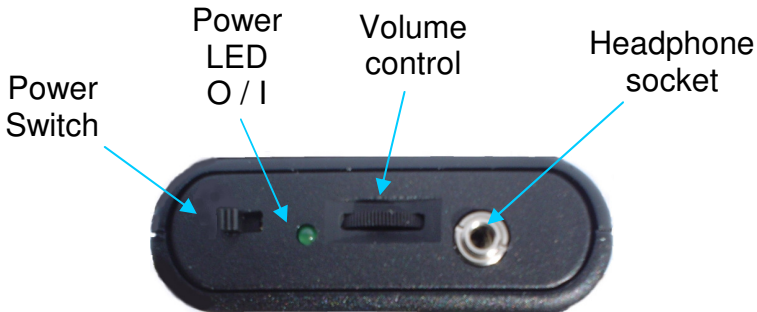


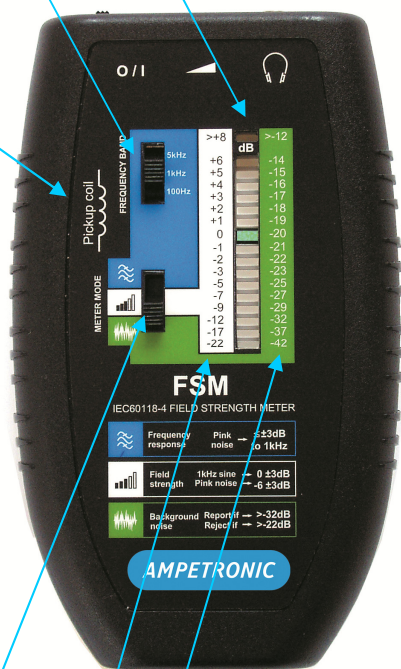
OVERVIEW OF UNIT



Frequency Band Switch

Overload indication

Pick-up coil



Meter mode scales in dB relative to 0.4A/m

Field strength



Background noise



>+8

> 12

6
5
4
3
2
1
0
-1
-2
-3
-5
-7
-9
-12
17
22

-14
-15
-16
-17
-18
-19
20
-21
-22
-23
-25
-27
-29
-32
37
42

Meter Mode Switch

Meter Mode Scales - See table on right for details


Frequency response



Absolute level is not important, only relative levels between frequency bands

OPERATION OF UNIT

Batteries and power-up

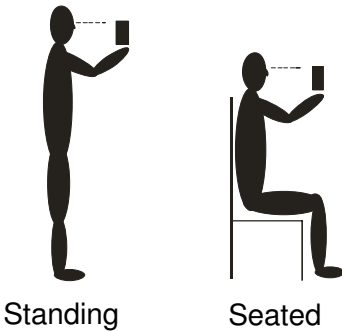
 Remove battery cover the on back of the FSM. Unwrap and insert batteries into the unit ensuring correct polarity is observed. Replace battery cover.

Set the power switch to the ON (I) position and check the green power LED next to it is illuminated. Note: As the unit is switched on the front panel meter will briefly illuminate before settling to a measurement.

Batteries should not be exposed to heat, sunshine or fire

Method of use

For most applications it is the vertical component of the magnetic field that is received by the hearing aid, as a result the FSM is designed to be used while held vertically as shown:



Standing or seated depending on system use.

Typically:




1.2m for seated persons

1.7m for standing adults

Beyond this there is a range of use that must be considered - see **Test commissioning procedure** part 1 'Volume of use' for further details.

Mode selection

All modes measure Audio frequency magnetic fields using the internal pickup coil

Meter Mode	Reference	Filtering	Signal
 Frequency response	Compare levels between bands	1/3 Octave bands of 100Hz, 1kHz & 5kHz	Pink noise
 Field strength	0dB or 400mA/m	Flat 50Hz to 8kHz	Any
 Background noise	-20dB or 40mA/m	A-weighted	System off

Frequency Selection

Switch between one of the three 1/3 octave band filters when in Frequency response mode. While running pink noise, use the 1dB increment range of the scale to see how the 100Hz, and 5kHz levels compare with 1kHz.

Headphones and volume adjustment

Insert the headphones into the socket on the top panel of the unit, and adjust the

volume using the adjacent thumbwheel.

For maximum flexibility, the signal heard in the headphones is post filter. This provides re-assurance that the correct measurement is being made, and can help with diagnosis of any problems.

Note: Headphones will be muted when $>+8\text{dB}$ / $>-12\text{dB}$ LED illuminates.

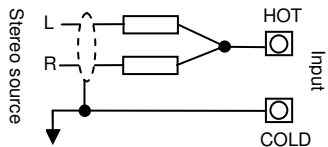
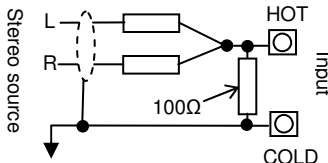
SIGNAL CABLES

In order to test / commission an induction loop system using the recommended test signals you will need to interface an audio source to an appropriate input of the system.

Most portable audio source playback devices will have a headphone output which can be used, and other equipment is likely to have a pair of phono outputs. Either way, care must be taken when feeding into a mono (single channel) input that both left and right stereo signals are summed / scaled correctly using appropriate resistors. The table below should provide a solution to the majority of inputs, but if in doubt contact Ampetronic for advice at support@ampetronic.co

These connections can be made using Ampetronic SCC (Signal Connection Cables) a kit of cables facilitating connection of most audio systems to most induction loop systems. Please contact Ampetronic or consult www.ampetronic.co for details.

Input type	Connector, pins & wiring		Connection requirements
Electret microphone i/p	2-pole jack	Tip	Hot
		Sleeve	Cold
Balanced microphone i/p (phantom power off)	XLR	X pin 1	Cold
		L pin 2	Hot
		R pin 3	Cold
Unbalanced line level i/p (mono)	2-pole jack	Tip	Hot
		Sleeve	Cold
Balanced line level i/p (mono)	3-pole jack	Tip	Hot
		Ring	Cold
		Sleeve	Cold
Low Z speaker i/p	Bare wire termination	Polarity is not important for floating inputs.	
Unbalanced line level i/p (stereo)	Twin phono	Left and Right have a separate cable each.	
100V speaker i/p	N/A		A CD player cannot produce these levels, and the best solution is to feed into the speaker system itself.



Note: It is possible to test a system by connecting only one channel (left or right) of the audio source to the equipment. This will not be a problem with the FSM test signals as both channels (Left and Right) are identical.

6 Overspill

PURPOSE – check that no magnetic spill exists that could interfere with a neighbouring loop system, above, below or to the side of this system, or cause a potential breach of confidentiality. This step is only required if there are neighbouring systems (within 4 x loop width distance) or there are confidentiality requirements.

*If **Overspill** analysis is not required - Go to step 7 **System use**.*

- Determine areas in which the spill of the system needs to be controlled – either for compatible operation with another system, or for confidentiality. Define points for measurement outside the room and mark them on the system sketch on the Certificate of Conformity (e.g. points G-K).

Note: Detailed architects drawings may be required in order to define the measuring positions for spill.



- Survey background noise in these positions with all loop systems turned off. This needs to be done to ensure that the spill measurements are not influenced by other factors.
- Switch on loop system, and using the combination signal (Test Signal track 1) take a reading at each of the overspill measurement points (G-K). Ensure areas in which spill needs to be controlled read less than -40dB during the burst of the sine-wave signal. Ensure the pick up coil is orientated the same as the hearing aid telecoil – usually vertical.
- Alternative method:



- This test can also be performed in the frequency response mode (set to 1kHz), using the combination signal. The measurements should be taken outside the loop in the area where spill needs to be controlled - during the sine bursts.

This method does provide better rejection of the background noise signal due to the sharp filtering in this mode, but unfortunately the levels shown by the meter do not tally with either scale.

In this mode the central green 0dB (-20dB) reference LED will illuminate with a -15dB signal re: 400mA/m; i.e. to take a measurement deduct 15dB from the white scale (Field strength mode) reading.

- For more detailed analysis of spill and noise issues, the use of more comprehensive audio test kit may well be required such as an NTI Minilyzer and Ampetronic CMR3 probe.

7 System use

PURPOSE – check that the system is delivering a useable, undistorted comfortable sound when received through a hearing aid or listening device.

- Set up the loop system inputs as they will be used, with actual input devices and actual programme signal from the venue e.g. audio feed from PA, or microphone. System problems such as hum or HF oscillation warrant a full investigation – see **TROUBLESHOOTING**.
- Ensure the programme signal activates the compression on the loop driver. If not, adjust input gain until compression is achieved.
- Use the FSM in 'Field strength' mode to check the room for levels, and signal quality. Ensure the pick up coil is orientated the same as the hearing aid telecoil – usually vertical.
- Record levels at each measurement point. The reading is the *maximum* LED illuminated over a 60 second period. Readings should be between -9dB and 0dB throughout the volume depending on programme material, and field pattern. It should not be necessary to make any adjustment to the system for this test.
- Ideally, hearing aid users should be present to listen to the system. Care must be taken to ensure that the hearing aids are set correctly for telecoil use. Alternatively a loop listener can be used (such as the headphone output of the FSM, or the Ampetronic ILR3). The system should be observed for signal strength, intelligibility, distortion and overall quality.

It can be useful to mark the FSM thumbwheel in a position where a comfortable listening level is achieved with a given set of headphones. This provides an objective reference when evaluating systems and background noise characteristics.



TROUBLESHOOTING

POWER LED not illuminated

Check that the power switch is toggled to the ON (I) position.



Check the batteries are inserted the right way round.

Try new batteries – the LED is designed to be extinguished when batteries are low, and the unit is then un-calibrated.

No Headphone signal

Check the FSM switched ON

Check the headphones are plugged in, and the volume control is turned up.

Check the $>+8\text{dB}$ / $>-12\text{dB}$ LED is not illuminated – the headphones are automatically disabled when this LED is illuminated to protect the user.

$>+8\text{dB}$ / $>-12\text{dB}$, and $+6\text{dB}$ / -14dB LED is illuminated

The last red $>+8\text{dB}$ / -12dB LED indicates that the maximum level of signal in the respective mode has been achieved. Normal testing should not illuminate this LED; it should be seen as an overload condition.

Main LED meter is not illuminated.

Switch the unit OFF, and ON again. On power-up the meter should briefly light a few LEDs. If there is no audio frequency magnetic field present when switched on, there will be no meter LEDs illuminated.

Check AFILS is switched on and running current into the loop.

Check the power LED is illuminated

Low magnetic field strength

Check the loop system is running current.

Due to insufficient CURRENT or excessive metal loss. The application may require a special loop design to achieve acceptable performance, contact Ampetronic for advice.

AFILS loop driver not running current

Check the COMPRESSION LEDs are illuminating.

Check that the CURRENT control is turned up sufficiently.

Check that the LOOP ERROR, or OVERHEAT LEDs are not illuminated.

Switch the unit off and turn back on.

Consult the loop driver's installation handbook.

Background noise

Check all loop systems are switched off / not running any current.

If the interference is still present with the loop system switched off, then you need to locate and eliminate the source of the interference before switching the loop system back on. Monitor with headphones whilst switching other electrical systems such as power, lighting etc ON and OFF

Interference in other systems

Magnetic fields can induce currents into any low impedance electrical path or loop. Audio or video systems with poorly designed or multiple earths may experience pick up of the loop signal.

The loop signal may appear as jagged lines or hum bars on a CCTV picture. This may be due to the CCTV (low impedance unbalanced 2-wire circuit) cables running in close proximity to the loop cable.

Remote (and apparently unconnected) PA systems can sometimes pick up loop signals. Always run long audio signal cables as 3-wire balanced circuits and keep away from loop cables. If in doubt, contact Ampetronic for advice.

TECHNICAL SPECIFICATIONS

POWER

Internal batteries	2 x AA / LR6 / AM-3
Range of operation	1.8V to 3.2V overall DC
Power	0.15W
Battery Life	Up to 100hrs depending on use, >40hrs typical

SIGNAL PROCESSING

<i>Meter Mode</i>	<i>Gain</i>	<i>Measurement scale</i>	<i>Frequency Response</i>
Frequency Response	0.071A/m (-15dB)	Measure difference between bands	1/3 Octave at 100Hz, 1kHz or 5kHz
Field Strength	0.400 A/m (0dB) as per IEC60118-4	-22dB to +8dB	Flat / unweighted 50Hz to 8kHz ± 0.25 dB
Background Noise	0.040 A/m (-20dB) reference	-42dB to -12dB	A-weighted

All measurement modes are true RMS 125ms detection. The FSM is defined as a Class 2, Type 2 meter according to IEC60118-4 and IEC61672-1 (where relevant). Overall gain change <0.5dB

OUTPUTS

Headphone socket	3.5mm stereo jack connector. 16 Ω min (32 Ω per side - outputs parallel) Maximum cable length 3m
Meter display	Colour coded flying spot LED
Power LED	Indicates unit is ON and calibrated

PHYSICAL

Weight	150 g (excluding batteries)
Dimensions	84 x 140 x 27 mm

ENVIRONMENTAL

Ingress Protection	IP20
Operating temperature range	-10 to 45 $^{\circ}$ C
Relative humidity	10 to 85% Non condensing

ACCESSORIES

SCC - Signal Connection Cables – A kit of cables for interfacing audio sources to inputs of induction loop systems

Details of all products and services provided by Ampetronic can be found at our website: www.ampetronic.co

WARRANTY & CALIBRATION

This product carries a five year parts and labour warranty from date of shipment from Ampetronic. To qualify for the five year warranty, the product must be registered at www.ampetronic.co (products/warranty), without which the warranty will be valid for two years only. The warranty could be invalidated if the instructions in this handbook are not followed correctly, or if the unit is misused in any way.

The FSM is calibrated during manufacturing test, and is valid until one year from the date the equipment leaves Ampetronic. Initial re-calibration is recommended one year from this date. This period may be extended if no adjustments are necessary.

DECLARATION OF CONFORMITY

Manufacturer: Ampetronic Ltd.

Unit 2, Trentside Business Village
Farndon Road
Newark
NG24 4XB

Declares that the product:

Description: Field Strength Meter
Type name: FSM







Conforms to the following Directive(s) and Norm(s):

Directive 2004/108/EC
EMC: EN55103-1 : 2009 Emission
EN55103-2 : 2009 Immunity

Directive 2006/95/EC
Safety: EN 60065: 2002+A12:2011
Directive 2011/65/EU RoHS

Date: February 2014, J.R. Pieters, Managing Director, Ampetronic Ltd.

BASIC COMMISSIONING PROCEDURE

AFILS Commissioning Procedure for Ampetronic FSM to IEC 60118-4:2006					
Step		Audio input	FSM settings	Adjustments	Performance requirements
1	Volume of use	SYSTEM OFF	METER OFF	n/a	Determine volume of use Sketch Layout
2	Background Noise	SYSTEM OFF		Sources of magnetic noise	< -22dB essential < -32dB acceptable
3	Field Strength (1)	Track 1: COMBINATION *		Loop current	-3 to +3dB peaks
4	Frequency Response	Track 2: PINK NOISE		MLC / tone control	-3 to +3dB peaks compared to 1kHz
5	Field Strength (2)	Track 1: COMBINATION *		Loop current	-3 to +3dB peaks
6	Overspill (if required)	Track 1: COMBINATION		n/a	< -42dB (OFF SCALE)
7	System use	ACTUAL SIGNALS		Input gain	-9 to 0dB peaks Subjective -> OK

TEST SIGNAL TRACK LISTING to download these signals go to www.ampetronic.com/signals

Track 1: COMBINATION (2 mins) Pink noise with 1s bursts of 1kHz Sine

Track 2: PINK NOISE (2 mins) Bandlimited as per IEC60118-4

Track 3: 1kHz SINE (1 min)

Contact information

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Tel: +44 (0) 1636 610062