

Magnetic field strength meter



BM-SCAN

USER GUIDE

H10878 - Version 1 / 03-2018

1 - Role of the measurer

The field measurer has been designed to ensure that magnetic loop systems are installed and certified according to the new IEC 60118-4 standard. When these standards are respected, the comfort of the user will be identical wherever he is using his prosthesis equipped with the T position.

The BM-SCAN makes it possible to commission an installation and certify its conformity. To do so, please follow the procedure for receiving the magnetic loops in the appendix. You can then complete the certificate of compliance.

2 - Measurer Operation

2-1 Switching the field measurer on/off

ON - Press and hold button A until the display lights up

Off - Press and hold button A until the unit turns off

When the process is finished the screen turns black

2-2 Mode selection

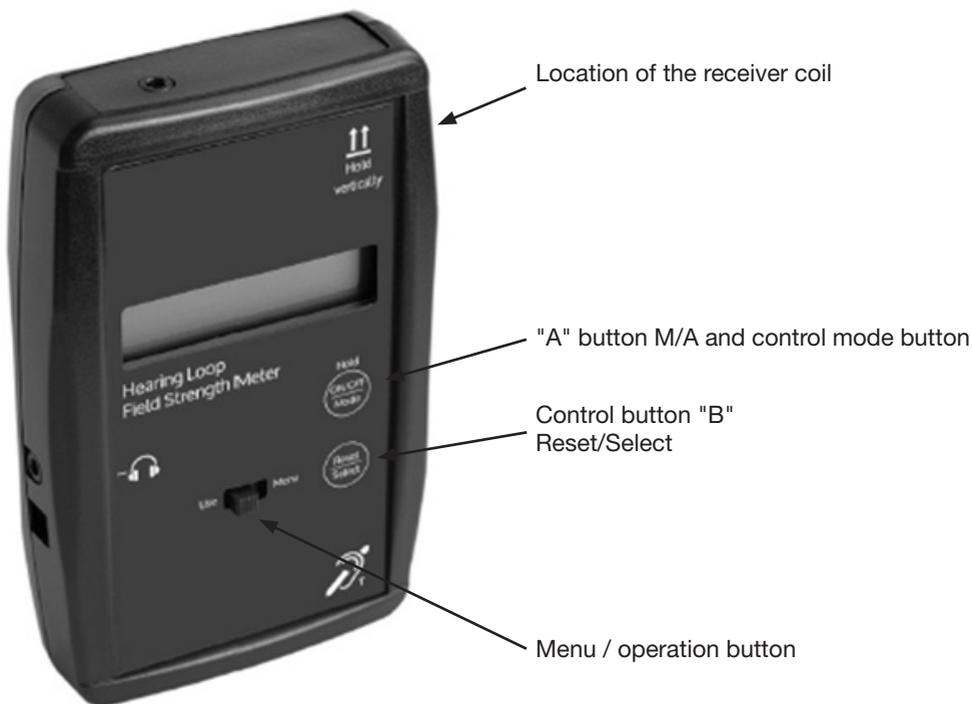
When you press the "A" key, it first displays the "BackGround Noise" mode, you must press the button again to switch to the next mode:

- 1 - **"BackGround Noise"** magnetic pollution test
- 2 - **"RMS / Peak"** signal measurement
- 3 - **"Field Strength"** magnetic field measurement
- 4 - **"Third Octave"** Level Measurement

2-3 Button "B" function

- 1 - In modes 1 - 3 press button "B" to reset the measurements
- 2 - In mode 4, press button "B" to advance the frequency by third octaves

3 - Components



4 - "Background" magnetic pollution level test

4-1 Activating the pollution level test mode

**Background noise
Weighted mode**

When the measurer is switched on, the "Weighted" background noise mode appears. The display will show the RMS value on the first line and the MAX value on the second line. Press button "B" to reset the MAX measurement.

A-RMS : -42.5 dBA
MAX : -37.9

4-2 How to test background noise?

When testing the background noise of a new building, turn on all lights, fans, sound system and other electrical equipment as if the building were in use. If you certify an installation, this test is performed without the hearing loop system being activated.

Walk in all areas where the loop system will be used, holding the meter upright at listening height. The important reading will be MAX reading. However, it is important to look at the RMS reading. If the MAX reading exceeds -32dBA (measurements above -32dBA will have a lower negative number, for example -30dBA means there is more background noise than -35dBA), you will need to specify areas where these noise levels are higher.

Notes and requirements of Standard 60118-4

The standard revised in 2004 notes that any background noise level below -47dBA will result in excellent signal / noise, but levels below -32dBA are acceptable and meet the requirements of the standard. If the background noise level is greater than -32dBA, building managers should be informed so that the source of the interference found can be repaired or isolated.

5 - RMS/Peak signal level

5-1 Principle

**RMS / Peak
Weighted mode**

The second mode is used to configure the audio loop signal level using a weighting filter. It is very difficult to set the field strength to an average of -12dBA as it will vary depending on the program used to configure the system. We will use the PEAK reading to confirm that our design and equipment meet the specifications of the standard. Press key "B" to reset PEAK playback.

**A-RMS : -12.5 dBA
MAX : -0.2**

Once the loop system has been installed, create a limited pink noise (100Hz to 5KHz) of the loop system bandwidth. Walk around the hearing area holding your meter vertically.

Note the readings and confirm that the A-RMS level does not vary by more than ± 3 dB. This lets you know that the signal level perceived in hearing aids will be the same no matter where the person is.

Next: Using an audio program similar to what is normally used in the building, adjust the level of the audio program to just above "normal". Now turn on the loop system and adjust the player level until a -3dB to 0dB level is obtained in the center of the loop. Reset the PEAK level and confirm that this level is on average 0 dB in the people's listening device.

Notes and requirements of Standard 60118-4

The standard states that the signal level in the loop area should not vary by more than ± 3 dB. Once confirmed, the signal level from the normal building program should peak at 0 dB as referenced at 400mA/m. This confirms that there is adequate loop current to produce both maximum and average signal levels (average is de-12dB or 100ma/m) for hearing instruments equipped with the T position.

6 - Frequency response

The methods below are two processes that can be used to confirm that the system correctly reproduces all required frequencies equitably in the 100 to 5KHz bandwidth. A signal tester generator such as the BM-SCAN will be required to perform these tests. Both methods will give precise results.

**Field strength
Flat reaction**

6-1 Method I - Sinusoidal signal

Send the following sinusoidal signals through the loop system without adjusting any of the audio level or loop controls: 100Hz, 250 Hz, 500 Hz, 1000 Hz, 2500 Hz and 5000 Hz.

Using the flat mode, record the RMS level generated by each of these. To meet the specification of the standard the levels shall not vary by ± 3 dB.

FS-RMS :	-12.5 dB
MAX :	-10.2

6-2 Method II - Pink noise signal

Send a pink noise signal into the magnetic loop system and select the third octave mode on the meter. It will initially start at a center frequency of 1000 Hz.

**Third octaves
F = 1000 Hz**

Press button "B" to scroll through the frequencies 100Hz, 200Hz, 500Hz, 1000Hz, 2500 Hz and 5000 Hz.

Notes and requirements of Standard 60118-4

The standard notes that in frequencies from 100Hz to 5000Hz the loop should also reproduce all signals. At a minimum, systems should be tested at 100Hz, 1KHz and 5KHz.

BP-RMS :	-22.5 dB
MAX :	1000 Hz

Record RMS level readings for each frequency.

As in method I, if the level does not vary by more than ± 3 dB, the installed system meets the IEC specifications of the standard. This method was requested by the technicians so that they could perform the test with an instrument without continuously adjusting the frequency source. It also facilitates testing in several locations.

7 - Headphone output

The 2-purpose headphone output jack: First, it can be used to monitor the loop program and gives you a weighted output signal that can be heard with standard headphones. To change the headphone volume, drag the Use / Menu button to Menu and use the Mode button to switch to the headphone volume. By pressing the "select" button, you will be directed to the volume control screen where the upper button increases the volume and the lower button decreases the volume. Once set, simply return to operation to save the setting.

A complete spectrum output can be sent from this same connector which could then feed a spectrum analyzer.

This would show the signal level at different frequencies and help confirm proper operation and evaluate the frequency and level of any interference.

To switch from Weighted to Flat: With the display on, switch to Use / Menu in "Menu", press the "A" mode button once to go to the Headphone Jack setup screen, then, by pressing the "B" selection button, you can choose a weighted or flat spectrum.

8 - Menu settings

In the menu, the following items can be set: backlight level, headphone output type, headphone volume, display units (dB, mG, uT) and switch-off delay (5 to 30min or none).

9 - Ligne en mode réponse plate

There is a new feature which is the dBV audio level. The measurements and the display allow to control the signal level coming from the sound system of the place. Poor sound in the loop system often comes from a low signal level in the sound system. This input uses the latest mode on the FSM and displays a specific level.

We recommend a level between -10dBV and 0dBV.

To use this feature scroll through the different modes until you see

"Line In Flat Response" on the screen.

10 - Specifications

Measuring range:	-62dB to +9dB (0dB = 400mA/m)
Peak factor :	<3
Resolution:	< 0.1dB resolution for higher levels -32dB
Measurement resolution:	0.1 dB
Detection type:	RMS on all features
Sensor :	Coil sensor
Direction of sensitivity:	In vertical position of the sensor (noted on the product)
Calibration :	Calibrated at 1000 Hz (sine) read 0 dB at 5.03 mG
Frequency response:	Flat ± 1 dB from 50 Hz to 10,000 Hz
Weighting:	2 meters specified in standard 61672-1
Power Source:	Battery (9V) and external power outlet
Headphone jack:	Weighted or flat output (selectable)
Display:	16x2 LCD
Backlight:	blue LED (adjustable brightness)



Procedure for receiving magnetic loops

Thanks to the law of February 2005, establishments receiving the public (ERP) are gradually equipping themselves with magnetic induction loops in order to facilitate listening for people with hearing difficulties. To be effective these systems must be carefully calibrated to verify that the installation has been made in compliance with standard EN60118-4. We recommend the delivery of a certificate of conformity to this standard, according to the model enclosed, signed by the installer.

Standard EN 60118-4 of March 2007

This standard defines 4 very precise parameters.

- The peak magnetic field must reach 400mA/m (integration time 0.125ms).
- Frequency responses should not vary more than 3dB between 100Hz and 5000Hz.
- The signal-to-noise ratio must be 47 dB (A-weighting).
- The magnetic field must be uniform throughout the listening area.

To allow a good listening it is necessary to check all these conditions.

The respect of the magnetic field intensity guarantees that the sound intensity is sufficient, the responses frequency control ensure that the entire sound spectrum is perceived in the same way and the signal-to-noise ratio measures the impact of interference magnetic disturbances on intelligibility. Despite the installation of adequate equipment, many factors can disturb these parameters: the presence of metallic structures causes the magnetic field to drop, transformers or current at 50Hz in the proximity cause magnetic noises. The size and the form of the room can make it difficult to meet the recommended values at all points.

The type-approval procedure

The following procedure is recommended:

- About the room, determine the points where the measurements will be taken (center, extremities, points near metal structures or noise sources).
- Measurements by the installer, after the adjustment of the installed equipment, of the various parameters set by the standard.
- Delivery of this document signed by the installer to the room manager.

Recommendation

Room managers must ensure that, when installing any magnetic induction loop, the installer delivers this certificate of conformity. Even if the room manager does not have the competence to judge the result of the measurements, this "installation report" should be able to be consulted at any time for a possible control by a team of auditors.

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