



emea

iCall  
Acoustic call unit



## Copyright

This document may not be copied in whole or in part or otherwise reproduced without prior written consent from IndigoCare Europe, except where specifically permitted under international copyright law.

## Disclaimer

The information in this document is subject to change without notice. IndigoCare Europe assumes no responsibility for inaccuracies or omissions and specifically disclaims any liabilities, losses, or risks, personal or otherwise, incurred as a consequence, directly or indirectly, of the use or application of any of the contents of this document. For the latest documentation, contact IndigoCare Europe.

This publication may contain examples of screen captures and reports or database used in daily operations. Examples may include fictitious names of individuals and companies. Any similarity to names and addresses of actual businesses or persons is entirely coincidental.

All examples of patient information in this document are fictitious. Any resemblance to a real patient or facility is purely coincidental. The owners and users of this product are solely responsible for complying with all applicable patient information laws. The users, by their use of this product, agree to indemnify the manufacturer and/or seller of this product against all claims, litigation, and suits filed for patient information violations.

## Intended use

Use this product only for the purpose it was designed for; refer to the data sheet and user documentation for details. For the latest product information, contact IndigoCare Europe. This Acoustic call guide is a working and supporting tool for certified engineers for installing and maintaining iCall installations.

## Contact information

### IndigoCare Europe BVBA

Schoebroekstraat 48

3583 Paal

Belgium

T +32 11 247090

[emea@indigocare.com](mailto:emea@indigocare.com)

[www.indigocare.com](http://www.indigocare.com)

# Revision history

Date	Revision	Description
2019-04-30	1.0	First version

# Index

<b>1. Introduction.....</b>	<b>5</b>
<b>2. Description .....</b>	<b>5</b>
2.1. LED.....	6
2.2. Microphone opening.....	7
2.3. The magnetic interface.....	7
2.4. Disable input.....	7
<b>3. Working principle .....</b>	<b>8</b>
3.1. Measurement .....	8
3.2. Basic conditions .....	9
3.3. Detailed conditions.....	9
3.4. Calibration .....	10
<b>4. Hardware installation .....</b>	<b>11</b>
4.1. Wiring .....	11
4.2. Installation location.....	11
4.3. Registration button.....	12
<b>5. Software installation.....</b>	<b>13</b>
5.1. Webpage.....	14
5.2. Nurse station (iCall 290 SIP-Touch) .....	15

# 1. Introduction

---

The iCall 341 LB-Acoustic Call (NWBAES2401) unit continuously monitors sound levels in a room and launches an alarm if certain audio thresholds are crossed during a certain time. The audio threshold and length can be modified easily and can be configured for a patient's specific needs and different room layout.

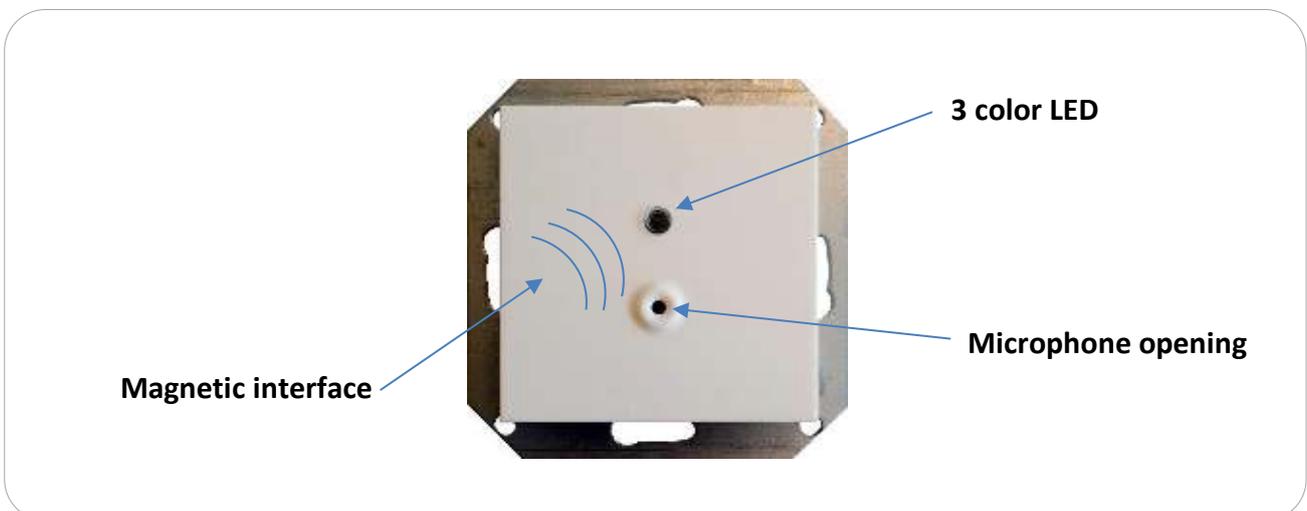


# 2. Description

---

The unit consists of 4 important parts:

- 3 color LED
- Microphone opening
- Magnetic interface
- Input 1



## 2.1. LED

### Red Led

- The red LED indicates that the room is in **CALL** state.

If the red LED is on, the room is in call state and the acoustic measurement is thereby halted. Nursing staff will be informed. In this state there's no analysis of the sound level anymore.

### Green Led

- The green LED indicates that the room is in **PRESENT** state or that the acoustic measurement is currently halted for a specific **TIMEOUT**.

If the green LED is permanently on, the room is in present state and the acoustic measurement is thereby halted. In this state there's no analysis of the sound level anymore. When the state of the room is changed to IDLE state, the measurement will continue after a certain predefined time (timeout). This short measurement interruption is implemented in order to leave the room safely, without triggering the acoustic unit, after a call has been cancelled.

The green LED flashes (2.5Hz) to indicate the timeout before the acoustic measurement is reactivated. This means that the button is in idle state, but that you still have some time before the acoustic measurements will start again.

### Yellow Led

- The yellow LED indicates the **crossing of the configured threshold level** during the measurement.

Each time a measurement sample crosses the configured threshold level, the yellow LED will go on. If the yellow LED stays illuminated for the configured time, an 'acoustic call' will be launched. If this LED is flashing during operation, it displays a visual feedback when the configured threshold level has been crossed. On one hand this can help you find the right setting for the acoustic unit, and on the other hand it indicates that the measurement is running and therefore the button is activated.

The yellow LED indicator can be turned off in the website, if the yellow LED is disabled only the red and green indicators will work.

## 2.2. Microphone opening

The microphone opening is an opening in the plastic of the button for the sound to reach the **microphone**. Don't cover this hole and don't put anything in front of it. Make sure there's a direct path from the source (patient) to the microphone opening.

## 2.3. The magnetic interface

The magnetic interface can be used to start a **calibration** of the unit. Each time a magnet is swiped in front of the button the calibration will be executed. More info can be found in the calibration chapter.

## 2.4. Disable input

Input contact 1 is used to **enable or disable** the acoustic measurement. It can be used to temporarily disable the acoustic measurement, for example when cleaning staff or other personnel enters the room and don't want to trigger an unwanted acoustic call while executing their tasks. They can locally disable the acoustic unit while they are working and enable it again when they are done.

To enable this function make a connection between the 24V and Input 1. Opening the connection will reactivate the acoustic measurement.



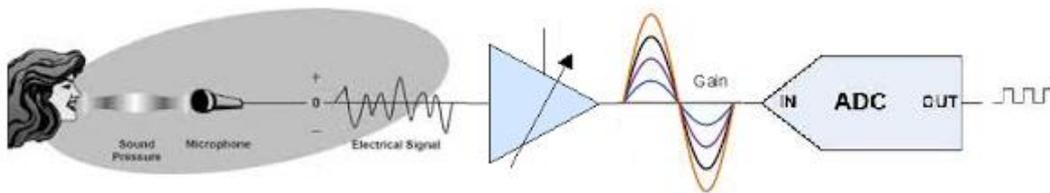
Open	Acoustic unit enabled
Closed	Acoustic unit disabled

<u>Connection</u>	<u>Type</u>	<u>Function</u>
1	+24V DC output	Common for input or output
2	Output 1	Call indicator
3	Output 2	Future use
4	Input 1	Enable / Disable (normal open contact)
5	Input 2	Future use
6	+24V DC output	Common for input or output

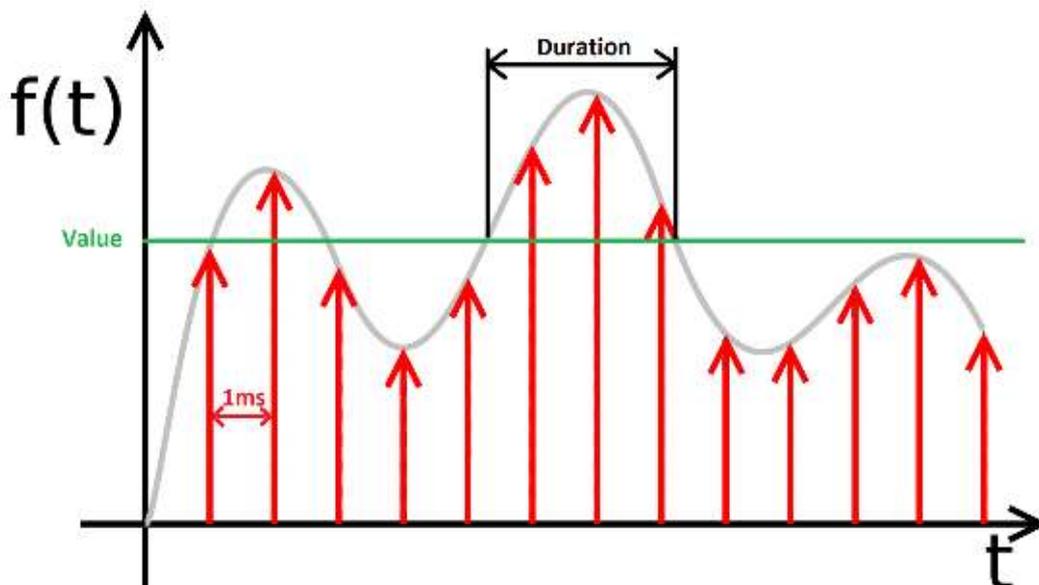
## 3. Working principle

### 3.1. Measurement

A microphone is picking-up the sound in the environment. This signal is amplified, filtered and sampled by a microcontroller. In the software of the microcontroller this processed signal is then analyzed and compared to a predefined set of conditions in order to evaluate if an acoustic call needs to be triggered.



Below graphic displays an example of such a signal entering the microcontroller together with some evaluation parameters set by the configuration.



## 3.2. Basic conditions

The sound level should be above a certain value during a certain time in order to trigger an acoustic call. However, this is just a basic description of the conditions that need to be fulfilled in order to trigger a call. The technique implemented to evaluate the audio signal is a bit more complex. We advise you to go through the more detailed description of this technique so you can avoid any issues.

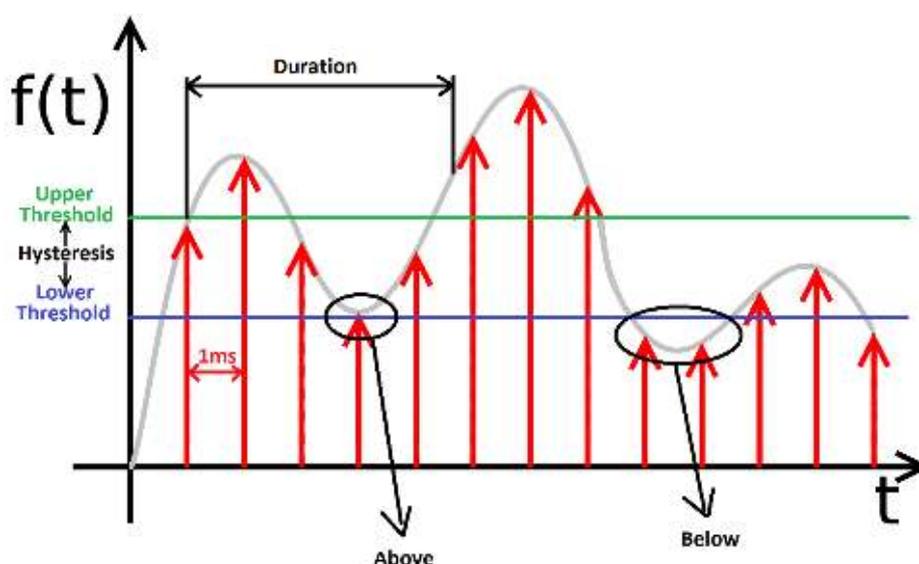
The unit has an integrated gain adjustable amplifier, which is capable of both reducing or amplifying the signal and therefore scales the loudness of the captured sound in the environment.

The signal produced by this amplifier is then sampled by the microcontroller and evaluated by the following post-processing technique.

## 3.3. Detailed conditions

The sound level should be above a certain upper threshold value and may not drop below a certain lower threshold value during a certain period of time in order to trigger an acoustic call. This method uses two threshold values, an **upper threshold** and a **lower threshold** value. The **hysteresis** designates the gap between these two threshold values.

This technique evaluates each sample. Once a sample is above the upper threshold value, a timer starts running as long as the next sample does not drop below the lower threshold value. If this timer reaches the duration set by the software, an acoustic call is launched. The timer resets when the sample drops below the lower threshold.



The upper and lower threshold are fixed and cannot be configured. Only the amplifier gain and duration time can be changed by the user.

The yellow LED provides visual feedback. This LED will illuminate as long as the timer is running. It will deactivate once the timer is reset, i.e. the signal drops below the lower threshold value.

By using this method, the energy of an audio signal will not have a direct impact on the activation of the call. A captured sample slightly above the upper threshold has the same acoustic value as a very loud captured sample. For that very loud signals, for example slamming doors or thunder, will not activate the acoustic call because the duration is not long enough.

## 3.4. Calibration

Because each room has different acoustic characteristics and ambient noise there is a calibration function implemented. This function will capture sound samples for 2 seconds and calculate the average acoustic background value. This averaged value is stored and used as a **zero point for all measurements**.

By using this zero point the unit is capable of making a relative measurement independent of the ambient noise in the room.

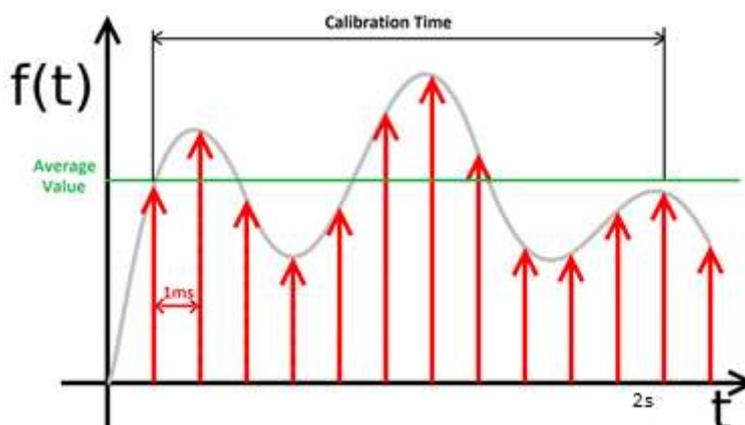
Keep in mind that it is important not to add any noise during these 2 seconds of calibration time because this will replace the zero point for all subsequent measurements.

We advise you to re-calibrate the unit:

- The first time a unit is installed.
- Each time the amplifier value is modified (automatically).
- Each time a unit is relocated.
- Each time (new) noise producing elements are placed in the room.

### **Note**

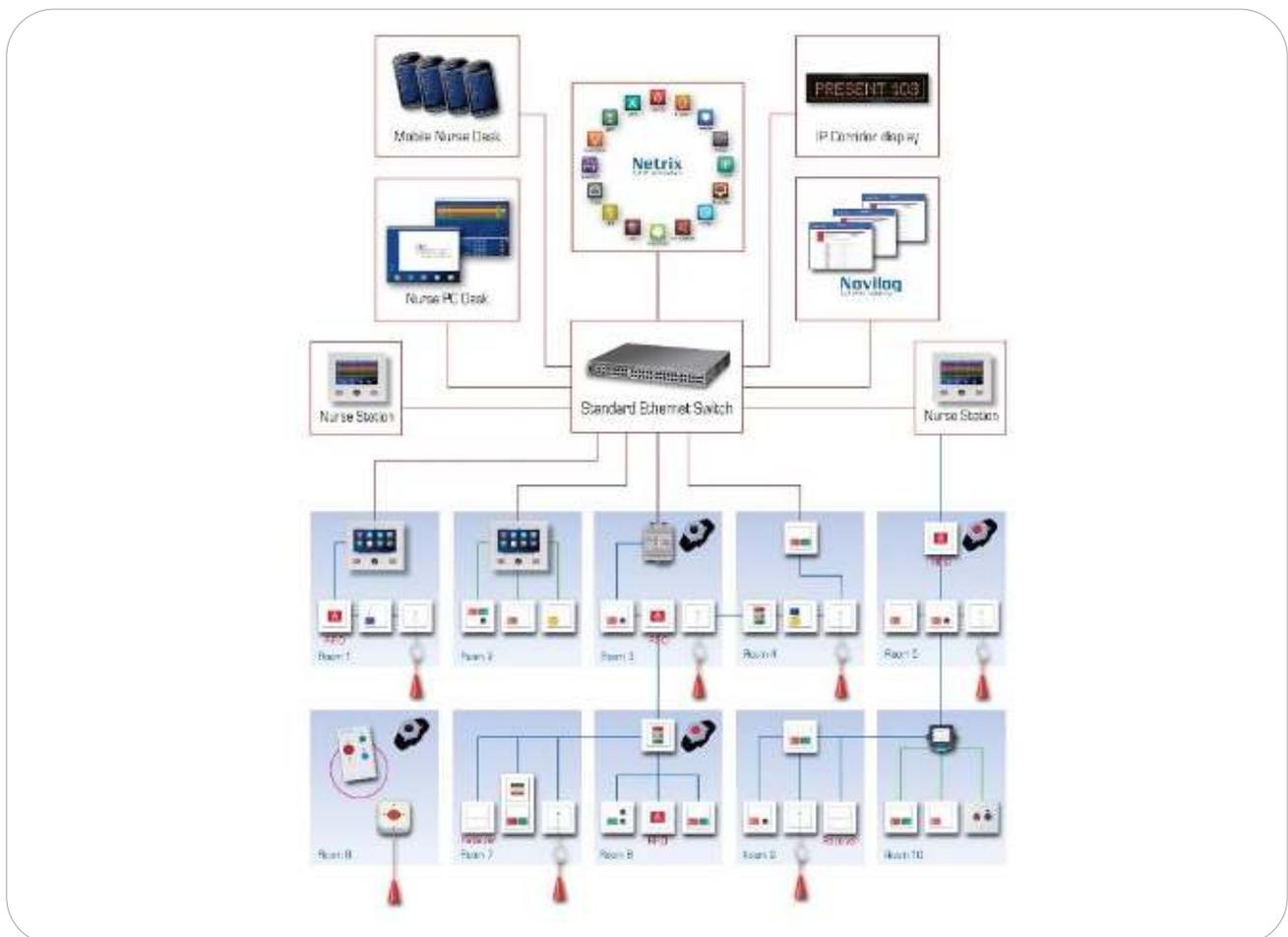
***The unit will not operate correctly if it is not calibrated properly!***



## 4. Hardware installation

### 4.1. Wiring

The installation and field wiring is straightforward and the same as other iCall Local Bus products. The iCall 341 LB-Acoustic Call unit is a Local Bus address unit with a 4-wire connection (+, -, T, R).



### 4.2. Installation location

Regarding the **installation location** in the room, we advise the following:

- Don't cover the sound hole of the unit nor put anything directly in front of it.
- Make sure there is a direct path from the source (patient) to the microphone opening.
- Do not install the unit nearby any noise source, like a heart monitor, ventilators or other noise producing elements.

## 4.3. Registration button

The registration button has 3 different functions:

- Registering the acoustic call unit on iCall IP-unit
- Setting the button in search mode
- Rebooting the button

### **Registering**

When pressing the button between **0 < t < 5 seconds** the unit will **register** itself on the IP-unit.

The LED will start blinking with the following rhythm from the moment the button is pressed:

***0.25s ON ---- 0.05s OFF ---- 0.25s ON ---- 0.05s OFF***

The local bus communication, and thus the address registration request will not start immediately after the button is pressed, but only after the button is released in less than 5 seconds.

If the registration is successful, the unit should now appear in the addresses list of the IP-unit. If you keep the button pressed, the unit will pass into search mode.

### **Search mode**

When pressing the button between **5 < t < 12 seconds** the unit will enter **search mode**. You will notice this by seeing the LED go from registering rhythm (slow) to search rhythm (fast). The LED will start blinking with the following rhythm from the moment the button is pressed:

***0.05s ON ---- 0.05s OFF ---- 0.05s ON ---- 0.05s OFF***

You should see an indication [  ] of search mode in the website next to the respective address.

If you do not release the button, the unit will pass into reboot mode.

### **Reboot**

When you hold the button **longer than 12 seconds**, the unit will be rebooted. You will notice this by the LED being continuously on.

## 5. Software installation

---

The unit can be configured in a few different ways. It is possible to adjust the parameters in the **website of the iCall IP-unit** where the button is connected to. The other possibility is to configure the unit over the network using the Touch Nurse iCall 290 Sip-Touch unit.

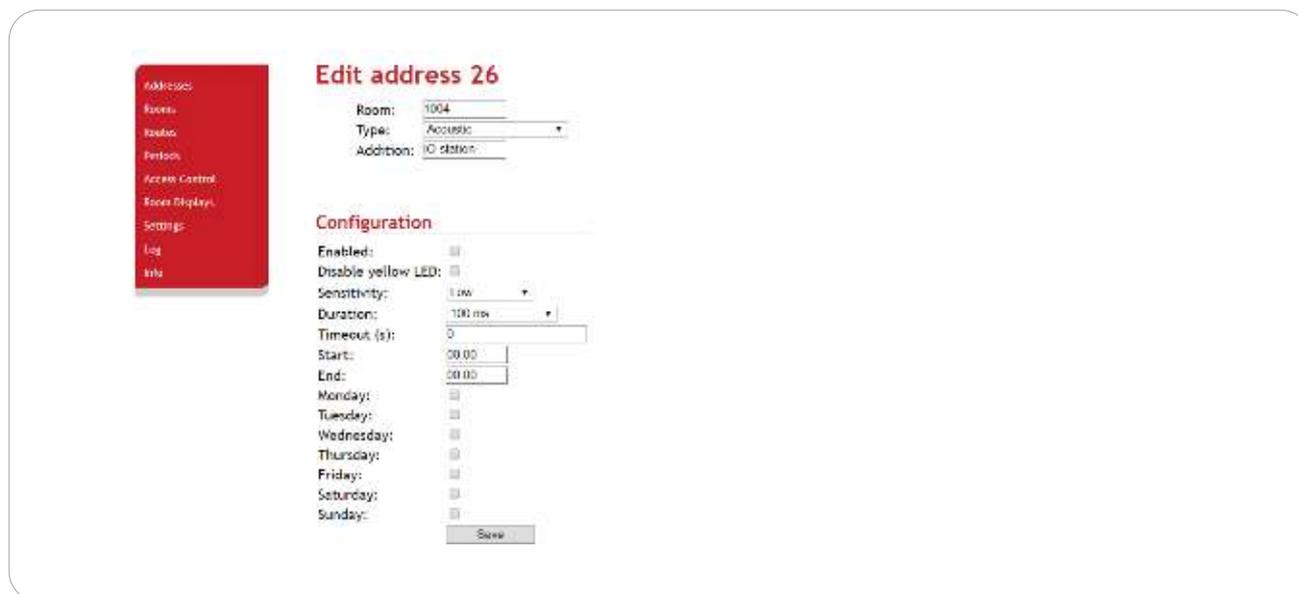
All parameters, except the time based parameters, for an acoustic button are saved on the local memory of the button itself. So even if you replace the IP-unit where the acoustic unit is connected to, the button will still remember its configuration.

The following parameters can be changed:

<b>Enabled</b>	Disable or enable the acoustic measuring. The unit will not collect samples and the LED will not react to sound if disabled.
<b>Disable Yellow LED</b>	Disable or enable the yellow LED indicator.
<b>Sensitivity</b>	The sensitivity can be changed according to the specific patient or location of the button inside the room. You can select 5 different sensitivities: <ul style="list-style-type: none"><li>• Low</li><li>• Low Medium</li><li>• Medium</li><li>• Medium High</li><li>• High</li></ul> After every change of this value the calibration is executed automatically.
<b>Duration</b>	The length that the acoustic measurement needs to be above the threshold to activate an acoustic call. The value can be selected between 0,1 sec. and 3,0 sec.
<b>Timeout</b>	The duration of the period after changing the room to idle state. The green LED of the unit will keep blinking as long as the timeout period is active. Acoustic measurement will not be processed as long as the timeout period is active.
<b>Start</b>	The starting time of the period when the unit should be enabled. Before the starting time, the unit will be disabled. Keep in mind that the LED will still react to sound during this disabled period, and an acoustic call is immediately cancelled if detected.
<b>End</b>	The ending time of the period when the unit should be enabled. After the ending time, the unit will be disabled. Keep in mind that the LED will still react to sound during this period, and an acoustic call is immediately cancelled if detected.
<b>Days (Mo - Su)</b>	The days of the week when the unit should be enabled.

## 5.1. Webpage

When editing the address in the webpage, you can change all parameters. After clicking 'Save', all parameters will be sent to the unit and a new calibration will start if needed. Remember to be quiet during the calibration.

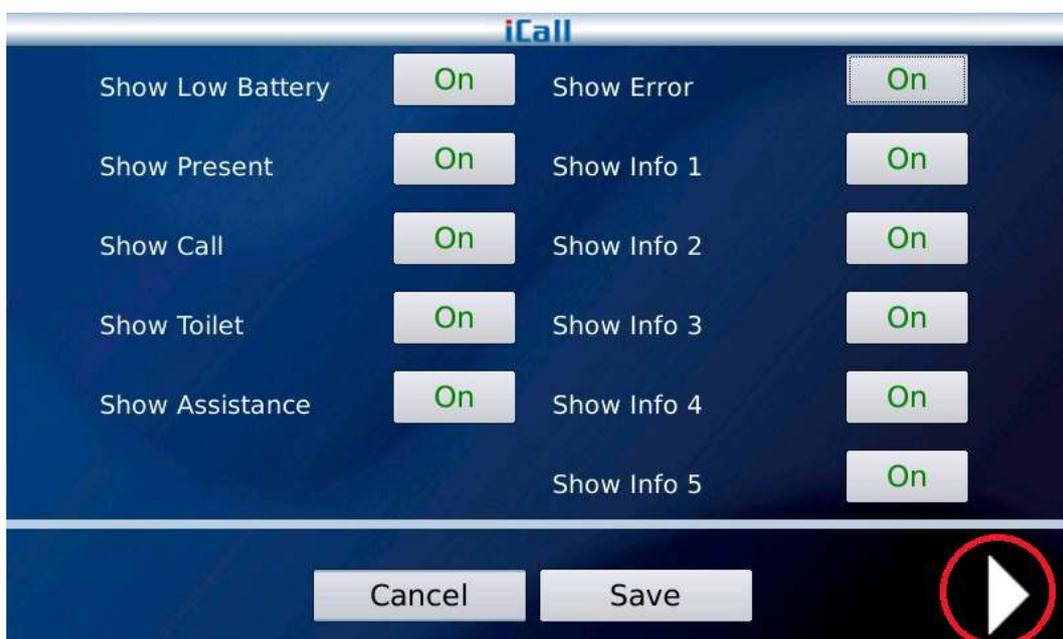


## 5.2. Nurse station (iCall 290 SIP-Touch)

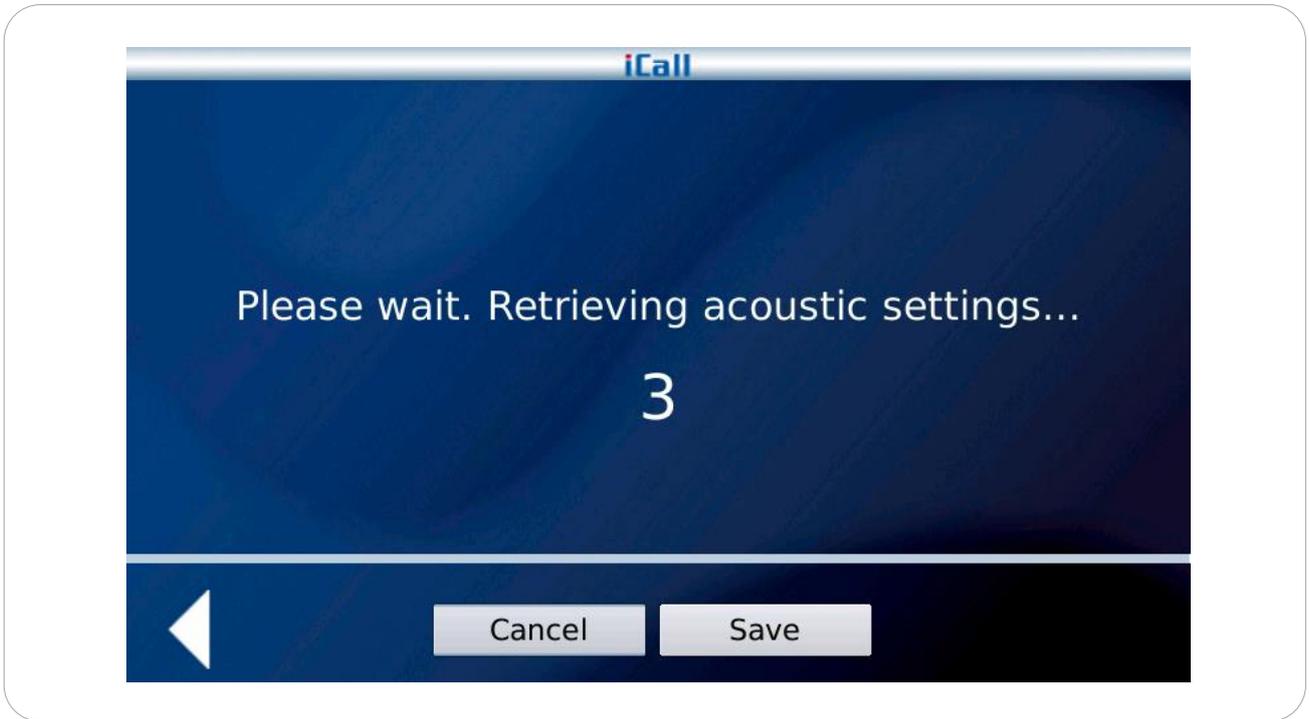
The easiest way to change the parameters is probably using the iCall 290 SIP-Touch Nurse station (NWATES0150). First, press the settings button.



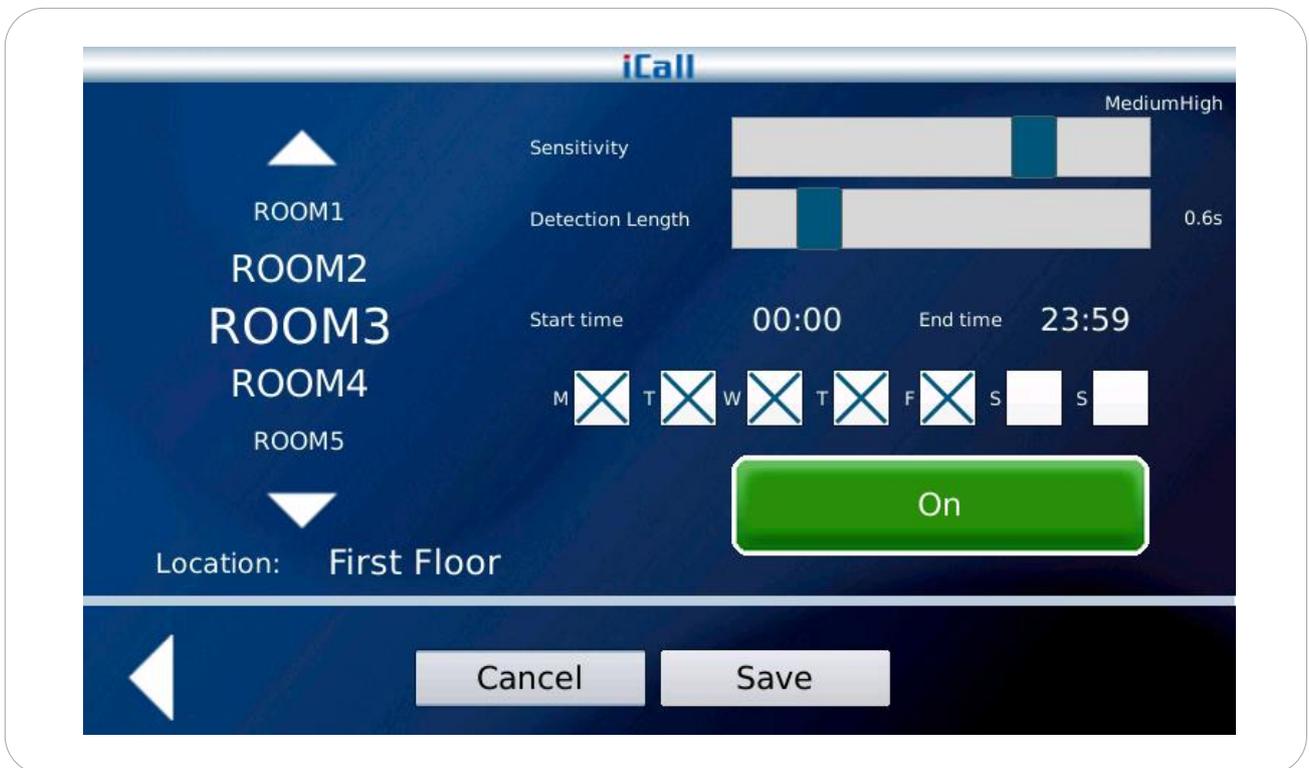
Then, navigate to the 4<sup>th</sup> screen by pressing the button on the right bottom side.



The nurse desk will now automatically scan the network to generate a list of all acoustic call buttons in the entire installation. This list will be updated every time this screen is opened to make sure the unit displays the most recent settings.



You can now change the acoustic settings by scrolling through the list of room numbers. Only the rooms that have an acoustic call button connected are displayed. Press the 'Save' button to make all changes permanent, even if you changed multiple rooms at the same time.





## Contact us for more info

---

### **IndigoCare Europe BVBA**

Schoebroekstraat 48  
3583 Paal  
Belgium  
T +32 11 247090

[emea@indigocare.com](mailto:emea@indigocare.com)

[www.indigocare.com](http://www.indigocare.com)

