



NESO 2.4

DIGITAL AUDIO TRANSMISSION SYSTEM FOR MONITORING

USER MANUAL



June 2024

0 INDEX

1. DESCRIPTION AND PICTURES	3
2. START WORKING WITH NESO 2.4	4
2.1 Start-up	
2.2 Audio connection	
2.3 Pairing transmitter and receivers	
2.4 Start and stop receiving audio	
3. EARPIECE RECEIVERS	6
3.1 Description	
3.2 Battery and power function	
3.3 Inserting and removing the speaker	
3.4 Recharging the receivers	
4. SPECIFICATIONS / FEATURES	9
4.1 Receivers	
4.2 Transmitters	
5. IMPORTANT INFORMATION.....	9
6.1 Warnings	
6.2 Product safety information	
6.3 Care and maintenance	
6. DECLARATION OF CONFORMITY.....	11
7. WARRANTY	11

1 DESCRIPTION AND PICTURES

NESO 2.4 is a DIGITAL AUDIO TRANSMISSION SYSTEM for monitoring applications to be used by TV productions, theatre, stage management, technicians, etc.

NESO 2.4 system consists of a radio frequency base station which works on the 2.4 GHz ISM band, and a complete range of in-ear as well as behind-the-ear receivers. These have been designed to deliver high quality audio transmission/reception for professional applications.

The system is factory configurable.

FRONT PANEL



1. Status LEDs
2. Up/down output volume level
3. Pairing button

REAR PANEL (USA & CANADA)



1. On/off switch
2. Type RP SMA antenna connector
3. XLR4 M: Power input – GND 1; + 4
4. XLR3 H: Audio IN – Line + 4 dB

2 START WORKING WITH NESO 2.4

2.1 START UP

NESO 2.4 works in the 2.4 GHz band. Walls, metals, and other obstacles such as the human body can obstruct the transmission. The location of the transmitter in relation to such obstacles will make a significant impact on signal quality. Connect the power supply and the antenna (vertical position) supplied to the proper connectors in the **NESO 2.4** transmitter. The device will be ready to be switched on. Do not turn, change, or disconnect the antenna. Only use the antenna supplied with the NESO 2.4 transmitter. Substitution or alteration of the supplied antenna could be harmful to the system and will violate EU/FCC/ISED standards.

2.2 AUDIO CONNECTION

Connect a line level (+ 4 dB) audio source to the XLR3 H connector. This input should only be balanced if specifically requested.

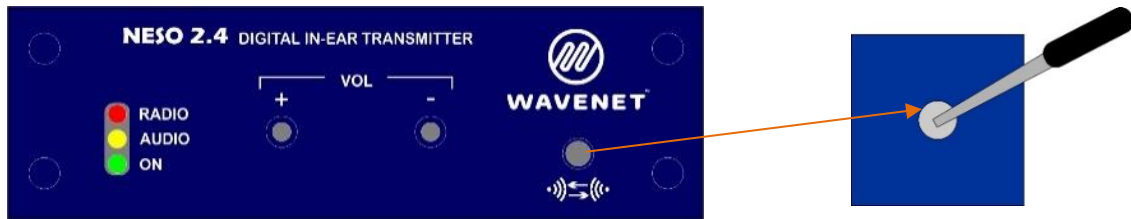
PIN 1 = GND		PIN 1= GND
PIN 2 = SIGNAL	or if balanced	PIN 2= HOT
PIN 3 = GND		PIN 3= COLD

There are “+” and “-” buttons on the front panel of the transmitter, which allows for fine tuning of the output audio level. Adjusting the transmitter’s volume will affect the volume of all the receivers paired to it. Please keep in mind that loud signals can cause injury to the inner ear and adjust accordingly.

2.3 PAIRING TRANSMITTERS AND RECEIVERS

NESO 2.4 system requires the transmitter and its associated receiver(s) to identify / pair with each other. There is no limit to the number of receivers that can be paired with each transmitter. To pair, connect the transmitter with the power supply and antenna. Switch it on. Make sure the audio cable is not connected to the transmitter. For multiple transmitters, label them as #1, #2 or #3 in accordance with the receivers with which they are paired.

Each receiver can be paired with three transmitters at once. Receivers cannot recognize a transmitter as multiple identities. They will only recognize it as the identity to which it was most recently paired. To begin, choose the number by which the transmitter is going to be recognized by the receiver(s). Using a small tool, push/tap the pairing button on the transmitter front panel as many times as the number chosen (1, 2 or 3). The push/tap must be less than 2 seconds to avoid the transmitter changing to one of the factory setting modes, which may cause the transmitter to malfunction. If the factory setting mode is accidentally switched on, simply switch off the transmitter, wait for a minute, and then switch it back on. The transmitter will return to the default mode.



To pair the **NESO 2.4** transmitter to a receiver as #1:

1. Ensure all the receivers near the transmitter are switched off (battery housing open or switched off if rechargeable).
2. Push the pairing button on the transmitter once.
3. The red LED on the front panel will blink once every two seconds to indicate the transmitter is ready to be paired as #1.
4. The transmitter will remain in pairing mode for 20 seconds.
5. Insert a battery and close the battery housing door on the receiver you wish to pair.
6. Place the receiver on top of the transmitter, centered over the ventilation grill.
7. While pairing, the red LED will light up for 3 seconds, then will blink again when pairing is finished.
8. Once the pairing is successful, restart both transmitter and receiver.
9. Connect the audio cable and switch on your transmitter.
10. To receive audio, switch on the earpiece by closing the battery housing. Wait to hear a short beep (activity indicator), and tap the button on the receiver once.

To pair devices for #2 or #3, follow the directions as above, but push the button twice to identify #2 and three times for #3. In these scenarios, the red led blinking will be as below.

Pairing button presses	Indicator light pattern	Transmitter identity
1	● ● ● ●	1
2	●● ●● ●● ●●	2
3	●●● ●●● ●●● ●●●	3

2.4 START AND STOP RECEIVING AUDIO

Once paired, the receiver will remain paired to a transmitter even after being turned off. To start receiving audio again just switch it on (close the battery housing), wait for the first activity beep and choose which transmitter from which to receive audio. If the receiver is out of the transmitter range for more than 5 minutes, it will automatically disconnect from the transmitter. Tap the receiver button again to receive audio once more.

- To receive from transmitter #1, tap the receiver button once.
- To receive from transmitter #2, tap the receiver button twice.
- To receive from transmitter #3, tap the receiver button three times.

Holding the button on the receiver for several seconds will put it into standby mode.

3 EARPIECE RECEIVERS

3.1 DESCRIPTION

Both in-ear and behind-the-ear receivers are radio frequency systems that fit the ear ergonomically; they are shaped to fit your ears. The receivers are virtually invisible while providing high quality audio. Receivers are designed to be used in either the left or right ear.

In-ear receivers are marked with a blue or red spot to indicate which receiver they are. The blue receiver is for the left inner ear. The red is for the right inner ear. In addition, the filter is also color-coded to match the left and right receivers. Cases for behind-the-ear receivers are also color-coded with a red (right) or blue (left) square with the inscription “MP2” on them. The shape of the speaker also illustrates whether it is for the left or right ear.

CAUTION: Be sure to clean the receivers frequently. Ear wax and debris can build up in the device, causing it to malfunction. Filters and cleaning tools are included with the receiver.

IN-EAR RECEIVER



- In-ear hearing terminal
- Battery holder
- 10 Batteries (blister 6 units)
- Kit de limpieza

BEHIND-THE-EAR RECEIVER



- Rear hearing terminal
- Battery holder
- Speaker / Headphone
- Open couplers
- 312 Batteries (blister 6 units)
- Cleaning kit

3.2 BATTERY AND POWER FUNCTION

In-ear receivers and non-rechargeable behind-the-ear receivers:

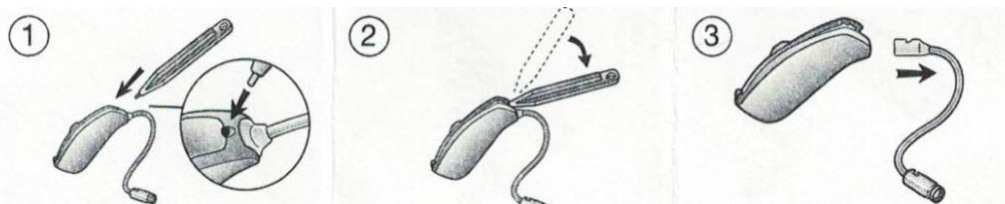
1. Open the battery housing.
2. Remove the adhesive protection from the battery and let sit for 2 minutes. This improves the longevity of the battery. Insert the battery into the receiver.
3. Close the battery housing. The receiver automatically switches on and waits for the receiving signal (see point **2.4**).

Rechargeable behind-the-ear receivers:

1. Switch on/off using the action button. Hold the button for 4-5 s to switch on/off.
2. The green LED light over the action button will light up once for a few seconds when switched on. When the receiver switches off, the green LED will flash three times.

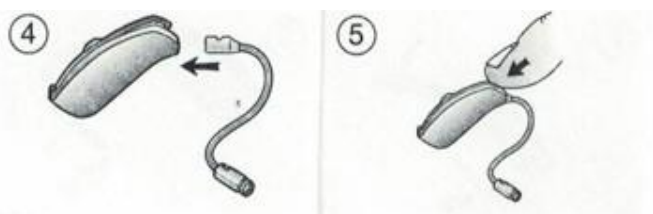
3.3 INSERTING AND REMOVING THE SPEAKER

Rechargeable receivers (images 1-3):



1. Using the supplied tool, insert it into the hole located on the speaker housing.
2. Insert the supplied tool into the opening on the speaker housing.
3. Gently press down until the plastic tab opens (it will rise up).
4. Pull out the speaker and with the plastic tab still open, push the new speaker into place inside the housing.
5. Ensure the connector position is correct, and that the speaker is fully inserted into its housing (wide part must be inside).
6. Close the plastic tab.

Non-rechargeable receivers (images 4-5):



1. Insert the supplied tool into the opening on the speaker housing.
2. Gently press down with the tool until the top cap opens.
3. Pull out the speaker and with the top cap opened, push the new speaker into place inside the housing.
4. Ensure the connector position is correct, and that the speaker is fully inserted into its housing (wide part must be inside).
5. Press the top cap to close the housing.

3.4 RECEIVER CHARGING PROCESS

Case/ charger:

For safety, use only the battery charger supplied by the manufacturer. On the first charge of the case/charger, charge for at least three hours. Be sure that hearing terminals are dry before putting them into the case/charger.

1. Plug the supplied power adapter into an electrical outlet and connect the charging cable to the connector on the back of the charger.
2. Three LEDs on the back side of the charger indicate the level of charge.
3. One red flashing LED means low charge level; three Green LEDs means full charge.
4. One full charge of the case/charger allows at least three full charges for two receivers.

LED	CHARGE LEVEL
●	Red flashing LED < 10% of charge
●	10-33% of charge
● ●	33-66% of charge
● ● ●	66-100% of charge

Rechargeable behind-the-ear receivers:

1. Put the receivers into the charge slots of the case/charger.
2. During the charging process, receiver LEDs slowly flash until the receiver is fully charged. When charging is complete (around 3 hours), the LEDs remain lit until the receiver is removed from the charger.
3. Five LEDs on the front of the case/charger show the charge level of the receiver batteries. When receivers are inserted or removed, these LEDs show the lowest battery level of both receivers. The LEDs indicate the charge level of the receiver batteries for 10 seconds, and then switch them off. Even so, the receivers will be still charging (see point #2).

LED	BATTERY LEVEL
●	0-20%
● ●	20-40%
● ● ●	40-60%
● ● ● ●	60-80%
● ● ● ● ●	80-100%

4 SPECIFICATIONS / FEATURES

4.1 RECEIVER

	IN-THE-CANAL	BEHIND-THE-EAR
Battery	10A Zinc/Air	312 Zinc/Air, RECHARGEABLE
Power consumption	1.15 mA	1.13 mA
RF frequency	2.4 ISM	2.4 ISM
Audio bandwidth	100 Hz – 9.5 kHz	100 Hz – 9.5 kHz
Distortion	0.5%	0.6%
Maximum SPL	100 dB	100 dB
Regulations	Comply FCC (CFR 47 part 15-C), ISED and UE regulations	

4.2 TRANSMITTER

Audio in level	0,775v
Audio connector	XLR3 H: Line +4 dB. Balanced
Audio bandwidth	50 Hz – 10 kHz
Latency	18 ms max.
Frequency	ISM 2.4 band (UN/85)
Output power	< +20dBm
Modulation	GFSK
Radio service	Bluetooth
Carrier type	Frequency hopping (FH)
Range (LOS)	Up to 90 m(300ft), depending on environment
Dimensions	155 x 115 x 35 mm
Weight	300 g
Power supply	12V/1A or external adapter 220V/50 Hz
Power supply connector	XLR4 M (1 GND, 4 +)
Operation conditions	0° - 45°C and relative humidity of < 95% (non-condensing)
Homologation reference	USA FCC ID: 2BC55NESO24-23 CANADA ISED ID: 31435-NESO24-23

5 IMPORTANT INFORMATION

5.1 HAZARD WARNINGS

- Keep this system out of reach of children under 5 years.
- This system must be repaired only by WAVENET RF Engineering. It is FORBIDDEN to change, modify or otherwise engage in internal handling of the system.
- Do not open or internally handle either the transmitter or receivers. In case of failure or malfunction, please contact WAVENET RF Engineering Technical Service.
- Use only the original accessories supplied by WAVENET RF Engineering. Using alternate accessories could cause a malfunction of the system and violates regulations.
- Do not use the supplied cables (for example the power supply cable) for any purpose other than those intended by the manufacturer.
- Do not operate this system in locations where this type of system is expressly forbidden.
- Do not operate this system on an aircraft without authorization from the flight crew.

5.2 PRODUCT SAFETY INFORMATION

- Protect the system from excessive shock, vibration, humidity (<95% non-condensing) and temperatures above 45°C/113°F.
- Never use heating systems (oven, microwaves oven, hairdryer, etc.) to dry the devices.
- Use a damp cloth to clean the devices. Never use domestic cleaning products or alcohol to clean them.
- Use only the elements supplied and suggested by WAVENET RF Engineering (power supply, batteries, charger, etc.) to power up the system.
- When the system is not in use, switch it off and store it properly.
- Radiation from X-Ray, CT or MRI may destroy and/or adversely affect the functionality of the system.
- Keep IN/OUT connectors clean.
- If the system is damaged in any way (including cables/connectors), overheated, or any liquid falls on it, stop use immediately and disconnect it. Contact the WAVENET RF Engineering Technical Service for further instruction.

5.3 CARE AND MAINTENANCE FOR RECEIVERS

Receivers require special care in terms of cleaning. Wax, humidity, dirt, and debris can lead to malfunctions. To avoid wax and dirt from entering the receivers, ensure filters are replaced on a regular basis (in the case of both types of receivers) or the open dome (in the case of behind-the-ear receivers). Wax consistency and buildup is different from person to person, therefore maintenance may vary between individuals, but is essential to ensure the functionality of the receivers.

For effective overall care, we suggest the following:

1. Do not immerse the receivers in any liquid.
2. Always keep the receivers clean and dry.
3. Open the battery case when receivers are not in use. This helps keep them dry.
4. Clean the receivers with a soft cloth and the supplied brush after every use to remove accumulated dirt.
5. For deeper cleaning, and to sanitize the receiver, use the air blower (reference **PLN**) and the cleaning spray (reference **SLN**).
6. To sanitize the receiver, a small amount of alcohol can occasionally be used indirectly on the receiver. Place a drop or two on the supplied brush or cloth, and then wipe the receiver with them.
7. Examine the open dome of the behind-the-ear receivers after each use. Replace frequently.
8. Examine the filter regularly (in both types of receivers). It is important to prevent dirt and/or earwax from accumulating, as it can enter the receiver, causing it to malfunction. Replace the filter frequently. Note: In-ear receivers require filters to be changed much more frequently.
9. Keep the receivers away from excessive heat and direct sunlight. Heat can warp the case, damage the electronics, and/or deteriorate the surface.

7 DECLARATION OF CONFORMITY (USA & CANADA)

The transmitter of this system complies with Part 15 of the FCC Rules and with RSS-247 and RSS-210 Rules of Industry Canada. Operation is subject to the following two conditions:

1. This transmitter must not cause interferences to other systems.
2. This system must accept any interference from other systems, including if these interferences cause a malfunction of it.

The transmitter has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The system generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with these instructions, may cause harmful interference to radio communications. There is no guarantee that interference will not happen in specific installations. If the system causes interference to radio and/or television reception (this can be determined by switching on and off the system), the user may try to correct the interference with these suggestions:

- Change location of the receiving antenna.
- Increase the distance between the system and the TV and/or radio device.
- Use a different socket for the system than those shared with the TV or radio device.
- Consult a radio/TV technician for help.

To comply with FCC RF exposure limits for general population, the antenna used for the transmitter of this system must be installed at least 20 cm from any person in the vicinity of the unit. In addition, the transmitter of this system must not be located or operating in conjunction with any other antenna or transmitter.

The transmitter of this system is a Class B digital device that complies with Canadian ICES-003. To comply with Canada RF exposure limits for general population, the antenna used for the transmitter of this system must be installed at least 20 cm from any person in the vicinity of said unit. In addition, the transmitter of this system must not be located or operating in conjunction with any other antenna or transmitter.

8 WARRANTY

In compliance with current European Union regulations, Servicios de Radio Wavenet offers a limited 2-year warranty, which is valid from the date of purchase. This warranty covers the repair of any manufacturing defects. The warranty does not cover damage caused by unsuitable system operation, chemical or liquids exposure, nor spare parts. The internal device handling, repair or non-authorized changes made by anyone other than Servicios de Radio Wavenet, S.L., will immediately null and void the warranty.

WARNING – any changes or modifications not expressly approved by the manufacturer and by the party responsible for compliance will void the user's authority to operate the system.