FAG

FAG Detector II – the “mobile” among data collectors

Technical Product Information

SCHAEFFLER GROUP
INDUSTRIAL

Application · Condition-based maintenance · Principle

Application

The FAG Detector II is a vibration measuring device and data collector rolled into one. Together with the PC software Trendline, the device was developed for data collection in offline plant monitoring. The FAG Detector II is easy and comfortable to use. It has a low mass. It is thus suitable for the monitoring of large plants where a measurement round would involve covering a considerable distance. With this device, parameters for vibration acceleration and vibration velocity can be measured in freely definable frequency bands. Machine vibrations are monitored according to ISO 10816 and the rolling bearing condition can be assessed by means of the demodulation detection method. Raw and demodulated signals can be stored and thus more detailed analysis of the vibration signals can be carried out in relation to time and frequency ranges. Imbalance and misalignment can be detected precisely, as can rolling bearing damage and gear problems. In addition, the device is equipped with a temperature measurement probe.

Condition-based maintenance

Condition-based maintenance means: identifying damage at an early stage, defining planned repairs, making optimum use of bearing life, and achieving considerable reduction in costs, in particular those relating to production stoppages. The costs of purchasing a diagnostic device, which is absolutely essential for this type of maintenance, can be recovered in a very short space of time. This is particularly true if the reasonably priced, easy to use and handy FAG Detector II is chosen. The device is also suitable for personnel that have no knowledge of vibration measurement. Use of the device is straight forward and can be learnt quickly. The user can generate individual routes and is then guided systematically from one measurement point to the next. The acceleration sensor is attached to the machine by means of a magnetic foot. At any time, the user can depart from a previously defined “measurement round” and add further measurement points. Data are measured and stored by simply pressing a key.

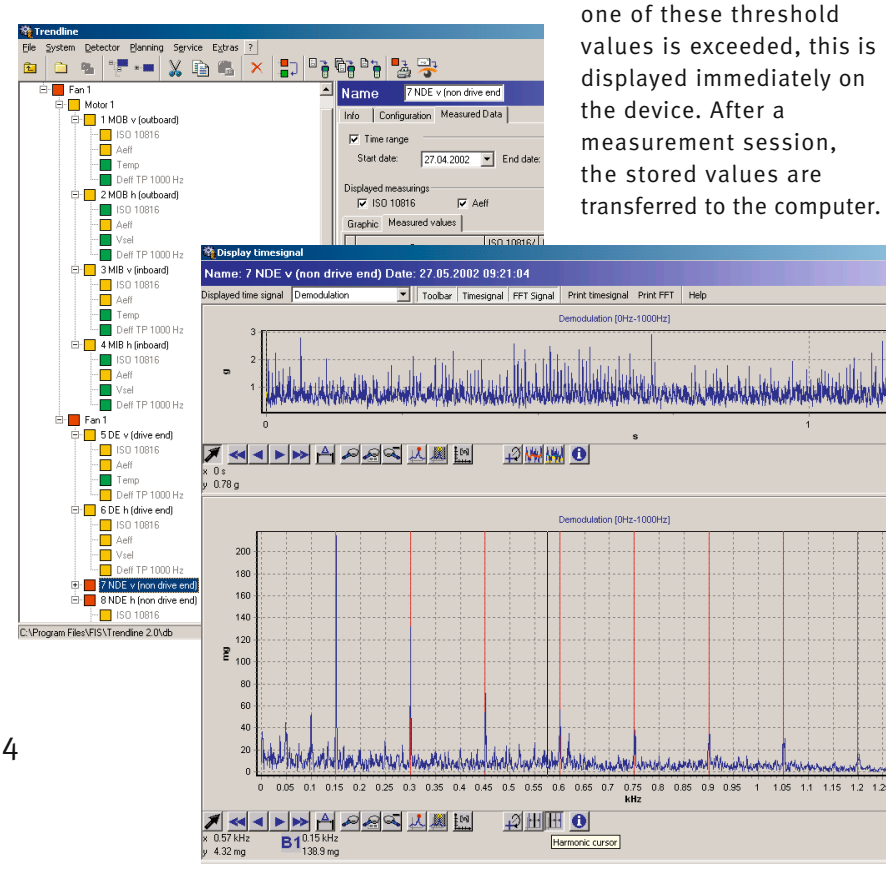
The principle

The FAG Detector II measures vibration signals at predefined measurement points using a sensor and uses these to calculate the RMS values for vibration velocity, vibration acceleration and demodulated acceleration. These values for characterising the machine or component condition are described in further detail in the table on page 6. Frequency bands of any width between 2 Hz and 20 kHz can be defined and monitored. The FAG Detector II has a dynamic memory management system and the base version can store up to 24 time signals. With expanded memory, up to 116 time signals can be stored using the “FIS.DETECTORII.SET.1MB”.

Principle · Operation

With an infrared sensor, this device can also be used for non-contact temperature measurement. After a measurement round, the parameters measured are transferred to a computer for evaluation, analysis and diagrammatic presentation using the software Trendline.
The precise location of the measurement points within the plant to be monitored is filled in the configuration. This also contains the sensor sensitivity and limit values for the main alarm and pre-alarm for each measurement point.
The configuration is generated using the software FAG Trendline and transferred to the Detector prior to measurement.
The sensor must be securely attached as close as possible to the point to be measured. In general, it is attached by means of the screw-mounted magnetic foot.

If this is not possible, for example with an aluminium housing, a small iron plate or support washer with the same size as the magnetic foot is attached to the measurement point. This can be carried out using hard-curing instant adhesives (e.g. cyanoacrylate adhesives).
On the FAG Detector II, this measurement location is selected in the configuration and measurement is started. During measurement, the speed should be constant (at least 120 or 600 min^{-1} are required for Vsel or ISO 10816 respectively).
The device records the sensor signals according to the selected bandwidths and calculates the characteristic values.
For each configuration, the FAG Detector II compares the new measured characteristic values with the defined limit values for main alarm and pre-alarm for this measurement location. If one of these threshold values is exceeded, this is displayed immediately on the device. After a measurement session, the stored values are transferred to the computer.



With the aid of trend analysis, the user can estimate when an alarm will probably be triggered.
When an alarm is triggered, an alarm report can be generated and printed out. In order to ensure comparability of values, they should be recorded under identical conditions. After an initial reference measurement, measurements are carried out at regular intervals.

E-mail button on the FAG Detector II

One very useful feature of the software, particularly for users with little experience of vibration measurement, is the e-mail button. This can be used to send measurement data to a vibration expert by e-mail at the touch of a button. In this way, an external diagnosis expert can be consulted for sophisticated analyses. Our F'IS service department will always be pleased to help you with such analyses.

User friendly

The display on the FAG Detector II shows the user all the information needed to operate the device:
- selection of the measurement point,
- user guidance during measurement,
- display of measurement results,
- the system settings.

The device can be easily operated using just the six keys on the soft keyboard.

Features · Ordering designation and scope of delivery

Features

- If you wish: you collect the data, we carry out a remote diagnosis
- Portable, handy, easy to use diagnostic device
- Low mass – 450 g
- Operation with one hand using 6 keys
- Dust and spray-resistant soft keyboard
- Working temperature 0 to 50 °C
- Automatic switch off after approx. 2 minutes
- Monitoring functions:
  - general vibration condition
  - rolling bearing condition
  - data collector for up to 1200 measurement points
  - headset jack for acoustic noise assessment
- Storage and display of up to 4 measurement values per measurement point for straightforward condition assessment
- Simple PC trend/graphics software with database for WIN 98/NT/2000/XP
- Sensor cable length possible up to 50 m

Ordering designation and scope of delivery

Ordering designation:
FIS.DETECTORII.SET
or
FIS.DETECTORII.SET.1MB

FAG DETECTOR II
Scope of delivery:

- Basic device with storage battery
- Acceleration pickup with magnetic foot
- Temperature sensor
- Power pack
- PC data cable
- User manual
- Protective bag with holder for temperature sensor
- PC software Trendline
- Case
- USB serial adapter

Accessories

- Second attachable bag for holding acceleration sensor
- Sensor extension cables for lengths of 5 m and 15 m are available on request

Selection of characteristic values

Selection of characteristic values

Possible characteristic values and signals for each measurement point	Measurement range/Resolution	Frequency range	Display
Characteristic value: vibration severity to ISO 10816 (VDI 2056) (broadband RMS value of vibration velocity) for general assessment of machine condition according to ISO 10816	**ISO 10816** = 0 – 999,9 mm/s	10 Hz – 1 kHz	Detector and PC
Characteristic value: vibration severity (freely selectable) (RMS value of vibration velocity, e.g. for detection of imbalances and misalignment)	$\mathbf{V_{sel}}$ = 0 – 999,9 mm/s	Freely selectable between 2 Hz and 1 kHz	Detector and PC
Characteristic value: acceleration (broadband RMS value of vibration acceleration, e.g. for monitoring of gearboxes)	$\mathbf{A_{eff}}$ = 0 – 25 g	2 kHz – 20 kHz	Detector and PC
Characteristic value: acceleration (freely selectable) (e.g. for selection gear set monitoring)	$\mathbf{A_{sel}}$ = 0 – 25 g	Freely selectable between 15 Hz and 20 kHz	Detector and PC
Characteristic value: demodulated signal 100 Hz/1000 Hz (RMS value of demodulated signal up to 100/ 1000 Hz, e.g. for monitoring of rolling bearing condition)	$\mathbf{D_{eff/TP100/1000\ Hz}}$ = 0 – 25 g	0 Hz – 100 Hz/ 0 Hz – 1000 Hz	Detector and PC
Characteristic value: demodulated signal 100 Hz/1000 Hz (freely selectable) (e.g. for selective monitoring of rolling bearing condition)	$\mathbf{D_{sel/TP100/1000Hz}}$ = 0 – 25 g	Freely selectable 0 Hz – 100 Hz/ 0 Hz – 1000 Hz	Detector and PC
Time signal of vibration acceleration up to 1 kHz, 4096 values	±25 g	2 Hz at 1 kHz	PC
Time signal of vibration acceleration up to 20 kHz, 4096 values	±25 g	2 Hz at 20 kHz	PC
Demodulated time signal up to 100 Hz, up to 1 kHz	±25 g	0 Hz to 100 Hz 0 Hz to 1 kHz	PC
Frequency spectrum (Fourier transform) of time signal of vibration velocity up to 1 kHz	±999,9 mm/s Resolution: 0,73 Hz	2 Hz to 1 kHz	PC
Frequency spectrum (Fourier transform) of time signal of vibration acceleration up to 20 kHz	±25 g, Resolution: 14,6 Hz	15 Hz to 20 kHz	PC
Frequency spectrum (Fourier transform) of time signal of demodulated signal or up to 100 Hz or up to 1 kHz	±25 g, Resolution: 0,073 Hz (at 100 Hz), 0,73 Hz (at 1 Hz)	0 Hz to 100 Hz or 0 Hz to 1 kHz	PC
Measurement point temperature	**Temp** = –15 °C to 240 °C	–	Detector and PC

On the PC, the user can specify for each measurement point whether and under what conditions certain time signals are to be stored.
Three different time signals can be measured, namely vibration acceleration (2 Hz – 1 kHz, 3 kHz scan rate),
vibration acceleration (2 Hz – 20 kHz, 60 kHz scan rate) and demodulated signal (0 Hz – 100 Hz/1 kHz , 300 Hz/3 kHz scan rate).
The Detector can, depending on the memory size, store 24 or 116 time signals.

Technical data

Device designation	FAG Detector II, ordering designation **FIS.DETECTORII.SET** with expanded memory **FIS.DETECTORII.SET.1MB**
Dynamic memory	max. 1200 measurement points without time signals, Basic version: 256 kbyte, up to max. 24 time signals can be stored, with expanded memory: 1 Mbyte, up to max. 116 time signals can be stored
PC interface	RS 232, baud rate: 38,2 kbps 57,6 kbps
Display	Illuminated graphic display (LCD), 128 × 64 pixels Dimensions: 55 × 33 mm
Inputs	BNC jack for ICP acceleration sensor with adjustable sensitivity: (mV/g), 9 pin jack for pyrometer (IR temperature sensor), 9 pin DIP jack with RS232 interface for PC data cable supplied, Connector for battery charger
Output	Connector for headset with 3,5 mm jack plug (Walkman), signal: demodulated signal
Detector languages	switchable between German, English, French, Dutch, Italian, Turkish, Spanish, Portuguese, Swedish and Finnish, other languages available by agreement
Keyboard	6 soft keys
Manual	German, English and French
Power supply	Rechargeable NiMH batteries
Operating time	Approx. 6 – 8 hours (continuous operation)
Temperature range	0 ... +50 °C (working temperature) –20 ... +70 °C (transport and storage temperature)
Dimensions (basic device)	230 × 70 (53) × 45 (53) mm (L × B × H)
Mass (basic device)	ca. 450 g
Protective bag	Two compartments, black nylon, 2 transparent film windows, openings with velcro fasteners, velcro holders for cable and sensor, carry strap
PC software Trendline	Runs under WINDOWS 98/NT 4.0 SP6/2000/XP • Configuration of FAG Detector II via RS232 interface • Hierarchy-based factory and measurement point manager with machine graphics facility • Generation of any number of measurement routes on PC • Integral database for storage of measurement values • Graphic representation of measurement values and their behaviour, trend analysis and trend extrapolation • Presentation of recorded time signals • FFT presentation of time signals • Report generator for alarms and measurement values • Available in German, English, French and Portuguese (others in preparation)
Temperature measurement	IR temperature sensor, handheld device for non-contact temperature measurement, measurement range –15 ... +240 °C (1 mV/°C/°F), spectral range 8 – 14 µm, minimum target 2,5 mm, distance ratio 4 : 1, connector plug for DETECTOR II

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FAG Kugelfischer AG & Co. oHG

P.O. Box 1260
D-97419 Schweinfurt

Georg-Schäfer-Strasse 30
D-97421 Schweinfurt

Service-Hotline
Phone +49 2407 9149-99
Fax +49 2407 9149-59
www.fis-services.com

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