Cert. #:4038.01

CERTIFICADO DE CALIBRACIÓN / *CALIBRATION CERTIFICATE*

INNOVATECIS CIA LTDA
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Certificado No. (*Certificate #*): 61036
Fecha de Recepción (*Reception Date*): 2025-09-08
Fecha de Calibración (*Calibration Date*): 2025-09-10
Próxima Fecha de Calibración (*Calibration Due*): 2026-09
Fecha de Emisión (*Emission Date*): 2025-09-10

Cliente (*Client*): GAD Municipal Tena
CRTV Tena, Barrio 3 de Mayo, Tena

Información del Instrumento (*Instrument Information*)

Equipo *(Instrument):*	Sonómetro	**Int. de Medición:** *(Measurement Range)*	(30 a 140) dB	**Ubicación:** *(Location)*	********
Marca *(Brand):*	Cesva				
Modelo *(Model):*	SC101	**División de escala:** *(Resolution)*	0.1 dB	**Lugar de Calibración:** (Place of Calibration):	Lab. INNOVATEC *INNOVATEC´s Lab.*
Serie *(Serial #):*	T253616				
Código *(Code):*	********				

Datos de Calibración (*Calibration Info*)
Procedimiento *(Procedure):* INN-PC-15

Condiciones Ambientales (*Enviromental Conditions*)
Temperatura (Temp): (21.1 °C a 21.4 °C) **Humedad (Humidity): (56.4 %HR a 55.9 %HR)**

Trazabilidad (*Traceability Info*)

Patrón (*Standard*)	**Marca** (*Brand*)	**Cert. #**	**Ultima Calibración** (*Last Cal.*)	**Periódo** (*Period*)
Multímetro Patrón	Transmille	AC-28786	2023-06-08	2.5 años
Medidor Acústico	Reed	US011-MIL-CI-23222062	2023-09-18	2 años
Calibrador Acústico	Reed	US011-MIL-CI-23222187	2023-09-18	2 años

Resultados (*Results*)

Ver Resultados en Hoja Adjunta

See results in attached Sheet

Comentarios: *Comments*: Los valores marcados con "#", no se encuentran dentro del Alcance de Acreditación de A2LA, pero si en la competencía técnica de INNOVATEC Industrial Solutions.

Calibrado por: *Calibrated by:* Jonathan Fonseca

Aprobado por: *Approved by:*

Fin de Certificado (*End of Certificate*)

Certificado No.: 61036 **Equipo** *(Instrument):* Sonómetro

Fecha de Calibración: 2025-09-10 **Marca** *(Brand):* Cesva

Tipo *(Type)*	**Rango** *(Range)*	**Patrón** *(Standard)*	**UBP** *(UUT)*	**Error** *(Error)*	**Incertidumbre** *(Uncertainty)*
Eléctrica	(20 a 140)dB @250 Hz	1.794 V (69.7 dB)	69.8 dB	0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @250 Hz	2.274 V (93.7 dB)	93.7 dB	0.0 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @250 Hz	2.674 V (113.7 dB)	113.8 dB	0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @500 Hz	1.796 V (69.8 dB)	69.7 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @500 Hz	2.276 V (93.8 dB)	93.7 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @500 Hz	2.676 V (113.8 dB)	113.6 dB	-0.2 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @1 kHz	1.804 V (70.2 dB)	70.1 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @1 kHz	2.286 V (94.3 dB)	94.2 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @1 kHz	2.686 V (114.3 dB)	114.2 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @2 kHz	1.796 V (69.8 dB)	70 dB	0.2 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @2 kHz	2.276 V (93.8 dB)	93.9 dB	0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @2 kHz	2.676 V (113.8 dB)	113.7 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @4 kHz	1.794 V (69.7 dB)	69.7 dB	0.0 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @4 kHz	2.274 V (93.7 dB)	93.8 dB	0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @4 kHz	2.686 V (114.3 dB)	114.2 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @8 kHz	1.804 V (70.2 dB)	70.1 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @8 kHz	2.286 V (94.3 dB)	94.3 dB	0.0 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @8 kHz	2.686 V (114.3 dB)	114.2 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @12.5 kHz	1.794 V (69.7 dB)	69.5 dB	-0.2 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @12.5 kHz	2.274 V (93.7 dB)	93.8 dB	0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @12.5 kHz	2.686 V (114.3 dB)	114.2 dB	-0.1 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @16 kHz	1.804 V (70.2 dB)	70 dB	-0.2 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @16 kHz	2.286 V (94.3 dB)	94.5 dB	0.2 dB	± 0.058 mV
Eléctrica	(20 a 140)dB @16 kHz	2.686 V (114.3 dB)	114.2 dB	-0.1 dB	± 0.058 mV
Acústica Ponderación A#	(20 a 140)dB @1 kHz	70 dB	70 dB	0.0 dB	± 0.40 dB
Acústica Ponderación A	(20 a 140)dB @1 kHz	94 dB	94 dB	0.0 dB	± 0.40 dB
Acústica Ponderación A	(20 a 140)dB @1 kHz	114 dB	114 dB	0.0 dB	± 0.40 dB
Acústica Ponderación C#	(20 a 140)dB @1 kHz	70 dB	69.9 dB	-0.1 dB	± 0.40 dB
Acústica Ponderación C	(20 a 140)dB @1 kHz	94 dB	94 dB	0.0 dB	± 0.40 dB
Acústica Ponderación C	(20 a 140)dB @1 kHz	114 dB	114 dB	0.0 dB	± 0.40 dB
Acústica Ponderación A#	(20 a 140)dB @2 kHz	70 dB	69.9 dB	-0.1 dB	± 0.40 dB
Acústica Ponderación A	(20 a 140)dB @2 kHz	94 dB	94 dB	0.0 dB	± 0.40 dB
Acústica Ponderación A	(20 a 140)dB @2 kHz	114 dB	114 dB	0.0 dB	± 0.40 dB
Acústica Ponderación C#	(20 a 140)dB @2 kHz	70 dB	70.1 dB	0.1 dB	± 0.40 dB
Acústica Ponderación C	(20 a 140)dB @2 kHz	94 dB	94 dB	0.0 dB	± 0.40 dB
Acústica Ponderación C	(20 a 140)dB @2 kHz	114 dB	114 dB	0.0 dB	± 0.40 dB
Acústica Ponderación A#	(20 a 140)dB @8 kHz	70 dB	70.1 dB	0.1 dB	± 0.40 dB
Acústica Ponderación A	(20 a 140)dB @8 kHz	94 dB	94 dB	0.0 dB	± 0.40 dB
Acústica Ponderación A	(20 a 140)dB @8 kHz	114 dB	114 dB	0.0 dB	± 0.40 dB
Acústica Ponderación C#	(20 a 140)dB @8 kHz	70 dB	70 dB	0.0 dB	± 0.40 dB
Acústica Ponderación C	(20 a 140)dB @8 kHz	94 dB	94 dB	0.0 dB	± 0.40 dB
Acústica Ponderación C	(20 a 140)dB @8 kHz	114 dB	114 dB	0.0 dB	± 0.40 dB

C.2.2 The onset time constant of the special signal detector is small compared with th 35 ms time constant. The design-goal decay rate of the detector is 2,9 dB/s with toleranc limits of ±0,8 dB/s and ±1,3 dB/s for class 1 and class 2 sound level meters, respectively. Th design-goal decay rate and the tolerance limits for design and manufacture correspon approximately to a decay time constant of 1 500 ms ± 250 ms and 1 500 ms ± 500 ms fc class 1 and class 2 sound level meters, respectively.

C.2.3 Sound level meters with time-weighting I should respond to single sinusoida tonebursts and to sequences of sinusoidal tonebursts in accordance with the tests given i C.3.

C.2.4 For steady sinusoidal electrical input signals with frequencies from 315 Hz to 8 kHz sound levels measured with time-weightings F and I should be the same within 0,4 dB. For single short toneburst, the sound level displayed with time-weighting I generally is greate than the sound level displayed with time-weightings F or S.

C.3 Tests of I-time-weighted sound level

C.3.1 For single 4 kHz sinusoidal electrical tonebursts of specified durations, table C.1 give the corresponding design goals for the highest A-frequency-weighted, I-time-weighted soun level relative to the A-weighted sound level displayed for the steady signal. Measure deviations from the design goals, extended by the actual expanded uncertainties c measurement, should be within the applicable tolerance limits. Tonebursts should b extracted from the steady 4 kHz input signal that produces a display of th A-frequency-weighted sound level stated in the instruction manual for the upper limit of th reference level range.

Table C.1 – Design goals for the relative response of A-frequency-weighted, I-time-weighted sound level to single 4 kHz tonebursts, with tolerance limits

Toneburst duration T_b ms	Highest response to a toneburst minus the response to a steady signal[a] dB	Tolerance limits, dB	
		Class	
		1	2
20	–3,6	±1,8	±2,3
5	–8,8	±2,3	±3,3
2	–12,6	±2,3	...

[a] Calculated from $10 \lg(1 - e^{-T_b/\tau})$,
where
T_b is the specified toneburst duration in seconds; and
τ is the 0,035 s time constant for time-weighting I.

C.3.2 For class 1 sound level meters, when the level of a 2 ms, 4 kHz toneburst is change by 10 dB, the display of the A-frequency-weighted, I-time-weighted sound level should chang by 10 dB ± 1,3 dB. For class 2 sound level meters, when the level of a 5 ms, 4 kHz toneburs is changed by 5 dB, the display of the A-frequency-weighted, I-time-weighted sound leve should change by 5 dB ± 1,3 dB.

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Table 1 – Directional response limits including maximum expanded uncertainty of measurement

Frequency kHz	Maximum absolute difference in displayed sound levels at any two sound-incidence angles within $\pm\theta$ degrees from the reference direction dB					
	θ = 30°		θ = 90°		θ = 150°	
	Class					
	1	2	1	2	1	2
0,25 to 1	1,3	2,3	1,8	3,3	2,3	5,3
>1 to 2	1,5	2,5	2,5	4,5	4,5	7,5
>2 to 4	2,0	4,5	4,5	7,5	6,5	12,5
>4 to 8	3,5	7,0	8,0	13,0	11,0	17,0
>8 to 12,5	5,5	...	11,5	...	15,5	...

NOTE Maximum absolute differences in displayed sound levels are extended by the expanded uncertainty of measurement for demonstration of conformance to the limits given above.

5.3.2 For any frequency within the specified ranges, the requirements of table 1 apply for any orientation of the sound level meter, or applicable components, around the reference direction.

5.4 Frequency weightings

5.4.1 At 1 kHz, the design goal for all frequency weightings is 0 dB with corresponding tolerance limits of ±1,1 dB for class 1 sound level meters and ±1,4 dB for class 2 sound level meters.

5.4.2 Table 2 gives the frequency weightings A, C, and Z, rounded to a tenth of a decibel and corresponding tolerance limits for class 1 and class 2 sound level meters. For a given performance class, tolerance limits in table 2 apply on all level ranges and after applying the adjustment described in 5.2 for the response to the sound calibrator at the calibration check frequency and under reference environmental conditions.

5.18.3 For group Y and group Z sound level meters, the maximum disturbance conducte the public supply of electric power shall be within the quasi-peak and average voltage-le limits given in table 5 at an a.c. power port. If the sound level meter conforms to the limit the average voltage of conducted disturbances when using a quasi-peak measuring devi the sound level meter shall be deemed to conform to the quasi-peak and average volt limits.

Table 5 – Limits for conducted disturbance to the voltage of a public supply of electr power including maximum expanded uncertainty of measurement

Frequency range MHz	Limits on voltage level of disturbance (re 1μV) dB	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

NOTE 1 See 4.1.2 of CISPR 16-1:1999 for the characteristics of quasi-peak-measuring receivers.

NOTE 2 Lower limits for voltage levels apply at the transition frequencies.

NOTE 3 Voltage level limits decrease linearly with the logarithm of the frequency in the range from 0,15 M to 0,50 MHz.

5.19 Crosstalk

5.19.1 Crosstalk, or leakage of signals between pairs of channels, is a concern for mu channel sound level meters.

5.19.2 At any frequency within the range of a class 1 or class 2 multi-channel sound le meter system, the difference between the level indicated on the display device, in response a steady electrical signal applied to the electrical input facility of one channel and adjustec indicate the upper limit of the applicable linear operating range, and the signal level indica for any other channel shall be at least 70 dB. Termination devices, as stated in the instruct manual, shall be installed in place of the microphones on the other inputs.

5.20 Power supply

5.20.1 An indication shall be provided to confirm that the power supply is sufficient operate the sound level meter within the specifications of this standard.

5.20.2 The instruction manual shall state the maximum and minimum power supply volta at which the sound level meter conforms to the specifications of this standard. With a sou calibrator applied to the microphone, the change in the displayed sound level, extended the expanded uncertainty of measurement, shall not exceed ±0,3 dB for class 1 sound le meters and ±0,4 dB for class 2 sound level meters when the supply voltage is reduced fr the maximum to the minimum.

5.20.3 If internal batteries are used to power the sound level meter, the acceptable batt types shall be stated in the instruction manual and preferably on the instrument. T instruction manual shall also state the continuous operating time, under referei environmental conditions, to be expected for the specified normal mode of operation when capacity batteries are installed.

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