



From software version 3.2.0
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Manual

Table of Contents

1	Welcome	7
2	General	9
2.1	About this documentation	9
2.2	Mode of functioning	9
2.3	Intended use	12
2.4	Scope of delivery	13
2.5	Characteristic values	15
2.6	Statement of Conformance to electrical safety and EMI requirements	17
3	Trendline 3	18
3.1	Program installation	18
3.1.1	System requirements	18
3.1.2	Trendline software installation	19
3.1.3	Detector Flash Updater installation	22
3.1.4	MSDE installation	24
3.1.4.1	..Registering databases at the MSDE/SQL server	27
3.1.5	Uninstalling	29
3.2	User interface	30
3.2.1	Main window	30
3.2.2	Menu bar	31
3.2.3	Toolbar	33
3.3	First steps	34
3.3.1	Adding a sensor	34
3.3.2	Installing USB-serial converter	36
3.3.3	Balancing activation	38
3.3.4	Register new detector	40
3.4	Setting up configuration	42
3.4.1	Enter system tree	42
3.4.2	Automatic assignment of RFID tags to measuring points	43
3.4.3	Create a measuring point	45
3.4.4	Setting characteristic values	50
3.4.5	Editing / deleting sensors	52
3.4.6	Managing measurement comments	52
3.4.7	Add balancing configuration	53
3.4.8	Setting up run up/coast down	61

3.4.9	Change alarm levels automatically	65
3.4.10	Send configuration	67
3.4.11	Deleting the Trendline database	68
3.5	Bearing database.....	68
3.5.1	Search bearing	69
3.5.2	Add bearing	71
3.5.3	Edit / delete bearings	72
3.5.4	Exporting / importing bearings	74
3.5.5	Manage groups	75
3.5.6	Add manufacturer	78
3.5.7	Edit / delete manufacturer	78
3.5.8	Select a different bearing database	80
3.6	Create a route.....	82
3.6.1	Create a new route	82
3.6.2	Create template	83
3.6.3	Send route	84
3.7	Download data from Detector.....	85
3.7.1	Sorting Wizard	86
3.8	Viewing measuring data.....	88
3.8.1	Measured values	88
3.8.2	Graphic	91
3.9	Reset Alarm Status.....	92
3.10	Delete measured data.....	93
3.11	EService.....	94
3.11.1	Before starting	94
3.11.2	Send data	94
3.12	Create reports.....	95
3.12.1	Measurement report	96
3.12.2	Alarm Report	100
3.12.3	Route report	102
3.12.4	Balancing report	102
3.12.5	Creating a run up/coast down report	104
3.13	Importing and exporting data.....	105
3.13.1	Importing data from a Trendline 3.x database	105
3.13.2	Export wizard	105
3.13.3	Export a measuring point	106
3.13.4	Import and export between different workstations	110
3.14	Program settings.....	110
3.14.1	General	110
3.14.2	Database	111

3.14.3 Report	111
3.14.4 E-mail	112
3.14.5 Data view	113
3.14.6 Automatic export	113
4 The FIS-Viewer.....	114
4.1 The working interface.....	114
4.1.1 Interface areas	114
4.1.2 Toolbar	115
4.1.3 Tools	116
4.1.4 Diagram display	122
4.1.5 Cursor and measuring information	123
4.1.6 The diagram information bar	125
4.2 Working with the Viewer.....	128
4.2.1 Displaying several diagrams simultaneously	128
4.2.2 Modifying the appearance of a diagram	128
4.2.3 Using the mouse to control the cursor or zoom function	132
4.2.4 Zoom tools	132
4.2.5 Cursor tools	137
4.2.6 Positioning of base cursor	144
4.2.7 Modifying the cursor properties	145
4.2.8 Other tools	151
4.2.9 Using the diagram information bar	152
4.2.10 Exporting data via the clipboard	160
4.2.11 Viewer settings	160
4.3 Keyboard shortcuts.....	171
5 Detector III.....	174
5.1 Detector display.....	174
5.2 Keyboard.....	174
5.3 Explanation of the symbols.....	175
5.4 Connectors.....	176
5.5 Accumulator.....	176
5.6 Switching on and off.....	178
5.7 Main menu.....	178
5.8 Data transfer.....	181
5.9 Measuring procedure.....	182
5.10 CM-measurement.....	182
5.10.1 Selection of measuring point	183
5.10.2 Measuring procedure	185

5.10.3	Display of values measured	185
5.10.4	Viewing time signals on the Detector display	186
5.10.5	Display of the FFT on the Detector display	187
5.10.6	Repeated measurements	188
5.10.7	Measuring with temperature sensor	188
5.10.8	Using the headset	189
5.11	Balancing measurement.....	189
5.11.1	Measuring rotational speed	194
5.11.2	Reference run	194
5.11.3	Trial run	195
5.11.4	Display coefficients and apply balance weights	197
5.11.5	Trim run	198
5.12	Determining the resonance range of a machine.....	199
5.13	Free measurement.....	201
5.14	System messages and their meaning.....	205
5.15	Update firmware.....	208
6	Special information.....	211
6.1	Time signals.....	211
6.2	Frequency selective characteristic values.....	212
6.3	Dynamic memory management.....	213
6.4	Analog branches in the Detector III.....	214
6.5	Establishing a data connection.....	214
7	Appendix.....	216
7.1	General information on vibration monitoring.....	216
7.1.1	Introduction	216
7.1.2	Frequency analysis	217
7.1.3	Demodulation analysis	218
7.1.4	Vibration characteristic values	227
7.1.4.1	...Arithmetic mean value.....	228
7.1.4.2	...Peak values (peak, peak to peak).....	228
7.1.4.3	...Root mean square (RMS).....	228
7.1.4.4	...Broad band RMS value.....	229
7.1.4.5	...Selective RMS value.....	229
7.1.5	Bibliography	230
7.2	Principles of non-contact temperature measurement.....	231
7.2.1	Introduction	231
7.2.2	Advantages of using IR thermometers	231
7.2.3	Infrared measuring system	232

7.2.4	Target	232
7.2.5	Handling the pyrometer	236
7.2.5.1...	Distance to spot size ratio.....	236
7.2.5.2...	Emissivity.....	237
7.2.5.3...	Measurement considerations.....	237
7.2.6	Bibliography	237
8	Technical data.....	239
Index	239

1 Welcome



Overview

The FAG Detector III¹⁷⁴ is a vibration measuring device, data collector and operational balancing device in one. Together with the Trendline 3¹⁸ software, the device allows improved planning of maintenance and increased machine availability.

Machine vibrations are a good indicator of a machine's condition. With the aid of Detector III, you can monitor machine vibrations according to ISO 10816 and roller bearing condition by means of the demodulation detection method. The base curve and demodulation signals stored in the system can then be used to analyze the signals in the time and frequency range. This permits detection of alignment errors and imbalance as reliably as roller bearing damage or gearing problems. Other process parameters that can be recorded are temperature and rotational speed.

Applications

Measuring and analyzing machine condition

The FAG Detector III records vibration signals at pre-defined measuring points by means of a sensor and then calculates the effective values for velocity, acceleration and demodulation. These characteristic values¹⁵ describe the condition of the machine and component.

You can define and monitor frequency bands of any frequency width in the range from 0.1 Hz to 20 kHz. FAG Detector III can save up to 1600 measuring points and up to 270 time signals. Once a measuring round has been finished, all data recorded are transferred to the Trendline software, where they are evaluated, analyzed and displayed.

Balancing with the Detector III (available as accessory function)

There are many and diverse reasons for unscheduled machine standstills. However, a considerable number of these is due, directly or indirectly, to imbalance or alignment errors. During operation, imbalance may cause severe vibrations, that can lead to consequential damage, for example premature bearing wear or fatigue-induced breaks. The result is machine failure and thus unscheduled production downtime.

The FAG Detector III is a tool with which you can not only detect but also remedy such conditions easily and efficiently. The easy user interface provides good support during the balancing process. Step by step, the device software guides the user through the balancing process. The user can create a configuration for each balancing process with the Trendline software. Furthermore, he can define templates that can be adapted on site on the machine. The balancing results are sent to the Trendline software. You can display them there in table form or as a diagram.

Analyzing data with the Trendline bearing database

The integrated bearing database (approx. 20,000 bearings from various manufacturers) simplifies and speeds up analysis of measured data in combination with the FIS-Viewer^[114]. It allows you to detect any irregularities at first glance and assign the appropriate components. You can save multiple bearings per measuring point. This allows you to check multiple bearing ball-pass frequencies at a measuring point. Every user can add new entries to the bearing database to suit individual needs.

2 General

2.1 About this documentation

This documentation describes the functionality of the Detector III and the Trendline software. It explains:

- how to create configurations⁴² or measuring routes⁸² on a computer and transfer these to the Detector;
- how to use the device to record measuring data;
- how to transfer data from the Detector to the computer and
- how data can be analyzed and stored.

The appendix also contains an introduction to the basic principles of vibration monitoring²¹⁶ and a brief description of the subject "Temperature measurement with the Detector III²¹⁶".

Safety information symbols

DANGER Safety symbol



This safety symbol warns you of material damage and dangers to health, life-threatening injuries and death.

General information symbols



This symbol indicates

- *helpful additional information and*
- *device settings or application tips that help you perform tasks more efficiently.*

Cross-reference symbol⁹: This symbol indicates a page in the manual with more detailed information. If you are reading the manual on screen in PDF format, you can jump to this page by clicking the word to the left of the cross-reference symbol.

2.2 Mode of functioning

Detector III is a hand-held measuring instrument with data recording function for offline monitoring of systems and machinery (condition monitoring). For this purpose, the instrument senses vibrations at pre-determined measuring points using a detector and works out the RMS values of vibration velocity, acceleration in vibration and demodulation, the so-called characteristic values, for characterizing machine or component condition. In addition, Detector can measure

temperatures using an infra-red sensor.

- Once a measuring round is finished, the measured characteristic values and any recorded time signals are transferred to a computer where they are evaluated, analyzed and graphically depicted using the Trendline software¹⁸¹.
- The exact location of the measuring point within the system to be monitored is stored in the configuration⁴²¹. There, the sensor sensitivity for each measuring point and the threshold values for main or preliminary alarm are stored as well. The configuration is created using the Trendline software¹⁸¹ and transferred to the Detector prior to measuring.
- For measuring, the vibration sensor is fixed to a pre-determined measuring point with the help of a magnet footing. If this is not possible due to the housing material (e.g. aluminum), attach an iron plate or a washer the size of the magnetic at the measuring point. This is easiest done with the help of a fast-curing superglue (e.g. cyan acrylate glue).
- The configuration of the measuring point is selected on the Detector and the measuring started. Detector records the sensor signals broadband and works out the characteristic values. These characteristic values are stored and transferred to the computer once the measuring round is finished.
- For each measuring point, the newly measured characteristic values are compared with the threshold values determined for this measuring point for a main alarm and pre-alarm. The Detector (main alarms) and the Trendline software (main and pre-alarms) display the threshold events. New characteristic values are stored. You can depict them graphically in the Trendline software depending on time of measuring.

In addition to the condition monitoring measurement (subsequently referred to as CM measurement¹⁸²) the Detector III also masters what is known as operation balancing. During this process the Detector helps you find the optimum position of balancing weights when carrying out the balancing measurement¹⁸⁹. These weights serve to compensate for imbalances in rotating parts and therefore extend their service life.

Before you start

Ferrit modules will reduce electromagnetic fields from the device which could otherwise affect other electronic devices in the vicinity.

You will receive three ferromagnetic modules with the RFID-Kit or the RFID-Detector. The ferrit modules have to be fasten to the three sensor cables (cable for the acceleration sensors as well as for the trigger sensor) of the Detector.



Ferrit module

Proceed as follows:

1. Put the sensor cable into the groove of the ferrit.
2. Adjust the cable so that the rim of the ferrit modul is placed addording to the picture. Please note that the ferrit module should be placed as close as possible to the Detector.
3. Close the retractable ferrit module enclosing the cable firmly till it engages.



Ferrits fasten at the sensor cables

2.3 Intended use

Disposal information

Neither the Detector nor the associated components may be disposed of via domestic waste as they contain electronic components and NiMH accumulators that must be disposed of in the proper manner. Please return them to us so that we can ensure disposal in keeping with legal and environmental requirements. Returning used devices is an important contribution to environmental protection.

Information to the user

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada

This Class A digital apparatus complies with Canadian ICES-003.

2.4 Scope of delivery

DETECT3-KIT



- Base unit with accumulator
- Accelerometer with magnetic foot
- Infrared temperature sensor
- Battery charger with travel adapter
- PC data cable (serial/USB)
- Manual
- Protective bag with temperature sensor holder
- Trendline PC software
- Case

DETECT3.BALANCE-KIT



- Acceleration sensor with magnetic foot and sensor cable
- Trigger sensor (optical and inductive)
- Scales
- Magnetic holder for trigger sensor
- Extension stick for magnetic holder
- Cable for trigger sensor (length 10 m)
- Reflex mark for optical trigger sensor
- Dongle for activating the balancing function
- Case

RFID KIT

- Base unit with accumulator and RFID reader
- 5 RFID tags
- Accelerometer with magnetic foot
- Infrared temperature sensor
- Battery charger with travel adapter
- PC data cable (serial/USB)
- Manual
- Protective bag with temperature sensor holder
- Trendline PC software
- Case

Accessories

Sensor extension cable (5m and 15m length), sensor bases and rail magnet available on request.

2.5 Characteristic values

Detector III can store up to 4 different (or same just as well) characteristic values per measuring point. The following characteristic values can be selected:

Characteristic value	Meaning
ISO 10816	RMS value of vibration velocity Frequency range: 10 Hz to 1 kHz Unit: mm/s
v_{sel}	RMS value of vibration velocity with freely selectable upper and lower limiting frequency Frequency range: 0.3 Hz to 20 kHz (depending on the lowpass frequency) Unit: mm/s
a_{eff}	RMS value of acceleration in vibration Frequency range: 2 Hz to 20 kHz (depending on the lowpass frequency) Unit: g
a_{sel}	RMS value of acceleration in vibration with freely selectable upper and lower limiting frequency Frequency range: 0.1 Hz to 20 kHz (depending on the lowpass frequency) Unit: g
d_{eff}	Demodulation signal of acceleration in vibration with switchable low-pass Frequency range: 0.1 Hz to 20 kHz (depending on the lowpass frequency) Unit: g
d_{sel}	RMS value of demodulation in vibration with freely selectable upper and lower limiting frequency Frequency range: 0.1 Hz to 20 kHz (depending on the lowpass frequency)

Characteristic value	Meaning
	Unit: g
T	Temperature Range: -20°C to +550°C Unit: °C
Crest factor	Ratio between peak value and RMS value (Crest factor = peak value / RMS value)



In addition to the aforementioned characteristic values, you can also measure rotational speed.

2.6 Statement of Conformance to electrical safety and EMI requirements

Declaration of conformity as per the Radio and Telecommunication Transmitter Devices Act (FTEG) and Directive 1999/5/EC (R&TTE)

The manufacturer:

F'IS, FAG Industrial Services GmbH
Kaiserstraße 100
D-52134 Herzogenrath Germany

declares that the product:

Detector III
Radio installation

Purpose:

RFID application

Device category:

Category 1

corresponds to the basic requirements of §3 and the other relevant provisions of FTEG (article 3 of R&TTE) if used for the intended purpose.

Health and safety as per § 3 (1) 1. (article 3 (1) a))

Harmonised standards used: EN 60950-1: 2001, EN 50364: 2001

Protection requirements with regard to EMC § 3 (1) 2, article 3 (1) b))

Harmonised standards applied: ETSI EN 301 489-3 V1.4.1

Measures for efficient use of the radio frequency spectrum

Harmonised standards applied: ETSI EN 300 330-2 V1.3.1.

This statement of conformance is issued based on testing the EMC aspects of a representative product sample of the above mentioned product in conformance with the following standards:

ETSI EN 301 489

ETSI EN 300 330

EN 61000-6-2

EN 61000-6-4

EN 60950-1

FCC Part 15

Measuring device identifier: CE

Herzogenrath, 22.06.2007



Dr.-Ing. Bernd Geropp
Geschäftsführer



i.V. Dipl.-Ing. Götz Langer
Entwicklungsleiter

3 Trendline 3

The Trendline software is the server-based program for the Detector III. The Detector itself is designed only for the recording of measured values. All data organization and evaluation tasks are carried out by the Trendline software.

The monitoring of a system is configured using the software which also evaluates, analyses, and stores the measuring data delivered by the Detector.

Further, Trendline 3 manages the exchange of data between the server on which the software is running and the Detector.

3.1 Program installation

In addition to the application program, the Trendline software requires the MSDE database server. It must be installed either on the local computer or on a network server. If you are already using an MSDE database server, you can register the databases with this.



Please note that you need Administrator permissions for your computer to install the Trendline software completely. If you do not have these permissions, ask your system administrator. For example, you can install the software with Administrator permissions and then switch back to a normal user.

3.1.1 System requirements

In order to use the Trendline software in an optimum way, the following minimum requirements must be met:

General system requirements

- Pentium III PC with 500 MHZ (recommended: 1 GHz)
- at least 512 MB RAM (recommended: 1 GB)
- Screen resolution: 1024x768 (pixels)

Operating systems

- with MSDE 2000: Windows 2000, Windows Server 2003, Windows XP



Please note that the Trendline software does not yet run on Windows Vista.

Hard disk memory for installing the Trendline software

- Trendline software 3.2 (without database and database server): 62 MB

- Detector Flash Updater: 4 MB
- Demo database and bearing database: 20 MB

Hard disk memory for installing the database server

- MSDE 2000: 50 MB

Hard disk memory for the database

- MSDE 2000: at least 2 GB (recommended: 6 GB)

Other requirements

- Microsoft Internet Explorer 6.0 SP1 or later

3.1.2 Trendline software installation

Please insert the Installation CD. If you do not have a CD, you can download the current version of Trendline from our website (www.fis-services.de).

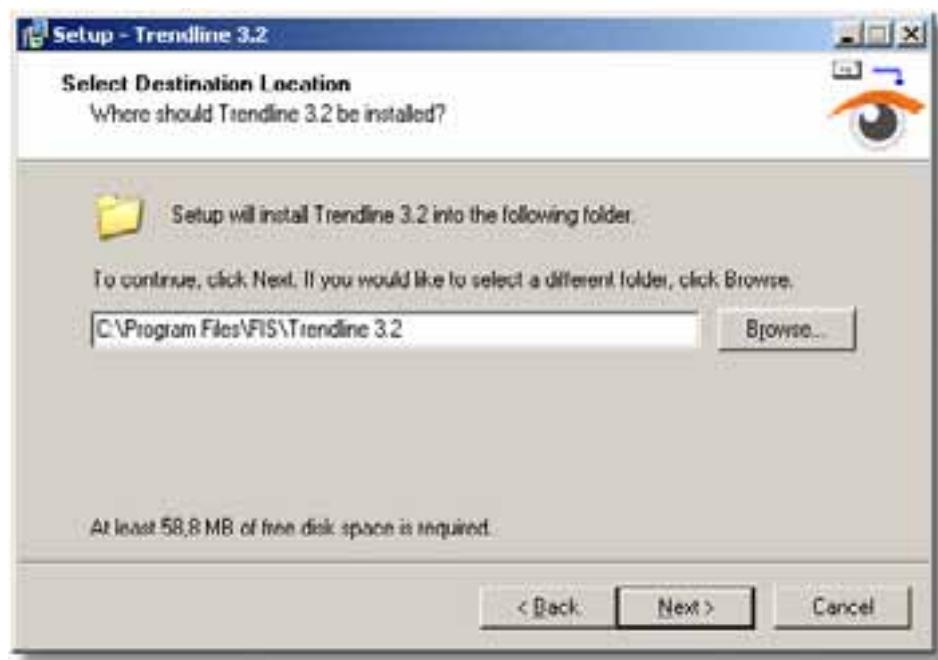
If the installation program does not start automatically you can start it manually using Windows Explorer:

1. Open **My computer**.
2. Under **Equipment with removable media** click the right-hand mouse button on the CD-ROM drive then click **Open**.
3. Start the Trendline installation file (Trendline-Setup-3.2.exe) by doubleclicking on it.
4. Please select the language to install the Trendline software. You can change the language settings  at any time after installing.

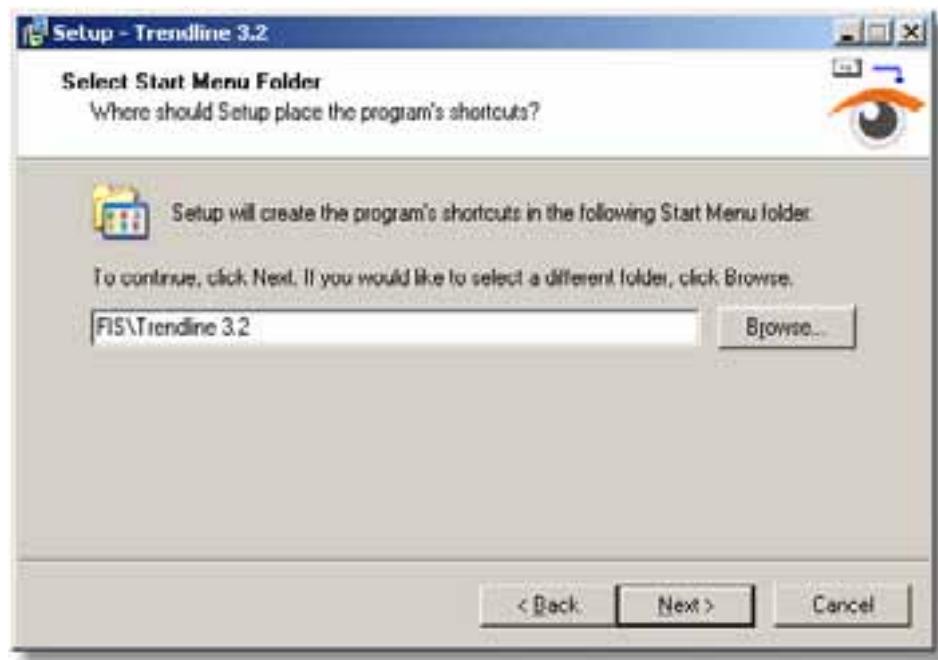
The Setup Wizard guides you through the rest of the installation:



5. Select the directory where you want to install the software and click **Next**.

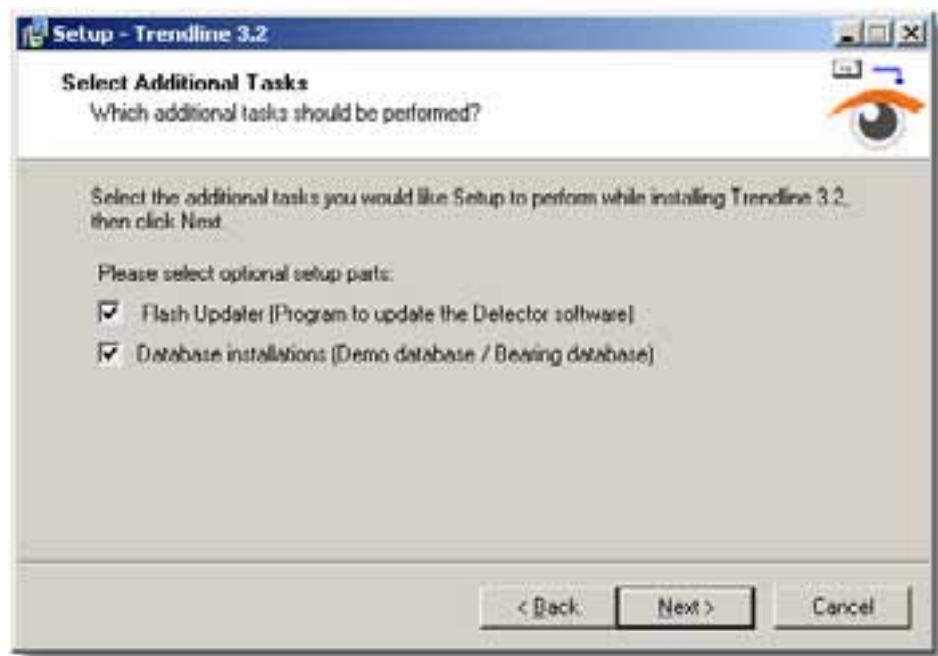


6. Select the Start menu directory to create the program link. Click on **Continue**.



7. Optionally, you can select other components of the Trendline software to install. To do so, check the checkbox next to the option

- Flash Updater** to update the Detector firmware ²⁰⁸
- Database installations** to install the demo database and/or bearing database and click **Continue**.





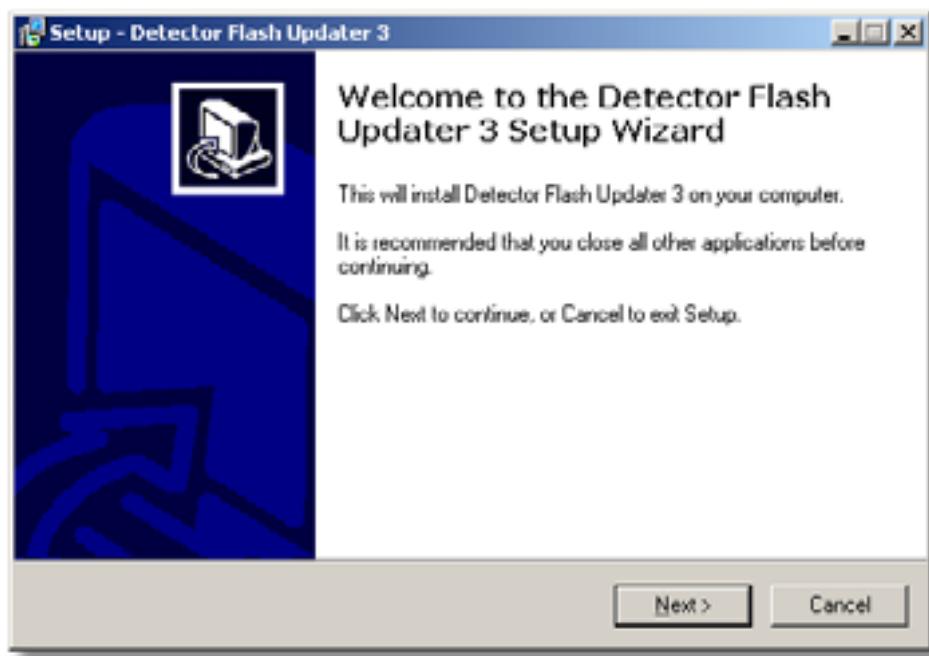
Please note that the Trendline software requires MSDE (Microsoft SQL Server 2000 Desktop Engine)!

8. In the next window check your settings and click **Install** or **Back** to correct your settings.

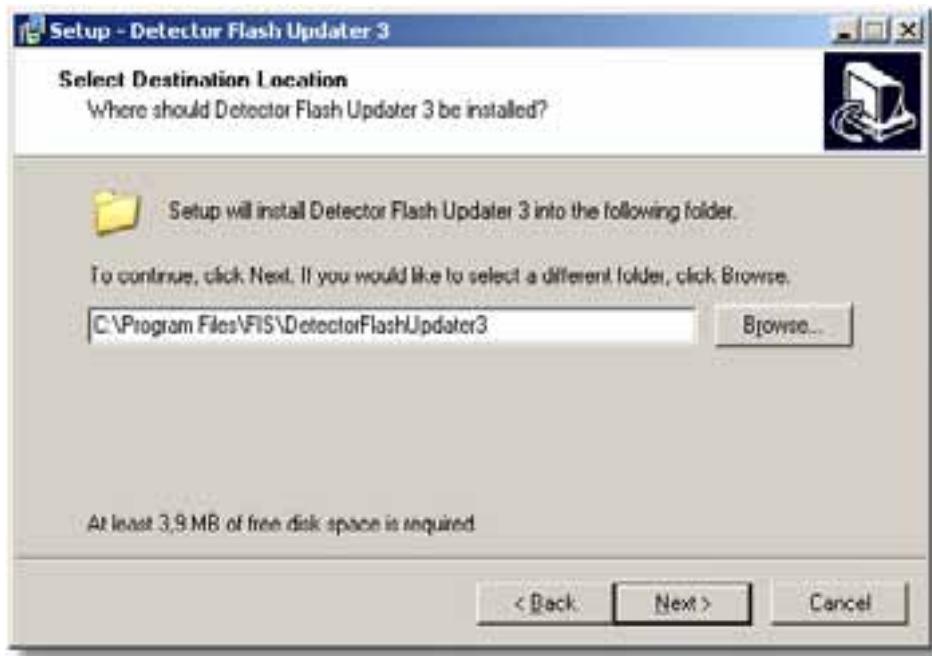
This installs the Trendline software.

3.1.3 Detector Flash Updater installation

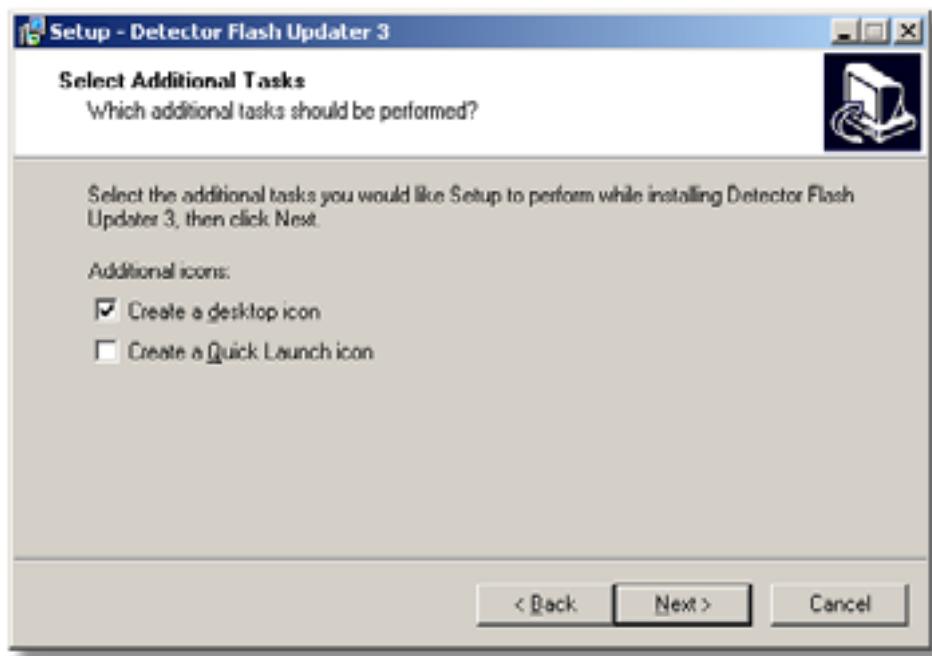
If you selected **Flash Updater** when you installed the Trendline software, the Setup Wizard automatically starts installation:



1. Select the directory where you want to install the software and click **Next**.



2. Optionally, you can add program icons on the desktop or to the quick launch bar. To do so, check the checkbox next to the option
 - a) **Create a desktop icon** to add a shortcut on your desktop
 - b) **Create a Quick Launch icon** to add a symbol to the Quick Launch bar next to the Start button
 and click on **Next**.

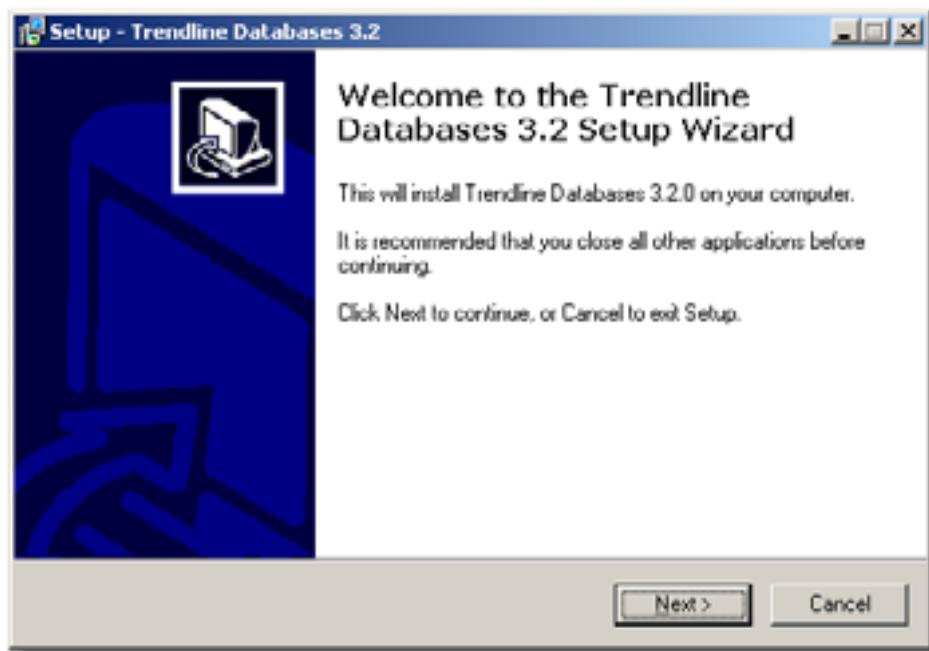


3. In the next window check your settings and click **Next** to install the Detector

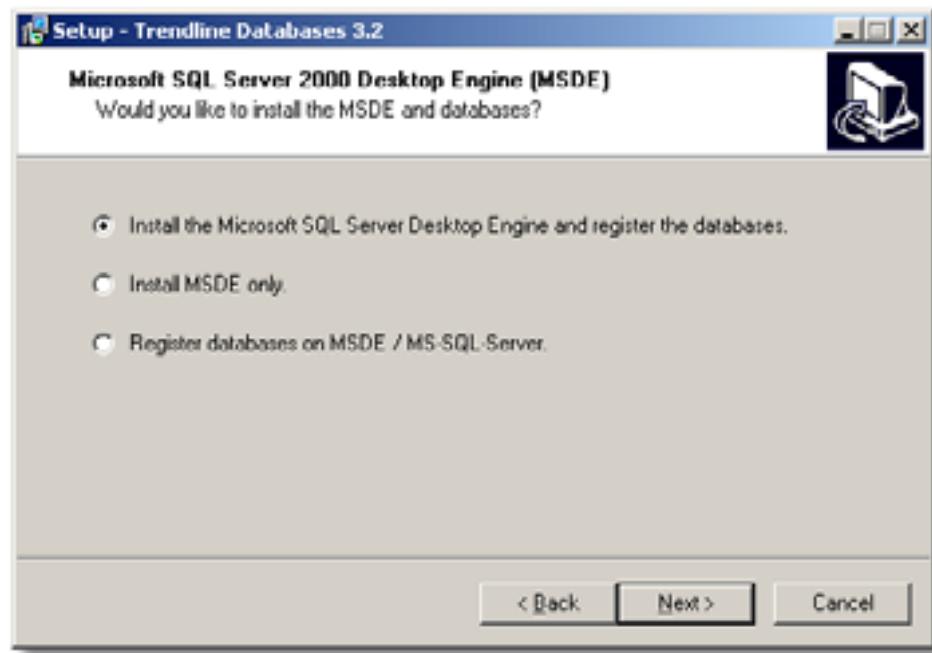
Flash Updater or **Back** to correct your settings.
This installs the Detector Flash Updater.

3.1.4 MSDE installation

If you selected **Database installation** when you installed the Trendline software, the Setup Wizard automatically starts installation:

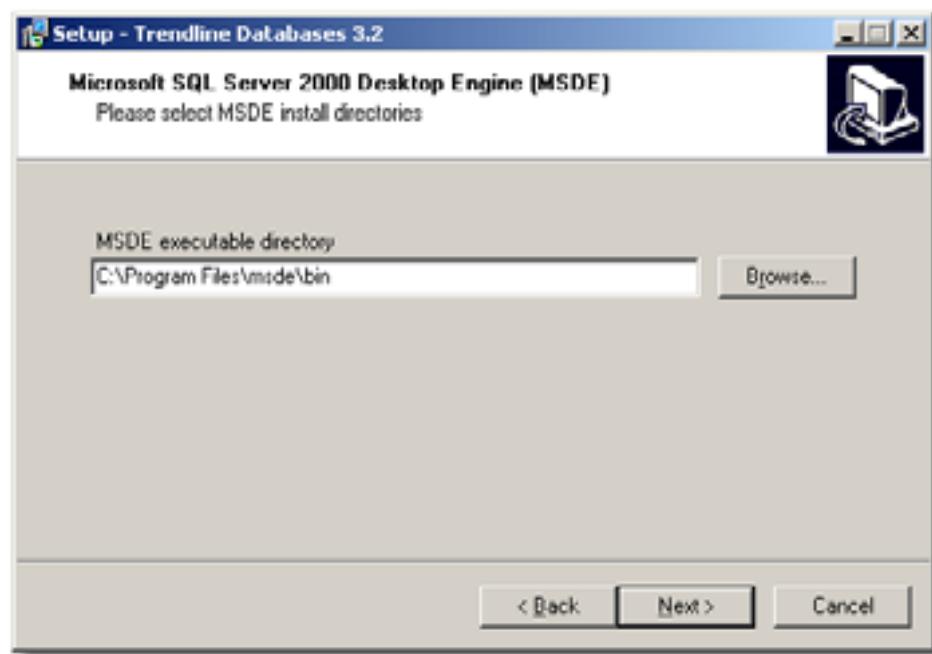


1. Please select whether you want to
 - a) **install MSDE and register database**,
 - b) **only install MSDE** or
 - c) **register databases with an existing MSDE/SQL server** and click **Continue**.

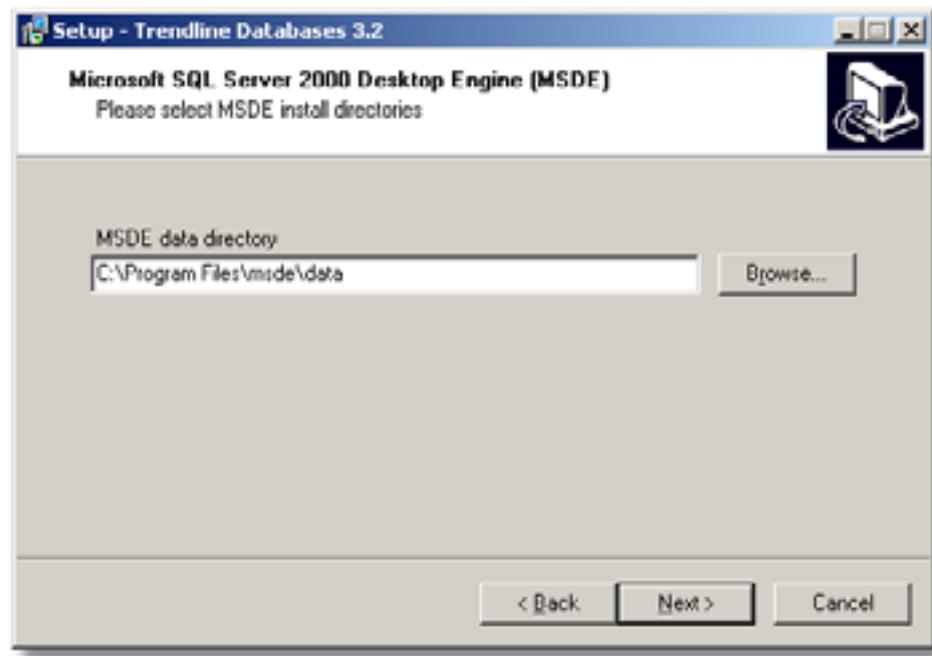


If you selected **Register databases with MSDE/SQL server**, please continue with registration [27](#).

2. Select the directory in which you want to install the database server. Click on **Continue**.

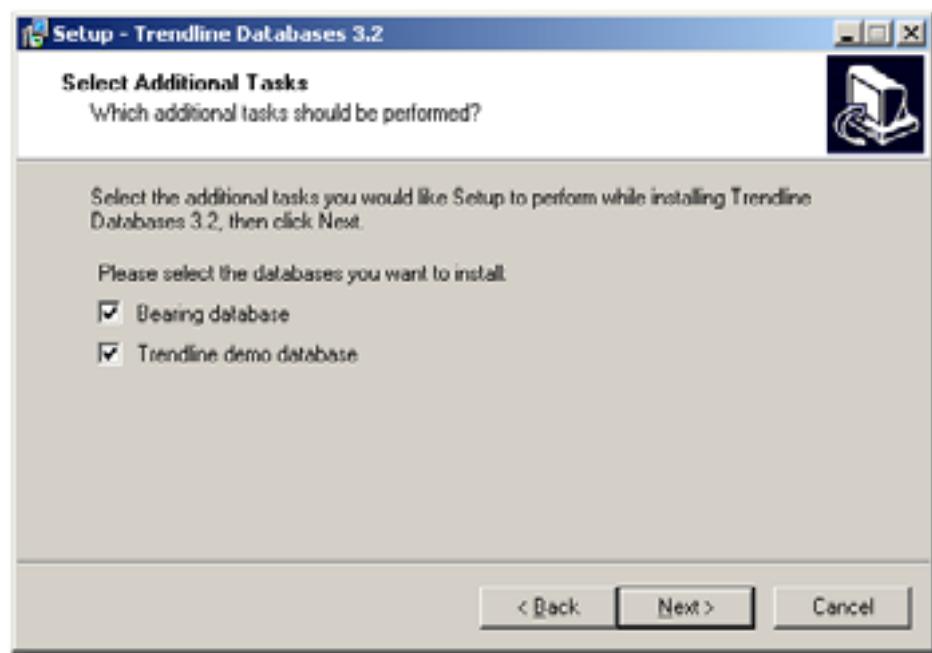


3. Select the directory in which you want to install the MSDE database. Click on **Continue**.



4. Optionally, you can select additional databases to install. To do so, check the checkbox next to the option

- a) **bearing database** ⁶⁸ to install the most common bearings in a database
- b) **demo Trendline database** to install a database with demo data and click **Continue**.



This installs the Microsoft SQL Server 2000 Desktop Engine (MSDE) with the selected databases.

5. Click **Finish** to close the Setup Wizard.

3.1.4.1 Registering databases at the MSDE/SQL server

If you selected **Register databases with the MSDE/SQL server**, you must connect the databases (Trendline and bearing database) to the MSDE/SQL server:

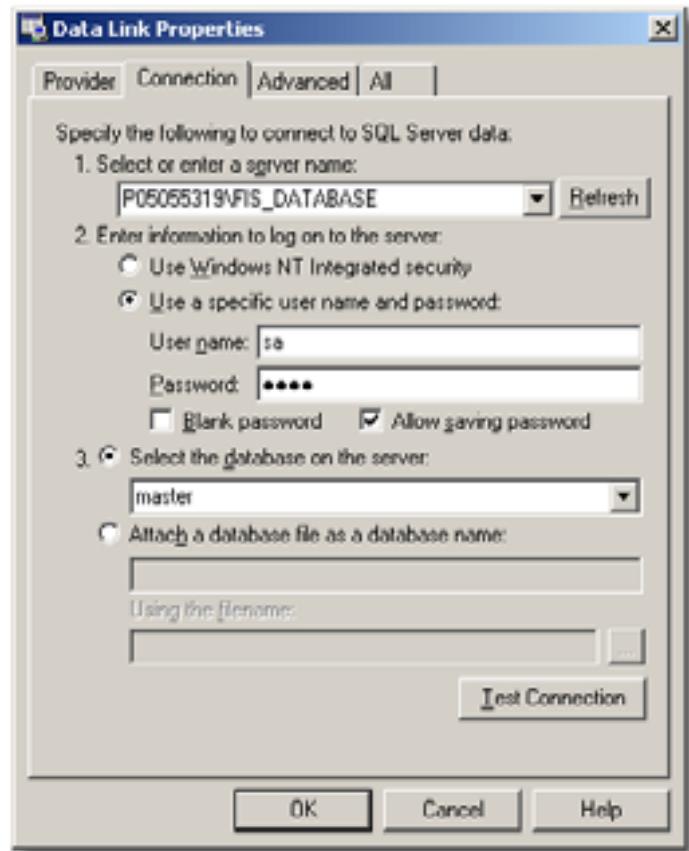
Registering Trendline databases at the MSDE/SQL server

1. Select the database server that contains the database from the server list or enter the server in the input field in the upper area of the window. Click on **Refresh** to display the list of available servers.



If you do not find any entries in the server list due to restricted user permissions, enter "Computer name\FIS_DATABASE" manually (if the name of your computer, for example, is "peters_laptop", the server name would be "peters_laptop\FIS_DATABASE"). You can find your computer's name in the Windows Explorer drives. If you are not sure about your computer's name, ask your administrator.

2. Select **Use a specific user name and password** and enter your user name and password to log-on to the database. If you select a database server that was installed during a Trendline installation (contains FIS_DATABASE in its name), the user name is **sa** and the password is **sql8**. Make sure to enable **Allow Password Save** to save the password.



3. Select the database **master** from the list.
4. Click on **OK**.

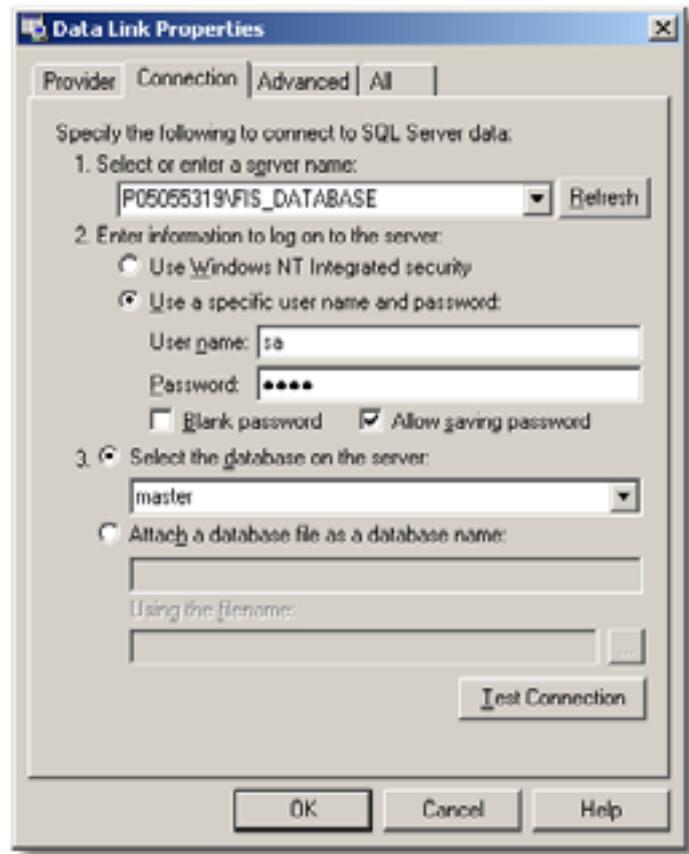
Registering a bearing database at the MSDE/SQL server

1. Select the database server that contains the database from the server list or enter the server in the input field in the upper area of the window. Click on **Refresh** to display the list of available servers.



If you do not find any entries in the server list due to restricted user permissions, enter "Computer name\FIS_DATABASE" manually (if the name of your computer, for example, is "peters_laptop", the server name would be "peters_laptop\FIS_DATABASE"). You can find your computer's name in the Windows Explorer drives. If you are not sure about your computer's name, ask your administrator.

2. Select **Use a specific user name and password** and enter your user name and password to log-on to the database. If you select a database server that was installed during a Trendline installation (contains FIS_DATABASE in its name), the user name is **sa** and the password is **sql8**. Make sure to enable **Allow Password Save** to save the password.



3. Select the database **master** from the list.
4. Click on **OK**.



*If you want to register the database later on, please select **bearingDB** instead of **masterDB**.*

3.1.5 Uninstalling

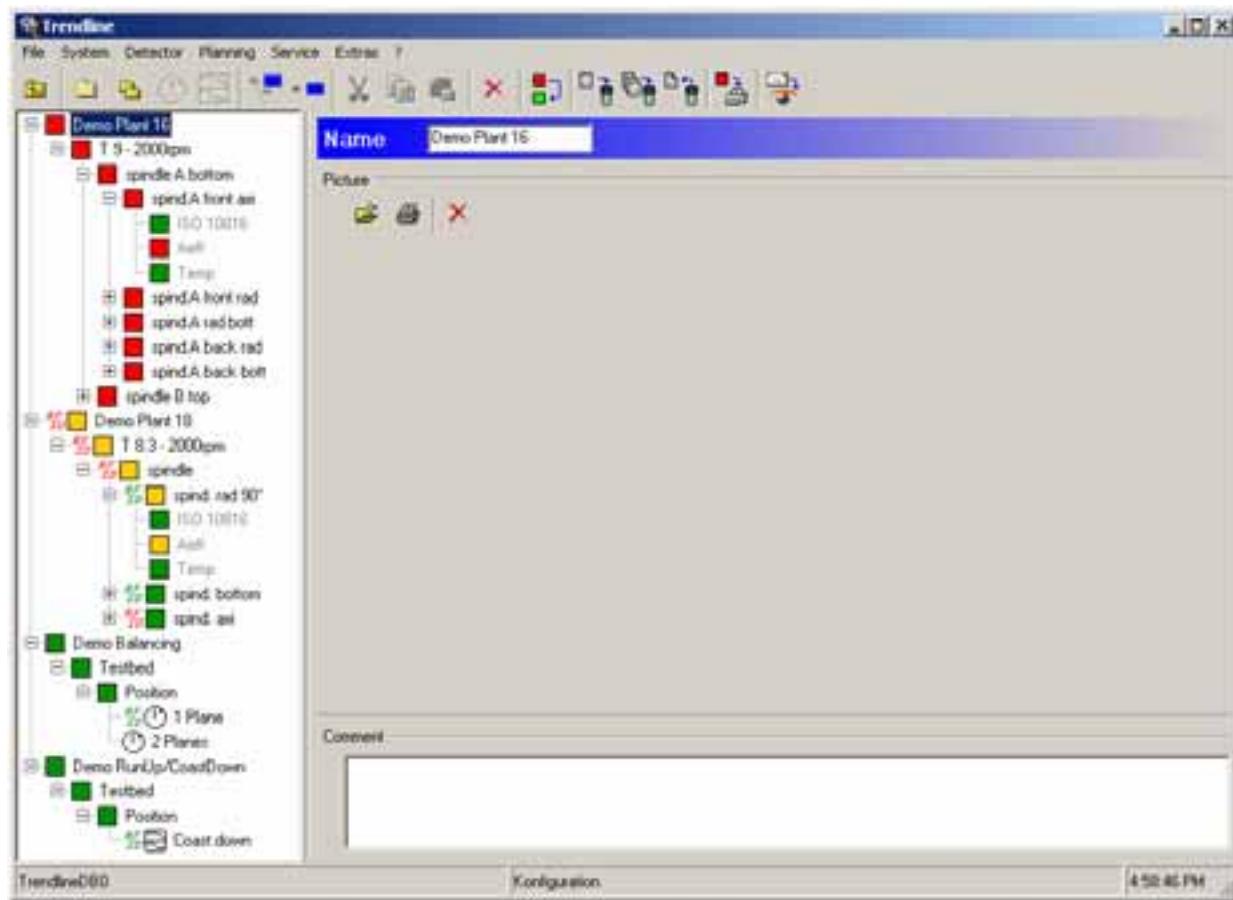
To uninstall the Trendline software, please click Programs > FIS > Trendline 3.2 **Uninstall Trendline** in the Start menu. This uninstalls the Trendline software and its components.

Please note that configuration and export files are left on your computer. For your safety, the database is not deleted either. To completely uninstall, you must delete these files manually.

3.2 User interface

3.2.1 Main window

The layout of the main Trendline 3 software window is based on standards which have developed for user interfaces in the meantime.



At the top edge of the main window you will find the menu bar ³¹, where you can call up the functions of the program via the menu items. Frequently used functions can also be activated using the buttons in the toolbar ³³.

On the left-hand side of the window the structure of the configuration for the system to be monitored is depicted in the form of a directory tree. The "Configurations", which are splitting in descending order into the levels "Section", "Machine" and "Measuring Point", are the highest classification element. That way, a measuring point within a configuration is clearly defined by its denomination as well as the specification and location of the machine the measuring place is to be found at.

Next to the denomination of each element of the configuration and system structure you will find a field marked in color. It indicates the alarm condition for this part of the system following the table below.

Color	Meaning
	For this level of the system structure no alarm is recorded.
	For this level of the system structure preliminary alarm is recorded.
	For this level of the system structure main alarm is recorded.
	An RFID tag has been assigned to this measuring point.
	An RFID tag in this part of the system has been marked as defective.

On the right-hand side next to the configuration and system structure you can insert an image. At the highest level you will find the tabsheets, where you can adjust the settings of the individual measuring points.

The dividing line between the image of the configuration and system structure can be shifted towards the right or left by dragging with the mouse.



In the configuration structure, always one element is marked. The properties of this element are depicted in the right-hand part of the window.

3.2.2 Menu bar

The menu bar allows access to the following functions of the Trendline 3 software:

Menu	Menu items and their functions	
File	New	Creates a new database.
	Open	Opens an existing database.
	Import	Loads records exported with Trendline.
	Export	Exports part of a current measuring point structure using the export wizard 105 or export a single measuring point 106 .
	Recently used databases	Trendline displays recently used databases at this point in the menu. You can specify the number in the program settings 111 .
	Close	Quits the Trendline software.
System	To root level	Takes you from your current position in the tree right back to the beginning, all the time.
	Rename	Rename currently selected element.
	New item	Inserts an element of the configuration structure in the same level as currently displayed.
	New subitem	Inserts an element of the configuration structure in the level below the current.
	Add balancing configuration 53	Inserts a balancing configuration.

Menu	Menu items and their functions	
Menu	Add run up/coast down configuration [61]	Creates a run up/coast down configuration.
	Expand selection	Flaps up all elements under the current element.
	Collapse selection	Closes the complete tree structure.
	Cut	Cuts out the current element of the tree.
	Copy	Copies the current element of the tree.
	Paste	Pastes the element on the clipboard into the current position in the tree. This is only possible in the tree level above that of the copied element, e.g. when copying a machine, this can only be pasted into the plant level of the tree.
	Delete entry	Deletes the current entry at the tree with all sub-entries.
	Delete measured data [93]	Deletes measured data from the current position.
	Reset alarm status [92]	Reset all alarms for the element of the configuration and system structure selected.
	Adjust alarm levels [65]	Automatic adjustment of the alarm levels.
Detector	Send configuration	Send all measuring points from currently selected element downwards to detector.
	Send route	Sends one of the pre-selected routes to the detector.
	Load data from Detector	Opens a connection to the detector and downloads all data stored in the detector.
	Configure Detector	Allows to set all options to the detectors registered.
	Balancing activation [38]	Enables the balancing function on the Detector.
	Sensor	Adds [34], edits and deletes sensors.
	Comment selection list [52]	Create and edit a list of comments.
Planning	Route	Creates out and edits routes.
	Template	Defines and edits configuration templates that can be used for ad-lib. measurements.
Service	EService	Sends selected data for further analysis.
	Measurement report [96]	Creates a measurement report.
	Alarm Report	Creates an alarm report.
	Route report	Creates a route report.
	Balancing report	Creates a balancing report.
	Run up/coast down Report	Creates a run up/coast down report.

Menu	Menu items and their functions	
Tools	Options	Program settings
	Bearing DB	Opens the bearing database 68 .
?	Contents	Contents of the online help.
	Index	Search index for the online help.
	First steps	Start using the Trendline Software.
	Menu bar	Explains all menus of the Trendline Software.
	Toolbar	Explains all icons in the toolbar.
	About Trendline	Information about the Trendline Software.

3.2.3 Toolbar

Frequently used functions of Trendline software can be used via the toolbar.



Toolbar

	Go to root element		Paste
	Create new item		Delete
	Create new sub-item		Reset Alarm Status
	Add balancing configuration		Send configuration to detector
	Add run up/coast down configuration		Send route to detector
	Expand tree entries		Download data from detector
	Close selected element		Alarm Report
	Cut		EService
	Copy		

3.3 First steps

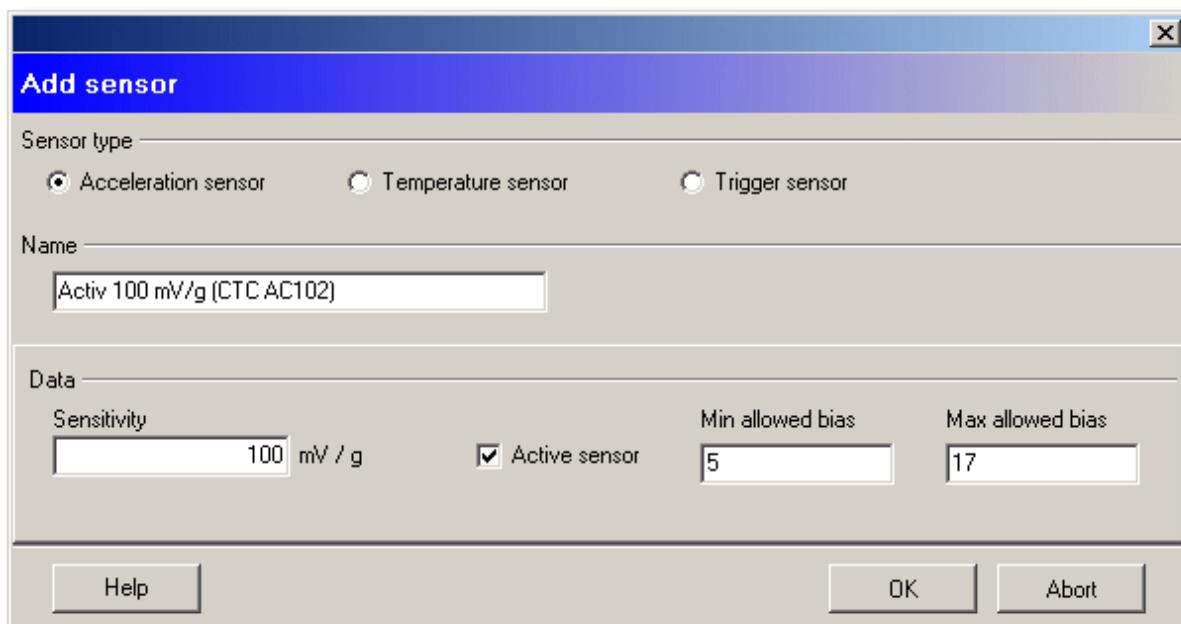
3.3.1 Adding a sensor

Before you can set up configurations, you must define the sensors you want to use. Detector III is delivered with all necessary sensors. They are pre-defined in the Trendline software.

Proceed as follows to add new sensors:

- In the **Detector** menu click **Sensor > Add**.
- In **Sensor type** choose from Acceleration, Temperature or Trigger sensor.
- In the **Name** field, enter a name for the sensor, e.g. "IMI 627".

Acceleration sensor



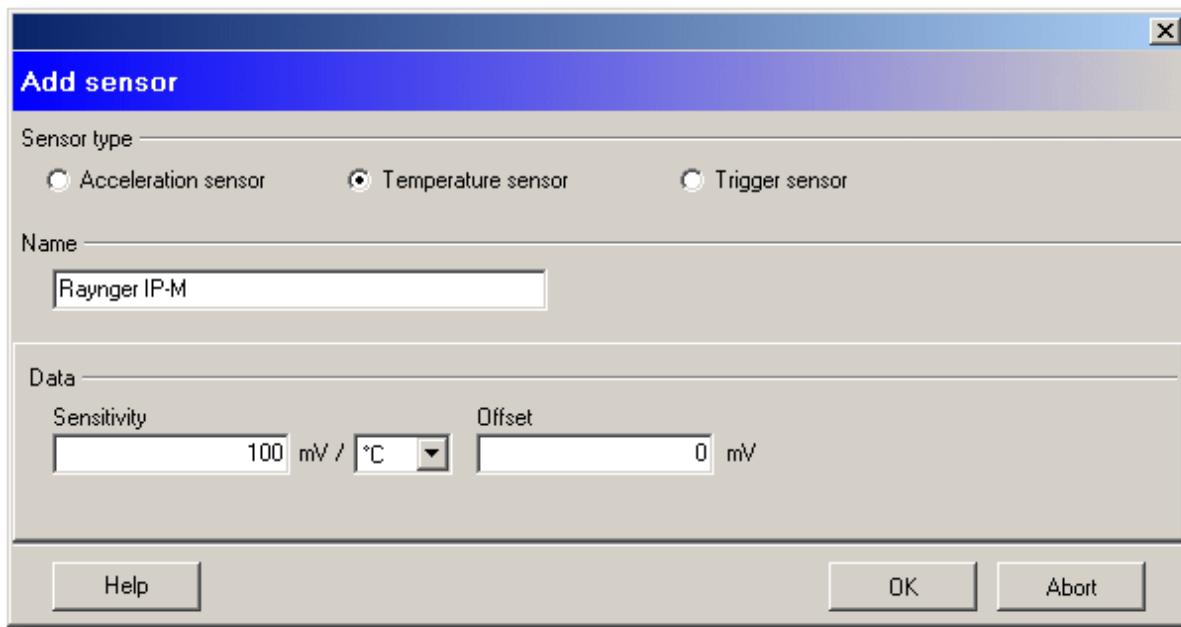
- Enter sensor sensitivity in mV/g in the **Sensitivity** field. Sensitivity is printed on the sensor or indicated in the enclosed specifications.
- When you add an active sensor, select **Active sensor** and enter minimum and maximum bias voltage in the appropriate input boxes. On the one hand, this activates sensor supply voltage in the Detector before the measurement is performed and activates a high pass to filter the supply voltage out of the measuring signal. On the other hand, the Detector checks whether sensor bias voltage is within the set thresholds. Minimum bias voltage must be at least 3, maximum bias voltage must not be greater than 17. The difference between the two values must not be less than 10.



*If you want to measure on a power supply unit, **Active sensor** must not be enabled.*

- Click **OK** to save the new sensor.

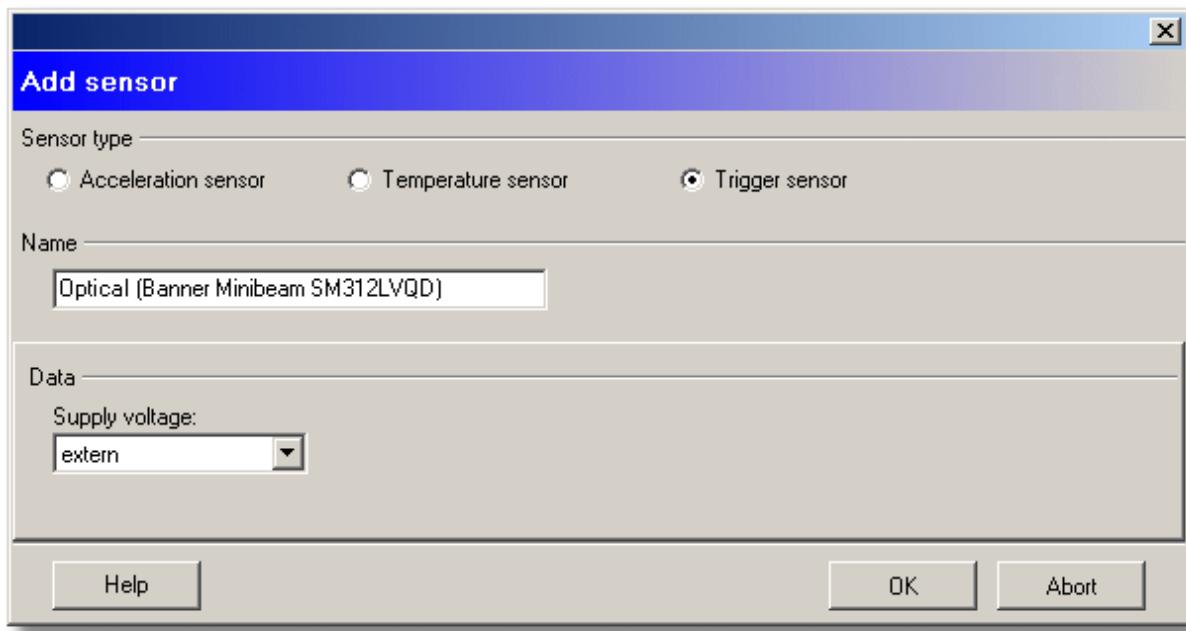
Temperature sensor



- Enter sensor sensitivity in mV/°C, mV/°F or mV/K and the offset in mV.
- Click **OK** to save the new sensor.

Trigger sensor

The trigger sensor serves to measure rotational speed and is used in operational balancing to start the measurement ^[189].



- Select the **Supply voltage: External, 5V, 12V.**
- Click **OK** to save the new sensor.

3.3.2 Installing USB-serial converter

A USB serial adapter is supplied with the Detector which you can use to connect the Detector to computers with USB interfaces.

When installing the adapter software make sure you have the adapter and the installation CD provided to hand.

Installation of the adapter software

To install the adapter software proceed as follows:

- Insert the supplied CD. The installation program should start automatically.

If the installation program does not start automatically you can start it manually using Windows Explorer:

1. Open **My computer**.
2. Under **Equipment with removable media** click the right-hand mouse button on the CD-ROM drive then click **Open**.
3. Double click to launch **autorun.exe**.
4. At **USB TO RS232 Converter**, click the folder icon next to **Product Driver**.



5. Select the **win_98se_me_2000_xp** folder.

6. Click on **Setup.exe**.

This launches the installation wizard which guides you through the installation.

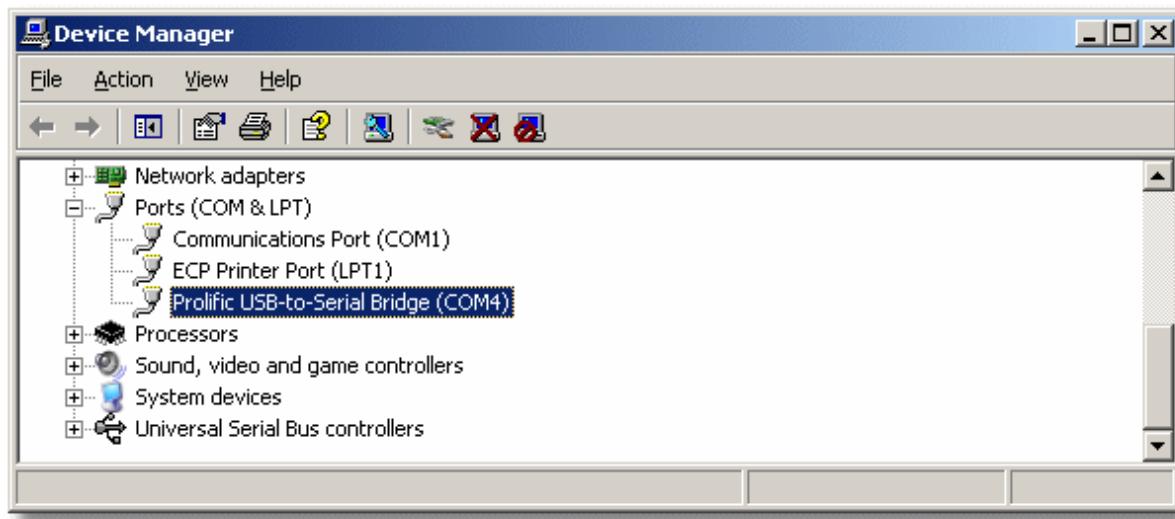


If you are already using other devices that use a Prolific USB to Serial chip, please uninstall the drivers for the old devices first as this may result in conflicts.

Checking serial interface settings

To make sure that communication between the Trendline software and the Detector works smoothly, you can check the USB serial adapter settings for the serial interface:

1. Click the right mouse button on **My computer** then click on **Properties**.
2. Click **Hardware** then **Device manager**. The adapter should be displayed as "Prolific USB-to-Serial Bridge" under **Connections (COM and LPT)**.



3. Close the Device manager.

Removing the adapter software

The adapter software can be removed as follows:

1. Click on **Start**, click on **Control panel** and then click on **Software**.
2. Click on **Modify or remove program** then click on **PL-2303-USB-to-Serial**.
3. Click on **Modify/remove** to uninstall the software.

3.3.3 Balancing activation

The Detector III is supplied ex works with the balancing functionality switched off. You can enable this function if you have purchased a Detector III balancing kit.

The balancing kit contains a USB dongle which can be used to enable one unit only.



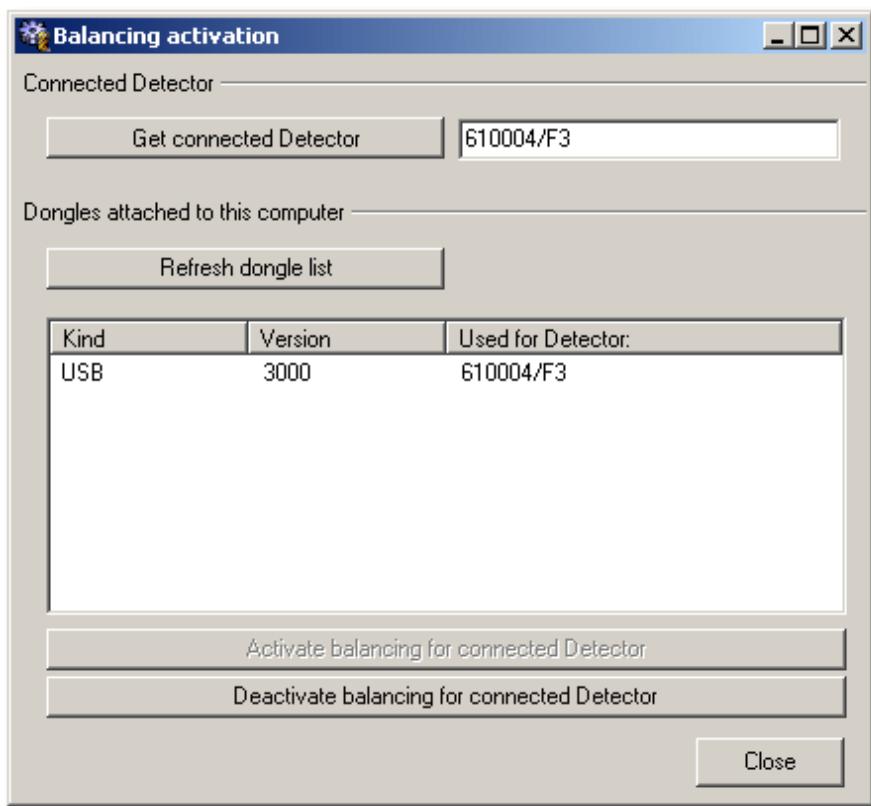
Dongle

This activation is essentially carried out as follows:

- A dongle is supplied with the balancing kit that has not previously been used.
- You can use this dongle to enable the balancing functionality for only one Detector which can be selected at will.
- Once enabled, the serial number of the Detector is saved on the dongle. From this point onwards the dongle may only be used with this specific Detector.
- You can also deactivate the balancing functionality in the Detector once again

using the corresponding dongle. The serial number on the dongle is then deleted and you can now use it to enable any other Detector of your choice. This is useful, for example, if you are sending a Detector to the manufacturer for calibration and want to use the balancing function on a different Detector in the meantime.

To activate the balancing function on the Detector, start the Trendline software. Connect the Detector to the PC using the serial cable. Plug the dongle into a free USB port. Switch on the Detector and **select** the Trendline menu item **Detector > balancing activation**. The following window is now displayed:



The serial number of the connected Detector and the dongle identified are displayed at the top and bottom respectively. The identified version should start with "3" in the case of Detector III. The serial number of the Detector for which this dongle has already been used or, if the dongle has not yet been used, <Empty> is displayed in the **Used for Detector:** column. Now select the required dongle from the **Type** column (should be displayed as "<Empty>" in the "Used for Detector" column). You can now enable the balancing functionality via **Activate balancing for connected Detector**. A new line **Balancing** should now be visible and the serial number of the Detector is displayed in the dongle line.



- *The first time the dongle is used Windows detects the driver that was previously installed with the Trendline software. If Windows asks for a driver select the automatic search option.*
- *If the dongle is not displayed or a previously used dongle appears in the list, please click **Refresh dongle list**.*
- *If the dongle is correctly identified by Windows but this is not displayed in the Trendline dongle list you may have an old driver installed on your system. You can check this in the device manager under USB controller -> CBUSB Ver 2.0. If Version 1.x is displayed, uninstall this driver and install the up-to-date driver on the Trendline CD in the CbSetup directory. In this case select the CRYPTO-BOX USB.*

3.3.4 Register new detector

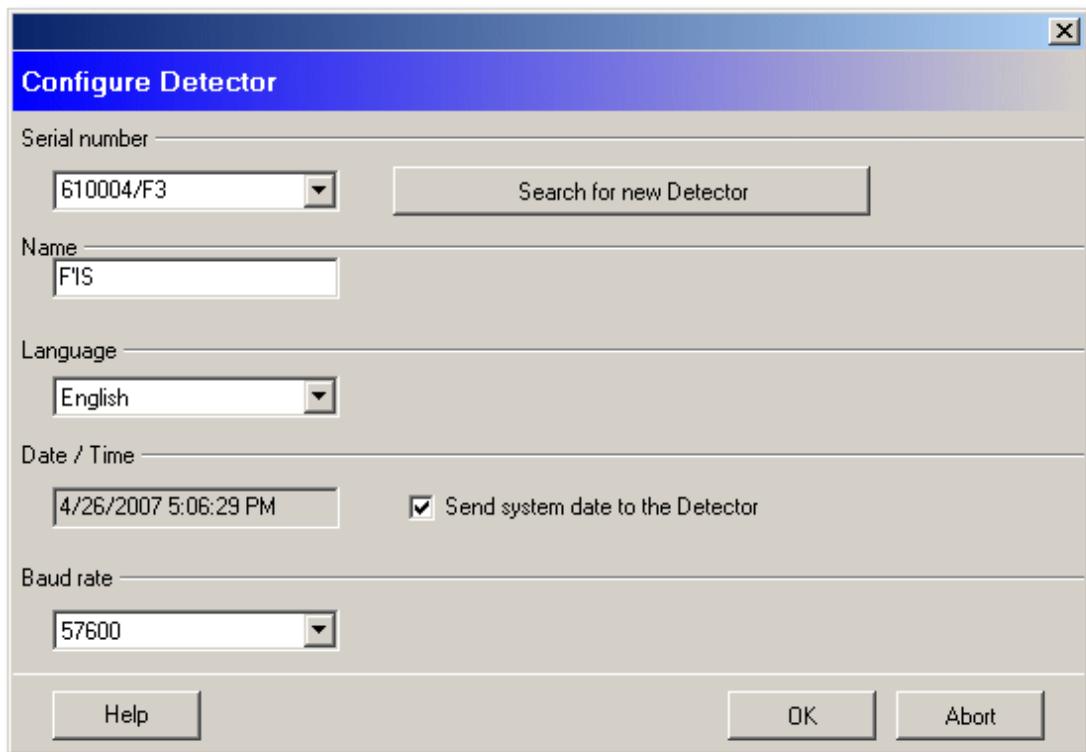
The Trendline software holds a database for administrating all detectors you use with your program. Prior to sending data to the Detector for the first time, it has to be registered to Trendline software. To do that, you connect the Detector to a serial interface of your computer using the data cable supplied and switch on the Detector.



The Detector which has just been connected to the computer is normally automatically detected by the system and registration of this is not compulsory.

How to register a new Detector:

- Click on **Detector > Configure Detector**.



- Connect the Detector to your PC and switch it on. Click on **Search for new Detector** to register the new Detector on to the program.
- You may give the Detector a **name**, which will be displayed in the default display when switching on the instrument.
- You can select the **language** for the Detector. Nevertheless it still can be changed at the Detector.
- You can set the time of the Detector either by entering the correct time and date (to do this, click on the figure you want to change) or by clicking **Send system date to the Detector** (that way the detector is set to the same time and date as your PC).
- Here, you can select the **baud rate** of the Detector. Under normal circumstances, you should select the highest possible (57,6 kbps). In case of problems with communication (e.g. the connection breaks down at times) you may select the lower baud rate of 38,4 kbps.
- After completing all settings, click on **OK** to send the changes to the Detector. Make sure that the Detector is switched on when clicking **OK**, because otherwise no communication is possible.

3.4 Setting up configuration

3.4.1 Enter system tree

Each configuration is subdivided into three levels, e.g. section – machine – measuring point.

Setting up configuration elements

In order to create a new configuration, carry out the following steps:

- Click on **System > New item** (or on ).
- Name the entry, e.g. "Cement Plant 1".
- Add the new sub-entry by clicking on **System > New sub-item** or click on . That way, you add a new section to the configuration. Name that e.g. "Section 1".
- Exactly as with the section, add another machine ("Machine 1") and a new measuring point ("Measuring Point 1") by following the sequence via **New sub-item**.

Moving or copying configuration elements

You can only move configuration elements if the target is on a higher level, i.e. you can

- move or copy a measuring point (level 3) to another machine (level 2), and
- move or copy a machine (level 2) to a different section (level 1).



If the target already contains sub-elements, the moved/copied element is always appended to the end of the list.

Moving an element

- Left-click on the element, keep the mouse button pressed, and drag the element onto the target element.
- Release the mouse button to insert the element.

Copying an element

- Left-click on the element while pressing the CTRL key, keep the mouse button and CTRL pressed, and drag the element onto the target element.
- Release the mouse button and CTRL to copy the element.

or:

- Right-click on the element and select **Copy**.
- Right-click on the target element and select **Paste**.

or:

- Right-click on the element, keep the mouse button pressed, and drag the element onto the target element. A pop-up menu displays.
- Select **Move**.

3.4.2 Automatic assignment of RFID tags to measuring points

In order to simplify allocation of measuring points in the Trendline configuration to measuring point in your system, you can add RFID tags to them. The Detector can read existing RFID tags at the measuring points and automatically assign the measured values to the correct measuring point in the Trendline software.



If you transfer a configuration with RFID settings to a Detector without an RFID reader, it displays an error after data transfer and ignores the RFID settings.

Assigning an RFID tag to a measuring point

Before using, you must assign the RFID tags placed on the measuring points. You can do this immediately before a CM or balancing measurement. Select the measuring points either in the Trendline software or in the on-site Detector:

Selection in the Trendline software

1. Select a measuring point in the Trendline configuration.
2. Click on the **Configuration** tab.
3. In the **RFID Status** box select **Assign RFID**.
4. Repeat this procedure for all measuring points to which you wish to assign RFID tags.
5. Send ⁶⁷ the configuration to the Detector.
6. During the round, select the appropriate measuring point in the Detector (see Selection of measuring point ¹⁸³).
 - a) Select **Start measurement**. The Detector reads the RFID tag on site and assigns it to the measuring point.
 - b) If you do not want to perform a measurement but just want to assign the RFID tag, select **Assign RFID** at the appropriate measuring point on the Detector.
7. Load the data from the Detector in Trendline. The RFID status of the measuring points is now set to "RFID assigned" and the green RFID icon is displayed in front of the measuring point in the configuration tree.



You can set the status of all measuring points of an element (e.g. a machine) to "RFID assigned". To do so, right-click the element and select **Assign RFIDs globally**. On the next round with the Detector you can assign the RFID tags placed here to all the appropriate measuring points.

Selection in Detector

1. If you have not assigned an RFID tag to a measuring point yet, you can also assign one on the Detector. You can assign it immediately before a CM/balancing measurement or before a run up/coast down test. Select the measuring point on the Detector and then the **Assign RFID** command. You can then perform a measurement.
2. Load the data from the Detector in Trendline. The RFID status of the measuring points is now set to "RFID assigned".

Removing the assignment of an RFID tag

1. Select a measuring point with an RFID tag assigned in the Trendline.
2. Click on the **Configuration** tab.
3. In the **RFID Status** box select **Delete RFID**.
4. Send  the configuration to the Detector.
5. During the round, select the appropriate measuring point in the Detector (see Selection of measuring point ).
6. Select **Start measurement**. The Detector prompts you to delete the tag.
Delete the tag and select **Tag deleted**.
If you do not delete the tag, select **Tag stays**.
7. Continue measuring.
8. Load the data from the Detector in Trendline. The RFID status of the measuring point is set to "No RFID" if the tag was deleted.



You can globally delete all RFID tag assignments to measuring points of an element (e.g. a machine) in the configuration. To do so, right-click the element and select **Delete RFIDs globally**. On the next round, confirm deletion of the RFID tag assignment for each measuring point before the measurement.

Changing the assignment of an RFID tag

To change the assignment of an RFID tag to a measuring point: First change the RFID status in the Trendline configuration and transfer the modified configuration to the Detector. On the next round with the Detector, you can then import the new RFID tag.

1. Select the measuring point in the Trendline configuration.
2. Click on the **Configuration** tab.
3. In the RFID Status box select **Edit RFID**.
4. Send  the configuration to the Detector.
5. During the round, select the appropriate measuring point in the Detector (see Selection of measuring point ).
6. Select **Start measurement**. The Detector prompts you to delete the tag.
 - a) Delete the tag and select **Tag deleted**. You can now assign the new RFID tag.
 - b) If you do not delete the tag, select **Tag stays**.
7. Continue measuring.
8. Load the data from the Detector in Trendline. The new RFID tag is assigned in the measuring point in the system configuration.

Exchanging a defective RFID tag

If communication with the RFID tag at a measuring point does not work, the user can mark it as "defective" in the Detector and then continue measuring. After the next data synchronization with the Trendline software, the RFID status "RFID defective" is displayed at the measuring point and recursively up to the top level in the configuration tree. You can then assign a different RFID tag to the measuring point.

1. The Detector cannot read the RFID tag at the measuring point. Select **RFID tag defective** in the Detector.
2. The program displays "Is the tag defective?". Select **Yes**.
3. Delete the RFID tag from the measuring point.
4. Load the data from the Detector in Trendline. The RFID status of the measuring points is now set to "RFID defective".
5. You can now assign a different RFID tag to the measuring point.

Additional information

- You can abort Detector RFID tag assignment handling functions by pressing **Esc**. This preserves the previous state of the assignment.
- If the Detector recognizes an RFID tag that is not in the configuration, it displays the error message: "At least one configuration does not exist".

3.4.3 Create a measuring point

The settings for the measuring point can now be made. Three tabs are assigned to each measuring point in the right-hand window: Information , Configuration  and Measured values .

Info

Comments on this measuring point may be entered in the field provided in the **Information** tab. It is also possible to insert an picture. To do this, click  and select the desired picture in the file dialogue. Please observe that these pictures should not be larger then 100kB, otherwise the program will run more slowly with a lot of large pictures. You can print out the picture using  and remove it using .

Configuration

Name Spind.A vom axi

Info **Configuration** **Measured data**

RFID

RFID State:  Assign RFID

RFID Number: 0000000000000000

Sensor

Acceleration: Aktiv 100 mV/g (CTC AC102)

Temperature: Raynger IP-M

Trigger: Optisch (Banner Minibeam SM312L,VQD)

Timesignal

Charac. values averaging:		FFT lines:		Save timesignal:	Lowpass:
no averaging		1600	always	1000	
Timesignal velocity	Averaging count:	1600	always	20000	
Timesignal acceleration	1600	always	1000		
Timesignal demodulation	1600	always			

Rotational speed

Acquire turning speed: Nominal turning speed: 2000.00 RPM Max. allowed deviation: 5.00 RPM

Template bearing list for future measurements:

Manufacturer	Name	Speed transmission ratio	Fixed outer race	Change Date
SKF	71922ACD	1	<input checked="" type="checkbox"/>	11/28/2003 11:37:54 AM

RFID status

In this section you can display and edit the status of an RFID tag assigned to the measuring point:

- **No RFID** No RFID tag is assigned to the measuring point.

- **Assign RFID** This option instructs the Detector to assign an RFID tag placed on the machine to this measuring point during the next round.
- **RFID assigned** An RFID tag is assigned to the measuring point. The unique ID is displayed in the **RFID number** field.
- **Delete RFID** This option instructs the Detector to cancel the RFID tag assignment to the measuring point during the next round.
- **RFID defective** The Detector has marked the assigned RFID tag as defective.
- **Change RFID** This option tells the Detector to replace the assigned RFID tag. During the next round, you must delete the tag and assign a new one before you can perform the measurement at this measuring point.



You can only select the statuses that are accessible as a follow-up status of the current status.

See also

Automatic assignment of RFID tags to measuring points .

Sensor

You can adjust the vibration measurement sensors and the temperature at **Sensor**. Only the sensors that were previously entered in the sensor database will be available for selection (see [Add sensor](#)). You can select a sensor for **Acceleration**, **Temperature** and **Trigger** from the sensor database.

Time signal

In this area you can specify how the Detector should handle time signals , FFTs and characteristic values.

- **Charac. value averaging:** the FFTs or characteristic values calculated from the time signals are averaged. If the average of four values is determined, for example, four values are recorded in succession, the FFT is calculated and the (frequency selective) characteristic values are produced. The time signals stored for the purposes of an averaged measurement are always the last time signals measured. Select **FFT** to determine the mean values of the FFTs calculated from the time signals and select **Char. values** to apply the average determined for the characteristic values calculated from the FFTs.
- You can set the resolution of the spectrum under **FFT lines**. Select 1600 (corresponds to 4096 samples) or 3200 FFT lines (corresponds to 8192 samples).
- You can use **Save time signal** to specify when a time signal should be saved: **never**, **always** or **on alarm** (a main alarm).

- At **Lowpass** you can select a low pass frequency for the frequency band to be measured from a predefined list. The sample rate in this case is always 2.56 times the selected low pass frequency.



Note that the filter calculation in the software is performed at the 200 Hz and 500 Hz settings and is therefore slower than at the other frequencies. Therefore, you should only select this high frequency if you really need it. Otherwise, select a greater number of FFT lines: For example, it is faster to measure at 1 kHz / 3200 FFT lines than at 500 Hz / 1600 FFT lines, although both measurements are performed at the same resolution.



*Apart from **Save time signal** the time signal settings can no longer be changed after the first measurement as otherwise it would no longer be possible to compare characteristic values.*

Rotational speed

If the rotational speed also needs to be determined by the Detector during the measurement select the **Acquire turning speed** option. The nominal rotational speed as well as the maximum permissible deviation in RPM should also be entered in the appropriate input fields. If the rotational speed deviates from the rotational speed band defined here during measurement, the Detector issues an error message but still performs the measurement.

Bearing list template

In this section you can assign bearings from the bearing database⁶⁸ to the measuring point or delete an assignment. The associated kinematic frequencies of the selected bearing are then also displayed in the evaluation diagram in the FIS-Viewer. Both when making assignments and deleting assignments you can choose whether

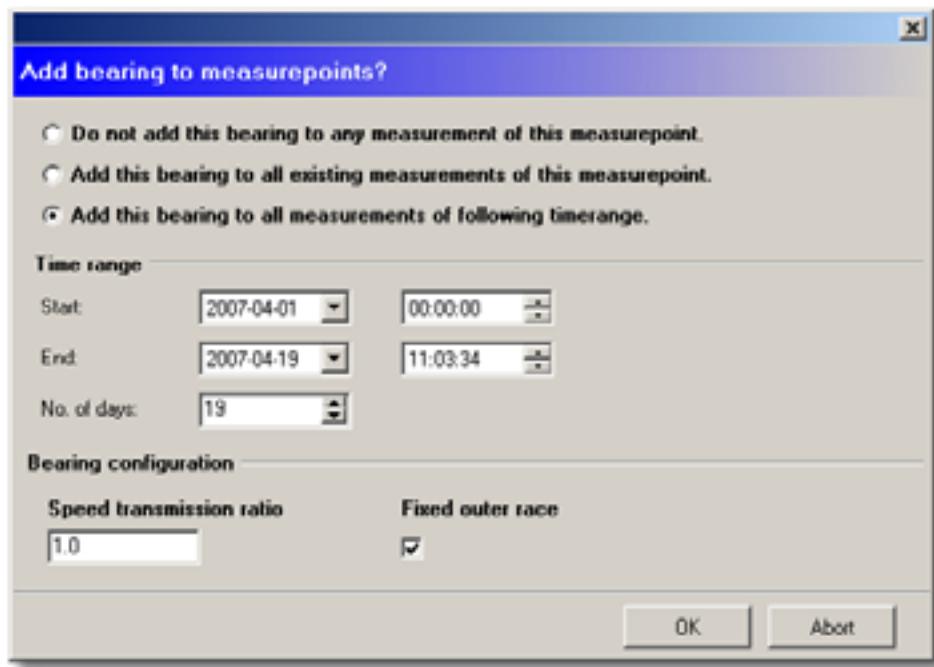
- to only apply bearing data in future
- for all measurements already performed, or
- only for measurements from a certain period



Specify the bearing assignment at measuring point level in the configuration. You can also assign bearing data directly to individual measured values. For more information refer to Measured values⁸⁸.

Add bearing

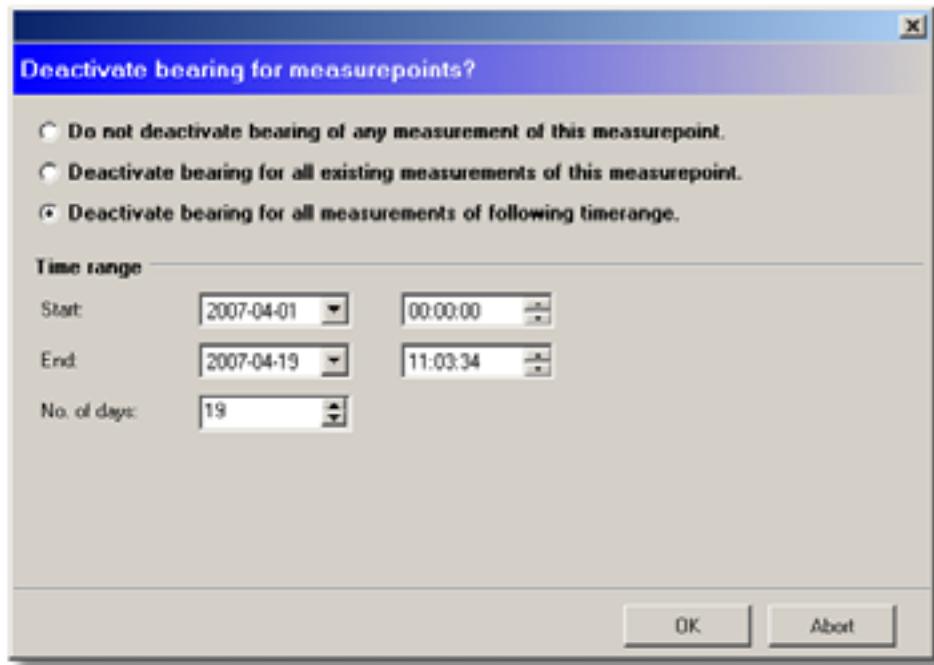
- Click  and select the bearing from the bearing database.



- Selecting measurements:
 - If you only want to apply the bearing information for future measurements, click **Do not add this bearing to any measurement of this measuring point.**
 - If you want to apply the bearing information to all saved measurements, click **Add this bearing to all existing measurements of this measuring point.**
 - To apply the bearing information to measurements in a certain time range, click **Add this bearing to all measurements of following timerange** and select the time range.
- In the **Bearing configuration** section enter the speed transmission ratio and select whether the bearing has a fixed outer race.

Disable bearing

- Click on the bearing to delete and then .



- Selecting measurements:
 - To keep the bearing information for the existing measurements of this measuring point, click **Do not disable the bearing for any measurement of this measuring point.**
 - To delete the bearing information from all saved measurements of this measuring point, click **Disable the bearing for all existing measurements of this measuring point.**
 - To delete the bearing information from measurements in a certain time range, click **Deactivate bearing for all measurements of following timerange** and select the time range.

Displaying bearing information

- Click on the desired bearing and then . This displays the bearing information in the bearing database.

Measured values

In the Measured data section you can display the acquired data numerically and graphically. For more information refer to Measured values .

3.4.4 Setting characteristic values

You can create the following characteristic values per measuring point:

- ISO 10816
- A_{sel} and A_{eff}

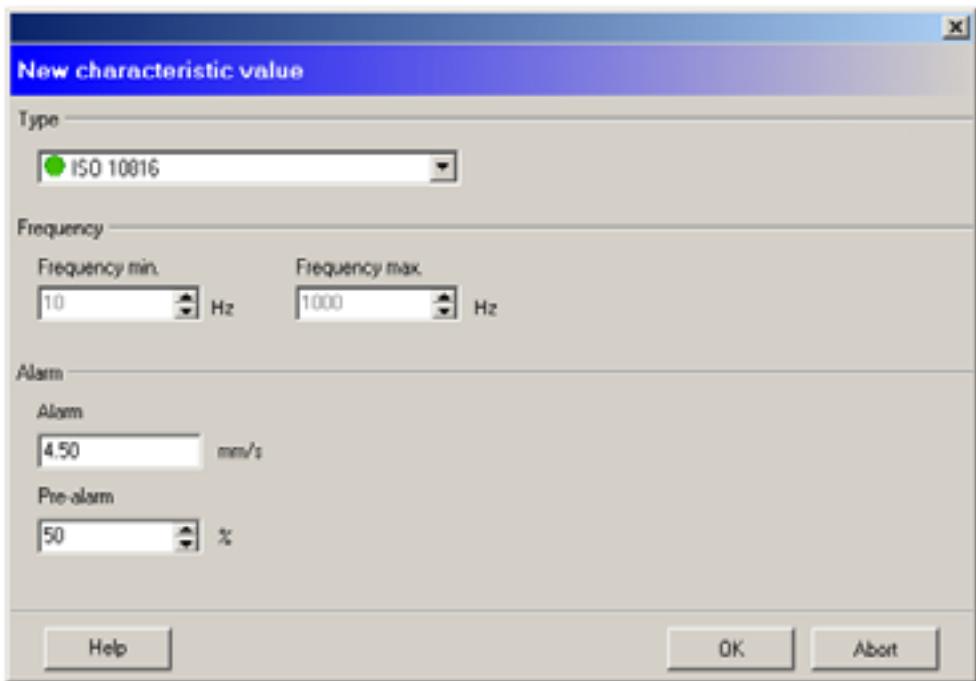
- D_{sel} and D_{eff} ,
- Temperature,
- V_{sel} ,
- Crest factor.

Please also observe the information in the "Frequency selective characteristic values" [\[212\]](#) section.



Characteristic values can be changed until they have been sent to the Detector for the first time. After that the characteristic values turn grey in the tree and cannot be altered anymore. Otherwise, the measuring results could not be compared.

To add a new characteristic value, right-click the measuring point the characteristic value is meant for and, after that, on **New sub-item**. Alternatively, you can do it via **System > New sub-item** or via . Now, the following window opens.



Under **Type** various characteristic values can be selected, which can be measured with the detector. With selective characteristic values (e.g. a_{sel}) the upper and lower cut-off frequency can be set in **Frequency min.** and **Frequency max.**, between which the characteristic value will be calculated. More information to that you will find in Frequency selective characteristic values [\[212\]](#). For the other characteristic values (ISO 10816, a_{eff} and d_{eff}) the cut-off frequencies are pre-set.

In the **Alarm** section you can set a threshold value for each characteristic value. If this is exceeded by a measurement, both Detector and Trendline software show

an Alarm. Additionally, a preliminary alarm threshold can be set in Trendline software. If the measured value exceeds this threshold, preliminary alarm is given for this measuring point in Trendline software. The Detector shows main alarms only. Prealarms are only displayed in Trendline.

See also

Reset alarm status [\[92\]](#).

3.4.5 Editing / deleting sensors

If you have added custom sensors [\[34\]](#) in addition to the pre-defined sensors, you can edit or delete them. However, this is only possible if the sensor is not being used in a configuration!

Editing a sensor

- In the **Detector** menu click **Sensor > Edit**.
- Select the sensor in the **Edit sensor** window.
- Edit the settings (see also [Add sensor \[34\]](#)) and click **OK**.

If the sensor is in use, the input boxes are grayed out and you cannot edit them.

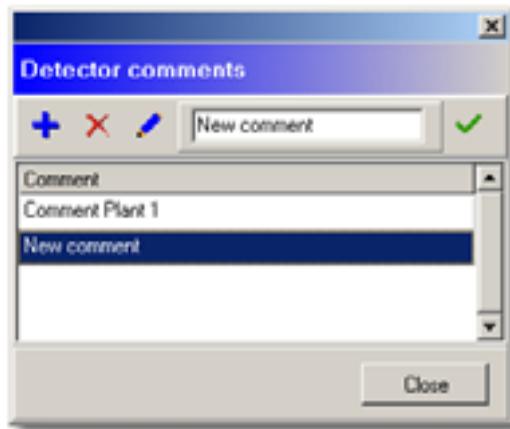
Deleting a sensor

- In the **Detector** menu click **Sensor > Delete**.
- Select the sensor to delete in the **Delete sensor** window and click **OK**.

If the sensor is in use, this is displayed in the window and you cannot delete it.

3.4.6 Managing measurement comments

In the Trendline software you can create short texts as measurement comments. The comments list is synchronized whenever data are exchanged with the Detector. During the measuring round, you can assign a comment from the list to every measurement on the Detector. The comment is saved with the measurement and displayed in the measuring results in the Trendline software. You can then edit the comment if necessary (see "Measured data [\[88\]](#)").



Create comment

- Click **Comment selection list** in the **Detector**.
- In the **Comments window** click .
- Enter the desired text and click .
- Click **Close**.

Delete comment

- Click **Comment selection list** in the **Detector**.
- In the **Comments window** click .
- Click **Close**.

Edit comment

- Click **Comment selection list** in the **Detector**.
- In the **Comments window** click .
- Enter the new text and click .
- Click **Close**.

3.4.7 Add balancing configuration

To create a balancing configuration click on a level 3 configuration element (machine or motor, for example). Then click **System > Add balancing configuration**.

General configuration

Name 1 Plane

Info General configuration Sensor configuration Measured data

RFID

RFID State	RFID Number
RFID Assigned	E004010008D9EBEF

Balancing settings

Type of vibration unit:	Acceleration	Turning speed settings
Characteristic:	Peak	Nominal turning speed: 1500.00 [RPM]
Balancing OK at:	0 [mg]	Max. allowed deviation: ± 50.00 [RPM]
		Averaging measurement count: 20

Balancing plane settings

Number of balancing planes:	1
Balancing plane 1:	Plane name: PL_1 Discrete positions: 10 Continuous: 0
Balancing plane 2:	

Resonance frequency bands

Frequency band	Low freq. [RPM]	High freq. [RPM]
Resonance	1600.00	2300.00

RFID status

In this section you can display and edit the status of an RFID tag assigned to the measuring point:

- **No RFID** No RFID tag is assigned to the measuring point.
- **Assign RFID** This option instructs the Detector to assign an RFID tag placed on the machine to this measuring point during the next round.
- **RFID assigned** An RFID tag is assigned to the measuring point. The unique ID is displayed in the **RFID number** field.
- **Delete RFID** This option instructs the Detector to cancel the RFID tag assignment to the measuring point during the next round.
- **RFID defective** The Detector has marked the assigned RFID tag as defective.
- **Change RFID** This option tells the Detector to replace the assigned RFID tag. During the next round, you must delete the tag and assign a new one before you can perform the measurement at this measuring point.



You can only select the statuses that are accessible as a follow-up status of the current status.

See also

Automatic assignment of RFID tags to measuring points [\[43\]](#).

Balancing settings

- **Type of vibration unit:** Select **Acceleration**, **Velocity** or **Displacement**.
- **Characteristic:** Specify here whether the **peak-to-peak value**, the **peak value** or the **root mean square (RMS)** should be evaluated.
- **Balancing OK at:** define the limit value for the balancing measurement here. If all measured values are below the value specified during the trim run [\[198\]](#) the balancing procedure has been successfully completed and the Detector ends the balancing measurement.

Rotational speed settings

- Enter the **Nominal turning speed** (in the predefined unit, see "Program settings / General [\[110\]](#)") and the **Max. permissible deviation** in the appropriate input boxes. Note that a deviation of more than 10% is not possible. If the rotational speed measured by the Detector is outside the rotational speed band defined here the Detector outputs an error message [\[205\]](#).
- During the measuring process the Detector averages the rotational speed values. Specify how many rotational speed values are to be used for averaging at **Number of averages to be determined during one measurement**. If you enter 20, for example, the Detector averages the values obtained for rotational speed across 20 revolutions.

Balancing plane settings

- **Number of balancing planes:** Select "1" for single-plane balancing or "2" for two-plane balancing.
- Enter a **plane name for the selected planes** or use the name suggested Trendline software (see also "Program settings / General [\[110\]](#)"). Due to the Detector display this name can only contain 5 characters.
- Click **Continuous** if you can attach the balancing weights anywhere on the shaft. If this is not possible (e.g. with a fan with 10 blades), **Continuous** must not be selected.
- If you deactivated **Continuous**, use **Discrete positions** to select the number of possible positions for the balancing weights, e.g. for a fan. In addition, please enter the angle of the next possible position against the direction of rotation to the reflex mark edge in **Angle trigger mark -> Pos. 1**. This position is called P1.

Resonant frequency bands

In this section you can manually enter the resonant frequency bands determined for this measuring point.

1. Click on .
2. Enter the name of the frequency band.
3. Select **Lower frequency** and **Upper frequency** and click OK.



You can copy resonant frequency bands determined from a run up/coast down test and subsequent creation of an amplitude/phase diagram to the balancing configuration (see Setup run up/coast down [61]).

Sensor configuration

Sensor position	BNC connector	Angle	Sensor
Sa_1	BNC1 (red)	0	Aktiv 100 mV/g (CTC AC102)

Sensor position settings

In this section you can insert up to four sensor positions. Each balancing plane must have at least one sensor position. If you add a new balancing configuration to the system configuration, a sensor position is automatically added per balancing plane.

- **Sensor position:** Enter a name for the sensor here (maximum of 5 characters). Due to the size of the Detector display this can only be 5 characters long.
- **BNC connector:** Select the BNC port¹⁷⁶ used to connect the sensor during the measurement. If you are measuring with two sensors, you should use both BNC connectors on the Detector as this accelerates the speed of measurement.
- **Angle:** Enter the angle of displacement of the sensor from the zero position in the direction of shaft rotation. The stator is always used as the reference for the zero position which points vertically upwards.
- **Sensor:** Select the sensor used from the sensor database³⁴ here.

Trigger settings

- **Select trigger sensor:** Select the trigger sensor used from the sensor database³⁴ here.
- **Name of trigger position:** Enter a designation for the trigger position. This is required for identification of the trigger sensor by the Detector. Due to the size of the Detector display this name can only be 5 characters long.
- **Angle of trigger sensor:** Enter the angle of displacement of the trigger sensor from the zero position in the direction of rotation.. The stator is always used as the reference for the zero position which points vertically upwards.
- Select **Positive** or **Negative** to indicate whether the measurement should start on a positive or negative edge on the trigger sensor. This edge determines the 0° position of the shaft.

Configured angles

In this area the Trendline software provides a graphic representation of the position of the sensors.



The sensor positions are always counted in the direction of shaft rotation.

Measured data

You can view the measured data in this area once a balancing measurement is complete and the data have been transferred to the Trendline software from the Detector.

Name **1 Plane**

Info | General configuration | Sensor configuration | **Measured data** |

Balancing jobs and applied weight data

Step Type **Amplitude - Appl. weight - Plane 1 [gr]** **Angle - Appl. weight - Plane 1** **Amplitude - Appl. weight - Plane 2 [gr]** **Angle - Appl. weight - Plane 2** **Weights removed?** **comment**

Balancing job : 1

Reference run	0.00	0	0.00	0	none	
Trial run 1	5.50	0	0.00	0	Plane 1	
Trim run	10.03	90	0.00	0	none	

Sensor data of selected step | **Sensor charts** | **Weight charts**

Show coefficients

Step Type	Sensor position	Date / Time	Speed [RPM]	Amplitude [mg]	Phase	Amplitude - Coeff. - Plane 1 [mg / Kgr]	Angle - Coeff. - Plane 1
Trim run	Sa_1	6/27/2006 11:25:59 AM	1526.56	32.94	8	4691.34	18

Edit comment

- In order to edit a measurement comment, click on the measurement and then **Edit comment of selected balancing step**.

Show details

To display the details of a measurement click on the appropriate entry in the list then click on .

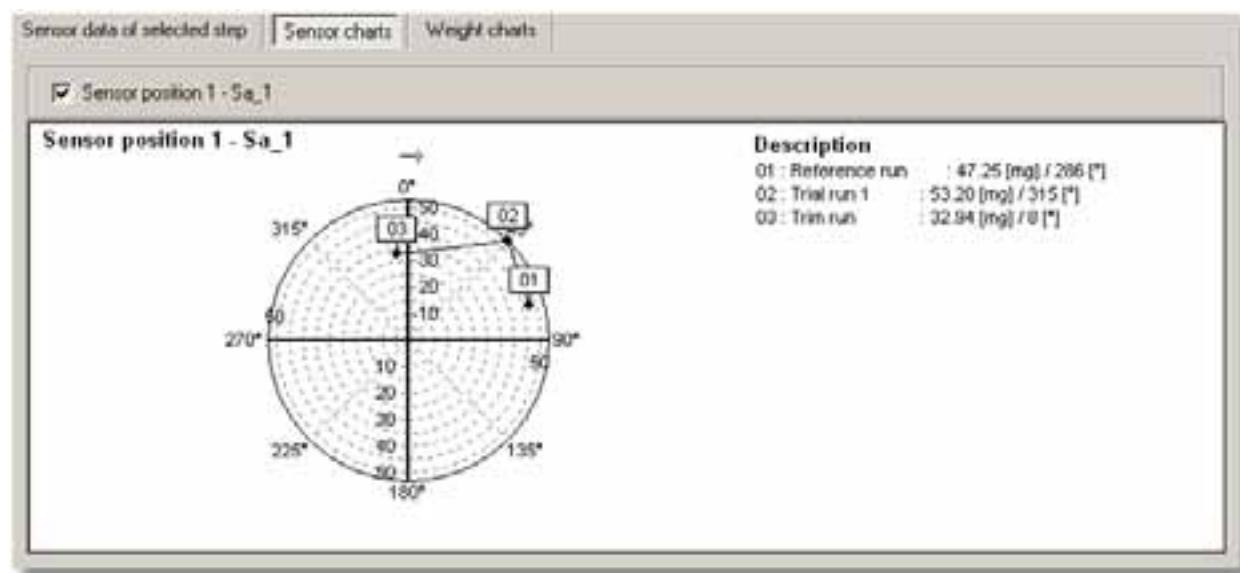
The Trendline software displays the sensor position, time of measurement, rotational speed, amplitude and phase of the vibration at the sensor at each stage of the balancing measurement. If you also wish to see the coefficients used and their corresponding amplitude and phase click **Show coefficients**.

If you wish to hide the details again click on .

Display sensor charts

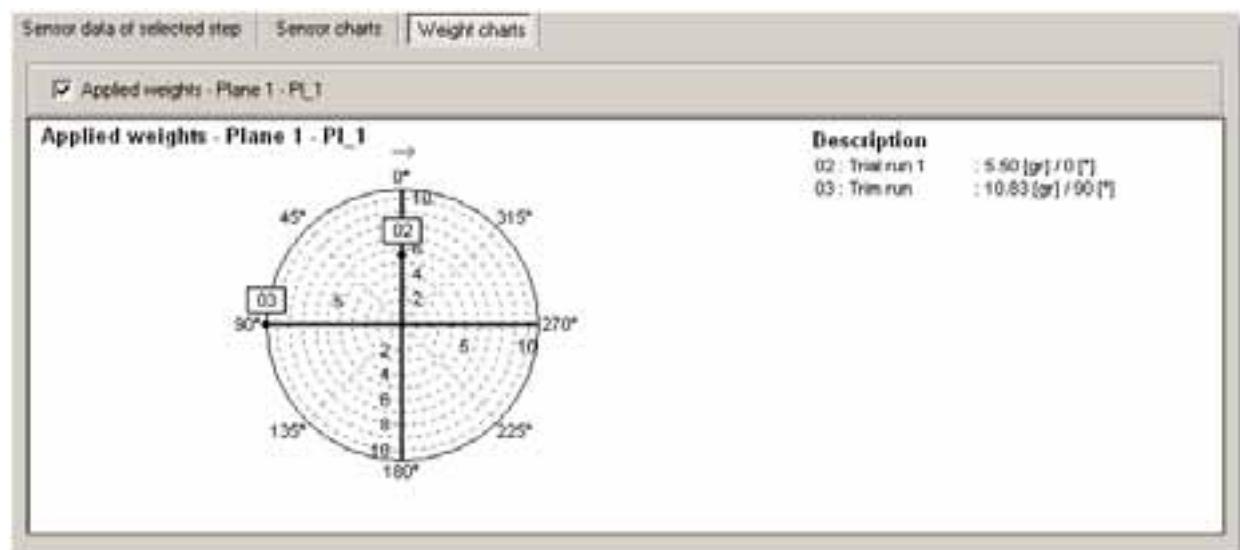
Click **Sensor charts** to display the position of the sensors as a chart. Trendline enters the sensor position on a circular chart for each individual step of the

measurement. You can activate/deactivate the display of each sensor at **Sensor position <n>**.



Display weight graphics

Click **Weight charts** to display the weights as a chart. The Trendline software enters the position of the weights during the trial run and trim run in a circular chart. You can switch the display of weights for each plane on or off by clicking on **Applied weights - Plane <n>**.



The positions of the weights are indicated against the direction of shaft rotation.

Print view of graphics



Click on  to call up a print preview of the graphics.

Balancing report



Click on  to generate a balancing report .

Delete balancing data

To delete the data obtained during a balancing measurement click the corresponding entry in the list then click . Click on .

3.4.8 Setting up run up/coast down

Configuration

Name Coast down

Info Configuration Measured data

RFID State RFID Assigned **RFID Number** E004010008D8EBE9

Acceleration sensor settings

Vibration sensor: Active 100 mV/g (CTC AC102) Name of sensor position: SEN Angle of vibration sensor: 0

Trigger settings

Select trigger sensor: Optical (Banner Minibeam SM312LVQD) Name of trigger position: TR Angle of trigger sensor: 0 Edge: Positive negative

Run up / coast down settings

Type of vibration unit: Displacement Characteristic: Peak-to-peak Measurement type: Run Up Coast Down

Frequency settings

Use automatic start frequency 9999.00 RPM Use automatic end frequency 300.00 RPM

Expert settings

Order: 1 Signal length: 4096 Use Hanning windowing

RFID status

In this section you can display and edit the status of an RFID tag assigned to the measuring point:

- **No RFID** No RFID tag is assigned to the measuring point.
- **Assign RFID** This option instructs the Detector to assign an RFID tag placed on the machine to this measuring point during the next round.
- **RFID assigned** An RFID tag is assigned to the measuring point. The unique ID is displayed in the **RFID number** field.
- **Delete RFID** This option instructs the Detector to cancel the RFID tag

assignment to the measuring point during the next round.

- **RFID defective** The Detector has marked the assigned RFID tag as defective.
- **Change RFID** This option tells the Detector to replace the assigned RFID tag. During the next round, you must delete the tag and assign a new one before you can perform the measurement at this measuring point.



You can only select the statuses that are accessible as a follow-up status of the current status.

See also

Automatic assignment of RFID tags to measuring points .

Acceleration sensor settings

- **Vibration sensor:** Select the sensor used from the sensor database  here.
- **Name of sensor position:** Enter a designation for the sensor position. This is required for identification of the sensor by the Detector. Due to the size of the Detector display this name can only be 5 characters long.
- **Angle of vibration sensor:** Enter the angle of displacement of the trigger sensor from the zero position in the direction of rotation.. The stator is always used as the reference for the zero position which points vertically upwards.

Trigger settings

- **Select trigger sensor:** Select the trigger sensor used from the sensor database  here.
- **Name of trigger position:** Enter a designation for the trigger position. This is required for identification of the trigger sensor by the Detector. Due to the size of the Detector display this name can only be 5 characters long.
- **Angle of trigger sensor:** Enter the angle of displacement of the trigger sensor from the zero position in the direction of rotation.. The stator is always used as the reference for the zero position which points vertically upwards.
- Select **Positive** or **Negative** to indicate whether the measurement should start on a positive or negative edge on the trigger sensor. This edge determines the 0° position of the shaft.

Run up / coast down settings

In this section you can make settings required for Determining the resonance range of a machine  with the run up/coast down test.

- **Type of vibration unit:** Enter which vibration unit to use at run up/coast down. The following are available: Displacement, Velocity and Acceleration.
- **Characteristic:** Specify here whether the **peak-to-peak value**, the **peak value**

or the root mean square (**RMS**) should be evaluated.

- **Measurement type:** Enter whether the Detector measures during **run up** or **coast down** of the machine

Frequency settings

In this section you can set the start and end frequency for Determining the resonance range of a machine¹⁹⁹ with the run up/coast down test.

- **Use automatic start frequency:** Enter the frequency at which the Detector starts measuring.
- **Use automatic end frequency:** Enter the frequency at which the Detector stops measuring.

Expert settings

The settings in this section concern conditioning of the measuring signal determined while Determining the resonance range of a machine¹⁹⁹ with the run up/coast down test.

- **Order:** Select what signal order the Detector should determine (1 = rotational speed signal, 2 = 1st harmonic, 3 = 2nd harmonic, 4 = 3rd harmonic).
- **Signal length:** Enter how many samples (1024, 2048 or 4096) the Detector should measure per measuring signal.
- **Use Hanning windowing:** Select whether the Detector should use Hanning windowing when conditioning the measuring signal. Hanning windowing leads to better quality of the digitized measuring signal, particularly at low rotational speeds. However, this additional step requires computing time in the Detector and leads to increased noise in the digitized signal.



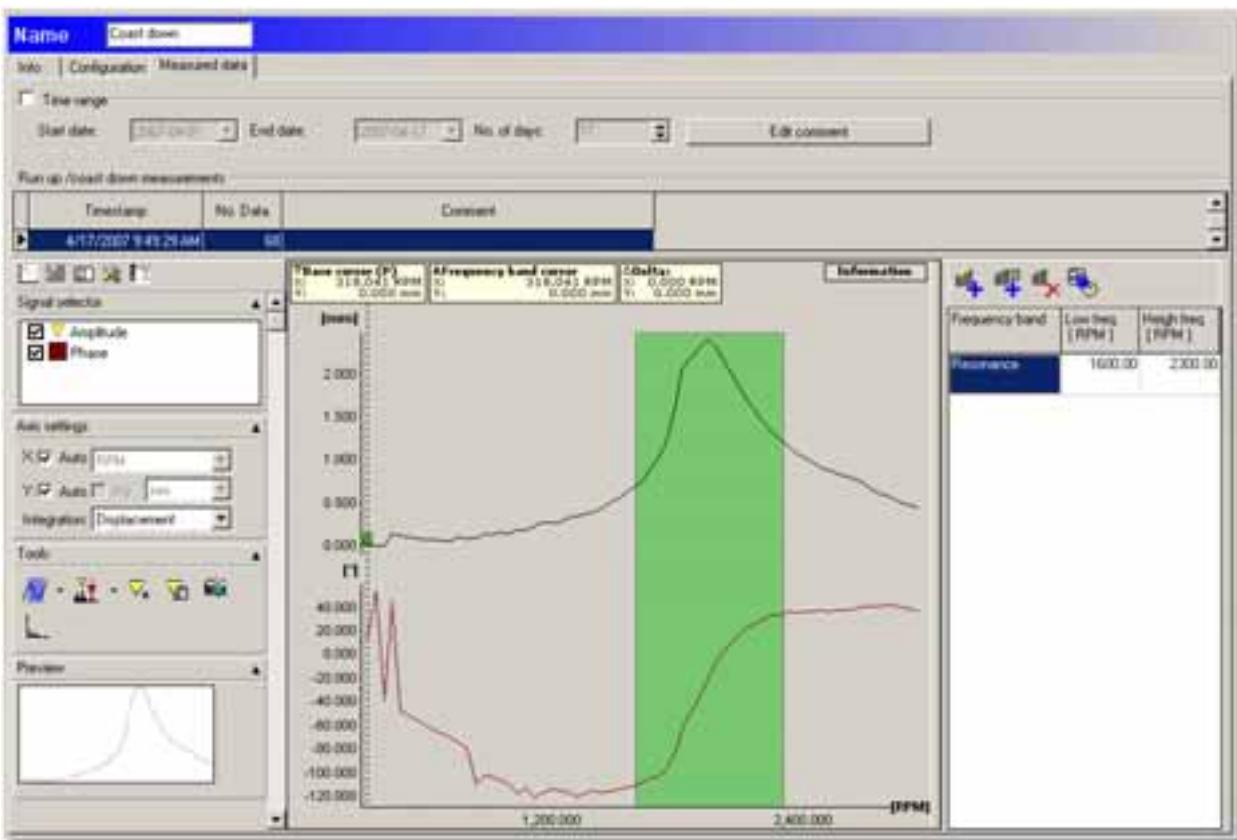
The effects of this setting depend very much on the type of machine and on the individual demands on the ratio of accuracy to the number of signal support points. As a general rule, you should

- *measure as many amplitude and phase values as possible for machines that run up/coast down quickly - i.e. reduce signal length and thus signal quality and do without Hanning windowing,*
- *increase accuracy for machines that run up/coast down slowly, i.e. increase signal length and thus signal quality and activate Hanning windowing.*

Measured data

In the Measured data window you can

- create an amplitude/phase diagram for a set of measured data,
- save frequency bands selected in the diagram and copy them to a balancing configuration⁵³.



The Run up/coast down measurements section displays the run up/coast down measurements saved for the measuring point.

Limit time range

- In order to limit the time range of the measured values displayed, select the **Time range** option.
- Set the desired start and end date.

Edit comment

- In order to edit a measurement comment, click on the measurement and then **Edit comment**.

Below the measurements the window is split into three sections. The amplitude/phase diagram is displayed in the middle, with the diagram editing tools to the left. To the right of the diagram there is a list of the user-defined frequency bands.

Displaying the amplitude/phase diagram and setting the frequency band

Click on a measurement to display the amplitude/phase diagram in the diagram window. You can use the FIS-Viewer zoom tools described in the "FIS-Viewer" [\[114\]](#) section to edit the diagram. Cursor tools for the diagram include the base cursor

(see "Cursor tools¹³⁷") and a difference cursor, with which you can specify a frequency band.

How to specify a frequency band in the amplitude/phase diagram:

- Move the base cursor (yellow) to the measuring point to specify the lower cutoff frequency.
- Move the difference cursor (green) to the desired measuring point to specify the upper cutoff frequency.

In the diagram information, you can read the position of the base and difference cursor and the width of the frequency band and amplitude difference.

Saving the frequency band

1. Select the frequency band in the amplitude/phase diagram and click .

2. Enter a name for the frequency band and click **OK**.

or:

1. Click on .

2. Enter the name of the frequency band.

3. Select the start and end frequency and click **OK**.

Deleting a frequency band

1. Click on the frequency band to delete.

2. Click on .

Copying frequency bands to a balancing configuration

1. Click on .

2. The **Add frequencies to balancing configuration** window displays the balancing configurations available in the system configuration. Select the desired balancing configuration and click **OK**.

3.4.9 Change alarm levels automatically

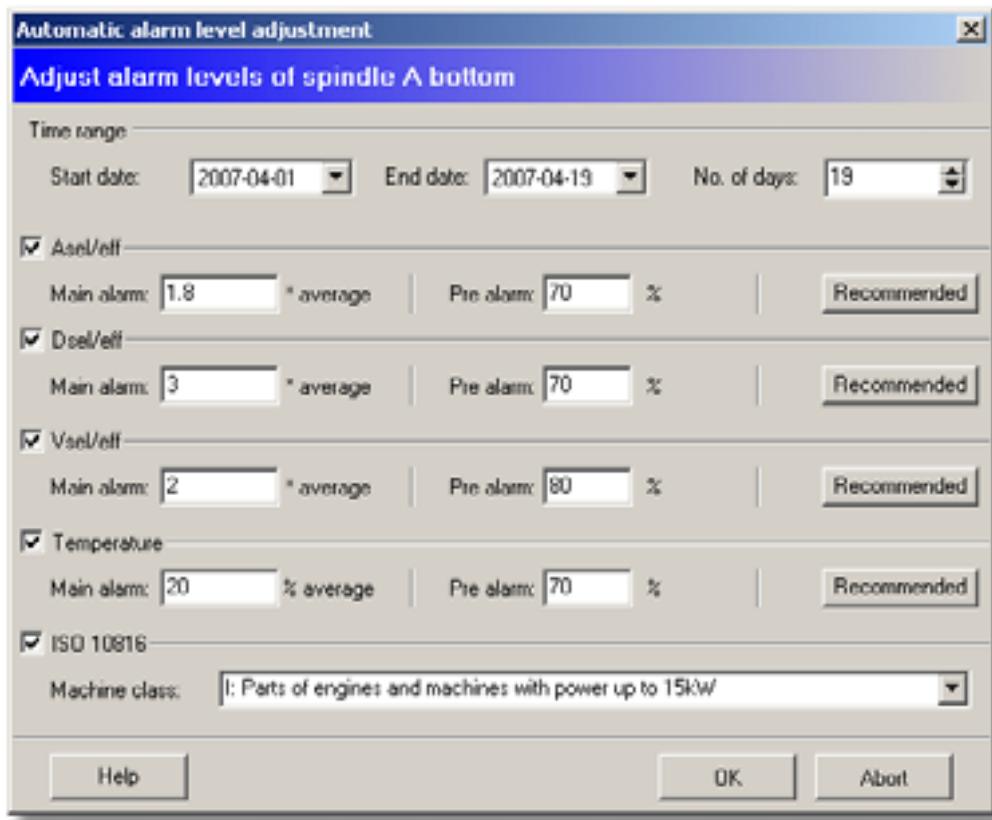
The Trendline software can automatically adjust the alarm settings for the individual characteristic values. During this process the software determines the average of all measured values for the relevant characteristic value and automatically adjusts the corresponding alarm value according to your specifications. Alternatively, you can use the values suggested by the software.

CAUTION *Modification of alarm thresholds may have severe effects on the service life of the monitored components if used improperly. You should therefore always carefully check whether the intended settings are suitable for your specific system.*



To modify the alarm values automatically proceed as follows:

- Select the required element from the configuration tree – a specific machine, for example. The alarm values for this element and all sub-elements it contains are modified.
- Click on **Alarm thresholds** in the **System** menu.



Specify time range

You can use the **Time range** option to limit the measuring values used for averaging. To do this, enter the start and end time. Alternatively, you can enter the end time and specify the duration in whole days in the **No. of days** input field. In the latter case the start time is automatically determined.

Configuration of automatic adjustment

Automatic adjustment of alarm values can be defined for each individual characteristic value¹⁵ (acceleration, demodulation, velocity and temperature) of the element selected in the configuration tree.

To activate the automatic adjustment for one characteristic value proceed as follows:

- Select the characteristic value.
- Enter the **main alarm** adjustment as a factor of the average value.
- Enter the **pre-alarm** adjustment as a percentage (less than 100).

or:

- Click **Recommended** to set the values recommended by Trendline.



The values suggested by Trendline for the automatic adjustment of alarm values are based on empirical values used by FAG Industrial Services GmbH. As entirely different settings may be required depending on the properties of the components being monitored these must be regarded purely as suggested values which are therefore non-binding. In all cases the user is responsible for selecting appropriate alarm values.

Select the **machine class** for the characteristic value **ISO 10816**.

I: Parts of engines and machines with power up to 15kW
II: 15kW up to 75kW without baseplate or up to 300kW with special baseplate
III: Large machines suited on heavy baseplates
IV: Large machines with power higher than 10MW on swinging baseplates

3.4.10 Send configuration

You can send a configuration or a part of a configuration to the Detector. For that, follow the sequence below:

- Select a machine in the tree.
- Connect the connector to the serial interface using the data cable.
- Switch on the detector.
- Click on **Detector > Send configuration** in Trendline 3 software or click on 

Now, the configuration for the machine selected including all measuring points is sent to the Detector. If you want to send a complete configuration, you would have to select the configuration in the tree (in the example in paragraph 3.3.1 this would be "Cement Plant 1") prior to sending the data. It is even possible to send one measuring point. This facility is mostly used for test purposes.



If the "Always save" option is selected for more time signals in the configuration that you wish to send to the Detector than are permitted in the Detector memory an error message will be output and the data will not be transferred. Also refer to Frequency analysis ²¹⁷.

3.4.11 Deleting the Trendline database

To delete a Trendline database and remove all configuration and measured data irreversibly, the database must be open.

- To delete the currently open Trendline database, click **Delete current database** in the **Tools** menu. The program displays a security prompt.
- Click **Delete** to delete the database irreversibly.



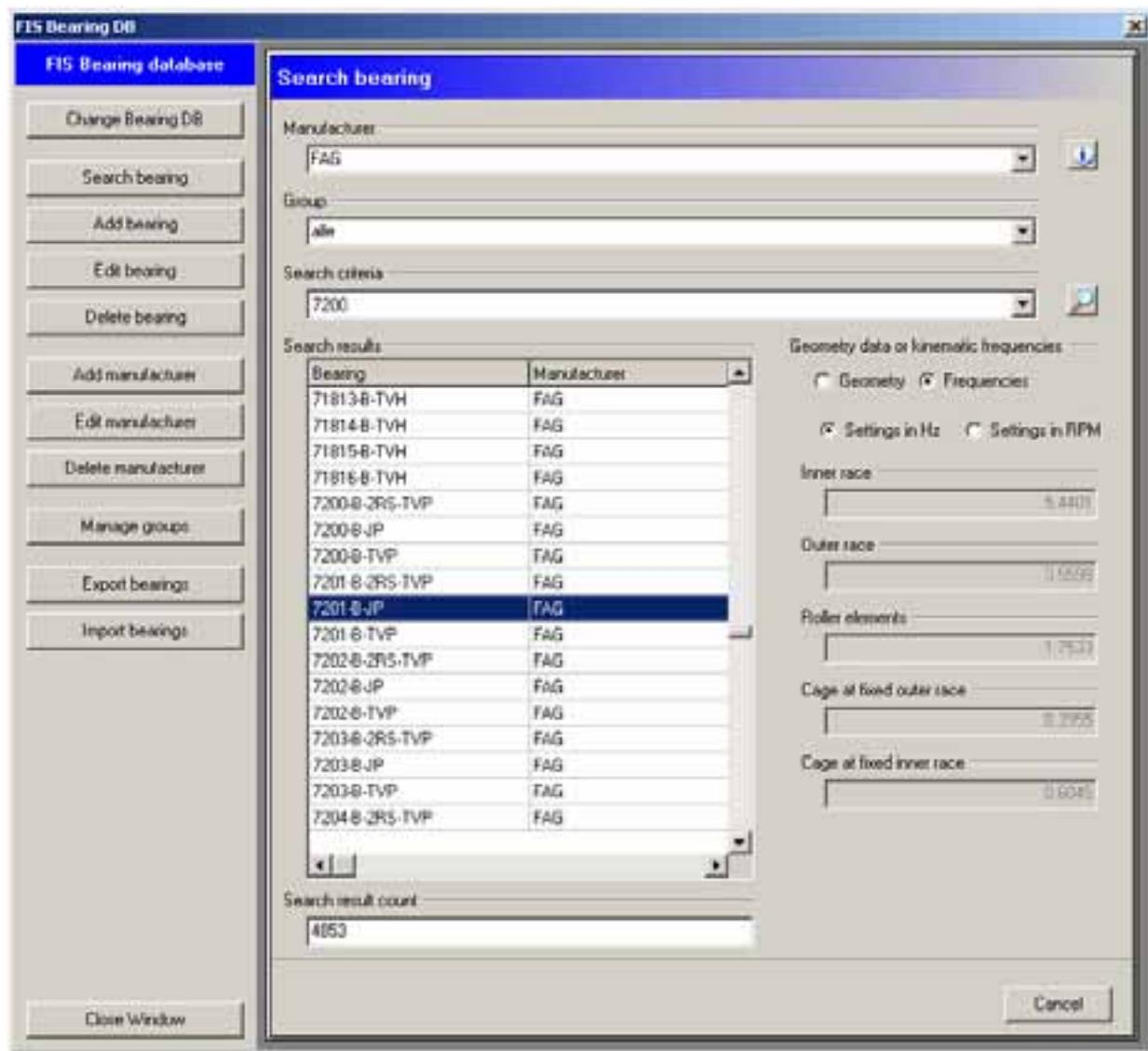
You cannot interrupt the delete process!

3.5 Bearing database

The Trendline database provides you with data on the most widely used bearings for use in your individual configuration (see Setting up measuring point ⁴⁵).

You can also add your own bearings ⁷¹ to the above. Furthermore, the Trendline bearing database also includes a group administration feature ⁷⁵ which you can use, for example, to group bearings of different makes that have similar characteristics.

Click **Tools > Bearing database** to open the bearing database.



3.5.1 Search bearing

To find a bearing click on **Search bearing** in the bearing database.

- Click on  to display all bearings.
- To restrict the search you can specify the **manufacturer** and/or **group**.
- Additionally, you can further limit the name of the bearing in **Search criterion**. You can use the wildcards "?" and "*" in the usual way, e.g.
 - o "*1200*" to find all bearing names containing 1200 or
 - o "?200*" to find all bearings whose name includes the text "200" at position 2-4.

The list of hits is displayed in **Search result**.

- Select the bearing to be modified and click on **Continue**.

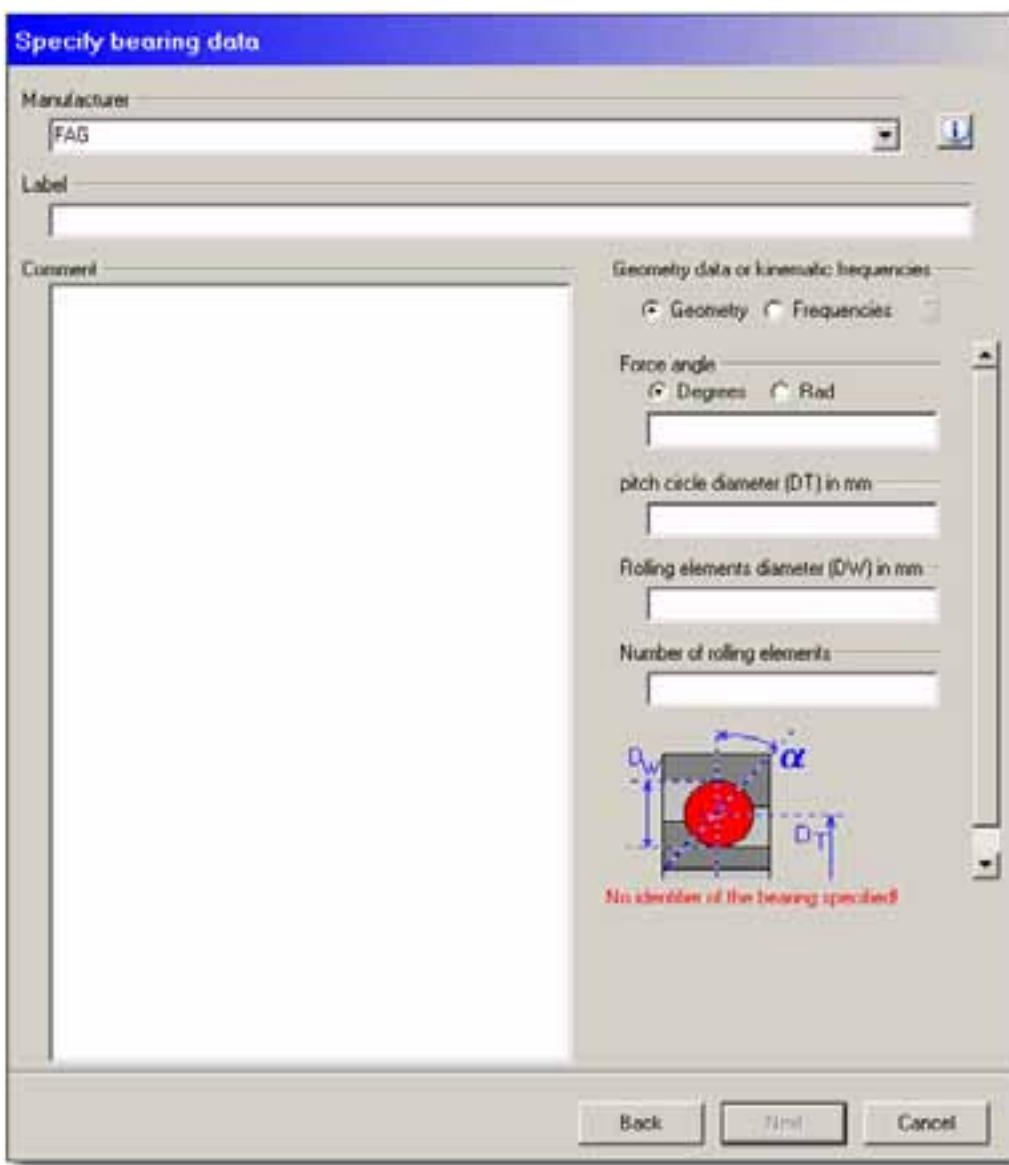
- Enter the data for the required bearing as described under Add bearing [71](#).
- Click on **Save**.

If the search results do not return a bearing, the bearing database may be defective or inaccessible. Then proceed as follows:

- Close the Trendline software.
- Deregister the database by running the `deinstall_fis_bearing_db_ocx.bat` file in **C:\Program Files\Common Files\FIS\BearingDB**.
- Register the database element by running the `install_fis_bearing_db_ocx.bat` file in the same directory.
- You can now restart Trendline.

3.5.2 Add bearing

To add a bearing to the bearing database click on **Add bearing**.



- Select a **manufacturer** from the list.
- Enter a name for the bearing in the **Label** field.
- Detailed comments may be entered in the **Comment** field (optional).

Geometry data or damage frequencies

- Use the **Geometry** and **Frequencies** options to switch between the input fields in the right-hand area of the window in order to enter corresponding data. When inputting the contact angle select either **degrees** or **radians** as the unit. When specifying the frequencies enter whether these should be in **Hz** or **rpm**.

Geometry data or kinematic frequencies

Geometry Frequencies

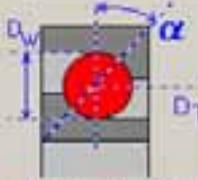
Force angle

Degrees Rad

pitch circle diameter (D_T) in mm

Rolling elements diameter (D_W) in mm

Number of rolling elements



No identifier of the bearing specified

Geometry data or kinematic frequencies

Geometry Frequencies

Force angle

Degrees Rad

pitch circle diameter (D_T) in mm

Rolling elements diameter (D_W) in mm

Number of rolling elements

No identifier of the bearing specified



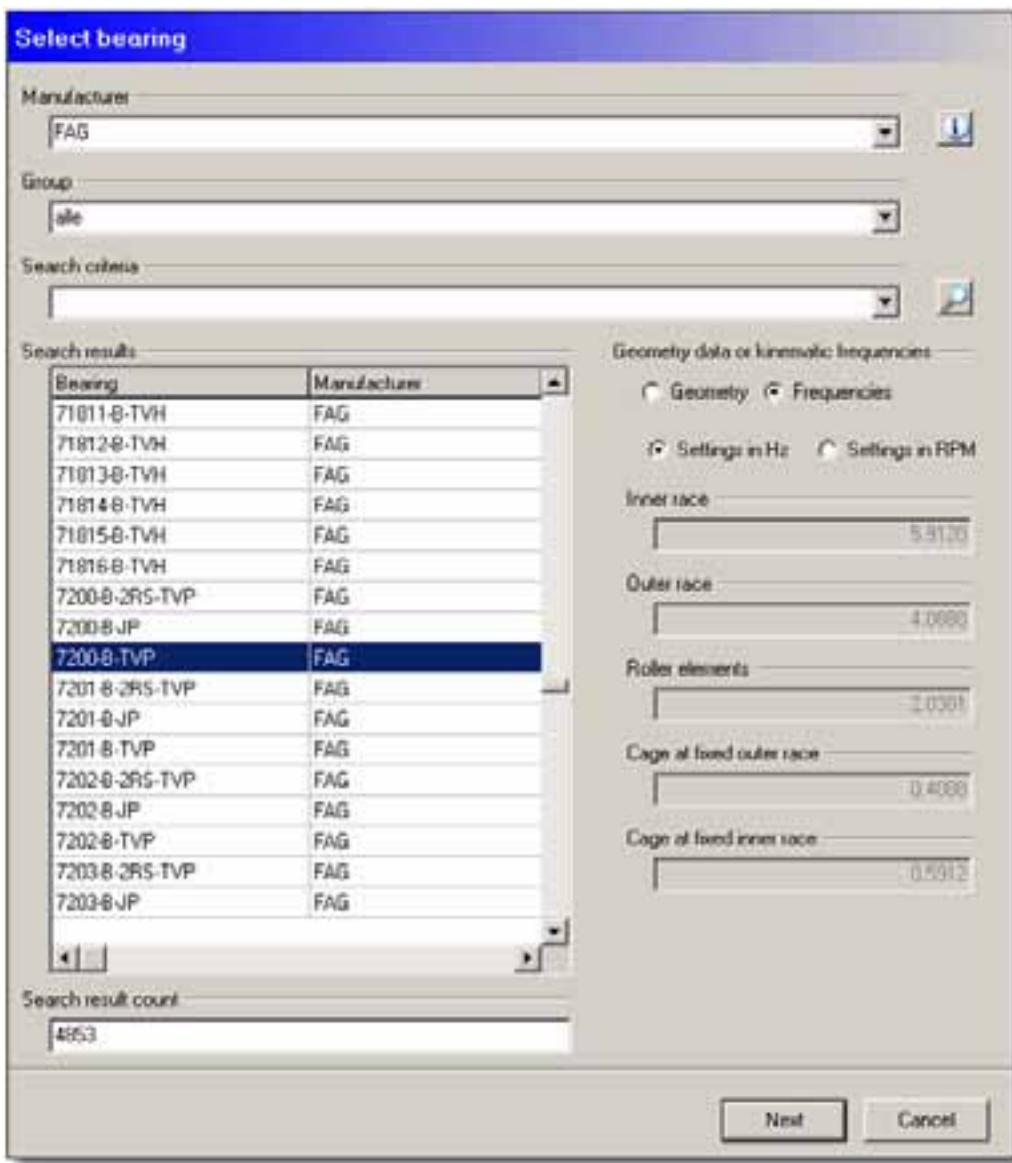
Trendline indicates whether any information still needs to be input in the bottom right-hand area of the window. The bearing can be added to the database only if all input is complete.

- Click on **Continue** to store the bearing in the bearing database.

3.5.3 Edit / delete bearings

Editing bearings

Click on **Edit bearing** and start by searching for the corresponding bearing as described at Search bearing .



The list of bearings found is displayed in **Search result** as well as the **number of hits**.

- Select the bearing to be modified and click on **Continue**.
- Enter the data for the required bearing as described under Add bearing [71](#).
- Click on **Continue**.



Click on  to open the **Manufacturer details** window. You can call up the contact details for the manufacturer here.

Deleting a bearing

- Carry out your search initially as described above [72](#) then select the bearing to

be deleted from the **Search result**.

- Click on **Delete bearing** to remove the bearing from the database.

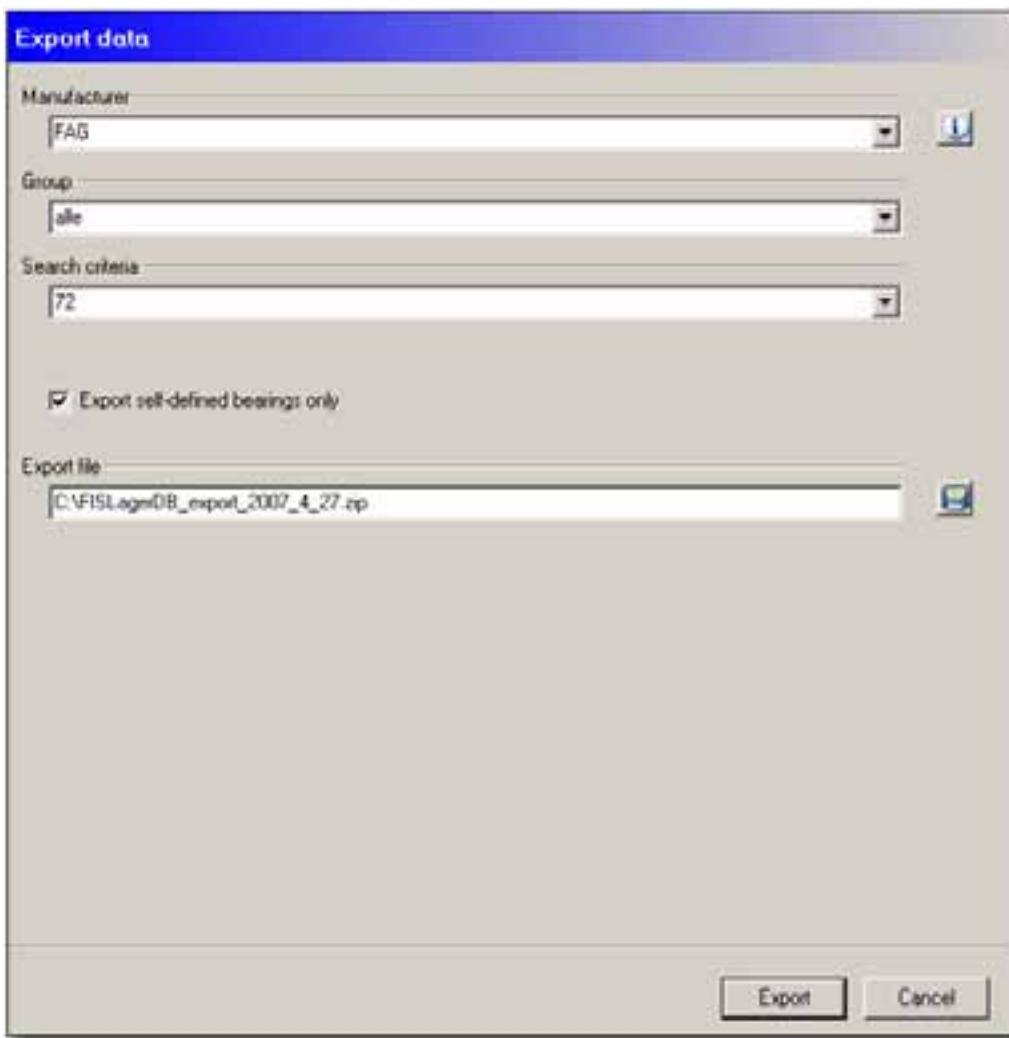


*You can only delete bearings that you have entered⁷¹ yourself!
Once all the bearings for a particular manufacturer have been deleted you can also delete the manufacturer⁷⁸.*

3.5.4 Exporting / importing bearings

Exporting bearings

Click on **Export bearing** and carry out your search for the bearing to be edited as described under Edit/delete bearings⁷².



- You can **use** the **Export self-created bearings only** option to restrict the export to bearings you yourself have entered.

- Click  and select the path and file name. By default, Trendline uses a file name according to the convention FISBearingDB_export_<year>_<month>_<day>.zip. Alternatively, you can use your own file name.

Importing bearings

- Click on **Import bearings**, then on .
- Select the import file.

3.5.5 Manage groups

You can use the manage group feature to classify bearings with similar characteristics regardless of their manufacturer.

- Click on **Manage groups** to call up the bearing database group administration feature.



Group bearings

Manufacturer: FAG

Group:

Search criteria:

Assigned bearings:

Assigned bearings list:

Bearing	Manufacturer
100-TVH	FAG
11204-TVH	FAG
11205-TVH	FAG
11206-TVH	FAG
11207-TVH	FAG
11208-TVH	FAG
11209-TVH	FAG
11210-TVH	FAG
11211-TVH	FAG
11212-TVH	FAG
1200-TVH	FAG
1201-TVH	FAG
1202-TVH	FAG
1203-TVH	FAG
1204K-TVH/C3	FAG
1204K-TVH/C3 + H	FAG
1204-TVH	FAG
1205K-TVH/C3	FAG
1205K-TVH/C3 + H	FAG
1205-TVH	FAG

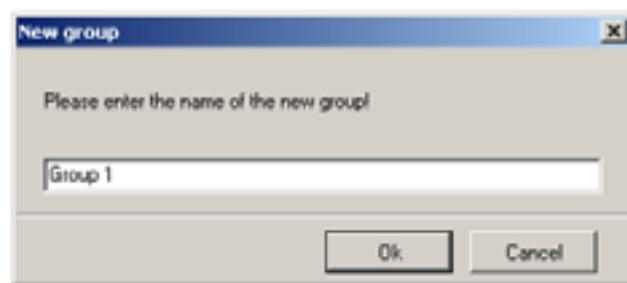
Unassigned bearings list:

Bearing	Manufacturer
B7001-E-2RSD-T-P4S	FAG
B7001-E-T-P4S	FAG
B7002-C-2RSD-T-P4S	FAG
B7002-C-T-P4S	FAG
B7002-E-2RSD-T-P4S	FAG
B7002-E-T-P4S	FAG
B7003-C-2RSD-T-P4S	FAG
B7003-C-T-P4S	FAG
B7003-E-2RSD-T-P4S	FAG
B7003-E-T-P4S	FAG
B7004-C-2RSD-T-P4S	FAG
B7004-C-T-P4S	FAG
B7004-E-2RSD-T-P4S	FAG
B7004-E-T-P4S	FAG
B7005-C-2RSD-T-P4S	FAG
B7005-C-T-P4S	FAG
B7005-E-2RSD-T-P4S	FAG
B7005-E-T-P4S	FAG
B7006-C-2RSD-T-P4S	FAG
B7006-C-T-P4S	FAG

Buttons: Save, Cancel

Create a new group

- To create a new group click on .



- Enter a name for the new group and click on **OK**.

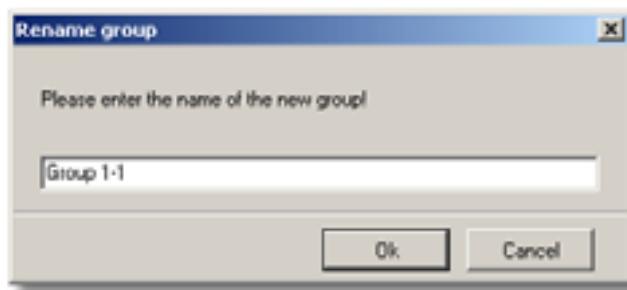
Assign bearings to a group

To assign one or more bearings to a group proceed as follows:

- Select the desired group from the **Group** list.
- Search for one or more bearings as described at "Edit/change bearing -> Search bearing ". The bearings found are displayed in the **Unassigned bearings** list.
- To assign a bearing to the group click on it then click on . The bearing should now be displayed in the **Assigned bearings** list.
- To assign all bearings found to the group click on . All bearings should now be displayed in the **Assigned bearings** list.
- To delete a bearing from the group click on the bearing in the **Assigned bearings** list then click on .
- To delete all bearings from the group click on .
- Click on **Save** assign the bearings to the group in the bearing database.

Rename a group

- To rename a group select it from the **Group** list and click on .



- Enter a new name for the group and click on **OK**.

Delete a group

- To delete a group select it from the **Group** list and click on .



Please note: the group is deleted immediately - you will not be prompted to confirm this! You should therefore only use these functions if you are sure that you wish to delete a group.

3.5.6 Add manufacturer

- Click on **Add manufacturer** to create a new manufacturer.

Create new manufacturer

Manufacturer	
Contact person	
Street	
Post code	City
Phone	Cell phone
Fax	E-mail
Internet	
Info	

Next **Cancel**

- Enter the manufacturer's data in the appropriate input fields and click on **Next**.
- Check your input in the window that subsequently appears. If the input is correct click **Add** to save the manufacturer in the bearing database or click **Back** to modify your input as required.

3.5.7 Edit / delete manufacturer

Edit manufacturer

- Click on **Edit manufacturer** to modify the data for one manufacturer.

Modify manufacturer

Manufacturer:

Contact person:

Street:

Post code: City:

Phone: Cell phone:

Fax: E-mail:

Internet:

Info:

Next **Cancel**

- Change the manufacturer data and click on **Next**.
- In the next window the Trendline shows your changes and the original data for an easy compare. Click on **Save** to stored your changes in the bearing database or click on **Back** to change your data.

Delete manufacturer

When you have deleted all bearings from a manufacturer from the database (see Edit/delete bearings ⁷²), you can also remove the manufacturer.

- Click **Delete manufacturer**.
- Then select the manufacture from the **Manufacturer** list and click **Continue**.

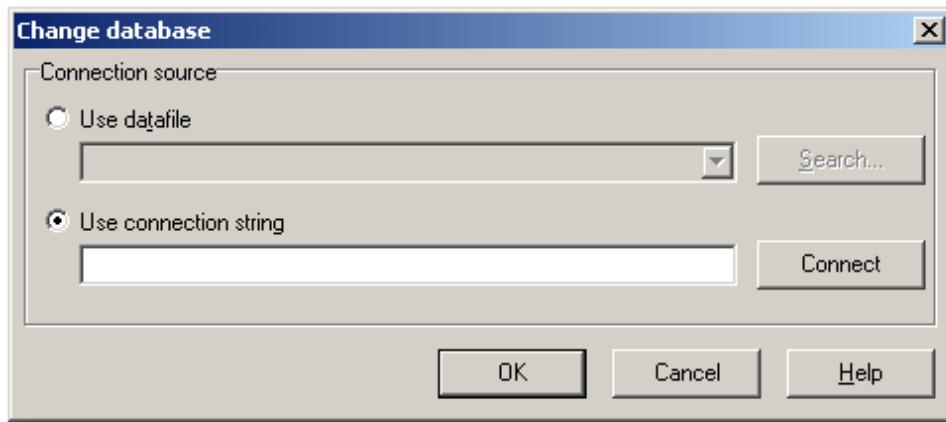
The manufacturer is then deleted from the bearing database.



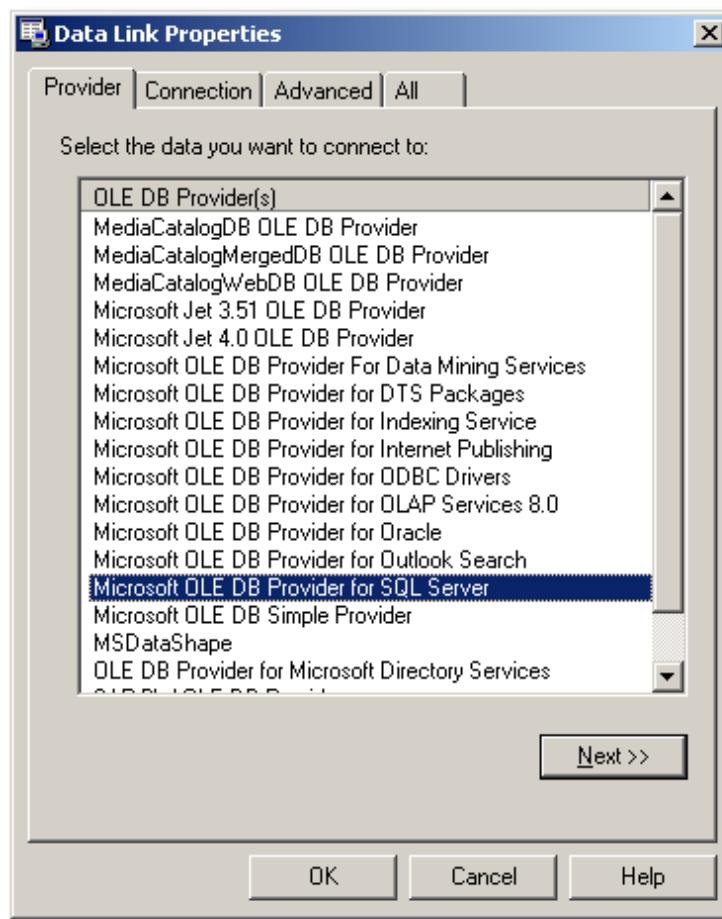
You can only delete manufacturers which have been added ⁷⁸ by yourself!

3.5.8 Select a different bearing database

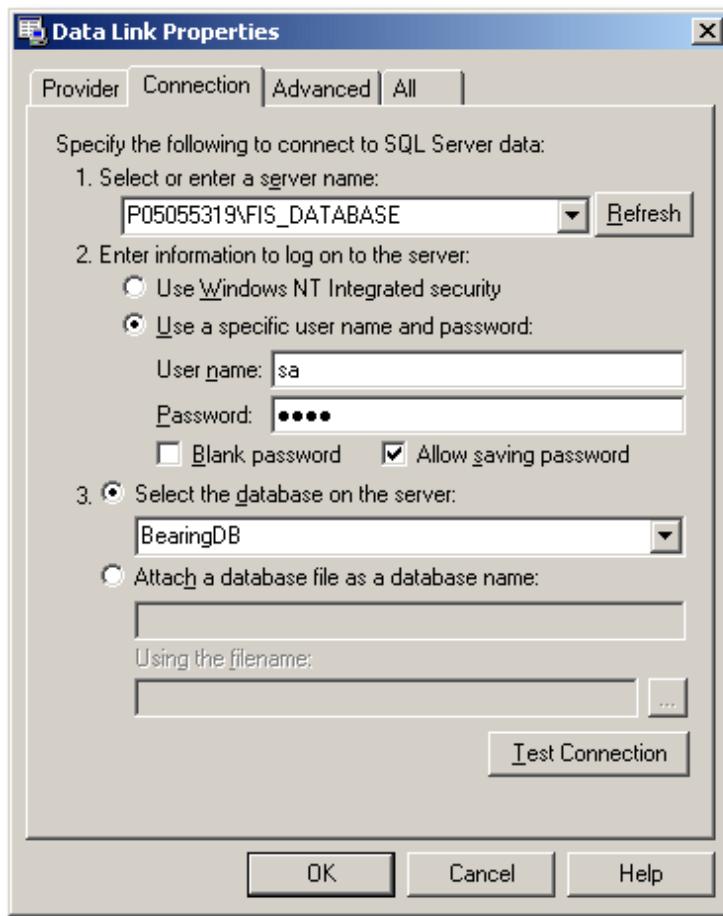
- Click on **Change bearing DB.**



- Select **Use connection string** and click **Connect**.



- Click on **Microsoft OLE DB Provider for SQL Server** then click **Next**.



- Select the database server that contains the bearing database from the server list or enter the server in the input field in the upper area of the window. Click on **Refresh** to update the list of available servers.



If you do not find any entries in the server list due to restricted user permissions, enter "Computer name\FIS_DATABASE" manually (if the name of your computer, for example, is "peters_laptop", the server name would be "peters_laptop\FIS_DATABASE"). You can find your computer's name in the Windows Explorer drives. If you are not sure about your computer's name, ask your administrator.

- Select **Use a specific user name and password** and enter your user name and password to log-on to the bearing database. If you select a database server that was installed during a Trendline installation (contains FIS_DATABASE in its name), the user name is **sa** and the password is **sql8**. Enable **Allow Password Save** to save the password.
- Select a **Bearing DB** from the list.
- Click on **OK** then also click **OK** in the **Change database** window.

The modified bearing database is now available for use.



For the database server installed with Trendline the user name is "sa" and the password is "sql8".

3.6 Create a route

After the system structure has been entered into a configuration (or several configurations just as well), there is the option to group parts of those configurations into routes using the function route. For example, one could create a route for each day of the week and measure certain machines only on Monday. A route for a certain mechanic, who maintains some machines of a configuration only, would be feasible just as well.

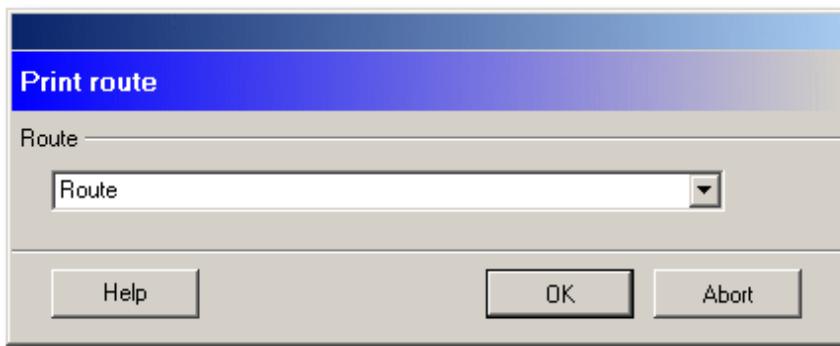
Should you want to take measurements at a measuring point not contained in the current route, you can take a free measurement with the Detector for that. To define the settings for that, at least one template must have been created⁸³ before. In this template you can set exactly the same properties as in an ordinary measuring point like characteristic values, sensor type, time signals, etc.

3.6.1 Create a new route

Open the window for the route planning under **Planning > Route**. A new window will open up, which is subdivided into three parts. On the left, you will find the configuration tree, in the middle the routes and on the right-hand side, same as in the configuration display, the settings. To create a new route, follow the sequence below:

1. Right-click the middle window and subsequently on Add Route. Alternatively you can click on  just as well.
2. Name the route in the right window and add a picture, if desired (for that, click on ).
3. Now, you can add elements from the configuration to the route. You can do that in two different ways:
 - a) Left-click the element you want to add to the route in the configuration tree. Subsequently, left-click the route you want to change in the middle window. Finally, right-click the middle window and then left-click **Add Selection**.
 - b) Left-click on the part of the configuration tree you wish to add. Keep the left mouse button pressed and drag the element onto the name of the route. Release the mouse button.
4. Repeat this procedure for all routes you want to create, e.g. for Monday to Friday.

Use the button  to print a route report to get an overview over the created routes. The following window is opened:



In this window you must select the route you want to print in the route report.

In this window you can select the route you want to display in the report.

3.6.2 Create template

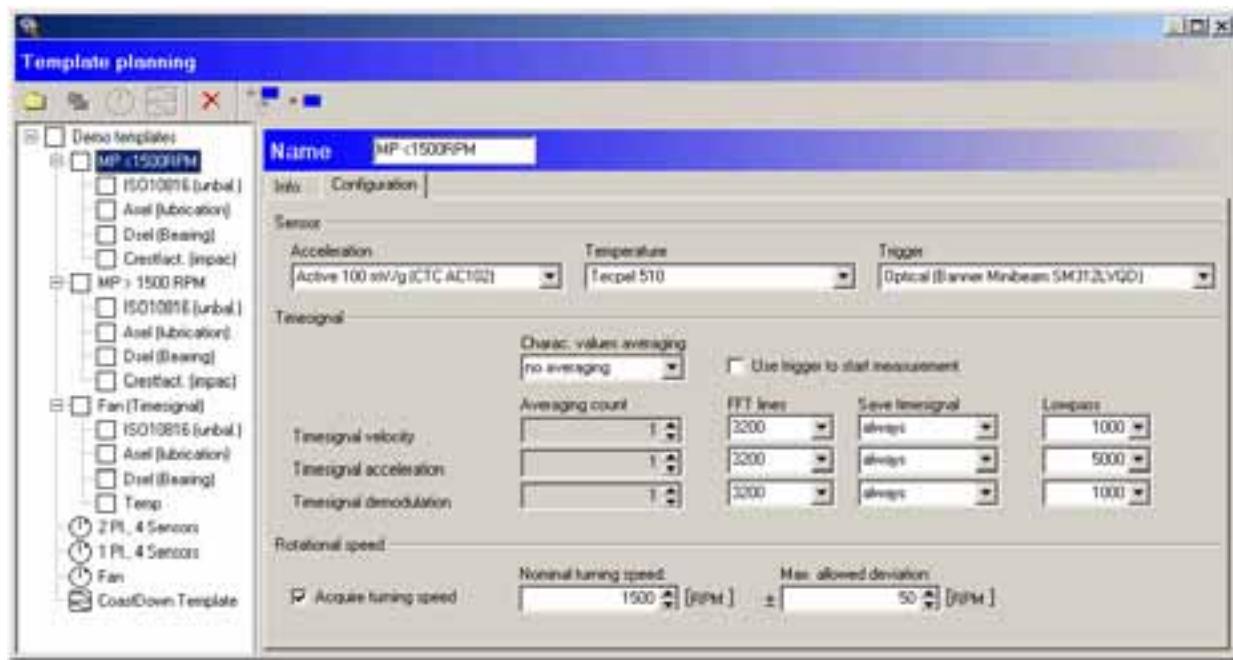
A template is a pattern for free measurements, i.e. measurements which are not in the current route.



You can send up to five templates for free CM measurements, balancing templates, and run up / coast down tests in a route.

A template has the same layout as a measuring point. As with a measuring point, time signals can be recorded and different characteristic values set. If you want to associate a free measurement with a certain measuring point, the template for this measurement must have the same layout as the respective measuring point. That means, the same characteristic values (with the same cut-off frequencies) must be set and the sensor must correspond as well. Time signals and alarm thresholds may differ, as the characteristic values can be compared none-the-less.

- To create a new template, click in the **Planning**-menu on **Template**.



- Click on  to add a new template group.
- Under **Name** you can name the group, under **Picture** you can include a picture with .

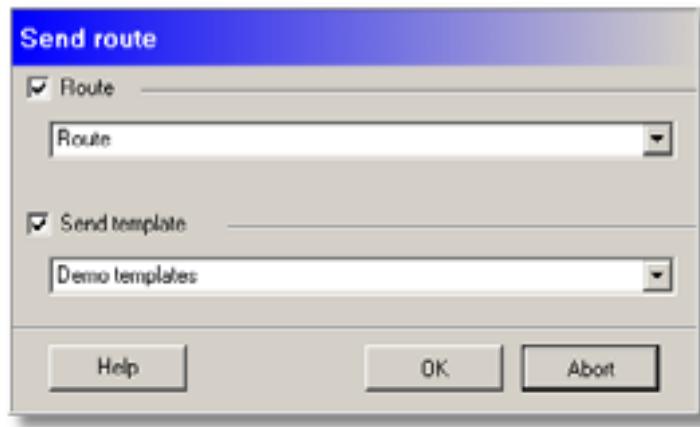
 - With  you create a new template. Here just as well, you can change the name (under **Info**) and insert a picture. Once you have created five templates into a group, you cannot add any more into this group. On the page **Configuration** you can set the sensor type and the time signals desired.
 - With  you add new characteristic values to the template. More information to that you will find in "Set up characteristic values" [50](#).

- In order to add a new balancing configuration to the template group click on  For more information refer to [Add balancing configuration](#) [53](#).
- In order to add a new run up / coast down configuration to the template group click on  For further details see "Setting up run up/coast down" [61](#).
- With  you can delete the element selected from the list.
- With  and with  you can unfold the tree starting from the element selected or close again respectively.

3.6.3 Send route

There are two ways to send a route to the detector:

- Click on **Detector > Send Route** (or on  in the configuration window).



- Select the **route** you want to send to the Detector.
- If you check the checkbox **Send Template**, you can select one of the previously defined template groups.
- Connect the Detector with the data cable to your PC and switch it on.
- Click **OK** to send the route to the Detector.

Another way of sending a route to the Detector is directly from route planning (

Planning > Route). Click on . The **Send route** window opens. Then proceed exactly as described above.



If the "Always save" option is marked for a greater number of measurement points in the route you wish to send to the Detector than are permitted in the Detector memory an error message will be output and the data will not be transferred. Also refer to System messages and their meaning ^[205].

3.7 Download data from Detector

After measuring with the Detector you have to transfer the data to Trendline 3 software. Connect the Detector with the data cable to your PC and switch it on.

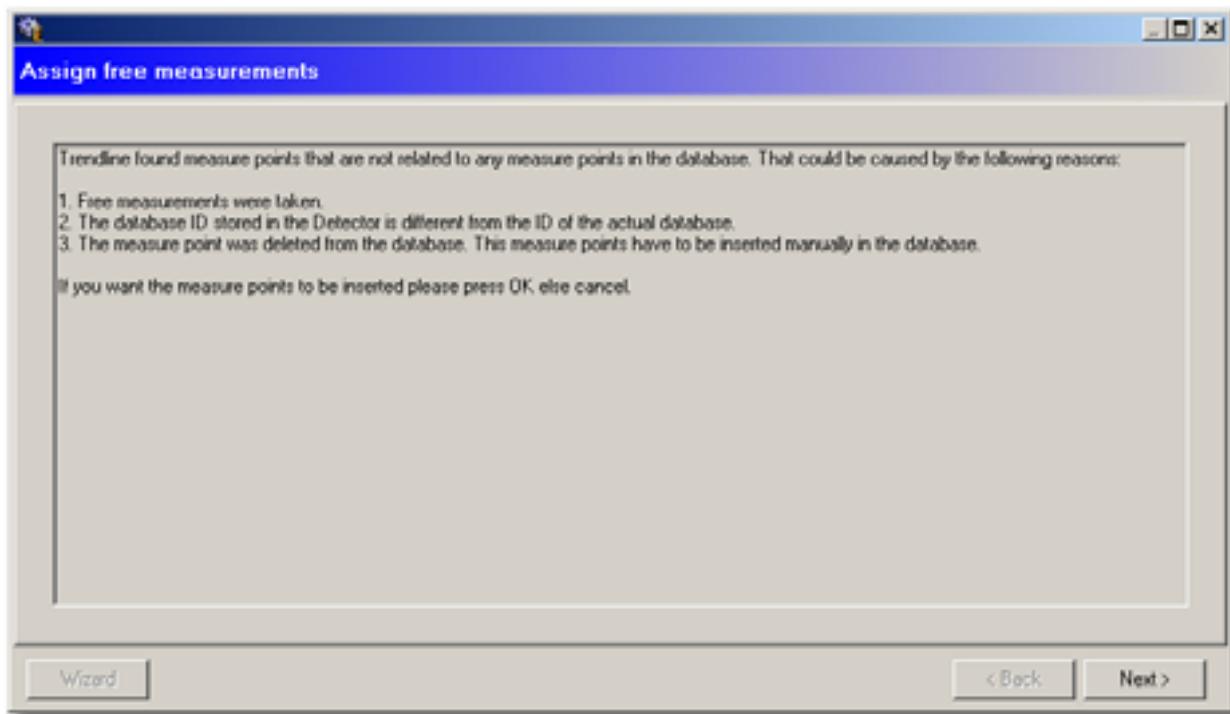
Click on **Detector > Load data from Detector** or on . Now, all data, that is configurations, time signals and free measurements, are downloaded onto the PC. This process can take several minutes depending on the amount of data.

Once all data have been received, they are stored at the respective locations in the database. It can happen that the program does not automatically sort the measuring points, e.g. you have taken free measurements or the configuration on the Detector had been created on a different PC. In this case, the sorting wizard  will be started automatically for sorting the measurements into your configuration tree.

3.7.1 Sorting Wizard

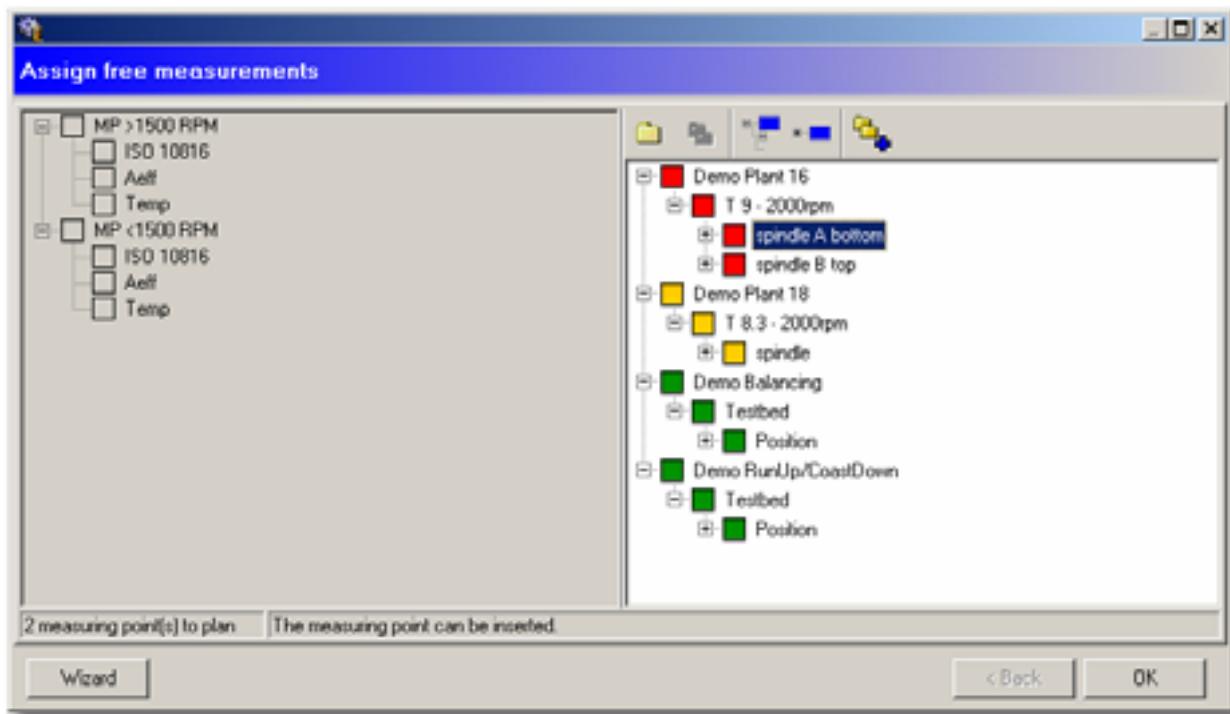
When you start the sorting wizard, Trendline displays an information window showing you why the data cannot be sorted in.

- Click **Next** to continue sorting in the data.

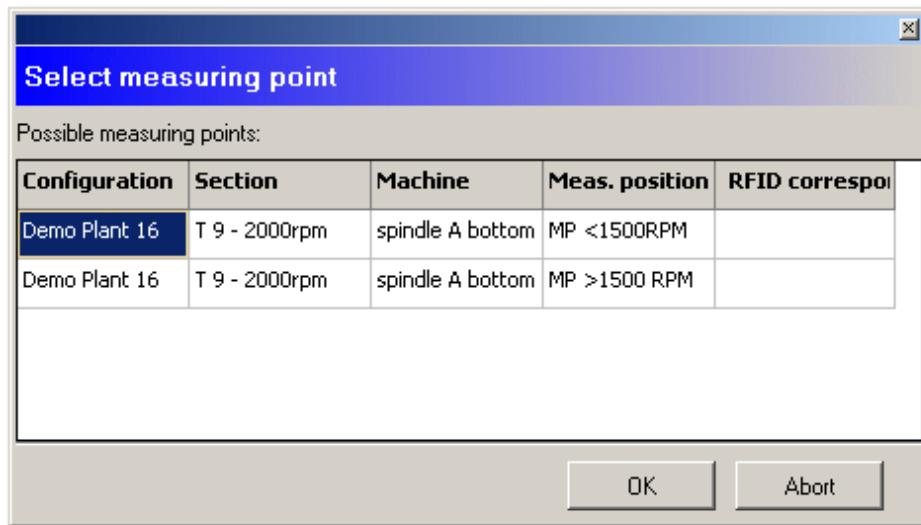


The next window is subdivided into two parts. On the left-hand side you will find the measuring points not yet sorted, on the right-hand side your configuration structure. Now, there are two possibilities.

- When a measuring point, which isn't sorted in yet, exists in one of the configurations already, you drag it with the left mouse button from the left window on the measuring point in the configuration. If the two really do match, the mouse cursor changes. You can release the mouse button to insert the measurement. In the status bar you can read why it was not possible to insert at a certain point.



- Alternatively, you can use the suggestions of the Trendline software. For this, click on **Wizard** and select a measuring point from the list of proposals.



If the measuring point does not exist in the configuration yet, you again have two possibilities.

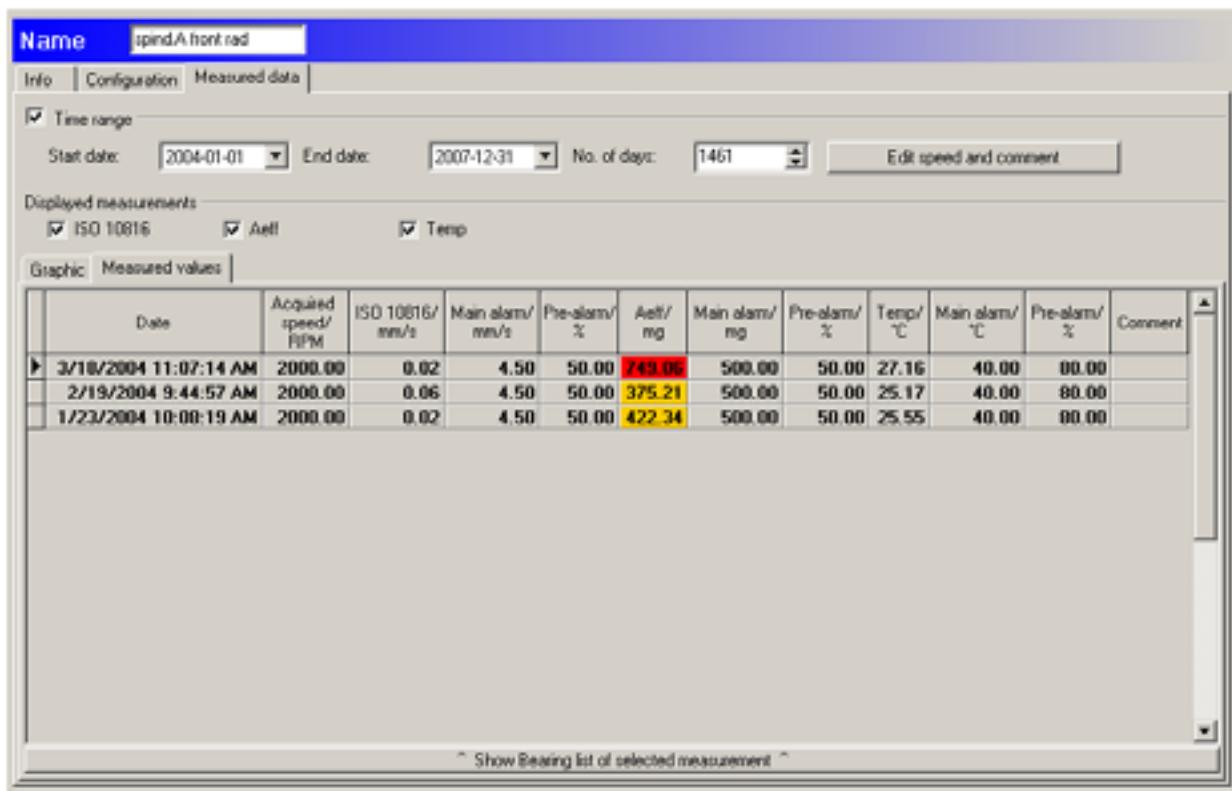
- If you want to add a measuring point to a machine, drag it into the right-hand window onto the machine name it is supposed to be added to.
- Additionally, you can add new configurations, sections and machines with the and buttons as you did, when creating the configuration. For this, see

also "Enter system structure" ⁴²".

3.8 Viewing measuring data

3.8.1 Measured values

In the register **Measured values** the selected measured values are displayed in a table. When a row is printed in bold, then at least one time signal for this measurement is stored. The time, the measured values determined and any pre-alarms or alarms that may have been output are displayed for each measurement in the measured values view.



The screenshot shows a software interface for viewing measured values. The title bar says 'Name: spindA.front.rad'. Below it are tabs for 'Info', 'Configuration', and 'Measured data' (which is selected). Under 'Measured data', there is a 'Time range' section with 'Start date: 2004-01-01', 'End date: 2007-12-31', 'No. of days: 1461', and a 'Edit speed and comment' button. Below that is a 'Displayed measurements' section with checkboxes for 'ISO 10816', 'Aeff', and 'Temp'. The main area is a table with columns: Date, Acquired speed/ RPM, ISO 10816/ mm/s, Main alarm/ mm/s, Pre-alarm/ %, Aeff/ mg, Main alarm/ mg, Pre-alarm/ %, Temp/ °C, Main alarm/ °C, Pre-alarm/ %, and Comment. The table contains three rows of data. A button at the bottom says 'Show Bearing list of selected measurement'.

	Date	Acquired speed/ RPM	ISO 10816/ mm/s	Main alarm/ mm/s	Pre-alarm/ %	Aeff/ mg	Main alarm/ mg	Pre-alarm/ %	Temp/ °C	Main alarm/ °C	Pre-alarm/ %	Comment
▶	3/18/2004 11:07:14 AM	2000.00	0.02	4.50	50.00	749.06	500.00	50.00	27.16	40.00	00.00	
	2/19/2004 9:44:57 AM	2000.00	0.06	4.50	50.00	375.21	500.00	50.00	25.17	40.00	00.00	
	1/23/2004 10:00:19 AM	2000.00	0.02	4.50	50.00	422.34	500.00	50.00	25.55	40.00	00.00	

Limit time range

- In order to limit the time range of the measured values displayed, select the **Time range** option.
- Set the desired start and end date.

Changing acquired speed and comment

You can also correct rotational speeds in the Measured value view and edit the measured values comment: Proceed as follows:

- Click on an entry in the list of measured values.
- Click **Change speed and comment**.

- Enter the new values and click OK.

Displaying measured values in the Viewer

You can display one or multiple measured values in the FIS-Viewer¹¹⁴.

- Double-click on a measurement to view it in the Viewer.
- To view multiple measured values, click the desired measured values while holding the CTRL key.
- Then double-click one of the selected measurements while holding the SHIFT key.

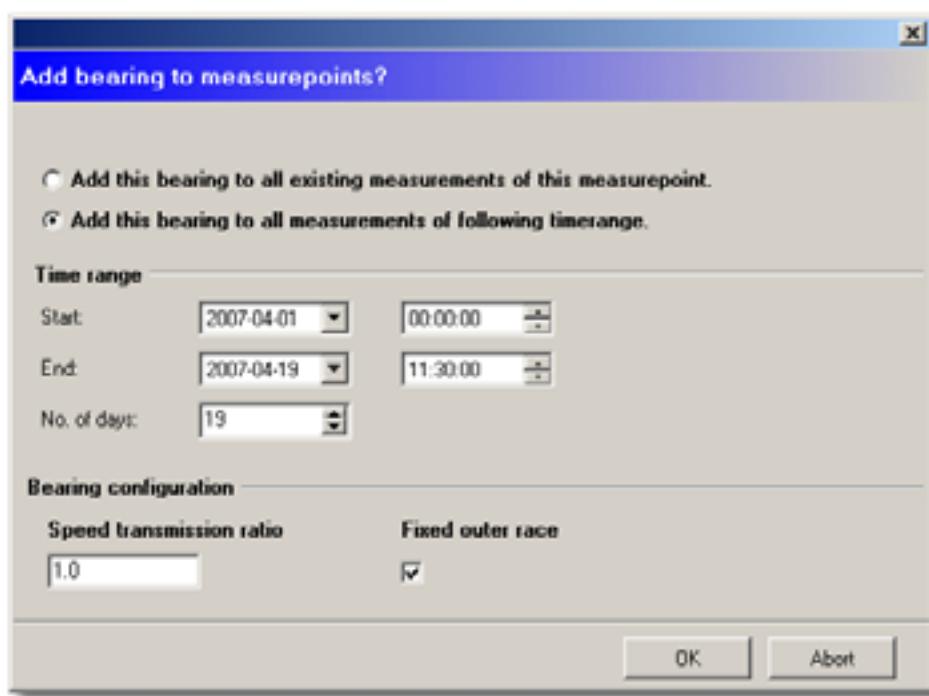
Show/hide bearing data

Click the **Display bearing data for selected measurement** button to display a list of bearings assigned to this measuring point in the configuration⁴⁵. You can also assign bearings to measurements or delete assignments here. The activation status of a bearing is indicated by the **disabled** checkbox. Both when making assignments and disabling you can choose whether

- bearing data should apply or not for all measurements already performed, or
- only for measurements from a certain period

Add bearing

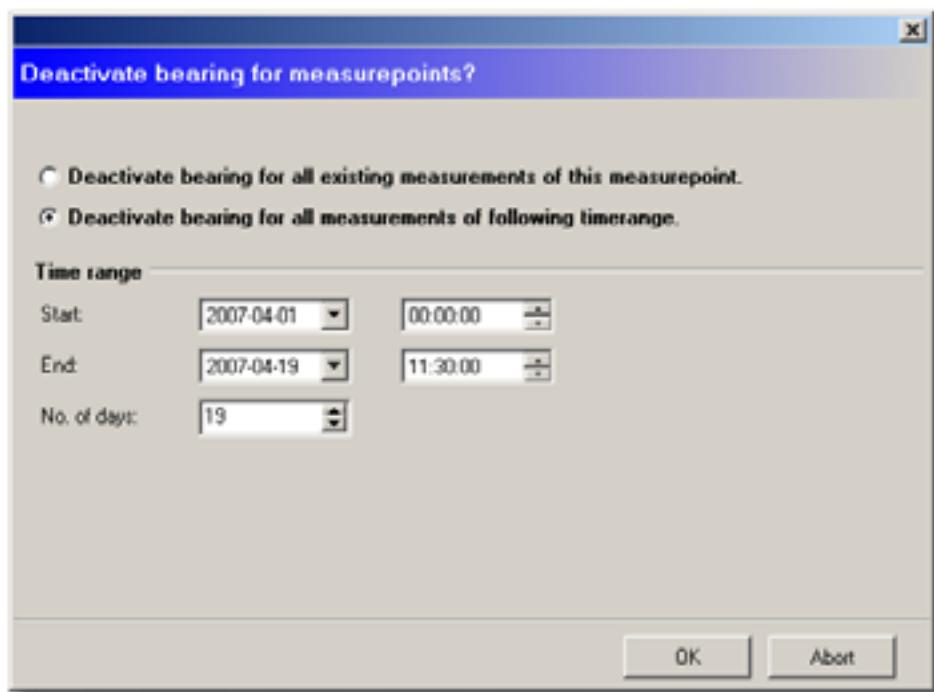
- Click  and select the bearing from the bearing database.



- Selecting measurements:
 - If you want to apply the bearing information to all saved measurements, click **Add this bearing to all existing measurements of this measuring point**.
 - To apply the bearing information to measurements in a certain time range, click **Add this bearing to all measurements of following timerange** and select the time range.
- In the **Bearing configuration** section enter the speed transmission ratio and select whether the bearing has a fixed outer race.

Disable bearing

- Click on the bearing to delete and then .



- Selecting measurements:
 - To delete the bearing information from all saved measurements of this measuring point, click **Disable the bearing for all existing measurements of this measuring point**.
 - To delete the bearing information from measurements in a certain time range, click **Deactivate bearing for all measurements of following time range** and select the time range.

Displaying bearing information

- Click on the desired bearing and then . This displays the bearing information in the bearing database.

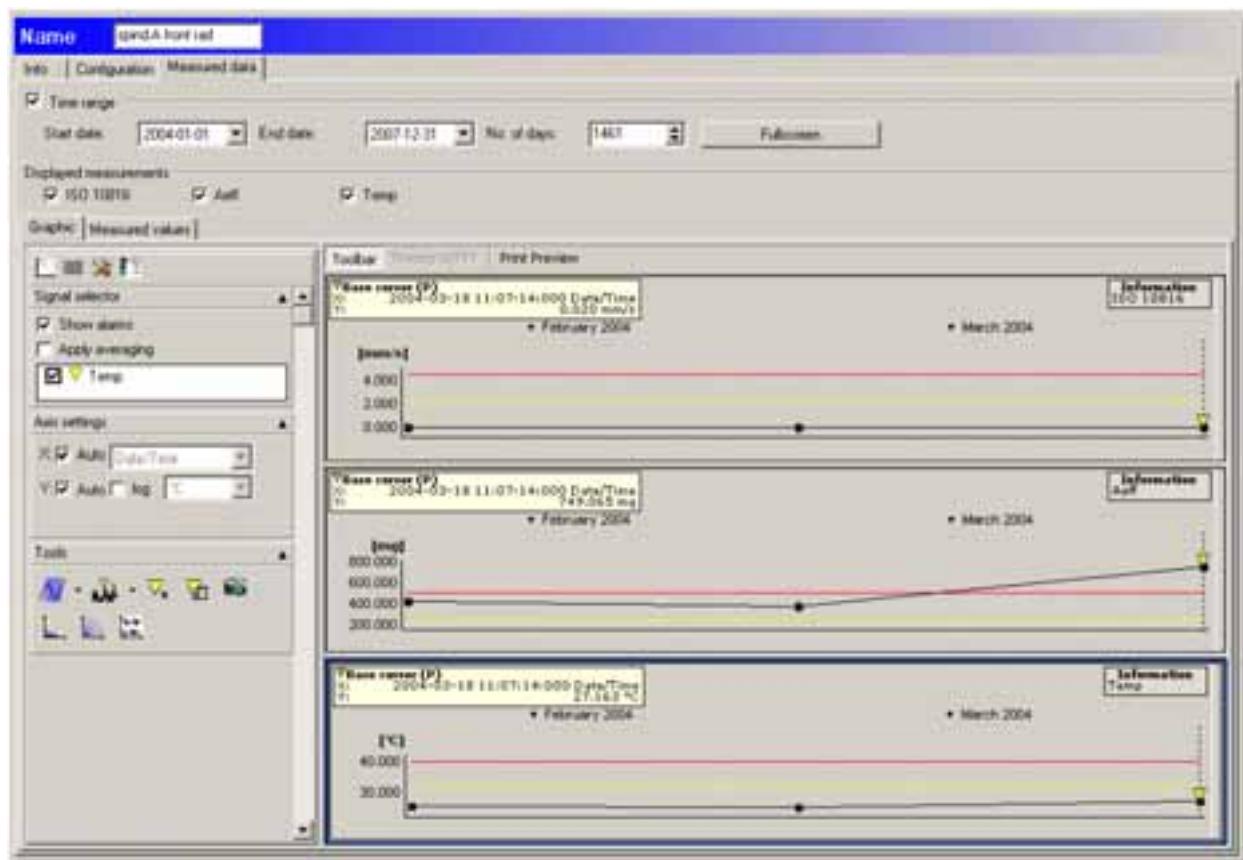
See also

Evaluating measured data with the FIS-Viewer^[114]

3.8.2 Graphic

On the **Diagram** tab, Trendline depicts the measured readings in a trend diagram with the aid of the integrated FIS-Viewer^[114]. The viewer provides a visual representation of the signals and characteristic values delivered by the Detector:

- Time signals
- Fast Fourier Transformations (FFTs)
- Trend data



Time range

Click on **Time range** to limit the shown data to a defined period and enter **Start date** and **End date**.

Alternatively you can select an End date and enter the **Number of days**. In this case, the Trendline sets the Start date automatically.

Fullscreen

Click on **Fullscreen** to view this graphic in the size of your monitor

Show additional bearing

Click **Show additional bearing** to select a bearing from the bearing database⁶⁸ and display its frequencies in a trend diagram.

Toolbar

Click **Toolbar** to show/hide Viewer toolbar. For further information, please refer to the description of the FIS-Viewer in the "Toolbar¹¹⁵" section.

Time signal, FFT signal

When in a trend diagram a certain value is surrounded by a small circle, then there is at least one time signal for this measurement. You can view this time signal by marking the value with the cursor and then clicking on **Time signal/FFT**. When there is no time signal for the selected value, then this symbol is grey and cannot be selected.

Print time signal, print FFT signal

Click these buttons to include the respective signal in the trend report (cf. "Printing").

Print

Click **Print** to create a trend report. The trend report combines the diagrams of the selected measured data for printing. Each diagram is printed on a separate page.

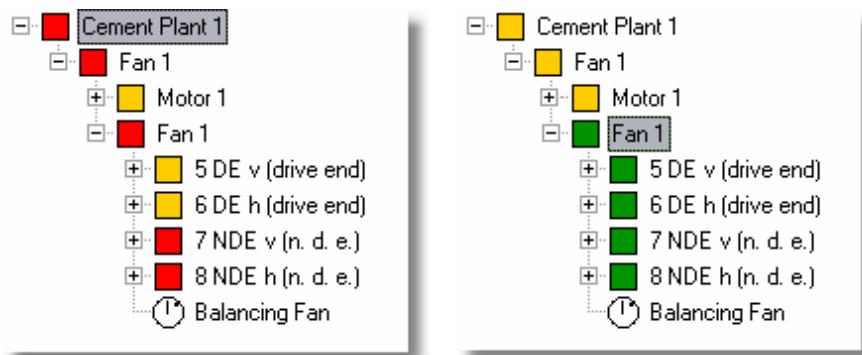


More detailed information on the viewer can be found here¹¹⁴.

3.9 Reset Alarm Status

In the system structure for each element the Trendline software displays whether an alarm or pre-alarm was measured (also see Main window³⁰). It may be sensible to reset this alarm status if the cause of an alarm has been identified and eliminated. The alarm status must be reset manually by the user as this decision cannot be made by the Trendline software.

- To reset the alarm status for a configurations element (e.g. machine or motor) and the associated sub-elements, click on the element in the system tree.
- Then click **System > Alarm Status Reset**.



Only the status display in the system structure is affected when the **alarm status** is reset. The measuring data⁸⁸ status displays remain unaffected.

3.10 Delete measured data

You can delete measured data in a set time range in the database. Doing this, the characteristic values (i.e. trend data) and the time signals recorded during that period of time are deleted. To delete data follow the sequence below:

- Left-click the element in the configuration tree, starting from which you want to delete the data. E.g. select one machine. All data relating to the measuring points of this machine are deleted for the selected time range.
- Click on **System > Delete measured data** or right-click on this point and select **delete measured data**.

Opens the **Delete measured data**:



- Select the date and time for the start and for the end of the required period.
- Click on **Period** to deactivate the option and delete all data.

- Click on **OK** to delete the data in the period selected.



Please observe that the data will be permanently deleted if you click "OK" in the above window and cannot be restored! There is no way of restoring the data!

3.11 EService

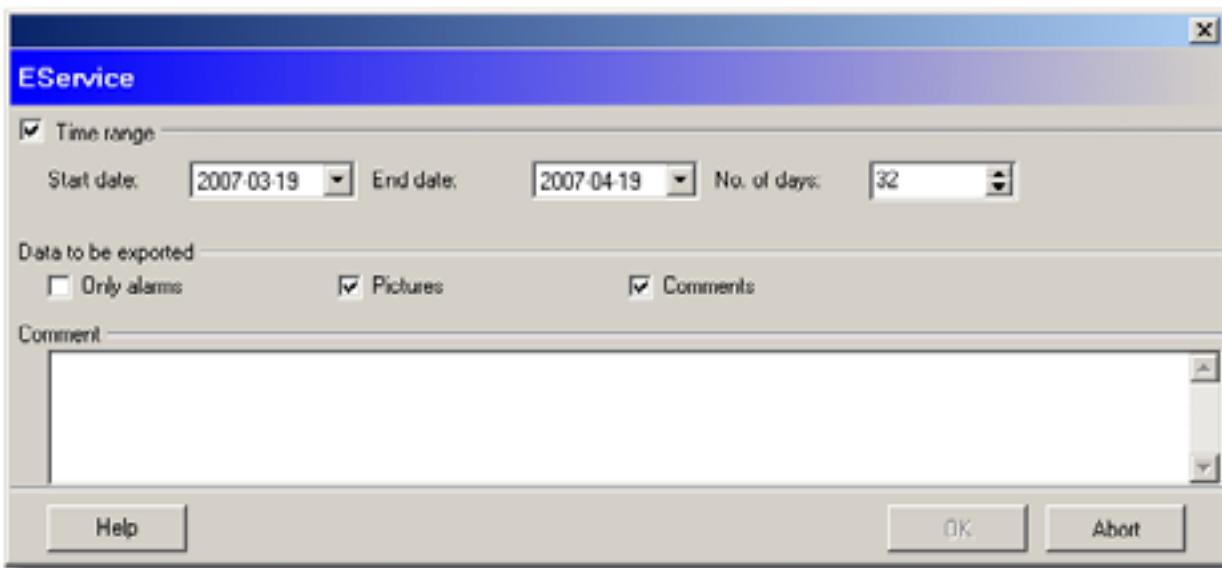
The Trendline software enables you now for the first time to utilize the services of FAG Industrial Services GmbH easily and conveniently. Regardless of whether we can assist you with the selection of measuring points or the analysis of the vibration signals recorded by you, the **EServices** function allows you to send all data necessary to FAG Industrial Services GmbH by e-mail.

3.11.1 Before starting

These services are economical, but will be charged for. You will find detailed information on our website <http://www.fis-services.de>. Or just contact our sales department (Tel. +49-(0)2407-9149-99 or sales@fis-services.de). If you have a valid service contract, you can enter the contract number in the Options menu (**Extras > Options > E-mail**). The contract number together with your e-mail address are needed for identification.

3.11.2 Send data

- Select the element on the configuration tree, starting from which you would like to send the data. Now, click on  or on **Service > EService**. Now, the following window opens.



At the top of the window you can select the time range, which you want to send the data for. If you have unchecked the **Time range** checkbox all previous data will be sent.

Enter at **Data to be exported**, which data shall be transferred. If no data can be sent via this selection anymore, i.e. if you want to send alarms only, but no alarms are in the selection, the **OK** button will be disabled.

- Click on **OK** now to send the data. Depending on your e-mail settings the data are transferred immediately or they are copied into an Outlook mail, which you will have to send manually.

3.12 Create reports

The Trendline software offers the following report types:

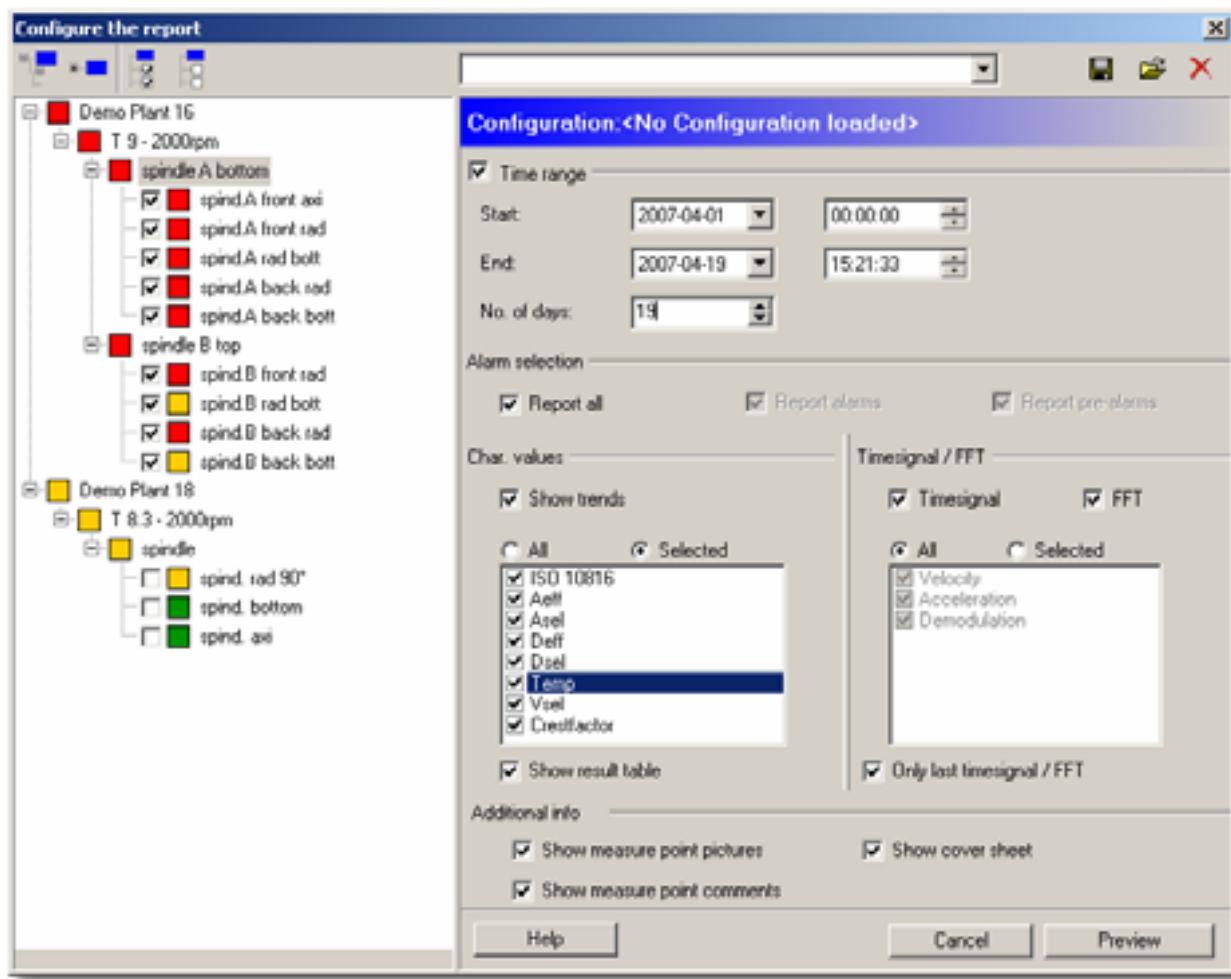
- The measurement report⁹⁶ provides a comprehensive overview of the measured values for the sensors defined in the configuration in tabular and graphic form.
- You can use the alarm report¹⁰⁰ to create an overview of preliminary and main alarms that have accumulated to date for freely selectable elements in your configuration.
- The route report¹⁰² presents all measuring points and corresponding measurement signals for a given route in the form of checklists. You can systematically and reliably "work through" the measuring point of a route with the aid of the route report.
- The balancing report¹⁰² provides you with a clear overview of balancing measurements carried out for one element of your configuration.
- The run up/coast down report¹⁰⁴ creates an overview of the run up/coast down configuration settings and the associated amplitude/phase diagrams.



Also see *report options* [111].

3.12.1 Measurement report

To create a measuring report click on **Measurement report** in the **Service** menu. The **Configure the report** window opens.



You can carry out the following in this window:

- Select which measuring points from the configuration should be displayed;
- Specify the scope and content of the report;
- Save the report configuration or load a previously saved configuration.

Select measuring points

Trendline displays all available measuring point configurations in the left-hand area of the configuration window.

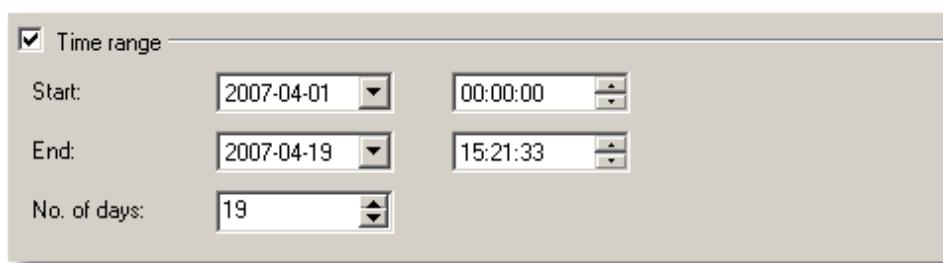
- Select individual measuring points to display the corresponding measured values in the report.
- Click on  to select all measuring points.
- Click on  to delete the selection.

Scope and content

You can specify the settings for the scope and content of the measuring report in the right-hand area of the configuration window:

Specifying a report time range

- Select the **Time range** option to define the limits for the report period.



- Enter the start and end time. Alternatively, you can enter the end time and specify the duration in whole days in the **No. of days** input field. In the latter case the start time is automatically determined.

Alarm selection

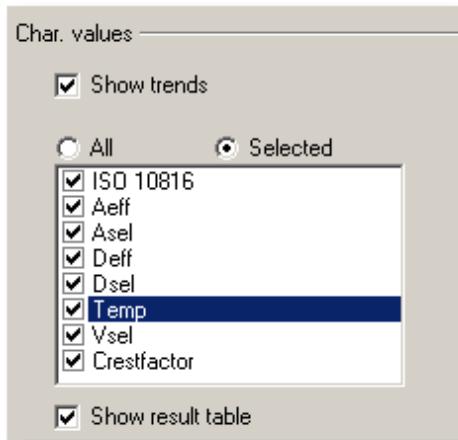
Pre-alarms and main alarms can be presented either separately or jointly in the report.

- Click on **Report all** to select all alarms or, to select individual alarm types, click on **Report alarms** or **Report pre-alarms**.



Select characteristic values

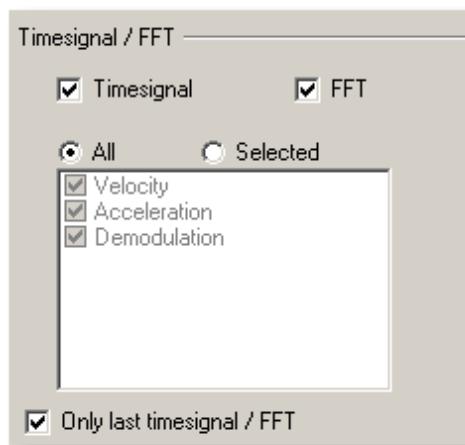
- Select which characteristic values should be displayed from the **Char. values** area.



- Click on **Show trends** to create a trend graphic that presents the measured values for the period specified.
- Click on **Selected** to display only a selection of available characteristic values and select the required characteristic values from the list.
- You can use the **Show table of results** option to instruct Trendline to create a table containing the measured values.

Select time signal / FFT

In the **Time signal / FFT** area you can specify which time signals are output and also whether their corresponding frequencies should be displayed in the report.

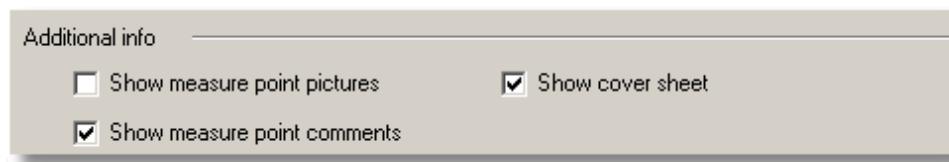


- Click on **Time signal** or **FFT** to activate the corresponding display.
- Click on **Selected** to display only a selection of available signals and select the required signals from the list.
- Click on **Last time signal / FFT only** to output only the last signals saved in each case. All previous measurements will be ignored.

Display additional information

The following options can be selected in the **Additional information** area:

- **Show measuring point pictures** to include the pictures inserted in the measuring point configuration ;
- **Show measuring point comments** to include the comments entered in the measuring point configuration ;
- **Show cover sheet** to output a cover sheet.



Save / load report settings

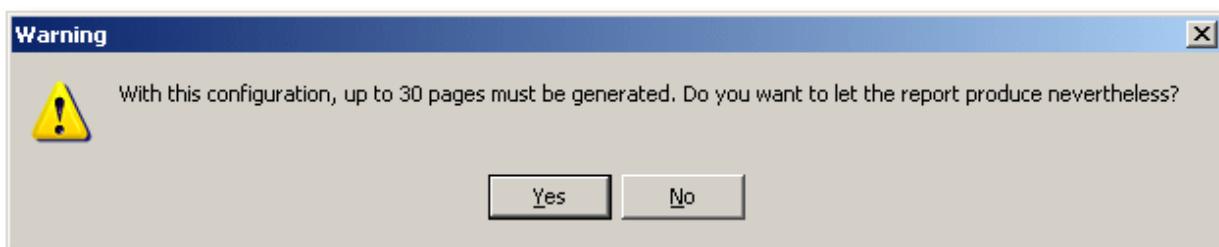
You can save the report settings for use at a later date.



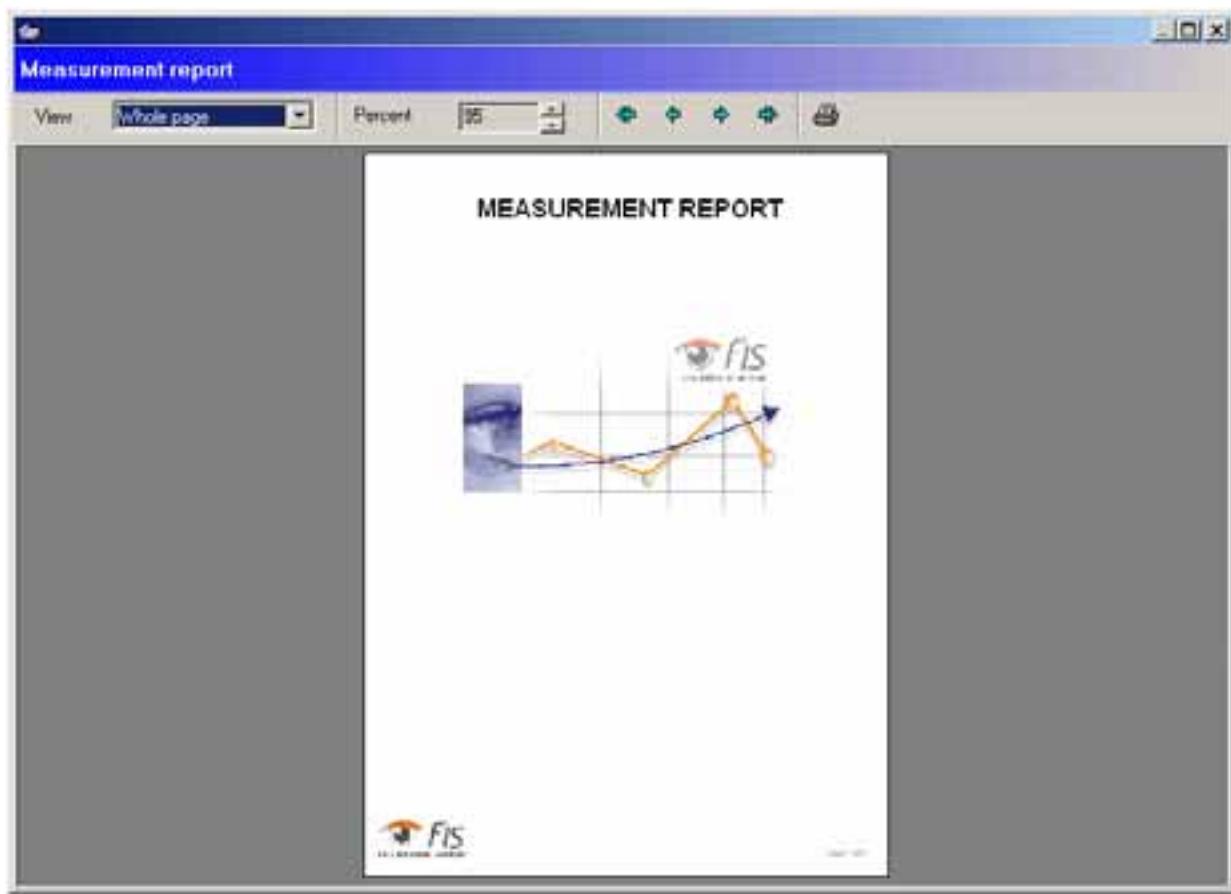
- To do this click on the diskette symbol. The **Insert configuration name** window opens.
- Enter the name of the configuration to be saved in the **Configuration name** input field. If this name already exists you can either overwrite the existing configuration or cancel the procedure.

Create report

Click on **Preview** to generate the report. Trendline outputs a warning if your chosen settings will cause a substantial report to be generated accompanied by a time-consuming calculation.



You still have the option of canceling the operation at this stage in order to reduce the report period or the quantity of data that will be output.



You can view the measuring report on-screen or print it out via the **Measuring report** window. You can use the toolbar to control the screen display:

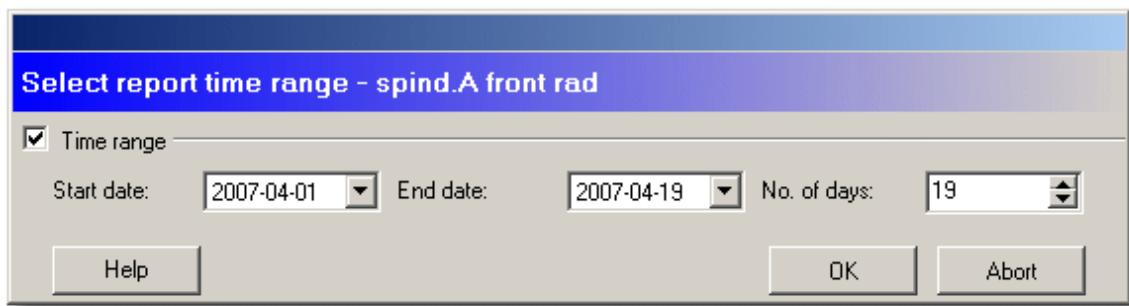


- Της δισπλαψ σιζε χαν βε δεφινεδ ιν **View**. Select **Percentage adjustment** to enter a zoom factor expressed as a percentage in the **Percentage** input field.
- You can navigate forwards or backwards through the report and also jump to the start or end of the report using the arrow buttons.
- Click on  to print out the report.

3.12.2 Alarm Report

You have the option of displaying main alarms and pre-alarms in an alarm report using the Trendline software.

- To do this, select the element in the configuration tree from which you wish to create the report.
- Click on **Service > Alarm report** or click on  in the Toolbar .



- Select the **Time range** option to define the limits for the report period. Enter the start and end time. Alternatively, you can enter the end time and specify the duration in whole days in the **Number of days** input field. In the latter case the start time is automatically determined.
- Deactivate the **Time range** option to incorporate all available data in the report.
- Click on **OK** to create the alarm report.
- You can view the measuring report on-screen or print it out via the **Alarm report** window.

The alarm report incorporates sections for main alarms and pre-alarms. All characteristic values for a given measuring point will be displayed in the main alarm section where at least one main alarm exists for this measuring point. Where a main alarm exists for a characteristic value this is displayed in bold and if a pre-alarm exists this is displayed in italics. If neither a main alarm nor pre-alarm exists the relevant characteristic value is displayed in grey.



Where a main alarm exists for a characteristic value, the main alarm threshold is used as reference for the exceeding value, and where a pre-alarm exists the pre-alarm threshold is used as reference.

You can use the toolbar to control the screen display:



- The display size can be defined in **View**. Select **Percentage adjustment** to enter a zoom factor expressed as a percentage in the **Percentage** input field.
- You can navigate forwards or backwards through the report and also jump to the

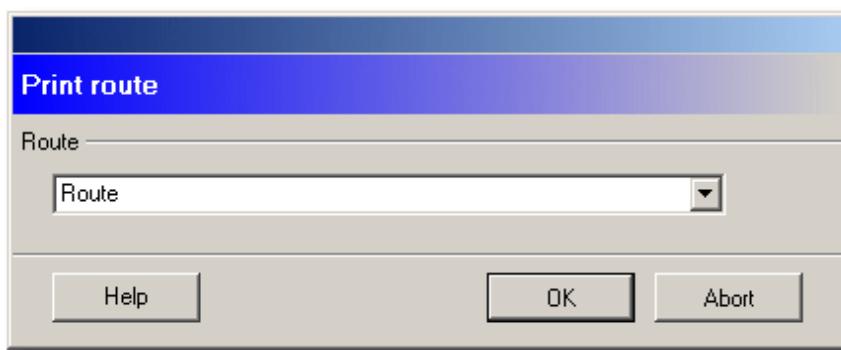
start or end of the report using the arrow buttons.

- Click on  to print out the report.

3.12.3 Route report

You can use the route report to create an overview of settings and measuring points for a specific route.

- Click on **Route report** in the **Service** menu and select a route that has been defined in your configuration.



- Click on **OK**. The **Route report** window opens.

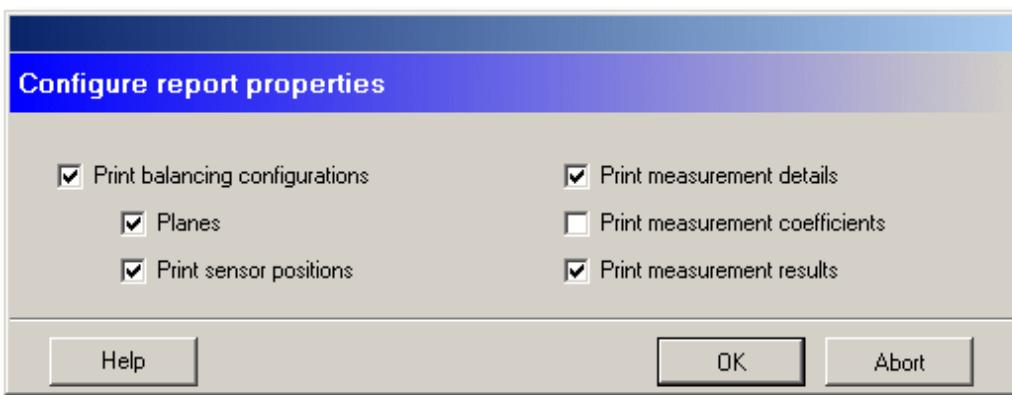
You can use the toolbar to control the screen display:



- The display size can be defined in **View**. Select **Percent adjustable** to enter a zoom factor expressed as a percentage in the **Percent** input field.
- You can navigate forwards or backwards through the report and also jump to the start or end of the report using the arrow buttons.
- Click on  to print out the report.

3.12.4 Balancing report

To create a balancing report click on an element of your system structure then click on **Balancing report** in the **Service** menu. The **Configure report properties** window opens.



- **Print balancing configurations:** If this option is selected the settings for the balancing configuration ⁵³ are printed with the report.
- **Print planes:** information on the planes is included in the report.
- **Print sensor positions:** information on the trigger sensor and vibration sensors is included in the report.
- **Print measurement details:** the individual steps of the balancing measurement, the amplitude and phase of the vibration, the time of measurement, the rotational speed and information on weights used are documented in the report.
- **Print measurement coefficients:** The coefficients determined during balancing are also displayed.
- **Print measurement results:** the start and end of the imbalance amplitude, the imbalance reduction and information on the balance weights determined are included.
- Click on **OK**. The **Route report** window opens.

You can use the toolbar to control the screen display:



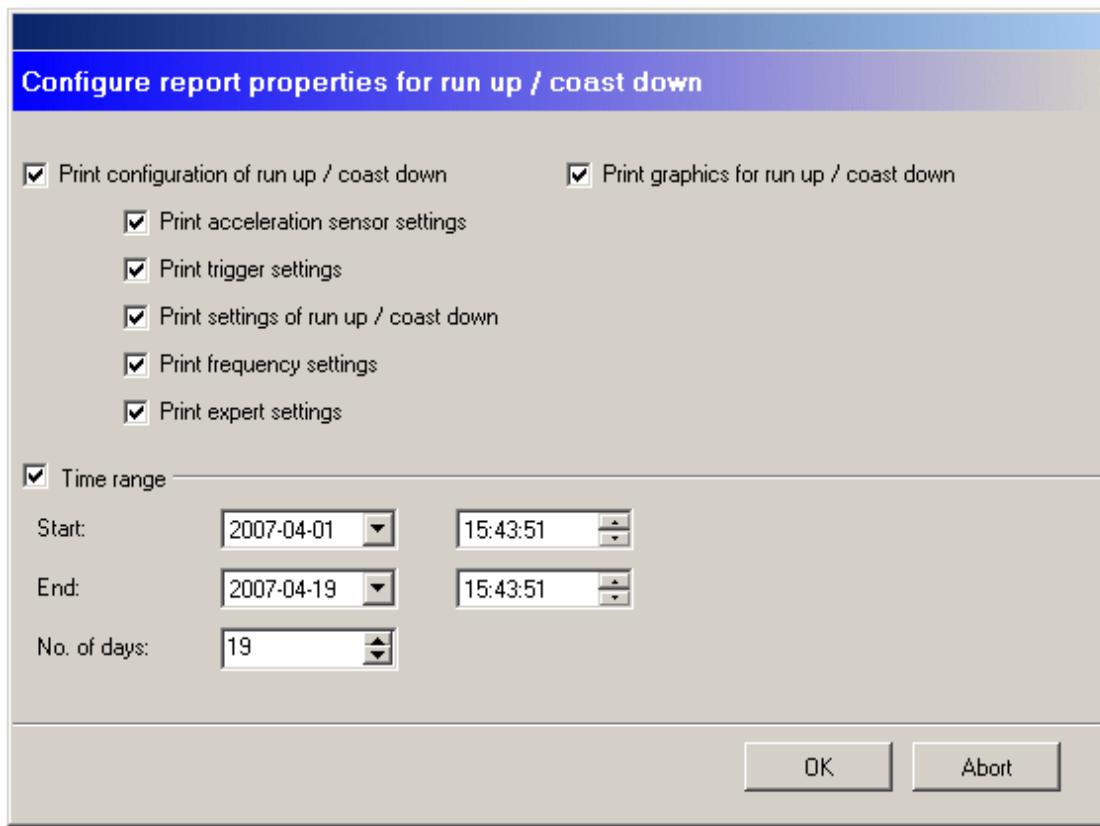
- The display size can be defined in **View**. Select **Percent adjustable** to enter a zoom factor expressed as a percentage in the **Percent** input field.
- You can navigate forwards or backwards through the report and also jump to the start or end of the report using the arrow buttons.
- Click on to print out the report.

See also

Add balancing configuration ⁵³

3.12.5 Creating a run up/coast down report

To create a run up/coast down report, select a run up/coast down configuration in your system tree and click **Run up/coast down report** in the **Service** menu. This displays the **Run up/coast down configuration**.

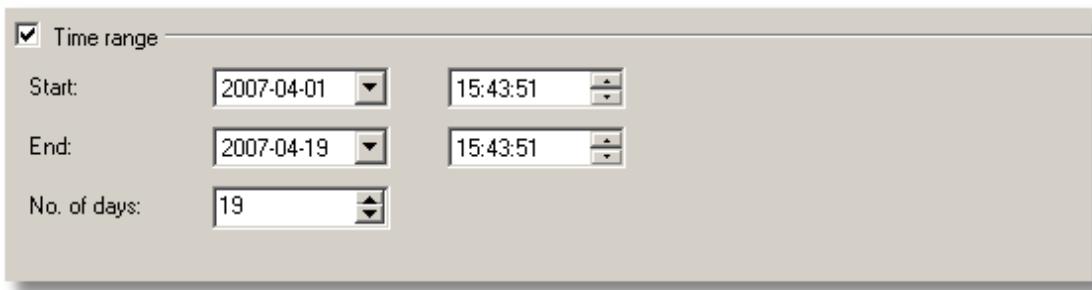


Selecting data for the report

- **Print configuration of run up / coast down:** If this option is enabled, all amplitude/phase diagram and run up/coast down test settings are also printed. To hide/show specific sections of this configuration ⁶¹, please use the other options.
- **Print run up/coast down diagrams:** The run up/coast down measured data ⁶³ available for the measuring point are also printed as an amplitude/phase diagram, including any frequency bands.

Specifying a report time range

- Select the **Time range** option to define the limits for the report period.



- Enter the start and end time. Alternatively, you can enter the end time and specify the duration in whole days in the **No. of days** input field. In the latter case the start time is automatically determined.

3.13 Importing and exporting data

3.13.1 Importing data from a Trendline 3.x database

You can import configurations and measuring data from a Trendline 3.x database using the following procedure: Use the following sequence:

- Click on **File > Import > Trendline 3.x data**.
- Select the file to be imported (*.tr3) and click **OK**.

3.13.2 Export wizard

Flexible selection of export data is possible using the export wizard. You can include pictures and comments, specify a period for the data to be exported or export only selected data objects, for example.

To export data proceed as follows:

- Click on **Export > Export wizard** in the **File** menu. This launches the export wizard which guides you step-by-step through the export function.



- First select an export file. To do so, click **Filename** and enter a file name.
- Next decide whether **pictures** and **comments** should also be exported. Note that pictures in particular can increase file size dramatically. Make sure that there is enough memory available.
- Now decide whether Trendline should export **All Data** or just a **Selection**. If you select **All data** the exported file may be very large.
- Finally, you can limit the data to be exported by selecting **Not yet exported data only** and/or **Only meas. positions with alarm conditons**.
- Click on **Finish** to apply your settings and create the export file.

3.13.3 Export a measuring point

You can export the data assigned to an individual measuring point to a text file to edit them with another program. The Trendline software saves the export files in one or several files in CSV format ("comma separated values"), i.e. data on a line are separated by commas. You can open files in CSV format with any common spreadsheet software to get a clear overview of the data in a table.

In addition to the measuring point data proper, the Trendline software also saves a file called "VersionInfo.csv" containing details on the program version and the database used.

Proceed as follows to save a measuring point:

- Click on the measuring point in the configuration tree.
- Click on **File > Export > Measuring Point**.
- Select the directory where you want to save the file and enter a file name. The program automatically adds the .csv ("comma separated variables") extension.
- Click on **OK** to export the data.

Below is a description of the contents of the export file depending on the type of measuring point.

Measuring point from a Cm configuration

If you export a measuring point from a CM configuration, the Trendline software saves a general export file with details of the configuration and other files with the time signals.

The general export file contains a line for each measurement containing the following:

Heading	Contents
idx	Measurement identification number.
State	Alarm Status: 0 – no alarm, 1 – pre-alarm, 2 – main alarm
Timestamp	Measurement timestamp.
Velocity	Export file with velocity time signal (the signal is an acceleration signal, see also Time signals 21).
Acceleration	Export file with the acceleration time signal.
Demodulation	Export file with the demodulation time signal.
Data x	Characteristic value measured
Name x	Name of characteristic value
Type x	Type of characteristic value 15 .
Prealarm x	Pre-alarm threshold in % of the main alarm threshold.

Heading	Contents
Alarm_x	Main alarm threshold.
Measuring point	Name of measuring point
export_timestamp	Export time
Comment	Measuring point comment
used_revolution	The rotational speed input by the user after the measurement. This value is identical to the rotational speed actually measured until it is changed.
config_revolution_delta	The maximum rotational speed deviation set in the measuring point configuration
config_revolution	The rotational speed set in the measuring point configuration.
revolution	The rotational speed measured on the Detector.
viewer_config_x	Configuration data for the FIS-Viewer.

- The entries "Name", "Type", "Prealarm", "Alarm" and "Data" are created for every existing characteristic value, i.e. a maximum of four times. **x** designates the serial number of the characteristic value.
- The entries "Velocity", "Acceleration" and "Demodulation" refer to other CSV files with the data of the measured time signals.

The time signal files are structured as follows:

- The file header contains the data.

Heading	Contents
idx	Measurement identification number.
Internal Number	Internal number identifying the measuring point.
Timestamp	Time stamp .
ValueUnit	Detector channel (velocity, acceleration or demodulation) of the measurement, as a figure and in plain text.
length	Column 1: Internal control index, Column 2: Number of FFT lines set in the configuration.
Ampl	Amplifier setting used in the measurement. Amplification factor = 2^{Ampl} , where 0 means amplification factor 1, 6 amplification factor 64. This constant is already considered in the time signal values.
Scale factor	Scale factor for the measurement. This has been worked into the time signal value already just as well.
Sample rate	Samples per Second.
Rotational speed	The rotational speed measured on the Detector.

Heading	Contents
GUID	Global unique identification number of the measuring point.
Timesignal count / FFT count	Number of time signals and FFT values

- The time signals and FFT values are stored in four columns under the header.
 - Column 1 contains the time of the measurement in seconds from the start of the time signal, column 2 contains the time signal measurement.
 - Column 3 contains the frequencies of the FFT in Hz, column 4 the amplitudes.

Measuring point from a balancing configuration

If you export a measuring point from a balancing configuration, the Trendline software saves a general export file with details on the configuration, the balancing jobs and the weights. In addition, the program creates one file per balancing step ("Data File<n>.csv") containing the associated sensor data.

The general export file contains the following details:

Heading	Contents
Data File	Export file with the sensor data.
Balancing measurepoint	Name of measuring point
Job Number	Number of the balancing job.
App. weight 1 amplitude	Amplitude of the weight used in plane 1.
App. weight 1 angle	Position angle of the weight used in plane 1.
App. weight 2 amplitude	Amplitude of the weight used in plane 2.
App. weight 2 angle	Position angle of the weight used in plane 2.
comment	Measurement comment.
step_type_text	Type of balancing step (reference run, trial run, etc.).
remove_weights_text	Indicates what weights were removed.

The sensor data files contain the following details:

Heading	Contents
Sensor position	Name of sensor position.
Amp. Coeff. plane 1	Amplitude of the coefficients in plane 1.
Ph. Coeff. plane 1	Angle of the coefficients in plane 1.

Heading	Contents
Amp. Coeff. plane 2	Amplitude of the coefficients in plane 2.
Ph. Coeff. plane 2	Angle of the coefficients in plane 2.
Speed	Rotational speed.
Amplitude	Amplitude of the vibration.
Phase	Phase of the vibration.
Timestamp	Measurement timestamp.
export_timestamp	Export time

Measuring point from a run up/coast down configuration

If you export a Measuring point from a balancing configuration, the Trendline software saves a file containing the values of the amplitude/phase diagram in addition to a general export file with details of the configuration.

The general export file contains the following details:

Heading	Contents
id	Identification number
Run up / coast down measuring point	Name of measuring point
timestamp	Measurement timestamp
Comment	Measurement comment
No. data points	Number of values measured in run up/coast down.
bodeplot data file	File with values from the amplitude/phase diagram
export timestamp	Export time

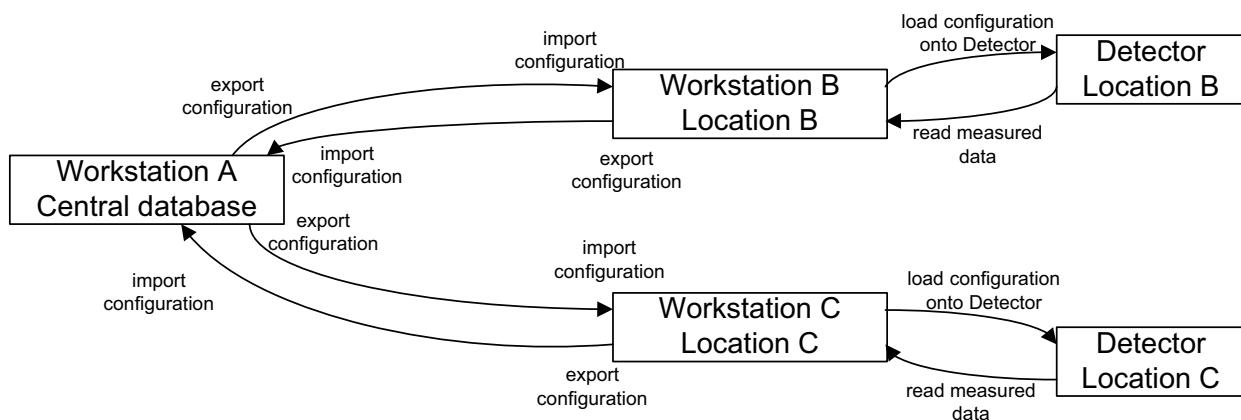
The file with the amplitude/phase diagram values contains the following details for each diagram value:

Heading	Contents
Amplitude	Vibration amplitude
Phase	Phase of the vibration
Frequency	Rotational speed

3.13.4 Import and export between different workstations

In Trendline every measuring point in the database has a unique number, the so-called GUID (Global Unique Identifier). This number is only stored in the database and is not displayed in the software. With it, configurations and measuring points are unambiguous over several workstations. Consequently when exporting data from one workstation and re importing it, it will be automatically recognized and sorted in correctly. This will be explained by means of an example.

On a central location (headquarters) all measured data is analyzed. However it is measured on several locations. This exports a part of the configuration containing the measuring points for location B and imports it to a computer at location B in Trendline. The data are imported into the Detector, the measuring points are measured, and the measured data are read back into the computer. The configuration is now exported from workstation B and imported into the Trendline on the workstation in headquarters. The following graph shows the example graphically.



Import and export between different workstations

3.14 Program settings

3.14.1 General

- Click on **Options** in the **Tools** menu then click on **General** in the **Options** window.

Name

- Click on **Name** to specify how new configurations, sections, routes, etc. should be named when you click on **New entry** or **New sub-entry**.



Please note that balancing plane identifiers on the Detector is limited to four characters.

Language

- Click on the **Language** selection box and select the dialogue language for the Trendline software.

System of units setting

In this section you can set the units system for the measured values listed.

The following options are available:

- **Standard SI units**,
- **Standard US units** or
- **User-defined units**. When making these settings you can assign units to each measured variable individually from the range of available units.

3.14.2 Database

- Click on **Options** in the **Tools** menu then click on **Database > History** in the **Options** window.

You can specify the number of entries the list of most recently opened databases should contain at the **Number** field in the **File** menu. The default value is 10.

3.14.3 Report

Click on **Options** in the **Tools** menu then click on **Report > Pictures** in the **Options** window.

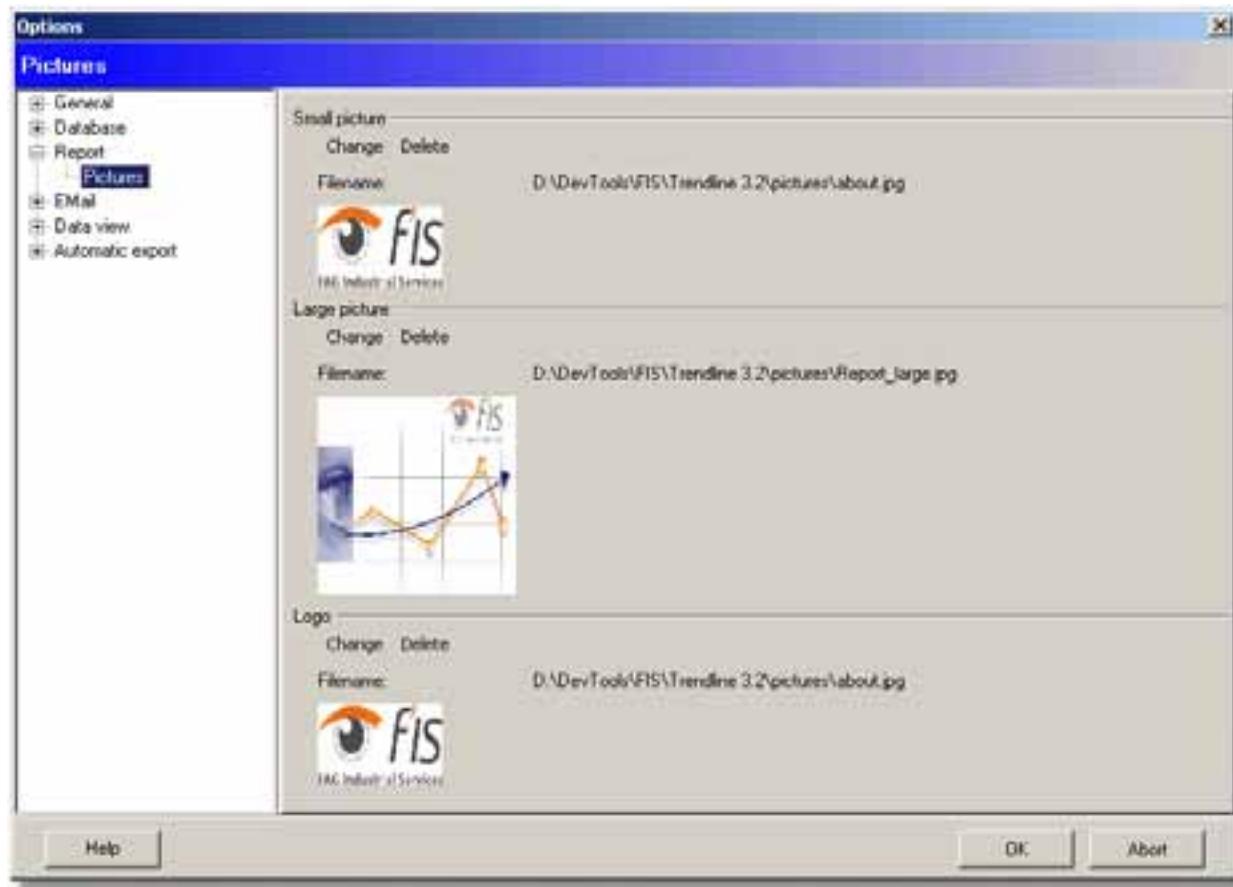
You can specify what pictures to print on a Trendline report  cover sheet here. The pictures are scaled automatically for the printout.

If you select a **picture** in the **Vignette** area this is printed at the bottom of the cover sheet on the left.

You can specify which picture is to be printed in the center of the cover sheet in the **Large picture** area.

In the **Logo section** you can specify what logo to print on the top right of all pages except for the cover sheet.

- Click **Edit** and select the desired graphics file. Trendline displays a preview and the file name.



- To remove a graphic file again click on **Delete**.

3.14.4 E-mail

In order for Trendline to be able to send data by e-mail (see also EService⁹⁴ or Automatic export¹¹³), you must enter the name of the sender, the recipient and the contract number.

- Go to the **Tools** menu and click on **Options** then click on **E-mail > Configuration** in the **Options** window.
- Enter your own e-mail address in **From**.
- Enter the e-mail address specified in the contract (e.g. nemo@fis-services.de) in **To** and the number of your service contract in **Contract number**.
- You can enter a text in the **Comment** field which will appear by default when the e-mail window is opened.

Additional settings

- Click **Configure** to set the protocol for Trendline to send e-mails. Trendline supports **Microsoft Outlook**, **MAPI** or **SMTP**. To obtain the correct settings consult your network administrator.

- To test whether e-mails are being transferred correctly click on **Test connection**

3.14.5 Data view

To edit program settings for data display (Viewer), in the **Tools** menu click **Options**, then in the **Options** window click **Data view > Configuration > Configure**. This opens the **Configuration window of the Viewer**.

For further details, refer to Viewer section "Program settings" ^[160].

3.14.6 Automatic export

The Trendline software can automatically export data from CM measurements ^[182] as soon as the Detector receives them. It can automatically send the exported data by e-mail or save them to a compressed ZIP file.

- Click on **Options** in the **Tools** menu then click on **Automatic** export in the **Options** window.

E-mail export

- Click on **Automatic** to switch on the automatic export and subsequent dispatch by e-mail.
- Click on **Only on alarms** to carry out the automatic e-mail export only if the data received from the Detector contains alarms.

File export

- Click on **Automatic** to instruct the software to export data automatically to a file.
- Click on **Only on alarms** to carry out the automatic file export only if the data received from the Detector contains alarms.
- In **Default file name (.tr3)** enter a name for the ZIP file to be saved. The file name must include the ".zip" extension.
- Select the storage location for the exported file at **Default directory**.

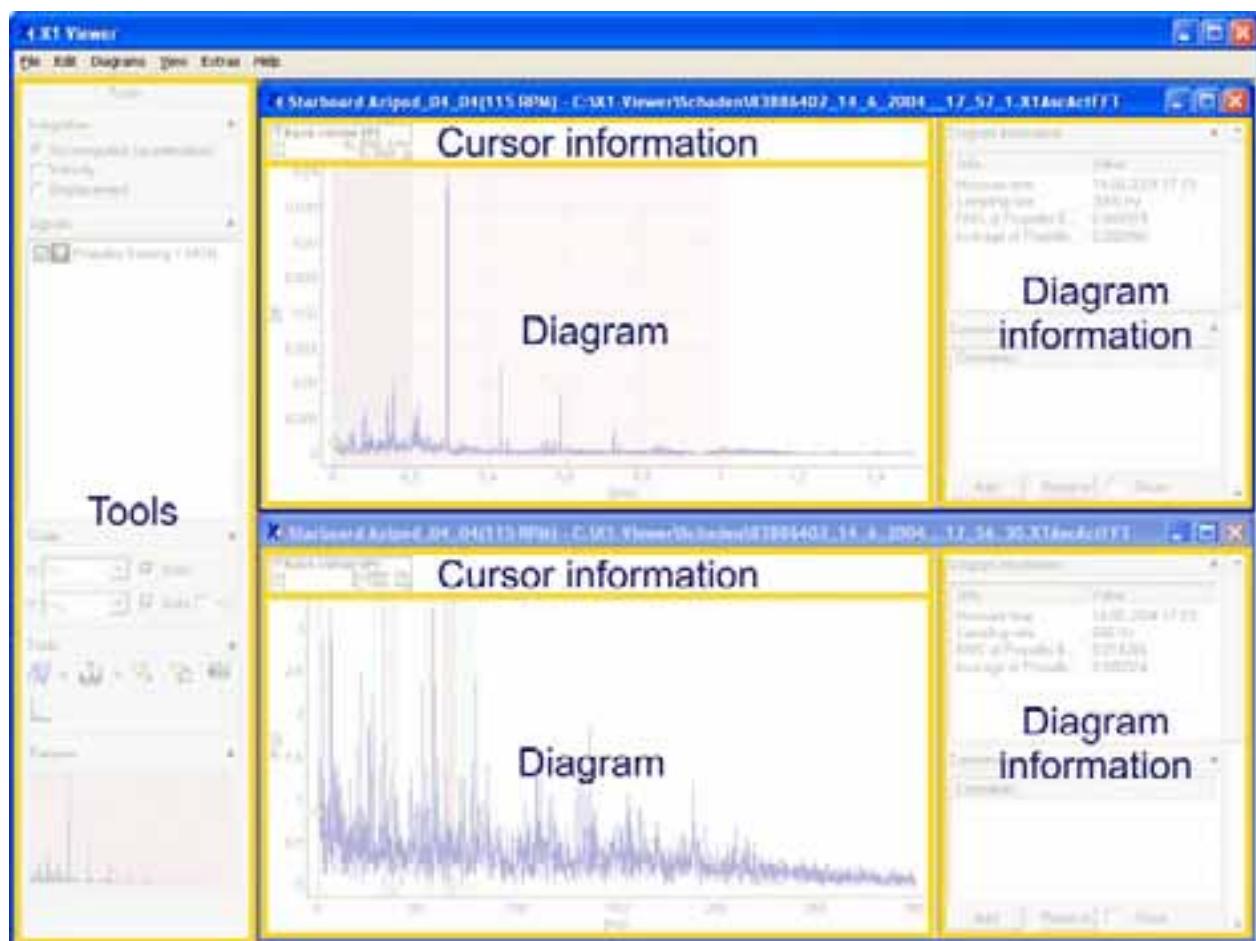
4 The FIS-Viewer

4.1 The working interface

4.1.1 Interface areas

- The toolbar¹¹⁵ contains various tools which can be used to arrange the diagrams and display/remove the tool area and diagram information bar as well as other tools which can be used to export measurement data, display the corresponding configuration for the data set selected and create a measurement report.
- You will find a range of navigation tools in the tools¹¹⁶ working area which can be used to modify the way in which the diagrams are presented and also find a number of different cursor tools for carrying out fault analyses. The choice of tools which can be used varies according to the type of diagrams displayed (FFTs, time signals or trend data).
- The main area of the working interface contains the diagram¹²² and the cursor and measuring information¹²³ area in which the corresponding values for the cursor selected are displayed.
- You will find additional information in the diagram information bar¹²⁵ (on measurement data for example) depending on the diagram type displayed. You can use the tools in this working area to do the following:
 - enter comments into the diagram
 - select frequency bands with FFTs in order to determine characteristic values for the fault analysis
 - determine the maximum, harmonic or sideband values from the diagram depending on the cursor type

The diagram information bar area for each diagram can be displayed or removed as required and can be used to increase the diagram area.



4.1.2 Toolbar

-  You can use the **Arrange windows horizontally** button to arrange open windows vertically above one another in the working area of the Viewer.
-  You can use the **Cascade windows** button to arrange open windows so they overlap in the working area of the Viewer.
-  You can use the **Full screen display of current diagram** button to fill the entire screen of the Viewer working area with the current diagram selected.
-  You can use the **Arrange minimized windows** button to arrange minimized windows horizontally from left to right in the working area of the Viewer.
-  If the **Arrange diagrams automatically** button is activated the size of the diagram always adjusts automatically to fit the available working area (when the tool area is displayed or removed, for example).
-  You can view a list of the windows that are currently open and make your selection using the **Display diagram list** button. The selected diagrams are arranged

horizontally and the rest of the diagrams are minimized.



You can use the **Display tool area** button to display/remove the tool area in the working interface of the Viewer.



You can display/remove the information bars of all open diagrams using the **Display diagram information bars**.



You can open a list of the windows that are currently open using the **Copy selected diagrams to clipboard** button. From this list you can also select whether the accompanying information text should be copied together with the diagram and define the size of the diagram. The diagrams selected are copied together to the clipboard as one graphic object.



You can use the button **Show time signals** to only show the time signal windows. All other windows will be minimized.



You can use the button **Show FFT** to only show the FFT windows. All other windows will be minimized.

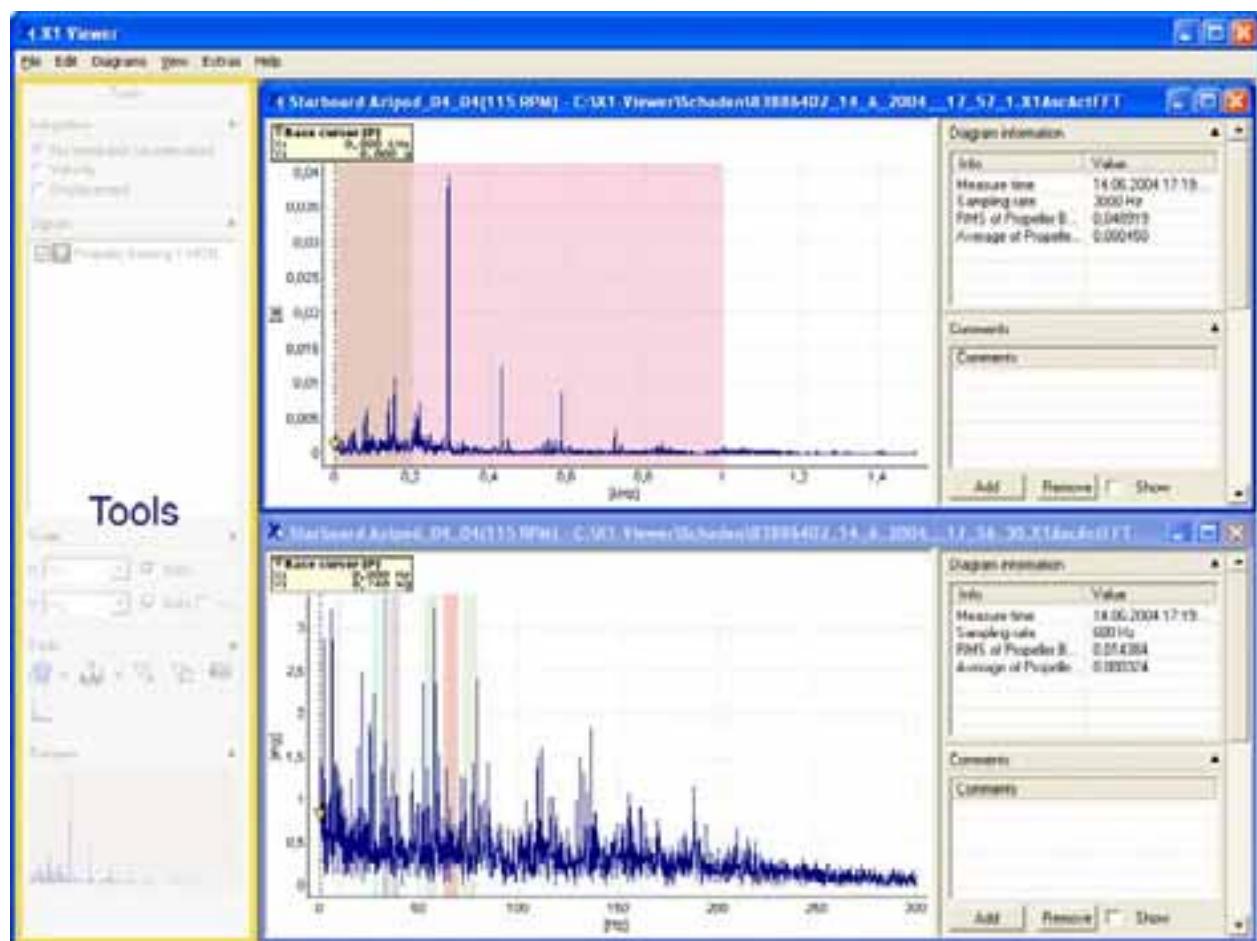


You can use the **Show all diagrams** to maximize all diagram windows.

4.1.3 Tools

The **tools** area contains a range of adjustments which you can use to set the display area for the diagrams. A range of different individually tailored tools is available depending on the type of data set displayed (time signals, FFT or trend data). These tools can be used for example to do the following:

- display/remove individual signals within a series of signals when working with trend data,
- modify the scale of measuring ranges,
- integrate the velocity and displacement from the acceleration,
- modify the display of the measuring range to suit your individual requirements and
- navigate through a diagram easily using the navigation overview.



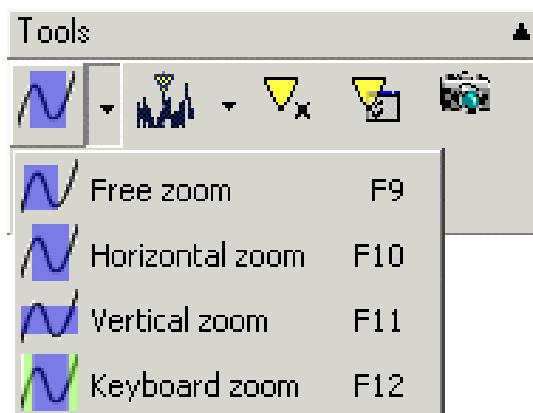
List of the tools available in conjunction with the corresponding diagram type displayed.

Tool	Time signal	FFT	Trend data
Automatic scaling [128]	✓	✓	✓
Manual scaling [128]	✓	✓	✓
Logarithmic display of axes [128]	✓	✓	✓
Integration of Y axis [128]		✓	
Free zoom [132]	✓	✓	✓
Horizontal zoom [132]	✓	✓	✓
Vertical zoom [132]	✓	✓	✓
Keyboard zoom [132]	✓	✓	✓
Base cursor	✓	✓	✓

Tool	Time signal	FFT	Trend data
Difference cursor	✓	✓	✓
RMS/AMV cursor	✓	✓	
Harmonic cursor		✓	
Sideband cursor		✓	
HS cursor		✓	
Revolutions cursor	✓	✓	
Positioning of base cursor	✓	✓	✓
Modify cursor properties	✓	✓	✓
Copy to clipboard	✓	✓	✓
Modify coordinates of axes	✓	✓	✓

Zoom tools

In order to optimise the display you can enlarge any part of the diagram using the various zoom tools. You can use one of the predefined zoom tools for this or define the zoom area numerically via a dialogue window.



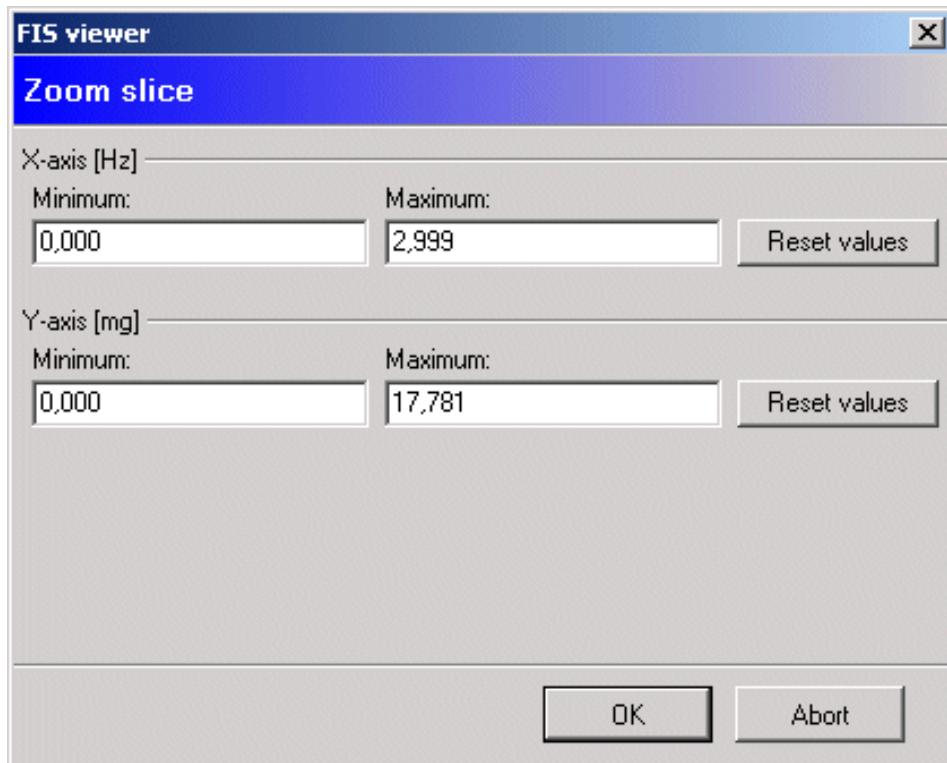
Zoom tools

Tool	Symbol	Description
Free zoom		You can use the Free zoom tool to enlarge any given rectangular area on the X and Y axis within a diagram.

Tool	Symbol	Description
Horizontal zoom		You can enlarge any part of a diagram in a horizontal direction using the Horizontal zoom tool. The range of values and scaling of the Y axis remain unchanged.
Vertical zoom		You can enlarge an area inside a diagram in a vertical direction using the Vertical zoom tool. The range of values and scaling of the X axis remain unchanged.
Keyboard zoom		You can use the Keyboard zoom feature to enlarge an area of the diagram using the keyboard instead of the mouse.

Specifying zoom selection in dialogue window

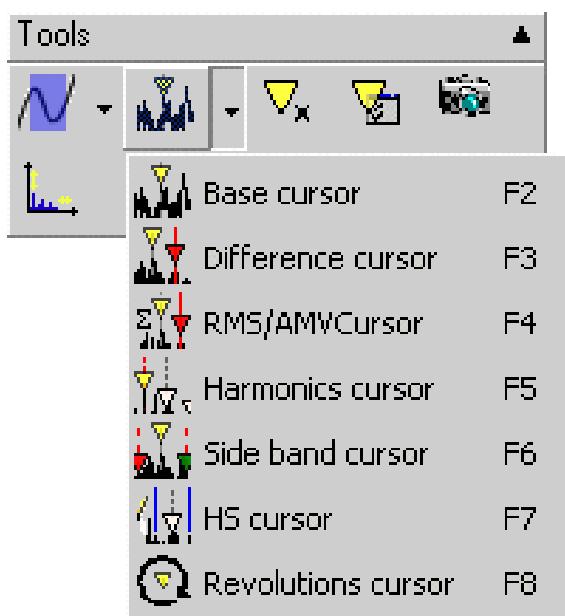
In addition to using the various zoom tools you can also specify the zoom selection via a dialogue window. To open the dialogue window which is currently active click on the zoom tool symbol. The boundary values can be entered in the numeric input fields for the zoom selection to be displayed.



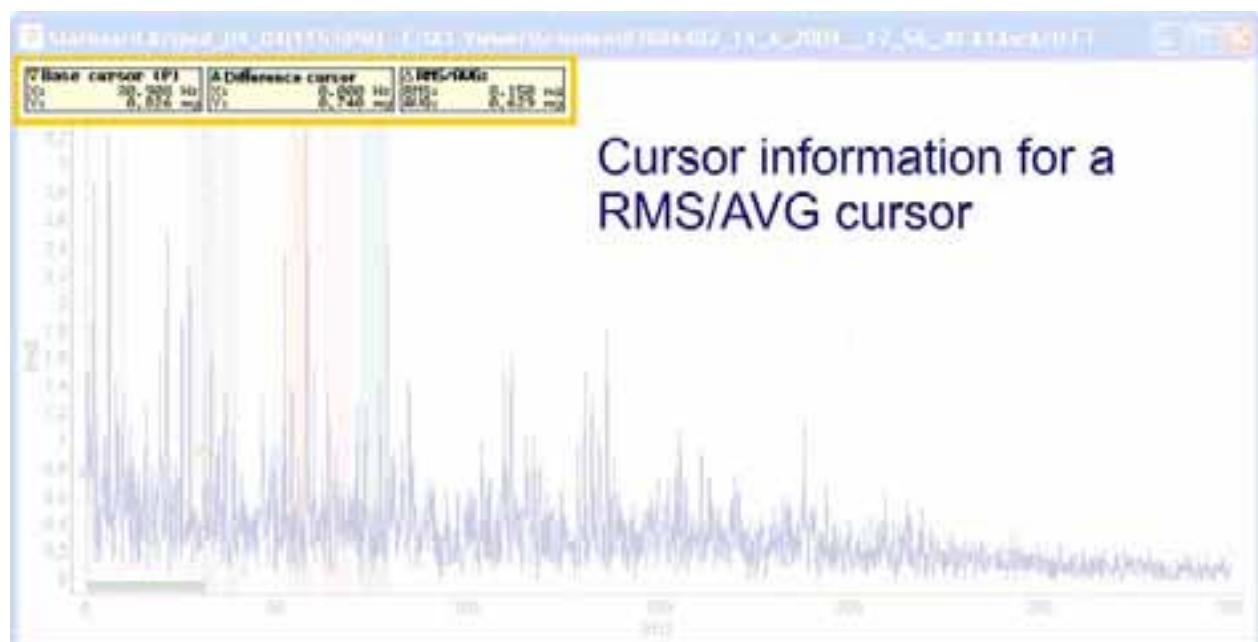
Cursor tools

You can specify the values from a diagram to be used for an analysis with the cursor tools. Depending on the type of diagram which has been opened

appropriate cursor tools are made available which can be used to obtain individual measuring and characteristic values directly from the diagram.



Information on the current cursor is displayed above the diagram. These value fields and the cursor itself can be removed/displayed by clicking on the cursor tool symbol that is currently active.



Tool	Symbol	Description
Base cursor (FFT, Time signals, Trend data)		You can use the base cursor to determine the measured values on the X and Y axis of a measuring point.
Difference cursor (FFT, Time signals, Trend data)		You can use the difference cursor to calculate the difference between two measured values.
RMS/AMV cursor (FFT, Time signals)		You can calculate the RMS (root mean square/effective value) and the AMV (arithmetic average) between two measuring points using the RMS/AMV cursor .
Harmonic cursor (FFT)		You can use the harmonic cursor to determine measured values at points in the diagram where harmonics (multiples of the basic frequency) are likely to occur.
Sideband cursor (FFT)		You can use the sideband cursor to determine additional measured values in definable sidebands starting from the base cursor.
HS cursor (FFT)		The HS cursor (Harmonic with Sidebands) combines both cursor types described above which means that both the harmonics and their sidebands will be displayed.
Revolutions cursor (FFT, Time signals)		The revolutions cursor marks the frequency that is assigned to a specific speed with a line. The value for this speed is calculated as follows: $n \left[\frac{U}{\text{min}} \right] = 60 \cdot f[\text{Hz}]$



A cursor can only be placed at a measuring point that exists. If you click on a position in the diagram where no measured value exists the cursor automatically jumps to the nearest existing measuring point.

Additional tools

In addition to the zoom and cursor tools you can use a range of further tools to change the manner in which signals or cursors are displayed and transfer data to other programs via the clipboard.

Tool	Symbol	Description
Positioning of base cursor		Places the base cursor at a point in the diagram specified via numeric input. The base cursor jumps to the measuring point nearest

		the value entered.
Cursor properties		Opens the cursor properties dialogue window where you can change the properties of the cursor currently used.
Clipboard		Copies an image of the current diagram view into the clipboard (further information 15†).
Modify coordinates of axes		Changes the display of minimum/maximum values for the X and Y axis (further information 15†).

4.1.4 Diagram display

The diagram area shows the FFT, time signals and trend data diagrams. You can specify the desired zoom area inside the diagrams and adjust the position of the cursor using the mouse or keyboard.



A description of the various zoom and cursor types is provided at Cursor and measuring information [123](#).