IEM D2.4

User Manual

UHF Wireless System

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1 General information

This document contains important instructions for the safe operation of the product. Read and follow the safety instructions and all other instructions. Keep the document for future reference. Make sure that it is available to all those using the product. If you sell the product to another user, be sure that they also receive this document.

Our products and documentation are subject to a process of continuous development. They are therefore subject to change. Please refer to the latest version of the documentation, which is ready for download under *www.thomann.de*.

1.1 Symbols and signal words

In this section you will find an overview of the meaning of symbols and signal words that are used in this document.

Signal word	Meaning
DANGER!	This combination of symbol and signal word indicates an immediate dangerous situation that will result in death or serious injury if it is not avoided.
WARNING!	This combination of symbol and signal word indicates a possible dangerous situation that can result in death or serious injury if it is not avoided.
NOTICE!	This combination of symbol and signal word indicates a possible dangerous situation that can result in material and environmental damage if it is not avoided.

Warning signs	Type of danger
	Warning – dangers due to batteries.
	Warning – danger zone.

2 Safety instructions

Intended use

This device is intended to be used for the wireless transmission of audio signals to earplugs. Use the device only as described in this user manual. Any other use or use under other operating conditions is considered to be improper and may result in personal injury or property damage. No liability will be assumed for damages resulting from improper use.

This device may be used only by persons with sufficient physical, sensorial, and intellectual abilities and having corresponding knowledge and experience. Other persons may use this device only if they are supervised or instructed by a person who is responsible for their safety.

Safety

DANGER!

Risk of injury and choking hazard for children!

Children can suffocate on packaging material and small parts. Children can injure themselves when handling the device. Never allow children to play with the packaging material and the device. Always store packaging material out of the reach of babies and small children. Always dispose of packaging material properly when it is not in use. Never allow children to use the device without supervision. Keep small parts away from children and make sure that the device does not shed any small parts (such knobs) that children could play with.

WARNING!

Incorrect handling of lithium batteries can result in injury!

In the event of a short circuit, overheating or mechanical damage, lithium batteries can cause severe injuries. Handle lithium batteries in a correct and professional manner. Store lithium batteries in a cool and dry place in their original packaging. Keep lithium batteries away from sources of heat. Never open lithium batteries. Only charge rechargeable lithium batteries with a suitable charger. Remove the lithium batteries before disposing of the device. Cover the poles of used lithium batteries with adhesive tape to prevent short circuits. Electrolyte can escape from damaged lithium batteries. Put the damaged lithium battery in air-tight packaging. Collect the electrolyte with absorbent paper. Wear rubber gloves while doing so.

WARNING!

Possible hearing damage due to high volumes on earphones!

The use of earphones at high volumes or for an extended period of time may result in permanent hearing impairment. Set the volume of your audio device to a medium value. Do not use the earphones for more than about an hour a day.

NOTICE!

Damage to the device if operated in unsuitable ambient conditions!

The device can be damaged if it is operated in unsuitable ambient conditions. Only operate the device indoors within the ambient conditions specified in the "Technical specifications" chapter of this user manual. Avoid operating it in environments with direct sunlight, heavy dirt and strong vibrations. Avoid operating it in environments with strong temperature fluctuations. If temperature fluctuations cannot be avoided (for example after transport in low outside temperatures), do not switch on the device immediately. Never subject the device to liquids or moisture. Never move the device to another location while it is in operation. In environments with increased dirt levels (for example due to dust, smoke, nicotine or mist): Have the device cleaned by qualified specialists at regular intervals to prevent damage due to overheating and other malfunctions.

NOTICE!

Risk of fire due to incorrect polarity!

Incorrectly inserted batteries may cause fires and destroy the device and the batteries. Observe the markings on the batteries and on the device. Ensure that proper polarity is observed when inserting batteries.

NOTICE!

Possible damage due to leaking batteries!

Batteries can leak and cause permanent damage to the device. Take the batteries out of the device if it is not going to be used for an extended period of time.

NOTICE!

Possible damage to lithium-ion batteries through incorrect storage!

Deep discharge can permanently damage lithium-ion batteries or cause them to lose some of their capacity. Charge the lithium-ion batteries before longer breaks in use and before storage. Ensure that the device is switched off for storage. Store the device at room temperature or cooler in an environment as dry as possible. Recharge the lithium-ion batteries about every three months if they are stored for a longer period of time to avoid permanent damage due to too deep self-discharge. Fully charge the lithium-ion batteries only shortly before use at room temperature.

NOTICE!

Possible staining due to plasticiser in rubber feet!

The plasticiser contained in the rubber feet of this product may react with the coating of the floor and cause permanent dark stains after some time. If necessary, use a suitable mat or felt slide to prevent direct contact between the device's rubber feet and the floor.

NOTICE!

Radio interference due to electromagnetic fields!

The unit emits electromagnetic radio signals. Overlapping radio waves may cause interference with the device and other devices. Do not use the device in locations where the use of wireless devices is prohibited.

3 Features and scope of delivery

The UHF wireless system IEM D2.4 is an in-ear monitoring system especially suitable for professional events, on rock stages and in concert halls, theatres and musicals.

Your UHF wireless system IEM D2.4 consists of the following components:

- 9.5" stereo transmitter IEM D2.4 T
  - Built-in monitoring function
  - Input: 2 × XLR / 6.35-mm jack combo socket
  - Output for headphones (3.5-mm and 6.35-mm jack sockets) with adjustable volume
  - Integrated limiter
  - Stereo / mono operation
  - OLED display
  - TNC antenna connection
  - Mounting option in a 19" (1 RU)
  - Power adapter (included)
- Bodypack receiver IEM D2.4 R (also available separately; item no. 519928)
  - Earphone output (3.5-mm jack socket) with volume control
  - Synchronisation via IR
  - Controls for volume and balance
  - OLED display
  - Power supply: Lithium-ion battery (included)
  - Charging station (included)
  - Belt clip

8 systems can be operated simultaneously. The system operates within a frequency range of 2400 MHz to 2483 MHz.

Included accessories: Power supply, lithium-ion battery, rack mount, charging station and antenna converter

Optional accessories: Earphones, lithium-ion replacement battery (item no. 453988) and mounting material for rack-mounting two transmitters (item no. 406584)

4 Installation and starting up

4.1 General Information

Unpack and check carefully there is no transportation damage before using the unit. Keep the equipment packaging. To fully protect the product against vibration, dust and moisture during transportation or storage use the original packaging or your own packaging material suitable for transport or storage, respectively.

Create all connections while the device is off. Use the shortest possible high-quality cables for all connections. Take care when running the cables to prevent tripping hazards.

Notes on wireless transmission

- This device utilizes frequencies that are not harmonized within the European Union (EU) and therefore may only be used in certain EU member states. In all European countries, the frequencies used for the transmission of audio signals are strictly regulated. Before you start, make sure the frequencies are allowed in the respective country and check whether the operation must be reported to the appropriate authority.
  For more information, please visit: *http://www.thomann.de*.
- Make sure that transmitter and receiver are both tuned to the same channel.
- Never set multiple transmitters to the same channel.
- Make sure that there are no metal objects between the transmitter and receiver.
- Avoid interference from other radio or in-ear systems.

4.2 Transmitter

Rack mounting

The unit has been designed for rack mounting in a standard 19-inch rack; it occupies one rack unit.

Connecting the power supply

NOTICE!

Damage to the external power supply due to high voltages!

The device is powered by an external power supply. The external power supply can be damaged if it is operated with the incorrect voltage or if high voltage peaks occur. In the worst case, excess voltages can also cause a risk of injury and fires.

Make sure that the voltage specification on the external power supply matches the local power grid before plugging in the power supply.

Only operate the external power supply from professionally installed mains sockets that are protected by a residual current circuit breaker (FI).

As a precaution, disconnect the power supply from the power grid when storms are approaching or it the device will not be used for a longer period.

First, connect the power supply to the transmitter and then plug the power supply into the power outlet.

Attaching the antenna

Attach the included antenna to the back of the transmitter. To improve transmission quality and adapt to spatial conditions, it can be rotated and swivelled.

Connecting audio and starting up

Connect the audio inputs of the transmitter with suitable line outputs of your mixer or your amplifier. Firstly, set the volume control to a middle position.

4.3 Receiver

Inserting the lithium-ion battery into the receiver

Make sure that the main switch / volume control of the receiver is in the "OFF" position.

Set the latches of the battery compartment in a vertical position. Simultaneously press the two latches on the side of the battery compartment and fold the lid down. Inserting the lithium-ion battery. Pay attention to the correct location of the poles. Close the battery compartment lid, it must click firmly into place. Set the latches of the battery compartment in a horizontal position to prevent the battery compartment from opening unintentionally.

Starting up the system

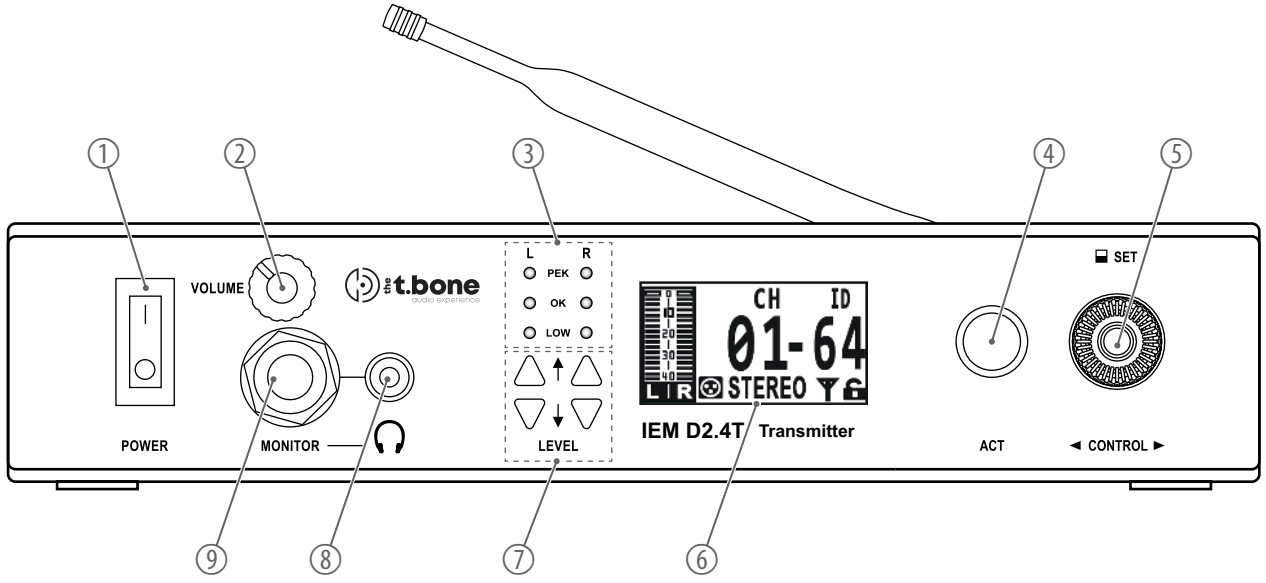
1. Ensure that both transmitter and receiver are switched off. The display on the transmitter is off; the main switch / volume control on the receiver is in the "OFF" position.
2. Attach the receiver to your belt or guitar strap with the clip.
3. Insert your earphone.

4. Turn on the transmitter and the receiver and test the transmission. Make sure that transmitter and receiver are tuned to the same channel. If necessary, adjust the volume on the transmitter and receiver as well as the levels on your mixer or amplifier.

5 Connections and controls

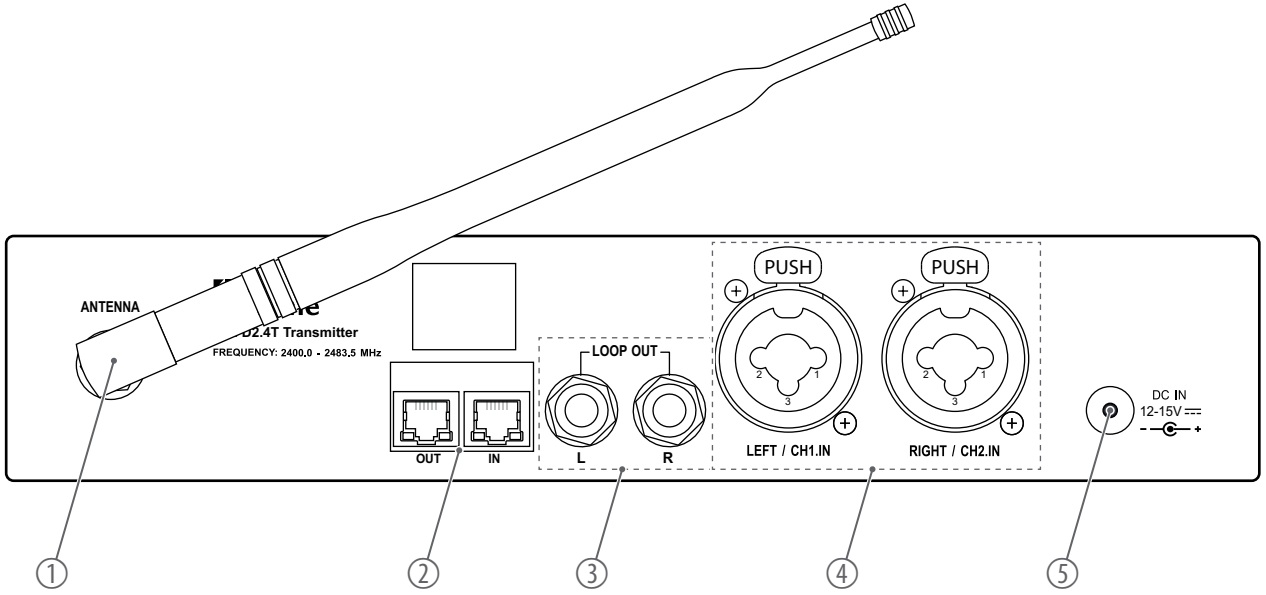
5.1 Transmitter

Front panel



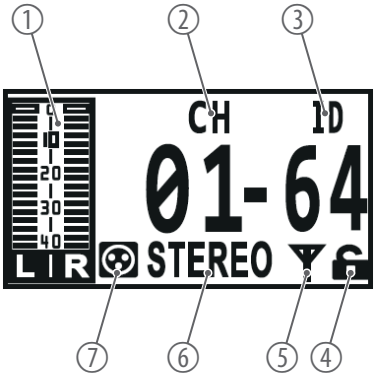
1	*[POWER]* | Main switch
2	*[VOLUME]* | Volume control
3	*[L]* / *[R]* / *[PEK]* / *[OK]* / *[LOW]* | Left and right sound quality indicator LEDs
4	*[ACT]* | Synchronisation button
5	*[CONTROL]* | Rotary control for adjusting parameters. Turn the control to select an option, press the control to confirm.
6	Display
7	*[LEVEL]* | Left and right input level adjustment buttons
8	*[MONITOR]* | 3.5-mm jack socket (stereo) for connecting headphones
9	*[MONITOR]* | 6.35-mm jack socket (stereo) for connecting headphones

Rear panel


ANTENNA
D2.4T Transmitter
FREQUENCY: 2400,0 - 2483,5 MHz
OUT
IN
LOOP OUT
L
R
PUSH
PUSH
LEFT / CH1.IN
RIGHT / CH2.IN
DC IN
12-15V
1
2
3
4
5

1	UHF antenna
2	*[OUT]* / *[IN]* | RJ11 sockets (no function)
3	*[LOOP OUT]* / *[L]* / *[R]* | 6.35-mm jack sockets (mono). The input signals are available at these outputs for forwarding to other wireless systems or other audio devices.
4	*[LEFT /CH1.IN]* / *[RIGHT /CH2.IN]* | XLR/6.35-mm jack combination sockets (left and right channels) for direct connection to a mixer or an audio device that serves as a signal source.
5	Connection socket for the power adapter

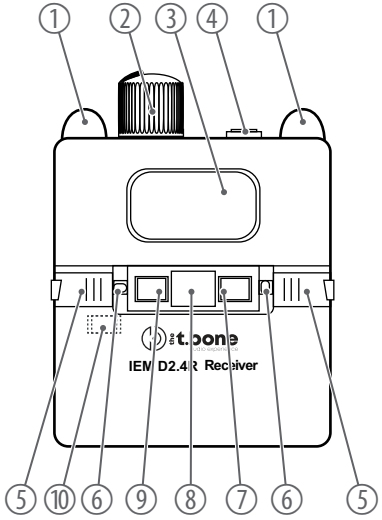
Display



1	Level meter for the left and the right audio input.
2	Channel display
3	ID indicator
4	Lock icon
5	Radio signal activated (antenna symbol) or deactivated (no antenna symbol)
6	Audio input stereo or mono
7	Icon for the audio source

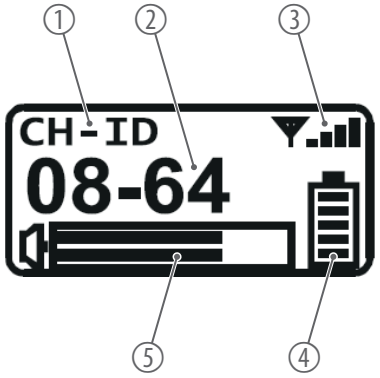
5.2 Receiver

Front panel



1	Antenna
2	*[OFF] / [VOL]* | Main switch and volume control. Turn this control clockwise past the point of resistance to turn on the receiver. Turn it further to increase the volume. Turn this control anti-clockwise to reduce the volume. Turn it further past the point of resistance to turn off the receiver.
3	Display
4	3.5 mm jack socket (stereo) for the earphones
5	Battery compartment latches
6	Battery compartment locks
7	Buttons to decrease the currently displayed value
8	Sync window
9	Buttons to increase the currently displayed value
10	*[FUNCTION]* | Button for calling up the setting options and saving the settings (the button is located under the battery compartment lid)

Display



1	Channel and ID display
2	Displays the selected channel and ID
3	Antenna signal display. Without the antenna icon, the bars indicate environmental interference.
4	Battery charge level indicator
5	Audio display ■ Top: left channel ■ Bottom: right channel.

6 Operating

6.1 Setting up the transmitter

Press *[CONTROL]* to enter the main menu.

Setting parameters

Turn *[CONTROL]* to the left or right to select a menu item. Press *[CONTROL]* to confirm.

Select *'Exit&Safe'* and press *[CONTROL]* to save the settings and return to the main menu.

Menu item	Values	Explanation
'RFOut'	*'ON' / 'OFF'*	Activating or deactivating the radio signal If the radio signal is deactivated, no radio signal is sent (RF mute).
'Channel'	*'1' … '8'*	Selecting a channel
'ID'	*'01' … '64'*	ID selection for each channel
'AFIn'	*'XLR'*	Analogue input (XLR)
'ST/MONO'	*'ST' / 'MONO'*	Selecting stereo or mono (L/R summed)

Menu item	Values	Explanation
'SetLock'	*'YES'* / *'NO'*	Lock activated or deactivated. When the lock is activated, no changes can be made to the settings.
'Net'		No function
'Version?'		Display of the current firmware version
'Exit&Safe'		Saving changes and back to the main menu

Setting input level

1. Press the buttons (6) to set the input level to 0.
2. Activate the audio source and set the output level to maximum.
3. Observe the indicator LEDs (5) and adjust the gain with the buttons (6) until the green *[OK]* LED lights up.

   ⇨ The orange *[LOW]* LED indicates that the audio input signal or gain is too low.

   The red *[PEK]* LED indicates that the audio input signal or the gain is too high. If the audio input signal remains too high, the warning message *'CLIP !'* appears on the display to indicate the distortion. Check for excessive input signal level.
4. During the adjustment process, connect the headphones to the monitoring connection on the transmitter and watch the LEDs to adjust the input level. Then turn on the receiver to check the sound.

Headphone monitoring

1. Use *[VOLUME]* to turn the volume down to minimum.
2. Connect headphones to the connection (3) or (4).
3. Use *[VOLUME]* to set an appropriate volume.

ACT synchronisation

1. Press the *[ACT]* synchronisation button to activate synchronisation.
   ⇨ The display shows *'ACT...'*.
2. Align the transmitter and the sync window on the receiver within 30 cm of each other.
   ⇨ The *'ACT...'* display disappears after successful synchronisation. The display returns to the main menu.

   If *'FAIL'* appears on the display, synchronisation was not successful. Try syncing again.

6.2 Setting up the receiver

Adjusting the volume

1. Turn the main switch / volume control (18) clockwise to switch on the device.
   ⇨ The display is switched on and shows the current channel when the battery is sufficiently charged.
2. Turn the main switch / volume control (18) clockwise to increase the volume or counter-clockwise to decrease the volume.
3. Turn the main switch / volume control (18) anti-clockwise to switch off the device.
   ⇨ The display briefly shows *'OFF...'* and then turns off.

Setting parameters

Press the *[FUNCTION]* button under the battery compartment lid repeatedly to select the setting option you want to change. Once the desired value has been set, press the *[FUNCTION]* button to confirm the value.

Menu item	Values	Explanation
'CH-ID'	*'1' … '8'* *'01' … '64'*	Setting channel and ID Choose the same values as for the transmitter.
'AF MODE'	*'STEREO'* *'MIXED'*	Selecting the receiver mode *'MIXED'*: You can hear the two inputs in both ears and vary the ratio of the two inputs using the balance. Example: CH1 is for vocals only, CH2 for the rest of the band. When using mixed mode, you can hear more vocals and less band signal (and vice versa) by shifting the balance to the left or right accordingly.
'BALANCE'		Press the buttons (24) or (25) to shift the balance of the output levels to the left or right.
'EQUALIZER'	*'FLAT'* *'LO-CUT'* *'LO-BOT'* *'HI-BOT'*	Tone control (flat, low-cut, low-booster, high-booster) ■ *'FLAT'*: No sound change ■ *'LO-CUT'*: Cutting off low frequencies ■ *'LO-BOT'*: Low frequencies are raised ■ *'HI-BOT'*: High frequencies are raised

Menu item	Values	Explanation
'EARDRIVE'	*'NORM'* *'LIVE'* *'PRO'* *'EXTRA'*	Four selectable sound presets to improve the basic sound of connected earphones.
'SET LOCK'	*'LOCK'* *'UNLOCK'*	Lock activated or deactivated. When the lock is activated, no changes can be made to the settings.
Charge level display		Each bar on the display stands for 20% charge, e.g. five bars at 100% and one bar at 20% remaining charge of the battery. If no bar is displayed, there is only 10% remaining charge. The battery should then be replaced or charged.

7 Technical specifications

7.1 Receiver

Number of systems that can be operated in parallel	8 systems	
Output connections	Headphones	1 × 3.5-mm jack socket, stereo
		Impedance: 16 Ω
		Receive mode: True diversity
		Latency: < 3.7 ms
Output level adjustment	+12 dBu	
Frequency range	2.400 GHz … 2.4835 GHz	
Bandwidth	2.4 GHz	
Sensitivity	–95 dBm	
Antenna gain	2.15 dBi	
NF frequency response	20 Hz…23 kHz	
Total harmonic distortion (THD)	≤ 0.1% @1kHz	
Signal-to-noise ratio	109 dB (A)	

Battery	Battery type	ICR-18500 lithium-ion battery (replaceable, item no. 453988)
	Voltage	3.7 V
	Capacity	1,400 mAh
	Operating time	8 h
Dimensions (W × H × D)	63 mm × 96 mm × 25 mm	
Weight	98 g	
Ambient conditions	Temperature range	0 °C…40 °C
	Relative humidity	20%…80% (non-condensing)

7.2 Transmitter

Number of systems that can be operated in parallel	8 systems	
Input connections	Power supply	Connection socket for the power adapter
	Audio	2 × XLR / 6.35-mm jack combo socket
Output connections	Headphones	1 × 6.35-mm jack socket, balanced
		1 × 3.5-mm jack socket, stereo
		Latency: < 3.7 ms
	Loop	2 × 6.35-mm jack socket, balanced
Frequency range	2.400 GHz … 2.4835 GHz	
Max. transmission power	10 mW	
Maximum input level	> +24 dBu	
Bandwidth	2 Hz	
Modulation type	Digital modulation	
Input impedance	> 6 KΩ	
Range in clear field of vision	approx. 80 m	

NF frequency response	5 Hz…23 kHz	
Total harmonic distortion	> 0.07%	
Signal-to-noise ratio	> 115 dB (A)	
Power supply	External power adapter, 100 - 240 V ~ 50/60 Hz	
Operating voltage	12 V ⎓ / 1 A, centre positive	
Dimensions (W × H × D)	209 mm × 42 mm × 115 mm	
Weight	0.85 kg	
Ambient conditions	Temperature range	0 °C…40 °C
	Relative humidity	20%…80% (non-condensing)

7.3 Battery charging station

Battery	Battery type	ICR-18500 lithium-ion battery
	Voltage	3.7 V
	Capacity	1,400 mAh
Power supply	External power adapter, 100 - 240 V ~ 50/60 Hz	
Operating voltage	12 V ⎓ / 1 A, centre positive	
Current consumption	600 mA	
Dimensions (W × H × D)	92 mm × 75 mm × 87 mm	
Weight	0.24 kg	
Ambient conditions	Temperature range	0 °C…40 °C
	Relative humidity	20%…80% (non-condensing)

8 Plug and connection assignment

Introduction

This chapter will help you select the right cables and plugs to connect your valuable equipment in such a way that a perfect sound experience is ensured.

Please note these advices, because especially in 'Sound & Light' caution is indicated: Even if a plug fits into the socket, an incorrect connection may result in a destroyed power amp, a short circuit or 'just' in poor transmission quality!

Balanced and unbalanced transmission

Unbalanced transmission is mainly used in semi-professional environment and in hifi use. Instrument cables with two conductors (one core plus shielding) are typical representatives of the unbalanced transmission. One conductor is ground and shielding while the signal is transmitted through the core.

Unbalanced transmission is susceptible to electromagnetic interference, especially at low levels, such as microphone signals and when using long cables.

In a professional environment, therefore, the balanced transmission is preferred, because this enables an undisturbed transmission of signals over long distances. In addition to the conductors 'Ground' and 'Signal', in a balanced transmission a second core is added. This also transfers the signal, but phase-shifted by 180°.

Since the interference affects both cores equally, by subtracting the phase-shifted signals, the interfering signal is completely neutralized. The result is a pure signal without any noise interference.

1/4" TS phone plug (mono, unbalanced)

1	Signal
2	Ground, shielding

Three-pole 1/8" mini phone jack (stereo, unbalanced)

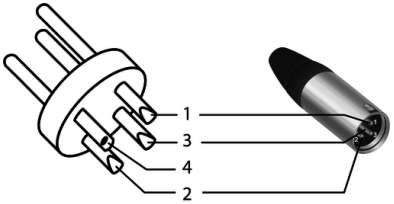
1	Signal (left)
2	Signal (right)
3	Ground, shielding

1/4" TRS phone plug (stereo, unbalanced)

1	Signal (left)
2	Signal (right)
3	Ground

XLR plug for signal input on the transmitter (balanced)

XLR / 6.35-mm jack combo sockets serve as signal input on the transmitter. The drawing and table show the XLR pin assignment (balanced wiring) and the assignment of a suitable jack plug.



1	Ground, shielding
2	Signal (in phase, +)
3	Signal (out of phase, –)
4	Shielding on the plug housing (optional)

9 Troubleshooting

In the following we list a few common problems that may occur during operation. We give you some suggestions for easy troubleshooting:

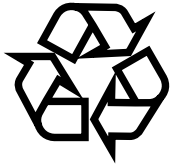
Symptom	Remedy
No sound	1. Check the power supply of the transmitter and receiver.
	2. Are the transmitter and receiver set to the same channel?
	3. Test the connection between the transmitter and the connected audio device (amplifier, mixer). Is the connected audio device turned on and does the signal level at the output of the audio device match to the input requirements of the transmitter?
	4. See if the sound transmission works when you move the receiver closer to the transmitter.
Transmission is interrupted	1. Make sure that no metal objects near the transmitter or receiver are obstructing the transmission.
	2. Modify the orientation of the antennas.
	3. If you are using more than one wireless system at the same time, check the used channels.

Symptom	Remedy
	4. Interference can also be caused by televisions, radios or mobile phones.
The sound is distorted	1. Change the volume control setting on the transmitter.

If the procedures recommended above do not succeed, please contact our Service Center. You can find the contact information at *www.thomann.de*.

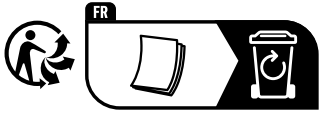
10 Protecting the environment

Disposal of the packing material



Environmentally friendly materials have been chosen for the packaging. These materials can be sent for normal recycling. Ensure that plastic bags, packaging, etc. are disposed of in the proper manner.

Do not dispose of these materials with your normal household waste, but make sure that they are collected for recycling. Please follow the instructions and markings on the packaging.



Observe the disposal note regarding documentation in France.

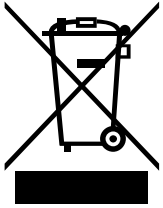
Disposal of batteries

Batteries must not be thrown away or burnt, but must instead be disposed of in line with the local regulations on the disposal of hazardous waste. Use the available collection sites.

Only dispose of lithium batteries when they are empty. Remove lithium batteries from the device before disposal if this is possible without destroying it. Protect used lithium batteries against short circuit, for example by taping the poles. Dispose the built-in lithium batteries together with the device. Check for an appropriate collection facility.

Dispose of the batteries and rechargeable batteries at relevant collection points or through your local waste facility.

Disposal of your old device



This product is subject to the European Waste Electrical and Electronic Equipment Directive (WEEE) as amended.

Do not dispose of your old device with your normal household waste; instead, deliver it for controlled disposal by an approved waste disposal firm or through your local waste facility. If in doubt, consult your local waste management facility. You can also return the device to a retailer if they offer to take the device back for free or if they are legally obliged to do so. When disposing of the device, comply with the rules and regulations that apply in your country. You can also return your old device to Thomann GmbH at no charge. Check the current conditions on *www.thomann.de*.

Proper disposal protects the environment as well as the health of your fellow human beings. This is because the proper handling of old devices negates the potential negative effects of hazardous substances, and because it conserves resources by recycling them.

Also note that waste avoidance is a valuable contribution to environmental protection. Repairing a device or passing it on to another user is an ecologically valuable alternative to disposal.

If your old device contains personal data, delete those data before disposing of it.