

## SOFT MAGNETIC MATERIALS

# AMH SERIES

The AMH Permeameters are automatic measuring systems to characterize rings and strips in DC and AC conditions. Laboratorio Elettrofisico manufactures a complete line for soft magnetic materials for DC up to 1 MHz.

# AMH SERIES

## SOFT MAGNETIC MATERIALS

### DESCRIPTION

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#### Characterize rings and strips at high solution in DC and AC

DC measurement provides analysis for the intrinsic and static properties. The AC measurement offers analysis for the behavior of the materials under dynamic conditions. Dynamic properties are affected by many factors depending on the particular application conditions.

Laboratorio Elettrofisico AC permeameter provides the designer with realistic characteristics of power losses, saturation field and induction performance relating to thickness of the material and the electrical resistivity.

### KEY BENEFITS

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- Remanence  $B_r$ , coercivity  $H_c$ , saturations values  $H_{sat}$ ,  $B_{sat}$ , cycle area, relative permeability, losses, losses separation, etc
- **All DC/AC AMH meet the International Standards IEC 60404-2, IEC 60404-4, IEC 60404-6, IEC 60404-10 and Analogue ASTM standards**
- Automatic measurement of complete DC or AC hysteresis loop, normal magnetization curve, permeability curve
- The measuring cycle is fully automatic and is controlled by Laboratorio Elettrofisico exclusive software (Neon), resulting in complete characterization of the material under test

### STANDARD CONFIGURATION

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The main cabinet containing:

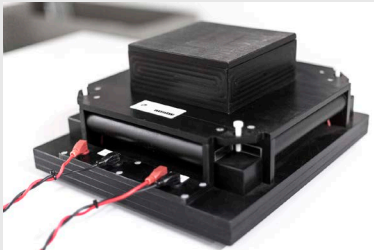
- Fluxmeter
- Arbitrary Function Generator
- Power amplifier
- Fast Acquisition Unit
- Reference sample for day-to-day control
- Dedicated software Neon
- PC and printer
- Connection tool for ring sample

# AMH SERIES ACCESSORIES

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## EF-LF-0.4K EPSTEIN FRAME TEST SET - LOW FREQUENCIES

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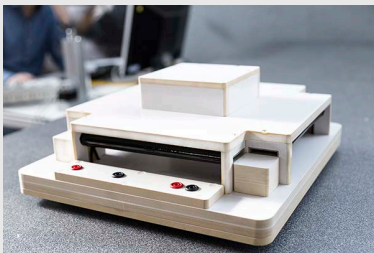


The EF-LF Epstein Frame Test Set is a 25 cm Epstein Frame designed for the magnetic characterization of electrical steel strip in accordance with IEC 60404-2, ASTM A343 and A348 test methods. When used in conjunction with one AMH-series, power losses and magnetizing characteristics at commercial frequencies can be measured by the means of a stack of rectangular strip specimens.

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## EF-MF-10K EPSTEIN FRAME TEST SET - MEDIUM FREQUENCIES

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The EF-MF Epstein Frame is a 25 cm Epstein Frame designed for the magnetic characterization of electrical steel strip in the frequency range 400 Hz to 10 kHz, in accordance with IEC 60404-10 standard. Used in conjunction with one AMH-series, the magnetic characteristics and power losses can be measured by the means of a stack of rectangular strip specimens.

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## ST-100 SINGLE STRIP TEST FIXTURE

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The Single Strip Test Fixture (ST-100) is used to characterize the magnetic properties of materials in accordance with ASTM A804 (standard test methods for alternating magnetic properties of materials at power frequencies using sheet type test specifications). The Single Strip Test is a relative test and should be correlated with Epstein Frame data if absolute measurements are required. If the Epstein Frame is used, the strips need to be cut the required size for the Epstein Frame.

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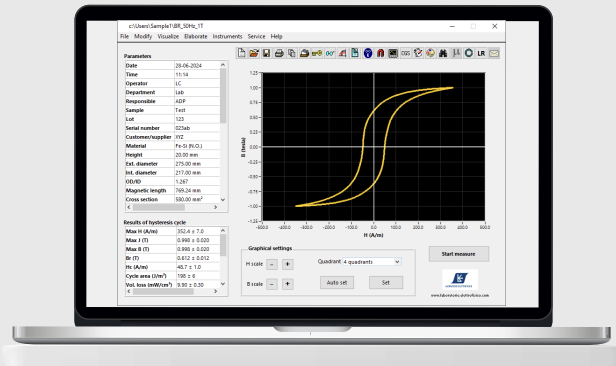
## RC-50-60-5 LF/HF Ring-coil

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Ring coils (RC) are used to measure ring specimens without the necessity to wind turns on them. A ring coil consists basically of an open multipolar connector, in which its pins are connected to give NH excitation turns and NB measuring turns when closed. Ring coils are usually tailored on specific sizes, materials, frequencies, levels, since different measuring conditions require different NH and NB values. Most of the ring coils can be used in a wide range of measuring conditions.

# AMH SERIES SOFTWARE NEON



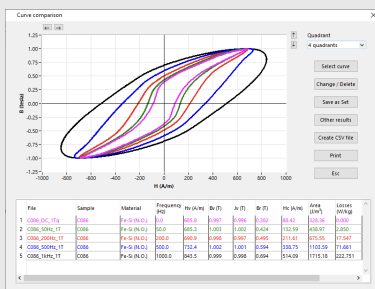
Main panel



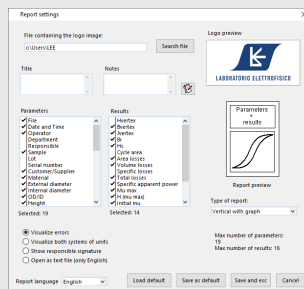
Losses evaluation with Steinmetz model

Our proprietary Neon software automatically manages measurements for the AMH, including comparison of different curves and statistical analysis. The software helps ensure the measuring process is accurate and absolute and helps prevent improper setting of the sample's parameters.

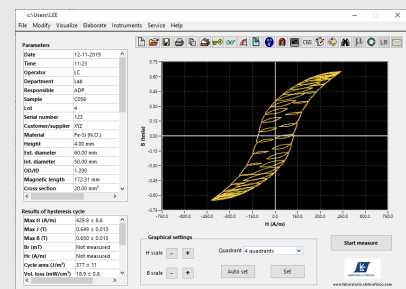
The Automatic Assistant notifies the operator and makes suggestion for the appropriate procedures or settings. The software also provides automatic creation for printing reports, database search feature and curve comparison.



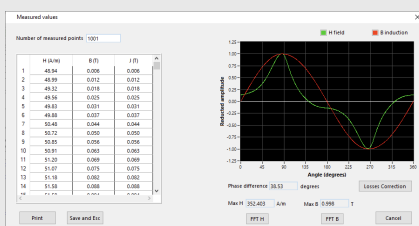
Losses separation with Bertotti's model



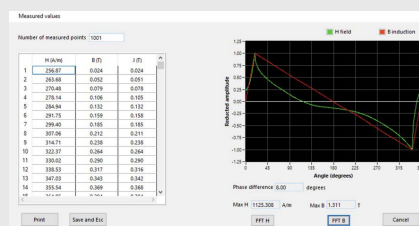
Automatic report setting, with multiple languages choice



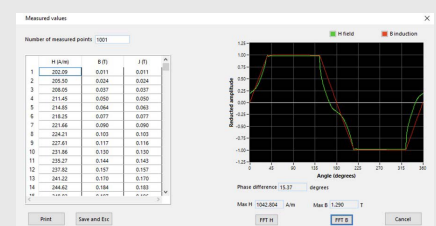
PWM waveforms



B waveforms: sinusoidal



B waveforms: triangular



B waveforms: trapezoidal

# AMH SERIES SOFTWARE NEON

## KEY BENEFITS

### TYPE OF MEASUREMENT

- Hysteresis loop, normal magnetization curve and relative permeability, in DC and AC conditions
- Sinusoidal B and sinusoidal H
- Optional: trapezoidal, triangular, PWM waveform
- Demagnetization of the sample
- Optional: anhysteretic

### SETTING OF MEASURING PARAMETERS

- Manual or automatic settings of magnetizing and demagnetizing field, speed, resolutions and many other parameters
- Setting of acceptance limit for direct quality control

### RESULTS

- Hsat, Bsat, Jsat, Br, Hc, loop area, realitive permeability, specific power losses, losses separation, Steinmetz coefficient and many advanced results
- Magnetic units in SI and CGS, measures in mm and inches, temperature in °C and °F

### DATA ELABORATION

- Curve comparison
- Curve's interpolation, automatic or using a mathematical function from a list
- Automatic control of the Fluxmeter
- Merging of different curves

### PRINTING A REPORT

- 3 pre-set reports with different sizes and contents
- Customized report option for charging the information and the language between English and Italian
- The report can be opened and saved with other word processor programs, like Microsoft Word™

### DATA BASE AND FILE SEARCHING

- Data base of measuring files with fast search options, ordering, selection, etc.
- Compability with other spreadsheet programs, such as Microsoft Excel™

### PROTECTION

- Password protection for restricting access according to selected parameters

### SET OF MEASURES

- Ability to group together different measurements in the same graph. The software recognizes the group type and provides additional results such as losses separation and determination of Steinmetz coefficients

# AMH SERIES DIMENSIONS

## AMH-200K-S

### Size

- L 543 x W 710 x H 543 mm
- L 21" x W 28" x H 21"

### Weight

- 80 kg / 176 lb



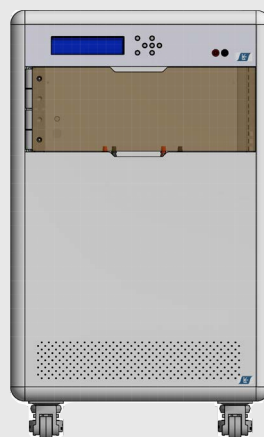
## AMH-50K-S

### Size

- L 543 x W 830 x H 889 mm
- L 21" x W 32.6" x H 35"

### Weight

- 160 kg / 352 lb



## AMH-1M-S

### Size

- L 543 x W 710 x H 514 mm
- L 21" x W 28" x H 20"

### Weight

- 50 kg / 110 lb



# ACCESSORIES SPECIFICATIONS

	EF - LF - 0.4K	EF - MF - 10K
FREQUENCY RANGE	DC - 400 Hz	400-10.000 Hz
MAGNETIC COMPENSATION	Yes	Yes
MAXIMUM CURRENT	10 A peak	3 A peak
MAXIMUM H FIELD	7500 A/m (95 Oe)	640 A/m (8 Oe)
EFFECTIVE LENGTH OF MAGNETIC PATH	0,94	0,94
URNS ON PRIMARY WINDING $N_H$	700	200
URNS ON SECONDARY WINDING $N_B$	700	200
RECOMMENDED DIMENSIONS (STRIPS)	30 x 280 mm (thick. 0,05-0,5 mm)	30 x 280 mm (thick. 0,05-0,5 mm)
DIMENSIONS OF MEASURING CHAMBER	32 x 10 mm	32 x 5 mm
OVERALL DIMENSIONS	360 x 326 x 166 mm	360 x 326 x 139 mm
WEIGHT	10 kg	7 kg

	ST - 100
FREQUENCY RANGE	DC - 400 Hz
MAX SAMPLE CROSS SECTION	45 x 0,8 mm
MINIMUM SAMPLE LENGHT	160 mm
MAXIMUM H FIELD	9000 A/m (110 Oe)
MAGNETIC COMPENSATION	Yes
OVERALL DIMENSIONS	186 x 106 x 162 mm
WEIGHT	5 kg

	RC - 50 - 60 - 5 - LF	RC - 50 - 60 - 5 - HF
MODEL	DC	DC ( recom. 1 kHz)
MIN FREQUENCY	1 kHz	20 kHz
MAX FREQUENCY	49 mm	49 mm
MIN I.D. OF SAMPLE	80 mm	80 mm
MAX O.D. OF SAMPLE	10 mm	10 mm
MAX CURRENT	13 A (peak)	13 A (peak)
$N_H$	28	20
$N_B$	9	6

# TECHNICAL SPECIFICATIONS 1/2

## GENERAL

FREQUENCY RANGE

MAX POWER

MEASURABLE MATERIALS

MEASURABLE QUANTITIES

MEASURBLE SHAPES

SAMPLE SIZE RING

SAMPLE SIZE STRIP (EPSTEIN)

TYPICAL ACCURACY RING

TYPICAL ACCURACY STRIP

TEST TIME

OPERATING T RANGE

## AMH-200K-S

DC ÷ 200 kHz

2200 VA peak

## AMH-50K-S

DC ÷ 50 kHz

6600 VA peak

## AMH-1M-S

DC ÷ 1 MHz

450 VA peak

Soft Magnetic Materials

Bsat, Jsat, Hsat, Br, Hc, cycle area,  $\mu_{rel}$ , specific losses P, losses separation

Ring, strip (with optional Epstein frame)

No physical limitation (size affects the max H field)

30 mm x 300 (multiple of 4)

Bsat, Br:  $\pm 1\%$ ; Hsat; Hc:  $\pm 1$ ,  $\mu_r$ :  $\pm 2\%$ ; Losses:  $\pm 3\%$

Bsat, Br:  $\pm 1\%$ ; Hsat; Hc:  $\pm 1$ ,  $\mu_r$ :  $\pm 2\%$ ; Losses:  $\pm 3\%$

60 - 180 seconds (typical)

15 ÷ 40 °C

## ACQUISITION

### UNIT

ADC RESOLUTION

SAMPLING RATE

MAX VOLTAGE RANGE

10 up to 16 bit

2,5 GS/s

$\pm 20$  V

10 up to 16 bit

2,5 GS/s

$\pm 20$  V

10 up to 16 bit

2,5 GS/s

$\pm 20$  V

## FUNCTION

### GENERATOR

FREQUENCY

VOLTAGE AMPLITUDE

AMPLITUDE RESOLUTION

THD

1  $\mu$ Hz to 20 MHz (1  $\mu$ Hz resolution) max measuring frequency is limited by acquisition unit

20 mVpp to 20 Vpp (4 digit resolution)

16 bits

<0.04%



# TECHNICAL SPECIFICATIONS 2/2

## FLUXMETER

### AMH-200K-S

### AMH-50K-S

### AMH-1M-S

MODEL

Digital Flux

RANGES

(1, 2, 5, 10, 20, 50, 100) x 2000  $\mu$ Wb

RESOLUTION

from 1  $\mu$ Wb (range 1) to 100  $\mu$ Wb (range 100)

ACCURACY

$\pm 0.5\%$

DRIFT

Less than 1 digit/minute

## PC AND

## SOFTWARE

OPERATING SYSTEM

Windows

SOFTWARE

Neon (English or Italian)

CONNECTION

LAN

## MAIN CABINET

POWER SUPPLY

220 Vac 50/60 Hz, 16 A absorption

(380 Vac 3 phase + neutral + ground, 50/60 Hz, 32 A absorption AMH-50K-S only)



## CONTACT US

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