



# EZSCAN2

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## User guide

## Version 3

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01/04/2016



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# 1 Introduction

The eZscan device is powered by the Windows 7 Embedded SP1 operating system.

## 1.1 Patent

The eZscan® device is covered by following patents: "Electrophysiological analysis system and method" (Patent 1 898 783 and 2 124 736), and "Procédé d'analyse physiologique par stabilisation d'une surtension" (PCT2014/069479).

## 1.2 Use

EZSCAN is a medical device for the early detection of peripheral autonomic neuropathy in order to screen for subjects at higher risk of diabetes or cardiometabolic disease (including prediabetes). It's an alternative method for screening of risk.

## 1.3 Principle

EZSCAN measures the capacity of the sweat glands to release chloride ions in response to an electric stimulus. It is a dynamic test equivalent to a stress test.

Description:

The eZscan device consists of the following:

- A control panel and display
- A pair of foot sensor plates
- A pair of hand sensor plates
- A power cable

## 1.4 Installation

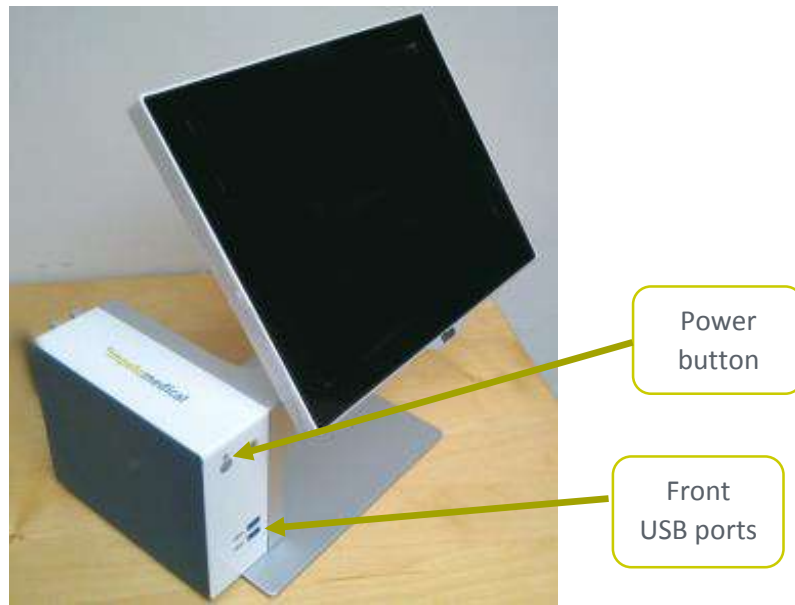
Carefully follow instructions in the corresponding manual to ensure correct installation. Complete installation should take no more than 15-20 minutes.

### NOTE

**Impeto Medical** is able to provide a printed version of this user guide within 7 business days following the receipt of request.

## 2 Power up the system

- 1 In front of the system, there are 2 USB ports and power button.
- 2 Press and release the power button to power on.



WARNING

NO MODIFICATION OF THIS EQUIPMENT IS ALLOWED.

## 3 Home page

### 3.1 List of available functionalities

Please note that a summary of all functions is in the “How to” section (*ref. p64*).

### 3.2 For User not logged in

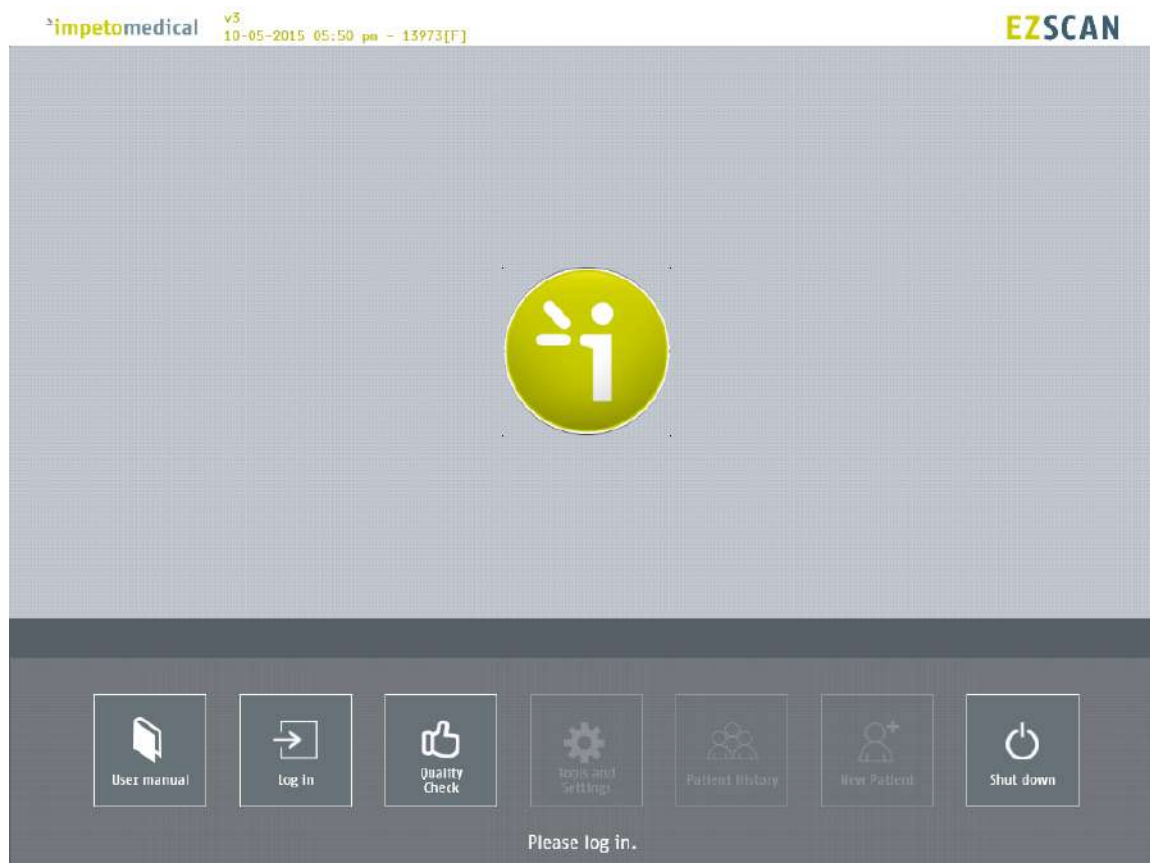


Figure 1 : Home page – no user logged in

- 1 Click on the Log in button. The “Log in” panel appears (*ref. p9*).
- 2 Click on Quality Check to launch the system “Quality check” (*ref. p13*).
- 3 Click on Shut down to shut down the system.



**WARNING**

**REMOVING THE POWER CORD FROM THE MASTER UNIT OR FROM THE OUTLET BEFORE COMPLETE UNIT SHUT OFF MAY IRREDEMIABLY CORRUPT DATA ON THE UNIT'S HARD DISK DRIVE.**

- 4 Click on User manual to display the electronic version of the user manual.

### 3.3 For a logged in User

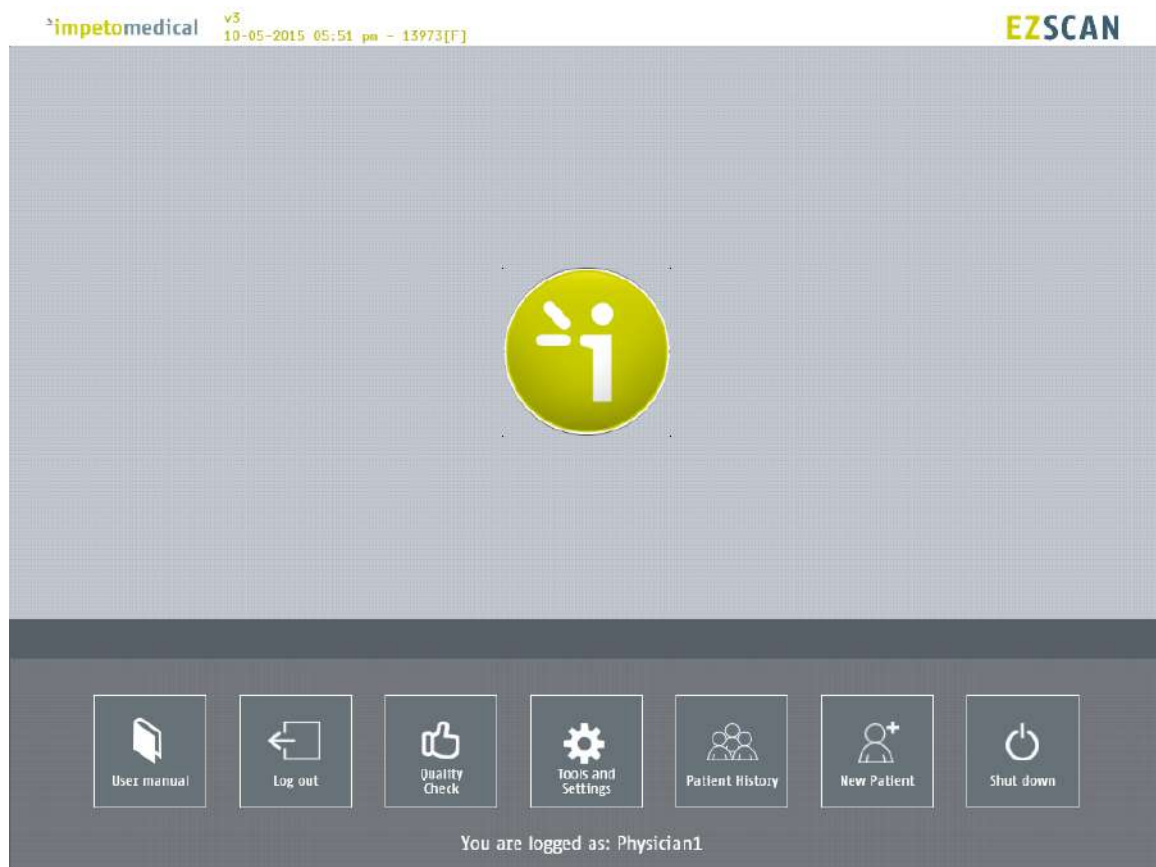


Figure 2 : Home page –user logged in

- 1 Click on Log out to log out the current user.
- 2 Click on Quality Check to launch the system “Quality check” (ref. p13).
- 3 Click on Shut down to shut down the system.
- 4 Click on User manual to display the electronic version of the user manual.
- 5 Click on Tools & Settings to enter the configuration page(s) (ref. p18).
- 6 Click on New patient to initiate a scan for a new patient (ref. p34).
- 7 Click on Patient history to access the patient history (ref. p39).



# 4 Log in page

## 4.1 List of controls



Figure 3 : Log in page

- 1 Select the physician in the Physician list.
- 2 Enter your password in the Password field using the on-screen keyboard. The initial password is provided by your system supervisor. Default password: impeto.
- 3 Click on Log in button to validate the current password for the selected physician (*ref. p8*).

### 4.1.1 Other controls

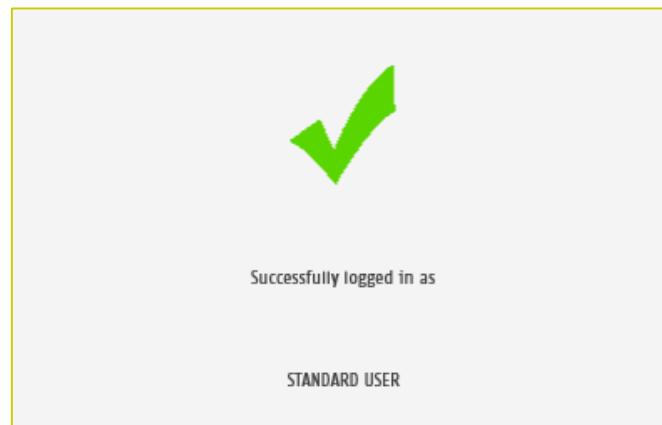
Click on the Home button (  ) to go to the home page (*ref. p8*).

Click on the Help button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

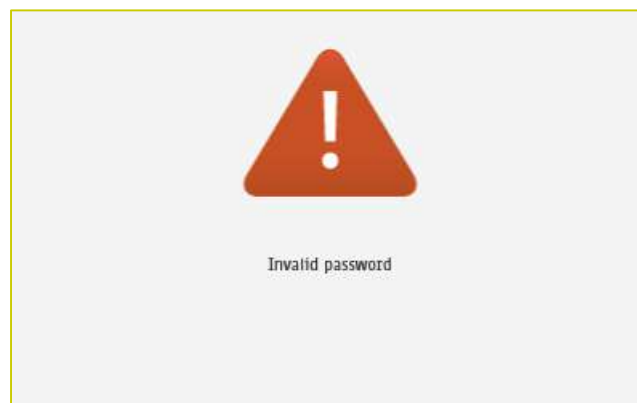
Click on Change password if you want to modify your current password (*ref. p11*).  
After the current password is entered in the password field.

## 4.2 Password validation

When the password is correct, the following message appears and the application automatically proceeds to the home screen (*ref. p8*):



When the password is not correct, the following message appears and the user has to log in again (*ref. p9*):



## 4.3 Password modification

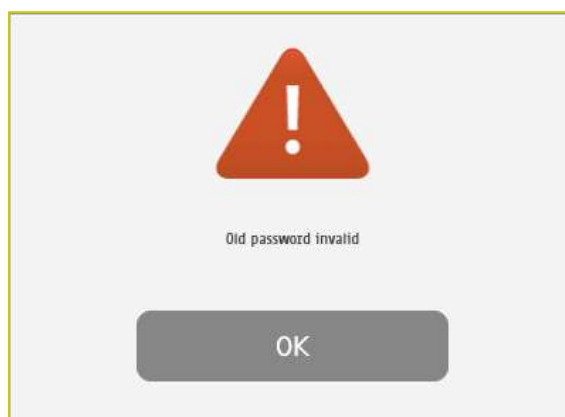
- 1 Enter your current password in the Current password field.  
Click Change password to show the new password fields.  
Fill the two new password fields with the same new password then click on Save password.



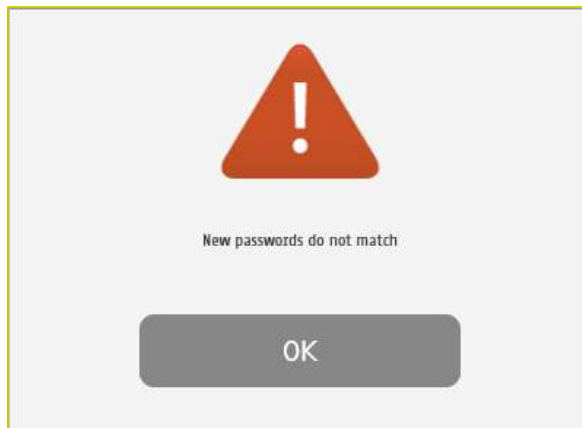
Figure 4 : Log in page – new password fields displayed

When the button Save password is clicked, a check is performed on the different passwords. Then,

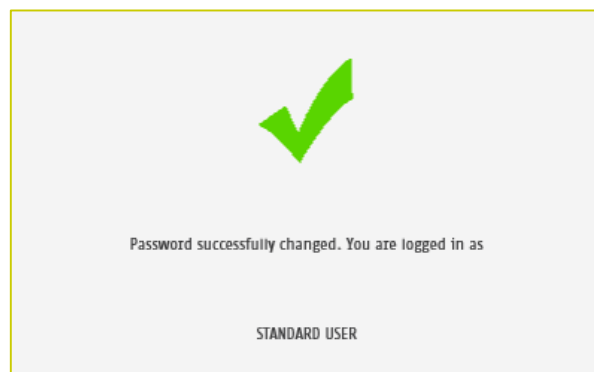
- If the old password is not correct, the following message appears:



- If the new passwords are not identical, the following message appears:



- If the old password is correct and the new passwords are identical, the following message appears and you are automatically logged in.



# 5 Quality check page

## 5.1 Overview

The Quality Check allows the operator to test the internal electronic circuitry of the system.

## 5.2 List of controls

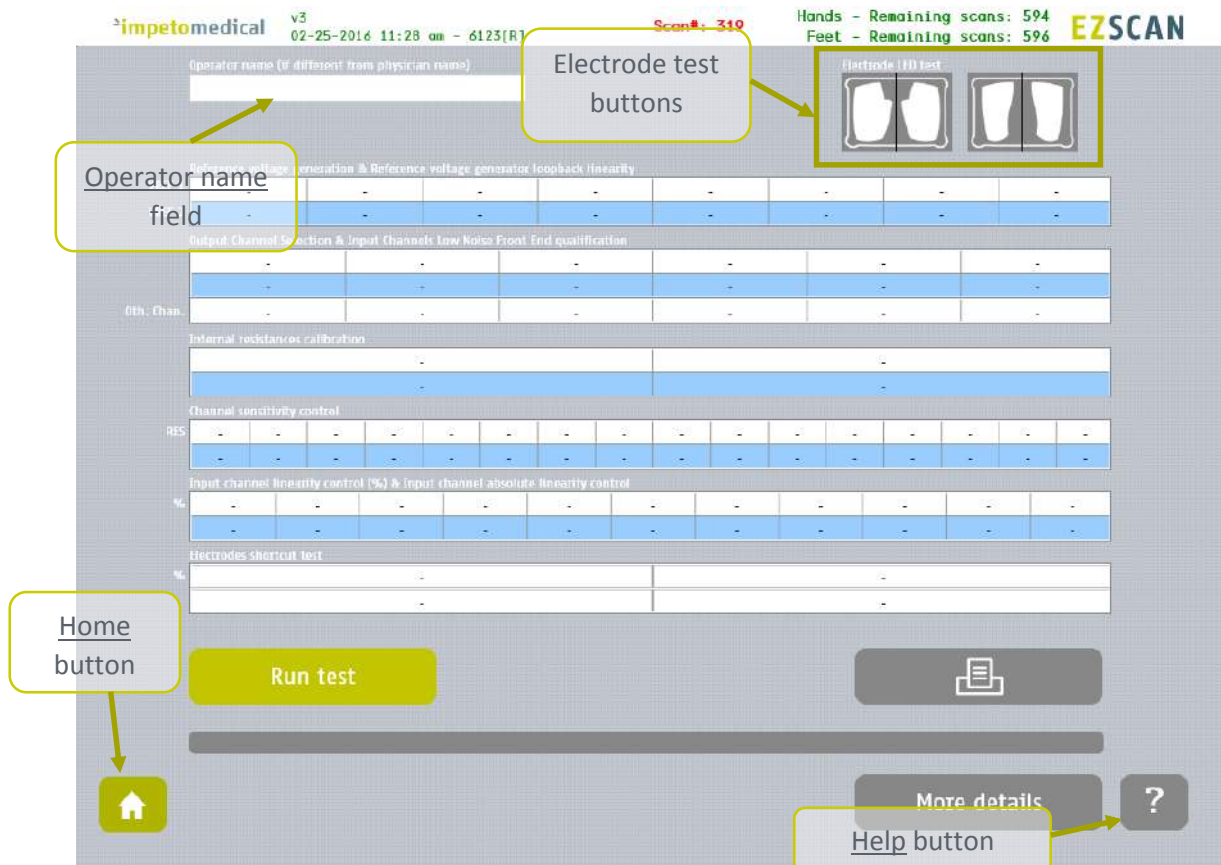


Figure 5 : Quality Check page – empty

- 1 Click on the hands (left) and feet (right) Electrode test buttons to check the connectivity with the electrodes. The appropriate electrode LED will light up if the connectivity is Ok.
- 2 Enter an Operator name to be displayed in the Quality Check report.
  - if the Operator name is not set, the Physician's name is displayed in the Quality Check report instead
- 3 Click on the Run test button to execute a full Quality Check sequence (*ref. p15 for Quality Check results interpretation*).

### NOTE

The electrodes must be carried out without patient (nobody on contact with the electrodes).

### 5.3 During a Quality Check test

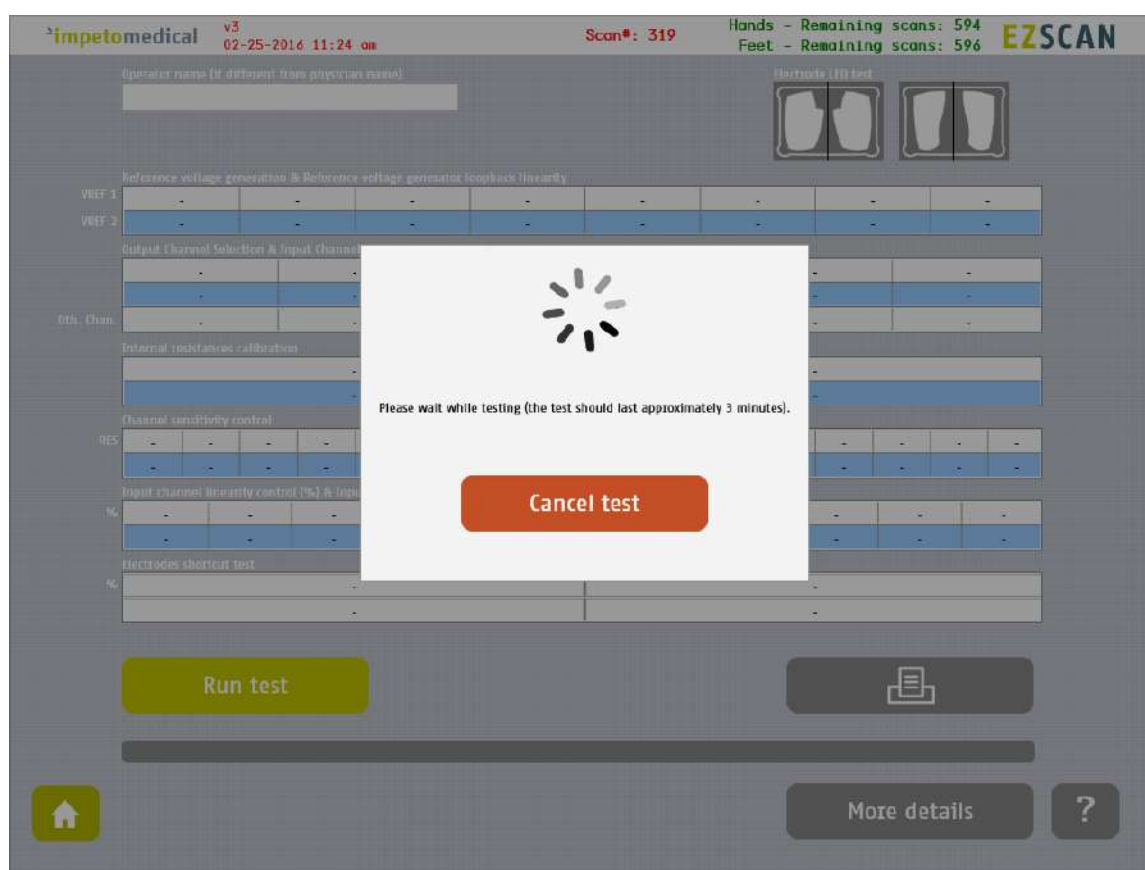


Figure 6: Quality Check page -During the Quality Check

- 1 Click on the Cancel test button to stop the Quality Check test.  
**NOTE:** It may take up to several minutes for the test to cancel.

## 5.4 Quality Check result interpretation

When the Quality Check is complete and no error occurred, green checks are displayed for every lines as follows:

impetomedical

v3  
02-25-2016 11:31 am - 6123[R]

Scan#: 319

Hands - Remaining scans: 594  
Feet - Remaining scans: 596

EZSCAN

Operator name (if different from physician name)

Electrode I/O test

Reference voltage generation & Reference voltage generator longback linearity

VREF 1	631	505	447	390	333	275	219	99	✓
VREF 2	648	518	459	400	342	283	225	101	

Output Channel Selection & Input Channels low Noise Front End qualification

	0	1	2	3	4	5	✓
	835	835	835	834	835	835	
ODs, Chan.	Pass	Pass	Pass	Pass	Pass	Pass	

Internal resistances calibration

	0	1	✓
	506	521	

Channel sensitivity control

RES	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	✓
	59	63	109	139	169	198	233	275	321	363	415	466	526	586	652	712	

Input channel linearity control (%) & Input channel absolute linearity control

%	0	10	20	30	40	50	60	70	80	90	100	✓
	0	108	213	321	408	521	623	719	827	928	1023	

Run test

Manual Test

More details

Home

?

Figure 7: Quality Check page - Complete and valid Quality check

If a problem occurs during the Quality Check, some warning icons appear in place of the green checks. In that case, please contact **Impeto** technical support (*ref. p79*).

impetomedical

v3

02-25-2016 11:31 am - 6123[R]

Scan#: 319

Hands - Remaining scans: 594

Feet - Remaining scans: 596

EZSCAN

Operator name (if different from physician name)

Electrode LED test

Reference voltage regeneration & Reference voltage generator loopback linearity

VRZ 1	630	504	447	390	333	275	218	98
VRZ 2	647	517	459	400	342	283	225	101

Output Channel Selection & Input Channels Low Noise Front End qualification

	0	1	2	3	4	5
	835	834	835	835	835	836
0th, Chan	Pass	Pass	Fail	Fail	Fail	Fail

Internal resistances calibration

	0	1
	504	520

Channel sensitivity control

RES	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	59	83	108	139	168	197	233	274	320	362	414	465	524	584	650	710

Input channel linearity control (%) & Input channel absolute linearity control

%	0	10	20	30	40	50	60	70	80	90	100
	0	107	212	320	406	520	622	717	825	925	1023

Electrodes shortcut test

%	84(%)	55(%)
	Fail	Fail

Run test

Problem observed during the test.

More details

?

Figure 8 : Quality Check page -Complete and invalid Quality check

- 1 Click on the Print button to print and export the Quality Check report.
- 2 Click on the More details button to display more information regarding to the Quality Check results.



## 5.5 To have more details on the Quality Check results

When an error occurred during the execution of a Quality Check, you can display more information by clicking on the More Details button to know the error source.

NOTE

Some of these information are only available for supervisor users.

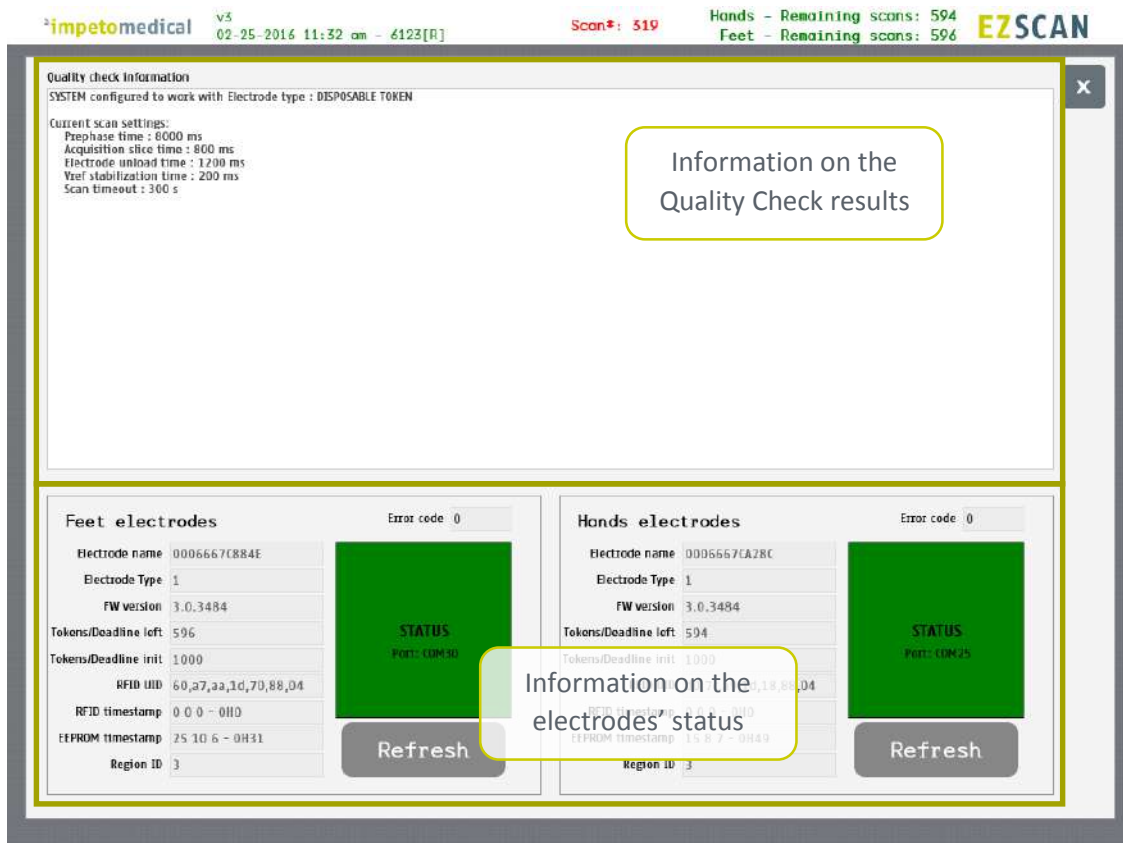



Figure 9: Quality Check page -More details on the Quality check results

- 1 Click on the X at the top right corner to close the window.

## 5.6 Other controls

Click on the Home button (  ) to go to the home page (ref. p8).

Click on the Help button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

# 6 Tools & Settings page(s)

## 6.1 Standard user – List of controls

If you are logged in as Supervisor, please see p20.

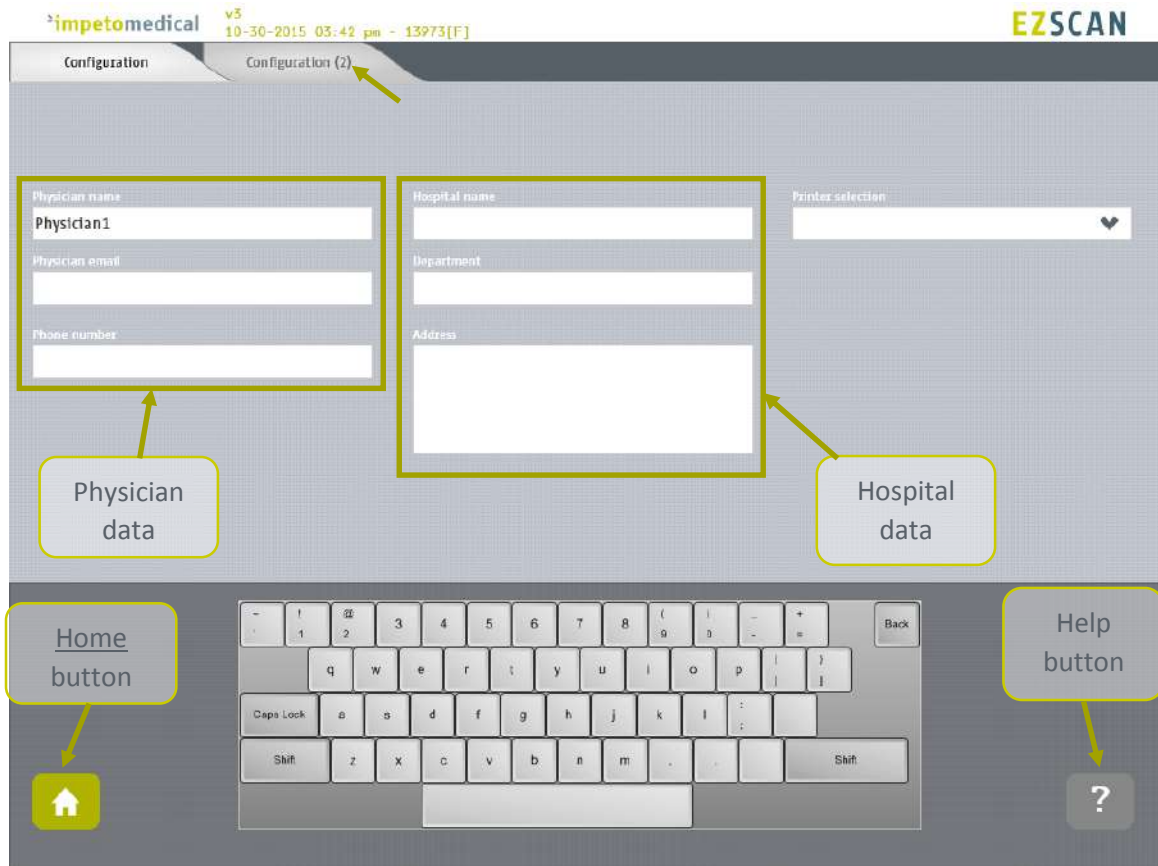


Figure 10 : Configuration page

- 1 Enter the physician information in the physician data fields.
- 2 Enter hospital information in the hospital data fields.
- 3 Select the printer from the dropdown list of installed printers (*ref. p61 to see how to install a printer driver*).

### 6.1.1 Other controls

Click on Configuration (2) tab to access to additional settings (*ref. p19*).

Click on the Home button (  ) to go to the home page (*ref. p8*).

Click on the Help button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

## 6.2 Standard users – Configuration (2) tab

The screenshot shows the EZSCAN Configuration (2) tab. At the top, there's a header with 'impetomedical v3', a timestamp '10-30-2015 03:42 pm - 13973[F]', and the 'EZSCAN' logo. Below the header, there are two tabs: 'Configuration' and 'Configuration (2)'. The main content area is divided into several sections: 'Password management' with a 'Modify selected user password' field and a 'Save password' button; 'System settings' with 'Idle time before system lock' options (10 minutes, 1 hour, 5 hours); 'Print settings' with a 'Direct Print' checkbox; 'Report options' with a checkbox to 'Display the last report with the new one'; 'Optional Patient Data' with checkboxes for 'List of drugs', 'BMI', and 'Waist'; and 'Additional scores to display' with a checkbox for 'Display mean conductances'. At the bottom, there's a keyboard layout diagram with a 'Home' button (house icon) and a 'Help' button (question mark icon).

Figure 11: Standard users - Additional settings

- 1 **Change your password using the Password management settings.**
- 2 **Select the time delay before the system locks itself and you are logged out the application.**
- 3 **Change your print settings:**
  - Check “Direct print” to display results and automatically print physician and patient reports after a successful scan. (Preferred setting)
  - Uncheck “Direct print” to display the results only. End user can select manual print from the report screen (ref. p53) or from patients’ history (ref. p39).
- 4 **Change the report settings for the selected physician:**
  - Activate or deactivate the display of reports for the previous exams (when existing)
- 5 **Select optional data (all options may not be available).**
- 6 **Enable the display of mean conductances on Results screen and the report**

### 6.2.1 Other controls

Click on the Home button (  ) to go to the home page (ref. p8).

Click on the Help button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

## 6.3 Supervisor users – Additional list of controls

All settings that are available for standard users are also manageable by a supervisor.

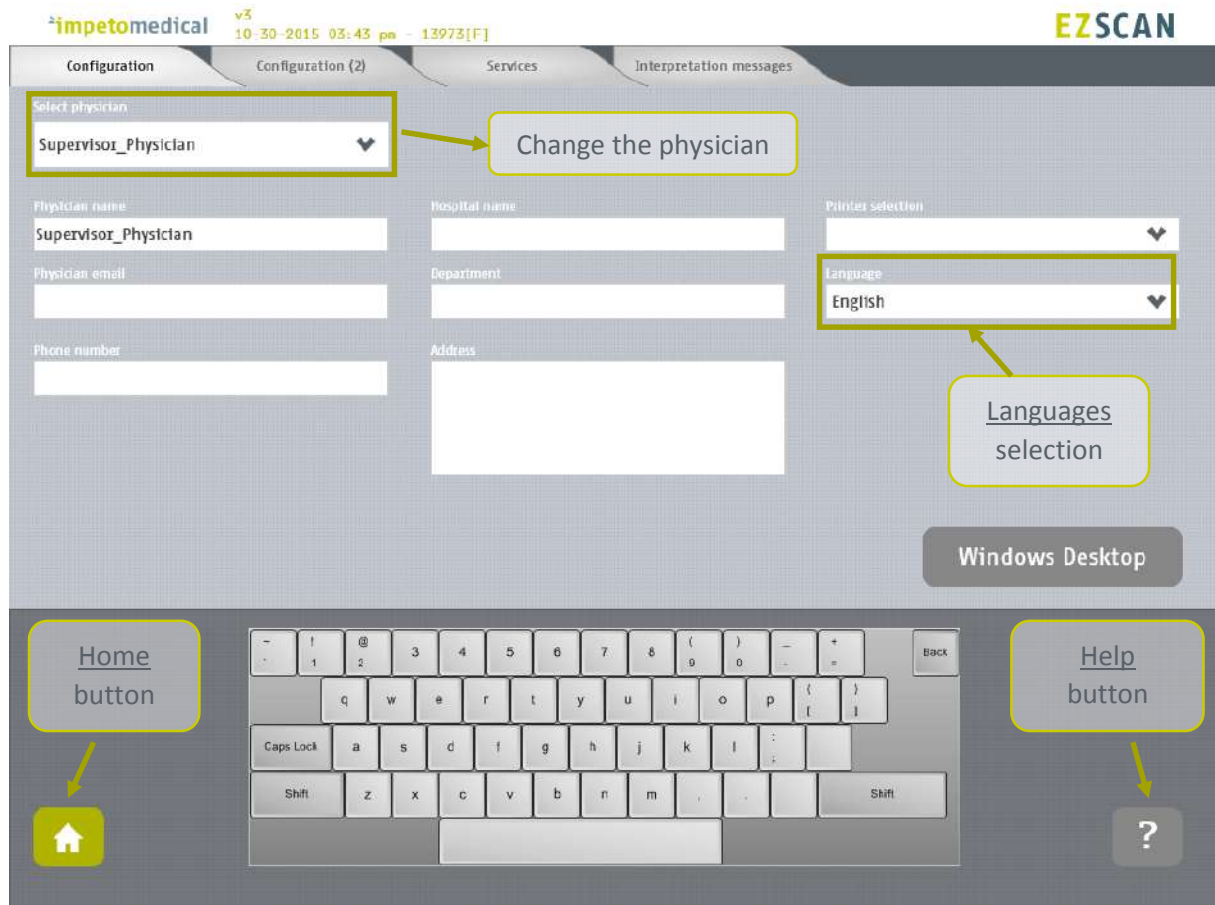


Figure 12: Configuration page - Additional controls for supervisor

- 1 Select the physician whose settings will be modified.
- 2 Select the language for the selected physician.
- 3 Click on Windows Desktop button to close the application and access the Windows OS desktop.


### 6.3.1 Other controls

Click on Configuration (2) tab to access to supervisor settings (ref. p21).

Click on Services tab to access to additional services (ref. p23).

Click on Interpretation messages to modify messages that appear as interpretation on the Results screen and on the reports. (ref. p25)

Click on the Home button (  ) to go to the home page (ref. p8).

Click on the Help button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

## 6.4 Supervisor users – Configuration (2) tab

**impetomedical** v3 31-03-2016 11:00 - 06123[R] **Selected physician: Supervisor\_Physician** **EZSCAN**

**Configuration (2)**

**Password management**

Select physician: **Supervisor\_Physician**

Modify selected user password:

**Save password**

**System settings**

Idle time before system lock: ☒ 10 minutes ☐ 1 hour ☐ 5 hours

Quality check frequency: ☐ Every week ☒ Every month

**Print settings**

☐ Direct print

**Cursor settings**

☒ Hide the mouse cursor

**Report options**

☒ Display the last report with the new one

**Date format**

☐ yyyy/dd/mm ☒ dd/mm/yyyy ☐ yyyy/mm/dd ☐ mm/dd/yyyy

**Optional patient data**

☒ List of drugs ☐ Country ☒ BMI ☒ Date of birth ☒ HbA1c ☒ Waist ☒ SBP/DBP

**Additional scores to display**

☒ Display mean conductances ☒ Enable patient modification

**Weight**

☒ kg ☐ lbs

**Height**

☒ Cm ☐ In

**Home button**



**Help button**

Figure 13 : Supervisor users - Configuration (2) page

- 1 Select the physician whose settings will be modified.
- 2 Set the password for the selected physician and click on “Save Password”.
- 3 Select the time delay before the system locks itself and you are logged out the application.
- 4 Select the frequency for Quality Check (a remainder will pop up if no Quality Check is run in the time specified).
- 5 Change the print settings for the selected physician:
  - Check “Direct print” to display results and automatically print the reports after a successful scan. (Preferred setting)
  - Uncheck “Direct print” to display the results only. End user can select manual print from the report screen (ref. p53) or for patients’ history (ref. p39).
- 6 Change the mouse cursor settings:
  - Check the box to hide the mouse cursor
  - Uncheck the box in case you want to use a physical mouse.
- 7 Change the report settings for the selected physician:
  - Activate or deactivate the display of reports for the previous exams (when existing)

8	<p><b>Select the date format to apply for the selected physician.</b></p> <p>Default mode is DD/MM/YYYY.</p>
9	<p><b>Select optional data for the selected physician (all options may not be available)</b></p> <ul style="list-style-type: none"> <li>• <i>When “Date of birth” is not checked, only the Year of birth is required.</i></li> </ul>
10	<p><b>Change data management settings:</b></p> <ul style="list-style-type: none"> <li>• <i>Enable the patient modification to allow standard users to modify demographic data for their patients.</i></li> <li>• <i>Enable the display of mean conductances on the Result screen and the report.</i></li> </ul>
11	<p><b>Select the preferred measurement format (linked to the selected physician).</b></p> <ul style="list-style-type: none"> <li>• <i>kg or lb (weight)</i></li> <li>• <i>cm or ft/in (height)</i></li> <li>• <i>cm or inches (waist)</i></li> </ul> <p>By default the application displays height in centimeters (cm) and weight in kilograms (kg).</p>

#### 6.4.1 Other controls

<p>Click on <u>Configuration</u> tab to access to the standard settings (<i>ref. p20</i>).</p>
<p>Click on <u>Services</u> tab to access to additional services (<i>ref. p23</i>).</p>
<p>Click on Interpretation messages to modify messages that appear as interpretation on the Results screen and on the reports. (<i>ref. p25</i>)</p>
<p>Click on the <u>Home</u> button (  ) to go to the home page (<i>ref. p8</i>).</p>
<p>Click on the <u>Help</u> button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.</p>



## 6.5 Supervisor users – Additional services



Figure 14 : Services page - Additional supervisor services

- 1 Select the physician whose settings will be modified.
- 2 Click on Import button to import data for the selected physician (*ref. p26*).
- 3 Select patients from the list. To do so, some tools are available:
  - A filter on patients' name, first name, year of birth and patient identifier (PID)
  - A filter on dates ("from" and "to" dates)
  - A control to select/unselect all patients from the list
- 4 Select exams from the exam list. To do so, some tools are available:
  - A filter on dates ("from" and "to" dates)
  - A control to select/unselect all exams from the list
- 5 When at least one patient is selected, click on Edit button to modify the data attached to the selected patient(s) (*ref. p31*).
- 6 Click on Export button to export data attached to the selected patient(s) and exam(s) (*ref. p29*).

### 6.5.1 Other controls

---

Click on Configuration tab to access to the standard user settings (*ref. p20*).

---

Click on Configuration (2) tab to access to supervisor settings (*ref. p21*).

---

Click on Interpretation messages to modify messages that appear as interpretation on the Results screen and on the reports. (*ref. p25*)

---

Click on the Home button (  ) to go to the home page (*ref. p8*).

---

Click on the Help button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

---



## 6.6 Supervisor users – Interpretation messages

The eZscan software is used to screen potential risk of diabetes or cardiometabolic disease. The computed scores are used to display the level of the potential risk and some explanation about the situation. The messages that are used in each situation can be modified by any user with supervisor privileges.

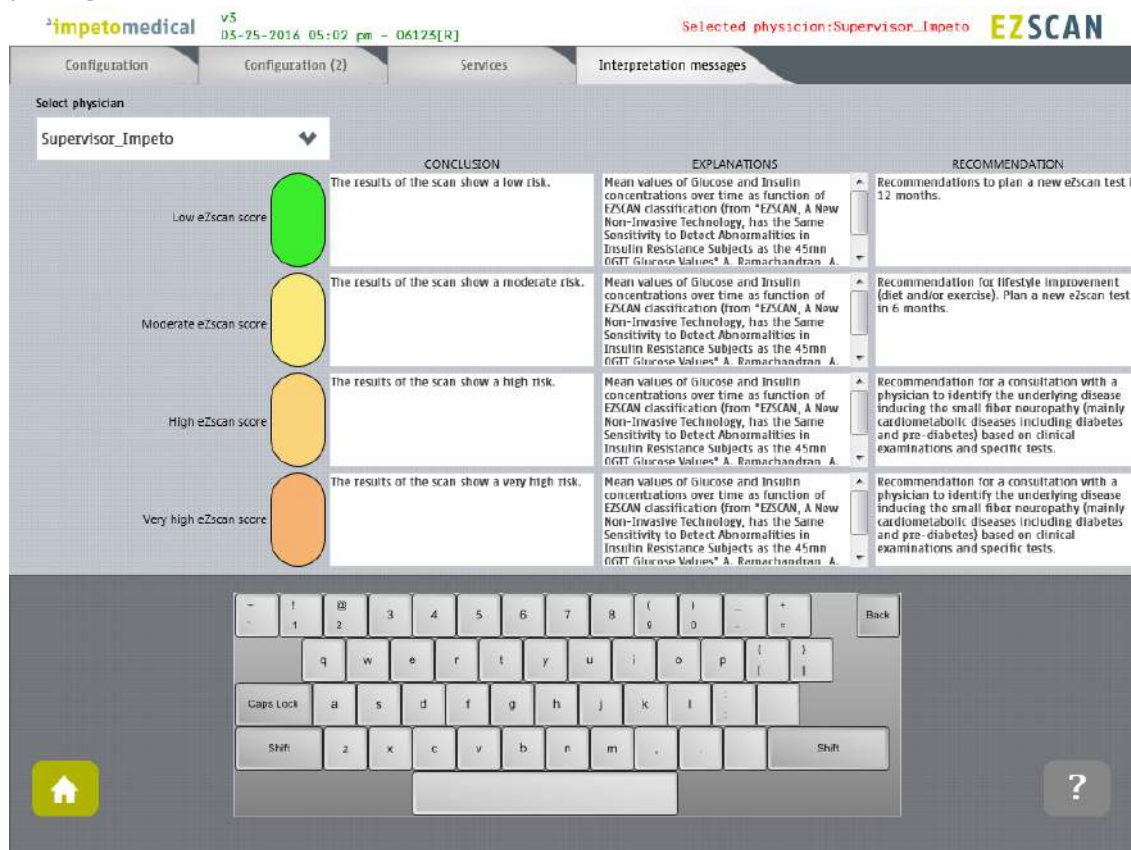


Figure 15: Modify interpretation messages

- 1 Select the physician whose settings will be modified from Configuration (*ref. p20*), Configuration (2) (*ref. p21*), or Services (*ref. p23*).
- 2 Select the type of message you want to modify and modify the content. The new content is saved automatically.

### 6.6.1 Other controls

Click on Configuration tab to access to the standard user settings (*ref. p20*).

Click on Configuration (2) tab to access to supervisor settings (*ref. p21*).

Click on Services tab to access to additional services (*ref. p23*).

Click on the Home button (  ) to go to the home page (*ref. p8*).

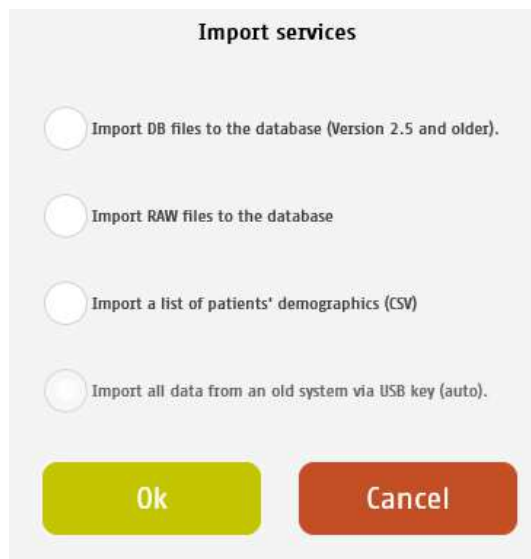
Click on the Help button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

## 6.7 Import data for a selected physician

- 
- 1 Insert a virus free USB key containing the data to import.



- 
- 2 Click on Import button. A popup window appear to precise the type of data you want to import:

A screenshot of a software dialog box titled "Import services". It contains four radio button options for selecting the type of data to import. At the bottom, there are two buttons: "Ok" (green) and "Cancel" (red).

**Import services**

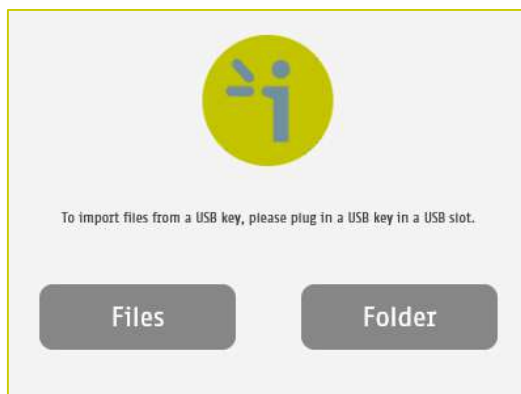
- ☐ Import DB files to the database (Version 2.5 and older).
- ☐ Import RAW files to the database
- ☐ Import a list of patients' demographics (CSV)
- ☐ Import all data from an old system via USB key (auto).

Ok Cancel

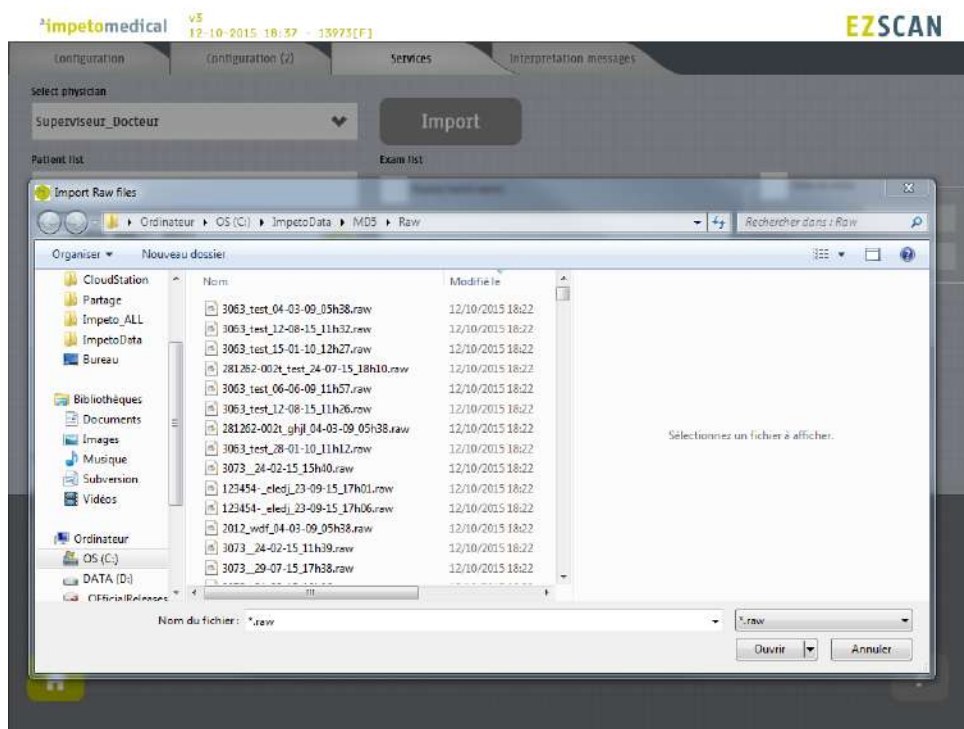
You can select several type of data:

- Import DB files: these are the raw data on old Impeto systems (2.xx version).
  - Import Raw files: these are the raw data on Impeto systems since 3.1 version.
  - Import a list of patients from a CSV files use the proposed template to ensure compatibility with the system (ref. p63).
  - Import all data from an old system via USB key (auto) : Import automatically data from older systems from a USB key. This option is only available if the database from the system is empty.
-

- 
- 3 Verify that the USB key is correctly plugged into the system and select if you want to import files or a complete folder:



- 
- 4 Validate and select files to import:

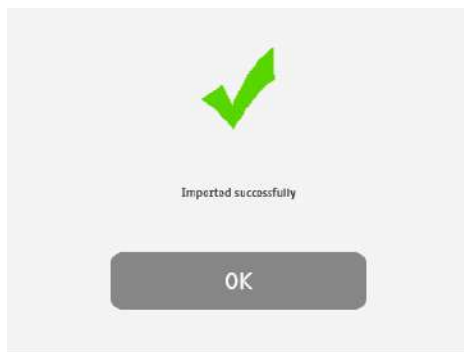


- 
- 5 The files are imported.



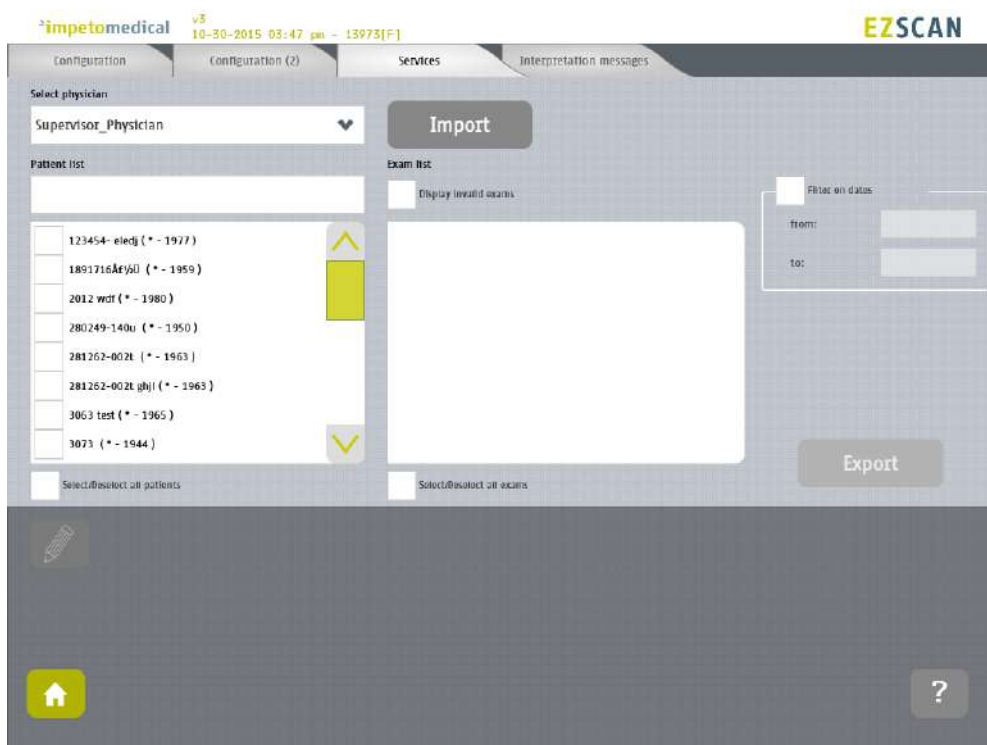
---

6 The import is complete.



---

7 The list of patients is updated with the new data.



## 6.8 Export data on a USB key for a selected physician

- 
- 1 Insert a virus free USB key containing enough free space (100 scans ~ 25MB).



- 
- 2 Select patient(s), exam(s) (*ref. p40*) and click on Export button. A popup window appears to precise the type of data you want to export:

A screenshot of a software dialog box titled "Export services". It contains five radio button options: "Compiled CSV (Excel) File on a USB key", "Encrypted patient (reversible)", "Random name (irreversible)", "Not encrypted", and "Export RAW data for selected exams". The "Not encrypted" option is selected, indicated by a green dot. At the bottom of the dialog, there are two buttons: a green "OK" button and a red "Cancel" button.

You can select several type of data:

- Compile and export a CSV file: including all data for the selected exams. The encryption of patients' names and first names is optional (reversible, irreversible or none).  
Stored within a /CompiledCSV/ folder on the USB key.
  - Export Raw files: These are the raw data, useful to switch from one Impeto system to another.  
Stored within a /ExportRaw/ folder on the USB.
-

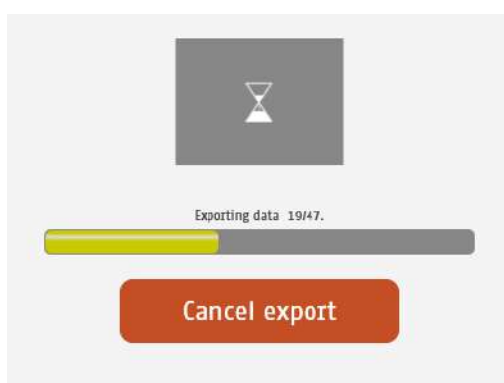
---

**3**      **Validate and verify that the USB key is correctly plugged into the system:**



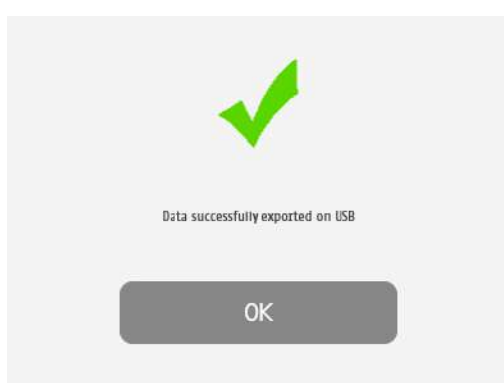
---

**4**      **Validate and the files are exported:**



---

**5**      **The export is complete.**



**NOTE**

When the export is complete, the data are on the USB key. For the RAW files export, when a file is missing, a file (MissingFiles.txt) is created on the USB key and contains the list of missing files.

**IMPORTANT**

We strongly recommend to back your data on a regularly basis.

## 6.9 Patient reconciliation & Patient demographic data modification

This feature is also available for standard users when it has been enabled by a supervisor (option “Enable patient modification”, ref. p19).

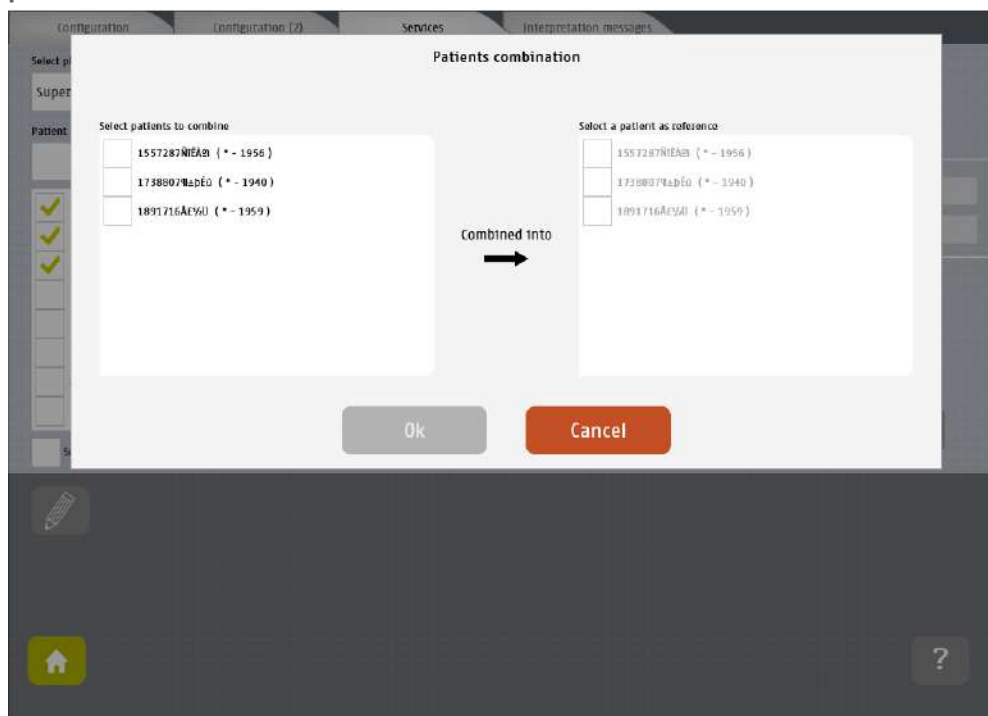
- 1 Select one or several patients (*ref. p40*) and click on the **Edit** button.

The screenshot shows a software interface with a top navigation bar containing tabs: Configuration, Configuration (2), Services, and Interpretation messages. Below the navigation bar, there is a 'Select physician' dropdown menu set to 'Supervisor\_Impeto' and an 'Import' button. The main area is divided into two sections: 'Patient list' on the left and 'Exam list' on the right. The 'Patient list' contains a list of patients with checkboxes and a vertical scrollbar. The patients listed are: Demo\_Asymetry Demo (\* - 1980), Demo\_CAN Demo (\* - 1980), Demo\_CAN\_Nephro Demo (\* - 1980), Demo\_FollowUp Demo (\* - 1976), Demo\_Green Demo (\* - 1980) (which is checked), Demo\_Movement Demo (\* - 1980), Demo\_Orange Demo (\* - 1980), and Demo\_Red Demo (\* - 1980). Below the list are buttons for 'Select/deselect all patients' and 'Select/deselect all exams'. The 'Exam list' section has a 'Display invalid exams...' checkbox and a date range filter set from '03-11-2015 17:27:00' to an empty 'to:' field. An 'Export' button is located at the bottom right. At the bottom of the interface, there is a yellow 'Edit' button (represented by a pencil icon) which is highlighted with a yellow box, a home button, and a help button (represented by a question mark icon).

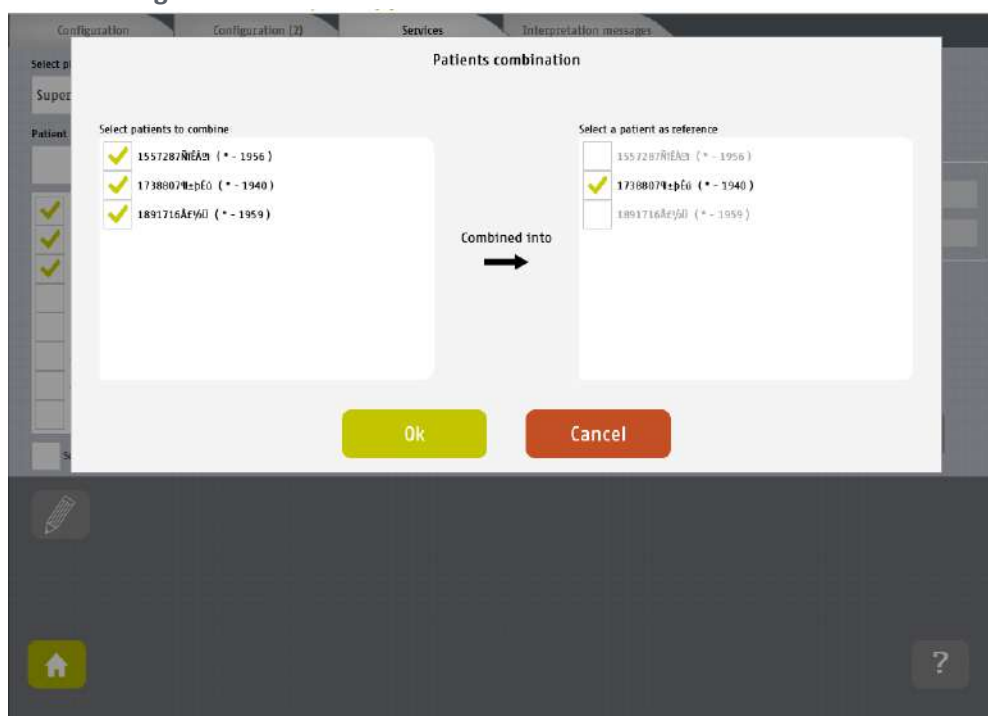
- 2 When only one patient is selected, a popup window is displayed to modify demographic data of the selected patient (name, first name, date of birth, patient ID):

The screenshot shows the same interface as before, but with a modal popup window titled 'Incorrect demographics data' in the center. The popup contains the text 'Please, verify demographics data:' followed by four input fields: 'Last name' (containing 'Demo\_Green'), 'First name' (containing 'Demo'), 'Date of birth (Day-Month-Year)' (with dropdowns for '1', 'January', and '1980'), and 'Patient identifier' (empty). At the bottom of the popup are 'Ok' and 'Cancel' buttons. The background interface is dimmed, showing the patient list with 'Demo\_Green Demo' still selected.

- 
- 3 When several patients are selected, a popup window is displayed to gather several patients under one:



- 
- 4 Select the patients to gather from the list on the left, and the referent patient from the list on the right:





- 5 Click on Ok to validate, and all the data for the patients to gather will be combined and updated with demographic data from the referent patient.  
The list of patient is then updated on the Services screen.

Configuration Configuration (2) **Services** Interpretation messages

Select physician  
Supervisor\_Physician

Import

Patient list

<input checked="" type="checkbox"/>	1891717(00-45% (* - 1958)
<input type="checkbox"/>	280249-140u (* - 1950)
<input type="checkbox"/>	alexandre_00000 (* - 1980)
<input type="checkbox"/>	alexandre_00002 (* - 1980)
<input type="checkbox"/>	Demo_Asymetry Demo (* - 1980)
<input type="checkbox"/>	Demo_CAN Demo (* - 1980)
<input type="checkbox"/>	Demo_CAN_Nephro Demo (* - 1980)
<input type="checkbox"/>	Demo_FollowUp Demo (* - 1976)

Select/deselect all patients

Exam list

☐ Display invalid exams

<input checked="" type="checkbox"/>	12-16-2014 15:10:00
<input checked="" type="checkbox"/>	12-16-2014 15:04:00
<input checked="" type="checkbox"/>	12-16-2014 14:53:00
<input checked="" type="checkbox"/>	12-16-2014 14:26:00
<input checked="" type="checkbox"/>	12-16-2014 14:06:00
<input checked="" type="checkbox"/>	12-16-2014 13:59:00

Select/deselect all exams

Filter on dates:  
from:   
to:

Export

?

# 7 Scan pages

When a patient does not exist already on the system, select New Patient button on the Home screen (ref. p8) and fill in demographic data for the patient.

## 7.1 List of controls

impetomedical v3 12-10-2015 16:47 - 13973[F] Scan#: 774 EZSCAN

PATIENT INFORMATION (\* Indicates a required field)

Last Name \* First Name \* Email

Date of Birth (Day-Month-Year) \* 1 January

Female Male

Age Weight (kg) Height (cm)

Waist (cm) BMI SBP/DBP (mmHg) HbA1c (100)

Scan Clear patient data

Home button Help button

Figure 16 : Patient page


- 1 After entering the mandatory patient data indicated by an \*, the Scan button becomes available and the user can start a scan (ref. p35 to setup patient's demographic information and start a scan).

Required data changes according to enabled options.

- 2 Click on Clear patient data to clear all patient data fields.

### 7.1.1 Other controls

Click on the Home button (  ) to go to the home page (ref. p8).

Click on the Help button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

## 7.2 Patient setup & start a scan

### 1 Set the patient's demographic information.

Enter data by clicking on the corresponding text boxes, which will make the on-screen keyboard appear:

- Last Name and/or Patient ID (IDENTITY CODE)
- First name
- Age or Date of birth (10 to 109 years). **This option can be modified by a supervisor (ref. p21)**
- Select the appropriate Gender
- Weight (10 to 199 kg OR 22 to 438 lbs)
- Height (100 to 249 cm OR 3 ft 3 ins to 8 ft)
- HbA1c (x10, 40 to 199 mmol/mol).
- SBP/DBP (8 to 400 mmHg). **This option can be changed by a supervisor (ref. p21).**
- Enter comments in the Additional comments field if necessary.

#### NOTE

It is also possible to use any standard PC-type keyboard connected to one of the USB connections available on the Master Unit.

#### NOTE

Verify the data with your patient. Invalid (out of acceptable range) or missing data will be flagged with a RED background and patient data should be re-entered.

### 2 If all required fields have been entered , then the scan button turns green as follows:



If all required fields have not been entered, then the scan button is greyed out and cannot be selected:



#### WARNING

The use of USB ports during the scan can lead to a system blocking issue. Please, do not try to plug or unplug USB device on the system during the scan.

- 
- 3 If all required fields have not been entered and the Scan button is selected, then any missing fields will be highlighted in red.

impetomedical v3 12-10-2015 18:48 - 13973[F] Scan#: 774 EZSCAN

PATIENT INFORMATION (\* indicates a required field)

Last Name \* First Name \* Email

Date of Birth (Day-Month-Year) \*

1 January

Female Male

Patient Identifier

Age Weight (kg) \* Height (cm) \*

0 0 0

Waist (cm) BMI SBP/DBP (mmHg) \* HbA1c (1.0x)

0 0 120 / 0 0

Scan Clear patient data

Back

Home ?

Figure 17: Scan page - Highlighting of empty required fields

- 
- 3 Click on the Scan button to start the scan (ref. p37).



WARNING

**THE PATIENT MUST NOT TOUCH THE MASTER UNIT.  
DO NOT TOUCH THE PATIENT DURING THE SCAN.**

---

### 7.3 What if the scan cannot be launched

If you filled in all information about the patient but the scan still cannot be launched:

- Please check that the sensor plates are correctly inserted within their dock respectively (ref. p56 to see how to insert a sensor plate within a dock). Also, check that the sensor plates were not inverted between hands and feet docks.
- Please check that the dock are correctly plugged on the system and reboot the system.
- If the issue persists, please contact **Impeto Medical** technical services

#### NOTE

Red LEDs on the docks indicates that the scan cannot be launched. If the issue persists after you followed the procedure above, please contact **Impeto Medical** Technical Services (ref. p79).

### 7.4 During the scan

- 1 The application displays a video and a progress bar during the scan. With smart electrodes, the scan progression is also described by the LED that are lighted progressively, from bottom to top, on each docks (hands and feet).

#### NOTE

A calibration is performed at the beginning of each scan.  
The patient is requested to remain still during the scan.

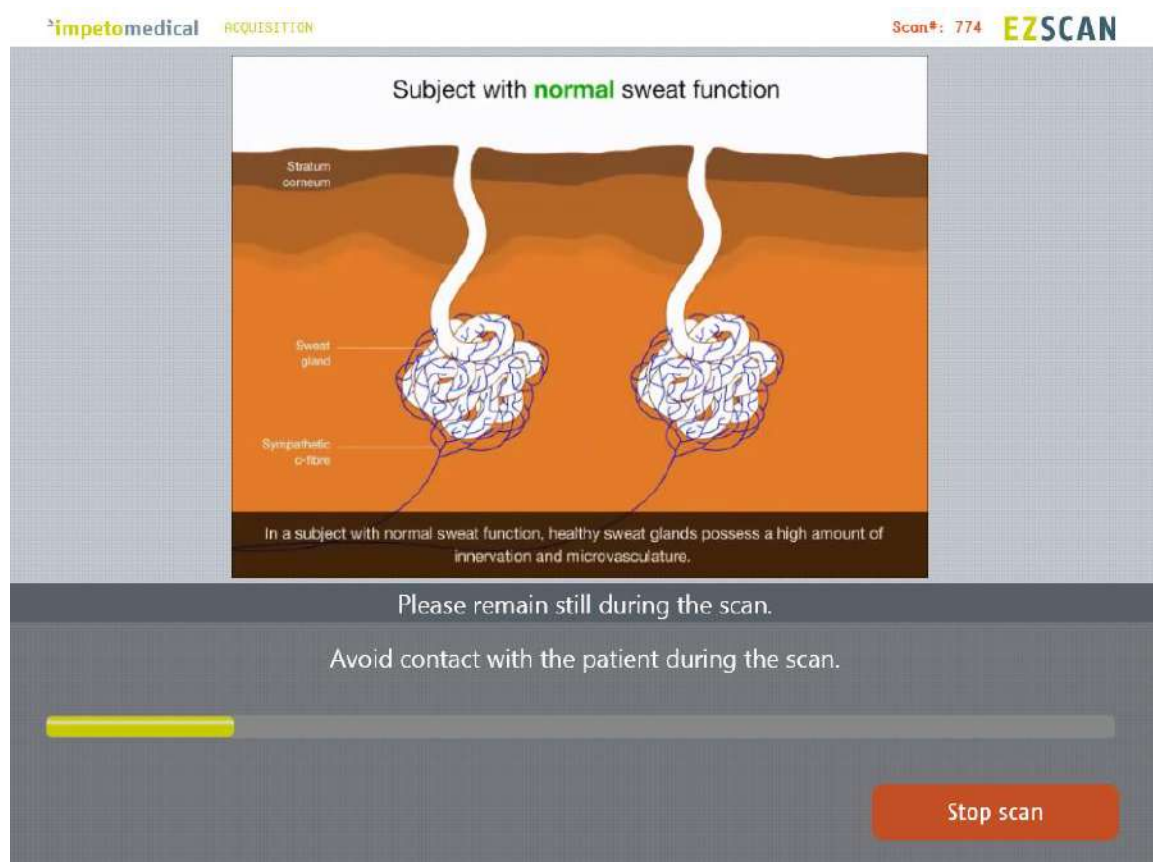


Figure 18: Acquisition

- 
- 2 If hand or foot contact on the sensor plates is lost during calibration, then an error message will appear on the screen.



- 
- 3 The scan can be cancelled at any time by selecting the Stop scan button.

- 
- 4 Scan completion is confirmed by a double-bell sound (unless muted).

- Upon successful completion of the scan, the scan number (#) will increase by 1 and the remaining scans will decrease by 1, as shown in the upper right hand corner of the screen. The result page is displayed once the scan successfully ends (ref. p48).
- When the scan ends with an issue, the application processes to the result page but the remaining scans will not decrease by 1, except if the scan is validated by the user (ref. p49)

- 
- 5 Clean the electrodes after each scan with manufacturer approved cleaning solution (ref. p55).
-

## 8 Patient History page

To retrieve data for exams and patients, click on the [Patient History](#) button from the Home screen (ref. p8).

### 8.1 List of controls

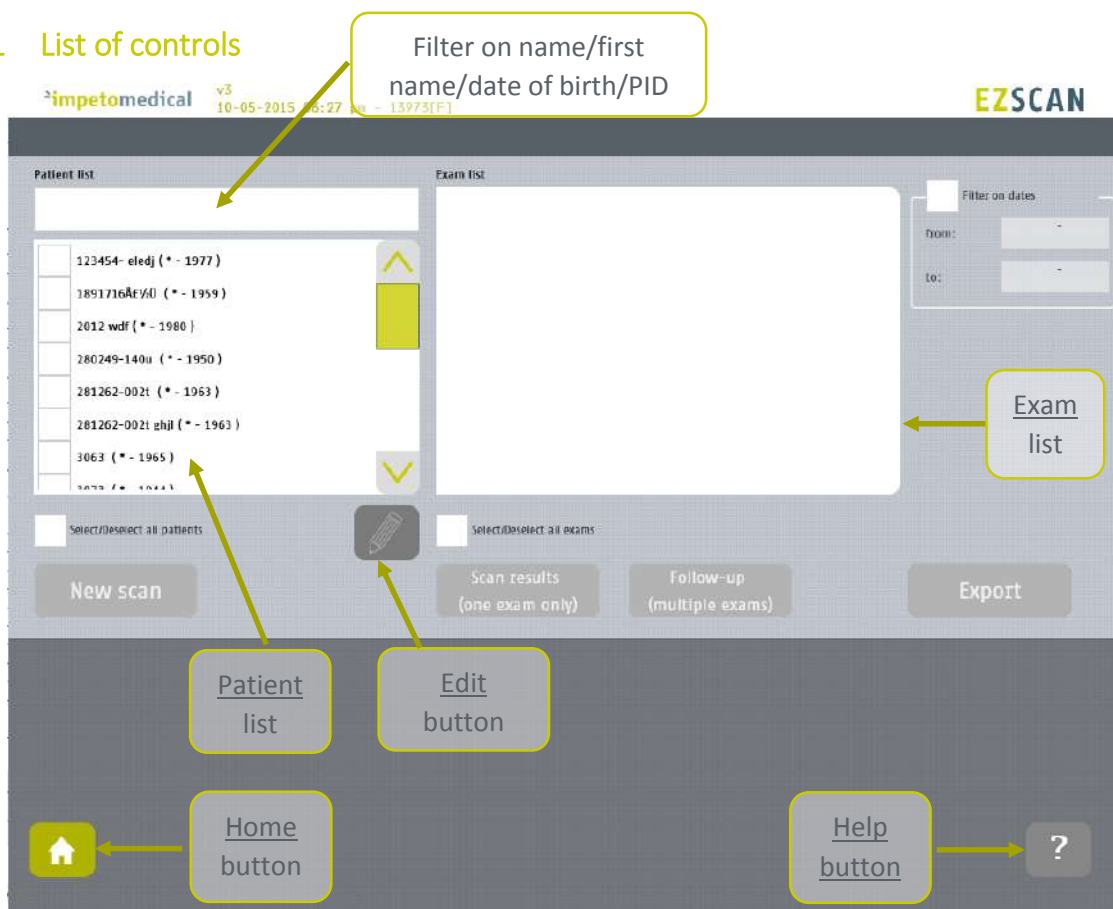


Figure 19 : Patient History page

- 1 Select patients from the [Patient list](#) and exams from the [Exam list](#) (ref. p40).
- 2 When available, edit patient demographic data or combine data from several patients by clicking on the [Edit button](#). The option can be enabled by supervisor users (ref. p21).
- 3 Start a [New scan](#) for the selected patient (ref. p34).
- 4 Display the [results](#) for the selected exam (ref. p48).
- 5 Display the [follow-up](#) screen for the selected exams (ref. p43).
- 6 [Export](#) or [print](#) data and reports for the selected exams (ref. p45).

#### 8.1.1 Other controls

Click on the [Home](#) button (  ) to go to the home page (ref. p8).

Click on the [Help](#) button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

## 8.2 Selection of patient(s) and exam(s)

To select a patient or an exam, select the corresponding checkbox.

**Use the patient filter to filter the patient list on name, first name, year of birth or patient ID.**

The screenshot shows the EZSCAN software interface. At the top, it displays 'impetomedical v3' and the date/time '10-05-2015 06:27 pm - 13973(F)'. The 'EZSCAN' logo is in the top right corner. The interface is divided into two main sections: 'Patient list' and 'Exam list'. The 'Patient list' contains a table of patients with checkboxes for selection. The 'Exam list' is currently empty. On the right side, there is a 'Filter on dates' section with 'from:' and 'to:' input fields. Below the lists, there are buttons for 'New scan', 'Scan results (one exam only)', 'Follow-up (multiple exams)', and 'Export'. At the bottom, there are icons for a home screen and a help/question mark.

Patient list	Exam list
<input type="checkbox"/> 123454- etedj (* - 1977)	
<input type="checkbox"/> 1891716AeYd (* - 1959)	
<input type="checkbox"/> 2012 wdf (* - 1980)	
<input type="checkbox"/> 280249-140u (* - 1950)	
<input type="checkbox"/> 281262-002t (* - 1963)	
<input type="checkbox"/> 281262-002t ghil (* - 1963)	
<input type="checkbox"/> 3063 (* - 1965)	
<input type="checkbox"/> 3075 (* - 1965)	

**Select the patient(s) from the patient list.**

The screenshot shows the EZSCAN software interface after selecting patients. The 'Patient list' now has two entries selected with checkboxes. The 'Exam list' is populated with a list of exams for the selected patient. The 'Filter on dates' section remains on the right. The buttons and bottom icons are the same as in the previous screenshot.

Patient list	Exam list
<input type="checkbox"/> 123454- etedj (* - 1977)	
<input type="checkbox"/> 1891716AeYd (* - 1959)	
<input checked="" type="checkbox"/> 2012 wdf (* - 1980)	<input checked="" type="checkbox"/> 2012 wdf
<input type="checkbox"/> 280249-140u (* - 1950)	<input type="checkbox"/> 03-04-2009 05:38:00
<input checked="" type="checkbox"/> 281262-002t (* - 1963)	<input type="checkbox"/> 281262-002t
<input type="checkbox"/> 281262-002t ghil (* - 1963)	<input type="checkbox"/> 07-24-2015 18:10:00
<input type="checkbox"/> 3063 (* - 1965)	<input type="checkbox"/> 09-18-2013 11:40:00
<input type="checkbox"/> 3075 (* - 1965)	<input type="checkbox"/> 03-29-2010 12:55:00 (Not validated yet)
	<input type="checkbox"/> 03-04-2009 05:38:00



---

Use the filter on dates to display exams for a precise date (here September 18th, 2013)

The screenshot shows the EZSCAN software interface. At the top left, it says 'impetomedical v3' and '10-05-2015 06:30 pm - 13973[F]'. At the top right is the 'EZSCAN' logo. The interface is divided into two main sections: 'Patient list' on the left and 'Exam list' on the right. In the 'Patient list' section, there are two sub-sections: 'Selected patients' and 'Filtered patients'. Under 'Selected patients', there is a checkbox with a green checkmark and the text '2012 wdf (\* - 1980)'. Under 'Filtered patients', there is a checkbox with a green checkmark and the text '281262-002t (\* - 1983)'. Below these, there is a checkbox labeled 'Select/deselect all patients'. In the 'Exam list' section, there is a date filter dropdown set to '09-18-2013 11:40:00'. Below this, there is a checkbox labeled 'Select/deselect all exams'. At the bottom of the interface, there are four buttons: 'New scan', 'Scan results (one exam only)', 'Follow-up (multiple exams)', and 'Export'. In the bottom left corner, there is a home icon, and in the bottom right corner, there is a question mark icon.

*The patients that were selected are still selected but separated in two categories whether they have exams corresponding to the date filter ("Filtered patients") or not ("Selected patients").*

*Then, the list of exam is updated according to the date filter.*

---

### 8.3 How to start a new scan for a patient

Select a patient (only one) and click on the New scan button (ref. p34):

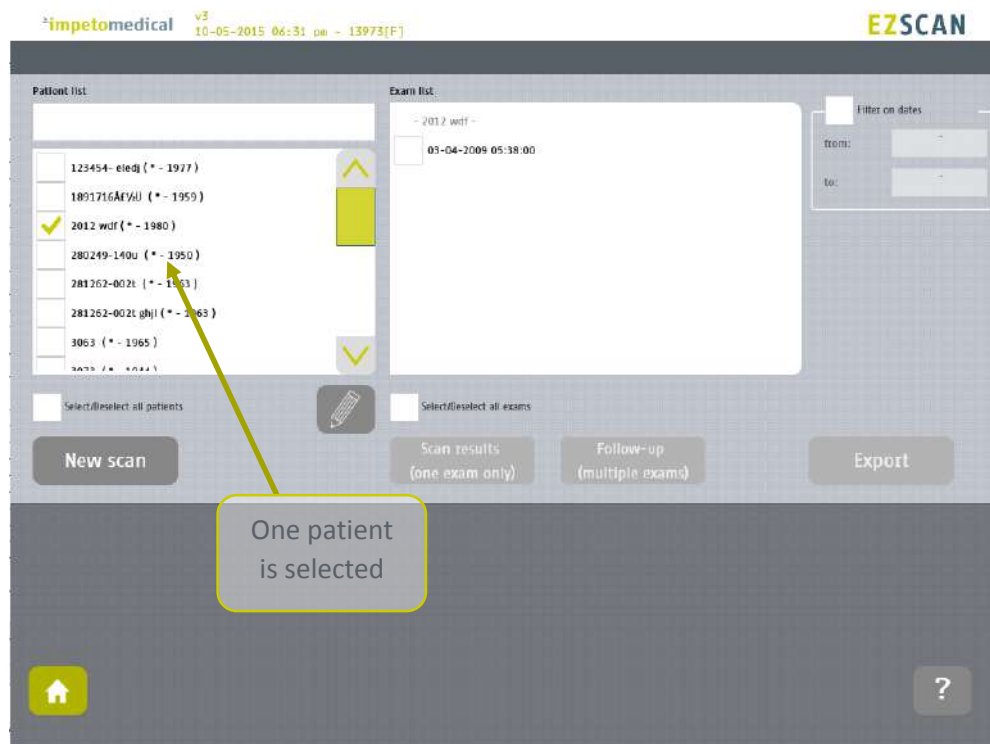


Figure 20: Start a new scan for an existing patient

### 8.4 How to display results for an exam

Select an exam (only one) from the list of exams and click on the Scan results button (ref. p48):

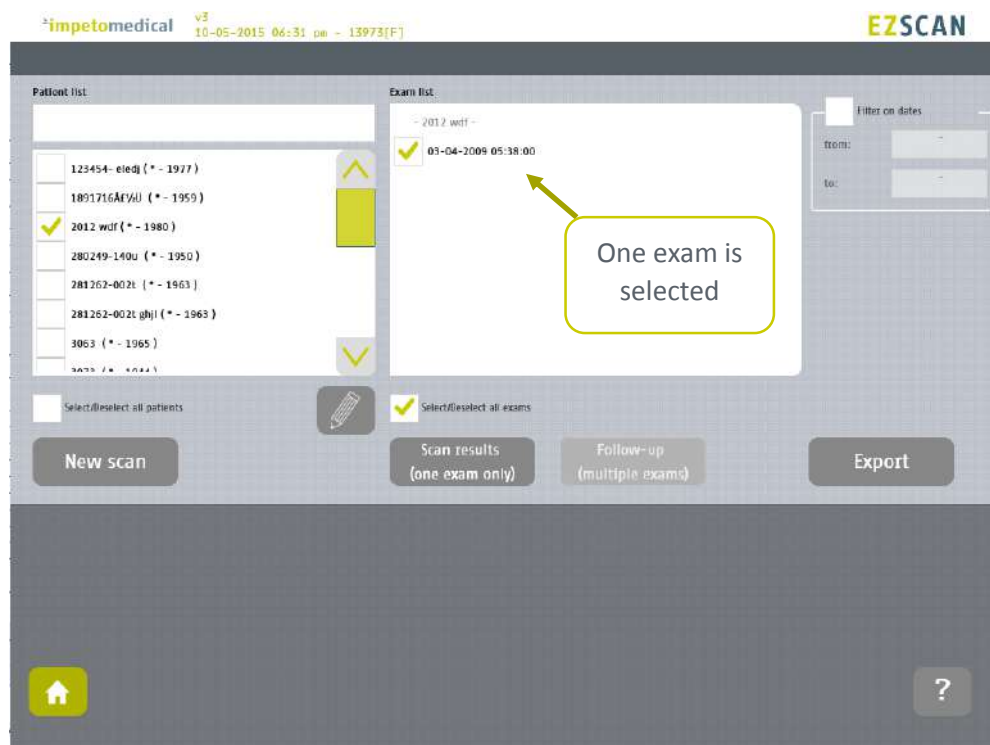
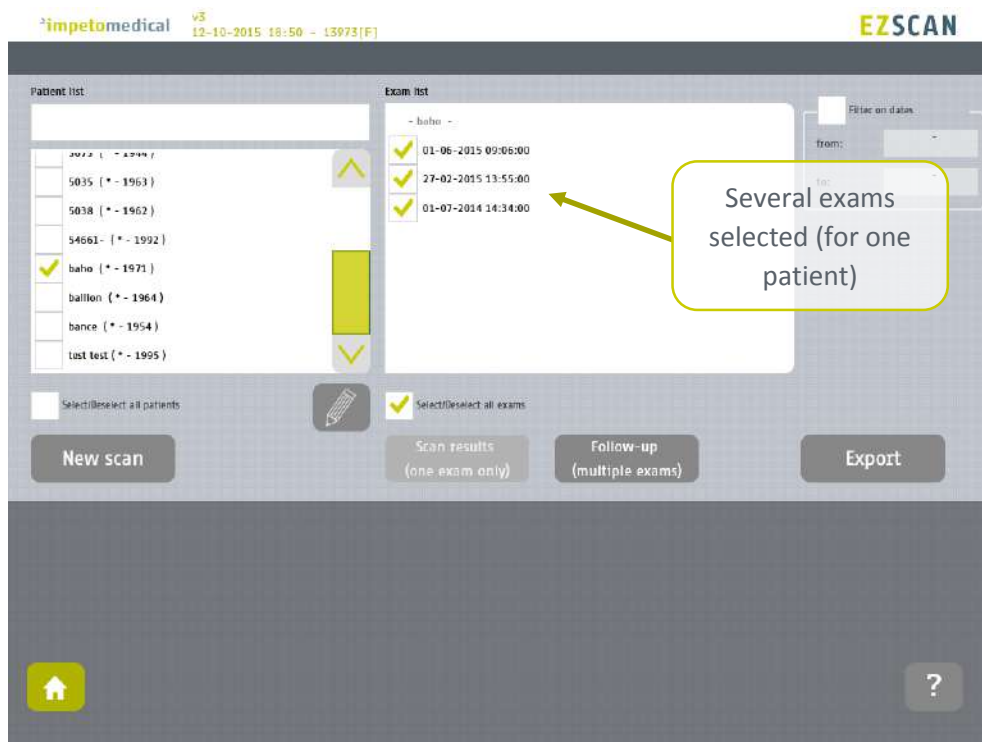


Figure 21: Display results for an exam

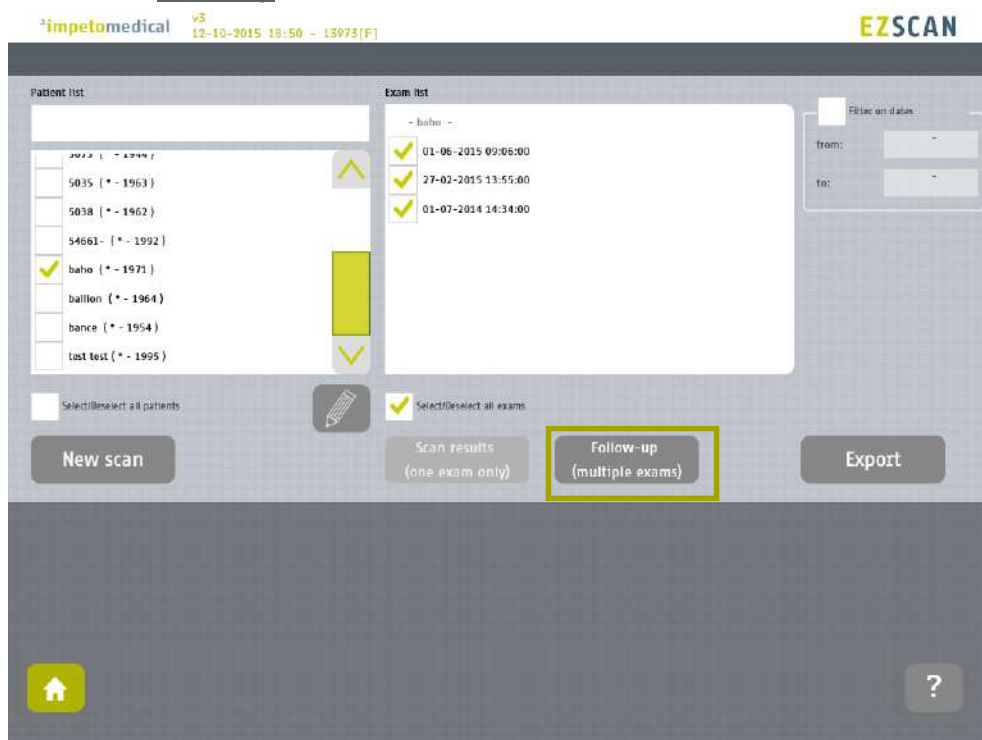
## 8.5 How to display the follow-up for a patient

Select several exams for a patient and click on Follow-up button:



*The follow-up of a patient is displayed when at least 2 exams are selected for the same patient and it is possible to display up to 15 exams.*

Click on the follow-up button.



---

The follow-up screen is displayed.

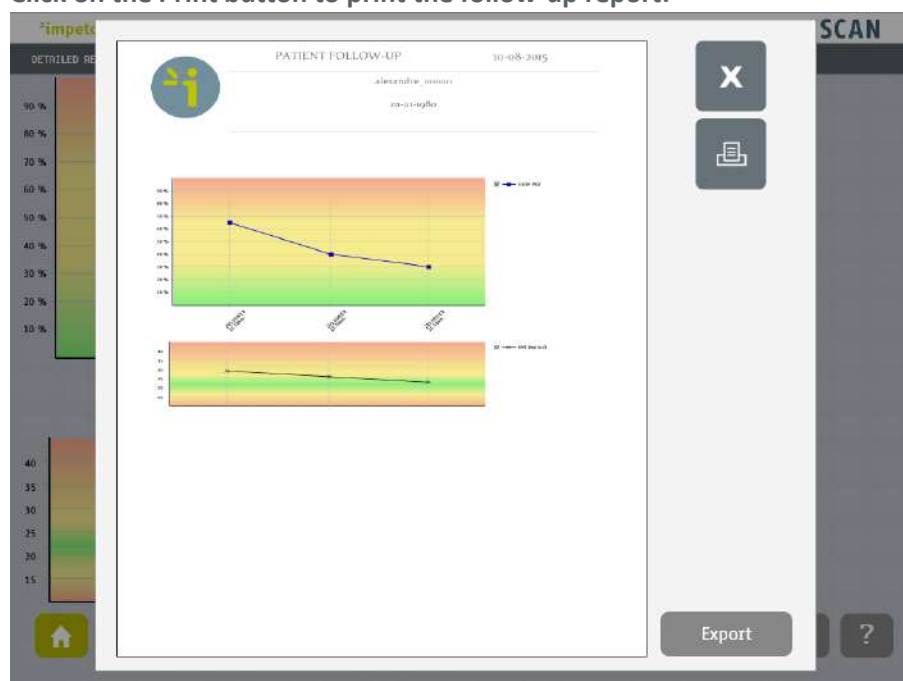


The top graph describes the eZscan score evolution. It is possible to display the score values by clicking on the curve.

The bottom graph describes the evolution of the Body Mass Index (BMI).

---

Click on the Print button to print the follow-up report:



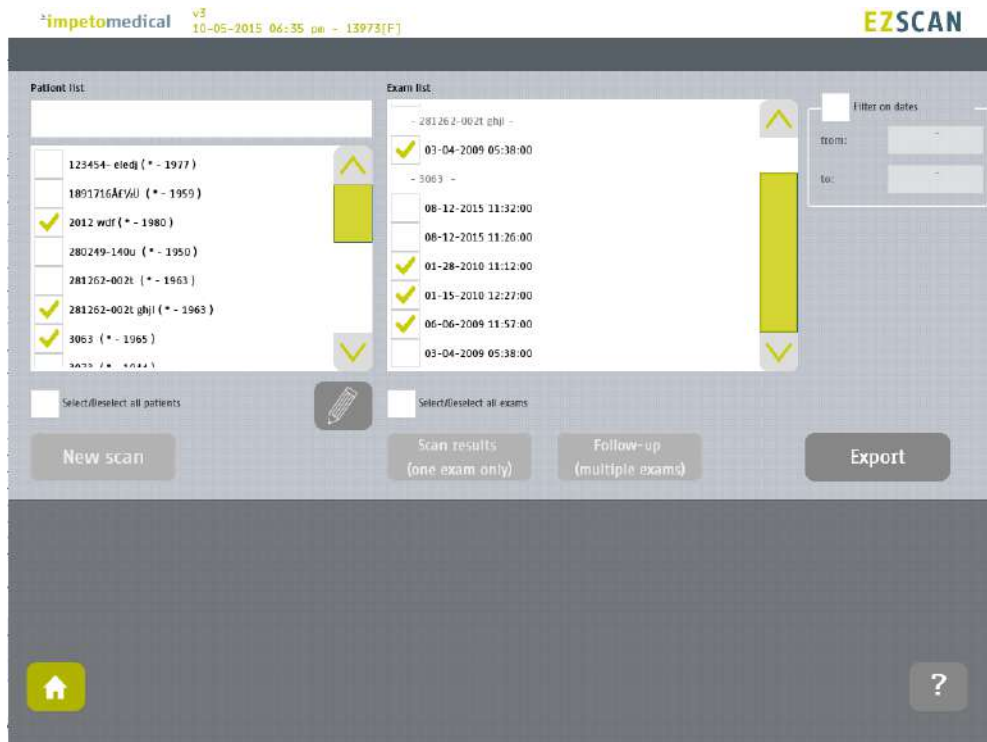
The PDF report is generated and stored within the system. To print the report physically, ensure that a printer has been selected and click on the print button.

To export the report on a USB key, click on the Export button and follow the instructions on the screen.

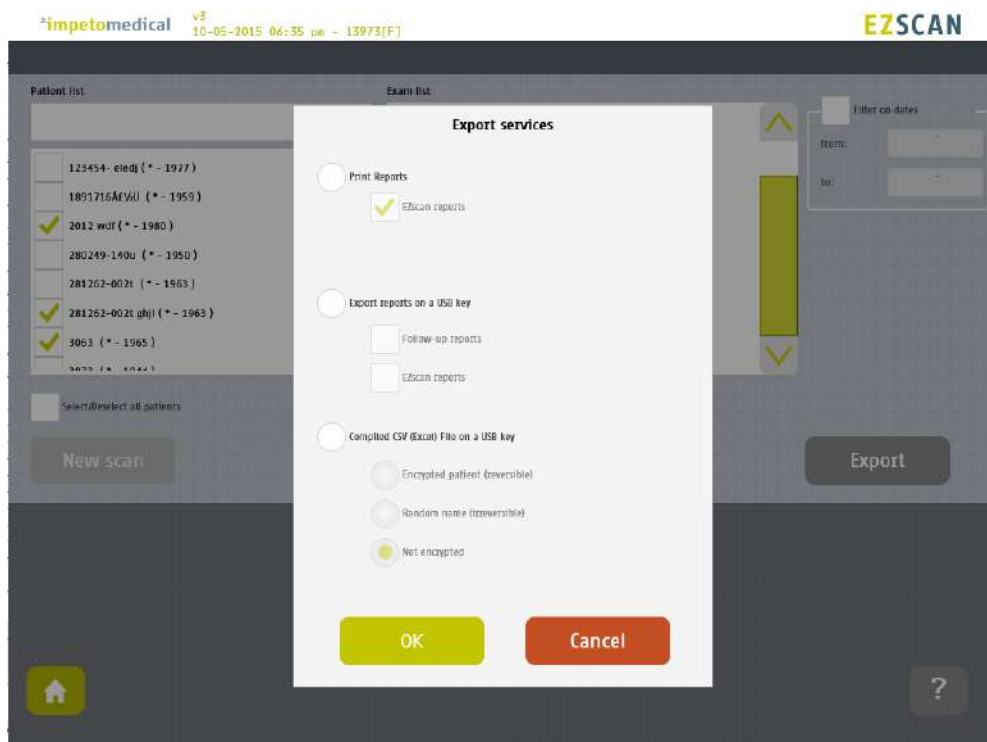
---

## 8.6 How to export data

Select patient(s) and exam(s) and click on the **Export** button:



Select an option:

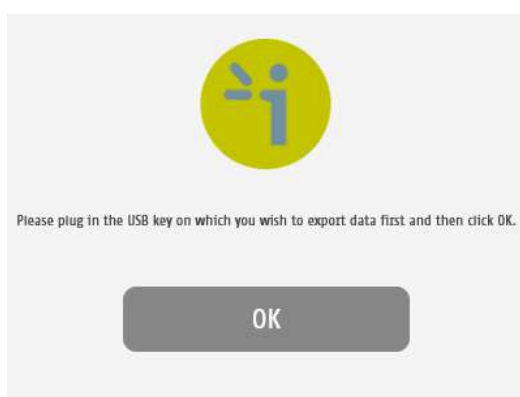


The different options are:

- Print the reports: If a printer is selected, the reports for the selected exams will be physically printed.
- Export the reports: You can export the different reports (eZscan and/or follow-up) for the selected exams on a USB key.  
Stored within a /ExportReports/ folder on the USB key.
- Compile and export a CSV file: including relevant data for the selected exams. The encryption of patients' names and first names is optional (reversible, irreversible or none).  
Stored within a /CompiledCSV/ folder on the USB key.

---

**Validate and in case of export, verify that the USB key is free of viruses and correctly plugged into the system:**



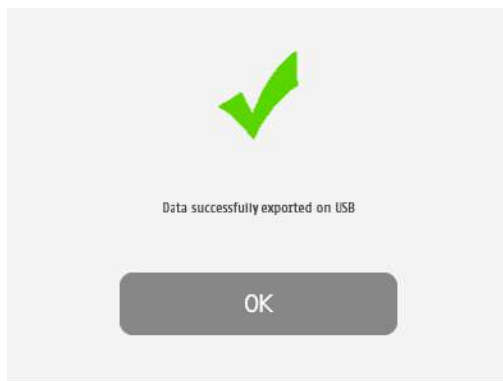
---

**Validate and the files are exported:**



---

**The export is complete.**



---

**NOTE**

When the export is complete, the data are on the USB key. For the reports export, when a file is missing, a file (MissingFiles.txt) is created on the USB key and contains the list of missing files.

**IMPORTANT**

We strongly recommend to back up your data on a regularly basis.

## 9 Result page

### 9.1 List of controls

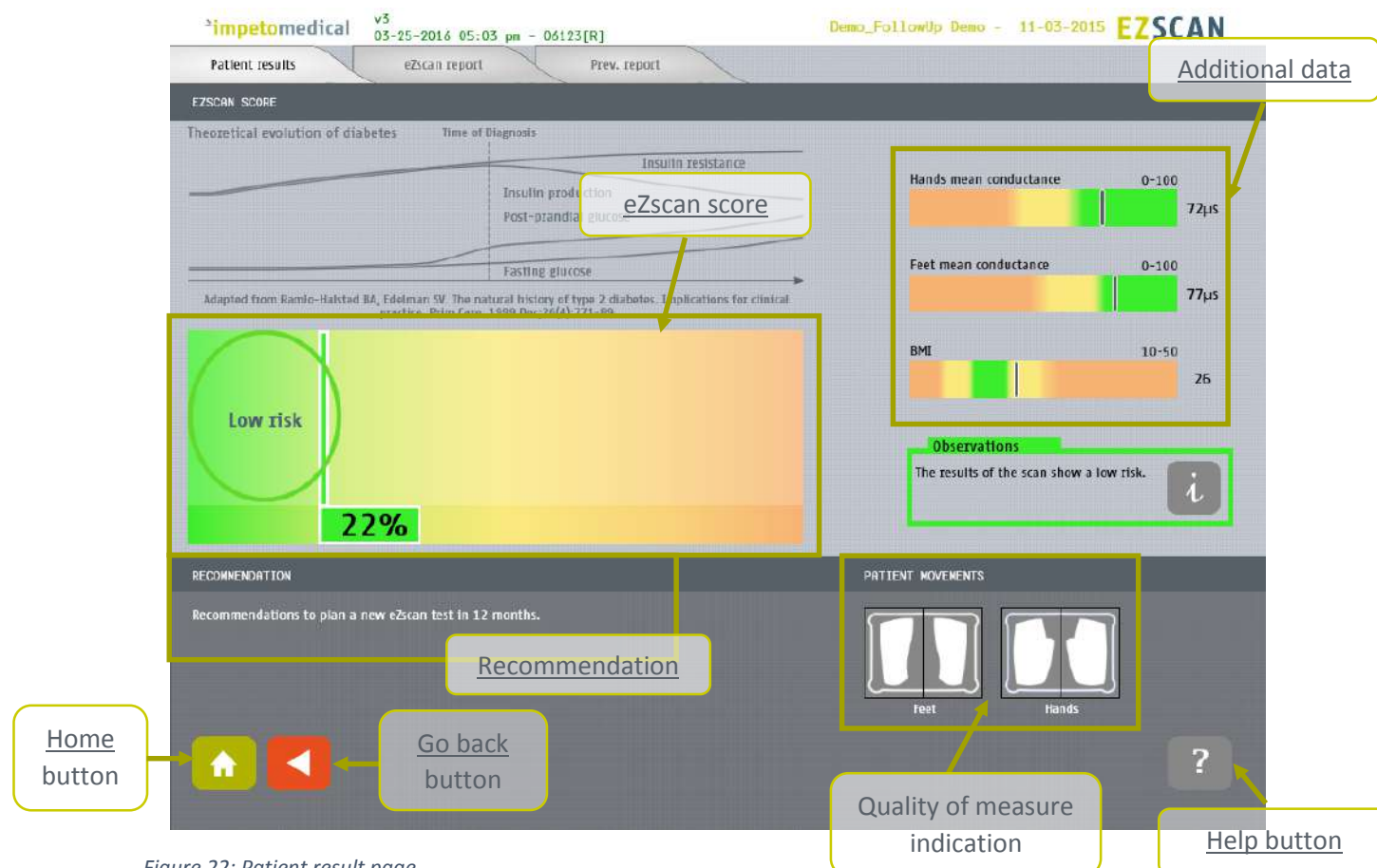



Figure 22: Patient result page

- 1 Click on the Patient Results tab to view the on-screen results.
- 2 Click on the eZscan Report tab to access the Report page (ref. p53). For more information on the results interpretation, go to p51.
- 3 When available, click on Previous Report tab to visualize the last generated report for the selected patient. This option can be enabled in Tools and Settings (ref. p19).
- 4 Click of the  button to display some explanations about the normal evolution of diabetes.

#### 9.1.1 Other controls

Click on the Home button (  ) to go to the home page (ref. p8).

Click on the Help button (  ) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

Click on the Go back (  ) button to go back in the application.

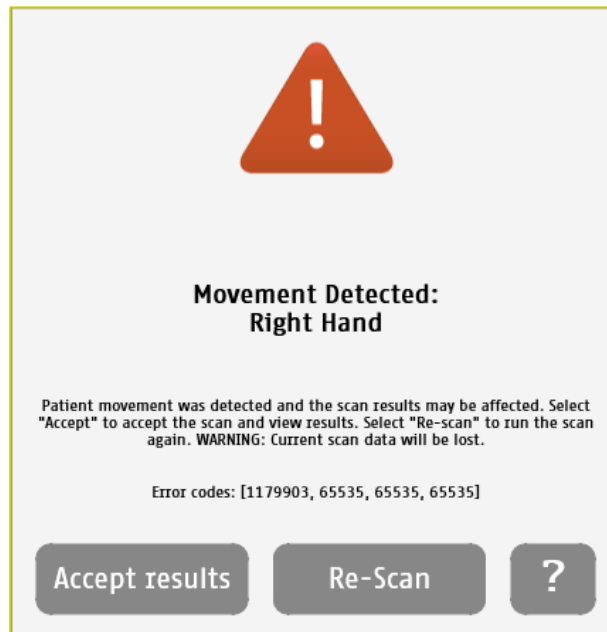


## 9.2 Results

The eZscan device immediately populates results after a scan. The score is computed using demographic data and measured Galvanic Skin Response for each extremity. The results are expressed as a risk score (from 0 to 100), the BMI value in kg/m<sup>2</sup>, and when activated (ref. p21 for supervisor settings) skin mean conductances measured in micro Siemens ( $\mu S$ ). Results should be interpreted by a physician and take into account the patient's clinical history.

### 9.2.1 Quality of Measure

If the patient moves during the scan, the following message appears on the screen:



The user is given the opportunity to accept the results or re-scan the patient. Selecting **Accept** will include the current results in the patient's follow-up. The reports will be generated with a mention that the patient moved during scan and that results may be affected.

Selecting **Re-Scan** will return the user to the scan page to start a new scan.

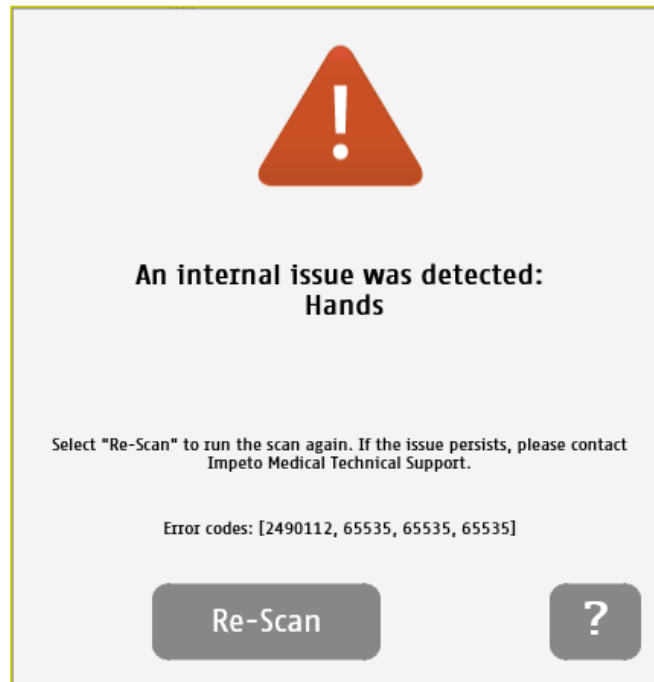
#### NOTE

Electrodes must be cleaned before re-scanning the patient with manufacturer approved cleaning solution.

#### NOTE

When performing a Re-Scan, the number of remaining scans will not be decreased until the user accepts the scan results or the scan is performed without error.

During the scan, if the patient is either grounded (touched during the scan), or if an internal issue occurs, the following message will appear:



After selecting the **Re-Scan** button, the current scan will be cancelled. The user will return to the scan page to start a new scan. If the issue persists, please contact **Impeto Medical** Technical Support (*ref. p79*).

#### NOTE

**When performing a Re-Scan, the number of remaining scans will not be decreased until the user accepts the scan results or the scan is performed without error.**

## 9.3 Quick interpretation of the results

### 9.3.1 Disclaimer

EZSCAN is a medical device for the early detection of peripheral autonomic neuropathy in order to screen for subjects at higher risk of diabetes or cardiometabolic disease (including prediabetes). It's an alternative method for screening of risk.

The device measures the capacity of the sweat glands to release chloride ions in response to an electrochemical stimulus on the palms of the hands and soles of the feet. Test results are provided as a risk score (4 risk levels illustrated in color-coded format easily understood by the patient: no risk, moderate risk, high risk, very high risk). When a risk is evidenced more specific tests are recommended for a precise diagnosis.

### 9.3.2 Low risk

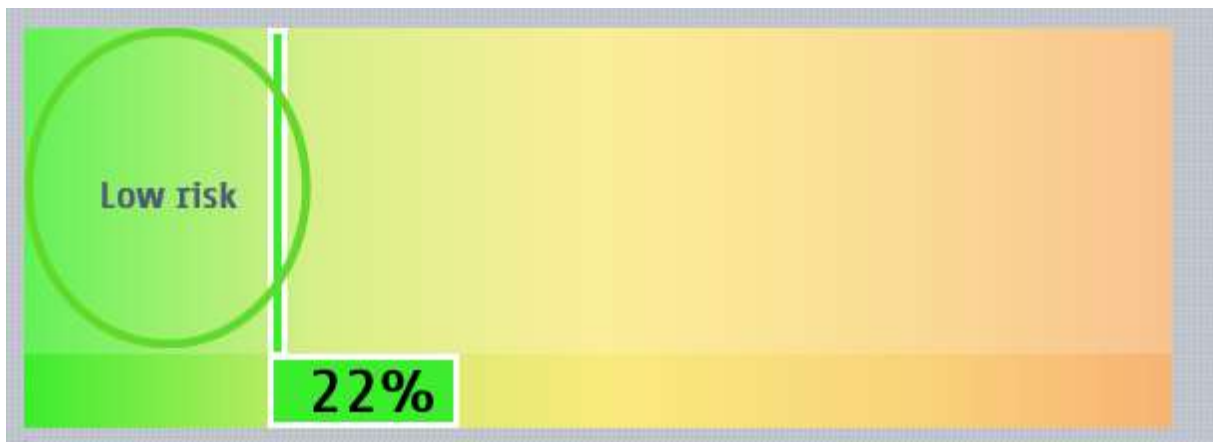


Figure 23: eZscan score with a low risk

The results of the scan show a low risk. The recommendations are to plan a new eZscan test in 12 months.

### 9.3.3 Moderate risk

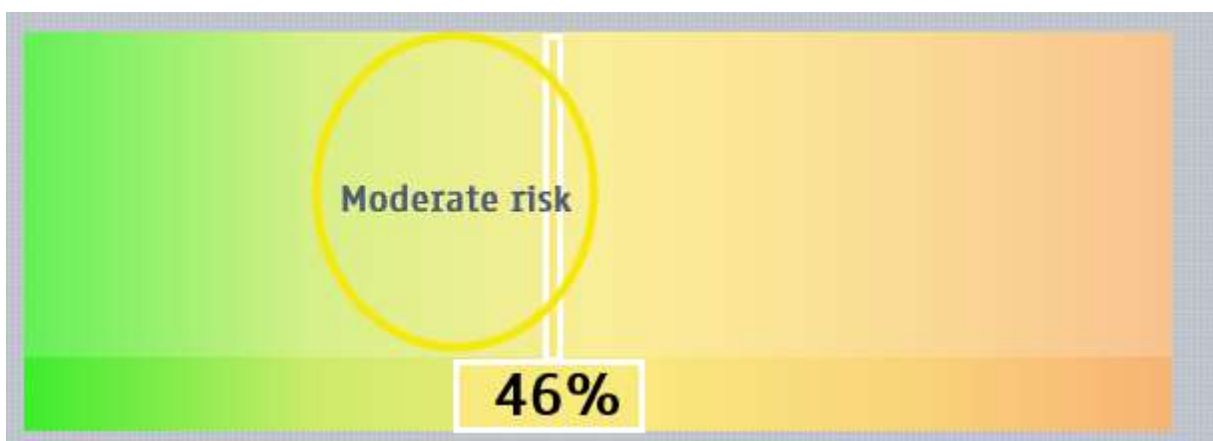


Figure 24: eZscan score with a moderate risk

The results of the scan show a moderate risk. Recommendation for lifestyle improvement (diet and/or exercise). Plan a new eZscan test in 6 months.

#### 9.3.4 High risk

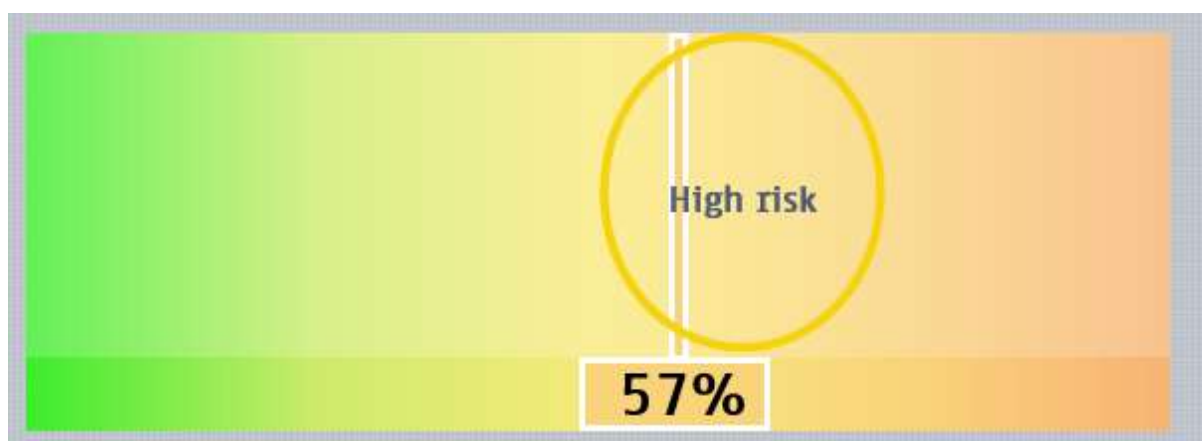


Figure 25: eZscan score with a high risk

The results of the scan show a high risk. Recommendation for a consultation with a physician to identify the underlying disease inducing the small fiber neuropathy (mainly cardiometabolic diseases including diabetes and pre-diabetes) based on clinical examinations and specific tests.

#### 9.3.5 Very high risk



Figure 26: eZscan score with a very high risk

The results of the scan show a very high risk. Recommendation for a consultation with a physician to identify the underlying disease inducing the small fiber neuropathy (mainly cardiometabolic diseases including diabetes and pre-diabetes) based on clinical examinations and specific tests

# 10 Report page

## 10.1 EZscan report

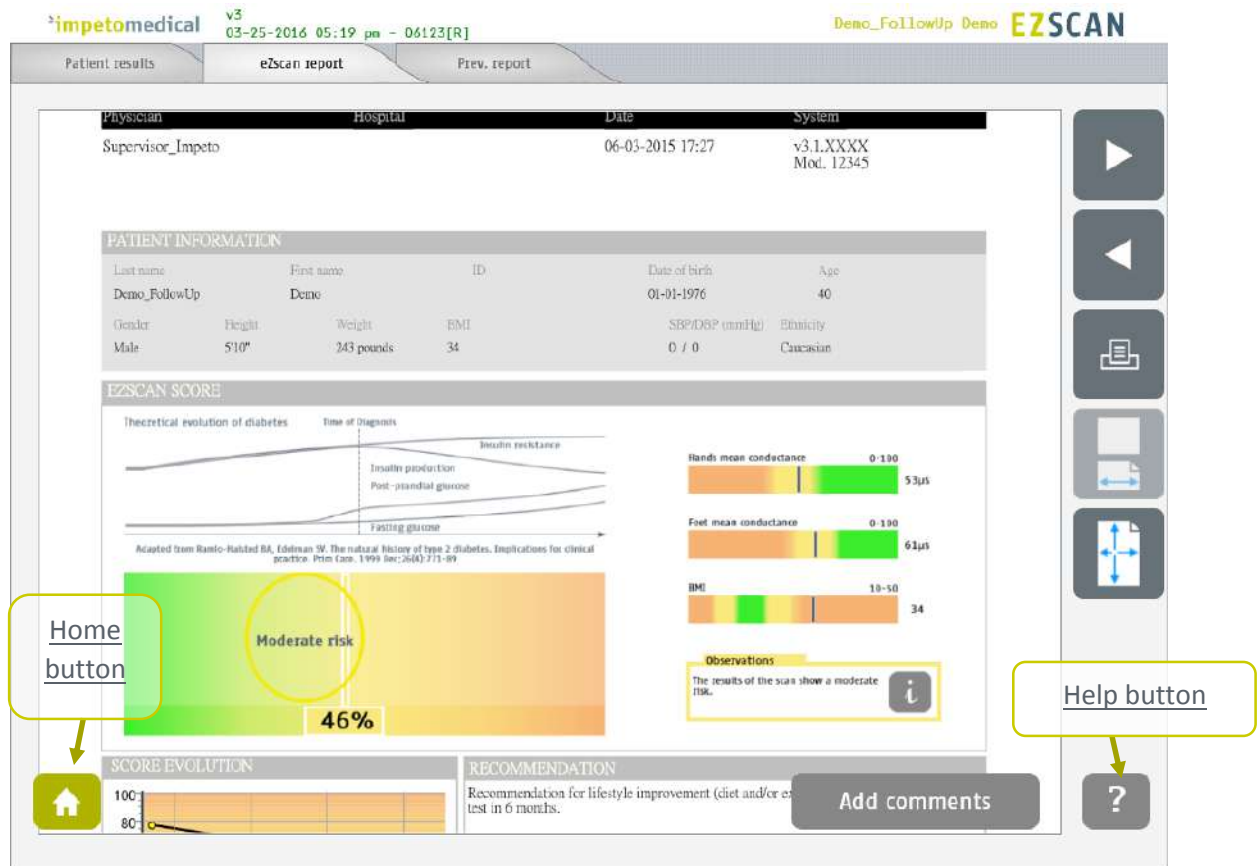


Figure 27: EZscan report page

- 1 Click on the Patient Results tab to view the results (*ref. p48*).
- 2 Navigate in the report (▶ and ◀ buttons)
- 3 Click on the Print button to physically print the report.
- 4 Click on the zoom buttons to display a full page view or page-width view
- 5 Click on Add comments button to enter new comments on the eZscan report.

### 10.1.1 Other controls

Click on the Home button (🏠) to go to the home page (*ref. p8*).

Click on the Help button (❓) to directly lead you to the specific topic that is displayed on the screen within the User Manual.

#### NOTE

When the option is enabled from additional supervisor settings (*ref. p21*), the report for the previous exam is displayed next to the new one.

## 10.2 Add comments on reports

While the user is visualizing the report, it is possible to add comments and select medication from a list.

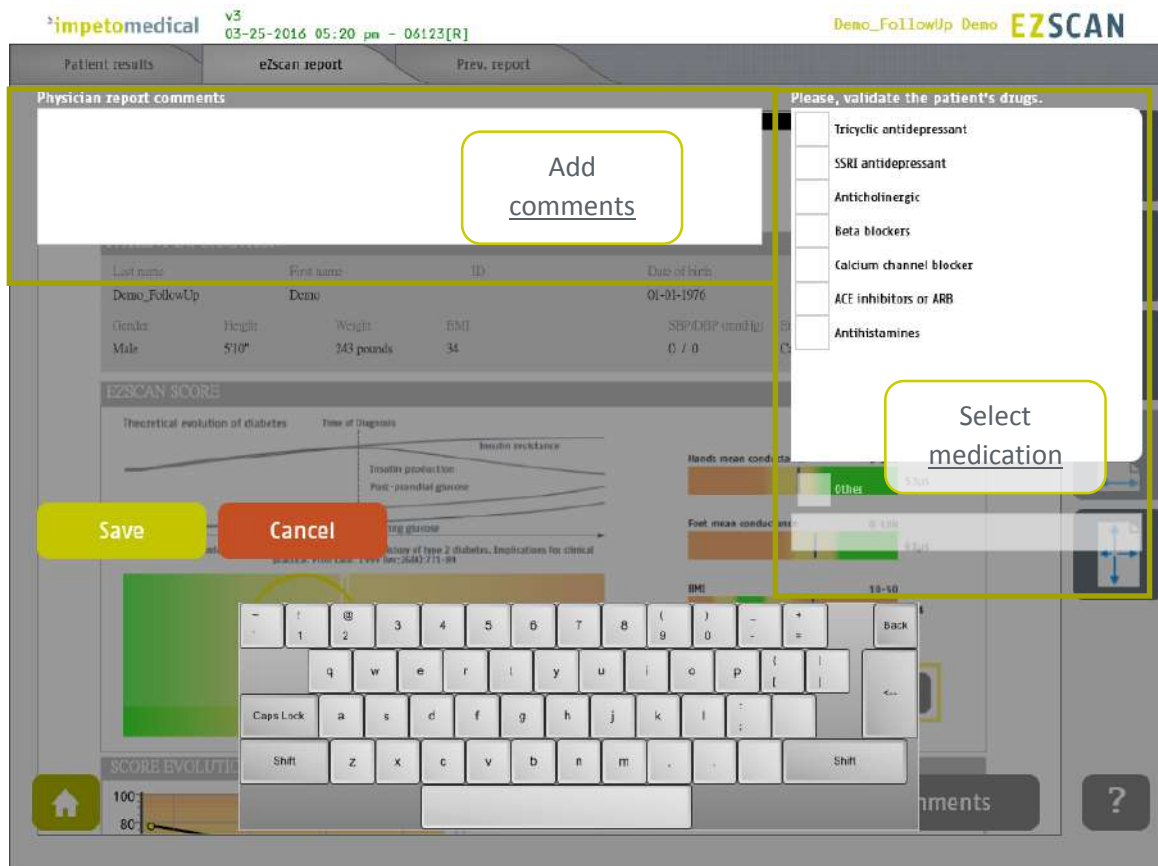


Figure 28: Add comments on reports

- 1 Add comments on the eZscan report.
- 2 Select a medication amongst the ones available in the list or add medication using the Other field.
- 3 Save the comments and generate the report(s) again or cancel the changes and go back to the report.

# 11 Cleaning the sensor plates



IMPORTANT

**Immediately after each scan**, it is important to clean all sensor plates with the manufacturer approved cleaning solution.

This will not only disinfect but neutralize the electrochemical reactions which have taken place on the sensor plates during the scan. Additionally, this stops the corrosion process which would otherwise quickly damage the sensor plates' surface.



- 
- 1      **Deposit only a small quantity of cleaning product on each sensor plate.**
  - 2      **Wipe sensor plates until dry.**
- 

*Use a new sheet for each sensor plate.*

---



IMPORTANT

**Strictly adhere to cleaning product instructions for use and precaution.**

## 12 Replace the electrodes

Before launching a scan (*ref. p35*), the number of available scans appears on the top right corner of the screen. The scan number (#) will increase by one and the number of remaining scans will decrease by one upon successful completion of a scan.

Also, the number of remaining scans is described by the lighted LEDS on each docks.

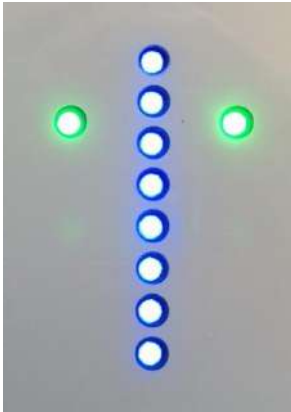


Figure 29: Remaining scans – ok

### 12.1 Thresholds

#### Thresholds 1:

The first warning appears when the first threshold is reached. The number of remaining scans turns orange.

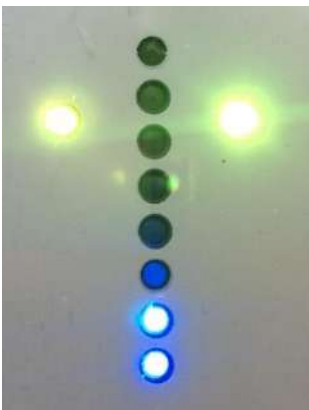


Figure 30: Remaining scans first warning



---

### Threshold 2:

The second warning appears when there are very few scans left. The number of remaining scans turns red.

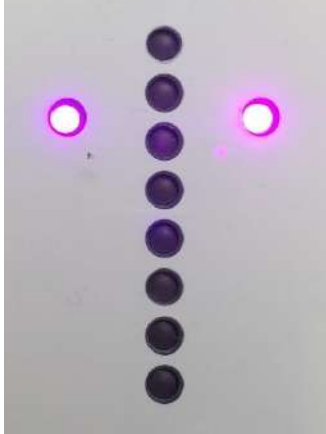


Figure 31: Remaining scans last warning



IMPORTANT

**PLEASE PLAN WELL ENOUGH IN ADVANCE WHEN PLACING YOUR ORDERS. IT CAN TAKE 5-7 BUSINESS DAYS FOR THE ORDER TO BE PROCESSED AND DELIVERED. YOU WILL NEED TO DETERMINE HOW SOON TO ORDER BASED UPON YOUR USAGE.**

---

### NOTE

The number of remaining scans can be different for the hand plates dock and for the feet plates dock. In that case, both values are displayed on top of the screen.

## 12.2 How to replace Sensor Plates

**Impeto Medical** will ship a set of sensor plates that will be used to replace the sensor plates once all scans have been used.

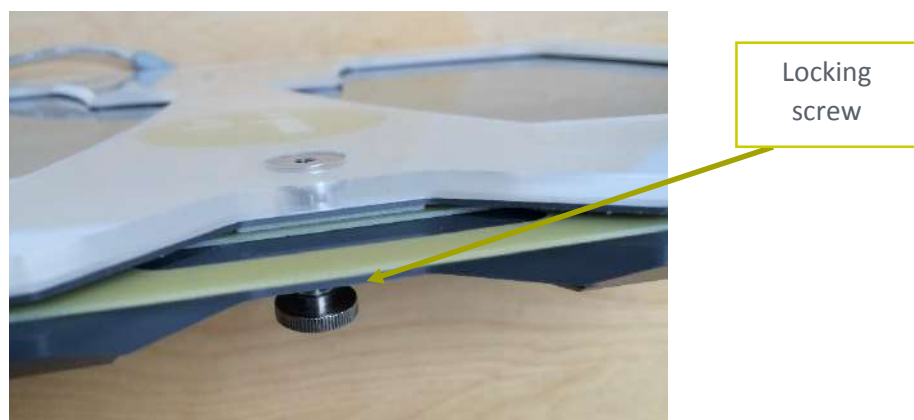
When there are no scans left, the system prevents the user to start more scans:

The screenshot shows the SUDOSCAN software interface. At the top, there's a status bar with 'impetomedical v5', a timestamp '07/13/2015 10:58 am - 56854[F]', and a message 'Scan#: 118 [ No scan left ]'. Below this is a 'PATIENT INFORMATION (\* indicates a required field)' section. It contains fields for 'Last Name', 'First name', 'Email', 'Date of Birth (Month-Day-Year)' (with dropdowns for 'January' and '1'), 'Ethnicity' (with a dropdown 'Please select an ethnicity'), 'Additional Patient Information' (a multi-line text area), 'Patient Identifier' (a text field), 'Age' (0), 'Weight (kg)' (0), 'Height (cm)' (0), 'Waist (cm)' (0), and 'BMI' (0). There are radio buttons for 'Female' and 'Male'. At the bottom left, there's a red 'Change plates' button. At the bottom right, there's a 'Clear patient data' button. A virtual keyboard is visible at the bottom of the screen.

Figure 32: Scan page - Change sensor plates.

Once you have received a new set of sensor plates, follow the instructions to replace them:

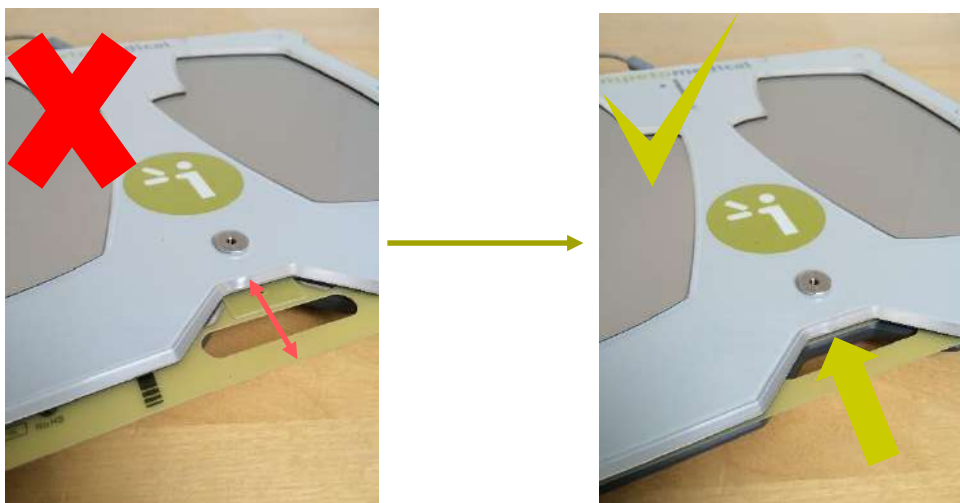
- 1 Under the sensor plate dock, loosen the locking screw and hold it down.



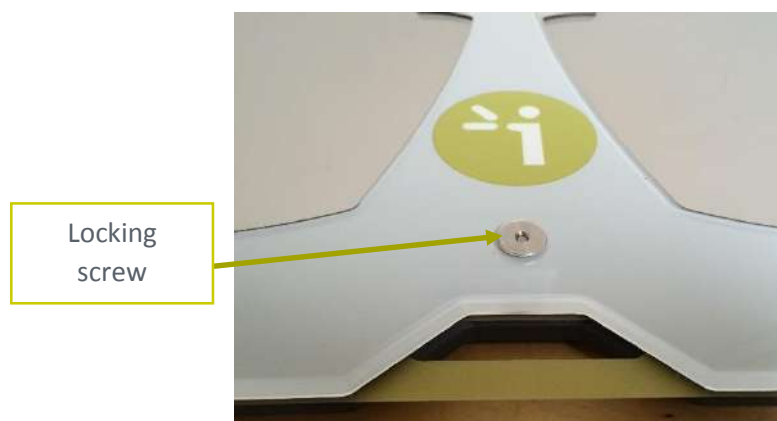
- 
- 2 Then remove the sensor plate to be replaced by pulling it gently.



- 
- 3 Insert the new sensor plate into the dock, gently pushing until the sensor plate comes to a complete stop.



- 
- 4 Tighten the locking screw.



After the change of sensor plate, return to the main screen of the software, then click the [New Patient](#) button. The remaining number of scans, displayed in the top right corner of the screen, is then updated.



#### WARNING

**IF THE DOCK HAS BEEN DISCONNECTED FROM THE SYSTEM, PLEASE PLUG IT BACK AND RESTART THE SYSTEM. THE REPLACEMENT OF THE SENSOR PLATES DOES NOT REQUIRE TO DISCONNECT THE DOCKS FROM THE SYSTEM, NOR TO RESTART THE SYSTEM WHEN THE PROCEDURE IS COMPLETED.**

#### NOTE

After a change of sensor plate, the first scan performed “pairs” the sensor plate with the dock in which it has been inserted. It is then no longer possible to use the sensor plate with another dock. Sensor plates must be replaced after all the scans have been used.

# 13 USB printer drivers installation

To install USB Printer drivers, you must be logged in as a Supervisor. In Tools & Settings, access the Windows Desktop (*ref. p20*).

- 
- 1 Ensure your USB key is free of viruses.



IMPORTANT

**DOUBLE CHECK ON ANOTHER COMPUTER THAT THE USB KEY IS FREE OF ANY VIRUS.**

- 
- 2 Insert a USB key with the appropriate printer drivers.
  - 3 Follow the standard Windows procedure to install the new printer drivers and configure the printer default options.
  - 4 Connect the USB printer to one of the USB ports available on the device.
- 



- 
- 5 After the installation successfully ends, reboot the system and start a Quality Check via the software (*ref. p13*).
-

# 14 Install software updates

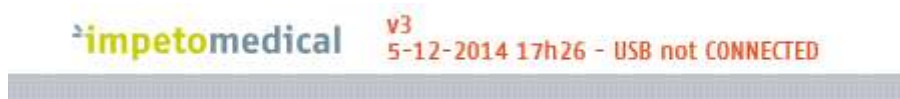
**Impeto Medical** will occasionally provide software updates to ensure continuous enhancement of Impeto Scan Devices products. Check with your distributor or contact **Impeto Medical** to learn how to access updates online.

When an update is available, Impeto Medical will provide adequate procedure along with the software update release.

# 15 Troubleshoot the system

## 15.1 USB connection

The following message can appear on top of the screen:



This means that the connection between the application and the hardware has been lost. It will not be possible to perform any scan in that situation.

To solve the issue:

- |   |  |
|---|--|
| 1 | Reboot the system.   |
| 2 | If the problem is not solved, contact your distributor or Impeto Medical ( <i>cf. p79</i> ). |

## 15.2 Test the hardware

The Quality Check controls the proper functioning of the device. It should be done regularly (*cf. p13*).

If an error occurs during normal use of the device, try to launch a Quality Check. If the test is negative and you still encounter issues, please contact your distributor or **Impeto Medical** (*cf. p79*).

## 15.3 Issue with the sensor plates

If the sensor plate docks show red leds, it means that there is an issue and that the scan cannot be launched.

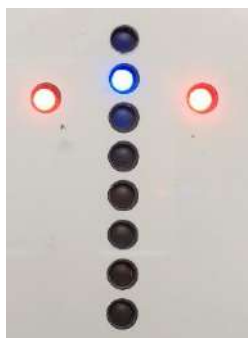


Figure 33: Issue with the sensor plate dock.

In that case, please follow procedure explained p37.

# 16 Annexes

## 16.1 Import a patient list via a CSV file

The template to follow for the CSV file is the following:

### 16.1.1 Required data

Name	Firstname	DayOfBirth	MonthOfBirth	YearOfBirth

### 16.1.2 Optional data

Gender	Age	PID

# 17 How to

## 17.1 For a standard user

p6	<b>Power up the system</b>
p7	<b>Shutdown or turn off the system</b>
p62	<b>Troubleshoot the system</b>
	<b>User Log in / Log off</b>
p7	Home page
p9	Log in page
	<b>Test the system hardware (via Quality Check):</b>
p8	Home page
p13	Quality check page
	<b>Quick start a scan by entering demographical patient data:</b>
p8	Home page
p34	Scan pages
p35	Patient setup & start a scan
p37	What if the scan cannot be launched
p55	<b>Clean the sensor plates</b>
	<b>Export reports to USB key:</b>
p8	Home page
p39	Patient History page
p45	How to export data
p56	<b>Replace the sensor plates</b>
	<b>Configure the hospital information:</b>
p8	Home page
p18	Standard user – List of controls
	<b>Select the printer driver:</b>
p8	Home page
p18	Standard user – List of controls
	<b>Retrieve previous patient data:</b>
p8	Home page
p39	Patient History page
	<b>Change password:</b>
p8	Home page
p9	Log in page
p11	Password modification



## 17.2 For a supervisor user only

	<b>Access to the desktop:</b>
p8	Home page
p20	Standard user – List of controls
	<b>Install an USB printer:</b>
p8	Home page
p20	Supervisor users – Additional list of controls
p61	USB printer drivers installation
	<b>Upgrade the application software</b>
p8	Home page
p20	Supervisor users – Additional list of controls
p62	Install software updates
	<b>Select the user for configuration purposes</b>
p8	Home page
p20	Supervisor users – Additional list of controls
p21	Supervisor users – Configuration (2) tab
p23	Supervisor users – Additional services
p25	Supervisor users – Interpretation messages
	<b>Select the language for display:</b>
p8	Home page
p20	Supervisor users – Additional list of controls
	<b>Metric selection</b>
p8	Home page
p21	Supervisor users – Configuration (2) tab
	<b>Date format selection</b>
p8	Home page
p21	Supervisor users – Configuration (2) tab
	<b>Printing configuration</b>
p8	Home page
p21	Supervisor users – Configuration (2) tab
	<b>Access to import/export services</b>
p8	Home page
p26	Import data for a selected physician
p29	Export data on a USB key for a selected physician
	<b>Set/reset the password of any user</b>
p8	Home page
p20	Supervisor users – Additional list of controls
p21	Supervisor users – Configuration (2) tab

# 18 Precaution of use and technical specifications

## Principle of EZSCAN device

Low voltage is applied to sensor plates in contact with the hands and feet, areas with the highest sweat gland density. The electrical current stresses the sweat glands which, in response, release chloride ions (Cl<sup>-</sup>).

At low voltage, the stratum corneum acts as a capacitor and only the sweat ducts allow the transmission of ions from the skin to the sensor plates. This ensures that the measurements taken correspond solely to the sweat gland function.

There is an observable electrochemical reaction between the Cl<sup>-</sup> ions and the anode.

The device records the electrochemical conductance related to the concentration of the chloride ions from the sweat glands and detected by the sensor plates (on the hands and feet).

The EZSCAN device is composed of a EZSCAN software integrated into a touch-screen Windows 7 PC computer and connected to 4 sensor plates placed on the feet, the hands.

## General operation of EZSCAN

The patient positions his bare feet on the feet sensor plates, applies the palms of his hands to the hands sensor plates.

After entering the patient demographic information (last name, first name, age, gender, height, weight), the operator will initiate the software and activate the electronic circuitry of the device, which will then apply DC voltage to the sensor plate and will measure the current passing through the sensor plates.

Several successive cycles of measurements are carried out in an automatic way and all the measured values are recorded on the hard disk. Data-processing is then performed to compute the conductance on each sensor plate.

At the end of the measurement cycle, which lasts approximately 3 minutes, the user can see the displayed patient report on the screen and also has the option of printing out a hard copy of the report. No control is accessible to the patient, and the use of the EZSCAN system is strictly reserved for physician use in a healthcare setting.

## Precautions of use and maintenance

### Transport

If it is necessary to pack, to transport or deliver EZSCAN after its use, it is recommended to arrange all its elements in their housing and position of origin.

Pay particular attention to carefully arrange the sensor plate cables in the locations especially designed for them in the protection foams, not to damage or weaken them.

The EZSCAN box can be stored upright or laid down.  
The EZSCAN device does not comprise any accumulator.



### Recycling

At the end of its lifetime, the EZSCAN device must be returned to **Impeto Medical**'s authorized distributor, which will return it to **Impeto Medical**, in order to ensure the recycling of certain components.

The components and the accessories of the EZSCAN device are free of mercury and of components containing this element.

### Protection against moisture



WARNING

Do not use the EZSCAN device in a wet or damp environment.

The EZSCAN device is not protected from the effects of the discharges of an external defibrillator, nor against high frequency currents or strong electromagnetic disturbances. The use of mobile telephones or wireless fixed telephones can cause signal disturbances.

### Electromagnetic compatibility



WARNING

The use of portable and mobile RF communication devices (for example: cellular telephones) can influence the analysis carried out during the recording, as the recorded signals can be disturbed by electromagnetic interferences.

The device should not be used in the presence of ionizing radiations (x-rays, gamma rays ...) because those could erase the internal storage.

For the tables concerning the electromagnetic emissions and the immunity of the recorder, see the appendices of this handbook.

### Maintenance of the device and sensor plates

No particular maintenance is necessary.

The external case and the cables of the sensor plates can be cleaned using a slightly wet tissue or soaked with soapy water. Do NOT use any detergent product, alcohol or acetone.

To avoid corrosion and ensuring the best conditions of hygiene, the feet and hands sensor plates must be cleaned immediately after each patient with an Impeto Medical approved cleaning solution.



WARNING

**ONLY PERSONEL AUTHORIZED BY IMPETO MEDICAL IS ALLOWED TO PERFORM ANY REPAIRS OR MAINTENANCE ON THE DEVICE (MAINTENANCE, CALIBRATION, ETC.).**

All the technical documents (component part lists, descriptions, calibration instructions) are kept by **Impeto Medical**.

The warranty is null and void if the EZSCAN device was opened and repaired by any unauthorized person. Warranty will hold only against manufacturing defects and certainly not for any mechanical damage due to mishandlings or misuse. Refer to manual for proper use of the equipment.

#### Use and storage conditions

- Do not block the vents
- Do not use the device in a dusty environment
- Do not use the device in an oxygen-rich environment, with vapors or inflammable gas
- Keep the device away from any flammable source
- The device is not intended to be sterilized
- Use the device inside
- Use the device in a dry environment
- Maintain a minimum distance of 20 cm around the master unit

#### Description of the pictograms affixed on the EZSCAN device and on the case

The following pictograms are affixed on the EZSCAN device:



Indicates that the parts applied of the device are of type BF (IEC 60601-1).

I

Class of electric protection.



The EZSCAN device is in conformity with European Directive 93/42/EEC.



Warning



Registered Trademark



Indicates the manufacturer catalogue reference



Indicates the manufacturer lot code



Indicates the serial number



Tells the user the need to consult the instructions for use



The product must be disposed in an appropriate structure for recovery and recycling

RoHS

Restriction of Hazardous Substances directive (Directive 2011/65/UE)

The following pictograms are affixed on the case:



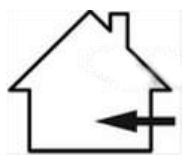
Handle with care



Fragile



Keep dry



Indoor use only



Keep upright



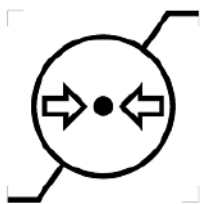
Recyclable



Indicates the temperature limit that the medical device can be safely exposed to



Indicates the range of moisture that the medical device can be safely exposed to



Indicates the range of atmospheric pressure that the medical device can be safely exposed to

### Use of the sensor plates

To ensure high quality recordings, particular care must be taken to the preparation of the skin of the patient and to the installation of the sensor plates.

It is also advisable to verify the sensor plate cable connectors are well inserted into the corresponding sockets at the rear of the EZSCAN Master Unit.



WARNING

### USE ONLY THE ORIGINAL SENSOR PLATES PROVIDED BY IMPETO MEDICAL.

**Impeto Medical** cannot guarantee the results of measurements carried out with sensor plates issued from other manufacturers.

When it is not in use, the EZSCAN device can be stored without disconnecting the sensor plate cables.



WARNING

### THE MAXIMUM WEIGHT ACCEPTED BY THE SENSOR PLATES IS 199KG OR 438LBS.

### Positioning on the sensor plates

The patient must position the sole of his bare feet in the center of the feet sensor plates and firmly apply their hands flat in the center of the hands sensor plates.

Except in the event of significantly overweight patient, all scans will be performed with patient standing upright on the feet sensor plates.

### Interrupting or stopping the recording

The test will automatically stop at the end of the measurements cycle, after approximately 3 minutes.

To stop the test BEFORE the end of the measurements cycle, select the Cancel button during the scan.

## Recommendations to the operator

As for any medical examination, it is recommended to check the environmental conditions and the condition of the patient before carrying out a measurement:

- Room temperature is between 65 and 95 degrees Fahrenheit,
- Cardiac holter measurements going on can be altered during the 2 minutes time scan.

## Contra-indications



WARNING

The repeated use of the EZSCAN device does not create any side effect. However, it is advised not to proceed with measurements on the following patients:

- People with any open or bleeding wounds that would come into contact with the surface of the sensor plate,
- People with missing limbs,
- Pregnant women or women who are uncertain about a possible pregnancy.

## Calibration

The EZSCAN device auto calibrates at the beginning of each test. The auto-calibration ensures that each sensor plate has enough contacts to proceed with the measurements.

If the calibration is interrupted, the operator is informed by an audible bell sound and/or an error message.

## Accessories and disposable parts

The following elements are available for the EZSCAN device:

Code	Description
E2MU	EZSCAN Master Unit
APH2	Hands plate with two sensor plates and its connecting cable
APF2	Feet plate with two sensor plates and its connecting cable
DSPHD	Smart Hand Electrodes desk
DSPFD	Smart Foot Electrodes desk
UMS2	Installation manual
ASAFE	Bottle of ANIOS Surfa'Safe spray cleaner
ELOCKS2	Sensor plate locking support
RCPU	Rack Central Processor Unit
PWS2	Medical Power Supply & Power Cable
WBOX	Box of Kim Wipes (KIMTECH Science Brand) for sensor plate cleaning



## Technical specifications

### • Description

The EZSCAN device is capable of measuring galvanic skin responses and is designed for the medical professional.

The EZSCAN device is a class IIa medical device (according to the EEC directive 93/42) and a class II medical device (according to FDA 21CFR 882.1540).

The EZSCAN device complies with IEC 60601-1 Edition 3 (Medical Electrical Equipment, Part 1: General requirements for safety) and IEC 60601-1-2 Edition 3 (Electromagnetic compatibility – Requirements and tests).

The EZSCAN device complies with ANSI/AAMI PC69:2007: Active implantable medical devices — Electromagnetic compatibility— EMC test protocols for implantable cardiac pacemakers and implantable cardioverter defibrillators. People with implantable cardiac pacemakers or implantable cardioverter defibrillators may be safely tested with the EZSCAN device, provided the EZSCAN remains at least 30 cm (12 inches) away from the implanted device, as laboratory tests have demonstrated that the EZSCAN device should not influence the function of implantable cardiac pacemakers and implantable cardioverter defibrillators due to Electromagnetic Interference at this distance.



WARNING

**STOP USE OF THE EZSCAN DEVICE IF THE PATIENT EXPERIENCES DIZZINESS OR BRADYCARDIA AS THESE COULD BE INDICATIVE OF INTERFERENCE WITH AN IMPLANTABLE CARDIAC PACEMAKER OR IMPLANTABLE CARDIOVERTER DEFIBRILLATOR.**

### • Characteristics of acquisition

Storage support:	SSD 64 Gb or 128 Gb
Mode:	No compression
Frequency of acquisition:	100 Hz
Resolution:	10 nS (nano Siemens)
Display units:	μS (micro Siemens)
Display precision:	+ or – 1 digit
Accuracy	2%

### • Electrical characteristics

Measurement voltage:	1V to 4V DC typical
Frequency:	0 Hz (DC current)
Dynamic resolution:	10 bits
Power requirement of the unit:	100-240 V~ 50/60 Hz 0.4/0.2A

### • Sealing

Index of protection:

Master Unit	IP20
Sensor plates	IP41
Power supply adapter	IP22

#### • Mechanical characteristics

Master Unit alone	9,5 kg
Master Unit dimensions	44,5 x 33,5 x 42,5 cm max
Weight of the Master Unit + sensor plate s: APH2 & APF2:	13,8 kg
Weight of the Master Unit + sensor plate s: DSPHD, DSPFD:	17,4 kg
Weight of the transportation box APH2, APF2	19.0 kg
Weight of the transportation box DSPHD, DSPFD	22.6 kg
Dimensions of the shipping box:	55 x 48 x 41 cm

#### • Storage, transport and conditions of use of the apparatus and sensor plates

	Temperature	Moisture (without condensation)	Pressure
Operation	18° to 35°C (65° to 95°F)	20% to 80%	700 to 1060 hPa
Storage	5° to 45°C (41° to 113°F)	10% to 85%	500 to 1060 hPa
Transport	-5° to 50°C (23° to 122°F)	10% to 90%	500 to 1060 hPa


Table 1

Guidance and manufacturer's declaration – electromagnetic emissions		
The EZSCAN device is intended for use in the electromagnetic environment specified below. The customer or the user of EZSCAN should ensure that it is used in such an electromagnetic environment.		
Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	EZSCAN uses RF energy for its internal function only. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.  EZSCAN is suitable for use in all establishments, including domestic establishments and those directly connected to the public low voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR 11	Class B	
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Table 2

<b>Guidance and manufacturer's declaration – electromagnetic immunity</b>			
EZSCAN is intended for use in the electromagnetic environment specified below. The customer or the user of the EZSCAN should ensure that it is used in such an electromagnetic environment.			
<b>Immunity test</b>	<b>IEC 60601-1-2 test level</b>	<b>Compliance Level</b>	<b>Electromagnetic environment guidance</b>
Electrostatic discharge (ESD) IEC 61000-4-2	$\pm 6$ kV contact $\pm 8$ kV air	$\pm 6$ kV contact $\pm 8$ kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical transient/burst fast IEC 61000-4-4	$\pm 2$ kV for power supply lines $\pm 1$ kV for input/output lines	$\pm 2$ kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	$\pm 1$ kV line(s) to line(s) $\pm 2$ kV line(s) to earth	$\pm 1$ kV mode differential $\pm 2$ kV mode common	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	$< 5$ % UT ( $> 95$ % dip in UT) for 0,5 cycle 40 % UT (60 % dip in UT) for 5 cycles 70 % UT (30 % dip in UT) for 25 cycles $< 5$ % UT ( $> 95$ % dip in UT) for 5 s	0 Vac during 10 ms 92 Vac during 100 ms 161 Vac during 1 s 0 Vac during 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the EZSCAN requires continued operation during power mains interruptions, it is recommended that the EZSCAN be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m for 50Hz and for 60Hz	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE UT is the a.c. mains voltage prior to application of the test level			

Table 3 - for ME equipment and ME systems that are not life-supporting

Guidance and manufacturer's declaration – electromagnetic immunity			
The EZSCAN is intended for use in the electromagnetic environment specified below. The customer or the user of the EZSCAN should ensure that it is used in such an electromagnetic environment.			
Immunity test	Immunity test	Immunity test	Immunity test
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 V rms	Portable and mobile RF communications equipment should be used no closer to any part of the EZSCAN, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.  <b>Recommended separation distance</b>  $d = 1.17 \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	3 V/m	$d = 1.17 \sqrt{P}$ 80 MHz to 800 MHz  $d = 2.33 \sqrt{P}$ 800 MHz to 2,5 GHz  where $P$ is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and $d$ is the recommended separation distance in metres (m).  Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey (1) should be less than the compliance level in each frequency range. (2)  Interference may occur in the vicinity of equipment marked with the following symbol:  

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

(1) Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the EZSCAN is used exceeds the applicable RF compliance level above, the EZSCAN should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the EZSCAN.

(2) Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V1] V/m.

Table 4 – for ME equipment and ME systems that are not life-supporting

Recommended separation distances between portable and mobile RF communications equipment and the EZSCAN			
The EZSCAN device is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the EZSCAN can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the EZSCAN as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1.17 \sqrt{P}$	80 MHz to 800 MHz $d = 1.17 \sqrt{P}$	800 MHz to 2,5 GHz $d = 2.33 \sqrt{P}$
0,01	0.12	0.12	0.23
0,1	0.37	0.37	0.74
1	1.16	1.16	2.33
10	3.69	3.69	7.37
100	11.6	11.6	23.3
For transmitters rated at a maximum output power not listed above, the recommended separation distance $d$ in metres (m) can be determined using the equation applicable to the frequency of the transmitter, where $P$ is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			
NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.			
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

# Contacts



## **Impeto Medical**

17, rue Campagne Première  
75014 PARIS – FRANCE

Tel: +33 (0)1 4320 1640

Fax: +33 (0)1 4335 1833

Mail: [info@impeto-medical.com](mailto:info@impeto-medical.com)

<http://www.impeto-medical.com/fr/>

## **Impeto Medical**

Room 107, Building 81,  
Stadium Road No.4,  
Chaoyang District, Beijing,  
China 100027

Mail: [info@impeto-medical.com](mailto:info@impeto-medical.com)

## **Impeto Medical, Inc.**

8910 University Center Lane, Suite 615  
SAN DIEGO, CA 92122 - USA

Tel: (858) 450.2800

Fax: (858) 450.2804

<http://www.sudoscan.com/>



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