

OXYTERRA RS

OPERATION MANUAL

CONTENTS

1. GENERAL INFORMATION	3
2. TECHNICAL SPECIFICATIONS	4
3. SAFETY PRECAUTIONS	6
4. ELECTROMAGNETIC COMPATIBILITY	7
5. INSTALLATION AND COMMISSIONING INSTRUCTIONS	8
6. OPERATING INSTRUCTIONS	12
7. MAINTENANCE	43
8. SANITATION	44
9. PACKAGING, STORAGE, TRANSPORTATION	45
10. DISPOSAL	46
11. MANUFACTURER'S WARRANTY	47
12. APPENDIX	48

1. GENERAL INFORMATION

Hereinafter, this Operation Manual is referred to as OM. It is necessary to study this OM before installation and operation.

1.1 Name of Device:

“OXYTERRA RS”.

1.2 Manufacturer:

D.O.O. “GR SYSTEM”.

Address: Republic of Serbia, 11032, Belgrade, Ratka Mitrovica 134.

Telephone: +381 117645044, +381 601494673

Email: oxysistemrs@gmail.com

1.3 Purpose of the Device:

The Device is designed to produce hypoxic, hyperoxic and normoxic gas mixtures from ambient air in order to conduct normobaric interval hypoxic and hyperoxic trainings.

1.4 Declaration of Conformity:

No. ICC140624.MDLVD2381, Belgrade, 16.06.2024.

Applicable Standard(s): EN 60204-1:2018, ISO 12100:2010, EN 60335-1:2012

1.5 Conditions of use:

Device is intended for home use only that help for recreation. Use the Device exclusively for non-medical training purposes.

1.6 Application:

Cosmetology, rehabilitation, recreation.

1.7 Training is prohibited during acute illness or chronic illness flare-ups.

1.8 Possible side effects:

The following side effects may occur when using the Device:

- palpitations;
- high blood pressure;
- headache or dizziness.

If side effects occur, consult a doctor.

2. TECHNICAL SPECIFICATIONS

2.1 The Device's exterior is represented in Appendix.

2.2 Dimensions: 500 x 500 x 1070 mm. Maximum deviation does not exceed 2.5%.

2.3 Weight: 55 kg $\pm$ 2.5%.

2.4 Rated voltage: (220 $\pm$ 22) V, 50 Hz.

2.5 Power consumption: not more than 1200 VA.

2.6 The Device generates the following breathing mixtures:

- hypoxic (oxygen percentage ranging from 7% to 16%);
- normoxic (oxygen percentage is 21%);
- hyperoxic (oxygen percentage is 33%).

2.7 Deviation of oxygen concentration from the set value is as follows:

- from 7% to 16%: not worse than $\pm$ 1.5%;
- 21%: not worse than $\pm$ 3%;

2.8 Discrete adjustment of oxygen concentration is as follows:

- from 7% to 16%: in 0.5% increments;

2.9 Time to establish the specified oxygen concentration: not more than 30 seconds.

2.10 Training duration: from 2 to 120 min, adjustment step: 1 min.

2.11 Time to establish the operating mode from the moment of power-on: not more than 5 minutes.

2.12 Output pressure: 250 $\pm$ 3 kPa.

2.13 Maximum output pressure: 700 $\pm$ 3 kPa.

2.14 It is necessary to make 30 minutes breaks every 2 hours of continuous operation. Maximum operation period under these conditions: 8 hours per day.

2.15 Pulse oximeter sensor.

2.15.1 Blood oxygen saturation (SpO₂) measurement range: from 70% to 100%. Accuracy: not worse than $\pm$ 3%.

2.15.2 Pulse rate (PR) measurement range: from 30 to 250 bpm. Accuracy: not worse than 2 bpm.

2.16 Display:

2.16.1 Diagonal: 19 inches.

2.16.2 Resolution: 1280 x 720.

2.17 Physical parameters monitored during the training session:

- oxygen concentration;
- blood oxygen saturation (SpO₂);
- pulse rate (PR).

2.18 Information saved after each training session:

- session type;
- date and time of the session;
- physiological parameters of the trainee.

2.19 Training sessions protocols can be viewed and exported to an external USB flash drive.

2.20 Special diagnostics are performed by the Device automatically before each training session. During the diagnostics, the following parameters are monitored:

2. TECHNICAL SPECIFICATIONS

- serviceability of the main components of the Device;
- operability of sound and light signaling systems.

If any error occurs during the diagnostics, training session execution is blocked.

2.21 Signals used for messages and warnings: audible and visual alarms. Level of audible alarms: not less than 55 dBA.

2.22 Average Mean Time Between Failures (MTBF): not less than 1000 hours. Average service life: 5 years.

2.23 Maximum temperature of the external surfaces: not more than 40°C (at 25°C ambient temperature).

2.24 Output breathing mixture temperature: not more than 35°C (at 25°C ambient temperature).

2.25 The Device must be installed according to the electromagnetic compatibility conditions described in Section 4 of this OM.

3. SAFETY PRECAUTIONS

- Using the Device for purposes different from those specified in this OM is strictly prohibited.
- The operation of the Device by untrained personnel or by those who have not reviewed this OM is strictly prohibited.
- Repair work must not be conducted while the power is on. Device must not be operated without proper protective grounding.
- The operator must ensure that the equipment, connecting cables and additional accessories are in good working condition before turning the Device on.
- Do not open the Device's enclosure. Maintenance, changes or upgrades must be done only by trained, authorized personnel.
- Route cables and hoses to avoid tripping hazards and prevent accidental disconnection or falls.
- Operating the Device with defects is strictly prohibited.
- Operating the Device with malfunctioning electrical equipment is strictly prohibited.
- Connecting electrical equipment that exceeds the Device's output power rating is strictly prohibited.
- Operating the Device during transportation is strictly prohibited.
- Using equipment not included in the Device's Scope of Supply is strictly prohibited.
- Using electrical cables not included in the Device's Scope of Supply is strictly forbidden.
- Do not alter, remove, or cover any labels or markings on the Device's surface.
- Blocking the ventilation system of the Device is strictly prohibited.
- Ensure that exhaust gases do not enter the ventilation system.
- Modifying the Device's software is strictly prohibited.
- The Device requires special measures to ensure electromagnetic compatibility. It must be installed and operated according to the electromagnetic compatibility information provided in this OM.
- Ensure that the voltage and frequency of the power supply matches the Device's specifications provided in this OM before connecting the Device to it.
- Using parts and accessories not specified in this OM may increase electromagnetic emission or reduce the Device's immunity to interference.
- Magnetic and electrical fields can cause interference and affect the proper operation of the Device. Ensure that all external devices operating near the Device meet the electromagnetic compatibility conditions described in Section 4 of this OM.
- Immediately dry the Device in case exposing it to rain or water splashes.
- This Device is intended for use by a single user at a time.
- Install the Device in a location where the screen is clearly visible and the controls and accessories are easily accessible.
- Keep this manual with the Device for easy access when needed.

4. ELECTROMAGNETIC COMPATIBILITY

The Device is intended for use in an electromagnetic environment where radiated high frequency interference is controlled. The operator can take measures to prevent electromagnetic interference by maintaining a required distance between portable and mobile radio communication equipment (transmitters) and the Device. The recommendations are listed below.

The Device uses RF energy for its internal function only. Its RF emissions are low and do not cause any interference to nearby electronic equipment.

The Device is suitable for use in all buildings, rooms, living spaces, and locations directly associated with low-voltage utility power supply buildings.

Floors should be wooden, concrete or tiled. If the floors are covered with synthetic material, the relative humidity should be at least 30%.

The quality of the power supply should meet typical commercial standards. If continuous operation during power interruptions is required, it is recommended to connect the Device to an uninterruptible power supply (UPS) or battery backup.

Magnetic power fields must have horizontal parameters.

Recommended spatial spacing:

$d=1,2\sqrt{P}$, (for range from 80 to 800 MHz) or

$d=2,3\sqrt{P}$, (for range from 800 MHz to 2,5 GHz),

where:

d is the recommended spatial spacing in meters,

P is the nominal maximum output power of the transmitter as specified by the manufacturer in watts.

The field strength of radio waves emitted by stationary transmitters must be lower than the limits specified for each frequency band.

5. INSTALLATION AND COMMISSIONING INSTRUCTIONS

5.1 Installation instructions

The Device must be installed in a location where the risk of water or other liquids entering the Device and its external modules is eliminated. The Device must be protected from moisture, temperature extremes, dust, sunlight, active chemicals, and similar factors.

Do not install the Device in an explosive or hazardous environment.

Carefully inspect the packaging for any signs of damage before unpacking. In case of any damage contact the carrier or the Manufacturer. In other case open the packaging and carefully extract the Device and its accessories. Check the Device and its accessories for any mechanical damage. Ensure that the supplied items match the components listed in the Scope of Supply indicated in the Product Data Sheet. Report any issues directly to the Manufacturer.

Retain the packaging materials for future equipment transportation.

5.2 Preparing for operation

Only trained personnel, familiar with the OM, may operate the Device.

5.2.1 Device Positioning

Place the Device on a flat, level surface, considering the length of cables, hoses, and power cords.

5.2.2 Casters' installation

Install the 4 swivel casters in the holes on the bottom of the enclosure.

5.2.3 Connecting the breathing hose

Attach the valve and the angle connector to the hose, then connect it to the corresponding port on the Device, as shown in Figure 1.



Figure 1 – Breathing hose connection

5.2.4 Connecting the face mask

Attach the face mask to the T-connector, as shown in Figure 2.

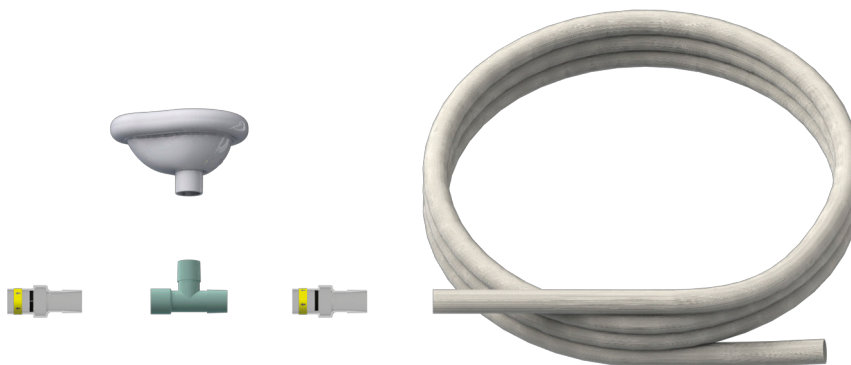


Figure 2 – Face mask connection to the breathing hose

5.2.5 Connecting the pulse oximeter sensor

Connect the SpO₂ sensor plug to the corresponding port on the Device, as shown in Figure 3.

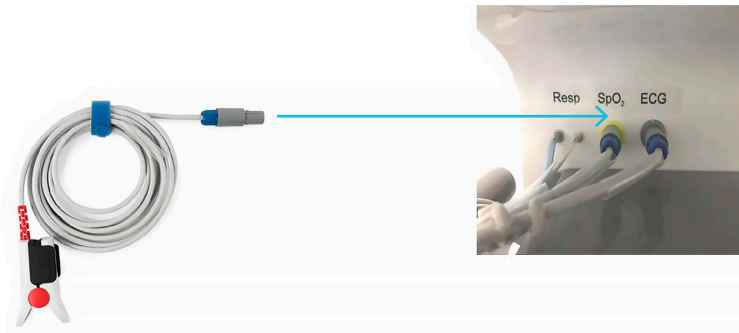


Figure 3–Pulse oximeter sensor connection

5.2.6 Connecting the power cable

Plug the power cable into the corresponding port on the rear panel of the Device, as shown in Figure 4.



Figure 4 –Power cable connection

5.2.7 Connecting an external device

Results from the training session (graphs, text or numerical values) can be transferred to an external device for storage or printing. Use the Device's USB port for this purpose, as shown in Figure 5.



Figure 5 –External device connection

5.2.8 Connection to the local network

Device is equipped with an RJ-45 network port. It is used for transferring training results to the organization's local network.

5.2.9 After completing the installation procedures described above:

- Inspect the Device for any mechanical damage.
- Ensure all external cables and accessories are properly connected.
- Press the power switch to turn on the Device. The built-in indicator will light up red.

6. OPERATING INSTRUCTIONS

Main screen

After powering on the Device, the main screen will appear on the Device's monitor (see Figure 6).

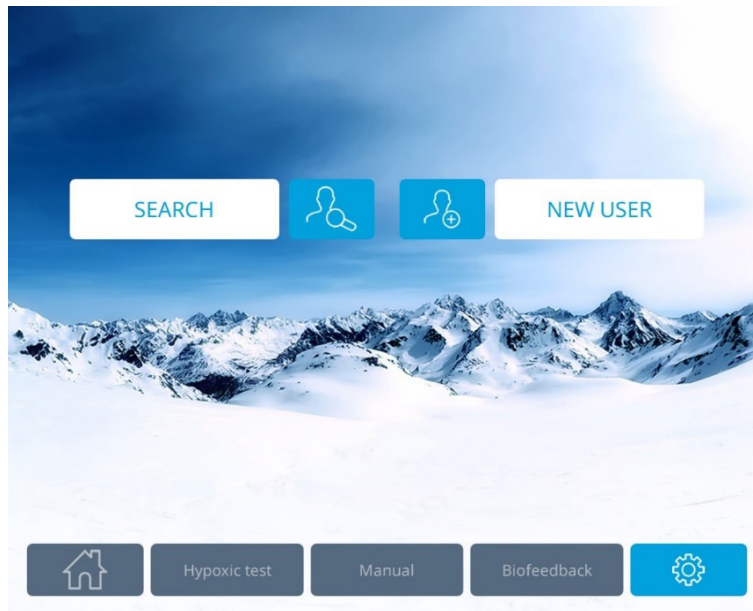


Figure 6 – Main screen



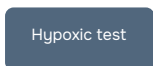
New user;



Search for an existing user;



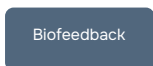
Home screen;



Hypoxic Test mode;



Manual training mode;



Automatic (Biofeedback) training mode;



Settings.



If any button is unavailable, its color will turn grey.

User database

Entering a new user

To create a new user, press the button . This will bring up the screen shown in Figure 7.



The form includes the following fields and options:

- Last name:
- First name:
- Mid name:
- E-Mail:
- Notes:
- Date of birth:
- Sex: ☐ male ☐ female
- Weight:
- Height:
- Tests: (No testing was done)
- Sessions: (No sessions)

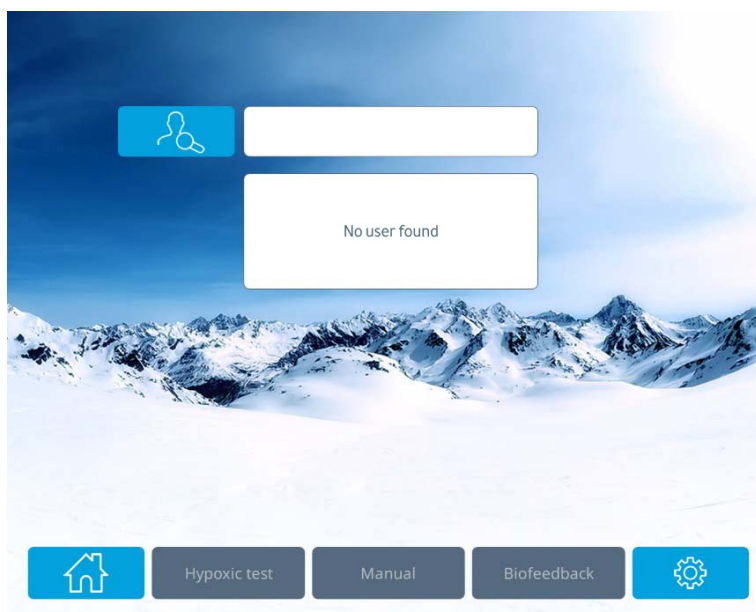
Navigation bar: Home, Hypoxic test, Manual, Biofeedback, Settings.

Figure 7 – New user entry

After entering the data, the information will be saved in the database and linked to the user's full name.

Selecting an existing user

To select an existing user, press the button . This will bring up the screen shown in Figure 8.



The screen includes the following elements:

- Search bar:
- Message: No user found

Navigation bar: Home, Hypoxic test, Manual, Biofeedback, Settings.

Figure 8 – Existing user search

Field  is intended for entering the user's name or surname to search the database. The result will be placed below the query line. Select a specific user by tapping the line with their full name. If no results are found, the message "No user found" will be displayed.

Settings

The Device Settings screen is shown in the Figure 9.

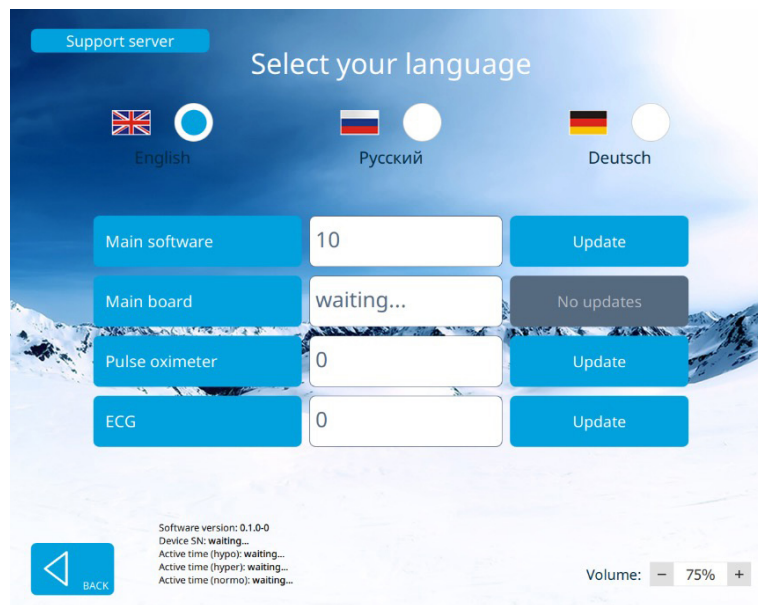


Figure 9 – Settings

Using the screen controls, the user can perform the following operations:

- language selection,
- volume adjustment,
- software update,
- main program update,
- main board update,
- pulse oximeter update.

Hypoxic test

In the Hypoxic test mode, the Device tests the trainee in order to determine the maximum oxygen concentration in the breathing mixture.

Hypoxic test settings

If this is the user's first Hypoxic test, the settings screen in Figure 10 will appear on the monitor.

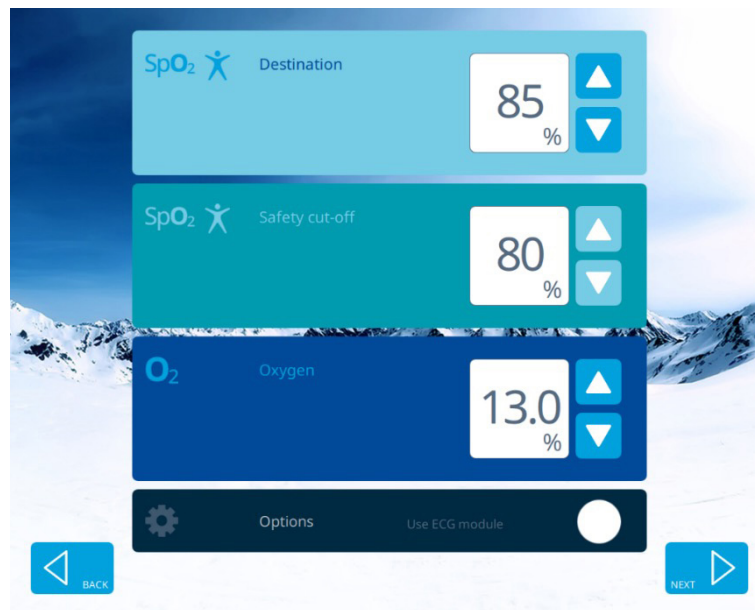


Figure 10 – New Hypoxic test

Use buttons ▲ and ▼ to increase or decrease parameter values. Adjustable parameters:

- target SpO₂ value,
- SpO₂ safety cut-off value,
- initial O₂ concentration in the breathing mixture.

If the user has performed a Hypoxic test before, the screen displaying its results will appear as shown in Figure 11. Press button **OK** to proceed to the Hypoxic test settings shown in Figure 12.

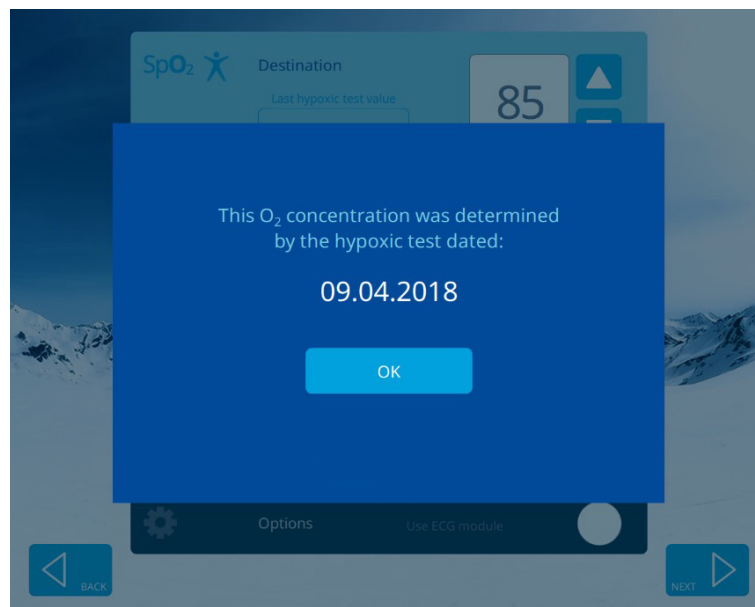


Figure 11 –Previous Hypoxic test results

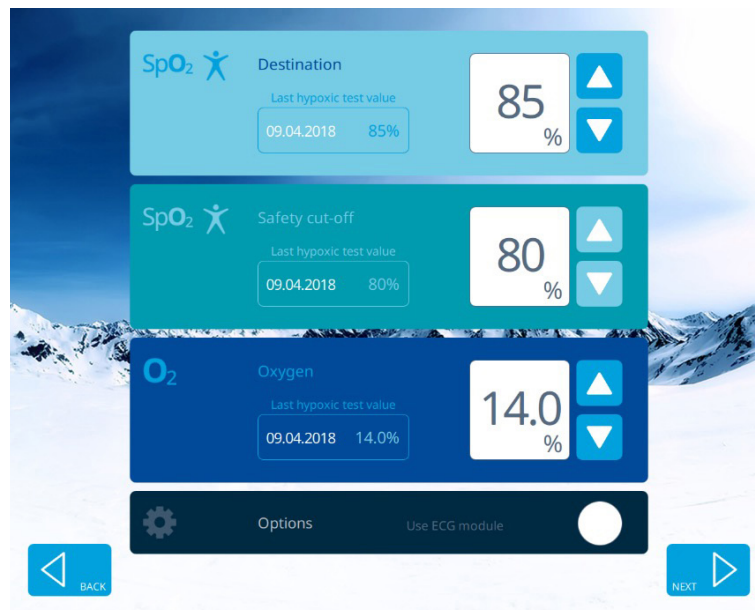


Figure 12 – Hypoxic test settings

This settings screen will also display the settings used for the previously performed Hypoxic test.

Press the button  to transit to the preparation stage.

Preparation for the Hypoxic test

The Hypoxic test preparation screen is shown in the Figure 13.

Put on the face mask and install the pulse oximeter sensor as shown on the screen

Upon correct installation:

- the pulse oximeter sensor will display the message “Sensor successfully connected”;
- the indicators for the measurement channels of O₂ concentration and SpO₂ in the top line of the screen will be filled with blue.

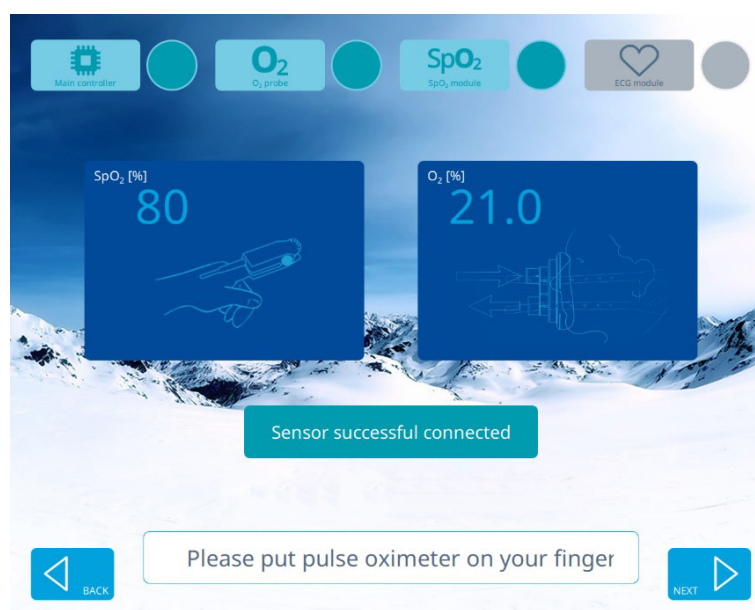


Figure 13 - Hypoxic test preparation

If a measurement channel is incorrectly connected or the sensor is improperly installed, the channel indicator will turn red, as shown in Figure 14.

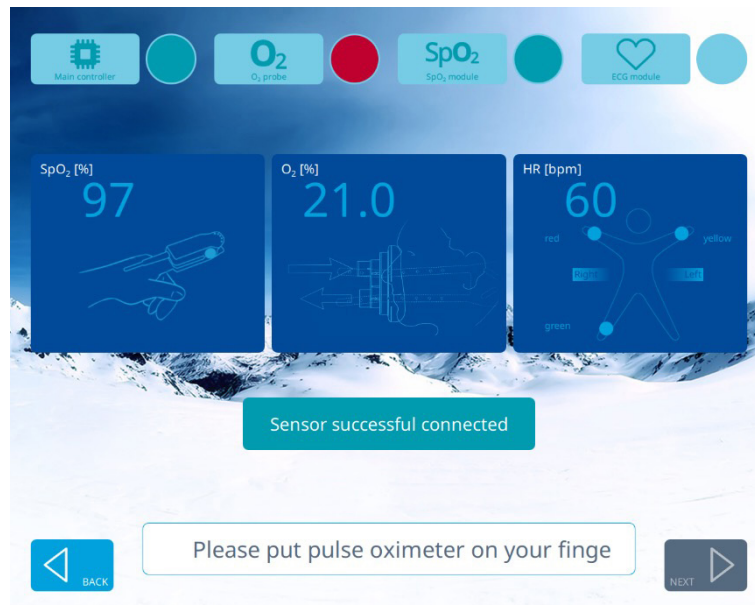


Figure 14 – Incorrect connection of O_2 concentration measurement channel

Hypoxic test

The screen of the Hypoxic test mode is shown in the Figure 15

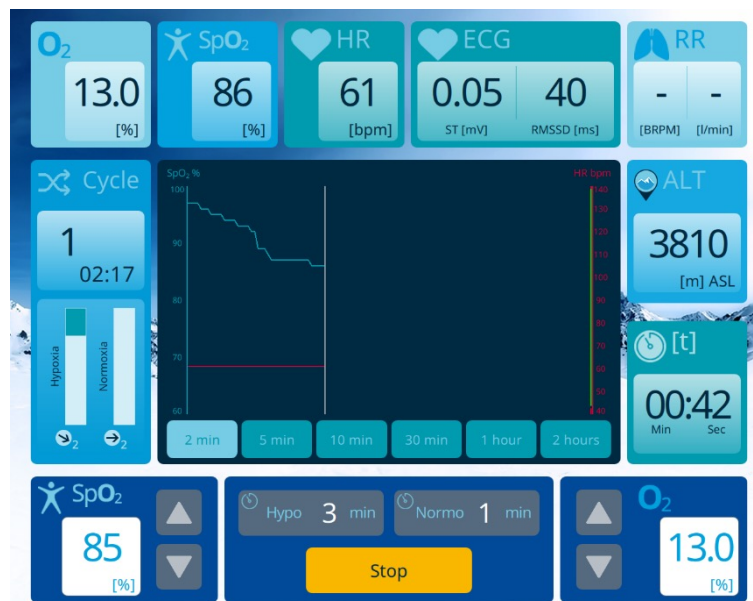


Figure 15 –Hypoxic test

Hypoxic test consists of alternating 3-minute hypoxia and 1-minute hyperoxia cycles. O_2 concentration is reduced by 0.5% until the SpO_2 reaches the target value. The test ends when the target SpO_2 is maintained for 1 minute.

O_2 and SpO_2 values obtained during the Hypoxic test are saved and linked to the user's full name. This data will appear in settings during future tests.

To interrupt the Hypoxic test, press the button . A pop-up window will appear on the screen, as shown in Figure 16.

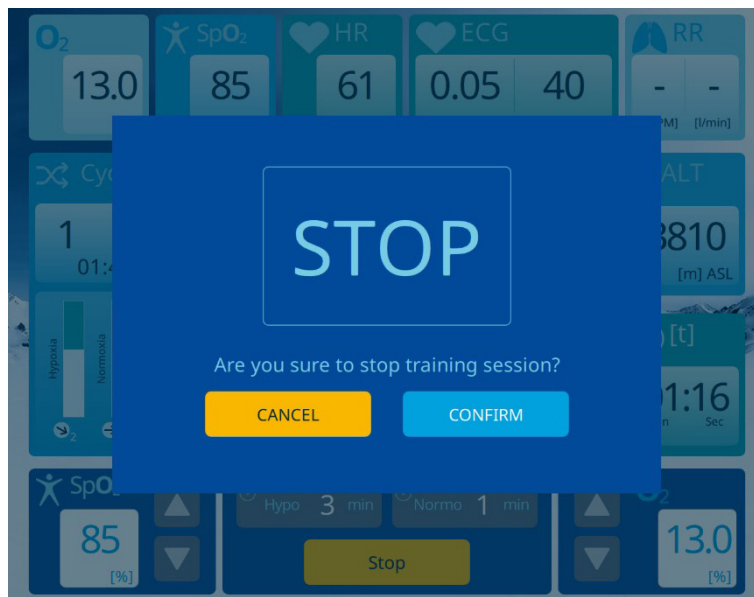


Figure 16 –Hypoxic test manual interruption



continue the Hypoxic test;



abort the Hypoxic test.

When aborting Hypoxic test, the screen shown in Figure 17 will appear.



Figure 17 –Hypoxic test abortion by operator

This screen shows “ABORTED BY OPERATOR” message and instructions for disconnecting the sensors and removing the face mask.

Use the buttons at the bottom of the screen to switch to other modes.

Messages and warnings

During the training session, the monitor might display the following messages:

- “Heart rate is too high” (Figure 18),
- “Heart rate is too low” (Figure 19).

These messages will trigger an audible alarm and activate the warning light indicator.

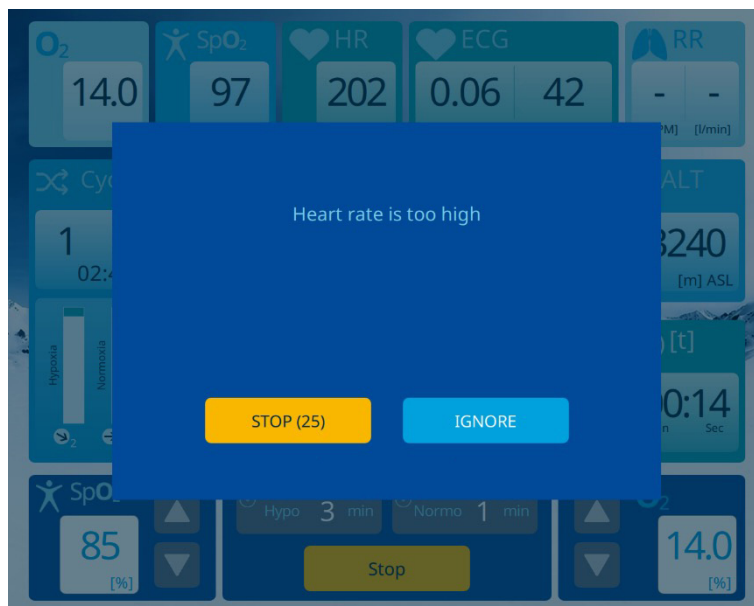


Figure 18 – “Heart rate is too high” message

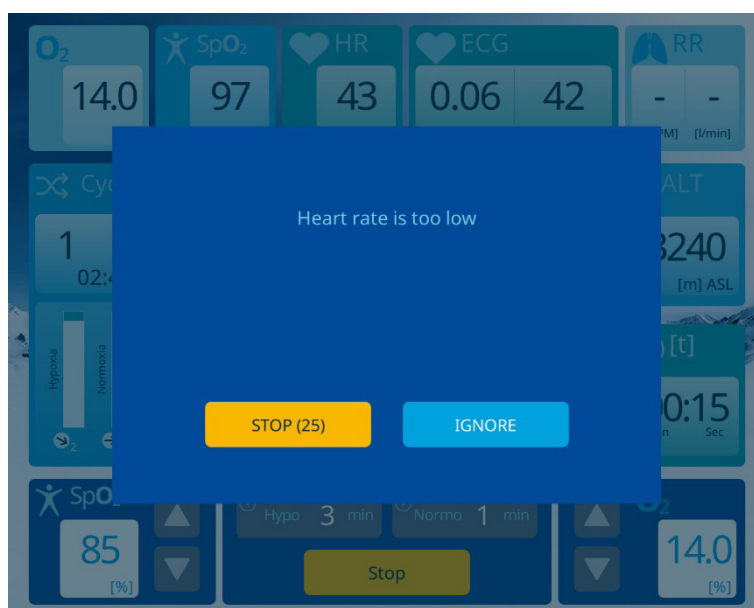


Figure 19 – “Heart rate is too low” message

STOP (25)

Hypoxic test mode will be stopped. The value in round brackets represents remaining time until automatic button activation (in seconds).

IGNORE

Hypoxic test will continue with a warning message displayed on the screen. The warning message is one of the following:

- “Warning. Heart rate higher than 200 beats per minute”;
- “Warning. Heart rate less than 45 beats per minute”.

Warning text is red.

At the end of the Hypoxic test, the screen shown in Figure 22 will appear. Actions depend on button selection.

Hypoxic test automatic abortion

If the Hypoxic test exceeds 40 minutes, the Device will switch to relaxing hyperoxia mode and display the pop-up window shown in Figure 20.



Figure 20 – Relaxing hyperoxia mode

After 3 minutes of relaxing hyperoxia or pressing the button **END RELAXATION PHASE**, the screen for automatic test interruption due to exceeding 40 minutes will appear (Figure 21).

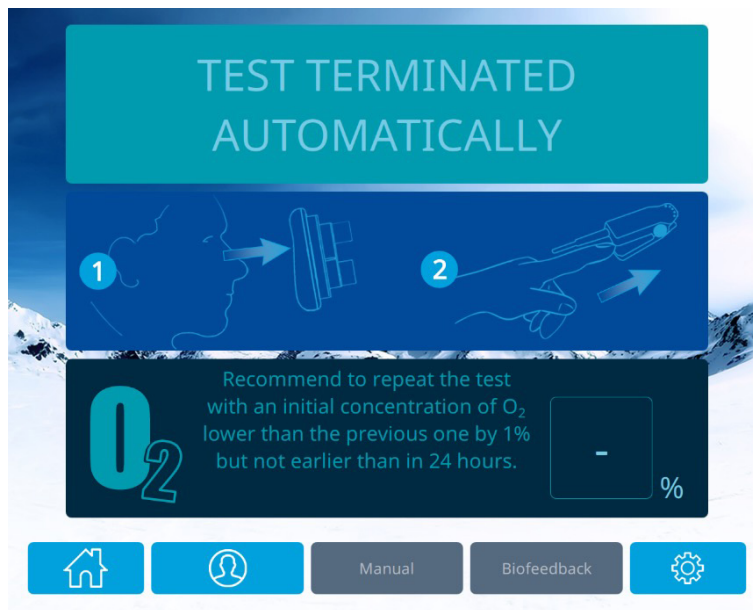


Figure 21 – Hypoxic test automatic abortion

Use the buttons at the bottom of the screen to switch to other modes.

Completion of the Hypoxic test

Upon successful completion of Hypoxic test, the screen in Figure 22 will appear. It will display the recommended O₂ concentration for the next training session.

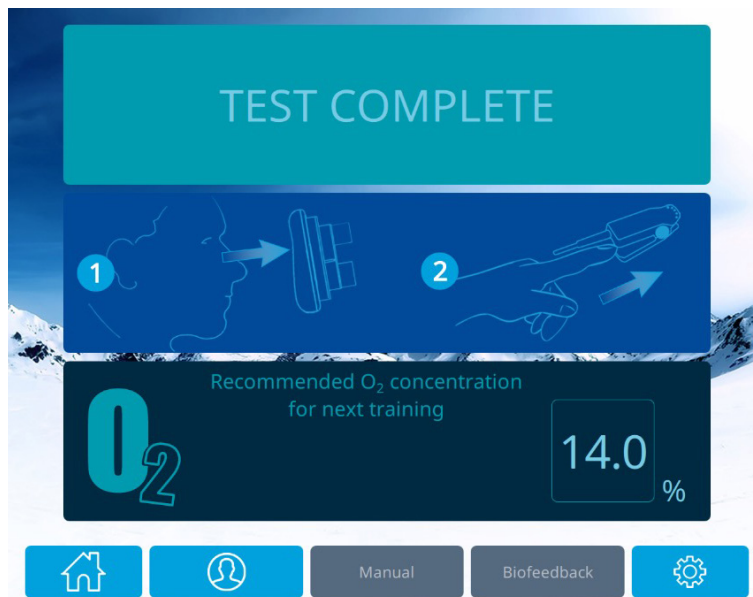


Figure 22 – Hypoxic test completion

Figure 23 shows the protocol screen for all Hypoxic test operations.

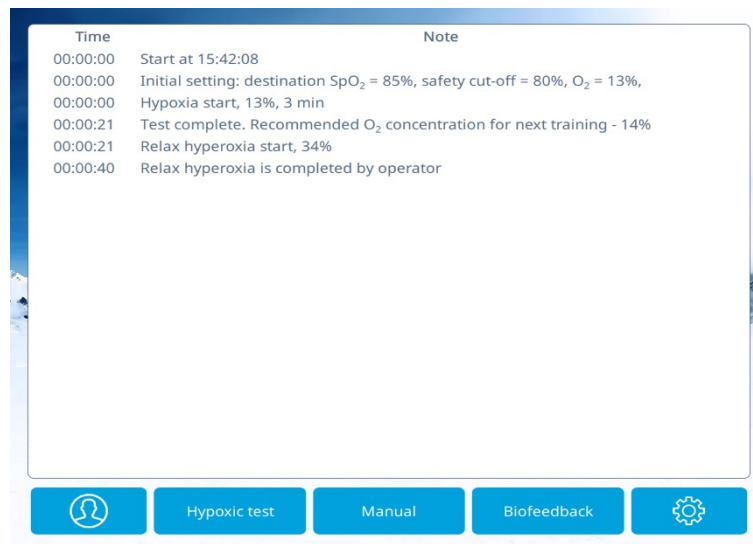


Figure 23 –Hypoxic test protocol

The protocol records all operations and results. These are saved in the database and linked to the user's full name.

Manual mode

This mode allows changing the training parameters during its process.

To switch to this mode, select the button **Manual** on the bottom line of the home screen (Figure 6).

Manual mode settings

After selecting this mode, a pop-up window will show the date of the last Hypoxic test (Figure 24). This Hypoxic test results will be used for automatic O₂ adjustment (Figure 25).

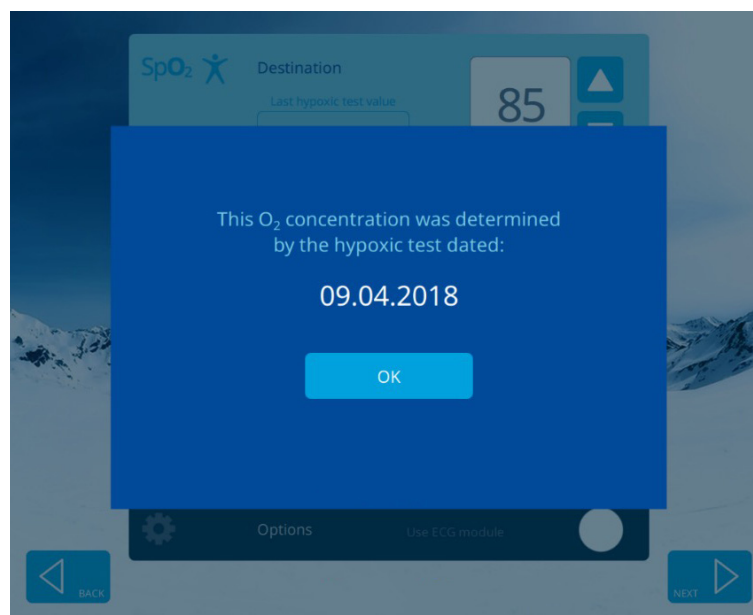


Figure 24 – Date of the previous Hypoxic test

Press the button **OK** to continue.

Use buttons **▲** / **▶** and **▼** / **◀** to increase or decrease parameter values.

Adjustable training parameters:

- SpO₂ safety cut-off. When this value is reached, the alarm indicator turns red and an alarm sound. At 85% value, the indicator color turns yellow. If the SpO₂ value entered exceeds 85%, the alarm indicator will always be red;
- number of training cycles. Each cycle consists of 2 phases: hypoxia and hyperoxia;
- parameters of the first hypoxic phase: oxygen concentration in the gas mixture and phase duration;
- selection of the second phase of the cycle: normoxia/hyperoxia and its duration.

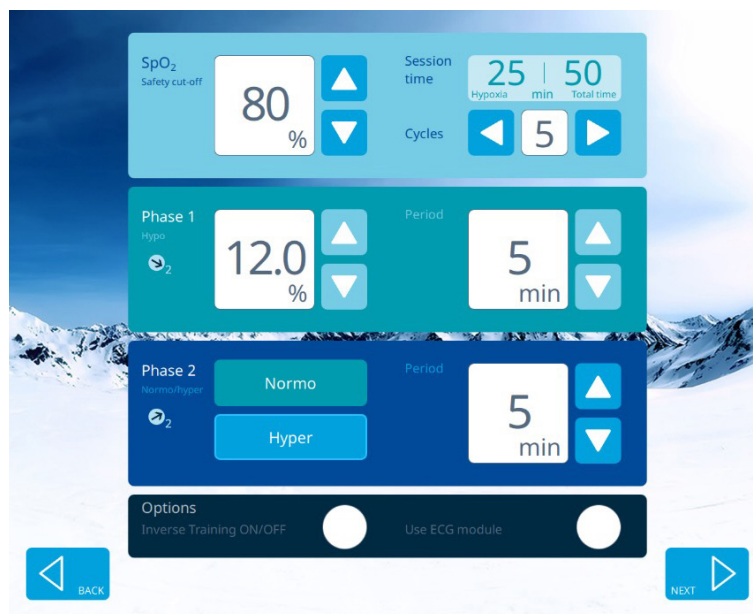


Figure 25 – Training setting

The total hypoxia duration and overall training time are calculated based on the set number of cycles and phase durations. Results are displayed in the upper right corner of the screen.

If the set SpO₂ value is below 85%, a message is displayed on the monitor (Figure 26).

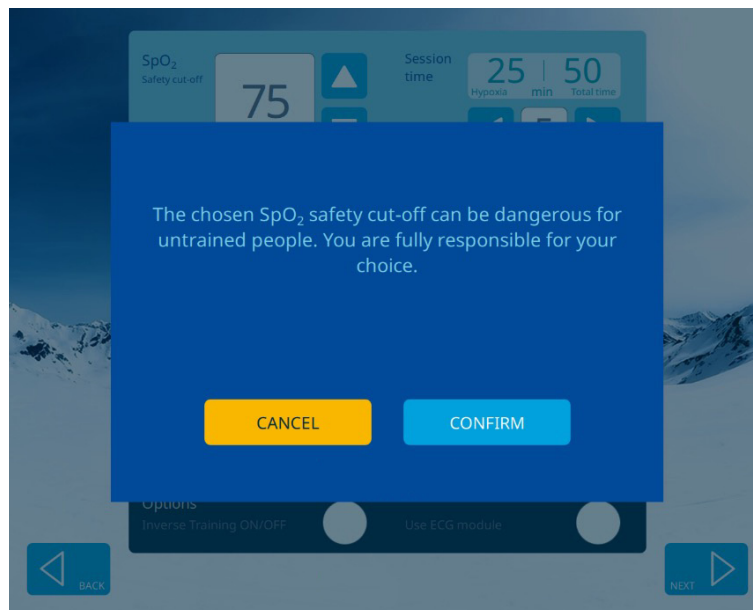


Figure 26 – Security SpO₂



cancel the entered value.



confirm the entered value.

Press the button



to transit to the preparation stage.

Preparation for the training

Special diagnostics are performed by the Device automatically when proceeding to the preparation stage. During the diagnostics, the following parameters are monitored:

- serviceability of the main components of the Device;
- operability of sound and light signaling systems.

If any error occurs during the diagnostics, training session execution is blocked.

Put on the face mask and install the pulse oximeter sensor as shown on the screen.

Upon correct installation:

- the pulse oximeter sensor will display the message “Sensor connected”;
- the indicators for the measurement channels of O₂ concentration and SpO₂ in the top line of the screen will be filled with blue (Figure 13).

If errors occur, the screen shown on Figure 14 is displayed.

Press



to proceed to the training.

Press



to return to the settings.

Manual mode training

The screen of the Manual mode is shown in the Figure 27.



Figure 27 – Manual mode training

The Device sequentially performs the phases of hypoxic-hyperoxic training according to the set parameters. The display shows all necessary information for monitoring the user's condition and training cycle phases.

The screen is divided into three sections:

- Top section: Current training parameters (O_2 concentration, SpO_2 , pulse rate).
- Middle section: Pulse and oxygen saturation graphs, current cycle info, phase duration, total training time, and altitude equivalent.
- Bottom section: Target training parameters (SpO_2 , O_2 concentration, phase durations).

During training session, the user can:

- adjust phase durations for hypoxia and hyperoxia;
- change SpO_2 values;
- modify O_2 concentration in the breathing mixture;
- change the time scale of the graphs (2, 5, 10, 30 min, 1, 2 hours);
- abort the training by pressing the button.

To change parameter values:

- press  to increase;
- press  to decrease.

Messages and warnings

During the training session, the monitor might display the following messages:

- “Heart rate is too high” (Figure 28),
- “Heart rate is too low” (Figure 29).

These messages will trigger an audible alarm and activate the warning light indicator.

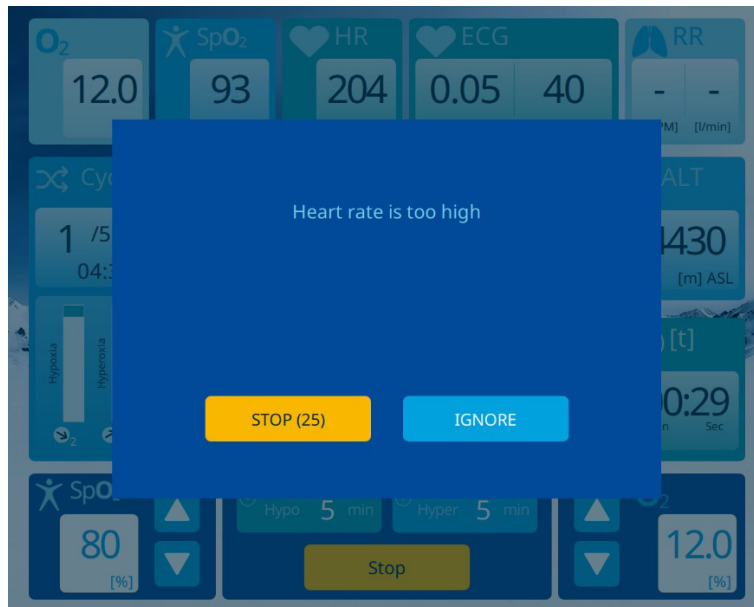


Figure 28 – “Heart rate is too high” message

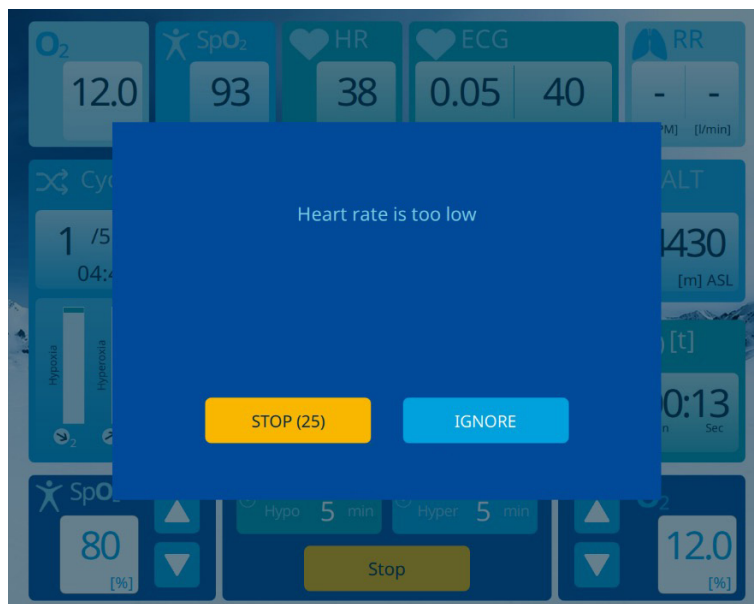


Figure 29 – “Heart rate is too low” message

STOP (25)

training session will be stopped. The value in round brackets represents remaining time until automatic button activation (in seconds).

IGNORE

training session will continue with a warning message displayed on the screen.

The warning message is one of the following:

- “Warning. Heart rate higher than 200 beats per minute”;
- “Warning. Heart rate less than 45 beats per minute”;

Warning text is red.

When aborting the training session, the screen shown in Figure 30 will appear.



Figure 30 – Training session abortion by operator

This screen shows “ABORTED BY OPERATOR” message and instructions for disconnecting the sensors and removing the face mask.

Use the buttons at the bottom of the screen to switch to other modes:



Home screen;



Repeat training session:



Settings.

Manual parameter's adjustment

Manual adjustment of hypoxic-hyperoxic training parameters is a key feature of this mode.

To adjust the hyperoxygenation duration, press the button  shown in Figure 27. The screen in Figure 31 will appear.

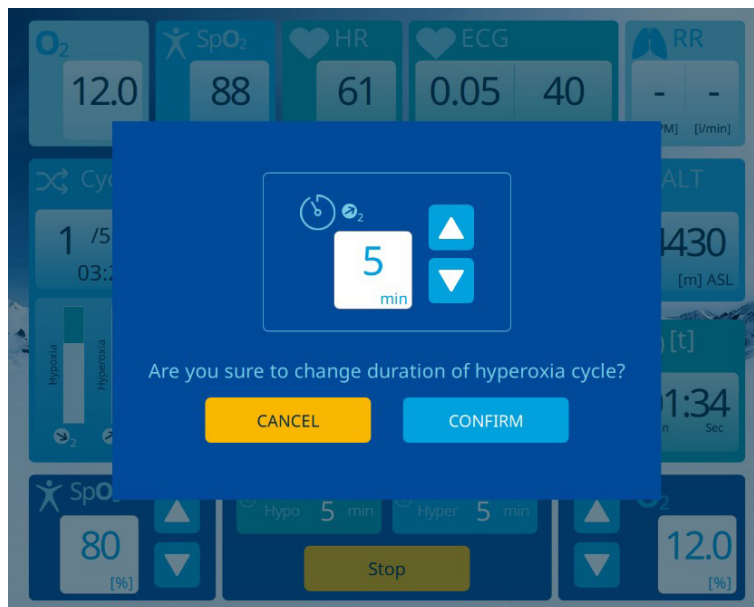


Figure 31 – Hyperoxia cycle length adjustment

To adjust the hypoxxygenation duration, press the button  shown in Figure 27. The screen in Figure 32 will appear.

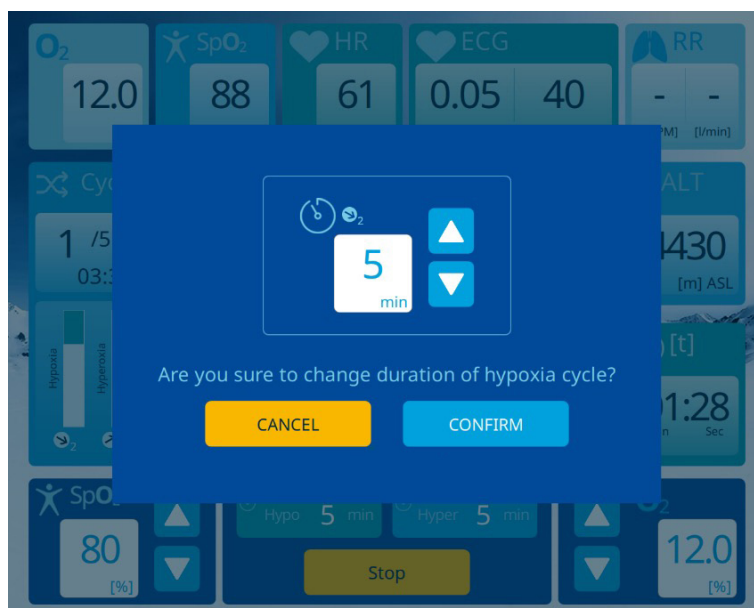


Figure 32 – Hypoxia cycle length adjustment

To adjust the oxygen concentration in the breathing mixture, press the ▲ or ▼ button at the bottom right of the screen (Figure 27). The screen in Figure 33 will appear.

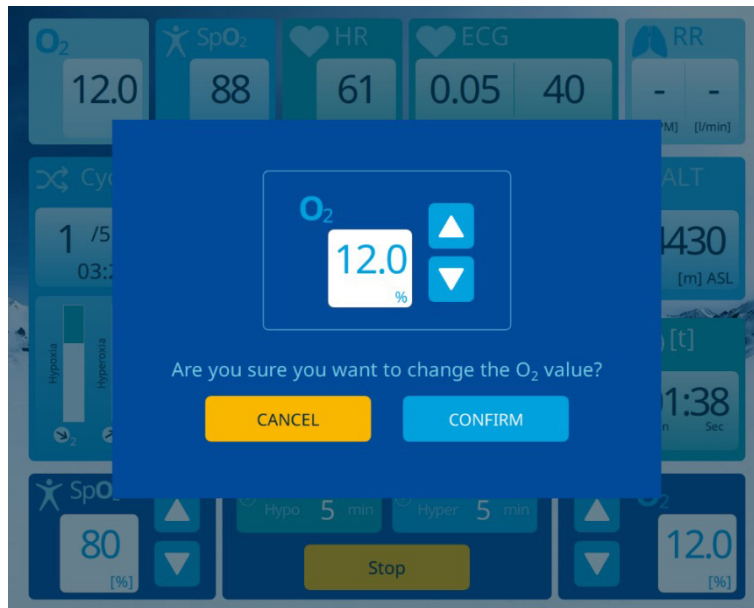


Figure 33 – O₂ concentration adjustment

To adjust the SpO₂ safety cut-off, press the ▲ or ▼ button at the bottom left of the screen (Figure 27). The screen in Figure 34 will appear.

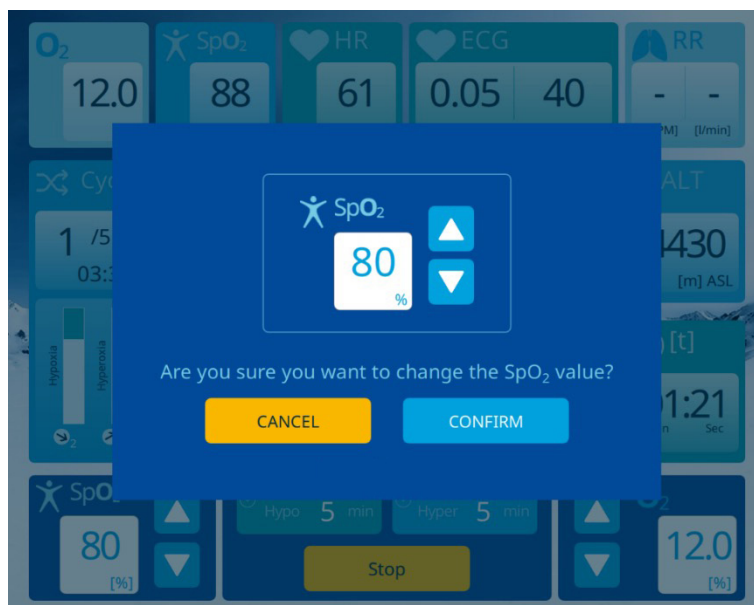


Figure 34 – SpO₂ safety cut-off adjustment

CANCEL

cancel the entered value.

CONFIRM

confirm the entered value.

Updated parameter values will appear on the training screen (Figure 27) after adjustments.

Training session manual abortion

To interrupt the training session, press the button . A pop-up window will appear on the screen, as shown in Figure 35.

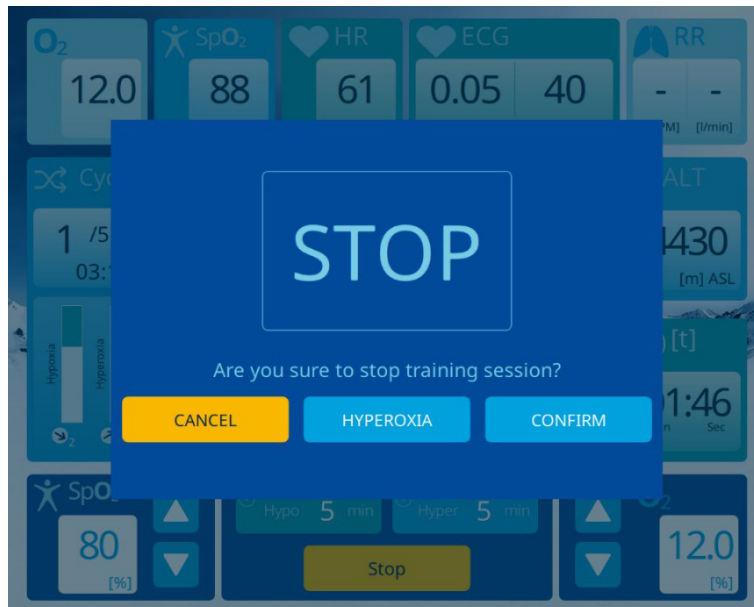


Figure 35 – Training abortion

	continue the training session,
	switch to relaxing hyperoxia,
	abort the training session.

Switching to relaxing hyperoxia displays the screen in Figure 36. Activate this mode when user needs a break. During this phase the O_2 concentration in the breathing mixture and SpO_2 values are displayed.



Figure 36 – Relaxing hyperoxia

Relaxation hyperoxia lasts for 3 minutes. Press **END RELAXATION PHASE** to abort this phase earlier if needed.

Recommendations

If SpO₂ level drops below SpO₂ safety cut-off value during training, the pop-up window in Figure 37 will appear.

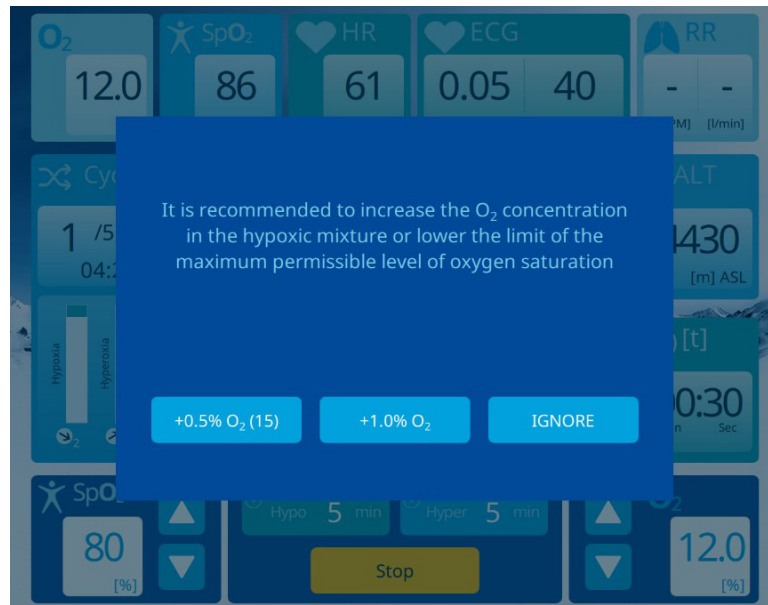


Figure 37 – Recommendation pop-up window

+0.5% O₂ (26)	increase oxygen concentration by 0.5%,
+1.0% O₂	increase oxygen concentration by 1.0%,
IGNORE	ignore the recommendation.

Training completion

At the end of all training cycles, the “TRAINING COMPLETE” notification is displayed on the monitor (Figure 38).

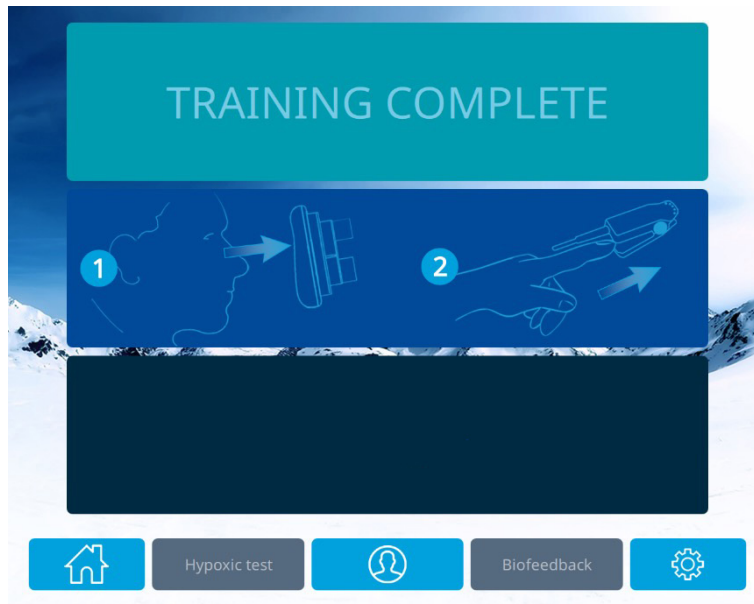


Figure 38 – Training completion

Use the buttons at the bottom of the screen to switch to other modes



Home screen;



Repeat training session;



Settings.

A protocol records all operations and results obtained during training session (Figure 39). This protocol is saved in the database and linked to the user's full name.

Time	Note
00:00:00	Start at 15:47:50
00:00:00	Initial setting: O ₂ = 12%, safety cut-off = 80%, mode = hyper, time: 1/1/2
00:00:00	Hypoxia start, 12%, 1 min
00:01:00	Hyperoxia start, 34%, 1 min
00:01:07	The operator changed the O ₂ concentration: 12.5%
00:02:00	The training is completed

Figure 39 – Training session protocol

Automatic (Biofeedback) mode

Unlike the manual mode, the automatic mode only allows adjustments to the duration of hypoxia and hyperoxia phases during training. All other parameters must be set before starting the exercise.

To switch to this mode, select the button **Biofeedback** on the bottom line of the home screen (Figure 6).

Automatic (Biofeedback) mode settings

After selecting this mode, a pop-up window will show the date of the last Hypoxic test (Figure 40). This Hypoxic test results will be used for automatic O₂ adjustment (Figure 41).

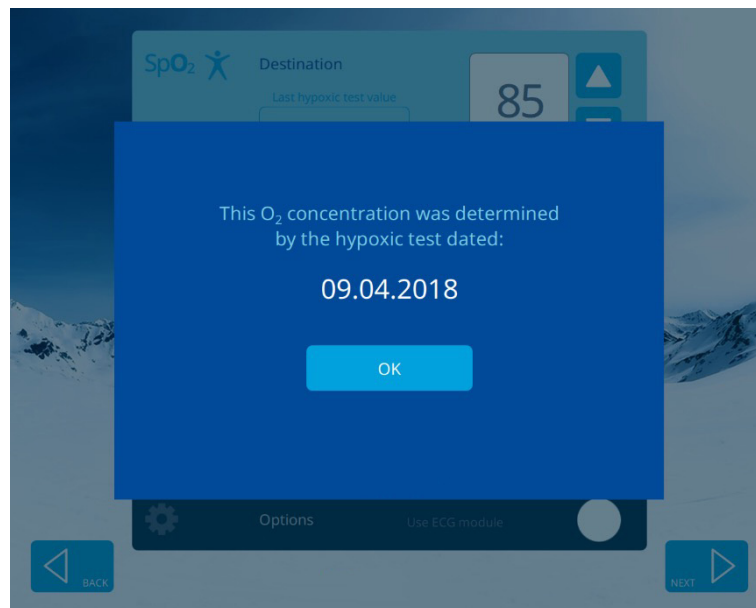


Figure 40 – Date of the previous Hypoxic test

Press the button **OK** to continue.

Use buttons **▲** / **▶** and **▼** / **◀** to increase or decrease parameter values.

Adjustable training parameters:

- SpO₂ target value. This value will be reached and maintained by the Device during the hypoxia phase of the training;
- number of training cycles. Each cycle consists of 2 phases: hypoxia and hyperoxia;
- parameters of the first hypoxic phase: oxygen concentration in the gas mixture and phase duration;
- selection of the second phase of the cycle: normoxia/hyperoxia and its duration.

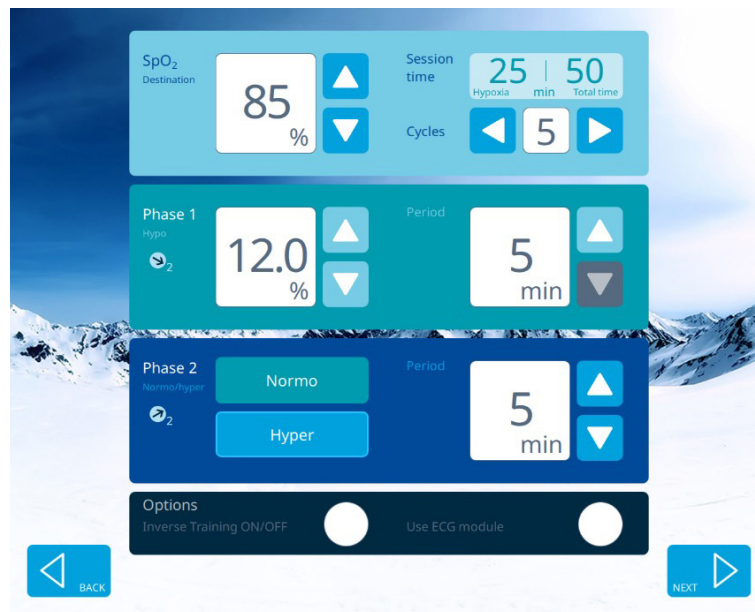


Figure 41 – Automatic (Biofeedback) mode settings

The total hypoxia duration and overall training time are calculated based on the set number of cycles and phase durations. Results are shown in the upper right corner of the screen.

Press the button  to transit to the preparation stage.

Preparation for the training

Special diagnostics are performed by the Device automatically when proceeding to the preparation stage. During the diagnostics, the following parameters are monitored:

- serviceability of the main components of the Device;
- operability of sound and light signaling systems.

If any error occurs during the diagnostics, training session execution is blocked.

Put on the face mask and install the pulse oximeter sensor as shown on the screen

Upon correct installation:

- the pulse oximeter sensor will display the message “Sensor connected”;
- the indicators for the measurement channels of O_2 concentration and SpO_2 in the top line of the screen will be filled with blue (Figure 13).

If errors occur, the screen shown on Figure 14 is displayed.

Press  to proceed to the training.

Press  to return to the settings.

Automatic (Biofeedback) mode training

The screen of the Automatic (Biofeedback) mode is shown in the Figure 42

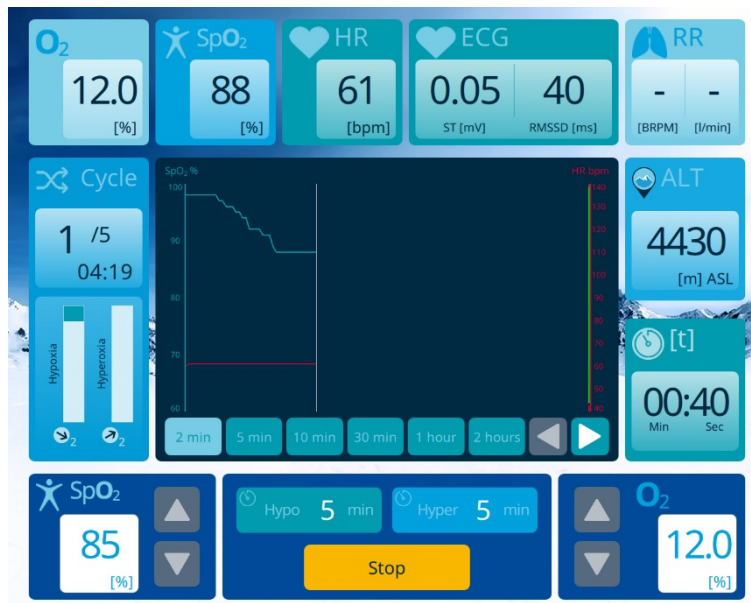


Figure 42 – Automatic (Biofeedback) mode training

The Device sequentially performs the phases of hypoxic-hyperoxic training according to the set parameters. The display shows all necessary information for monitoring the user's condition and training cycle phases.

The screen is divided into three sections:

- Top section: Current training parameters (O_2 concentration, SpO_2 , pulse rate).
- Middle section: Pulse and oxygen saturation graphs, current cycle info, phase duration, total training time, and altitude equivalent.
- Bottom section: Target training parameters (SpO_2 , O_2 concentration, phase durations).

During training session, the user can:

- adjust phase durations for hypoxia and hyperoxia;
- change the time scale of the graphs (2, 5, 10, 30 min, 1, 2 hours);
- abort the training by pressing the button  .

Messages and warnings

During training, messages and warnings are displayed on the screen.

- “Heart rate is too high: (Figure 43),
- “Heart rate is too low” (Figure 44).

These messages will trigger an audible alarm and activate the warning light indicator.

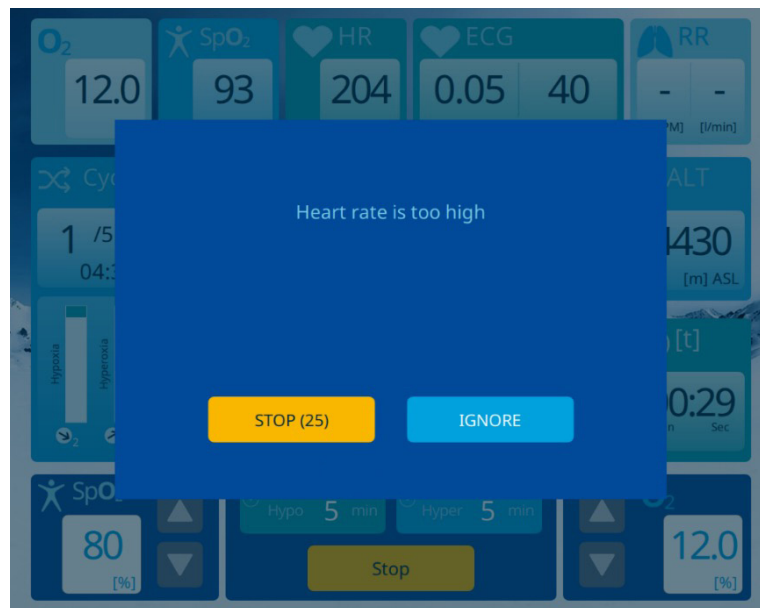


Figure 43 – “Heart rate is too high” message

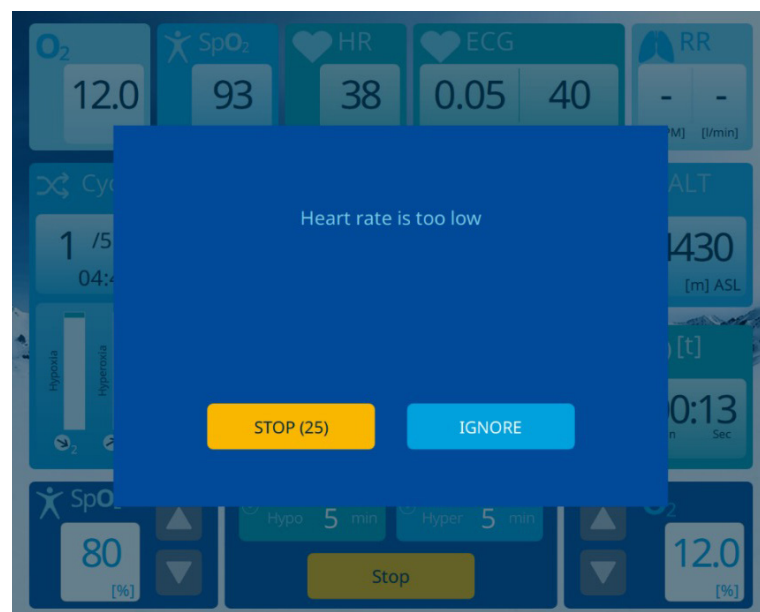


Figure 44 – “Heart rate is too low” message

STOP (25)

training session will be stopped. The value in round brackets represents remaining time until automatic button activation (in seconds).

IGNORE

training session will continue with a warning message displayed on the screen. The warning message is one of the following:

- “Warning. Heart rate higher than 200 beats per minute”;
- “Warning. Heart rate less than 45 beats per minute”;

Warning text is red.

When aborting the training session, the screen shown in Figure 30 will appear.

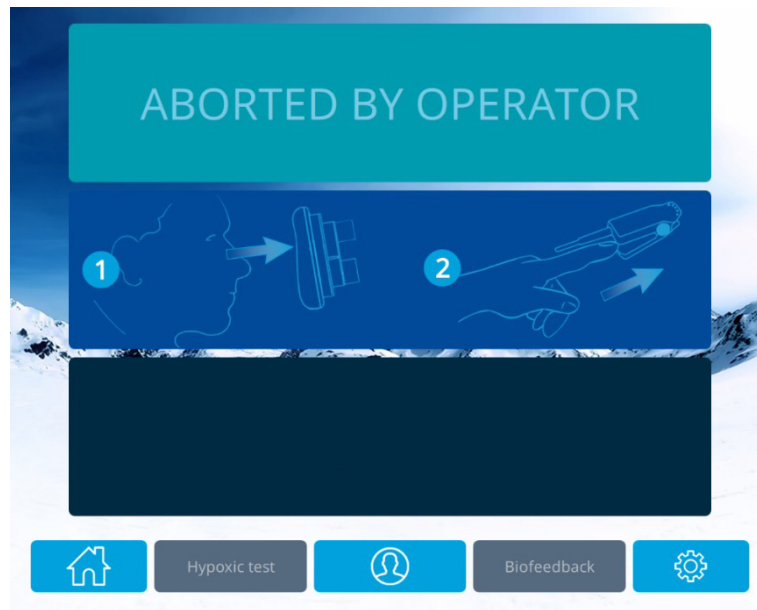


Figure 45 – Training session abortion by operator

This screen shows “ABORTED BY OPERATOR” message and instructions for disconnecting the sensors and removing the face mask.

-  Home screen;
-  Repeat training session;
-  Settings.

Parameter's adjustment

Automatic (Biofeedback) mode allows adjustment of the duration of hypo- and hyperoxygenation.

To adjust the hyperoxygenation duration, press the button  shown in Figure 42. The screen in Figure 46 will appear.

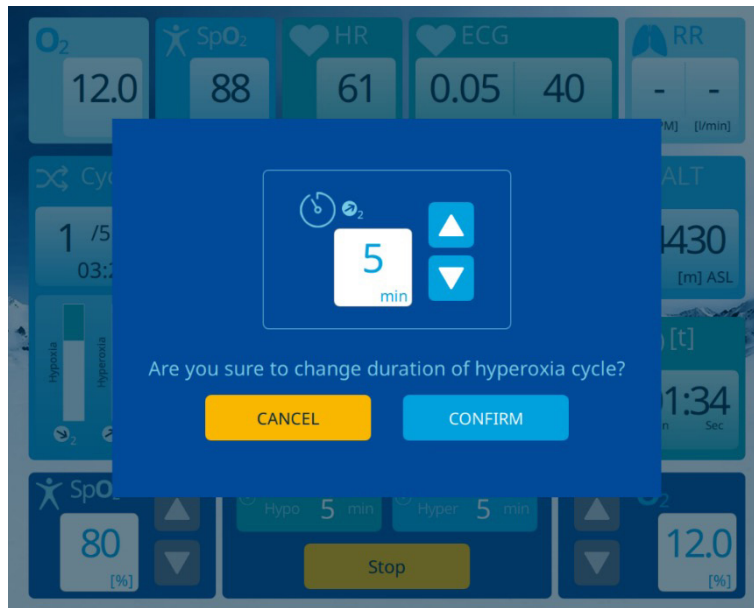


Figure 46 – Hyperoxia cycle length adjustment

To adjust the hypoxxygenation duration, press the button  shown in Figure 42. The screen in Figure 47 will appear.

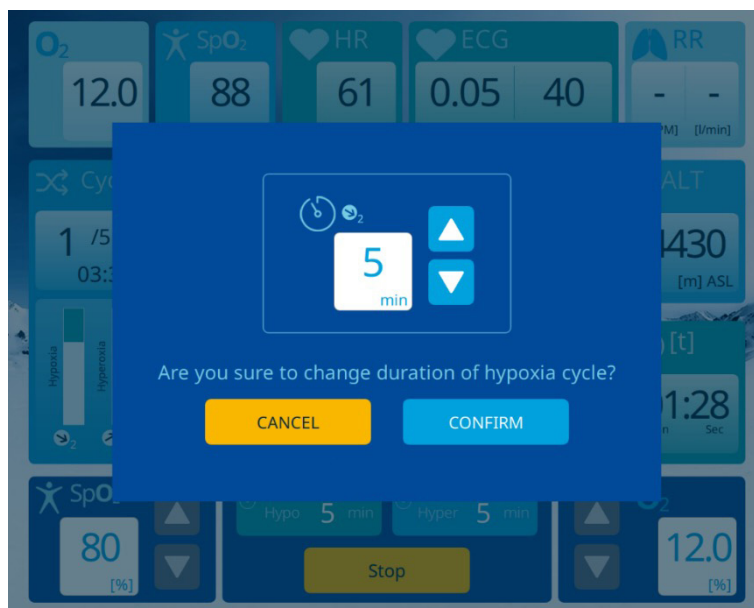


Figure 47 – Hypoxia Cycle Duration Setting

Use buttons  and  to make adjustments.

 cancel the entered value.

 confirm the entered value.

Updated parameter values will appear on the training screen (Figure 42) after adjustments.

Training session manual abortion

To interrupt the training session, press the button . A pop-up window will appear on the screen, as shown in Figure 48.

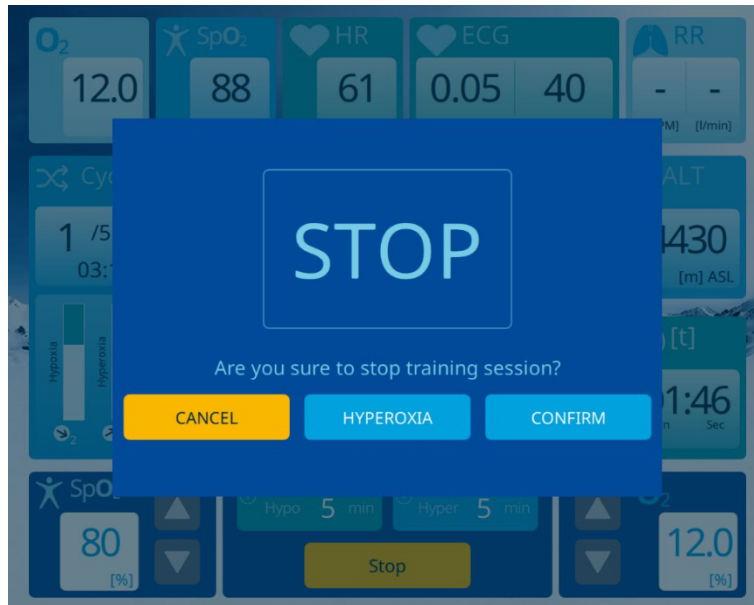


Figure 48 – Training abortion

	continue the training session;
	switch to relaxing hyperoxia;
	abort the training session.

Switching to relaxing hyperoxia displays the screen in Figure 49. Activate this mode when user needs a break. During this phase the O₂ concentration in the breathing mixture and SpO₂ values are displayed.



Figure 49 – Relaxing hyperoxia

Relaxation hyperoxia lasts for 3 minutes. Press **END RELAXATION PHASE** to abort this phase earlier if needed.

Training completion

At the end of all training cycles, the “TRAINING COMPLETE” notification is displayed on the monitor (Figure 51).

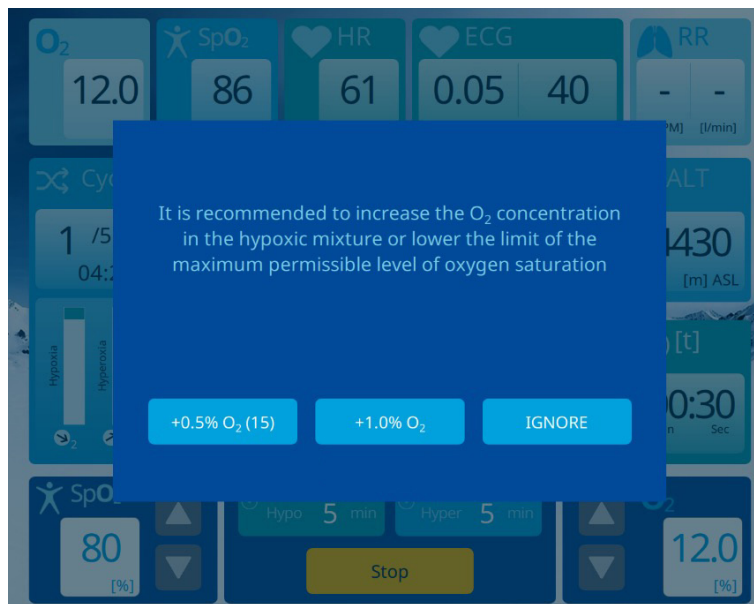


Figure 50 – Recommendation pop-up window

Use the buttons at the bottom of the screen to switch to other modes:



Home screen,



Repeat training session,



Settings.

A protocol records all operations and results obtained during training session (Figure 52). This protocol is saved in the database and linked to the user's full name.



Figure 51 – Results protocol of training

Turning off the Device

1. Ensure that the training session is complete.
2. Remove the face mask and pulse oximeter sensor.
3. Turn off the Device using the “On/Off” switch (Figure 4). The built-in indicator will turn off.

7. MAINTENANCE

7.1 Regular maintenance is crucial. Failure to maintain can cause malfunctions and pose health risks.

7.2 Only authorized personnel are permitted to perform repairs. Unauthorized repairs may damage the Device and cause health hazards.

7.3 Report any faults to the Manufacturer immediately.

7.4 Inspect the Device before use, every 6 months, and after repairs or upgrades.

Only qualified personnel should perform this inspection. During the inspection:

7.4.1 Check that operating conditions and power source are correct.

7.4.2 Inspect the Device and accessories for any damage.

7.4.3 Ensure all power cords are intact and undamaged.

7.4.4 Use recommended accessories only.

7.4.5 Verify the Device is in good working condition.

7.5 Current Repair:

7.5.1 Current repairs must be done by trained personnel only. Replace faulty components with new ones. Use on-screen information for diagnostics.

7.5.2 Report any faults immediately to the service center or Manufacturer.

7.5.3 Users must not attempt repairs. Only authorized service center or Manufacturer personnel are allowed to perform repairs.

8. SANITATION

8.1 Clean the Device and accessories regularly. Follow these rules to avoid damage:

8.1.1 Dilute reagents as recommended or use the lowest concentrations.

8.1.2 Do not immerse the Device or its parts in liquid.

8.1.3 Do not spill liquid on the Device or accessories.

8.1.4 Do not use abrasive materials or cleaners that can damage plastic surfaces.

8.2 Clean the Device regularly according to facility standards.

8.3 Recommended cleaning agent: diluted sodium hypochlorite.

8.4 Cleaning procedure:

8.4.1 Turn off and unplug the Device.

8.4.2 Clean the display with a soft cloth and glass cleaner.

8.4.3 Wipe external surfaces with a soft cloth and cleaner.

8.4.4 Remove any remaining cleaner with a dry cloth.

8.4.5 Allow the Device to dry in a ventilated area.

8.5 Disinfection:

8.5.1 Disinfection may damage the Device. Perform disinfection according to the facility's maintenance schedule.

8.5.2 Clean the Device before disinfection.

8.5.3 Wipe external surfaces with a wrung-out gauze pad moistened with a 3% hydrogen peroxide solution.

9. PACKAGING, STORAGE, TRANSPORTATION

9.1 Packaging:

9.1.1 Packaging should protect the Device from mechanical and environmental damage and facilitate handling. Custom packaging is allowed with consumer approval.

9.1.2 Technical documentation must be enclosed in a sealed envelope, plastic bag, or paper wrap.

9.2 Storage:

9.2.1 Store the Device in its original packaging during the warranty period.

9.2.2 Store the Device away from direct sunlight, moisture, temperature extremes, dust, active chemicals, precipitation, ammonia, or corrosive gases and environments. Keep the temperature between +5°C and +40°C and relative humidity of up to 80%.

9.2.3 If needed, store on shelves in a single row. Adhere to handling instructions on the packaging.

9.3 Transportation:

9.3.1 Transport the Device in covered vehicles in accordance with relevant cargo regulations.

9.3.2 During transportation, maintain temperatures from -40 °C to +50 °C and humidity below 95% (without condensation).

10. DISPOSAL

10.1 If the Device is no longer repairable or suitable for use, dispose of it according to applicable regulations. Ensure compliance with all legal and technical requirements for disposal.

10.2 Criteria for Device End-of-Life:

10.2.1 The Device can no longer be safely used.

10.2.2 The Device's lifespan is exhausted, and repair is economically unfeasible.

11. MANUFACTURER'S WARRANTY

11.1 The warranty lasts for 12 months from the date of acceptance.

11.2 The Manufacturer guarantees the Device meets technical specifications if the transportation, operation, and storage instructions are followed.

11.3 Opening the Device voids the warranty. The Manufacturer will not accept claims for:

11.3.1 Mechanical damage.

11.3.2 Improper use.

11.3.3 Software damage caused by malware.

11.3.4 Foreign objects, liquids, animal waste, or insects inside the Device.

11.3.5 Issues caused by external power or connected equipment faults.

11.3.6 Damaged seals, stickers, or signs of unauthorized repair.

11.4 The Device has no user-serviceable parts. Repairs must be conducted by the Manufacturer or an authorized service center.

11.5 Free repairs are available during the warranty period for Device faults. The Manufacturer or an authorized service centers handle transportation of the faulty Device to the Manufacturer or the authorized service center.

APPENDIX

Figure A1 shows the Device's exterior: (a) front view and (b) rear view.

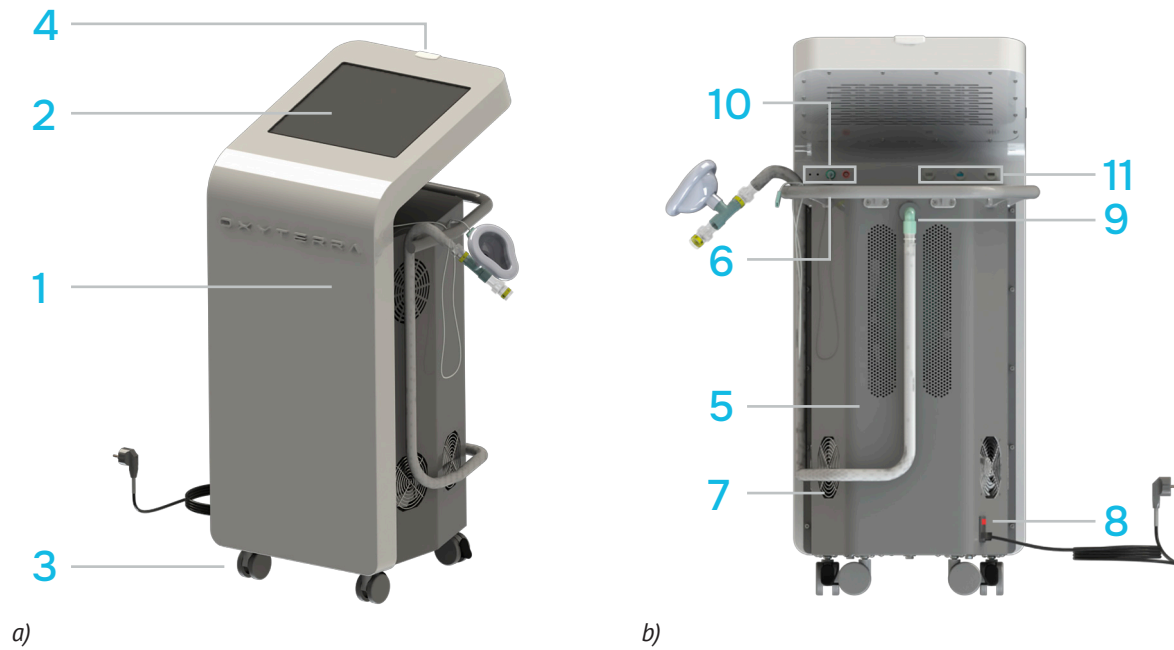


Figure A 1 – Device:

1 – body; 2 – display; 3 – swivel wheels; 4 – alarm indicator light; 5 – enclosure; 6 – handrail; 7 – fan; 8 – “On/Off” switch with built-in indicator; 9 – breathing hose connector; 10 – measurement channels sensors connectors; 11 – external devices connectors

