

FRAX Series

Sweep frequency response analysers

Megger[®]



- **Highest accuracy in the industry.**
- **High dynamic range to cover all your testing needs**
- **Fulfills international standards for SFRA measurements**
- **Advanced analysis and decision support built into the software. FRAX 150 with built in PC and touchscreen**
- **Imports data from other FRA test sets**
- **Wireless communication (FRAX 101)**
- **Battery operated (optional FRAX 99 and FRAX 101)**
- **Continuity control of ground connections (FRAX 101 and 150)**

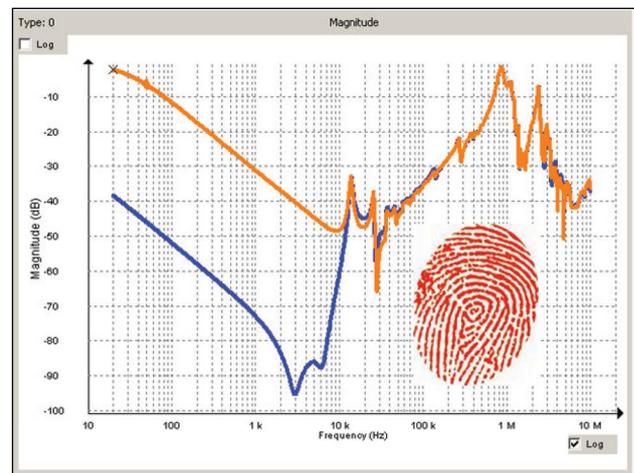
DESCRIPTION

Power transformers are some of the most vital components in today's transmission and distribution infrastructure. Transformer failures cost enormous amounts of money in unexpected outages and unscheduled maintenance. It is important to avoid these failures and make testing and diagnostics reliable and efficient.

The FRAX series of sweep frequency response analyzers (SFRA) detects mechanical and electrical changes of the core and winding assembly of power transformers. Major utilities and service companies have used the FRA method for more than a decade and the method is covered in international standards. The measurement is easy to perform and will capture a unique fingerprint of the transformer. The measurement result is compared to a reference fingerprint and gives a direct answer if the mechanical parts of the transformer are unchanged or not. Deviations indicate geometrical and/or electrical changes within the transformer.

FRAX detects problems such as:

- Winding deformations and displacements
- Shorted turns and open windings
- Broken clamping structures
- Core connection problems
- Partial winding collapse
- Faulty core grounds
- Core movements



Collecting fingerprint data using Frequency Response Analysis (FRA) is an easy way to detect electro-mechanical problems in power transformers and an investment that will save time and money.

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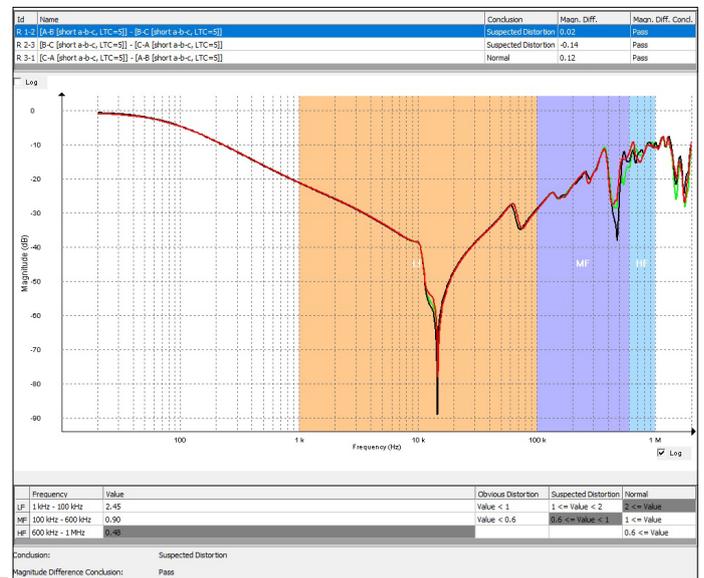
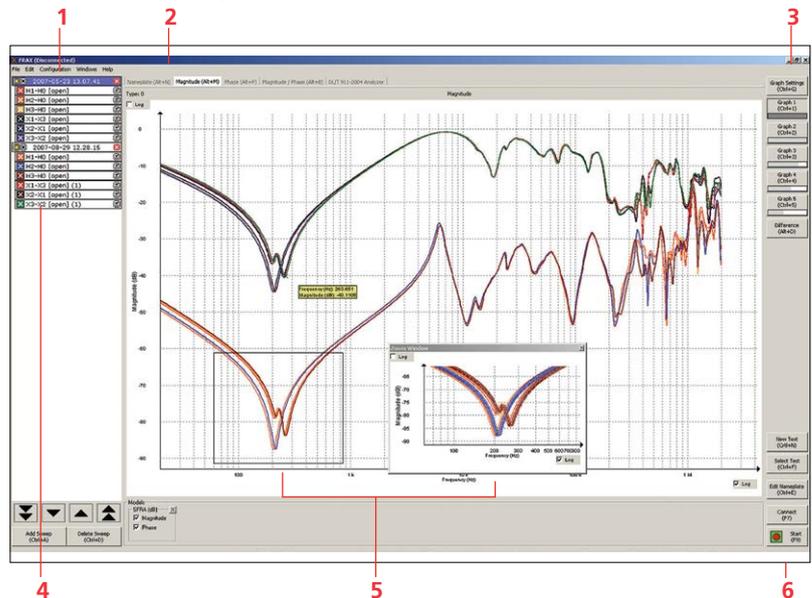
BENEFITS

- Compact and rugged design.
- Guaranteed repeatability by using superior cabling technology and standardized signal cable grounding technique (IEC 60076-18, Method 1).
- Fulfills international standards for Sweep Frequency Response Analysis (SFRA) measurements (IEC 60076-18, IEEE C57.149 etc).
- Dynamic range and accuracy to detect even the most subtle electro-mechanical changes within the transformer to be detected.
- Advanced analysis and support software tools allows for sound decision making with regard to further diagnostics analysis and/or transformer disposition.
- Built-in PC with touchscreen (FRAX 150).

FEATURES

1. Test object browser – Unlimited number of tests and sweeps. Full user control.
2. Quick select tabs – Quickly change presentation view for different perspectives and analysis tools.
3. Quick graph buttons – Programmable graph setting lets you change views quickly and easily.
4. Sweep/curve settings – Every sweep can be individually turned on or off, change color, thickness and position.
5. Dynamic zoom – Zoom in and move your focus to any part of the curve.
6. Operation buttons – All essential functions at your fingertips; select with mouse, function keys or touch screen.
7. Automated analysis compares two curves using an algorithm that compare amplitude as well as frequency shift and lets you know if the difference is severe, obvious or light.

Decision support is provided by using a built-in analysis tool based on correlation analysis.



FRAX Series

Sweep frequency response analysers

SPECIFICATIONS	FRAX 99	FRAX 101	FRAX 150
Specifications are valid at nominal input voltage and an ambient temperature of +25°C ±5°, (77°F). Specifications are subject to change without notice.			
Environment			
Application field	The instrument is intended for use in medium and high-voltage substations and industrial environments.		
Ambient temperature			
Operating	-20°C to +55°C (-4°F to +131°F)	-20°C to +55°C (-4°F to +131°F)	-5°C to +50°C (23°F to +122°F)
Storage	-30°C to 70°C (-22°F to +158°F)		
Humidity	< 95% RH, non-condensing		
CE-marking			
EMC	2004/108/EC		
LVD	2006/95/EC		
General			
DC power supply	11-16 V DC		-
AC power supply	-	-	90 – 264 V AC, 47 – 63 Hz
Internal battery ¹⁾	24 Wh/2.2 Ah (optional)	49 Wh/4.4 Ah (optional)	No
Dimensions			
Instrument	300 x 169 x 55 mm (11.8" x 6.65" x 2.16")		410 x 340 x 205 mm (16.1" x 13.4" x 8")
Transport case	520 x 460 x 220 mm (20.5" x 18.1" x 8.7")		No
Weight			
Instrument	1.4 kg (3.1 lbs) 1.95 kg (4.29lbs) with battery		8.5 kg (18.7 lbs)
Case and accessories	12 kg (26 lbs)	15 kg (33 lbs)	Accessories 10kg (22 lbs)
Measurement section			
Test method	Sweep frequency (SFRA)		
Frequency range	0.1 Hz – 25 MHz, user selectable		
Frequency resolution	0.01%		
Frequency accuracy	0.01% (measurement error)		
Level resolution	0.001 dB		
Number of points	Default 1046, Up to 32 000 points, user selectable		
Measurement time	Default 64 s, fast setting, 37 s (20 Hz – 2 MHz)		
Points spacing	Log., linear or both		
Sweep settings	Individual settings for customer defined frequency bands. Linear and logarithmic scale or combination of both		
Internal noise level (average 20 Hz to 2 MHz)	< -120 dB	< -140 dB	< -140 dB
Dynamic range ²⁾	>130 dB	>150 dB	>150 dB
Inaccuracy	±0.1 dB from +10 dB down to -40 dB ±1 dB from - 41 dB down to -100 dB	±0.1 dB from +10 dB down to -40 dB ±0.5 dB from - 41 dB down to -100 dB	
IF bandwidth	User selectable, default <10%		
USB	Yes	Yes	4 type A, 1 type B
Bluetooth	No	Yes	No
FRAX Software for Windows 7/8/10/11	Yes	Yes	Yes
Standards / guides	Fulfills requirements in IEC 60076-18, IEEE C57.149, DL/T 911, CIGRE TB 342 as well as other international standards and recommendations		
Ground loop detection	No	Yes	Yes

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Analog Output

Channels	1	1	1
Compliance voltage	20 V p-p	0.20 – 24 V p-p	0.20 – 24 V p-p
Applied voltage at 50 Ω		0.1 – 12 V p-p	0.1 – 12 V p-p
Output impedance	50 Ω		
Protection	Short-circuit protected		
Frequency range	0.1 Hz – 25 MHz		
Sweep direction	Low to high or high to low		

Analog Input

Channels	2		
Sampling	Simultaneous		
Frequency range	0.1 Hz – 25 MHz		
Input impedance	50 Ω		
Sampling rate	100 MS/s		

Analysis and data management

Analysis	Cross correlation according to DL/T 911 and NCEPRI as well as customisable. Magnitude difference.		
Data import:	Omicron (.fra, .tfra), Doble (.sfra, .sfrx), CIGRE TB342 .xfra, IEC 60076-18 .xml.		
Data export	CIGRE TB342 .xfra, IEC 60076-18 .xml, Doble sfra, .csv, .txt		

Built in PC	No	No	Yes
Operating system	–	–	Windows embedded
Touchscreen	–	–	12"
Memory	–	–	1000 records in internal memory External storage on USB stick

1) Rechargeable Li-ion battery, replaceable by accredited service centre only

2) Dynamic range is defined from +10 dB to internal noise in the unit

INCLUDED ACCESSORIES



Included accessories shown above: Mains cable, ground cable, (2) ground braid sets, (2) earth/ground braid leads (insulated), (2) C-clamps, generator cable, measure cable, field test box, nylon accessory pouch, (2) earth/ground braids with clamp, and canvas carrying bag for test leads.



FTB101

Several international FRA guides recommend verification integrity of cable and instrument before and after a test using a test circuit with a known FRA response supplied by the equipment manufacturer. FRAX comes with a field test box FTB101 as a standard accessory and allows the user to perform this important validation in the field at any time and secure measurement quality.

OPTIONAL ACCESSORIES



FDB101

The FRAX demo box FDB101 is a transformer kit that can be used for in-house training and demonstrations. The small transformer is a single-phase unit with capability to simulate normal as well as fault conditions. Open as well as shorted measurements can be performed. The unit also contains two test impedances, one of them the same as used in the FTB101 field test box.

ORDERING INFORMATION

Item	Art. No.
FRAX-101	
With accessories, 18 m (60 ft) cable set	AC-19090
With accessories, 9 m (30 ft) cable set	AC-19092
With accessories incl. battery, 18 m cable set	AC-19091
With accessories incl. battery, 9 m cable set	AC-19093
FRAX-99	
With accessories, 18 m cable set	AC-29092
With accessories, 9 m cable set	AC-29090
With accessories, incl. battery, 18 m cable set	AC-29096
With accessories, incl. battery, 9 m cable set	AC-29095
FRAX-150	
With accessories, 18 m cable set	AC-39090
With accessories, 9 m cable set	AC-39092
Included accessories for all models	
Generator cable	
Measure cable	
4 x 3 m (10 ft) ground braid set	
2 x 0.3 m (1 ft) braid with clamp	
2 x C-clamp (bushing connector clamp)	
2 x G-clamp (ground clamp)	
Field Test Box FTB101	
Ground cable 5 m (15 ft)	
Mains cable	
FRAX software for Windows	
User manual	
Additional included accessories for FRAX 99	
AC/DC adapter	
Light transport case	
Canvas carrying bag (for accessories)	
USB cable	
Additional included accessories for FRAX 101	
AC/DC adapter	
Transport case	
Bluetooth adapter	
USB cable	
Additional included accessories for FRAX 150	
Canvas carrying bag (for accessories)	
Optional Accessories	
Calibration set	AC-90020
FRAX demo box FDB 101	AC-90050
FRAX generator and ref cable, 9 m (30 ft)	GC-30040
FRAX generator and ref cable, 18 m (60 ft)	GC-30042
FRAX measure cable, 9 m (30 ft)	GC-30050
FRAX measure cable, 18 m (60 ft)	GC-30052
C-clamp	GC-80010
E-clamp (single hand grip clamp)	GC-80030

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