

Manual



Scan&Listen

V2.0 2013 - 10



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I. The Scan&Listen device

The particle velocity is a scalar value that was never before audible as human ears are not sensitive to it. The properties of such magnitude, the particle velocity, make it very suitable for applications where the background noise and reflections have a high level.

The purpose of the setup, combined with a PU or a Scanning probe, is to easily detect and locate sound sources, even in the most complicated noise environments.

1. Setup characteristics

a) Functionality

Scan and Listen is a double function device that allows:

- Listening to pressure and particle velocity:
- Acquisition and recording of both signals

The Microflown particle velocity sensor needs from the setup:

b) Powering

The Scan and Listen device provides power supply to the probe in order to make it functional and sensitive. There are two modes of powering:

(1) *Battery mode*

S&L device works with 9V batteries which allow the powering of the probe. This allows portability of the system.

The amplification of the signal is then dependent on the battery charge.

The battery level is indicated by the switch color, if green, there is enough battery left to continue using the battery. If red and blinking it needs to be connected to a power socket or battery needs to be replaced with a new one.

(2) *Powered mode*

S&L can be directly connected to a power socket in order to obtain a constant current supply.

This mode is mostly recommended to be used for recording and analyzing the signal in a PC in combination with a frontend.

c) Amplification

Differently to the Microflown signal conditioner, the S&L device is a simplified version, allowing High gain operation.

NOTE: If Low gain amplification is needed, then a signal conditioner should be used.

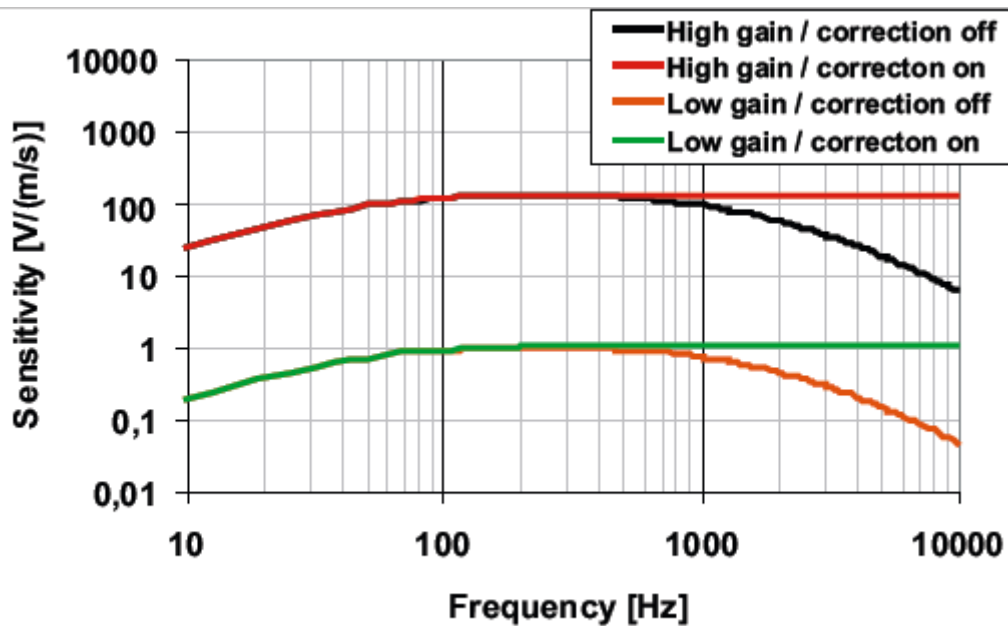


Figure 1. High/Low gain amplification

d) Equalization

S&L device is calibrated with the probe in order to apply the best curve fitting into the setup. The system works as a simplified equalizer for the Listening function, leaving the signal intact for the signal out function (non-corrected mode).

(1) Listening functionality

The equalization module implemented in the S&L device is simplified compared to the Microflown signal conditioner electronics. The equalization performed enhances high frequencies applying f_{c2} filter.

NOTE: The sensitivity of the sensor is constant only in Power mode, in battery mode is dependent on the battery charge

Pressure channel is only amplified for the listening functionality.

(2) Acquisition functionality

If the Scan and Listen device is connected to a frontend, the pressure and velocity signal need to be corrected, applying the calibration functions as follows:

- Frequency response: Signal [Volts]/ S_u or S_p , using the equations below. Obtaining the response in the selected units
- Phase response: Signal [Volts]- ϕ_u or ϕ_p

(a) Velocity sensor model correction:

$$S_p \left[\frac{mV}{Pa^*} \right] = \frac{S_u @ 250 \text{ Hz} \left[\frac{mV}{Pa^*} \right]}{\sqrt{1 + \frac{f_{c1u}^2}{f^2}} \sqrt{1 + \frac{f^2}{f_{c2u}^2}} \sqrt{1 + \frac{f^2}{f_{c3u}^2}} \sqrt{1 + \frac{f_{c4u}^2}{f^2}}} \quad (2)$$

Or

$$S_u \left[\frac{V}{m/s} \right] = \frac{S_u @ 250 \text{ Hz} \left[\frac{V}{m/s} \right]}{\sqrt{1 + \frac{f_{c1u}^2}{f^2}} \sqrt{1 + \frac{f^2}{f_{c2u}^2}} \sqrt{1 + \frac{f^2}{f_{c3u}^2}} \sqrt{1 + \frac{f_{c4u}^2}{f^2}}} \quad (3)$$

$$\varphi_p [deg] = \tanh^{-1} \frac{C_{1u}}{f} + \tanh^{-1} \frac{f}{C_{2u}} + \tanh^{-1} \frac{f}{C_{3f}} \tanh^{-1} \frac{C_{4u}}{f}$$

(b) Pressure sensor model correction:

$$S_p \left[\frac{mV}{Pa} \right] = S_p @ 1KHz \frac{\sqrt{1 + \frac{f^2}{f_{c3p}^2}}}{\sqrt{1 + \frac{f_{c1p}^2}{f^2}} \sqrt{1 + \frac{f_{c2p}^2}{f^2}}} \quad (4)$$

$$\varphi_p [deg] = \tanh^{-1} \frac{C_{1f}}{f} + \tanh^{-1} \frac{C_{2f}}{f} + \tanh^{-1} \frac{f}{C_{3f}} \quad (5)$$

NOTE: More information about the calibration of probe and signal conditioner calibration contained in the probe datasheet.

B. Typical applications

- Acoustic problem detection
- Sound source location
- Fast trouble shooting
- End Of Line control

II. Compatible Probes

Number of sensors / channels:

- PU: 1 pressure sensor and 1 particle velocity sensor

Packaging:

- Regular: ½ inch, 90 mm handle. Package gain. Lemo connector.
- Mini: ½ inch, 42 mm handle. Package gain. Mini Lemo connector.
- Match: 1D - 45 mm length. No package gain. USB connector.

Maximal threshold level:

- Regular



PU match



PU regular



PU mini

III. Components list

- Scan and listen device
- Headphones
- Line out cable
- Probe cable
- Power supply

IV. S&L device specifications

Physical	
Height: 24 mm	
Width: 79 mm	
Depth: 130 mm	
Weight: 180 g	
General electrical features	
Electric impedance: 56 Ohms	Fuse: 250 mA
Power supply: Input voltage: 15-18 V	S/N : Lower than probe (included in probe datasheet)
Consumption:	Harmonic distortion: 20 dB reduction within first harmonic
<ul style="list-style-type: none"> max : 1W (56.7mA at 18V) idle : 0.8W (44mA at 18V) 	
Environmental parameters	
<ul style="list-style-type: none"> Variation due to temperature: <0,1 dB (20-55 Deg) Variation due to humidity: <0,1 dB (20-90%) 	

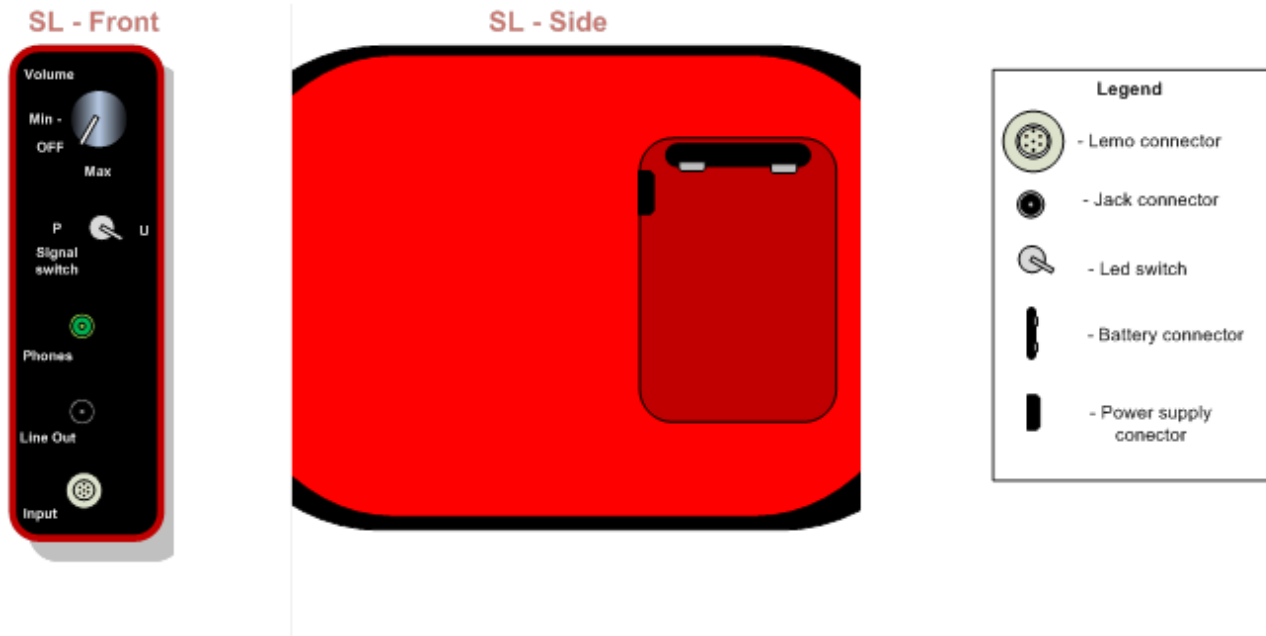
Function	Characteristics	Modes			
		Battery mode		Powered mode	
	Power	9v E-block battery		14-18 V DC power	
Listening	Maximum output power	0,5 W @ 1KHz		1,5 W @ 1KHz	
	Connector type	3,5 mm jack (to Headphones)			
Acquisition	Maximum output power	Pressure	Velocity	Pressure	Velocity
		330mV	330mV	700 mV	330mV
	Connector type	3,5 jack (to 2 BNC)			

V. Headphones: Beyerdynamic DT 770 M

Transducer Type: Dynamic Frequency response: 5-30.000Hz Nominal impedance: 80 Ohm Nominal SPL: 105 dB Ambient noise isolation: 35 dBA Total Harmonic distortion: < 0,2 %

VI. Cabling and Schematics

A. Schematics



1. Hardware connections

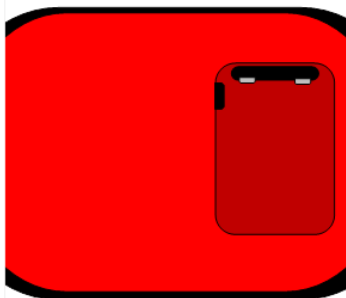
a) Probe connection

The PU probe is connected via the Lemo Female connector in the front part of the device. The compatible cables to make such connection are:

- PU mini standard cable
- PU mini S&L cable

b) Battery mode

To operate the system in battery mode, insert the battery block on the side of the device.



(1) Hardware indications

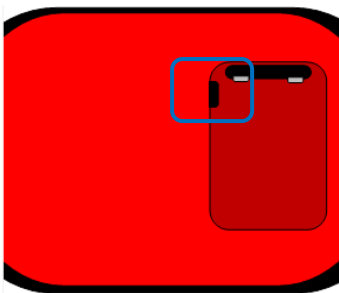
The indication of the battery status is done in the front panel, illuminating the P-U switch.

- If the battery is charged the switch will be illuminated in green when the power switch is turned on.
- If the battery is nearly empty, the switch led will start flashing and use red color

NOTE: when using battery mode, the amplification of the signals varies with the battery charge so if acquisition functionality needs to be used, use the power mode instead of battery.



c) Power mode



Use this mode always for the acquisition function, to make sure the signal amplification is constant and calibrated.

To connect the power supply, subtract the battery from the battery holder, this will give access to the power supply connector.

(1) Hardware indications

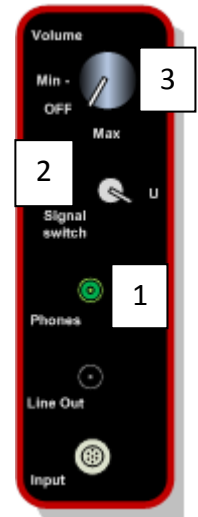
When the power connector is used and the power switch turned on, the P-U switch with led, should be lighted.



d) Listening function

1. To use the listening functionality the headphones should be connected in the green 3,5 mm Jack connector.
2. To select the channel to which listen, pressure or velocity, use the lighted switch installed in the front side of the Scan & Listen device. The velocity channel is filtered to enhance high frequencies.
3. To select the signal amplification use the Volume switch also installed in the front panel of the device

WARNING: The headphones cord also has a volume control, make sure it is activated in case there is no signal on the headphones and the battery indicator is green (full).

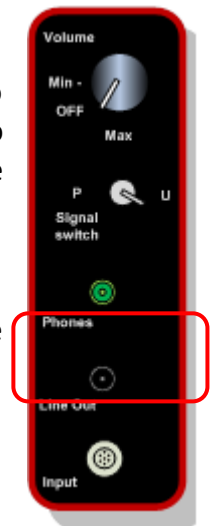


e) Acquisition function

The Scan and Listen device can also be used as a signal conditioner and connected to a frontend to acquire and/or record the pressure and velocity captured signals. To do so, the Line out connector 3,5 jack connector needs to be plugged in. The other side of the cable is finished by two BNC connections:

- Red output: particle velocity
- Black output: pressure

The pressure and particle velocity signals are not equalized so amplitude and phase need to be corrected with the equations explained in section 1.d.2. a and b.



B. Cables and connectors

Scan and Listen device is compatible with:

- Regular probe: PU mini standard cable
- Mini probe : Scan and Listen cable

The connector pinning from the Scan and Listen side is:

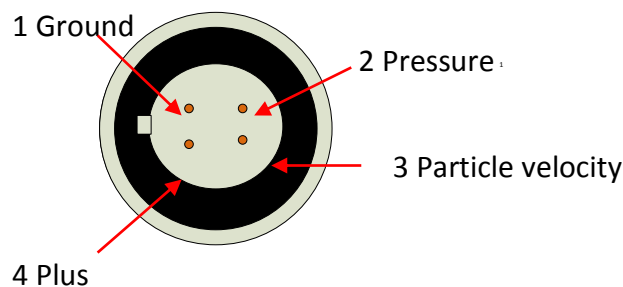


Figure 2. Cable connections to 4 pin Female connector in Scan and Listen device

C. Re-calibration.

The Scan&Listen device needs to be recalibrated with its matched probe every 2 years.

VII. Usage and precautions

A. Usage and operation

- Always review the status of the battery before using Listen functionality. Take into account that the amplification of the signals is battery dependent.
- If acquisition functionality is to be used the power supply mode needs to be used.

B. Precautions and not to do's

Use parts, connector and power supplies provided with the equipment. Do not use the device with any cable or extension cable not supplied by Microflown Technologies.

In case of losing some part please consult with Microflown Technologies before using a similar item.

VIII. Technical contact

For any problem or doubt with your equipment, please contact Microflown Technologies Customer service:

- Mail: cs@microflown.com
- Skype: [cs.microflown](https://www.skype.com/contact)
- Telephone: 0031(0) 88 001 08 11 Monday to Friday , from 9:00 to 17:00 (UTC+1).

IX. Warranty policy, repairs and replacements

A. Warranty and replacement or substitution

1. Full warranty (year 1 and 2)

The warranty period starts on the date of the invoice.

During the first two years (24 month) the Seller offers a warranty on all its Products, except for trading items and third party manufactured items. The Seller warrants that all Products will be free from defects in materials and workmanship for this period of two years. During this two years period, the Seller will repair or replace products free of charge. Products damaged by accident, abuse, misuse, natural disaster or by any unauthorized disassembly, repair or modification are not covered by this warranty. The incurred transportation costs of returning the Products to Seller will

be borne by the Buyer. The logistical cost for returning the Products back to the Buyer will be borne by the Seller. Several Product come with a “VOID if seal is broken” sticker, the warranty is void at all time when this sticker is broken.

2. Grace period (year 3 and 4)

During the third and fourth year the Seller offers a Grace Period. In the Grace Period the Products purchased at an earlier date can be replaced by completely new state of the art Products of the same scope of the original purchase. This applies only for the Products known as standard probes and signal conditioners. In the first year of the Grace Period, (year 3) customers have an option to replace their products for 25 % of the actual ex works end user price. The full freight and packaging charges apply.

In the second year of the grace period, (year4) customers have an option to replace their products for 50 % of the actual ex works end user price. The full freight and packaging charges apply.

The new products are accompanied by a new warranty. Both the two years warranty and grace period becomes applicable again from the date of invoice.

3. Repairs outside warranty policy

Alternatively two years after the purchase, small repairs might be offered all time against estimated costs to be quoted. Repairs come with six months' warranty with the same condition as the two year warranty