( <b>DUT</b> ) and can also be connected to an extension cable for external sound/alarm level measurements. Held in place on the Puck magnetically.
8. Humidity Probe	Measures Humidity. Can be moved within the device under test ( <b>DUT</b> ). Held in place on the Puck magnetically. Not required for radiant warmers
9. Hub Connections - Left Side	a. T4 Temperature Input b. T5 Temperature Input c. Airflow Sensor Input d. Power Input e. Power LED f. Power Switch
10. Hub Connections - Right Side	a. T3 Temperature Input b. T2 Temperature Input c. Humidity Sensor Input d. Sound Level Sensor Input
11. Positioning Frame	Allows T2/7 - T5/10 Pucks to be positioned with respect to T1/6 at the center of the mattress
12. Positioning Frame Components	a. Longitudinal positioning bar b. Horizontal positioning bar c. T bracket

Each of the sensors has an internal magnet on the bottom which will hold it in place on the Thermal Mass. Each sensor also has a cable with a miniDIN connection to connect to the **HUB**.

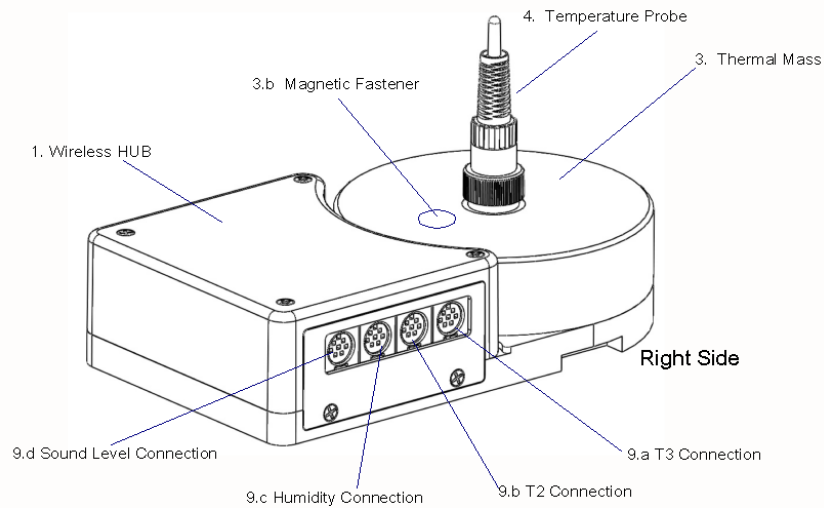


Figure 1: Wireless HUB - Right Side View

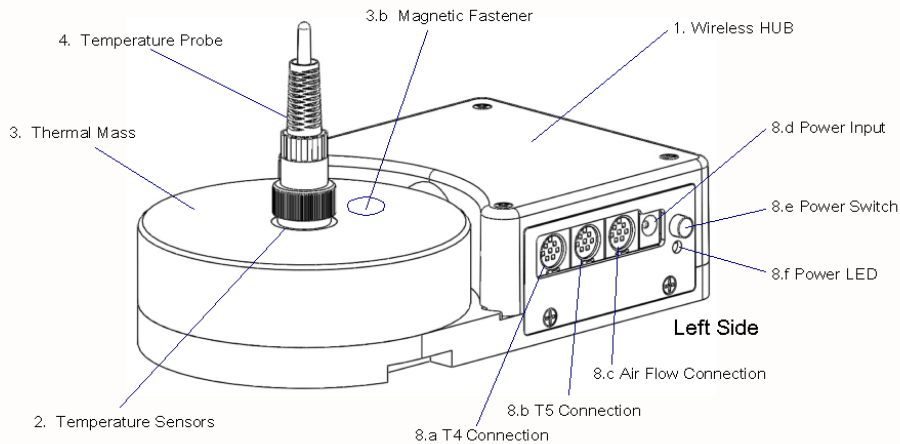


Figure 2: Wireless HUB - Left Side View

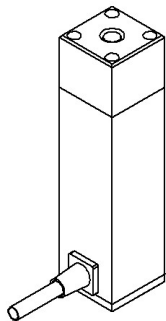


Figure 3:  
Sound Level Sensor

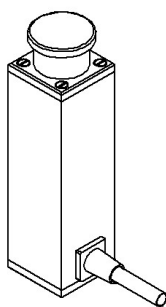


Figure 4:  
Air Flow Sensor

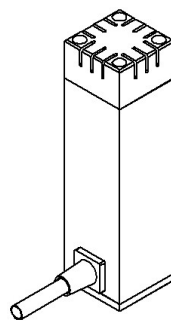


Figure 5:  
Humidity Sensor

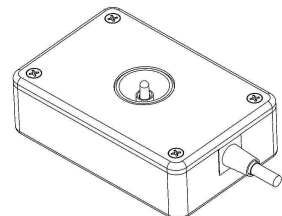


Figure 6: Mattress  
Temperature Sensor

## 2.4 Setup

To test a radiant warmer according to the Standard, the Sensor System must be placed on the mattress of the DUT with the Temperature Probe of the Hub in the center of the mattress, and the Temperature Probes of the remaining 4 Temperature Pucks placed in the center of each of the 4 quadrants of the mattress. The positioning frame is designed to assist in the positioning of the Pucks and to hold them in place during a test.

Measure the mattress to determine its size. For instance, the AirShields C200 has a nominal mattress size of 14 inches wide (36 cm) by 24 inches long (61 cm). Divide the mattress into 4 quadrants, each quadrant being 7 inches (18 cm) by 12 inches (30.5 cm). For this mattress, the center of quadrant Q2 is 3.5 inches above the long axis and 7 inches from the cross axis, see point **C2**, Figure 7.

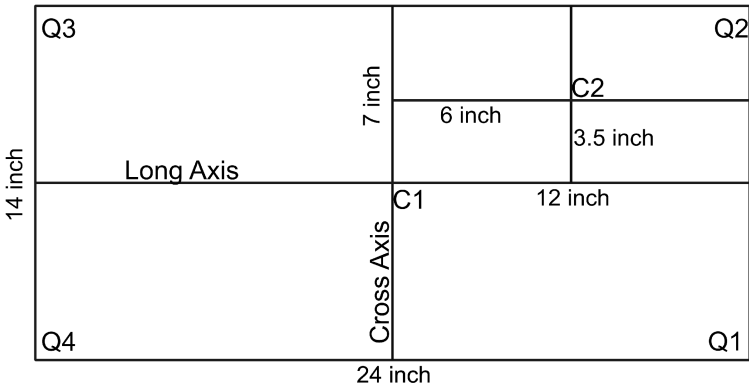
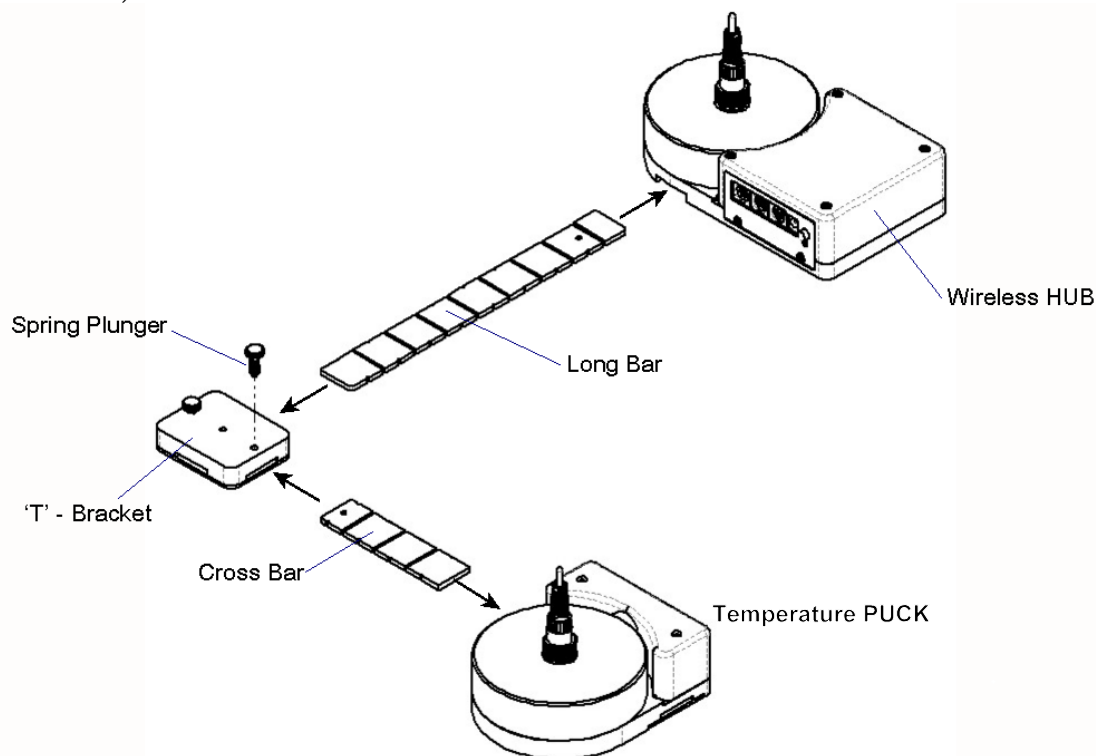


Figure 7: Mattress Quadrants and Center Locations

In setting up the positioning frame, the longitudinal (long) bar would be placed in the body of the **HUB**, with the end having a small hole about 1" from the end sliding into the slot in the **HUB**, as indicated in **Figure 8**. The 'T- bracket' is placed over the long bar and slid into the position marked '6' inches on the long bar. Similarly, the horizontal (cross) bar is slid into the 'T- bracket' and locked in place with the spring plunger. The smaller **Temperature Puck** is then slid into place to the position marked '3.5' inches on the cross bar. If the positioning frame is placed with the temperature probe of the **HUB** in the center of the mattress at C1, then the second temperature probe would be in the center of the mattress quadrant Q2 at position C2 in the diagram. For mattresses of other sizes, the 'small' **Pucks** can be moved along the bars as required to meet the dimensional requirements.

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If the smaller **Temperature Puck** seems too close, it can be rotated 180 degrees, in which case, add 3.5" to the markings on the long bar. In the example above, the 9.5 inch marking (6" + 3.5" = 9.5") would be used.

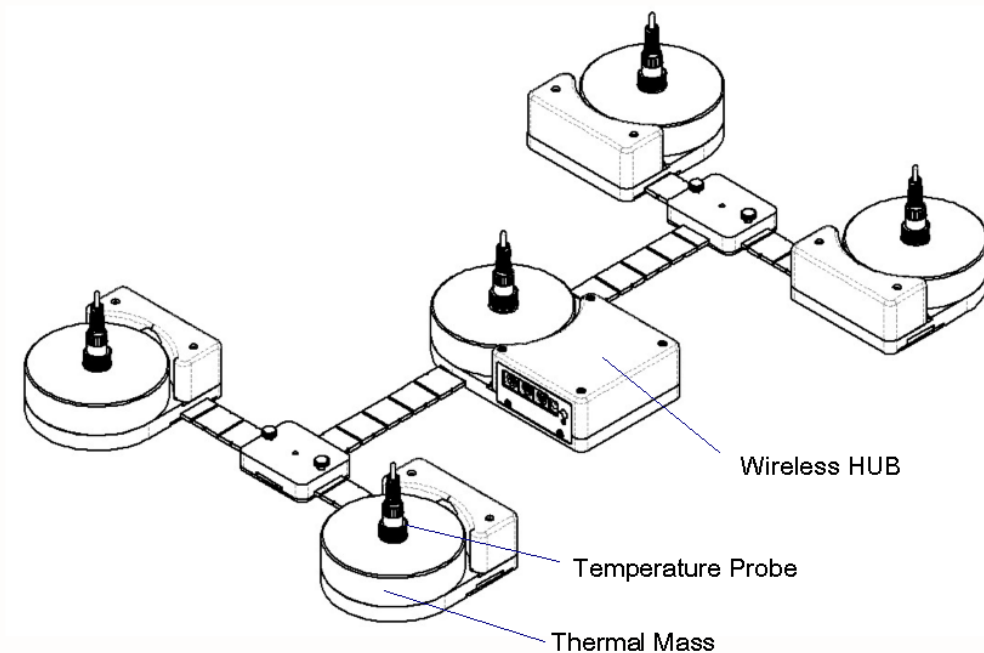


**Figure 8:** Positioning Frame Assembly

Temperature Pucks for each of the other three quadrants are set up in the same manner. The fully assembled system is shown in **Figure 9**.

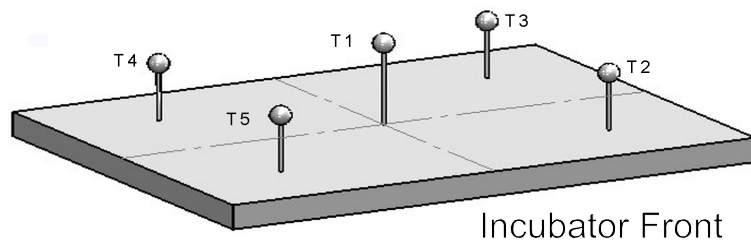
The vPad-RW test system is now configured mechanically, according to the Standard, to take temperature and other measurements in the center of the radiant warmer and in the center of each of the four quadrants of the mattress. It is now necessary to make the electrical connections for each of the sensors.

As previously described, the large round 'Puck' represents a thermal mass imitating the infant body in a radiant warming environment. This 'Puck' is made of aluminum with a black heat absorbing coating, with a temperature sensor embedded in the aluminum block. In this configuration, the temperature measured by the 'Puck' is specifically configured to test **radiant warmers**. For testing **incubators**, a Temperature Probe is inserted into the connector at the center of each Puck. This Temperature Probe bypasses the thermistor in the Puck and elevates the thermistor in the Probe to a position approximately 10 cm above the mattress, in accordance with the Standard.



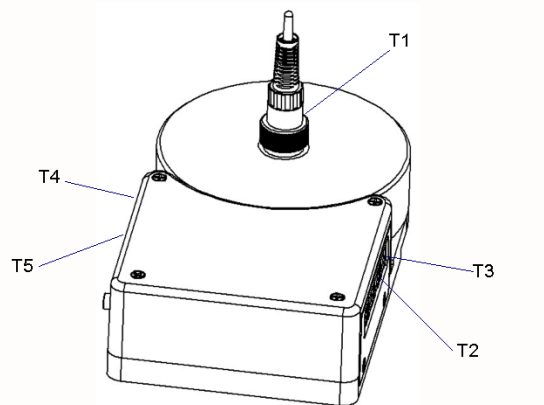
**Figure 9:** Sensor Frame Fully Assembled

In the Test Reports generated by the test software, the temperatures are referred to as T1 for the center of the incubator, and T2, T3, T4 and T5 for each of the quadrants as shown in **Figure 10**. If the Probes are removed, to test a radiant warmer for example, the above temperatures are then T6 to T10 respectively.



**Figure 10:** Temperature Sensor Positions

The cables from the individual **Pucks** will connect to the **HUB** as indicated in **Figure 11**, **Figure 2** and **Figure 1**.



**Figure 11:** Temperature Sensor Connection Locations

The sensors for Sound and Airflow also connect to the **HUB**, as indicated in **Figure 2** and **Figure 1**. These sensors are utilized when the relevant test is selected in the software test setup. When utilized, the sensors are held in place on the Puck by magnets.

The tablet connects wirelessly via Bluetooth to the wireless **HUB**.

The tablet also provides connection to the **Skin Sensor Oven** through the USB port so that **Skin Temperature Probes** can be checked for accuracy



## 2.5 Power On

After the System has been setup for the required mechanical positions, it may be turned on by pressing the Power On switch on the **HUB**, shown in **Figure 2**. If the **HUB** is being charged, with the AC Adapter plugged into the Power Input connector, a small LED below the Power On switch will illuminate RED, regardless of the position of the Power On switch. If the Power On switch is activated but the AC Adapter is not plugged in, the LED will illuminate YELLOW. If the AC Adapter is not plugged in and the Power On switch is NOT activated, the LED will not illuminate.

The **HUB** may be powered by battery or by AC Adapter.

Once turned ON, the **HUB** will wait for the tablet to initiate communications.

## 2.6 vPad-RW Software

The vPad-RW software is preloaded on the tablet. When turned on, the tablet presents the Android Home Screen, where selecting the vPad-RW icon will run the vPad-RW Application. When you exit the Application, the Tablet will return to the Home Screen. It is recommended no other apps be loaded onto the tablet so as to avoid conflicts with other apps, or accidentally infecting the tablet with a virus or other malware. Problems which arise from loading other apps on the tablet are not covered by warranty.

**NOTE: The vPad-RW software is setup to test Infant Radiant Warmers. The large black PUCKs are the required thermal mass for Radiant Warmer testing and have embedded temperature sensors for that purpose. The vPad-IN software for Infant Incubators uses the same hardware, with the addition of the temperature probes, and the humidity sensor. vPad-IN software may be already loaded on your tablet, or may be purchased as an accessory. Contact your dealer for details.**

The software will allow the user to create different test protocols that may not encompass the complete requirements of the Standard, but which are suitable for testing or verifying different parts of the radiant warmer's operation. The Default test protocol includes all of the tests required by Section 8 (Accuracy of Data) and some parts of Section 101(Additional Requirements) of the Standard. User defined protocols may be created, saved and recalled for future use.

In addition, the user can create a mini database of the warmers and incubators that have been or are to be tested. In order to do a test, the user must input a Control Number (ID) so that the test report can be identified. The test technician's initials are also required so the report will show who was responsible for doing the test. Other information can be optionally input to further identify the DUT.

## 2.7 Radiant Warmer Primer

Radiant Warmers are a controlled temperature environment which are used to maintain the body temperature of newborns who, for various reasons, are unable to regulate their own body temperature. Radiant Warmers generally work in one of two modes: 1) manual temperature control, or 2) body (skin) temperature control.

In manual temperature control, the radiant energy from the infrared heating element in the warmer is used to control the infrared energy radiated to the infant on the mattress. The infant's body absorbs the energy, resulting in an increase in body temperature. In this mode the infant's body temperature must be carefully monitored and the energy output of the warmer adjusted constantly to ensure the infant's temperature remains at an acceptable value.

It is generally more effective to control the temperature of the baby by monitoring the baby skin temperature directly and automatically adjusting the radiant energy to maintain the infant's skin temperature at the desired temperature.

In addition to controlling the temperature of the patient, radiant warmers may also support a number of other features, including but not limited to: alarms for high temperature, and independent, non-electronic, temperature indicators.

## 3 Tablet Setup

The following instructions relate to the tablet to be used with the vPad-RW Radiant Warmer test system. The measurement hardware is placed on the Radiant Warmer mattress, as described in Chapter 2, and communicates with the tablet via Bluetooth. The tablet will be paired with the measurement hardware and the vPad-RW App will be installed and activated prior to delivery, and should not need any further setup.

Ensure the tablet has been charged before attempting to use it for testing. The tablet and wireless hub batteries will last for at least 4-6 hours when fully charged, but if power is available, it is advisable to connect the charger to the units for the duration of any long tests.

To switch the tablet ON, press and hold the tablet power button (5-10 sec) until the tablet 'HOME screen' appears. The Android operating system will be fully loaded when the screen below is displayed.

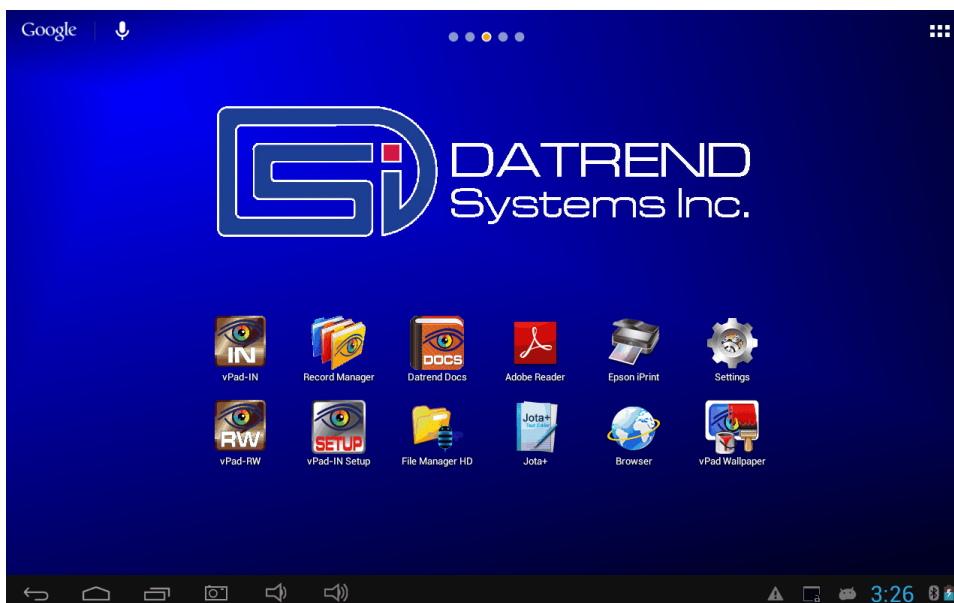
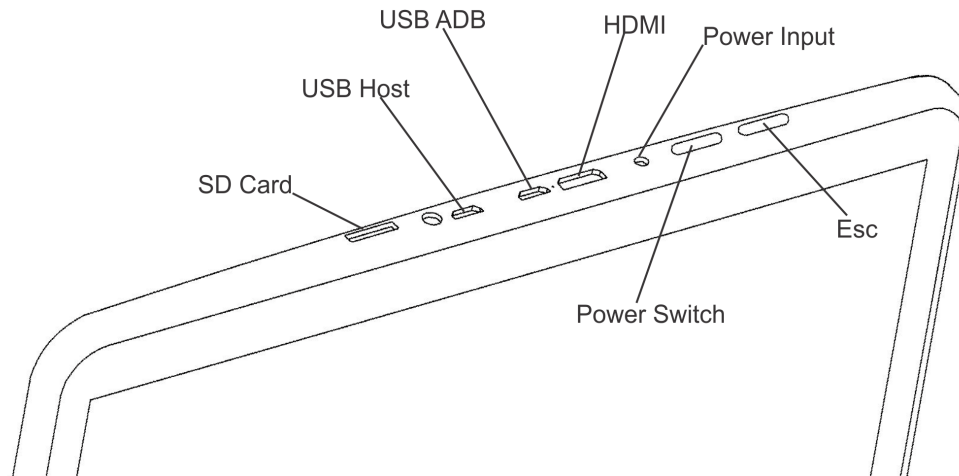


Figure 12: Tablet Home Screen

## vPad-RW OPERATING MANUAL

The Input/Output ports of the tablet are all arranged along the top edge of the tablet. These are:

- SD card: up to 16 Gb
- USB Host: for connection to USB drive, keyboard, barcode scanner, etc.
- USB ADB: Android Developer Bridge, for hardwire control of other devices
- HDMI: Output to HDMI display
- Power Input: 5V, 500mA min
- Power Switch
- Esc: Escape out of the app you are in and return to the Home screen



**Figure 13:** Tablet I/O ports

Switch the tablet OFF when vPad-RW will not be in use for an extended period of time. Press and hold the ON/OFF switch until a confirmation message appears on the tablet screen. Select the appropriate response to complete the Power Off sequence.

When it is not necessary to have the tablet display on (and you are running from battery power), it is good practice to turn the display OFF temporarily. Pressing and releasing the Power ON/OFF button momentarily will put the tablet in a 'sleep or standby' mode. Press the ON/OFF button momentarily again to 'wake' the tablet. This is NOT the same as OFF, but it will reduce power consumption and extend the usable battery life of the tablet.

## 4 Operation

This chapter explains how to use vPad-RW to define performance tests and inspections on infant radiant warmers, following a predefined sequence of steps referred to as an Autosequence. This chapter describes the software used to control the test operation and assumes that the hardware has been assembled and is in place in the Baby Compartment of the radiant warmer, as described in Chapter 2.

### 4.1 HOME Screen

The (typical) Android HOME screen (**Figure 14**) is displayed approximately 60 seconds after switching the tablet ON.



Figure 14: Android Home Screen

## vPad-RW OPERATING MANUAL

Initiate actions on the tablet by pressing the corresponding icon or button. For example:



Press to launch the vPad-RW software application, or "**app**". Use this app to perform automated infant radiant warmer testing.



Press to launch the vPad-IN app. Use this app to perform automated baby incubator testing.



Press to launch the vPad Record Manager app. Use this app to copy, print, convert or delete Test Records saved by vPad-RW.



Press to access Settings. Use this menu to configure sound, display, touchscreen, and wireless setup.



By default, vPad-RW is supplied with WiFi connectivity disabled. Use the Settings menu to enable wireless connectivity, in accordance with policies of your institution or organization.



At bottom middle or top right on the screen\*, press this **Apps** icon to access more apps which are installed on the tablet.



On bottom task bar, middle or left on the screen\*, press this **Home** icon to return from an app to the Home screen.



On bottom task bar, middle or left on the screen\*, press this **Back** icon to navigate back one step, from the app or screen currently being displayed, to a previous one. For some apps, this button's function may be disabled.



On bottom task bar, middle or left on the screen\*, press this **Recents** icon to jump from the current app to a different app that was started earlier, but is currently on pause.

\* Android operating system version dependent, subject to change without notice. For more information on how to use the Android tablet, refer to the tablet operator manual supplied with vPad-RW.

## 4.2 Startup



Press the vPad-RW icon, , on the Android Home screen to start the app. A splash screen will display the product name and the software version.

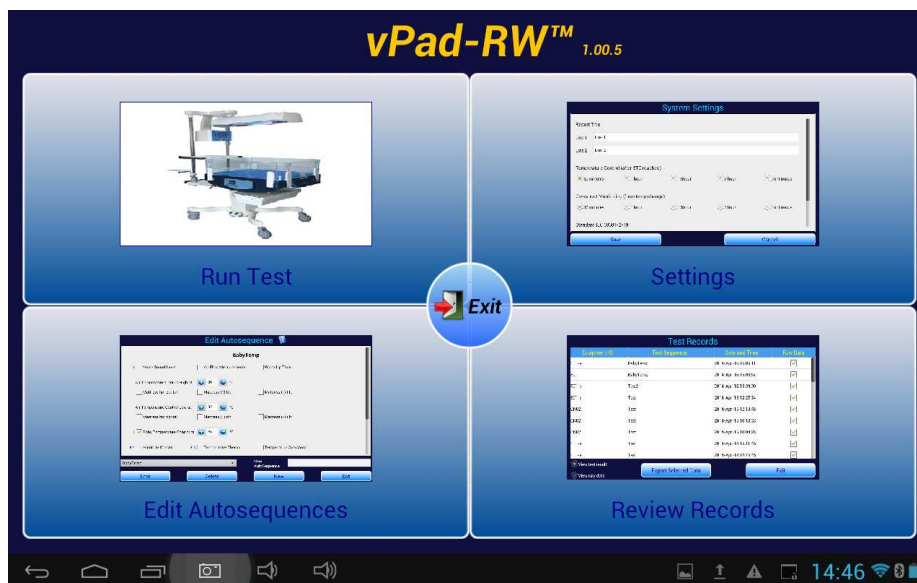


Figure 15: vPad-RW Splash Screen

From the splash screen, the user can select one of the four modules that provide vPad-RW with its functionality: 1) Test Settings; 2) AutoSequences; 3) Run Test; and, 4) Review Records. Each of these modules will be discussed in detail in the remainder of this chapter.

## 4.3 Test Settings

The functional performance of infant radiant warmers is defined by the Standard IEC 60601-2-21: Medical Electrical Equipment Part 2: Particular Requirements for the Safety of Infant Radiant Warmers. This standard defines the mechanical and electrical requirements that manufacturers are expected to meet when designing an infant radiant warmer. When testing a warmer after the design has been certified to meet this standard, the most relevant tests are related to the physical parameters of temperature, airflow and sound. The functional specifications for these parameters are contained within section 8 of the Standard - 'Accuracy of Operating Data and Protection Against Incorrect Output', and section 101 - 'Additional Requirements'. vPad-RW has been designed to test these particular requirements. (Note: Section numbering may change from time to time as the Standard is revised.)

As temperature tests tend to take a long time, vPad-RW has been designed to allow the user to define the particular subset of tests that are desired. This subset can be saved as a Autosequence (protocol) for future use.

## 4.4 Global Settings

The system and test setups are accessed from the Main Screen of the vPad-RW program as shown in **Figure 15**. Pressing the **vPad-RW Settings** portion of the screen will access the **System Settings** screen of **Figure 16** and **Figure 17**, which will allow modification of how the system will react or perform tests, in a general sense during tests.

### Report Title

The Report Title is a 2 line entry which will show up on every report, to identify the facility which owns the radiant warmers or, alternately, the facility / Company doing the testing. Touch in either Line 1 or Line 2 and enter the Title(s) desired. Once a report is created, the Report Title in the report is fixed and will not change if the System Setting is modified (see **Figure 16**).



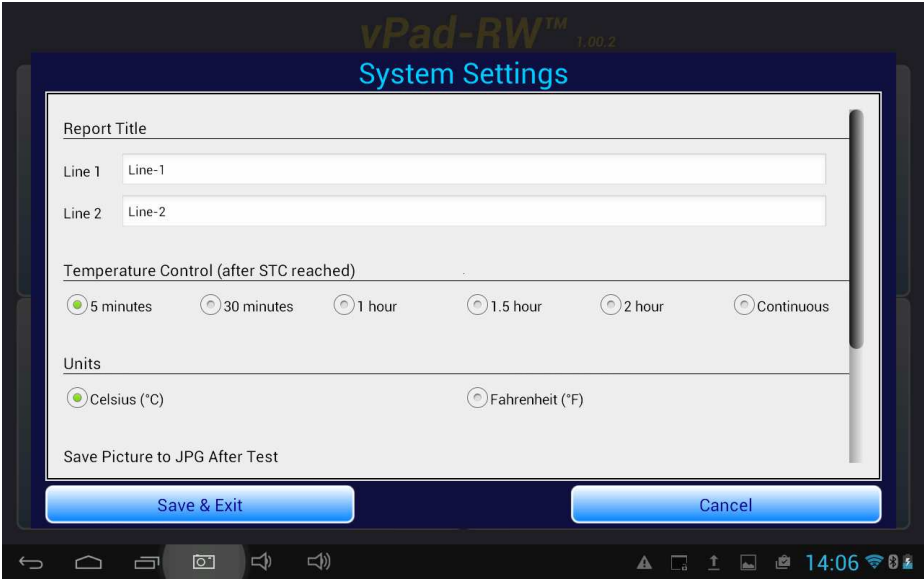


Figure 16: System Settings

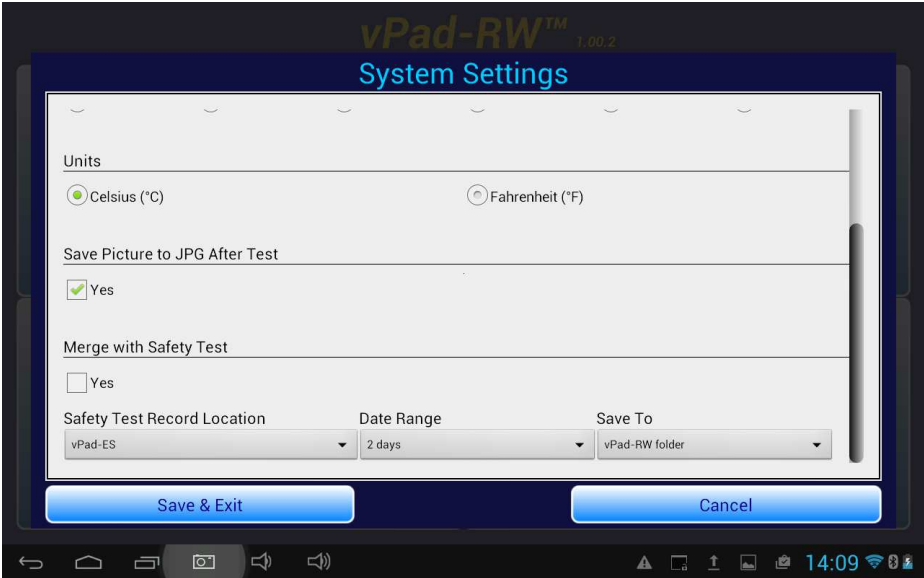


Figure 17: System Settings (cont)

### Temperature Timer

In accordance with the Standard, vPad-RW is designed to recognize a condition called the Steady Temperature Condition (**STC**), which is defined in the Standard, in Section One, clause 2.10.101 as:

Steady Temperature Condition: a condition which is reached when the temperature, measured at the center of the **TEST DEVICE** (the ‘puck’) positioned on the mid point of the **EQUIPMENT** (radiant warmer) mattress, does not vary by more than 1 °C over a period of 60 minutes.

During a particular temperature test, once **STC** is reached the user can optionally set vPad-RW to continue recording the temperature for an additional 5, 30 , 60, 90 or 120 minutes. If a timer is set, vPad-RW will stop the test the selected number of minutes after **STC** is reached. Alternately, the time can be set to continuous, in which case the user can stop the test at any time after **STC** is reached by touching the **Stop Test** button.

### Units

The units that the system will use for temperature reporting can be selected as either °C or °F. Note that when switching units, the results may not be simple integers; for instance 36 °C will become 96.8 °F. It is best to select one unit of measure and stick with it.

### Save Picture to JPG after test

The graph which represents the temperature versus time response of the radiant warmer may be of interest and can be saved to memory. If it is saved, the screen will display the image after the test is accepted, and the filename of the image will be included in the test report.

### Merge with Safety Test

The tests performed by vPad-RW can be quite time consuming, therefore it is generally impractical to perform a safety test on a radiant warmer and then do a performance test with the vPad-RW app, all as part of one test or Checklist. In order to keep test data together, it is possible to merge the safety test (or even a performance inspection using vPad-Check or vPad-mT) with the test results of the vPad-RW app.

If it is desirable to merge the electrical safety test record and vPad-RW performance record, check the **Yes** box under **Merge with Safety Test**. Select the location where the safety test(s) will be found from the list presented under **Safety Test Record Location**. It is expected that the safety test and performance test will be done reasonably close together. Under **Date Range**, select the most appropriate date range to find the most current safety test(s). The default is 2 days, but there are also options for 1 week and All. Finally, in the **Save To** selection, the merged file can be directed to the vPad-RW test records area, or saved back to the original safety test records location.

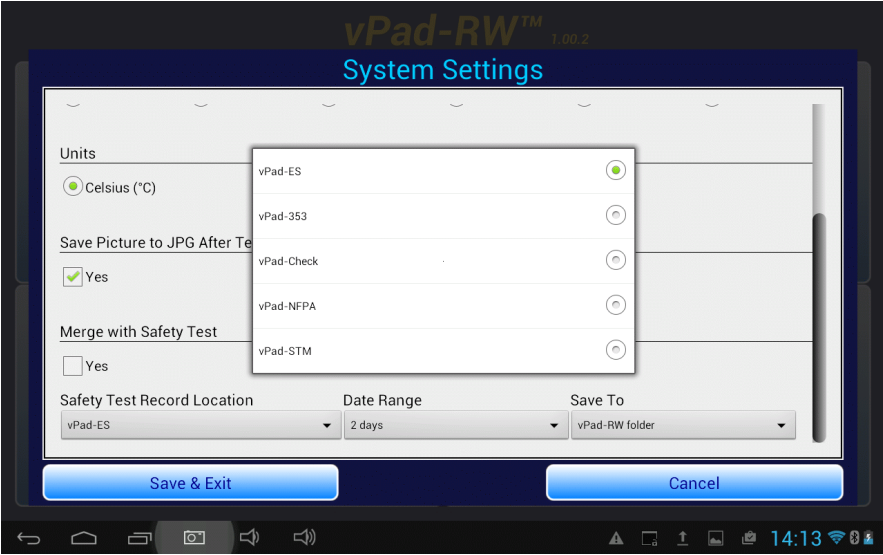


Figure 18: Merging Safety Test Results - Choose App

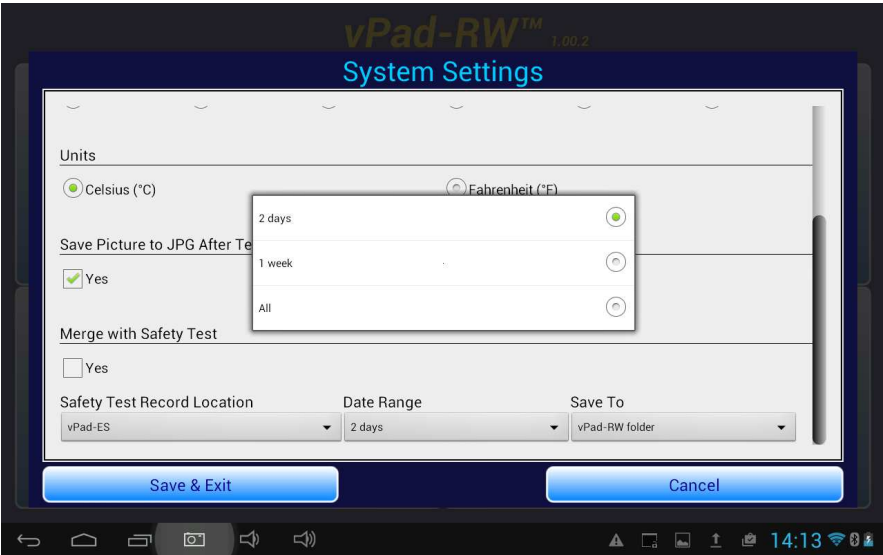


Figure 19: Merging Safety Test Results - Time frame

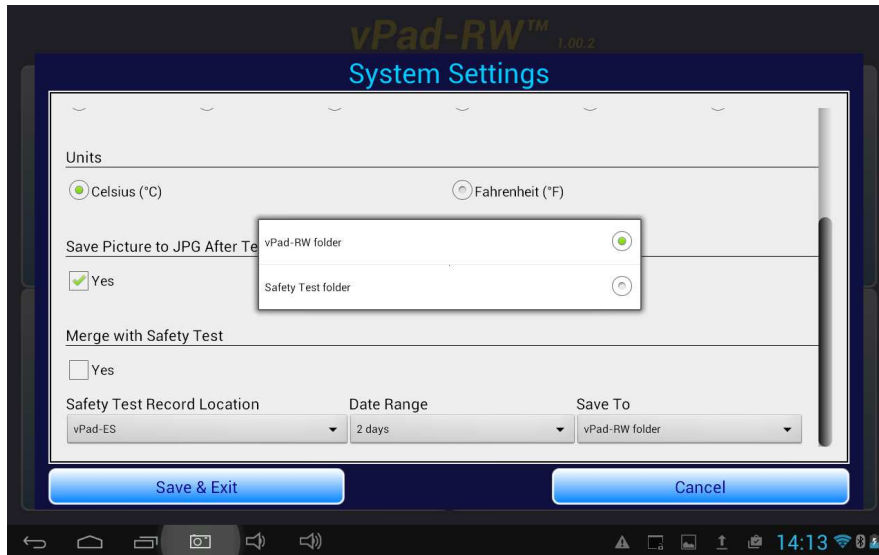


Figure 20: Merging Safety Test Results - Destination Folder

When the **Merge with Safety Test** option has been selected, and **Save** is pressed at the end of an radiant warmer test, a list of safety tests for the radiant warmer **ID**, and meeting the above criteria, will be displayed. Touching the appropriate filename line will cause the radiant warmer test record data to be appended to the safety test record, and the resulting file will be saved to the designated **Save To** location.

## Language

vPad-RW is designed to work in multiple languages. Changing languages is a function of the tablet. If a translation of the App is available, it will be automatically selected by changing the 'native' language of the tablet. Contact your dealer for further details on language availability for this app.

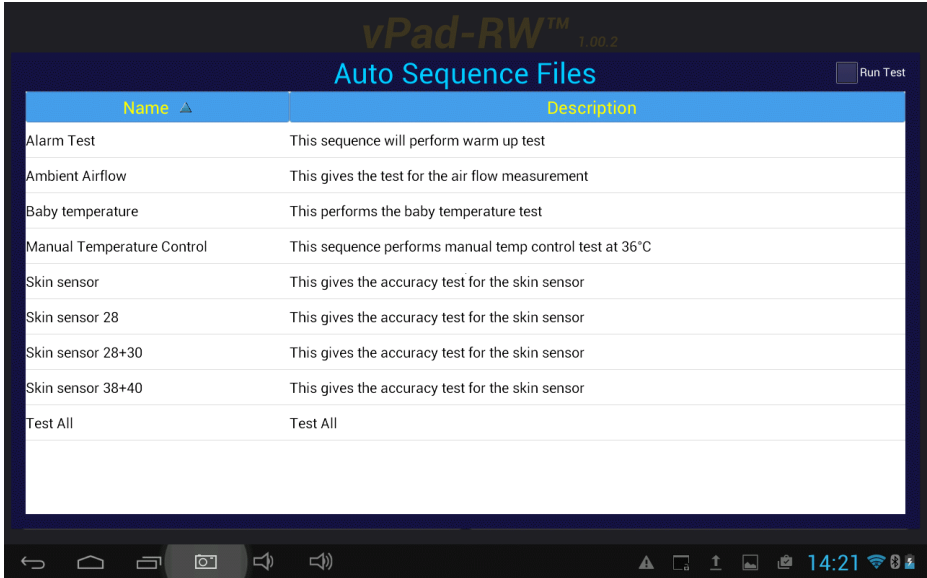
## 4.5 Create / Edit / Run Autosequences

Autosequences are a defined set of parameters to test during the radiant warmer performance assurance procedure. Touching the **Edit Autosequences** quadrant on the main screen will provide a list of available Autosequences which can either be Edited, used as templates to create new Autosequences, or, be selected to **Run** directly.

The scrollable list of Autosequences provides the sequence name and the sequence description for easy selection. Technically, the Standard expects all the parameters to be tested, however, this really only true for the type certification test when the manufacturer is seeking regulatory approval. Typically, when doing routine performance assurance testing, a user/owner of a radiant warmer may elect to do a subset of the overall test which reflects the risk level and testing schedule for a given parameter. These various tests or sequences can be created and saved for easy selection when testing is to be done.

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In the upper right corner of the Autosequence list screen (see **Figure 21**), there is a check box, **Run Test**. If this box is not checked, selecting an autosequence will allow editing of the selected sequence, or use of the selected sequence as a template for creating a new sequence. If the box is checked, selecting a sequence will actually start running or performing the selected test, without entering the edit screen first.




Name ▲	Description
Alarm Test	This sequence will perform warm up test
Ambient Airflow	This gives the test for the air flow measurement
Baby temperature	This performs the baby temperature test
Manual Temperature Control	This sequence performs manual temp control test at 36°C
Skin sensor	This gives the accuracy test for the skin sensor
Skin sensor 28	This gives the accuracy test for the skin sensor
Skin sensor 28+30	This gives the accuracy test for the skin sensor
Skin sensor 38+40	This gives the accuracy test for the skin sensor
Test All	Test All

**Figure 21:** Auto Sequences

**Figure 22**, shown on the next page, allows Autosequences to be created, modified, recalled and saved to meet the particular needs of the user. From this screen each test parameter can be enabled as required for a test. If it is expected the test may be needed again, it can be saved as an Autosequence by entering a name into the field **Sequence Name**, entering a **Description**, and pressing the **Save** button. During an Autosequence, the parameters will be tested in the order in which they appear on the screen. This order has been selected to minimize disruption of the temperature tests by opening the radiant warmer doors at inopportune times. To enable testing of a parameter, touch its related check box. Enabled tests will display a check mark in the box.

The **Save** button will save the defined Autosequence to a file with the filename given in the **Sequence Name** field. If the name is the same as the original name (eg. Editing an existing sequence), the existing file will be updated. If the **Sequence Name** has been changed, a new filename will be created. If a file is selected and the **Delete** button is touched, the existing file will be deleted *after* the **Exit** button is pressed. The settings, however, will remain on the screen for further editing, or saving to a new filename.

Some parameters have a small number in front of the selection box. If the  icon is pressed, a help screen will be displayed, providing information on the numbered parameter.

In this part of the manual, each parameter will be described in reference to the requirements of the Standard.

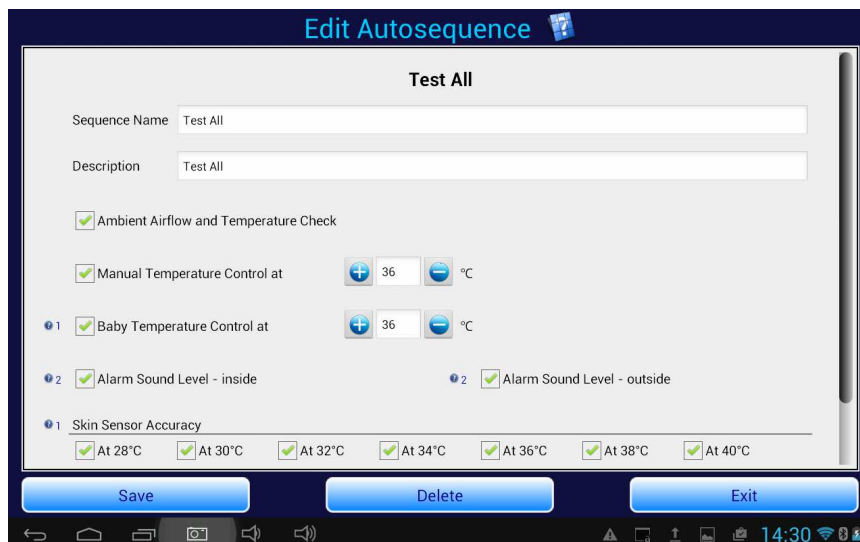


Figure 22: Edit Auto Sequences

## Ambient Air Flow and Temperature Check

The flow of air across the radiant warmer mattress is measured in terms of **Air Velocity (AV)** [section 2, clause 10.2.1], and is measured at the midpoint of the mattress. The AV at the specified point shall not exceed 0.3 m/s. This test is performed before the (heating) temperature testing is started. During the ambient airflow test the ambient temperature is also tested to be in the range of 18 to 30 °C

## Manual Temperature Control

The manual temperature test is preset to 36 °C, as recommended by the Standard however, vPad-RW will allow testing at other temperatures. **STC** has been previously defined. The Mid Point Average Temperature (**MPAT**) is defined in the Standard, section one, clause 2.10.103 as:

The **TEST DEVICE AVERAGE TEMPERATURE** of the **TEST DEVICE** at the mid point fo the **EQUIPMENT** mattress

Where the Test Device Average Temperature (**TDAT**) is defined in the Standard, section one, clause 2.10.102 as:

The average temperature reading taken during a **STEADY TEMPERATURE CONDITION** at regular intervals at the center of a **TEST DEVICE**

With a Control Temperature setting of 36 °C, in Manual Control Mode, the radiant warmer is allowed to reach **STC** and the **MPAT** is calculated. For the temperature measured at the center of the mattress, the difference between the **MPT** and the **TDAT** for each of the other 4 temperature measurement positions **T7 - T10** must not exceed **2 °C**.

### Baby Temperature Control

The ability of the radiant warmer to control the baby's temperature using a skin temperature sensor in Servo Control Mode can be tested by selection of the Baby Temperature Control test at 36 °C. As with the Manual Temperature Control, this test can be performed at temperatures other than that recommended by the Standard.

Testing Servo Controlled Mode or Baby Temperature Control is described in the Standard in section 8, clause [50.103]. With a Control Temperature setting of 36 °C, in Baby (Skin) Control Mode, the pre-tested Skin Temperature Sensor (see Skin Sensor Accuracy test) is attached to the black metal 'puck' at the center of the mattress. The radiant warmer is allowed to reach **STC**. The difference between the Skin Temperature Sensor and the Control Temperature must not exceed 0.5 °C at any time after **STC** is **TRUE**.

### Alarm Sound Level - Inside

The Standard requires the alarm sound levels to be tested inside and outside of the radiant warmer to ensure they are not so loud as to injure the infant, and loud enough to be heard by the operator. For the test inside the radiant warmer (on the mattress where the infant would be positioned), the requirements are defined in section 101, clause 102.1. The sound pressure level (A weighted) is measured at a position of 5-10 cm above the center of the mattress, with the radiant warmer operating. The sound level at the mattress during an alarm must not exceed 80 dBA.

### Alarm Sound Level - Outside

The Standard requires the alarm sound levels to be tested inside and outside of the radiant warmer to ensure they are not so loud as to injure the infant, and loud enough to be heard by the operator. For the test outside the radiant warmer, the requirements are defined in section 101, clause 102.1. The sound pressure level (A weighted) is measured at a position 3 meters perpendicular to the front of the radiant warmer, 1.5 meters above the floor. The sound level during an alarm must be at least 65dBA.

### Skin Sensor Accuracy

The sensor used to control the temperature in the Baby Temperature Control test must have an accuracy as defined in the Standard under section 8, clause 50.101. Testing the accuracy of the Skin Temperature Sensor (STS) requires the use of a separate temperature-controlled 'oven' module. The 'oven' can be set to a temperature of 28 °C to 40 °C. The STS is plugged into the radiant warmer's temperature control module and the temperature sensing element is placed in the 'oven'. The difference between the Skin temperature displayed on the radiant warmer's control module and the oven's temperature must not exceed 0.3 °C

## Select All/Clear All

The Select All and Clear All buttons on the Autosequence display allow selection of every parameter test (Select All) or no parameter tests (Clear All). These selections can be useful when beginning to set up an Autosequence, depending on whether most of the tests are required or very few tests are required.

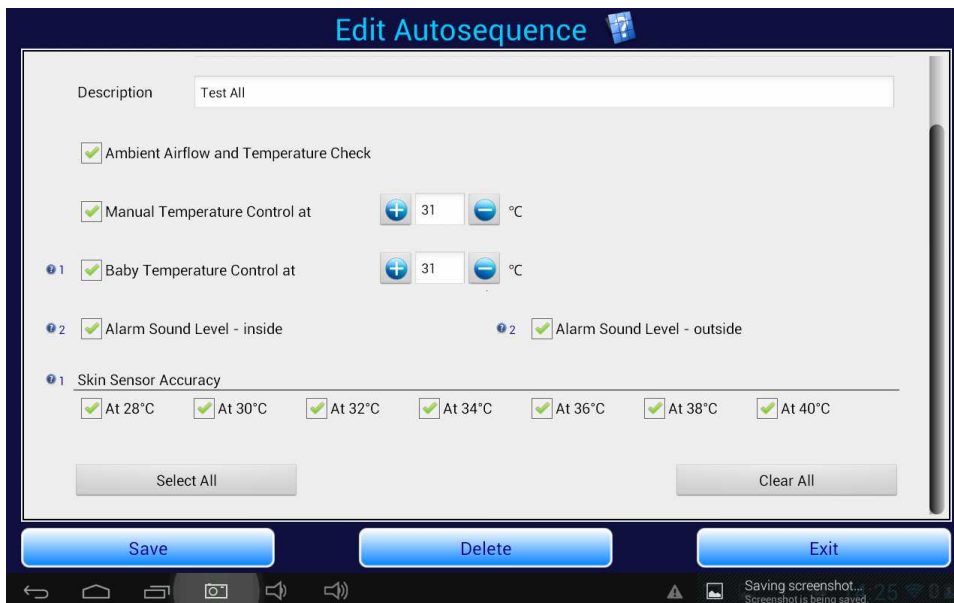


Figure 23: Edit Auto Sequences (cont)

## 4.6 Run Test

In addition to running a test by selecting an autosequence from the Edit Autosequence screen, a test can be run by touching the Run Test quadrant of the main screen. The only difference is whether you select the Autosequence first through the Edit Autosequence list, or you select the Autosequence after you choose the radiant warmer to test through the Run Test option.

Regardless of the way in which a test is ‘run’, the test requires that the radiant warmer be identified, so that the report can be saved. Running a test will first display the device information input screen shown below.

It is mandatory to enter the Equipment ID, as it will form the core of the test report filename. The Technician Initials (or alternate code) is also mandatory to identify who performed the test. Other information (make, model, location, facility) may be entered, but are not mandatory.

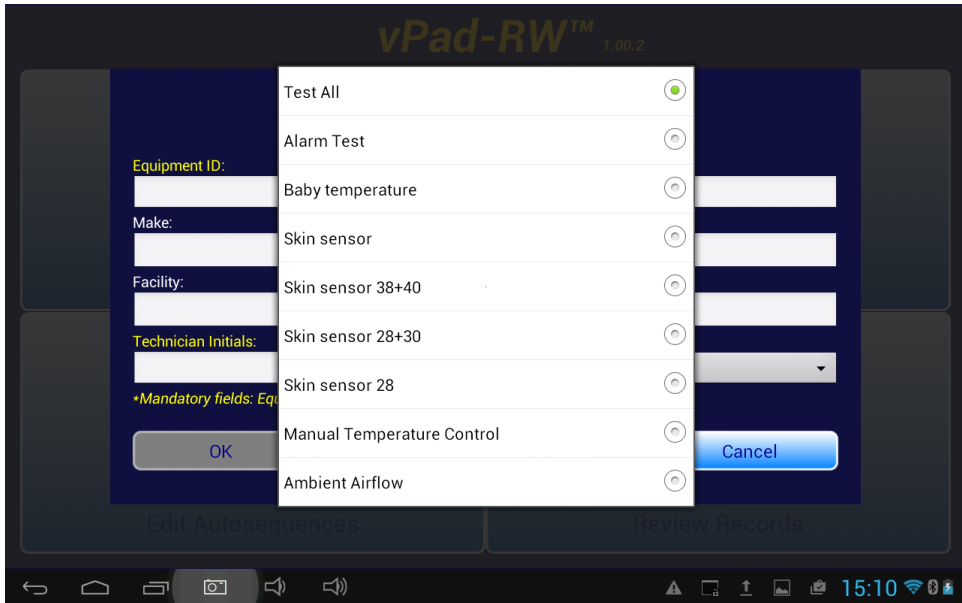




The image shows the 'Radiant Warmer Tests' screen of the vPad-RW 1.00.2 application. The screen has a dark blue background with white text. At the top, the title 'Radiant Warmer Tests' is displayed in a light blue font. Below the title, there are two columns of input fields. The left column contains 'Equipment ID:', 'Make:', 'Facility:', and 'Technician Initials:'. The right column contains 'Serial Number:', 'Model:', 'Location:', and 'Auto Sequence:'. The 'Auto Sequence:' field is a dropdown menu currently showing 'Test All'. Below the input fields, there is a note: '\*Mandatory fields: Equipment ID and Technician Initials are always mandatory.' At the bottom of the form, there are three buttons: 'OK', 'Clear', and 'Cancel'. The 'OK' button is greyed out, while 'Clear' and 'Cancel' are blue. Below the form, there are two tabs: 'Edit Autosequences' and 'Review Records'. At the very bottom, there is a status bar with various icons and the time '15:11'.

Figure 24: Equipment Information Screen

If this screen was entered from the Edit Autosequence option, the correct Autosequence will be included in the AutoSequence field. Otherwise, if this screen was entered from the Run Test screen, it will be necessary to select the desired AutoSequence from the list of defined Autosequences, as shown below.



The image shows the 'Radiant Warmer Tests' screen with the 'Auto Sequence' dropdown menu open. The dropdown menu lists several options: 'Test All', 'Alarm Test', 'Baby temperature', 'Skin sensor', 'Skin sensor 38+40', 'Skin sensor 28+30', 'Skin sensor 28', 'Manual Temperature Control', and 'Ambient Airflow'. Each option has a radio button next to it. The 'Test All' option is selected, indicated by a green dot. The 'Cancel' button is visible at the bottom right of the dropdown menu. The background of the screen is the same as in Figure 24, but the 'OK' button is still greyed out.

Figure 25: Selecting the Auto Sequence

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Once the mandatory information is entered, the **OK** button will be enabled. Touching the **OK** button will begin the actual test.

As data is entered and accepted (by pressing OK) for the radiant warmer inventory, a small database is created which will allow a radiant warmer to be selected from a list, in the future. To select an radiant warmer from the list, simply touch the Equipment ID field (or Serial Number field), and a list of pre-existing entries will be displayed. Touch the entry which matches the radiant warmer you wish to test, and all of the fields will be populated from the database.

The screenshot shows a dark-themed application interface. On the left, there are several input fields: 'Equipment ID:' with a value 'CN01-0302', 'Facility:', 'Technician Initials:', and a note '\*Mandatory fields: Equipment ID and Technician Initials are always mandatory.' On the right, there are fields for 'Serial Number:', 'Model:', 'Location:', and 'Auto Sequence:' with a 'Test All' button. A 'Next' button is located on the right side of the form. A virtual keyboard is displayed at the bottom of the screen.

Figure 26: Selecting Equipment from the database

With the equipment information properly entered and the correct Autosequence selected, touch the **OK** button to run the test. Details of the screens which will be displayed during the various available tests will be covered in Chapter 5.

## 5 Running a Test

### 5.1 Overview

Once the required Autosequences have been designed and saved, vPad-RW is ready to run a test on a radiant warmer. This chapter describes the software used to control the test operation and assumes that the hardware has been assembled and is in place in the **mattress** of the warmer, as described in Chapter 2.

The process of creating/editing and selecting an Autosequence for processing has been described in Chapter 4. Once the equipment information has been input and the OK button pushed, vPad-RW will proceed to perform each of the individual tests enabled in the Autosequence. The tests will proceed in the order shown on the Edit Autosequence screens, which have been determined to be the order which will be least disruptive to the completion of the temperature tests (to minimize temperature change / loss).

The remainder of this chapter describes the individual tests and the screens that will be encountered during the performance of the test.

**Note:** If the wireless hub is running off the battery and the voltage gets low, an alarm will sound every five seconds and a warning sign will be placed on the flashing battery icon:



The mains charger must be connected to ensure no loss of data.

## 5.2 Ambient Air Flow and Temperature

If an **Ambient Airflow and Temperature** test has been selected, the instruction screen of **Figure 27** will be shown.

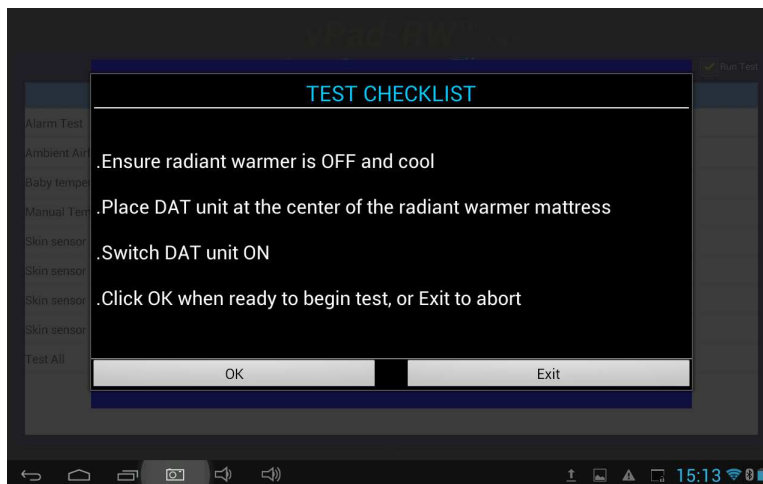


Figure 27: Ambient Airflow & Temperature Test Instructions

Note: Remove the Protective Cap from the Airflow Sensor body to expose the sensor prior to attempting any measurements.

When all sensors are in place, click on the **OK** button.

Once the Bluetooth wireless connection is made to the DAT (Data Acquisition Device) the user must press **Continue** to proceed with the actual test. This screen is just to confirm that wireless communications have been established.

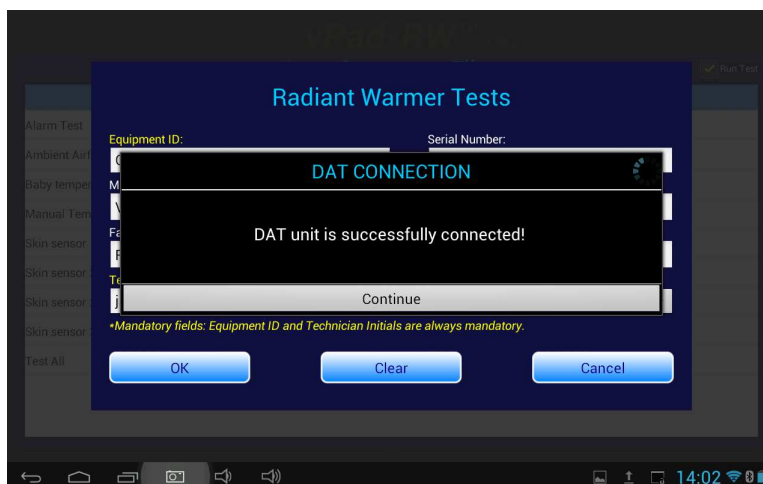
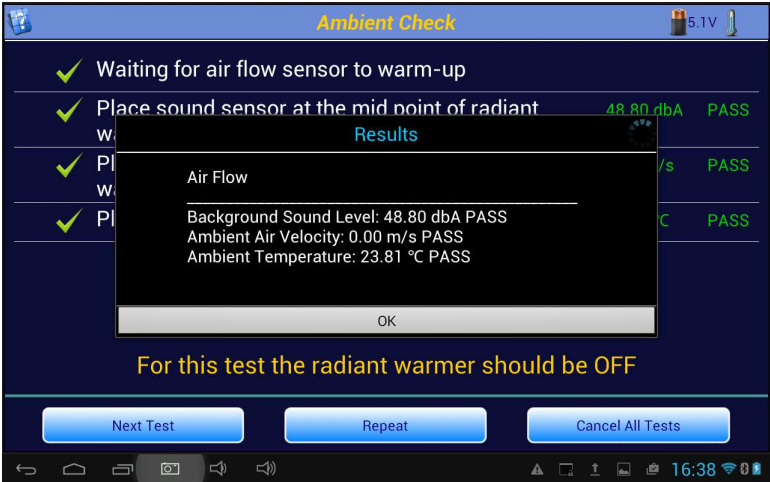


Figure 28: Bluetooth connection confirmation message

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When the measurements have been completed the results will be reported as indicated in **Figure 29** below.



**Figure 29:** Ambient Check Test Results

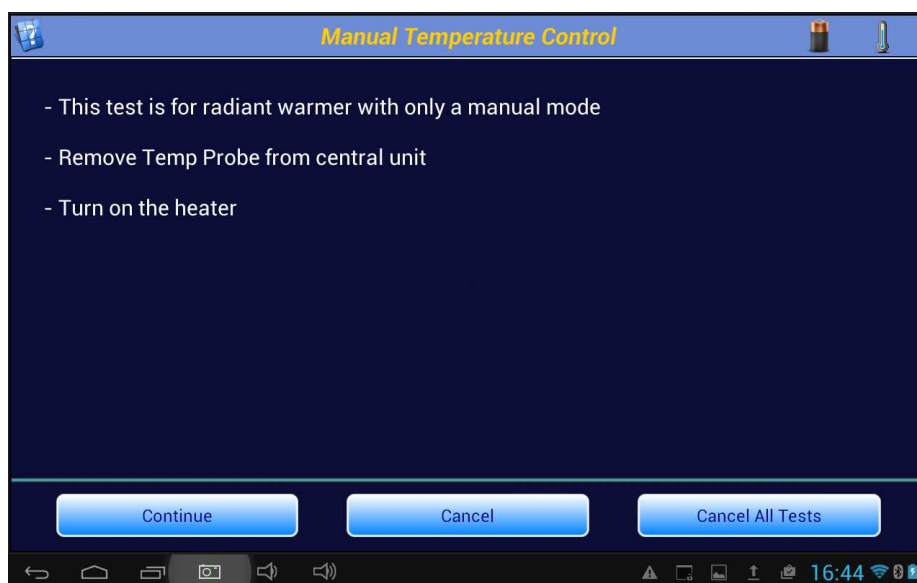
If, during this test, a measurement is found to be outside of the accepted values (per requirement 50.102), the measurement will be shown in amber and it will be possible to make corrections and retest the ambient values.

Acceptable Ambient Values:	Background Sound Level:	< 50 dbA
	Air Velocity:	< 0.1 m/s
	Temperature:	23 ± 2°C

## 5.3 Manual Temperature Control Test

A radiant warmer must be able to maintain a constant/consistent radiant infrared energy output so as to be able to maintain an infant's body temperature (under ideal conditions). The Standard requires the radiant warmer to be able to sustain a Steady Temperature Condition (**STC**), per section 8, clause 50.102. While the Standard allows testing at any temperature, it generally recommends 36 °C for the temperature test.

When a **Manual Temperature Control** test is initiated by an Autosequence, the test instructions are presented as shown in **Figure 30**. The radiant warmer is then set to Manual Control mode and turned **ON**, if it is not already running. When the actions indicated in the instructions are complete, click on the **Continue** button to start the test.



**Figure 30:** Manual Temperature Control Set-up Instructions

When the test starts, the program will create a graph of the temperature at the center of the mattress from the sensor embedded in the **Test Device** (the 'puck'). As shown in **Figure 31**, the display will also indicate the **Control Temperature** defined in the Autosequence, and the length of time the test will continue to run after **STC** is reached. In the example shown, the **Control Time** has been set to 30 minutes. After **STC** has been reached, the timer will count down to zero, at which time the test will terminate. If the time has been set to **Continuous**, the test will run until the **Stop Test** button is pressed.

In addition, the **Mid Point Temperature** will be displayed on a minute to minute basis. The **Mid Point Average Temperature** will not be displayed until **STC** is reached.

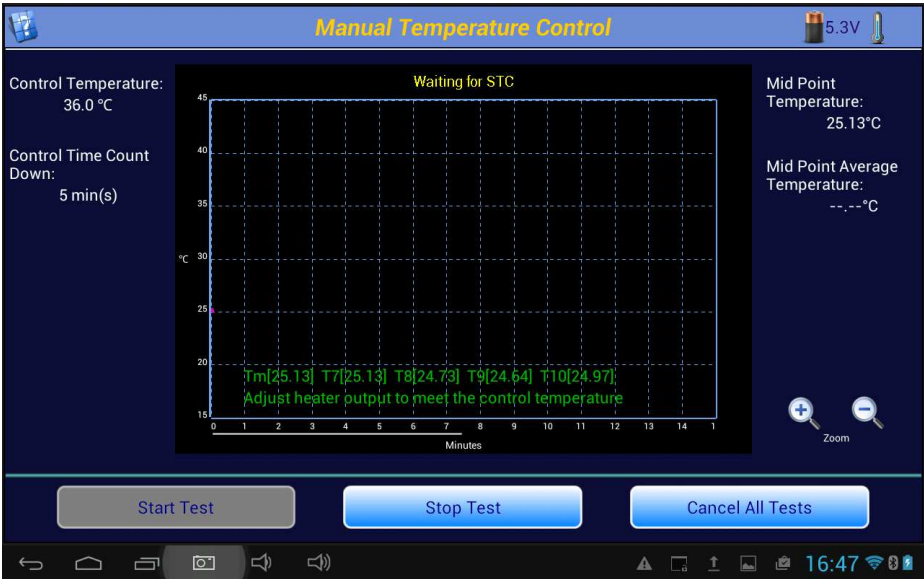


Figure 31: Data Collection Screen

During the test, all of the data points collected, including those for the temperatures at the other 4 locations, are saved to a Raw Data file. Any event which occurs during the test is also saved as a comment. Typical comments would be: Minute Mode, Manual Temperature Control at 36 °C Started, Waiting for **STC**, etc. The Raw Data file can be exported and used to recreate the test graphics.

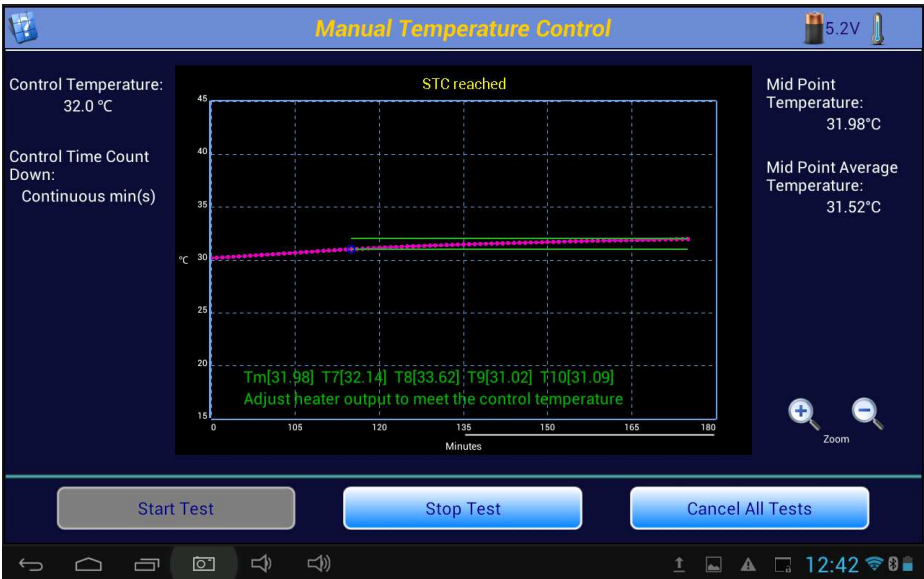


Figure 32: Data Collection Screen once STC reached

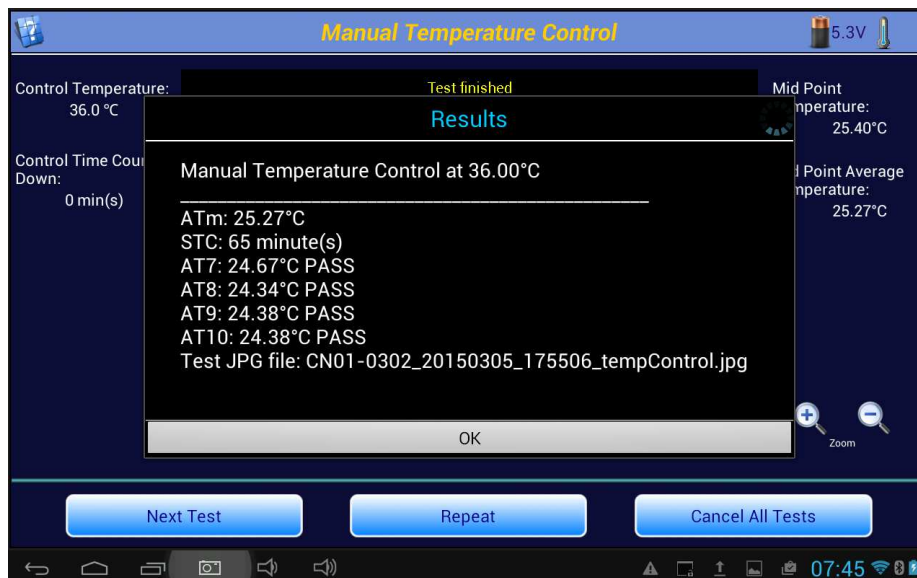


Figure 33: Test Results

At the end of the test, the **Results** summary will be displayed, **Figure 33** . In addition to the **Mid Point Average Temperature (ATm)** and the length of time that **STC** was true, vPad-RW will also report other values required by the Standard. The terms **AT7 - AT10** refer to the **Device Average Temperature** at each of the locations in the centers of the four quadrants of the mattress. These averages are calculated in a similar manner to the **ATm** value, from the temperatures measured at locations T7 - T10. These averages must not differ from the **ATm** by more than 2 °C.

## 5.4 Baby Temperature Control

In the **Baby Temperature Control** Test the **Skin Temperature Sensor** of the radiant warmer is attached to the **Test Device** at the middle point of the mattress. In this test, the tests performed in the **Manual Temperature Control** test are performed, along with a check to ensure the temperature measured by the Skin Temperature Sensor does not differ from the Control Temperature by more than 0.5 °C. The instruction screen shown in **Figure 34**, the parameters on the display for the **Baby Temperature Control** follow the same format as the **Manual Temperature Control**.



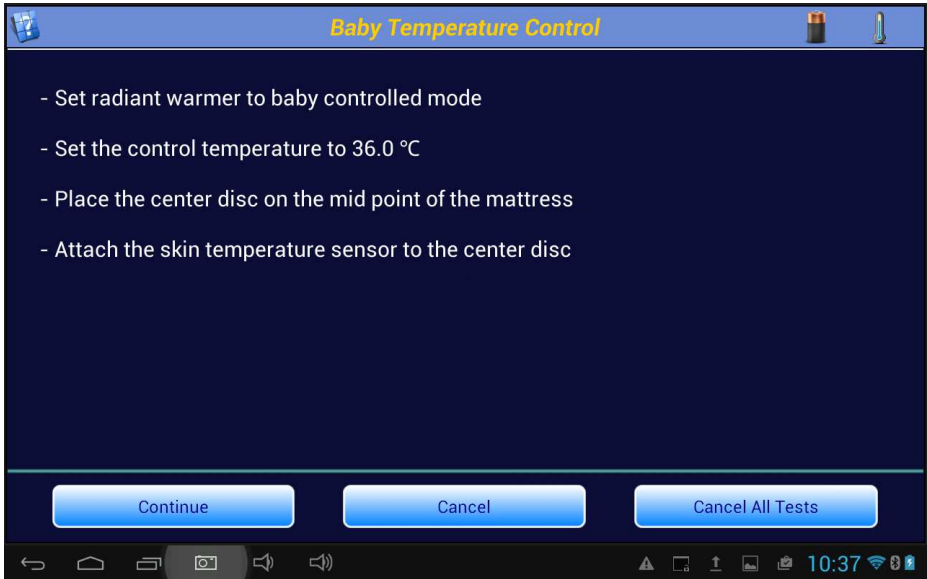


Figure 34: Baby Temperature Control Set-Up Instructions

When running the test and STC is reached, the Skin Temperature Reading button will be enabled, as shown in **Figure 35**.

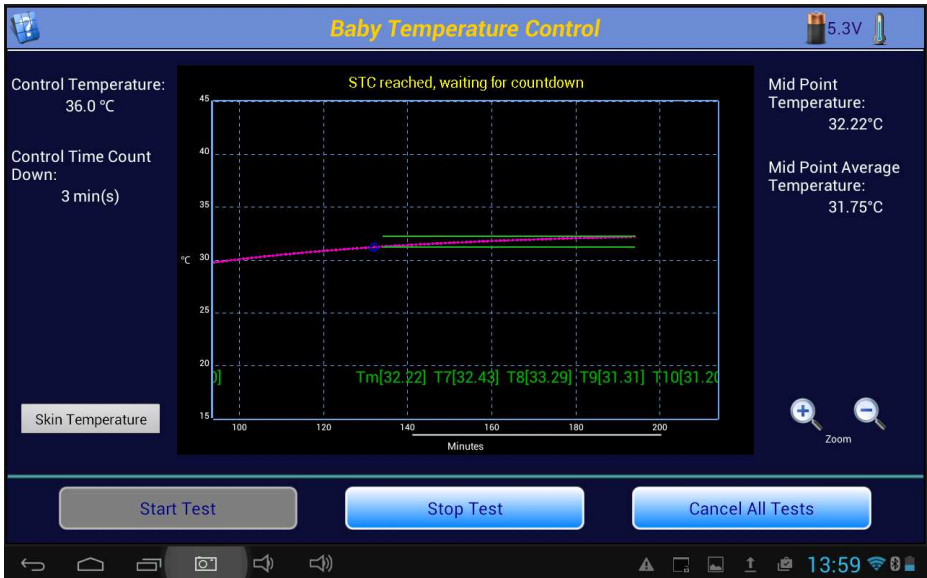
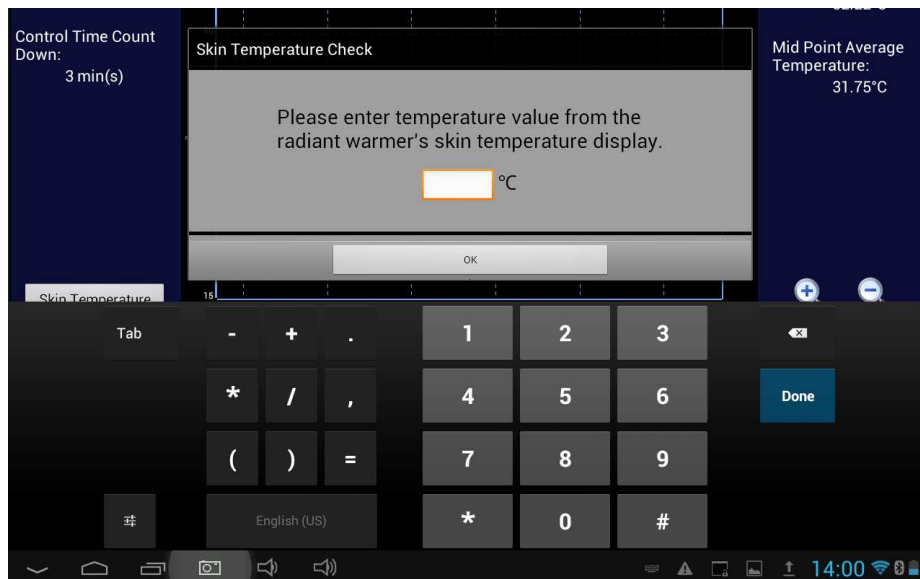


Figure 35: Data Collection Screen once STC reached

Clicking on this button will allow the Skin Sensor temperature, as indicated on the radiant warmer, to be input into the test result. See **Figure 36**, for an example of how this is done.



**Figure 36:** Skin Sensor Temperature

As with the manual test, the Baby Temperature ends with a summary of the results of the test, which will be integrated into the test report, **Figure 37**.



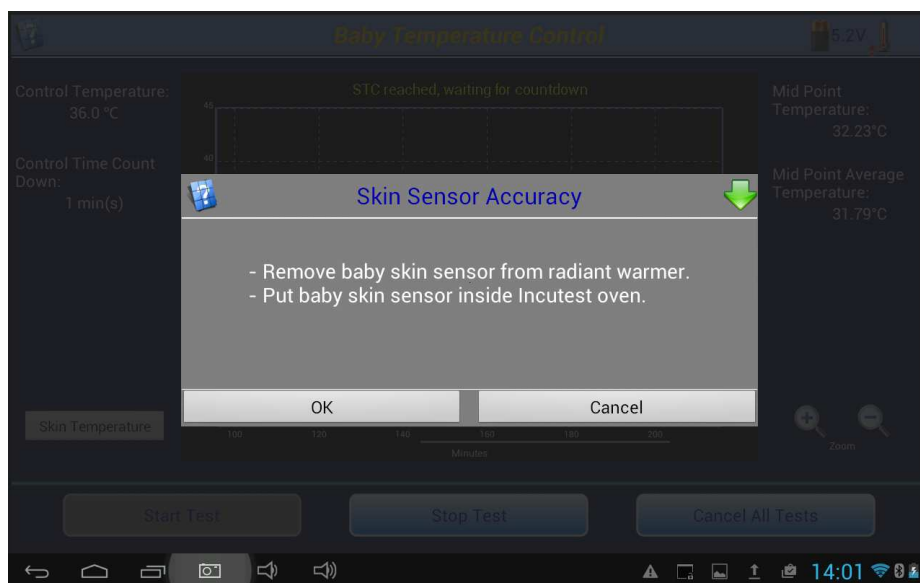
**Figure 37:** Baby Temperature Control - Test Results

Prior to completing the test, the Skin Sensor can be tested for accuracy using the Probe Test. This is covered in the next section.

## 5.5 Probe Test

If a **Baby Temperature Control** test or a **Skin Sensor Accuracy** Test have been selected in an Autosequence, a **Probe Test** icon, , will appear in the upper right corner of the screen (as

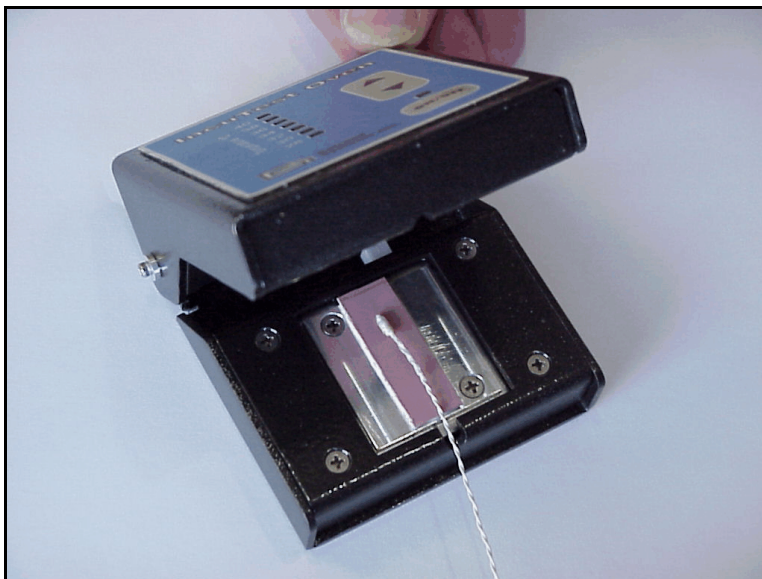
shown previously in **Figure 37**). A **Probe Test** can be initiated at any time when this button is visible, and the test will (can) run in the background. When first activated, the instruction screen for the **Skin Accuracy Test** will be displayed.



**Figure 38:** Skin Sensor Test

The Skin Sensor must be tested for accuracy before the **Baby Temperature Control** test can be performed. To facilitate this, the **Probe Test** is made available as soon as the Autosequence starts. This allows the Sensor to be tested in the background, and be available when the **Baby Temperature Control** test is ready to begin. Note that the **Probe Test** can be included in any sequence, it is not limited to use with the **Baby Temperature Control** test.

To test the Skin Sensor, it must be placed in a tightly controlled temperature environment. vPad-RW provides an optional Sensor Oven to perform this test. The Sensor is removed from the radiant warmer mattress / Test Device and placed in the Oven. The Sensor remains plugged into the radiant warmer Control Panel and the radiant warmer must be placed into the Skin Temperature Control Mode, with the temperature of the Skin Sensor displayed. The adhesive disk which holds the sensor to the infant's skin must be removed and, if necessary, the sensor should be unrolled so the cable is straight. The sensor should be positioned in the Oven as indicated in **Figure 39** with the sensor tip toward the back of the thermal pad in the Oven, to provide good thermal contact.



**Figure 39:** Sensor Placed in Oven

The Oven is connected to the USB Host port of the tablet via a microUSB to microUSB cable, and must be connected to its own 15-18 VDC power supply via the adapter input connection on the back of the Oven. Press the Power ON/OFF switch on the front panel to activate the Oven. When the Probe Test is initiated by touching the Probe Test icon, the app provides an instruction screen on how to make the connection.


The **Skin Sensor Accuracy** Test can be performed at temperatures from 28 °C to 40 °C in increments of 2 °C . The Oven is controlled by vPad-RW software when connected to the **USB Host** port. Once the Sensor has been correctly placed in the Oven, as indicated above, click the **OK** button to initiate the Sensor Test. Alternately, the **Cancel** button can be clicked to abort the **Skin Sensor Accuracy** Test. During a test, the **Skin Sensor Accuracy** dialog box on the screen can be reduced to the **Probe Test** icon by clicking on the  icon in the upper right corner of the dialog box.



Figure 40: Skin Sensor Accuracy Set Up Instructions

If more than one temperature has been selected on the Autosequence, the test will begin with the lowest temperature value defined in the test. When the test starts, the screen will change to the Temperature Stabilization screen indicated in ?. While this screen is displayed, the system is waiting for the Oven temperature to operate consistently within  $\pm 0.1$  °C. To abort the **Skin Sensor Accuracy** test, click on the **Cancel** button.

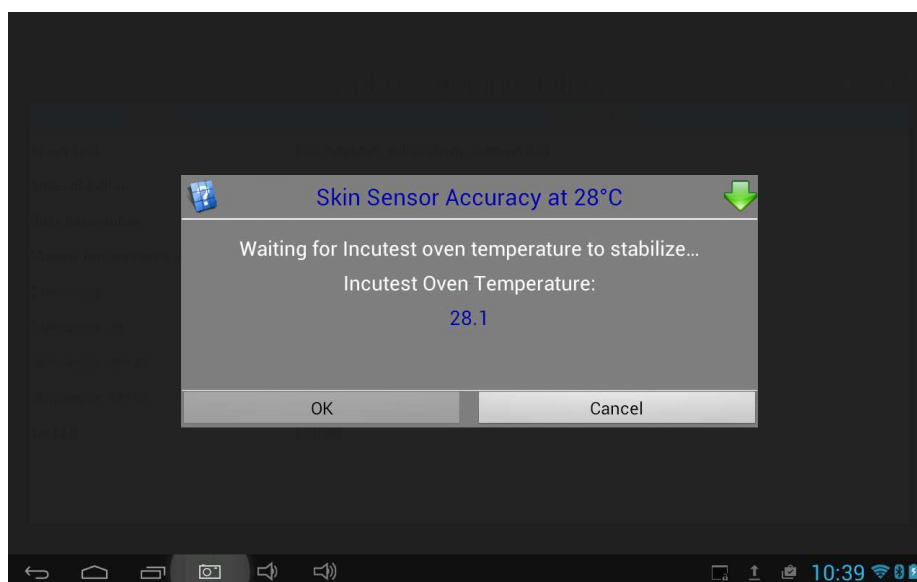
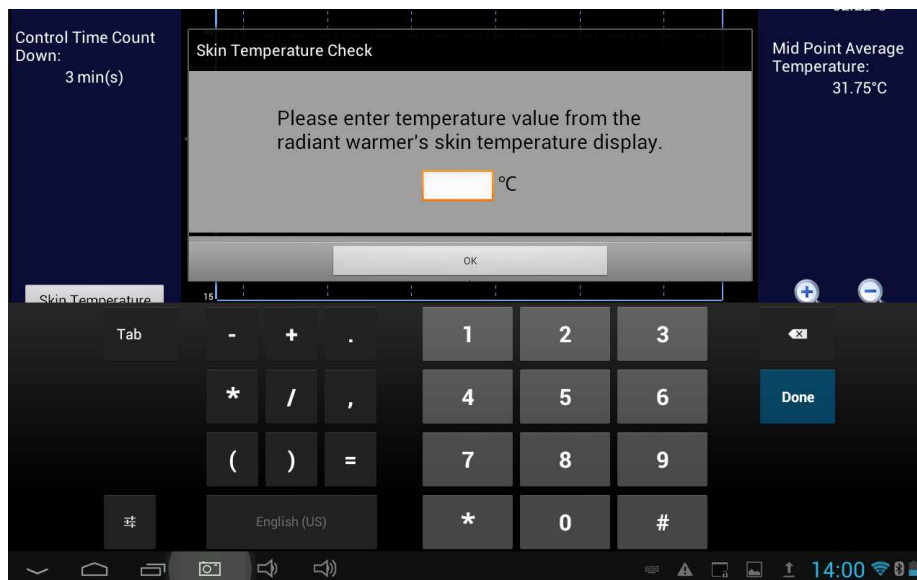


Figure 41: Skin Sensor Accuracy Test

Once the Oven temperature has stabilized at the set temperature, the program will automatically proceed to the Sensor Temperature Input screen, **Figure 42**. On this screen the temperature of the Skin Sensor, as shown by the Control Panel of the radiant warmer, can be entered. If another test (ambient airflow, manual temperature control, etc.) is in progress when the **Probe Test** requests the Sensor temperature, the radiant warmer can be switched between Air control and Skin control *momentarily* to read the Skin Temperature, without affecting the **Air Temperature Control** test.



**Figure 42:** Sensor Temperature Accuracy - Input Screen

If the Skin Sensor reading from the radiant warmer and the Oven temperature agree to within 0.3°C the Sensor will display a **PASS** indication, otherwise it will display **FAIL**. Clicking the **OK** button will accept the result and continue on to the next temperature, if there is one, in the Autosequence. The **Skip** and **Cancel** buttons will function as previously described.

If you switch back to another test in progress, the Probe Test icon will display the current temperature of the Oven, and will show red arrows moving upwards as the Oven heats:



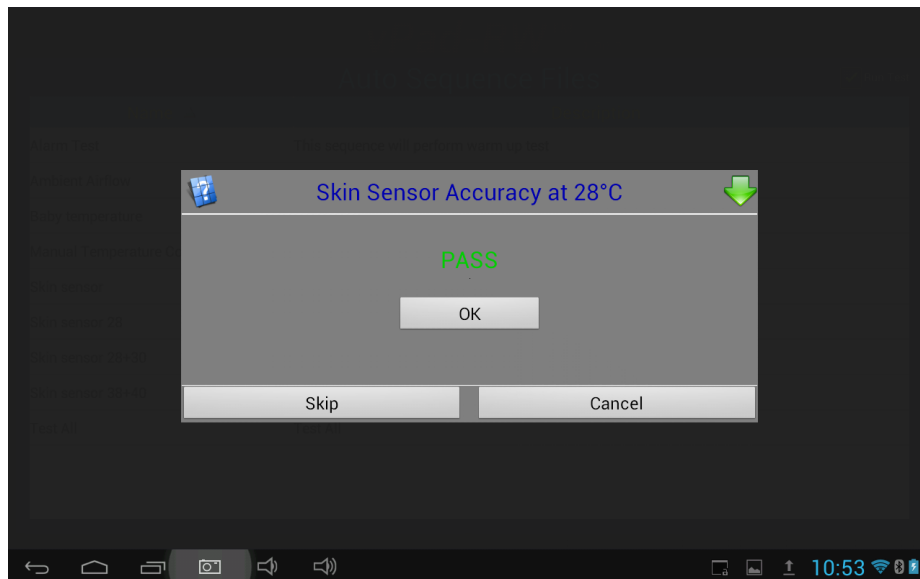


Figure 43: Sensor Temperature Accuracy - Test Status

When all of the temperatures indicated in the Autosequence have been tested, the test will be considered to be complete, and the app can return to any other test which was in progress. If no other sensor tests are to be done, the **Probe Test** icon will be removed from the screen. The Sensor can then be placed in the radiant warmer to perform the **Baby Temperature Control** test. For this test, the Skin Sensor is suspended 10 cm above the center of the mattress. For further details, see the section on **Baby Temperature Control**.

## 5.6 Alarm Sound Level - Inside

The alarm sounds generated by a radiant warmer have the potential to damage the infant's hearing if they are too loud. The Standard defines in section 11, clause 102.2, that an alarm sound measured at a height of 10 - 15 cm above the center of the mattress must not exceed 80 dBA. Following the instruction screen of **Figure 44**, the **Sound Sensor** is placed on the central Puck, held in place with the magnetic fasteners.

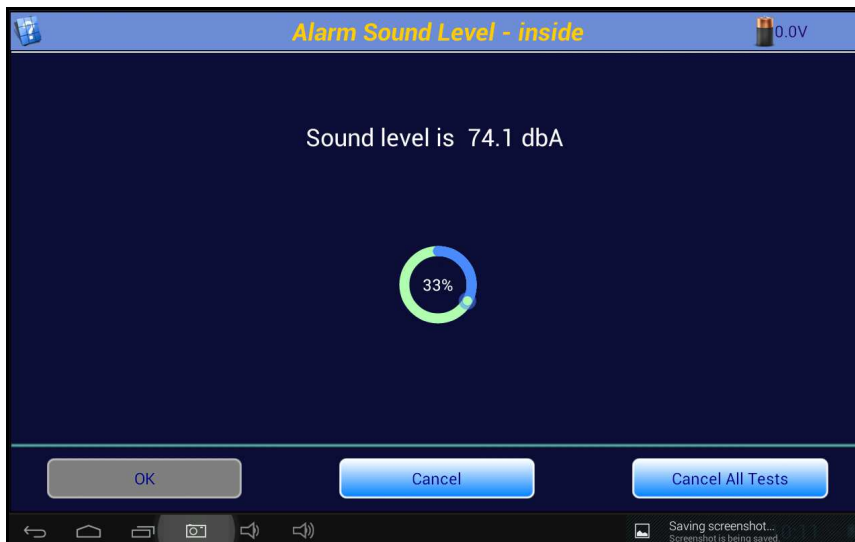


Figure 44: Alarm Sound Level Instructions

Once in place, an alarm is initiated by the user. The alarm can be generated in any manner the user sees fit. While the alarm is sounding, click on the **OK** button to take the measurement. While the alarm sound is processed, a progress indicator screen is displayed.

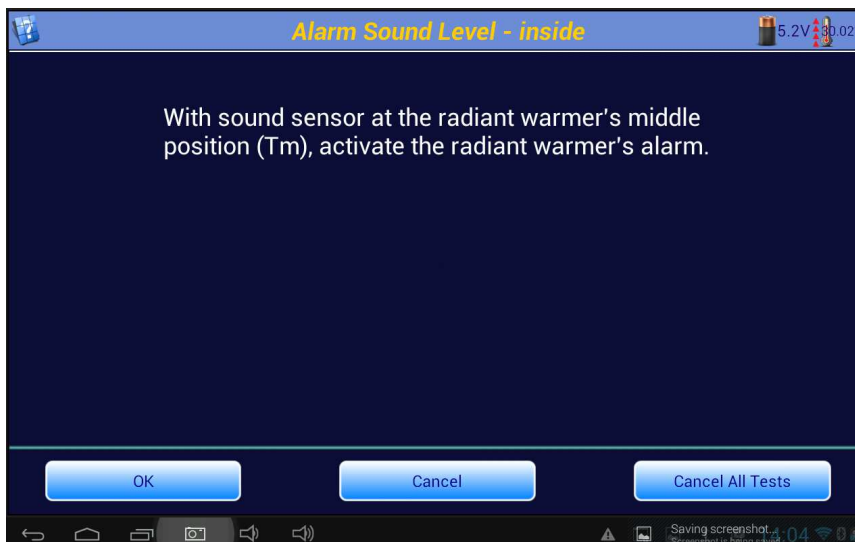
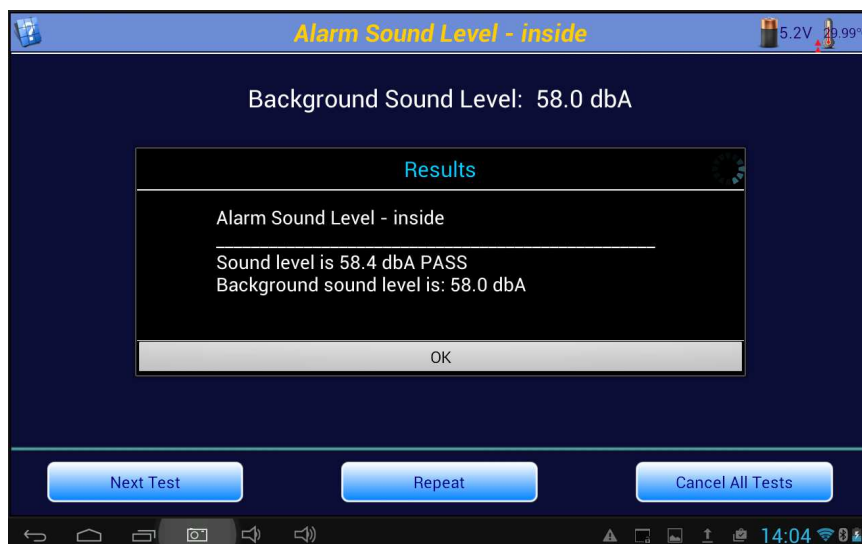


Figure 45: Alarm Sound Level: Set- Up Instructions for Inside Test



When the alarm sound measurement is complete, the result will be displayed as in **Figure 46**.



**Figure 46:** Alarm Sound Level: Inside Test Result

## 5.7 Alarm Sound Level - Outside

In addition to the alarm sounds inside the radiant warmer, alarms generated by the radiant warmer must be loud enough to be heard by care givers outside of the radiant warmer. ? shows the instruction screen for the outside alarm. The alarm sounds outside of the radiant warmer are taken at a distance of 3 meters from the front of the radiant warmer at a height of 1.5 meters above the floor, as defined in the Standard section 11, clause 102.3. The Sound Sensor is unplugged from the **Puck** in the radiant warmer and removed from the Baby Compartment. The **Sound Sensor** can then be plugged into an extension cable to allow it to be moved around outside the radiant warmer. The **Sensor** is then placed at the position defined by the Standard. An alarm is activated on the radiant warmer and the **OK** button is clicked.

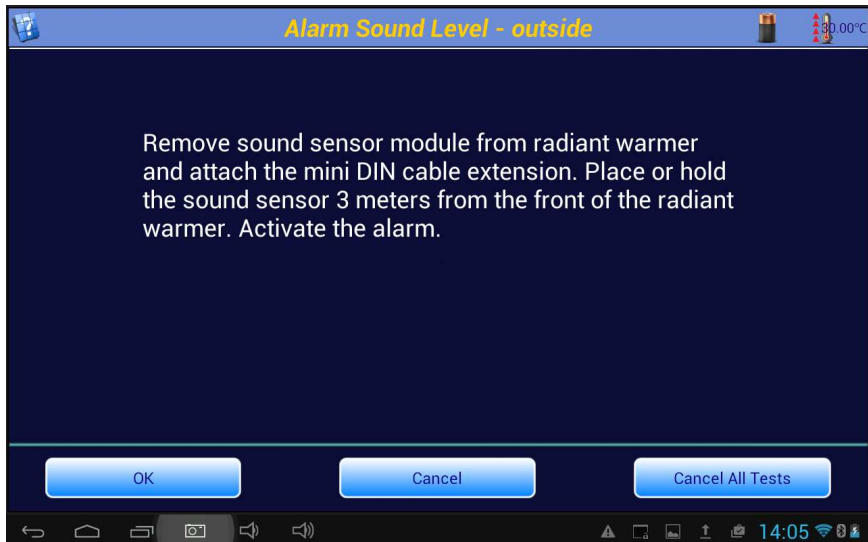


Figure 47: Alarm Sound Level: Set-up Instructions for Outside Test

The Standard requires that the sound level of the alarm is at least 65 dBA at the prescribed position. When the alarm sound measurement is complete, the result will be displayed as in **Figure 48**.

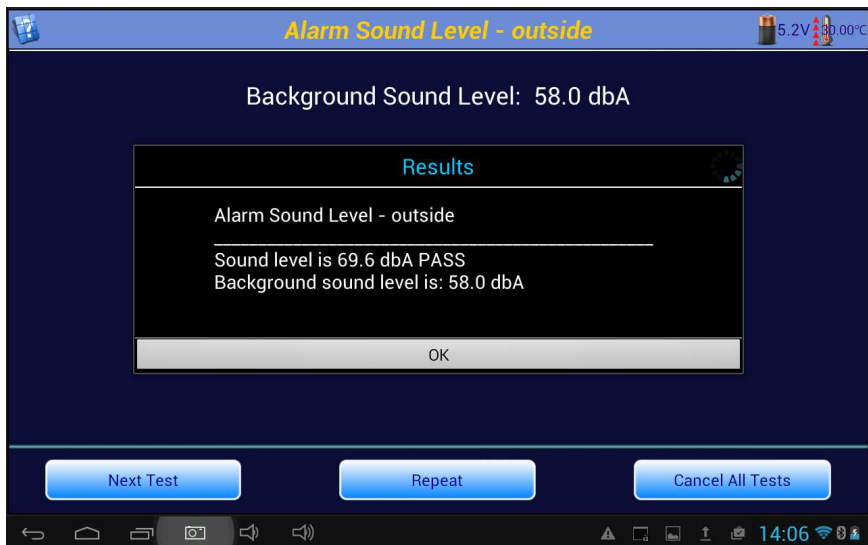


Figure 48: Alarm Sound Level: Outside Test Results

# 5.8 Saving Test Reports

When **Next Test** is pressed during an autosequence, the particular parameter test is considered to be complete. If this is the *last* or *only* test being performed, the content of the **Test Report** is shown on the screen. If it is decided that the report need not be saved, press **Cancel**. If it would be helpful to add a comment regarding any aspect of the test, press **Add Comment**. To save the report press **Save**.



Figure 49: Test Report

Pressing **Add Comment** will display a Text Input window, and touching anywhere in the window will bring up a keyboard to allow a comment to be created. This comment will form part of the final test report.

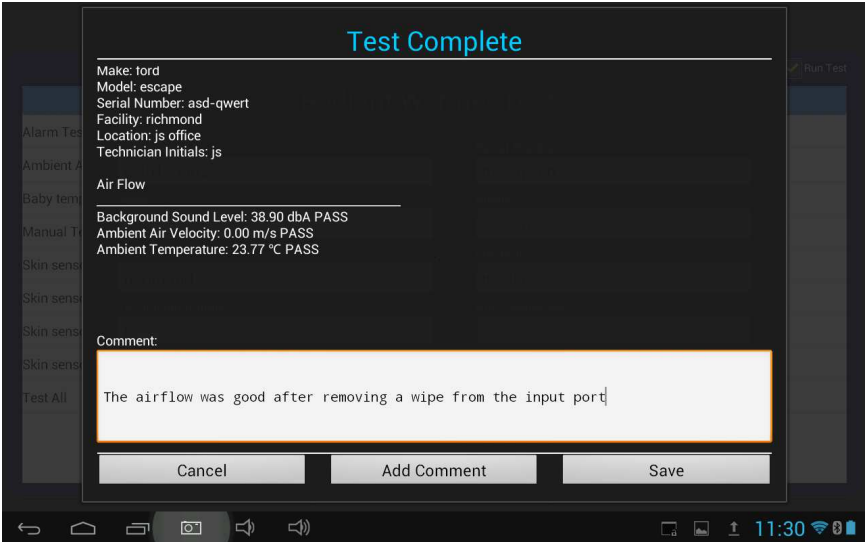


Figure 50: Test Report with Comments

If the option to **Merge with Safety Test** has been enabled in the **System Settings**, a list of electrical safety test reports relevant to the **Equipment ID** being tested will be displayed. This list will be extracted from the **Records** folder of the vPad app specified in the **System Settings/Test Record Location**. The list will be trimmed to meet the **Date Range** specified. If there are no electrical safety test reports that match the criteria, a message will be displayed at the bottom of the screen, and the test report will be saved to the **vPad-RW test/Records** folder.



Figure 51: Test Report

If one or more appropriate electrical safety test reports are found, the filenames will be presented in a dropdown list to allow selection of the correct report. Select a safety test and press **OK** to proceed, or press **Cancel** to abort the merge and simply save the radiant warmer test report.

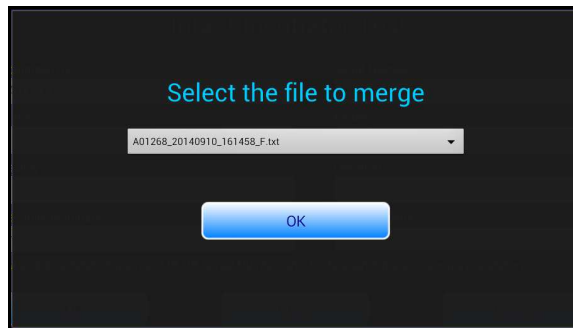


Figure 52: Test Report

The merged file will be saved to the original safety test report location or to the **vPad-RW/Records** folder, as per the choice made in the **System Settings**.

Chapter

6

# 6 Test Reports

## 6.1 Overview

Test results are saved in two formats after the tests are completed, a summary report and a file containing all measured data points and comments collected during the test.

## 6.2 Recalling Records

From the Main Screen test records can be recalled for viewing, printing and transfer by clicking on the Review Records image. A list of the test results in memory will be displayed on the screen as shown in **Figure 53**.

Equipment ID	Test Sequence	Date and Time
CN01-0302	Ambient Airflow	2015 Mar 09 11:28:34
CN01-0302	Ambient Airflow	2015 Mar 09 10:58:38
CN01-0302	Ambient Airflow	2015 Mar 06 14:31:52
CN01-0302	Test All	2015 Mar 06 14:16:55
CN01-0302	Test All	2015 Mar 05 08:37:18
CN01-0302	Ambient Airflow	2015 Mar 04 08:51:52
CN01-0302	Ambient Airflow	2015 Mar 04 08:42:24
CN01-0302	Alarm Test	2015 Mar 04 08:41:26
CN01-0302	Ambient Airflow	2015 Mar 04 08:39:19

☒ Test Result  
☐ Raw Data

Exit

Figure 53: Test Records

## vPad-RW OPERATING MANUAL

The listing can be ordered by Equipment ID, Test Sequence or Date. Clicking on the title of the field and the list will be re-ordered in ascending or descending order as appropriate, using multiple touches. The types of report listed are indicated by checkmarks in the **Test Results** or **Raw Data** check boxes. Both types of files are created during a test and should normally be available for each test.

From this screen it is possible to View the Test Results by touching on a filename. This will open Record Manager to display the contents of the selected file. Once in **Record Manager**, other files may also be viewed, transferred or printed (see the Record Manager manual). Printing will be processed according to the setting in **Record Manager**, and can be set using the **Copy To External Device** function from within **Record Manager**.

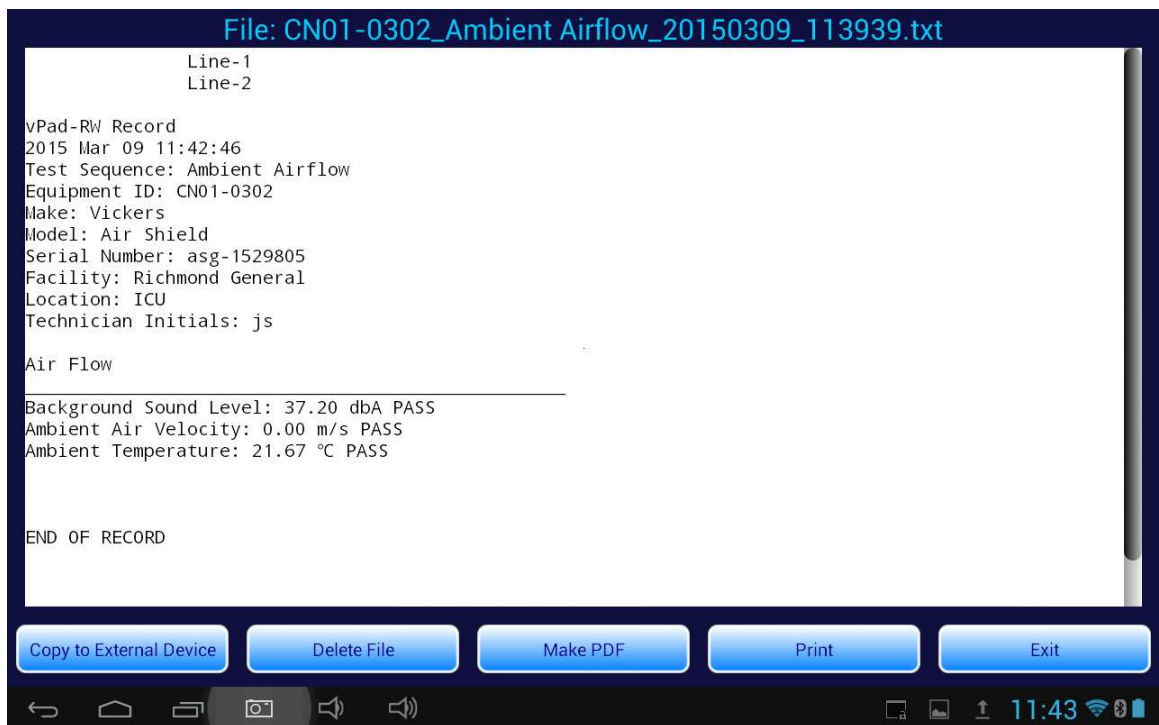


Figure 54: Test Report in Record Manager

**Raw Data** may be viewed in the same way, after first checking the **Raw Data** checkbox. Select **Copy To External Device** - see the next section. When complete, click on the **Exit** button to return to the Main Screen.

## 6.3 View Raw Data

The view **Raw Data** option will display the individual data points measured during the test as indicated in **Figure 55**. This test report provides measurement data for each of the parameters measured along with a time stamp, in seconds. The parameters T1 - T5 (recorded when testing incubators) represent the temperatures at the end of the Temperature Probe, 10 cm above the mattress. Parameters T6-T10 represent the temperature of the large thermal mass related to the Probes T1 - T5 respectively. TM is the mattress temperature (recorder when tested incubators). RH (relative humidity), SL (sound level), AF (air flow) and BVL (battery voltage) are recorded as appropriate to the test. LSL and V1 - V4 are reserved for future use. The Comments column contains text entries inserted by the program as events occur during the test. The Comments may include indications of the data sample rate, the start or end of a test, relevant parameter values collected during the test, etc. This report may be printed out by clicking the **Print** button.

File: CN01-0302\_Test All\_20150305\_163648.raw.csv

Secs	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	TM	RH	SL	AF	LSL	BVL	V1	V2	V3	V4	Comments
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.29	32.22	32.55	30.92	30.97	0.00	1.34	84.60	0.00					;Second...
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.15	0.00	1.55	69.10	1.31					;Wait...
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.35	24.91	24.79	25.15	0.00	1.55	58.20	1.31					;Wait...
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.82	25.15	0.00	1.55	52.40	1.31					;Wait...
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.33	24.91	24.82	25.15	0.00	1.55	49.00	1.31					;Wait...
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.15	0.00	1.55	48.40	1.31					;Wait...
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.88	24.79	25.15	0.00	1.56	48.50	1.31					;Wait...
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.15	0.00	1.56	49.40	1.28					;Wait...
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.33	24.91	24.79	25.13	0.00	1.56	49.90	1.31					;Wait...
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.13	0.00	1.56	50.60	1.31					;Wait...
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.15	0.00	1.56	49.40	1.31					;Wait...
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.15	0.00	1.56	47.90	1.31					;Wait...
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.15	0.00	1.56	47.60	1.31					;Wait...
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.15	0.00	1.56	53.30	1.31					;Wait...
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.33	24.88	24.79	25.15	0.00	1.56	52.60	1.31					;Wait...
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.15	0.00	1.56	48.40	1.28					;Wait...
33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.31	24.88	24.79	25.15	0.00	1.56	51.90	0.98					;Wait...
34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.33	24.91	24.79	25.15	0.00	1.56	51.10	0.74					;Wait...
35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.33	24.91	24.79	25.15	0.00	1.56	47.50	0.57					;Wait...
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.31	24.91	24.79	25.15	0.00	1.56	48.30	0.45					;Wait...
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.33	24.91	24.79	25.13	0.00	1.56	47.30	0.36					;Wait...
39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.33	24.91	24.79	25.15	0.00	1.56	47.90	0.31					;Wait...
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.26	25.33	24.91	24.79	25.15	0.00	1.56	47.70	0.26					;Wait...
41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.33	24.88	24.79	25.15	0.00	1.56	48.00	0.22					;Wait...
42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24	25.33	24.88	24.79	25.13	0.00	1.56	48.10	0.19					;Wait...

Copy to External Device   Delete File   Make PDF   Print   Exit

11:48

Figure 55: Raw Data File in Record Manager



## 6.4 Exporting Data

Test result files on the tablet may be exported to a USB memory stick, to another device via Bluetooth file transfer or to a Dropbox using the Copy To External device option in Record Manager. Clicking this button will start the File Transfer Utility app, as shown in **Figure 56**. Refer to the vPad-RM manual for instructions on selecting and moving files. Press **Exit** to return to the file list in vPad-RW.



Figure 56: File Transfer Utility

The Raw Data is exported as a comma separated unicode text file. Unlike the ordinary CSV format, the unicode text file supports international language and can be imported into a spreadsheet. This text file may be used to recreate graphs that were seen during the test, or to create detailed reports which include graphs.



## 7 Calibration and Maintenance

Calibration of vPad-RW/vPad-IN by an authorized Datrend Service Facility is required on an **annual** basis to maintain the 5 year factory warranty. Refer to the Calibration Decal applied on the back of the unit to determine calibration status of your vPad-RW/vPad-IN System. The tablet is covered by a one year manufacturers warranty.

vPad-RW/vPad-IN contains no user serviceable parts. ***Opening the case of any vPad-RW/vPad-IN component or module, for any reason, will void the warranty.***

For calibration or service assistance, contact Datrend for a Return Materials Authorization (RMA) number or the location of the nearest Service Facility.

130-4020 Viking Way  
Richmond, BC • CANADA • V6V 2L4  
Tel: 800.667.6557 (North America Only) or  
604.291.7747 • Fax 604.294.2355  
e-mail: [customerservice@datrend.com](mailto:customerservice@datrend.com)

vPad-RW/vPad-IN should be cleaned with a soft, lint free, damp cloth. Use of cleaning agents may result in scratching, discoloration, or streaking.

**NOTE:** ***All components of the system , including the tablet must be returned, when the system is returned for Calibration.***



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