

SHURE[®]

LEGENDARY
PERFORMANCE™

BASICS

**MICROPHONES.
WIRELESS SYSTEMS.
IN-EAR-MONITORING.**



SHURE[®]

LEGENDARY
PERFORMANCE[™]

WHAT LEGENDARY PERFORMANCE MEANS TO SHURE

We believe that the phrase legendary performance should not be used lightly. At Shure, we take its connotations seriously and use past accomplishments as a foundation and roadmap for the future.

We start by thinking about performance as it relates to our products, and we work hard to ensure that they remain the “gold standard” of quality, reliability, and durability.

Equally, we are always conscious of our performance as an industry leader. We are committed to developing products that will provide the same high quality and reliability tomorrow as they do today.

We also rate our performance in the context of our relationships. Enabling others to fulfill their potential drives us to provide the best service, support and training possible. In this respect, we like to share our knowledge freely.

Ultimately, our 84-year heritage has been built on a diverse and storied foundation of legendary performances, and all of our activities revolve around optimizing *your* performance.

SHURE KNOWS HOW

For almost every application there are specially designed and optimized Shure microphones and wireless systems. This guide provides you a basic overview on how microphones, wireless systems and in-ear-monitoring systems work, what you need to consider to select the best product for your requirements, and how to set them up and use them.

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SHURE



WIRED MICROPHONES

THE BASICS

Microphones are used whenever the sound of a voice or an instrument needs to be reinforced – either on stage, in a rehearsal room, at presentations or recording at home or in a studio.

There are three main technical characteristics that distinguish microphones from each other. These characteristics are important to understand to make the best choice for your needs:

Transducer type

How does the microphone physically pick up the sound and convert it into an electrical signal?

Polar pattern/ directionality

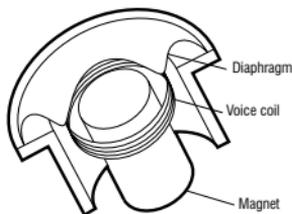
From which direction does a microphone pick up the sound?

Frequency response

Is the output level or sensitivity of all frequencies the same?

Transducer Type

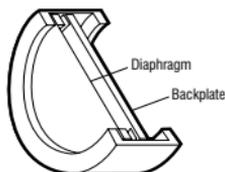
The transducer is the heart of the microphone. It converts sound into an electrical signal. The two most common transducer types are Dynamic and Condenser:



Dynamic Microphones

Dynamic microphones employ a diaphragm, a voice coil and a magnet. The voice coil is surrounded by a magnetic field and is attached to the rear of the diaphragm. The motion of the voice coil in this magnetic field generates the electrical signal corresponding to the picked up sound.

Dynamic microphones have a relatively simple construction and are therefore economical and rugged. They can handle extremely high sound pressure levels and are largely unaffected by extreme temperatures or humidity.



Condenser Microphones

Condenser microphones are based on an electrically-charged diaphragm/ backplate assembly which forms a sound-sensitive capacitor. When the diaphragm is set in motion through sound, the space between the diaphragm and the backplate is changing, and therefore the capacity of the capacitor. This variation in spacing produces the electrical signal.

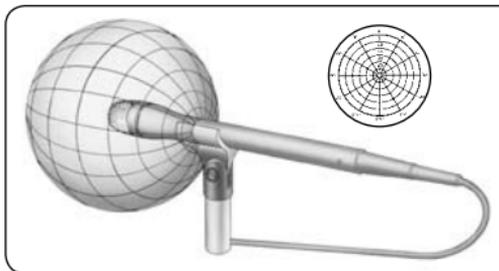
All condenser microphones need to be powered: either by batteries in the microphone or by phantom power (cf. Glossary p. 61) provided by a mixer. Condensers are more sensitive and can provide a smoother, more natural sound, particularly at higher frequencies.

Polar pattern/ directionality

The polar pattern of a microphone is the sensitivity to sound relative to the direction or angle from which the sound arrives, or easier worded how well the microphone “hears” sound from different directions. The most common types of directionality are:

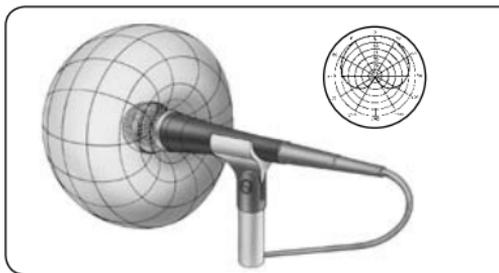
Omnidirectional

The omnidirectional microphone has equal output or sensitivity at all angles, this means it picks up sound from all directions. Therefore the microphone has not to be aimed in a certain direction which is helpful especially with lavalier microphones. A disadvantage is that an omni cannot be aimed away from undesired sources such as PA speakers which may cause feedback.



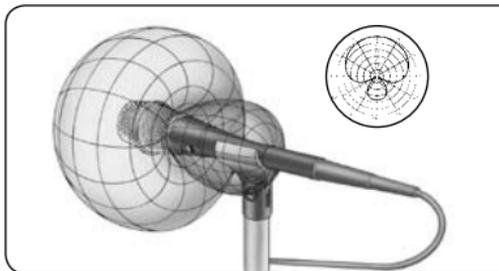
Cardioid

A cardioid microphone has the most sensitivity at the front and is least sensitive at the back. It isolates from unwanted ambient sound and is much more resistant to feedback than omnidirectional microphones. That makes a cardioid microphone particularly suitable for loud stages.



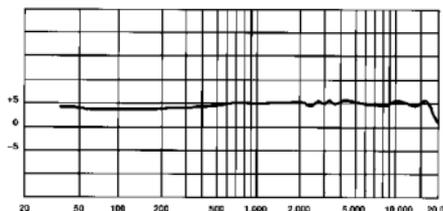
Supercardioid

Supercardioid microphones offer a narrower pickup than cardioids and a greater rejection of ambient sound. But they also have some pickup directly at the rear. Hence it is important to place monitor speakers correctly. Supercardioids are most suitable when single sound sources need to be picked up in loud environments. They are the most resistant to feedback.



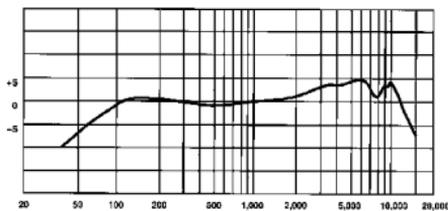
Frequency Response

The frequency response is the output level or sensitivity of a microphone over its operating range from lowest to highest frequencies. Generally two types exist:



Flat frequency response

All audible frequencies (20 Hz – 20 kHz) have the same output level. This is most suitable for applications where the sound source has to be reproduced without changing or “coloring” the original sound, e.g. for recording.



Tailored frequency response

A tailored response is usually designed to enhance a sound source in a particular application. For instance, a microphone may have a peak in the 2 – 8 kHz range to increase intelligibility for live vocals.

INFO: Proximity Effect

Every directional microphone (i.e. cardioid, supercardioid) has a so-called proximity effect. This is created when the microphone moves closer to the sound source resulting in an increase in bass response and, hence, warmer sound. Professional singers often work with this effect. To test this out, experiment with bringing the microphone closer to your lips when singing and listen for the change in sound.

HOW TO FIND THE RIGHT MICROPHONE

What do you want to pick up?

The first important criterion to choose a suitable microphone is the application. Are you speaking, singing or playing an instrument? **Dynamic microphones** are generally preferred for loud voices, amplified guitars or drums.

Condenser microphones provide a more natural, detailed sound and are therefore the better choice for acoustic instruments such as guitars, brass and overheads with drums or delicate voices. Especially in studios a more natural sound reproduction is desired, which makes the condensers more suitable in recording applications.

If a condenser microphone is your first choice, remember that your mixer must be able to supply phantom power to the microphone or you need to buy a condenser microphone that uses batteries to supply the condenser element power.

In which environment do you want to use the microphone?

Will the microphone be used on stage, in a conference room or in a recording studio? The usage environment influences the directionality of a microphone.

Omnidirectional microphones provide the most natural sound reproduction. However, they are the most sensitive to feedback. They are best suitable for recording or presentations where small PAs are used.

On stages with loud PA and monitoring systems, you will not find omnidirectional microphones but **cardioids** or **supercardioids**. Through picking up the sound from the front and isolating unwanted off-axis sound and ambient noise, these unidirectional microphones minimize feedback.

Do you prefer a natural sound or an optimized sound for a specific application?

Depending on the use of the microphone and the environment it is used in, a flat or tailored frequency response may be the better choice.

A microphone with a **tailored frequency response** (e.g. the PG58, SM58®, Beta 58A) cuts through the mix without the need to adjust the mixer. If it is desired to reproduce a sound source without changing or coloring, a **flat frequency response** (e.g. PG81, KSM137) is the better choice. In studios you will mostly find microphones with a flat frequency response.



APPLICATION AND POSITIONING

Speech and Vocal

Application	Desired Response	Positioning
Speech 	Natural sound Minimal "p" popping and "s" sounds.	10-50 cm away from the mouth, slightly off to one side.
Vocal 	Robust sound Emphasized bass, maximum isolation from other sources.	< 10 cm away from the mouth, directly in front of microphone.

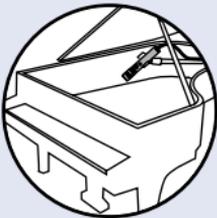
Electrical Instruments

Electric-Guitar 	Most attack	2 cm away from speaker, centered directly in front of speaker cone.
	Sharp attack	2 cm away from speaker, at the edge of speaker cone.
	Medium attack	10-15 cm away from speaker, directly in front of speaker cone.

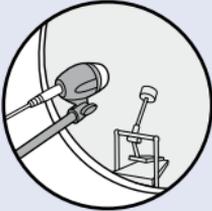
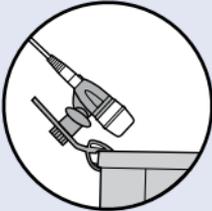
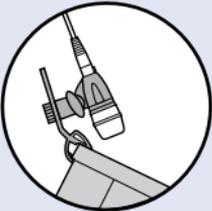
Acoustic Instruments

Application	Desired Response	Positioning
Guitar		
	More bass Good placement when leakage or feedback is a problem.	20 cm from the sound hole.
	Bass heavy Full sound.	10 cm from the sound hole.
	Warm, mellow Less detail.	10-15 cm from the bridge.
	Natural Well balanced, slightly bright.	15 cm above the side, over the bridge.

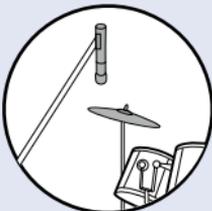
Acoustic Instruments

Application	Desired Response	Positioning
Piano 	Natural, bright	2-15 cm just over open top, above treble strings. Good placement when only one microphone is used.
	Natural, balanced	2-15 cm just over open top, one microphone above bass strings, one microphone above treble strings for stereo.
Wind Instruments 	Bright Clear sound.	15-60 cm away from the instrument and directly in front of the bell.

Acoustic Instruments

Application	Desired Response	Positioning
<p>Bass Drum</p> 	<p>Sharp attack Maximum bass sound, highest sound pressure level.</p> <p>Medium attack Balanced sound.</p> <p>Soft attack Balanced, resonant sound.</p>	<p>3-7 cm away from beater head (inside drum), slightly off-center from beater.</p> <p>20-30 cm away from beater head (inside drum), directly in front of beater.</p> <p>5-8 cm away from outside head, directly in front of beater (double head kick drum only).</p>
<p>Snare</p> 	<p>Most attack Crisp "snap".</p>	<p>2-7 cm above rim of top drum head. Aim mic at drum head.</p>
<p>Toms</p> 	<p>Medium attack Full, balanced sound.</p>	<p>2-7 cm one microphone on each tom, or between each pair of toms, above drum heads. Aim each mic at top drum heads.</p>

Acoustic Instruments

Application	Desired Response	Positioning
<p>Percussion</p> 	<p>Most attack Natural sound.</p>	<p>2-7 cm above rim of top head of drum. Aim mic at drum head.</p>
<p>Hi-Hat</p> 	<p>Natural</p>	<p>3-15 cm aim microphone down toward cymbal, a few inches over edge.</p>
<p>Cymbals (Overhead)</p> 	<p>Natural</p>	<p>30-100 cm above drummer's head.</p>

SHURE WIRED MICROPHONES AT A GLANCE

Microphone Overview

PG Series

The entry to Shure.



The entry to professional Shure quality, reliability and sound

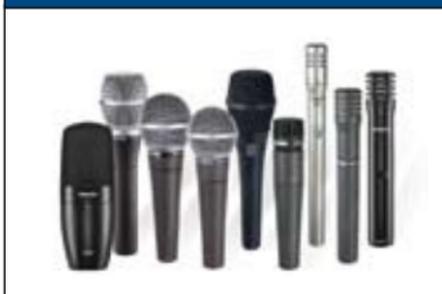
Analog and digital connectivity options

Wide range of microphones to suit different applications

PG48			
PG58			
PG57			
PG81			
PG52			
PG56			
PG27			
PG42			

SM Series

Industry standard. Professional utility.



Legendary sound for performance and recording applications

Reduced handling noise and improved gain before feedback

Rock-solid construction proven through decades of rigorous use

SM48			
SM58 [®]			
SM86			
SM87A			
SM57			
SM81			
SM94			
SM137			
SM27			
SM7B			



dynamic



condenser



flat



tailored



cardioid



supercardioid



omnidirectional



bidirectional

Beta Series

The first choice of professionals.



Specialized, precision engineered models with high sensitivity

Maximum isolation and minimum off-axis sound for higher gain-before-feedback

Unmatched, tour-tested construction and ruggedness

Beta 58A			
Beta 87A			
Beta 87C			
Beta 53			
Beta 54			
Beta 57A			
Beta 98S			
Beta 98H/C			
Beta 52A			
Beta 56A			
Beta 91			

KSM Series

Premium microphones.



Wide dynamic range, high sensitivity and low self noise

Full frequency response and minimized proximity effect

Shure renowned ruggedness combined with premium studio sound

KSM9			
KSM32			
KSM44			
KSM137			
KSM141			

Application Guide

The following examples show the preferred choices for the listed application (preferred option in bold, alternative options follow).

Vocal

Dynamic
Condenser Live
Condenser Studio
Headset
Choir

PG

The entry to Shure.



PG58 | PG48

PG42 | PG27

PG30

PG81

Acoustic Instruments

Guitar
Brass
Piano
Strings

PG81 | PG27

PG57 | PG27

PG81

PG81

Electric Instruments

Guitar
Bass

PG57 | PG27

PG52 | PG57 | PG56

Drums & Percussion

Bass Drum
Snare Drum
Hi-Hat
Tom Tom
Overhead

PG52

PG57

PG81

PG56 | PG57

PG81 | PG27

SM

Legendary microphones.



SM58® | SM48

SM86 | SM87A

SM27

WH30 | WH20

SM81 | SM137

SM81 | SM137

SM27 | SM57

SM81 | SM137

SM81 | SM137

SM57 | SM7B | SM27

SM57 | SM27

SM57

SM57

SM81 | SM94

SM57

SM81 | SM27

Beta

The first choice of professionals.



Beta 58A

Beta 87A | Beta 87C

Beta 54 | Beta 53

Beta 57A

Beta 98H/C

Beta 91

Beta 57A

Beta 57A

Beta 52A | Beta 56A | Beta 57A

Beta 52A | Beta 91

Beta 57A | Beta 98D/S

Beta 98S

Beta 56A | Beta 98D/S

KSM

Premium microphones



KSM9

KSM44 | KSM32

KSM141

KSM137 | KSM141

KSM32 | KSM44

KSM141 | KSM137

KSM137 | KSM141

KSM32 | KSM44

KSM32 | KSM44

KSM137 | KSM141

KSM137 | KSM32

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WIRELESS MICROPHONES

THE BASICS

Conventional wired microphones convert sound into an electrical audio signal that is sent to the sound system through a cable. Live music stages that are crowded with cables from microphones for vocals, guitars, drums and other instruments can become a snake pit of overlapping wires and limit the performers' freedom of movement on the stage.

Wireless microphone systems convert audio signals created by microphones into radio signals, which are sent by a transmitter through the air to the receiver and then through the sound system. They eliminate the need for cables, so you are no longer tethered to a sound system or tripping through messy performing environments.

With continuous advances and improvements in sound quality and reliability, wireless microphone systems are more affordable and popular than ever. Their potential goes far beyond the stage. You can find wireless microphone systems in exercise studios, schools, houses of worship, presentation halls – anywhere a performer or presenter wants true freedom of movement.



Components

A wireless microphone system basically features two components: a transmitter and a receiver. The sound is mainly influenced by the microphone capsule. The wireless system should not affect this sound.

Transmitter

Two types of transmitters – handheld or bodypack – send sound, without a cable, to a wireless receiver at the mixing console:



Handheld

The handheld microphone transmitter integrates the transmitter into the microphone handle, so both functions are contained in one unit. Unique with all Shure wireless systems is that the microphone head is interchangeable, and you can choose the best microphone option depending on the application.



Bodypack

Lavalier, headworn and instrument microphones, as well as guitar cables, must plug into a bodypack transmitter to send their audio signals. Sleek, lightweight bodypacks can be easily clipped to clothing or a guitar strap.

Headworn vocal microphones: Rugged, comfortable, easy-to-position headsets provide superior voice pickup in any active user setting.

Lavalier vocal microphones: A range of sizes combine low visibility with high-quality professional audio. They provide full, clear sound for speech and vocal applications.

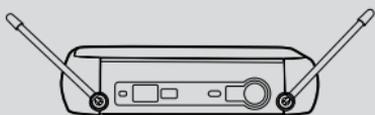
Clip-on instrument microphones: A versatile solution for high volume wind, brass and percussion players. Gooseneck and clamp ensure secure fit and positioning.

Guitar/ bass cable: Connects any guitar to a bodypack for wireless performance.



Receiver

Wireless receivers process signals sent from a handheld microphone or a bodypack transmitter and convert them into an electrical signal. This signal is then sent through a cable to the guitar amp or the mixer.



INFO: Diversity Receiver

So-called “diversity” receivers feature two separate antennas to ensure consistent signal reception. If the wireless signal becomes worse or even noisy on one antenna, the second antenna takes over the reception, and so drop outs and noisy signals are avoided. All Shure wireless products feature diversity reception to maximize reliability compared to non-diversity systems.

Basics of RF

Every wireless microphone system transmits and receives sound on a specific radio frequency, known as the **operating frequency**. The crucial part in using wireless systems is the right choice of this operating frequency. You cannot combine arbitrary RF frequencies as the microphones will compete with each other, and each system will experience noisy interference and/ or **drop outs**. It is also not possible to use two wireless systems on one frequency in the same venue or to use two wireless microphones with just one receiver at the same time. More advanced systems offer greater frequency selection, flexibility and the ability to combine more receivers and transmitters to serve more users.

To make it easier for the user, Shure systems offer pre-configured frequencies to accommodate multiple users. Furthermore, several Shure wireless systems automatically scan the environment for open frequencies.

A word on legality

Operating frequencies of wireless microphone systems are only a part of the whole spectrum of wireless devices such as radio, TV, mobile phones and the like. Every country has defined different frequencies available for microphone systems. Shure wireless systems are pre-programmed to use the legal frequencies in your country. Please contact the Shure distributor in your country for more details on the legal use of wireless microphones.

HOW TO FIND THE RIGHT WIRELESS SYSTEM

Which application is the wireless system for?

For almost every application there is a specific wireless system configuration available. Which one is the best choice for you, depends on how you want to use it.

Application	Configuration
Vocals	Handheld transmitter
Singing dancer, keyboarder, drummer, fitness instructor, dance instructor	Headworn microphone & bodypack
Stage actor, presenter, worship leader	Lavalier microphone & bodypack
Horn, percussion	Clip-on instrument microphone & bodypack
Guitar, bass	Instrument cable & bodypack

Your usage application is only one key factor in choosing a wireless microphone. Also consider the microphone transducer design and polar pattern. These greatly impact how any wireless microphone reproduces your live sound.

For example, if you are a vocalist who performs onstage with loud monitors, you might want a handheld transmitter with a cardioid or even supercardioid polar pattern to minimize feedback. If you tend to sing in a low voice a condenser microphone helps to produce a clearer and more natural sound. If you have already used a wired Shure mic (e.g. the SM58®) it makes sense to choose the same microphone capsule with a wireless system.

For presentations or in a theater, lavalier and headworn microphones with an omnidirectional polar pattern are suitable, as floor wedges are rarely used for these applications. These microphones are the least sensible to breathing noise and deliver the most natural sound – which is particularly beneficial for speech applications.

How many wireless systems will be in use at the same time and location?

Every wireless microphone system has a certain maximum amount of compatible channels that can be used simultaneously. If you are operating only a single system in one location, you can choose any wireless system available.

Before choosing a wireless system you should consider how many systems might be added in the future in your band. This also includes wireless in-ear-monitoring systems. If you choose a system with maximum four compatible channels it can become tight pretty fast. Better systems allow for eight, twelve or even more units to be operated at the same time without interference. Therefore you should consider the maximum amount of compatible channels with a wireless system before the purchase.

If you operate more than one wireless system the carrier frequencies have to be chosen carefully, as RF signals interact and interferences can occur. If you are using wireless systems of the same type this is normally no problem as the frequencies are usually stored in groups that are compatible with each other. With different wireless systems this is more complicated. Units with Auto Frequency Selection help to find an open frequency automatically and avoid sources of interference.

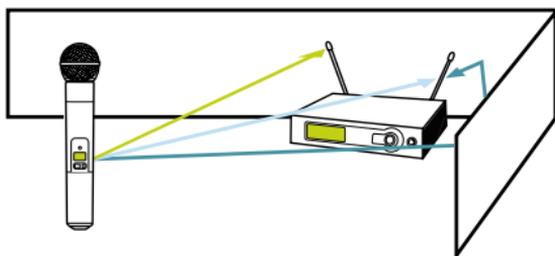
Should you have difficulties in finding open frequencies please contact the Shure Support Team.

APPLICATION AND POSITIONING

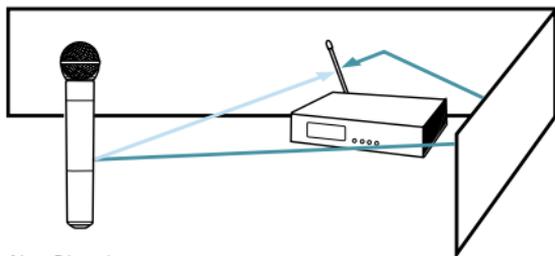
Signal path from transmitter to receiver

Transmitter signals radiate in all directions, not just in a direct path. This causes reflections on walls, floors and ceilings which overlap with the directly sent signal. With single antenna receivers, so called non-diversity systems, direct and reflected signal can often cancel each other out, causing a sound drop out.

Diversity receivers with two antennas are better able to handle longer distances and more cluttered signal paths. They are also more reliable in settings where there is no line of sight between the receiver and the transmitter.



Diversity



Non-Diversity

Receiver and antenna placement

Place the receiver properly

Receivers are not only subject to interference from external sources that use radio frequencies. Where possible, keep receivers also a few feet (or rack spaces) away from CD/ DAT/ MD players, PCs/ notebooks and special-effect units.

Position antennas properly

Ideally, antennas should be positioned above an audience or other obstructions so that the transmitter and receiver can “see” one another. When receivers are mounted in a rack, antennas must be located on the front panel or allowed to project through the top of the rack. With diversity receivers the antennas should be oriented at a 45-degree angle to maximize the distance between the tips. To receive the optimal diversity effect the antennas should have a distance of 40 cm (one wave length). Less distance deteriorates this effect.

The usage of an antenna splitter

If you operate more than one wireless system and move from venue to venue, it is usually more convenient to mount receivers in a rack case. This degrades the performance of the wireless systems as the antennas are too close to one another. With more advanced wireless systems the antennas are detachable which allows the usage of an antenna splitter. The splitter feeds one “master” pair of antennas to serve all receivers for an increased RF-reliability. With four or more receivers in one rack we recommend to use an antenna splitter as this leads to a significant improvement in performance.



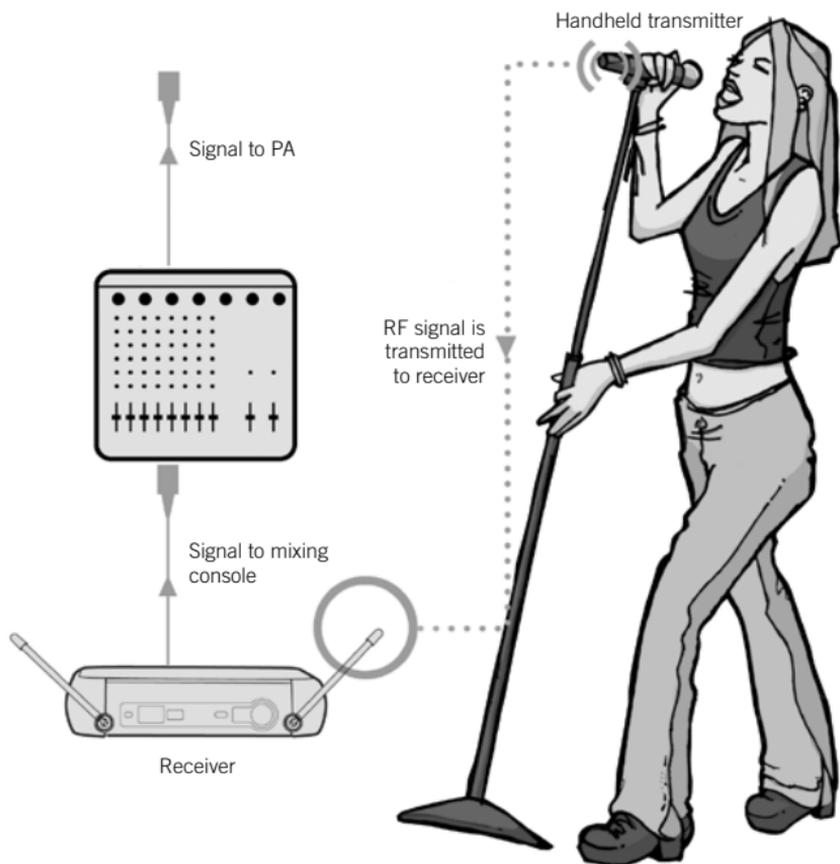
Power supply

Unlike most wired microphones, all wireless transmitters require batteries. As a result, batteries are an important and constant replacement part that should also be checked regularly.

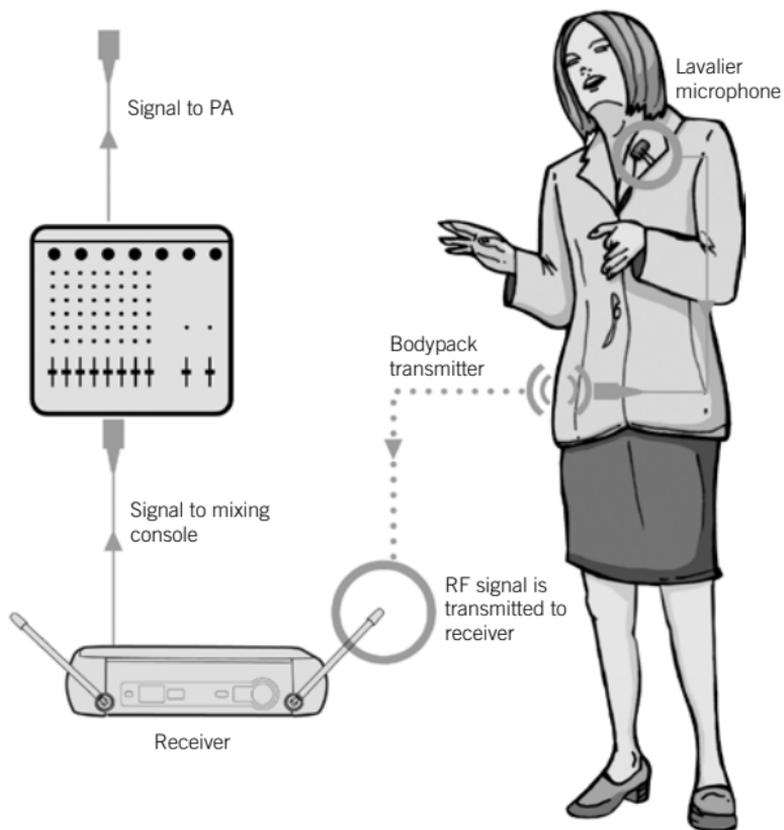
The usage of rechargeable batteries is possible. Rechargeable mignon (AA) batteries are recommendable as they are available with a capacity of 2500 mAh or even more – the more capacity, the longer the battery life. Unfortunately, there are no rechargeable 9 V batteries available that offer an appropriate capacity. Alkali 9 V batteries offer twice the battery life. But if the usage is less than three hours, rechargeable 9 V batteries can be used as well.

Setup Snapshots

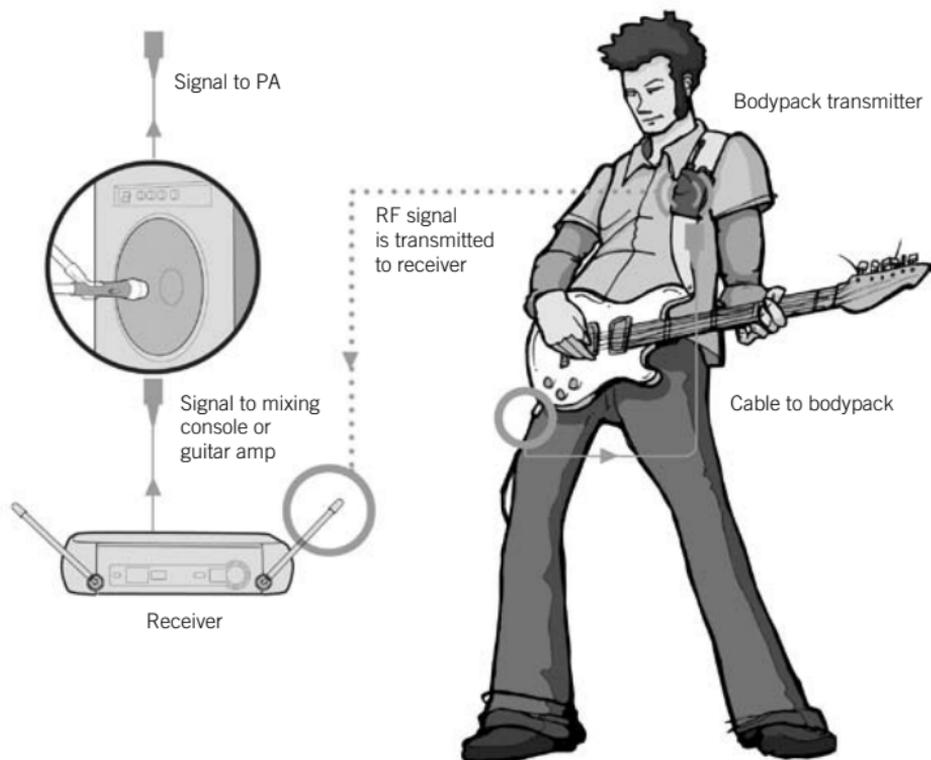
Singer



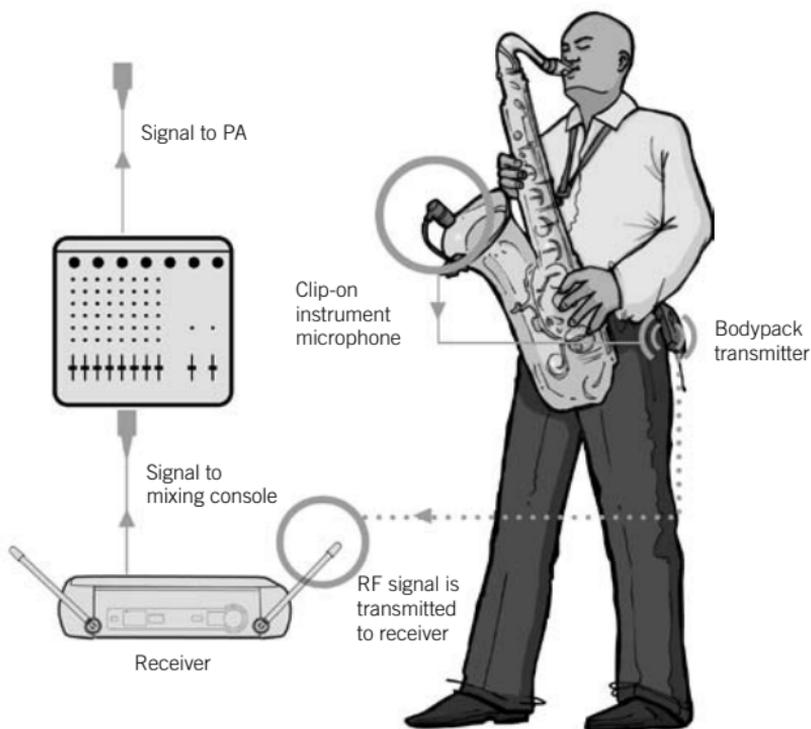
Presenter



Guitarist



Saxophone player



SHURE WIRELESS SYSTEMS AT A GLANCE

Wireless Systems

Performance Gear
Wireless

The entry to Shure Wireless.



PGX

Legendary sound.
Remarkably easy.

Handheld Configurations

Compatible Systems Per Band

Selectable Frequencies

Auto Setup Features

Audio Reference Companding

Furnished Antennas

Advanced Antenna Options

Rack Hardware

Carrying Case

Transmitter Display

Receiver Display

Batteries, Battery Life

PG58

Up to 4

10

No

No

Internal $\frac{1}{4}$ -wave

No

Optional (URT)

Optional System Case

Multi-Color LED

Multi-Color LEDs

9 V, > 8 hrs.

PG58, SM58[®], SM86,
Beta 58A

Up to 8

Up to 90

Scan/ Sync

Yes

Attached $\frac{1}{4}$ -wave

No

Optional (URT)

System Case

Multi-Color LED

Multi-Color LEDs

2 „AA“, > 8 hrs.

SLX®

The out-of-the-box wireless solution.



SM58®, SM86, Beta 58A, Beta 87A, Beta 87C

Up to 12

Up to 960

Scan/ Sync

Yes

Detachable 1/4-wave

Yes

Included

Optional System Case

Backlit LCD + multi-color LED

LCD + LEDs

2 „AA“, > 8 hrs.

ULX

Sophisticated, scalable wireless solution. Take Control.



SM58®, SM86, SM87A, Beta 58A, Beta 87A, Beta 87C

Up to 20

Up to 1440

Scan/ Group Scan

Yes

Remoteable 1/2-wave

Yes

Included

Optional System Case

Backlit multi-function LCD + LED

Multi-function LCD + LEDs

9 V, > 8 hrs.

UHF-R

Premier, networkable wireless technology. Do More.



SM58®, SM86, SM87A, Beta 58A, Beta 87A, Beta 87C, KSM9

Up to 47

Up to 3000

Scan/ Group Scan/ Sync

Yes

Remoteable 1/2-wave

Yes

Included

Transmitter Case

Backlit multi-function LCD

Multi-function LCD + LEDs

2 „AA“, > 8 hrs.

Microphone Options

Wireless Handhelds

PG58



A rugged mic tuned to accentuate the clarity of lead and backup vocals.

  60 Hz - 15 kHz*

PGW

PGX

ULX

SLX

UHF-R

SM58®



The legendary Shure vocal mic designed for superior vocal clarity and warmth. Consistently the first choice of performers around the globe.

  50 Hz - 15 kHz*

PGX

SLX

ULX

UHF-R

BETA 58A



A top choice among vocalists for its smooth extended frequency response. Provides maximum isolation from other onstage sounds.

  50 Hz - 16 kHz*

PGX

SLX

ULX

UHF-R

BETA 87A



Studio-quality sound for live performance vocals. Provides smooth, tailored frequency response for detail and accuracy of sound.

  50 Hz - 20 kHz*

PGX

SLX

ULX

UHF-R

 dynamic  condenser  cardioid  supercardioid

SM86



This smooth sounding vocal mic is tailored for warm and rich vocal reproduction.

☝ ☹ 50 Hz - 18 kHz*

PGX SLX ULX UHF-R

SM87A



A sensitive vocal mic that features a smooth, tailored response for a warm, accurate sound. Tight polar pattern and 3-stage pop filter.

☝ ☹ 50 Hz - 18 kHz*

ULX UHF-R

BETA 87C



The Beta 87C vocal microphone offers an extremely smooth, tailored response for a warm, natural sound. The cardioid polar pattern compensates for the isolation often associated with the use of personal monitors.

☝ ☹ 50 Hz - 20 kHz*

SLX ULX UHF-R

KSM9



KSM9 captures vocal subtlety with extraordinary detail to deliver clear articulation, functional flexibility and precise vocal reproduction. It offers exceptional consistency across all frequencies, providing more gain-before-feedback, and minimizing proximity effect.

☝ ☝ ☹ 50 Hz - 20 kHz*

UHF-R

* Overall frequency response depends on wireless system.

Wireless Headset Microphones

WH20



Rugged design with flexible gooseneck boom



 50 Hz - 15 kHz*

Black finish

PG30



Compact, rugged design with flexible gooseneck boom



 50 Hz - 20 kHz*

Black finish

Beta 53



Interchangeable frequency response capsules



 20 Hz - 20 kHz*

Black or tan finish (WBH53)

Beta 54



Superior ambient rejection; high gain-before-feedback



 20 Hz - 20 kHz*

Black or tan finish (WBH54)

WH30



Rugged design with flexible gooseneck boom


 40 Hz - 20 kHz*

Black finish

WCM16



High ambient rejection


 50 Hz - 18 kHz*

Black finish

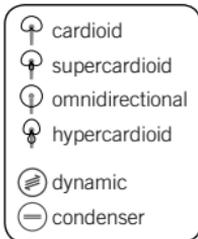
Countryman WCE6



Combines high audio quality with minimal visibility


 30 Hz - 20 kHz*

Black, tan or light tan finish (WCE6i)



All shown headset microphones are also available as wired version.

* Overall frequency response depends on wireless system.

Wireless Lavalier and Instrument Microphones

PG185



Compact, rugged design

☐ ⊖ 50 Hz - 20 kHz*

Schwarz

WL93



Two different cable lengths

☐ ⊖ 50 Hz - 20 kHz*

Black or tan finish

WCB6



Lowest visibility

☐ ⊖ 20 Hz - 20 kHz*

Black, cocoa, tan or light tan

WL50



Two sensitivity versions

☐ ⊖ 20 Hz - 20 kHz*

Black, tan or white finish



WL183



Interchangeable polar pattern capsules


 50 Hz - 17 kHz*

Black finish

WL184 / 185



Interchangeable polar pattern capsules


 50 Hz - 17 kHz*

Black finish

WL51



Low visibility


 20 Hz - 20 kHz*

Black or white finish

Beta 98H/C



A versatile mic for brass and percussion instruments


 20 Hz - 20 kHz*

Black

All shown lavalier and instrument microphones are also available as wired version.

* Overall frequency response depends on wireless system.

SHURE



IN-EAR-MONITORING

THE BASICS

What is monitoring?

Learning about in-ear-monitoring begins with understanding what monitoring is and why it's necessary. Monitoring boils down to being able to hear (monitor) your performance as you perform, so you know exactly what you and the other musicians are doing on stage.

Stage monitoring got its starts in the 1960s, as progressively louder rock bands started to discover that if everyone in a group can hear each other, they can perform better. This was accomplished by sending specific sound mixes to onstage floor-resting loudspeakers ("floor wedges"). They ushered in the age of monitoring, but were noisy, bulky and centered their sound in one place.

Today, in-ear-monitoring systems enable you to personally hear just what you want to without affecting what others hear. These systems are comfortable, wearable amplification devices to replace floor wedges with earphones worn "in ear".

The advantages of in-ear-monitoring

Conventional monitoring is achieved with bulky, heavy floor wedges placed onstage. In-ear-monitoring provides a more pleasant and precise way of monitoring:

Sound quality: When you're in-ear, you can enjoy a clear mix at lower levels, high-fidelity sound and less interruption from outside noise.

Also the sound for the audience is better as in-ear-monitoring systems eliminate feedback, and the loud stage noise often resulting from booming floor wedges is not picked up by the microphones onstage.

Mobility: Floor wedges center their sound on one place. With in-ear-monitoring, the speakers are in your ears, so you can expand your range onstage and hear yourself perfectly anywhere you go.

Portability: An entire in-ear system fits in a briefcase that goes where you go. Not only are floor wedges noisy, they are also bulky onstage and heavy to load out.

Where can I use in-ear-monitoring?

Generally, you can use in-ear-monitoring systems for every application where monitoring is necessary.

Live on stage – Bands often playing at different locations benefit from the ability to control their own personal mix. Furthermore, transportation effort is reduced as no floor wedges and amplifiers are necessary.

Rehearsal rooms – In-ear-monitoring turns the worst rooms into good rehearsal spaces. You not only get more practice in, you also reduce vocal strain and ringing ears.

Studio – During recording, in-ear performers can control volume levels and adjust the click track volumes themselves. They also enjoy the comfort of small earphones versus bulky traditional headphones. Isolating earphones also reduce outside noise and mic bleeding during the vocal overdubs.

Classical music performers – Especially with picking up acoustical instruments floor wedges tend to create feedback. Onstage or in the pit, in-ear-monitoring systems provide discrete monitoring for performers without sacrificing the quality of the sound the audience enjoys.

Theater and stage performances – These performers appreciate a cleaner, less-cluttered stage, thanks to the absence of floor wedge monitors. But the greatest in-ear advantage in these situations is the ability for actors, actresses and crew to monitor director instructions without the knowledge of the audience.

Broadcast environments – Besides the sound advantages, in-ear-monitoring systems help reporters and broadcast personalities isolate outside noise. They also enable cueing of events via satellite link and can be used as a wireless interruptible foldback (IFB) system for camera operators, stage managers and on-camera talent.



Ways to go in-ear

As with microphones there are two ways to get in-ear: wired and wireless. Both of these systems are made up of complementary components that enable you to hear the monitor mix in your ear. These include:



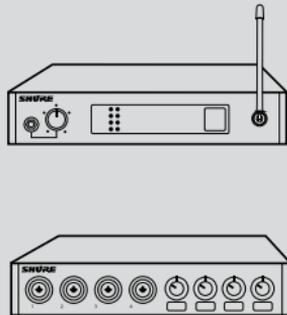
Earphones – compact, high-fidelity stereo in-ear-monitors.

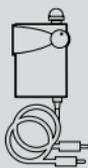


Bodypack receiver – sleek, wearable units that receive sound and give you control.

Transmitter – modules that send sound for wireless systems.

Mixer – modules that allow for advanced levels of control.





Wired in-ear-monitoring

If you're in one place the majority of the time, like a drummer, keyboardist or backup singer, wired systems are an easy choice. They are the lower-cost alternative and also save RF frequencies.

A wired in-ear-monitoring system includes a lightweight and small bodypack and a pair of earphones. The bodypack is connected to the mixer directly with a cable. The performer hears the monitor mix through the earphones.



Wireless in-ear-monitoring

Wireless in-ear-monitoring systems offer the performer full freedom of movement on stage.

As with wired systems the musicians wear a bodypack receiver clipped to a belt, guitar strap or pocket. The monitor mix is not received by a cable but through radio frequencies and therefore a transmitter is needed to send the signal. This unit is connected to the mixer with a cable.



Hybrid in-ear-monitoring

A few bodypacks (like the Shure P2R) are hybrid units. This means the receivers are capable of working either with wired or wireless systems. So you can start out wired and purchase a wireless transmitter later to upgrade to wireless when your budget permits. Or use in either configuration, depending on your setting.

There are also variations beyond that to combine wired and wireless usage. A drummer for instance can receive the in-ear-monitoring mix wireless and add a click track wired directly in the bodypack.

HOW TO FIND THE RIGHT IN-EAR-MONITORING SYSTEM

Stereo or mono?

Conventional monitoring is solely used mono. With in-ear-monitoring a stereo mix is also possible. In mono, both earphones reproduce the same audio, and stereo means you're listening to the fullest, most accurate monitor sound possible.

However, not for all performers a stereo image is useful and some even prefer mono as the stereo signal does not “turn” with the movements on stage. Whereas stereo is a big advantage for a pianist that is used to hear his signal as natural as possible.

There are mono and stereo systems available. Mono systems can only be used mono and stereo systems can be used mono as well as stereo.

Shure stereo systems offer a proprietary feature called **MixMode**. This is a dual channel mode, enabling you to control relative levels of two separate signals (a vocal and band mix, for example) while hearing both signals in both ears at the same time.

Are you a stationary or mobile performer?

Stationary – If you are in one place the majority of time, like a drummer, keyboardist or backup singer, wired systems are an easy choice and a lower cost alternative.

Mobile – If you need to move when you perform, go wireless and leave the cables behind. You'll hear a great mix no matter where you are on stage. Wireless systems are more complex than wired, but offer greater flexibility.

Can you share a monitor mix with others or do you require a personal monitor mix?

Shared Mix – With a shared wireless mix, everyone in your group with a wireless body-pack can hear the same monitor mix from a single transmitter. It's a cost-effective way for a band to monitor in-ear.

Personal Mix – In a band or ensemble situation, performers often want to receive a monitor mix tailored to their preferences. Typically, a musician wants to hear himself at louder volume than the rest of the band. Wired systems offer this in any way. With wireless systems, every musician needs his own wireless receiver and transmitter. If the musicians prefer a mono mix, the amount of transmitters can be halved. An example would be a signal sent from one stereo transmitter for a singer and a guitarist. On the left side is the mix for the singer and on the right side the mix for the guitarist. In MixMode the singer can turn the balance knob to receive only the left signal and therefore has its own mix – the same counts for the guitarist who turns the balance knob to receive the right side and so his own monitor mix.

How many channels need to operate simultaneously?

RF frequencies – no matter if wireless microphones or in-ear-monitoring systems – need to be chosen carefully. For an easy setup all Shure in-ear-monitoring systems feature pre-selected frequencies which are compatible. This means they can be operated simultaneously without interference from each other. All systems have a maximum amount of compatible channels, and the number of channels needed in your setup defines the right system for you. But you also need to consider the amount of wireless microphone systems that are used at the same time.

APPLICATION AND POSITIONING

RF remains RF

The setup and the handling are the same with RF signals from a fixed transmitter and a mobile receiver – as with in-ear-monitoring – or the other way round as with wireless microphone systems. Therefore, the same basics as with wireless microphone systems are valid.

INFO: Bodypack receiver

In most cases bodypack receivers are non-diversity (with one antenna). As mentioned above, diversity systems work most effectively with a 40 cm distance between the antennas. As the distance becomes less (as in the case of a small bodypack receiver) the diversity effect does not work properly anymore. The performance increase does not justify the higher cost associated with a diversity receiver. Additionally, it is not as critical as with a wireless microphone if short sound drop outs occur.

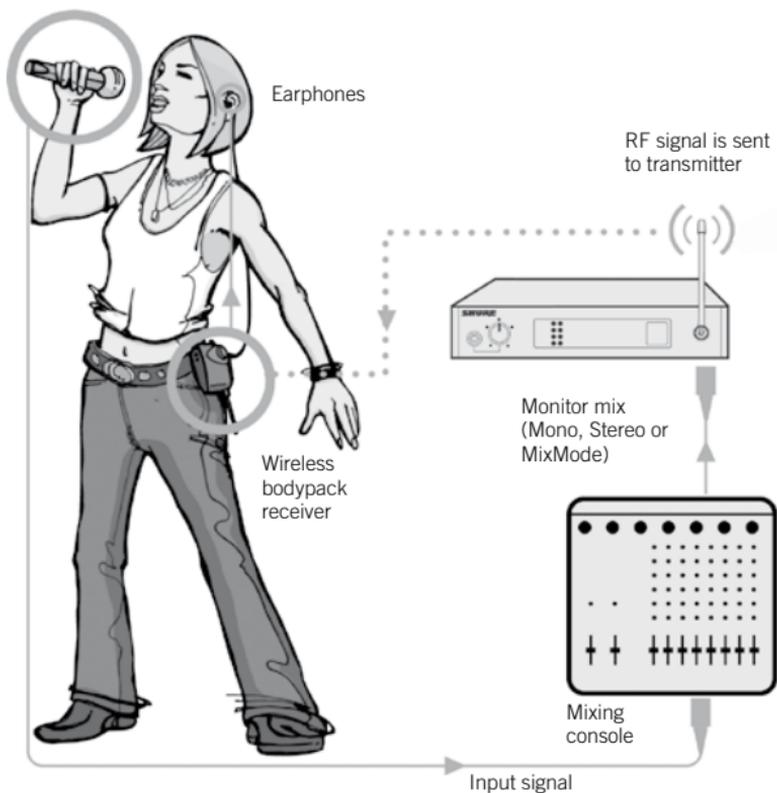
Again, if antennas are too close to one another they interact and create interferences. Reducing the number of transmitter antennas in close proximity reduces the chance of experiencing sound drop outs. Similar to the antenna splitters with wireless microphone systems there are antenna combiners available for in-ear-monitoring systems. These units combine multiple wireless transmitter antennas to one antenna and lead to the best possible performance.

ATTENTION:

In-ear-monitoring transmitters and wireless microphone receivers interact heavily. Therefore, a minimum distance of 3 meters is recommended. The best way is to separate those systems in two different racks.

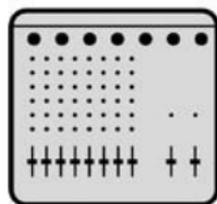
Setup Snapshots

Vocalist (wireless)



Guitarist (wired)

Monitor mix is transmitted to
bodypack receiver via cable



Mixing
console

guitar signal



Earphones

Wired bodypack
receiver

SHURE IN-EAR-MONITORING SYSTEMS AT A GLANCE

PSM Systems

Listening Mode

Compatible Systems per Band

Transmitter Inputs

Transmitter Outputs

Wired Bodypack Option

Personal Mix Control

Remoteable Transmitter Antenna

Battery Life

PSM 200

The full featured entry to in-ear-monitoring.



Mono

Up to 4

2 x XLR/ 6.3 mm Combo
Mic/ Line Level

2 x XLR Split Outputs

Yes

On Transmitter

No

Wired 6 hrs./ Wireless 4 hrs.

PSM 400

For greater versatility and control.



Mono, Stereo or MixMode

Up to 8

2 x 6.3 mm
Line Level

2 x 6.3 mm Split Outputs
3.5 mm Earphone Output

Yes

On Receiver

Yes

Wired and Wireless 8 hrs.

PSM 700

The industry standard in in-ear-monitoring.



Mono, Stereo or MixMode

Up to 16

2 x XLR/ 6.3 mm Combo
Line Level

2 x 6.3 mm Split Outputs
3.5 and 6.3 mm Earphone Output

No

On Receiver

Yes

Wireless 6 hrs.

Professional Earphones

Specifically designed for use with in-ear-monitoring systems.

SCL2 Earphones



Dynamic MicroSpeakers deliver full range sound.

105 dB SPL/mW

16 Ω

22 Hz - 17.5 kHz

30 g

157 cm

141 cm

Transparent

Black

SCL3 Earphones



Wideband MicroSpeakers with extended frequency response.

115 dB SPL/mW

26 Ω

25 Hz - 18.5 kHz

28 g

141 cm

157 cm

157 cm

Black

White

Gray

Sensitivity

Impedance

Frequency Response

Weight

Cable Length

Color Variations

SCL4**Earphones**

High-Definition
MicroSpeakers with Tuned
BassPort for detailed highs
and extended bass.

109 dB SPL/mW

29 Ω

22 Hz - 19 kHz

31 g

141 cm	157 cm
--------	--------

Black	White
-------	-------

SCL5**Earphones**

High-Definition
MicroSpeakers with inline
crossover for incredibly
accurate sound.

122 dB SPL/mW

110 Ω

20 Hz - 18.5 kHz

31 g

155 cm

Transparent

Consumer Earphones

Specifically designed to work best with portable audio devices.

SE115 Earphones



The 2nd Generation Dynamic MicroSpeakers deliver detailed, warm, sound quality with improved bass.

105 dB SPL/mW

16 Ω

22 Hz - 17.5 kHz

30 g

45/ 136 cm*

Blue/ red/ pink/ black

SE210 Earphones



High-Definition MicroSpeakers for full range audio.

114 dB SPL/mW

26 Ω

25 Hz - 18.5 kHz

30 g

45/ 136 cm*

Black/ white

Sensitivity

Impedance

Frequency Response

Weight

Cable Length

Color Variations

* modular cable

SE310**Earphones**

High-Definition MicroSpeakers + Tuned BassPort for extended range audio plus enhanced bass.

111 dB SPL/mW

28 Ω

22 Hz - 19 kHz

28 g

45/ 136 cm*

Black/ white

SE420**Earphones**

Dual TruAcoustic MicroSpeakers with a dedicated tweeter and woofer for defined lows, mids and highs.

109 dB SPL/mW

22 Ω

20 Hz - 19 kHz

31 g

45/ 136 cm*

Black/ white

SE530**Earphones**

Triple TruAcoustic MicroSpeakers with a dedicated tweeter and dual woofers for an expansive soundstage and full-bodied bass.

119 dB SPL/mW

36 Ω

18 Hz - 19 kHz

30 g

68/ 136 cm*

Bronze

APPENDIX

GLOSSARY

Balanced/ unbalanced circuit

An unbalanced output carries the signal on a single conductor (plus shield). Influences on the cable (like the humming of a parallel power cable) are audible. When using a balanced output the signal is carried on two conductors (plus shield). The signal on each conductor is the same level but the opposite polarity. A balanced microphone input amplifies only the difference between the two signals and rejects any part of the signal which is the same on each conductor.

Cardioid

See p. 9

Condenser microphone

See p. 8

Diversity

See p. 25

Dynamic microphone

See p. 8

Dynamic range [dB]

The range between self noise and the maximum sound pressure level. Within this range the microphone can successfully pick up.

Electret (permanently biased) condenser microphone

The microphone capsule (membrane and backplate) of a condenser microphone requires polarizing voltage to charge the condenser element. Is an electret (a synthetic polarized material) attached to the backplate, the polarizing voltage does not need to be supplied externally. Nevertheless, an electret condenser microphone also requires power (by battery or phantom power) to operate the preamplifier.

Feedback

During the normal operation of any sound system, sound produced by the loudspeakers can be picked up by the microphones, re-enter the system and become amplified. At certain points this can cause the system to create a noisy, sustained "howl" known as feedback.

Frequency response

See p. 10

Impedance [Ω]

In an electrical circuit, opposition to the flow of alternating current, measured in ohms. The lower the impedance, the more current supports the microphone. The output impedance of a microphone should be much smaller than the input impedance of the microphone input of a mixer.

MixMode

See p. 49

Omnidirectional

See p. 9

Operating frequency

See p. 26

Phantom power

All condenser microphones require phantom power. The 48 V (sometimes 12 V) are provided by the most mixers through the microphone cable. Some condensers can be operated with a battery and are therefore suited for mixers without phantom power or PC sound cards.

Proximity effect

See p. 10

Self-noise [dB]

The self-noise or equivalent noise level is the sound level that creates the same output voltage as the microphone does in the absence of sound. This is the lowest point of the microphone's dynamic range, and is particularly important with recording sounds that are quiet.

Sensitivity [mV/Pa] or [dB/Pa]

The electrical output that a microphone produces for a given sound pressure level. In most cases sensitivity is measured with a sound pressure level of 94 dB (1 Pascal). The higher the sensitivity, the "louder" the microphone.

Small and large diaphragm

The terms small and large diaphragm are used with condenser microphones. A large diaphragm has a diameter of at least 1 inch (2.54 cm). Large diaphragm microphones are popular for vocal recordings as they add harmonics to the sound which makes voices sound smoother. Small diaphragm microphones feature a flat frequency response and sound more natural. This is why they are popular for instrument recordings.

Supercardioid

See p. 9

THD – total harmonic distortion [%]

The total harmonic distortion, or THD, of a signal is a measurement of the harmonic distortion present and is defined as the ratio of the sum of the powers of all harmonic components to the power of the fundamental.

Transducer type

See p. 8

Want to know more?

Additional literature can be found under the category “Tech Support” on www.shure.com/proaudio

IMPRINT

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SHURE AGAINST COUNTERFEITING

Did you know many popular Shure models including the SM58® and Beta 58A are illegally manufactured and sold around the world as authentic Shure products?

Despite all superficial similarities to authentic Shure products, counterfeits, on average, use much lower quality materials and are very unreliable, much less rugged and offer significantly lower performance and sound quality. Counterfeits are also not covered by Shure's warranty policy should you need it.

While Shure is taking action to protect you and our brand, there are things you can actively do to reduce the chances that you purchase a counterfeit:

- Be a wise shopper. Familiarize yourself with signs of counterfeit products, be cautious of incredibly low prices offered by on-line auctions and merchants and, when possible, inspect merchandise before you buy.
- Buy only from authorized Shure dealers. You can find a list of authorized dealers and distribution centers on the Shure websites.



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PERFORMANCE™

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