CUBE Smart Noise Monitoring Terminal

User manual

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01dB

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User manual

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Welcome to the world of 01dB

ACOEM would like to thank you for purchasing this 01dB product and invites you to refer to this user manual. For more information on ACOEM's products and services, please visit www.acoemgroup.com.

Receipt of your equipment

This product was carefully inspected and tested prior to shipping. Nevertheless, you are requested to check when opening the packaging that there is no sign of damage and that all the accessories are included. If this is not the case, please notify ACOEM or its approved representative without further delay. You are advised to keep the packaging in case you need to return your equipment for maintenance at ACOEM's premises.

Warranty

For this 01dB product, ACOEM offers a 24-month warranty for parts and labor, against all manufacturing defects, with free shipment to return the equipment to ACOEM. Any defects or damage caused by normal wear or resulting from negligence (poor supervision, maintenance or storage conditions, misuse of product, etc.) or arising from modifications that are not allowed for nor specified by ACOEM are excluded from the warranty. Up to the expiry date of the warranty period, ACOEM undertakes to rectify any defect that adversely affects the normal operation of the product and that fails within the scope of this warranty. In the event that such a defect should arise, you should inform ACOEM is writing without delay, including any information liable to be useful in diagnosing the nature of the defect and providing all supporting data as to the existence of the defect.

Further information

For further information:

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- Contact our Customer service Department by e-mail at 01db.support@acoemgroup.com

CHAPTER 1
GENERAL PRESENTATION

1.1 INTRODUCTION

CUBE is a communicating “Smart Noise Monitoring Terminal”. It is a new generation of evolutionary instrument for unattended noise measurement. Customised display screens allow for flexible use and immediate access to essential results. The customisation of stored data also allows optimising its storage capacity, while offering the possibility to monitor the time history of many parameters. The programming of all available functions (Input / Output / Storage…) allows meeting best the user’s requirements.

- The data measured with the instrument are displayed in 2 independent ways:
- On the built-in back-lit colour screen of the instrument (¼ VGA, 2.4 inches – visible zone: about 49mm x 37mm). This display is used for simple hand-held measurements. It is intended for non-expert users for experimentations where the measurement time is typically short (a few minutes)
- On a remote screen, such as a tablet, smartphone or laptop, using an off-the-shelf networked device equipped with Wi-Fi or 3G connectivity and a web browser, in conjunction with the web interface, the web server built into the instrument. This function offers access to all the functions of the instrument (configuration, calibration and verification, real-time display).

A status bar - visible on the built-in screen and on the web interface - gives the operator a quick overview of the device status and the current measurement. At any time the user can access more detailed information looking at the different menus available. For instance, the user is informed about the remaining battery life (depending on parameters of the selected configuration), disk space available etc.

The integrated Ethernet, Wi-Fi and 3G communication features give the user complete control of the instrument (configuration, real-time values, stored data, calibrations), with equal ease adjacent to the measurement point (a few dozen metres away using point-to-point Wi-Fi) and at a distance (3G). Hence, the interest for simultaneous measurement in several points and as a result getting fully synchronised and geo-referenced results using several instruments with built-in GPS.

Particularly well suited to the requirements of acoustics expert and non-expert users, the instrument will help the experimentalist optimise his/her time, through:
- Easy deployment on the field: no cable, wireless communication, remote screen used as an interface and a remote control
- Predefined parameter configurations and easy management of measurement configurations
- A simplified calibration and adjustment procedure entailing automatic detection of the placement of a sound level calibrator
- A periodic verification procedure on the operating of the entire measurement chain
- Coding functions allowing for the accurate identification of incriminated sources, contributing to the sound level or the emergence.

It is used as a medium and long-term measuring instrument for noise monitoring of neighbourhood, environmental or industrial noise.

Starting the instrument for the first time:

When delivered, the instrument is configured with default configuration (see § 8.3). For remote use, the user must initialise the communication between the instrument and the web interface.

It is recommended to read the user manual before any manipulation on the instrument.

Warning:
“This device emits in some cases (Wi-Fi or 3G connection) electromagnetic waves, do not use on pacemaker wearers.”

1.2 OVERALL INSTRUMENT PRESENTATION

1.2.1 Nomenclature

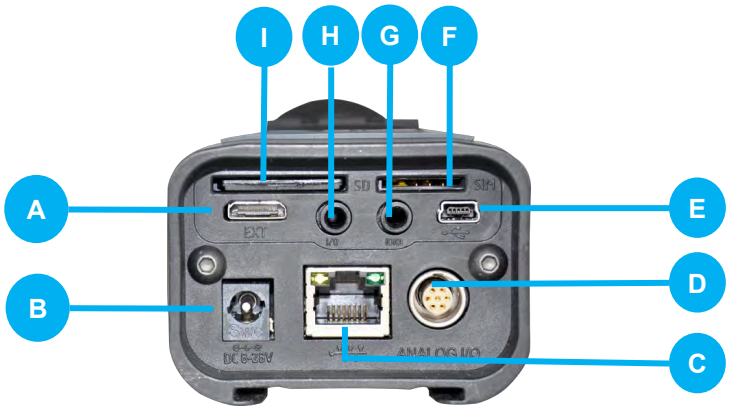
The CUBE instrument includes:

- CUBE Instrument: casing with rechargeable battery that can be simply replaced by a distributor's after-sales department.
- All weather pre-polarized microphone 1/2' type G.R.A.S. 40CD
- RA0208 noise cone for class 1 (IEC 61672-1 edition 2 (2013)) with 0° and 90° reference directions
- DMK01 weatherproof outdoor microphone kit with PRE22 preamplifier
- RAL135 10 m extension cable
- European mains charge block, non-lockable connector
- Windscreen
- Mini USB cord
- 2GB SD memory card, minimum requirement: Class 6 (Class 10 or higher is recommended)
- CD with user's manual
- Metrological documents
- 2 year warranty
- Accessories included in type approval certificate, see CHAPTER 11.

See also CHAPTER 3: Accessories.

1.2.2 Overview

01 – Connectors for external antennas
02 – Colour display
03 – Keyboard



A – Mini HDMI
B – Power supply input
C – Network
D – External microphone preamplifier input and analogue output
E – Mini USB
F – SIM card slot
G – RS232 input
H –TTL input/output
I – SD card slot

1.2.3 Outdoor use

CUBE is not designed for outdoor use without protection

Note: The charging block provided is not waterproof.

1.3 THE KEYBOARD

On the front panel of the instrument, the keyboard includes 1 ON/OFF key and 3 context (multi-function) keys;:

01 – ON/OFF key
02 – 3 context (multi-function) keys

Operating of the ON/OFF key:

- Press the ON/OFF key shortly to turn the instrument on.
- Press the ON/OFF key shortly to:
  - Present the QR code. The QR code is used by the mobile application 01dB Connect to set up the WIFI connection. The QR code is available on all the mode of the instrument
  - Select the display on screen with the Key 1 and 3, in case the instrument is in storage mode, in SLM mode or in ready mode.
- Pressing for 3s on the ON/OFF key will present the Stand-by or Switch off menu. In case the instrument is in storage mode or in SLM mode (Start/Stop), the device cannot enter on Stand-by mode or be switched-off to avoid any unwanted stop caused by the user. In stand-by mode it is possible to wake-up the instrument by sending an SMS or by shortly pressing the ON/OFF again. Data contained in the memory won't be lost
- The measurement is stopped either:
  - By a timer contained in the measurement configuration (measurement ending time)
  - Or by a "stop" action on the web interface
  - Or by pressing key 2 of the instrument: 
  - Or after complete discharge of the battery
  - Or if the memory is full

- In case the user no longer has an interface (e.g., failure of the interface supporting device, battery default), a very long pressure (20s) on the ON/OFF key will stop the instrument (forced shutdown, similar to other instruments in this product range). Here again, the data contained in the memory won't be lost.

The operating of these keys is explained in the paragraphs below: it changes according to the context.

-  Key 1 is used, e.g., to launch the Start SLM menu, access a scrolling list, take a break in the measurements in SLM mode, resume the acquisition, redo the calibration, activate manual coding (Marker 1)…
-  Key 2 is used, in particular, to access the Main Menu, go back to the previous screen, stop a measurement…
-  Key 3 is used, in particular, to launch the LOG Start menu, select a sub-menu or view corresponding information, make a configuration active, launch a back-erase procedure, start the acquisition of an Audio signal…

1.4 INSTRUMENT'S LEDS

The instrument status can be remotely checked with 3 LEDs:
- ON LED
- Wi-Fi LED
- Overload LED

1.4.1 ON LED (green)

This LED lights up 100% when the instrument is powered up. During the charge, when the instrument is set to the OFF position, it lights up at 50%. As soon as the instrument is operating, it lights up 100% and the charge information is indicated on the display (in the status bar). It is blinking when the instrument is in measurement mode.

1.4.2 Wi-Fi LED (blue)

The Wi-Fi LED lights up as soon as the Wi-Fi component is powered up (starting up takes 1 minute). It is blinking when the communication is established. If the Wi-Fi is off, the LED is also off. Pressing any key (1, 2, 3 or ON/OFF) of the keyboard, if the aircraft mode is inactive, will reactivate the Wi-Fi and turn the blue light on, whether the keyboard is locked or not.

1.4.3 Overload LED (red)

In READY mode, the LED lights up and flashes for one second, when the input level is saturated and then turns off.
In SLM mode, as soon as the microphone input level is saturated, the Overload LED lights up and stays on until the end of the measurement.
In LOG mode, as soon as the microphone input level is saturated once, the Overload LED lights up and stays on until the end of the measurement campaign

1.5 ABOUT OPTIONS

See § 5.4.5 Miscellaneous . This manual describes all the functions of the instrument, for all options. Some functions presented here are available only if the instrument has the corresponding licence.

1.6 MAIN FUNCTIONS

- Single and broad dynamic range
- Parallel measurements of:
  - LXY, LXeq, LXYeq and LXpeak indicators (LAF, LAS, LAI, LCI, …, LAeq, LZeq,…, LASeq, LAFeq,…, LCpk, LZpk)
  - 1 or 2 Spectra Leq or LYeq and LY (Y=F, S, I)
- Calculation and storage of 7 statistical indices over a selectable indicator
- Real-time display of time history and spectra
- Remote connection via GSM/3G modem with transfer of results with no interruption of the measurement
- Transfer of stored data by USB connection of mass memory storage type
- Wi-Fi / 3G / Ethernet communication
- FTP server
- FTP client
- Manual (5 codes) and automatic (5 codes) event coding
- Possibility to use pre-programmed thresholds to trigger events
- Recording of the audio signal simultaneously with manual and automatic triggers, but also on a periodic basis or simply from a manual command
- Real time signal listen in: the GSM connection provides a simple means of listening to the audio signal in real time by calling DUO as if it were a telephone; the modem option and a voice and data plan are required.
- GPS-based geolocalization and time function: enables the position of the DUO to be stored, and ensures that the internal clock is perfectly synchronised.
- Storage capacity depending on the SD card used (maximum in early 2012: 128 GB SDXC card).
- Customisation of display and storage
- Possible programming of measurement start in terms of start and end dates
- Graphic representation of the results
- Self-test function for quick control of the operating
- Function for regular automatic verification of the measurement chain
- Integrated battery (battery life time up to more than 20 hours depending on the configuration)

1.7 THE TWO MEASUREMENT MODES AND THE READY MODE

- Ready mode: mode where the instrument is waiting for a measurement to start
- SLM mode: classic integrating sound level meter mode.
- LOG mode: data-logging sound level meter mode with storage of time histories.

1.8 STARTING THE INSTRUMENT AND ITS REMOTE WEB INTERFACE

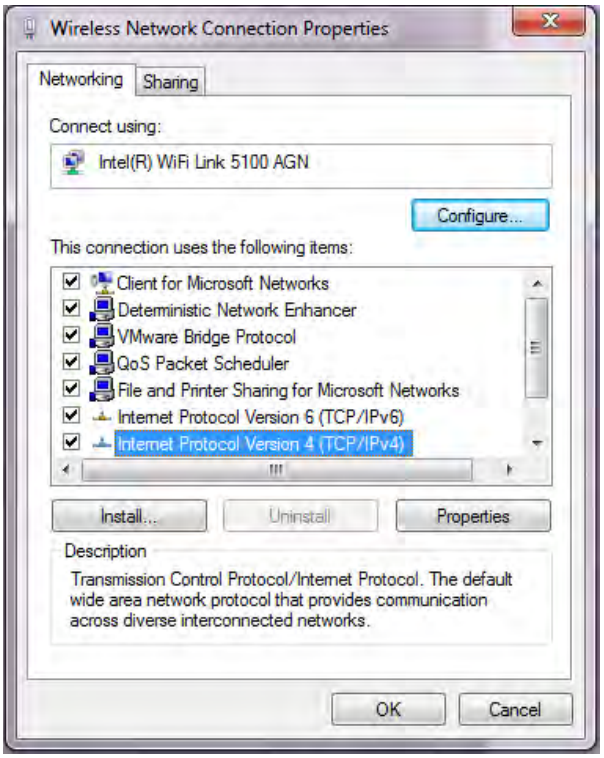
The getting started example below includes Wi-Fi communication. The operating principle for the remote web interface is similar for the other communication modes.

To initiate communication through the 3G network, refer to § 6.2.2.
To initiate communication through the Ethernet network, refer to § 6.4.2.

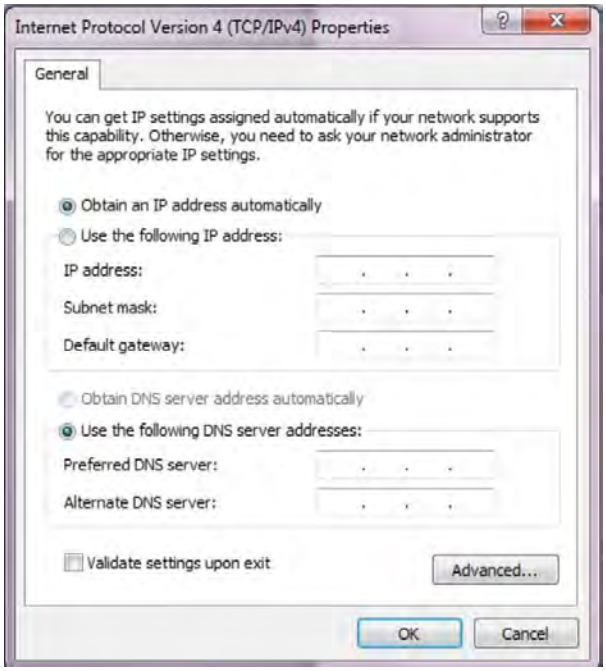
1.8.1 Setting up the communication through the Wi-Fi network

When using the instrument for the first time, one must set up the communication:

Configure the network connection with an automatic IP address.
For instance, for Windows 7, open the “Wireless network connection properties” window:



Select Internet Protocol (TCP/IP) and click on Properties.



Ticks the following field:

- Select Obtain an IP address automatically

By default, the instrument setup is:

- Wireless network (Ad-hoc and infrastructure):
  SSID name: CUBE_[S/N]
  Data encryption: disabled
- Sub-network:
  Wi-Fi IP address: 192.168.1.1
  Wi-Fi sub-network mask: 255.255.255.0

1.8.2 Turn on/Calibrate/Measure with the instrument and the web interface

The operator turns the instrument on using the ON/OFF key  .

The instrument is then in Ready mode. In this mode, one just needs to set a standard noise source and to turn it on for the instrument to automatically detect its presence. The instrument then switches to acoustic calibration mode and starts the procedure. At the end of the calibration procedure, the user can either accept, or repeat, or refuse the calibration by pressing the corresponding context key.

On the remote control (iPod Touch, iPhone, iPad, PC…), the user can open the corresponding the instrument interface by connecting to the IP address of the instrument through the associated navigator.

The operator can then start the instrument calibration, either by automatic detection of a standard noise source, or by selecting the “Calib.” menu (see § 4.2.5 or 5.3 relative to calibration via the main menu of the instrument and the web interface).

The user goes to the “Measurement Configuration” menu of the instrument to select the configuration among those existing or to the “Meas. Config.” menu when connecting from the web interface to customise a configuration (see § 5.2.1 relative to the measurement configurations through the main menu of the instrument and the web interface).

The user can then launch the measurement by activating the Start SLM mode or the Start LOG mode, depending on the requirements (see § 4.3 and 5.2.7 relative to the measurements via the main menu of the instrument and the web interface).

1.9 MANAGEMENT OF THE STAND-BY MODE

The instrument can be set to stand-by mode manually by pressing on the ON/OFF key of the instrument (press  briefly) or on the Stand-by command button of the web interface ().

One can exit the standby mode:

- Manually by pressing key  of the instrument,
- In a programmed way by using the timer functions (see § 5.2.2.4)
- Remotely by sending an SMS (with string “IP”) to the instrument if it is in standby mode. This action will “wake up” the instrument, which will, in turn, send back an SMS containing its IP address, its http port, its serial number and the name of the site folder where the measurements are stored.

Note:
The instrument automatically switches to stand-by mode when the battery reaches its minimum capacity threshold (3%) when the power supply mode is selected as the charging mode (see § 5.4.4). If a measurement is in progress, the instrument stops the acquisition and stores the current measurement before going into stand-by mode. When the charge is up again, the instrument automatically starts up in the mode it was in when it shut down (a new measurement starts if the instrument was in measurement mode). The information is available in the LOG file.

The instrument automatically goes into stand-by mode to optimise its power consumption in the following cases: when the instrument's memory is full or when a scheduled measurement is finished (Timer function).

CHAPTER 2
METROLOGICAL INDICATORS

2.1 MEASURED AND DISPLAYED ACOUSTIC INDICATORS

2.1.1 Definition

2.1.1.1 Generic terms

Time-weighted sound pressure level: Twenty times the decimal logarithm of the ratio of the RMS value of a given sound pressure to the reference sound pressure (by convention set to 20 µPa for airborne sounds), the RMS value of the sound pressure resulting from standardised frequency weighting and standardised time weighting.

Maximum weighted sound pressure level: The highest time-weighted sound pressure level over a given time interval.

Minimum weighted sound pressure level: The lowest time-weighted sound pressure level over a given time interval.

Sound pressure peak level: Twenty times the decimal logarithm of the ratio of a peak sound pressure to the reference sound pressure, the peak sound pressure being obtained using standardised frequency weighting.

Equivalent continuous sound pressure level: Twenty times the decimal logarithm of the ratio of the square root of the average of the sound pressure over a given time interval, to the square of the sound pressure to the reference sound pressure, the sound pressure being obtained using standardised frequency weighting.

Noise exposure level: Sound energy received since the beginning of the measurement (ten times the decimal logarithm of the ratio of the noise exposure to the reference exposure, which is given by the product of the square of the reference sound pressure by the reference duration equal to 1 s).

Statistical sound level Ln: Level exceeded during n% of the measurement time (NF S 31010)

TaktMax: Maximum sound level, with A frequency weighting and Fast or Pulse time weighting, over 3 s or 5 s (DIN 45657).

Worksite exposure level: Equivalent progressive continuous level projected or observed, calculated over a predetermined time period.
The worksite exposure level is a combination at a time t between the continuous equivalent level measured (observed) since measurement started, and the continuous equivalent projected level until the end of measurement, assuming a certain constant background noise level.

The worksite exposure level varies over the calculation time period, as follows: as time progresses, the assumed data are replaced with actual data.
At the end of the calculation period, the worksite exposure level is equal to the mean level over the period (global Leq level).

Period: time range determined by a starting date and time and ending date and time. Each period represents a memory record for a measurement session.

Logging interval (T): Logging interval = storage rate: calculation time for the indicators and time between 2 successive storages in the internal memory of the instrument.

Fast logging interval (CT): Logging interval during coding.

Sliding value: Index calculated every T over a sliding duration Ts.

Back erase time: Function enabling the integration of the levels measured during the last 5 or 10 seconds to be cancelled.

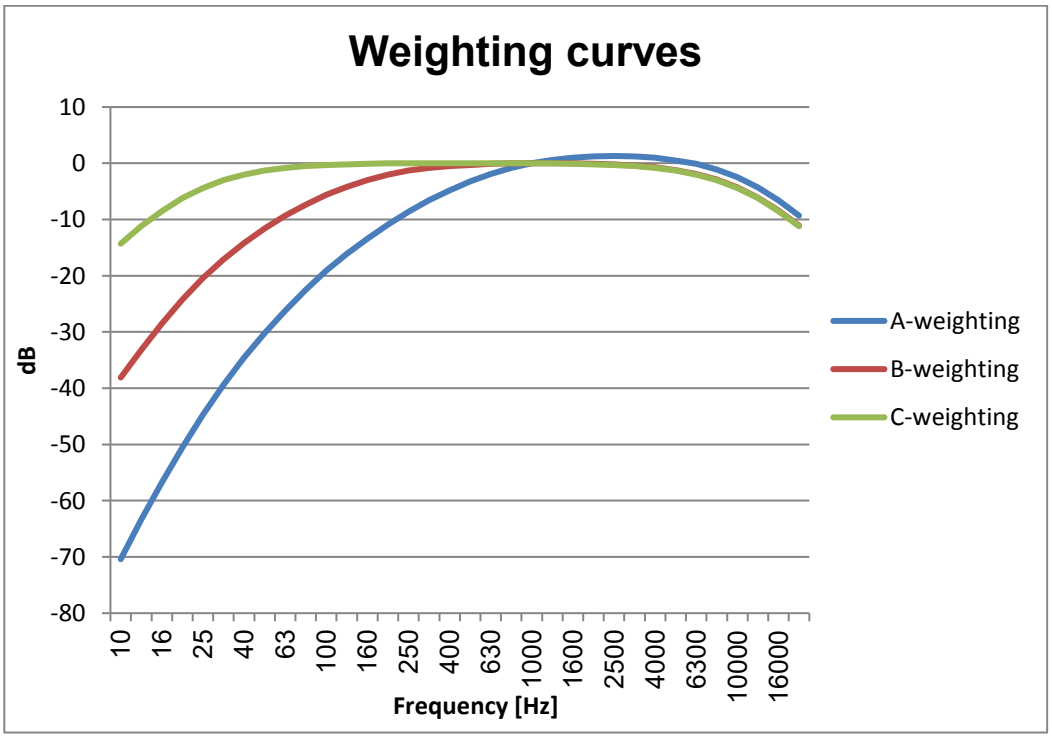
Overall results: Results calculated over the entire period (Leq, statistical indices…).

Partial or intermediate results for display: Results calculated every 0.5 s.

2.1.1.2 Frequency weightings and time weightings (IEC 61672-1 edition 2 2013)

Frequency weightings A, B, C, Z

Weighting based on frequency, applied to instant sound pressure (difference between the signal level indicated on the sound level meter display and the corresponding level for a permanent sinusoidal input signal of constant amplitude (depending on frequency)).



Frequency	A-weighting	B-weighting	C-weighting
10	−70.4	−38.1	−14.3
12.5	−63.4	−33.2	−11.2
16	−56.7	−28.5	−8.5
20	−50.5	−24.2	−6.2
25	−44.7	−20.4	−4.4
31.5	−39.4	−17.1	−3.0
40	−34.6	−14.2	−2.0
50	−30.2	−11.6	−1.3
63	−26.2	−9.3	−0.8
80	−22.5	−7.4	−0.5
100	−19.1	−5.6	−0.3
125	−16.1	−4.2	−0.2
160	−13.4	−3.0	−0.1
200	−10.9	−2.0	0.0
250	−8.6	−1.3	0.0
315	−6.6	−0.8	0.0
400	−4.8	−0.5	0.0
500	−3.2	−0.3	0.0
630	−1.9	−0.1	0.0
800	−0.8	0.0	0.0
1000	0.0	0.0	0.0
1250	0.6	0.0	0.0
1600	1.0	0.0	−0.1
2000	1.2	−0.1	−0.2
2500	1.3	−0.2	−0.3
3150	1.2	−0.4	−0.5
4000	1.0	−0.7	−0.8
5000	0.5	−1.2	−1.3
6300	−0.1	−1.9	−2.0
8000	−1.1	−2.9	−3.0
10000	−2.5	−4.3	−4.4
12500	−4.3	−6.1	−6.2
16000	−6.6	−8.4	−8.5
20000	−9.3	−11.1	−11.2

Time frequencies S, F, I

Time exponential function, corresponding to a specified time constant, which weights the square of the instant sound pressure.

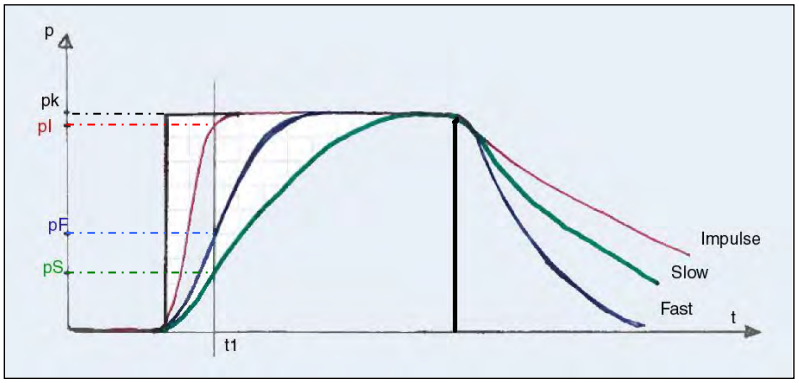
In Standard IEC 61672–1 edition 2, three different configurations of time weighting are under consideration:

- S (slow): time constant of 1 s
- F (fast): time constant of 125 ms

And in Appendix C (for information only),

- I (Impulse): time constant in running-up phase 35 ms, time constant in coast-down phase 1.5 s.

Peak sound pressure (peak)
The lowest time-weighted sound pressure level over a given time interval.



2.1.2 Available Indicators

2.1.2.1 Wide band

Acoustic indicators measured and displayed by the instrument are listed below. In case of an under range for one of these values, the display shows a " ∨ " sign before the indicated levels. In case of an overload, the display shows a " ^ " sign before the indicated values.

Note: A compilation of the acoustic magnitudes under review as part of the type approval is presented in Paragraph 11.2.

Note: Values with the "0.5s" subscript are values for display only. They are not stored, except if the user chose to store results with an integration time of 500 ms.

Note:
- X corresponds to frequency weighting (A, B, C, Z)
- Y corresponds to time weighting (F, S, I)
- MinMax are Minimum and Maximum values of the levels measured at integration time T (logging period)
- n represents a statistical index
- T represents the integration time T(or logging period)
- d is equal to 3 or 5s

LXeq: equivalent continuous level, with frequency weighting (X = A, B, C, Z)

LXeqT: equivalent continuous level, with frequency weighting (X = A, B, C, Z) calculated over a period T

LXY: instantaneous sound pressure level, with frequency weighting (X = A, B, C, Z) and time weighting (Y = S, F, I)

LXpeak: peak sound pressure level, with frequency weighting (C, Z)

LXYeq: equivalent continuous level, with frequency weighting (X = A, B, C, Z) and time weighting (Y = S, F, I)

LXYTmd: Maximum sound level, with A frequency weighting and Fast or Pulse time weighting, over 3 s or 5 s (TaktMax)

LXYMinMax: minimum/maximum sound pressure level with frequency weighting (A, B, C, Z) and time weighting (S, F, I)

PNL0.5s (PNLT0.5s): Perceived Noise Level (Tone corrected) stored every 0.5 seconds

Ln: statistical sound pressure level (statistical index)

Ln calculation method: type of indicator on which statistical indices are calculated

LnsT: Sliding statistical index

LeqMinMax: minimum/maximum equivalent continuous level

LXeqTMinMax: minimum/maximum equivalent continuous levels, with frequency weighting (X= A, B, C, Z), calculated over a period T

LXYeqTMinMax: minimum/maximum equivalent continuous levels, with frequency weighting (X= A, B, C, Z) and time weighting, calculated over a period T

Leq start/stop: Leq calculated between 2 dates (start and stop) determined by the user

LAeqsT & LAeqsT2: Sliding LAeq (2 sliding periods T and T2)

LAexPT: worksite exposure level

LXE: noise exposure level also called SEL

Note: Sliding indicators require an initialisation time equal to their calculation time Ts. Example: for LAeqsT configured with a calculation time of 10 minutes, the first value will only be displayable and stored after 10 minutes of measurement.

2.1.2.2 Spectral values

Octave spectrum (8 Hz - 16 kHz)

1/3 octave spectrum (6.3 Hz - 20 kHz)

Leq spectrum: continuous equivalent level spectrum

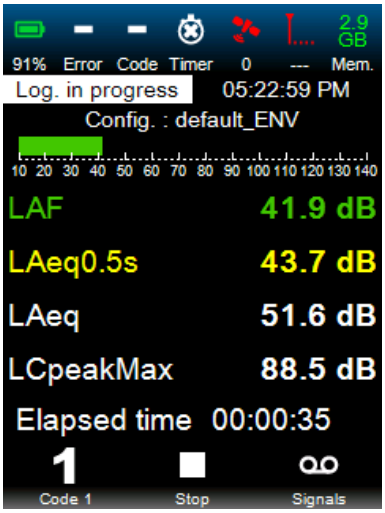
LYeq spectrum: continuous equivalent level spectrum, with time weighting (Y= S, F, I)

LY spectrum: instantaneous sound pressure level spectrum, with time weighting (Y= S, F, I)

2.1.3 *Colour rules*

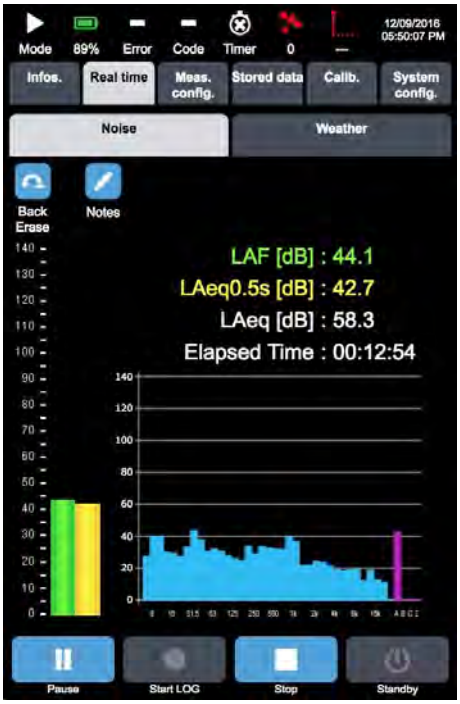
To distinguish on the display between instant values (stored at the logging interval TI) and overall values, the following colour rule is applied.

- "Logging in progress" screen in the built-in interface
- Instant values are displayed in green and yellow (every 0.5s).
- Overall values integrated since the beginning of the measurement are displayed in white.



Note: the bar graph is displayed in green. It represents the green instant numerical value.

- "Real-time" screen of the web remote interface
- Instant values are displayed in green and in yellow.
- Overall values are displayed in white.



Note: the bar graph displayed in green represents the green instant numerical value; the bar graph displayed in yellow represents the yellow instant numerical value.

2.1.4 Instant display values

Acoustic indicators on display correspond to values calculated at the display rate (0.5s on the Web interface and 0.1s on Instrument's built-in display).

2.1.4.1 Ready and SLM modes

LXeq0.5s	LXpeak	LXY	LXY0.5sMinMax	LXYeq0.5s	LXYTd
LAeq0.5s	LCpeak	LAF	LAF0.5sMax	LAFeq0.5s	LAFT3
LBeq0.5s	LZpeak	LAS	LAS0.5sMax	LBFeq0.5s	LAIT3
LCeq0.5s		LAI	LAI0.5sMax	LCFeq0.5s	LAFT5
LZeq0.5s		LBF	LBF0.5sMax	LZFeq0.5s	LAIT5
LCeq-LAeq0.5s		LBS	LBS0.5sMax	LASeq0.5s	
		LBI	LBI0.5sMax	LBSeq0.5s	
		LCF	LCF0.5sMax	LCSeq0.5s	
		LCS	LCS0.5sMax	LZSeq0.5s	
		LCI	LCI0.5sMax	LAIeq0.5s	
		LZF	LZF0.5sMax	LBIeq0.5s	
		LZS	LZS0.5sMax	LCIeq0.5s	
		LZI	LZI0.5sMax	LZIeq0.5s	
			LAF0.5sMin		
			LAS0.5sMin		
			LAI0.5sMin		
			LBF0.5sMin		
			LBS0.5sMin		
			LBI0.5sMin		
			LCF0.5sMin		
			LCS0.5sMin		
			LCI0.5sMin		
			LZF0.5sMin		
			LZS0.5sMin		
			LZI0.5sMin		

2.1.4.2 LOG mode

LXeq0.5s	LXeqT	LXpeak	Sliding values	LXexPT	PNL0.5s
LAeq0.5s	LAeqT	LCpeak	LAeqsT	LAexPT	PNL0.5s
LBeq0.5s	LBeqT	LZpeak	LAeqsT2		PNLT0.5s
LCeq0.5s	LCeqT		LnsT		
LZeq0.5s	LZeqT				
LCeq-LAeq0.5s					

LXY	LXYTMinMax	LXYeq0.5s	LXYeqT	LXYTd
LAF	LAFTMax	LAFeq0.5s	LAFeqT	LAFT3
LAS	LASTMax	LBFeq0.5s	LBFeqT	LAIT3
LAI	LAITMax	LCFeq0.5s	LCFeqT	LAFT5
LBF	LBFTMax	LZFeq0.5s	LZFeqT	LAIT5
LBS	LBSTMax	LASeq0.5s	LASeqT	
LBI	LBITMax	LBSeq0.5s	LBSeqT	
LCF	LCFTMax	LCSeq0.5s	LCSeqT	
LCS	LCSTMax	LZSeq0.5s	LZSeqT	
LCI	LCITMax	LAIeq0.5s	LAIeqT	
LZF	LZFTMax	LBIeq0.5s	LBIeqT	
LZS	LZSTMax	LCIeq0.5s	LCIeqT	
LZI	LZITMax	LZIeq0.5s	LZIeqT	
	LAFTMin			
	LASTMin			
	LAITMin			
	LBFTMin			
	LBSTMin			
	LBITMin			
	LCFTMin			
	LCSTMin			
	LCITMin			
	LZFTMin			
	LZSTMin			
	LZITMin			

2.1.5 Overall values

LXY (Max or Min) values are calculated every 5 msec.
LXeq and LXYeq are calculated every 500msec in SLM mode and at a rate corresponding to the selected logging period (logging interval T) in LOG mode.
These values correspond to the values calculated since the beginning of the measurement.

2.1.5.1 SLM Mode

LXeq	LXeq0.5s MinMax	LXE	LXpeakMax	Ln
LAeq	LAeq0.5sMax	LAE	LCpeakMax	Ln1
LBeq	LBeq0.5sMax	LBE	LZpeakMax	Ln2
LCeq	LCeq0.5sMax	LCE		Ln3
LZeq	LZeq0.5sMax	LZE		Ln4
	LAeq0.5sMin			Ln5
	LBeq0.5sMin			Ln6
	LCeq0.5sMin			Ln7
	LZeq0.5sMin			

LXYMinMax	LXYeq	LXYeq0.5s MinMax	LXYTmd
LAFMax	LAFeq	LAFeq0.5sMax	LAFTm3
LASMax	LBFeq	LBFeq0.5sMax	LAITm3
LAIMax	LCFeq	LCFeq0.5sMax	LAFTm5
LBFMax	LZFeq	LZFeq0.5sMax	LAITm5
LBSMax	LASeq	LASeq0.5sMax	
LBIMax	LBSeq	LBSeq0.5sMax	
LCFMax	LCSeq	LCSeq0.5sMax	
LCSMax	LZSeq	LZSeq0.5sMax	
LCIMax	LAIeq	LAIeq0.5sMax	
LZFMax	LBIeq	LBIeq0.5sMax	
LZSMax	LCIeq	LCIeq0.5sMax	
LZIMax	LZIeq	LZIeq0.5sMax	
LAFMin		LAFeq0.5sMin	
LASMin		LBFeq0.5sMin	
LAIMin		LCFeq0.5sMin	
LBFMin		LZFeq0.5sMin	
LBSMin		LASeq0.5sMin	
LBIMin		LBSeq0.5sMin	
LCFMin		LCSeq0.5sMin	
LCSMin		LZSeq0.5sMin	
LCIMin		LAIeq0.5sMin	
LZFMin		LBIeq0.5sMin	
LZSMin		LCIeq0.5sMin	
LZIMin		LZIeq0.5sMin	

2.1.5.2 LOG DI ≤ 0.5s mode

LXeq	LXeqT MinMax	LXE	LXpeakMax	Ln
LAeq	LAeqTMax	LAE	LCpeakMax	Ln1
LBeq	LBeqTMax	LBE	LZpeakMax	Ln2
LCeq	LCeqTMax	LCE		Ln3
LZeq	LZeqTMax	LZE		Ln4
	LAeqTmin			Ln5
	LBeqTmin			Ln6
	LCeqTmin			Ln7
	LZeqTmin			

LXYMinMax	LXYeq	LXYeqTMinMax	LXYTmd
LAFMax	LAFeq	LAFeqTMax	LAFTm3
LASMax	LBFeq	LBFeqTMax	LAITm3
LAIMax	LCFeq	LCFeqTMax	LAFTm5
LBFMax	LZFeq	LZFeqTMax	LAITm5
LBSMax	LASeq	LASeqTMax	
LBIMax	LBSeq	LBSeqTMax	
LCFMax	LCSeq	LCSeqTMax	
LCSMax	LZSeq	LZSeqTMax	
LCIMax	LAIeq	LAIeqTMax	
LZFMax	LBIeq	LBIeqTMax	
LZSMax	LCIeq	LCIeqTMax	
LZIMax	LZIeq	LZIeqTMax	
LAFMin		LAFeqTMin	
LASMin		LBFeqTMin	
LAIMin		LCFeqTMin	
LBFMin		LZFeqTMin	
LBSMin		LASeqTMin	
LBIMin		LBSeqTMin	
LCFMin		LCSeqTMin	
LCSMin		LZSeqTMin	
LCIMin		LAIeqTMin	
LZFMin		LBIeqTMin	
LZSMin		LCIeqTMin	
LZIMin		LZIeqTMin	

2.1.5.3 LOG DI > 0.5s mode

LXeq	LXeq0.5s MinMax	LXE	LXpeakMax	Ln
LAeq	LAeq0.5sMax	LAE	LCpeakMax	Ln1
LBeq	LBeq0.5sMax	LBE	LZpeakMax	Ln2
LCeq	LCeq0.5sMax	LCE		Ln3
LZeq	LZeq0.5sMax	LZE		Ln4
	LAeq0.5smin			Ln5
	LBeq0.5smin			Ln6
	LCeq0.5smin			Ln7
	LZeq0.5smin			

LXYMinMax	LXYeq	LXYeq0.5s MinMax	LXYTmd
LAFMax	LAFeq	LAFeq0.5sMax	LAFTm3
LASMax	LBFeq	LBFeq0.5sMax	LAITm3
LAIMax	LCFeq	LCFeq0.5sMax	LAFTm5
LBFMax	LZFeq	LZFeq0.5sMax	LAITm5
LBSMax	LASeq	LASeq0.5sMax	
LBIMax	LBSeq	LBSeq0.5sMax	
LCFMax	LCSeq	LCSeq0.5sMax	
LCSMax	LZSeq	LZSeq0.5sMax	
LCIMax	LAIeq	LAIeq0.5sMax	
LZFMax	LBIeq	LBIeq0.5sMax	
LZSMax	LCIeq	LCIeq0.5sMax	
LZIMax	LZIeq	LZIeq0.5sMax	
LAFMin		LAFeq0.5sMin	
LASMin		LBFeq0.5sMin	
LAIMin		LCFeq0.5sMin	
LBFMin		LZFeq0.5sMin	
LBSMin		LASeq0.5sMin	
LBIMin		LBSeq0.5sMin	
LCFMin		LCSeq0.5sMin	
LCSMin		LZSeq0.5sMin	
LCIMin		LAIeq0.5sMin	
LZFMin		LBIeq0.5sMin	
LZSMin		LCIeq0.5sMin	
LZIMin		LZIeq0.5sMin	

2.1.6 Instant spectral values

2.1.6.1 SLM Mode

Leq0.5s	LYeq0.5s	LY
Leq0.5s	LFeq0.5s	LF
	LSeq0.5s	LS

2.1.6.2 LOG mode

Leq0.5s	LeqT	LYeq0.5s	LYeqT	LY
Leq0.5s	LeqT	LFeq0.5s	LFeqT	LF
		LSeq0.5s	LSeqT	LS

2.1.7 Overall spectral values

These values correspond to the values calculated since the start of the measurement.

2.1.7.1 SLM mode

Leq	Leq0.5sMinMax	LYeq	LYeq0.5sMinMax	LYMinMax
Leq	Leq0.5sMax	LFeq	LFeq0.5sMax	LFMax
	Leq0.5sMin	LSeq	LSeq0.5sMax	LFMin
			LFeq0.5sMin	LSMax
			LSeq0.5sMin	LSMin

2.1.7.2 LOG DI ≤ 0.5s mode

Leq	LeqTMinMax	LYeq	LYeqTMinMax	LYMinMax
Leq	LeqTMax	LFeq	LFeqTMax	LFMax
	LeqTMin	LSeq	LSeqTMax	LFMin
			LFeqTMin	LSMax
			LSeqTMin	LSMin

2.1.7.3 LOG DI > 0.5s mode

Leq	Leq0.5sMinMax	LYeq	LYeq0.5sMinMax	LYMinMax
Leq	Leq0.5sMax	LFeq	LFeq0.5sMax	LFMax
	Leq0.5sMin	LSeq	LSeq0.5sMax	LFMin
			LFeq0.5sMin	LSMax
			LSeq0.5sMin	LSMin

2.2 SPECIAL CASE: WEATHER VALUES

The following weather values are available:
- Wind speed
- Wind direction
- Rain intensity
- Atmospheric pressure
- Air temperature
- Relative humidity

These values displayed in real time in all modes and refreshed every second (independently of the logging time selected for weather data).

2.3 ADDITIONAL INDICATORS MEASURED AND DISPLAYED

The main additional indicators that are measured deal with battery charge status, under range/overload/electrical check indicators, coding in progress (5+1), audio storage, programming of measurement triggers, number of GPS satellites picked up, type of communication (GPRS, EDGE, 3G, 3G+), as well as signal strength (from 1 to 4 bars) and available memory (Mem).

In case a weather station of type VAISALA is connected, an icon is displayed when the communication is established between the sensor and the instrument. The icon is displayed intermittently with the communication icon

CHAPTER 3
ACCESSORIES

3.1 EXTERNAL ANTENNAS

CUBE is delivered either with:

- 3 in1 GPS, Cellular (2G and 3G) and Wi-Fi heavy-duty IP67 antenna with high efficiency in a low profile compact format. The antenna screws down permanently onto a roof or metal panel.

- Or 2 rod antennas and a GPS patch

3.2 WEATHER STATION OPTION

3.2.1 Introduction

The instrument can interface four different weather stations:

- Vaisala type WMT52 or WXT532 two parameters (wind speed and direction)
- Vaisala type WXT520 or WXT536 six parameters (wind speed and direction, humidity, rain intensity, barometric pressure, temperature)

3.2.2 *Connection to the instrument with a mini HDMI connector*

Connection to the instrument can be achieved using a cable with a mini HDMI connector, which ensures both power supply of the weather station and communication.

The mini HDMI connector is plugged into the EXT connector (1).

Refer to Chapter 5.2.2.1 Store sub-menu to set up the acquisition.

3.3 WEATHERPROOF OUTDOOR MICROPHONE UNIT DMK01

3.3.1 General

The DMK01 microphone unit comprises:

- PRE22 external preamplifier fitted with two seals
- body
- dummy microphone
- wind foam
- lower mounting nut
- Acoustic nose cone

Detail of dummy microphone and PRE22 preamplifier

View of complete DMK01 with nose cone

A RAL135 adapted extension cable is available as an option, with a standard length of 10 m.

3.3.2 Use

The 40CD microphone and the noise cone supplied with CUBE must be mounted on the PRE22 preamplifier.

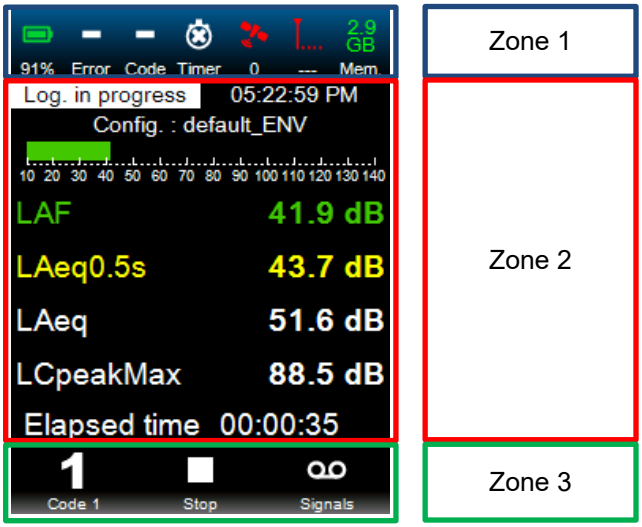
Once the microphone is mounted on the preamplifier, the user shall slide the extension cable in the body of the DMK01 unit, connect the unit to the preamplifier and gently set the assembly into the body until it stops. It is recommended that silicone be used on the seals so as to make the fitting in easier. The fixing nut is screwed until it stops to ensure proper fixing of the cable.

CHAPTER 4
USING THE INSTRUMENT ALONE

4.1 BUILT-IN DISPLAY

The 240×320 pixel (i.e. ~37 x 49 mm) LCD screen is a colour screen. Back-lit, it allows reading both in full sun exposure and at night, with little light.

The display includes 3 zones:
- Zone 1: Status bar
- Zone 2: Working zone (menus, results, graphs, etc.)
- Zone 3: Keys' context commands zone.



The status bar includes different icons and informs the user on the status of the instrument.

The working zone displays the active menu and configuration (as texts), as well as measured levels and associated graphs.

Context commands of the keys appear as icons and text (e.g. 

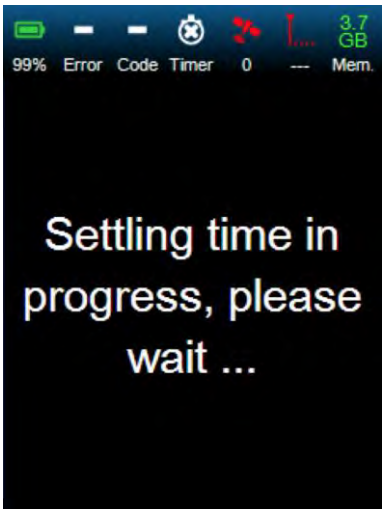
).

4.1.1 Boot Screens

When the instrument is turned on, the following screens are displayed on the instrument:

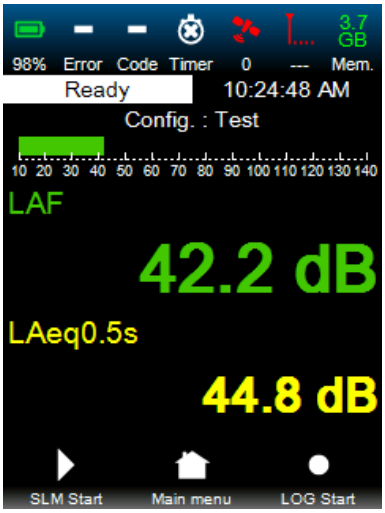
Instrument power-up screen:

Warm-up screen:



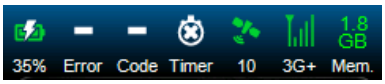
After power up, the Ready screen is displayed, along with the measurement configuration and display used last. Noise indicators are displayed in the working zone.

Three menus are displayed in the command zone: SLM Start, Main Menu and LOG Start.



Note: Keys SLM Start and LOG Start are disabled if the battery is slow or if the memory card is full. If the time programmed with the timer is close (less than 2 minutes), the SLM Start key is also disabled.

4.1.2 Status bar



The status bar shows:

- The status of the battery charge (%)
- Errors corresponding to an overload, an under range or a wrong electrical check (Error)
- Current coding (Code), as well as the audio recording. If several codes (and/or the audio recording) are in progress, they are displayed one after the other with a display period of 1 second
- The presence or not of an active timer (Timer)
- The number of GPS satellites picked up (Number)
- The type of communication (GPRS, EDGE, 3G, 3G+), as well as the signal strength (from 1 to 4 bars)
- The available memory in GB, MB or kB (Mem)

4.1.3 Working zone

The working zone (Zone 2) displays:

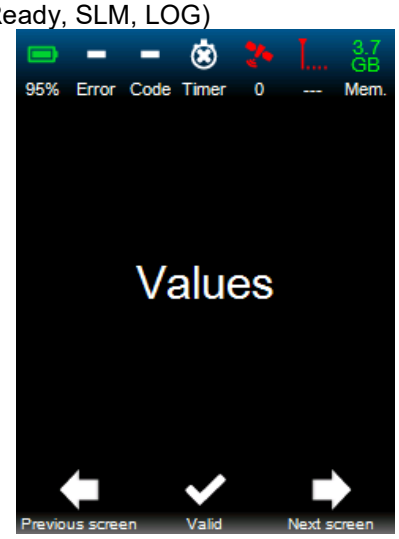
- The instrument status (Ready, SLM, LOG)
- Time information
- Measurement configuration used
- Selected display

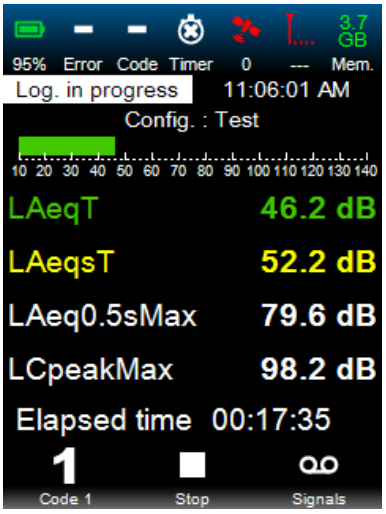
4.1.4 Display

4.1.4.1 Display types

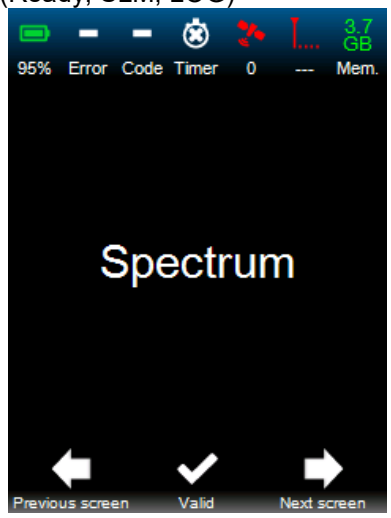
Up to four different display types (depending of the instrument status) are available:

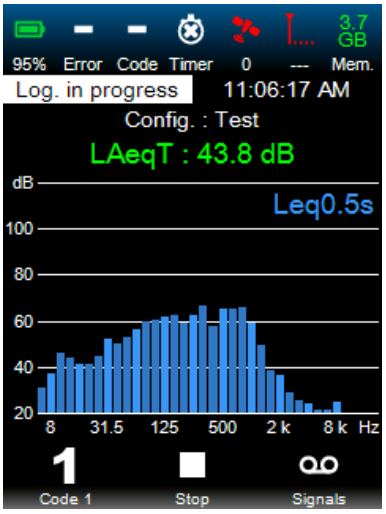
- Values (Ready, SLM, LOG)



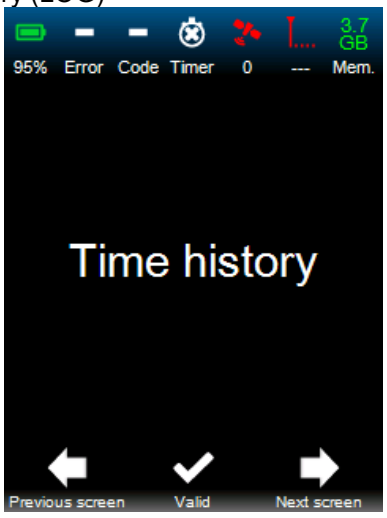


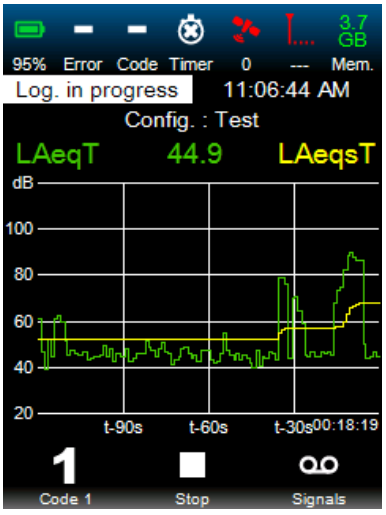
- Spectrum (Ready, SLM, LOG)



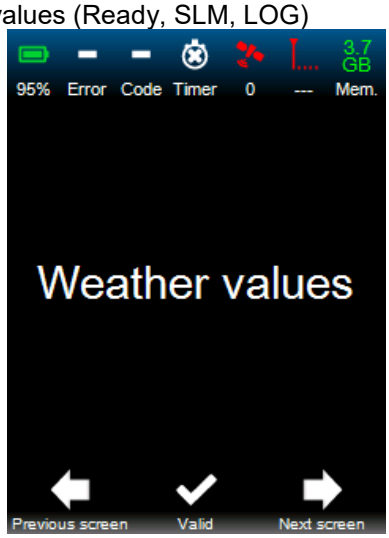


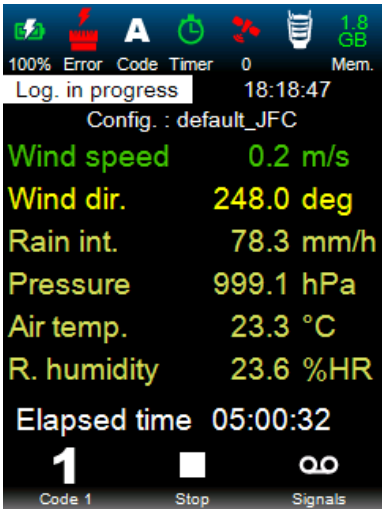
- Time History (LOG)





- Weather values (Ready, SLM, LOG)





4.1.4.2 Selection of the display type

The display type selection is done by:

- press the ON/OFF key shortly when the instrument is on Ready, SLM or LOG mode.

➔ The QR code is displayed.

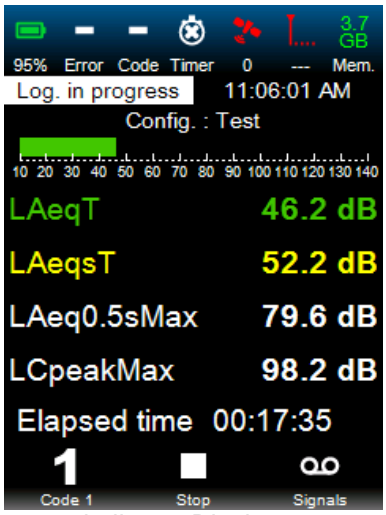
- select the display type:
  - use the key 1 and 3
  - validate by pressing the key 2.

OR

- Press shortly the ON/OFF button to return to the previous screen

4.1.5 Quantity of information

The character size varies depending on the number of indicators selected on the Web interface. The user can display from 1 to 4 indicators, based on the set-up selected using the Web interface (see § 5.4.2).

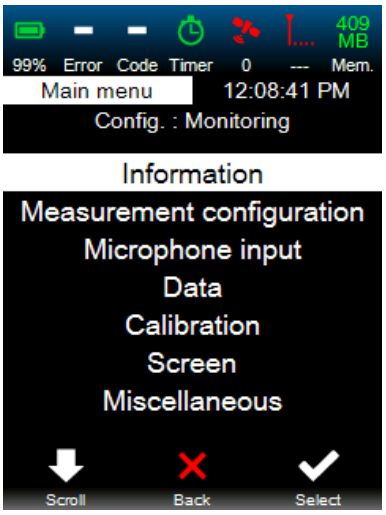


4-indicator Display

1-indicator Display

4.2 MANAGING THE INSTRUMENT SET-UP VIA THE MAIN MENU

The main menu of the instrument includes 6 sub-menus:



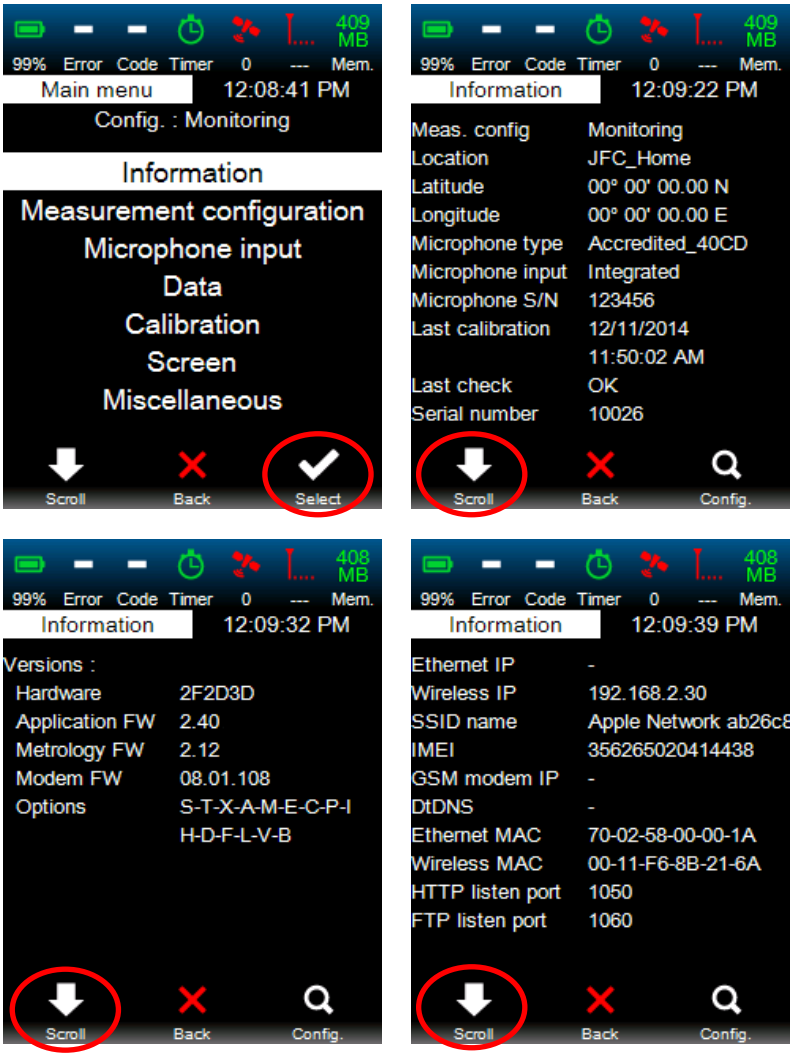
- **Information**: allows displaying information relative to the instrument (system parameters)
- **Measurement configuration**: allows selecting the configuration among those stored previously
- **Data**: allows viewing and deleting data present on the SD card
- **Calibration**: allows starting acoustic calibration manually
- **Screen**: allows selecting the set of colours suited to the situation
- **Miscellaneous**: allows generating special functions.

Note: The **Microphone input** menu is not available on CUBE

4.2.1 *Information about the instrument*

The “Information” menu is used to consult the current characteristics corresponding to the status of the instrument (system parameters).

After activation of the Information menu with key 3 (Selection), the user can view the characteristics of the instrument in the pull-down list using key 1 (Scroll).



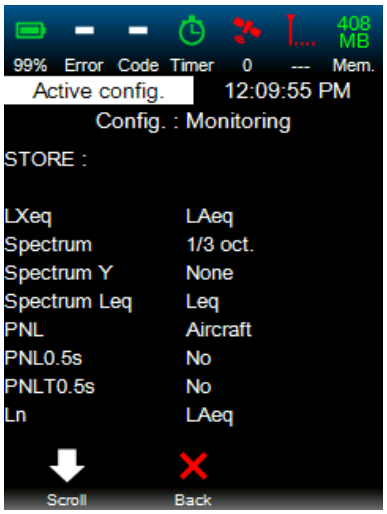
System parameters are as follows:

- Selected measurement configuration
- Name of site
- Latitude
- Longitude
- Type of input configured
- Microphone serial number
- Date of last calibration
- Status of last electrical check
- Serial number
- Versions of hardware/ firmware application / firmware metrology / Firmware MODEM
- Activated options
- Ethernet IP address
- Wi-Fi IP address
- SSID name
- IMEI number
- GSM IP address
- DtDNS (internal service associating the domain name with the IP address of the instrument)
- Ethernet MAC identifier
- Wi-Fi MAC identifier
- HTTP port
- FTP port

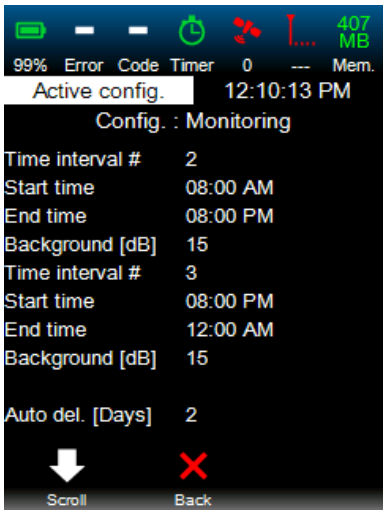
4.2.2 Information about the measurement configuration

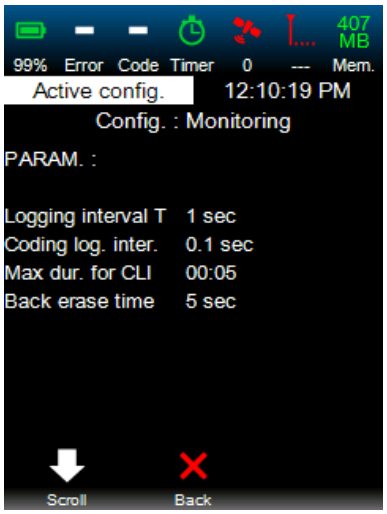
The active measurement configuration settings can be viewed via the “information” menu by pressing button 3 (Config).

Active configuration parameters – STORE & PARAM



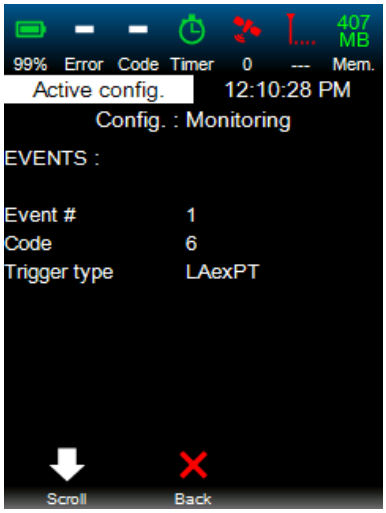
Stored acoustic indicators (STORE)





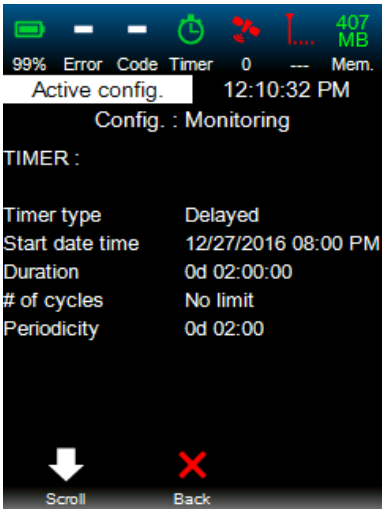
Logging parameters (PARAM)

Active configuration parameters – TRIGGER, TIMER & AUDIO



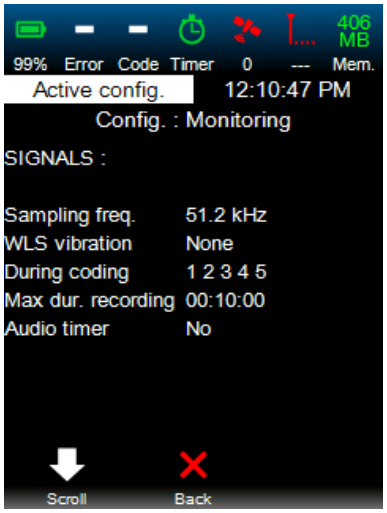
Coding on event (AUTO TRIGGER)

- Event number
- Code number
- Trigger type



Clock (TIMER)

- Timer type
- Start date time
- Duration
- Number of cycles
- Timer periodicity



SIGNALS

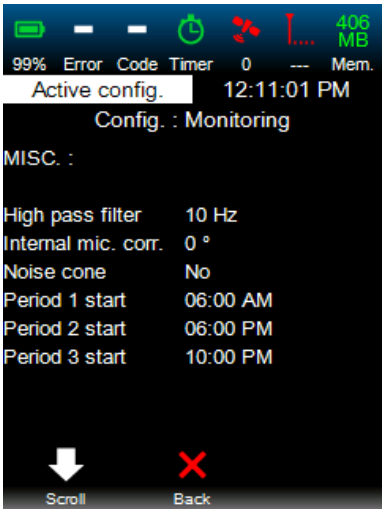
- Audio Sampling frequency
- Audio trigger simultaneous with channel coding
- Max recording time
- Audio timer
- Start date
- Period
- Duration

TIMER

- **Measurement type**: depending on timer type different information will be displayed on instrument screen as shown in the example above (delayed measurement → start date time, duration, number of cycles and periodicity)
- **Timer type**: 3 different types of timer definition are available (immediate, delayed, daily periodic). In the latter case the 3 possible consecutive periods must always represent a full day (24 hours).

SIGNALS

- **Sampling frequency**: selection of the sampling frequency for audio signal (51.2kHz, 25.6kHz, 12.8kHz, 6.4kHz, 3.2kHz, 1.6kHz), to record the audio signal.
- **During coding**: indicates codes for which the signal will be recorded in parallel.
- **Max audio duration**: maximum time recording period. “No Limit” corresponds to an audio recording with no time limit. The maximum value is 99 hours:59 minutes:59 seconds
- **Audio timer**: trigger of a specific audio recording independent of the trigger on level or of coding. Applies for periodic audio recordings.
- **Start date**: setting in days, hours and minutes for the date from which the recording can start. If the date is over when the configuration is activated, then the error will be notified to the user.
- **Period**: settings in days, hours and minutes for the periodicity of the audio recordings; max value is 99 days 23h59
- **Duration**: settings in days, hours and minutes for the audio recording period, max value is 99 days 23h59.



High-pass filter

Microphone internal correction: microphone reference direction for the measurement

Nose cone (yes or no)

Start of period 1: starting time for period 1

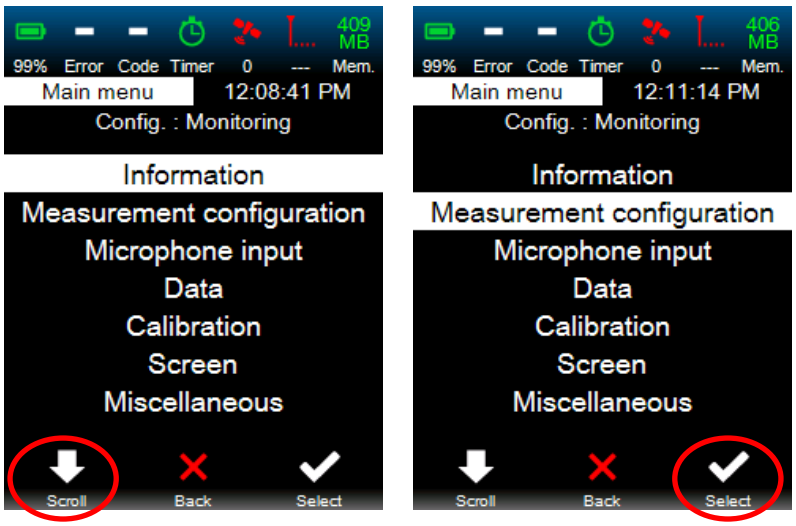
Start of period 2

Start of period 3

These periods are used for the time management of the measurement and apply when selecting trigger levels

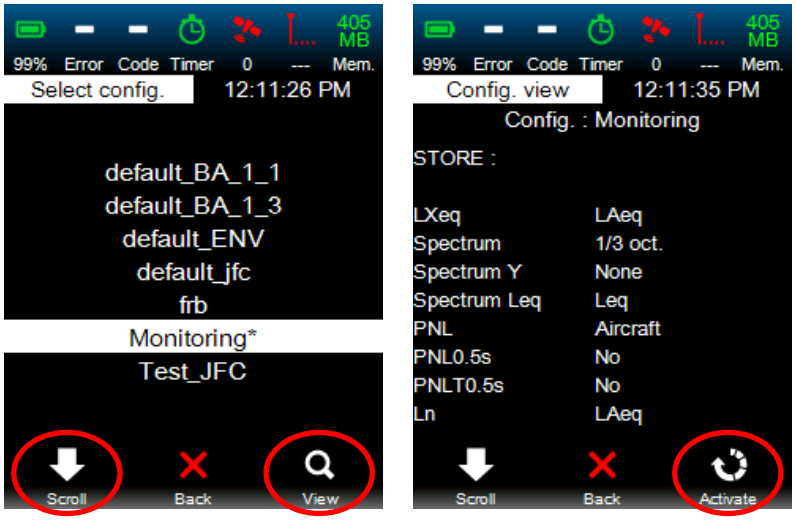
4.2.3 *Selecting the measurement configuration*

To configure the measurements, the user must select the “Measurement configuration” menu after scrolling down the list using key 1 (Scroll). The menu is then selected by activating key 3 (Select).



The operator selects the configuration for the new measurement campaign in the list. The corresponding parameters are then displayed using key 3 (View), which allows:

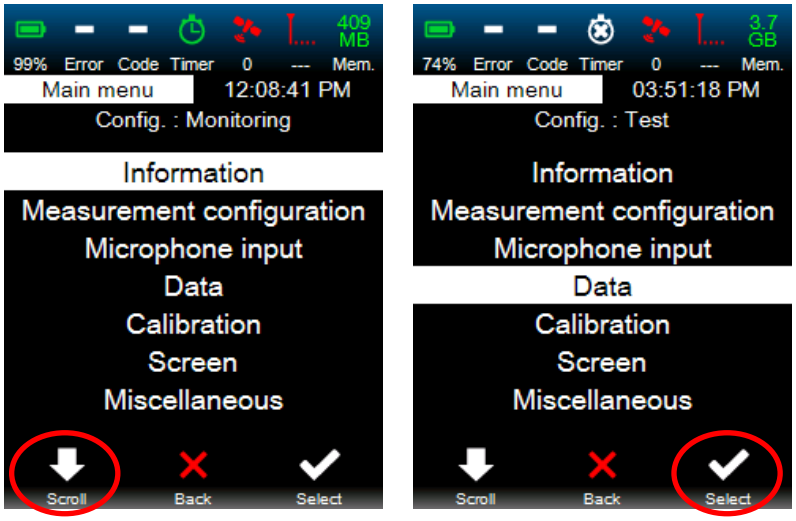
- viewing all parameters (key 1 – Scroll)
- going back to the previous menu (key 2 – Back) to select a new configuration
- activating the current configuration (key 3 – Activate). A message stating “Stabilisation in progress” is displayed in this case. The “Ready” interface is the current screen again and the measurement can be started immediately.



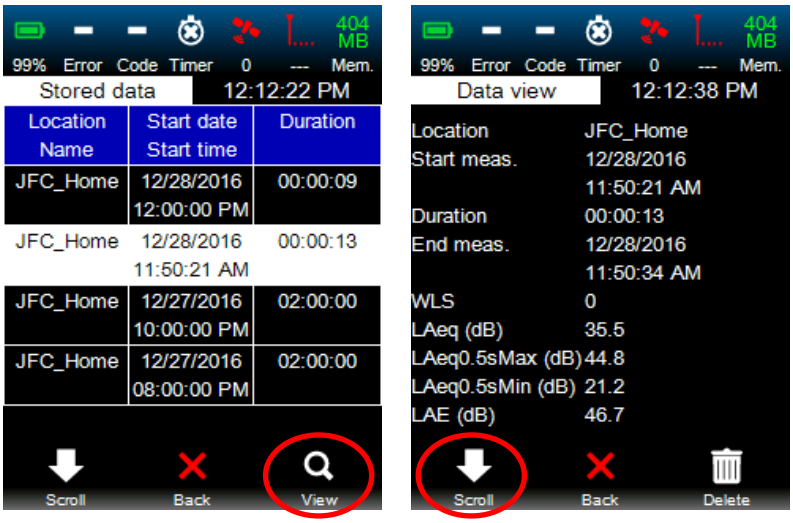
Note: The user can also view and upload the factory predefined configuration “default_ENV”. This specific configuration can’t be changed and must first be stored under a new name, before any modification on such a new configuration. In addition the user cannot change configuration parameters using the instrument alone. Changes are made using the web interface.

4.2.4 *Accessing data stored previously*

Previously measured data can be displayed in the “Data” menu. The user must scroll down the list using key 1 (Scroll) and activate the selection of the menu with key 3 (Select).



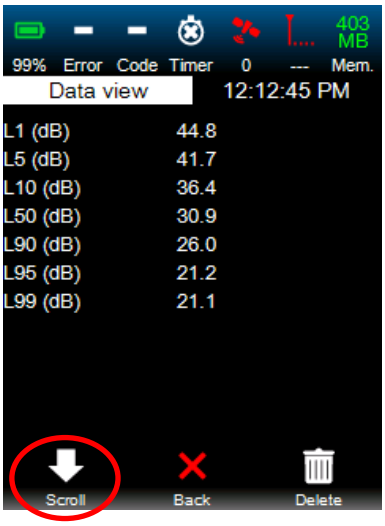
Then, the user must select the measurement campaign from the list (key 1 – Scroll), based on the site name and date/time of the campaign. He/she can then view stored data using key 3 (View).

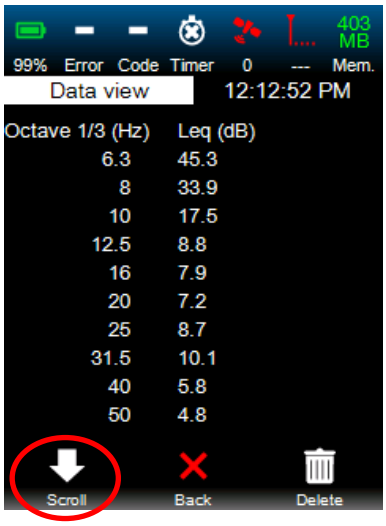


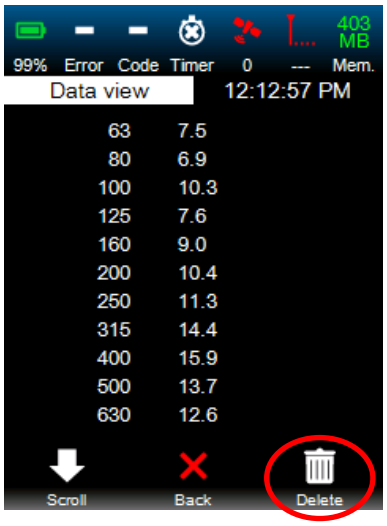
Navigation in the “Data view” screen is possible using key 1 (Scroll).
All values corresponding to the different indicators stored are displayed.

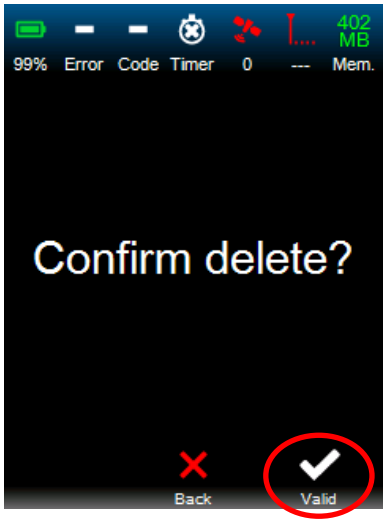
The operator can:

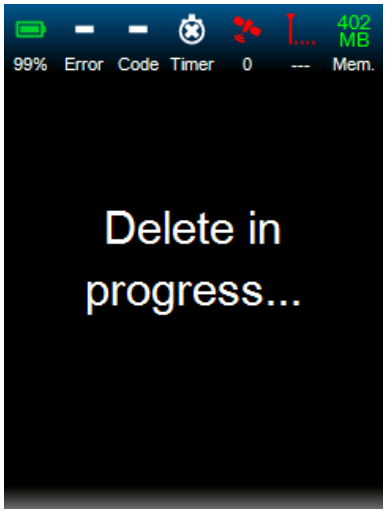
- continue viewing measured data using key 1 (Scroll)
- go back to the previous screen to select another measurement campaign (key 2 – Back)
- delete the measurement campaign currently on display using key 3 (Delete). In this case, a confirmation message will be displayed for removal, then deletion.


99% Error Code Timer 0 --- Mem.
403 MB
Data view
12:12:45 PM
L1 (dB) 44.8
L5 (dB) 41.7
L10 (dB) 36.4
L50 (dB) 30.9
L90 (dB) 26.0
L95 (dB) 21.2
L99 (dB) 21.1
Scroll
Back
Delete


99% Error Code Timer 0 --- Mem.
403 MB
Data view
12:12:52 PM
Octave 1/3 (Hz) Leq (dB)
6.3 45.3
8 33.9
10 17.5
12.5 8.8
16 7.9
20 7.2
25 8.7
31.5 10.1
40 5.8
50 4.8
Scroll
Back
Delete

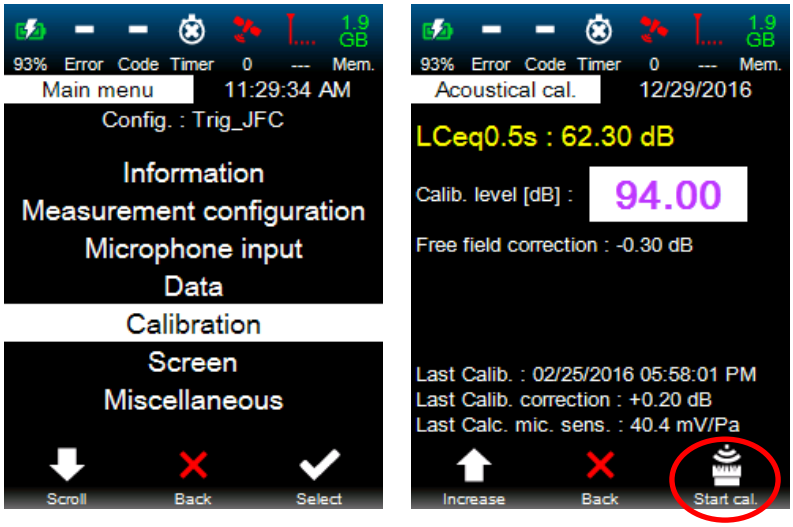

99% Error Code Timer 0 --- Mem.
403 MB
Data view
12:12:57 PM
63 7.5
80 6.9
100 10.3
125 7.6
160 9.0
200 10.4
250 11.3
315 14.4
400 15.9
500 13.7
630 12.6
Scroll
Back
Delete


99% Error Code Timer 0 --- Mem.
402 MB
Confirm delete?
Back
Valid


99% Error Code Timer 0 --- Mem.
402 MB
Delete in progress...

4.2.5 *Starting calibration from the main menu*

The “Calibration” menu is used to do the calibration of the instrument prior to starting the measurement on the site. To do so, the user selects the Calibration menu using key 3 (Select) and then can access the calibration parameters from the list using key 1 (Scroll). The reference value can then be adjusted to the calibration signal (in dB) around 74dB, 94dB, 104dB, 114dB or 124dB.



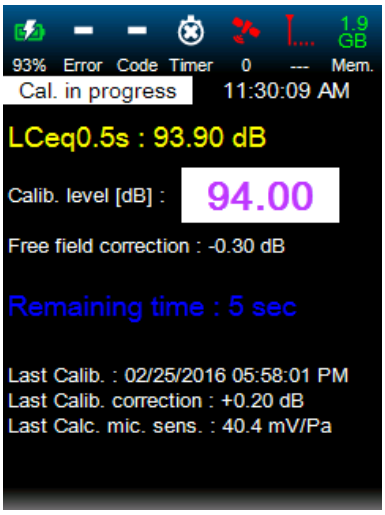
Information relative to the last calibration is displayed in white:

- Date/time
- Calibration correction (gain correction with respect to the rated value)
- Recalculated microphone sensitivity

Fine tuning of the calibration value is possible by pressing on button 1 “Increase”. The displayed value will then be changed upwards only by steps of 0.05dB. Repeating this action several times allows the user to reach the correct value if exceeded by error.

To achieve the calibration of the instrument, set the noise calibrator on the microphone and turn it on. Wait for the signal generated by the calibrator to be stable (refer to the user manual of the calibrator for optimum use).

Press key 3 (Start Cal.) to start the calibration procedure. The calibration level expressed in dB is displayed, along with a 5-second countdown. The instrument automatically adjusts the gains of the measurement chain so as to correspond to the reference level.

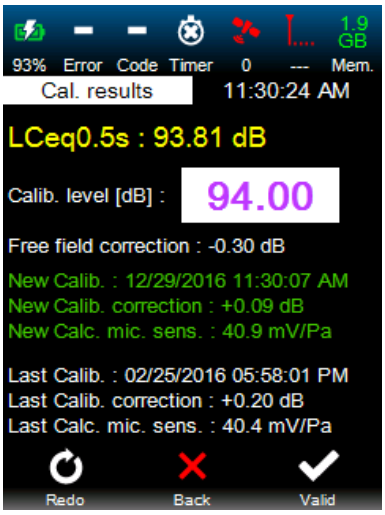


When the calibration procedure is finished, the information relative to the calibration is displayed in green:

- Date/time
- Calibration correction
- Microphone sensitivity

If the correction exceeds +/-1.5dB, the coincidence between the reference level and the measured level is not reached. This difference may be due to the malfunction of an element of the instrument. The operator must search for the cause of this difference. For optimum diagnosis, contact 01dB or your 01dB distributor.

Press key 3 (Valid) to validate the calibration. Press key 1 (redo) to redo the calibration without saving the previous information.



After validation of the calibration, the information is updated and displayed in green. The operator can exit the “Calibration” menu using key 2 (Back).

After validation of the calibration, the main menu is displayed. The measurement can be launched after exiting the main menu using key 2 (Back).

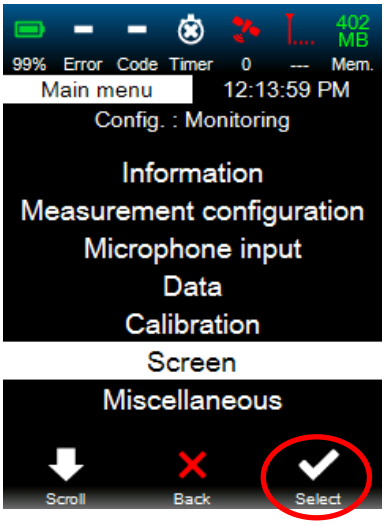
Note: The instrument can detect the presence of a sound calibrator on the microphone, by considering that the stable sound pressure level measured, equal to 74, 94, 104, 114 or 124 dB corresponds to the value to be taken into account for the calibration. The calibration procedure is then launched automatically when the instrument is in Ready mode. The user just has to validate (or redo) the calibration results.

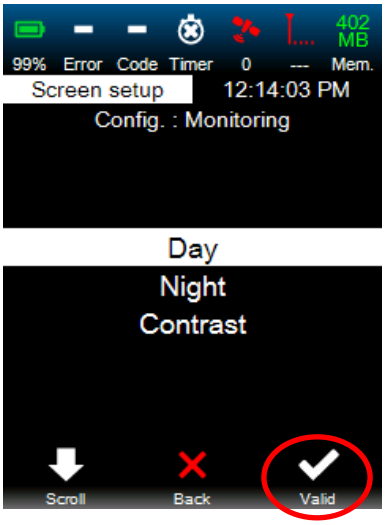
Note: for legal verification, use assigned calibrated CAL21 calibrator or equivalent calibrated.

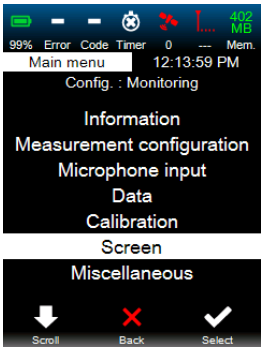
4.2.6 Setting up the screen display (day, night, contrast)

For a better readability, 3 different screen display configurations are available.

The colour of the screen is defined from the main menu via the “Screen” menu. The screen background can be adapted to day or night measurements or to measurements done during intermediate periods/situations.

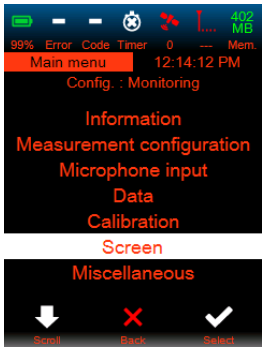






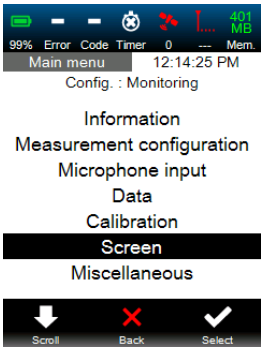
Set of colours for day

Black background



Set of colours for night

Black background, orange characters

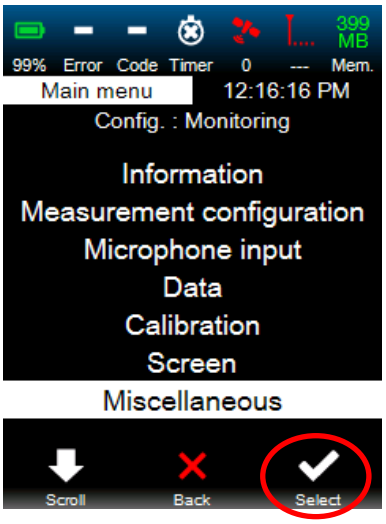


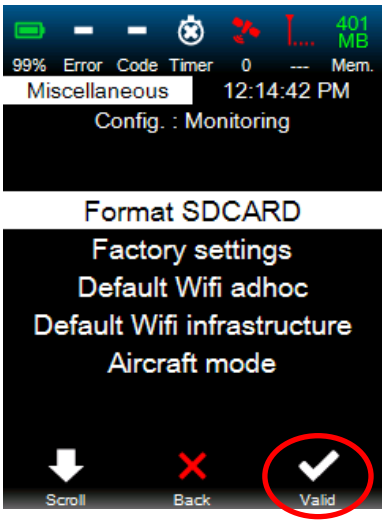
Contrasted colour set

fast white:

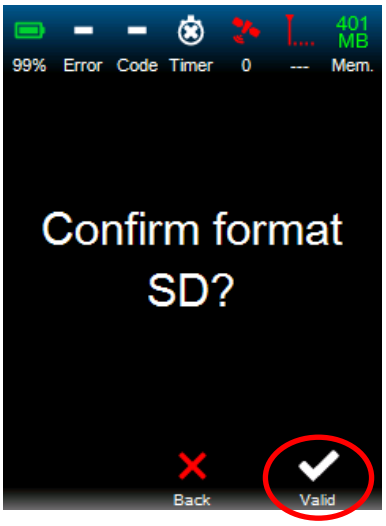
4.2.7 *Formatting the SD card*

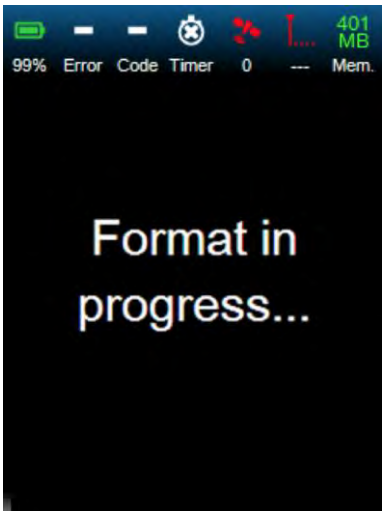
Formatting of the SD card in the instrument is done using menu “Miscellaneous” then “Format SD card” with key 3 (Select). Formatting is validated using key 3 (Valid).





The user is prompted for confirmation to avoid any erroneous action. Key 3 (Valid) is used for confirmation.

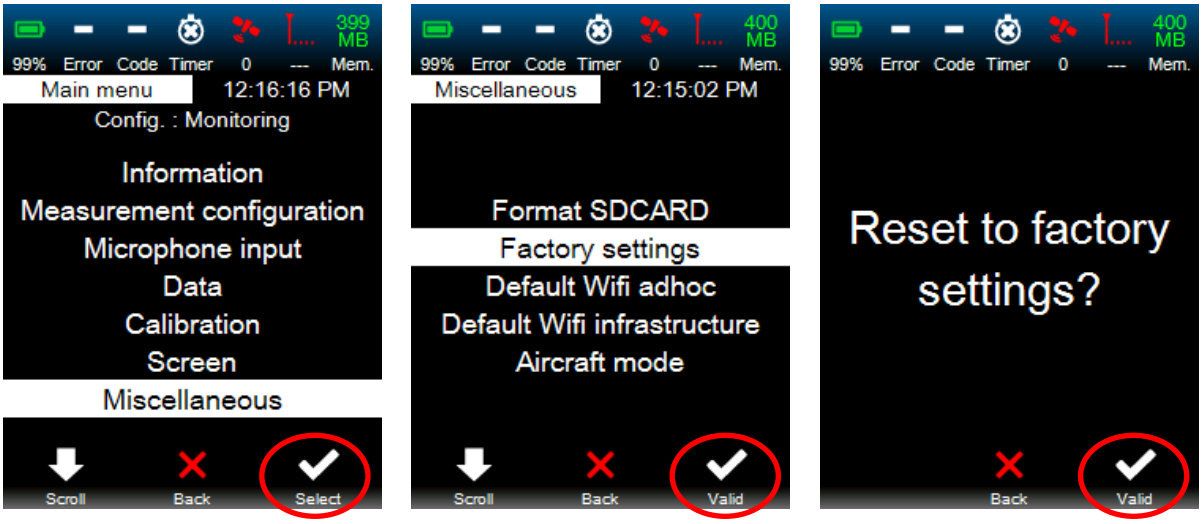




Validating the confirmation will generate the formatting of the SD card (with associated message) and the return to the main menu.

4.2.8 *Restoring factory settings*

Restoring factory settings in the instrument is achieved using the “Miscellaneous” menu and then “Factory settings”.



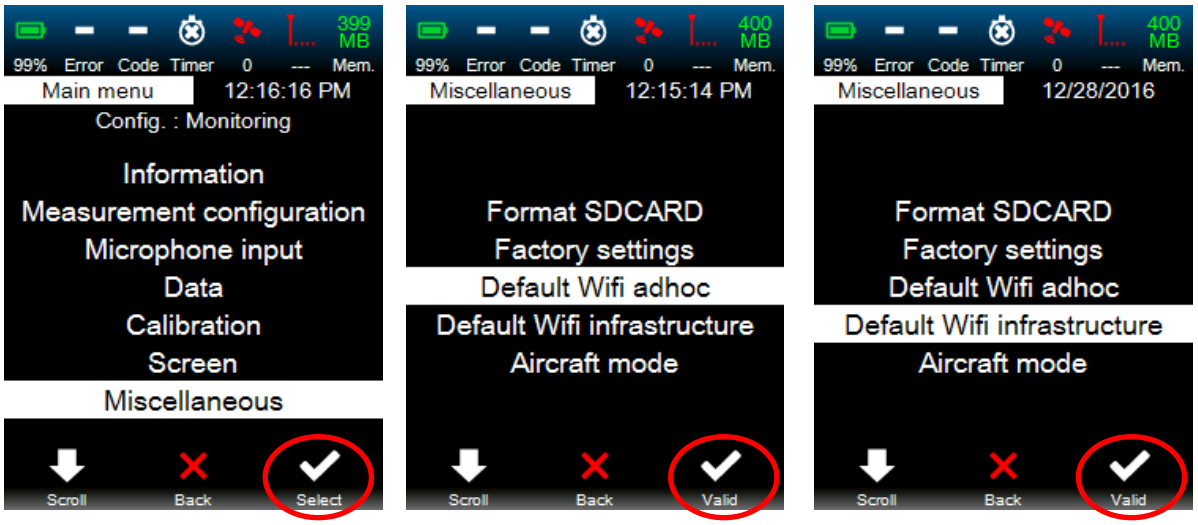
Once again, the user is prompted for confirmation in order to avoid any unwanted action.

Validating the confirmation message will restore the factory settings and display the main menu again.

Note: The instrument will delete all configurations, calibration, electrical check and LOG files (i.e. info which are stored in the instrument’s internal memory). Measurement files are on the SD card. Therefore they will not be deleted.

4.2.9 *Return to default Wi-Fi configuration*

Default Wi-Fi parameters are restored using menu “Miscellaneous”, and then “Default Wi-Fi Ad-Hoc or infrastructure”.



These functions are useful in case of a need for Wi-Fi connection mode change. For instance for a configured Wi-Fi router off range, then it is not possible to set a connection without switching back to Ad-Hoc mode.

Restoring the default Wi-Fi connection will restore the default Wi-Fi parameters.

- Ad-Hoc connection

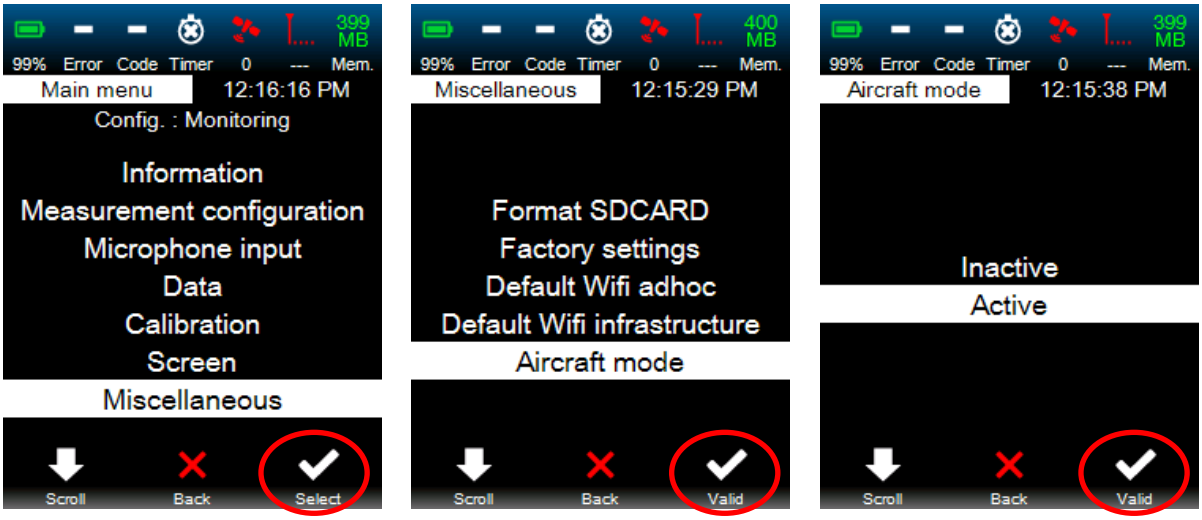
- Channel 6
- SSID name: CUBE_[Serial number]
- No authentication
- No encryption
- No network key
- DHCP disable
- IP address 192.168.1.1
- Subnet mask: 255.255.255.0

Recovering default Wi-Fi infrastructure restores default infrastructure parameters:

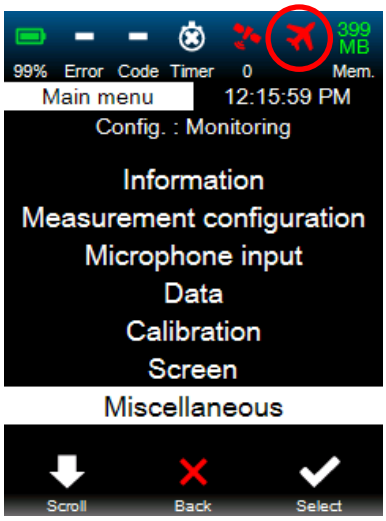
- Ad-Hoc connection disabled
- SSID name: CUBE_[Serial number]
- No authentication
- No encryption
- No network key
- DHCP activated

4.2.10 Aircraft mode

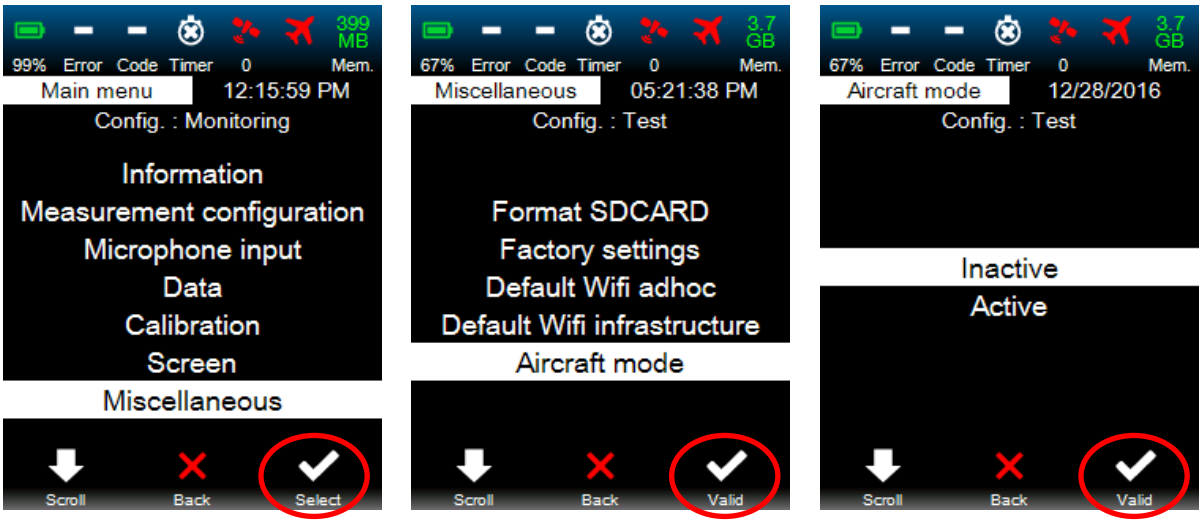
Activate the Aircraft mode in the instrument is achieved using the “Miscellaneous” menu, then “Aircraft mode” and then “Activate”.



The aircraft mode switch-off the Wi-Fi and the 3G modem. When the aircraft mode is activated an aircraft icon appear on the status bar.

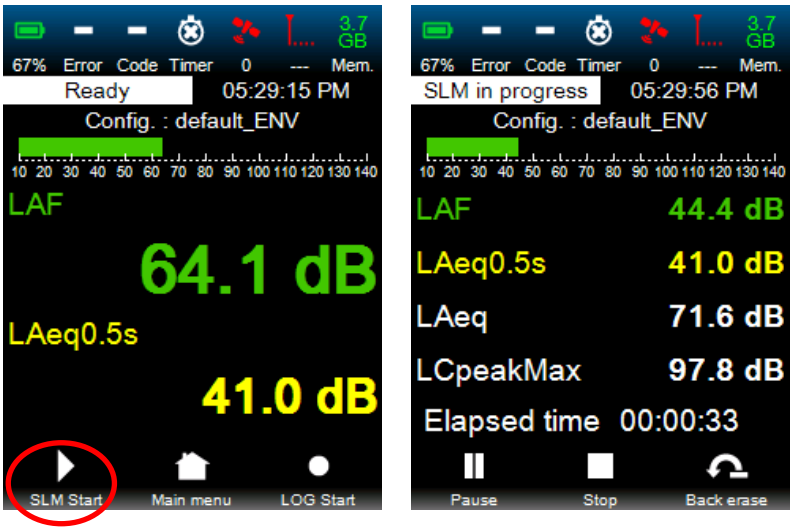


The only way to stop the Aircraft mode is to select “Inactivate” on the “Aircraft mode” menu.



4.3 STARTING A NOISE MEASUREMENT USING MENU SLM START

The measurement is launched from the Ready reference screen. The user must select the “SLM Start” menu and the data acquisition in Start/Stop mode is immediate.



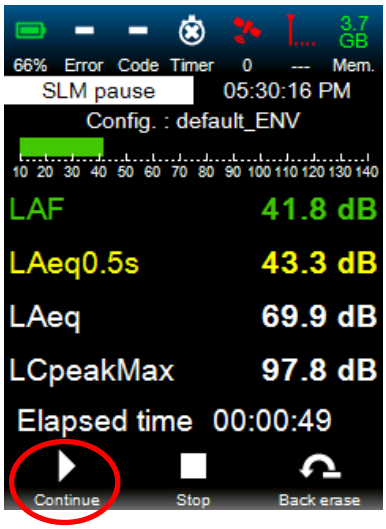
In this mode, only the overall values (setup in the running configuration) are computed.

4.3.1 *Interrupting the measurement (Pause)*

If the operator wished to stop the measurement temporarily, he/she must press key 1 (Pause). The time counter (Elapsed time) is stopped. Instant sound levels keep on being displayed on the screen but they are not taken into account in the SLM measurement results.

4.3.2 *Resuming the measurement (Continue)*

To resume the acquisition, press key 1 (Continue).



4.3.3 *Deleting the most recent samples of the measurement (Back erase)*

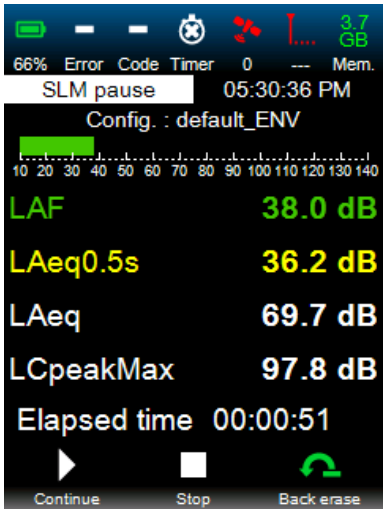
The Back Erase mode is used to delete, from the Leq calculation and only in SLM mode, up to 10 seconds of recordings, this duration being defined by the user. “ Back erase” goes from white to green when activated. The last seconds of acquisition are not taken into account in the measurement.

This function is useful when, in a Leq calculation, noise sources need to be removed as they do not belong to the noise event to characterise (dog barking, cars, talking, operator’s noise…).

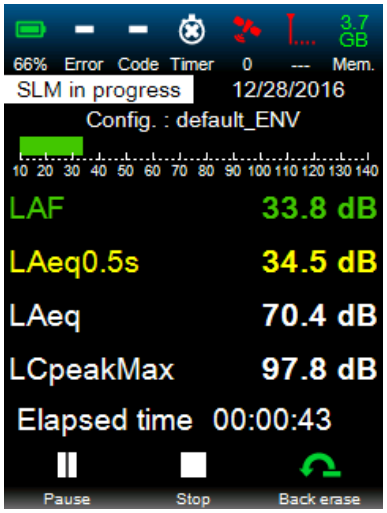
It is possible to activate the Back erase function, either in Pause mode, or in Real-time acquisition mode:

In Pause mode, in the course of a SLM acquisition, press the Back erase key to delete from the Leq calculation the last n seconds defined in this menu.

In Real time mode, press the Back erase key to delete the last n seconds, but the acquisition continues until the Pause or Stop key is pressed. The Back erase function can be used several times in the same recording session. The acquisition time must be longer than the elementary duration of the Back erase function.



Back erase in Pause mode

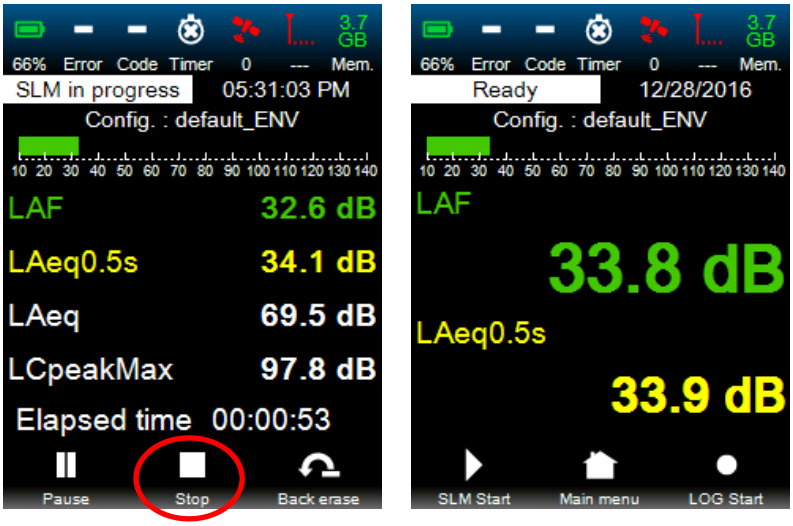


Back erase in Real time mode

Note: If the Back erase function is initially set to 0s, then the button is disabled.

4.3.4 *Stopping the measurement permanently (Stop)*

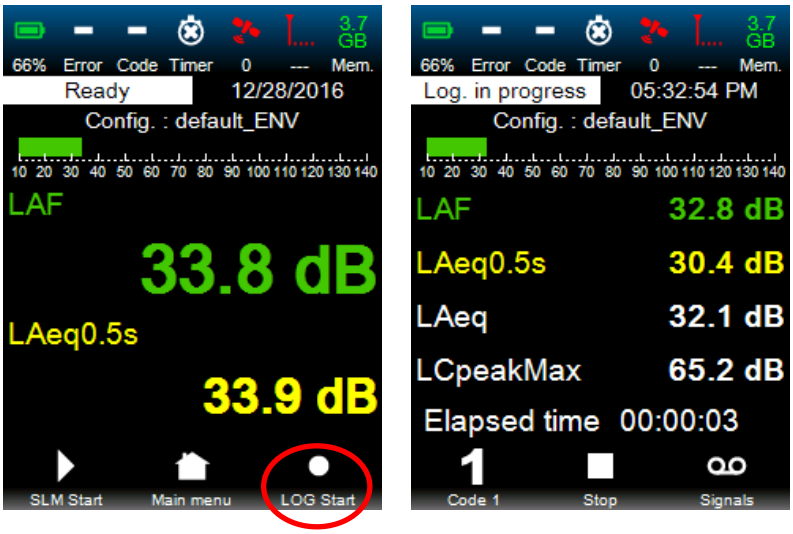
The permanent stop of the measurement occurs after validation of key 2 (Stop). This action generates a return to the Ready reference screen.



Note: Press Stop to automatically store all measured results and reset the values held (Overload, max, LeqGlobal). The storage time is negligible and the display of the measured levels is instantly recovered

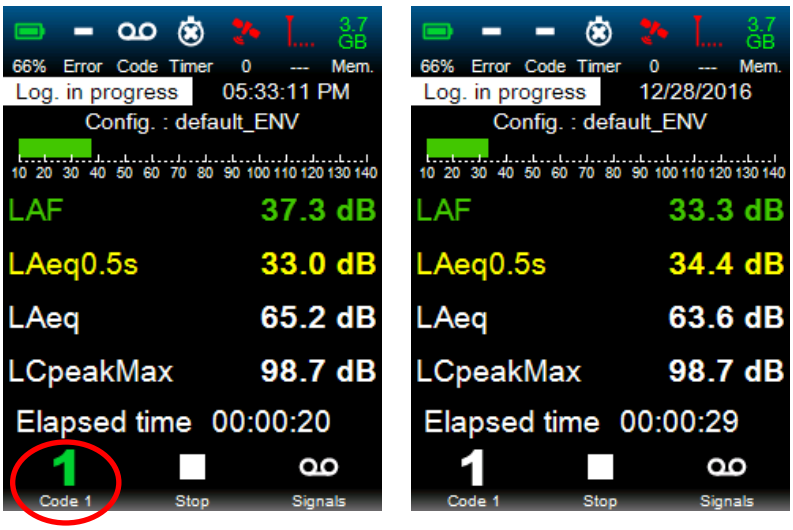
4.4 STARTING NOISE RECORDING USING MENU LOG START

The recording is launched from the Ready reference screen. The user selects the “LOG Start” menu using key 3 and the recording of data is immediate in the absence of a predefined timer. If a timer is defined, either the operator manually starts a measurement before the programmed date, or the instrument will wait for the timer to be triggered to start the measurement.



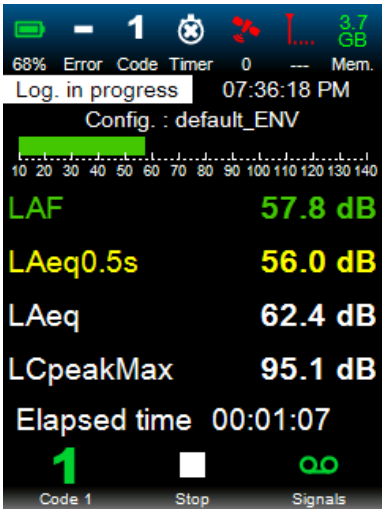
4.4.1 *Coding events (Code 1)*

The instrument allows for manual coding of events only in Code 1 (codes 2 to 5 available only from web interface). To do so, press key 1 (Code 1) as soon as the noise event to code occurs in order to start coding. Icon 1, which is white when coding is not active, turns green during the activation period. When the incriminated source disappears, press on key 1 (Code1) again to validate the end of the occurrence of the noise event and deactivate coding. The icon turns white again.



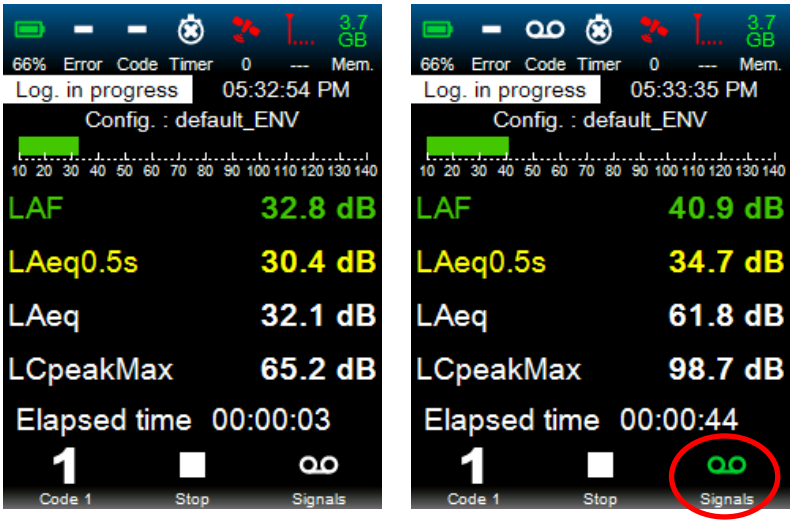
Note: Automatic coding (automatic code A) can be triggered on threshold depending on the configuration validated from the web interface only (see § 5.2.2.3 Trigger auto. sub-menu)

Note: Coding (Codes 1 to 5) activates or not audio recording. Activation can be set up using web interface.



4.4.2 *Triggering Audio recordings (Audio)*

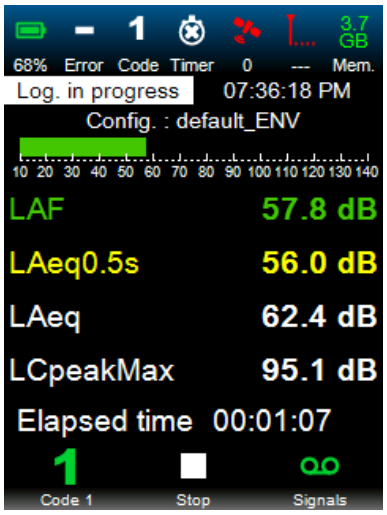
The recording of the audio (and vibration for DUO and FUSION) signal is possible manually. When the operator wishes sound recording he/she can trigger the storage of Audio data by pressing key 3 (Audio). The Audio recording is stopped by pressing key 3 again. The icon turns white again.



If the audio recording is automatically triggered by the audio timer, then the Audio icon becomes green. The user can then takes over again by pressing key 3 (green Audio) to manually force the stop of the Audio recording.

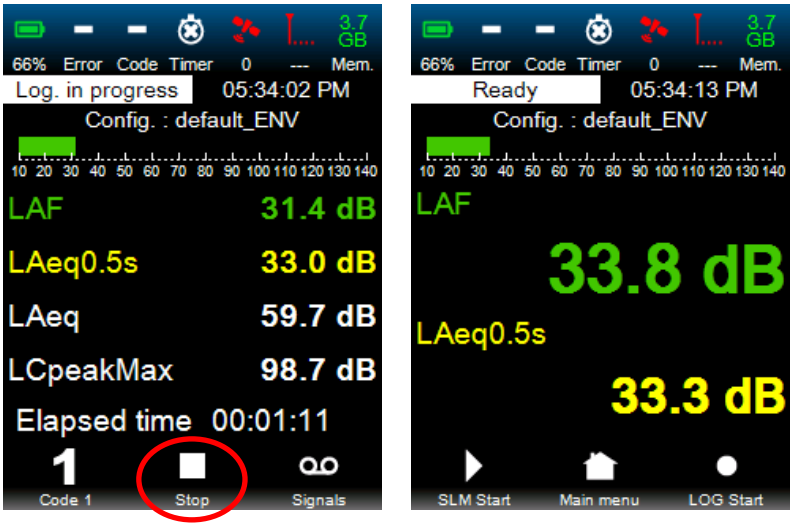
Note: the Audio trigger can be achieved automatically on threshold from the configuration on the web interface. The triggering threshold can be an acoustic threshold (Auto. code.) and/or a time threshold (Timer). The Audio icon can be activated or deactivated automatically if the programmed audio conditions are fulfilled.

Note: Audio recording can be independent of manual coding if the configuration is set accordingly. An audio recording can thus be done during a coding or not.



4.4.3 *Stopping the measurement (Stop)*

The measurement is stopped with key 2 (Stop). The measurement campaigned is finished and the “Ready” menu is displayed.

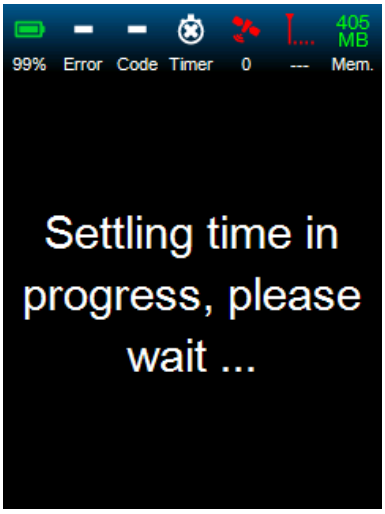


Note: Press Stop to automatically store all measured results and reset the values held (Overload, max, LeqGlobal). The storage time is negligible and the display of the measured levels is instantly recovered.

4.5 SPECIFIC SCREENS

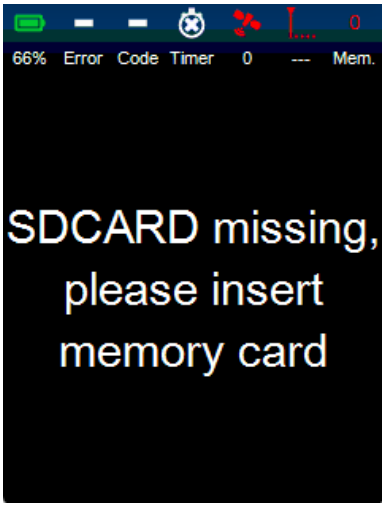
4.5.1 *Menu settling time screen*

This interface is displayed for any change in the measurement configuration:



4.5.2 *"SD card missing" screen*

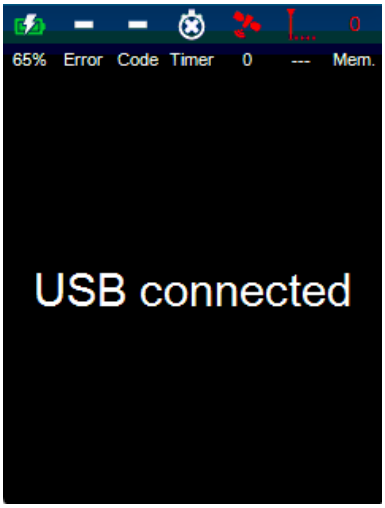
In the absence of a SD card, the instrument will detect this abnormal situation and the following message will be displayed:



The user must insert the SD card in the drive for the instrument to operate.

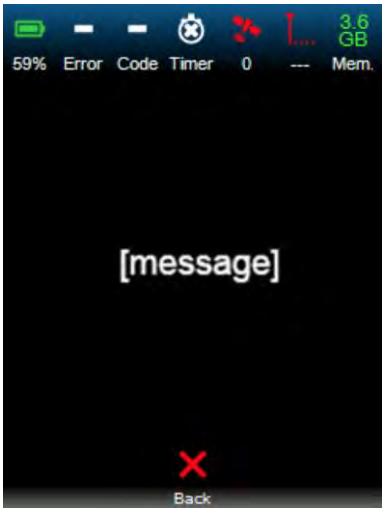
4.5.3 *"USB connected" screen*

After connection of a USB cable to the instrument (in order to transfer stored data), the display instantly shows the message below:



4.5.4 *"Message" screen*

Depending on the measurement status of the instrument (SLM Start, LOG Start or Pending recording), commands Stand-by and Stop will trigger the display of the following messages:



Instrument	Start SLM or Start LOG	Pending recording
Stand-by	"Please stop measurement before stand-by!"	"Stop timer before standby!"
Stop	"Please stop measurement before switch off!"	"Stop timer before switch off!"

Press key 2 (Back) to go back to the previous menu.

4.5.5 *Slave mode screen*

When the user controls the instrument using the Web interface, the following screen appears on the local display:

Pressing any key will terminate the remote connection and allow the operator regaining control of the instrument. This is possible if and only if the keyboard is not locked.

4.6 SUMMARY OF ICONS AND KEYS

Symbol	*Explanation*	*Symbol*	*Explanation*
	Activate		Activate disabled
	Audio / Audio OFF		Audio disabled
	Audio ON		
	Back to previous menu		Back to previous menu disabled
	Back erase / Back erase OFF		Back erase disabled
	Back erase ON		
	Calibration		Calibration disabled
	Electrical check error		
1	Code 1 / Code 1 OFF	1	Code 1 disabled
1	Code 1 ON	2	Code 2
3	Code 3	4	Code 4
5	Code 5	A	Auto Code
–	No code		
	Trash		Trash disabled
	Start Stop / Continue		Start Stop disabled / Continue disabled
	Pause		Pause disabled
	Recording		Recording disabled

Symbol	Explanation	Symbol	Explanation
	Stop		Stop disabled
	Redo		Redo disabled
	Pull-down list		Pull-down list disabled
	Next screen		Previous screen
	Validation / OK		Validation disabled / OK disabled
	Full battery		Empty battery
	Battery is charging		Battery is charging / UPS active (with CME01 & CME02)
	Programming ON		Programming active soon
	Programming OFF		Overload
	GPS OK		GPS NOK
	Communication OK		Communication OK with roaming
	Communication NOK		Aircraft mode
	Memory status		
	Main Menu		Main Menu disabled
	Display		Display OFF
	*WLS sensor connected, charge < 25%		*WLS sensor connected, 25% ≤ charge <50%
	*WLS sensor connected, 50% ≤ charge <75%		*WLS sensor connected, charge ≥ 75%
	Weather station communication ok		

*: FUSION and DUO only

CHAPTER 5
WEB INTERFACE PRESENTATION

5.1 DESCRIPTION OF THE WEB INTERFACE

The web interface (Instrument's embedded application) has been designed for access through the Internet. The instrument acts as a Web server. The application software is then embedded in the instrument as HTML pages. Remote access to the instrument can be achieved using an Internet navigator on all types of remote control (PC / Pocket PC / Tablet PC / Internet Tablet / Netbook or Smartphone).

Important note: no application needs to be installed.

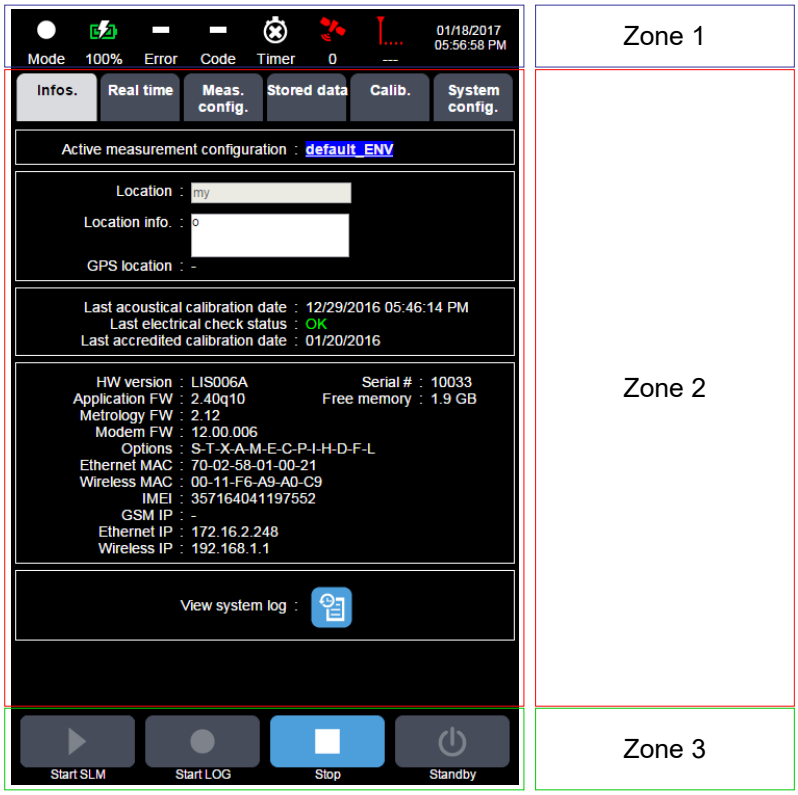
The Web interface works with the following navigators:
- Windows™ Internet Explorer from version 11 on PC.
- Safari from version 5 on MAC OS and Mobile Safari on IOS, iPod touch, iPhone, iPad
- Firefox from version 5.0. Firefox is a Web navigator developed and distributed by the Mozilla Foundation. It is compatible with various versions of Microsoft Windows, Mac OS X and GNU/Linux.
- Opera from version 10.61 on PC
- Chrome from version 8.0 and Chrome under Android from version 2.2

Note: due to compatibility issues, the use of Windows™ IE (Internet Explorer) versions < 11 is not recommended and will not display correctly real time graphs and status bar.

Note: With a slow connection (3G with small bandwidth), many tests have shown that the Opera navigator is the most performing one to refresh the display of the web interface, in particular on Real-time pages. Thus, it is highly recommended using this navigator to communicate with the Web server.
Note: Due to some compatibility issues between navigators some pages might not be correctly displayed or refreshed → another navigator must then be used. We recommended using OPERA.

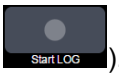
The typical screen for the Web interface has standard dimensions of 480*800 pixels. It allows, in particular with its black background, for easy reading of the information in full sun exposure and at night with little light. The display includes 3 zones:

- Zone 1: status bar
- Zone 2: working zone (menus, results, graphs…)
- Zone 3: context command zone for keys.



The status bar contains different icons and informs the user on the status of the instrument.

The working zone allows displaying the main and secondary menus (as HTML page tabs), measured levels and associated graphs.

Context commands of the keys are shown as text and icons (e.g., 

).

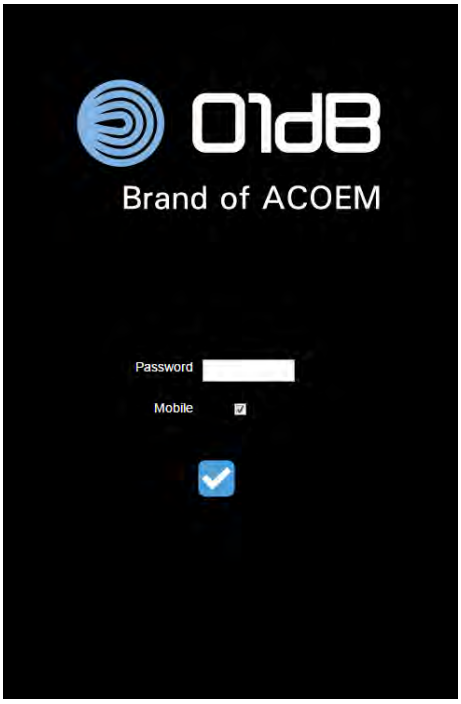
5.1.1 Web interface screens

5.1.1.1 Start-up screen

When opening the Web interface, the following screens are displayed:

Start-up screen

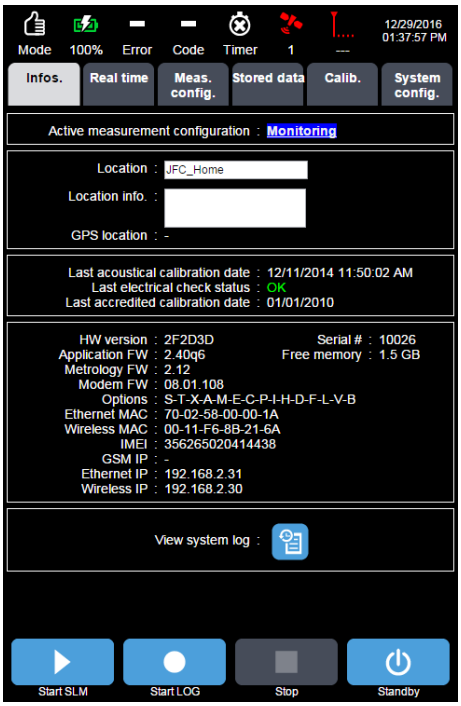
The operator must enter the production output IP address of the instrument (http://192.168.0.1 if Ethernet connection, http://192.168.1.1 if Wi-Fi connection) in the Web browser in order to access the web interface, after configuration of the network (see CHAPTER 6 Communication and connections). The screen shown below is returned by the instrument and displayed on the interface:



The password (if set by the user) is required to connect the interface to the instrument.
Selecting the “mobile” option improves the stability of the connection in case of slow connection (3G or GPRS type). The refresh rate is 1 sec instead of 0.5 sec for the normal connection.

5.1.1.2 Infos screen

Once the connection is set up, the generic “Infos.” screen is displayed:

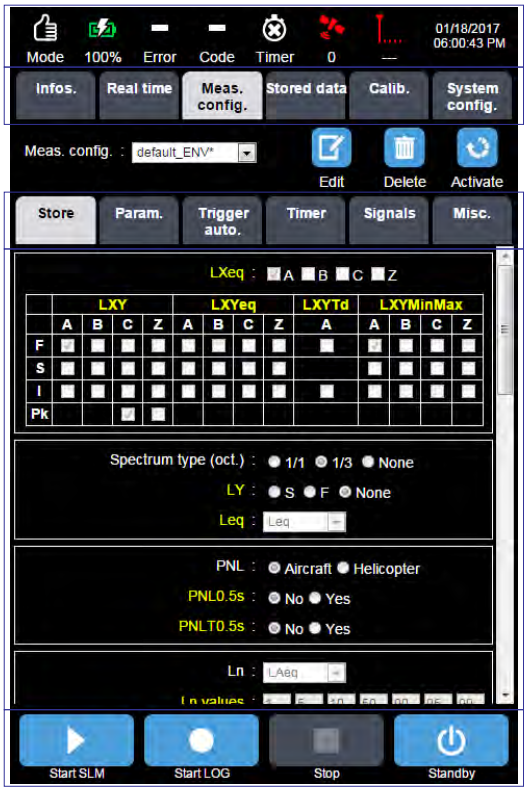


5.1.1.3 Main menu

The main menu of web interface is made up of several tabs. The selected tab is displayed in a light colour (grey background):

- **Infos.** tab: it contains man information. This menu is displayed by default when the application is opened.
- **Real time** tab: this menu is used during the measurements. It is used to:
  - During the measurement in simple sound level meter mode, access back erase and comment.
  - During the measurement in storage mode, code 5 different manual codes, access audio recording, time-stamped comments and weather data.
- **Meas. config.** tab: it is used to configure the measurements.
- **Stored data** tab: this menu is used to access the data stored in the instrument.
- **Calib.** tab: menu for sound calibration and electrical check of the measurement chain.
- **System config.** tab: this menu is devoted to system configuration.

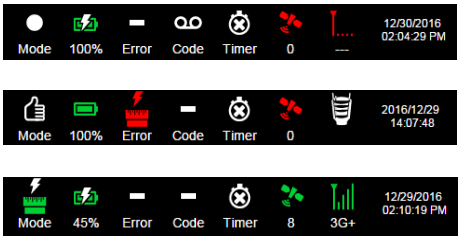
5.1.1.4 Sample screen



Status bar	
Main menu	
Secondary menu	
Content	
Measurement commands (“remote keys”)	

Note : PNL indicators are only available on CUBE and DUO

5.1.2 The status bar



3 examples of status bar

Various icons are displayed, depending on the status of the instrument:
Current mode: Storage, SLM in progress, SLM Pause, Ready, USB connected, SD card disconnected, Electrical check, Sound calibration in progress and stabilisation time (stabilisation icon). This icon is used to recall the current status when navigating through the different menus.

- **Battery level and status** (charged or discharged): charge symbol icon and % charge when charging, battery symbol icon and % charge remaining off charging time. When the charge is < 10%, the battery icon turns red. The instrument automatically checks the state of battery charge for its operation within the specifications of the standard (minimum charge level should be 3%: when the load is equal or less than 3%, the instrument stops the current measurement, stores the latest information, closes the current files and turns off when the power supply mode is selected as the charging mode (see § 5.4.4).

- **Metrological error** during the measurement in progress:
  - error during the last electrical check
  - overload

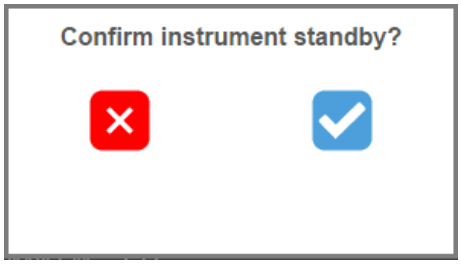
  If several errors are detected, they are displayed one after the other at a rate of 1 second. The electrical check error remains visible as long as a new check with « OK » has not occurred. The overload error is updated at the end of a measurement. In Ready mode, this indication is short-lived.
- **Code** indicates whether the instrument is in automatic, manual coding mode or not.
  - The corresponding icon then displays 1, 2, 3, 4 or 5 in manual coding and A for automatic coding. In case of multiple coding, the icons are scrolled with a period of 1 second.
  - Furthermore, if an audio recording is in progress, the audio icon scrolls with the code icons.
- **Code** indicates whether the instrument is in automatic, manual coding mode or not. The green icon indicates that the timer is programmed or that the measurement is in progress. The orange icon indicates that the measurement is going to start soon. The white icon indicates that no timer is programmed, in which case the instrument starts instantly upon request of the user.
- **GPS** shows the number of satellites. A green icon corresponds to 4 satellites and more. The icon becomes red if less than 4 satellites are detected. The number of detected satellites is displayed.
- **GPRS/EDGE/3G/3G+** indicates the type and intensity of the connection. A green icon corresponds to 3 or more communication bars. The icon turns red if less than 3 bars are detected.
- **WLS**: Connection to wireless sensor (the icon appears every 2 seconds alternatively with the GPRS/EDGE/3G/3G+ icon (Only for FUSION and DUO))
- **Weather station**: Connection to the Weather station (the icon appears every 2 seconds alternatively with the GPRS/EDGE/3G/3G+ icon when the communication is operational
- **Current date and time**: this display depends on the selected language.

5.1.3 Command zone

The measurement command bar contains 4 command buttons. It is displayed in all screens.

Buttons are blue if they can be activated, otherwise they are grey. Launching a measurement command from the Start SLM or Start LOG will systematically display the Real time tab. The Standby command can be used to set the instrument to standby mode. The instrument cannot be turned off completely from the Web interface. Only the action of pressing the ON/OFF button for at least 2 seconds will turn the instrument off. Waking-up the instrument from stand-by is effective by establishing communication with modem option active and sending a dedicated SMS.

Pressing on the Standby button will open a confirmation window:



In SLM mode, this measurement command bar is replaced by:

In SLM Pause mode, it appears as follows:

Note: In order to simplify data storage, pressing the Stop button will automatically record the finalised measurement on the SD card, and this, for both measurement modes (SLM and LOG).

5.2 SETTING UP THE NOISE MEASUREMENT PARAMETERS (MEAS. CONFIG., INFOS., REAL TIME TABS)

5.2.1 Managing a measurement configuration (Meas. Config. tab)

When the **Meas. Config.** tab is opened, the following items are displayed on top of the interface:

In the pull-down menu, the user selects the measurement configuration to apply. After adequate selection of the configuration short name from the list, the user can Edit, Delete or Activate the selected configuration.

All parameters are updated on the display in order to correspond to this configuration. As long as the user has not clicked on the Edit button, the interface remains in a viewing mode: no parameter change is possible.

Note: the active measurement configuration is tagged with a star (here, Test_wood*).

5.2.1.1 Edit a configuration

In Edit mode, the pull-down menu becomes an input field where the name of a new configuration can be entered.

Once new parameters have been properly entered, press Save to save the edited configuration. Moreover, if the edited configuration is the already selected configuration (i.e. the one tagged with a star), then the display will automatically go to the Real Time mode.

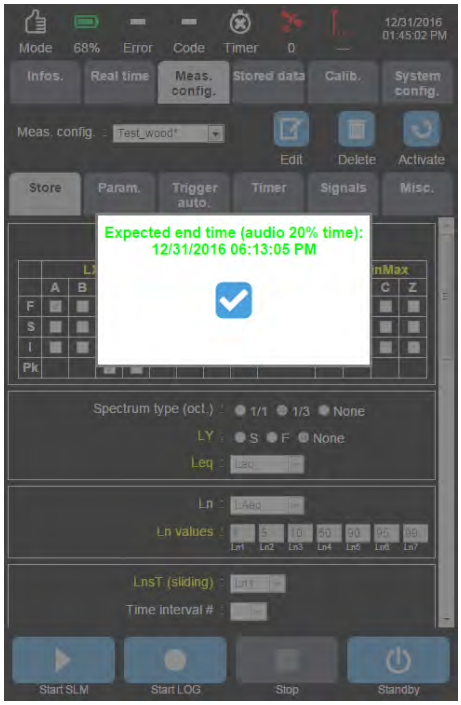
After deleting the selected configuration, the default configuration (“defaut_BA_1_1”, “defaut_BA_1_3” or “default_ENV”) is displayed again: these are the only ones that can neither be modified nor deleted.

Note: in case of incompatible or erroneous data input, clicking on Save will automatically display in red the related parameter.

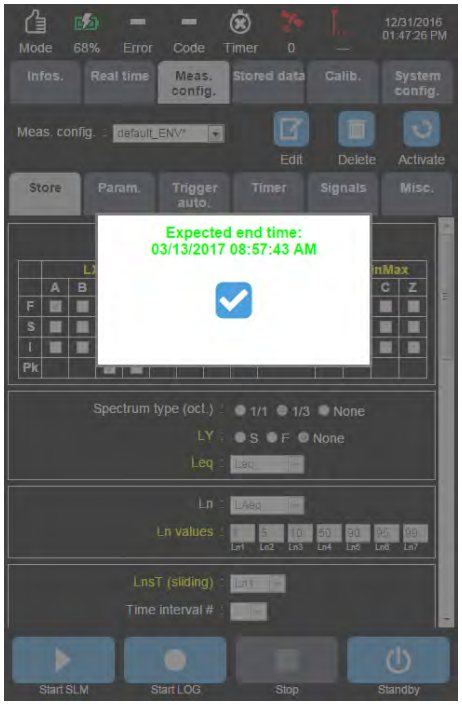
Note: The active configuration (marked with an asterisk) cannot be deleted.

5.2.1.2 Activate a configuration

Press the activation button to display a window indicating the estimated end date for the measurement, taking into account the discriminating value between the remaining battery operating life and the remaining memory on the SD card, calculated along with all measured parameters, including audio recording 20% of the time.



Expected end time
depending on the battery

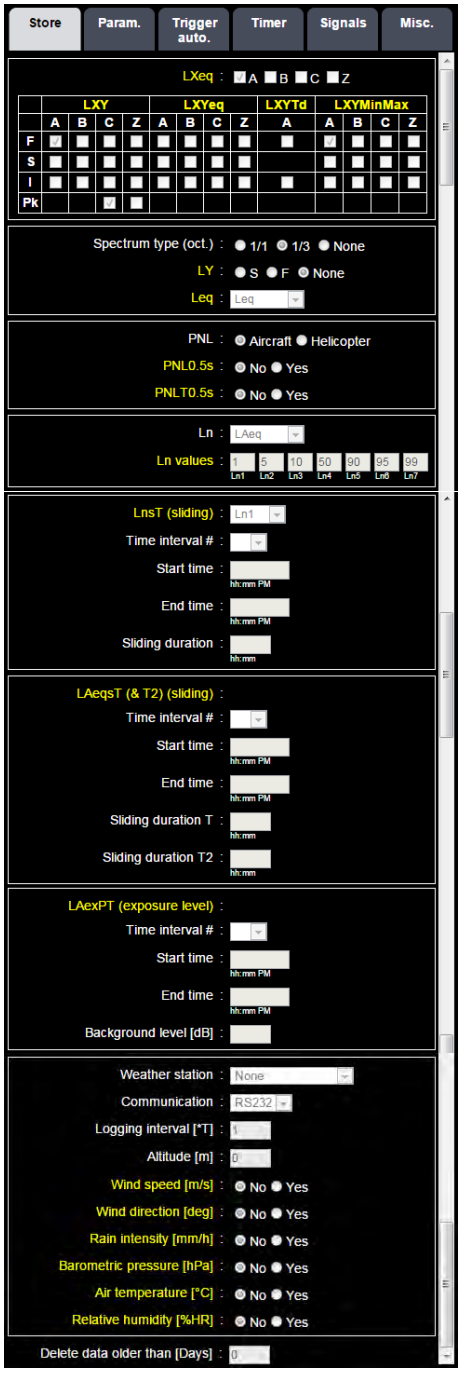


Expected end time depending
on the available memory (
the instrument connected to the mains)

5.2.2 Setting up the acquisition (Meas. Config. tab)

5.2.2.1 Store sub-menu

The Store sub-menu is used to set up all the values that will be stored during the acquisition:



- **LXeq**: selection of equivalent continuous levels with A, B, C, Z frequency weightings, recorded at every logging period T. Check boxes allow for multiple choices among LAeq, LBeq, LCeq and LZeq.
- **Selection table** for levels recorded with X = A, B, C or Z frequency weightings and Y= F (Fast), S (Slow) and I (Impulse) time weightings. By default, the storage of the Taktmax value LXYTd is achieved with a default logging period T of 3 seconds.
- **Type of spectra** (oct): allows selecting whether the analysis and storage of spectral data will be achieved in 1/1 or 1/3 octave. If None is selected, then no spectrum will be stored.
- **LY**: spectrum time weighting: selection of the type of time weighting used. If None is selected, then any spectral value will be stored without time weighting.
- **Leq spectrum**: the list of Leq spectra allows selecting between Leq, LYeq (Y being either F, or S) or none.

Time weighting LY ↓	**Leq** →	**None**	**Leq**	**LYeq**
None			Leq	
S		LS	LS Leq	LS LSeq
F		LF	LF Leq	LF LFeq

- **PNL**: Perceived Noise Level. The PNL and PNLT can be calculated in real time for aircraft or helicopters. The PNL0.5s and PNLT0.5s values may only be selected if T= 0.5 seconds and LS spectrum are selected. If this is not the case, the Yes / No option is disabled.
- **Ln values**: statistical indices; 7 indices can be measured at the same time. Possible selections range from L0 to L99, n being an integer.
- **LnsT, LAeqsT and LAeqsT2**: LnsT: Sliding Ln with 1 sliding duration; LAeqsT and LAeqsT2: 2 different sliding LAeq with 2 different durations (T & T2). Up to 24 different periods can be defined. The sliding time can be selected from 00h01min to 03h00min and must be a multiple of the logging interval (>=2), not exceeding the equivalent of 14,400 times the logging interval. Press the “+” icon to create an additional period; Press the “-” icon to delete the selected period. If no periods are selected, the value is not stored.
- **LAexPT**: Exposure level. Up to 24 different periods can be defined. The background noise can be selected from 0 to 130 dB. Press the “+” icon to create an additional period; Press the “-” icon to delete the selected period. If no periods are selected, the value is not stored.

  Important: It is possible to define periods that span midnight. For example: Period 1: 18:00 to 06:00; Period 2: 06:00 to 18:00. In this case the user sets the start time for period 1 to 06:00 and the end time for period 1 to 18:00. If the user then creates period 2, by default the start time for period 2 corresponds to the end time of period 1, and the end time of period 2 (or of the last period created) corresponds to the start time of period 1.

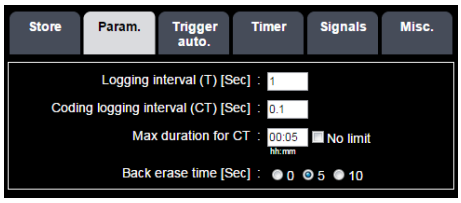
- **Weather station:** The type of weather station can be selected from the following: None, WXT520/WXT536 or WMT52/WXT532. The logging interval for weather data is defined as a multiple of the normal logging interval and must be ≥ 1 second. If the WMT52 weather station is selected, only the wind speed and wind direction are shown in yellow; the other values are disabled. The altitude field is used to correct the atmospheric pressure to its sea level equivalent (altitude 0). If no weather station is selected, all values are disabled.

- **Communication:** The choice of the type of connection (RS232 or HDMI) depends on the type of station used (for deliveries before 2014, connection has to be selected as « RS232 » (« Y » cable connector and connected to the instrument with 3.5 jack); from 2014 on, new weather stations include a 10 m cable with mini HDMI for connection to the instrument (data and power supply).
- **Delete data older than**: this field can be used to select the maximum duration for which data is stored on the SD card. Value 0 or between 2 and 9999 days. If the value is set to 0 days, no data is deleted. The default value is 0 days. The data to be deleted is analysed automatically when a measurement stops (manual stop or automatic stop).

Note: weather data will not be acquired if the model of weather station physically connected to the instrument does not correspond to the model selected in the configuration. A message in the event log will record the error.

Note: A weather station can be plugged into the instrument while it is running. However, the weather station will only be operational once the measurement configuration has been re-activated or when a measurment start.

5.2.2.2 Param. sub-menu



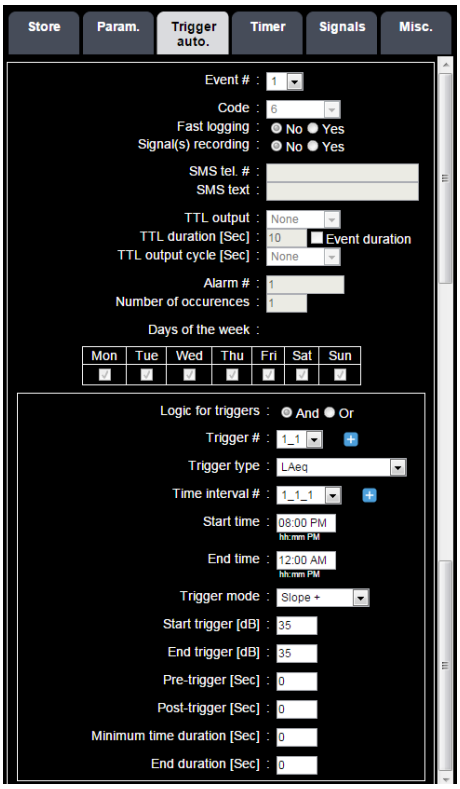
The Param. sub-menu is used to set parameters specific to the acquisition:

- **Logging interval T**: The value can be set from 20 msec to 3600 s:
  - From 20 msec to 1 second, the value must be a multiple of 5 msec and an integer sub-multiple of 1 second (0.5 s, 0.25 s, 0.2 s, 0.125 s, 0.1 s, 0.05 s, 0.04 s, 0.025 s, 0.02 s)
  - Above 1 second, the value can be set in 1-second steps.

- **Coding logging interval (CT)**: allows defining a shorter period than T for storage during a coding. This parameter is also called “Fast logging period”. It is active only during a LOG measurement. Its value can only be a sub-multiple of the logging period T defined above, and must be a multiple of 5 msec. The default value is 100 msec. To deactivate fast logging period, it must be selected as equal to standard logging period T (thus coding will not generate any files with fast logging sampling).
- **Maximum duration for CT**: storage time limit at fast logging period. The maximum value is 23h 59mn 59sec. Option “No limit” can also be selected.
- **Back erase time**: parameter active only during a SLM measurement. It allows cancelling the last 5 or 10 seconds of measurement when pressing the Back erase button of the Real time menu. When 0 is selected, then the Back erase button is disabled.

5.2.2.3 Trigger auto. sub-menu

Trigger auto sub-menu allows to create triggers and events and rules for events triggering (markers, signal recording, alarms).



- **Event No.**: selected from none, 1, 2, 3, 4 and 5. Default value: empty box (no “-” icon). Press “+” to create event 1; Press “-” to delete event 1. Subsequent actions apply to the selected event.
- **Code**: used to assign a code to the event. The value can be selected as none or between 6 and 10 (lower codes are reserved for manual coding). The default value is an empty box. If a code is selected, the next 2 lines are enabled:
- **Fast logging interval**: if yes is selected, the instrument stores values at the fast logging interval during coding.
- **Audio recording**: if yes is selected, the instrument stores the audio signal during coding.
- **SMS tel #**: Enter a phone number to which a text message will be sent when the event occurs. No number by default. With Trigger option T activated, only one number can be entered. With Advanced Trigger option X, several numbers may be entered using a semicolon “;” as a separator.
- **SMS text**: used to customise the text of the message sent. Limited to 100 characters
- **TTL output**: used to the logic output on the instrument. Possible values: None, 0 or 1. Default value: disabled.
- **TTL duration**: duration between 1 and 3600 s; default value 10 s.
- **TTL output cycle**: choice between None, 1, 2, 4 or 8 seconds (ratio is 50%). If at least one of the selections in System config./Misc./TTL output forced is activated @0, TTL output is forced @0 and the cycle (start of the event) starts by a TTL @0.
- **Alarm No.** (01dB use only): numerical value between 1 and 999999. Default value: 1
- **Min. number of occurrences** (01dB use only): minimum number of occurrences of the event to present the information on the supervisor screen. Value between 1 and 9999, default value 1. If this number is not exceeded, the event is classified “orange”. As soon as this number is reached, the event is classified “red”. The event count is reset to zero at the end of the last period set in the combination of triggers defined below.

- **Days of the week**: day(s) of the week on which the event applies (all days checked by default)
- **Logic for Trigger**: selects whether “and” or “or” logic is used for combinations of triggers.
- **Trigger No.**: Trigger selection, between i_1 and i_5 for event i. Default value: i_1 (no “-” icon). Press “+” to create trigger i_2; press “-” to delete trigger i_2. Subsequent actions apply to the selected trigger.
- **Trigger type**: value selected from one of the following values:

LXeqT	LXpeak	LXYTMinMax	Sliding values	LXexPT
LAeqT	LCpeak	LAFTMax	LAeqsT	LAexPT
LBeqT	LZpeak	LASTMax	LAeqsT2	
LCeqT		LAITMax	LnsT	
LZeqT		LBFTMax		
		LBSTMax		
		LBITMax		
		LCFTMax		
		LCSTMax		
		LCITMax		
		LZFTMax		
		LZSTMax		
		LZITMax		

Leq frequency spectrum bands	TTL	Weather
Each frequency band (1/1 or 1/3 oct.)	TTL@0	Wind speed
	TTL@1	Wind direction
		Rain intensity
		Atmospheric pressure
		Air temperature
		Relative humidity

- Time interval #, start time & end time Up to 24 periods can be created, edited and modified, except in the special cases of sliding values and exposure levels (doses): the time intervals are created in the Store tab, and accordingly can only be viewed here.

Trigger menu for “Slope +” and “Slope -” Trigger Mode

Trigger menu for “Between” and “Exclude” Trigger Mode

- **Trigger mode**: Depending of the trigger type, up to 4 different modes are available
  - Slope +: trigger is active if the value is higher than the Start trigger level
  - Slope –: trigger is active if the value is lower than the Start trigger level
  - Between: trigger is active when the value is between the low and high trigger levels
  - Exclude: trigger is active when the value is outside the low and high trigger levels
- **Start trigger / Low trigger** (Trigger levels can be different depending on the period defined in Misc. sub menu):
  - **Start Trigger**: Defines a trigger level corresponding to a violation.
  - **Low trigger**: Defines the lower limit of the Between or Exclude slot.
- **End trigger / High trigger** (Trigger levels can be different depending on the period defined in Misc. sub menu):
  - **End trigger:** Defines a trigger level corresponding to the end of violation.
  - **High trigger**: Defines the higher limit of the Between or Exclude slot
- **Pre-trigger**: trigger before threshold violation, from 0 to 9 seconds.
- **Post-trigger**: duration of trigger end, can vary from 0 to 60 seconds.
- **Minimum time duration**: minimum duration of threshold violation in order to actually trigger automatic coding; this can vary from 0 to 60 seconds.
- **End duration**: minimum time period during which the level must be lower than the trigger ending Level in order to end coding; this can vary from 0 to 60 seconds
- **Tel. # for notification:** It is possible to program mobile telephone # to send a SMS in case of an ongoing trigger.

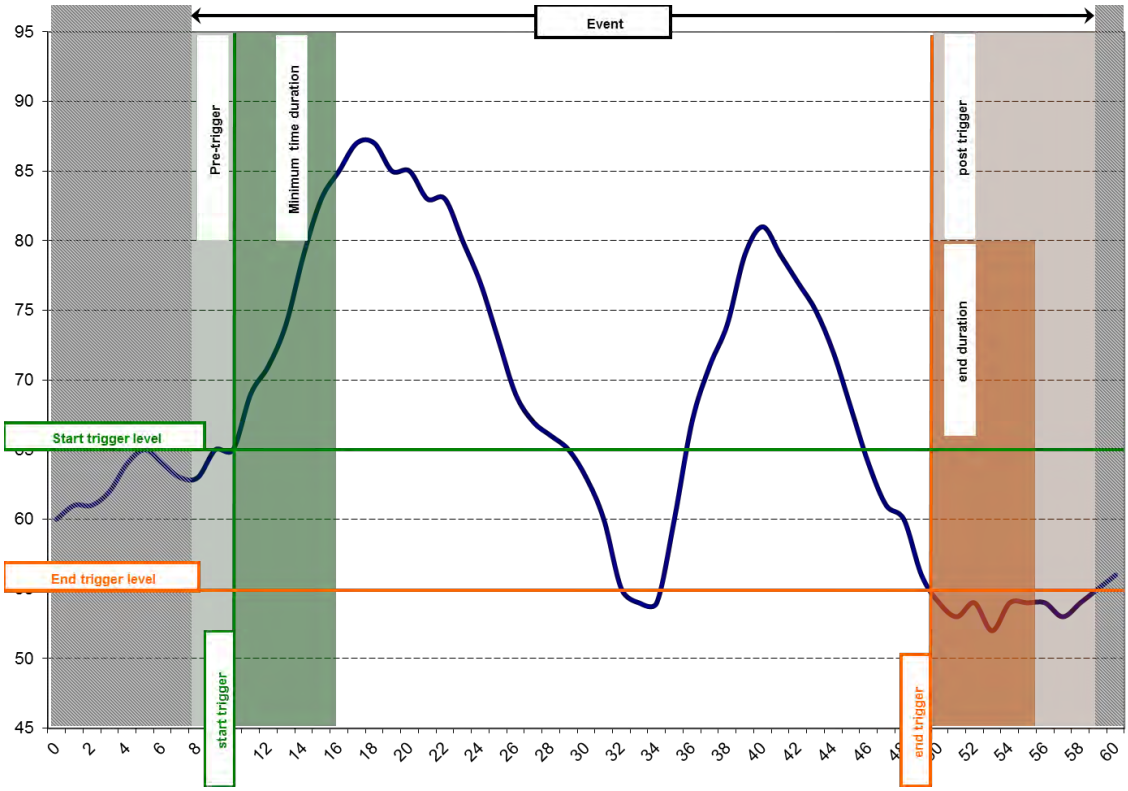


Diagram illustrating the different parameter settings for automatic trigger with slope + mode.

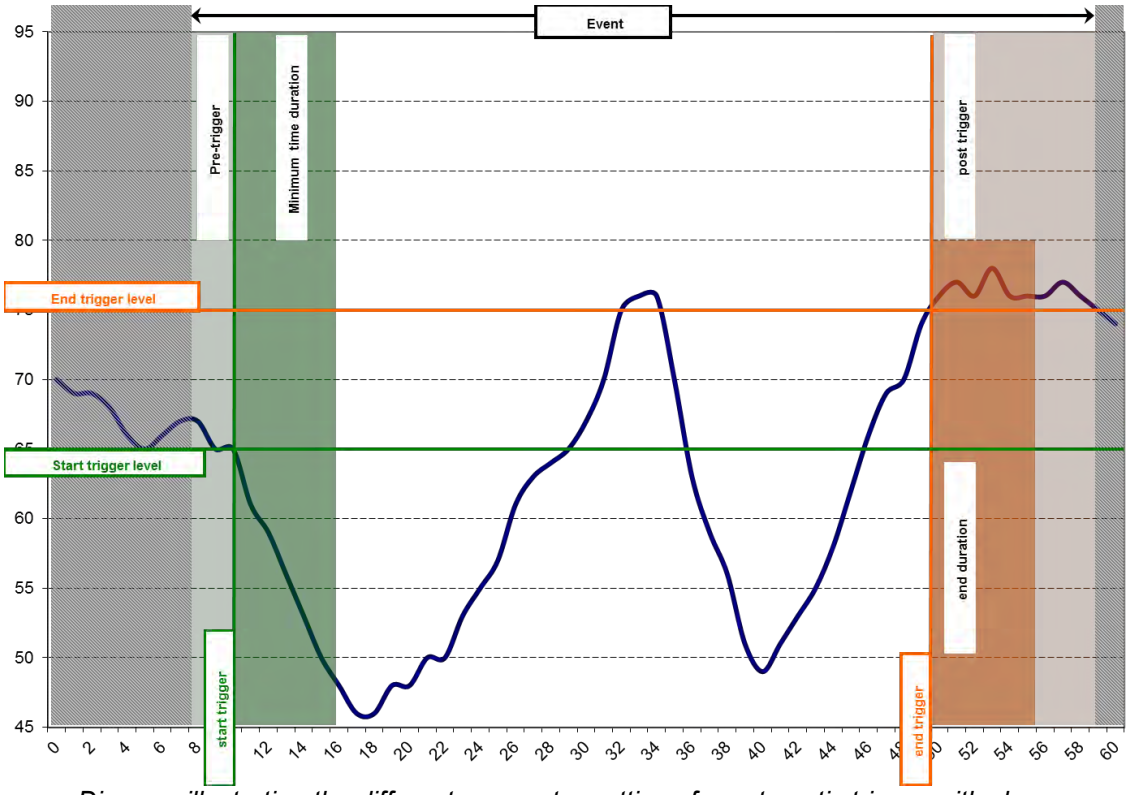


Diagram illustrating the different parameter settings for automatic trigger with slope – mode

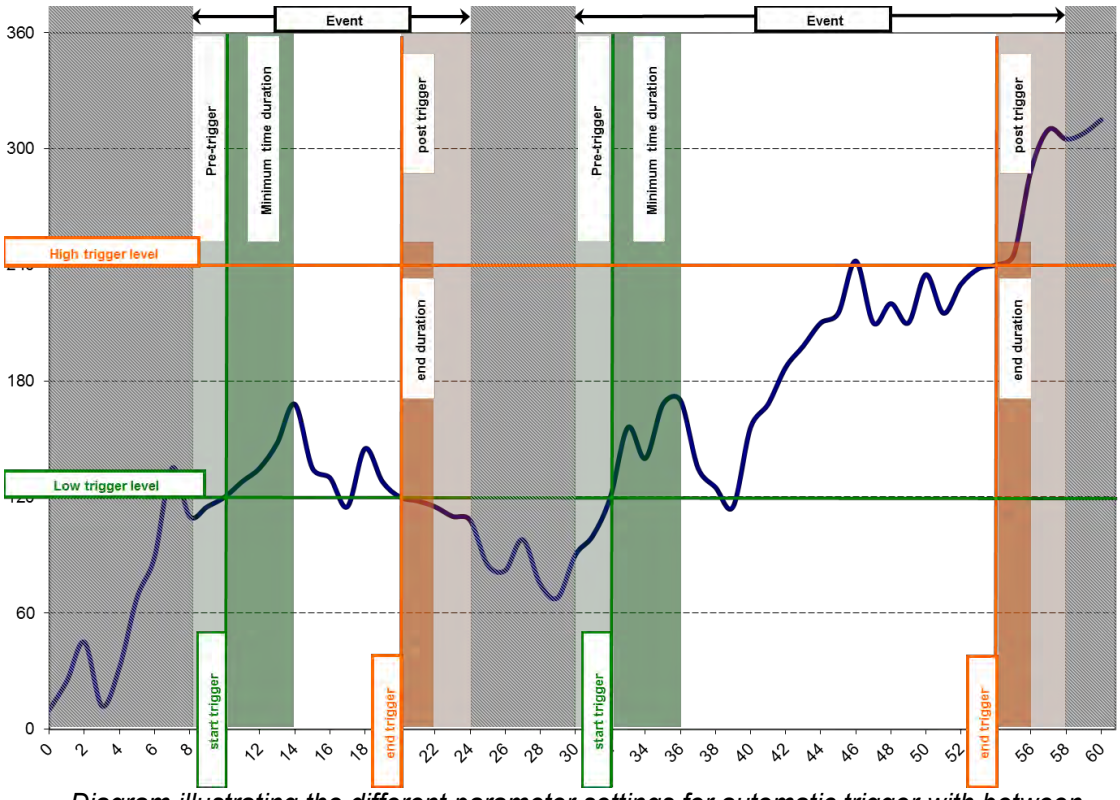


Diagram illustrating the different parameter settings for automatic trigger with between mode.

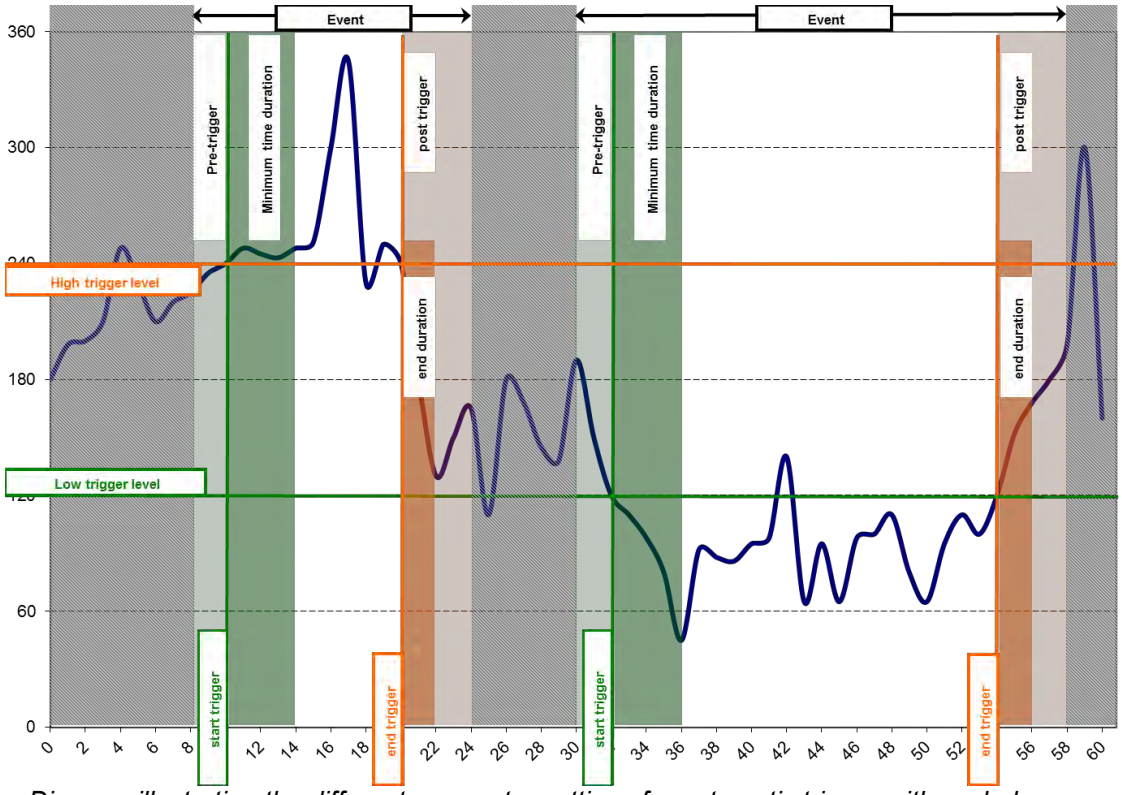


Diagram illustrating the different parameter settings for automatic trigger with exclude mode.

Limit on audio recordings due to maximum memory buffer size:
Let's define T1 = (pre-trigger+minimum time duration) setup by the user and T2 = (pre-trigger applied by the instrument on the audio recording), then we obtain:
Coding start and start of fast logging = date/time of trigger confirmed - T1
Audio recording start = date/time of trigger confirmed – T2
with T2 depending on the audio sampling frequency as the following table indicates:

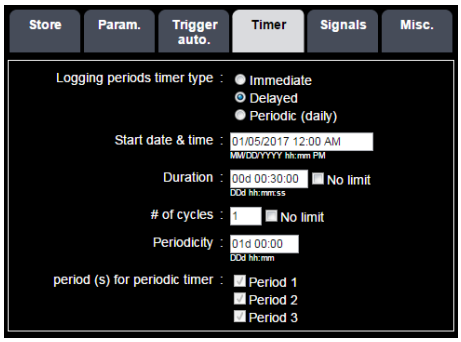
Audio sampling frequency	T1	T2
51200Hz	9sec. < T1 < 70sec.	9sec.
25600Hz	18sec. < T1 < 70sec.	18sec.
12800Hz	36sec. < T1 < 70sec.	36sec.
6400Hz	70sec. Max	T1
3200Hz	70sec. Max	T1
1600Hz	70sec. Max	T1

Special case: selecting sliding values and dose values: in this case the periods are already defined in the Store tab and cannot be modified.
Special case "TTL": in this case the trigger start and trigger end levels are disabled.

If selected audio signal type is MP3, the signal is recorded without pre-trigger.

5.2.2.4 Timer sub-menu

Timer sub menu allows to program timers.



Timer functions are available only in LOG mode. The timer is active in standby mode.
The Timer mode can be exit by changing the configuration or by selecting a configuration where the timer is not active

Type of timer

- **Immediate**: corresponds to the manual mode with no timer (immediate start of the measurement after indication of the measurement duration, the ending date and time depend on the battery life and on the memory capacity or the programmed duration. The next fields are then disabled since they are not relevant in this timer mode.
- **Delayed**: corresponds to the case where the user wants to schedule a starting date & time for storage (after 5 min the instrument stops and waits for the starting date & time to wake-up and start the measurement). The measurement automatically starts on the programmed date and time or manually upon the user's choice. The measurement stops either automatically after the programmed duration, or when the memory capacity is full, or manually by action from the user.
- **Periodic** (daily): corresponds to the situation where the user wants to program 1, 2 or 3 (consecutive or not) storage periods per day (until the battery is empty or the memory capacity is full). Typically, this mode allows triggering a measurement that stores every day during period(s) 1, 2 or (and) 3.

Note: Start and end times of periods 1, 2 or 3 can be programmed, but adjacent, meaning full 24-h coverage. The programming of the periods is done in the Meas. Config./Misc. tab (see Paragraph 5.2.2.6 Misc. sub-menu). The beginning of the 1st period stored is a time selected to correspond to the end of the 3rd period, the beginning of the 2nd period corresponds to the end of the 1st period, the beginning of the 3rd period corresponds to the end of the 2nd period and this until the battery is empty, or the memory is full or by choice of the user.

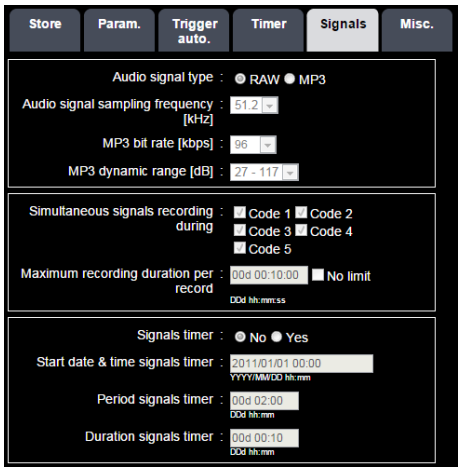
Start date & time: programming of the starting date and time. If the configuration is activated after schedule, then an error message is displayed and the trigger becomes inactive. The user must then re-assign a correct starting date.
Duration: programmed duration per storage. This function is active only in delayed timer mode. The maximum value is 99 days 23 hours 59 minutes and 59 seconds.
# of cycles: number of programmed starts. "No limit" corresponds to a mode where the instrument keeps running until the battery is empty or until the memory is full. Value ranging from 1 to 9999.

Periodicity: corresponds to the time period between each timer. This function is active only in delayed timer mode. The maximum value is 99 days 23 hours 59 minutes. The value for Periodicity must be equal to or longer than the measurement time.

Continuous periodic timer: allows selecting the storage period(s) according to the definition given in the Note above. This function is active only in periodic timer mode.

5.2.2.5 Signal(s) sub-menu

The signal (s) sub-menu allows to set up audio signals:



Audio signal type : allows selecting either RAW (uncompressed data for dBTrait post-processing) or MP3 (format MPEG-1/2 Audio Layer 3 compressed data)
Audio signal sampling frequency: allows selecting audio signal sampling frequency; Possible choices:

For RAW : 51.2kHz, 25.6kHz, 12.8kHz, 6.4kHz, 3.2kHz, 1.6kHz)
For MP3 : 48kHz, 32kHz, 16kHz, 8kHz

MP3 bit rate [kbps] : allows selecting MP3 bit rate ; possible choices : :

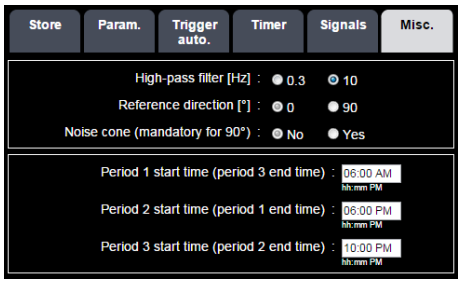
Fe [kHz]	48	32	16	8
Possible bit rate [kbps]	32 96 192	32 96 192	8 32 96	8 32 96

MP3 dynamic range[dB] : allows selecting the most appropriate dynamic range for MP3 signal; possible choice: 27-117 ou 47-137 dB
Simultaneous signals recording during: allows to start a signal recording during manual coding or not.
Maximum recording duration per record: allows limiting the maximum recording time of an audio signal during a coding. No limit corresponds to an audio recording with no time limit. The maximum value is 7 days; the minimum value is 5 seconds. No limit corresponds to an audio recording with no time limit.
Signals timer: allows setting up an audio timer independently of coding. If this option is selected by the user, the instrument will automatically launch audio recordings according to the parameters below (6, 7, 8).
Start date & time for signals timer: allows selecting the starting data and time for the audio timer. If the configuration is activated after the scheduled date, then the error will be notified to the user and the audio timer will be triggered at the next calculated occurrence
Period signals timer: this is the time period between each start of audio recording (in days, hours, minutes). The maximum value is 99 days 23 hours 59 minutes.
Duration signals timer: duration of each audio recording. The maximum value is 99 days 23 hours 59 minutes.

5.2.2.6 Misc. sub-menu

This menu can be used to set up:
- The type of metrological configuration; input filter and reference direction.
- Specific periods during which the trigger and timer processing can be set up separately.

These periods can be, for instance: 6:00 am – 6:00 pm, 6:00 pm – 10:00 pm, 10:00 pm – 6:00 am



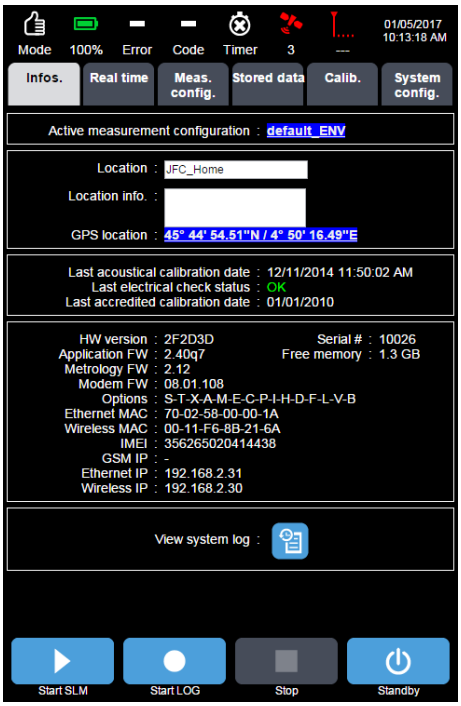
High-pass filter [Hz]: allows selecting the high-pass input filter; either 0.3 Hz, or 10 Hz. In order to avoid saturation of the input stage by very low frequency signals (such as the slamming and blowing of a door closing), one must use the 10Hz cut-off filter. On the opposite, the analysis of very low frequency signals requires using the 0.3 Hz filter (used as a 1/3 octave filter for instance).
Reference direction [°]:
With internal input selected:
- 0° greyed because CUBE has no internal input.

With external input selected:
- 0° corresponds to the measurement configuration for aircrafts noise, DMK01 mounted vertically
- 90° corresponds to using the instrument placed in a vertical position during noise measurements with “ground sources”, such as, e.g., ground transport noise.

Nose cone (mandatory for 90°): the user can select or not select the cone for 0° reference direction. In this case in order to take its influence into account properly it is necessary to select its presence or not BEFORE the measurement is performed. For 90° reference direction the user HAS to use the cone in order to fulfil directivity criteria of ISO 61672-1 edition 2.
Period 1 start time (Period 3 end time): allows defining the start of period 1 and the end of period 3.
Period 2 start time (Period 1 end time): allows defining the start of period 2 and the end of period 1.
Period 3 start time (Period 2 end time): allows defining the start of period 3 and the end of period 2.

Note: Activation of one or the other of these filters affects only the indicators measured with B, C, Z, octave or third octave weightings. Switching to 0.3 Hz or 10 Hz filters does not generate any corrective action on indicators measured with A frequency weighting.

5.2.3 *Information on the status of the instrument and on the measurement in progress (Infos tab)*



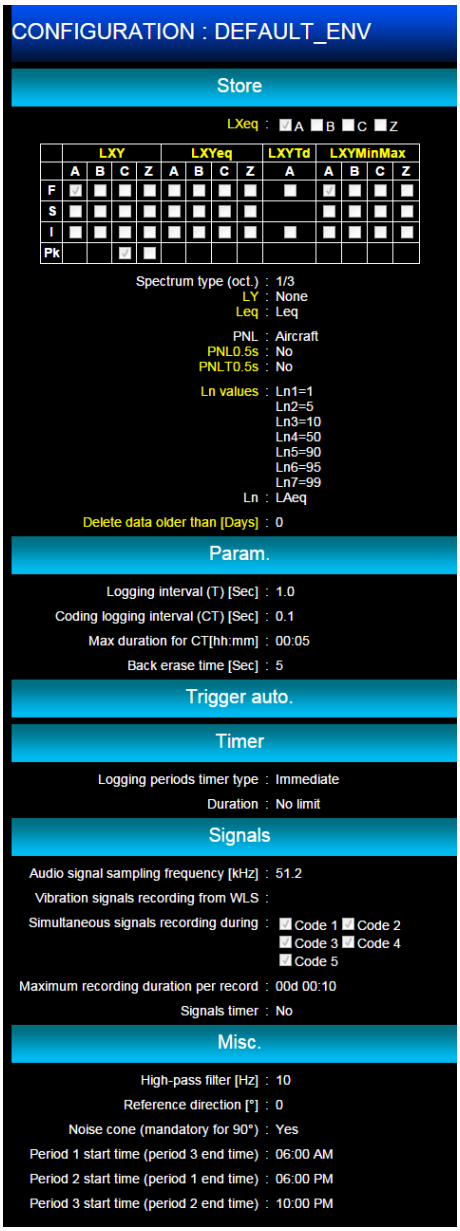
The Infos tab can be split up into several zones as described below.

5.2.3.1 Measurement configuration

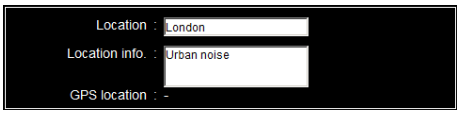
The name of the active configuration is a hypertext link that allows opening a new tab describing the entire active measurement configuration:

- Stored indicators
- Storage parameters
- Type of coding
- Time parameters
- Signals recording parameters…

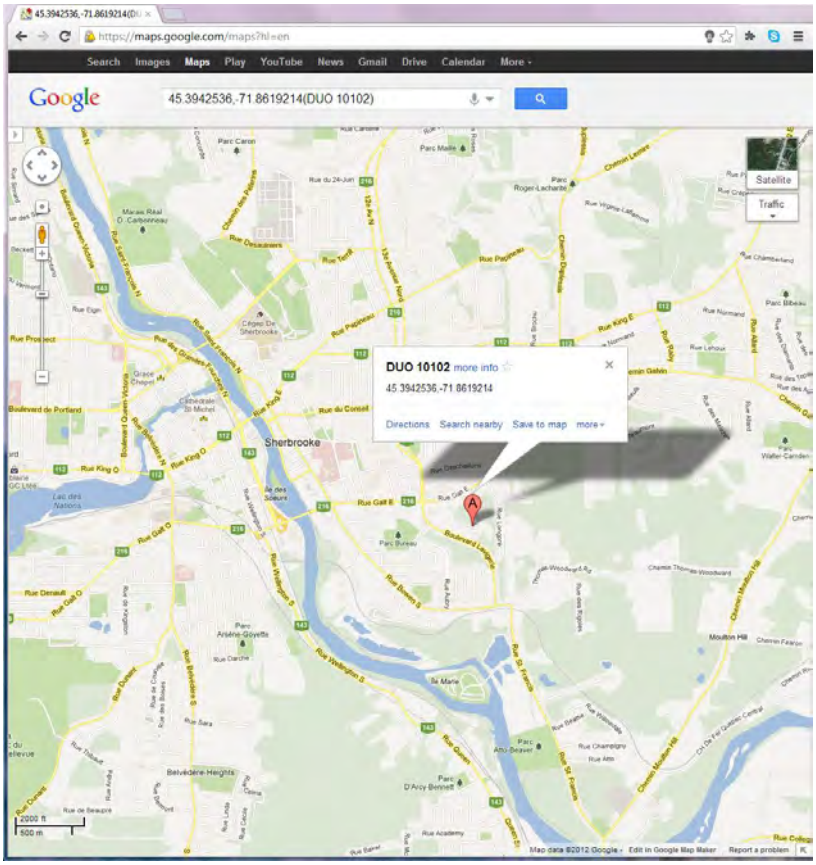
Example: measurement configuration (DEFAULT_ENV)



5.2.3.2 Location

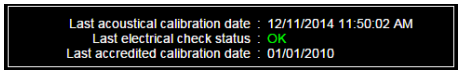


- **Location**: in this field the user inputs the name of the test site. This name then defines the name of the directory used to store the measurement campaigns. This text field is accessible only if the instrument is in Ready mode and contains a maximum of 12 characters.
- **Location info**: this larger text field (256 characters maximum) offers the possibility to enter more details relative to the current campaign.
- **GPS location**: displays the GPS coordinates of the instrument in hypertext. This information is stored with each measurement campaign. If you are connected to the Internet, one click on the hypertext link will open an additional tab in Google Maps™:



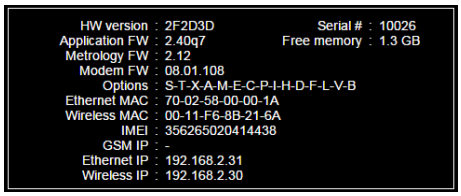
When changing a field relative to the location, the validation icon is displayed. The change must be validated in order to be taken into account for the next campaign. The validation icon disappears after validation.

5.2.3.3 Metrology



- **Last acoustical calibration date**: this information field indicates the date of the last calibration done using a noise calibrator.
- **Last electrical check status**: informs about the status at the last electrical check. “OK” means that the conditions are fulfilled. “NOTOK” means that the conditions are not fulfilled for at least one of the controlled frequencies.
- **Last accredited calibration date**: indicates the date of the last accredited calibration.

5.2.3.4 Additional information



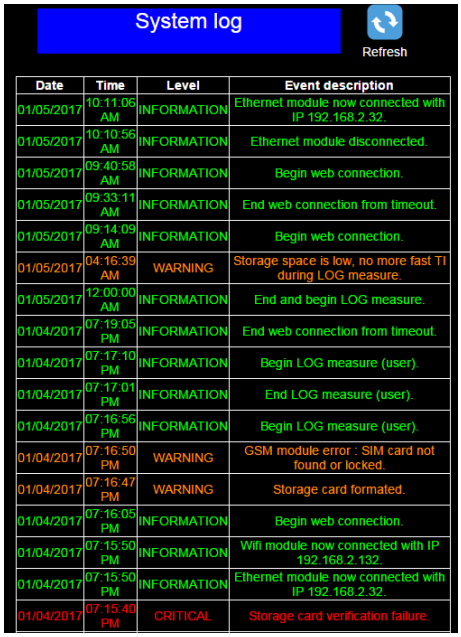
- **HW version**: hardware version number
- **Application FW**: application firmware number
- **Metrology FW**: metrology firmware number
- **Modem FW**: modem firmware number.
- **Options**: available options
- **Ethernet MAC**: Ethernet MAC identifier
- **Wireless MAC**: Wi-Fi MAC identifier
- **IMEI**: International Mobile Equipment Identity: unique number for mobile phone identifier
- **IP GSM**: public IP address on cellular network
- **Ethernet IP**: IP address for Ethernet link connection.
- **Wireless IP**: IP address for wireless infrastructure connection
- **Serial #**: serial number of the instrument
- **Free memory**: memory capacity remaining on SD card.

5.2.3.5 System log

Pressing the System log icon opens up a new tab listing all events, with 3 levels:

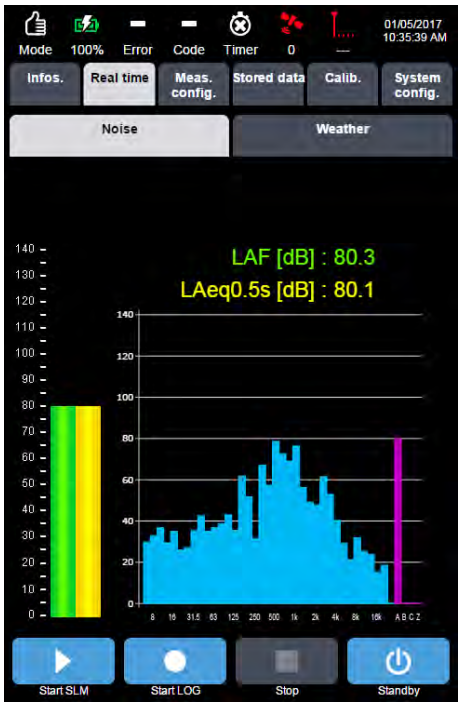
- CRITICAL: critical events are listed in red.
- WARNING: events requiring particular attention are displayed in orange.
- INFORMATION: informative events are listed in green.

Up to 500 events are stored in non-volatile memory. Beyond 500 events, the oldest event will be deleted upon occurrence of a new event.



Date	Time	Level	Event description
01/05/2017	10:11:06 AM	INFORMATION	Ethernet module now connected with IP 192.168.2.32.
01/05/2017	10:10:56 AM	INFORMATION	Ethernet module disconnected.
01/05/2017	09:40:58 AM	INFORMATION	Begin web connection.
01/05/2017	09:33:11 AM	INFORMATION	End web connection from timeout.
01/05/2017	09:14:09 AM	INFORMATION	Begin web connection.
01/05/2017	04:16:39 AM	WARNING	Storage space is low, no more fast TI during LOG measure.
01/05/2017	12:00:00 AM	INFORMATION	End and begin LOG measure.
01/04/2017	07:19:05 PM	INFORMATION	End web connection from timeout.
01/04/2017	07:17:10 PM	INFORMATION	Begin LOG measure (user).
01/04/2017	07:17:01 PM	INFORMATION	End LOG measure (user).
01/04/2017	07:16:56 PM	INFORMATION	Begin LOG measure (user).
01/04/2017	07:16:50 PM	WARNING	GSM module error : SIM card not found or locked.
01/04/2017	07:16:47 PM	WARNING	Storage card formated.
01/04/2017	07:16:05 PM	INFORMATION	Begin web connection.
01/04/2017	07:15:50 PM	INFORMATION	Wifi module now connected with IP 192.168.2.132.
01/04/2017	07:15:50 PM	INFORMATION	Ethernet module now connected with IP 192.168.2.32.
01/04/2017	07:15:40 PM	CRITICAL	Storage card verification failure.

5.2.4 Real-time displays (Real time\Noise tab)



The screen is split up in several actives zones:

- 'Instant values' zone
- 'Spectrum' zone
- 'XL instant values' zone (bargraph)

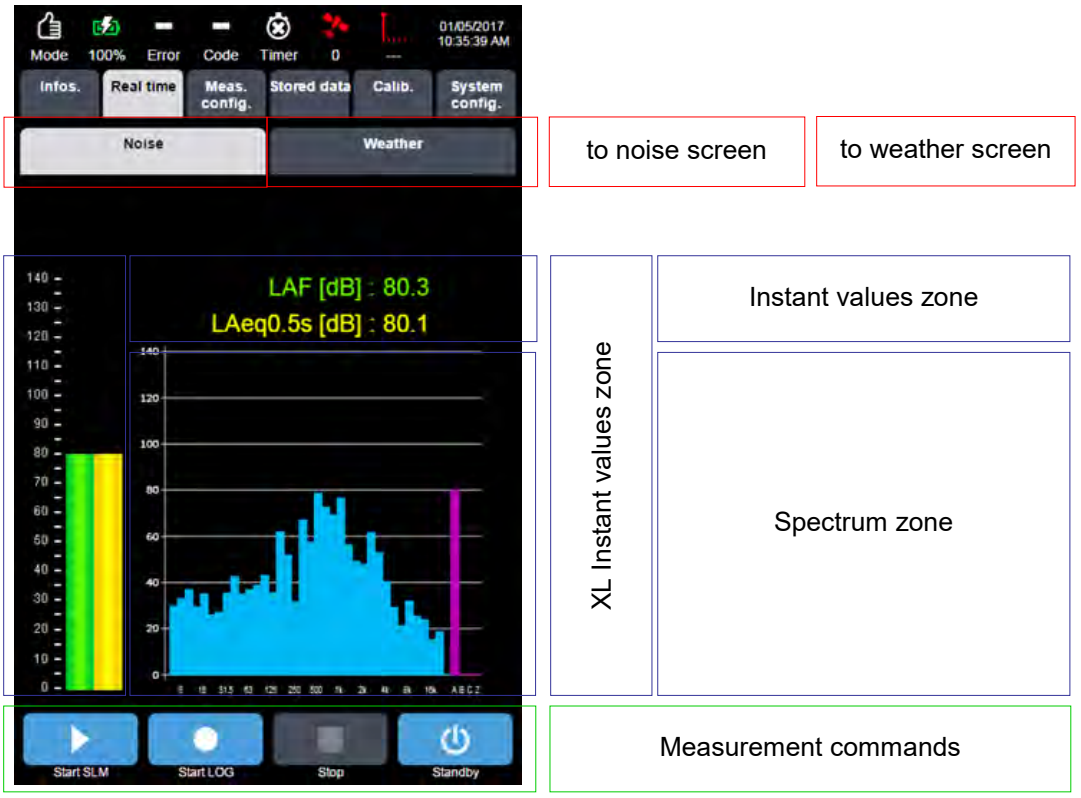
Clicking on the different zones of the screen allows changing the indicators on display, or switching from a graphic display (spectrum, graph) to a numerical display.

Note: Real-time displays are only indicative: due to the variable quality and rapidity of the connection, some configurations (especially GPRS connection) do not allow for real-time display of all measured data. The display sometimes freezes until the next data pack is received: this should be known to the user when using this display mode. However, "static" menus (Infos, Meas. config., Stored data, System config.) can be fully used in "slow" communication modes of GPRS type.

5.2.5 *Real time menu in Ready mode*

5.2.5.1 Real time/Noise screen in Ready mode

The following screen is displayed when opening the Real time tab in Ready mode:

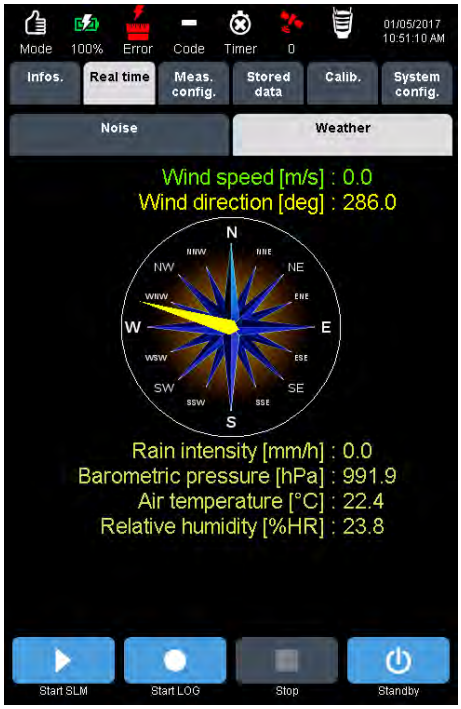


- Pressing (or left clicking with the mouse) the Instant values zone allows displaying the Instant Values page (4 values).
- Clicking on a value allows modifying the indicator on display.
- Pressing (or left clicking with the mouse) the Instant values zone allows displaying the Instant Values page (2 values).
- Pressing (or left mouse clicking) the Spectrum zone allows displaying the Spectrum page.
- Another click on the Spectrum zone allows displaying all the numerical values of related to the displayed spectrum.
- Press (or left click) the Weather sub-menu to display the Weather screen.

Displayed values can be modified by the user using the sub-menus described below.

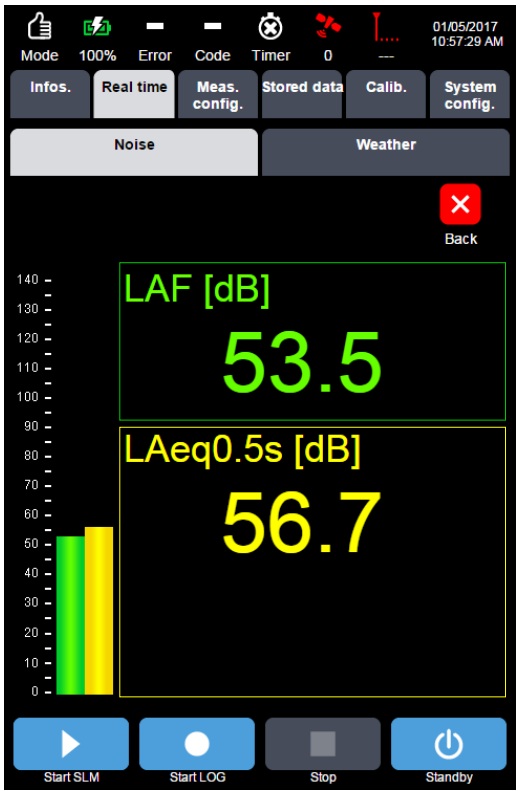
5.2.5.2 Real time\Weather screen in Ready mode

Weather screen display in Ready mode:



The values displayed on this screen cannot be modified by the user.

5.2.5.3 XL page in Ready mode (Noise)



- Press Back to go back to the main page of the Real time/Ready mode.

Modification of indicators on display (valid on all modes):

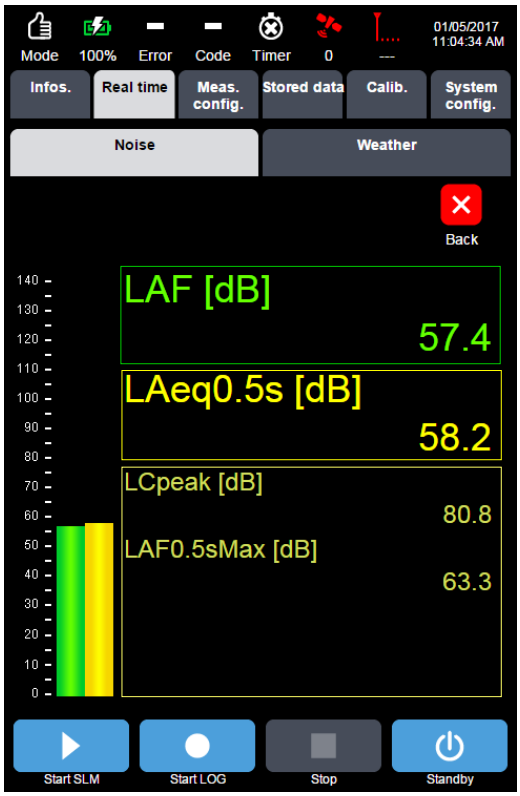
- Press the green zone to open a selection list that allows selecting the type of value and then the value to display.
- Click on an indicator in this list to open a new window allowing for finer selection, e.g., click on LXeq0.5s to select the type of Leq to display depending on the configuration (LAeq, LBeq, LCeq, LZeq).

- Press the yellow zone to display a selection list that allows selecting the value to display, like for the green zone.

The selected indicators are shown in the bargraph of the main page, in the Instant values page and in the Graph focus page.

The indicators can be selected among all measured parameters (see Paragraph 2.1.4.1 Ready and SLM modes). The selection list also includes a “Cancel” command, which allows going back without changing the value on display.

5.2.5.4 Instant values page in Ready mode (Noise)

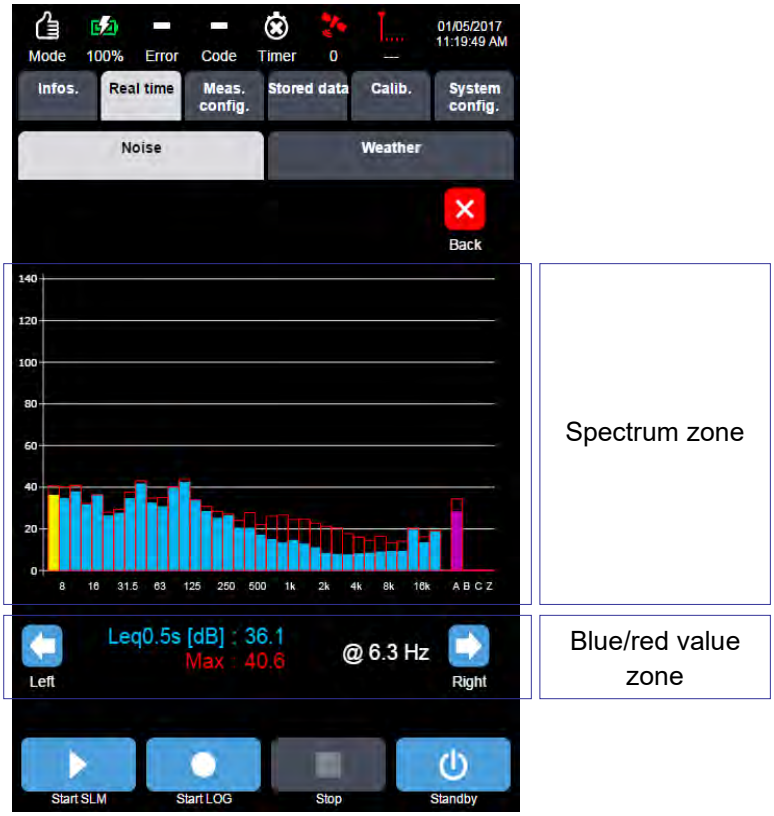


- Press Back to return to the main page of the Real time/Ready mode.
- Press the green, yellow or light yellow zones to open a selection list for the value to display, as described in the previous paragraph.

The selected green and yellow values will appear in the bargraphs of the main page, as well as in the Instant Values and Graph focus pages.

Values can be selected among all measured parameters (see Paragraph 2.1.4.1 Ready and SLM modes). The selection list also includes a “Cancel” command, which allows going back without changing the value on display.

5.2.5.5 Spectrum page in Ready mode

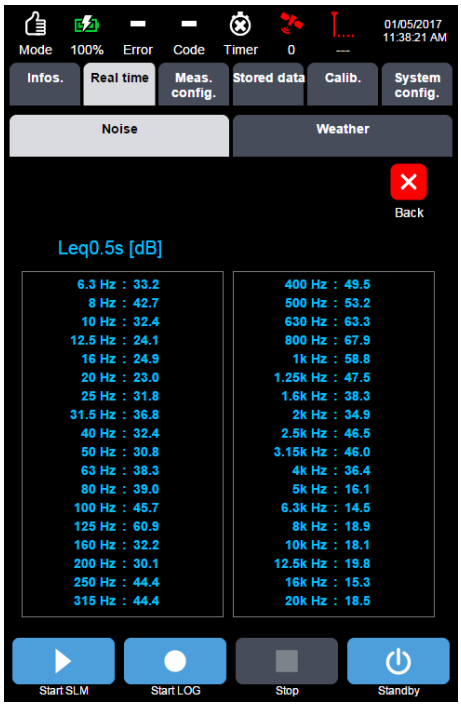


The visual display tool allows displaying, in addition to an average value, its maximum value collected (in red colour), refreshed every 5 sec (this latter value is only for display and is not stored in the measurement file).

“Left/Right” icons are used to move the cursor over the spectral bands. The numerical value of the selected band is displayed under the graph.

- Press Back to go back to the main real time / Ready mode page.
- Pressing the blue zone will open a selection list for the value to display. Values for display can be selected among Leq0.5s or LY. As previously described, the selection list also includes a “Cancel” command, which allows going back without changing the value on display.
- Pressing the spectrum zone will display numerical spectral values.

5.2.5.6 Spectral numerical values page in Ready mode



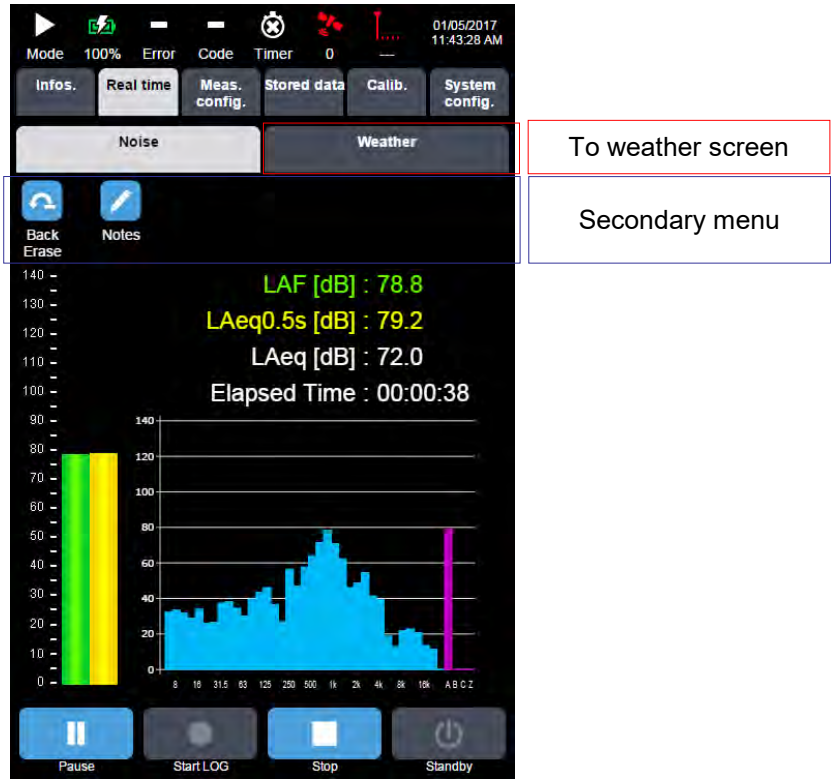
- Displayed values correspond to values selected on the Spectrum page (Leq0.5s for the example).
- Press Back to go back to the Spectrum page in Ready mode.

Note; a “v” sign in front of a numerical value indicates an under range or insufficient level for the corresponding frequency band.

5.2.6 *Real time menu in SLM mode*

5.2.6.1 Main screen

If the user launched a measurement in SLM mode (by pressing on Start SLM), the display is changed with two additional pieces of information as shown below: display in white of a user-selectable overall level and the time elapsed since the beginning of the measurement (information in white characters).



Furthermore, a secondary menu is displayed in each sub-menu of the real-time menu.

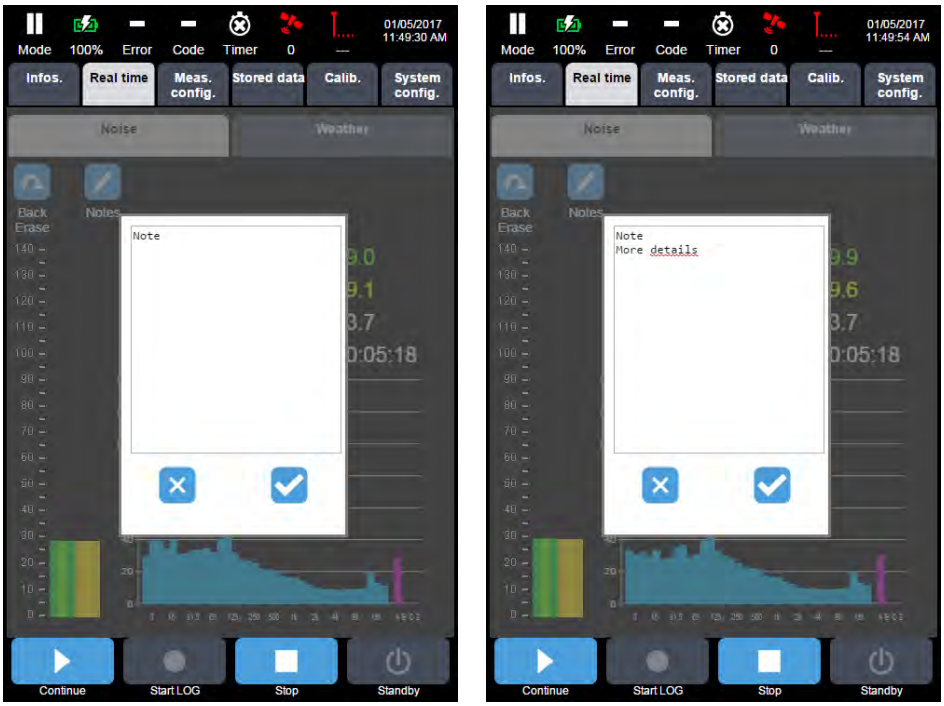
Back erasing is used to delete from any calculations the last x seconds of acquisition and the corresponding maximum and minimum values (measured during the erased time interval). Back erasing is done in real time mode or after a switch to pause.

The Back erase key turns green during 2 seconds in order to get feedback from the user.

Switching to Pause mode will stop the acquisition and calculations on overall values, as well as the collection of max/min values and time histogram. Instant values at the display rate will remain however updated.

The Pause icon is replaced with the Continue icon as shown below:

Press on Notes to open an input window.

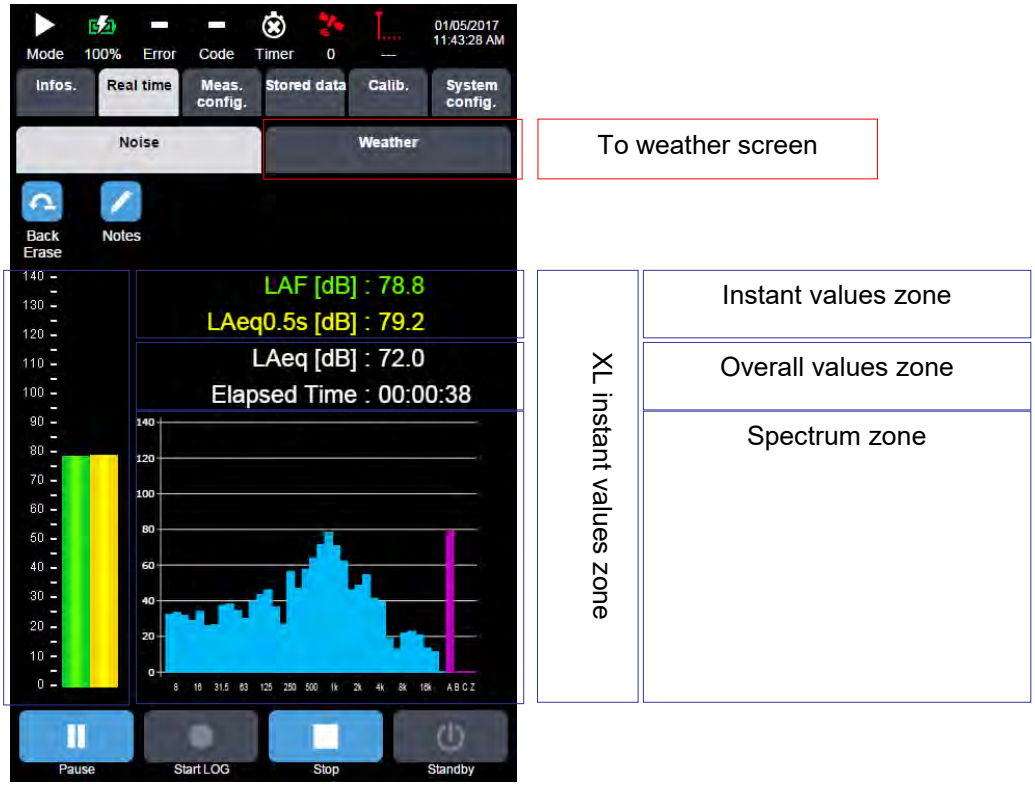


Press again to open the same note. The size of this text field is limited to 2000 characters.

If, upon the first opening, the operator does not type in anything, then the note is not created.

Notes recorded during the measurement can be accessed later on when processing the campaign in dBTRAIT.

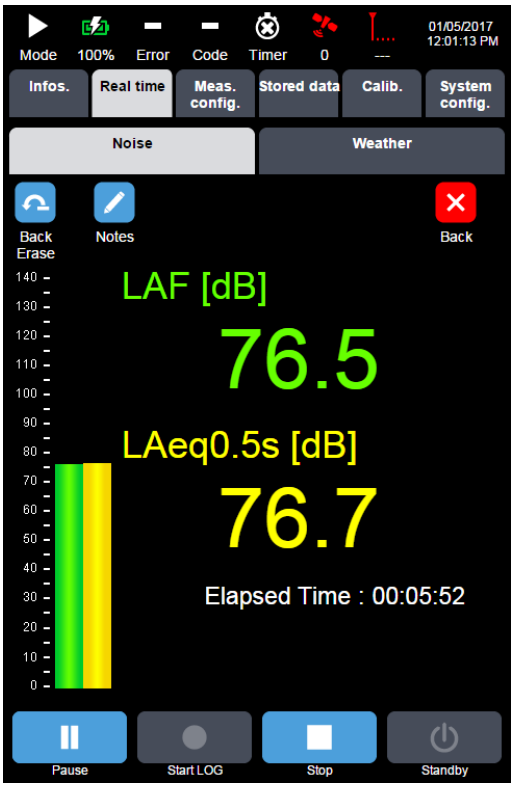
Press Stop to end the acquisition and automatically store the measurement.



- Press (or right click with the mouse) on the Instant values zone to display the Instant values page (4 values).
- Press (or right click with the mouse) on the XL Instant values zone to display the XL Instant values page (2 values).
- Click on a value to modify the indicator on display.
- Press the overall values zone to display the overall values integrated since the beginning of the measurement.
- Press (or left click with the mouse) on the Spectrum zone to display the Spectrum page.
- Press (or left click) the Weather sub-menu to display the Weather screen.

Note: in SLM mode, the weather values can be displayed in real time but are not stored.

5.2.6.2 XL page in SLM mode

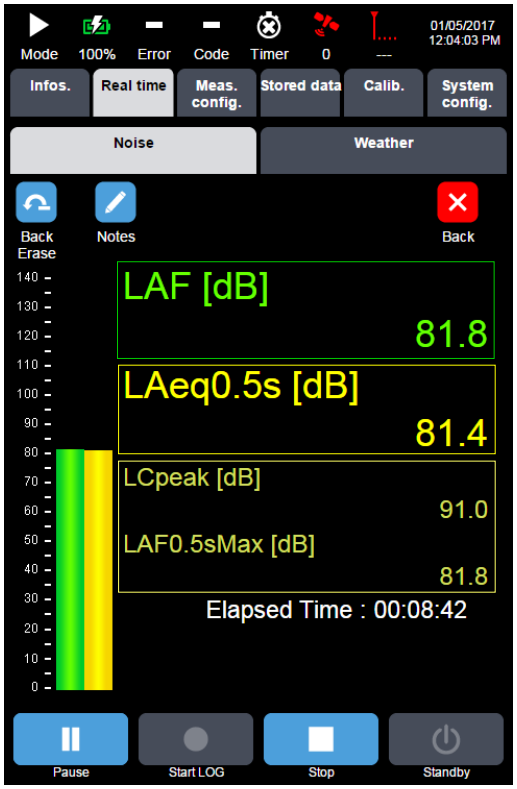


The display is very similar to the one in Ready mode, with the indication of the time elapsed since the beginning of the measurement.

The selected values are shown as numbers and bargraphs.

Values can be selected among all measured parameters (see Paragraph 2.1.4.1 Ready and SLM modes). The selection list also includes a “Cancel” command, which allows going back without changing the value on display.

5.2.6.3 Instant values page in SLM mode



Green value zone
Yellow value zone
Light yellow value zone

Here again the display is very similar to the one in Ready mode, with the indication of the time elapsed since the beginning of the measurement.

- Press Back to return to the main page of the Real time/Ready mode.
- Press the green or yellow zones to open a selection list for the value to display.
- Pressing the light green value zone will open a selection list for the value to display.

The selected values will appear in the bargraphs of the main page, as well as in the Instant Values and Graph focus pages.

Press the light yellow value zone to open a selection list for the value to display.

Values can be selected among all measured parameters. The selection list also includes a “Cancel” command, which allows going back without changing the value on display.

5.2.6.4 Spectrum page in SLM mode

“Left/Right” icons are used to move the cursor over the spectral bands. The numerical value of the selected band is displayed under the graph.

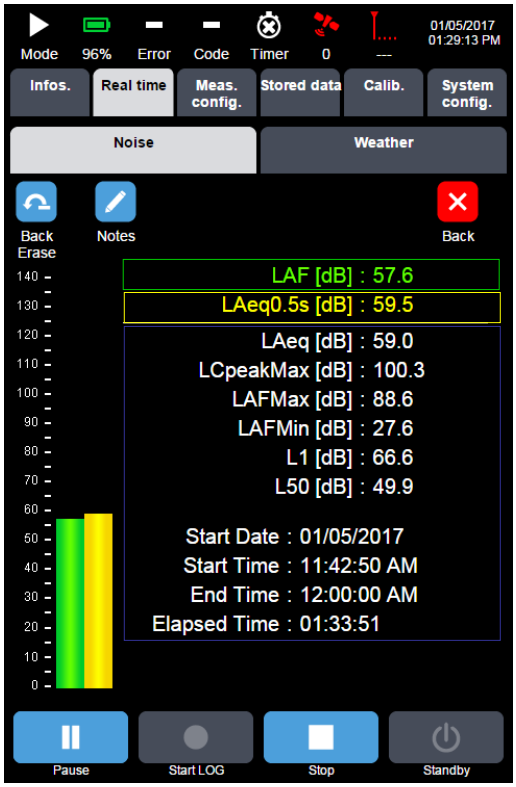
- Press Back to return to the main page of the Real time/SLM mode.
- Values for display can be selected among Leq0.5s, LYeq or LY. As previously described, the selection list also includes a “Cancel” command, which allows going back without changing the value on display.
- Press the frequency zone to display numerical spectral values.

5.2.6.5 Instant values page in SLM mode

- Displayed values correspond to values selected on the Spectrum page.
- Press Back to go back to the Spectrum page in Ready mode.

“Back Erase” and “Notes” actions are also available from this screen.

5.2.6.6 Instant values page in SLM mode



- Press Back to return to the main page of the Real time/SLM mode.
- Press the green zone to open a selection list for the value to display.
- Press the yellow zone to open a selection list for the value to display.

The selected values will appear in the bar graphs of the main page, as well as in the Instant Values and Graph focus pages.

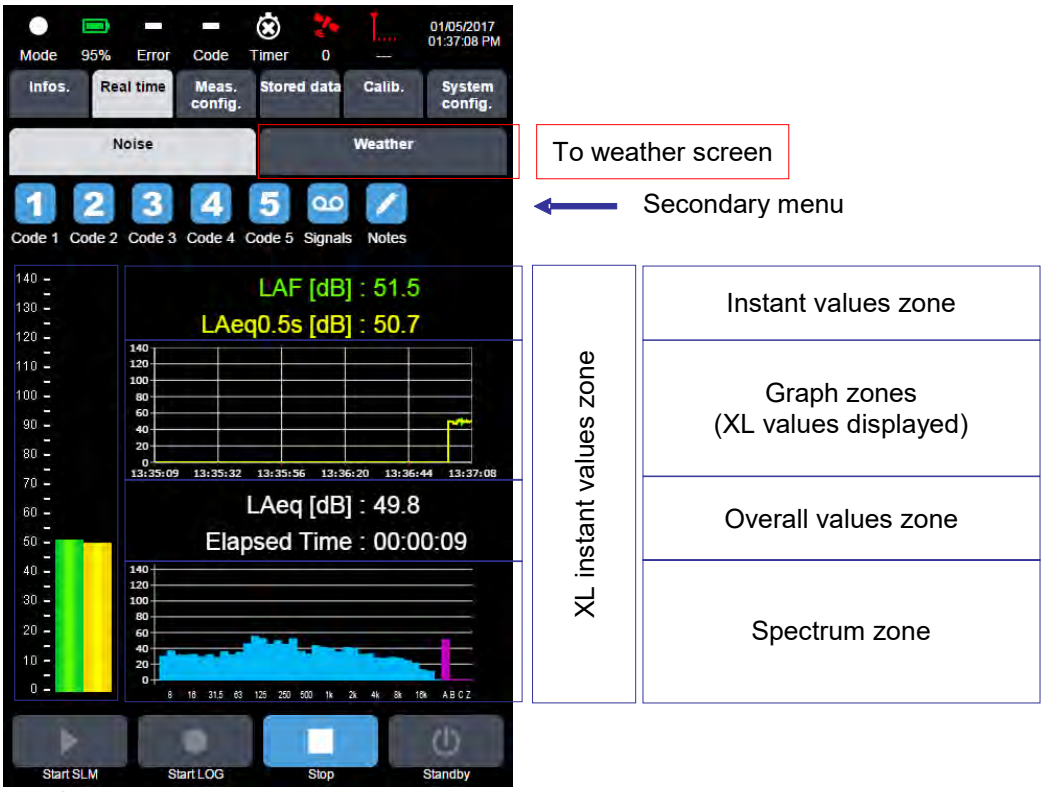
- Press the Values zone (white colour) to open a selection list among the available values.

The start date and time correspond to the starting date and time for the measurement.
The elapsed time represents the logging period of the measurement, with taking into account of the possible back erasing actions.

5.2.7 *Real time menu in LOG mode*

5.2.7.1 Main screen

The main screen includes several page selection zones:



Secondary menu:

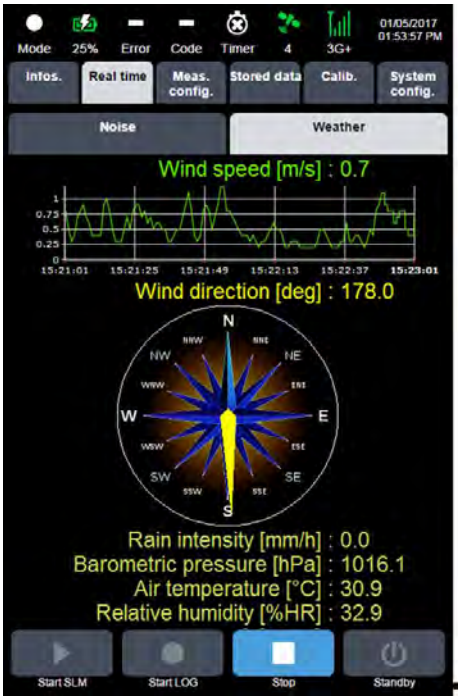
- Possibility to define codes 1, 2, 3, 4 and 5 (also called markers). Several codes can be activated simultaneously. When a coding is in progress, the corresponding icon becomes green and data are tagged at each logging period T.
- Triggering any code will start parallel storage at the fast logging period (if fast logging period shorter than standard logging period) of the indicators stored at the logging period, as well as the time (audio) signal, if selected.
- Pressing the Signal icon will launch an audio recording with no coding. The Signal icon turns green. Pressing this icon again will stop the signal recording. If the signal recording is triggered by the signal timer, then the icon automatically becomes green. The user can still have control by pressing the green Signal icon to force the manual stop of the recording of time signals.
- Pressing the Notes icon will open an input window pre-filled with the current date and time. Pressing this icon again will open a new note containing the new current date and time. The maximum size of each note is limited to 2000 characters. If after opening a note, the operator does not write anything, then the note will not be stored.
- Pressing (or left clicking) the Instant values zones will display the Instant values page (4 values).
- Pressing (or left clicking) the XL instant values zone will display the XL page (2 values).
- Pressing the overall values zone will display the overall values integrated since the beginning of the measurement.
- Pressing (or left clicking) the Spectrum zone will display the Spectrum page.

Weather screen:

- Press (or left click) the Weather sub-menu to display the Weather screen.

5.2.7.2 Secondary Weather screen in LOG mode

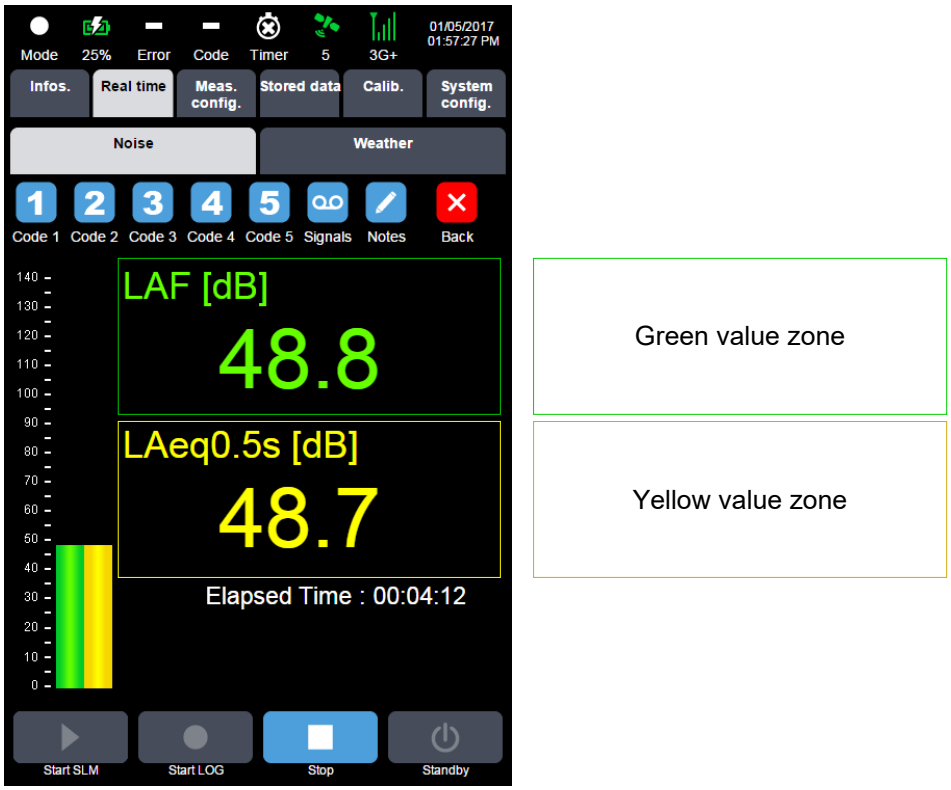
Weather screen display in LOG mode:



The values displayed on this screen cannot be modified by the user.

5.2.7.3 XL page

This screen displays the numeric bargraph values in an even larger size.



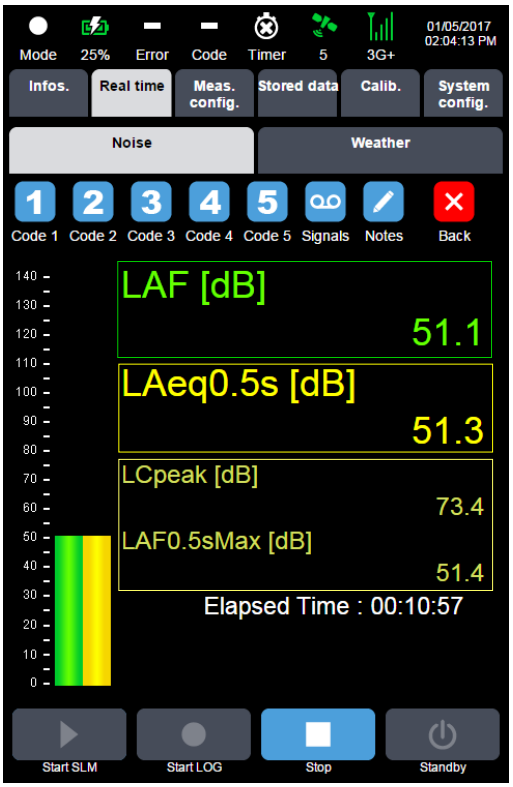
- Press Back to return to the main page of the Real time/LOG mode.
- Press the green zone to open a selection list for the value to display.
- Press the yellow zone to open a selection list for the value to display.

The selected values will appear in the bargraphs of the main page, as well as in the Instant Values and Graph focus pages.

The selection can choose among all parameters measured (See section 2.1.4.2 LOG). The selection list also includes a “Cancel” command, which allows going back without changing the value on display.

5.2.7.4 Instant values page in LOG mode

The values displayed on this page are calculated and refreshed every 500ms:



Green value zone

Yellow value zone

Light yellow value zone

The display is identical to the ready mode, with additional indication of the time elapsed since the start of measurement.

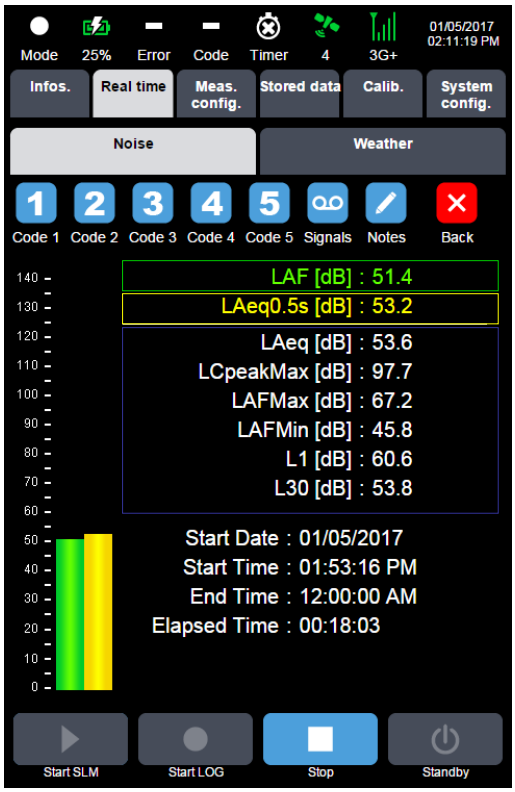
- Press Back to return to the main page of the Real time/LOG mode.
- Press the green zone to open a selection list for the value to display.
- Press the yellow zone to open a selection list for the value to display.

The selected values will appear in the bargraphs of the main page, as well as in the Instant Values and Graph focus pages.

The selection can choose among all parameters measured (See section 2.1.4.2 LOG). The selection list also includes a “Cancel” command, which allows going back without changing the value on display.

5.2.7.5 Overall values page in LOG mode

In this case the web interface is displaying overall values of selected indicators as calculated over the elapsed time.



Green value zone

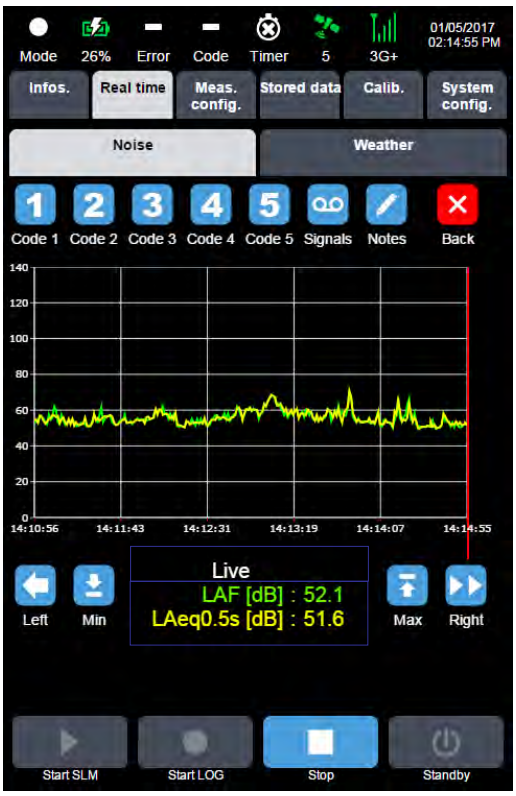
Yellow value zone

Individual selection zone

- Press Back to return to the main page of the Real time/LOG mode.
- Press the green zone to open a selection list for the value to display.
- Press the yellow zone to open a selection list for the value to display.
- The selected values will appear in the bargraphs of the main page, as well as in the Instant Values and Graph focus pages
- The selection can be chosen among all parameters measured (See sections 2.1.5.2 LOG DI ≤ 0.5s and 2.1.5.3 LOG DI > 0.5s).

5.2.7.6 Graph page

Clicking in the time history zone of the Real-time main screen will display the following page:



Time cursor
Selection zone of 2 values to display

The display allows viewing 2 minutes of current graphs live, the corresponding time indication and the levels of the 2 selected indicators corresponding to the cursor position.

- Press the green zone to open a selection list for the value to display.
- Press the yellow zone to open a selection list for the value to display.
- The selected values will appear in the bargraphs of the main page, as well as in the Instant Values and Graph focus pages.

Values can be selected among all measured parameters (see Paragraph 2.1.4.2 LOG). The selection list also includes a “Cancel” command, which allows going back without changing the value on display.
The related curves are updated every 500 msec.

Behaviour of the cursor:

- Starting position: on the far right, live.
- If the user presses Max or Min, the cursor goes to the maximum or minimum value of the section on display. After 2 minutes, the cursor goes back to the value on the far right, “live”.

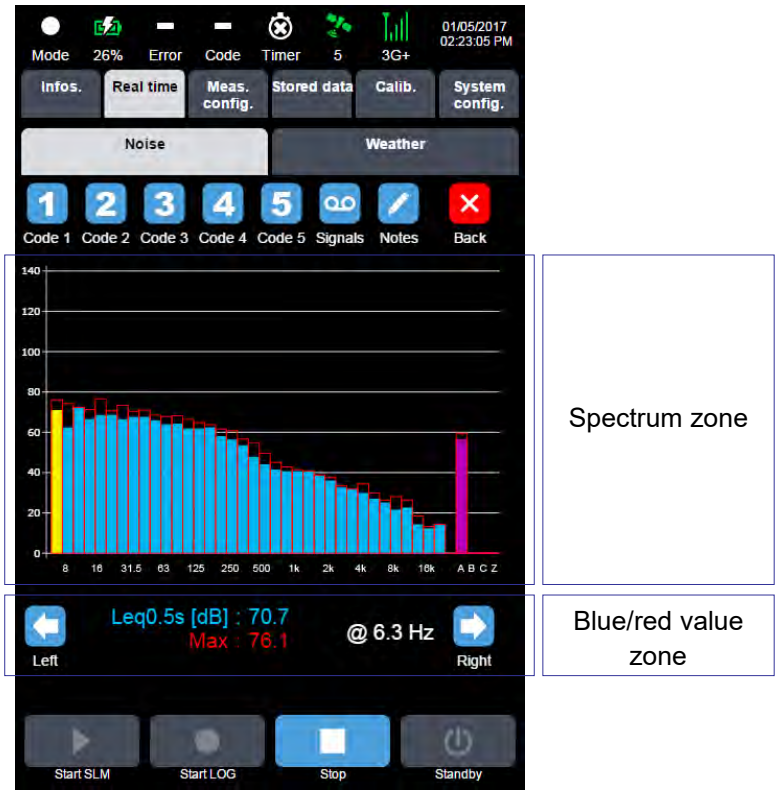
If the user moves the cursor to the left, then the cursor stays on the selected time value as long as it is displayed. After 2 minutes, the cursor naturally goes back to the far right value (“live”).

If the user presses Left, shift of the cursor by one value to the left.
If the user presses Right, shift of the cursor by 10 values to the right.

- Press Back to return to the main page of the Real time/LOG mode.

5.2.7.7 Spectrum page

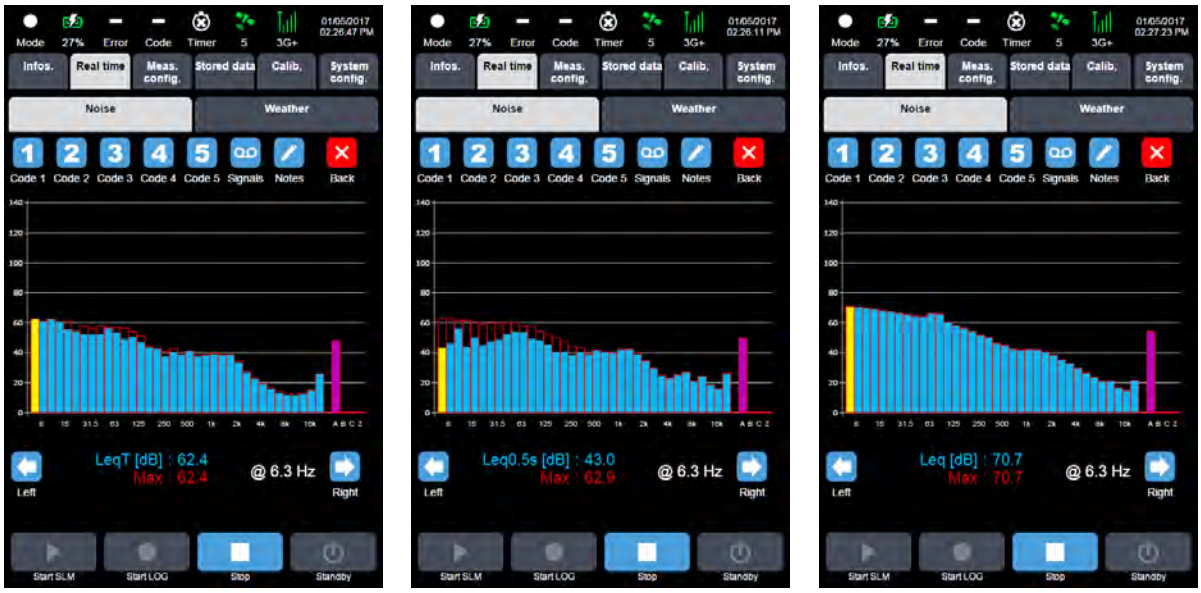
Clicking in the spectrum zone of the screen will display the following page:



The visual display tool allows displaying, in addition to an average value, its maximum value collected (in red colour), updated every 5 sec.

“Left/Right” icons are used to move the cursor over the spectral bands. The numerical value of the selected band is displayed under the graph.

- Press Back to return to the main page of the Real time/LOG mode
- Press the blue value to open a selection list for the value to display. The selected value is shown on the spectrum of the main page. This value can be selected among Leq0.5s or LY.

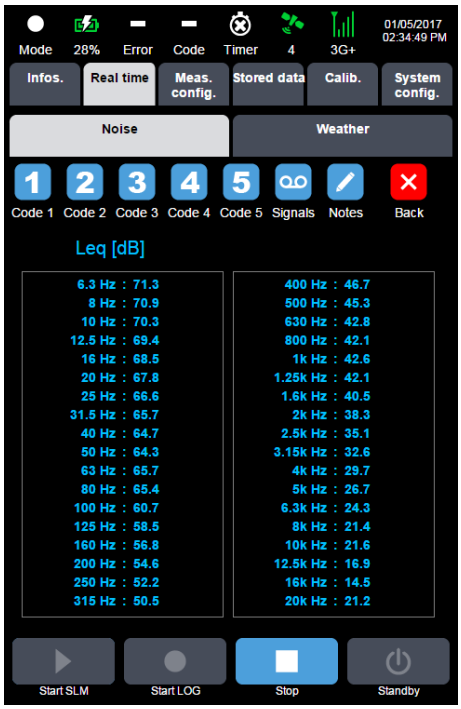


LeqT: equivalent continuous level calculated over the logging period
LeqT: equivalent continuous level calculated over the logging period
Leq: equivalent continuous level calculated since the measurement start
LYeq0.5s: equivalent continuous level based on LY calculated every 0.5 s
LY: Y-weighted sound pressure level refreshed every 0.5s

- Press the frequency zone to display the displayed spectral values in numerical form.

5.2.7.8 Numerical values page in LOG mode

This page is displayed by clicking on the spectrum zone of the previous screen.



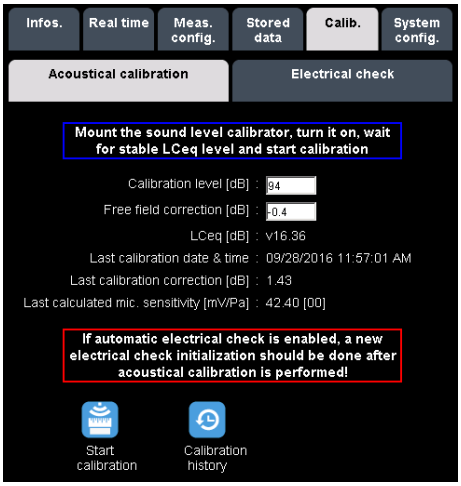
- Displayed values correspond to values selected on the Spectrum page (selected parameter us recalled on top left above the tables).
- Press Back to go back to the Spectrum page in LOG mode.

Note: a “v” sign in front of a numerical value indicates an under range or insufficient level for the corresponding frequency band.

5.3 CALIBRATION (CALIB. TAB)

5.3.1 Display 1: Status of the last calibration

The Calib. tab displays the following window:



The calibration level can be changed using the corresponding text field. The input value is validated by pressing the Start calibration button. This value is the one selected in case of an automatic calibration (detectable when the instrument is in Ready mode). It can be selected around 74, 94, 104, 114 and 124 dB by steps of 0.05 dB.

The free field correction is modified by the user within a range of values between -1 and + 1 dB.

- Configuration with a G.R.A.S. 40CD internal microphone requires a free field correction of -0.4 dB.
- Configuration with a DMK01 external microphone kit requires a free field correction of -0.2 dB for 40CD microphone.

The instrument stores 3 free field correction values in memory, and restores them individually for each configuration:

- value for internal 40CD microphone configuration (by default -0.4 dB)
- value for DMK01 configuration with 40CD (by default -0.2 dB)
- value for user microphone configuration (by default 0 dB).

Sound level calibrator must be compliant to IEC 60942 (CAL 21). The calibration frequency is 1000 Hz.

The displayed value corresponds to LCeq 0.5 seconds.

Information relative to the last calibration is displayed.

The Start calibration command button is used to start a new calibration procedure: the display is shown below (display 2).

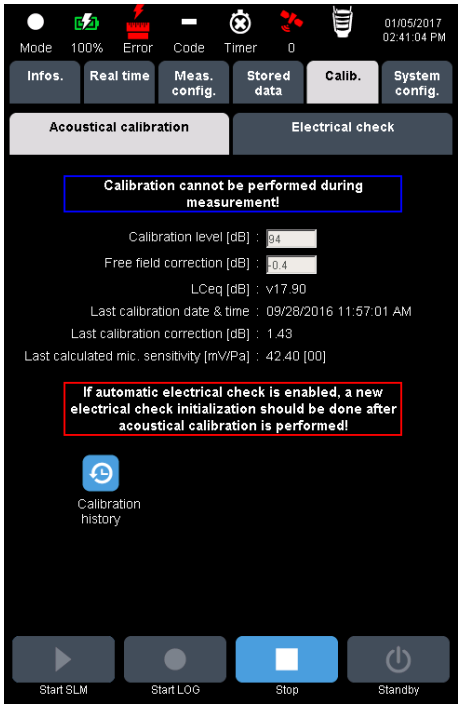
The Calibration history command button launches display 5, shown below.

Please remember the following and important instruction:

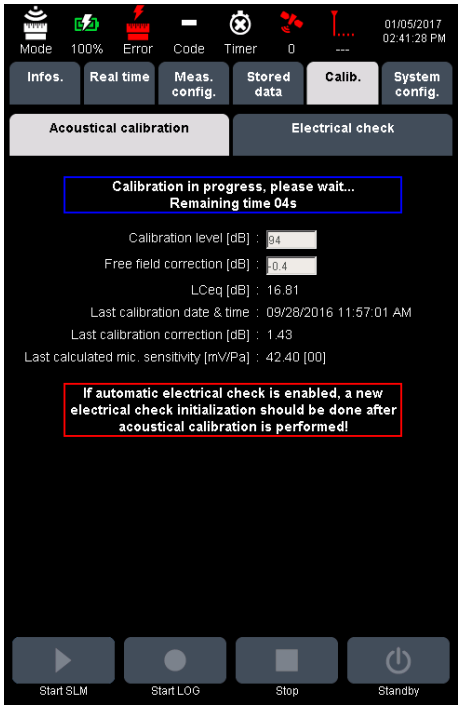
If automatic electrical check is enabled, a new electrical check initialization should be done after acoustical calibration is performed!

This must be respected in case of active automatic electrical check.

If a measurement is in progress, then the Calibration menu only allows viewing the calibration history:



5.3.2 Display 2: Calibration in progress

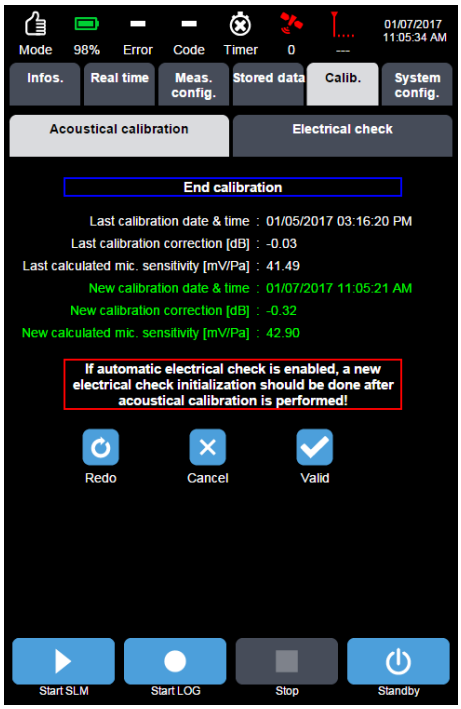


During calibration, command buttons are disabled and no measurement can be launched.

The calibration occurs on the LCeq value, with an integration time of 8 seconds. Wait for the signal of the noise calibrator to stabilise before starting the calibration procedure.

Note: This page automatically appears if the user has placed the standard noise source on the microphone and has activated it, whatever page displayed beforehand.

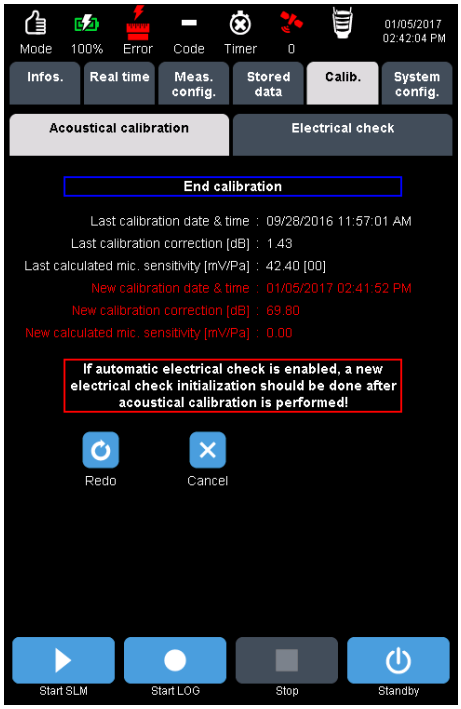
5.3.3 *Display 3: End of calibration with satisfactory value (correction < 1.5 dB)*



The new calibration values are indicated in green. The user can either redo, or cancel or validate this new calibration.

- Press Redo to go back to Display 2.
- Press Validate to save the new calibration data.

5.3.4 *Display 4: End of calibration with wrong value (correction > 1.5 dB)*

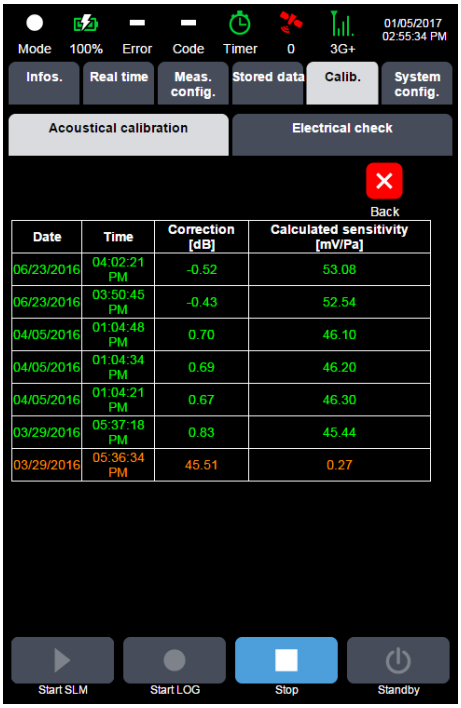


The new calibration values are indicated in red. The user can either redo or cancel the calibration procedure.

- Press Redo to go back to Display 2.
- Press Cancel to go back to Display 1.

Note: If the calibration fails again, this means that the tolerance of +/-1.5dB for the calibration correction is exceeded: either the microphone sensitivity has decreased, or the microphone is damaged. In any event, the instrument must be returned to the factory.

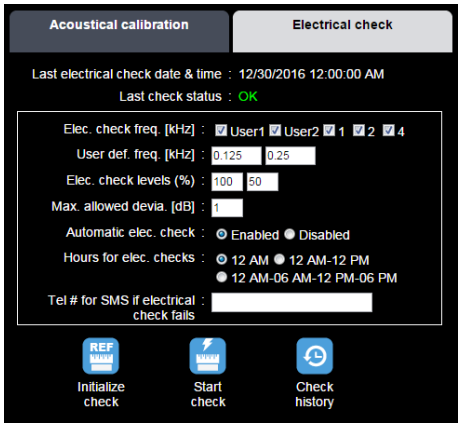
5.3.5 Display 5: Calibration history



A summary table listing the results of previous calibrations is available to view the calibration history.

Up to the last 500 calibration values are stored in the memory.

5.3.6 Display 6: Electrical check



The electrical check is used to perform a test of the entire measurement chain, including the microphone capsule. It consists in injecting a sinusoidal charge into the microphone at selected frequencies at one or two levels relative to the maximum level. The principle is to collect the reference values (electrical check set-up) and to check that the possible deviation between the reference values and the actual measured values (obtained at periodic intervals upon the user's choice for automatic check, or just from time to time on user's action) does not exceed a maximum deviation, which is typically set to 0.5 dB.

If only one excitation level is required, one just needs to set the second level ratio to 0%.

- **User frequencies** (User 1 and User 2): two user frequencies can be selected, in 1 Hz steps from 10 Hz to 20 kHz. Default values: 125 and 250 Hz.
- **Elect. check levels**: excitation level ratios can be selected between 0 and 100%. 0% means no activated second level. An excitation level ratio of 100% corresponds to an equivalent sound level of about 102 dB.
- **Max. allowed devia**.: maximum deviation beyond which the electrical check is NOT OK (typically, 0.5 dB). This input value ranges from 0.2 dB and 1.5 dB, by steps of 0.1 dB.
- **Automatic electrical check**: if this option is active, the instrument will automatically launch an electrical check sequence at the scheduled check times.
- **Tel # for SMS if electrical checks fails**: allows sending an SMS in case of electrical check failure
- **Initialize check**: allows setting up the reference values. It is recommended that a new set-up be done after an acoustical calibration.
- **Start check**: launches the checking procedure.
- **Check history**: displays the electrical checks history.

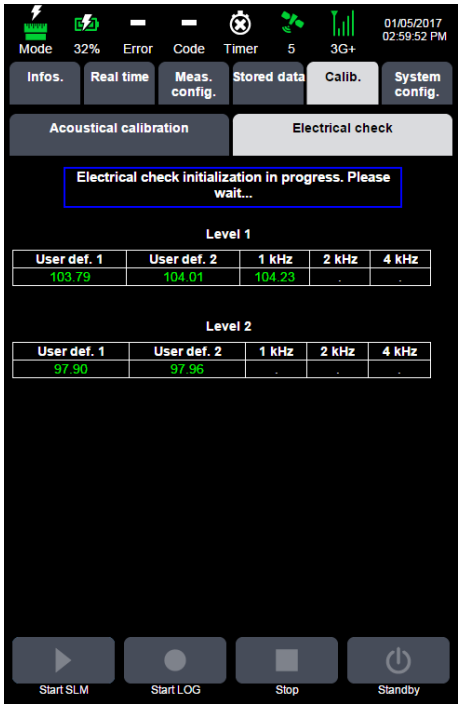
Note: for easier validation of the measurements, each electrical check occurs after the closing of the campaign in progress and is followed by the opening of a new campaign. In case the electrical check fails, only the previous campaign is affected. In SLM mode, the automatic electrical check is deactivated.

Note: Electrical check does not replace an acoustic calibration; it comes as an additional tool for periodic automatic tests of the whole measurement chain.

Note: In case of an ongoing event while a CIC is supposed to occur, the electrical check is discarded until the next scheduled time window.

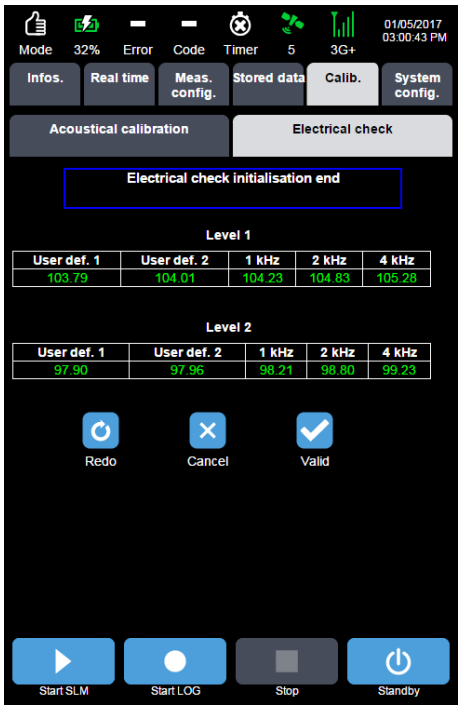
We recommend using:
- the 3 predefined frequencies
- user frequencies at 0.125 kHz and 0.250 kHz.
- one level at 100% and the other at 0% (single pass).
- For better fault sensitivity, use 0.35 dB as the max. deviation.

5.3.7 Display 7: Set-up of the current electrical check



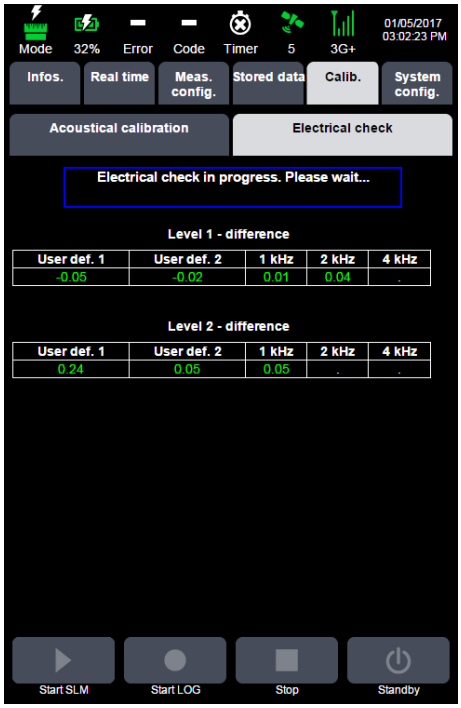
The current display shows the progress of the measurements (about 4 seconds per frequency and per level).

5.3.8 Display 8: End of electrical check set-up



Reference values are indicated and saved. The user can redo, cancel or validate this set-up.

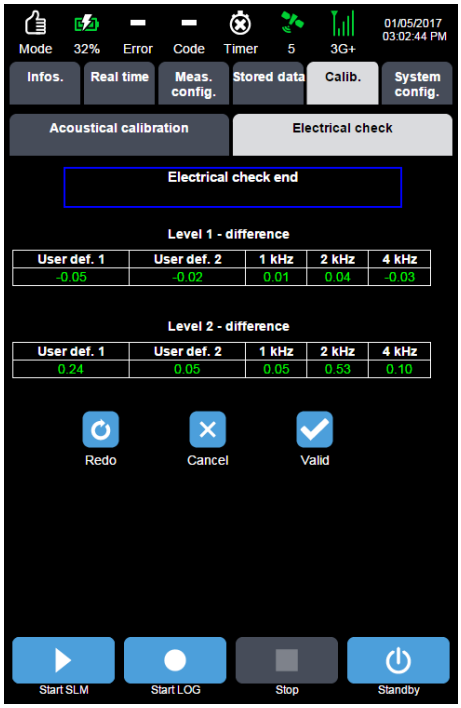
5.3.9 Display 9: Electrical check in progress



Indicated values correspond to the difference between reference values and the values of the measurement in progress.

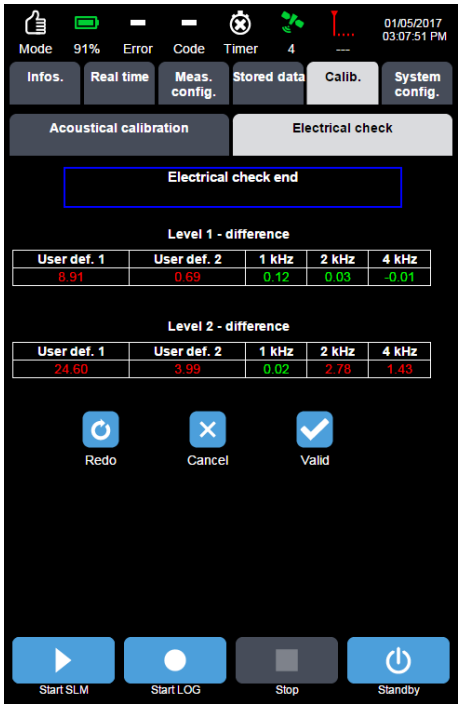
The green colour means that the difference is within tolerance. Red display means that the measurement is out of tolerance.

5.3.10 Display 10: End of electrical check with OK test



The new check values are indicated in green. The user can either, redo, cancel or validate this new electrical check.

5.3.11 Display 11: End of electrical check with NOK test



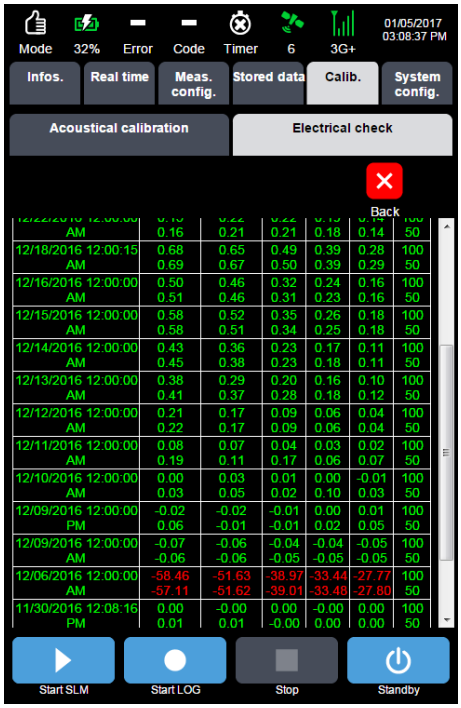
The new values are shown in green if they fulfil the maximum deviation condition, else in red. The user can redo, cancel or validate this new electrical check.

The off-tolerance results can be due to a microphone default or more generally a default of the measurement chain, but also to some high interference (over 10 dB below the excitation level measured during set-up) during the electrical check.

If the electrical check still yields off-tolerance results, the instrument should be returned to the factory.

Note: the status bar shows an electrical check error (3rd icon from the top left). This indication disappears as soon as a new electrical check fulfils the maximum deviation condition.

5.3.12 Display 12: History of electrical checks



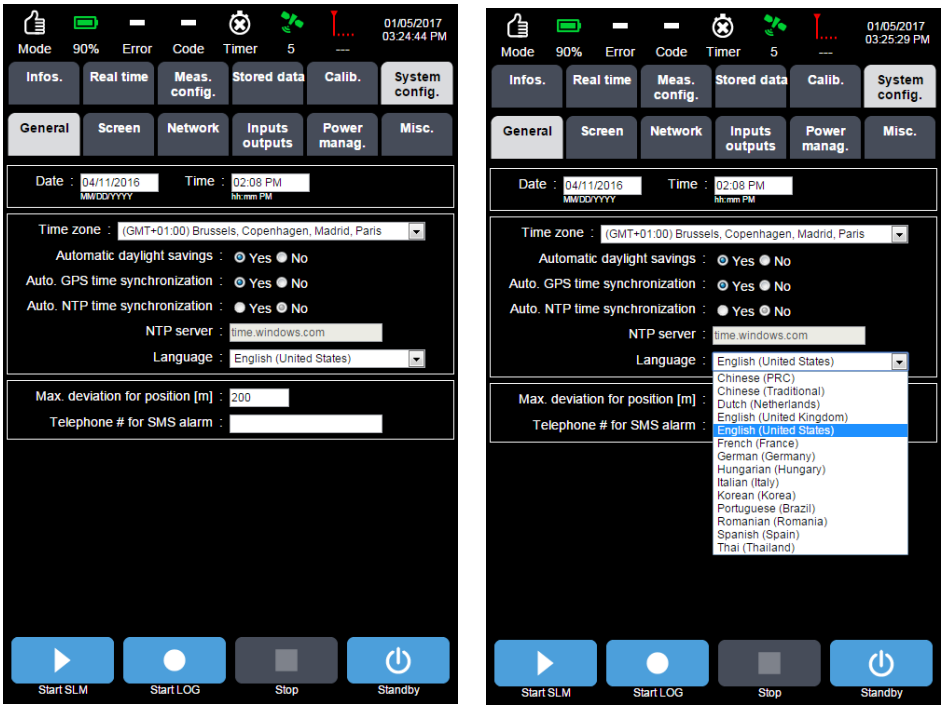
AM	0.16	0.21	0.21	0.18	0.14	50
12/18/2016 12:00:15 AM	0.68 0.69	0.65 0.67	0.49 0.50	0.39 0.39	0.28 0.29	100 50
12/16/2016 12:00:00 AM	0.50 0.51	0.46 0.46	0.32 0.31	0.24 0.23	0.16 0.16	100 50
12/15/2016 12:00:00 AM	0.58 0.58	0.52 0.51	0.35 0.34	0.26 0.25	0.18 0.18	100 50
12/14/2016 12:00:00 AM	0.43 0.45	0.36 0.38	0.23 0.23	0.17 0.18	0.11 0.11	100 50
12/13/2016 12:00:00 AM	0.38 0.41	0.29 0.37	0.20 0.28	0.16 0.18	0.10 0.12	100 50
12/12/2016 12:00:00 AM	0.21 0.22	0.17 0.17	0.09 0.09	0.06 0.06	0.04 0.04	100 50
12/11/2016 12:00:00 AM	0.08 0.19	0.07 0.11	0.04 0.17	0.03 0.06	0.02 0.07	100 50
12/10/2016 12:00:00 AM	0.00 0.03	0.03 0.05	0.01 0.02	0.00 0.10	-0.01 0.03	100 50
12/09/2016 12:00:00 PM	-0.02 0.06	-0.02 -0.01	-0.01 -0.01	0.00 0.02	0.01 0.05	100 50
12/09/2016 12:00:00 AM	-0.07 -0.06	-0.06 -0.06	-0.04 -0.05	-0.04 -0.05	-0.05 -0.05	100 50
12/06/2016 12:00:00 AM	-58.46 -57.11	-51.63 -51.62	-38.97 -39.01	-33.44 -33.48	-27.77 -27.80	100 50
11/30/2016 12:08:16 PM	0.00 0.01	-0.00 0.01	0.00 -0.00	-0.00 0.00	0.00 0.00	100 50

A summary table listing the results of the previous electrical checks is available to view the calibration history.

Up to the last 500 calibration values are stored in the memory. The recording of the 501st result will erase the 1st recorded result

5.4 SETTING UP THE MEASUREMENT SYSTEM

5.4.1 General points



- **Date & time**: allows for manual input of date and time parameters. These fields are modified automatically if one of the clock synchronisation options (GPS or NTP) is active and operational.
- **Time zone**: allows selecting the relevant time zone.
- **Automatic daylight savings**: allows for automatic taking into account of Summer time/Winter time.
- **Auto. GPS time synchronisation**: allows for automatic synchronisation of the clock with the GPS clock. This option is operational if at least four GPS satellites are detected.

- **NTP clock synchronisation**: allows for automatic synchronisation of the clock on the instrument using NTP (Network Time Protocol). This option can only be enabled if GPS clock synchronisation is not enabled. This option is operational if the instrument is connected to the Internet.

Note: automatic clock synchronisation, by GPS or NTP, does not occur during measurement. If a clock offset is detected during a measurement, it is corrected at the end of the measurement. In particular, for continuous measurements, the clock can be corrected at midnight, as measurements are systematically closed and restarted at midnight.

For example, if the clock is found to be 2 minutes slow during a measurement, the measurement will be stopped at 23:58 (actually midnight). A new measurement will immediately be started. The clock correction will be recorded in the event log.

If the clock is found to be 2 minutes fast during a measurement, the measurement will be stopped at 00:02 (actually midnight). A new measurement will immediately be started. The clock correction will be recorded in the event log. When processing the measurements using dBTRAIT, there will be overlapping data for the period from 0:00 to 0:02. dBTRAIT software includes an automatic function to handle this overlap, whereby the measurements from 0:00 to 0:02 corresponding to the clock reset are automatically retained.

- **NTP server**: used to define the NTP server

Example: time.windows.com

- **Language**: possible selection among for instance: English, Chinese (PRC & Traditional), Dutch, French, German, Hungarian, Italian, Korean, Portuguese, Romanian, Spanish (Castilian), Thai… and more through software updates.

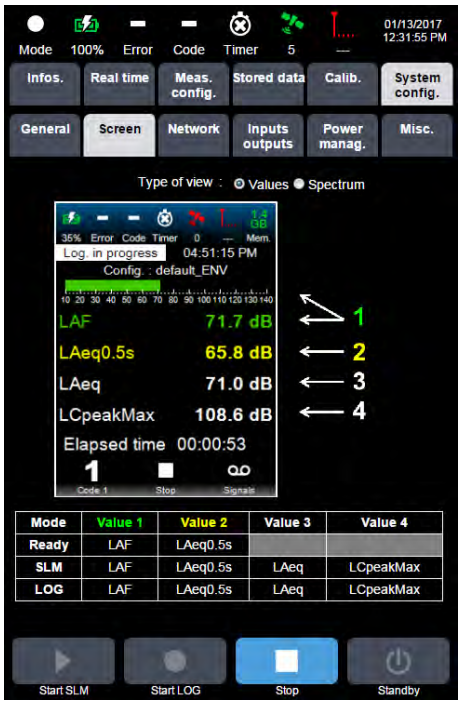
- **Max. deviation for position [m]**: this is used for an alert if the instrument is moved unexpectedly. The function defines the maximum movement (in metres) allowed before an alert is issued. The unit's movement is calculated from the GPS coordinates stored in the current measurement and the current GPS coordinates. The default value is 200 m. If there are fewer than four GPS satellites visible, this trigger is automatically disabled. Set this value to 0 to disable this function.

- **Tel. number for text alert**: used to define a telephone number to which a text message is sent if the instrument is moved unexpectedly. This function requires the unit to have a SIM card installed and correctly configured for sending SMS text messages.

5.4.2 Built-in screen

This function allows customising the built-in screen of the instrument. The user can select the indicators to display on this screen, and this for each operating mode.

5.4.2.1 Display mode: values

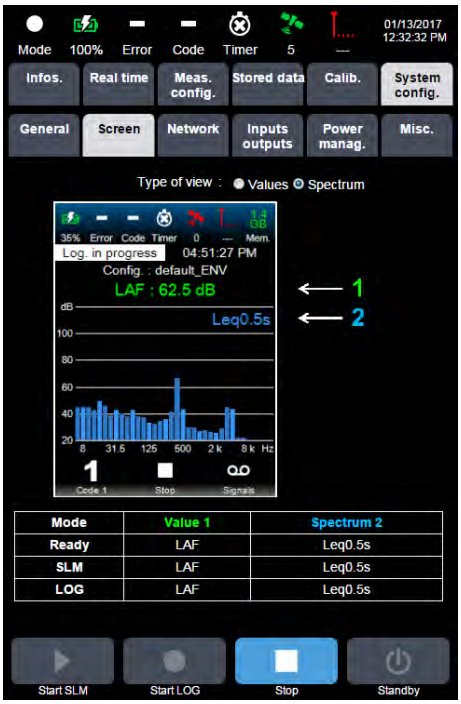


Internal display example for values

The selection is done among all possible values selected in the current measurement configuration, each box with a red frame (as shown below) opening the appropriate selection list. Green and yellow values are instant values, while white values are overall values.

If “None” is selected (except for value 1, where “none” cannot be selected: the instrument is always displaying at least 1 value!), then the line is not displayed and the character size on the internal screen is readjusted accordingly (1, 2, 3 or 4 lines).

5.4.2.2 Display mode: spectrum



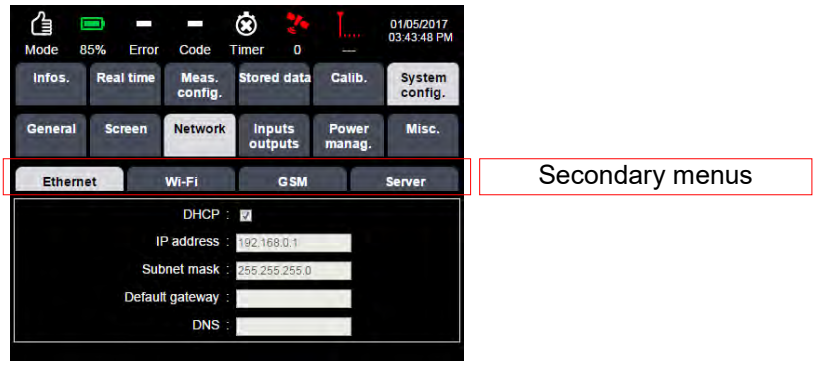
Internal display example for spectrum

The choice of displayed values is made the same way among the values selected in the measurement configuration.

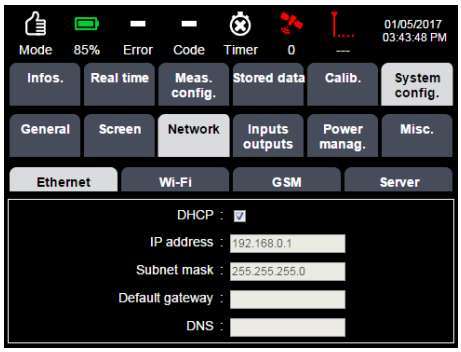
The user can select the wanted display directly on the instrument with a shortly press on the ON/OFF key (see § 4.1.4)

5.4.3 *Network*

In this sub-menu, the user can access the configuration of the instrument's communication modes and protocols via various secondary menus.



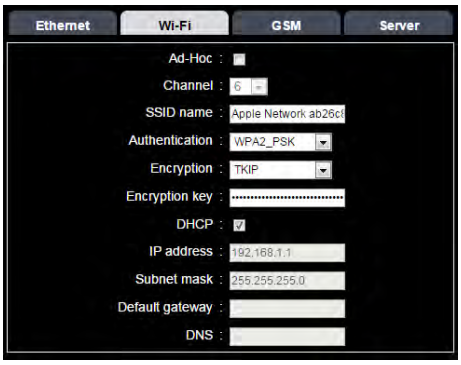
5.4.3.1 Ethernet sub-menu



The following parameters can be configured by the user:

- **DHCP**: this option enables the IP address to be configured automatically when it is connected to a network that has a DHCP server (e.g. a corporate network). Once DHCP field ticked, an IP address and related subnet mask are automatically assigned.
- Ethernet **IP address**
- **Subnet mask**
- **Default gateway**
- **DNS**

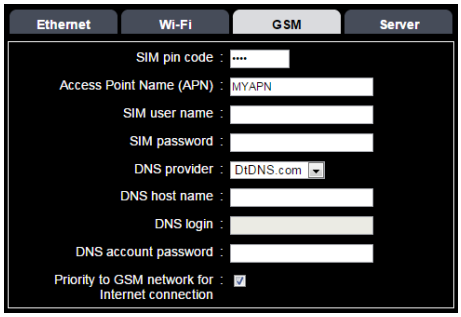
5.4.3.2 Wi-Fi sub-menu



The following parameters can be configured by the user:

- **Ad-hoc**: Ah-hoc mode if activated
- **Channel**: if Ad-hoc active, the channel can be selected (selection between 1, 6 or 11).
- **SSID name**: Name of the Wi-Fi network to which the instrument connects.
- **Authentication**: choice between WEP, WPA, WPA_PSK, WPA2, WPA2_PSK or disable
- **Encryption**: Wi-Fi encryption option
- **Encryption key**: encryption key if the authentication option is selected.
- **DHCP**: Dynamic Host Configuration Protocol
- Wi-Fi **IP address**
- **Subnet mask**
- **Default gateway**
- **DNS**: Domain name system

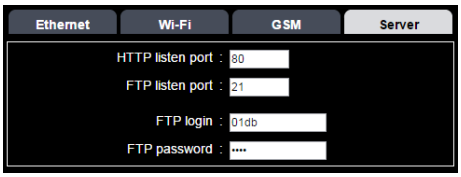
5.4.3.3 GSM sub-menu



The following parameters can be configured by the user:

- **SIM PIN code**
- **Access point name (APN)**
- **SIM user name**: required by some operators in some countries
- **SIM password**: required by some operators in some countries
- **DNS provider:** DtDNS or DynDNS
- **DNS host name**
- **DNS login**
- **DNS account password**
- **Priority to GSM network for Internet connection**: in scenarios where two modes of communication to the Internet are active at the same time at the same instant (via Ethernet / ADSL and 3G network), this option allows you to prioritize one of two modes. If preferred mode selected is defective, the other mode is automatically made functional.

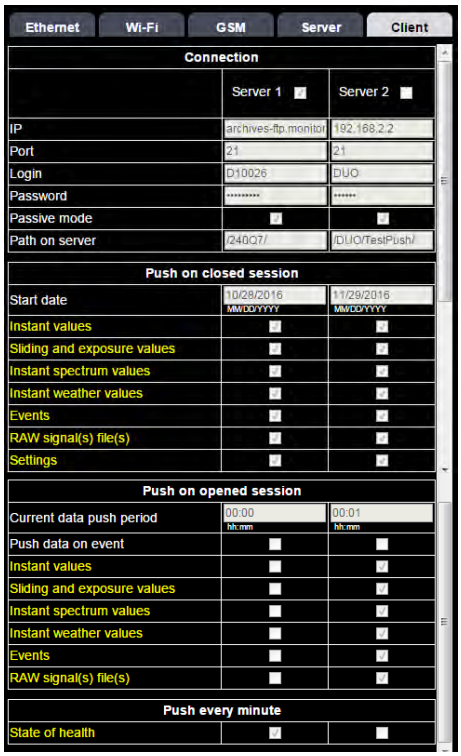
5.4.3.4 Server sub-menu



The following parameters can be configured by the user:

- **HTTP listening port**
- **FTP listening port**
- **FTP login**: for file transfer
- **FTP password**: for file transfer

5.4.3.5 Client Sub-menu



Client sub-menu allows for configuring the automatic push data transfer
The following parameters can be configured by the user:

- **Connection** - It is **possible** to configure the two servers independently
  - **Server 1:** transfer of data to a primary server
  - **Server 2:** transfer of data to a secondary server
  - **IP:** IP address of the server
  - **Port:** Port of the server
  - **Login:** login for server access
  - **Password:** password for server access
  - **Passive mode:** communication is initiated by the client; when Passive mode is unselected , data transfer is done using active mode
  - **Path on server:** sub-directory on the server where data will be uploaded (facultative)

- **Push on closed session**
  - **Start date:** on activation of the server, existing data on the SD card will be pushed from that date
  - The following parameters allows for selecting the types of data to upload:
    - **Instant values**
    - **Sliding and exposure values**
    - **Instant spectrum values**
    - **Instant weather values**
    - **Events**
    - **RAW Signal(s) file(s) :** RAW or MP3 signal(s) file(s)
    - **Settings**

- **Push on opened session :** In this mode, the data are pushed in append mode while the measurement session is open.
  - **Push data every:** ability to push data in append mode at each period defined in this field HH: mm (default 00:00: open session push mode disabled).
  - **Push data on event:** if selected, when an event occurs, the data of the event selectable below will be pushed (Note: A delay could be occurred between the end of the event and the beginning of the push).
  - The following parameters allows for selecting the types of data to upload:
    - **Instant values**
    - **Sliding and exposure values**
    - **Instant spectrum values**
    - **Instant weather values**
    - **Events**
    - **RAW Signal(s) file(s) :** RAW or MP3 signal(s) file(s)

- **Push every minute:** This functionality allows the instruments to write every minute an XML file on the selected server with the most important information for State Of Health (SOH)

State of Health data (in .XML format) contains the following information:

```
<StateOfHealth version="1">
      <Model>DUO</Model>
      <Device>1100</Device>
      <SerialNumber>10018</SerialNumber>
      <LocalTime>2017-01-04T19:02:55</LocalTime>
      <TimeZone>Romance Standard Time</TimeZone>
      <Bias>-60</Bias>
      <ModeState>3</ModeState>
      <LicenseEndDate></LicenseEndDate>
      <BatteryCapacity>8</BatteryCapacity>
      <BatteryState>0</BatteryState>
      <ChargerPresent>1</ChargerPresent>
      <FreeMemoryMb>1816</FreeMemoryMb>
      <StorageState>4</StorageState>
      <NbSatellites>5</NbSatellites>
      <Latitude>45.811</Latitude>
      <Longitude>4.77413</Longitude>
      <GSMStrength>4</GSMStrength>
      <GSMNetwork>4</GSMNetwork>
      <GSMIP>90.121.122.252</GSMIP>
      <HTTPPort>1050</HTTPPort>
      <WeatherState>0</WeatherState>
      <TTLInputState>0</TTLInputState>
      <CheckError>0</CheckError>
      <NewHistory>1</NewHistory>
      <EventAlarm Code="x">x</EventAlarm>
      <EventAlarm Code="x">x</EventAlarm>
</StateOfHealth>
```

“Model” Tag: commercial name of the device (DUO or CUBE)

“Device” Tag: 01dB/CMG device type (DUO=1100, CUBE=1600)
“SerialNumber” Tag: Serial number (typically 5 numbers)
“LocalTime” Tag: Date in local time (YYYY-MM-DDTHH:MM:SS)
“TimeZone” Tag: Official name of the time zone (ex: « Romance Standard Time » for Paris)
“Bias” Tag: Time difference in minutes compared to the UTC time (bias = UTC-local)
“ModeState” Tag: Running mode state

- 0:Recording
- 1:Startstop_Running
- 2:Startstop_Pause
- 3:Ready
- 4:Stabilization
- 5:Mass_Storage_Device
- 6:Card_Out
- 7:Electrical_Check_Running
- 8:Electrical_Check_Init
- 9:Calibration_Running
- 10:Autotest_Running
- 11:Building_Inside_Test
- 12:Building_Pause
- 13:Building_Recording_Time_History
- 14:Building_Recording_Spectrum
- 15:Building_End_Time_History
- 16:Building_End_Spectrum

“BatteryCapacity” Tag: remaining battery %
“BatteryState” Tag:

- 0: Battery_low,
- 1: Battery_good

“ChargerPresent” Tag: 1 if present, else 0
“FreeMemoryMb” Tag: remaining SD memory in Mo
“StorageState” Tag: Status of the SD card:

- 0:missing SD card
- 1:Wrong file format
- 2: Very low available space (<3Mo)
- 3: Low available space (<50Mo)
- 4: No problem

“NbSatellites” Tag: Number of viewed satellites
“Latitude” Tag: Latitude in decimal value
“Longitude” Tag: Longitude in decimal value
“GSMStrength” Tag: GSM power level 0 to 4 bars
“GSMNetwork” Tag: GSM network registered

- 0:none
- 1:GPRS
- 2:EDGE
- 3:3G
- 4:3G+

“GSMIP” Tag: GSM IP address
“HTTPPort” Tag: HTTP port
“WeatherState” Tag:

- 0:Weather station not used
- 1:Weather station OK
- 2: Weather station not detected
- 3:Weather station ID error
- 4:Weather station setup error
- 5:Weather station communication error

“TTLInputState” Tag: State of the TTL input (0 or 1)
“CheckError” Tag: CIC result : 1 if error, else 0
“NewHistory” Tag: 1 if events are available with GetAlarms HTTP command else 0
“EventAlarm” Tag: Status of the dBSurv alarms (useful for its initialization) : 0=inactive 1=active, “Code” being the alarm reference number. Up to 9 tags like this can be obtained (5 user events and 4 standard events)

Note: the automatic data transfer feature can be enabled or disabled when the instrument is in Ready mode only.

Note: About the parameter Start Date: if this parameter corresponds to a date subsequent to the date when the activation server (a future date), the parameter start date will not work : the eventual data stored between activation and start date will be transferred .

Note: the web interface allows you to enable the transfer of data to both servers whose address is the same. However, security is integrated. Thus in such a case transfers are made only to the server 1, to avoid duplication of transfers due to possible data entry errors.

Note: The automatic data transfer process will wake up the modem if it is in stand-by mode

5.4.3.6 Input/Output parameters

In this page, the user can set up the inputs/outputs of the instrument:

- Input of the measurement chain: either the integrated microphone or the user microphone (user-defined microphone), or the microphone connected to the external channel at the bottom of the instrument.
- Weighting and gain of the analogue output of the signal.

Input parameters are as follows:

- **Microphone input**: allows selecting the input, which is either an integrated microphone, or an external preamplifier input using the instrument Lemo™ connector. If the external input is selected, it replaces the integrated microphone. The connection cable length will typically be 10 m
- **Microphone type**:
  - 40CD microphone supplied (in this case the following fields are disabled)
  - 40CD user
  - user
- **Microphone S/N**: field allowing for input of the serial number of the user microphone (possible only if XX user microphone selected).
- **DMK01 S/N**: used to enter the serial number of the DMK01 outdoor microphone unit PRE22 preamplifier.
- **Sensitivity** [mV/Pa]: allows for input of the sensitivity of the user's microphone.

Output parameters for the internal microphone only:

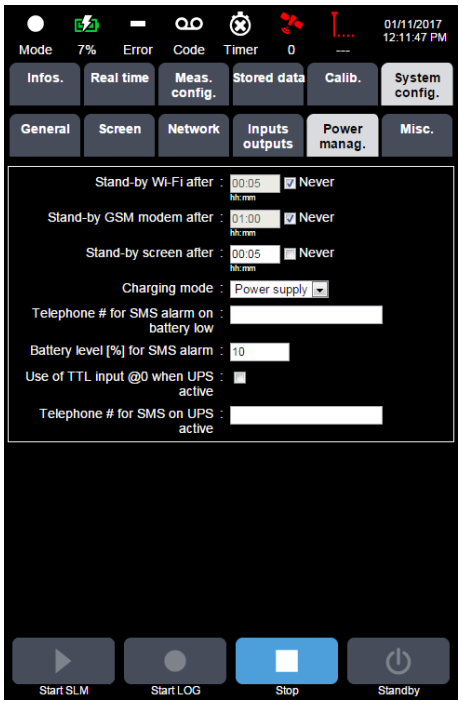
- **AC output NA (no internal microphone)**

Note: For the CUBE with the hardware version LIS003C (and higher) the AC output is available with the external microphone using the RAL137-10M extension cable. In this case the gain is fixed (+13dB / maximum voltage 3.4Vpp) with no frequency weighting applied.

5.4.4 *Power management*

In order to increase the operating lifetime of the instrument, the user can activate/deactivate elements that are not required for the measurement, such as:

- Wi-Fi communication
- Use of the GSM module
- Screen backlight



Power management parameters are as follows:

- **Stand-by Wi-Fi after:** allows managing the shutdown of the Wi-Fi module after an inactive period. Turning this module on again is done either by pressing one of the keys, or by sending an SMS (with string “IP”) to the GSM modem.
- **Stand-by GSM modem after**: allows the GSM modem connection to be cut after an inactive period, which frees the line and reduces power consumption. The instrument answers the SMS with an SMS containing its IP address, its http port, its serial number and the name of the location directory where the current measurements are stored.
- **Stand-by screen after**: allows managing the shutdown of the screen backlight after an inactive period. Turning the backlight on again is done by pressing one of the keys.
- **Charging mode**: allows to manage the 8V-28V power input:
  - **Power supply:** This mode is selected when the instrument is used with a standard power supply (fixe voltage). In this mode the instrument automatically switches to stand-by mode when the battery reaches 3% of its capacity. It is possible to wake-up the instrument when a power supply is plugged (USB or 8V-28V) even if the battery capacity is lower than 3%.
  - **Solar panel:** This mode must be selected only when a solar panel is directly plugged into the 8V-28V input. It is a specific charging mode (MPPT: maximum power point tracking) not compatible with the standard charger: a standard power supply (with fixed voltage lower than 18V) plugged on the 8V-28V input will neither power on nor recharge the instrument.
    In this mode if there is not enough sun exposure to charge the instrument, the instrument will automatically switch to stand-by mode when the battery becomes below 10% of its capacity. Every hour the instrument will wake-up and check if it is in charging mode or if its battery capacity is over 15%. If one of these two conditions is true then the log restart, else the instrument will go back on the stand-by mode for 1 hour.
    If, due to low battery level, the instrument is in Stand-by mode or switched off, and if the solar panel doesn’t provide enough energy to recharge the battery, connecting a

standard power supply will neither power on nor recharge the instrument. The only way to wake-up the instrument is to charge it through the USB input or plug a power supply with a voltage between 18V and 28V.
This management of power-on/off avoids to switch-on and switch-off the instrument when the internal battery charge level is low and the solar panel does not deliver enough energy for recharge.
Battery: This mode is selected when the instrument is directly connected to a lead battery. In this mode the instrument automatically switches to stand-by mode when the internal battery reaches 10% of its capacity, and every hour the instrument will wake-up and check if it is in charging mode or if its internal battery capacity is over 15%. If one of these two conditions is true then the log restart, else the instrument will go back on the stand-by mode for 1 hour.
This management of power-on/off avoids to switch-on and switch-off the instrument when the internal and external battery charge levels are low. This mode will not avoid a deep discharge of the external battery.

- **Telephone # for SMS alarm on low battery**: used to define a telephone number to which the instrument will send a text message when the remaining battery charge is equal or less than the battery % setup by the user. This function requires the unit to have a SIM card installed and correctly configured for sending SMS text messages.

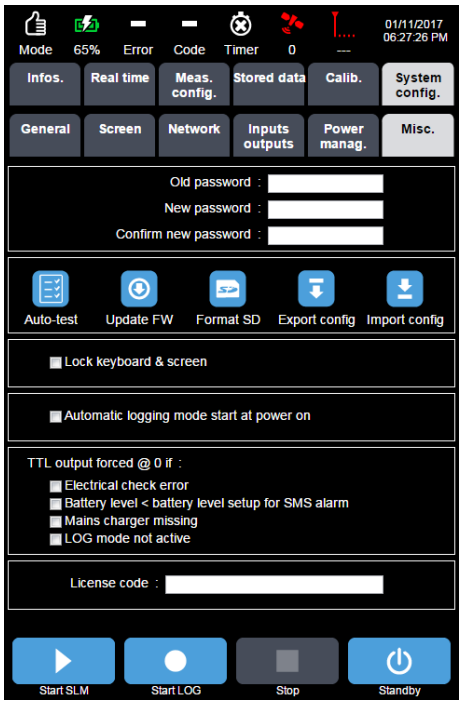
- **Use of TTL input @0 when UPS active:** Tick this box if the instrument is used with the CME01 or CME02 cabinets provided by 01dB. With these cabinets the instrument is powered by a UPS which informs the status of the main power supply via the TTL input of the instrument (1 if the main power supply is ok / 0 if the main power supply is down).
In case of main power supply failure, the instrument is temporally powered by the battery of the UPS, the lightning on the battery icon become orange 

.
Complete the **Telephone # for SMS on UPS active** field to receive a text message with the date, time of the main power supply failure; the serial number and location of the instrument and the message: “UPS active”. This function requires the unit to have a SIM card installed and correctly configured for sending SMS text messages

5.4.5 *Miscellaneous*

In this screen the user can manage finer functionalities of the system, such as:

- Change of password
- Check of the system components
- Update of firmware
- Formatting of the SD memory
- Export and import of measurement configurations
- Locking keyboard and screen shut-off
- Automatically starting measurement in LOG mode when the unit is powered up
- License code



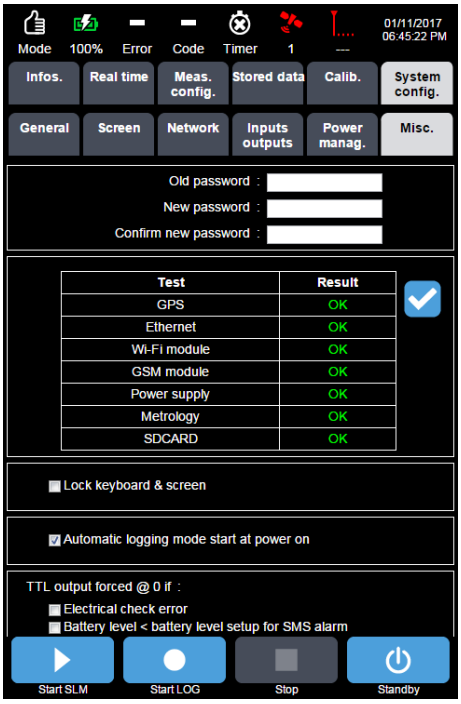
Configurations import/export

When exporting configurations, the instrument stores them in the \export directory in the SD card. To import configurations, it is needed to create a \import directory at the root of the SD card and copy inside the selected configurations. Or alternately to use the dBFileManager software, which includes a function dedicated to that. See § 7.4.3 Transfer configuration files.

Password management:

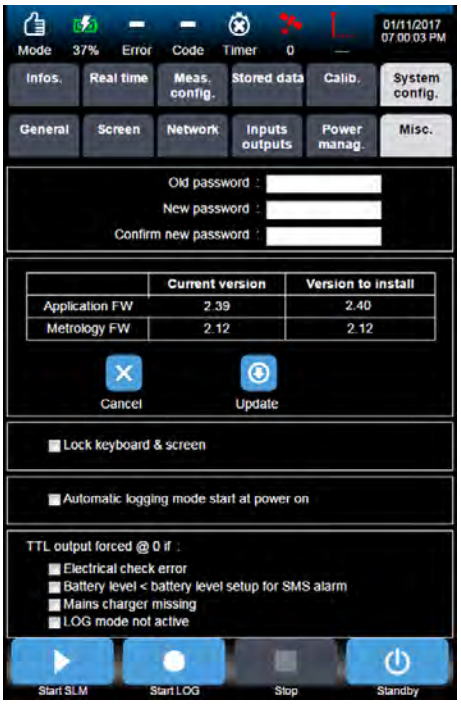
- **Old password**: to change the password, one must first enter the current password. *When the instrument is initialised, no password is set.* The user can choose to use the password functionality or not.
- **New password**: allows entering the new password.
- **Confirm new password**: allows for confirmation of the new password.

Auto test: performs an automatic test of the instrument's functions



- GPS
- Ethernet
- Wi-Fi module
- GSM module
- Power supply
- Metrology (background noise)
- SD card

Firmware update



In the example above, the update will upgrade from version 2.39/2.12 to 2.40/2.12.
The update can only be done if the instrument charger is connected to the mains. If not connected, then the "update" button is not visible.

SD card formatting:

Export configuration: export measurement configurations from the instrument to the SD card.

Import configuration: import measurement configurations to the instrument from the SD card, in the directory *"xml/configurations"*.

Note: once a measurement configuration has been exported, it can be downloaded from the instrument to a PC using FTP file transfer software. The dBFileManager program includes a feature for retrieving measurement configurations (from the instrument to a PC) and dispatching measurement configurations (from the PC to one or more instruments). See § 7.4.3 Transfer configuration files.

Lock keyboard & screen: allows locking the keyboard keys and turning the screen off. Unlocking of the keys and turning on of the screen is done either by unselecting the check box within the web interface, or by pressing simultaneously keys  and  of the instrument. Furthermore, the screen automatically turns off after 10 minutes if the web interface is not active.

TTL output forced @0 if:
Function that drives the TTL output and forces it @0 for the different possible choices:

- Electrical check error
- Battery level < battery level setup for SMS alarm
- Mains charger missing
- LOG mode not active

Note: if at least one of the selections is activated, TTL output is forced @0 and the cycle (start of the event) starts by a TTL @ 0.

Automatic start login mode start at on power on: this option automatically starts a measurement in LOG mode when the unit is powered on.

Licence code: allows entering a licence code for the instrument. After validation of the new licence code, the summary of available options is displayed on the Infos page. The correspondence between (initial) option codes and options is given in Paragraph 9.3.

5.4.5.1 Firmware and operating system update

The update of the instrument program is achieved after the user is provided with a .czip file. This file must be copied to the SD card (at the root of the card) **after its formatting** (make sure the data are backed up before formatting). The new .czip file is automatically detected. The program is updated in a few minutes. A message informs the user that the program has been updated after completion of the task.

After the update is completed, the following messages are displayed in the system log file of the instrument:

01/11/2017	07:12:58 PM	WARNING	Firmware updated (2.40q7).

Note: The update process does not lead to the loss of the memorised configurations or of the calibration and electrical check data (their history is then also saved).

Note: acoustic calibration is required after an update procedure.

Note: The update can only be achieved through the web interface (Wi-Fi, 3G or Ethernet).

Note: the update is possible only if the charger is connected. If this is not the case, the update button will not be displayed.

Note: For the application firmware version 2.40 and higher the SD card file format has to be exFAT to record data. If the SD card is FAT32 file format the data previously saved on the SD card (using a former firmware version) are readable by FTP or USB through the instrument.

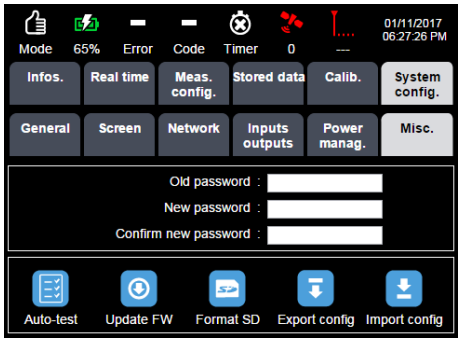
Note: To update an instrument with an application firmware version equal or lower than 2.38 to the application firmware 2.40 or higher, it is mandatory to first install the application firmware version 2.39.

5.4.5.1.1 Copy of the update file to the SDcard

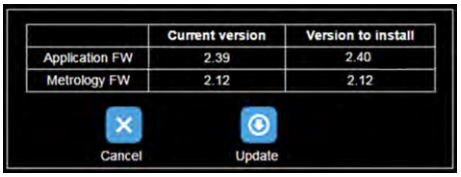
- Connect the mini USB cable between the instrument and the PC.
- Message “USB connected” should appear on the instrument screen.
- The SD card of the instrument must appear as a removable disk on the PC.
- Copy the .czip file of the version to update onto the SD card: the file is called *.czip
- Other options: the .czip file can also be copied through FTP or by extraction and insertion of the SD card in an appropriate SD card drive.
- When the .czip file is copied to the SD card of the instrument via FTP, we recommend using dBFileManager software, which includes a dedicated function.
  See § 7.4.3 Transfer configuration files.

5.4.5.1.2 Firmware update

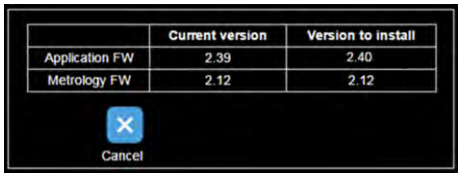
- Connect the instrument charger
- Connect an Ethernet cable between the PC and the instrument to perform the update via Ethernet.
- On the PC, open a recommended Internet browser and log onto the instrument
- Select “System Config”, then “Misc.” and then “FW update”



The WEB interface displays the current software version and that to install, which is present on the SD card:



the instrument connected to the mains

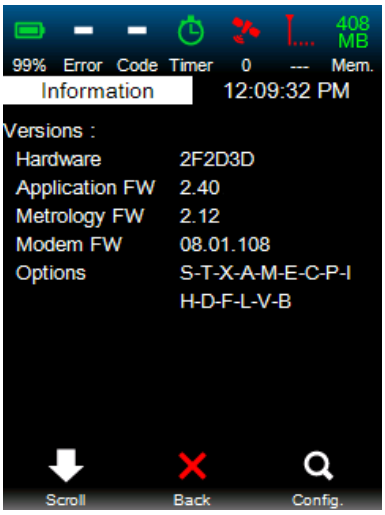


the instrument not connected to the mains:
update not available

- Click on ‘Update’
- The screen of the Web interface turns black. Close the browser
- Wait for a few seconds until the instrument restarts and performs the update. The instrument screen displays ‘Updating’.
- Wait for the update to complete before disconnecting the charger. As soon as the update is finished, the instrument restarts again.
- Log on through the web interface and check in the “Infos” tab that the current version is indeed the updated version.

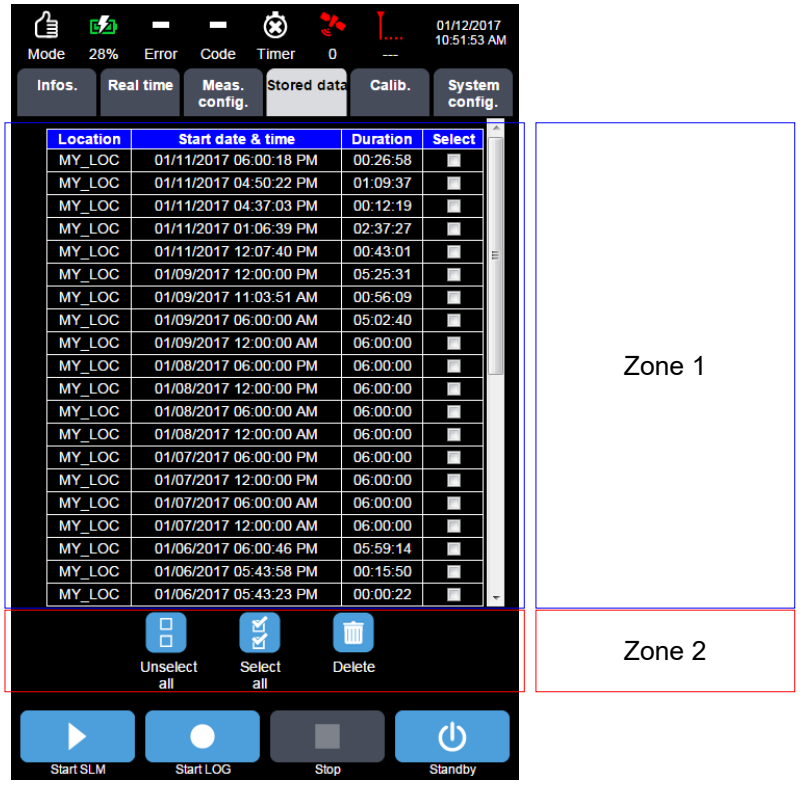
Note: The cache of the browser must be cleared.

Using the instrument keyboard, one can also check the installed versions: select ‘Main Menu’ (centre key), then ‘Information’ (right key) and then ‘Scroll’ (left key) to display the current version.



5.5 VIEWING MEASURED DATA (STORED DATA TAB)

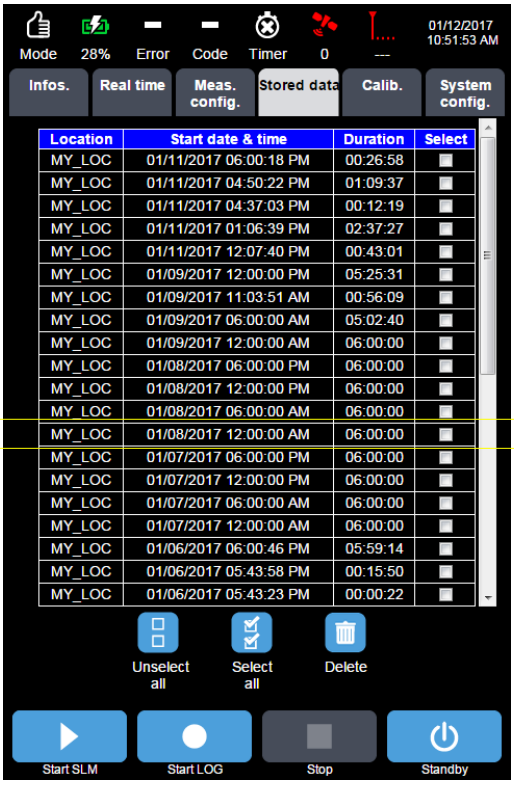
The main page of the Stored data tab is shown below:



The Stored data tab includes 2 zones:

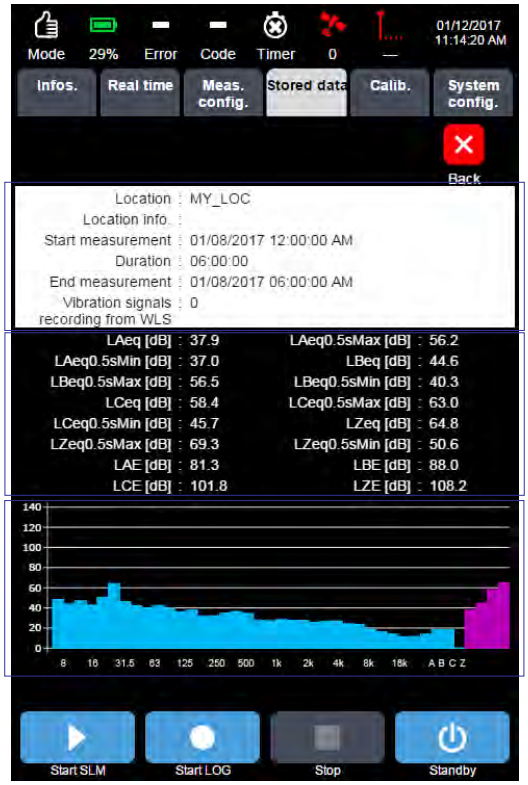
- The first zone lists all measurement campaigns. For each campaign, the following information is displayed: name of site, starting date and time, duration, possibility to select for the user.
- The second zone is used to select quick select/unselect, with dedicated keys to select all or unselect all. It also allows deleting selected measurement campaigns.

5.5.1 Selection of the measurement campaigns



To view a measurement campaign, the operator must select the corresponding line in the list of measurements and then click one of the lines to open the interface showing the stored data.

The window you can see next page is displayed when selecting for instance the line within the yellow box:



Measurement info zone

Overall values zone

Spectrum zone

- The Measurement info. zone provides general information on the measurement campaign : location, additional comment about the measurement location, measurement start, duration, measurement end.
- The Overall values zone shows overall data for the measurement period.
- The Overall spectrum zone provides access to spectral values.

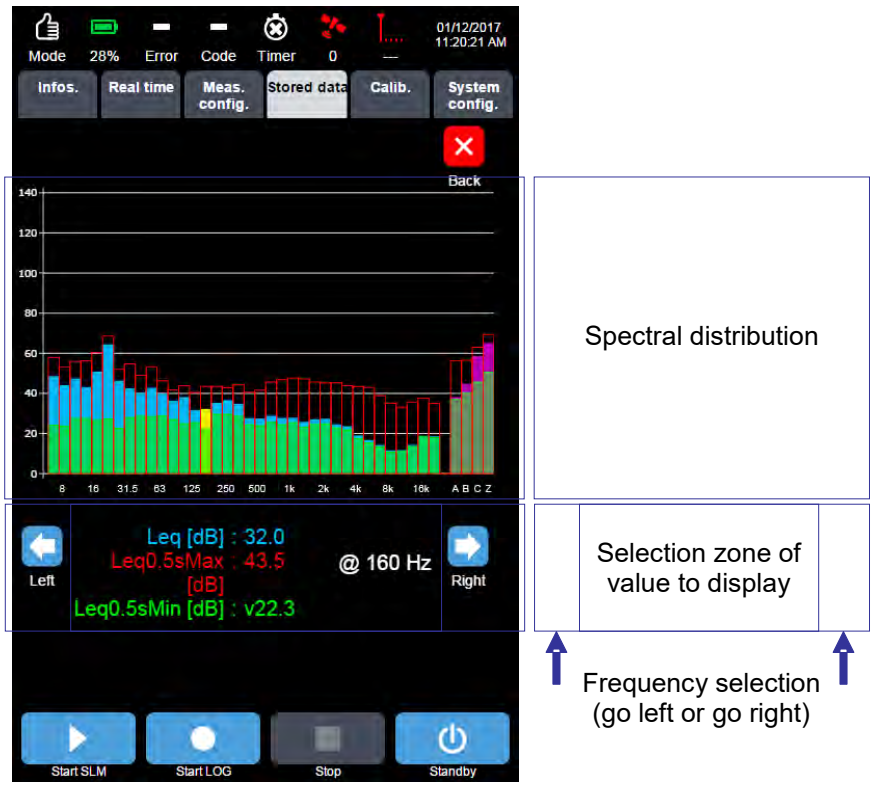
5.5.2 Displaying overall values

Overall values are those previously selected by the user, during the measurement in LOG mode or in SLM mode. If there are many data to view, the scroll bar on the right can be used. Moreover, clicking on this zone (Overall values) will focus the display on the Measurement info. Zone and on the Overall values zone only (the Overall spectrum zone disappears). This allows the user viewing all overall values. The spectrum can be displayed again by pressing the Back button.

Note: Pressing a second time on the Back button will allow going back to the main page of the Stored data tab.

5.5.3 Displaying spectral values

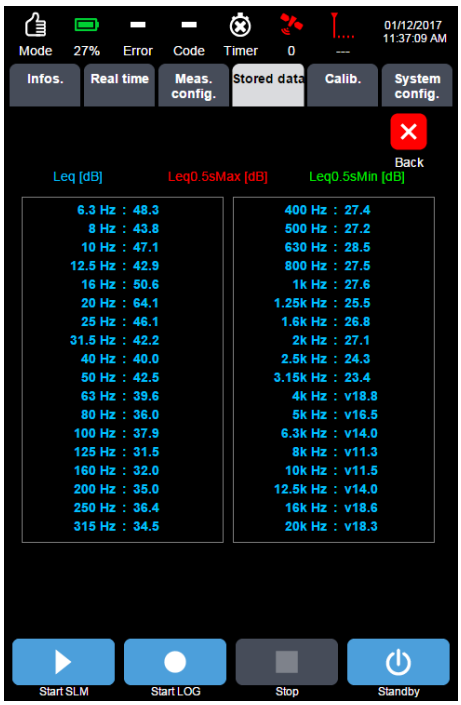
To access measured values, the operator must click on the spectrum. The spectral distribution appears in 1/1 or 1/3 octave. The values indicated below the spectrum correspond to the data of the selected band (which is then shown in yellow): moving over to the next band is done using the left/right arrow keys.



The operator can select the overall/Max/Min indicator represented graphically by clicking on one of the 3 following indicators:

The user can then select the value to display among the indicators available in the selection list (which reflects the user's previous choice when defining the measurement campaign and related indicators to acquire).

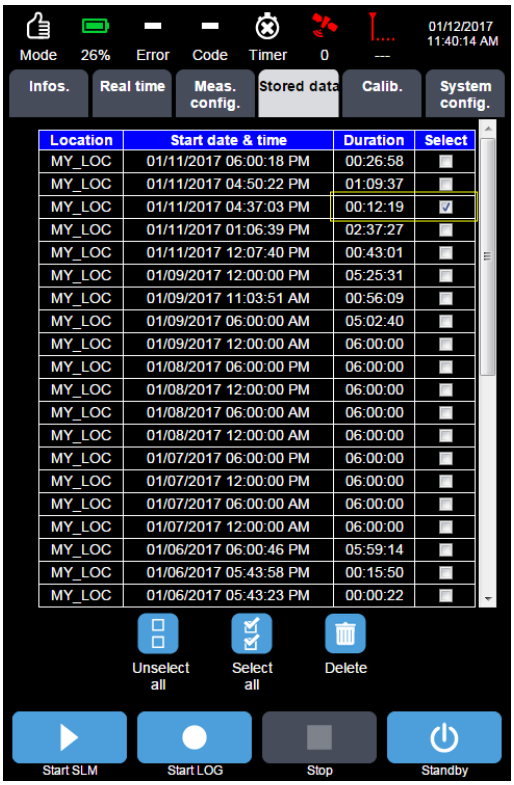
Clicking on any band of the spectral distribution allows for access to measured values.
By default, the displayed data correspond to the overall values, Leq (dB) in blue.



Max./Min. values can be displayed by selecting the indicator in red for Max values or green for Min. values.

5.6 DELETING MEASURED DATA (STORED DATA TAB)

Selecting measurement campaigns
The main page of the Stored data is as follows:

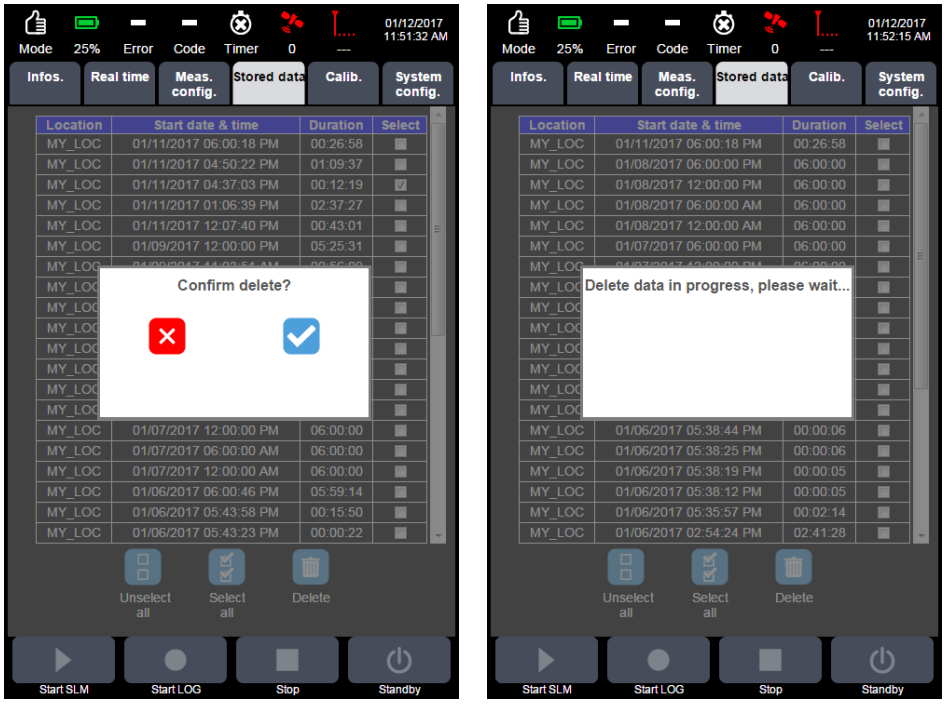


Selected measurement to delete

The user selects the measurement campaigns to delete by checking the corresponding Select. boxes. To make deletion effective, the user must then click on the Delete button.

Note: global selection is possible using the Select All button. Global unselection is also possible, using the Deselect All button.

This induces the following window prompting the user to confirm the action:



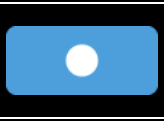
The Back button is used to discard deletion of the selected campaigns, whereas a click on the Validation button makes it definitive.

Note: If a large number of measurements have to be deleted (e.g., a hundred), the operation can take some time. In this case, it may be impossible to connect to the instrument via the web interface as long as the data are not deleted. If this is not possible, formatting of the SD card will be the preferred method to delete a large number of measurements, as it is faster.

5.7 WEB INTERFACE ICONS AND KEYS

Symbol	*Explanation*	*Symbol*	*Explanation*
	Activate		Activate disabled
	Edition		Backup
	Validation / OK		Cancel
	Back to previous menu		
	Calibration		Calibration disabled
	Calibration info.		
	Electrical check initialisation disabled		Electrical check initialisation disabled
	Check		Electrical check disabled
	Calibration / check history		
	Code 1 OFF		Code 1 ON
	Code 1 disabled		Code 1
	Code 2		Code 2 ON
	Code 2 disabled		Code 2 info.
	Code 3 OFF		Code 3 ON
	Code 3 disabled		Code 3 info.

Symbol	Explanation	Symbol	Explanation
	Code 4 OFF		Code 4 ON
	Code 4 disabled		Code 4 info.
	Code 5 OFF		Code 5 ON
	Code 5 disabled		Code 5 info.
	No code info. View no error		
	Right scroll		Left scroll
	Fast forward		
	Max		Min
	Back erase time		Back Erase ON
	Comment		
	Audio		Audio ON
	Audio disabled		Audio info.
	Log file		
	Redo		Refresh
	Select all		Unselect
	Deletion		Delete disable

Symbol	Explanation	Symbol	Explanation
	SD card formatting		SD card formatting in progress
	Self-test		Self-test disabled
	Updating		Up to date
	Export config		Import config
	Start stop / Continue		Start stop / Continue disabled
	Pause		
	Record		Record disabled
	Standby		Standby disabled
	Stop		Stop disabled
	Full battery		Battery completely discharged
	Battery charging		UPS active
	Electrical check info.		Electrical check error
	Programming ON		Programming active soon
	Programming OFF		Overload
	GPS OK		GPS NOK

Symbol	Explanation	Symbol	Explanation
	Communication OK		Communication OK with roaming
	Communication NOK		Aircraft mode
	Continue info.		Start stop / pause info.
	Record info.		
	No SD card info.		Msd info.
	Stabilisation info.		System ready info.
	*WLS sensor connected, charge < 25%		*WLS sensor connected, 25% ≤ charge < 50%
	*WLS sensor connected, 50% ≤ charge < 75%		*WLS sensor connected, charge ≥ 75%
	Weather station communication ok		

* : FUSION and DUO

CHAPTER 6
COMMUNICATION AND CONNECTIONS

6.1 COMMUNICATION USING A WI-FI TYPE NETWORK

6.1.1 General

Wi-Fi (short for Wireless Fidelity) is a set of wireless communication protocols meeting the standards of group IEEE 802.11 (ISO/CEI 8802-11). A Wi-Fi network allows connecting wirelessly several computers. Using Wi-Fi, a broad-band wireless local network can be created over a range of several dozen meters indoors. In an open environment, the range can reach several dozen metres. The wireless communication indicator (blue LED) on the unit flashes during communication.

6.1.2 Precisions on point-to-point (Ad-Hoc) and infrastructure connection modes

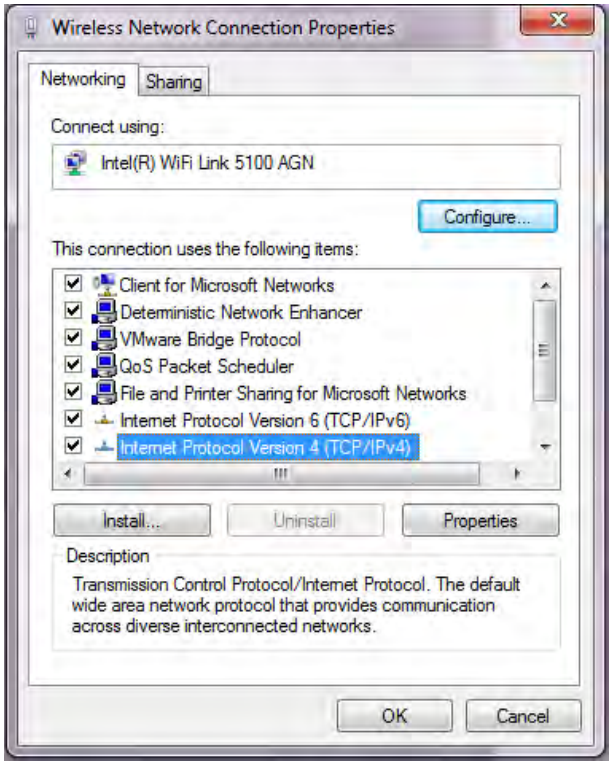
The “Ad-Hoc” point-to-point mode is an operating mode that allows for the direct connection of an instrument equipped with a Wi-Fi card, without using a third device like an access point ([AP]). This is an ideal mode for fast interconnecting of machines with no additional equipment required. The implementation of such a network resorts to setting up the machines to the Ad-Hoc mode (instead of Infrastructure mode), possibly selecting a channel (frequency), a network name (SSID) common to all and, if required, an encryption key. The benefit of this mode is to get rid of third-party devices, i.e., to be able to operate with no access point.
The point-to-point (Ad-Hoc) mode allows setting up a direct on-site connection between several instruments, such as an instrument, a WLS wireless vibration sensor (Only for DUO and FUSION) and an iPad-type tablet or a laptop computer (Windows 7 or lower). For Windows 8 and 10 please check dedicated FAQ on the 01dB portal.

The “Infrastructure” mode is an operating mode that allows connecting computers equipped with a Wi-Fi card through one or several access points (AP) that act as hubs (e.g., repeater or switch on an Ethernet network). In this case, the implementation of such a network requires setting up “Access Points” (AP) at regular intervals in the area that is to be covered by the network. The access points, as well as the machines, must be set up with the same network name (SSID = Service Set Identifier) in order to be able to communicate. The benefit of this mode, in a corporate setting, is to ensure mandatory routing through the Access point; it is thus possible to check who is accessing the network.
The Infrastructure mode then allows connecting the instrument to a corporate wireless network.

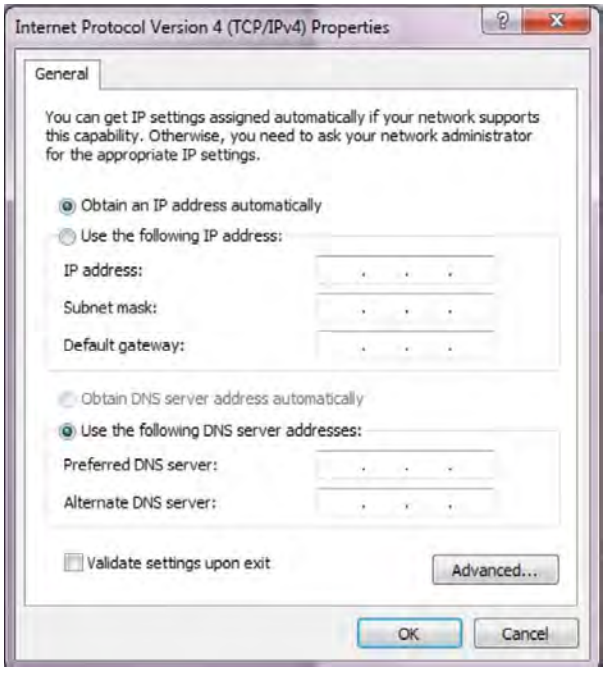
6.1.3 *Setting up the Wi-Fi communication (ad-hoc)*

When using the instrument for the first time, one must set up the communication:

Configure the network connection with an automatic IP address:
For instance, for Windows 7, open the “Wireless network connection properties” window:



Select Internet Protocol (TCP/IP) and click on Properties.



Ticks the following field:

- Select Obtain an IP address automatically

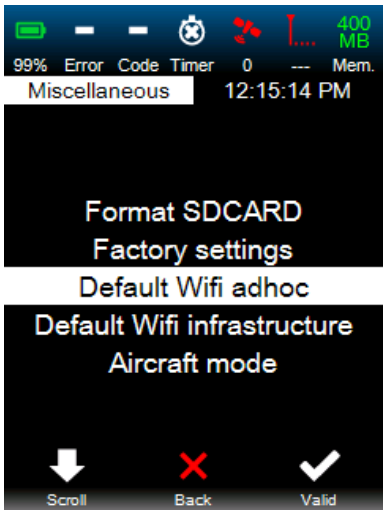
By default, the instrument belongs to:
- The following wireless network:
- SSID name: CUBE_[S/N]
  Data encryption: disabled
- The following sub-network:
  Wi-Fi IP address: 192.168.1.1
  Wi-Fi sub-network mask: 255.255.255.0

Note: If the connection between one or several instruments and the Web interface is established through a point-to-point (ad-hoc) network, the user will have to select an SSID name common to all instruments.

Note: The address to enter in the browser is: http://XXX.XXX.XXX.XXX with XXX.XXX.XXX.XXX, the IP address declared in the Network system config menu, or if a listening port different of 80 is declared: http://XXX.XXX.XXX.XXX:YYYY with YYYY, the http listening port.

6.1.4 Default Ad-Hoc or Infrastructure mode

If the instrument is set up in the office while an access point for connection in Infrastructure mode is present, it will not be possible to establish an on-site connection in the absence of an access point. Therefore, if a Wi-Fi connection is required on site, the user will have to change the configuration of the connection mode to Ad-Hoc or Infrastructure before leaving the office. If required, return to the default Ad-Hoc or Infrastructure mode is possible in the “Miscellaneous” menu of the built-in interface:



Ad-Hoc default settings :
- Channel : 6
- SSID name: CUBE_[S/N]
- Authentication : none
- IP address : 192.168.1.1

Infrastructure mode default settings :
- SSID name: CUBE_[S/N]
- Authentication : none
- DHCP: yes

6.1.5 01dB Connect App

01dB Connect App allows to :

- Connect to, DUO, FUSION, CUBE or ORION
- Open a tutorial for connection.
- Access to Customers helpdesk 01dB.
- Access to 01dB website.
- Access to 01dB YouTube channel.
- Access to 01dB Twitter.
- Access to 01dB Facebook page.
- Find 01dB representatives.

The following explanation concerns the connection to DUO, FUSION or CUBE

6.1.5.1 Connection using Android OS

01db Connect App, available in play Store  allows to easily connect to the instrument:

1. On DUO, FUSION or CUBE:
   a. Select “Default Wifi infrastructure” settings (refer to § 4.2.9 Return to default Wi-Fi configuration)

   b. Press shortly the ON/OFF bouton to have the QR code on the display of the device

2. On Android device:

   a. Open 01db Connect App 

   b. Scan instrument QR code by pressing QR code icon 
   Your instrument SSID is automatically entered:

   c. Press Connect icon  to connect to the DUO, FUSION or CUBE – Check that the Wi-Fi blue LED is turned-on on you instrument

   d. Navigate through the instrument web interface:

6.1.6 *Connection using iOS*

01db Connect App, available in Apple Store allows to easily connect to the instrument:

1. On DUO, FUSION or CUBE:
   a. Select “Default Wifi adhoc” settings (refer to § 4.2.9 Return to default Wi-Fi configuration)

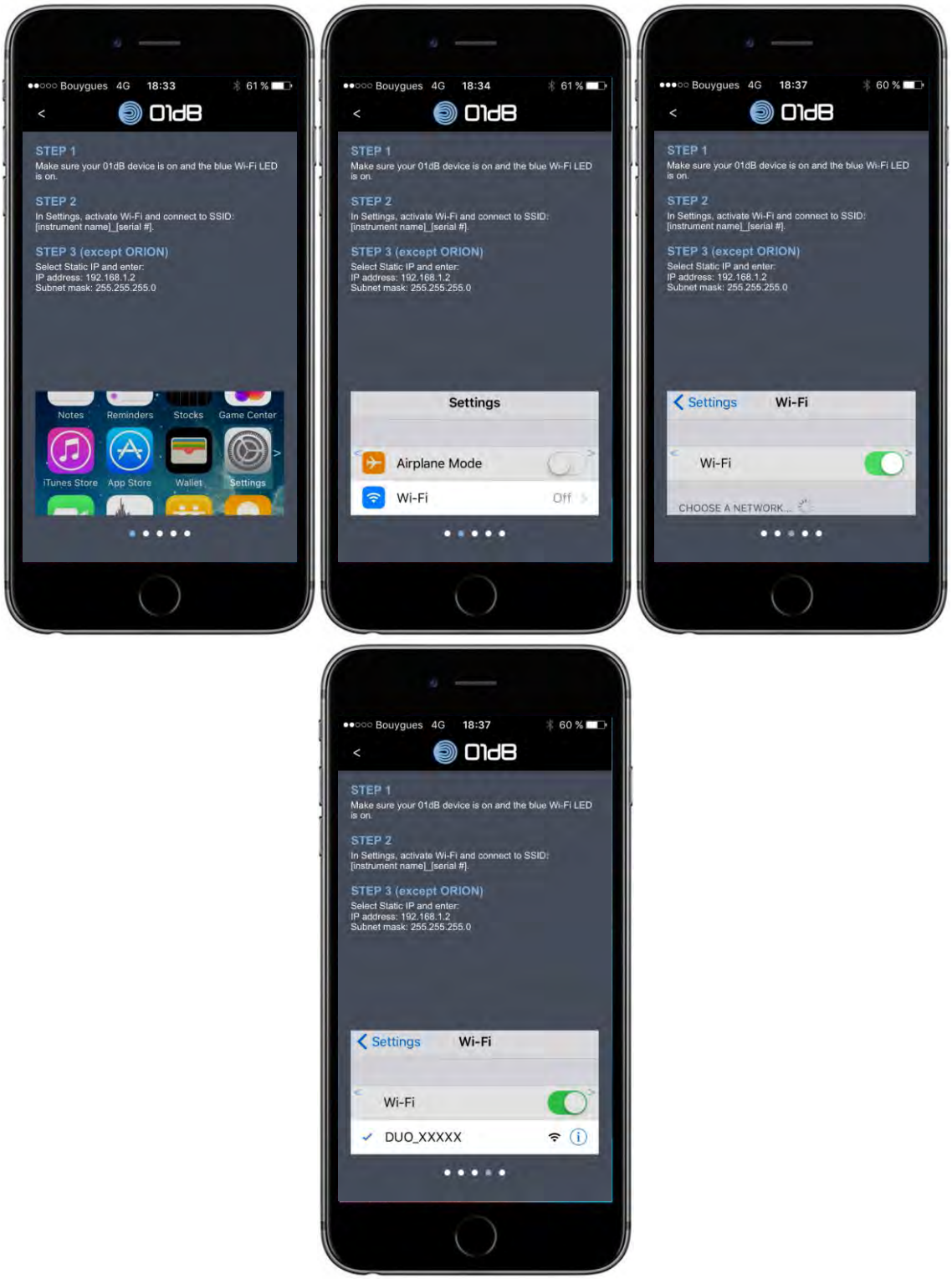
   b. Optional – if you don’t know the serial number of your instrument: Press shortly the ON/OFF bouton to have the QR code on the display of the device

2. On iOS device:

   a. Open 01db Connect App

   b. Optional – if you don’t know the serial number of your instrument: Scan the instrument QR code by pressing QR code icon . The Wi-Fi SSID will appear on the interface

   c. Connection using iOS needs manual selection of the Wi-Fi SSID when connecting. Refer to help pages on the device (step 1 and 2 only for the FW 2.40):


Bouygues 4G 18:33 61 %
01dB
STEP 1
Make sure your 01dB device is on and the blue Wi-Fi LED is on.
STEP 2
In Settings, activate Wi-Fi and connect to SSID: [instrument name]_[serial #].
STEP 3 (except ORION)
Select Static IP and enter:
IP address: 192.168.1.2
Subnet mask: 255.255.255.0
Notes
Reminders
Stocks
Game Center
iTunes Store
App Store
Wallet
Settings
Bouygues 4G 18:34 61 %
Settings
Airplane Mode
Wi-Fi
Off
Bouygues 4G 18:37 60 %
Settings
Wi-Fi
Wi-Fi
CHOOSE A NETWORK...
Bouygues 4G 18:37 60 %
Settings
Wi-Fi
Wi-Fi
DUO_XXXXX

d. Once the SSID is selected just press Connect:

6.2 COMMUNICATION USING A 3G-TYPE NETWORK

6.2.1 General

In 3G wireless communication mode, the strength of the communication signal with the instrument is indicated as a visual icon on the built-in display and on the web interface remote display.

The third generation (3G) refers to a standard relative to mobile phone technology. Accessible to the general public, it relies on the Universal Mobile Telecommunications System (UMTS) standard that allows for much faster baud rates (2Mbps expected when the network is mature) than with the previous generation (GSM).

3G communication with the instrument makes it directly available from the internet (via the World Wide Web). To benefit from this feature, you must insert within the instrument a SIM card having the option “public IP address”. The instrument becomes then accessible on the Internet. Be aware that the use of a public IP address often comes along with using the adequate APN (Access Point Name).

APN (Access Point Name): this is the identifier related to the internet connection hub (this parameter is specific to the use of internet with a mobile phone).
DNS (Domain Name System): this service allows establishing the link between an IP address and a domain name.

Good to know

Depending on countries and service providers, you may find different options, specific points or limitations in using 3G communications.

Some examples are listed below. Please contact your service provider for more information.

- **APN**:
  - many APN may be used in some cases:
    - an APN code dedicated to surfing on the internet (local IP address)
    - an APN code dedicated to make the instrument accessible through the internet using a public IP address

This choice may depend on the options of your internet service package.

- Examples of **public IP addresses**:
  - 80.xxx.xxx.xxx or 90.xxx.xxx.xxx

- Examples of **private IP addresses**:
  - 10.xxx.xxx.xxx

- **Transfer rate**:
  - Using the public IP option, the choice may be offered among several transfer rates, as a function of the options within your internet service package.

- **Fixed or dynamic public IP**:
  - Most often your public IP address will be a dynamic one, i.e. it will change after each access to the 3G modem within the instrument, or on a periodic basis.
  - In some cases, your internet provider may propose a fixed public IP address, linked with your SIM card. This address remains unchanged.

- **Port number**
  - Limitations may exist on port numbers.
    Please contact your service provider for more information on this topic.

- **Specific case**
  - The instrument might return a private IP address although the inserted SIM card has been delivered with the public IP option.
    Please contact your service provider in order to get the correct public IP identifier linked to the provided SIM card

Connection examples

- with limitation on port number:
  (example: with Orange France, port number above 1024 are authorized)
  - 90.94.104.189 :1050
- without limitation on port number:
  - 93.93.238.197

Note: The required subscription must include the Data and public IP address option.

Note: In most cases, the operators do not provide fixed IP addresses. The user must then use a dynamic DNS server of DTDNS type or equivalent. Then, in order to know the IP address of the instrument, the user can send it an SMS (with or without text); the instrument will then reply by sending another SMS containing its IP address. its http port, its serial number and the name of the folder where measurement campaigns are stored.

Note: in some countries, France for instance with Orange provider, in order to set up a 3G connection, the following ports must be opened:
- HTTP listening port: >1023
- FTP listening port: >1023

Thus, the address to enter in the navigator must be: http://XXX.XXX.XXX.XXX :1050 for instance.

Note: in case of instable connection, e.g. due to poor network coverage, sending an SMS with the string “REBOOT” allows restarting the device and so initiating a new connection. The instrument responds with an SMS giving its serial number, the directory of current campaigns and a new IP address. If the instrument is in measurement mode (LOG mode), the “REBOOT” action stops the measurement, stores the corresponding data on the SD card, sets the instrument off and then restarts the instrument which will automatically open up a new measurement campaign.

Note: in case of bad quality connection due to poor GSM network coverage, the modem of the instrument will try automatically to reconnect to the network. If it fails (error “can’t register network in the system log of the instrument), the instrument will try again during 15 minutes. If it fails connecting after 15 minutes, the modem will be turned off (modem power off) during 45 minutes to prevent from unstability. During this period, the instrument will not manage any SMS. Every hour the modem will try again the same sequence (if the standby GSM modem option is on "Never"). Furthermore, in case of non-response modem, the instrument will reboot automatically.

Note: The instrument can generate a large quantity of measured data. When a 3G connection is used to upload data, 01dB recommends checking with the provider if the size of the files to upload is in line with the subscription. 01dB cannot be responsible for any excessive billing.

6.2.2 *Setting up 3G communication*

The connection between the instrument and the web interface through 3G is set up simply by knowing the IP address of the instrument connected to the network.

To know this IP address, generally a non fixed address, two methods are possible:
- Send an SMS (with string “IP”) so that the instrument sends a reply with its current IP address
- In the built-in screen, in the Information menu, page 3, read the GSM modem IP. This information is listed only if the modem is connected (not in standby mode).

Note: for more detailed information, see Paragraph 5.4.3 Network

6.3 WIRELESS COMMUNICATION AND POWER MANAGEMENT

The management of wireless communication on the instrument allows optimising power consumption through relevant switch to standby mode and efficient “wake up” procedure.

Note: In case of a combined use of basic Wi-Fi or 3G connections, the user is advised to select the protocol to use depending on the service quality.

The quantity and types of transferred data can be selected, for instance:
- Use of web interface and any file transfer with direct connection through a cable (LAN)
- Use of web interface and file transfer on 3G-type protocol. In this case, precautions are required regarding the quantity of data transferred and the values of the ftp and http ports
- Use of web interface on short-distance broad-band protocol, of Wi-Fi type.

6.4 COMMUNICATION USING AN ETHERNET (LAN) TYPE NETWORK

6.4.1 *General*

The Ethernet complies with an international standard: ISO/IEC 8802-3

The connection of the instrument to the Ethernet is achieved through its fixed IP address.

The address to enter in the navigator is: http://XXX.XXX.XXX.XXX with XXX.XXX.XXX.XXX the IP address declared in the Network system configuration menu, if the http port is 80 (by default) or http://XXX.XXX.XXX.XXX:YYYY if a listening port is declared: with YYYY the HTTP listening port if different from 80. For more information, see section 5.4.3.1 Ethernet sub-menu .

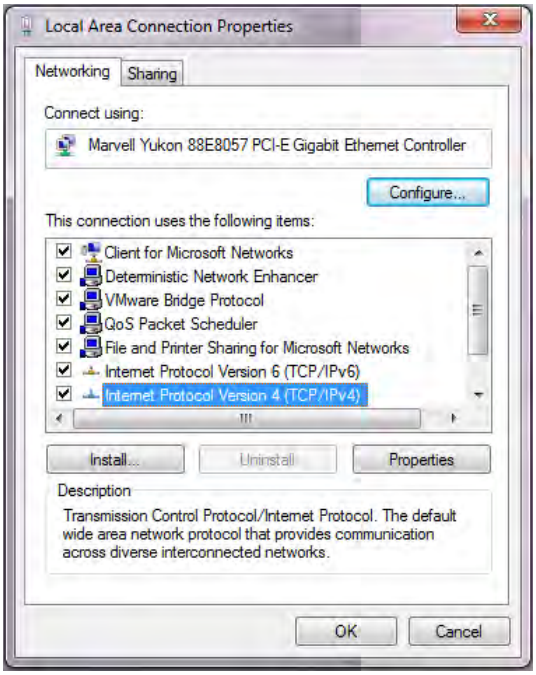
Note: If the DHCP option is enabled, the instrument's address is displayed on the web interface information page and in the unit's information menu.

Note: On a local network the port 80 of the instrument is always an active listening port.

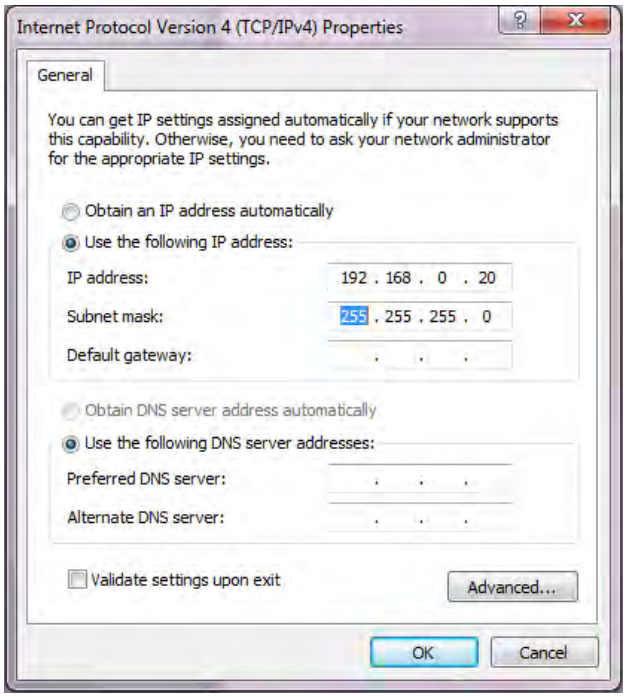
6.4.2 *Setting up Ethernet network communication*

Configure the connection to the local network with a fixed IP address:

For instance, for Windows 7, open the “Local network connection properties” window:



Select Internet Protocol (TCP/IP) and click on Properties:



Enter the following values:
- Select Use a fixed IP address
- IP address: 192.168.0.X with X ranging from 1 to 255 and different of the instrument value (which must be 192.168.0.Y, with Y from 1 to 255, different of X)
- Sub-network mask: 255.255.255.0

By default, the instrument is defined as follows:
- Ethernet IP address 192.168.0.1
- Wi-Fi sub-network mask: 255.255.255.0

To change the connection parameters of the instrument, see Paragraph 5.4.3 Network.

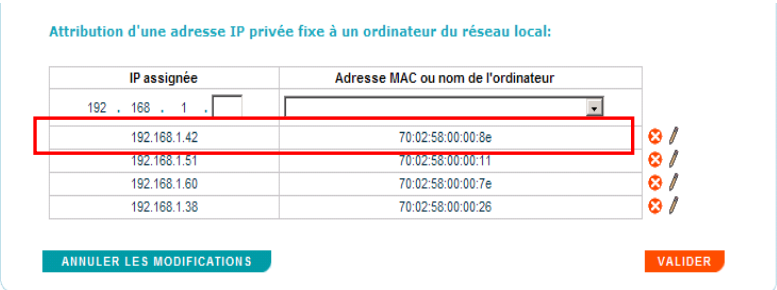
6.5 CONNECTION VIA AN ADSL ROUTER (ETHERNET AND WI-FI)

The link between the instrument and the web interface via an ADSL router (or ADSL “box”) is set up simply by knowing the public IP address of the ADSL router to which the instrument is connected.
The router must be configured beforehand.

The example below is for a Bouygues Telecom ADSL box (Bbox):

1-Enable the DHCP service

2-Assign a fixed private IP address to the instrument (here 192.168.1.42) and enter its MAC address

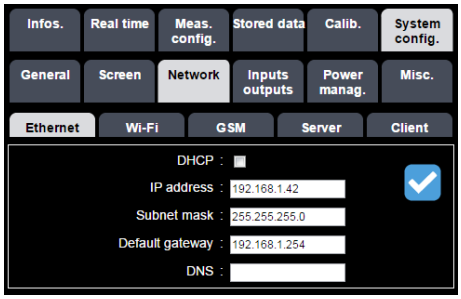


3-Create NAT/PAT rules for the instrument's HTTP and FTP ports: see the settings below (the example uses “DUO” for the HTTP port, and “DUO_ftp” for the FTP port)

4-Enable the DMZ service and redirect traffic from the Internet to the instrument's IP address

5-Configure the Ethernet network on the instrument:

- enter the IP address configured on the router (see point 2 above; here 192.168.1.42)
- enter the router's subnet mask (see point 1 above; here 255.255.255.0)
- enter the default gateway (see router IP address in point 1 above; here 192.168.1.254)



6-For Wi-Fi Infrastructure communication, configure the Wi-Fi network for the instrument:

- enter the configured IP address on the router (see 2-; here 192.168.2.9)
- enter the subnetwork mask of the router (see 1-; here 255.255.255.0)
- enter the default gateway (here 192.168.2.1)

Note: This case of connection using an ADSL router is interesting since it avoids 3G subscription fees, while benefiting from ADSL and unlimited quantity of transferred data. Thus, in the case of a measurement point located at a position covered by a Wi-Fi router ADSL modem (with Administrator's rights), an instrument can be accessible at no cost from anywhere.

6.6 TRANSFER OF STORED DATA

The access to stored data is available in three ways:

- By FTP, through a LAN network connection, a 3G long-range wireless connection or a Wi-Fi short-range wireless connection.
- Through a direct USB connection using the adequate cable supplied with each instrument.
- Through extraction from the SD card and reading from an external peripheral device.

6.6.1 *FTP transfer through LAN, 3G or Wi-Fi connection*

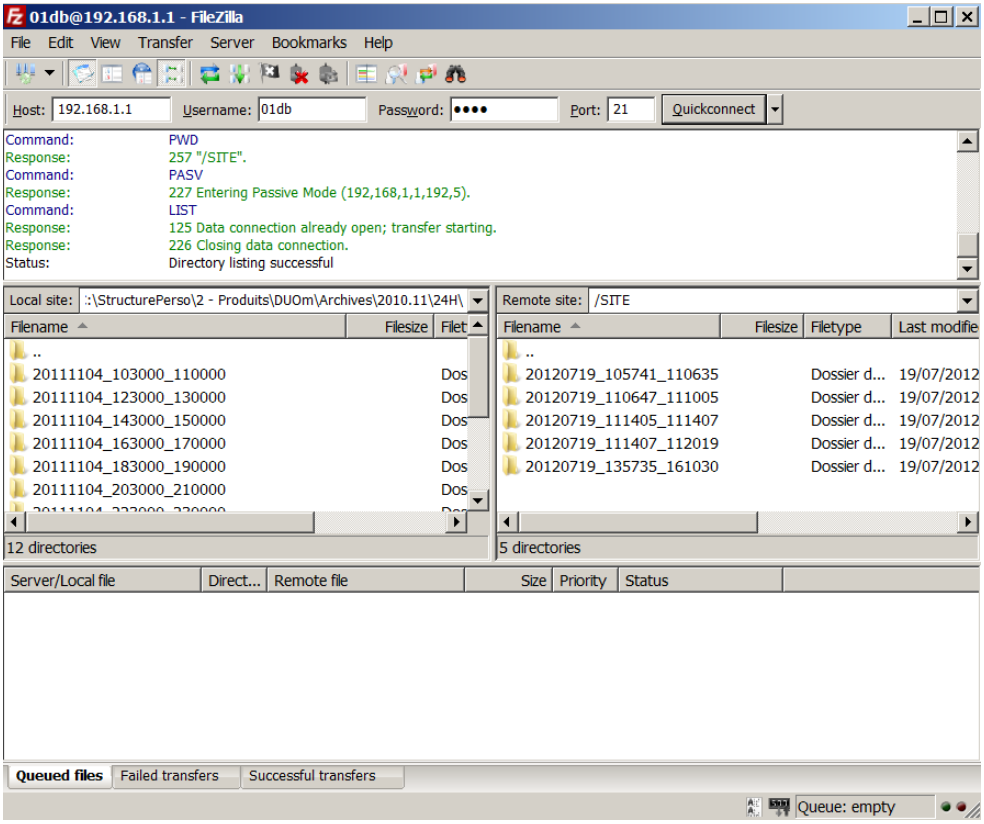
Data transfer is achieved using an Ethernet RJ45 cable (cross or not), 3G connection or Wi-Fi connection from the instrument to the network.

Some FTP client must be used (e.g. the dedicated software dBFileManager, or the generic FileZilla® software).

The files are copied from the FTP server of the instrument, to the user's computer (or a dedicated ftp site).

Sound analysis is then achieved "off-line" using dBTrait.

Note: the complete functions of dBFileManager are described in CHAPTER 7.



In the above example (FileZilla),

- the IP address is 192.168.1.1
- the user ID (FTP user) is 01db
- the password is 01db (●●●●)
- the listening port is 21.

Folders containing measurement files are identified by: [date]_[start time]_[end time].

Note: In order to keep the instrument's FTP server operational, it is reset every day at midnight for prevention purposes. Thus, all transfers in progress at midnight will be interrupted.

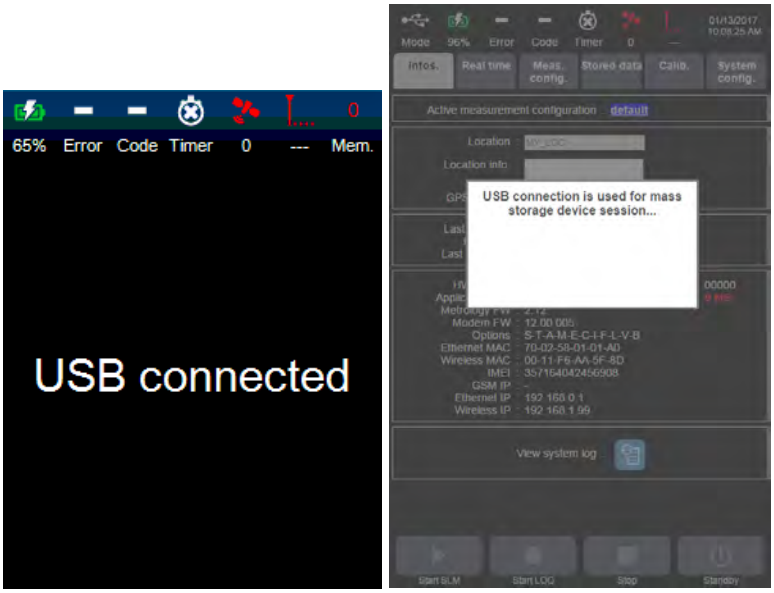
6.6.2 *USB connection and extraction of the SD card*

Connecting the instrument through USB using the supplied mini USB/USB cable allows viewing the data stored on the memory card as an external drive.

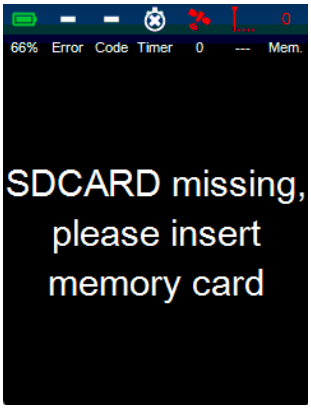
Note: No driver installation is required on the first connection.
Note: The USB connection is possible only when the instrument is in Ready mode. In SLM or LOG mode, access to storage is actually restricted to measurement only.

The transfer is achieved either using a cable connected between the instrument and a PC with a high baud rate, or by extracting SD card and inserting it into the corresponding drive of your PC.

In the first case, one just needs to connect the suitable transfer cable (delivered with the instrument) between the instrument and the computer and to turn the instrument on in Ready mode. The user can then copy the measurement campaigns onto the PC to save them and launch dBTrait. The opening of the measurement campaign files is immediate within dBTrait.



In the second case, the SD card is removed from the instrument when the instrument is off, and then inserted in the PC in the dedicated “SD card” drive (or into any relevant SD card reader device connected to your PC). Measurement campaigns are stored as .CMG files in a folder that the user can copy onto the PC for storage purpose. dBTrait is then launched, from which the campaign files can be opened. It is highly recommended that the instrument be turned off before extracting the SD card, otherwise it might be irreversibly damaged.



6.7 SMS FUNCTIONALITIES

6.7.1 SMS alarms

- On event → message content: instrument serial #, location, date and time, user defined text, IP address:http port
- On low battery (% set by the user) → message content: instrument serial #, location, date and time, % remaining battery
- On movement: → message content: instrument serial #, location, date and time, GPS coordinates, distance from previous location, IP address:http port (the alarm trigs if the instrument has moved more than the user defined distance)
- On CIC error: → message content: Date and time, instrument serial #, location, Electrical Check error!
- On UPS active → message content: Date and time, instrument serial #, location, UPS active

Note: Phone numbers can be entered using the international format with codes “00” or “+”. Depending on the countries, one or the other code shall be preferred. Examples: 0033 for France, +61 for Australia.

6.7.2 Automatic SMS actions:

- Sending “IP” by SMS to the instrument makes it reply by sending an SMS with the 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

6.7.3 Actions on SMS sent to the instrument:

- On SMS sent “IP”, the instrument replies by sending an SMS with 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 sent “reboot”, the instrument reboots to establish a new connection and replies with an SMS with the instrument serial #, location, date and time, IP :port address

6.8 HTTP COMMAND LINES

- The instrument FTP server management (in case FTP server is disconnected):
  http://ip:port/priv/FTPserver.asp?Action=x
  - x = 0 → stop server
  - x = 1 → start server
  - x = 2 → restart server

- Reboot the instrument through Internet:
  http://ip:port/pub/Reboot.asp
  Note: same behaviour as when a “reboot” SMS is sent

- Forced SMS (to obtain SIM card phone #):
  http://ip:port/pub/SendSMS.asp?Number=x
  x = SMS mobile #

- Stop measurement (equivalent to “Stop” button):
  http://ip:port/pub/stoplog.asp

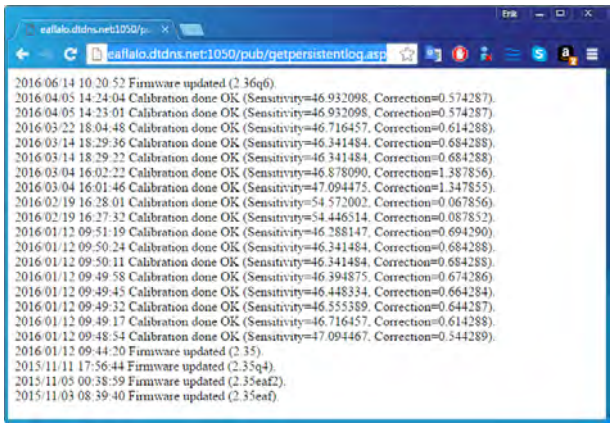
- Start log (equivalent to “Start Log” button”):
  http://ip:port/pub/startlog.asp

- Measurement configuration activation:
  http://ip:port/pub/activateconfiguration.asp?config=XXX
  XXX is the name of the configuration in memory to activate.

- Activation of the VNC server
  http://ip:port/pub/Remote.asp?flag=2
  Note: To stop the VNC server a reboot of the device is needed

- Persistent log file (file not erased when reset to factory settings):
  http://ip:port/pub/getpersistentlog.asp

  Example:



CHAPTER 7
dBFILEMANAGER SOFTWARE

7.1 INTRODUCTION TO THE SOFTWARE

01dB has developed a specific application, dBFileManager. This application allows for a simplified connection to the DUO, FUSION, CUBE and ORION instruments (by FTP protocol) for downloading measurements, as well as various other operations.

The dBFileManager software may be launched from the dBTrait software, via the « File » menu.

Note: dBFileManager is the standard data collection software, manually operated. The dBDataCollector software is offered in complement. It is characterised by its autonomous functions and automation.

7.2 MAIN FUNCTIONS OF dBFILEMANAGER

The main functions of dBFileManager are as follows:

- Management of DUO, FUSION, CUBE and ORION equipment catalog (installed base)
- Measurement data downloading (closed / unclosed campaigns), with possible selection of the types of data to download
- Download and Dispatching of measurement configurations and/or systems configurations
- Dispatching of.czip files (Firmware update files)

The connection to instruments may be established by any communication mode: Ethernet connections, Wi-Fi and 3G.

7.3 SOFTWARE INSTALLATION AND LAUNCHING

The dBFileManager v6 software is automatically installed together with dBTrait v6 software, by executing the corresponding setup file.

For previous versions of dBFileManager (e.g. 5.5.3.0), the software is installed by executing the dedicated Setup file.

Once the installer has been launched, a series of windows intuitively guides the user through the software installation process.

Once the installation has been completed, the dBFileManager software may be launched directly from the dBTrait software, via the « File » menu.

Note: the use of dBFileManager software does not require any particular license number.

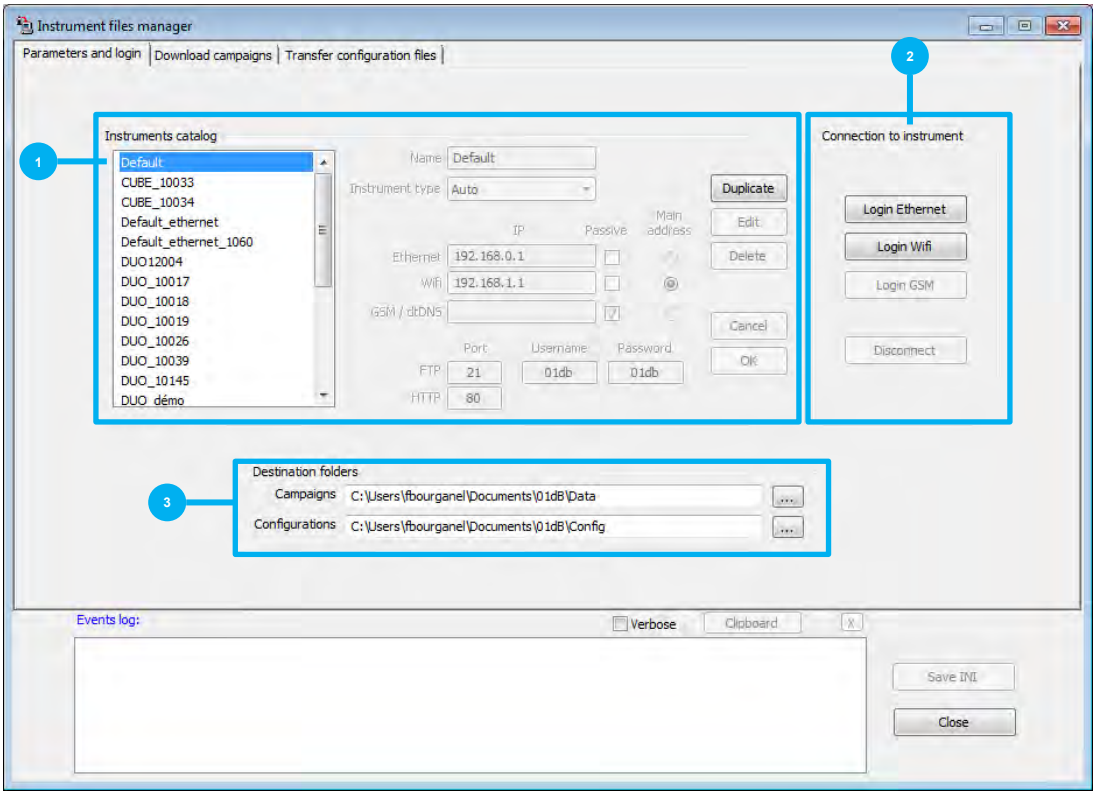
7.4 DESCRIPTION OF THE USER INTERFACE

The dBFileManager user interface is composed of 3 tabs, plus a lower area for Events log.

7.4.1 Parameters and login

The Parameters and login tab includes:

❶ The catalog management
❷ The connection to instruments
❸ The choice for destination folders:
- o For measurement data
- o For configuration files (for transfer of configuration files carried out from the 3rd tab).



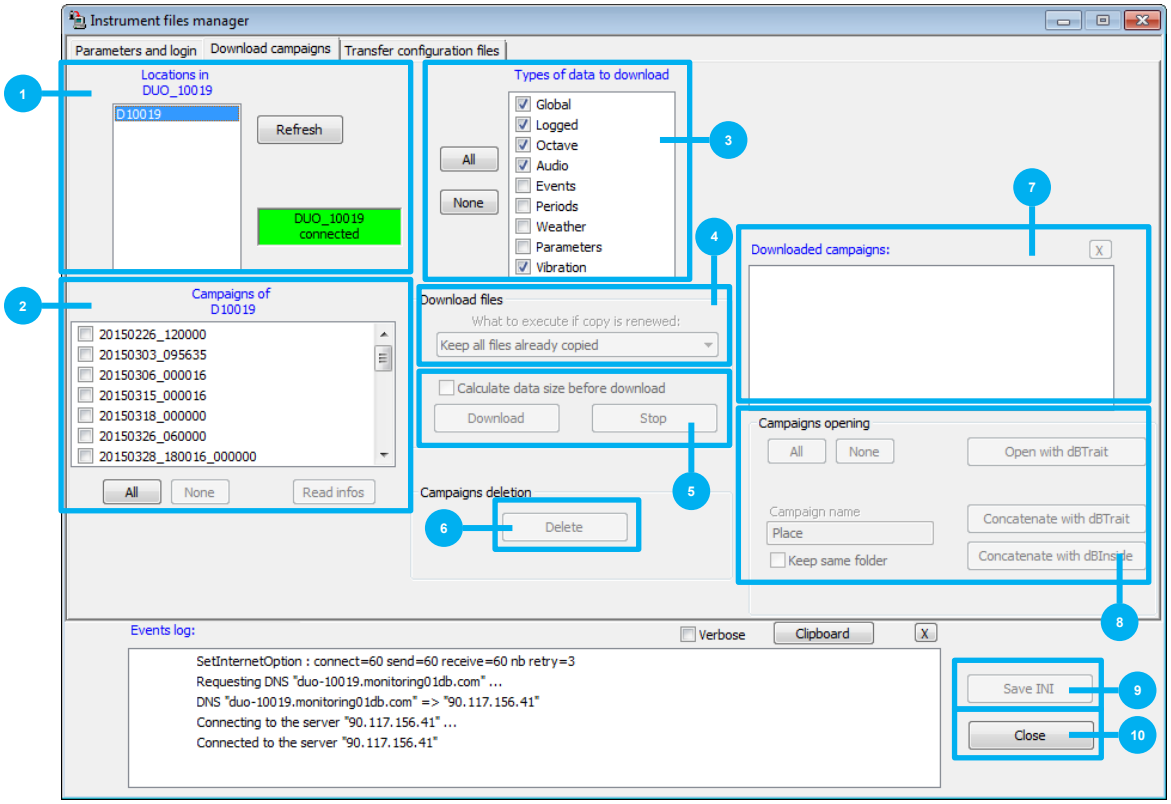
📖 *A "default" instrument is available in the catalog, allowing an easy and quick connection to a brand new instrument with its factory settings. When connecting to "default", the instrument type is automatically determined (whatever the type is: DUO, FUSION CUBE, or ORION).*

7.4.2 *Download campaigns*

The Download campaigns tab applies to the current connected instrument, and includes:

❶ The selection of a measurement location for which data are to be downloaded
❷ The selection of measurement campaigns to be downloaded
❸ The selection of the data types to be downloaded (choices are different between **DUO/FUSION/CUBE** and **ORION**).
❹ The copying mode (in case of copy renewal)
❺ Two buttons for launching / stopping the download process
The option « Calculate data size before download » to get an estimated data size amount, allowing the user to carry on or cancel the download process.
❻ The deletion of selected campaigns (deletion on the remote instrument)
❼ The list of downloaded campaigns (during the current software session) (Downloaded campaigns area)
❽ Quick open buttons, for the selected campaigns (in the Downloaded campaigns area):

- **Open with dBTrait** : launches dBTrait and open one or several campaigns in the standard mode (campaigns to be analyzed separately)
- **Concatenate with dBTrait**: launches dBTrait and opens several campaigns in Concatenated mode (for « Environmental » measurements only).
- **Concatenate with dBInside**: launches dBInside and opens several campaigns in Concatenated mode (for « Building » measurements only).



❾ Save INI button: for saving manually the global software configuration (the global software configuration is also systematically saved during exit).
❿ Close button: for exiting the software.

7.4.3 *Transfer configuration files*

The Transfer configuration files tab is dedicated to 3 functions, which procedures are described here below:

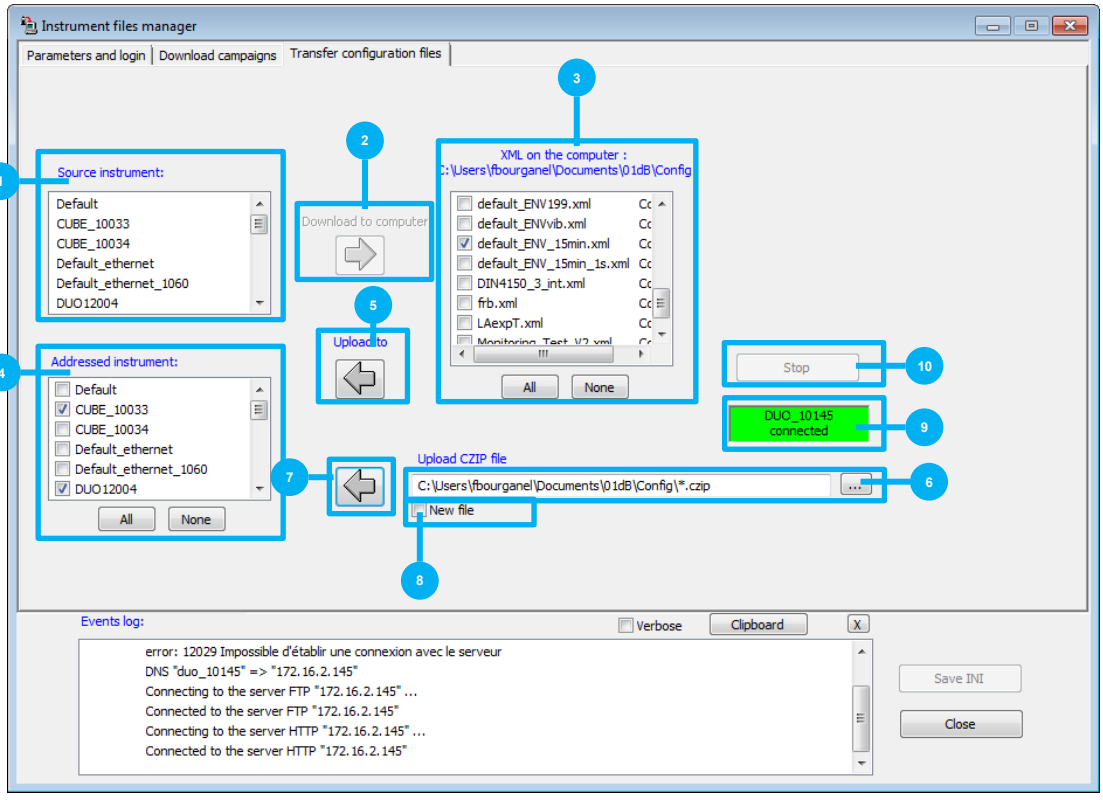
Download of measurement configurations and/or systems configurations
❶ Select the « Source instrument »
❷ Press the « Download to computer » button:
Starts downloading of the configuration files available in the « Export » directory of the selected remote instrument.
❸ Successfully transferred configuration files are displayed in the « XML on the computer » area

Dispatching of measurement configurations and/or systems configurations
❸ Select the wished configuration files from the « XML on the computer » area (the storage folder on the computer is also reminded here)
❹ Select the instruments to which the configuration files should be sent
❺ Press the « Upload to » button:
Starts dispatching the selected configuration files towards the « Addressed instruments ».

***Note**: Configurations can then be imported from each of the addressed instrument.*

Dispatching of .czip files (Firmware update files)
❹ Select the instruments to which the .czip files should be sent
❻ Select the .czip file to be dispatched using the « File selection » button
❼ Press the « Upload CZIP file » button:
Starts dispatching the .czip file towards the selected instruments
❽ In case of upload error (shown in the Events log), tick the « New file » option and upload again. The file previsouldy uploaded with errors will be deleted.

For all cases:
❾ When an instrument is connected, it is listed in the « current connected instrument » (the area turns green)
❿ Press the « Stop » button for interrupting an ongoing file download/upload

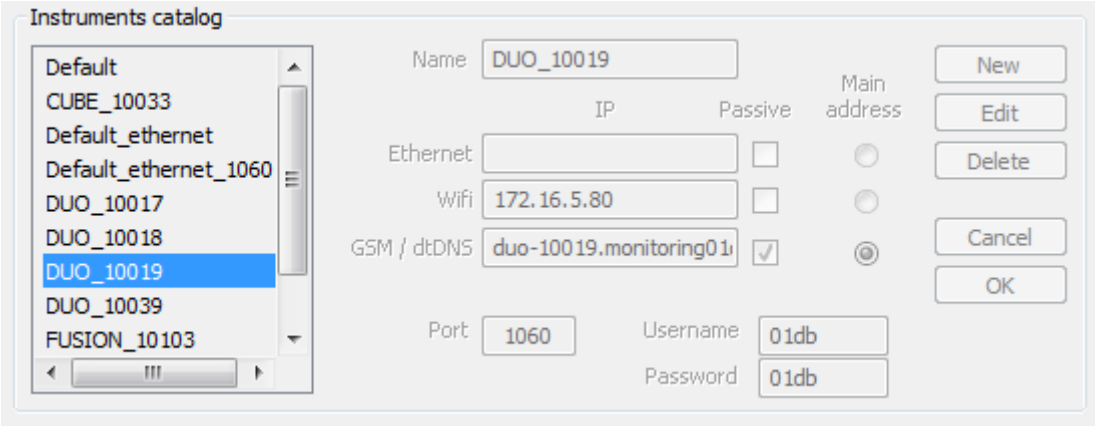


7.5 INSTRUMENTS CATALOG AND CONNECTIONS

7.5.1 Catalog management

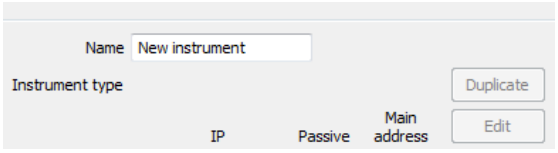
The dBFileManager Instruments catalog is a directory allowing the user to list all DUO, FUSION, CUBE and ORION instruments for which the user may want to transfer data.

Note: The dBFileManager Instruments catalog is shared with the dBDataCollector automatic transfers application. Therefore, all instruments already entered in the dBFileManager Instruments catalog will be automatically accessible in dBDataCollector, and vice-versa.



7.5.2 Addition/Editing of equipment in the Instruments catalog

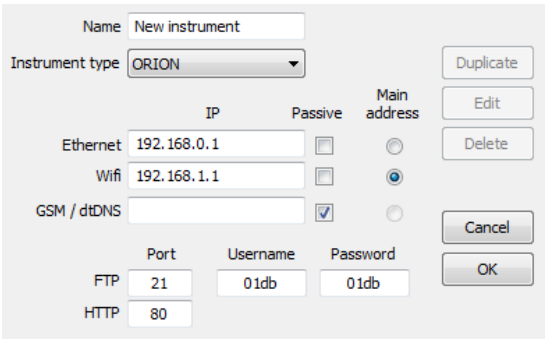
The Duplicate button allows the addition of a new instrument of type DUO, CUBE, FUSION or ORION into the catalog. The addition is carried out by duplicating the selected instrument from the catalog.



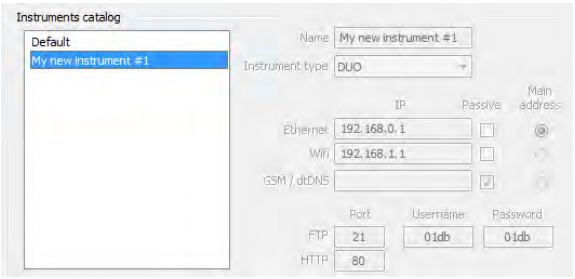
A default Name will be attributed to the created instrument

The user then sets the Instrument type from the Dropdown menu,

and completes the fields necessary for communicating with the instrument and its identification:



Once all information concerning the new instrument has been entered, the user confirms by pressing the OK button.
The new instrument then appears in the catalog listing on the left:



Description of the fields available for each instrument:

- **Name**: instrument identification
- Instrument type
- **Ethernet**: Instrument Ethernet IP address
- **Wi-Fi**: Instrument Wi-Fi IP address
- **GSM/dtDNS**: GSM/3G IP address, or name of dtDNS host if this parameter has been configured on the unit
- **FTP Port**: FTP port No. as configured on the unit
- **HTTP Port**: HTTP port No. as configured on the unit
- **Username**: FTP username as configured on the unit
- **Password**: FTP password as configured on the unit
- **Passive Mode**: option to be independently selected for each connection mode possible.

- **Main address**: address (or connection mode) which will effectively be used for communication with this instrument for configuration files transfers.
  Only one main address may be selected.

At least one IP address must be entered for an instrument, but not necessarily for all three.

The Instruments catalog is not limited in number and thus allows the simple management of an installed base of several tens of units, for example.

An instrument present in the catalog may be modified. Simply select in the list to the left then click on the **Edit** button.

Lastly, the **Delete** button allows the deletion of an instrument from the Catalog. A confirmation message allows the operation to be confirmed / cancelled.

📖 *For an instrument used in DHCP mode, its machine name can be entered in the Ethernet field, e.g.: DUO_xxxxx, where xxxxx is the unit's serial No.*

📖 *Passive Mode: this mode is recommended for communication with an instrument in GSM (3G) mode. In general, the other communication modes (Ethernet and Wi-Fi) do not require enabling this option.*

📖 *In the event of connecting to DUO using its dtDNS host name, a name resolution phase precedes the connection. This phase is visible in the Events log. In this case, the DNS "cache" is worked around (or "shunted") to avoid dBFileManager trying to connect to an address that is no longer valid (which is the case after 24 hours maximum, for example, for a 3G DUO connection via the Orange operator in France).*

- *Resolution of the DNS name: search for correspondence between the dtDNS name and the IP connection address.*
- *DNS cache: keeps the last IP address corresponding to the dtDNS name; this information is stored on the PC that hosts dBDataCollector.*

7.5.3 Browsing the Instruments catalog and Connections

The Instruments catalog can be browsed by selecting the instruments that appear in the list on the left of the Catalog window.

When an instrument is selected, it is possible to start a connection using the buttons to the right of the Catalog window:

The connection is possible for all types of non-empty addresses for the selected instrument.

In the example below, the selected DUO has two addresses: a WiFi address, and a GSM/dtDNS address (defined as the main address).

***Note**: connection steps are visible in the Event log.*

7.6 ADDITIONAL INFORMATION

7.6.1 Settings files

The dBFileManager software uses one settings file (.INI):

- [ALLUSERSPROFILE]/01dB/dBTrait/dBTrait.ini
  - Main software settings file

N.B.: the ALLUSERSPROFILE directory depends on the operating system used:
- Windows 7: C:\ProgramData

The dBTrait.ini file contains the settings for the dBTrait software and for the dBFileManager software.
It is manually saved by pressing the Save INI button, or when exiting the software.

7.6.2 Catalog file

The dBFileManager Instruments catalog is stored in the following file:

- [ALLUSERSPROFILE]/dBHard/CatalogInstrument.xml

N.B.: the ALLUSERSPROFILE directory depends on the operating system used:

- Windows 7: C:\ProgramData

This file is common to and shared with the dBDataCollector software when installed on the same workstation as dBFileManager.

To transfer the Instruments catalog from one computer to another, simply copy the CatalogInstrument.xml file from the [ALLUSERSPROFILE]/dBHard/ directory on the source computer and paste this in the same directory on the target computer.

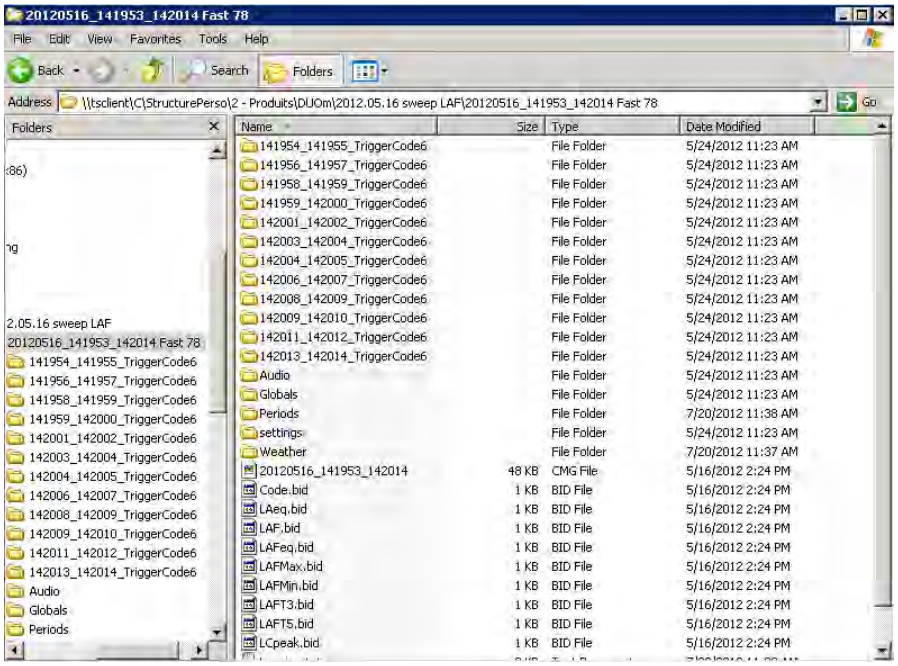
7.6.3 Trouble shooting

In case of connection issues: check the Windows firewall settings on your computer.
Sometimes it can be necessary to set the network options of dBFileManager to both « public » **and** « private » for a proper communication authorizing.

CHAPTER 8
GENERAL INFORMATION

8.1 DATA FORMAT

Measurement sessions are stored as .CMG files with associated files and subdirectories. All files are stored in a directory corresponding to the measurement date and time.
During a measurement, a .CMG measurement session is systematically closed at midnight and a new one starts without data loss at 00:00:00 (with possibly a NTP or GPS clock re-synchronization) this open/close process is also done every time an electric check is automatically performed. In that case some seconds corresponding to the test duration are not stored.



The example above shows the contents of the measurement session on 4 January 2012 between 06:00:33 and midday:

- Directories:
  - ***_TriggerCode6**: contains the parallel measurement during coding with a fast logging interval
  - **Audio**: contains audio files
  - **Globals**: contains the global values measured between the start and end of the measurement
  - **Periods**: contains the instant indicator measurements per period
  - **Settings**: contains additional information (measurement configuration, daily electrical check results, system log during measurement, etc.) in .xml files.
  - **Weather**: contains weather measurements
- The **.cmg file**, containing all rules for reading the files from the associated session
- **.bid files** containing the binary values of each instant value measured
- **Logging.txt:** manual comments made during the measurement

8.2 STORAGE MEMORY

8.2.1 Memory capacity and data storage size

The instrument includes a slot for the SD card. The capacity of this memory allows storing all selected indicators:

- Each stored indicator corresponds to 2 bytes.
- Each stored 1/1 octave spectrum corresponds to 24 bytes.
- Each stored 1/3 octave spectrum corresponds to 72 bytes.

For instance, a 2 GB memory allows storing more than 100 days of data with the following configuration:

- Logging period T of 1 second.
- During 20% of the time, fast logging period of 100 msec.
- Storage of 4 indicators and one 1/3 octave spectrum for each logging period and fast logging period.
- No audio recording.

8.2.2 Storage of the raw audio signal

The time signal is a metrological audio signal sampled at 51.2 kHz maximum. It is coded in 24 bits and stored in 32 bits. The sampling frequency can be selected so as to decrease the file size. It is stored as a binary file that can be read by 01dB software applications (dBFA and dBTRAIT software for instance). The header includes all information able to find the calibrated sound levels. The audio signal is split up in order to have a maximum size compatible with dBFA and dBTRAIT applications: maximum 30 minutes (an audio file stored continuously will be automatically closed after 30 minutes, then a new audio file will immediately be stored).

Each stored second of audio signal corresponds to (4 bytes) x (sampling frequency).

For instance, a memory card of 2 GB allows storing more than:

- Around 2 hours and 40 min (162 min) of measurement with the audio signal sampled at 51.2 kHz.
  Calculation is performed using the following formula:

  recording time = SD card capacity[MB] /(4 x sampling frequency)

8.2.3 Automatic storage cut-off thresholds

The instrument features an automatic memory management system, which guarantees that measurements at the primary logging interval are stored, stopping fast logging interval and audio storage if necessary.

There are two automatic storage cut-off thresholds: **low** threshold and **critical** threshold
Case 1: measurement with infinite duration

- Low threshold: stop storing fast logging interval and audio data at 50 MB remaining
- Critical threshold: stop storing at primary logging interval at 3 MB remaining

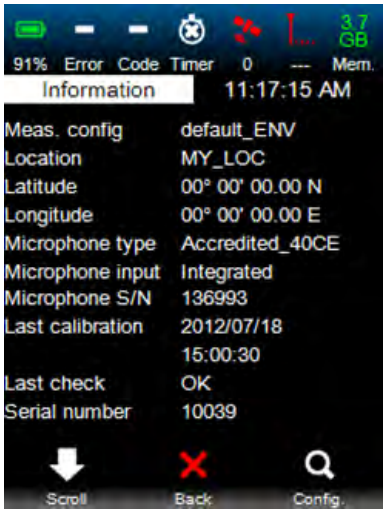
Case 2: measurement with finite duration

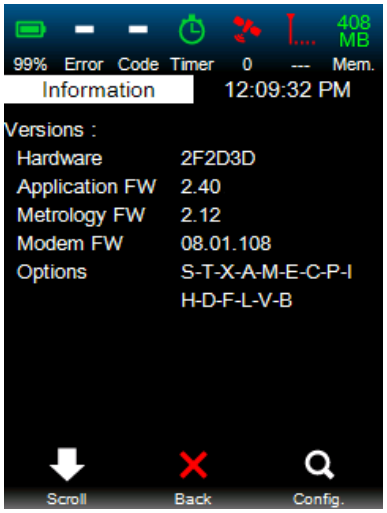
- In this case, the unit gives priority to ensuring that the measurement can be completed at the primary logging interval.
- Fast logging interval and audio storage may be cut off at a low threshold greater than 50 MB, depending on the time remaining before the end of measurement, the logging interval value, and the number of values stored (i.e. the total number of values remaining to be stored at the primary logging interval).

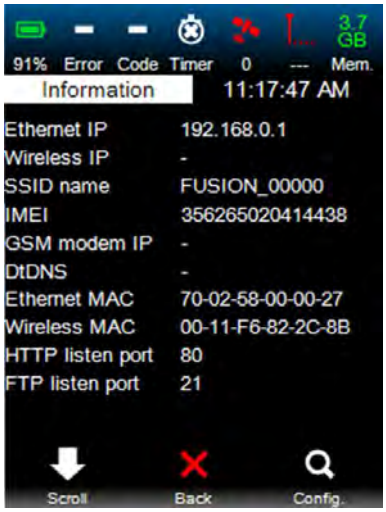
8.3 DEFAULT CONFIGURATION (FACTORY CONFIGURATION)

The factory parameter settings are as follows:

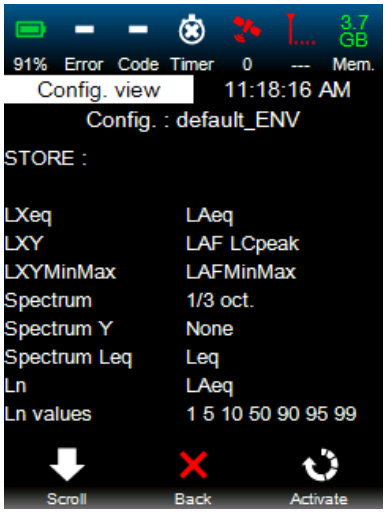
8.3.1 Information

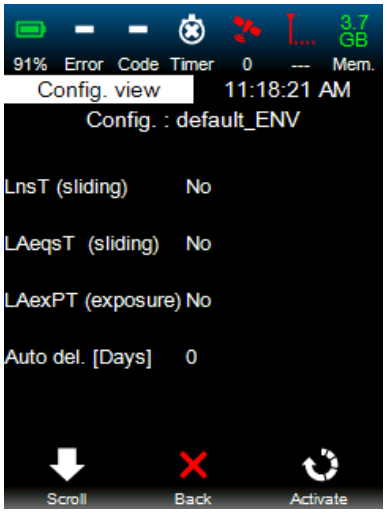


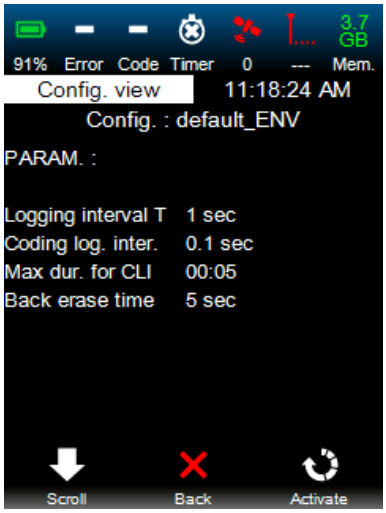


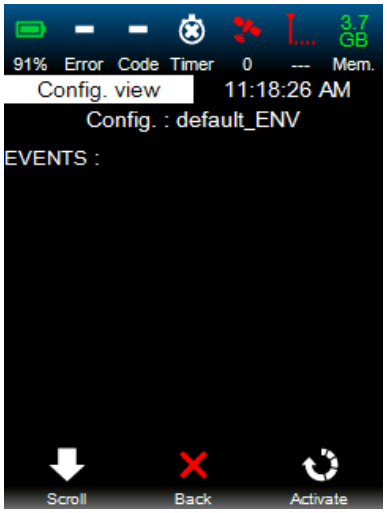


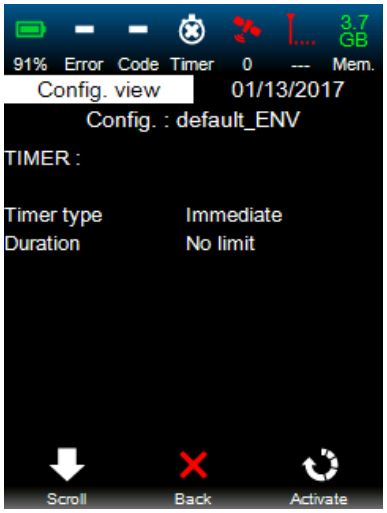
8.3.2 Measurement configuration (default*)

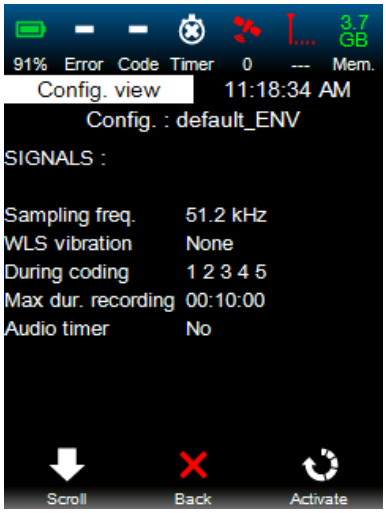


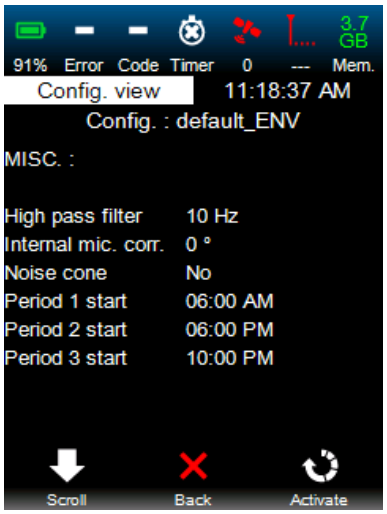




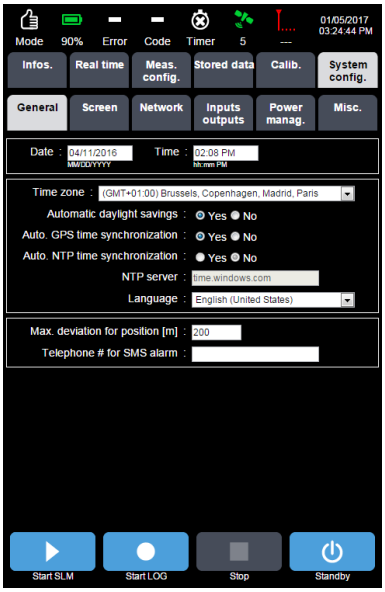


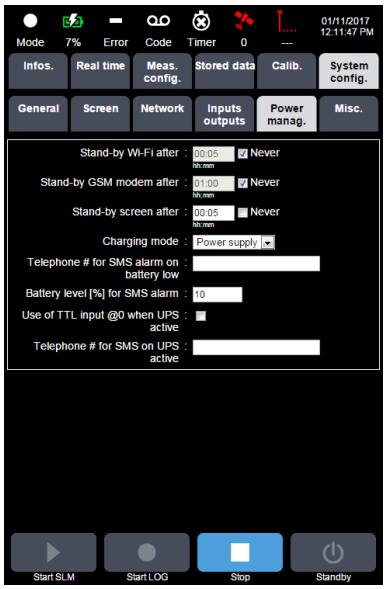


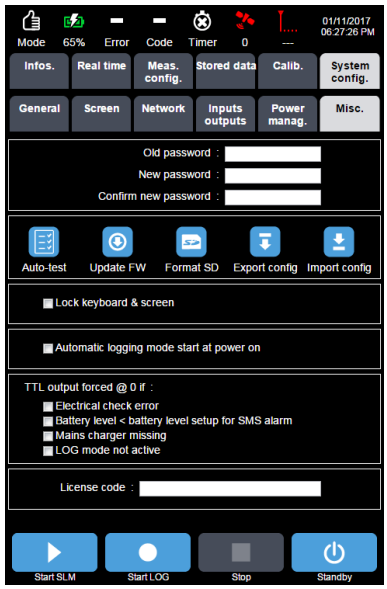




8.3.3 System configuration



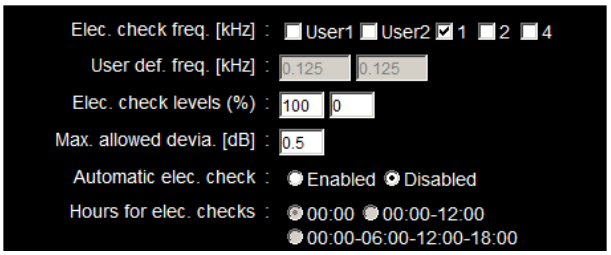




8.3.4 Default value of calibration level

The default calibration level is 94 dB, the default frequency weighting is C-weighting.

8.3.5 Default values for electrical check



8.3.6 Default values of Real time screen in the Web interface

4 instant values	7 overall values	Spectral values
• LAF • LAeq0.5s • LCpeak • LAF0.5sMax	• LAeq • LCpeakMax • LAFMax • LAFMin • Ln1 (=L1) • Ln4 (=L50) • Ln6 (=L90)	• Leq0.5s

CHAPTER 9
TECHNICAL SPECIFICATIONS

9.1 ELECTRONIC BASIS

Designed around performing signal processors of type ARM9 and DSPs, the instrument can calculate in parallel several types of results (e.g., Fast, Slow, Impulse time constants, in A, B, C, Z frequency weightings).

9.2 SOFTWARE BASIS

Two separated software units ensure the instrument's intelligence:

- A processing unit that performs signal processing and calculations (metrology firmware).
- A management unit that manages the interface and the sequencing of operations (applications firmware).

These two software units are completely independent one from another: changes within one unit won't affect the other one.

9.3 TABLE OF OPTIONS

The table below shows the correspondence between the software options existing for the instrument and the equivalent option codes (corresponding letters) displayed in the summary of the Infos page:

Option	Initials	Description
Spectrum	S	Analysis and storage enabled for 1/1 and 1/3 octave spectra
Trigger	T	1 automatic coding and 5 manual codings enabled
Audio	A	Possibility of audio recording enabled
Modem	M	Modem enabled
Ethernet	E	Ethernet connection enabled
Check	C	Electrical check function enabled
Advanced Trigger	X	5 advanced automatic codes enabled
PNL	P	PNL(T) : Perceived noise level measurements enabled
Indicators	I	Storage of sliding indicators and exposure level
FTP	F	FTP server enabled
Log	L	Storage of time history of acoustic parameters enabled
HTTP Commands	H	Integrators http commands enabled
Push data	D	Automatic push data tranfer (FTP client)

Note: the instrument includes a feature for short-term use of options via temporary licences. In this case, the instrument automatically returns to the minimum options (E, C) when the licence expires. If a measurement is in progress when the temporary licence expires, the measurement only continues after expiry for indicators not requiring optional features. Expiry of a temporary licence is recorded in the event log.
If the M option is temporary, the user must take all necessary precautions (i.e. updating the licence remotely before the modem is disabled). If this is not done the instrument will no longer be connected to the Internet after the licence expires.

9.4 DETAILED TECHNICAL CHARACTERISTICS

IEC class:
IEC 61672-1 edition 2 (2013) (0° and 90° reference direction)
IEC 61620 (1995) NF EN 61260/A1 (2002)

Sound Level Meter, Integrating Sound Level Meter with storage, group X.

Linearity range domain

With 40CD microphone
Upper limit (LAF, LAS / LAI): 138 dB
Upper limit (LBF, LBS / LBI): 138 dB
Upper limit (LCF, LCS / LCI): 138 dB
Upper limit (LZF, LZS / LZI): 138 dB

Lower limit (LAF, LAS / LAI): 21 dB
Lower limit (LBF, LBS / LBI): 21 dB
Lower limit (LCF, LCS / LCI): 26 dB
Lower limit (LZF, LZS / LZI): 31 dB

[dB]	$L_{A\ S/F}$	$L_{C\ S/F}$	$L_{Z\ S/F}$	L_{AeqT}	L_{Cpeak}
31,5 Hz	25-97	25-134	30-137	25-97	60-137
1 kHz	22–137	25-137	30-137	22-137	60-140
4 kHz	22–137	25-137	30-137	22-137	60-140
8 kHz	22-133	25-131	30-136	22-133	60-139 at 90° 60-136 at 0°
12, 5 kHz	22-129	25-127	30-135	22-129	60-138 at 90° 60-135 at 0°

Note: Linearity checks systematically begin with a 94 dB level.

Peak dynamic range
60-140 dBC, 1 range

Time weighting
Slow, Fast, Impulse, Peak

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

Measurements and storage of all indicators

Instant acoustic 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									

PNLandt PNLT (Perceived noise level) aircraft and hélicopter
LnsT (Sliding Ln)
LAeqsT (Sliding LAeq)
LAexPT (Exposure level)

Instant weather values stored
Wind speed [m/s]
Wind direction [°]
Rain intensity [mm/h]
Atmospheric pressure [hPa]
Air temperature [°C]
Relative humidity [%RH]

Acoustic logging interval T
Min. 20 msec - max. 3,600 s, 5 msec steps
Fast logging interval: min. 20 msec - max. standard logging interval or 60 sec if standard logging interval is more than 60 sec, 5 msec steps
Fast logging interval applicable only during coding
The fast logging interval is a sub-multiple of the primary logging interval

Weather logging interval
The logging interval for weather values is a multiple of the acoustic logging interval and cannot be less than 1 second.

Spectral analysis
1/1 (8 Hz – 16 kHz) and 1/3 (6.3 Hz – 20 kHz)

Statistics
7 Ln selectable from L1 to L99 by steps of 1 dB
Rate: T if Leq or 20 msec if Lp, programmable values, classes of 0.1 dB

Back erase
0, 5s, 10s applicable in SLM mode

High-pass filter
0.3 Hz / 10 Hz

Reference directions
0° and 90°, 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

Static pressure influence

Static pressure [kPa]	Typical difference	Expanded uncertainty (k=2)	class 1
100	0.0	0.3	±1
95	0.0	0.3	±1
90	0.1	0.3	±1
85	***0.2***	0.3	±1
80	***0.2***	0.3	±1.2
77	***0.2***	0.3	±1.2
70	***0.3***	0.3	±1.2
65	***0.3***	0.3	±1.2

Storage modes
LOG mode: data-logging sound level meter mode with storage of time histories.

Signals recording:

Audio
Audio signal type : allows selecting either RAW (uncompressed data for dBTrait post-processing) or MP3 (format MPEG-1/2 Audio Layer 3 compressed data)
Audio signal sampling frequency: allows selecting audio signal sampling frequency; Possible choices:
For RAW : 51.2kHz, 25.6kHz, 12.8kHz, 6.4kHz, 3.2kHz, 1.6kHz)
For MP3 : 48kHz, 32kHz, 16kHz, 8kHz
MP3 bit rate [kbps] : allows selecting MP3 bit rate ; possible choices : :

Fe [kHz]	**48**	**32**	**16**	**8**
Possible bit rate [kbps]	32 96 192	32 96 192	8 32 96	8 32 96

Vibration

Audio trigger
Simultaneous with codes or manual (by the instrument and the web interface)

Events (automatic coding)
5 user-definable events: 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 trigger
On the instrument: 1 code “code 1”
On web interface: 5 codes: “codes 1 to 5”

Timers
Immediate, delayed, periodic
Periodic audio

Preamplifier
External optional PRE22 (included in DMK01) on secondary input (standard cable 10 m)

Acoustic background noise:
Noise from the complete system, microphone placed in a isolated cavity

Electric background noise:
The microphone is replaced by a ADP12 adaptor, and the input is short-circuit
Measurement is performed with 30 sec averaging

Typical background noise:
Microphone (thermal noise): 14.5 dBA, 15.0 dBC, 15.3 dBZ
Electronics: 11 dBA, 12.5 dBC, 18.5 dBZ
Total: 16.1 dBA ; 16.8 dBC, 20.2 dBZ

[dB]		$L_{A\ S/F}$	$L_{C\ S/F}$	$L_{Z\ S/F}$	L_{AeqT}
Acoustic	Typical	16,1	16,8	20,2	16,1
	maximuml	20,0	21,0	24,0	20,0
Electric	typical	11,0	12,5	18,5	11,0
	maximum	16,0	17,0	21,0	16,0

The background noise specific to the instrument results from the implementation of the standard microphone and is independent of the selected configuration (e.g., the configuration used for power supply, Wi-Fi, GPS, screen).

Keys
4 silent keys: on/stand-by/off key and 3 multi-function keys

Status indicators
LED red (overload)
LED blue (Wi-Fi connection)
LED green (power on, measurement in progress, charge)

Display
High contrast colour screen 38*50mm resolution 320*240 pixels
3 sets of colours (day, contrast, night)

USB connection
Type 2.0; mass storage (1.2m cable)

Ethernet connection:
Connector RJ45 (shielded cable maximum length 3m)
Speed: 100 Mbits/s

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
Integrated FTP client for automatic data upload to server

Voice activation on cellular network
Possibility to call instrument phone # with “voice” subscription to listen to the on-going measurement; Gain 20dB, signal compression in modem

SMS alarms
- On event → message content: instrument serial #, location, date and time, user defined text, IP address:http port
- On low battery (user defined %) → message content: instrument serial #, location, date and time, % remaining battery
- On movement: → message content: instrument serial #, location, date and time, GPS coordinates, distance from previous location, IP address:http port (the alarm trigs if the instrument has moved more than the user defined distance)
- On CIC error (electrical check)
- On UPS actif

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 (in use with internal microphone only)
Inactive (no internal microphone)

Electrical check
Programmable periodicity: 1, 2 or 4 times per day (0h,0h-12h, 0h, 6h, 12h, 18h)
3 pre-set frequencies (1,000 Hz, 2,000 Hz, 4,000 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 8 hours

Typical power consumption
Without communication and display backlight off: < 1.2 W
+ display backlight on: < 1.6 W
+ Wi-Fi
    Without communication: < 1.8 W
    With communication: < 2.0 W
+ Modem: < 3,.8 W

Operating lifetime
(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)
20 hours with Wi-Fi connection (during 10% of measurement time)
15 hours with active 3G connection (during 10% of 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).

For continuous use (fixed point), it is strongly recommended to change the SD card considered a consumable every 6 months during the site visit, as it can be highly stressed and has a limited life.

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
IP42 if the instrument is used in vertical position with the 40CD microphone (weatherproof microphone)

Influence of vibration

Use with outdoor microphone unit DMK01:

- For mechanical vibration of an acceleration level of 1 m/s² 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
730 g
H x L x D: 220 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.

Connecting these accessories has no influence on measurements

9.5 1/1 AND 1/3 OCTAVE BAND FILTERS

Octave and third octave band integrated filters within the instrument are digital filters based on decimation and filtering of order 8.
The list of centre frequencies is established in a base 2 system, the measuring range is unique and extends from background noise to 137dB range (see range table below).
Under range and overload signals determine the linearity range of each filter; overload being activated from 138.2dB (this level is based on the calibration correction).

Note: In case of under range of one or several spectral values, the value of 0 dB is arbitrarily assigned to the band.

For measurements in the lower frequency bands the logging period should be increased. The input filter must be set to 0.3Hz.
Power management is such that the measurement is interrupted if the battery voltage is too low. The battery icon and the percentage provide information in real time on the state of battery charge.
From the standpoint of environmental conditions, built-in filters meet the same requirements as the instrument.

Standard:	CEI IEC 1260 (1995)
Analytical method:	Real time A/D conversion
Sampling frequency:	51.2 kHz
Analogue high-pass filter:	0.3Hz - 10Hz (software selectable)
Frequency range:	spectrum 1/1 8 Hz-16 kHz (upon high-pass filter) spectrum 1/3 6.3 Hz-20 kHz (upon high-pass filter)
Centre frequencies (Hz):	6.3/8/10Hz 12.5/16/20, 25/31.5/40, 50/63/80, 100/125/160, 200/250/315, 400/500/630, 800/1k/1.25k, 1.6k/2k/2,5k, 3.15k/4k/5k, 6.3k/8k/10k, 12.5k/16k/20k

Reference ranges (level) in connection to the sound level meter:

FILTER		RANGE
1/3 OCTAVE	6.3Hz – 31.5Hz	20-137
	40Hz –5κHz	15-137
	6.3KHz – 20 κHz	20-137
1/1 OCTAVE	8 Hz – 31.5 Hz	20-137
	63 Hz – 1 κHz	15-137
	2 κHz- 16KHz	20-137

Reference level: 94 dB
Reference signal: 50mV/Pa
Reference attenuation: 0 dB
Maximum input load (rms): around 8.1V rms.
Stabilisation time: about 12s.

9.6 MICROPHONE TYPE 40CD (AND NOSE CONE)

The 40CD microphone (+ nose cone) has been designed for use with CUBE in external configuration (with nose cone, reference directions 0° or 90°). The main features are as follows:

- Frequency response (after correction applied in the instrument): 3.15 Hz–20 kHz ±2 dB
  5 Hz–10 kHz ±1 dB
- Nominal sensitivity: 50 mV/Pa
- Polarisation voltage: 0 V
- Upper limit (3% distortion): 148 dB
- Capacitance: 17 pF
- Temperature range: -40°C - +120°C
- Temperature coefficient (250 Hz): -0.007 dB/°C
- Static pressure coefficient: -0.01 dB/kPa
- Hygrometry: 0-100% (no condensation)
- Influence of humidity: < 0.1dB (0–100% RH)
- Pressure equalization: rear

9.7 ADDITIONAL METROLOGICAL CHARACTERISTICS / INFORMATION FOR TYPE APPROVAL

9.7.1 Initialization

Upon start-up, the system relies on a self-control routine to make sure that:

- The complete system is operational;
- There is enough storage space;
- Internal batteries are operational.

The instrument keeps track of each start-up procedure (time-stamping and log). The start-up time between the instant the instrument is turned on and the instant when it is ready for operations is shorter than 20 seconds. The closing of a measurement period is shorter than 1s.

When changing environmental conditions (temperature, humidity), it is recommended to have the instrument in stand-by mode during 15 minutes or so before starting a measurement in the new conditions in order to avoid a temperature difference between the instrument and the ambient environment.

9.7.2 Default configuration

The settings of the default configuration are predefined and supplied which each new instrument (see section 4.2.8 Restoring factory settings)

9.7.3 Free field correction

The free field correction value is set from the Calibration main menu, see 5.3 Calibration (Calib. tab).

Using the external input:

- With the DMK01 unit / PRE22 preamplifier / 40CD microphone assembly: the default value is -0.2 dB. This value takes into account the effect of the windscreens, as well as of the shape of the DMK01 set.

Important: These free-field correction factors must be used during all expertise measurements.

9.7.4 Frequency corrections based on the active measurement configuration, external 40CD microphone configuration (use with DMK01)

FUSION, CUBE or DUO associated with the DMK01 weatherproof outdoor microphone unit, can be used either for a reference direction of 0° (nose cone is mandatory), or for a reference direction of 90° (nose cone is mandatory).
The tables below indicate the frequency corrections applied, based on the configuration:

Frequency	Configuration	
	0° with nose cone	**90° with nose cone**
80	0.0	0.0
100	0.0	0.0
125	0.0	0.0
160	0.0	0.0
200	0.0	0.0
250	0.0	0.0
315	0.0	0.0
400	0.0	0.0
500	-0.1	0.0
630	-0.1	0.0
800	-0.1	0.0
1,000	-0.2	0.1
1,250	-0.3	0.1
1,600	-0.5	0.2
2,000	-0.6	0.2
2,500	-0.8	0.3
3,150	-0.9	0.5
4,000	-0.9	0.7
5,000	-1.0	0.9
6,300	-2.4	0.6
8,000	-4.2	-1.0
10,000	-4.1	-0.6
12,500	-1.6	2.4
16,000	0.4	3.1
20,000	0.9	3.1

Note: The type 40CD microphone by G.R.A.S. is optimised to be used specifically with FUSION, CUBE or DUO. This microphone presents characteristics close to those of a random field microphone and should not be used with an instrument other than FUSION or DUO.

9.7.5 Characteristics of the windscreen, external 40CE microphone (FUSION) and external 40CD microphone configurations (FUSION, CUBE or DUO) (use with DMK01), nose cone is mandatory

9.7.5.1 Maximum change in sensitivity level within various angles from the reference direction; reference direction: 0°

Loudspeaker distance: 2 m
Mounting: One plane of symmetry.

Level: 84 dB Frequency weighting: Z (Lin)

with a ± 30° angle

Frequency Hz	Maximum change dB		Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	Microphone 40CE + windscreen	Microphone 40CD + windscreen		
250 - 1,000	0.2	0.1	0.3	1.3
1,000 - 2,000	0.3	0.3	0.5	1.5
2,000 - 4,000	1.1	1.1	0.5	2.0
4,000 - 8,000	1.9	1.5	1.0	3.5
8,000 - 12,500	3.2	3.7	1.5	5.5

with a ± 90° angle

Frequency Hz	Maximum change dB		Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	Microphone 40CE + windscreen	Microphone 40CD + windscreen		
250 - 1,000	0.5	0.3	0.3	1.8
1,000 - 2,000	1.2	1.1	0.5	2.5
2,000 - 4,000	2.1	1.7	0.5	4.5
4,000 - 8,000	4.8	4.6	1.0	8.0
8,000 - 12,500	5.1	5.9	1.5	11.5

with a ± 150° angle

Frequency Hz	Maximum change dB		Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	Microphone 40CE + windscreen	Microphone 40CD + windscreen		
250 - 1,000	0.9	0.7	0.3	2.3
1,000 - 2,000	1.7	1.5	0.5	4.5
2,000 - 4,000	2.2	2.2	0.5	6.5
4,000 - 8,000	5.3	5.6	1.0	11.0
8,000 - 12,500	5.4	5.9	1.5	15.5

Notes: Characteristics compliant with the specifications of class 1 sound level meters.

9.7.5.2 Maximum change in sensitivity level within various angles from the reference direction; reference direction: 90°

Loudspeaker distance: 2 m
Mounting: One plane of symmetry

Level: 84 dB Frequency weighting: Z (Lin)

Maximum change in sensitivity level within various angles from the reference direction, in decibels:

with a ± 30° angle

Frequency Hz	Maximum change dB		Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	Microphone 40CE + windscreen	Microphone 40CD + windscreen		
250 - 1,000	0.5	0.5	0.3	1.3
1,000 - 2,000	0.8	0.8	0.5	1.5
2,000 - 4,000	1.7	1.6	0.5	2.0
4,000 - 8,000	2.4	2.4	1.0	3.5
8,000 - 12,500	2.5	2.5	1.5	5.5

with a ± 90° angle

Frequency Hz	Maximum change dB		Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	Microphone 40CE + windscreen	Microphone 40CD + windscreen		
250 - 1,000	0.6	0.6	0.3	1.8
1,000 - 2,000	1.4	1.4	0.5	2.5
2,000 - 4,000	4.0	3.5	0.5	4.5
4,000 - 8,000	5.1	5.3	1.0	8.0
8,000 - 12,500	5.8	6.1	1.5	11.5

with a ± 150° angle

Frequency Hz	Maximum change dB		Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	Microphone 40CE + windscreen	Microphone 40CD + windscreen		
250 - 1,000	0.6	0.6	0.3	2.3
1,000 - 2,000	1.5	1.5	0.5	4.5
2,000 - 4,000	4.0	3.5	0.5	6.5
4,000 - 8,000	5.1	5.3	1.0	11.0
8,000 - 12,500	5.9	6.1	1.5	15.5

Characteristics complies with the requirements of sound level meters for class 1

9.7.5.3 Weighting frequencies 40CE (FUSION) ; reference direction: 0°

Reference pressure level: 84 dB
Reference frequency: 1,000 Hz Loudspeaker distance: 2 m
Accessories:
- DMK01 with preamplifier PRE22
- Windscreen for external unit DMK01
- Nose cone RA0208
- Extension cable RAL135 10m

Temperature: 20.7°C Relative humidity: 40.5% Static pressure: 998.4 hPa

Nominal frequency (Hz)	Level deviation dB Frequency weighting			Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	A	B	Z		
10	-0.2	-0.1	0.0	0.5	+3.5; -∞
12.5	-0.3	-0.2	-0.1	0.5	+3.0; -∞
16	0.1	-0.2	-0.0	0.5	+2.5; -4.5
20	0.1	-0.1	-0.0	0.5	±2.5
25	-0.3	-0.2	-0.0	0.5	+2.5; -2.0
31.5	-0.2	-0.1	-0.0	0.5	±2
40	0.0	0.1	0.0	0.5	±1.5
50	-0.1	-0.1	-0.0	0.5	±1.5
63	0.0	-0.1	0.0	0.5	±1.5
80	-0.0	-0.0	-0.0	0.5	±1.5
100	-0.2	-0.1	-0.1	0.2	±1.5
125	-0.1	-0.1	-0.1	0.2	±1.5
160	-0.1	-0.1	-0.1	0.2	±1.5
200	-0.1	-0.2	-0.1	0.2	±1.5
250	-0.2	-0.1	-0.1	0.2	±1.4
315	-0.1	-0.1	-0.1	0.2	±1.4
400	-0.0	-0.0	-0.0	0.2	±1.4
500	-0.1	-0.0	-0.0	0.2	±1.4
630	-0.0	-0.0	-0.0	0.2	±1.4
800	-0.1	0.0	0.0	0.2	±1.4
1,000	0.1	0.1	0.1	0.2	±1.1
1,250	0.0	0.0	0.1	0.2	±1.4
1,600	0.2	0.2	0.2	0.2	±1.6
2,000	0.3	0.3	0.3	0.3	±1.6
2,240	0.4	0.4	0.4	0.3	±1.6
2,500	0.2	0.2	0.3	0.3	±1.6
2,820	0.6	0.6	0.6	0.3	±1.6
3,150	0.6	0.6	0.6	0.3	±1.6
3,550	0.2	0.1	0.2	0.3	±1.6
4,000	0.7	0.7	0.7	0.3	±1.6
4,470	0.2	0.2	0.2	0.3	±2.1
5,000	0.3	0.2	0.3	0.3	±2.1
5,620	0.2	0.1	0.2	0.3	+2.1; -2.6
6,300	-0.2	-0.1	0.1	0.3	+2.1; -2.6
7,080	-0.3	-0.3	-0.0	0.4	+2.1; -3.1

Nominal frequency (Hz)	Level deviation dB Frequency weighting			Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	A	B	Z		
8,000	-0.4	-0.4	0.0	0.4	+2.1; -3.1
8,410	-0.3	-0.4	0.2	0.4	+2.6; -3.6
8,910	-0.3	-0.2	0.4	0.4	+2.6; -3.6
9,440	-0.2	-0.2	0.7	0.4	+2.6; -3.6
10,000	0.1	0.1	1.1	0.4	+2.6; -3.6
10,600	-0.1	-0.0	1.2	0.6	+3; -6
11,200	-0.6	-0.5	1.0	0.6	+3; -6
11,900	-1.7	-1.7	0.2	0.6	+3; -6
12,500	-2.7	-2.7	-0.4	0.6	+3; -6
13,300	-3.5	-3.5	-0.7	0.6	+3.5; -17
14,100	-4.5	-4.5	-1.1	0.6	+3.5; -17
15,000	-5.9	-6.0	-1.8	0.6	+3.5; -17
16,000	-8.2	-8.2	-3.1	0.6	+3.5; -17
16,800	-10.5	-10.5	-4.3	0.9	+4; -∞
17,800	-13.4	-13.4	-5.7	0.9	+4; -∞
18,800	-16.4	-16.4	-6.8	0.9	+4; -∞
20,000	-18.3	-18.4	-6.3	0.9	+4; -∞

9.7.5.4 Weighting frequencies 40CE (FUSION) ; reference direction: 90°

Reference pressure level: 84 dB
Reference frequency: 1,000 Hz Loudspeaker distance: 2 m
Accessories:
- DMK01 with preamplifier PRE22
- Windscreen for DMK01
- Nose cone RA0208
- Extension cable RAL135 10m

Temperature: 21.5°C Relative humidity: 36% Static pressure: 998.4 hPa

Rated frequency (Hz)	Deviation dB Weighting frequency			Extended uncertainty (k=2) (dB)	MPE Class 1 (dB)
	A	B	Z		
10	0.2	0.1	-0.2	0.5	+3.5; -∞
12.5	-0.1	-0.2	-0.2	0.5	+3.0; -∞
16	-0.1	-0.0	-0.1	0.5	+2.5; -4.5
20	0.1	0.1	-0.0	0.5	±2.5
25	-0.0	-0.0	-0.1	0.5	+2.5; -2.0
31.5	-0.2	-0.2	-0.1	0.5	±2
40	-0.0	-0.0	-0.0	0.5	±1.5
50	-0.0	-0.0	-0.0	0.5	±1.5
63	-0.0	-0.0	-0.0	0.5	±1.5
80	-0.2	-0.2	-0.1	0.5	±1.5
100	-0.1	-0.1	-0.1	0.2	±1.5
125	-0.1	-0.1	-0.1	0.2	±1.5

Rated frequency (Hz)	Deviation dB Weighting frequency			Extended uncertainty (k=2) (dB)	MPE Class 1 (dB)
	A	B	Z		
160	-0.0	-0.0	-0.1	0.2	±1.5
200	-0.2	-0.2	-0.2	0.2	±1.5
250	-0.2	-0.2	-0.2	0.2	±1.4
315	-0.2	-0.1	-0.2	0.2	±1.4
400	-0.2	-0.2	-0.2	0.2	±1.4
500	-0.2	-0.1	-0.2	0.2	±1.4
630	-0.3	-0.2	-0.3	0.2	±1.4
800	-0.3	-0.2	-0.2	0.2	±1.4
1,000	-0.2	-0.2	-0.2	0.2	±1.1
1,250	-0.1	-0.2	-0.2	0.2	±1.4
1,600	-0.2	-0.2	-0.2	0.2	±1.6
2,000	-0.1	-0.1	-0.2	0.3	±1.6
2,240	-0.2	-0.2	-0.2	0.3	±1.6
2,500	-0.1	-0.1	-0.1	0.3	±1.6
2,820	0.0	0.0	0.0	0.3	±1.6
3,150	-0.0	-0.0	0.1	0.3	±1.6
3,550	0.2	0.1	0.2	0.3	±1.6
4,000	0.4	0.4	0.5	0.3	±1.6
4,470	0.4	0.4	0.4	0.3	±2.1
5,000	0.6	0.6	0.7	0.3	±2.1
5,620	0.3	0.2	0.4	0.3	+2.1; -2.6
6,300	-0.4	-0.4	-0.2	0.3	+2.1; -2.6
7,080	-0.0	-0.0	0.3	0.4	+2.1; -3.1
8,000	-0.3	-0.3	0.2	0.4	+2.1; -3.1
8,410	0.1	0.1	0.7	0.4	+2.6; -3.6
8,910	0.2	0.2	0.9	0.4	+2.6; -3.6
9,440	0.1	0.1	1.0	0.4	+2.6; -3.6
10,000	-0.6	-0.5	0.5	0.4	+2.6; -3.6
10,600	-1.3	-1.4	-0.1	0.6	+3; -6
11,200	-2.3	-2.3	-0.8	0.6	+3; -6
11,900	-3.9	-3.9	-2.0	0.6	+3; -6
12,500	-5.2	-5.3	-2.9	0.6	+3; -6
13,300	-6.7	-6.7	-3.9	0.6	+3.5; -17
14,100	-8.2	-8.2	-4.8	0.6	+3.5; -17
15,000	-10.2	-10.2	-6.1	0.6	+3.5; -17
16,000	-12.2	-12.2	-7.1	0.6	+3.5; -17
16,800	-14.4	-14.3	-8.1	0.9	+4; -∞
17,800	-17.3	-17.2	-9.6	0.9	+4; -∞
18,800	-20.6	-20.6	-11.0	0.9	+4; -∞
20,000	-21.7	-21.7	-9.7	0.9	+4; -∞

Characteristics complies with the requirements of sound level meters for class 1

9.7.5.5 Weighting frequencies 40CD; reference direction 0°

Reference pressure level: 84 dB
Reference frequency: 1,000 Hz Loudspeaker distance: 2 m
Accessories:
- DMK01 with preamplifier PRE22
- Windscreen for external unit DMK01
- Nose cone RA0208
- Extension cable RAL135 10m

Temperature: 21.5°C Relative humidity: 36% Static pressure: 994.2 hPa

Nominal frequency (Hz)	Level deviation dB Frequency weighting			Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	A	B	Z		
10	0.3	0.3	0.2	0.5	+3.5; -∞
12.5	0.2	0.1	0.1	0.5	+3.0; -∞
16	0.1	0.1	0.2	0.5	+2.5; -4.5
20	0.1	0.1	0.2	0.5	±2.5
25	0.0	0.1	0.1	0.5	+2.5; -2.0
31.5	0.1	0.2	0.2	0.5	±2
40	0.1	0.2	0.2	0.5	±1.5
50	0.1	0.2	0.2	0.5	±1.5
63	0.1	0.1	0.2	0.5	±1.5
80	0.2	0.2	0.2	0.5	±1.5
100	0.0	0.1	0.1	0.2	±1.5
125	0.0	0.1	0.1	0.2	±1.5
160	0.2	0.1	0.1	0.2	±1.5
200	0.1	0.0	0.1	0.2	±1.5
250	0.0	0.0	0.1	0.2	±1.4
315	0.1	0.1	0.1	0.2	±1.4
400	0.2	0.3	0.2	0.2	±1.4
500	0.1	0.2	0.1	0.2	±1.4
630	0.1	0.1	0.1	0.2	±1.4
800	0.1	0.1	0.1	0.2	±1.4
1,000	0.1	0.1	0.1	0.2	±1.1
1,250	0.1	0.1	0.1	0.2	±1.4
1,600	0.0	0.0	0.0	0.2	±1.6
2,000	-0.0	0.1	-0.0	0.3	±1.6
2,240	-0.0	0.1	0.1	0.3	±1.6
2,500	-0.0	0.1	0.1	0.3	±1.6
2,820	0.1	0.2	0.2	0.3	±1.6
3,150	0.3	0.3	0.3	0.3	±1.6
3,550	-0.0	-0.0	0.1	0.3	±1.6
4,000	0.5	0.5	0.6	0.3	±1.6
4,470	0.2	0.2	0.3	0.3	±2.1
5,000	0.4	0.3	0.4	0.3	±2.1
5,620	0.3	0.3	0.4	0.3	+2.1; -2.6
6,300	0.0	0.0	0.2	0.3	+2.1; -2.6
7,080	-0.1	-0.2	0.1	0.4	+2.1; -3.1

Nominal frequency (Hz)	Level deviation dB Frequency weighting			Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	A	B	Z		
8,000	-0.4	-0.4	0.1	0.4	+2.1; -3.1
8,410	-0.4	-0.4	0.2	0.4	+2.6; -3.6
8,910	-0.2	-0.1	0.5	0.4	+2.6; -3.6
9,440	0.1	0.1	0.9	0.4	+2.6; -3.6
10,000	0.1	0.1	1.2	0.4	+2.6; -3.6
10,600	0.0	0.0	1.3	0.6	+3; -6
11,200	-0.5	-0.4	1.1	0.6	+3; -6
11,900	-1.4	-1.4	0.5	0.6	+3; -6
12,500	-2.3	-2.3	-0.0	0.6	+3; -6
13,300	-3.5	-3.4	-0.6	0.6	+3.5; -17
14,100	-5.0	-5.1	-1.6	0.6	+3.5; -17
15,000	-6.9	-6.9	-2.8	0.6	+3.5; -17
16,000	-9.3	-9.3	-4.2	0.6	+3.5; -17
16,800	-11.8	-11.7	-5.5	0.9	+4; -∞
17,800	-14.3	-14.4	-6.7	0.9	+4; -∞
18,800	-17.3	-17.3	-7.8	0.9	+4; -∞
20,000	-19.0	-19.0	-7.0	0.9	+4; -∞

9.7.5.6 Weighting frequencies 40CD; reference direction 90°

Reference pressure level: 84 dB

Reference frequency: 1,000 Hz Loudspeaker distance: 2 m

Accessories:
- DMK01 with preamplifier PRE22
- Windscreen for external unit DMK01
- Nose cone RA0208
- Extension cable RAL135 10m

Temperature: 21.5°C Relative humidity: 36% Static pressure: 994.2 hPa

Nominal frequency (Hz)	Level deviation dB Frequency weighting			Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	A	B	Z		
10	-0.4	-0.5	-0.2	0.5	+3.5; -∞
12.5	-0.1	-0.3	-0.1	0.5	+3.0; -∞
16	-0.3	-0.2	-0.1	0.5	+2.5; -4.5
20	-0.1	-0.2	-0.0	0.5	±2.5
25	-0.0	-0.2	-0.0	0.5	+2.5; -2.0
31.5	-0.1	-0.0	-0.0	0.5	±2
40	-0.0	-0.0	-0.0	0.5	±1.5
50	-0.1	0.0	0.0	0.5	±1.5
63	-0.1	-0.1	-0.1	0.5	±1.5
80	-0.1	-0.1	-0.1	0.5	±1.5
100	-0.1	-0.1	-0.1	0.2	±1.5
125	-0.1	-0.1	-0.1	0.2	±1.5
160	-0.1	-0.1	-0.2	0.2	±1.5

Nominal frequency (Hz)	Level deviation dB Frequency weighting			Expanded uncertainty (k=2) (dB)	MPE Class 1 (dB)
	A	B	Z		
200	-0.2	-0.2	-0.2	0.2	±1.5
250	-0.3	-0.2	-0.2	0.2	±1.4
315	-0.2	-0.1	-0.1	0.2	±1.4
400	-0.2	-0.2	-0.2	0.2	±1.4
500	-0.1	-0.0	-0.1	0.2	±1.4
630	-0.2	-0.1	-0.2	0.2	±1.4
800	-0.1	-0.1	-0.1	0.2	±1.4
1,000	-0.1	-0.1	-0.1	0.2	±1.1
1,250	-0.1	-0.1	-0.1	0.2	±1.4
1,600	-0.1	0.0	-0.1	0.2	±1.6
2,000	-0.0	-0.0	-0.0	0.3	±1.6
2,240	-0.1	0.0	0.0	0.3	±1.6
2,500	0.0	0.0	0.0	0.3	±1.6
2,820	0.1	0.1	0.1	0.3	±1.6
3,150	0.1	0.1	0.2	0.3	±1.6
3,550	0.3	0.3	0.3	0.3	±1.6
4,000	0.4	0.4	0.4	0.3	±1.6
4,470	0.3	0.3	0.4	0.3	±2.1
5,000	0.7	0.6	0.7	0.3	±2.1
5,620	0.6	0.6	0.7	0.3	+2.1; -2.6
6,300	-0.7	-0.6	-0.4	0.3	+2.1; -2.6
7,080	-0.8	-0.8	-0.5	0.4	+2.1; -3.1
8,000	-0.7	-0.7	-0.2	0.4	+2.1; -3.1
8,410	-0.5	-0.5	-0.0	0.4	+2.6; -3.6
8,910	-0.8	-0.7	-0.1	0.4	+2.6; -3.6
9,440	-0.3	-0.3	0.5	0.4	+2.6; -3.6
10,000	0.2	0.2	1.2	0.4	+2.6; -3.6
10,600	0.3	0.3	1.6	0.6	+3; -6
11,200	-0.0	0.1	1.6	0.6	+3; -6
11,900	-1.1	-1.1	0.9	0.6	+3; -6
12,500	-2.4	-2.4	-0.1	0.6	+3; -6
13,300	-4.6	-4.5	-1.7	0.6	+3.5; -17
14,100	-6.7	-6.8	-3.3	0.6	+3.5; -17
15,000	-9.0	-9.0	-4.8	0.6	+3.5; -17
16,000	-11.3	-11.3	-6.2	0.6	+3.5; -17
16,800	-13.6	-13.5	-7.3	0.9	+4; -∞
17,800	-16.1	-16.1	-8.4	0.9	+4; -∞
18,800	-19.3	-19.3	-9.7	0.9	+4; -∞
20,000	-20.8	-20.9	-8.8	0.9	+4; -∞

Characteristics complies with the requirements of sound level meters for class 1

9.7.6 *Sound pressure levels displayed in response to the sound pressure generated by a multifrequency acoustic calibrator or in response to a simulated sound pressure generated by an actuator. Models of the calibrator or driving grid*

The correction data are detailed in §12.2: Correction factors according to IEC 62585 standard.

The actuator is GRAS type RA0014 ½ associated to power supply type 14AA:

Multifrequency sound level calibrator is B&K type 4226

9.7.7 *Overload and under range*

The system can manage overloads and under ranges caused by off-range measurements.

- The overload indicator (« ^ ») is dynamic for the real-time indicators on display, and locked for overall indicators, as soon as an overload occurs. A LED on the DUO casing is associated with the overload indicator.
- READY Mode: the LED flashes one second when a level is overloaded, then turns off
- SLM or LOG modes: Once a level is overloaded, the LED lights on and remains active until the operator presses the stop button to stop the ongoing measurement.
- An indicator for low level (under range « v ») is displayed as soon as the measured level is lower than the lower level of the measurement indicator, then disappears when the “under range level” is exceeded again.

During the measurement, the operator is informed in real-time of an overload/under range. At the end of the measurement, the device indicates that one or several over/under ranges occurred during the measurement. The information relative to the duration of the overload/under range is available in post-processing mode.

9.8 ENERGETIC PERFORMANCES

Equipped with a polymer Lithium battery with a voltage of 3.7V and capacitance of 6750 mAh, CUBE has a rated operating lifetime longer than 20 hours. Its lifetime is of about 500 cycles of charge/discharge: its capacity is then 60% (and 80% after 300 cycles).

This integrated battery can only be replaced by accredited people.

It is recommended that no other charger than then one delivered with the instrument be used (AC Adapter Model ZDA 120150EU Input AC 100-240V 0.8A Output 12V 1500mA).

The clock is saved by a rechargeable internal battery (Panasonic LI-Coin Battery ML1220F1A ML1220F1A 3V 17mAh) with a lifetime of about 3 years.

9.9 STORAGE PERFORMANCES

The instrument is delivered with a basic memory of 2 GB. This memory can be extended to 32 GB or more. The performances of this memory must be optimal for the proper operating of the instrument (recommended requirement: SDCard Class 8 minimum).

Please note only SD cards provided by 01dB must be used. ACOEM cannot be held responsible for data loss if the SD card used is not delivered by ACOEM.

9.10 MECHANICAL PERFORMANCES

9.10.1 Casing

The instrument casing includes a device to access the electronic card, the battery and the other peripheral devices for maintenance operations by the manufacturer (but these items are not accessible to the user without specific tools). The manufacturer's after-sales services can change the batteries of the instrument.

9.10.2 Resistance to external aggressions

The casing material limits the absorption of excessive natural sweat when handling the instrument. It is resistant against chemical aggressions, both indoors and outdoors:

- splashes of water,
- splashes of oil,
- splashes of flammable liquids (gasoline…),
- iodine,
- smoke saturated environment…

9.10.3 Protection rating

The casing of the instrument, as well as all its connectors and accessories are resistant against external aggressions occurring during classical use of the sound level meter.

9.10.4 Marking

The name of 01dB brand is engraved on the front panel of the casing.

The following information is engraved on the rear panel:

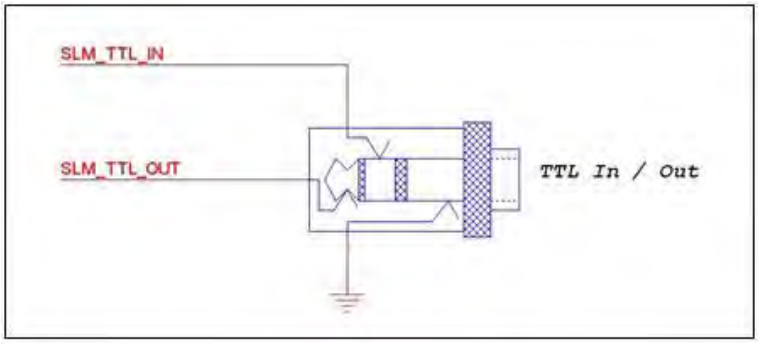
- manufacturer name,
- serial number of the instrument,
- manufacturing standards relative to the instrument,
- CE marking.

Stickers indicating the model approbation are also affixed on the rear side of the instrument.

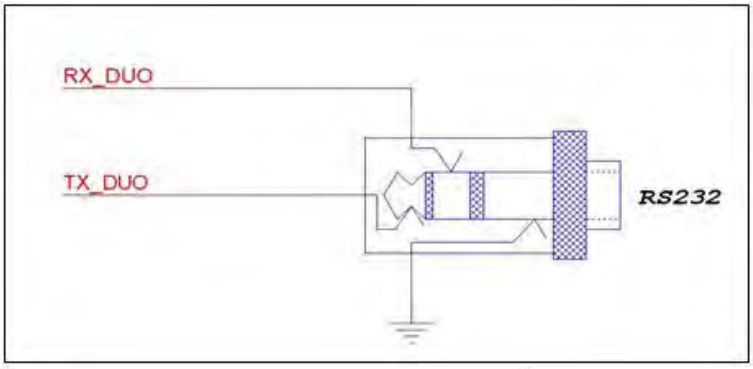
Note: The approbation sticker is destroyed if the user opens the casing.

9.11 CONNECTORS

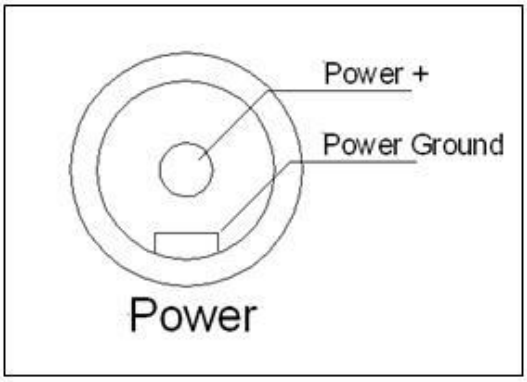
TTL input/output



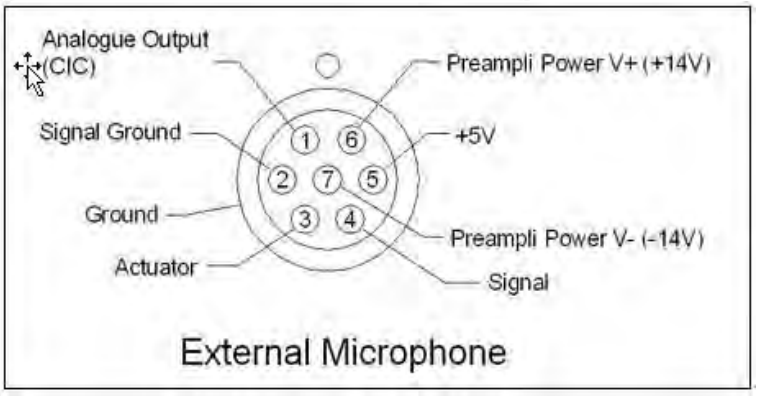
RS232 (service and weather)



Power supply



External microphone preamplifier input and analogue output



9.12 ELECTROMAGNETIC COMPATIBILITY

The instrument is compliant with standards CEM IEC 61000-6-1 and 2 / CEM IEC 61000-6-3 and 4.

- Effect of electrostatic discharges on the operating of the sound level meter: application of electrical discharges according to standard 61000-4-2 can disturb the measurements. The disturbance stops when the discharges stop. In no case will the already stored measurement be affected.
- The product is compliant with the specifications of standard CEI IEC 61672-1 edition 2 relative to the exposure to fields with radioelectric frequency in the 26MHz-1GHz band.
- The product is also compliant with Standard 61000-4-8 (fields with mains frequency).
- The device is compliant with the requirements of standard IEC 61672-1 edition 2 with an effective value of the non modulated electrical field intensity lower than 10 V/m.
- The use of Wi-Fi & GSM produce stronger radio emissions
- The immunity to high frequency fields is reduced when Wi-Fi transmission is enabled, as well as data transfer via GSM, and when the instrument is connected to the power supply.
- When the instrument is connected to the power supply and when fields with strong interference are present next to the instrument, it is more sensitive to line frequency effects.
- ± 4 kV contact discharges and ± 8 kV airborne discharges have no effect on the display of measured values.
- With exposure to electromagnetic fields > 10 V/m, the device for sound level measurements has not been tested below 74 dB.

9.13 WASTE DISPOSAL

In no event should this instrument be thrown in trash. It must be disposed of according to the WEEE directive. Waste disposal and recycling procedures complaint with WEEE* shall be adopted.

*WEEE: Waste Electrical and Electronic Equipment

CHAPTER 10
INTEGRATORS COMMANDS

10.1 INTRODUCTION

The "integrators commands" allow retrieval of information in real time. The operator has the possibility to query CUBE by a simple HTTP request, and CUBE responds with the corresponding real time values.

10.2 GETREALTIMEVALUESLIST

To check the list of values available in real time (§10.3)

HTTP command:
HTTP:///*[IP address:http port]*/pub/GetRealTimeValuesList.asp
Parameters : none
Returned values: values in XML format:

```
<PublicRealTimeValuesListStatus>
  <LocalTime>YYYY/MM/DD HH:MM:SS</LocalTime>
  <Configuration>configuration</Configuration>
  <Values>v1 ;v2 ;v3 ;vn</Values>
  <Spectrums>s1 ;s2</Spectrums>
  <Weather>w1 ;w2 ;w3 ;w4 ;w5 ;w6</ Weather >
</PublicRealTimeValuesListStatus>
```

where YYYY = year, MM = month, DD = day, HH = hour, MM = minute, SS = second
configuration = name of active configuration
vx = instantaneous values
sx = spectral values
wx = weather parameters values

Example: information received when command “GetRealTimeValuesList” sent:

```
<P<PublicRealTimeValuesList version="1">

  <LocalTime>2012/01/04 22:01:01</LocalTime>

  <Configuration>Erik</Configuration>

   <Values>LAeq0.5s;LAF;LBF;LCF;LZF;LAFeq0.5s;LBFeq0.5s;LCFeq0.5s;LZFeq0.5s;LAFT3;LAFT5;LAeqT;LAFTMax;LAFTMin;LAFeqT;LBFeqT;LCFeqT;LZFeqT</Values>

  <Spectrums>Leq0.5s;LeqT;LS</Spectrums>

   <Weather>WindSpeed;WindDirection;RainIntensity;BarometricPressure;AirTemperature;RelativeHumidity</Weather>

  </PublicRealTimeValuesList>
```

10.3 CONFIGUREREALTIMEVALUES

To configure the types of data that will be sent when the command "GetRealTimeValues" will be executed (§10.4).

HTTP command:

HTTP://*[IP address:http port]*/pub/ConfigureRealTimeValues.asp? V=[v1]&…&V=[v30]& S=[s1]& S=[s2]&W=[w1]&…&W=[w6]

Where IP address is the IP address **or** the DTDNS name of the DUO and http port is the port opened for HTTP

Parameters:

- Parameters of type V=vx where vx stays for an instant value label (maximum 30 values)
- Parameters of type S=sx where sx stays for an instant spectrum label (maximum 2 values)
- Parameters of type W=wx where wx stays for weather parameters (6 values max.):
    - WindSpeed
    - WindDirection
    - RainIntensity
    - BarometricPressure
    - AirTemperature
    - RelativeHumidity

Note: Please refer to §10.2 for the list of avalaible real time value

Returned code:

« OK » or « ERR »

In case no parameter is specified, then the current configuration is sent back in XML format:

```
<PublicRealTimeConfiguration>
  <InstantValues>
    <Instant>v1</Instant>
    <Instant>v2</Instant>
  </InstantValues>
  <InstantSpectrums>
    <Spectrum>s1</Spectrum>
    <Spectrum>s2</Spectrum>
  </InstantSpectrums>
  <WeatherValues>
    <Weather>w1</Weather>
    <Weather>w2</Weather>
  </WeatherValues>
</PublicRealTimeConfiguration>
```

10.4 GETREALTIMEVALUES

To receive the data configured in §10.3

HTTP command:
HTTP:///*[IP address:http port]*/pub/GetRealTimeValues.asp
Parameters: none
Returned values: values in XML format:

```
<PublicRealTimeValues>
  <LocalTime>YYYY/MM/DD HH:MM:SS.T</LocalTime>
  <Values>40.0;41.0;41.0</Values>
  <Spectrum1>40.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0</Spectrum1>
  <Spectrum2>40.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0;41.0</Spectrum2>
  <Weather>10.0 ;12.0 ;0.0 ;1000.0 ;34.0 ;54.0 ;</ Weather >
</PublicRealTimeValues>
```

where YYYY = year, MM = month, DD = day, HH = hour, MM = minute, SS = second, T = (0 or 5) half a second.

Real time values are delivered within « ; » in the <Values> field.
Real time spectrum values are delivered within « ; » in the <Spectrum1>, <Spectrum2> fields.
Weather parameters values are delivered within « ; » in the <Weather> field

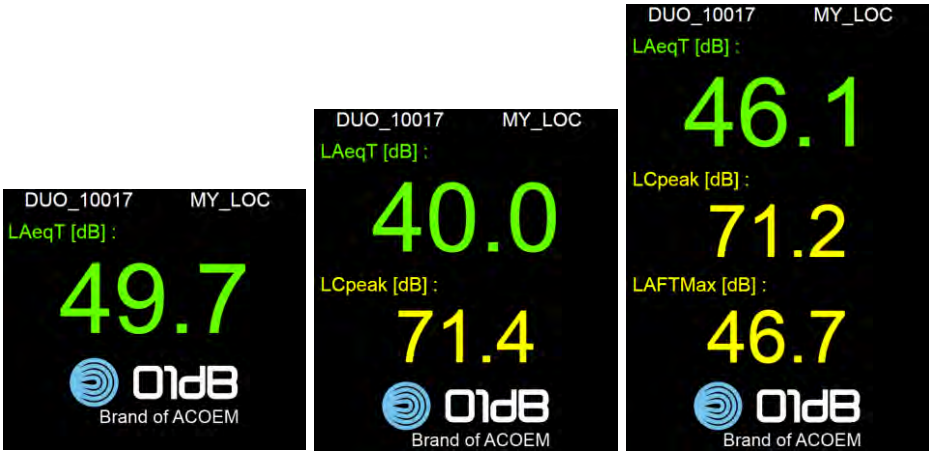
Example: information received when command “GetRealTimeValues” sent:

```
<PublicRealTimeValues version="1">

  <LocalTime>2012/01/04 22:04:53.0</LocalTime>

  <Values>59.0;58.8</Values>

  <Spectrum1>68.1;79.4;80.8;69.3;73.5;79.3;71.0;72.7;74.7;71.7;69.5;65.8;65.8;61.7;57.7;53.8;51.3
;50.9;48.9;49.2;47.8;49.2;49.0;47.8;46.1;45.4;44.5;44.2;44.0;43.8;38.6;28.9;v19.5;v14.6;v17.5;35.0
</Spectrum1>

  <Weather>10.8;67.0</Weather>

  </PublicRealTimeValues>
```

10.5 PUBLIC DISPLAY

It is possible to connect to a simple web display enabling the visualization of real time values using the address: HTTP:// *[IP address:http port]*/pub/

The instrument replies with a simple web page actualized every second with 1, 2 or 3 values displayed:



The top line:

Left shows the instrument type and its serial number

Right shows the location

The real time displayed values and their order are setup by the Configurerealtimevalues command (§10.3).

In the examples upper the commands are:

1 value:

HTTP://*[IP address:http port]*/pub/ConfigureRealTimeValues.asp?v=LAeqT

2 values:

HTTP://*[IP address:http port]*/pub/configurerealtimevalues.asp?v=LAeqT&v=LCpeak

3 values:

HTTP://*[IP address:http port]*/pub/configurerealtimevalues.asp?v=LAeqT&
v=LCpeak&v=LAFTMax

The main value is green whereas the secondary values are yellow.

10.6 GETSTATUS

To receive the real time status of CUBE

HTTP command:
HTTP:///[IP address:http port]/pub/GetStatus.asp
Parameters: none
Returned values: values in XML format:

```
<PublicStatus version="3">
 <Device>device_Type</Device>
 <LocalTime>YYYY/MM/DD HH:MM:SS</LocalTime>
 <Mode>mode</Mode>
 <BatteryCapacity>bat_capa</BatteryCapacity>
 <BatteryState>bat_state</BatteryState>
 <Charging>charging</Charging>
 <CheckErr>check_err</CheckErr>
 <NbSat>nb_sat</NbSat>
 <Mem>mem</Mem>
 <StorageState> Storage_State<\ StorageState>
 <WeatherState> Weather_State<\WeatherState>
 <TTLInputState> TTL_Input_State<\TTLInputState >
 <GSMLevel>gsm_level</GSMLevel>
 <GSMNet>gsm_net</GSMNet>
 <Longitude>longitude</Longitude>
 <Latitude>latitude</Latitude>
 <TimeZone>timezone<TimeZone>
 <Bias>bias</Bias>
 <Alarms>alarms</Alarms>
 <EventAlarm Code="alarm1_code">alarm1_state</EventAlarm> // if alarm defined for event 1
 <EventAlarm Code="alarm2_code">alarm2_state</EventAlarm> // if alarm defined for event 2
 <EventAlarm Code="alarm3_code">alarm3_state</EventAlarm> // if alarm defined for event 3
 <EventAlarm Code="alarm4_code">alarm4_state</EventAlarm> // if alarm defined for event 4
 <EventAlarm Code="alarm5_code">alarm5_state</EventAlarm> // if alarm defined for event 5
</PublicStatus>
```

where

Device_Type = Internal 01dB identification number (DUO=1100, CUBE=1600)
YYYY = year, MM = month, DD = day, HH = hour, MM = minute, SS = second
mode = Recording (0); Startstop_Running (1); Startstop_Pause (2); Ready (3) ; Stabilization (4); Mass_Storage_Device (5); Card_Out (6); Electrical_Check_Running (7); Electrical_Check_Init (8); Calibration_Running (9); Autotest_Running (10); Building_Inside_Test (11); Building_Pause (12); Building_Recording_Time_History (13); Building_Recording_Spectrum (14); Building_End_Time_History (15); Building_End_Spectrum (16)
bat_capa = % of battery available
bat_state = « low » ou « good »
charging = 1 if charging, 0 if not
check_err = 1 if error, 0 if no error
nb_sat = number of satellites available
mem = memory left (in MB)
Storage_State = missing SD card (0); Wrong file format (1); Very low available space (<3Mo) (2); Low available space (<50Mo) (3); No problem (4)

Weather_State = Weather station not used (0); Weather station OK (1); Weather station not detected (2); Weather station ID error (3); Weather station setup error (4); Weather station communication error (5)
TTL_Input_State = State of the TTL input (0 or 1)
gsm_level = GSM antenna signal strength (0 to 4)
gsm_net = registered GSM network 0=none, 1=GPRS, 2=EDGE, 3=3G, 4=3G+
alerts = 1 if alerts detected, 0 if no
longitude = decimal value for longitude
latitude = decimal value for latitude
timezone = time zone name
bias = timeshift vs. UTC (UTC = local+bias) – value in minutes

10.7 GETALARMS

To obtain the status of the alarms

HTTP command :
HTTP:// *[IP address:http port]*/pub/GetAlarms.asp
Parameters : Delete=1 (optionnal)

If “delete” parameter =1, then alarms log is deleted.

Reply :
- « OK » if no file
- « ERR » if error during deletion of alarms log
- else (if no delete) :

```
<Alarms>
 <Alarm type="PowerSupplyPresent">
  <LocalTime>2011/04/05 22:00:00</LocalTime>
  <UTCTime>2011/04/05 20:00:00</UTCTime>
 </Alarm>
 <Alarm type="PowerSupplyAbsent">
  <LocalTime>2011/04/05 22:00:00</LocalTime>
  <UTCTime>2011/04/05 20:00:00</UTCTime>
 </Alarm>
 <Alarm type="ElectricalCheckError">
  <LocalTime>2011/04/05 22:00:00</LocalTime>
  <UTCTime>2011/04/05 20:00:00</UTCTime>
 </Alarm>
 <Alarm type="CampaignAutoDelete">
  <LocalTime>2011/04/05 22:00:00</LocalTime>
  <UTCTime>2011/04/05 20:00:00</UTCTime>
 </Alarm>
 <Alarm type="LowBattery">
  <LocalTime>2011/04/05 22:00:00</LocalTime>
  <UTCTime>2011/04/05 20:00:00</UTCTime>
 </Alarm>
 <Alarm type="EventBegin">
  <Code>12014</Code>
  <RedLevel>50</RedLevel>
  <Trigger type="LAeqT">
   <Mode>0</Mode>
   <BeginCondition>90</BeginCondition>
   <BeginValue>105</BeginValue>
  </Trigger>
  <LocalTime>2011/04/05 22:00:00</LocalTime>
  <UTCTime>2011/04/05 20:00:00</UTCTime>
 </Alarm>
```

```
<Alarm type="EventEnd">
 <Code>12014</Code>
 <RedLevel>50</RedLevel>
 <RedLevel>50</RedLevel>
 <Trigger type="LAeqT">
  <Mode>0</Mode>
  <WorstValue>90</WorstValue>
  <WorstValueTime>2011/04/05 22:35:38</WorstValueTime>
  <EndCondition>90</EndCondition>
  <EndValue>105</EndValue>
 </Trigger>
 <LocalTime>2011/04/05 22:00:00</LocalTime>
 <UTCTime>2011/04/05 20:00:00</UTCTime>
</Alarm>
<Alarm type="Movement">
 <LocalTime>2011/04/05 22:00:00</LocalTime>
 <UTCTime>2011/04/05 20:00:00</UTCTime>
 <Latitude>10</Latitude>
 <Longitude>20</Longitude>
 <Distance>1500</Distance>
</Alarm>
<Alarm type="RecordingBegin">
 <LocalTime>2011/04/05 22:00:00</LocalTime>
 <UTCTime>2011/04/05 20:00:00</UTCTime>
</Alarm>
<Alarm type="RecordingEnd">
 <LocalTime>2011/04/05 22:00:00</LocalTime>
 <UTCTime>2011/04/05 20:00:00</UTCTime>
 <Error>1</Error>
</Alarm>
<Alarm type="TimeResynchro">
 <LocalTime>2011/04/05 22:00:00</LocalTime>
 <UTCTime>2011/04/05 20:00:00</UTCTime>
 <Seconds>10</Seconds>
</Alarm>
<Alarm type="StorageState">
 <LocalTime>2011/04/05 22:00:00</LocalTime>
 <UTCTime>2011/04/05 20:00:00</UTCTime>
 <State>0</State>
</Alarm>
<Alarm type="WeatherState">
 <LocalTime>2011/04/05 22:00:00</LocalTime>
 <UTCTime>2011/04/05 20:00:00</UTCTime>
 <State>0</State>
</Alarm>
</Alarms>
```

Each alarm is described by its attribute.
Parameter for the alarm:

- RecordingEnd ➔ Error : equal to 1 if log stop on SD card error
- TimeResynchro ➔ Seconds : number of second for the resynchro (>0 ou <0)
- StorageState ➔ State : 0=missing SD card, 1=Wrong file format, 2=Very low availble space (<3Mo), 3=Low available space (<50Mo), 4=No problem
- WeatherState ➔ State : 0=Weather station not used; 1=Weather station OK; 2=Weather station not detected; 3=Weather station ID error; 4=Weather station setup error; 5=Weather station communication error
- EventBegin/EventEnd : Add trigger block if event has only one trigger
- If trigger type is TTL@1/0 then no mode and WorstValue information
- Mode : 0=SLOPE+, 1=SLOPE-, 2=BETWEEN, 3=EXCLUDE
- WorstValue & WorstValueTime empty if mode 2 or 3

10.8 DELETEALARMS

To delete alarms log
HTTP command:
HTTP:// *[IP address:http port]*/pub/DeleteAlarms.asp
Parameter: none
Reply : « ERR » if error during deletion of alarms log ; else « OK »

This command deletes the alarms log.

CHAPTER 11
REQUIREMENTS FOR TYPE APPROVAL

Some specific measurement tasks require that the measuring instruments used be imperatively approved and calibrated.

The instrument is available for approval as a class 1 sound level indicator according to standard IEC 61672-1, 2 and 3 edition 2 (2013)
The device can then be verified. Calibrations must be performed by appropriate legal metrological organisations.
In France: LNE
In Switzerland: METAS
In Germany: PTB

Further to its verification, the unit is sealed.

In case of a further operation on the instrument by the service department, the previous calibration is no longer valid and re-calibration is required.

This also applies to repairs and firmware updates.

Requests for calibration shall necessarily and exclusively be performed with the approved equipment configuration and with authorised accessories:

11.1 COMPONENTS FOR THE TYPE APPROVAL

The following configurations are part of the approval:
Use with 40CD microphone and DMK01 weatherproof outdoor microphone unit (option):

- **Reference direction 0°**
  - Configuration 1: DMK01 and small windscreen with nose cone
- **Reference direction 90°**
  - Configuration 2: DMK01 and small windscreen with nose cone

Verifiable components of the instrument:

- CUBE sound level indicator
- Microphones type G.R.A.S. 40CD
- DMK01 weatherproof outdoor microphone unit (option), consisting of PRE22 preamplifier, RAL135-10M cable, G.R.A.S. 40CD microphone and RA0208 nose cone
- Small windscreen, diameter of about 6 cm, length 10 cm with circular groove, to be used without cone
- Stainless steel cone, diameter 15 mm, length 115 mm
- Cal21 standard noise source or equivalent
- Mounting profile,
- Mains adapter (option), model ZDA 120150EU, 12 V

Acoustic calibration of the instrument before each request for transfer of ownership:

- Use of assigned calibrated Cal21 calibrator or equivalent calibrated (see calibration marking)
- Exclusive use of assigned calibrated Cal21 calibrator (see calibration marking)
- Reference pressure level: 94 dB exclusively
- Calibration frequency: 1,000 Hz only
- The default value of the free-field correction is necessarily set to -0.2 dB.

11.2 REVIEW OF ACOUSTIC MEASURED LEVELS SUBJECT TO VERIFICATION

The following acoustic measured levels are part of the type approval:

Instant levels:
- LAF: A-weighted sound pressure level with FAST time constant
- LAS: A-weighted sound pressure level with SLOW time constant
- LCF: C-weighted sound pressure level with FAST time constant
- LCS: C-weighted sound pressure level with SLOW time constant
- LZF: Non weighted sound pressure level with FAST time constant
- LZS: Non weighted sound pressure level with SLOW time constant
- LAI: A-weighted sound pressure level with IMPULSE time constant

Sound pressure level over a time interval:
- LAFmax: Maximum value of A-weighted sound pressure level with FAST time constant
- LASmax: Maximum value of A-weighted sound pressure level with SLOW time constant
- LCFmax: Maximum value of C-weighted sound pressure level with FAST time constant
- LCSmax: Maximum value of C-weighted sound pressure level with SLOW time constant
- LCpeak: peak value of C-weighted sound pressure level
- LZFmax: Maximum value of non weighted sound pressure level with FAST time constant
- LZSmax: Maximum value of non weighted sound pressure level with SLOW time constant
- LAeq: A-weighted equivalent continuous sound pressure level
- LAE: A-weighted noise exposure level

Taktmax level (specific to Germany):
- LAFT(3): A-weighted Taktmax level with FAST time constant for a 3s cycle
- LAFT(5): A-weighted Taktmax level with FAST time constant for a 5s cycle
- LAIT(3): A-weighted Taktmax level with IMPULSE time constant for a 3s cycle
- LAIT(5): A-weighted Taktmax level with IMPULSE time constant for a 5s cycle

Statistical levels:
- LAL1, LAL5, LAL10, LAL50, LAL90, LAL95, LAL99

Spectral values

Octave spectrum (8 Hz - 16 kHz)	1/3 octave spectrum (6.3 Hz - 20 kHz)

- LA: A-weighted sound pressure level spectrum
- LC: C-weighted sound pressure level spectrum
- LZ: Non weighted sound pressure level spectrum
- LAeq: A-weighted equivalent continuous sound level spectrum
- LCeq: C-weighted equivalent continuous sound level spectrum
- LZeq: Non weighted equivalent continuous sound level spectrum

11.3 STANDARDS RELATIVE TO THE APPROVAL OF THE SOUND LEVEL METER

- Class 1 sound level meter according to standard IEC 61672 -1 (2013)
- Class 1 third octave filters according to standard IEC / NF EN 61260 (September 2001)
- Standards CEM CEI 61000-6-1; 61000-6-2; 61000-6-3; 61000-6-4

CHAPTER 12
INFORMATION FOR THE IMPLEMENTATION OF CALIBRATION TESTS

12.1 INTRODUCTION

(Legal verifications are performed by the legal metrological authorities of the countries under consideration)

Category: CUBE “Smart Noise Monitoring Terminal”, manufacturer 01dB-Metravib

Approval marking:

Version number for approved software:
- France: 2.xx – 2.12
- Germany: 2.35 - 2.12
- Switzerland: pending

The version number of the software is read via the main menu - Information - (scroll down).
The relevant display for the certification is the built-in screen of the instrument, with colour display.

Instructions to perform acoustic tests:
Three types of free-field corrections are implemented: cone correction, windscreen correction, microphone correction.
The wind correction is the same for small windscreens and integral protection foams, and cannot be disabled. The microphone correction includes the correction for directivity, according to reference directions 0° or 90°. The microphone and the cone correction are defined by the user based on the configuration. Correction values are available in § 12.2
The acoustic test must be performed for each configuration below:

Use with 40CD microphone and DMK01 weatherproof outdoor microphone unit (option):
- **Reference direction 0°**
  - Configuration 1: DMK01 and small windscreen with nose cone
- **Reference direction 90°**
  - Configuration 2: DMK01 and small windscreen with nose cone

Instructions to perform electrical tests:
Preparation: the windscreen must be removed, as well as the cone that must be unscrewed (left thread). The microphone is then available and can also be unscrewed.
The input of test signals is performed through the ADP12 adaptor, the microphone rated sensitivity is 40 mV/Pa (40CE) or 50 mV/Pa (40CD).
In Configuration 1 (0° with no cone), the windscreen correction is effective and must be taken into account by the calculation.

Linear operating range:
Please refer to CHAPTER 9 Technical Specifications

12.2 CORRECTION FACTORS ACCORDING TO IEC 62585 STANDARD

12.2.1 Electrical signal tests of frequency weightings

12.2.1.1 CUBE external microphone input for DMK01

Frequency Hz	Microphone (dB)	Expanded uncertainty (k=2) (dB)	SLM case (dB)	Expanded uncertainty (k=2) (dB)	Windscreen (dB)	Expanded uncertainty (k=2) (dB)
Outdoor DMK01 unit – Reference direction 0°; Windscreen with noise cone						
63,10	-0,25	0,25	0,16	0,25	0,02	0,20
66,83	-0,25	0,25	0,16	0,25	0,02	0,20
70,79	-0,25	0,25	0,16	0,25	0,02	0,20
74,99	-0,25	0,25	0,16	0,25	0,02	0,20
79,43	-0,25	0,25	0,16	0,25	0,02	0,20
84,14	-0,25	0,25	0,17	0,25	0,02	0,20
89,13	-0,25	0,25	0,15	0,25	0,02	0,20
94,41	-0,25	0,25	0,15	0,25	0,02	0,20
100,00	-0,25	0,25	0,15	0,25	0,02	0,20
105,93	-0,25	0,25	0,14	0,25	0,02	0,20
112,20	-0,25	0,25	0,16	0,25	0,02	0,20
118,85	-0,25	0,25	0,14	0,25	0,02	0,20
125,89	-0,25	0,25	0,17	0,25	0,02	0,20
133,35	-0,25	0,25	0,16	0,25	0,02	0,20
141,25	-0,25	0,25	0,16	0,25	0,02	0,20
149,62	-0,25	0,25	0,15	0,25	0,02	0,20
158,49	-0,25	0,25	0,16	0,25	0,02	0,20
167,88	-0,25	0,25	0,17	0,25	0,02	0,20
177,83	-0,25	0,25	0,15	0,25	0,02	0,20
188,36	-0,25	0,25	0,16	0,25	0,03	0,20
199,53	-0,25	0,25	0,16	0,25	0,03	0,20
211,35	-0,25	0,25	0,16	0,25	0,03	0,20
223,87	-0,25	0,25	0,16	0,25	0,03	0,20
237,14	-0,25	0,25	0,18	0,25	0,03	0,20
251,19	-0,24	0,25	0,18	0,25	0,03	0,20
266,07	-0,24	0,25	0,16	0,25	0,03	0,20
281,84	-0,24	0,25	0,17	0,25	0,03	0,20
298,54	-0,24	0,25	0,17	0,25	0,03	0,20
316,23	-0,24	0,25	0,18	0,25	0,03	0,20
334,97	-0,24	0,25	0,19	0,25	0,04	0,20
354,81	-0,24	0,25	0,18	0,25	0,04	0,20
375,84	-0,24	0,25	0,19	0,25	0,04	0,20
398,11	-0,23	0,25	0,20	0,25	0,04	0,20
421,70	-0,23	0,25	0,20	0,25	0,05	0,20
446,68	-0,23	0,25	0,20	0,25	0,05	0,20
473,15	-0,23	0,25	0,20	0,25	0,05	0,20
501,19	-0,22	0,25	0,21	0,25	0,06	0,20
530,88	-0,22	0,25	0,21	0,25	0,06	0,20
562,34	-0,22	0,25	0,21	0,25	0,07	0,20
595,66	-0,21	0,25	0,21	0,25	0,08	0,20
630,96	-0,21	0,25	0,21	0,25	0,08	0,20
668,34	-0,20	0,25	0,20	0,25	0,09	0,20
707,95	-0,19	0,25	0,20	0,25	0,10	0,20
749,89	-0,19	0,25	0,19	0,25	0,11	0,20
794,33	-0,18	0,25	0,18	0,25	0,12	0,20

Frequency Hz	Microphone (dB)	Expanded uncertainty (k=2) (dB)	SLM case (dB)	Expanded uncertainty (k=2) (dB)	Windscreen (dB)	Expanded uncertainty (k=2) (dB)
Outdoor DMK01 unit – Reference direction 0°; Windscreen with noise cone						
841,40	-0,17	0,25	0,18	0,25	0,14	0,20
891,25	-0,16	0,25	0,17	0,25	0,15	0,20
944,06	-0,15	0,25	0,16	0,25	0,17	0,20
1000,00	-0,14	0,25	0,15	0,25	0,18	0,20
1059,25	-0,12	0,25	0,14	0,25	0,20	0,20
1122,02	-0,11	0,25	0,13	0,25	0,22	0,20
1188,50	-0,09	0,25	0,12	0,25	0,23	0,20
1258,93	-0,07	0,25	0,11	0,25	0,24	0,20
1333,52	-0,05	0,25	0,11	0,25	0,25	0,20
1412,54	-0,02	0,25	0,09	0,25	0,25	0,20
1496,24	0,01	0,25	0,07	0,25	0,25	0,20
1584,89	0,04	0,25	0,03	0,25	0,25	0,20
1678,80	0,08	0,25	-0,01	0,25	0,27	0,20
1778,28	0,12	0,25	-0,06	0,25	0,32	0,20
1883,65	0,16	0,25	-0,11	0,25	0,39	0,20
1995,26	0,22	0,25	-0,17	0,25	0,49	0,20
2113,49	0,28	0,25	-0,20	0,25	0,58	0,20
2238,72	0,34	0,25	-0,23	0,25	0,64	0,20
2371,37	0,42	0,25	-0,25	0,25	0,64	0,20
2511,89	0,50	0,25	-0,27	0,25	0,61	0,20
2660,73	0,59	0,25	-0,29	0,25	0,63	0,20
2818,38	0,68	0,25	-0,36	0,25	0,76	0,20
2985,38	0,79	0,25	-0,50	0,25	0,98	0,20
3162,28	0,90	0,25	-0,70	0,25	1,06	0,20
3349,65	1,03	0,25	-0,85	0,25	0,84	0,20
3548,13	1,16	0,25	-0,86	0,25	0,55	0,20
3758,37	1,31	0,25	-0,82	0,25	0,62	0,20
3981,07	1,47	0,25	-0,97	0,25	1,07	0,20
4216,97	1,64	0,35	-1,26	0,35	1,19	0,30
4466,84	1,84	0,35	-1,41	0,35	0,75	0,30
4731,51	2,05	0,35	-1,49	0,35	0,62	0,30
5011,87	2,28	0,35	-1,69	0,35	1,03	0,30
5308,84	2,53	0,35	-1,74	0,35	1,21	0,30
5623,41	2,80	0,35	-1,79	0,35	1,24	0,30
5956,62	3,08	0,35	-2,10	0,35	1,46	0,30
6309,57	3,37	0,35	-2,26	0,35	1,75	0,30
6683,44	3,68	0,35	-2,28	0,35	1,84	0,30
7079,46	3,99	0,35	-2,33	0,35	2,04	0,30
7498,94	4,30	0,35	-2,54	0,35	2,11	0,30
7943,28	4,60	0,35	-2,46	0,35	2,36	0,30
8413,95	4,91	0,45	-2,57	0,35	2,24	0,30
8912,51	5,22	0,45	-2,59	0,35	2,16	0,30
9440,61	5,51	0,45	-2,48	0,35	2,43	0,30
10000,00	5,70	0,45	-2,36	0,35	1,92	0,30
10592,54	5,75	0,45	-2,13	0,35	1,27	0,30
11220,18	5,83	0,45	-2,01	0,35	-0,08	0,30
11885,02	6,01	0,45	-1,95	0,35	-1,43	0,30
12589,25	5,89	0,45	-1,65	0,35	-3,14	0,30
13335,21	5,54	0,45	-1,27	0,35	-4,36	0,30
14125,38	5,11	0,45	-1,17	0,35	-5,57	0,30
14962,36	4,78	0,45	-0,85	0,35	-6,99	0,30
15848,93	4,12	0,45	-0,66	0,35	-8,30	0,30
16788,04	2,94	0,45	-0,42	0,35	-8,89	0,30

Frequency Hz	Microphone (dB)	Expanded uncertainty (k=2) (dB)	SLM case (dB)	Expanded uncertainty (k=2) (dB)	Windscreen (dB)	Expanded uncertainty (k=2) (dB)
Outdoor DMK01 unit – Reference direction 90°; Windscreen with noise cone						
63,10	-0,32	0,25	0,17	0,25	0,00	0,20
66,83	-0,32	0,25	0,17	0,25	0,00	0,20
70,79	-0,32	0,25	0,17	0,25	0,00	0,20
74,99	-0,32	0,25	0,17	0,25	0,00	0,20
79,43	-0,32	0,25	0,17	0,25	0,00	0,20
84,14	-0,32	0,25	0,17	0,25	0,00	0,20
89,13	-0,32	0,25	0,18	0,25	0,00	0,20
94,41	-0,32	0,25	0,16	0,25	0,00	0,20
100,00	-0,32	0,25	0,17	0,25	0,00	0,20
105,93	-0,32	0,25	0,15	0,25	0,00	0,20
112,20	-0,32	0,25	0,16	0,25	0,00	0,20
118,85	-0,32	0,25	0,16	0,25	0,00	0,20
125,89	-0,32	0,25	0,17	0,25	0,00	0,20
133,35	-0,32	0,25	0,16	0,25	0,00	0,20
141,25	-0,32	0,25	0,17	0,25	0,00	0,20
149,62	-0,32	0,25	0,15	0,25	0,00	0,20
158,49	-0,32	0,25	0,15	0,25	0,00	0,20
167,88	-0,32	0,25	0,16	0,25	0,00	0,20
177,83	-0,32	0,25	0,15	0,25	0,00	0,20
188,36	-0,32	0,25	0,14	0,25	0,00	0,20
199,53	-0,32	0,25	0,14	0,25	0,00	0,20
211,35	-0,32	0,25	0,14	0,25	0,00	0,20
223,87	-0,32	0,25	0,13	0,25	0,00	0,20
237,14	-0,32	0,25	0,14	0,25	0,00	0,20
251,19	-0,32	0,25	0,13	0,25	0,00	0,20
266,07	-0,32	0,25	0,13	0,25	0,00	0,20
281,84	-0,32	0,25	0,11	0,25	0,00	0,20
298,54	-0,32	0,25	0,10	0,25	0,00	0,20
316,23	-0,32	0,25	0,11	0,25	0,00	0,20
334,97	-0,31	0,25	0,10	0,25	0,00	0,20
354,81	-0,31	0,25	0,09	0,25	0,00	0,20
375,84	-0,31	0,25	0,09	0,25	0,00	0,20
398,11	-0,31	0,25	0,09	0,25	0,00	0,20
421,70	-0,31	0,25	0,09	0,25	0,00	0,20
446,68	-0,31	0,25	0,08	0,25	0,00	0,20
473,15	-0,31	0,25	0,08	0,25	0,00	0,20
501,19	-0,31	0,25	0,07	0,25	0,01	0,20
530,88	-0,31	0,25	0,08	0,25	0,01	0,20
562,34	-0,30	0,25	0,08	0,25	0,01	0,20
595,66	-0,30	0,25	0,07	0,25	0,01	0,20
630,96	-0,30	0,25	0,08	0,25	0,01	0,20
668,34	-0,30	0,25	0,09	0,25	0,01	0,20
707,95	-0,30	0,25	0,09	0,25	0,02	0,20
749,89	-0,29	0,25	0,09	0,25	0,02	0,20
794,33	-0,29	0,25	0,10	0,25	0,02	0,20
841,40	-0,29	0,25	0,11	0,25	0,02	0,20
891,25	-0,28	0,25	0,12	0,25	0,02	0,20
944,06	-0,28	0,25	0,12	0,25	0,02	0,20
1000,00	-0,27	0,25	0,12	0,25	0,02	0,20
1059,25	-0,27	0,25	0,12	0,25	0,02	0,20
1122,02	-0,26	0,25	0,11	0,25	0,02	0,20
1188,50	-0,26	0,25	0,10	0,25	0,02	0,20

Frequency Hz	Microphone (dB)	Expanded uncertainty (k=2) (dB)	SLM case (dB)	Expanded uncertainty (k=2) (dB)	Windscreen (dB)	Expanded uncertainty (k=2) (dB)
Outdoor DMK01 unit – Reference direction 90°; Windscreen with noise cone						
1258,93	-0,25	0,25	0,09	0,25	0,02	0,20
1333,52	-0,24	0,25	0,07	0,25	0,03	0,20
1412,54	-0,24	0,25	0,04	0,25	0,03	0,20
1496,24	-0,23	0,25	0,00	0,25	0,03	0,20
1584,89	-0,22	0,25	-0,05	0,25	0,04	0,20
1678,80	-0,22	0,25	-0,11	0,25	0,05	0,20
1778,28	-0,21	0,25	-0,17	0,25	0,05	0,20
1883,65	-0,20	0,25	-0,25	0,25	0,07	0,20
1995,26	-0,18	0,25	-0,30	0,25	0,08	0,20
2113,49	-0,17	0,25	-0,33	0,25	0,11	0,20
2238,72	-0,15	0,25	-0,35	0,25	0,14	0,20
2371,37	-0,13	0,25	-0,36	0,25	0,18	0,20
2511,89	-0,10	0,25	-0,39	0,25	0,23	0,20
2660,73	-0,07	0,25	-0,46	0,25	0,28	0,20
2818,38	-0,03	0,25	-0,53	0,25	0,32	0,20
2985,38	0,01	0,25	-0,59	0,25	0,36	0,20
3162,28	0,05	0,25	-0,69	0,25	0,40	0,20
3349,65	0,10	0,25	-0,85	0,25	0,45	0,20
3548,13	0,15	0,25	-1,01	0,25	0,51	0,20
3758,37	0,20	0,25	-0,98	0,25	0,55	0,20
3981,07	0,27	0,25	-0,86	0,25	0,56	0,20
4216,97	0,35	0,35	-0,99	0,35	0,57	0,30
4466,84	0,45	0,35	-1,36	0,35	0,56	0,30
4731,51	0,56	0,35	-1,50	0,35	0,51	0,30
5011,87	0,67	0,35	-1,36	0,35	0,48	0,30
5308,84	0,77	0,35	-1,35	0,35	0,52	0,30
5623,41	0,86	0,35	-1,67	0,35	0,50	0,30
5956,62	0,92	0,35	-2,21	0,35	0,37	0,30
6309,57	0,98	0,35	-2,47	0,35	0,36	0,30
6683,44	1,05	0,35	-2,35	0,35	0,53	0,30
7079,46	1,14	0,35	-2,28	0,35	0,88	0,30
7498,94	1,24	0,35	-2,52	0,35	1,21	0,30
7943,28	1,30	0,35	-2,61	0,35	1,62	0,30
8413,95	1,32	0,45	-2,82	0,35	2,18	0,30
8912,51	1,32	0,45	-3,01	0,35	2,62	0,30
9440,61	1,30	0,45	-2,48	0,35	2,99	0,30
10000,00	1,16	0,45	-2,56	0,35	2,85	0,30
10592,54	0,86	0,45	-2,30	0,35	2,53	0,30
11220,18	0,62	0,45	-2,17	0,35	1,31	0,30
11885,02	0,41	0,45	-1,81	0,35	-0,04	0,30
12589,25	-0,17	0,45	-1,61	0,35	-1,86	0,30
13335,21	-1,03	0,45	-1,49	0,35	-3,26	0,30
14125,38	-1,91	0,45	-0,85	0,35	-4,40	0,30
14962,36	-2,73	0,45	-0,64	0,35	-4,95	0,30
15848,93	-3,93	0,45	-0,58	0,35	-5,17	0,30
16788,04	-5,84	0,45	-0,20	0,35	-5,17	0,30

12.2.2 Use of GRAS type RA0014 ½ actuator

12.2.2.1 CUBE external microphone input for DMK01

Frequency Hz	Microphone and SLM case (dB)	Expanded uncertainty (k=2) (dB)	Wind screen (dB)	Expanded uncertainty (dB)
reference direction 0°; windscreen with noise cone				
125,89	-0,16	0,25	0,02	0,2
1000	0	0,25	0,18	0,2
7943,28	4,9	0,35	2,36	0,3
reference direction 90°; windscreen with noise cone				
125,89	-0,03	0,25	0	0,2
1000	0	0,25	0,02	0,2
7943,28	1,71	0,35	1,62	0,3

12.2.3 Use of type B&K 4226 multifrequency calibrator

12.2.3.1 CUBE external microphone input for DMK01

Frequency Hz	Microphone and SLM case (dB)	Expanded uncertainty (k=2) (dB)	Wind screen (dB)	Expanded uncertainty (dB)
reference direction 0°; windscreen with noise cone				
125,89	-0,07	0,25	0,02	0,2
1000	0,07	0,25	0,18	0,2
7943,28	3,09	0,35	2,36	0,3
reference direction 90°; windscreen with noise cone				
125,89	-0,12	0,25	0	0,2
1000	-0,09	0,25	0,02	0,2
7943,28	-0,32	0,35	1,62	0,3

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