

SC420

DATASHEET

D_SC420_v0014_20180103_EN

Class 1 sound level meter and spectrum analyser* by third octave bands

*Optional

PRESENTATION

The SC420 is an instrument distinguished for its power, versatility, ergonomics and its high performance as a class 1 sound level meter, according to IEC 61672.

Thanks to its modular platform, the SC420 can be expanded with advanced measurement options, such as third octave band spectrum analysis, FFT analysis or reverberation time measurement.

The SC420 provides audio recording with prerecording and voice comments, external memory through microSD cards, automatic start and stop of measurements and audio recordings based on timers and thresholds, and has been designed according to the ON & PLAY philosophy in order to offer a simple and enjoyable experience for the user from the start.

APPLICATIONS

- Measurement of environmental functions with simultaneous tonality, impulsiveness, and low frequency content evaluation* (ISO 1996-2 ANNEX C: Reference method for assessing the presence of audible tones)
- Measurement of airborne sound insulation between rooms, façade insulation and impact sound insulation of floors in one third octave bands* (ISO 16283, ISO 140, ISO 717)
- Evaluation of reverberation time using the interrupted noise and integrated impulse response methods together with quality indicators of the decay* (ISO 3382-1/-2)
- Measurement of sound power, analysis of industrial machine noise (product development and quality control) and service equipment in buildings* (ISO 3744, ISO 16032)
- Evaluation of industrial hygiene* (Directive 2003/10/EC)



AVAILABLE ENHANCEMENT MODULES

*Optional

	Reference	Description
OCCUPATIONAL NOISE Module*	DS420	Noise exposure measurement according to Directive 2003/10/EC
1/1 OCTAVE FILTERS Module*	OF420	16 Hz to 16 kHz octave band filters analysis plus overall functions and NC and NR curves
1/3 OCTAVE FILTERS Module*	TF420	10 Hz to 20 kHz one-third octave band filters analysis plus overall functions
REVERBERATION TIME Module* (includes KRT key)	RT420	Reverberation time measurement by 1/1 and 1/3 octave bands using the interrupted noise and the integrated impulse response methods. Includes C, ξ and B-T quality parameters
FFT ANALYSIS Module*	FF420	FFT Analysis of 10000 lines from 0 to 20000 Hz (2 Hz/line)
ANALYSIS QUALITY AUDIO RECORDING Module*	HI420	Records WAV (uncompressed) format audio files, 24 bits resolution, 48 kHz sampling frequency and constant gain for later analysis

SC420

MAIN FEATURES

Class 1 sound level meter and spectrum analyser
by third octave bands*



*Optional

MAIN FEATURES:

- **ON & PLAY PHILOSOPHY:** User friendly, single range, simultaneous measurement of all functions, functions logged into memory in 3 different time bases: t (measurement time), T (time history) and 125 ms (Short Leq)
- External microSD MEMORY CARD
- AUDIO recording with prerecording and voice comments
- MEASUREMENT AUTOMATISMS: Timers, DEN thresholds, external input:
 - Automatic start and stop of measurement and logging
 - Automatic audio recording with pre-recording
- MARKS: manual (keyboard) and external input
- BACKERASE
- New ergonomic DESIGN
- Incorporated USB and built in BLUETOOTH® connectivity
- Automatic display ZOOM
- File system optimized for Big Data
- Sensitivity and date and time change history
- Icon menu, no language setting
- Ready for environmental monitoring: auto ON and automatic measurement and logging start. Downloads while measures
- Sound field (free or diffuse) and outdoor kit correction selector.

ON & PLAY PHILOSOPHY:

The SC420 incorporates the ON & PLAY philosophy in its design which allows the user to focus on the measurement and not on operating the equipment.

Just press the ON button and in just a few seconds the SC420 is ready to measure, without any need to set scales, measurement ranges, detectors or frequency weightings beforehand.

The SC420 measures all functions simultaneously and saves both the final results (t), as well as time history of partial value (T) and "Short Leq" time history every 125 ms.

It can't be any easier: ON & PLAY.

ON & PLAY

The ON & PLAY philosophy has been developed in order to quickly understand how to work with the device and to be intuitive, even after long periods of inactivity.

ON & PLAY offers a simple and enjoyable experience from the first moment of contact with the device.

With ON & PLAY measurement has never been so easy.

EXTERNAL REMOVABLE microSD MEMORY :

The information measured by the SC420 (final results and time histories), the audio files and voice notes are saved on the microSD card inserted into the SC420.

Once the measurements are complete and the SC420 is powered off, the microSD card can be removed and inserted into a computer. The data can then be transferred using the program CESVA Lab. The download can be completed much faster this way.

The file system used by the SC420 is optimized for downloading large quantities of data (Big data).

MicroSD cards up to 32 GB have been tested successfully.



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MAIN FEATURES

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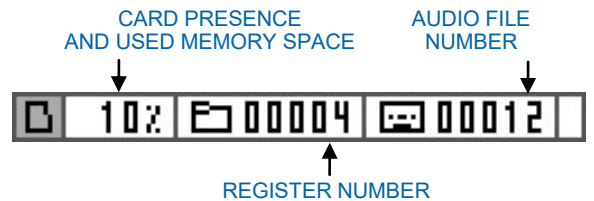
*Optional

AUDIO RECORDING AND VOICE COMMENTS

The SC420 can record audio files (listening quality), while it logs acoustic functions, facilitating its subjective evaluation and the recognition of sound sources. This recordings can be done manually or through automatic configurations.

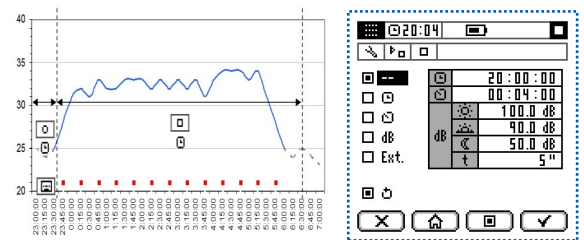
The SC420 allows recording of voice comments in order to record commentary notes, indications regarding the measurement (measurement points), the environment (field decisions) or simply interesting ideas that arise.

The SC420 with the HI420 module* can record fragments of audio with analysis quality for further post processing.



AUTOMATIONS: TIMERS, DEN THRESHOLDS and EXTERNAL

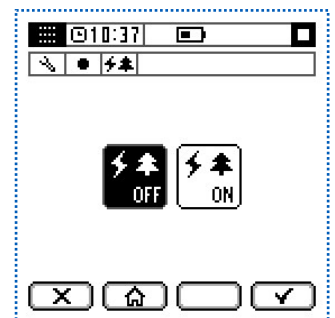
The SC420 has a complete system of automated configurations, to start and stop measuring and audio recording, using automatic timers and triggers when exceeding threshold by DEN time-zones. Its power and versatility offer infinite combinations that will perform the finest tasks for the most demanding users.



READY FOR ENVIRONMENTAL MONITORING

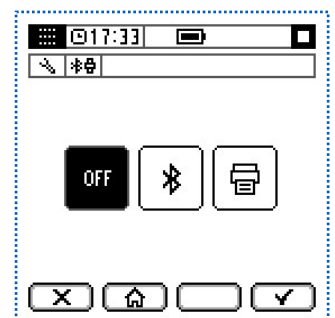
The SC420 is designed to work as an automatic continuous noise monitoring unit. For this, an environmental monitoring powering option is made available, which allows resuming a measurement after recovery from a power failure.

Thanks to its file structure, that has been prepared for large quantities of data (Big data), it allows downloading while measuring and erasing parts that have already been downloaded.



USB, PRINTER AND BLUETOOTH® CONNECTIONS

The SC420 communicates with a PC through a USB port and through a class 1 wireless Bluetooth® communication in order to download data, programming, control and real time visualization. Wireless Bluetooth® technology is very useful for measuring sound insulation between rooms since the connection can be established through walls, floors and ceilings, as well as to download data and programming noise monitoring terminals at ground level without needing to access them directly. Also the RS-232 port of the SC420 can be configured to connect a serial printer.



The trademark Bluetooth is owned by Bluetooth SIG, Inc.

SC420

TECHNICAL SPECIFICATIONS

Class 1 sound level meter and spectrum analyser*
by third octave bands



*Optional

CERTIFICATIONS AND STANDARDS

- IEC 61672-1:02 class 1, EN 61672-1:03 class 1
- IEC 61260:95/A1:01 class 1, EN 61260:95/A1:01 class 1
- ANSI S1.4:83/A:85 type 1, ANSI S1.43:97 type 1, ANSI S1.11:04 class 1
- OIML R 58:98, OIML R 88:98
- DIN 45657:2005 in reference to the Taktmaximalpegel function
- **CE** Marking. Complies with 73/23/EEC and EMC 89/336/EEC low-tension regulations, the latter amended by 93/68/EEC
- Pattern approval certificate for Spain.

MICROPHONES

MODEL C140:

TYPE:	½" Condenser microphone
POLARIZATION:	200 V
NOMINAL CAPACITY:	20.0 pF
NOMINAL SENSITIVITY:	43.5 mV/Pa
PREAMPLIFIER:	PA020

MODEL C240:

TYPE:	½" Condenser microphone
POLARIZATION:	0 V
NOMINAL CAPACITY:	20.0 pF
NOMINAL SENSITIVITY:	49.0 mV/Pa
PREAMPLIFIER:	PA040

MODEL C-130:

TYPE:	½" Condenser microphone
POLARIZATION:	200 V
NOMINAL CAPACITY:	22.5 pF
NOMINAL SENSITIVITY:	17.5 mV/Pa
PREAMPLIFIER:	PA020

MEASUREMENT RANGES

FUNCTIONS LF, LS, LI, Lt and LT(including LAeqT):

	Weigh. A(dB)	Weigh. C(dB)	Weigh. Z(dB)
C140+PA020:	23.4 to 137.0	23.4 to 137.0	27.2 to 137.0
C240+PA040:	23.4 to 137.0	23.8 to 137.0	27.8 to 137.0
C-130+PA020:	24.8 to 137.0	26.3 to 137.0	31.0 to 137.0

LCpeak FUNCTION:

	Weigh. C(dB)
C140+PA020, C240+PA040 and C-130+PA020:	55.0 to 140.1

TYPICAL NOISE

C140+PA020:

	Weigh. A(dB)	Weigh. C(dB)	Weigh. Z(dB)
ELECTRIC:	7.7	8.0	14.2
TOTAL AT 20°C:	15.9	15.9	19.7

C240+PA040:

	Weigh. A(dB)	Weigh. C(dB)	Weigh. Z(dB)
ELECTRIC:	5.2	6.3	12.8
TOTAL AT 20°C:	15.9	16.3	20.3

C-130+PA020:

	Weigh. A(dB)	Weigh. C(dB)	Weigh. Z(dB)
ELECTRIC:	11.5	13.4	18.9
TOTAL AT 20°C:	17.3	18.8	23.5

FREQUENCY WEIGHTING

AVAILABLE WEIGHTINGS: A, C and Z
CLASS ACCORDING TO IEC 61672: class 1

TIME WEIGHTING

AVAILABLE WEIGHTINGS: F, S and I
CLASS ACCORDING TO IEC 61672: class 1

FUNCTIONS

AVAILABLE FUNCTIONS: see tables for each mode
RESOLUTION: 0.1 dB

PEAK DETECTOR

ON SET TIME CONSTANT: < 75 µs

ENVIRONMENTAL CRITERIA

STATIC PRESSURE INFLUENCE:

OPERATION RANGE	MAXIMUM ERROR
(at 1 kHz and 94 dB or 104 dB)	
from 65 to less than 85 kPa:	0.9 dB
from 85 to 108 kPa:	0.4 dB

TEMPERATURE INFLUENCE:

OPERATION RANGE	MAXIMUM ERROR
from -10 to +50 °C:	0.5 dB

HUMIDITY INFLUENCE:

OPERATION RANGE	MAXIMUM ERROR
(in the absence of condensation)	(at 40°C and 1 kHz)
from 25 to 90 %:	0.5 dB

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INPUTS AND OUTPUTS

MEMORY CARD SLOT:

TYPE OF CARD:	microSD
MAXIMUM CAPACITY:	32 GB
MINIMUM CLASS:	4

USB COMMUNICATION:

TYPE:	Digital meets USB rev. 2.0.
CONNECTOR:	USB Micro-B
CONNECTION CABLE:	CN400 0.5 m long

WIRELESS COMMUNICATION:

TYPE:	Class 1 Bluetooth®
TRANSMISSION FREQUENCY:	2402 to 2480 GHz
RANGE:	50 m

RS-232 SERIAL COMMUNICATION, AC OUTPUT, DIGITAL

OUTPUT AND DIGITAL INPUT:

AVAILABLE VIA:	Multi-connector cable CN420
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LISTENING QUALITY AUDIO RECORDING AND VOICE NOTES

FORMAT:	WAV File
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LISTENING QUALITY

RESOLUTION:	16 bits
SAMPLING FREQUENCY:	24 kHz
GAIN:	Automatic

POWER

BATTERIES:

TYPE:	2 alkaline 1.5 V, AA (LR6) size
TYPICAL DURATION:	8:45 hours

EXTERNAL POWER:

VOLTAGE INPUT RANGE:	4.25 to 5.25 VDC
MINIMUM CURRENT:	250 mA

To feed the SC420 from an alternate public current, the use of an AM300 mains feeder and CN400 cable are recommended.

DIMENSIONS AND WEIGHT

DIMENSIONS:	292 x 85 x 25 mm
WEIGHT:	with batteries 330 g without batteries 280 g

OCTAVE BAND FILTERS (Optional)

Class 1 octave band filters according to IEC 61260 with central frequency 16, 31.5, 63, 125, 250, 500, 1000 (1k), 2000 (2k), 4000 (4k), 8000 (8k) and 16000 (16k) Hz.

ONE-THIRD OCTAVE BAND FILTERS (Optional)

Class 1 one-third octave band filters according to IEC 61260 with central frequency 10, 12.5, 16, 20, 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000 (1k), 1250 (1.25k), 1600 (1.6k), 2000 (2k), 2500 (2.5k), 3150 (3.15k), 4000 (4k), 5000 (5k), 6300 (6.3k), 8000 (8k), 10000 (10k), 12500 (12.5k), 16000 (16k) and 20000 (20k) Hz.

REVERBERATION TIME (Optional)

DECAY CURVE AND IMPULSE RESPONSE MEASUREMENT:
Using equivalent levels (linear average) with successive integration time of 10 ms during a 6 second period.

OBTAINING THE DECAY CURVE FROM THE IMPULSE RESPONSE:

Schroeder's backward integration method.

DECAY CURVE SLOPE ESTIMATION:

Automatic estimation of the decay curve from a least-squares fit linear regression analysis.

QUALITY INDICATORS:

Non-linearity parameter ξ , curvature C and B-T product for each frequency band.

FFT FOURIER TRANSFORMER (Optional)

TIME WINDOW:	Hanning
No. OF LINES:	10000
ANALYSIS RESOLUTION:	2 Hz
DETECTOR:	Equivalent level
FREQUENCY WEIGHTING:	A and Z

ANALYSIS QUALITY AUDIO RECORDING (Optional)

FORMAT:	WAV File
ANALYSIS QUALITY:	
RESOLUTION:	24 bits
SAMPLING FREQUENCY:	48 kHz
GAIN:	Optimal and constant during the recording

The characteristics, technical specifications and accessories may be altered without prior notice

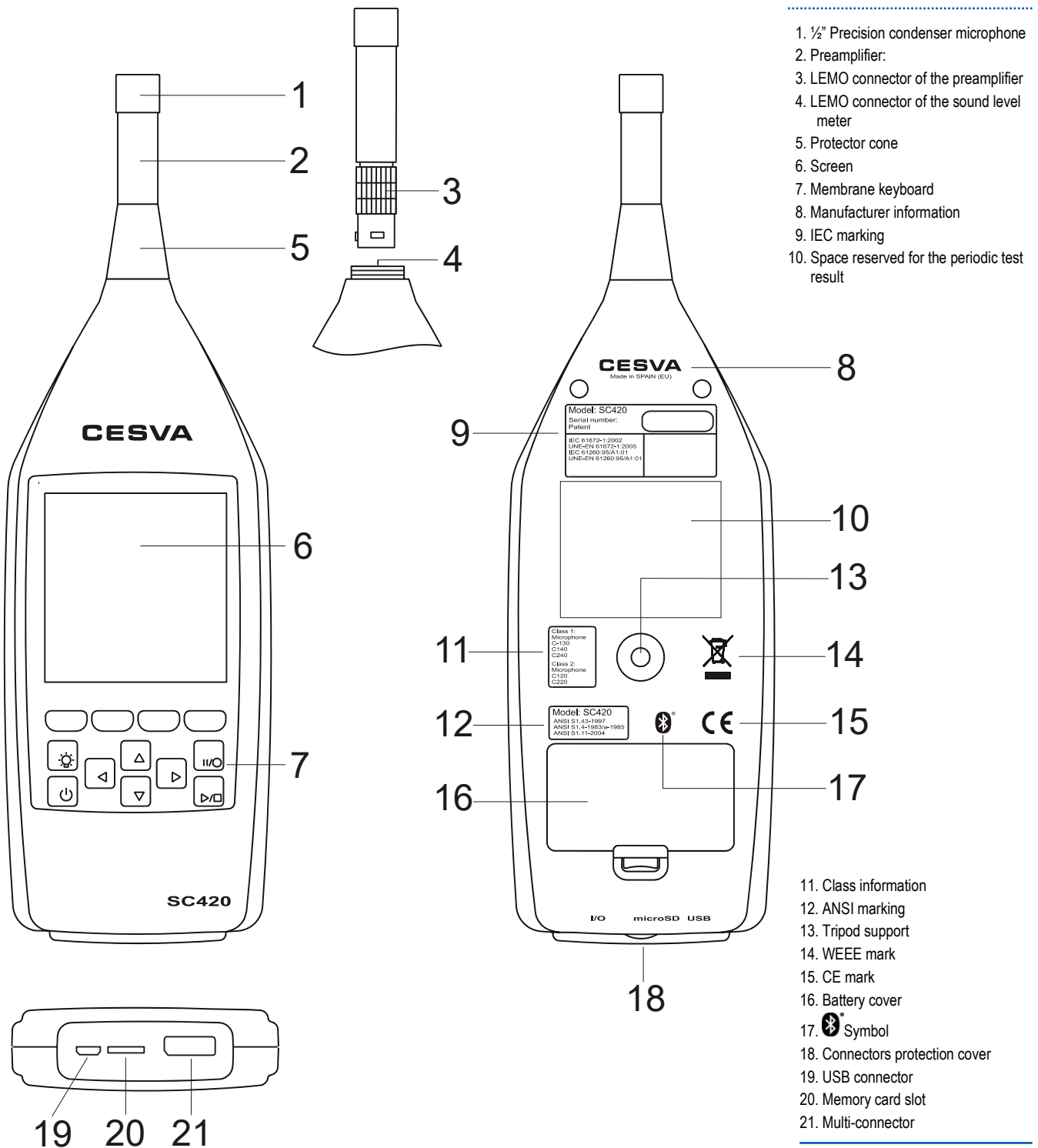
SC420

DEVICE PARTS

Class 1 sound level meter and spectrum analyser*
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*Optional



1. 1/2" Precision condenser microphone
2. Preamplifier:
3. LEMO connector of the preamplifier
4. LEMO connector of the sound level meter
5. Protector cone
6. Screen
7. Membrane keyboard
8. Manufacturer information
9. IEC marking
10. Space reserved for the periodic test result

11. Class information
12. ANSI marking
13. Tripod support
14. WEEE mark
15. CE mark
16. Battery cover
17. Symbol
18. Connectors protection cover
19. USB connector
20. Memory card slot
21. Multi-connector

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ACCESSORIES

Class 1 sound level meter and spectrum analyser*
by third octave bands



*Optional



Wind screen PV009



Micro USB-USB connection cable to PC CN400



Class 1 sound calibrator CB006



Multi-connector cable CN420



Output audio cable CN421



Outdoor kit TK200



Mains feeder (V= 100/240 V, 50/60 Hz) AM300

SUPPLIED ACCESSORIES :

SI020	CESVA Lab communication software for PC
CN400	PC micro USB-USB connection cable
PV009	Wind screen
	MicroSD memory card
	2 1.5 V batteries

OPTIONAL ACCESSORIES

CB006	Class 1 sound calibrator	CN010	Microphone extension cable 10 m
TR040	1.10 m tripod	CN030	Microphone extension cable 30 m
TR050	1.50 m tripod	CN420	Multi-connector cable
ML043	Transport briefcase (48x37x16 cm)	CN421	Output audio cable
ML013	Transport briefcase (39x32x12 cm)	TR001	Tripod adapter
ML063	Special outdoors briefcase (51x38x15 cm)	PR003	Extension rod 3 m
AM300	Mains feeder (V= 100/240 V, 50/60 Hz)		
FNS020	Case		
TK200	Outdoor kit		
CN003	Microphone extension cable 3 m		

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SC420

AVAILABLE MEASUREMENT MODES

Sound level meter mode (Always included)

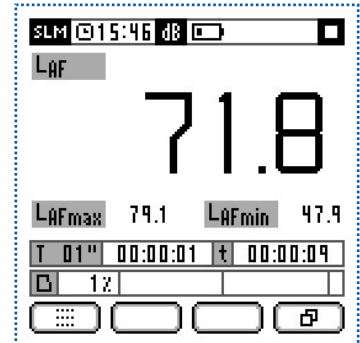


WHAT DOES IT MEASURE?

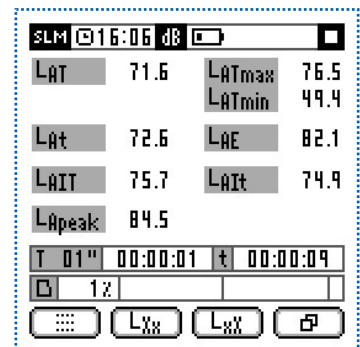
The sound level meter mode is perfect for measuring overall sound pressure levels, both instant values as well as averages based on integration (equivalent level). The SC420 measures all the functions simultaneously with all frequency weights (A, C and Z) and calculates statistics, such as maximum and minimum values and percentiles. It also measures "short" functions: measurement of certain functions every 125 ms, which is ideal for analyzing short periods of time, source identification and detection of transitory acoustic events, etc.

APPLICATIONS

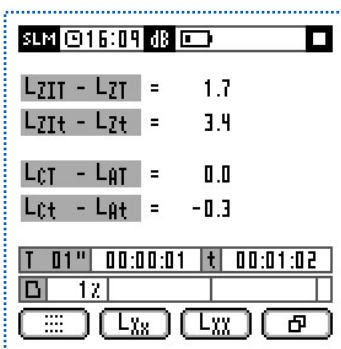
Outstanding among the applications of the SC420 are its ability to measure sound levels of noisy activities, urban road traffic and machines such as compressors, pneumatic drills and pumps, to measure appropriate parameters to ensure protection against noise of workers and to measure the sound measurement parameters to evaluate levels of noise pollution including impulsivity indexes, low frequency content indicators, etc.



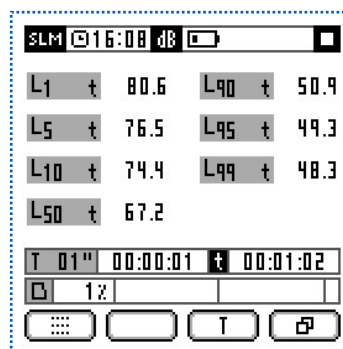
Preferred screen: shows functions F1, F2 and F3.



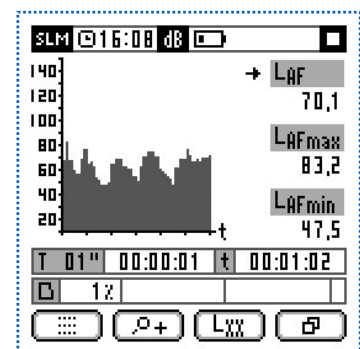
Numerical screen: shows the values for all functions



Advanced screen: shows special acoustic functions



Statistical screen: shows the value of the percentiles



Time history screen: shows the time history of F1, F2 and F3.

SOUND LEVEL METER MODE FUNCTIONS

*Not shown on screen

Measuring time t	LXt, LXE, LXpeak, LXIt, (LXIt-LXt), (Lct-Lat), Lnt, LXFmax, LXSmax, LXImax, LXFmin, LXsmin, LXImin, LAF5t, LAF5t-LAT
Integration time T	LXT, LXIT, (LXIT-LXT), (LCT-LAT), LnT, LXTmax, LXTmin, LAF5T, LAF5T-LAT
1 s	LXF, LXS, LXI, LX1s*, LXpeak1s*, LXFmax1s*, LXSmax1s*, LXImax1s*, LXFmin1s*, LXsmin1s*, LXImin1s*
125 ms	LXF125ms*, LXS125ms*, LXI125ms*, LX125ms*, LXpeak125ms* X: A, C and Z; n: 1%, 5%, 10%, 50%, 90%, 95% and 99%

SC420

AVAILABLE MEASUREMENT MODES

1/1 octave band spectrum analyser measurement mode (Optional: OF420 module)

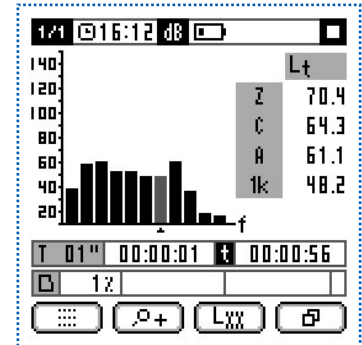


WHAT DOES IT MEASURE?

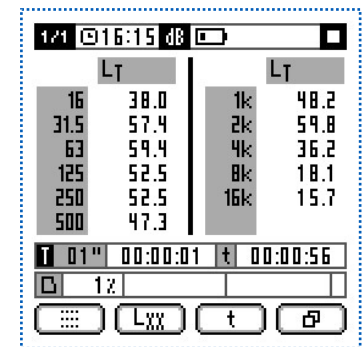
The 1/1 octave band spectrum analyser mode is ideal for conducting real-time measurement of equivalent continuous sound pressure levels in octave bands centred on frequencies 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hz (without frequency weighting); at the same time as overall values, equivalent level and peak level with frequency weightings A, C and Z. The SC420 measures these functions throughout the measurement period t, the consecutive integration period T and every 125 ms ("short" functions). Additionally, it also measures both overall and spectral percentiles. The SC420 provides a room background noise evaluation screen: NC (Noise Criterion) curves and NR (Noise Reduction) curves.

APPLICATIONS

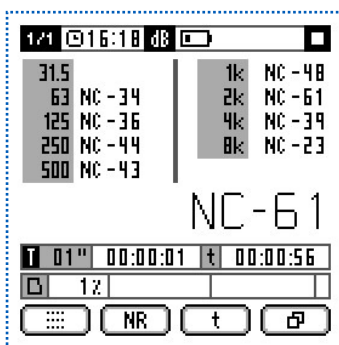
Major applications of this mode include measurement of sound insulation, frequency analysis of industrial, environmental and workplace noise, analysis of noise generated by air conditioning systems and room background noise.



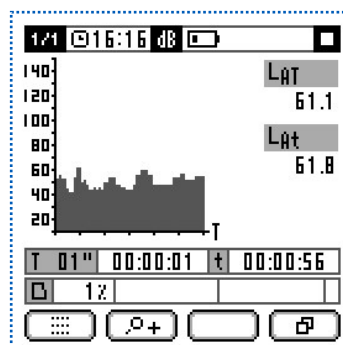
Graphic screen: shows the measured spectrum in real time



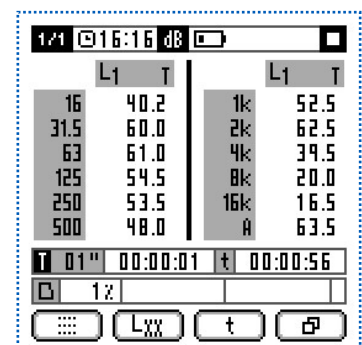
Numerical screen: shows the values for all functions



Curve screen: evaluates the spectrum according to the NC and NR curves



Time history screen: shows the time history of LAT



Statistical screen: shows the value of the percentiles

1/1 SPECTRUM ANALYSER MODE FUNCTIONS

*Not shown on screen

Measuring time t	LXt, LXpeakt, LAnt, Lft, Lfnt, Evaluation of NC (63 Hz – 8 kHz) and NR (31.5 Hz – 8 kHz) curves
Integration time T	LXt, LXpeakt, LAnt, Lft, Lfnt, Evaluation of NC (63 Hz – 8 kHz) and NR (31.5 Hz – 8 kHz) curves
125 ms	LX125ms*, LXpeak125ms*, Lf125ms*

X: A, C and Z; n: 1%, 5%, 10%, 50%, 90%, 95% and 99%; f: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hz.

SC420

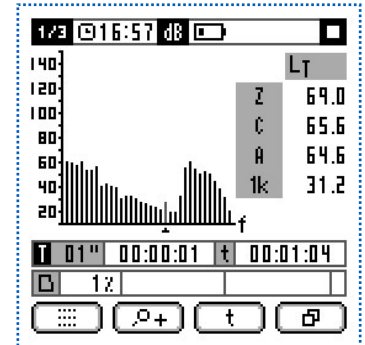
AVAILABLE MEASUREMENT MODES

1/3 octave band spectrum analyser measurement mode (Optional: TF420 module)



WHAT DOES IT MEASURE?

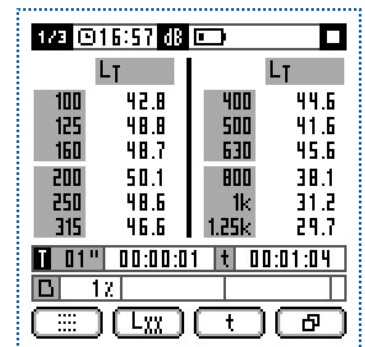
1/3 spectrum analysis mode has been designed to measure spectral content with one-third octave band resolution. The SC420 conducts a frequency analysis of the equivalent sound pressure level in one-third octave bands from 10 Hz to 20 kHz (without frequency weighting). This analysis is carried out in real time for all bands and throughout the entire dynamic range (without scale settings); measuring the equivalent level for the measurement time t , the consecutive integration time T and every 125 ms ("short" functions). The SC420 measures the equivalent overall level with frequency weighting A, C and Z, along with other sound level functions, while measuring the spectrum.



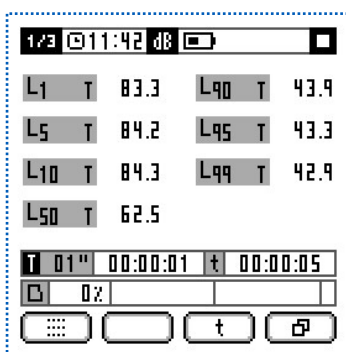
Graphic screen: shows the measured spectrum in real time

APPLICATIONS

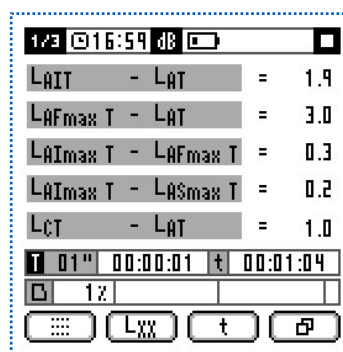
The most important applications that this mode offer are: the measurement of sound insulation in one-third octave bands, the evaluation of environmental noise, including corrections for the presence of tonal and impulse components and low frequency content, the detection and identification of noise sources, etc.



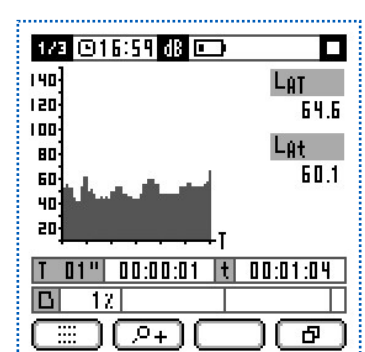
Numerical screen: shows the values for all functions



Statistical screen: shows the value of the LAT percentiles



Advanced screen: shows special acoustic functions



Time history screen: shows the time history of LAT

1/3 SPECTRUM ANALYSER MODE FUNCTIONS

*Not shown on screen

Measuring time t	LX t , LAI t , LAFmax t , LASmax t , LAImax t , (LAI t -LAT), (LAFmax t -LAT), (LAImax t -LAFmax t), (LAImax t -LASmax t), (LCT-LAT), Lf t , Lf n t
Integration time T	LXT, LAIT, LAFmax T , LASmax T , LAImax T , (LAI T -LAT), (LAFmax T -LAT), (LAImax T -LAFmax T), (LAImax T -LASmax T), (LCT-LAT), Lf T , Lf n T
125 ms	LX125ms*, LAI125ms*, LAFmax125ms*, LASmax125ms*, LAImax125ms*, Lf125ms* X : A, C and Z; n: 1%, 5%, 10%, 50%, 90%, 95% and 99%

f: 10, 12.5, 16, 20, 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12500, 16000 and 20000 Hz.

SC420

AVAILABLE MEASUREMENT MODES

Reverberation time measurement mode, by 1/1 and 1/3 octave bands (interrupted noise method)
(Optional: RT420 module, includes KRT key)



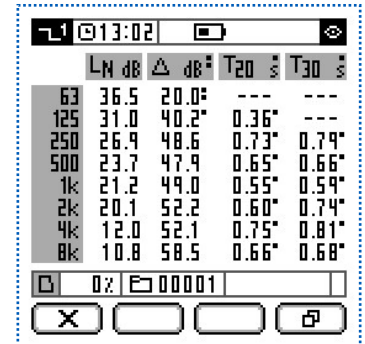
WHAT DOES IT MEASURE?

The reverberation time mode (interrupted noise method) in octave bands and one-third octave bands measures the reverberation time for all the octave bands from 63 Hz to 8 kHz and for all the one-third octave bands from 50 Hz to 10 kHz. The interrupted noise method consists of obtaining the sound pressure level decay as a function of time within the room being studied, exciting the room with broadband random noise and recording the decay of the sound level when the noise emission is suddenly interrupted. The reverberation time T_{20} and T_{30} is obtained automatically by estimating the decay curve from a least-squares fit linear regression analysis.

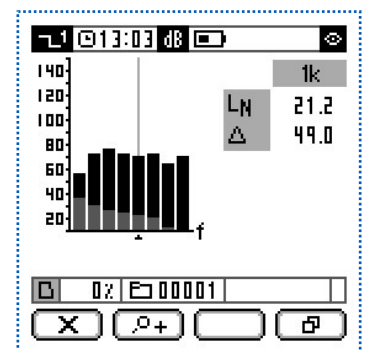
In order to complete this measurement, an omnidirectional sound source (FP122) which emits a broadband sound (pink or white noise) is required. With these modes, the SC420 can simultaneously measure the value of T_{20} , T_{30} and the decay curves, along with the quality evaluation parameters (C, ξ and B·T).

APPLICATIONS

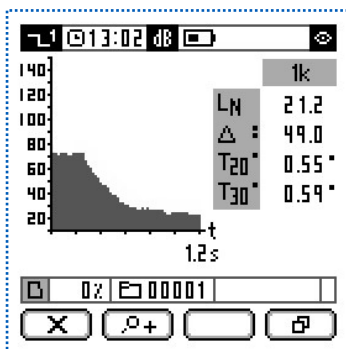
The application of these modes includes the measurement of reverberation time in rooms, the measurement of absorption coefficients in reverberant rooms, the measurement of sound insulation in buildings and building elements, etc. The reverberation time module includes the KRT key for the calculations, curves edition and report creation of reverberation time measurements. (It runs through CIS application).



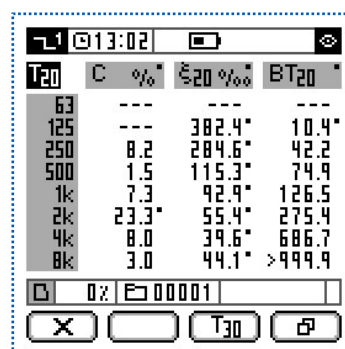
Numerical screen: shows the values for all functions



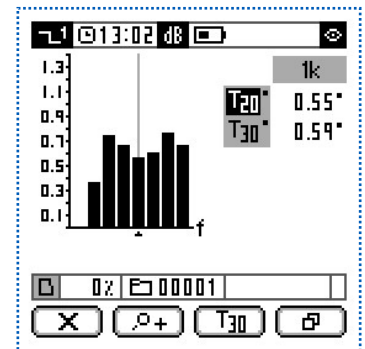
Noise levels graphic screen: shows its spectrum



Decay curve graphic screen: Shows its time history



Numerical quality screen: shows the C, ξ and B·T values



Reverberation time graphic screen: shows its spectrum

REVERBERATION TIME (INTERRUPTED NOISE METHOD) MEASUREMENT MODE FUNCTIONS

T_{20} , T_{30} , LN, Δ , C, ξ_{20} , BT₂₀, ξ_{30} , BT₃₀, and the decay curve

Octave band filters 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hz

One-third octave band filters 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000 and 10000 Hz

SC420

AVAILABLE MEASUREMENT MODES

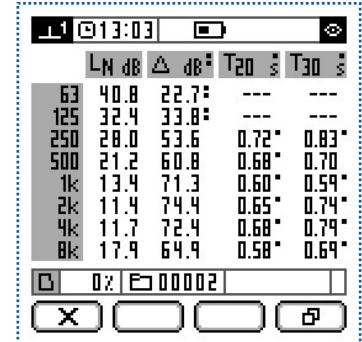
Reverberation time measurement mode, by 1/1 and 1/3 octave bands
(integrated impulse response method)
(Optional: RT420 module, includes KRT key)



WHAT DOES IT MEASURE?

The reverberation time mode (integrated impulse response method) in octave bands and one-third octave bands measures the reverberation time for all the octave bands from 63 Hz to 8 kHz and for all the one-third octave bands from 50 Hz to 10 kHz. The integrated impulse response method consist of obtaining the decay curve of the sound level from the impulse response of the room being tested through the Schroeder method.

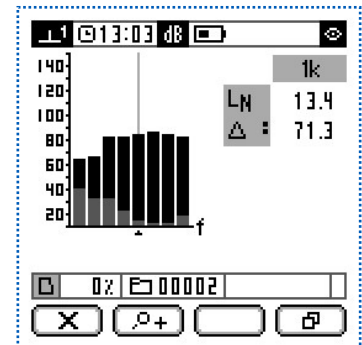
Firstly the response of the room to a dirac impulse or a short transitory sound, which may offer a sufficient approximation, is measured, obtaining the impulse response. Then the decay curve is obtained through the backwards integration of the impulse response, according to the Schroeder method. The reverberation time T_{20} and T_{30} is obtained automatically by estimating the decay curve from a least-squares fit linear regression analysis. With these modes, the SC420 can simultaneously measure the value of T_{20} , T_{30} and the impulse responses and decay curves, along with the quality evaluation parameters (C, ξ and B·T).



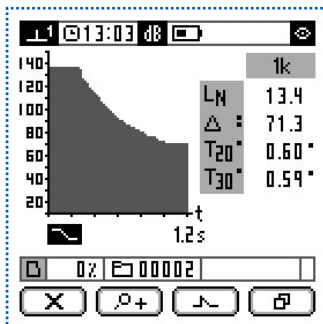
Numerical screen: shows the values for all functions

APPLICATIONS

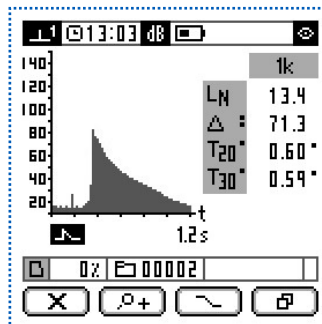
The application of these modes includes the measurement of reverberation time in rooms, the measurement of absorption coefficients in reverberant rooms, the measurement of sound insulation in buildings and building elements, etc. The reverberation time module includes the KRT key for the calculations, curves edition and report creation of reverberation time measurements. (It runs through CIS application).



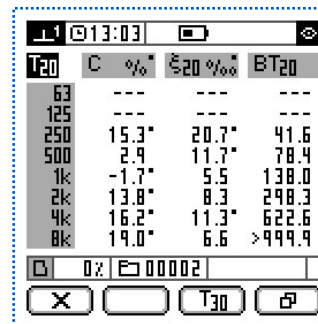
Noise levels graphic screen: shows its spectrum



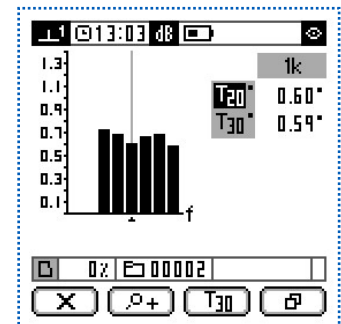
Curve graphic screen: shows the decay curve time history



Curve graphic screen: shows the impulse response time history



Numerical quality screen: shows the C, ξ and B·T values



Reverberation time graphic screen: shows its spectrum

REVERBERATION TIME (INTEGRATED IMPULSE RESPONSE METHOD) MEASUREMENT MODE FUNCTIONS

T_{20} , T_{30} , LN, Δ , C, ξ_{20} , BT₂₀, ξ_{30} , BT₃₀, the impulse response and the decay curve

Octave band filters 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hz

One third octave band filter 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000 and 10000 Hz

SC420

AVAILABLE MEASUREMENT MODES

Occupational noise measurement mode (Optional: DS420 module)



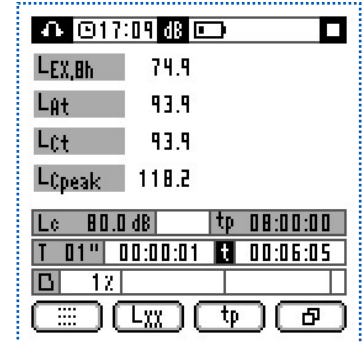
WHAT DOES IT MEASURE?

Occupational noise mode simultaneously measures all the parameters necessary to evaluate the noise exposure of the worker with and without hearing protectors (SNR, HML and Octaves). The SC420, beside measuring the equivalent level with frequency weighting A and C (SNR and HML method), simultaneously carries out a real time frequency analysis by octave bands from 63 Hz to 8 kHz (Octave method).

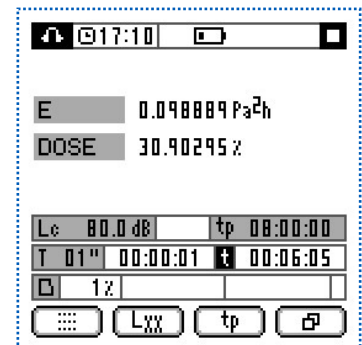
Moreover, it enables the measurement to be carried out during a time shorter than the exposition time, because it shows on the screen all parameters projected to the expected exposure time (programmable projection time tp).

APPLICATIONS

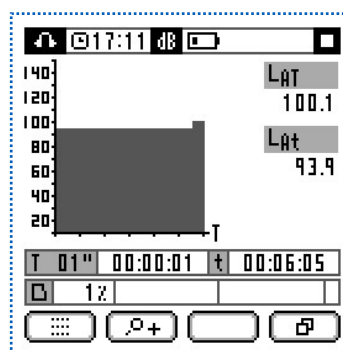
The occupational noise mode of the SC420 is designed for the application of Directive 2003/10/EC regarding the protection of the health and safety of workers against risks regarding the exposure to noise.



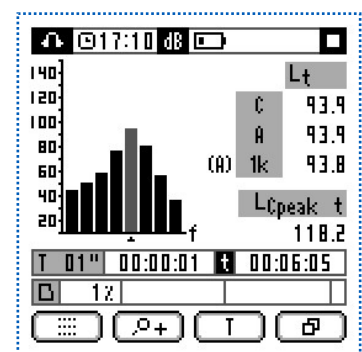
Numerical screen: shows the values for all functions



Numerical screen: shows the values for all functions



Time history screen: shows the time history of LAT



Graphic screen: shows the measured spectrum in real time

FUNCTIONS OF OCCUPATIONAL NOISE MODE

Measuring time t LAT, LcT, LcpeakT, LfXt, LEX,8h*, E*, DOSE*, LEX,8hp*, Ep*, DOSEp*

Integration time T LAT, LCT, LcpeakT, LfXT

*: The LEX,8h, LEX,8hp, E, Ep, DOSE and DOSEp functions are not saved but are evaluated in function of the LC and tp values each time they are recovered.

X: A or without weighting; f: 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hz

SC420

AVAILABLE MEASUREMENT MODES

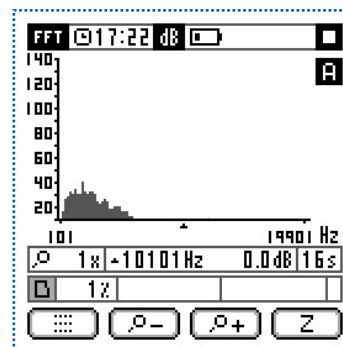
FFT narrowband frequency analyser measurement mode (Optional: FF420 module)



WHAT DOES IT MEASURE?

The FFT narrowband frequency analysis mode of the SC420 sound level meter carries out a frequency analysis with constant bandwidth filters covering the frequency range from 0 Hz to 20 kHz in real time and in all the dynamic measurement range (no scale setting). The FFT analysis has 10000 effective lines with a resolution of 2 Hz/line. The SC420 measures the equivalent continuous sound pressure level from 1 to 60 seconds with frequency weightings A and Z for each FFT line.

In this mode, the resolution at high frequencies is greater than the one obtained with the 1/3 octave band analyser mode with percentage bandwidth.



Graphic screen: shows the measured spectrum

APPLICATIONS

The most important applications that this mode offers are the following: detection and evaluation of the tonal components when these are found between neighbouring one-third octave bands, frequency analysis of continuous and transient signals (industrial and environmental), detailed evaluation of tonal components according to ISO 1996-2 and DIN 45681.

FUNCTIONS OF FFT NARROWBAND FREQUENCY ANALYSER MODE

Measuring time $t \leq 60$ s LfXt

X: A or Z; f: 10000 lines of constant broadband between 0 - 20000 Hz 2Hz/line.

SC420

AVAILABLE MEASUREMENT MODES

Analysis quality audio recording measurement mode (Optional: HI 420 module)



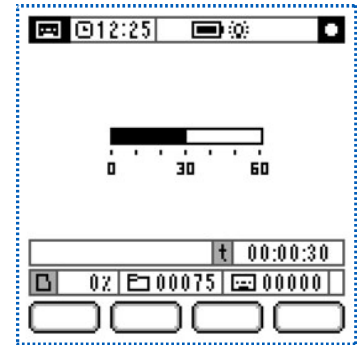
WHAT DOES IT MEASURE?

The audio recording mode (analysis quality) allows for recording the audio signal acquired by the microphone in the memory card.

This signal is stored uncompressed, thus being suitable for professional use. By not incurring any loss of quality, it allows having all the necessary information from which, if the user uses an appropriate software application, will be able to carry out a much more detailed post processing.

APPLICATIONS

This mode can be advantageous independently of the application in which it is being used as it allows a perfect acquisition of the audio signal, to carry out a post processing and obtain additional information.



Analysis quality audio acquisition screen

FEATURES OF ANALYSIS QUALITY AUDIO RECORDING MODE

FORMAT:	WAV File
RESOLUTION:	24 bits
SAMPLING FREQUENCY:	48 kHz
GAIN:	Optimum and constant throughout the recording
MAXIMUM DURATION:	1 minute

SC420

ORDERING INFORMATION

Class 1 sound level meter and spectrum analyser
by third octave bands*



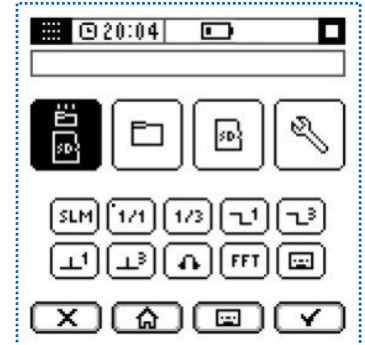
*Optional

THE SC420 AND ITS AVAILABLE ENHANCEMENT MODULES:

The SC420 has different measurement modes. The sound level meter mode is always included in the instrument. Other measurement modes are optional.

In order to activate new measurement modes in the SC420, the corresponding enhancement module has to be purchased. To do so, simply contact your supplier.

The available modules and their description are detailed below:



The active measurement modes appear in the main menu

Optional Modules	Reference	Description	
OCCUPATIONAL NOISE Module*	DS420	Measurement of noise exposure according to Directive 2003/10/EC	
1/1 OCTAVE BAND FILTERS Module*	OF420	Analysis by octave band filters from 16 Hz to 16 kHz plus overall functions and NC and NR curves	
1/3 OCTAVE BAND FILTERS Module*	TF420	Analysis by one-third octave band filters from 10 Hz to 20 kHz plus overall functions	
REVERBERATION TIME Module* (Includes KRT key)	RT420	Reverberation time measurement by 1/1 and 1/3 octave bands using the interrupted noise method and the integrated impulse response method. Include C,ξ and B·T quality parameters	
FFT ANALYSIS Module*	FF420	FFT analysis of 10000 lines from 0 to 20000 Hz (2 Hz/line)	
ANALYSIS QUALITY AUDIO RECORDING Module*	HI420	Recording of audio files in WAV format (without compression), 24 bit resolution, 48 kHz sampling frequency and constant gain for later analysis.	

RECOMMENDED MODULES ACCORDING TO THE REQUIRED APPLICATION

APPLICATION	OPTIONAL MODULES TO BE INCLUDED
EVALUATION OF ENVIRONMENTAL NOISE ISO 1996-2, DETECTION OF AUDIBLE TONES SIMPLIFIED METHOD (Annex D)	TF420 1/3 SPECTRUM ANALYSER Module*
MEASUREMENT OF SOUND INSULATION ISO 16283, ISO 140	TF420 + RT420 REVERBERATION TIME Module*
MEASUREMENT OF NOISE AT WORKPLACE NOISE DIRECTIVE 2003/10/EC	DS420 OCCUPATIONAL NOISE Module*
DETECTION OF AUDIBLE TONES ISO 1996-2 SIMPLIFIED METHOD (Annex D) and REFERENCE METHOD (Annex C)	FF420 FFT ANALYSIS Module*
DETERMINATION OF THE SOUND POWER LEVEL ENGINEERING METHOD FREE FIELD OVER A REFLECTING PLANE ISO 3744	TF420 + RT420 REVERBERATION TIME Module*
ACQUISITION OF NOISE SIGNAL FROM MACHINERY FOR ANALYSIS WITH POST PROCESSING SOFTWARE	HI420 ANALYSIS QUALITY AUDIO RECORDING Module*