



**MedVision**

## **USER MANUAL**

**Simulator PS.AUS.P**

**Pediatric Patient Auscultation Simulator**



# Contents

<b>Introduction</b>	<b>2</b>
<b>1 Setting Up</b>	<b>3</b>
1.1 Smartscope charging . . . . .	3
<b>2 Start-up</b>	<b>4</b>
2.1 Start-up sequence . . . . .	4
2.2 Turning on the smartscope . . . . .	4
<b>3 Auscultation points - location</b>	<b>6</b>
<b>4 Authentication</b>	<b>9</b>
<b>5 Auscultation menu</b>	<b>11</b>
5.1 Auscultation control menu . . . . .	11
5.2 Auscultation sound selection . . . . .	12
5.3 Auscultation point selection . . . . .	12
5.4 Auscultation sounds settings . . . . .	14
5.5 Phonogram, ECG and RR graphs . . . . .	16
5.6 Highlighting auscultation points . . . . .	18
5.7 List of auscultation sounds . . . . .	22
<b>6 Malfunctions</b>	<b>27</b>
<b>Acknowledgement table</b>	<b>30</b>

## Introduction

This Data Sheet describes the features and operation of the pediatric patient auscultation simulator (Figure 0.1) and helps identify both normal and abnormal conditions of a patient by using a smartscope.

The torso of the auscultation patient simulator has a realistic musculoskeletal structure of a teenager and is featured with true-to-life anatomical landmarks. The skin is realistic in appearance and feel.



Figure 0.1. Simulator

The use of a realistic simulator, computer system for the generation of physiological conditions and reactions and realistic and adapted medical equipment ensure that the training process is run without any risk to the health and life of a real patient.

**Note:** the simulator medical equipment only imitates the real ones and must not be used outside the simulator's environment.

# 1 Setting Up

## 1.1 Smartscope charging

1. Take a smartscope.
2. Insert the charger connector into the charging port of the device.
3. Plug the charger into a power outlet (220 V).
4. Wait until the smartscope is fully charged (may take up to three hours).



Figure 1.2. Smartscope

The LED located opposite to the port is used as a charge indicator. While charging, the LED indicator is blinking red. As soon as the battery charging is complete the LED stops blinking and turns off.

## 2 Start-up

### 2.1 Start-up sequence

1. Unpack the main components of the simulator.
2. Press the power button on the instructor's tablet. Wait until the server and the instructor software are ready (takes about 3-5 minutes).
3. Wait until the software starts running.
4. Plug the torso into a power outlet (220 V). If you are going to use the software to only demonstrate sounds, through internal or external speakers and without the use of the smartscope of the auscultation simulator, you may skip Point 4. The torso may be connected later, if necessary.

If the software has not started automatically, click on the Starter app icon on the tablet desktop. If there is no app icon on the tablet desktop, start Server software first and then Auscultation.

### 2.2 Turning on the smartscope

1. Do a short press on the power button once. The power button is located on the opposite side of the charging port.
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2. The power indicator starts blinking rapidly and you need to wait for the simulator to start up (takes about one minute).
3. In the software (the Connections section of the Instructor software), check the status of the simulator connection. If the connection is successful, the icon of the corresponding simulator will be marked with a green tick.

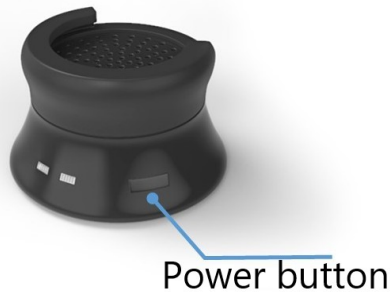


Figure 2.3. The smartscope power button

## 3 Auscultation points - location

The torso of the patient simulator is the main element used in performing and practicing auscultation, including:

- Auscultation of heart sounds (Figure 3.4)
- Auscultation of lung sounds (anterior (Figure 3.5), and posterior (Figure 3.6))
- Auscultation of bowel sounds (Figure 3.7)

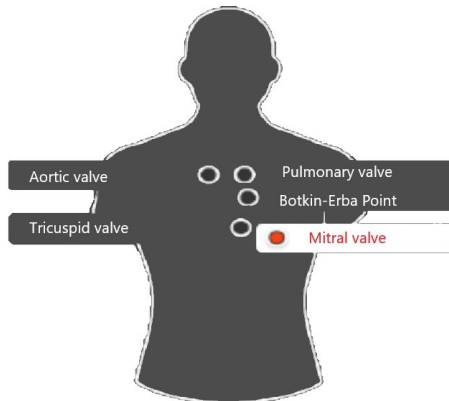


Figure 3.4. Auscultation of heart sounds



### 3 AUSCULTATION POINTS - LOCATION

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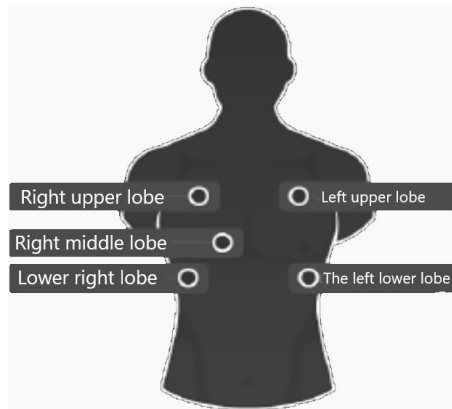


Figure 3.5. Lungs anterior

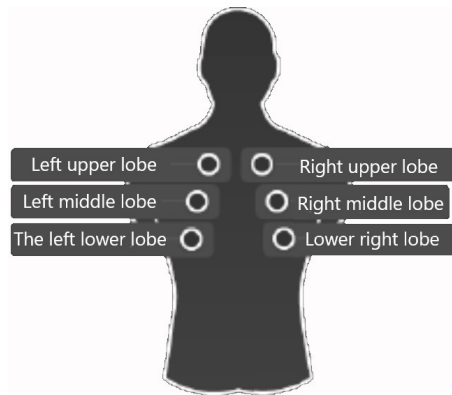


Figure 3.6. Lungs posterior

### 3 AUSCULTATION POINTS - LOCATION

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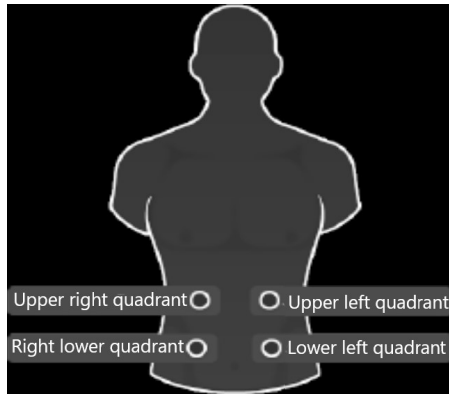


Figure 3.7. Auscultation of bowel sounds

If the torso is connected to the power supply (220V), the auscultation points light up: red for the heart, blue for the lungs, yellow for the bowel. The software allows adjusting both the intensity and type of the sounds of heart, lungs and breathing. It is possible to compare phonograms of different breathing sounds and transmit them to external speakers, e.g. for demonstration purposes. The library of sounds includes both normal breathing, heart tones and peristalsis, and abnormal crackles, noises and pathologies in high definition.

## 4 Authentication

Auscultation software runs automatically after the instructor's tablet is turned on and the simulator starts up.

If the software has not started automatically, click on the Starter app icon on the tablet desktop. If there is no app icon on the tablet desktop, start Server software first and then Auscultation.

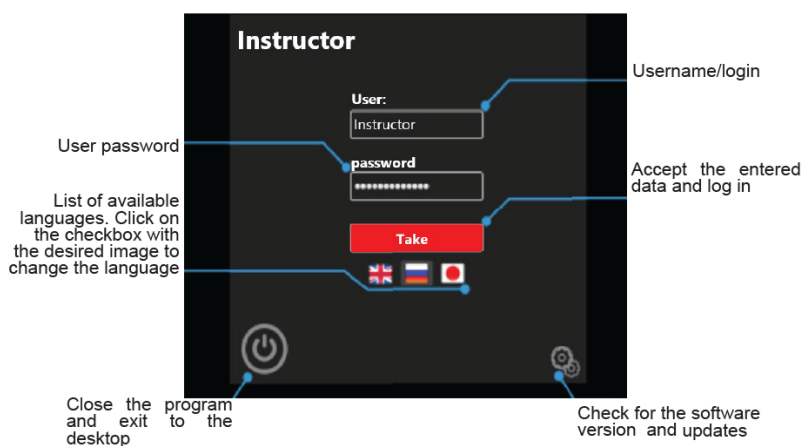


Figure 4.8. Instructor Software authentication window

Authentication menu (Figure 4.8) will open immediately after the program starts running. To log in and go to the main menu, enter your


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## 4 AUTHENTICATION

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username/login in the User field, enter your password in the Password field and click on the Accept button.

In the authentication menu, you can change the software interface language. The available languages are represented as icons of flags located under the Accept button. To change the software interface language, click on the relevant flag icon.

To close the program and return to the Simulation Centre, click on the exit icon , located in the bottom left-hand corner of the authentication window.

## 5 Auscultation menu

### 5.1 Auscultation control menu

The general layout of the software menu is presented below:

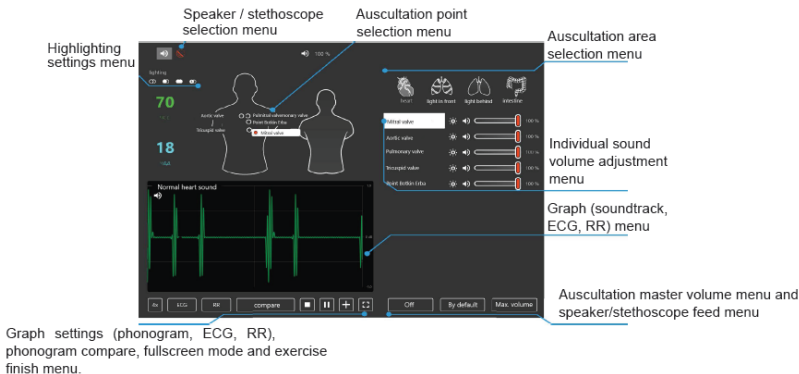


Figure 5.9. Auscultation software - User authentication

### 5.2 Auscultation sound selection

- In the Sounds menu (Figure 5.10), select the area of auscultation. The area names are colored yellow.
- Open the drop-down menu for the subsection by clicking on V icon.
- Select a sound from the subsection by clicking on its name.

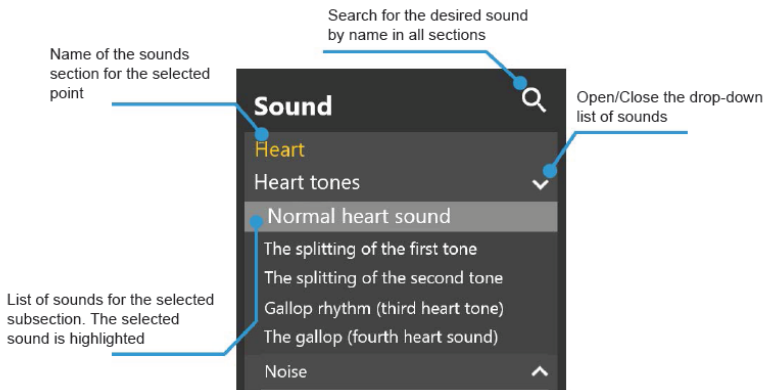


Figure 5.10. Auscultation sound selection

### 5.3 Auscultation point selection

To select an auscultation point in the program:

1. Select an auscultation sound (Figure 5.9);

2. Select a sound area. To do this, tap the corresponding area icon in the control menu. The following areas are available:

- Auscultation of heart sounds
- Auscultation of lung sounds (anterior)
- Auscultation of lung sounds (posterior)
- Auscultation of bowel sounds.

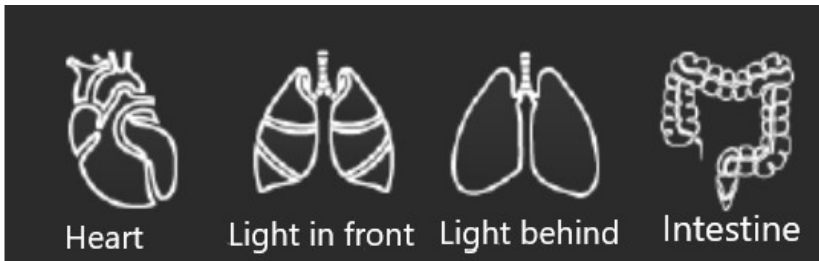


Figure 5.11. Sound volume settings menu

3. Select the point of auscultation. To do this, in the control menu, tap the name of the relevant point on the torso image. The selected point will be highlighted in white.

## 5 AUSCULTATION MENU

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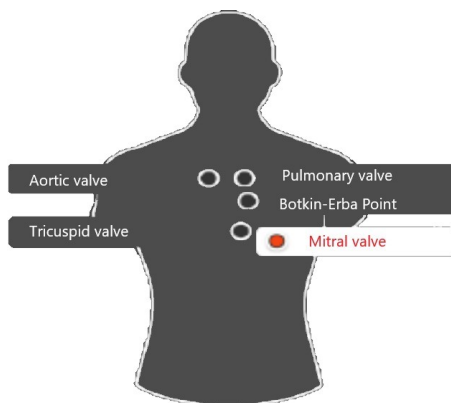


Figure 5.12. The selected auscultation point

Alternatively, after selecting the sound, position the stethoscope with the smartscope turned on to the desired point (see Section 3 "Auscultation points - location") to activate it automatically (Figure 5.12).

### 5.4 Auscultation sounds settings

To change the sound volume, use the slider with the scale located on the right side of the control menu (Figure 5.9) "Auscultation software - User authentication".



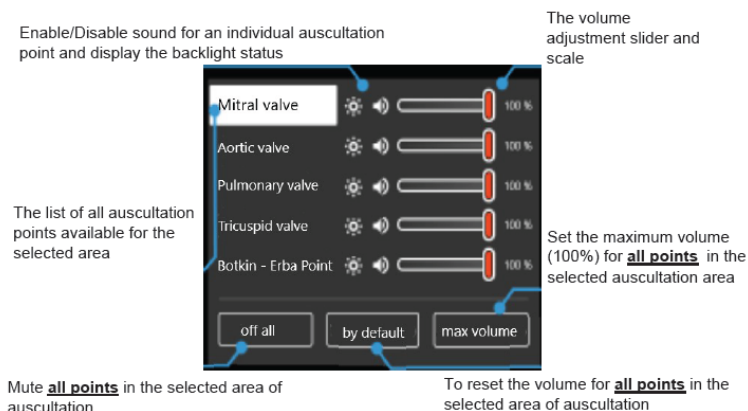


Figure 5.13. Sound volume settings menu

The volume level is determined by the percentage value and is changed using the slider. To change the volume level of the selected point, click on the slider icon and drag it on the scale to the desired value. To quickly turn off the sound for the selected point, click on the Speaker icon. To change the volume values for all auscultation points in the selected area, use the buttons at the bottom of the control menu (Figure 5.13) “Auscultation area selection”.

The following functions are available:

- Mute all - mute completely
- Default - undo all changes and set original volume values

## 5 AUSCULTATION MENU

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- Max Volume - set the maximum (100%) volume for all points



To switch the sound between the stethoscope and the external speaker, use the icons at the top of the control menu, “Auscultation software - User authentication” (Figure 5.9).

The icon of the selected source will be marked white, and the name of the source itself (speaker/ stethoscope) will be displayed next to it. The inactive sound source will be marked red.

### 5.5 Phonogram, ECG and RR graphs

The graph of the phonogram of the selected sound is displayed on the main menu screen, “Auscultation software - User authentication” (Figure 5.9) and “Phonogram, ECG and RR graphs” (Figure 5.14). The name of the selected sound is also displayed here.

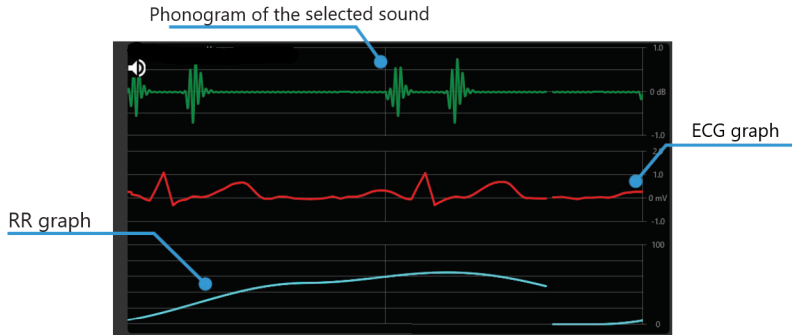


Figure 5.14. Phonogram, ECG and RR graphs

By default, only the phonogram of the selected sound will be displayed. To enable the display of RR and ECG graphs, it is necessary to use the Graph Management Menu (Figure 5.15), located under the field of graphs.

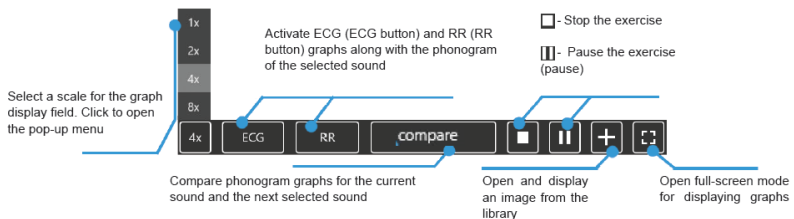


Figure 5.15. Graph management menu

To compare the phonogram graphs for two sounds/noises, first

## 5 AUSCULTATION MENU

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click the Compare button (Figure 5.15), and then select the second sound from the main list, Auscultation software - User authentication (Figure 5.9), the selected auscultation point (Figure 5.12).

The compared phonograms will be displayed in the graph field, Comparison of phonogram graphs (Figure 5.16). The phonogram of the active (playable) sound will be marked with the Speaker icon. The initial phonogram will be marked with a frame.



Figure 5.16. Comparison of phonogram graphs

### 5.6 Highlighting auscultation points

To activate the backlight of auscultation points on the torso, use the Highlighting menu of Auscultation Points Highlighting Controls (Figure 5.17), next to the auscultation point selection area in the main menu, Auscultation software - User authentication (Figure 5.9).



Figure 5.17. Auscultation points highlighting controls

By default, highlighting is disabled. Click to activate highlighting for all points in the selected area. The highlighted points are displayed as follows:

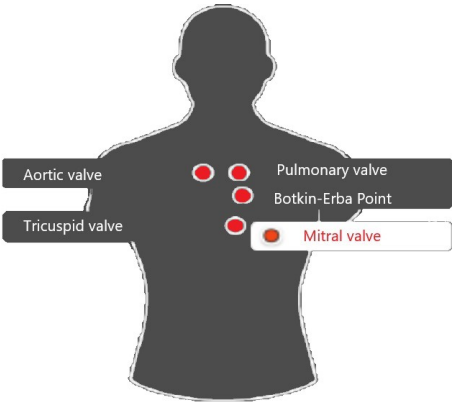


Figure 5.18. Highlighting of all auscultation points in the software

Clicking on will activate highlighting for only one point When you

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## 5 AUSCULTATION MENU

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click on any other point, it will be automatically highlighted, and the previous point will go off.

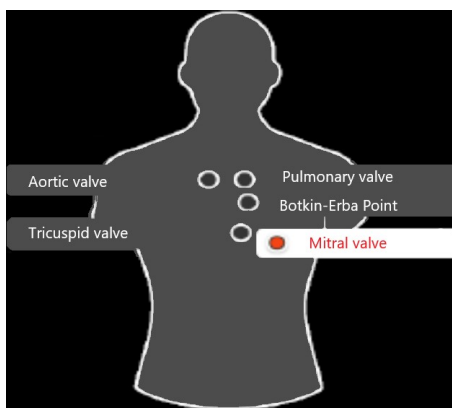


Figure 5.19. Highlighting of an auscultation point in the software

To activate highlighting for several points, click on the button in the point selection menu (Figure 5.12) and highlight multiple points (Figure 5.21).

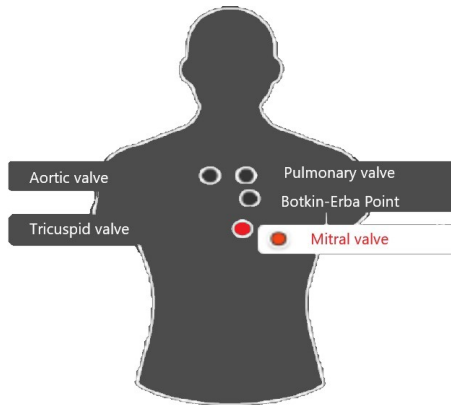


Figure 5.20. Highlighting of multiple points in the software

To quickly switch highlighting between selected and unselected points, use the button to invert highlighting between selected and unselected points. After clicking on this button, the program inverts highlighting. If multiple points are highlighted in the software (inversion) (Figure 5.21) after clicking on “Invert highlighting between selected and unselected points”, the points will be highlighted as follows:

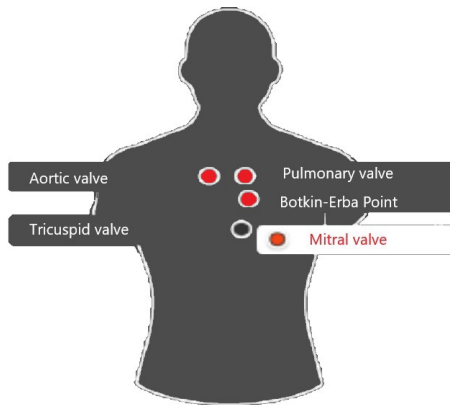


Figure 5.21. Highlighting of multiple points in the software (inversion)

### 5.7 List of auscultation sounds

#### **Auscultation**

Auscultation of sounds reproduced by the simulator (torso) is possible in both, anterior and posterior, zones and includes:

Auscultation of heart sounds (39 sounds):

- Normal heart sound
- Split first heart sound
- Split second heart sound



- Third heart sound (gallop)
  - Fourth heart sound (gallop)
  - Functional murmur
  - Diastolic murmur
  - Opening snap
  - Holosystolic murmur
  - Early systolic murmur
  - Mid-systolic murmur
  - Continuous murmur
  - Austin Flint murmur
  - Pericardial friction rub
  - Graham Steell's murmur
  - Aortic valve regurgitation
  - Aortic valve stenosis and regurgitation
  - (удалено)
  - Mitral valve regurgitation
  - Mitral valve stenosis
  - Mitral valve prolapse
-

- Mitral valve stenosis and regurgitation
  - Mitral valve stenosis and tricuspid valve regurgitation
  - Pulmonary valve stenosis
  - Pulmonary valve regurgitation
  - Tricuspid valve regurgitation
  - Coarctation of the aorta
  - Hypertrophic cardiomyopathy
  - Patent ductus arteriosus
  - Atrial septal defect
  - Ventricular septal defect
  - Acute myocardial infarction
  - Congestive heart failure
  - Systemic hypertension
  - Acute pericarditis
  - Dilated cardiomyopathy
  - Pulmonary hypertension
  - Tetralogy of Fallot
  - Ventricular aneurysm
-

### Auscultation of bowel sounds (14 sounds):

- Normal bowel sound
- Hyperactive sounds
- Hypoactive sounds
- Borborygmus
- Capotement
- Peritoneal friction rub
- Normal bowel sound with bruits
- Irritable bowel syndrome
- Diarrhea
- Bruits due to renal arteries stenosis
- Constipation
- Ulcerative colitis
- Crohn's disease
- Paralytic ileus

### Auscultation of lung sounds (11 sounds):

- Bronchial respiration
-

## 5 AUSCULTATION MENU

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- Vesicular respiration
- Diminished vesicular respiration
- Coarse crackles
- Fine crackles
- Wheezes
- Rhonchi
- Stridor
- Pleural friction rub
- Bronchovesicular sounds
- Gurgling rales

## 6 Malfunctions

PROBLEM	CAUSE	SOLUTION
The smartscope does not connect to the system	<ol style="list-style-type: none"><li>1. Failure in automatic Bluetooth connection</li><li>2. By default, the wrong device has been selected</li></ol>	Go to Settings>Devices>Bluetooth and other devices, select smartscope (RFAU-***) and connect manually. Then open "Manage audio devices" and choose Realtek Digital as your default device

## 6 MALFUNCTIONS

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The instructor's tablet does not connect to the Wi-Fi router	<ol style="list-style-type: none"><li>1. Failure in automatic Wi-Fi connection.</li><li>2. IP failure</li></ol>	<ol style="list-style-type: none"><li>1. Go to Settings-&gt;Network and Internet, check your Wi-Fi connection.</li><li>2. To configure IP, go to the network and sharing Center&gt; Change adapter settings. Find the required Wi-Fi network in the General list and select "Properties". In the window that opens, select the line IP version 4 (TCP/IPv4) and double-click on it. In the new menu put a tick in the "Use the following IP address" and enter the following data : IP-address: 192.168.0.(simulator number) Subnet mask: 255.255.255.0 Default gateway: 192.168.0.1 Preferred DNS server: 192.168.0.11 Alternative DNS server: 192.168.0.111</li></ol>
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### **Information to be presented to the Service Centre**

In case of any other malfunction please contact our Service Centre.  
Please attach the following information to the letter:

1. The simulator full name and serial number.
2. Problem description.
3. Error message screenshot.
4. Detailed description of the actions leading to the problem.
5. A dxdiag.txt file from the PC where the software error occurred.

To create such a file, simultaneously press Windows and R and type «dxdiag» in the pop-up window. After that click on Save All Information in the pop-up window.

**Acknowledgement table**

I have read and understood the manual:

Table 2. Acknowledgement table

Date	Name	Signature	Stamp