



# FUSION Smart Sound & Vibration Analyzer Technical Datasheet

## FUSION – TECHNOLOGY AT THE SERVICE OF YOUR PRODUCTIVITY

### SIMPLY UNIQUE !

With FUSION, 01dB launches its new sound level meter: simply unique, designed to fulfil your needs in all situations. Easy to use, as effective in the hand as on a tripod, this instrument offers the best available technology to handle all measurement situations. Powerful functions, including vibration measurements, are integrated to meet your needs for on-site analysis, making FUSION the most innovative sound level meter and an exceptionally communicating tool, increasing your productivity!

Certified Class 1 solution according to IEC 61672, FUSION offers the highest standard in metrological quality for your data. Multitasking it gathers performance and simplicity within one single instrument. Connection to an intelligent wireless sensor FUSION can even record vibrations signals on 3 axes simultaneously with acoustic indicators and audio signals.

FUSION is a new member within 01dB ecosystem focused on improving your productivity. You will appreciate its simplicity of use, its degree of remote controllability and the power of its processing software



### MAIN SPECIFICATIONS

FUSION presents the unique technical specifications:

- IEC 61672 Class 1
- Built-in preamplifier
- Free-field microphone type G.R.A.S.40CE
- Large dynamic range 118 dB
- Self-check system (CIC)
- Automatic calibrator detection
- High-definition color display
- Rubber side grips
- Windscreen claw
- All-in-one: Wi-Fi, 3G Modem, GPS...
- Remote control by web interface
- Parallel storage of all acoustic indicators
- Advanced triggers
- Metrological audio recording
- Wireless vibration signal recording in 3 axis
- 24-hour capacity
- Multiple processing software packages (dBTRAIT, dBFA, dBBATI...)
- Numerous accessories (all weather case DSC01, outdoor microphone unit DMK01...)

### MAIN APPLICATIONS

FUSION is a multi-purpose sound level meter including all functions aimed at maximizing your productivity. It can be used as a control instrument and offers evaluation, analysis and monitoring capabilities application to noise and vibration measurement in the following fields of activity:

- Noise exposure
- Industrial plant noise mapping
- Urban noise
- Construction site noise
- Industrial noise
- Transportation noise
- Windmill noise
- Recreational activities noise
- Vibration of machines
- Vibration of structures
- Building acoustic
- ...

## PERFORMANCE AND SIMPLICITY

### THE 01dB ECOSYSTEM

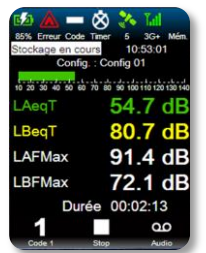
FUSION is a member the new 01dB product range sharing with DUO and CUBE the same ecosystem focused on improving your productivity. Being familiar with one of them just means mastering the other ones. Same built-in screen, same web interface, same accessories, same software tools... everything is designed in order to optimize the time you need to use these instruments.



### SIMPLIFIED ERGONOMICS

FUSION can be used with its context keys and high-definition built-in colour screen. It is therefore possible to load a stored configuration, to start an acquisition, to mark an event and start an audio recording, to do a calibration and to access stored measurements ...

No more need for a computer keyboard to manage the whole set of measurement campaigns!



### REMOTE COMMUNICATION

Using a communicating tool (smartphone, tablet, laptop...) you can access FUSION using a simple internet browser. Thanks to the embedded webserver FUSION offers direct access to any of the available functions: configuration, coding, acoustic calibration and electrical check, real time display of instant values...) without the need of further specific applications.

Remote connection is possible using Ethernet, Wi-Fi or 3G integrated modem (option). Therefore remote access to FUSION is possible from wherever you are.



### GPS LOCATION

The built-in GPS allows FUSION to get measurement data include GPS location for easy visualization of the measurement position in dBTRAIT post-processing software.

In case of an unexpected displacement of FUSION, a user defined movement detection function will warn the operator by sending an SMS with the new geographical coordinates and the distance from the previous location (Need 3G Option).

### SMART AND POWERFUL

FUSION measures noise and vibrations perfectly. Its powerful functions contribute to optimizing your operational efficiency: continuous audio recording, innovative trigger threshold definition, advanced acoustic indicators, automatic calibrator detection, periodic electrical checks, remote setting changes and listening, etc.

### WIRELESS IN YOUR OFFICE

Direct access to FUSION is possible from your office WIFI network without additional software. Any of your collaborators can thus have hands on one or several FUSION instruments using WIFI access.

Measured data are collected at a glance and you can already schedule your next measurement campaign!

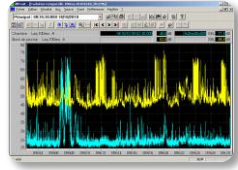
## 01dB SOFTWARE: SO POWERFUL

---

To cover each application, 01dB offers a complete range of software tools: dBTRAIT (processing of data such as LAeq...), dBFA (advanced frequency analysis of measured data) or dBATI (processing of building acoustics measurements).

dBTRAIT is the most commonly used software program with the entire range of 01dB products. Initiated in the early 90's dBTRAIT was progressively improved over the years, taking also benefits from users feedback. It includes processing functions such as multiple indicators calculations, analysis results according to regulations as well as advanced coding capabilities which help identify noise sources.

To simplify your work, you can install 01dB software as many times as needed. Furthermore, there is no physical protection key to plug into your PC.



## ACCESSORIES: MORE THAN A DETAIL!

---

Lateral grips make FUSION fit well within your hand. In addition a neoprene hand strap which can be mounted using the dedicated aluminium profile on the back of the instrument is adding even more security for a perfect handling of your instrument.



A fixation profile for tripod mounting is also part of the delivered set of accessories. FUSION can thus quickly and safely fixed on a tripod.



A windscreen claw also comes along with FUSION, which prevent losing the windscreen when performing measurements.

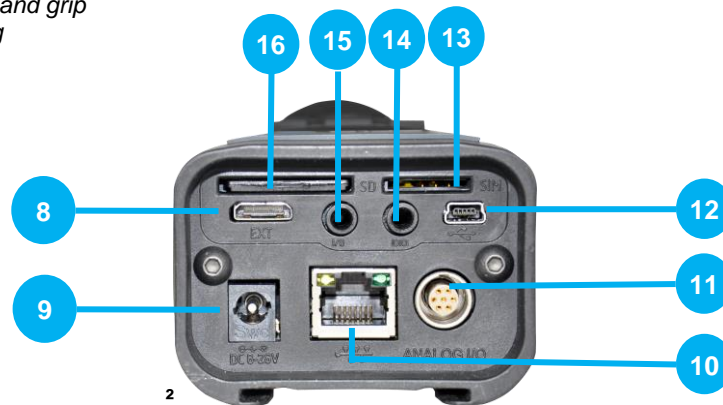
01dB, these accessories are genuinely useful and serve to improve your productivity day after day



## GENERAL OVERVIEW



- 01 – Class 1 microphone
- 02 – Integrated preamplifier
- 03 – Colour display
- 04 – Keyboard
- 05 – Windscreen
- 06 – Removable hand grip
- 07 – Rail fastening



- 08 – Mini HDMI (weather station connection)
- 09 – DC 8-28V power supply input
- 10 – RJ45 Network
- 11 – External microphone preamplifier input and analogue output
- 12 – Mini USB
- 13 – SIM card slot
- 14 – RS232 input
- 15 – TTL input/output
- 16 – SD card slot

## NO COMPROMISE WITH METROLOGY

---

### ACOUSTIC CALIBRATION DETECTION

---

In order to simplify the deployment of FUSION in the field, an automatic function for the detection of a sound level calibrator is used to launch the calibration procedure without any action required from the user, other than powering up the calibrator.

When FUSION detects a stable level around the predefined calibration level, it automatically starts the calibration procedure. At the end of this procedure, the instrument indicates the new calculated sensitivity and prompts the user for validation, repeat or rejection of the calibration. Information provided is stored and added up to the historical data of the instrument.



### MULTI-FREQUENCIES CHARGE INJECTION CHECK (CIC)

---

The built-in charge injection check allows testing the entire measurement chain, including the microphone of FUSION. It consists in injecting a sinusoidal charge (1 or 2 levels) into the microphone membrane, at the selected frequencies.

The principle is to collect reference levels (initialisation stage) and to check over time that the maximum deviation between the reference values and the measured values does not exceed a user defined level, typically set to 0.5 dB.

The controlled frequencies are 1000, 2000, 4000 Hz and a two user-defined frequencies. A multiple-frequency check offers the advantage of a better assessment of a possible degradation of the microphone membrane. The process lasts from 10 to 30 seconds and occurs between two measurement campaigns, so as to make their validation easy



### REFERENCE DIRECTIONS

---

During a measurement with the instrument in hand, the sound level meter must be pointed at the source according to standard IEC 60651. This is why FUSION is delivered with a free field microphone for measurements with an angle of incidence of  $0^\circ$  with respect to its main axis.

The IEC-61672 standard requires a perfect control of the frequency response polar diagram, in particular at  $\pm 30^\circ$ . The fine shape of FUSION, along with its conical upper part, allows complying with this criterion.

During unattended monitoring measurement, multiple sources are usually measured with a random position with respect to the measurement point. Noise generated by ground transportation, leisure activities, construction sites is coming from all directions, although mainly the horizontal direction.

In this case FUSION may be equipped with the outdoor microphone unit DMK01 (see later on the dedicated section about accessories) especially designed to perfectly match applications where noise sources can be located all around the instrument, and more specifically coming from the horizontal direction.

Placed vertically, the outdoor microphone unit DMK01 is configured in FUSION for a propagation direction oriented  $90^\circ$  from its axis to perfectly meet the requirements of the IEC 61672 standard on sound level meters relative to noise incidence from the horizontal direction.

## TWO MEASUREMENT MODE

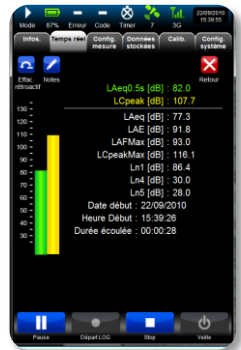
### SLM MODE (INTEGRATING SOUND LEVEL METER)

The integrating sound level meter mode allows for a simple but complete noise assessment over a period that includes overall global and spectral data as well as statistics. In case of an unexpected event (dog barking, police or ambulance siren) during a measurement a back erase function will reject the last 5 or 10 seconds of measurement

### LOG MODE (INTEGRATING LOGGING SOUND LEVEL METER)

FUSION in LOG mode includes the storage of time histories. It is designed for experts familiar with the short term Leq method. Instantaneous values and spectra are stored at every logging period T.

When the trigger option is active, up to 5 different markers can be entered manually. In addition an event detector can be defined with limits based on 24 possible consecutive periods of the day. FUSION can record a (non-compressed) metrological audio signal simultaneously with the events. When an event occurs, a fast logging period set by the user becomes active. Finally, during acquisition, written time-stamped comments can be recorded in the measurement campaign



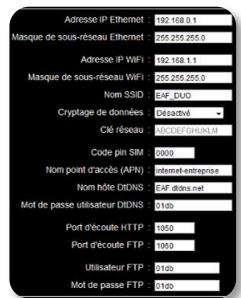
## MULTI-COMMUNICATION

### COMMUNICATION MODULES

The integration of communication modules in FUSION allows communicating with the instrument using in 4 different ways:

- USB storage
- Ethernet network (RJ45)
- Point-to-point Wi-Fi network
- Infrastructure Wi-Fi network
- 3G communication using the built-in modem  
(Modem option needs to be active; SIM card and subscription are not included).

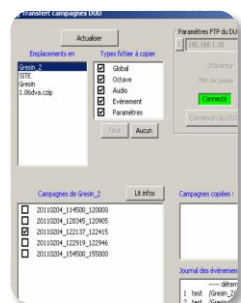
All connection parameters are accessible from the web interface.



### REMOTE DATA TRANSFER

Access to stored data and data transfer can be obtained in different ways using:

- FTP client as for instance Filezilla®
- dBFileManager software (included with FUSION) for manual downloads on demand
- USB mass storage (SD card access)
- SD card removed and an external memory card reader.



## DETAILS OF WEB INTERFACE

### STATUTS BAR

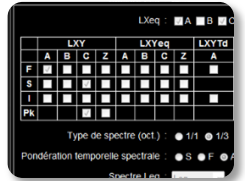
Always on display, the status bar can be used to rapidly check the operating of the main functions of FUSION: current acquisition mode, battery status, detection of an error (overload, electrical check), possible marker(s) in progress, activation of a timer or not, number of GPS satellites picked up, type of connection and 3G signal strength.



### MEASUREMENT CONFIGURATION

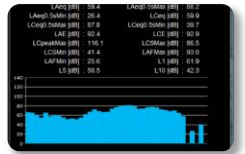
A measurement configuration for FUSION can be set using ergonomic sub-menus. It is then possible to remotely configure the parameters to store, the automatic trigger thresholds, the logging period and delayed starts.

Configuration management allows rapidly loading a predefined configuration.



### DATA ACCESS

Data stored in the instrument's memory can be viewed using the web interface: the user can visualise the different measurement campaigns stored in the instrument, without disturbing the measurement in progress. Additionally an automatic function can be activated in order to remove data older than a predefined number of days.



## POWERFUL DATA ACQUISITION

### INNOVATIVE ACOUSTIC INDICATORS

On top of usual instantaneous data measured and stored (Leq, spectra, ...), FUSION allows for acquiring advanced indicators at logging period rate on user defined periods:

- Sliding LAeq with user defined sliding period,
- Sliding Ln with user defined sliding period,
- Exposure level with predefined background noise,

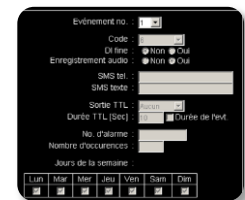


### UNIQUE EVENT DETECTION FILTERS

In order to efficiently detect noise events (upon noise threshold or noise source recognition conditions), FUSION has a unique system of filters.

All instantaneous data measured at logging period rate can be used as criteria for triggers, including advanced indicators, frequency bands and weather data.

Each trigger is defined by 7 different parameters (start/stop noise levels, pre-/post-trigger duration...). Furthermore, it can be typically setup on an hourly basis, which allows creating up to 24 different triggers in a day.



An event can generate several actions: personalised SMS, audio recording, parallel measurement with fast logging period, TTL output ...



## VIBRATION BUT DIFFERENTLY

---

### INNOVATION

---

Sometimes classical sound level meters can interface with vibration sensors more or less successfully. In any case this requires a wired solution, using one single measurement channel and... reading the collected results on a dB scale dedicated for acoustics!

As a world premiere 01dB proposes FUSION the only sound level meter capable of recording and storing in parallel 3-axis vibrations, audio signals and all acoustic indicators.

### 3-AXIS WIRELESS VIBRATION

---

Relying on WIFI connection FUSION interfaces with the wireless sensor WLS developed by ACOEM. This industrial sensor allows recording vibration signals on 3 axes (X, Y, and Z). The sensor's lifetime is 8 hours it can be recharged using a simple USB connection.

### ACOUSTIC AND VIBRATION

---

FUSION allows recording vibrational signal on 1 (Z) or 3 axes simultaneously (X, Y and Z). What is more: FUSION can record and store in parallel 3-axis vibrations, audio signals and all acoustic indicators (instant values, spectral values...).

Audio and vibration signals recording is possible either manually using FUSION integrated keyboard, or remotely with a web interface connection to the instrument, or based on an acoustic trigger as part of the parameter definition of the current settings.

In fact it can be useful to further process vibration signals which correspond to a sound source with higher level than authorized.

### AUTOMATIC POST-PROCESSING

---

In order to optimize the analysis, the acquired signals (audio and vibration, recorded with a metrological quality) can be analyzed "on the spot" once imported within dBTRAIT. Predefined analysis can be set by the user and assigned in dBTRAIT. Of course such parameters can be modified at any time.

As soon as the automatic processing is performed, computed results corresponding to each signal become available within dBTRAIT for further processing and analysis.

## ADVANCED DATA POST-PROCESSING

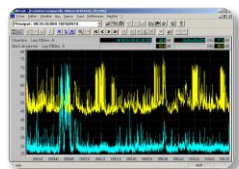
---

### MARKERS BETWEEN FUSIONS

---

Using several FUSION instruments synchronized by GPS on a single site allows for a detailed analysis of the recorded phenomena. It then becomes possible to clearly identify a car and/or train pass-by, a building site noise, an industrial noise, using multiple markers.

Analysis at the measurement point takes advantage of the information collected at the coding points (and thus validates that the incriminated sources are indeed active). Moreover, data post-processing using dBTRAIT will allow assigning markers from the coding points onto the measurement campaign collected at the measurement point.



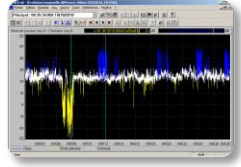
## SYNCHRONIZED LEVELS DIFFERENCE MARKERS

---

Analysis in dBTRAIT allows first to calculate the time history of the difference between the measurement point and the coding point.

The time history of such difference is then analysed and automatically marked in order to detect events during which the disturbing source(s) emerge(s) from the sum of all other noises sources.

The example besides illustrates an analysis of the time difference between measurement and coding points. Results in blue (positive difference: noise levels at the measurement point higher than at the coding point) indicate some non-significant noise at the measurement point, whereas results in yellow show a negative difference which highlight some significant noise at the coding point.



## AND EVEN MORE

---

### IMPORT AND EXPORT OF CONFIGURATION FILES

---

Measurement configurations can be stored, exported and imported for the benefit of the user: it becomes therefore possible to load measurement configurations from a FUSION instrument onto several ones, and thus run measurement campaigns relying on the same parameter settings for all instruments. This feature is also of temporary use to replace a FUSION while performing a periodic test at a laboratory.

### DATA STORAGE MANAGEMENT

---

A retention period can be configured to automatically delete data older than a predefined past date.

### REMOTE LISTEN-IN

---

Remote listen-in is possible with a voice & data subscription simply by dialling the telephone number of the SIM card in FUSION; FUSION will pick up the line after 2 tones and you can directly listen to the audio signal in real time.

## MAIN ACCESSORIES

### WLS WIRELESS VIBRATION SENSOR

FUSION interfaces in a very simple way to the WLS industrial wireless sensor. It allows recording vibrational signal on 3 axes (X, Y and Z) simultaneously with the recording of audio signals and all acoustic indicators (instant values, spectral values...).

The WLS sensor allows vibration recording on 1 axis (Z) or 3 axes simultaneously (X, Y and Z) with a frequency sampling of 12.8 kHz and a dynamic scale of 80g.

Battery operated (type Li-Ion) with an average lifetime of about 8 hours; it is rechargeable using a simple USB connection.

Several mounting accessories are available.



### OUTDOOR MICROPHONE UNIT DMK01

FUSION external preamplifier input allows connecting an outdoor microphone unit of type DMK01 especially designed to separate the microphone from the instrument body.

This unit is composed of a stainless steel body, a dedicated preamplifier which allows using the microphone delivered with FUSION, a noise cone a specific windscreen and a dummy microphone designed to protect FUSION when its microphone is removed and used with the DMK01.

Specific electronic corrections are implemented in FUSION for the outdoor microphone unit DMK01 (embedded settings) in order to satisfy 0° and 90° reference directions.

Charge injection calibration check can also be operated from FUSION using DMK01 unit.



### WEATHER STATIONS

A weather station can be interfaced to FUSION so as to be able to simultaneously measure and store noise and weather data.

It is possible to select between 2 VAISALA weather stations: WMT52 type (2 parameters) or WXT520 type (6 parameters). These two weather stations have the particularity of transducers without any moving parts to avoid any breakdown in case of harsh weather conditions.

A unique cable is used for the power supply and the data transfer. This cable is connected on the HDMI mini port of FUSION. The weather data logging period is defined as a multiple of the noise logging period.



	WMT52	WXT520
Wind speed	•	•
Wind direction	•	•
Air temperature		•
Relative humidity		•
Rain intensity		•
Barometric pressure		•

## ALL WEATHER CASE DSC01

---

For mid- and long-term environmental noise and vibration measurements FUSION can be inserted into a DSC01 weather protected case. This case will provide complete protection against bad weather conditions and also deals as a protection against theft or vandalism.

This case can incorporate one or two DEB01 high capacity batteries providing an average battery life of 10 to 20 days.

The DSC01 case also includes several glands which allow you to use different cables (microphone extension cable, cable link with a weather station...) ensuring perfect sealing properties...



## AVAILABLE OPTIONS

---

### FSN2002000 - MULTISPECTRA OPTIONS

---

Activates multi-spectra measurement and storage:

- Type of spectrum: 1/1 or 1/3 octave
- Time weighting: Fast or Slow or none
- Simultaneous measurement and storage of two types of spectra (Leq and time weighting)

Stores spectral data at the logging period rate

If Trigger option (FSN2004000) activated:

- Possibility to store spectra at a faster logging period during events (down to 20 msec)

### FSN2003000 – AUDIO RECORDING OPTION

---

Activates metrological audio recording:

- Selectable frequency sampling
- Manual trigger for recording start and stop directly from FUSION or remotely from the web interface
- User defined timer (periods and duration)

If Trigger option (FSN2004000) is activated

- Automatic audio recording during an event
- Synchronized audio recording simultaneously with manual markers

### FSN2004000 – TRIGGER OPTION

---

Activates single trigger:

- Days of the week condition for event detection activation
- One of the instantaneous values (broadband or frequency bands) measured can be selected (including weather data) for each period; event detection is defined by;
  - User defined start trigger and end trigger levels
  - User defined pre-trigger
  - User defined post-trigger
  - Minimum time duration
- Up to 24 user defined periods within a day

Additional actions triggered during an event:

- SMS generation (with 3G Modem Option FSN2006000)
- TTL output (event or user defined duration)
- Audio recording (with Audio recording option FSN2003000) or vibration signal (with Option FSN2008000)
- Fast logging parallel measurement

### **FSN2005000 – ADVANCED INDICATORS OPTION**

---

Measurement and storage of the following instantaneous indicators:

- Sliding LAeq (start time and end time, sliding duration)
- Sliding Ln (start time and end time, sliding duration)
- Exposure Level (start time and end time, predefined background noise level)

### **FSN2006000 – 3G MODEM ACTIVATION OPTION**

---

Activates 3G modem for internet connection using 3G/GPRS/EDGE and UMTS/HSDPA networks:

- Full remote control and access with a smartphone, an internet tablet or a standard computer (Windows, Ios, MAC)
- FTP server for data transfer
- Automatic SMS notification on event detection (with Trigger option FSN2004000)
- Support of DTDNS dynamic IP address server
- SMS alarm on low battery (10% )
- SMS alarm on movement detected from initial location
- Possibility to call FUSION as a mobile phone to listen to real time noise from the microphone (voice subscription necessary)

### **FSN2007000 – WEATHER OPTION**

---

Measurement and storage of weather data acquired by VAISALA weather stations types WXT520 (6 transducers) or WMT52 (2 transducers):

- User defined selection of parameters
- Altitude correction for barometric pressure
- User defined Logging period (as a multiple of the noise logging period)
- Real time display of weather information with the web interface (wind rose for wind direction, time history for wind speed, instantaneous values for the other weather parameters)

### **FSN2008000 – VIBRATION SIGNAL RECORDING OPTION**

---

Activates metrological signal recording from the WLS sensor:

- Definition of the number of axes to be recorded: 1 (Z) or 3 (X, Y and Z)
- Manual trigger for recording start and stop directly from FUSION or remotely from the web interface
- User defined timer (periods and duration)

If Trigger option (FSN2004000) is activated

- Automatic audio recording during an event
- Synchronized audio recording simultaneously with manual markers



## PACKAGES

### OVERALL SPECIFICATIONS

All FUSION packages contain the minimum following specifications:

<ul style="list-style-type: none"> <li>• Point to point Wi-Fi connection</li> <li>• Ethernet connection</li> <li>• Wi-Fi data transfer</li> <li>• Ethernet data transfer</li> <li>• GPS location</li> <li>• GPS or NTP time synchronization</li> <li>• Periodic electrical check (multi CIC 5 frequencies, 2 levels)</li> <li>• USB connection(mass storage)</li> <li>• SD card reader</li> <li>• 0° reference direction</li> <li>• Web interface for remote control</li> </ul>	<ul style="list-style-type: none"> <li>• dBFileManager software for manual data transfer</li> <li>• SLM mode (Start/Stop)</li> <li>• LOG mode (time history)</li> <li>• Instantaneous values (up to 44 values in parallel)</li> <li>• Global values</li> <li>• Global statistical values (7 Ln values)</li> <li>• Back erase (mode SLM)</li> <li>• Timer functions : immediate, delayed, daily periodic</li> </ul>
---	--

### AVAILABLE PACKAGES

It is possible to order separately one or several options (for the delivery or as evolutions).

	FSN2002000 Multispectra	FSN2003000 Audio Recording	FSN2004000 Triggers	FSN2005000 Advanced indicators	FSN2006000 3G Modem	FSN2007000 Weather	FSN2008000 Vibration signal recording
FSN3001000 Logger Wi-Fi	○	○	○	○	○	○	○
FSN3002000 Recorder Wi-Fi	○	●	●	○	○	○	○
FSN3003000 Analyzer Wi-Fi	●	○	○	○	○	○	○
FSN3004000 Expert Wi-Fi	●	●	●	○	○	○	○
FSN3005000 Advanced Wi-Fi	●	●	●	●	○	○	○
FSN3006000 Logger Wi-Fi /3G	○	○	○	○	●	○	○
FSN3007000 Recorder Wi-Fi/3G	○	●	●	○	●	○	○
FSN3008000 Analyser Wi-Fi/3G	●	○	○	○	●	○	○
FSN3009000 Expert Wi-Fi /3G	●	●	●	○	●	○	○
FSN3010000 Advanced Wi-Fi/3G	●	●	●	●	●	○	○

● Included ○ Option

## TECHNICAL SPECIFICATIONS

### IEC class:

IEC 61672-1 (2002-2005) (0° and 90° reference direction)  
IEC 61620 (1995) NF EN 61260/A1 (2002)  
Sound Level Meter, Integrating Sound Level Meter with storage, group X.

### Type approval

LNE-27092 rev0 20th March 2014  
PTB (soon available)

### Dynamic range

21-139 dB (A, B), 26-139 dB (C), 31-137 dB (Z),  
1 single range for a rated sensitivity of 40 mV/Pa

### Linear operating range for A weighting (5 frequencies)

31,5 Hz : 26-98 dB  
1 kHz : 23-138 dB  
4 kHz : 23-138 dB  
8 kHz : 23-134 dB  
12,5 kHz : 23-130 dB

### Dynamic range Peak

61-140 dBC, 1 single range

### Time weightings

Slow, Fast, Impulse, Peak

### Frequency weightings

X=A, B, C, Z; Y=S, F, I for LXeq and LXY  
X=A; Y=S, F, I for LXYTd  
X=C, Z for LXpk

### Instantaneous broadband values stored

	LXY				LXYeq				LXYTd	LXYMinMax			
	A	B	C	Z	A	B	C	Z	A	A	B	C	Z
F	X	X	X	X	X	X	X	X	X	X	X	X	X
S	X	X	X	X	X	X	X	X	X	X	X	X	X
I	X	X	X	X	X	X	X	X	X	X	X	X	X
Pk			X	X									

LnsT (sliding Ln)

LAeqsT (sliding LAeq)

LAexPT (exposure level)

### Instantaneous weather data stored

Wind speed [m/s]

Wind direction [°]

Rain intensity [mm/h]

Barometric pressure [hPa]

Air temperature [°C]

Humidity [%HR]

### Noise logging period T

Mini 20ms - maxi 3600s, 5 ms steps

Short logging period: mini 20ms – max standard T, 5 ms steps.

Short logging period applicable during events

Short logging period must be a divisor of T

### Weather logging period

Weather logging period is a multiple of T with a minimum of 1 second

### Spectral analysis

Parallel measurement and storage of Leq and LY (Y=F, S, I)

### Filters

1/1 (8Hz-16kHz) et 1/3 (6.3Hz-20kHz)

### Statistics

7 selectable Ln in parallel from L1 to L99, 1 dB class

Samples for calculation: T if Leq or 20 ms if LXY, 0.1 dB resolution

### Back erase

0, 5s or 10s, SLM mode only

### Input high pass filter

0,3 Hz / 10 Hz

### Reference directions

0° on internal input

0° and 90°, selectable built-in correction on external input (with a DMK01 external microphone)

### Reference point for microphone

Centre of the protection grid (with or without nose cone)

### Reference level

94 dB

### Starting point for linearity tests

Reference level, i.e. 94 dB

### Data storage modes

SLM (hand-held sound level meter) and LOG (logging sound level meter)

### Audio recording

Uncompressed metrological signal, Fs = 51200 Hz

Sampling frequencies: 51200, 25600, 12800, 6400, 3200, 1600 Hz

Pre-trigger = 10s at Fs=51200 Hz

LEMO output connector

### Vibration

Signal: Metrological, Fs = 12,800 Hz

Pre-trigger = 0 sec

1 (Z) or 3-axis(X, Y and Z)

### Audio recording triggers

Simultaneously with events and manual (using FUSION integrated key and web interface for remote control)

### Events (automatic coding)

1 user-definable event: codes 6 to 10

24 user-definable time periods

### Triggers

Settings for pre-trigger, post-trigger, minimum time, end time

Types: on instant acoustic and weather values (except wind direction), instant spectral values, TTL input

### Manual markers

On the instrument: 1 code "code 1"

On web interface: 5 codes: "codes 1 to 5"

### Timers

Immediate, differed, daily periodic

Audio: periodic

### Typical background noise

(with 40CE mounted on FUSION)

	Background noise (dB)		Expanded uncertainty (k=2) (dB)
	Electronic	Total	
LpA,F	13	18.5	0.3
LpA,S			
LAeq			
LpC,F	13.5	19.1	
LpC,S			
LpZ,F	18.5	20.5	
LpZ,S			

### Preamplifier

Integrated, not removable

External type PRE22 (included in DMK01) on external input (standard 10 m lemo extension cable)

### Integrated keys

4 silent keys: on/stand-by/off and 3 multi-functions keys

### Status indicators

LED red (overload)

LED blue (Wi-Fi connection)

LED green (power ON), blinking on on-going measurement, charge ON)

**Display**

High contrast colour screen 38\*50mm resolution  
320\*240 pixels  
3 sets of colours (day, contrast, night)  
Display rate: 0.1s, Display resolution: 0.1dB

**USB connection**

Type 2.0; mass storage mode, charge on USB

**Ethernet connection**

Connector RJ45, Speed: 100 MB/s  
DHCP mode

**Wi-Fi Connection:**

IEEE 801.11b, g  
Point-to-point connection and infrastructure mode

**Cellular network connection**

Embedded modem 3.5G compatible with 4-band  
GSM/GPRS/EDGE and 3-band UMTS/HSDPA

**Data connectivity**

Integrated Network protected http server for web interface  
Integrated FTP server for data access

**Voice activation on cellular network**

Possibility to call the instrument phone number with  
« voice » subscription to listen to the on-going  
measurement; Gain 20dB gain, signal compression in  
modem

**SMS alarms**

- On event: SMS text with DUO serial #, location, date and time, user defined text, IP address:http port
- On low battery (10%): SMS text with DUO serial #, location, date and time, % remaining battery
- On movement: SMS text with DUO serial #, location, date and time, GPS coordinates, distance from previous location, IP address:http port (the alarm trigs if DUO has moved more than the user defined distance)

**Automatic SMS actions**

- Sending "IP" by SMS to instrument makes it reply by sending an SMS with instrument serial #, location, date and time, IP:port address and automatically sends a new SMS at every new IP address in case of floating IP

**Actions on SMS sent to the instrument**

- On SMS sent "IP", the instrument replies by sending an SMS with the instrument serial #, location, date and time, IP:port address
- On SMS sent "stop", the instrument stops replying new SMS if IP has changed
- On SMS "reboot", the instrument reboots to establish a new connection and replies with an SMS with instrument serial #, location, date and time, IP :port address

**Web interface refresh rate webpages**

Standard: twice per second  
Mobile: once per second

**Analogue output**

Audio output A, B, C or Z (+/-10Vpp R=200Ohms)  
Adjustable gain: 0, 10, 20, 30, 40, 50 dB

**Electrical check**

Programmable periodicity: 1, 2 or 4 times per day (0h,0h-12h, 0h, 6h, 12h, 18h)  
3 pre-set frequencies (1000 Hz, 2000 Hz, and 4000 Hz) and 2 user-defined frequencies (between 10 Hz and 20 kHz)  
2 user-defined excitation levels, maximum level 5 V (100%)

**External microphone input**

For DMK01, PRE22 (R = 560kOms / 22Vpp (+/- 11V)

**TTL output**

R = 100 Ohms / 0 / 5V

**TTL input**

R = 100 kOhms / 0...1V = "0" 1.8...5V = "1"

**Battery**

Type lithium polymer  
Voltage 3.7V  
Capacity 6750 mAh  
Non removable, charging time approximately 3 hours

**Typical power consumption**

Without communication: < 800 mW  
+ Wi-Fi : < 1,600 mW  
+ Modem : < 3,500 mW

**Operating lifetime**

20 hours with Wi-Fi connection (during 10% of measurement time)  
15 hours with active 3G connection (during 10% of measurement time)  
(for temperatures ranging from 10°C to 50°C, in LOG mode with IT = 1 s, fine IT 100 ms, 1/3 octave and audio recording on threshold during 10% of the measurement time)

**External power supply**

DC 8 to 28 V on charge input  
DC 5 V on USB input (slow charge)

**Memory**

SD, SDHC or SDXC card, 2 GB or higher (2GB standard delivery) for measured data and signals. Minimum recommended requirement: ≥ class 10. Please note only SD cards provided by 01dB should be used.

01dB cannot be held responsible for data loss if the SD card used is not delivered by 01dB.  
Measured data stored on the SD card every 10 seconds.

Non-volatile memory for configurations, system log (500), calibration data (500) and electrical checks (500)

**Clock**

GPS PPS, error < 50 milliseconds  
Internal clock, error < 0.5 s/24 hours

**Localization**

Automatic with integrated GPS  
Information stored with measurement campaigns

**Warm-up time**

From power off: < 25 seconds

**Operating temperature:**

-10°C to +50°C

**Humidity**

IEC 60068-2-78: damp heat: 90% HR (non condensing at 40°C)

**Electromagnetic compatibility**

According to Directive 2004/108/EC  
NF EN 61000-6-1 NF EN 61000-6-2 NF EN 61000-6-3 NF EN 61000-6-4 (2001)  
ETSI EN 300 328 V1.5.1 (2004)

**Protection**

IP40 in standard use

**Influence of vibration**

*Use with no outdoor microphone:*

- For mechanical vibration of an acceleration level of 1 m/s<sup>2</sup> perpendicular to the microphone diaphragm, at frequencies 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 630 Hz, 800 Hz and 1000 Hz: the lower limit of the linear operating domain for A-weighting becomes 80 dB.
- For mechanical vibration of an acceleration level of 1 m/s<sup>2</sup> parallel to the microphone diaphragm, at frequencies microphone diaphragm, at frequencies 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 630 Hz, 800 Hz and 1000 Hz: the lower limit of the linear operating domain for A-weighting becomes 60 dB.

*Use with outdoor microphone unit DMK01:*

- For mechanical vibration of an acceleration level of  $1 \text{ m/s}^2$  perpendicular to the microphone diaphragm, at frequencies microphone diaphragm, at frequencies 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 630 Hz, 800 Hz and 1000 Hz: the lower limit of the linear operating domain for A-weighting becomes 75 dB.

**Weight and dimensions**

775 g

H x L x P: 300 x 70 x 52 mm

**Optional Accessories**

- Weatherproof external charger IP67 (10m cable)
- Weather station VAISALA type WMT52 specific for the instrument (2 parameters: wind speed and direction)

- Weather station VAISALA type WXT520 (6 parameters: wind speed and direction, rain intensity, relative humidity, air temperature, barometric pressure, Connection cable between weather station and the instrument by mini HDMI cable)
- Outdoor microphone unit type DMK01 including preamplifier type PRE22, 10 m cable and nose cone. The use of RAL135 10 m cable does not need any particular correction.
- All weather case DSC01 with option 1 battery (10-days) or 2 batteries (20-days)
- Wireless vibration sensor 3-axis (X, Y, Z) 80g, Weight 280 g, Dimension  $\text{Ø}40 \times \text{H}115 \text{ mm}$ , 8h battery life.

Connecting these accessories has no influence on measurements

## DELIVERABLE ET ACCESSOIRES

The standard package (FSN1001000) of FUSION includes the following items:



*FUSION with 40CE microphone*



*Handle*



*Profile for tripod mounting*



*Windscreen*



*Windscreen claw*



*Packaging*



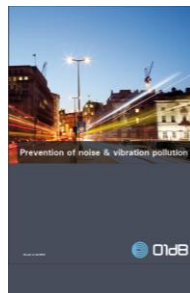
*SD card 2Go*



*AC Power supply*



*USB cable*



*Metrological documentations*



*CD-ROM with User manual*



## **ACOEM**

### **Smart monitoring, diagnosis & solutions**

**ACOEM** offers comprehensive products and services comprising smart monitoring, diagnosis and solutions, drawing upon its unique expertise in the field of vibrations and acoustics.

**ACOEM** contributes to the improvement of:

- quality of life and risk prevention in urban and industrial environments
- productivity and the reliability of industrial processes
- the design of robust and high-performance products with low noise levels
- protection of sites, vehicles and people in hostile environments

With its **01dB**, **METRAVIB** and **ONEPROD** brands, **ACOEM** works with decision-makers in industry, defence and the environment throughout the world.

For more information, visit our web site at [www.acoemgroup.com](http://www.acoemgroup.com)



**200 chemin des Ormeaux**  
**69578 LIMONEST – FRANCE**  
Tel.: +33 (0)4 72 52 48 00

[www.acoemgroup.com](http://www.acoemgroup.com)

---

Asia

Tel. +66 (2) 7112 293 – Fax +66 (2) 7112 293

South America

Tel. + 55 (11) 5089 6460 – Fax +55 (11) 5089 6454

---