

How to Choose the Right 2Mic Model

by Ken Donnell, Owner and Developer of the MiniFlex 2Mic

Introduction

For 25 years, I have answered the many questions from guitarists who are deciding which MiniFlex model is best for their needs. This document is my attempt to put all of these answers into one clear and well organized statement. There are 6 different 2Mic models for guitar available, with each model having specific features that may address the needs of any individual guitarist. Part of answering these questions involves helping acoustic guitarists understand how the amplification process works, and the options for the best amplification equipment available. Plus, it is important for guitarists to understand the differences between pickups and microphones.

Perhaps the most important information in this document is the explanation in the differences between using a line level – high impedance, or a mic level – low impedance, signal. Either choice works fine, but there are potential advantages and/or disadvantages to using either mic or a line level signal. Please read this section carefully.

While the 2Mic is officially a microphone, it is actually *a completely new type of microphone* that has never before existed. Because of its superior ability to reject feedback and accurately record the acoustic sound of guitars, the 2Mic can do things not possible with any other microphone design. As with any innovative product, there is sometimes a learning curve for how to best use the 2Mic with amplification equipment that was designed for pickups and older types of single mic systems. Reading the information contained within this document will help to lessen this learning curve – and we at MiniFlex are always happy to answer any question regarding the 2Mic. We have solutions for almost every [problem] any guitarist may encounter when first using the 2Mic.

Choices of 2MIC

There are four important general choices to consider when choosing a 2Mic to amplify your guitar:

1. How you prefer to have the 2Mic mount in your guitar:
 - Endpin mount or
 - Quick mount.
2. The frequency response and EQ preferred:
 - Pre-Eq'd in low frequencies, or
 - No pre-EQ
3. How the 2Mic is powered:
 - Battery powered or
 - Phantom powered
4. The strength of signal you want your 2Mic to produce:
 - High impedance (line level), or
 - Low impedance (mic level).

Mounting Choices for Your New 2Mic

The MiniFlex 2Mic is available with two basic mounting options:

- End Pin mount - Models 1, 4, 5 and 7
- Quick mount - Models 2 and 3

The sound quality is the same for either option, so your decision should be based on which mounting option best meets your needs.

End pin mounted 2Mic

These models are unique among all of the guitar amplification products available in that no component of the 2Mic assembly contacts any vibrating part of the guitar – not the sides, back, or especially, not the soundboard. All components of end pin mounted 2Mics are suspended from the output jack that is connected only to the tail block of the guitar, a structural, non-vibrating component of the instrument.

Most magnetic pickups clip into the soundhole of a guitar, significantly blocking the passage of air out of the instrument. And most piezo pickups make direct contact with the sound board, or worse, the under saddle area or the bridge. The sound board of any stringed instrument is highly sensitive to dampening through contact with any other object. Try having someone place their finger on the central soundboard area of your guitar while you are playing, and the dampening effect of such contact will become immediately noticeable.

All end pin mounted 2mics have all of their electronic components mounted onto – within the housing, or barrel of the 2mic assembly. Once mounted inside the guitar, all one has to do is plug in and play. It is that simple.

Note: The exception being the Model 4 which uses an external power supply.

Quick Mount 2Mics

These models do not have the simplicity of “plug and play” offered by the end pin mounted 2mics, but other features may be important to certain guitarists. While there is some contact with the soundboard by the 2mic mechanisms, this contact is next to the fingerboard and edge of the soundhole, which is not a primary acoustic sound producing region of a guitar.

- Model 2: Is our least expensive 2Mic model of all. Yet it delivers the same quality of sound as our most popular end pin mounted Model 1. The Model 2 requires strap buttons at the tail block and heel of the guitar. Mounting or removal requires approximately one minute. The Model 2 is an excellent choice for guitarists who have more than one guitar they wish to amplify. The Model 2 can be moved easily from one instrument to another, and avoids the need to enlarge the hole in the tail block for installation of an end pin output jack.
- Model 3: Is our professional Quick Mount Model designed for studio applications or live performances with classical, flamenco, and vintage steel stringed instruments where absolutely no modification to the guitar is possible – even installing strap buttons. The Model 3 is also easily installed or removed, but it is possible to leave the Model 3 installed on a guitar on a semi-permanent basis, even if the guitar is placed inside its case. The Model 3 is the most versatile of all 2Mic Models in that it can be mounted on to any guitar, and can generate either a line level or mic level signal – described further below. This versatility and durable mounting makes the Model 3 an excellent choice for daily professional use in studios or with guitars that no modification to the instrument is possible.

Frequency Response and EQ options

Two different mic elements are used for MiniFlex 2Mic models and with different frequency responses for each. Plus, some models have a pre-set equalization to roll off some of the low and mid-low frequencies that sometimes may cause both steel string and nylons stringed guitars to sound “boomy” during live performances.

Models 1, 2, 4, and 5 use mic elements with a frequency response of 80-15K Hz. All three models have electronic circuitry that slightly reduces the low and mid-low frequencies to prevent the guitar sounding “boomy”.

Model 7 uses a mic elements with a full frequency response of 50 – 16K Hz and with no pre-EQ

Model 3 uses the same full frequency mic element as the Model 7, but has the option of having an output signal with pre-EQ, or without pre-EQ, depending upon which external power supply is used. (EPS-1 or EPS-2)

Note: Both the EPS-1 and EPS-2 power supplies are included with the Model 3.

Battery-Phantom Power options

Some 2Mic models are designed to be powered by batteries, while other models require phantom power from a P.A. or other external devices. All of the 2Mic Models that create a mic level signal – Models 5 and 7 – require phantom power to operate. All of the 2mic models that create a line level signal are battery operated – Models 1, and 2.

The advantage to using battery power and a line level signal is the versatility of connecting with almost all types of amplification gear available. Batteries should be changed approximately every two years.

The advantage to choosing the phantom powered Model 5 or 7 means that one will never need to change batteries, but also requires that a phantom power source – usually a P.A. mixer, be present for the 2Mic to operate.

Model 4 is normally shipped only with an EPS-1 – with the EPS-2 being an optional accessory.

Model 3 includes both an EPS-1 and EPS-2 as standard components

Line Level Signals Compared to Mic Level Signals

Perhaps one of the most confusing technical elements of using miniature microphones to amplify guitars and other stringed instruments with “close mics” concerns the strength of the signal generated by the mic, often termed the “output impedance”. There are two general strengths of output impedance used with guitar amplification gear – a line level signal (high impedance), or a mic level signal (low impedance). There are advantages and disadvantages to either choice, so it is important for every musician to understand in advance which type of signal will best meet their needs before choosing a specific 2mic model. It is especially important to have the output impedance of your 2Mic match the anticipated input impedance of the amplification equipment you plan to use.

Note: The exceptions to this choice being our Model 3 – quick mount, and the Model 4 – end pin mount. Both the Model 3 and the Model 4 have the option of creating either a line level signal or a mic level signal by using either the EPS-1 or EPS-2 power supply.

Pickups and Microphones

Before describing the differences between mic and line level signals it is first important to have a brief discussion about microphones in general, and the differences between pickups and microphones. Some novices to guitar amplification believe that the 2mic is just another type of pickup, but this is not correct. Microphones and pickups both record sound for amplification but the logic and equipment needed for mics & pickups is very different. Pickups typically only record and reproduce the fundamental tones of a stringed instrument. This is especially true for magnetic pickups, which record none of the overtones that provide the warmth and depths of sound created by an acoustic guitar or other stringed instruments. Piezo transducers record some overtones, but Piezos still mostly reproduce only fundamental tones. Microphones record all of the frequencies created by an acoustic guitar and create a much more complex signal filled with overtones and other audio nuances. This is why the tone quality for microphones is so much more natural than for pickups. However, this ability to reproduce all of these overtones is why microphones are so much more vulnerable to feedback than pickups, and the potential

for feedback is why microphone signals are more delicate to process than the less complex signals generated by pickups.

The 2Mic is the breakthrough design which solves this problem of feedback from microphones used to close mic stringed instruments. The phasing of the 2 separate microphones permits the 2Mic to achieve volume levels equal to, or often greater than, piezo pickups. Plus, having a line level output for the 2Mic often permits the 2Mic to mimic how a pickup works for many applications. But be careful to avoid using the 2Mic with electric guitar equipment that is designed to receive a very high impedance signal unless the 2Mic signal is somehow boosted – or pre-amp'd, usually by employing a DI box of some type.

For extreme feedback environments, even the 2Mic cannot compete with magnetic pickups for feedback rejection in every possible performing situation. For someone playing an acoustic guitar in a bar band setting, a magnetic pickup will probably be the best option – not the most natural tone, but able to complete with drums, bass and keyboards without feedback. For all other venues, the 2Mic will perform great – if used with the proper equipment.

Microphone Varieties

There are several varieties of microphones available today, but they all function in a similar manner. Within the mic housing, there is some type of receiving device, usually a diaphragm that is activated by the passage of sound energy – that is, moving air, over the diaphragm. Most modern mics fall into two basic categories:

- Dynamic microphones: These have a large enough diaphragm that the sound energy alone is capable of activating the diaphragm to produce a signal that can be transmitted, amplified, and converted back into sound by speakers
- Condenser microphones: These have a diaphragm that is charged by a small electric current – typically 1.5-12v. Because the diaphragm is charged, condenser mics can be very small, and still produce an extremely high quality of sound reproduction. But, condenser microphone must have this current from either a battery or phantom power source to operate.

It is not possible to build dynamic mics small enough that can produce a high quality tone reproduction to use dynamic mics for on-board – that is, close mic, amplification with stringed instruments. Only condenser mics are used with the 2mic, so all of the following discussion will relate only to condenser mics that need some type of electric current to operate.

Mic and Line Level Signals

One of the more confusing technical aspects of using the 2Mic versus pickups is the difference between generating a mic or line level signal. Typically, pickups generate a high impedance line level signal, while most microphones generate a low impedance mic level signal. For phantom powered 2Mic Models, we have chosen to generate a typical low impedance mic level signal – standard for Models 5 and 7, and optional for Models 3 and 4. For our battery operated 2 Mic models we have chosen a mid-range output impedance line level signal in order to be compatible with amplification gear designed for both Microphones and pickups – Model 1 and 2, optional for Models 3 and 4. There are both mechanical differences, and differences of signal strength between line level and mic level signals.

The Two Fundamental Mechanical Differences

There are two fundamental mechanical differences between mic and line level signals:

1. The number of conductors – or wires, used to transmit the signal

- Line level signals always use a mono, or 2 conductor cable – the same as a standard electric guitar cable. These cables can plug into most 1/4" phone jacks found on amplifiers and signal processing equipment.
 - Mic level signals commonly – but not always, use a 3 conductor cable similar or identical to a standard XLR microphone cable. Mic level signals mostly need to connect into the XLR input jacks of P.A. systems or acoustic amplifiers. But, some modern amplifiers are designed to accept mic level signals using XLR, or 1/4" TRS – or stereo plugs, jacks and cables.
2. There are two different strengths of the signal transmitted
- The standard for line level signals is based on the output of magnetic pickups used with electric guitars and basses, and typically has signal strength of 8-12K ohm. Piezo transducer pickups have a very low output, but are usually combined with a pre-amp that will boost the sign to approx. 6-8K ohms
 - The standard mic level signal is 500-1K ohm – which is approximately 10% of the signal strength for magnetic pickups

It is very important to properly match the strength of the output signal for any amplification device to the input signal anticipated by the amplifier or P.A. mixer. If a low impedance mic with an output signal of 1K ohms is connected to a guitar amp input expecting to receive an 8K ohm signal, the signal from the mic will be very weak even when the amp is turned up to full volume. Plus, the tone quality will be very poor and there will also be a lot of noise and hiss. Conversely, if a magnetic pickup with an 8K ohm is connected into a PA mixer input that is designed to receive a 1K ohm signal, the pickup signal will overdrive the input resulting in terrible feedback, noise, and poor tone quality.

Advantages and Disadvantages: Line Level Signals

Advantages: Much of the amplification gear designed for guitars and stringed instruments is built to receive a high impedance signal of 8-12K ohms. Equalizers, effects devices, pedals, and other on-stage volume and tone control devices all expect to receive such a high impedance signal.

Note: The mid-range line level signal 2Mic models will be compatible with most high impedance equipment designed for pickups. But if the equipment being used has both 1/4" and XLR inputs, we suggest trying the XLR input by using the 1/4"-XLR adapter MiniFlex supplies at no charge with all line level 2mics. We have found that when amplification equipment has both XLR and 1/4" inputs, the 1/4" inputs sometimes expect a very high impedance signal, and the mid-range 2mic signal will not effectively drive these inputs. The result will be a very low sound output with a lot of noise & hiss. Plugging into the XLR input with the adapter solves this problem and the 2Mic will work wonderfully.

Disadvantages: Overall tone quality for a line level signal will not be as good as a mic level signal when used for microphones. Line level signals are more likely to have hiss or other line noise in the signal. Mic level signals are much quieter. For performing, this difference in tone quality will probably not be noticeable unless an extremely high quality P.A. system in a good concert hall is used. But in a studio setting, there is a noticeable difference in sound quality between a line level and mic level signal. In a studio setting, the line level signal 2Mic – for example that found in the Model 1, will sound great, while the mic level signal 2Mic, for example, the Model 7, will sound fantastic.

Line level signals cannot travel more than 30 feet – 10 meters, without experiencing a significant loss in signal strength and tone quality. For musicians running their own sound on stage, line loss will not be a problem. But for longer cables runs or plugging into a P.A. snake – some type of direct box or DI interface may be a necessity. Finally, mono line level signals can be prone to Radio Frequency (RF) interference.

Minimizing RF Interference

Here is a little “trick” that we have learned for avoiding RF interference with line level signals – such as with the Model 1. Place one or two small loops in the cable along its length. These loops will help to block the cable from acting as an antenna and to better reject RF signals.

Advantages and Disadvantages: Mic Level Signals

Advantages: The low impedance and fully balanced line – 3 conductors, of a mic level signal will provide transmission of highest possible tone quality and with little or no line noise. Fully balanced, low impedance mic signals can travel great distances without any line loss or deterioration of tone quality. Balanced mic signals can transmit phantom power from a P.A. signal to a condenser microphone and eliminate the need for an on-board battery to supply power to the mics. Also, fully balanced signals are protected from RF interference.

Disadvantages: Signal processing, equalizers and other volume or tone control equipment is not readily available for balanced mic level signals. Mic level signals generally need to go directly into a P.A. mixer, with all of the volume and tone settings being under the control of the operator of the P.A. mixer – which is normal for most microphones.

Signal Strengths Used for the 2Mic

Line level signals are the standard output for the Model 1 and the Model 2, and are optional on the Model 3 and the Model 4. We chose to have our line level 2Mics operate at a mid-range signal strength in order to get the best performance and have the greatest versatility. The Model 1 has an output signal of 4K ohm. The Model 2 is 3.5K ohm. The Model 3 is 4.5K ohm, while the Model 4 can produce either a 3.5K ohm or a 4.5K ohm signal. We chose these mid-range signal strengths because when mic signals are taken to the normal line level signal strengths of 8-12K ohms, there can be problems with noise and poor tone quality. This mid-range signal strength is the most versatile we have discovered, and permits these models of 2Mic to work well with almost any type of amplification gear available. The signal is still low enough to connect into the low impedance inputs of P.A. systems, or directly into the high impedance inputs of most amplifiers and effects devices.

Mic level signals for the 2Mic Model 5 and the Model 7 operate at 500K ohm for maximum clarity of tone and protection against possible line loss. These models will perform the same as any standard low impedance microphone, and are specifically designed to be connected directly into a P.A. or recording mixer that has phantom power available.

Personal Recommendations

During my 30 years of testing and developing the MiniFlex 2Mic, I fall in love with every new model we have created. Each model has special features that work best in specific situations and with certain equipment. Overall, I prefer the end pin mounted models for their ease of use, and the simple “plug and play” nature of their design. Nothing will compare with the sound of the Model 7 in a recording studio or in a concert hall using a high quality mixer and P.A. system, but the new Model 3, which uses the same mics as the Model 7, is clearly the best choice for anyone playing a classical, flamenco, or vintage steel string guitars where no modification is possible, or for professional studios where a different guitar might need to be amplified every day.

Even though I have my choice of any 2mic model, and all of the equipment needed to operate any of these models, I find myself regularly coming back to the original battery operated line level signal Model 1. I like the convenience of the end pin mount, and the battery life is so long that I really can not remember the last time I needed to change a failing battery. Perhaps it is not the best sounding 2mic –

but it still sounds great in any application I need – on a small stage, a big stage, plugging into a guitar amp at a friend's home, or even into the mixer of a high quality studio. I never find myself constrained by the audio limits of the Model 1, and I often make use of its versatility to plug into and work effectively with almost any type of amplification gear available.

If I were a touring musician, there is no question that I would personally choose the Model 5 for the convenience of pre-EQ in the bass frequencies, phantom power, and a fully balanced mic signal. Finally, if I were a guitarist who has spent many years using piezo pickups and incorporated the tone qualities of these pickups into my overall sound, I would choose the Model 4 so I could have both a pickup as well as the 2Mic to amplify my guitar.

Note: The Model 1 mounted through a separate hole in the tailblock and using two separate output cables is also a great option for having a pickup and 2Mic in the same guitar.

Conclusion

The bottom line is that there are 2Mic models to fit the needs of every acoustic, classical, or flamenco guitarist. We, at MiniFlex, urge you to carefully consider your needs, and choose whatever model will work best for you. Our standard policy is to offer an unconditional 30 day money back guarantee, and a 90 day free exchange for a different model of 2Mic. So, please do not be afraid to try any of our Models and test thoroughly in your real world environment. And if you have any questions, please contact us. We are always here and happy to help.