the t.bone
audio experience

TWS 16 HT 600/821/863 MHz

User Manual

UHF Wireless System

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25.02.2025, ID: 269812, 273718, 186343 (V3)

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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.
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 – high-voltage.
	Warning – danger zone.

2 Safety instructions

Intended use

This device is intended to be used for the wireless transmission of audio signals from microphones or instruments to amplifiers or active speakers. 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.

DANGER!

Danger to life due to electric current!

Within the device there are areas where high voltages may be present. Never remove any covers. There are no user-serviceable parts inside. Do not use the device when covers, safety equipment or optical components are missing or damaged.

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). Ensure that the power cord plug is easily accessible at all times if it is the only device to safely disconnect the device from the mains supply. 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.

NOTICE!

Damage to the device due to use of unsuitable external power supplies!

If the device is operated with an unsuitable external power supply, the device can be damaged by overvoltage or incorrect polarity. If things go badly, using an unsuitable power supply can also cause a risk of injury and fire. Only use the external power supply designated for the device or an equivalent external power supply with identical parameters. If in doubt, compare the voltage specifications on the external power supply and the polarity (+/-) with the specifications in this manual and printed on the device. Voltage and polarity must always match.

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 staining due to plasticiser in rubber feet!

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

3 Features

The UHF wireless system TWS 16 HT is particularly suitable for professional audio transmission, for example at events, on rock stages and in concert halls, theatres, musicals or night clubs.

TWS 16 HT 600 MHz (item no. 269812)

Your UHF wireless system TWS 16 HT consists of the following components:

- 9.5" diversity receiver DS 16R
  - Adjustable squelch
  - Two antennas for optimum reception quality
  - Very high sensitivity at very high signal-to-noise ratio
  - Outputs: XLR, 6.35-mm jack socket
  - Mounting in a 9.5-inch rack or (with a second TWS-16 receiver) in a 19-inch rack
  - Power supply: 12 V ⎓
- Handheld microphone DS 16H
- Included accessories: 12 V plug-in power supply, mounting material for rack mounting and cable with two 6.35 mm jack plugs
- Optionally available microphone clamp (item no. 150793)

Up to four systems can be operated simultaneously. The system operates in one of 16 switchable channels (in the range 606.225 MHz…629.825 MHz).

TWS 16 HT 821 MHz (item no. 273718)

Your UHF wireless system TWS 16 HT consists of the following components:

- 9.5" diversity receiver DS 16R
  - Adjustable squelch
  - Two antennas for optimum reception quality
  - Very high sensitivity at very high signal-to-noise ratio
  - Outputs: XLR, 6.35-mm jack socket
  - Mounting in a 9.5-inch rack or (with a second TWS-16 receiver) in a 19-inch rack
  - Power supply: 12 V ⎓
- Handheld microphone DS 16H
- Included accessories: 12 V plug-in power supply, mounting material for rack mounting and cable with two 6.35 mm jack plugs
- Optionally available microphone clamp (item no. 150793)

Up to four can be operated simultaneously. The system operates in one of 16 switchable channels (in the 821.725 MHz…831.450 MHz range).

TWS 16 HT 863 MHz (item no. 186343)

Your UHF wireless system TWS 16 HT consists of the following components:

- 9.5" diversity receiver DS 16R
  - Adjustable squelch
  - Two antennas for optimum reception quality
  - Very high sensitivity at very high signal-to-noise ratio
  - Outputs: XLR, 6.35-mm jack socket
  - Mounting in a 9.5-inch rack or (with a second TWS-16 receiver) in a 19-inch rack
  - Power supply: 12 V ⎓
- Handheld microphone DS 16H
- Included accessories: 12 V plug-in power supply, mounting material for rack mounting and cable with two 6.35 mm jack plugs
- Optionally available microphone clamp (item no. 150793)

Up to three systems can be operated simultaneously. The system operates in one of 16 switchable channels (in the 863.125 MHz…864.875 MHz range).

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

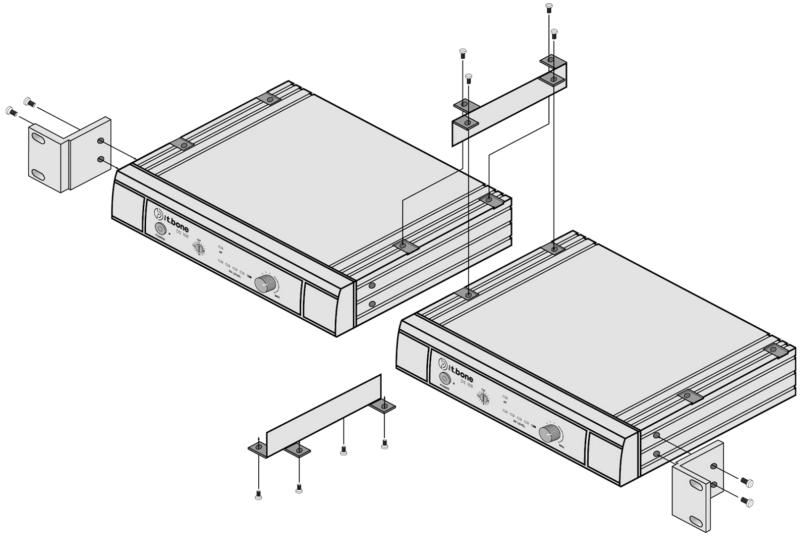
- This device utilizes frequencies that are not harmonized within the European Union (EU) and therefore may only be used in certain EU member states. In all European countries, the frequencies used for the transmission of audio signals are strictly regulated. Before you start, make sure the frequencies 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 Receiver

Rack mounting

The device is designed for mounting in a standard 9.5-inch rack; it occupies one rack unit (RU). The fixing material required for assembly is included.

Two devices can be mounted side by side in a 19-inch rack. Connect the two devices with the supplied connection brackets as shown in the drawing below.



Connecting the power supply

1. Connect the power supply to the receiver.
2. Plug the power supply into the wall socket.

Connecting audio and starting up

1. Connect one of the audio outputs of the receiver to your mixer or your amplifier.
2. Ensure that only one of the two outputs is ever used at a time, because faults might occur otherwise.
3. If you are using a microphone input on your mixer, turn the volume control to about 1 o'clock.

   If you are using a line input on your mixer, turn the volume control clockwise all the way to the stop.

   ⇨ If you are using a microphone input, the audio level on the output sockets is approximately 77 mV.

   ⇨ If you are using a line input, the audio level on the output sockets is approximately 770 mV.
4. To get the best sound quality, a fine adjustment of the controller may be required.

4.3 Handheld microphone

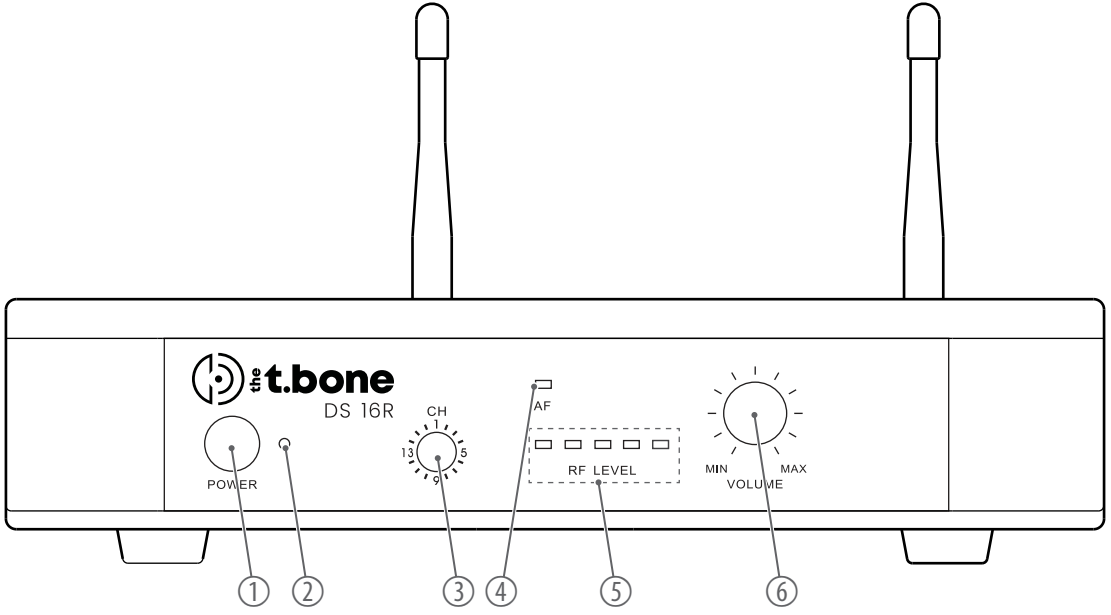
Inserting batteries

1. Unscrew the bottom housing section of the transmitter.
2. Open the battery compartment cover by lifting the clip.
3. Insert the batteries. Pay attention to the correct location of the poles. The correct battery arrangement is illustrated in the battery compartment.
4. Close the battery compartment.
5. Screw the lower housing part tight.
6. Turn on the transmitter.

5 Connections and controls

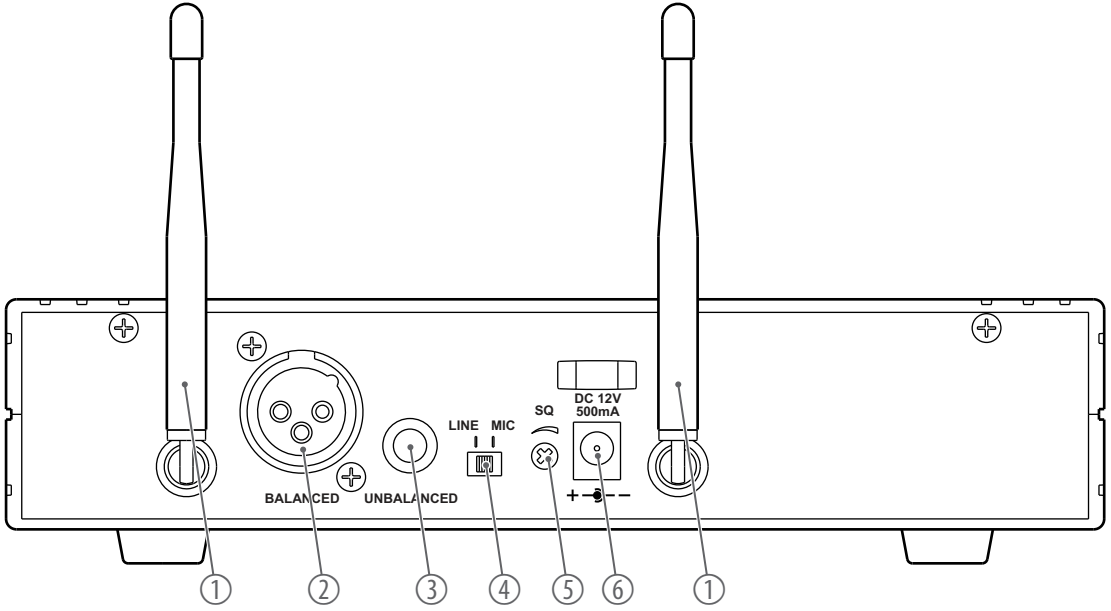
5.1 Receiver

Front panel



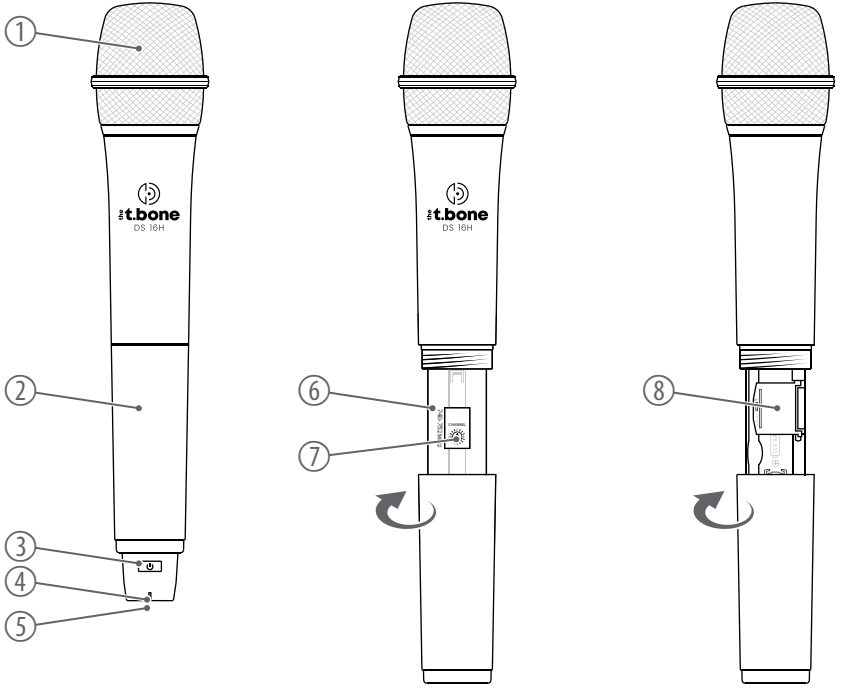
1	*[POWER]* | Main switch Turns the receiver on and off.
2	The indicator lights up red when the receiver is on and ready for operation.
3	*[CH]* | Rotary control for selecting a channel between 1 and 16
4	*[AF]* | The indicator lights up red when an audio signal is received.
5	*[RF LEVEL]* | The LEDs indicate the strength of the received carrier signal. The more LEDs are on, the better the reception. If no LED lights up, no signal is received.
6	*[VOLUME]* | Controls for setting the output level on the two audio outputs on the back

Rear panel



1	Suitable UHF antennas The receiver evaluates the radio signal coming from both antennas and selects the signal with the higher quality for further processing.
2	*[AUDIO OUTPUT – BALANCED]* | XLR panel plug as balanced audio signal output for direct connection to a mixer, power amplifier or recording device
3	*[AUDIO OUTPUT – UNBALANCED]* | 6.35-mm jack socket as unbalanced audio signal output for direct connection to a mixer, power amplifier or recording device
4	*[LINE/MIC]* | Level adjustment switch for the audio outputs. When connecting the audio output of the receiver to a line input, select the *[LINE]* position. When connecting the audio output of the receiver to a microphone input, select the *[MIC]* position.
5	*[SQUELCH]* | Shows the set squelch level for the radio signal. If the set value of the squelch is not reached, no sound is output. Setting the squelch too high can lead to dropped signals. Setting the squelch too low can cause unwanted noise.
6	*[DC INPUT]* | Socket for connecting the supplied power supply unit If you are using a different power supply, observe the correct voltage, the polarity of the plug and the power consumption.

5.2 Handheld microphone



1	Grid to protect the microphone from damage and to reduce wind and breathing noise
2	Lower housing part. Unscrew to open.
3	⏻ | Main switch Press the switch for several seconds to turn the transmitter on or off.
4	Power indicator The LED lights up when the transmitter is on.
5	Coloured markings symbolising the frequency range.
6	Indication of the frequency range in which the transmitter operates. The specification here must match the specification printed on the underside of the receiver.
7	*[CHANNEL]* | Rotary control for selecting a channel between 1 and 16 The transmitter and receiver must be set to the same channel.
8	Battery compartment for two round cell batteries (AA, LR06), 1.5 V or comparable rechargeable batteries To open, push the clip gently in the direction of the arrow and pull it up. To close, push down the clip until the clip engages.

6 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. Make sure that transmitter and receiver are operating in the same frequency range. The frequency range can be found on the devices.
	3. Are the transmitter and receiver set to the same channel?
	4. Test the connection between the receiver and the connected audio device (amplifier, mixer). Is the connected audio device turned on and does the signal level on the output of the receiver match the input requirements of the audio device?
	5. See if the audio transmission works when you move the transmitter closer to the receiver. The "SQUELCH" control may be set too high.
	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 frequencies and channels.
	3. Interference can also be caused by televisions, radios or mobile phones.
The sound is distorted	Change the “VOLUME” control settings on the receiver.

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

7 Technical specifications

7.1 Receiver

Number of systems that can be operated in parallel	600 MHz	4 systems
	821 MHz	
	863 MHz	3 systems
Input connections	Power supply	Socket for connecting the supplied power supply
Output connections	Line output	1 × XLR panel plug, balanced
	Tuner output	1 × 6.35 mm jack socket, unbalanced
Output level adjustment	10 dBV @THD < 1%	
Frequency range	600 MHz	606.225 MHz…629.825 MHz
	821 MHz	821.725 MHz…831.450 MHz
	863 MHz	863.125 MHz…864.875 MHz
Bandwidth	600 MHz	24 MHz
	821 MHz	11 MHz
	863 MHz	2 MHz

Sensitivity	–99 dBm	
Antenna gain	2.6 dBi	
NF frequency response	50 Hz…15 kHz (±3 dB)	
Total harmonic distortion (THD)	< 1%	
Signal-to-noise ratio	> 94 dB, at 20 kHz deviation and 60 dBµV from the antenna input	
Power supply	External power adapter, 100 - 240 V ~ 50/60 Hz	
Operating voltage/current	12 V ⎓ / min. 500 mA, polarity: Centre positive	
Dimensions (W × H × D)	210 mm × 50 mm × 189 mm	
Weight	515 g	
Ambient conditions	Temperature range	0 °C…40 °C
	Relative humidity	20%…80% (non-condensing)

7.2 Handheld microphone

Frequency range	600 MHz	606.225 MHz…629.825 MHz
	821 MHz	821.725 MHz…831.450 MHz
	863 MHz	863.125 MHz…864.875 MHz
Max. transmission power	10 mW	
Maximum input level	–13 dBV	
Bandwidth	600 MHz	24 MHz
	821 MHz	11 MHz
	863 MHz	2 MHz
Modulation type	Frequency modulation (FM)	
Input impedance	600 Ω	
Range in clear field of vision	Up to 70 m	
NF frequency response	50 Hz…15 kHz (±3 dB)	
Total harmonic distortion	< 1%	
Battery	Battery type	2 × round cell batteries (AA, LR06) or comparable rechargeable batteries

	Voltage	1.5 V
	Capacity	65 mA ± 5 mA
	Operating time	10 - 14 h
Dimensions (L × Ø)	250 mm × 55 mm	
Weight	218 g	
Ambient conditions	Temperature range	0 °C…40 °C
	Relative humidity	20%…80% (non-condensing)

7.3 Frequency charts

TWS 16 HT 600 MHz
(item no. 269812)

Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
606.225 MHz	607.225 MHz	609.625 MHz	610.225 MHz	611.025 MHz	611.625 MHz	615.025 MHz	619.225 MHz

Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16
619.625 MHz	621.225 MHz	621.625 MHz	624.825 MHz	625.425 MHz	627.225 MHz	628.625 MHz	629.825 MHz

TWS 16 HT 821 MHz
(item no. 273718)

Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
821.725 MHz	822.250 MHz	822.925 MHz	823.375 MHz	823.950 MHz	824.850 MHz	825.450 MHz	826.525 MHz

Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16
827.300 MHz	827.825 MHz	828.525 MHz	828.925 MHz	829.475 MHz	829.875 MHz	830.975 MHz	831.450 MHz

TWS 16 HT 863 MHz
(item no. 186343)

Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
863.125 MHz	863.375 MHz	863.625 MHz	864.000 MHz	864.250 MHz	864.500 MHz	864.750 MHz	864.875 MHz

Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16
863.250 MHz	863.500 MHz	863.750 MHz	863.875 MHz	864.125 MHz	864.375 MHz	864.625 MHz	864.875 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.

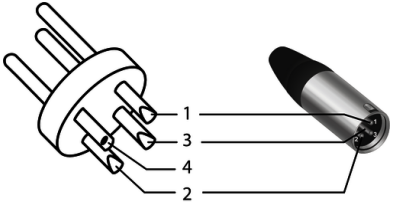
In a professional environment, therefore, the balanced transmission is preferred, because this enables an undisturbed transmission of signals over long distances. In addition to the conductors 'Ground' and 'Signal', in a balanced transmission a second core is added. This also transfers the signal, but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

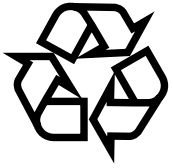
XLR plug (balanced)



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

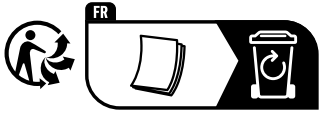
9 Protecting the environment

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.



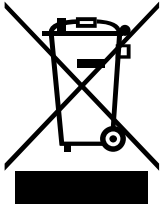
Observe the disposal note regarding documentation in France.

Disposal of batteries and rechargeable batteries

Do not dispose of batteries and rechargeable batteries with normal household waste, but in accordance with the local regulations for the disposal of hazardous waste. Use the available collection sites or contact your local waste disposal facility.

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

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. For example, use the classified ads of Thomann GmbH.

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