



# Instrument Handbook

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Optimus+ VNK  
Vehicle Noise  
Measurement Kit

**About this quick start guide**

- The instructions in this user manual refer to the operation of Cirrus Research plc Optimus+ sound level meters with version 5.0 or higher of the firmware
- Where the terms 'Optimus+' or 'Optimus' are used, it refers to all variants within the Optimus+ range of instruments, including the Optimus+ Yellow (CR:150 series), Optimus+ Red (CR:160 series), Optimus+ Green (CR:170 series) and Optimus+ Purple (CR:190 series)
- Full technical details for the Optimus+ range of instruments can be found on the Cirrus Research website at [www.cirrusresearch.co.uk/library/datasheets/](http://www.cirrusresearch.co.uk/library/datasheets/)
- For full operational instructions, please consult the instrument handbook that was supplied with your Optimus+

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**Updates**

In the interests of continuous product improvement, Cirrus Research plc reserves the right to make changes to product specifications without notice.

To learn about the latest updates that have been implemented into this product and to download the most current version of this user manual, visit our website at [www.cirrusresearch.co.uk](http://www.cirrusresearch.co.uk)

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## 1 Setting up the Optimus VNK

In order to perform vehicle noise measurements to ISO 5130-2007 and §29 StVZO, there are strict conditions that have to be met when it comes to the setup of your instrument. This section will guide you through setting up your Optimus VNK.

### 1.1 Location of performing the test

In order to reduce the influence that surroundings of your environment have on your vehicle noise measurements, it's best to choose a location that meets the following criteria:

- an open space that consists of a flat area made of concrete, asphalt or any other hard material that has high acoustical reflectivity (excluding compressed or other earth surfaces e.g. soil)
- the edges of the test site (walls, buildings, fences etc) must be at least 3m away from the exterior of the vehicle being tested. When testing exhaust noise, the vehicle must be no less than 1m away from a pavement edge
- any obstacles outside the test site must not be closer than 3m to the microphone
- nobody whose presence influences the meter readings can be present during the test, with the exception of the observer and driver
- testing should not be done in adverse weather; gusts of wind must not affect the measurement data

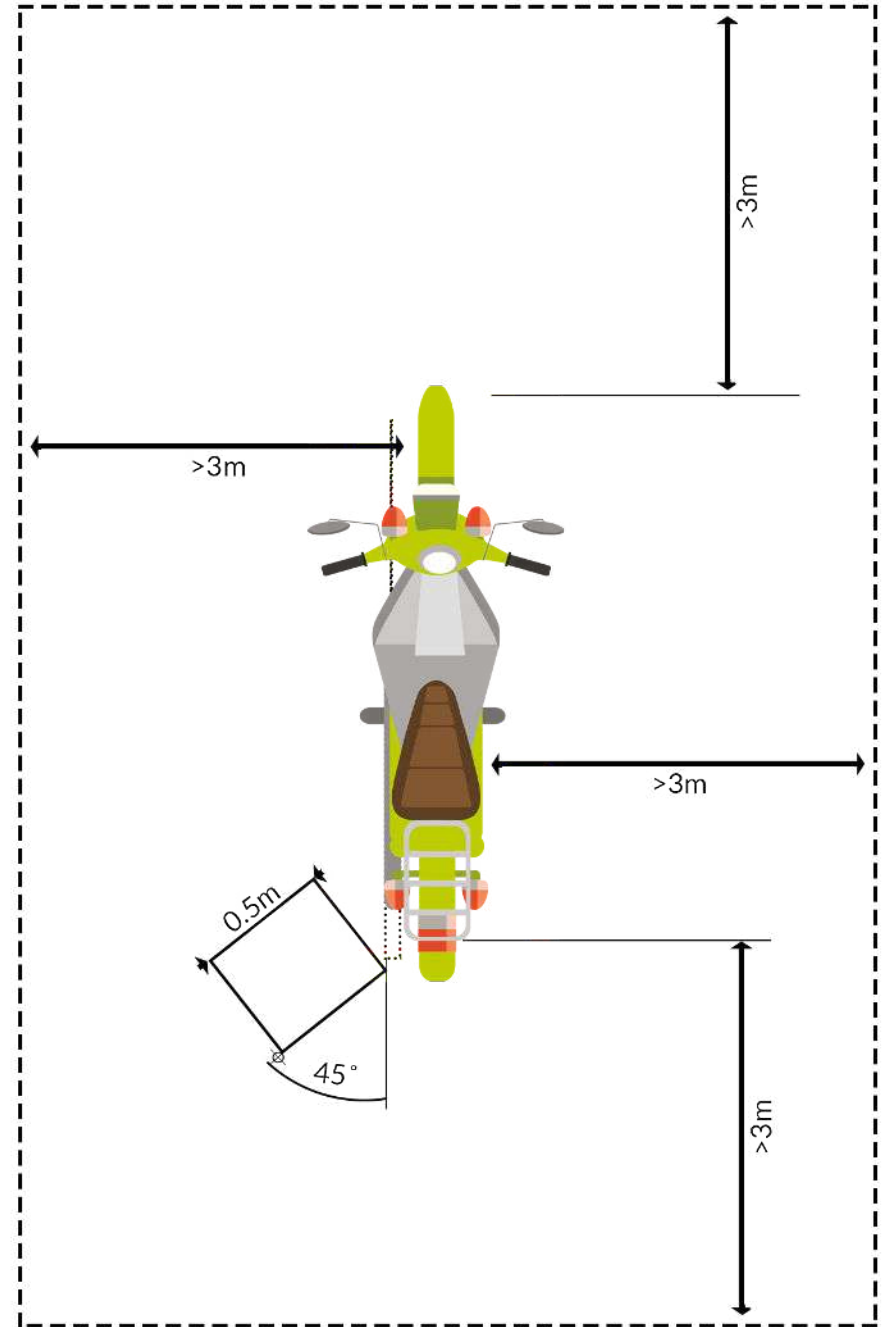
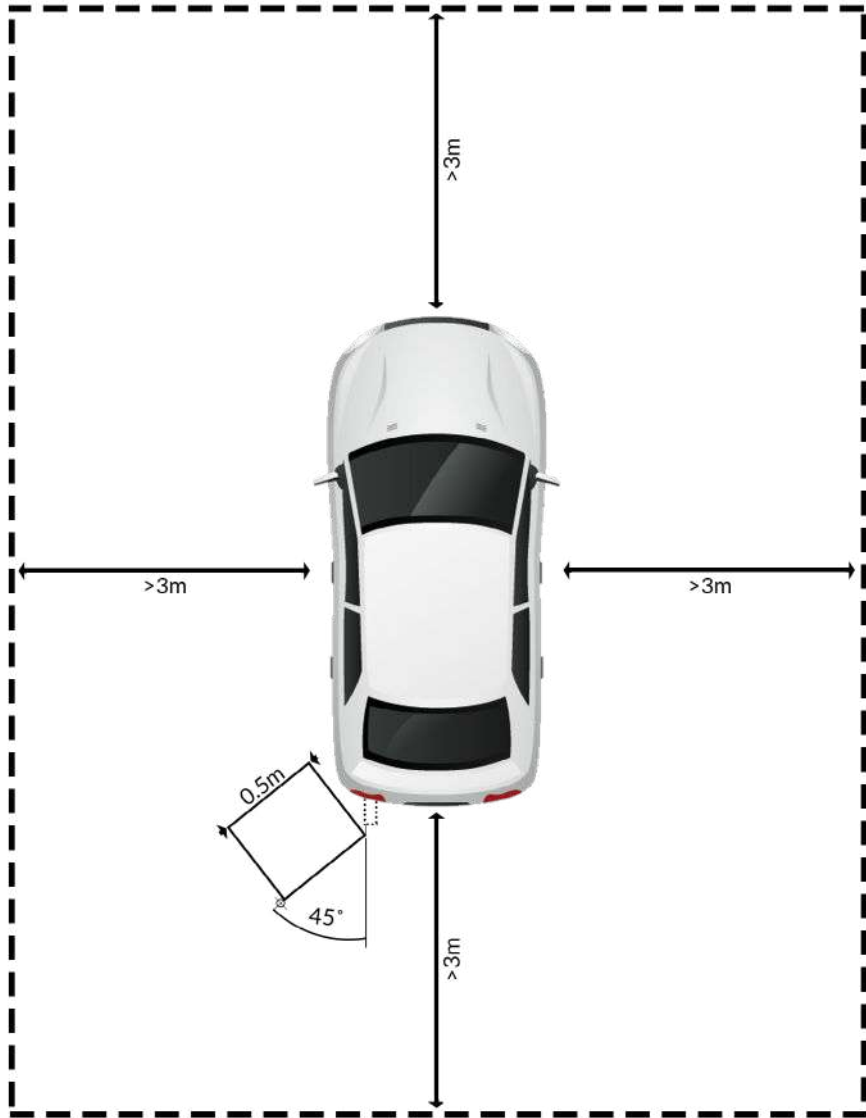
### 1.2 Position of microphone

The vehicle noise measurement template provided with the Optimus VNK will help you position the microphone in the correct place. When measuring exhaust noise, the microphone should be positioned on the tripod approximately 0.5 meters away from the exhaust and at a 45° angle.



Fit the exhaust into cut-out section on the template and extend the antenna to ensure the microphone is positioned correctly.

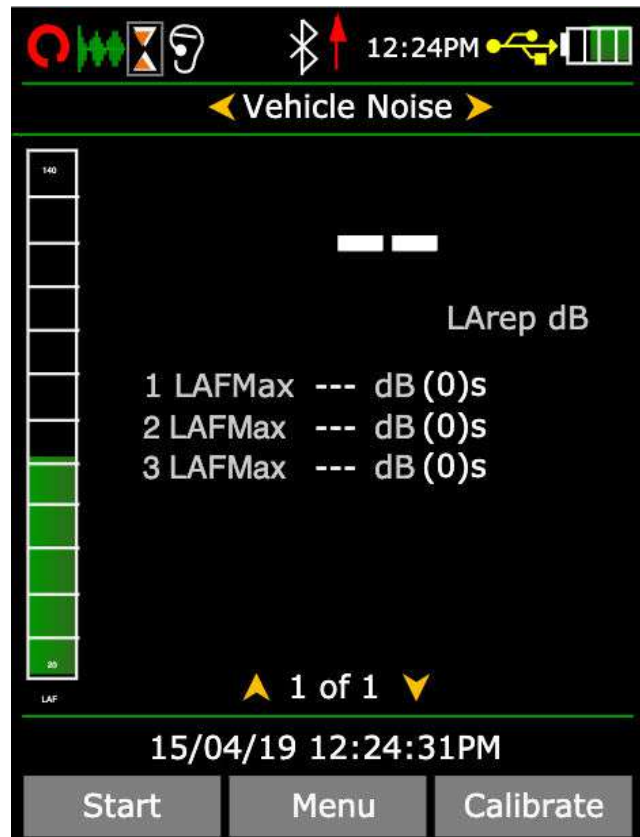
The diagrams on the next page provide a visual representation of where to position the microphone when conducting noise tests on either a car/van or a motorcycle.



## 1.2 Setting up the instrument

For full operational instructions for the Optimus+ range of sound level meters, please consult the handbook supplied with the Optimus VNK, or alternatively you can download it from the Cirrus Research website: [www.cirrusresearch.co.uk/library/user-manuals](http://www.cirrusresearch.co.uk/library/user-manuals).

Firstly, turn on your Optimus+ by holding the power button on the side of the instrument. Once the instrument has loaded, use the left and right arrow keys to navigate to the vehicle noise screen, as shown below.



In order to capture the three measurements required, you will need to ensure that the vehicle noise trigger button (included with the Optimus VNK) is plugged into the sound level meter, using the 3mm audio jack, which is under the rubber cover at the base of the instrument.

The microphone is attached to the sound level meter via an extension cable, which can be attached to the tripod included with the Optimus VNK. Once the microphone is in place, run the extension cable from the microphone to the cockpit, where you will be able to use the sound level meter along with the trigger button.

Image for illustrative purposes only - please refer to previous section for correct placement of vehicle in testing site.



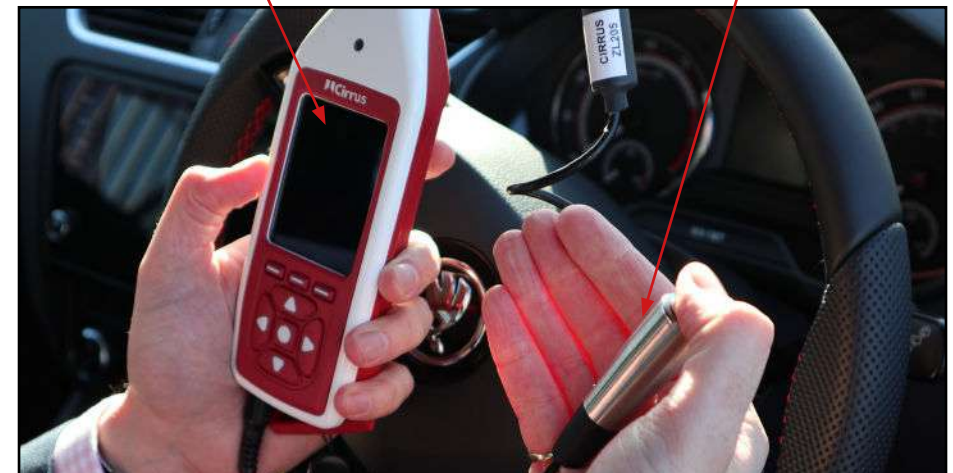
Microphone and tripod

Preamplifier extension

Optimus+ sound level meter

Optimus+ sound level meter

Vehicle noise trigger button

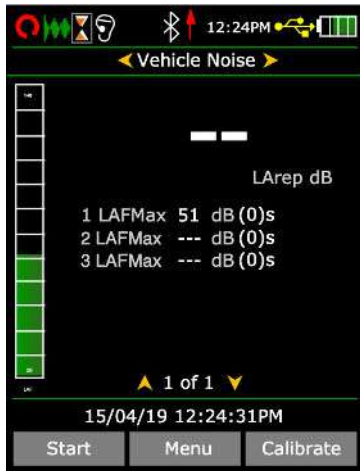


## 2 Performing measurements

Once your Optimus VNK is set up, you're ready to begin taking vehicle noise measurements. The following section sets out how to use the Optimus VNK to make measurements to ISO 5130-2007 and §29 StVZO standards.

With the car's engine running at its normal temperature and the Optimus+ sound level meter turned on, gently press the accelerator to achieve the appropriate number of revolutions per minute for your vehicle (as per section 6.4 of ISO 5130-2007). You can use your car's rev counter as a guide.

Gradually press the throttle to achieve the correct engine speed. Once you're at the correct RPM, press and hold the vehicle noise trigger button to begin the first reading.

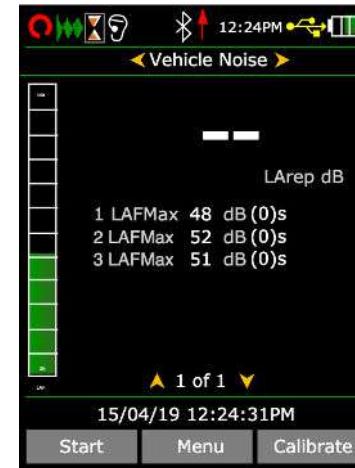
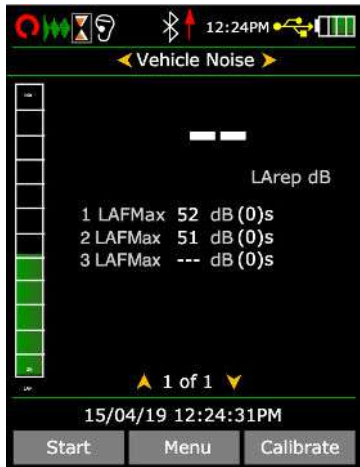


Hold the engine speed for at least one second whilst continuing to hold the trigger button. Then, rapidly release the throttle and allow the engine to return to idling speed, keeping the trigger button pressed. Once idling, you should release the trigger button.

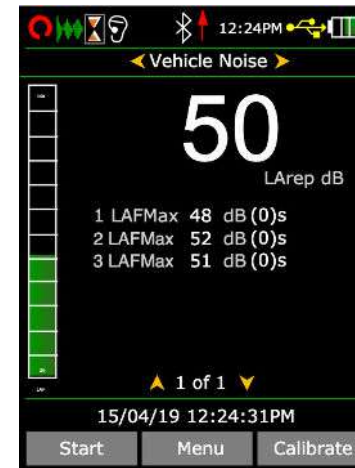
The first measurement will be recorded in position one on the Vehicle Noise screen on your Optimus+. The measurement will be the LAFMax for the duration of when the engine was at the target speed and throughout the deceleration period.

For your overall measurement to be compliant with the international standard, three measurements must be taken. Your Optimus+ sound level meter will automatically calculate the LArep from these three measurements, which will constitute the result for that measurement period.

Once you have captured the first reading, repeat the process as described above to capture the second value. The second measurement will appear in position one on the screen of your Optimus+.

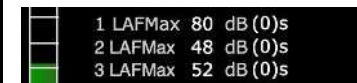


Repeat the process a final time to capture the last measurement. The third measurement will appear in position one on the screen of your Optimus+.



Once three measurements have been taken, the LArep (average of the three measurements) will automatically be displayed. This value should be given as the result of the noise test you've just conducted.

If you wish to test another vehicle with the same instrument or retest the same vehicle, simply press the trigger button again when you are ready to take a measurement. This will overwrite the value in position one, as shown below.



Alternatively, you can press 'Menu' or the middle button to open the menu, and then the 'back' button to exit. This will reset the vehicle noise display.



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