the t.bone
audio experience

IEM 100

User Manual

UHF Wireless System

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863.100

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 – 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!

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.

3 Features and scope of delivery

The UHF wireless system IEM 100 is an in-ear monitoring system especially suitable for professional events, on rock stages and in concert halls, theatres and musicals.

Your IEM 100 UHF wireless system consists of the following components:

- 9.5-inch stereo transmitter IEM 100 ST
  - Very high sensitivity at very high signal-to-noise ratio
  - Input: 2 × XLR / 6.35-mm jack combo socket
  - Output for headphones (6.35-mm jack socket) with adjustable volume
  - Mounting option for one transmitter per 19-inch rack
  - Power supply: 12 V ⎓ (DC)
- Bodypack receiver IEM 100 R
  - Earphone output (3.5-mm jack socket) with volume control
  - Power supply: 2 round cell batteries (AA, LR6, 1.5 V)
- Earphone EP 3

Three systems can be operated simultaneously. The system operates within a frequency range of 863.1 MHz to 864.4 MHz.

Included accessories: 12 V plug-in power supply, mounting material for rack mounting, antenna converter and plastic case

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.

If there is not enough space on the device for direct assembly of the antenna, for example because there is not much space in the rack, you can use the included coaxial cable to assemble the antenna separately from the device. To do this, use the supplied BNC coupling.

Connecting audio and starting up

Connect the audio inputs of the transmitter with suitable line outputs of your mixer or your amplifier. Move the level adjustment switch (11) to the "–12 dB" position. First, set the input sensitivity control (2) to a middle position.

To get the best sound quality, a fine adjustment of the controller may be required. If the input level is too low, slide the level adjustment switch (11) to the "0 dB" position.

4.3 Receiver

Inserting batteries into the receiver

Press on the snap-in locks at the side to open the battery compartment (18). Flip the lid open and insert the batteries. Pay attention to the correct location of the poles. Close the battery compartment and switch the transmitter on. The "RF" LED (22) lights up briefly.

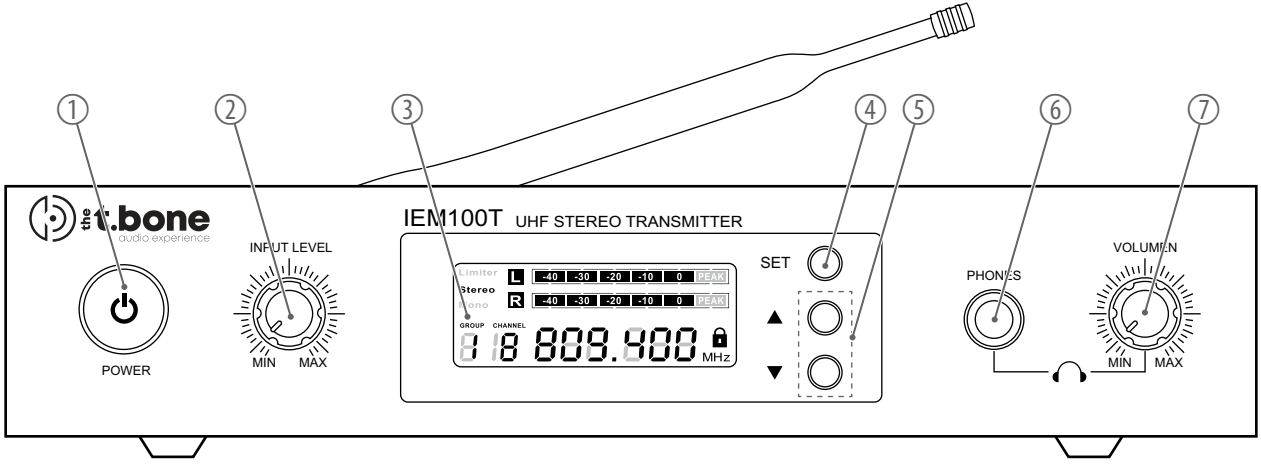
Starting up the system

1. Make sure that the receiver is turned off, and the main switch / volume control (14) is in the “OFF” position.
2. Attach the receiver to your belt or guitar strap with the clip.
3. Carefully insert the earplug into the ear canal, note the markings ‘L’ and ‘R’ for the left and right side.
4. Turn on the transmitter and the receiver and test the transmission. Make sure that transmitter and receiver are set to the same frequency group and channel. If necessary, adjust the volume on the receiver, the input sensitivity of the transmitter and the levels on your mixer or amplifier.

5 Connections and controls

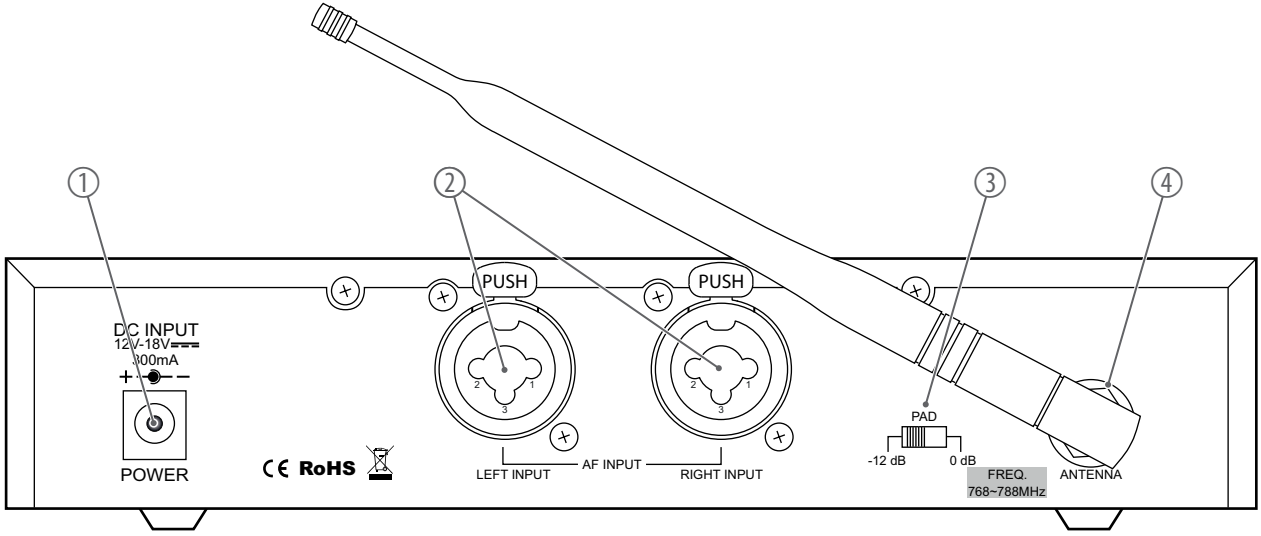
5.1 Transmitter

Front panel



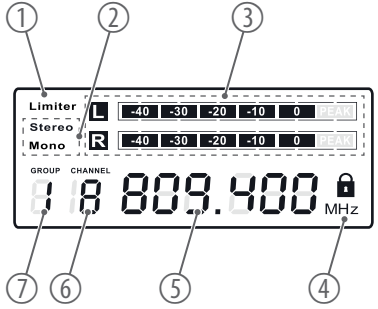
1	*[POWER]* | Main switch. Turns the device on and off. To turn on, press this button for about 1 second.
2	*[INPUT LEVEL]* | Control for adjusting the input sensitivity
3	Display
4	*[SET]* | Enter button for menu control
5	▲ / ▼ | Buttons for increasing or decreasing the value currently displayed
6	*[PHONES]* | Socket for connecting headphones
7	*[VOLUME]* | Volume control for the headphone output

Rear panel


1
2
3
4
DC INPUT
12V-18V
300mA
POWER
PUSH
PUSH
LEFT INPUT
AF INPUT
RIGHT INPUT
PAD
-12 dB
0 dB
FREQ.
768~788MHz
ANTENNA

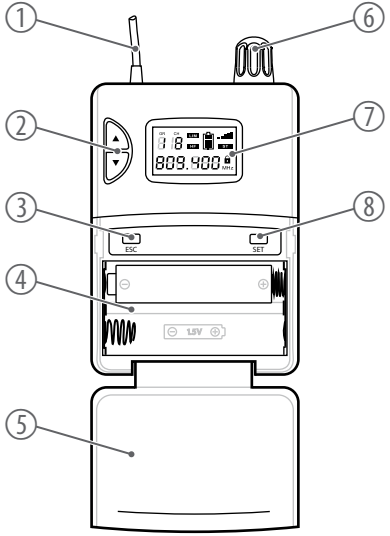
1	*[DC INPUT]* | Socket for connecting the supplied plug-in power supply. If you are using a different power supply, observe the correct voltage, the polarity of the plug and the power consumption.
2	*[LEFT INPUT]* / *[RIGHT INPUT]* | XLR/6.35-mm jack combination jacks (left and right channels) for direct connection to a mixer or an audio device that serves as a signal source.
3	*[PAD]* | Level adjustment switch. Move the switch to the "–12 dB" position to attenuate the input signals by 12 dB. There is no attenuation in the "0 dB" position. Underneath it is the indication of the frequency range in which the device operates. The specification here must match the specification printed on the back of the receiver.
4	*[ANTENNA]* | BNC panel socket for the supplied UHF antenna. Make sure that the frequency indicated on the antenna is within the range that is indicated on the transmitter.

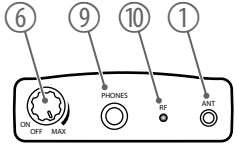
Display

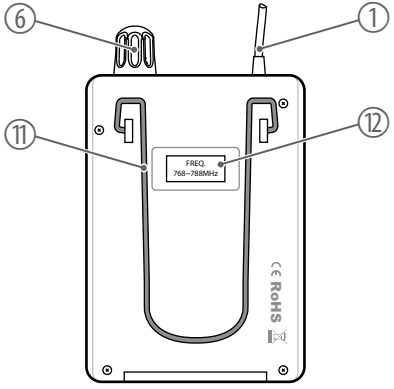


1	*[Limiter]* | Indicates limiter action as protection against volume peaks.
2	*[Stereo]* / *[Mono]*| Indicates the set operating mode (stereo or mono).
3	Level indicator for left and right channels
4	🔒 | Indicates that the device is locked to prevent unintentional changes.
5	Displays the frequency that is assigned to the set combination of frequency group and channel.
6	*[CHANNEL]* | Displays the selected channel.
7	*[GROUP]* | Displays the selected frequency group.

5.2 Receiver

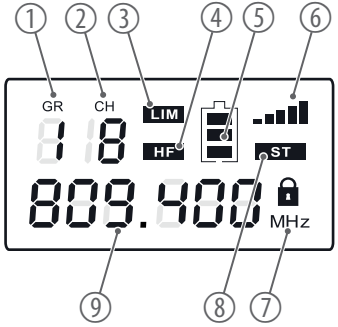

1
6
2
7
3
8
4
5
809.400
ESC
SET
1.5V


6
9
10
1
PHONES
IF
ANT
ON
OFF
MAX


6
1
11
12
FREQ.
768~788MHz
CE RoHS

1	Flexible antenna
2	▲ / ▼ | Buttons for increasing or decreasing the currently displayed value. Press and hold the corresponding button to adjust the balance.
3	*[ESC]* | "Cancel/Exit" function in the menu
4	Battery compartment for two round cell batteries (AA, LR6), 1.5 V or comparable rechargeable batteries
5	Battery compartment lid
6	*[ON/OFF/MAX]*| 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.
7	Display
8	*[SET]* | Enter button for menu control
9	*[PHONES]* | 3.5.mm jack socket (stereo) for earphones
10	*[RF]* | This LED lights up when the device receives a radio signal.
11	Clip for attaching the receiver to a belt or guitar strap
12	Indication of the frequency range in which the device operates. The specification here must match the specification printed on the back of the transmitter.

Display



1	*[GR]* | Displays the set frequency group.
2	*[CH]* | Displays the selected channel.
3	*[LIM]* | Indicates limiter action as protection against volume peaks.
4	*[HF]* | Indicates that the high frequency boost function is on.
5	Battery level indicator. Replace the batteries when there is only one bar left.
6	Radio signal strength indicator (one to five bars)
7	🔒 | Indicates that the device is locked to prevent unintentional changes.
8	*[ST]* | Indicates that the radio link is transmitting a stereo signal.
9	Displays the frequency that is assigned to the set combination of frequency group and channel.

6 Operating

6.1 Setting up the transmitter

Selecting the frequency group and channel

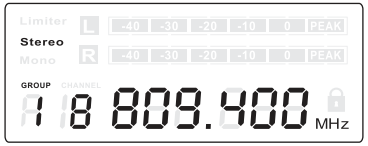
Press *[SET]* repeatedly until the *'GROUP'* field (frequency group) flashes on the display. Use the ▲ or ▼ buttons to increase or decrease the displayed value by one. When the desired value appears, press *[SET]* to confirm the setting and proceed to the next menu item.

Press *[SET]* repeatedly until the *'CHANNEL'* field flashes on the display. Use the ▲ or ▼ buttons to increase or decrease the displayed value by one. When the desired value appears, press *[SET]* to confirm the setting and proceed to the next menu item.

In the lower area, the display shows the used transmission frequency in MHz that is assigned to the set combination of frequency group and channel (*Chapter 7.3 'Frequency table' on page 30*).

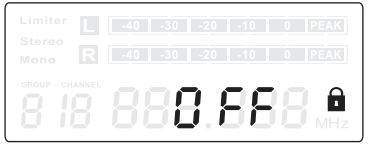
Transmitter and receiver must be set to the same combination of frequency group and channel. If you use multiple wireless systems from this device family, you will achieve the best results by assigning all systems to the same frequency group, but giving each system a different channel.

Selecting the operating mode



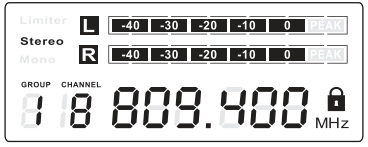
Press *[SET]* repeatedly until the *'Stereo'* or *'Mono'* field flashes on the display. Use the ▲ and ▼ buttons to switch between mono and stereo mode. When the desired mode appears, press *[SET]* to confirm the setting and proceed to the next menu item.

Locking the settings



Press *[SET]* repeatedly until *'ON'* or *'OFF'* and the 🔒 symbol start to flash on the display. Use the ▲ or ▼ buttons to toggle between locked mode (display *'ON'*) and normal mode (display *'OFF'*). In locked mode, you can view the system settings, but you cannot change them. If the device is locked, the 🔒 symbol appears on the display. Press *[SET]* to confirm the setting and proceed to the next menu item.

Adjusting the input level

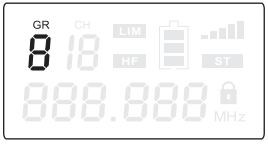


The display shows the input levels of the left and right channels in a bar display. Set the input sensitivity controller (2) so that the bar is utilised up to the scale value "0". If the input level is still too low, slide the level adjustment switch (11) to the “0 dB” position.

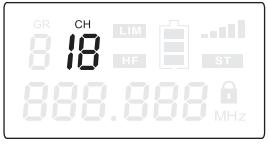
6.2 Setting up the receiver

The [SET] and [ESC] buttons that you need to set up the receiver are located behind the battery compartment lid.

Selecting the frequency group and channel



Press *[SET]* repeatedly until the *'GROUP'* field (frequency group) flashes on the display. Use the ▲ or ▼ buttons to increase or decrease the displayed value by one. When the desired value appears, press *[SET]* to confirm the setting and proceed to the next menu item. Press *[ESC]* to confirm the setting and exit the menu.

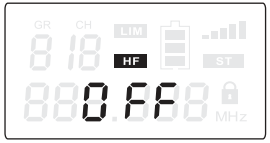


Press *[SET]* repeatedly until the *'CHANNEL'* field flashes on the display. Use the ▲ or ▼ buttons to increase or decrease the displayed value by one. When the desired value appears, press *[SET]* to confirm the setting and proceed to the next menu item. Press *[ESC]* to confirm the setting and exit the menu.

In the lower area, the display shows the used transmission frequency in MHz that is assigned to the set combination of frequency group and channel (*Chapter 7.3 'Frequency table' on page 30*).

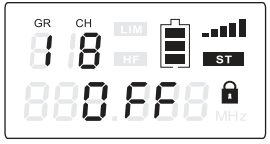
Transmitter and receiver must be set to the same combination of frequency group and channel. If you use multiple wireless systems from this device family, you will achieve the best results by assigning all systems to the same frequency group, but giving each system a different channel.

Turning on the treble boost



Press *[SET]* repeatedly until *'ON'* or *'OFF'* and the *'HF'* field start flashing on the display. Use the ▲ or ▼ buttons to turn the treble boost function on or off (display *'ON'* or *'OFF'*). If this function is enabled, the frequencies above 10 kHz are boosted by 6 dB and the display shows the *'HF'* field. If the function is disabled, there is no treble boost. Press *[SET]* to confirm the setting and proceed to the next menu item. Press *[ESC]* to confirm the setting and exit the menu.

Locking the settings



Press *[SET]* repeatedly until *'ON'* or *'OFF'* and the 🔒 symbol start to flash on the display. Use the ▲ or ▼ buttons to toggle between locked mode (display *'ON'*) and normal mode (display *'OFF'*). In locked mode, you can view the system settings, but you cannot change them. If the device is locked, the 🔒 symbol appears on the display. Press *[SET]* to confirm the setting and proceed to the next menu item. Press *[ESC]* to confirm the setting and exit the menu.

7 Technical specifications

7.1 Receiver

Number of channels	16	
Output connections	Earphones	1× 3.5-mm jack socket (stereo)
Audio output level	100 mW	
Output level adjustment	+3 dB	
Frequency range	863 MHz … 865 MHz	
Bandwidth	2 MHz	
Modulation type	Frequency modulation (FM)	
Sensitivity	–94 dBm @ 30 dB SINAD, typical	
Antenna gain	0.5 dBi	
NF frequency response	50 Hz…15 kHz (±3 dB)	
Image frequency rejection	≥ 55 dB	
Total harmonic distortion (THD)	< 1%	
Signal-to-noise ratio	> 85 dB (A)	

Battery	2 round cell batteries (AA, LR6)	
Dimensions (W × H × D), without antenna	105 mm × 64 mm × 23 mm	
Weight	100 g	
Ambient conditions	Temperature range	0 °C…40 °C
	Relative humidity	20%…80% (non-condensing)

7.2 Transmitter

Input connections	Power supply	Socket for connecting the power adapter
	Line input	2× XLR/6.35-mm jack combo socket, balanced
Output connections	Headphones	1× 6.35-mm jack socket (stereo)
Frequency range	863 MHz … 865 MHz	
Gain range	40 dB	
Max. transmission power	10 dBm	
Transmission level	10 dBm	

Maximum input level	> +8 dBu	
Bandwidth	2 MHz	
Modulation type	Frequency modulation (FM)	
Input impedance	6.8 KΩ	
Range in clear field of vision	> 50 m	
NF frequency response	60 Hz…16 kHz (±3 dB)	
Total harmonic distortion (THD)	< 1% @ 1 kHz	
Power supply	External power adapter, 100 - 240 V ~ 50/60 Hz	
Operating voltage	12…18 V ⎓ / 300 mA, centre positive	
Dimensions (W × H × D), without antenna	212 mm × 44 mm × 160 mm	
Weight	960 g	
Ambient conditions	Temperature range	0 °C…40 °C
	Relative humidity	20%…80% (non-condensing)

7.3 Frequency table

Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
863.100 MHz	863.900 MHz	864.500 MHz	864.900 MHz	863.200 MHz	863.300 MHz	863.400 MHz	863.500 MHz

Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16
863.600 MHz	863.700 MHz	863.800 MHz	864.000 MHz	864.100 MHz	864.200 MHz	864.300 MHz	864.400 MHz

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)

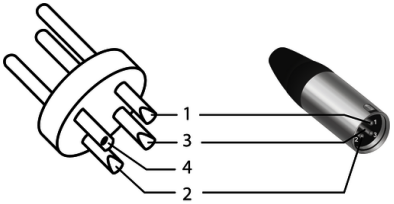
1	Signal
2	Ground, shielding

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:

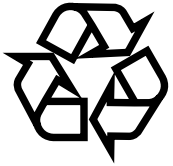
Symptom	Remedy
No sound	1. Check the power supply of the transmitter and receiver.
	2. Ensure that the transmitter and receiver are operating in the same frequency range and that the transmitter antenna is designed for this frequency range. The frequency range can be found on the devices.
	3. Are the transmitter and receiver set to the same frequency group and channel?
	4. 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?
	5. See if the sound transmission works when you move the receiver closer to the transmitter.
	6. Make sure that no metal objects near the transmitter or receiver are obstructing the transmission.
Transmission is interrupted	1. Modify the orientation of the antennas.

Symptom	Remedy
	2. If you are using more than one wireless system at the same time, check the used frequency groups and channels.
	3. Interference can also be caused by televisions, radios or mobile phones.
The sound is distorted	Change the setting of the "INPUT LEVEL" control 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*.

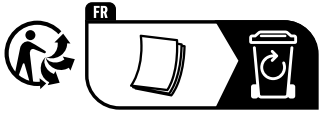
10 Protecting the environment

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.

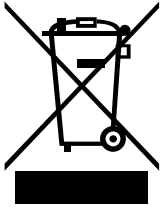
Disposal of batteries

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.

Before disposing of your old device, remove the batteries if this is possible without destroying it.

Dispose of the batteries or rechargeable batteries at suitable 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.