

FRAX200 Series Sweep Frequency Response Analyser



- Built-in demagnetisation and automatic ground loop check
- Optional FSX200 switchbox enables one-time connection to all phases
- Active clamps for safe, one-hand bushing connection
- High measurement repeatability with shielded cabling and IEC-compliant grounding
- Battery operation with removable pack and flight-mode discharge
- Full sweep with ground check completed in under one minute
- Entry level version FRAX200 BAS with less features also available

DESCRIPTION

The FRAX200 provides high-resolution frequency response measurements to detect mechanical or electrical changes inside power transformers. By injecting a swept sinewave and analysing the response, it identifies core and winding faults with excellent accuracy. The instrument is lightweight and field-ready, featuring USB-C and wireless Bluetooth communication using Bluetooth Low Energy (BLE) technology, intuitive PC software, and options for automation.

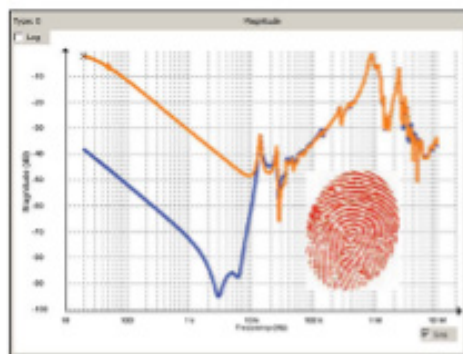
The new, optional, FSX200 switchbox facilitates connection to all phases simultaneously through a single connection. This is achieved using active clamps (patent pending). The active clamps enable the additional leads to be disconnected at the bushing end, thereby eliminating the influence of connected cables associated with phases not included in the current measurement.

Additionally, the FRAX200 features a built-in demagnetisation circuit that allows the transformer core to be demagnetised before the measurement begins. This eliminates uncertainties in the low-frequency regions caused by residual magnetisation of the transformer core.

Typical problems detected with the sweep frequency method are:

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

Using the Sweep Frequency Response Analysis (SFRA) technique for detecting electro-mechanical problems in power transformers requires comparison to previous data and is often seen as a fingerprint method. Start collecting data for your transformers. This is an easy way to ensure reliability in your transformer fleet and an investment that will save time and money.



Note: Images reflect typical configurations and may vary from delivered products

FRAX200 Series Sweep Frequency Response Analyser

APPLICATION

In its standard application, a fingerprint/reference curve for each winding is captured when the transformer is new or when it is in a known, good condition. These curves can later be used as reference during maintenance tests or when there is reason to suspect a problem. The most reliable method is the time-based comparison where curves are compared over time on measurements from the same transformer.

Collection of data is essential for fingerprint comparisons. Always make sure your collected data has as little unknown factors as possible. Here the FRAX200 can help you with:

- Guaranteed repeatability by using superior cabling technology and standardised signal cable grounding technique (IEC 60076-18, Method 1).
- Fulfils international standards for Sweep Frequency Response Analysis (SFRA) measurements: (IEC 60076-18, IEEE C57.149, etc.).
- Highest dynamic range and accuracy in the industry allowing even the most subtle electro-mechanical changes within the transformer to be detected.
- Demagnetising the transformer before the measurements starts with the internal demagnetising functionality. This is done using Megger standard method, adaptive demagnetisation, implemented in numerous other Megger equipment.
- System automatically performs, and stores the result in the data file, ground loop detection not allowing any data collection without proper connection.

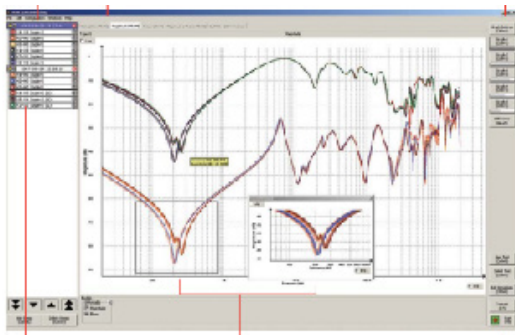


Figure 1: Overview of sweep response curves with interactive display tools

FEATURES

Included software without any licence control, possibility to install for multiple users without any additional requirements for yearly payments.

Software includes:

Test object browser – Unlimited number of tests and sweeps. Full user control.

- Quick select tabs – Quickly change presentation view for different perspectives and analysis tools.
- Quick graph buttons – Programmable graph setting lets you change views quickly and easily.
- Sweep/curve settings – Every sweep can be individually turned on or off, change colour, thickness and position.
- Dynamic zoom – Zoom in and move your focus to any part of the curve.
- Operation buttons – All essential functions at your fingertips; select with mouse, function keys or touch screen.
- Automated analysis compares two curves using an algorithm that compares amplitude as well as frequency shift and lets you know if the difference is severe, obvious or light. Pass/fail criteria for shorted measurements.

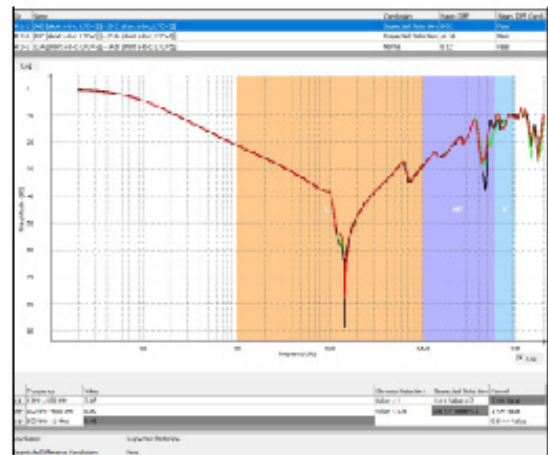
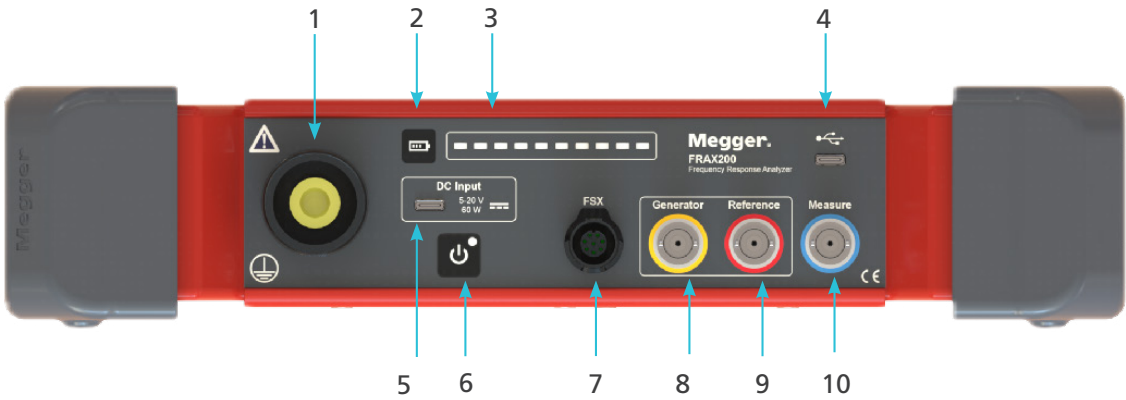


Figure 2: Frequency band selection view for detailed curve analysis

FRAX200 Series
Sweep Frequency Response Analyser

FRAX200



Item	Description	Item	Description
1	Ground (earth) terminal	6	On/Off button
2	Battery charge check push button (only FRAX200 ADV)	7	Switchbox Connector (for FSX200) (only FRAX200 ADV)
3	Device status and battery charge LED indicator	8	Generator (Yellow)
4	USB-C for data transfer	9	Reference input (Red)
5	USB-C for DC-input and charging	10	Measure input (Blue)

SWITCHBOX FSX200



Item	Description	Item	Description
1	Measurement channel 1	6	Connector for auxiliary shorting clamps
2	Measurement channel 2	7	Connector for Generator (Yellow) connection between FSX200 and FRAX200
3	Measurement channel 3	8	Connector for Reference (Red) connection between FSX200 and FRAX200
4	Measurement channel 4	9	Connector for Measure (Blue) connection between FSX200 and FRAX200
5	Connector for multi-cable between FSX200 and FRAX200		

FRAX200 Series

Sweep Frequency Response Analyser

SPECIFICATIONS

Specifications are valid at fully charged batteries and an ambient temperature of +25 °C, ± 3 °C. Specifications are subject to change without notice.

Environment

Application field

For use in medium and high-voltage substations and industrial environments.

Temperature

Operating¹⁾

-20 °C to +55 °C (-4 °F to + 131 °F)

Storage

-40 °C to +70 °C (-40 °F to + 158 °F)

Relative humidity (%RH)

5% to 95%, non-condensing

Altitude

Operational to 3 000 m

CE-marking

EMC

2004/108/EC

LVD

2006/95/EC

Shock

IEC 60068-2-27

Vibration

IEC 60068-2-64

Transport

ISTA 2A

Flammability class

V0

General

DC power supply

11 to 16 V DC, USB-C

Internal battery³⁾

58 Wh / 5.2 Ah

Dimensions

Instrument

L 330 x W 190 x H 70 mm

L 13 x W 7.5 x H 2.8 in

Transport case

FRAX200 ADV

L 590 x W 460 x H 300 mm

L 23.2 x W 18.1 x H 11.8 in

FRAX200 BAS

L 315 x W 390 x H 150 mm

L 12.40 x W 15.35 x H 5.91 in

Weight

Instrument

FRAX200 ADV

2.4 kg (5.3 lbs)

FRAX200 BAS

2.3 kg (5.1 lbs)

Transport case with

FRAX200 ADV and accessories

9 m (30 ft) 16.8 kg (37 lbs)

Transport case with

FRAX200 BAS

3.7kg (8.2 lbs)

Measurement section

Test method

Sweep Frequency Response Analysis (SFRA)

Frequency range

0.1 Hz – 30 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

< -140 dB (average 20 Hz to 2 MHz)

Dynamic range²⁾

>150 dB

Accuracy (measurement error)

± 0.1 dB from +10 dB down to -50 dB

± 0.5 dB from -51 dB down to -100 dB

User selectable, default <10%

IF bandwidth

Communication

PC communication

USB-C

Bluetooth

Yes

Software

FRAX Software for Windows

Standards / guides

Fulfils requirements in

IEC 60076-18,

IEEE C57.149-2012, CIGRE Technical

Brochure 342, DL/T 911-2004,

as well as other international

standards and recommendations

Other

Ground loop detection

Yes, automatic

Demagnetisation³⁾

Yes, Adaptive 2A current

Analog output channels

1

Compliance voltage

Generator output

0.20 – 24 V p-p

Measurement voltage at 50 Ω

0.1 – 12 V p-p, default set at 10 V p-p

Output impedance

50 Ω

Protection

Short-circuit protected

Frequency range

0.1 Hz – 30 MHz

Sweep direction

Low to high or high to low

Analog input

Channels

2

Sampling

Simultaneous

Frequency range

0.1 Hz – 30 MHz

Input impedance

50 Ω

Sampling rate

100 MS/s

FSX200 SWITCHBOX

Analog output

Channels

4

Input/output impedance

50 Ω

AUX output

32 V, active short circuit clamps, max three in series

Dimensions

Instrument: FSX200

L 330 x W 190 x H 70 mm

L 13 x W 7.5 x H 2.8 in

Transport case

L 590 x W 460 x H 300 mm

L 23.2 x W 18.1 x H 11.8 in

Weight

Instrument

1.8 kg (4 lbs)

Transport case with FSX

and accessories, 9 m (30 ft)

19.0 kg (42 lbs)

Measurement section

Frequency range

0.1 Hz – 2 MHz

Internal noise level

< -140 dB (average 20 Hz to 2 MHz)

Dynamic range²⁾

>150 dB

Accuracy (measurement error)

± 0.2 dB from +10 dB down to -50 dB

± 0.5 dB from -51 dB down to -100 dB

IF bandwidth

User selectable, default <10%

Service and calibration

Factory-calibrated with certificate.

Recommended recalibration interval:

1–3 years. Service and calibration

available via Megger-authorized

centres.

1) Max battery temperature is 60°C, internal shut off during long operation times

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

3) FRAX200 ADV

FRAX200 Series Sweep Frequency Response Analyser

INCLUDED ACCESSORIES

Picture	Part Number	Description	FRAX200 ADV	FRAX200 BAS	FSX200	FRAX200 + FSX200
		Active clamp				
	GC-80054	Yellow	1			1
	GC-80056	Blue	1			1
	GC-80052	Red			1	1
	GC-80059	White			1	1
		FRAX generator cable				
	GC-30040	Red/Yellow, 9 m (30 ft)	1	1		1
	GA-30044	Yellow/Yellow, 9 m (30 ft)			1	1
	GA-30046	Blue/Blue, 9 m (30 ft)			1	1
	GA-30049	White/White, 9 m (30 ft)			1	1
	GC-30042	Red/Yellow, 18 m (60 ft)	1	1		1
	GA-30054	Yellow/Yellow, 18 m (60 ft)			1	1
	GA-30056	Blue/Blue, 18 m (60 ft)			1	1
	GA-30059	White/White, 18 m (60 ft)			1	1
	GC-30043	Red/Yellow, 30 m (100 ft)	1			1
		FRAX measure cable				
	GC-30050	9 m (30 ft)	1	1		1
	GC-30052	18 m (60 ft)	1	1		1
	GC-30053	30 m (100 ft)	1			1
	GC-80010	C-clamp		2		
	GC-80060	Ground clamp	2	2	2	4
	GC-30033	Ground braid insulated, 3 m (10 ft)	2	2	2	4

FRAX200 Series

Sweep Frequency Response Analyser

Picture	Part Number	Description	FRAX200 ADV	FRAX200 BAS	FSX200	FRAX200 + FSX200
	GC-30036	Ground braid extension, 3 m (10 ft)	2	2	2	4
	GC-30037	Ground braid 0.3 m (1 ft) with clamp	2	2	2	4
	GA-00925	Switchbox interconnection cable, 0.3 m (1 ft)			1	1
	GA-30025	BNC cable 0.25 m RG58			3	3
	GA-00935	Cable, AUX > Shorting clamp 3 m (10 ft)			2	2
	GA-00945	Cable, AUX > Shorting clamp 10 m (33 ft)			1	1
	GC-80070	FSX200 Shorting clamp			3	3
	GC-30080	Ground cable, green/yellow 10 m (33 ft)	1	1		1
	HC-04290	AC/DC Adapter, USB-C, 60 W	1	1		1
	HG-00240	USB-C cable	1	1		1
	AA-00015	IEC 60320 C7 mains lead	1	1		1
	AC-90060	FRAX Field Test Box FTB-101	1	1		1
	GD-30000	Transport case FRAX200 maxi *Depending on FRAX200 + FSX200 combination	1			1*

FRAX200 Series

Sweep Frequency Response Analyser

Picture	Part Number	Description	FRAX200 ADV	FRAX200 BAS	FSX200	FRAX200 + FSX200
	GD-30005	Transport case FRAX200 mini *Depending on FRAX200 + FSX200 combination	1			1*
	GD-30015	Transport case FSX200 mini *Depending on FRAX200 + FSX200 combination	1			1*
	GD-30025	Transport case FRAX200 BAS		1		
	2012-180	Cable backpack		1	1	1
No image available	SA-AC101	PC software for FRAX	1	1		1

OPTIONAL ACCESSORIES

Picture	Part Number	Description	FRAX200 ADV	FRAX200 BAS	FSX200	FRAX200 + FSX200
	AC-90050	FRAX demo box FDB101	1	1		1

FRAX200 Series

Sweep Frequency Response Analyser

ORDERING INFORMATION

Description	Part number
FRAX200 ADV 9 m	AC-49090
FRAX200 ADV 18 m	AC-49092
FRAX200 ADV 30 m	AC-49094
FRAX200 BAS 9 m	AC-49091
FRAX200 BAS 18 m	AC-49093
FSX200 3 x 9 m	AC-49190
FSX200 3 x 18 m	AC-49192
FRAX200 ADV + FSX200 9 m with maxi case	AC-40090
FRAX200 ADV + FSX200 18 m with maxi case	AC-40092
FRAX200 ADV + FSX200 9 m with mini case	AC-40094
FRAX200 ADV + FSX200 18 m with mini case	AC-40096

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