

**FAG**



**FAG ProCheck  
State of the Art Machine Monitoring  
for Maximum Availability**

**SCHAEFFLER**



# Advantages · Areas of application

## FAG ProCheck

The prevention of unplanned downtime and thereby increasing the availability of machinery represents an increasingly important challenge in the field of maintenance. At the same time, components should not be replaced on a preventive basis but only when a malfunction occurs. In this way, the service life can be used to its optimum and cost savings can be achieved. Modern systems for condition and process monitoring are able to master this mixture of requirements.

FAG ProCheck is a proven online system that has been developed specially for vibration monitoring and quality assurance. Due to its high functionality and versatility, it can be used to monitor plant and components in all conceivable industry segments.

## Advantages of FAG ProCheck

- Early detection and prevention of damage
- Multi-channel measurements and corresponding analyses
- Compact, robust design
- ATEX certification for use in widely varying industrial sectors
- Intelligent algorithms for analysis of measurement data
- Versatile communication interfaces and connection options
- High reliability and security through use of Flash Disk data storage
- Combination of various monitoring parameters for increased reliability.

## Areas of application

FAG ProCheck was developed for the monitoring of rotating components and can be used in almost all industry segments, such as

- paper
- steel and aluminium
- raw material extraction and processing
- energy production
- oil and gas.

This spectrum ranges from applications in which a particularly robust system is required through to use in explosion risk areas.



FAG ProCheck



Gearbox monitoring on a hot rolling line

# Online monitoring · Modularity and flexibility

## Online monitoring and diagnosis

FAG ProCheck is an intelligent online monitoring system. Following installation and configuration, data are measured, recorded and analysed – continuously and on a fully autonomous basis. If the device detects changes in vibration behaviour, this can be outputted via a hardware interface and notified to the customer's PLC. In devices with a digital interface, all the information can be digitally notified to the customer's process control point via the optional Modbus TCP protocol. This gives an enormous reduction in cabling work. Where a Remote Service arrangement with FAG is in place, all data can be sent automatically via the Cloud to the FAG Remote Center. In this case, the customer simply requires one PC to collect and send the data. The software required for this purpose is available free of charge.

## Flexible application possibilities

FAG ProCheck is suitable for the checking of individual machines as well as complete plant. Depending on the variant, the FAG ProCheck has up to 16 sensor channels. By means of additional digital and/or analogue inputs, a wide

range of process information can be recorded and evaluated. Monitoring can be started with a minimal installation which can be expanded at a later stage. All the FAG ProCheck systems in a network can be managed using a central database. This allows central access to all data.



Various monitoring modules (analogue/digital)

# Analysis methods

## Analysis methods

In order to obtain authoritative information from the recorded data, FAG ProCheck uses proven analysis methods.

Broadband parameter monitoring is used to detect changes in the overall vibration behaviour of plant at an early stage, together with selective frequency monitoring. With the aid of selective frequency monitoring, changes in individual components of a machine can be detected and analysed. These changes can be detected and allocated at an early stage on the basis of characteristic patterns in the corresponding signals. The use of the demodulated curve spectrum is of decisive importance here. With the aid of this signal, shock pulses caused by gearbox or rolling bearing problems can be detected and analysed at an early stage.

In time-based broadband monitoring, the following parameters are calculated from the original signal:

- RMS
- crest factor
- peak value
- peak-to-peak
- steady component.

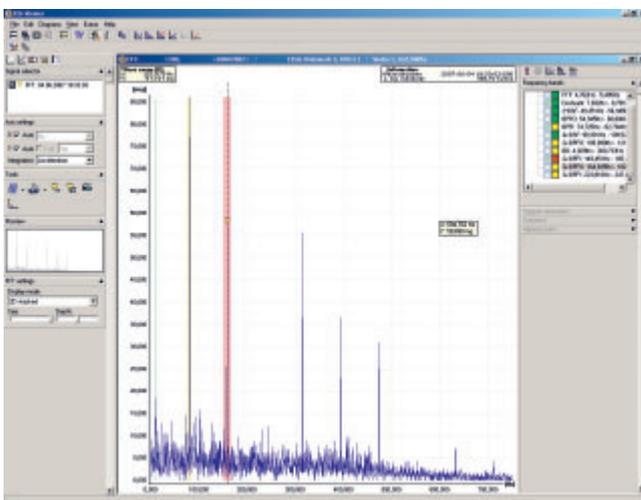
In selective frequency monitoring, the following parameters are used for analysis:

- ISO 10816
- RMS, broadband or selective
- bearing diagnostic value (LDZ), broadband or selective.

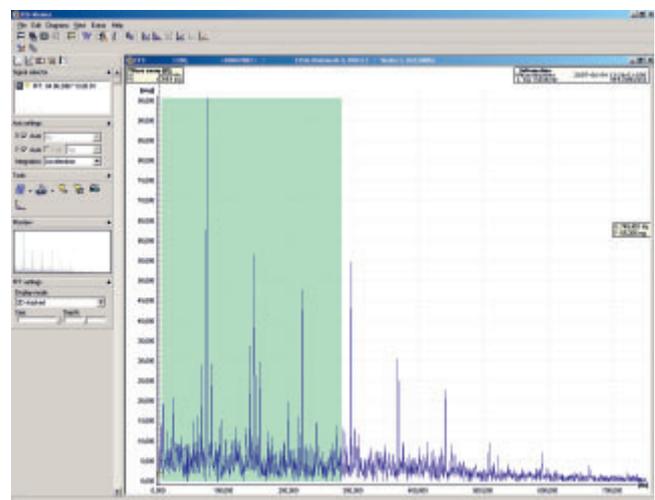
In addition to recording vibration signals, it is also possible to record other process information such as

- temperature
- pressure
- load
- speed
- torque
- oil status/oil quality and correlate these with the vibration data.

This correlation allows more authoritative statements to be made on the condition of the machine.



Viewer: Selective frequency monitoring



Viewer: Broadband monitoring

# Communication · Software

## Communication with a higher level system

For communication with a higher level system, various inputs and outputs as well as Modbus TCP/IP are available.

Additional signals can be received via digital or analogue inputs and used for triggering or validation of measurements. These signals can thus be used as command variables for dependent signal analysis such as alarm threshold control. These signals can also be used to initiate time-controlled or event-controlled measurement tasks and thus control automation of data logging in certain applications.

On the other hand, information such as alarm status can be transferred to a higher level system and held there for further processing.

Communication with FAG ProCheck can be carried out via the following channels:

- network (TCP/IP)
- serial
- modem.

## Cloud

A new addition is the free-of-charge program Transfer Link, which facilitates data transfer via conventional Cloud service providers. These include: Own Cloud, Microsoft Cloud, Google Drive or Amazon Cloud Drive.

If remote service from FAG is required, all data are stored on an in-house Cloud server in Germany.



Simple data exchange via the Cloud

# Software · Functionality

## Software

Successful vibration monitoring of plant is dependent to a large extent on the software. In addition to simple configuration and use of the software, the various data presentation and analysis options are of decisive importance. In order to fulfil this requirement as well as possible, the software Administrator for FAG ProCheck is divided into the following components:

- Configuration Manager
- Remote Server
- Data Link
- E-Mail Link
- Transfer Link

## Configuration Manager

The module is used to configure FAG ProCheck. The following settings are made:

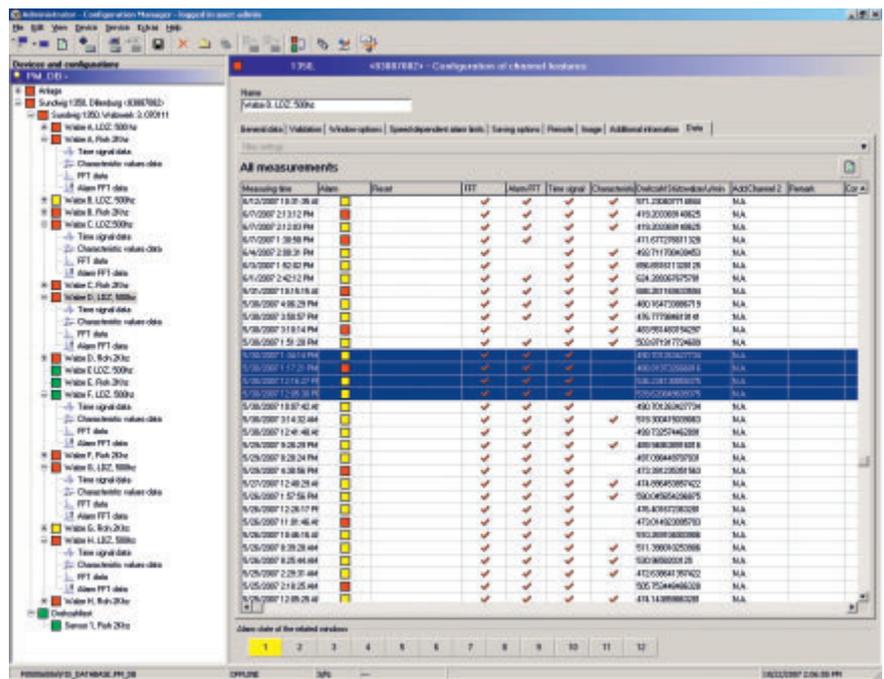
- allocation of connected sensors to particular monitoring configurations
- allocation of additional channels (inputs/outputs) to existing configurations
- definition of the frequency bands to be monitored
- definition of the necessary alarm thresholds

Configuration Manager is the central point for managing the administration of monitoring systems and the database as well as user administration. It can be used to issue a wide variety of access rights in FAG ProCheck. Configuration Manager also provides the alarm list for FAG ProCheck. This records all status changes such as the sending or modification of configurations.

## Remote Server/Data Link/ E-Mail Link/Transfer Link

Remote Server is used to transfer data from FAG ProCheck to the software Administrator. This software module offers the option of transmitting data on either a time-controlled or event-controlled basis. The user can select which measurement values (time signals, frequency spectra or trend values) are transferred from FAG ProCheck and stored in the appropriate database by means of Data Link. This functionality ensures seamless data storage. In order to provide FAG ProCheck data held in the database to other people, the E-Mail Link and Transfer Link functionality is available. E-Mail Link allows the user to define automatic data export by e-mail. The data can be sent to any

number of mailboxes required. At the recipient's end, all incoming e-mails are checked and, if these contain measurement data, they are automatically transferred to the corresponding database. Alternatively, the data can be transferred using Transfer Link via conventional Cloud services.



Configuration Manager: Alarm list

# Software · Functionality

The Viewer is a central visualisation tool that can present the data in diagrammatic form.

In order to offer the user optimum support in viewing and evaluating the data, various analysis methods are used. When using the Viewer, he is additionally supported by a large number of cursor and zoom functions such as differential, harmonic, side band cursors etc.

## • Trend analysis

Trend analysis is a simple and reliable method for assessing changes in the vibration behaviour of machinery. The trends can be based on parameters in broadband monitoring as well as on narrow-band parameters of individual components such as a rolling bearing outer ring or a gear tooth set.

For example, monitoring of an outer ring may be carried out by bringing together several narrowband frequency bands for overrolling frequency and the harmonics to form one parameter.

Incipient damage or a forthcoming problem becomes apparent in an increase in the trend values for a monitored component or machine. Since the information is obtained at an early stage, the user still has sufficient time to react.

## • FFT analysis

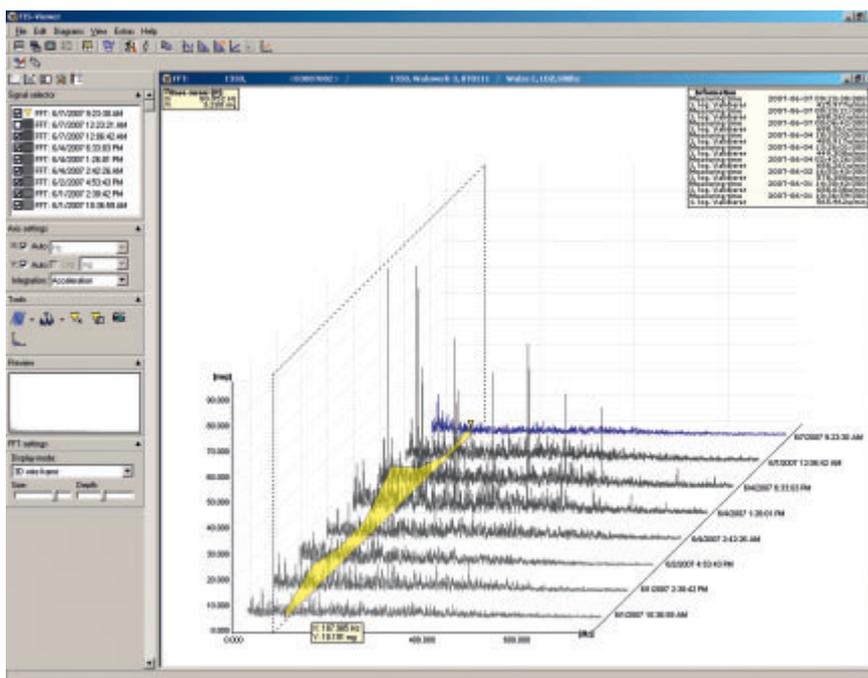
FFT analysis subdivides the recorded signals into their individual frequency components. It is therefore possible to monitor the amplitudes of individual frequencies within narrow bands for specified limit values. If alarm limits are

breached, an alarm is triggered. This subdivision into frequency portions allows very reliable assessment of machinery condition. It is possible to precisely allocate the frequencies to particular components such as bearing rings, gear teeth or to phenomena such as misalignment, imbalance etc.

## • Waterfall diagram and sonogram

These two presentation methods allow transparent visualisation of time-based spectral changes in the vibration behaviour. The waterfall diagram is a presentation method in which the individual FFTs are presented behind each other spatially to give a three-dimensional image. In the sonogram, the development of the spectrum over time is presented by means of colour.

Both presentation options give the user a rapid and simple graphic overview of the development over time of the various frequency portions of the vibration. As a result, the analyses are easily understood even by non-experts in vibration monitoring.



Viewer: Waterfall diagram

## Versions and ordering designations

### FAG ProCheck versions and ordering designations

	PRO-CHECK-12CH	PRO-CHECK-16CH
<b>IEPE channels</b>	12	16 <sup>1)</sup>
<b>Analogue inputs</b>	8	6 <sup>2)</sup>
<b>Analogue current outputs</b>	8	4
<b>Digital outputs</b>	16	–

<sup>1)</sup> Multiplexer

<sup>2)</sup> Inputs AI7/AI8 allocated to sensor OK detection

## Technical data

### Vibration inputs

<b>Sensor channels</b>	12 channels, 16 channels with multiplexer
<b>Parallel measurement</b>	4 channels or 2 channels for multiplexed systems
<b>Sensoren</b>	IEPE acceleration sensors
<b>Measurement range</b>	± 10 V
<b>Sensor power supply</b>	4,7 mA at 24 V

### Analogue measurements

<b>Measurement functions</b>	Time signal, spectrum, demodulated signal, acceleration (RMS), velocity (RMS), displacement (RMS)
<b>Parameters in time range</b>	RMS, peak, peak-to-peak, crest factor, steady component
<b>Parameters in frequency range</b>	ISO 10816, bearing diagnosis value LDZ (broadband/selective), RMS (broadband/selective)

### Signal processing

<b>Lines</b>	max. 25 600
<b>Low passes</b>	5, 10, 20, 50, 100, 200, 500 Hz / 1, 2, 5, 10, 20 kHz
<b>Scanning rate</b>	50 kHz
<b>Dynamics/resolution</b>	120 dB / 24 Bit
<b>FFT averaging</b>	RMS, Peak Hold
<b>High passes</b>	250, 750, 2 000 Hz

### Inputs (analogue or digital)

<b>Input range</b>	± 10 V
<b>Resolution</b>	12 Bit
<b>Quantity</b>	max. 8
<b>Scanning rate</b>	analogue 50 Hz–10 kHz, digital 50 kHz

### Communication with process control point

<b>Recording</b>	Modbus TCP/IP (optional)
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## Technical data

### Outputs

<b>Switching outputs</b>	max. 16, 6–30 V, source, 750 mA (24 V)
<b>Current outputs</b>	max. 8, 16 Bit, 0–20 or 4–20 mA

### Memory

<b>RAM</b>	64 MB
<b>Memory</b>	512 MB (Flash Disk)

### Interfaces

RS 232 (max. data rate 115 KBit/s)  
Ethernet 10/100 MBit/s (IEEE 802.3)

### Approvals

- CE
- GOST
- ATEX by agreement

### Other information

<b>Dimensions with housing</b>	400×300×190 (W×H×D)
<b>Mass</b>	7,5 kg
<b>Protection class</b>	IP 65 (in housing), IP 40 (only for National Instruments hardware)
<b>Operating temperature</b>	–40 °C to +70 °C (only for National Instruments hardware)
<b>Voltage power supply, power consumption</b>	9 to 35 V, 17 W (only for National Instruments Hardware) 18 to 30 V, max. 48 W (in housing) 115 to 230 V, max. 50 W (with power pack)
<b>Software</b>	Administrator (updates on Internet) Compatible with Windows 7 (32bit and 64bit) and Windows 8 (32bit and 64bit) Available in: German, English
<b>Mass</b>	7,5 kg

### SQL Server

Microsoft® SQL Server® 2012 Express, database: 10 GB

# Everything from a single source – Customised monitoring solutions for everyone

## Everything from a single source – customised monitoring solutions for everyone

The Schaeffler service function is a full service supplier in the field of condition-based maintenance. With the sourcing of high quality FAG products, the customer thus gains access to a range of product-related services (see diagram). Based on many years' experience, Schaeffler knows that customers wishing to change to the concept of continuous condition monitoring have differing needs and requirements. We therefore offer a com-

prehensive portfolio of products and services containing both standard and customer-specific solutions that are always developed in close partnership with the customer.

The service portfolio for continuous condition monitoring covers the following areas:

- consultancy
- installation
- commissioning
- system support
- continuous and regular measurements.

The customer decides which of the available services he wishes to use. For example, he can choose to have complete monitoring of his

plant by Schaeffler service experts or to have his employees qualified for independent monitoring at their own responsibility through training. Whichever service is selected, the Schaeffler team of experts is available to assist the customer at any time. If you have any further questions on our services, please contact us direct or visit our website.



for remote configuration and analysis of measurement data

**E-service**



**Support hotline**



**Training**

**Free software updates**



Services for FAG ProCheck

## Notes

## Notes



**Schaeffler Technologies  
AG & Co. KG**

Postfach 1260  
97419 Schweinfurt  
Germany

Georg-Schäfer-Straße 30  
97421 Schweinfurt  
Germany

Phone +49 2407 9149-66

Fax +49 2407 9149-59

E-Mail [industrial-services@schaeffler.com](mailto:industrial-services@schaeffler.com)

Internet [www.schaeffler.com/services](http://www.schaeffler.com/services)

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