

# Leak Sound Meter LSM1

The LSM1 is a versatile, compact, battery-operated handheld device with head set and precise digital signal-level display.

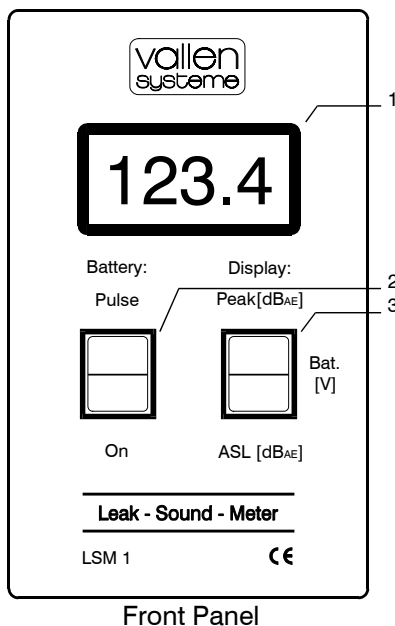
## 1 Application

The LSM1 helps to conveniently detect and quantify discrete and / or continuous acoustic signals in the frequency range 20 to 100kHz, as generated by source mechanisms, such as

- Leakage
- flow turbulence
- dripping
- cavitation
- particle impact
- flow of material
- delamination
- debonding
- fiber breakage
- phase transitions
- crack formation
- crack growth
- deformation
- twinning
- corrosion
- partial discharge and others.

The LSM1 is the ideal tool to detect, quantify and search for such acoustic sources. It is also an ideal tool for the AE-field test engineer to sort out whether or not the noise condition at a structure is suitable for an AE test. It helps to localize undesired noise sources and to improve the reliability and efficiency of the AE-test.

## 2 Front and Rear Panel Elements

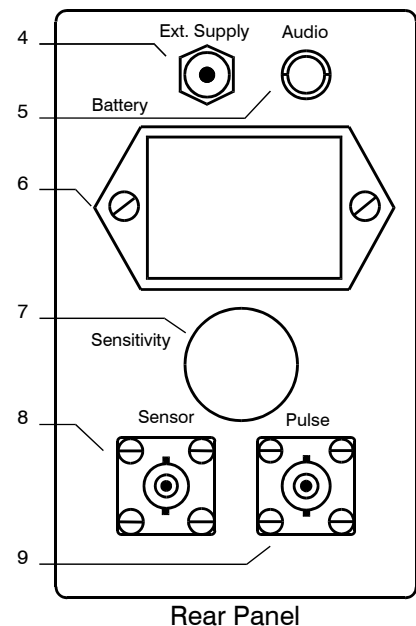


### Front Panel Elements:

- 1 3 1/2-digit LCD-display
- 2 Switch "Battery", 3 positions:  
upper: send calibr. pulse  
middle: Off  
lower: On
- 3 Switch "Display", 3 positions:  
upper: Peak [dB<sub>AE</sub>]  
middle: Battery voltage [V]  
lower: ASL [dB<sub>AE</sub>]

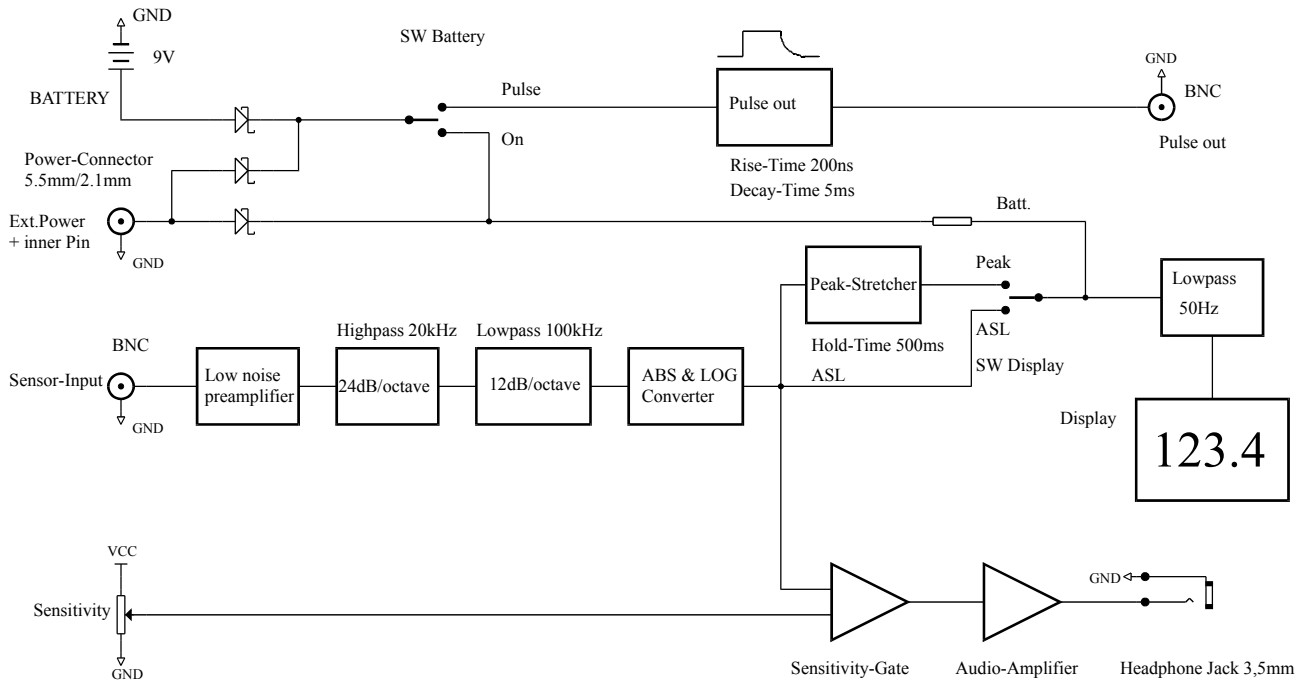
### Rear Panel Elements:

- 4 External 7-15V<sub>DC</sub> supply conn.
- 5 Audio Head Set connector
- 6 Box housing the 9V-Battery
- 7 Sensitivity potentiometer
- 8 Sensor input (BNC)
- 9 Pulse output (BNC)



Size (mm):105H \* 65W \* 85 D, Size (inch): 4.13H \* 2.56W \* 3.35D, Weight: 550g, Made in Germany

### 3 Blockdiagram of LSM1



The AE signal (delivered by a piezo-electric AE-sensor) is fed-in over the BNC-connector "Sensor Input" (left side of block diagram, in the middle) and amplified by a low noise preamplifier. A filter module rejects undesired frequency components. The signal is rectified and the logarithm is obtained. This forms the ASL-signal (Average Signal Level) which represents a wide dynamic range of the input signal (20 to 106dB<sub>AE</sub>). This ASL signal is fed into the Peak Stretcher which holds the highest input signal for 500ms constant. This time is the optimum trade off for readability at the display and fast desired update of the display after a sensor move on the tested structure. In addition, the ASL signal goes over a sensitivity gate to the audio amplifier and is made audible by the externally connected audio head set.

For the numerical LCD-display, one of three signals can be selected at the "Display" switch:

- the Average Signal Level (ASL) in dB<sub>AE</sub>,
- the Peak Amplitude Level (Peak) in dB<sub>AE</sub>, or
- the Battery Voltage in V

To power the instrument by the internal battery, one must press the switch "Battery" into the "On"-position. In order to save battery capacity, the released "Battery" switch returns automatically to the middle (Off) position. If the instrument is powered by an external 7-15V<sub>DC</sub> supply, the instrument is also supplied when the switch "Battery" is not pressed.

Pressing the switch "Battery" to the "Pulse" position generates a single pulse of sharp rise and slow decay. This pulse, when fed into a suitable coupled VS30-V-transducer, generates a reproducible excitation of the structure under test for a fast and efficient sensor sensitivity check with a multi channel AE-test-setup. This pulse fits to a preamplifier gain of 46dB, means it avoids saturation that would happen with a pencil break source.

The sensitivity potentiometer lets one adjust the sensitivity of the audio monitor to the desired level. A signal of lower level than set by the sensitivity potentiometer will not be audible, a signal of higher level will be audible. This makes the audio monitor very sensitive to small changes of amplitude at a certain signal level range. It lets one easily discover in which direction the sensor must be moved for best amplitude increase. Most probably this direction points to the acoustic source. The most suitable sensors for this application are the Vallen-Systeme VS30-V and VS45-H.

## 4 Specifications

### 4.1 AE-preamplifier (sensor connector) and analogue measurement chain:

Input impedance:	> 10M $\Omega$ parallel 10pF
Measurement range:	200mV <sub>PK</sub> = 106dB <sub>AE</sub>
Internal noise:	< 10 $\mu$ V <sub>PK</sub> = 20dB <sub>AE</sub>
Frequency range:	20-100 kHz (standard)
Filter roll-off:	High pass 24dB/octave, Low pass 12dB/octave
Logarithm error:	1.5dB (40-100 dB <sub>AE</sub> )

### 4.2 Display:

ASL / Peak (range)	20.0 to 106.0 (dB <sub>AE</sub> )
ASL / Peak (error)	1.5dB <sub>AE</sub> (incl. logarithm error of preamplifier)
Battery:	7.0 to 9.9 (V)

### 4.3 Pulser:

Pulse Output:	+4.7V (duration of contact closure). Sharp rise, slow decay
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### 4.4 Power Supply: 9 V battery block

Power consumption:	70mA
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### 4.5 Housing: (aluminum profile)

Size (mm):	105H * 65W * 85 D
Size (inch):	4.13H * 2.56W * 3.35D
Weight:	550g

### 4.6 Environmental conditions:

Temperature range:	-30 to +70°C
Humidity:	0-90% not condensing

### 4.7 Available accessories:

LSM1-NTE:	Power supply for 230VAC
Sensor:	VS30-V (25-80kHz) or VS45-H: 40 to 300kHz
Head-Set (included)	

Filters and sensors for other frequency ranges and other applications are also available.

If your application needs to acquire and / or store AE-data for real time or post test analysis, please request info about our Acoustic Emission Signal Conditioner ASCO-P and our high-end AE-System AMSY-5.

*Specifications are subject to change as product developments are made*

## 5 Regulations concerning redemption and disposal of LSMx

We, Vallen-Systeme GmbH, are registered manufacturer of the measurement instrument LSMx (WEEE-Reg.-Nr. DE 68150283) where x indicates different instrument versions regarding their functionality.

According to German law (§10 subparagraph 2 of Elektro- und Elektronikgerätegesetz – ElektroG) and in the interests of our customers, we accept the obligation for redemption and appropriate disposal of those LSMx which have been placed by us on the market within the scope of the before mentioned law, after August 13, 2005.

For this we provide the following procedure:

- Owners of old instruments request our agreement with the return of old instruments. The goods to be returned must be described unambiguously and identified by serial number and/or the identification numbers.
- Upon our approval owners may ship the goods free of costs for us.
- We will dispose the goods according to the relevant laws and regulations on our costs.
- Goods returned without our approval will not be accepted and returned to the owner on his account.

With this measure we wish to serve our customers in the best way to properly dispose old instruments and to contribute to re-use, recycling and proper disposal of electronic waste.



Equipment labelled with the symbol shown left must be disposed separately from unsorted municipal waste within the European Union.