The SC160 is a Type 2, low cost, easy to use, integrating sound level meter and real time octave band spectrum analyser that allows you to make sound measurements quickly, conveniently and easily. It has a single range, so there is no need to make any range adjustments.

The SC160 simultaneously measures all the functions for each function modes (sound level meter or spectrum analyser) with frequency weightings A, C, and Z. The SC160’s graphic screen provides graphical and numerical representation of the measured functions.

The data measured and recorded by the SC160 can be transferred to a personal computer so that they are available in electronic format. The AC output allows you to obtain the signal from the preamplifier and make a calibrated recording on D.A.T.

The microphone is detachable. It can therefore be uncoupled and moved away from the SC160 by means of an extension cable (CNR-ITV).

The SC160 can be used as either a sound level meter or a spectrum analyser and room noise evaluator by NC and NR curves.

The sound level meter mode is ideal for measuring overall sound pressure levels. The SC160 simultaneously measures all functions with all frequency weightings and calculates statistical data as maximum and minimum values and percentiles.

The spectrum analyser mode allows you simultaneously and in real time to measure the sound levels and peak levels for octave bands from 31.5 Hz to 16 kHz and the overall sound pressure levels and peak levels with frequency weightings A, C and Z.

Inside the analyser mode there is a special screen to evaluate room noise, specially designed for HVAC system installers, engineers, and consultants, that allows you to assess noise in real time using the NC and NR curves criterion.

**Applications**
- Evaluation the noise exposure of workers at workplace simultaneously to the verification of PPE (Personal Protective Equipment)
- Room acoustics: NC and NR evaluation, measurement of the reverberation time
- Evaluation of noise from machinery
- Sound insulation survey

**User friendly**
- Measures all parameters simultaneously with frequency weightings A, C and Z
- One single range 30-137 dBA; up to 140 dB peak
- Back Light graphic screen and membrane keyboard for easy use

**Features**
- Type 2 integrating sound level meter meeting IEC 60651:01 type 2, IEC 60804:00 type 2, ANSI S1.4:83 (A1 :85), ANSI S1.43:97 standards
- Real time octave band spectrum analyser 31.5 Hz–16 kHz. ANSI S1.11:86
- Real time room noise evaluator by NC and NR curves
- Reverberation time measurement in real time for octave band (Optional)
- Measurement results can be stored in the memory
- Includes software and cable for real time retrieval of all the measured and recorded data and their transmission to a PC
- Real time data transmission through wireless communication system Bluetooth®
- Detachable microphone for use of the extension cable (CNR-ITV)
### SC160

**Diagram of the screens structure**

**Available Functions**

#### Sound Level Meter Mode

<table>
<thead>
<tr>
<th>Nom</th>
<th>Description of Sound Level Meter mode functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>L_{XF}</td>
<td>Sound pressure level with fast time weighting (Fast)</td>
</tr>
<tr>
<td>L_{X5}</td>
<td>Sound pressure level with slow time weighting (Slow)</td>
</tr>
<tr>
<td>L_{XI}</td>
<td>Sound pressure level with impulse time weighting (Impulse)</td>
</tr>
<tr>
<td>L_{XTE}</td>
<td>Equivalent continuous sound pressure level with integration time T</td>
</tr>
<tr>
<td>L_{XE}</td>
<td>Sound exposure level S.E.L.</td>
</tr>
<tr>
<td>L_{Apeak}</td>
<td>Peak sound pressure level</td>
</tr>
<tr>
<td>L_{t}</td>
<td>Measurement time</td>
</tr>
<tr>
<td>T</td>
<td>Integration time</td>
</tr>
<tr>
<td>L_{1}, L_{5}, L_{10}, L_{50}, L_{60}, L_{90}, L_{99}</td>
<td>Percentiles, with A frequency weighting</td>
</tr>
</tbody>
</table>

#### Analyser Mode 1/1

<table>
<thead>
<tr>
<th>Nom</th>
<th>Description of Analyser mode 1/1 functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>L_{XT}</td>
<td>Equivalent continuous sound pressure level with integration time T</td>
</tr>
<tr>
<td>L_{XT,f}</td>
<td>Equivalent continuous sound pressure level with integration time T for the f octave band selected. (See graphic below)</td>
</tr>
<tr>
<td>L_{Apeak}</td>
<td>Peak Sound pressure level</td>
</tr>
<tr>
<td>L_{NC,f}</td>
<td>Peak Sound pressure level for the f octave band selected. (See graphic below)</td>
</tr>
<tr>
<td>NC, NR, f</td>
<td>NC curve not exceeded by the measured spectrum</td>
</tr>
<tr>
<td>NR, f</td>
<td>NR curve not exceeded by the measured spectrum</td>
</tr>
<tr>
<td>NC,f</td>
<td>NC curve not exceeded by the measured spectrum in the f band. (See graphic below)</td>
</tr>
<tr>
<td>NR,f</td>
<td>NR curve not exceeded by the measured spectrum in the f band. (See graphic below)</td>
</tr>
</tbody>
</table>

X: Frequency weighting A, C and Z

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>31,5</th>
<th>63</th>
<th>125</th>
<th>250</th>
<th>500</th>
<th>1k</th>
<th>2k</th>
<th>4k</th>
<th>8k</th>
<th>16k</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC, NR, f</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC,f</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR,f</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SC160
Accessories

Standard accessories
- FNS-020 Case
- PVM-05 Windscreen
- STF030 Program for PC
- CN-201 Cable for connection to a PC
- 9 volts battery

Optional accessories
- CB-5 Acoustic calibrator
- CNR-ITV Microphone extension cable
- CN-USB Serial-USB converter cable
- CN-DAT AC output audio cable
- TR-40 Tripod (height 1.1 m)
- TR050 Tripod (height 1.55 m)
- A-200 Mains feeder 230 V 50 Hz to 9 V
- A-100 Battery converter 12 V to 9 V
- BT001 Bluetooth® device for the Sound Level Meter
- BT002 Bluetooth® device for the PC
- ML-50 Transport briefcase (49 x 36 x 14 cm)
- ML-10 Transport briefcase (30 x 38 x 8 cm)
- IM003 Printer 40 columns serial
- RT-030 Reverberation time module
Sound Level Meter Mode

Kind of recording

<table>
<thead>
<tr>
<th>All each second</th>
<th>1 hour 30 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1, F2 and F3 each second</td>
<td>36 hour 21 minutes</td>
</tr>
<tr>
<td>F1 each second</td>
<td>84 hour 50 minutes</td>
</tr>
<tr>
<td>L_T and partial percentiles every T</td>
<td></td>
</tr>
<tr>
<td>T= 1 s</td>
<td>12 hours</td>
</tr>
<tr>
<td>T= 1 min</td>
<td>1 month</td>
</tr>
<tr>
<td>T= 1 hour</td>
<td>5 years</td>
</tr>
</tbody>
</table>

Spectrum Analyser Mode in 1/1 octave band

Kind of recording

| L_T + L_peak of each octave band | 4 hours 45 minutes |
| L_T + L_peak global with frequency weighting A, C and Z |
| Each T |
| T=1 s | 11 days 21 hours |
| T=5 min | 2 months |
| T=1 hour | 2 years |

* F1, F2 and F3 are the acoustic functions selected by the user on the preferential screen. They may be any of the 54 different functions the SC160 measures in sound level meter mode.

The SC160 may store in its internal memory the values of the measured functions. When the unit is switched off, the data is saved and may be retrieved and displayed directly from the SC160 or transferred to a PC. The memory may be erased directly from the SC160.

In the memory of the SC160 may be stored the final results of a measurement or continuous recordings of functions with programmable register time.
Standards and Specifications
Complies with the following standards.
• EN 60651:94 (A1:94) (A2:01) type 2, EN 60804:00 type 2, EN 61260:95 (A1:01) type 2
• IEC 60651:01 type 2, IEC 60804:00 type 2, IEC 61260:95 (A1:01) type 2
• ANSI S1.4:83 (A1:01) type 2, ANSI S1.43:97 (A2:02) type 2, ANSI S1.11:04
• Mark complies with 73/23/CEE and CEM 89/336/CEE low-tension regulations, the latter amended by 93/68/CEE.

Measurement range
• $L_F$, $L_S$, $L_I$, $L_T$ and $L_t$
  Indicator limits: 0 – 137 dB
  Primary range
  Upper limit   A  C  Z
    113 113 113
  Lower limit   36 36 40
  Measurement range:
  Upper limit: 137 137 137
  Crest factor 3: 130 130 130
  Crest factor 5: 126 126 126
  Crest factor 10: 120 120 120
  Lower limit: 19 21 32
• $L_{peak}$
  Indicator limits: 0 – 140 dB

Noise
• Electrical noise:
  Maximum    A  C  Z
    12  12,1 23,1
  Typical   9,1 11,4 18,5
• Total noise (electrical + thermic of the microphone):
  Maximum 27,1 31,0 39,0
  Typical 25,3 29,0 35,0

Frequency weighting
Complies with the EN 60651 type 2 standard
Weightings A, C and Z

AC Output
Frequency weighting: linear
Sensitivity to 137 dB and 1 kHz (Gain = 0dB): 3,8 Vrms (max)
Upper limit: 7 Vpeak; Output impedance: 100 Ω
Gain: 0 and 40 ± 0,2 dB
Microphone
- Model CESVA P-05: ½” Condenser microphone with preamplifier. Equivalent impedance: 3000 Ω. Nominal sensitivity: 16,0 mV/Pa in reference conditions.

Time weighting
LF, LS, L1 according class 2 tolerances

Parameters
See table | Resolution: 0,1dB

Octave filters
Type 2 according EN 61260:95/ A1:01. Nominal octave bands central frequency: 31,5, 63, 125, 250, 500, 1000, 2000, 4000, 8000, 16000 Hz

Influence of humidity
Operation range: 30 to 90 %
Maximum error at 30%<R,H.<90% at 40 ºC and 1 kHz: 0,5 dB
Storage without batteries: < 93 %

Effects of magnetic fields
In an 80 A/m magnetic field (1 oersted) at 50 Hz, all gives a reading of less than dB(A) is given

Influence of temperature
Operation range: -10 to +50 ºC
Maximum error (-10 to +50ºC): 0,5 dB
Storage without batteries: -20 to +60 ºC

Effects of vibrations
For frequencies between 20 and 1000 Hz and 1 m/s²: < 75 dB(A)

Battery
9 V Battery type 6LF22.
Battery life with continuous use:
- Sound Level Meter mode: 8 hours
- Spectrum Analyser mode: 6 hours
Mains feeder: A-200

Dimensions and Weight
Dimensions: 341 x 82 x 19 mm
Weight:
- With battery: 627 g
- Without battery: 573 g
The SC160 is supplied with the software application **CAPTURE Studio** that allows you to:

- Configure the SC160
- Retrieve data from the SC160 in real time.
- Download registers from the SC160 memory to a PC.
- Erase the SC160 memory.
- Display graphically and numerically the data files and convert them into different formats (.txt, .xls, .mdb)
- System of encrypted file. The files are saved in *.ccf own format and can not be changed and it guarantees the total integrity and legality of those.

**CAPTURE Studio** provides you with a convenient, easy-to-use environment for obtaining, in digital format, data acquired by the SC160, it runs in PC under Windows 9x/Me/2000/NT/XP.

The characteristics, technical specifications and accessories may vary without prior notice
Reverberation time mode in 1/1 octave bands

The module of reverberation time measurement of the SC160 Sound Level Meter allows:

- The simultaneously measurement of the reverberation time $T_{20}$ and $T_{30}$ by the interrupted noise method for the octave bands of 63, 125, 250, 500, 1000, 2000, and 4000 Hz.
  - $T_{30}$ is the time, expressed in seconds, that it is required for the sound pressure level to decrease 60 dB. The $T_{30}$ is the result of multiply by 2 the necessary time that takes the level to reduce 30dB.
  - $T_{20}$ is the time, expressed in seconds, that it is required for the sound pressure level to decrease 60 dB. The $T_{20}$ is the result of multiply by 3 the necessary time that takes the level to reduce 20dB.

- Measurement range (depends on the frequency band):
  - TR minimum: 0.1 s
  - TR maximum: 10.0 s

- The automatic detection of the decay curve and its slope estimation through a least square approximation.

- Decay curves calculated from the averaging time between 10 ms and 40 ms depending on the frequency band.

- The possibility of storing the results in memory: Values of $T_{20}$, $T_{30}$ and decay curves, for all octave bands.

Calculus and measurement standards


The Reverberation Time Module for the SC160 is optional and may be purchased when buying the SC160 or later. All SC160 purchased before this date may be upgraded with this module.

Next it is appears a graphic with the steps that have to be followed to be able to make a reverberation time measurement.

Storage Capacity

| Reverberation time ($T_{20}$ and $T_{30}$) + Background noise ($L_N$) + maximum level ($L_N + \Delta$) + decay time history | 100 measurements |

- $L_N$ de $\Delta$ de $T_{30}$ s $T_{20}$ s

- Procedure for the RT measurement

1. Switch the SC160 to RT mode
2. Press $\rightarrow$ to start the measurement process
3. Validate the background noise by pressing $\rightarrow$
4. Increase progressively the sound pressure level by starting the sound source
5. When the source emits the necessary sound pressure level and the acoustic field reaches the stationary state, press $\rightarrow$ to validate this level
6. Stop the noise emission
7. After a few seconds from the noise emission stop it will appear at the screen of the SC160 the RT values

Maximum level ($L_N + \Delta$)

Background noise $L_N$
SC160

Dosimeter Module for the assessment of noise at workplace

The dosimeter module for the assessment of noise at workplace of the SC160 adds a new measurement mode that is perfect for the application of the Directive 2003/10/CE which adapts to the technical progress the regulation on protection of the health and safety of workers against the risks regarding the exposure to noise. In The Member States, the corresponding transposition to national law.

This dosimeter module allows you to simultaneously measure all parameters needed to assess the levels of noise to which workers are exposed when wearing or not hearing protectors (SNR, HML, Octaves).

The SC160 measures simultaneously the equivalent level with frequency weighting A and C \([ L_{At}, L_{Ct} ]\), daily noise exposure level \([ L_{EX,8h} ]\) (ISO 1999), Noise exposure in Pa²h \([ E ]\) and noise dose \([ \text{DOSE} ]\) referred to a programmable Criterion Level \([ L_C ]\), and, of course, also the Peak Level with frequency weighting C \([ L_{Cpeak} ]\) (ISO 1999).

Moreover, the SC160 allow you to carry out the measurement during a time shorter than the exposition time, because it shows on the screen all parameters projected to the expected exposition time (programmable projection time \([ t_p ]\) ).

To evaluate the exposure to noise taking into account the attenuation of the individual hearing protectors worn by the worker, the SC160, beside measuring the equivalent level with frequency weighting A and C \([ L_{At}, L_{Ct} ]\) (SNR and HML method), simultaneously carries out a real time frequency analysis with frequency weighting A and by octave bands from 63 Hz to 8 kHz (Octave method).

The huge memory of the SC160 allows you to store the time history of the measured parameters, and afterwards recalculating them for any desired time interval.

The SC160 helps you to asses and measure the exposure to noise and also brings you all data needed to inform and train about the significance and potential risks of the results of the assessment and measurement.

Moreover, It helps you to design and run a reduction programme and to choose the suitable hearing protectors.

The dosimeter module for the assessment of noise at workplace is not included with the SC160. It is an optional module and it can be acquired when buying the SC160 or later.