USER MANUAL

DDS

Version 3.7.2 – Dec. 22, 2022

Content:

Installation

System Requirements

DDS is designed for MS Windows 7 and higher systems.

What is needed to run the free version of DDS?

You need only to download the installation file from http://adash.com/downloads/adash-software and run it.

What is needed to run the full (licensed) version of DDS?

You need the following things to run the full version of DDS for the first time:

1. Run the installation file (which you received on the USB drive or CD).
2. Keep the **USB drive (or CD)** inserted during the first run of DDS as the license file is being imported to DDS.
3. Insert the **USB License Key** (dongle) to the other computer USB port; the license key is there.

Note: During the first run of DDS, the USB drive (or CD) with installation files and license file needs to be inserted. During another runs of DDS you don't need the USB drive there anymore.

The hardware USB License Key (dongle) has to be inserted every time you run DDS.

License Key

Please be aware that your license is saved in USB License Key (dongle). Actually you buy the dongle not the software which is free of charge. To run DDS with the Vibrio M or the Lubri you do not need the dongle. There is only a small limitation – it can only handle one tree with a maximum size of 200 MB.

You can install DDS to many computers, but you can only run it when the USB License Key (dongle) is found by (connected to) the computer. This is the advantage compared to a PC-based license file. You can simply move the license key between the computers.

A network LAN dongle is also available for DDS running on more computers simultaneously. Contact your dealer or us for details.

Advanced Note: If you have more Adash software products, you only need one USB License Key (dongle). All additional details about the products properties are saved in the file with the .lic (.aky for older products) extension in the main DDS directory (folder). If you contact us regarding licenses, please always send the dongle serial number to us.

Upgrading

When you run the DDS, then it checks the newer version on Adash website. If the newer version is available, you can install it.
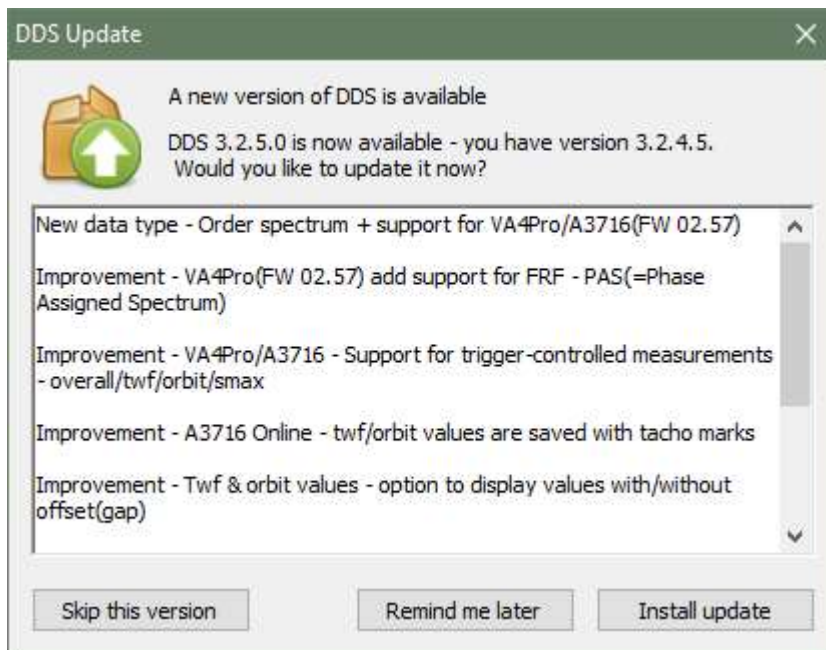
Install update – the new version will be downloaded and installed. The DDS has been closed before updating.

Remind me later – skipping of update and the new version will be offered again in next run.

Skip this version – This version will not be installed and DDS will nor remind you again about this version.

Manually you can check new version by **Help/ Update** button.

If you wish to change the checking for new updates after the application start, set desired option in the global settings (Tools / Global Settings / General tab / Application section / Check for updates).

The newer version you can also find directly on www.adash.com.

DDS Installation

DDS

You can always find the installation file on the Adash website http://adash.com/downloads/adash-software . You need appropriate computer system rights to running the installation file (if you have problem to run installation, contact your IT administrator). Then follow the installer instructions.

DDS will be installed to *C:\Program Files(x86)\Adash\DDS or C:\Program Files\Adash\DDS*. It depends on whether you have 32 or 64bit system. You can choose another specific location.

Check the option "always use the DDS to open .ndb file" , if you wish to run DDS by double-clicking on the . ndb file name/icon.

IMPORTANT: The license file is usually provided on a flash drive. The DDS tries to import it in the first run. The license can be later changed/imported using the dialog in **Help / Licenses / Import**.

USB License Key Driver (dongle) driver

The driver (HASP driver) is also on the flash drive. You can also download it from the Adash website http://adash.com/downloads/third-parties-software . Choose **USB License Key Driver** for your Windows version).

Language selection

DDS asks which language to use in first run (on PCs, where DDS has not been installed before).

Use the *Tools / Globals / General / Application / Language.* If the proper language file is not found (removed by user), then the default English version is used.

Main Menu visage

The main window appears after run. The main menu is at the top (Tree, Graph, Route, ...). Every menu *TAB* contains a sets of functions (*SECTIONS*) which are displayed in the panel below the menu.

The section contains function *BUTTONS*. We will use the **Tab/Section/Button** sequence in description of functions (e.g. Tree/Selection/Save).
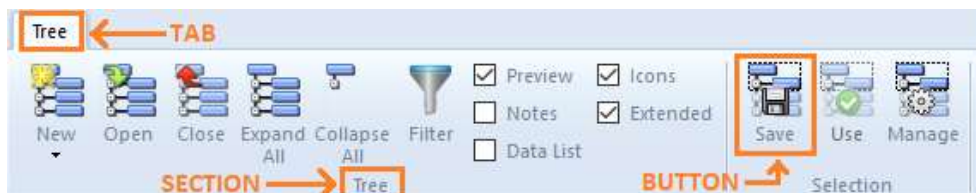
The number of functions is large and you can use various monitor resolution. That is why the windows system modifies the icons. If you have large resolution then the big icons with text description appear. For lesser resolution the small icons with text appear. The next step is small icons without text. The next step is small icons alone. In the last phase is complete section hidden in one button (combo box), see the Edit section in last picture.
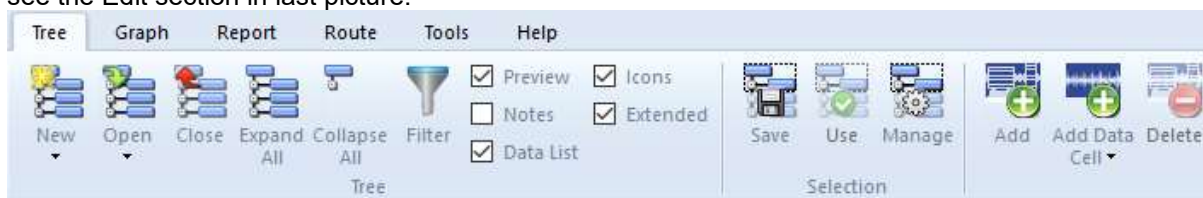
The procedure to make icons smaller and display text or not can be different for each individual section. It means text is in one section and is not in next section.
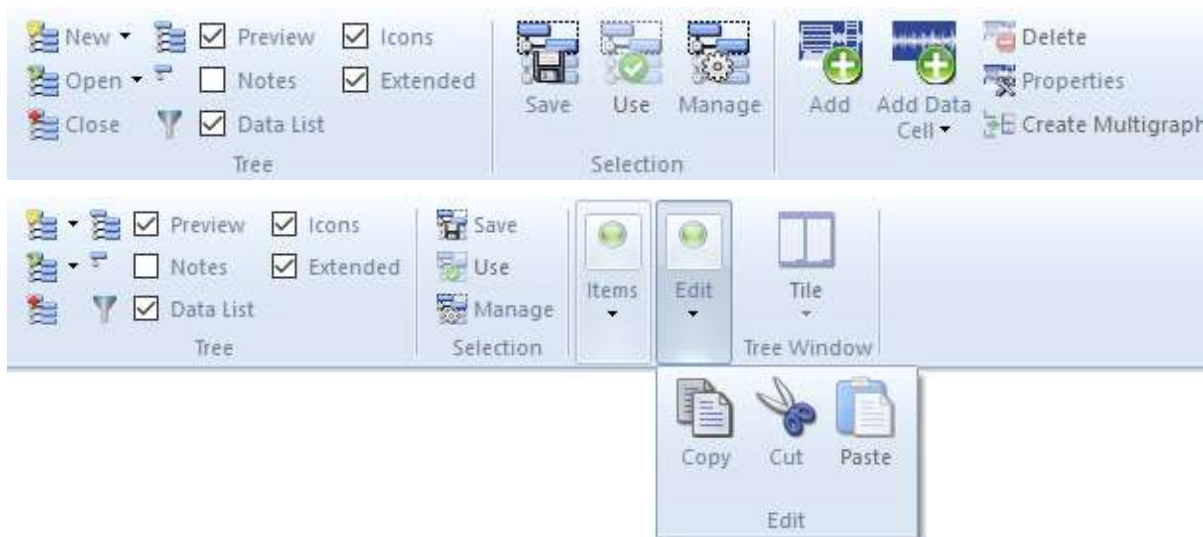
Data Structure

Tree

The base data structure is the TREE. You can call it database, if you want. The tree is built up by tree items. The tree size is limited for free version (200 MB). The tree structure is hierarchical. The number of levels of the tree is not limited.

Tree structure example:

Tree Item and Data Cell

Two different tree items are in the tree.

Tree item

This is used for developing the tree structure (e.g. site, production line, machine, machine parts, points, ...). The tree item doesn't contain readings (measurements).

Data Cell

This item contains readings (overalls, spectra, time waveforms,...). Typically the data cells are created under the Measurement Points. However data cells can be created anywhere, e.g. the speed data cell is usually in the machine.
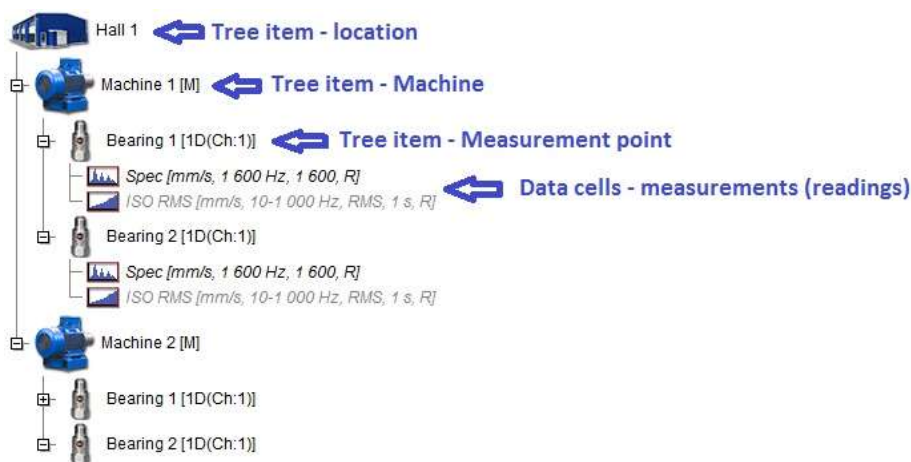
Static and Dynamic Data Cells

Two kinds of data cells exists:

Static data cell it contains readings where data contains one value only. For example an overall or process value. The value may be complex (real+imaginary parts, XY gap values, …) and may also contain some condition information (usually the speed).

Dynamic data cell contains readings where data contains array (many) of values; for example spectrum (many lines), time waveform (samples) or order analysis (orders).

Route and Online Data Collection

The DDS is uniquely designed for collection of readings by portable instrument and online units. Usually producers have special software for each of them. All data from Adash unite are completely compatible.

Database Files Options

There are 3 options of tree (database) files available.

Most of the users use the database which is saved in one file with .ndb extension. It enables simple handling in computer. The database type is SQLite. This type works perfectly for route measurement. It cannot be used for online measurement.

The DDS can also work with SQL Server databases. It is necessary for online measurements. The DDS installation disc contains the **MySQL Connector ODBC 5.3.4 win32** driver. See more details in Adash 3716 manual.

You can use the full license or just MS SQL Server Express (free, but with some limitations). DDS offers the MS SQL Server option only if the appropriate driver is installed (SQL Server Native Client 10.0/11.0) and the **Allow MS SQL Server** is set to yes (**Tools/ Globals/ General / Other**)

Machine Label

Somewhere in the tree hierarchy you need to define which tree items are machines. It is important for route, which contains list of machines. Use the Machine checkbox for that. The capital M you will see behind the tree item name. The **Extended** function must be checked.
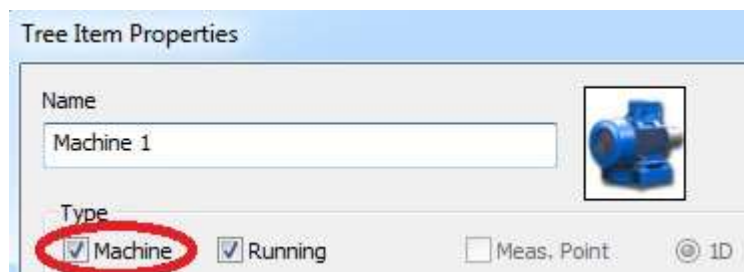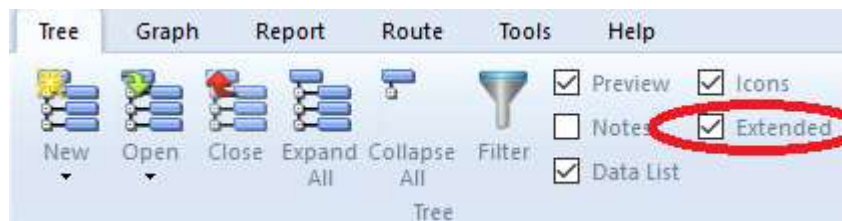
Measurement Point

Under the machine you should define the measurement points. The point is a location on the machine surface, where the sensor is put. You can define one (1D - usually accelerometer), two (2D - usually two proximity probes) or three (3D - triaxial accelerometer) measurement axes in the point. Use the Meas.Point checkbox for that.

The following properties are available for the point:

> technical - bearings, gears, speed conversion, ...), ...
> reading - default sensor, default RPM, ...
> alerts - bands, overalls, ...

Where are Data stored on the computer

The default location of the SQLite databases for all users is in *C:\ProgramData\DDS\DB*. You can use any other user location.

If you need to find the location of a tree (*.ndb file) then select the Open Tree function. The window with the list of trees appears. Right click on any tree and choose Open folder with database.

The demo Tree

The DDS demo tree appears after installation. It contains examples of the tree items with data.
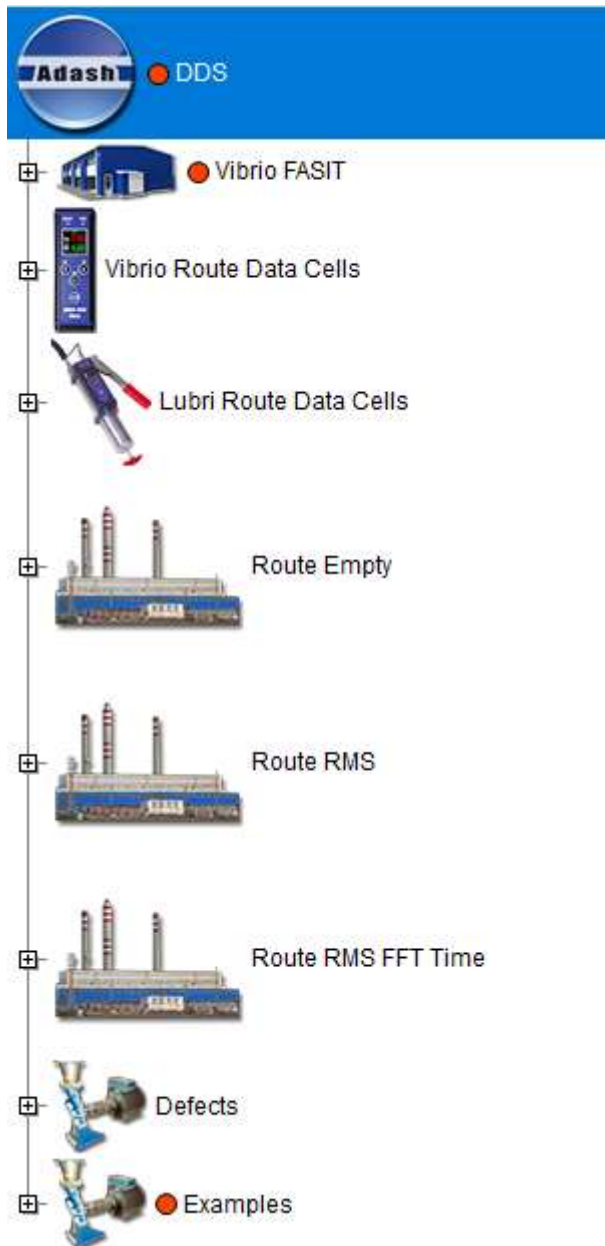
Vibrio FASIT

Sample structure of the route using the FASIT expert system only

Vibrio Route Data Cells

Definitions of all data cells, which can be used with A4900 Vibrio M unit.

Vibrio M data cells (readings) are predefined and it is not possible to change its parameters such as frequency range, number of lines etc. Only these predefined measurements can be measured with Vibrio M. See below Vibrio M data cells.

Explanation of the first data cell *Vel-RMS*:

Measurement of Velocity, RMS in mm/s in 10 Hz to 1000 Hz frequency range.

Vibrio Route Data Cells [S]

Pre-Defined Route Data Cells [1D(K:1)]

- Vel_RMS [mm/s, 10-1 000 Hz, RMS, 1 s, R]
- Acc_RMS [g, 500-16 000 Hz, RMS, 1 s, R]
- Vel_Peak [mm/s, 10-1 000 Hz, 0-P, 1 s, R]
- Acc_Peak [g, 500-16 000 Hz, 0-P, 1 s, R]
- Vel_Time [mm/s, 1-1 000 Hz, 0.8 s, R]
- Vel_FFT [mm/s, 1 000 Hz, 800, R]
- Acc_Time [g, 1-16 000 Hz, 0.05 s, R]
- Acc_FFT [g, 16 000 Hz, 800, R]
- Demod_RMS [g, 500-16 000 Hz, 1 s, R]
- Demod_Peak [g, 500-16 000 Hz, 1 s, R]
- Demod_Time [g, 500-16 000 Hz, 2 s, R]
- Demod_FFT [g, 500-16 000 Hz, 400 Hz, 800, R]
- Disp_RMS [µm, 2-100 Hz, RMS, 1 s, R]
- Disp_0P [µm, 2-100 Hz, 0-P, 1 s, R]
- Disp_PP [µm, 2-100 Hz, P-P, 1 s, R]
- Temp [°C, R]
- FASIT [R]

Route Empty

Example of route structure without data cells.

Route RMS

Example of route structure with data cells for overall (wideband) readings.

Route RMS FFT Time

Example of route structure with data cells for overall (wideband) readings, spectra and time waveforms.

Defects

Example of readings with unbalance, looseness, misalignment, bearing failure (fault frequencies).

Examples

Example of all possible data types available in full DDS version, with example data.

Tree section

This section is contained in Tree tab. Tree tab menu appears by default:
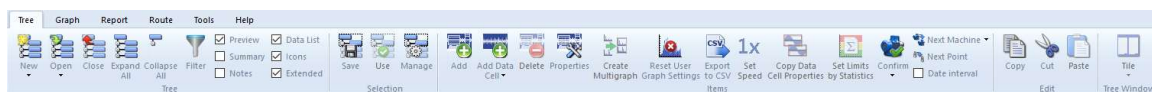
You can work with the tree by using the mouse or the keyboard.

You can select the Tree Item by left-clicking on it. You open/close the branches of Tree Item by double-clicking on it.

Use the up/down arrows to move up/down along the displayed tree items.

To open/close the branches of the tree item push Enter. The Enter button opens (closes) just one branch below the tree item.

To expand or close all branches below the tree item press the + or - button. The right arrow opens the branch. Left arrow closes the branch.

If you wish to move down along the tree items of the same type (machines, meas.points) press TAB. To move up along those tree items press SHIFT+TAB. If the data cell is selected and you push TAB, you will move to the next data cell of the same type and same physical value (even if it is in next machine). By pushing TAB+SHIFT you will move up in the same way.

You can select the same data cells in all measurement points in the machine. Hold Ctrl + Shift and select required data cell. All data cells with the same type and name will be selected.

By pressing Space Bar you can move between Tree and Graph (when data cell is selected).

Only one tree is allowed in free DDS version. That is why the New/Open/Close Tree options are not available.

New Tree (new database)

 Select the Tree in the menu and the New icon. In the next window define the name of new tree (the top item) and location. For beginners we recommend the default location (see the chapter Data Structure/ Where are Data stored in the Computer).

Open Tree

We use the user list of often used trees. The opening of tree is faster, because you only need to select one tree from the list. You don't need to waste your time to find every tree on your hard drive by Explorer. Once you create a new tree, it is automatically included to the list. If you received some external tree from other user e.g. by email, then you need to add the tree file (with .ndb extension) into the list manually.

When you click on the arrow asside the Open icon, the user list appears and you can select required tree.
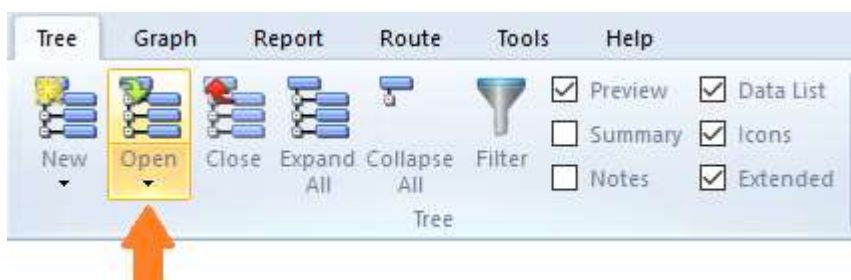
When you click on the Open icon, the next *Open Tree* window appears. It contains the list, you can select required tree and press Open or use double right click directly in the list.

The *Open Tree* window contains following functions:

Add to List   you add next tree to the user list (it adds the next .ndb file)

Remove from List   removes the tree from list (not from the computer)

Set as default the default tree is opened when you run the software

Import MDB DDS2011 MDB, Import MDB DDS2011 SQL   for user of old DDS software
to import old databases

Delete DB File removes the .ndb file from computer

Defragmentation   defragments the ndb file
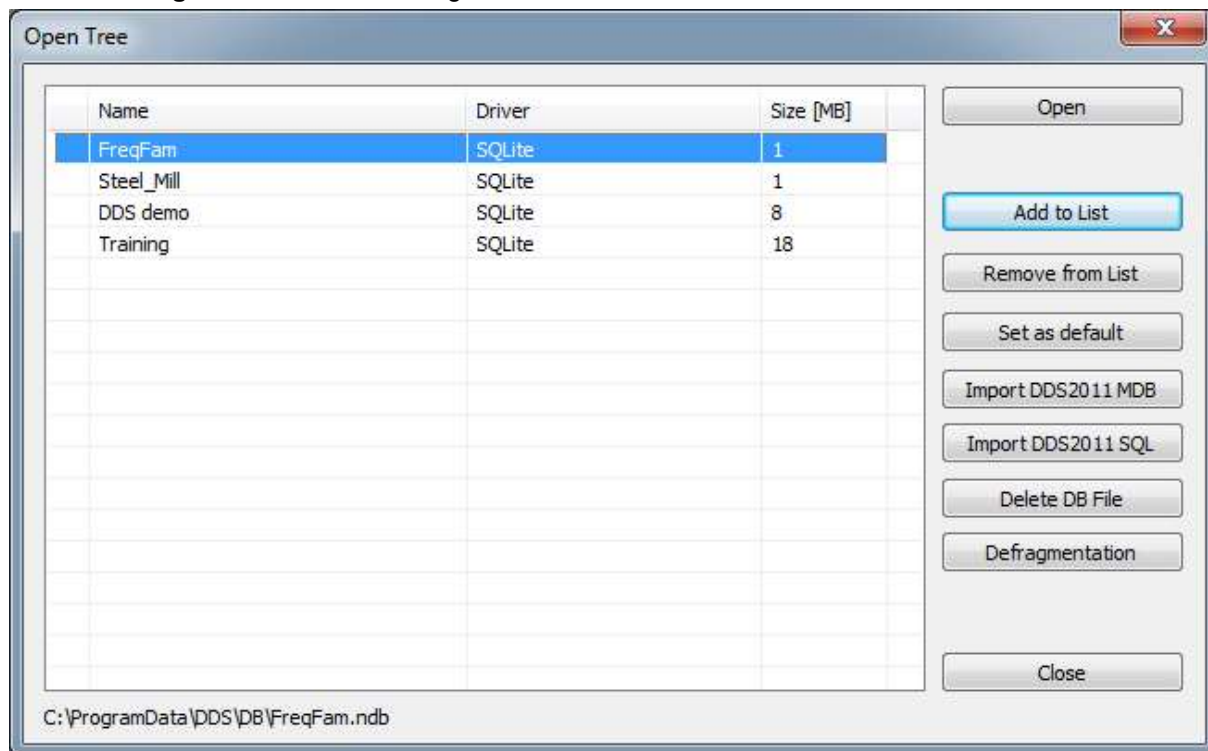
Close Tree

Closes the opened tree and closes the tree window.

Expand All, Collapse All

 Opens or closes all branches in the tree. The keyboard shortcut "*" has the same effect.

Note. There is also shortcut "+" that expands only selected tree item.

Tree Filter

This function enables to select only only part of the tree. Push the Filter button or press Ctrl+F. You can find tree items or data cells, which are matching to entered conditions (text, type,…).

Filtering and selection are two main available options. Filtering displays only tree items which are in compliance with defined conditions. The selection displays complete tree and items in compliance with defined conditions are selected (makes active - blue colored).

You can use also the Filtering first and then use the Selection in filtered tree.

If the when case sensitive searching is required, use the checkbox.

Tree item searching

Write required text to the Find text box in Tree Item section. You can search in all tree items or only in Machines or only in Points. If you write e.g. "fan", then all items, which contain the "fan" in the name will be selected.

If you need to use more then one text strings, then use the "+" (plus) symbol between them. E.g. "fan+pump" means finding all fans and pumps (it means the name contains "fan" or "pump" or both.

You can also use the advanced conditions, which enables to define items and also their parent items. You use the "/" symbol. E.g. if you enter LineA/motor, then will be selected all items which contains "motor" and at least one of parents contains "LineA". This system is similar like folders system in computer.

You can also select the Route and to search of items only in that route.

Data Cell searching

Write required text to the Find text box in Data Cell section. If you write e.g. "NDE", then all cells, which contain the "NDE" in the name, will be selected.

If you need to use more then one text strings, then use the "+" (plus) symbol between them. E.g. "NDE+DE" means finding all NDEs and DEs.

You can also use the advanced conditions, which enables to define items and also their parent items. You use the "/" symbol. E.g. if you enter motor/NDE, then will be selected all items which contains "NDE" and at least one of parents contains "motor". This system is similar like folders system in computer.

Additionally you can define also required data cell type. Next data cell key-words can be used:

all	all data cells
oa	overall(wideband)
dmd_oall	overall demodulated (enveloped)
time	time waveform
dmd_time	time waveform demodulated (enveloped)
spec	spectrum
dmd_spec	spectrum demodulated (enveloped)
speed	speed

dc	discrete current or voltage or manually entered cell for process values
orbit	2D waveform
order	order analysis
acmt	compressed time signal, see VA4 manual for more details
ap	amplitude + phase
smax	maximum of displacement for shaft vibration
cplxsmax	maximum of displacement for shaft vibration and its phase
cl	center line
ps	phase shift
img	image
rec	record
bal	balancing
fasit	fasit
frf	frequency response function

If you need to use more then one key-words, then use the "+" (plus) symbol between them.

Finally you can select only data cells which are over then some alert limit. Use the function Find equal or Higher alert then.

The route name can be selected in Route section. Then the filtering or selection will be done only on that route items.

Filter, Select and Turn OFF filter

Push the Filter or Select to apply the rules for selection. Push the Turn OFF filter for canceling of filter. When no corresponding item is found then the message "Not found" is displayed. The filter rules are always applied to complete tree.

Save Filter

The complete Window Filtering setting can be easily saved and later used for another part of the tree. In the right part of the Filtering window there is a list of already saved settings. Double-click on the name to apply saved settings. Click the Save button to save the window settings.

Preview

The Preview page is switched on or off. See the Plotting of Graphs chapter for more details about screen areas and pages.

Checkbox Preview can't be checked together with Summary checkbox. The default state of both checkboxes is in the global settings (Tools/Globals/tab General/section Other/Preview/Summary on Startup).

Summary

If the Summary checkbox is on (checked), the function Item Summary is applied immediately after selection of tree item.

Checkbox Summary can't be checked with together Preview checkbox. The default state of both checkboxes is in the global settings (Tools/Globals/tab General/section Other/Preview/Summary on Startup).

Notes

The Notes page is switched on or off.

There are the notes displayed in this tab, which are saved under and above the selected tree item.

E.g. if there is the data cell selected, you will see the notes from the Point and Machine at the same time. If there is Machine selected, you will see the notes from all Points of the Machine.

DataList

The data list is bellow the tree, when data cell is selected. It is list of readings with their properties:

Id number
Date/Time of reading
Value (only for static reading)
Speed

- measured by tacho
- inherited from parent tree items, the symbol * is used Reached Alert Instrument, which was use for reading.

The reading changed and deleted. The new static reading can be added.

Icons

The icons are displayed in the tree.

Extended

If it is ON then the text information is added to tree items. Every letter of alphabet has next meaning:

M	machine is checked
1D, 2D, 3D	point dimension and channel number (if checked)
S	the speed is defined
B	the bearing is defined
R	will be transferred to the route
!	expired data cell, new reading should be taken
Ch	list of channels
T	tacho here
On	online meas. point

The data cell extended info contains unit, range, lines number,… .

Selection section

Selection section is contained in Tree tab.

Save

Any tree selection (selected item set) can be saved and then recalled. This function can be used for example, when you create protocol repeatedly on the same items or when you view the same group of data cells frequently. It is useful in cases where filtration is not possible.

Create a selection of the tree that you want to recall later. Push _Selection/ Save_. Enter the name of the selection and confirm.

Save function is also available in the right mouse-click menu on the tree.

Use

When you want to recall the saved selection, click the Selection/ Use and select the name of the saved selection.

Use function is also available in the right mouse-click menu on the tree.

Manage

If you want to see the list of all saved selections, click the _Selection/ Manage_ button. You can use buttons for operating with individual items.

Items section

Item section is contained in Tree tab.

Add Tree Item

Select the tree item and you can create a new item bellow it (the child item). Push Add and the following Tree Item Properties window appears.

Properties

Select the tree item and push the Properties button. Or use the right click on tree item and select Properties in the menu.

Name
The name of item

Icon
Every tree item can have own icon (image). In the Tree Item Properties window it is displayed next to the name. Click on that and the Icon Setting window appears. You can select one icon from the list or push the No Icon button. Use the Tools/Icons for management of this list of icons.

Machine
Check it, if the item is the machine. That is important for route, because the route is the list of machines.

Running
If this checkbox is off, then the machine is not running and it will not be load to route. It is useful, when the machine is not running for long time. It enables to not load it to route.

Meas.Point

Check it, if the item is the point. The Point is the basic term for reading. It is the place, where the sensor is mounted. The machine is the list of points in the route. Several different point types are available. The 1D, 2D, 3D property is our new approach to the point.

        1D   It means one sensor used in one direction/orientation/axe. Typically it is the accelerometer.

        2D   It means use of two sensors in one point. Typical use of 2D is the shaft displacement reading, when two proximity (eddy current) sensors are used. To be precise, it is not point - it is the plane. The directions are marked as A and B.
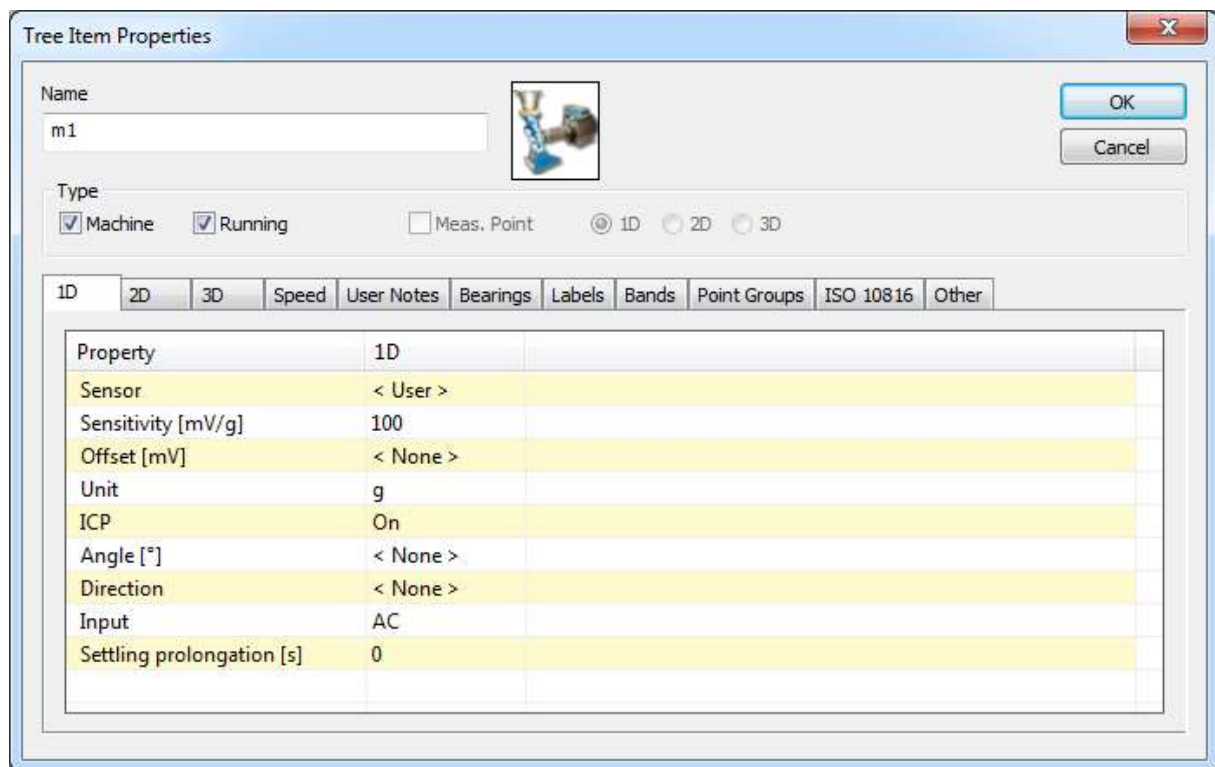
        3D   This point is designed for tri-axial sensor. The directions are marked as X, Y and Z.

1D – 2D – 3D check boxes

If the item is the point, select the type of it.

1D, 2D, 3D

When you have defined the dimension of point, then one of these tree tabs leaves in window.

An example of 1D point, accelerometer is used as sensor.

An example of 2D point, two eddy current proximity sensors.

An example of 3D point, triaxial accelerometer.

Sensor Properties

Sensor

< User >   all parameters you manually enter

< None >	choose the None, then you expect, that sensor parameters will be defined in some tree item above and inherited.
< Inherited >	all parameters are inherited from the tree item above this item. You can see also the name of that item.
< some name >	the sensor from the predefined sensors list is used (see the chapter Tools/Sensors). If you change any parameter manually, then the Sensor changes to < User >. Such change has no effect in sensors list.

Sensitivity

Sensitivity of sensor.

Offset

some sensors (typically eddy current proximity sensors) needs to add or subtract the offset voltage value to obtain the correct result.

Unit

Physical unit.

ICP

on/off   powering of sensor.

Angle

Angle in degrees of sensor (typically eddy current proximity sensors).

Direction

Horizontal/ vertical   just information, no effect in evaluation.

Channel

Channel number, which will be used for measurement.

Input

AC, DC, AC+DC   voltage frequency type of measurement.

Settling prolongation

Time in seconds, which will be added to standard measurement initialization time.

Sensor properties changes for many items at once

You can select more tree items and modify sensor properties at once for all of them. If the value *<Various>* is displayed, it means that this property has various values for selected items. This property is ignored, when you save the new entered values of other properties.

Property	1D	
Name	< User >	
Sensitivity [mV/g]	< Various >	
Offset [mV]	< None >	
Unit	g	
ICP	On	
Angle [°]	< None >	
Direction	< None >	
Channel	< Various >	
Input	AC+DC	
Settling prolongation [s]	0	

Tabs: .1D Speed Bearings Labels Other

Why sensor definition over the point?

Now you probably want to ask why it is possible to define the sensor in every tree item. You expected it in Point only, didn't you?

The DDS enables the inheriting of many properties. E.g. when you define the sensor type in the root (top) tree item, then this sensor will be used for all points. There is no need to define it individually in every point item. But if the individual sensor is defined directly in the Point, then it is preferred and no inheriting is used.

Generally you can define all three options (1D, 2D and 3D) in root item ONLY on the top of tree. Then these parameters will be used for all points in the tree (depending of type 1D or 2D or 3D). To be precise it will be used for all points which do not contain individual definition of sensor parameters.

It enables to define sensors, default speed, bearings, bands, etc. in proper items and then inherit them down in the tree.

Speed

Tacho here

Check this box when the tacho is on the **OUTPUT** shaft of selected tree item. The speed on other tree items (over and bellow) is defined by **Gear ratio** factor.

Default Speed

It is the value, which is used when the speed is not measured directly by tacho. Directly measured speed value by tacho value has always the highest priority and it is used over the Default speed. The **Default Speed** is always the speed on the **OUTPUT** of selected tree item.

You can select one of these options:

<Value>   write the speed value directly (e.g. 3000).
<None>   speed is inherited from parent tree items (if exists)
On machine type are available two next additional options:

<Detected>   the instrument runs the speed detection procedure before first reading

<Manually Entered> the instrument requires the manually entered speed before first reading

Note. Detected and Manually Entered speed has a priority for routes over Default Speed set in a tree items below machine.

Gear Ratio

It enables to define the ratio between the input and output speed of tree item. For example when the input speed is 1500 RPM and output speed is 525 RPM, then the ratio is 0.35.

If more gear ratios are over the point, then ratio are used step by step for speed calculation on each tree item.

E.g. Let suppose gearbox with 3 gears. The tacho is mounted on the 2nd gear output shaft. Then the Gear factor enables to get correct speed also on input and output shaft of gearbox.

E.g. the default speed is defined in the motor item and the reading is taken on gearbox output. The gear ratio enables to get correct speed value on all lower tree items.

Note : Up to the version 3.1.6 was used the **Tacho factor** for multiplying of measured speed by tacho and the **Gear factor** for multiplying of **Default speed**. Now is the **Gear factor** used for both options. Additionally you have to define the position of tacho sensor. Older databases are automatically converted, when you open them by new version.

Min. speed

The lowest speed value, which is expected. The reading is not taken for lower values. The 1/100 Hz is the minimum value.

It has direct relation to the tacho pulse waiting timeout. We expect one pulse per one rotation. Two pulse is required for speed calculation. If the Min.Speed = 0.5Hz, then the max waiting time could be 2 sec. If two pulses did not come in that 2 sec, then **NoSpeed** warning appears. Be careful of the 1/100 Hz as the minimum value. When you will use this minimum and the tacho cable would be broken, then waiting time will be 100 sec.

User Notes

You can create text notes in this Tab, which are linked to the tree item. You can use them for description of the actual condition or to make a note of a task which needs to be done (e.g. "faulty bearing", "grease the bearing").

If the **Failure** and **Severity** are entered, then this notes will be printed in **Failures Report.**

If the **Confirm** is checked, then the note is settled and is not included in reports.

If you will point on the tree item by mouse (with defined notes) and you will wait for a while, the last ten notes will be displayed as a tooltip (small floating window).

The Notes can be used in every item for maintenance control, supervising and reporting.

Bearings

It is the list of bearings which are assigned to the tree item. The list is empty if you have not assigned any bearings.

Press Add button to open the User bearing database. Select the bearing (or more bearings) which you need to assign. You can use the **Find** function. Push Add button. Close the window.

The bearings entered directly in selected Tree Item are displayed black. If the name is grey, then this bearing is inherited from some predecessor (parent). It means it is not defined in this item.

Select the bearing and push Remove to delete the bearing from the list.

Name	NB	BD	PD	CA	FTF	BSF	BPFO	BPFI	Fixed ring
00000-TMK	< None >	< None >	< None >	< None >	0,382	1,979	3,82	6,18	Outer
01114-COO	< None >	< None >	< None >	< None >	0,417	2,917	4,167	5,833	Outer

Labels

You can define labels for special frequencies. They will be drawn to every spectrum graph in this tree item.

The labels are divided into three groups - General, Gear and Vanes. The general group should contain all labels except gears and vanes frequencies. But you can e.g. save all your labels only to general group. The dividing to 3 groups has one meaning. When you push the *Graph/ Labels/ Change Group* then all the defined groups are displayed circularly. The user labels are displayed always together with them.

See the Labels in Graph chapter for more details.

Gearbox Calculator

System provides a simple way how to calculate gearbox forcing frequencies. The input speed of gearbox is used for all formulas.

Push Gearbox Calculator button. Pus Add to define new stage. You can edit **Input shaft teeth** and **Output shaft teeth** for each stage of gearbox (use double click on value, which you want to edit).

Bands

Bands are the function for spectrum evaluation. Usually are used for spectral alarm bands use. Bands should be defined originally in data cells, but the inheriting function enables to define them in other tree items. That is why it is available to use in any item. See the **Add the Data Cell** chapter for more details.

Point Groups

Point group is a set of points on one machine that are in route measured together (simultaneously). Such reading uses more channels.

The procedure of group of points creation begins in the tree. Select all points which you want to measure together (multi-selection). All selected points must be in one machine they have not to be in existed point group.

Apply the right click and select **Create Group of Points**.
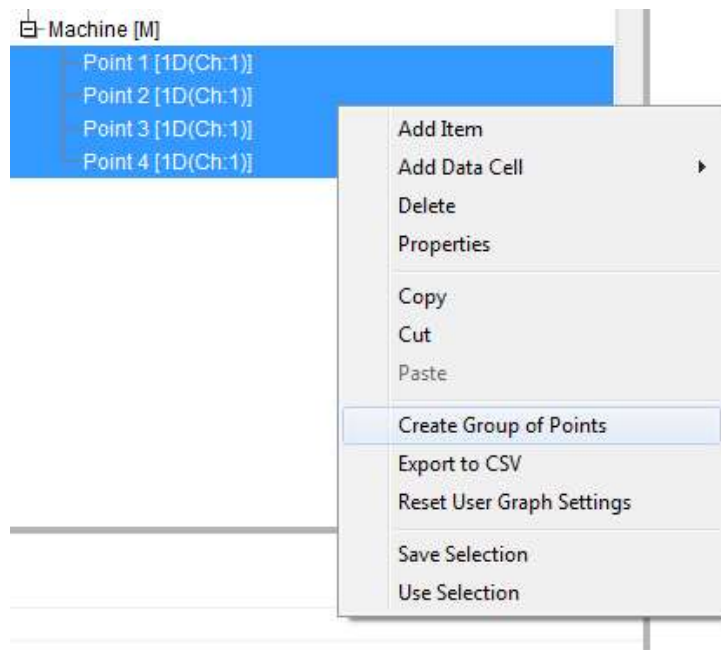
Enter the name of point group in next window.
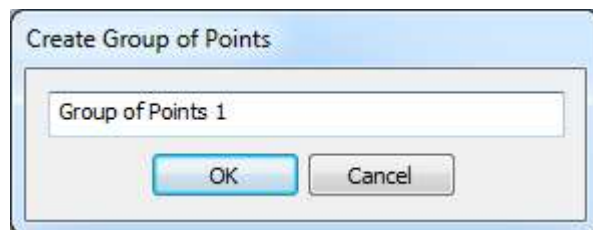
You can see the group name in the tree.
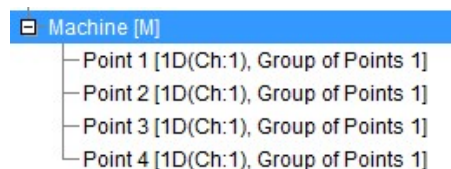
When open the **Properties** window of the Machine (which contains selected points) and select the Point Groups tab. You can see the list of groups (only one group exist yet). If you select the group, then you can see points of that. Here you can also delete or rename Point Group or change their order in a route.

2D Settings

When the point is 2D dimension, then the journal **Bearing clearance** and **Direction of rotation** can be set.

ISO 10816

If you want to use ISO 10816 limits for velocity data cells, you must define the machine group and foundation.

> **Set to All Cells**   when you check it, then the ISO 10816 limits will be set to all velocity cells in the machine.

Other

This tab is available for tree items and center line data cell.

Tree item

Route name

It enables to use specific name for tree item, which will be used in the route. If it is not used, then the name of route item is created from all items in the route path. For example if the Pump of cooling system A52 is used in the tree, then it is too long for using in the instrument. You can use only A52 as **Route** name and only this three characters will be transferred to instrument.

Use In Route Path

(Yes, No), if some tree items in the point route path are not required to transfer to the instrument, then select **No**. This item is not available for Machine and Point (both of them must always be in the route).

User Id

If you have some ID system of machines and their parts in your factory, then this ID enter here. It will be used in all reports.

Online delay

Setting for online measurement: If the value rises above the noise level, values will not be stored for a given time (in seconds).

Continual Saving

Enables route data collection on measurement point to be measured like in a Runup(retrig). Measurement is stopped manually not after first measurement. This feature is supported on VA4 and VA5 devices with firmware 2.80+.

Data cell Center line

Gap Refer definition, it is initial position of shaft before runup.

Properties	Route	Data	Other	

Type	Value	
GAP A [µm]	703	
GAP B [µm]	-500	

Selection of tree items

The selection is made by single click of mouse. Use the Ctrl or Shift buttons for selection of more items.

Items Moving in the Tree

By Mouse

You can move one or more items together by drag and drop.

Two symbols are displayed when you move the mouse cursor inside tree:

Left arrow	The selected item will be moved to the new position with all child items.
[+]	The selected item will be copied, in the next window you will decide whether to copy with recordings or not. You can change also the function to *Move*.
Two rectangles	The selected item will be moved, in the next window you change the function to *Copy*.

By Clipboard

You can copy/move selected items by standard Copy/ Cut/ Paste functions. The items in Clipboard are in red color. Clear it using Esc.

Multi copying

One tree item you can copy to many other items at once.

Example:

Follow next steps to copy of one data cell to many other points.

- select one data cell and press Ctrl+C or Tree/Copy,
- select all target points (Ctrl + mouse left click)
- press Ctrl+V or Tree/ Paste.

Add the Data Cell

Select the tree item and press the Add Data Cell button (or use right mouse click). The list of available readings appears. Some types are available only for data cells, some are available also for all tree items. The availability also depends of point dimension (1D, 2D, 3D).

Select one of them and next window with several tabs appears. Various tabs are displayed for various data cell types. Enter the name of data cell.

Templates list

For every data cell you need to define the reading properties. It means numbers of lines or samples, frequency interval, averaging, … . It can be done in Properties tab directly or you can select one of predefined templates. The parameters of selected template is copied to the properties tab, where you can edit them. You can also save your parameters as template.

Properties

Define the reading properties. See chapter Reading (Measurement) Properties for details.

Route

Transfer to Route	**No** means the cell will not be loaded to route	
Interval	required time interval for readings. If **< None >**, then the cell is always loaded to instrument. If the for example **Interval = 1 week**, then cell is loaded to the instrument only if last reading is older then 1 week.	
Manual Entry	the value is manually entered in route	
Last Reading Time	info about last reading	

If you add data cell to 2D or 3D point and the measurement uses only one channel (overall, time signal, spectrum,…) then you can check the **Copy to all inputs of meas. point**.

The data cell will be created on all channels/inputs of the point. Channel/input character is also added to the cell name.

Bands (available only for spectrum cell)

Precisely speaking it is set of spectrum alarm bands. It is the special function applied only to spectrum. The Bands tab contains the list of bands (or it is empty).

Push the **Add** button and enter the band name. Enter the band parameters:

Use   this checkbox enables to switch on/off the band use
Name   the name is drawn in spectrum graph
Min, **Max**   frequency interval
Detect Type   **RMS, Max line**   the type of value which is calculated. The **Max line** means the top line in band.
Unit   frequency unit
Inherited from   the band inherited from parent items

Limits for Static

Limits gives a notice to you, when measured value is over the limit. When it happens, then colored circle is drawn aside from data cell name. The color matches the alarm type (defined in Tools/Alarms). The colored circle with the highest achieved alarm is inherited up to the root item in tree.

Three ways how to create limit is available for static data cells.

ISO 10816

The limits are defined according the ISO 10816 standard and are available only for velocity readings in frequency interval 10-1000Hz. The **Machine Group** and **Machine Foundation** (ISO 10816 tab) has to be defined before the using this standard.

Adash

The limits are derived from Adash rules, which are developed for more than 25 years of Adash history. These limits require to know the speed value. That is the key point, we do not think, that one limit value can work well for wide speed range defined in ISO 10816. Adash limits are available for two data cells types:

- velocity readings in frequency interval 10-1000Hz, which forks very well for unbalance, misalignment and looseness detection (3 levels see below)
- acceleration readings in frequency interval 500 - 16 000 Hz (higher frequency then 16 kHz is accepted too).
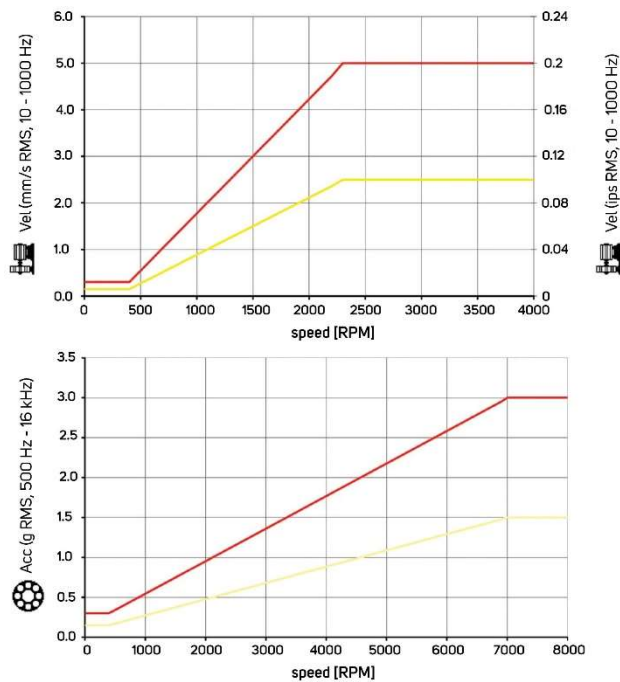
The colored circles is used in the trends only, not the limit lines. It is because of the relation to speed. Each reading can have different speed.

DDS allows to adjust limit levels for velocity and acceleration readings
- **Low** – limits as in graph above
- **Medium** – limits for Low * √2
- **High** - limits for Low * 2
- Or enter directly the factor for multiplying the Adash limit levels (Low)

User
The user can also define own limit values. Look to the example.

Select one or more data cells. Open the **Properties** and **Limits.** Check the **User**. Now the limit in the bottom is available (active) to use.
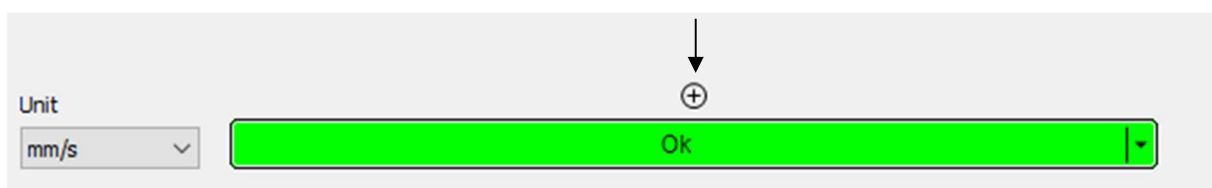
Click on the **+** symbol. New window appears. Enter the limit value and press **Ok**.
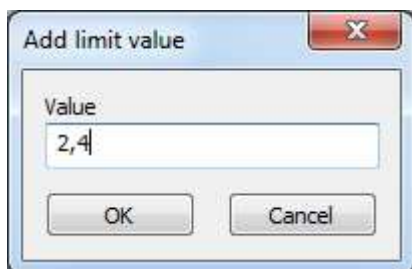
The 2.4 value appears in bar. The alarm color is used automatically (the next above Ok color).
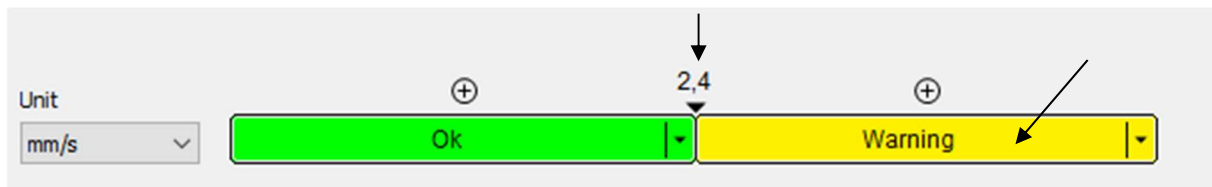
You can change value too. Use the right click and **Edit** or left double click on the value and enter new value. The **Delete** option is available too.

When you want change the alarm color, then click in the colored area. The list of available alarm colors appears (defined in **Tools/ Alarms**). Select new alarm color.
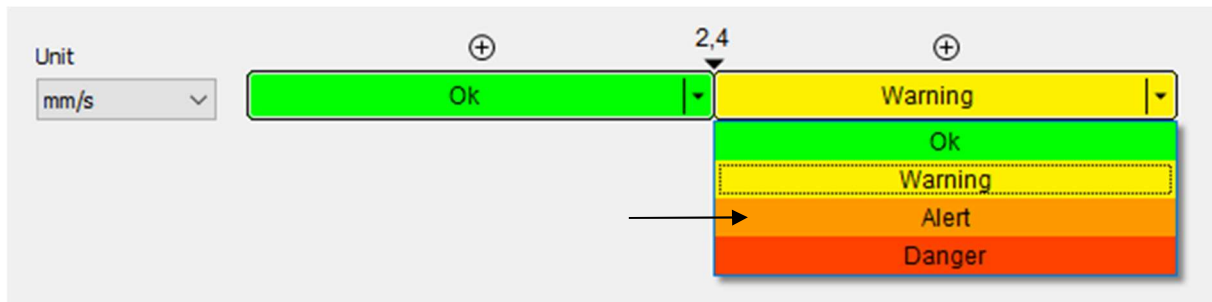
This procedure repeat until all limits are defined.
You can also change the unit of limits for example from mm/s to inch/s.

When you close the **Properties** window, then the new limits are drawn.
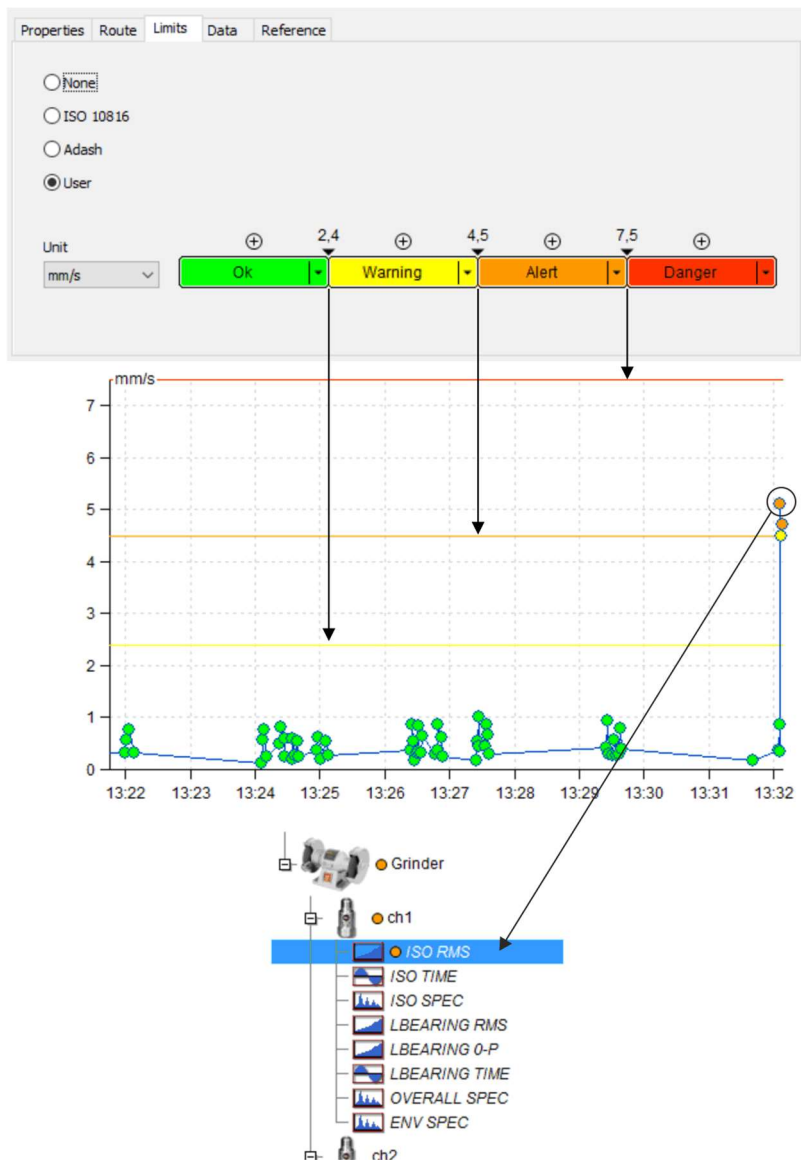
The **User** limits can user change also directly in the trend graph (**Limit value edit in graph**).

Multi edit of limits

Select more data cells of the same type, e.g., more static cells ISO RMS. Display the properties and the Limits tab. It looks like the tab of one selected cell. Now you can edit values and the changes will be made in all selected cells.

If limits are not identical in all selected data cells, then you can enter the new identical limits for all selected cells.

Limit value edit in graph

The limits edit you can do also directly in graph. Open graph, use right mouse button click and set the Limits to ON. Then limits are displayed (of course some limits must be defined for data cell).

Addition of new limit value

1. Press and hold Ctrl key (button in keyboard), make left double click on required Y value in graph, standard window appears, edit parameters and press OK.
2. Open right click menu and select Limits/ Add

Value edit for existed limit

Move the cursor to limit line. The cursor symbol is changed and the value of limit appears.

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1. Use left mouse button, drag the line and move it to required value (position).
2. Open right click menu and select Edit

Delete of limit

Move the cursor to limit line. The cursor symbol is changed and the value of limit appears. Open right click menu and select Delete

Limits for FASIT

For FASIT data cells the limits are used automatically. There as an option to adjust(multiply) the Adash limit levels for velocity and acceleration (see Limit Levels for Static/Adash above)

Limits for Spectrum

The limits for spectrum are related to defined spectral alarm bands. The limit values are defined individually for every band.

To define one or more bands is the first step you need to do.

Used	Name	Min	Max	Detect Type	Unit	Inherited From
☑	1X Speed	23	27	RMS	Hz	
☑	Harmonics	45	260	RMS	Hz	

Two bands are created. **1X speed** for speed frequency which is 25Hz for this machine. The second band **Harmonics** contains 10 harmonics (50, 75, 100, 125, …, 250).

Now open the **Limits** tab. It is empty.

Push **Add** and select band for limits entering.

Now you define Quantity, Unit and Detect Type. Enter limit values by the same way as in static data cells.

Now we explain two kinds of Detect Type. The first Detect Type is defined in **Bands** tab. Two possible choices are available. The **RMS** means the rms value, which is calculated from all frequencies in band (rms=square root of ($f_1^2 + f_2^2 + … + f_N^2$)). The **Max line** means the top peak in band.

The second is the spectrum Y axe Detect Type in the **Limits**. It can be **RMS, 0-P** or **P-P**.

Example: the band Detect Type is **Max line** and for specific spectrum the Max line can be used as 2,5g^{RMS} or 3,52g^{0-P} (0-P=1,41*RMS) or 7,05g^{P-P} (P-P=1,41*0-P=2,82*RMS).

Band and limit edit in spectrum graph

Display bands with limits in graph (right click menu - Bands/ With limits).

Add band

Two possible procedures exist.

1. Press and hold Ctrl button. Make left double click. Standard band window appears. The minimum a maximum frequency in this window depend on the location, where you made the click.
2. Open right click menu and select Bands/ Add. Again the minimum a maximum frequency in this window depend on the location, where you made the click.

Edit band frequencies

Two possible procedures exist.

1. Move cursor to band and make left double click or open right click menu and select Edit Band.
2. Move cursor to left or right frequency border, drag the border by left mouse button and move.

Delete band

Move cursor to band, open right click menu and select Delete Band.

Add limit value to the band

Two possible procedures exist.

1. Move cursor inside band to the position, where you want to create the limit value. Make right click menu and select **Add limit value**. If you need, change the value in window.
2. Move cursor inside band to the position, where you want to create the limit value. Press and hold Ctrl button. Make left double click. If you need, change the value in window.

Edit limit value

Move cursor to band limit position. Cursor symbol is changed and limit value is displayed.

1. Drag the limit and move it.
2. Open right click menu and select Edit Limit Value.

Delete limit value

Move cursor to band limit. Cursor symbol is changed and limit value is displayed. Open right click menu and select Delete Limit Value.

Data

It contains list of all readings. You can edit them or delete.

Any static and spectrum reading can be labeled as Reference. This value is downloaded to the route and used in instrument. Select required reading and press Set Reference button. The ® appears after the reading number in first column.

The DC Offset can be manually entered for time signals and orbits. Select required reading, push Edit and enter value.

Reference

Any static and spectrum reading can be labeled as Reference. This value is downloaded to the route and used in instrument. Select required reading and press Set Reference button. Selected value is also displayed in Reference tab, where you can disable it e.g. for limited time.

Static Reference
Defined reference value is displayed in graph.

Spectrum Reference

Select the reference spectrum (Data tab). Use the tolerance values for reference spectrum development.
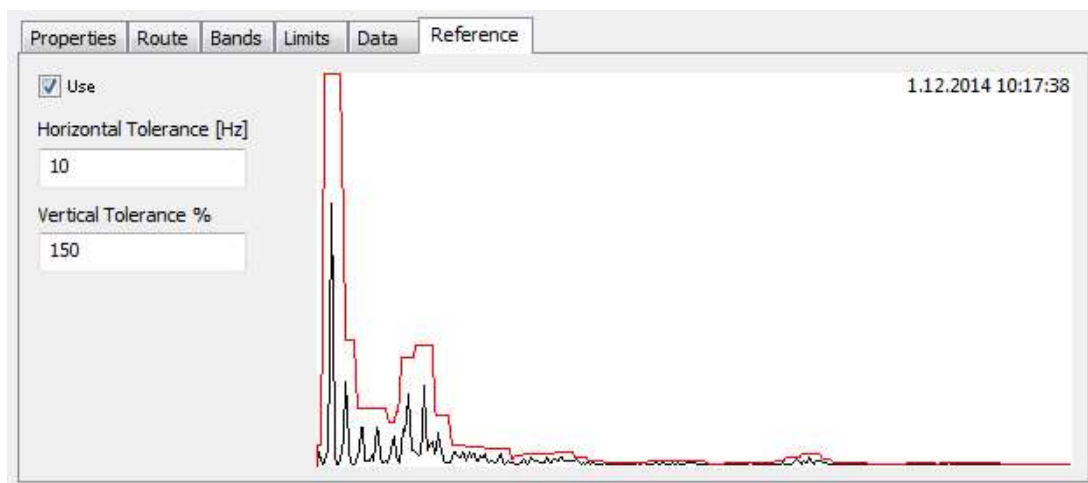
Delete Item

It deletes selected tree items.

Create Multigraph

Multigraph is the set of graphs created from several data cells which can be compared to each other. The multigraph behaves the same way as the normal graph, but there are several functions which enable to compare the graphs easily.

Basic features of multigraph are following: certain views are changed for easier comparison of readings from data cells, actual reading of cursor values from all viewed data cells, the zoom of axis is same on the axis with the same unit.

To create multigraph, choose the data cells from the tree (those which can be compared). Click on icon Create multigraph in section Graph or do the right click on tree and choose Create multigraph.

Multigraph of static cells

All basics functions of trend graph are same as for the usual graph.

Graph Type

Amplitude – trends are overlaid. There are axes with units on the multigraph left side. The active trend has bold line. You can change it by pushing Shift + Arrow Up/Down. The order of the y-axes is changed by active trend selection (the right y-axis always belongs the active trend). The maximum number of y-axes is set in *Global settings/All Graphs/section Other/Graph Count in Stacked*. If the limit is exceeded, the y-axis of active data is shown only.
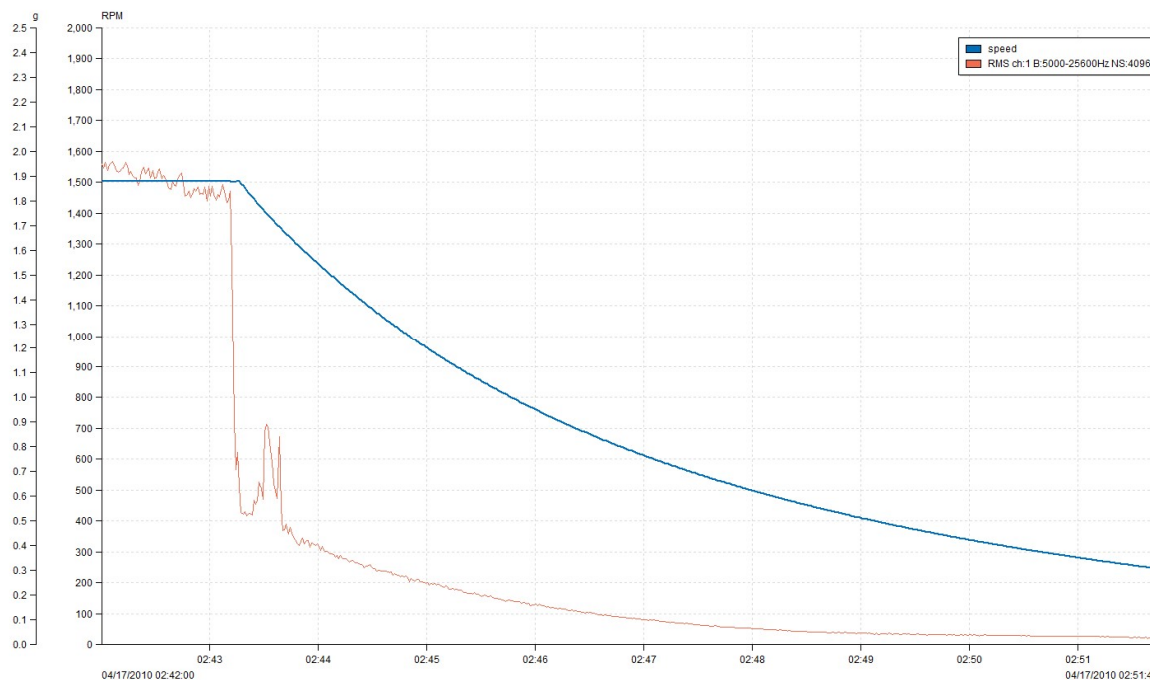
If you want to activate one trend in multigraph, simply click on trend name in the legend. If you do not see the legend, open context menu on graph (right mouse click) a select where the legend should be displayed (submenu Legend Position).
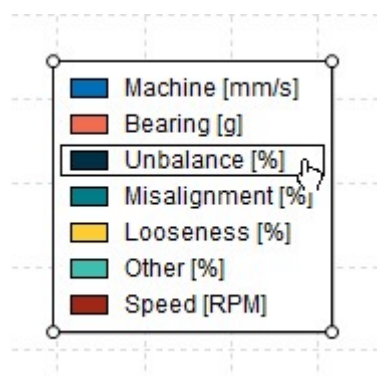
Amplitude Stacked - you can see the set of graphs in one window. Each graph represents one data cell. To activate the data cell do the left click on graph or use Shift + Arrow Up/Down.
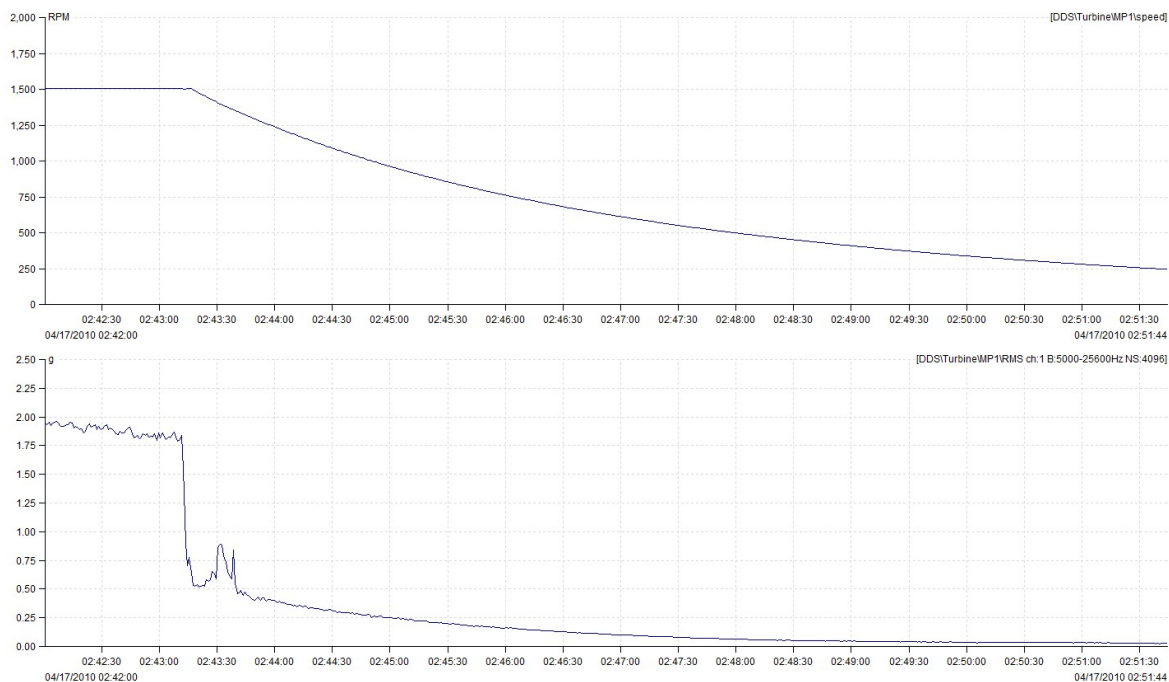
Y Unit Relation – this graph enables to evaluate relations between units on Y axes. E.g. if we have speed trend and vibration trend, we can show the graph showing relation between speed and vibration. The unit on X axe must be selected by user. If the data are not taken at the same times, the values are approximated. Time of measured values is represented by color gradient. The timeline legend appears, when you move the mouse cursor to "i" icon in the top-right corner of graph. In the image example you can see relation between vibration and power. Dark circles are the latest measurements, the lightest are oldest.
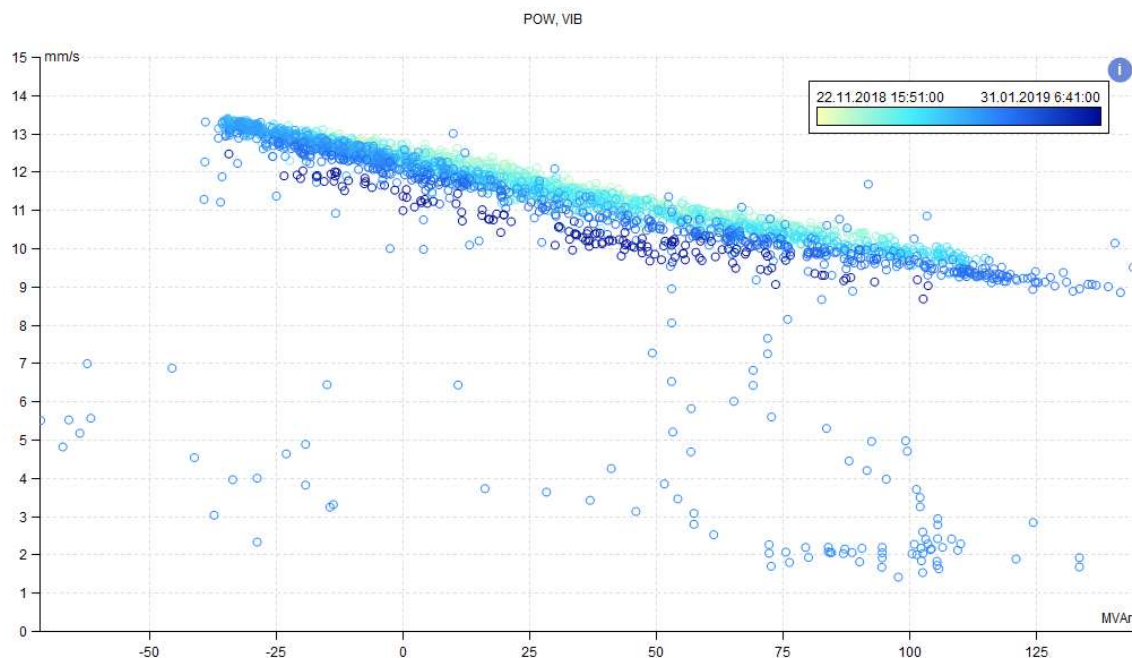
Multigraph of dynamic data cells

To create the Multigraphs from dynamic data cell, select several data cells and push **Create Multigraph** from main menu in tree section (or in right click menu). You can create the multigraphs just from the data cells which can be compared (same data type and same physical value).

For example, if you choose 4 spectrums and create the multigraph, you can select from following Graph type options.

Graph Type

Amplitude – it shows the amplitude of just one selected (active) data cell. You can see the information about the active data cell in the header of the graph. To change the active data cell push Shift + Arrow Up/Down. To switch between the readings use Arrow Up/Down.

Amplitude Stacked –the group of the several graphs is displayed in one window. Each graph contains reading of one data cell. The number of displayed graphs is limited by choice in global settings (General/All Graphs/section Other/Graph Count in Stacked). E.g. if you create multigraph from 10 data cells and the limit in global settings is 6, there will be 6 graphs displayed on the screen. You can view the rest of the graphs by changing the active data cell (Shift + Arrow Up/Down). Push Page Up/Down for faster switching between the data cells. It activates each n-data cell (n is the limit value from global setting).

Active data cell is the leading data cell (is it highlighted by border). You can switch between readings in leading data cell by pushing Arrow Up/Down button. The nearest time reading is chosen in other data cells.
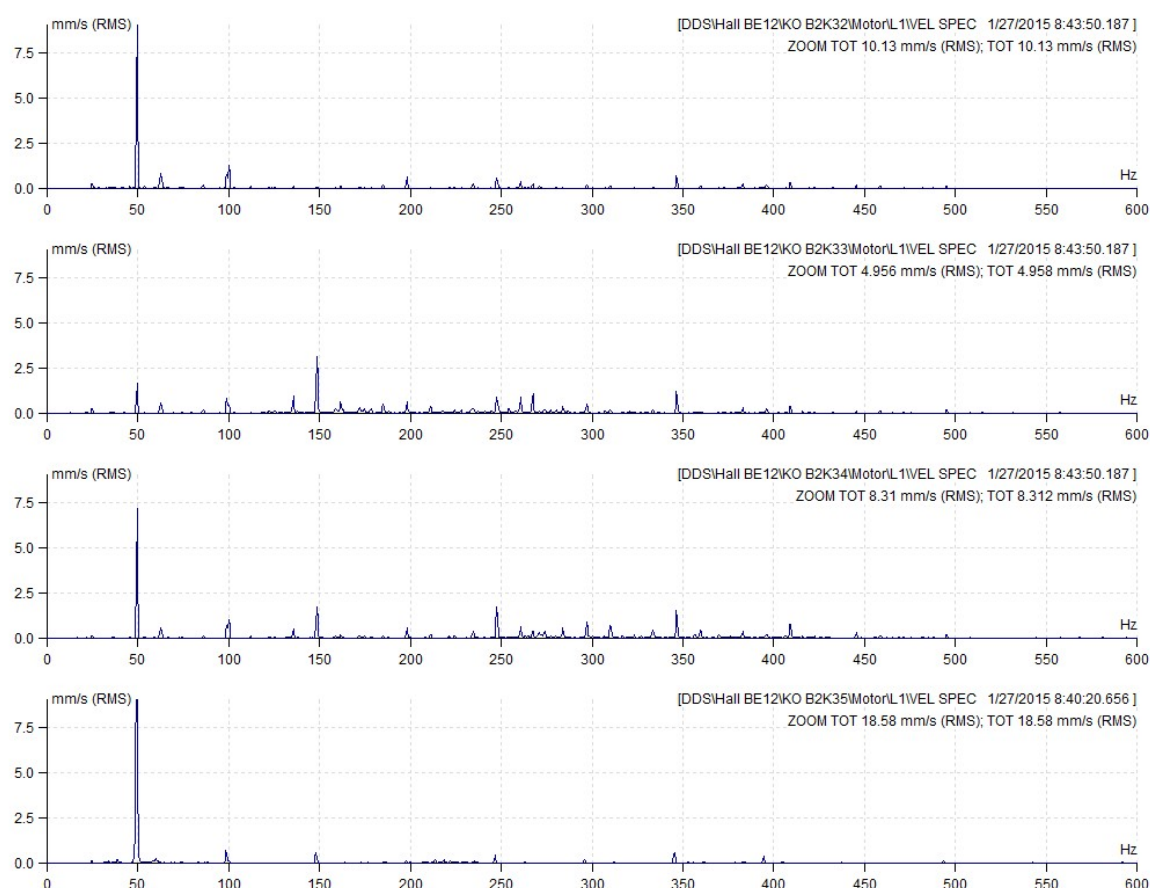
Waterfall – there is one reading of each data cell in waterfall multigraph displayed. To change active data cell push Shift + Arrow Up/Down. To switch between the readings push Arrow Up/Down.

The information about active data cell is shown is header of the graph window. Information about other readings you obtain by moving the mouse beyond the end of x-axis of reading.
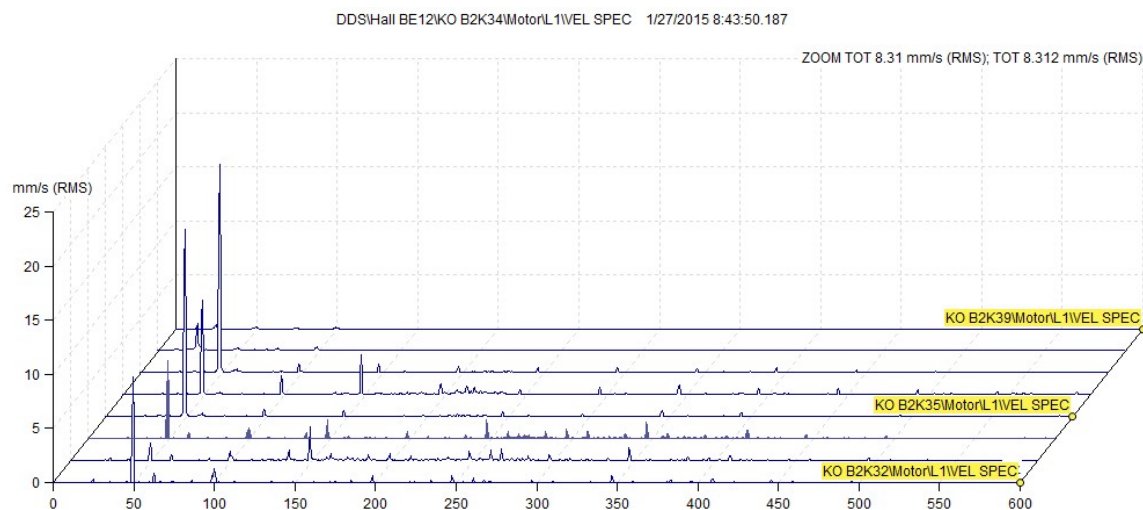
Overlay – display of spectra over each other (each one has a different color). Colors of individual spectra can be set in Global Settings / Skin tab / Multigraphs.
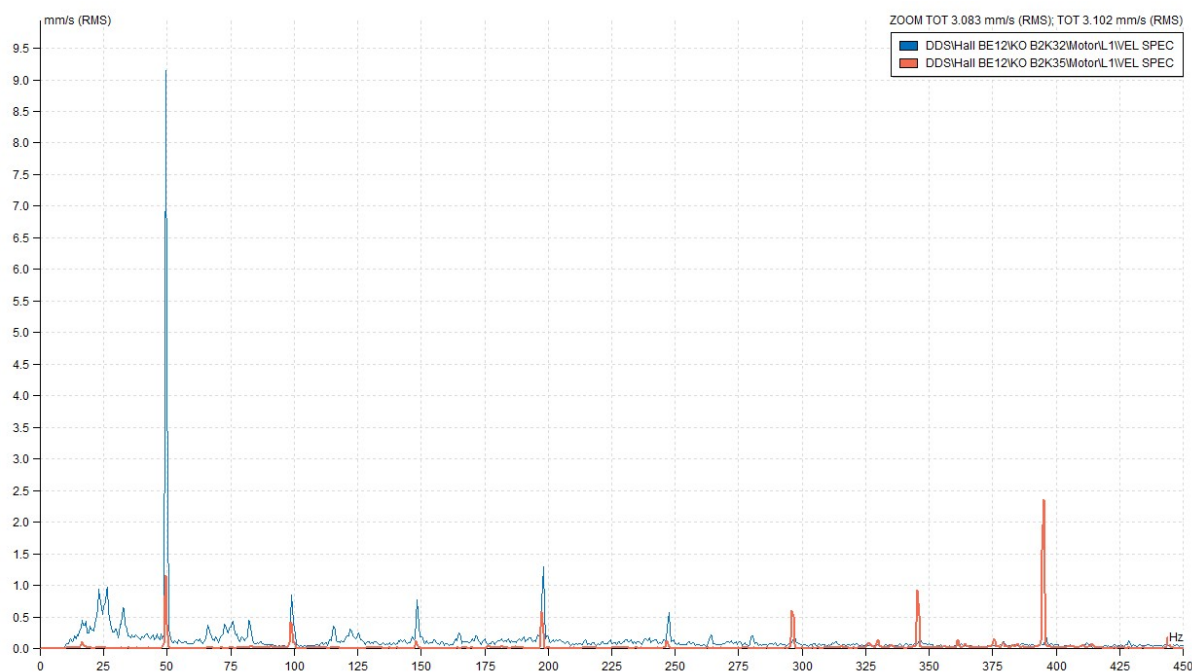
Reset User Graph Settings

When you use right click on the tree item, the Reset User Graph Settings function is in the list.

You define properties for every data cell. E.g. the mm/s ie in the Global list, but you define ips for one data cell. Then this definition has the priority and graph will use ips.

When you want to remove such special defined properties, then use the Reset User Graph Settings function. Then will be used the Global options again.

Export of data

Data are exported in csv format, which enables easy import to other software.

Select tree items you want to export. Select Tree\Export to CSV item in main menu. If the item contains data, then next window is displayed.

All – all data from all data cells will be exported

> **Last (day, month, year..)** – only data from N last days/months/years will be exported

> **Last N readings** – last N readings from each cell will be exported

> **Date interval** – only readings from selected time interval will be exported. You can use one of them empty.

> **Data Type** – you can select export of static readings only (overall value, speed etc.) or dynamic readings (spectrum, time signal etc.).

> **Target folder** – path to the folder, where csv file will be saved.

The export function creates structure of folders, which is the same as the structure of tree.
Each static data cell creates one csv file.
Dynamic cell creates one csv file for each measurement, all saved in new folder.

Import of data

Data can be also imported into DDS. You can import them in CSV format. Click on empty data cell where you want to import data with right mouse button and choose 'Import from CSV'.
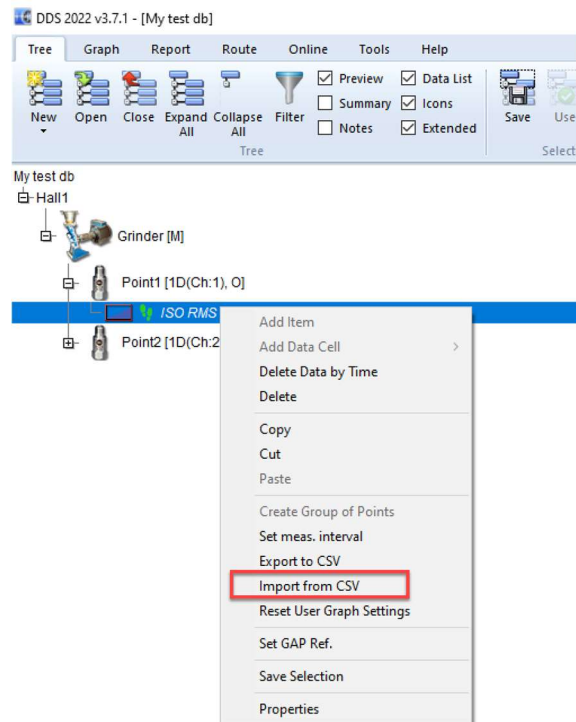
Find your CSV file and import it with following window.

Format of CSV file needs to look like this:

// user:header_username	sample:317	
date[YYYY-MM-DD hh:mm:ss.ms]	amplitude[mm/s]	speed[RPM]
2022.08.23 07:13:07:137	4.8413	1579.2
2022.08.23 07:14:15:1415	4.7841	1593.3
2022.08.23 07:14:37:1437	4.7503	1593.3
2022.08.23 07:14:59:1459	4.7779	1593.3
2022.08.23 07:15:21:1521	4.7891	1593.6
2022.08.23 07:15:43:1543	4.8045	1593.6
2022.08.23 07:16:05:165	4.774	1593.3
2022.08.23 07:16:27:1627	4.7709	1593.6
2022.08.23 07:16:48:1648	4.7486	1593.6
2022-08-23 07:17:11.040	4.8076	1593.6

Set speed

1x When the tacho is used during the readings, then the speed value is saved directly to the measurement. This function allows you to add the speed value to readings manually. Select a tree items (machine and below) and press **Set speed**. Enter the speed (in dialog window) and select the time interval. Press OK and DDS saves the speed into all readings in this time interval. In a dropdown menu are available options to set multiply or divide suggested value by 2 and 4.

Copy Data Cell Properties

The limits and references (for static data cells and spectra) can be copied from the source item.

1. Select the source data cell.
2. Edit limits and/or bands. Save it (push OK).
3. Click to *Tree/Copy Data Cell Properties* button. In the next window select what you want to copy (Reference, Limit, Bands).
4. Select the target data cells (you can use the Filter function). Copy Data Cell Properties window remains opened. Then push OK.
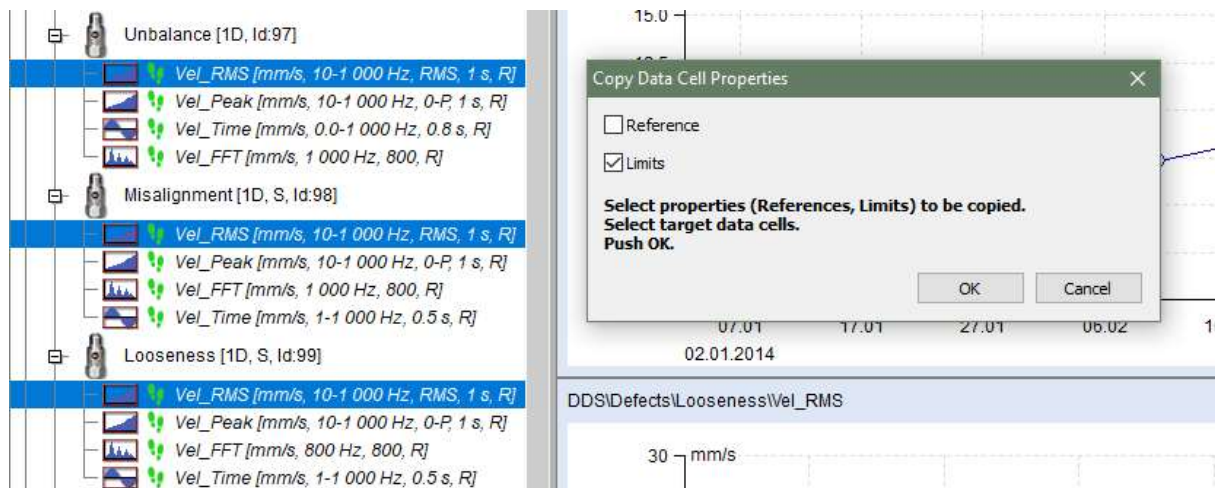
Set Limits by Statistics

The using of statistics is the next way how to define limits static data cells. You can use two functions; each is suitable for another use case. For proper functionality you should have sufficient number of measurements for that (we recommend more than 15 readings).
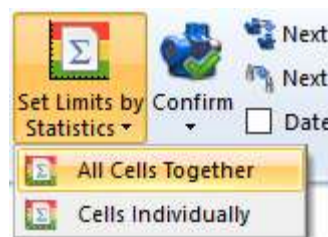
All Cells Together – the same limits will be set to all compatible data cells (the same type of measurement). The statistical analysis is made from all readings from all data cells together.

Select the data cell or more data cells (e.g. from the same machines type). The Filter function is useful for that. Push the Tree/Set Limits by Statistics/All Cells Together. The windows with calculated limits appears.
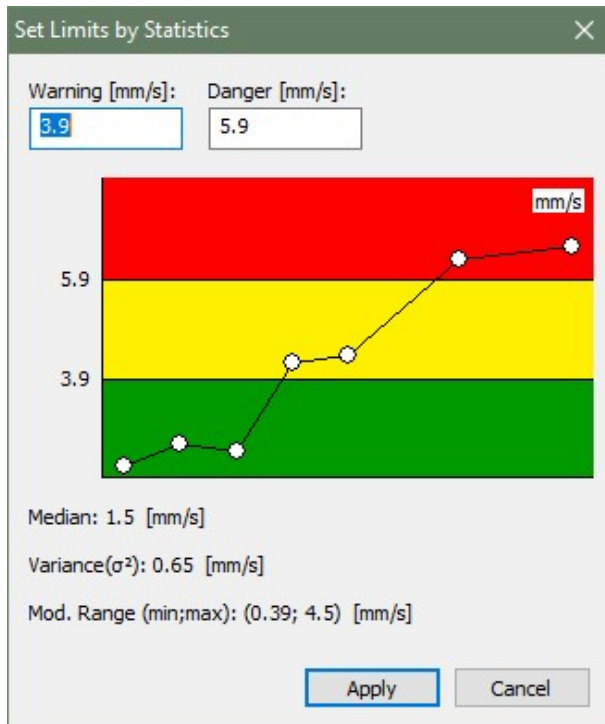
You can manually modify the values if you want. Limits are set when you press the Apply button.

Limits math algorithm:

$$\sigma^2 = \frac{1}{N} * \sum_{i=1}^{N} (X_i - median\, X)^2$$

$$\sigma = \sqrt{(\sigma^2)}$$

$$warning = median\, X + 3 * \sigma$$

$$alert\, limit = 1.5 * warning\, limit$$

Cells Individually - the limits are set individually for every static data cell. Select tree item(s), you set limits for all static data cells under this tree item(s). Or select group of data static data cells (you can use the Filter function). Now Push the Tree/Set Limits by Statistics/Cells Individually. The calculations may take a longer time. Once the limits are calculated and their setting is over, you can display window with details.

Data Cell	Warning	Danger	Median	Variance	Min	Max
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-NDE OVR ISO HOR	3.37 mm/s	5.05 mm/s	1.61 mm/s	0.345 mm/s	0.758 mm/s	3.2 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-NDE\H-ACC OVR HOR	0.315 g	0.473 g	0.141 g	0.003 g	0.001 g	0.29 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-NDE_ch2\ V-VEL OVR ISO VERT	4.33 mm/s	6.5 mm/s	1.94 mm/s	0.635 mm/s	0.891 mm/s	3.86 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-NDE_ch2\V-ACC OVR VERT	0.388 g	0.581 g	0.169 g	0.005 g	0.001 g	0.301 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-NDE_ch3\ Ax-VEL OVR ISO AX	3.52 mm/s	5.27 mm/s	1.82 mm/s	0.32 mm/s	0.93 mm/s	2.82 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-NDE_ch3\Ax-ACC OVR AXIAL	0.434 g	0.652 g	0.199 g	0.006 g	0.144 g	0.389 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-DE\ H-VEL OVR ISO HOR	3.04 mm/s	4.56 mm/s	1.47 mm/s	0.273 mm/s	0.943 mm/s	3.05 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-DE\H-ACC OVR HOR	0.335 g	0.502 g	0.131 g	0.005 g	0.001 g	0.291 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-DE_ch2\ V-VEL OVR ISO VERT	3.73 mm/s	5.6 mm/s	1.46 mm/s	0.577 mm/s	0.925 mm/s	3.49 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-DE_ch2\V-ACC OVR VERT	0.32 g	0.479 g	0.154 g	0.003 g	0.003 g	0.238 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-DE_ch3\ Ax-VEL OVR ISO AX	2.18 mm/s	3.27 mm/s	1.21 mm/s	0.104 mm/s	0.837 mm/s	1.95 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\MOTOR\MTR-DE_ch3\Ax-ACC OVR AXIAL	0.662 g	0.994 g	0.292 g	0.015 g	0.104 g	0.577 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\GBOX\INPUT-DE\H-VEL-NDE-OVR	1.49 mm/s	2.23 mm/s	1.02 mm/s	0.025 mm/s	0.7 mm/s	1.29 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\GBOX\INPUT-DE\H-ACC-NDE-OVR	0.309 g	0.464 g	0.118 g	0.004 g	0.061 g	0.326 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\GBOX\INPUT-DE_ch2\V-VEL-NDE-OVR	1.36 mm/s	2.04 mm/s	0.861 mm/s	0.028 mm/s	0.678 mm/s	1.24 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\GBOX\INPUT-DE_ch2\V-ACC-NDE-OVR	0.128 g	0.192 g	0.074 g	0.0 g	0.051 g	0.108 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\GBOX\INPUT-DE_ch3\AX-VEL-NDE-OVR	2.41 mm/s	3.62 mm/s	1.02 mm/s	0.214 mm/s	0.614 mm/s	2.3 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\GBOX\INPUT-DE_ch3\AX-ACC-NDE-OVR	0.117 g	0.175 g	0.065 g	0.0 g	0.017 g	0.091 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\GBOX\INPUT-NDE\H-VEL-NDE-OVR	1.39 mm/s	2.08 mm/s	0.866 mm/s	0.03 mm/s	0.769 mm/s	1.39 mm/s
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\GBOX\INPUT-NDE\H-ACC-NDE-OVR	0.426 g	0.639 g	0.172 g	0.007 g	0.11 g	0.438 g
POWER STATION\TRANSPORT LINE\CB035 B27\BELT 27\GBOX\INPUT-NDE_ch2\V-VEL-NDE-OVR	2.11 mm/s	3.17 mm/s	1.05 mm/s	0.125 mm/s	0.798 mm/s	2.11 mm/s

All statistic values (median, variance, min, max) are calculated from modified measurements array. From array are removed all values, which have a value greater than 3x median.

Confirm, Remove Confirmation, Undo Confirmation

If the limit values are used, the tree contains the warning colors. When the high vibration value occurs, then this color is e.g.red. We repair the machine and vibration value get back to the low value. But in the tree we still see red color, because the high value exists. We need to set the time stamp in trend and the readings before that time would be ignored in warning/alerts evaluation. Only readings after that time will be used for warning color evaluation. The **Confirm** function do that.

Confirm function can be used on any tree item or data cell. To use the Confirm function, select the tree item (e.g. machine) and push the button Tree/Items/Confirm. The calendar appears and you need to choose the date.

In case the data cell is selected and the graph is displayed, the time of the selected reading is used as the time of Confirmation (the reading must be chosen by cursor in the trend graph). If the Confirm function is applied on the data cell, all the other data cells in the same Tree Item (Point) will be confirmed.

The information about the time of Confirmation is saved in the tree item as a note. The note can be displayed in tab Tree Item properties/Notes or in tab Notes in graph section (tab Notes must be switched on).

In case you need to remove the Confirm function, use the function Remove confirmation (you need to open the menu of Confirm button).

If you made the wrong confirmation, you can us the Undo function and to return back. It is very useful when you work with many tree items together (multiselection).

Next Machine, Next Point

Use this buttons to move to the next machine or point in the tree.

You can move only to machines/point which contain readings from defined time interval. All other machines will be skipped. Check the box **Time Interval** in ribbon panel and use the **Time interval** button (bottom part of **Next Machine** button) to specify time interval. You can specify both times or one time only (**From** or **To**).

Date interval

Check the box **Time Interval** in ribbon panel, when you want to define and use the time interval settings for next machine or point.

Edit section

Edit section is contained in Tree tab.

Copy, Cut, Paste

You can copy/cut and paste tree item into another tree item.

If you use main menu, select the tree item to be copied/moved and click on the menu button Tree/Edit/Copy or Cut. The selected tree item changes color to red. Now select the tree item into which you want copy/move previously selected the tree item and click on the menu button Tree/Edit/Paste.

If you use keyboard:

Ctrl + C for Copy
Ctrl + X for Cut
Ctrl + V for Paste

Tree Window section

Tree Window section is contained in Tree tab.

Tile

If you have open more than one database, you can distribute all database windows for better comfort.

Horizontal tiles – the windows side by side.

Vertical tiles – the windows above.

Cascade –the windows into cascade from the top left corner to the bottom right corner.

Reading (Measurement) Properties

The readings are saved in data cell, which is special tree item. It differs from other tree items like Machine, Point, etc. which don't contain measured data.

Vibration Readings

The most often used readings in route are in the following list. Usually for all of them the accelerometer is used. The main properties will be mentioned for each of them.

Overall, Demod Overall

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Trigger Control	see VA4 manual
Length	reading length in seconds
Fmin	highpass filtering frequency, Fmin and Fmax define the frequency band
Fmax	lowpass filtering frequency
Detect Type	RMS, True 0-P, True P-P, Scaled 0-P, Scaled P-P, Kurtosis, Crest, AVG
Averaging	Linear, Peak Hold
Averaging Type	Linear, Min, Max, Median
Avg	Off or number of averages

Time (time waveform)

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Length	reading length in seconds
Fmin	highpass filtering frequency, Fmin and Fmax define the frequency band
Fmax	lowpass filtering frequency
Avg	Off or number of averages

Demod Time

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Length	reading length in seconds
Fmin	highpass filtering frequency, Fmin and Fmax define the frequency band
Fmax	lowpass filtering frequency

Spectrum

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Fmin	highpass filtering frequency
Range	spectrum range, lowpass filtering frequency (Fmax)
Lines	number of lines
Window Type	Hanning, Rectangular, Transient, Exponential
Averaging	Linear, Peak Hold, Time Synchro
Avg	Off or number of averages
Overlap	percentage overlaping
Zoom Spectrum	yes, no
Full Spectrum	yes, no

Demod Spectrum

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Range	spectrum range, lowpass filtering frequency (Fmax)
Lines	number of lines
Demod Fmin	highpass filtering frequency, Demod Fmin and Demod Fmax define the frequency band
Demod Fmax	lowpass filtering frequency
Avg	Off or number of averages
Averaging	Linear, Peak Hold, Time Synchro
Overlap	percentage overlaping

ACMT

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Length	reading length in seconds
Fmin	highpass filtering frequency
ACMTFs	the sampling frequency for ACMT evaluation.

Orbit

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Input A	valid only for 2D point - signal selection
Input B	valid only for 2D point - signal selection
Length	reading length in seconds
Fmax	lowpass filtering frequency
Avg	Off or number of averages

Smax

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Input A	valid only for 3D point - signal selection
Input B	valid only for 3D point - signal selection
Length	reading length in seconds
Fmax	lowpass filtering frequency
Averaging Type	Linear, Min, Max, Median
Avg	Off or number of averages

Complex Smax

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Input A	valid only for 3D point - signal selection
Input B	valid only for 3D point - signal selection
Length	reading length in seconds
Fmax	lowpass filtering frequency
Averaging Type	Linear, PeakHold
Avg	Off or number of averages

Amplitude + Phase

Quantity	quantity (acceleration, velocity, displacement, ...)
Averaging	Linear, Peak Hold
Avg	Off or number of averages
Resolution	required FFT resolution (take care of signal length), see VA4 manual for details
Order/Frequency	selection between tracking of x speed or exact frequency
Value	value of tracked frequency or x speed

Centerline

Quantity	quantity (displacement, ...)
Averaging	Linear, Peak Hold

Phase Shift

Avg	Off or number of averages
Frequency	Tacho or manual entering of speed
Resolution	required FFT resolution (take care of signal length), see VA4 manual for details
Order/Frequency	selection between tracking of x speed or exact frequency
Value	value of tracked frequency or x speed

FRF (Frequency Response Function)

Range	response range (lowpass filtering frequency (Fmax))
Lines	number of lines
Window Type 1,2	Hanning, Rectangular, Transient, Exponential
Result type	H1, H2, H3
Avg	Off or number of averages
Overlap	overlapping percentage

Orders

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Averaging	Linear, Peak Hold
Avg	Off or number of averages
Orders	(1/2,1-5), (1-5), (1/2,1-10), (1-10)
Resolution	required FFT resolution (take care of signal length), see VA4 manual for details

Filtered Orbit

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Averaging	Linear, Peak Hold
Avg	Off or number of averages
Orders	(1/2,1-5), (1-5), (1/2,1-10), (1-10)

Order Spectrum

Quantity	physical quantity (acceleration, velocity, displacement, ...)
Fmax	lowpass filtering frequency
Lines	number of lines
Orders	number of orders
Averaging	Linear, Peak Hold
Avg	Off or number of averages

MinMax (available only in online database)

Duration	total duration of measurement in [HH:MM] format

Density (available only in online database)

Duration	total duration of measurement in [HH:MM] format
Interval	division into octaves or decades. The octave is an interval between two values whose ratio is 2:1. The decade is an interval between two values whose ratio is 10:1
Bands per Interval	interval (octave or decade) is divided into the bands. This enables more precise division of the x axis

Other Readings

Speed

Avg	Off or number of averages
Averaging	Linear, maximum, minimum, median
Pulses per rotation	(available only in online databases) – one or more pulses per one rotation

Process

Quantity	physical quantity (voltage, current, power, ...)
Avg	Off or number of averages
Averaging	Linear, maximum, minimum, median

Manual entry   yes, no

FASIT

Description is in Drawing graphs, FASIT below.

Temperature

Measurement from instrument's non-contact IR temperature sensor (VA3/Vibrio M)

Ultrasound

Ultrasound frequency range measurements.

Record and it's Analysis

It enables route measurement of record (in VA4 Pro) and it´s later analysis in the office. You need to install VA4Pro Virtual Unit before using this function. Download VA4Pro Virtual Unit from Adash website www.adash.com. Define the link to VA4 Pro Virtual Unit in DDS software (Globals / General / Application).

To analyze transferred record in DDS software, choose Record (in section Data/Data Cell Properties) and press button Analyze (accessible also via right click menu in record graph, or double click on a data cell if there is only one record in it). The software VA4Pro Virtual Unit will be run and you can analyze the record and make the measurement by the same way you do it with analyzer VA4 Pro. Note. maximum record size stored in a tree is 500 MB.

Record
Length	reading length in seconds
FS	sampling frequency
AC,DC	AC,DC inputs settings

Other types

Image

The PNG, JPEG, and BMP formats are supported.

File

You can save any binary file into the database and export it from the database whenever you want.

Balancing

The balancing report imported from VA4 or VA3 instrument.

Drawing of graphs

Screen Areas

The screen is divided into 3 main areas. The tree area is on the upper left side. The data area (DataList of readings) is below the tree on the left side. The Plot/Report areas on the right side are prepared for drawing of graphs and reports.
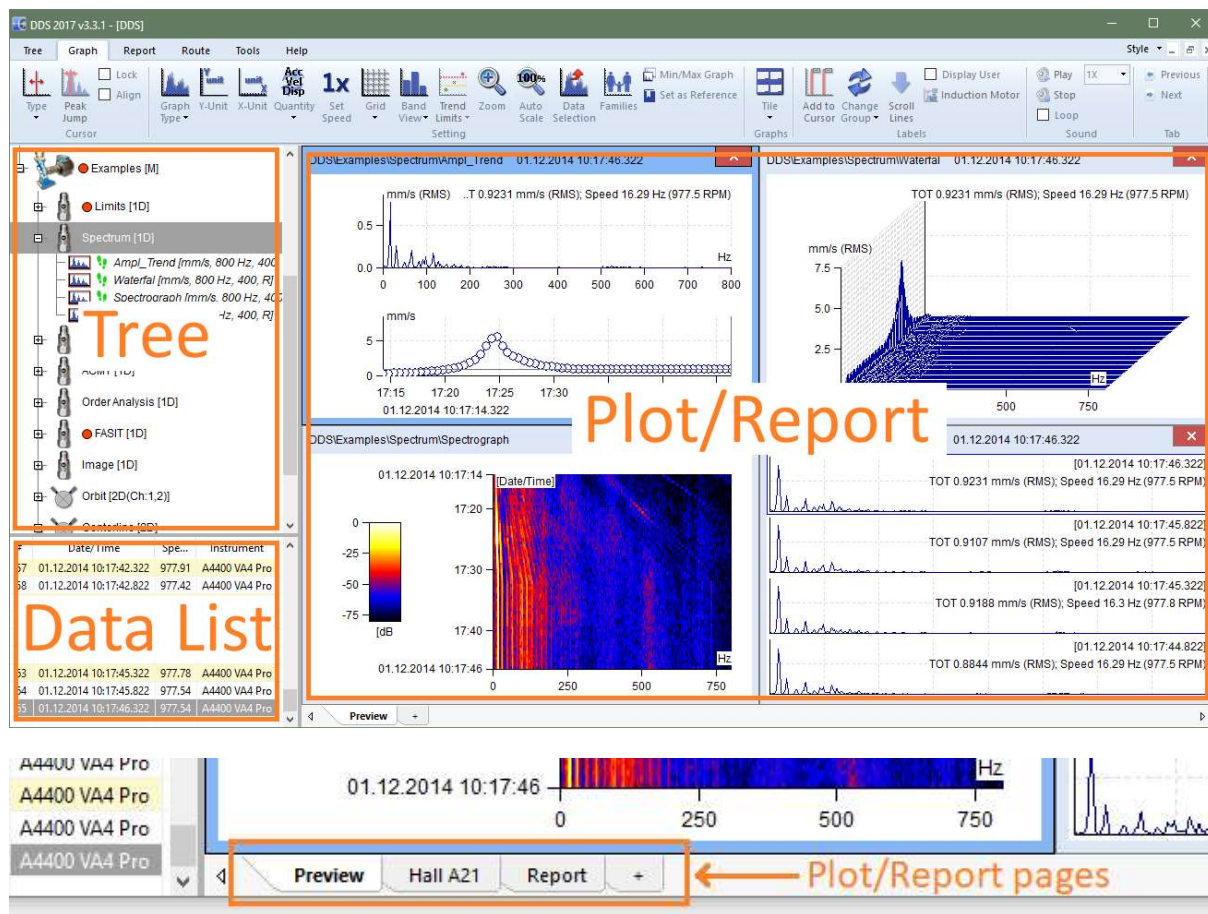
Plot/Report Area and Pages

The Plot/Report area contains pages (like in MS Excel). Various graphs can be plotted in each page. The texts and images can be added in report pages.

The Preview page is the basic plot page. It enables fast preview of readings.

Preview Page

Use the checkbox Preview in Tree section to create Preview page. This page is a default plot page for graphs plotting. If we open the branch in the tree, then the several basic plotting are available:

One reading or trend
Select one data cell in point. The static cell (e.g.overalls) creates the trend graph. The dynamic cell (e.g.spectra) creates the graph with last reading or waterfall.

All data cells from one point
Select the Point with several data cells. All cells graphs will be created together in the PreView.

User multiselection

Use the standard Windows buttons (Shift, Ctrl) for multiselection in tree. All selected cells graphs will be created together in the PreView.

Plot Page

The graphs are drawn in plot pages. Create the new plot page using the "**+**" (in the bottom of page). Drag the data cell from the tree and drop it on required position in plot page.
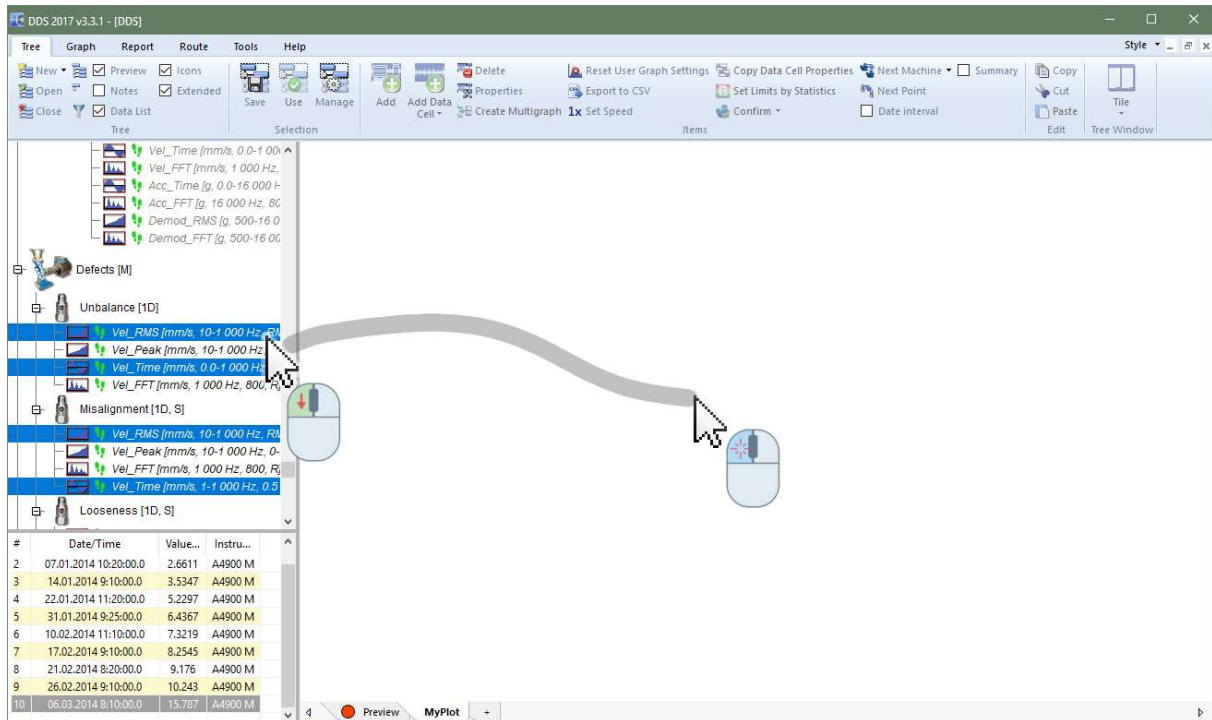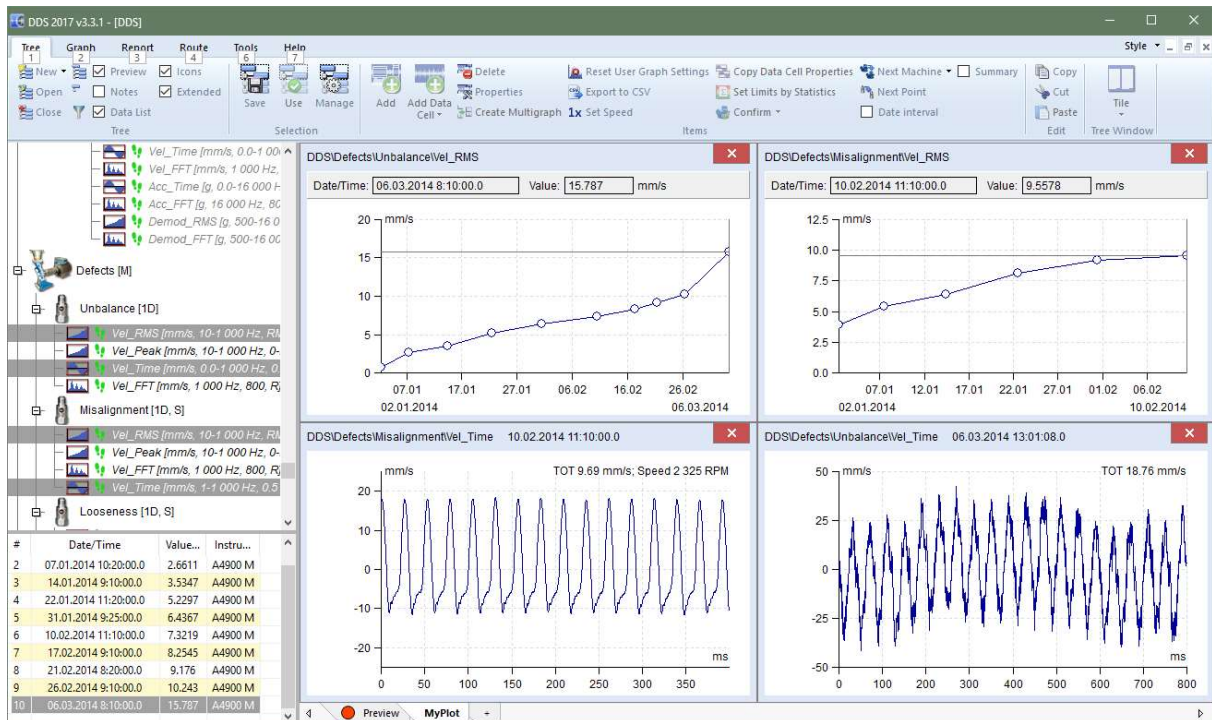
Use the Graph/Graphs/Tile [icon] to organize them.

If you select more compatible data cell in the tree, then you can create multigraph by **Tree/Create Multigraph** or by right click menu **Create Multigraph**. You can also drag the multiselection by mouse, move the cursor to the plot page, push and hold the **Ctrl** button and drop it. The multigraph will be created. Without holding **Ctrl** individual graphs will be created.

Template Page

This page type is designed for display a predefined set of data cells from **one** measurement point. For example, create template page and drag data cells ISO RMS, ISO SPEC and ISO TIME from tree into template page. If you then click to next point which contains data cells with same names and quantities, then graphs in template will be filled with data from this point. Used data cells must be from one measurement point.
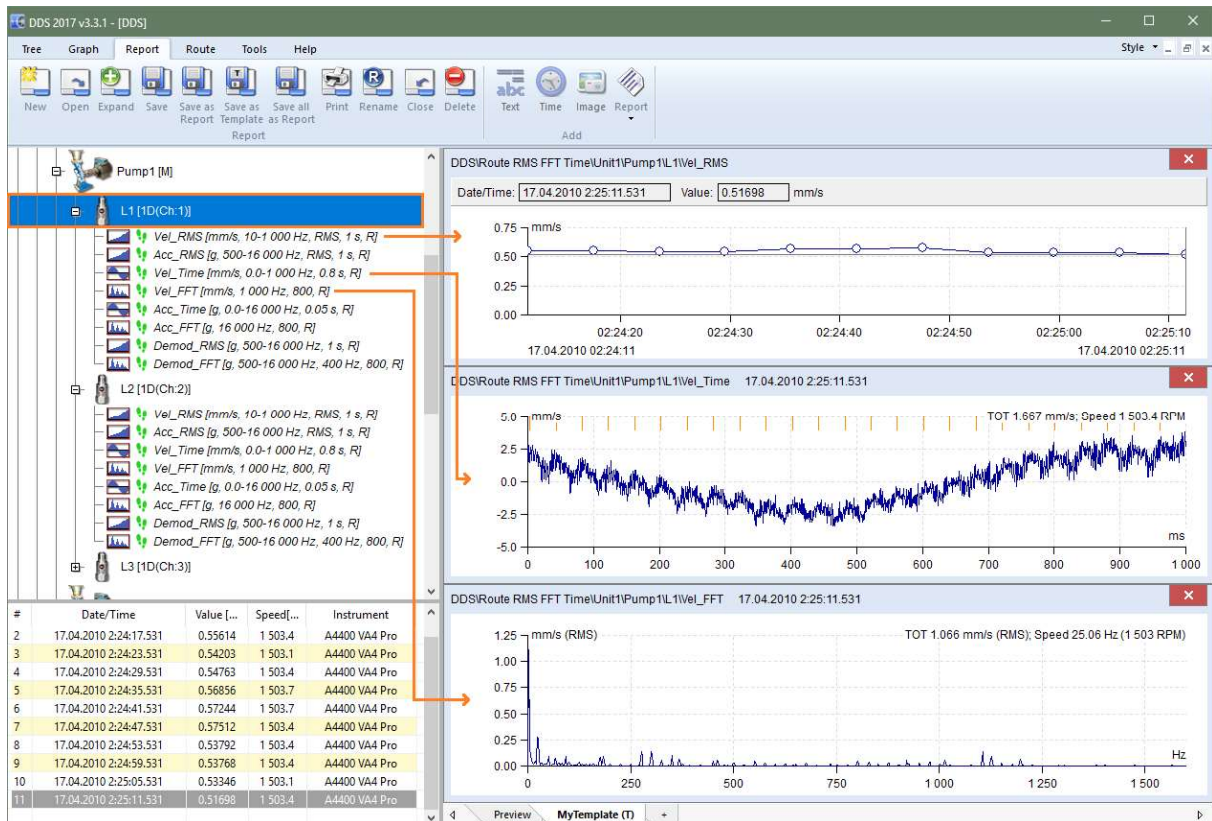
If you have created the plot page and you have put the graphs into, then you can save this page as template. The templates functions are in **Report** tab, **Report** section. Use the **Save as template** function to save the page as template.
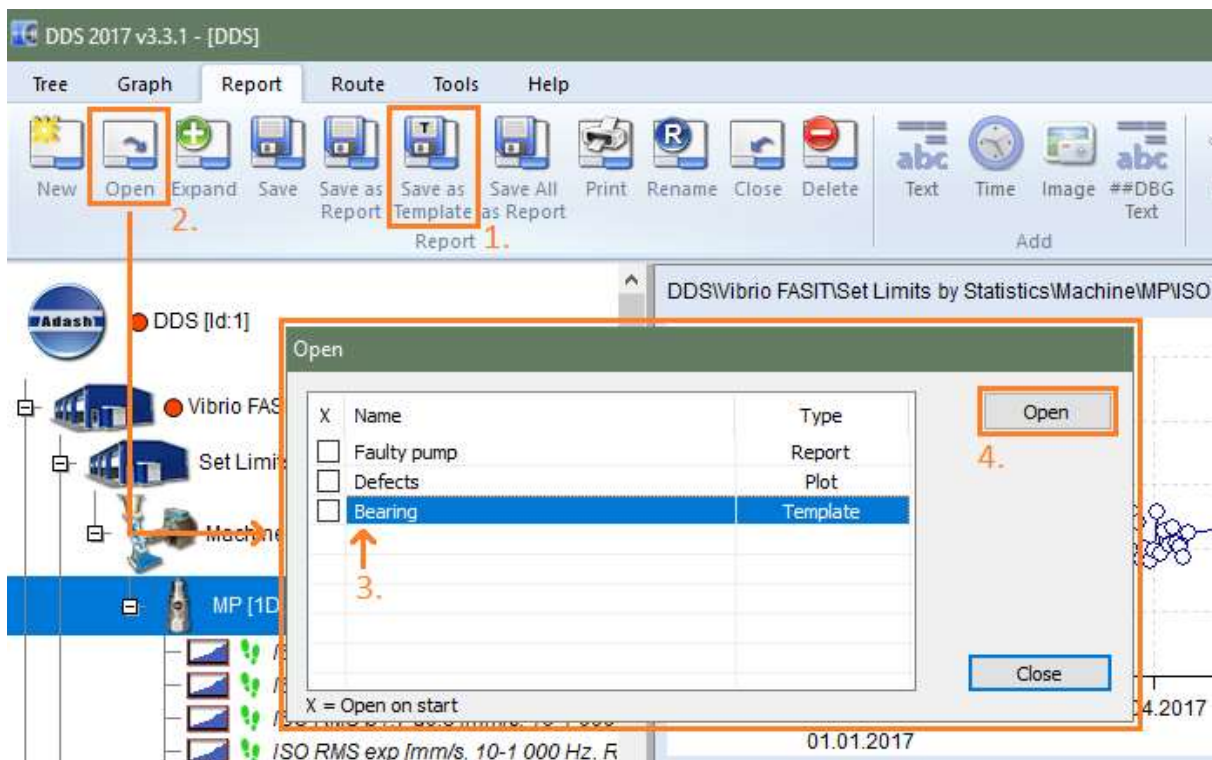
Use the **Report/ Report section/ Open** to open the template again.

Report Page

See the Reporting chapter.

Notes Page

The notes can be written in each tree item (Item Properties/ Notes). All notes from selected item and from all its children items are displayed in the Notes page.

Next functions for Pages

Use the mouse right click on the page name and the items menu appear.

Rename
Print
Clear
Close All
Properties
Close

Rename

Renames the page.

Print

Prints page.

Clear

Removes all graphs and cleans the page area.

Close All

Closes all pages except PreView and Notes.

Properties

Show message with information about the tab type.

Close

Closes one page. Click by middle mouse button on the page tab is another way to close the page.

Summary item

This function enables to create quickly the pages (according to data cell selection), which contain same type of data cell and physical quantity. DC data cells are exception, they are grouped in one page.

Copying of the graph to clipboard

To copy the graph as a bitmap to the clipboard do the right mouse click on the graph and select the option *Export/Print->Copy to clipboard.* The other option is to use Ctrl+C (graph needs to be active).

Drag and Drop the Data Cell to Drawing Area

When you created new page then use the mouse for selection of data cells and drag and drop them to the drawing area.

If only one data cell is dropped to page, then one window is created for that cell.

If more data cells, which are the same type, are selected in the tree, then two options are available:

if they are dropped by mouse to the page, then the new window will be created for every cell,

if "Ctrl" is pressed it will create one Multigraph(if available) instead of separate windows

if the Create Multigraph command is used (mouse right click menu on any selected item), then all graphs are drawn in one window. It enables to work with cursor, zoom and other properties together in all graphs.

If more data cells, which are not the same type, are selected in the tree, and dropped by mouse to the page, then the new window will be created for every cell.

Static Data Cell Graph

If the static data cell is selected then the trend graph appears.
Use the right click on graph and next menu appears.

Graph Type	>
Cursor	>
X Axe Type	>
Y Axe Unit	
Auto Scale	
Zoom	
Limits	>
Labels	>
Grid	>
Export / Print	>
Position	>
Close	
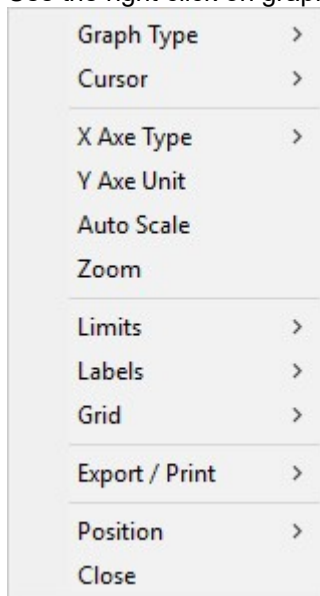
See Graph chapter for details.

Spectrum Data Cell Graph

Use the Preview page or drag and drop the spectrum data cell to new page. Use right click and the menu appears.

Graph Type	›	
Cursor	›	
Peak Jump		
Enter Speed		
Families		
Y Axe Unit		
Phase Type	›	
Y Axe Type	›	
Y Axe Detect	›	
X Axe Unit	›	
X Axe Type	›	
Order Type	›	
Sort By	›	
Auto Scale		
Y Scale	›	
Zoom		
Labels	›	
Bands	›	
Grid	›	
Export / Print	›	
Data selection		
Hide lines		
Display hidden lines		
Position	›	
Close		

The special items only are described:

Locate Peak   move the single cursor to some position and select the Locate Peak function. The cursor will be moved to the nearest exact peak position. The algorithm is based on FFT features and finds the position also between lines. It is useful for precise detection of speed.

Enter Speed   enablers to enter the speed value to the header of spectrum data. This place has the most priority level for data acquisition. If the cursor is used, then its position is offered.

Families   see Families chapter for details

X/Y Axe Type to switch between the types of axis (linear, logarithmic, decibels – just for Y-axis)

Phase Type   ranges (-180, 180), (0, 360) and AUTO are available. The AUTO creates special range without graph oscillation between top and bottom of scale.

Labels   See Labels in Graph chapter for details.

Data Selection   the list off all readings appears and you can do the selection.

Hide Peak(s)   If any cursor type is on, then this function hides all lines under cursor frequencies. It means, that all harmonic frequencies are hidden when harmonics cursor is selected. Using of sideband or delta cursor works similarly. Hidden frequencies are drawn in grid color.
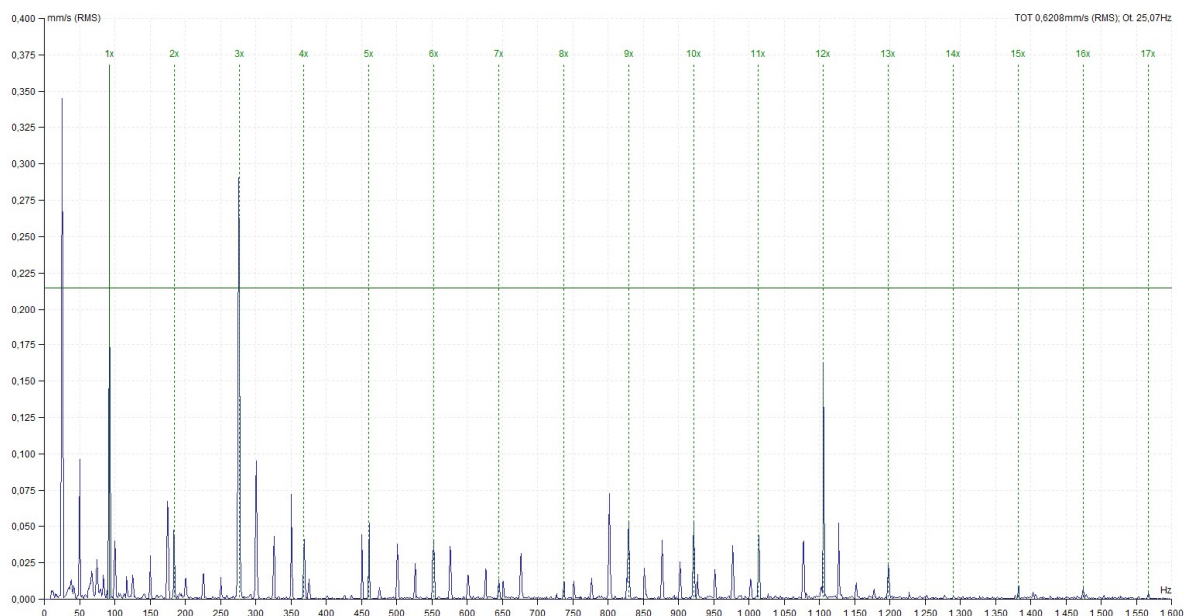
Display hidden peak(s) switches off the hidden peaks and all lines are visible again.

Fine cursor movement between lines

In case of harmonic cursor or sideband cursor use, main cursor movement according to existing spectrum lines can be a restricting factor. If the real rotation frequency lays between two frequency lines we cannot achieve correct position of harmonic components. The higher multiple harmonic component is, the higher difference from the real value we get. The DDS program solves this situation by the main cursor movement between existing frequency lines.

The first method is positioning the cursor by arrows. If you use the right/left arrows only, the cursor moves with corresponding measurement step. When you use these arrows with the *Ctrl* key pressed the cursor movement is 10 times finer. This allows precise placement of the harmonic component on the corresponding spectrum peak.

The second method solves the problem from the opposite side but with the same result. If there is necessary to place e.g. 10th harmonic components to specified spectrum position, drag it by the

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mouse and place it. The main cursor position is then changed proportionally. You can work the same way with the sideband cursor.

Default cursor

When no is cursor displayed in spectrum graph, then you can click the left button on required position. The cursor selected in Tools/Globals/All graphs/Cursor/Default spectrum cursor will be displayed. Position of cursor is defined by mouse position and the Locate Peak function is automatically applied.

Quick switch to the sideband cursor

If there is a cursor in spectral graph, hold SHIFT button and use left click in graph on required position. Cursor is changed to sideband cursor and first sideband is moved to mouse position.

Waterfall

This plot works with spectra.

Maximum number of readings

The maximum number of readings in waterfall is defined in Tools/ Globals/ All Graphs / Waterfall. If e.g. this number is 32 and you select more recordings (e.g. 320) then only 32 readings will be displayed (each 10th). The "filtered" is written aside from Y unit.

Properties

You can control the properties of the plot by the mouse. We need to define several positions for next explanations. Every axe has the beginning (min value) and the end (max value). We will use following positions: Xmin, Xmax, Ymin, Ymax, Zmin, Zmax.

Xmin, Ymax, Zmin   Move the cursor to this point. You can (drag and drop) change the size of Y axe. When you move the end point, the % of max size is displayed.

Xmin, Ymin, Zmax   you can change the size of Z axe and its angle.

Xmax, Ymin, Z anywhere   You can look the times of readings. In compressed view case you look the time intervals which are averaged to one spectrum.

Cursors

All cursors work also in waterfall. Additionally you see the cuts through all spectra. If you use the delta cursor, then the delta cut is drawn in cursor position.

Draw Style Outline or Gradient

Two draw styles are available for waterfall. Set required style in Global Settings / All Graphs / Waterfall / Draw Style.

Z Axe Labels

Labels of Z axe are displayed when you move mouse cursor nearby to end of X axe of one graph (e.g. spectrum). The first and last label are always displayed and label closest to mouse cursor.
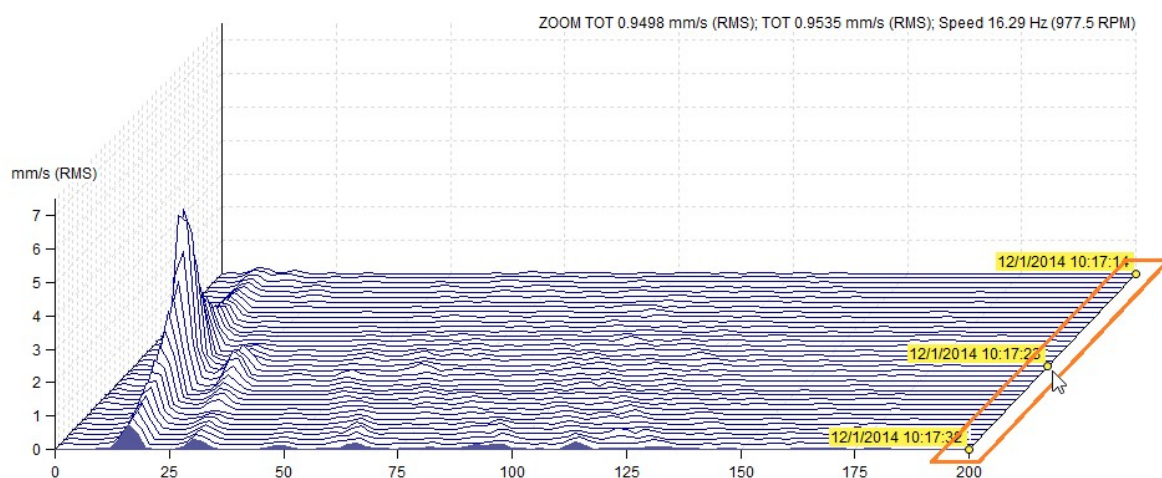
If you want always to display Z axe labels, set the option in the global settings (Global Settings/tab All Graphs/section Waterfall/Always Display Z Info) to **on**. If this option is on, the labels are displayed until there is a free area.
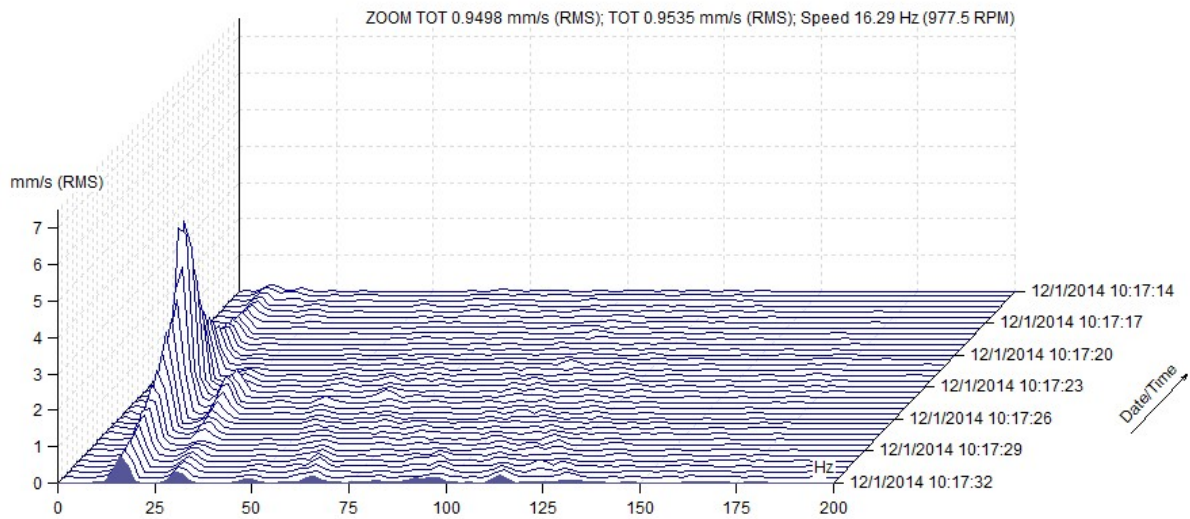
Amplitude + Trend

This plot works with spectra.

The amplitude spectrum is drawn in the top half and the trend overall value in the bottom half. Trend is displayed over the time scale on x axe. Initially the overall values are displayed in the trend.

Use the delta cursor to define different frequency range.
If the single cursor is displayed, then the trend on cursor frequency is drawn.
If bands are defined, then their trends are drawn. Use the band cursor for selection.

Amplitude + Trend (Amplitude / Speed)

This is option of previous paragraph. When the speed is measured together with vibration, the trend can be displayed over the speed scale on x axe.

Amplitude Stacked

Several spectra are displayed in one window. Use the mouse or arrows to change the selection. All functions like cursor operation, zoom, … will be done at all spectra at once.

Spectrograph

Two dimensional (2D) graph of spectra. You can imagine it as the view to waterfall from the top. The color is related to amplitude value. To change the dB range, go to Global settings (Tools/Global Settings/Dynamic Graphs/Range[dB] or do the right mouse at local menu graph (item Range).
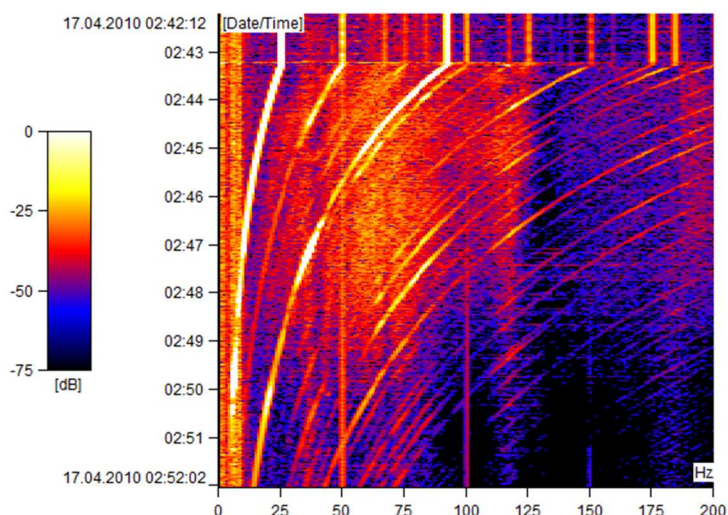
MinMax spectra

Spectrum plot from MinMax data cell draws also the minimal, maximal and average value.
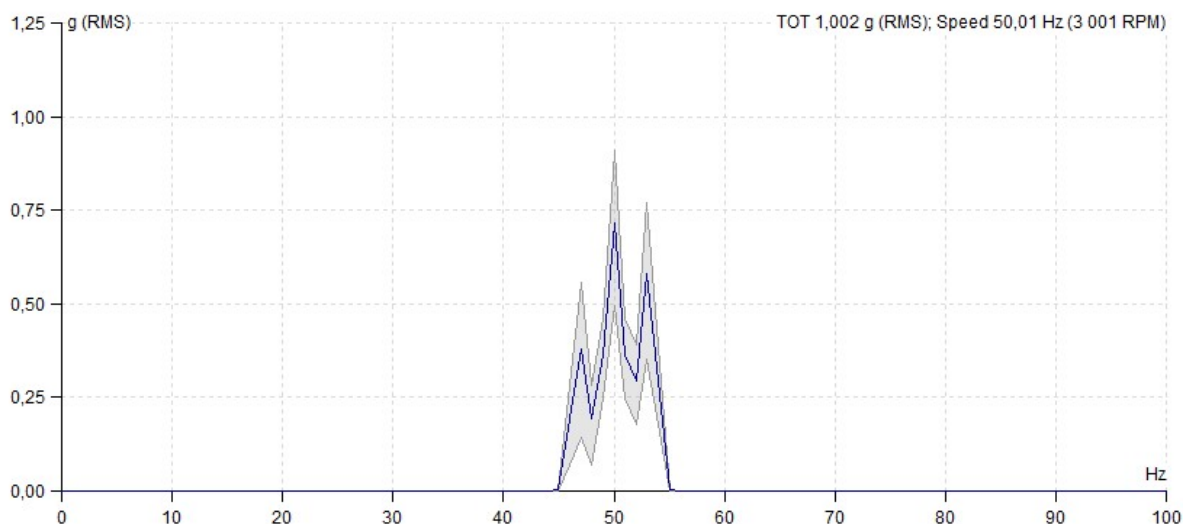
Order analysis graph

The graph is similar to spectrum graph. Most of functions are the same (Amplitude, Amplitude and Phase, Amplitude Stacked). Order analysis contains additional graph properties Polar, Amplitude+Polar, Amplitude + Phase Trend. The polar graph is always drawn from cursor position order.
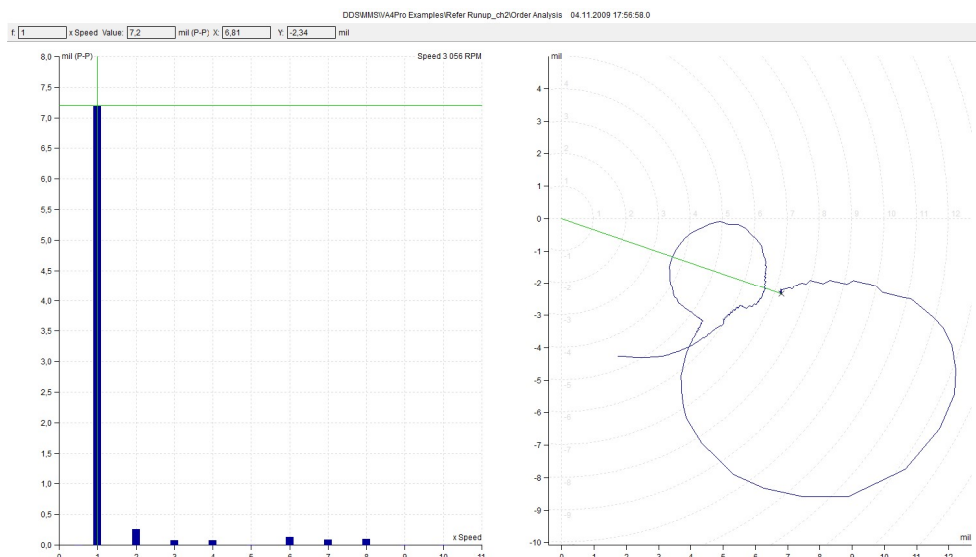
Filtered orbit graph

It is available for Filtered orbit data cell. You can check the orders, which will be used for orbit drawing. The graph contains the mathematical extrapolation using pure sine waves (with the amplitude and phase of each selected order).

Tis graph type is also for two independent orders data cells. Select two cells with orders. Select function in Tree menu. See more information in Create Multigraph section.
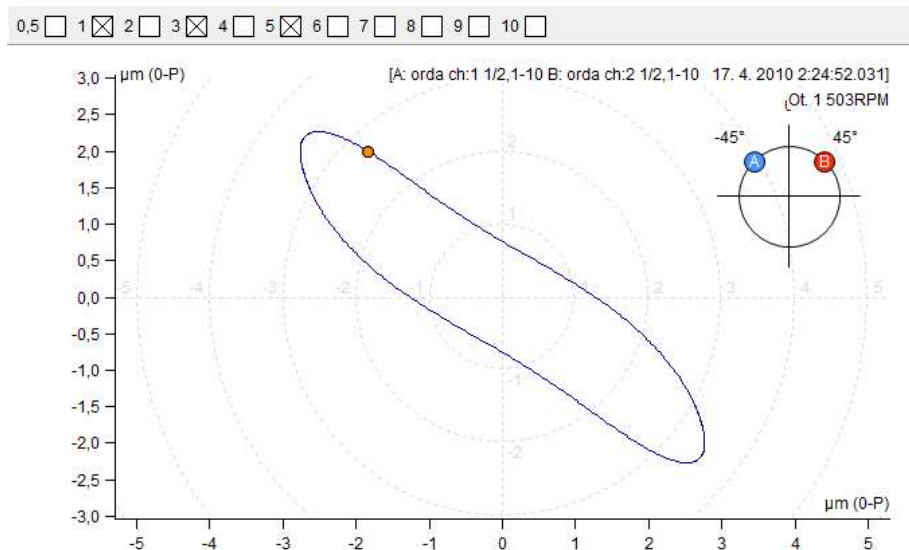
Orbit Data Cell Graph

The right click menu contains similar items like time signal. The Graph Type contains special items.

Display offset display with DC value measured with data (on/off)

Graph Type

Time A / Time B	time signal on selected channel is displayed
Orbit	the orbit from two time signals is displayed (be careful of correct settings of sensor angles in 2D point)
Orbit A B	orbit and both time signals are displayed together

Center line graph

Graph Type

Gap A / Gap B   Gap A and Gap B trends
Center line   Gap A and Gap B in one 2D graph

Center line graph displays the real radial position of shaft in journal bearing. The bearing clearance shape is defined in **Other** tab in Properties window.

Use the double click to display the speed value in graph. Use the double click again to remove the mark.

DDS\MMS\T16\HP\HP Front B1\SV1\CenterLine
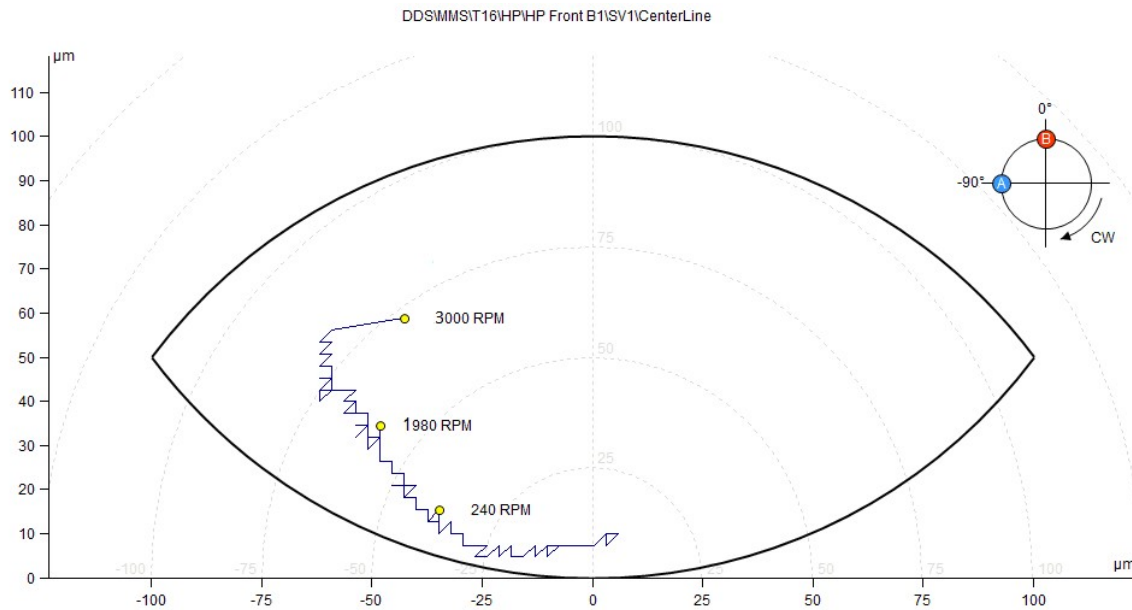
FASIT Graph

FASIT means **FA**ult **S**ource **I**dentification **T**ool. It helps to find the source of problem. The graph contains several parts. Each partial bar graph contains the alarms colors (see Tools/ Setting/ Alarms)

The color tells you the severity of problem (failure). The circle contains sections, which are related to probability of every fault source.

The total vibration severity of machine

Bearing condition

Speed (value only, no severity indication)

Severity of unbalance

Severity of looseness

Severity of missalignment

Severity of other sources

Graph Type

FASIT   only FASIT displayed (the same view as on instrument screen)
Fasit+Trend   FASIT + the trend of selected parameter, use the mouse click for selection
Trend   trends of all FASIT parameters in one multigraph

% Distribution

3,35 mm/s RMS   0,1 g RMS   1 494RPM

3,35 mm/s RMS   0,1 g RMS   Speed - 1 494 RPM

% Distribution
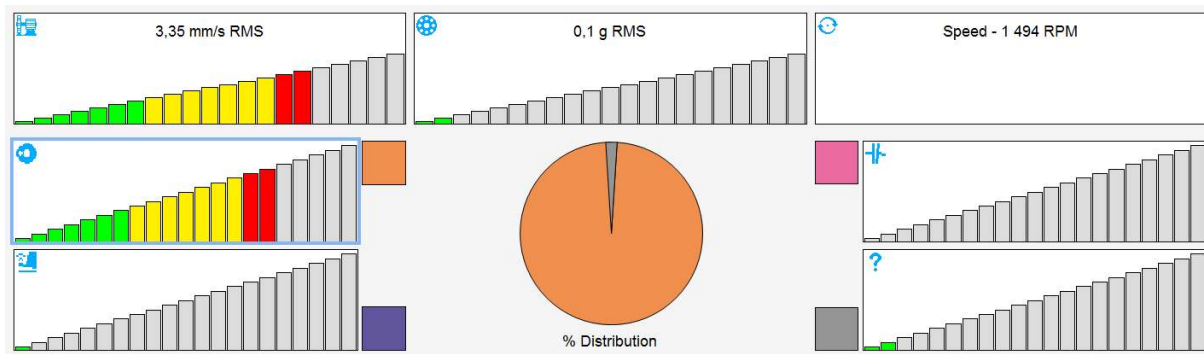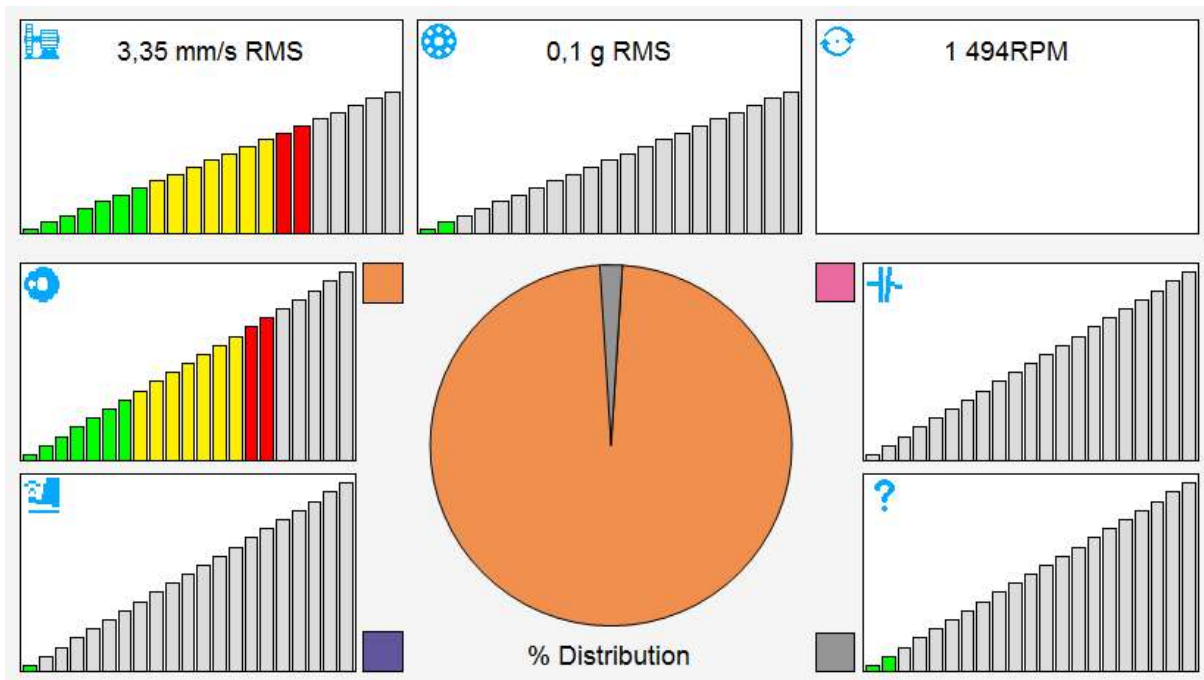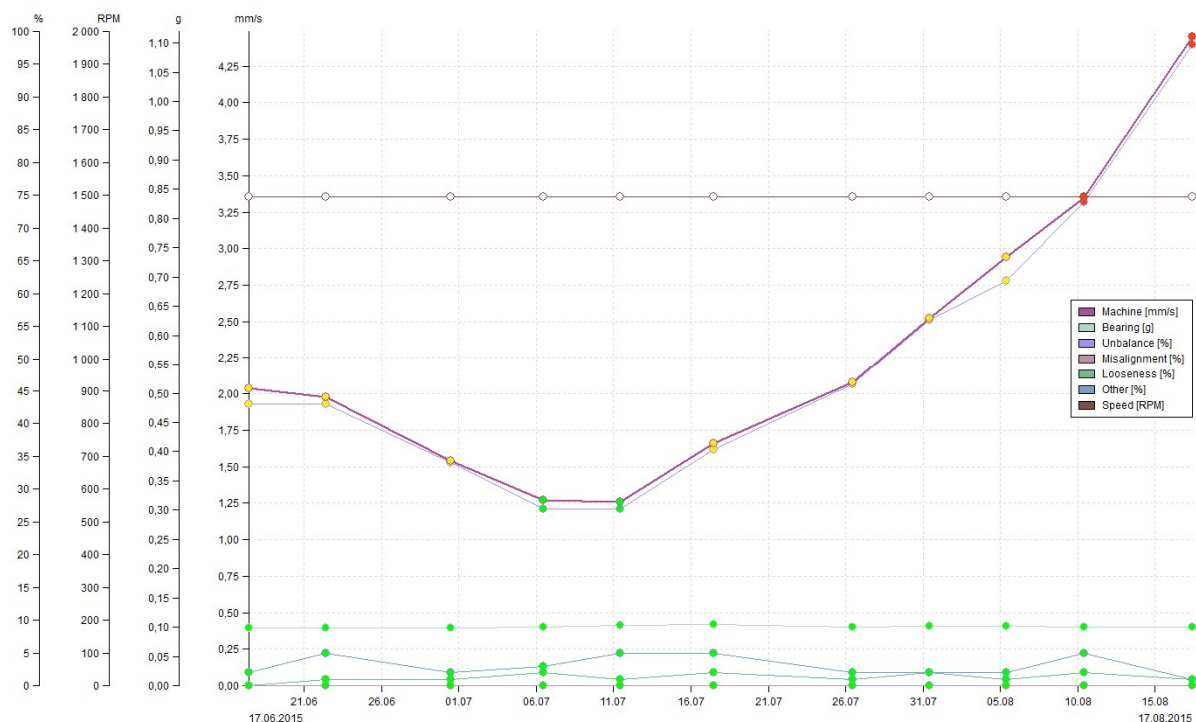
Density Graph

Density is statistically processed trend of one value(static) readings. Value range is split into intervals and density traces how many times the reading value occurred in each interval. It is roughly similar to what is known as histogram in photography.

Graph Type

Amplitude

On X axe are represented intervals and on Y axe is a bar displaying the proportion of how many times the values from interval appeared in all readings. On top right corner of graph is also the information about median from all readings and their count.
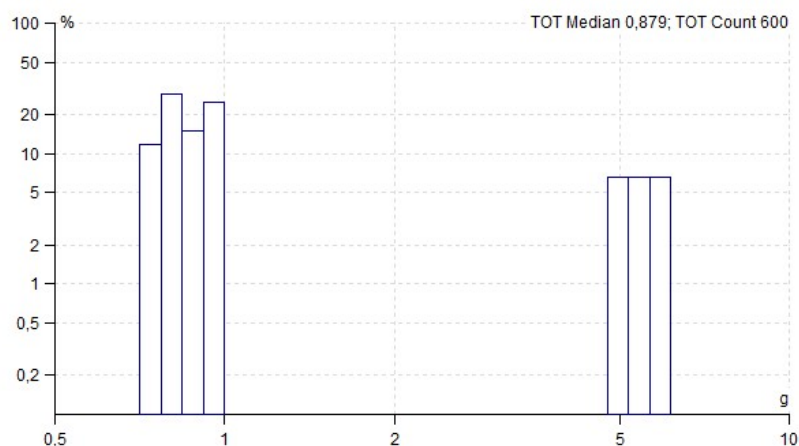
Amplitude + Trend

Is available only if more than one density reading is available. On top is displayed the same graph as in type above and on the bottom is displayed the trend of values. These values are calculated according to a selected cursor. If no cursor is selected the trend value is a median from whole density measurement, if delta cursor is selected the value is median values only from selected interval(s) and case the single cursor is used it tracks only the percentage of the selected interval.
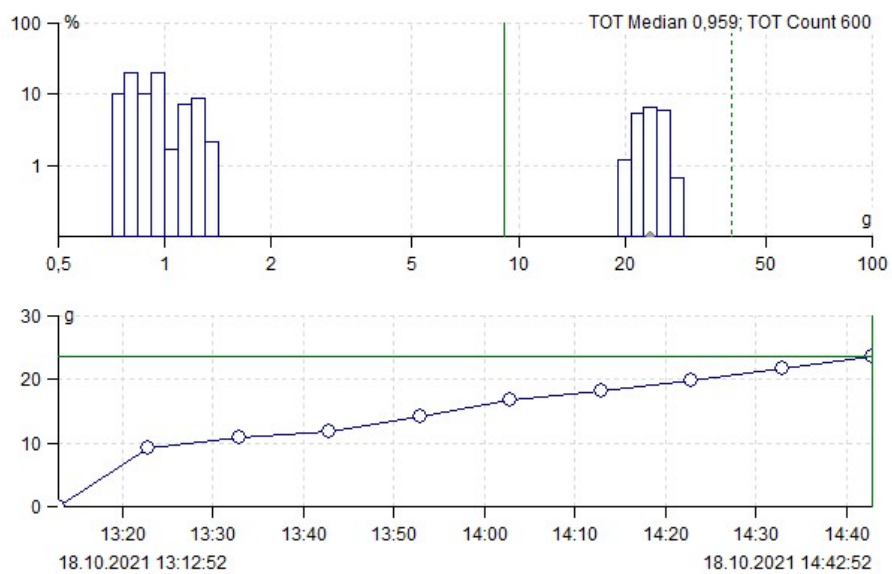
Waterfall

Displays the history of density readings in one graph.
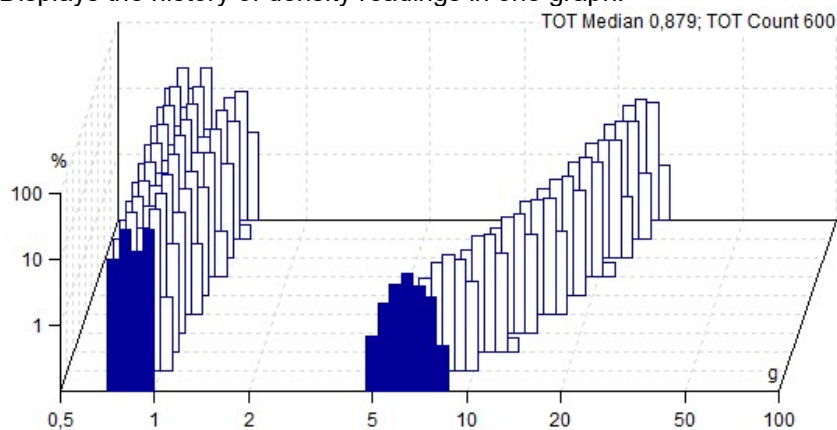
Graph tab

The main target of vibration diagnostics is to recognize the condition of machines. The graphs drawing and evaluating is the main tool how to do that. Especially checking of the trends is usually useful way for that.

Cursor section

Cursor section is contained in Graph tab.

Cursor Type

None	no cursor displayed
Single	one cursor line only
Harmonic	1X, 2X, ..., NX frequencies
Sideband	central frequency and sidebands in spectrum
Periodic	for frequency evaluation in time waveform
Delta RMS	RMS, 0-P, P-P value of delta frequency interval in spectrum (related to detect type)
Delta Max	max peak value (highest line) of delta interval in spectrum
Delta 0-P, Delta P-P	amplitude ranges for time signal
Band	band value in spectrum

Locate peak

The spectrum contains lines with some resolution, for example 1Hz. But the real speed can have any value, not only on these lines. The FFT has the property, which enable to determine exact speed value. Place the cursor to the peak line in spectrum and push Locate Peak. It finds the accurate peak position (frequency) in spectrum and the amplitude on that frequency is displayed as well. If the sideband cursor is selected and there is a peak near sideband 1x the delta is adjusted as well.

The cursor on 100 Hz peak   Cursor moved to 100.4 Hz
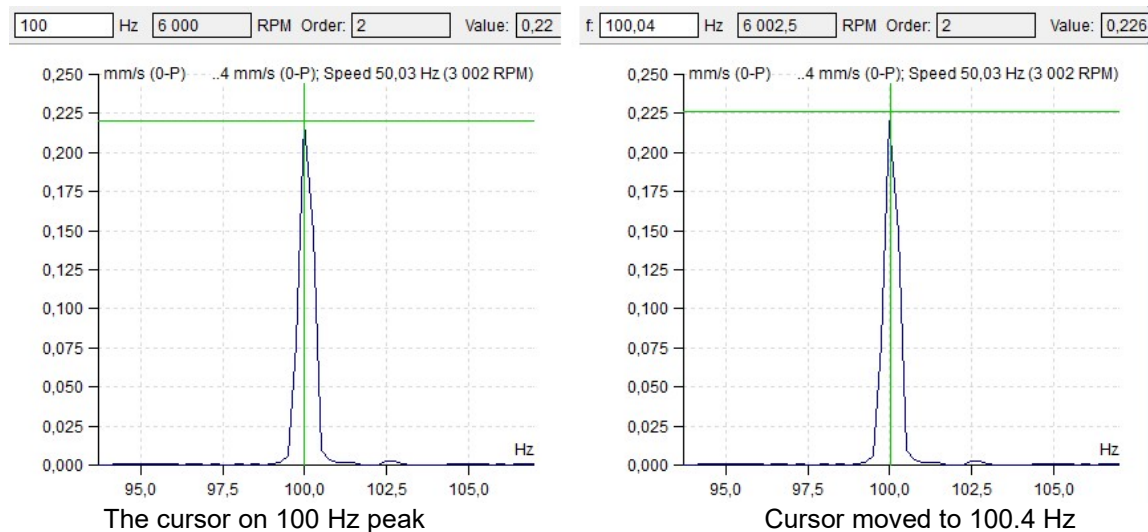
Find Harmonics

Detects harmonic families in spectrum and places there a harmonic cursor. If more harmonic families were found, repeat the button pressing and harmonic cursor will toggle between them.

Find Sidebands

Finds sidebands with given delta f in spectrum. If more sidebands were found pressing this button again toggles between them.

Lock

Check the Lock checkbox. When more graphs of one type are plotted in the page (e.g.6 spectra cells) then you can move with cursor position in one graph and the cursor moves also in other graphs. The movement is not continuous, but all new positions are plotted after you release the mouse button.

If you change cursor type then selected type is applied to all graphs.
If you uncheck the Lock, then each cursor is separated from the others.

Align

The same (similar) time of reading is kept on displayed graphs. E.g. when there are displayed 2 graphs: trend of overall values and spectrum and we move with cursor in trend of overall values, the reading with same (or nearest similar) time will be displayed in spectrum. It works the other way around as well, when we change the spectrum graph, the cursor in trend of overall values is changed accordingly. It works for both static and dynamic graphs.

Setting section

Setting section is contained in Graph tab.

Graph Type

For spectra only.

Amplitude	single spectrum standard graph
Amplitude + Phase	spectrum graph contains amplitude and phase
Amplitude + Trend	spectrum graph contains amplitude and trend of cursor or overall value
Amplitude Stacked	several graphs in one window (the max number is defined in Globals / All Graphs / Other / Graph Count in Stacked)
Waterfall	more spectra plotting in 3D

Y-Unit

Next window appears. The selection of Y axe unit. Integrated units of original reading are available for spectrum.

X-Unit

Selection of X axe unit. When you push the down arrow, then you can select unit from the list.

Quantity

It enables shifting between acceleration, velocity and displacement.

Set Speed

The manual enter of speed to the reading data head. The cursor position is offered and can be manually changed.

Grid

It enables to draw several types of grids.

Band View

If band is defined, then three display modes are available - Off, Basic, With Limits

Trend Limits

This checkbox switch the limits displaying on/off. It is available only for static data cells, where the trend graph is possible.

Zoom

Standard zoom definition.

Mouse zooming is also available. When you operate with mouse in the plot, then both axes are zoomed. When you operate below the X axe, then only the X zoom is applied. When you operate on the left of Y axe, then only the Y zoom is applied.

The mouse zoom works normally when the cursor is off. If the cursor is on, then the mouse has the cursor priority. The mouse zoom is available with CTRL button on keyboard.

When you place the mouse symbol inside the plot area, then also the mouse wheel (roller) can be used for zooming.

Autoscale

Cancellation of zoom.

Data Selection

The list of readings appears. You can make the selection.

Families

See special Families chapter.

Min/Max graph

It maximizes the size of the graph window or return it to the previous size.

Set as Reference

This function will set current reading as a reference. If it is a static value, the reference value will be the value selected by cursor. See Spectra data limits / Reference

View Reference

Quickly show/hide reference on all displayed graphs.

Graphs section

Section is contained in Graph tab.

Tile

If you have open more than one graph, you can distribute all graph windows for better comfort.

Tile – distribute graphs in tiles.

Tile Horizontal – the graphs side by side.

Tile Vertical – the graphs above.

Cascade – the graphs into cascade from the top left corner to the bottom right corner.

Labels section

Section is contained in Graph tab. Please see the special chapter Labels in Graph for details.

Add To Cursor

Add user label linked to the cursor position. Cursor must be displayed.

Change Group

Displays labels defined in Labels and Bearing tabs in Tree Item Properties and change the groups (bearing, general, gear, vanes, off).

Scroll Lines

If more bearings are defined, then it scrolls them.

Display User

Display On/Off of user labels.

Induction Motor

Displays FL with FL+/-FP sidebands on spectrum graph. Option is available only on spectrum measured in current or voltage.

Sound section

Section is contained in Graph tab.

Play, Stop, Loop

When the waveform graph is selected, then we can listen the waveform on headphones output. If the Loop is checked, then the waveform is replayed again and again until the Stop button is used. You can control the speed of playback (0.1x,…, 10x)

Note: If there is delta cursor selected, DDS plays the sound only from the selected part.

Tab section

Section is contained in Graph tab.

Previous, Next

If more Tabs are opened, you can move along them by pressing Previous or Next button.

Data Postprocessing

This feature allows to create a trend from spectrum data cell or remove selected readings (measurements) from spectrum cells.

Take a look at the spectrum graph with Amplitude + Trend graph type to see how the trend is being created. Turn the cursor on (simple or delta), and you can see that the trend is created from the cursor values on each data cell measurement. On example below we see the development of the overall value in 20-30 Hz frequency band.
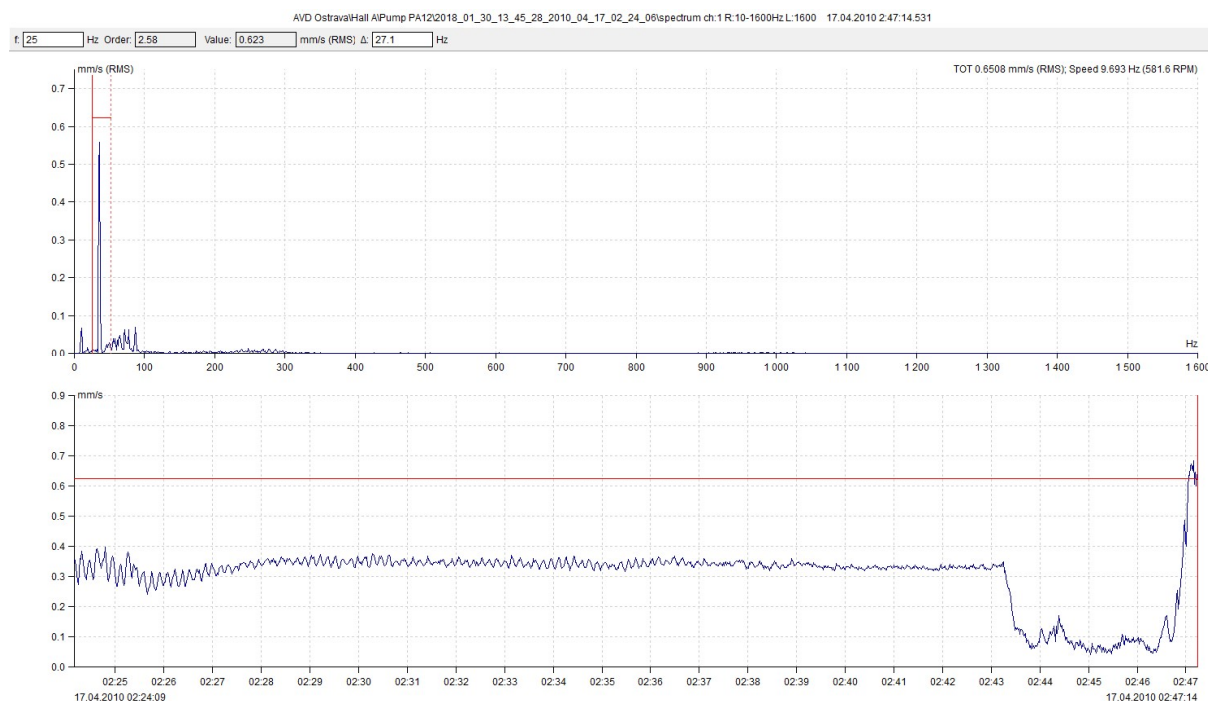
The Postprocessing feature creates this trend too and enables its additional filtering. Filtered trend data you can save to new static data cell.

Saving of trend

Open the spectrum graph, switch the cursor on and press right mouse button. Select the Data Postprocessing item. Next window with parameters appears.

If the data cell contains a larger amount of readings, then the loading indicator appears on the bottom left corner and the buttons are not available. But you can work with the window parameters during loading process. When the loading is completed, then the indication disappears. Statistical properties of the trend data (Median, Variance, min / max, Count) appears on the bottom right corner.

You can set up several filter parameters in the postprocessing window. This filter is then applied to the trend.

After setting of required filter parameters, click Save Trend button. You will be informed how many values matches with your parameters, it means remain in trend. You can still go back and change the parameters. If you are satisfied, confirm the information window and enter the name of the new data cell. The data cell will be created in the same measurement point as the spectrum over which you started Postprocessing.

indicator   Statistical properties

Postprocessing window parameters:

Amplitude Interval –trend will contain only values inside this interval.
Speed interval – trend will contain only readings with speed inside this interval.
Min. Amplitude Difference – required minimal difference between two neighboring trend values.
Min. Speed Difference – required minimal difference of speed between trend values.
Date interval – trend will contain only values inside this time interval.
Min. Time Difference – required minimal time difference between two neighboring trend values.

Spectrum data cell data removal

Deleting readings from a spectrum data cell is made by the same way as when saving a trend. Just do not click the Save Trend button, but Delete button. You will be informed how many readings will be deleted. If you really want to delete these readings, confirm by clicking Delete. Attention! This action is not reversible. All spectra whose cursor value matches with applied filter will be deleted.

Data selection using static data cell

In the spectrum graph it is possible to select the set of data you want working with. E.g. you can select the data from last month only. This function is called Data Selection (Graph tab / Settings / Data Selection). The Data Selection window allows you also to select those readings which have the same measurement time as measurement times of other data cell (the control cell).

Use the Select by Cell button (in the Data Selection window). Enter the ID of control cell. You can find the cell ID in the Data Cell Properties window or right next to the tree name (Tree / Extended option has to be enabled).

By combining Postprocessing, Save Trend, Select by Cell, we have a powerful tool in hand.

Example:

We measured machine vibrations for a few hours using Run Up mode in VA4Pro device.

When displaying a waterfall spectra graph, you can notice several spectra with high amplitude in the

0-18 Hz band. These wrong measurements was caused by badly mounted sensor. To view a graph without these spectra we can use Data Selection. However, if measurement was made for several hours, the number of readings could be tens of thousands. So we use the Data Postprocessing function. We open spectrum graph and set the delta cursor to 0 Hz to 18 Hz. We open the Data Postprocessing window and select that we are interested only in amplitude values less than 0.7 mm/s.
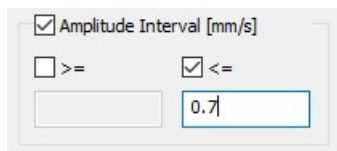
Click Save Trend button and enter the name of the data cell to be created. Now we will find the ID of created data cell. Find the data cell ID in the Properties window, next to the name or it is visible directly in the tree (Extended function enabled). Now we go back to the spectrum graph, select the Data Selection function and click Select By Cell button. Enter the data cell ID and confirm the window. Now we can display the waterfall and we see that unwanted measurements are no there.
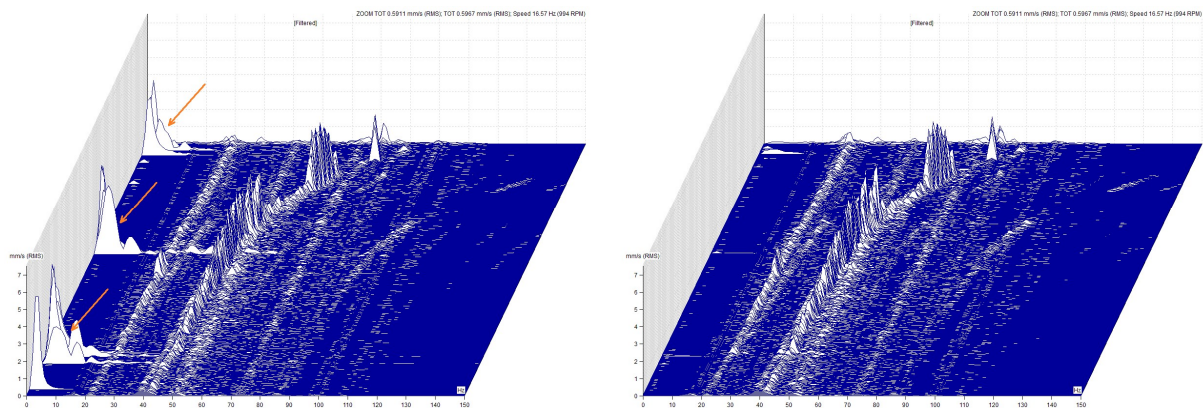
Display important data only

Data Postprocessing also allows you to quickly move between large amount of measured data and only between those measurements which are interesting for you.

Example: Lets have a measurement point with spectra, time signals and static data cells. Let's presume that we are interested to see only the data which were measured at the same time and when there was overall RMS value in spectrum in range of 20-30 Hz higher than 3.5 mm/s.

Open the spectrum graph, set the delta cursor on 20-30 Hz range and run the Data Postprocessing.

Set the amplitude value higher than 3.5 mm/s and save it as trend. Select the measurement point from the tree (all readings from the point will be displayed in Preview). Enable Align Cursor function in Graph type.
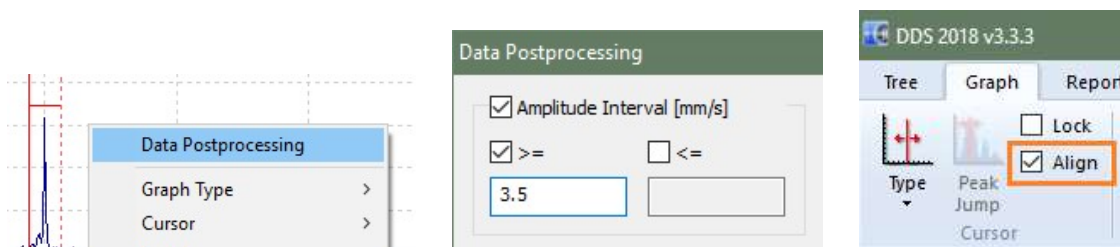
Data reduction

With Postprocessing, you can also reduce data by amplitude or speed. For example, if we measure coast down, where the speed will slowly decrease and the data will be measured very often, we will get a large number of measurements with the same speed. If we will look at waterfall spectra, the data will not be "well readable". There is simply too much of them. You can argue that the property of the waterfall view is that if there is too much of data, then it is "reduced" by itself. Yes, but this reduction is linear and does not depend on the speed value. The difference in speed between two spectra at the beginning of measurement will be significantly smaller than in the middle of set where the speed is steeply decreasing. Therefore, it is more appropriate to create a trend using Postprocessing that will

have the Min parameter Speed Difference, eg. 5 RPM, and then use it in Data Selection (Select by Cell).
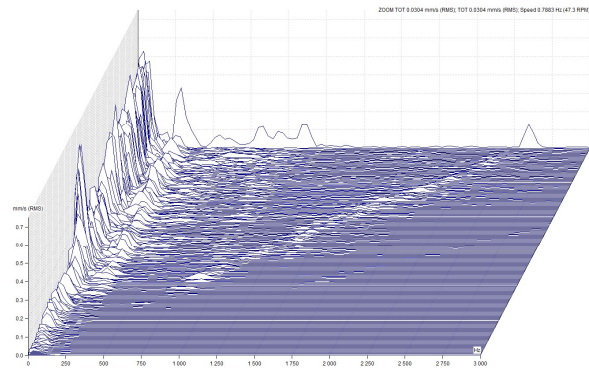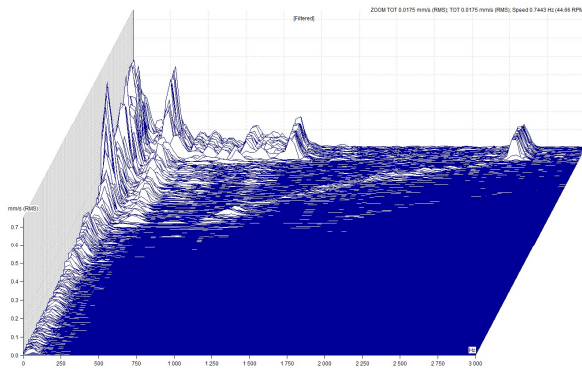
The same way we can work with the required Min Amplitude Difference and Min. Time Difference between every neighboring values.

The last possibility of data reduction is to specify a required time interval. The resulting trend will only contain the values from the spectra measured in this interval. If you run Data Postprocessing function in the Amplitude + Trend spectrum graph view, the Date Interval parameter is set according to the X-axis zoom in the trend graph, and the Amplitude Interval parameter is set according to the Y-axis zoom in the amplitude graph.

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Next technical information you find on www.adash.com

Labels in graph

You can add short text labels into the graphs, which can be connected to the certain value in the graph. There are two types of labels which can be added to the graph: user labels and generated labels.

User Labels

You can enter the text and choose the position of the label. To enter the user label, do the double click on the graph (the window with label settings appear) or do the right click on the graph and you will receive the menu where select Labels/Add Label. You can add the label to the position of the cursor. The cursor needs to be switched on and you can add the label by doing the right click and selecting Add label or you can add the label through the main menu Graph/Labels/Add to Cursor.

To edit existing label do double-click on the label or do the right click on the label and select Edit from menu displayed. To change the position of the label, drag it with mouse.

The user labels are saved together with certain reading (e.g. spectrum) and they are displayed together. In view type Waterfall the labels are not displayed.

Edit of user label

The position of label rectangle can be changed by mouse.

The position on the X axe change by mouse. Drag the small cross which is on the bottom end of line and move anywhere.

Use the right click on user label and select Edit (double click on label has the same effect). The new window appears. You can change the text.

Use Ctrl+Enter for new line in text.

If the checkbox **Link to value** is off, then the line from label rectangle to graph will not be drawn.

Generated Labels (Bearings, Vanes, Gear, General)

The other labels are generated labels. The text and position is generated from parameters defined by user (which can be changed in window Tree item properties). Those labels are displayed in groups between which you can switch (in main menu tab Graph/section Labels/Change group or use right mouse click and select Labels).

Graph Type	>
Cursor	>
Peak Jump	
Enter Speed	
Families	
Y Axe Unit	
Phase Type	>
Y Axe Type	>
Y Axe Detect	>
X Axe Unit	>
X Axe Type	>
Order Type	>
Sort By	>
Auto Scale	
Y Scale	>
Zoom	

Labels	>
Bands	>
Grid	>
Export / Print	>
Data selection	
Hide lines	
Display hidden lines	
Position	>
Close	

| Add Label |
| Delete All User |
| Display User |
| ✓ Display Bearings |
| Display General |
| Display Gear |
| Display Vanes |
| Display Speed |
| Display Top Peak |
| Induction Motor |
| Display Only Selected Bearing |

Bearings

The fault frequencies of bearings are displayed. They are defined in any tree item above the data cell (window Tree item properties/Labels). The labels are displayed in case that the speed is known in spectrum or it is inherited from the tree item above the data cell.

The failure frequencies are displayed for each bearing. If you want to display the selected bearing labels then push right mouse button and select **Labels/Display Only Selected Bearing**. The speed value is required for failure frequencies detection. This value can be measured, manually entered (Default speed in Properties) or inherited from higher tree item.

FTF - Fundamental Train Frequency
BPFI - Ball Pass Frequency of Inner ring
BPFO - Ball Pass Frequency of Outer ring
BSF2 - Ball Spin Frequency * 2 = Ball defect frequency
BSF2 is the bearing failure frequency which you can see exactly in the spectrum, because spinning defective ball hits the bearing twice during one ball revolution: once hits outer ring and once inner ring.

General, Gear, Vanes

The position is defined by frequency entered by user. Those labels are defined in Tree item properties/tab Labels. When the unit is **x Speed**, then it is related to the **OUTPUT** speed of item. It is important for gearboxes. Groups Gears and Vanes could be defined in group General, but there would be overlapping of the labels and it could be confusing. For this reason it is better to divide the labels into the groups and switch between them.

Speed

Displays speed frequency, which can be measured or entered in Properties.

Top Peaks

The list of N top peaks is displayed. The number N is defined in Global settings / Dynamic Graphs / Other / Top Peaks Count.
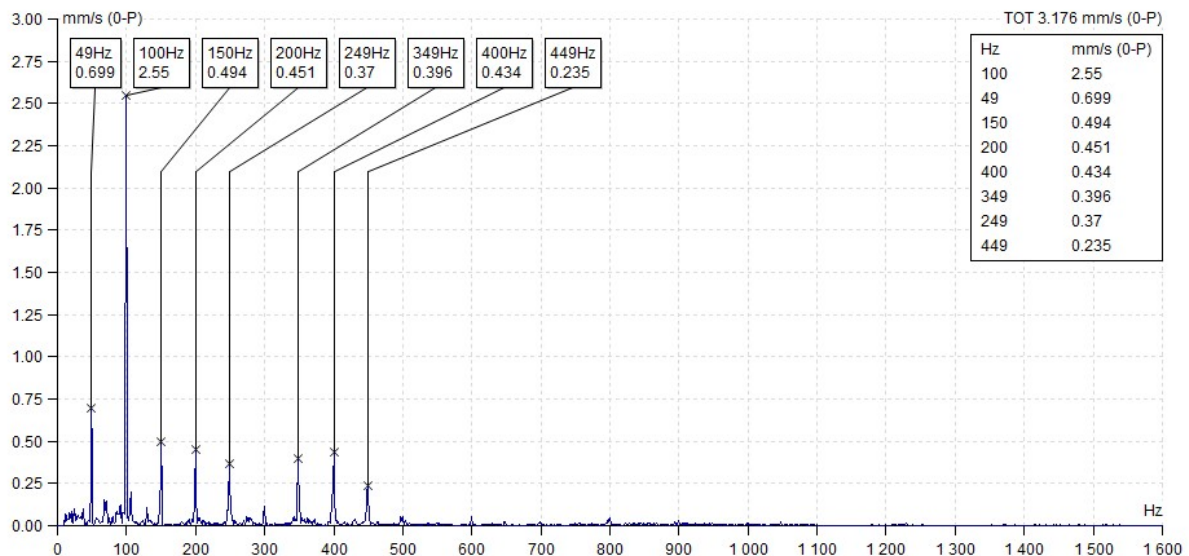
Induction (asynchronous) Motor

Displays FL with FL+/-FP sidebands on spectrum graph. The proper spectrum resolution is also required (at least two lines between line frequency and sideband). Option is available only on spectrum measured in current or voltage.

Defect frequencies of the asynchronous electric motor:

fL: line frequency
fP - pole pass frequency (= slip frequency * poles number)
fS: slip frequency (real speed must be measured together with spectrum)
fL+/-fP: side-band frequency (indicates interrupted rotor rod)

The side bands should be at least 40dB less then line frequency line. If not, then interrupted rotor bars are probable.

Display only selected bearing

Displays only one (selected) bearing in spectrum. Normally are displayed all bearings defined in Properties, which can confuse the reader of reports.

Families

Families are a powerful tool for frequency spectrum analysis. This feature enables quicker identification of the significant peaks in the spectrum.

Peak definition:

The peak contains 5 lines with the middle line being the highest and those next to it decreasing in size (the 1st and 5th line are the lowest lines).

Pure math Peak definition:

The spectrum contains lines f_i (i=1,..,N), which have the amplitudes a_i. If k exists, for which the following is true: $a_{k-2} < a_{k-1} < a_k > a_{k+1} > a_{k+2}$, then the f_k is the Peak.

Noise limit (threshold):

The noise limit is in RMS - 0.1g, 0.1mm/s, 10um or 1% of TOT of spectrum (depends of which value is higher). For example when the TOT = 3mm/s, then 1% of that is 0.03mm/s, Because it is lower then 0.1mm/s, then the 0.1mm/s will be used. When TOT=20mm/s, then 1% is 0.2mm/s. It is higher then 0.1mm/s and the 0.2mm/s will be used as noise limit.

Definition of **Frequency family**:

It the set of frequencies in spectrum, which are related to the carrier frequency. The relation can be harmonic or sideband. The sidebands also can be around each harmonic frequency. The individual line is included to set only when the peak also exists on that line and the amplitude is higher then noise limit.

Family with only carrier frequency.

Family with harmonics. The 3rd, 6th and 9th harmonics are missing, because there is not peak or the peak is lower then noise limit.
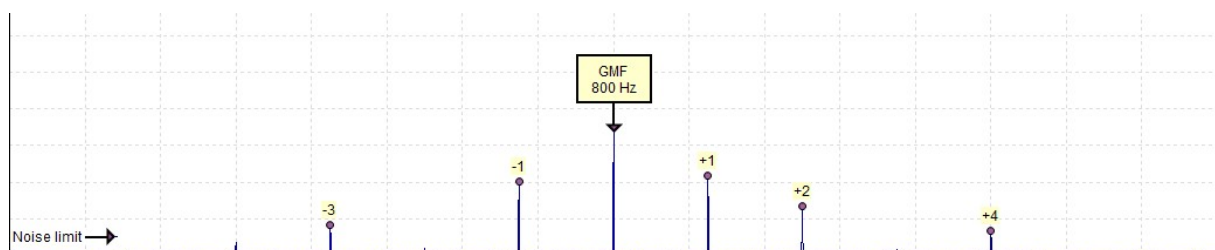
Family with sidebands, some of them are missing.

Using of families

To display the frequency families, select the Graph tab and then the Families button
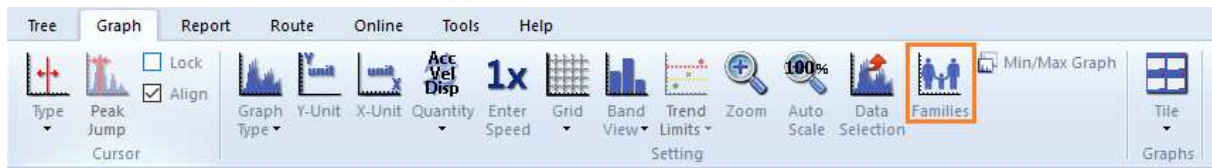
or select Families in the local spectrum menu (right mouse click).
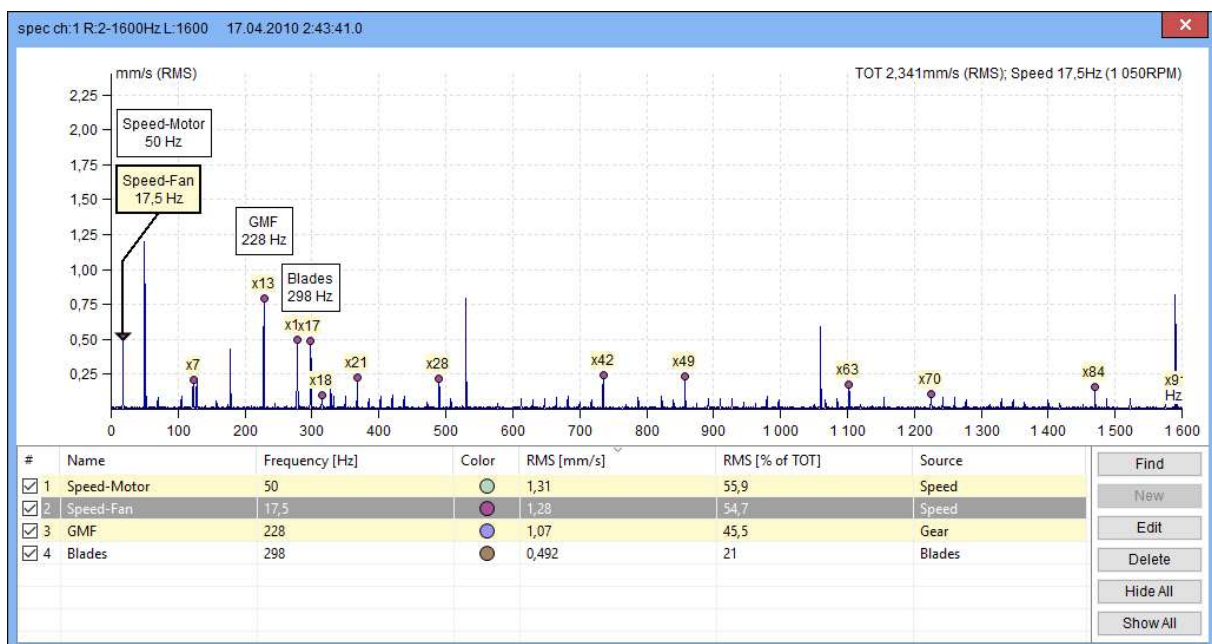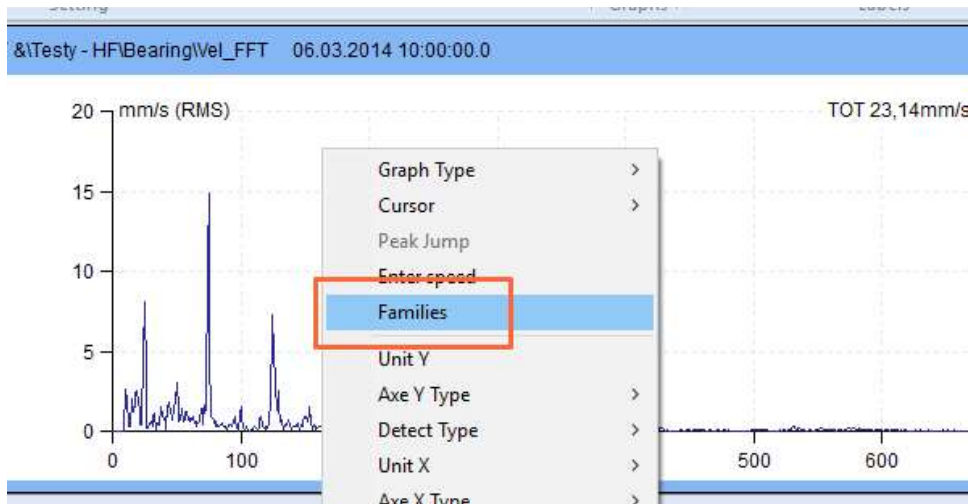
When the Families function is switched on, the window is split into two parts. The spectrum with the labels on the selected frequencies of families is in the upper window. A detailed list of families with their parameters is in the bottom part. Initially this list contains all frequencies, which are defined in Properties of all items in machine path.

Family parameters are the following:

Name – name of the family
Frequency – peak frequency
Color – color of the family label (generated randomly)

RMS – total RMS of family (RMS of one frequency is counted from 5 lines)
RMS [% of TOT] – percentage of the family RMS, when 100% is RMS of complete spectrum. You can see, the sum is not equal 100%. It is correct because many peaks are contained in more then one family.

Source – family source (Speed, Bearings, General, Gear, Labels, Found, User)

Which families are displayed in the spectrum? All checked families (first column in the list) are displayed. The selected frequency the list or frequency selected by cursor is highlighted.

If the family is not displayed (the first column is unchecked), then the family frequencies peaks are hidden.

You can change the order of the families in relation to each column. Click on the name of the column.
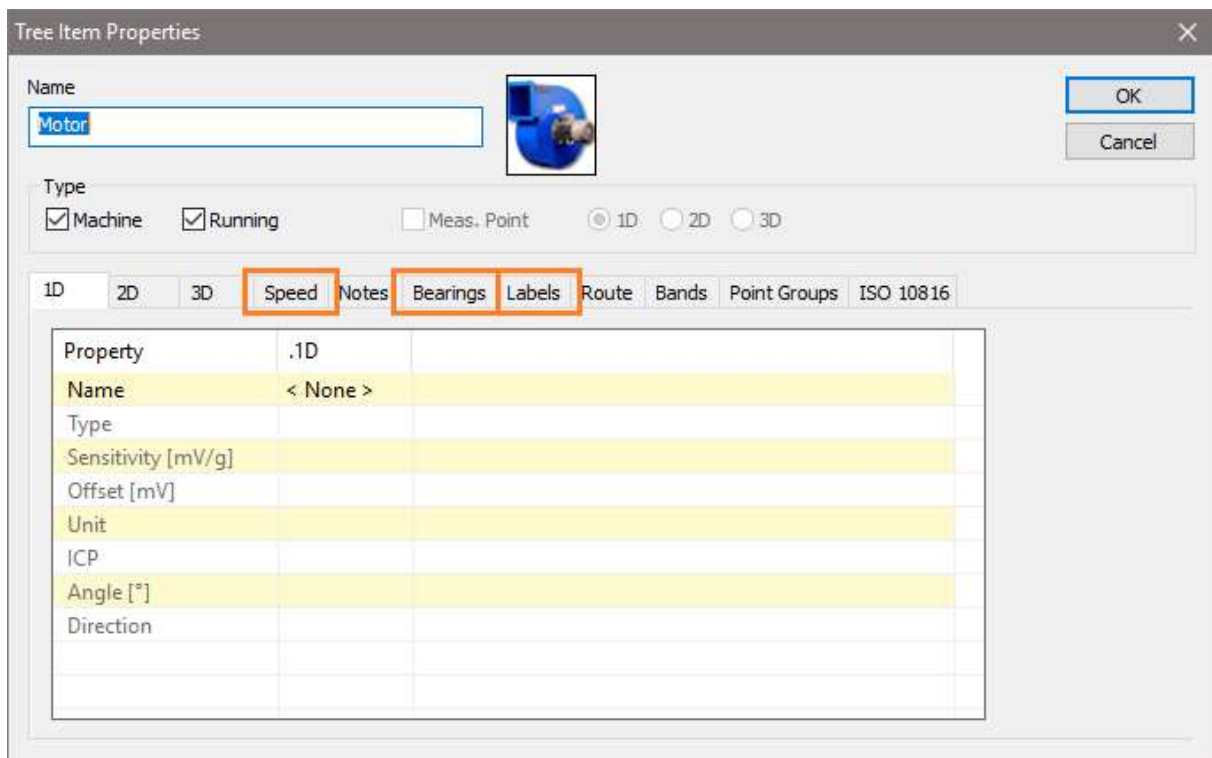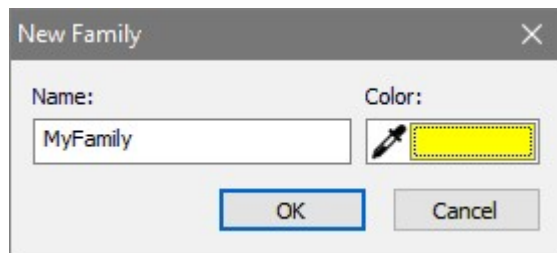
Family Searching

Other families that exist in the spectrum can be found with the Find button (the button is on the right, next to the list of families).

Press the **Find** button. The procedure will find next families in the spectrum. The new frequencies with their labels appear in the spectrum. These frequencies have next needed properties:
- The **Peak** exists on the frequency,
- The amplitude value is higher the **Noise Limit**.

You can also create new family manually. Display the cursor and move it to required frequency. It does not matter what type of cursor you use. Press the New button to open the window with Family parameters and enter required values. Press OK button to confirm the parameters. When you select the frequency, which is used by other existed family, then the warning window appears and new family will not be created. When on selected frequency is not peak or the amplitude is lower then noise limit, then warning appears and new family will not be created.

The Delete button deletes the selected Families in the list.

The Hide All button unchecks the first column of all Families. The Display All button checks the first column of all families.

Reporting

Reports are used to present the measured data. In the Report tab are tools for report making. One report corresponds to one DDS page (more about DDS pages see chapter Drawing of graphs -> Plot/Report Area and Pages).
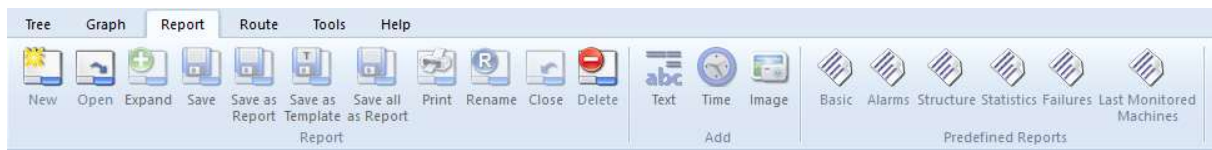
User Reports

You can create own reports. You can add into texts, images and graphs. Graphs are alive and you can work with them as in Preview page or plot page.

Page format for printing you can set in Tools/Setting/Global/General/Report/Page Format.

Functions for creating report page, saving and other function are in Report section.

Function for inserting report objects are in Add section.
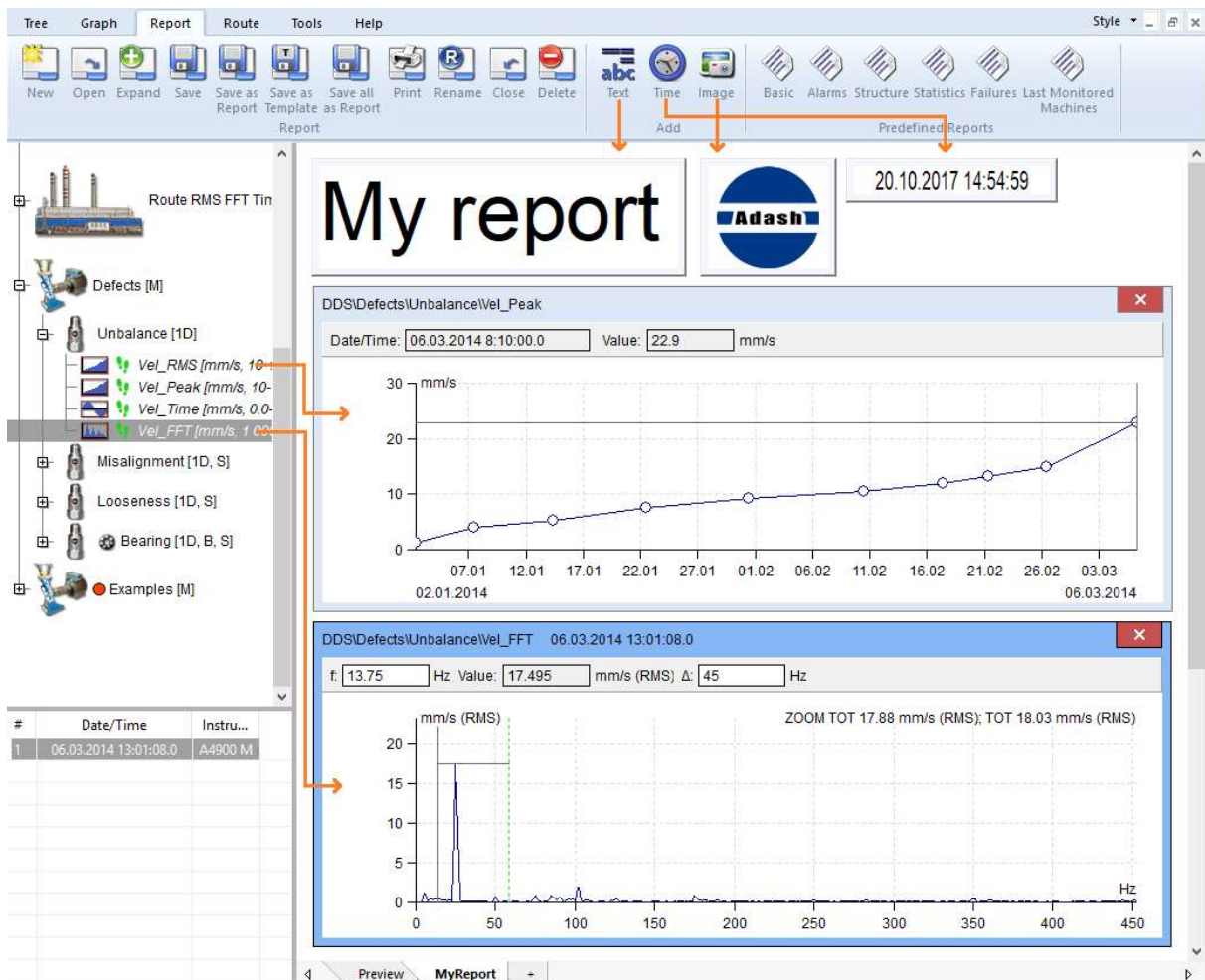
Predefined Reports

The process of making reports is always the same. First, you select set of tree items, containing the required data and click on one button of predefined reports. Second, change settings of specific report and click Ok. The report is created as new page. Please, try to create all report types and look for content.

Basic Report

Database: Main factory
Report Date: 20.10.2017
Report Interval: Last 1 values

(Ok - O, Warning - W, Alert - A, Danger - D)

Name	Date	Value	Unit	Alarm
FACTORY A3012 J23\CB035 B28				
BELT 27\MOTOR\MTR-NDE\ H-VEL OVR ISO HOR	07.05.2015 9:08:59	2.15	mm/s	
BELT 27\MOTOR\MTR-NDE\H-ACC OVR HOR	07.05.2015 9:08:59	0.136	g	
BELT 27\MOTOR\MTR-NDE_ch2\ V-VEL OVR ISO VERT	07.05.2015 9:08:59	1.4	mm/s	
BELT 27\MOTOR\MTR-NDE_ch2\V-ACC OVR VERT	07.05.2015 9:08:59	0.137	g	
BELT 27\MOTOR\MTR-NDE_ch3\ Ax-VEL OVR ISO AX	07.05.2015 9:08:59	1.67	mm/s	
BELT 27\MOTOR\MTR-NDE_ch3\Ax-ACC OVR AXIAL	07.05.2015 9:08:59	0.316	g	
BELT 27\MOTOR\MTR-DE\ H-VEL OVR ISO HOR	07.05.2015 9:09:49	1.68	mm/s	
BELT 27\MOTOR\MTR-DE\H-ACC OVR HOR	07.05.2015 9:09:49	0.291	g	
BELT 27\MOTOR\MTR-DE_ch2\ V-VEL OVR ISO VERT	07.05.2015 9:09:49	2.55	mm/s	
BELT 27\MOTOR\MTR-DE_ch2\V-ACC OVR VERT	07.05.2015 9:09:49	0.16	g	
BELT 27\MOTOR\MTR-DE_ch3\ Ax-VEL OVR ISO AX	07.05.2015 9:09:49	1.95	mm/s	
BELT 27\MOTOR\MTR-DE_ch3\Ax-ACC OVR AXIAL	07.05.2015 9:09:49	0.577	g	
BELT 27\GBOX\INPUT-DE\H-VEL-NDE-OVR	07.05.2015 9:10:41	1.18	mm/s	
BELT 27\GBOX\INPUT-DE\H-ACC-NDE-OVR	07.05.2015 9:10:41	0.173	g	
BELT 27\GBOX\INPUT-DE_ch2\V-VEL-NDE-OVR	07.05.2015 9:10:41	0.809	mm/s	
BELT 27\GBOX\INPUT-DE_ch2\V-ACC-NDE-OVR	07.05.2015 9:10:41	0.058	g	
BELT 27\GBOX\INPUT-DE_ch3\AX-VEL-NDE-OVR	07.05.2015 9:10:41	1.75	mm/s	
BELT 27\GBOX\INPUT-DE_ch3\AX-ACC-NDE-OVR	07.05.2015 9:10:41	0.055	g	
BELT 27\GBOX\INPUT-NDE\H-VEL-NDE-OVR	07.05.2015 9:11:35	0.769	mm/s	
BELT 27\GBOX\INPUT-NDE\H-ACC-NDE-OVR	07.05.2015 9:11:35	0.171	g	
BELT 27\GBOX\INPUT-NDE_ch2\V-VEL-NDE-OVR	07.05.2015 9:11:35	0.99	mm/s	
BELT 27\GBOX\INPUT-NDE_ch2\V-ACC-NDE-OVR	07.05.2015 9:11:35	0.07	g	
BELT 27\GBOX\INPUT-NDE_ch3\AX-VEL-NDE-OVR	07.05.2015 9:11:35	3.29	mm/s	
BELT 27\GBOX\INPUT-NDE_ch3\AX-ACC-NDE-OVR	07.05.2015 9:11:35	0.084	g	
BELT 27\GBOX\OUT MOT-DE\H-VEL-NDE-OVR	07.05.2015 9:12:10	1.28	mm/s	

Preview   **Basic Report**   +

Report section

Section is contained in Report tab.

New

Click on the button New and enter the report page name. You must always create report page by this **New** function. The report functions are not available in standard Plot page (created by "+").

Open

The list of saved report/template pages appears. Select one of them and open it.

Checked Reports (on the beginning of each line in the list) will be opened automatically after tree opening.

X	Name	Type
☐	Faulty pump	Report
☐	Defects	Plot
☐	Bearing	Template

X = Open on start
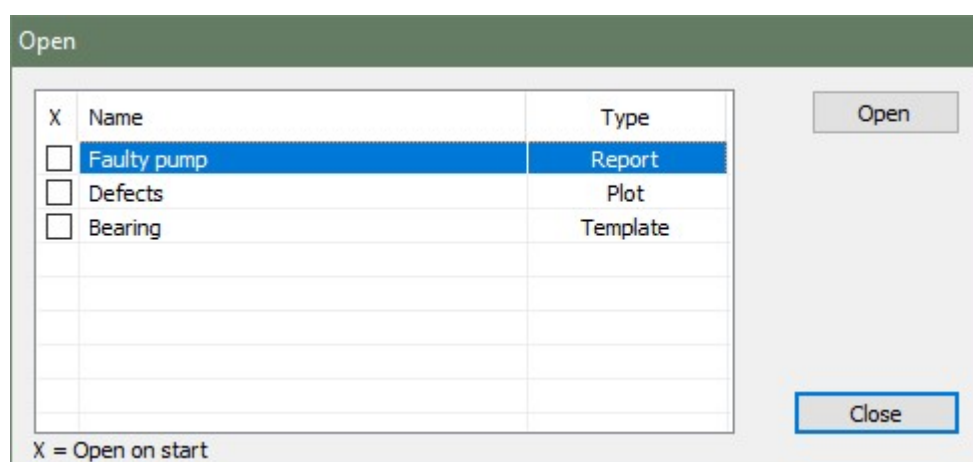
Expand

When you create a new reporting report, then only the first printing page is created. In the process of report development you will probably need a longer document. The Expand function makes the document longer and creates new empty space for writing. The page separators are also displayed.

Save

It saves the selected page. It uses the page name.

Save as Report

Enter the new name and save the selected page as report.

Save as Template

Enter the new name and save the selected page as template.

Save All as Report

Save all open pages under one name.

Print

It prints selected page.

Rename

It renames selected page.

Close

It closes the selected page in plotting area.

Delete

The list of saved pages appears. Select one of them and delete it.

Add section

Section is contained in Report tab.

Text

It adds the empty text box into the report. Use the right click and select the Edit or do the double click in the box. Next edit window appears. Write your comments, use formatting of text.

Use the drag and drop to move the box.
Use the right click and select the Delete to remove the box.

Time

It adds the date+time box with actual date and time. Use the drag and drop for moving of box. Use the double click to update the value.

Use the right click and select the Delete to remove the box.

Image

It adds the image into the report. Initially the empty box is created and the window Image Select appears. Initially it contains the empty list. Use the Add button and select image file or images from the computer. Selected images are added to the list and saved to the tree. If the list contains required image select it and press OK. The image appears in the image box.

Use the right click and select the Select Image or do the double click in the box for change of image.

Use the drag and drop for moving of box.

Order of objects

All objects in report can be moved forward and backward to place them with correct order. Use right click and the **Position** command.

Predefined Reports Section

Select the tree item and click on one button from predefined report. Define time interval in next window. Select columns, which you want to see in report in next window. You can hide this windows by check the checkbox "Don't ask me again". You can display this window again by settings in Global Settings/tab General/section Report/Basic – Select Columns Window or Alarm – Select Columns Window.

If you wish to show the reduce paths to the tree items in report (machine – meas.point – data cell), set up the option Reduce path to Yes. It is in Tools / Globals / General / Report / Reduce Paths.

Basic

This report enables to print:

- all static readings from defined time interval
- last static readings
- static readings from last N days (N is manually entered)

Alarms

It develops the list of all alarms of the selected tree item and its all children. If the selected item is below the machine, then all alarms of that machine will be displayed.

Structure

It develops the text print with the tree structure of the selected tree item and its all children.

Statistics

Creates the list of statistic parameters of all static data cells. List contains following stats:

Average– average of values
Median - average alternative, elimination of extremes is advantage here
Weighted average - the time interval between readings is used as the weight. If for example we have one reading per day, then 1 day is the weight. If in this data cell we have one reading in one weak (we missed others) then this one reading have the weight 7 days. In the average it is used seven times.

Relative variation AVG - responds to the variation of readings in data cell. If all readings have the same value, then it is 0. It is the percentage variation weighted to the average.

$$EX = \frac{1}{n} \times \sum_{i=1}^{n} x_i$$

$$v = \frac{1}{n} \times \sum_{i=1}^{n} |x_i - EX|$$

$$var\% = \frac{v}{EX}$$

Failures

The Failures report is created. Follow next steps:

Select tree item (Hall A).
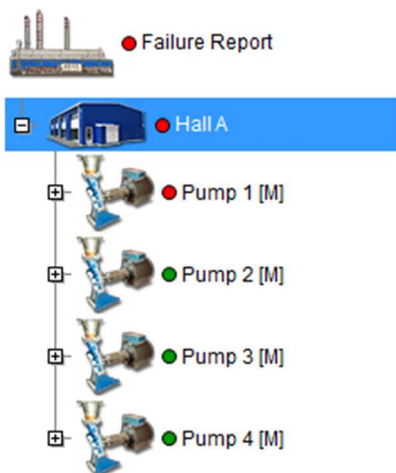
Select Report/ Add/ Report/ Failures.
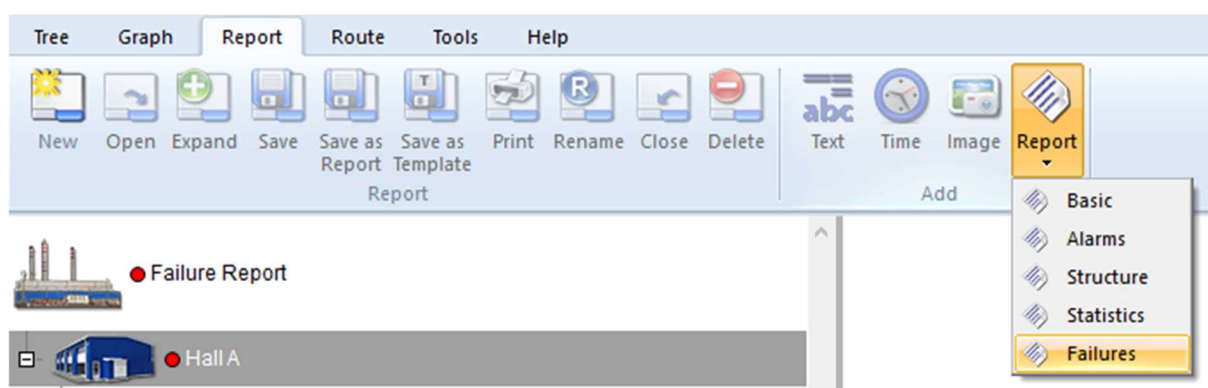
Enter severity limit. Only higher severities will be included to report. Check whether you want report which contain FASIT or User Notes or both. Press OK:

Failures Report

09.09.2016

FASIT Severities

Machine	Last Meas. Date	Failure	Severity	Alarm
Failure Report\Hall A\Pump 1	01.06.2015	Unbalance	98%	🟥
Failure Report\Hall A\Pump 4	03.11.2015	Looseness	91%	🟥
Failure Report\Hall A\Pump 3	03.12.2015	Misalignment	89%	🟥
Failure Report\Hall A\Pump 5	23.01.2016	Other	77%	🟥

User Notes

Tree Item	Date	Failure	Text	Severity	Alarm
Failure Report\Hall A\Pump 4	12.09.2016	Looseness	Repair!	100%	🟥
Failure Report\Hall A\Pump 1	09.09.2016	Unbalance	Repair!	100%	🟥

Alarm colors are used in % intervals <0,33), <34,66), <67,100).

Last Monitored Machines

It is list of machines, which have at least one reading in defined time interval. The last reading is printed in table. The ID of machine is defined in Properties of machine.

FASIT Report

Report is focused only on FASIT data cells. The user selects a part of the tree, selects the time interval and chooses which information from FASIT will be displayed. Data cells that do not contain any data will also be displayed (for easy comparison with the previous reports).

Printing of colors in printer

When you print reports, you can switch on or off the colors. It depends of your internet browser. In case of MS Internet Explorer such parameter is in Page Setup section (Tools/Print/Page Setup).

Route tab

Select the Route menu item. The plotting area is closed and the list of saved routes appears. Each route is the list of machines. You can expand every branch in the list by mouse.

Basic Operations

Create New Route

Drag the required part of the tree on the left and drop it to Routes area.

If you drop it to empty area (the cursor symbol is arrow), then you manually enter the name and new route appears in the list.

Add next machines or point to the route

Drag the machine from the tree on the left and drop it to selected route in the list. The cursor symbol is [+]). You can add only machine, it is not possible to add for example the point.

Route section

New

Creates new empty route. The machines must be added (drag and drop) separately. This is the correct way how to define route. Firstly create the new route in **Routes** list and then move machines by mouse from the tree to the route.

Delete

Deletes selected route(s) in the routes list.

Rename

Renames selected route in the route list.

Delete Items

Deletes selected items from one route.

Instrument section

Section is contained in Route tab. Each button from this section, represents one of measurement instrument. Press the button and instrument window appears. You can found in the next chapter how to work with this window.
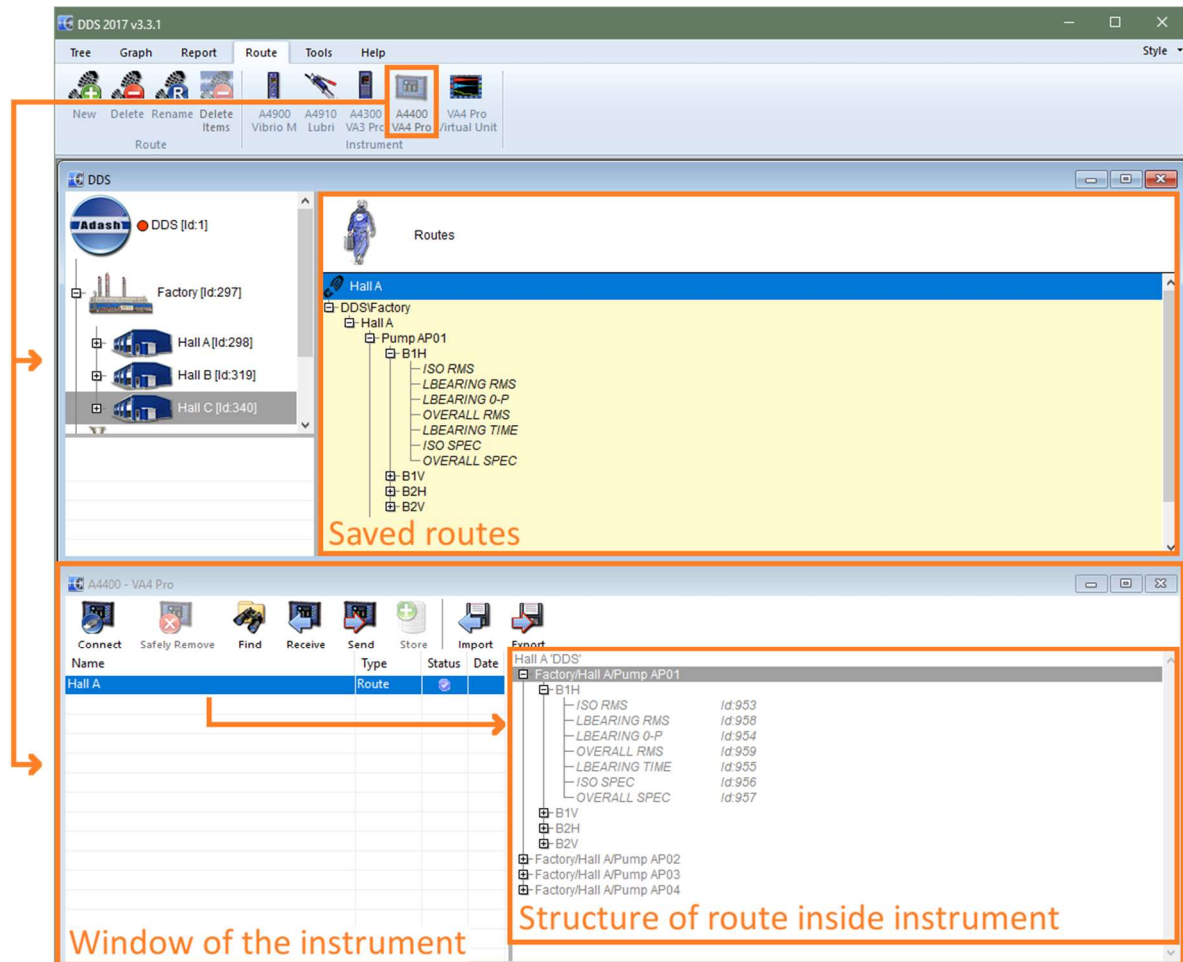
A4900 Vibrio M

Opens A4900 Vibrio window. This instrument is free.

A4910 Lubri

Opens A4910 Lubri window.

A4300 VA3 Pro

Opens A4300 VA3 Pro window.

A4300 VA3 Lite

Opens A4300 VA3 Lite window. This instrument is free. It enables to use only subset of all measurement types in VA3. It enables to to use only readings which are available in A4900 Vibrio unit.

A4400 VA4 Pro

Opens A4400 VA4 Pro window.

VA4 Pro Virtual Unit

Opens VA4 Virtual Unit window. This unit is free. It enables to run the VA4 Pro firmware in the PC.

Data download to and from the instrument

Download procedure is very similar for all instruments. We describe how to work with the instrument VA4 Pro. The differences between the instruments will be described.

Route upload to the instrument

1. Connect instrument by USB cable.
   The VA3 and VA4 can be switched on or off. The Vibrio and Lubri must be switched on.

2. Open the instrument window (push the button with instrument icon). Press the **Connect** button to open connection with instrument. DDS automatically download structure of data which are saved in instrument.
   The Vibrio and Lubri are connected directly, without **Connect** button.

3. Drag and drop selected route from **Routes** list to the instrument window.
   You can drag and drop selected machine(s) directly from the tree. But it is better to create the route in the **Route** list. You can use it repeatedly. It is also better for large routes.

4. Select one or more routes in the instrument window (blue colored). Press **Send**. Routes are uploaded to the instrument.
   The Vibrio and Lubri can use only one route. Be careful, the new route overwrites the old one.

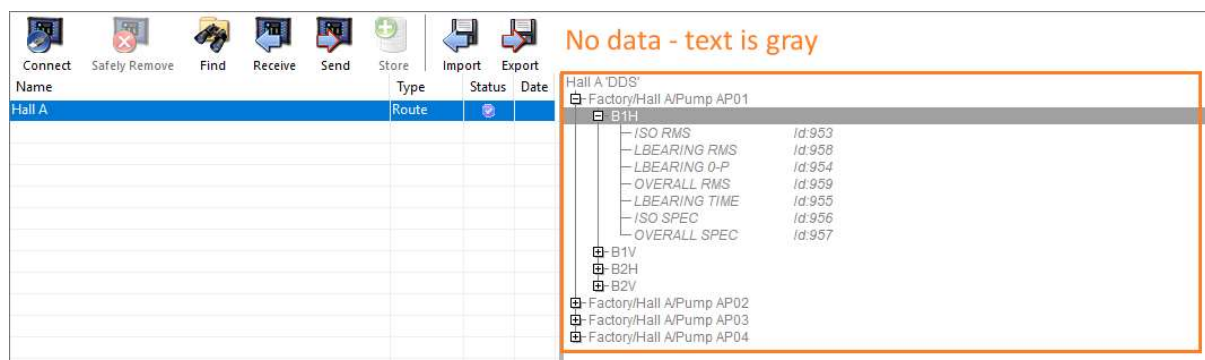5. Press the **Safely Remove** button and disconnect the USB cable.
6. Now you are ready to measure the route.

Route download from instrument to DDS

1. Connect instrument by USB cable.
   The VA3 and VA4 can be switched on or off. The Vibrio and Lubri must be switched on.

2. Open the instrument window (push the button with instrument icon). Press the **Connect** button to open connection with instrument. DDS automatically download structure of data which are saved in instrument.
   The Vibrio and Lubri are connected directly, without **Connect** button.

3. Select the route. The offroute data also are in the list. Look at the **Type** and search the **Route** text. In the right window area the route structure is displayed. Press **Store** button. Data are copied to the DDS tree. When the route items are gray colored, then no data are saved in the instrument. If item contain data, then is black colored and the date and time of last reading is displayed.

Gray items, no data saved in the instrument.

Black items with data and date and time of last measurement.

4. Press the **Safely Remove** button and disconnect the USB cable.
5. Now you are ready to analyze data in DDS.

Download of off-route data

You can make measurements also in other modules then Route. These data are saved in the instrument and you can download them to the DDS.
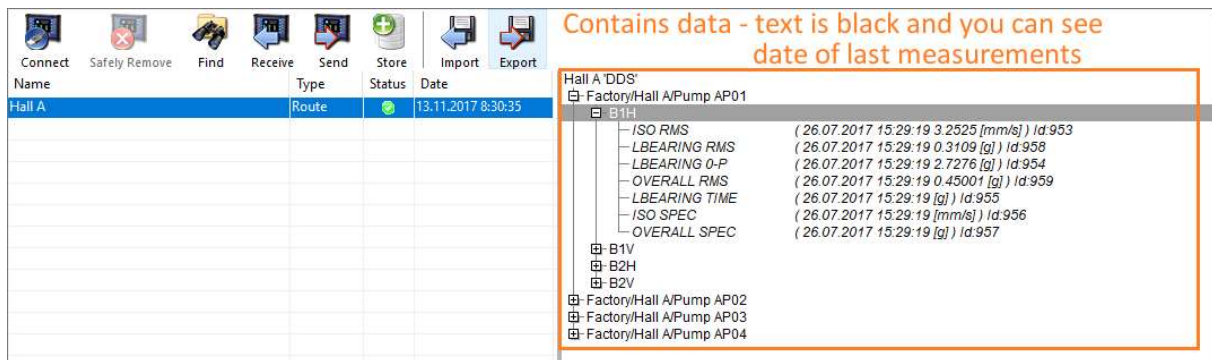
1. Connect instrument by USB cable.
   The VA3 and VA4 can be switched on or off. The Vibrio and Lubri must be switched on.

2. Open the instrument window (push the button with instrument icon). Press the **Connect** button to open connection with instrument. DDS automatically download structure of data which are saved in instrument.
   *The Vibrio and Lubri are connected directly, without **Connect** button.*

3. The **Type** off data is displayed for every item in the list. It tells you, in what module were data measured. Select required item. You can see the structure in the right side. The date and time of last measurements are displayed. You can drag the item from the left list or item(s) from right list and drop it directly to the required position in the tree.
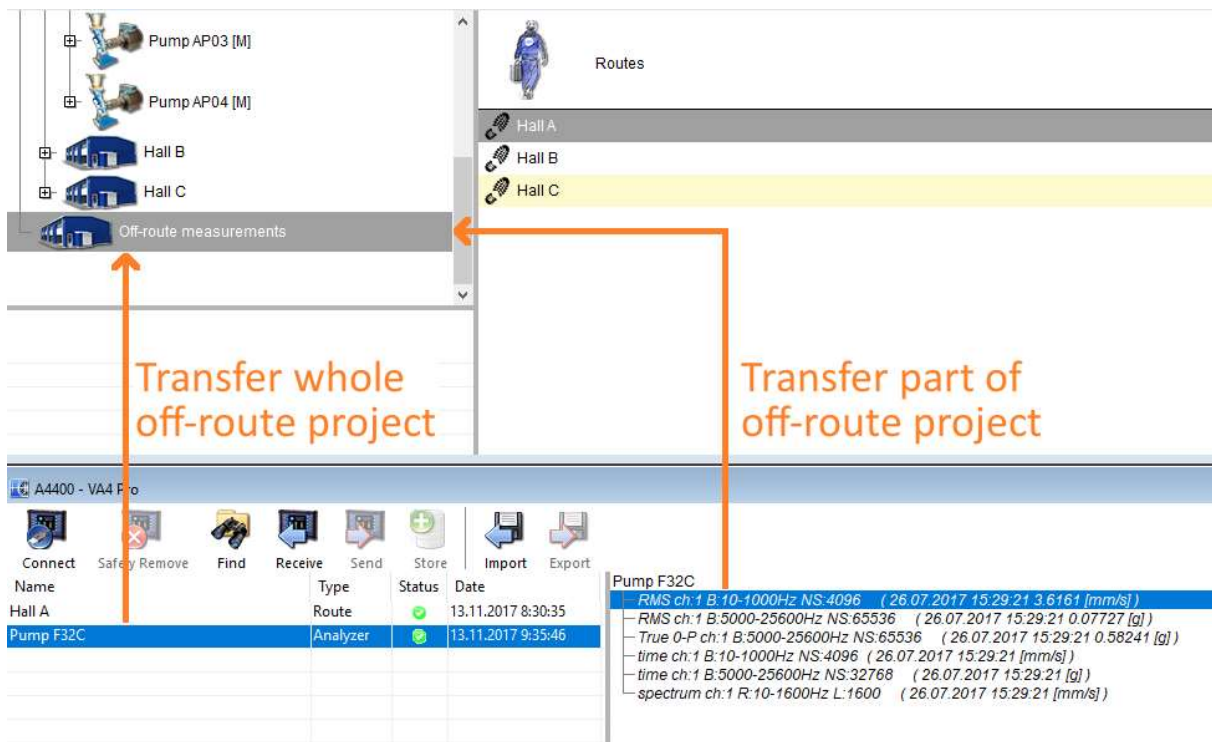
Instruments Window

The window contains:

- menu with buttons,
- list of projects in the left side,
- structure of selected project in right side.

The **Status** information exist for every project. Three colors exist.

blue   the project was only in the list in DDS, it is not uploaded to the instrument yet,
black   the project is uploaded to the instrument already, but it is empty (no measurements),
green   the project contains readings, which can be downloaded to DDS.
red   the project file in instrument is damaged. An unexpected error occurred when loading.

Status	Date
⊘	
⊘	
⊘	9. 12. 2014 10:56:26
⊗	

Connect

Open the connection (interface) with instrument. It reads projects from the instrument.

Safely Remove

Always use the safely remove button before you disconnect the USB cable.

Find

The exploring of path to Virtual Unit data folder or path to the copy of instrument files folder.

Receive

Reads the projects from instrument.

Send

Sends selected project(s) to the instrument.

Store

Saves route(s) to the DDS. It works only for routes.

Export and Import

The **Route Downloader** software enables upload and download routes to the instrument without DDS software. It is suitable for remote data collection. You create the **Export** file (.rdi) for selected route and this file you send by email to the person, which will measure the route. This person uses the **Route Downloader** software (free) and uploads route to the instrument. Then he can make measurements. By using the **Route Downloader** software again he creates the file (.rdx) with data. This file he sends by email back to the office. You use the **Import** function to download the route data to the DDS. See the **Route Downloader** manual for details.

Run

This button is available only in VA4 Virtual Unit window. It runs the Virtual Unit software. Then you can analyze records saved in computer.

Program Virtual Unit is currently being delivered as an installation package. If it is correctly installed, DDS automatically detect Virtual Unit paths. If the Virtual Unit was copied manually to computer, you have to set Virtual Unit paths to DDS global settings manually. If you cannot open instrument window Virtual Unit or you cannot run program Virtual Unit (icon Run in interface window), make sure that paths are set correctly. DDS needs to know the location of two Virtual Unit folders.

Main folder – folder contains binary files of the Virtual Unit. Inside you can find folder named *bin* and file *VA4.ini*. The path is usually *C:\Program Files (x86)\Adash\A4410 Virtual Unit* (applies to Windows 7 and later, 64bit).

Data folder – into this folder the Virtual Unit saves all measurement data. The path is usually *C:\Program Files (x86)\Adash\A4410 Virtual Unit* (applies to Windows 7 and later, 64bit). If you are not sure where this folder is located, you can read this information from the file VA4.ini in main folder (key PATHS ver.Virtual Unit 2.57 and later).

Both Virtual Unit paths are saved in DDS Global settings:

- Tools/Globals/tab General/section Application/VA4 Virtual Unit Path (main folder)
- Tools/Globals/tab General/section Application/VA4 Virtual Unit Data Folder (data folder).

Online tab

Tab Online is displayed only if online database is opened. In a case of route database the online tab is hidden. Online database is special type of database, which is designed for continuous online data collection from instruments series three thousands (A3716, A3800).
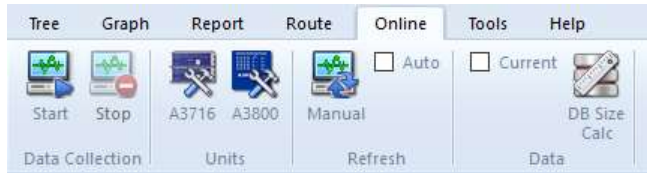
Data Collection section

Start

Send configuration into all connected online instruments and run data collection.

Stop

Stop data collection from all connected online instruments.

Units section

A3716

Open window for management of online units A3716.

A3800

Open window for management of online units A3800.

Refresh section

Manual

Manual refresh of opened graphs.

Auto

Turn on/off auto refresh of data in opened graphs.

Data section

Current

Opens page for displaying static measurements, which are measured right now. Data isn't read from the database, but directly from the online instruments.

DB Size Calc

It calculates the estimated database size per year.

Tools tab

The Tools menu item contains functions for settings of DDS.

Settings section

It is contained in Tools tab.

Sensors

The list contains predefined sensors, which can be used in Point properties definition. Push the **Sensors** icon. The new window with sensors list or empty box appears. Push **Add** and define the new sensor. You can edit the existing sensors by **Edit** button or by double click. If the predefined sensor is used in Route, then its name is also displayed. It should simplify the handling with sensor in route.

Sensors Setting

Name	Settings
AC150	100 mV/g ICP

Tabs: 1D 2D 3D

Buttons: Add, Edit, Remove, Close

Sensor

Name: AC150

Property	1D
Sensitivity [mV/g]	100
Offset [mV]	< None >
Unit	g
ICP	On
Input	AC+DC
Settling prolongation [s]	0

OK   Cancel
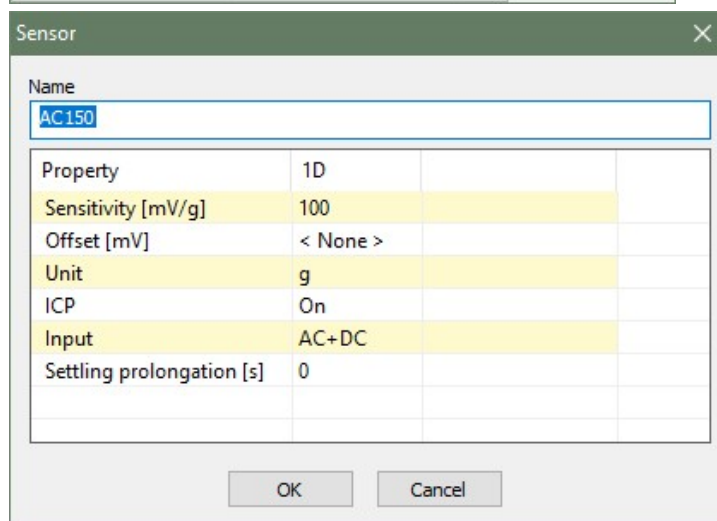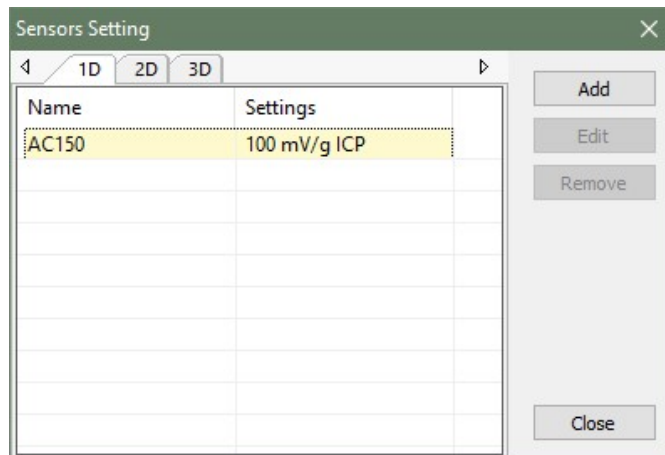
Bearings

After the installation of the DDS, there is file bearings.lbr in installation folder of DDS\data. It contains approx. 30 000 bearings. It is large number and to work with such long list would be difficult. That is why the user can create his own database of bearings, which contains the subset of complete list. This database contains all bearings which are used in the Tree. The User's list of bearings is empty in the new Tree. The required bearings needs to be imported firstly from bearing database (file bearing.lbr).

Press the button **Bearings** to display the window User bearing database. The list of the bearings which were added to the database is displayed. When no bearings were added previously, the list is empty.

Press **Import** to import bearings. DDS opens the file bearings.lbr.

Select required bearings and press **Add**. Use the **Find** function for faster searching. The bearings are imported to the User's database. When you finished import of all required bearings close the window.

The bearing fault frequencies can be defined by two ways:
- to define geometry of bearing (numbers of balls, ball diameter, pitch diameter and contact angle).
- to define four parameters (FTF, BSF, BPFO, BPFI) which give the fault frequencies after multiplying by speed.

You can **Edit** bearing parameters or create **New** bearing by entering parameters manually.

Press **Export** to export all/selected bearings into new bearing database file for instruments VA4Pro or VA5. Save exported bdx01.va4 file into root directory of VA(45)_DISC drive. After instrument restart, the firmware overwrites the old instrument bearing database with new one.

Alarms (Alerts)

Introduction

The DDS uses a new approach. We use this term for limits of reading values. This new concept enables to define user number of alerts. The only two alerts (e.g. warning and danger) are usually enough in many applications. But if we need more, we can define them. You should understand that in this moment we define only alert types (generally they are the **words**, which will be used). The limit values for each type will be defined individually for each data cell.

Example:

In Alerts types we defined the Warning and Danger alerts types. The OK alert is default type.

For two data cells we can define exact limits:

overall velocity	5 mm/s (0.2 ips) for Warning,	9 mm/s (0.35 ips) for Danger
overall acceleration	0.5 g for Warning,	1 g for Danger

Create the alert type

Push the **Alarms** button. The **Alarm list** window appears with the list of types. The default first type is OK, which cannot be deleted. You can only change the name and color of OK.

Push the **Add** button for new type. Define the new name and select the color. You can change the severity (order) in the list.

Icons

Every tree item can have own icon. Push the **Icons** button.
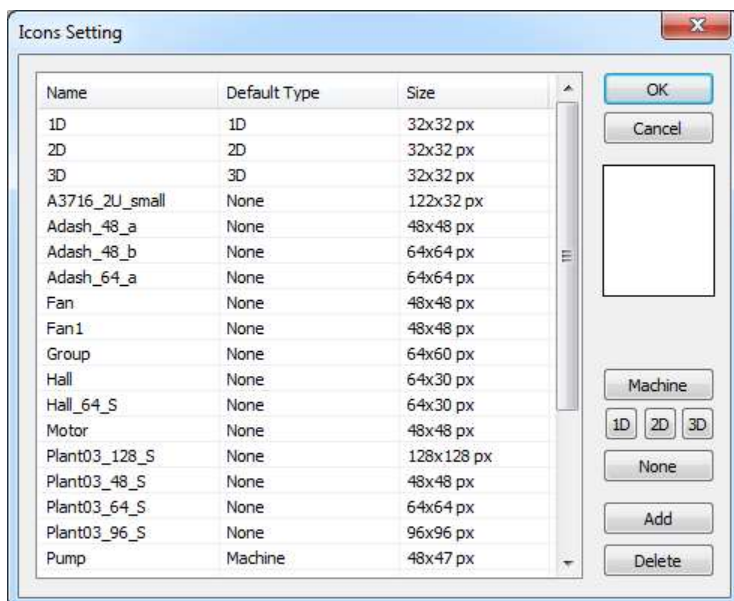
The window contains the list of available icons.

Push **Add** to add the new icon to the list. Push **Delete** to remove icon from the list.

You can also define the default icons for machine, 1D point, 2D point and 3D point. Such default icon is automatically used for each items type. Use the **Machine, 1D, 2D, 3D** buttons to define it.

Globals

In the Global window you can define many parameters, which enable to customize DDS or define defaults parameters.

General

Application

Language – default language for DDS (the change will be shown after restarting the software)

VA4Pro Virtual Unit Path –the path to the VA4Pro Virtual Unit main folder (see Route chapter, part Run for details)

VA4Pro Virtual Unit Data Folder – the path to the VA4Pro Virtual Unit data folder (see Route chapter, part Run for details)

Check Updates   **always/ never**   updates check after DDS run

Report

Page format

Reduce paths   The "yes" option means, that the tree items paths is reduced only to machine/point/data cell.

Basic (Select Columns) – yes, no   The "yes" choice means, that the offer of columns is displayed for each report.

Alarm (Select Columns) - yes, no;   The "yes" choice means, that the offer of columns is displayed for each report.

Other

Precision of Numbers   number of valid digits (if it is 3, then 1024.16 is displayed as 1024, 64.28 as 64.3, 8.51 as 8.51, 0.041 as 0.041).

Display Small Numbers   **yes**   small numbers are displayed in exponential format.
                                  no   small numbers are displayed as 0.

Alarm Evaluation from – Last Confirmation Time or Last Reading Only

Auto Switch Ribbon Panel – if yes, tabs are active according to the selected items (graph, tree)

Maximum Count of Preview Graphs – maximum number of graphs opened in Preview

Allow MS SQL – yes, no   enables to use Microsoft SQL Server

Defragmentation

              yes   the defragmentation (size decrease) is made always when database is closed (no question)
              no   no defragmentation is made
              ask   question before defragmentation

Power Line Frequency – the frequency of power line

Open Help in   **DDS**   the help file is opened in DDS

                          Web browser   the help file is opened in web browser

Display Preview on   the preview is linked to Measurement Point or Data Cell

Preview/Summary on Startup – specifies opening of Preview/Summary page on startup DDS

Generate Summary – summary create tabs by data cell type or name

Disp. Tooltips in the Main Menu – if move mouse cursor on any main menu button and wait

a secound, will appear tooltip with name of button. This is useful for small displays, on which they are main menu buttons without caption.

Crash Report – Enables reporting about DDS application crash. After DDS crash application will ask if it may send necessary data for analysis to Adash.

All Graphs

Cursor

Align Time - it keeps same (similar) time of reading in all displayed graph (see the chapter Graph menu item/Align)

Lock –synchronizes the position of the cursors in all graphs
Harmonic Lines – number of harmonic cursors
Sideband Lines – number of sideband cursors
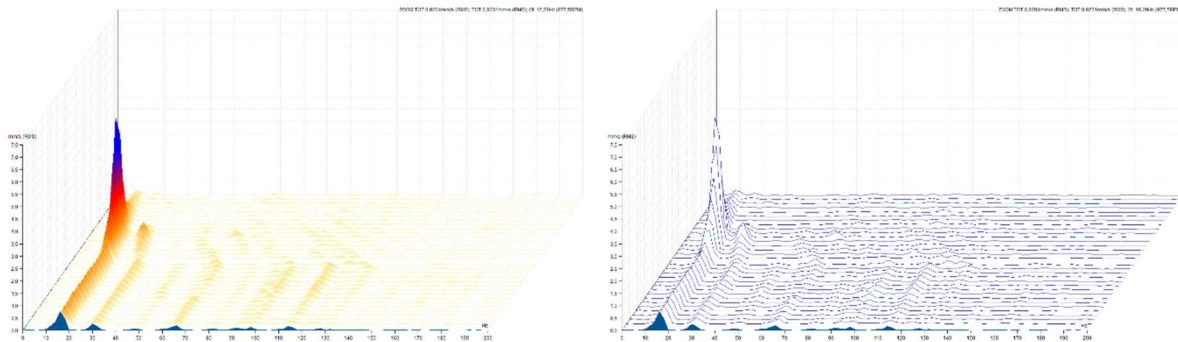**Periodic Lines** – number of periodic cursors

Waterfall

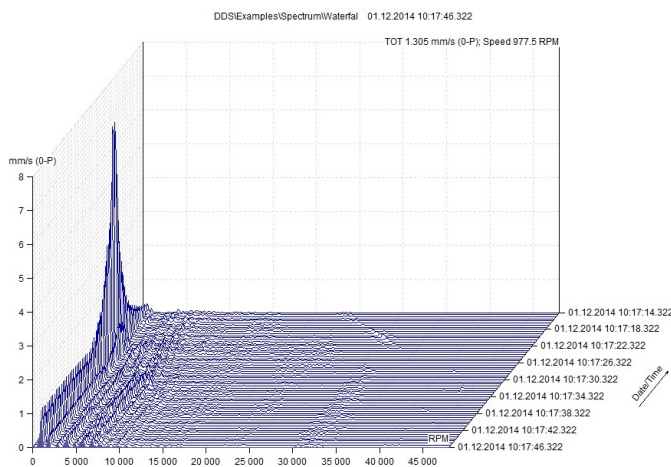**Angle[°]** – angle of waterfall z axe

Graph Height[%] – the height of waterfall graph, defined as percentage of total height

Maximum Number of Readings – maximum possible number of graphs in waterfall

Draw Style - outline or gradient

Always Display Z Info - time labels in cascade on Z axis will be always displayed on the right side of the graph (according to reading sorting type).

Other

Phase Type – Y axe range, < -180°, 180° >, < 0°, 360° >, < Auto >. The < Auto > is special format, when the drifts +/-180 or 0/360 do not occur in graph.

Display Readings from Last – data cell is showing the day/week/month/year before the last measured data (including the last measured data). If you enter the number directly, data cells shows the last N measured data. If you enter number and character "h" (e.g. 12h), data cells shows the last N hours measured data.

Graph Count in Stacked – maximum number of graphs displayed in tiles
Number of columns in Stacked – 1 is default value

Legend Position

Display User Labels – the initial status, you can display/hide them always from menu

Grid – the type of grid in graphs

Display Reference – disables/enables display of reference values in graphs. Reference values are defined in data cell properties, in Reference tab.

Fixed Scale

Enable Fixed Scale – yes, no

In next lines you specify initial default range for every unit.

Static Graphs

View Type

1x Amplitude + Phase – the default graph type of *1x Amplitude + Phase* data cell
FASIT – the default graph type of FASIT data cell
Centerline – the default graph type of Centerline data cell

Other

Display Limits – initial display type of limits (Off, Lines, Bars)
Display X Axe Unit – switches off/on the x-axis legend for static graphs
Hide Meas. Circles – yes, no   each measured value in trend is signed by circle, when huge number of values exist, then circles are not displayed

X Range – format type of Date-time range for static graphs

Dynamic Graphs

View Type

Time – Amplitude, Amplitude Stacked

Spectrum – Amplitude, Amplitude + Phase, Amplitude + Trend, Amplitude Stacked, Waterfall, Spectrograph

ACMT – Amplitude, Amplitude Stacked, Amplitude + Spectrum

Order - Amplitude, Amplitude + Phase, Amplitude + Trend, Amplitude + Phase Trend, Amplitude Stacked, Waterfall

Orbit – Time A, Time B, Orbit, Orbit A B

Other

Spec. Y Axe Type – it switches between linear/logarithmic/decibel axes in spectrum graph
Spec. X Axe Type – it switches between linear/logarithmic axes in spectrum
Sort By – readings are ordered according to time/speed/order
Order Type – Ascending, Descending
Acc. Detect Type – RMS, 0-P, P-P
Vel. Detect Type – RMS, 0-P, P-P
Disp. Detect Type - RMS, 0-P, P-P
Band View Type – displaying of bands in spectrum graphs
                              off   bands are not displayed

simple	bands displayed as bar, the height is related to value
with limit values	all limits value are displayed in bar

Display Generate Labels – group of generated labels is displayed (the group which is active, see chapter Labels in Graph for more information)

Top Peaks Count – number of peaks in table

Display Top Peaks Labels – if the function is on Yes, then the label with value is displayed under the local maximum

Range [dB] – initial range for logarithmic y-axe

Display Tacho Marks – yes, no   Switches on/off tacho marks in time waveforms and orbits.

Unit

You can set up the system of units and default units for selected physical values.

Skin

Setting of display of the graph

Route

Data Cells

Transfer to Route - initial value of *Transfer to Route* function
Interval Type + Interval – required time interval for route readings

Route Parameters

Show parameters dialog – the dialog with question what should be transferred to the analyzer

Send Data Cells – transfers the data cells with expired interval/all to the route

Include Alarmed - the points with reading in alarm (not OK) are always load to the instrument, regardless of time interval

Send Reference – type of reference value, which is sent to analyzer

Reference Version – enables sending reference values in much faster way into supported devices(VA3 FW 1.30+, VA4 & VA5 FW 2.80+)

Display Route Report – show detailed information about sending/receiving route

Online

This parameters are described in **A3000 series manual**.

Email

General

Send email if limits exceed – Yes/No
Send email when data collection started – Yes/No
Sender – sender email address
Sender Name
Recipient – recipient of email notification (separate multiple addresses with a semicolon)
Subject – subject of email notification

> **Min. Time Betwean Emails [min]** - interval reducing repetitive alerts from one machine (minutes)

SMTP Server

> **Address** – address of SMTP server (e.g. smtps://smtp.gmail.com:465)
> **User** – user name (my.mail@gmail.com)
> **Password** –password of email account

Test

> **Email** - if you click it will send a test email

Shortcuts

You can define the shortcut for any command. Push the **Shortcuts** button. Select the Menu Item and command. Enter new key and press **Assign**. During this procedure you are informed whether your new key is already used or not. If it is used, then there is also command for which it is used displayed.

You can define more keys for one command.
You can remove any already assigned key using the delete button.

Default shortcuts

S	Single cursor
D	Delta RMS cursor
H	Harmonic cursor
B	Sideband cursor
N	cursor OFF
Ctrl+P	Locate Peak
Ctrl+E	tree item properties
Space	switches the focus between tree and graphs
Tab	select next item
Shift+Tab	select previous item
Ctrl+F	Filter (tree menu item)

Tools section

Section is contained in Tools tab.

Defragmentation

Use this function to compress the size of the tree file (database file). This function is available only for Route tree (SQlite database) not for online trees.

Synchronization

The example situation is good for understanding. The company makes measurements on many locations. The people are traveling to that places with notebooks and data collectors. The main tree database in saved in the office server in headquarter location. When people go to the field trip, they copy that tree to their notebooks. They make readings and after several days they return back to the office. In every notebook they have new measurements. It means that in each notebook is different database. All new readings have to be saved to the office server. It is clear, that standard copy function does not enable that.

The synchronization function can do it. In the notebook is the SOURCE tree. The office server tree is the DESTINATION tree. When you run it, then all new readings will be copied to the office tree.

Select source tree and destination tree. Press **Compare** and the list of new readings in source tree appears. Exactly that is the list with all readings, which are not in destination tree. They can be older. Now you can uncheck some data cells which you do not want copied to destination tree. Press **Synchronize** and all checked readings from the list will be copied.

If you push **Synchronize** firstly (not the **Compare**) then all data cells will be synchronized and the list appears after it.

Data Cell	Readings
Hall B\Fan FB21\B1\ISO RMS	3
Hall B\Fan FB21\B1\ISO SPEC	3
Hall B\Fan FB21\B1\ISO TIME	3
Hall B\Fan FB21\B1\LBEARING 0-P	3
Hall B\Fan FB21\B1\LBEARING RMS	3
Hall B\Fan FB21\B1\LBEARING TIME	3
Hall B\Fan FB21\B2\ISO RMS	1
Hall B\Fan FB21\B2\ISO SPEC	1
Hall B\Fan FB21\B2\ISO TIME	1
Hall B\Fan FB21\B2\LBEARING 0-P	1
Hall B\Fan FB21\B2\LBEARING RMS	1
Hall B\Fan FB21\B2\LBEARING TIME	1
Hall B\Fan FB21\B3\ISO RMS	2
Hall B\Fan FB21\B3\ISO SPEC	2
Hall B\Fan FB21\B3\ISO TIME	2

Synchronize Trees — Source Tree: AVD Hall B — Destination Tree: AVD Ostrava — Compare — Synchronize — Close

Backup and Restore

These functions are available only in full DDS version (not in the free of charge version).
Backup saves complete tree to a single file with .bkp extension.
Restore is the inverse function.

Note: Tree in SQLite database format is saved in single file and you can save that file as backup directly. The Backup and Restore function are designed primarily for SQL database formats.

Time Interval Export

This function is available only in full DDS version (not in the free DDS version).

Export creates a tree copy that includes only data from selected time interval and selected tree items(optional). Exported data can be also deleted from the original tree. This enables e.g. to create tree with the data only from particular runup or remove older data from the tree. If the tree is smaller then it speeds up the work with tree.

Reduce Data

This function is used to reduce a number of measurements in the database and therefore reduce its size. However, this is not a simple dilution of values.
For static data cells, the reduction is managed by two basic parameters: minimum time between measurements and percentage change of value. In other way: the reduction always keeps at least one measurement in the database for example 1h except for measurements where the value has changed by more than eg 10% compared to the previous measurement. Static values data reduction can be defined twice. We create so-called short-term and long-term reduction.

We can define: keep a month of data as it is, and reduce only data older than month to one value per hour, except for values where the change was 10% or more. Reduce data older than two months to one value in 6 hours except for values where the change was 20% or more.
It is very similar for dynamics, where we however do not expect significant change. Time interval of measurement with the highest total energy is kept. Again, it is possible to define short and long term reduction.

Bit Compression

 This function can reduce the database size to one-fourth of its original size. Only dynamic data cells are compressed. If you run this compression, all saved dynamic data cells in database will be compressed. Future data are not compressed and this function must be applied again.

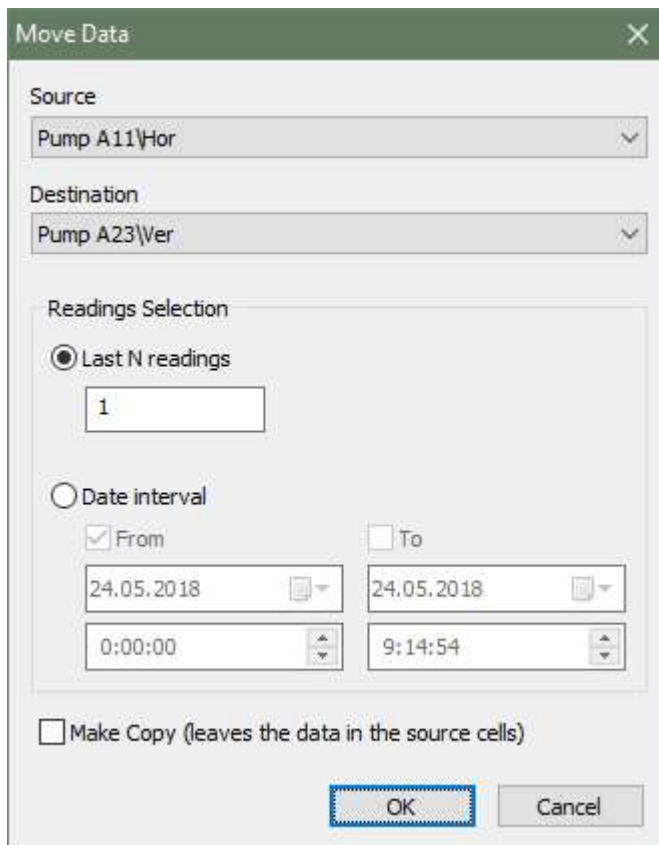Online database store all dynamic data already compressed.

Move Data

 Allows you to move data from one data cell to another. It also works for any tree item. But the tree items must have the same structure.

Example of use

If you measure route and it happens that you measured the meas. point in the wrong place. You do not have to go back and measure one point. You can move the all data from wrong point to correct point in DDS software.

1. Select wrong measured point (tree item) and point (tree item) where you want to transfer data.

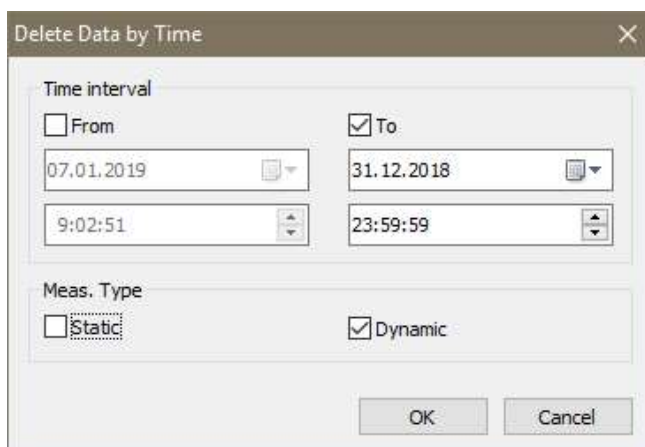2. Go to the Tool tab (main menu) and click on button Move Data (section Tools).

3. Select source tree item and specified which readings will be moved. You can choose last N readings or all reading in date interval. If you check Make Copy, readings will be only copied.

Delete Data by Time

Complete deleting of measurements in the time interval. Select tree items (e.g. machines, points, machine group, ..), right click on this item(open the local menu) and click to function named *Delete Data by Time*. Now set time interval for data deleting.

E.g. uncheck *From* (since the beginning of time), check *To* and set date to 31.12.2018 and time to 23:59:59. Uncheck *Meas. Type* Static. If you confirm this dialog, all dynamic data older than 31.12.2018 23:59:59 will be deleted.
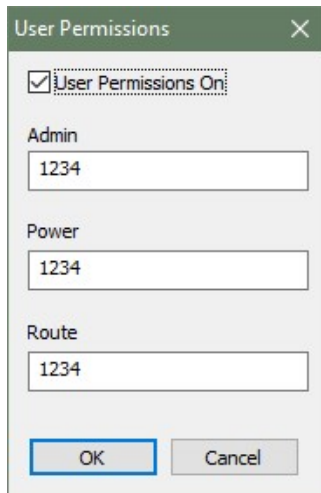
User Permission section

Section is contained in Tools tab. If many people work with DDS, then it is recommended to assign user permissions to them. Not everybody should have full access to all available functions.

Manage

Opens dialog which allows turns on and off the user permission and sett passwords for all security levels. All default passwords are 1234.

Admin	full access to all functions
Power	cannot create new database and cannot edit user permissions
Route	cannot modify tree structure, cannot switch on/off online readings
View	can only view data

Log In

If user permissions are on, you use this button to log in.

Log Out

If user permissions are on, you use this button to log out.

Help tab

Help

 Opens the help file.

About

 The version details of DDS.

Licence

 Contains license information. It enables import of license if you buy full version.

Update

 Checks for the new DDS update. It will offer its download and installation, if the new version is available.