FRANEO 800
The next generation for a reliable core and winding diagnosis of power transformers
Mechanical or electrical problems in power transformer windings, contacts or cores are the result of:

> extraordinarily high mechanical forces,
> shocks due to transportation and seismic activities, or
> mains power failures such as high short-circuit currents.

Problems such as these will not necessarily lead to a breakdown, but a power transformer’s ability to withstand further mechanical loads will be drastically reduced.

These problems can be identified with our new FRANEO 800, the successor to the well-established FRAnalyzer, by using the Sweep Frequency Response Analysis (SFRA) principle.

**Worldwide proven measurement method**

Since the IEC 60076-18 standard was introduced, the method has become one of the common electrical tests and its acceptance on the market has increased accordingly.

SFRA performs measurements in a frequency domain. It is robust against broadband and narrowband noise and thus, it is able to achieve a high signal-to-noise ratio. SFRA is a non-invasive measurement method and based on a comparison of actual and reference measurements.
With FRANEO 800 and the SFRA being used you can detect defects as well as faults in the magnetic core, the winding assembly, and the clamping structures of power transformers, such as:

- Axial and radial winding deformation
- Displacements between high- and low-voltage windings
- Partial winding collapse
- Shorted or open turns
- Faulty grounding of core or screens
- Core movement
- Broken clamping structures
- Problematic internal connections

As a result you can improve the reliability of your transformers, reduce maintenance costs and, most of all, avoid unexpected and expensive outages.

**Your benefits**

- Wide dynamic measuring range (> 150 dB)
- Reproducible results thanks to innovative connection technique, based on IEC 60076-18, Method 1
- Guided workflow for test set-up, execution and assessment for easy analysis without expert knowledge
- Fast measurement times due to intelligent sweep algorithm
- Small and light-weight equipment guarantees optimum usability

[www.omicronenergy.com/FRANEO-800](http://www.omicronenergy.com/FRANEO-800)
Measuring principle

FRANEO 800 injects a sinusoidal excitation voltage with a continuously increasing frequency into one end of the transformer winding and measures the signal returning from the other end. Due to a direct measurement in the frequency domain, no additional data processing is required.

The comparison of input and output signals generates a unique frequency response, which can be compared with reference data. Thereby, deviations can indicate changes of internal components. These deviations can be directly related to different sections of the frequency range and they can be discerned from each other.

Power transformers can be seen as a complex electrical network of capacitances, inductances and resistors. Each electrical network has its own unique frequency response (so-called „fingerprint“).
SFRA as basis for further measurements

The SFRA measurement technique is the most sensitive diagnostic method for the detection of mechanical deformations. As the SFRA covers a wide frequency range, electrical defects and faults can also be indicated.

Based on the SFRA results you can reliably assess the integrity of your power transformer and, if required, derive further diagnostic measurement techniques, such as leakage reactance, exciting current, or winding resistance measurements. These measurements can be performed with our multifunctional CPC 100 + CP TD12/15.

FRANEO 800 is a very reliable and efficient test set for the classical core and winding diagnosis of power transformers. At the same time, it supports you in the best possible way during the diagnosis of complex defects within the active part of your power transformer.

SFRA combines different advantages:

> Most sensitive method for detecting mechanical and electrial changes within the active part of power transformers.

> Non-invasive measurement method, which allows the assessment of power transformers’ integrity without applying high-voltages.

> Comprehensive method, providing additional information to facilitate the condition assessment of the power transformer.

Geometrical changes within and between the elements of the network cause deviations of a transformer’s frequency response. FRANEO 800 compares such measurement results with the original fingerprint.
Since SFRA is a comparative method, it is vital that measurements become reproducible. This is the only way to guarantee that deviations between an actual measurement and its fingerprint can be related to defects within the observed transformer.

The connections between the measuring device and the transformer terminals, as well as the grounding technique, all have an influence on the reproducibility of your measurement.

**Innovative connection technique for the highest level of reproducibility**

The improved bushing clamps can easily be mounted to transformer bushings, achieving a reliable electrical contact. They provide a high level of cable relief, which increases the longevity of the required accessories.

Ensuring the highest available signal-to-noise ratio, several double shield coax cables are used, which have to be grounded by an additional connection following certain conventions.

**Optimum measurement setup with shortest braid concept**

Wide flat braids are dedicated for this. They provide a large surface area, the lowest inductance and are less sensitive to interference. This makes the measurement independent from the cable position and significantly increases the level of reproducibility especially in the high-frequency range area.

In order to eliminate any influence of the grounding system on your measurement results, the grounding braids should always run tightly along the body of the bushings. This is ensured by the specially designed flange-screw clamps and the flexible length of the grounding braids being used.

Due to the special design of the bushing clamps a reliable contact is achieved.

Flange-screw clamps with spikes function as reliable contacts even through layers of paint or dirt.
FRANEO 800 – our new solution for a reliable frequency response analysis

Highest dynamic range and accuracy
Due to the innovative measurement concept, high precision measurements can be performed with an accuracy of ± 0.5 dB down to -100 dB.
The low noise floor ensures that even strong attenuated measurement traces can be measured with high accuracy. Thereby, FRANEO 800 is able to achieve the best dynamic range (> 150 dB) in the SFRA testing industry.

Variable output voltage
FRANEO 800 now offers you a freely adjustable output voltage from 0.1 Vpp to 10 Vpp (at 50 Ω). Thus, results of previous measurements with other FRA test devices can easily be compared with new measurements. Making use of the extraordinary dynamic range, the signal-to-noise ratio can be enhanced and the influence of interference reduced by using a higher output voltage.

Intelligent sweep settings
The intelligent sweep settings shorten the measurement duration significantly. The implemented algorithm first performs a broadband measurement and then focuses on the critical frequency areas, achieving more precise measurement results.
In order to be able to support future comparisons of new FRANEO 800 results with previous results, different sweep setting profiles can be selected.

Ground Loop Check
The integrated ‘Ground Loop Check’ verifies the test setup and makes sure that the grounding braids are properly connected. It gives you a “Pass/Fail” assessment and either allows or prevents you from continuing with your measurement. This internal check guarantees reproducible measurement results.

One solution in one box for easy and comfortable testing
With FRANEO 800 you get all the required components in just one box. This makes testing quite comfortable and the system easy to transport. Its newly developed, extremely robust housing is ideal for on-site testing. With the powerful integrated battery, you can also perform tests in environments without a power supply.
Management of location, asset and test data
PTM provides a well-structured database for managing SFRA and additional transformer test results to get a comprehensive overview of your asset’s condition. You can define and manage locations, assets, jobs and reports in an easy and fast way.

Import and export functionality
Measurements performed and stored with the old FRAnalyzer database, can easily be imported in the new PTM database, using the migration assistant wizard that is included. In addition, data can be filtered or exported in common formats such as XML, PDF, Microsoft® Word, Microsoft® Excel.

Data synchronization and back-up
With the ‘PTM DataSync’ module, you can synchronize your local database with a PTM server database. The server database collects the test data from every user connected to the server. Thus, data synchronization and storage are safer and more convenient than they have ever been before.
Execution of diagnostic tests
You can select between several predefined test templates. These templates fully comply with current standards and guidelines and always consider the nameplate values that have already been entered. You can also create your own test templates for your individual needs.

Easy connection due to wiring diagrams
Pre-configured wiring diagrams, that depend on the selected vector group of your power transformer, assist you with setting up the test equipment in the correct manner. This minimizes the likelihood of measurement errors and speeds up your testing process.

PTMate app – your mobile companion
PTMate is our mobile companion for PTM. The app supports you on site and extends the PTM feature set to your smartphone, such as easy data entering, fast and safe wiring for tests, as well as starting and stopping of SFRA measurements when using FRANEO 800.

Result analysis and reporting
After the measurement a reference test of the same transformer will be selected automatically. FRANEO 800 provides you with a mathematical solution for comparing the traces based on the Chinese standards DLT 911/2004 or NCPRI. This is a powerful tool for assessing the mechanical and electrical integrity of your power transformer.

Comparison tools for detailed analysis
For a detailed analysis you can compare different test results side-by-side in one diagram. You can choose between a time- and type-based comparison as well as a phase-based comparison.

Customized, individual reports
PTM can automatically generate reports for SFRA and any further measurements, e.g. leakage reactance, exciting current or winding resistance. This gives you a comprehensive overview of your power transformer, its test results, and its assessment.

You can easily adapt the reports to your needs, e.g. compile the included parts, provide comments or incorporate your company logo.

For a comprehensive analysis, PTM offers automatic result assessment and comparison as well as customized reporting.
## Technical data FRANEO 800

### General

**Frequency range**
1 Hz ... 30 MHz

### Source output

**Output impedance**
(for f = 20 Hz...2 MHz) 50 Ω (± 2%)

**Connector**
BNC

**Amplitude**
10 Vpp (at 50 Ω)

**Dynamic range**
(for f = 20 Hz...2 MHz)
> 150 dB

### Attenuation/Accuracy

(for f = 20 Hz...2 MHz)

**Typical accuracy**
± 0.1 dB (down to -50 dB) and
± 0.3 dB (between -50 dB and -100 dB)

**Guaranteed accuracy**
± 0.3 dB (down to -50 dB) and
± 0.5 dB (between -50 dB and -100 dB)

### Mechanical data

**Dimensions**
252 x 53 x 265 mm / 10 x 2 x 10.4 in

**Weight**
1.8 kg / 4 lbs
(without measuring cables)

### Environmental

**Temperature**
Operating: -10 °C ... + 55 °C / + 14 °F ... + 131 °F

**Storage**: -35 °C ... + 55 °C / + 31 °F ... + 131 °F

**Relative humidity**
20% ... 95%, non-condensing

## System requirements\(^1\) for PTM

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Windows 10(^{™}), 64-bit</th>
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<tr>
<td>Windows 8(^{™}) and 8.1(^{™}), 64-bit</td>
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<tr>
<td>Windows 7(^{™}) SP1, 32-bit and 64-bit</td>
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<tr>
<th>CPU</th>
<th>Multicore system with 2 GHz or faster</th>
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<tr>
<td>Single core system with 2GHz or faster</td>
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<table>
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<tr>
<th>RAM</th>
<th>minimum 4 GB (8 GB)</th>
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<table>
<thead>
<tr>
<th>Hard disk</th>
<th>minimum 5 GB of available space</th>
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<table>
<thead>
<tr>
<th>Storage device</th>
<th>DVD-ROM drive</th>
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<tr>
<th>Graphics adapter</th>
<th>Super VGA (1280×768) or higher-resolution video adapter and monitor(^2)</th>
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<tr>
<th>Interface</th>
<th>USB 2.0(^3), Ethernet NIC(^4)</th>
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<tr>
<th>Installed software(^5)</th>
<th>Microsoft Office® 2016, Office® 2013, Office® 2010 or Office® 2007</th>
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\(^1\) Recommended system requirements marked in bold
\(^2\) Graphics adapter supporting Microsoft® DirectX 9.0 or later is recommended.
\(^3\) USB 2.0 is needed for operation with FRANEO 800 and DIRANA.
\(^4\) The Ethernet NIC is needed for operation with CPC 100 and CIBANO 500.
\(^5\) Installed software required for the optional Microsoft Office® interface functions.
**FRANEO 800 packages**

<table>
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<tr>
<th>Description</th>
<th>Ordering No.</th>
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<tr>
<td>FRANEO 800 Standard Package</td>
<td>VE000661</td>
</tr>
<tr>
<td>Package for performing sweep frequency response analysis (SFRA) on power transformers, featuring the FRANEO 800 device, dedicated bushing and flange clamps, the aluminium braids as well as the Primary Test Manager™ (PTM) software for easy operation.</td>
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| FRANEO 800 Quick Connection Package | VE000662 |
| Package for performing sweep frequency response analysis (SFRA) on power transformers, featuring the FRANEO 800 device, all-in-one cables (incl. ring reference ground connection and easy-to-connect clamps) as well as the Primary Test Manager™ (PTM) software for easy operation. |

**FRANEO 800 accessories and upgrades**

<table>
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<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Clamp Set for Short Bushings</td>
<td>VEHZ0673</td>
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<tr>
<td>2 x Short aluminum braids (1.5 m / 5 ft), 2 x Clamps in a carry bag</td>
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| Quick Connection Upgrade Option | VEHZ0689 |
| 1 x Transport bag, 2 x All-in-one cables with ring reference ground connection and easy-to-connect clamps, 2 x Grounding leads (1 m / 3 ft), 2 x Grounding leads (2 m / 7 ft) |
OMICRON is an international company serving the electrical power industry with innovative testing and diagnostic solutions. The application of OMICRON products allows users to assess the condition of the primary and secondary equipment on their systems with complete confidence. Services offered in the area of consulting, commissioning, testing, diagnosis and training make the product range complete.

Customers in more than 160 countries rely on the company’s ability to supply leading-edge technology of excellent quality. Service centers on all continents provide a broad base of knowledge and extraordinary customer support. All of this together with our strong network of sales partners is what has made our company a market leader in the electrical power industry.