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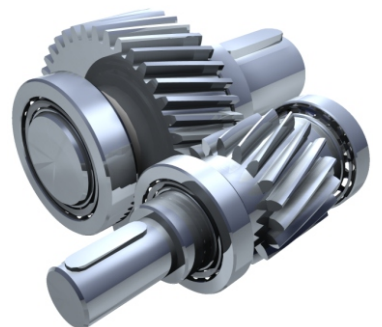


PeakStore5



Manual Version 3.0

www.maschinendiagnose.de



PeakStore5



Manual Version 3.0
GfM Gesellschaft für Maschinendiagnose mbH
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1. General

The data acquisition system PeakStore5 is used for data acquisition on mechanical drives for vibration diagnostics purposes. The PeakStore5 is available in 3 different variants:

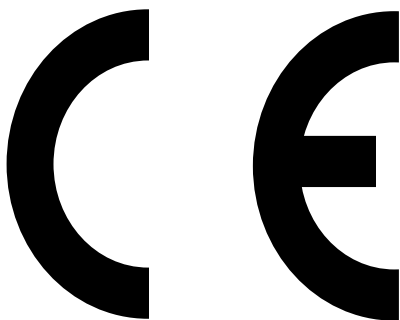
- PeakStore504 with 4 input channels
- PeakStore508 with 8 input channels
- PeakStore512 with 12 input channels

It can be connected with accelerometers with constant current feed, inductive displacement sensors or other isolated signals with ± 10 V. The data is measured with up to 51.2 kHz individually configured per channel. The measurement time can be chosen from a pool of 8 measurement times ranging from 1.3 s to 163.48 s. Alternatively an undefined measurement time can be set where multiple hours of measurement data can be collected depending on the available free disk space and the measurement configuration.

Synchronously up to 2 speed channels with a constant sampling rate of 6.4 kHz can be measured.

The software Peakanalyzer Manager provides the possibility to configure and manage the PeakStore. It also provides an interface to control the measurement and input additional side information in a measurement protocol. Additionally, online spectra can be calculated during the measurement.

1.1. CE-Labeling



We declare herewith,

GfM Gesellschaft für Maschinendiagnose mbH

Köpenicker Straße 325, Haus 40, D-12555 Berlin,

that our product

PeakStore5

in all product variations¹

complies to the following relevant regulations: ^{2,3}

¹ This applies to complete measurement systems. For individual components the conformity has to be proven in the target system. If applied correctly it is not expected to have affects according to device safety or EMV.

² This conformity declaration applies only the systems supplied by GfM. Changes or extensions are in the responsibility of the operator and thus has to ensure the conformity with the corresponding EG-Directive.

³ Harmonised Norms:

DIN EN 61326:2002 (Produktnorm): Es werden die Störfestigkeits-Prüfanforderungen an Betriebsmittel, die zum Gebrauch in industriellen Bereichen vorgesehen sind (gemäß EN 61326/A1 Tabelle A1 und Tabelle 3) sowie die Störaussendungsgrenzwerte (gemäß EN61326/Tab.3) eingehalten.

DIN EN 61000-4-2:2001, -4-3:2001, -4-4:2002, -4-5:2001, -4-6:2001

DIN EN 61010-1:2002

DIN EN 55011:2000 (Funkstörfeldstärke Klasse A)

EG-Niederspannungsrichtlinie 73/ 23/EWG*

(applied in Germany by 1. Verordnung zum Gerätesicherheitsgesetz)

Elektromagnetische Verträglichkeit 89/336/EWG* und 92/31/EWG*

(applied in Germany by the EMV-Gesetz)

*) changed by CE-Kennzeichnungsrichtlinie 93/68/EWG

The measurement system is developed and manufactured by the following guidelines:

Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte DIN EN 61 010-1: 2002

It was tested with greatest care before delivery and was shipped in perfect condition.

1.2. Notes to radio interference suppression

The PeakStore5 fulfills the EMV-policy for unlimited usage in living area and industrial area in a regular installed state.

All additional products that are connected to the device must be also suppressed by radio interference according to BMPT-Vfg. Nr. 1046/84 or Nr. 243/91 or EG-Richtlinie 89/336/EWG. Products that fulfill the requirement are labeled with a CE-Label or a label describing the suppression of radio interference by the manufacture.

Products that do not fulfill the requirements can only be used with an individual license of the BZT.

All signal cables that are connected to the PeakStore5 must be shielded.

Please consider that all signal inputs and outputs except the power connection is shielded. Only in this case a high interference immunity and a reduced interference emission can be achieved. The interference immunity can be further increased if the shield of the signal inputs is connected to protected earth on the side of the PeakStore5.

1.3. FCC-Note

This device has fulfilled all thresholds in tests that are formalized in chapter 15 of the FCC-Guideline (in 47 CFR 15.105)⁴ for digital devices of the class B. These thresholds have sufficient protection of harmful radiation for the installation in living areas. Devices of this class generate and use high frequency electromagnetic waves and may emit these. Thus if the instructions are not realized properly it is possible to disturb the radio reception. However in exceptional cases certain installations can cause disturbances. If the radio or TV reception is disturbed and it can be backtracked to the device by switching it off and on it can be corrected by the following actions:

- Adjust the direction of the receiver
- Increase the distance between the device and the receiver
- Plug in the power connector of the device in another socket so that the device is connected to a different electrical circuit than the receiver.

⁴ FCC - United States Federal Communications Commission

- If necessary contact our support or contact an experienced radio or TV technician.

1.4. Changes

According to FCC-Guidelines it is not permitted to operate the device with changes that are not approved by GfM.

1.5. Cables

To fulfill the thresholds of class B devices according to part 15 of the FCC-Guidelines it must be ensured that all signal cables that are connected to the Peakalyzer are shielded.

1.6. Accident Prevention

It is confirmed that the delivered product is procured according to accident prevention regulation "Elektrische Anlagen und Betriebsmittel" (BGV-A3 der Sammlung der Einzel- und Unfallverhütungsvorschriften der gewerblichen Berufsgenossenschaften in Deutschland)⁵.

This confirmation has only the purpose to release the company of verifying the device before the first installation (§ 5 Abs. 1, 4 der BGV-A3). Civil warranty and liability claims are not regulated by this confirmation.

1.7. After unpacking

After unpacking the device should be checked for mechanical damages or loose parts in the inner. If a transport damage is occurred, contact GfM and do not install the device.

1.8. Transportation

Transport the PeakStore5 in the original package or in a package that ensures an adequate protection. Transport damages are excluded from guarantee claims.

1.9. Before Installation

If the PeakStore5 was carried from a cold environment to the operating area, condensation may occur. In this situation wait until the temperature adopted to the environment and it is absolutely dry before putting it in operation. If there is condensation due to transport or storage wait at least 2 hours for acclimation.

1.10. Protected Earth, Shield, Power Supply

The PeakStore5 has to be connected to protected earth to fulfill the thresholds for devices of class B according to part 15 of the FCC-Guidelines. The same counts as a requirement for the specified technical data.

All connected signal cables to the PeakStore5 must be shielded and the shield must be connected to protected earth. Thus the shield must have a galvanic contact with the chassis.

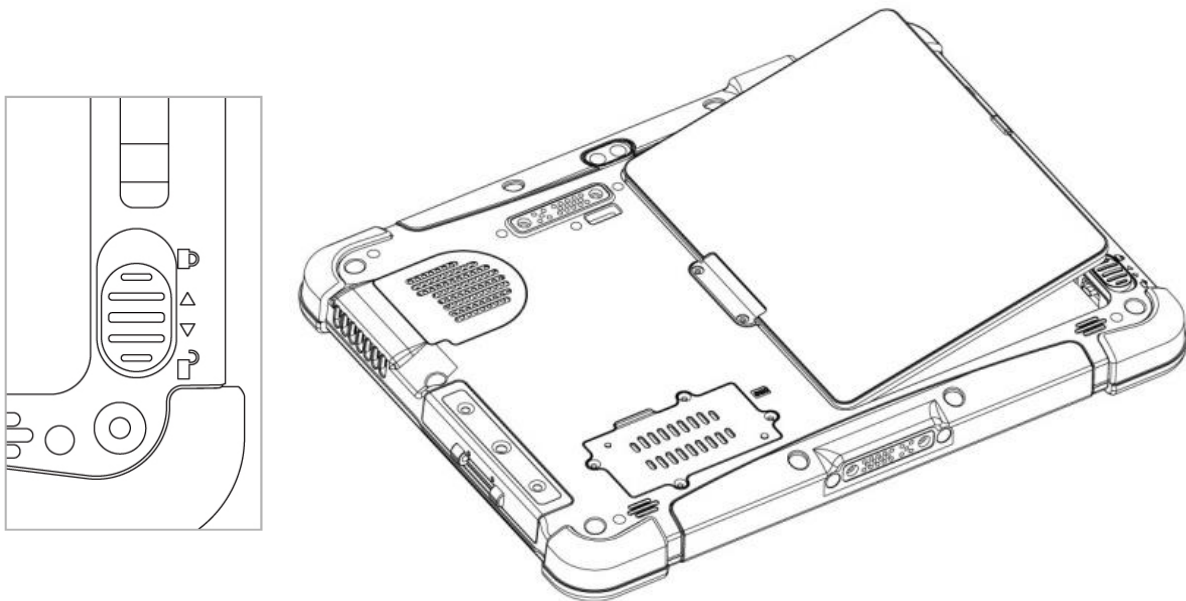
To connect the PeakStore5 to protected earth, an additional cable for protected earth connection is available that can be connected to the DC IN connector for the sensor supply (see 4.3). On the other side of the cable is an 4 mm connector that can be used to connect it to protected earth.

⁵ Former VBG-4, also see <http://www.bgfe.de/pages/gesetze/bgv.htm>

1.11. Accumulator and Battery

The system contains a lithium long term battery that does not need any special maintenance. An exchange of the battery should be done by the manufacturer or user in the scope of a system inspection or maintenance. The exchange is recommended every 4 to 7 years depending on the application. Before exchanging the accumulator it is required to turn of the tablet. The accumulator can be accessed on the back of the tablet. Beforehand the measurement system must be unplugged. This can be done by the four screws on the back of the PeakStore5. Afterwards the accumulator can be removed.

1. Switch off PeakStore5 and unplug all cables.
2. Turn PeakStore5 and remove the four screws on the back of the measurement device.
3. Remove the accumulator by switching the two locks (see Picture 1).



Picture 1: Exchange of accumulator (Source: Winmate M101 Manual)

2. Delivery components

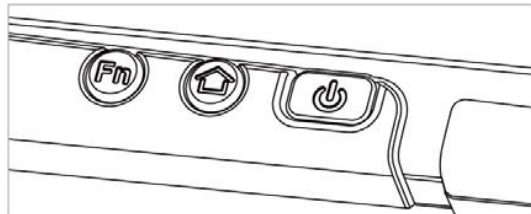
The following components belongs to the standard scope of delivery:

- Data collection system PeakStore5 in the variants PeakStore504 (4-channel), PeakStore508 (8-channel) or PeakStore512 (12-channel)
- Installation-CD Software Peakalyzer Manager
- CD with license and calibration data of the PeakStore5
- PeakStore5 Manual
- Power line 230 V AC
- Power supply unit AC/DC
- Bluetooth keyboard

Optionally the following components can be delivered:

- Accelerometer IMI608A11 (100 mV / g)
- Accelerometer IMI601A02 (500 mV / g)
- Optical speed sensor
- Mounting for optical speed sensor
- Self-adhesive reflective tape
- Hard-top case for the PeakStore5 and sensors
- Extension for the remote control
- Shoulder strap and mounting for the PeakStore5
- Additional sensor supply (24 V)
- Cable for protected earth connection
- Replacement accumulator

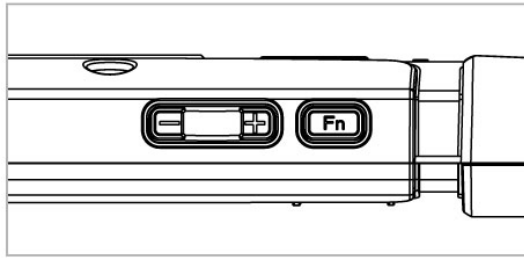
3. Control Elements



Picture 2: Function keys front bottom (Source: Winmate M101 Manual)

The measurement can be started via the function key Fn1 on the bottom front side. If a configuration with an undefined measurement time is activated, this function key can also be used to stop the measurement. If the PeakStore5 is in Standby mode, the settling process is first started. The actual measurement will start immediately after the settling process is finished. By pressing the Fn1 key longer, the touch mode can be switched. There are modes for the stylus, hand and a rain mode available. The mode can be switched depending on the environmental conditions.

The home key displays the tablet module configuration of optional devices on the right side of the display. Among others, the coupling of the measurement device to the tablet can be switched off completely (see 5). Via the power key the tablet can be switched off or shut down.



Picture 3: Function keys on top (Source: Winmate M101 Manual)

The function key Fn2 on the upper side deactivates all input channels and accordingly reduces the power consumption. If the key is pressed again, the input channels are activated and the settling process starts.

4. Connections



Picture 4: Sensor inputs on upper side

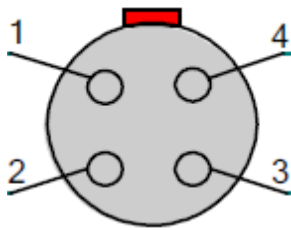
4.1. Sensor Inputs

The accelerometers are connected to the connectors labeled with 1 to 12 on the upper side of the PeakStore5. The accelerometers are directly supplied by the PeakStore5. If sensors are connected that require an additional power supply, e.g. displacement sensors, the additional power supply has to be connected to the DC IN connector on the right side (see 4.3).

While connecting the sensors the correct assignment of the numbered sensors to the inputs has to be considered. The sensors are calibrated to the dedicated channel and will produce false signals otherwise.

The magnets of the accelerometers have to be attached to the machine surface as follows: The acceleration sensors must be secured to the vertical measuring position on the machine surface by oblique positioning and careful tipping. Please pay attention on a fixed fit of the accelerometers.

Inductive displacement sensors should be installed so that the average distance between sensor and measuring object is about the half measurement range. Thus a displacement sensor with a measurement range of 0.25 – 1.25 mm should have a distance of about 0.75 mm.



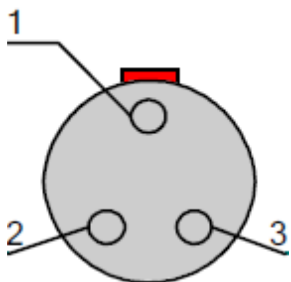
Pin	Assignment
1	+IN
2	+V Extern
3	-V Extern
4	-IN

Picture 5: Pin assignment of sensor inputs

4.2. Speed Inputs

The speed sensors are connected to the LEMO connectors S1 for the first speed sensor and S2 for the second speed sensor. The supply voltage for the speed sensors is directly supplied by the PeakStore5.

The optical speed sensor is used to measure the speed on rotating machine parts. Before installation and positioning a reflex tape must be placed on a rotating machine part. The optical speed sensor must be oriented and fixed towards the reflex tape. The distance between reflex tape and sensor should be between 25 and 80 cm. The optimal orientation is signaled by a blinking LED on the sensor if the PeakStore5 is switched on. The correct speed measurement can be verified in the sensor overview of the PeakStore5 or via the remote control. The display can vary slightly. If there are heavy variations, the orientation of the speed sensor should be checked and the measurement should be repeated.



Pin	Assignment
1	+IN
2	+14 V _{DC}
3	GND

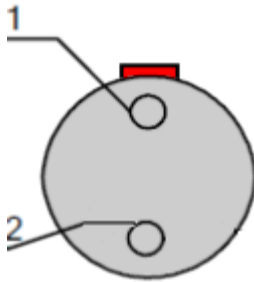
Picture 6: Pin assignment speed inputs

4.3. External sensor supply voltage and protected earth connection

If the connected sensors require an additional supply voltage (Pin 2 and 3 in 4.1), the DC IN connector on the right side of the PeakStore5 can be used to connect an accumulator with the desired voltage. If the connected supply voltage is greater than 14 V, the connected speed sensors are also powered by the external supply to reduce the load from the internal accumulator.

Note: Only a supply voltage of 24 V DC or lower must be connected to the DC IN connector.

Furthermore, the DC IN connector can be used to connect the PeakStore5 with protected earth with an optional available protected earth cable.



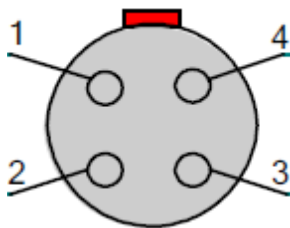
Pin	Assignment
1	+V Extern
2	-V Extern

Picture 7: Pin assignment of external sensor supply voltage

4.4. USB Connection

The PeakStore5 can also be connected directly to a PC without tablet.

In this case, the coupling via the expansion port is not used but the separate USB connector on the right side of the PeakStore5 is used. A USB connection cable can be ordered additionally from GfM. It has to be ensured that not both, the expansion port and the separate USB connection, are used in parallel.



Pin	Assignment
1	+5V
2	Data-
3	Data+
4	GND

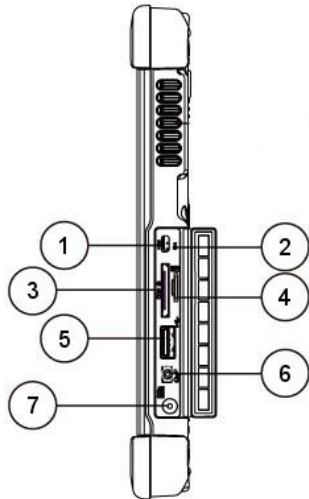
Picture 8: Pin assignment USB connection

4.5. USB connection expansion port

The connection between the PeakStore5 and the tablet is done via a 5-pole spring contact on the hidden front side of the PeakStore5 to the expansion port of the tablet on the back. The USB connection of the expansion port is also used for the power supply of the measurement component of the PeakStore5.

4.6. Connections at the Tablet

On the right side of the PeakStore5 behind a cover additional connectors are available.



Number	Assignment
1	Micro HDMI
2	Reset Switch
3	LAN/RS232 Adapter Port
4	MicroSD Slot
5	USB 3.0
6	Microfon/Line Out
7	Power Connector

Picture 9: Connectors on the right side (Source: Winmate M101 Manual)

The USB 3.0 connector (5) can for example be used for the measurement data export on an USB-Stick.

The power unit is connected to the power connector (7). It is recommended to connect the power unit only for recharging the battery or for long term measurements.

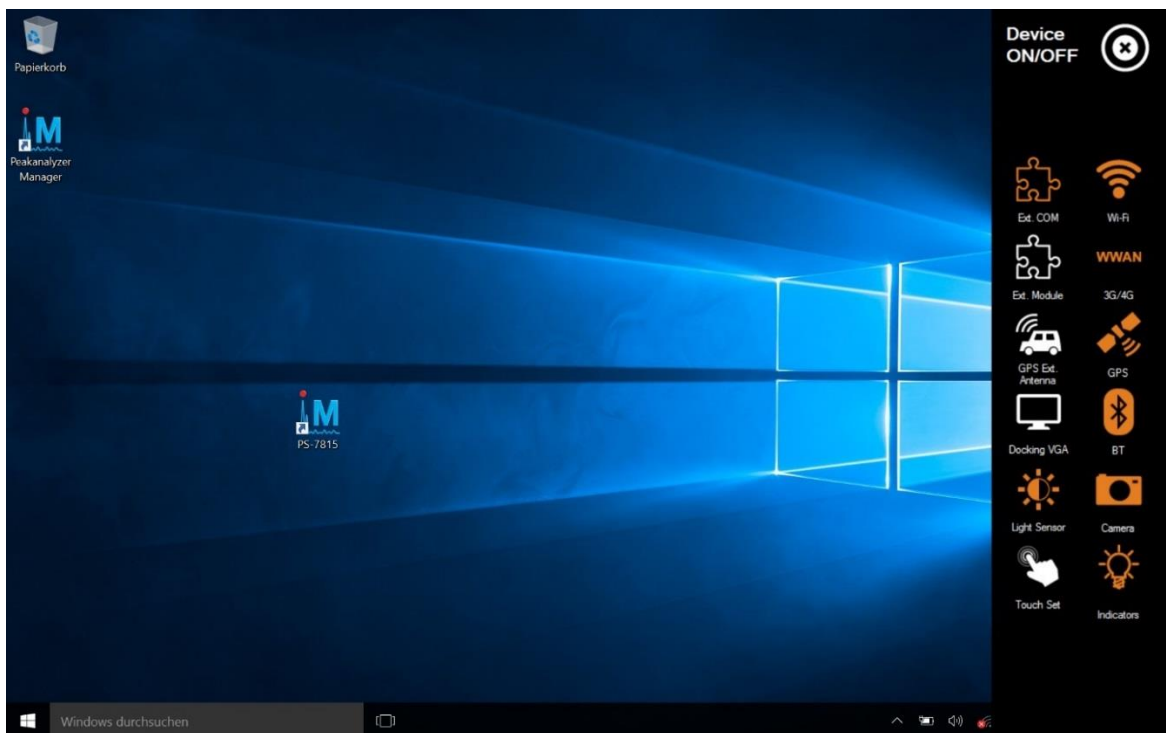
5. Standby Mode

To achieve a long battery runtime, it is wise to switch of the measurement module if it is not needed. There are two different modes available to reduce the power consumption. The input channels can be deactivated via the Peakalyzer Manager. This function is available via the button "Deactivate PeakStore" in the sensor overview or via the function key Fn2 on the upper side of the PeakStore5. In this case only the input channels are deactivated and the main interface is still supplied with power.



Picture 10: Sensor overview

Alternatively, the complete measurement module can be deactivated via the tablet module configuration. This will completely deactivate the USB expansion port on the back of the tablet. The battery life time of the tablet is increased considerably by this deactivation. However, the reactivation time for the measurement module is much longer than the other variant. To deactivate the expansion port, the Home key of the tablet must be pressed. In the menu on the right side the Device button must be touched to open the optional tablet modules. In this menu the external COM port can be deactivated and also activated.



Picture 11: tablet module configuration

6. Software Usage

The software Peakalyzer Manager serves as interface to manage the data collection systems PeakStore504, PeakStore508 and PeakStore512. At first the license of the according PeakStore5 must be added to the Peakalyzer Manager. The license manager is available via the menu item Extras → Licenses. Via the button Add License the license that is delivered with the PeakStore5 can be added.

The license can be extended by a balancing module, allowing to balance machines with up to two balancing layers. If this option is activated, it is also shown in the license manager in the Peakalyzer Manager.

The coupling of the PeakStore5 to the tablet is done via the expansion port in the standard delivery. This expansion port is activated automatically during the boot process of the tablet but can also be activated manually via the tablet module configuration.

If the PeakStore5 is used via the separate USB connection in combination with a normal PC, the USB connection must be first established before the PeakStore5 is added to the Peakalyzer Manager.

Afterwards the PeakStore5 can be added to the Peakalyzer Manager via the menu item Diagnosis system → New → PeakStore. The button Search lists all supported measurement devices that are connected via USB.

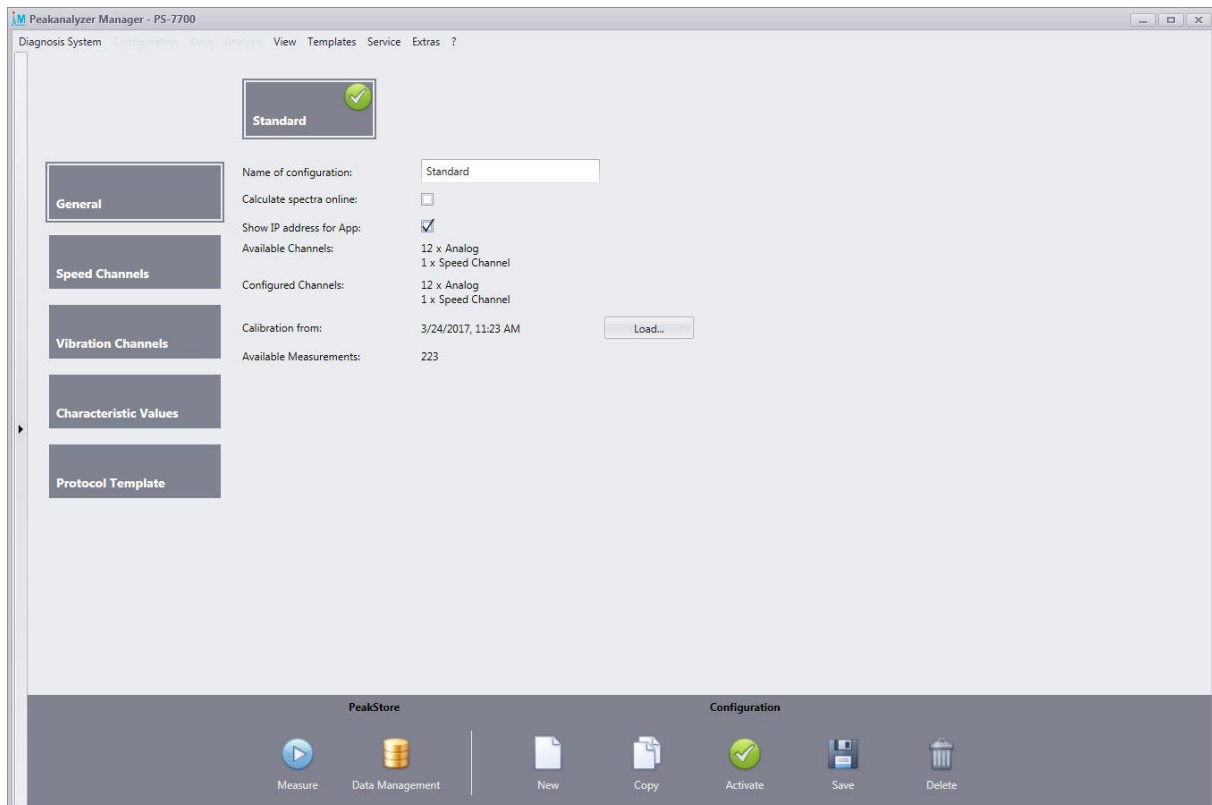
The PeakStore5 is then listed in the device browser of the Peakalyzer Manager like any other system. After the selection of the PeakStore5 in the device browser, a query of the channel properties is done and the configuration site is opened.

Via the menu Extras → Options → PeakStore → General the directory where all measurement data should be saved can be chosen. Additionally, a shortcut to the desktop or in the Windows startup can be created. This will start the Peakalyzer Manager and automatically select the desired PeakStore5 and will start the settling process with active configuration.

6.1. Configuration

In the configuration view, there is a menu bar in the bottom with some general functionalities. The button New will create a new configuration. The button Activate will choose the currently opened configuration as measurement configuration. This active configuration will also be automatically loaded if the PeakStore5 is selected in the device browser. The button Save will save all changes of the currently opened configuration if there are no validation errors. If invalid configuration parameters are set, a window will be opened with description of the invalid parameter. The button delete will delete the selected configuration. This is only possible if there are no measurement data existent for this configuration. If applicable, these have to be deleted in the data management first.

6.1.1. General



Picture 12: configuration menu general

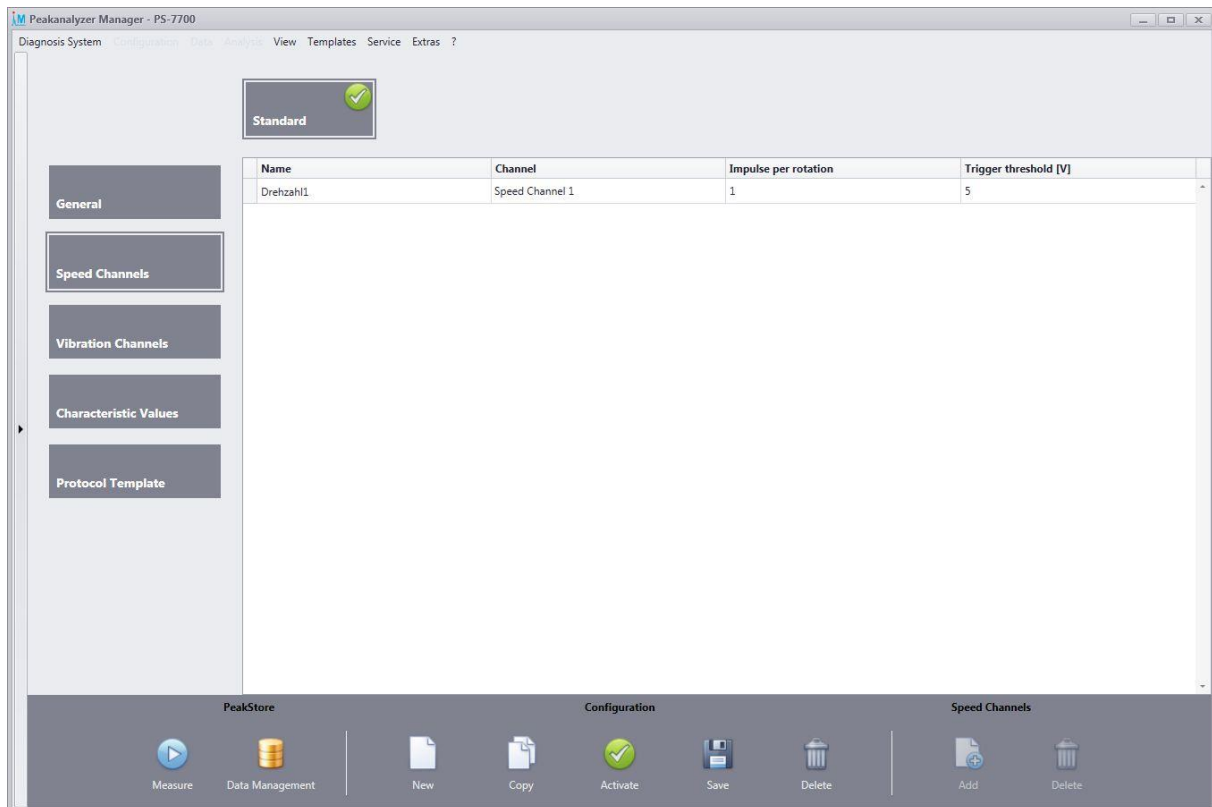
The menu tab General of the selected configuration contains the following parameters:

- **Name of Configuration:** An arbitrary alphanumeric name to identify the configuration. This name is also inserted in the measurement protocol.
- **Configuration Type:** It can be chosen between vibration measurement and balancing in one or two layer. Details for the balancing can be found in chapter 6.3.
- **Online-Calculation of Spectra:** This option can be activated if the online calculation of online order and frequency spectra is desired during the measurement. If the online calculation is not activated the battery life time is increased.
- **Show IP Address for App:** If this option is activated, the IP Address of the WLAN adapter of the tablet is shown in the sensor overview.

Additionally, the following information are available on the general site:

- The number of available speed and sensor channels
- The number of configured speed and sensor channels
- The date of the calibration data. Also, a new calibration file can be loaded in this section.
- The amount of available measurements with the current channel settings. If the measurement time is set to undefined on the vibration channel site, the maximum storage time is shown.

6.1.2. Speed Channels



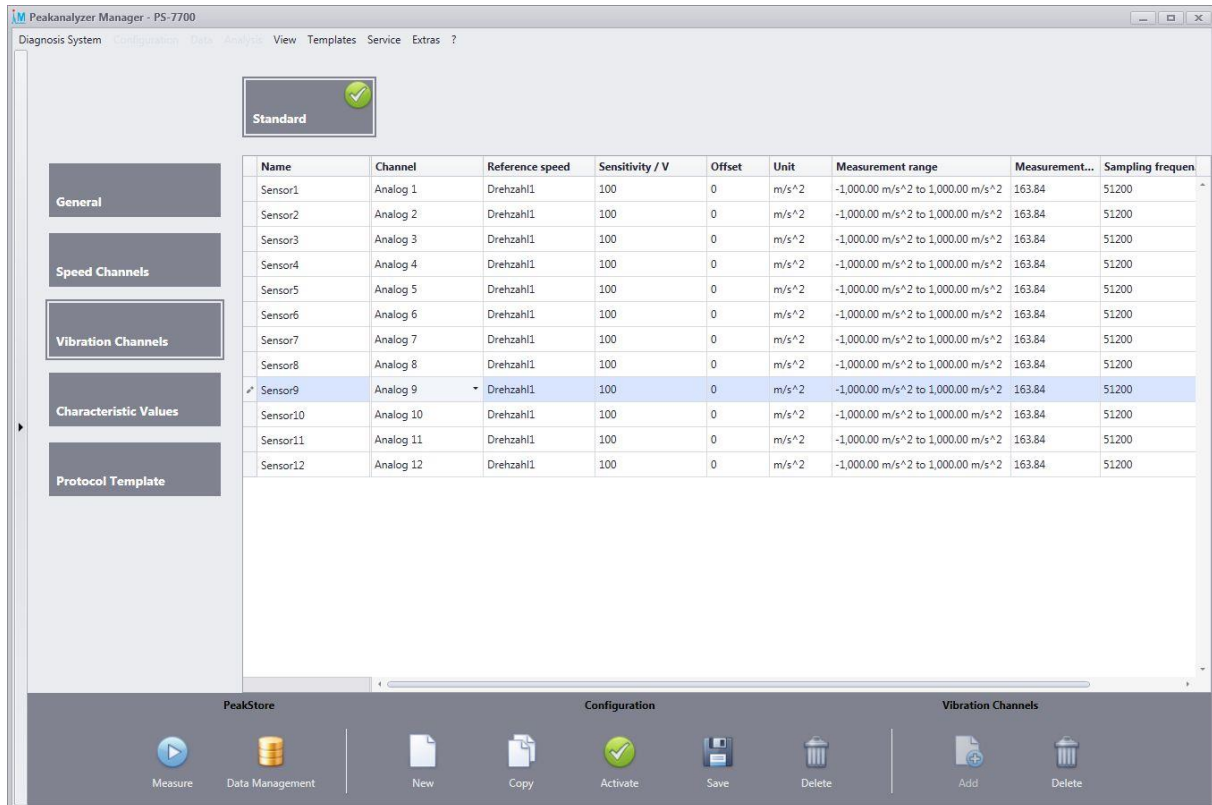
Picture 13: configuration menu speed channels

On the site Speed Channels the speed sensors can be configured. In general, there are two input channels for speed sensors available. Via the button Speed Channels → New a new speed sensor can be added. In the table an arbitrary name can be set for this channel. Additionally, the impulses per rotation that are measured by the sensor must be adjusted to the correct value. The trigger threshold of the speed channel can be adopted if necessary. The speed sensors that are delivered by GfM Gesellschaft für Maschinendiagnose mbH work ideal with the standard value of 5 V.

If no speed sensor is configured, the online calculation of spectra is reduced to frequency and envelope frequency spectra. The calculation of order and envelope order spectra requires a speed measurement.

For the configuration type balancing it is required to measure the speed.

6.1.3. Vibration Channels



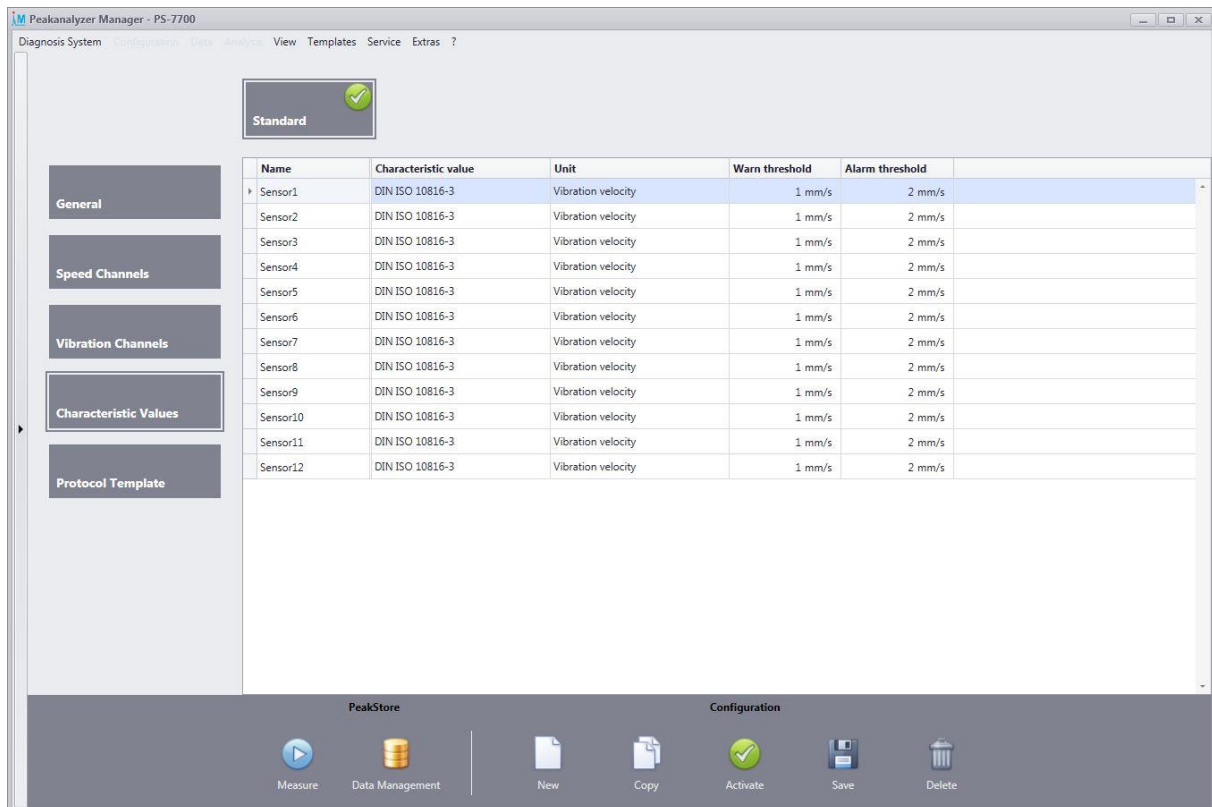
Picture 14: configuration menu vibration channels

On the configuration site Vibration Channels, the individual analogue inputs can be configured. Via the button Vibration Channels → New a new sensor can be added and afterwards be configured in the table. The following parameters are available:

- **Name:** an arbitrary name for the sensor description or name of the measurement position.
- **Channel:** the corresponding input channel
- **Reference Speed:** the speed that is used for the order spectra of this sensor
- **Sensitivity / V:** the sensitivity of the sensor. If a calibration file is given on the general site, the value from the calibration file is used automatically.
- **Offset:** the offset of the sensor. For accelerometers with IEPE interface this value is usually 0. For analogues displacement sensors, the offset of the displacement sensor must be entered.
- **Unit:** the physical unit of the sensor
- **Measurement range:** the measurement range of the channel. Here you can select from ± 10 V to ± 1 V.
- **Measurement time:** the measurement time is changed for all channels accordingly. It can be chosen from a pool of 8 measurement times. Alternatively, the measurement time can be set to undefined. In this case the measurement must be stopped explicitly to finish the measurement.
- **Sampling frequency:** The sampling frequency can be set individually for each channel from a pool of 9 sampling frequencies.
- **Coupling:** The coupling can be chosen for each channel individually from IEPE, AC or DC.

If the configuration type balancing was chosen, a balancing layer must be assigned to each sensor. Furthermore, the sampling frequency is fixed to 51.2 kHz for all sensors.

6.1.4. Characteristic Values



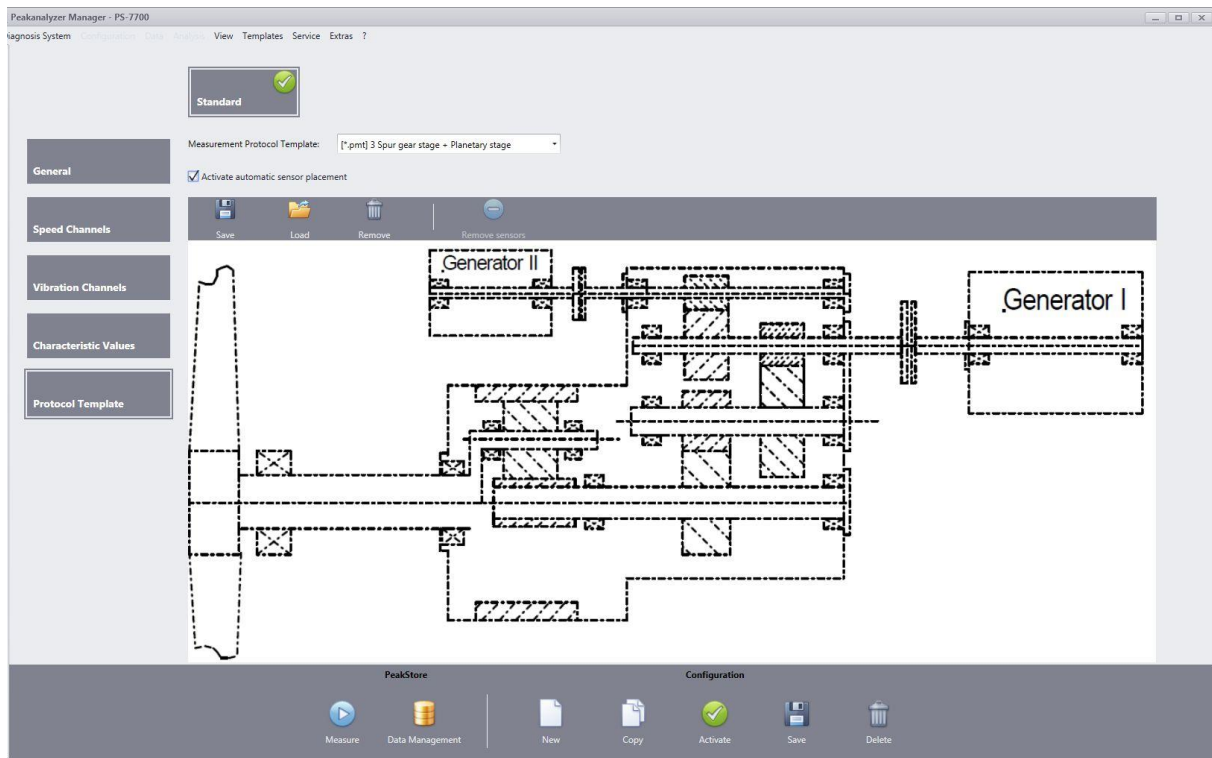
Picture 15: configuration site characteristic values

For accelerometers that are configured in the vibration channels site, a characteristic value can be configured on this site. If an accelerometer is added, the r.m.s. of vibration velocity based on DIN-ISO 10816-3 is preconfigured for this sensor. The following r.m.s. values of vibration velocity or vibration acceleration can be configured for each sensor:

- DIN ISO 10816-3 with bandwidth 10 Hz – 1 kHz
- DIN ISO 10816-21 with bandwidth 0.1 Hz – 10 Hz
- DIN ISO 10816-21 with bandwidth 10 Hz – 1 kHz
- DIN ISO 10816-21 with bandwidth 10 Hz – 2 kHz
- DIN ISO 10816-21 with bandwidth 10 Hz – 5 kHz

For each characteristic value a warning and an alarm threshold can be configured. It is then possible to monitor warn and alarm threshold exceeding in the measurement overview.

6.1.5. Measurement Protocol Template



Picture 16: configuration menu measurement protocol template

A measurement protocol template can be chosen from a pool of templates. The templates of type (*Drawing*) contains a drawing surface where a schema of the machine can be drawn by hand. The data type (*Picture*) contains a preset machine schema picture. Templates with the data type (*Empty*) omits the sensor overview completely. The following templates are available:

- 2 Spur gear stage + Planetary stage
- 3 Spur gear stage
- 4 Spur gear stage + Planetary stage
- A60-B130
- Blade bearing
- Motor
- Planetary stage + 2 Spur gear stage
- Motor
- Motor + Gear box
- Turbine + Gear box + Generator
- Empty Template

Additionally, the sensor positions can be placed beforehand if the selected protocol is of the type (*Picture*). These are then used in each measurement with this configuration. At first the check "Activate automatic sensor placement" must be set. The desired position has to be clicked to place the sensor. If an already placed sensor is clicked again, a popup will open to change the measurement position and direction.

6.2. Vibration Measurement

If the PeakStore5 is selected in the device browser, the measurement overview of the active configuration is automatically selected. The configured channels will be activated and the settling process of the input channels will start. The settling process can also be cancelled. The PeakStore5 is then deactivated and must be activated via the button “Activate PeakStore” before a measurement starts. If the PeakStore5 is active, the PeakStore5 can be deactivated via the same button or the function key Fn2 on the top of the PeakStore5. If activated, the PeakStore5 is in a monitoring mode where the current characteristic values and the current speed can be viewed.

This also increases the power consumption of the PeakStore5. If the monitoring mode is not needed, it is recommended to deactivate the PeakStore5 to increase the battery life time.

A measurement can be started by pressing the Start button in the right bottom of the application. Alternatively, the function key Fn1 on the front bottom of the tablet can be used to start a measurement. If the PeakStore5 is deactivated, the settling process will start first before the actual measurement is started automatically.

If a predefined measurement time is configured and the measurement is cancelled via the stop button during the measurement time, all measurement data of the current measurement will be withdrawn.

To switch between the different measurement views, the navigation buttons in the right top of the application can be used. The Home button always leads to the sensor overview.

6.2.1. Sensor Overview



Picture 17: Sensor overview

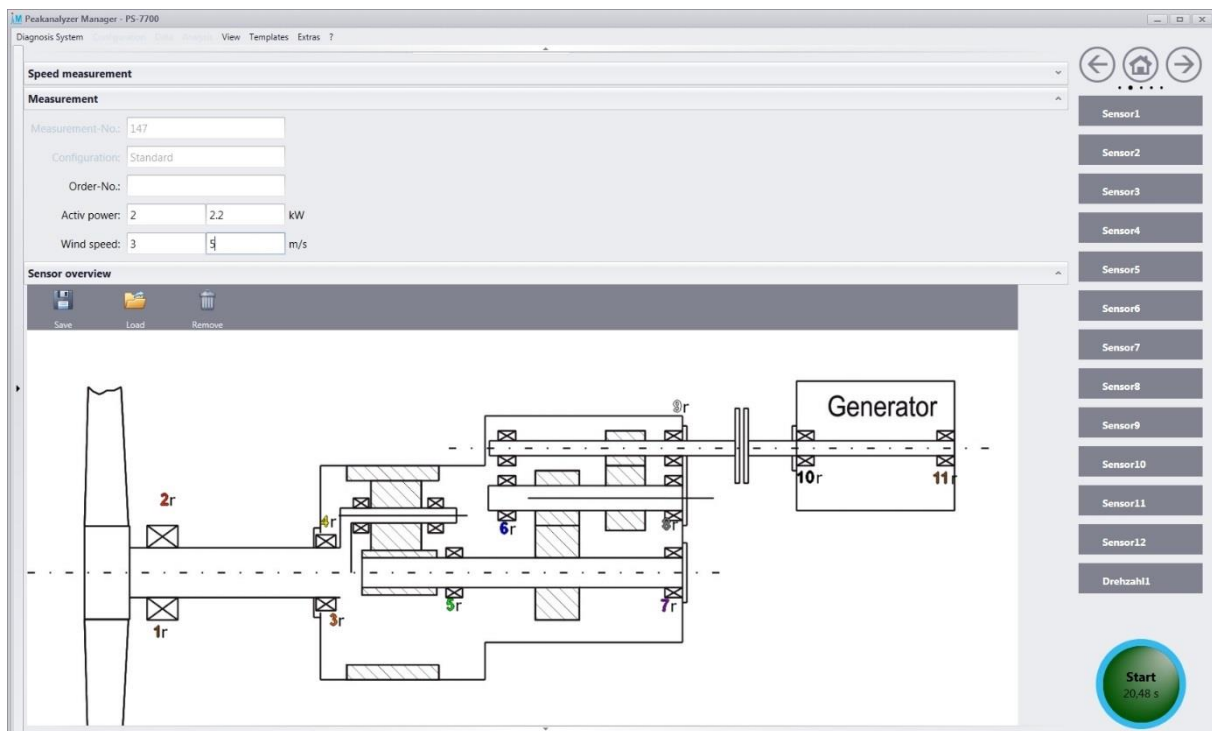
The sensor overview site is the main site of the measurement overview. Above the actual sensor information are buttons to open the current configuration and to open the data management as well as the activation/deactivation of the PeakStore5. Additionally, there are information of the current measurement start time and the current measurement number. Also the available free measurements that depend on the free disk space is shown.

For the individual sensors the following information are displayed:

- *Accelerometers*: The current characteristic value that is configured for this sensor.
- *Displacement sensors and other sensors*: The current measurement value is shown.
- *Speed*: The current speed value. Additionally, the variation of the speed in percent during the measurement.

By pressing on the sensor, the time signal of the selected sensor will be shown.

6.2.2. Measurement protocol



Picture 18: Measurement protocol

All relevant additional information that are important for the measurement can be added in the measurement protocol. Depending on the chosen measurement protocol template in the configuration, the provided data can vary. Some information will be filled automatically, like the configuration name, the current measurement number and the date of measurement.

The measurement protocol is divided in the following categories:

General

- Name and company of the measurer
- Measurement start time will be filled automatically

Machine information

- Manufacturer, type, number, location, nominal power and operator of the machine
- Manufacturer, type, number, nominal speed and ratio of the gear box if present
- Manufacturer, type, number and bearing description of the motor or generator

Speed measurement

- Positioning of the speed sensor
- Impulse per revolution is taken from the configuration

Measurement

- Current measurement number will be filled automatically
- Configuration name will be filled automatically
- Order number if available
- Process information, e.g. current wind speed or actual power output

Sensor overview

The measurement protocol templates of type (*Picture*) have a preset picture. The measurement positions of the individual sensors can be placed on this picture. The desired position has to be clicked to place the sensor. If an already placed sensor is clicked again, a popup will open to change the measurement position and direction.

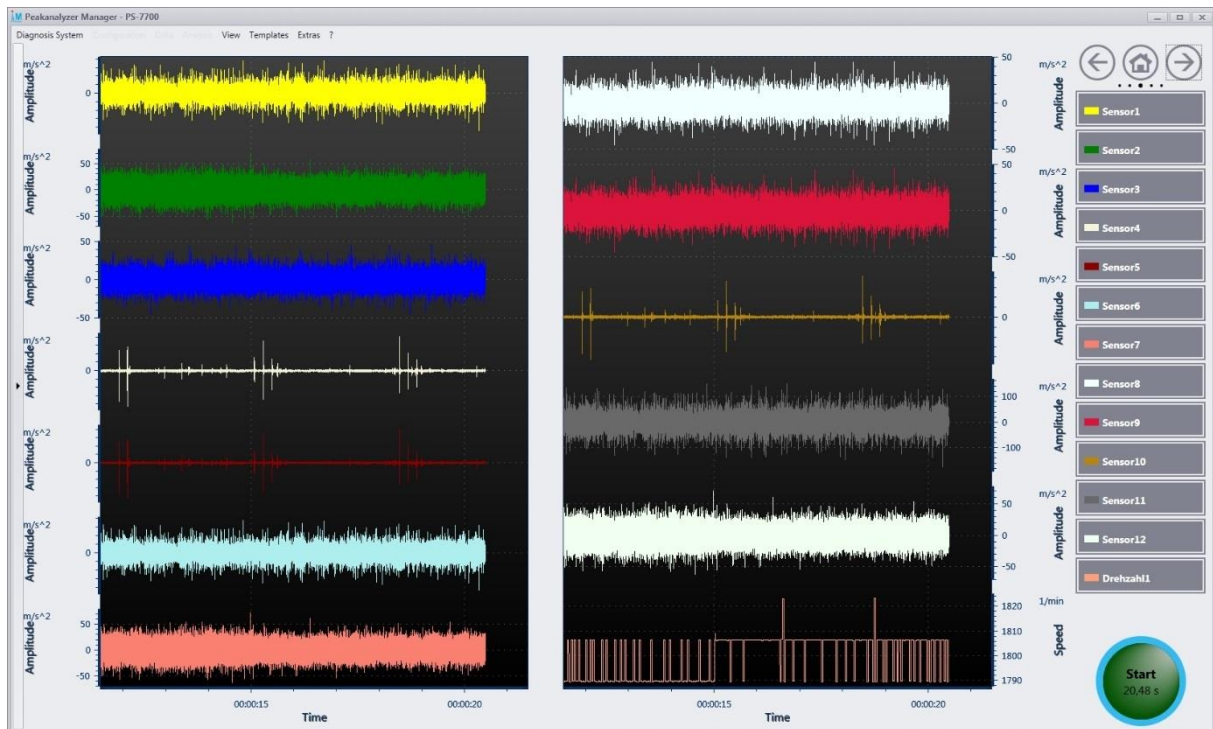
If the same sensor arrangement is used in multiple measurements, it is recommended to save the positioning. This can be done by pressing the save button above the picture. The position will be saved under the given name. By pressing the load button the selected positioning is applied to the current picture.

If a measurement protocol template of data type (*Drawing*) is chosen, a schema picture of the machine can be drawn by hand. The drawing mode can be activated by pressing the Design button in the sensor overview. The empty box can be used to draw any picture. The completed picture can be saved as separate picture file or copied to the clipboard to use it in another application. Additionally, there are functionalities to revert the last operation, erase parts of the picture or delete the complete picture.

Miscellaneous

- An arbitrary text that can contain additional information of the measurement

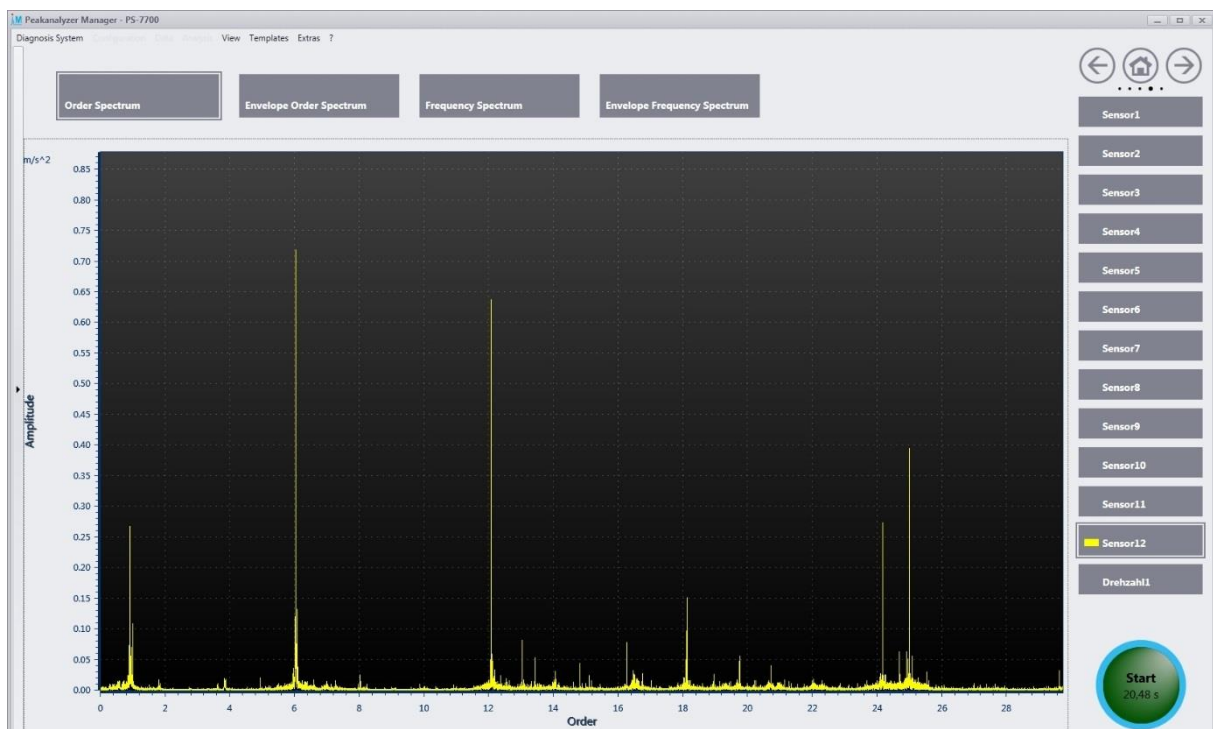
6.2.3. Time Signals



Picture 19: Time signals

On this site the measured time signals of all sensors, also in parallel, can be viewed. The signals that should be shown, can be changed by the sensor listing on the right side. The curve window is frequently updated to show the latest data during the measurement. If the measurement is finished, the curve window can be zoomed freely to show certain parts in detail.

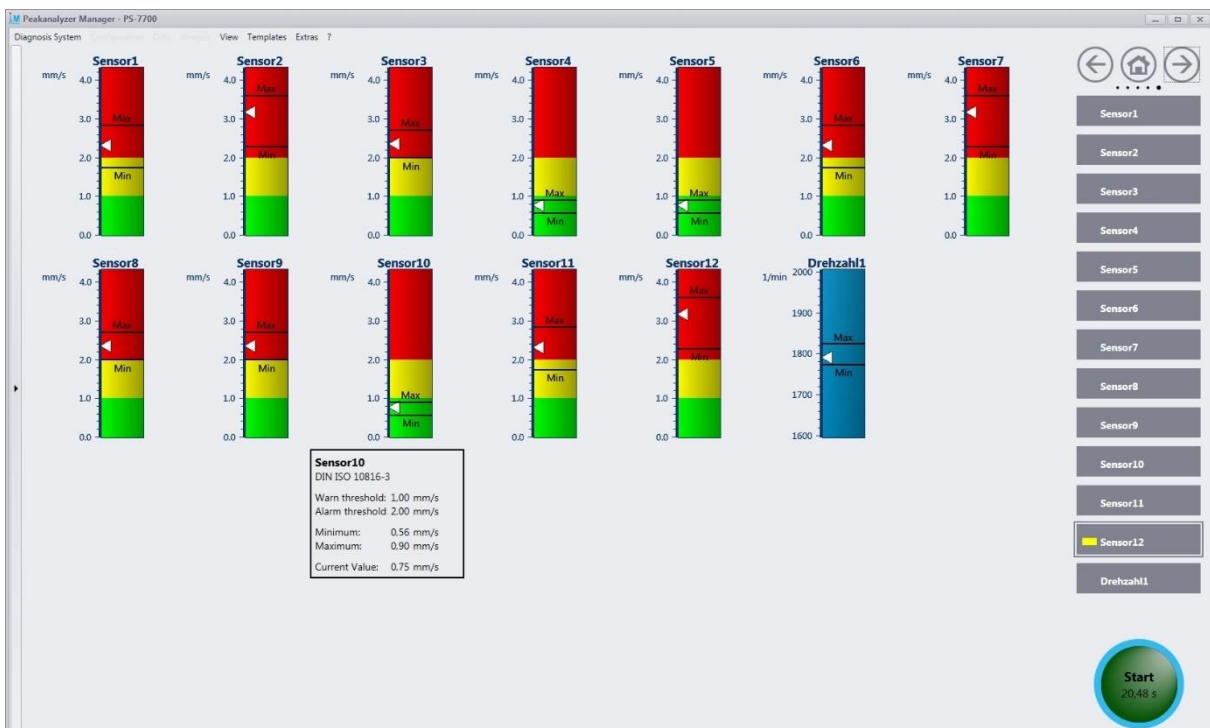
6.2.4. Spectra



Picture 20: Online-Spectra

If the online calculation of spectra is activated in the configuration, the order, envelope order, frequency and envelope frequency spectra of up to four sensors can be displayed. The spectrum type can be chosen by the buttons above the curve window. The spectra are recalculated multiple times during the measurement with increasing resolution. Thus the spectra with the best resolution are available at the end of the measurement. If an undefined measurement time is chosen, the resolution of the calculated spectra will increase up to 163,84 s. From this point on the last 163,84 s are used in a ring buffer system to calculate a new spectrum.

6.2.5. Characteristic Values



Picture 21: Characteristic Values

Warning and alarm thresholds can be configured for each characteristic value of the accelerometers. The visualization of the characteristic values can be found on the characteristic value site. The characteristic value is recalculated continuously during the measurement for each sensor. The graphical view displays the minimal and maximal value during a measurement with a horizontal line. The current characteristic value is visualized with a small arrow. The configured warning and alarm thresholds are emphasized with green, yellow and red ranges. If the mouse is hold over a sensor, the concrete values are shown in a popup window.

For connected displacement sensors, speed sensors or other sensors the minimal, maximal and current value of the physical measured unit are shown.

The upper bound of the y-axis is adjusted simultaneously for all characteristic values of the same type. This allows an easier comparison of the characteristic values. This behaviour can be changed in the options under Extras → Options → PeakStore → Characteristic Values. Furthermore, the colouring of the sensor name can be changed to show different characteristic value types in different colours.

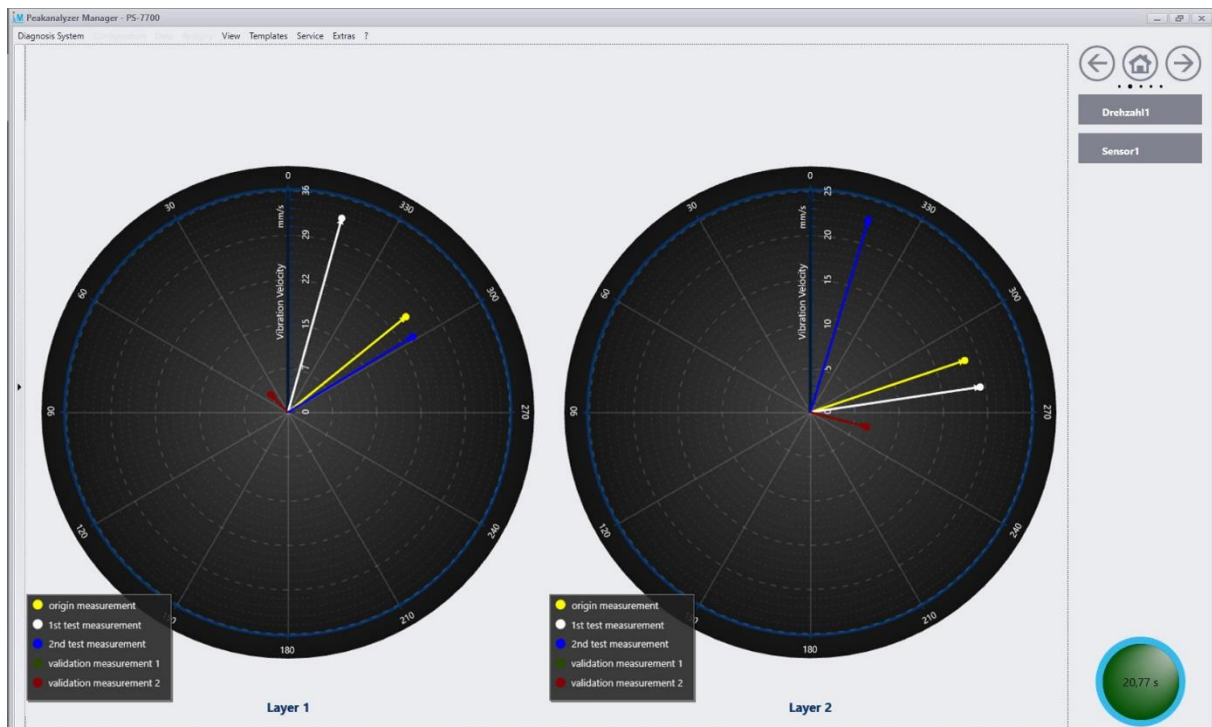
6.3. Balancing

If a configuration of type balancing is selected, the measurement view for the balancing process is shown. The usual sensor overview from the vibration measurement is replaced by an assistant driven overview for the balancing process. The pages for time signals (see 6.2.3), online spectra (see 6.2.4) and characteristic values (see 6.2.5) are identical to the vibration measurement.

The balancing process is done in multiple stages. At first an origin measurement is done to determine the initial imbalance of the machine. Afterwards a test measurement with a test mass is required to calibrate the system. If the balancing is configured for two layers, a second test measurement on the second layer is required. Afterwards up to 5 validation measurements will follow where balancing masses are applied to the layers to reduce the initial imbalance.

Generally, each measurement consists of a preparation phase, the actual measurement and an acknowledgment of the current measurement. If a misconfiguration was done, the current step can be cancelled at any time to go back to the last step. During the measurement phase, the PeakStore will wait until the speed is in a valid range and then start the actual measurement. If the speed changes during the measurement to an invalid range, the measurement is stopped immediately. The speed must be in the valid range to automatically restart the measurement.

The main results of the balancing process are aggregated in a polar view and can be shown at any time of the measurement.

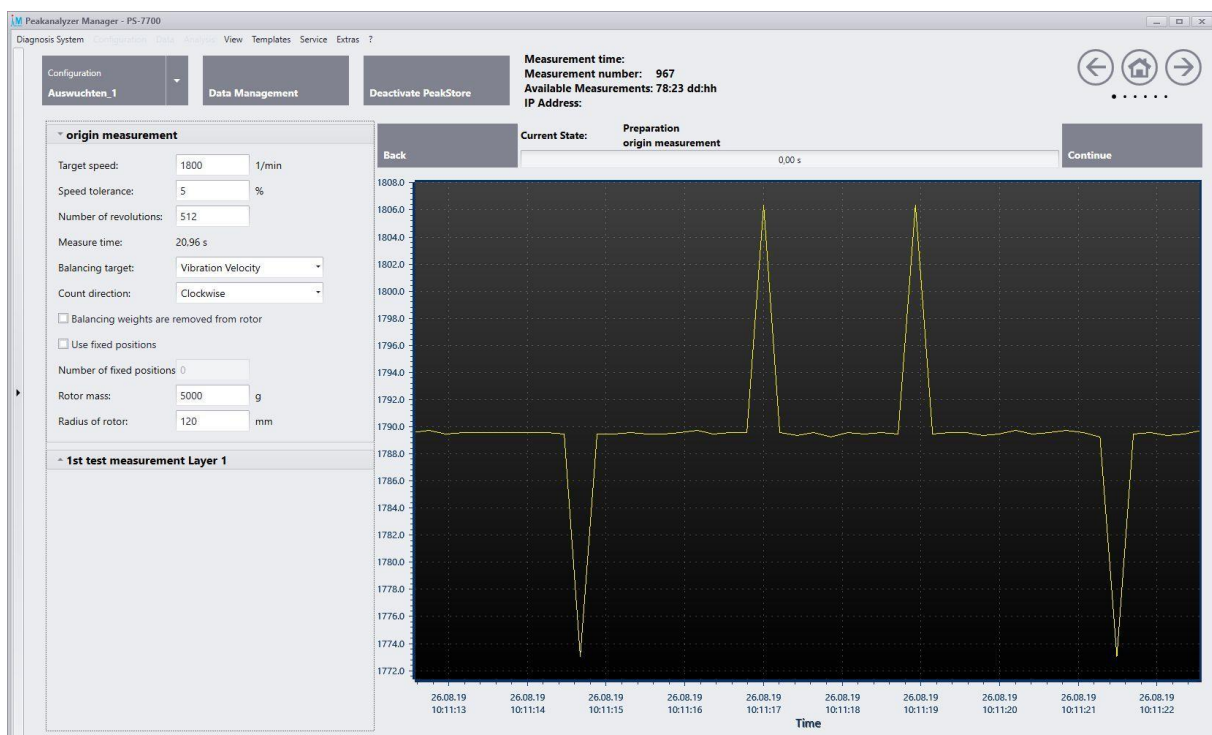


Picture 22: Polar view of two-layer balancing

A protocol of the whole balancing process is shown and saved after the balancing process is finished.

6.3.1. Preparation

Before the actual balancing process can be started, the vibration sensors and the speed sensor must be applied. A reflection mark must be placed ideally on one of the balancing layers for the speed measurement. This mark is also the 0° reference position for the later process that is relevant for applying masses. The speed sensor must be placed with the holder that it shows directly on the reflection mark. Additionally, the vibration sensors must be placed directly on the bearing of the balancing layer. Ideally it is placed directly on the housing of the bearing. The type of the vibration sensor must be chosen that the lower cut off frequency is below the speed frequency. If configuration type is set to balancing in one layer, the vibration sensor must be placed on this layer. If balancing in two layers is activated, one vibration sensor must be placed on each layer. It is necessary to take into account the correct layer for each vibration sensor, as parametrized in the configuration (see also 6.1.3).



Picture 23: Parameter Balancing Process

Afterwards, the following parameter must be set for the whole balancing process (see also Picture 23):

- **Target speed:** This speed is used for the whole balancing process. Ideally the balancing process is done at normal operational speed of the machine. It should be avoided to balance the machine in the resonance range.
- **Speed tolerance:** The acceptable deviation from the given target speed. A maximum tolerance of 50% is allowed.
- **Number of revolutions:** One measurement in the balancing process is done with the given number of revolutions. It will be automatically rounded to the nearest power of two. The expected measurement time directly results from the combination of the number of revolutions and the target speed.
- **Balancing target:** The imbalance of the machine can be determined via the measured vibration acceleration or via the inferred vibration velocity.

- *Count direction*: It can be chosen between clockwise and counterclockwise. The reflection mark always references the position 0°. The count direction on the balancing layer is always from the perspective of the speed sensor, thus with view on the reflection mark.
- *Use fixed positions*: If masses can only be applied to dedicated positions, this option must be checked. The positions must be distributed equidistantly over the whole balancing layer.
- *Number of fixed positions*: The number of fixed positions must be entered here, if the option “use fixed positions” is activated.
- *Rotor mass*: The mass of the rotor in gram. The information is required to calculate the quality level after the balancing according to DIN ISO 21940-11:2017-03.
- *Radius of mass positions*: For the calculation of the quality level according to DIN ISO 21940-11:2017-03 the radius of mass positions is also required. It is the distance of the mass position to the centre of the balancing layer. On these positions the test masses as well as the balancing masses must be applied.

6.3.2. Origin Measurement

The origin measurement can be started by clicking on continue, if all parameters are set up. It will be first waited until the speed is in the valid range. If this is the case the actual measurement starts automatically and also stops automatically if the required number of revolutions are reached.

6.3.3. Test Measurement

A calibration of the system is required to calculate the correct balancing masses. For a balancing in one layer, a test measurement with a test mass on this layer is required. If the balancing is done in two layers, an additional test measurement with a test mass on the second layer must be done. The test masses must be removed from the corresponding layer after each test measurement. The example in Picture 24 shows an application of a test mass of 80 g at position 60°. After the machine is at the expected target speed, the measurement can be started. If the balancing is done in two layers, the mass can be removed from the first layer and applied to the second layer.

The screenshot shows a software interface for configuring a test measurement. The title bar reads "1st test measurement Layer 1". There are two rows of input fields:

- The first row is labeled "Position test mass:" and contains a dropdown menu with the value "60,00" and a degree symbol (°) to its right.
- The second row is labeled "Weight of test mass:" and contains a text input field with the value "80" and a unit "g" to its right.

Picture 24: Definition test mass

6.3.4. Validation Measurement

The balancing masses to correct the initial imbalance are calculated after the successful test measurement. If the option “use fixed positions” was activated, two masses per layer are calculated. Picture 25 shows an exemplary calculation of required balancing masses to reduce the initial imbalance. If it is not possible to apply the exact masses to the locations, the actually applied masses can be entered.

▼ validation measurement 1

Target values:
 Layer 1 Degree: 300,00° Weight: 499,378 g
 Layer 1 Degree: 360,00° Weight: 241,412 g

Actual values:
 Layer 1 Degree: 300,00° Weight: 499,378
 Layer 1 Degree: 360,00° Weight: 241,412

Quality level:

Picture 25: Calculation of balancing masses

After the masses are applied, a validation measurement is required. The determined quality level will be shown in the window afterwards. If the required quality level was not reached, a further validation measurement can be added to the balancing process. The additionally calculated masses must be added to the existing masses from the last validation measurement. This step can be repeated up to 5 times.

6.3.5. Finalization

If the target quality level is within the desired range, the balancing process can be finished after the validation measurement. The protocol of the balancing process will directly be shown in an internal pdf viewer (see Picture 26). The measurement data and protocol are also available in the data management section afterwards.

Balancing Report

Company: GIM Gesellschaft für Maschinendiagnose mbH
 Name: Reinke Date: 8/26/2019 Time: 12:53 PM Confidential BAL

Machine
 Manufacturer: GIM Type: Name: Pruefstand
 Location: Berlin Nominal Power: 5 kW
 Operator: GIM

Settings
 Rotor mass: 5000 g Rotor radius: 85 mm
 Sensor Layer 1: Sensor1 Sensor Layer 2: Sensor2
 Balancing target: Vibration Velocity Count direction: Counterclockwise
 Measurement time: 13.78 s Rotation count: 512 Impulse/Rev: 1
 Reference speed: 3000 1/min Tolerance +/-: 5 % Fixed position in interval: 30°
 Balancing weights are added to rotor

Mass

	Target values			Actual values		
	Position	Weight	Radius	Position	Weight	
Test masses						
1st test measurement	0°	4.08 g	75 mm	-	-	
2nd test measurement	0°	4.08 g	75 mm	-	-	
Balancing masses						
validation measurement 1	Layer 1	60°	4.78 g	75 mm	60°	6 g
		90°	1.34 g	75 mm	90°	0 g
	Layer 2	270°	1.76 g	75 mm	270°	0 g
		300°	0.02 g	75 mm	300°	0 g

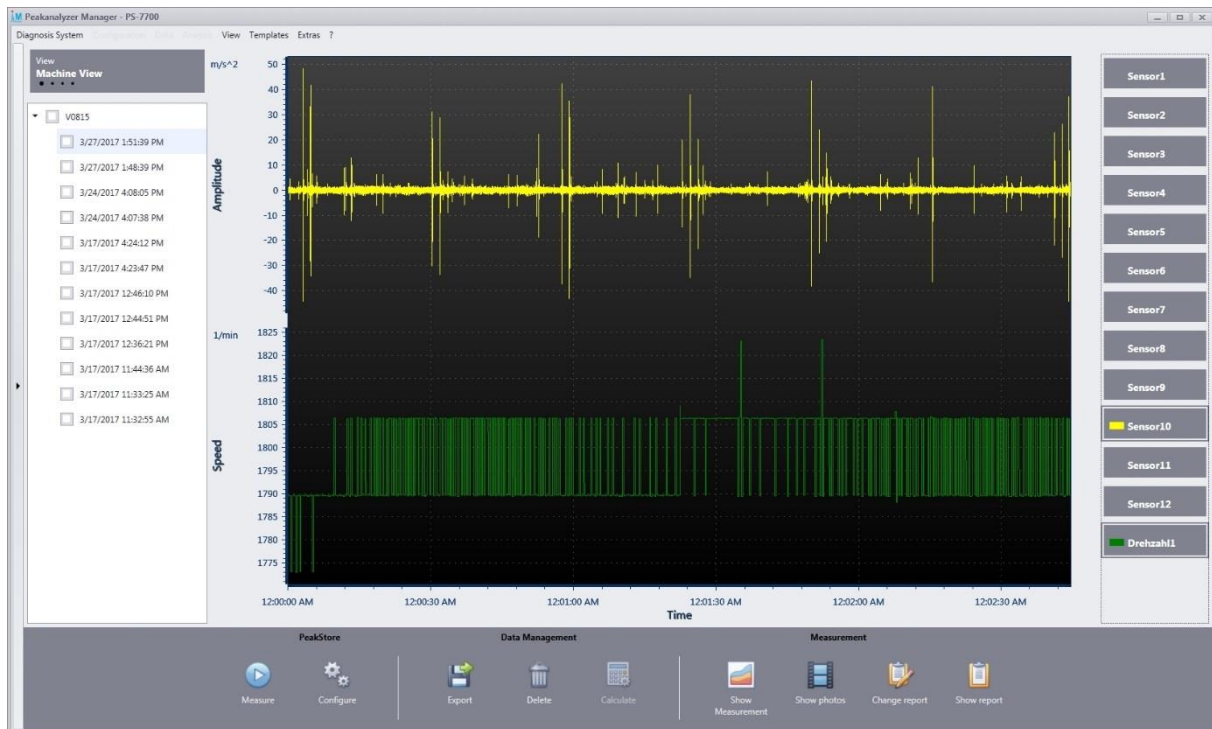
Results

Step	Speed	Layer 1			Layer 2		
		Pos.	v rms	G	Pos.	v rms	G
origin measurement	2956.69 1/min	313°	27.96 mm/s	31.92 mm/s	145°	13.01 mm/s	9.5 mm/s
1st test measurement	2965.25 1/min	352°	26.94 mm/s	-	162°	12.99 mm/s	-
2nd test measurement	2956.69 1/min	308°	29.16 mm/s	-	98°	23.64 mm/s	-
validation measurement 1	2948.18 1/min	26°	3.77 mm/s	3.68 mm/s	161°	8.01 mm/s	9.6 mm/s

Start 13.82 s

Picture 26: Balancing report

6.4. Data Management



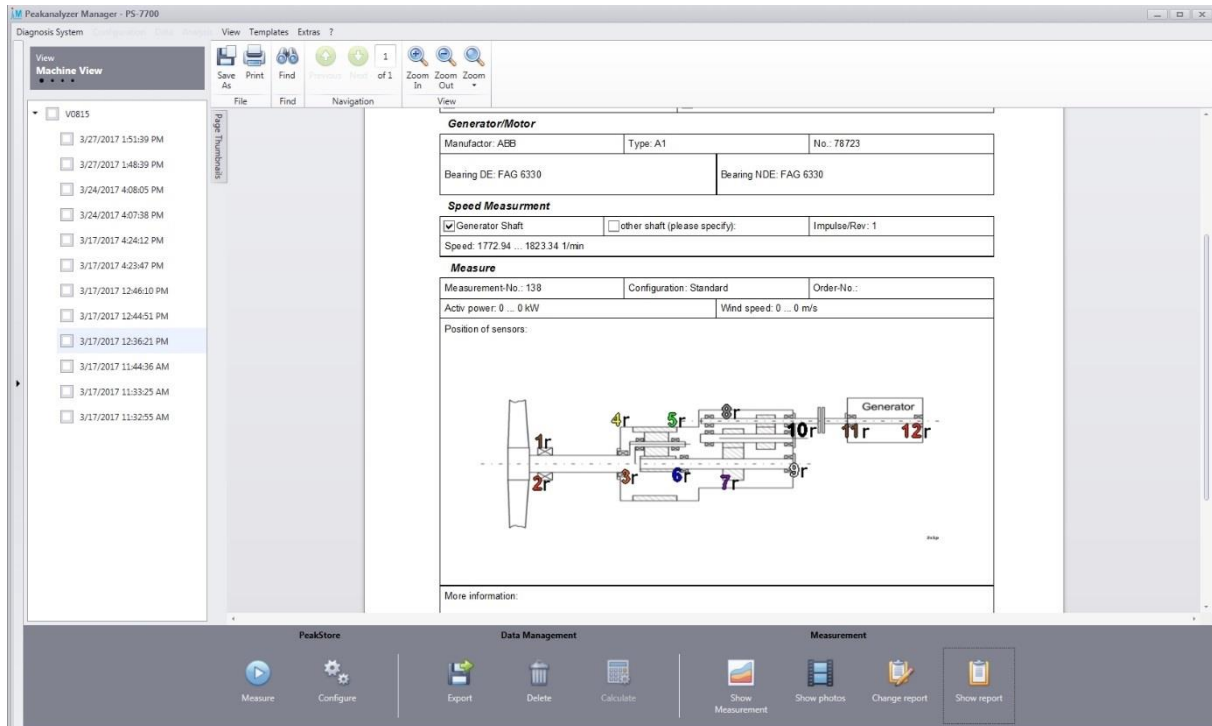
Picture 27: Measurement data in the data management

The data management handles all recorded measurement data of the PeakStore5. All measurement data are structured in the left tree view. The button View above the measurement listing allows to change the structuring of the measurement data listing. The following options are available:

- *Machine View*: The measurement data is grouped according to the measured machine.
- *Configuration View*: The measurement data is grouped according to the used configuration.
- *Order View*: The measurement data is grouped according to the order number that was entered in the measurement protocol.
- *Chronology View*: The measurement data is listed chronologically without any further grouping.

If one measurement is selected, the measurement data can be visualized by pressing the button "Show measurement". On the right side, the desired sensors can be chosen. By default the speed signal is preselected if one measurement is shown.

If there are additionally photos saved, that were recorded with the PeakStore Remote App, these can be displayed by pressing the button "Show photos".



Picture 28: Measurement protocol as generated pdf

The generated measurement protocol can be viewed in an integrated pdf viewer if the button „Show report” is pressed. From this view the pdf can also be saved in a separate file or be outputted to a connected printer.

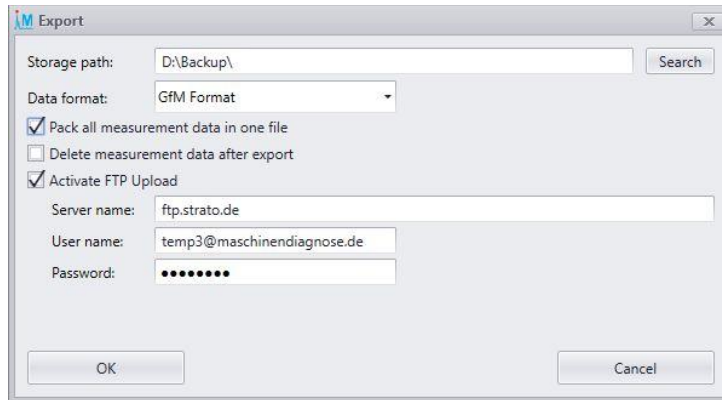
If the measurement protocol contains erroneous inputs, the entered data can be changed by pressing the button “Change report”. This will open the edit mode of the measurement protocol as described in the measurement overview. To save the changes, the button “Save report” has to be pressed.

If measurements or complete machines in the left data browser are selected with a check, these data can be exported, deleted or calculated with the Diagnostic Tool. For the data export a separate window will open where the desired target directory can be chosen. Thus a connected USB-Stick can be chosen to export the data. The selected measurement data will be compressed to a single file for all measurements or a single file per measurement. The measurement data will be exported to the GfM internal raw data format by default. Alternatively, the data can be exported to WAV or ASCII format.

If desired, the measurement data can be deleted after the export finishes.

Additionally, the measurement data can be transmitted to a FTP server. For example the data can be transferred to GfM Gesellschaft für Maschinendiagnose mbH directly after the measurement for an analysis. Alternatively, the measurement data can be uploaded to any other FTP server. A stable internet connection, e.g. via WLAN, must be available to use the FTP upload functionality. Also the FTP login data must be known.

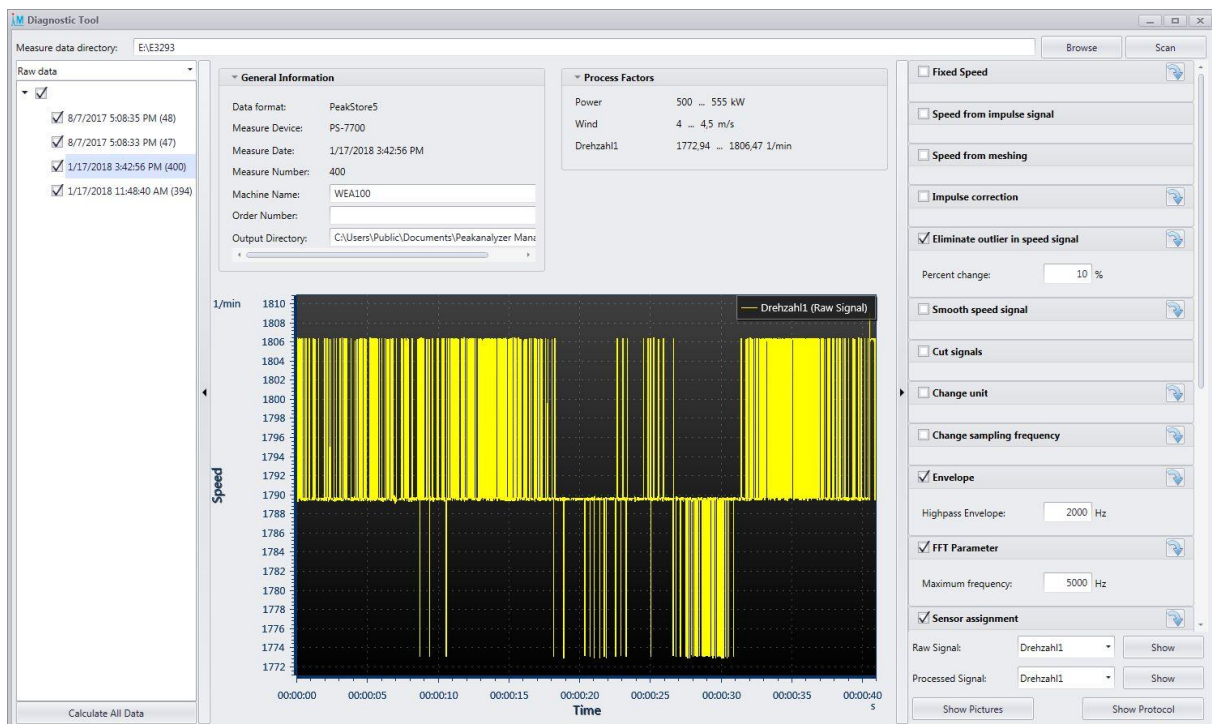
The exported measurement data can be imported and processed on another PC via the Diagnostic Tool of the PeakAnalyzer Manager.



Picture 29: Measurement data export

Via the button „Delete“ all selected measurement data will be completely deleted from the PeakStore5 after an additional question.

The selected measurement data can be calculated with the Diagnostic Tool if the button “Calculate” is pressed. The Diagnostic Tool will open and the checked data will be preselected for further editing and calculation.



Picture 30: Diagnostic Tool

On the left side of the Diagnostic Tool the measurement data that were selected in the PeakStore5 data management are shown. Each measurement can be preprocessed individually. Afterwards the order, envelope order, frequency and envelope frequency spectra as well as the characteristic values are calculated for each measurement. The preprocessing contains among others the following tools:

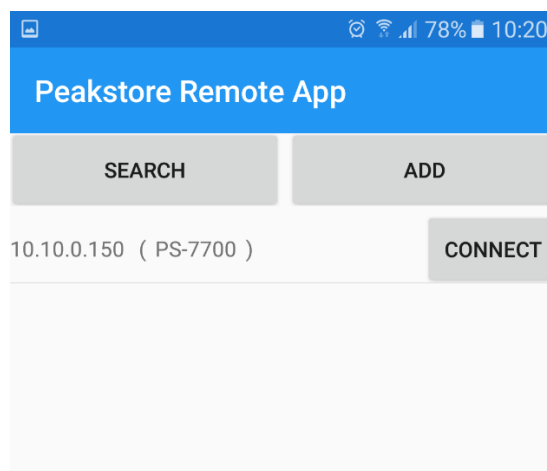
- Apply a fixed speed value instead of the measured speed signal
- Calculation of the speed of a tooth mesh
- Elimination of speed outlier
- Smoothing of the speed signal

- Cutting of speed and sensor signals
- Adaption of envelope and FFT parameter
- Renaming of sensor names to measurement positions

The calculated measurement data are finally inserted under the measured machine in the device browser of the Peakalyzer Manager. The analysis of the calculated data can then be done with the usual analysis tools of the Peakalyzer Manager. Detailed information about the Diagnostic Tool and the analysis tools can be found in the manual of the Peakalyzer Manager.

7. Remote Control

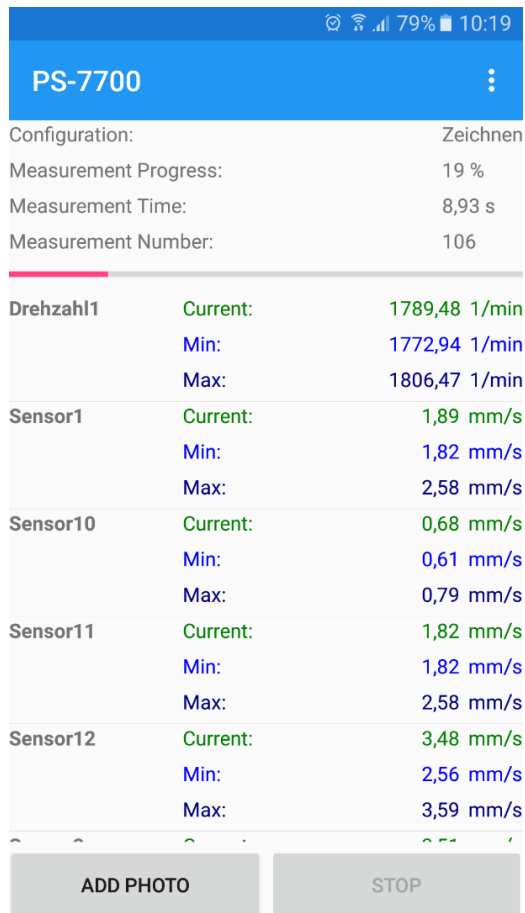
There is a free of charge App for the Smartphone platforms Android from version 4.1 and iOS from version 9.2 available that allows the remote control of the PeakStore5. The PeakStore Remote App must be installed from the corresponding store. An active WLAN connection must be established between Smartphone and PeakStore5 to get the PeakStore Remote App working. It is recommended to use an additional WLAN route as access point between these two where both devices are connected to. A battery driven WLAN router can also be ordered as additional component at GfM Gesellschaft für Maschinendiagnose mbH.



Picture 31: Connect PeakStore Remote App to PeakStore5

If the WLAN connection is established on both sides, the PeakStore Remote App can be started and a broadcast search for the PeakStore5 can be done. If the PeakStore5 is not automatically found, the PeakStore5 can be added manually. Therefore the IP address of the WLAN connection of the tablet, that is shown in the sensor overview if configured, must be entered in the App.

If the connection to the PeakStore5 is established successfully, the overview page will open. The PeakStore5 must be in the measurement overview. If the configuration view or data management is opened, a measurement cannot be started.



Picture 32: Measurement overview of the PeakStore Remote App

In the upper part of the App common information of the measurement are displayed. These are:

- The name of the configuration
- The measurement progress in percent
- The current measurement time
- The current measurement number

The measurement progress is also visualized with the progress bar.

Furthermore, there is an overview of all sensors with their current, minimal and maximal characteristic values of accelerometers or speed values of speed sensors displayed. The minimal and maximal values are only updated during a measurement. If the measurement is currently stopped, only the current value is updated.

Via the button Start on the right bottom a measurement can be started. If a configuration with an undefined measurement time is activated, the measurement can also be stopped with the same button.

Additionally, photos can be taken and saved in the measurement with the PeakStore Remote App. These can be photos of type designations, photos of the machine or sensor positioning. The taken photos are directly transmitted to the PeakStore5 and are saved in the current measurement after confirmation. An arbitrary free description and a category (machine picture, generator picture, gear box picture or other) can be added for each picture.

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