

OVERHEAD LINES

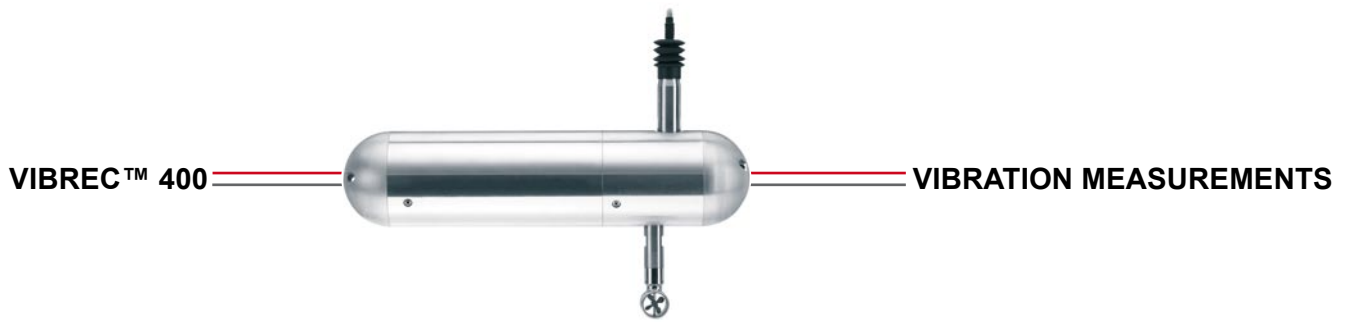
PRODUCT CATALOGUE

VIBREC™ 400 RECORDERS

Advanced Solution for Conductor Vibration Measurements

THE POWER CONNECTION

CABLE SYSTEMS | COMPONENTS | OVERHEAD LINES | RAILWAY CATENARY SYSTEMS



The Vibration Problem

Aeolian vibrations of overhead line conductors and their detrimental effects are well known. These unavoidable vibrations are generated by wind flow and may cause fatigue failure in the conductor strands and other line components.

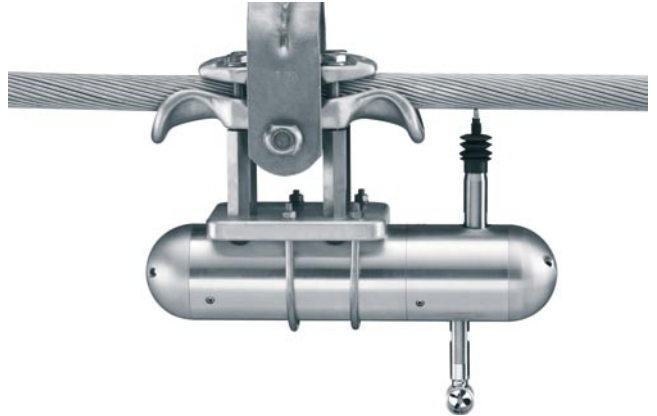
To verify the conductor vibration severity, transmission line engineers, all over the world, measure the vibration intensity of transmission line conductors by using dedicated vibration recorders. Measurements made in accordance with the relevant IEEE and CIGRE guidelines, allow the evaluation of the endurance capability and the lifetime of the conductors.



The Vibration Solution

The VIBREC™ 400 recorders were developed specifically for this task. They record, convert and store data of conductor vibration by autonomous, long term, direct measurements at the points of probable damage, i.e. at the suspension and tension clamps, at damper, spacer or spacer damper clamps, at warning spheres and other fittings clamps.

More than 500 PFISTERER SEFAG VIBREC™ recorders are presently successfully in service all over the world and deliver day after day, throughout the years, valuable information about the vibration behaviour of the line conductors. In this way, vibration problems can be anticipated by improving, when necessary, the existing damping system.



Features

- Wind velocity measurements can be correlated with the vibration measurements.
- 3D matrix for vibration amplitude, vibration frequency and wind velocity perpendicular to the conductor is available with user selectable class ranges.
- Time histories show the shape of the actual measured vibration signal.
- Fast Fourier Transformation (FFT) of measured signals shows dominating frequencies useful for proper damper selection.
- User selectable setting of measurement cycle time, as well as quasi continuous measurements, can be used.
- Up to 6 months of unattended operations at default setting (10 sec. sampling, 15 min. pause period) is possible.
- Adjustable hardware and software filters for elimination of noise and for signal and data conditioning are user selectable.
- Automatic start and stop function allows easier and trouble free installation and removal of the recorder.
- Ambient temperature measurements are implemented.

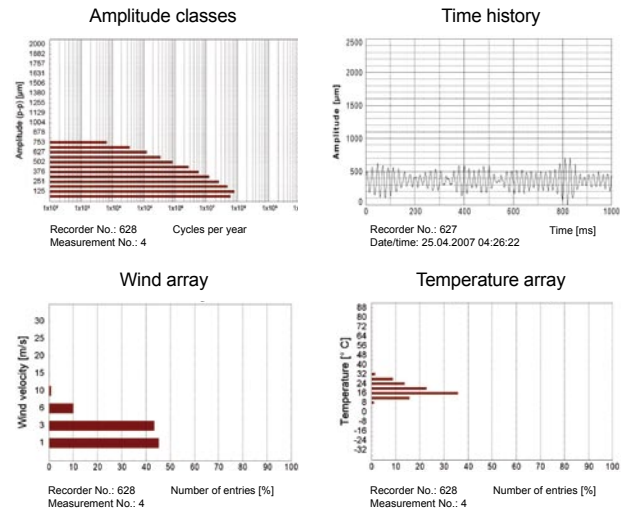
The LIFE™ 400 Software

The VIBREC™ 400 recorder can be connected directly to any PC. The powerful communication software LIFE™ 400, which is included with every VIBREC™ 400 free of charge, allows easy and flexible setting of the measuring parameters, such as:

- Amplitude and frequency ranges
- Wind and temperature classes
- Sampling and pause periods
- Automatic start and stop function of the measurements

as well as comfortable data readout and elaboration including:

- Maximum vibration amplitude vs. frequency
- Accumulated stress curve
- Number of cycles at each wind, frequency and amplitude level
- Danger ratio at each wind, frequency and amplitude level
- Wind and temperature distribution
- Time history reconstructions of the most significant recording



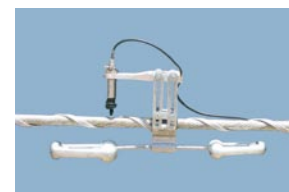
The Wind Sensor

The wind sensor is a high precision anemometer specifically designed to register the wind velocity component perpendicular to the conductor, synchronously with the corresponding vibration amplitudes and frequencies, enabling a unique correlation between these three important vibration parameters, in a 3D matrix. The wind sensor includes a temperature sensor that may be used to estimate the variations of the conductor tension and to consider possible ice deposits on the conductors during the measurement period.



Special Application

Damage at damper, spacer, spacer damper and warning sphere locations may occur due to poor damper design or incorrect hardware placement. The VIBREC™ 400 offers as an option the possibility of a **remote sensor** and enables vibration measurements at such locations.



A special **PT1A** recorder equipped with a wire displacement transducer can be used for subspan oscillation measurements on lines in operation.

The recorder is set-up for measurement of oscillation amplitude up to ± 381 mm (± 15 inches) and oscillation frequencies in the range $0,2 \div 3,6$ Hz.



Extensive Testing

The VIBREC™ 400 has successfully passed extensive tests such as:

- Vibration test
- Shock test
- Power frequency and impulse voltage test
- Corona test
- High current test up to 1500 A
- Climatic test
- Functional and signal classification tests

Specification

- **Measuring parameters**
Vibration bending amplitude, vibration frequency, wind velocity component perpendicular to the conductor and ambient temperature.
- **Sensors**
LVDT displacement transducer (± 1 mm).
Propeller anemometer (0 to 40 m/sec.).
Silicone temperature sensor.
- **Optional**
Separate LVDT for remote measurements.
Strain gauges for stress assessment.
Wire displacement transducer for subspan oscillation measurements.
- **Frequency range**
0,2 – 200 Hz.
- **Signal detection**
Sampling rate of the signal: 2 kHz.
Amplitude: peak-valley detection from two subsequent extremes.
Frequency: inversion of time lag between two subsequent extremes.
- **Filtering**
Adjustable amplitude filter (default setting: 42 μ m).
- **Data classification**
Events counting and storage in user selectable classes in a matrix with max. 32 amplitudes and max. 32 frequencies. With wind sensor data storage in 3D matrix with 8 user selectable wind velocity classes with automatic correlation of wind data to vibration amplitude/frequency data. Temperature classification in max. 32 classes.
- **Storage memory**
Max. 10^9 events per matrix element.
- **Measurement cycle time**
15 min. default, can be preset from quasi continuous measurement to 8-hours intervals.
- **Sampling duration**
10 sec. default, can be preset from 0 to 65 sec. intervals.
- **Electronics**
Electronic circuits using SMD technology.
Powerful microprocessor allows implementation of user-defined firmware and evaluation algorithms.
Function control by LEDs.
- **Real-time clock**
Built-in real-time clock allows user selectable presetting of automatic start and stop function for measurements.
- **Communication**
Built-in serial interface (RS 232) allows direct connection to PC at 9'600 baud rate. USB port can also be used via a serial/USB adapter.
- **Utility software**
Utility programme Life™ 400 for parameter set-up and data read-out via PC included. It allows graphical presentation and data evaluation including lifetime estimation.
- **Power supply**
3 Lithium batteries (3,6 Volt) size C.
The batteries have a six month life with default settings.
A separate battery for memory backup (3 year life) is installed.
- **Temperature range**
– 40 °C to + 80 °C (–30 °C to + 65 °C with wind sensor)
- **Degree of protection**
IP 66 (DIN).
- **Dimensions**
Aluminium alloy tube, length 306 mm, dia. 70 mm.
- **Weight**
Approximately 1,7 kg including batteries.
- **Test**
Extensive type, routine and field test are performed systematically.