

# Univox<sup>®</sup> FSM Basic

AFILS Field Strength Meter

## User Guide



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## Introduction

Univox® FSM Basic is a calibrated precision measurement device, designed for measuring the performance of Audio Frequency Induction Loop Systems (AFILS). The meter enables easy and straight-forward assessment of background noise, field strength and frequency response of the system to comply with the requirements of IEC 60118-4.

Two different frequency response characteristics are provided: 'NORMAL' which is a restricted response, similar to that of a hearing aid, and 'FLAT' which is a wide, flat response, similar to that of an equalized induction loop receiver for wide-band communication.

The meter is calibrated in two ranges; +6dB to -21dB and -21 to -48dB with respect to the field strength of 400mA/m, recommended by IEC 60118-4, allowing background magnetic noise levels to be measured as well as AFILS signal strengths. The measured audio signal may be monitored using headphones on all range and filter combinations.

## Overview



\* The range indicator in use flashes when the battery is low.

## Background information

- The meter responds to program peaks. The PPM style of indicator was developed by broadcasters to control the peak levels of audio signals and so prevent overmodulation of the transmitters. The PPM meter allows the user to verify in real time that an AFILS can provide sufficient field strength for good speech clarity.
- The monitor audio output is active on all range and filter combinations. The monitor output frequency response is modified to emulate that of a typical induction loop listener. This means that the person testing hears a similar signal to that to be heard by a loop user.
- The meter is operated in the vertical plane so that is easy to read when held at the hearing position.
- This meter is designed with high quality components for low noise and operates over a very wide range of 54dB in two stages. The range in use is indicated by an LED as is a low battery condition warning.
- Two measurement filter (tone) responses are provided. The FLAT setting is provided only for measuring system frequency response in conjunction with an external signal generator. For all other measurement the NORMAL setting is used.
- The meter is calibrated, traceable to International Standards. Annual checking of calibration is advised.

## Instructions for use

### Background noise measurement (Noise)

NOTE: Do not use the monitor headphones on higher than volume 4 for this test, (i.e. on LO range setting) in order to maintain accuracy and stability in the instrument.

1. Switch off or disconnect from the mains power any audio induction loop equipment, (note that any other mains operated equipment, that normally would be in use within the test area, should be switched on).
2. Set the TONE (filter) switch to the NORM position (8).
3. Move the RANGE switch to the LO position (9).
4. Hold the meter in vertical position, with the top at the position a hearing aid is likely to be used, (1.2m for sitting and/or 1.7m for standing height. If both sitting and standing positions are used, measure at 1.45m).
5. Observe the LED bar graph and document the background noise levels within the listening area.

NOTE: For long time listening the IEC 60118-4 recommended background noise level should be below -47dB. If the background noise level exceeds -32dB, the nature of the magnetic noise should be assessed and remedial measures to achieve lower background noise level should be considered. For short time announcements, background noise levels of up to -22dB can be accepted, as the loop system will still be beneficial to hearing aid user.

### Field strength deviation/overspill (Coverage)

NOTE: For Field strength deviation/overspill (Coverage) measurement a precise 1kHz frequency signal, Univox 1kHzSineWave.mp3 should be used.

1. Connect the loop driver to the mains power.
2. Connect the signal source and activate the audio file 1kHzSineWave.mp3.
3. Adjust the input level at the loop driver according to the manual.
4. Adjust the field strength level at a reference measuring position to approximately -12dB.
5. Set the TONE (filter) switch to the NORM position (8).

6. Move the RANGE switch to HI position (7).
7. Hold the meter in vertical position with the top at the listening height and measure the variation (field strength deviation) within the listening area. Confirm that the field strength does not deviate by more than  $\pm 3\text{dB}$ .
8. Measure the overspill distribution outside the loop area, if required. (NOTE: overspill is not defined by the IEC 60118-4 but can be considered as magnetic field above  $-32\text{dB}$ .)

## Basic frequency test (FQ)

NOTE 1: For Frequency test Univox MultiFreq.mp3 (the audio file includes 3 tones in the following sequence: 2sec@1kHz; 1sec@silence, 2sec@100Hz; 2sec@5kHz), should be used.

1. Activate the audio file MultiFreq.mp3.
2. The loop driver input level should be set according to the manual and the field strength level adjusted to  $-12\text{dB}$ . Make sure that the output does NOT saturate, or clip.
3. Set the TONE (filter) switch to the FLAT position (6).
4. The RANGE switch should be set to HI position (7).
5. Hold the meter in a vertical position with the top at the listening height and measure the frequency response for 100kHz, 1kHz and 5kHz. The frequency response for 100Hz to 5kHz should be within the range  $\pm 3\text{dB}$  with reference to the response at 1kHz. If the deviation is larger, try to adjust the frequency response with the drivers MLC control, (refer to the driver's manual).
6. After any frequency adjustment(s), double-check that the loop driver delivers 400 mA/m (0dB) in program peaks, without clipping.

NOTE 2: It is not uncommon for certain locations within the area of a loop system to suffer poor background noise, frequency response or signal strength, due to the surrounding construction metal and layout of electrical services in a building. If the majority of the area covered by the loop gives satisfactory signal to noise ratio then the poor areas may be marked as not suitable for hearing aid users, as recommended by IEC 60118-4.

## Adjustment of field strength level (Field)

NOTE: Univox 1kHz\_pulse.wav or itu.wav test signal should be used for adjustment of field strength level. A continuous sine wave is not recommended since the loop driver's AGC might decrease the level.

1. Activate the audio file 1kHz\_pulse.wav.
2. Adjust the input level according to the driver's manual.
3. Set the TONE (filter) switch to the NORM position (8).
4. Set the RANGE switch to HI position (7).
5. Hold the meter in a vertical position and adjust the field strength level until 0dB (400mA/m) at the listening height is achieved. (A representative reference measurement position is midway between the center of the loop and the loop perimeter.)
6. Confirm that the field strength level does not vary more than  $\pm 3$ dB within the listening area.

## System commissioning

1. Connect the actual signal source/s, preferably speech, and adjust the input level according the loop driver's manual, (if the primary sound source is unavailable, haspeech.wav or itu.wav audio files can be used).
2. Set the TONE (filter) switch to the NORM position (8).
3. Set the RANGE switch to HI position (7).
4. Hold the meter in a vertical position at the listening height.
5. Measure the field strength and verify that the highest peak reaches 0dB (400mA/m) by observing the highest reading. Confirm that the field strength variation within the room is within  $\pm 3$ dB.
6. Check that the sound quality (clear sound with no distortion) is acceptable by listening to the sound of the loop through the monitor headphones at a comfortable volume.

## **Safety, Care and Maintenance**

Keep the unit away from heat sources such as radiators, heaters, or other appliances that produce heat.

Do not expose the unit to direct sunlight.

Do not use the unit near water.

Avoid objects or liquids getting into or onto the unit.

Clean only with a damp cloth. Do not use abrasive cleaners.

Do not remove screws from or open the unit casing. This will invalidate the calibration and any warranty.

Damage to hearing can occur with consistent exposure to high volume when using headphones. Always check the volume level before using headphones.

## **Calibration**

The unit is calibrated in three points, (-12dB, -6dB, and 0dB) to meet IEC6 60118-4 requirements. If measurement accuracy is critical the instrument should be recalibrated annually. Have the calibration rechecked if the instrument is dropped or otherwise damaged.

## **Batteries**

Press and slide battery cover to remove.

Orientate the battery as shown in the battery compartment molding. No harm will occur if the battery is reversed but the instrument will not work.

Rechargeable batteries are not recommended for infrequently used equipment due to self-discharge but can be used in the instrument. Operating life will be shorter from a rechargeable battery than from the alkaline battery.

Replace the battery as soon as convenient after the red range indicator(s) start to flash.

Switch off the meter when not in use to prolong the working life of the battery.

Remove the battery if not required for an extended period of time and remove an exhausted battery as soon as possible to prevent leakage.

Dispose of the old battery according to the local regulations.

## Specification

Power:	1 x PP3 9V alkaline
Current drain:	20-50mA
Battery life:	>10 hours
Indicating ranges:	-51 dB to -24dB and -24dB to +3dB with respect to 0.40A/m
Indicator style:	BBC/EBU Peak Program Meter (3ms attack, 650ms decay)
Resolution:	3dB
Absolute accuracy:	±0.5dB@0dB (400mA/m) and -27dB(18mA/m) reducing to ±1.5dB@-24dB(25mA/m) and -48dB(1.6mA/m)
Filter characteristics	NORM: -3dB@630Hz $\pm$ 5kHz FLAT: -3dB@40Hz $\pm$ 14Hz
Headphone monitor:	Max 2x19mW into 32ohms
Relevant standards:	EN 60118-4

## Environment



Please follow existing disposal regulations in your country. If you respect these instructions you ensure human health and environmental protection.



(Univox) Bo Edin AB  
Stockby Hantverksby 3,  
SE-181 75 Lidingö, Sweden

+46 (0)8 767 18 18  
info@edin.se  
www.univox.eu

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 **univox**  
BY EDIN