Zieaz™ Microphones

Model: LCA1

Instruction Manual

Company website: Zieaz.net
Webshop: Z-microphones.net

CE	EMC 2014/30/EU; DS/EN 55032:2015 (Radiation Emission). DS/EN 55035:2017 (RF immunity @ 3V/m). RoHS 2011/65/EU.
	Waste from Electrical and Electronic Equipment (WEEE).

In this manual:

Introduction

Recording music has inspired musicians to perfect their performance by playing it back to one self; allowing repetitive self-criticism to shape the expression to the intended artwork idea, or to create something completely new.

It is not different for those that make the hardware, that do the actual storage of sound and for the sound reproduction.

A Microphone is the first boundary of acoustical perception, in that series of technical devices to solve that function. It should be as useful as possible, as practical possible and last as long as possible.

A Zieaz™ Microphone is build with the concept of “Precision where It matters”. And means that the microphone is build to balance usefulness and enough mechanical robustness, to last for about 3 human generations.

In perspective of: As many have measured, postulated and foreseen regarding humans way of living on planet earth; When we are producing a Zieaz™ product, we strive to minimize our strain on earths natural resources. And as a company, we participate in deciphering our own and others cultural aspects, that promote our longest and most sound way of living on earth for future generations.

We invite you to be at part of how our products are made, and with what materials to use. Knowing that it is a challenging task, to make a responsible product in a holistic “frame” or “orb” of thinking. From substance/soil/rock; to the product ready to be used.

Ramesh Patel

Zieaz™ Microphones,

Planetary address: (Earth @ Galaxy “Milky Way”); Europe/Denmark, Haslev.

Specifications

Acoustic Principle:	Condenser capsule; 17mm backplate; 18mm diaphragm. 135V (±5V) Externally polarised.
Active Electronics:	JFET impedance converter with OP-Amp buffer: OPA1612 SoundPlus™.
Directional Pattern:	Cardioid
Frequency Range:	20Hz ~ 20,000Hz (see graph)
Output Impedance:	Less than 30 ohms. Typical about 22ohms.
Sensitivity:	25mV/Pa @ 94dB SPL. ±4dB @ 1Khz. Individual data sheet available.
Equivalent Noise:	4dB A-weight *(Equivalent to perceived noise).* 14dB Z-weight *(Linear / full spectrum).*
Maximum Output:	+16.2dBu (@ 1kHz, 1% THD into 1kΩ).
Dynamic Range:	> 135dB
Maximum SPL:	139dB (@ 1kHz, 1% THD into 1kΩ).
Signal/Noise:	90dB SPL.
Power Requirement:	Phantom P48
Output Connection:	19 pin HDMI®. See pin schematic for 3-pin XLR connection. Requires a Zieaz™ HDMI to XLR patch cable for use with standard music equipment.
Net Weight:	182 Grams; about 170g of Brass (CuZn40Pb2/CW617N). Other materials: about 12g (grid, plug, electronics etc.).
Corporate Social Responsibility (CSR) information:	
ECO Data: *Progressive evaluation/benchmark and ECO-chemical rebalancing.*	https://lca.earth/ *(Site under development, planned ready before 2023) .* *https://eco-tracking.lca.earth/?vies=DK32208746*
United Nations 17 Sustainable Development Goals (SDGs):	Goal 12: *Ensure sustainable consumption and production patterns.* See our company participation at: https://zieaz.net/sdg1-17

Frequency Response

Please refer to individually measured data for most accurate frequency curve.

Example form SN: 2021002 (+ 2,8dB at 55Hz, -2dB at 1,7KHz, -1dB at 20KHz).

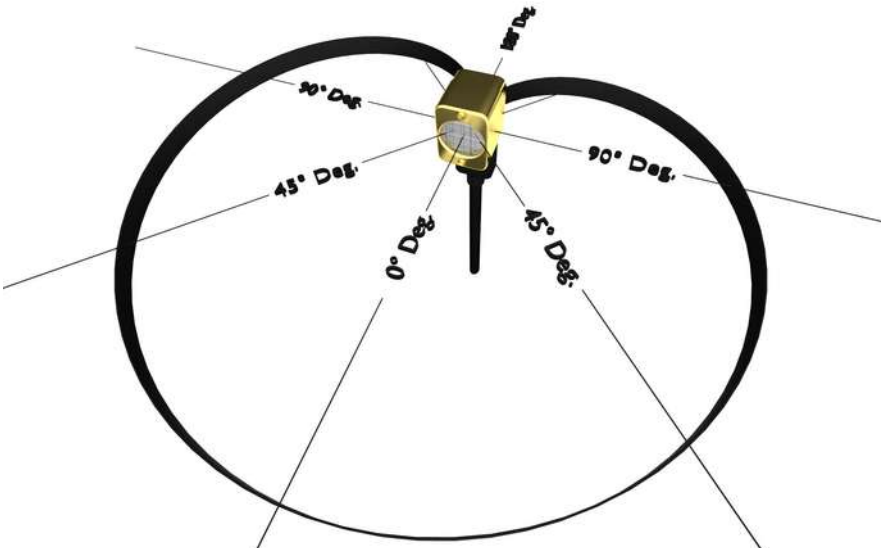
Polar Response

Cardioid.

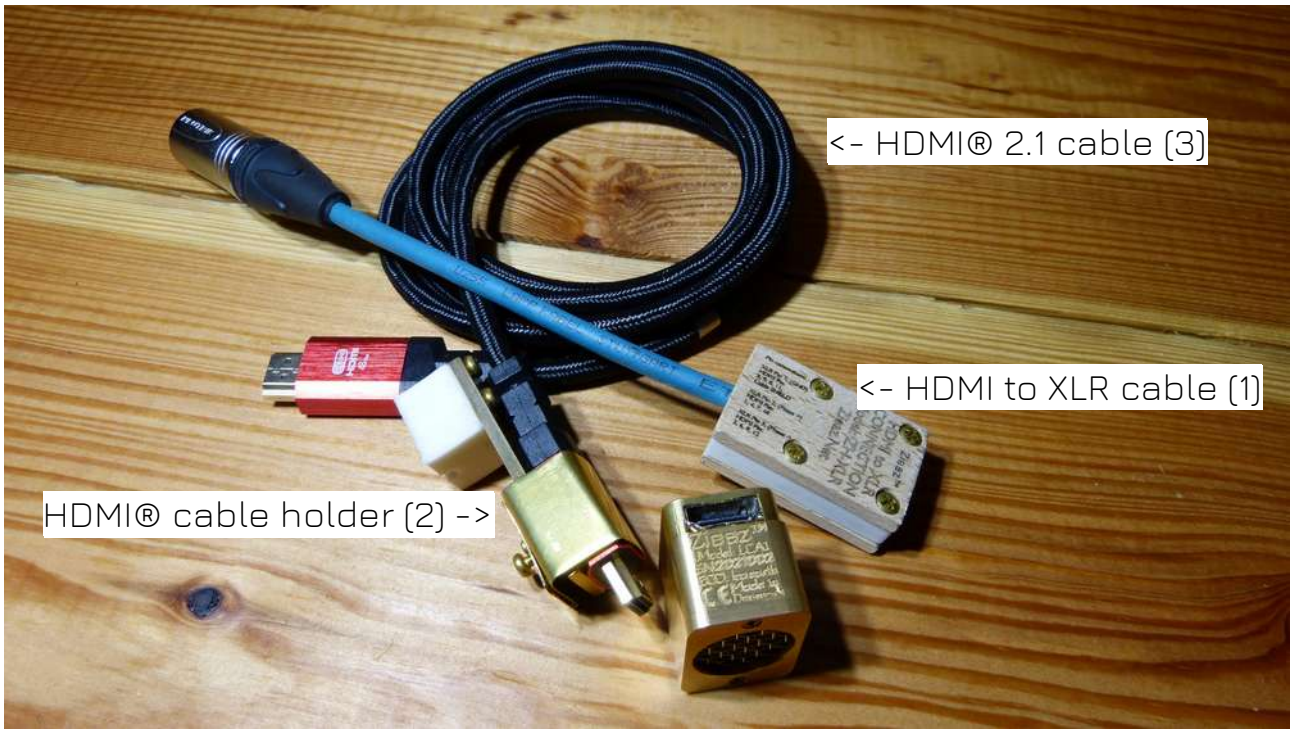
The polar response curve is a guideline for how to place the microphone at the sound source.

The curve around the microphone represents the response at different angles form the microphones centre.

The highest response at 0° (centre), slight reduction at 45°, more reduction at 90°, and almost no response at 180° degrees.



Accessories



1: HDMI® to 3-Pin XLR cable. See Schematic on next page.

2: 3/8" threaded holder for HDMI® cable.

3: General purpose passive HDMI® 2.1 cable. *Available at our webshop with optional test.*

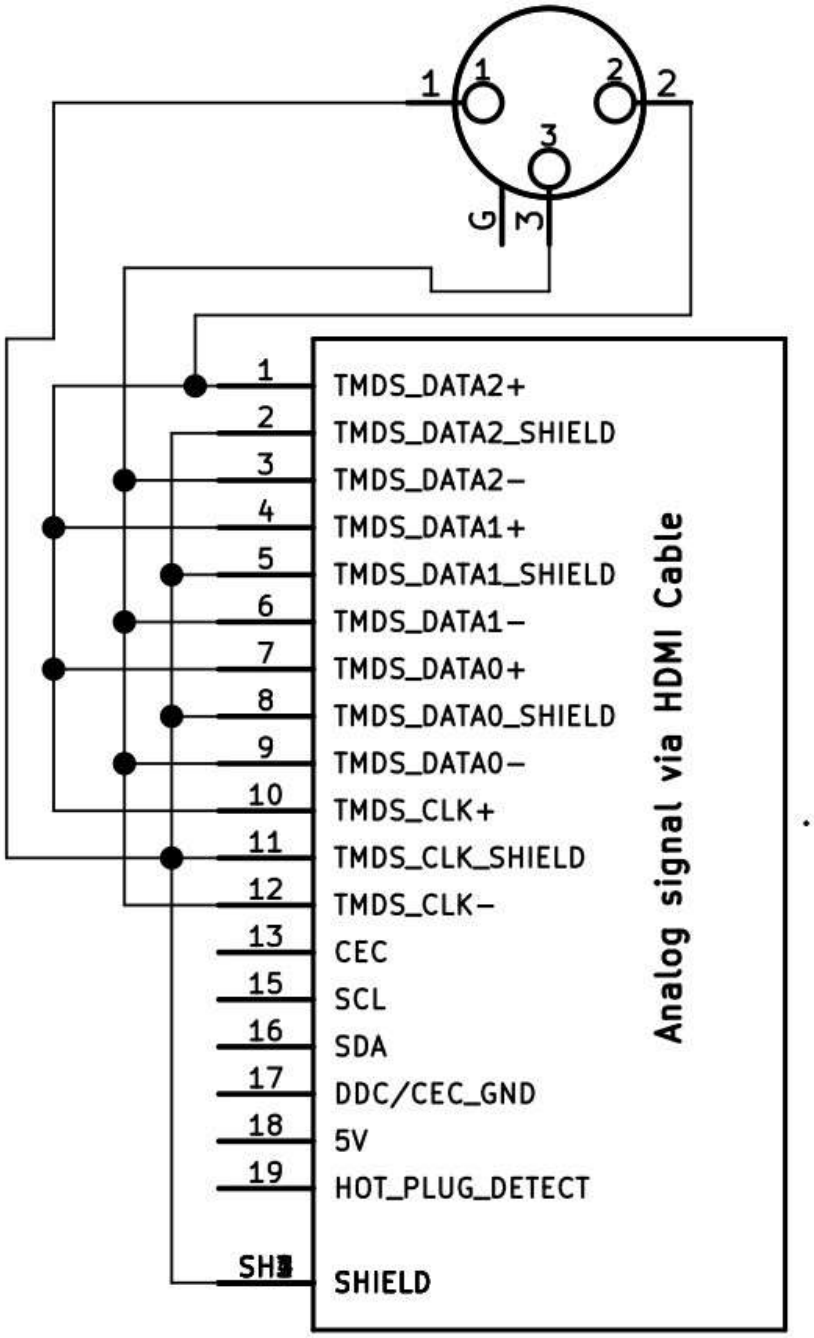
Accessories: TPE Rubber case (White, 3D printed)

Shock mount is under development. Please subscribe to relevant newsletter on zieaz.net or contact us for updates.

Never connect or use an Active or Optical HDMI® cable, digital device as PC display output/input, TV/Overhead etc. as the electronic components in the cable/device can be damaged permanently, when connected to the Phantom P48 power from the audio device. Warranty is voided for any device, if connected to an digital device.
Info: Active or Optical HDMI® cable are typically are longer than 3 meters and cost about 10 times more than passive cables.

For longer distance from the microphone to audio equipment; use a standard 3-Pin XLR extension cable up to 100meters.

Zieaz™ HDMI® to 3-Pin XLR schematic



Do not connect to Digital device like ~~Computer, Projector, TV/Monitor~~ etc,
as the +48V Phantom power supplied from soundcard/audioequipment/mixer can resoult in permanent damage to the digital device, inluding active HDMI/Optical HDMI Cables!.

Use ONLY with a Zieaz™ device and passive HDMI cable. Preferred HDMI version 2.1 for minimum radio interference.

Zieaz™ XLR3-to-HDMI v. 1.0

Radio immunity/noise:

HDMI® version 2.1

HDMI® version 2.1 is different to earlier versions in terms of shielding *(also known as "Pin 1 problem")*.
A Zieaz™ Microphone is only sold with version 2.1 for compliance to CE regulations regarding RF-immunity. However the microphone can be used with lower versions than 2.1 (backwards compatible), at the users own risk of recording unintended signals from radio transmitters, like mobile phones or nearby noise/signal generators as radio stations or faulty a device.

Please read the HDMI® version 2.1 specification here:
https://www.hdmi.org/spec/hdmi2_1

Text form the webpage: It features exceptionally low EMI (electro-magnetic interference) which reduces interference with nearby wireless devices.

HDMI 2.1 Testing and Certification:

All products must comply with Version 2.1 of the HDMI Specification and the HDMI 2.1 Compliance Test Specification (CTS); and until the CTS is available and a product has passed compliance testing a product cannot claim to be 2.1 compliant or market that it supports 2.1 features.

Example with a mobile phone setup; Wi-Fi + 4G phone connection enabled.

The LCA1 microphone comply with a field strength of 3V/m: domestic grade immunity to radio signals. That means that if a mobile phone transmit 2 Watts of radio power and is about 2,7 meters from the microphone, the radio interference or “noise” from the mobile phone will not influence the recorded signal (immunity).

Better immunity performance is likely for a LCA1 Microphone (industrial grade or better). Testing for the actual limit is very expensive at a specialised test centre. We will only investigate the immunity limit upon sufficient demand. Try to “stress” your setup before recording, by streaming a video using mobile data close (1 to 50cm) from your recording gear; all wires act as antennas, so it is a way to “find” weak links in your complete recording setup. Alternatively you can perhaps purchase/lease a relatively cheap field strength meter, to find RF-transmitters if you experience problems.

Advice when recording to avoid Radio Noise:

Limit the radio noise or signals by setting mobile phones in flight mode. Old computer monitors and old switching power supplies, tend to generate electrical/magnetic noise, that can influence any electrical device.

Supplying Power

P48 phantom power

We recommend connecting all cables with P48 phantom power in OFF mode, to prevent wear on device protective components.

The LCA1 microphone requires P48 volts phantom power.

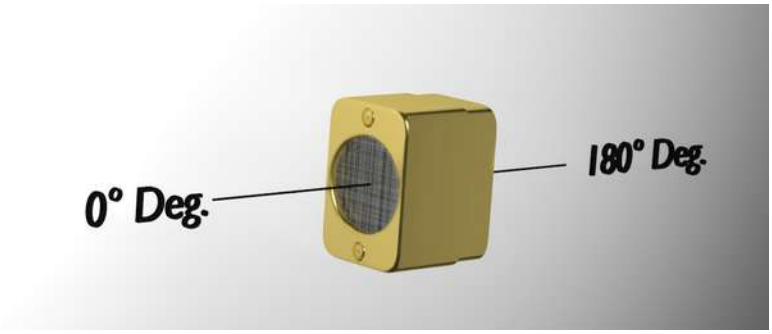
When using with devices with no P48 volts phantom power option, an external phantom power supply is needed. Make sure that the power supply can deliver +48Volts. You can expect lower microphone sensitivity *(with lower than +48 Volts)*, if using a battery powered solution when depleted/low battery.

Warranty Is not covered if connected to a phantom power supply, that supplies higher than +55 volts. Or reversed/negative voltage relative to pin 1 (signal ground).

Microphone Placement

The LCA1 has its front where the grid is, and it is the centre of sensitivity (0 Degree angle).

Preparing for basic usage at 0° Deg. Angle

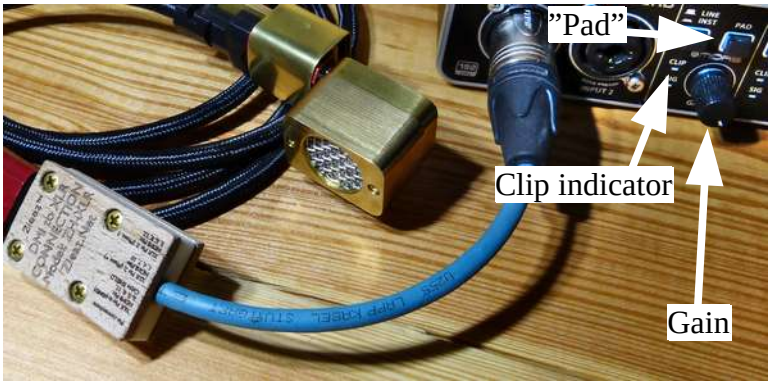


We recommend starting with no effects like EQ/filtering/compressor/dynamics, when adjusting the appropriate preamp level in the “analogue domain”.

Setting the gain for optimum signal level and separation to audible background sounds/noise is important for a good recorded track.

- If the gain is to high, you will get unfixable distortion on your recorded track.
- If the gain is to low, you might record to much unwanted sound.

A way to determine the optimum gain for the microphone input, is to produce the maximum sound level for the session, while setting the gain so the clipping light just blink *(usually red light)*. And then adjust a bit lower, to minimize the chance of clipping/distortion.



This will ensure the best signal to noise ratio. And give the best options for processing the recorded/live sound afterwards.

The input in “analogue domain”; you can typically set the gain from 0dB to +50dB, or -16dB to +60dB depending on preamp design. Using “Pad” reduces the input level typically by -10dB, -20dB before the gainstage. This will help to match the sound level to electrical level *(full-scale analogue/digital range)*, then recording very loud instruments.

Recording sounds of different types.

Dynamic range & online tools

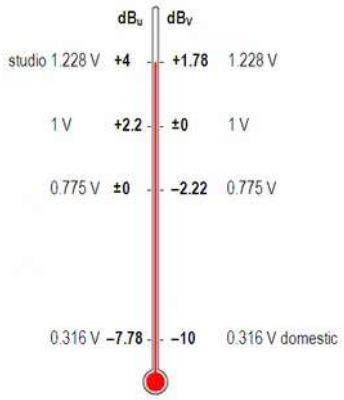
Depending on the sound source's dynamic range, you can estimate the proper gain setting in the analogue domain, and afterwards add various sound processing.

There are some limits to consider if want to use the microphone up-close (1 to 30cm), or from to 1 meter to 10 meters.

We have provided at online tool to estimate where the limits are in therms of maximum sound pressure the microphone can handle, the limits of various standard preamps specifications and optimum distance from the microphone to the sound source.

You have to check your preamp full-scale level in dBu, to use the online calculator.

Try it on: https://z-microphones.net/db-guide

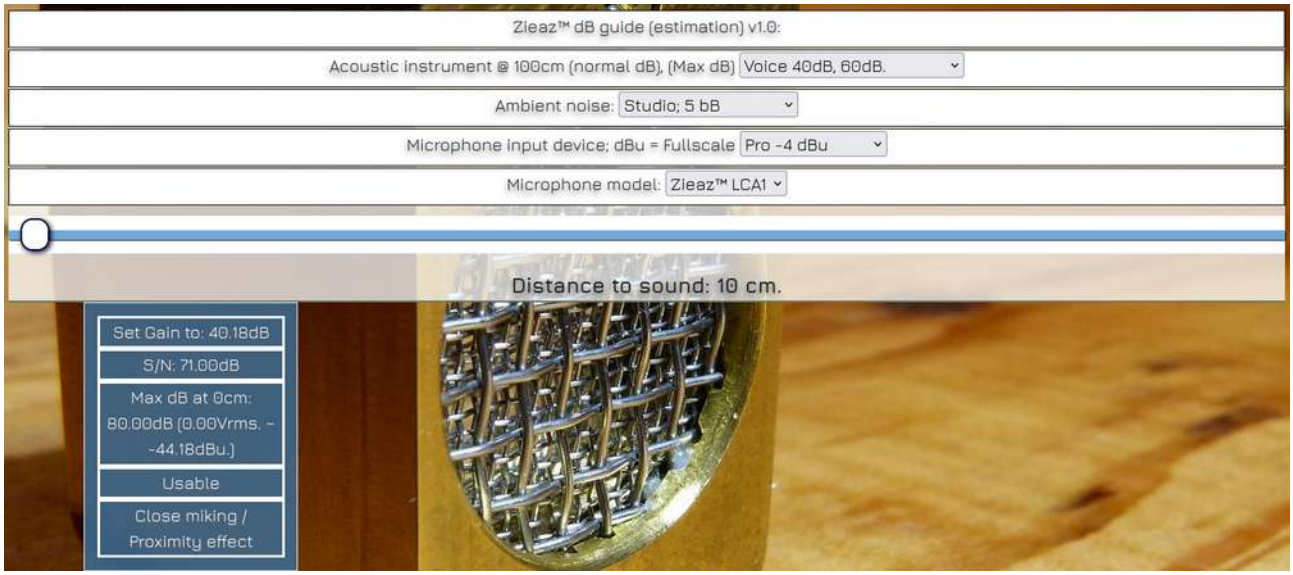


Example from online calculator/conversion: http://www.sengpielaudio.com/calculator-db-volt.htm

See examples from the online dB guide on next page.

Some examples: *By dragging the dot on the blue line, you can find the optimum distance from the sound source to the microphone from 1cm to 1000cm.*

A low-loudness singer & use of Pop-filter/Pop-shield



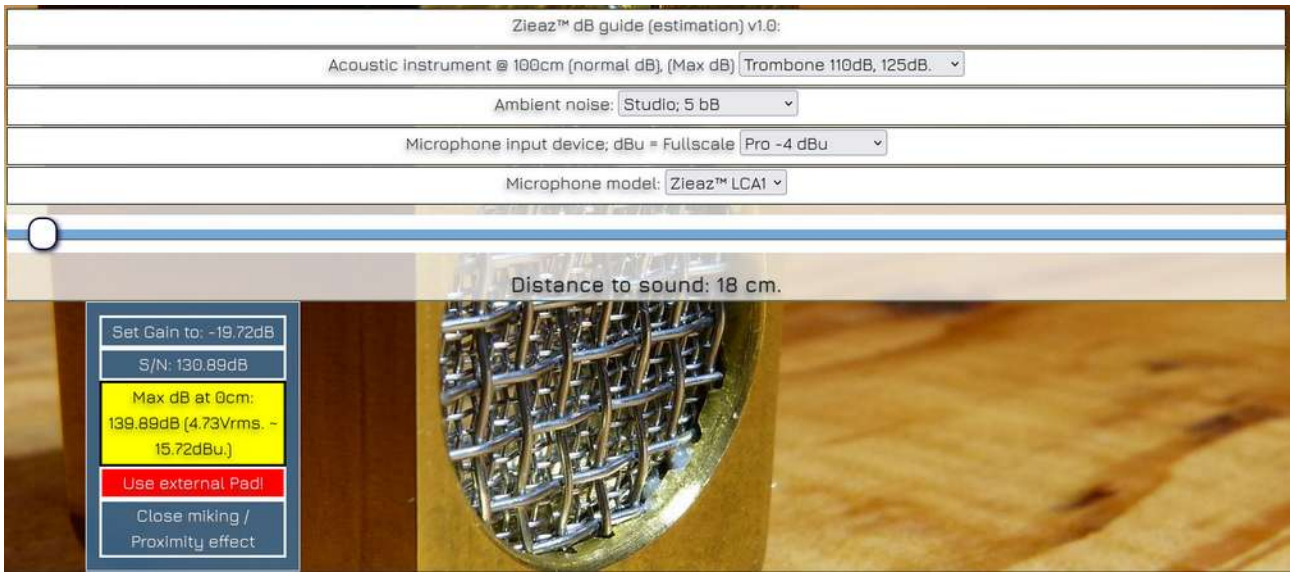
Example 1: A low-loudness singer's loudness is about 60dB (Peak), and 40dB (normal) witch is about 20dB of dynamic range *(60dB – 40dB = 20 dB)*.
The "Set Gain to" is at 40.18dB and indicates, that setting the gain knob to about 80% of full gain would be close to a optimum setting.

In the "real world" it is difficult to be accurate with gain settings, and a singer typically moves around about 5cm to 50cm when performing. So defining the *minimum + maximum* distance to the microphone and *maximum* gain *when closest to the microphone;* is important to get a good distortion free recording.

Using a Pop-filter/Pop-shield at a distance of about 10-15cm as on the picture to the right. Will greatly reduce "plosive" or moving Pop-"winds". When saying/singing English words with [p], [t], [k] like "pat", "kid", "bag", usually those "Pop" sounds can overload the the signal for a brief time. *Plosive in other languages may be different.*
This would risk of distortion and/or the need for extra sound processing/effects to remove the problematic Pop's.

Pop-filter/Pop-shield.
Diameter of the screen is 15 cm, and placed about 20 cm form the LCA1

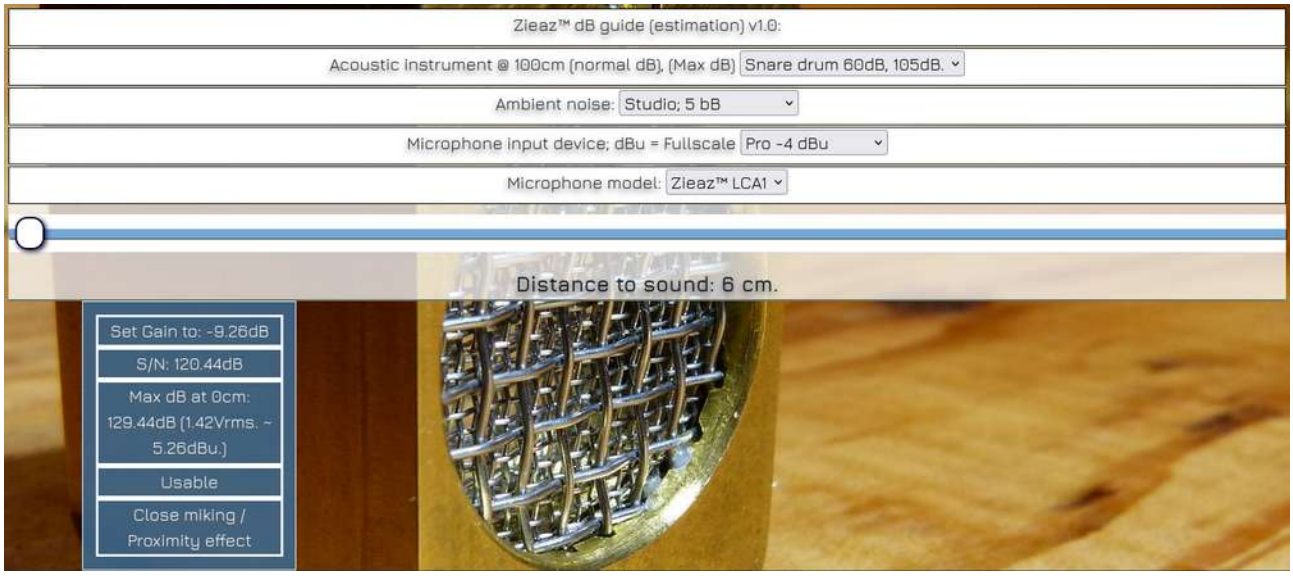
The Pop-filter/Pop-shield also limits the amount of moist/saliva mouth from speech and singing, that otherwise would have landed on the microphone. The microphone also has a longer lifespan in a dryer environment - *lower than 95% relative humidity*.
The microphone also performs better in dryer air, as humidity plays a role in the way sound is transferred to the diaphragm of the microphone.



Example 2: A Trombone at 18cm *(assumed to be played that loud…)*; because the waveform of the trombone has high peaks of high frequencies *(greater than 1000Hz)*, the "Max dB at 0cm" turns yellow to indicate the near maximum limit of the microphone. *The sound pressure at the diaphragm is close to the damaging level, and the distance to the trombone should not be shorter.*

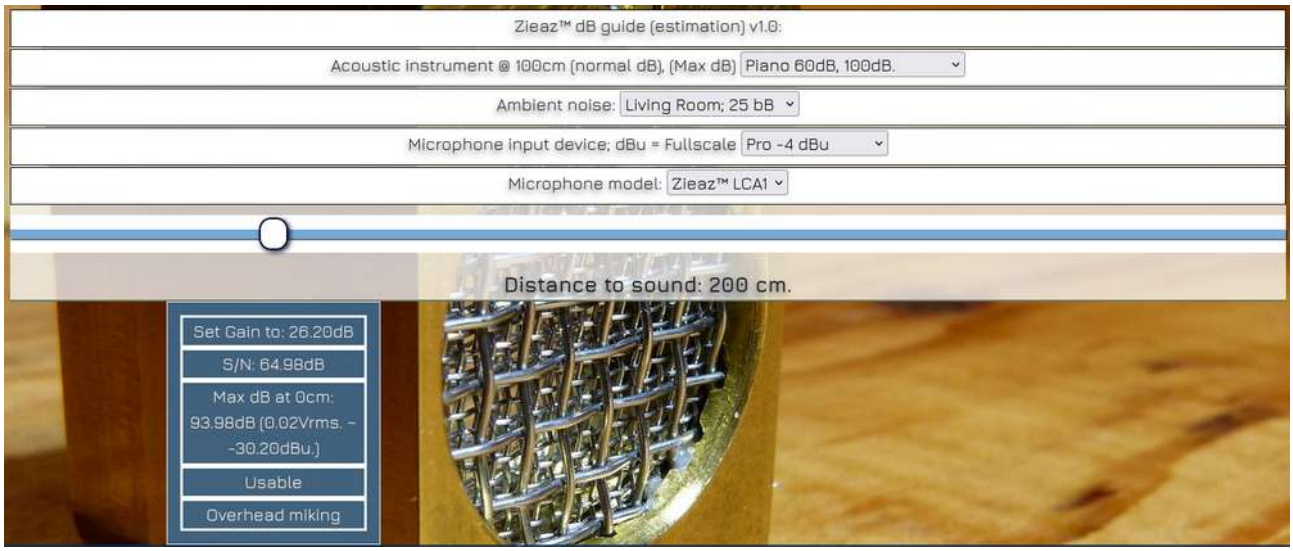
The "Set Gain to" is -19.72dB and indicates that you should use a -20dB Pad and 0dB Gain (or -16dB gain at about 27cm). The red "Use external Pad!" indicates an assumption, that the selected preamp *(Pro -4dBu)*, does not support more than -10dB Pad reduction. Use a preamp with -20dB Pad reduction, or increase the distance of the microphone to the trombone, to match the -10dB Pad limit of about 56cm.

A dilemma & practical issue; humans perception of sound intensity level is logarithmic. The waveform of the trombone is "compressed" for our perception when we listen to it directly. Because the recording gear is a linear system, and the dominant/constant frequencies for a tenor trombone are E2 (82.4 Hz) to Bb4 (466.2 Hz). Depending on the overall "sound picture" or style of your mixing philosophy; "rounding" the high peaks using a limiter/dynamics/compressor after the preamp, will adapt the waveform to "fit" for maximum volume capability in the electrical & digital domain *(linear scale)*; so the appropriate "perceived" level can be adjusted In the recording software/mixer without notable distortion.
Please refer to your preamp/hardware build-in features, and your recording/DAW software for sound shaping options/effects.



Example 3: "Close Miking"; Placing the microphone at about 5-10 cm from the instrument allows good separation form other instruments, that also are close to the microphone. In this case a "Close Miking" setup where the microphone is placed at a distance of 6cm from a snare drums top skin. The "Set Gain to:" is -9.26dB, so enabling a -10dB Pad switch on the preamp *(if available)* and 0dB Gain is a good setting.

Importance to Pad/Gain level in the analogue domain: Since the "Max dB at 0cm" is around 129dB, the peak voltage at peak sound pressure in the LCA1 microphone will reach about +5,2 dBu *(1,4 Volts RMS),* so when connected to a -4dBu *(0,49 Volt RMS)* full-scale preamp, the signal from the microphone needs to be reduced *before* the gain stage in the preamp to prevent distortion. The estimated signal reduction needed can be calculated as following: 1,4 Volt / 0,49 Volt = 2,86 times reduction = minus 9dB ~ so a -10dB Pad is sufficient.



Example 4: "Overhead Miking"; In this example the microphone is placed at 2 meters distance from a piano.

Assuming that the recording finds place in a concert hall; there will be some background noise from the audience, actors, technical equipment and re-vibration from walls etc. So an ambient noise of 25dB would be realistic for the Signal to Noise calculation, of the intended instrument/multiple instruments sound to be captured.

When recording the "whole" sound of a symphony orchestra; placement of overhead microphones *(2 or more)*, needs to be placed so they capture as many of the instruments as possible. Usually an experienced sound engineer knows how to place low-loudness instruments and high-loudness instruments in appropriate distance to the microphones.

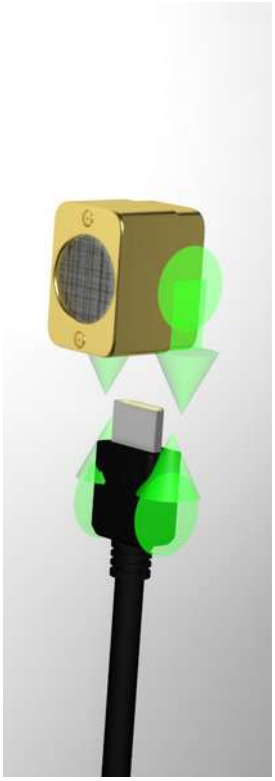
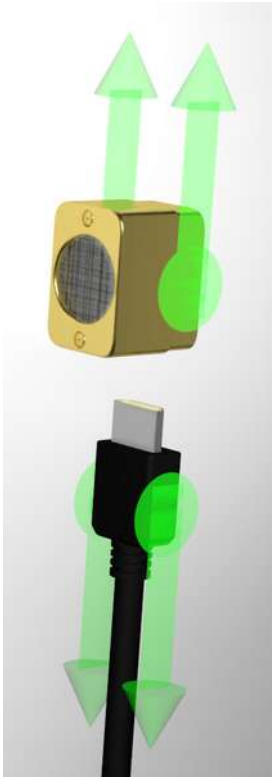
Working with microphone placement is in general a "trial and error + adjustment" learning process. So the learning how a specific microphone will capture sound is experience based.
The above "dB guide" is just a tool for finding some technical limits, based on some generalized data.

Storage & Handling

Plug-in & Unplugging:

The LCA1 should be plugged on the HDMI cable, while holding *(green circles)* on the sides of the back, in a straight motion to minimize stress on the plug and the HDMI cable.

The LCA1 should be unplugged from the HDMI cable, by pulling from the sides on the back *(green circles)*, in a straight motion to minimize stress on the plug and the HDMI cable.

Plug-in	Unplug
	

To reduce fingerprints on the brass body while unplugging, use a dry cotton cloth or paper kitchen towel.

Please be aware that you can easily drop the microphone when unplugging, as the microphone is slippery and relatively small in size.

After usage:

If used in a session, where the instruments has expelled moisture, drying with a dry cloth is recommended.

Instruments that expel significant moisture, could be wind instruments and vocal recording at close range. Using a “Pop filter” to reduce moisture is recommended.

Transportation:

The LCA1 microphone should be stored in dry place between 5° to 60° degrees Celsius.

Using a optional 3D Printed TPU/TPE case for the LCA1 microphone, will protect the microphone against drops, that can damage the the microphone, add dents and/or scratches.

When stored in small unvented bags or boxes:

To minimize condensation from air & temperature changes, place a standard Silica Gel bag can prolong the lifespan of the microphone, and reduce the natural development of patina on the brass body of the microphone. The Silica Gel bags can usually be reused when heated – Please follow the manufactures guidelines for drying the Silica Gel bags.

Cleaning & Polish guide

Why?

At Zieaz™ we have chosen not to use lacquer or paint on our products. Some of the reasons for this is to reduce the environmental chemical load, and working with brass over stainless steel with higher mechanical strength, requires stronger machinery + liquid cooling and higher cutting-tool wear.
Using Aluminium limits the choice of thermal expansion/retraction compatible screws, that eventually would loosen over time.

Overall assessment; Brass is currently a more optimum choice in terms of mechanical strength & machinability; resulting in about 90% percent of the microphone made in the same material. This will simplify the recycling process when the microphone have reached its limit of repairability.

Natural patina / Cosmetic ageing

Brass will generate natural patina over time. It is a process when moisture in air, fingerprints and other "substances" comes in contact with the brass parts.

The microphones functionality will not be affected by patina.

It is up to the owner to evaluate the need for polishing. Some like patina on their brass products, as some other have different preferences for.

Procedure

When cleaning & polishing; use a cloth that has a low release of fibres, as they would build up near the diaphragm at the grid.
If using a wet-wipe, the amount of "wetting-liquid" could make foam, that will enter the microphone though the grid and plug if significant/visible; this is bad, as the liquid from the foam could reach the diaphragm and alter the weight on the diaphragm, resulting in a altered sound pick-up or sensitivity.

The best procedure for a low release of fibres and foam we have experience with; is a combination of 1 wet-wipe *(generic or with alcohol for better antibacterial/antiviral properties)*, 1 kitchen towel *(paper or cotton),1* flat wood-board / wood kitchen cutting board. *Optional;* 1 sheet of printer/copy paper for high-gloss polishing.

Only polish when the microphone is <u>not connected</u>.

<u>Any other cleaning methods are considered warranty void! As some polishing products can have high abrasive effect and/or liquids/chemicals that can damage the microphone.</u>

On the pictures on the next page, you can see some examples that the guarantee will cover on the functional part of the microphone.

The procedure does not promise a desirable result, as scratches, dents cannot be recovered by polishing. And very stubborn patina requires specialized recovery work at a Zieaz™ authorized workshop.

Visit our webshop for guidance for our cleaning/polishing and diaphragm replacement services at: https://z-microphones.net/shop

Press the microphone firmly down to the wet-wipe or printer-paper while pulling/pushing from side to side until an acceptable result is achieved on each side. When polishing the opening with the grid; have 1 side open, so the air pressure does not harm the diaphragm. *Optional; use a dry cloth to hold the microphone, so new fingerprints does not get on while polishing*.
Expect to use 5-15 minutes for polishing. Long strokes from side to side makes an relative efficient way of polishing.
Always do the polishing on a table with good clearing to the table-edge, in case the microphone slips your grip and potentially fall and drop on the floor/ground.

Using wet-wipes will clean the surface gently with, low risk of applying scratches.

The kitchen towel will prevent generation of foam from the wet-wipe, and provide a soft underlay.
Hold one each end of the wet-wipe.

About half of the opening is free; this way there will <u>not</u> build-up high air pressure while polishing.

Using printer/copy paper can produce a high gloss result. Always use kitchen towel as underlay between the wood-board and wet-wipe/paper.
Note: thin dry paper can cut; "paper cut" on fingers. Take care to edges of the paper. Fold edges if needed.

The edge of the wood board can be useful to reach the inner corner of the back.

Take care of keeping all areas & surfaces dust/sand/dirt/splinter free as that can add scratches to the microphone.

Future upgrades & Modifications

The LCA1 is upgradable & modifiable as Zieaz™ develop more features.

When upgrading or modifying any electronic device; new compliance test is required for safety, electro magnetic signals and durability etc. is required. Therefore we will probably develop new microphone models, that the LCA1 can be converted to upon owner request at an additional conversion fee.

Any upgrades or modifications made by user is not covered by Zieaz™ product guarantee, as Zieaz™ is unable to verify or test the altered product.

Warranty

The LCA1 Microphone warranty consists of 2 aspects:

1. Functional warranty; normal warranty rules for electronic devices in Denmark (EU), that defines that the product shall operate accordingly to specifications described at the purchase time, and 2 yeas after that date at normal use.
    1. Normal use is described I this manual.
    2. Contact Zieaz™ for extension of warranty if possible.
    3. Planed conversion of the LCA1 microphone to Open-source hardware in 2032, may alter how and whom the warranty may rely on if conversion is successfully.
2. "Finish warranty"; is not covered.
    1. The finish cannot be quantified or generalized, as each product has unique features due to the manufacturing process, and normal use wear of untreated brass generates natural patina/colouration changes.
        1. *Before purchase; Review the images of each individual LCA1's, identified by the unique serial number. An image collection is saved at Zieaz™ for reference.*
    2. If design or appearance is factor for usage in media production; please contact Zieaz™ for guidance and solutions.
3. Warranty does not cover damage of/on; *(outside normal use)*:
    1. Items the user accidentally drops the microphone on. *Examples;* dents/cracks/marks etc. on floor, tables, tablets/mobile phones etc. or other items caused by dropping the microphone.
    2. Injury to live beings; humans, pets or other animals caused by dropping the microphone upon them.
    3. Allergies caused by handling brass parts with skin contact. *Copper hypersensitivity is very rare.*
    4. As proven by many studies; Copper alloys *(as the brass used for the LCA1 microphone)*; are antiviral and antibacterial with relative effective results. However there is no guarantee that handling the LCA1 microphone and accessories, will effectively reduce bacteria and viruses. Zieaz™ cannot be held responsible for improper hygiene, that could cause a viral or bacterial

transfer. Please refer to the Cleaning & Polish guide in this manual, for optimum hygiene when using the LCA1 microphone.

4. Any upgrades or modifications made by user is not covered by Zieaz™ product guarantee, as Zieaz™ is unable to verify or test the altered product.
    1. If the product is passed on to a new owner; please inform the new owner about any user upgrades or modifications that violate the warranty.

Return policy:

Please visit our website for a detailed return policy and procedure for returning: https://z-microphones.net/ or https://zieaz.net/

Recycling & End Of Life condition

The LCA1 Microphone should be returned to a Zieaz™ Microphones workshop even if a repair is not possible:

- A recycling reward may be issued to the submitter: a fixed discount amount, or electronic payment/bank transfer.
- Free shipping to a Zieaz™ office from a EU country may also be provided.

Please visit https://z-microphones.net/ , https://zieaz.net/ or https://lca.earth/ for recycling and reward information.

- Disassembly's guidelines if applicable/available.
- Material recycling guidelines for:
  - Brass; CuZn40Pb2/CW617N.
  - Semiconductors & electronic components.
  - Plugs and cables.
  - Accessories with non-biodegradable substances.

Zieaz™ European office

Zieaz™ Microphones
Street name :Kastanievej 1
Post code: 4690
City: Haslev
Country: Denmark
CVR: 32208746 / VIES: DK32208746

Technical Support

For information and technical support questions contact:

Email: sound@zieaz.net

Mobile phone: +45 20 64 35 38