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S1 DIGITAL

SENNHEISER

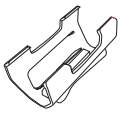
Delivery includes

S1 DIGITAL headset

Transport case for headset and accessories

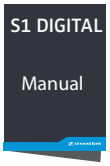
Cable clip

Wind and pop screen



Belt clip

Reference Guide



Instruction manual

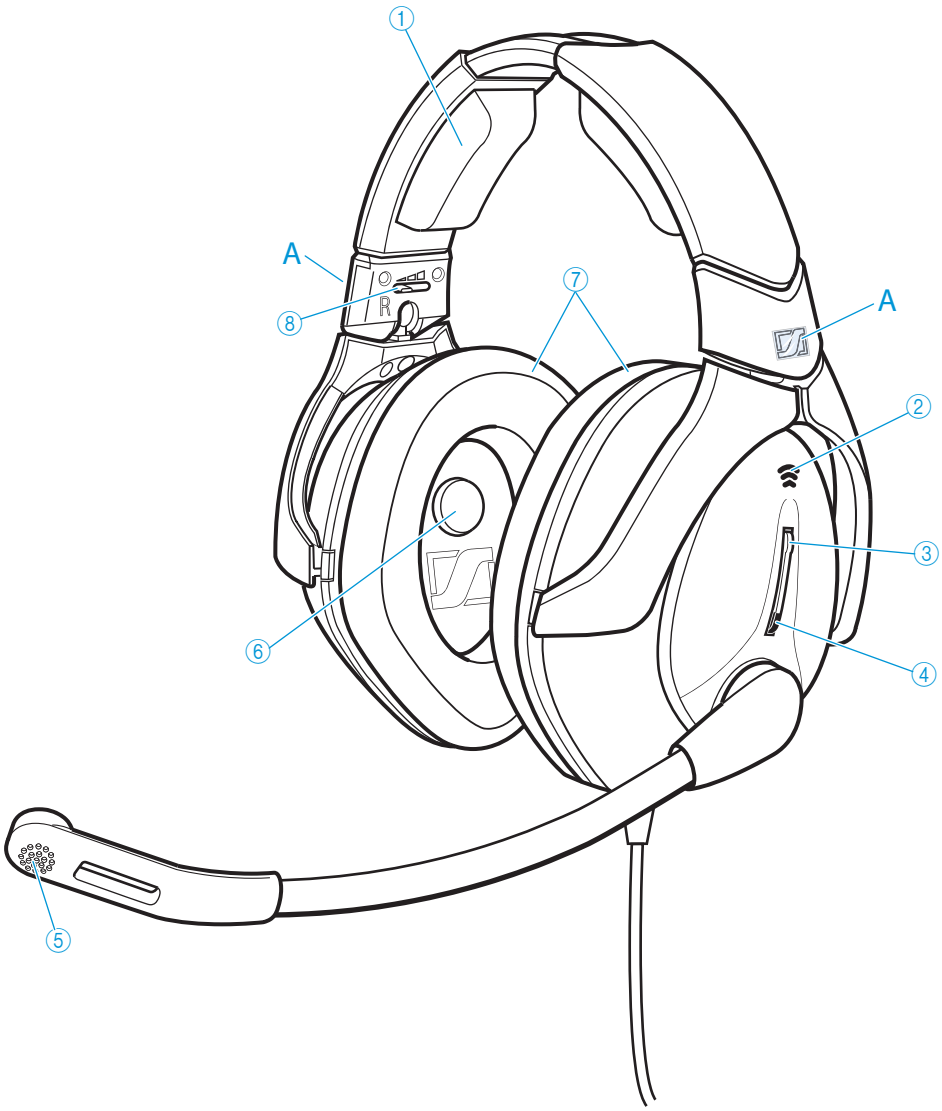
A list of accessories can be found on the S1 DIGITAL product page at www.sennheiser-aviation.com or www.sennheiser.com.

For information on suppliers, contact your local Sennheiser partner:

- www.sennheiser-aviation.com > ‘‘Purchase Information’’
- www.sennheiser.com > ‘‘Service & Support’’

Product overview

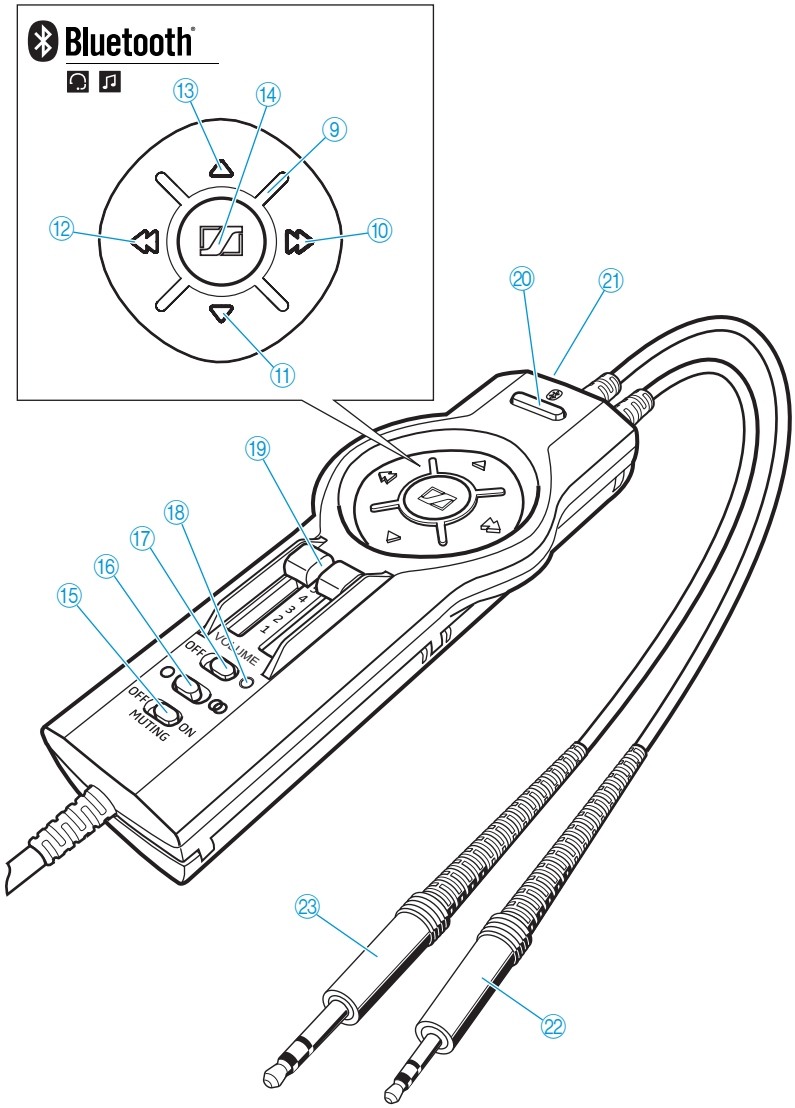
Overview of the headset



1. Headband padding
2. (Outer) NoiseGard™/digital microphone
3. Smart Update button
4. LED Smart Update LED
5. Microphone
6. (Inner) NoiseGard™/digital microphone
7. Ear pads
8. Contact pressure slide switch

Before wearing the headset, remove the protective foil A from the Sennheiser logo.

Overview of the control unit



⑨ LED

⑩ Fast-forward button

⑪ Volume button

⑫ Rewind button

⑬ Volume button

⑭ Multi-function button

⑮ MUTING OFF/ON switch

⑯ Mono /stereo switch

⑰ Power OFF/ON switch

⑱ Power LED

⑲ Master VOLUME slide control

⑳ Phone button

㉑ Hollow jack socket for optional power supply

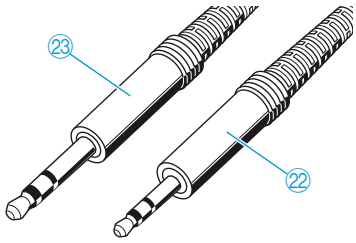
㉒ 5.25 mm jack plug (PJ-068 equivalent)

㉓ ¼" (6.35 mm) jack plug (PJ-055 equivalent)

You can directly remote-control any **Bluetooth** device supporting the AVRCP profile and connected to the S1 DIGITAL by using the operating elements ⑨ to ⑭.

Putting the S1 DIGITAL into operation

Connecting the headset to the intercom



▶ Connect the jack plugs of the control unit to the corresponding jack sockets of your intercom.

Jack plug of the control unit	Jack socket of the intercoms
5.25 mm jack plug ㉒	Microphone input
¼" (6.35 mm) jack plug ㉓	Headphone output

Powering the headset

WARNING

Danger of short circuit!

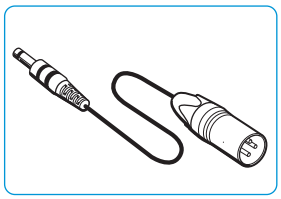
Technical defects can cause a short circuit.

▶ Before putting the headset into operation, ensure that the socket of the on-board DC power supply system is protected by a 1 A fuse.

There are different options for powering the headset:

- Connection to the on-board DC power supply system (12 – 35 V_{DC}) via a mounted 3-pole XLR socket or the cigarette lighter socket
- Power supply via two batteries/rechargeable batteries inserted in the control unit (to be ordered separately)

Connection via a 3-pole XLR socket



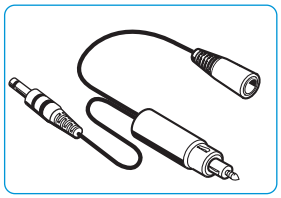
The Adapter-P-XLR-3 adapter cable (optional accessory available from your Sennheiser partner) allows you to connect the headset to the on-board DC power supply system (12 – 35 V_{DC}) via a mounted 3-pole XLR socket.

▶ Have a 3-pole XLR socket (optional accessory) mounted by a technician qualified to perform this type of installation.

▶ Connect the Adapter-P-XLR-3 adapter cable to the mounted 3-pole XLR socket.

▶ Connect the hollow jack plug of the adapter cable to the hollow jack socket on the control unit.

Connection via the cigarette lighter socket



The Adapter-P-CIG adapter cable (optional accessory available from your Sennheiser partner) allows you to connect the headset to the on-board DC power supply system (12 – 35 V_{DC}) via the cigarette lighter socket.

▶ Connect the cigarette lighter plug to the on-board DC power supply system.

▶ Connect the hollow jack plug of the adapter cable to the hollow jack socket on the control unit.

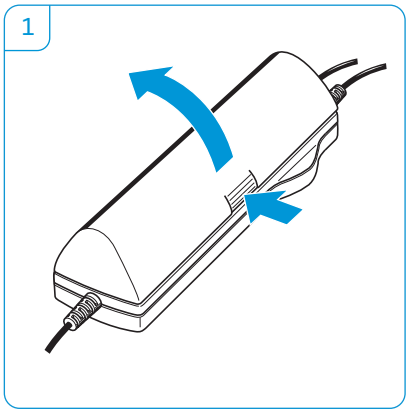
▶ Where required, connect an additional device to the XLR-3 socket of the adapter cable (max. 1 A).

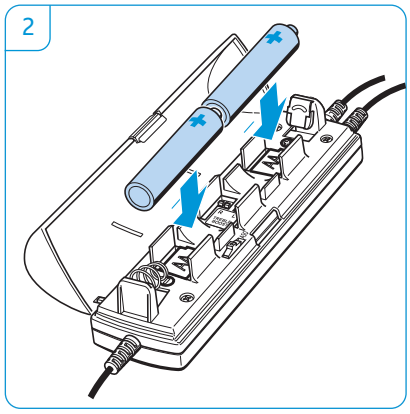
Power supply via two batteries/rechargeable batteries

1 Open the cover of the battery compartment on the control unit.

2 Insert two AA size batteries/rechargeable batteries. Observe correct polarity.

3 Close the cover of the battery compartment.





When you switch the headset on (see page 16), the Power LED ⑱ provides information on the remaining battery/rechargeable battery capacity.

LED lights up yellow: The battery/rechargeable battery capacity is sufficient.

LED lights up red: The batteries/rechargeable batteries are flat.

Type of use	Type	Operating time
NoiseGard™/digital	Alkaline batteries/rechargeable batteries	approx. 25 hrs
	Lithium batteries	approx. 40 hrs
NoiseGard™/digital and **Bluetooth** technology	Alkaline batteries/rechargeable batteries	approx. 15 hrs
	Lithium batteries	approx. 25 hrs

If the battery capacity is low, the headset automatically switches off to protect the batteries/rechargeable batteries from total discharge and leakage.

▶ Replace the batteries or recharge the rechargeable batteries.

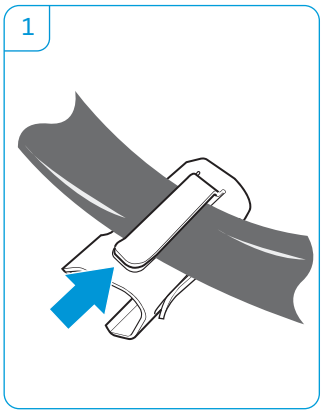
Attaching the belt clip, the cable clip and the design caps

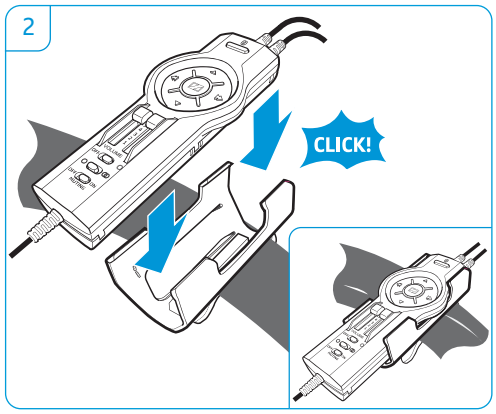
Attaching the belt clip

The belt clip allows you to attach the control unit to the seat belt so that the control unit doesn't hinder you.

1 Slide the belt clip onto the seat belt.

2 Snap the control unit into the belt clip. Make sure not to squeeze any connection cable.





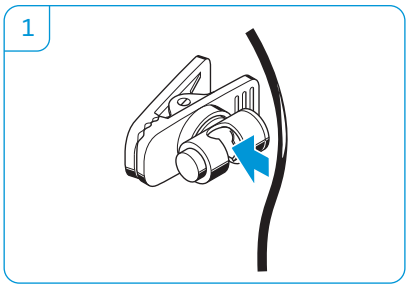
Attaching the cable clip

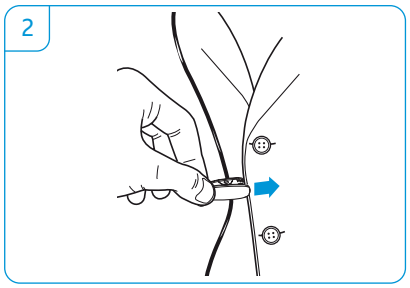
The cable clip allows you to attach the headphone cable to your clothing so that the cable doesn't hinder or distract you.

1 Guide the headphone cable through the cable clip.

2 Attach the cable clip to your clothing.

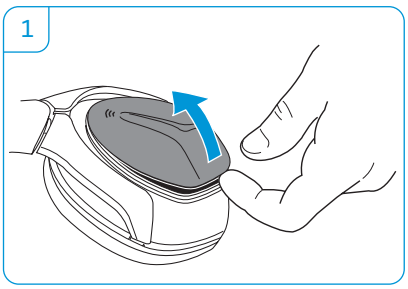
3 Loop the cable through the clip so that the headphone cable doesn't hinder you.

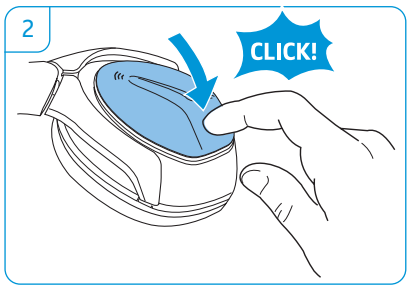




Attaching the design caps

Design caps in different finishes and with individual imprints are available from your Sennheiser partner.





Connecting the headset to a Bluetooth device

CAUTION

Danger of malfunction due to radio waves!

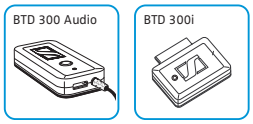
The transmitted radio waves of mobile phones can impair the operation of sensitive and unprotected devices.

- Only make calls with the headset in environments where wireless **Bluetooth** transmission is permitted.

The headset complies with the **Bluetooth** 2.1 standard. In order that data can be transmitted wirelessly using **Bluetooth** technology, you have to pair your headset with a **Bluetooth** device.

The headset can save the connection profiles of up to eight **Bluetooth** devices with which it has been paired. After switch-on, the headset automatically tries to connect to the last connected **Bluetooth** device.

If you pair the headset with a ninth **Bluetooth** device, the saved connection profile of the first **Bluetooth** device will be overwritten. If you want to re-establish a connection with the first **Bluetooth** device, you have to pair the headset with this **Bluetooth** device again.

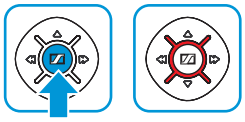


- If your audio source does not have a **Bluetooth** interface, use an optional dongle (see page 24).

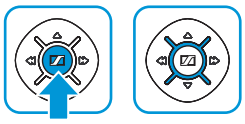
Pairing the headset with a Bluetooth device

The following chapter describes, by way of example of a mobile phone, how to pair the headset with a **Bluetooth** device.

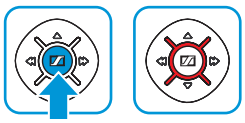
- Make sure that
  - the headset is connected to the on-board DC power supply system or that the control unit is equipped with fully charged batteries/ rechargeable batteries,
  - the mobile phone's **Bluetooth** visibility is enabled (see the instruction manual of the corresponding **Bluetooth** device),
  - the headset is placed close to the mobile phone (approx. 50 cm or 19.7").
- Switch the headset on by setting the Power OFF/ON switch ⑰ to the position ON.



- Press and hold the multi-function button until the LED alternately flashes blue and red.
- On your audio source, activate the **Bluetooth** function "Add a new device".
- When the mobile phone prompts for a password or PIN code, enter the default PIN code "0000".
- Proceed as described in the instruction manual of the mobile phone.



Once the headset has found the mobile phone, the devices exchange device identification information. The LED flashes 3 times blue. You hear an ascending beep. The devices have identified each other and the headset is paired with the mobile phone.



If no device is found within approx. 5 minutes, the LED flashes 3 times red and you hear a descending beep. The headset will then try for 3 minutes to connect to one of the up to 8 previously paired **Bluetooth** devices. If this fails, the **Bluetooth** function automatically switches off after 10 minutes.

- In this case, repeat the necessary steps to pair the headset with the mobile phone again.

Switching the "Bluetooth connection" flashing on/off

To switch the flashing off during an existing **Bluetooth** connection:

- Switch the **Bluetooth** function off (see page 15).
- Press and hold the multi-function button until the LED alternately flashes blue and red.
- Briefly press the Volume ▲ button.

To switch the flashing on during an existing **Bluetooth** connection:

- Switch the **Bluetooth** function off (see page 15).
- Press and hold the multi-function button until the LED alternately flashes blue and red.
- Briefly press the Volume ▼ button.

Using the S1 DIGITAL

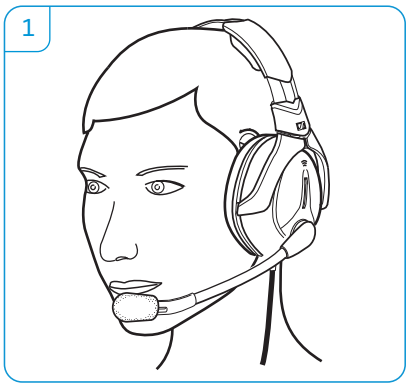
Individually adjusting the headset and wearing it

Adjusting the headband

For good noise attenuation and best possible comfort, the headset has to be adjusted to properly fit your head. To do so, you can adjust the headband.

1 Wear the headset so that the headband runs over the top of your head.

2 Adjust the length of the headband so that
   – your ears are completely inside the ear pads,
   – you feel even, gentle pressure around your ears,
   – a snug fit of the headband on the head is ensured.



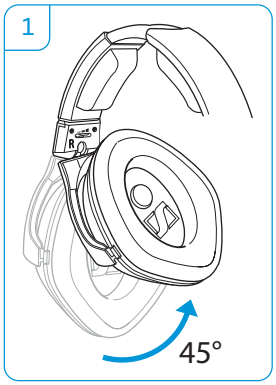
Adjusting the contact pressure

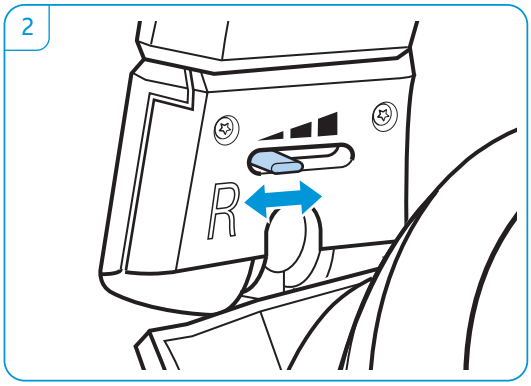
The S1 DIGITAL allows you to choose your preferred contact pressure setting, which offers a good balance between best possible noise attenuation and still comfortable contact pressure.

In order to achieve greater noise attenuation, a higher contact pressure is required.

1 Tilt the ear cups by approx. 45° to release the mechanics of the slide switches.

2 Use the 3-step slide switches to change the contact pressure for each ear cup.

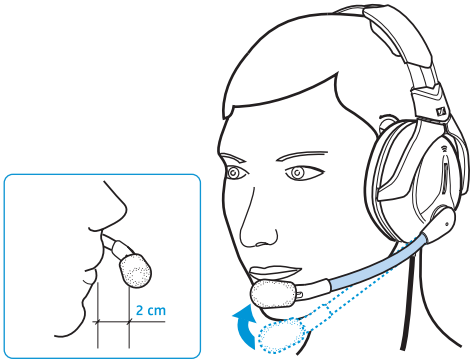




Positioning the microphone towards the corner of the mouth

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.
- Always use the supplied wind and pop screen.

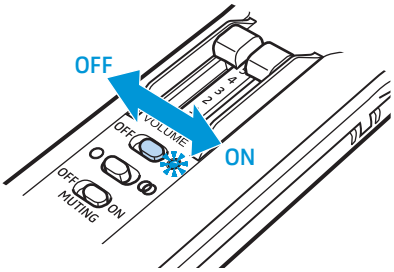


Switching the headset on/off

▶ Set the Power OFF/ON switch to the position ON.

ON NoiseGard™/digital is switched on. The Power LED lights up, indicating the battery charge status or power supply via the on-board DC power supply system.

OFF NoiseGard™/digital is switched off. The Power LED goes off.

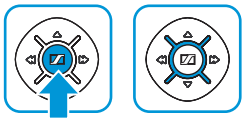


When the S1 DIGITAL, and thus NoiseGard™/digital, is switched off, it can be used as a conventional, passive headset.

Switching the Bluetooth function on/off

▶ Switch the headset on to use the **Bluetooth** function.

Switching the Bluetooth function on



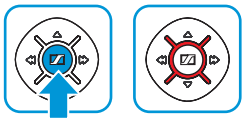
▶ Press and hold the multi-function button until the LED flashes blue. You hear an ascending beep.

– When switching the **Bluetooth** function on for the first time, the headset will automatically go into pairing mode.

– When the headset is already paired with a **Bluetooth** device, the **Bluetooth** connection is automatically established. You hear a beep in the headset.

– When the headset is already paired with a **Bluetooth** device but the **Bluetooth** device is switched off or out of range, the LED flashes blue. The headset will try for 3 minutes to connect to one of the up to 8 previously paired **Bluetooth** devices. If this fails, the **Bluetooth** function automatically switches off after 10 minutes.

Switching the Bluetooth function off



▶ Press and hold the multi-function button until the LED flashes 3 times red.
You hear a descending beep. The **Bluetooth** function is automatically deactivated.

If you switch the **Bluetooth** function off, NoiseGard™/digital remains switched on.

Adjusting the headset to the listening situation

Adjusting the volume

WARNING

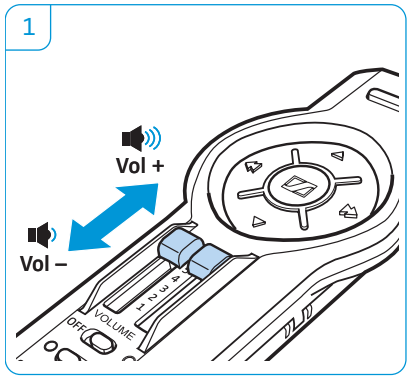
Danger of hearing damage!

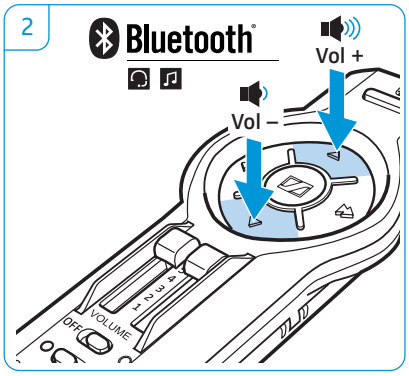
Listening at high volume levels for long periods can lead to permanent hearing defects.

- ▶ Before putting the headset on, set the volume to a low level.
- ▶ Do not continuously expose yourself to high volumes.

The control unit features a Master VOLUME slide control which allows you to adjust the volume for the left and right channel separately. Using the Master VOLUME slide control you simultaneously adjust the volume for both ATC communications and your connected **Bluetooth** device.

1. Use the Master VOLUME slide control to adjust the volume to a comfortable level.
2. Use the Volume ▼ button and the Volume ▲ button to adjust the volume of your connected **Bluetooth** device to the volume for ATC communications.





Switching between mono and stereo mode

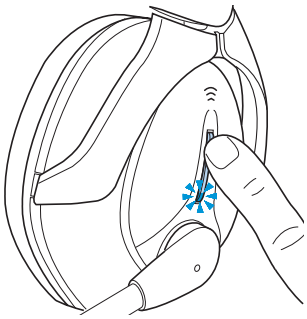
The control unit features a mono ○/stereo ⧉ switch ⑯ which allows you to switch between mono and stereo mode, depending on the intercom.

- ▶ Set the mono ○/stereo ⧉ switch ⑯ to the desired position:

  ○ = mono

  ⧉ = stereo

Using Smart Update



The noise level in the cockpit changes depending on the flight situation. Whenever you perceive a change in the noise level (e.g. during take off and when the cruise altitude is reached), you should perform the Smart Update in order to ensure optimum noise compensation at any given time.

The outer and inner microphones measure the sound and NoiseGard™/digital is adjusted accordingly via the electronics. Smart Update only works when the headset is switched on.

- ▶ Press the Smart Update button.
  The Smart Update button lights up for approx. 4 seconds and you hear an acknowledgement tone, indicating that NoiseGard™/digital is adjusted to the noise level.

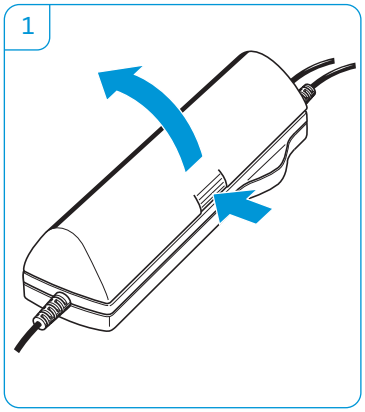
Activating the "auto shut-off" function

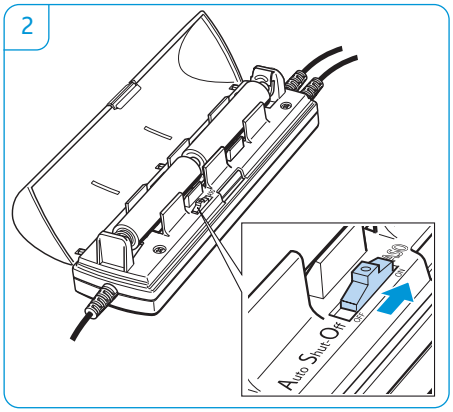
The "auto shut-off" function automatically switches the headset off when it is disconnected from the intercom or when the aircraft avionics are switched off. With the "auto shut-off" function activated, the operating time is increased. The headset is delivered ex-works with the function deactivated.

1 Open the cover of the battery compartment on the control unit.

2 Set the Auto Shut-Off switch to the position ON.

3 Close the cover of the battery compartment.





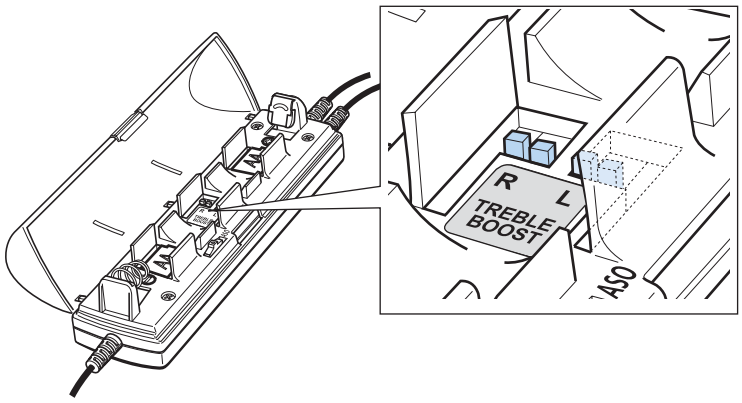
Microphone BIAS – microphone supply for mobile phones

When used in the cockpit, the headset is powered via the intercom. If you want to use the headset for making phone calls outside the cockpit, you have to deactivate the "auto shut-off" function.

▶ Set the Auto-Shut-Off switch to the position OFF.

Switching the 3-step treble boost on/off

The switches for the 3-step treble boost allow you to individually adjust the speech intelligibility for the left and right channel separately. For this, you can boost the frequency response in the approx. 1 kHz to 6 kHz region in three steps.



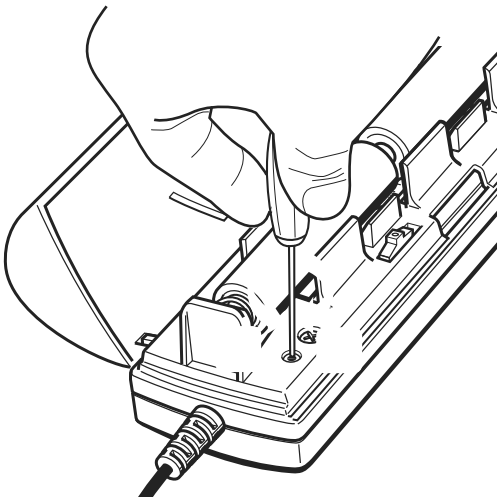
The following switch positions apply to left and right channel:

No treble boost	Treble boost – step 1	Treble boost – step 2	Treble boost – step 3

Adjusting the microphone sensitivity

The microphone sensitivity has been factory preset to 35 mV/Pa.

Use a slotted screwdriver to adjust the microphone sensitivity.



Remote-controlling connected Bluetooth devices

You can directly remote-control any Bluetooth device supporting the AVRCP profile and connected to the S1 DIGITAL by using the buttons on the headset. Please refer to the instruction manual of your audio source for information on whether your Bluetooth device supports the AVRCP profile.

Adjusting the volume for connected devices

WARNING

Danger of hearing damage!

Listening at high volume levels for long periods can lead to permanent hearing defects.

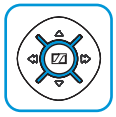
Before putting the headset on, set the volume to a low level.

Do not continuously expose yourself to high volumes.

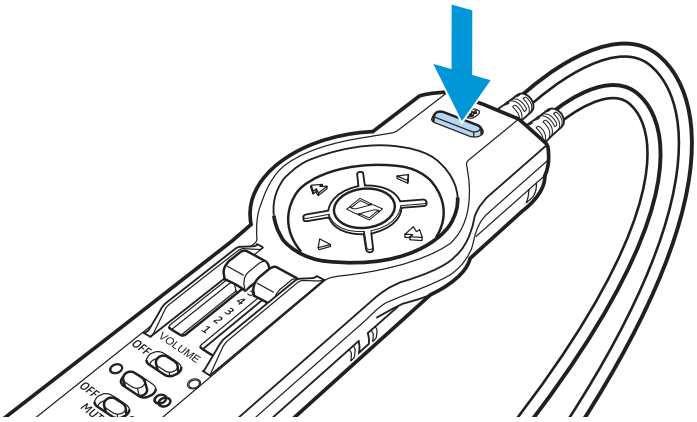
Use the Volume button and the Volume button to adjust the volume of your connected Bluetooth device. When the minimum or maximum volume is reached, you hear an acknowledgement tone.

Button	Duration	Function
		Incrementally increases the volume
		Incrementally reduces the volume
		Continuously increases the volume
		Continuously reduces the volume

Remote-controlling a mobile phone



If your S1 DIGITAL has a **Bluetooth** connection to your mobile phone, the LED flashes blue when the mobile phone is ringing. You can also hear the ring tone of your mobile phone in the headset if your mobile phone supports this function.



When the mobile phones rings:

Button	Duration	Function
		Accepts/ends the call
	2s	Rejects the call (acknowledgement tone)

When the mobile phone is switched on, does not ring and you do not make a phone call:

Button	Duration	Function
	1s	Redials the last number (acknowledgement tone)
		Activates voice dial

During a call:

Button	Duration	Function
	5s	Transfers the ongoing call back to the mobile phone
	2s	Activates the muting function (acknowledgement tone)
Any button		Deactivates the muting function

Resetting the settings of the headsets

You can reset all settings of your headset to the factory default settings. In doing so, the connection profiles of the Bluetooth devices used are deleted, thus preventing that other users of the headset can access your Bluetooth enabled devices.

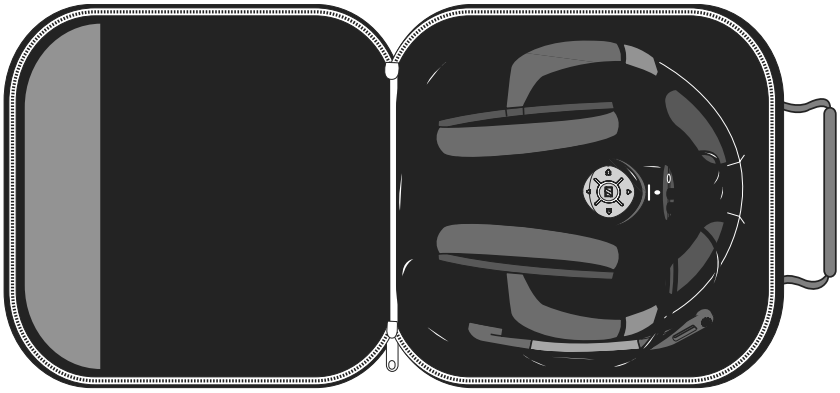
Press and hold the multi-function button until the LED flashes 3 times red. The Bluetooth function is switched off.

Press and hold the multi-function button until the LED alternately flashes blue and red.

Press the Phone button for at least 5 seconds until the settings of the headset are reset.

Transporting the S1 DIGITAL

The headset comes with a transport case. To ensure optimum protection of the headset when not in use or during transport, you should store the headset in the supplied transport case.



Folding up the headset

For space-saving stowage, e.g. in your pilot's case, you can fold up the headset compactly.

Fold the right ear cup inwards.

If a problem occurs ...

Problem	Possible cause	Solution	Page
Power LED ⑱ does not light up on switch-on	The batteries/ rechargeable batteries are flat.	Charge the rechargeable batteries or replace the batteries.	9
	The aircraft fuse is defective.	Check the aircraft fuse.	–
No audio signal during **Bluetooth** connection	The headset is switched off.	Switch the headset and the **Bluetooth** function on.	15
	The headset is not paired with a **Bluetooth** device.	Pair the headset with the audio source again.	11
	The **Bluetooth** function is switched off.	Switch the **Bluetooth** function on.	15
Headset cannot be paired	The pairing does not work.	Check if the audio source supports the A2DP profile. If not, use one of the optional stereo audio transmitters.	24
	The audio source is switched off.	Switch the audio source on	11
Headset does not react to any button press	The operation of the headset is faulty.	Change the batteries/ rechargeable batteries.	9
No active noise compensation	NoiseGard™/digital is switched off.	Switch NoiseGard™/ digital on.	15
	The aircraft fuse is defective.	Check the aircraft fuse.	–
Very low volume communication even though NoiseGard™/ digital is switched on	The volume is set too low.	Increase the volume.	16
	The headset is not connected correctly.	Check the jack plug of the headset.	8
Audio signal in one ear only	You are receiving a mono source but the headset is set to stereo operation.	Set the headset to mono operation.	16
	The Master VOLUME slide control ⑲ is misadjusted.	Check the Master VOLUME ⑲ slide control.	16

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 partner for assistance.

To find a Sennheiser partner in your country, search at www.sennheiser-aviation.com > "Purchase Information" or www.sennheiser.com > "Service & Support".

Accessories and spare parts

Accessories

Cat. No.	Accessory
504987	Adapter-P-XLR-3 adapter cable
504988	Adapter-P-CiG adapter cable
502887	HZH 350 hygiene pads
502389	BTD 300i wireless stereo audio transmitter for iPod and iPhone
502388	BTD 300 Audio wireless stereo audio transmitter for audio/video devices

Spare parts

Leatherette ear pads, 1 pair

GEL ear pads, 1 pair

Wind and pop screen

Headband padding, 1 pair

Cover for inner NoiseGard microphone, 1 pair

Belt clip

HZC 08 cable clip

Transport case

Valuable information on NoiseGard™/digital

Combination of two NoiseGard strategies

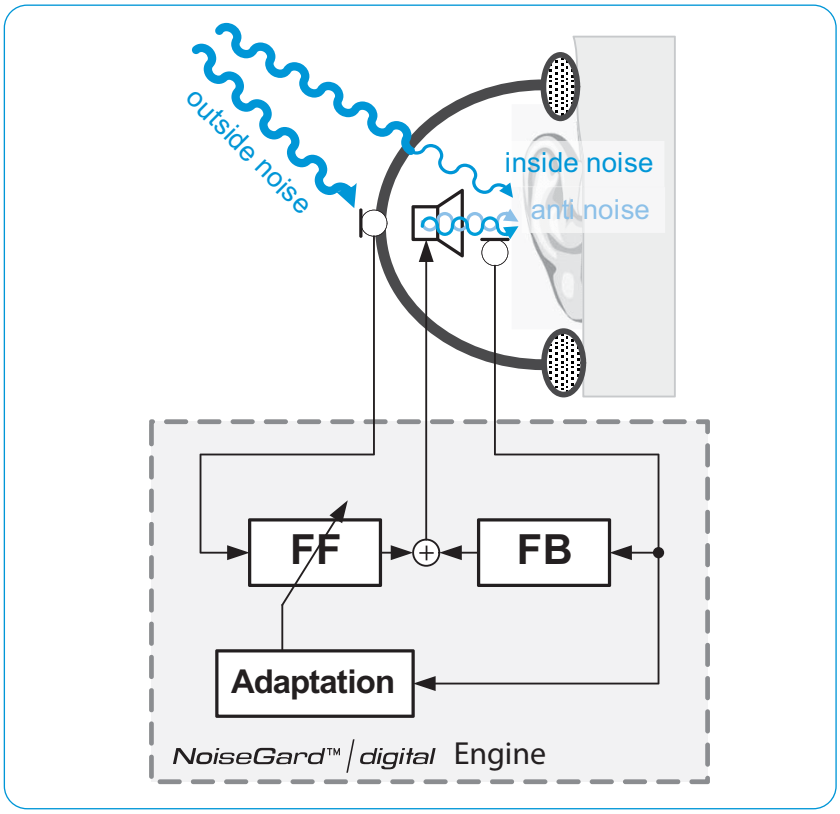
Active noise compensation (ANR, NoiseGard) is based on the principle of cancelling out unwanted sound using "anti-sound" (phase-inverted sound). Basically, one must distinguish between two different strategies: the feedback strategy (FB) and the feedforward strategy (FF).

Operating principle of the two ANR strategies

Feedback ANR uses microphones integrated into the inside of the ear cups to pick up the sound signal near the ear. This sound signal is processed by an FB control circuit which then calculates the required "anti-sound" and outputs it via the loudspeaker. This is the "classic" NoiseGard strategy used in most headsets with analog NoiseGard technology. FB-NoiseGard works especially well in the low-frequency range.

Feedforward ANR, on the other hand, uses microphones mounted on the outside of the ear cups to directly pick up the unwanted noise. The FF control circuit then calculates the required "anti-sound" and outputs it via the loudspeaker. Since the FF control circuit cannot become unstable at higher frequencies, it allows for a strikingly increased NoiseGard performance in the upper frequency range.

NoiseGard™/digital uses both ANR strategies. Apart from the loudspeaker, each ear cup features its own inner and outer microphone, allowing to combine the advantages of both strategies. As a result, the NoiseGard performance is outstanding both in terms of the amount of noise attenuation and the frequency ranges treated.



The NoiseGard™/digital technology of the S1 DIGITAL uses an innovative approach. By means of the microphones, the current sound situation is analyzed to fully calculate the optimum control circuit settings. This calcu-

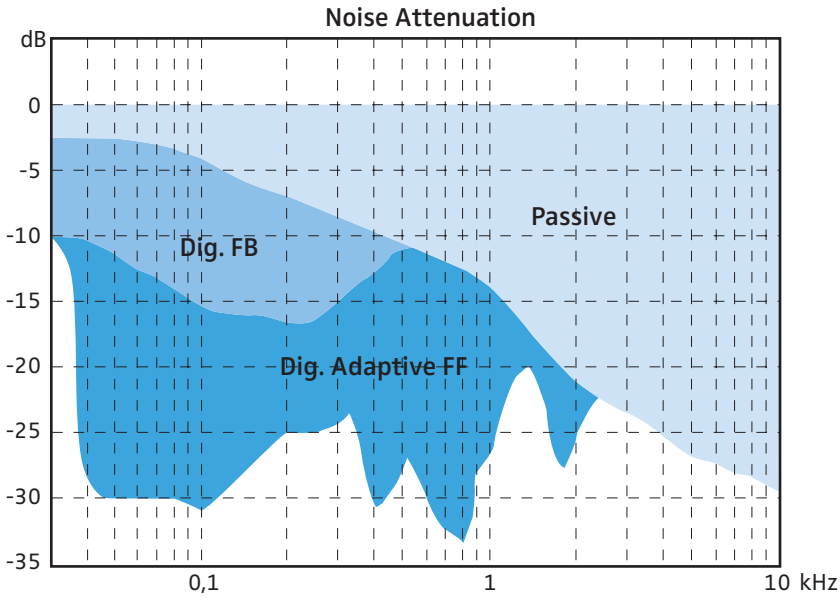
lation is done by a fully-adaptive algorithm, for which a high-performance signal processor is used. This fully-adaptive algorithm is the core of the NoiseGard™/digital technology and ensures that the currently dominant sound components are particularly well attenuated. The attenuation curve resulting from the adaptation is therefore always optimal for the current situation.

The sound components that are dominant in the ear not only depend on the noise of the aircraft but also on the user's position in the cockpit and, above all, on how the sound is transmitted through the headphones to the ear. This, in turn, depends on the fit of the headphones, on whether or not glasses are worn and on the head and ear anatomy.

Compared to other adaptive technologies available on the market, the particular strength of the fully-adaptive FF-NoiseGard is its ability to cancel broadband noise and not only individual tonal components. Cockpit noise consists of broadband noise components and individual tonal components (e.g. the fundamentals and harmonics of propeller rotation). If only the tonal components are canceled, the broadband noise remains unaffected and no significant noise reduction can be achieved in practice. Due to its full adaptivity, the NoiseGard™/digital technology allows to simultaneously cancel both broadband and tonal sound components, thus always leading to an excellent performance.

Overall noise compensation (principle)

The attenuation curves of the passive attenuation and of the digital FB-ANR are fixed, whereas the attenuation of the digital adaptive FF-ANR depends on the situation. This reveals the powerful effect of adaptivity, which always provides the greatest attenuation where the loudest noise components manifest themselves.

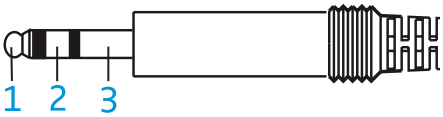


Specifications

Headset	
Transducer principle	dynamic, closed
Ear coupling	circumaural
Frequency response	20 – 16,000 Hz
Impedance active/passive	mono: 130 Ω passive/180 Ω active stereo: 260 Ω passive/ 360 Ω active
Characteristic SPL	98 dB SPL at 1 kHz, 1 V_{rms} 90 dB SPL at 1 kHz, 1 mW
Max. SPL	115 dB SPL at 1 kHz
THD	<1% at 98 dB SPL
Contact pressure, adjustable	approx. 5 – 7 N
Microphone incl. preamplifier	
Type	BKE S1-P
Transducer principle	pre-polarized condenser microphone, noise-compensating
Frequency response	100 Hz – 10 kHz
Output voltage	20 – 80 mV/Pa, adjustable 35 mV/Pa (factory preset)
Terminating impedance	150 – 2,200 Ω
Supply voltage	8 – 16 V_{DC}
General data	
Ambient temperature	operation: –15 °C to +55 °C storage: –55 °C to +70 °C
Weight without cable	approx. 410 g
Cable length	approx. 1.90 m
Power supply for NoiseGard™/digital	12 – 35 V_{DC} at max. 150 mA (on-board DC power supply system) 2.4 – 3.0 V_{DC} (batteries/rechargeable batteries)
Operating time (NoiseGard™/digital only)	Alkaline batteries/rechargeable batteries: approx. 25 hrs Lithium batteries: approx. 40 hrs

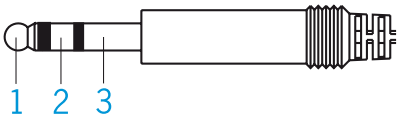
Connector assignment

5.25 mm jack plug (PJ-068 equivalent)



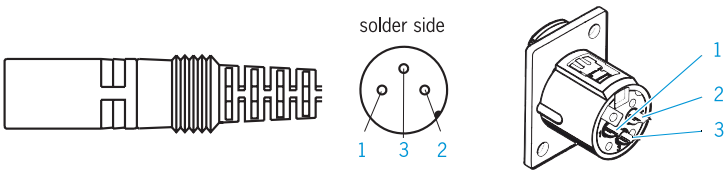
1 Not assigned
2 Microphone High
3 Microphone Low

¼″ (6.35 mm) jack plug



1 Audio High left
2 Audio High right
3 Audio Low

XLR 3-pole socket (optional accessory)



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

Hollow jack socket (optional accessory)

1 Power supply (4 V_{DC})
2 Ground

Manufacturer declarations

Warranty

Sennheiser GmbH & Co. KG gives a warranty of 5 years on this product. For the current warranty conditions, please visit our website at www.sennheiser-aviation.com or www.sennheiser.com or contact your Sennheiser partner.

In compliance with the following requirements

- RoHS Directive (2002/95/EC)
- WEEE Directive (2002/96/EC)
- Battery Directive (2006/66/EC)

CE Declaration of Conformity

- R&TTE Directive (1999/5/EC)
- EMC Directive (2004/108/EC)
- Low Voltage Directive (2006/95/EC)

The declaration is available at www.sennheiser.com. Before putting the product into operation, please observe the respective country-specific regulations!

Rechargeable batteries

The supplied rechargeable batteries can be recycled. Please dispose of them as special waste or return them to your specialist dealer. In order to protect the environment, only dispose of exhausted batteries.

WEEE Declaration

Your Sennheiser product was developed and manufactured with high-quality materials and components which can be recycled and/or reused. This symbol indicates that electrical and electronic equipment must be disposed of separately from normal waste at the end of its operational lifetime.

Please dispose of this product by taking it to your local collection point or recycling centre for such equipment. This will help to protect the environment in which we all live.

In compliance with:

USA	FCC ID: DMOS1CW3011
Canada	IC: 2099A-S1CW3011
Europe	CE 0682

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Sennheiser electronic GmbH & Co. KG

Am Labor 1, 30900 Wedemark, Germany
www.sennheiser-aviation.com | www.sennheiser.com

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