

WHALETEQ

DFS200

User Manual



Revision 2023-04-07
DFS200 APP Version 1.5.8

Copyright © 2013-2023 All Rights Reserved.
WhaleTeq Co., LTD

No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, or by any means, electronic, mechanical, magnetic, optical, chemical, manual or otherwise, without the prior written permission of WhaleTeq Co., LTD.

Disclaimer

WhaleTeq Co., LTD. provides this document and the programs "as is" without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose.

This document could contain technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in future revisions of this document. WhaleTeq Co., LTD. is under no obligation to notify any person of the changes.

The following trademarks are used in this document:



is a registered trademark of WhaleTeq Co., LTD

All other trademarks or trade names are property of their respective holders.

Contents

1	Introduction	7
1.1	Concept.....	7
1.2	Applications.....	7
2	Specifications	9
2.1	General Specifications	9
2.2	Compliance Specifications.....	9
2.3	Energy Measurement Specifications	10
2.4	ECG Signal Specifications.....	10
3	Instrument Familiarization	11
3.1	Top.....	11
3.2	Front and Rear	13
3.3	Back	14
3.4	Wiring Diagram	15
4	Getting Started	16
4.1	Smartphone Requirement.....	16
4.2	APP Installation.....	16
4.3	Firmware Update.....	17
4.3.1	System Requirements.....	17
4.3.2	Software Installation	18
5	APP Function and Operation Instruction	19
5.1	APP General Introduction	19
5.1.1	APP Function.....	19
5.1.2	Smartphone Wireless Connection	20
5.1.3	DFS Device Connection	21
5.1.4	DFS Device Auto-off.....	21
5.1.5	DFS Device Low Battery	21
5.2	Routine List Operation.....	22
5.3	Manual Test Operation.....	25
5.4	AED Battery Test Operation	28
5.5	History.....	29
5.6	Settings	31
5.6.1	Login.....	31

5.6.2 DFS Management	31
5.6.3 Set Pass/ Fail Range	32
5.6.4 Manual Test 3 Consec. Defib	32
5.6.5 Reset	33
5.6.6 Language Selection	33
5.6.7 Terms & Conditions of Use	33
5.6.8 Privacy Policy	34
5.6.9 Current version	34
6 Standalone Operation	34
7 Calibration and Validation.....	34
8 Troubleshooting	35
9 Cautions	35
10 Ordering Information	36
11 Package Contents.....	38
12 Revision History.....	39
13 Contact WhaleTeq.....	40

List of Tables

Table 1: General Specification	9
Table 2: Compliance Specification.....	9
Table 3: Energy Measurement Specification.....	10
Table 4: ECG Signal Specification.....	10
Table 5: AED Discharge LED	12
Table 6: DFS Status LED	12
Table 7: ON/OFF Button	12
Table 8: Button Functions in Routine Test	23
Table 9: Elements on the Outcome Page of Manual Test.....	26
Table 10: Button Functions in History	30
Table 11: DFS200 Test System.....	36
Table 12: DFS200 Optional Accessories.....	37
Table 13: Optional DFS200 Paddle Box Set	38
Table 14: Optional Calibration Service and Warranty Extension	38
Table 15: DFS200 Standard Package Content	38
Table 16: DFS200 Optional Accessories.....	39
Table 17: Revision Version.....	39

List of Figures

Figure 1: Top Side of DFS200	11
Figure 2: Front and Rear Side of DFS200	13
Figure 3: Back Side of DFS200	14
Figure 4: Wiring Diagram (1)	15
Figure 5: Wiring Diagram (2)	16
Figure 6: Home Screen of DFS200 APP	19
Figure 7: Pairing Interface	20
Figure 8: Routine List on the Home Screen	22
Figure 9: Routine List Interface	22
Figure 10: Outcome Page of Routine List	24
Figure 11: Manual Test on the Home screen	25
Figure 12: Manual Test Interface	25
Figure 13: Outcome Page of Manual Test	26
Figure 14: Waveform Enlarge Once.....	27
Figure 15: Waveform Enlarge Twice.....	27
Figure 16: Arrow Icon	28
Figure 17: Waveform Displayed Upside Down.....	28
Figure 18: AED Battery on the Home Screen	29
Figure 19: AED Battery Interface	29
Figure 20: History on the Home Screen	30
Figure 21: History Interface	30
Figure 22: DFS Device Settings Interface.....	32
Figure 23: Firmware Update Reminder	32
Figure 24: 3 Consec. Defib. Activation.....	33

1 Introduction

1.1 Concept

WhaleTeq DFS200 is designed as an AED field tester for on-site installation, periodic function inspection, and maintenance service empowered by data retrieval and routine creation.

AED (Automated External Defibrillator) is a life-saving medical device that delivers defibrillation upon identifying and analyzing the ECG of resuscitation-needed patient. Because AEDs are installed in public areas where they can be reached before ambulance arrival, the majority of AEDs relies on one-time batteries and require only minimal training compared to hospital-use defibrillators.

Ensuring the functionality of AEDs on a periodic basis becomes widely accepted around the world, and DFS200 is the ideal tool to conduct such a regular inspection.

1.2 Applications

WhaleTeq DFS200 is a handheld and versatile AED field tester, functioning as an ECG signal simulator, defibrillation energy guarantee equipment, and AED battery measuring tool for AED regular maintenance checks. DFS200 is controlled and communicated via APP through smartphone Bluetooth connection.

For ECG signal, DFS200 simulates NSR (Normal Sinus Rhythm) as well as various arrhythmias that may or may not need AED defibrillation. The amplitude and BPM of NSR can be adjusted. In addition, User may enable *consecutive test* for certain AED models with the feature of 3 discharges in a row. Arrhythmia convert combination (ECG waveform before vs. after defibrillation) is available.

For energy guarantee, DFS200 allows customized pass/fail criteria of adult and pediatric defibrillation discharge, respectively, of the delivered energy. To ensure the durability of DFS200, protection against multiple defibrillations is implemented. (DFS200 is recommended to be

used for analyzing defibrillation shock at the interval of at least 60 seconds apart.)

The battery measurement introduced here is for that of the AED. Periodic inspection on AED battery is essential to ensure the availability of defibrillation when needed. The record includes test date & time, serial number of AED tested, as well as test results of the maintenance task. User may add notes as reminders and export the results for further analysis.

- Optional accessories: Battery measurement probe with load can better estimate remaining battery level via cross-checking reference table ([Details](#)). The AED battery level is responsible for the defibrillation shock energy. The battery measurement probe with load can simulate the actual power consumption within the AED as if the battery is installed in the AED making the test more accurately. As a result, the user can obtain more information than from the AED self-test.
- Optional accessories: The paddle box set has outstanding electrical conductivity and mechanical characteristics. Besides, the conductive gel drainage grooves are designed for easy cleaning.
- Optional function: DFS200 can work with WhaleTeq's AED Intelligent Management Solutions (AIMS) which includes functions such as AED tester and APP, AIMS Cloud CMS, and IoT customized module. ([AIMS Introduction](#))

2 Specifications

2.1 General Specifications

Table 1: General Specification

Items	Specifications
Temperature	Operating: 0 °C ~ +50 °C (+32 °F ~ +122 °F)
	Storage: -20 °C ~ +60 °C (-4 °F ~ +140 °F)
Humidity	10 % ~ 90 % non-condensing
Communications	Wireless (Low Energy Radio) USB Type-C connector
Operation Modes	Remote (APP)
Power	9V alkaline battery*1 Battery level display & low power alert on APP
Mechanical	Housing: ABS Plastic Size (L x W x H): 17.0 x 8.55 x 4.0cm Weight: 330g

2.2 Compliance Specifications

Table 2: Compliance Specification

Items	Specifications
Safety Standards	CE: IEC/EN61010-1:2010 + A1:2016; Pollution degree 2 61010-2-030:2017
Electromagnetic Compatibility Standards (EMC)	CE: EN61326-1; EN301489-1/EN301489-17 FCC: EMC P15B
Other Standards	CE: RF EN 300328; EN62311 NCC: RF LP0002

2.3 Energy Measurement Specifications

Table 3: Energy Measurement Specification

Items	Specifications
Maximum Energy	Range: Up to 600J Accuracy: ± 1 % of reading ± 1J for below 2.5kV; ± 2 % of reading ± 2J for 2.5kV and above
Load Resistance	Resistance: 50Ω Accuracy: ±1 %, non-inductive (<2 μH)
Pulse Width	Range: 1.0 ~ 50.0ms Accuracy: ±0.1ms
Voltage	Range: Up to 5000V _p Accuracy: ± (1 % of reading + 2V), typical
Maximum Average Power	12 W, equivalent to 1 defib pulse of 360J every 30 seconds
Battery Level (AED Battery)	Measurement Voltage: 0.40 ~ 40.00V Accuracy: ± 0.05V for 5.00 ~ 40.00V
Battery Level (AED Battery, measured with 200mA load)	Measurement Voltage: 3.60 ~ 40.00V Accuracy: ± 0.05V for 3.60 ~ 40.00V

**Specifications are subject to change without prior notice.*

2.4 ECG Signal Specifications

Table 4: ECG Signal Specification

Items	Specifications
Waves	Ventricular Fibrillation - Coarse Ventricular Fibrillation - Fine Ventricular Tachycardia (≥ 180 bpm) Ventricular Tachycardia (≥ 234 bpm) Atrial Fibrillation Asystole

Items	Specifications
Normal Sinus Rhythm (NSR)	30 ~ 240 (by 10) BPM
Amplitude	0 – 5 mV (V_{p-p} 5mV)

3 Instrument Familiarization

3.1 Top

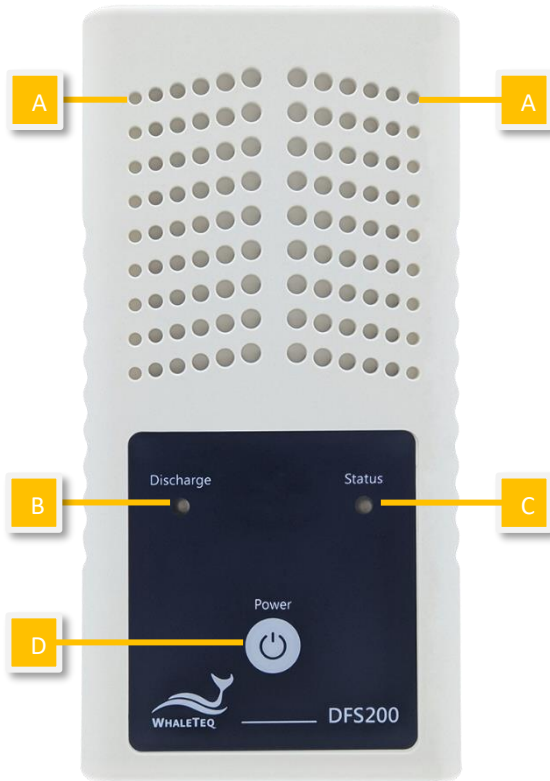


Figure 1: Top Side of DFS200

- A. **Ventilation Holes:** Allow ventilation during operation. Keep this side up when in use.

B. AED Discharge LED:

Table 5: AED Discharge LED

Scenario	LED Behavior
No Discharge	No light
Discharge Detected (Pass)	If the discharge value equals to or is greater than the joule number set in APP*, the green light continues for a while.
Discharge Detected (Fail)	If the discharge value is less than the joule number set in APP*, the red light continues for a while.

Note: From APP Settings, User may set the Discharge LED to follow the pass/ fail range of either adult or pediatrics. See section 5.6.3.

C. DFS Status LED:

Table 6: DFS Status LED

Mode	Power On	Low Power
Standalone Operation	Green/ Red light alternates every second.	Red light blinks every 2 seconds.
APP connected (BT) or AP Connected (USB)	Green light blinks every 2 seconds.	

D. On/Off Button:

Table 7: ON/OFF Button

Scenario	Button Behavior
On	Press the button for about 1 second to turn on DFS200.
Off	Long press the button for 3 seconds to turn off DFS200. Alternatively, after DFS200 idles for 3 minutes, it'll automatically be turned off. The length of idle time can be customized via APP described in 5.6.2.

3.2 Front and Rear

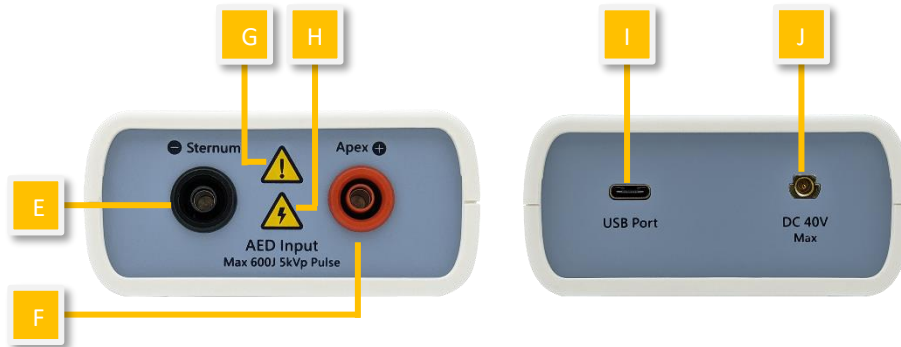


Figure 2: Front and Rear Side of DFS200

- E. **AED Interface Jack (Sternum):** Connect the Sternum jack to the AED pad labeled Sternum via DFS accessory “AED Interface Cable”.
- F. **AED Interface Jack (Apex):** Connect the Apex jack to the AED pad labeled Apex via DFS accessory “AED Interface Cable”.
- G. **Caution:** DFS200 is recommended to be used for analyzing defibrillation shock at the interval of at least 60 seconds apart.
- H. **Caution, the possibility of electric shock:** From the time AED starts charging for defibrillation until right after energy delivery, users are recommended to stay clear from DFS200.
- I. **USB Port:** Connect to the computer and open software *DFS200 Firmware Update Tool.exe* to ensure the DFS200 firmware is the latest version.
- J. **DC 40V Max:** Insert the SMA connector here and place test leads at the AED battery to measure the voltage of the AED battery.

3.3 Back

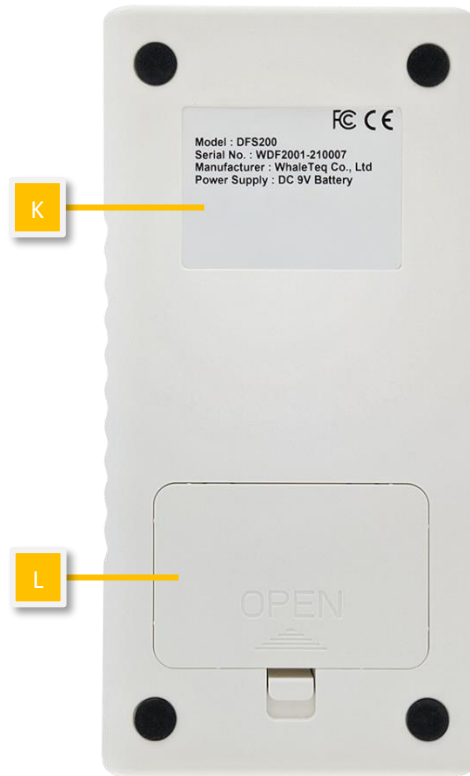


Figure 3: Back Side of DFS200

- K. **Label:** Contain information including model, serial number, manufacturer, and power supply.
- L. **Battery Compartment:** Insert 9V battery for power supply. Both disposable alkaline batteries and rechargeable batteries can be used.

3.4 Wiring Diagram

- AED Testing Scenario

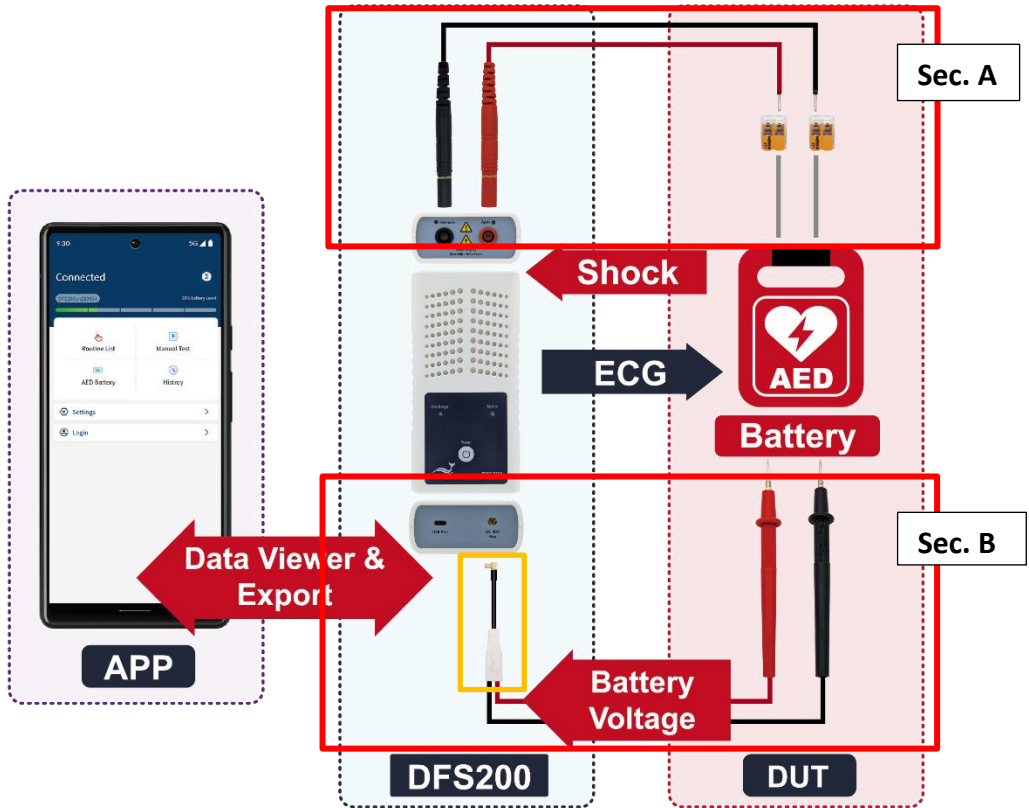


Figure 4: Wiring Diagram (1)

Note:

1. Sec. A is for Routine List and Manual Test while Sec. B is for AED battery.
2. To plug in properly, please make sure the yellow lines on the black and red banana males that connect to DFS200 in sec. A totally disappear in the port.
3. When removing the connector in sec. B from DFS200 (the yellow frame part), please pull out the connector by holding the black part instead of the white part.

• Defibrillator Testing Scenario (Optional)

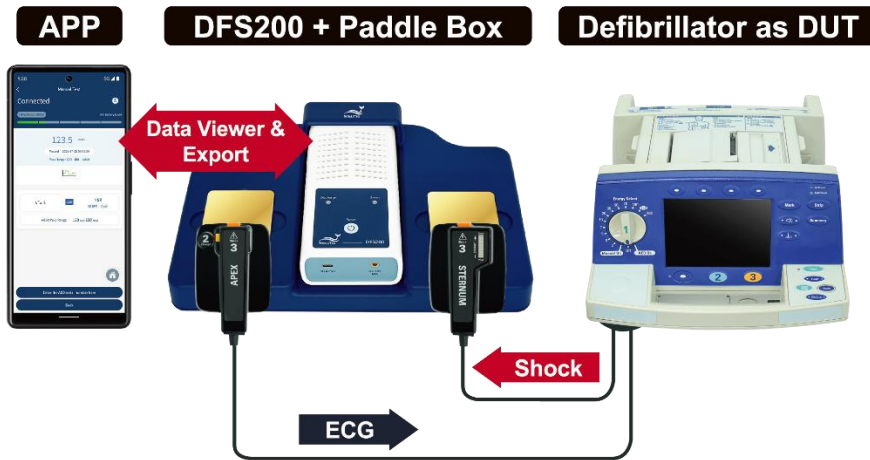


Figure 5: Wiring Diagram (2)

4 Getting Started

4.1 Smartphone Requirement

Android

Android 6.0 and above

iOS

iOS 10 and above

Bluetooth

Bluetooth Low Energy 4.2 and above

4.2 APP Installation

Please follow the steps below to download and execute DFS200 APP.

1. Download DFS200 APP from Google Play or App Store.

2. Allow the permissions including Location and Storage.
 3. Tap on DFS200 APP to conduct an AED test via executing DFS200.
- Note:** If DFS200 APP cannot be installed properly, check for the operating system or restart the smartphone.

4.3 Firmware Update

DFS200 firmware can be updated by the following steps.

1. Download *DFS200 Firmware Update Tool.exe* on your computer from WhaleTeq's website.
2. Connect the DFS200 with a USB data transfer cable.
3. Turn on DFS200. Make sure the battery is installed and above minimal working level.
4. Follow the instructions to complete the update.

4.3.1 System Requirements

To use *DFS200 Firmware Update Tool.exe*, User should use a Windows OS PC to connect the USB port of DFS200.

PC requirements:

- Windows PC (Windows 7 or later, suggest to use the genuine version)
- Microsoft .NET 4.0 or higher
- Administrator access (essential for installing software, driver, and Microsoft .Net Framework)
- 1.5 GHz CPU or higher
- 1GB RAM or higher¹
- USB port

¹ Relative to normal PC processing, there is no special use of PC speed. However, there has been noted a slow increase in system RAM usage over long periods of time up to 30-40MB (related to MS Windows "garbage collection"). PCs with only 512MB or less installed and are running several other programs (in particular, Internet Explorer), may exceed the available RAM, requiring access to the hard drive and dramatically impacting speed. In this case, streaming interruptions and other problems may occur.

4.3.2 Software Installation

Please follow the steps below to download and execute DFS200 software.

1. Download DFS200 software from WhaleTeq's website.
2. Open the file explorer and select the download location.
3. Double click on *DFS200 Firmware Update Tool.exe* to execute DFS200 PC software.

Note: If you cannot update your DFS firmware, please contact WhaleTeq's service team (service@whaleteq.com).

5 APP Function and Operation Instruction

5.1 APP General Introduction

5.1.1 APP Function

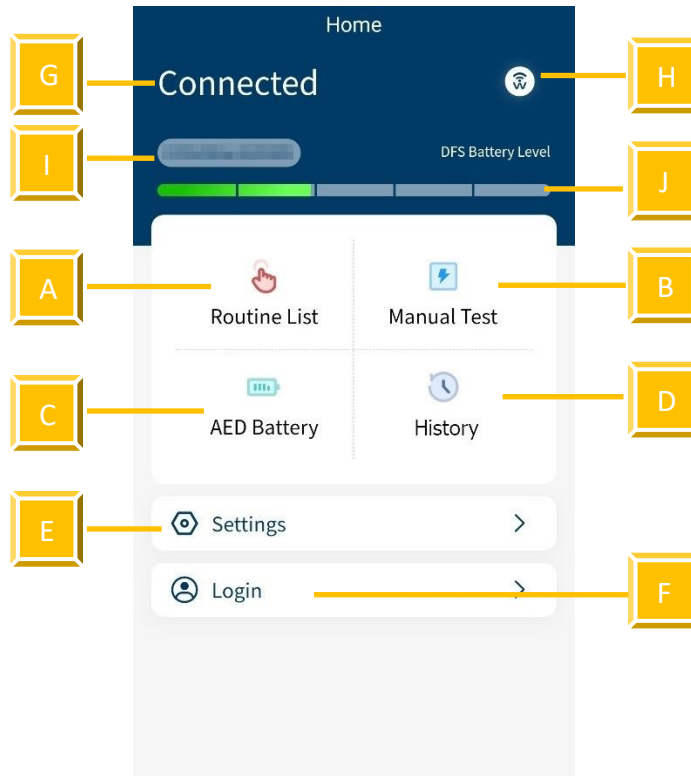



Figure 6: Home Screen of DFS200 APP

DFS200 APP contains the most used functions for maintaining AED:

- A. **Routine List:** for creating a list of to-do work beforehand upon arriving at AED maintenance destination.
- B. **Manual Test:** test for checking the performance of an AED with arrhythmia combinations of user's choice.
- C. **AED Battery:** test for ensuring the battery level is good enough for giving defibrillation when needed.
- D. **History:** for saving the test time, AED serial number, test results including defibrillation and battery, as well as notes keeping.
- E. **Settings:** include DFS Management, 3 Consecutive Defibrillation, Reset, Language Switch, Terms & Conditions of Use, Privacy Policy, and APP version.
- F. **Login:** for AIMS Cloud CMS.

Other icons on the home screen:

- G. Connection Status:** to know the connection status with a DFS device at a glance.
- H. Connection Icon**  : see section 5.1.2 and section 5.1.3.
- I. DFS ID:** to identify the DFS device currently in use
 Note: If a new version of firmware has been published, there will be a red dot at the right upper-hand side of the DFS ID as a reminder.
- J. DFS Battery Level:** to alert when low battery

5.1.2 Smartphone Wireless Connection

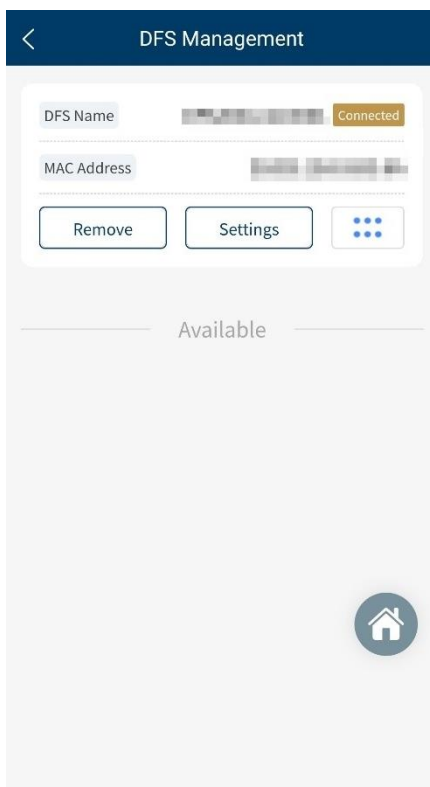






Figure 7: Pairing Interface

Click  to open DFS200 APP. The APP controls the DFS200 device via smartphone's Bluetooth.


If the Bluetooth of the smartphone is **OFF**, by clicking , the APP pops up a message reminding the user to turn on the smartphone's Bluetooth.


If the Bluetooth is **ON**, by clicking , the APP shows Paired Devices as well as Other Available Devices (see the figure on the left). DFS200 device in APP is recognized as *DFS200sn* with 6 digits of the serial number corresponding to that labeled on the device.

For not yet paired devices, select the intended DFS from Other Available Devices and pair to start. When connected, the APP connectivity icon changes to  and the DFS battery level appears. For having been paired devices, DFS will connect automatically when both Bluetooth and DFS are on.

Note: If there is an incoming call when the APP is operating, the connection between the smartphone and the DFS200 might be affected. If they disconnect, please go to "DFS Management" to reconnect the desired device.

5.1.3 DFS Device Connection

When APP shows , no DFS is connected. The Status LED blinks in alternating red and green when APP is not connected. Please turn on the Bluetooth function and choose desired DFS to use.

When APP shows , it is confirmed that DFS is connected. When connected to DFS200 APP, the Status LED blinks green.

5.1.4 DFS Device Auto-off

Auto-Off: DFS200 will be turned off after the device idles for a certain time. The default value is 3 minutes. See section 5.6.2 for more details.

Note: USB connection for FW update does not support auto-off.

5.1.5 DFS Device Low Battery

When DFS is in low battery, and the connection is via smartphone Bluetooth, the Status LED blinks red. At the same time, the APP screen would blink low battery icon.

5.2 Routine List Operation

DFS200 simulates normal heart signals as well as heart signals for a variety of arrhythmias. To do a quick inspection of an AED, it is recommended to use the Routine List. After setting all the test items in the Routine List, User can complete a quick check of the performance of the AED. To connect AED with DFS200, please refer to section 3.4 Wiring diagram and make sure sec. A is properly connected.

To operate **Routine List**:

1. Click the Routine List on the home screen and click the Add button, Figure 9 will show on the screen.

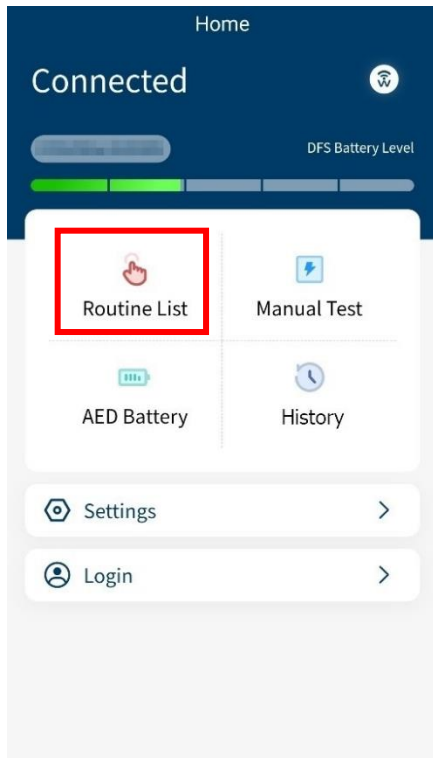


Figure 8: Routine List on the Home Screen

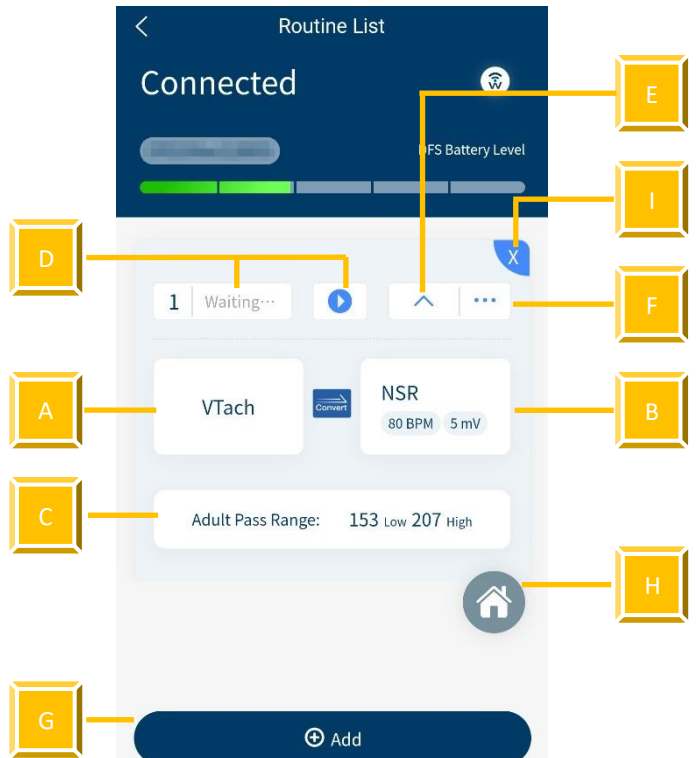


Figure 9: Routine List Interface

Table 8: Button Functions in Routine Test

Item	Name	Description
A	ECG pattern (before) button	To set the ECG pattern before defibrillation.
B	ECG pattern (after) button	To set the ECG pattern after defibrillation.
C	Pass Range button	To set the pass range of the defibrillation.
D	Start/Stop button	To start/stop the test (when User starts testing, the status beside the start button will change).
E	Hide/Expand button	To hide or show the parameter(s).
F	Sequence button	To adjust the sequence of the test item(s).
G	Add button	To add new test item(s). Note: User can add up to six test items at once.
H	Home button	To return to the home screen.
I	Delete button	To delete the test item(s).

- Click the VTach and User can see various ECG patterns from the list. Choose the desired test pattern. The provided ECG patterns are listed below:

VTach	Asystole
VTach-Fast	AFib
VFib-Coarse	NSR
VFib-Fine	CUSTOM-1
	CUSTOM-2

Note:

- To change the parameters for CUSTOM-1 and CUSTOM-2, please contact WhaleTeq (Section 13).
- The selections of the ECG patterns are divided into two categories, red and black. The red ones trigger the AED to send a defibrillation shock, and the black ones don't.

3. Click the NSR and choose the outcome ECG pattern after the defibrillation shock. Also, User can change the BPM ranging from 30 to 240 BPM set in 10 BPM intervals and the amplitude ranging from 0 to 5 mV set in 0.5 mV intervals.
4. Click the Adult pass range below to customize the pass range between 1 to 600 joules for either adult or pediatrics.

Note: The pass range sets in Routine List only applies in this mode and won't change the range in DFS Management setting.
5. When the settings are complete, press the start button to start testing.
6. After the test, the data will automatically be saved in History. To input the AED serial number and any notes for detail, follow the steps below.

To **Enter the serial number** (for Routine List, Manual Test, and AED battery):

1. Click Enter the AED serial number here button.



Figure 10: Outcome Page of Routine List

2. Enter the AED serial number and any notes in the detail page.
3. Click the save button to complete the procedure.

Note:

- (1) User can also enter the AED serial number through History. See section 5.5.
- (2) User can enlarge the waveform for further analysis. See page 27 to learn more.

5.3 Manual Test Operation

With arrhythmia combinations of user's choice, Manual Test is for checking any brand and model of AED, including but not limited to fully automatic AED and those with increasing energy for consecutive defibrillation shocks. For models providing consecutive defibrillation shocks with increasing energy, User shall turn on the option "Manual Test 3 Consec. Defib," which is available from Settings. (See Settings 5.6.4)

To operate the **Manual Test**:

1. Click the Manual Test on the home screen.

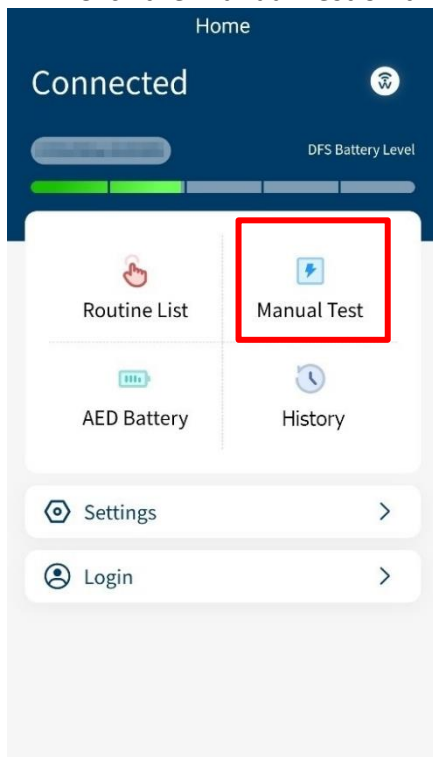


Figure 11: Manual Test on the Home screen

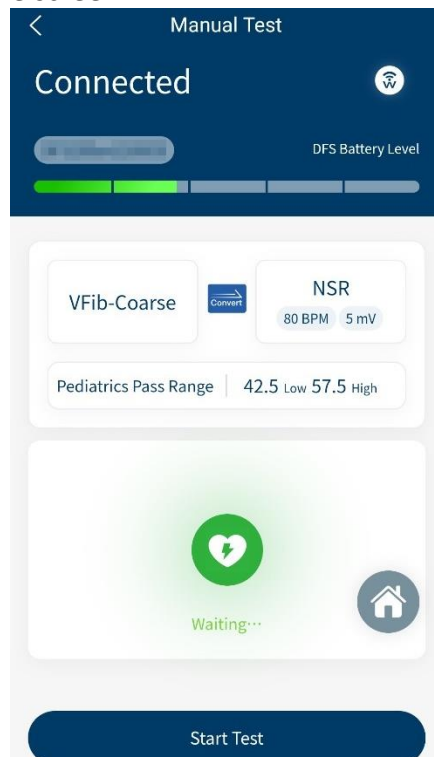


Figure 12: Manual Test Interface

2. The interface of Manual Test is similar to Routine List. Click VTach to select the ECG patterns before defibrillation and click NSR to select the ECG patterns after the defibrillation.
Note: The pass range in Manual Test cannot be changed here. See section 5.6.3 to adjust the pass range for Manual Test.
3. Click the Start Test button to initiate the test.
4. After the test, User will see the outcomes shown on the screen.

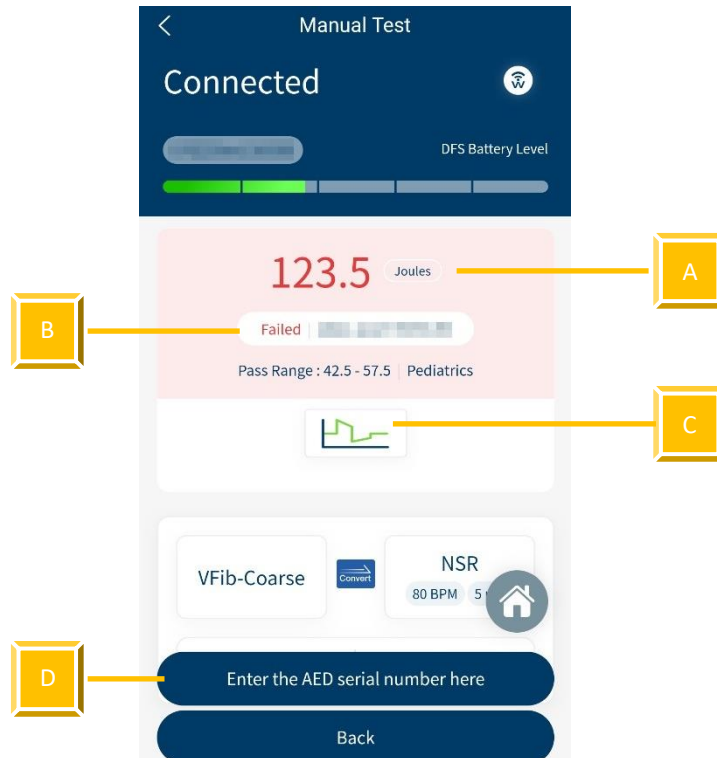


Figure 13: Outcome Page of Manual Test

Table 9: Elements on the Outcome Page of Manual Test

Item	Name	Description
A	Outcome	To display the Joules of the defibrillation.
B	Status	To show whether the Joules lies within the pass range. Note: If the test passes, the background color will be blue. If failed, red.
C	Waveform	To show the waveform of the defibrillation.

Item	Name	Description
D	Enter AED serial number	To enter the serial number of an AED and any notes to this test data.

To **enlarge the waveform picture** (for both Routine List and Manual Test):

1. Click the waveform on the outcome page and User will see the left figure below.

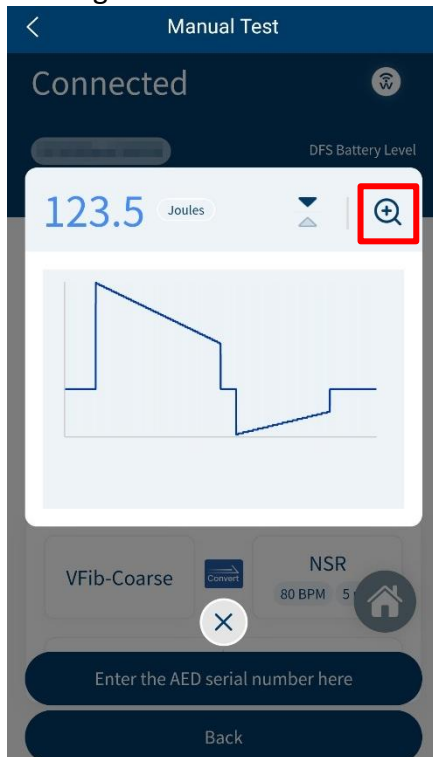


Figure 14: Waveform Enlarge Once

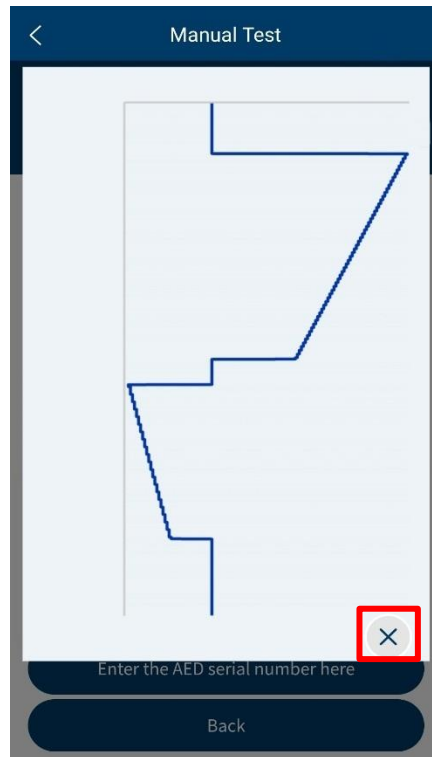


Figure 15: Waveform Enlarge Twice

2. To enlarge again, click the magnifying glass on the right upper-hand side.
3. To close the image, click the cross on the screen.

To **flip the waveform figure** (for both Routine List and Manual Test):

1. Click the waveform on the outcome page and User will see the left figure below.
2. Click the arrow icon in the red frame and the system will flip the waveform figure.

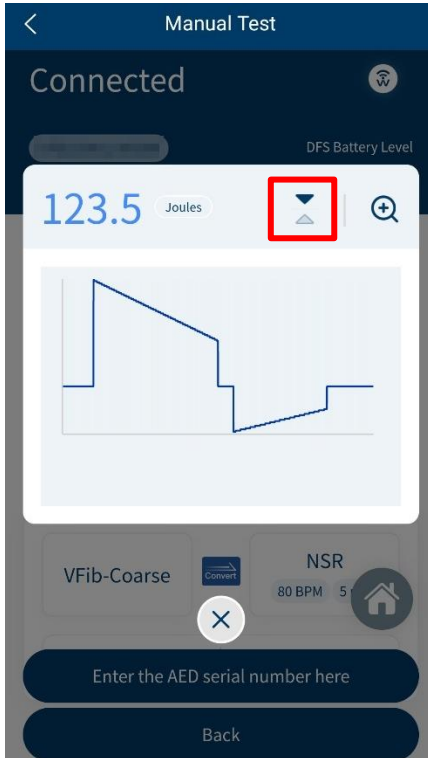


Figure 16: Arrow Icon

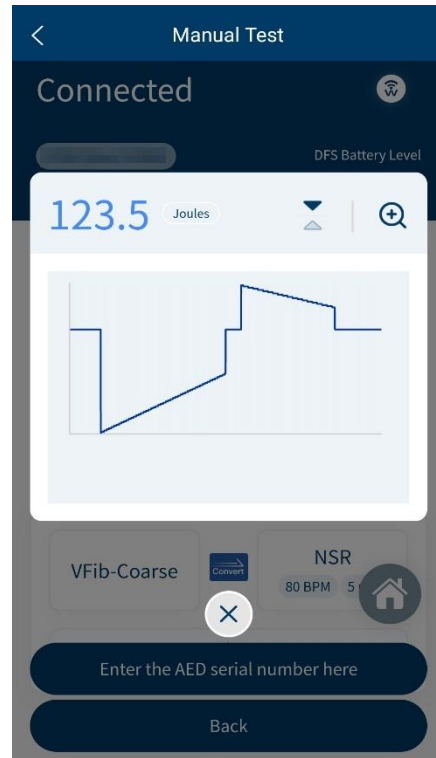


Figure 17: Waveform Displayed Upside Down

5.4 AED Battery Test Operation

AED battery test is for checking whether the battery level of the AED is good enough for giving defibrillation when needed. To conduct an AED battery test with DFS200, please refer to section 3.4 Wiring diagram and make sure sec. B is properly connected.

To operate **AED Battery**:

1. Click the AED Battery on the home screen.
2. Follow the steps on the screen to complete the AED Battery test. Please put the removed AED battery on a fixed surface, and avoid holding the AED battery, test probes and mobile phone for testing at the same time, so as to remain the same measurement position. The result will show up after placing the test probes at the AED battery for 5 seconds, and the test data will automatically be saved in History. To add the AED serial number or any notes to the data, click Enter the AED serial number here button.

Note: The battery measurement probe with load is an optional accessory which can simulate the actual power consumption within the AED as if the battery is installed in the AED. To know more about this accessory, please refer to section 1.2.

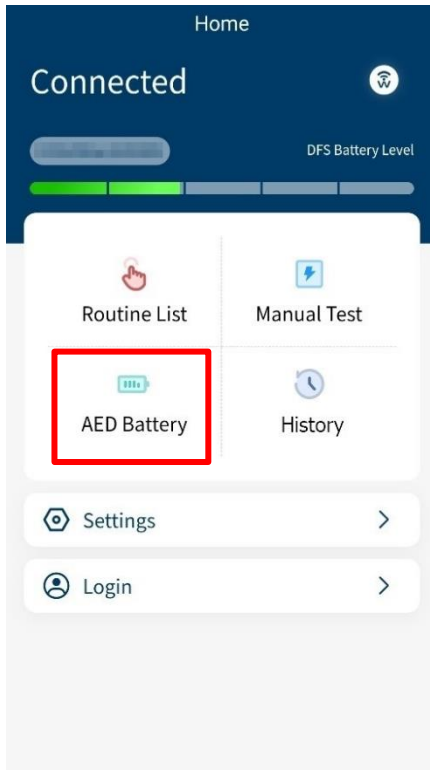


Figure 18: AED Battery on the Home Screen

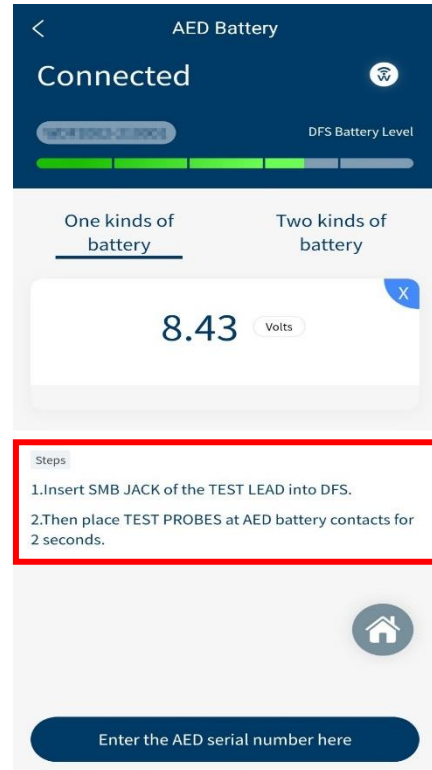


Figure 19: AED Battery Interface

5.5 History

The record in History keeps the test date & time, the serial number of AED tested, as well as test result completes the maintenance task. User may include notes as reminders and export the results for further analysis.

To operate **History**:

1. Click History on the home screen and User will see Figure 21 on the screen.
2. In this page, User can manage, sort, or export the data by clicking different buttons. The button functions are listed below:

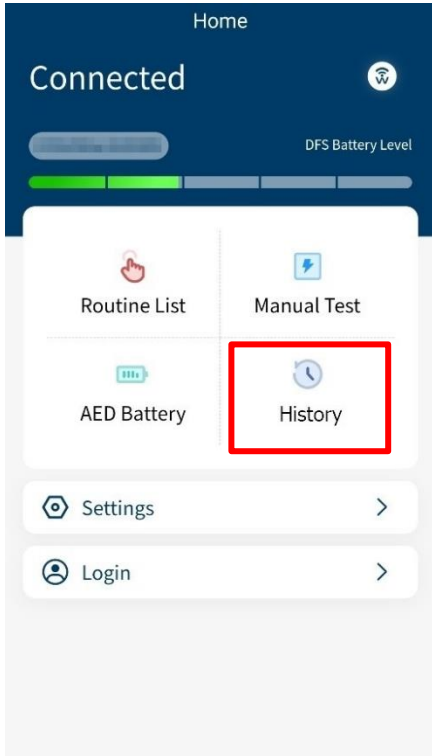


Figure 20: History on the Home Screen

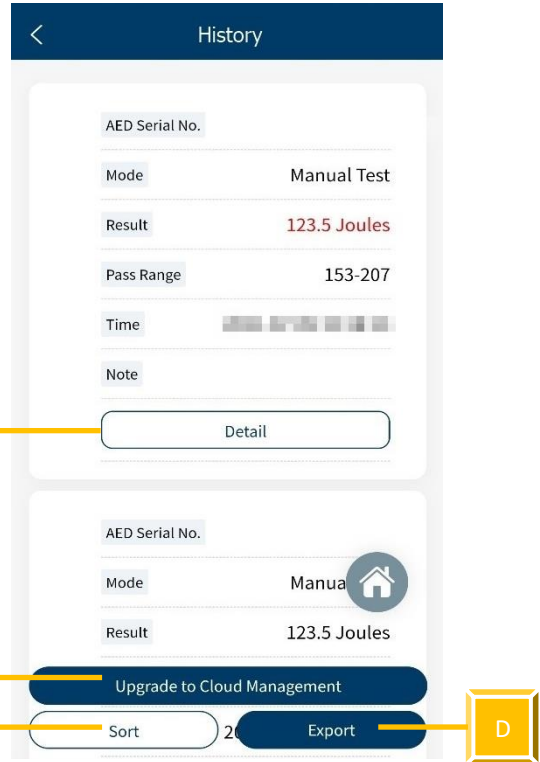


Figure 21: History Interface

Table 10: Button Functions in History

Item	Name	Description
A	Detail	To add AED serial number and any notes to the data.
B	Upgrade to Cloud Management	To better manage the data through a particular system. Note: To know more about this system, please refer to sec.13 to contact WhaleTeq.
C	Sort	To sort the data in different sequences.
D	Export	To export the data (*.csv) to other platforms.

5.6 Settings

5.6.1 Login

Login for AIMS Cloud CMS which can help the user to further manage or analyze the data. To know more about this system, please refer to sec.13 and contact WhaleTeq.

5.6.2 DFS Management

For first-time User, all DFSs are listed under Available and none under Paired. Once pairing from Available, the DFS is moved to Paired section. If there is more than one DFS under Paired section, the top one will be automatically connected when both DFS device and the smartphone Bluetooth are on. Users may also arrange the DFSs in Paired section. Please refresh Available for nearby DFS device that is ON.

In DFS Management, User can set the standby time (part A) and the ECG waveform for standalone mode (part B). Standalone mode allows DFS200 to work without APP. Please refer to section 6 for more details.

Besides, User can know whether there is a new version of firmware for the Product. If there is a new version of firmware, after clicking the refresh button, a red dot appears to remind the user of the update.

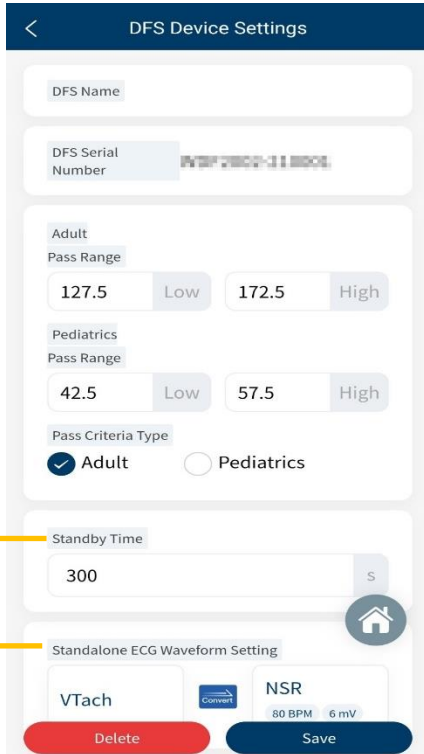


Figure 22: DFS Device Settings Interface

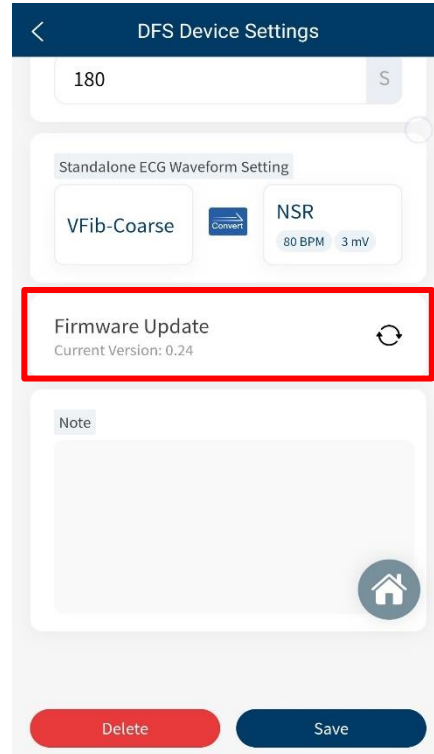


Figure 23: Firmware Update Reminder

5.6.3 Set Pass/ Fail Range

User can set adult and pediatric pass criteria here. Only when DFS device is connected does this page work. Depending on the different models of DUT (AED), the delivered defibrillation is different. DFS200 allows User to self-define the minimal and maximal limits of the defibrillation shock. Equal or above the minimal limit value, the Discharge LED lights green; otherwise, lights red.

5.6.4 Manual Test 3 Consec. Defib

Default is off for the majority of AEDs. Turning this function on allows consecutive ECG patterns played as well as consecutive record keeping.

To activate **consecutive defibrillation test**:

1. In Settings, User will see the figure below on the screen.
2. Enable the Manual Test 3 Consec. Defib and User can start testing.

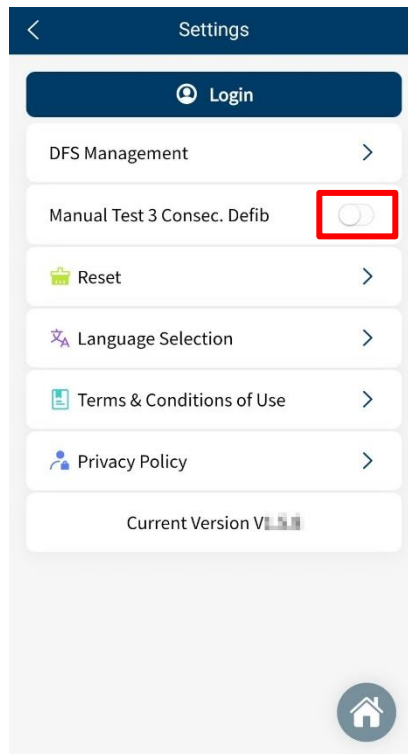


Figure 24: 3 Consec. Defib. Activation

5.6.5 Reset

Clear the customized setting including paired DFSs. Test results will remain in History.

5.6.6 Language Selection

User can switch the language of the DFS200 APP for Mandarin, simplified Chinese, English, or French.

5.6.7 Terms & Conditions of Use

This page informs User about the terms of use regarding DFS200.

5.6.8 Privacy Policy

This page informs User of WhaleTeq's policies regarding the collection, use, and disclosure of personal data when using WhaleTeq's Service.

5.6.9 Current version

Check the version number of the DFS200 APP here.

6 Standalone Operation

The DFS200 can work alone without DFS APP when in certain situations such as the smartphone is not in hand or out of battery.

With the known default ECG pattern specified in advance from APP (see section 5.6.2), the DFS200 automatically plays this ECG combination upon being turned on and the Status LED would blink red/green alternatively.

Then, if the AED determines that a defibrillation shock is needed and then delivers the corresponding energy, the DFS200 Discharge LED lights according to the threshold (adult/ pediatric) specified in advance from APP.

The above procedure completes one round of an energy test.

7 Calibration and Validation

It is recommended to get DFS200 calibrated annually. Calibration and validation both require traceable equipment. Steps for Calibration/ Validation methods are available upon request. Please contact WhaleTeq for more details (See section 13).

8 Troubleshooting

- (1) If after AED defibrillation shock, and the DFS200 “Discharge” does not light up, check the AED interface cable connection.
- (2) If User is certain that the AED defibrillation energy matches its spec, but the “Discharge” LED lights red, check 5.6.2 DFS Management setting to ensure the joule threshold is set correspondingly.
- (3) When DFS200 “Status” blinks red, change the battery at User’s earliest convenience.
- (4) When using the battery measurement probe with load (model no. 300-DFBMPLD) to test an AED battery but can’t have its test result, please check whether the probe’s surface is warm or the probe has been continuously used for more than 30 seconds. The above situations indicate that the probe is overheated, so users should suspend the test and restart after it cools down.






9 Cautions

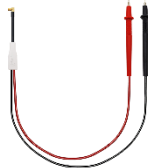
- (1) Follow AED instructions during testing with DFS200.**
- (2) Follow color code and/ or labeling when connecting DFS200 and AED via AED interface cable.**
- (3) When DFS200 is in use, the face containing LEDs and buttons must face up to allow ventilation.**
- (4) To allow ventilation, DFS200 should be used to analyze defibrillation energy at the interval of at least 60 seconds.**
- (5) AED battery test probe should remain steady when testing.**
- (6) USB cable used for FW upgrade must be file-transferrable.**
- (7) Battery, whether one-time use or rechargeable, must be included in DFS for accurate energy measurement.**
- (8) When Status LED blinks red, the Discharge LED may dim and blink at a faster frequency. This is a warning to change the battery as soon as possible in order to ensure accurate test results.**
- (9) USB Port cannot be used to charge the battery.**
- (10) For best performance, rechargeable battery capacity is recommended to be 800 mAh or above.**
- (11) When not in use for a longer period, remove the battery from DFS200 to ensure a longer lifespan of the battery.**

- (12) DFS200 is a defibrillator / AED handheld tester, which can also be used in laboratory and can calibrate the defibrillation energy.
- (13) If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

10 Ordering Information

Table 11: DFS200 Test System

Model No.	Image	Description
300-DFS200		DFS200 AED Field Tester Main device
D06-9000321		9V Alkaline Battery
K22-0500101 ¹		Open-ended AED Cable (Banana Male), 0.5 meter (Black)
K22-0500102 ¹		Open-ended AED Cable (Banana Male), 0.5 meter (Red)
N61-0210033		Compact Splicing Connector

Model No.	Image	Description
K29-0900501 ²		Battery Measurement Probe

Note:

1. Customization of AED interface cable adapter is available. Please contact WhaleTeq (service@whaleteq.com).
2. The battery measurement probe in this package can be replaced with the battery measurement probe with load (300-DFBMPLD). For the details and quotation, please contact WhaleTeq.

Table 12: DFS200 Optional Accessories






Model No.	Image	Description
K27-1800304		USB Transfer Cable: Type-A to Type-C (Male to Male), 1.8 meter
G34-0600101		DFS Carrying Bag
300-DFBMPLD		Battery Measurement Probe with Load

Table 13: Optional DFS200 Paddle Box Set

Model No.	Image	Description
300-DFPDOCK		DFS Tester Docking Base for Defibrillator
E13-070P101		DFS Tester Defibrillation Receiving Plate

Note: One DFS Tester Docking Base for Defibrillator needs to install two DFS Tester Defibrillation Receiving Plate.

Table 14: Optional Calibration Service and Warranty Extension

Model No.	Description
C3	Provides (3) years of calibration service coverage. WhaleTeq equipment can be calibrated to original performance on the basis of (1) year interval.
R3	Extend the limited warranty from (1) year to (3) years.

11 Package Contents

Table 15: DFS200 Standard Package Content

Item	Q'ty
DFS200 AED Field Tester Main device	1
9V Alkaline Battery	1
Open-ended AED Cable (Banana Male), 0.5 meter (Black)	1
Open-ended AED Cable (Banana Male), 0.5 meter (Red)	1
Compact Splicing Connector	2
Test Lead Set for AED Battery Level	1

DFS200 Optional Accessories

Table 16: DFS200 Optional Accessories

Item	Q'ty
USB Transfer Cable: Type-A to Type-C (Male to Male), 1.8 meter	1
DFS Carrying Bag	1
Battery Measurement Probe with Load	1
DFS Tester Docking Base for Defibrillator	1
DFS Tester Defibrillation Receiving Plate	1

12 Revision History

Table 17: Revision Version

Version	Revision Description	Issue Date
2021-07-27	First Version	2021-07-31
2021-12-31	Add Chapter 1.2 Battery measurement probe with load & paddle box introduction Chapter 2.3 Energy Measurement Specifications Chapter 3.4 Defibrillator Testing Scenario (Optional) Chapter 9 Caution (5) (12) Chapter 10 ordering information Chapter 11 Package contents	2022-01-14
2022-12-28	Update Chapter 2 Specifications Section 5.1.2 Smartphone Wireless Connection Section 5.4 AED Battery Test Operation	2023-01-04

	Chapter 10 Ordering Information Chapter 11 Package Contents	
2023-04-07	Update Figure 10, 19, 22, and 24 Section 5.6.6 Language Selection Chapter 8 Troubleshooting	2023-04-07

13 Contact WhaleTeq

WHALETEQ Co., LTD

service@whaleteq.com | (O)+886 2 2517 6255

8F., No. 125, Songjiang Rd., Zhongshan Dist., Taipei City 104474, Taiwan