SENNHEISER

HMEC 460

Instructions for use

NoiseGard™

Contents

Thank you for choosing Sennheiser!

We have designed this product to give you reliable operation over many years. Over 60 years of accumulated expertise in the design and manufacture of high-quality electro-acoustic equipment have made Sennheiser a world-leading company in this field.

Please take a few moments to read these instructions carefully, as we want you to enjoy your new Sennheiser products quickly and to the fullest.

Safety instructions

- Please read these instructions carefully and completely before using the headset.
- Make these instructions easily accessible to all users at all times.
- Always include these instructions when passing the headset on to third parties.
- During flight operation, do not use the headset for telephone calls.
- With the NoiseGard active noise compensation switched on, typical aircraft sounds (for example, those from engines, propellers, warning alarms, etc.) may sound different to you. Before operating any aircraft, make sure that, with NoiseGard switched on, you can hear and recognize these sounds. Set the volume to safe levels that do not interfere with your ability to hear informational sounds and warning alarms.
- The headset is capable of producing sound pressure exceeding 85 dB(A). 85 dB(A) is the sound pressure corresponding to the maximum permissible volume which is by law (in some countries) allowed to affect your hearing for the duration of a working day. Higher volumes or longer durations can damage your hearing!
- Never repair or attempt to repair a defective headset yourself. Contact your Sennheiser agent or the Sennheiser Service Department.
- Only replace parts of the headset whose replacement is described in this manual. All other parts of the headset must be replaced by your Sennheiser agent.

- Protect the headset from humidity. Only use a slightly damp cloth to clean the headset. For information on how to clean the headset, contact your Sennheiser agent.

Intended use of the headset

Intended use includes:

- having read and understood these instructions, especially the chapter ''Safety instructions''.
- using the headset in helicopters, propeller and turboprop aircraft and within the operating conditions and limitations described in these instructions.

Improper use

''Improper use'' means using the headset other than as described in these instructions, or under operating conditions which differ from those described herein.

The HMEC 460 headset

The HMEC 460 is a pilot headset with closed ear protector headphones and NoiseGard active noise compensation for use in helicopters, propeller and turboprop aircraft.

The headset has the following features:

- Flexible microphone boom with quick-fixing device
- Lightweight
- Comfortable leatherette earpads (replaceable)
- Padded headband
- Headband padding can be buttoned
- Single-sided connecting cable
- Folding mechanism for space-saving transport
- Stylish silver design
- Good attenuation of ambient noise due to NoiseGard active noise compensation
- Clear communications even in the noisiest environment due to NoiseGard active noise compensation and MKE 45-1 pre-polarized condenser microphone with adjustable sensitivity
- Increased speech intelligibility due to a frequency response optimized in the 500 Hz to 5 kHz region

- Adaption to the aircraft intercom system via mono/stereo switch
- Separate volume control for left and right channel
- Boom switch for microphone boom left/right position
- With the NoiseGard active noise compensation switched off, the headset can be used as a conventional headset
- ''Audio-In'' signals from the 3.5 mm jack socket mute automatically in the presence of intercom and/or RT traffic
- 2.5 mm jack socket for connecting a mobile telephone
- 3.5 mm jack socket for connecting a portable audio player
- Three options for powering NoiseGard
  (on-board power supply system, cigarette lighter socket or batteries)
- Fail safe operation in case of power failure
- 10-year warranty and ''Made in Germany''

Delivery includes

1 HMEC 460 headset

1 audio cable (1.4 m) with 2 x 2.5 mm stereo jack for compatible mobile telephones

1 audio cable (1.4 m) with 2 x 3.5 mm stereo jack for portable audio players

1 padded carry and storage bag for headset and accessories

1 wind shield for microphone

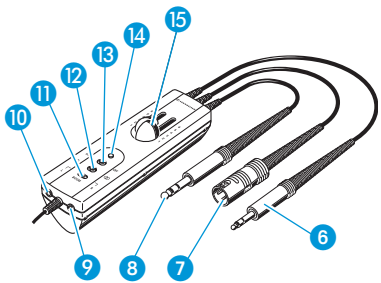
1 MZQ 2002-1 cable clip

1 instruction manual

Overview of operating elements

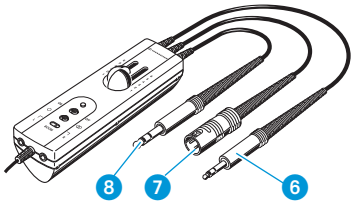
Headset

1. Headband padding
2. Quick-fixing device
3. Microphone
4. Earpads
5. Headband



Operating control

6. 5.25 mm jack plug (PJ-068 equivalent)
7. XLR-3 plug
8. ¼" (6.35 mm) jack plug
9. 2.5 mm jack socket
10. 3.5 mm jack socket
11. Boom switch
12. Mono/stereo switch
13. ON/OFF switch
14. LED for operation and battery status indication
15. Separate slide volume controls for left and right channel



Connecting cable

1 5.25 mm jack plug (PJ-068 equivalent) 6 for connecting the microphone

1 ¼" (6.35 mm) jack plug 8 for connecting the headphones

1 XLR-3 plug 7 for connecting the power supply for the NoiseGard electronics

Preparing the headset for use

Connecting the headphones and the microphone

To connect the headset to the intercom:

▶ Connect the jack plugs 6 and 8 to the corresponding jack sockets of your intercom.

Powering the NoiseGard active noise compensation

There are three options for powering the NoiseGard active noise compensation:

1. Connection to the on-board DC power supply system (12–35 V_{DC})
2. Connection to the cigarette ligther socket (12–35 V_{DC}) via an adapter cable (optional accessory)
3. Power supply via two AA batteries (not included) inserted in the operating control

The supply voltage for the NoiseGard system is processed by the in-line electronics in the connecting cable.

CAUTION! **Danger of short circuit!**

In the unlikely case of a fault, a short circuit could occur.

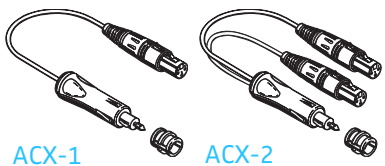
- Before switching NoiseGard on, ensure that the aircraft electrical circuit which supplies the headset from the on-board DC power supply system is protected by a 1 A fuse.

Connecting the headset to the on-board DC power supply system

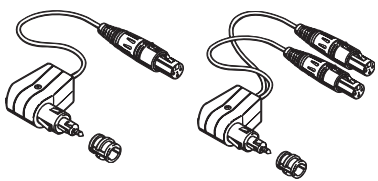
To power the NoiseGard electronics, you can connect the headset to the on-board DC power supply system (12–35 V_{DC}).

- ▶ Have a 3-pole XLR socket (optional accessories) be mounted by a technician qualified to perform this type of installation.
- ▶ Connect the XLR-3 plug (7) to the 3-pole XLR socket.

Connecting the headset to a cigarette lighter socket (12–35 V_{DC}) via an adapter cable



ACX-1 ACX-2



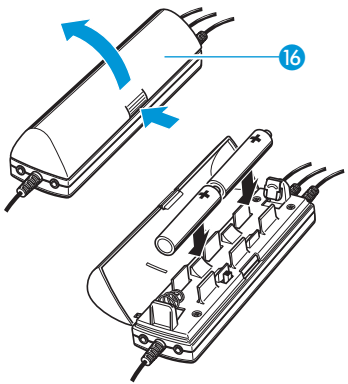
ACX-11 ACX-22

Sennheiser offers special adapter cables with XLR-3 socket for connecting the NoiseGard electronics of the headset to the on-board DC power supply via the cigarette lighter socket:

- ACX-1 adapter cable for powering one headset via the cigarette lighter socket
- ACX-2 adapter cable for powering two headsets via the cigarette lighter socket

The adapter cables are also available with a right-angled jack plug featuring a 7.5 A fuse and a green LED operation indicator:

- ACX-11 adapter cable for powering one headset via the cigarette lighter socket
- ACX-22 adapter cable for powering two headsets via the cigarette lighter socket



To connect the headset via an adapter cable:

- Connect the XLR-3 plug 7 of the headset to the XLR-3 socket of the adapter cable.
- Connect the plug or right-angled jack plug of the adapter cable to the cigarette lighter socket.

Powering the NoiseGard electronics via two (rechargeable) batteries

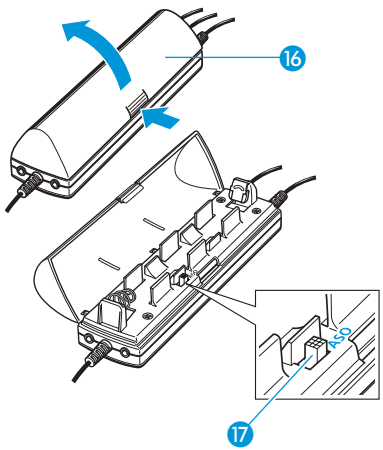
- Open the cover of the battery compartment 16 on the operating control.
- Insert two 1.5 V AA alkaline-manganese batteries (IEC LR 6) or two 1.2 V AA NiMH rechargeable batteries. Observe correct polarity.
- Close the cover of the battery compartment 16.

With NoiseGard switched on (see "Switching NoiseGard on/off" on page 21), the LED 14 provides information on the remaining battery/rechargeable battery capacity.

LED 14 lights up yellow:	The battery capacity is sufficient.
LED 14 lights up red:	The batteries are flat. Replace the batteries.

If the battery voltage is too low, NoiseGard automatically switches off to protect the batteries from total discharge and leakage.

- Replace the batteries or recharge the rechargeable batteries.



Activating the ‘‘auto shut-off’’ function

The battery-saving ‘‘auto shut-off’’ function automatically switches the NoiseGard electronics off when the headset is disconnected from the intercom or when the aircraft avionics are switched off. The headset is delivered ex-works with the ‘‘auto shut-off’’ function deactivated.

To activate the ‘‘auto shut-off’’ function:

- ▶ Open the cover of the battery compartment 16 on the operating control.
- ▶ Set the switch 17 to the position ‘‘ASO’’.
- ▶ Close the cover of the battery compartment 16.

Connecting a mobile telephone

The 2.5 mm jack socket 10 allows you to connect a mobile telephone. A suitable adapter for your mobile telephone with 2.5 mm jack socket is available from your Sennheiser agent.

DANGER! **Danger of accident due to reduced attention!**

Making telephone calls or operating the mobile telephone limits your attention and may cause accidents.

▶ During flight operation, do not use the headset for telephone calls!

Note:

The latest information on cell phone compatibility can be downloaded from the HMEC 460 product page at www.sennheiser.com.

▶ Connect the audio cable to the 2.5 mm jack socket ⑩ on the operating control and to the corresponding 2.5 mm jack socket on your mobile telephone.
You can adjust the volume of the mobile telephone via the headset's operating control. However, the functions of the mobile telephone cannot be controlled via the headset's operating control.

▶ Switch NoiseGard on (see page 21).
Audio from the mobile telephone and from the intercom are heard simultaneously through the headset.

▶ Operate your mobile telephone as usual and observe the manufacturers instructions.

Connecting an additional audio player

The operating control has a 3.5 mm jack socket (9), allowing you to connect an additional audio player. The required audio cable fitted with two 3.5 mm jack plugs is included.

DANGER! **Danger of accident due to reduced attention!**

Listening to music or operating an audio device limits your attention and may cause accidents.

- During flight operation, do not use the headset for listening to additional audio sources!

Hearing damage due to high volumes!

This headset is capable of producing high sound pressure levels. Higher volumes or longer durations can damage your hearing!

- Set the volume to a medium level. Make sure that you can hear critical sounds such as warning alarms.

- Connect the audio cable to the 3.5 mm jack socket (9) on the operating control and to the corresponding 3.5 mm jack socket on your audio player.
- Switch NoiseGard on (see page 21).
  "Audio-In" signals mute automatically in the presence of intercom and/or RT traffic.

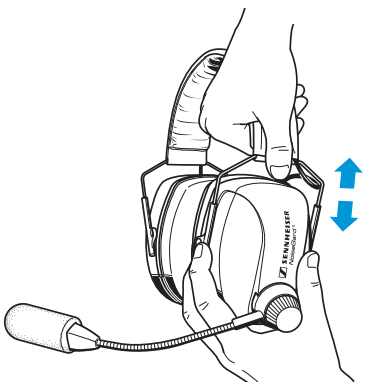
Adjusting the headset

Adjusting the headband

For good noise attenuation and best possible comfort, the headband has to be adjusted to properly fit your head:

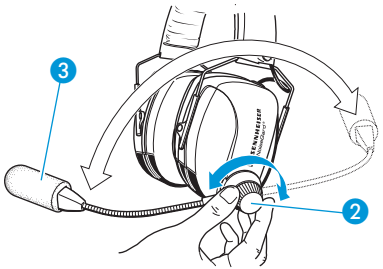
Note:

Make sure not to squeeze any connecting cable when adjusting the headband. Squeezing can damage the connecting cables.



- ▶ Wear the headset so that the headband runs over the top of your head.
- ▶ Adjust the length of the headband as shown so that
  - – your ears are completely inside the earpads,
  - – you feel even, gentle pressure around your ears,
  - – a snug fit is ensured.

Rotating the microphone boom

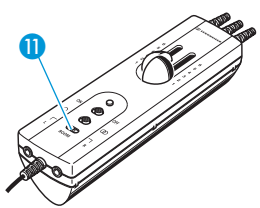


The microphone boom can be worn on either side of the mouth.

- Loosen the quick-fixing device 2.
- Rotate the microphone boom 3 by 180°.
- Tighten the quick-fixing device 2.

Changing the left and right stereo channel

The operating control is fitted with a boom switch 11. The position "R" or "L" of the boom switch corresponds to the position of the microphone on the left or right side of the mouth. When the microphone boom is rotated to permit left or right side microphone orientation, the boom switch allows you to correctly assign the audio channels (L/R) to the appropriate headphone sides. This enables the correct orientation of the volume controls and any stereo audio signals.

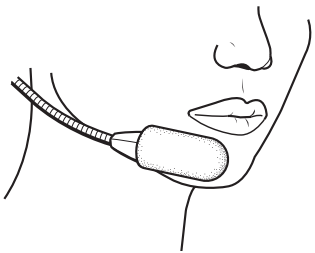


If the microphone is worn on the right side of the mouth:

- Set the boom switch 11 to the position "R".

If the microphone is worn on the left side of the mouth:

- Set the boom switch 11 to the position "L".



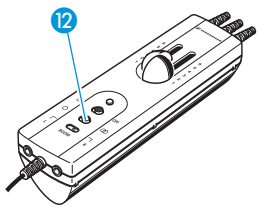
Positioning the microphone towards the corner of the mouth

The microphone boom is flexible, so you can position it individually.

- Bend the microphone boom so that the microphone is placed at the corner of the mouth. Maintain a distance of approx. 2 cm between microphone and mouth.

Using the headset

Switching between mono and stereo mode



The operating control is fitted with a mono/stereo switch, which allows you to switch between mono and stereo mode to suit the aircraft radio / audio panel / intercom installation.

If the audio panel, intercom system or radio installation in your aircraft is mono:

▶ Set the mono/stereo switch 12 on the operating control to position "◯" (mono).
The RT and or intercom will be heard in both ears.

If the audio panel, intercom system or radio installation in your aircraft is stereo, for example if there is a music player such as a CD player installed in the panel:

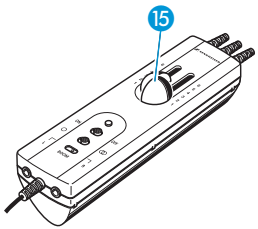
▶ Set the mono/stereo switch 12 on the operating control to position "◯◯" (stereo).
The left and right channels from the audio panel will be fed to the corresponding sides of the headset.

Notes:

– If you set the mono/stereo switch to "◯◯" (stereo) and you find that you only hear RT or intercom in one side of the headset then you should set the mono/stereo switch to "◯" (mono).

– Setting the mono/stereo switch to "◯" (mono) when the aircraft panel is wired as a stereo system will result in you hearing only the left channel of audio from the panel in both sides of the headset. Depending on how the panel is configured you may not hear some sounds from the panel in this case. Refer to the aircraft operating handbook or a qualified avionics engineer.

Adjusting the volume



The operating control is fitted with two slide volume controls 15 with which you can adjust the volume for the left and right channel separately.

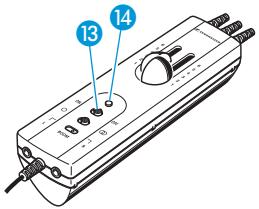
CAUTION! **Hearing damage due to high volume levels!**

The headset is capable of producing high sound pressure levels. Higher volumes or longer durations can damage your hearing!

▶ Adjust the volume to a medium level. Make sure that you can hear critical sounds such as warning alarms.

▶ Use the two slide controls 15 to adjust the desired volume.

Switching NoiseGard on/off



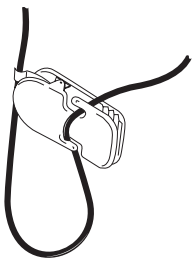
▶ Set the NoiseGard ON/OFF switch 13 to the desired position: “ON” or “OFF”.

ON: NoiseGard is switched on. The LED 14 lights up, indicating the battery status (see page 12) or power supply via the on-board DC power supply system.

OFF: NoiseGard is switched off. The LED 14 goes off.

With the NoiseGard active noise compensation switched off, the headset can be used as a conventional headset.

Attaching the cable clip



The headphone cable can be fixed by means of the cable clip.

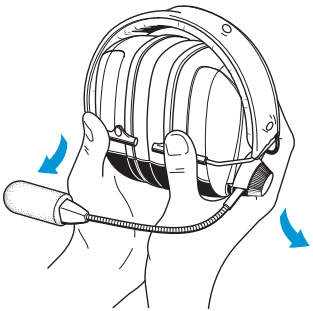
▶ Guide the headphone cable through the metal cable clip as shown.

▶ Attach the cable clip to your clothing.

▶ Loop the cable through the clip so that the headphone cable doesn’t hinder or distract you.

Folding up the headphones

For easy and space-saving transportation, the earcups can be folded up and tucked between the headband.



To fold up the headphones:

- Grasp both earcups.
- Fold up the earcups and tuck them between the headband.

To unfold the headphones:

- Grasp both earcups.
- Pull the earcups down and away from the headband.

Care and maintenance

Cleaning the headset

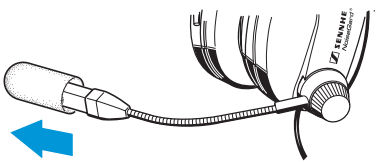
CAUTION! **Danger of short-circuit due to the ingress of water!**

Water entering the housing of the headset can cause a short-circuit and damage the electronics.

- Only use a soft, slightly damp cloth to clean the headset. Do not use any solvents or cleansing agents.

- Use a soft, slightly damp cloth to clean the headset from time to time.
- If the headset is very dirty, use a cloth dampened with mild, soapy water.

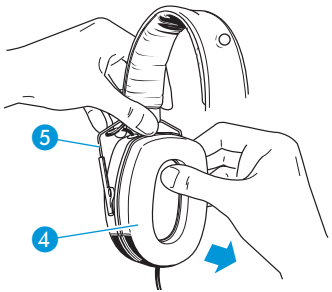
Replacing the wind shield



To replace a damaged wind shield, proceed as follows:

- Carefully pull the wind shield from the microphone.
- Slide-on the new wind shield and ensure that it fits securely over the microphone.

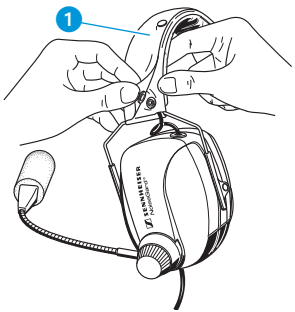
Replacing the earpads



To replace a damaged earpad, proceed as follows:

- Hold the headset on the outside of the earcup and on the headband 5.
- Grasp the edge of the earpad 4 behind the earcup as shown and peel it up and away from the earcup.
- Slide the new earpad onto the earcup. Repeat for the other earcup.

Replacing the headband padding



To replace a damaged headband padding, proceed as follows:

- Open the snaps on the headband padding 1 and remove it.
- Put the new headband padding around the headband.
- Close the snaps.

If a problem occurs...

Problem	Possible cause	Possible solution
No active noise compensation	The NoiseGard electronics are switched off.	Set the NoiseGard ON/OFF switch to "ON".
	The batteries/ rechargeable batteries are low.	Check to see if the LED is lit yellow. If the LED is lit red, replace the batteries/rechargeable batteries.
	The XLR-3 plug is not connected to the power source.	Connect the XLR-3 plug to the power source.
	The aircraft fuse is defective.	Replace the aircraft fuse.

Problem	Possible cause	Possible solution
Active noise compensation but very low volume communication	The volume is set too low.	Increase the volume of your headset.
	The headphone jack plug is not connected correctly.	Connect the headphone jack plug.
Active noise compensation but reduced intelligibility	The microphone jack plug is not connected correctly.	Connect the microphone jack plug.
Communications in one ear only	You are receiving a mono source but the headset is set to stereo operation.	Set the mono/stereo switch to "◯" (mono).

If a problem occurs that is not listed in the above table or if the problem cannot be solved with the proposed solutions, please contact your local Sennheiser agent for assistance.

Accessories/spare parts

Product name	Product description	Cat. No.
–	Gel earpads	093807
–	Spare earpads	517607
ACX-1	Adapter cable for powering one headset	ACX-1
ACX-11	Adapter cable for powering two headsets	ACX-11
ACX-2	Adapter cable with a right-angled jack plug for powering one headset	ACX-2
ACX-22	Adapter cable with a right-angled jack plug for powering two headsets	ACX-22
MZW 45	Wind and pop shield	075823
MZQ 2002-1	Cable clip	044740
–	Padded carry and storage bag for headset and accessories	078366
–	Headband padding	515462
–	Audio cable with two 2.5 mm stereo jacks	515468
–	Audio cable with two 3.5 mm stereo jacks	515466
–	XLR 3-pole socket	048883

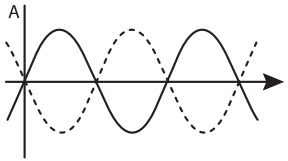
Valuable information on NoiseGard

The NoiseGard principle

One of the greatest stress factors today is noise. Research has shown that noise affects the nervous system, and can cause tiredness, poor concentration, irritability and tension. Of even greater concern is the permanent damage to hearing that can result from noise at high levels.

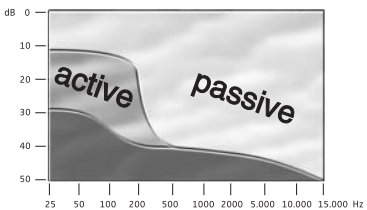
This problem concerns pilots in particular. Cockpit noise amounts to about 80 dB(A) in jets and to 90 up to 97 dB(A) in turboprops. During takeoff and landing, the noise level is even higher. To be able to understand radio traffic in spite of the noisy environment, the ATC signal level must be set to at least 95 dB(A). Permanent hearing loss caused by the continuous noise in aircraft is one reason why many pilots became prematurely disabled or lose their pilot´s license.

Circumaural communication headsets provide noise attenuating properties and are commonly used to address this problem. However, the noise attenuation of these headsets is uneven. High frequencies are reduced considerably, but low frequency wind and engine noise, the most prominent noise in many of today's aircraft, is attenuated very little. In response to these problems, Sennheiser has developed an active noise compensation system – NoiseGard – which, combined with a high-quality passive hearing protector, provides consistent noise attenuation over the entire audio range. The overall noise level is reduced so that the radio volume can be turned down but enough noise still remains for the pilot to safely monitor the aircraft engines.



NoiseGard active noise compensation is achieved by generating a signal identical in sound pressure level but exactly reversed in phase to the noise signal, the effect being that the out-of-phase signal cancels most of the noise signal.

Active noise compensation is accomplished in the following manner: Each earcup includes a microphone, a feedback control circuit, and a transducer to reproduce both the communication and the noise cancelling signal. The feedback control microphones sense the total sound pressure within each earcup resulting from both the desired radio signal from the receiver and the undesired noise that has come through the earcup. The microphone signal is amplified and the radio signal is subtracted from it. The remaining signal (noise) is then filtered and inverted and the radio signal is added back in. Eventually, the entire signal is amplified and fed back to the transducer in each earcup. Since the noise component of the signal is inverted, it cancels the noise signal coming through the earcup. The radio signal remains unaffected, as it was not processed through the cancellation circuits.



The diagram on the left shows noise compensation with NoiseGard: Passive hearing protectors effectively attenuate noise from the middle and upper frequency range, the effect decreasing sharply in the lower range. However, active noise compensation with NoiseGard combined with passive hearing protectors results in a reduction of noise of approx. 25 dB in the 25–500 Hz frequency range. The total attenuation resulting from active and passive noise compensation is about 30 dB over the entire audio range.

A 10 dB reduction in noise is perceived subjectively as a halving in volume. A further reduction in noise of 10 dB again results in a decrease in unwanted noise by 50 %.

Specifications

Headphones

Transducer principle	dynamic
Ear coupling	circumaural, closed
Frequency response	20–20,000 Hz
Nominal impedance active/passive	400/300 Ω, mono 600/600 Ω, stereo
Attenuation (active/passive)	> 25–40 dB
Contact pressure	approx. 8 N

Microphone incl. preamplifier

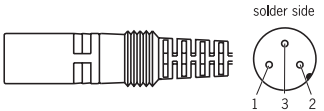
Transducer principle	pre-polarized condenser microphone capsule, noise-compensating, MKE 45-1
Frequency response	300–5,000 Hz
Max. sound pressure level	120 dB
Min. terminating impedance	150 Ω
Output voltage	400 mV ± 3 dB at 114 dB (as per RTCA/DO 214)
Supply voltage	typ. 16 V_{DC} (8-16 V_{DC}, approx. 8-25 mA, as per RTCA/DO 214)

General data

Connecting cable	1.5 m, single-sided
Weight without cable	370 g
Power supply for NoiseGard	12–35 V_{DC}
Fuse	1.5 A fuse
Connectors	5.25 mm jack plug (PJ-068 equivalent) for microphone, ¼" (6.35 mm) jack plug for headphones, XLR-3 plug for NoiseGard
Controls	mono/stereo switch on/off switch for NoiseGard LED for operation and battery status indicator volume control for headphones
Temperature range	operation: -15 °C to +55 °C storage: -55 °C to +55 °C
Operating time	approx. 30 hours with two 1.5 V AA alkaline-manganese batteries or two 1.2 V AA NiMH rechargeable batteries

Connector assignment

XLR-3 plug

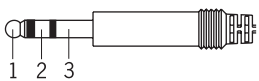


1 Power supply for NoiseGard (12–35 V_{DC+})
2 Ground
3 Not assigned!

5.25 mm jack plug (PJ-068 equivalent)

1 Not assigned!
2 Microphone High
3 Microphone Low

¼" (6.35 mm) jack plug



1 Audio High left
2 Audio High right
3 Audio Low

Manufacturer Declarations

Warranty

The original Sennheiser product you have purchased is covered by a warranty of 10 years. The warranty period begins on the date of purchase of brand new, unused products by the first end user. Please retain your sales receipt (or your warranty certificate) as proof of purchase. Unless you submit proof of purchase, which will be verified by your local Sennheiser service partner, you will be obliged to pay for any repairs that are carried out. Proof of purchase must state the date of purchase and name of the product.

We shall satisfy our warranty obligations by remedying any material or manufacturing faults free of charge at our discretion either by repair or by exchanging individual parts or the entire appliance. Any defective parts removed from a product during the course of a warranty claim shall become the property of Sennheiser electronic GmbH & Co. KG.

The following cases are not covered by the above warranty:

- minor faults or deviations in the quality of a product which do not affect the product's value or fitness for its intended purpose
- any accessories supplied with the product
- rechargeable and disposable batteries (these products have a shorter service life, the length of which also depends on the frequency of use)
- faults resulting from improper use (e.g. operating errors, mechanical damage, incorrect operating voltage)
  Proper use for the purposes of this warranty is defined as use of the product under the conditions stated in the instructions for use.
- faults due to wear and tear

- any modification of Sennheiser products effected by you or a third party, unless Sennheiser has given its prior written consent to the nature and extent of the modification
- faults due to force majeure
- faults of which the purchaser was already aware at the time of purchase

All warranty claims become void if the product is tampered with by unauthorised persons or repair shops.

Warranty claims can be enforced in any country throughout the world in which the statutory rights of the country concerned are not in conflict with our warranty regulations. No other warranty claims or claims over and above the rights stated in these terms and conditions will be accepted.

Consumers may be entitled to statutory rights in their own countries which are not restricted by these warranty terms and conditions, as the warranty is governed by the laws of the country in which the Sennheiser product was purchased by the consumer. The provisions of the UN Convention on the International Sale of Goods do not apply to this service.

If you wish to file a claim under the warranty, please send the product to your local service partner, together with accessories and proof of purchase.

The customer bears the risk of shipment. To avoid any damage in transit, please use the original packaging if possible.

CE Declaration of Conformity

This equipment is in compliance with the essential requirements and other relevant provisions of Directive 2004/108/EC. The declaration is available on the internet site at www.sennheiser.com.

Before putting the device into operation, please observe the respective country-specific regulations!

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