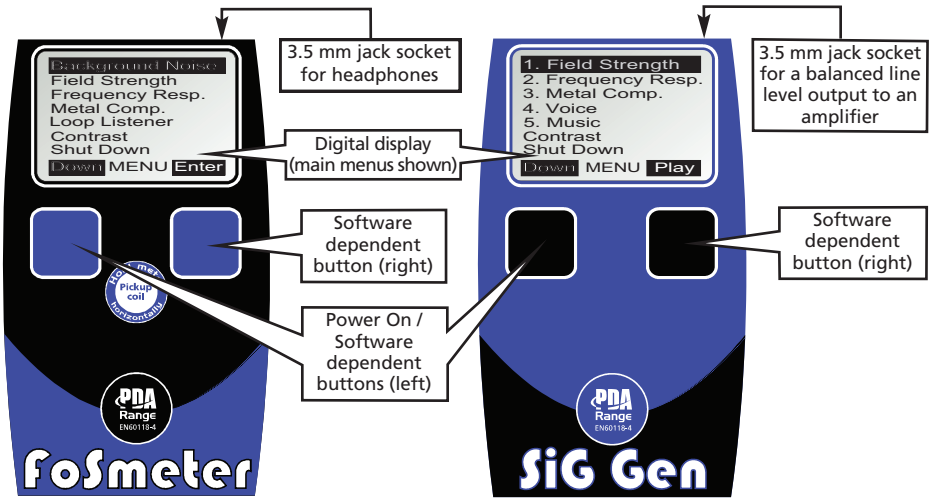
Instructions for the Fosmeter Pro (FPRO) and Audio Signal Generator (FPROSG)

FPRO: Induction Loop Tester & Loop Listener

FPROSG: Audio Signal Generator for PDA Range

Please read ALL of these instructions carefully before operating this equipment.



ITEMS SUPPLIED

Part No. FPROK1 (kit)

1 x Fosmeter Pro (FPRO)
1 x Audio Signal Generator (FPROSG)
2 x Protective pouch
1 x 32 ohm headphones (HEAD1) for FPRO
2 x 9 V battery
1 x User Instruction (Document No. DCM0004006), i.e. this document
1 x FPRO Calibration Certificate (Document No. DCM0004007)
1 x AFILS Test Certificate (Document No. DCM0004008)

IMPORTANT NOTE

These instructions are for competent persons only and detail the 400 mA/m Fosmeter Pro (FPRO) which is used to test an audio frequency induction loop system (AFILS) in accordance with EN 60118-4 (Magnetic field strength in audio frequency induction loop systems).

Additional items required (contact your distributor)

Amplifier and audio lead(s). **Note**: Different amplifiers require specific audio connection leads, refer to the table below for selection:

Amplifier Type	Lead Required	Lead Type
PDA102 (all variants) / MLK1K / PDA200E	AL3	3.5 mm jack to bare ended lead
Pro-Range	AL14	3.5 mm jack to XLRM lead

PRODUCT DESCRIPTION

The FPRO and FPROSG both assist with the set up and testing of an AFILS for compliance with EN 60118-4. They each have the following features:

- measures magnetic field strength, background noise, frequency response, metal compensation plus voice and music (FPRO only).
- a digital LCD; provides a user-friendly interface to simplify testing. Contrast controls and battery life indication are also provided (both FPRO & FPROSG).
- two 'soft' buttons; change their functions to suit the menu options being accessed (both FPRO & FPROSG).
- auto power-off feature; warns the user after 10 minutes of no buttons being pressed, then gives the user 30 seconds to shutdown the device, or postpone the event (both FPRO & FPROSG).
- 3.5 mm headphone jack socket; allows audible monitoring using (supplied) headphones (FPRO only).
- 3.5 mm jack socket; for balanced line level audio output (FPROSG only).
- test tones are provided to test magnetic field strength, frequency response and metal compensation, plus music and voice tracks to assist with subjective testing (FPROSG only).
- powered by a (supplied) 9V PP3 battery (both FPRO & FPROSG).

INTRODUCTION TO TESTING INDUCTION LOOPS

Induction loop systems require careful testing and calibration prior to operation. The most efficient way of doing this is to use the FPRO. The current standard EN 60118-4 recommends that the achievable magnetic field strength of an AFILS over a 'covered area' should be 400 mA/m at least at one point. The most effective way of ensuring this requirement is met is to measure the magnetic field strength of a consistent output from an AFILS amplifier using the FPRO.

TECHNICAL SPECIFICATION

The specification below applies to both the FPRO and FPROSG, unless stated.

Power			
Internal Battery	1 x 9 V PP3 battery (non-rechargeable)		
Quiescent Current	25 mA		
Battery Life	12 hours approx.		
Signal Processing			
Measurement	**Calibration (FPRO)**	**Measurement Scale (FPRO)**	**Frequency**
Magnetic Field Strength	400 mA/m (0 dB L) as per EN 60118-4	<-22 to >+8 dB L	1 kHz detection (FPRO) / Track 1 output (FPROSG)
Frequency Response	400 mA/m (0 dB L) as per EN 60118-4	<-22 to >+8 dB L	100 Hz / 1 kHz / 5 kHz detection (FPRO) / Track 2 output (FPROSG)
Background Noise (FPRO)	+/-1 dB L	<-42 to <-32 dB L	A-weighted detection
Metal Compensation	—	—	3rd octave band 1 kHz to 8 kHz (FPRO) / Track 3 output (FPROSG)
Physical			
Weight	145 g approx.		
Overall Dimensions	117 mm x 79 mm x 18.5 mm		
Socket (3.5 mm jack)	HEAD1 headphone output (FPRO) / Balanced line level output (FPROSG) - 1 V RMS		
Digital Display	LCD type (viewing area 50 mm diagonal)		
Environmental			
Ingress Protection	IP20		
Note: The units contain sensitive electronic equipment. They are designed for indoor use only and MUST NOT be subjected to conditions likely to affect their performance.			

OPERATION

FPRO's buttons

FPROSG's buttons

Pushbutton Controls

The FPRO's two blue and FPROSG's two black 'soft' buttons (shown above) change their functions depending on the menu option being accessed. The lower section of the digital display denotes the buttons' functions, which are listed in the table below.

Which Button	Display Shows	Function
Left	n/a	Switches on the unit (press & hold the button)
	Down	Scrolls vertically through the menu options (see examples Fig.1 & 2)
	+	Adjusts the display's contrast (see example Fig.2)
	Shut Down	Shuts down the unit (see examples Fig.3 & 4)
	Start	Starts a measurement test (FPRO only)
	Hold	Holds a measurement reading on the display (FPRO only)
	Sample	Restarts a measurement after a hold (FPRO only)
Right	Enter	Selects a menu option (see examples Fig.1 & 2)
	Exit	Returns to main menu (see example Fig.2)
	Prevent	Postpones the unit's auto shutdown (see example Fig.3)
	OK	Acknowledges a display message (see example Fig.4)
	Play	Plays a test track (FPROSG only)
	Stop	Stops a test track (FPROSG only)

Powering Up & Switching On

Slide off the battery cover on the back of the unit and insert the 9 V battery (supplied). Switch on the unit by pressing and holding its left button. The PDA logo is briefly displayed and then the unit's main menu.

Shutting Down

From the main menu, select the 'Shut Down' menu option (see Fig. 1).

Contrast Control

The contrast of the LCD can be changed between a value of 30 and 60. When the contrast reaches 60 the display rolls back to 30. The unit defaults to 45 when initially powered up.
From the main menu, select the 'Contrast' menu option (see Fig. 2). Press '+' button to set contrast level.

Fig.1

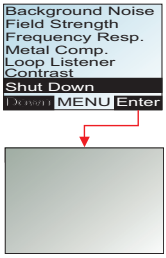
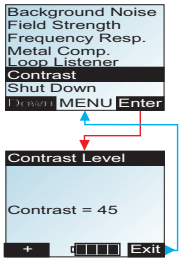


Fig.2



Auto Shutdown & Battery Check

Auto shutdown occurs if none of the unit's buttons are pressed for 10 minutes (see Fig.3). If 'Prevent' is selected, the display returns to the last used menu option.

A battery level check runs in the background and warns the user if the level is low (see Fig.4). If OK is pressed the unit will run for 5 more minutes before the user is warned again. **Note**: Always carry out testing using a good quality, long-life battery.

Fig.3

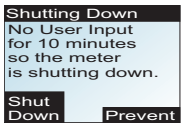
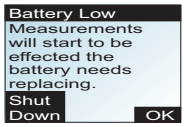


Fig.4



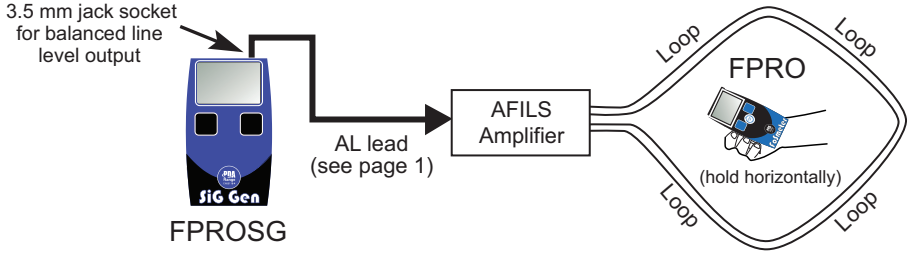
Orientation of the FPRO

The FPRO's pick up coil senses the magnetic field that hearing aids respond to when the unit is held in a horizontal position.
Note: The FPRO can be read with its digital display facing up or down in a horizontal plane.

TESTING TO EN 60118-4

Test Equipment Set Up

1. Connect an audio source, e.g. the FPROSG, to a suitable balanced line input at the AFILS amplifier using an AL test lead (see diagram below). **Note**: Suitable AL leads are listed on page 1.



2. Switch on the amplifier and adjust the input signal control and loop drive current in accordance with the amplifier's manual.

Background Noise & System Noise Measurements

This test is designed to ensure that background and system noise levels of the site / system do not affect the intelligibility of the system in the covered area. Noise levels are measured by the FPRO and categorised as acceptable, tolerable or too high in accordance with EN 60118-4.

Background noise measurements should be taken **before** the AFILS is installed. Check if background noise levels in the covered area are acceptable for an AFILS to be installed.

System noise measurements should be taken a**fter** the AFILS is installed. With the amplifier switched on, all inputs muted, and other services switched off, check if background noise levels in the covered area are acceptable.

1. Power up the FPRO.

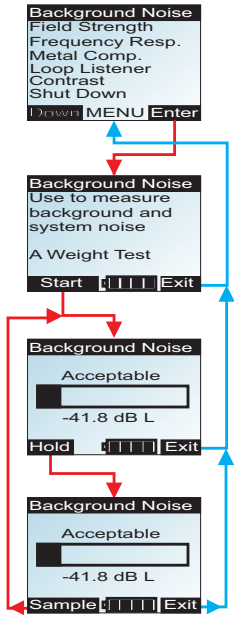
2. From the FPRO's main menu, select 'Background Noise' menu option (see right).

3. Walk around the covered area and check good readings are achieved.

Acceptable results: >-42 dB L to <-32 dB L
Tolerable results: >-32 dB L to <-22 dB L
Too High: >-22 dB L (Bar will max out at -22 dB L)

4. Take readings and record the results on the AFILS Test Certificate.

5. Carry out further checks at random within the covered area to confirm that the background noise is acceptable.



Magnetic Field Strength Measurement

This test is designed to ensure the loop signal provides sufficient volume without distortion in the covered area. The FPRO detects a pulsed 1 kHz signal in accordance with EN 60118-4 and is calibrated at 400 mA/m (i.e. 0 dB L).

1. Set up the test equipment and power up the FPRO, FPROSG and amplifier.

2. From the FPROSG's main menu, select and play 'Field Strength' (track 1) menu option.

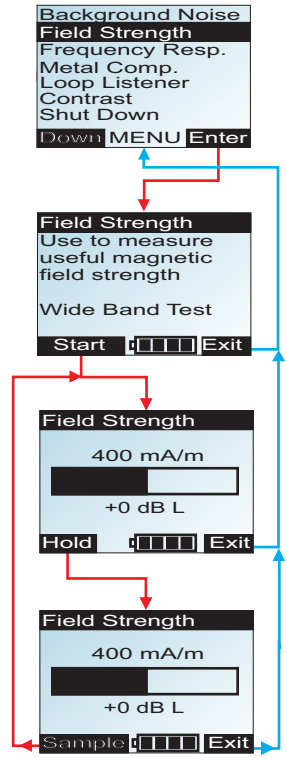
3. From the FPRO's main menu, select 'Field Strength' menu option (see right).

4. Walk around the covered area and check that 400 mA/m (0 dB L) is achieved*, ideally at a typical listening height of 1.2 m to 1.8 m and in centre of the loop, but anywhere in the area covered by the loop is acceptable.

5. If this cannot be achieved, adjust the 'Gain' or 'Drive Control' on the amplifier until the reading displayed on the FPRO is (highest peak) 400 mA/m = 0 dB L.

6. Take readings and record the results on the AFILS Test Certificate.

7. Carry out further checks at random within the covered area to confirm that the field strength is acceptable.



***Note**: 400 mA/m (0 dB L) is the value the AFILS must be able to produce in the usable magnetic volume to comply with EN 60118-4, but the output only needs to be 100 mA/m (-12 dB L). BS 7594:2011, clause 10 A3 (Perimeter Loops) states the field variation can be up to 6 dB L across the useful magnetic field volume, hence provided 400 mA/m (0 dB L) is achievable anywhere else in the volume of coverage, the field strength can be as low as -6 dB L (200 mA/m) elsewhere.*

Final commissioning of the system also needs to consider EN 60118-4, clause 6.4.2 (NOTE 2). This states that because the field strength varies from place to place it is bound to be equal to the required value at some places, more at others and less elsewhere. The subjective loudness also depends on the volume control settings of the hearing aid, which are not under the manufacturer's or installer's control. It is therefore inappropriate to make a specific value of field strength mandatory, when there is a consensus that a change of the field strength should be made.

Frequency Response Measurement

This test is designed to ensure good speech intelligibility in the covered area. The FPRO detects 100 Hz, 1 kHz and 5 kHz frequencies in accordance with EN 60118-4 and presents the results in the style of an easy-to-read bar graph. (EN 60118-4 recommends this test is done at levels of -10 dB L.)

1. Set up the test equipment and power up the FPRO, FPROSG and amplifier.

2. From the FPROSG's main menu, select and play 'Frequency Resp.' (track 2) menu option.

3. From the FPRO's main menu, select 'Frequency Resp.' menu option (see right).

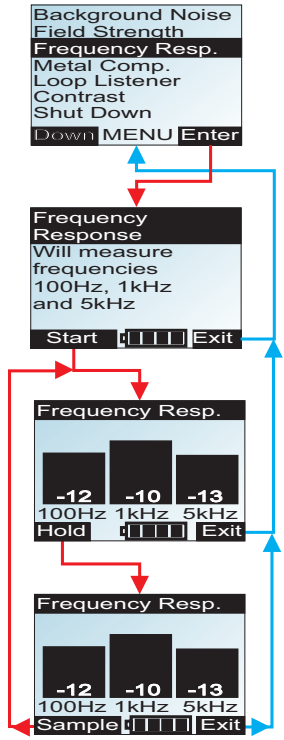
4. Walk around the covered area and check good readings are achieved.

Acceptable results: +/-3 dB L from a 1 kHz reference level

5. If good readings cannot be achieved, adjust the 'Metal Compensation' control on the amplifier (if fitted) until optimum readings are displayed, i.e. the bar readings are as near as possible to being levelled.

6. Take readings and record the results on the AFILS Test Certificate.

7. Carry out further checks at random within the covered area to confirm that the frequency response is acceptable.



Metal Compensation Measurement

This test is above and beyond the scope of EN 60118-4 and is designed to ensure losses due to building structure and furnishings do not cause poor signal quality at high audio frequencies. The FPRO measures frequencies 1 kHz through 8 kHz for use with amplifiers capable of metal compensation functions. Levels of -10 dB L are suitable for this test.

1. Set up the test equipment and power up the FPRO, FPROSG and amplifier.

2. From FPROSG's main menu, select and play 'Metal Comp.' (track 3) menu option.

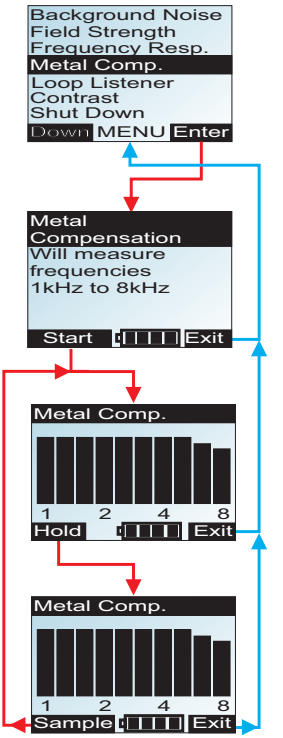
3. From the FPRO's main menu, select 'Metal Comp.' menu option (see right).

4. Walk around the covered area and check good readings are achieved. Record the results on the AFILS Test Certificate.

Acceptable results: Bar readings are levelled out

5. If good readings cannot be achieved, adjust the 'Metal Compensation' control on the amplifier (if fitted) until optimum readings are displayed, i.e. the bar readings are as near as possible to being levelled out.

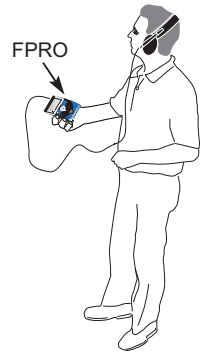
6. Carry out further checks at random within the covered area to confirm that the metal compensation is acceptable.



Subjective / Loop Listening Tests

WARNING: Ensure headphones are connected to the FPRO when performing subjective / loop listening tests. Using other modes may result in an increased volume output. DO NOT connect headphones to the FPROSG.

This test is designed to ensure hearing aid users receive an undistorted and clear signal in the covered area from the system's actual inputs (microphones, music sources, etc.). The voice and music tracks provided on the FPROSG can assist with subjective testing, if required.



Note: *The installation of an AFILS is performed with the purpose of improving a service for the hearing impaired. Therefore, it is recommended that hearing-aid users should be present when the loop system is initially commissioned to confirm that measurements taken reflect subjective tests. It is the opinion of these day-to-day users that should ultimately determine the output level of the system.*

1. Activate the system's actual input(s).

Note: If the system's actual inputs are <u>not</u> available, as an alternative, the FPROSG provides both 'Voice' (track 4) and 'Music' (track 5) menu options.

2. Power up the FPRO and connect the HEAD1 headphones to the FPRO's 3.5 mm jack socket.

3. From the FPRO's main menu, select 'Loop Listener' menu option (see right).

4. Walk around the covered area and check clear audio signals are achieved. Record the results on the AFILS Test Certificate.

5. If possible, confirm the audio signals are acceptable to actual hearing-aid users.