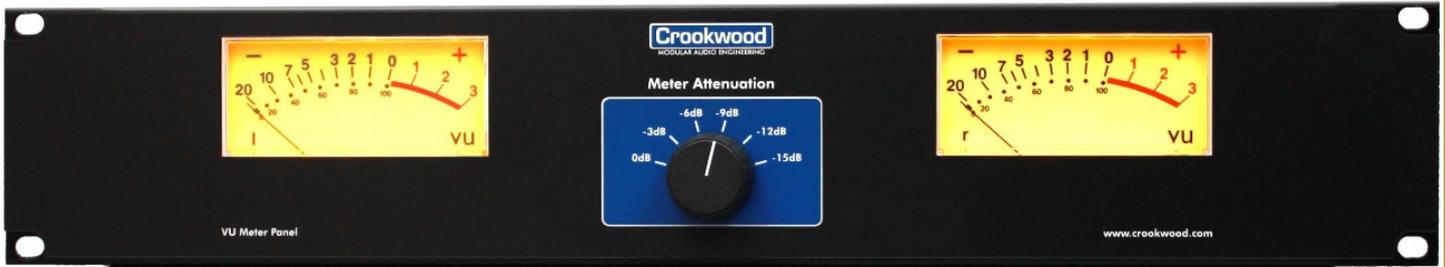


## Crookwood VU Meter User guide

### Everything you need to know about your VU meter



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## > Overview

The **Crookwood** VU meters are dual channel precision Sifam VU meters, and mounted on 2U panel with LED backlights and an active meter input attenuator.

They have these features:

- 2U 19" for easy mounting, with optional wooden surround for desktop applications
- Unique built in precision multi position attenuator, so the VU units will work properly with any studio level. Without this attenuator other VU meters can't be used fully with modern digital levels
- XLR inputs on rear of meter
- Large, proper Sifam VU mechanical meters, not cheap knock offs, they perform to the VU spec almost perfectly
- LED meter backlighting for very long life, with gel film for a gentle yellow colour
- Electronic balanced high impedance inputs allow connection to any type of device, balanced or not, without any loading issues.
- Open rear for easy calibration and trimming
- Only 8cm deep, so it can fit in any space
- Supplied with 12V DC plug in power supply, 1m lead length, universal mains fittings
- Modular construction, easy to upgrade or repair
- There are trims available for the electrical and mechanical calibration of the meters.



## Warning!

These meters are mechanically based. They have sensitive moving parts and will break if dropped or knocked heavily. Just take care, and they will last a very long time.

## > How to get the meters up and running

After delivery, please check that there is no obvious mechanical damage, then follow this procedure:

1. Install the meters into your studio. See the installation notes in this manual
2. Calibrate the meters. The meters are pre-calibrated, but you need to re-calibrate them after shipping, as the mechanical movement will have altered. See the calibration notes in this manual
3. Use the meters! There are notes on using the attenuator and levels in the user section of this manual.

> Panel pictures

Front Panel View



Rear Panel View



Optional oak desktop case



## > Installation

The meters are easy to install. The 2RU version just gets bolted into a frame, or it will come with an optional desktop wooden pod, like this:



The 2RU meter needs 80mm of depth behind the panel.

## Audio Connections

At the rear of each panel by the attenuator are 2 XLR sockets for the audio inputs. Looking from the rear, the left socket is for the left meter, and the right socket is for the right meter.

Allow 100mm (4") for putting the matching XLRs into the rear of the meter panels. This means allowing a clearance of 125mm (5") from the front of each panel to the rear.

## Too tight?

Where the meter depth doesn't allow it, you can do the following to reduce the depth to 40mm (1.75")

- Fold over the ¼" spade connectors on each of the meters until they are parallel with the front panel.
- Use right angle XLE connectors

## Where should I connect my VU?

The best place is across a meter output on your monitor controller or console. That way you can select what you want to meter, and meter what you're hearing.

Failing this, try to connect it across a monitor DAC, or on the inputs to a ADC after an analogue chain. The high impedance inputs make this easy to do, but you'll need to make up a passive mult cable to split the signal to the meters and the normal destination.

## > Calibration

There are two calibration trims: an electrical one which adjusts the gain of the meter, and a mechanical one, which alters the offset of the meter needle from rest.

Usually, you'll only have to alter the electrical one, but there are instances when you'll need to adjust both.

### Basic Calibration

Use the electric trim pots for this. They are located on the rear, under the XLR socket. As viewed from the rear, the left hand pot trims the L meter, and the right hand pot trims the R meter.

Viewed from the front, they are obviously reversed ( left pot trims R meter, right pot trims L meter).

The pots have about 2dB of movement on them, they don't alter the meter dynamics, and will trim the meter for all attenuations. If the required trim is greater than this, trim them for maximum, then trim mechanically (see below).

Follow this procedure:

- Ideally trim for 0VU at the 0dB attenuation setting. This will give you the most confidence going forwards. Refer to the table on page 4 for the appropriate level in dBu.
- If you can't easily do this, trim at any attenuator setting that make sense. It will still work.
- Send out a 1KHz sine wave from your DAW, making sure nothing is clipping.
- Adjust the electric trim until the meter needle is exactly over the 0VU marking.

### Mechanical Calibration

On the back of each meter is a black screw type trimmer. This adjusts the position of the meter needle relative to the signal level. Normally you shouldn't have to touch this, but occasionally you won't be able to calibrate the meter without it. Why? Well it could be because of one of these reasons:

- The mechanical mechanism has been shocked, and the needle displaced
- Your analogue meter outputs have relatively high impedance, so the meter is reading low.
- There is loss elsewhere in the system, which you have to make up on the meters.

Whatever it is, you can adjust the mechanical stops as well. When you do this, you will notice that the VU needle will sit at or slightly above the -20VU indicator even when there is no signal present. It's a trade off you'll have to make, but again in practice means nothing because you're interested in the moving music levels, not static test levels.

To trim the meter:

- First trim it as best you can with the electrical trimmers
- Then adjust the mechanical trim until the meter is calibrated. Note that there is a bit of hysteresis with the mechanical trimmer, so after trimming, turn the signal off and on to make sure it's still calibrated.

## > Using the VUs

This seems like a silly section, it's obvious isn't it? Well yes, but here's some useful facts.

### Front Panel Attenuator

This allows you to set the range of the meters, so that the needles don't ram up against the stops if the level is too loud. They are adjustable in 3dB steps, so you can choose the best range for your application.

Here's a useful table showing you what the steps and the levels actually mean.

Attenuator Setting	0VU	+3VU
0	+4dBu	+7dBu
-3	+7dBu	+10dBu
-6	+10dBu	+13dBu
-9	+13dBu	+16dBu
-12	+16dBu	+19dBu
-15	+19dBu	+22dBu



### Different Levels measurement systems

dBu is an absolute reference value of level, independent of impedances. For reference, your digital gear will be calibrated in dBFs, where 0dBFs is the maximum output level that the converter can output (or accept on its inputs).

#### Ready for some maths?

Typically you'll set up your levels so that at say -14dBFs you'll get 0VU. This means that your 0dBFs level is +18dBu (14dB of headroom in digital till 0dBFs, plus 0VU ( which is +4dBu) = 18dBu)!

What does this mean for you? Well your operating levels affect how loud things are and also how some pieces of equipment respond to them.

### Digital Levels

All digital levels are absolute. The maximum they can ever go is 0dBFs. However your converters will map this into an analogue world, where the absolute maximum signal is typically +27dBu for balanced gear, or +21dBu for unbalanced gear. The calibration above of 0dBFs = +18dBu, means that you will never clip any of your analogue gear. However, once you're in the analogue domain, you've got an extra 9dB of possible headroom to play

with, before you have to attenuate it back into the digital domain for storage again. This is perhaps why analogue summing boxes got popular.

You can use this headroom to EQ and compress signals without clipping, or you can selectively clip signals for effect. At the end of the chain you'll have to attenuate the level back to below 0dBFS to avoid digital clipping however. Or not if you want to clip digitally for effect!

Some older pieces of equipment will sound different at higher levels, and some people then change their operating level to be lower than this, say 0dBFS = 12dBu. Their rooms will sound quieter however, unless they add gain into the monitor chain.

The adjustable attenuator on our meters allows you to make sure you can see what is going on, at any point.

## Analogue Levels

In the olden days, music was stored on analogue tape machines. These had a maximum storage level of about +10dBu, so with average music a VU meter without an attenuator was about perfect for indicating levels.

## Peaks and Averages

A VU meter is an averaging type meter: it shows the average level of the music. A digital peak meter – like the one on your DAW, however shows the peak level of the music. Another type of meter, a true peak meter shows where the signal would peak at, if it didn't clip at 0dBFS. You can play two different pieces of music into a peak meter and they will indicate that they are about the same level. However when you play them, one can be much, much louder. A VU will show you this difference.

## LuFs and VUs

The modern way to measure loudness is with LuFs – an average loudness level. Modern meters have great LuFs and true peak displays, and are really useful to see what might happen to your music when it hits a streaming service.

But...

Music is a living thing, if you spend your time agonising over LuFs and staring at a screen, the chances are the music will suffer. It's much better to manipulate it using your ears, and glance at our VU meter to get a sense whether or not you're going too loud. A classic case of less is more!

We've got a full article about this here: <https://crookwood.com/blog/the-beauty-of-vu-meters/>

## Using the VU to calibrate other kit

If you've calibrated your VU, you can use it to calibrate other pieces of equipment in the studio. **But here's a few notes:**

- Only use sine waves for calibrating, and make sure nothing's clipping. You'll get very different levels with non-sine or clipped waveforms, even if a digital peak meter says they are the same value.
- Despite our best efforts, there will be about 0.1dB error as you move between the different attenuations. This shouldn't matter to real life, so please don't get hung up about slight differences in steady state sine wave levels between attenuations. It's good enough for 99% of all the calibration you'll have to do.
- The VU is very accurate relatively to about 0.05dB changes in level (a needle thickness at 0VU). So on the same attenuation setting, you can use it to compare left and right levels accurately. However these 0.05dB levels are very fine, and in practise 0.25dB matching is more than good enough for everyday use, even mastering only really require +/- 0.1dB. If you try and regularly calibrate finer than this you'll go quite mad, as your eyes won't be able to repeatedly resolve the differences on the meter, and analogue gear drifts, especially compressors!
- Look straight at the meter when you calibrate, not to the side. You'll lose 0.25dB easily if you do.
- The VU is not accurate at the bottom end of its range. Do not try to calibrate stuff at -20VU!

This may seem a bit pedantic: the VU can be used successfully to calibrate other equipment, but day to day, you want to use it with music not sine waves. This is where you'll see its true value.

## > Problems? Questions?

At any point, please feel free to call us for advice. Our details are:

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Thank you again for buying this meter from us.